Gateway Quick Setup Guide

Rayleigh Instruments — EST. 1964

rayleigh connect

Installation should be carried out by a qualified electrician.

STEP 1

Go to portal

On your web browser visit-
rayleighconnect.net
or scan the QR Code.

STEP 2

Create an Account or Sign In

You must have an active rayleighconnect account to view data from your device.

STEP 3

Activate Subscription.

Activate your subscription using the pre-supplied 16-digit activation coupon.

STEP 4

If using a Rayleigh Instruments SIM card.

Please contact us for activation.

Tel: 01245 428500

STEP 5

Insert SIM card or connect to your Ethernet Network.

By default your rayleighconnect Gateway will be in DHCP mode.

For SIM card enabled devices you will also need to attach the mobile network antenna.

STEP 6

Connect Gateway to a Modbus Network.

Ensure the A(+) and B(−) polarity is correct and that each meter has a unique slave address.

Note: Each device has two communication terminals , the positive labelled A or + and the negative labelled B or −. See reverse for wiring diagram example.

SAFETY

- Read instructions prior to installation or operation of the unit. Risk of electric shock. Only to be installed by competent personnel.
- Unit is intended to be installed in Mechanical Environment `M1`, with Shock and Vibrations of low significance, as per 2004/22/EC Directive.
- Unit is intended to be installed in Electromagnetic Environment `E2`, as per 2004/22/EC Directive.
- Do not use the equipment if there is any damage.
- Ensure that the equipment is supplied with correct voltage.
- The equipment must not come in close proximity to any heating sources, oils, steam, caustic vapours or other unwanted process by-products.
- Always isolate the power supply to the equipment prior to undertaking any work. Always confirm absence of supply prior to starting work using appropriate voltage detection equipment.
- Wiring shall be done strictly according to the terminal layout. Confirm that all connections are correct before energizing the equipment.
- All cables used for power connection should be stranded or solid core copper with a max. cross section of 2.5mm^2 (24-12 AWG).
- For Modbus connection we recommend Belden 9841 shielded cable or equivalent.
  Note: *To reduce electromagnetic interference, use of wires with adequate ratings and twists of equal size are recommended. All connection should be kept as short as possible. Routing of connecting cables shall be away from any internal EMI source.*
- All wiring to be in accordance with applicable local standards.
- Do not modify, repair or dissemble the unit.
- Operating temperature −10...+55°C.
- Relative humidity 0...85%, non condensing.

CE   UK CA

STEP 7

Connect power to your gateway.

There are different ways depending on the model you have .

Please refer to the 'Example Connection Diagram' supplied with your gateway.

PRO	LITE
5V DC	230V AC

Default Modbus Settings

Baud Rate	9600
Parity	None
Databits	8
Stopbits	1

STEP 8

Turn on the Gateway.

Allow up to 3 minutes for the gateway to connect online.

The 'STATUS' light on the front of the gateway will go green upon connection.

STEP 9

Register the gateway to your account.

Register using the Serial Number and Reg. Code

The Serial Number and Reg. Code are located on the Example Connection Diagram supplied with your Gateway.

Please have these to hand when registering and keep in a safe place.

Gateway (Serial) Number also on Gateway.

Ensure your Gateway Model supports sufficient number of meters.

Model Ref.	# of Meters
RI-EC4-LITE	4
RI-EC16-PRO / RI-EX16-LITE	16
RI-EC128-PRO / RI-EX128-PRO	128

A. Click the Grid Icon

B. On Pop-up Click 'Add gateway' and follow instructions.

STEP 10

Register your connected Modbus devices..

This step will add your devices to your online dashboard.

C. Click the Cog Icon and then on the Pop-up Click the 'Add extension' button.
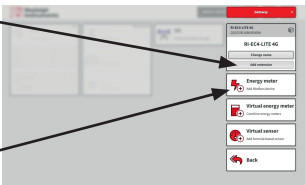
D. Then on the extended Pop-up Click on the 'Energy meter - Add Modbus device' button and add your energy meter.

STEP 11

Allow up to 3 minutes for your Modbus devices to connect.

Energy meter	20 686 kWh — Energy Meter
L1: —	L1: 234 V 16.5 A
L2: —	L2: 234 V 16.5 A
L3: —	L3: 234 V 16.5 A

3 Minutes

CHECKLIST

- Is Modbus polarity correct?
- Does each Modbus device have a unique slave address?
- Does each meter have the correct communication settings?
- If applicable, have CT ratios and network setting etc. been correctly configured?

KNOWLEDGE BASE

Comprehensive Technical documents and Help Files are available through our document portal.
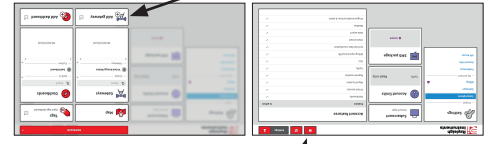
docs.rayleighconnect.net

SUPPORT

Please run through the above checklist before contacting support.
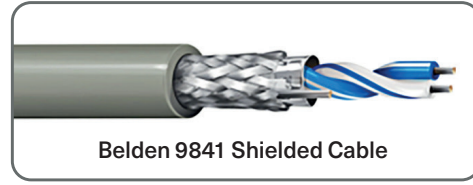
Tel: +44 (0)1245 428500

Modbus RS485 Topology

- Always ensure devices are disconnected from power when wiring this device.
- Modbus RS485 cabling is different in some ways to standard power cabling. This may cause some electricians to experience difficulties in commissioning a system as an understanding of the network topology is essential.
- A Modbus RS485 network connects a Master device, your Gateway, to one or more Slave devices, your energy meter(s) or other Modbus devices.
- A two-wire Modbus RS485 network operates in half-duplex mode on one twisted pair cable. All devices on the network can be transmitters or receivers but only one may transmit at any given time. The network must have one master device (your Gateway) which polls the network of slave devices and the slave then responds. All devices on the network receive any transmitted data but only the device for which the data is intended will respond if necessary.
- Each device has two communication terminals , the positive labelled A or + and the negative labelled B or –.
  NB: Both cables in a Modbus RS485 network carry data.
- These terminals must be connected in parallel with all A terminals connected together and all B terminals connected together in a daisy-chain* topology.
  * Tree and Star networks are NOT permitted and will NOT function!
- Inverting the A and B connections on one device will not only stop that device from communicating but may also stop all devices on the network from working.
  For this reason we highly recommend that you plan ahead. Check the building plans and design the network on paper before you install. Choose a colour-code for your network and stick to it. This will help you to avoid errors in your installation. Also ensure that your devices have a unique ID and are set up identically (see Modbus RS485 Device Settings).
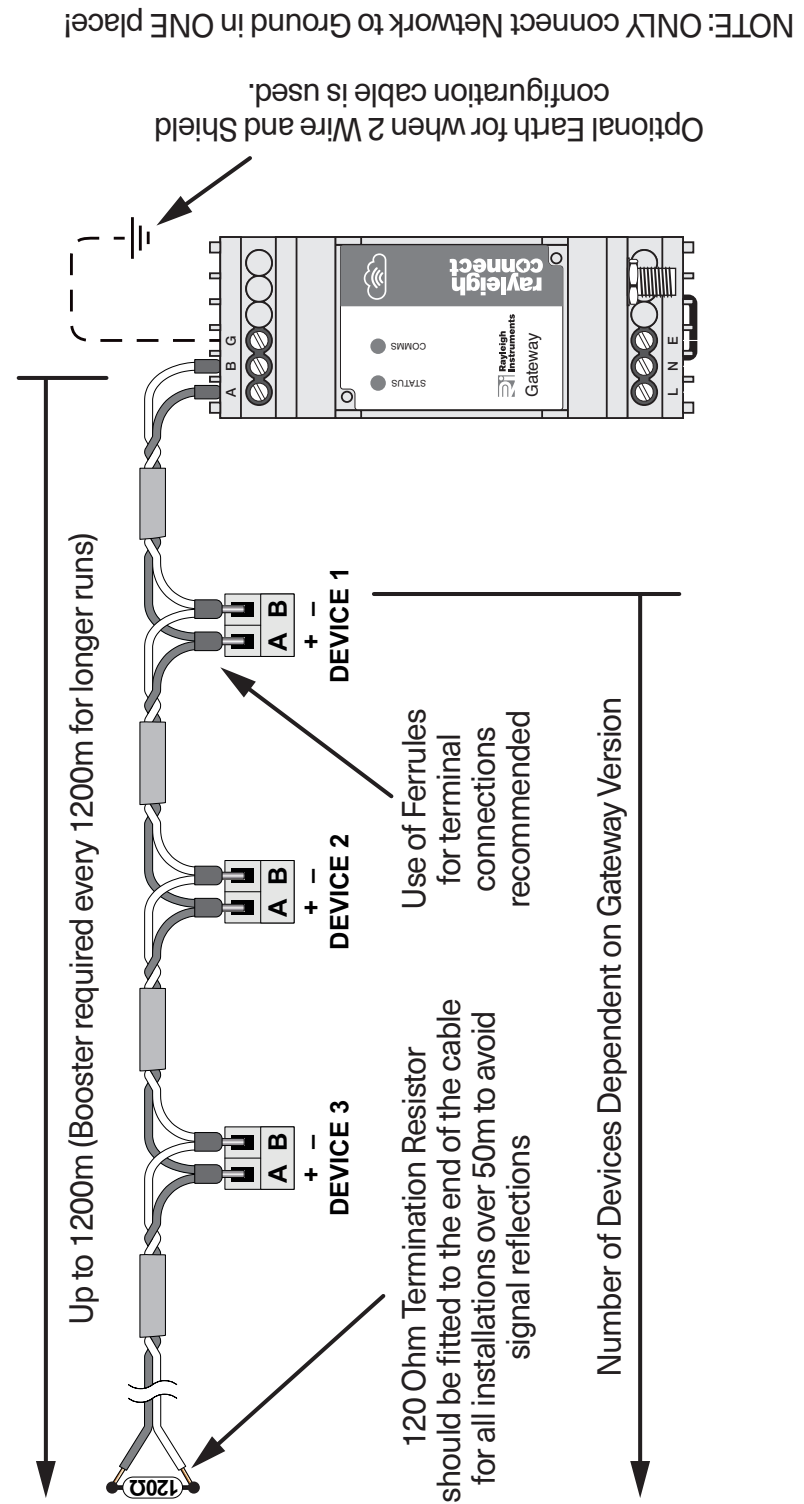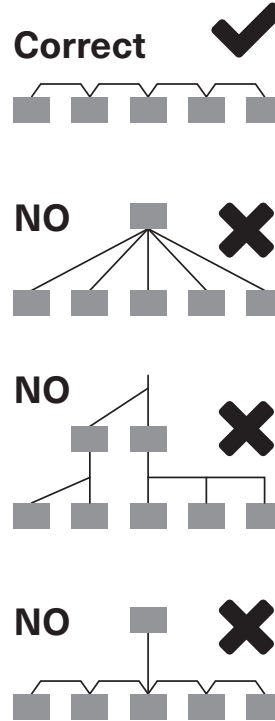
Modbus RS485 Cabling

- All applicable local regulations should be followed when installing communication wiring.
- The Modbus RS485 recommended cable characteristics are : twisted pair with tinned copper braid shielding. Minimum overlap: 65%. Gauge: AWG 24. Characteristic impedance: 120Ω. Maximum linear resistance: 100Ω/km. Maximum capacitance between conductors: 60pF/m. Maximum capacitance between conductors and shielding: 100pF/m. Maximum length of network cable: 1300m.
- For cabling your **rayleighconnect**™ Gateway network we recommend using Belden 9841 twisted-pair cable or equivalent. We also recommend that you use ferrules to ensure good clean connection with the terminals.
- Shielded twisted-pair cable reduces network susceptibility to electromagnetic interference. The arrangement of successive coils, each facing in the opposite direction to the next one, effectively cancels out any magnetic field traversing the cable.
- It can be difficult to assess if shielding is required in a particular network, however the use of shielded cable will reduce the likelihood of problems arising and is only slightly more expensive than unshielded. The shielding works like a Faraday cage to exclude external electromagnetic interference from disturbing the signals in the communication wires.
- For installations where the cable run is 50 metres or more a 120Ω* resistor should be fitted to minimise signal reflections in the data cables; thus reducing communication error rates and electromagnetic emissions.
  (*Resistor value = Impedance of wiring - typically 120Ω for twisted-pair cable)
- Termination resistors should only be at the extreme ends of a RS485 network in order to prevent signal reflection in an open circuit. Some RS485 devices have a resistor built in. If you use such a device and the resistor is not disengaged than you should only use this device at the extreme end of your network.

Wiring your Modbus RS485 Devices - Two Wire and Shield Configuration

- The RS485 interface standard does not specify a ground wire but connecting the ground (GND) can significantly reduce the problem of induced noise form EMI on the network.
- Twisted-pair cable inherently reduces susceptibility to external electromagnetic noise in the cable. Using a grounded shield further reduces this potential problem.
- The shielding works like a Faraday cage to exclude external electromagnetic interference from disturbing the signals in the communication wires.
- For larger installations and installations where there is a lot of other wiring and equipment that could cause noise in the data lines this represents best practice.
- Wherever possible, run your communication cabling in a separate conduit to power lines.
- The cable shielding must only be grounded at a single point to prevent any potential ground 'loops'.
- In order for your Gateway to function correctly, the Modbus RS485 devices must be connected in sequence in a daisy-chain network topology.
- Do NOT wire multiple devices direct to your Gateway in a Star Network or as a Tree Network; the system will not work in these configurations.

Belden 9841 Shielded Cable

Use 'Daisy-chain network topology ONLY with Modbus 485 networks

Correct ✔

NO ✘

NO ✘

NO ✘

NOTE: ONLY connect Network to Ground in ONE place!

Optional Earth for when 2 Wire and Shield configuration cable is used.

rayleigh connect

COMMS

STATUS

RI Rayleigh Instruments

Gateway

A B G

L N E

Up to 1200m (Booster required every 1200m for longer runs)

A B
+ –
DEVICE 1

A B
+ –
DEVICE 2

A B
+ –
DEVICE 3

Use of Ferrules for terminal connections recommended

120Ω

120 Ohm Termination Resistor should be fitted to the end of the cable for all installations over 50m to avoid signal reflections

Number of Devices Dependent on Gateway Version