

GoodWe Modbus Protocol of Inverter

Grid-tied single phase G3 series (Customer Version)



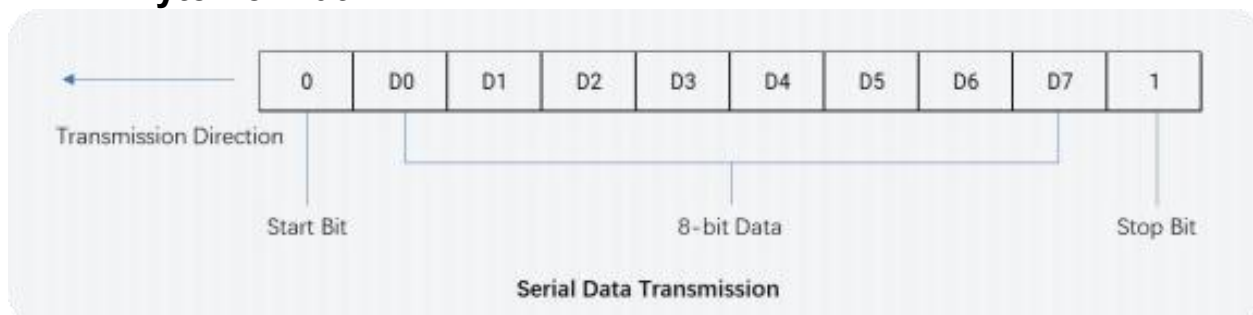
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This MODBUS RTU protocol applies to the communication between GoodWe PV grid-connected inverters – [Grid-tied single phase G3 series](#) and the monitoring device.

The protocol can be used to read real-time operating data and fault status of the inverter, and to perform remote control.

1. Byte Format



A byte is of 8 binary digits working together with 1 start bit (0) and 1 stop bit (1) in transmission, 10 bits in total. As illustrated below, D0 is the least significant bit (LSB) and D7 is the most significant bit (MSB). Pass to the least significant bit first, then to the most significant bit.

2. Communication Data Format

Data are exchanged in the form of word or doubleword:

Data Type	Register Size	Byte Size	Description
Byte Data	1	1	
Integer Data	1	2	One forwarding at one time, from the most significant bit to the least significant bit.
Long Integer Data	2	4	Two separate forwarding, from the most significant bit to the least significant bit.
Floating-point Data			

3. Frame Format

3.1 Read the Content of Register (Function code: 03 H)

3.1.1 Frame format from host device

No.	Code	Example	Description
1	Device Address	1	The device's communication address range 1-247
2	03H	03H	Function code
3	MSB of First Register	00H	The address of first register
4	LSB of First Register	01H	
5	MSB of Register Number	00H	Register number
6	LSB of register Number	02H	
7	CRC16 MSB of Checksum	95H	CRC Checksum Data
8	CRC16 LSB of Checksum	CBH	

3.1.2 Frame format by device (normal data)

No.	Code	Description
1	Device Address	The device's communication address range 1-247
2	03H	Function code
3	Byte Number of Receiving Data (2N)	Number of data
4	MSB of First Register Data	High bit of Data 1
5	LSB of First Register Data	Low bit of Data 1
...
2N+2	MSB of Register Data N	High bit of Data N
2N+3	LSB of Register Data N	Low bit of Data N
2N+4	CRC16 MSB of Checksum	High bit of checksum
2N+5	CRC16 LSB of Checksum	Low bit of checksum

3.1.3 Frame format by device (error of first register address or number)

No.	Code	Description
1	Device Address	The device's communication address range 1-247
2	83H	Function code
3	02H	Error Code
4	CRC16 MSB of Checksum	High bit of checksum
5	CRC16 LSB of Checksum	Low bit of checksum

3.1.4 Set the Content of Register (Function code: 10H)

3.1.5 Frame format from host device

No.	Code	Example	Description
1	Device address	1	The device's communication address range 1-247
2	10H	10H	Function code
3	MSB of First Register	00H	Address of register 0000H
4	LSB of First Register	00H	
5	MSB of Register Number	00H	Register number 01H
6	LSB of Register Number	01H	
7	Byte Number (N)	02H	Byte number of register 02H
8	MSB of Data	0AH	Data 0AF0H
9	LSB of Data	F0H	
10	CRC16 MSB of Checksum	A0H	CRC Checksum
11	CRC16 LSB of Checksum	B4H	

3.1.6 3.2.2 Frame format by device (write successful)

No.	Code	Example	Description
1	Device Address	1	The device's communication address range 1-247
2	10H	10H	Function code
3	MSB of First Register	00H	Address of register 0000H
4	LSB of First Register	00H	
5	MSB of Register Number	00H	Register number 01H
6	LSB of Register Number	01H	
7	CRC16 MSB of Checksum	01H	CRC Checksum
8	CRC16 LSB of Checksum	C9H	

3.1.7 Frame format by device (data error)

No.	Code	Description
1	Device Address	The device's communication address range 1-247
2	90H	Function code
3	03H	Error code
4	CRC16 MSB of Checksum	CRC Checksum
5	CRC16 LSB of Checksum	

3.1.8 Frame format by device (error of register address or number)

No.	Code	Description
1	Device Address	The device's communication address range 1-247
2	90H	Function code
3	02H	Error code
4	CRC16 MSB of Checksum	CRC Checksum
5	CRC16 LSB of Checksum	

4. Baud Rate of Communication

9600bps

5. Device Address

The range of device address is 1 – 247 with 247 as default setting before delivery.

You may set the address onsite according to SOP.

6. CRC Checking of Communication

03H: read (Note: read of one or more consecutive addresses are supported.)

10H: write (Note: RTC time should be written together.)

7. CRC Checking of Communication

7.1.1 The CRC checking is performed from the first byte to the last byte before the MSB of CRC checksum.

7.1.2 CRC check code Please refer to chapter 11.

8. Register Address of Device

#Address	English Name	#R/W	#Type	#Size	#SF	#Units	Range	Note
30004	Device Serial Number	RO	STR	8	1	N/A	[0, 0]	ASCII code, 16 bytes 1547-1 Device column name information - corresponds to the serial number in the protocol description
30034	DSP1 software version	RO	U16	1	1	N/A	[0, 0]	DSP1 software version
30103	PV1 voltage	RO	U16	1	10	V	[0, 0]	
30104	PV1 current	RO	U16	1	10	A	[0, 0]	
30105	PV2 voltage	RO	U16	1	10	V	[0, 0]	
30106	PV2 current	RO	U16	1	10	A	[0, 0]	

30107	PV3 voltage	RO	U16	1	10	V	[0, 0]	
30108	PV3 current	RO	U16	1	10	A	[0, 0]	
30115	Phase voltage AB	RO	U16	1	10	V	[0, 0]	Not supported on single-phase models
30116	Phase voltage BC	RO	U16	1	10	V	[0, 0]	Not supported on single-phase models
30117	Phase voltage CA	RO	U16	1	10	V	[0, 0]	Not supported on single-phase models
30118	Phase voltage AN	RO	U16	1	10	V	[0, 0]	
30119	Phase voltage BN	RO	U16	1	10	V	[0, 0]	Not supported on single-phase models
30120	Phase voltage CN	RO	U16	1	10	V	[0, 0]	Not supported on single-phase models
30121	Phase A current	RO	U16	1	10	A	[0, 0]	
30122	Phase B current	RO	U16	1	10	A	[0, 0]	Not supported on single-phase models
30123	Phase C current	RO	U16	1	10	A	[0, 0]	Not supported on single-phase models
30124	Phase A frequency	RO	U16	1	100	Hz	[0, 0]	
30125	Phase A frequency	RO	U16	1	100	Hz	[0, 0]	Not supported on single-phase models
30126	Phase A frequency	RO	U16	1	100	Hz	[0, 0]	Not supported on single-phase models
30127	AC active power	RO	U32	2	1000	kW	[0, 0]	AC active power (1547 use)
30129	Inverter status	RO	U16	1	1	N/A	[0, 0]	0:waiting 1:on grid 2:fault 3:off grid 4:self-check
30130	Fault code	RO	U32	2	1	N/A	[0, 0]	See master DSP fault code table for details
30132	Warning code	RO	U16	1	1	N/A	[0, 0]	Warning code (1547 use)
30133	AC apparent power	RO	U32	2	1000	kVA	[0, 0]	
30135	AC reactive power	RO	S32	2	1000	kVar	[0, 0]	
30141	Cabinet Temperature	RO	S16	1	10	°C	[0, 0]	
30144	Daily AC generation	RO	U16	1	10	kWh	[0, 0]	
30145	Total AC generation	RO	U32	2	10	kWh	[0, 0]	
30147	Total generation time	RO	U32	2	1	H	[0, 0]	
30149	Safety Country Code	RO	U16	1	1	N/A	[0, 0]	

30163	BUS Voltage	RO	U16	1	10	N/A	[0, 0]	
30164	NBUS Voltage	RO	U16	1	10	N/A	[0, 0]	
30165	Derating Mode	RO	U32	2	1	N/A	[0, 0]	Bit 0: Overtemperature derating Bit 1: Active power derating Bit 2: Reactive power derating(PF/QU/FixQ) Bit 3: Power VS Frequency Bit 4: PU Curve Bit 5: Export power derating Bit 6: DRED derating Bit 7: Limited power start derating Bit 8: Maximum current derating Bit 9: Overvoltage derating (For GW) Bit 10: Power calibration limit power (For ATS)
33050	Specification Over Extended Power Factor	RO	S16	1	100	N/A	[0, 0]	1547-1 Device Listing Information - Device Support Maximum Overrun Power Factor
33051	Specification Over Extended Power	RO	U16	1	1	W	[0, 0]	1547-1 Device listing information - the device supports the maximum overrun power output at the maximum overrun power factor
33052	Specification Under Extended Power Factor	RO	S16	1	100	N/A	[0, 0]	1547-1 Device Listing Information - Device Support Maximum Hysteresis Power Factor
33053	Specification Under Extended Power	RO	U16	1	1	W	[0, 0]	1547-1 Device Listing information - the device supports the maximum hysteresis power output at the maximum hysteresis power factor
33054	Apparent Power Rate	RO	U16	1	1	W	[0, 0]	1547-1 Device Listing Information - Device Apparent Power Rating
33055	Normal Operating Category	RO	STR	8	1	N/A	[0, 0]	1547-1 Device Listing Information--Safety strategy Cat_A/Cat_B
33063	Abnormal Operating Category	RO	STR	8	1	N/A	[0, 0]	1547-1 Device Listing Information--Safety strategy Cat_I/Cat_II/Cat_III
33071	Reactive Inject Power	RO	S16	1	1	VA	[0, 0]	1547-1 Device Listing Information--Maximum

	Rate							injected reactive power
33072	Reactive Absorb Power Rate	RO	S16	1	1	VA	[0, 0]	1547-1Device Listing Information--Maximum absorbed reactive power
33073	Active Power Rate	RO	U16	1	1	W	[0, 0]	1547-1Device Listing Information--Rated active power
33074	Apparent Power Rate	RO	U16	1	1	VA	[0, 0]	1547-1Device Listing Information--Rated apparent power
33075	AC Volt Norm Rate	RO	U16	1	10	V	[0, 0]	1547-1Device Listing Information--Normal operating rated AC voltage
33076	AC Volt Max Rate	RO	U16	1	10	V	[0, 0]	1547-1Device Listing Information--Maximum AC voltage
33077	AC Volt Min Rate	RO	U16	1	10	V	[0, 0]	1547-1Device Listing Information--Minimum AC voltage
33078	Supported Safety Control Mode	RO	U32	2	1	N/A	[0, 0]	1547-1Device Listing Information--Safety control mode: CONST_PF-QV-QP-PV-Pfreq-FixCosθ
33080	Manufacturers	RO	STR	8	1	N/A	[0, 0]	1547-1Device Listing Information--Device Manufacturers
33088	Reactive Susceptance	RO	U16	1	1	N/A	[0, 0]	1547-1Device Listing Information--Model Susceptance

#Addresses	English Name	#R/W	#Type	#Size	#SF	#Units	Range	Note
40313	Device RTC Time Year/Month	RW	U16	1	1	N/A	[0, 0]	MSB Year/LSB Month 13-99/1-12
40314	Device RTC Time Day/Hour	RW	U16	1	1	N/A	[0, 0]	MSB Day/LSB Hour 1-31/0-23
40315	Device RTC Time Minute/Second	RW	U16	1	1	N/A	[0, 0]	MSB Minute/LSB Second 0-59/0-59
40323	LVRT switch	RW	U16	1	1	N/A	[0, 1]	0:disable 1:enable
40324	HVRT switch	RW	U16	1	1	N/A	[0, 1]	0:disable 1:enable
40325	Islanding Disable	RW	U16	1	1	N/A	[0, 1]	0:enable 1:disable
40326	Shadow mode switch	RW	U16	1	1	N/A	[0, 1]	0:disable 1:enable
40327	Export Power Limit	RW	U16	1	1	N/A	[0, 1]	0:disable 1:enable

	Switch							
40328	Export Power Set	RW	U32	2	1	N/A	[0,1000000]	Export Power Load Limit
40330	Power On (Allow grid self-testing)	RW	U16	1	1	N/A	[0, 0]	Write 0 to take effect
40331	Power Off(Not allow grid self-testing)	RW	U16	1	1	N/A	[0, 0]	Write 0 to take effect
40332	Restart	WO	U16	1	1	N/A	[0, 0]	Write 0 to take effect
40336	Set the export power percentage	RW	U16	1	1	%	[0, 500]	Export power limit
40345	Hardware Export Power Limit Switch	RW	U16	1	1	N/A	[0,1]	0:disable 1:enable
40350	N-PE Detector Switch	RW	U16	1	1	N/A	[0,1]	0:disable(Default) 1:enable
40351	N-PE Fault Threshold	RW	U16	1	10	V	[0,2300]	Default 50V
40365	GFCI Fault Clear Switch	RW	U16	1	1	N/A	[0,1]	0:No action 1:Clear GFCI fault
40480	Active power adjust	RW	U16	1	1	%	[0,100]	Corresponding to 0%-100% active power (1547 use)
40481	PF reactive power adjust	RW	U16	1	1	%	[0, 0]	[1,20], [80,100] 1-20,lagging 0.99-0.8 80-100,leading 0.80-1, Note: if read command returns to 0xffff, it means that the inverter is not in PF setting mode (1547 use)
40482	Reactive power adjust	RW	S32	2	1	Var	[0, 0]	Reactive power setting (32 bits) Note: if read command returns to 0xffffffff, it means that the inverter not in reactive power setting mode.
40484	Reactive power adjust (percentage adjust)	RW	S16	1	1	%	[0, 0]	Reactive power setting (16 bits), setting in percentage. [-60,60] (1547 use)
40500	Safety Code	RW	U16	1	1	N/A	[0, 65535]	
42400	Fix Q switch	RW	U16	1	1	N/A	[0,1]	0: off 1: enable (1547 added)
42401	Fix PF switch	RW	U16	1	1	N/A	[0,1]	0: off 1: enable (1547 added)

