

## groov EPIC PROCESSOR

### Features

- > High-resolution LCD display with touch capability for edge configuration and *groov*® View HMI
- > Web-based commissioning, troubleshooting, and HMI
- > Built-in security with encryption, user authentication including LDAP, device firewall, VPN client, and more
- > Pre-loaded software: *groov* Manage, *groov* View, Node-RED, Ignition/Ignition Edge®, and CODESYS® Runtime Engine
- > Programmable with flowcharts and scripting, or IEC 61131-3 compliant languages including ladder diagram, or with C/C++, Python, Java, or other languages using secure shell access (SSH)
- > Dual independent Gigabit Ethernet network interfaces
- > Dual USB ports for serial communication, touchscreen monitors, keyboards, or a mouse
- > HDMI port for external monitors or touchscreen
- > UL Hazardous Locations approved and ATEX compliant

### DESCRIPTION

The **Edge Programmable Industrial Controller** is an embedded Linux® real-time controller with gateway functions, well suited for any automation or industrial internet of things (IIoT) application.

A compact industrial computer, the *groov* EPIC processor features a resistive-touch, high-resolution LCD display for on-the-spot configuration, troubleshooting, and HMI. The LCD display swings open to provide easy access to the power button, power supply connectors, network interfaces, ports, and status LEDs.

- Dual, independent Gigabit Ethernet network interfaces securely segment trusted networks (like your control network) from untrusted networks (like the internet).
- Dual USB ports connect to serial interfaces, WiFi adapters, and keyboard, mouse, and touchscreen controls.
- An HDMI port connects to an external monitor for displaying configuration and *groov* View HMI on an external large screen, useful for local process visualization and OEM applications.

The processor can operate through a wide range of operating temperatures (-20 to 70 °C), and with its industrial design, it can be used in a large variety of applications and operating environments. The CPU is an industrial, quad-core ARM® processor running open-source Linux with real-time extensions.



### groov EPIC processor

With built-in touchscreen display that opens to reveal power button, LEDs, ports, and connectors



### Models

Two *groov* EPIC processors are available. Both have the same features and include the same software, with the following differences:

- **GRV-EPIC-PR1** has 2 GB RAM and 6 GB user space. It ships with Inductive Automation's Ignition & Ignition Edge version 7 pre-installed but can be upgraded to version 8 with a firmware update (license required for either).
- **GRV-EPIC-PR2** has more memory and disk space: 3.75 GB RAM and 22 GB user space. It ships pre-installed with Ignition version 8 (license required). (It cannot run version 7 of the Ignition or Ignition Edge software.)

For included software and license information, see [page 2](#).

For more specifications, see [page 5](#).

### Part Numbers

Part	Description
GRV-EPIC-PR1	Chassis mount processor for the <i>groov</i> EPIC system; ships with Ignition 7, supports Ignition 7 and 8
GRV-EPIC-PR2	Chassis mount processor for the <i>groov</i> EPIC system with increased RAM & storage; supports and ships with Ignition 8
GROOV-LIC-EDGE	Activation key for Ignition Edge software, version 7
GROOV-LIC-EDGE8	Activation key for Ignition Edge software, version 8
GROOV-LIC-CRE	Activation key for CODESYS Runtime Engine software
GROOV-LIC-SHELL	Activation key for secure shell access to Linux operating system

## Software

Both models include the following software:

- **groov Manage** for browser-based management of your *groov* EPIC system, from the integrated front touchscreen display or any browser-based device
- **PAC Project™** Basic Software Suite (installed and running on your Microsoft® Windows® computer) for developing control programs and a Windows-based HMI
- **CODESYS** Development System and Runtime Engine for creating and running **IEC 61131-3** compliant programs. All IEC 61131-3 languages are supported, including Function Block Diagram (FBD), Structured Text (ST), Sequential Function Charts (SFC), and Ladder Diagram (LD). (Requires the free CODESYS Runtime Engine License, [GROOV-LIC-CRE](#).)
- Access to the Linux operating system through a **secure shell** to run custom applications (requires the free SSH License, [GROOV-LIC-SHELL](#))
- **groov View** for building and viewing custom operator interfaces for local, mobile, and browser-based devices
- **Node-RED** for creating data flows to connect cloud services, databases, and APIs through pre-built nodes
- **Ignition** or **Ignition Edge** from Inductive Automation®, running on *groov* EPIC (no PC required):
  - Ignition Edge connects to Allen-Bradley®, Siemens®, and Modbus®/TCP devices via OPC UA and offers efficient IIoT communications using MQTT with Sparkplug B payload (requires purchase of license [GROOV-LIC-EDGE](#) for Ignition Edge version 7 or [GROOV-LIC-EDGE8](#) for version 8).
  - Full Ignition includes MQTT with Sparkplug B, connects to PLCs, adds external access to the OPC UA server, and offers scripting, database support, and a wide array of Ignition modules. [Contact us](#) for Ignition license information.

## Programming

You can run complex control programs on the *groov* EPIC processor developed with any of the following:

- PAC Control, Opto 22's flowchart-based programming language
- CODESYS Development System V3 using any IEC 61131-3 compliant programming language
- Python, C/C++, JavaScript, and other popular software development tools

## Configuration

The *groov* Manage app gives you central access to your *groov* EPIC for configuration, troubleshooting, and commissioning. Use *groov* Manage from your computer, smartphone, tablet, or the *groov* EPIC's touchscreen—the interface is consistent and easy to use on all devices.

In addition to configuring I/O channels for signal inputs and features including PID (proportional-integral-derivative) control loops, you can also set up security, networking, software, and other features in *groov* Manage.

## HMI

*groov* View offers easy browser-based, mobile-ready development of a custom HMI with trending, events, and user notification. Communication is secured with user authentication and TLS encryption. And, because the HMI is web server-based, what you build can be viewed on any authorized device with a web browser.

