



K A C O 
new energy.

KACO blueplanet 3.0 NX1 M2
KACO blueplanet 3.7 NX1 M2
KACO blueplanet 4.0 NX1 M2
KACO blueplanet 5.0 NX1 M2

Application note – Installation and using APP

■ English version



Authorised electrician
Important safety instructions



Android-APP



iOS-APP

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1 WLAN Network Configuration

1.1 Authorization

The app for Android and iOS (See Google Playstore or App Store) will automatically connect to the Wi-Fi Stick hotspot via SSID and password in QR code, so the app needs certain authorisations to access the device of the smart phone as below:

🔄 Access the device of smart phone.

- 1 Photo and media permission.
- 2 Location permission.
- 3 Device information permission.
- 4 Picture and video permission
- 5 Location service.

» Proceed with network configuration

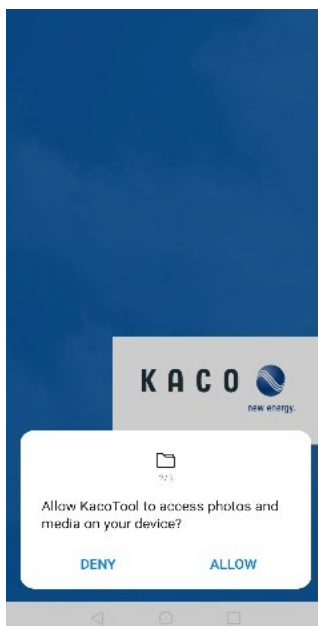


Fig. 1: Photo and media permission

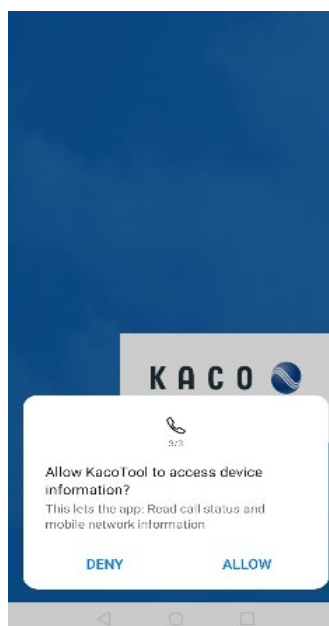


Fig. 2: Location permission

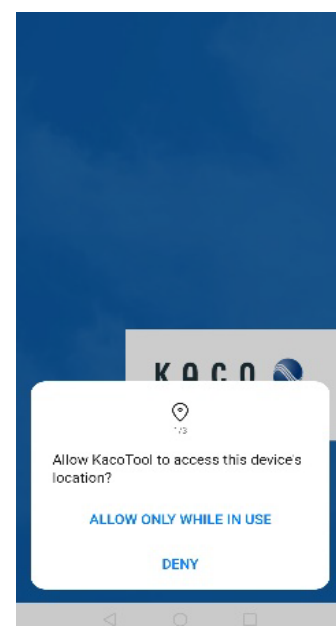


Fig. 3: Device information permission

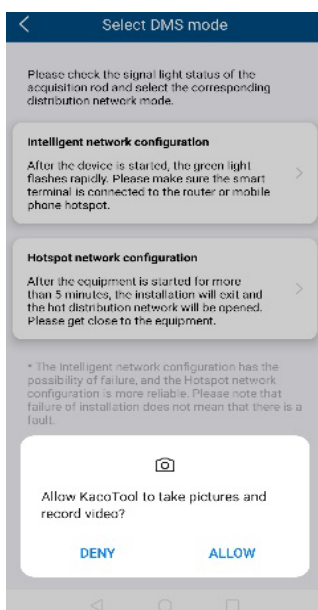


Fig. 4: Pictures and video

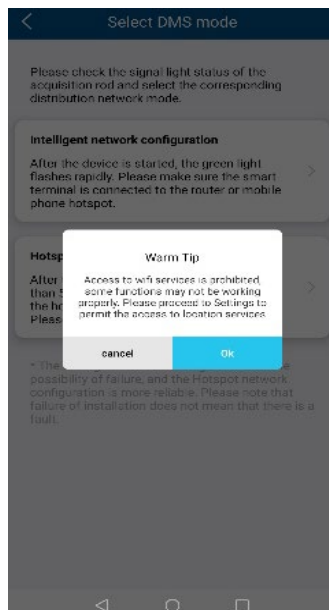


Fig. 5: Location services



NOTE

The tool app doesn't use these permissions to record user's phone data. Please grant these permissions to tool app.

1.2 Network configuration

Network configuration setting as below:

🔄 Network configuration setting.

- 1 Open the tool app and click the "INSTALLATION" button (The tool app will open the phone's camera).
 - 2 Scan the QR code label on Wi-Fi stick. then the tool app will automatically connect to Wi-Fi stick's hotspot.
 - 3 Click the "Select network" button, choose the Wi-Fi SSID of the nearby router provides Internet network to Wi-Fi stick. You can also manually enter the router SSID.
 - 4 Fill in the password of SSID selected, click the "Ok" button to start the network configuration.
 - 5 Wait for the result of the network configuration.
- » Proceed with changing another router, if the router Wi-Fi stick connected to does not work.

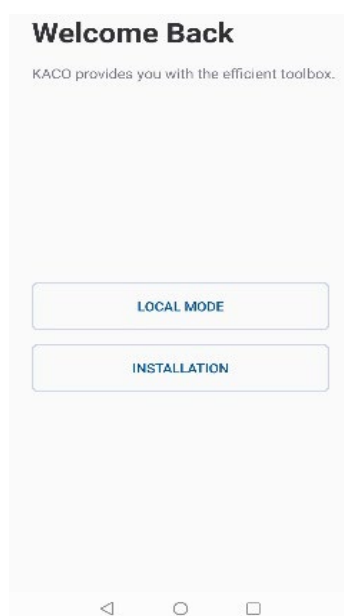


Fig. 6: Home page

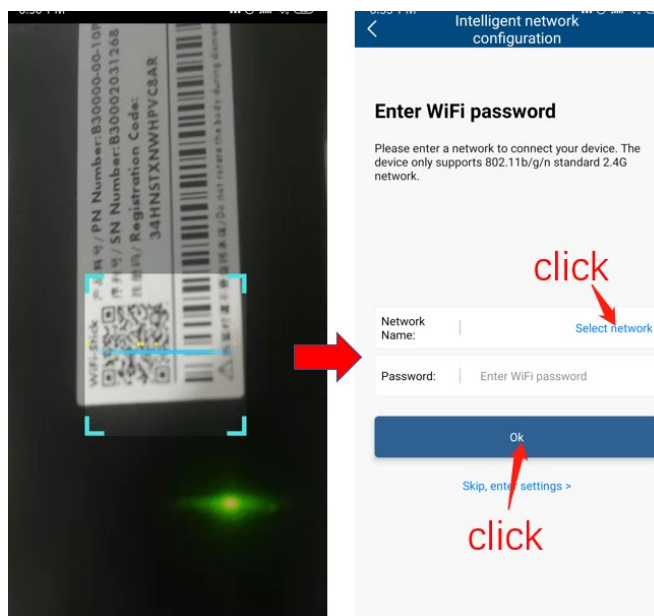


Fig. 7: Scan QR code

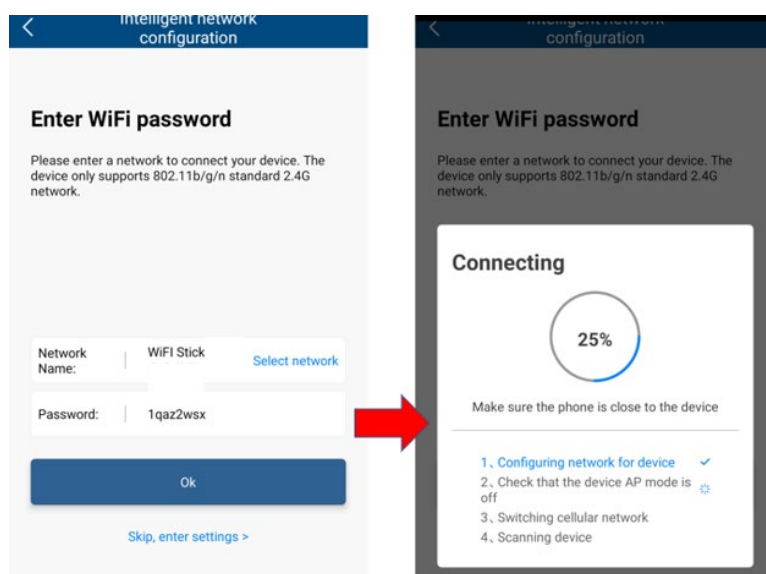


Fig. 8: Network configuration

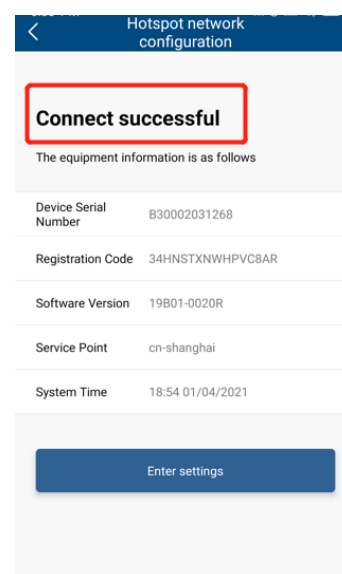


Fig. 9: Successful configuration

NOTE



Frequency band

Before the Network configuration, please prepare a WLAN router supports 2.4G frequency band. Wi-Fi stick only supports 2.4G frequency band.

