



# FactoryTalk Logix Echo Getting Results Guide



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# 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.

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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.

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**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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These 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.

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**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.

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**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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The following icon may appear in the text of this document.



**Tip:** Identifies information that is useful and can help to make a process easier to do or easier to understand.

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Rockwell Automation recognizes that some of the terms that are currently used in our industry and in this publication are not in alignment with the movement toward inclusive language in technology. We are proactively collaborating with industry peers to find alternatives to such terms and making changes to our products and content. Please excuse the use of such terms in our content while we implement these changes.

# Additional resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
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,	Provides declarations of conformity, certificates, and other certification details.

View or download publications at <https://www.rockwellautomation.com/en-us/support/documentation/literature-library.html>. To order paper copies of technical documentation, contact a local Rockwell Automation distributor or sales representative.

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## Open Source Software Licenses

The software included in this product contains copyrighted software that is licensed under one or more open source licenses.

You can view a full list of all open source software used in this product and their corresponding licenses by opening the index.html file located your product's OPENSOURCE folder on your hard drive.

The default location of this file is:

C:\Program Files (x86)\Rockwell Software\FactoryTalk Logix Echo\ReleaseNotes\OPENSOURCE\index.htm

You may obtain Corresponding Source code for open source packages included in this product from their respective project web site(s). Alternatively, you may obtain complete Corresponding Source code by contacting Rockwell Automation via the **Contact** form on the Rockwell Automation website: <http://www.rockwellautomation.com/global/about-us/contact/contact.page>. Please include "Open Source" as part of the request text.

# Overview

## FactoryTalk Logix Echo


FactoryTalk® Logix Echo™ is a software application that emulates the behavior of ControlLogix® 5580, GuardLogix® 5580, CompactLogix™ 5380, and Compact GuardLogix® 5380 controllers. Use FactoryTalk Logix Echo to test, debug and optimize application code without physical hardware. Additionally, connect to HMI and other simulation software to create a comprehensive digital twin of your process or machine.

## Emulated controllers

Use FactoryTalk Logix Echo to emulate controllers using these versions of Logix Designer:

Controller	Logix Designer software version
ControlLogix 5580, including process controllers and all PlantPAx® built-in instructions	33 and later
GuardLogix 5580	35 and later
CompactLogix 5380	36 and later
Compact GuardLogix 5380	36 and later

You can continue to use Studio 5000 Logix Emulate software to emulate the ControlLogix 5570 family of controllers.

The Studio 5000 Logix Designer project file can be downloaded directly to the emulated controller over the emulated controller Ethernet port when a compatible version of the Logix Designer application is installed on the same PC. In the Logix Designer application, the dialog box title bars display  **[Emulator]** when connected to an emulated controller.

ControlLogix, GuardLogix, CompactLogix, and Compact GuardLogix emulated controllers are compatible with project files belonging to the same family of controllers. For example, you can download a 1756-L85E project file to a 5580 emulated controller. To use the 5580 emulated controller, create projects in the Logix Designer application for ControlLogix 5580 controllers.

**IMPORTANT:**

Do not use FactoryTalk Logix Echo to control physical machines, devices, or processes! The application blocks outgoing CIP Class 3 communication and Class 0/1 communications through the Ethernet port to help prevent control of physical devices.

When using ControlLogix, GuardLogix, CompactLogix, and Compact GuardLogix emulated controllers:

- You do not need to use the **Change Controller** option to change the project type to debug or download to the emulator software. The Logix Designer project file, version 33.00 or later, does not require modifications to run on 5580 or 5380 emulated controllers when using FactoryTalk Logix Echo. Controller Organizer configuration including the I/O Configuration is retained when emulating the controller.



- Motion Instructions used with Virtual axes are supported on emulated controllers with Logix Designer versions 33.00 and later.
- Motion Instructions used with CIP Axes in Test Mode are supported on emulated controllers with Logix Designer versions 35.00 and later and FactoryTalk Logix Echo version 2.01 and later. You can use the functions just as you would on a physical controller.

## Differences between emulated and physical controllers

Some functionality of emulated controllers differs from the functionality of physical controllers.

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**IMPORTANT:** Do not depend on the emulated controller to match the performance or operation of the physical controller. Execution times for instructions and programs might be different in an emulated controller compared to a physical controller.

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This table describes the main functional differences between emulated controllers and physical controllers.

Functionality	Emulated controller behavior
Control of physical I/O	Emulated controllers cannot control physical inputs and outputs and cannot establish a connection to a physical device.
License-based source protected content	5580 and 5380 emulated controllers do not support License-Based Source Protected content. Remove License-Based Source Protection from the project contents to emulate the controller.
SD card encryption	Project content loaded to the virtual SD card is not encrypted or digitally signed.
Safety signatures	<p>You do not need to modify or remove the safety signature for an existing GuardLogix or Compact GuardLogix project before downloading it to an emulated GuardLogix or Compact GuardLogix controller.</p> <p>You can use FactoryTalk Logix Echo to generate an imitated safety signature and download a project to an emulated GuardLogix or Compact GuardLogix controller. The imitated safety signature is used only for the emulation and cannot be used on a physical GuardLogix or Compact GuardLogix controller. However, you can include imitated safety signatures in Granular Safety Signature reports that you generate in the Logix Designer application.</p> <p>In Logix Designer version 36 and later, the safety signature is a hierarchy of multiple safety signature elements. For example, the safety task, programs, and routines are examples of safety signature elements. Use imitated safety element signatures during impact analysis to help identify the individual changes within a controller project. It might reduce your certification effort if your validation plan does not require re-validation of unchanged elements. To view all safety signature elements for</p>

