



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:

υ	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. 4: Pictures and video



Fig. 2: Location permission



Fig. 5: Location services



Fig. 3: Device information permission





#### 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:

#### ひ 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

The equipment info	ormation is as follows
Device Serial Number	B30002031268
Registration Code	34HNSTXNWHPVC8AR
Software Version	19B01-0020R
Service Point	cn-shanghai
System Time	18:54 01/04/2021
	Enter settings

#### Fig. 9: Successful configuration



## NOTE



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

**Frequency band** 

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:

U 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:

- ひ 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.

奈, <sup>209</sup> 泉/s Ф	🖾 岩 63% 💷 10:1	10	🖾 "ll 😤 👫 🐼		🖸 🕏 63% 🗖
Monitor Device	e Details				
Export Setting		>	<	Time Zone	
			(UTC+04:30) Ka	bul	
ter List		>	(UTC-09:00) Ala	aska	
N	aiswei-stick	5	(UTC-10: 00) AI	eutian Islands	
vare llodate	21510-004P	>	(UTC + 07: 00) E	Barnaul, Gorno-Alt	taysk
	21310-0001		(UTC+03:00) Ku	wait, Riyadh	
tor Device Details		<u></u>	(UTC+04:00) Ab	ou Dhabi,Muscat	
nected cloud platform:	3	0	(UTC+03:00) Ba	ghdad	
:	05:10 21/03/2022	>	(UTC-03:00) Bu	enos Aires	
t Monitor	×	č	(UTC + 04: 00) /	Astrakhan, Ulyano	vsk
art Monitor	Ó	Đ	(UTC-04:00) At	lantic Time (Canac	da)
			(UTC+09:30) Da	arwin	
			(UTC + 08: 45) \	ſukla	
			(UTC+10:00) Ca	nberra, Melbourn	e, Sydney
0 1			$\triangleleft$	0	



# 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 configurated 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 configurated 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.

ひ 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 configurated 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.

ひ 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 » Proceed with inverter parameter	c on "LOCAL MODE" to ch r setting.	oose the Wi-Fi stick.				
	J	C Point-to-Point				
	Welcome Back	1, 🔜 B30002031268 IP:160.190.0.1:8484				

KACO provides you with the efficient toolbox.		
LOCAL MODE	•	

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.

- Ů 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.

9:26 AM	… & ත් ක්r4යං œ onitor Device Details	9:27 AM	ୟଟିଆକ୍ତ t	9:27 AM Control Pa	ይ ල 뛞 ବ ම rameter ngs
		1 、 🔀 5.0NX12000087(ModBus:3)	>	Inverter's Details	>
Inverter List					
				Inverter's Parameter Setting	>
WLAN	HUAWEI-B310-9290 >				
Firmware Update	21510-001R >				
Monitor Device D	etails >				
Connected cloud	platform: 🥝				
Time:	01:21 28/05/2021 Q				
Reset Monitor	<b>\$</b>				
Restart Monitor	Ð				
		<b>_</b>			
		Scan device			

#### Fig. 13: Connect to inverter

#### NOTE

#### Scan device in Inverter List page

**(i)** 

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.:

9:3	MA 0	& © 111 📚	66
<	Set	tings	
Inve	erter's Details		
Inve	erter's Parameter Setting		
P			
L	Verif	cation	
L	Username		
L	5.0NX12000087		
L	Passcode		
L			
L			
L	Cancel	Connect	

