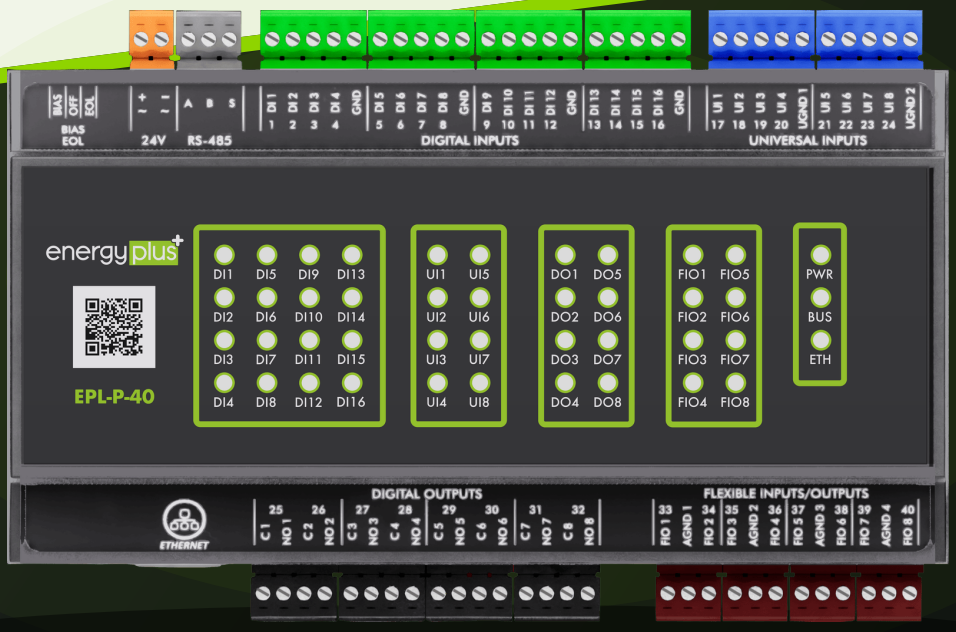
energyplus

EPL-P-40

User Manual

Sedona-based application controller and field I/O platform

Firmware V2.0.3 | October 2026



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1. Using This Manual

This manual is intended for technical users who want to commission the EPL-P-40 device in the field quickly and correctly. The first sections describe the intended use of the product and the commissioning workflow. Later sections cover channel modes, service interfaces and integration details.

2. Document Scope

This user manual covers commissioning, basic configuration, service tasks and technical integration of the EPL-P-40 product. It is written for field technicians, system integrators, commissioning engineers and service personnel.

3. Reading Order

Step	Purpose
1	Verify the product role, the I/O groups and the wiring rules.
2	Choose the first access method: web, BLE, Workbench or Niagara N4.
3	Compare the channel modes and field signals with the project form.
4	Configure the application, kit and communication settings for the commissioning scenario.
5	Check the live values, LED states and supervisory system feedback.
6	Keep the software version, backup file, screenshots and handover records.

4. Safety and Usage Notes

- Installation and commissioning must be carried out by authorized technical personnel.
- Complete the power supply, field wiring and communication connections in accordance with local standards and the project electrical design.
- De-energize the device before making terminal connections.
- Verify I/O types, signal levels and field equipment compatibility before commissioning.
- When communication settings change, the related services may restart; active sessions and field communication may be interrupted briefly.

5. Commissioning Record

Add the following information to the project file at site handover:

- device serial number and label name
- firmware, application and kit version
- IP address, subnet, gateway and the communication ports in use
- RS-485 line settings and device addresses
- I/O modes and scaling values in use
- backup files created
- supervisory system register/object/point test results, if any

- web, BLE, Workbench or Niagara N4 screenshots

6. Abbreviations

Abbreviation	Description
DI	Digital Input
DO	Digital Output
UI	Universal Input
FIO	Flexible I/O (flexible input/output); a channel group that can be configured as analog output, digital output or digital input
BMS	Building Management System
MS/TP	Master-Slave/Token-Passing
OTA	Over-the-Air software update

7. Standard Commissioning Sequence

1. Verify the device label and the target application.
2. Complete the power supply, I/O and communication connections.
3. Connect to the device through the web interface or BLE.
4. Configure the channel modes, communication settings and service parameters.
5. Verify the live values and field feedback.
6. If required, back up the application and complete the software update.

8. Revision History

Rev	Date	Description
1.0	2026-06-08	Initial release
1.1	2026-10-21	Corporate cover and page layout renewed; channel numbering, kit names and technical content aligned with firmware V2.0.3

9. Product Overview

EPL-P-40 is a Sedona-based application controller and local field I/O platform. Inside building automation control cabinets, the product serves as a single-housing control platform for control logic, I/O monitoring, driving actuator outputs, field communication and local service work.

Control behavior is built by the Sedona application running on the device. Physical I/O channels, time schedules, control blocks and field communication are linked together within the same application. The application is programmed live with EnergyPlus Workbench or EnergyPlus Niagara modules.

9.1. Typical Applications

- AHU, pump, boiler, chiller and auxiliary plant control
- Energy management, alarm and status monitoring

- Time schedules, application logic and field scenarios
- Sensor acquisition and driving analog/digital actuator outputs
- Controller stations that communicate with field devices and supervisory systems over Modbus, BACnet or MQTT

9.2. Core Functions

- Sedona-based control application
- 16 DI, 8 UI, 8 DO, 8 FIO (40 physical points in total)
- Per-channel mode, scaling and calibration settings
- Modbus TCP/RTU, BACnet/IP, BACnet MS/TP and MQTT communication within the Sedona application
- Network, channel and service operations through the local web interface
- Field access, monitoring and channel setup over BLE
- Software update from the web interface
- Live programming, backup and restore with EnergyPlus Workbench and Niagara N4

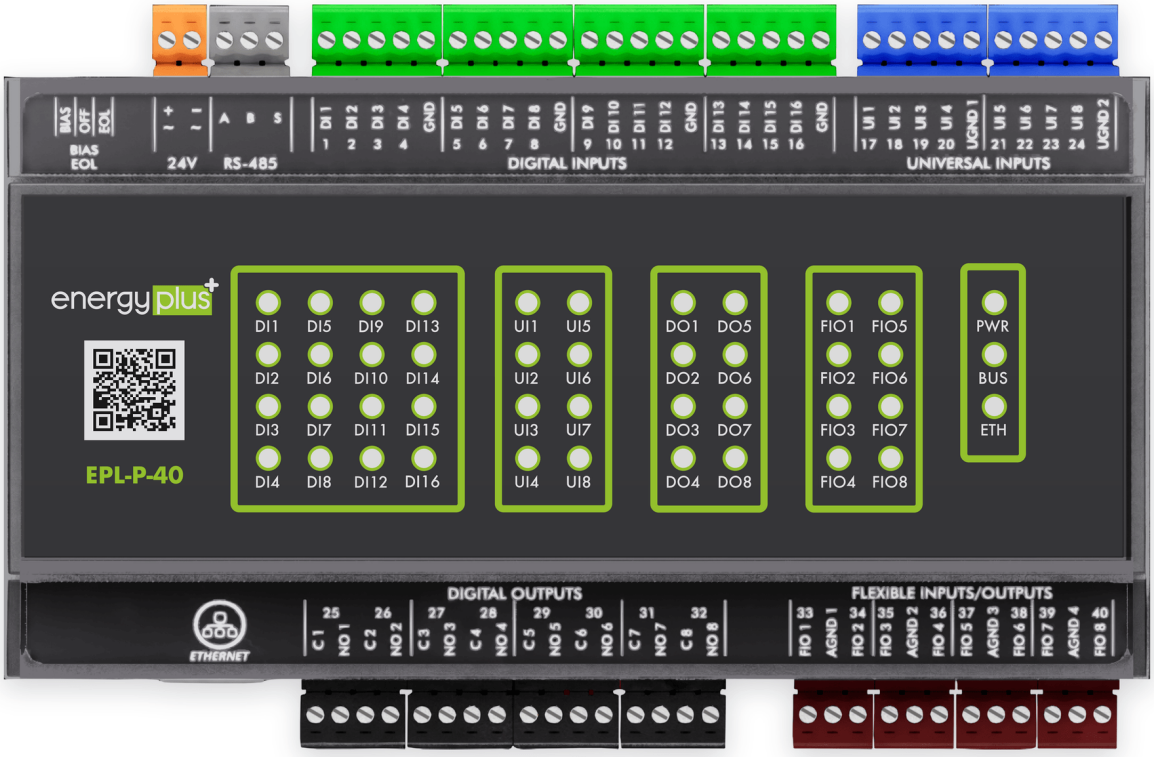


Figure 1. Front panel and terminal layout

10. User Access and Commissioning

10.1. Access Methods

EPL-P-40 offers four access paths:

Access	Usage
Local web interface	Accessed over Ethernet via HTTP (port 80). Used for network settings, channel engineering, live values, file operations and software update. The web interface does not provide HTTPS.
BLE	Used with the mobile app in the field to identify the device, read live values, set up channels, drive outputs manually and configure Ethernet.
EnergyPlus Workbench	Used over SOX/DASP (UDP 1876) for live programming, backup and restore of the Sedona application.
Niagara N4	Used with EnergyPlus Niagara modules for a direct device connection or for station integration.

The device can also be found on the local network under the mDNS name epl-p-40. This name is set by the device and cannot be changed from the web interface.

