

Solax Power Single Phase External Communication Protocol V1.2

X1 Series



1. RS485 Parameter:

Parameter	Value
Speed	9600bps
Data bit	8
Parity	None
Stop bit	1
RS485 bus	2 wries A,B /4-wries T+, T-, R+, R-

2. Communication timing:

Timing parameter	Value
Delay before Inverter begins to send response	0~0.5 Sec
Inter-character delay	0~0.2 Sec
The least interval time between two instructions	0.5 Sec
Time out for Inverter communication	10 Min

3. Packet Format

Header	Source Address	Destination Address	Control Code	Function Code	Data length
2 Bytes (0x AA 55)	2 Bytes (0xXX 00)	2 Bytes (0x00 XX)	1 Byte	1 Byte	1 Byte (N)

Data0	Data1	Data2	Data3	...	Data(N-1)	Checksum
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes

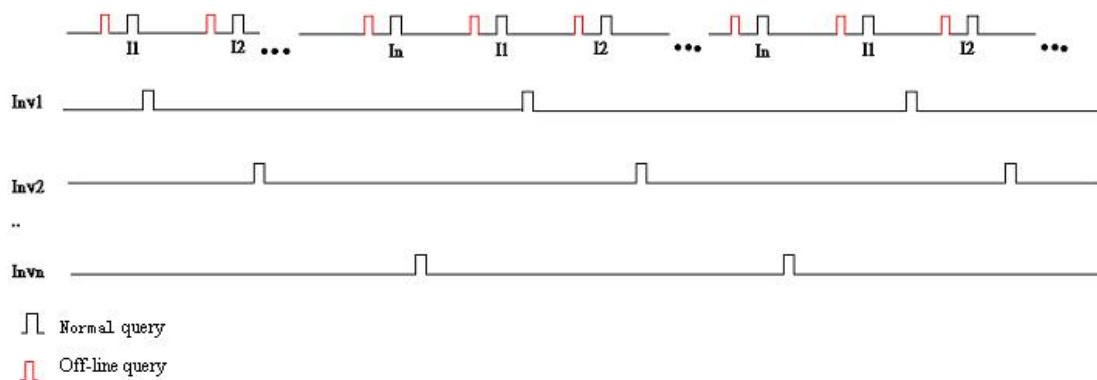
4. Description

	Description
Header (0xAA 0x55):	the header of each packet .
Source Address	designate the sender address . (it is XX00 for AP, or it is 00XX for Inverter)
Destination Address	designate the receiver address. (it is XX00 for AP, or it is 00XX for Inverter)
Control Code	there are 4 kinds: 1. Register(0x10) 2. Read(0x11) 3. Write(0x12) 4. Execute(0x13)

Function Code	
Data length	designate the data length. (If there is not the data column, the data length is 0)
Data0,1,2..	Data column
Checksum	Header + Source Address + Destination Address + Control Code +Function Code + Data length +Data0 + .. +Data (N-1)

5. Packet Communication Method

- It is necessary to get address from AP for each Inverter and the register address is unique for each Inverter.
- The communication method is as follows: AP is master and Inverter is slave, that is, firstly AP sends out the instruction to each Inverter and Inverter executes the operation when receiving its own instruction. Inverter can't actively send the instruction.
- The packet must include the sender and receiver address when AP sends query or control instruction to each Inverter. These instructions will be seen by all on-line Inverters. But the Inverter can only do when the instruction is suitable to its own address and the packet should include the sender and receiver address when Inverter responds to the instruction in the same way.
- AP routine query using the periodic query method (according to address ranking) is as follows:



- It will firstly be sent when AP needs to write the data or allocate address while the routine query will be postponed.
- If AP can't receive the correct response to the sent command in 0.5Sec, AP will send the instruction again after 0.5Sec(the least interval between instructions). When it can't also receive the response for 3 times, AP will cancel the register and no longer send the instruction to the address.