Fig. 14: Inverter passcode



## 2.2.2 Enabling Inverter functions

9:27 AM & to ™ ♥ ∞ Control Parameter Settings	9:31 AM & ☺ ﷺ ♥ ⊕	11:04 AM … & © ≌ ♥ ③
Inverter's Details	Function Settings	Active Power Control Enabled
		EEG enabled
Inverter's Parameter Setting	Grid Standards Settings VDE4105 >	Power Ramp Rate Control Enable
	Parameter Settings For Starting	Overvoltage active power reduction P(V)
	Grid Voltage Protection	Overfrequency active power reduction P(f)
		Reactive Power Control Enabled
	Grid Frequency Protection >	LVRT Enable
	Reconnection Time Settings	Overvoltage Protection (10min Average) Enable
	Other Protection Settings	N-PE Enable
		Parallel connection enabled
	Active Power Settings	
	Overfrequency Curve Settings	
	Overvoltage Curve Settings	
	Static Reactive Power Configuration	
	Time constant (3 $\tau$ ) $>$	
	Fixed PF Settins	
	Cosp(P) Curve Settings	

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

Fig. 16: Inverter function enable/disable

## 2.2.3 Inverter gird 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.

Control Parameter Settings		C Grid Standard	ls Settings
Inverter´s Details	>	Australia	click
		AS 4777.2 : 2015	
Function Settings	>	Citypower and Powercor	AUSGrid
Active Power Start-Stop Settings	>	Endeavor Energy	EvoEnergy
Çlici	<	Horizon Power	Energx Ergon
Grid Standards Settings 🛛 📕 AS 4	777.2:2015 >	Western Power	SA Power
Parameter Settings For Starting	> .	Belgium	
		C10/11:2019	
Grid Voltage Protection		Brazil	
Grid Frequency Protection	>	BR NBR 16149:2013	
Reconnection Time Settings	>	Germany	
Other Protection Settings	>	VDE4105	
		Hungary	
Ramp Rate Settings	>	EN50549-HU	
Active Power Settings	>	Netherlands	
Overfrequency Curve Settings	>	EN 50549 Netherland	



## 2.2.4 Inverter gird 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.

9:31 AM Inverter's Parameter	, & © ‰ ≑ ⊛ er	10:47 AM Parame	eter Settings For C
Function Settings	>	Start voltage (volt.) max limit	259.0 V(230-300)
Grid Standards Settings	VDE4105 >	Start voltage (volt.) min limit	199.5 V(45-230)
Parameter Settings For Starting		Start frequency (freq.) max limit	54.9 Hz(50-55)
Grid Voltage Protection	>	Start frequency (freq.) min limit	49.5 Hz(45-50)
Grid Frequency Protection Reconnection Time Settings	>		
Other Protection Settings	>		Settings
Active Power Settings	>		
Overfrequency Curve Settings	>		
Overvoltage Curve Settings	>		
Static Reactive Power Configuration	>		
Time constant (3τ)	>		
Fixed PF Settins	>		
Cosφ(P) Curve Settings	>		

Fig. 18: Parameter settings for starting



## 2.2.5 Inverter gird 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

9:31 AM & ♂ :	M 🗢 🐵	9:35 AM C Grid Volt	tage Prote	
Eurotion Sattings	× 1	3rd voltage (volt.) max limit	295.0	V(230-300)
Function Settings		3rd voltage (volt.) max limit trip time	4900	ms(0-300000)
Grid Standards Settings	DE4105 >	2nd voltage (volt.) max limit	299.0	V(230-300)
Parameter Settings For Starting		2nd voltage (volt.) max limit trip time	4900	ms(0-300000)
Parameter Settings For Starting		1st voltage (volt.) max limit	259.0	V(230-300)
Grid Voltage Protection		Tat voltage (volt.) max limit trip time	1900	ms(0-300000)
Grid Frequency Protection	>	3rd voltage (volt.) min limit	99.0	V(45-230)
Reconnection Time Settings	>	3rd voltage (volt.) min limit trip time	4900	ms(0-300000)
Other Protection Settings	>	2nd voltage (volt.) min limit	99.0	V(45-230)
		2nd voltage (volt.) min limit trip time	4900	ms(0-300000)
Active Power Settings	>	1st voltage (volt.) min limit	189.0	V(45-230)
Overfrequency Curve Settings	>	1st voltage (volt.) min limit trip time	1900	ms(0-300000)
Overvoltane Curve Settings		Voltage increase protection	259.0	V(230-280)
overvoltage ourve settinga		Voltage increase protection trigger time	20.0	ms(0-60000)
Static Reactive Power Configuration	>	Reconnect voltage (volt.) max limit	252.0	V(230-300)
Time constant (3τ)	>	Reconnect voltage (volt.) min limit	196.5	V(45-230)
Fixed PF Settins	>		Settings	
Cosφ(P) Curve Settings	>			