Installation position

Please keep the Wi-Fi stick within 10 meters of the router.

SSID and password of router availability

Wi-Fi stick only supports 32 characters SSID and password.

1.3 Change the router

If the router is still working and you want the Wi-Fi stick to connect to another router:

↻ Connect to another router.

- 1 Connect the smart phone to the router through Wi-Fi and open the tool app, click the “LOCAL MODE” button.
- 2 Enter the “Monitor Device Details” page, and click the “WLAN” item which shows the router connected now.
- 3 Select the new router in list and enter the password, click the “Confirm Settings” button in the “Router” page.
» Proceed with inverter parameters settings.

If the router is broken or lost, and the Wi-Fi stick can't connect to it, the blue LED light doesn't work, you can find the SSID of Wi-Fi stick's hotspot named the Wi-Fi stick's serial number in your WLAN list. You can connect to the Wi-Fi stick hotspot with the registration code on the label as password.

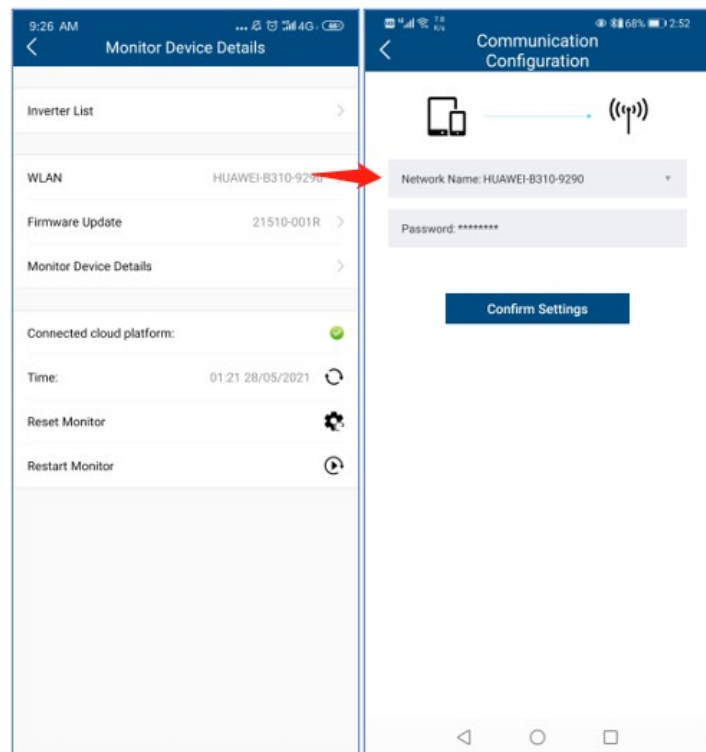


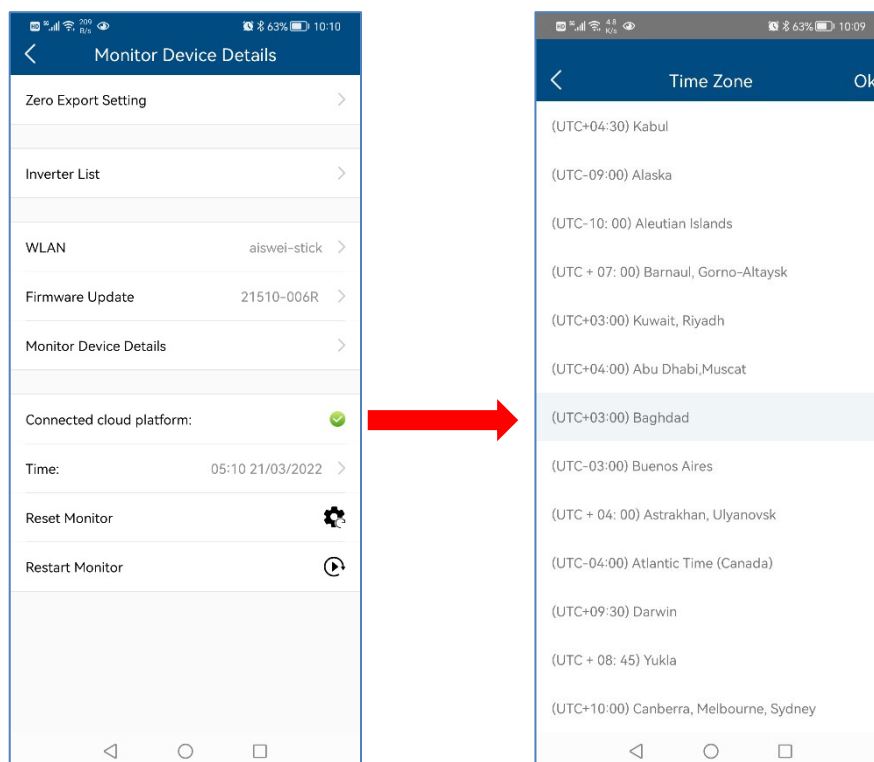
Fig. 10: Change network

1.4 Set the time zone to Wi-Fi stick

Before configuring the router to upload the inverter data, you must configure the time zone setting as follow:

🔄 Time zone configuration setting.

- 1 Open the tool app and click the "INSTALLATION" button (The tool app will open the phone's camera).
 - 2 Scan the QR code label on Wi-Fi stick. then the tool app will automatically connect to Wi-Fi stick's hotspot.
 - 3 Click the ">" button of the time item, choose the Time Zone and click the OK button.
- » Proceed with setting the time zone to the Wi-Fi stick used to calculate the local time for data uploading.



2 Inverter Parameters Settings

2.1 Connect to Wi-Fi stick

2.1.1 Connect Wi-Fi stick directly through the Wi-Fi stick's hotspot

If haven't configured the WLAN network to the Wi-Fi stick yet, you can find the Wi-Fi stick' SSID in WLAN list of your smart phone. If had configured the WLAN network to the Wi-Fi stick, but the blue LED light of the Wi-Fi stick doesn't work, you also can find the Wi-Fi stick's SSID in WLAN list of your smart phone. The password of the Wi-Fi stick's hotspot is the registration code on the Wi-Fi stick.

🔄 Connect Wi-Fi stick directly through the Wi-Fi stick's hotspot.

- 1 Open the phone Wi-Fi settings page.
 - 2 Find the Wi-Fi stick's hotspot named the serial number
 - 3 Connect to the hotspot with registration id on the Wi-Fi stick as password.
 - 4 Come back to the app and click on "LOCAL MODE" to choose the Wi-Fi stick.
- » Proceed with inverter parameter settings.

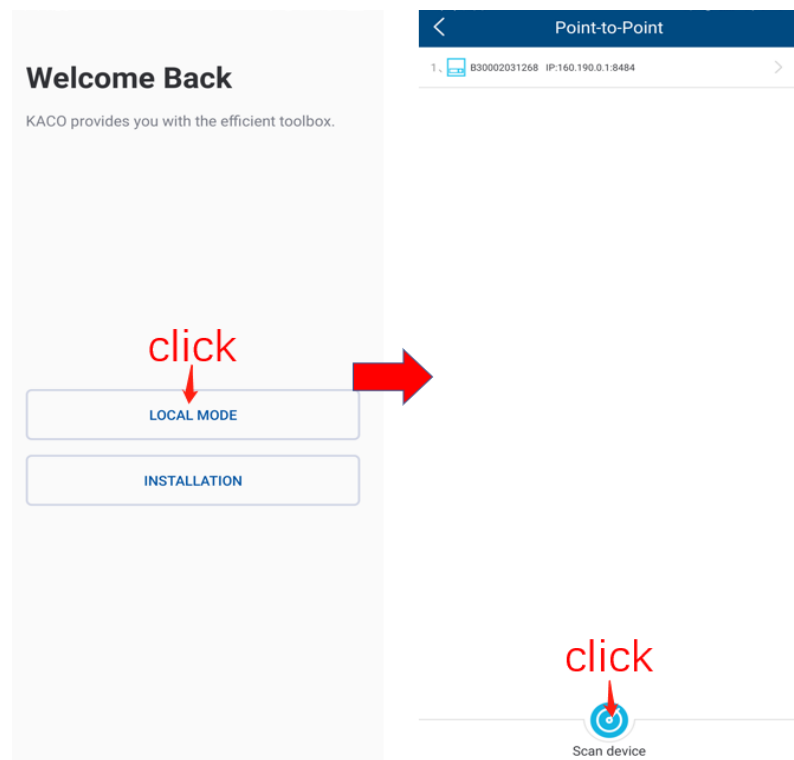


Fig. 11: Connect to Wi-Fi stick

NOTE



Can't find the smart Wi-Fi dongle in your WLAN list?

Sometimes you can't find the smart Wi-Fi dongle in your WLAN list:

- › Close the Mobile Data of phone and come back to app to click on "Scan device" to get the Wi-Fi stick.

2.1.2 Connect Wi-Fi stick through the router

If had configured the WLAN network to the Wi-Fi stick and the blue LED light of the Wi-Fi stick works, you need to connect your smart phone to the router.

