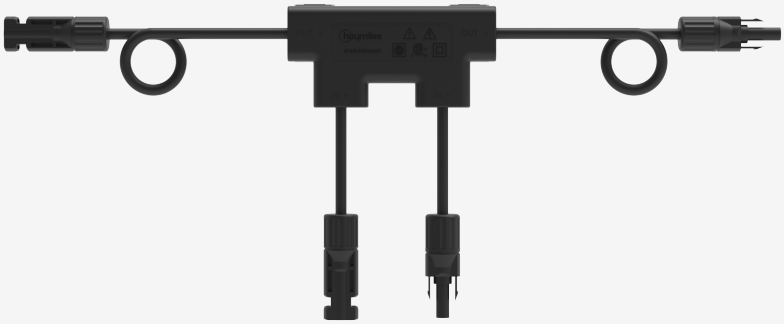
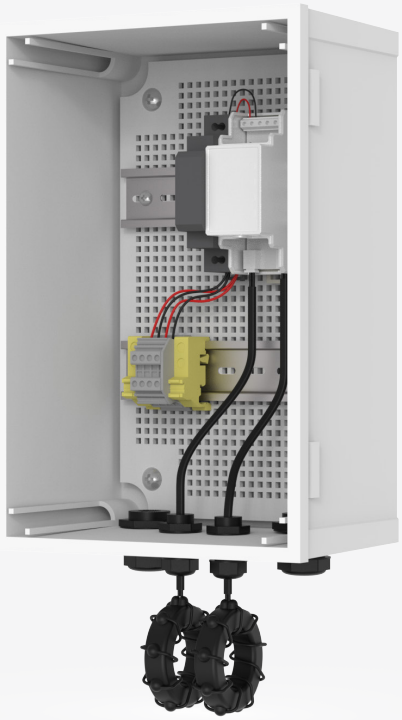
Open Energy for All





Rapid Shutdown

USER MANUAL

HRSD-1C
HT-G20
HT-G20-Kit

Legal Notice

Hoymiles has made every effort to ensure the accuracy and completeness of this manual. However, the content of this manual is continually reviewed and amended, due to product enhancements or feedback from real-world usage.

Hoymiles retains the right to modify this manual without prior notice at any time. Please refer to Hoymiles official website at **www.hoymiles.com** or scan the QR code for the latest version.

Warranty

To ensure reliability and warranty compliance, follow the installation instructions in this manual. You can access the current warranty conditions at **www.hoymiles.com**.

Contact Information

If you have technical queries or any questions concerning Hoymiles products, please contact us.

Floor 6, Building 5, Housheng 99 Road, Gongshu District, Hangzhou 310015 P. R. China

hoymiles.com

Europe	France	service.fr@hoymiles.com
	Germany	service.de@hoymiles.com
	Italy	service.it@hoymiles.com
	Netherlands	service.nl@hoymiles.com
	Spain	service.es@hoymiles.com
	Other EU countries	service.eg@hoymiles.com
Latin America	Brazil	service.br@hoymiles.com
	Spanish-speaking countries	service.mx@hoymiles.com
North America	USA	service.us@hoymiles.com
	Cannada	service.ca@hoymiles.com
Asia Pacific	Australia & New Zealand	service.au@hoymiles.com
	Asia & Pacific	service.asia@hoymiles.com

Before contact, make sure the following information at hand:

- Model of the product
- Brief description of the problem

Using This Manual

Symbols

Symbol	
•	List
Step 1 ...	Installation steps in a defined order
a. ...	Installation steps in a defined order

Tool and Related Documents

To quickly select the HRSD or Transmitter, use **Rapid Shutdown Compatibility Calculator**.

For more information or related documents, refer to the **product page** at hoymiles.com.

Revision History

Issues	
V202402	Original issue

CONTENTS

1. Safety Information

1.1 Safety Symbols

This manual contains **IMPORTANCE**, **NOTICE**, **WARNING**, and **DANGER** notes. These instructions demand increasingly great attention as the severity levels rise.

The instructions do not cover all the possible conditions and situations that may occur. It is important to perform wiring, installation, operation, commissioning, maintenance, and troubleshooting with common sense, caution, and care.

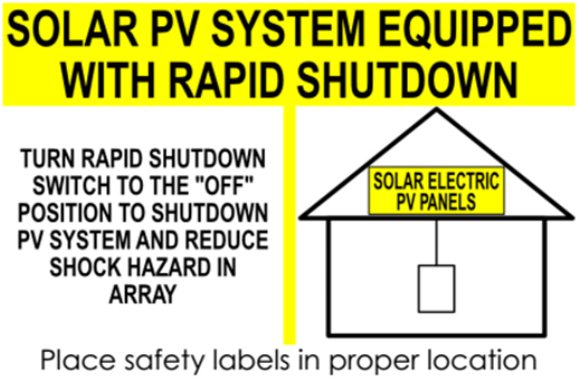
Symbols	Meaning
 DANGER	This indicates a hazardous situation that can result in high level electric shocks and other serious physical injuries.
 WARNING	This indicates a hazardous situation that may result in serious physical injuries.
 NOTICE	This indicates a situation that can result in product damages.
 IMPORTANCE	This indicates complementary information.

1.2 Safety Instructions

 DANGER
• No flammable and combustible materials should be seen where the rapid shutdown system is installed.
• Do not touch any live parts in the system, including the PV array, when connecting the system to the electrical grid.
• Do not connect or disconnect the HRSD under load. Turning off the Inverter or the HRSD may not reduce the risk. Internal capacitors in the inverter can remain charged for minutes after all power sources are disconnected. If service is required, verify that the capacitors have discharged by measuring the voltage across inverter terminals before disconnecting wiring. Wait 30 seconds after rapid shutdown activation before disconnecting DC cables or turning off DC disconnect.
• Do not remove the cover of the products in case of electric shock. Only professionals should carry out decommission and repair.
 WARNING
• To reduce the risk of injury, carefully read all the instructions in this manual first.
• All the installation MUST comply with local regulations and technical rules.
• Do not attempt to install the products in inclement weather.
• Only professionals should install and replace the HRSD and the Transmitter. The professionals must be qualified, trained and skilled, and shall strictly adhere to this Manual during installation, operation and maintenance.
• Before installing or using an HRSD or a Transmitter, please read related technical notes (see **Tool and Related Documents**) and all the instructions and warnings on the inverter system itself as well as on the PV array.
• Do not operate the HRSD with damaged or substandard wiring or connectors. Check the remaining cables and connectors and ensure they are in good condition and appropriate in rating.
• To install the HRSD, connect the input cables to the PV module first, and then connect the HRSD output cables in series.

• For parallel string connections, connect the HRSD to the PV modules, serially connect the outputs of all the HRSD, pass one side (+ or -) of the string through the transmitter, and connect to the inverter to turn the system ON.
• Do not touch the body of the running HRSD because it can reach high temperatures during heat dissipation.
• To disconnect the HRSD, remove the output cables of the HRSD string first, and then disconnect the input cables from the PV modules.
NOTICE
• Do not mix DC connectors from different manufacturers. Damages caused by it will void the Hoymiles warranty.
• Improper installation may lead to HRSD damage, which is not covered under warranty.
• Human-made damages caused by improper handling or dismantling the product will void the warranty.
• Be sure to verify that the voltage and current specifications of the PV module match those of the HRSD.
• Cables of the HRSD inputs and the PV module outputs cannot be extended.
• Never apply an external voltage source to a module or string equipped with the HRSD.
IMPORTANCE
• To reduce the system risk, it is recommended that string inverters be able to perform Arc Fault Protection and DC Insulation Resistance Detection during the operation.
• The HRSD is shipped in the OFF position and measures 0.9 V to 1.1 V when the “permission to operate” signal is not present.
• Max. cable length from inverter (+) to inverter (-): 800 m (2625 ft.)
• Recommended Max. number of strings connected to the HRSD: 30 modules[1]
• Hoymiles recommends that the Transmitter power supply be on the same AC branch circuit as the inverter to meet rapid shutdown requirements.
• Max. current per Core of Transmitter: 75 A, 150 A, or 250 A
• Max. number of strings per Core[2]: 5 (75 A Core), 15 (150 A Core), or 20 (250 A Core)
• Place rapid shutdown system sticker no more than 1m (3 ft.) from the Transmitter or AC disconnect.

1. Source: SunSpec RapidShutdown Specification. Please refer to local regulations before installation.
2. With Φ 6 mm (0.24 in) DC cable diameter (without DC connector) (Refer to **8.2** or **8.3** for details.)

