

Commissioning a System from the Static Structural Test Reference Architecture

The Static Structural Test Reference Architecture provides a customizable solution for high-channel-count static structural test applications.

This document contains information that is necessary to set up and operate the components included in the reference architecture, including hardware installation and software configuration procedures.



Note This document does not contain detailed information for the individual hardware components included in your system. Refer to [Related Documentation](#) on page 11 for links to relevant documentation for the individual components in your system.

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Before You Begin

Complete the following tasks before you install, configure, or operate the components included in your system.

1. Ensure that you have a system design and schematic prepared per the instructions in the [Static Structural Test Reference Architecture Design Guide](#).
2. Review the [safety and compliance documentation](#) for each component in your system.

Assembling System Components

Complete the following steps to assemble and install the hardware components included in your system design.

1. Mount the instrumentation.

Model	Where to Go
cDAQ-9189	Mounting the cDAQ-9185/9189 in the cDAQ-9185/9189 User Manual
cRIO-9805	Expansion Module for CompactRIO User Manual
PS-14	Mounting Equipment and Mounting Orientation and Installation in the NI PS-14 Power Supply User Manual
PS-15	Mounting Equipment and Mounting Orientation and Installation in the NI PS-15 Power Supply User Manual
PS-16	Mounting Equipment and Mounting Orientation and Installation in the NI PS-16 Power Supply User Manual

2. Ground the CompactDAQ chassis and Ethernet switches.

Model	Where to Go
cDAQ-9189	Installing the cDAQ Chassis and Chassis Grounding Screw in the cDAQ-9185/9189 User Manual
cRIO-9805	Grounding the Expansion Module for CompactRIO Expansion Module for CompactRIO User Manual

3. Install the C Series modules in the CompactDAQ chassis.

Model	Where to Go
cDAQ-9189	Installing the cDAQ Chassis and Removing Modules from the cDAQ Chassis in the cDAQ-9185/9189 User Manual

4. Install network cables according to your system design.
5. Install power cabling to all instruments and Ethernet switches.

Model	Where to Go
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cDAQ-9189	<i>Wiring External Power to the cDAQ Chassis</i> in the cDAQ-9185/9189 User Manual
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cRIO-9805	<i>Connecting the cRIO-9805 to an External Power Supply</i> in the Expansion Module for CompactRIO User Manual
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6. Connect all sensor wiring to the C Series modules.

Model	Where to Go
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NI-9213	<i>Connecting a Thermocouple</i> in the NI-9213 Getting Started Guide
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NI-9215	<i>NI-9215 Pinout</i> in the NI-9215 Getting Started Guide
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NI-9235	<i>Connecting a Quarter-Bridge Sensor</i> in the NI-9235 Getting Started Guide
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NI-9236	<i>Connecting a Quarter-Bridge Sensor</i> in the NI-9236 Getting Started Guide
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7. Visually inspect the LED indicators on the instrumentation to verify power.

Model	Where to Go
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cDAQ-9189	<i>cDAQ-9189 Front Panel</i> in the CompactDAQ Chassis Manual
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cRIO-9805	<i>cRIO-9805 LEDs</i> in the Expansion Module for CompactRIO Manual
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PS-14	<i>DC On LED</i> in the NI PS-14 Power Supply User Manual
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PS-15	<i>DC OK LED</i> in the NI PS-15 Power Supply User Manual
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PS-16	<i>DC OK LED</i> in the NI PS-16 Power Supply User Manual
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8. Download and install the Static Test Software on the host PC from ni.com/downloads.



Note Refer to the *Static Test Software Readme* at ni.com/r/sstreadme for more information about installing and activating the software included in the Static Test Software.

Configuring Software

Complete the following steps to install and configure the software for first use.

1. [Reserve cDAQ-9189 chassis in Measurement and Automation Explorer \(MAX\)](#).
2. [Upgrade cDAQ-9189 chassis firmware](#).
3. [Configure your FlexLogger project](#).



Tip When configuring your device channels in FlexLogger, you can apply the same configuration from a single channel to multiple channels. Select a single channel row and press <Ctrl-C> or right-click and select **Copy**, then select multiple channel rows and press <Ctrl-V> or right-click and select **Paste**. Alternatively, select all the channels that should share the same configuration, hover over any channel and click the **Configure** gear. Enter a root string in the

Name field to auto-enumerate the channel name from the root string. Configure the channels and click **Done**.

4. *Configure the Static Data Viewer.*

Reserving cDAQ-9189 Chassis in MAX

Complete the following steps to add cDAQ-9189 chassis to your software configuration.

