

HP EMS box V2

User Manual

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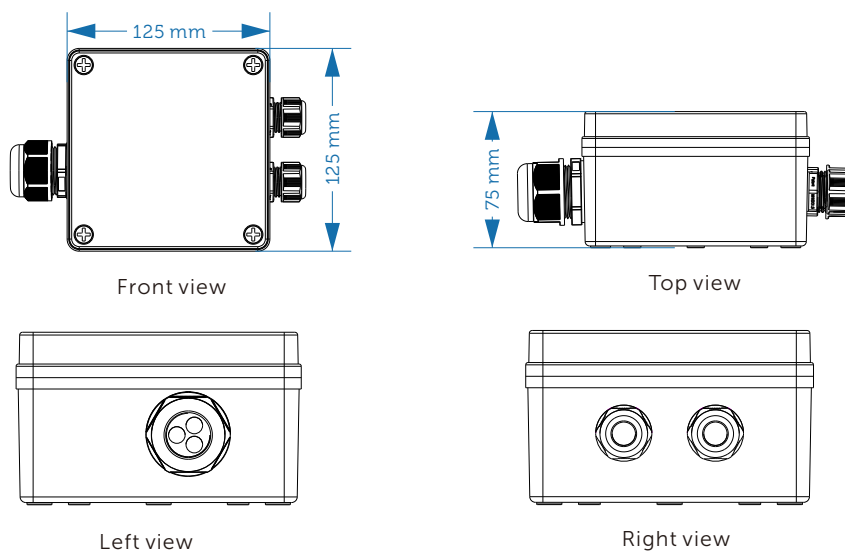
1 Overview of the HP EMS box V2

1.1 Introduction

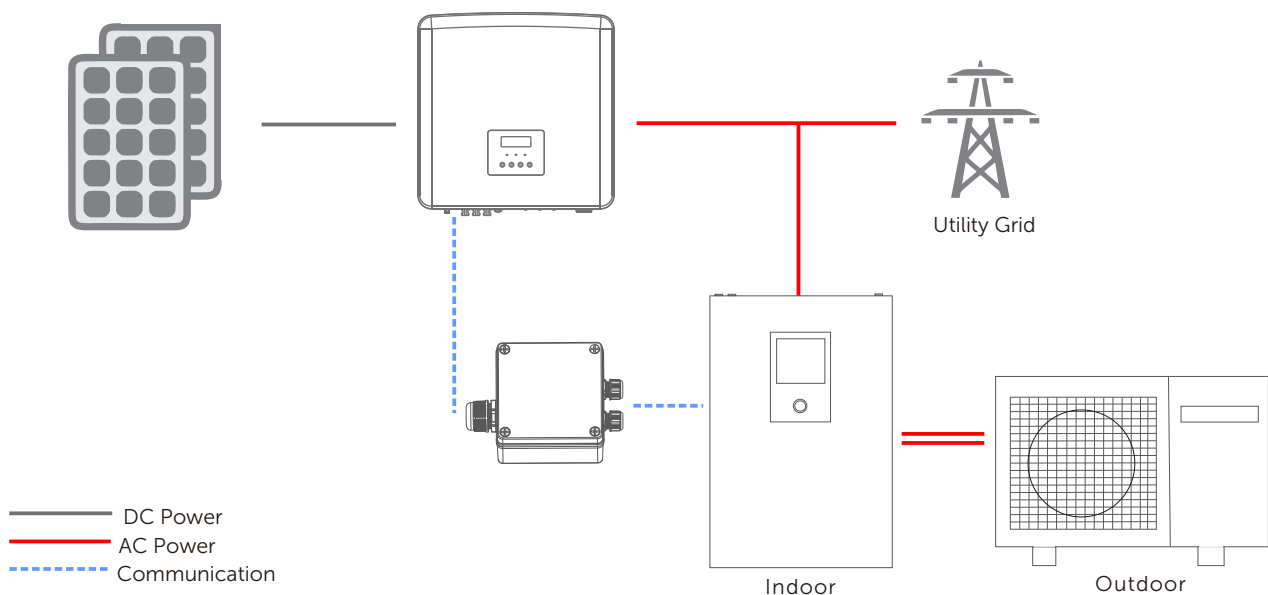
An HP EMS box V2 is a heat pump controller. It communicates with Dražice inverters through the RS485 and controls a heat pump with the dry contact or the analog output. Users can control the HP EMS box V2 to make use of the surplus solar energy of the inverter and battery storage capacity.

Note: A heat pump can only be connected to a HP EMS box V2.

1.2 Dimension



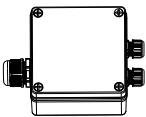


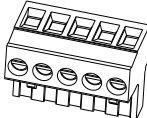
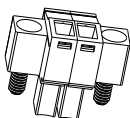
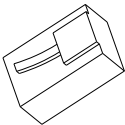

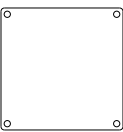

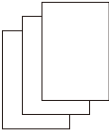
1.3 Diagram



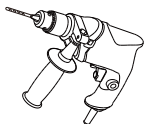
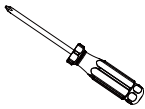
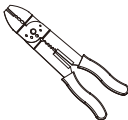
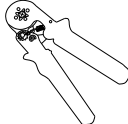
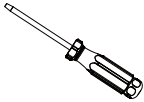
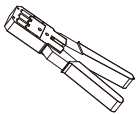
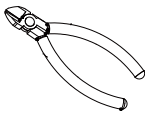
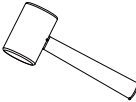

2 Installation

2.1 Packing List

Check if there is any distortion or damage during transportation. If there is any damage or items missing, please contact the dealer.

 HP EMS box V2 × 1	 Self-tapping screws × 4	 Expansion tubes × 4	 5 pin male pluggable terminal block × 1	 2 pin male pluggable terminal block × 1
 RJ45 terminals × 2	 1 mm ² tube pre-insulated terminals × 7	 Marking Cardboard × 1	 Power Adapter × 1 (optional)	 Documents

2.2 Tool Preparation

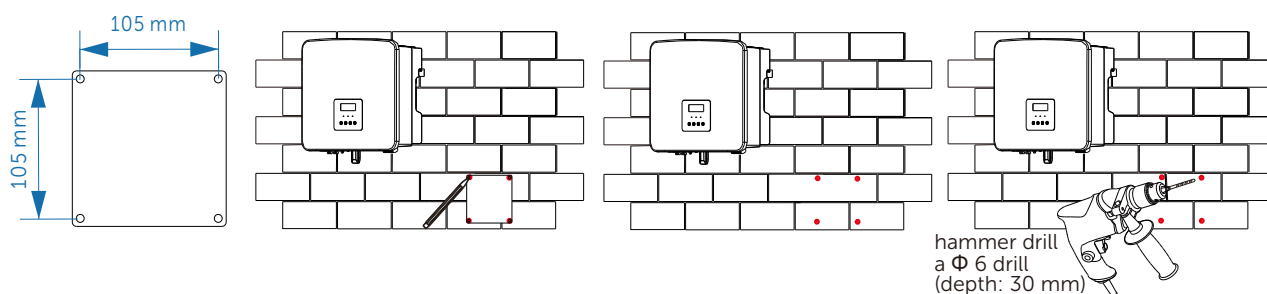
 Drill (Bit Φ 6)	 Cross-shaped screwdriver	 Cable stripper	 Crimping plier	 Flat-shaped screwdriver
 Network cable crimping plier	 Diagonal plier	 Rubber hammer	 Marker	

2.3 Wall Mounting

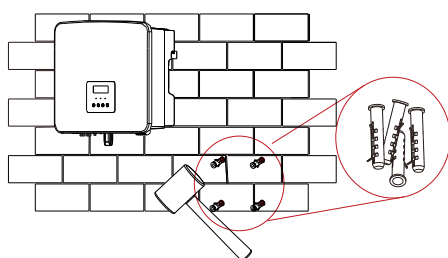
Step1. Use a marking cardboard to locate the holes and drill them on the wall.