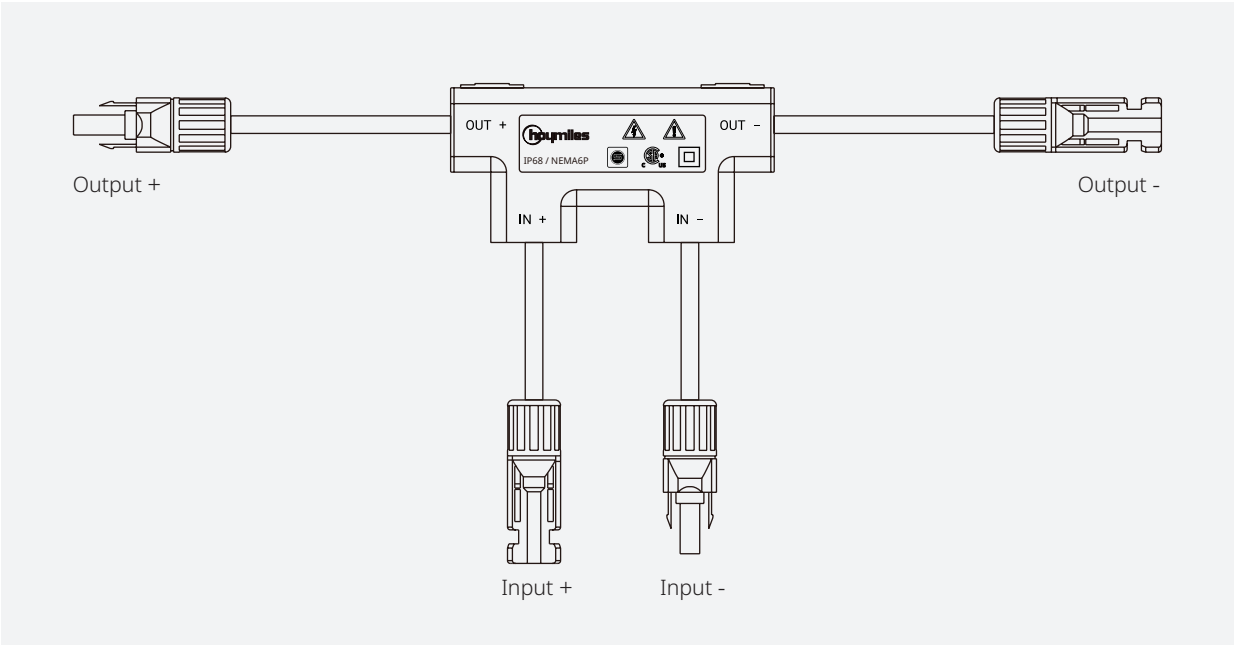


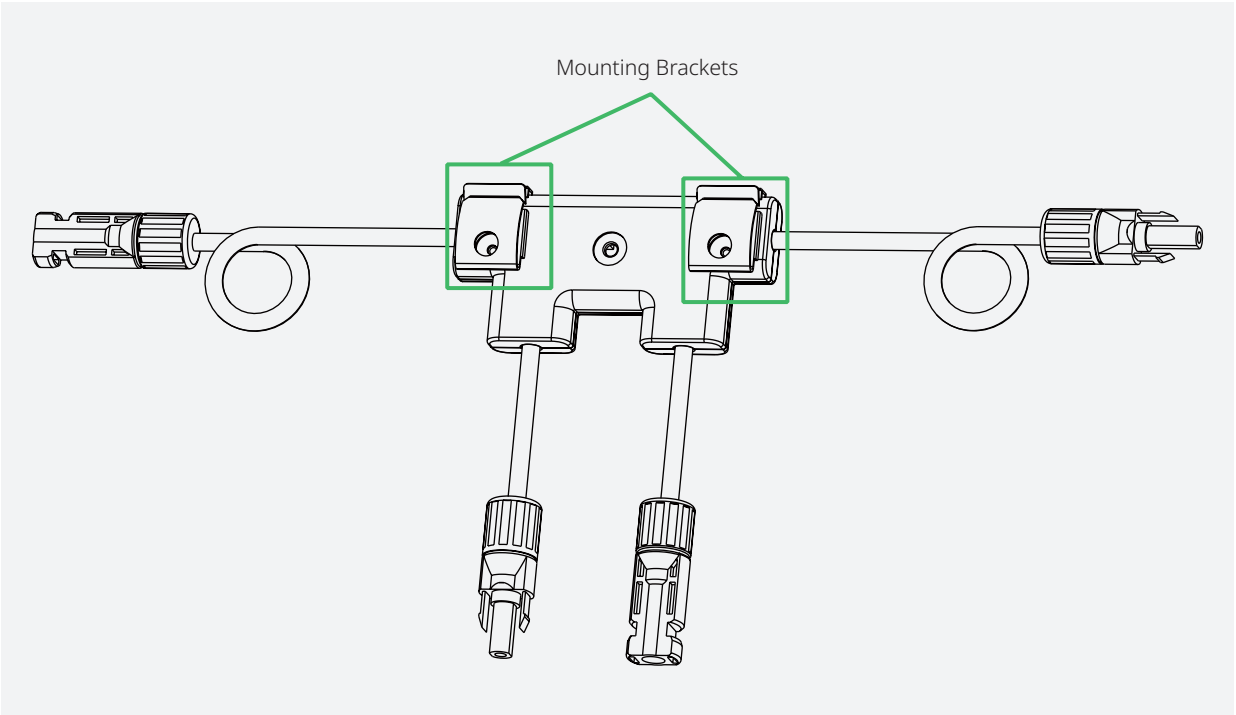
Place safety labels in proper location

2. Products

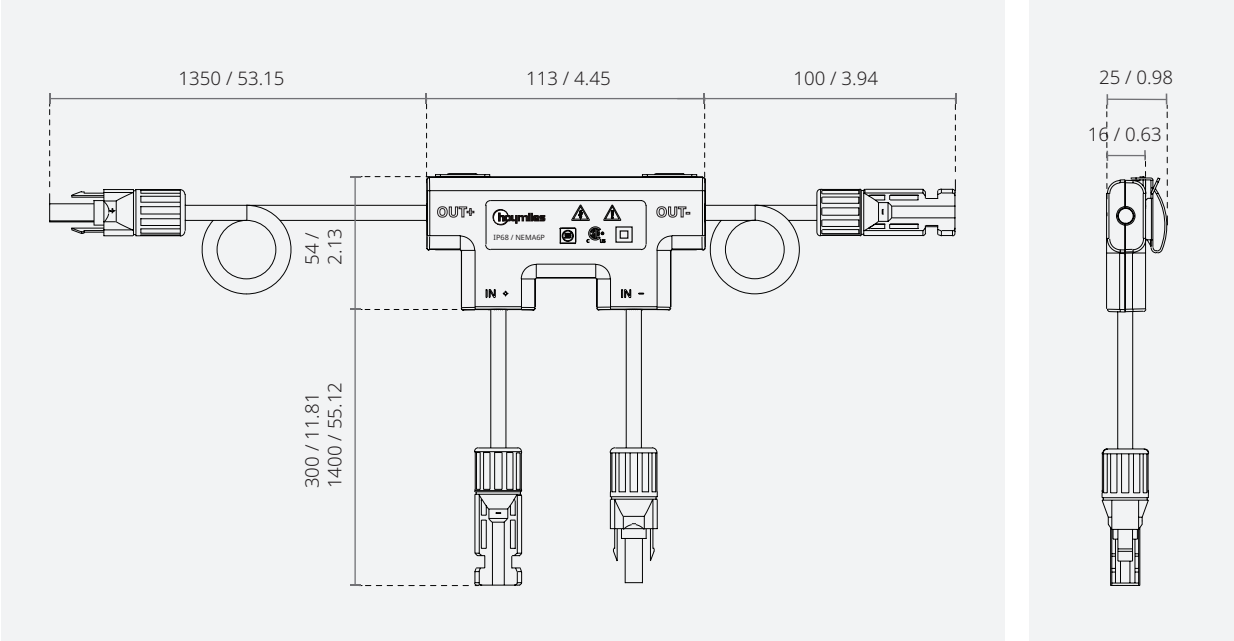
2.1 HRSD-1C

Appearance





Dimensions (mm / inch)



Features

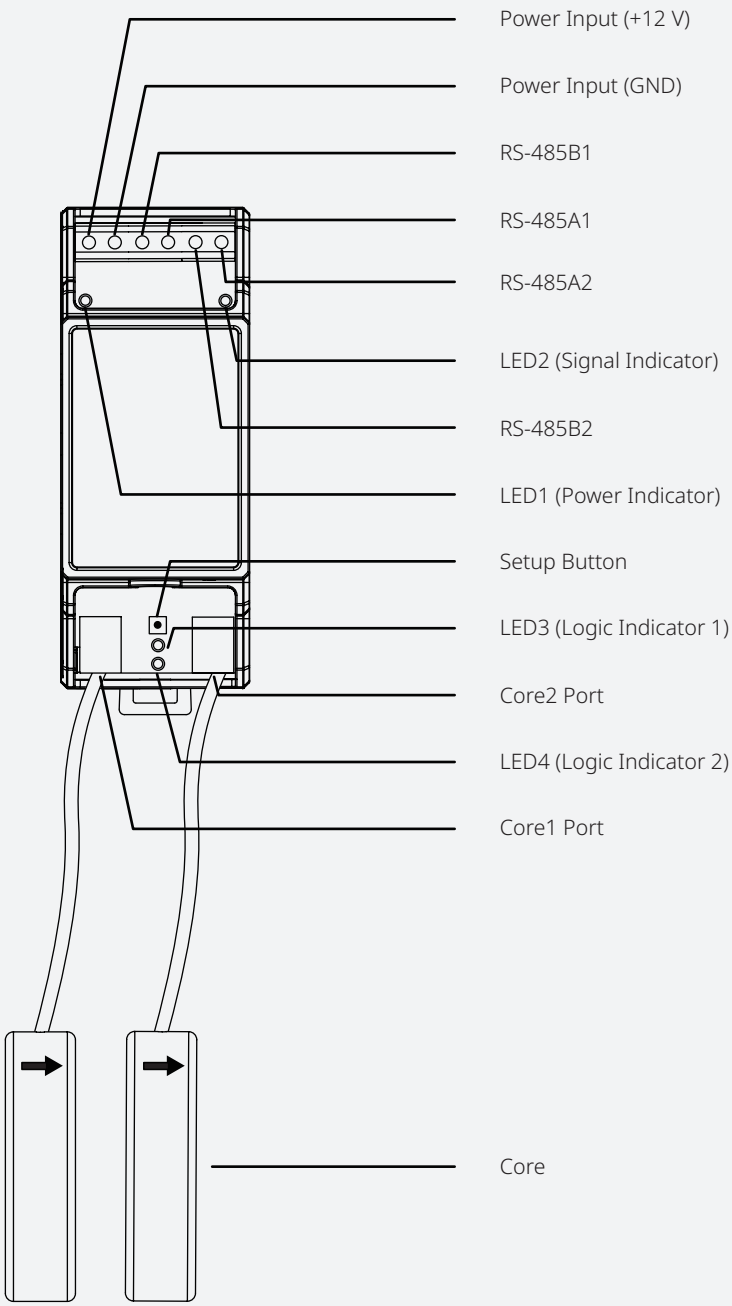
• Meets Sunspec RSD, NEC 2017 & NEC 2020 690.12 requirements
• Uses Active Bypass to reduce heat generation in shade and other situations
• Uses graphene heat spreader to improve heat dissipation
• Plug & play, no configuration required
• Lower power consumption and wider operating voltage range
• Able to avoid crosstalk with special communication modulation technique

As part of Hoymiles Rapid Shutdown Solution for the PV system, HRSD-1C is connected with one module. It meets NEC 2017, NEC 2020, UL 1741 and SunSpec Rapid Shutdown requirements, guaranteeing PV system safety.

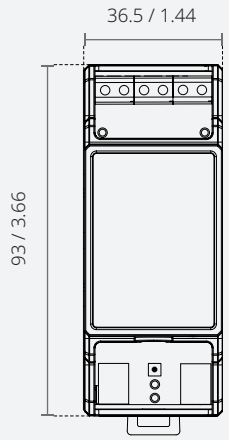
The HRSD device enables proper operation of the PV system when it is installed and receives a “permission to operate” signal from the Hoymiles Transmitter. In an emergency, the PV system would enter module-level rapid shutdown mode by simply disconnecting the AC power of the Transmitter or using an external initiator. (Please see **3.2** for details.)

2.2 HT-G20

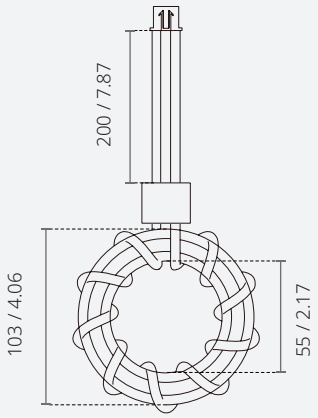
Appearance



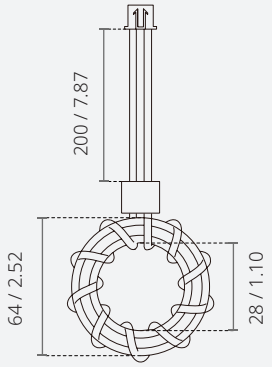
Dimensions (mm / inch)



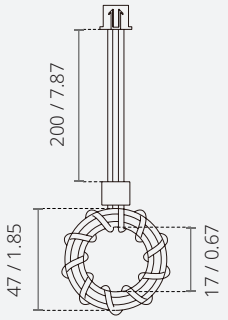
Transmitter



Core-250 A



Core-150 A



Core-75 A

Features

• Module-level rapid shutdown with Hoymiles HRSD
• Achieves rapid shutdown through Transmitter power-off or external initiation
• Advanced crosstalk prevention solution
• Complied with NEC 2017&NEC 2020 690.12 requirements
• Equipped with single/dual Core

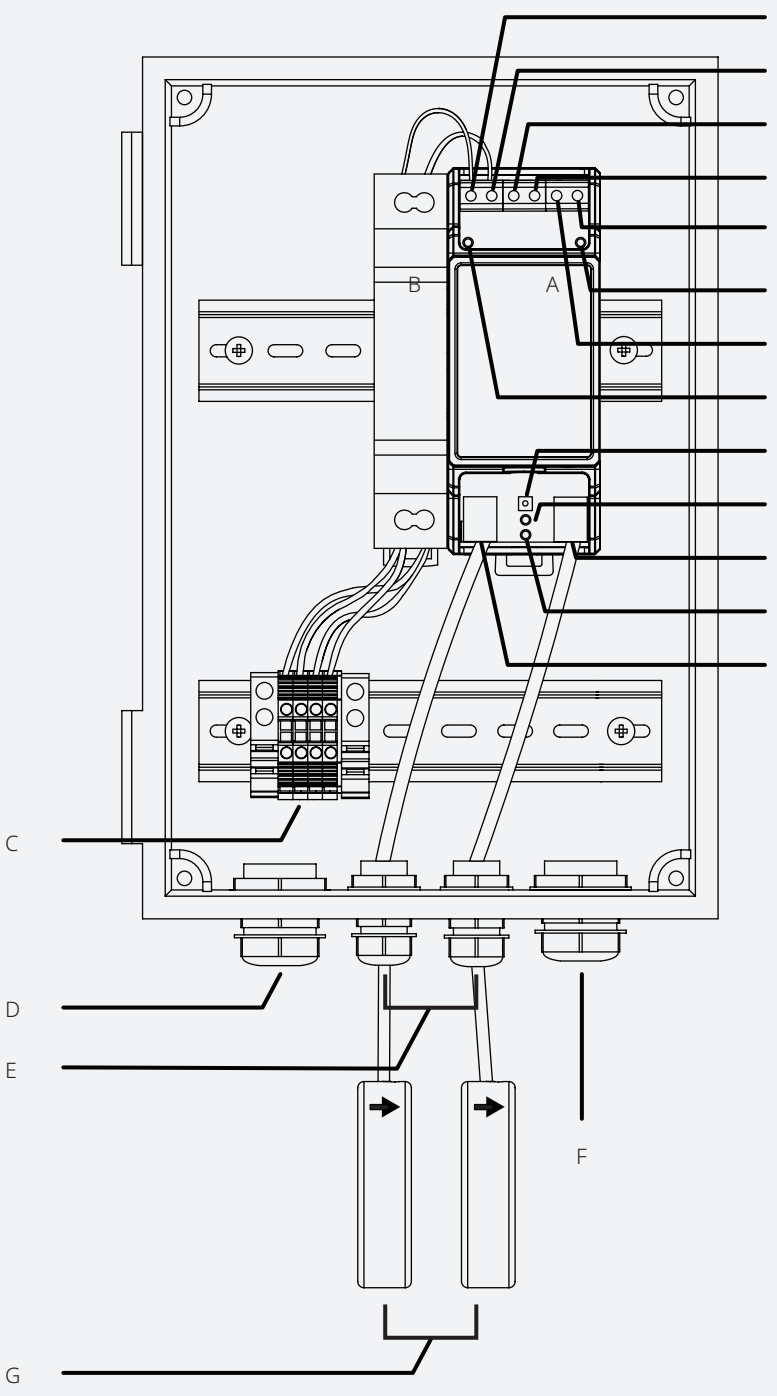
As part of Hoymiles Rapid Shutdown solution, Hoymiles Transmitter HT-G20 works with HRSD for module-level rapid shutdown.

When powered on, the HT-G20 uses PLC technology to continuously send a “permission to operate” signal to HRSD, enabling the PV system to start producing power.

In case of emergency, the PV system would enter module-level rapid shutdown mode by simply disconnecting the AC power of the Transmitter or using an external initiator. (Please see **3.2** for details.)

2.3 HT-G20-Kit

Appearance



[A] Transmitter HT-G20

[B] 85-277 VAC DIN Rail PSU

[C] Terminal Block

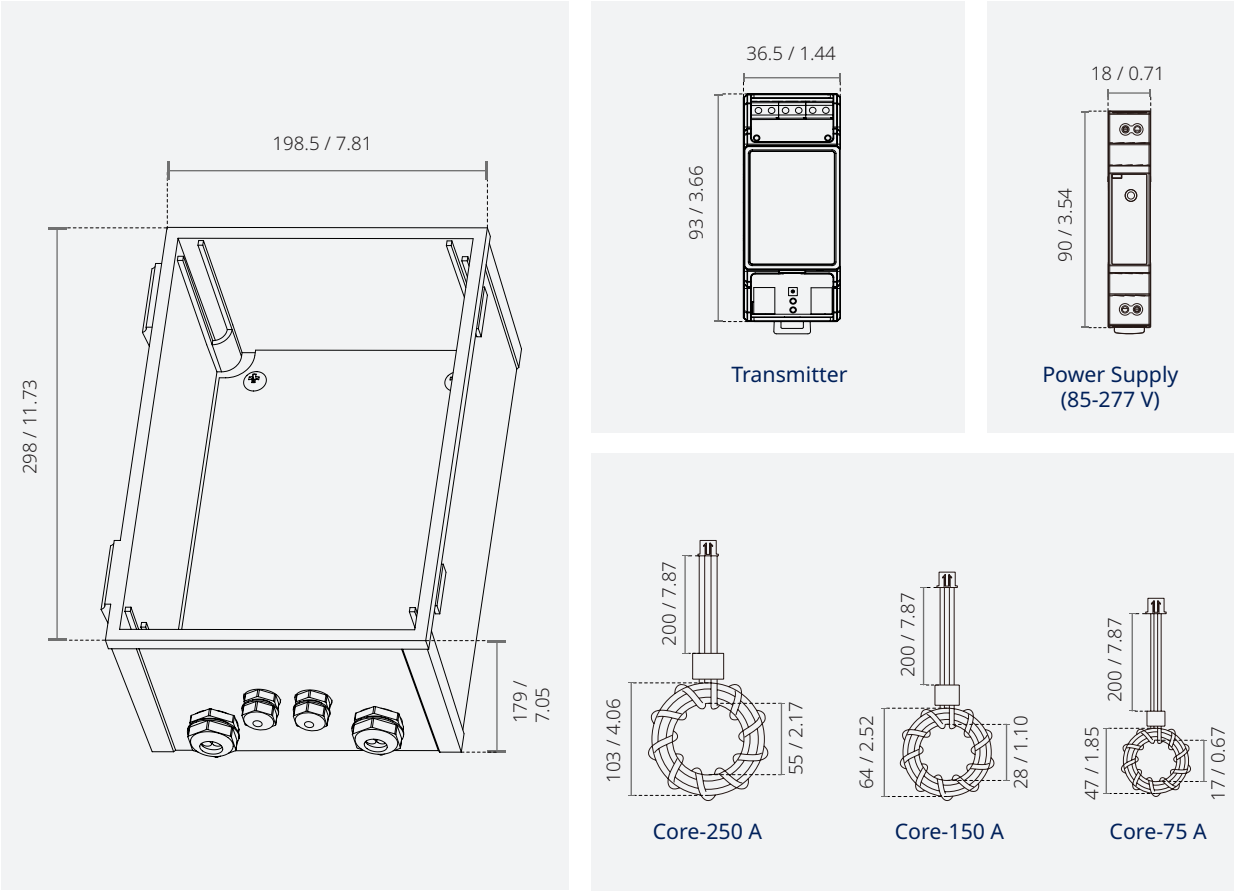
[D] AC Power Cable Gland

[E] Core Cable Gland

[F] RS-485 Cable Gland

[G] Core

Dimensions (mm / inch)



Features

• Module-level rapid shutdown with Hoymiles HRSD
• Achieves rapid shutdown through Transmitter power-off or external initiation
• Advanced crosstalk prevention solution
• Weatherproof outdoor enclosure
• Complied with NEC 2017&NEC 2020 690.12 requirements
• Equipped with single-phase power supply

As part of Hoymiles Rapid Shutdown solution, the HT-G20-Kit is designed to work with HRSD for rapid shutdown at the module level. The kit comprises one HT-G20 (available in single or dual Core), one single-phase power supply, and an outdoor enclosure.