Functionality	Emulated controller behavior
	a project, run the Safety Signature report in the Logix Designer application.
Emulated Safety Partner controllers	You can compile and download SIL2/PLd and SIL3/Plc configured Studio 5000 Logix Designer projects to an emulated controller. However, when you select <b>Partner available</b> for a GuardLogix controller, FactoryTalk Logix Echo emulates only the presence of the Safety Partner. The Safety Partner is not operational.
Safety I/O Module-related tags	When inhibited or faulted, the safety I/O module tag data is not put in the Safe State, so the safety I/O-related tags can be overwritten. You can use either the Logix Designer tag editor or the FactoryTalk Logix Echo SDK to edit the values of safety I/O module-related tags to simulate inputs and outputs.
Cross checks	Emulated controllers do not support Cross Checks.
Cross load	Emulated controllers do not support Cross Loading.
Motion support	<p>FactoryTalk Logix Echo supports produce-and-consume communication for virtual axes between emulated controllers. Emulated controllers communicate either through Ethernet ports or the emulated backplane.</p> <p>FactoryTalk Logix Echo also supports Axis Test Mode simulation for both Motion and Motion and Safety applications. You can simulate execution of motion instructions in the standard task, Drive Safety instructions in the Safety Task, and applicable Axis Status on ControlLogix and GuardLogix 5580 controllers.</p> <p>For more information regarding Axis Test Mode and how it can help verify application logic on FactoryTalk Logix Echo, refer to <i>Integrated Motion on the EtherNet/IP Network: Configuration and Startup User Manual</i> (MOTION-UM003N-EN-P) on the <a href="#">Rockwell Automation Lit Library</a>.</p>
Automatic Diagnostics	Emulated controllers gather only controller instance diagnostics and detect connection loss. Diagnostics for modules and external devices are not supported.
Email	Email functionality is not supported.
Ethernet port	The Ethernet port is always enabled.
USB port	Controller USB ports are not emulated.
Serial number matching	ControlLogix and GuardLogix 5580 controllers and Compact Logix and Compact GuardLogix 5380 controllers ignore serial number matching.
Module discovery	Module discovery is not supported.
Tag connections between controllers	When emulating a project, most I/O modules in the <b>I/O Configuration</b> tree are faulted. Only produce/consume tag connections between emulated controllers work as expected.

Functionality	Emulated controller behavior
Time scaling	Time scaling, the acceleration or deceleration of virtual time, is supported. Use the <a href="#">API on page 26</a> to implement time scaling.
Trends	The application uses virtual time for the time stamps on trends in the emulated controller. Virtual time does not always match actual time.
SNMP	Simple Network Management Protocol (SNMP) is not supported.
Redundancy	The emulated controller operates only as a primary controller. The high availability (HA) status reports success, but the synchronization with a second controller and support of sync modules is not available. The emulated scan time will not reflect the actual performance of redundancy in physical controllers.
Controller webpages	Controller webpages are not supported.
Fault dumps	Fault dumps are always stored in the virtual SD card directory, even if the virtual SD card is detached from the emulated controller. Fault dump files use the Microsoft minidump format. <b>Important:</b> The contents of crash log data files are not protected and might reveal project information.
HMIBC instructions	HMI Button Control (HMIBC) instructions are not supported.
GSV and SSV instructions	FactoryTalk Logix Echo supports Get System Value (GSV) and Set System Value (SSV) instructions for emulated controller instances only. When GSV and SSV instructions target external objects, the instructions return the result for an unconnected device.
OPC Unified Architecture (OPC UA)	Emulated controllers do not support OPC UA. OPC UA is supported on physical controllers in Logix Designer versions 36.00 and later.

## Navigate FactoryTalk Logix Echo

Use the FactoryTalk Logix Echo panes to view and configure emulated controllers.

- The **Devices** pane provides controls to create multiple ControlLogix and GuardLogix emulated controllers, and multiple chassis for them. You can also create multiple CompactLogix and Compact GuardLogix emulated controllers, which are chassis-less. The Devices pane lists all the emulated devices in your system.
- The **Controller** pane displays settings for the selected controller.
- The **Device Status** pane displays the status for each emulated controller and provides controls to modify the keyswitch position and turn the controller instance on or off.


## Controller pane settings

Use the **Controller** pane to view controller attributes and edit controller settings. This table describes the attributes and settings on the **Controller** pane.

Setting	Description
Vendor	The manufacturer of the emulated controller. For most controllers, the vendor is Rockwell Automation/Allen Bradley. This setting is applied when the controller is added and cannot be changed.
Type	The emulated controller type, such as a ControlLogix 5580. This setting is applied when the controller is added and cannot be changed.
Revision	The firmware revision for the emulated controller. This setting is applied when the controller is added and cannot be changed.
Name	The emulated controller name. Contains up to 40 characters and must begin with a letter or an underscore.
Description	A brief description of the emulated controller.
IP Address	The IP address assigned to the emulated controller.
Dual IP	For CompactLogix and Compact GuardLogix 5380 controllers, select <b>Dual IP</b> to configure both of the emulated controller Ethernet ports on separate networks, each with its own IP address.
Linear/DLR	For CompactLogix and Compact GuardLogix 5380 controllers, select <b>Linear/DLR</b> to configure both of the emulated controller Ethernet ports to reside on the same Ethernet network as a single, logical node.  <b>NOTE:</b> Device Level Ring (DLR), a Layer 2 protocol that provides media redundancy in a ring topology, is not supported.
ACD Path	The project path for the emulated controller's .acd files. An ACD path might look like this: C:\Users\username\Documents\Studio5000\Projects\Emulated
Chassis	The name of the chassis that contains the emulated controller.
Slot	The slot number for the emulated controller. Not displayed for controllers that are not chassis-based.
Switch controller on or off	Turns the emulated controller on or off. When a controller is On, the emulated controller executable is launched and is running. When a controller is in the Off state, the controller configuration is saved but the emulated controller executable is not launched. <b>Tip:</b> To restart an emulated controller, turn off the controller and then turn it on.
SD Card	Indicates whether an SD card is attached to the emulated controller.
Partner available	Adds a Safety Partner controller for a GuardLogix 5580 controller and enables emulation of a SIL3/PLc controller. The

Setting	Description
	partner controller occupies the next available slot in the chassis and appears in the <b>Devices</b> explorer with <i>Partner</i> at the end of the name. Partner controllers are not editable, and you cannot download projects to them.  When this check box is cleared, the controller operates as a SIL2/PLd controller.
SIL3/PLe	For Compact GuardLogix 5380 controllers, select <b>SIL3/PLe</b> to set the safety level of the controller to SIL3/PLe.

## Device Status pane settings

Select **Device Status**  to display the **Device Status** pane.

This table describes the status settings.



**Tip:** To turn off all the controllers, right-click the Device Status pane header or select the collapsed menu  and select **Turn off all controllers**.

Setting	Description
Controller name and on-off switch	Use the on-off switch beside the controller name to enable or disable the controller.
Mode	Select <b>Run</b> , <b>Remote</b> , or <b>Program</b> for the controller mode.
Status	The Run and OK status lights are green when the controller is in Run mode and is not in a faulted state. The OK light is red when there is a controller fault.
Fault messages	When a controller fault occurs, an error message appears under the Status lights.