↻ Connect Wi-Fi stick through the router.

- 1 Open the phone Wi-Fi settings page, and manually connect to the router.
- 2 Come back to the app and click on “LOCAL MODE” to choose the Wi-Fi stick.
» Proceed with inverter parameter setting.

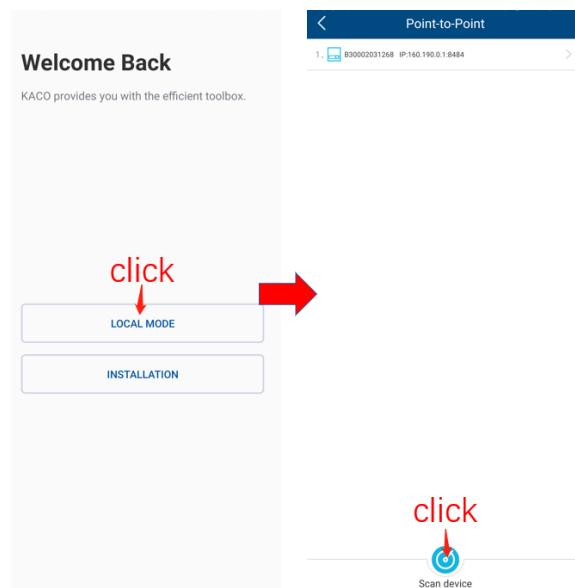


Fig. 12: Connect to Wi-Fi stick

NOTE



Can't find the smart Wi-Fi dongle in your WLAN list?

Sometimes you can't find the smart Wi-Fi dongle in your WLAN list:

- › Sometimes you can't find the smart Wi-Fi dongle in your WLAN list. You need to check the network of your phone is the same as that of Wi-Fi stick, and click the “Scan device” button again, wait for the scan results to be shown in the list with Wi-Fi stick' serial number and ip address. If you haven't found the smart Wi-Fi stick in list after multiple attempts, you can close the router to connect to Wi-Fi stick directly through the Wi-Fi stick's hotspot.

2.2 Inverter parameters settings

2.2.1 Connect to inverter

Connect to the Wi-Fi stick with the tool app.

🔄 Enter the “Inverter list”.

1 Enter the “Monitor Device Details” page

2 Click the “Inverter List” item and enter the “Inverter List” page to connect to the inverter.

3. Click the inverter serial number.

» Proceed with inverter parameters settings.

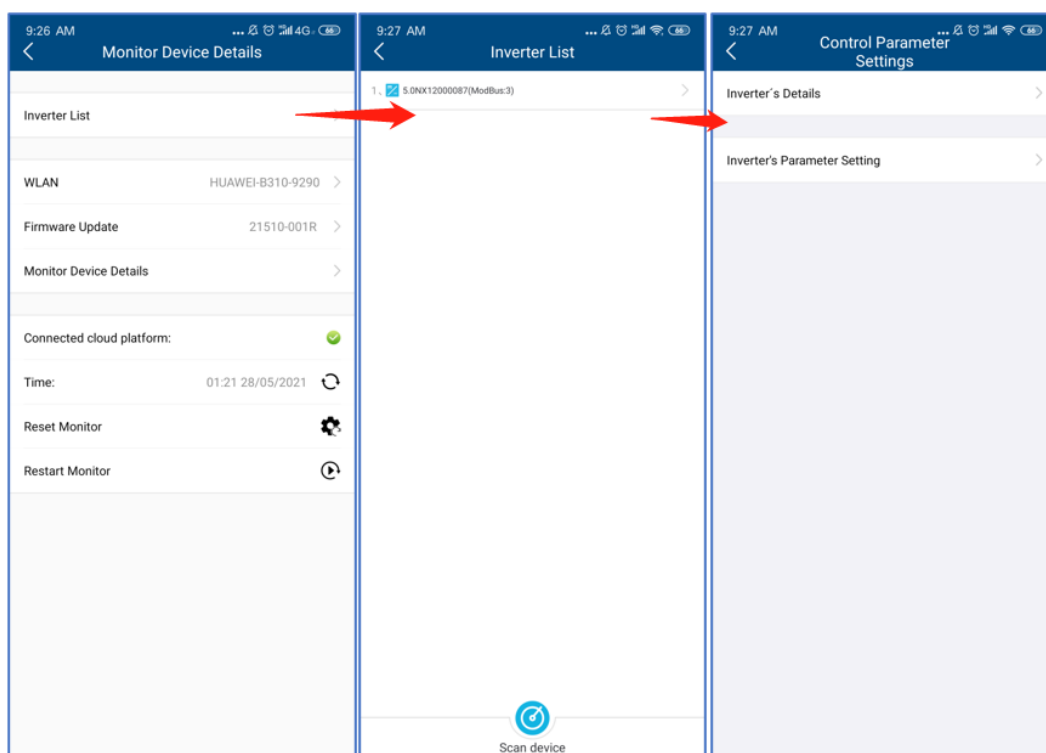


Fig. 13: Connect to inverter

NOTE

Scan device in Inverter List page

Under normal circumstances, you do not need to search for devices.

You might lose your previous inverter list and data due to the following cases:



- › The Wi-Fi stick has no communication with the inverter.
- › You have added a single inverter/multiple inverters connected to the Wi-Fi stick.
- › You have removed a single inverter/multiple inverters connected to the Wi-Fi stick.
- › You have replaced a single inverter/multiple inverters connected to the Wi-Fi stick.

By clicking “Inverter’s Parameter Setting”, you can set the inverter parameters. No passcode is required for the first use of these parameter settings during the initial commissioning of the inverter. If the inverter parameters need to be changed after the initial commissioning, a passcode will be required. The inverter-specific passcode can be obtained from KACO Service.:

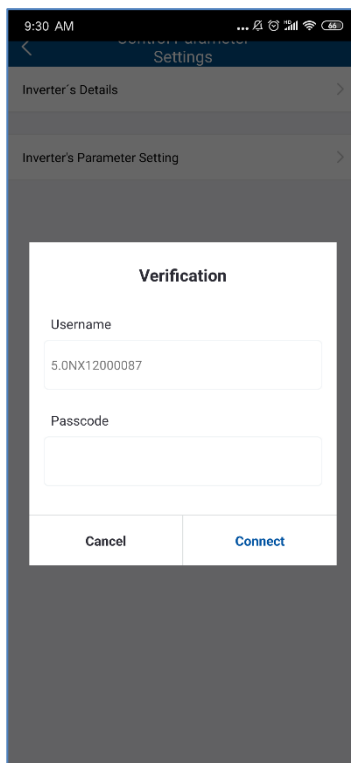


Fig. 14: Inverter passcode

2.2.2 Enabling Inverter functions

All required inverter functions can be activated by enabling them as shown below.

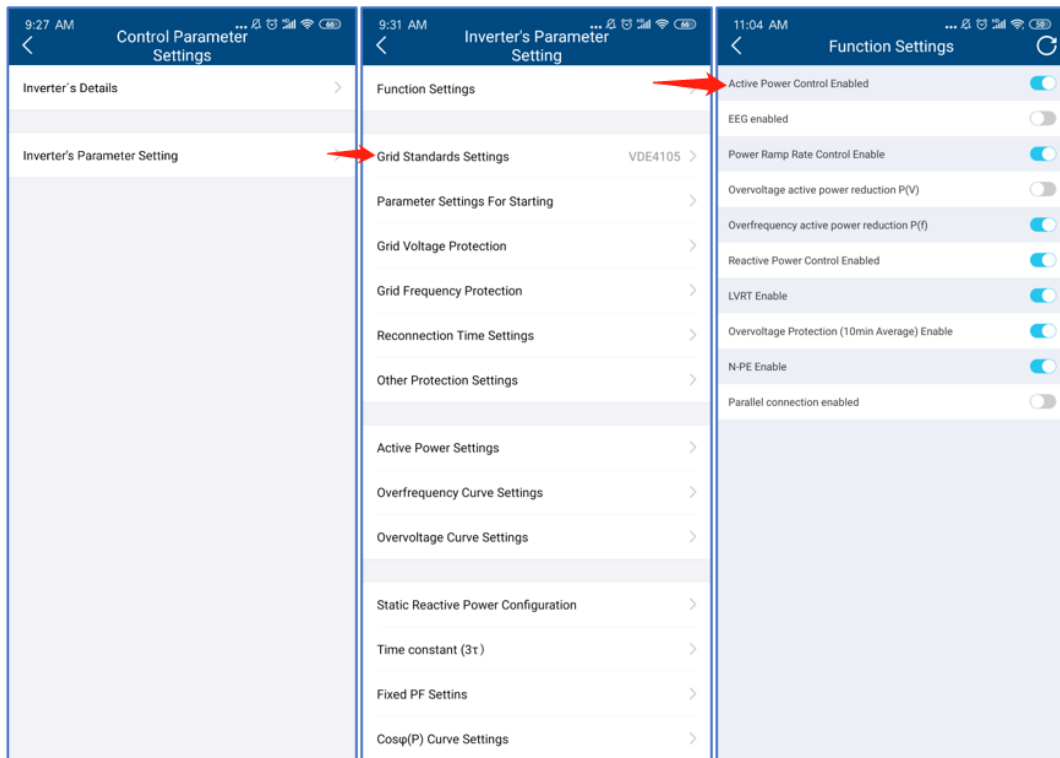


Fig. 16: Inverter function enable/disable

2.2.3 Inverter grid parameter setting: grid standards

The currently selected country standard is displayed on the right side of 'Country standard'.

