QT2-5OO
COMMUNICATION SPECIFICATION

(MODBUS RTU mode communication protocol)

⊖ **DAIICHI ELECTRONICS CO., LTD.**

Content

1. Communication specification

Item	Specification	Default setting
Standard	TIA RS-485-A (2003)	—
Protocol	MODBUS RTU mode	—
	Use function code : 03H, 04H, 06H, 08H	
Transmission system	Half-duplex two-wire system	—
Synchronous system	Asynchronous communication method	—
Bit rate ([1])	4800bps / 9600bps / 19200bps / 38400bps	9600bps
Modulation code	NRZ	—
Start bit	1 bit	—
Data length	8 bits	—
Parity ([1])	NONE / Even number / Odd number	Even number
Stop bit ([1])	1 bit / 2 bit	1 bit
Cable length	1000m (The total extension)	—
Address ([1])	1 - 247 (Connection is possible to 31 sets.)	1
Error detection	CRC-16 $(X^{16} + X^{15} + X^2 + 1)$	—
Transmission character	Binary	—

Transmission data are sent out from a bit 0.

Note([1]) Settings can be changed.

2. Transmission and reception protocol

(1) Usual request (Query)

To a response, it takes the following time.

4800bps : 10～12ms
9600bps : 10～12ms
19200bps : 10～12ms
38400bps : 10～12ms

Master side

Address	Function code	Data	CRC

Address	Function code	Data	CRC

Address	Function code

Slave (QT2-500) side

Please make the following time till the next transmission.

4800bps : Over 10ms
9600bps : Over 5ms
19200bps : Over 5ms
38400bps : Over 3ms
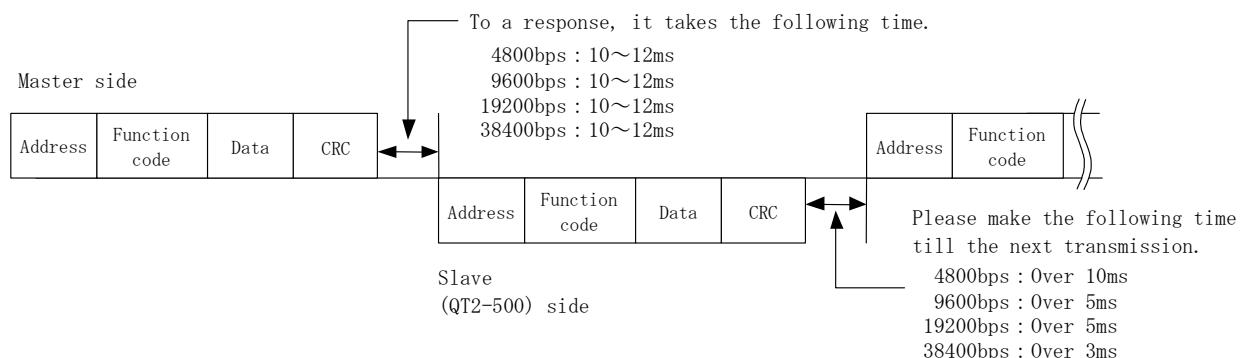
(2) Brosdcast request (Query)

If the specify all stations as an address, it becomes a broadcast request. At this time, the slave side becomes unresponsive.

Please make the following time till the next transmission.

4800bps : Over 22ms
9600bps : Over 22ms
19200bps : Over 22ms
38400bps : Over 22ms

Master side

Address	Function code	Data	CRC

Address	Function code

No answer

Slave (QT2-500) side
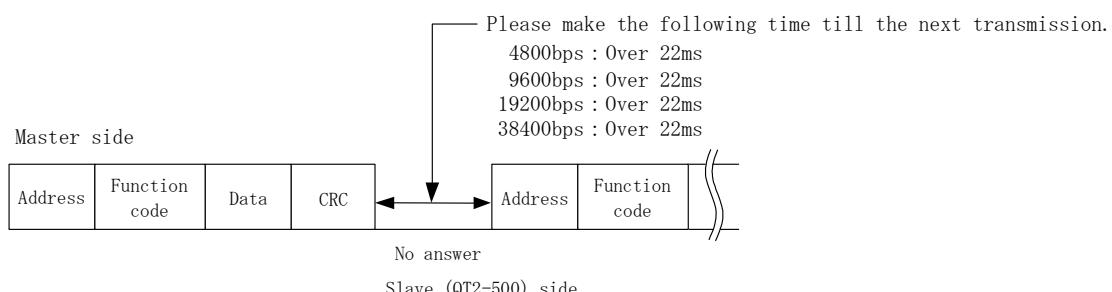
(3) Time-out of between data

The interval between data and data must be 1.5 characters or less.

