Open Energy for All

Technical Note

Selection and Installation of AC End Cables for Flex-S3 Cable System

Region: EMEA & APAC
Version: V1.3
Release Date: 2024-08-06

1 Introduction

The Hoymiles microinverter system's AC output line consists of three main components:

- Microinverters
- AC Trunk
- AC End Cable

The AC Trunk, which includes cables and connectors from the Flex-S3 Cable System, transfers power from the microinverters to the AC End Cable. The AC End Cable, which includes a Flex-S3 Cable Terminal Connector and a single AC cable, connects the AC Trunk to the distribution box (see Figure 1).

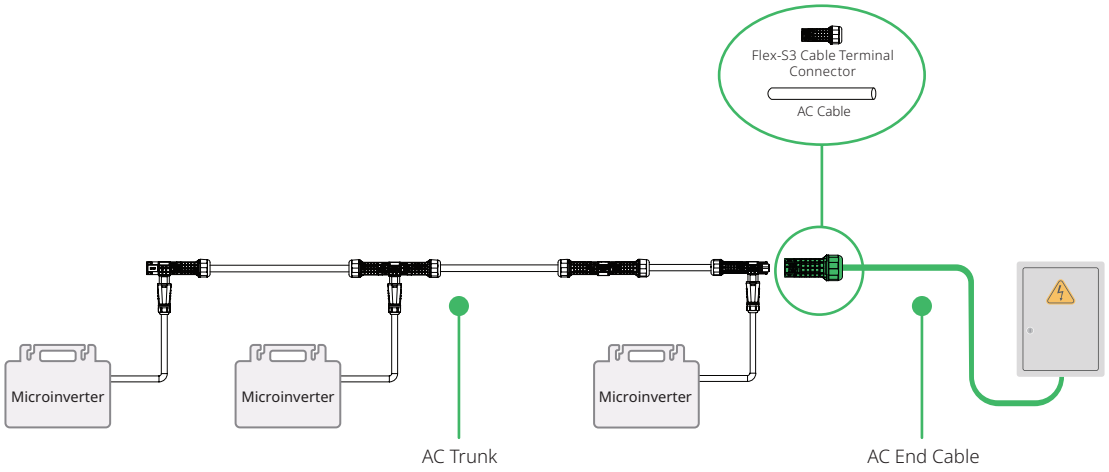


Figure 1-Typical Microinverter System Diagram

For installation, you should select the appropriate length and size of the AC End Cable based on the project configuration and the distance from the final microinverter on the AC Trunk to the distribution box. This document guides on selecting and installing the AC End Cable.

2 Cable Selection

This section covers seven key aspects of cable selection.

2.1 Conductor Number and Material

Considering the grid type supported by HMS series microinverters and the superior conductivity of the copper, Hoymiles recommends the use of a **three-core copper cable*** for the microinverter system.

NOTE

- *In this document, "three-core" means the cable has three separate wires: neutral (N), protective earth (PE), and live (L). Each of these wires is made up of one solid strand of conductive material.*
- *Copper is chosen as the conductor material because of its superior conductivity to reduce voltage drop.*

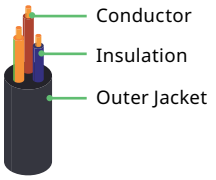


Figure 2-Composition of Cables

2.2 Conductor Type

Cables usually come in two conductor types: solid and stranded. Solid wire consists of a single strand of wire, while stranded wire is made up of multiple strands twisted together.



Figure 3-Solid vs. Stranded Wire

Both types of conductors are acceptable. You can choose either based on the local regulations and your preferences.

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Importantly, Hoymiles offers different Flex-S3 Cable Terminal Connectors that are compatible with either solid or stranded wire. Be sure to use the correct one. Refer to ***3 Connector Selection*** for details on the Flex-S3 Cable Terminal Connector.

2.3 Cable Size

The Flex-S3 Cable System datasheet specifies two configurations for the Flex-S3 Cable Terminal Connectors: one for 2.5 mm² cables and another for 4 mm² and 6 mm² cables.

Larger cables have higher ampacity, meaning they can handle more current. The table below shows the recommended ampacity for each cable size in the Flex-S3 Cable System:

Cable Size (mm²)	2.5	4	6
Cable Ampacity (A)	0-25	0-34	0-40

Table 1-Cable Size and Ampacity Comparison

For effective and safe operation, the AC cable's ampacity should be higher than the **total output current of each AC output line***. Calculate the total output current in advance to select the appropriate cable size.