## Security considerations

Keep these security considerations in mind when using FactoryTalk Logix Echo.

**IMPORTANT:** FactoryTalk Logix Echo supports a subset of the security features that are available in physical controllers to help protect intellectual property in controller projects. Rockwell Automation recommends you review account access to limit the risk of exposing sensitive information in your projects.

Functionality	Emulated controller behavior
License-based source protected content	The 5580 and 5380 emulated controllers do not support License-Based Source Protected content. Remove License-Based Source Protection from the project contents to emulate controllers.

Functionality	Emulated controller behavior
License Validation (LV) instruction	The License Validation (LV) instruction is not fully functional. On an emulated controller you can load a project that contains an LV instruction, but the instruction does not validate the provided license number. On the emulated controller, the instruction always returns a true result for both valid and invalid licenses.
Snapshots and crash log data	The contents of snapshots and crash log data files are not protected and might reveal project information.
SD card encryption	Project content loaded to the virtual SD card is not encrypted or digitally signed.

## Use an emulated controller

### Avoid FactoryTalk Linx port conflict


Both FactoryTalk Logix Echo and the **Listen on Ethernet/IP encapsulation ports** setting, enabled by default in FactoryTalk® Linx™, use port 44818. To prevent a port conflict with FactoryTalk Linx, you must turn off the **Listen on Ethernet/IP encapsulation ports** setting in FactoryTalk Linx.

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**IMPORTANT:** When you turn off the **Listen on Ethernet/IP encapsulation ports** setting in FactoryTalk Linx, other applications that rely on FactoryTalk Linx might not work as expected.

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To enable or disable the **Listen on Ethernet/IP encapsulation ports** setting in FactoryTalk Linx, follow these steps:

1. On the Windows **Start** menu, select **Rockwell Software > FactoryTalk Linx Browser**.
2. On the FactoryTalk Linx main menu, select **Configure Drivers** .
3. On the **Configure Drivers** dialog box, select the emulate driver from the **Configured Drivers** list.
4. Select **Edit**.
5. On the **Advanced** tab, select **Listen on Ethernet/IP encapsulation ports** to enable the setting. Clear the check box to disable the setting.

### Add an emulated controller

Add a controller to create an emulated controller in FactoryTalk Logix Echo. Configure the settings for an emulated controller when adding it. Modify the controller settings at any time.

You can add a controller by entering controller settings, or you can select an existing .acd file to automatically populate the controller settings.

#### To add a controller:

1. In **Devices**, right-click anywhere in the pane, or select .



**Tip:** To add a ControlLogix or GuardLogix 5580 controller to a specific chassis, right-click that chassis. CompactLogix and Compact GuardLogix 5380 controllers do not appear in the specific chassis menu because they are not assigned to a chassis.

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2. Select **Add Controller**.  
To add a controller from an .acd file, select **Add controller from ACD**. When you add a controller from an .acd file, the controller properties are read-only.
3. In **Add Controller**, configure these controller settings. The settings are populated if you added the controller by using an .acd file.
  - **Type.** Select a controller type:
    - Compact GuardLogix 5380
    - CompactLogix 5380
    - ControlLogix 5580
    - GuardLogix 5580

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**NOTE:** CompactLogix and Compact GuardLogix 5380 controllers are not assigned to a chassis, so they do not appear in the menu when you right-click a specific chassis to add the controller.

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- **Name.** Type a name for the emulated controller using up to 40 valid characters.
  - (optional) **Description.** Type up to 10,240 characters to describe the emulated controller. For example, describe which line in your manufacturing system the device emulates.
  - **Switch controller on or off.** To add a controller without turning it on, select **Off**. The default setting is **On** for a new controller.
  - **Chassis Name.** For ControlLogix and GuardLogix 5580 controllers, the emulated chassis that hosts the controller. Select **New** and type a chassis name to add a new chassis, or select **Existing** to select an existing chassis.
  - **Revision.** Select the major, minor, and sub-minor revision of the controller. If the required firmware revision is not listed, run the FactoryTalk Logix Echo Common Installer again and select the firmware for installation. If necessary, go to the Rockwell Automation [Product Compatibility and Download Center \(PCDC\)](#) to download additional firmware.
  - **IP Address.** Select the [IP address on page 19](#) for the controller.  
You can configure a controller with no IP address, but one emulated controller on each chassis should have an IP address. If none of the controllers has an IP address, the controllers on that chassis can be online but cannot receive project downloads and cannot carry out Logix Designer operations.
  - **Subnet Mask.** The subnet mask is populated by default, but you can edit it if necessary.
  - **Dual IP.** For CompactLogix and Compact GuardLogix 5380 controllers, select **Dual IP** to configure both Ethernet ports on separate networks, each with its own IP address.
  - **Linear/DLR.** For CompactLogix and Compact GuardLogix 5380 controllers, select **Linear/DLR** to configure both Ethernet ports to reside on the same Ethernet network as a single, logical node.
  - **Slot.** For ControlLogix and GuardLogix 5580 controllers, select the chassis slot in which the controller resides. Each controller in FactoryTalk Logix Echo must have a unique slot number on each chassis.
  - **SIL3/PL.** For Compact GuardLogix 5380 and GuardLogix 5580 controllers, select SIL3/PL to set the safety level of the controller to SIL3/PL. When not selected, the safety level is set to SIL2/PLd.
  - **Partner available.** For a GuardLogix 5580 controller, select this check box to include a partner controller. When you select this box, FactoryTalk Logix Echo automatically adds a safety partner for the controller.  
The partner controller occupies the next available slot in the chassis and appears in the **Devices** explorer with *Partner* at the end of the name. Partner controllers are not editable, and you cannot download projects to them.
4. Select **Add**.  
The emulated controller appears in the **Devices** pane. For ControlLogix and GuardLogix 5580 controllers, the slot number for each controller appears in brackets at the beginning of each controller name.

## Delete a controller

Follow these steps to delete an emulated controller.



## To delete a controller

1. Complete one of these actions to delete a controller:
  - From the **Devices** explorer, right-click the controller and select **Delete**.
  - From the **Devices** explorer, double-click the controller. In the **General** view for the controller, select **Delete**.
2. When prompted, select **Yes** to delete the controller permanently.

## Modify a controller

Modify an emulated controller in the **Controller** pane. Modifications made to the **Controller Instance** or **SD Card** properties take immediate effect.



