Growatt Monitoring Solutions

With the development of the PV industry, the PV system today is not only a power generation system, but also an intelligent energy management system. In order to achieve remote monitoring, operation, maintenance and intelligent control, the monitoring systems are now an important part of the PV system.

To meet the needs of different applications, Growatt gives customers many options for communication such like WLAN, GPRS, RF, LAN or RS485. Customers can flexibly choose communication device according to the actual situation of the solar system.

1.Single Inverter Monitoring

The monitoring equipment of single inverter should be convenient, stable and cost-effective. Now the common single inverter communication modes on the market are WiFi, GPRS and LAN etc. The following will introduce several single inverter communication devices from Growatt.

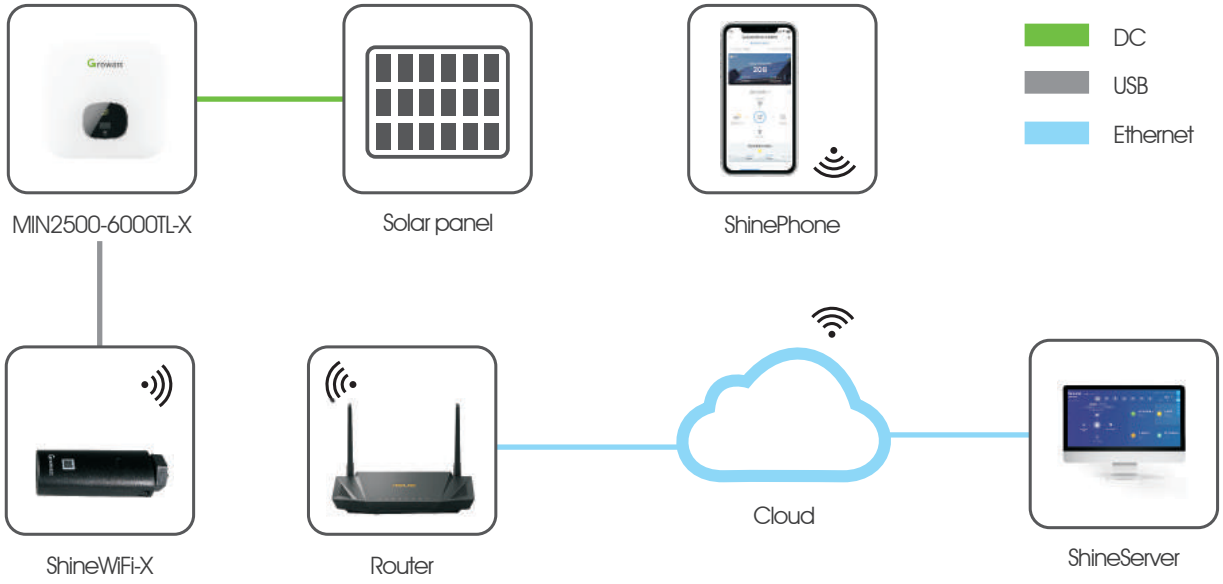
1.1.WLAN

We recommend using WLAN communication device in the power station with only one inverter and where the site has a router.
Growatt Shine WiFi-S and Growatt Shine WiFi-X are the WLAN communication devices, the difference between Growatt Shine WiFi-S and Growatt Shine WiFi-X is that WiFi-S is suitable for Growatt -S series inverters with RS232 interface, while WiFi-X is suitable for Growatt new generation -X series with USB interface*[1].

Growatt Shine WiFi-S

Growatt Shine WiFi-X

Growatt Shine WiFi-S/-X will collect the data from inverter and then through the router to upload the data to the Growatt Server. Register and login to Growatt ShineServer & ShinePhone system, you will be able to achieve remote monitoring, operation and maintenance of the inverter. The Shine WiFi-S/-X can storage the data up to 40 days, even if the network communication is interrupted for many days, when the network communication is restored, all the previous data will be uploaded again.