Please make the interval of data and data fewer than the following time. A timeout error occurs.

4800bps : Below 3.8ms
9600bps : Below 1.9ms
19200bps : Below 0.9ms
38400bps : Below 0.5ms

Address	Function code		Data	CRC

2
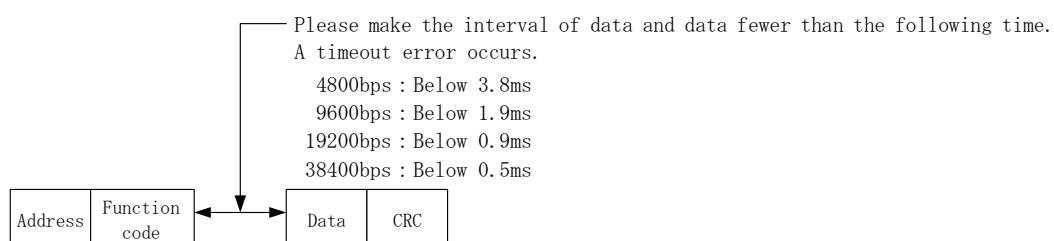
3. Calculation method of CRC-16

CRC-16 is adopted as error checking in Modbus RTU mode.
An address, a function code, and data are calculated by the following method.

```
        ┌──────────────┐
        │    CRC-16    │
        └──────┬───────┘
               ↓
        ┌──────────────┐
        │ Data X←FFFFH │
        │  Assignment  │
        └──────┬───────┘
               ↓
        ┌──────────────┐
        │   Data X ←   │
        │Date X XOR nth data│
        └──────┬───────┘
               ↓
        ┌──────────────┐
        │    Data X    │
        │Right 1 bit shift│
        └──────┬───────┘
               ↓
          ◇ Carry      ── Yes ──┐
          occurrence ?          ↓
               │ No      ┌──────────────┐
               │         │   Data X ←   │
               │         │Data X XOR A001H│
               │         └──────┬───────┘
               ↓←───────────────┘
          ◇ 8 times shift
            End ?  ── No ──┐
               │ Yes       │
               ↓           │
    ┌──────┐              │
    │ n+1  │ ── No ── ◇ All data end?
    └──────┘              │ Yes
                          ↓
        ┌──────────────────┐
        │The high order of data│
        │ X, and lower byte │
        │    exchange      │
        └──────┬───────────┘
               ↓
        ┌──────────────┐
        │     END      │
        └──────────────┘
```
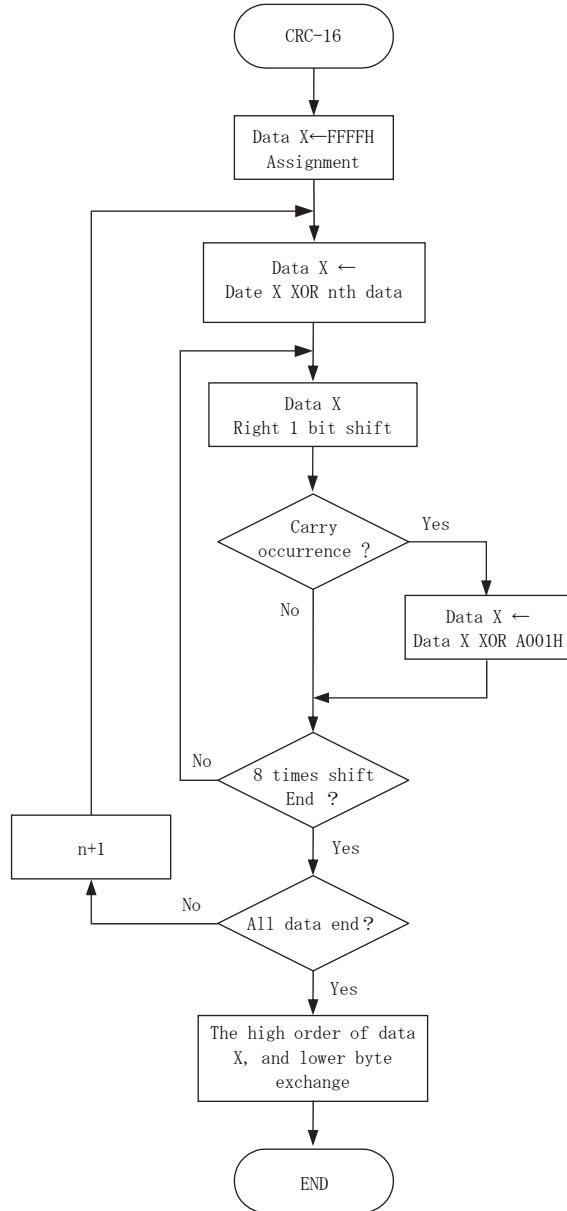
(1) Arithmetic process