Drill holes with a $\Phi 6$ drill.

Depth: at least 30 mm.

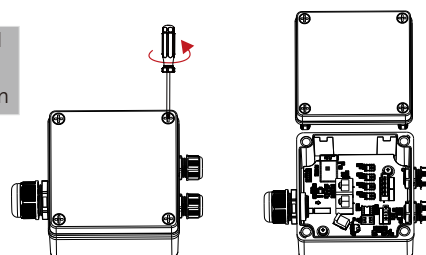


Step2. Put the expansion tubes in the holes and tighten them with a hammer.

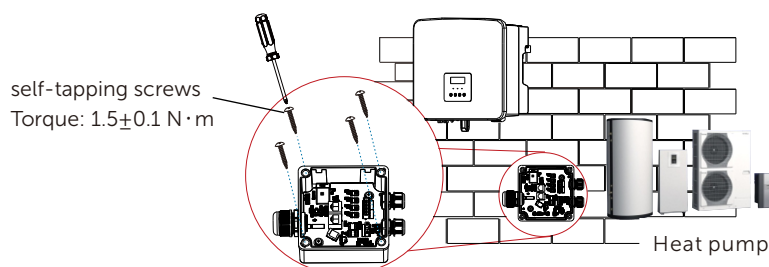


Step3. Dismantle the top cover of the HP EMS box V2.

cross-shaped
screwdriver
torque: 1 N·m



Step4. Pass self-tapping screws through the channels in the four corners of the box and screw them tightly.

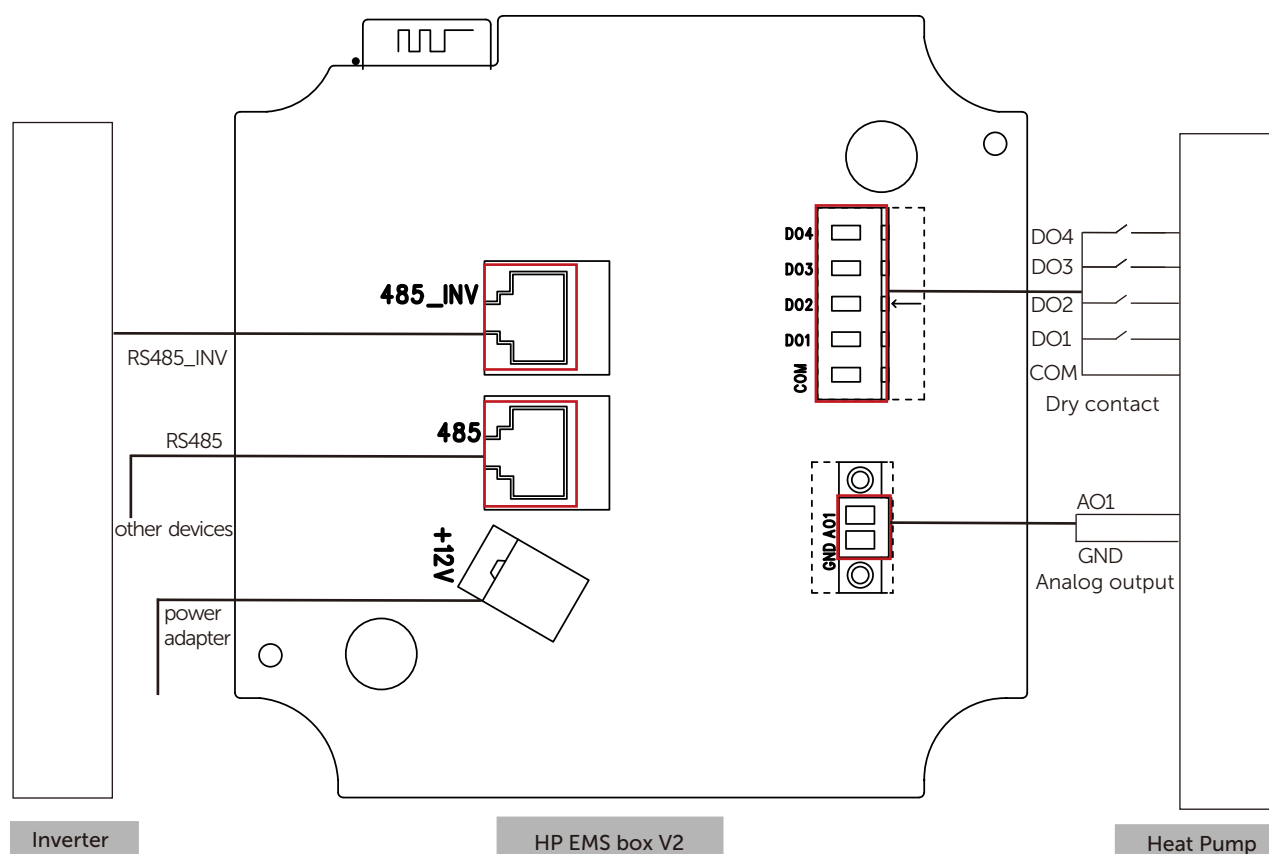


Note!

- Choose a place where the HP EMS box V2 is not directly exposed to the sun and close to the heat pump.
- The HP EMS box V2 needs to be installed horizontally. Please refer to picture in step 4 for the right installation method of the HP EMS box V2.

3 Electrical Connection

The figure below introduces the ports the HP EMS box V2, which shall be connected to the ports of a heat pump and an inverter.



- Functions of the ports of the HP EMS box V2

Name of ports	Functions of ports
Dry Contact(DO)	4 channel dry contact
Analog output(AO)	0-10 Vdc analog output
RS485_INV	Pin 4 and pin 5 are for RS485 communication with the inverter. Pin 3 and pin 6 are for 11-15 Vdc power supply input to the HP EMS box V2.
RS485	a branch port of the RS485_INV port for RS485 communication (Pin 4 and Pin 5)
Power Adapter	9- 14 Vdc power supply input to the HP EMS box V2

Note!

Pin 3 and pin 6 of RS485_INV port and a power adapter both can supply power for the HP EMS box V2, and users can choose one to get HP EMS box V2 powered.

