

Technical Information

# **AISWEI Interface**

**(Based On Modbus Standard Protocol)**

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‘Modbus’ herein refers to industrial standard serial communication protocol.

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# Table of Contents

<b>1</b>	<b>Information on this Document</b> .....	<b>1</b>
<b>2</b>	<b>Safety</b> .....	<b>2</b>
2.1	Intended Use.....	2
2.2	Skills of Qualified Persons.....	2
<b>3</b>	<b>AISWEI Modbus Profile</b> .....	<b>3</b>
3.1	Information on the Assignment Tables.....	3
3.2	AISWEI Data Types and NaN Values.....	4
3.3	AISWEI Modbus Profile – Register Overview.....	5
3.4	Warning and Error Codes.....	20
3.5	Grid Codes.....	22
3.6	Frame format.....	24
3.6.1	Read Holding Register (Function Code: 0x03).....	24
3.6.2	Read Input Register (Function Code: 0x04).....	25
3.6.3	Write Single Holding Register (Function Code: 0x06).....	26
3.6.4	Write Multiple Holding Registers (Function Code: 0x10).....	27
3.6.5	Write Multiple Holding Registers (Function Code: 0x10) for broadcast.....	28
3.6.6	Exception Codes.....	28
<b>4</b>	<b>Contact</b> .....	<b>29</b>

# 1 Information on this Document

## Validity

This document is valid for AISWEI inverters.

## Target Group

This document is intended for qualified persons. Only persons with appropriate skills are allowed to perform the tasks described in this document.

## Terminology

Information	Explanation
Pn	The rated active power of device
Pm	The instantaneous power when the power control curve reaches the starting point
Sn	The rated apparent power of device

## 2 Safety

### 2.1 Intended Use

The Modbus interface of the supported devices is designed for industrial use, via RS485 or RS422 protocol to enable remote control of the PV system, remote querying of values, and remote parameter setting.

### 2.2 Skills of Qualified Persons

The activities described in this document must only be performed by qualified persons. Qualified persons must have the following skills:

- Detailed knowledge of the grid management services
- Knowledge of IP-based network protocols
- Training in the installation and configuration of IT systems
- Knowledge of the Modbus specifications
- Knowledge of and compliance with this document and all safety information

## 3 AISWEI Modbus Profile

### 3.1 Information on the Assignment Tables

The assignment tables of the AISWEI Modbus profile present the following information:

Information	Explanation
<b>ADR (DEC)</b>	Decimal Modbus address, you need to remove 3x or 4x and subtract 1, then convert to hexadecimal and use it in the communication frame. Such as 31001 (decimal) → 1000 (decimal) → 0x03e8 (hexadecimal)
<b>Description/ number code(s)</b>	Short description of the Modbus registers and the number codes used.
<b>Type</b>	Type of the data (see Section 3.2).
<b>Unit</b>	Unit of the data.
<b>Gain</b>	Real value = Gain * output value
<b>Access</b>	RO: Read Only RW: Read and Write WO: Write Only

## 3.2 AISWEI Data Types and NaN Values

The following table shows the data types used in the AISWEI Modbus profile and the possible NaN values. The AISWEI data types are listed in the assignment tables in the Type column. They describe the data widths of the assigned values:

Type	Description	NaN Value
<b>B16</b>	Bit field (16-bit)	0xFFFF
<b>B32</b>	Bit field (32-bit)	0xFFFF FFFF
<b>S16</b>	Signed integer (16-bit)	0x8000
<b>U16</b>	Unsigned integer (16-bit)	0xFFFF
<b>S32</b>	Signed integer (32-bit)	0x8000 0000
<b>U32</b>	Unsigned integer (32-bit)	0xFFFF FFFF
<b>E16</b>	Number code (16-bit)	0xFFFF
<b>String</b>	String type (16-bit, combination of two 8-bit ASCII characters, the high 8-bit is the first ASCII character, and the low 8-bit is the second ASCII character)	0x0000



### 3.3 AISWEI Modbus Profile – Register Overview

In the following table you will find all the measured values and parameters of the AISWEI Modbus Profile.

