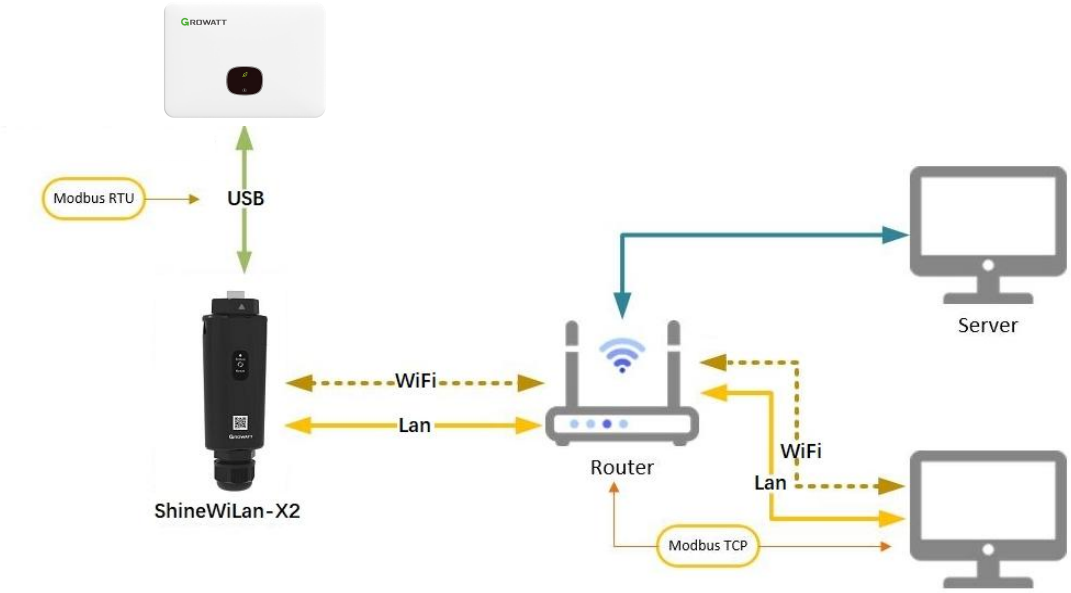
Single Device Control via Growatt Modbus TCP (ShineWiLan-X2)

Allow your PV system to be flexibly controlled by the third party platform

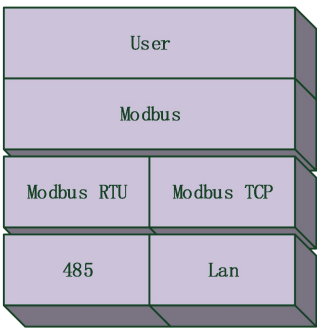
ShineWiLan-X2 is Growatt newest single-device datalogger, which supports remote monitoring and control, also could be used for the local configuration. Integrated with WiFi, Lan and Bluetooth module, the network configuration experience and success rate have been greatly improved compared with the old version device. And it also could be used to support third party control based on MODBUS TCP protocol. This paper will introduce the function in detail.

System Topology Diagram



To realize the MODBUS TCP control, the third party system is connected to the router through a LAN cable, the ShineWiLan-X2 is connected to the router through WiFi or Lan cable, and the ShineWiLan-X2 communicates with the inverter via the USB port.The communication protocol between the third-party system and ShineWiLan-X2 is Modbus TCP, and the protocol between ShineWiLan-X2 and inverter is Modbus RTU. ShineWiLan-X2 is acting as an intermediary to convert Modbus TCP protocol to Modbus RTU protocol. Customers still need to read and set the value of the inverter according to Growatt's inverter protocol registration table.

Description of Modbus protocol



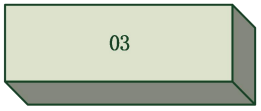
- Modbus TCP and Modbus RTU are both Modbus protocols. Due to the different media (RS485 and LAN), there is a little difference in the data format of the protocols.
- Modbus RTU protocol data format:

- Modbus TCP/IP protocol data format:

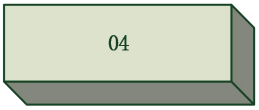
- Modbus TCP and Modbus RTU are both Modbus protocols, but the connection methods used are different. Except for the difference in the data header and inspection method, the content format of the data read from the slave is the same.

