

The *groov* EPIC® Learning Center functions as a complete demonstration unit—providing a live experience for your pilot and Proof of Concept projects—and training unit, traveling with you to provide on-site instruction. The Learning Center also plays an integral role in the free OptoU Online Training (training.opto22.com), providing hands-on experience and the opportunity for more in-depth exercises.

NOTE: The Learning Center is meant to be used as a demonstration unit. Do not use it in production applications.

This version of the *groov* EPIC Learning Center comes with a GRV-EPIC-PR2 processor that is pre-installed with Ignition Edge®, PAC Control Engine, *groov* Manage, CODESYS® Runtime Engine, and more. A software package for this Learning Center is available on the Opto 22 website and includes pre-developed software projects, strategies, flows, and more based on automation for a convenience store.

What you need

- *groov* EPIC Learning Center 2 (part number [GRV-EPIC-LC2](#))
- A computer or device with internet access and on the same network as the Learning Center 2
 - To work with PAC Control and CODESYS, you need a Microsoft® Windows® PC
- [groov EPIC Learning Center 2 Package \(3.0\)](#) from the Opto 22 website

NOTE: The Learning Center 2 Package is not compatible with the older Learning Center product (GRV-EPIC-LC).

In this document

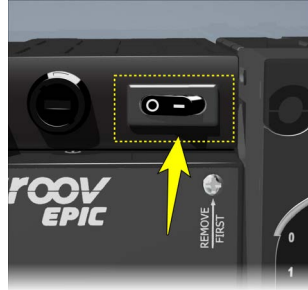
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BEFORE YOU BEGIN

1. Complete all tasks in the printed form that shipped with your *groov* EPIC Learning Center ([groov EPIC Learning Center 2 Assembly](#), form 2409).
2. Register and create a [MyOpto account](#) on the Opto 22 website (opto22.com). This account allows you to download firmware updates, activate the full *groov* View license, access our free OptoU online training resources, and take advantage of many other benefits.
3. Set the panel light switch to the bottom position (programmable). Review [groov EPIC Learning Center 2 Assembly](#) (form 2409) for detailed instructions.

POWER ON YOUR groov EPIC

1. Facing the front of the Learning Center (rotate as needed), toggle the power button behind the touchscreen to turn on the EPIC processor. Close the touchscreen.



2. When the EPIC displays the Welcome screen (it may take a few minutes), note the **Hostname** and **Eth0 IP Address** of your Learning Center.

Example	Your Learning Center
	Hostname: _____ Eth0 IP Address: _____

3. In a web browser on your computer, type the following in the URL address bar:
`https://<hostname>` where *hostname* is replaced with either the hostname or Eth0 IP address of your EPIC processor.

Examples: `https://opto-03-fa-bf`
`https://xxx.xxx.xxx.xxx`

NOTE: Some routers cannot connect using a hostname and require an IP address. If you are unable to connect using the hostname, use the Eth0 IP address of your EPIC processor.

4. If your browser displays a security warning, ignore or bypass it to connect to the EPIC processor.
5. On the Welcome screen, click **Let's Get Started**.

COMMISSION AND ACTIVATE YOUR groov EPIC

Once powered on, perform the following tasks to commission your groov EPIC Learning Center, which includes creating your first administrator-level user account and installing certificates to secure it. Before you complete commissioning, a best practice is to verify your firmware version.

Create an administrator-level user account

1. On the Create an Account screen, enter a username and password that meets your company security requirements or general security recommendations. This creates the first administrator-level user for your Learning Center.

IMPORTANT: Remember these credentials! For security reasons, there is no method to recover a forgotten groov EPIC password or username.

2. Click **Create Account**. After creating the account, click **Configure Device** to continue.

Finish commissioning

Finish the commissioning by completing the following lessons in the [Commissioning groov EPIC](#) online course (log in with your MyOpto account):

NOTE: You can skip the quizzes. They are not required to finish commissioning.

Curriculum

- Overview
- Setting Up Authentication**
 - 1 - The Welcome! Screen
 - 2 - Creating the First Administrator Login Account
 - Quiz 1: Authentication
- Setting the Time and Hostname**
 - 3 - Setting the Time Zone
 - 4 - Setting the Hostname
 - Quiz 2: Time and Hostname
- Setting Up an Encrypted Connection**
 - 5 - About the Server SSL Certificate
 - 6 - Creating and Downloading a Server SSL Certificate
 - 7 - Installing the Server SSL Certificate on Your Computer
 - 8 - Confirming there's a Secure Connection
 - Quiz 3: Encryption
- Up Next: Activating Your groov EPIC

- 3. Setting the time zone.
- 4. Setting the hostname.
- 5. and 6. Creating a Server SSL Certificate and downloading the Public Certificate.
- 7. Installing the Public Certificate in your Trusted Root Certification Authorities Store.
- 8. Confirming you have a secure connection.

Activate the groov EPIC processor

Activating the *groov* EPIC in your Learning Center fully licenses *groov* View so you can avoid restarting it after the two-hour trial period. Follow the [Activate Your groov EPIC Processor](#) video on the Opto 22 website (you may need to log in with your MyOpto account) to activate the *groov* EPIC on your Learning Center. Note that the video applies to both the GRV-EPIC-PR2 and GRV-EPIC-PR1 processors (your Learning Center contains a PR2).

Your *groov* EPIC Learning Center is now ready for programming. The PAC Control, *groov* View, Node-RED, Ignition Edge, and CODESYS software are included with your Learning Center.

INSTALL THE SOFTWARE PACKAGE AND APPLICATIONS

The [groov EPIC Learning Center 2 Package](#) is designed for the *groov* EPIC Learning Center 2 (part number GRV-EPIC-LC2). This software package contains projects that help you learn how to create control programs, operator interfaces (HMIs), and connections with other devices, software, and online services to move data where you need it.

Software project files include:

- PAC Control (control programming)
- *groov* View (HMI creation and viewing)
- Node-RED (IIoT connectivity)

- Ignition Edge (IIoT connectivity)
- CODESYS (an alternative control programming option)

You can use the Learning Center 2 and these files together with the *groov* EPIC Training Series, our free online training available for you at training.opto22.com.

Install the *groov* EPIC Learning Center 2 Package

1. On opto22.com, search for EPIC Learning Center 2 and click [groov EPIC Learning Center 2 Package](#) from the search results.
2. On the *groov* EPIC Learning Center 2 Package page, click **Download** and save the file to your computer.
3. Navigate to where you saved the file and unzip (extract) the files.

Install PAC Control

PAC Control is an easy-to-use flowchart-based software for creating and running a control program on the *groov* EPIC. The control program is called a *strategy*.