**Tip:** You can configure the revision number for the emulated controller only when you add a controller.

## To modify a controller

1. In the **Devices** pane, double-click the controller.  
The controller settings appear in the **Controller** pane.
2. Modify these properties:
  - **Name.** The name can contain up to 40 characters.
  - **ACD Path.** Defines the location of the .acd project file. Select **Browse** to add or modify the project file associated with the emulated controller.
  - **Description.** An optional description of the emulated controller. The description can contain up to 10,240 characters.
  - **Switch controller on or off.** To turn a controller on or off, select **On** or **Off**. When the emulated controller is **On**, FactoryTalk Logix Echo emulates running the controller code. When the emulated controller is **Off**, the controller configuration is saved, and FactoryTalk Logix Echo does not emulate running the controller code. Modifications to this property take immediate effect.
  - **Chassis Name.** The emulated chassis that hosts the controller.
  - **IP Address.** The [IP address on page 19](#) used to communicate with the emulated controller. Select an address from the list of available IP addresses.



**Tip:** Use the **General Properties** pane of the emulated controller to change the IP address to any of the supported loopback addresses (127.x.x.x).



- **Subnet Mask.** The subnet mask is populated by default, but you can edit it if necessary.
- **Dual IP.** For CompactLogix and Compact GuardLogix 5380 controllers, select **Dual IP** to configure both Ethernet ports on separate networks, each with its own IP address.
- **Linear/DLR.** For CompactLogix and Compact GuardLogix 5380 controllers, select **Linear/DLR** to configure both Ethernet ports to reside on the same Ethernet network as a single, logical node.
- **Slot.** For ControlLogix and GuardLogix 5580 controllers, the chassis slot in which the controller resides. Each controller in FactoryTalk Logix Echo must have a unique slot number.
- **SD Card.** Indicates whether a virtual SD card is attached to the emulated controller.

- **Partner available.** Includes a partner controller for a GuardLogix 5580 controller. When you select this box, FactoryTalk Logix Echo automatically adds a safety partner for the controller. Partner controllers are not editable and you cannot download projects to them.
  - **SIL3/PLe.** For Compact GuardLogix 5380 controllers, select SIL3/PLe to set the safety level of the controller to SIL3/PLe. When not selected, the safety level is set to SIL2/PLd.
3. Select **Apply** to save the modifications to the controller.

## Turn off all controllers at once

Set all emulated controller instances to off with one command.

To turn off all controllers at once:

1. Select **Device Status**  to display the **Device Status** pane.
2. Right-click the Device Status pane header or select  and then select **Turn off all controllers**.

## Download .acd files

Use the **Download** pane to download an .acd project file to an emulated controller or to multiple emulated controllers.

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**NOTE:** To download an .acd file to an emulated controller, the Logix Designer application must be installed on the same computer as FactoryTalk Logix Echo.

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### To download .acd files to emulated controllers

1. In the **Tools** menu, select **Download**.
2. In the **Download** pane, select the controllers to receive the .acd file. The number of selected controllers appears at the top of the pane.



**Tip:** Select any column heading to sort the controller list by column. On the **Controller** or **Chassis** heading, select  to search and filter the list.

3. If the **Path** column is empty, enter the path to the .acd file, or select **Browse** to browse to the file location.
4. Select **Download**. The **Download** column indicates progress and whether the download succeeded or failed.



**Tip:** You can start additional downloads before a current download is complete.

5. To cancel downloading, select **x** in the download progress bar. Closing the **Download** pane does not cancel downloading.
6. Check the **Console** pane for detailed information about the download. Information appears for each controller selected for the download.

## IP Addresses

You assign an IP address to an emulated controller when you add it in a chassis. The **IP address** menu lists available addresses from these sources:

- The loopback address, reserved in Windows for testing. By default, FactoryTalk Logix Echo allows you to assign 127.0.0.1 from the IP address menu. Use the **General Properties** pane of the controller to change the IP address to any of the supported loopback addresses (127.x.x.x).

The main limitation of the loopback address is that the Logix Designer application does not allow communication to loopback IP addresses. For example, other controllers cannot share produce-and-consume data with an emulated controller that uses a loopback address.

- IP addresses configured in Windows. If you have administrator privileges on your workstation, you can add IP addresses to your workstation's Ethernet card using the **Advanced TCP/IP** dialog box in Windows. The Logix Designer application allows communication to these addresses across a network, allowing program downloads from other workstations and produce-and-consume data sharing with other controllers.

Keep these considerations in mind when assigning IP addresses for emulated controllers:

- You can configure an emulated controller with no IP address. Workstations can download programs to the controller across the emulated backplane through another controller with a valid IP address.

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**NOTE:** One emulated controller on each chassis must have an IP address. If none of the controllers has an IP address, the controllers on that chassis can be online but cannot receive project downloads and cannot carry out Logix Designer operations.

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- You can assign the same IP address to more than one emulated controller. Use duplicate IP addresses on multiple emulated controllers to test a project on a variety of controllers and configurations without re-configuring an IP address for each test. The emulated controller that you start first can communicate over IP; other emulated controllers with the same IP address cannot communicate.
- The Ethernet port on an emulated controller is always enabled, even if it has been disabled in the Logix Designer application.
- Emulated controllers do not support the Quality of Service (QoS) protocol.

## Add and manage multiple chassis


Add chassis to the FactoryTalk Logix Echo configuration to emulate a multi-chassis system for ControlLogix or GuardLogix 5580 controllers.

One chassis, named **Chassis**, is included in the configuration by default. Each chassis that you add must have a unique name. There is no set limit to the number of chassis you can add.

## Add a chassis

Follow these steps to add additional chassis.

### To add a chassis:

1. In **Devices**, right-click anywhere in the pane, or select .
2. Select **Add chassis**.

3. In **Add Chassis**, enter a name for the chassis by using up to 40 valid characters. The name must be different from the names of existing chassis.
4. (Optional) Enter a chassis description by using up to 10,240 characters.
5. Select **Add**. The new chassis appears in **Devices**.

## Delete a chassis

Follow these steps to delete a chassis.

### To delete a chassis

- In **Devices**, right-click the chassis and select **Delete**.  
If controllers are associated with the chassis, a dialog box states that the associated controllers will be deleted with the chassis.

## Modify a chassis

Edit the name and description of a chassis.

### To modify a chassis

1. In **Devices**, right-click the chassis.  
The chassis properties appear in **Edit Chassis**.
2. Modify these properties:
  - **Name**. The name can contain up to 40 characters and must be unique.
  - **Description**. An optional description of the chassis. The description can contain up to 10,240 characters.
3. Select **Apply**.