#### Input Registers

ADDR(DEC)	Description/number code	Type	Unit	Gain	Access
31001	Device Type: 1=Single phase / 3=Three pahse	String	-	-	RO
31002	Modbus address: Default as 3	U16	-	-	RO
31003~31018	Serial Number	String	-	-	RO
31019~31026	Machine type: for example, "ASW3000", please refer to the specific machine in practice	String	-	-	RO
31027	Current grid code: refer to Section 3.5	E16	-	-	RO
31028~31029	Rated Power	U32	W	1.0	RO
31030~31036	Software Version	String	-	-	RO
31044~31050	Safety Version	String	-	-	RO
31057~31064	Manufacturer's name: for example, "AISWEI", refer to the specific machine	String	-	-	RO
31065~31072	Brand name: for example, "AISWEI", please refer to the specific machine	String	-	-	RO
31301	Grid rated voltage	U16	V	0.1	RO
31302	Grid rated frequency	U16	Hz	0.01	RO
31303~31304	E-Today of inverter	U32	kWh	0.1	RO
31305~31306	E-Total of inverter	U32	kWh	0.1	RO
31307~31308	H-Total	U32	H	1.0	RO
31309	Device State: 0 = Wait 1 = Normal 2 = Fault 4 = Checking	E16	-	-	RO
31310	Connect time	U16	s	1.0	RO

31311	Air temperature	S16	°C	0.1	RO
31312	Inverter U phase temperature	S16	°C	0.1	RO
31313	Inverter V phase temperature	S16	°C	0.1	RO
31314	Inverter W phase temperature	S16	°C	0.1	RO
31315	Boost temperature	S16	°C	0.1	RO
31316	Bidirectional DC/DC Converter temperature <sup>(*)</sup>	S16	°C	0.1	RO
31317	Bus voltage	U16	V	0.1	RO
31319	PV1 voltage	U16	V	0.1	RO
31320	PV1 current	U16	A	0.01	RO
31321	PV2 voltage	U16	V	0.1	RO
31322	PV2 current	U16	A	0.01	RO
31323	PV3 voltage <sup>(*)</sup>	U16	V	0.1	RO
31324	PV3 current <sup>(*)</sup>	U16	A	0.01	RO
31325	PV4 voltage <sup>(*)</sup>	U16	V	0.1	RO
31326	PV4 current <sup>(*)</sup>	U16	A	0.01	RO
31327	PV5 voltage <sup>(*)</sup>	U16	V	0.1	RO
31328	PV5 current <sup>(*)</sup>	U16	A	0.01	RO
31339	String 1 current <sup>(*)</sup>	U16	A	0.1	RO
31340	String 2 current <sup>(*)</sup>	U16	A	0.1	RO
31341	String 3 current <sup>(*)</sup>	U16	A	0.1	RO
31342	String 4 current <sup>(*)</sup>	U16	A	0.1	RO
31343	String 5 current <sup>(*)</sup>	U16	A	0.1	RO
31344	String 6 current <sup>(*)</sup>	U16	A	0.1	RO
31345	String 7 current <sup>(*)</sup>	U16	A	0.1	RO
31346	String 8 current <sup>(*)</sup>	U16	A	0.1	RO
31347	String 9 current <sup>(*)</sup>	U16	A	0.1	RO
31348	String 10 current <sup>(*)</sup>	U16	A	0.1	RO
31359	L1 Phase voltage	U16	V	0.1	RO
31360	L1 Phase current	U16	A	0.1	RO
31361	L2 Phase voltage <sup>(*)</sup>	U16	V	0.1	RO
31362	L2 Phase current <sup>(*)</sup>	U16	A	0.1	RO
31363	L3 Phase voltage <sup>(*)</sup>	U16	V	0.1	RO

31364	L3 Phase current <sup>(*)</sup>	U16	A	0.1	RO
31365	RS Line voltage <sup>(*)</sup>	U16	V	0.1	RO
31366	RT Line voltage <sup>(*)</sup>	U16	V	0.1	RO
31367	ST Line voltage <sup>(*)</sup>	U16	V	0.1	RO
31368	Grid frequency	U16	Hz	0.01	RO
31369~31370	Apparent power	U32	VA	1.0	RO
31371~31372	Active power	U32	W	1.0	RO
31373~31374	Reactive power	S32	Var	1.0	RO
31375	Power factor	S16	-	0.01	RO
31378	Error message:please refer to section 3.4	E16	-	-	RO
31379	Warning message:please refer to section 3.4	E16	-	-	RO
31601~31602	PV total power	U32	W	-	RO
31603~31604	PV E-Today	U32	kWh	0.1	RO
31605~31606	PV E-Total	U32	kWh	0.1	RO
31607	Battery communication status: 0x000A=Normal 0x0005=Error	E16	-	-	RO
31608	Battery status: 0 = Not available 1 = Idle 2 = Charging 3 = Discharging 4 = Error	E16	-	-	RO
31609	Battery error status : Bit0 communication data error 0 - valid 1 - invalid Bit1 cell or module over voltage 0 - valid 1 - invalid Bit2 cell or module under voltage 0 - valid 1 - invalid Bit3 cell temperature is too high 0 - valid 1 - invalid Bit4 cell temperature too low 0 - valid 1 - invalid Bit5 discharge over current 0 - valid 1 - invalid Bit6 charging over current	B16	-	-	RO

	0 - valid 1 - invalid Bit7 internal communication error 0 - valid 1 - invalid Bit8 cell imbalance 0 - valid 1 - invalid Undefined bit.:The default value is 1				
31613	Battery warning status: Bit0 communication data error 0 - valid 1 - invalid Bit1 cell or module voltage high 0 - valid 1 - invalid Bit2 cell or module voltage low 0 - valid 1 - invalid Bit3 cell temperature high 0 - valid 1 - invalid Bit4 cell temperature low 0 - valid 1 - invalid Bit5 discharge current high 0 - valid 1 - invalid Bit6 charging current high 0 - valid 1 - invalid Bit7 internal communication failure 0 - valid 1 - invalid Bit8 cell imbalance 0 - valid 1 - invalid Undefined bit.:The default value is 1	B16	-	-	RO
31617	Battery voltage	U16	V	0.01	RO
31618	Battery current	S16	A	0.1	RO
31619~31620	Battery power	S32	w	1	RO
31621	Battery temperature	S16	° C	0.1	RO
31622	Battery SOC	U16	-	0.01	RO
31623	Battery SOH	U16	-	0.01	RO
31624	Battery charging current limit	U16	A	0.1	RO
31625	Battery discharge current limit	U16	A	0.1	RO
31626~31627	Battery E-Charge-Today	U32	kWh	0.1	RO
31628~31629	Battery E-Discharge-Today	U32	kWh	0.1	RO
31630~31631	E-Consumption-Today at AC side	U32	kWh	0.1	RO
31632~31633	E-Generation-Today at AC side	U32	kWh	0.1	RO
31634	EPS load voltage	U16	V	0.1	RO

31635	EPS load current	U16	A	0.1	RO
31636	EPS load frequency	U16	Hz	0.01	RO
31637~31638	EPS load active power	U32	w	1	RO
31639~31640	EPS load reactive power	U32	Var	1	RO
31641~31642	E-Consumption-Today at EPS load side	U32	kWh	0.1	RO
31643~31644	E-Consumption-Total at EPS load side	U32	kWh	0.1	RO

**Holding register**

ADDR(DEC)	Description/number code	Type	Unit	Gain	Access
40201	Remote switch command: 0 = POWER OFF 1 = POWER ON	E16	-	-	RW
41001	RTC:Year	U16	-	-	RW
41002	RTC:Month	U16	-	-	RW
41003	RTC:Day	U16	-	-	RW
41004	RTC:Hour	U16	-	-	RW
41005	RTC:Minute	U16	-	-	RW
41006	RTC:Seconds	U16	-	-	RW
41102	Storage Inverter Switch: 1 - OFF 2 - ON	E16	-	-	RW
41103	Type selection of energy storage machine: 0 - Invalid 1 - Energy storage machine 2 - Grid off inveter 3 - Grid connected inverter 4 - Force charge with City electricity (battery wake-up)	E16	-	-	RW
41104	Run mode: 0 - Invalid 1 - Off 2 - Self generating self use 3 - Backup power supply 4 - Customer defined	E16	-	-	RW
41105	Battery manufacturer: 1 - PYLON 2 - DYNESS 3 - BYD 4 - LG 5 - AISWEI	E16	-	-	RW
41108	Smart meter status: 0x000A - Meter Online	E16	-	-	RW

	0x0005 - Meter Offline				
41109	Smart meter adjustment flag bit: 0x000A = Start 0x0005 = Stop	E16	-	-	RW
41110~41111	Set target power value	S32	w	1	RW
41112~41113	Current power value of smart meter	S32	w	1	RW
41114	Anti reverse current flag : 0x000A = ON 0x0005 = OFF	E16	-	-	RW
41115	Battery wake-up (Force charge) sign: 0x000A = ON 0x0005 = OFF 0xFFFF =Not triggered	E16	-	-	RW
41151	Commbox and cloud communication status : 0x000A = Cloud Online 0x0005 = Cloud Offline 0x00AF = Network not configured	E16	-	-	RW
41152	Charge discharge flag bit: 1 - Stop 2 - Charging 3 - Discharge	E16	-	-	RW
41153	Charge and discharge power command: ' - ' - charging power ' + ' - discharge power	S16	W	1	RW
44001	Active power control function : 0 = Disable 1 = Enable	E16	-	-	RW
44002	EEG control function : 0 = Disable 1 = Enable	E16	-	-	RW
44003	Slope load function : 0 = Disable 1 = Enable	E16	-	-	RW
44004	Overvoltage reduce power	E16	-	-	RW

	function : 0 = Disable 1 = Enable				
44005	Overfrequency reduce power function : 0 = Disable 1 = Enable	E16	-	-	RW
44006	Reactive power control function : 0 = Disable 1 = Enable	E16	-	-	RW
44007	LVRT Function : 0 = Disable 1 = Enable	E16	-	-	RW
44009	10 Minutes Average Overvoltage protect function 0 = Disable 1 = Enable	E16	-	-	RW
44010	Islanding protect function : 0 = Disable 1 = Enable	E16	-	-	RW
44012	PE connection check function : 0 = Disable 1 = Enable	E16	-	-	RW
44017	Overload function : 0 = Disable 1 = Enable	E16	-	-	RW
44025	Shadow MPPT function <sup>(6)</sup> : 0 = Disable 1 = Enable	E16	-	-	RW
45201	Grid code: please refer to section 3.5	E16	-	-	RW
45202	Overvoltage protection value of the first grid connection	U16	V	0.1	RW
45203	Overvoltage protection value of the first grid connection	U16	V	0.1	RW
45204	Overvoltage protection value of the first grid connection	U16	Hz	0.01	RW
45205	Underfrequency protection value for first grid connection	U16	Hz	0.01	RW



45206	Grid Voltage High Limit3	U16	V	0.1	RW
45207~45208	Grid Voltage High Limit Time3	U32	ms	1.0	RW
45209	Grid Voltage High Limit2	U16	V	0.1	RW
45210~45211	Grid Voltage High Limit Time2	U32	ms	1.0	RW
45212	Grid Voltage High Limit1	U16	V	0.1	RW
45213~45214	Grid Voltage High Limit Time1	U32	ms	1.0	RW
45215	Grid Voltage Low Limit3	U16	V	0.1	RW
45216~45217	Grid Voltage Low Limit Time3	U32	ms	1.0	RW
45218	Grid Voltage Low Limit2	U16	V	0.1	RW
45219~45220	Grid Voltage Low Limit Time2	U32	ms	1.0	RW
45221	Grid Voltage Low Limit1	U16	V	0.1	RW
45222~45223	Grid Voltage Low Limit Time1	U32	ms	1.0	RW
45224	10 Minutes Average Overvoltage Threshold	U16	V	0.1	RW
45225	10 Minutes Average Overvoltage Portect Time	U16	ms	1.0	RW
45226	Overvoltage recover value	U16	V	0.1	RW
45227	Undervoltage recover value	U16	V	0.1	RW
45228	Grid Frequency High Limit3	U16	Hz	0.01	RW
45229~45230	Grid Frequency High Limit Time3	U32	ms	1.0	RW
45231	Grid Frequency High Limit2	U16	Hz	0.01	RW
45232~45233	Grid Frequency High Limit Time2	U32	ms	1.0	RW
45234	Grid Frequency High Limit1	U16	Hz	0.01	RW
45235~45236	Grid Frequency High Limit Time1	U32	ms	1.0	RW
45237	Grid Frequency Low Limit3	U16	Hz	0.01	RW
45238~45239	Grid Frequency Low Limit Time3	U32	ms	1.0	RW
45240	Grid Frequency Low Limit2	U16	Hz	0.01	RW
45241~45242	Grid Frequency Low Limit Time2	U32	ms	1.0	RW
45243	Grid Frequency Low Limit1	U16	Hz	0.01	RW
45244~45245	Grid Frequency Low Limit	U32	ms	1.0	RW

	Time1				
45246	Vary rate of Frequecny protect value	U16	Hz/s	0.01	RW
45247~45248	Vary rate of Frequecny protect time	U32	ms	1.0	RW
45249	Overfrequency recover value	U16	Hz	0.01	RW
45250	Underfrequency recover value	U16	Hz	0.01	RW
45251	Time of first connection to grid	U16	s	1.0	RW
45252	Time of re-connection to grid	U16	s	1.0	RW
45253	ISO protect threshold	U16	kΩ	1.0	RW
45254	DCI protect threshold	U16	mA	1.0	RW
45255	DCI protect time	U16	ms	1.0	RW
45401	Load rate of first connection to grid	U16	%Pn/min	1.0	RW
45402	Load rate of re-connection to grid	U16	%Pn/min	1.0	RW
45403	Active Power Set	U16	%Pn	0.01	RW
45404	Increase rate of active power	U16	%Pn/min	0.01	RW
45405	Decrease rate of active power	U16	%Pn/min	0.01	RW
45408	Over frequency reduce power mode: 0 = None 1 = Fixed reduction ratio, non – hysteresis 2 = Fixed reduction ratio, hysteresis 3 = Not fixed reduction ratio, non – hysteresis 4 = Not fixed reduction ratio, hysteresis	E16	-	-	RW
45409	Over frequency reduce power: Start frequency	U16	Hz	0.01	RW
45410	Over frequency reduce power: Stop frequency	U16	Hz	0.01	RW
45411	Over frequency reduce power: Back frequency	U16	Hz	0.01	RW
45412	The reduce ratio of over frequency reduce power	U16	%Pnor%Pm	0.01	RW

45413	Over frequency reduce power :reduce power delay time	U16	s	0.1	RW
45414	Over frequency reduce power:recover power delay time	U16	s	0.1	RW
45416	Speed of Over frequency recover to Pn	U16	%Pn/min	0.01	RW
45417	Over frequency reduce power <sup>(6)</sup> : 0 power frequency point	U16	Hz	0.01	RW
45419	Over voltage reduce power mode: 0 = None 1 = Not fixed reduction ratio, non – hysteresis 2 = Not fixed reduction ratio, hysteresis 3 = Fixed reduction ratio, non – hysteresis 4 = Fixed reduction ratio, hysteresis	E16	-	-	RW
45420	Over voltage reduce power: Start voltage	U16	%Un	0.01	RW
45422	Over voltage reduce power: Stop voltage	U16	%Un	0.01	RW
45424	Over voltage reduce power: Back voltage	U16	%Un	0.01	RW
45426	The reduce ratio of over voltage reduce power	U16	%Pnor%Pm	0.01	RW
45427	Over voltage reduce power delay time	U16	s	0.1	RW
45428	Over voltage recover power delay time	U16	s	0.1	RW
45429	Speed of Over voltage recover to Pn	U16	%Pn/min	0.01	RW
45432	Under frequency increase power mode: 0 = None 1 = Fixed reduction ratio, non – hysteresis 2 = Fixed reduction ratio, hysteresis	E16	-	-	RW

	3 = Not fixed reduction ratio, non – hysteresis 4 = Not fixed reduction ratio, hysteresis				
45433	Under frequency increase power: Start frequency	U16	Hz	0.01	RW
45434	Under frequency increase power: Stop frequency	U16	Hz	0.01	RW
45435	Under frequency increase power: Back frequency	U16	Hz	0.01	RW
45436	The increase ratio of under frequency increase power	U16	%Pnor%Pm	0.01	RW
45437	Under frequency increase power delay time	U16	s	0.1	RW
45438	Under frequency recover power delay time	U16	s	0.1	RW
45440	Speed of Under frequency recover to Pn	U16	%Pn/min	0.01	RW
45441	Under frequency increase power 0 power frequency point	U16	Hz	0.01	RW
45443	Under voltage increase power mode: 0 = None 1 = Fixed increase ratio, non – hysteresis 2 = Fixed increase ratio, hysteresis 3 = Not fixed increase ratio, non – hysteresis 4 = Not fixed increase ratio, hysteresis	E16	-	-	RW
45444	Under voltage increase power: Start voltage	U16	%Un	0.01	RW
45445	Under voltage increase power: Stop voltage	U16	%Un	0.01	RW
45446	Under voltage increase power: Back voltage	U16	%Un	0.01	RW
45447	The increase ratio of under voltage increase power	U16	%Pnor%Pm	0.01	RW

45448	Under voltage increase power delay time	U16	s	0.1	RW
45449	Under voltage increase power delay time	U16	s	0.1	RW
45450	Speed of under voltage recover to Pn	U16	%Pn/min	0.01	RW
45451	Pav <sup>(s)</sup>	S16	%Pn	0.01	RW
45452	DRMs Pval <sup>(s)</sup>	U16	%Pn	0.01	RW
45501	Reactive power control mode: 0 = None 1 = Fixed power factor 2 = cos φ(P) curve 3 = Fixed Q value 4 = Fixed Q value of AU DRMs 5 = Linear Q(U) curve 6 = Hysteresis Q(U) curve	E16	-	-	RW
45502	Time constant of reactive power curve	U16	s	1.0	RW
45503	Power factor	S16	-	0.0001	RW
45504	cos φ(P) curve: Active power of the first point	U16	%Pn	0.01	RW
45505	cos φ(P) curve: cos φ of the first point	S16	-	0.0001	RW
45506	cos φ(P) curve: Active power of the second point	U16	%Pn	0.01	RW
45507	cos φ(P) curve: cos φ of the second point	S16	-	0.0001	RW
45508	cos φ(P) curve: Active power of the third point	U16	%Pn	0.01	RW
45509	cos φ(P) curve: cos φ of the third point	S16	-	0.0001	RW
45510	cos φ(P) curve: Active power of the fourth point	U16	%Pn	0.01	RW
45511	cos φ(P) curve: cos φ of the fourth point	S16	-	0.0001	RW
45512	Lock in voltage (for cos φ(P) curve)	U16	%Un	0.01	RW
45513	Lock out voltage (for cos φ(P) curve)	U16	%Un	0.01	RW

	curve)				
45516	Q Set Value	S16	%Sn	0.01	RW
45518	Q(U) curve : U of the first point	U16	%Un	0.01	RW
45519	Q(U) curve : Q of the first point	S16	%Sn	0.01	RW
45520	Q(U) curve : U of the second point	U16	%Un	0.01	RW
45521	Q(U) curve : Q of the second point	S16	%Sn	0.01	RW
45522	Q(U) curve : U of the third point	U16	%Un	0.01	RW
45523	Q(U) curve : Q of the third point	S16	%Sn	0.01	RW
45524	Q(U) curve : U of the fourth point	U16	%Un	0.01	RW
45525	Q(U) curve : Q of the fourth point	S16	%Sn	0.01	RW
45526	Lock in power (for Q(U) curve)	U16	%Pn	0.01	RW
45527	Lock outpower (for Q(U) curve)	U16	%Pn	0.01	RW
45606	LVRT Trigger voltage	U16	%Un	0.01	RW
45609	LVRT active power limit mode: 0 = None 1 = Limit (Default as limit to 0) 2 = Limit to 0	E16	-	-	RW

(\*) ----- Supported on some models

31601~31644, 41102~41153, 45432~45450 Special for storage inverter

### 3.4 Warning and Error Codes

Warning Code	Description
0	No warning
30	Recover from warning
150	SPD Damaged
156	Internal fan warning
157	External fan warning
163	String current abnormal
165	Ground connect warning
166	CPU self-test ---- Register abnormal
167	CPU self-test ---- RAM abnormal
168	CPU self-test ---- ROM abnormal
174	Low Air Temperature
175	Battery Soc Low
176	Battery Fault Status
177	Battery Communication DisConnect
178	EPS Output Over
179	Combox and Cloud Disconnect
180	PV string inverse



Error Code	Description
1	Communication Fails between M-S
3	Relay check Fail
4	DC Injection High
5	The result of Auto Test Function is fail
6	DC bus is too high
8	AC HCT Failure
9	GFCI Device Failure
10	Device fault
32	ROCOF Fault
33	Fac Failure :Fac Out of Range
34	AC Voltage Out of Range
35	Utility Loss
36	GFCI Failure
37	PV Over Voltage
38	Isolation Fault
40	Over temperature in Inverter
41	Consistent Fault :Vac differs for M-S
42	Consistent Fault :Fac differs for M-S
43	Consistent Fault :Groud I differs for M-S
44	Consistent Fault :DC inj. Differs for M-S
45	Consistent Fault :Fac,Vac differs for M-S
46	High DC bus
47	Consistent Fault
48	Average volt of ten minutes Fault
56	GFCI protect fault:30mA level
57	GFCI protect fault:60mA level
58	GFCI protect fault:150mA level
61	DRMS Communication Fails(S9 Open)
62	DRMS order disconnection device(S0 Close)
65	PE connection Fault

### 3.5 Grid Codes

Grid Code	Description
35	NB/T32004:2018
47	AU AS 4777.2 : 2015
48	NZ AS 4777.2 : 2015
49	ENGG-50Hz
50	ENGG-60Hz
59	CNS15382:2018
64	EN 50549-1
65	NL EN50549-1:2019
66	BR NBR 16149:2013
67	VDE0126-1-1/A1/VFR
68	IEC 61727 50Hz
69	C10/11:2019
70	VDE-AR-N4105:2018
71	IEC 61727 60Hz
72	G98/1
73	G99/1
74	AU AS/NZS4777.2:2020 A
75	AU AS/NZS4777.2:2020 B
76	AU AS/NZS4777.2:2020 C
77	NZ AS/NZS4777.2:2020
78	IL SI4777.3
79	KR KS C 8565:2020
80	ES UNE206007-1
81	CY EN50549-1
82	CS PPDS A1
83	PL EN50549-1
84	CEI 0-21:2019
85	DK EN50549-1
86	CH NA/EEA-NE7

87	SE EIFS:2018
88	FI EN50549-1
89	RO Order208
90	SI EN50549-1
91	LV EN50549-1
92	VDE0126/VFR2019 IS (50Hz)
93	VDE0126/VFR2019 IS (60Hz)

### 3.6 Frame format

MODBUS protocol format: RTU format. Each communication data unit is composed of 1 bit starting bit, 8 bit data bit and 1 bit stopping bit, no parity .

MODBUS function codes:

- Read Holding Register (0x03)
- Read Input Register (0x04)
- Write Holding Single Register (0x06)
- Write Holding Multiple Registers (0x10)
- Write Holding Multiple Registers (0x10) for broadcast

#### 3.6.1 Read Holding Register (Function Code: 0x03)

**Request:**

Device ID	1 Byte
Function code	1 Byte
Register Address(Hi)	1 Byte
Register Address(Lo)	1 Byte
Register length	2 Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

**Response:**

Device ID	1 Byte
Function code	1 Byte
Byte count	1 Byte
Data	N × 1 Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

**Error:**

Device ID	1 Byte
Function code + 0x80	1 Byte
Exception code	1 Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

### 3.6.2 Read Input Register (Function Code: 0x04)

#### Request:

Device ID	1 Byte
Function code	1 Byte
Register Address(Hi)	1 Byte
Register Address(Lo)	1 Byte
Register length	2 Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

#### Response:

Device ID	1 Byte
Function code	1 Byte
Byte count	1 Byte
Data	N × 1 Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

#### Error:

Device ID	1 Byte
Function code + 0x80	1 Byte
Exception code	1 Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

### 3.6.3 Write Single Holding Register (Function Code: 0x06)

**Request:**

Device ID	1 Byte
Function code	1 Byte
Register Address(Hi)	1 Byte
Register Address(Lo)	1 Byte
Data	2 Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

**Response:**

Device ID	1 Byte
Function code	1 Byte
Register Address(Hi)	1 Byte
Register Address(Lo)	1 Byte
Data	2 Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

**Error:**

Device ID	1 Byte
Function code + 0x80	1 Byte
Exception code	1 Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

### 3.6.4 Write Multiple Holding Registers (Function Code: 0x10)

#### Request:

Device ID	1 Byte
Function code	1 Byte
Register Address(Hi)	1 Byte
Register Address(Lo)	1 Byte
Register length	2 Byte
Data length	1 Byte
Data	N × 1Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

#### Response:

Device ID	1 Byte
Function code	1 Byte
Register Address(Hi)	1 Byte
Register Address(Lo)	1 Byte
Register length	2 Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

#### Error:

Device ID	1 Byte
Function code + 0x80	1 Byte
Exception code	1 Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

### 3.6.5 Write Multiple Holding Registers (Function Code: 0x10) for broadcast

**Request:**

Device ID	1 Byte
Function code	1 Byte
Register Address(Hi)	1 Byte
Register Address(Lo)	1 Byte
Register length	2 Byte
Data length	1 Byte
Data	N × 1Byte
CRC(Lo)	1 Byte
CRC(Hi)	1 Byte

**Response: none**

### 3.6.6 Exception Codes

- 0x01 Illegal function
- 0x02 Illegal address
- 0x03 Illegal data
- 0x04 Slave device failure



## 4 Contact

If you experience any technical problems with our products, please contact the AISWEI Service Hotline to provide you with the necessary assistance:

**AISWEI New Energy Technology (Jiangsu) Co., Ltd.**

No 198, Xiangyang Road

215011 Suzhou (China)