The PAC Control strategy runs the logic that controls the devices and sensors on the Learning Center load panel. The strategy also controls interaction with the *groov* View HMI and the Node-RED projects. If you want to run the *groov* View project or the Node-RED project, you must install and run the PAC Control strategy first. For more information about PAC Control, review the [PAC Control User's Guide](#) (form 1700).

To learn how to use PAC Control, install the following software on your Windows computer:

1. Go to opto22.com, search for PAC Project Basic and select [PAC Project Basic](#) (PAC Project contains PAC Control).
2. On the PAC Project Basic page, click **Download** and save the file (.exe) to your computer.
3. Double-click the downloaded *.exe file and follow on-screen instructions to complete the installation.

NOTE: CODESYS is an alternative to PAC Control and included in the Learning Center 2. For more information, go to "Optional: the CODESYS Development System" on page 15.

Set Up Ignition Edge

If you want to learn about **Ignition Edge**, set up the Learning Center using the Ignition Edge Panel Development license included in your *groov* EPIC Learning Center. Review "[Activate the Ignition Edge Panel Development License](#)" on page 13 for complete instructions.

RUN THE PAC CONTROL STRATEGY

The files for this project are in the **PAC Control Strategy Complete** folder in the [groov EPIC Learning Center 2 Package](#).

Start PAC Control

1. On your Windows computer, open PAC Control (ensure that you are in Config mode).
2. Click **File > Open Strategy**.
3. Navigate to the folder where you unzipped (extracted) the Learning Center 2 Package and open the **PAC Control Strategy Complete** folder.

4. Select the strategy file (ending in .iab) and click **Open**. If a message about a missing subroutine appears, click **Yes**.

Set the Control Engine to the groov EPIC processor on your Learning Center

1. In the CStore strategy tree in the left pane, expand **Control Engines** by clicking the + sign.
2. Double-click **epic-lc**.
3. In the Configure Control Engines window, click **Modify**.
4. In the Select Control Engine window, click **Add**.
5. In the Control Engine Configuration window, enter `epic-lc` in the **Control Engine Name** field.
6. Under Settings, change the **IP Address/Hostname** field to the IP address of your EPIC processor. If you do not know the IP address, launch *groov* Manage and navigate to **Network > Status > Ethernet 0 > IP Address** to view it.
7. Click **OK** to close the Control Engine Configuration window.
8. On the Select Control Engine window, click **OK**. The control engine name appears in the **Active Engine** field.
9. Click **OK** to close the Configure Control Engines window.
10. Choose **File > Save Strategy**.

Set the Location of your Learning Center

1. In the CStore strategy tree in the left pane, expand the **Variables > String Variables** folder (click the + icons).
2. Double-click **Convenience_Store_Location**. The Edit Variable window appears.
3. In the **Initial Value** field, change `your_location_here` to a city, state/province/region abbreviation (for example: *Temecula, CA*).
4. Click **OK**.
5. Choose **File > Save Strategy**.

Download and run the strategy

1. Select **Mode > Debug** to download the strategy to your *groov* EPIC. If a download warning message appears, click **Yes** to continue downloading the strategy to the processor.
2. Select **Debug > Run** to run the strategy. If a confirmation window appears, click **Start Strategy**. The PAC Control strategy is now running on the *groov* EPIC Learning Center 2.
3. If you want to close PAC Control, click **File > Exit**.

RUN THE OPC UA DATA SERVICE

The OPC UA data service provides applications (such as Ignition Edge, Node-RED, and other third party applications) access to the PAC Control strategy, I/O values, and PID values in the project files.

For this Learning Center example, the OPC UA data service requires you to:

- Configure the built-in OPC UA server on the *groov* EPIC
- Configure two scanned devices: the *groov* EPIC and its *groov* I/O unit
- Enable public access of PID loops on the EPIC so that third party applications can access their data
- Enable the Data Service

Configure the built-in OPC UA server

1. Access your Learning Center from *groov* Manage by entering the following in a web browser on your PC:
`https://<hostname or Eth0 IP address>`

Log in if prompted.

NOTE: You may encounter a site security warning when using the Eth0 IP address if the security certificate is set up for the hostname.

2. From the *groov* Manage Home page, click **Data Service** > **Configure** (top right corner).
3. Click **Add OPC UA**.
4. Move the slider to the right so that it shows green for the following fields under Configuration:
 - **Enable**
 - **Allow Anonymous Access**
 - **Allow Writes**
 - **None** (under Security Policies)
5. Click **Save**.

Configure the scanned devices

1. Click **Add Local PAC Controller** under Scanned Devices on the Data Service Configuration page (**Data Service** > **Configure** from the *groov* Manage Home page).
2. Enter `pac_tags` as the name of your EPIC's control strategy in the **Device ID** field, and click **Save**.
3. Click **Add Local I/O System** under Scanned Devices.
4. Enter `epic_io` as the name of the your EPIC's local I/O in the **Device ID** field, and click **Save**.
5. Click **Status** to return to the Data Service page.

Enable public access of PID loops

1. From the Data Service page, click **Configure** (top right corner).
2. In the **Public Access** section, click **PID Loops**.
3. Click **PIDO: PID_Store_Temperature**.
4. Click **Configure**.
5. Scroll down and move the **Public Access** slider to the right so it turns green.
6. Ensure the **Readable** slider is green and move the **Writable** slider to the right so it turns green.
7. Click **Save** in the top right corner.
8. Use the navigate links in the top left corner to return to the *groov* Manage Home page.

Enable the Data Service

1. From the *groov* Manage Home page, click **Data Service**.
2. Click **Enable** in the **Data Service Runtime** field.

When the **Data Service** status changes to **Running**, the OPC UA server is ready to provide data to clients (like *groov* View, Ignition Edge Panel, and your favorite OPC UA client).

RUN THE NODE-RED PROJECT

Node-RED is a visual programming tool you can use to wire together devices, databases, cloud applications, and APIs (application programming interfaces) with simple logic flows in a web browser. It is included in the *groov* EPIC processor. For more information about Node-RED, review the [Node-RED OptoU courses](#) on the Opto 22 website (log in with your MyOpto account).

The flows in the Node-RED project provide data for the Weather page of the *groov* View project, and the EPIC and Weather pages of the Node-RED Dashboard. If you want to run this project, you must install and run the PAC Control strategy first.

The files for this project are in the **Node-RED Complete** folder in the [groov EPIC Learning Center 2 Package](#).