6. Control Code :0x10 'register'

Control code	Function code	Vector	Description
0x10	0x00	AP → Inverter	Off-line query

0x10	0x80	Inverter→AP	register request
0x10	0x01	AP →Inverter	send register address
0x10	0x81	Inverter→AP	address confirm
0x10	0x02	AP →Inverter	remove register
0x10	0x82	Inverter→AP	remove confirm
0x10	0x03	AP →Inverter	re-connect removed Inverter
0x10	0x04	AP →Inverter	Re-register

Off-line query Example:

- AP queries whether there is a new Inverter added (Control Code:0x10 Function Code 0x00)

Header	Source Address	Destination Address	Control Code	Function Code	Data length	Checksum
2 Bytes (0xAA 0x55)	2 Bytes (0XX 0x00)	2 Bytes (0x00 0xXX)	1 Byte (0x10)	1 Byte (0x00)	1 Byte (0x00)	2 Bytes

- The off-line Inverter reply register request(Control Code:0x10, Function Code 0x80)

Header	Source Address	Destination Address	Control Code	Function Code	Data length	Data0
2 Bytes (0xAA 0x55)	2 Bytes (0x00 0x00)	2 Bytes (0xXX 0x00)	1 Byte (0x10)	1 Byte (0x80)	1Byte (0x0E)	1 Byte

Data1	Data2	Data3	...	Data13	Checksum
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes

Description: Data0 to Data13 is Inverter serial number

- AP allocates address for Inverter (Control Code:0x10 Function Code 0x01)

Header	Source Address	Destination Address	Control Code	Function Code	Data length	Data0
2 Bytes (0xAA 0x55)	2 Bytes (0x00 0x00)	2 Bytes (0xXX 0x00)	1 Byte (0x10)	1 Byte (0x01)	1Byte (0x0B)	1 Byte

Data1	Data2	Data3	...	Data13	Data14	Checksum
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1Byte (register Address)	2 Bytes

Description: the rules of AP allocating address, Data0 to Data13 is Inverter serial number

- AP should record every allocated address of Inverter that has been registered and set up a

map for allocated address.

- AP will allocate a proper address to Inverter according to records of the map of allocated address.

■ Inverter reply address confirm (Control Code:0x10 Function Code 0x81)

Header	Source Address	Destination Address	Control Code	Function Code	Data length	Data0	Checksum
2 Bytes (0xAA 0x55)	2 Bytes (0x00 0xXX)	2 Bytes (0xXX 0x00)	1Byte (0x10)	1 Byte (0x81)	1Byte (0x01)	1Byte ACK(0x06)	2 Bytes

Description: The state of Inverter will be changed from ‘not registration’ state to ‘registration’ state after Inverter has finished the register program, then it will not respond to the ‘off-line query’ from AP.

6. Control Code :0x11 ‘Read’

Control code	Function code	Vector	Description
0x11	0x02	AP → Inverter	query normal info
0x11	0x82	Inverter → AP	Response for query
0x11	0x03	AP → Inverter	Read ID info
0x11	0x83	Inverter → AP	Response for ID info

Header	Source Address	Destination Address	Control Code	Function Code	Data length	Checksum
2 Bytes (0xAA 0x55)	2 Bytes (0xXX 0x00)	2 Bytes (0x00 0xXX)	1 Byte (0x11)	1 Byte (0x02)	1 Byte (0x00)	2 Bytes

The data response for normal query from inverter:

The following is the data part of the response package.