To select the required local grid code please click on 'Grid Standard Settings'. The next page will display the country standard list. Here you can choose the right grid standard.

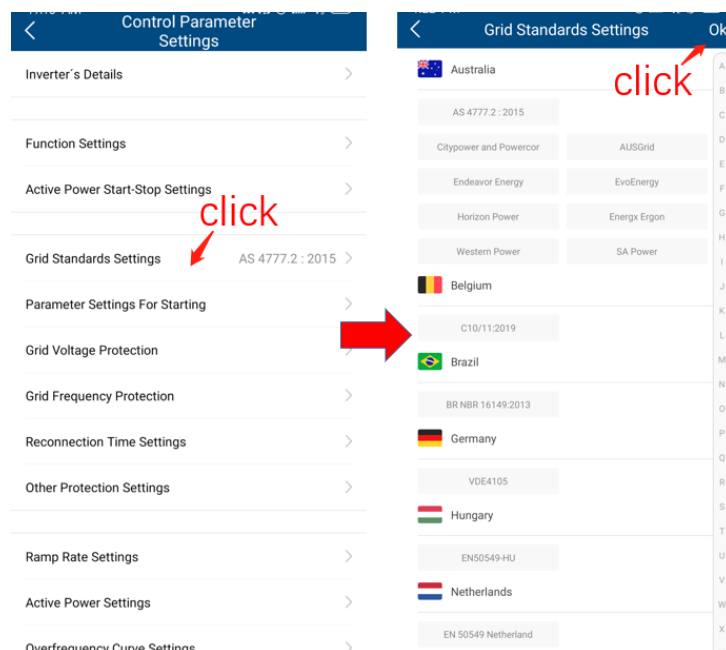


Fig. 17: Grid Standard

2.2.4 Inverter grid parameter setting: power up

Tap 'Parameter Settings For Starting', the next page will display the parameter.

The appropriate voltage range and frequency range for starting can be set according to the requirements of the local grid company.

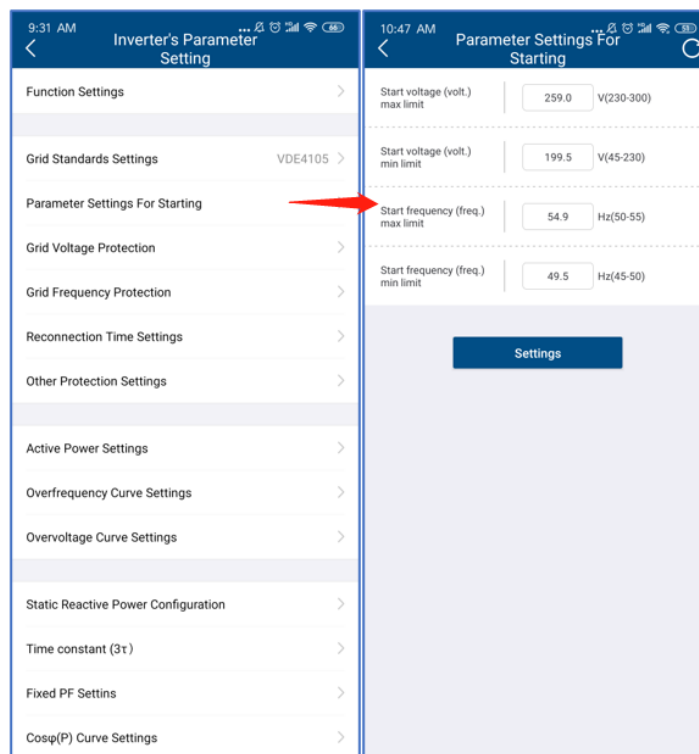


Fig. 18: Parameter settings for starting

2.2.5 Inverter grid parameter setting : voltage protection

Tap 'Grid Voltage Protection', the next page will display the parameter.

There are three threshold level for the overvoltage and undervoltage protection. The first threshold means the smallest range, and the third threshold means the largest range.

All thresholds need to follow the principles as below:

1. The first maximum threshold \leq The second maximum threshold \leq The third maximum threshold
2. The first minimum threshold \geq The second minimum threshold \geq The third minimum threshold
3. The first threshold tripping time \leq The second threshold tripping time \leq The third threshold tripping time

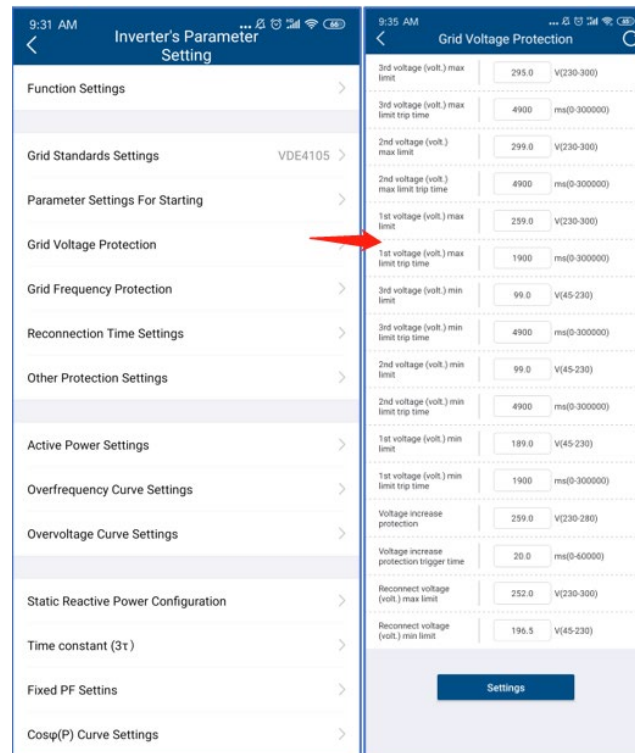


Fig. 19: Grid voltage protection

2.2.6 Inverter grid parameter setting: frequency protection

Tap 'Grid Frequency Protection, the next page will display the parameter.

There are three threshold level for the over-frequency and underfrequency protection. The first threshold means the smallest range, and the third threshold means the largest range.

All thresholds need to follow the principles as below:

1. The first maximum threshold \leq The second maximum threshold \leq The third maximum threshold
2. The first minimum threshold \geq The second minimum threshold \geq The third minimum threshold
3. The first threshold tripping time \leq The second threshold tripping time \leq The third threshold tripping time

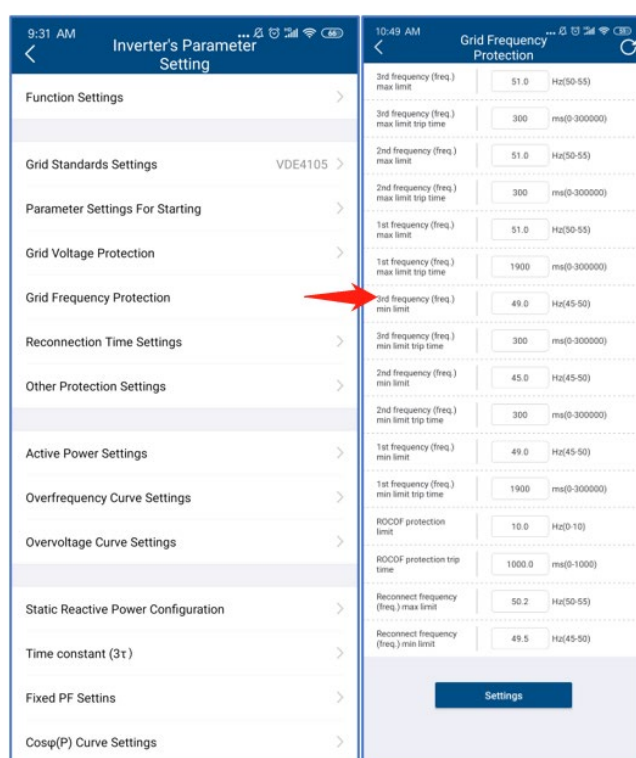


Fig. 20: Grid frequency protection

2.2.7 Inverter grid parameter setting: reconnection time

Tap 'Reconnection Time Settings', the next page will display the parameter.

The observation time during which all the voltage and the frequency values are observed to be within a specified range prior to the inverter connection or reconnection to the grid can be set in this page.