Create a Node-RED administrator-level account

The best practice is to create a separate user account for Node-RED API access in the event you ever need to revoke the account without affecting your primary system administrator account (created in [“Create an administrator-level user account” on page 2](#)). The Node-RED account must have system administrator permissions to use the API key in the Node-RED nodes.

1. Access your Learning Center from *groov* Manage by entering the following in a web browser on your PC:
`https://<hostname or Eth0 IP address>`

If prompted, log in with the username and password you set up in [“Create an administrator-level user account” on page 2](#).

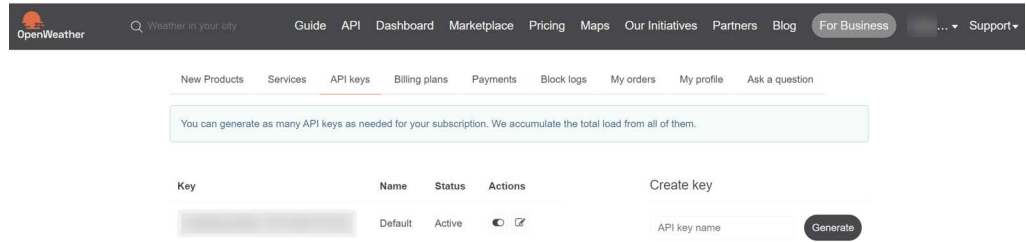
NOTE: You may encounter a site security warning when using the Eth0 IP address if the security certificate is set up for the hostname.

2. Click **Accounts**.
3. Click **Users**.
4. Click **Add** (in the upper right corner).
5. Configure the account with the following information and permissions:
 - a. Enter `Node-RED_API` as the **Username**.
 - b. Enter `opto22` as the **Password**.
 - c. Select **System-wide Administrator - Yes** in the **Permissions** field.
6. Click **Save** (in the upper right corner).

Create an OpenWeather account and obtain an API key

1. Go to the OpenWeather website (home.openweathermap.org).
2. Follow the instructions on the website to sign up and register for an account.

- After you confirm your email address and log in with your new account, click your username in the menu and select **My API Keys**. The OpenWeather website shows your API key (blurred in the following image):



- In the **Key** field, highlight the API key and press CTRL+C to copy the text to the computer clipboard.
- Open your favorite text editor (like Notepad) and press CTRL+V to paste the API key into the editor.
- Save it with a filename like `OpenWeatherMap_API.txt` in a secure location because you need it in the Node-RED project.

Load the Node-RED project

- Access your Learning Center from groov Manage by entering the following in a web browser on your PC:
`https://<hostname or Eth0 IP address>`

Log in if prompted.

NOTE: You may encounter a site security warning when using the Eth0 IP address if the security certificate is set up for the hostname.

- From the groov Manage Home page, click **Node-RED**.
- Click **Project Management > Upload Project**.
- Navigate to the folder where you unzipped (extracted) the Learning Center 2 Package and open the **Node-RED Complete** folder.
- Select the Node-RED project file (ending in `.project.zip`) and click **Open**. groov Manage displays a message that it is uploading and decompressing the project.
- When the project is uploaded, click **Start**.
- When a message confirming Node-RED has started appears, click **Close**.

Start the Node-RED Editor

- In groov Manage, click **Status** to return to the Node-RED page.
- Click **Open Node-RED Editor**.
- Click the **X** in the top right corner of the Node-RED welcome message.

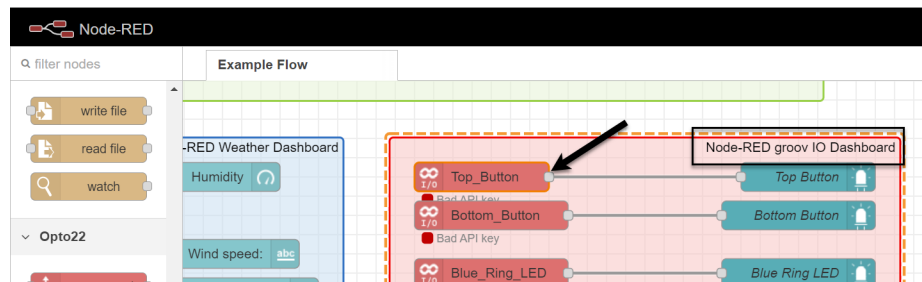
Get the API key for your Node-RED user account


- From the groov Manage Home page, click **Accounts**.
- Click **Users**.
- Click the ID of the Node-RED administrator-level user you created in ["Create a Node-RED administrator-level account"](#) on page 7.

4. In the API Key area, highlight the text in the **API Key** field and press CTRL+C to copy it to the computer clipboard.
5. Click **Cancel** > **Accounts** > **Home** to return to the *groov* Manage Home page.

Configure *groov* I/O nodes with the *groov* Manage API key

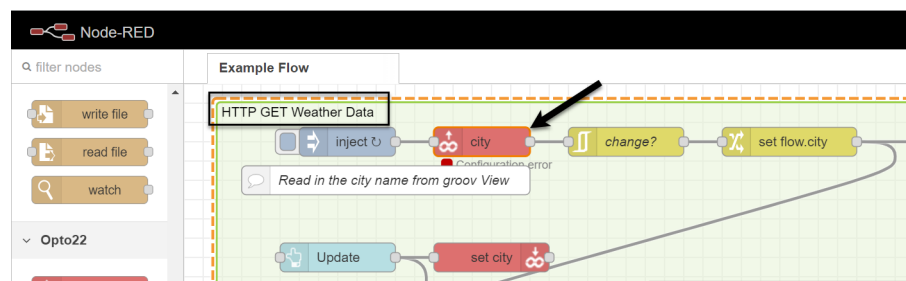
1. Return to the Node-RED browser tab or window.
2. In the Example Flow, scroll to the **Node-RED groov IO Dashboard** group (red outline) and double-click the **Top_Button** node.





3. In the **Edit groov i/o input node** panel on the right, click the pencil () icon next to the **Device** field.
4. In the **API Key** field, press CTRL+V to paste the API key you copied earlier and click **Update**.
5. Click **Done**.
Because the *groov* I/O nodes use the same device (localhost), all the other *groov* I/O input nodes are automatically configured with this API key.