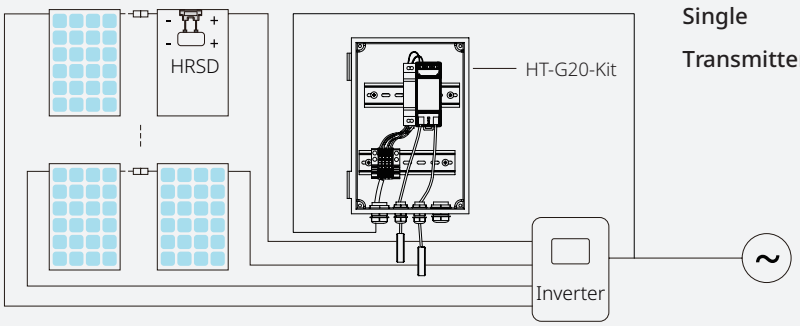
When powered on, the HT-G20 uses PLC technology to continuously send a “permission to operate” signal to HRSD, enabling the PV system to start producing power.

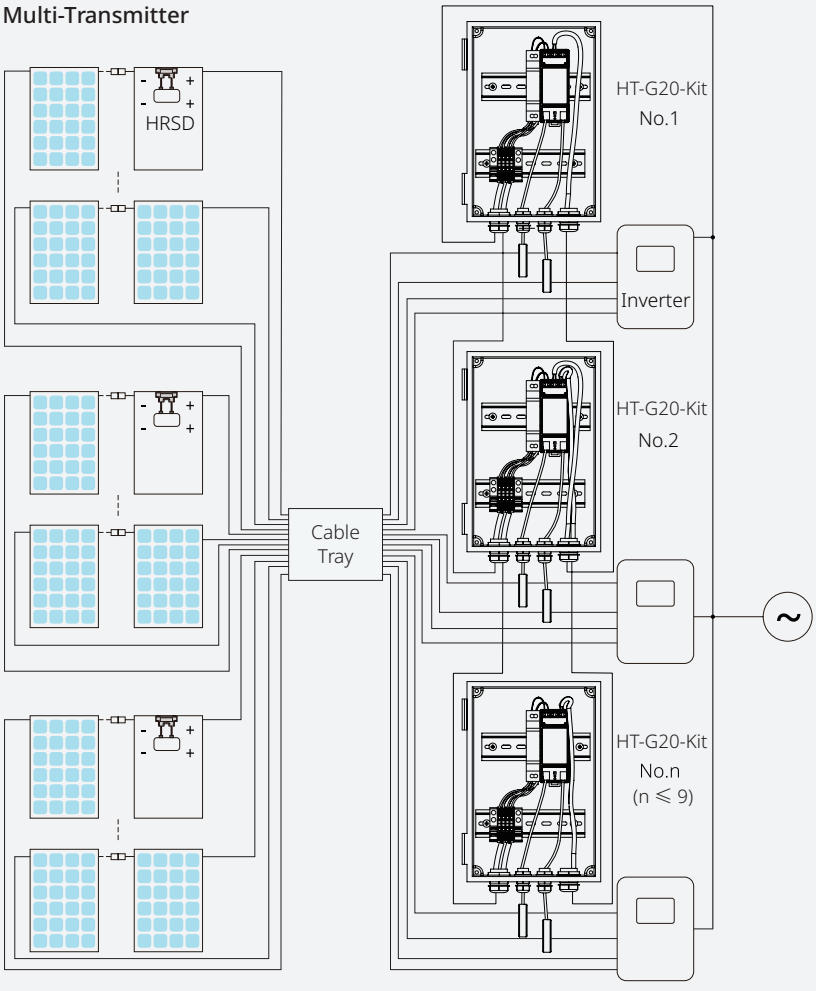
In case of emergency, the PV system would enter module-level rapid shutdown mode by simply disconnecting the AC power of the Transmitter or using an external initiator. (Please see **3.2** for details.)

3. Hoymiles Rapid Shutdown System

3.1 System Overview

Hoymiles Rapid Shutdown System consists of the HRSD and the Transmitter, as shown below.

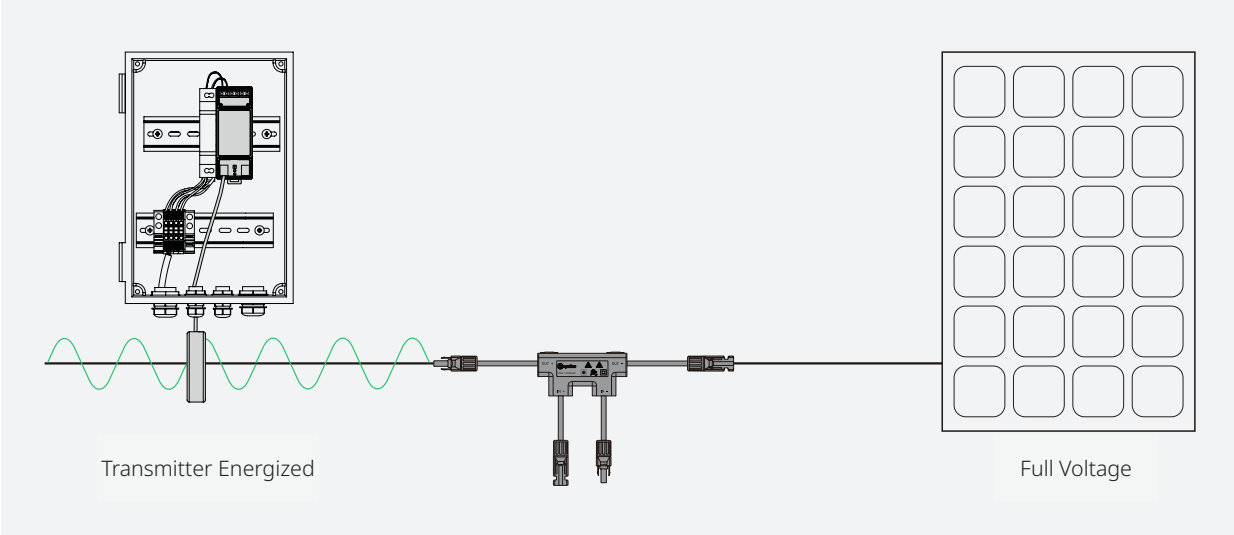


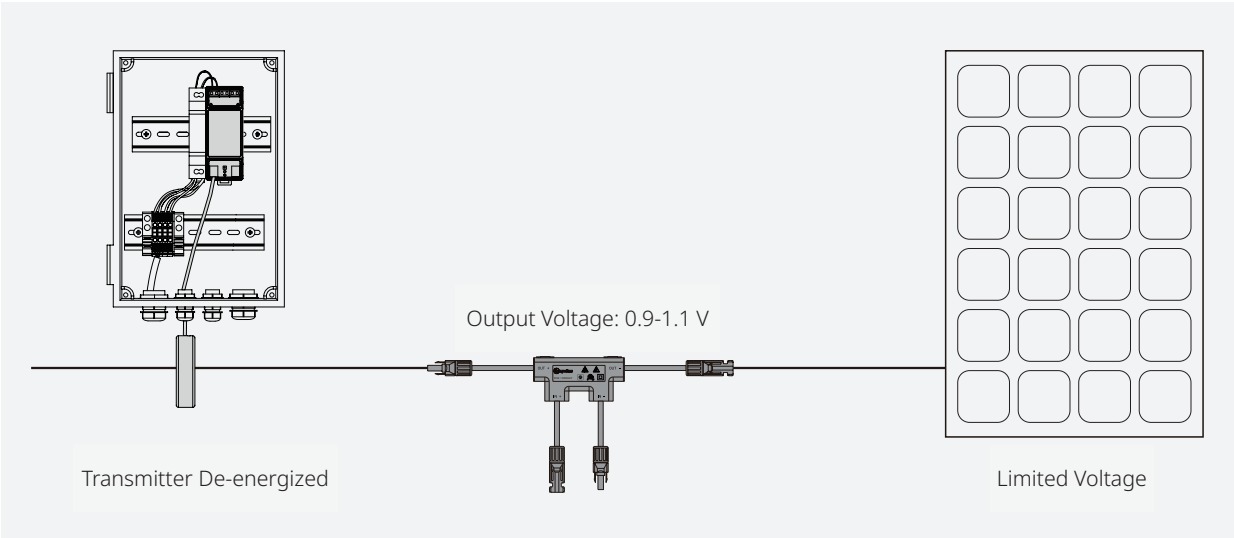


IMPORTANCE

- *Hoymiles recommends that the Transmitter power supply be on the same AC branch circuit as the inverter to meet rapid shutdown requirements.*

When energized, the Transmitter constantly sends a “permission to operate” signal to the HRSD-1C, which receives the signal and turns **ON** and allows full PV module voltage. When de-energized, the Transmitter stops the signal, making the HRSD-1C enter shutdown mode with output voltage reduced to 0.9-1.1 V. Thus, the PV array enters rapid shutdown mode in the event of AC grid loss.





NOTICE

- *The figures above are intended for working principle illustration only. They do not serve as wiring references.*

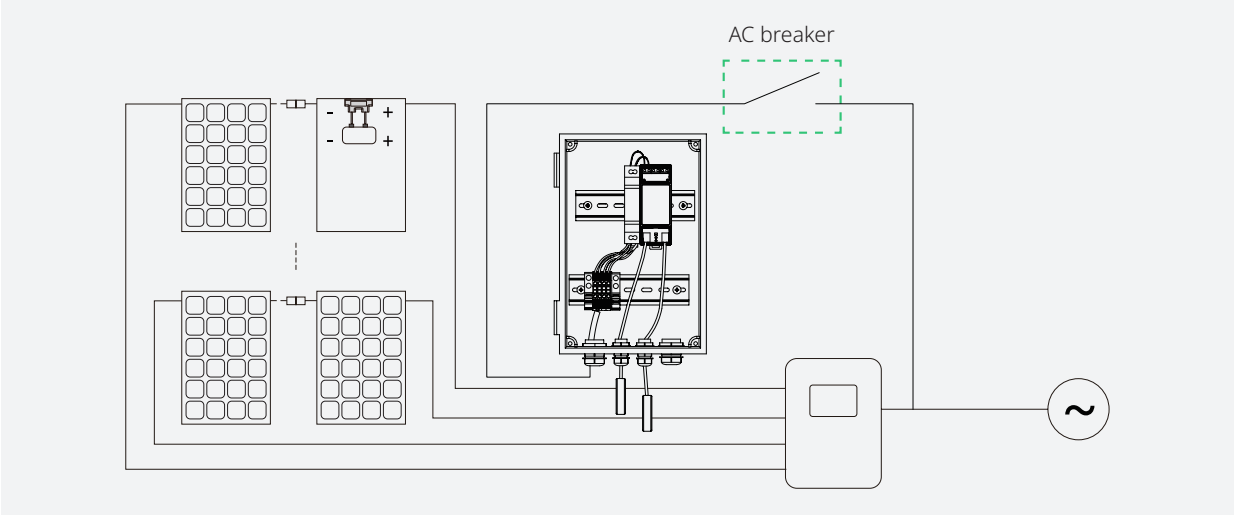
3.2 Initiation Methods

Hoymiles Rapid Shutdown System can be initiated in two ways—1) turning off the AC breaker and 2) pressing the external emergency stop button.

3.2.1 Turning off AC Breaker

Working Principle

This method requires an **upstream** AC breaker. When the breaker is turned off, the DC 12V power to the Transmitter is disconnected, which interrupts the “permission to operate” signal transmission, making the HRSD enter shutdown mode.



Wiring Method

Respectively connect the output L and N ports of the AC breaker to the L and N ports of the DIN rail PSU.