- Function Code Description

Commonly used function codes are: 03 and 04:

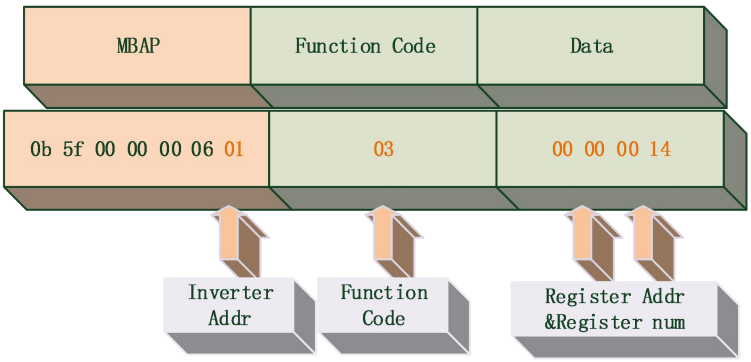


03 is Holding Register()



04 is Input Register()

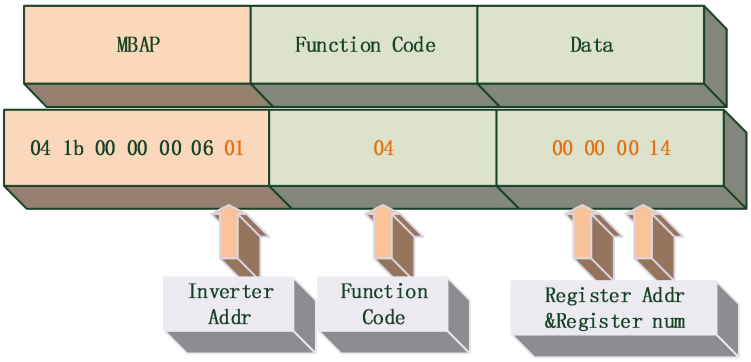
- If a third-party platform wants to read the holding registers (0~19 address) of the No. 1 inverter, it needs to use the 03 command code.



The above is a case sent by the third-party platform to ShineWiLan-X2,among which there are 7 bytes in MBAP, the seventh byte 01 is the inverter address. The middle part is the Function Code, 03. And the Data area is based on Growatt Modbus RTU protocol, the first two bytes 00 00 to indicate the start address of the register: the start address is 0; and the last two bytes 00 14 are the number of addresses, which need to be converted into decimal, (the bytes are hexadecimal), 00 14

converted to decimal is 20, which means there are 20 addresses.

- If the third-party platform needs to read the input registers (0-19 address) of the No. 1 inverter, it needs to use the 04 Function Code.



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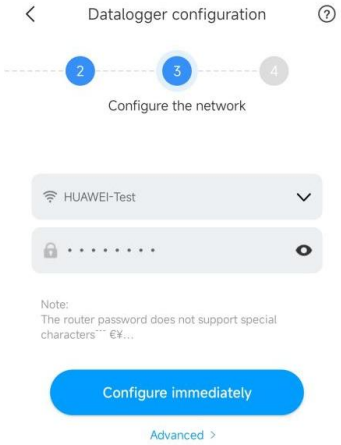
4. How does the third party system read the inverter register data through ShineWiLan-X2

- The third-party system reads the data of the inverter through ShineWiLan-X2, which is to ask ShineWiLan-X2 to obtain the data of a certain register of the inverter. ShineWiLan-X2 will read the data according to the register address required by the third-party system and return the data to the third-party system. For the register table, please refer to the Growatt inverter Modbus RTU protocol file.
- The register table in Growatt inverter Modbus RTU protocol file is only applicable to Growatt's inverter as the file list

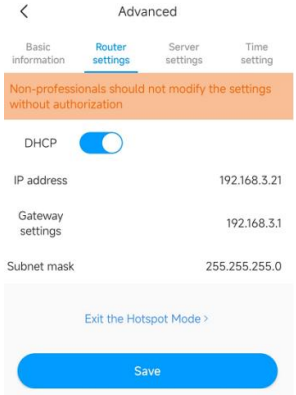
5. **IP Address Configuration between ShineWiLan-X2 and third-party platform**

- It is necessary to ensure that ShineWiLan-X2 and the third-party system are in the same LAN system (e.g., under the same router).
- For example, if the network segment of the LAN is 192.168.3.x, the IP of the ShineWiLan-X2 could be set to the static IP: 192.168.3.8. Or you can obtain the IP address assigned by the router automatically by enable the DHCP function (Note: DHCP is enabled by default for ShineWiLan-X2)
- Below are the configuration process of ShineWiLan-X2 datalogger to the server with the static IP:

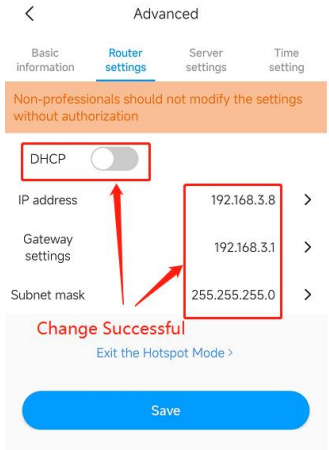
(1) Enter the "Configure the network" interface under the Hotspot Mode in the ShinePhone APP.



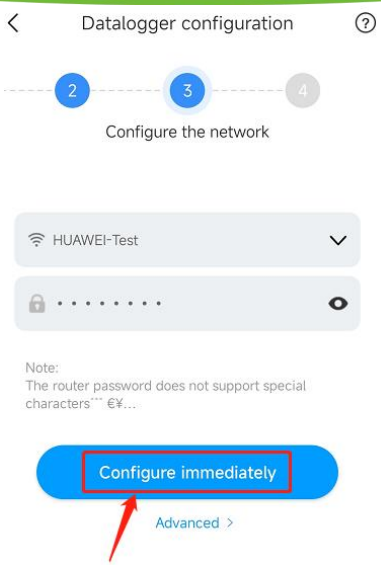
(2) Click "Advanced" to enter the advanced settings, select "Router settings", enter password "growatt+YYMMDDDD", such as: "growatt20231121", you can switch the DHCP and modify the IP address, gateway address and subnet mask.



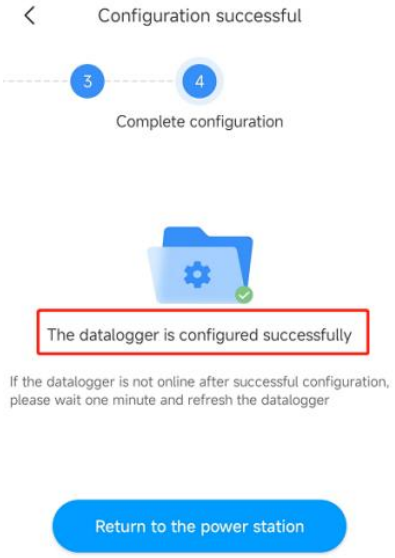
(3) Turn off DHCP, change the IP to 192.168.3.8, change the gateway address to 192.168.3.1, the subnet mask to 255.255.255.0 by default.



(4) Return to the "Configure the network" interface, fill in the WiFi name and password that the ShineWiLan-X2 needs to connect to, and then click the "Configure immediately" button to configure the network. If you connect ShineWiLan-X2 and router via Lan cable, the "Configure immediately" step could be skipped.



(5) After network configuration success, you can use the Modbus TCP function according to the following steps.



- If your routing network does not require a specified IP (static IP), it is recommended to use the default DHCP function of ShineWiLan-X2. In this way, you only need to configure the WiFi account and password of ShineWiLan-X2, or use an Lan cable to connect to the router in the same network. No additional configuration is required for ShineWiLan-X2.
- The IP of the third-party platform is set to 192.168.3.7 (it should between 192.168.3.2 and 192.168.3.254 and can not use the same IP as ShineWiLan-X2)

6. Configuration of third-party system

- The IP of the third party system is set to 192.168.3.8 and needs to be on the same LAN as ShineWiLan-X2 (e.g.,under the same router).

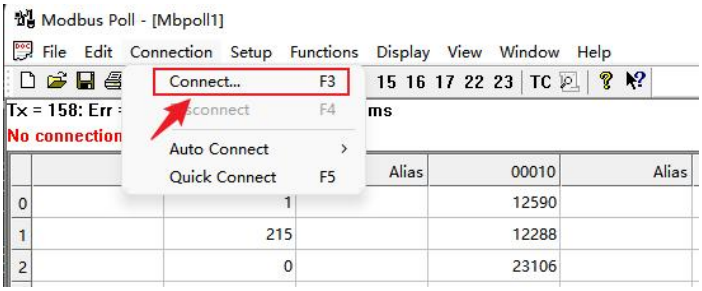
7. How to use a third-party system to read inverter data

- The simulation software of the third-party system may have a different operation interface, but you can refer to the following process.
- The inverter data reading is according to the register table of Growatt inverter Modbus RTU protocol file.

