Nexus Gateway

Nexus Lite · Nexus 4G



NEXUS-LITE · NEXUS-4G

Installation and Operation User Manual

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About AERL

Australian Energy Research Laboratories (AERL) was founded in 1985 by Stuart Watkinson to commercialise the Power Optimizer, which he developed while studying at the University of Queensland. It became the AERL MAXIMIZER™, a universal maximum power point tracker (MPPT).

Today AERL designs, integrates and supports power conversion, lithium energy storage, monitoring and earth-fault detection products for commercial, industrial and off-grid energy systems, including oil and gas, mining and telecommunications sites.

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Important Safety Information

01

About this manual, safety notes

This manual contains important safety information and installation instructions for the AERL Nexus Gateway: the Nexus Lite and the Nexus 4G. It uses the following symbols for important operating information and potentially dangerous conditions.

Important

Indicates information that must be followed to ensure proper operation of the Nexus.

Caution

Indicates a critical procedure for the safe installation of the unit, or safety information that must be followed.

1.1 About This Manual

This manual gives installation and operating instructions for the Nexus Lite and the Nexus 4G. Everything in it applies to both models except the Nexus 4G chapter, which covers what only the Nexus 4G has. Read all of its instructions and cautions before you start the installation.

Only qualified electricians and technicians may install the Nexus.

Do not disassemble or attempt to repair this product unless you are qualified and have written permission from AERL to do so.

AERL will not be held responsible in any way for mishandling of this product or for installation of the product in a manner that does not comply with the instructions in this manual.

1.2 Safety Notes

Caution

- The Nexus is designed for indoor installation only. Do not mount it where splashing water or direct sunlight can reach the unit.
- The DC power input is galvanically isolated, but always install and service the unit with the upstream supply isolated.
- Use a 5 V USB-C supply, or a DC source within the 12–60 Vdc input range. Applying voltages outside the rated range may damage the unit and will void the warranty.

Introduction

Models, what you will need

02

The AERL Nexus Gateway is a communications gateway for remote monitoring, configuration and control of distributed energy systems. It connects field equipment (solar charge controllers, batteries, inverters and other compatible CAN bus and Modbus devices) to AERL Cloud, where data can be viewed, alerts set up and equipment managed from anywhere.

Its main features are:

- AERL Cloud compatible out of the box: no configuration on the device for an Ethernet connection.
- Isolated CAN bus and RS485 ports for safe interfacing with field equipment.
- Wide-input DC power (12–60 Vdc), or 5 V USB-C power for bench use.
- Dual-band Wi-Fi and Ethernet.
- Compact enclosure for wall or DIN-rail mounting.

2.1 Models

Model	What it has
Nexus Lite (NEXUS-LITE)	The Nexus Gateway (formerly sold as Nexus): CAN bus, RS485, Ethernet and Wi-Fi
Nexus 4G (NEXUS-4G)	Everything the Nexus Lite has, plus an integrated 4G cellular modem with a SIM card slot, digital inputs and output relays

2.2 What You Will Need

- An AERL Nexus Gateway.
- A power source: a 12–60 Vdc supply (permanent installation) or a 5 V USB-C supply (bench or commissioning).
- An Ethernet cable to a network with internet access; or, for the Nexus 4G, a SIM card with a data plan (see the Nexus 4G chapter).
- CAT5e or CAT6 patch leads for the CAN and RS485 equipment you will monitor.
- An AERL Cloud account. Sign up at aerl.cloud/signup if you do not already have one.

The serial number and pin code printed on the Nexus label are needed to claim the Nexus in AERL Cloud. Keep the label accessible during commissioning.

Specifications

General and power, connectivity

03

The complete specifications are in the Nexus Gateway datasheets (Nexus Lite and Nexus 4G).

3.1 General and Power

Parameter	Nexus Lite	Nexus 4G
Part number	NEXUS-LITE	NEXUS-4G
Weight	350–400 g	—
Dimensions (W × H × D)	105 × 160 × 35 mm	—
Enclosure type	Indoor Type 1 / IP20	Indoor Type 1 / IP20
Mounting method	Wall or DIN rail	Wall or DIN rail
Operating temperature	−20 to 50 °C	−20 to 50 °C
Storage temperature	−40 to 70 °C	−40 to 70 °C
DC power input	12–60 Vdc (galvanically isolated)	12–60 Vdc (galvanically isolated)
USB-C power input	5 V (power only)	5 V (power only)
Power consumption	5 W	7 W
Warranty	2 years	2 years