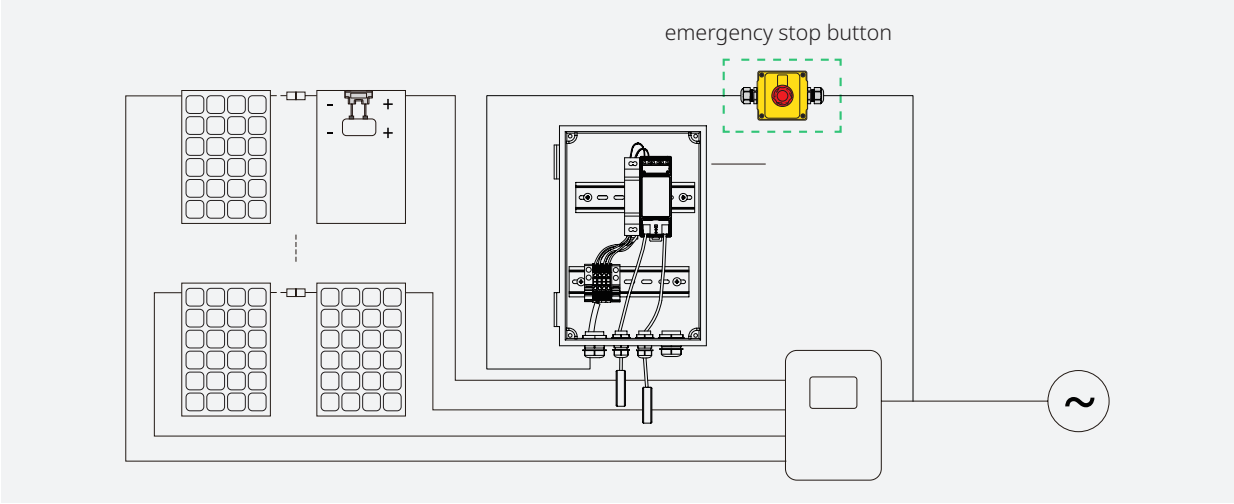
NOTICE

- *The AC breaker should be installed at an accessible location.*

3.2.2 Pressing External Emergency Stop Button

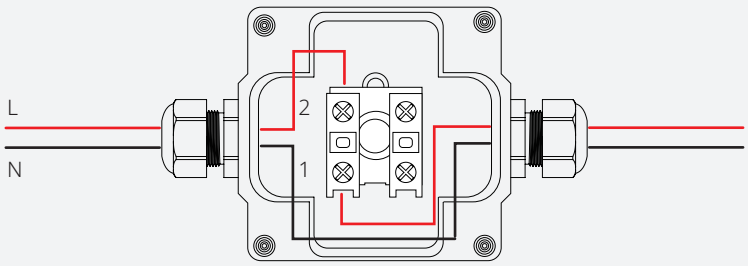
Working Principle

This method requires an **upstream** external emergency stop button. When the button is pressed, the DC 12V power to the Transmitter is disconnected, which interrupts the “permission to operate” signal transmission, making the HRSD enter shutdown mode.



Wiring Method

Serially connect the NC contacts **(1 and 2)** of the emergency stop button to the live wire (L) of the upstream AC cable.



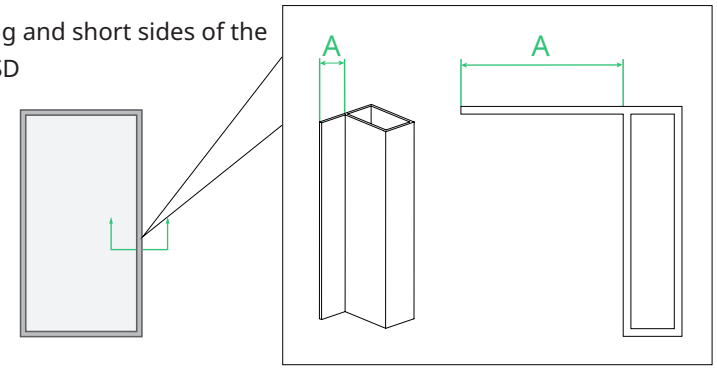
NOTICE

- *The AC circuit should be **220V 6A** or **380V 4A**.*
- *The emergency stop button should be installed at an accessible location.*

4. Cable Length and Routing

4.1 Configuration of Cable Lengths

The HRSD can be mounted on both the long and short sides of the PV module frame. Choose the suitable HRSD based on the installation scenario.

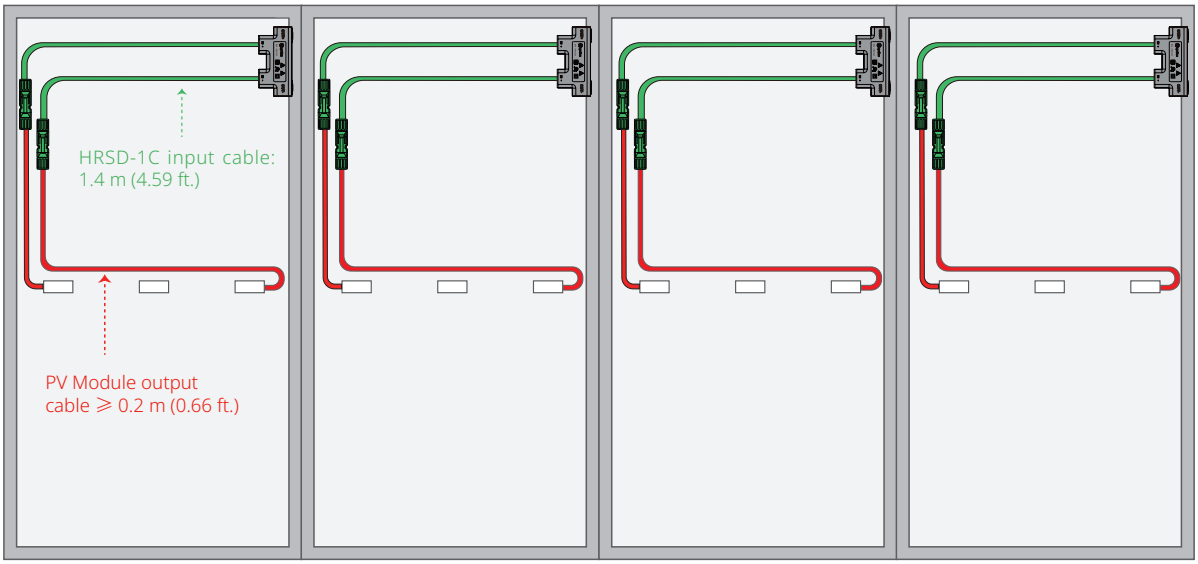


NOTICE

- To securely fasten the HRSD to the PV module frame, ensure A is 15 mm at minimum for clipping.

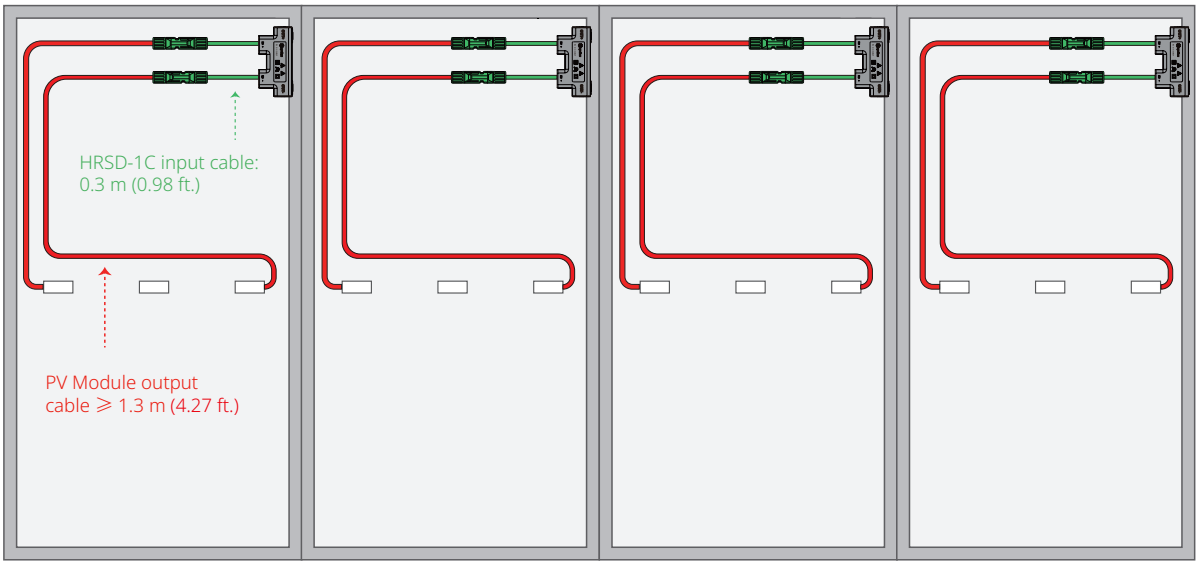
Scenario One: Long-side Installation

For PV modules with short output cables, choose HRSDs with input cables of the suitable length shown below.



** The proportions of the HRSDs have been modified to improve the depiction of the structure.*

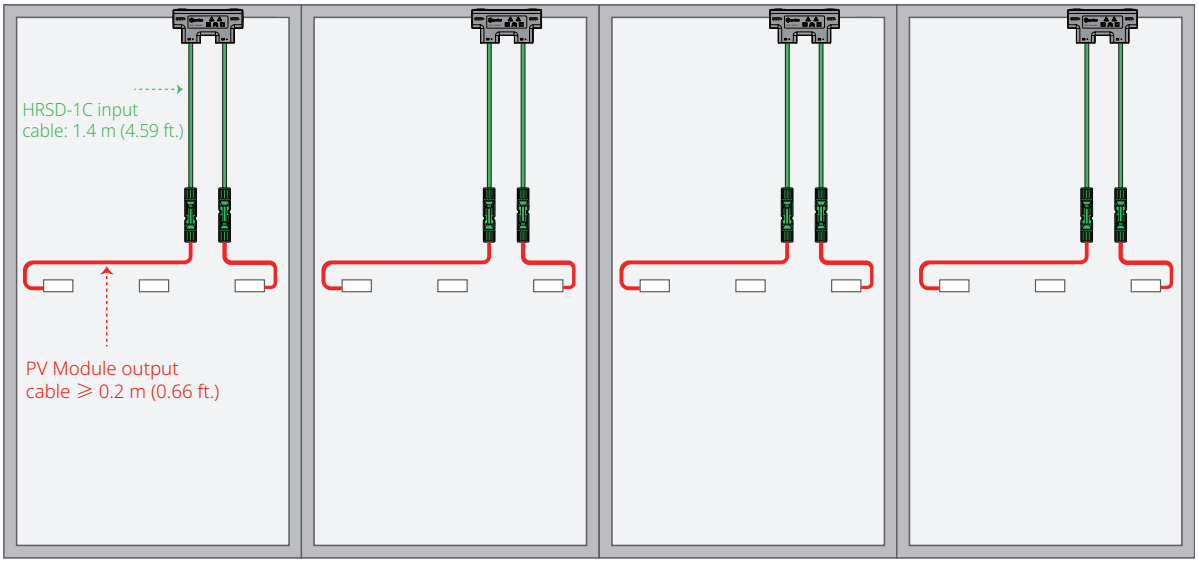
For PV modules with long output cables, choose HRSDs with input cables of the suitable length shown below.



** The proportions of the HRSDs have been modified to improve the depiction of the structure.*

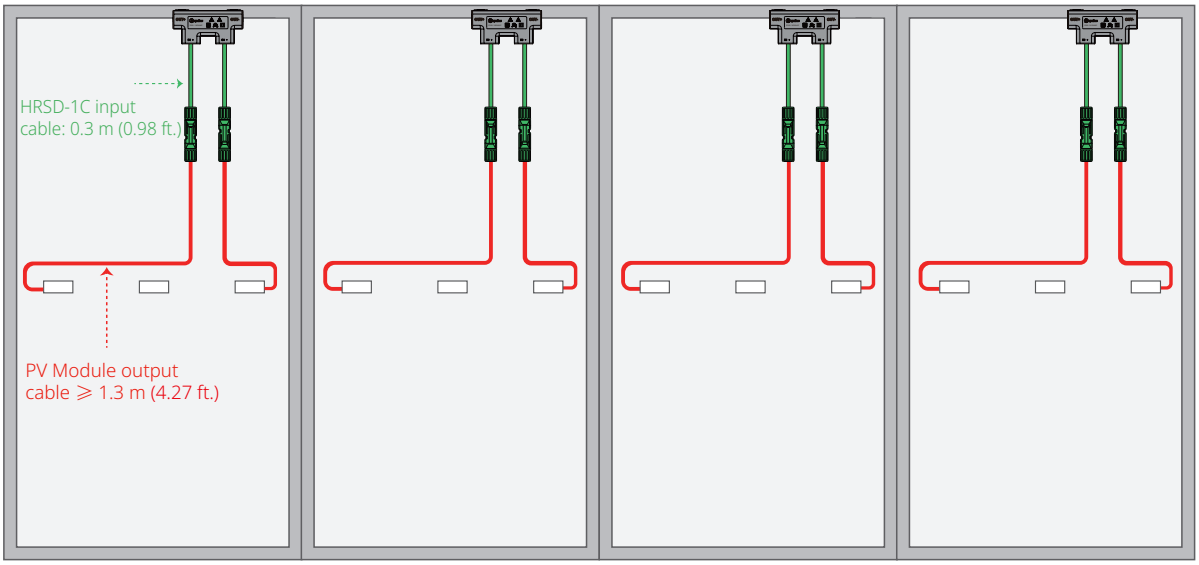
Scenario Two: Short-side Installation

For PV modules with short output cables, choose HRSDs with input cables of the suitable length shown below.



** The proportions of the HRSDs have been modified to improve the depiction of the structure.*

For PV modules with long output cables, choose HRSDs with input cables of the suitable length shown below.