Growatt Shine WiFi-X (Same like –S series) System diagram

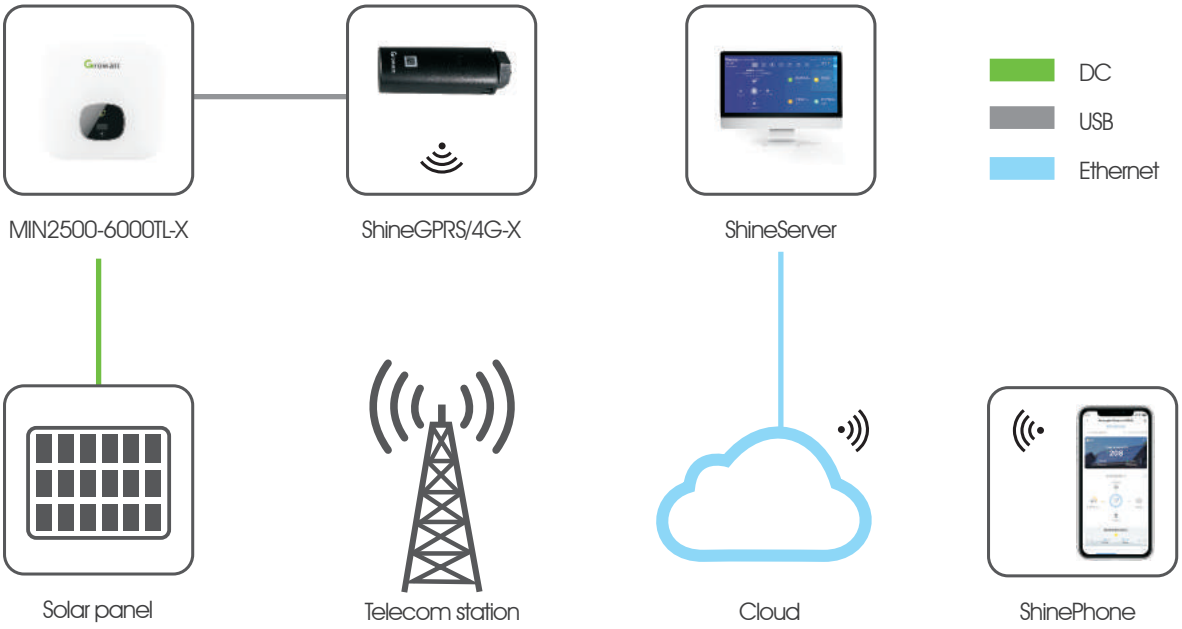
1.2.GPRS/4G

For the site with single inverter but in the rural area without local network we will suggest to use GPRS/4G communication devices. These devices can communicate directly with the base stations of local mobile network operators and transmit data to the server.Growatt ShineGPRS/4G and ShineGPRS/4G-X*2 are the best solution for single inverter monitoring in rural area.

Growatt ShineGPRS/4G

Growatt ShineGPRS/4G-X

ShineGPRS/4G(-X) will collect the data from inverter then communicate with local Telecom base station, through the base station, the data of inverter will be upload to the Server. To realize the communication between ShineGPRS/4G(-X) and local base station, SIM card is necessary. In order to allow customers to conveniently use Growatt ShineGPRS 4G(-X) around the world, ShineGPRS/4G(-X) can compatible with 2G, 3G and 4G communication protocols and also can compatible with SIM cards of more than 100 operators. The monthly communication tariff is only tens of megabytes. Only when it need firmware upgrade will it consume more tariff, but it will not exceed 200Mb per month at most.



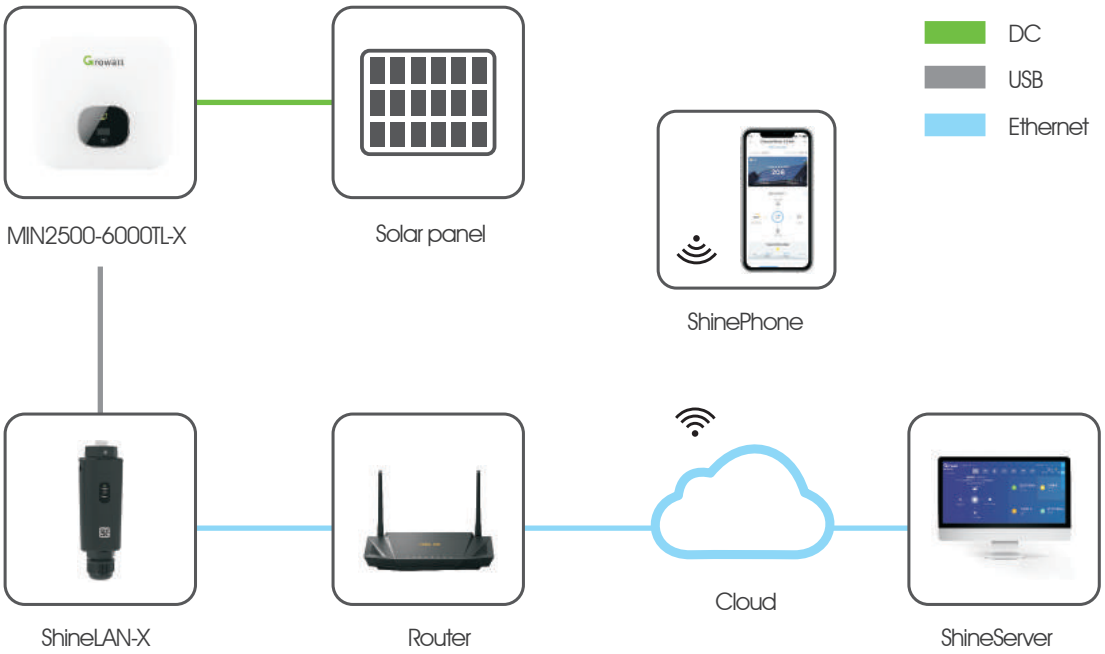
Growatt ShineGPRS/4G -X System diagram

1.3.LAN

In some places with routers and simple environment suitable for wiring, using LAN communication is also a recommended method. To meet this kind demand of customer and also for supply a simple way to monitor the inverter, Growatt ShineLAN-X is the right device for LAN connection. (ShineLAN-X only available for Growatt –X series inverters)

Growatt ShineLAN-X

Customers only need to simply plug the ShineLAN-X into the inverter and then connect the router's network cable to the ShineLAN-X, the communication between inverter and Server will be automatically established. It is quite simple that it only need to connect the cable rather than configure the WiFi or worry about the data consumption of GPRS.



Growatt ShineLAN-X system diagram

2.Multiple Inverters Monitoring

For the PV plants with many inverters and large capacity, the field environment is usually more complicated. In order to achieve centralized monitoring of a large number of inverters, batch operation and maintenance, a reliable and stable monitoring device which can monitor multiple inverters is necessary.

In order to achieve multi-inverters communication, there are two common methods. One is that all inverters communicate with the data logger and then the data is transmitted to the cloud by the data logger; the other is that the inverters communicate with each other, then, the host inverter transmits all inverter data to the data logger and then the data logger uploads the data to the server. Usually, for the device quantity below 10, the data logger can directly collect the data from the inverter through WiFi, GPRS or RS signal. However, when the quantity is more, usually the inverters will firstly realizes master-slave communication through RS485 then the master inverter connect with data logger.

2.1. ShineLink/ShineLink-X (RF signal)

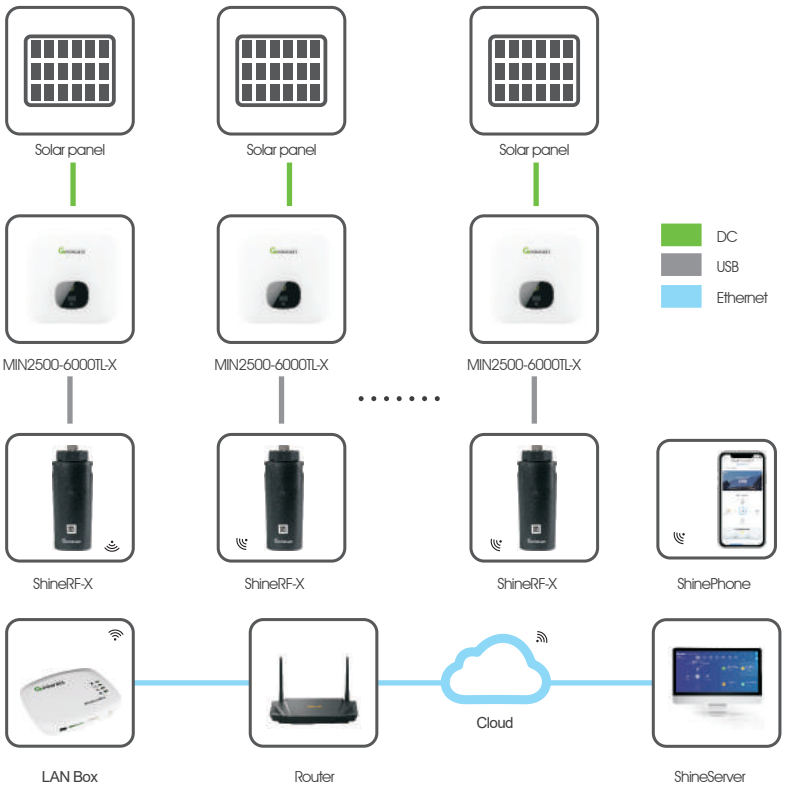
As mentioned above, when the PV plant needs multiple inverters monitoring but the number of inverters is small, It's better to make the inverter to communicate directly with data logger. Growatt ShineLink/ShineLink-X are the devices design for small quantity multiple inverters monitoring. The ShineLink/ShineLink-X is consist with LAN box and RF sticks:

Growatt ShineLink

Growatt ShineLink-X

ShineLink is so simple to be used that the customer only need to plug the RF sticks into the inverters and connect the LAN box with local router through Ethernet cable, then the RF stick will transmit the data of inverter to LAN box through RF433 signal and the LAN box will upload the data to the Internet (An RF signal is an electromagnetic wave that communications systems use to transport information through air from one point to another).

Compare with WiFi signal, RF433 communication has longer communication distance. Using ShineLink/ShineLink-X can realize up to 120m communication distance between inverter and LAN box (Without wall). The LAN box can monitoring up 8 devices remotely which is very suitable for the plant with multiple inverters but not too much and also need wireless communication.



Growatt ShineLink-X（Same like ShineLink） system diagram

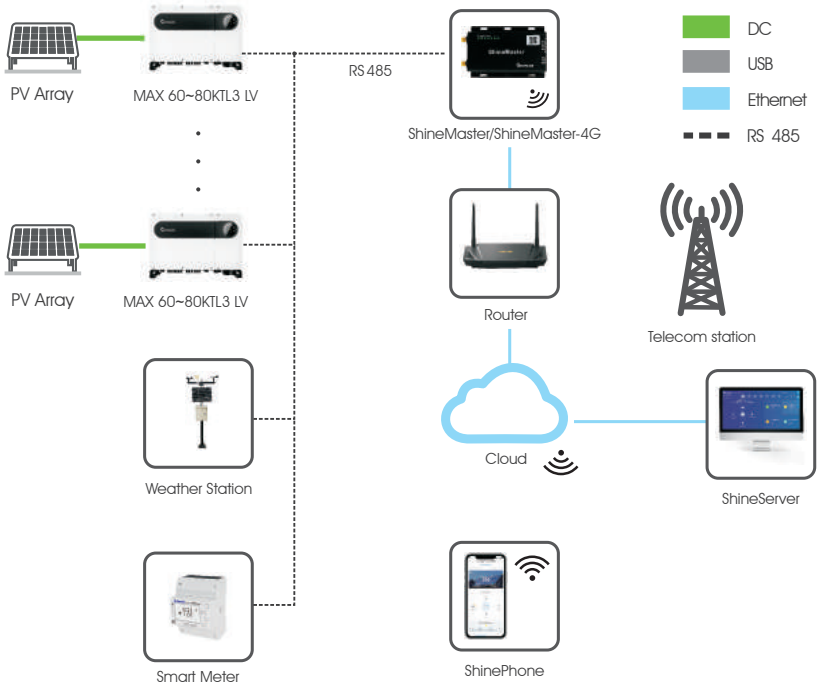
2.2.ShineMaster/ShineMaster-4G

For commercial or utility project, usually the number of inverters may reach as many as dozens. In this situation, it's not reliable to let each inverter to communicate with data logger directly. In order to ensure the stability and accuracy of the monitoring system, it's necessary to connect the inverter together then through the master inverter to transmit the data of all inverters to data logger.

Growatt ShineMaster/ShineMaster-4G are the devices for big commercial or utility project (The difference between ShineMaster and ShineMaster-4G is ShineMaster-4G can communicate with Server by 4G remotely and Shinemaster-4G can connect double devices than normal ShineMaster).

Growatt ShineMaster/ShineMaster-4G

Growatt inverters can be connected to each other by RS485 first and then connected to the ShineMaster through the master inverter. In the meantime, expect the inverter, the device with RS485 can also be connected into the system, such like smart meter or weather station (ShineMaster can compatible with maximum 32 devices and for ShineMaster-4G can compatible with maximum 64 inverters). ShineMaster will collect all the data through RS485 and then upload the data through local router which connected by the Ethernet cable (For ShineMaster-4G, customer can choose connect the ShineMaster to router by Ethernet or choose to insert a SIM to upload the data through local base station remotely).



Growatt ShineMaster/ShineMaster-4G System diagram

In order to facilitate the installation and configuration of the system, the ShineMaster/ ShineMaster-4G have internal web page for configuration. Through the internal web page, customer can easily add & delete devices, setting network and even control the power limitation (Need combine with smart meter).

Growatt ShineMaster/ShineMaster-4G internal web page

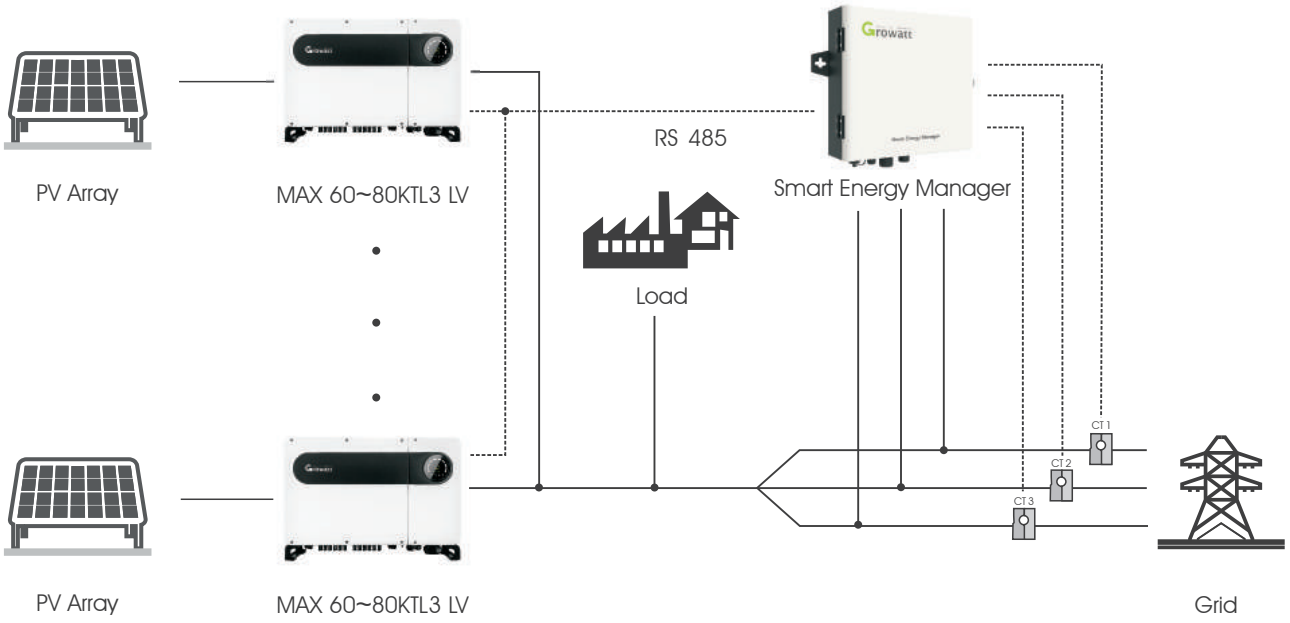
2.2.Smart Energy Manager

Just like mentioned in the beginning, the PV system today is not only a power generation system, but also an intelligent energy management system. For the big project, operators need more detail to monitor, schedule and maintain the plant. In addition, for complex big plant, the connection of the wire is also a problem. Therefore, the monitoring devices for big project shall both smart and easy to use.

Growatt Smart Energy Manager is the best solution for big plant, it is an update of ShineMaster Because in addition to the functions of the ShineMaster, it also integrates the meter and CT. Also it is even smarter, the monitoring platform of it can show more detail data compare than ShineMaster, it can show the real time system diagram, the self-consumption and more easy to control the inverter from the monitoring platform.

Growatt Smart Energy Manager

Same like ShineMaster, the inverters and the RS485 devices shall connect each other and then through the master inverter connect to Smart Energy Manager. In addition, it also need to connect with grid, the CT (Current Sensor) will help the Smart Energy Manager to measure AC side current in the big plant which even more than 2MW.

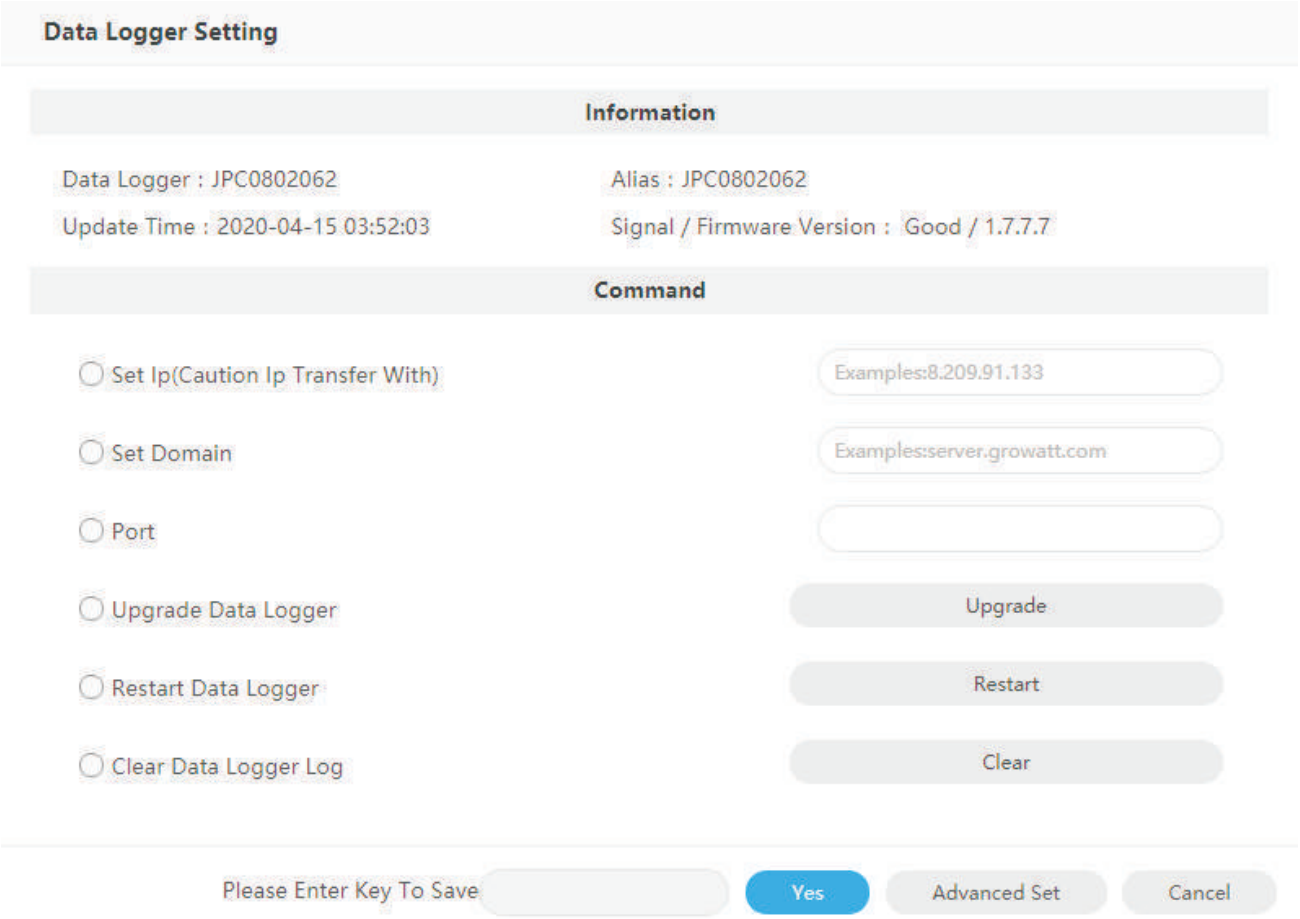


Growatt Smart Energy Manager System Diagram

Monitoring platform of Smart Energy Manager

2.4.Fixed IP address mode

For the customer who care about the data security and want to track the network operation, like in office, school or hospital, customer can fix the IP address of the data logger (Including all Growatt monitoring devices), the setting page shows like below:



Fixed IP address setting page

Conclusion

Intelligent monitoring, remote operation and maintenance are already essential features of future PV plants. In order to realize the intelligentization of PV systems, in addition to the inverter technology itself, it is also very important to choose suitable monitoring device for different environments and different plant scenarios. In order to ensure Growatt customers to choose the appropriate monitoring device, the following table will be a good reference. You can simply select monitoring device based on this table. For specific suggestions and detailed information, please consult Growatt.

Monitoring Device	Communication signal	Compatible models	Number of supported devices	Applicable scenarios
ShineWiFi-S	WiFi	All -S series	1	Single –S series Growatt inverter with router in plant and need wireless connection
ShineWiFi-X	WiFi	All -X series	1	Single –X series Growatt inverter with router in plant and need wireless connection
ShineGPRS/4G	GPRS/4G	All -S series	1	Single –S series Growatt inverter without router in plant and need wireless connection
ShineGPRS/4G-X	GPRS/4G	All -X series	1	Single –X series Growatt inverter without router in plant and need wireless connection
ShineLAN-X	Ethernet	All –X series	1	Single –X series Growatt inverter with router in plant and need wire connection
ShineLink	RF433/Ethernet	All –S series	8	Suitable for small plant with router and up to 8 Growatt –S series inverters need wireless communication;
ShineLink-X	RF433/Ethernet	All –X series	8	Suitable for small plant with router and up to 8 Growatt –X series inverters need wireless communication;
ShineMaster	RS485/Ethernet	Growatt C&I on-grid inverters	32	Suitable for C&I plant with router and up to 32 Growatt C&I inverters; Need to connect the RS485 communication line between inverters and RS485 devices.
ShineMaster-4G	RS485/Ethernet/4G	Growatt C&I on-grid inverters	64	Suitable for C&I plant with or without router and up to 64 Growatt C&I inverters; Need to connect the RS485 communication line between inverters and RS485 devices.
Smart Energy Manager	RS485/Ethernet	Growatt C&I on-grid inverters	32	Suitable for C&I plant with router and up to 32 Growatt C&I inverters which also require slef-consumption monitoring and smarter control; Need to connect the RS485 communication line between inverters and RS485 devices.

*1. The differences between all -S and -X series monitoring devices are same as described here.

*2. There also two models calls ShineWiFi-F and ShineGPRS-F which have same function like ShineWiFi-S/-X and ShineGPRS/4G(-X) but just used for Growatt off-grid inverters, the detailed of it will not be described here.

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Growatt New Energy