By introducing ports of the HP EMS box V2, the specific connection methods of ports among the box and a heat pump and an inverter shall be illustrated below.

3.1 Connection of the RS485_INV port

- Functions of the RS485_INV port:

- communication between the HP EMS box V2 and the inverter.
- power supply from the inverter to the HP EMS box V2.

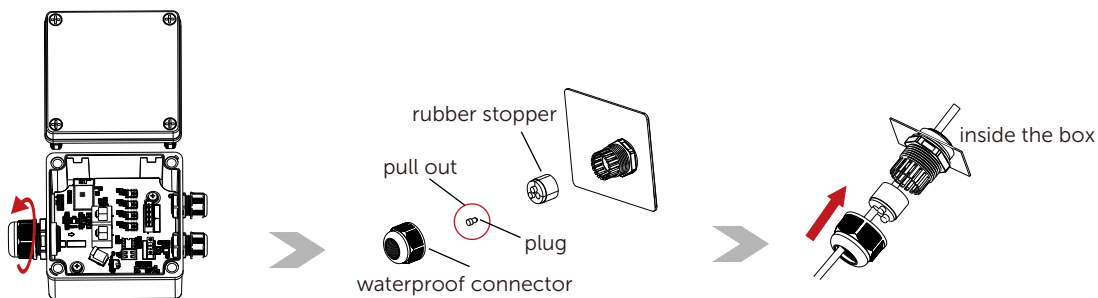
- RS485_INV Pin Definition

	1	2	3	4	5	6	7	8
	X	X	+13V	RS485-A	RS485-B	GND	X	X

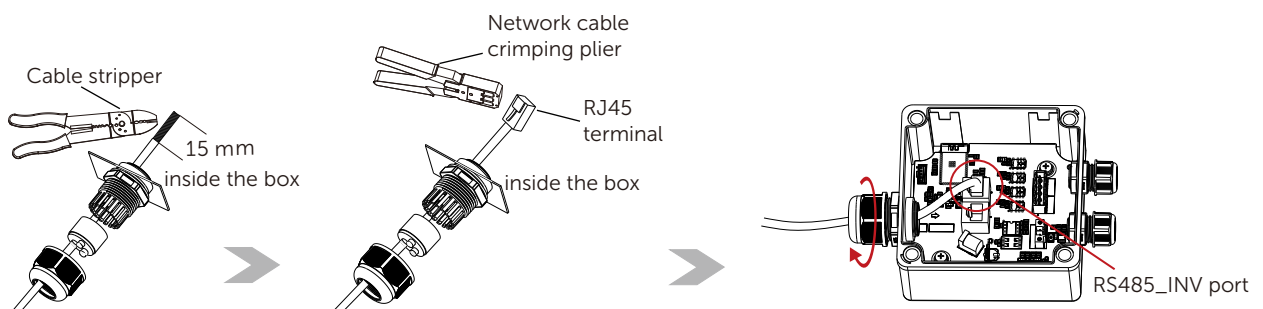
- Cable connection between an inverter and the HP EMS box V2

①. Cable connection of RS485_INV port (HP EMS box V2 side)

Step1. Unscrew the waterproof connector of the box, pull out one plug in the rubber stopper and thread a cable through the waterproof connector, the rubber stopper and insert it into the box.



Step2. Make a cable: strip 15 mm layer off the end of the cable **in the box** and plug the end into a RJ45 terminal according to the pin definition with a plier crimped. Connect the cable with the terminal to the RS485_INV port in the box, ensure rubber stoppers without cable threading are with plugs and then screw the waterproof cover tightly.



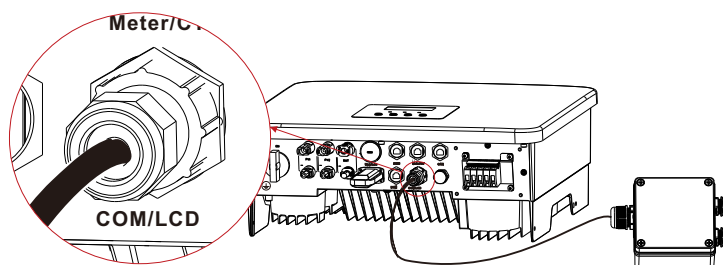
②.Cable connection of the inverter side

The HP EMS box V2 can be connected with different inverters to achieve communication between devices. With matching tests, IN.Hybrid and IN.Compact series inverters can be matched to supply power for the HP EMS box V2. For further matching questions of other Dražice inverters, please contact us for help before installation.

Here is an introduction to the port of inverters supplying power for the HP EMS box V2.

a) IN.Hybrid series inverters

IN.Hybrid series inverters support power for the HP EMS box V2 through COM/LCD port or COM port of the inverter respectively.



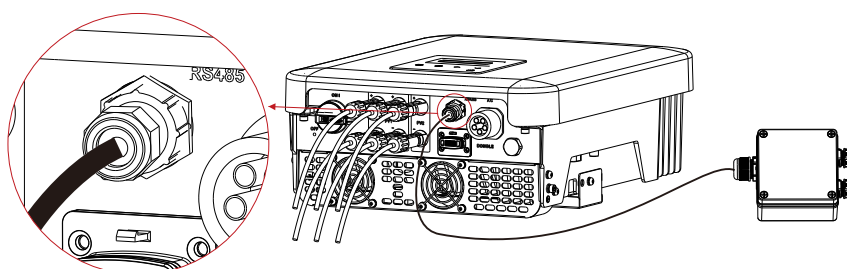
IN.Hybrid inverter for example

- COM Pin Definition of IN.Hybrid series

	1	2	3	4	5	6	7	8
	X	X	+13V	RS485_A	RS485_B	GND	X	X

b) IN.Compact series inverters

IN.Compact series inverters support power for the HP EMS box V2 through RS485 port of the inverter.



IN.Compact inverter for example

- RS485 Pin Definition of IN.Compact series

	1	2	3	4	5	6	7	8
	X	X	+12V	RS485_A	RS485_B	GND	X	X

When the inverter and the HP EMS box V2 are well connected, users need to enable the RS485 communication with the HP EMS box V2 in the settings of the inverter.

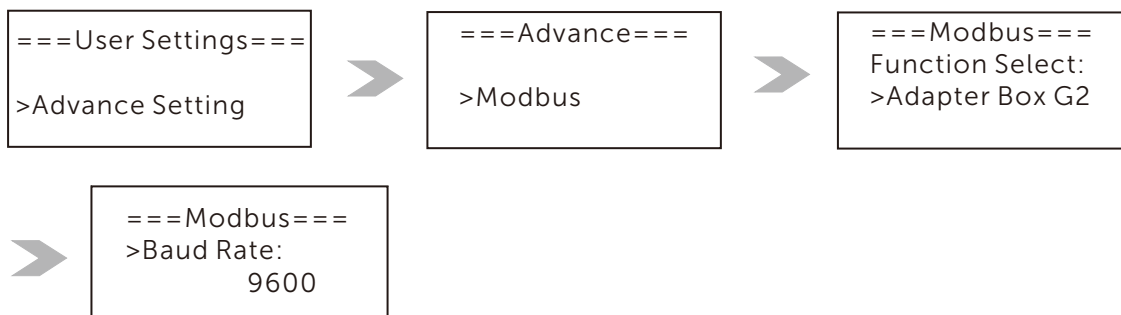
Notice!