Fig. 19: Grid voltage protection



### 2.2.6 Inverter gird 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 ≤ The second maximum threshold ≤ 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

9:31 AM 总包: K Inverter's Parameter Setting	M \$ @	C Gric	Frequence rotection	80≫1≑G y
Eurotion Settinge	~	3rd frequency (freq.) max limit	51.0	Hz(50-55)
runcuon settings		3rd frequency (freq.) max limit trip time	300	ms(0-300000)
Grid Standards Settings	DE4105 >	2nd frequency (freq.) max limit	51.0	Hz(50-55)
Deserved and the first first first first		2nd frequency (freq.) max limit trip time	300	ms(0-300000)
Parameter Settings For Starting		1st frequency (freq.) max limit	51.0	Hz(50-55)
Grid Voltage Protection	>	1st frequency (freq.) max limit trip time	1900	ms(0-300000)
Grid Frequency Protection	-	3rd frequency (freq.) min limit	49.0	Hz(45-50)
Reconnection Time Settings	>	3rd frequency (freq.) min limit trip time	300	ms(0-300000)
Other Protection Settings	>	2nd frequency (freq.) min limit	45.0	Hz(45-50)
		2nd frequency (freq.) min limit trip time	300	ms(0-300000)
Active Power Settings	>	1st frequency (freq.) min limit	49.0	Hz(45-50)
Overfrequency Curve Settings	>	1st frequency (freq.) min limit trip time	1900	ms(0-300000)
Overvoltage Curve Sattings		ROCOF protection limit	10.0	Hz(0-10)
oreronage ourre oeneliga		ROCOF protection trip time	1000.0	ms(0-1000)
Static Reactive Power Configuration	>	Reconnect frequency (freq.) max limit	50.2	Hz(50-55)
Time constant (31)	>	Reconnect frequency (freq.) min limit	49.5	Hz(45-50)
Fixed PF Settins	5		Settings	
Cosø(P) Curve Settings	>			

Fig. 20: Grid frequency protection



# 2.2.7 Inverter gird 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.

9:31 AM Inverter's Paramet Setting	໕ ໊ ‰ 奈 ඔ er	9:41 AM Reco	nnection Time C Settings
Function Settings	>	Start connect time	69.0 s(30-1600)
		Reconnect time	<b>6</b> 9.0 s(30-1600)
Grid Standards Settings	VDE4105 >		
Parameter Settings For Starting	>		Settings
Grid Voltage Protection	>		
Grid Frequency Protection	>		
Reconnection Time Settings		→	
Other Protection Settings	>		
Active Power Settings	>		
Overfrequency Curve Settings	>		
Overvoltage Curve Settings	>		
Static Reactive Power Configuration	>		
Time constant (31)	>		
Fixed PF Settins	>		
Cosφ(P) Curve Settings	>		

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.

9:31 AM Inverter's Parameter Setting	1011 † G	9:44 AM C Active Pow	& ☺ ‰ ≑ ∞ ver Settings C
Function Settings	>	Active power limit Based on inverter rated power	100.0 %Pn(0-110)
Grid Standards Settings	VDE4105 >	Active power ramp-up gradient	610.0 %Pn/min(5650)
Parameter Settings For Starting	>	Active power ramp-down gradient	610.0 %Pn/min(5-650)
Grid Voltage Protection	>	Sett	ings
Grid Frequency Protection	>		
Reconnection Time Settings	>		
Other Protection Settings	>		
Active Power Settings	>		
Overfrequency Curve Settings	>		
Overvoltage Curve Settings	>		
Static Reactive Power Configuration	>		
Time constant (3τ)	>		
Fixed PF Settins	>		
Cosφ(P) Curve Settings	>		

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:  $\Delta P$  is the active power as a percentage of Pn, 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 Pn, the inverter provide hysteresis in the control of active power response to over-frequency.