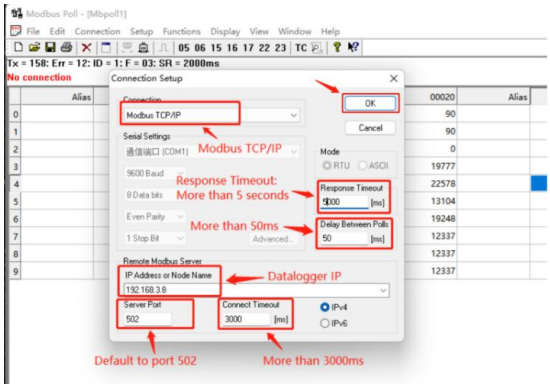
e.g.

Read the register of the inverter whose address is 1, Function Code, 03, read 0-124, 125~249 in two segments, a total of 250.

Third party systems connect to the ShineWiLan-X2 through Modbus TCP:



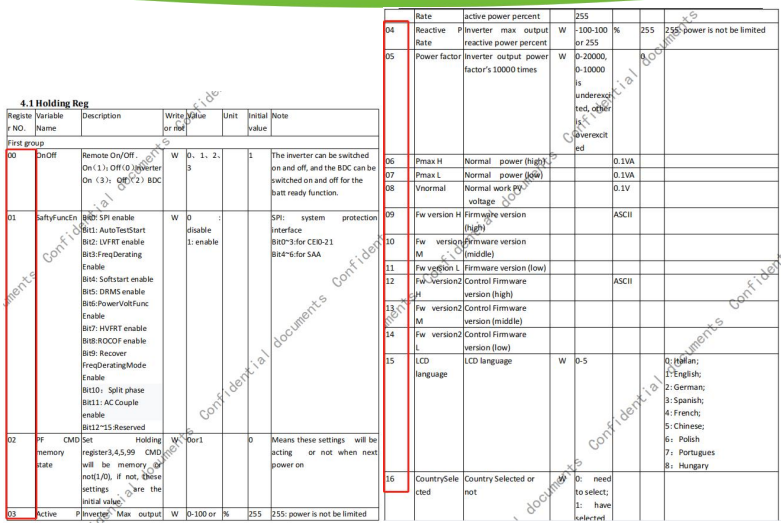
Click on "Connect" to link up.



Configuration of connection parameters

Click OK to connect. If the connection is not successful, please make sure that the connection parameters are configured correctly and that the IP of the ShineWiLan-X2 is set to static.

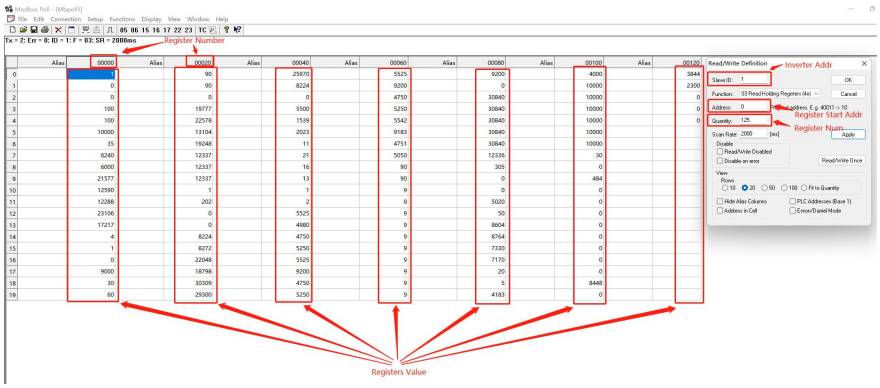
According to Growatt inverter Modbus RTU protocol file.