A splitter can be used if the communication port of the inverter is occupied.

LCD setting on the inverter

When the cables are well connected, users need to set the LCD on the inverter to enable the RS485 communication between the inverter and the HP EMS box V2.

a) Setting steps on IN.Hybrid series inverters




b) Setting steps on IN.Compact series inverters



3.2 Connection of the RS485 port

- Function of the RS485 port:
a branch port of RS485_INV port for RS485 communication with other devices.
- RS485 Pin Definition

	1	2	3	4	5	6	7	8
	X	X	X	485-A	485-B	X	X	X

Notice: refer to the communication cable connection method of the RS485_INV port.

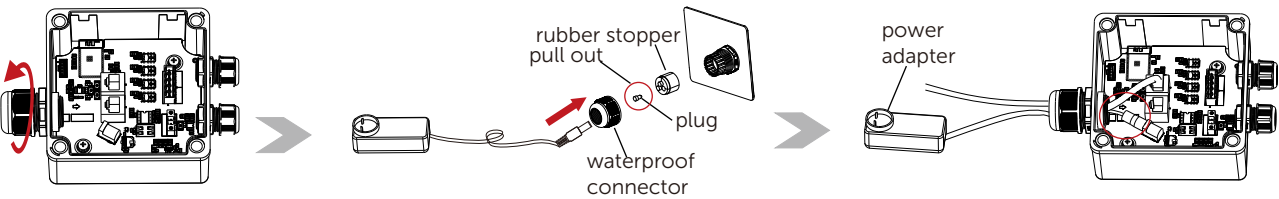
3.3 Connection of the power adapter port (optional)

- Function of a power adapter

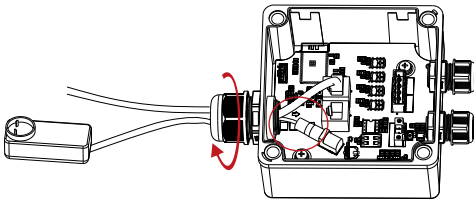
A power adapter is optional for the power supply of the HP EMS box V2. If the inverter matched cannot supply power for the HP EMS box V2, a power adapter is needed.

- Cable connection of a power adapter

Step1. Pull out one plug in the rubber stopper, thread the cable of the power adapter through the waterproof connector, the rubber stopper and then insert the cable into the power adapter port.



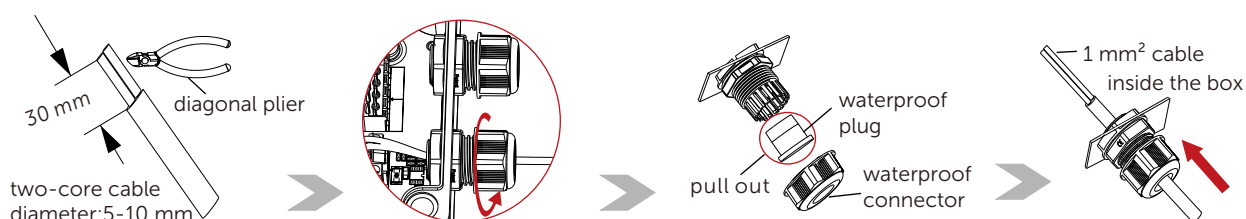
Step2. Check the rubber stopper without cable threading through are with plugs and then screw the waterproof connector tightly.



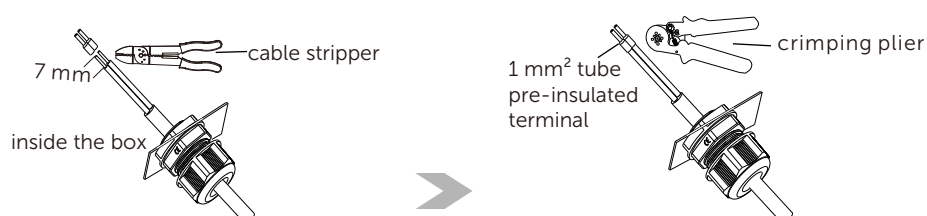
3.4 Connection of the AO port

Note: open ports without cable threading through must be plugged to prevent water. And reserve a proper length of all connected cables in the box to reduce its pulling force for connected terminals.

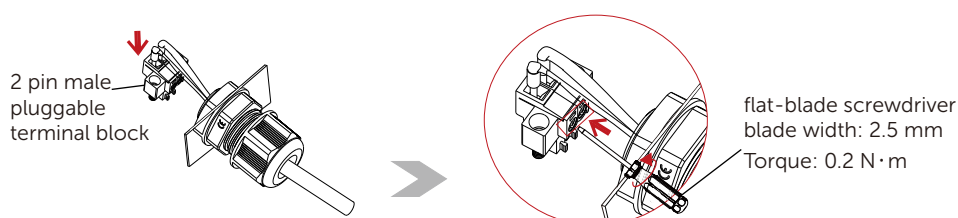
Step1. Prepare a two-core cable, remove 30 mm layer off from one end, pull the waterproof plug out and thread the cable through the waterproof connector into the box.



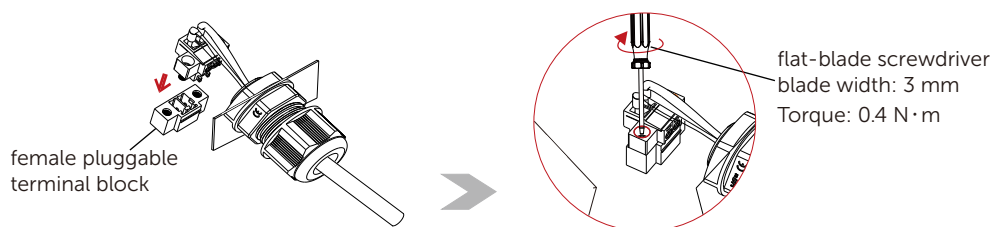
Step2. Strip 7 mm layer off the peeled cables and insert them into 1 mm² tube pre-insulated terminal and crimp them tightly.



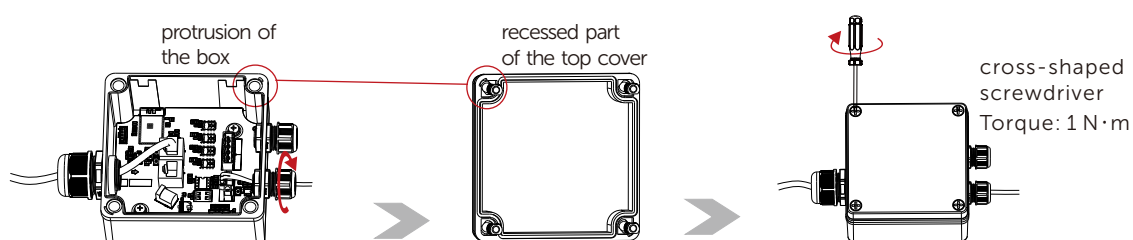
Step3. Insert the cables with terminals into the male pluggable terminal block and screw them tightly.