## Use SD Cards

Attach a virtual Secure Digital (SD) card to an emulated controller to simulate the use of an SD card. A folder on your computer functions as the SD card repository. You can create, write, delete, or modify files in the virtual SD card directory just as you would with a physical SD card.

To view the virtual SD card contents, right-click the controller in the **Devices** pane and select **View SD card**. Browse to the simulated location of the SD card.



**Tip:** The time required to communicate with the virtual SD card might vary from the communication time required for physical SD cards.

---

Keep these considerations in mind when using a virtual SD card:

- FactoryTalk Logix Echo creates a folder for the virtual SD card on every emulated controller, even if the virtual SD card is not set to **Attached**. The folder on the workstation running FactoryTalk Logix Echo is:  
`C:\ProgramData\Rockwell Software\FactoryTalk Logix Echo\Controllers\emulated controller's globally unique identifier (GUID)\Root\sd`

- The virtual SD card reports available space based on the Windows file system on your workstation. The available space is not comparable to the space on a physical SD card.
- On physical controllers, you can store module firmware on the SD card. You cannot store module firmware on the virtual SD card.
- If a major nonrecoverable fault (MNRF) occurs on the emulated controller, FactoryTalk Logix Echo stores the fault dump in the virtual SD card folder. The fault dump is stored even if the virtual SD card is detached.

---

**IMPORTANT:**

The contents of snapshots and crash log data files are not protected and might reveal project information.

---

## Attach an SD Card to a controller

To simulate the presence of an SD card in an emulated controller, attach a card to it.

### To attach a virtual SD card to a controller

1. In the **Devices** pane, double-click a controller to display the controller settings.
2. Under **SD card**, select **Attach**.
3. To view the virtual SD card contents, right-click the controller in the **Devices** pane and select **View SD card**.  
Browse to the simulated location of the SD card.

## Manage emulated controller firmware

Firmware for emulated controllers is installed when you install FactoryTalk Logix Echo. Rockwell Automation recommends that you install all the supported firmware versions in case you need them.

In FactoryTalk Logix Echo, the **Firmware Packages** pane lists the installed firmware packages. To install additional firmware, follow one of these steps:

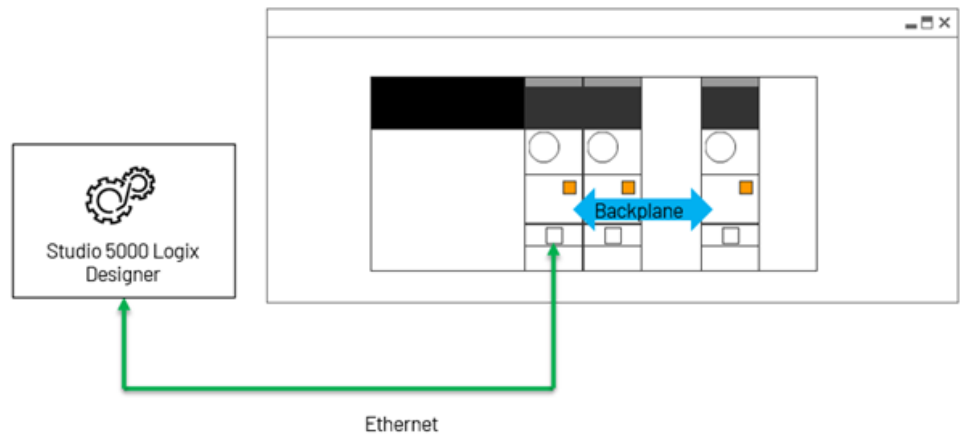
- Re-run the FactoryTalk Logix Echo installer and make sure all the firmware versions are selected, or
- Download firmware from the [Rockwell Automation Product Compatibility and Download Center \(PCDC\)](#) and install it using the Microsoft Windows installer.

## Emulated controller communication

Emulated controllers communicate over Ethernet and across the emulated backplane. You can connect with an emulated controller locally or remotely. Emulated controllers communicate with the Logix Designer application, with other emulated controllers, and with HMI and CIP-based applications.

### Communicating with the Logix Designer application

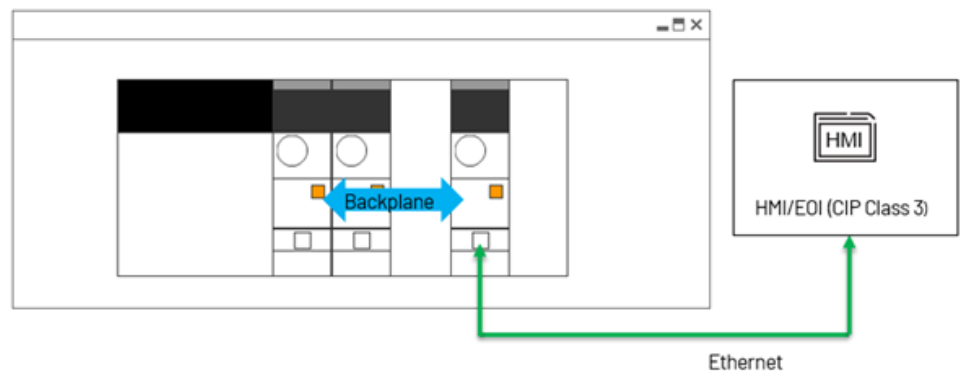
The Logix Designer application connects to emulated controllers over Ethernet. It can also bridge through one emulated controller connected over Ethernet to another emulated controller through the emulated backplane.



## Communicating with HMI and CIP-based applications

When communicating with HMI and CIP-based applications, emulated controllers use Class 3 (Messages) communication through:

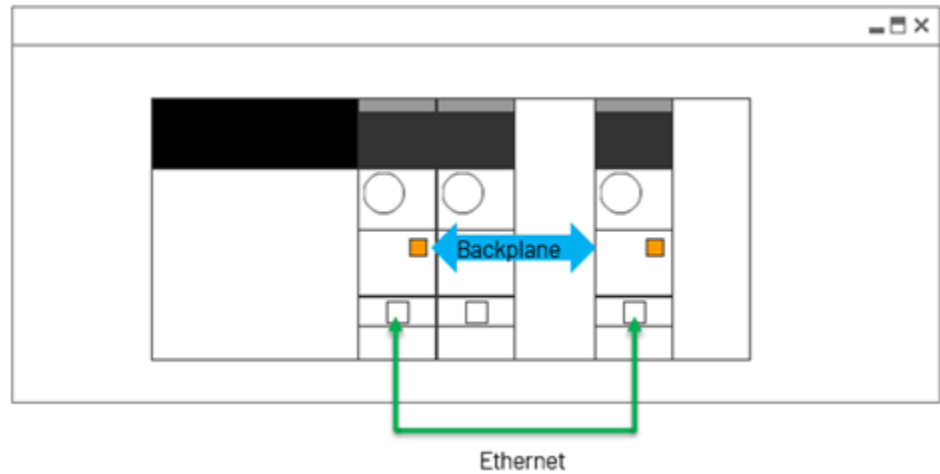
- Ethernet by using the EtherNet/IP protocol.
- A controller-to-controller bridge over the emulated backplane to EtherNet/IP.