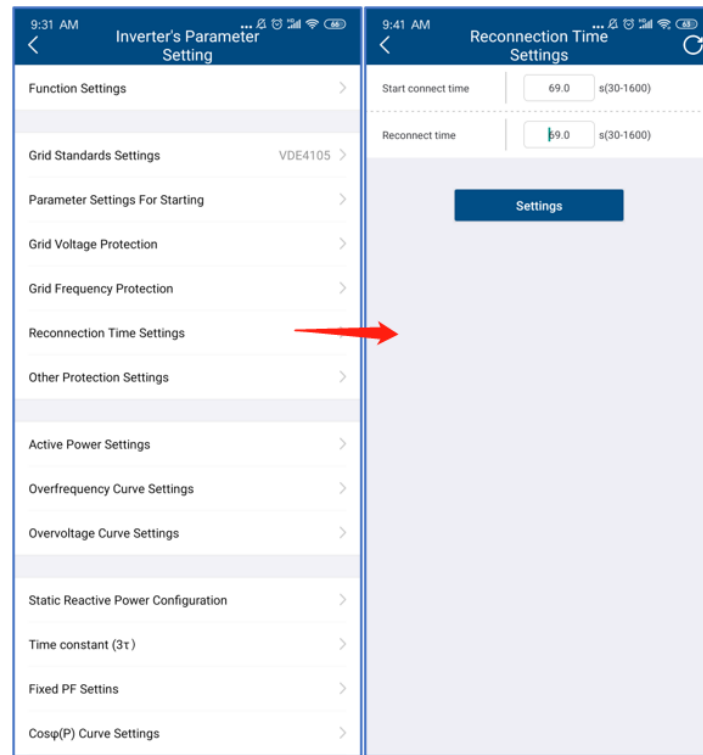


Fig. 21: Reconnection time

2.2.8 Inverter active power setting: power limit

During Changing in a.c. operation and control or changing in energy source operation, the active power generated by the inverter shall not exceed a specified gradient expressed as a percentage of the active nominal power of the inverter per minute. You can set 'Active power gradient for increasing' and 'Active power gradient for reducing' according to the requirement.

The grid company maybe requires reduction of active power on set point. You can set 'Active power limit' according to the requirement.

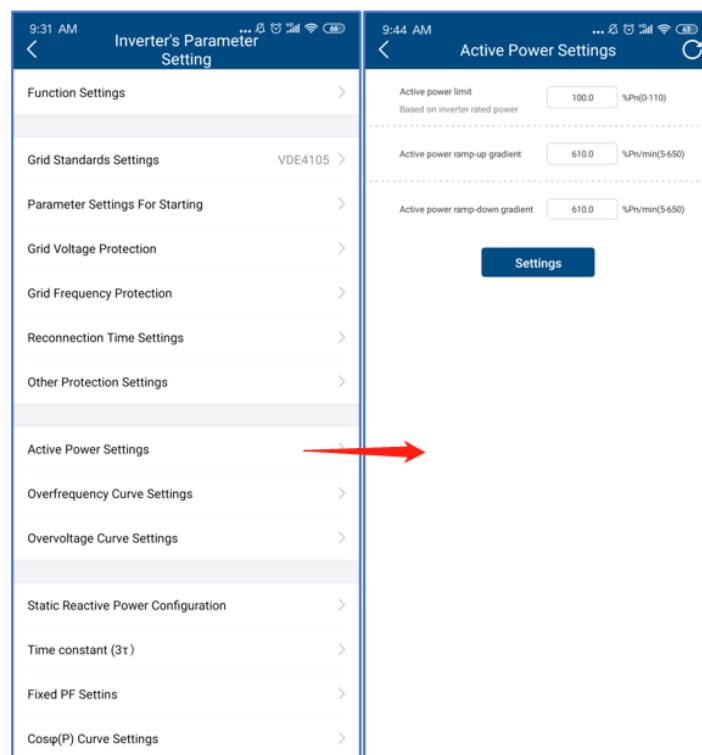


Fig. 22: Power limit

2.2.9 Inverter active power setting : over-frequency curve

The inverter may be capable of activating active power response to over-frequency at a programmable frequency threshold with a programmable droop. There are four mode can be chosen here.

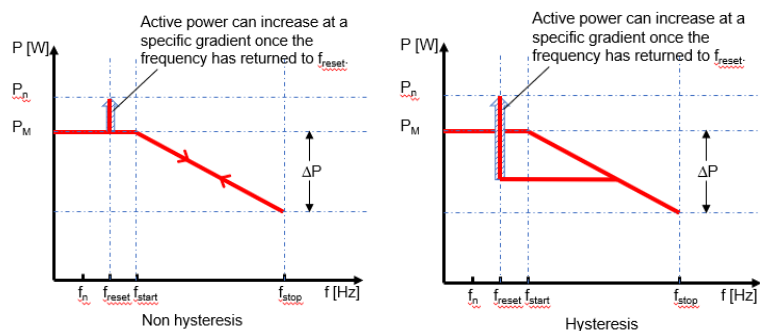
Fix gradient and non-hysteresis: ΔP is the active power as a percentage of P_n , the inverter provide non-hysteresis in the control of active power response to over-frequency.

Fix gradient and hysteresis: ΔP is the active power as a percentage of P_n , the inverter provide hysteresis in the control of active power response to over-frequency.

Variable gradient and non-hysteresis: ΔP is the active power as a percentage of P_M , the inverter provide non-hysteresis in the control of active power response to over-frequency.

Variable gradient and hysteresis: ΔP is the active power as a percentage of P_M , the inverter provide hysteresis in the control of active power response to over-frequency.

The below figure descripts the difference between hysteresis and non-hysteresis control



Here,

f_n : The rated frequency

f_{reset} : Reset frequency

f_{start} : Starting frequency

f_{stop} : Stopping frequency

ΔP : Active power in percentage during reducing

Intentional delay time for $P(f)$ is only active for the activation of the function after the frequency over f_{start} , and the intentional delay time plus inherent dead time shall be less than 2s

Min. delay time for active power release is the delay time that the active power can increase after the frequency below f_{reset} .

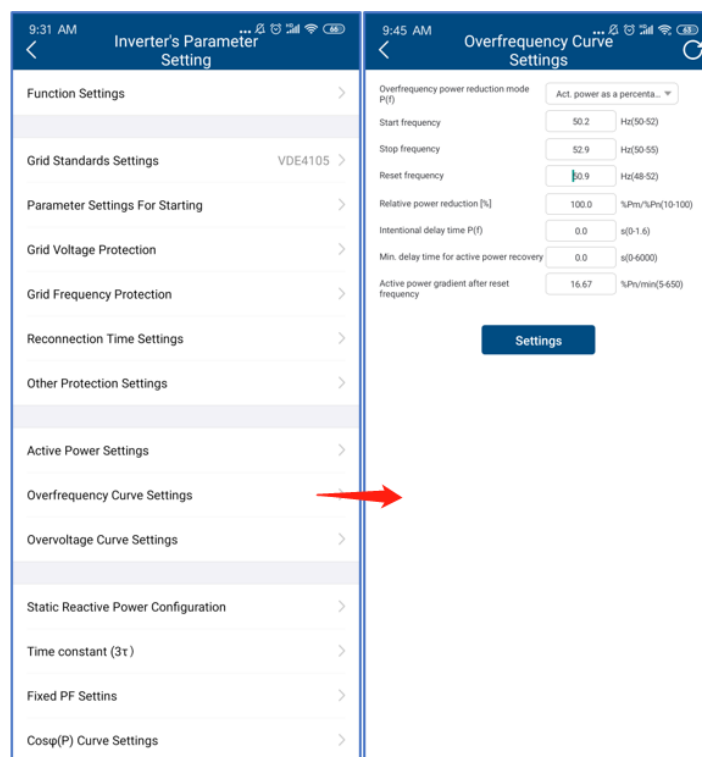


Fig. 23: Over-frequency curve

2.2.10 Inverter active power setting : over-voltage curve

The inverter may be capable of activating active power response to overvoltage at a programmable voltage threshold with a programmable droop. There are five mode can be chosen here.

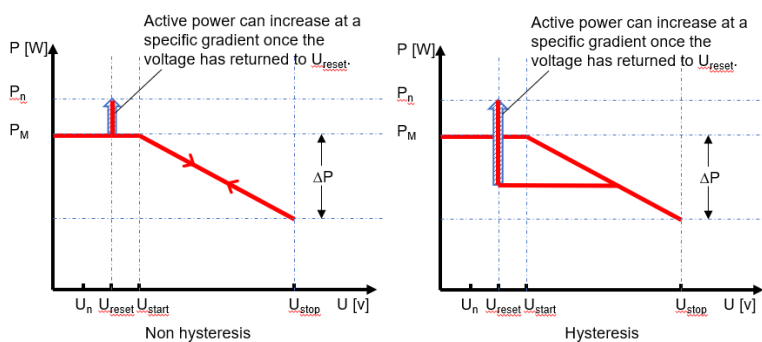
Fix gradient and non-hysteresis: ΔP is the active power as a percentage of P_n , the inverter provide non-hysteresis in the control of active power response to overvoltage.

Fix gradient and hysteresis: ΔP is the active power as a percentage of P_n , the inverter provide hysteresis in the control of active power response to overvoltage.

Variable gradient and non-hysteresis: ΔP is the active power as a percentage of P_M , the inverter provide non-hysteresis in the control of active power response to overvoltage.

Variable gradient and hysteresis: ΔP is the active power as a percentage of P_M , the inverter provide hysteresis in the control of active power response to overvoltage.

The below figure describes the difference between hysteresis and non-hysteresis control.



Here,

f_n : The rated voltage

f_{reset} : Reset voltage

f_{start} : Starting voltage

f_{stop} : Stopping voltage

ΔP : Active power in percentage during reducing

Intentional delay time for $P(f)$ is only active for the activation of the function after the voltage over U_{start} , and the intentional delay time plus inherent dead time shall be less than 2s

Min. delay time for active power release is the delay time that the active power can increase after the voltage below U_{reset} .