Configure *groov* View nodes with the *groov* Manage API key

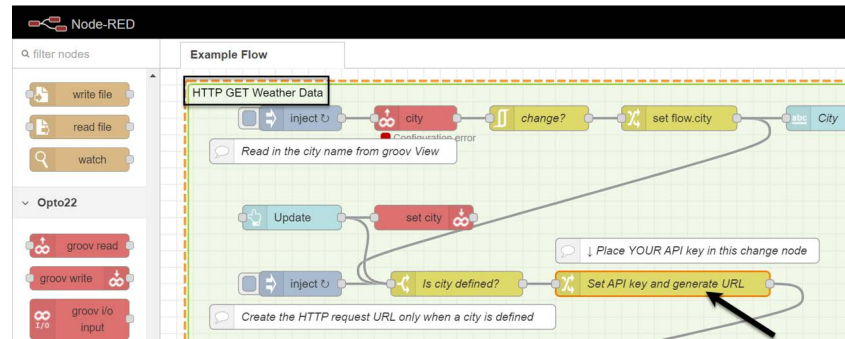
1. In the Example Flow, scroll to the **HTTP GET Weather Data** group (green outline) and double-click the **city** node.



2. In the **Edit groov read node** panel on the right, click the pencil () icon next to the **Data Store** field.
3. In the **Groov Project** field, click the pencil () icon.
4. Press CTRL+V to paste the API key in the **API Key** field (this is the same API key you configured on the **Top_Button** node earlier).
5. Click **Update** > **Update** > **Done** to save your changes.

Set up the OpenWeather API key

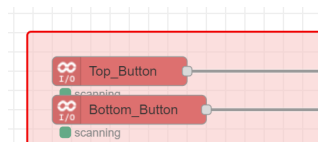
1. Open the text file that has the OpenWeather API key you obtained in “[Create an OpenWeather account and obtain an API key](#)” on page 7 and copy it to the Windows clipboard (highlight the API key and press CTRL+C).
2. In the **HTTP GET Weather Data** group (green outline), double-click the **Set API key and generate URL** node.



3. Under Rules, delete `<YOUR_API_KEY>` in the first **to the value** field and paste (CTRL+V) the OpenWeather API key.
4. Click **Done**.

Deploy the flow

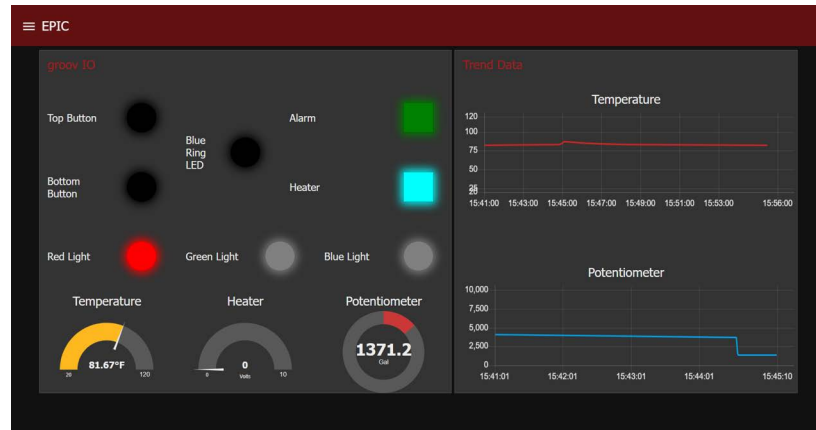
Click **Deploy** in the upper-right corner of the Node-RED Editor. After the flow is deployed, a “scanning” status with a green indicator appears below each Opto22 node in the Node-RED *groov* I/O Dashboard group. This indicates the Node-RED flow is communicating to the configured I/O point.



Run the Node-RED Dashboard

1. Return to the *groov* Manage Home page and click **Node-RED** > **Node-RED Dashboard**.

2. Play with the buttons, potentiometer, and temperature probe on your Learning Center 2 to discover how they change the dashboard as shown in the following image:



RUN THE groov VIEW PROJECT

groov View is a simple tool for building and viewing an operator interface (HMI) on any computer or mobile device with a web browser. To build the HMI, you just drag and drop elements into the HMI and then tag them with the I/O channel or variable they represent. For more information, review the [groov View User's Guide](#) (form 2027).

In the groov View project, the HMI is already built. It runs an HMI for the PAC Control project strategy, and it has Data Stores that work with the Node-RED project flows. When you run the groov View project, it can refresh displayed data when the built-in OPC UA data service is configured to access PAC Control strategy tags and groov I/O memory map values. If you want to run this project, you must install and run the PAC Control strategy first.

The files for this project are in the **groov View Complete** folder in the [groov EPIC Learning Center 2 Package](#).

Start groov View and load the groov View project

1. Access your Learning Center from groov Manage by entering the following in a web browser on your PC:
`https://<hostname or Eth0 IP address>`

Log in if prompted.

NOTE: You may encounter a site security warning when using the Eth0 IP address if the security certificate is set up for the hostname.

2. From the groov Manage Home page, click **groov View**.
3. Verify that **Running** displays in the **Status** field and click **Open groov View**. If groov View is not running, click **Enable** in the **Runtime** field.

NOTE: If you did not activate groov View using the instructions in "Activate the groov EPIC processor" on page 3, you will be prompted to do so or continue in the 2-hour trial mode.

4. In the upper right, click the **Menu** button (⚙️ Menu) and choose **Switch to Build mode**.
5. Click **File > Restore Project from Computer**.

6. In the Restore Project window, click **Browse**. Navigate to the folder where you unzipped the Learning Center 2 Package and open the **groov View Complete** folder.
7. Select the *groov View* project file (ending in `.tar.gz`) and click **Open**.
8. In the Restore Project window, type `groov` for the username and `epic` for the password.
9. Click **Restore** and then click **OK** in the warning message to continue.
10. Click **Close > Close**.

The *groov View* project is uploaded and displayed in *groov Build* mode.

Run and explore *groov View*

You can explore *groov View* not just from the web browser on your computer, but also from a web browser on your mobile phone (or device) and from the *groov EPIC* touchscreen.

*NOTE: If you did not activate your Learning Center (review [page 3](#)), *groov View* will run in trial mode for two hours and then you need to restart it by stopping and starting *groov View* from the *groov Manage* menu.*

From a computer web browser

1. After starting and loading the *groov View* project (review “[Start *groov View* and load the *groov View* project](#)” on [page 11](#)), click **File > Save All Changes and Switch to *groov View*** in your browser. The *groov View* project is now running.
2. Click the navigation icon in the upper left corner. The *groov View* pages are divided into two page categories:
 - *Learning Center*—animated with tags that are connected to the *groov EPIC* Learning Center 2 load panel.
 - *C-Store 022*—animated with simulated data.You can click through the interface to interact with the screen as well as interact with the load panel to observe changes on the *groov View* HMI.