3.2 Connectivity

Interface	Nexus Lite	Nexus 4G
CAN bus	2 × RJ45 (linked internally), galvanically isolated, no built-in termination, 500 kbps	As Nexus Lite
RS485 Modbus	1 × RJ45, galvanically isolated	As Nexus Lite
Ethernet	1 × RJ45	1 × RJ45
Wi-Fi	Dual band	Dual band
4G cellular	—	Yes, SIM card slot
Digital inputs and output relays	—	Yes
Encryption	SSL/TLS	SSL/TLS

Installation

Location, mounting, connectors, DC power input, USB-C power

04

4.1 Location

Caution

- The Nexus enclosure is rated IP20 and is intended for indoor installation only. Do not mount it where splashing water, direct sunlight or excessive dust can reach the unit.
- Route cables downwards away from the Nexus, so that any moisture that condenses on the cables does not run back into the product.
- Allow at least 25 mm of free space on all sides of the enclosure for airflow.

In a system with an RS485 (Modbus) device such as a Selectronic SP PRO, mount the Nexus as close as possible to that device, so that the RS485 run is short.

4.2 Mounting

Mount the Nexus on a wall, using the mounting flanges, or on a 35 mm DIN rail. Mount it with the connectors facing downwards or sideways, so that cables leave the connectors without strain.

4.3 Connectors



Figure 4.1 Nexus Lite: USB, RS485, CAN 2, CAN1 and ETH on the front; DC IN on the side

Label	Connector
DC IN + –	DC power input, 2-pole pluggable terminal
USB	USB-C, 5 V power input only

Label	Connector
RS485	RS485 Modbus RTU, RJ45
CAN 2, CAN1	CAN bus, RJ45 × 2, linked inside the Nexus
ETH	Ethernet, RJ45

The Nexus 4G also has an LTE antenna connector, a SIM card slot, HDMI, RST and an RLY / IO terminal: see the Nexus 4G chapter.

4.4 DC Power Input

The Nexus can be powered from either of two inputs: use only one at a time. Use the DC input for a permanent installation. Connect a DC supply between 12 V and 60 V to the **DC IN** terminal. The input is galvanically isolated from the rest of the Nexus.

Pin	Function
1 (+)	12–60 Vdc input
2 (–)	Ground

1. Isolate the supply.
2. When the Nexus is fed from a battery, fit a fuse or circuit breaker in its supply, close to the battery.
3. Wire the plug with the supply off, checking the polarity: positive to pin 1 (+), negative to pin 2 (–).
4. Push the plug into the **DC IN** socket and restore the supply.

> **Important**
> The input is protected against reverse polarity, but confirm the polarity before you apply power. Prolonged incorrect connection may damage the input stage.

4.5 USB-C Power

For bench or commissioning use, connect a 5 V USB-C supply to the **USB** port. The USB-C port is a power input only: it is not a data connection.

4.6 Power-On

The Nexus starts automatically when power is applied. It then:

1	Starts its local services.
2	Connects to the network.
3	Connects to AERL Cloud.
4	Starts finding the connected field equipment.

Connecting Field Equipment

CAN bus, RS485 Modbus, supported equipment

05

The Nexus has two CAN bus sockets and one RS485 Modbus socket, all RJ45. Use CAT5e or CAT6 patch leads, shielded for CAN runs, and keep data cables away from DC power cables.

5.1 CAN Bus

The CAN interface runs at a fixed 500 kbps, matching the AERL device family. Every device on the bus must use 500 kbps.

Pin	Function
4	CAN High
5	CAN Low
6	Ground

All pins not listed are not connected.

- The CAN interface is galvanically isolated.
- **CAN 1 and CAN 2 are linked inside the Nexus** (one CAN interface, two sockets), so the Nexus can sit inline on the bus: for example, battery to CAN 1, and CAN 2 on to the inverter or MPPT.
- **The Nexus has no built-in termination.** A CAN bus is terminated with 120 Ω at both ends. If the Nexus is at an end of the bus, fit a 120 Ω RJ45 termination plug in its unused CAN socket. If it is mid-bus, fit no plug.