① 2 bytes of data-area X is secured to a CRC calculation.

② FFFFH is substituted for ① as initial value.

③ XOR of data X and the nth data (n=1) is calculated. Assign it to data X.

④ The 1-bit shift right of the data X is done.

⑤ If carry occurs in operation of ④, data X and XOR of A001H are taken.

⑥ Operation of ④ - ⑤ is repeated until it shifts 8 times.

⑦ XOR of the next data (n+1) and Data X is calculated. Assign it to data X.

⑧ Operation of ④ - ⑦ is repeated until processing of all data is completed.

⑨ 1 byte of upper and 1 byte of lower of data-area X for a CRC calculation are replaced.

(2) Example of calculation

CRC Object range				
1 byte	1 byte	2 byte	2 byte	2 byte
Address	Function code	Data address	Number of request data	CRC
01H	04H	00H 00H	00H 19H	31C0H
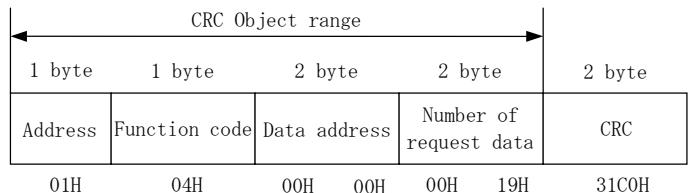
4. Communication process flow chart

```
        ┌──────────────┐
        │     Idle     │◀─────────────────────────┐
        └──────────────┘                          │
               │                                  │
               ▼                                  │
        ┌──────────────┐                          │
        │Data receiving│                          │
        └──────────────┘                          │
               │                                  │
               ▼                                  │
          ╱─────────╲        No                   │
         ╱ Local     ╲──────────────────────────▶│
         ╲ address ? ╱                            │
          ╲─────────╱                             │
               │ YES                              │
               ▼                                  │
          ╱─────────╲        Error                │
         ╱           ╲──────────────────────────▶│
         ╲Error check╱                            │
          ╲─────────╱                             │
               │ Normal                           │
               ▼                                  │
          ╱─────────╲        Error                │
         ╱ Function  ╲──────────────┐             │
         ╲ code      ╱              │             │
          ╲ check   ╱               │             │
           ╲───────╱                │             │
               │ Normal             │             │
               ▼                    │             │
          ╱─────────╲    Out of     │             │
         ╱Data-address╲   range     │             │
         ╲ range check ╱───────────▶│             │
          ╲──────────╱              │             │
               │ Normal             │             │
               ▼                    ▼             │
        ┌──────────┐          ┌──────────┐        │
        │   Data   │          │Error code│        │
        │transmission│        │  answer  │        │
        └──────────┘          └──────────┘        │
               │                    │             │
               └────────────────────┴─────────────┘
```
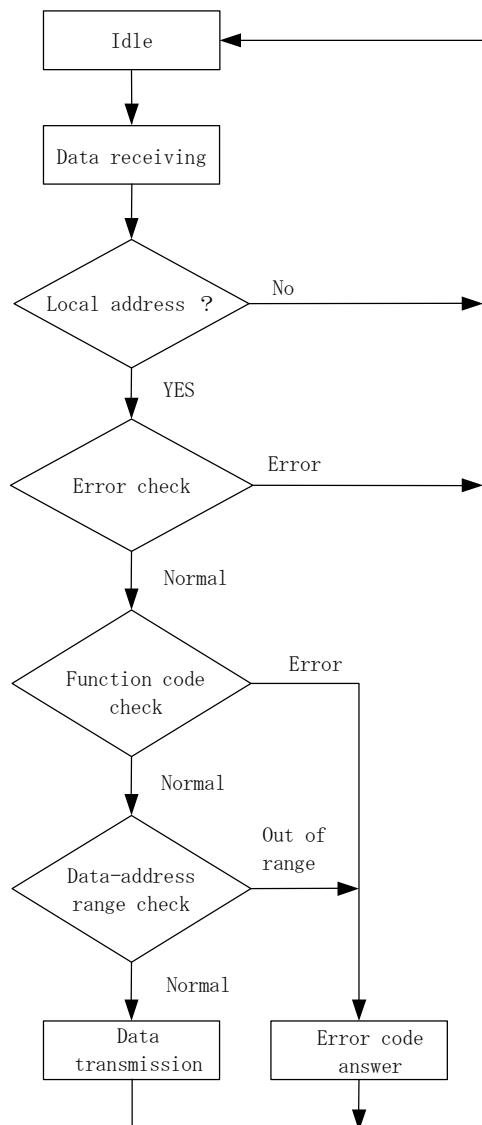
5. QT2-500 communication specification terminal arrangement