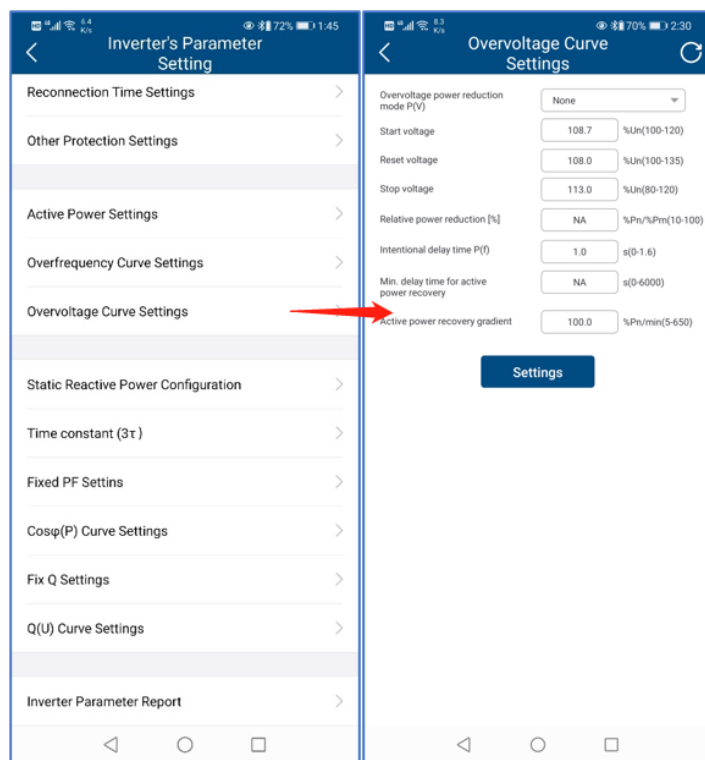
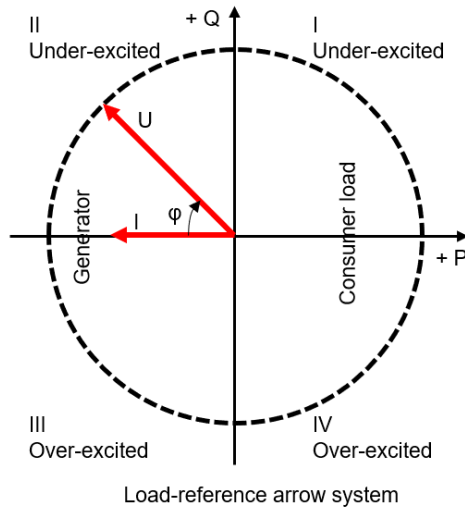


Fig. 24: Over-voltage curve

2.2.11 Inverter reactive power setting: running mode

The inverter may be required to participate to voltage control by means of production and absorption of reactive power. There are seven reactive power control modes. Only one mode may be active at a time.

The inverter acts as a load from the perspective of the grid according to the country standard. This means the inverter operation in Quadrant II (under-excited) or III (overexcited) as below.



Over-excited reactive power also known as Capacitive reactive power or Leading power factor.

Under-excited reactive power also known as Inductive reactive power or Lagging power factor.

Tap 'Reactive power control mode' to choose the mode. Then the 'Three times the time constant' should be set first. The reactive power change may require to correspond with a first order filter. The 'Three times the time constant' is three time constant of the filter and is the time until 95% of the nominal value is reached.

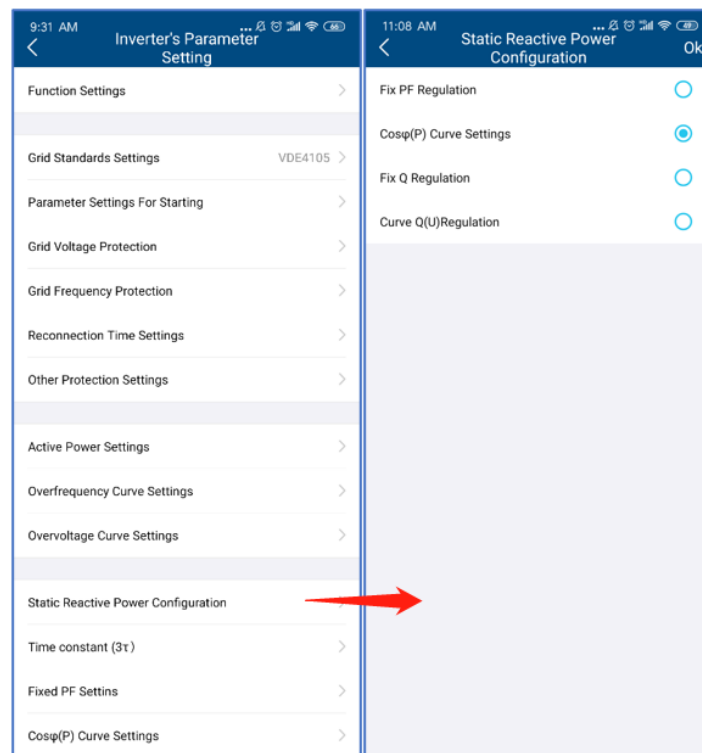


Fig. 25: Reactive running mode

2.2.12 Inverter reactive power setting: fixed power factor

The fixed displacement factor $\cos \phi$ can be set.

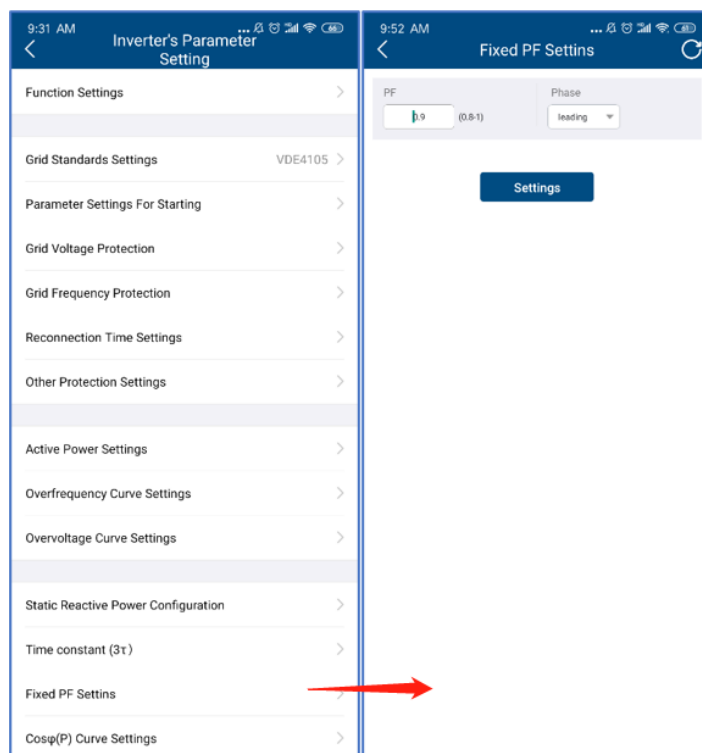
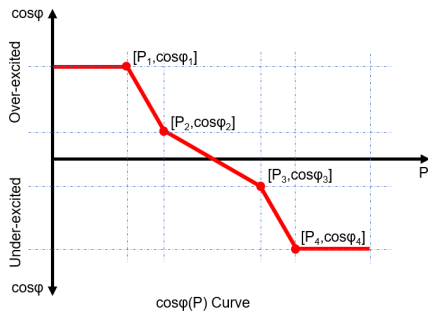


Fig. 26: Fixed power factor

2.2.13 Inverter reactive power setting: $\cos(\Phi)$ – P curve

The power related control mode $\cos \Phi$ (P) controls the $\cos \Phi$ of the output as a function of the active power output.

There are four coordinate points that can be adjustable in the curve as below figure.



The coordinate points are the active power as a percentage of P_n and the displacement factor $\cos \Phi$.

Some grid company maybe requires two voltage thresholds as a percentage of U_n to activate or deactivate the function. The voltage thresholds normally call 'lock-in' and 'lock-out' voltage.

Activation threshold as a percentage of U_n corresponds to 'lock-in' voltage

Deactivation threshold as a percentage of U_n corresponds to 'lock-out' voltage

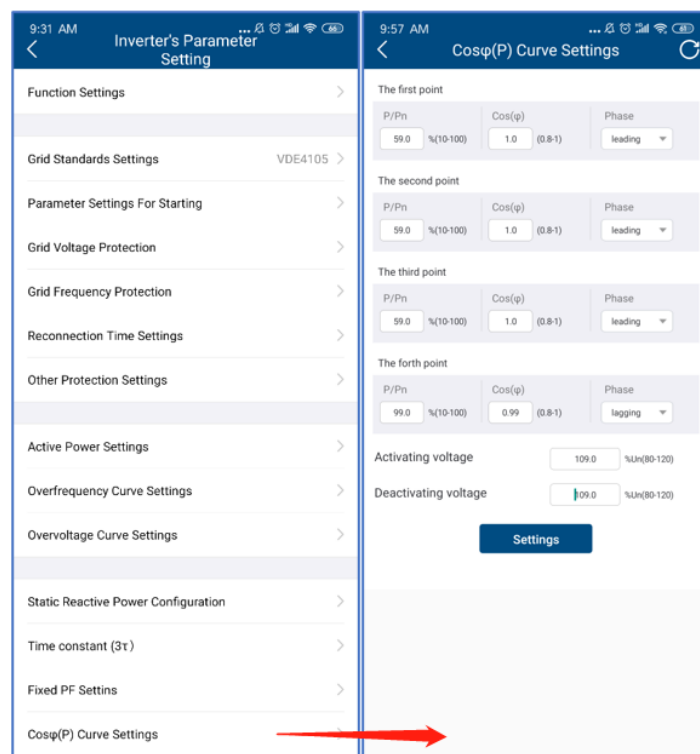


Fig. 27: $\cos \Phi$ curve

2.2.14 Inverter reactive power setting: fixed Q

The fixed reactive power as a percentage of P_n can be set.