Variable gradient and non-hysteresis:  $\Delta P$  is the active power as a percentage of PM, the inverter provide non-hysteresis in the control of active power response to over-frequency.

Variable gradient and hysteresis:  $\Delta P$  is the active power as a percentage of PM, 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,

fn: The rated frequency

freset: Reset frequency

fstart: Starting frequency

fstop: Stopping frequency

 $\Delta P$ : 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 fstart, 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 freset.



9:31 AM Inv	erter's Parameter Setting	& © 11 † ⊕ I	9:45 AM <	Overfreque Settir	ncy Curv ngs	e
ction Settings		>	Overfrequency pow P(f)	ver reduction mode	Act. power a	is a p
			Start frequency		50.2	Н
d Standards Setti	nas	VDE4105 >	Stop frequency		52.9	н
			Reset frequency		\$0.9	Н
rameter Settings	For Starting	>	Relative power red	uction [%]	100.0	3
d Vale as Destant	lee.		Intentional delay tir	me P(f)	0.0	5(
rid voitage Protect	tion		Min. delay time for	active power recovery	0.0	s(0
irid Frequency Prot	ection	>	Active power gradi frequency	ent after reset	16.67	%F
econnection Time ther Protection Se	Settings	>		Settir	igs	
ctive Power Settin	gs	>				
Verfrequency Curv	e Settings	-	➡			
Vervoltage Curve S	Settings	>				
Static Reactive Pow	er Configuration	>				
īme constant (3τ)		>				
ixed PF Settins		>				

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:  $\Delta P$  is the active power as a percentage of Pn, 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 Pn, the inverter provide hysteresis in the control of active power response to overvoltage.

Variable gradient and non-hysteresis:  $\Delta P$  is the active power as a percentage of PM, the inverter provide non-hysteresis in the control of active power response to overvoltage.

Variable gradient and hysteresis:  $\Delta P$  is the active power as a percentage of PM, the inverter provide hysteresis in the control of active power response to overvoltage.

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



Here,

fn: The rated voltage

freset: Reset voltage

fstart: Starting voltage

fstop: 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 Ustart, 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 Ureset.



■ <sup>6</sup> 加金 <sup>64</sup> メ Inverter's Param <u>eter</u>	<b>D</b> 1:45	ଅ™୍୷ାରି <sup>83</sup> ∕ Overvol	® tage Curve	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Setting		Se Se	ttings	0
Reconnection Time Settings	>	Overvoltage power reduction mode P(V)	None	Ŧ
Other Protection Settings	>	Start voltage	108.7	%Un(100-120)
		Reset voltage	108.0	%Un(100-135)
		Stop voltage	113.0	%Un(80-120)
Active Power Settings	>	Relative power reduction [%]	NA	%Pn/%Pm(10-100)
Querfrequency Curve Settings	5	Intentional delay time P(f)	1.0	s(0-1.6)
orenequency curre certaings		Min. delay time for active	NA	s(0-6000)
Overvoltage Curve Settings	)	Active power recovery gradient	100.0	%Pn/min(5-650)
Static Reactive Power Configuration	>	Se	ettings	
Time constant (3τ)	>			
Fixed PF Settins	>			
Cosφ(P) Curve Settings	>			
Fix Q Settings	>			
Q(U) Curve Settings	>			
Inverter Parameter Report	>			
		$\triangleleft$	0 1	

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.