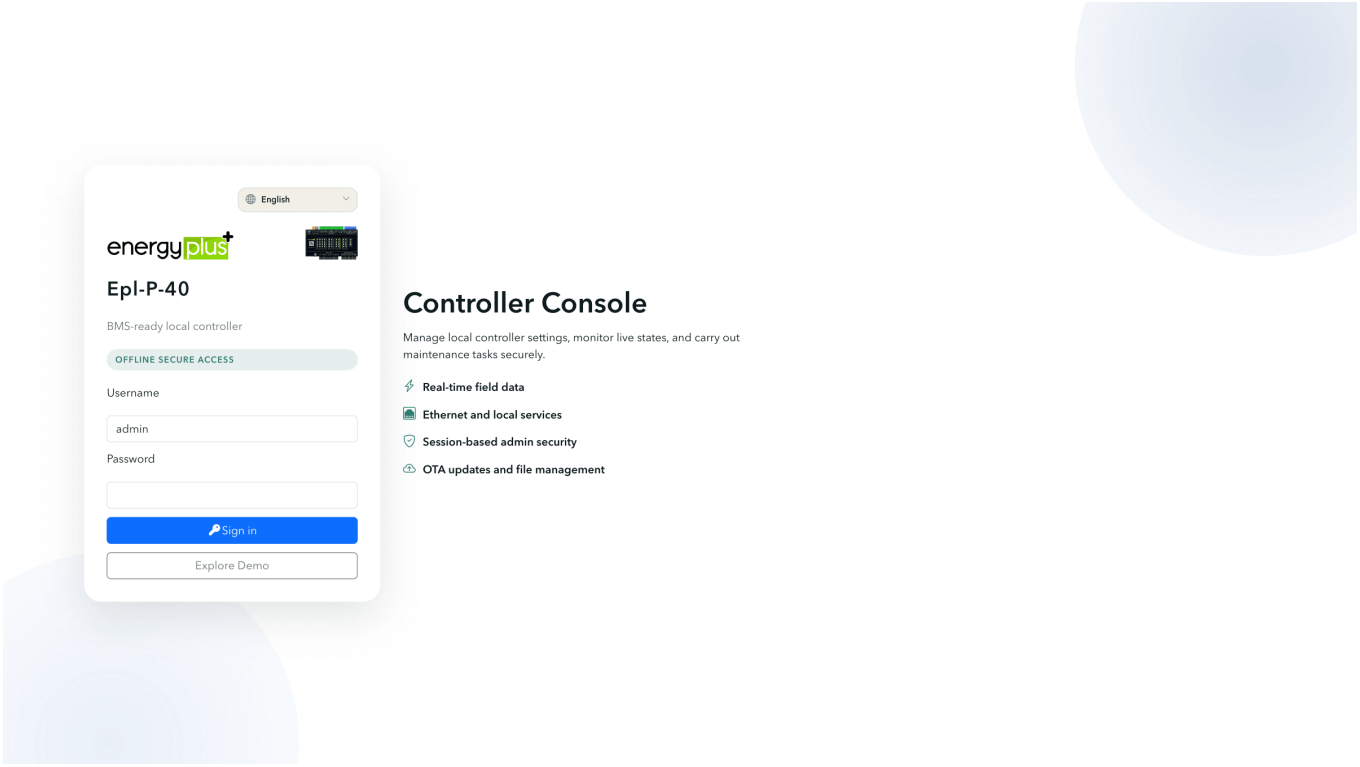


Figure 2. Web interface: login

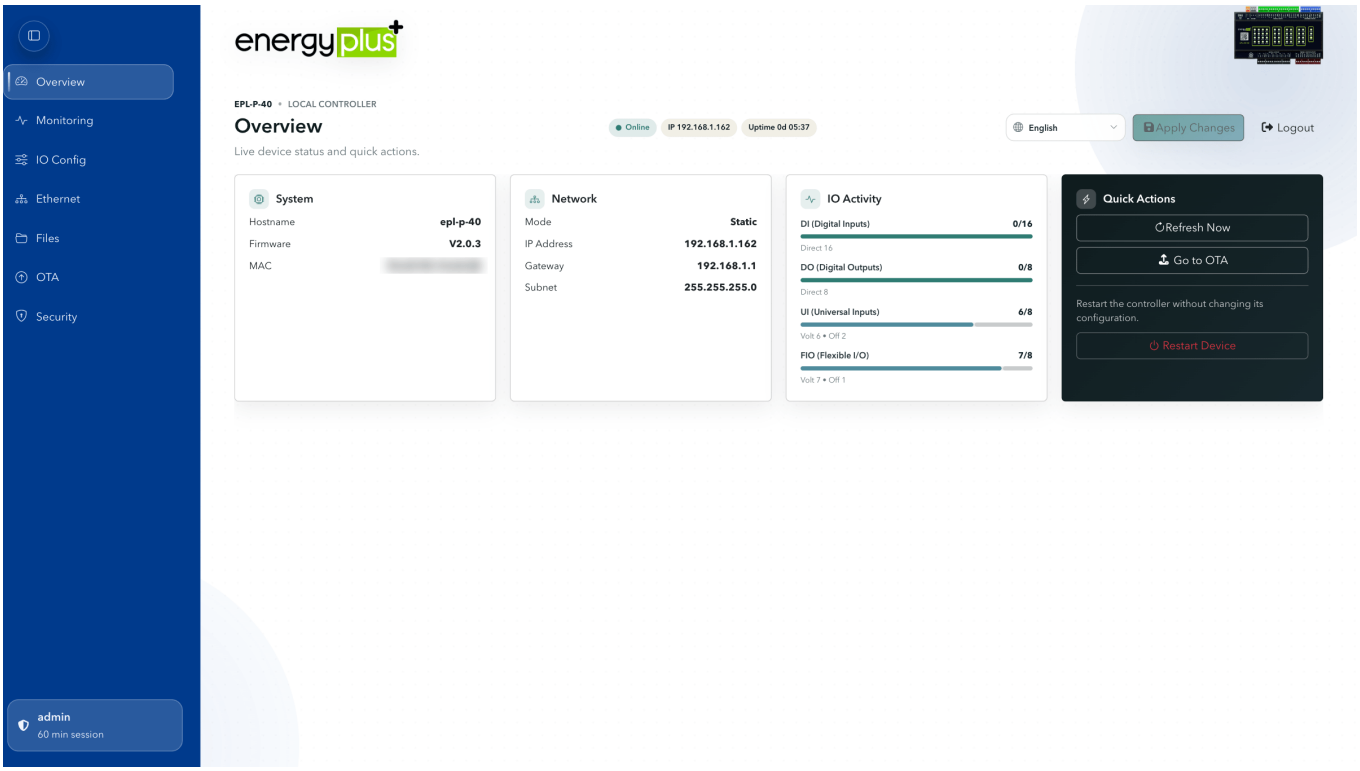


Figure 3. Web interface: overview

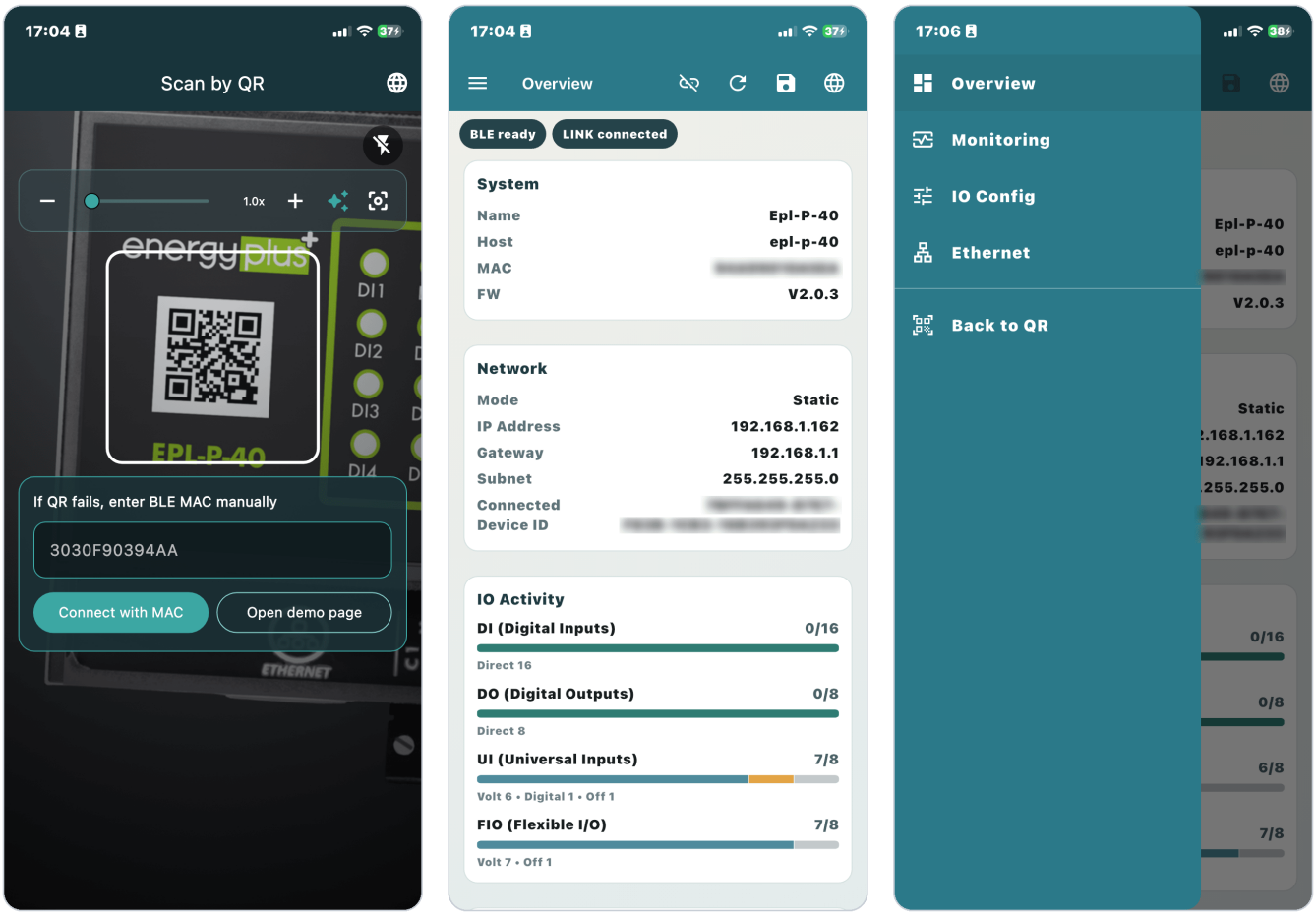


Figure 4. Mobile app: QR connection, overview and menu

10.2. User Account

The web interface is accessed with the admin account; the login credentials are delivered with the device. This account is used for network settings, channel engineering, live monitoring, driving DO/FIO outputs manually, file operations, software update, changing the administrator password and enabling or disabling BLE.

Change the administrator (admin) password at the first login. The device does not enforce this change; it must be done during commissioning. The password is 1..31 bytes long. The account is not locked after failed login attempts; therefore, use the device only in a network segment that is accessible to authorized persons only. Do not share the access credentials with unauthorized persons, and store them securely in the project handover records.

The web interface and BLE provide no factory reset function. If the administrator password is lost, contact the manufacturer's service.

Session rules:

- A session expires after 60 minutes without activity since the last operation. Automatic refresh of a visible tab also extends the session.
- Only one web session is active at a time; a new login ends the previous session.
- Logout ends the session immediately.

10.3. Factory Network and Label Information

Item	Value
Default IP address	192.168.1.160 (static)
Subnet mask / gateway	255.255.255.0 / 192.168.1.1
Local network name (mDNS)	epl-p-40.local
Ethernet MAC address	Device-specific; verify it in the Eth. MAC Address field on the product label.
Serial number	Device-specific; verify it in the S/N field on the product label.

For first access, place the service computer on the same IP network. If the device IP settings have been changed, verify them against the site records or the product label.

In the factory setting DHCP is disabled and DNS is set to automatic; with a static IP, the gateway and 8.8.8.8 are used as DNS servers.

10.4. Recommended Commissioning Sequence

1. Complete the power supply, I/O and Ethernet connections.
2. Put the service computer on the same IP network as the device and connect to the web interface.
3. Change the administrator password.
4. Set the project IP settings on the Ethernet page.
5. Set the channel modes and engineering ranges on the IO Config page.
6. Load or program the Sedona application with EnergyPlus Workbench or Niagara N4.
7. If required, enter the device license in the platform component.
8. Verify the live signals and output responses.
9. Save the application to persistent memory, take a backup and record the software version.