1. Launch MAX from your host computer.
2. Right-click **Devices and Interfaces** and select **Find Network NI-DAQmx Devices**.
3. Click **Select All**, then select **Add Selected Devices**.
4. Verify that each C Series module is listed beneath the associated CompactDAQ chassis in your system.
5. To determine successful installation of the chassis, right click the chassis name listed under **Network Devices** and select **Self Test**.

When the self-test finishes, a message indicates successful verification or if an error occurred.

Upgrading cDAQ-9189 Chassis Firmware

Complete the following steps to upgrade firmware for the cDAQ-9189 chassis in your system. You must upgrade the firmware for each individual chassis in your system.

1. Launch MAX.
2. Expand **Devices and Interfaces** and select your chassis under **Network Devices**.
3. On the **System Settings** tab, click **Update Firmware**.

By default, the file dialog window opens to the location of the firmware files installed with the NI-DAQmx driver.

4. Select the firmware version as specified in the *Static Test Software Readme* and click **Open**.
5. When the **Update Firmware** window appears, click **Begin Update**.

Configure Static Data Viewer

After installing the Static Test Software, you must configure NI Web Server, SystemLink, and the Annotation for Static Data Viewer FlexLogger plugin to add support for the Static Data Viewer.

Complete the tasks in the following sections to configure NI Web Server security and authentication, SystemLink user roles and privileges, and FlexLogger annotation.

Configuring NI Web Server

1. Launch NI Web Server Configuration from the Start menu.

If this is your first time launching NI Web Server Configuration, a guided setup window appears. Click **Custom** to access the configuration options described in the following steps.

2. On the **Remote** tab, select the following settings:
 - a) Under **Remote Connections**, select **Allow remote connections from any client**.
 - a) Under **Cross-Origin Resource Sharing (CORS) Settings**, select **Disable CORS and block access from external content**.
3. On the **HTTPS** tab, choose whether to use a certificate from a certification authority, a self-signed certificate, or no certificate. Refer to [Choosing an HTTPS Setting](#) in the *NI Web Server Manual* for more information about each setting.



Note The Static Data Viewer has been validated with HTTP, and HTTPS with a self-signed certificate in Google Chrome.

To use HTTPS, you must obtain a certificate. For options on obtaining a certificate, refer to the *Certificates* section in [Security in NI Web Technology](#). The certificate must be installed on NI Web Server. For self-signed certificates and some IT-signed certificates, clients must also import the certificate to their device as part of a browser-specific process for trusting the certificate.



Tip To import a self-signed certificate to a client device using Google Chrome, open the browser settings and navigate to **Manage Certificates**. Import the self-signed certificate to **Trusted Root Certification Authorities**.

4. On the **Authentication** tab, select the following settings to specify how you want users to connect to the server.
 - a) Select **Log in as users controlled by the web server** and set a password to create an admin account that is controlled by the NI Web Server.
-  **Note** You can assign administrator privileges to additional accounts in SystemLink. Refer to [Configuring SystemLink User Roles and Privileges](#) on page 6 for more information.
- b) To configure settings for remote client access, refer to [Choosing an Authentication Setting](#) in the *NI Web Server Manual* and the [SystemLink Operations Handbook](#).
5. On the **Applications** tab, expand Static Data Viewer and select **users** next to **Allows viewing the resource**.
 6. Click **Apply and restart** to save changes and restart the PC.
 7. After restarting, launch NI Web Server Configuration.
 8. On the **Control** tab, verify that the NI Web Server is running and enabled.

If the NI Web Server is not running, select **Enable the web server**, **Start**, and **Apply and restart** on the **Control** tab.

Configuring SystemLink User Roles and Privileges

To use the Static Data Viewer, all users must have required SystemLink privileges. Complete the following steps to register users, define user roles, and assign privileges.



Note Only admins have access to make the following changes in SystemLink.

1. Launch the NI SystemLink Web Application from the Start menu. When logging in for the first time, use the admin credentials that you created in [Configuring NI Web Server](#) on page 4.



Tip You can also launch the application from the NI Web Server Configuration application by opening the **Summary** tab and clicking the **Running Server URI** link. This URL is referred to as the *SystemLink URL*.

2. Click  to open the SystemLink navigator.
3. In **Access Control »Roles** tab, create a new role to define an analyst using the Static Data Viewer and specify the minimum required privileges for each feature listed in the following table. Refer to [Configuring a Role and Privileges](#) in the *SystemLink Manual* for more information about creating new user roles.

