



Modbus-RTU protocol of Solax Power Single phase inverter

X1-Boost G3.0/G3.1/G3.2

Version 1.0

2021-10-29



History list:



1. RS485 Parameter:

Parameter	Value
Baud rate	9600bps
Data bit	8
Parity	None
Stop bit	1
RS485 bus	A(Data+); B(Data-)

2. Communication timing:

Timing parameter	Value
The least interval time between two instructions	1 Sec
Character-gap time out(silent time between 2 package)	>100ms
Response timeout	1 Sec

3. Read holding register

Function Code	Register	Name	R/W	Detail	Unit	Type	Len
0x03	0x00–0x2FF	Reserved	NA	System Reserved	NA	NA	NA
	0x300–0x306	SeriesNumber	R	14 Chars, MSB=SN[14]	14Chars	Uint16	7
	0x307–0x30D	FactoryName	R	14 Chars, MSB=FactoryName[14]	14Chars	Uint16	7
	0x30E–0x314	ModuleName	R	14 Chars, MSB=ModuleName[14]	14Chars	Uint16	7
	0x315–0x317	Reserved	NA	/	/	Uint16	3
	0x318	Reserved	NA	/	/	Uint16	1
	0x319	Reserved	NA	/	/	Uint16	1
	0x31A	Reserved	NA	/	/	Uint16	1
	0x31B	Reserved	NA	/	/	Uint16	1
	0x31C	Reserved	NA	/	/	Uint16	1
	0x31D	Reserved	NA	/	/	Uint16	1
	0x31E	Reserved	NA	/	/	Uint16	1
	0x31F	Reserved	NA	/	/	Uint16	1
	0x320	Reserved	NA	/	/	Uint16	1
	0x321	Reserved	NA	/	/	Uint16	1
	0x322	Reserved	NA	/	/	Uint16	1
	0x323	Reserved	NA	/	/	Uint16	1
	0x324	Reserved	NA	/	/	Uint16	1
	0x325	Reserved	NA	/	/	Uint16	1
	0x326	Reserved	NA	/	/	Uint16	1
	0x327	Reserved	NA	/	/	Uint16	1
	0x328	Reserved	NA	/	/	Uint16	1



	0x329	Reserved	NA	/	/	/	Uint16	1
	0x32A	Reserved	NA	/	/	/	Uint16	1
	0x32B	Reserved	NA	/	/	/	Uint16	1
	0x32C	Reserved	NA	/	/	/	Uint16	1
	0x32D	Reserved	NA	/	/	/	Uint16	1
	0x32E	Reserved	NA	/	/	/	Uint16	1
	0x32F	Reserved	NA	/	/	/	Uint16	1
	0x330	Reserved	NA	/	/	/	Uint16	1
	0x331	Reserved	NA	/	/	/	Uint16	1
	0x332	Reserved	NA	/	/	/	Uint16	1
	0x333	Reserved	NA	/	/	/	Uint16	1
	0x334	Reserved	NA	/	/	/	Uint16	1
	0x335	Reserved	NA	/	/	/	Uint16	1
	0x336	Reserved	NA	/	/	/	Uint16	1
	0x337	Reserved	NA	/	/	/	Uint16	1
	0x338	Reserved	NA	/	/	/	Uint16	1
	0x339	Reserved	NA	/	/	/	Uint16	1
	0x33A	Reserved	NA	/	/	/	Uint16	1
	0x33B	Reserved	NA	/	/	/	Uint16	1
	0x33C	Reserved	NA	/	/	/	Uint16	1
	0x33D	Reserved	NA	/	/	/	Uint16	1
	0x33E	Reserved	NA	/	/	/	Uint16	1
	0x33F	Reserved	NA	/	/	/	Uint16	1
	0x340	Reserved	NA	/	/	/	Uint16	1
	0x341	Reserved	NA	/	/	/	Uint16	1
	0x342	Reserved	NA	/	/	/	Uint16	1
	0x343	Reserved	NA	/	/	/	Uint16	1
	0x344	Reserved	NA	/	/	/	Uint16	1
	0x345	Reserved	NA	/	/	/	Uint16	1
	0x346	QCurve_FixQset	R	Fix Q Power	1Var	int16	1	
	0x347	QCurve_SetMode	R	Set Mode (off, UnderExcited, OverExcited, PF, Qu, FixQPower)	0~5	Uint8_ Hi		
				Set Pf Value				
	0x348	bQCurve_SetPf	R	Set Pf Value	0~100	Uint8_ Low	1	
	0x349	QCurve_CosP_Pf1Limit Up	R	Upper Limits Point1	0~100	Uint8_ Hi		
				Lower Limts Point2				
	0x349	QCurve_CosP_Pf4Limit Dn	R	Upper Limits Point4	0~100	Uint8_ Hi		
				Lower Limts Poin3				