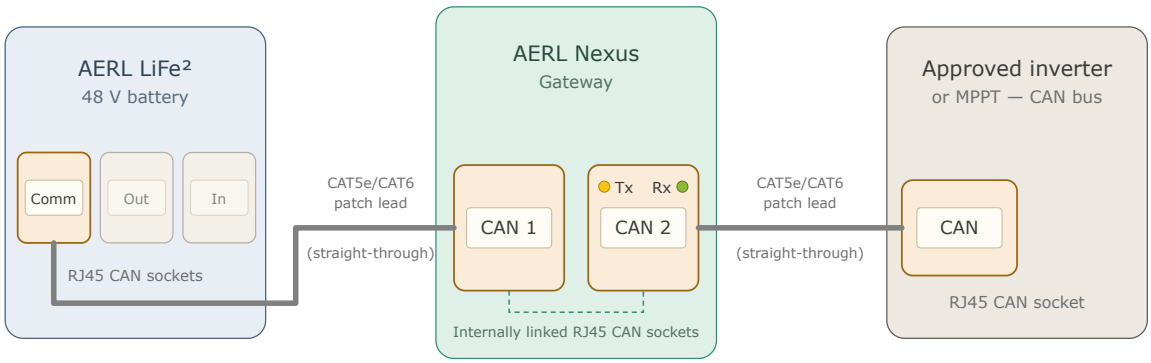


Figure 5.1 Inline pass-through: the LiFe² battery connects to Nexus CAN 1, and the internally linked CAN 2 connects on to the approved inverter or MPPT

5.2 RS485 Modbus

The RS485 port connects a Modbus RTU device, such as a Selectronic SP PRO inverter. The Nexus is the Modbus master: do not put another Modbus master on the same link.

Pin	Function
3	RS485 A
6	RS485 B
8	Ground

All other pins are not connected. The RS485 port is galvanically isolated. Follow the device manufacturer's wiring guidance, and terminate the bus correctly at both ends.

Two LEDs next to the RS485 socket, **Tx** and **Rx**, show the link working: Tx flickers when the Nexus sends a Modbus request, Rx when the device replies.

5.3 Supported Equipment

CAN devices are found automatically. A Modbus device is added to the Nexus in AERL Cloud (see the AERL Cloud chapter); AERL Cloud allows one Modbus device per gateway.

Equipment	Connection	Set-up
AERL CoolMax SRX and SRX-R solar charge controllers	CAN	Below
AERL LiFe² 5120S battery	CAN	Below
AERL Kakadu 120 battery	CAN	Below
AERL Battery Sense	CAN	Through the CoolMax SRX: below
Pylontech US5000, XESS ION 5120 batteries	CAN	On the battery's CAN bus
Selectronic SP PRO 2i inverter	RS485	Below
Deye Hybrid Inverter LV 3P	RS485	Added in AERL Cloud as a Modbus device
ABB Upscale UPS	SNMP, over the network	Set up in AERL Cloud
AERL CP-30, AERL EarthGuard	—	Contact AERL

The current list of supported equipment is on the AERL Cloud help site, docs.aerl.cloud (Devices).

5.4 CoolMax SRX and SRX-R

Connect a Nexus CAN socket to a **CANBUS** RJ45 socket on the CoolMax SRX (inside the access cover) or on the SRX-R backplane, with a straight-through patch lead. Run the bus on through the other SRX units from their second CANBUS socket. Enable the 120 Ω termination switch on the last SRX on the bus only. Leave the SRX CAN bus speed at its default, 500 kbps.

5.5 LiFe² 5120S Battery

Connect the Nexus inline on the battery's CAN bus: the master battery's **COMM** port to Nexus **CAN 1**, and Nexus **CAN 2** on to the inverter or MPPT. The master battery's COMM port has an internal 120 Ω termination, so the battery is one end of the bus. If the Nexus is the other end, fit a 120 Ω termination plug in its spare CAN socket. The LiFe² AERL Cloud Integration Guide has the details.

5.6 Kakadu 120 Battery

The Kakadu 120 needs a Nexus Gateway to manage its communications. Connect the **INV** port of the master BMS to a Nexus CAN socket. The **Master Unit** setting on that BMS sets its terminating resistor; on every other BMS it is off. For a Kakadu system with Selectronic SP PRO inverters, follow the Kakadu 120 commissioning guide for the SP PRO SPLC1202 and CoolMax SRX.

5.7 Selectronic SP PRO

Connect a straight-through CAT5e or CAT6 patch lead from **Port 1** on the SP PRO's comms card to the Nexus **RS485** socket. In SP LINK, switch Modbus on with Modbus address 1, 9600 baud, 8 data bits, no parity, 1 stop bit, then add the SP PRO to the Nexus in AERL Cloud. On a PowerChain system, connect to the PowerChain master. The Nexus Gateway SP PRO Setup Guide has the full procedure.

5.8 Battery Sense

The Battery Sense connects to a CANBUS socket on a CoolMax SRX, as its manual describes. When the Nexus is on the same CAN bus, the Battery Sense readings appear in AERL Cloud. If the Battery Sense is the last device on the bus, set its 120 Ω termination switch to ON.