10. If BLE will not be used after commissioning is complete, disable it on the Security page.

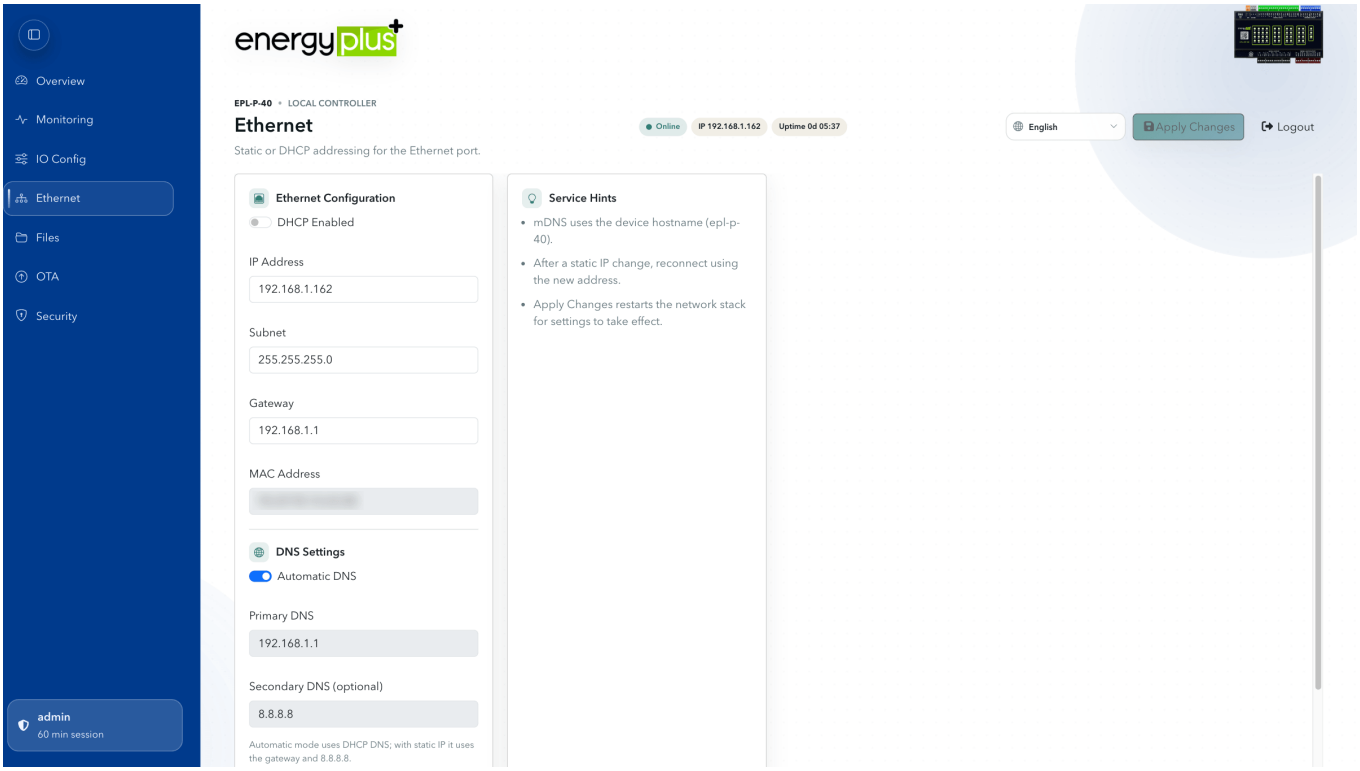


Figure 5. Web interface: Ethernet settings

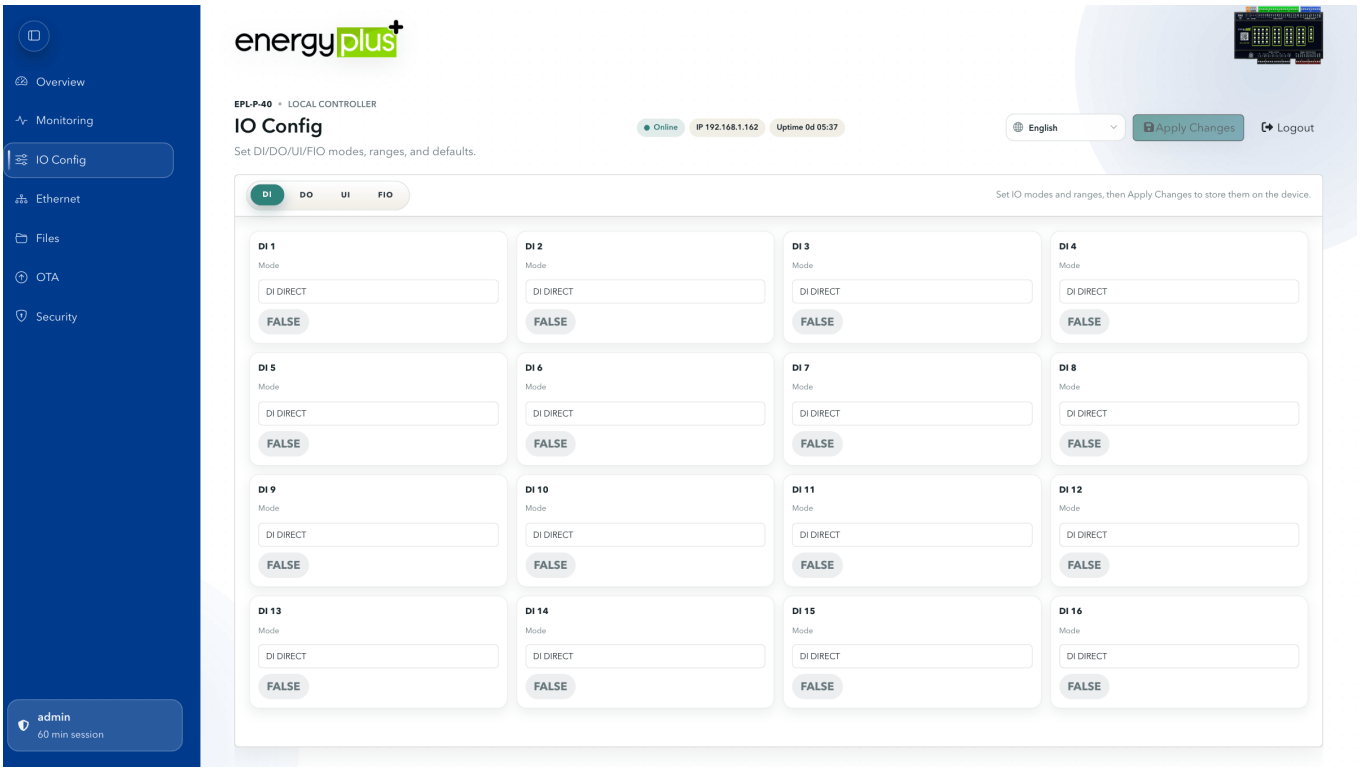


Figure 6. Web interface: IO settings

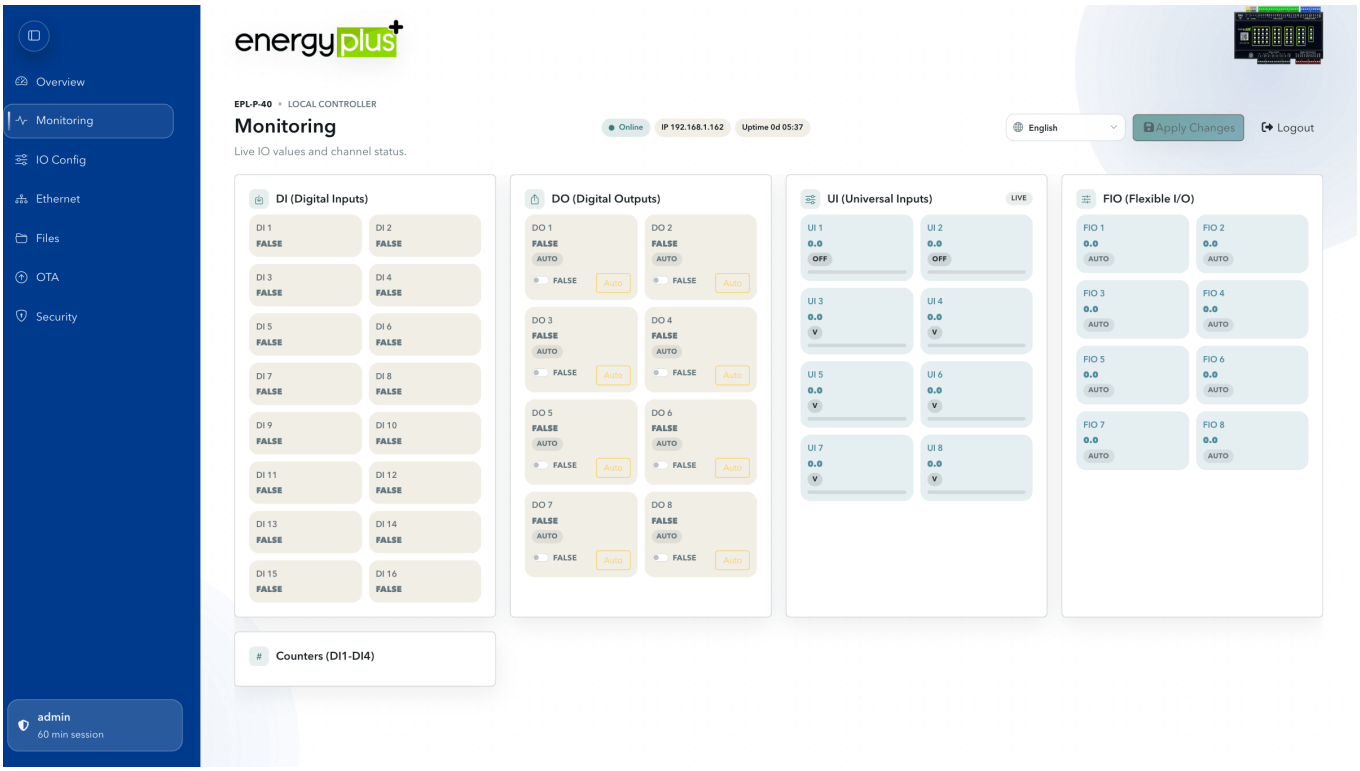


Figure 7. Web interface: live signals

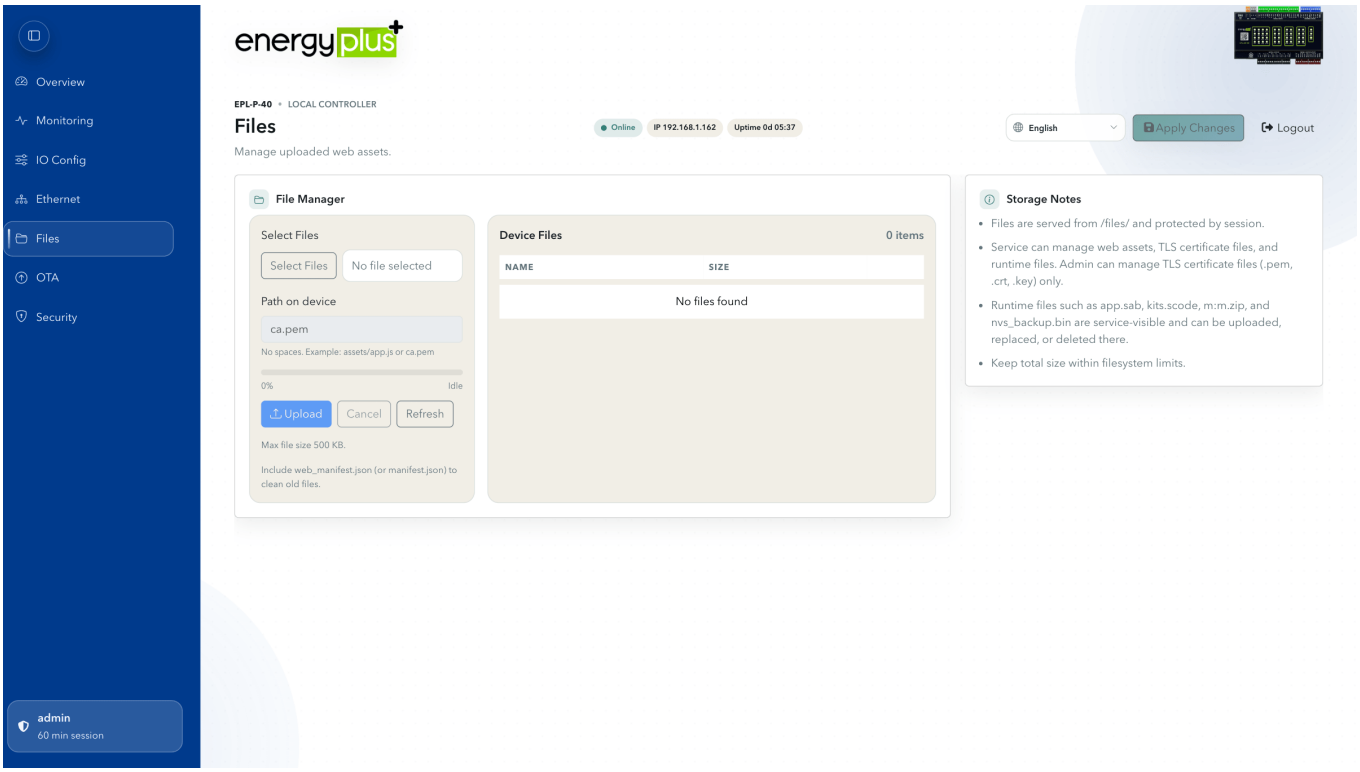


Figure 8. Web interface: files

11. Web Interface

The local web interface is available in six languages: Turkish, English, German, Russian, Italian and French. The interface opens in English the first time; the selected language is stored in the browser. The demo mode on the login page shows the interface with sample data and sends no changes to the device.

The interface consists of the following pages:

Page	Function
Overview	Device name, software version, MAC address, network information and channel usage summary. Refreshing the information, going to the software update page and restarting the device (Restart Device) are done here.
Monitoring	Live values and states of the DI, UI, DO and FIO channels; DI1..DI4 counter values. DO and FIO outputs can be driven manually for service purposes; selecting Auto hands the output back to application control.
IO Config	Channel modes, min, max, offset values; counter card for DI1..DI4 in COUNTER mode (total, window result, elapsed time, window duration and counter reset).
Ethernet	DHCP on/off, IP address, subnet mask, gateway and DNS settings. The MAC address is read-only.
Files	File upload; listing, downloading and deleting TLS certificate files.
OTA	Uploading the firmware package (.bin). The device restarts when the upload is complete.
Security	Changing the administrator password, enabling or disabling BLE, BLE device name and Bluetooth MAC address.

Changes on the IO Config and Ethernet pages are sent to the device with the Apply Changes button in the top bar. Pages with unsaved changes are marked in the menu.

After the restart command the device restarts after approximately 1.5 seconds and manually driven outputs return to automatic control.

The web interface does not configure communication protocols or licenses. Modbus, BACnet and MQTT communication is configured within the Sedona application; the license is configured in the platform component through EnergyPlus Workbench or Niagara N4.