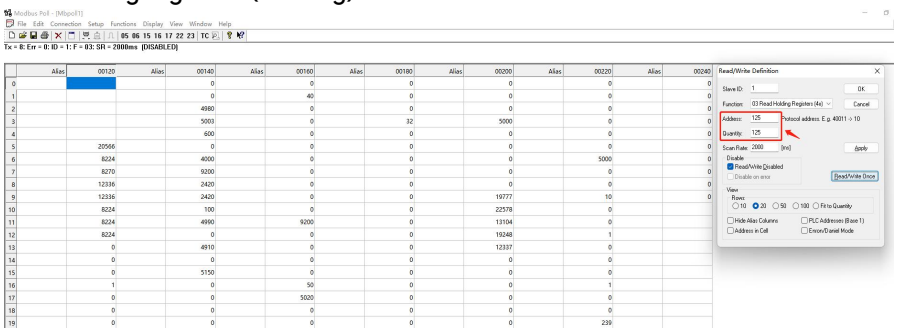
4.1 Holding Reg

Register NO.	Variable Name	Description	Write or not	Value	Unit	Initial value	Note
First group							
00	OnOff	Remote On/Off On（1）; Off（0）inverter On（3）; Off（2）BDC	W	0、1、2、3		1	The inverter can be switched on and off, and the BDC can be switched on and off for the batt ready function.
01	SaftyFuncEn	BIT0: SPI enable Bit1: AutoTestStart Bit2: LVFRT enable Bit3:FreqDerating Enable Bit4: Softstart enable Bit5: DRMS enable Bit6:PowerVoltFunc Enable Bit7: HVFRT enable Bit8:ROCOF enable Bit9: Recover FreqDeratingMode Enable Bit10：Split phase Bit11: AC Couple enable Bit12~15:Reserved	W	0：disable 1: enable			SPI: system protection interface Bit0~3:for CEI0-21 Bit4~6:for SAA
02	PF CMD memory state	Set Holding register3,4,5,99 CMD will be memory or not(1/0), if not, these settings are the initial value	W	0or1		0	Means these settings will be acting or not when next power on
03	Active P Rate	Inverter Max output active power percent	W	0-100 or 255	%	255	255: power is not be limited
04	Reactive P Rate	Inverter max output reactive power percent	W	-100-100 or 255	%	255	255: power is not be limited
05	Power factor	Inverter output power factor's 10000 times	W	0-20000, 0-10000 is underexcited, other is overexcited		0	
06	Pmax H	Normal power (high)				0.1VA	
07	Pmax L	Normal power (low)				0.1VA	
08	Vnormal	Normal work PV voltage				0.1V	
09	Fw version H	Firmware version (high)				ASCII	
10	Fw version M	Firmware version (middle)					
11	Fw version L	Firmware version (low)					
12	Fw version2 H	Control Firmware version (high)				ASCII	
13	Fw version2 M	Control Firmware version (middle)					
14	Fw version2 L	Control Firmware version (low)					
15	LCD language	LCD language	W	0-5			0: Italian; 1: English; 2: German; 3: Spanish; 4: French; 5: Chinese; 6：Polish 7：Portugues 8：Hungary
16	CountrySelected	Country Selected or not	W	0: need to select; 1: have selected			

Read the inverter 0~124 holding registers (Holding)::

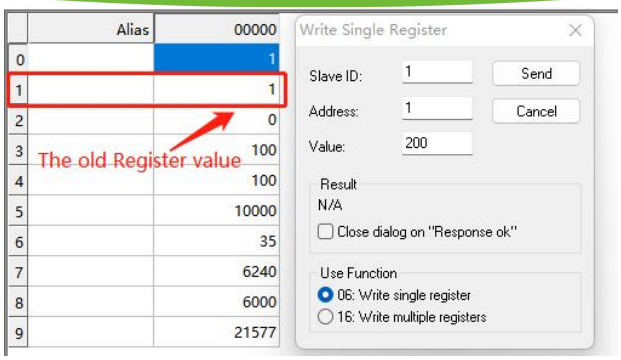


Read the inverter 125~249 holding registers (Holding)

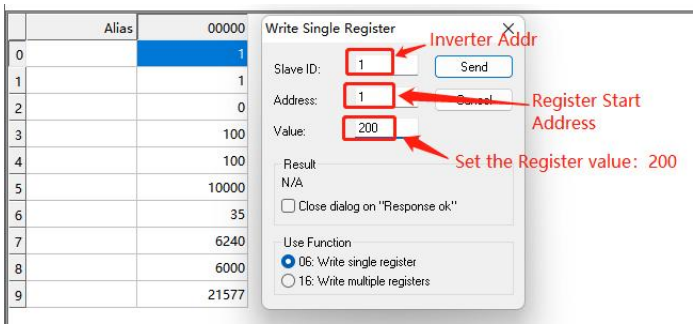


- **Set the 03 section of the inverter 1, and set the address 1 of the register to 200 and read.**

First check section 03 of inverter 1, the original value of register 1 is 1.



Modify the value of register 1 to 20



Modify successfully: