DCDC Communication Protocol V.1.10

1. Physical interface

Specifically refers to the A/B terminals of the DC/DC module's RS485 signal. **(Physical interface: 485_1A/485_1B)**

2. Protocol Description

Standard Modbus RTU, support 03 read data and 06 write data function code.

Baud Rate	Parity check bit	Data bit	Stop bit
9600bps	None	8	1

3. Protocol address

Items	Address	Instructions
DSP Version	0x6000 0x6001 0x6002	V B D
CPLD Version	0x6003 0x6004 0x6005	V B D
Operating Status	0x6006	【Standby, Running, Fault】 Bit 0 = 0: Standby Bit 3 = 1: Charging or Discharging Running Bit 6 = 1: Fault
Heat Sink Temperature	0x6007	INT16, Read-only, Unit: ℃, scaled by 10 times
Total High-Side Voltage	0x6008	INT16, Read-only, Unit: V, scaled by 10 times
Positive High-Side Bus Voltage	0x6009	INT16, Read-only, Unit: V, scaled by 10 times
Negative High-Side Bus Voltage	0x600A	INT16, Read-only, Unit: V, scaled by 10 times
Positive-Negative High-Side Bus Voltage Difference	0x600B	INT16, Read-only, Unit: V, scaled by 10 times
Low-Side Voltage	0x600C	INT16, Read-only, Unit: V, scaled by 10 times
Low-Side Current	0x600D	INT16, Read-only, Unit: A, scaled by 10

		times
DC Power on Low-Side	0x600E	INT16, Read-only, Unit: kW, scaled by 10 times
Module Ambient Temperature	0x600F	INT16, Read-only, Unit: ℃, scaled by 10 times
Ambient Temperature Limited Power	0x6010	INT16, Read-only, Unit: kW, scaled by 10 times, Actual power limit under ambient temperature limitation
MPPT Boost Uncontrolled Rectification Closure Success Flag	0x6011	INT16, Read-only, 0: Uncontrolled rectification closure unsuccessful, 1: Uncontrolled rectification closure successful
Dehumidification Mode Running Flag	0x6012	INT16, Read-only, 0: Non-dehumidification mode, 1: Dehumidification mode
Positive to Ground Insulation Resistance	0x6013	INT16, Read-only, Unit: kΩ, scaled by 1 times, 10 represents 10 kΩ
Negative to Ground Insulation Resistance	0x6014	INT16, Read-only, Unit: kΩ, scaled by 1 times, 10 represents 10 kΩ
Insulation Detection Running Time Counter	0x6015	INT16, Read-only, Unit: s, scaled by 1 times, Detection completes after runtime counter exceeds 30, starting a new detection resets the counter
Insulation Detection Running Flag	0x6016	UINT16, Read-only, 0: Insulation detection not running, 1: Insulation detection running
DCDC Parallel Module Online Flag	0x6017	Bit 0: DCDC Module 1 online flag: 0: Offline, 1: Online Bit 1: DCDC Module 2 online flag: 0: Offline, 1: Online Bit 2: DCDC Module 3 online flag: 0: Offline, 1: Online Bit 3: DCDC Module 4 online flag: 0: Offline, 1: Online Bit 4: DCDC Module 5 online flag: 0: Offline, 1: Online Bit 5: DCDC Module 6 online flag: 0: Offline, 1: Online Bit 6: DCDC Module 7 online flag: 0: Offline, 1: Online Bit 7: DCDC Module 8 online flag: 0: Offline, 1: Online Bit 8: DCDC Module 9 online flag: 0:

		Offline, 1: Online Bit 9: DCDC Module 10 online flag: 0: Offline, 1: Online Bit 10: DCDC Module 11 online flag: 0: Offline, 1: Online Bit 11: DCDC Module 12 online flag: 0: Offline, 1: Online Bit 12: DCDC Module 13 online flag: 0: Offline, 1: Online Bit 13: DCDC Module 14 online flag: 0: Offline, 1: Online Bit 14: DCDC Module 15 online flag: 0: Offline, 1: Online Bit 15: DCDC Module 16 online flag: 0: Offline, 1: Online
DCDC Parallel Module Fault Flag	0x6018	Bit 0: DCDC Module 1 fault flag: 0: No fault, 1: Fault Bit 1: DCDC Module 2 fault flag: 0: No fault, 1: Fault Bit 2: DCDC Module 3 fault flag: 0: No fault, 1: Fault Bit 3: DCDC Module 4 fault flag: 0: No fault, 1: Fault Bit 4: DCDC Module 5 fault flag: 0: No fault, 1: Fault Bit 5: DCDC Module 6 fault flag: 0: No fault, 1: Fault Bit 6: DCDC Module 7 fault flag: 0: No fault, 1: Fault Bit 7: DCDC Module 8 fault flag: 0: No fault, 1: Fault Bit 8: DCDC Module 9 fault flag: 0: No fault, 1: Fault Bit 9: DCDC Module 10 fault flag: 0: No fault, 1: Fault Bit 10: DCDC Module 11 fault flag: 0: No fault, 1: Fault Bit 11: DCDC Module 12 fault flag: 0: No fault, 1: Fault Bit 12: DCDC Module 13 fault flag: 0: No fault, 1: Fault Bit 13: DCDC Module 14 fault flag: 0: No fault, 1: Fault

		Bit 14: DCDC Module 15 fault flag: 0: No fault, 1: Fault Bit 15: DCDC Module 16 fault flag: 0: No fault, 1: Fault.
DCDC Parallel Module Running Flag	0x6019	Bit 0: DCDC Module 1 running flag: 0: Not running, 1: Running Bit 1: DCDC Module 2 running flag: 0: Not running, 1: Running Bit 2: DCDC Module 3 running flag: 0: Not running, 1: Running Bit 3: DCDC Module 4 running flag: 0: Not running, 1: Running Bit 4: DCDC Module 5 running flag: 0: Not running, 1: Running Bit 5: DCDC Module 6 running flag: 0: Not running, 1: Running Bit 6: DCDC Module 7 running flag: 0: Not running, 1: Running Bit 7: DCDC Module 8 running flag: 0: Not running, 1: Running Bit 8: DCDC Module 9 running flag: 0: Not running, 1: Running Bit 9: DCDC Module 10 running flag: 0: Not running, 1: Running Bit 10: DCDC Module 11 running flag: 0: Not running, 1: Running Bit 11: DCDC Module 12 running flag: 0: Not running, 1: Running Bit 12: DCDC Module 13 running flag: 0: Not running, 1: Running Bit 13: DCDC Module 14 running flag: 0: Not running, 1: Running Bit 14: DCDC Module 15 running flag: 0: Not running, 1: Running Bit 15: DCDC Module 16 running flag: 0: Not running, 1: Running
Module Address	0x601A	UINT16, Read-only, Address determined by external 8421 dial code (applicable to new version)
Total Charging Energy Low Byte	0x601C	UINT16, Read-only, Unit: kWh, scaled by 10 times, ((low byte + high byte * 65536) / 10)
Total Charging Energy High Byte	0x601D	
Total Discharge Energy Low Byte	0x601E	UINT16, Read-only, Unit: kWh, scaled by

Total Discharge Energy High Byte	0x601F	10 times, ((low byte + high byte * 65536) / 10)
Daily Charging Energy	0x602A	UINT16, Read-only, Unit: kWh, scaled by 10 times, 10 represents 1 kWh
Daily Discharge Energy	0x602B	UINT16, Read-only, Unit: kWh, scaled by 10 times, 10 represents 1 kWh
Configurable Parameters		
Low-Side Constant Voltage Charging Voltage Setting	0x6100	UINT16, Unit: V, Read/Write, scaled by 10 times (200 represents 20 V)
Low-Side Overvoltage Protection Point	0x6101	UINT16, Unit: V, Read/Write, scaled by 10 times (200 represents 20 V)
Low-Side Undervoltage Protection Point	0x6102	UINT16, Unit: V, Read/Write, scaled by 10 times (200 represents 20 V)
High-Side Constant Voltage Charging Voltage Setting	0X6103	UINT16, Unit: V, Read/Write, scaled by 10 times (200 represents 20 V)
High-Side Overvoltage Protection Point	0x6104	UINT16, Unit: V, Read/Write, scaled by 10 times (200 represents 20 V)
High-Side Undervoltage Protection Point	0x6105	UINT16, Unit: V, Read/Write, scaled by 10 times (200 represents 20 V)
Set Charging and Discharging Power	0x6106	INT16, Unit: kW, Read/Write, scaled by 10 times (200 represents 20 kW), Positive 200: 20 kW from low side to high side; Negative 300: 30 kW from high side to low side
Set Charging and Discharging Current(Default)	0x6107	INT16, Unit: A, Read/Write, scaled by 10 times (200 represents 20 A), Positive 200: 20 A from low side to high side; Negative 300: 30 A from high side to low side (Take absolute value in bidirectional constant voltage mode, 200 represents bidirectional ±20 A range)
Photovoltaic Panel Open Circuit Voltage Setting	0x6108	UINT16, Unit: V, Read/Write, scaled by 10 times (200 represents 20 V), Sets open-circuit voltage of low side PV panel in boost MPPT, Sets open-circuit voltage of high side PV in buck MPPT
Module Auto Start Enable	0x6109	UINT16, Read/Write, 0: Disable auto start enable, 1: Auto start enable (configured to 1 and fixed parameters, device will automatically set 0x610A to 1 after power-on)
Module On/Off Setting	0x610A	UINT16, Read/Write, Module on/off switch, 0: Off, 1: On

