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COMMUNICATION PROTOCOL

# **MODBUS MANUAL**

## M1M Power Meters

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## 1. Applicable Products

The following table lists the types of products to which this document applies:

M1M 15	M1M 15 Modbus
M1M 20	M1M 20 Modbus, M1M 20 Ethernet, M1M 20 I/O
M1M 20 Pro	M1M 20 I/O Pro
M1M 30	M1M 30 Modbus, M1M 30 Ethernet, M1M 30 I/O
M1M 30 Pro	M1M 30 I/O Pro

Please carefully distinguish that the different types of products support different Modbus functions.

## 2. General

M1M products offer include versions with both Modbus-RTU and Modbus-TCP/IP protocols. The Modbus protocol is specified in its entirety in Modbus Application protocol Specification available at <https://modbus.org/specs.php>. If you want to know the Modbus protocols of other ABB series of meters, please refer to the relevant documents.

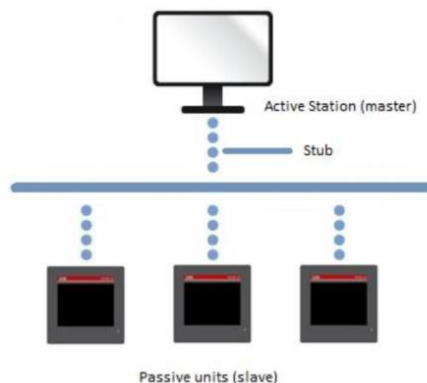
### 2.1. Modbus-RTU

#### 2.1.1. Overview

M1M Modbus RTU communication protocol is done on master-slave reply to connection (half duplex), 3-wire (A, B, and Common) polarity dependent bus according to the RS-485 standard. Modbus is a master-slave communication protocol that can support up to 247 slaves (which is the same as the individual device address range in Modbus RTU) organized as a multidrop bus. The communication is half duplex. Services on Modbus are specified by function codes.

#### 2.1.2. Topology

The RS-485 bus uses line topology, see figure below. Stubs at the meter connections are allowed but should be kept as short as possible and no longer than 1 m. Bus termination in both ends of the line should be used. The resistors should have the same values as the characteristic impedance of the cable which normally is 120 Ohm.

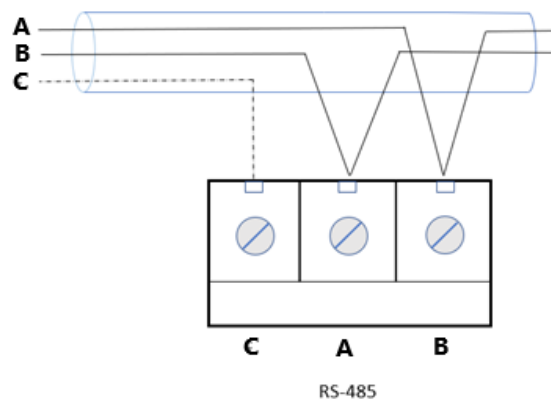


#### 2.1.3. RS-485 wiring

Each M1M provided with Modbus RTU communication is equipped with RS-485 port. The RS485 terminal is a 3-pole plug contact. A and B are mandatory for the correct communication of the device.

C can be connected to the data common ground, if available and needed. RS485 is a differential signal so no common ground is required.

Given the differential nature of the RS485 signal, the signal can be recovered without any reference to a ground as such - the signal is the difference between the A and B voltages, not the different between one voltage and ground. The third wire C (Common) helps to ensure that the common mode requirements (-7 V to +12 V) of the transceivers are maintained.

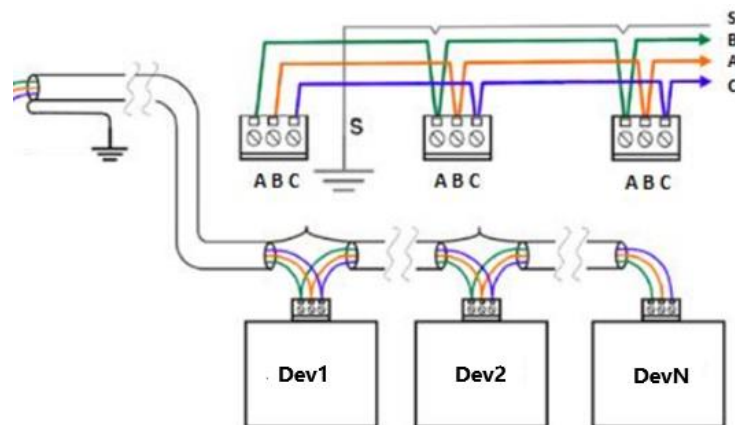


#### 2.1.4. Cable

Cable used is non-shielded or shielded twisted pair cable with wire area of 0.35-1.52mm<sup>2</sup> Maximum length of the bus is 700 m.

The cable recommended in this type of connection has 2 twisted pairs. A pair will be used for "A" and "B", one of the wires of the second pair will be used as common wire and the fourth wire will be not used.

See image below:



Recommended practice:

- Good quality shielded twisted pair cable should be used.
- If shielded cable is used the shield should be connected to ground in one end.
- Do not put communications cables and power cables in the same raceways.
- Route communications cables to avoid potential noise sources such as high-power equipment.
- Ferrite should be used especially when long cables are used.

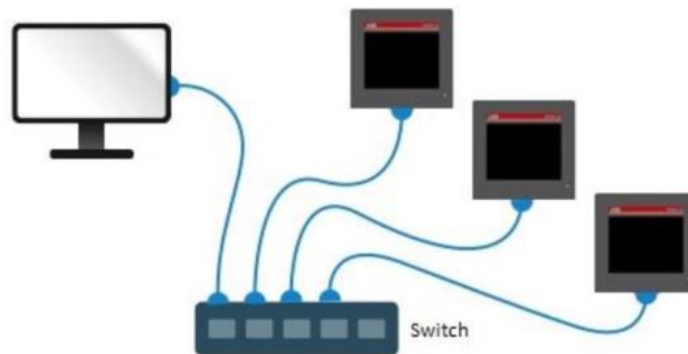
## 2.2. Modbus-TCP/IP

### 2.2.1. Overview

Modbus TCP/IP is a Modbus variant used for communications over TCP/IP networks, typically connecting over port 502 (default value).

### 2.2.2. Topology

Hereafter an example of Modbus TCP/IP topology. Please note that M1M Ethernet allows to daisy-chain the Modbus TCP/IP communication through 2 RJ45 ports on the devices.



