Application Note AN019

General RS485 Cable Wiring Guide

Making the Hub 2-Meter and Hub 2-Inverter RS485 cables from scratch

Overview

Hub 2 is supplied with two RS485 cables in the box: the Hub 2-Meter RS485 cable, which connects Hub 2 to the Hub 2 Meter, and the Hub 2-Inverter RS485 cable, which connects Hub 2 to the battery inverter.

Wherever possible, use the supplied cables and modify only the inverter end, as described in the brand-specific application notes. This note explains how to make either cable from scratch, for example where a longer cable is needed.

Compatibility

- Levelise Hub 2
- Hub 2 Meter (supplied with Hub 2)
- A Levelise-compatible battery system

What You'll Need

- Shielded Cat5e (STP) cable cut to the required length
- 1x RJ11 (6P4C) crimp plug (supplied with Hub 2)
- Hub 2-Meter cable: 3x 0.25 mm² bootlace ferrules
- Hub 2-Inverter cable: 1x RJ45 crimp plug, or for Fox ESS, 2x 0.25 mm² bootlace ferrules and the communication connector supplied with the inverter
- Crimping tool for RJ11 (6P) and RJ45 (8P) plugs
- Ferrule crimping tool
- Wire cutters and strippers
- Screwdrivers
- Cable tester or multimeter

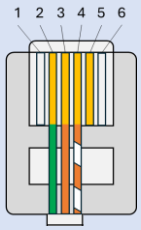
Cable Requirements

- Make each cable from a single continuous length. Do not join or splice cables to extend them.
- Each RS485 signal pair (A and B) must use the two wires of one twisted pair: orange and orange & white for the Hub 2-Meter cable; blue and blue & white for the Hub 2-Inverter cable. Keep the pair twisted as close to each connector as possible.
- Do not connect spare cores, the foil screen or the drain wire to any connector pin, and do not use spare cores for any other purpose.
- Maintain a 50 mm gap between the RS485 cables and power cables.

Quick Summary for Experienced Users

If you're confident, use the following pinout reference tables to make the cables. Pin positions are shown looking at the contacts of the plug with the latch at the rear.

Hub 2-Meter RS485 Cable

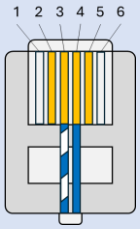
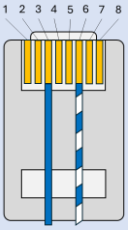
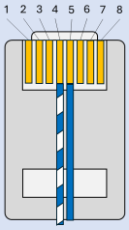
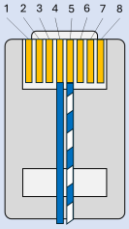
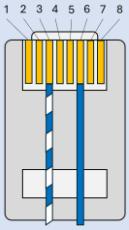
Pin	**Hub End** (RJ11 Connector)	Wire Colour	**Meter End** (Ferrule into Hub 2 Meter terminal)
			
1	Not present	–	–
2	**Green (Ground)**	Green	**Terminal 8**
3	**Orange (RS485 B)**	Orange	**Terminal 9**
4	**Orange & white (RS485 A)**	Orange & white	**Terminal 10**
5	Unused by Hub	–	–
6	Not present	–	–

Hub 2-Inverter RS485 Cable

Inverter-end connections by brand (full pinouts on the next page):

Brand	Inverter Connector	Blue (RS485 A)	Blue & white (RS485 B)	Inverter Port	Further Details
Afore	RJ45	**Pin 3**	**Pin 6**	ECOM	AN012
Alpha ESS	RJ45	**Pin 5**	**Pin 4**	RS485 (behind comms cover)	AN013
Fox ESS	Proprietary (ferrules)	**Terminal 4**	**Terminal 3**	METER/CT/RS485	AN014
SolaX	RJ45	**Pin 4**	**Pin 5**	COM/LCD	AN015
Hinen	RJ45	**Pin 6**	**Pin 3**	METER	AN018

Hub 2-Inverter RS485 Cable – Pinouts

Pin	**Hub End** (RJ11)	**Afore ASL** (RJ45)	**Alpha ESS SMILE-G3** (RJ45)	**SolaX** (RJ45)	**Hinen** (RJ45)
					