From a mobile phone/device web browser

1. To use your phone or other mobile device to view the HMI, open a web browser and enter the Learning Center 2 hostname or Eth0 IP address of your EPIC processor as the URL:
`https://<hostname or Eth0 IP address>`

NOTE: You may encounter a site security warning when using the Eth0 IP address if the security certificate is set up for the hostname.
2. Log in with the username and password you set up in “[Create an administrator-level user account](#)” on [page 2](#).
3. Select **groovView > Open groovView**.
4. Tap through the interface and interact with the load panel to observe changes on the *groov View* HMI.

From the *groov EPIC* processor touchscreen

1. On the *groov EPIC* touchscreen, tap **groovView**.

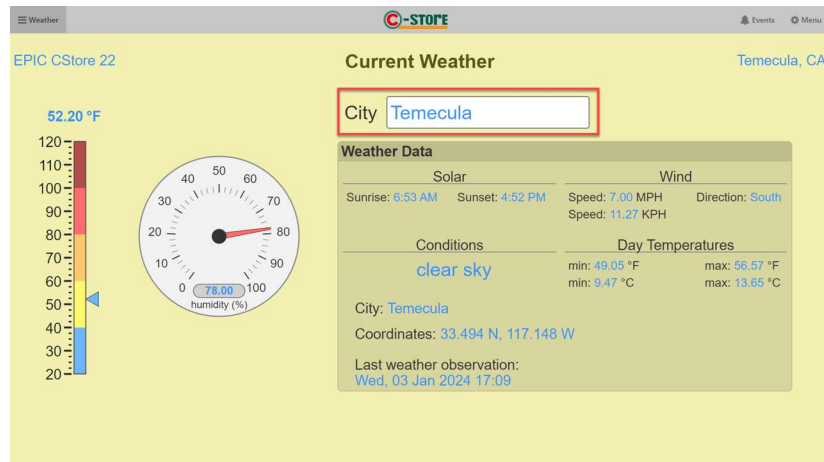
NOTE: If prompted to log in, enter the credentials for the account you created in “[Create an administrator-level user account](#)” on [page 2](#)).
2. Tap **Open groovView**.
3. Tap through the interface and interact with the load panel to observe changes on the *groov View* HMI.
4. To return to the main menu, tap the icon on the top right and tap **groov Manage**.

Display the current weather data of a city in *groov* View

If you established a connection to OpenWeather (review [“Run the Node-RED Project” on page 7](#)), the Weather page in the *groov* View project can be used to display the current weather data of a city you select.

1. Ensure the *groov* View Learning Center project is running (if not, follow the instructions in [“Start groov View and load the groov View project” on page 11](#) to load the project file).
2. Click the navigation icon in the upper left corner and go to the **Weather** page.
3. Click in the **City** field (may currently display **ERROR**).
4. Enter the name of the desired city (such as Temecula), and click **OK**.

The current weather data for that city displays as shown in the following image:



ACTIVATE THE IGNITION EDGE PANEL DEVELOPMENT LICENSE

An Ignition Edge Panel Development license key is included with your *groov* EPIC Learning Center 2. This Development license gives you access to all of the features in Ignition Edge Panel, including:

- No tag or device limitations (with some exceptions)
- IIoT (MQTT) functionality
- Sync Services
- EAM
- Compute
- Historical and event logging (alarming, auditing) for 35 days in your *groov* EPIC’s internal storage
- Local visualization functionality

IMPORTANT: We strongly recommend that you have an internet connection to complete this process. If not, visit the [Inductive Automation licensing activation documentation](#) about offline license activation. The Ignition Edge Panel Development license is solely for evaluation and training purposes, and it is not authorized for commercial or production environments.

Enable and set up Ignition Edge

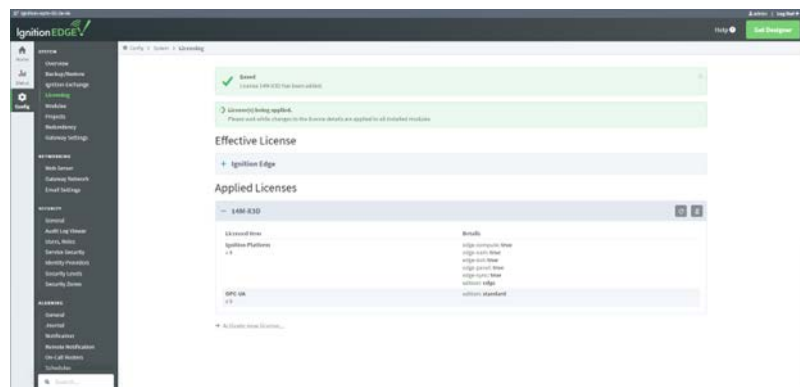
1. From the *groov* Manage Home page, click **Ignition**.
2. Under the Config section, confirm **Platform** displays **Ignition Edge**.
3. Slide the **Enable Ignition Edge** button to the right so it turns green and click **Save**.

4. If a message about the HTTP Port and HTTPS Port values appears, click **OK**.
After a few moments, confirm the **Ignition Edge** field under the Status area displays **Running**.
5. Click **Open Ignition Edge**.
6. From the Inductive Automation Software License Agreement window, select **I have read and agree with the terms and conditions** and click **Next**.
7. Create an Ignition user account with administrative permissions by entering a **Username**, a **Password**, and then click **Next**. Ensure you remember these credentials.
8. From the Configure Ports window, keep the default values for the **HTTP**, **HTTPS Port**, and **Gateway Network Port** fields and click **Finish Setup**.

Activate the Ignition Edge Panel Development license

This procedure provides the steps for **online** (internet connection) license activation. If your EPIC processor does *not* have an internet connection, visit the [Inductive Automation licensing activation documentation](#) for information about **offline** license activation.

1. When prompted, click **Start Gateway**.
The Ignition Gateway starts after a few moments.
2. In the upper right corner, click **Log In**.
3. Enter your **Username** and click **Continue**.
4. Enter your **Password** and click **Continue**.
5. In the upper right corner, click **Activate Ignition**.
6. Click **Activate License**.
7. In the **License Key** field, enter the Ignition Edge Panel Development license key included with your Learning Center and click **Submit**.
8. When an internet connection is detected, click **Activate**.
The license is applied and the applied features are displayed.



For more about working with Ignition Edge, go to the [Ignition Edge](#) courses in Opto 22's free groov EPIC online training (log in with your MyOpto account).

NOTE: Be sure to unactivate Ignition Edge prior to updating groov EPIC firmware and other tasks. For more information, see the [Unactivating Ignition Edge License](#) lesson in the Ignition Edge course.