Step4. Plug the male pluggable terminal block with cables into the female pluggable terminal block fixed in the HP EMS box V2 and screw them tightly.



Step5. Screw the waterproof connector tightly, align the recessed part of the top cover with the protrusion of the box and lock the top cover.



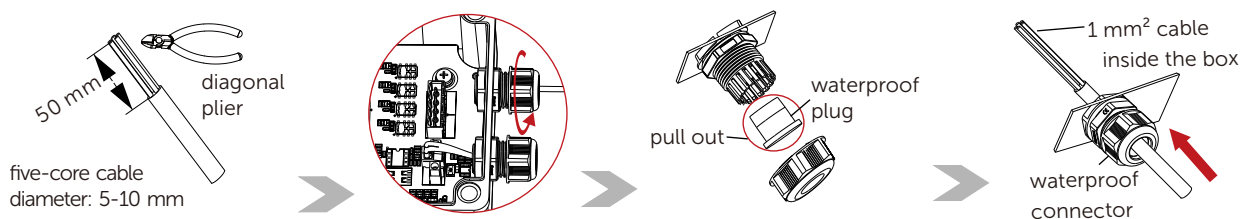
Please refer to the manual of a heat pump for how the other end of the cable is connected to the heat pump.

3.5 Connection of the DO port

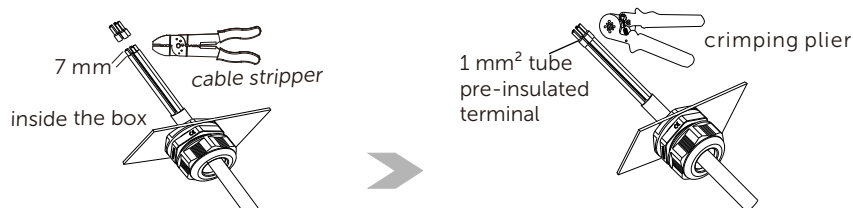
Note: open ports without cable threading through must be plugged to prevent water. And reserve a proper length of all connected cables in the box to reduce its pulling force for connected terminals.

a) DO port connection under the control of dry contact

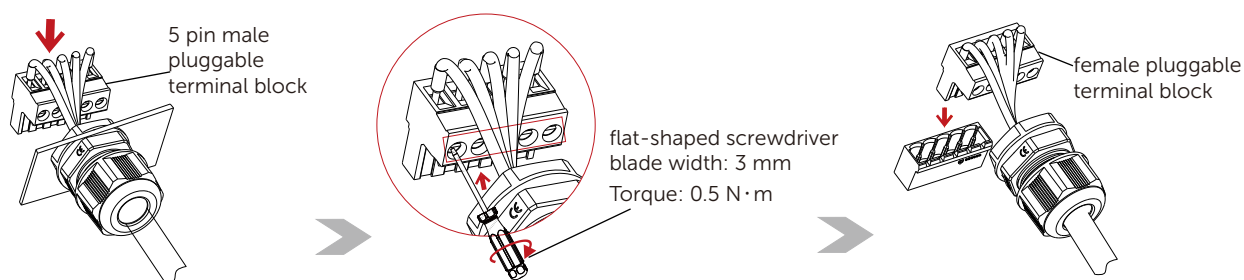
Step1. Prepare a five-core cable, remove 50 mm layer off from one end, pull the waterproof plug out and thread the cable through the waterproof connector.



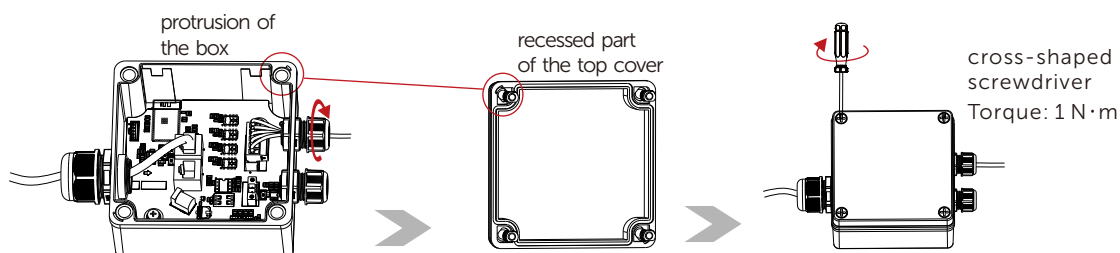
Step2. Strip 7 mm off the peeled cables and insert them into 1 mm² tube pre-insulated terminal.



Step3. Insert the cables with terminals into the male pluggable terminal block, screw them tightly. Insert the male pluggable terminal block with cables into the female pluggable terminal block fixed in the HP EMS box V2.



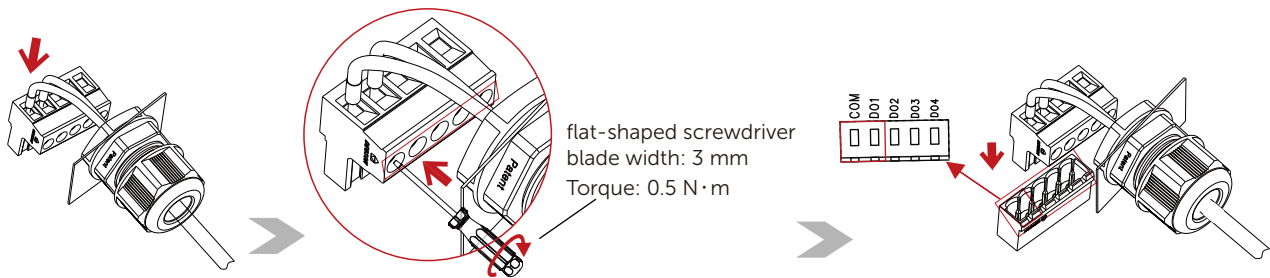
Step4. Screw the waterproof connector tightly, align the recessed part of the top cover with the protrusion of the box and lock the top cover.



b) DO port connection under the control of SG Ready

Step1. Prepare a two-core cable, then strip, crimp and threading the cable through connectors and then make the cable as the way you have been done in a).

Step2. Insert the cables with terminals into the male pluggable terminal block, screw them tightly. Insert the male pluggable terminal block with cables into the DO1 and COM port if the female pluggable terminal block fixed in the HP EMS box V2.



Step3. After step 2 is finished, screw tight the waterproof connector and lock the top cover as the method in a).

Please refer to the manual of a heat pump for how the other end of the cable is connected to the heat pump.

4 Configuration of APP

The APP "Dražice Solar" is used to control the HP EMS box V2.

The screen shots here are for reference only and the actual interfaces may differ. Users can update their APP as needed.

4.1 APP Login

➤ APP account login

- If you don't have the app or monitoring cloud's account yet, you can operate as below:

➤ Monitoring Cloud Registration

Step 1: Use your smart phone to scan below QR code or search for the keyword "Dražice Solar" in Appstore to download the Monitoring App.