Hardware Debugging Command	0x610B	UINT16, Read/Write, Bit 8 set to 1 to fix parameters, automatically reset after fixing, fixing parameters not allowed during operation
DCDC Operating Mode Setting (Key Registers, Not to Be Modified During Operation Unless Necessary)	0x610C	Bit 0: Enable delayed undervoltage protection: 0: Disable, 1: Enable Bit 1: Delayed undervoltage protection side selection: 0: Low side, 1: High side Bit 2: Enable constant voltage mode after constant current/constant power mode: 0: Disable, 1: Enable (effective when DCDCMode is 1) Bit 3: DCDC current/voltage mode selection 1: CV, 0: CC Bit 4: DCDC current/power mode control 0: Constant power mode, 1: Constant current mode Bit 5: Reserved Bit 6: Enable DCDC operation Bit 7: Reserved Bit 8: Enable high side positive/negative bus software balancing control Bit 9: Enable MPPT calculation filtering: 0: Disable, 1: Enable Bit 10: DCDC voltage control 0: Low side voltage control, 1: High side voltage control Bit 11: Enable bidirectional DCDC voltage control current Bit 12: Enable MPPT Boost charging: 0: Disable, 1: Enable Bit 13: DCDCMode0 (00-MPPT, 01-NoSYNC, 10-SYNC) Bit 14: DCDCMode1 (00-MPPT, 01-NoSYNC, 10-SYNC) Bit 15: MPPT mode selection 0: Boost MPPT, 1: Buck MPPT
Maximum Power Limit of DCDC Module	0x610D	UINT16, Unit: kW, Read/Write, scaled by 10 times (200 represents max 20 kW charging/discharging)
Maximum Current Limit of DCDC Module	0x610E	UINT16, Unit: A, Read/Write, scaled by 10 times (200 represents max 20 A charging/discharging)

PC Control Command	0x610F	UINT16, Read/Write, Bit 15 set to 1 to reset system, clear faults, system automatically resets to zero after clearing faults, reset command only valid when system is not running and has faults
Transient Switching Shadow Register for Charging and Discharging Power Setting	0x6110	INT16, Unit: kW, Read/Write, scaled by 10 times (200 represents 20 kW), Positive 200: 20 kW from battery to bus; Negative 300: 30 kW from bus to battery
Transient Switching Shadow Register for Charging and Discharging Current Setting	0x6111	INT16, Unit: A, Read/Write, scaled by 10 times (200 represents 20 A), Positive 200: 20 A from battery to bus; Negative 300: 30 A from bus to battery (Take absolute value in bidirectional constant voltage mode, 200 represents bidirectional ±20 A range)
Transient Switching Shadow Register for DCDC Operating Mode Setting	0x6112	Bit 0: Enable delayed undervoltage protection: 0: Disable, 1: Enable Bit 1: Delayed undervoltage protection side selection: 0: Low side, 1: High side Bit 2: Enable constant voltage mode after constant current/constant power mode: 0: Disable, 1: Enable (effective when DCDCMode is 1) Bit 3: DCDC current/voltage mode selection 1: CV, 0: CC Bit 4: DCDC current/power mode control 0: Constant power mode, 1: Constant current mode Bit 5: Reserved Bit 6: Enable DCDC operation Bit 7: Reserved Bit 8: Enable high side positive/negative bus software balancing control Bit 9: Enable MPPT calculation filtering: 0: Disable, 1: Enable Bit 10: DCDC voltage control 0: Low side voltage control, 1: High side voltage control Bit 11: Enable bidirectional DCDC voltage control current Bit 12: Enable MPPT Boost charging: 0: Disable, 1: Enable