5.9 AERL Industrial HMI (HMI-10)

The HMI-10 has the Nexus software built in: it does not connect to a Nexus Gateway. See the AERL Industrial HMI (HMI-10) User Manual.

Network Connection

Ethernet, Wi-Fi, firewall requirements, how often data is sent

06

The Nexus needs internet access to send its data to AERL Cloud.

6.1 Ethernet

Connect a Cat5e or better Ethernet cable from the site router or switch to the **ETH** port. The Nexus gets its address by DHCP and connects to AERL Cloud on its own: no further configuration is needed. The cable can be plugged in before or after power-on. Ethernet is recommended for permanent installations.

6.2 Wi-Fi

The Nexus has dual-band Wi-Fi. Wi-Fi is not set up from AERL Cloud: if Ethernet is not available at the site, contact AERL for help with a Wi-Fi set-up. Have the Nexus serial number and the site's Wi-Fi network name ready.

6.3 Firewall Requirements

The Nexus starts every connection itself: no inbound ports need to be opened. The network must allow outbound HTTPS (TCP port 443) to AERL Cloud services (aerl.cloud), and network time (NTP). If the site's network filters outbound traffic, contact AERL support for the list of addresses to allow.

6.4 How Often Data Is Sent

The Nexus detects the type of connection it has. It sends data every minute on Ethernet or Wi-Fi, and every ten minutes on a cellular connection (Nexus 4G). During a network outage it stores data locally and uploads it automatically once it reconnects.

AERL Cloud

Claiming the Nexus, confirming the equipment

07

Once the Nexus is powered, online and wired to the field equipment, claim it in your AERL Cloud organisation. Its data is visible only after it is claimed.

7.1 Claiming the Nexus

You need the Owner, Admin or Technician role in the organisation to claim a gateway.

1. Sign in at aerl.cloud. If you have no account, create one at aerl.cloud/signup; your first sign-in asks you to create an organisation.
2. Click **Add Gateway** on the dashboard or the **Gateways** page, or the **+** button in the top bar.
3. On **Claim Your Gateway**, enter the **Serial Number** and **Pin Code** printed on the Nexus label, then click **Claim Gateway**.
4. On **Gateway Claimed!**, choose **Assign to Existing Location**, or **Create New Location** with the site's name and address. Click **Continue**.
5. On **Setup Complete!**, click **View Location**.

There is nothing to configure on the Nexus itself: it connects to AERL Cloud with credentials set at manufacture. If a gateway has been claimed by the wrong organisation by mistake, contact AERL support.

7.2 Confirming the Equipment

- **CAN devices** are found automatically and appear under the location once the Nexus is online.
- **A Modbus device** (for example an SP PRO) is added in AERL Cloud by a user with the Owner or Admin role: open **Gateways** and click **Manage** beside the Nexus. In **Edit Gateway**, under **Modbus Devices**, click **Add Device**, choose the **Device Product**, then click **Add Device**. The Nexus loads the new configuration within about five minutes, without a restart.

7.3 Giving Others Access

To give a customer or colleague access, invite them from the organisation's **Invitations** page in AERL Cloud and choose their role.

7.4 Further Reading

The AERL Cloud help site, docs.aerl.cloud, covers organisations, locations, users, alerts and reports:

- Quickstart: docs.aerl.cloud/start/quickstart
- Gateways: docs.aerl.cloud/cloud/gateways
- Gateway configuration: docs.aerl.cloud/cloud/gateway-configuration
- Devices: docs.aerl.cloud/cloud/devices
- Alerts and events: docs.aerl.cloud/cloud/alerting-and-events/overview

Nexus 4G

SIM card, antenna, cellular data

08

The Nexus 4G is the Nexus Gateway with an integrated 4G cellular modem, digital inputs and output relays. Everything else in this manual applies to it unchanged.



Figure 8.1 Nexus 4G: LTE antenna and SIM slot on the left, the RLY / IO terminal on the right

8.1 SIM Card

The Nexus 4G takes a Micro-SIM in the **SIM** slot. Use a SIM with a data plan that covers the site.

1. Isolate the power to the Nexus 4G.
2. Push the Micro-SIM into the **SIM** slot until it latches. To remove it, push it in again and release.
3. Restore the power.

> **Important**
>
> Contact AERL before you commission a Nexus 4G on cellular: AERL confirms the SIM and the network settings it needs.

8.2 Antenna

Connect the LTE antenna to the **LTE** connector, and place the antenna where the cellular signal is best, outside any metal enclosure.