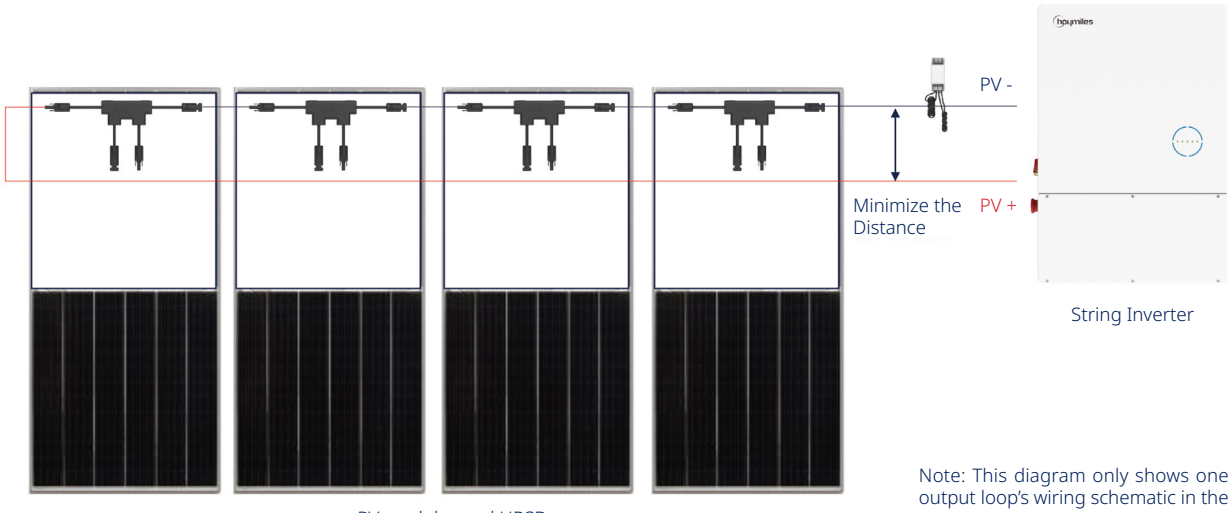


** The proportions of the HRSDs have been modified to improve the depiction of the structure.*

4.2 Routing Instruction

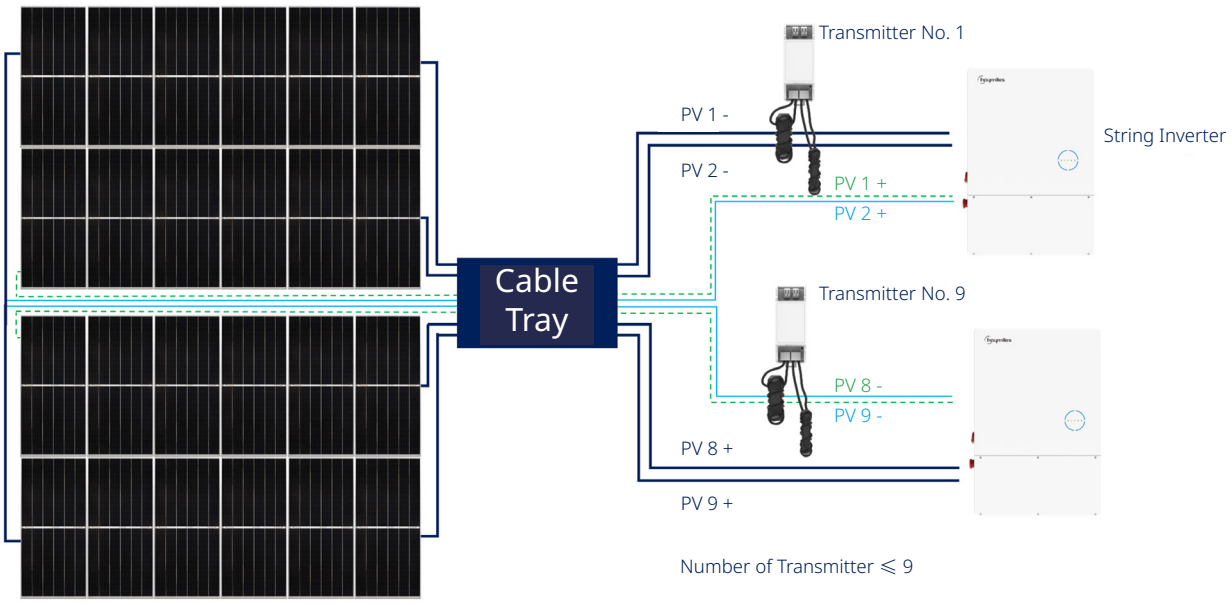
To ensure effective communication,

- minimize the distance between positive and negative cables within the same string.
- up to **nine** Transmitters can be placed at one site.



PV modules and HRSDs

Note: This diagram only shows one output loop's wiring schematic in the PV system.



Number of Transmitter ⩽ 9

PV arrays and HRSDs

5. Installation

** The installation instructions in this chapter are in accordance with the National Electrical Code (NEC), NFPA 70, and Canadian Electrical Code (CEC Code).*

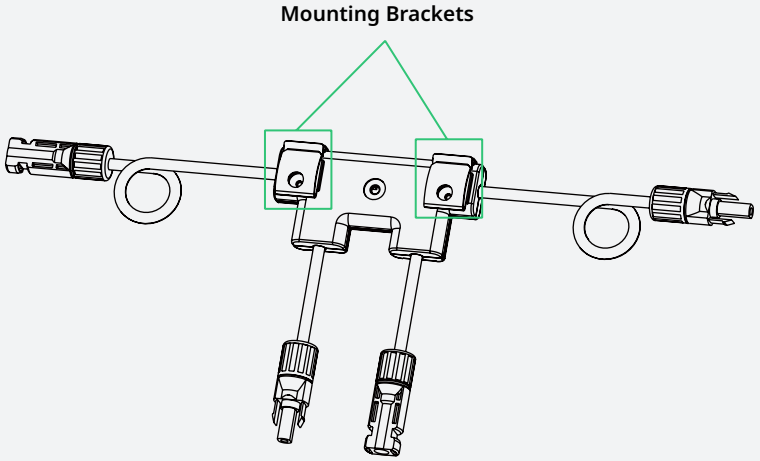
5.1 HRSD-1C

WARNING	• To disconnect the HRSD-1C, remove the output cables of the HRSD string first, and then disconnect the input cables from the PV modules.

NOTICE	• Cables of the HRSD inputs and the PV module outputs cannot be extended.

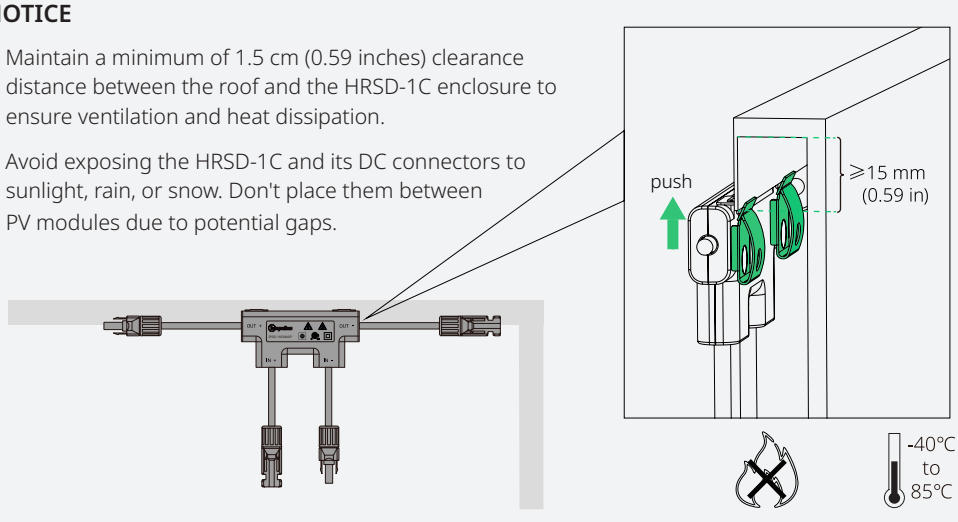
IMPORTANCE	• HRSD-1C output voltage is 0.9 V to 1.1 V when the Transmitter "permission to operate" signal is not present. • Max. cable length from inverter (+) to inverter (-): 800 m (2625 ft.) • Max. number of strings recommended: 30 modules* *Source: SunSpec RapidShutdown Specification. Please refer to local regulations before installation.

Step 1 Buckle HRSD-1C on the PV module frame.

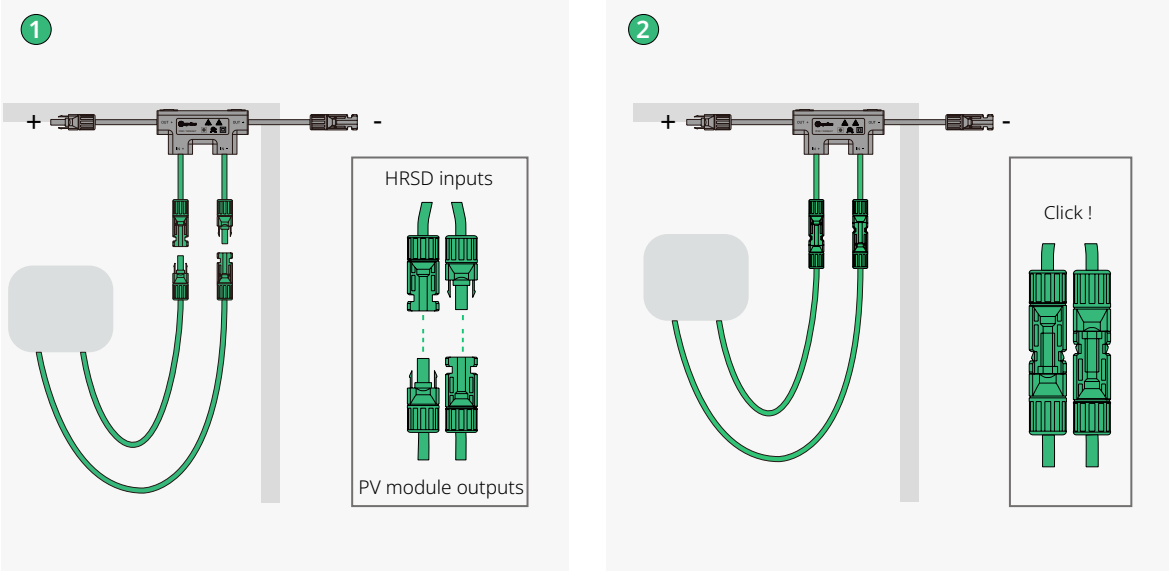


NOTICE

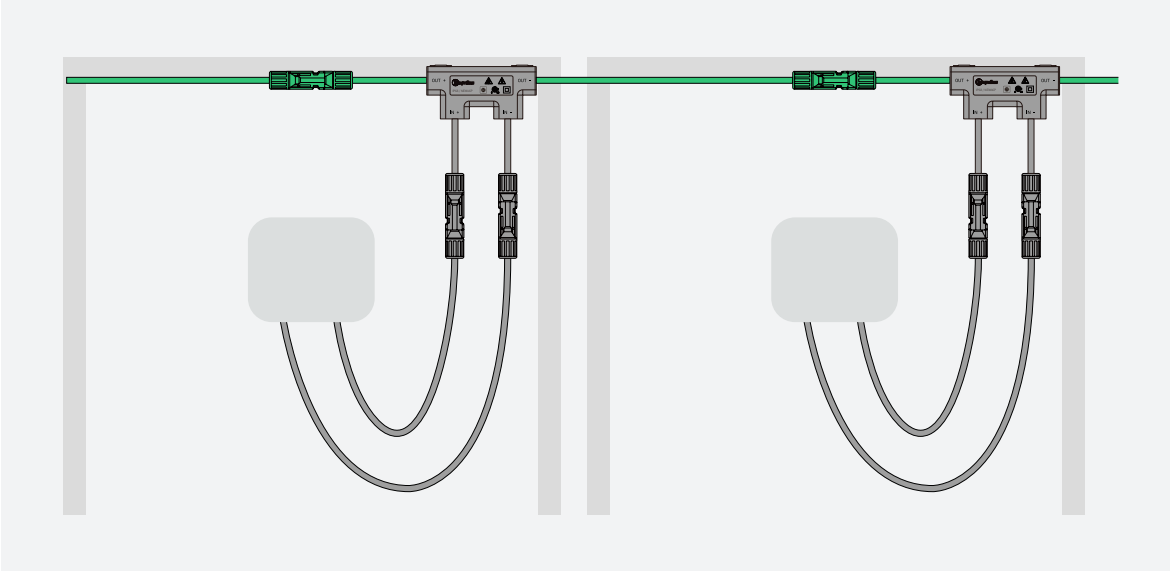
- Maintain a minimum of 1.5 cm (0.59 inches) clearance distance between the roof and the HRSD-1C enclosure to ensure ventilation and heat dissipation.
- Avoid exposing the HRSD-1C and its DC connectors to sunlight, rain, or snow. Don't place them between PV modules due to potential gaps.



Step 2 Connect the PV modules to the HRSD-1C.



Step 3 Connect the HRSD-1C outputs in series.



5.2 HT-G20

WARNING	• Before installation, ensure that the whole system is disconnected from the power source and the HRSD has been installed.

NOTICE	• Improper installation may lead to HT-G20 damage, which is not covered under warranty.

IMPORTANCE	• Hoymiles recommends that Transmitter power supply be on the same AC branch circuit as the inverter to meet rapid shutdown requirements. • Place rapid shutdown system sticker no more than 1m (3 ft.) from the Transmitter or AC disconnect. • Max. current per Core: 75 A, 150 A, or 250 A • Max. cable length from inverter (+) to inverter (-): 800 m (2625 ft.) • Max. number of strings per Core*: 5 (75 A Core), 15 (150 A Core), or 20 (250 A Core) * With Φ 6 mm (0.24 in) DC cable diameter (without DC connector) (Refer to **8.2** for details.)

Preparation

Please prepare the following items before installation.

Category	Item	Specification
Equipment	DIN rail	35 mm
	DIN rail power supply	with DC output voltage of 12 V
Cable	RS-485 cable (multi-Transmitter system only)	24-12 AWG (0.20-3.30 mm^2) outdoor shielded twisted pair cable, with outer diameter of 6-6.7 mm (0.24”-0.26”)
	12 V DC power cable	26-12 AWG (0.12-3.30 mm^2) outdoor shielded copper cable, with outer diameter of 6-6.7 mm (0.24”-0.26”)
Tool	Personal protective equipment (PPE)	-
	Screwdriver	M2.5
	Crimping tool	26-12 AWG (0.12-3.30 mm^2)
	Diagonal cutter	-
	Wire stripper	-

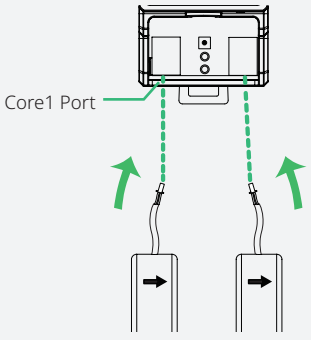
Steps

** For a single Transmitter system, skip **Step 3** and **Step 6**.*

Step 1 **Mount the Transmitter and the power supply on the DIN rail.**

Step 2 **Connect the Core.**

Ensure you face the the Core’s right-arrow side, and connect the Core cable to the port.
For a single-Core Transmitter, connect the cable to the Core1 port.

