

GoodWe EMS Protocol (Ready Only)

For ET/EH/BH/BT Series

Ver: 1.7 Updated on Feb 26th, 2020



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CHANGE RECORDS

Ver.	Date	Modification	Prepared by	Approved by
1.0	20180602		Sjy	xu
1.1	20180926	1. Add SIMCCID Address of GPRS module, 35050 2. Add battery running data register 37011 3. Add 70% limit in VDE safety code 45263	Sjy	Xu
1.2	20181030	Add BMS data via 485	Sjy	Xu
1.3	20181128	Add Modbus addressed of safety country		
1.4	20190501	Data and format update	Xu	Xu
1.5	20190821	1. Add battery BMS data 2. Add LVRT/HVRT registers	Sjy	
1.6	20190903	Update grid-connection checking, reconnection and waiting time definition	Ls	
1.7	20190926	Update registers for CEI Auto test	Sjy	

1. PROTOCOL DESCRIPTION

This is a map document of standard MODBUS RTU protocol for only GoodWe energy storage inverters compatible with HV battery – **EH, ET, BT, BH series**.

Inverter Address: Can be assigned from 1~247. 247 is factory default assignment.

Communication baud rate: **The default baud rate is 9600 bps**

Error Code Returned From Inverter Device:

02H: Register address fault or overflow of read register number

03H: Data error

04H: Built-in verification code error

05H: Communication time-out

Function code:

03H: Reading

06H: writing single register

10H: writing multiple registers

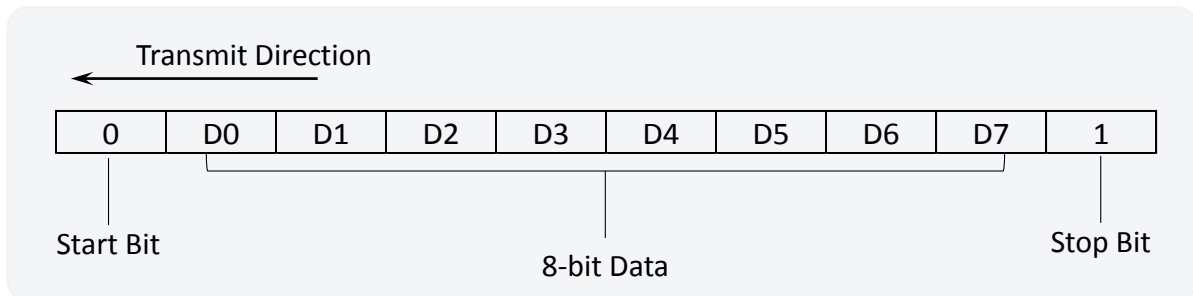
CRC Verification:

CRC Verification formula : $X^{16}+X^{12}+X^5+1$

CRC Verification code refer to No.10 Chapter.

Byte Format:

Every byte consists of 1 start bit, 8-bit binary code and 1 stop bit, 10 bit in total. The byte transmit sequence is described as below. D0 is the lowest bit of data and D7 is the highest.

**Communication Data Format:**

Data is transmitted as word or double word format.

Data Type	Amount of Register	Amount of Byte	Description
Byte Data	1	1	
Integer Data	1	2	Return at one time, from high bit to low bits
Long integer	2	4	Return in two parts, from high bit to low bits
Floating Point Data			

2. Data Frame Format (Function Code: 03H)**2.1 Data Frame Format from Host PC**

Data NO	Content	Sample	Description
1	Inverter Address	1	Communication address(1-247, Default 0XF7)
2	03H	03H	Function code
3	High byte of first register	00H	Address of register 0001H
4	Low byte of first register	01H	
5	Amount. of High bit Register	00H	Amount of register 02H
6	Amount. of Low bit Register	02H	
7	CRC16 Verification (high bit)	95H	CRC Code of verification
8	CRC16 Verification (low bit)	CBH	

2.2 Data Frame Format from Inverter (If Data Reading Successfully)

Data NO	Content	Description
1	Inverter Address	Communication address(1-247, default 0xF7)
2	03H	Function code
3	Amount of byte of data (2N)	Amount of byte of data
4	High byte of data of first register	High byte of first register

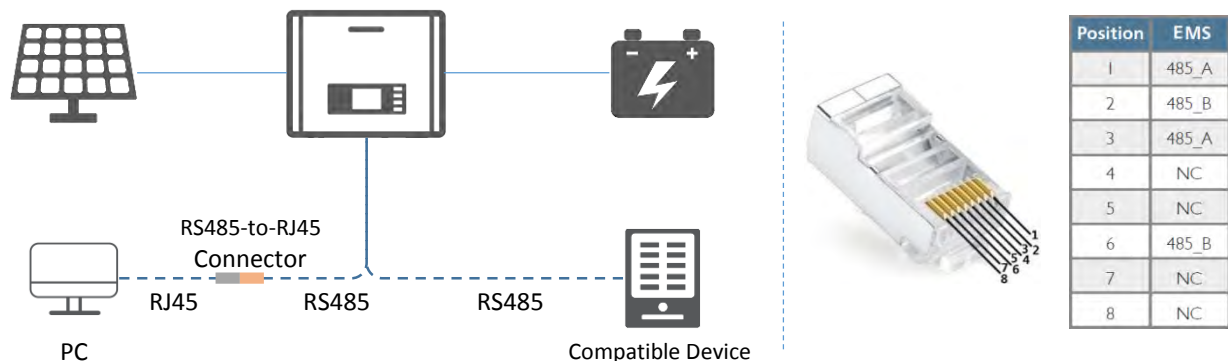
5	Low byte of data of first register	Low byte of first register
...	...	...
2N+2	High byte of data of the Nth register	High byte of the Nth register
2N+3	Low byte of data of the Nth register	Low byte of the Nth register
2N+4	High byte of CRC16 verification code	High byte of CRC verification code
2N+5	Low byte of CRC16 verification code	Low byte of CRC verification code

2.3 Data Frame Format from Inverter (Register Addr. or register number is wrong)

Data NO	Content	Description
1	Inverter Address	Communication Address (1-247)
2	83H	Function code
3	02H	Error Code
4	High byte of CRC16 verification code	CRC verification code
5	Low byte of CRC16 verification code	CRC verification code

3. System Wiring Instruction

This is the basic wiring and instructions before starting reading interactive log between GoodWe energy storage inverter and the compatible device, which is to be connected by EMS port on inverter.



Solar inverter must be powered up by DC or AC power before it can communicate successfully to the compatible device.

To read the interactive log, the laptop has to be connected in parallel with compatible device by RS485 cable and a RS485-to-RJ45 connector to PC.

4. Modbus Address and Explanation

4.1 Device Information Data Registers

ADDR.	NAME	R/W	TYPE	UNIT	Mutiple	Nr.	Remark
35000	Modbus protocol version	RO	U16	N/A	1	1	
35001	Rated power	RO	U16	N/A	1	1	
35002	AC output type	RO	U16	N/A	1	1	0:single phase 1: three phase four wire system 2: three phase three wire system
35003	Serial number	RO	STR	N/A	1	8	ASCII , 16 bytes
35011	Device type	RO	STR	N/A	1	5	ASCII , 10 bytes
35016	DSP1 software version	RO	U16	N/A	1	1	
35017	DSP2 software version	RO	U16	N/A	1	1	
35018	DSP SVN version	RO	U16	N/A	1	1	
35019	ARM software version	RO	U16	N/A	1	1	
35020	ARM SVN version	RO	U16	N/A	1	1	
35021	DSP Internal Firmware Ver.	RO	STR	N/A	1	6	Example '04004-13-S01'
35027	ARM Internal Firmware Ver.	RO	STR	N/A	1	6	Example '02034-04-S01'
35050	SIMCCID	RO	STR	N/A	1	100	For GPRS module

4.2 Running Data Registers

ADDR.	NAME	R/W	TYPE	UNIT	Mutiple	Nr.	Remark
35100	RTC	RO	U16	N/A	1	1	Hbyte-year/Lbyte-month: 13-99/1-12
35101		RO	U16	N/A	1	1	Hbyte-day/Lbyte-hour: 1-31/0-23
35102		RO	U16	N/A	1	1	Hbyte-minute/Lbyte-second: 0-59/0-59
35103	Vpv1	RO	U16	V	10	1	PV1 voltage
35104	Ipv1	RO	U16	A	10	1	PV1 current
35105	Ppv1	RO	U32	W	10	2	PV1 Power
35107	Vpv2	RO	U16	V	10	1	PV2 voltage
35108	Ipv2	RO	U16	A	10	1	PV2 current
35109	Ppv2	RO	U32	W	10	2	PV2 Power
35111	Vpv3	RO	U16	V	10	1	PV3 voltage
35112	Ipv3	RO	U16	A	10	1	PV3 current
35113	Ppv3	RO	U32	W	10	2	PV3 Power
35115	Vpv4	RO	U16	V	10	1	PV4 voltage
35116	Ipv4	RO	U16	A	10	1	PV4 current
35117	Ppv4	RO	U32	W	10	2	PV4 Power
35119	PV Mode	RO	U32	N/A		2	PV Module work mode, Table 8-3 8-4
35121	Vgrid_R	RO	U16	V	10	1	R phase Grid voltage
35122	Igrid_R	RO	U16	A	10	1	R phase Grid current
35123	Fgrid_R	RO	U16	Hz	100	1	R phase Grid Frequency

35124	Reversed					1	Reversed
35125	Pgrid_R	RO	S16	W	1	1	R phase Grid Power
35126	Vgrid_S	RO	U16	V	10	1	S phase Grid voltage
35127	Igrid_S	RO	U16	A	10	1	S phase Grid current
35128	Fgrid_S	RO	U16	Hz	100	1	S phase Grid Frequency
35129	Reversed					1	Reversed
35130	Pgrid_S	RO	S16	W	1	1	S phase Grid Power
35131	Vgrid_T	RO	U16	V	10	1	T phase Grid voltage
35132	Igrid_T	RO	U16	A	10	1	T phase Grid current
35133	Fgrid_T	RO	U16	Hz	100	1	T phase Grid Frequency
35134	Reversed						Reversed
35135	Pgrid_T	RO	S16	W	1	1	T phase Grid Power
35136	Grid Mode	RO	U16			1	Grid mode, refer to Table 8-10
35137	Reversed					1	Reversed
35138	Total INV Power	RO	S16	W	1	1	Total Power of Inverter
35139	Reversed					1	Reversed
35140	AC ActivePower	RO	S16	W	1	1	
35141	Reversed					1	Reversed
35142	AC ReactivePower	RO	S16	Var	1	1	
35143	Reversed					1	Reversed
35144	AC ApparentPower	RO	S16	VA	1	1	
35145	Back-Up Vload_R	RO	U16	V	10	1	R phase Load voltage of Back-Up
35146	Back-Up Iload_R	RO	U16	A	10	1	R phase Load current of Back-Up
35147	Back-Up Fload_R	RO	U16	Hz	100	1	R phase Load Frequency of Back-Up
35148	Load Mode_R	RO	U16			1	Load work mode, refer to Table 8-11
35149	Reversed					1	Reversed
35150	Back-Up Pload_R	RO	S16	W	1	1	R phase Load Power of Back-Up
35151	Back-Up Vload_S	RO	U16	V	10	1	S phase Load voltage of Back-Up
35152	Back-Up Iload_S	RO	U16	A	10	1	S phase Load current of Back-Up
35153	Back-Up Fload_S	RO	U16	Hz	100	1	S phase Load Frequency of Back-Up
35154	Load Mode_S	RO	U16			1	Load work mode, refer to Table 8-11
35155	Reversed					1	Reversed
35156	Back-Up Pload_S	RO	S16	W	1	1	S phase Load Power of Back-Up
35157	Back-Up Vload_T	RO	U16	V	10	1	T phase Load voltage of Back-Up
35158	Back-Up Iload_T	RO	U16	A	10	1	T phase Load current of Back-Up
35159	Back-Up Fload_T	RO	U16	Hz	100	1	T phase Load Frequency of Back-Up
35160	Load Mode_T	RO	U16			1	Load work mode, refer to Table 8-11
35161	Reversed					1	Reversed
35162	Back-Up Pload_T	RO	S16	W	1	1	T phase Load Power

35163	Reversed					1	Reversed
35164	PLoad_R	RO	S16	W	1	1	R phase Load Power
35165	Reversed					1	Reversed
35166	Pload_S	RO	S16	W	1	1	S phase Load Power
35167	Reversed					1	Reversed
35168	Pload_T	RO	S16	W	1	1	T phase Load Power
35169	Reversed					1	Reversed
35170	Total Back-Up Load	RO	S16	W	1	1	Load Power of Back-Up
35171	Reversed					1	Reversed
35172	Total Load Power	RO	S16	W	1	1	Total Power of load
35173	Ups Load Percent	RO	U16	%	100	1	
35174	Air temperature	RO	S16	C	10	1	Inverter internal temperature
35175	Module temperature	RO	S16	C	10	1	
35176	Radiator temperature	RO	S16	C	10	1	
35177	FunctionBitValue	RO	U16			1	
35178	BUSVoltage	RO	U16	V	10	1	BUS Voltage
35179	NBUSVoltage	RO	U16	V	10	1	NBUS Voltage
35180	Vbattery1	RO	U16	V	10	1	First group battery voltage
35181	Ibattery1	RO	S16	V	10	1	First group battery current
35182	Reversed					1	Reversed
35183	Pbattery1	RO	S16	W	1	1	First group battery power
35184	Battery1 Mode	RO	U16			1	1st group battery work mode, Table 8-9
35185	Warning code	RO	U16			1	
35186	SafetyCountry	RO	U16			1	
35187	Work Mode	RO	U16			1	refer to Table 8-1
35188	Operation Mode	RO	U16			1	Storage Inverter work mode, Table 8-12
35189	Error Message	RO	U32			2	Failure status description, Table 8-2
35191	PV E-Total	RO	U32	1KW.Hr	10	2	Total PV Energy
35193	PV E-Day	RO	U32	1KW.Hr	10	2	PV Energy in today
35195	E-Total	RO	U32	1KW.Hr	10	2	Total Feed Energy to grid
35197	h-Total	RO	U32	H	1	2	Total feeding hours
35199	E-Day-Sell	RO	U16	1KW.Hr	10	1	Feed Energy to grid in today
35200	E-Total-Buy	RO	U32	1KW.Hr	10	2	
35202	E-Day-Buy	RO	U16	1KW.Hr	10	1	
35203	E-Total-Load	RO	U32	1KW.Hr	10	2	Total Energy of Load
35205	E-Load-Day	RO	U16	1KW.Hr	10	1	Energy of load in day
35206	E-BatteryCharge	RO	U32	1KW.Hr	10	2	Charge energy
35208	E-Charge-Day	RO	U16	1KW.Hr	10	1	Energy of charge in day

35209	E-BatteryDischarge	RO	U32	1KW.Hr	10	2	Discharge energy
35211	E-discharge-Day	RO	U16	1KW.Hr	10	1	Energy of discharge in day
35212	BattStrings	RO	U16	Pcs	1	1	
35213	CPLD warning code	RO	U16			1	
35214	wChargerCtrlFlg	RO	U16			2	
35215	Derate Flag	RO	U16			1	Safety power curve flag
35216	Derate frozen power	RO	S32	W		2	Safety curve power
35218	DiagStatusH	RO	U32			2	
35220	DiagStatusL	RO	U32			2	

4.3 External Communication Data (ARM)

ADDR.	NAME	R/W	TYPE	UNIT	Mutiple	Nr.	Remark
36000	comcode	RO	U16			1	
36001	RSSI	RO	U16			1	
36002	ManufacturerCode	RO	U16			1	EMS protocol code
36003	bMeterConnectStatus	RO	U16			1	1: connect correctly , 2: connect reverse , 3: connect incorrectly , 0: not checked
36004	Meter communicate Status	RO	U16			1	1: OK, 0: NG
36005	MTActivepowerR	RO	S16	W	1	1	Pmeter R
36006	MTActivepowerS	RO	S16	W	1	1	Pmeter S
36007	MTActivepowerT	RO	S16	W	1	1	Pmeter T
36008	MTTotalActivepower	RO	S16	W	1	1	Pmeter
36009	MTTotalReactivepower	RO	U16	W	1	1	
36010	MeterPF_R	RO	U16		100	1	Meter power factor R
36011	MeterPF_S	RO	U16		100	1	Meter power factor S
36012	MeterPF_T	RO	U16		100	1	Meter power factor T
36013	MeterPowerFactor	RO	U16		100	1	Meter power factor
36014	MeterFrequency	RO	U16		100	1	
36015	E-Total-Sell	RO	float	1Kwh	10	2	
36017	E-Total-Buy	RO	float	1Kwh	10	2	
36019	MTActivepowerR	RO	S32	W	1	2	Pmeter R
36021	MTActivepowerS	RO	S32	W	1	2	Pmeter S
36023	MTActivepowerT	RO	S32	W	1	2	Pmeter T
36025	MTTotalActivepower	RO	S32	W	1	2	Pmeter
36027	MTReactivepowerR	RO	S32	W	1	2	Phase R reactive power
36029	MTReactivepowerS	RO	S32	W	1	2	Phase S reactive power
36031	MTReactivepowerT	RO	S32	W	1	2	Phase T reactive power
36033	MTTotalReactivepower	RO	S32	W	1	2	Total reactive power
36035	MTApparentpowerR	RO	S32	W	1	2	Phase R apparent power
36037	MTApparentpowerR	RO	S32	W	1	2	Phase S apparent power
36039	MTApparentpowerR	RO	S32	W	1	2	Phase T apparent power
36041	MTTotalApparentpower	RO	S32	W	1	2	Total apparent power
36043	Meter Type	RO	U16	NA	1	1	
36044	Meter software version	RO	U16	NA	1	1	

4.4 Flash Information

ADDRESS	NAME	R/W	TYPE	UNIT	Mutiple	Number	Remark
36900	FlashPgmParaVer	RO	U16	NA	1	1	
36901	FlashPgmWriteCount	RO	U32	NA	1	2	
36903	FlashSysParaVer	RO	U16	NA	1	1	
36904	FlashSysWriteCount	RO	U32	NA	1	2	
36906	FlashBatParaVer	RO	U16	NA	1	1	
36907	FlashBatWriteCount	RO	U32	NA	1	2	
36909	FlashEepromVer	RO	U16	NA	1	1	
36910	FlashEepromWriteCount	RO	U32	NA	1	2	
36912	WiFiDataSendCount	RO	U16	NA	1	1	
36913	WifiUpDataDebug	RO	U16	NA	1	1	

4.5 BMS Information

ADDR.	NAME	R/W	TYPE	UNIT	Multiple	Nr.	Remark
37000	DRMStatus	RO	U16			1	Refer Table 8-15
37001	BattTypeIndex	RO	U16		1	1	Battery manufactor index setting
37002	BMS Status	RO	U16			1	BMS Work Status
37003	BMS Pack Temperature	RO	U16		10	1	
37004	BMS Charge I _{max}	RO	U16		1	1	
37005	BMS Discharge I _{max}	RO	U16		1	1	
37006	BMS Error Code L	RO	U16			1	Bit 0~15 refer to Table 8-7
37007	SOC	RO	U16	%	1	1	First group battery capacity
37008	BMS SOH	RO	U16	%	1	1	
37009	BMS Battery strings	RO	U16	Pcs	1	1	
37010	BMS Warning Code L	RO	U16			1	Bit 0~15 refer to Table 8-8
37011	Battery protocol	RO	U16			1	
37012	BMS Error Code H	RO	U16	NA	NA	1	Bit 16~31 refer to Table 8-7
37013	BMS Warning Code H	RO	U16	NA	NA	1	Bit 16~31 refer to Table 8-8
37014	BMS Software Version	RO	U16	NA	1	1	
37015	Battery Hardware Version	RO	U16	NA	1	1	
37016	Maximum cell temperature ID	RO	U16	NA	1	1	
37017	Minimum cell temperature ID	RO	U16	NA	1	1	
37018	Maximum cell voltage ID	RO	U16	NA	1	1	
37019	Minimum cell voltage ID	RO	U16	NA	1	1	
37020	Maximum cell temperature	RO	U16	°C	10	1	
37021	Minimum cell temperature	RO	U16	°C	10	1	
37022	Maximum cell voltage	RO	U16	mV	1	1	
37023	Minimum cell voltage	RO	U16	mV	1	1	