42402	Fix PF Lead/Lag	RW	U16	1	1	N/A	[0,1]	0: Leed 1: Lag (1547 added)
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Note:

- **U16: 16 bit unsigned number**
- **S16: 16 bit signed number**
- **U32: 32 bit unsigned number**
- **S32: 32 bit signed number**
- **RO:read only WO:write only R/W:read & write**
- **Register setting range column [0,0] indicates that no range limit is set. If there are special instructions in the remarks, the instructions shall prevail**
- **Register setting range represents the data range that communication can fill in, the actual setting range may be slightly different according to different models. The data result of the frame returned by MODBUS writing data shall prevail.**

Table 8-2-2: Definition of Error

Master DSP

Bit NO	Dec	Hex	Error message	Description
Bit31	2147483648	0x80000000	SCI Fail	Communication between microcontrollers is failure
Bit30	1073741824	0x40000000	Flash R/W Fail	flash cannot be read or written
Bit29	536870912	0x20000000	Grid frequency overrun	The grid frequency is out of tolerable range
Bit28	268435456	0x10000000	AFCI Fault	AFCI Fault
Bit27	134217728	0x08000000	TBD	TBD
Bit26	67108864	0x04000000	TBD	TBD
Bit25	33554432	0x02000000	Relay Check Fail	Relay check is failure
Bit24	16777216	0x01000000	TBD	TBD
Bit23	8388608	0x00800000	Export Power Limit Fault - Hardware	Abnormal Export Power Limit function (Australian safety regulations)
Bit22	4194304	0x00400000	TBD	TBD
Bit21	2097152	0x00200000	TBD	TBD.
Bit20	1048576	0x00100000	TBD	TBD
Bit19	524288	0x00080000	High DC component	Inverter detects a higher DC component in AC output.
Bit18	262144	0x00040000	Isolation Fail	Isolation resistance of PV plant out of tolerable range
Bit17	131072	0x00020000	Vac Fail	Grid voltage out of tolerable range
Bit16	65536	0x00010000	FAN Fail	The external fan failure
Bit15	32768	0x00008000	PV Over Voltage	PV Voltage is too high
Bit14	16384	0x00004000	TBD	TBD
Bit13	8192	0x00002000	Over temperature	Temperature is too high
Bit12	4096	0x00001000	TBD	TBD
Bit11	2048	0x00000800	DC Bus High	DC bus is too high

Bit10	1024	0x00000400	Ground I Fail	Ground current is too high
Bit9	512	0x00000200	Utility Loss	Utility is unavailable
Bit8	256	0x00000100	TBD	TBD
Bit7	128	0x00000080	TBD	TBD.
Bit6	64	0x00000040	TBD	TBD
Bit5	32	0x00000020	TBD	TBD
Bit4	16	0x00000010	TBD	TBD
Bit3	8	0x00000008	TBD	TBD
Bit2	4	0x00000004	TBD	TBD.
Bit1	2	0x00000002	AC HCT Fail	The output current sensor is abnormal
Bit0	1	0x00000001	GFCI Fail	GFCI check failure

9.Example

The following examples for supplementary description

Example 1

Function code: 03 (to read grid frequency)

Request from Host device: F7 03 7D 55 00 01 98 E0

Reply from Inverter: F7 03 02 13 88 7D 07

Value of frequency received: 0x1388 (5000 in decimal)

Actual frequency value: 50.00Hz (5000 divided by gain-100)

Example 2

Function code: 10 (to set single register for export power enable)

Request from Host device: F7 10 A1 6F 00 01 02 00 01 F1 A1

Reply from Inverter: F7 10 A1 6F 00 01 06 BE

Example 3

Function code: 10 (to set more than one register with consecutive addresses for RTC time modification into 2020/12/3 14:10:00)

Request from Host device: F7 10 A1 61 00 03 06 14 0C 03 0E 0A 00 8F 00

Reply from Inverter: F7 10 A1 61 00