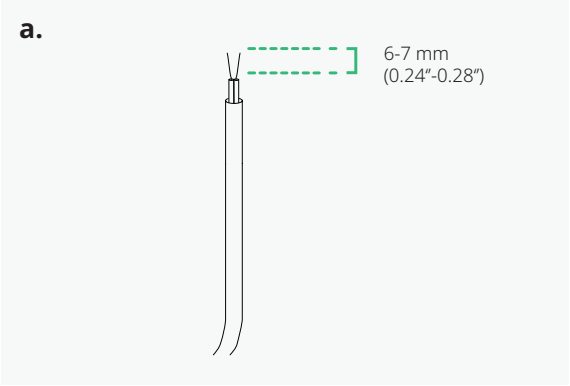


Step 3 Connect the RS-485 cable to the first HT-G20.

a. Strip the insulation of the RS-485 cable 6-7 mm (0.24”-0.28”) from the end.

b. Crimp the stripped cable to the 485B1 and 485A1 ports.
(Blue-485B1, Brown-485A1; torque: 0.4 N·m / 3.5 lb·in)

** The color of the RS-485 cable may not be brown and blue. Adhere to the local codes.*



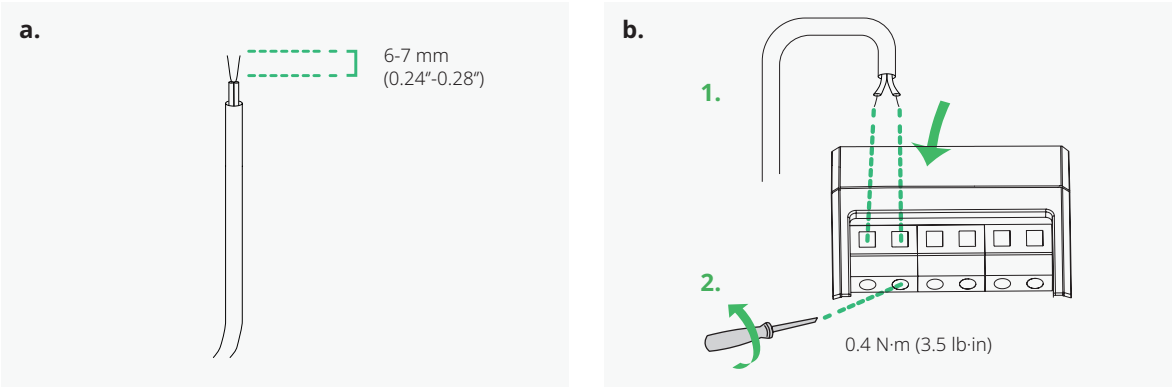
Step 4 Connect the power supply and the HT-G20.

a. Strip the insulation of the 12 V DC power cable 6-7 mm (0.24”-0.28”) from the end.

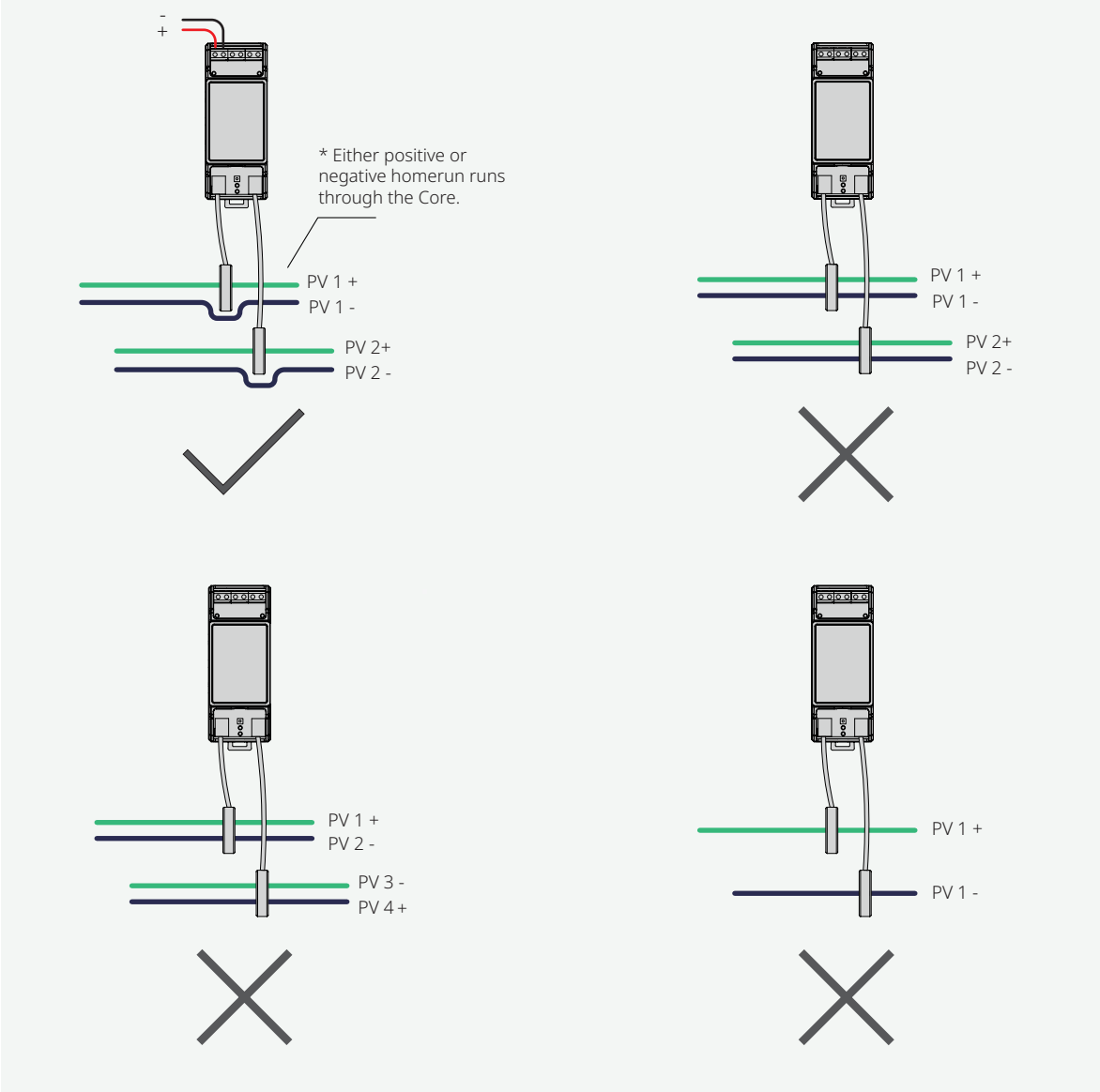
b. Crimp the stripped cable to the Power Input ports.
(Red-12 V, Black-GND; torque: 0.4 N·m / 3.5 lb·in)

** The color of the 12 V DC power cable may not be red and black. Adhere to the local codes.*

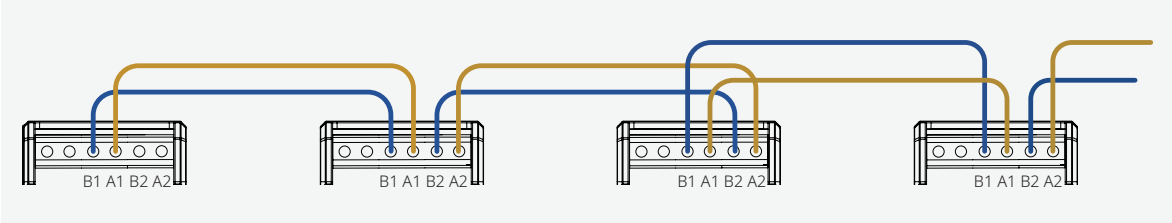
c. Connect the other end of the cable to the output terminals of the power supply.



Step 5 Pass either positive homerun or negative homerun through the Core.



Step 6 Connect the RS-485 ports of all the Transmitters in a defined order.



5.3 HT-G20-Kit

WARNING	• Before installation, ensure that the whole system is disconnected from the power source and the HRSD has been installed.

NOTICE	• Improper installation may lead to HT-G20-Kit damage, which is not covered under warranty.

IMPORTANCE	• Hoymiles recommends that the Transmitter power supply be on the same AC branch circuit as the inverter to meet rapid shutdown requirements. • Place rapid shutdown system sticker no more than 1m (3 ft.) from the Transmitter or AC disconnect. • Max. current per Core: 75 A, 150 A, or 250 A • Max. cable length from inverter (+) to inverter (-): 800 m (2625 ft.) • Max. number of strings per Core*: 5 (75 A Core), 15 (150 A Core), or 20 (250 A Core) * With Φ 6 mm (0.24 in) DC cable diameter (without DC connector) (Refer to **8.3** for details.)

Preparation

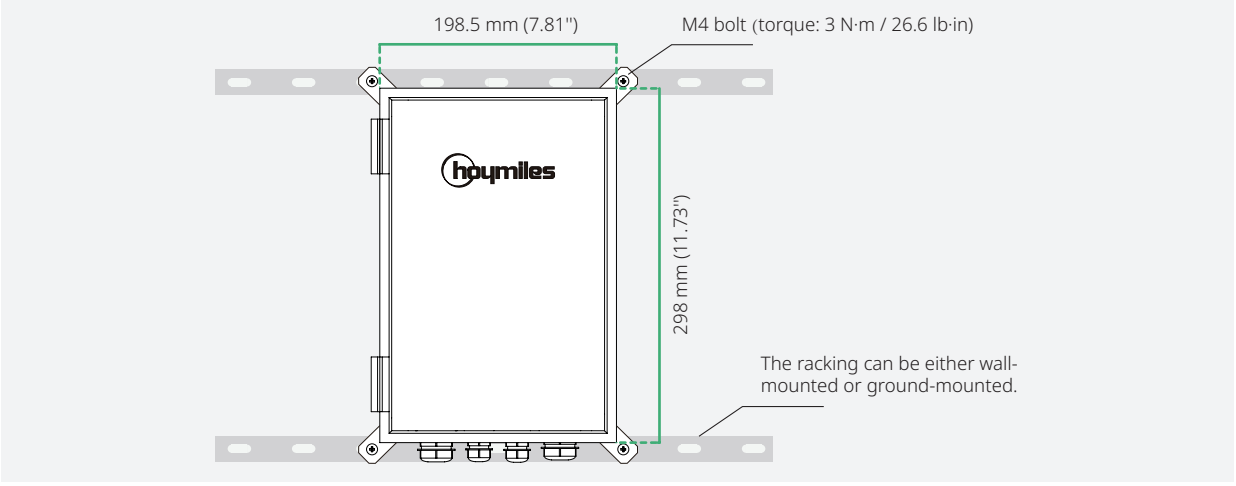
Please prepare the following items before installation.

Category	Item	Specification
Cable	RS-485 cable (multi-Transmitter system only)	24-12 AWG (0.20-3.30 mm^2) outdoor shielded twisted pair cable, with outer diameter of 6-6.7 mm (0.24”-0.26”)
	AC power cable	26-12 AWG (0.12-3.30 mm^2) outdoor shielded copper cable, with outer diameter of 6-6.7 mm (0.24”-0.26”)
Tool	Personal protective equipment (PPE)	-
	Screwdriver	M2.5, M4
	Torque wrench	M16, M25
	Crimping tool	26-12 AWG (0.12-3.30 mm^2)
	Diagonal cutter	-
	Wire stripper	-

Steps

Mechanical Installation

Select a suitable installation location for the enclosure based on its dimensions.



Electrical Installation

** For a single Transmitter system, skip **Step 2**, **Step 5**, and **Step 6**.*

Cable gland accessories	Sealing nut	Split-type bushing	Hole plug

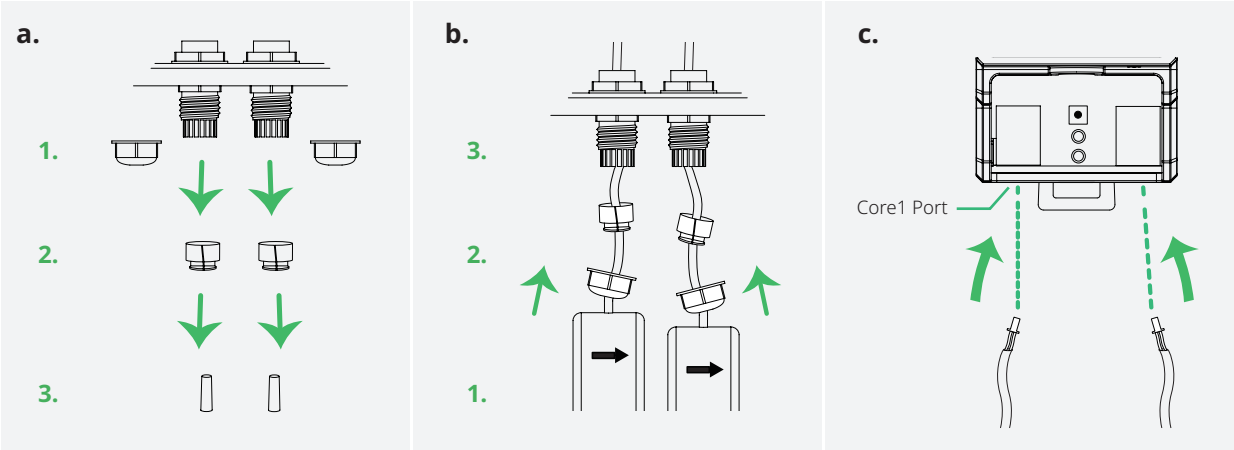
Step 1 Connect the Core.

a. Unscrew the sealing nut on the Core Cable Gland, and remove the split-type bushing and the hole plug in it.

b. Ensure you face the the Core's right-arrow side, and pass the Core cable through the nut, the bushing, and the gland in succession.

c. Connect the cable to the port. For a single-Core Transmitter, connect the cable to the Core1 port.

d. Insert the bushing back in place, and securely screw the nut. (Torque: 2-3 N·m / 17.70-26.55 lb·in)



Step 2 Connect the RS-485 cable to the first HT-G20-Kit.