## The *groov* EPIC System

GRV-EPIC-PR1 and GRV-EPIC-PR2 are part of the *groov* EPIC system, which provides a complete control and communications system at the network's edge, including:

- **I/O.** Connect to field devices and translate their electrical signals into the ones and zeros that computer systems understand. The *groov* EPIC system offers analog, digital, and serial functions, including thermocouple linearization, local PID loop control, watchdog, totalizing, and much more.
- **Control.** Automate equipment and systems at the network's edge. Create flowchart-based control strategies, IEC 61131-3 compliant programs, or custom-developed applications with popular software development tools.
- **Connectivity and Data Handling.** Acquire, move, and share data from industrial systems, legacy equipment, business and IT systems, and the cloud through a variety of connecting technologies like Node-RED, RESTful APIs, and Ignition SCADA.
- **Visualization.** Securely monitor, control, and use data as you need it—locally, on premises, or from anywhere using *groov* View. Authorized users can view your operator interface on the *groov* EPIC's touchscreen, a mobile device, a computer, or anything with a web browser.

The system includes processor, software, I/O modules, chassis, and power supply.

- The chassis holds the power supply, processor, and selected, modular I/O modules you need for your application. For more information, see the [groov EPIC Chassis Data Sheet \(form 2247\)](#).
- Power supplies are available for AC power, DC conversion, and pass-through connections from a DC power supply you already own. For more information, see the [groov EPIC Power Supplies Data Sheet \(form 2246\)](#).
- The *groov* I/O modules connect a variety of field devices to your *groov* EPIC system. The table on the next page lists the available I/O modules and the form numbers to learn more about them.

## groov I/O MODULES

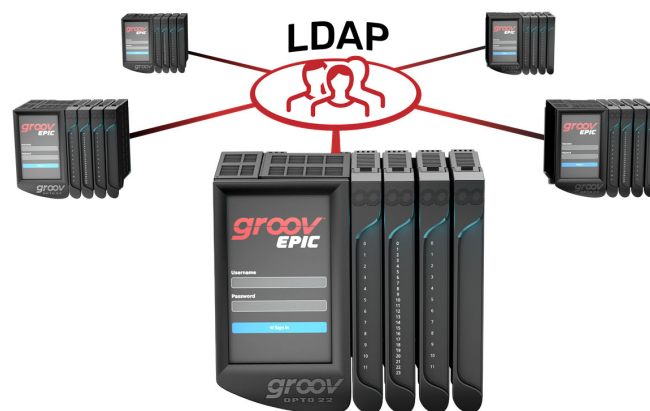
Module description	Part numbers	Form number
groov 115 VAC Input Modules	GRV-IAC-24, GRV-IACS-24, GRV-IACI-12, GRV-IACIS-12	2226
groov 180–280 VAC Input Modules	GRV-IACHV-24, GRV-IACHVS-24, GRV-IACIHV-12, GRV-IACIHVS-12	2222
groov DC Input Modules	GRV-IDC-24, GRV-IDCS-24, GRV-IDCI-12, GRV-IDCIS-12, GRV-IDCIFQ-12, GRV-IDCSW-12	2236
groov 2–16 VAC VDC Input Modules	GRV-IACDCTL-24, GRV-IACDCTL-24	2237
groov 12–250 VAC Output Modules	GRV-OAC-12, GRV-OACI-12, GRV-OACS-12, GRV-OACIS-12	2231
groov 5–60 VDC Output Modules	GRV-ODCI-12, GRV-ODCIS-12	2238
groov DC Output Sourcing Module	GRV-ODCSRC-24	2242
groov Mechanical Relay Output Module	GRV-OMRIS-8	2243
groov ICTD Temperature Input Module	GRV-IICTD-12	2300
groov Thermistor/Resistor Input Module	GRV-IRTD-8, GRV-ITR-12	2301
groov Analog Current Input Module	GRV-IMA-24, GRV-IMAI-8	2239
groov Analog Thermocouple/Millivolt Input Module	GRV-ITM-12, GRV-ITMI-8	2240
groov Analog Voltage Input Module	GRV-IV-24, GRV-IVI-12, GRV-IVIRMS-10	2241
groov Analog Voltage and Current Output Module	GRV-OVMALC-8, GRV-OVMAILP-8	2244
groov Multifunction Mixed Signal Module	GRV-MM1001-10	2353
groov Power Monitor Module	GRV-IVAPM-3	2351
groov Serial Module	GRV-CCANI-2, GRV-CSERI-4	2296

## SECURITY

Designed for secure data communication, *groov* EPIC processors help you create and maintain a secure system with features like these:

- **Two independent network interfaces**—Use one for your trusted network and the other for an untrusted network, like the internet. Plug in a compatible USB-to-Wifi adapter and add a wireless network. Data cannot pass between networks.
- **Data encryption**—Out of the box, all connections to *groov* EPIC from your computer or mobile device are encrypted using SSL/TLS. So is the data EPIC communicates to on-premises or cloud-based software, systems, and services.
- **Device firewall and security certificates**—You have control over firewall ports on *groov* EPIC and can upload server and client security certificates as needed.
- **VPN client**—Data on *groov* EPIC can be securely accessed from remote locations through a virtual private network, using the built-in Open VPN client.
- **Controlled user access**—From the time you first turn it on, *groov* EPIC requires user authentication. You control all user accounts and groups. And you can scale up your control system more easily by configuring *groov* EPICs to connect to your LDAP-compatible directory service. With **LDAP**, your IT staff can manage all users for all EPICs from a central place. Centralized user

management can also help satisfy data integrity requirements in regulated industries.



- **MQTT/Sparkplug B**—Communicate data more securely and efficiently using device-originated, outbound connections between *groov* EPIC and an MQTT broker located either on premises or in the cloud. For more on MQTT, see [Getting Started with MQTT in groov Products](#) (form 2350).

- **OptoSupport Remote Support Service (RSS)**—If problems arise, you can use OptoSupport RSS to create a secure, encrypted connection between your *groov* EPIC and Opto 22's support team, so they can remotely help diagnose and troubleshoot. The remote connection can only be started by you, and only after you and an Opto 22 support team member have determined that the best way to help you is through a remote connection.

## REMOTE I/O TOOLS

*groov* Manage provides a robust complement of features to configure EPIC as remote I/O:

- **Easy I/O configuration**—With just a few clicks, you can:
  - Configure Digital inputs/outputs with features like latches
  - Configure Analog inputs/outputs with features like scaling
  - Enable and disable Watchdogs
  - Configure features like temperature units for the entire chassis.
- **PID configuration**—Configure PIDs, then monitor and change values directly on the touchscreen or through a browser. In the browser, you can view trends and then adjust scaling to view trends over a long period of time or zoom in on specific values or axes.
- **Scratch Pad**—Peer-to-peer communication of values: define your area and then set the values through *groov* Manage.
- **Generic MMP**—Look up and change values in OptoMMP memory map areas.
- **MMP and Modbus Calculators**—Need help calculating the hexadecimal address of the Analog Channel Write area of the OptoMMP map for the fourth channel of the third module? Or, how about converting it to the correct Modbus Unit ID and register? These two calculators can help.

## NETWORKING CAPABILITY AND TOOLS

*groov* EPIC provides dual, independent Gigabit Ethernet network interfaces, helping you connect to up to two different networks. Plug in a compatible USB-to-WiFi adapter and you can expand connectivity to include a wireless network. Set up an OpenVPN server (on-site or in a cloud) and create a Virtual Private Network (VPN) connection to your *groov* EPIC with the on-board OpenVPN client.

You can connect to a single, flat network right-out-of-the-box: insert an Ethernet cable to ETH0 and turn on *groov* EPIC. Have a slightly more complex network or need to fine-tune some network settings? *groov* EPIC provides networking capabilities so that your IT department can:

- Add or override existing DNS server IP addresses, domain names, and Gateway IP addresses assigned by DHCP servers, plus manage their query order.
- Enable port redirect to control the flow of network traffic to, through, and out of the network interfaces.

If you encounter any issues, on-board networking tools can help you diagnose them:

- **Ping**—A commonly used tool to test basic connectivity from each of the *groov* EPIC processor's interfaces.
- **Test TCP Port**—Helps determine if a port on a particular server is open or closed.
- **Traceroute**—A tool to help you see the route a packet takes to reach its destination.
- **Nslookup**—Determine the domain name and IP address of a DNS server at the host.

## SYSTEM COMPATIBILITY

The *groov* EPIC system is compatible with many other Opto 22 products:

- Your *groov* EPIC processor is fully compatible with [groov RIO](#) Ethernet-based edge I/O modules. EPIC can use them not only as traditional remote I/O but also for exchanging data with sensors and devices that *groov* RIO is wired to and applications it connects to. See the [groov RIO Data Sheet](#) (form 2317), for more information on these capable multifunction, multi-signal I/O industrial units.
- A *groov* EPIC processor running a PAC Control strategy can also use existing SNAP PAC I/O units as remote I/O.
- If you already have a SNAP PAC controller running a PAC Control strategy and need additional capabilities in your system, you can add *groov* EPIC for remote I/O and to easily connect with PLCs, enterprise software, and cloud services for IIoT applications.

## SPECIFICATIONS

Specification	GRV-EPIC-PR1	GRV-EPIC-PR2
Power requirements	7.1 W typical, 9.1 W max.	
Memory	2 GB RAM 2 MB battery-backed RAM 6 GB user space	3.75 GB RAM 2 MB battery-backed RAM 22 GB user space
Backup battery for real-time clock	BR2032	
Screen size and resolution	5 inches diagonal; 480 x 800 pixels	
Ethernet Communication (wired)	Two independent 10/100/1000 Mbps RJ-45 connectors, each with a separate IP address (separate IP networks). Supports Auto MDI-X (crossover cable not needed).	
USB	USB 2.0 (two ports; can be used to connect serial devices via a USB-to-serial converter with an FTDI chipset)	
HDMI	Connector Type: A. HDMI Specification: Version 1.4a. Max. Resolution: 1920 x 1080 pixels at 60 Hz	
Minimum PAC Project Version	10.000	10.3003
Minimum Opto 22 Library Package For CODESYS Version	1.0.0.0	2.0.1.0
Ignition & Ignition Edge Versions	7; 8 with firmware upgrade	8 only
Maximum Number of PAC Control Engine Charts	64	64
Torque, bottom hold-down screw	3.5 in-lb (0.4 N-m)	3.5 in-lb (0.4 N-m)
Torque, top hold-down screw	1.5 in-lb (0.17 N-m)	1.5 in-lb (0.17 N-m)
Operating temperature	-20 °C to +70 °C	-20 °C to +70 °C
Storage temperature	-40 °C to +85 °C	-40 °C to +85 °C
Humidity	5–95% RH	5–95% RH
MTBF (minimum, 25 °C)	900,000 hours	750,000 hours
Agency approvals and certifications	UL/cUL (Class 1 Div. 2 <sup>a</sup> ), CE, ATEX (Category 3, Zone 2), RoHS, DFARS, UKCA	
Warranty	30 months	30 months

a. For use in hazardous locations, equipment must be mounted in an enclosure that meets the requirements of the National Electrical Code, ANSI/NFPA 70, and ANSI/ISA-61010-1 (82.02.01).

## Device Compatibility

The following USB devices have been tested to be compatible with *groov* EPIC processors for the function listed.

### Serial communication

The following USB-to-serial adapters have been tested and proven to be compatible with *groov* EPIC:

Device Manufacturer	Model
B&B Electronics	USOPTL4 (isolated RS-485)
	USPTL4 (non-isolated RS-485)
	USO9ML2 (isolated RS-232)
Gearmo	GM-482422 (non-isolated RS-485/RS-422)
	GM-FTD1-A12 (non-isolated RS-232)
	SERIAL-B (non-isolated RS-232)

### Wireless communication

The following WiFi USB adapters have been tested and proven to be compatible with *groov* EPIC:

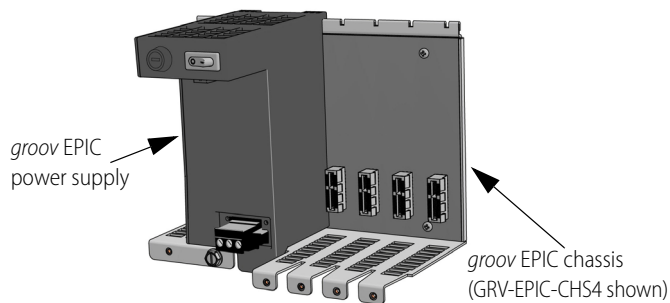
Device Manufacturer	Model
Netis®	WF2180
	WF2190



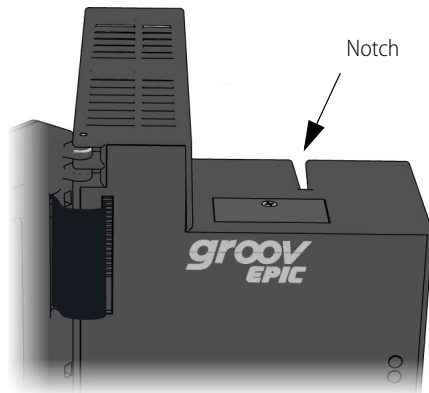
## INSTALLING AND REMOVING THE PROCESSOR

### Installing the Processor

1. Make sure you installed the power supply according to the directions in the [groov EPIC Power Supplies, Converters, and Adapters Data Sheet](#) (form 2246).