## Emulated controllers communicating with each other

When communicating with each other, emulated controllers use Class 1 (Produce/Consume) or Class 3 (Messages) communication through:

- The emulated backplane.
- Ethernet by using the EtherNet/IP protocol.

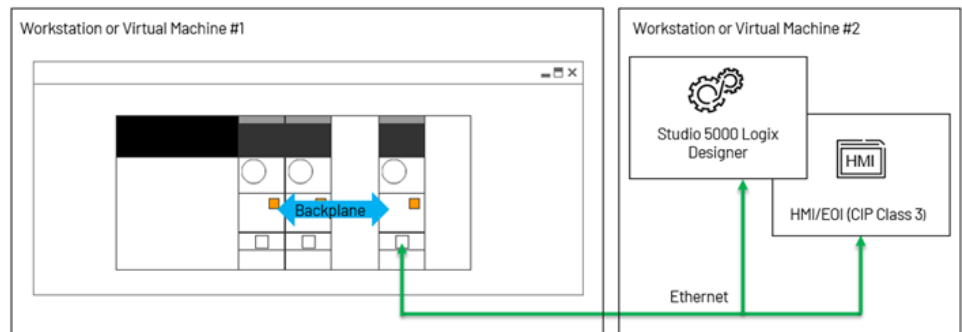


## Remote connection to emulated controllers

Remote instances of the Logix Designer application and HMI applications can communicate with emulated controllers over Ethernet.



**Tip:** When the Logix Designer application is not installed on the same workstation as FactoryTalk Logix Echo, some functionality that depends on Logix Designer services is disabled. For example, you cannot add an emulated controller by using an .acd file, and you cannot download programs through FactoryTalk Logix Echo or the FactoryTalk Logix Echo API.



## Communication considerations

Keep these considerations in mind when planning communications with emulated controllers.

### IMPORTANT:

Do not use FactoryTalk Logix Echo to control physical machines, devices, or processes! The application blocks outgoing CIP Class 3 communication and Class 0/1 communications through the Ethernet port to help prevent control of physical devices.

This table describes communication differences between emulated controllers and physical controllers.

Functionality	Emulated controller behavior
Communication to I/O devices	Cannot communicate with physical I/O devices. However, you can use the FactoryTalk Logix Echo API to simulate input and output values, and input and output values can be overwritten.
Controller messaging	Messaging is supported to local, emulated controllers only.
Ethernet port	The Ethernet port is always enabled. You can download a program to an emulated controller even if the Ethernet port is disabled on the <b>Controller Properties &gt; Port Configuration</b> tab in the Logix Designer application.
FactoryTalk Linx speed and duplex settings	You can edit the Ethernet speed and duplex settings in FactoryTalk Linx, but those settings do not affect the behavior of the emulated controller.
Socket interface	The Socket Interface is not supported.
USB port	You cannot communicate with an emulated controller using the USB port. However, you can perform a status check on the USB port to validate a program. You cannot view or browse to an emulated controller using the USB driver.
Quality of Service (QoS)	Emulated controllers do not support the QoS protocol.

## Virtual time

FactoryTalk Logix Echo relies on a virtual clock to indicate the passage of time on emulated controllers. Virtual time on an emulated controller runs in two modes:

- Free-running mode, which is a close approximation to the time on your workstation. In this mode, FactoryTalk Logix Echo compares the virtual time to the Windows time available on your computer and adjusts to match the Windows clock within a few milliseconds. When an emulated controller is on, its time elapses in free-running mode by default.
- Co-simulation mode, which you control through the FactoryTalk Logix Echo [API on page 26](#). In this mode, you control the virtual time:
  - Control the flow of virtual time.
  - Adjust the fidelity of continuous tasks.
  - Synchronize emulated controllers.

Keep these virtual time considerations in mind:

- On emulated controllers, the synchronization settings on the **Controller Properties dialog box - Date/Time** tab and on the **Controller Properties - Advanced Time Sync** dialog box have no effect. In free-running mode, FactoryTalk Logix Echo considers all emulated controllers to be synchronized based on the workstation's Windows clock. In co-simulation mode, you control the synchronization of emulated controllers. Synchronized emulated controllers should all rely on the same time mode. For example, to be synchronized, two emulated controllers in co-simulation mode must rely on the same time leader.






**Tip:** Set up the time configuration on your workstation before you run a synchronized system of emulated controllers. Changing the workstation time after a synchronized system starts running can lead to inaccuracies or non-synchronized results.

- Motion virtual axis produce/consume tags do not report faults, but they might not work as precisely as on a physical controller.
- Displayed scan times will probably vary from project to project and will differ from scan times on physical controllers.

## Export the results of an operation

Export the results of an operation as a CSV or Microsoft Excel file.

### To export the results of an operation

1. In the list of operations in the **Output** pane, select an operation.  
If the **Output** pane is hidden, select the **Output** icon  to display it.
2. In the **Operations** list, select an operation to export.
3. Right-click anywhere in the list of results and select an export option:
  - **Export > CSV Export**
  - **Export > Excel Export (.xlsx)**
  - **Export > Excel Export (.xml)**




**Tip:** You can also copy and then paste results into a spreadsheet or document:

- Right-click anywhere in the results table.
- Select **Copy** or **Copy with headers**.
- Paste the results into a document or spreadsheet.

## View license usage information

To view license usage information, select **Help > About**. No licenses are in use when no controllers are turned on.

- When FactoryTalk Logix Echo is using a controller license, the **License status** says **License is in use**.
- When FactoryTalk Logix Echo is not using a controller license, the **License status** says **License is not in use**.

To refresh the license status, select .