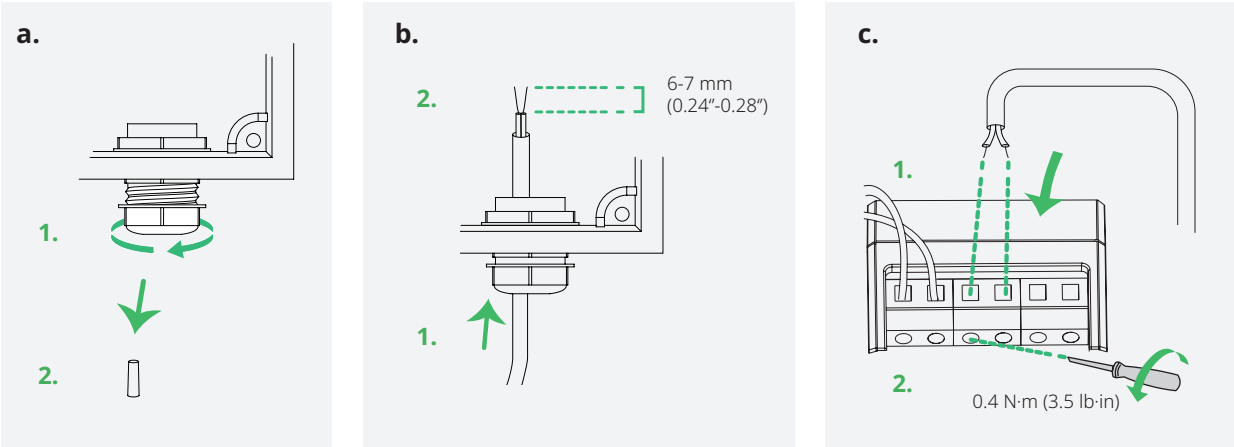
a. Loosen the sealing nut on the RS-485 Cable Gland of the first HT-G20-Kit, and remove one hole plug.

b. Insert the RS-485 cable into the gland, and strip the insulation 6-7 mm (0.24"-0.28") from the end.

c. Crimp the stripped RS-485 cable to the 485B1 and 485A1 ports. (Blue-485B1, Brown-485A1)

** The color of the RS-485 cable may not be brown and blue. Adhere to the local codes.*

d. Securely screw the nut. (Torque: 5-6 N·m / 44.25-53.10 lb·in)



Step 3 Connect the AC power cable to the first HT-G20-Kit.

a. Loosen the sealing nut on the AC Power Cable Gland of the first HT-G20-Kit, and remove the hole plug.

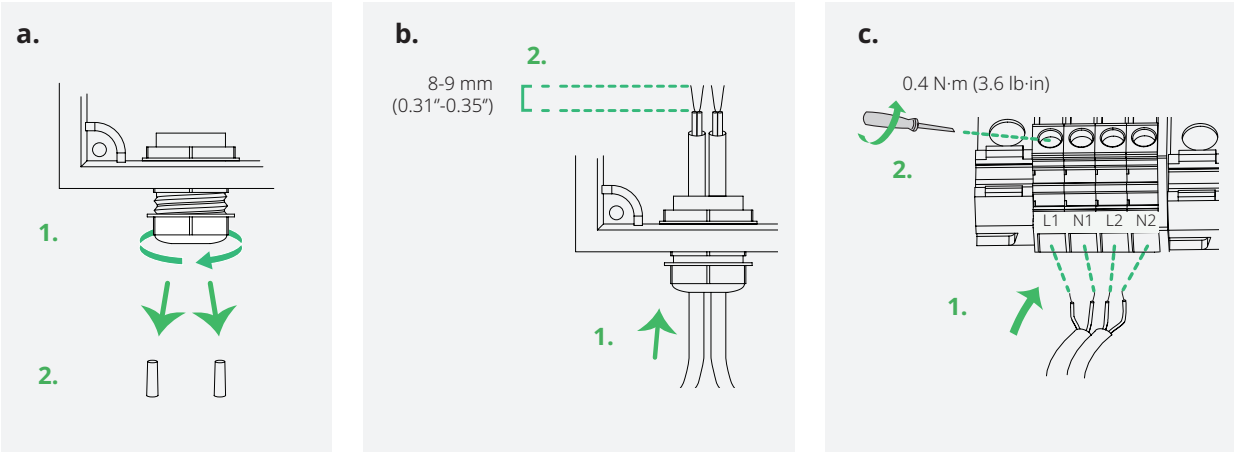
** For a single Transmitter system, remove one hole plug; for a multi-Transmitter system, remove two.*

b. Insert the AC power cable into the gland, and strip the insulation 8-9 mm (0.31”-0.35”) from the end.

** For a single Transmitter system, insert one AC cable; for a multi-Transmitter system, insert two.*

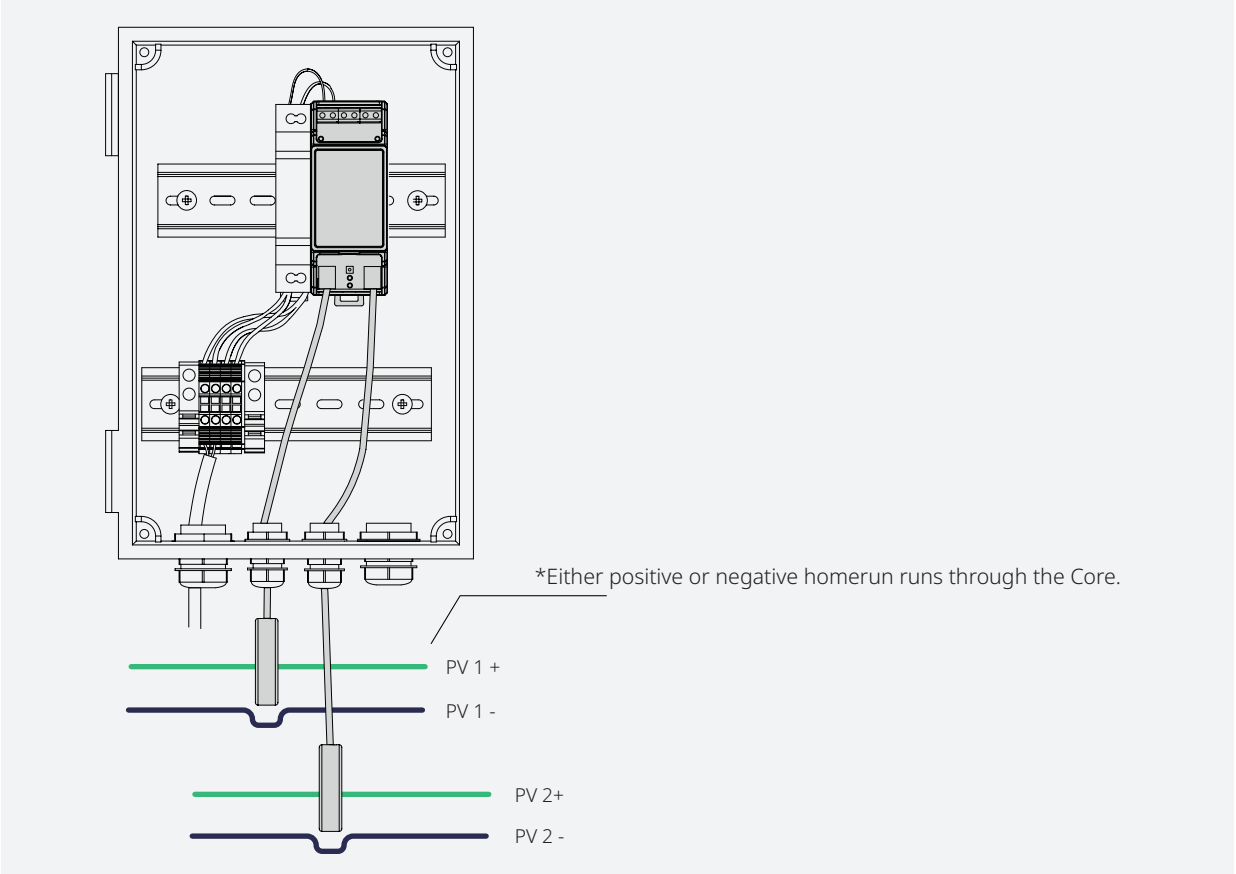
c. Crimp the stripped AC power cable to the terminal block.

d. Securely screw the nut. (Torque: 5-6 N·m / 44.25-53.10 lb·in)



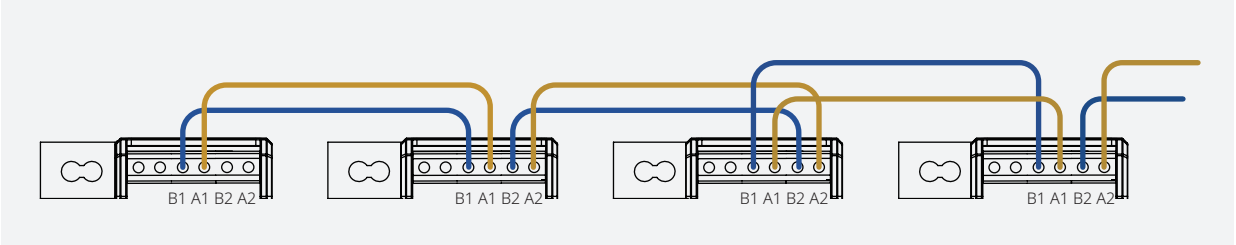
Step 4 Pass either positive homerun or negative homerun through the Core.

* *For common mistakes, refer to 5.2 on* ***page 20****.*



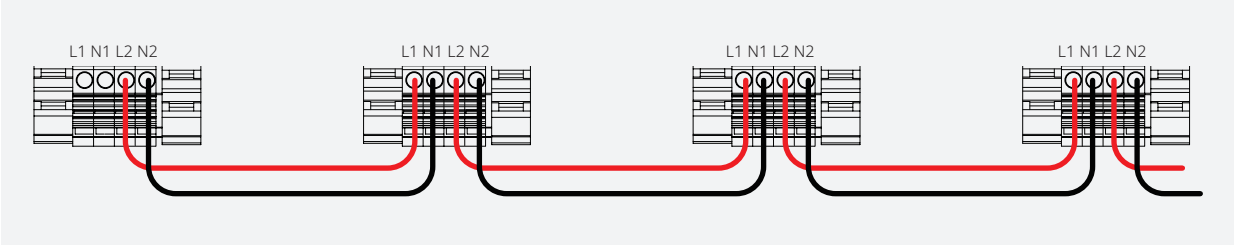
Step 5 Connect the RS-485 ports of all the Transmitters in a defined order.

** Remove only one hole plug in the RS-485 Cable Gland of the last HT-G20-Kit.*



Step 6 Connect all the terminal blocks in a defined order.

** Remove only one hole plug in the AC Power Cable Gland of the last HT-G20-Kit.*



6. System Commissioning and Maintenance

6.1 System Commissioning

WARNING	• Before system commissioning, ensure that the Core and all the cables are connected correctly and securely. • Up to nine Transmitters can be connected by the RS-485 cable.

Step 1 Turn on the Transmitter.

a. Turn on the power supply to energize the Transmitter.

b. Check the status of LED1 and LED2 according to the table below.

	Status	Indicates
LED1	Solid green	The power supply functions normally.
	Off	The DC power is not present. / The input voltage is not 12V.
LED2	Green flash (one time)	The Transmitter is energized.
	Green flash (1s gap)	Networking is not performed.

Step 2 Perform networking.

a. Check the power supply functions normally (all LED1 solid green), and press and hold the Setup button of one Transmitter for 5-8s.

b. The LED4 solid red light indicates that the Transmitter enters search mode. Wait for about 15s.

c. If the networking succeeds, the LED3 will be flashing green (1s gap). (Skip to **Step 4**.)
If the networking fails, the LED4 will be flashing red (1s gap). (Go to **Step 3**.)

Step 3 (Optional) Reset the Transmitter.

a. Press and hold the Setup buttons of all the Transmitters for 10s at minimum.

b. During the reset period, the LED4 will be flashing red for five times (0.2s gap), then it will be off. It indicates that the Transmitter is reset successfully.

c. Repeat **Step 2**.

Step 4 Synchronize the Transmitter signals.

a. Press and hold the Setup button of the same Transmitter in **Step 2** for 3-8s to select it as the master. Then the LED3 will be solid green, meaning that the Transmitter signals are being synchronized.

b. After the synchronization, the LED2 will be flashing green and the time gaps are shown as below. The system operation begins.

Number of the Transmitter	Time gap (s)
1-4	1.0
5	1.2
6	1.4
7	1.7
8	1.9
9	2.1

6.2 System Maintenance

WARNING	• Before system maintenance, ensure that the Core and all the cables are connected correctly and securely, and that the power supply functions normally. • Up to nine Transmitters can be connected by the RS-485 cable.

Follow the steps in 6.1 when either the Transmitter or its amount in the system is changed.

7. Troubleshooting

7.1 Terminology

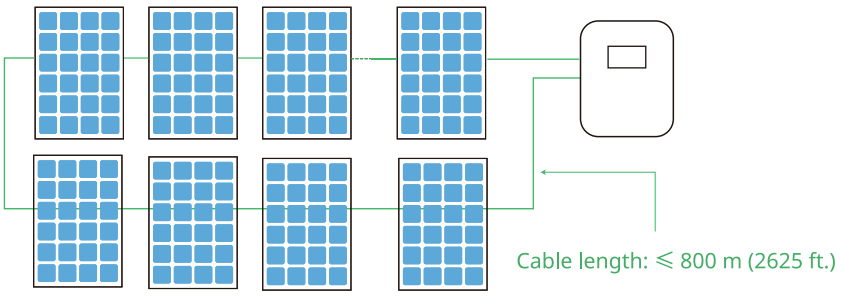
- **PV module string:** a group of panels wired into a single input on your inverter.
- **Voc:** Stands for open-circuit voltage, which is the maximum voltage the PV module can produce when it is not connected to a load.

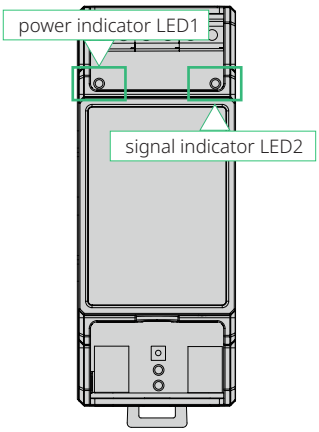
7.2 Troubleshooting Guide

7.2.1 PV module string has no DC voltage (0 V)

Problem	The output voltage of one or more PV module strings is displayed as 0.0 V on the inverter monitoring platform.
Possible cause	There is an open circuit condition within the PV module string due to the wiring issues in the connectors, or there is an operation abnormal of the HRSD.
Troubleshooting Procedure	
Step 1	Find the failed PV module string and disconnect the inverter from it. **Check each connector in the faulty string for accidental disconnections or loose connections.** If any looseness or disconnection issues are found, replug the connectors and check whether the string voltage displayed on the inverter monitoring platform has returned to a normal value. If the voltage has not returned to a normal one, move on to Step 2.
Step 2	Visually check the HRSD for a bulging cover or any visible damage. If there are visible signs of damage around the HRSD, contact the distributor for a replacement. Otherwise, reconnect the inverters to the PV module strings and observe the voltage changes of the PV module string.
Step 3	If the string output is still 0 V, refer to **7.2.3 HRSD has no output voltage (0 V)**.