NOTE

- *The total output current of each AC output line is the sum of all the output currents from the microinverters per line.*
- *The current-carrying capacity (ampacity) of a conductor is influenced by the electrical resistance of the material. The ampacity calculations in this document are based on copper conductors and may not apply to other materials.*
- *Consider local regulations, which may recommend oversizing the AC cable or reducing the number of microinverters per line to limit voltage drop for longer cable lengths.*
- *The cable ampacity values provided in Table 1 are for reference only; consult the local electrical code for specific guidelines.*

2.4 Nominal Voltage

Because the HMS series microinverters are designed for a single-phase AC output voltage of 230 V, the AC cable's nominal voltage should be at least 230 V.

Hoymiles recommends a 450/750 V (U0/U) low-voltage cable for optimal performance and safety.

2.5 The Dressing Method and Environment

When running the AC End Cable from the roof to the exterior wall of a house, it can be laid inside a metallic sheathed cable, installed in a cable tray, or directly exposed to the open air.

For outdoor installations, choose cables that are resistant to UV, fire, and temperature extremes (-40℃ to 90℃). Additionally, ensure the cable complies with local regulations.

Here is the technical data of a Flex-S3 Connection Cable for your reference:

Region	Model	Standard
EMEA & APAC	H07RN-F	EN50525-2-21*

Table 2-Flex-S3 Connection Cable Specifications

NOTE

EN50525-2-21 does not specify requirements for outdoor wiring. However, cables and connectors from the Flex-S3 Cable System can be used in the open air. If you are using cables from other manufacturers, consult them to confirm suitability for outdoor use. If the cables are not suitable, consider using a cable tray or a metallic sheathed cable.

2.6 Insulation Color

AC cables are color-coded for safety reasons. You can typically identify the various functions of the conductors by observing the color of their insulation.

Given that cable color codes are specified based on the region or country, Hoymiles recommends that you consult the local insulation color specifications before selecting an AC cable.

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Standards	Region / Country	Live (L)	Neutral (N)	Protective Earth (PE)
IEC 60446 EN 60446 BS 7671	The European Union, UK, Malaysia			
AS/NZS 3000 (updated)	Australia, New Zealand			
AS/NZS 3000	Australia, New Zealand			
-	Singapore			
-	India, Pakistan			
-	Korea			
JIS	Japan			

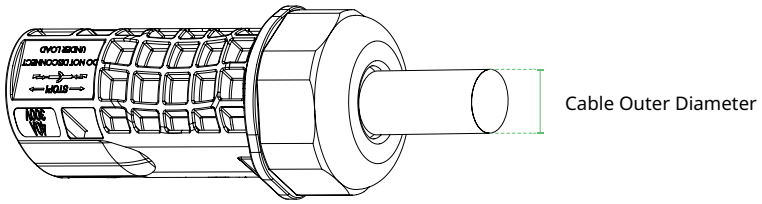
Table 3-Wiring Color Codes Infographic

NOTE *To avoid incorrect connections, the insulation color of the conductors in the AC End Cable must match the insulation color in the distribution box.*

2.7 Cable Outer Diameter

Since the AC cable needs to be connected to the Flex-S3 Cable Terminal Connector, the AC cable must be compatible with the Flex-S3 Cable Terminal Connector in terms of both outer diameter.

The Flex-S3 Cable Terminal Connector includes a waterproof cover, terminal pins, compression ring, gasket, and nut. Tightening the nut compresses the ring and gasket, sealing the cable to create a tight, waterproof connection. Effective waterproofing requires that the cable's outer diameter matches the compression ring and gasket diameters.



You should verify that the AC cable meets the specified requirements:

Cable Size (mm^2)	2.5	4	6
Outer Diameter (mm)	9.7-12.2	13.7-16.1	13.7-16.1

Table 4-Recommended Outer Diameter of AC Cable

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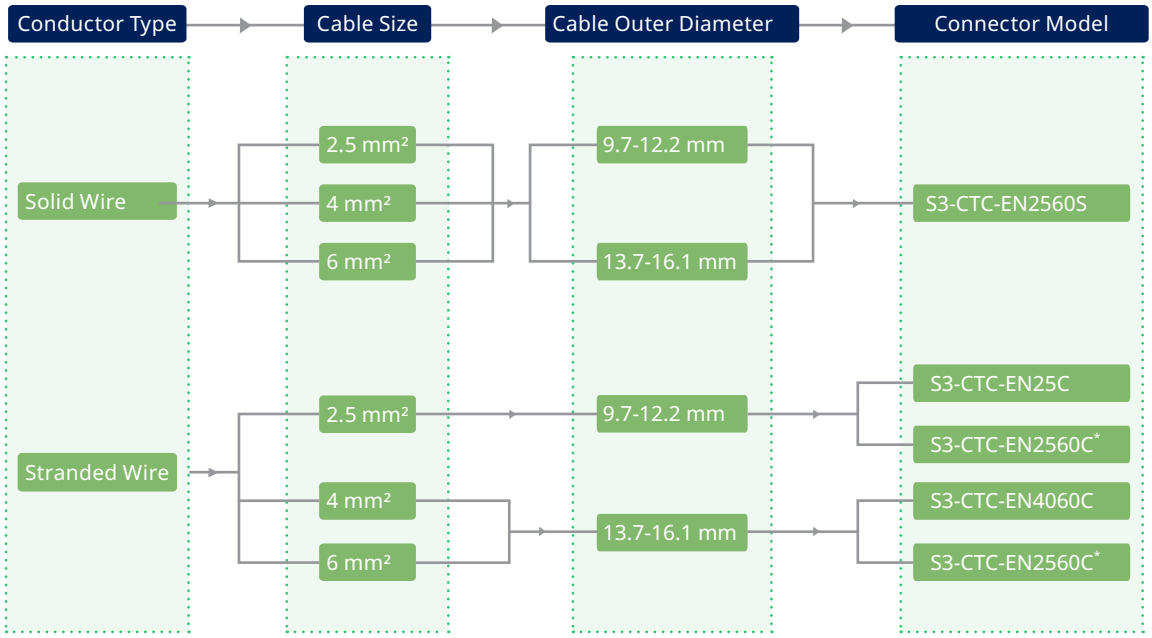
3 Connector Selection

Four models of Flex-S3 Cable Terminal Connectors are available, each with specific specifications:

Model	Adapted Conductor Type	Adapted Cable Size (mm^2)	Adapted Cable Outer Diameter (mm)
S3-CTC-EN25C	Stranded Wire	2.5	9.7-12.2
S3-CTC-EN4060C	Stranded Wire	4 & 6	13.7-16.1
S3-CTC-EN2560C*	Stranded Wire	2.5 & 4 & 6	9.7-12.2, 13.7-16.1
S3-CTC-EN2560S	Solid Wire	2.5 & 4 & 6	9.7-12.2, 13.7-16.1

Table 5-Flex-S3 Cable Terminal Connector Specifications

To choose the right connector, follow these steps:



NOTE

S3-CTC-EN2560C and S3-CTC-EN2560S have two configurations:

- *With gasket type 1: Compatible with 2.5 mm^2 cable.*
- *With gasket type 2: Compatible with 4/6 mm^2 cable.*

Therefore, both connectors can work with 2.5 mm^2 cable or 4/6 mm^2 cable.

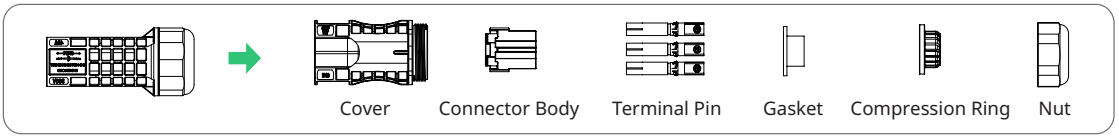
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4 Installation Method

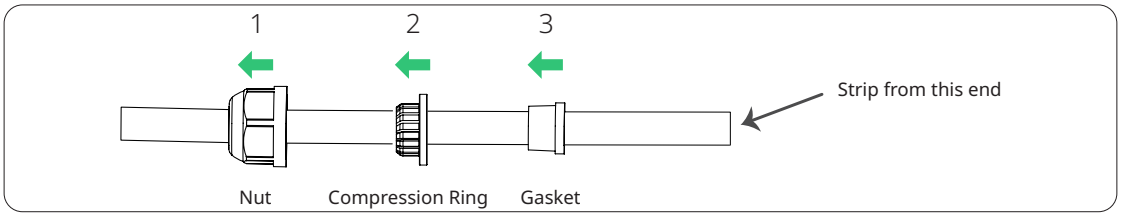
Step 1 Perapare an AC cable.

Wire Type	Conductor Type	Core Number	Cable Diameter	Nominal Voltage
Outdoor Use	Solid/Stranded	Three	≤ 16.1 mm	450/750 V (U0/U)

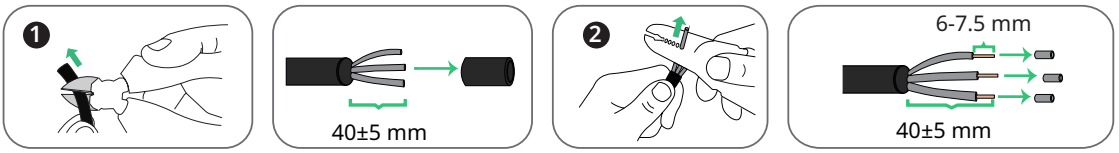
Step 2 Check and ensure that the Flex-S3 Cable Terminal Connector can be separated into six parts.



Step 3 Push the parts through the AC cable in the correct order.