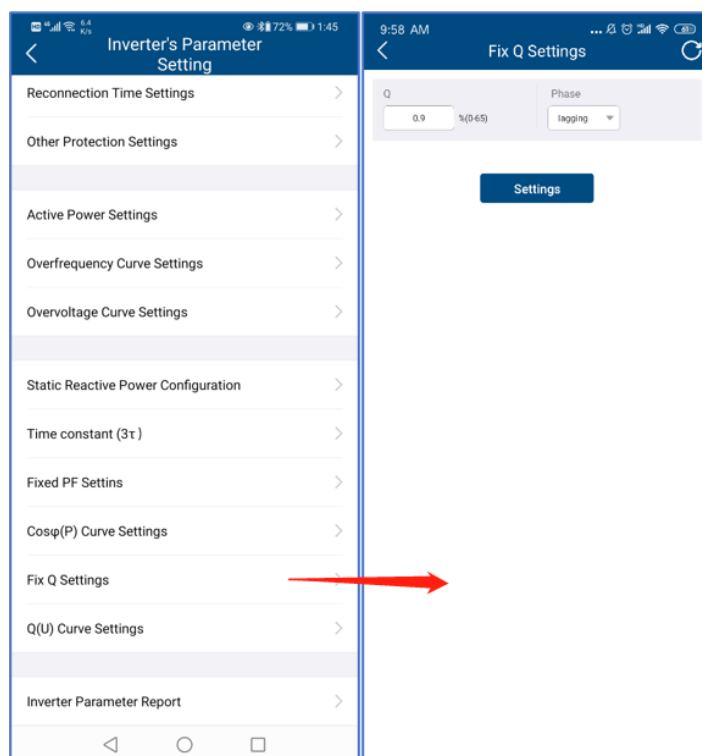
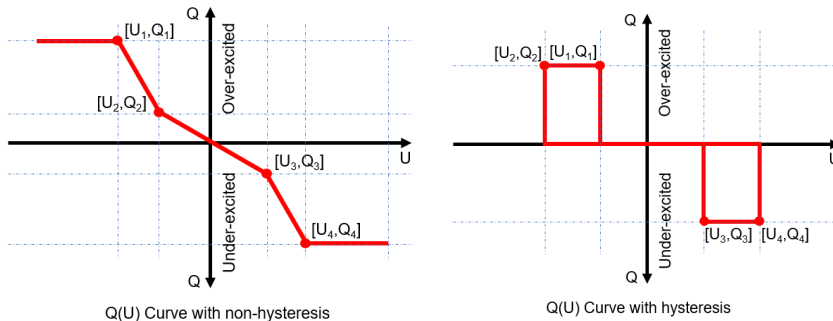


Fig. 28: Fixed Q

2.2.15 Inverter reactive power setting: Q-U curve

The voltage related control mode Q(U) controls the reactive power output as a function of the voltage.

There are four coordinate points that can be adjustable in the curve and the difference between non-hysteresis and hysteresis control shown as below figure.



The coordinate points are the voltage as a percentage of U_n and the reactive power as a percentage of P_n .

Some grid company maybe requires two active power thresholds as a percentage of P_n to activate or deactivate the function. The active power thresholds normally call 'lock-in' and 'lock-out' active power.

Activation threshold as a percentage of P_n corresponds to 'lock-in' active power.

Deactivation threshold as a percentage of P_n corresponds to 'lock-out' active power.

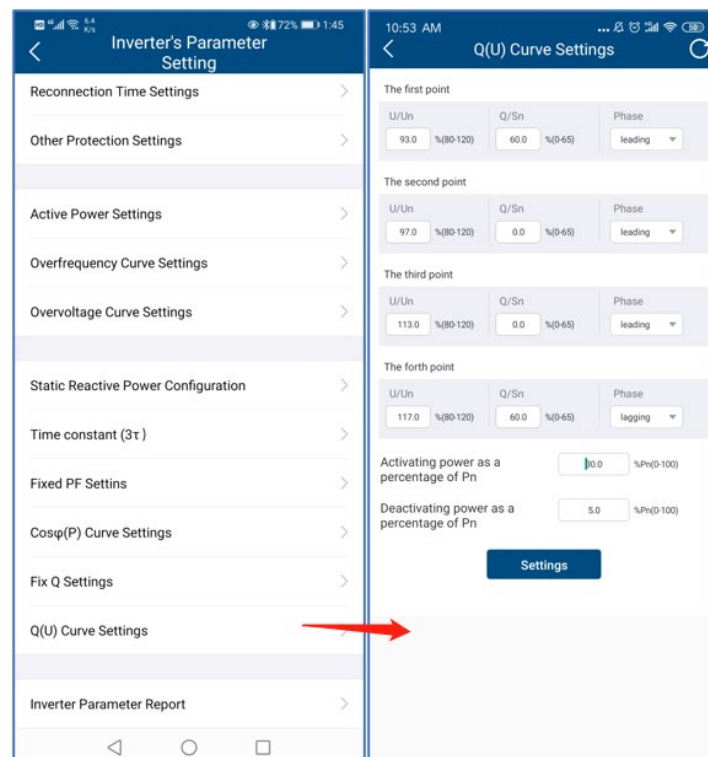


Fig. 29: Q-U curve

2.2.16 Inverter parameters report

Tap 'Inverter Parameter Report', the next page will display the parameter.

🔄 Export inverter parameter in file

- 1 After grid parameter setting, press "Inverter Parameter Report" menu, and grid parameter will be shown on page.
- 2 Press "Export PDF" button, the export file is located as a pdf file in "kaco.report" folder on your smart phone

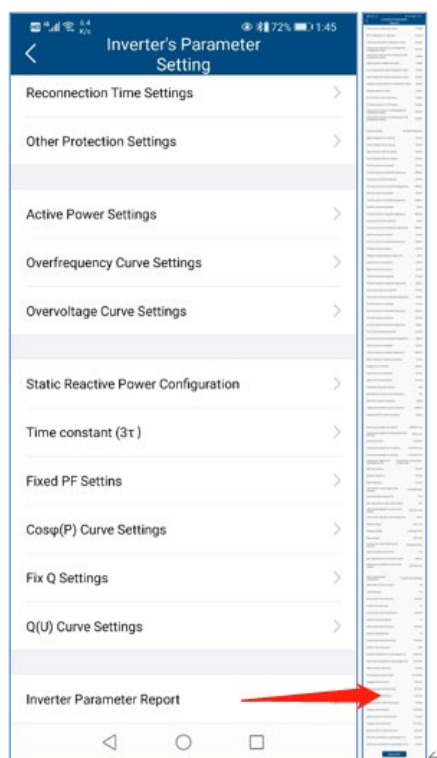


Fig. 30: Parameters report

NOTE



Passcode

Parameter export without the inverter-specific passcode is only possible during initial commissioning. If an export is required after initial commissioning, a passcode will be required. The inverter-specific passcode can be obtained from the KACO new energy Service.

2.3 Inverter real time data

2.3.1 Connect to inverter

Connect to the Wi-Fi stick with the tool app.

🔄 Enter the “Inverter list”.

1 Enter the “Monitor Device Details” page

2 Click the “Inverter List” item and enter the “Inverter List” page to connect to the inverter.

3. Click the inverter serial number.

» Proceed with inverter real time data.

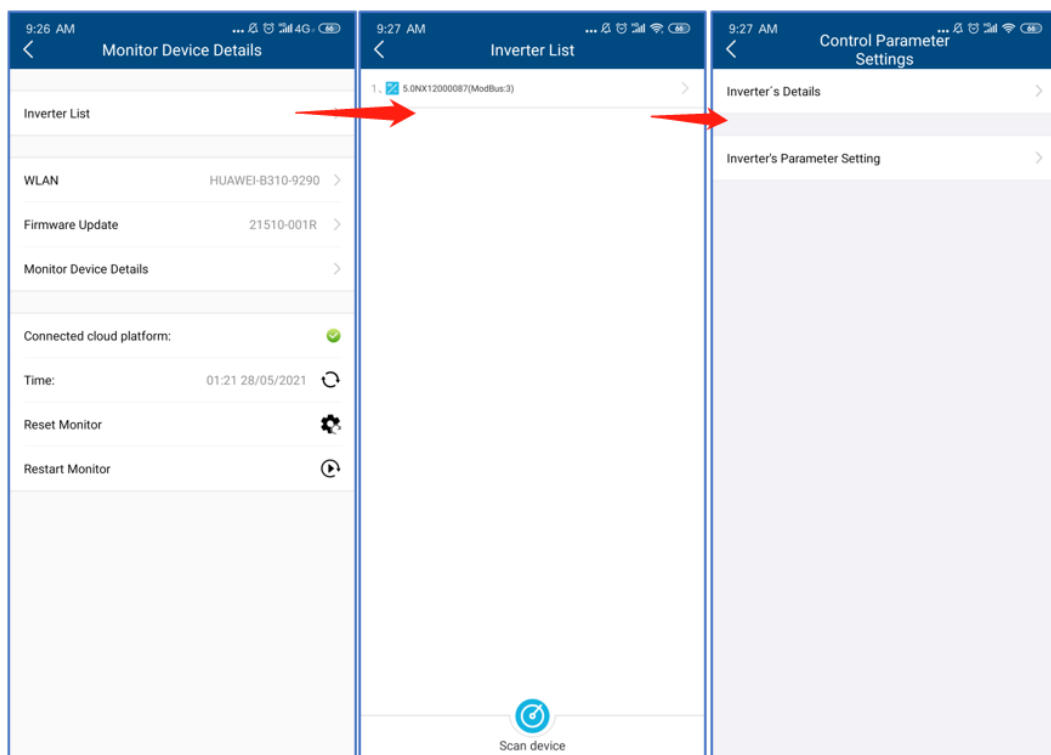


Fig. 13: Connect to inverter

NOTE

Scan device in Inverter List page

Under normal circumstances, you do not need to search for devices.

