



## LoRaWAN Modbus RS485 Master – Hardware Guide

### Description

The enLink LoRaWAN Modbus Master is a ready-to-use radio transmitter with an RS485 interface.

This product meets the needs of users to communicate with one or more Modbus RS485 slaves and transmit their register information via a LoRaWAN network.


The product can handle up to 32 Modbus registers, e.g. 5 slaves with 6 x 32-bit parameters per slave.

The product transmits the data from the slaves periodically, based on a user definable interval (subject to LoRaWAN compliance).

The product is configured either via the micro-USB port or remotely via the LoRaWAN network, allowing the user to adjust key parameters such as transmission interval and transmission power, as well as define the Modbus slave definitions.

The product is powered by an external power supply (not included). **For systems requiring UL approval, enLink Modbus must be used with a power supply certified to UL 60950-1.**

### General Specifications

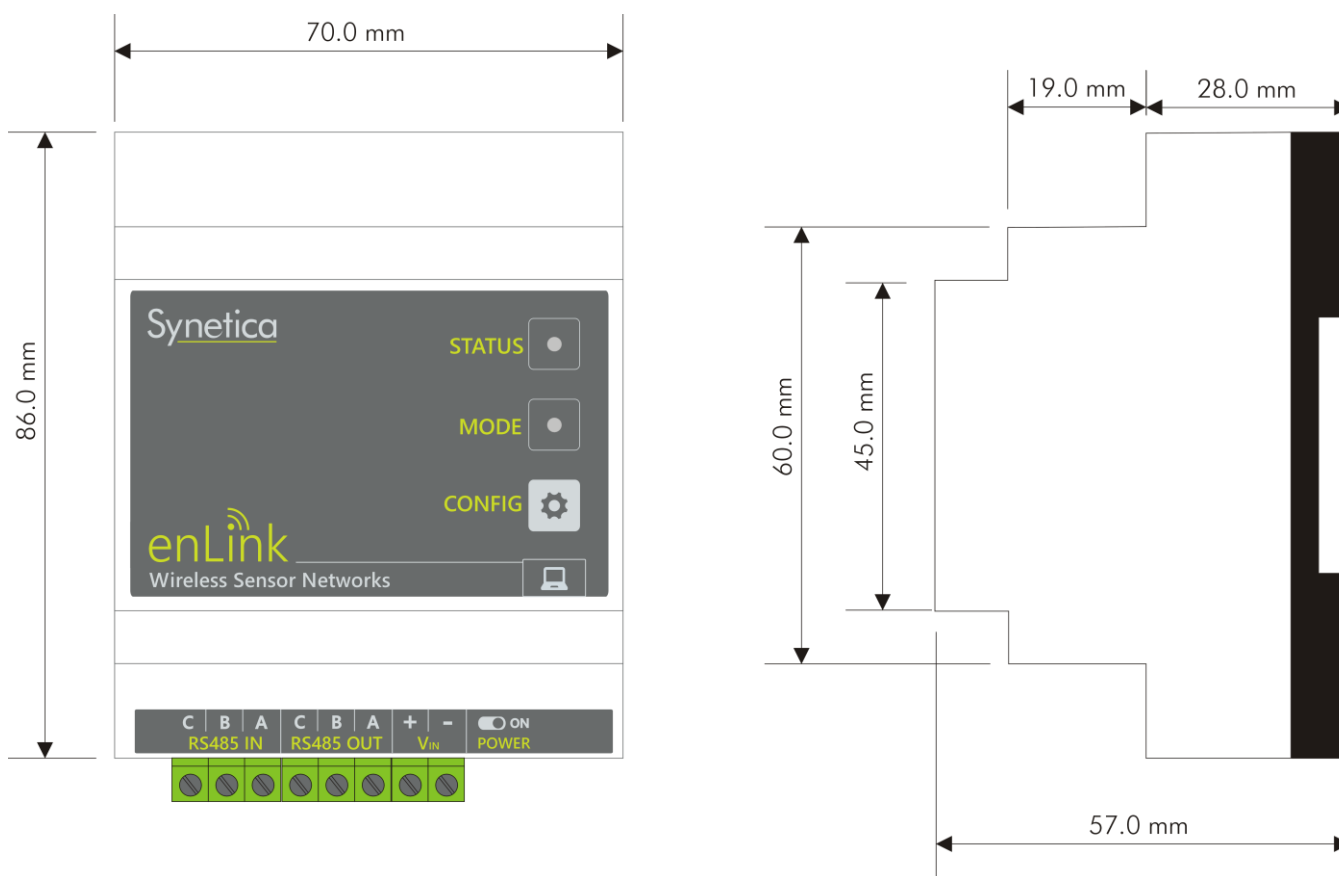
Parameter	Value
Supply Voltage	12 - 24V DC 
Supply Current	120mA (max) <sup>(1)</sup>
Working Temperature	-25°C...+70°C
Weight	100g
Dimensions	86 x 70 x 57mm
LoRaWAN	Class A, EU: 868MHz, US: 915MHz

<sup>(1)</sup> The device should be powered with a power supply unit with a minimum rating of 250mA.