37024	Pass Infomation1	RO	U16	NA	NA	1	
37025	Pass Infomation2	RO	U16	NA	NA	1	
37026	Pass Infomation3	RO	U16	NA	NA	1	
37027	Pass Infomation4	RO	U16	NA	NA	1	
37028	Pass Infomation5	RO	U16	NA	NA	1	
37029	Pass Infomation6	RO	U16	NA	NA	1	
37030	Pass Infomation7	RO	U16	NA	NA	1	
37031	Pass Infomation8	RO	U16	NA	NA	1	
37032	Pass Infomation9	RO	U16	NA	NA	1	
37033	Pass Infomation10	RO	U16	NA	NA	1	
37034	Pass Infomation11	RO	U16	NA	NA	1	
37035	Pass Infomation12	RO	U16	NA	NA	1	
37036	Pass Infomation13	RO	U16	NA	NA	1	
37037	Pass Infomation14	RO	U16	NA	NA	1	
37038	Pass Infomation15	RO	U16	NA	NA	1	
37039	Pass Infomation16	RO	U16	NA	NA	1	
37040	Pass Infomation17	RO	U16	NA	NA	1	
37041	Pass Infomation18	RO	U16	NA	NA	1	
37042	Pass Infomation19	RO	U16	NA	NA	1	
37043	Pass Infomation20	RO	U16	NA	NA	1	
37044	Pass Infomation21	RO	U16	NA	NA	1	
37045	Pass Infomation22	RO	U16	NA	NA	1	
37046	Pass Infomation23	RO	U16	NA	NA	1	
37047	Pass Infomation24	RO	U16	NA	NA	1	
37048	Pass Infomation25	RO	U16	NA	NA	1	
37049	Pass Infomation26	RO	U16	NA	NA	1	
37050	Pass Infomation27	RO	U16	NA	NA	1	
37051	Pass Infomation28	RO	U16	NA	NA	1	
37052	Pass Infomation29	RO	U16	NA	NA	1	
37053	Pass Infomation30	RO	U16	NA	NA	1	
37054	Pass Infomation31	RO	U16	NA	NA	1	
37055	Pass Infomation32	RO	U16	NA	NA	1	

BMS Detailed Information

ADDR.	NAME	R/W	TYPE	UNIT	Multiple	Nr.	Remark
37100	BMS Flag	RO	U16	NA	NA	1	
37101	BMS Work Mode	RO	U16	NA	NA	1	
37102	BMS Allow Charge Power	RO	U32	W	1	2	
37104	BMS Allow Discharge Power	RO	U32	W	1	2	
37106	BMS Relay Status	RO	U16	NA	NA	1	

37107	Battery Module Number	RO	U16	NA	NA	1	
37108	BMS Shutdown Fault Code	RO	U16	NA	NA	1	
37109	Battery Ready Enable	RO	U16	NA	NA	1	
37110	Alarm Under temperature ID	RO	U16	NA	NA	1	
37111	Alarm Over temperature ID	RO	U16	NA	NA	1	
37112	Alarm Differ temperature ID	RO	U16	NA	NA	1	
37113	Alarm Charge Current ID	RO	U16	NA	NA	1	
37114	Alarm Discharge Current ID	RO	U16	NA	NA	1	
37115	Alarm Cell Over Voltage ID	RO	U16	NA	NA	1	
37116	Alarm Cell Under Voltage ID	RO	U16	NA	NA	1	
37117	Alarm SOC Lower ID	RO	U16	NA	NA	1	
37118	Alarm Cell Voltage Differ ID	RO	U16	NA	NA	1	
37119	Battery1 Current	RO	S16	A	10	1	
37120	Battery2 Current	RO	S16	A	10	1	
37121	Battery3 Current	RO	S16	A	10	1	
37122	Battery4 Current	RO	S16	A	10	1	
37123	Battery5 Current	RO	S16	A	10	1	
37124	Battery6 Current	RO	S16	A	10	1	
37125	Battery7 Current	RO	S16	A	10	1	
37126	Battery8 Current	RO	S16	A	10	1	
37127	Battery1 SOC	RO	U16	%	1	1	
37128	Battery2 SOC	RO	U16	%	1	1	
37129	Battery3 SOC	RO	U16	%	1	1	
37130	Battery4 SOC	RO	U16	%	1	1	
37131	Battery5 SOC	RO	U16	%	1	1	
37132	Battery6 SOC	RO	U16	%	1	1	
37133	Battery7 SOC	RO	U16	%	1	1	
37134	Battery8 SOC	RO	U16	%	1	1	
37135	Battery1 SN	RO	U32	NA	NA	2	
37137	Battery2 SN	RO	U32	NA	NA	2	
37139	Battery3 SN	RO	U32	NA	NA	2	
37141	Battery4 SN	RO	U32	NA	NA	2	
37143	Battery5 SN	RO	U32	NA	NA	2	
37145	Battery6 SN	RO	U32	NA	NA	2	
37147	Battery7 SN	RO	U32	NA	NA	2	
37149	Battery8 SN	RO	U32	NA	NA	2	

4.6 For CEI Auto Test

ADDR.	NAME	R/W	TYPE	UNIT	Multiple	Nr.	Remark
38000	Work Mode	RO	U16	NA	NA	1	
38001	Error Message H	RO	U16	NA	NA	1	
38002	Error Message L	RO	U16	NA	NA	1	
38003	SimVoltage	RO	U16	V	10	1	
38004	SimFrequency	RO	U16	Hz	100	1	
38005	TestResult	RO	U16	NA	NA	1	
38006	NA	RO	U16		NA	1	
38007	NA	RO	U16		NA	1	
38008	Vac1	RO	U16	V	10	1	
38009	Fac1	RO	U16	Hz	100	1	
38010	Pac 1	RO	U16	W	1	2	
38012	Line1AvgFaultValue	RO	U16	V	10	1	
38013	Line1AvgFaultTime	RO	U16	s	1	1	
38014	Line1VHighfaultValue	RO	U16	V	10	1	
38015	Line1VHighfaultTime	RO	U16	ms	1	1	
38016	Line1VLowfaultValueS1	RO	U16	V	10	1	
38017	Line1VLowfaultTimeS1	RO	U16	ms	1	1	
38018	Line1VLowfaultValueS2	RO	U16	V	10	1	
38019	Line1VLowfaultTimeS2	RO	U16	ms	1	1	
38020	Line1FHighfaultValueCom	RO	U16	Hz	100	1	
38021	Line1FhighfaultTimeCom	RO	U16	ms	1	1	
38022	Line1FlowfaultValueCom	RO	U16	Hz	100	1	
38023	Line1FlowfaultTimeCom	RO	U16	ms	1	1	
38024	Line1FHighfaultValue	RO	U16	Hz	100	1	
38025	Line1FHighfaultTime	RO	U16	ms	1	1	
38026	Line1FlowfaultValue	RO	U16	Hz	100	1	
38027	Line1FlowfaultTime	RO	U16	ms	1	1	
38028	Vac2	RO	U16	V	10	1	
38029	Fac2	RO	U16	Hz	100	1	
38030	Pac 2	RO	U16	W	1	2	
38032	Line2AvgFaultValue	RO	U16	V	10	1	
38033	Line2AvgFaultTime	RO	U16	s	1	1	
38034	Line2VHighfaultValue	RO	U16	V	10	1	
38035	Line2VHighfaultTime	RO	U16	ms	1	1	
38036	Line2VLowfaultValueS1	RO	U16	V	10	1	
38037	Line2VLowfaultTimeS1	RO	U16	ms	1	1	
38038	Line2VLowfaultValueS2	RO	U16	V	10	1	
38039	Line2VLowfaultTimeS2	RO	U16	ms	1	1	

38040	Line2FHighfaultValueCom	RO	U16	Hz	100	1	
38041	Line2FhighfaultTimeCom	RO	U16	ms	1	1	
38042	Line2FlowfaultValueCom	RO	U16	Hz	100	1	
38043	Line2FlowfaultTimeCom	RO	U16	ms	1	1	
38044	Line2FHighfaultValue	RO	U16	Hz	100	1	
38045	Line2FHighfaultTime	RO	U16	ms	1	1	
38046	Line2FlowfaultValue	RO	U16	Hz	100	1	
38047	Line2FlowfaultTime	RO	U16	ms	1	1	
38048	Vac3	RO	U16	V	10	1	
38049	Fac3	RO	U16	Hz	100	1	
38050	Pac 3	RO	U16	W	1	2	
38052	Line3AvgFaultValue	RO	U16	V	10	1	
38053	Line3AvgFaultTime	RO	U16	s	1	1	
38054	Line3VHighfaultValue	RO	U16	V	10	1	
38055	Line3VHighfaultTime	RO	U16	ms	1	1	
38056	Line3VLowfaultValueS1	RO	U16	V	10	1	
38057	Line3VLowfaultTimeS1	RO	U16	ms	1	1	
38058	Line3VLowfaultValueS2	RO	U16	V	10	1	
38059	Line3VLowfaultTimeS2	RO	U16	ms	1	1	
38060	Line3FHighfaultValueCom	RO	U16	Hz	100	1	
38061	Line3FhighfaultTimeCom	RO	U16	ms	1	1	
38062	Line3FlowfaultValueCom	RO	U16	Hz	100	1	
38063	Line3FlowfaultTimeCom	RO	U16	ms	1	1	
38064	Line3FHighfaultValue	RO	U16	Hz	100	1	
38065	Line3FHighfaultTime	RO	U16	ms	1	1	
38066	Line3FlowfaultValue	RO	U16	Hz	100	1	
38067	Line3FlowfaultTime	RO	U16	ms	1	1	

4.7 Power Limit

ADDR.	NAME	R/W	TYPE	UNIT	Multiple	Nr.	Remark
38450	Feed Power Limit Coefficient	RO	U16	‰	1	1	
38451	L1 Power Limit	RO	U16	W	1	1	
38452	L2 Power Limit	RO	U16	W	1	1	
38453	L3 Power Limit	RO	U16	W	1	1	
38454	Inverter Power Factor	RO	S16	1	1000	1	
38455	PV MeterDC Power	RO	S32	W	1	2	
38457	Etotal Grid Charge	RO	U32	1KW.Hr	10	2	
38459	Dispatch Switch	RO	U16	NA	1	1	
38460	Dispatch Power	RO	S32	W	1	2	
38462	Dispatch Soc	RO	U16	%	1	1	
38463	Dispatch Mode	RO	U16	NA	1	1	

5. Attached Table List

Table 8-1 Operation Mode

Mode	Code	Description
Wait	0x00	cut off all the connection to Inverter
On-Grid	0x01	PV inputs to Inverter, Inverter outputs to Grid
Off-Grid	0x02	PV inputs to Inverter(1st),Battery inputs to Inverter(2nd),Inverter work as AC source
Fault	0x03	Fault ,fault mode, something is in fault mode
Flash	0x04	Inverter upgrade
Check	0x05	Power on self-check of inverter