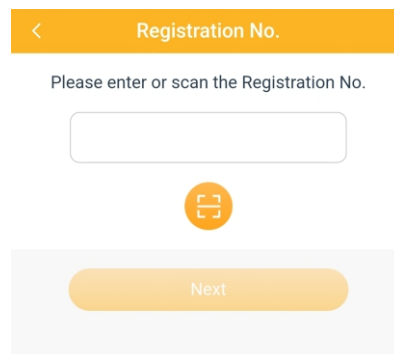
iOS



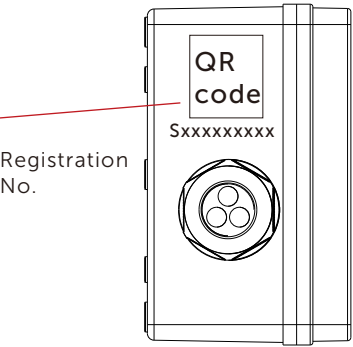
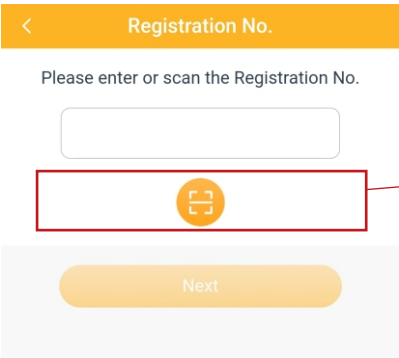
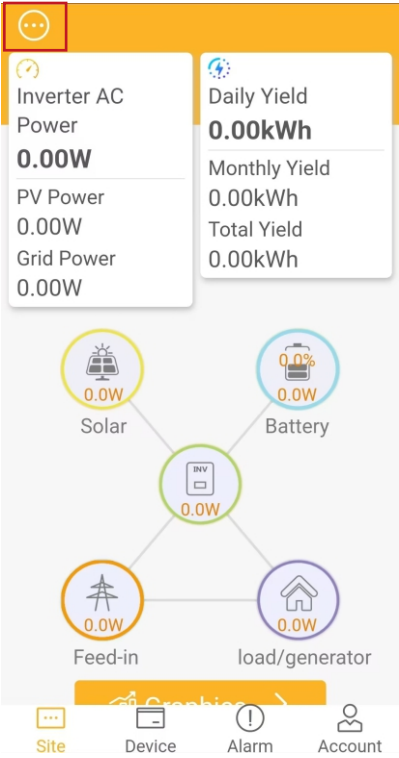
Google

Step 2: Touch the setting button at the upper left corner of the Monitoring App to choose language.

Step 3: Touch "Create a new account" at the bottom of Monitoring App and enter or scan the Registration No. to create the account.



Step 4: For the first login, click “+” to create site. Scan the Registration No. and follow the instructions to complete the site creation and WiFi connection.



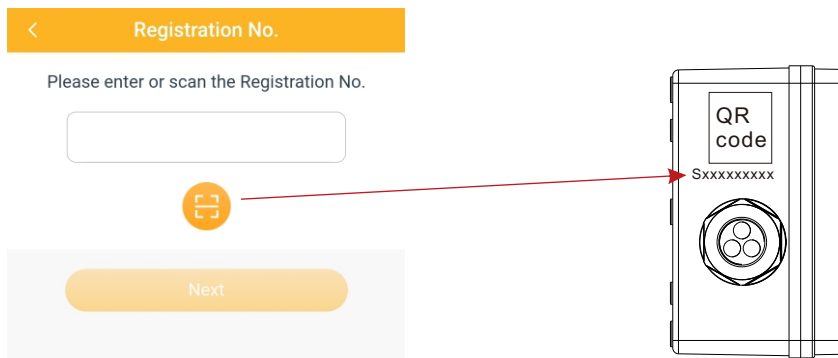
Registration No.

- If you already have the account, you can operate as below:

➤ Add Device

Step 1: Login your account and turn to "Device" page in the app.

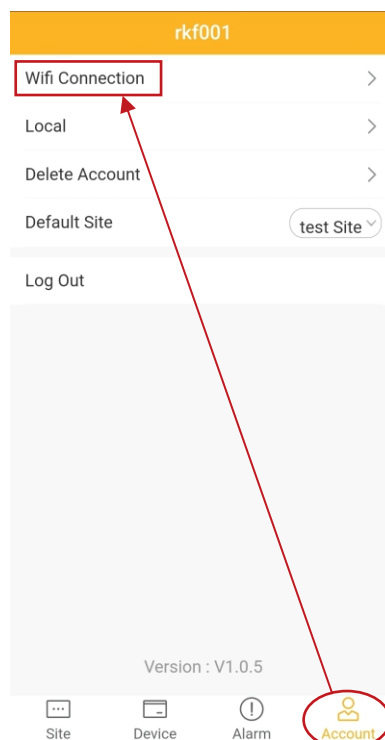
Step 2: Touch the "+" icon on the upper right corner and scan the Registration No. to add the HP EMS box V2.



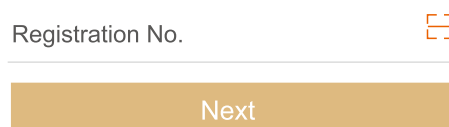
➤ Wi-Fi Connection

Step 1: Login your account and turn to "Account" page in the app.

Step 2: Click "Wifi Connection".

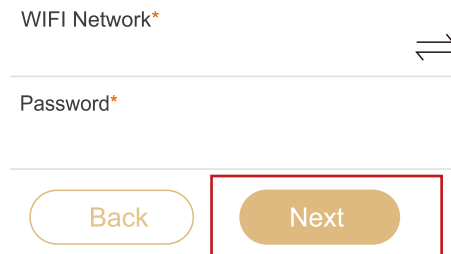


Step 3: Type in or scan the Registration No. of the HP EMS box V2. Then touch "Next" and agree to join the network of the HP EMS box V2.



Step 4: Type in or choose your home Wi-Fi SSID and password, then touch "Next".

*Only 2.4GHz Wi-Fi is available.

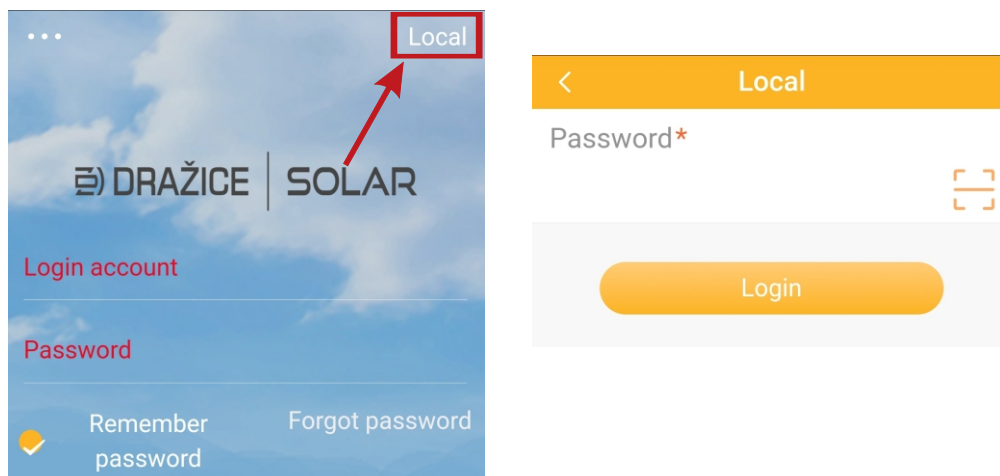


Step 5: Follow the instructions to complete Wi-Fi setting, there will be a note when the setting successes.