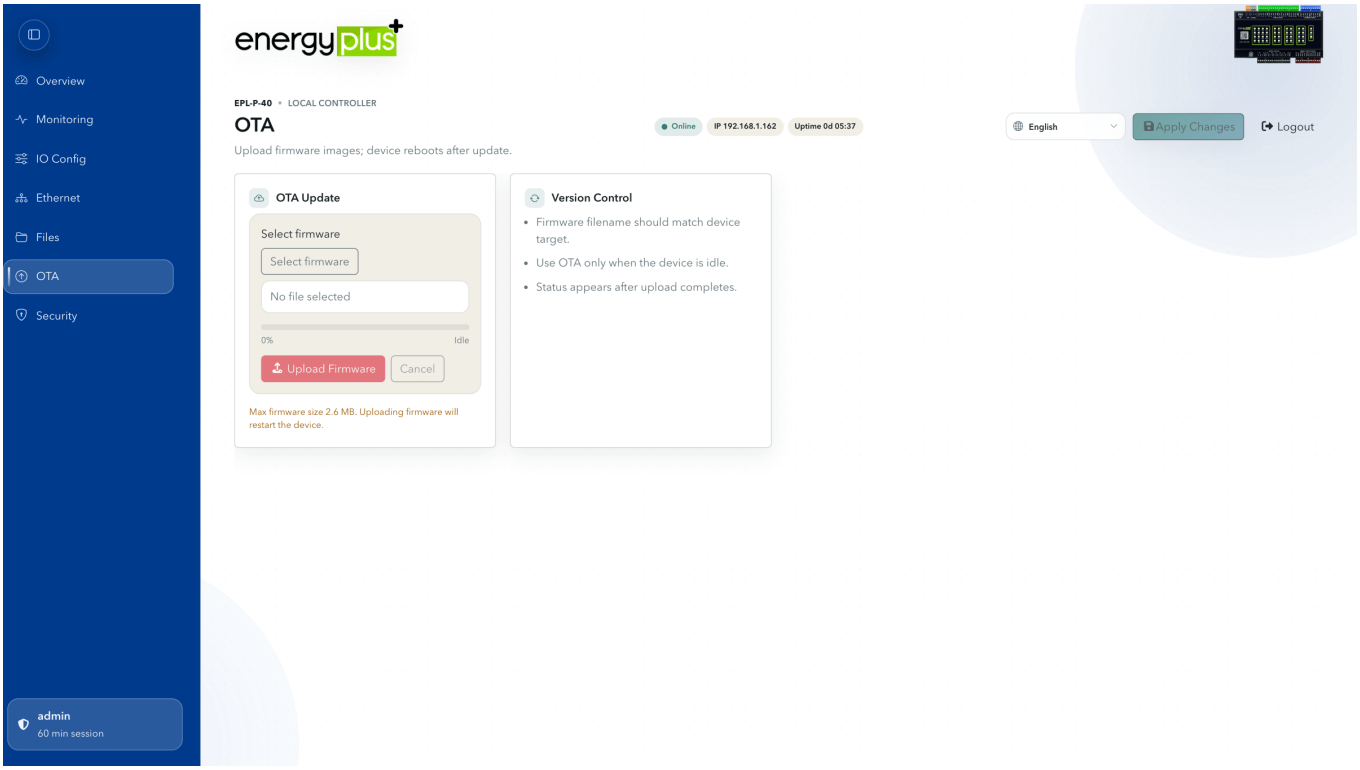


Figure 9. Web interface: software update

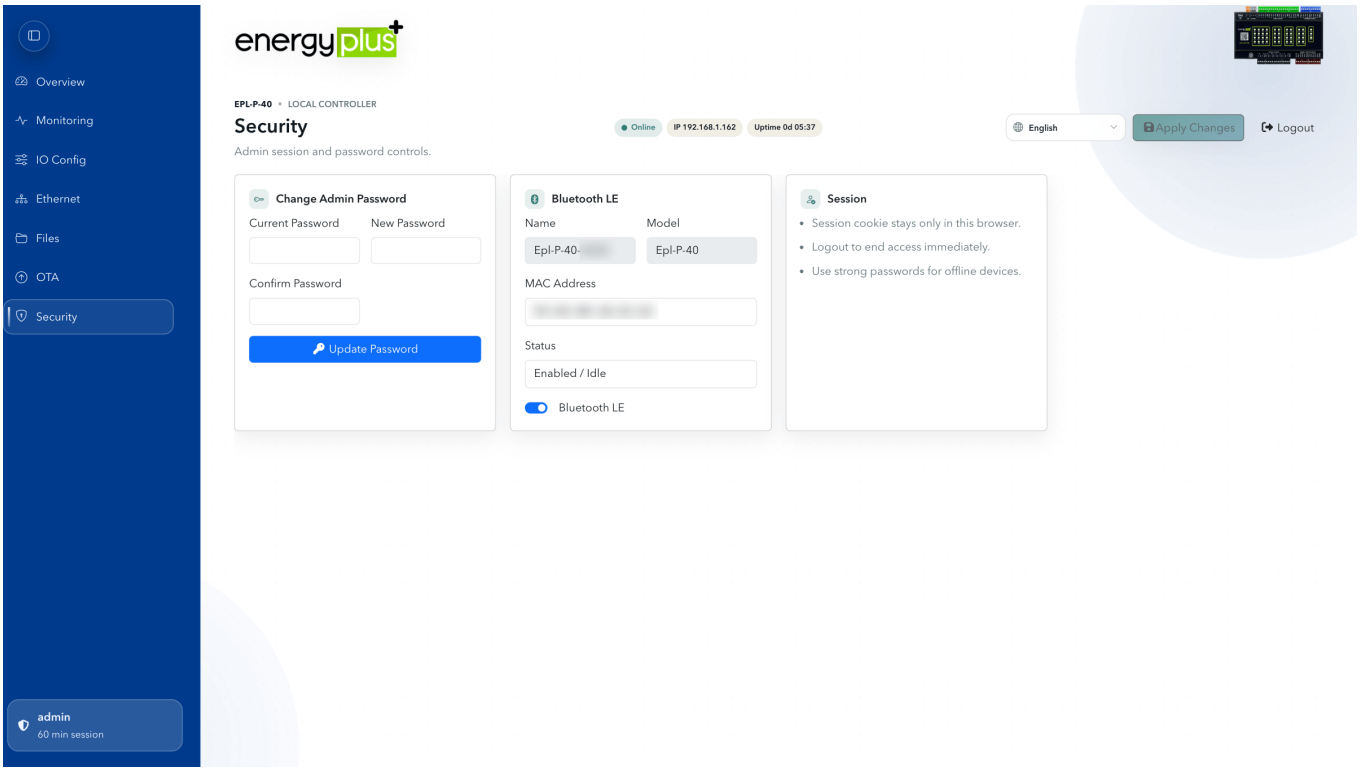


Figure 10. Web interface: administrator password and Bluetooth LE

11.1. Network Settings

The Ethernet page contains the following fields:

- DHCP on/off
- IP address, subnet mask and gateway (when DHCP is off)
- Automatic DNS; when disabled, the primary DNS is mandatory and the secondary DNS is optional

New settings are applied approximately 0.5 seconds after saving, and the browser is redirected to the new IP address or to epl-p-40.local. The device has no fallback IP address. If a wrong address is entered, correct the setting by reaching the device at the new address, through the Ethernet page of the BLE app or through the Sedona platform component.

11.2. Driving Outputs Manually

With the admin role, DO and FIO outputs can be driven manually from the Monitoring page and from the BLE app:

- A manually set value is locked; there is no time limit. It stays in effect until Auto is selected or the device is restarted.
- The manual override state is not written to persistent memory; after a power failure or restart the output returns to application control.
- A manually set value is a logical command; in REVERSE mode the physical output is driven inverted.
- For an FIO analog output, the manual value is entered in engineering units and limited to the channel's min/max range.
- While an output is driven manually, the overriden field of the related Sedona DO or AO component becomes true. Sedona commands are retained and applied when Auto is selected.

11.3. File Operations

The Files page lists, downloads and deletes TLS certificate files (.pem, .crt, .key).

File upload rules:

- All permitted file types can be uploaded: the four application runtime files, web interface files (including their .gz compressed versions) and TLS certificate files.
- The upper limit per file is 500 KB; the file name must not contain spaces.
- A file with the same name is overwritten without confirmation.
- When web_manifest.json is uploaded, web interface files not in its list are deleted; application runtime files and TLS files are kept.
- To download a file, click its name in the list.
- While the Sedona application is starting or verifying an update, the application runtime files cannot be written or deleted; repeat the operation a few seconds later.

The TLS certificate files are for the TLS setting of the MQTT connection; the web server does not use them.

Changing the application runtime files affects the running Sedona application. Replace these files only with versions compatible with the project package, and take a current backup before the operation.

11.4. Software Update

- The software update upload can be canceled while in progress. The maximum package size is approximately 2.6 MB.
- The device only checks that the file is a valid firmware image; it does not check product, brand or version. Therefore, upload only firmware packages supplied by the manufacturer and prepared for EPL-P-40.
- The new software does not automatically return to the previous version (no rollback).
- The update keeps the device settings and the files on the device. Web interface files are not updated by the firmware package; if required, upload them separately from the Files page.
- The device restarts during the update; I/O outputs and field communication are interrupted briefly.
- Choose a time for the update when active field operations will not be affected, and take a backup beforehand.
- After the update, verify the software version on the Overview page.

12. BLE Service Flow

The BLE interface is used with the mobile app for field service work. The device advertises under the name EPL-P-40-XXXX; the last four characters are the last two bytes of the Bluetooth MAC address (uppercase hexadecimal). The full BLE name and the Bluetooth MAC address are shown on the Security page.

The mobile app connects to the device by scanning a QR code or by entering the MAC address; no pairing is done through the phone's operating system. The app has the Overview, Monitoring, IO Config and Ethernet pages.

Operations available over BLE:

- reading live values and channel states
- writing DI, DO, UI and FIO channel settings
- driving DO and FIO outputs manually and setting them to Auto

- reading DI1..DI4 counter values, setting the window duration and resetting the counter
- reading and writing Ethernet settings (a new setting is applied immediately)
- restarting the device

The BLE connection requires no pairing, PIN or role. Only one connection is accepted at a time; while connected, the device is not visible in advertising. The connection does not close on a timeout.

BLE is enabled in the factory setting. The on/off state is persistent and can be changed on the Security page; when BLE is disabled, the connected phone is also disconnected. If BLE will not be used after commissioning is complete, disabling it is recommended.

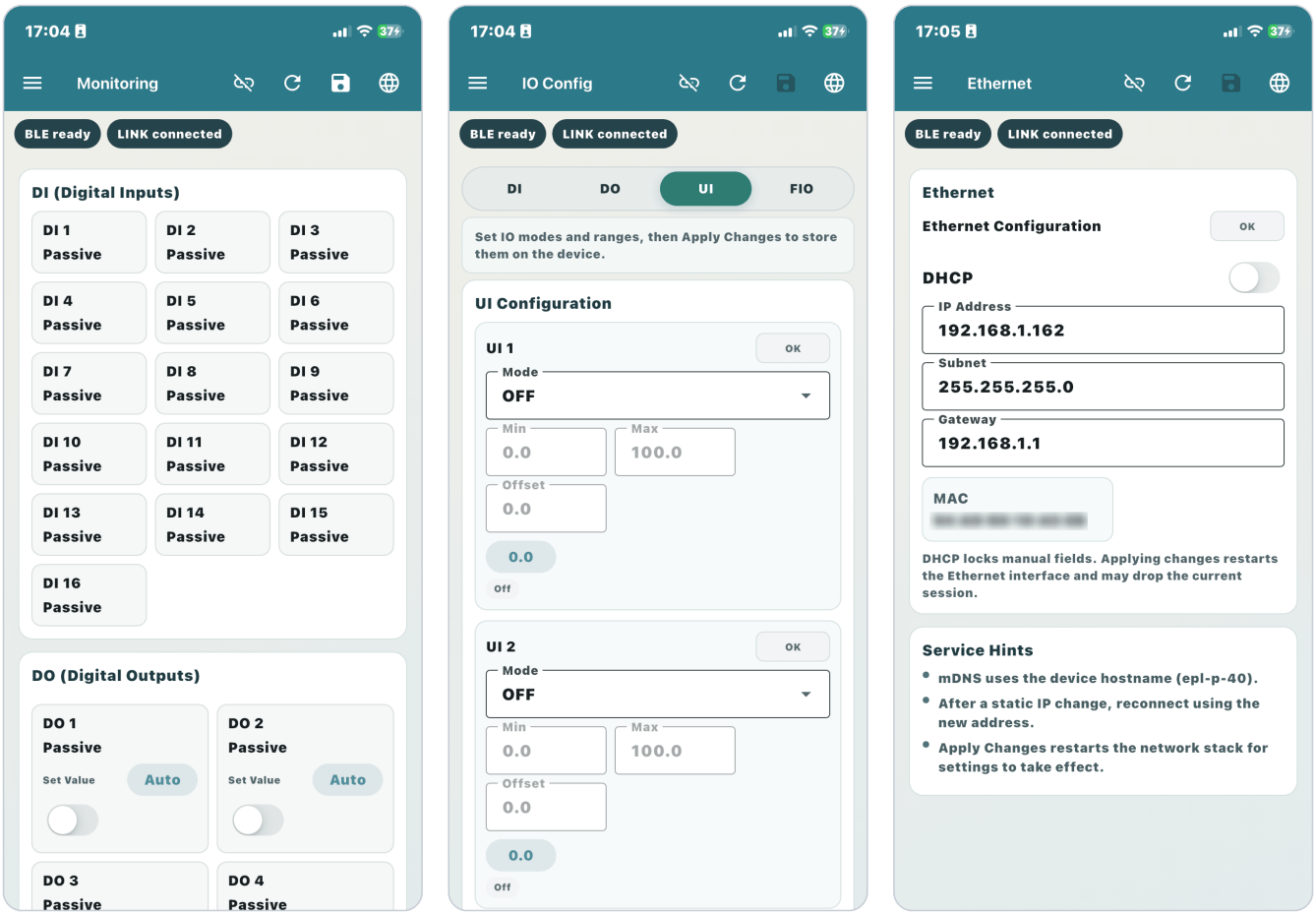


Figure 11. Mobile app: live monitoring, IO settings and Ethernet settings

13. I/O Structure

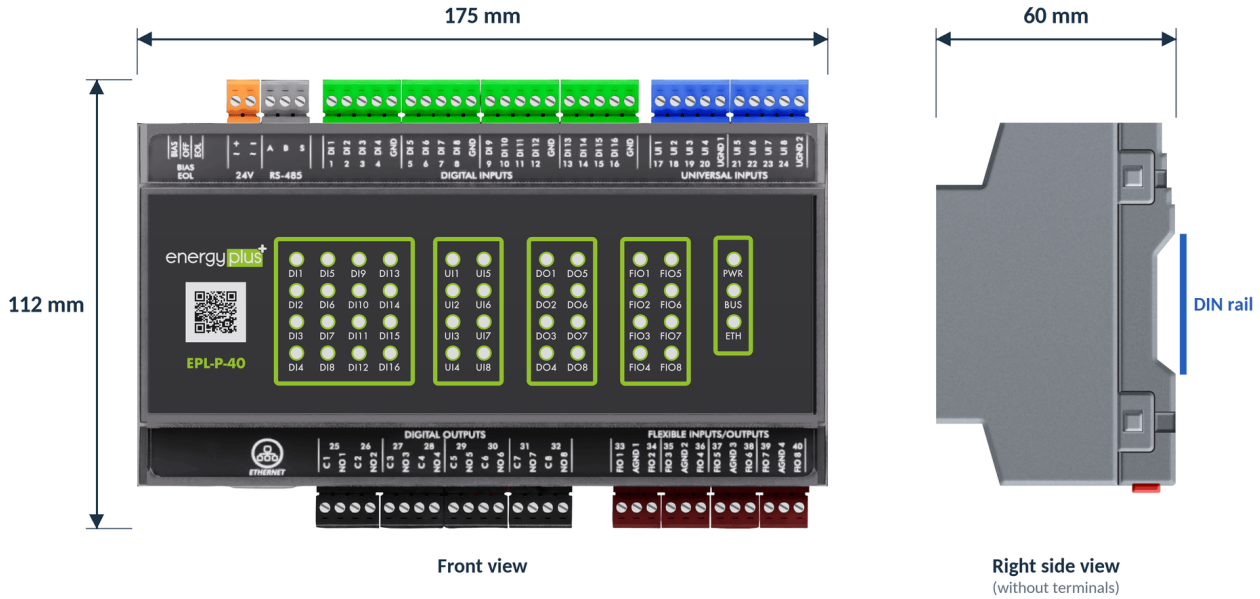
13.1. Channel Groups

Group	Count	Channel no.	Usage
DI	16	1..16	Digital input; DI1..DI4 can also be used as counter inputs.
UI	8	17..24	Voltage, current, digital contact, NTC/PT/NI sensor or resistance input.
DO	8	25..32	Relay output; direct or reverse operation.
FIO	8	33..40	Flexible input/output (UO): analog output, digital output or digital input.

