

## Edge Programmable Industrial Controller



# OPTO 22

Your Edge in Automation.™



# This is EPIC.

The world's first  
Edge Programmable Industrial Controller

## groov EPIC processor

Real-time, open-source Linux® OS

Industrial quad-core ARM® processor

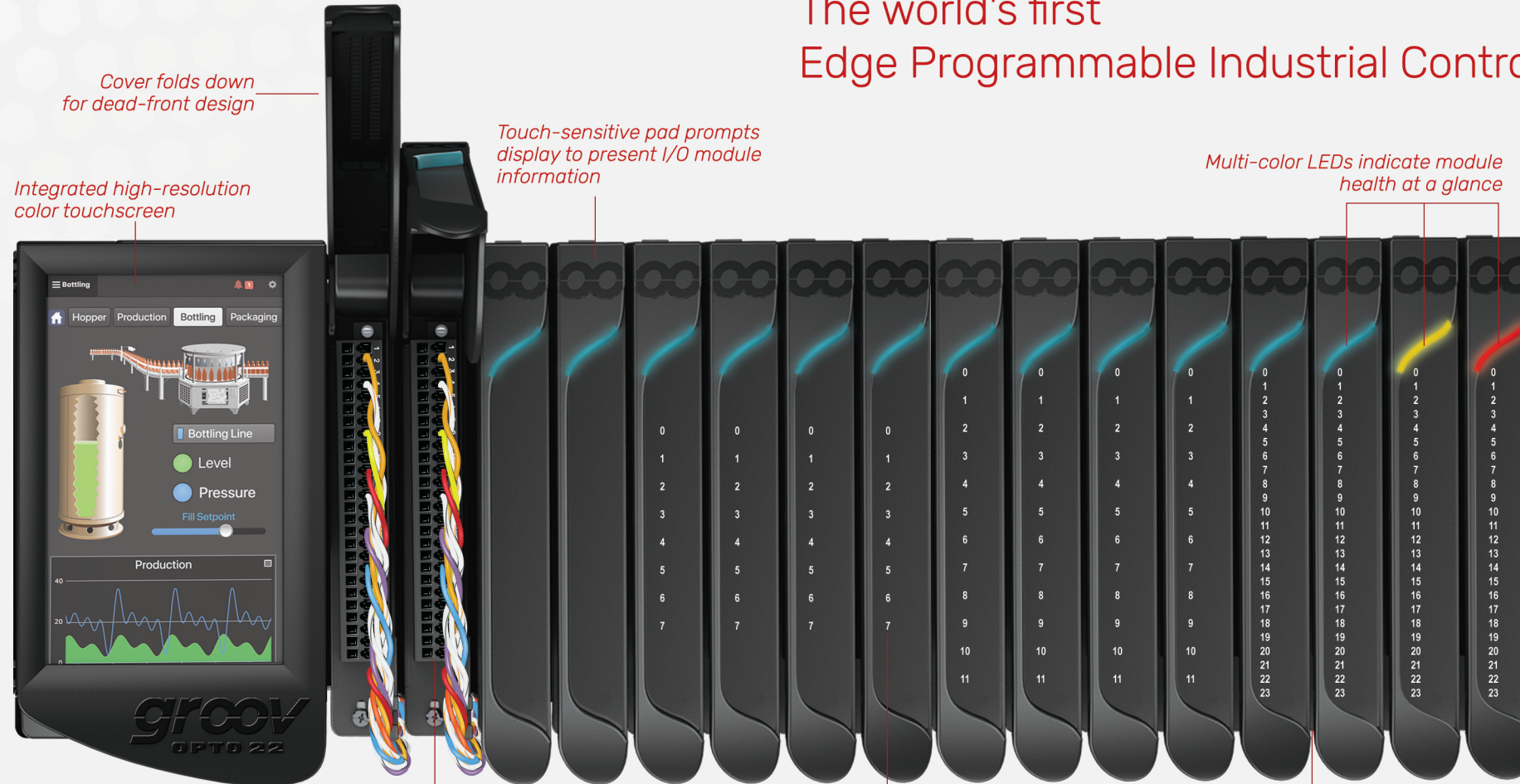
Configuration, troubleshooting, and  
HMI on touchscreen or remotely  
through web browser

Dual, independent Gigabit Ethernet network  
interfaces for designing secure systems

Dual USB ports for serial communications,  
touchscreen monitors, or Wi-Fi adapters

HDMI output for optional external monitor

Wide -20 to 70 °C operating  
temperature range



## groov I/O

4 to 24 channels per module

4, 8, or 16 position stainless-steel chassis

Hot-swappable I/O

Multi-featured analog output with voltage,  
current, and loop sourcing in one module

Analog inputs offer 20-bit resolution  
at 0.1% accuracy over span

DC outputs: load switching at 0.4 amps  
per channel @ 70°C

AC outputs: load switching at 0.5 amps  
per channel @ 70°C; blown-fuse detection

AC/DC outputs: mechanical relay at  
5 amps per channel @ 70 °C

Channel-to-channel isolation available

UL Hazardous Locations approved and  
ATEX compliant

**Guaranteed-for-life I/O**

## groov I/O module

Spring-clamp removable  
connector with captive  
hold-down screw

Single module  
retention screw and strain relief  
tab

## What is EPIC?

**Edge** – Collect, process, view, and exchange data where it's produced—at the edge of the network. Securely share data among databases, cloud services, Allen-Bradley® and Siemens® PLC systems, and other equipment, using tools like Ignition Edge® by Inductive Automation®, Node-RED™, and MQTT. Visualize data on the integral touchscreen, an external HDMI monitor, or from any web browser or mobile device.

**Programmable** – Options for control programming include flowcharting with PAC Control™ or IEC-61131-3 standard languages with CODESYS. Secure shell access lets you build your own custom-developed applications with Python, C/C++, and other languages and run them on an open, Linux-based automation system.

**Industrial** – From plant floors to remote sites, the edge demands industrially hardened equipment—like a wide operating temperature range, solid-state drives, UL Hazardous Locations approval, and ATEX compliance.

**Controller** – Reliable real-time control—with flowchart, Ladder Diagram, Function Block Diagram, Structured Text, Sequential Function Charts, and custom programming options—plus guaranteed-for-life I/O provide the solid base for all other functions.

Learn more about *groov* EPIC. Speak to an application engineer at 800-321-OPTO, email us at [systemseng@opto22.com](mailto:systemseng@opto22.com), or visit us on the web at [opto22.com](http://opto22.com).

**groov**  
**EPIC**

**OPTO 22**  
Your Edge in Automation.™



# groov EPIC<sup>™</sup> Software

## groov MANAGE

groov Manage is the central command to your groov EPIC<sup>®</sup> system, helping you configure, troubleshoot, and commission your groov EPIC processor, I/O modules, and network interfaces. You can use this browser-based application locally on the EPIC processor's high-resolution color touchscreen, or on your computer, smartphone, or tablet.

## 🔧 PAC Control

PAC Control, part of the PAC Project Software Suite, is an intuitive tool for programming industrial automation, process control, remote monitoring, data acquisition, and industrial internet of things (IIoT) applications. Flowchart-based with optional scripting, PAC Control lets you create and debug control programs and then download and run them on a groov EPIC processor.



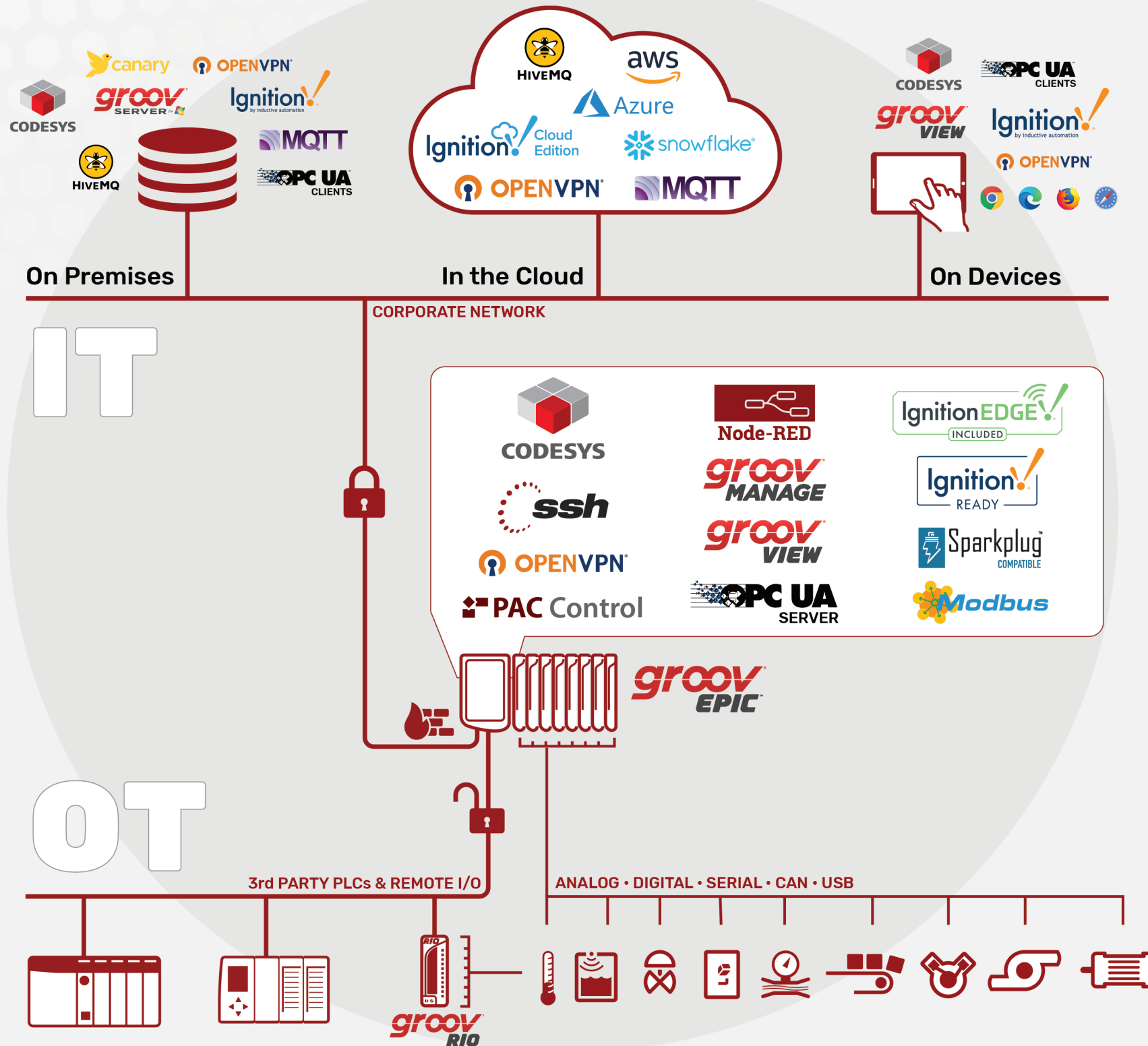
Use CODESYS<sup>®</sup> Development System V3 to create IEC 61131-3 compliant control programs that run on a groov EPIC processor. You can choose among Function Block Diagram (FBD), Structured Text (ST), Sequential Function Charts (SFC), and Ladder Diagram (LD). And you can expand functionality even more using products from the CODESYS Store.



Build your own custom applications using languages you know like Python, C/C++, and others, and run them on an open, Linux<sup>®</sup>-based automation system with Secure Shell access.



With the OPC UA server on board, groov EPIC offers a familiar, platform-independent way to exchange data among devices and software within your OT network. Smoothly integrate your PAC Control and I/O tags into SCADA and HMI software using OPC UA—no special drivers required.



## groov VIEW

Use groov View to build operator interfaces to monitor and manage your system from the EPIC processor, and from any device with a web browser. User authentication and data encryption keep systems secure. groov View has easy drag-drop-tag construction, no tag or user limits, and includes trends, events, and user notifications.



groov EPIC extends the Ignition<sup>®</sup> Platform to the edge of your network, eliminating the need for a Microsoft Windows computer. Run Ignition directly on the EPIC processor and gain access to data on Allen-Bradley<sup>®</sup>, Siemens<sup>®</sup>, and Modbus<sup>®</sup>/TCP PLCs and devices with the built-in OPC UA server and drivers. Choose either Ignition Edge<sup>®</sup> or full Ignition, both products of Inductive Automation<sup>®</sup>. Utilize the full array of Ignition modules including MQTT, database support, reporting, MES connectivity, and more.



Improve communications efficiency and reduce reliance on IT networking resources with MQTT, a secure, lightweight transport protocol with a publish/subscribe architecture that decouples devices from applications. The Sparkplug payload definition for industrial applications also manages field device states for easier implementation.



Build simple data flows to wire together databases, cloud applications, and APIs using Node-RED. This open-source, multi-platform IIoT development tool gives you a large library of 600+ prebuilt nodes, so you can leverage existing software code and use it directly in your applications.

# OPTO 22

Your Edge in Automation.<sup>™</sup>



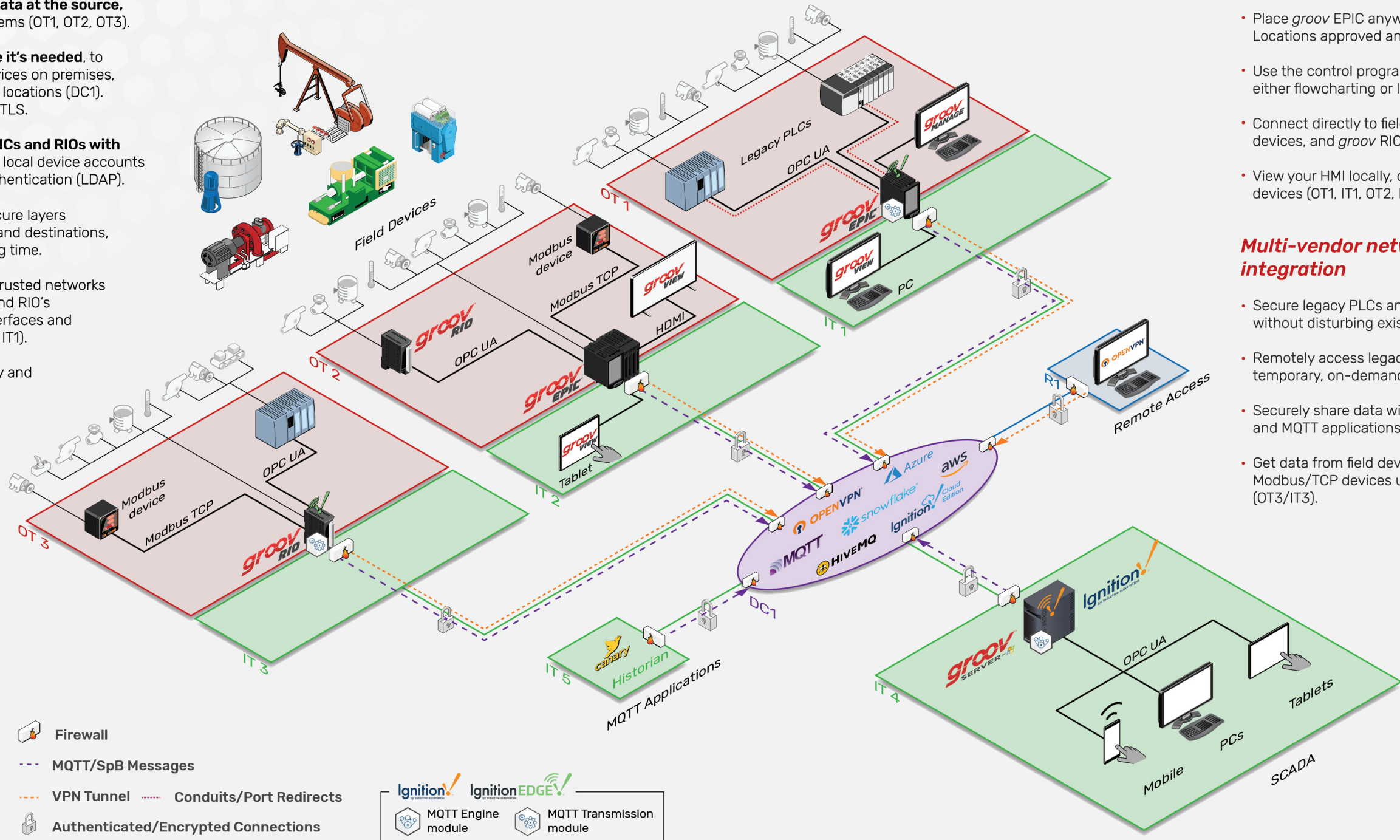
# IIoT System Architecture

**Acquire and process OT data at the source,** from field devices and systems (OT1, OT2, OT3).

**Communicate data where it's needed,** to software, services, and devices on premises, in the cloud, and at remote locations (DC1). All data is encrypted using TLS.

**Secure access to your EPICs and RIOs with user authentication,** both local device accounts and centrally managed authentication (LDAP).

- Avoid complex and unsecure layers between data resources and destinations, reducing costs and saving time.
- Segment trusted and untrusted networks into zones using EPIC's and RIO's independent network interfaces and device firewalls (OT1 from IT1).
- Improve system efficiency and scalability with MQTT and Sparkplug B (DC1, IT5).
- Allow secure remote access to your OT systems with VPN.



## Real-time I/O sensing and control

- Place *groov* EPIC anywhere. UL Hazardous Locations approved and ATEX compliant.
- Use the control programming language you prefer, either flowcharting or IEC 61131.
- Connect directly to field devices, Modbus/TCP devices, and *groov* RIO edge I/O modules (OT2).
- View your HMI locally, on PCs, and on mobile devices (OT1, IT1, OT2, IT2, IT4).

## Multi-vendor network and software integration

- Secure legacy PLCs and acquire their data without disturbing existing systems (OT1).
- Remotely access legacy PLCs with VPN and temporary, on-demand conduits. (R1)
- Securely share data with SCADA systems (IT4) and MQTT applications (IT5).
- Get data from field devices, legacy PLCs, and Modbus/TCP devices using *groov* RIO edge I/O (OT3/IT3).



## groov EPIC® Processors

|              |  |
|--------------|--|
| GRV-EPIC-PR1 | Controller, HMI and gateway with Ignition 7, 2 GB RAM, 6 GB user space     |
| GRV-EPIC-PR2 | Controller, HMI and gateway with Ignition 8, 3.75 GB RAM, 22 GB user space |

## groov EPIC Chassis

|                |  |
|----------------|--|
| GRV-EPIC-CHS0  | Processor and power supply only mounting chassis |
| GRV-EPIC-CHS4  | 4-module analog/digital/serial mounting chassis  |
| GRV-EPIC-CHS8  | 8-module analog/digital/serial mounting chassis  |
| GRV-EPIC-CHS16 | 16-module analog/digital/serial mounting chassis |

## groov EPIC Power Supplies

|               |                                       |
|---------------|---------------------------------------|
| GRV-EPIC-PSAC | Power supply, 110-240 VAC             |
| GRV-EPIC-PSDC | Power converter, 24-48 VDC            |
| GRV-EPIC-PSPT | Pass-through power adapter, 10-15 VDC |

## Software

Note: *groov Manage*, *groov View*, PAC Control Runtime, and Node-RED are included with the GRV-EPIC-PR1. CODESYS Runtime, Ignition Edge, and Secure Shell are pre-installed, but require a license (order part number shown below):

|                 |  |
|-----------------|--|
| GROOV-LIC-CRE   | <i>groov</i> EPIC activation key for CODESYS Runtime     |
| GROOV-LIC-EDGE  | <i>groov</i> EPIC activation key for Ignition Edge v7    |
| GROOV-LIC-EDGE8 | <i>groov</i> EPIC activation key for Ignition Edge v8    |
| GROOV-LIC-SHELL | <i>groov</i> EPIC activation key for Secure Shell access |

## groov EPIC Mixed Signal, Multifunction Modules

|               |  |
|---------------|--|
| GRV-MM1001-10 | 8 multifunction, mixed signal channels; 2 form C electromechanical relay output channels |
|---------------|--|

## groov Discrete Input Modules

|                  |   |
|------------------|---|
| GRV-IAC-24       | AC input, 24 ch, 85-140 VAC   |
| GRV-IACS-24      | AC input, 24 ch, 85-140 VAC, on/off state only                                  |
| GRV-IACI-12      | AC input, 12 ch, 85-140 VAC, ch-to-ch isolation                                 |
| GRV-IACIS-12     | AC input, 12 ch, 85-140 VAC, ch-to-ch isolation, on/off state only              |
| GRV-IACHV-24     | AC input, 24 ch, 180-280 VAC  |
| GRV-IACHVS-24    | AC input, 24 ch, 180-280 VAC, on/off state only                                 |
| GRV-IACIHV-12    | AC input, 12 ch, 180-280 VAC, ch-to-ch isolation                                |
| GRV-IACIHVS-12   | AC input, 12 ch, 180-280 VAC, ch-to-ch isolation, on/off state only             |
| GRV-IDC-24       | DC input, 24 ch, 15-30 VDC  |
| GRV-IDCS-24      | DC input, 24 ch, 15-30 VDC, on/off state only                                   |
| GRV-IDCI-12      | AC/DC input, 12 ch, 10-30 VDC, 10-25 VAC, ch-to-ch isolation                    |
| GRV-IDCIS-12     | DC input, 12 ch, 10-30 VDC, ch-to-ch isolation, on/off state only               |
| GRV-IDCIFQ-12    | DC input, 12 ch, 2.5-30 VDC, ch-to-ch isolation                                 |
| GRV-IDCSW-12     | DC input, 12 channels, switch status  |
| GRV-IACDCTTL-24  | AC/DC input, polarity insensitive, 24 channels, 2-16 V AC/DC                    |
| GRV-IACDCTTLS-24 | AC/DC input, polarity insensitive, 24 channels, 2-16 V AC/DC, on/off state only |

## groov Discrete Output Modules

|              |   |
|--------------|---|
| GRV-OAC-12   | AC output, 12 ch, 12-250 VAC                                  |
| GRV-OACS-12  | AC output, 12 ch, 12-250 VAC, on/off state only               |
| GRV-OACI-12  | AC output, 12 ch, 12-250 VAC, ch-to-ch isolation              |
| GRV-OACIS-12 | AC output, 12 ch, 12-250 VAC, ch-to-ch isolation, on/off only |

## groov Discrete Output Modules

|             |  |
|-------------|--|
| GRV-ODCI-12 | DC output, 12 ch, 5-60 VDC, ch-to-ch isolation |
|-------------|--|

|               |   |
|---------------|---|
| GRV-ODCIS-12  | DC output, 12 ch, 5-60 VDC, ch-to-ch isolation, on/off only   |
| GRV-ODCSRC-24 | DC output, 24 ch, 5-60 VDC, sourcing                          |
| GRV-OMRIS-8   | AC/DC output, 8 ch, mechanical relay, 0-250 VAC/5-30 VDC, 5 A |

## groov Analog Input Modules

|               |   |
|---------------|---|
| GRV-IICTD-12  | Analog input, 12 ch, temperature, ICTD  |
| GRV-IMA-24    | Analog input, 24 ch, configurable input ranges of 4-20 mA, 0-20 mA, -20 mA to +20 mA                        |
| GRV-IMAI-8    | Analog input, 8 ch, ch-to-ch isolation, 0-20 mA, field or chassis-powered loop                              |
| GRV-IRTD-8    | Analog input, temperature (RTD) or resistor, 8 channels   |
| GRV-ITMI-8    | Analog input, 8 ch, thermocouple or mV, ch-to-ch isolation  |
| GRV-ITM-12    | Analog input, thermocouple or mV, 12 channels   |
| GRV-ITR-12    | Analog input, 12 ch, temperature/thermistor or resistor   |
| GRV-IV-24     | Analog voltage input, 24 ch, 8 configurable input ranges from $\pm 1$ to $\pm 160$ VDC                      |
| GRV-IVAPM-3   | Input, power monitoring, 3 phase, 600 V with 0.333 V, 1 V, 1 A or 5 A CT                                    |
| GRV-IVI-12    | Analog voltage input, 12 ch, configurable input ranges from $\pm 1.25$ to $\pm 160$ VDC, ch-to-ch isolation |
| GRV-IVIRMS-10 | Analog RMS voltage input, 10 channels, 0-300 VAC/VDC, channel-to-channel isolation                          |

## groov Analog Output Modules

|               |  |
|---------------|--|
| GRV-OVMAILP-8 | Analog output, 8 ch, voltage or current, ch-to-ch isolation, field or chassis-powered loop |
| GRV-OVMALC-8  | Analog output, 8 ch, voltage or current, chassis-powered loop                              |

## groov Serial Modules

|             |  |
|-------------|--|
| GRV-CCANI-2 | Serial communication, 2 ch, CAN, ch-to-ch isolation              |
| GRV-CSERI-4 | Serial communication, 4 ch, RS-232 or RS-485, ch-to-ch isolation |

## groov Accessories

|                        |   |
|------------------------|---|
| GRV-TEX-26F6           | 26-wire cable for <i>groov</i> I/O modules. Straight-through; no common terminals. Flying leads |
| GRV-TERM26-5           | <i>groov</i> I/O module terminal, 5 pack  |
| GRV-TERMG26-5          | <i>groov</i> I/O module terminal, gray, for thermocouple modules, 5-pack                        |
| GRV-TERMPM13-5         | <i>groov</i> I/O power monitoring module terminal, 5 pack                                       |
| GRV-TEX-SCTOOL         | <i>groov</i> spring clamp terminal tool   |
| GRV-TEX-RCTM-5         | <i>groov</i> RIO cable tie push mount, 5 pack   |
| GRV-ENC-POLY-SM        | <i>groov</i> EPIC/RIO enclosure, 1-2 devices/chassis, polycarbonate, wall or panel mount, IP65  |
| GRV-ENC-POLY-MD        | <i>groov</i> EPIC/RIO enclosure, 1-4 devices/chassis, polycarbonate, wall or panel mount, IP69  |
| GRV-EPIC-BATT-BR2032-3 | Pack of 3 replacement batteries for <i>groov</i> EPIC processors                                |
| GRV-EPIC-PSAC-FUSE-5   | Pack of 5 2-amp 250 V slow fuses for the GRV-EPIC-PSAC power supply                             |
| GRV-EPIC-PSDC-FUSE-5   | Pack of 5 4-amp 250 V slow fuses for the GRV-EPIC-PSDC power converter                          |
| GRV-EPIC-PSPT-FUSE-5   | Pack of 5 10-amp 125 V fast fuses for the GRV-EPIC-PSPT power adapter                           |

## groov RIO

A family of intelligent, independent I/O units that can work as remote I/O units through PAC Control strategies, Node-RED flows, CODESYS applications, and custom control programs:

|                  |   |
|------------------|---|
| GRV-R7-MM1001-10 | Remote I/O; 8 multi-signal, multifunction channels; 2 form C electromechanical relay output channels                        |
| GRV-R7-MM2001-10 | Remote I/O; 8 multi-signal, multifunction channels; 2 form C electromechanical relay output channels, Ignition Edge 8       |
| GRV-R7-I1VAPM-3  | Energy monitoring edge I/O; 3-phase energy monitoring, 18 power and energy channels per phase plus 10 accumulation channels |

2396-250527

# OPTO 22

43044 Business Park Drive, Temecula, California, 92590-3614 U.S.A.  
Local: 951-695-3000 Toll-free: 800-321-6786 • [www.opto22.com](http://www.opto22.com)

All trademarks, trade names, logos, and service marks belong to their respective companies. 2-25

