Inverter

Inverter & Charger

Solar Charge Inverter
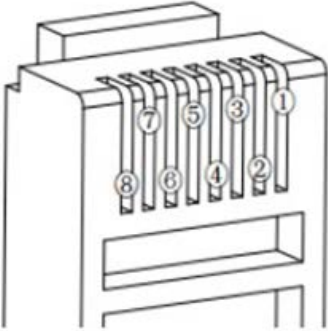
Modbus Protocol V1.6

1. Update records

version	Updated	update content	Author	Review
V1.0	2019.05.10	First release (high frequency and industrial frequency share this agreement, there is no corresponding definition Filled with 0xFFFF)	Gao Yi	Huang Feng
V1.1	2019.01.21	Added: 4009 address is defined as input frequency	Gao Yi	Huang Feng
V1.2	2020.03.11	Added: 4110~4111 addresses are defined as unique identification codes; Correction: 4112~4199 address bytes; Newly added: Some protocols of 4327~4615 energy storage inverters; Added: 4568 address is defined as charging power setting; (Simultaneously applicable to PV and AC charging) Note: 4000~4326 are protocols for ordinary inverters; 4000~4615 are protocols for energy storage inverters;	Ansonsen	Huang Feng
V1.3	2020.03.16	For 4303~4310, 4311~4318, 4319~4326 Add description to the address, in which 4319~4326 are made into hardware and software File, protocol version number	Huang Feng	Huang Feng
V1.4	2020.05.21	Modification: Definition of charging status in 4332 address; Modification: the number of bytes in the 4334-4393 address; Modification: the definition of the fault in the address 4398 ~ 4401; Modification: Add remarks to the 4402 address definition'year'; Modification: 4419 address is defined as reserved; Modification: the definition of "01" in 4420 address was changed to "0xAA";	Ansonsen	Huang Feng

		Modification: The unit in 4422 address was changed to 0.1A, and the definition was changed to total charge Electric current can be set; Modification: the battery type definition in 4424 address; Modification: 4438 address is defined as reserved; Modification: The unit in the 4442 address is 0.01 Hz; Modification: The 4451 address is defined as reserved; Modification: 4547-4549 addresses are defined as reserved; Modification: 4562-4563 address is defined as reserved; Modification: The 4568 address is defined as reserved, the original definition is the same as 4422; Modification: 4600 address is read-only R; Description: 1) 4000~4326 is suitable for unidirectional and industrial frequency inverters 2) 4000～4006,4009,4108～4301,4303～ 4615 is suitable for bidirectional energy storage inverter		
V1.5	2020.10.9	Newly added: FFH is a general address code, all slaves respond and return to Huang Chengcheng Reply to the command. General address code FFH and inverter current Device ID plays the same role.		Huang Feng
V1.6	2021.1.11	New addition: 4452 overvoltage protection voltage 4453 overvoltage protection recovery Gao Yi 4454 Undervoltage alarm recovery voltage		Huang Chengcheng

2. Pin definition:

	①	+ 5V (power supply is positive, load capacity is not less than 200mA)
	②	A (RS485 bus signal)
	③	B (RS485 bus signal)
	④	GND (power ground/communication ground)
	⑤	NC (idle, other functions are not allowed)
RJ45通讯接口	⑥	CAN_H (CAN bus signal)
	⑦	NC (idle, other functions are not allowed)
	⑧	CAN_L (CAN bus signal)

Description:

-> RS485 initial baud rate 9600bps

-> CAN initial baud rate 500Kbps

-> RS485 and CAN can be combined into one physical interface or separated into two

Physical interface

->For products without CAN interface requirements, CAN pin definitions can be ignored

3. Agreement definition:

1. Format

Start character	address code function code starting address (1BYTE) (1BYTE) (2BYTE) (2BYTE) (2BYTE)			Data length	CRC check	Terminator

2. Description

1) Start character: >10ms

2) Address code: 1 byte, range: 01H ~ F7H (decimal 1 ~ 247) , 00H is the broadcast address, all the slaves respond, but no command is returned; FFH is the general address code, all the slaves respond and return the response command. The general address code FFH has the same effect as the current Device ID of the inverter.

3) Function code: 1 byte

Command name	Access data type	function code	Error code
Read single or multiple word registers	WORD	03H	83H
Write a single word register	WORD	06H	86H
Write consecutive N word registers	WORD	10H	90H

4) Starting address: 2 bytes

5) Data length: 2 bytes

6) CRC check: 2 bytes, CRC checksum of each byte of address code, function code and data

7) Terminator: >10ms

note:

1) The data address and data are 2 bytes, **The high byte is sent first, then the low byte; while the CRC is to send the low bit first, then the high bit.**

2) The error code means that there is an error in the frame data sent by the server, and the abnormal response function code returned by the client: error code = function code | 80H

3) Exception code description

a, 01H-unsupported function code

b, 02H-PDU start address is incorrect or PDU start address + data length is out of the legal range c, 03H-read register data or write register data is too long

d, 04H - The client fails to read or write registers

e, 05H - The data check code sent by the server is incorrect

3. Examples

1) Read the holding register

request:

description	Number of bytes	command
Device address	BYTE	01H~F7H
function code	BYTE	03H
starting address	WORD	4000~4059; 4100~4199; 4300~4615;
Number of words read	WORD	Ensure that the read data is within the legal address range
Check code	WORD	CRC checksum of all the above bytes

Normal response:

description	Number of bytes	command
Device address	BYTE	01H~F7H
function code	BYTE	03H
Data length	BYTE	01H~FAH

Data content	WORD	Read data (high bit first, low bit last)
…	WORD	Read data (high bit first, low bit last)
Check code	WORD	CRC checksum of all the above bytes

Abnormal response:

description	Number of bytes	command
Device address	BYTE	01H~F7H
Error code	BYTE	83H
Exception code	BYTE	N (N=1,2,3,4,5)
Check code	WORD	CRC checksum of all the above bytes

2) Write a single register

request:

description	Number of bytes	command
Device address	BYTE	01H~F7H
function code	BYTE	06H
starting address	WORD	4100~4199; 4300~4615;
data input	WORD	0000H~FFFFH
Check code	WORD	CRC checksum of all the above bytes

Normal response

description	Number of bytes	command
Device address	BYTE	01H~F7H
function code	BYTE	06H
starting address	WORD	4100~4199; 4300~4615;
data input	WORD	0000H~FFFFH
Check code	WORD	CRC checksum of all the above bytes

Abnormal response:

description	Number of bytes	command
Device address	BYTE	01H~F7H
Error code	BYTE	86H
Exception code	BYTE	N (N=1,2,3,4,5)
Check code	WORD	CRC checksum of all the above bytes

3) Write consecutive n registers

request:

description	Number of bytes	command
Device address	BYTE	01H~F7H
function code	BYTE	10H
starting address	WORD	4100~4199; 4300~4615;

Number of write addresses	WORD	
Write bytes	BYTE	Twice the number of write addresses
Data content		Data written (high bit first, low bit last)
…		Data written (high bit first, low bit last)
Check code	WORD	CRC checksum of all the above bytes

Normal response:

description	Number of bytes	command
Device address	BYTE	01H~F7H
function code	BYTE	10H
starting address	WORD	4100~4199; 4300~4615;
Number of write addresses	WORD	0001H~007DH
Check code	WORD	CRC checksum of all the above bytes

Abnormal response:

description	Number of bytes	command
Device address	BYTE	01H~F7H
Error code	BYTE	90H
Exception code	BYTE	N (N=1,2,3,4,5)
Check code	WORD	CRC checksum of all the above bytes

Four, PDU address allocation table

PDU address (Decimal)	word Section	read / write	unit	description	data		Parsing	return data	Analysis example
4000	2	R	0.1V	Inputvoltage					AC input voltage
4001	2	R	0.01A	Input current					AC input current
4002	2	R	0.1V	Output voltage					Inverter output voltage
4003	2	R	0.01A	Output current					Inverter output current
4004	2	R	0.01Hz	Output frequency					Inverter output frequency
4005	2	R	0.1V	Battery voltage					battery voltage
4006	2	R	0.1℃	Temperature					Internal temperature
4007~ 4008	4	R	/	Device Status	High Word	Bit31	1: Input UVP		High frequency inverter failure
						Bit30	1: Input OVP		BIT31: Input undervoltage
						Bit29	1: Output OPP		BIT30: Input overvoltage
						Bit28	1: DC/DC overload		BIT29: Output overload
						Bit27	1: DC/DC OCP(HW)		BIT28: DC/DC overload
						Bit26	1: BUSOVP		BIT27: DC/DC hardware overcurrent
						Bit25	1: PEN		BIT26: Bus overvoltage
						Bit24	1: OTP		BIT25: Ground fault
						Bit23	1: Output short circuit		BIT24: Other failures
						Bit22	1: Output UVP		BIT23: output short circuit
						Bit21	1: Output OVP		BIT22: output undervoltage
						Bit20	1: Sleep		BIT21: output overvoltage
						Bit19	reserve		Bit20: Low power sleep
						Bit18	reserve		
						Bit17	reserve		
						Bit16	reserve		
					Low Word	Bit15	1: Utility Fail	ups malfunction	Power frequency machine failure
						Bit14	1: Battery Low		
						Bit13	1: AVR		
						Bit12	1: UPS Fail		
						Bit11	1: UPS Type isLine-Interactive 0: UPS Type is On line		
						Bit10	1: Test in progress 1:		
						Bit9	Shutdown Active		
						Bit8	1: Beeper On		
						Bit7	1: Fan locked(Inv)	Inverter malfunction	
						Bit6	1: Over Load(Inv)		
						Bit5	1: Short Cut (Inv)		

					Bit4	1: Bat bad(Inv) (AC start Vbat<9V)		
					Bit3	reserve		
					Bit2	reserve		
					Bit1	reserve		
					Bit0	reserve		
4009	2	R	0.01Hz	I/P Frequency				AC input frequency
4010~4059		R	/	Reserve				Reserved
4100	2	R/W	/	Battery or utility	00H	DisableTestfor10seconds	01H	If the battery voltage is low, the UPS will Switch mains supply immediately
					01H	EnableTestfor10seconds		
4101	2	R/W	/	TurnOn/Off beep	00H	Turn on beep	01H	Turn on when AC output is abnormal buzzer
					01H	Turn off beep		
4102	2	R/W	/	Inverter mode	00H			01H: Normal mode 02H: Sleep mode 03H: Shut down 04H: reserved position
					01H	Normal mode		
					02H	Sleep mode		
					03H	Shutdown		
					04H	Restore		
4103	2	R/W	0.1min	Shutdown UPS output Delay time	Range from 0.2~10min			
4104	2	R/W	1min	After UPS output off, delay time to turn on UPS output again	Range from 0000~9999			
4105	2	R/W	/	Cancel shutdown command	00H	Cancel Shutdown command (UPS in shutdown mode)		
					01H	Turn on UPS output (UPS in restore wait mode)		
4106	2	R/W	0.1V	Rating Voltage				Rated voltage
4107	2	R/W	0.01A	Rating Current				Rated current
4108	2	R/W	/	Inverter Password				
4109	2	R/W	/	Device ID	01H~F7H			Default: 01H
4110~4111	4	R/W	/	Unique identification code				Unique identification code Default: 0xFFFFFFFF
4112~4199	176	R/W	/	Reserve				Reserved
4300	2	R		Inverter fault state	00H	Normal		Is it in a protected state
					01H	Fault		

4301	2	R		Inverter Charger action query	00H	Inverter is not charging Inverter		Is it charging
					01H	is charging		
4302	2	R		Charger knob test	00H	Charger knob is at 100~500A level		Current knob adjustment
					01H	Chargerknob is at 600~1000A level		
4303~4310	16	R	ASICII	Company Name				Default: RENOGY
4311~4318	16	R	ASICII	Inverter Model				Default: Product SKU Version number in product approval certfic
4319~4326	16	R	ASICII	Version	grid formula：xx.xx.14			Hardware|firmware|protocol version number Version number in product approval certfic
Photovoltaic Information								
4327	2	R	/	BatSoc%				Percentage of battery remaining
4328	2	R	0.1A	ChargeCurr				Charging current flowing into the battery Current, for example 500, means 50.0A
4329	2	R	0.1V	Pv volt				PV voltage
4330	2	R	0.1A	Pv Curr				buck controller output inductor flow
4331	2	R	1W	Pv charger Power				PV charging power
4332	2	R	/	ChargeState	Low Word	00H: Charging is not turned on 01H: Constant current charging 02H: Constant voltage charging 04H: Floating charge 06H: Battery activation phase 07H: Battery disconnect processing stage		Lower 8 bits: (charging status)
4333	2	R	1W	ChargePower				Charging power
4334~4393	120	R/W	/	Reserve				Reserved
Inverter settings								
4394~4397	8	R	/	CurrErrReg		Fault bits, each bit represents a fault, A total of 64 bits. This register is for internal adjustment Test tool use.		Current fault bit
4398~4401	8	R	/	CurrFcode		01: Battery undervoltage 02: The average discharge current of the battery is soft Piece protection 03: The battery is not connected alarm 04: Battery undervoltage stops discharging alarm 05: Battery overcurrent protection 06: Charging overvoltage protection 07: Bus overvoltage hardware protection 08: Busbar overvoltage software protection 09: PV overvoltage protection 10: Bulk overcurrent software protection		The current fault code, a total of 4 addresses, Each address stores a current fault The fault code corresponding to the fault can be Display 4 fault codes. 0 means No fault. For example, there is currently a batt Two causes of undervoltage and inverter overlo barrier. It is displayed as follows: 4398: 01 4399: 13 4400: 00 4401: 00

						11: bulk overcurrent software protection			
						12: Mains power failure			
						13: Bypass overload protection			
						14: Inverter overload protection			
						15: Inverter overcurrent hardware protection			
						16: Inverter overcurrent software protection			
						17: Inverter short circuit protection			
						18: Mains charging overcurrent hardware protection			
						19: Bulk radiator over temperature protection			
						20: Inverter radiator over temperature protection			
						21: Fan failure			
						22: Memory failure			
						23: Model setting error			
						24: CmdOff			
						25: Busbar short circuit			
						26: Relay short circuit			
						27: The mains charging board is overheated			
						28: AC input and output are reversed			
						29: Bus undervoltage software protection			
						30: The battery capacity is less than 10% (connect BMS host only)			
						31: The battery capacity is less than 5% (connect BMS host only)			
						32: Shut down with low battery (connect to BMS Host only)			
4402	2	R/W	/	SysDateTime					High 8 digits: year (20 means 2020) Lower 8 bits: month
4403	2	R/W	/	SysDateTime					High 8 digits: day Low 8 bits: hour
4404	2	R/W	/	SysDateTime					High 8 bits: minutes Low 8 bits: seconds
4405	2	R	/	MachineState		00: Power-on delay 01: waiting state 02: Initialization 03: soft start 04: Mains operation 05: Inverter operation 06: Inverter to mains 07: Mains to inverter 08: reserved 09: reserved 10: Shut down 11: failure			Current state of the machine

address	byte	Read and write	unit	English name		Max	Minimum	Defaults	Remarks
4406	2	R	/	PriorityFlag		0: The user did not enter a password 1: User password has been entered 4: The factory password has been entered			Password protection status flag
4407	2	R	0.1V	BusVolt					bus voltage
4408	2	R	0.1A	Load Curr					Load current
4409	2	R	1W	Load Active Power					Load active power
4410	2	R	1W	Load Reactive Power					Load apparent power
4411	2	R	1mV	Inv Dc Volt					Inverter DC component
4412	2	R	0.1A	Line Chg Curr					When the mains is charging, the battery side cu
4413	2	R	%	Load Ratio					Load percentage
4414	2	R	0.1℃	Temper-a					DC-DC heat sink temperature
4415	2	R	0.1℃	Temper-b					DC-AC heat sink temperature
4416	2	/	/	/					Reserved
Switch control									
4417	2	W	/	Cmd Machine Reset		1: Reset Other: No action			Reset control
4418	2	W	/	Cmd Restore Factory Setting		0xAA: restore, Other: No action Restore factory values to clear all accumulated information Information, and restore the parameters to the default state, Restart to take effect			Restore factory value
4419	2			Reserve					
4420	2	W	/	Cmd Clear His Record		0xAA: Clear Other: No action			Clear history
4421	2	W	/	Batt Equal Chg Immediate		0: prohibited 1: enable			Immediately equalize charging instructions
Battery related settings									
4422	2	R/W	0.1A	Pv Chg Curr Set					The total charging current can be set
4423	2	R/W	1AH	Bat Rate Cap					Rated battery capacity
4424	2	R/W	/	BatTypeSet		00: UserDef 01: SLD 02: FLD 03: GEL 04: LFP14 (48v) 05: LFP15 (48v) 06: LFP16 (48v) 07: LFP7 (24v) 08: LFP8 (24v) 09: LFP9 (24v) 10: NCA			Battery type

4425	2	R/W	0.1V	Bat Const Chg Volt		9.0V	15.5V	14.4V	Equalizing charging voltage
4426	2	R/W	0.1V	Bat Improv Chg Volt		9.0V	15.5V	14.4V	Boost charging voltage/overcharge voltage
4427	2	R/W	0.1V	Bat Float Chg Volt		9.0V	15.5V	14.0V	Floating charge voltage/overcharge return Voltage
4428	2	R/W	0.1V	Bat Improv Chg Back Volt		9.0V	15.5V	13.2V	Increase charging return voltage
4429	2	R/W	0.1V	Bat Over Dischg Back Volt		9.0V	15.5V	12.6V	Over discharge return voltage
4430	2	R/W	0.1V	Bat Under Volt		9.0V	15.5V	11.0V	Undervoltage warning voltage
4431	2	R/W	0.1V	Bat OverDischg Volt		9.0V	15.5V	12.2V	Over discharge voltage
4432	2	R/W	0.1V	Bat Dischg Limit Volt		9.0V	15.5V	11.2V	Discharge limit voltage
4433	2	R/W	1s	Bat OverDischg Delay Time		0S	120S	60S	Over discharge delay time
4434	2	R/W	1min	Bat Const Chg Time		0min	600min	120min	Equalizing charging time
4435	2	R/W	1min	Bat Improv Chg Time		10min	600min	120min	Improve charging time
4436	2	R/W	1day	Bat Const Chg Gap Time		0Day	255Day	30Day	Equalizing charge interval
4437	2	R/W	0.1V	Bat Switch Dc Volt		36.0V	62V	46V	Mains switching voltage
4438	2			Reserve					
4439	2	R/W	0.1V	Batt Volt Sw To Inv		36V	62V	64.0V	Inverter switching voltage
4440	2	R/W	1min	Batt Equal Chg Time out		5min	900min	240min	Equalization charge timeout
				Inverter settings					
4441	2	R/W	/	Output Priority		0: solar 1: line 2: sbu			Output priority
4442	2	R/W	0.01Hz	Output Freq Set					Output frequency
4443	2	R/W	/	Ac Volt Range		0: wide range 1: narrow range			AC input range
4444	2	R/W	/	Power Saving Mode		0: prohibited 1: enable			Energy saving mode
4445	2	R/W	/	Auto Restart Ov Load		0: prohibited 1: enable			Overload automatic restart
4446	2	R/	/	Auto Restart Ov Temper		0: prohibited			Automatic restart when over temperature

		W				1: enable	
4447	2	R/W	/	Chg Source Priority		0: PV priority, only when PV is invalid Waiting to start mains charging 1: Mains power priority, only when mains power is invalid Wait until photovoltaic charging is started 2: Mixed mode, city electricity and photovoltaic at the same time Charge, priority to photovoltaic. 3: Photovoltaic only, not charging from mains.	Charging priority
4448	2	R/W	/	Alarm Enable		0: prohibited 1: enable	Alarm control
4449	2	R/W	/	Alarm En When Source Loss		0: prohibited 1: enable	Alarm enable when input source is interrupted
4450	2	R/W	/	Byp Enable When Ov Load		0: prohibited 1: enable	Overload bypass enable
4451	2	R	/	Reserve			Reserved bit
4452	2	R	0.1V				Overvoltage protection voltage
4453	2	R	0.1V				Overvoltage protection recovery voltage
4454	2	R	0.1V				Undervoltage alarm recovery voltage
4455~4500	92	R/W	/	Reserve			Reserved
				Electricity statistics			
4501~4507	14	R	1AH	PV Energy Last 7day			PV power generation in the last 7 days history according to
4508~14	14	R	1AH	Bat Chg Energy Last 7day			Battery charge level last 7 days calendar Historical data
4515~4521	14	R	1AH	Bat DisChg Energy Last 7day		00: Yesterday's power generation 01: Power generation the day before yesterday	Battery discharge capacity last 7 days calendar Historical data
4522~4528	14	R	1AH	Line Chg Energy Last 7day			Mains charging capacity in the last 7 days Historical data
4529~4535	14	R	0.1KWH	Load Consum Last 7day			Load power consumption last 7 days calendar Historical data
4536~4542	14	R	0.1KWH	Load Consum From Line Last 7day			The load consumes electricity recently from the 7 days of historical data
4543	2	R	1AH	Bat Chg AH Today Bat			Battery charging hours
4544	2	R	1AH	Dischg AH Today			Battery discharge ampere hours on the day
4545	2	R	0.1KWH	Generat Energy Today			PV power generation on the day
4546	2	R	0.1KWH	Used Energy Today			Load electricity consumption on the day
4547~4549	6			Reserve			
4550~4551	4	R	1AH	Bat Chg AH Total Bat			Accumulated charging hours of battery
4552~4553	4	R	1AH	Dischg AH Total			Accumulated battery discharge ampere hours

4554~4555	4	R	0.1KWH	Generat Energy Total				PV cumulative power generation
4556~4557	4	R	0.1KWH	Used Energy Total				Load cumulative power consumption
4558	2	R	1AH	Line Chg Energy Tday				Electricity charge on the day
4559	2	R	0.1KWH	Load Consum Line Tday				The load consumes electricity from the mains o
4560	2	R	1min	Inv Work Time Today Line				Inverter working time on the day
4561	2	R	1min	Work Time Todya Reserve				Bypass working hours on the day
4562~4563	4	R						
4564~4565	4	R	0.1KWH	Load Consum Line Total				Load accumulative power consumption from ma
4566	2	R	1h	Inv Work Time Total Line				Inverter cumulative working time
4567	2	R	1h	Work Time Total				Bypass cumulative working time
4568~4599	64	R/W	/	Reserve				Reserved
broken record								
4600~4615 32		R	/	FaultHistoryRecord				Each fault record occupies 16 Address, a total of 16 faults are stored recording. The internal data format of the fault record is fix Meaning: (according to the internal offset addre definition) 0x00: fault code, fault code See the instruction manual for specific definition The value of the barrier code is 0, which means The fault record is invalid. 0x01~0x03: fault code occurred time 0x04~0x0F: When a fault occurs 12 packets captured at the moment data.