8.3 Cellular Data

On a cellular connection the Nexus 4G sends its data every ten minutes, to keep the data used low. AERL Cloud shows the Nexus 4G online once it has reported in the last 15 minutes, as for any gateway.

8.4 Digital Inputs and Output Relays

The **RLY / IO** terminal carries two output relays (R1, R2) and four digital inputs. The relays are for SELV circuits only: 30 V DC or 24 V AC at most, 3 A.

> **Caution**
> Contact AERL before you wire the RLY / IO terminal. Never connect mains voltage to the relays or the inputs.

Operation and Troubleshooting

Normal operation, software updates, status in AERL Cloud

09

9.1 Normal Operation

Once claimed and connected, the Nexus works on its own. It:

- Reads the connected field equipment continuously.
- Stores data locally during a network outage and uploads it once the connection returns.
- Renews its AERL Cloud credentials automatically.
- Applies software updates published by AERL.

No interaction with the Nexus itself is needed. All monitoring and configuration is done in AERL Cloud.

9.2 Software Updates

The Nexus updates itself automatically while it is connected to AERL Cloud: no installer action is needed. Updates are installed at a quiet time; the Nexus restarts to finish an update and is offline for a short time. If an update does not work, the Nexus goes back to the previous version by itself.

Firmware updates for connected AERL equipment, such as CoolMax SRX controllers, are started from AERL Cloud: see the AERL Cloud help site.

9.3 Status in AERL Cloud

The Nexus is monitored from AERL Cloud. On the **Gateways** page each gateway shows its **Status** and **Last Seen** time; its **Manage** window shows its Hub ID and software (Firmware) version.

- **Online**: the Nexus has reported in the last 15 minutes.
- **Offline**: it has not reported in the last 15 minutes, or has never reported.

Equipment on a gateway shows **Online**, **Sleeping** (normal for a CoolMax SRX that is quiet overnight), **Offline** or **Inactive**.

9.4 Troubleshooting

Symptom	Check
The Nexus does not power up	DC input within 12–60 Vdc and the polarity correct; the DC IN plug fully home; or the 5 V USB-C supply fully seated.
The Nexus has never come online	The Ethernet cable goes to a port with internet access; outbound HTTPS (port 443) is allowed; the right serial number was claimed. Nexus 4G on cellular: SIM, data plan and antenna.

Symptom	Check
The Nexus was online and went offline	Power, the network or cellular link, and the site firewall. The Nexus retries by itself and uploads the stored data when it reconnects. Note the Last Seen time.
No CAN devices appear	The Nexus is online; the devices are powered and wired to CAN 1 or CAN 2; CAN High, CAN Low and ground on pins 4, 5 and 6 of each lead; every device runs at 500 kbps; the bus is terminated at both ends.
CAN devices drop in and out (CAN errors)	Exactly two 120 Ω terminations on the bus, one at each end; shielded cable; data cables away from power cables; loose or damaged RJ45 plugs.
Modbus device shows no data; Tx LED not flickering	The Nexus is online and the Modbus device has been added to it in AERL Cloud.
Tx flickers, Rx does not	The cable goes to the right port on the device; a straight-through lead; the device is powered; its Modbus address, baud rate and format (SP PRO: 1, 9600, 8N1).
Tx and Rx flicker, no data in AERL Cloud	The product chosen in Edit Gateway matches the device, and the device's Modbus settings match it.

For alarm codes and faults of the connected equipment, see the AERL Cloud help site, docs.aerl.cloud/troubleshooting.

If these checks do not solve the problem, contact AERL support on 1800 950 865 or at support@aerl.com.au. Have the Nexus serial number (or Hub ID) and the time it went offline ready.

Compliance and Warranty

Compliance, warranty, change log

10

10.1 Compliance

The AERL Nexus is designed and tested to applicable Australian electrical and electromagnetic compatibility standards for Class B information-technology equipment installed indoors. Refer to the markings on the unit and the accompanying declaration of conformity for the standards covered by your unit's revision.

10.2 Warranty

The Nexus Lite and the Nexus 4G have a **2-year warranty**. It starts 30 days after AERL dispatches the Nexus, or on the day it first connects to AERL Cloud if that is sooner.

Register your Nexus at **aerl.com.au/warranty-registration**. Registration does not change the 2-year warranty.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

The full terms and the claim procedure are in the AERL Nexus Gateways Warranty Statement, at aerl.com.au.

Record the details from your Nexus label here:

Detail	Value
Model	
Serial number	
Installed on	

10.3 Change Log

Revision	Date	Change
2.1.0	11 / 2026	First issue.

Thank You for Choosing AERL

If you have any questions or need support, contact AERL.

Sincerely,

The AERL Team

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