OPTIONAL: THE CODESYS DEVELOPMENT SYSTEM

The **CODESYS Development System** offers an alternative control programming option to PAC Control for the groov EPIC. You can use CODESYS to create and compile a control program in any IEC 61131-3 compatible language. The CODESYS project includes examples of Ladder Diagram and Structured Text programs. Like the PAC Control project, the CODESYS project runs the logic that controls the devices and sensors on the Learning Center 2 load panel. You can run either a PAC Control strategy or a CODESYS control program on the groov EPIC processor.

IMPORTANT: Starting the CODESYS controller stops the PAC Control control engine and deletes the PAC Control strategy. It will also affect some of the gadgets in groov View that depend on PAC Control tags.

CODESYS stops after a two-hour trial period and needs to be restarted. To avoid an interruption while performing all the steps in this section, you can use a free CODESYS license from Opto 22. Search for **GROOV-LIC-CRE** on the Opto 22 website (opto22.com) and follow the instructions to request one.

For more information about CODESYS, review the [CODESYS OptoU training courses](#) on the Opto 22 website (log in with your MyOpto account).

Install CODESYS

If you want to learn about CODESYS, install the following CODESYS software on your Windows computer:

1. Go to the CODESYS® Store website (us.store.codesys.com or store.codesys.com) and download **CODESYS Development System V3.5.19.20** (32-bit version) or higher. Follow the on-screen instructions to complete the installation.
2. Once installed, go to opto22.com, search for **CODESYS** and select [Opto 22 Library Package for CODESYS Development System](#).
3. On the Opto 22 Library Package page, click **Download** and save the file (.package) to your computer. Ensure you download version **3.1.0.0** or higher.

Load the Project Archive

1. Access your Learning Center from groov Manage by entering the following in a web browser on your PC:
`https://<hostname or Eth0 IP address>`

Log in if prompted.

NOTE: You may encounter a site security warning when using the Eth0 IP address if the security certificate is set up for the hostname.

2. From the groov Manage Home page, choose **Controller > CODESYS Controller**.
3. Click **Enable** in the **Runtime** field to start the CODESYS control engine and click **OK** to confirm. When ready, the **Controller Status** field changes to **Running**.

*NOTE: If you have PAC Control open and a strategy running, click **Ignore** in the warning message. This stops the PAC Control strategy from running. You can close PAC Control if desired.*

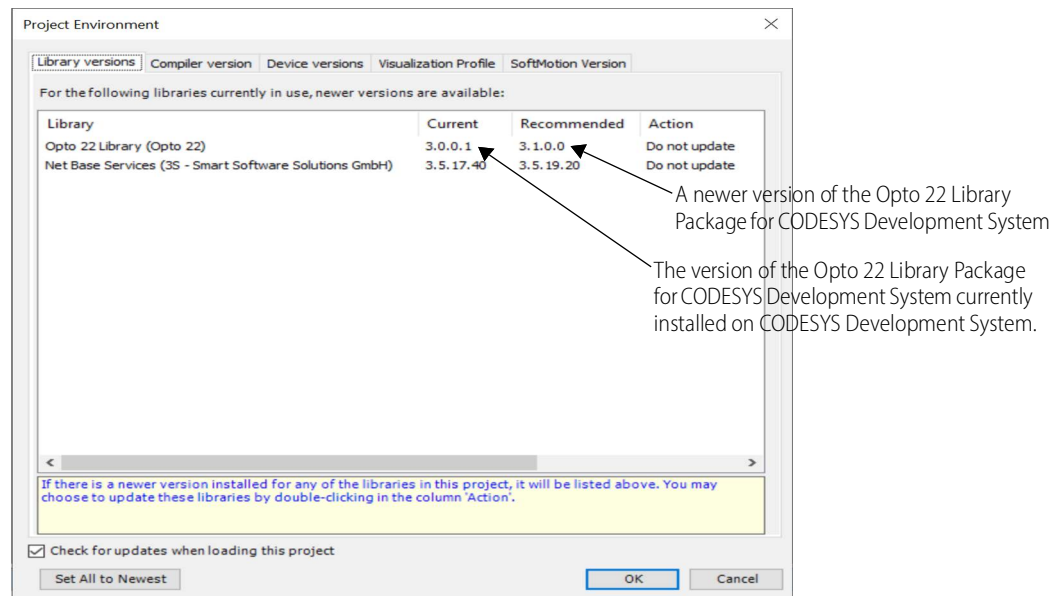
4. Open the CODESYS Development System on your computer.
5. In CODESYS, click **File > Project Archive > Extract Archive**.
6. Navigate to the folder where you unzipped (extracted) the [groov EPIC Learning Center 2 Package](#) and open the **CODESYS Complete** folder.
7. Select the `.projectarchive` file and click **Open**. If prompted, select to open the file in this CODESYS version with different code (do not select the option to install a compatible version).

8. In the Extract Project Archive window, select the **Extract into the same folder where the archive is located** option and click **Extract**.

Update the Opto 22 CODESYS Library and add missing libraries

The CODESYS Development system checks whether the version of the Opto 22 Library Package installed in CODESYS Development System matches the level that was used to create the project file (ending in .project).

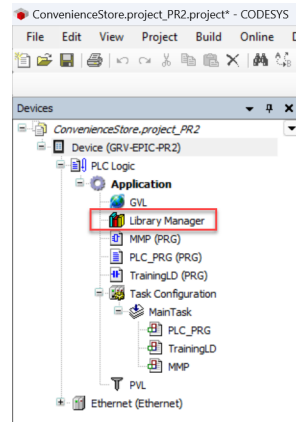
If they do not match, CODESYS displays the Project Environment window:



If this is your first time running CODESYS, you may also need to add any missing libraries after you update the Opto 22 Library Package.

1. In the Project Environment window on the Library Versions tab, double-click **Do not update** in the **Action** column.
2. From the list of actions, choose **Update to...** and click **OK**. The library updates.

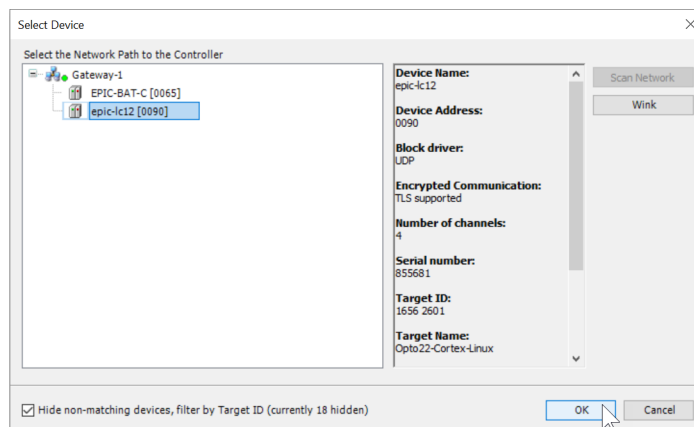
- In the Devices pane, expand **Device > PLC Logic > Application** and double-click **Library Manager**.