You might lose your previous inverter list and data due to the following cases:



- › The Wi-Fi stick has no communication with the inverter.
- › You have added a single inverter/multiple inverters connected to the Wi-Fi stick.
- › You have removed a single inverter/multiple inverters connected to the Wi-Fi stick.
- › You have replaced a single inverter/multiple inverters connected to the Wi-Fi stick.

2.3.2 Inverter's details

Click the "Inverter's Details", you can view the real time data from the inverter. The parameters shown on the page are as follow:

Parameter	Description
PV1	Voltage and current of MPPT 1 at DC side
PV2	Voltage and current of MPPT 2 at DC side
U1	Voltage and current at AC side
E-Today	Generation today
E-Total	Cumulative power generation after installation
H-Total	Cumulative running hour after installation
Power	Current power at AC side
Power Factor	Power factor at AC side
Data update time	The sampling time.
Error code	It is "N/A", when no error happened.

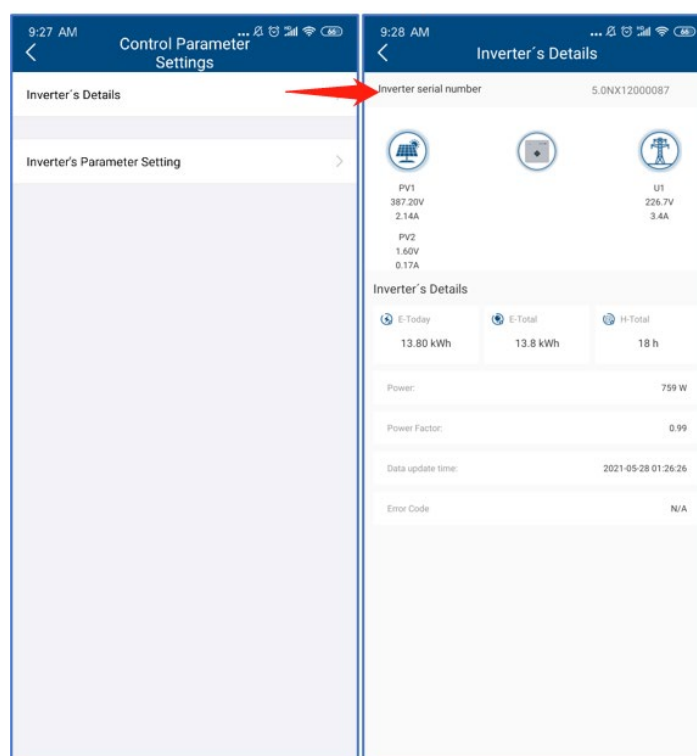


Fig. 15: Inverter real time data

3 Firmware Update

3.1 Wi-Fi stick firmware update

🔄 Current firmware package is available on the KACO homepage and does not match the firmware version on the unit(s).

1 Download the firmware "KACO_NX1_Vxx.zip" with the required *.bin files from our homepage www.kaco-newenergy.com under Downloads/Software.

2 Unzip the firmware to the mobile device and open the **KACO-NX1 APP**.

3 Scan the QR code on the Wi-Fi stick, log in and select the device in the network.

4 On the "Monitor Device Details" page, click the entry "Firmware Update".

5 Select the page labelled "Monitor". "Local upgrade" and select the file **WIFI_STK.bin** from the firmware path.

➤ After a successful update, continue with the inverter firmware.

NOTE: In **case of error**, please check the Android version / iOS version on your mobile device. The currently available firmware version can only be installed from **Android 9.0** or **iOS 12**.

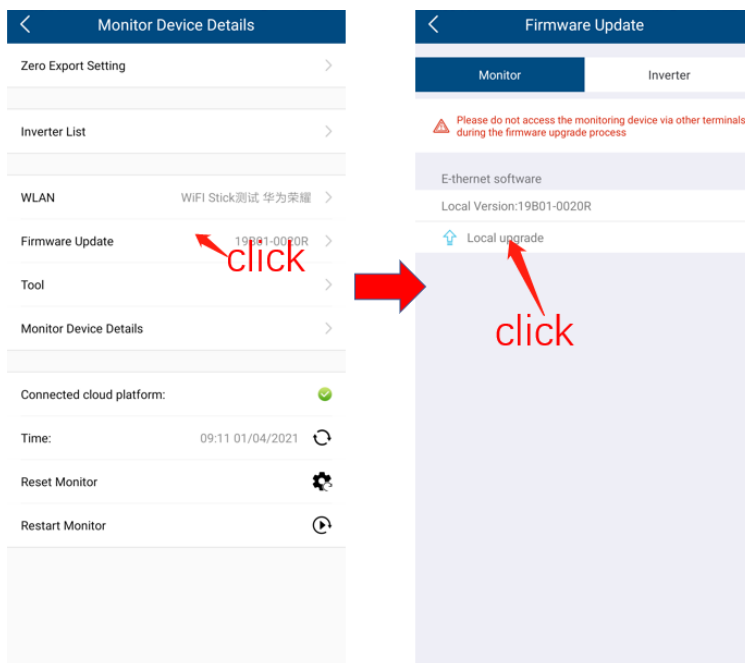


Fig. 31: Wi-Fi stick firmware

3.2 Inverter firmware update

🔄 Firmware update of the Wi-Fi stick successfully carried out and Wi-Fi stick connected.

- 1 Click the "Monitor Device Details" page in the KACO-NX1 APP.
 - 2 Click on "Firmware Update" and select the page with the label "Inverter".
 - 3 Select the "Inverter" and select the device.
 - 4 Click on "Local upgrade" under "Master" and select the file **masterVxxx-xxxxx-xx.bin** from the firmware path.
 - 5 Click on "Local upgrade" under "Safety" and select the file **safetyVxxx-xxxxx-xx.bin** from the firmware path..
- You have successfully completed the firmware update.

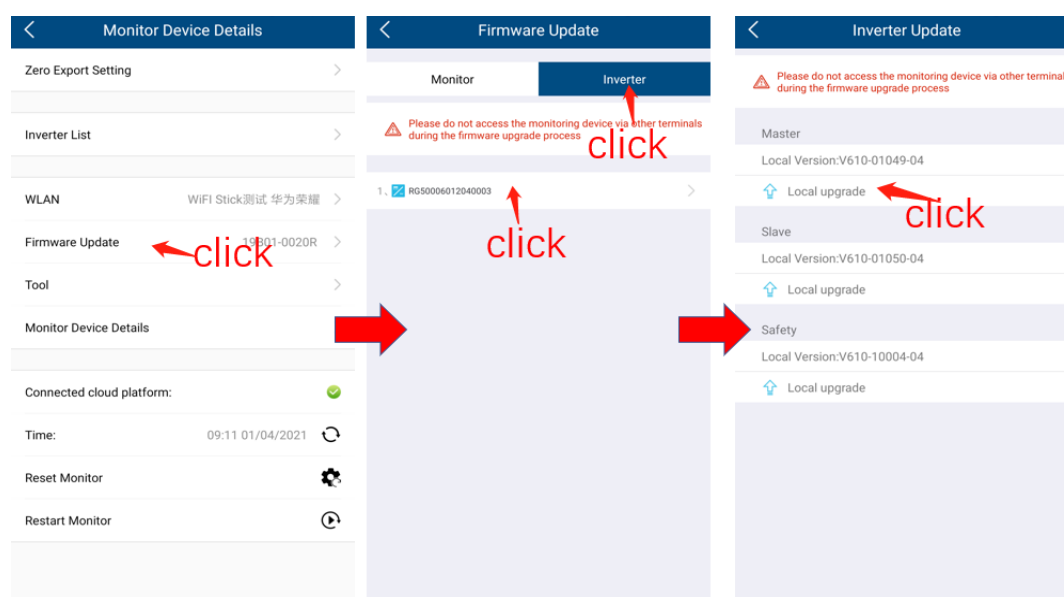


Fig. 32: Inverter firmware



NOTE

Please keep the DC power > 100W during the upgrade process.

The whole process will take about 10 minutes at least. After 10 minutes, you can check the firmware with the tool app. The *.bin versions must completely match the versions from the firmware path.



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