		Bit 13: DCDCMode0 (00-MPPT, 01-NoSYNC, 10-SYNC) Bit 14: DCDCMode1 (00-MPPT, 01-NoSYNC, 10-SYNC) Bit 15: MPPT mode selection 0: Boost MPPT, 1: Buck MPPT
Transient Switching Enable for Operating Mode	0x6113	UINT16, Read/Write, 0: Disable, 1: Enable
Transient Switching for Mode	0x6114	UINT16, Read/Write, 0: Normal mode, 1: Switch to shadow register mode
Control Configuration Word	0x6115	Bit 0: Clear charge energy: 0: No clear, 1: Clear Bit 1: Clear discharge energy: 0: No clear, 1: Clear Bit 2: Reserved Bit 3: Reserved Bit 4: Reserved Bit 5: Enable power limit by temperature: 0: Disable, 1: Enable Bit 6: Reserved Bit 7: Enable EMS COM2 fault: 0: Disable, 1: Enable Bit 8: Enable EMS COM1 fault: 0: Disable, 1: Enable Bit 9: Reserved Bit 10: Enable insulation detection before operation: 0: Disable, 1: Enable Bit 11: Enable insulation detection filtering: 0: Disable, 1: Enable Bit 12: Enable insulation detection EMS control: 0: Auto control, 1: EMS control Bit 13: Insulation detection high/low side selection: 0: Low side, 1: High side Bit 14: Enable dehumidification function: 0: Disable, 1: Enable Bit 15: Reserved
Insulation Detection EMS Control Single Detection Enable	0x6116	INT16, Read/Write, 1: Perform single insulation detection, software will automatically set to 0 after starting (interval between two detections should be greater than 2 minutes), 0: No action
Insulation Detection Start Voltage Setting	0x6117	INT16, Unit: V, Read/Write, scaled by 10 times (200 represents 20 V), Insulation

		detection starts only when high side voltage is greater than this voltage and insulation detection is enabled
Insulation Detection Auto Detection Enable Bit	0x6118	INT16, Read/Write, 1: Enable automatic mode for insulation detection, 0: Disable automatic mode for insulation detection
MPPT Boost Uncontrolled Rectification Start Bit	0x6119	INT16, Read/Write, 1: Start MPPT Boost uncontrolled rectification, 0: Do not start MPPT Boost uncontrolled rectification
MPPT Boost Uncontrolled Rectification Enable Bit	0x611A	INT16, Read/Write, 1: Enable MPPT Boost uncontrolled rectification, 0: Disable MPPT Boost uncontrolled rectification
Define Number of Parallel Units	0x611B	UINT16, Read/Write, Define parallel number, single operation is 1, maximum 16 parallel units
Parallel Master-Slave Configuration	0x611C	INT16, Read/Write, Set parallel master/slave, 1: Master, 0: Slave (Only one master in parallel operation, others are slaves)
Fault Information		
Hardware Fault Word 1	0x6020	
Hardware Fault Word 2	0x6021	
DCDC Fault Word	0x6022	
High Voltage Side Fault Word	0x6023	
Parallel Fault Word	0x6024	
System Fault Word	0x6025	
Switch Fault Word	0x6026	Reserved
Other Fault Word	0x6027	
Fault Shield Word	The fault mask word corresponds to the fault response word bit by bit. When a bit in the related fault mask word is set to 1, the corresponding bit in the fault response word will not trigger a module fault.	
Hardware Fault Mask Word 1	0x6120	
Hardware Fault Mask Word 2	0x6121	
DCDC Fault Mask Word	0x6122	
High Voltage Side Fault Mask Word	0x6123	
Parallel Fault Mask Word	0x6124	
System Fault Mask Word	0x6125	
Switch Fault Mask Word	0x6126	Reserved
Other Fault Mask Word	0x6127	

Year (Calibration)	0x612A	INT16, read/write, calibration year, writing 2023 calibrates to the year 2023
Month (Calibration)	0x612B	INT16, read/write, calibration month, writing 8 calibrates to August
Day (Calibration)	0x612C	INT16, read/write, calibration day, writing 25 calibrates to the 25th day
Hour (Calibration)	0x612D	INT16, read/write, calibration hour, 24-hour format, writing 10 calibrates to 10 AM
Minute (Calibration)	0x612E	INT16, read/write, calibration minute, writing 31 calibrates to 31 minutes
Second (Calibration)	0x612F	INT16, read/write, calibration second, writing 20 calibrates to 20 seconds