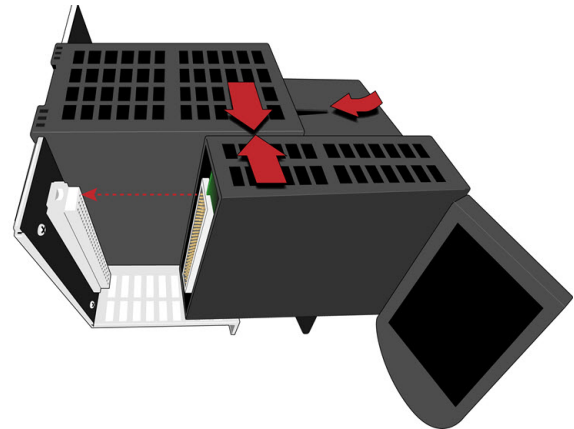
2. Review "Processor orientation" on page 8 to understand which side of the processor is the top, underside, back, and face.
3. Lift open the LCD display so you can see the notch on the top side of the processor.



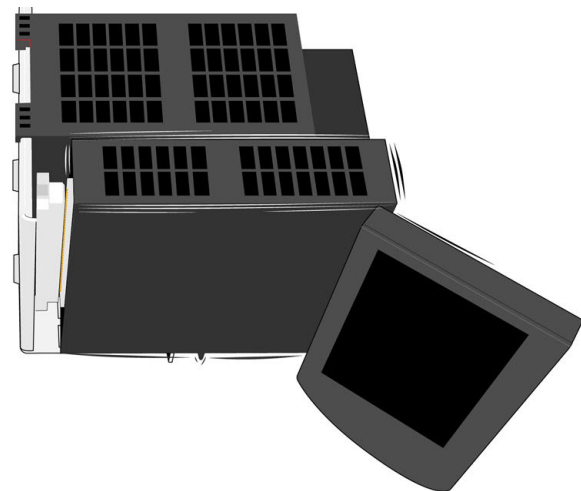
4. Hold the processor by the left side, and make sure that the notch on the processor aligns with the guide tab on the power supply.



5. **Align the connectors.** With the LCD display open, slowly guide the processor straight onto the chassis—holding it flush against the side of the power supply—until you feel the processor start to touch the connector on the chassis.

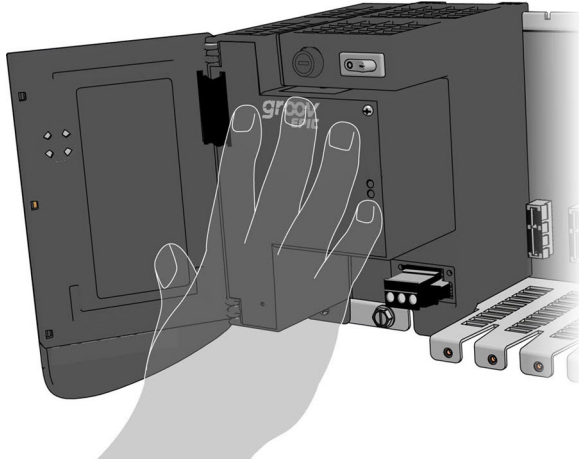


When it touches, lightly jiggle the processor to help the pins on the processor's connector properly align themselves into the holes of the chassis' connector.

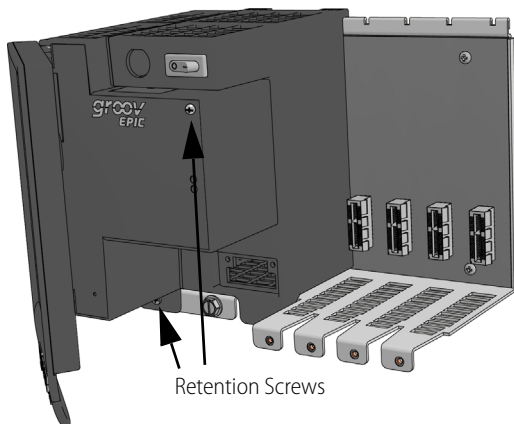


6. **Seat the processor.** Push the processor (not the LCD display) into the connector until it resists further pressure.

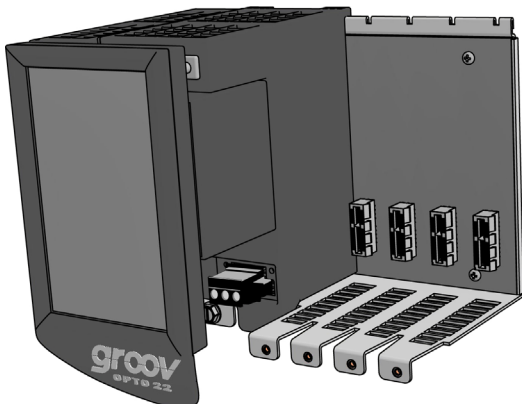
**IMPORTANT:** Do not push on the LCD display.



7. Tighten the retention screws that attach the processor to the power supply and the chassis to the recommended torque listed in "Specifications" on page 5.