### 2.2.3. Cable

Suitable cables for Modbus TCP/IP connection:

CATEGORY	SHIELDING
Category 5	Unshielded
Category 5e	Unshielded
Category 6	Shielded or Unshielded
Category 6a	Shielded
Category 7	Shielded

Recommended practice

- If shielded cable is used the shield should be connected to ground in one end.
- Do not put communications cables and power cables in the same raceways.
- Route communications cables to avoid potential noise sources such as high-power equipment.
- Ferrite should be used especially when long cables are used.

## 3. Modbus transport format

### 3.1. Byte format

The byte format includes data bits, parity bits 6 and stop bits.

Masters and slaves on the same bus must use the same byte format to ensure normal transmission of communication.

### 3.2. Frame format

#### 3.2.1. Modbus-RTU data frame

A Modbus request frame generally has the following structure:

Slave Address	Function Code	Data	Error Check
1 byte	1 byte	N byte	2 bytes

#### Slave Address:

Slave address code is the first byte of each frame and occupies one byte, ranging from 0~247, and the address 0 is the broadcast address.

Each slave must have a unique address code, and only the matched slave address can respond and send back information. The address code sent indicates the address of the slave to be sent, and the address code returned by the slave indicates the address of the slave to be sent back. The corresponding address code can indicate which slave machine the information came from.

The network messages can be query-response or broadcast type. The query-response command sends a query from the master to an individual slave and is generally followed by a response. The broadcast command sends a message to all slaves and is never followed by a response.

#### Function Code:

Function code decides the service to be performed.

The function codes in M1M (H stands for hex)

Function code	Application	Description
03H	Read holding registers	Used to read measurement values or other information from the electricity meter. Single or registers can be read in one request.
10H	Write multiple registers	Used to config meter with single or multiple Modbus registers.

#### Data:

The data are used to exchange between the host and the slave in the way of reading and writing registers, and the data length is varying.

Modbus uses a '**big-Endian**' representation for addresses and data items. This means that when a numerical quantity larger than a single byte is transmitted, the most significant byte is sent first.

For example

Register size	Value	
16 - bits	0x1234	the first byte sent is 0x12 then 0x34

**If the data corresponding to the register is 0xFFFF when using 03H, the current device cannot measure or calculate the register data.**

For example, when the M1M device is set to "3 3T", that means the 3-phase 3-wire system, the phase voltage cannot be measured. When reading the phase voltage data, the meter responds to the phase voltage data as 0xFFFF.

**Error Check:**

Modbus adopts CRC16 verification mode and ‘small-Endian’ byte order transmission, that is, low bytes are transmitted before high bytes are transmitted.

**All communication examples in the following section are described according to Modbus-RTU unless otherwise specified.**

**3.2.2. Modbus-TCP/IP data frame**

The Modbus-TCP/IP data frame format is basically the same as the Modbus-RTU data frame format, only with an extra 6-byte header and no check:

Frame header	Slave address	Function code	Data
6 bytes	1 byte	1 byte	N bytes

More details can see [Modbus-TCP/IP \(https://modbus.org/specs.php\)](https://modbus.org/specs.php).

**3.3. Frame format of Function Code 3**

Function code 3 is used to read measurement values or other information from the electricity meter.

Request frame

Slave Address	Function Code	Data		Error Check
1~247	0x03	Address	No. of Register	CRC16
1 byte	1 byte	2 bytes	2 bytes	2 bytes

Response frame

Slave Address	Function Code	Data		Error Check
1~247	0x03	Byte count	Data	CRC16
1 byte	1 byte	1 byte	No. of Register *2 bytes	2 bytes

The value range of “No. of Register” is 1-125, and the “Byte count” equal to 2 times of “No. of Register”.

Please refer to chapter 3 for the specific example.

**3.4. Frame format of Function Code 16**

Function code 16 is used to modify settings in the meter.

**Note:** When the M1M uses the 10H function code setting, it must write all registers of the same function consecutively, and it is not supported to write some registers of the function.

Request frame

Slave Address	Function Code	Data				Error Check
1~247	0x10	Start Address	No. of Register	No. of Data	Register Values	CRC16
1byte	1byte	2 bytes	2 bytes	1 byte	No. of Register *2 byte	2 bytes

Response frame

Slave Address	Function Code	Data		Error Check
1~247	0x10	Start Address	No. of Register	CRC16
1 byte	1 byte	2 bytes	2 bytes	2 bytes

Please refer to chapter 3 for the specific example.



### 3.5. Exception Responses

If an error should occur while processing a request, the power meter gives an exception response that contains an exception code.

An exception frame has the following structure:

Slave Address	Function Code	Exception Code	Error Check
1 byte	1 byte	1 byte	CRC16

In the exception response the function code is set to the function code of the request plus 0x80.

The exception codes that are used are listed in the following table:

Exception Code	Exception	Definition
01	Illegal Function	A function code that is not supported has been used.
02	Illegal data address	The requested register is outside the allowed range.
03	Illegal data value	The structure of a received message is incorrect.
04	Slave device failure	Processing the request fail due to an internal error in the meter.

## 4. M1M Mapping Tables

### 4.1. Features

The purpose of this section is to explain the relation between register number and metering data. Please visit the ABB Library <https://library.abb.com/d/9AKK107991A8720> to get the full Modbus table file. The following table describes the meanings of each register in the source file:

Quantity/Functionality	Name of the meter quantity
Explanation	other information available in the meter (if applicable).
Unit	Unit of data (if applicable).
Resolution	Resolution of the value for this Quantity (if applicable). A resolution of 0.01 means that the received data needs to be divided by 100 and then taken to two decimal places.
Data Type	Data types Unsigned is an unsigned integer, signed is a signed integer, ASCII is a character type, and float 32bits is a 32-bit floating point type.
Access	Read / Write access. Read means read-only, write means write-only, read/write means registers can read and write.
Register (Hex)	Hexadecimal start registers address <sup>a</sup> .
Register (Dec)	Decimal start registers address.
Nr of registers	Number of registers. The number of registers used for this meter quantity. A register is 2 bytes, and if the number of registers for a function is 4, the amount of data for that function is 8 bytes.
Product type	Meter type Note the corresponding model number after each register address. For example, the "Average current L1" register is only applicable to M1M 30, but not to M1M 15 and M1M 30. The "Tariff settings" function is only applicable to M1M 30 I/O Pro, and other products are not suitable.
Functional block	Number of Modbus registers for the meter quantities.

Before setting parameters through communication, enable the communication setting function via HMI, otherwise you cannot set parameters, for details, see the user manual.

## 4.2. Energy

Follows are energy registers.