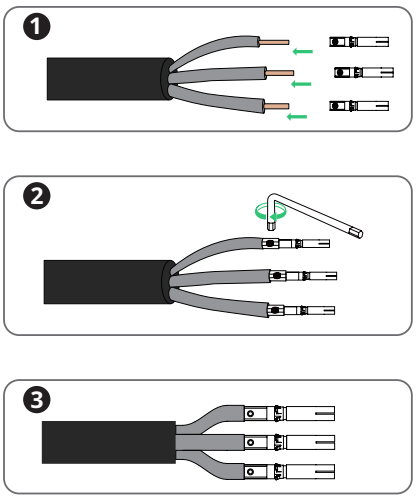
Step 4 Strip off 40±5 mm of the outer jacket with a diagonal cutter. Then, use a wire stripper to strip the insulation, exposing 6-7.5 mm of the conductor.



Step 5

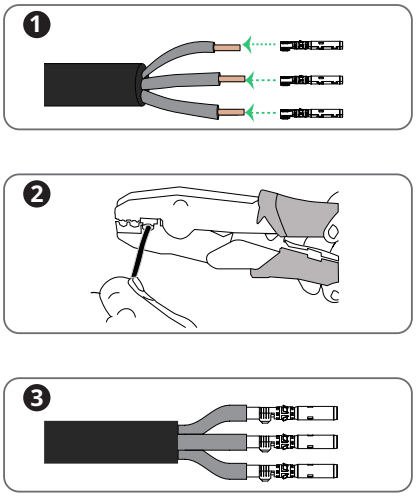
Solid Wire

Insert the conductors into the terminal pins, then use a hex key to tighten the screws clockwise until they are secure (Torque: 4.0±0.8 N•m).



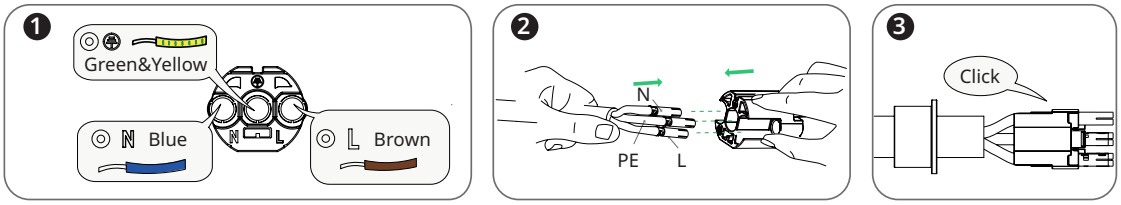
Stranded Wire

Insert the conductors into the terminal pins, and use the crimping tool to crimp the connection.

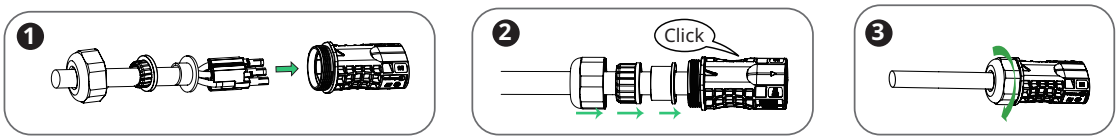


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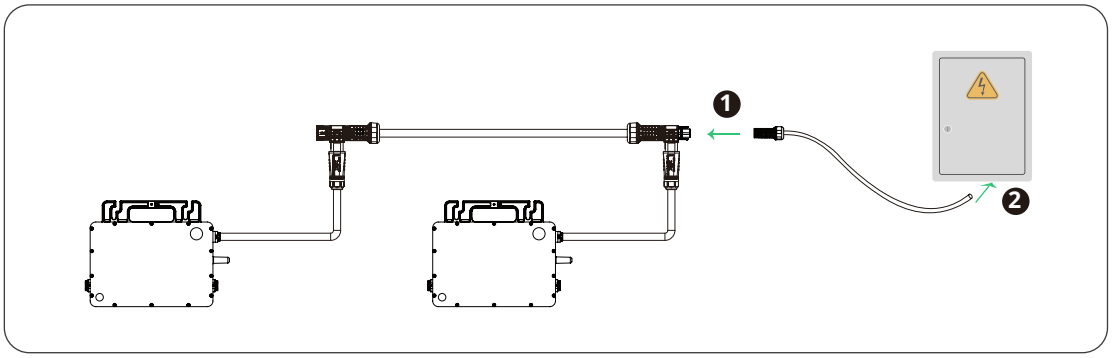
Step 6 Plug the crimped cable into the connector body.



Step 7 Plug the fixed cable into the Flex-S3 Cable Terminal Connector. Then firmly tighten the nut using the torque wrench (Torque: 2.5±0.5 N•m).



Step 8 Plug one end of the AC End cable into the microinverter and the other end into the distribution box.



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