4. Appendix

4.1. Appendix 1: Troubleshooting information

Hardware fault word parsing

1. Hardware fault word 1 0x6020

Bit0--EPO Fault Flag: 1 for EPO fault, 0 for normal operation.
Bit1--IGBT OCP Flag: 1 indicates IGBT overcurrent protection (OCP) fault, 0 indicates normal operation.
Bit2--High Voltage Side Hardware Overvoltage Flag: 1 indicates a fault due to high voltage side hardware overvoltage, 0 indicates normal operation.
Bit3--High Voltage Side Hardware Overcurrent Flag: 1 indicates a fault due to high voltage side hardware overcurrent, 0 indicates normal operation.
Bit4--IGBT Hardware Overcurrent Flag: 1 indicates a fault due to IGBT hardware overcurrent, 0 indicates normal operation.
Bit5--Reserved Bit;
Bit6--Reserved Bit;
Bit7--Reserved Bit;
Bit8--Reserved Bit;
Bit9--Reserved Bit;
Bit10--Reserved Bit;
Bit11--Reserved Bit;
Bit12--Reserved Bit;
Bit13--Reserved Bit;
Bit14--Reserved Bit;
Bit15--Reserved Bit.

2. Hardware failure word 2 0x6021

Bit0--24V Auxiliary Power Supply Fault Flag: 1 indicates a fault in the 24V auxiliary power supply, 0 indicates normal operation.
Bit1--Fan Fault Flag: 1 indicates a fan fault, 0 indicates normal operation.
Bit2--Connection Fault Flag: 1 indicates a single board connection fault, 0 indicates normal operation.
Bit3--Reserved Bit;
Bit4--Reserved Bit;
Bit5--Reserved Bit;
Bit6--Reserved Bit;
Bit7--Reserved Bit;
Bit8--Power Module Overtemperature Flag: 1 indicates a power module overtemperature condition, 0 indicates normal operation.
Bit9--Reserved Bit;

Bit10--±15V Auxiliary Power Supply Fault Flag: 1 indicates a fault in the ±15V auxiliary power supply, 0 indicates normal operation.
Bit11--Reserved Bit;
Bit12--Reserved Bit;
Bit13--Reserved Bit;
Bit14--Reserved Bit;
Bit15--Reserved Bit;

3. DCDC fault word 0x6022

Bit0--Precharge Timeout Fault Flag: 1 indicates a precharge timeout fault, 0 indicates normal operation.
Bit1--Reserved Bit;
Bit2--Reserved Bit;
Bit3--Reserved Bit;
Bit4--Reserved Bit;
Bit5--Reserved Bit;
Bit6--Reserved Bit;
Bit7--Reserved Bit;
Bit8--Reserved Bit;
Bit9--Low Voltage Side A Phase Software Overcurrent Flag: 1 indicates a fault due to software overcurrent in the low voltage side A phase, 0 indicates normal operation.
Bit10--Low Voltage Side B Phase Software Overcurrent Flag: 1 indicates a fault due to software overcurrent in the low voltage side B phase, 0 indicates normal operation.
Bit11--Low Voltage Side C Phase Software Overcurrent Flag: 1 indicates a fault due to software overcurrent in the low voltage side C phase, 0 indicates normal operation.
Bit12--Low Voltage Side Negative Terminal Software Overcurrent Flag: 1 indicates a fault due to software overcurrent in the low voltage side negative terminal, 0 indicates normal operation.
Bit13--Internal Module Short Circuit Fault Flag: 1 indicates a fault due to an internal module short circuit, 0 indicates normal operation.
Bit14--Reserved Bit;
Bit15--Reserved Bit;

4. High voltage side fault word 0x6023

Bit0--High Voltage Side Precharge Overvoltage Flag: 1 indicates a fault, 0 indicates normal operation.
Bit1--High Voltage Side Polarity Reversal Fault Flag: 1 indicates a fault, 0 indicates normal operation.
Bit2--High Voltage Side Short Circuit Fault Flag: 1 indicates a fault, 0 indicates normal operation.
Bit3--Reserved Bit;

Bit4--High Voltage Side Overvoltage During Operation Flag: 1 indicates a fault, 0 indicates normal operation.
Bit5--High Voltage Side Undervoltage During Operation Flag: 1 indicates a fault, 0 indicates normal operation.
Bit6--High Voltage Side Positive-Negative Bus Imbalance Flag: 1 indicates a fault, 0 indicates normal operation.
Bit7--Reserved Bit;
Bit8--Reserved Bit;
Bit9--Reserved Bit;
Bit10--Reserved Bit;
Bit11--Reserved Bit;
Bit12--Reserved Bit;
Bit13--Reserved Bit;
Bit14--Reserved Bit;
Bit15--Reserved Bit;

5. Parallel fault word 0x6024

Bit0--Reserved Bit;
Bit1--Mismatch with Master Mode Setting: 1 indicates a fault, 0 indicates normal operation.
Bit2--Reserved Bit;
Bit3--Reserved Bit;
Bit4--Reserved Bit;
Bit5--Reserved Bit;
Bit6--Reserved Bit;
Bit7--Reserved Bit;
Bit8--Reserved Bit;
Bit9--Reserved Bit;
Bit10--Reserved Bit;
Bit11--Reserved Bit;
Bit12--Reserved Bit;
Bit13--Reserved Bit;
Bit14--Reserved Bit;
Bit15--Reserved Bit;

6. System fault word 0x6025

Bit0--Reserved Bit;
Bit1--Control Board EEROM Fault Flag: 1 indicates a fault, 0 indicates normal operation.
Bit2--Reserved Bit;
Bit3--Reserved Bit;
Bit4--Reserved Bit;
Bit5--Reserved Bit;
Bit6--Reserved Bit;
Bit7--Reserved Bit;

Bit8--Reserved Bit.
Bit9--Reserved Bit;
Bit10--Reserved Bit;
Bit11--Reserved Bit;
Bit12--Reserved Bit;
Bit13--Reserved Bit;
Bit14--Slave CAN Communication Fault Flag: 1 indicates a fault, 0 indicates normal operation.
Bit15--EMS Communication Fault Flag: 1 indicates a fault, 0 indicates normal operation.

7. Other fault word 0x6027

Bit0--Low Insulation Resistance Fault: 1 indicates a fault, 0 indicates normal operation.
Bit1--Reserved Bit;
Bit2--Reserved Bit;
Bit3--Reserved Bit;
Bit4--Low Voltage Side Undervoltage: 1 indicates a fault, 0 indicates normal operation.
Bit5--Reserved Bit;
Bit6--Software Transient Overcurrent: 1 indicates a fault, 0 indicates normal operation.
Bit7--Reserved Bit;
Bit8--Reserved Bit;
Bit9--Reserved Bit;
Bit10--Low Voltage Side Overvoltage: 1 indicates a fault, 0 indicates normal operation.
Bit11--Low Voltage Side Overcurrent: 1 indicates a fault, 0 indicates normal operation.
Bit12--Low Voltage Side Polarity Reversal: 1 indicates a fault, 0 indicates normal operation.
Bit13--Reserved Bit;
Bit14--Reserved Bit;
Bit15--Reserved Bit;

Appendix 2: On/Off information

■ Operation Command

Power on [need to set 0x610A to 1]
Power off [need to set 0x610A to 0]
Reset [In fault state, setting Bit 15 of 0x610F to 1, the DSP will automatically reset Bit 15 to zero after reset.]
Curing parameter command [In non-operational state, setting Bit 8 of 0x610B to 1, the DSP will automatically clear Bit 8 after solidification.]
(Please note that Bit positions are counted from 0 to 15, ranging from Bit 0 to Bit 15.)

■ Charge/discharge operation

Standby → Charge/discharge → Power off

(1) DCDC mode

1. Writing a positive or negative value to 0x6107 adjusts the charging or discharging current, for example, writing -200 represents a current of 20A. (Negative values indicate power supply from the high-voltage side to the low-voltage side, while positive values indicate power supply from the low-voltage side to the high-voltage side.) (The module supports a maximum of ±100A.)
2. Writing 1 to 0x610A initiates the startup process; the machine boots up after 10 seconds.
3. When EMS detects the battery is fully charged, you can shut down the system by writing 0 to 0x610A.

(2) MPPT mode

1. Writing 1 to 0x610A initiates the startup process; the machine boots up after 10 seconds and operates in MPPT mode.
2. Writing 0 to 0x610A shuts down the device; it remains inactive.