		Upper					Low
	0x34A	Reserved	NA	/	/	Uint16	1
	0x34B	Reserved	NA	/	/	Uint16	1
	0x34C	Reserved	NA	/	/	Uint16	1
	0x34D	Reserved	NA	/	/	Uint16	1
						See Machine Type	
		PowerType	R	Machine Type		Uint8_ Lo	
	0x34E	Safety	R	Safety		See Safety	
						Uint8_ Hi	1
		Reserved	NA	/	0~3	Uint8_ Low	
	0x34F	PowerRatio	R	Percent of power limits	0.01	Hi	1
	0x350	Reserve	R	/	/	Uint16	1
	0x351	/	NA	/	/	Uint16	1
	0x352	DSP Firmware Version	R	DSP Version	/	Uint16	1
	0x353	ARM Firmware Version	R	ARM Version	/	Uint16	1
	0x354	ExportPower	R	Grid-Connected Power	1W	Uint16	1

Machine Type:

X1-BOOST

```
#define 3.0Kw 0
#define 3.3Kw 1
#define 3.6Kw 2
#define 4.2Kw 3
#define 4.6Kw 4
```

X1-MINI

```
#define 0.7Kw 5
#define 1.1Kw 6
#define 1.5Kw 7
#define 2.0Kw 8
#define 0.6Kw 9
```

X1-AIR

```
#define 2.5Kw 10
#define 2.8Kw 11
#define 3.3Kw 12
```

X1-BOOST

```
#define 5.0Kw 13
#define 5.3Kw 14
```



#define 5.98Kw 15
#define 6.0Kw 16
#define 5.5Kw 17

X1-MINI G3

#define 0.6Kw 18
#define 0.7Kw 19
#define 1.1Kw 20
#define 1.5Kw 21
#define 2.0Kw 22
#define 2.5Kw 23
#define 3.0Kw 24
#define 3.3Kw 25
#define 3.6Kw 26

Safety:

VDE0126	0
VDE4105	1
AS4777	2
G98	3
C10_11	4
TOR	5
EN50438_NL	6
Denmark2019_W	7
CEB	8
Cyprus2019	9
cNRS097_2_1	10
VDE0126_Greece	11
UTE_C15_712_Fr	12
IEC61727	13
G99	14
CQC	15
VDE0126_Greece_is	16
C15_712_Fr_island_50	17
C15_712_Fr_island_60	18
Guyana	19
MEA_Thailand	20
PEA_Thailand	21
cNewZealand	22
cIreland	23
cCE10_21	24



cRD1699	25
EN50438_Sweden	26
EN50549_PL	27
Czech_PPDS	28
EN50438_Norway	29
EN50438_Portug	30
cCQC_WideRange	31
BRAZIL	32
EN50438_CEZ	33
IEC_Chile	34
Sri_Lanka	35
BRAZIL_240	36
EN50549-SK	37
EN50549_EU	38
G98/NI	39
Denmark2019_E	40
RD1699_island	41
EN50549_Romania	42
Philippines60Hz	43
Mexico	44

Example:

QUERY	Example (Hex)
Field Name	
Slave Address	11
Function	03
Starting Address Hi	00
Starting Address Lo	6B
No. of Points Hi	00
No. of Points Lo	03
Error Check (LRC or CRC)	—

RESPONSE	Example (Hex)
Field Name	
Slave Address	11
Function	03
Byte Count	06
Data Hi (Register 40108)	02
Data Lo(Register 40108)	2B
Data Hi(Register 40109)	00
Data Lo(Register 40109)	00
Data Hi(Register 40110)	00
Data Lo(Register 40110)	64
Error Check (LRC or CRC)	—



4. Read input register

Function Code	Register	Name	R/W	Detail	Unit	Type	I
0x04	0x00-0x3FF	Reserved	NA	System Reserved	NA	NA	
	0x400	Vdc1	R	Pv1 input voltage	0.1V	Uint16	
	0x401	Vdc2	R	Pv2 input voltage	0.1V	Uint16	
	0x402	Idc1	R	Pv1 input current	0.1A	Uint16	
	0x403	Idc2	R	Pv2 input current	0.1A	Uint16	
	0x404	Vac	R	Grid Voltage	0.1V	Uint16	
	0x405	Reserved	NA	/	/	Uint16	
	0x406	Reserved	NA	/	/	Uint16	
	0x407	Fac	R	Grid Frequency	0.01Hz	Uint16	
	0x408	Reserved	NA	/	/	Uint16	
	0x409	Reserved	NA	/	/	Uint16	
	0x40A	Iac	R	AC current	0.1A	Uint16	
	0x40B	Reserved	NA			Uint16	
	0x40C	Reserved	NA			Uint16	
	0x40D	INVTemperatureDeg	R	Radiator Temperature	1°C	Uint16	
	0x40E	Pac	R	AC Output power	1W	Uint16	
	0x40F	RunMode	R	Inverter status(see below Run Mode)	/	Uint16	
	0x410	Reserved	NA	/	/	Uint16	
	0x411	Reserved	NA	/	/	Uint16	
	0x412	Reserved	NA	/	/	Uint16	
	0x413	Reserved	NA	/	/	Uint16	
	0x414	Pdc1	R	Power of DC1	1W	Uint16	
	0x415	Pdc2	R	Power of DC2	1W	Uint16	
	0x416	GridVoltFaultValue	R	Fault value of Grid Voltage	0.1V	Uint16	
	0x417	Reserved	NA	/	/	Uint16	
	0x418	Reserved	NA	/	/	Uint16	
	0x419	GridFreqFaultValue	R	Fault value of Grid Frequency	0.01Hz	Uint16	
	0x41A	Reserved	NA	/	/	Uint16	
	0x41B	Reserved	NA	/	/	Uint16	
	0x41C	DciFaultValue	R	Fault value of DCI	1mA	Uint16	
	0x41D	Reserved	NA	/	/	Uint16	
	0x41E	Reserved	NA	/	/	Uint16	
	0x41F	Pv1VoltFaultValue	R	Fault value of PV1 Voltage	0.1V	Uint16	
	0x420	Pv2VoltFaultValue	R	Fault value of PV2 voltage	0.1V	Uint16	
	0x421	INVTemperatureDegFalutValue	R	Fault value of Radiator temperature	1°C	Uint16	
	0x422	Gfcifaultvalue	R	Fault value of gfci	1mA	Uint16	
	0x423	YieldTotal.LSB	R	LSB of yield total	0.1Kwh	Uint16	