Table 8-2 Error Message

Bit NO	Error message	Description
Bit31	Internal Communication Failure	Communication between microcontrollers is failure
Bit30	EEPROM R/W Failure	EEPROM cannot be read or written
Bit29	Fac Failure	The grid frequency is out of tolerable range
Bit28	DSP communication failure	Communication between ARM and DSP is failure
Bit27	PhaseAngleFailure	Phase angle out of range (110°~140°)
Bit26	TBD	NA
Bit25	Relay Check Failure	Relay check is failure
Bit24	TBD	NA
Bit23	Vac Consistency Failure	Different value between Master and Slave for grid voltage
Bit22	Fac Consistency Failure	Different value between Master and Slave for grid frequency
Bit21	TBD	NA
Bit20	Back-Up Over Load	NA
Bit19	DC Injection High	The DC injection to grid is too high
Bit18	Isolation Failure	Isolation resistance of PV-plant out of tolerable range
Bit17	Vac Failure	Grid voltage out of tolerable range
Bit16	External Fan Failure	The external fan failure
Bit15	PV Over Voltage	Pv input voltage is over the tolerable maximum value
Bit14	Utility Phase Failure	Utility Phase Failure
Bit13	Over Temperature	Temperature is too high
Bit12	InternalFan Failure	The fan in case failure
Bit11	DC Bus High	Dc bus is too high
Bit10	Ground I Failure	Ground current is too high
Bit9	Utility Loss	Utility is unavailable
Bit8	AC HCT Failure	AC HCT check failure 3 times
Bit7	Relay Device Failure	Relay check failure 3 times
Bit6	GFCI Device Failure	GFCI check failure 3 times

Bit5	TBD	NA
Bit4	GFCI Consistency Failure	Different value between Master and Slave for GFCI
Bit3	DCI Consistency Failure	Different value between Master and Slave for output DC current
Bit2	TBD	NA
Bit1	AC HCT Check Failure	The output current sensor is abnormal
Bit0	GFCI Device Check Failure	The GFCI detecting circuit is abnormal

Table 8-3 PV Mode

Byte	Description
0	PV1 mode refer to under table
1	PV2 mode refer to under table
2	PV3 mode refer to under table
3	PV4 mode refer to under table

Table 8-4 PV Mode Code

Mode Code	Description
0x00	NO PV, inverter disconnects to PV
0x01	Standby, PV does not output power
0x02	Work, PV output power

Table 8-7 BMS Alarm Code

Alarm value							
Bit31	Bit30	Bit29	Bit28	Bit27	Bit26	Bit25	Bit24~Bit16
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Charging over-voltage3	Discharge under-voltage3	Cell High temperature3	Communication failure2	Charging circuit Failure	Discharge circuit Fault	Battery Lock	Battery break
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
DC bus fault	Precharge fault	Discharging overcurrent 2	Charging overcurrent2	Cell Low temperature2	Cell High temperature2	Discharging under-voltage2	Charging over-voltage2

Table 8-8 BMS Warning Code

Warning value							
Bit31~Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reserved				System High temperature	System Low temperature2	System Low temperature1	Cell-imbalance
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
System Reboot	communication failure1	Discharging over-current1	Charging over-current1	Cell Low temperature1	Cell High temperature1	Discharge under-voltage1	Charging over-voltage1

Table 8-9 Battery Status

Mode Code	Description
0x00	No Battery, inverter disconnects to Battery
0x01	Standby, no discharging and no charging
0x02	Discharging
0x03	Charging
0x04	Waiting for charge
0x05	Waiting for discharge

Table 8-10 Grid Status

Mode Code	Description
0x00	Loss, inverter disconnects to Grid
0x01	OK, inverter connects to Grid
0x02	Fault, something is wrong

Table 8-11 Backup Status

Mode Code	Description
0x00	ON, inverter connects to Load
0x01	OFF, inverter disconnects to Load

Table 8-12 Operation Mode

Mode Code	Description
0x01	Cut off all the connection to Inverter(wait mode)
0x02	PV inputs to Inverter, Inverter outputs to Grid(online mode)
0x04	PV inputs to Inverter(First),Battery inputs to Inverter(Second),Inverter work as AC source(battery mode)
0x10	Fault, fault mode, something is in fault mode(fault mode)

Table 8-13 Energy Status

Code	Description
0x00	Inverter neither send power to Grid, nor get power from Grid.
0x01	Inverter sends power to Grid
0x02	Inverter gets power from Grid.

Table 8-14 Diagnostic Status

Bit	Diagnose Info	Explanation	Type
0	BatteryVoltLow	Battery not discharge caused by low battery voltage	Affect discharge
1	BatterySOCLow	Battery not discharge caused by low SOC	
2	BatterySOCInBack	Battery SOC not recover to allow-discharge level	
3	BMSDischargeDisable	BMS not allow discharge	
4	DischargeTimeOn	Discharge time is set, 1: On, 0: OFF	
5	ChargeTimeOn	Charge time is set, 1: On, 0: OFF	
6	DischargeDriveOn	Discharge driver is turned on	

7	BMSDischgCurrentLow	BMS discharge current limit is too low	
8	DischargeCurrentLow	Discharge current limit is too low (from App)	
9	MeterCommLoss	Smart Meter communication failure	
10	MeterConnectReverse	Smart Meter connection reversed	
11	SelfUseLoadLight	Low load power, cannot activate battery discharge	
12	EMSDischargeZero	Discharge current limit 0A from EMS	
13	DischargeBUSHigh	Battery not discharge caused by over high PV voltage	
14	BatteryDisconnect	Battery disconnected	Affect charging
15	BatteryOvercharge	Battery overcharged	
16	BMSOverTemperature	Lithium battery over temperature	
17	BMSOvercharge	Lithium battery overcharged or an individual cell voltage is higher	
18	BMSChargeDisable	BMS does not allow charge	Affect discharge
19	SelfUseOff	Self-use mode turned off	
20	SOCDeltaOverRange	SOC Jumps abnormally	Other
21	BatterySelfDischarge	Battery discharge at low current for long time, continuously over 30% of battery SOC	
22	OffgridSOCLow	SOC is low under off-grid statues	
23	GridWaveUnstable	Grid wave is bad, switch to back-up mode frequently	
24	FeedPowerLimit	Export power limit is set	
25	PFValueSet	PF value is set	
26	RealPowerLimit	Active power value is set	
27	DCOutputOn		
28	SOCProtectOff		
29	Discharge mode for BP		

Table 8-15 DRM Status

Bit NO	DRMx	Description
Bit0	DRM0	DRM0 Switch : 1 ON/0 OFF
Bit1	DRM1	DRM1 Switch : 1 ON/0 OFF
Bit2	DRM2	DRM2 Switch : 1 ON/0 OFF
Bit3	DRM3	DRM3 Switch : 1 ON/0 OFF
Bit4	DRM4	DRM4 Switch : 1 ON/0 OFF
Bit5	DRM5	DRM5 Switch : 1 ON/0 OFF
Bit6	DRM6	DRM6 Switch : 1 ON/0 OFF
Bit7	DRM7	DRM7 Switch : 1 ON/0 OFF
Bit8	DRM8	DRM8 Switch : 1 ON/0 OFF
Bit9		
Bit...		
Bit15	DRED Connect Status	DRED Status : 1 Connect / 0 Disconnect

6. CRC16

```
const INT8U auchCRCHI[] = { 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,  
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,  
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,  
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,  
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,  
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,  
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,  
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40  
};
```

```
const INT8U auchCRCLo[] = { 0x00, 0xC0, 0xC1, 0x01, 0xC3, 0x03, 0x02, 0xC2, 0xC6, 0x06, 0x07, 0xC7, 0x05,
0xC5, 0xC4, 0x04,
0xCC, 0x0C, 0x0D, 0xCD, 0x0F, 0xCF, 0xCE, 0x0E, 0x0A, 0xCA, 0xCB, 0x0B, 0xC9, 0x09, 0x08, 0xC8, 0xD8, 0x18,
0x19, 0xD9, 0x1B, 0xDB, 0xDA, 0x1A, 0x1E, 0xDE, 0xDF, 0x1F, 0xDD, 0x1D, 0x1C, 0xDC, 0x14, 0xD4, 0xD5, 0x15,
0xD7, 0x17, 0x16, 0xD6, 0xD2, 0x12, 0x13, 0xD3, 0x11, 0xD1, 0xD0, 0x10, 0xF0, 0x30, 0x31, 0xF1, 0x33, 0xF3,
0xF2, 0x32, 0x36, 0xF6, 0xF7, 0x37, 0xF5, 0x35, 0x34, 0xF4, 0x3C, 0xFC, 0xFD, 0x3D, 0xFF, 0x3F, 0x3E, 0xFE,
0xFA, 0x3A, 0x3B, 0xFB, 0x39, 0xF9, 0xF8, 0x38, 0x28, 0xE8, 0xE9, 0x29, 0xEB, 0x2B, 0x2A, 0xEA, 0xEE, 0x2E,
0x2F, 0xEF, 0x2D, 0xED, 0xEC, 0x2C, 0xE4, 0x24, 0x25, 0xE5, 0x27, 0xE7, 0xE6, 0x26, 0x22, 0xE2, 0xE3, 0x23,
0xE1, 0x21, 0x20, 0xE0, 0xA0, 0x60, 0x61, 0xA1, 0x63, 0xA3, 0xA2, 0x62, 0x66, 0xA6, 0xA7, 0x67, 0xA5, 0x65,
0x64, 0xA4, 0x6C, 0xAC, 0xAD, 0x6D, 0xAF, 0x6F, 0x6E, 0xAE, 0xAA, 0x6A, 0x6B, 0xAB, 0x69, 0xA9, 0xA8, 0x68,
0x78, 0xB8, 0xB9, 0x79, 0xBB, 0x7B, 0x7A, 0xBA, 0xBE, 0x7E, 0x7F, 0xBF, 0x7D, 0xBD, 0xBC, 0x7C, 0xB4, 0x74,
0x75, 0xB5, 0x77, 0xB7, 0xB6, 0x76, 0x72, 0xB2, 0xB3, 0x73, 0xB1, 0x71, 0x70, 0xB0, 0x50, 0x90, 0x91, 0x51,
0x93, 0x53, 0x52, 0x92, 0x96, 0x56, 0x57, 0x97, 0x55, 0x95, 0x94, 0x54, 0x9C, 0x5C, 0x5D, 0x9D, 0x5F, 0x9F,
0x9E, 0x5E, 0x5A, 0x9A, 0x9B, 0x5B, 0x99, 0x59, 0x58, 0x98, 0x88, 0x48, 0x49, 0x89, 0x4B, 0x8B, 0x8A, 0x4A,
0x4E, 0x8E, 0x8F, 0x4F, 0x8D, 0x4D, 0x4C, 0x8C, 0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82, 0x42,
0x43, 0x83, 0x41, 0x81, 0x80, 0x40
};
```

```
INT16U sCRC16(INT8U *puchMsg, INT16U usDataLen)
{
    INT8U uchCRCHi = 0xFF ;
    INT8U uchCRCLo = 0xFF ;
    INT8U uIndex ;
    while (usDataLen--)
    {
        uIndex = uchCRCHi ^ *puchMsg++ ;
        uchCRCHi = uchCRCLo ^ auchCRCHi[uIndex] ;
        uchCRCLo = auchCRCLo[uIndex] ;
    }
    return ((INT16U)uchCRCHi << 8 | uchCRCLo) ;
}
```