Header	Source Address	Destination Address	Control Code	Function Code	Data length
2 Bytes (0x AA 55)	2 Bytes (0xXX 00)	2 Bytes (0x00 XX)	1 Byte (0x11)	1 Byte (0x82)	1 Byte (N)

Data0	Data1	Data2	Data3	...	Data(N-1)	Checksum
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes

Data

Unit

Description

Length

Temperature	-	Temperature	2Byte
E-today	0.1KWH	Yield today	2Byte
Vpv1	0.1V	PV1 voltage	2Byte
Vpv2	0.1V	PV2 voltage	2Byte
Ipv1	0.1A	PV1 current	2Byte
Ipv2	0.1A	PV2 current	2Byte
Iac	0.1A	Current output	2Byte
Vac	0.1V	Grid voltage	2Byte
Frequency	0.01Hz	Grid frequency	2Byte
power	0.1w	Power output	2Byte
Not use	-	Not use	2Byte
E-total	0.1kwh	Yield total	4Byte
T-total	1hour	Runtime total	4Byte
Mode	-	Inverter mode	2Byte
GridVoltFault	0.1V	Grid voltage fault value	2Byte
GridFreqFalut	0.01Hz	Grid frequency fault value	2Byte
DCIFault	1mA	DC injection fault value	2Byte
TemperatureFault	-	Temperature fault value	2Byte
PV1Fault	0.1V	Pv1 voltage fault value	2Byte
PV2Fault	0.1V	PV2 voltage fault value	2Byte
GFCFault	1mA	GFC fault value	2Byte
ErrMessage	-	Error Message	4Byte

When sending the MSB will be firstly transmitted as a packet of word format.

The detail of "Run Mode":

Value	Mode
0	Wait Mode
1	Normal Mode
2	Fault Mode
3	Permanent Fault Mode

The detail of "ErrMessage":

//BYTE0

Uint16 TzProtectFault:1;//0

Uint16 MainsLostFault:1;//1

Uint16 GridVoltFault:1;//2

```

Uint16 GridFreqFault:1;//3
Uint16 PLLLostFault:1;//4
Uint16 BusVoltFault:1;//5
Uint16 BIT06:1;//6
Uint16 OciFault:1;//7    OciFault;
//BYTE1
Uint16 Dci_OCP_Fault:1;//8
Uint16 ResidualCurrentFault:1;//9
Uint16 PvVoltFault:1;//10
Uint16 Ac10Mins_Voltage_Fault:1;//11
Uint16 IsolationFault:1;//12
Uint16 TemperatureOverFault:1;//13
Uint16 FanFault:1;//14
Uint16 bit15:1;//15
//BYTE2
Uint16 SpiCommsFault:1;//16
Uint16 SciCommsFault:1;//17
Uint16 BIT18:1;//18
Uint16 InputConfigFault:1;//19
Uint16 EepromFault:1;//20
Uint16 RelayFault:1;//21
Uint16 SampleConsistenceFault:1;//22
Uint16 ResidualCurrent_DeviceFault:1;//23
//BYTE3
Uint16 BIT24:1;//24
Uint16 BIT25:1;//25
Uint16 BIT26:1;//26
Uint16 BIT27:1;//27
Uint16 BIT28:1;//28
Uint16 DCI_DeviceFault:1;//29
Uint16 OtherDeviceFault:1;//30
Uint16 BIT31:1;//31

```

The data response for ID info query from inverter:

array	detail
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Data9	1: single phase
Data10~data15	Rated power,(ascii char)
Data16~data20	Firmware ver (ascii char)
Data21~data34	Module name(ascii char)
Data35~data48	Factory name(ascii char)
Data49~data62	SerialNumber(ascii char)
Data63~data66	Rated bus voltage(ascii char)

7. Control Code :0x12 'Write

Control code	Function code	Vector	Description
0x12	0x0x	AP →Inverter	Write
0x12	0x8x	Inverter→AP	Return ACK

Header	Source Address	Destination Address	Control Code	Function Code	Data length	Data MSB	Data LSB	Checksum
2 Bytes (0xAA 0x55)	2 Bytes (0xFF 0x00)	2 Bytes (0x00 0xFF)	1 Byte (0x12)	1 Byte (0x0x)	1 Byte (0x02)	1Byte	1Byte	2 Byte

The following is the data part of the response package.