1	Not present	Unused by Hub	Unused by Hub	Unused by Hub	Unused by Hub
2	Unused by Hub	Unused by Hub	Unused by Hub	Unused by Hub	Unused by Hub
3	**Blue & white (RS485 B)**	**Blue (RS485 A)**	Unused by Hub	Unused by Hub	**Blue & white (RS485 B)**
4	**Blue (RS485 A)**	Unused by Hub	**Blue & white (RS485 B)**	**Blue (RS485 A)**	Unused by Hub
5	Unused by Hub	Unused by Hub	**Blue (RS485 A)**	**Blue & white (RS485 B)**	Unused by Hub
6	Not present	**Blue & white (RS485 B)**	Unused by Hub	Unused by Hub	**Blue (RS485 A)**
7	Not present	Unused by Hub	Unused by Hub	Unused by Hub	Unused by Hub
8	Not present	Unused by Hub	Unused by Hub	Unused by Hub	Unused by Hub

Important: Fox ESS inverters also require their Modbus settings to be changed, and Hinen inverters share the RJ45 connector with the inverter's own meter or CT (pins 1, 5, 2 and 8). See AN014 and AN018 respectively before terminating the inverter end for these brands.

Otherwise, follow the detailed step-by-step instructions below.

Detailed Step-by-Step Guide

Part A – Hub 2-Meter RS485 Cable

1. **Prepare the Cable**
   - Cut the Cat5e cable to the required length, allowing approximately 100 mm extra for terminating both ends.

     Important: Feed the cable through any waterproof glands (for example, on the Outdoor Kit or the meter enclosure) before fitting either connector.

   - At the Hub end, strip ~25 mm of the outer sheath. Be careful not to nick the inner conductors.
   - Trim the foil screen, drain wire and all wires other than green, orange and orange & white flush with the end of the sheath.

2. **Terminate the Hub (RJ11) End**
   - Untwist the orange pair only as far as needed and straighten the three wires.
   - Hold the RJ11 plug with the contacts facing you and the latch at the rear (pin 1 on the left), and arrange the wires according to the Hub 2-Meter pinout table above.
   - Ensure:
     - **Green wire (Ground)** is in **position 2**
     - **Orange wire (RS485 B)** is in **position 3**
     - **Orange & white wire (RS485 A)** is in **position 4**
     - Positions 1, 5 and 6 are left empty
   - Trim the wires evenly so that, when they are fully inserted, the cable sheath also enters the plug.
   - Insert the wires into the RJ11 plug, ensuring each wire reaches the end of its channel.

     Important: The Hub end must use a 6-position RJ11 (6P4C) plug. Never fit an RJ45 plug to the Hub end – it will not seat correctly and can damage the Hub 2 port.

   - Crimp the connector securely using the 6P die of the crimping tool.

     Important: The RJ11 (Hub) end is the most critical termination – poorly terminated RJ11 connectors cause unreliable communication with Hub 2. Check the wire order and insertion through the plug before crimping. If in doubt, cut off the plug and re-terminate.

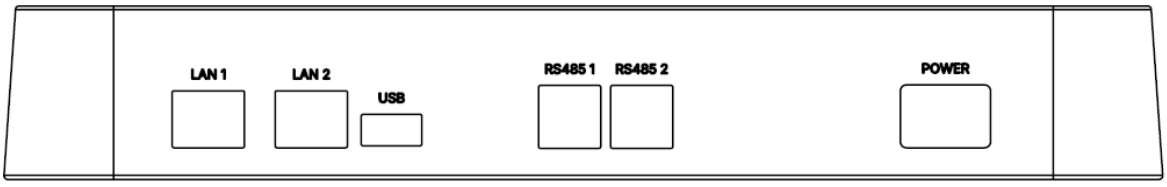
3. **Terminate the Meter End**
   - Strip ~25 mm of the outer sheath from the meter end of the cable.
   - Trim the foil screen, drain wire and all wires other than green, orange and orange & white flush with the end of the sheath.
   - Strip ~6 mm of insulation from the green, orange and orange & white wires.
   - Insert each stripped wire into a 0.25 mm² ferrule and crimp.

4. **Test the Cable**
   - Use a cable tester or multimeter to verify continuity and pinout (Recommended):
     - **RJ11 pin 2** to the **green** ferrule
     - **RJ11 pin 3** to the **orange** ferrule
     - **RJ11 pin 4** to the **orange & white** ferrule
     - No continuity between any two wires

5. **Connect the Cable**
   - With the supply to the Hub 2 Meter isolated, connect the ferrules to the meter terminals and tighten the terminal screws:
     - **Green** to **terminal 8**
     - **Orange** to **terminal 9**
     - **Orange & white** to **terminal 10**

Important: The Hub 2 Meter must be installed by a qualified electrician in a suitably rated enclosure. Ensure the meter is set to Modbus address 1 and baud rate 19,200 (see AN010).