**Tip:** To use FactoryTalk Logix Echo without tying up a controller license, right-click the **Device Status** pane header and then select **Turn off all controllers**.

## Use the API

The FactoryTalk Logix Echo Application Programming Interface (API) provides programmatic access for third-party applications to manage an emulated environment and interact with simulation systems. The functionality of FactoryTalk Logix Echo is accessible through the API.

---

**IMPORTANT:** To access the full functionality of the API, install the Logix Designer application, version 33.00 or later, on the same workstation as FactoryTalk Logix Echo. Some API functionality is not available unless the Logix Designer application is installed.

---

The FactoryTalk Logix Echo SDK Documentation kit describes the functionality available through the API.

### To open the SDK Documentation kit

1. On the **Windows Start** menu, expand **Rockwell Software**.
2. Select **FactoryTalk Logix Echo SDK Documentation**.



**Tip:** The SDK Documentation kit is installed with FactoryTalk Logix Echo as an option. If it does not appear on the **Windows Start** menu, run the FactoryTalk Logix Echo installer again and select the **SDK** installation option.

---

## Use controller snapshots

### Add a snapshot

Add a snapshot to capture and save the settings of a controller or group of controllers.

#### To add a snapshot

1. In the **Tools** menu, select **Snapshots**.
2. Select **Add** to open the **Add Snapshot** dialog box.
3. In the **Name** box, enter a name for the snapshot. The name can contain up to 40 characters.
4. (optional) In the **Description** box, enter a description for the snapshot.
5. Select the controllers to include in the snapshot.
6. Select **Add**.

### Edit a snapshot

Edit a snapshot to update its name and description.

#### To edit a snapshot

1. In the **Tools** menu, select **Snapshots**.
2. In the **Snapshot** pane, right-click a snapshot and select **Edit**.
3. Update the snapshot name or description.
4. Select **Apply**.

### Restore a snapshot

Restore a snapshot to apply the controller settings saved in the snapshot.

---

**IMPORTANT:** Message instructions executing when you saved the snapshot might generate an error when you restore the snapshot.

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**IMPORTANT:** When you restore a snapshot, the WallClockTime (WCT) of the emulated controller changes to the WCT at the time the snapshot was taken. The **Enable Time Synchronization** setting on the Logix Designer **Controller Properties** dialog box does not affect the WCT.

---



**Tip:** Restoring a snapshot purges all existing user projects from the controllers.

---

#### To restore a snapshot




1. In the **Tools** menu, select **Snapshots**.
2. Select the snapshot to restore.

3. Check the **Inconsistencies** box for any inconsistencies that exist between the current setup and the snapshot. If errors appear, correct them before restoring the snapshot.
4. Select **Restore**.
5. Select a Restore option:
  - **Restore only**. This option restores the snapshot using only the chassis and controllers in the current configuration.
  - **Create only**. This option adds new chassis and controller without adjusting the current configuration.
  - **Restore and create**. This option adds new chassis and controllers if necessary. The current configuration might be overwritten.
  - **Delete all and create**. This option deletes the current configuration and creates the controllers and chassis in the snapshot.
6. Select **Restore** to apply the controller settings in the snapshot using the selected option.

## Snapshot inconsistency icons

The **Inconsistencies** box lists inconsistencies that exist between the current setup and a snapshot.

These icons indicate the severity of the inconsistencies.

- Blue information icon . Indicates a minor inconsistency that does not affect the restore operation, but you should be aware of. For example:  
Controller 'CLX1' in slot 0 of chassis 'ChassisA2' is disabled and will be turned on by snapshot restore operation.
- Yellow caution icon . Indicates an inconsistency that might cause a problem after the snapshot is restored but does not prevent the restore operation. For example:  
IP address 0.0.0.0 used by the controller 'CLX3' in slot 1 of chassis 'Chassis\_22' was not found on any Ethernet adapter. The co
- Red error icon . Indicates an inconsistency that prevents the **Restore Only** operation. Select one of the other restore options, such as **Restore and Create**, or fix the inconsistency to use **Restore Only**. This example shows a possible inconsistency:  
Controller 'Controller17' in slot 2 of chassis 'Chassis3\_CLX' does not exist. Create a matching controller before restoring the sn

## Export a snapshot

Export a snapshot to make it available on another workstation.

### To export a snapshot

1. In the **Tools** menu, select **Snapshots**.
2. In the **Snapshot** pane, right-click a snapshot and select **Export**.
3. Select a destination folder for the exported snapshot.
4. Enter a file name for the snapshot and then select **Save**.  
The snapshot file appears in the destination folder as *filename.echo-snap*.

## Import a snapshot

Import a snapshot to add it to your snapshot list.

### To import a snapshot

1. In the **Tools** menu, select **Snapshots**.
2. Select **Import** to open a **File Explorer** dialog box.
3. Browse to the location of the snapshot and select it.
4. Select **Open**. The snapshot is added to the snapshot list.

## Troubleshoot emulated controllers

### Troubleshooting

Use these resources to troubleshoot emulated controllers and the FactoryTalk Logix Echo application.

- Check information in the FactoryTalk® Diagnostics Viewer. To open the Viewer, open the FactoryTalk® Administration Console and select **Tools > FactoryTalk Diagnostics > Viewer**.

Use the information, warning, and error messages in the FactoryTalk Diagnostics Viewer to monitor FactoryTalk Logix Echo status, keep a record of completed actions, and resolve issues in FactoryTalk Logix Echo.

For more information on setting up and using FactoryTalk Diagnostics, see the [FactoryTalk View Site Edition User's Guide](#).

- Generate data files using the problem-report-collector.ps1 script.
- Change port numbers to correct a port conflict.

### Run the Data Collector

If you need help from Rockwell Automation technical support, a technician might request data generated by Data Collector. The Data Collector gathers data from FactoryTalk Logix Echo that can help the technician identify a problem with the application or with an emulated controller.

To collect all relevant application data, the Data Collector requests administrator privileges. The Data Collector can successfully run without administrator privileges, but some application data might not be collected.

#### To generate data files using the Data Collector:

- On the **Help** menu, select **Run Data Collector**.
- Follow the prompts in the terminal window.



**Tip:** You can also run the data collector from the FactoryTalk Logix Echo [API on page 26](#).

---

The Data Collector collects log files and controller memory data and compresses it in two zip files:

- FTLogixEchoProblemReportIP.zip
- FTLogixEchoProblemReport.zip

The zip files appear in this folder:

C:\Users\username\AppData\Local\Temp\GUID

### Correct a port conflict

If a port conflict occurs with another application after you install FactoryTalk Logix Echo, you can change the port numbers used for the WebSocket and service API connections.