	0x424	YieldTotal.MSB	R	MSB of yield total			Uint16
	0x425	YieldToday.LSB	R	LSB of yield today			Uint16
	0x426	YieldToday.MSB	R	MSB of yield today		0.1Kwh	Uint16
	0x427	Inverter_FaultMessage.Word0	R	Word0 of Inverter_FaultMessage (LSB)	/		Uint16
	0x428	Inverter_FaultMessage.Word1	R	Word1 of Inverter_FaultMessage (MSB)	/		Uint16
	0x429	Reserved	NA	/	/		Uint16
	0x42A	Reserved	NA	/	/		Uint16
	0x42B	Reserved	NA	/	/		Uint16
	0x42C	ENVTemperatureDeg	R	Control Board Temperature	1°C		Uint16
	0x42D	ENVTemperatureDegFaultValue	R	Fault value of Control Board temperature	1°C		Uint16
	0x42E	Reserved	NA	/	/		Uint16
	0x42F	Manager_FaultMessage.All	R	Manager_FaultMessage	/		Uint16
	0x430	Reserved	R	/	/		Uint16
	0x431	Reserved	R	/	/		Uint16
	0x432	Reserved	R	/	/		Uint16
	0x433	Reserved	R	/	/		Uint16
	0x434	Reserved	R	/	/		Uint16

The detail of “Run Mode”:

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

The detail of “Inverter_FaultMessage”:

BIT31	Reserved	
BIT30	Other_DeviceFault	
BIT29	DCI_DeviceFault	
BIT28	Reserved	
BIT27	Reserved	
BIT26	Reserved	
BIT25	Reserved	
BIT24	GeneralHardLimitFault	
BIT23	ResidualCurrent_DeviceFault	
BIT22	SampleConsistenceFault	
BIT21	RelayFault	



BIT20	EepromFault
BIT19	InputConfigFault
BIT18	Reserved
BIT17	SciCommsFault
BIT16	SpiCommsFault
BIT15	EarthFault
BIT14	Reserved
BIT13	TemperatureOverFault
BIT12	IsolationFault
BIT11	Ac10Mins_Voltage_Fault
BIT10	PvVoltFault
BIT09	ResidualCurrentFault
BIT08	Dci_OCP_Fault
BIT07	Inv_OCP_Fault
BIT06	ExportHardLimitFault
BIT05	BusVoltFault
BIT04	PLLLostFault
BIT03	GridFreqFault
BIT02	GridVoltFault
BIT01	MainsLostFault
BIT00	TzProtectFault

The detail of “Manager_FaultMessage”:

BIT15	Reserved
BIT14	Reserved
BIT13	Reserved
BIT12	Reserved
BIT11	Reserved
BIT10	Reserved
BIT09	Reserved
BIT08	Reserved
BIT07	Reserved
BIT06	Reserved
BIT05	Reserved
BIT04	Meter_Error
BIT03	Reserved
BIT02	E2promError
BIT01	Reserved
BIT00	Reserved



Example:

QUERY	Example (Hex)
Field Name	
Slave Address	11
Function	04
Starting Address Hi	00
Starting Address Lo	08
No. of Points Hi	00
No. of Points Lo	01
Error Check (LRC or CRC)	—

RESPONSE	Example (Hex)
Field Name	
Slave Address	11
Function	04
Byte Count	02
Data Hi(Register 30009)	00
Data Lo(Register 30009)	0A
Error Check (LRC or CRC)	—