8. Close the LCD display.

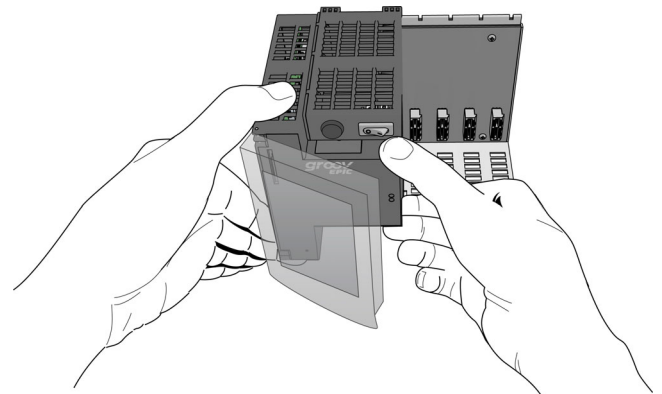


## Removing the Processor

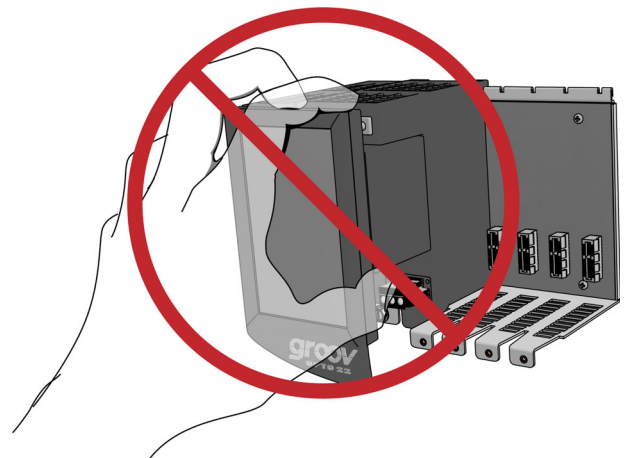
1. Lift the LCD display so that you can access the retention screws and power switch.
2. Turn off the unit.

**IMPORTANT:** Do not attempt to remove the processor and power supply as a single unit.

3. Remove the retention screws that attach the processor to the power supply and the chassis.
4. Hold the processor with both hands, one hand on the left side and the other hand at the top



**IMPORTANT:** Do not attempt to remove the processor by grasping the screen.



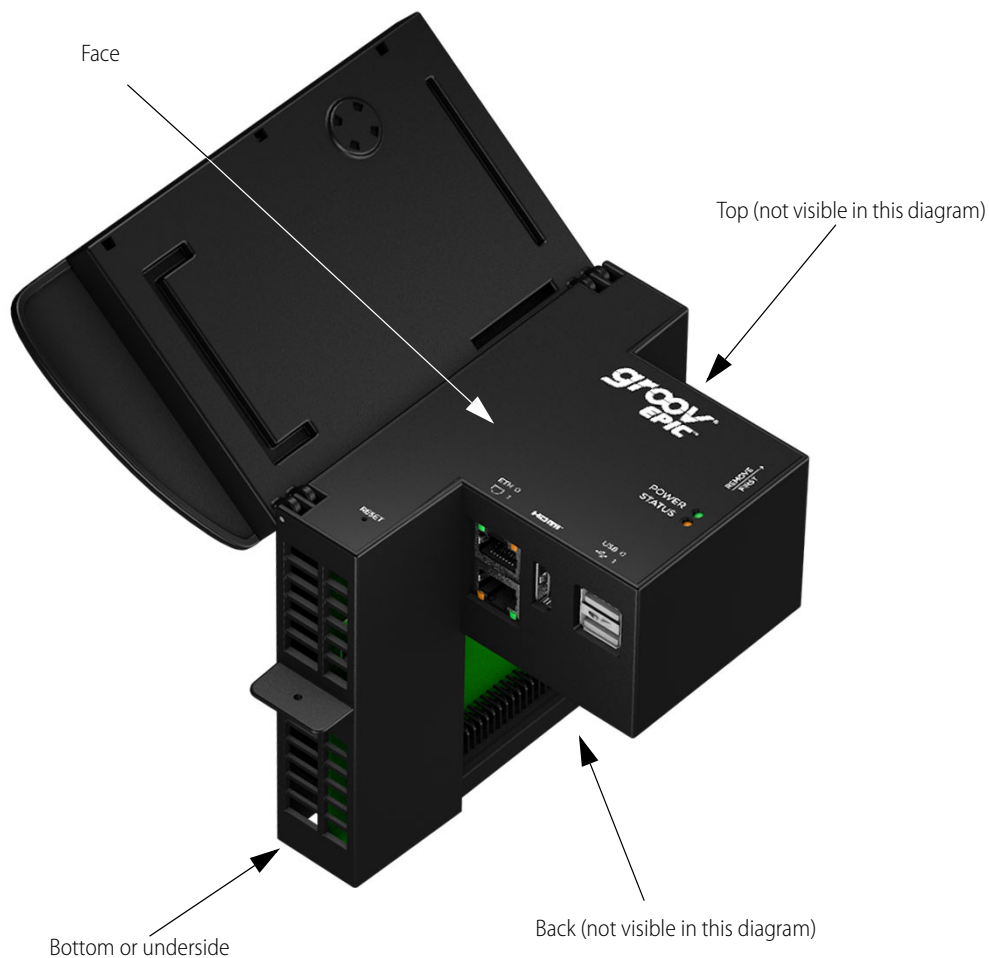
5. Pull the processor straight out. Do not wiggle the processor.

**IMPORTANT:** Handle and carry the processor only by the plastic case. Do not touch any of the exposed circuitry.

6. Close the LCD display.

## PROCESSOR ORIENTATION

The following diagram identifies which side of the processor is the bottom or underside, the face, the top and the back. This helps orient you when you are reading the installation and removal instructions.





## LCD DISPLAY

The LCD display features resistive-touch capability, which means you can manipulate the display with gloved fingers or a stylus (not included).

The LCD display is your window to both your control system and HMI. With *groov* Manage, you can:

- Configure and troubleshoot all *groov* I/O modules mounted on the chassis, including I/O channel signal inputs and features like PID control loops.
- Configure the EPIC's Ethernet network interfaces and device firewall, and create rules to control access to its ports.

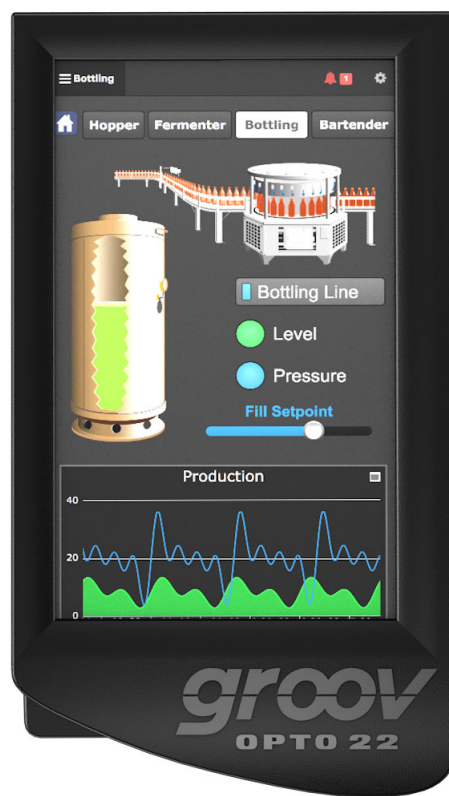
- View the current state of input channels and set the state of output channels.
- Access a library of information about all *groov* I/O modules available through Opto 22, including specifications and wiring diagrams.
- Review logs for troubleshooting.

The LCD display also shows your *groov*View HMI, which you can build and configure within your web browser on your PC. This HMI is also available to authorized users on computers and mobile devices.

*groov* Manage



*groov* View HMI



LEDs, NETWORK INTERFACES, AND PORTS

The diagram below describes the LEDs, network interfaces, and ports on the *groov* EPIC processor. All of these interfaces and indicators are easily accessed by lifting the hinged LCD display. When the LCD display is closed, it does not interfere with cables connecting the processor to external devices such as an external monitor. For more information about LEDs, network interfaces, and ports, see [groov EPIC User's Guide](#) (form 2267).

LEDs

LED	Indicates
SPEED LED	Indicates link speed (Off = 10 Mbps, Green = 100 Mbps, Orange = 1000 Mbps)
LINK ACT LED	Indicates link status or activity (on/solid = link present, blinking = link present and local activity)
POWER LED	Indicates status of power (Green = on; Red = on, resetting)
STATUS LED	Indicates whether the unit is running with full functionality. (Green = all normal; blink green and red = starting a restore to defaults)

Ports

The HDMI port offers a connection to an external monitor, such as an HDMI-ready touch-screen monitor, so that you can display *groov* Manage or your *groov*View HMI on a separate screen.

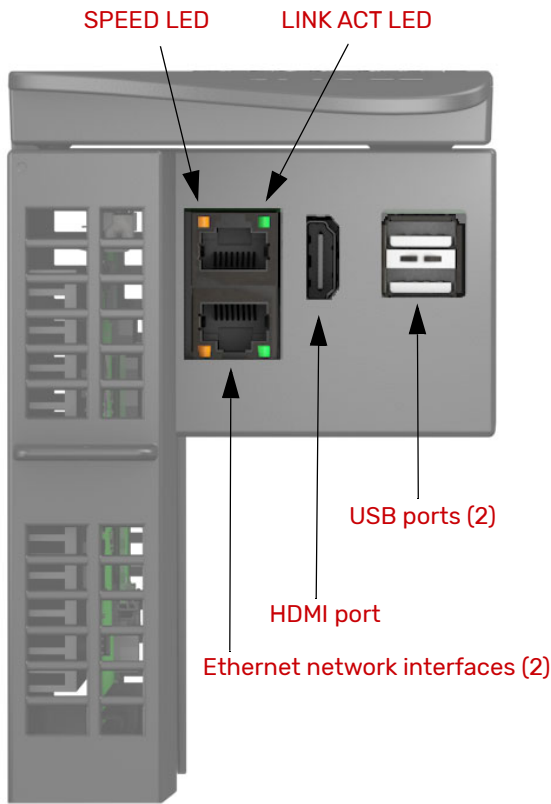
The two USB ports offer several ways to extend the capabilities of the processor. You can connect:

- Serial devices via a USB-to-serial converter
- A mouse, keyboard, or both to make it easier to type in data and navigate through the screens
- WiFi adapters to add wireless connectivity

For device compatibility information, see ["Device Compatibility"](#) on page 5.

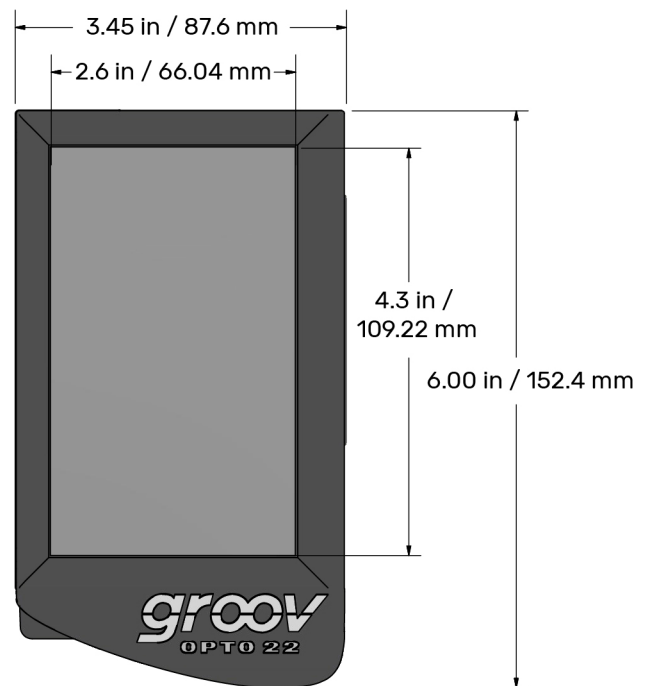
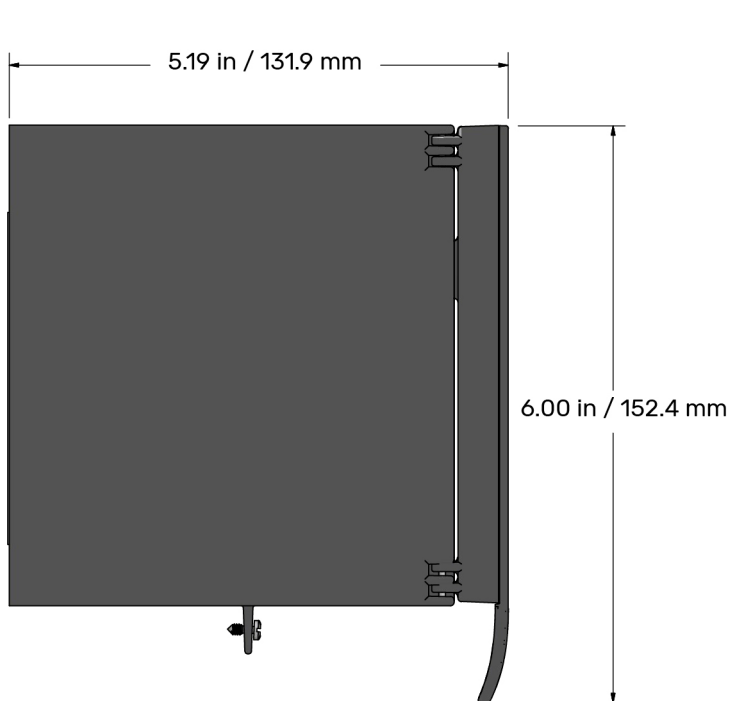
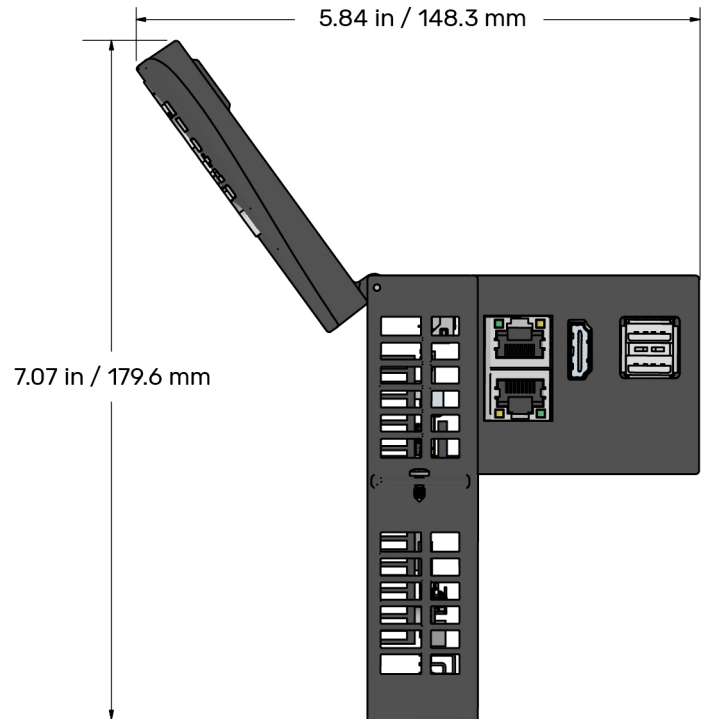
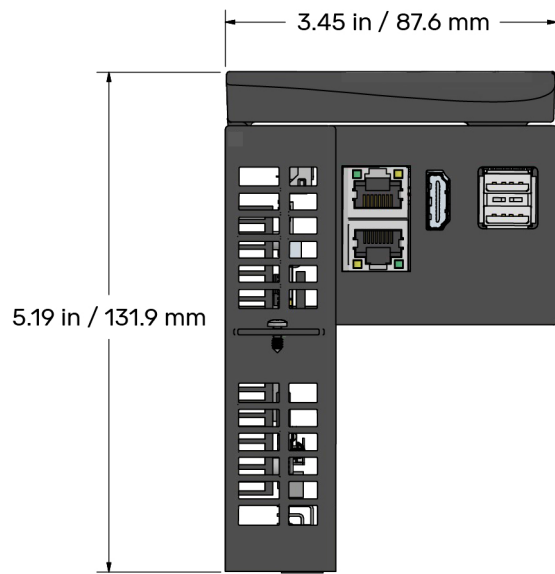
Independent Ethernet Network Interfaces

The Ethernet network interfaces are independent, which means they are not connected internally. Each requires its own IP address, and the two interfaces must be on different subnets.