- In the Library Manager window, click **Download Missing Libraries**. If you do not have this option, you are not missing any libraries and can continue to [“Configure the GRV-EPIC-PR2 device” on page 17](#).
- In the Download Missing Libraries window, select all libraries listed and click **Download**. Once the download completes, the Library Manager window is updated.

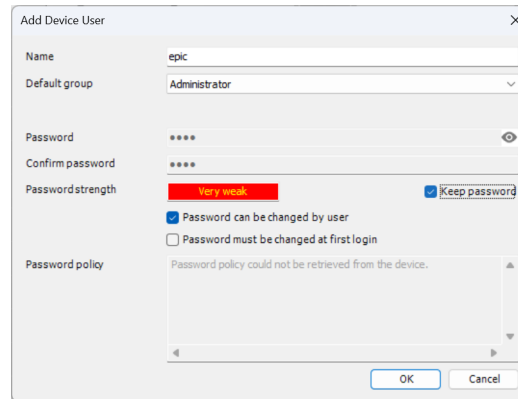
Configure the GRV-EPIC-PR2 device

- In the Devices pane on the left, double-click **Device**.
- Click **Scan Network**.
- In the Select the Network Path to the Controller pane, highlight your control engine and click **OK**.
If your EPIC does not appear, the CODESYS control engine on your EPIC may have been running for more than two hours. In *groov* Manage, choose **Controller > CODESYS Controller**. Disable the CODESYS controller and then click **Enable** to re-enable it. Repeat these steps until you can select your control engine.

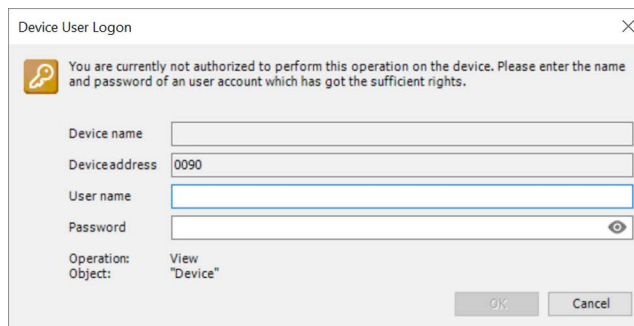


- If a message about the mandatory use of user management appears, click **Yes**.

5. The Add Device User window appears:

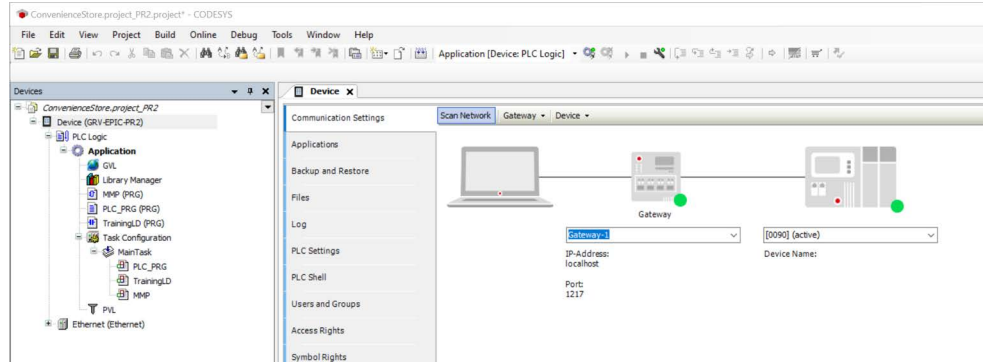


- a. Enter `epic` in the **Name** field.
 - b. Enter `epic` in the **Password** fields.
 - c. Check the **Keep password** option to continue with the current password (you can change it to something stronger later).
 - d. Click **OK**.
6. In the Device User Logon window:



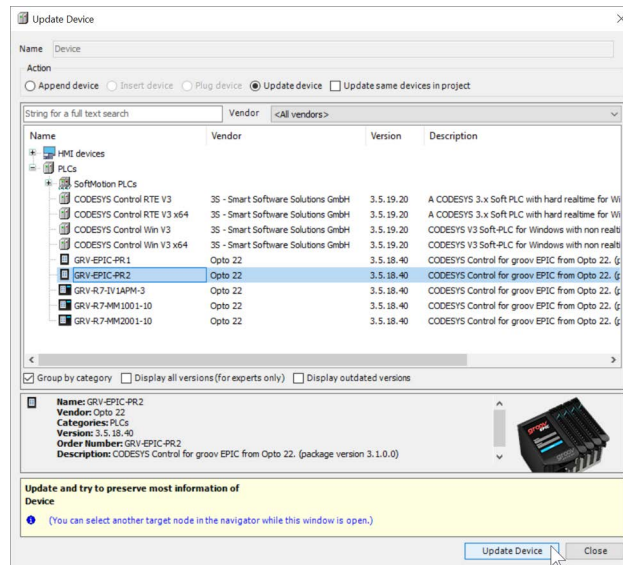
- a. Enter `epic` in the **User name** field.
- b. Enter `epic` in the **Password** field.
- c. Click **OK**.

7. If prompted about upgrading the storage format, click **Yes**. Re-enter the username and password if prompted again.
On the Communications Settings tab of the Device page, a green dot appears next to the Gateway and another green dot next to the PLC image (representing your EPIC):



Update the Device version

1. In the **Devices** pane on the left, right-click **Device (GRV-EPIC-PR2)**, and choose **Update Device**.
2. In the Update Device window, select the **GRV-EPIC-PR2** device under the **Name** category and click **Update Device**. The device's libraries are updated from the Opto 22 Library Package for CODESYS.



3. When the update is finished and the screen refreshes, click **Close**.

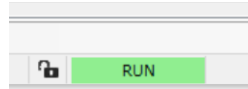
Define the Ethernet device's IP address

1. In the **Devices** pane on the left, double-click **Ethernet (Ethernet)**.
2. On the **General** tab of the Ethernet page, click **Browse** in the **Network interface** field.
If prompted, re-enter the **User name** (*epic*) and **Password** (*epic*), and click **OK**.
3. In the Network Adapters window, select **lo** with **127.0.0.1** listed in the **IP address** column and click **OK**.
4. Click **File > Save Project**.
5. Click **Build > Generate Code**.

The **Messages** field shows warnings and other messages that you can ignore. If there are error messages, you must resolve them before you can run and download the project.