## Modbus Specifications

Parameter	Value
Mode	2-wire RS485, half-duplex
Baud Rate	1200...38400 bps
Parity	None/Odd/Even
Data Bits	8
Stop Bits	1

## Physical Specifications



Parameter	Value
Length	86.0mm
Width	70.0mm
Height	57.0mm
Weight	150g
Ingress Rating	IP20 <sup>(1)</sup>
Material	Lexan 940/ Noryl VO 1550
Self-extinguishing	UL94-Vo
Terminal Apertures	2 x 2.5mm <sup>2</sup> cables

<sup>(1)</sup> For an IP rated enclosure, please see the Accessories section of this document

## Safety Information

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Synetica for any consequences arising out of the use of this guide.

A suitably qualified person has the skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

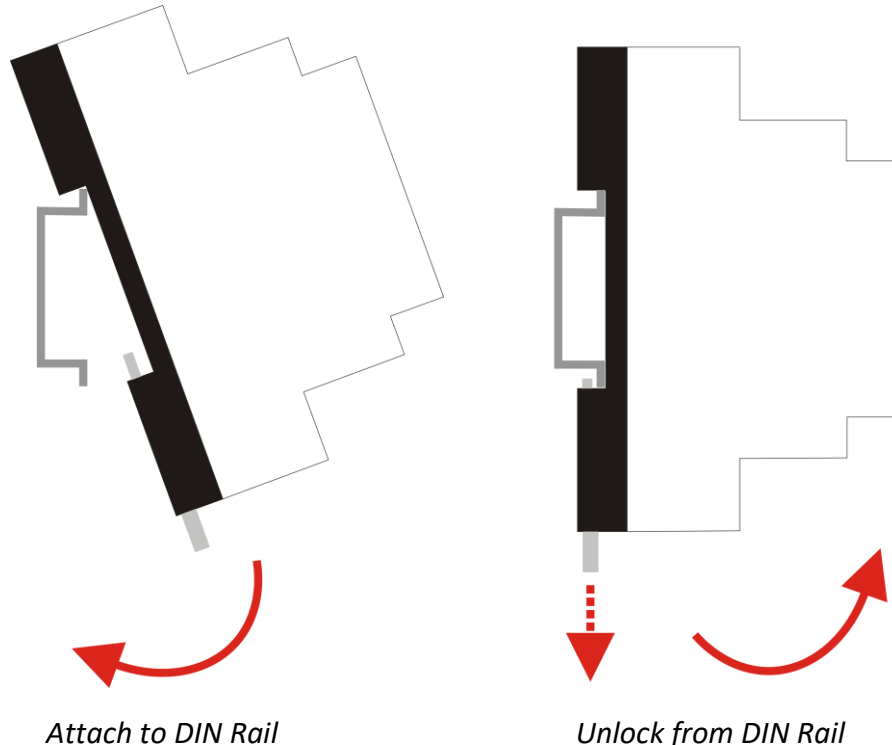
To ensure safe and reliable operation, the unit must be operated according to the instructions in the manual.

## Mounting

The unit is designed to be mounted on standard 35mm DIN rail, either within a suitable electrical panel (a panel certified to UL 508A / IEC 61439 , for example) or within a separate IP rated enclosure (see accessories section).

To attach, simply hook the upper mount over the top of the DIN rail and push the bottom of the unit towards the DIN rail.

To unlock, pull the lower retaining clip downwards (using a tool, such as a screwdriver) and pull the bottom of the unit away from the DIN rail.



## Positioning

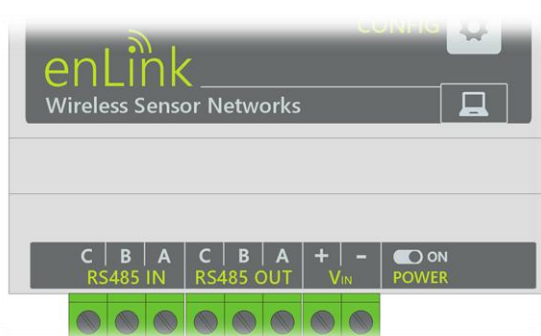
The unit comes with an integral PCB antenna that should provide adequate wireless coverage for most scenarios. In situations where there may be excessive attenuation e.g. due to building structure, a unit with an external antenna can be specified (see Accessories section of this document). Please consult your enLink dealer for further details.