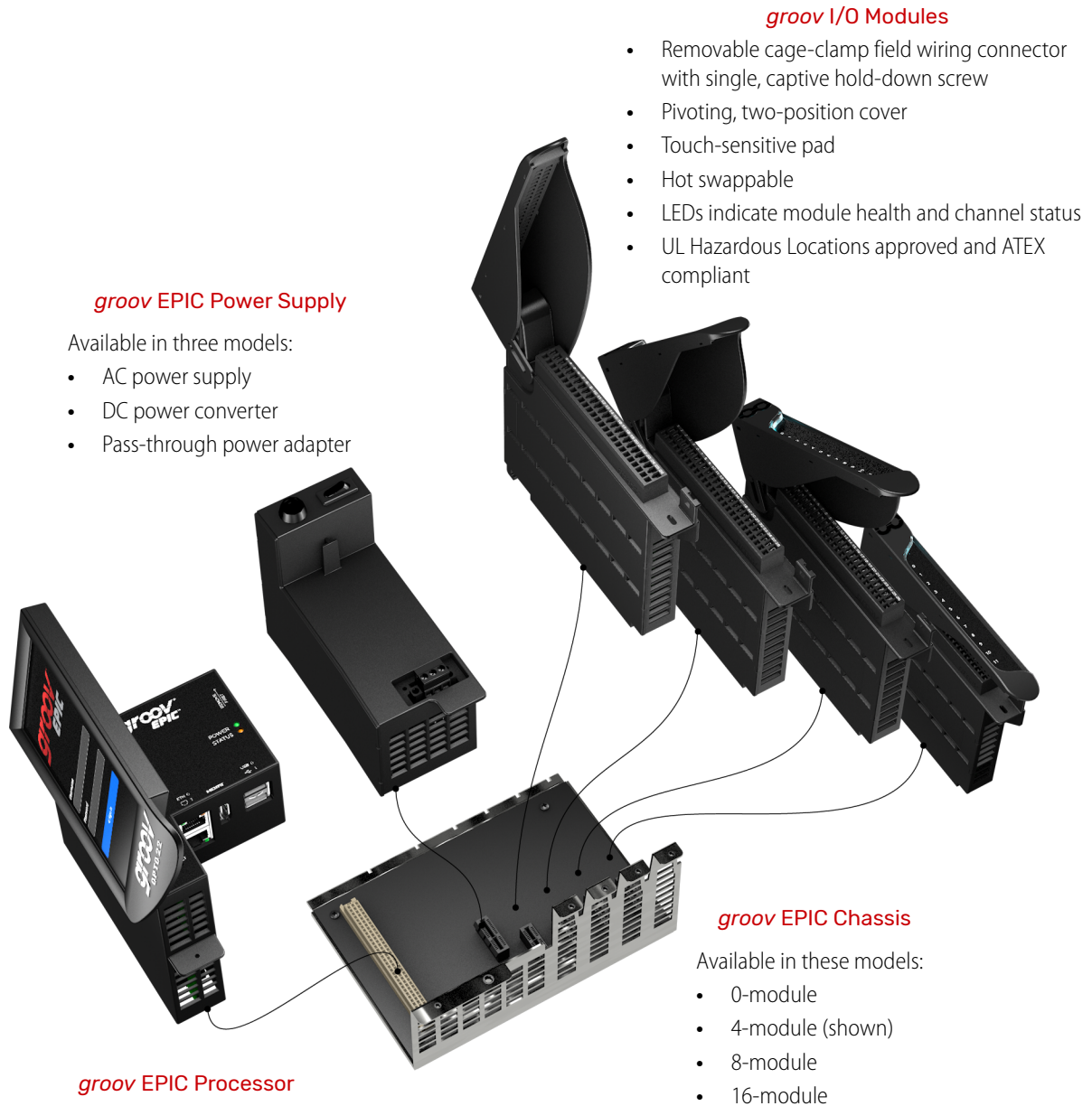


## DIMENSIONS: GRV-EPIC-PR1 AND GRV-EPIC-PR2

The processor features an LCD display that swings open and closed. The diagram to the right shows the LCD display open to its fullest extent. The diagram below shows the LCD display closed.



## HARDWARE ARCHITECTURE



### groov EPIC Power Supply

Available in three models:

- AC power supply
- DC power converter
- Pass-through power adapter

### groov I/O Modules

- Removable cage-clamp field wiring connector with single, captive hold-down screw
- Pivoting, two-position cover
- Touch-sensitive pad
- Hot swappable
- LEDs indicate module health and channel status
- UL Hazardous Locations approved and ATEX compliant

### groov EPIC Processor

- Web-based commissioning, troubleshooting, and groov View HMI
- Compatible with PAC Project Basic (installs on Windows computer)
- Pre-installed software: *groov* Manage, *groov* View, Node-RED, Ignition, and CODESYS Runtime Engine
- LCD touch display
- Dual USB ports for serial communications or touchscreen monitors
- HDMI port for external monitors, touchscreens, and WiFi adapters
- Dual independent Gigabit Ethernet network interfaces
- Supports up to 16 groov I/O modules
- Available in two models: GRV-EPIC-PR1, GRV-EPIC-PR2

### groov EPIC Chassis

Available in these models:

- 0-module
- 4-module (shown)
- 8-module
- 16-module

## PRODUCTS

Opto 22 develops and manufactures reliable, easy-to-use, open standards-based hardware and software products. Industrial automation, process control, remote monitoring, data acquisition, and industrial internet of things (IIoT) applications worldwide all rely on Opto 22.

### groov RIO®

*groov RIO edge I/O* offers a single, compact, PoE-powered industrial package with web-based configuration and IIoT software built in, support for multiple OT and IT protocols, and security features like a device firewall, data encryption, and user account control.

Standing alone, *groov RIO* connects to sensors, equipment, and legacy systems, collecting and securely publishing data from field to cloud. Choose a universal I/O model with thousands of possible field I/O configurations, with or without Ignition from Inductive Automation®, or a *RIO EMU energy monitoring unit* that reports 64 energy data values from 3-phase loads up to 600 VAC, Delta or Wye.

You can also use *groov RIO* with a Modbus/TCP master or as remote I/O for a *groov EPIC* system.

### groov EPIC® System

Opto 22's *groov Edge Programmable Industrial Controller (EPIC) system* gives you industrially hardened control with a flexible Linux®-based processor with gateway functions, guaranteed-for-life I/O, and software for your automation and IIoT applications.

### groov EPIC Processor

The heart of the system is the *groov EPIC* processor. It handles a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

In addition, the EPIC provides secure data communications among physical assets, control systems, software applications, and online services, both on premises and in the cloud. No industrial PC needed.

Configuring and troubleshooting I/O and networking is easier with the EPIC's integrated high-resolution color touchscreen. Authorized users can manage the system locally on the touchscreen, on a monitor connected via the HDMI or USB ports, or on a PC or mobile device with a web browser.

### groov EPIC I/O

*groov I/O* connects locally to sensors and equipment. Modules have a spring-clamp terminal strip, integrated wireway, swing-away cover, and LEDs indicating module health and discrete channel status. *groov I/O* is hot swappable, UL Hazardous Locations approved, and ATEX compliant.

### groov EPIC Software

The *groov EPIC* processor comes ready to run the software you need:

- Programming: Choose flowchart-based PAC Control, CODESYS Development System for IEC61131-3 compliant programs, or secure shell access (SSH) to the Linux OS for custom applications
- Node-RED for creating simple IIoT logic flows from pre-built nodes
- Efficient MQTT data communications with string or Sparkplug data formats
- HMI: *groov View* to build your own HMI viewable on touchscreen, PCs, and mobile devices; PAC Display for a Windows HMI; Node-RED dashboard UI
- Ignition or Ignition Edge® from Inductive Automation (requires license purchase) with OPC-UA drivers to Allen-Bradley®, Siemens®, and other control systems, and MQTT communications



### Older products

From solid state relays, to world-famous G4 and SNAP I/O, to SNAP PAC controllers, older Opto 22 products are still supported and working hard at thousands of installations worldwide. You can count on us for the reliability and service you expect, now and in the future.

## QUALITY

Founded in 1974, Opto 22 has established a worldwide reputation for high-quality products. All are made in the U.S.A. at our manufacturing facility in Temecula, California.

Because we test each product twice before it leaves our factory rather than testing a sample of each batch, we can afford to guarantee most solid-state relays and optically isolated I/O modules for life.

## FREE PRODUCT SUPPORT

Opto 22's California-based Product Support Group offers free technical support for Opto 22 products from engineers with decades of training and experience. Support is available in English and Spanish by phone or email, Monday–Friday, 7 a.m. to 5 p.m. PST.

Support is always available on our website, including [free online training](#) at OptoU, how-to [videos](#), [user's guides](#), the Opto 22 KnowledgeBase, and [OptoForums](#).

## PURCHASING OPTO 22 PRODUCTS

Opto 22 products are sold directly and through a worldwide network of distributors, partners, and system integrators. For more information, contact Opto 22 headquarters at **800-321-6786** (toll-free in the U.S. and Canada) or **+1-951-695-3000**, or visit our website at [www.opto22.com](http://www.opto22.com).