5. Calc CheckSum

```
Uint16 sGetCrc16(Uint8 *pData, Uint16 wDataLenth)
{
    static const Uint16 wCRCTable[] = {
        0X0000, 0XC0C1, 0XC181, 0X0140, 0XC301, 0X03C0, 0X0280, 0XC241,
        0XC601, 0X06C0, 0X0780, 0XC741, 0X0500, 0XC5C1, 0XC481, 0X0440,
        0XCC01, 0X0CC0, 0X0D80, 0XCD41, 0XF00, 0XCF01, 0XCE81, 0XE40,
        0XA00, 0XCAC1, 0xcb81, 0XB40, 0XC901, 0X09C0, 0X0880, 0XC841,
        0XD801, 0X18C0, 0X1980, 0XD941, 0X1B00, 0XDBC1, 0XDA81, 0X1A40,
        0X1E00, 0XDEC1, 0XDF81, 0X1F40, 0XDD01, 0X1DC0, 0X1C80, 0XDC41,
        0X1400, 0XD4C1, 0XD581, 0X1540, 0XD701, 0X17C0, 0X1680, 0XD641,
        0XD201, 0X12C0, 0X1380, 0XD341, 0X1100, 0XD1C1, 0XD081, 0X1040,
        0XF001, 0X30C0, 0X3180, 0XF141, 0X3300, 0XF3C1, 0XF281, 0X3240,
        0X3600, 0XF6C1, 0XF781, 0X3740, 0XF501, 0X35C0, 0X3480, 0XF441,
        0X3C00, 0XFCC1, 0XFD81, 0X3D40, 0FF01, 0X3FC0, 0X3E80, 0XFE41,
        0XFA01, 0X3AC0, 0X3B80, 0XFB41, 0X3900, 0XF9C1, 0XF881, 0X3840,
        0X2800, 0XE8C1, 0XE981, 0X2940, 0XEB01, 0X2BC0, 0X2A80, 0XEA41,
        0EEE01, 0X2EC0, 0X2F80, 0XEF41, 0X2D00, 0XEDC1, 0XEC81, 0X2C40,
        0XE401, 0X24C0, 0X2580, 0XE541, 0X2700, 0XE7C1, 0XE681, 0X2640,
        0X2200, 0XE2C1, 0XE381, 0X2340, 0XE101, 0X21C0, 0X2080, 0XE041,
        0XA001, 0X60C0, 0X6180, 0XA141, 0X6300, 0XA3C1, 0XA281, 0X6240,
        0X6600, 0XA6C1, 0XA781, 0X6740, 0XA501, 0X65C0, 0X6480, 0XA441,
        0X6C00, 0XACC1, 0XAD81, 0X6D40, 0XAF01, 0X6FC0, 0X6E80, 0XAE41,
        0XAA01, 0X6AC0, 0X6B80, 0XAB41, 0X6900, 0XA9C1, 0XA881, 0X6840,
        0X7800, 0XB8C1, 0XB981, 0X7940, 0XBB01, 0X7BC0, 0X7A80, 0XBA41,
```



```
0XBE01, 0X7EC0, 0XF80, 0XB41, 0XD00, 0BDC1, 0BC81, 0X7C40,  
0XB401, 0X74C0, 0X7580, 0XB541, 0X7700, 0XB7C1, 0XB681, 0X7640,  
0X7200, 0XB2C1, 0XB381, 0X7340, 0XB101, 0X71C0, 0X7080, 0XB041,  
0X5000, 0X90C1, 0X9181, 0X5140, 0X9301, 0X53C0, 0X5280, 0X9241,  
0X9601, 0X56C0, 0X5780, 0X9741, 0X5500, 0X95C1, 0X9481, 0X5440,  
0X9C01, 0X5CC0, 0X5D80, 0X9D41, 0X5F00, 0X9FC1, 0X9E81, 0X5E40,  
0X5A00, 0X9AC1, 0X9B81, 0X5B40, 0X9901, 0X59C0, 0X5880, 0X9841,  
0X8801, 0X48C0, 0X4980, 0X8941, 0X4B00, 0X8BC1, 0X8A81, 0X4A40,  
0X4E00, 0X8EC1, 0X8F81, 0X4F40, 0X8D01, 0X4DC0, 0X4C80, 0X8C41,  
0X4400, 0X84C1, 0X8581, 0X4540, 0X8701, 0X47C0, 0X4680, 0X8641,  
0X8201, 0X42C0, 0X4380, 0X8341, 0X4100, 0X81C1, 0X8081, 0X4040 };
```

```
Uint8 nTemp;  
Uint16 wCRCWord = 0xFFFF;  
  
while(wDataLenth --)  
{  
    nTemp = *pData++ ^ wCRCWord;  
    wCRCWord >>= 8;  
    wCRCWord ^= wCRCTable[nTemp];  
}  
return wCRCWord;  
  
} // End: CRC16
```