Load-reference arrow system

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

Under-excited reactive power also kwon 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 maybe 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.

9:31 AM & ♂ 端 幸 ∞	11:08 AM ℓ ថ ﷺ ♥ Configuration Ok
Function Settings	Fix PF Regulation
	Cosφ(P) Curve Settings
Grid Standards Settings VDE4105 >	Fix Q Regulation
Parameter Settings For Starting	Curve Q(U)Regulation
Grid Voltage Protection	
Grid Frequency Protection	
Reconnection Time Settings	
Other Protection Settings	
Active Power Settings	
Overfrequency Curve Settings	
Overvoltage Curve Settings	
	<u> </u>
Static Reactive Power Configuration	
Time constant (3 $\tau$ ) $>$	
Fixed PF Settins >	
Cosφ(P) Curve Settings	

Fig. 25: Reactive running mode



# 2.2.12 Inverter reactive power setting: fixed power factor

The fixed displacement factor  $\cos \varphi \; \mbox{ can be set.}$ 

9:31 AM … <sup>(Д</sup> Inverter's Parameter	9:52 AM & © 24 ♥ @
Function Settings	PF Phase
Grid Standards Settings VDE4105 >	the first the second se
Parameter Settings For Starting	Settings
Grid Voltage Protection	
Grid Frequency Protection	
Reconnection Time Settings	
Other Protection Settings	
Active Power Settings	
Overfrequency Curve Settings	
Overvoltage Curve Settings	
Static Reactive Power Configuration	
Time constant (31)	
Fixed PF Settins 2	
Cosp(P) Curve Settings	

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 Pn and the displacement factor  $\cos \varphi$  .

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

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

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

9:31 AM A to ™ ♥ ∞	9:57 AM & ত ‰ ඥ @ < Cosφ(P) Curve Settings C
Function Settings	The first point
	P/Pn Cos(q) Phase
Grid Standards Settings VDE4105 >	39.0 %(10-100) 1.0 (0.8-1) reading *
	The second point
Parameter Settings For Starting >	P/Pn Cos(φ) Phase
Grid Voltage Protection >	59.0 %(10-100) 1.0 (0.8-1) leading *
	The third point
Grid Frequency Protection >	P/Pn Cos(φ) Phase
Reconnection Time Settings	59.0 %(10-100) 1.0 (0.8-1) leading v
Other Protection Sattings	The forth point
other Protection Settings	P/Pn Cos(φ) Phase
	99.0 %(10-100) 0.99 (0.8-1) lagging *
Active Power Settings	Activating voltage 109.0 %Un(80-120)
Overfrequency Curve Settings	Deactivating voltage \$109.0 %Un(80-120)
Overvoltage Curve Settings	Settings
Static Reactive Power Configuration	
Time constant (3 $\tau$ ) $>$	
Fixed PF Settins	
Cosφ(P) Curve Settings	

Fig. 27: Cos  $\Phi$  curve



# 2.2.14Inverter reactive power setting: fixed Q

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

■ "加会" <sup>64</sup> 約 く Inverter's Parameter Setting	9:58 AM & ♂ 2al ♥ 3b < Fix Q Settings C
Reconnection Time Settings	Q Phase
Other Protection Settings	and any
	Settings
Active Power Settings	
Overfrequency Curve Settings	
Overvoltage Curve Settings	
Static Reactive Power Configuration	
Time constant (3 r )	
Fixed PF Settins	
Cosφ(P) Curve Settings	
Fix Q Settings	<b>↓</b> →
Q(U) Curve Settings	
Inverter Parameter Report	

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 Un and the reactive power as a percentage of Pn.

Some grid company maybe requires two active power thresholds as a percentage of Pn 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 Pn corresponds to 'lock-in' active power.