Applications and Privileges Services

Alarms and Notifications	<ul style="list-style-type: none">• Enable the following Privileges:<ul style="list-style-type: none">– Acknowledge alarms– Create tag alarm rules– Delete alarms– Delete tag alarm rules– List and view alarms– View details for strategies, groups, and email templates– Read tag alarm rules– Set and clear alarms– Modify tag alarm rules
Messages	<ul style="list-style-type: none">• Set Privilege Specificity to *• Enable the following Privileges:<ul style="list-style-type: none">– Allow all privileges
Tags	<ul style="list-style-type: none">• Set Privilege Specificity to *• Enable the following Privileges:<ul style="list-style-type: none">– List tags and view tag value, history, properties, and keywords



Note It may take up to five minutes for privilege changes to take effect.

Registering Users in SystemLink

To enable client access to the Static Data Viewer, all clients must log in to SystemLink for the first time to register their user accounts and admins must assign the user accounts to the Default workspace.



Note The admin must send the [SystemLink URL](#) to all clients before completing the following steps.

1. All clients must complete the following steps.
 - a) Ensure that the client is either on the same network as the NI Web Server or a VPN.
 - b) Open a web browser and enter the SystemLink URL provided by the admin.
 - c) On the SystemLink login page, enter your Windows credentials associated with your organization.
 - d) Notify the admin after successfully logging in.
2. Admins must complete the following steps.
 - a) Launch the SystemLink Web Application.
 - b) In **Access Control »Users**, verify that the client accounts appear as expected.
 - c) In **Access Control »Workspaces**, assign users and roles to the Default workspace. Static Data Viewer is compatible only with the Default workspace.

Assign analyst accounts to the role created in [Configuring SystemLink User Roles and Privileges](#) on page 6. Refer to [Assigning Users to Roles in a Workspace](#) in the *SystemLink Manual* for more information.



Note To assign the admin role to additional accounts, refer to [Configuring a Role and Privileges](#) in the *SystemLink Manual*.

To verify client access to the Static Data Viewer, log in to SystemLink and click the Static Data Viewer.



Tip Bookmark the SystemLink URL in your web browser for easy access.

Configuring SystemLink Tag Ingestion for High-Channel-Count Applications

1. Navigate to `C:\ProgramData\National Instruments\Skyline\Config` and open `TagIngestion.json`.
2. Add a key value pair `"Throttling.ValuesPerSecond" : 5000`.
3. Save the file.
4. Restart the host PC.

Configuring FlexLogger for Static Data Viewer

Complete the following steps to configure FlexLogger for use with the Static Data Viewer.

1. Open your test project in FlexLogger.
2. On the **Channel Specification** toolbar, select **Add channel »Plugin** and select **Annotation for Static Data Viewer**.

3. Click the **Configure** gear on the top right corner of the plugin header to open the plugin parameters configuration dialog.
4. Set **SystemLink Server URL** to the **Running Server URI** located at **NI Web Server » Summary** .
5. Set **SystemLink Username** and **SystemLink Password** to any credentials that have full privileges for SystemLink Messages.
6. Configure the FlexLogger project to publish channel data to SystemLink tags.
 - a) In your configured FlexLogger project, go to **Project »Settings** and check the **Publish channels as local tags** checkbox.
 - b) Restart FlexLogger.

Validate System Configuration

Complete the steps in the following sections to ensure that all system components are configured correctly and the Static Data Viewer is ready for analyst use.

Before you complete the following steps, launch the following applications:

- Launch FlexLogger and open your configured project.
- Launch the Static Data Viewer from an analyst device and log in using analyst credentials.
- Launch SystemLink and log in as an admin. Open the SystemLink Alarm Utility from **Utilities »Alarms** .



Note Keep Static Data Viewer and SystemLink open in separate browser windows or different devices as you complete the verification steps.

Verifying FlexLogger Configuration

Complete the following steps to verify that your instrument is configured in FlexLogger and ready to perform a test.

1. Confirm that all the chassis used in your system appear in the **Channel Specification** pane.
2. For each channel, open the **Channel Configuration** pane and ensure the configuration parameters match the latest test plan.
3. In the **Channel Specification** pane, confirm that live data populates for each module in your system.



Note On large systems, it can take several minutes for the TSN network to self-configure and for modules to begin acquiring data.

4. In the **Channel Specification** ribbon, confirm that the **SYNC** indicator appears green.
5. From the **Channel Specification** pane, select all the strain channels and perform a shunt calibration.
6. In the **Logging Specifications** tab, ensure that you've entered the logging file path and segment parameter.

Verifying the Strain Gauge Connections

Complete the following steps to verify the connection between a strain gauge and a channel.

1. From the **Channel Specification** pane in FlexLogger, choose the channel you want to verify.
2. Perform a null offset operation on that channel.
3. Open the **Channel Configuration** pane for the channel and ensure that the live data reading shows approximately zero.
4. Go to your hardware setup and disconnect the strain gauge from the channel you just nulled.
5. From the **Channel Configuration** pane in FlexLogger, ensure that the live data reading shows the maximum signal range for the channel.