Ideally, the product must be 20 cm away from any obstacle and, if possible, near an opening (the closer the obstacle is, the more the emitted power will be absorbed).

All the materials encountered by a radio wave will attenuate it. Bear in mind that metal (metal cabinets, beams, etc.) and concrete (reinforced concrete, partitions, walls, etc.) are the most critical materials for the propagation of radio waves.

For optimum transmission, the device should be mounted 1.5m off the ground and, in any instance, as high as possible.

## Electrical Connections



Connector	Terminal	Function
RS485 IN	C	Modbus network ground <sup>(1)</sup>
RS485 IN	B	Modbus network <sup>(2)</sup>
RS485 IN	A	Modbus network + <sup>(3)</sup>
RS485 OUT	C	Modbus network ground
RS485 OUT	B	Modbus network -
RS485 OUT	A	Modbus network +
V <sub>IN</sub>	+	Power supply 12-24VDC
V <sub>IN</sub>	-	Power supply 0VDC

<sup>(1)</sup> Terminal is internally connected to RS485 OUT Ground

<sup>(2)</sup> Terminal is internally connected to RS485 OUT -

<sup>(3)</sup> Terminal is internally connected to RS485 OUT +

### RS485

The electrical interface is 2-wire RS485, via 3 screw terminals. Connection should be made using twisted pair screened cable (Typically 22 gauge Belden 8761 or equivalent).

All "A" and "B" connections are internally daisy chained together. The screens should also be connected to the "C" (ground) terminal. To avoid the possibility of loop currents, an Earth connection should be made at only one point on the network.

Line topology may or may not require terminating loads depending on the type and length of cable used. The impedance of the termination load should match the impedance of the cable and be at both ends of the line. Typically, the cable should be terminated at each end with a 120 ohm (0.25 Watt min.) resistor.

A total maximum length of 3900 feet (1200 metres) is allowed for the RS485 network. A maximum of 32 electrical nodes can be connected, including the enLink Master controller. The address of each slave can be set to any value between 1 and 245 (addresses 246 and 247 are reserved for the enLink Master). Broadcast mode (address 0) is not supported.

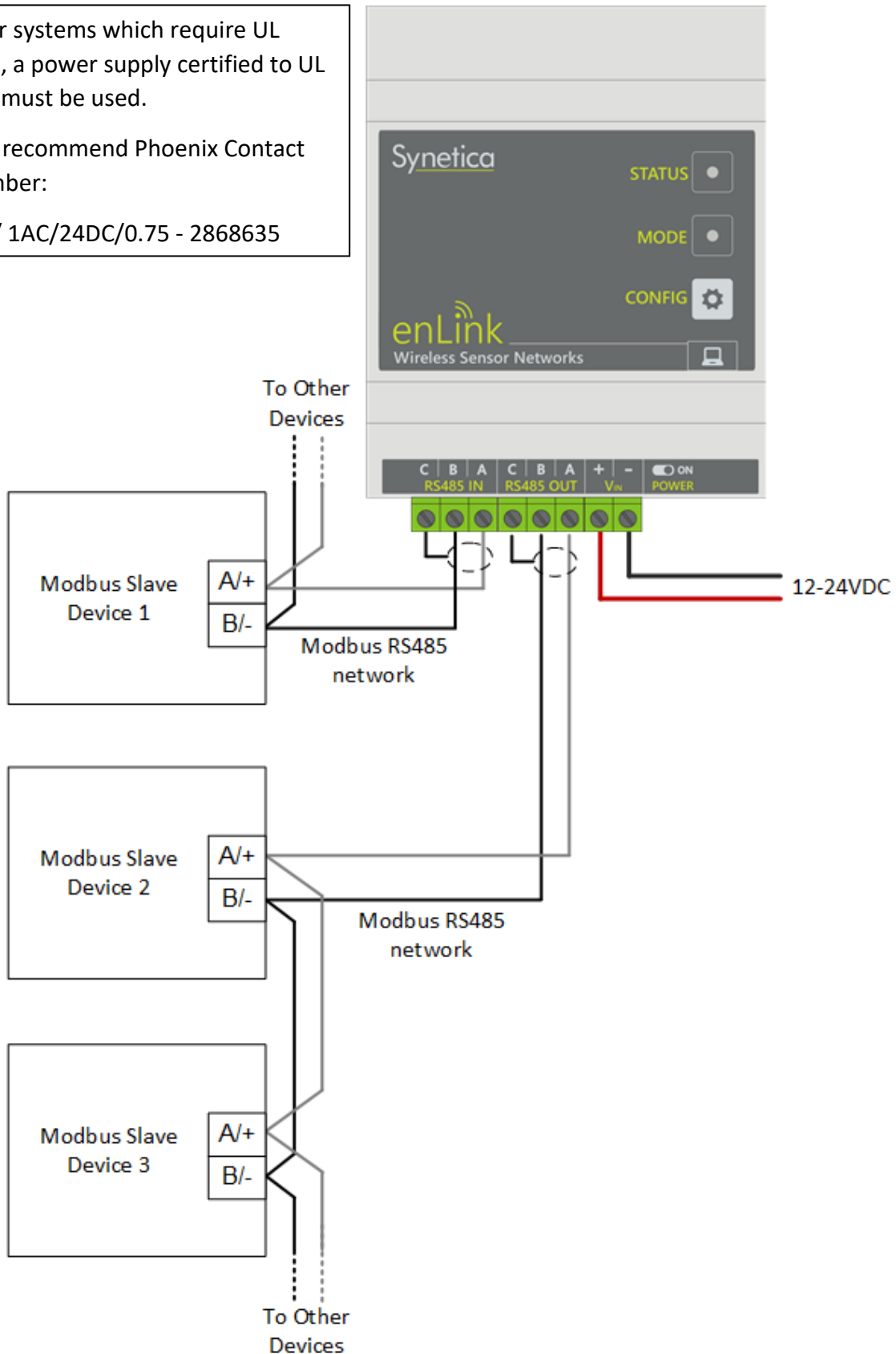
The maximum latency time of any connected slave is 150ms i.e. this is the amount of time that can pass before the first response character is output. The enLink Master allows this period of time to elapse before assuming that the slave is not going to respond.

## Wiring Example – Modbus Slaves

The unit may be connected to any Modbus slave device, as shown in the diagram below.

Note: For systems which require UL approval, a power supply certified to UL 60950-1 must be used.

Synetica recommend Phoenix Contact part number:  
STEP-PS/ 1AC/24DC/0.75 - 2868635



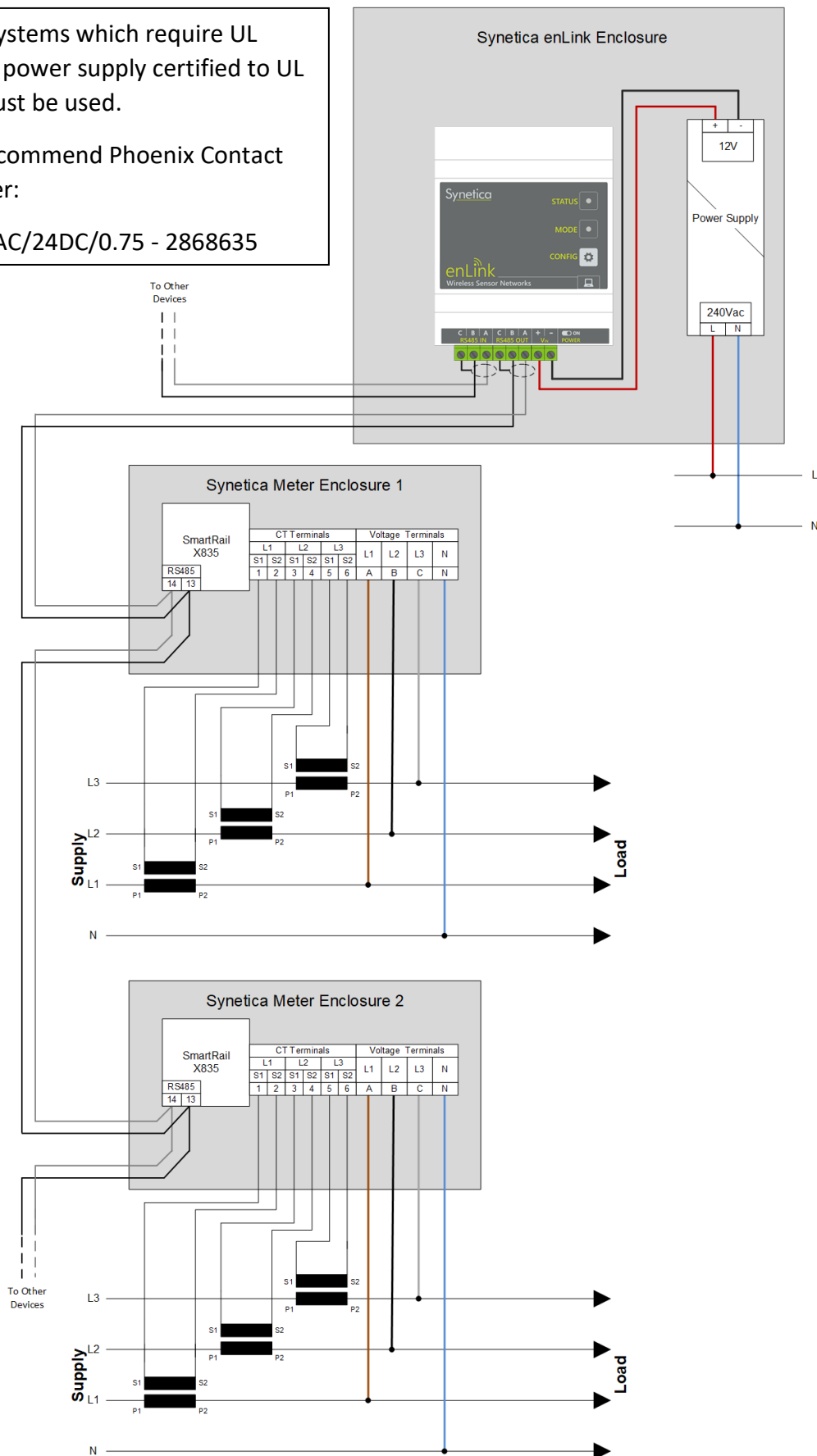
## Wiring Example – Synetica Meters

The following diagram shows the connections used for the Synetica metering system.

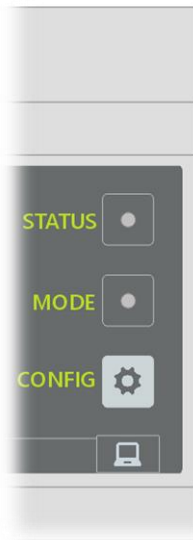
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Synetica recommend Phoenix Contact part number:

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## User Interface



Status LED	Description
Red Flashing	Joining LoRaWAN network
5 Green Flashes	Successfully joined LoRaWAN
1 Blue Flash	Config Button Pressed
Mode LED	Description
2 Cyan Flashes	LoRaWAN data transmitted
2 Yellow Flashes	LoRaWAN data received
1 Green Flash	USB connected/disconnected
Config Button	Description
Single press	Send LoRaWAN status message

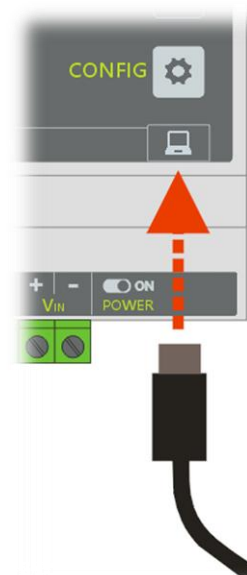
## Configuration

The unit can be programmed either remotely, over the LoRaWAN network, or locally via the USB connector.

The initial setting of LoRaWAN parameters, such as network security keys, must be done locally, using the enLink Configuration Utility before remote configuration is possible.

When the USB is connected, the unit does not use the voltage from the host PC to power itself.

For further guidance on configuring the unit, refer to the enLink LoRaWAN Modbus Master User Guide.



## Power

The unit has a power switch, which is in the OFF position when shipped from the factory.

Prior to commissioning, the switch should be slid to the right to enable power and place the device in an active state.



## Ordering Information

Description	Order Code
enLink LoRaWAN RS485 Modbus Master	SYN-ENL-MOD

## Accessories

Description	Order Code
IP65 enclosure (UL 94 HB rated) with integral 100-240VAC power supply approved to UL 60950-1 <sup>(1)</sup>	SYN-ENC-ENL-PSU
USB programming lead (micro-B)	SYN-CABLE-USB-MB

<sup>(1)</sup>Note the UL certification (UL File number E504478) applies to the enLink Modbus unit only, accessories have their own UL certifications and / or approvals.

## Technical Support Contact Information

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## Document History

Revision	Date	Author	Comments
A	DEC-2017	RL	Initial Release
B	FEB-2018	RL	Customer Release
C	APR-2018	DN	Update configuration section
D	NOV-2018	SW	Added UL approval PSU requirements
E	JAN-2019	SW	Added additional mounting information and contact details