   - Plug the RJ11 end into the port marked ‘RS485 2’ on Hub 2.



   - If using the Outdoor Kit, ensure all cable glands are properly sealed and the RS485 cables are not bent at the port.

Part B – Hub 2-Inverter RS485 Cable

1. **Prepare the Cable**
   - Cut the Cat5e cable to the required length, allowing approximately 100 mm extra for terminating both ends.

     Important: Feed the cable through any waterproof glands (for example, on the Outdoor Kit or the inverter) before fitting either connector.

   - At the Hub end, strip ~25 mm of the outer sheath. Be careful not to nick the inner conductors.
   - Trim the foil screen, drain wire and all wires other than blue and blue & white flush with the end of the sheath.

2. **Terminate the Hub (RJ11) End**
   - Untwist the blue pair only as far as needed and straighten the two wires.
   - Hold the RJ11 plug with the contacts facing you and the latch at the rear (pin 1 on the left), and arrange the wires according to the Hub 2-Inverter pinout table above.
   - Ensure:
     - **Blue & white wire (RS485 B)** is in **position 3**
     - **Blue wire (RS485 A)** is in **position 4**
     - Positions 1, 2, 5 and 6 are left empty
   - Trim the wires evenly so that, when they are fully inserted, the cable sheath also enters the plug.
   - Insert the wires into the RJ11 plug, ensuring each wire reaches the end of its channel.
   - Crimp the connector securely using the 6P die of the crimping tool.

     Important: The RJ11 (Hub) end is the most critical termination – poorly terminated RJ11 connectors cause unreliable communication with Hub 2. Never fit an RJ45 plug to the Hub end.

3. **Terminate the Inverter End**
   - For RJ45 inverters (Afore, Alpha ESS, SolaX and Hinen):
     - Strip ~25 mm of the outer sheath and trim the foil screen, drain wire and all wires other than blue and blue & white flush with the end of the sheath.

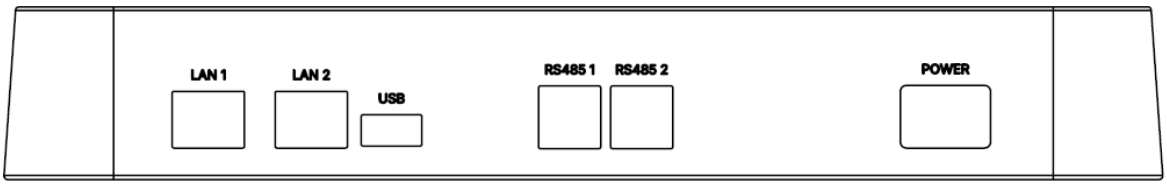
- Hold the RJ45 plug with the contacts facing you and the latch at the rear (pin 1 on the left), and position the blue and blue & white wires according to the inverter brand in the pinout tables above.
- Trim the wires evenly, leaving ~12 mm exposed, and insert them into the RJ45 plug, ensuring full insertion and correct alignment.
- Crimp the connector securely using the 8P die of the crimping tool.

Important: Ensure the cable sheath also enters the plug slightly for strain relief. For Hinen inverters, the inverter's meter or CT wires must be terminated in the same RJ45 plug – see AN018.

- For Fox ESS inverters, terminate the blue and blue & white wires with ferrules into terminals 4 and 3 of the Fox ESS communication connector, following the steps in AN014.

4. **Test the Cable**
   - Use a cable tester or multimeter to verify continuity and pinout (Recommended):
     - **RJ11 pin 4** (blue) to the **RS485 A** position for the inverter brand
     - **RJ11 pin 3** (blue & white) to the **RS485 B** position for the inverter brand
     - No continuity between the two wires

5. **Connect the Cable**
   - Plug the inverter end into the inverter port listed in the table above*.
   - Plug the RJ11 end into the port marked 'RS485 1' on Hub 2.



- If using the Outdoor Kit, ensure all cable glands are properly sealed and the RS485 cables are not bent at the port.

* IMPORTANT: Where these steps differ from or conflict with the manufacturer instructions, the manufacturer's instructions take precedence

Additional Resources

For more details on installing Hub 2, including the Quick Installation Guide, user manual and the application notes referenced in this note, visit:

support.levelise.com

- AN010 Configuring the Hub 2 Meter
- AN012 Afore RS485 Wiring Guide
- AN013 Alpha ESS RS485 Wiring Guide
- AN014 Fox ESS RS485 Wiring & Setup Guide
- AN015 SolaX RS485 Wiring Guide
- AN018 Hinen RS485 Wiring Guide