6. Click **Online > Login**.
7. If a warning appears about creating an application that does not exist on the device, click **Yes**. If prompted, enter the **User name** (epic) and **Password** (epic), and click **OK**.
8. If a message appears about the device being unavailable, click **OK**.
9. Click **Debug > Start**.

The green RUN indicator confirms the project is running on your groov EPIC.



Now that the CODESYS application is running, you can do things like set breakpoints, cycle through the ladder diagram, and toggle channels to see how the lights change on the Learning Center load panel.

If you are familiar with PAC Control programming, note that the I/O in the CODESYS project files have the same names as the I/O in the PAC Control project files. You can learn more about creating IEC61131-3 compliant programs and using them with groov View HMI's by following the [CODESYS courses](#) in Opto 22's free groov EPIC online training (log in with your MyOpto account).

TROUBLESHOOTING

Compatibility

Because the Opto 22 product line and online training are always evolving, you may encounter issues if the Learning Center Package you downloaded, the firmware version on the groov EPIC processor in your Learning Center, and the software on your computer are not all compatible.

Check the compatibility below:

If you have this version of the Learning Center 2 Package...	...it works with this version of firmware and software:
3.0.0 or higher	<ul style="list-style-type: none"> groov EPIC firmware 3.5.1 or higher CODESYS Development System 3.5.19 Patch 2 or higher Opto 22 CODESYS Library Package 3.1.0.0 or higher PAC Control 10.5 or higher

To verify the groov EPIC processor firmware version

1. Navigate to **Info and Help > About > System Version**. The required firmware version is **3.5.1-b.85** or higher.
2. Open a new browser tab or window and go to the Opto 22 website (opto22.com).
3. Log into your MyOpto account.
4. Click **MyOpto** at the top of the page and navigate to **Manage groov > Manage**, and under **My groov List**, click **Manage** next to your Learning Center's groov EPIC processor.
5. If the version number of the groov EPIC **Field Update** is higher than your **System Version** number under the **Latest Releases** section, download and install the newer firmware from the website. Follow instructions in the video [Installing a System Update](#) on the Opto 22 website (opto22.com) under **Support > Videos > groov EPIC videos**.

Connecting to your groov EPIC processor

NOTE: Some routers cannot connect using a hostname and require an IP address. If you are unable to connect using the hostname, use the Eth0 IP address of your EPIC processor. You may encounter a site security warning when using the Eth0 IP address if the security certificate is set up for the hostname.

1. Open a browser and enter the hostname or Eth0 IP address of your EPIC processor in the URL. Examples:
`https://<hostname>`
`https://<Eth0 IP address>`
2. Log in with the system user ID and password you created when you first started the Learning Center (in ["Create an administrator-level user account"](#) on page 2).

Finding the groov EPIC hostname

If you didn't note the hostname when you turned on the Learning Center for the first time, you can find it in *groov* Manage: **Home** > **Network** > **Status**.

Recovering forgotten user ID and password for the Learning Center

For security reasons, *groov* EPIC does not provide any way to recover a forgotten password or username. If you do not know the user ID and password of the administrator account created when the Learning Center was first turned on, you must reset the *groov* EPIC processor to factory defaults (review the [groov EPIC User's Guide](#) (form 2267) for instructions).

In any of the following situations, you must create a new administrator account:

- Turning on a new *groov* EPIC Learning Center for the first time
- Turning on a *groov* EPIC Learning Center after installing a firmware update *without* backup settings enabled
- Resetting a *groov* EPIC processor to factory defaults through the RESET pinhole

Follow steps in the online lesson [Activating Your groov EPIC](#) to create the first administrator account. Remember to choose a password that follows strong security recommendations.

Backing up previous work

If you have been using your *groov* EPIC Learning Center and want to preserve your work, follow steps in the [How to Backup, Update Firmware, and Restore Your groov EPIC Unit](#) online course (log in with your MyOpto account).

Calibrating the touchscreen

If a graphic on the EPIC processor's touchscreen is not responding accurately, the touchscreen may need to be calibrated.

1. Log into your *groov* EPIC processor through the touchscreen with a user ID that has administrator permissions.
2. Tap **System**.
3. Tap **Display**.
4. Tap **Calibrate Touchscreen**.
5. Follow the instructions on the screen to run through the calibration exercise (you may be prompted to repeat the exercise).
6. After you successfully complete the exercise and return to the Display page, tap **Save**.

7. When prompted to restart the display, tap **OK**.
8. After the processor restarts, log back in.

I/O mapping

The following table can help you understand how the load panel is mapped to the modules.

I/O Mapping		
Digital Inputs (GRV-IACDCTTL-24)	Digital Outputs (GRV-ODCI-12)	Universal I/O (GRV-MM1001-10)
Ch 0: Top push button, latching	Ch 0: Blue LED ring around bottom push button	Ch 0: ICTD temperature probe
Ch 1: Bottom push button, momentary	Ch 1: Sonalert Alarm	Ch 4: Resistor in ICTD probe
Ch 6: Light rain status (from DO Ch 3)	Ch 3: Light rain	Ch 7: Potentiometer
Ch 8: Light rain status (from DO Ch 4)	Ch 4: Light rain	
Ch 10: Light rain status (from DO Ch 5)	Ch 5: Light rain	
Ch 12: Light rain status (from DO Ch 6)	Ch 6: Light rain	
	Ch 7: Panel light, Red	
	Ch 8: Panel light, Green	
	Ch 9: Panel light, Blue	
	Ch 10: Output, software driven	
	Ch 11: Output, software driven	

FOR HELP

Sources for more information

- [FREE online training](https://training.opto22.com)—available anytime at training.opto22.com
- [Premium Factory Training](#)—hands-on, instructor-led at the Opto 22 factory and headquarters
- [groov EPIC User’s Guide](#) (form 2267)
- [Developer website](https://developer.opto22.com)—more about using CODESYS, Node-RED, APIs, and more at developer.opto22.com
- [OptoForums](#)—help from the Opto 22 customer community



Product Support

If you are having difficulty using the *groov* EPIC Learning Center 2 and cannot find the help you need in this document or on our website, contact Opto 22 Product Support. Product Support is provided by experienced engineers in our Temecula, California, office. Product Support is FREE.

Phone: 800-TEK-OPTO
(800-835-6786 toll-free in the U.S. and Canada)
951-695-3080
Monday through Friday,
7 a.m. to 5 p.m. Pacific Time

Email: support@opto22.com

Opto 22 website: www.opto22.com

NOTE: Email messages and phone calls to Opto 22 Product Support are grouped together and answered in the order received.