Header	Source Address	Destination Address	Control Code	Function Code	Data length
2 Bytes (0x AA 55)	2 Bytes (0xFF 00)	2 Bytes (0x00 XX)	1 Byte (0x12)	1 Byte (0x8x)	1 Byte

Data	Checksum
ACK(0x06)	2 Bytes
NACK(0x15)	

Function Code	-	-	Length
0x00	0.1v	PV start volt	2Byte
0x01	1s	Reconnect time	2Byte

0x04	0.1v	GridVoltLow	2Byte
0x05	0.1v	GridVoltHigh	2Byte
0x06	0.01Hz	GridFreqLow	2Byte
0x07	0.01Hz	GridFreqHigh	2Byte
0x08	0.1v	10min avg volt high	2Byte
0x09	1mA	DCI limits	2Byte
0x0A	0.1v	GridVoltLowSlow	2Byte
0x0B	0.1v	GridVoltHighSlow	2Byte
0x0C	0.01Hz	GridFreqLowSlow	4Byte
0x0D	0.01Hz	GridFreqHighSlow	4Byte
0x0F	NA	MSB:wPfSettingPoint1_Mode LSB:wPfSettingPoint2_PF	2Byte
0x10	NA	MSB:wPfSettingPoint3_PFUP LSB:wPfSettingPoint4_PFLOW	2Byte
0x11	NA	MSB:wPfSettingPoint5_PLOW LSB:wPfSettingPoint6_PUP	2Byte
0x12	1%	wAcPowerLimit	2Byte
0x13	0.01Hz	fFreqPoint	2Byte
0x14	2~12	fFreqDroop	2Byte
0x15	1%	wQuVrateUp	2Byte
0x16	1%	wQuVrateLow	2Byte
0x17	1Var	wQsetTemp	2Byte
0x18	0.01%	wgra	2Byte
0x19	0.1v	wv2	2Byte
0x1a	0.1v	wv3	2Byte
0x1b	0.1v	wv4	2Byte
0x1c	1%	wQurangeV1	2Byte
0x1d	1%	wQurangeV4	2Byte
0x1e	NA	bVoltPowerLimtit	2Byte
0x1f	NA	wPowerManagerEnable	2Byte
0x20	NA	wGlobalSeachMPPTStrartFlg	2Bytes
0x21	NA	wFrqProtectRestrictive	2Bytes
0x22	1s	wQuDelayTimer	2Bytes
0x23	1ms	wFreqActivePowerDelayTimer	2Bytes

8. Control Code :0x13 'Execute

Control code	Function code	Vector	Description
0x13	0x0x	AP → Inverter	Execute
0x13	0x8x	Inverter → AP	Return ACK

Header	Source Address	Destination Address	Control Code	Function Code	Data length	Data MSB	Data LSB	Checksum
2 Bytes (0xAA 0x55)	2 Bytes (0xFF 0x00)	2 Bytes (0x00 0xFF)	1 Byte (0x13)	1 Byte (0x0x)	1 Byte (0x02)	1Byte	1Byte	2 Byte

The following is the data part of the response package.

Header	Source Address	Destination Address	Control Code	Function Code	Data length
2 Bytes (0xAA 55)	2 Bytes (0xFF 00)	2 Bytes (0x00 XX)	1 Byte (0x13)	1 Byte (0x8x)	1 Byte

Data	Checksum
ACK(0x06)	2 Bytes
NACK(0x15)	

Function Code	-	-	Length
0x0F		Reserved	14byte
0x10		Reserved	14byte
0x11		Reserved	14byte
0x14		Set time (yy/mm/dd/hh/mm/ss)	6byte

校验和计算:

Checksum:

```
void sFillChecksum(UINT8 bLen)
{
    UINT8 i;
    UINT16 wChkSum;

    wChkSum = 0;
    for(i = 0; i <= (bLen + 8); i++)
    {
        wChkSum = wChkSum + bExternTxPackage[i];
    }
    bExternTxPackage[(bLen + 9)] = (UINT8)(wChkSum / 256);
    bExternTxPackage[(bLen + 10)] = (UINT8)(wChkSum % 256);
}
```