➤ Local Mode

Use your smart phone to connect the Dražice Wi-Fi signal (Wifi_Sxxxxxxx).

Then touch Local and type in password (initially same as the Registration No.) to access the Local Mode in the Monitoring App.

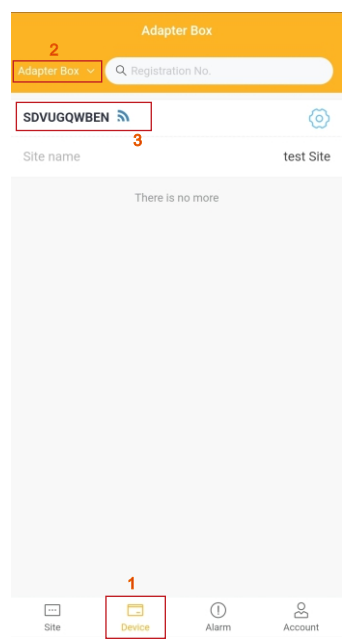


* Users can visit the IP address <http://192.168.10.10/> in a browser to configure WiFi if necessary. (The password is the Registration No.)

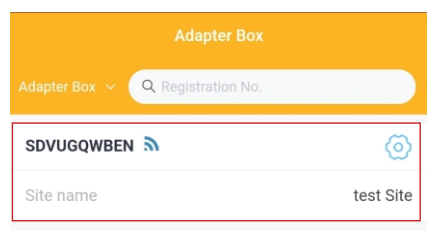
4.2 Settings for the HP EMS box V2

➤ Monitoring interface

Step 1. Click "Device" at the bottom of the interface. Select "Adapter Box" from the drop-down list on the top left corner to enter the monitoring interface.



Step2. Choose the user's online device. The status, analog output and the present step of dry contact are as below.



SDVUGQWBEN	
Dry contact status	
Dry contact 1	●
Dry contact 2	●
Dry contact 3	●
Dry contact 4	●
Analog output	0 V
Step	6

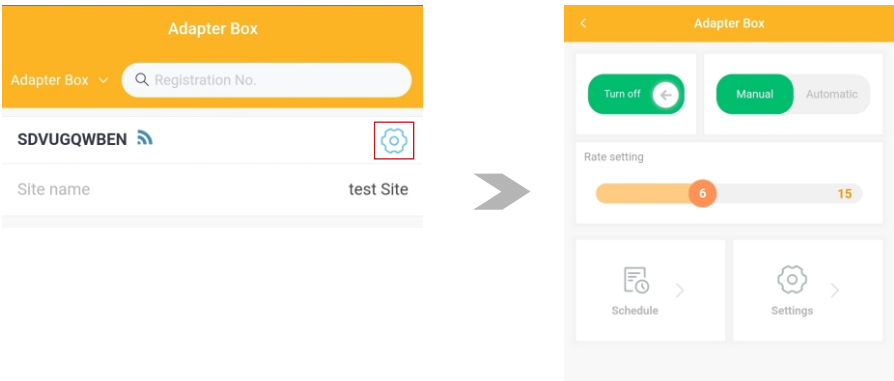
* Green points indicate the dry contact relay is closed and grey points mean the relay is open.

* "Analog output" indicates the analog output voltage which is at the range of 0 ~ 10 V.

* "Step" indicates the present step of the HP EMS box V2.

➤ Setting interface

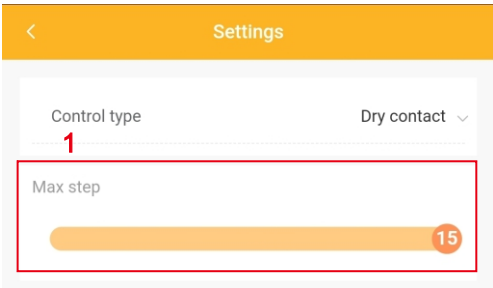
Click the icon below to enter the setting interface.



Users choose "Automatic" and can control a heat pump with the following methods (selecting in the drop-down list of "Control type") in accordance with the actual cable connection.

①. Dry Contact

Step1. The HP EMS box V2 offers 15 steps. Users set the "Max step" as needed according to the max step of the heat pump connected. Also, the step range of "Step setting" in the setting interface shall change with the parameter of the "Max step" users set.



Dry contact setting page

Step2. Click “Step setting” to set the rate of each step of the HP EMS box V2 in accordance with the rate of the heat pump connected.

2

Step setting

<Rate settingSave

D1	D2	D3	D4	Step	Rate(%)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0	0
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1	10
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	2	20
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	30
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	4	50
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	5	70
<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	6	80
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	7	100

TB142 10-11 (COM-IN5)	TB142 10-12 (COM-IN6)	TB142 10-13 (COM-IN7)	TB142 10-14 (COM-IN8)	Step for capacity setting		
OFF	OFF	OFF	OFF	[OFF]	OFF	0%
ON	OFF	OFF	OFF	[ON]	Step1	10%
OFF	ON	OFF	OFF		Step2	20%
ON	ON	OFF	OFF		Step3	30%
OFF	OFF	ON	OFF		Step4	50%
ON	OFF	ON	OFF		Step5	70%
OFF	ON	ON	OFF		Step6	80%
ON	ON	ON	OFF		Step7	100%

HP EMS box V2

heat pump for example

Step3. Set the “Fallback step” as needed. That is the step of the HP EMS box V2 when the communication between the inverter and the HP EMS box V2 is disconnected.

3

Fallback step

5

7

Step4. Set the “Load capacity” in accordance with the rated power of the heat pump connected to finish settings under dry contact.

4

Load capacity (W)

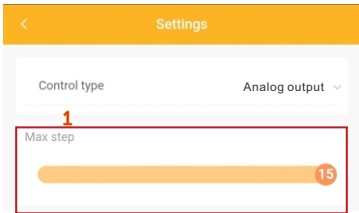
6000

Save

Step5. Set effective time periods on the “Schedule” setting page to enable the settings of the HP EMS box V2.

②. Analog output

Step1. Set the "Max step" to adjust the power accuracy of the step in accordance with the power of the heat pump.



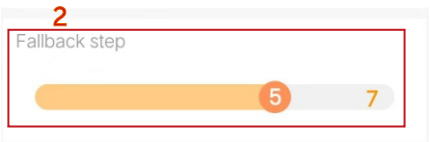
Step	Analog output
OFF	0 V
Step 1	1.25 V
Step 2	2.5 V
Step 3	3.75 V
Step 4	5 V
Step 5	6.25 V
Step 6	7.5 V
Step 7	8.75 V
Step 8	8.75~10 V

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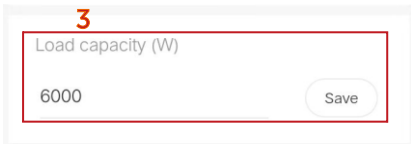
0-10V	Step for capacity setting	
0~0.63V	OFF	0%
1.88V	Step1	10%
3.13V	Step2	20%
4.38V	Step3	30%
5.63V	Step4	50%
6.88V	Step5	70%
8.13V	Step6	80%
9.38~10V	Step7	100%

heat pump for example

Step2. Set the "Fallback step" as needed. That is the step of the HP EMS box V2 when the communication between the inverter and the HP EMS box V2 is disconnected.



Step3. Set the "Load capacity" in accordance with the rated power of the heat pump connected to finish settings under dry contact.



Step4. Set effective time periods on the "Schedule" setting page to enable the settings of the HP EMS box V2.

③. SG Ready

Under "SG Ready" mode, the dry contact only control the default relay DO1. The relay is closed when "Signal ON condition" is met and the relay is open when "Signal OFF condition" is met.

Under automatic mode, users select "Automatic", click "Settings" to select "SG Ready" and set the parameters below.

Step1. Set parameters under the "Signal ON condition" and the "Signal OFF condition" as needed. The "Threshold of battery" shall be set at the range of 10%~100%. The parameters under "Limitation of Signal ON" do not need to be set.

Note: The difference between "Threshold on Feed in power" and "Threshold of consumption" must be greater than the power of the heat pump.

Step2. Select "And" / "Or" under different situations under "Automatic" mode.

Scenario	Situation	"And/ Or" to select	the Result relating to "And/ Or" selection
Battery connected	No 0kW export control	Realtime power going to grid > the power putting on "threshold on feed in power"	"Or" -when either condition is met;
		Realtime battery SOC > the SOC putting on "threshold of battery SOC"	"And" -when both conditions are met
		Realtime power taking from grid > the power putting on "threshold of consumption"	"Or" -when either condition is met;
		Realtime battery SOC < the SOC putting on "threshold of battery SOC"	"And" -when both conditions are met
	Export control set 0kW in system	Realtime battery SOC > the SOC putting on "threshold of battery SOC"	to select "Or"
		Realtime power taking from grid > the power putting on "threshold of consumption"	"Or" -when either condition is met;
		Realtime battery SOC < the SOC putting on "threshold of battery SOC"	"And" -when both conditions are met
No battery connected	No 0kW export control	Realtime power going to grid > the power putting on "threshold on feed in power"	either "And" or "Or"
		Realtime power taking from grid > the power putting on "threshold of consumption"	either "And" or "Or"
	Export control set 0kW in system	This function cannot be supported.	

Notice: Signal off takes the priority when both "Signal ON condition" and "Signal OFF condition" are met.

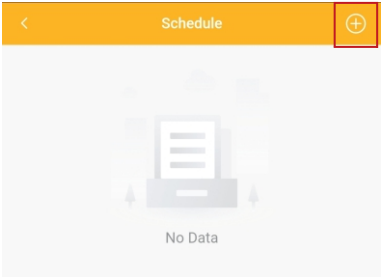
* The "Minimum per ON signal" indicates the relay shall be closed for at least 5 minutes when it meets the "Signal ON condition".

* The "Maximum ON per day" indicates the relay shall be open when the heat pump is controlled by the HP EMS box for more than 1200 minutes within a natural day.

Step3. Set effective time periods on the "Schedule" setting page to enable the settings of the HP EMS box V2.

How to set schcedules

Step1. Click "Schedule" in the setting interface to enter the scheduling page. Then touch the icon "+" on the top right corner to set new time periods.

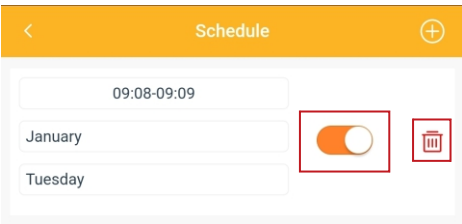


Step2. Set new time periods.

A screenshot of the 'Schedule' page showing the configuration options for a new time period. The top bar is orange with a back arrow and the word 'Schedule'. Below the bar, there's a section for 'Activation' with a toggle switch. Then, there's a section for 'Repeated_month' with radio buttons for each month from January to December. Below that is a section for 'Repeated_week' with radio buttons for each day of the week from Monday to Sunday. At the bottom, there are two input fields for 'Start time' and 'End time', both showing '09:08' and '09:09' respectively. A large orange checkmark icon is at the bottom center.

- * "Activation" makes the schedule users set valid.
- * "Repeated_month", "Repeated_week", "Start time" and "End time" specify the valid time periods.
- * The range of "Start time" and "End time" should be at 00:00-23:59 and the "End time" must be later than the "Start time".
- *Click "Save" when users complete all the settings.

Note: Users can set up to 6 time periods. The enabling switch (the "Activation" switch) and the "delete" icon are used to adjust the schedules.



5 Technical Data

Product Name	HP EMS box V2
Model	HP EMS box V2
Max. Dry Contact	2 A 30 V d.c./ 0.5 A 230V a.c. *4
Analog Output	0-10 Vdc
Rated Input Voltage	9-14 Vdc
Idle Power	0.5 W
Rated Power	2 W
EIRP Power	17.46 dBm (Measured Max. Average)
Frequency	2.412~2.472GHz
Antenna Type	PCB antenna
Interface	RS485
Degree of Protection	IP65
Operating Temperature	-40~60 °C
Wireless Mode	802.11 b/g/n
Dimension (mm)	125 * 125 * 75
Net Weight (kg)	0.4

6 Certification and Safety

6.1 Certification mark



6.2 Safety

The HP EMS box V2 produced by Družstevní závody Dražice – strojírna s.r.o. has been designed and tested strictly in accordance with relevant safety regulations. The safety instructions must be followed when installing and maintaining the electrical and electronic equipment. Improper operation will cause personal injury and property damage to the operator and the third party.

- Before installation, ensure all power of the HP EMS box V2 has been cut off.
- Do not dismantle or scrap by force.
- Strictly follow the installation guide to connect cables and the enclosure must be well locked before the HP EMS box V2 is electrified.
- Unauthorized opening and cable connection will void the warranty and cause lethal danger or serious injury due to electric shock.
- Refer to the corresponding installation guide for related safety requirements when it is connected to other devices.
- Anti-static measures should be taken to decrease the damage of static electricity to electronic components.
- Keep away from flammable, explosive materials.
- All the product labels and nameplate on the inverter shall be maintained clearly visible.



Indicates that the product must not be processed with household waste. It must be brought to an electric and electronic waste collection point for recycling and disposal. By ensuring the appropriate disposal of this product you also help in preventing potentially negative consequences for the environment and human health. The recycling of materials helps preserve our natural resources. For further information regarding the recycling of this product, please contact your municipality, local waste disposal center or the store where the products was purchased.

a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

RF exposure warning

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

7 Contact Us

If you have any question or any technical question about HP EMS box V2, please contact us through the following methods.

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Tel: +420 326 370 911

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