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type
5000	Active energy - import	kWh	Unsigned	0.01	4	M1M 15/20/30
5004	Active energy - export	kWh	Unsigned	0.01	4	M1M 20/30
500C	Reactive energy - import	kvarh	Unsigned	0.01	4	M1M 15/20/30
5010	Reactive energy - export	kvarh	Unsigned	0.01	4	M1M 20/30
5018	Apparent energy - import	kVA	Unsigned	0.01	4	M1M 15/20/30
5170	Total Active energy - import (Tariffs)	kWh	Unsigned	0.01	16	M1M 30 I/O Pro
5190	Total Active energy - export (Tariffs)	kWh	Signed	0.01	16	M1M 30 I/O Pro
51B0	Total Reactive energy - import (Tariffs)	kvarh	Unsigned	0.01	16	M1M 30 I/O Pro
51D0	Total Reactive energy - export (Tariffs)	kvarh	Unsigned	0.01	16	M1M 30 I/O Pro

### Example

request (read Total Active energy – import).

Slave address	0x01
Function code	0x03
Start address, high byte	0x50
Start address, low byte	0x00
No. of registers, high byte	0x00
No. of registers, low byte	0x04
Error check (CRC), high byte	0x55
Error check (CRC), low byte	0x09

Response frame:

Slave address	0x01
Function code	0x03
Byte count	0x08
Value of registers	0x00 00 00 00 00 0F 42 43
Error check (CRC), high byte	0x95
Error check (CRC), low byte	0xD7

The result of response means the value of registers is 0x0F4243, the decimal conversion is 1000003, the resolution is 0.01, so the total import active energy is 1000003/100=10000.03kWh.

**Note:** M1M15 does not count "output active energy" and "output reactive energy". Its "output active energy" and "output reactive energy" are respectively counted in "input active energy" and "input reactive energy".

### 4.3. Real Time Data

Follows are real time data registers.

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type
5B00	Three phase system voltage	V	Unsigned	0.1	2	M1M 15/20/30
5B02	Phase voltage L1	V	Unsigned	0.1	2	M1M 15/20/30
5B04	Phase voltage L2	V	Unsigned	0.1	2	M1M 15/20/30
5B06	Phase voltage L3	V	Unsigned	0.1	2	M1M 15/20/30
5B08	Line voltage L1-L2	V	Unsigned	0.1	2	M1M 15/20/30
5B0A	Line voltage L3-L2	V	Unsigned	0.1	2	M1M 15/20/30
5B0C	Line voltage L1-L3	V	Unsigned	0.1	2	M1M 15/20/30
5B0E	Three phase system current	A	Unsigned	0.01	2	M1M 15/20/30
5B10	Current L1	A	Unsigned	0.01	2	M1M 15/20/30
5B12	Current L2	A	Unsigned	0.01	2	M1M 15/20/30
5B14	Current L3	A	Unsigned	0.01	2	M1M 15/20/30
5B16	Current N	A	Unsigned	0.01	2	M1M 20/30
5B1A	Active Power total	W	Signed	0.01	2	M1M 15/20/30
5B1C	Active Power L1	W	Signed	0.01	2	M1M 15/20/30
5B1E	Active Power L2	W	Signed	0.01	2	M1M 15/20/30
5B20	Active power L3	W	Signed	0.01	2	M1M 15/20/30
5B22	Reactive Power total	VAR	Signed	0.01	2	M1M 15/20/30
5B24	Reactive Power L1	VAR	Signed	0.01	2	M1M 15/20/30
5B26	Reactive Power L2	VAR	Signed	0.01	2	M1M 15/20/30
5B28	Reactive Power L3	VAR	Signed	0.01	2	M1M 15/20/30
5B2A	Apparent Power total	VAR	Signed	0.01	2	M1M 15/20/30
5B2C	Apparent Power L1	VA	Signed	0.01	2	M1M 15/20/30
5B2E	Apparent Power L2	VA	Signed	0.01	2	M1M 15/20/30
5B30	Apparent power L3	VA	Signed	0.01	2	M1M 15/20/30
5B32	Frequency	Hz	Unsigned	0.01	1	M1M 15/20/30

5B33	Power Total Angle	°	Signed	0.1	1	M1M 15/20/30
5B34	Power Angle L1	°	Signed	0.1	1	M1M 15/20/30
5B35	Power Angle L2	°	Signed	0.1	1	M1M 15/20/30
5B36	Power Angle L3	°	Signed	0.1	1	M1M 15/20/30
5B37	Voltage Angle L1	°	Signed	0.1	1	M1M 15/20/30
5B38	Voltage Angle L2	°	Signed	0.1	1	M1M 15/20/30
5B39	Voltage Angle L3	°	Signed	0.1	1	M1M 15/20/30
5B3D	Current Angle L1	°	Signed	0.1	1	M1M 15/20/30
5B3E	Current Angle L2	°	Signed	0.1	1	M1M 15/20/30
5B3F	Current Angle L3	°	Signed	0.1	1	M1M 15/20/30
5B40	Power factor total		Signed	0.001	1	M1M 15/20/30
5B41	Power factor L1		Signed	0.001	1	M1M 15/20/30
5B42	Power factor L2		Signed	0.001	1	M1M 15/20/30
5B43	Power factor L3		Signed	0.001	1	M1M 15/20/30
5B48	Cosphi (displacement factor total)		Signed	0.001	1	M1M 15/20/30
5B49	Cosphi (displacement factor L1)		Signed	0.001	1	M1M 15/20/30
5B4A	Cosphi (displacement factor L2)		Signed	0.001	1	M1M 15/20/30
5B4B	Cosphi (displacement factor L3)		Signed	0.001	1	M1M 15/20/30

**Example**

Request (read Phase voltage L1~L3)

Slave address	0x01
Function code	0x03
Start address, high byte	0x5B
Start address, low byte	0x02
No. of registers, high byte	0x00
No. of registers, low byte	0x06
Error check (CRC), high byte	0x77
Error check (CRC), low byte	0x2C

## Response frame

Slave address	0x01
Function code	0x03
Byte count	0x0C
Value of registers	0x00 00 08 CA 00 00 08 CB 00 00 08 CC
Error check (CRC), high byte	0x9F
Error check (CRC), low byte	0x32

The result of response means the L1 to L3 phase voltages in the meter are 0x08CA, 0x08CB and 0x08CC respectively, which are converted to base decimal and multiplied by the resolution, the phase voltages are  $2250/10=225.0V$ ,  $2251/10=225.1V$  and  $2252/10=225.2V$  respectively.

#### 4.4. Average, maximum, and minimum values

Follows are average, maximum, and minimum values.

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type
5BD4	Average current L1	A	Unsigned	0.01	2	M1M 30
5BD6	Average current L2	A	Unsigned	0.01	2	M1M 30
5BD8	Average current L3	A	Unsigned	0.01	2	M1M 30
5BDA	Average current neutral	A	Unsigned	0.01	2	M1M 30
5BDC	Average voltage L1	V	Unsigned	0.1	2	M1M 30
5BDE	Average voltage L2	V	Unsigned	0.1	2	M1M 30
5BE0	Average voltage L3	V	Unsigned	0.1	2	M1M 30
5BE2	Average voltage L1-L2	V	Unsigned	0.1	2	M1M 30
5BE4	Average voltage L2-L3	V	Unsigned	0.1	2	M1M 30
5BE6	Average voltage L1-L3	V	Unsigned	0.1	2	M1M 30
5BE8	Average active power total	W	Signed	0.01	2	M1M 30
5BEA	Average active power L1	W	Signed	0.01	2	M1M 30
5BEC	Average active power L2	W	Signed	0.01	2	M1M 30
5BEE	Average active power L3	W	Signed	0.01	2	M1M 30
5BF0	Average reactive power total	VAR	Signed	0.01	2	M1M 30
5BF2	Average reactive power L1	VAR	Signed	0.01	2	M1M 30
5BF4	Average reactive power L2	VAR	Signed	0.01	2	M1M 30
5BF6	Average reactive power L3	VAR	Signed	0.01	2	M1M 30
5BF8	Average apparent power total	VA	Signed	0.01	2	M1M 30
5BFA	Average apparent power L1	VA	Signed	0.01	2	M1M 30
5BFC	Average apparent power L2	VA	Signed	0.01	2	M1M 30
5BFE	Average apparent power L3	VA	Signed	0.01	2	M1M 30
5C10	Maximum current L1	A	Unsigned	0.01	2	M1M 30
5C12	Maximum current L2	A	Unsigned	0.01	2	M1M 30
5C14	Maximum current L3	A	Unsigned	0.01	2	M1M 30
5C16	Maximum current neutral	A	Unsigned	0.01	2	M1M 30
5C18	Maximum voltage L1	V	Unsigned	0.1	2	M1M 30
5C1A	Maximum voltage L2	V	Unsigned	0.1	2	M1M 30
5C1C	Maximum voltage L3	V	Unsigned	0.1	2	M1M 30
5C1E	Maximum voltage L1-L2	V	Unsigned	0.1	2	M1M 30
5C20	Maximum voltage L2-L3	V	Unsigned	0.1	2	M1M 30
5C22	Maximum voltage L1-L3	V	Unsigned	0.1	2	M1M 30
5C24	Maximum active power total	W	Signed	0.01	2	M1M 30

5C26	Maximum active power L1	W	Signed	0.01	2	M1M 30
5C28	Maximum active power L2	W	Signed	0.01	2	M1M 30
5C2A	Maximum active power L3	W	Signed	0.01	2	M1M 30
5C2C	Maximum reactive power total	VAR	Signed	0.01	2	M1M 30
5C2E	Maximum reactive power L1	VAR	Signed	0.01	2	M1M 30
5C30	Maximum reactive power L2	VAR	Signed	0.01	2	M1M 30
5C32	Maximum reactive power L3	VAR	Signed	0.01	2	M1M 30
5C34	Maximum apparent power total	VA	Signed	0.01	2	M1M 30
5C36	Maximum apparent power L1	VA	Signed	0.01	2	M1M 30
5C38	Maximum apparent power L2	VA	Signed	0.01	2	M1M 30
5C3A	Maximum apparent power L3	VA	Signed	0.01	2	M1M 30
5C4C	Maximum current L1 timestamp		Unsigned		2	M1M 30
5C4E	Maximum current L2 timestamp		Unsigned		2	M1M 30
5C50	Maximum current L3 timestamp		Unsigned		2	M1M 30
5C52	Maximum current neutral timestamp		Unsigned		2	M1M 30
5C54	Maximum voltage L1 timestamp		Unsigned		2	M1M 30
5C56	Maximum voltage L2 timestamp		Unsigned		2	M1M 30
5C58	Maximum voltage L3 timestamp		Unsigned		2	M1M 30
5C5A	Maximum voltage L1-L2 timestamp		Unsigned		2	M1M 30
5C5C	Maximum voltage L2-L3 timestamp		Unsigned		2	M1M 30
5C5E	Maximum voltage L1-L3 timestamp		Unsigned		2	M1M 30
5C60	Maximum active power total timestamp		Unsigned		2	M1M 30
5C62	Maximum active power L1 timestamp		Unsigned		2	M1M 30
5C64	Maximum active power L2 timestamp		Unsigned		2	M1M 30
5C66	Maximum active power L3 timestamp		Unsigned		2	M1M 30
5C68	Maximum reactive power total timestamp		Unsigned		2	M1M 30
5C6A	Maximum reactive power L1 timestamp		Unsigned		2	M1M 30



5C6C	Maximum reactive power L2 timestamp		Unsigned		2	M1M 30
5C6E	Maximum reactive power L3 timestamp		Unsigned		2	M1M 30
5C70	Maximum apparent power total timestamp		Unsigned		2	M1M 30
5C72	Maximum apparent power L1 timestamp		Unsigned		2	M1M 30
5C74	Maximum apparent power L2 timestamp		Unsigned		2	M1M 30
5C76	Maximum apparent power L3 timestamp		Unsigned		2	M1M 30
5C88	Minimum current L1	A	Unsigned	0.01	2	M1M 30
5C8A	Minimum current L2	A	Unsigned	0.01	2	M1M 30
5C8C	Minimum current L3	A	Unsigned	0.01	2	M1M 30
5C8E	Minimum current neutral	A	Unsigned	0.01	2	M1M 30
5C90	Minimum voltage L1	V	Unsigned	0.1	2	M1M 30
5C92	Minimum voltage L2	V	Unsigned	0.1	2	M1M 30
5C94	Minimum voltage L3	V	Unsigned	0.1	2	M1M 30
5C96	Minimum voltage L1-L2	V	Unsigned	0.1	2	M1M 30
5C98	Minimum voltage L2-L3	V	Unsigned	0.1	2	M1M 30
5C9A	Minimum voltage L1-L3	V	Unsigned	0.1	2	M1M 30
5C9C	Minimum active power total	W	Signed	0.01	2	M1M 30
5C9E	Minimum active power L1	W	Signed	0.01	2	M1M 30
5CA0	Minimum active power L2	W	Signed	0.01	2	M1M 30
5CA2	Minimum active power L3	W	Signed	0.01	2	M1M 30
5CA4	Minimum reactive power total	VAR	Signed	0.01	2	M1M 30
5CA6	Minimum reactive power L1	VAR	Signed	0.01	2	M1M 30
5CA8	Minimum reactive power L2	VAR	Signed	0.01	2	M1M 30
5CAA	Minimum reactive power L3	VAR	Signed	0.01	2	M1M 30
5CAC	Minimum apparent power total	VA	Signed	0.01	2	M1M 30
5CAE	Minimum apparent power L1	VA	Signed	0.01	2	M1M 30
5CB0	Minimum apparent power L2	VA	Signed	0.01	2	M1M 30
5CB2	Minimum apparent power L3	VA	Signed	0.01	2	M1M 30
5CC4	Minimum current L1 timestamp		Unsigned	1	2	M1M 30
5CC6	Minimum current L2 timestamp		Unsigned	1	2	M1M 30
5CC8	Minimum current L3 timestamp		Unsigned	1	2	M1M 30

5CCA	Minimum current neutral timestamp		Unsigned	1	2	M1M 30
5CCC	Minimum voltage L1 timestamp		Unsigned	1	2	M1M 30
5CCE	Minimum voltage L2 timestamp		Unsigned	1	2	M1M 30
5CD0	Minimum voltage L3 timestamp		Unsigned	1	2	M1M 30
5CD2	Minimum voltage L1-L2 timestamp		Unsigned	1	2	M1M 30
5CD4	Minimum voltage L2-L3 timestamp		Unsigned	1	2	M1M 30
5CD6	Minimum voltage L1-L3 timestamp		Unsigned	1	2	M1M 30
5CD8	Minimum active power total timestamp		Unsigned	1	2	M1M 30
5CDA	Minimum active power L1 timestamp		Unsigned	1	2	M1M 30
5CDC	Minimum active power L2 timestamp		Unsigned	1	2	M1M 30
5CDE	Minimum active power L3 timestamp		Unsigned	1	2	M1M 30
5CE0	Minimum reactive power total timestamp		Unsigned	1	2	M1M 30
5CE2	Minimum reactive power L1 timestamp		Unsigned	1	2	M1M 30
5CE4	Minimum reactive power L2 timestamp		Unsigned	1	2	M1M 30
5CE6	Minimum reactive power L3 timestamp		Unsigned	1	2	M1M 30
5CE8	Minimum apparent power total timestamp		Unsigned	1	2	M1M 30
5CEA	Minimum apparent power L1 timestamp		Unsigned	1	2	M1M 30
5CEC	Minimum apparent power L2 timestamp		Unsigned	1	2	M1M 30
5CEE	Minimum apparent power L3 timestamp		Unsigned	1	2	M1M 30

The timestamp format is the total number of seconds from January 1, 2010 to the time the data was stored.

**Example:**

Request frame of reading Maximum active power total.

Slave address	0x01
Function code	0x03
Start address, high byte	0x5C
Start address, low byte	0x24
No. of registers, high byte	0x00
No. of registers, low byte	0x02
Error check (CRC), high byte	0x96
Error check (CRC), low byte	0x50

## Response frame

Slave address	0x01
Function code	0x03
Byte count	0x04
Value of registers	0x00 12 34 56
Error check (CRC), high byte	0xCC
Error check (CRC), low byte	0xC8

The result means the current total maximum active power in the meter is 0x123456, which is converted to base decimal and multiplied by the resolution, that is  $1193046/100=11930.46W$ .

## 4.5. Power Quantity

Follows are power quantity registers.

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type	
5D00	Phase Voltage harmonics	L1 (THD)	%	Unsigned	0.1	1	M1M 20/30
5D01		L1 (2nd,3rd...40th) , up to 15th for M1M 20	%	Unsigned	0.1	39	M1M 20/30
5D80		L2 (THD)	%	Unsigned	0.1	1	M1M 20/30
5D81		L2 (2nd,3rd...40th) , up to 15th for M1M 20	%	Unsigned	0.1	39	M1M 20/30
5E00		L3 (THD)	%	Unsigned	0.1	1	M1M 20/30
5E01		L3 (2nd,3rd...40th) , up to 15th for M1M 20	%	Unsigned	0.1	39	M1M 20/30
6000	Current harmonics	L1 (THD)	%	Unsigned	0.1	1	M1M 20/30
6001		L1 (2nd,3rd...40th) , up to 15th for M1M 20	%	Unsigned	0.1	39	M1M 20/30
6080		L2 (THD)	%	Unsigned	0.1	1	M1M 20/30
6081		L2 (2nd,3rd...40th) , up to 15th for M1M 20	%	Unsigned	0.1	39	M1M 20/30
6100		L3 (THD)	%	Unsigned	0.1	1	M1M 20/30
6101		L3 (2nd,3rd...40th) , up to 15th for M1M 20	%	Unsigned	0.1	39	M1M 20/30
6200	Unbalances	Phase voltage	%	Unsigned	0.1	2	M1M 30, M1M 20 I/O Pro
6202		Line voltage	%	Unsigned	0.1	2	M1M 30, M1M 20 I/O Pro
6204		Current	%	Unsigned	0.1	2	M1M 30, M1M 20 I/O Pro

### Example

Request (read phase voltage, line voltage and current unbalance)

Slave address	0x01
Function code	0x03
Start address, high byte	0x62
Start address, low byte	0x00
No. of registers, high byte	0x00
No. of registers, low byte	0x06

Error check (CRC), high byte	0xDA
Error check (CRC), low byte	0x70

Response frame

Slave address	0x01
Function code	0x03
Byte count	0x0C
Value of registers	0x00 00 00 32 00 00 00 3C 00 00 00 46
Error check (CRC), high byte	0x0F

means the unbalance degree of phase voltage, line voltage and current in the meter is 0x32、0x3C、0x46, which are converted to base decimal and multiplied by the resolution, these are 50/10=5.0%、60/10=6.0%、70/10=7.0%.

## 4.6. IO

Follows are IO registers.

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type
6300	Digital Output 1 Status		Unsigned		1	M1M 20/30
6301	Digital Output 2 Status		Unsigned		1	M1M 20/30
6308	Digital Input 1&2 Status		Unsigned	1	2	M1M 20/30
630A	Digital Input 3&4 Status		Unsigned	1	2	M1M 30 I/O Pro
6318	Digital Input 1&2 pulse counter		Unsigned	1	8	M1M 20/30
6310	Digital Input 3&4 pulse counter		Unsigned	1	8	M1M 30 I/O Pro

Note: The type of the DO port must be set to "COMM" on HMI, otherwise communication control of DO cannot be achieved. Status of DI and DO, 0=OFF,1=ON.

Example

Example of reading Digital Input 1&2 Status.

Slave address	0x01
Function code	0x03
Start address, high byte	0x63
Start address, low byte	0x08
No. of registers, high byte	0x00
No. of registers, low byte	0x02
Error check (CRC), high byte	0x5B
Error check (CRC), low byte	0x8D

receiving the response frame from device.

Slave address	0x01
Function code	0x03
Byte count	0x04
Value of registers	0x00 00 00 01
Error check (CRC), high byte	0x0F
Error check (CRC), low byte	0xE6

The status of DI1 and DI2 is 0x00 and 0x01, respectively, that is DI1=OFF, DI2=ON.

**Example**

Example of setting DO1 is ON.

Request frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x63
Start address, low byte	0x00
No. of registers, high byte	0x00
No. of registers, low byte	0x01
Byte count	0x02
Value of registers	0x00 01
Error check (CRC), high byte	0x46
Error check (CRC), low byte	0xD0

Response frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x63
Start address, low byte	0x00
No. of registers, high byte	0x00
No. of registers, low byte	0x01
Error check (CRC), high byte	0xA4
Error check (CRC), low byte	0x20

The result means that setting successful.

## 4.7. Device information

Follows are device information registers, and only the product tag name can be modified.

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type
8900	Serial number(s)		ASCII		5	M1M 15/20/30
8908	Meter firmware version		ASCII		8	M1M 15/20/30
8910	Product type number ID		Unsigned		1	M1M 15/20/30
8911	Linear Slave ID		Unsigned		1	M1M 15/20/30
8919	Product tag name		ASCII		5	M1M 15/20/30
8960	Type designation		ASCII		6	M1M 15/20/30
8966	Product Name		ASCII		8	M1M 15/20/30

Example of reading serial number

Request frame

Slave address	0x01
Function code	0x03
Start address, high byte	0x89
Start address, low byte	0x00
No. of registers, high byte	0x00
No. of registers, low byte	0x05
Error check (CRC), high byte	0xAF
Error check (CRC), low byte	0x95

Response frame

Slave address	0x01
Function code	0x03
Byte count	0x0A
Value of registers	0x4E 32 35 37 41 42 31 32 33 34
Error check (CRC), high byte	0x42
Error check (CRC), low byte	0x14

The result means the meter's SN is 0x4E323537414231323334. the hexadecimal code is converted to ASCII "N257AB1234".

### Example of reading Product Name

Request frame:

Slave address	0x01
Function code	0x03
Start address, high byte	0x89
Start address, low byte	0x66
No. of registers, high byte	0x00
No. of registers, low byte	0x08
Error check (CRC), high byte	0x8E
Error check (CRC), low byte	0x4F

Response frame:

Slave address	0x01
Function code	0x03
Byte count	0x10
Value of registers	0x4D 31 4D 20 33 30 20 49 2F 4F 20 50 72 6F 20 20
Error check (CRC), high byte	0x3B
Error check (CRC), low byte	0x35

The result means that the meter's name is 0x4D 31 4D 20 33 30 20 49 2F 4F 20 50 72 6F 20 20. the hexadecimal code is converted to ASCII "M1M 30 I/O Pro ".



## 4.8. Time and Date

Only M1M30 can set this function.

**Note:** All registers of time and date that must be set together, and it is not possible to set only the time or only the date

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type
8A00	Date Time (0xYYMMDDHHMMSS)		Unsigned		3	M1M 30
8CF7	Timer up counter	hour	Unsigned	0.1	2	M1M 20/30
8CF9	Timer down counter	hour	Unsigned	0.1	2	M1M 30

### Example

Read frame

Slave address	0x01
Function code	0x03
Start address, high byte	0x8A
Start address, low byte	0x00
No. of registers, high byte	0x00
No. of registers, low byte	0x03
Error check (CRC), high byte	0x2F
Error check (CRC), low byte	0xD3

Response frame

Slave address	0x01
Function code	0x03
Byte count	0x06
Value of registers	0x16 02 02 0E 00 00
Error check (CRC), high byte	0x3A
Error check (CRC), low byte	0x38

The result of response means the current date of the meter is 0x1602020E0000, year is 0x16, month is 2, date is 2, hour is 0xE, minute is 0, second is 0, which are converted to base decimal, that is 2022/2/2 14:00:00.

## 4.9. Transformer ratios

Follows are transformer ratios registers.

**Note:** When setting the ratio between the current and the voltage transformer, you must set all the registers of the current and voltage transformer. You cannot set only the current transformer or only the voltage transformer.

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type
8C00	CT primary		Unsigned	1	2	M1M 15/20/30
8C02	CT secondary		Unsigned	1	2	M1M 15/20/30
8C04	VT primary		Unsigned	1	2	M1M 15/20/30
8C06	VT secondary		Unsigned	1	2	M1M 15/20/30
8CE5	Wires		Unsigned	1	1	M1M 15/20/30

The wiring method and the ratio of current and voltage transformers do not belong to the same function but are placed in the same chapter. When setting up, it is necessary to set it separately. When setting CT and VT, all registers of CT and VT must be set. It is not possible to only set the CT or only set the VT.

### Example

Setting the primary/secondary of CT transformer to 5A/5A and the primary /secondary of the voltage transformer to 230V/230V.

Request frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0x00
No. of registers, high byte	0x00
No. of registers, low byte	0x08
Byte count	0x10
Value of registers	0x00 00 00 05 00 00 00 05 00 00 00 E6 00 00 00 E6
Error check (CRC), high byte	0xF1
Error check (CRC), low byte	0xC0

Response frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0x00
No. of registers, high byte	0x00
No. of registers, low byte	0x08
Error check (CRC), high byte	0xEB
Error check (CRC), low byte	0x5F

The response frame means the setting is successful.

## 4.10. Communication

### 4.10.1. Modbus-RTU

When setting Modbus-RTU communication parameters, all registers must be set at the same time, and only some parameters cannot be set.

Follows are Modbus-RTU registers.

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type
8CEB	Address, 1~247		Unsigned		1	M1M 15/20/30
8CEC	Baudrate, 9600~115200		Unsigned		2	M1M 15/20/30
8CEE	Parity		Unsigned		1	M1M 15/20/30

#### NOTE:

The range of device address bits: 1~247.

The range of baudrate: 9600, 19200, 38400, 57600, 115200.

The range of Parity: 0-none, 1-even, 2-odd.

All registers must be set simultaneously.

#### Example

Reading the Modbus-RTU communication parameters refers to the other examples above.

Setting the Modbus-RTU communication parameters to address 1, baud rate 19200, and byte format 8E1.

Request frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xEB
No. of registers, high byte	0x00
No. of registers, low byte	0x04
Byte count	0x08
Value of registers	0x00 01 00 00 4B 00 00 01
Error check (CRC), high byte	0x40
Error check (CRC), low byte	0x63

Response frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xEB
No. of registers, high byte	0x00
No. of registers, low byte	0x04
Error check (CRC), high byte	0x9B
Error check (CRC), low byte	0x6E

The response frame means the setting is successful.

### 4.10.2. Modbus-TCP/IP

When setting the Modbus-TCP/IP communication parameters, you must set all registers at the same time. You cannot set only some parameters.

Follows are Modbus-TCP/IP registers.

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type
8CEF	DHCP, 0=disable, 1=enable		Unsigned		1	M1M 20/30
8CF0	IP, A.B.C.D=0xAABBCCDD		Unsigned		2	M1M 20/30
8CF2	Mask, A.B.C.D=0xAABBCCDD		Unsigned		2	M1M 20/30
8CF4	Gateway, A.B.C.D=0xAABBCCDD		Unsigned		2	M1M 20/30

### Example

Reading the Modbus-TCP/IP communication parameters refers to the other examples above.

Setting the Modbus-TCP/IP communication parameters to DHCP disable, IP address to 192.168.1.12, mask to 255.255.255.0, and gateway address to 192.168.1.1.

The TCP packet header is for reference only. The actual packet shall prevail.

Request frame

TCP header	0x00 00 00 00 00 15
Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xEF
No. of registers, high byte	0x00
No. of registers, low byte	0x07
Byte count	0x0E
Value of registers	0x00 00 C0 A8 01 0C FF FF FF 00 C0 A8 01 01

Response frame

TCP header	0x00 00 00 00 00 06
Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xEF
No. of registers, high byte	0x00
No. of registers, low byte	0x07

The response frame means the setting is successful.

#### 4.11. Power without decimal point

Follows are registers.

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type
CB1A	Average Active power total Scaler 1	W	Signed	1	2	M1M 15/20/30
CB1C	Average Active power L1 Scaler 1	W	Signed	1	2	M1M 15/20/30
CB1E	Average Active power L2 Scaler 1	W	Signed	1	2	M1M 15/20/30
CB20	Average Active power L3 Scaler 1	W	Signed	1	2	M1M 15/20/30
CB22	Average Reactive power total Scaler 1	VAR	Signed	1	2	M1M 15/20/30
CB24	Average Reactive power L1 Scaler 1	VAR	Signed	1	2	M1M 15/20/30
CB26	Average Reactive power L2 Scaler 1	VAR	Signed	1	2	M1M 15/20/30
CB28	Average Reactive power L3 Scaler 1	VAR	Signed	1	2	M1M 15/20/30
CB2A	Average Apparent power total Scaler 1	VA	Signed	1	2	M1M 15/20/30
CB2C	Average Apparent power L1 Scaler 1	VA	Signed	1	2	M1M 15/20/30
CB2E	Average Apparent power L2 Scaler 1	VA	Signed	1	2	M1M 15/20/30
CB30	Average Apparent power L3 Scaler 1	VA	Signed	1	2	M1M 15/20/30
CBE8	Max Active power total Scaler 1	W	Signed	1	2	M1M 30
CBEA	Max Active power L1 Scaler 1	W	Signed	1	2	M1M 30
CBEC	Max Active power L2 Scaler 1	W	Signed	1	2	M1M 30
CBEE	Max Active power L3 Scaler 1	W	Signed	1	2	M1M 30
CBF0	Max Reactive power total Scaler 1	VAR	Signed	1	2	M1M 30
CBF2	Max Reactive power L1 Scaler 1	VAR	Signed	1	2	M1M 30
CBF4	Max Reactive power L2 Scaler 1	VAR	Signed	1	2	M1M 30
CBF6	Max Reactive power L3 Scaler 1	VAR	Signed	1	2	M1M 30
CBF8	Max Apparent power total Scaler 1	VA	Signed	1	2	M1M 30
CBFA	Max Apparent power L1 Scaler 1	VA	Signed	1	2	M1M 30
CBFC	Max Apparent power L2 Scaler 1	VA	Signed	1	2	M1M 30
CBFE	Max Apparent power L3 Scaler 1	VA	Signed	1	2	M1M 30

CC24	Min Active power total Scaler 1	W	Signed	1	2	M1M 30
CC26	Min Active power L1 Scaler 1	W	Signed	1	2	M1M 30
CC28	Min Active power L2 Scaler 1	W	Signed	1	2	M1M 30
CC2A	Min Active power L3 Scaler 1	W	Signed	1	2	M1M 30
CC2C	Min Reactive power total Scaler 1	VAR	Signed	1	2	M1M 30
CC2E	Min Reactive power L1 Scaler 1	VAR	Signed	1	2	M1M 30
CC30	Min Reactive power L2 Scaler 1	VAR	Signed	1	2	M1M 30
CC32	Min Reactive power L3 Scaler 1	VAR	Signed	1	2	M1M 30
CC34	Min Apparent power total Scaler 1	VA	Signed	1	2	M1M 30
CC36	Min Apparent power L1 Scaler 1	VA	Signed	1	2	M1M 30
CC38	Min Apparent power L2 Scaler 1	VA	Signed	1	2	M1M 30
CC3A	Min Apparent power L3 Scaler 1	VA	Signed	1	2	M1M 30
CC9C	Average Active power total Scaler 1	W	Signed	1	2	M1M 30
CC9E	Average Active power L1 Scaler 1	W	Signed	1	2	M1M 30
CCA0	Average Active power L2 Scaler 1	W	Signed	1	2	M1M 30
CCA2	Average Active power L3 Scaler 1	W	Signed	1	2	M1M 30
CCA4	Average Reactive power total Scaler 1	VAR	Signed	1	2	M1M 30
CCA6	Average Reactive power L1 Scaler 1	VAR	Signed	1	2	M1M 30
CCA8	Average Reactive power L2 Scaler 1	VAR	Signed	1	2	M1M 30
CCA A	Average Reactive power L3 Scaler 1	VAR	Signed	1	2	M1M 30
CCAC	Average Apparent power total Scaler 1	VA	Signed	1	2	M1M 30
CCAE	Average Apparent power L1 Scaler 1	VA	Signed	1	2	M1M 30
CCB0	Average Apparent power L2 Scaler 1	VA	Signed	1	2	M1M 30
CCB2	Average Apparent power L3 Scaler 1	VA	Signed	1	2	M1M 30

#### Example

Reading the power data without decimal points is the same as reading the real-time data above, except that the obtained power data are all integers.

## 4.12. Tariffs Setting

Only M1M30 I/O Pro support this function, Registers' map as follows.

Register (Hex)	Quantity/Functionality	Unit	Data Type	Resolution	No. of registers	Product Type
8A07	Current active tariff (None, 1~4)		Unsigned		1	M1M30 I/O Pro
8C90	Tariffs source, 0=RTC, 1=Communication, 2=DI, 0xFF=Disable.		Unsigned		1	M1M30 I/O Pro
8C91	Input configuration, fixed 0x04E4, see the sheet "Details"		Unsigned		1	M1M30 I/O Pro
8C92	Weekday type - Monday, 0=weekday, 1=weekend		Unsigned		1	M1M30 I/O Pro
8C93	Weekday type - Tuesday, 0=weekday, 1=weekend		Unsigned		1	M1M30 I/O Pro
8C94	Weekday type - Wednesday, 0=weekday, 1=weekend		Unsigned		1	M1M30 I/O Pro
8C95	Weekday type - Thursday, 0=weekday, 1=weekend		Unsigned		1	M1M30 I/O Pro
8C96	Weekday type - Friday, 0=weekday, 1=weekend		Unsigned		1	M1M30 I/O Pro
8C97	Weekday type - Saturday, 0=weekday, 1=weekend		Unsigned		1	M1M30 I/O Pro
8C98	Weekday type - Sunday, 0=weekday, 1=weekend		Unsigned		1	M1M30 I/O Pro
8C99	Weekday Start time - T1, 0xHHMM, 0xFFFF: Disable		Unsigned		1	M1M30 I/O Pro
8C9A	Weekday Start time - T2, 0xHHMM		Unsigned		1	M1M30 I/O Pro
8C9B	Weekday Start time - T3, 0xHHMM		Unsigned		1	M1M30 I/O Pro
8C9C	Weekday Start time - T4, 0xHHMM		Unsigned		1	M1M30 I/O Pro
8CA1	Weekend Start time - T1, 0xHHMM, 0xFFFF: Disable		Unsigned		1	M1M30 I/O Pro
8CA2	Weekend Start time - T2, 0xHHMM		Unsigned		1	M1M30 I/O Pro
8CA3	Weekend Start time - T3, 0xHHMM		Unsigned		1	M1M30 I/O Pro
8CA4	Weekend Start time - T4, 0xHHMM		Unsigned		1	M1M30 I/O Pro
8CA9	Special day Start time - T1, 0xHHMM, 0xFFFF: Disable		Unsigned		1	M1M30 I/O Pro
8CAA	Special day Start time - T2, 0xHHMM		Unsigned		1	M1M30 I/O Pro
8CAB	Special day Start time - T3, 0xHHMM		Unsigned		1	M1M30 I/O Pro

8CAC	Special day Start time - T4, 0xHHMM		Unsigned		1	M1M30 I/O Pro
8CD3	Special day - Total number, 1~50		Unsigned		1	M1M30 I/O Pro
8CD4	Special day - Current special day number, 1~Total number		Unsigned		1	M1M30 I/O Pro
8CD5	Special day - Entry Date, 0xYYMMDDxx (xx fixed FF)		Unsigned		2	M1M30 I/O Pro
8CD7	Special day - Entry ID, 1~Total number		Unsigned		1	M1M30 I/O Pro
8CE6	DST Start Date time, 0xYYMMDDHH		Unsigned		2	M1M30 I/O Pro
8CE8	DST End Date time, 0xYYMMDDHH		Unsigned		2	M1M30 I/O Pro
8CEA	DST Enable, 0=Disable, 1=Enable		Unsigned		1	M1M30 I/O Pro

**Note:**

All related registers need to be configured together and cannot be configured individually. Such as:

Start times for weekdays, weekends, and special days, DST(daylight saving time).

The YYMMDDHHMMSS means year, month, date, hour minute, second, the YYMMDDHH means year, month, date, hour.

When setting the DST, the start year and end year must be same.

**Example:**

Reading tariffs settings refer to the other examples above.

**Example of setting tariffs**

Setting tariffs in RTC approach, Monday through Friday is a working day and Saturday through Sunday is a weekend.

Request frame.

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0x92
No. of registers, high byte	0x00
No. of registers, low byte	0x07
Byte count	0x0E
Value of registers	0x00 00 00 00 00 00 00 00 00 00 00 01 00 01
Error check (CRC), high byte	0x23
Error check (CRC), low byte	0x75

Response frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0x92
No. of registers, high byte	0x00
No. of registers, low byte	0x07
Error check (CRC), high byte	0x0A
Error check (CRC), low byte	0xB6



The response frame means the setting is successful.

#### Example of setting special day

Setting special day first needs to configure its total.

Enable T1 Special day Start time at 00:19

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xA9
No. of registers, high byte	0x00
No. of registers, low byte	0x01
Byte count	0x02
Value of registers	0x00 0C
Error check (CRC), high byte	0xFB
Error check (CRC), low byte	0x79

Response frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xA9
No. of registers, high byte	0x00
No. of registers, low byte	0x01
Error check (CRC), high byte	0xFB
Error check (CRC), low byte	0x79

Setting Special day's total number is 32

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xD3
No. of registers, high byte	0x00
No. of registers, low byte	0x01
Byte count	0x02
Value of registers	0x00 20
Error check (CRC), high byte	0xF9
Error check (CRC), low byte	0xE3

Response frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xD3
No. of registers, high byte	0x00
No. of registers, low byte	0x01
Error check (CRC), high byte	0xDA
Error check (CRC), low byte	0xA0

## Configuring the 16th Special day

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xD4
No. of registers, high byte	0x00
No. of registers, low byte	0x01
Byte count	0x02
Value of registers	0x00 10
Error check (CRC), high byte	0xF8
Error check (CRC), low byte	0x40

## Response frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xD4
No. of registers, high byte	0x00
No. of registers, low byte	0x01
Error check (CRC), high byte	0x6B
Error check (CRC), low byte	0x61

Configure the 16th special date as January 9th, 2024. Note that the ID and date must be set simultaneously.

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xD5
No. of registers, high byte	0x00
No. of registers, low byte	0x03
Byte count	0x06
Value of registers	0x18 01 09 FF 00 10
Error check (CRC), high byte	0x68
Error check (CRC), low byte	0xD3

## Response frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xD5
No. of registers, high byte	0x00
No. of registers, low byte	0x03
Error check (CRC), high byte	0xBB
Error check (CRC), low byte	0x60

**Example of setting DST**

Example of setting DST to start at 00:00 on March 31,2024, end at 00:00 on October 27, 2024.

Request frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xE6
No. of registers, high byte	0x00
No. of registers, low byte	0x04
Byte count	0x08
Value of registers	0x18 03 1F 00 18 0A 1B 00
Error check (CRC), high byte	0xCF
Error check (CRC), low byte	0x16

Response frame

Slave address	0x01
Function code	0x10
Start address, high byte	0x8C
Start address, low byte	0xE6
No. of registers, high byte	0x00
No. of registers, low byte	0x04
Error check (CRC), high byte	0x0A
Error check (CRC), low byte	0xAD

The response frame means the setting is successful.



**ABB LV Installation Materials Company Limited, Beijing, China**  
R&D Department  
No. 17 Kangding Street, Beijing Economic Technological Development Area, China  
[new.abb.com/low-voltage](http://new.abb.com/low-voltage)