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

■ "Jul © 14 Known Setting	72% 💷) 1:45	10:53 / <	AM Q	(U) Cur	ve Settir	& © ⊒a ਵ ngs	°® C
Reconnection Time Settings	>	The first	point				
		U/Un		Q/Sn		Phase	
Other Protection Settings	>	93.0	%(80-120)	60.0	%(0-65)	leading *	
		The seco	ond point				
Active Power Settings	>	U/Un		Q/Sn		Phase	
1 Augustation (1999) (*1998) 200 (80) - 200 (80)		97.0	%(80-120)	0.0	%(0-65)	leading *	•
Overfrequency Curve Settings	>	The third	l point				
Querustana Curus Sattinga		U/Un		Q/Sn		Phase	
Overvoitage Curve Settings	1	113.0	%(80-120)	0.0	%(0-65)	leading *	
		The forth	n point				
Static Reactive Power Configuration	>	U/Un		Q/Sn		Phase	
Time constant (31)	>	117.0	%(80-120)	60.0	%(0-65)	lagging *	
Fixed PF Settins	>	Activatir percenta	ng power a age of Pn	s a	Þ	0.0 %Pn(0-100	1)
Cosφ(P) Curve Settings	>	Deactiva percenta	ating powe age of Pn	r as a	5	10 %Pn(0-100	0)
Fix Q Settings	>			Se	ettings		
Q(U) Curve Settings		-					
Inverter Parameter Report	>						
< ○ □							

Fig. 29: Q-U curve



### 2.2.16 Inverter parameters report

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

- ひ Export inverter parameter in file
  - 1 After grid parameter setting, press "Inverter Parameter Report" menu, and gird 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

■ #all ® #4	<b>D</b> 1:45	
Reconnection Time Settings	>	
Other Protection Settings	>	
Active Power Settings	2	
Overfrequency Curve Settings	>	
Overvoltage Curve Settings	>	
Static Reactive Power Configuration	>	
Time constant (3τ )	>	
Fixed PF Settins	>	
Cosq(P) Curve Settings	>	
Fix Q Settings	>	
Q(U) Curve Settings	>	
Inverter Parameter Report	-	
< 0 □		

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.

- ひ 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.

Inverter List	Settings
1, 🔀 5.0NX12000087(ModBus:3)	Inverter's Details
-	
	Inverter's Parameter Setting
	< Inverter List

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

U 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 <u>www.kaco-newenergy.com</u> 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**.

	K Monitor Device Details	
Zero Export Se	etting	>
Inverter List		>
WLAN	WiFI Stick测试 华为到	荣耀 >
Firmware Upda	ate 19801-00	eor >
Tool	CIICI	>
Monitor Device	e Details	>
Connected clo	oud platform:	<b>S</b>
Time:	09:11 01/04/202	0
Reset Monitor		¢
Restart Monito	or	Ð

Fig. 31: Wi-Fi stick firmware



# 3.2 Inverter firmware update

U 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 filei masterVxxx-xxx.bin from the firmware path.
- 5 Click on "Local upgrade" under "Safety" and select the file safetyVxxx-xxxxx.bin from the firmware path..

> You have successfully completed the firmware update.

K Monitor Device Details		K Firmware U	lpdate	< Inverter Update	
Zero Export Setting	>	Monitor	Inverter	Please do not during the firm	access the monitoring device via other terminals ware upgrade process
Inverter List	>	Please do not access the monit during the firmware upgrade pro	oring device via other terminals	Master	
WLAN W	ViFI Stick测试 华为荣耀 >	1 , 🔀 RG50006012040003	>	Local Version:	rade
Firmware Update		click	<b>K</b>	Slave Local Version:	V610-01050-04
Tool	>			🟠 Local upg	rade
Monitor Device Details				Safety	
		×		Local Version:	/610-10004-04
Connected cloud platform:	0			🟠 Local upg	rade
Time:	09:11 01/04/2021 0				
Reset Monitor	<b>\$</b>				
Restart Monitor	$\odot$				

#### 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.

3014901-03-220524