Figure 1 shows the terminal numbers and the position of the groups on the front panel.

13.2. Technical Specifications

Specification	Value
Local I/O capacity	16 DI (DI1..DI4 counter inputs), 8 UI, 8 DO relay outputs, 8 FIO (flexible input/output)
UI measurement resolution	22 bit
Communication interfaces	1 × Ethernet RJ45 (10/100 Mbit/s), 1 × RS-485, Bluetooth LE (service and commissioning)
BACnet vendor ID	1600 (registered with ASHRAE)
Supply voltage	24 Vac ±20% or 21..30 Vdc
Nominal power consumption	5 VA
Supply class	Class 2
Protection and temperature class	IP20 enclosure protection, T50 operating class
Operating environment	0..50 °C, 5..95% relative humidity (non-condensing)
Storage environment	-20..70 °C, 5..95% relative humidity (non-condensing)
DO relay output rating	5 A @ 277 Vac or 3 A @ 30 Vdc, resistive load
FIO analog output range	0..10 V or 2..10 V selectable; maximum load current 20 mA per channel
Mounting	DIN rail (EN 60715, 35 mm), cabinet mounting
Enclosure dimensions (width × height × depth)	175 mm × 112 mm × 60 mm



Overall dimensions (W x H x D): 175 x 112 x 60 mm, plugged terminals included. DIN rail, in-cabinet mounting; IP20.

Figure 12. Mechanical dimensions

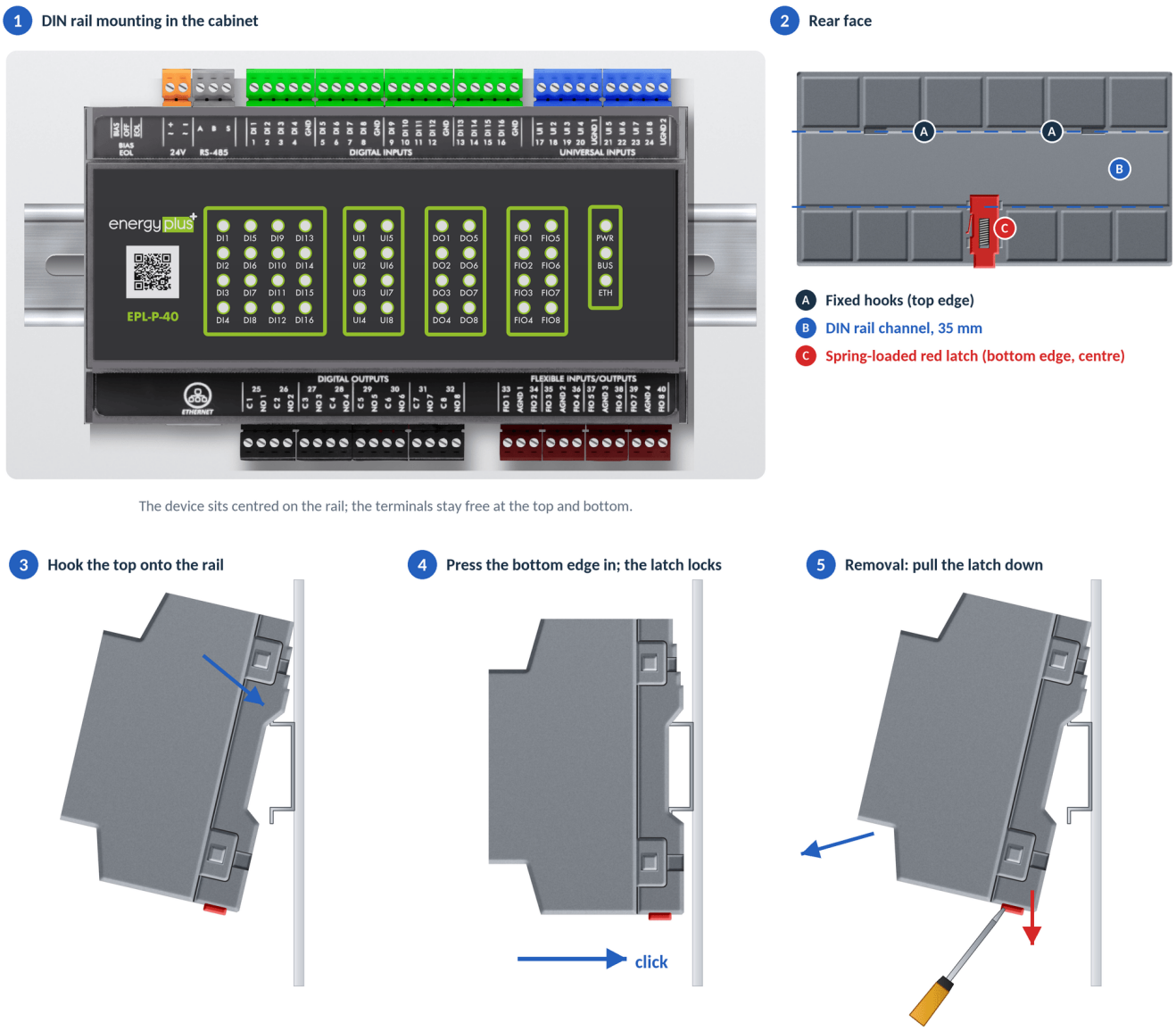


Figure 13. DIN rail mounting and removal

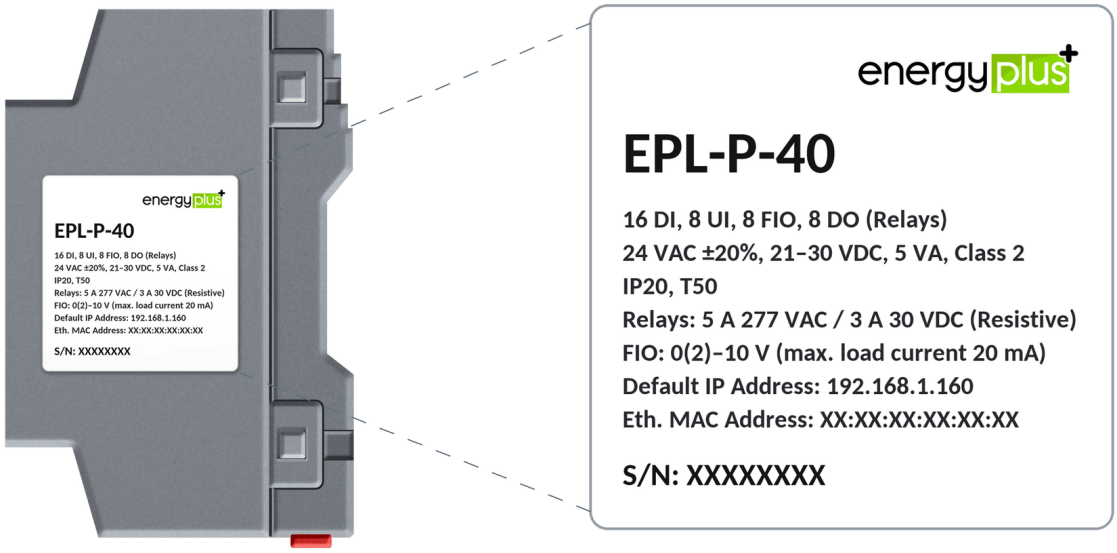


Figure 14. Product label location

13.3. Supported Modes

DI modes:

Code	Meaning
0	DI DIRECT
1	DI REVERSE
2	COUNTER (DI1..DI4 only)

DO modes:

Code	Meaning
0	DO DIRECT
1	DO REVERSE

UI modes:

Code	Meaning
0	OFF
1	0-10 VOLT
2	2-10 VOLT
3	0-20 mA
4	4-20 mA
5	DI DIRECT
6	DI REVERSE
7	NTC 1.8K

Code	Meaning
8	NTC 2.2K
9	NTC 3.3K
10	NTC 10K3A1
11	NTC 10K4A1
12	NTC 10K CAREL
13	NTC 20K6A1
14	PT1000
15	NI1000 DIN
16	NI1000 LG
17	RESISTOR

FIO modes:

Code	Meaning
0	OFF
1	0-10 VOLT analog output
2	2-10 VOLT analog output
3	DO DIRECT
4	DO REVERSE
5	DI DIRECT
6	DI REVERSE

FIO channels have no current (mA) output. The FIO digital output mode is not a relay contact: while the output is active, approximately 10 V DC is present at the terminal (maximum 20 mA). Use a suitable interposing relay to drive a relay or contactor. In FIO digital input mode, connect a potential-free (dry) contact.

13.4. Counter Inputs (DI1..DI4)

COUNTER mode can be selected only on channels DI1..DI4. COUNTER cannot be selected for DI5..DI16; a stored COUNTER setting on these channels is applied as DI DIRECT.

Counting behavior:

- The inputs are sampled every 1 ms. Each rising edge of the raw input (transition from inactive to active, closing of the contact) increments the counter by 1.
- There is no software contact bounce (debounce) filter. The active and inactive times of the pulse must each be longer than 1 ms (theoretical upper limit approximately 500 Hz). Use bounce-free pulse sources.
- The REVERSE setting is not applied to the counter. The channel LED lights orange while the raw input is active.
- Counting starts 5 ms after the channel is set to COUNTER mode; an input that is already active at that moment is not counted.
- The total value is in the range 0 .. 4 294 967 295; after the largest value it wraps to 0.

Storing the total:

- On boards with FRAM, the total is written to FRAM shortly after each change and is retained through a power failure.

- On boards without FRAM, the total starts from 0 at power-up and is reset while the channel is not in COUNTER mode.
- When the channel is taken out of COUNTER mode, the window information is cleared; on boards with FRAM the total is retained. Pulses arriving in other modes are not counted.

Counting window:

- The window duration is set between 3 .. 14400 minutes; the default is 3 minutes. The window duration is not persistent; it returns to 3 minutes on restart. The device does not apply out-of-range values.
- The window starts at power-up or when the channel is set to COUNTER mode; the elapsed time is shown in minutes.
- When the time expires, the number of pulses in that window is published as the window result and the elapsed time restarts from 0. The published result is held for one minute and then returns to 0. Read the result within this time or store it in the application.
- If the window duration is reduced to a value lower than or equal to the elapsed time, the running window closes in the next second and the result is published.

Resetting the counter (Reset button on the IO Config page, or BLE) sets the total, the window result, the elapsed time and the running window to 0; on boards with FRAM the value 0 is also written to FRAM.

On the web interface, the counter card shows the Total, Window, Elapsed (min), Window Set (min) fields and the Reset button; the Monitoring page also has a counter card. The value of a DI channel in COUNTER mode is the total value. Use on the Sedona side is described in the Sedona I/O Components section.

13.5. Persistence and Power-Up Behavior

Channel settings (mode, min, max, offset) are written to persistent memory approximately 1 second after a change; this storage is independent of the saveInterval setting in the platform component. Output commands, manual override states and the counter window duration are not persistent.

In the factory setting, UI and FIO channels are in OFF mode and DI and DO channels are in DIRECT mode; min = 0, max = 100, offset = 0.

At power-up and until the application writes the first command to an output:

- DO DIRECT relays are released and DO REVERSE relays are energized.
- FIO analog outputs are at the min level (0 V or 2 V); the FIO digital output command is 0, so an FIO output in DO REVERSE mode is active.
- Manual override states are cleared.

The output is also put into the same initial state when the mode of an FIO channel is changed. Select the field equipment so that it is safe in this initial state.

13.6. LED and Live Status Behavior

The front panel has a status LED for each channel plus the PWR, BUS and ETH LEDs. The channel LEDs are arranged in the DI1..DI16, UI1..UI8, DO1..DO8 and FIO1..FIO8 groups. At power-up all LEDs show a short start-up animation; the channel LEDs then switch to the behavior below.

Channel	LED behavior
DI	green when active in DIRECT mode, blue when active in REVERSE mode; lights orange on each pulse in COUNTER mode (DI1..DI4)
UI analog	flashes green/blue while the measurement is between min..max, lights turquoise at or above max, off at the min value; in 2-10V and 4-20mA modes lights red when the signal is below the lower limit
UI digital	green when DI DIRECT is active, blue when DI REVERSE is active
UI sensor	orange in normal measurement; steady red on a short circuit, flashing red on an open circuit
DO	when the output is active, green in DIRECT mode, blue in REVERSE mode
FIO analog	flashes purple between min and max, steady purple at or above max, off at the min value
FIO digital output	when the command is active, green in DO DIRECT mode, blue in DO REVERSE mode
FIO digital input	green when DI DIRECT is active, blue when DI REVERSE is active
PWR	lights white while the device is running; green while a BLE connection is active
BUS, ETH	driven by hardware; BUS shows the state of the RS-485 line and ETH the state of the Ethernet link, and they are not affected by software settings

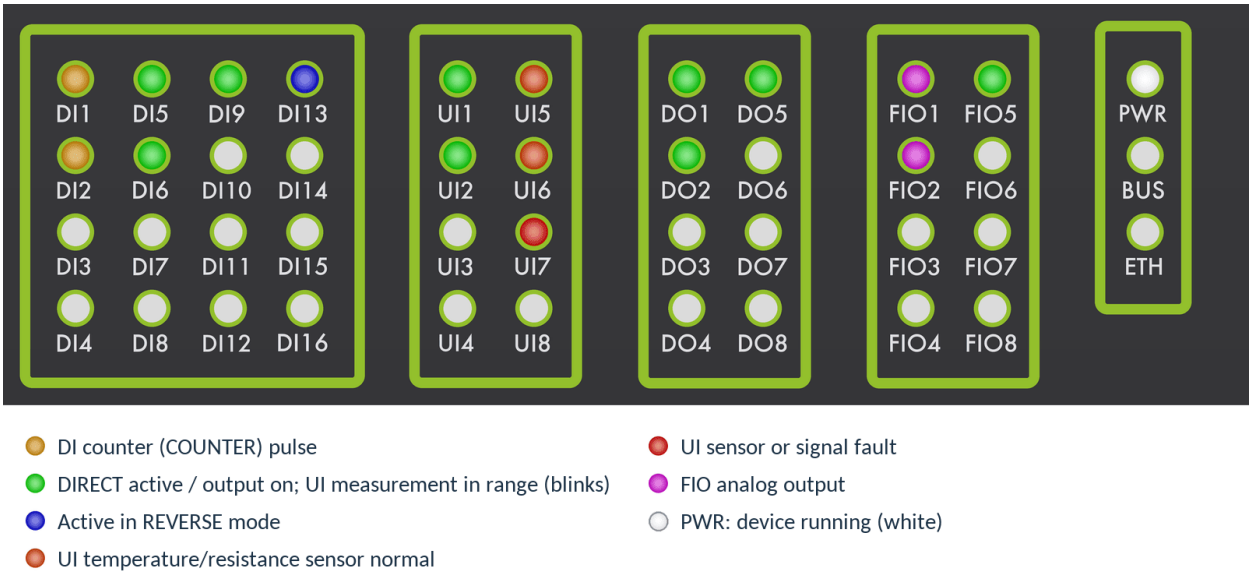


Figure 15. Front panel LED states (example operating state)

14. Sedona I/O Components

Physical channels are used in the Sedona application through the components of the EplP40_IO kit. Each component is bound to a channel by its channelNo (1..40) value; for the component to work, the channel must be in a suitable mode.

Component	Valid channels	Condition
DI	1..16; 17..24 and 33..40	DI mode 0/1 for 1..16; mode 5/6 (DI DIRECT/REVERSE) on UI and FIO channels.
AI	17..24	The UI channel must not be in a digital input mode (5/6).
DO	25..32; 33..40	Mode 3/4 (DO DIRECT/REVERSE) on FIO channels.
AO	33..40	FIO mode 1/2 (0-10 V / 2-10 V).
HwCounter	1..4	DI mode 2 (COUNTER).
Register components	address 1..200	Access the persistent register area as a numeric, boolean or enum value.

The component status field can take the following values:

Status	Meaning
NORMAL	Channel and mode are suitable; the component is running.
FAULT	AI: sensor or signal fault (open circuit, short circuit, out of range). DO/AO: the in input is empty (null). DI (on a UI or FIO channel): the value read is invalid.
INCOMPATIBLE	The channel exists, but the selected mode is incompatible with this component type.
UNAVAILABLE CHANNEL	The channel number cannot be used for this component type, channelNo is 0, or the application has not yet reached stable operation.
NOT LICENCED	There is no valid license on the device.

In the AI component, the faultCode field gives the cause of the fault: 0 normal, 1 open circuit, 2 short circuit, 3 out of range. On an open or short circuit out becomes empty (null); in the out-of-range state out keeps the calculated value.

Component fields:

- All components have an enable field.
- DO and AO: in is the application command, value shows the value applied to the output. While overrider is not empty, the output follows this value and overriden becomes true; the auto action clears the overrider value. Manual driving through the web or BLE also sets overriden to true.
- The AO command is limited to the min/max range of the FIO channel.
- A DO/AO that is disabled (enable = false) or whose in input is empty does not change the physical output; the output stays in its last state.
- HwCounter: out is the counter total. A value written to the in field (0 .. 4 294 967 295) sets the total to this value (preset); the write is applied only when in changes and the channel is in COUNTER mode. The window result and the elapsed time are not exposed to Sedona.

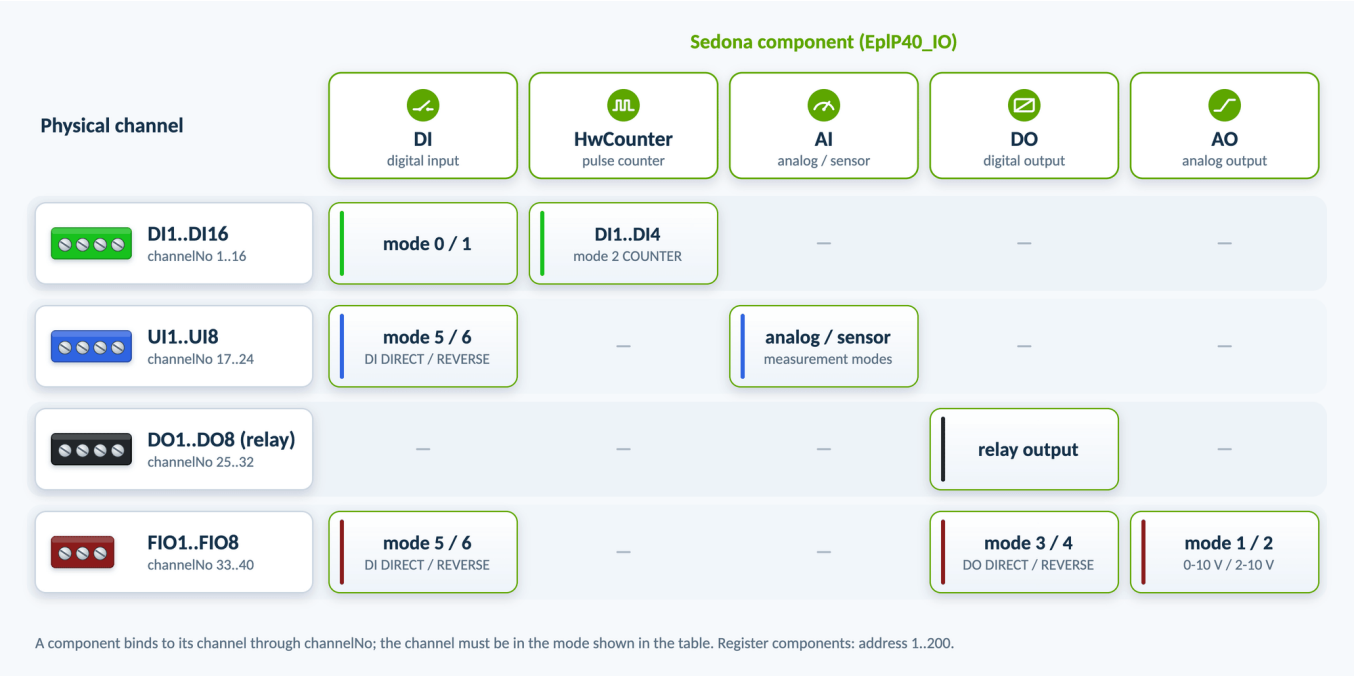


Figure 16. Channel groups and Sedona I/O components

14.1. Channel Behavior

UI channels:

- min/max are used only in the 0-10 VOLT, 2-10 VOLT, 0-20 mA and 4-20 mA modes. The value is the signal linearly scaled to the min/max range plus offset, and it is not limited: a signal above 10 V or 20 mA exceeds the max value; entering min > max inverts the scale.
- In the 2-10 VOLT and 4-20 mA modes, the channel goes to FAULT (faultCode = 3) when the signal is at or below 2 V / 4 mA (including exactly 0%). In the 0-10 VOLT and 0-20 mA modes a broken wire is not detected.
- After offset is added, the value is limited to -20 .. 120 °C in NTC modes and to -50 .. 150 °C in the PT1000 and NI1000 modes.
- RESISTOR mode measures 0 .. 600000 Ω; offset, min and max are not applied.
- On a sensor open or short circuit, the web interface and BLE show a fixed value: NTC open circuit -20 °C, short circuit 120 °C; PT/NI open circuit 150 °C, short circuit -50 °C.
- The value is reported with 0.1 resolution, truncated rather than rounded.
- Measurements are filtered against short fluctuations; large changes bypass the filter and are reflected immediately.
- Digital modes give a 0/1 value.

FIO channels:

- In analog modes, the value from the application is limited to the min/max range and converted to an output voltage. When min = max is entered, the output stays at 0 V (0-10 VOLT) or 2 V (2-10 VOLT). The Sedona command is limited to ±3276.8.
- In digital output modes, the 0/1 command is applied as a voltage output.
- In digital input modes, the field contact is read.

15. Platform Component

The EplP40Platform platform component exposes device-level settings and information to the Sedona application:

Field / action	Usage
Channel fields	di01..di16 and do01..do08: value and mode. ui01..ui08 and fio01..fio08: value, mode, min, max and offset. The UI value is read-only.
Direct channel write	Writing do01..do08 and fio01..fio08 drives the output directly; writing di01..di04 sets the counter total. No license check is done on these writes. Using the EplP40_IO components in the application is recommended.
registrationCode	Field for entering the device license code. The field is cleared after the code is entered; the result is shown in the state field.
state	License state: Unregistered or Registered.
invalidSerialCode	Becomes true if no license code in a valid format is stored on the device.
serialNumber	Device serial number; the license is bound to this number.
IpAddress, SubnetMaskAddress, GatewayAddress	Network information. When written, the device switches to static IP and DHCP is disabled.
MacAddress	Ethernet MAC address (read-only).
flashAvailable	Free space in the device file system.
saveInterval	Automatic save interval of the Sedona application in minutes. Default -1 (off); entering 0..29 gives 30, maximum 14400. Saves only the Sedona application; register values are saved on every write. No extra save is made when power fails.

Field / action	Usage
restart	Restarts the platform's service and driver networks; the device does not restart.
reboot	Restarts the device; this is a hidden action and asks for confirmation.
refresh	Reads the platform fields from the device again.
BackupNvs, RestoreNvs	Backup and restore of the persistent registers and I/O channel settings to and from the nvs_backup.bin file.

The Regs (1..100) and Regs_2 (101..200) components for the register area are created automatically below the platform component.

The device clock is kept by the hardware clock (RTC) on the board. Time, time zone and UTC offset are set through the Date Time Service in EnergyPlus Workbench or Niagara N4.

15.1. Register Components

The NumericReg, NumericFloatReg, BooleanReg, EnumReg, EnumIntReg, EnumShortReg and EnumByteReg components use the persistent register area of 200 addresses:

- Values are held as 32-bit floating point in Regs (1..100) and Regs_2 (101..200); integers are stored losslessly up to ±16 777 216.
- Address 0 makes the component passive.
- Components using the same address share the same value.
- The value is saved to persistent memory on every write.

16. Licensing

Some Sedona components on EPL-P-40 require a device license. The license code is bound to the device serial number and is supplied specifically for the device; there is no trial period or expiry. The code is entered in the registrationCode field of the platform component through EnergyPlus Workbench or Niagara N4. The web interface has no license page.

An accepted license restarts the related drivers after approximately 1 second. While the license is not valid, the device checks the code again once per minute.

Function	License requirement
Local I/O components (EplP40_IO)	Base license
Modbus TCP and RTU master, Modbus TCP gateway	Base license
Modbus slave (RTU and TCP)	Base license
BACnet/IP and BACnet MS/TP	Base license
BACnet IP ↔ MS/TP routing (router)	Optional router feature in addition to the base license
Register components, MQTT, serial communication, time schedules and logic blocks	No license required

Without a license, the related components show a no-license indication in their status field and do not run their field function. The text shown depends on the component: NOT LICENCED in I/O components, Not Licensed or Not licensed in Modbus components, Not licensed in BACnet components. In BACnet components, the bacnetLicensed and routerLicensed fields also show the license state.

If only the IP port or only the MS/TP port is enabled in the BACnet service, the base license is sufficient. When both ports are enabled together, the device operates as a BACnet router: BACnet/IP and BACnet MS/TP are opened at the same time,

the device routes between the two networks and announces itself as a router. This requires the service's routerEnabled field to be on and the optional router feature to be included in the license; choose different IP and MS/TP network numbers (default 1 and 2). Without the router feature, the BACnet service does not start while both ports are enabled and the status field shows Router not licensed; if routerEnabled is off, it shows Router required. To return to a single port, disable the unused port.

17. EnergyPlus Workbench, SOX and Niagara Driver Usage

Two tools are used for application programming and advanced commissioning of EPL-P-40. EnergyPlus Workbench is the working tool used to program the device application live on the Sedona wiresheet. On the Niagara side, EnergyPlus Niagara modules offer two uses. In the first, the Sox Connection connection type is selected from the Open Device menu in the Niagara N4 engineering interface to connect directly to the device without running a station, and Wire/Slot/Link Sheet, Application Manager, Backup/Restore Tool and Kit Manager are used. In the second, the device is placed under a Niagara station with eplus-rt; Device Manager, Point Manager, SOX gateway/tunnel, schedules, user synchronization and proxy point integration are managed.

Process	Usage
Live monitoring	Runtime values, point states, slot/property fields and link relationships are monitored. Monitoring does not change the running application.
Live programming	Adding components, creating links, writing slots/properties and invoking actions are done on the wiresheet. Since equipment connected to outputs may be affected, run the test sequence in a controlled manner.
Persistent save	The verified application is saved to persistent memory. Changes made before a persistent save may not be retained on a restart or power failure.
Service package	Retrieving the application file, sending it to the device, backup and restore steps are managed with Application Manager and the Backup/Restore Tool.
Niagara N4 direct connection	A station-less device session is opened by selecting Sox Connection from the Open Device menu; live programming and service are done with Wire/Slot/Link Sheet, Application Manager, Backup/Restore Tool and Kit Manager.
Niagara station driver integration	Device, point, schedule, SOX gateway/tunnel, proxy point and user synchronization are managed within the station. Point discovery is based on the active Sedona application on the device and the kit state.

17.1. Programming with Workbench

Typical flow on the Workbench side:

1. open the device session
2. verify the kit set and the platform manifest on the device
3. open the active application tree and the wiresheet view
4. build the blocks, links and point connections live on the wiresheet
5. verify the control logic with slot/property values and live point values
6. save the verified application to persistent memory
7. before site handover, retrieve the application file with Application Manager and save the device backup with the Backup/Restore Tool

17.2. Kit and Manifest Management

The application runs with a kit set made up of platform, I/O, control, communication and auxiliary block families. If the kit set on the device and the kit and manifest files in the programming tool do not match, live programming, persistent save, restore or opening a SOX session may be affected.

The kit set used is determined by the project requirements and listed in the handover package. Kit families:

Family	Kits
Core platform and services	sys, inet, datetime, web, sox, pstore; EplP40Platform for platform and device access
Local I/O	EplP40_IO: DI, AI, DO, AO, HwCounter and persistent register components
Logic and selection	EplusLogic, EplusLatches, EplusSelects
Process and calculation	EplusControl, EplusMath, EplusConversion, EplusConstants
Timing and utilities	EplusSchedule, EplusTimer, EplusUtil, EnergyPlusDynamicSchedule
Communication	EplusModbusTcpMaster, EplusModbusRtuMaster, EplusModbusSlave, EnergyPlusBacnet, BacnetDriver, EnergyPlusMqtt, EplusSerial

Items to check:

- kit versions installed on the device
- kit and manifest files on the EnergyPlus Workbench or Niagara side
- the kit family expected by the project application
- platform and I/O kit compatibility

17.3. Live Access with SOX

A SOX session provides live access between EnergyPlus Workbench or EnergyPlus Niagara modules and the application running on the device. The device tree, component structure, point values, links and service fields can be monitored through this session. With suitable permissions, adding/deleting components, renaming, writing slots/properties, invoking actions and creating/removing links can also be done in the same session.

Typical use:

- opening the device tree in Niagara N4
- discovering points with Point Manager
- accessing the device through a SOX tunnel or gateway
- monitoring live point values
- live application editing and verification after testing

17.4. Application Manager and Backup/Restore Tool

Live programming is done on the running application while a SOX session is open. Persistent save, Application Manager and Backup/Restore Tool operations, on the other hand, are separate processes carried out at the end of commissioning or during service work. At project handover, record the active application, kit package, backup and software version together.

Application Manager manages only the application file. The Backup/Restore Tool creates the service backup of the device; besides the application file, this backup also covers the kit package and the persistent register/I/O settings. Therefore, do not treat the application file and the service backup as having the same scope.

18. Engineering Rules

18.1. Analog Scaling

- min, max and offset values are entered in steps of 0.1.
- The engineering range is limited to -3276.8 .. 3276.7.
- In UI analog modes, the input signal is linearly scaled to the min/max range.
- UI offset shifts the calculated value.
- In FIO analog modes, the value from the application is limited to the min/max range and converted to an output voltage.
- FIO offset adjusts (trims) the full scale of the analog output: the full scale changes by the ratio offset / max. For example, with max = 100 and offset = 1 the full scale increases by approximately 1% (approximately 10.1 V). In 2-10 VOLT mode the 2 V lower level also changes by the same ratio.

18.2. Sensor Measurement Ranges and Fault Detection

Sensor / signal	Measurement range	Fault detection
NTC families	-20 .. 120 °C	Short circuit ≤ 10 Ω, open circuit ≥ 300 kΩ
PT1000, NI1000	-50 .. 150 °C	Short circuit ≤ 50 Ω, open circuit ≥ 2000 Ω
RESISTOR	0 .. 600000 Ω	-
2-10 VOLT	2 .. 10 V	≤ 2 V out of range
4-20 mA	4 .. 20 mA	≤ 4 mA out of range

When a fault is detected, the related Sedona component goes to the FAULT state.

18.3. Examples

Example 1: 4-20 mA pressure input on UI2 (channel 18)

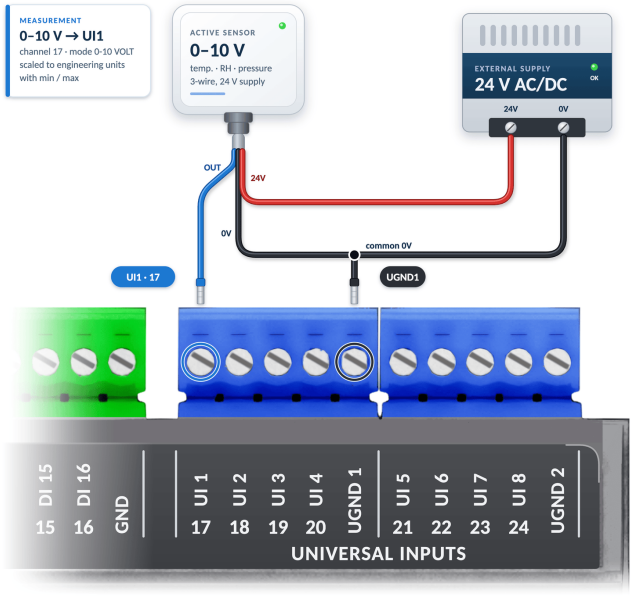
- mode = 4-20 mA
- min = 0
- max = 100
- offset = -2.5
- expected point value at 12 mA input: 47.5

Example 2: 2-10 V analog output on FIO1 (channel 33)

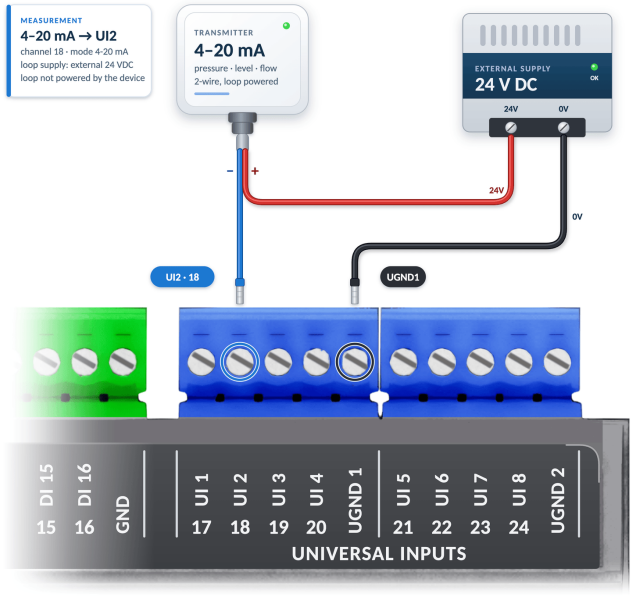
- mode = 2-10 VOLT
- min = 0
- max = 100
- command 30
- expected value at the physical output: approximately 4.4 V

18.4. Wiring Examples

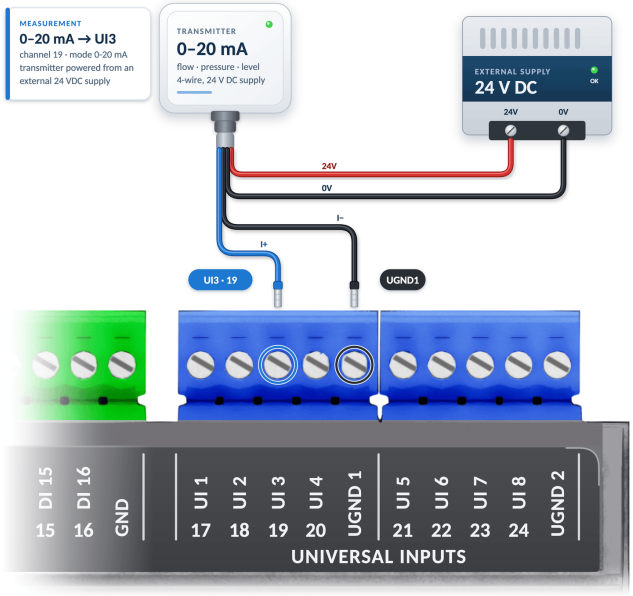
The diagrams below show the input connections on the device terminals. The channels shown are examples; the same wiring applies to the other channels of the same connection group. Detailed descriptions are in the EPL-P-40 Wiring and Mounting Reference document.



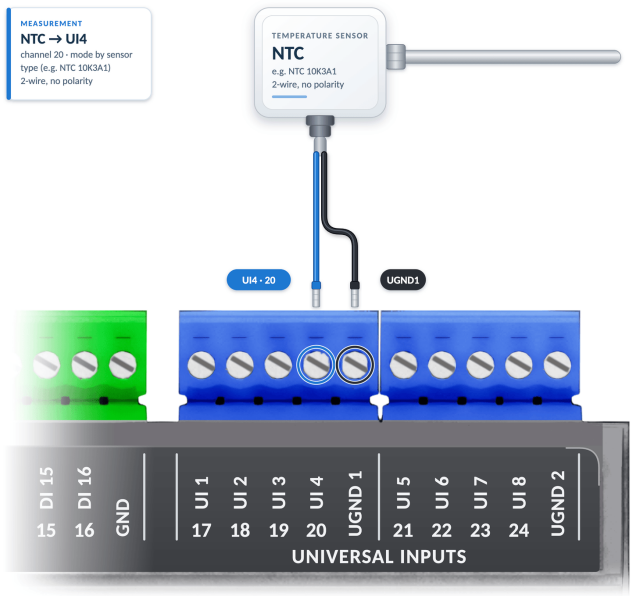
0-10 V active sensor (3-wire)
UI1 (17) and UGND1; mode 0-10 VOLT (2-10 VOLT for a 2-10 V sensor).



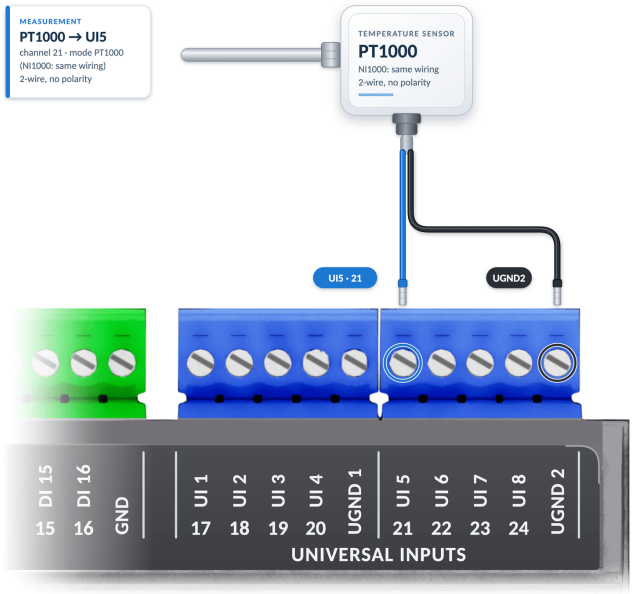
4-20 mA passive transmitter (2-wire)
UI2 (18) and UGND1; external 24 VDC loop supply; mode 4-20 mA.



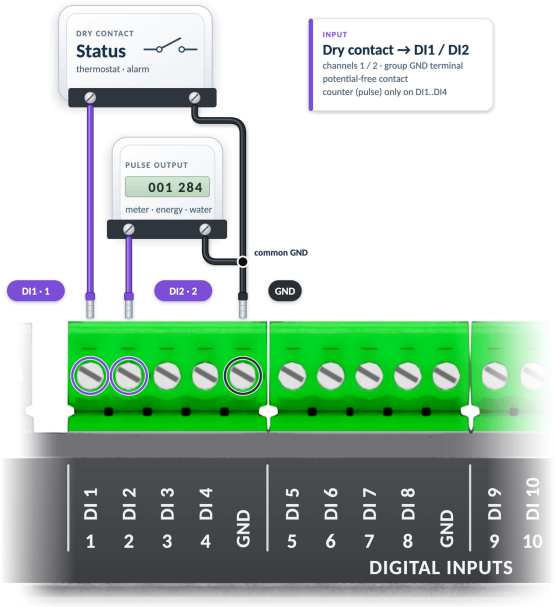
0-20 mA active transmitter (4-wire)
UI3 (19) and UGND1; the transmitter is powered from an external 24 VDC supply; mode 0-20 mA.



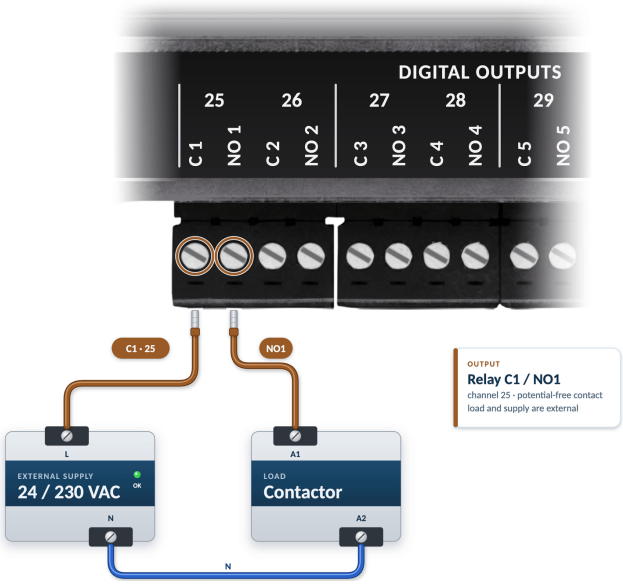
NTC sensor (2-wire)
UI4 (20) and UGND1; mode according to the sensor type (e.g. NTC 10K3A1).



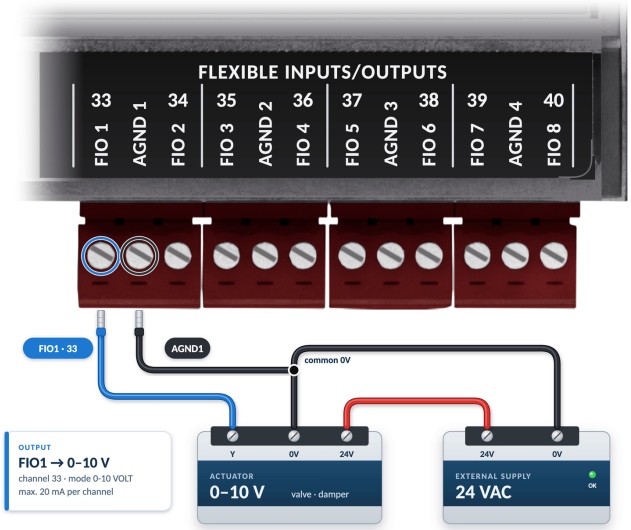
PT1000 sensor (2-wire)
UI5 (21) and UGND2; mode PT1000 (NI1000 uses the same wiring).



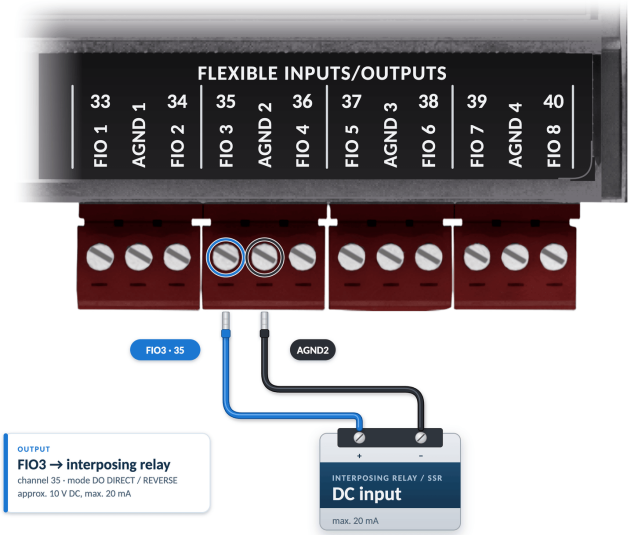
Digital input: dry contact and pulse
DI1 / DI2 and the group GND terminal; counter only on DI1..DI4.



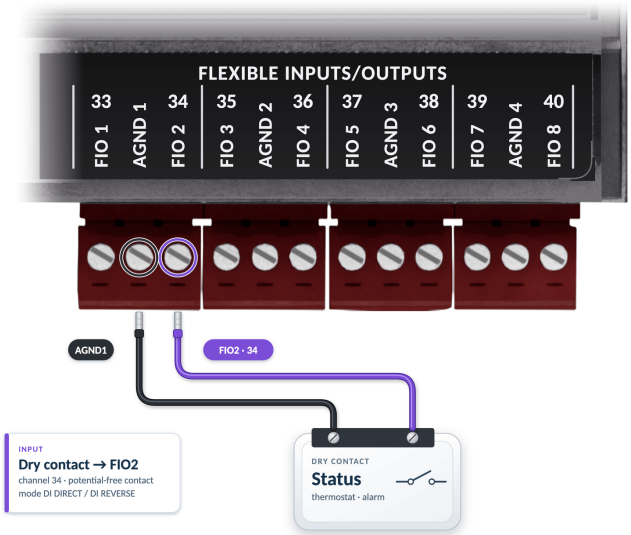
DO relay output
C1 / NO1 (channel 25); potential-free contact, load and supply are external.



FIO 0-10 V analog output
FIO1 (33) and AGND1; mode 0-10 VOLT; at most 20 mA per channel.



FIO digital output
FIO3 (35) and AGND2; approx. 10 V DC, at most 20 mA; drives an interposing relay or SSR.



FIO digital input
FIO2 (34) and AGND1; potential-free contact; mode DI DIRECT / DI REVERSE.

19. Communication and Integration

Field communication on EPL-P-40 is provided by communication kits added to the Sedona application. Which protocol runs in which role is determined by the components added to the application and their settings. Therefore, the controller has no fixed Modbus register table or BACnet object list; the address and object structure is defined together with the project application.

Function	Kit	Usage
Modbus TCP master	EplusModbusTcpMaster	Reading from and writing to Modbus TCP devices on Ethernet; IP address, port (default 502) and slave address per target device.
Modbus RTU master	EplusModbusRtuMaster	Reading from and writing to Modbus RTU devices on the RS-485 line; baud rate, parity, data bits and stop bits are configurable (default 9600 8N1).
Modbus slave	EplusModbusSlave	Serving application data to the supervisory system over Modbus RTU (RS-485) and Modbus TCP (port 502).
BACnet	EnergyPlusBacnet, BacnetDriver	BACnet/IP (UDP 47808) and BACnet MS/TP over RS-485 (default 38400 baud); serving BACnet objects, communicating with remote BACnet devices; with the optional router license, IP and MS/TP run at the same time with routing between them.
MQTT	EnergyPlusMqtt	MQTT broker connection (default port 1883); optional TLS.
Serial communication	EplusSerial	Application-specific serial communication over RS-485.
Dynamic time schedule	EnergyPlusDynamicSchedule	Time schedules with weekly programs and special day definitions that can be updated at runtime.

The RS-485 line must be used by only one serial protocol at a time. When the settings of communication components are changed, the related communication restarts; field communication may be interrupted briefly.

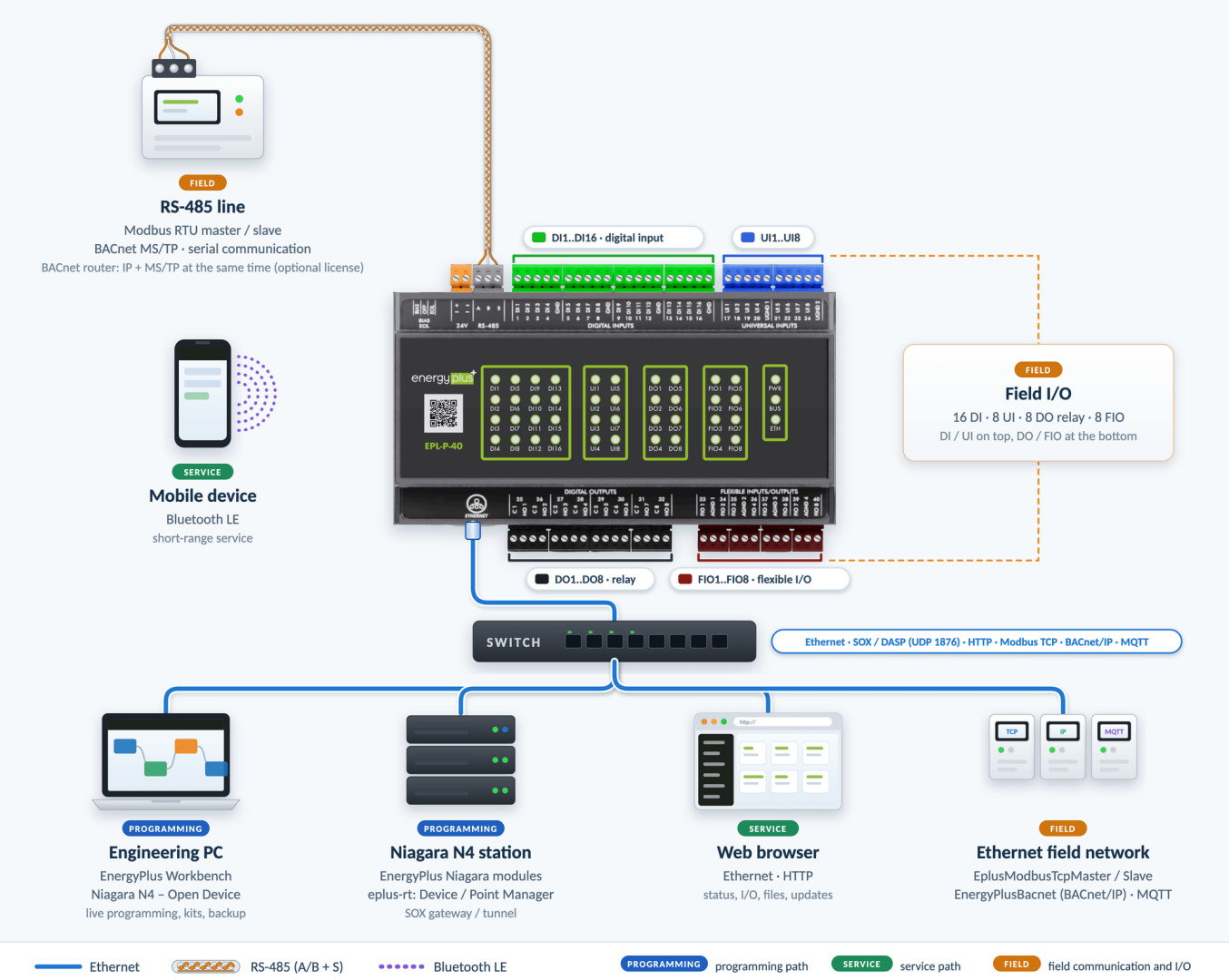


Figure 17. System integration topology

20. Backup, Restore and Application Files

The application and setting information of the device is held in the following files:

File	Content
app.sab	The running Sedona application.
kits.scode	Compiled form of the kits used by the application.
m:m.zip	Kit manifest archive.
nvs_backup.bin	Backup of the 200 persistent registers and the I/O channel settings.

The BackupNvs action in the platform component writes only the persistent register values and the I/O channel settings to the nvs_backup.bin file; counter values, network settings, the license and the Sedona application are not included in this backup. The RestoreNvs action asks for confirmation and does not show its result in a separate field; check the values after a restore.

Backup and restore operations are done with the Backup/Restore Tool, Application Manager and Kit Manager in EnergyPlus Workbench or Niagara N4.

Typical maintenance flows:

- updating the application files
- taking a device backup with Save Backup
- applying an existing backup with Restore from file or Restore Selected Backup

Take a current backup before field changes, kit changes and software updates.

21. Troubleshooting

Symptom	Probable cause	Check
I/O component shows INCOMPATIBLE	channel mode is incompatible with the component type	channel mode on the IO Config page and the component's channelNo value
I/O component shows UNAVAILABLE CHANNEL	channel number is invalid for this component type or 0	match between component type and channel group
DO or AO component shows FAULT	the in input is not linked or empty	the component's in link
Component shows NOT LICENCED or Not Licensed	device license not entered or invalid	state and license code in the platform component
UI does not give the expected value	wrong mode, min/max or offset	channel mode, field signal and scaling settings
UI shows FAULT	sensor open/short circuit or signal out of range	sensor connection, sensor type, cable and faultCode
Counter counts too many pulses	contact bounce	use a bounce-free pulse source (electronic output)
Counter does not count	channel not in COUNTER mode or pulse shorter than 1 ms	channel mode, pulse duration and the LED lighting orange
Window result shows 0	the published result is cleared after one minute	read the result at the end of the window or store it in the application
FIO output does not reach the expected level	min/max limiting or offset effect	command value, limits, offset and field measurement

Symptom	Probable cause	Check
Output does not follow the application	output driven manually from the web interface or BLE	set the output to Auto on the Monitoring page; check the overriden field in the Sedona component
File operation fails	file type, file size, file name, or Sedona is starting	file type, 500 KB limit and file name; repeat a few seconds later
No access after a software update	device is restarting or the IP has changed	reconnection, current IP and software version
Administrator password unknown	password lost	contact the manufacturer's service; the device has no factory reset function