7.2.2 PV module string has less output voltage than expected

Problem	The voltage displayed on the inverter monitoring platform is significantly lower than the expected Voc × n*. *n: Here, n refers to the number of PV modules in each string.
Possible Cause	This issue may be related to various factors, such as power supply failure in the Transmitter, signal interference between the Transmitter and the HRSD, internal malfunction or power supply failure in the HRSD, wiring issues in the PV module string, or damage to the PV modules.
Troubleshooting Procedure	
Step 1	**Confirm the following installation are correct.** • The current passing through the Core aligns with the data specified in the Transmitter's user manual. • The cable length (the PV+ to PV- loop of each PV string) does not exceed 800 m (2625 ft.). • The homeruns passing through the Core are of the same polarity, either all positive or all negative. 

Step 2	**Check and ensure the power supply is functioning properly.** Observe whether the power indicator LED1 is solid. If LED1 is solid, proceed to **Step 3**. Otherwise, manually test the power supply with a multimeter to check whether the voltage is 12 V. If the voltage is 12 V, move on to **Step 3**. If not, replace the power supply.	
Step 3	**Check and ensure the signal indicator LED2 is functioning properly.** Observe whether the signal indicator LED2 is flashing. If the LED2 is flashing, proceed to **Step 4**. If the LED2 is solid, it means that the Transmitter has not sent a "permission to operate" signal. Restart the transmitter and observe whether the LED2 is flashing. If it does, proceed to **Step 4**. If it is still solid, contact Hoymiles technical support team.	
Step 4	**Check whether there are loose connections between PV modules and the HRSD.** If there are loose connections, reconnect the connectors. Otherwise, proceed to **Step 5**.	
Step 5	**Check if the PV modules and the HRSD are functioning properly.** If the Transmitter is functioning and generating a "permission to operate" signal, follow the steps below to check the PV modules and the HRSD. (If you don't have the necessary equipment, skip the following steps.) 1. Use an infrared **camera** or a **handheld temperature gun** to check if there is a module with an abnormally low-temperature reading. 2. Use a **multimeter** to sequentially test the voltage on OUT+ and OUT- of each HRSD. • If an HRSD's OUT+ and OUT- give the same voltage, this HRSD has no output voltage and should be replaced. • If there is a certain voltage difference between the OUT+ and OUT- of the HRSD, this HRSD is working normally. Disconnect this HRSD and measure the PV module's output voltage. If the PV module has no output voltage, the PV module may be the problem and needs to be replaced.	

7.2.3 HRSD has no output voltage (0 V)

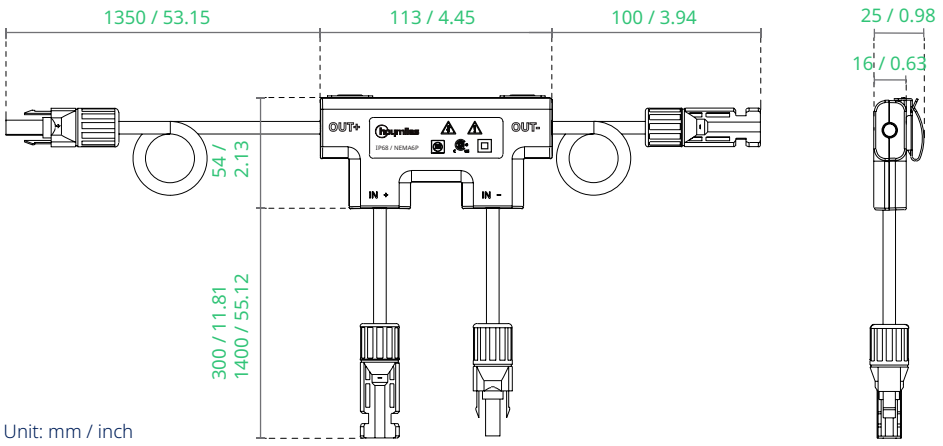
Problem	The output voltage of a certain HRSD is measured at 0 V.
Possible Cause	There is an internal malfunction in this equipment.
Troubleshooting Procedure	
Step 1	**Check and ensure the rapid shutdown system is connected properly.**
Step 2	**Check if the PV modules are functioning properly.** Disconnect the HRSD from the PV module and use a multimeter to measure the output voltage of the PV module. If the output voltage is normal (depending on the specification of your PV plant, the standard of 'normal' might be different), the HRSD may be the problem. Proceed to measure the output voltage of the HRSD with a multimeter. Otherwise, replace the PV module.
Step 3	**Check if the HRSD is functioning properly.** Check and ensure that the PV modules are functioning properly and the PV modules and HRSDs are correctly connected. Once these have been confirmed, measure the output voltage of the HRSD with a multimeter. If the output voltage is still 0 V, there is an internal malfunction in the HRSD. Contact Hoymiles technical support team to replace the HRSD.

8. Technical Specifications

8.1 HRSD-1C

Model	HRSD-1C	HRSD-1C-B
Electrical Data		
Input voltage range	13-80 V	13-65 V
Maximum current	15 A	20 A
Maximum short circuit current	25 A	
Maximum system voltage	1000 V / 1100 V (1500 V optional)	
Communication type	SunSpec PLC	
Shutdown output voltage	1 V	
Power consumption	200 mW	
Mechanical Data		
Input connectors	MC4 / MC4 EVO2, optional	
Input cable length[1]	0.3 m (0.98 ft.) / 1.4 m (4.59 ft.), optional	
Output connectors	MC4 / MC4 EVO2, optional	
Output cable length[2]	1.35 m (+) / 0.1 m (-) 4.43 ft. (+) / 0.33 ft. (-)	
Dimensions	113 x 54 x 16 mm (4.45 x 2.13 x 0.63 in)	
Environmental		
Operating temperature range	-40°C to +85°C (-40°F to +185°F)	
Outdoor rating	IP68 / NEMA6P	
Compliance		
Safety	UL1741, CSA C22.2 No. 330-17, IEC/EN 62109-1	
EMC	FCC Part15 Class B, ICES-003, IEC/EN 61000-6-1/-2/-3/-4	

*1: The former matches PV module output cables of 1.3 m (4.27 ft.) at minimum, and the latter matches those of 0.2 m (0.66 ft.) at minimum.
2: Fits PV module in portrait installation. Contact Hoymiles if horizontal installation is needed.



Unit: mm / inch

8.2 HT-G20

Electrical												
Transmitter input voltage	12 V DC (+/-2%)											
Transmitter input current	1 A											
Communication												
Communication type	PLC											
Max. cable length between inverter input (+) and input (-)	800 m (2624.67 ft.)											
Core												
Number of Core connected	1			1			2			2		
Max. allowable current per Core	75 A			150 A			150 A			250 A		
DC cable diameter	Φ 6 mm (0.24")	Φ 6.45 mm (0.25")	Φ 7 mm (0.28")	Φ 6 mm (0.24")	Φ 6.45 mm (0.25")	Φ 7 mm (0.28")	Φ 6 mm (0.24")	Φ 6.45 mm (0.25")	Φ 7 mm (0.28")	Φ 6 mm (0.24")	Φ 6.45 mm (0.25")	Φ 7 mm (0.28")
Max. number of strings per Core*	5	4	3	15	12	10	15	12	10	20	18	16
Max. number of HRSD-1Cs per Core**	150	120	90	450	360	300	450	360	300	600	540	480
Max. number of HRSD-2Cs per Core**	75	60	45	225	180	150	225	180	150	300	270	240
Mechanical												
Dimensions	93 × 36.5 × 53 mm (3.66 × 1.44 × 2.09 in)											
Mounting type	DIN35 rail											
Environmental												
Operating temperature range	-40°C to +85°C (-40°F to +185°F)											
Outdoor rating	IP30 / NEMA1											
Compliance												
Safety	UL1741, CSA C22.2 No. 330-17											
EMC	FCC Part 15B, ICES-003											

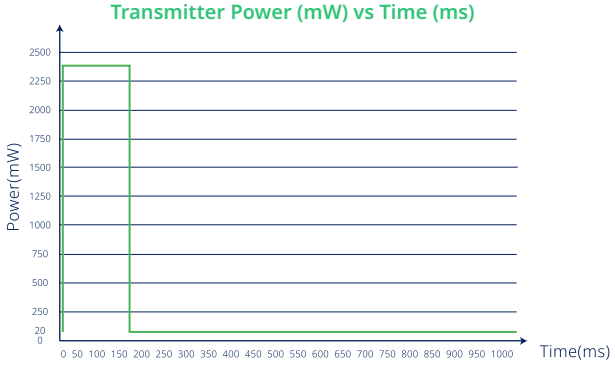
* The maximum number of strings per Core is determined by the DC cable current and diameter. The total cable current should not exceed the Core's maximum allowable current, and the total cable diameter should not exceed the Core's diameter.

** Max. number of HRSDs per Core = Max. number of strings per Core × number of PV modules per string (In the table we have assumed each string has 30 PV modules.)

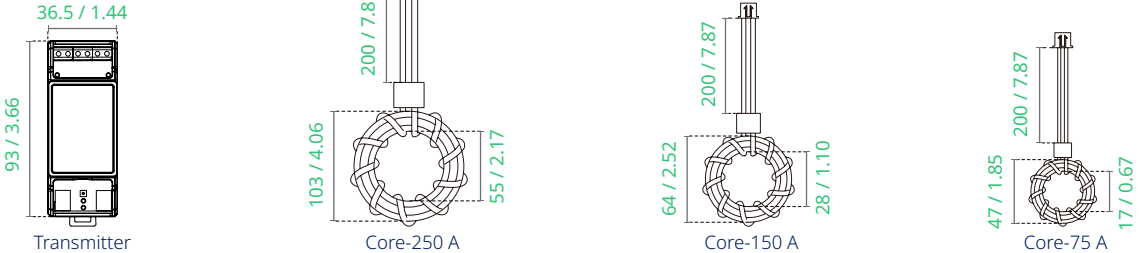
When installed inside an inverter, the HT-G20 needs to be powered with the following power curve at least.

- Voltage: 12 V DC (+/-2%)
- Power Standby: 0.2 W
- Duty Cycle: 16%
- Max. Power: 3 W

Transmitter Power (mW) vs Time (ms)



Unit : mm / inch

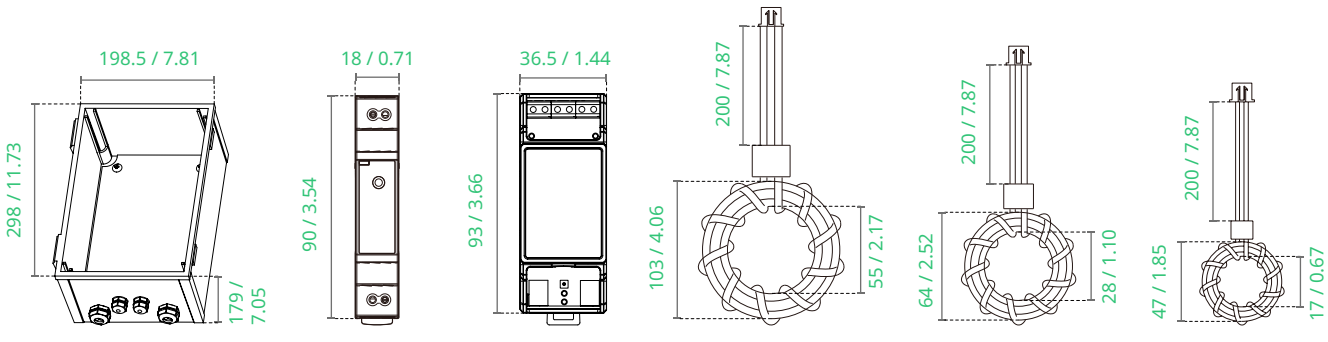


8.3 HT-G20-Kit

Electrical												
Transmitter input voltage	12 V DC (+/-2%)											
Transmitter input current	1 A											
PSU input voltage range	85-277 V AC											
Communication												
Communication type	PLC											
Max. cable length between inverter input (+) and input (-)	800 m (2624.67 ft.)											
Core												
Number of Core connected	1			1			2			2		
Max. allowable current per Core	75 A			150 A			150 A			250 A		
DC cable diameter	Φ 6 mm (0.24")	Φ 6.45 mm (0.25")	Φ 7 mm (0.28")	Φ 6 mm (0.24")	Φ 6.45 mm (0.25")	Φ 7 mm (0.28")	Φ 6 mm (0.24")	Φ 6.45 mm (0.25")	Φ 7 mm (0.28")	Φ 6 mm (0.24")	Φ 6.45 mm (0.25")	Φ 7 mm (0.28")
Max. number of strings per Core*	5	4	3	15	12	10	15	12	10	20	18	16
Max. number of HRSD-1Cs per Core**	150	120	90	450	360	300	450	360	300	600	540	480
Max. number of HRSD-2Cs per Core**	75	60	45	225	180	150	225	180	150	300	270	240
Mechanical												
Dimensions	198.5 × 298 × 179 mm (7.81 × 11.73 × 7.05 in)											
Mounting type	Wall-mounted											
Environmental												
Operating temperature range	-40°C to +85°C (-40°F to +185°F)											
Outdoor rating	IP65											
Compliance												
Safety	UL1741, CSA C22.2 No. 330-17											
EMC	FCC Part 15B, ICES-003											

* The maximum number of strings per Core is determined by the DC cable current and diameter. The total cable current should not exceed the Core's maximum allowable current, and the total cable diameter should not exceed the Core's diameter.

** Max. number of HRSDs per Core = Max. number of strings per Core × number of PV modules per string (In the table we have assumed each string has 30 PV modules.)



Unit : mm / inch

Power Supply (85-277 V) | Transmitter | Core-250 A | Core-150 A | Core-75 A