## WebSocket connection port number

Typically, the WebSocket protocol uses port 80. Follow these steps to change the port number for a WebSocket connection.

### To change the port number for a WebSocket connection

1. Navigate to this folder on your workstation:  
C:\Program Files (x86)\Rockwell Software\FactoryTalk Logix Echo\Dashboard\resources\app\dist\app-backend\config
2. In a text editor, open the production.json file.
3. Enter the new port number for two properties in the file. Enter the same port number for both properties.

```
{
  "gateway": {
    ...
    "routerPort": WEBSOCKET_PORT_HERE,
    ...
    "services": [
      ...
      {
        "name": "emulate-dashboard-backend",
        "command": "EmuDashboardBackend.exe",
        "args": [
          "ws://localhost:WEBSOCKET_PORT_HERE/emulate-dashboard-backend"
        ],
      }
    ]
  },
  ...
}
```

4. Save and then close the default.json file.
5. Close FactoryTalk Logix Echo and then reopen it.

## Change the service API port number

Follow these steps to change the service API port number for the FactoryTalk Logix Echo interface.

### To change the service API port number

1. Navigate to this folder on your workstation:  
C:\Program Files (x86)\Rockwell Software\FactoryTalk Logix Echo\Dashboard\resources\app\dist\app-backend\config



**Tip:** On 32-bit Windows workstations, navigate to this folder:

C:\Program Files\Rockwell Software\FactoryTalk Logix Echo\Dashboard\resources\app\dist\app-backend\config

2. In a text editor, open the production.json file.

3. Replace SERVICE\_API\_PORT with a valid port number. The default service API port number is 46520.

```
{
  "gateway": {
    ...
    "services": [
      ...
      {
        "name": "emulate-dashboard-backend",
        "command": "EmuDashboardBackend.exe",
        "args": [
          "ws://localhost:46540/emulate-dashboard-backend",
          SERVICE_API_PORT
        ],
      }
    ]
  },
  ...
}
```

4. Save and then close the default.json file.
5. Navigate to this folder on your workstation:

C:\Program Files (x86)\Rockwell Software\FactoryTalk Logix Echo\Service



**Tip:** On 32-bit Windows workstations, navigate to this folder:

C:\Program Files\Rockwell Software\FactoryTalk Logix Echo\Service

6. In a text editor, open the EmulateService.exe.config file.
7. Replace SERVICE\_API\_PORT with a valid port number. The default is 46520.

```
<?xml version="1.0" encoding="utf-8"?> <configuration>
...
<applicationSettings>
  <RockwellAutomation.Emulate.Service.Properties.Settings>
    <setting name="ServiceApiPort" serializeAs="String">
      <value>SERVICE_API_PORT</value>
    </setting>
    ...
  </RockwellAutomation.Emulate.Service.Properties.Settings>
</applicationSettings>
</configuration>
```

8. Save and then close the EmulateService.exe.config file.
9. In the Windows search bar, search for the **Services** application and then open it.
10. In the list of services, right-click **FactoryTalk Logix Echo Service** and then select **Restart**. The port number is updated when the service restarts.



# FactoryTalk Logix Echo SDK

## SDK Doc kit and NuGet package

The FactoryTalk Logix Echo SDK and API provide a way to integrate all the FactoryTalk Logix Echo functionality into your own software applications. Use the SDK and API to build applications to connect directly to controllers for simulation and data analysis.

The SDK Documentation kit is installed as an option with FactoryTalk Logix Echo. To find the SDK documentation:

- On the **Windows Start** menu, expand **Rockwell Software**.
- Select **FactoryTalk Logix Echo SDK Documentation**.



**Tip:** If the SDK Documentation kit does not appear on the **Windows Start** menu, run the FactoryTalk Logix Echo installer again and select the **SDK** installation option.

The SDK Documentation kit contains:

- SDK Documentation, which provides detailed explanations of all the API functions and their uses with sample code.
- NuGet package, which includes .NET Standard 2.0 assemblies that allow access to the API. This package can be installed in any .NET application that supports .NET Standard 2.0. You can find the NuGet package in the SDK installation directory:

C:\Program Files (x86)\Rockwell Software\FactoryTalk Logix Echo\SDK

For more information on NuGet, see these Microsoft resources:

- [.NET Standard | Microsoft Docs](#)
- [NuGet documentation | Microsoft Docs](#)

## API functions

FactoryTalk Logix Echo provides two sets of APIs:

- Service API. Use the Service API to manage a FactoryTalk Logix Echo system and to perform all the functions that can be done in FactoryTalk Logix Echo.
- Controller API. Use the Controller API to control execution of an emulated controller and access controller tags.

### Service API capabilities

Use the Service API to carry out these FactoryTalk Logix Echo functions.

- Controller—Create, read, update, and delete controllers.
- Chassis—Create, read, update, and delete chassis.
- Firmware—List firmware packages.
- Download—Download projects directly to a controller from the API.
- Snapshot—Create, restore, delete, import, and export system snapshots.
- FactoryTalk Logix Echo license—Check the status of the license.
- Language—Set the language used for error messages.

## Controller API capabilities

The Controller API provides these capabilities:

- Data Exchange, a fast API to read and write single or multiple tags.
- CoSimulation, which switches an emulated controller to CoSimulation mode. In CoSimulation mode the Controller API controls time quantum execution, getting and setting coordinated system time, and changing the fidelity of continuous tasks.

# Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	<a href="https://rok.auto/support">rok.auto/support</a>
Knowledgebase	Access Knowledgebase articles.	<a href="https://rok.auto/knowledgebase">rok.auto/knowledgebase</a>
Local Technical Support Phone Numbers	Locate the telephone number for your country.	<a href="https://rok.auto/phonesupport">rok.auto/phonesupport</a>
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	<a href="https://rok.auto/literature">rok.auto/literature</a>
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	<a href="https://rok.auto/pcdc">rok.auto/pcdc</a>

## Documentation feedback

Your comments help us serve your documentation needs better. If you have any suggestions on how to improve our content, complete the form at [rok.auto/docfeedback](https://rok.auto/docfeedback).

## Waste Electrical and Electronic Equipment (WEEE)



At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental information on its website at [rok.auto/pec](https://rok.auto/pec).

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