Verifying Alarm Rule Functionality

Complete the following steps to ensure that SystemLink receives the alarm rules created in the Static Data Viewer.

1. Create an alarm rule.

Application	Task
Static Data Viewer	In the Data Table , enter a value in the HI Alarm or LO Alarm field.
SystemLink Alarm Utility	<ol style="list-style-type: none">1. Navigate to Alarm Rules »Tags to verify that an alarm rule tag appears for the channel with the configured alarm.2. Verify that the alarm rule is configured with an Annotate Log File notification.

2. Modify an alarm rule.

Application	Task
Static Data Viewer	In the Data Table , modify an alarm rule for a channel using any of the alarm rule configuration options in the Data Table .
SystemLink Alarm Utility	Navigate to Alarm Rules »Tags to verify that the changes appear in the alarm rule tag for the channel.

3. View all alarm rules.

Application	Task
Static Data Viewer	On the Saved Alarm Rules page, verify that all alarm rules appear.

Application	Task
SystemLink Alarm Utility	Navigate to Alarm Rules »Tags and ensure all expected alarm rules appear.



Note Each analyst can make their own rule for any given channel. There can be multiple alarm rules per channel if multiple analysts are using Static Data Viewer.

4. Delete alarm rules.

Application	Task
Static Data Viewer	On the Saved Alarm Rules page, select a channel from Alarm Rules and click Delete .
SystemLink Alarm Utility	Navigate to Alarm Rules »Tags and ensure the alarm rule does not appear.

Verifying Alarm Management Features

1. On the **Home** page of the Static Data Viewer, select a channel and set the **HI Alarm** level to a value that is less than the current live value.
2. Check the **Alarm Enabled** checkbox.
3. Ensure the alarm instance appears in the **Alarms** list.
4. Select the alarm from the **Alarms** list and click **Acknowledge Alarm**.

The alarm instance should change from red to yellow once the alarm is acknowledged.

5. Uncheck the **Alarm Enabled** checkbox to disable the alarm.
6. In the **Alarms** list, select the alarm and click **Clear Alarm**. Verify that the alarm no longer appears in the list.

Verifying Saved Preferences

Complete the following steps to ensure that the Static Data Viewer retains saved preferences between analysts sessions.

1. On the **Home** page of the Static Data Viewer, take note of the selected channels and configured alarm settings.
2. Close the Static Data Viewer and reopen it.
3. Verify that all channels and configured alarm settings from the previous session appear as expected.

Verifying Log Annotations

1. In the configured FlexLogger project, click **Run** to start a test.
2. In the Static Data Viewer, write a comment in the **Note** field and click **Add Note to Log**.
3. Force an alarm instance by creating an alarm rule for a specific channel. Set **HI Alarm** to a level below the current live value and check **Alarm Enabled**.
4. In FlexLogger, click **Pause** to pause the test, then click **Resume**.

5. Double-click the log file in FlexLogger to open the file and view the data.

Verify that the comment, alarm instance, and the pause and resume events are recorded in the log file.

After validating the Static Data Viewer, notify analysts that the Static Data Viewer is ready for use. Refer to the [Static Data Viewer Manual](#) for more information about using the application.

Verifying SystemLink Tag Functionality

Complete the following steps to validate that channel data from FlexLogger is publishing as SystemLink tags.

1. Log in to the Static Data Viewer with an analyst profile.
2. On the **Home** page, verify that the **Channel List** populates with all the channels in your configured FlexLogger project.
3. Select a handful of channels and verify that the **Data Table** displays the live data for all selected channels from the **Channel List**.

Related Documentation

Refer to the following documents to learn more about the Static Structural Test Reference Architecture, associated software, and hardware components.

Static Structural Test Reference Architecture Documentation

- [Static Structural Test Reference Architecture Design Guide](#)

Related Documentation

Refer to the following links at [ni.com/manuals](#) for detailed information about the instruments used in the Static Structural Test Reference Architecture, including safety and compliance information, calibration and maintenance procedures, and detailed hardware installation instructions.

Table 1. Hardware Component Documentation

Model	Where to Go
cDAQ-9189	cDAQ-9189 CompactDAQ Chassis User Manuals
cRIO-9805	cRIO-9805 Expansion Module for CompactRIO User Manuals
NI-9213	NI-9213 User Manuals
NI-9215	NI-9215 User Manuals
NI-9235	NI-9235 User Manuals
NI-9236	NI-9236 User Manuals

Table 1. Hardware Component Documentation (Continued)

Model	Where to Go
PS-14	NI PS-14 Power Supply User Manuals
PS-15	NI PS-15 Power Supply User Manuals
PS-16	NI PS-16 Power Supply User Manuals

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