Please connect the terminating resistor (accessories) to the terminating equipment on the connection form.
Connection terminal: Between 40 (+) and 42 (−)

Terminal No.

QT2-500

40   +

42   −

41   SG

Inside common
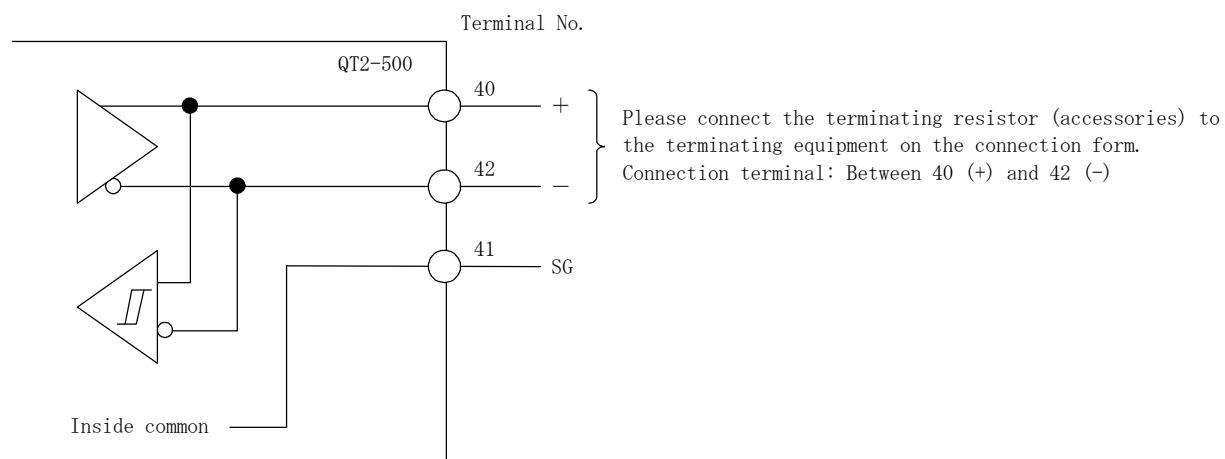
6. MODBUS RTU mode

6.1 Function code

The next function code is supported with this product.

Code	Name	Data address	Contents	MODBUS original function
03	Setting value request	40001 -	Readout of setting (VT ratio, CT ratio, Various interval, Electric energy count value)	Read holding registers
	Model information request	40501 -	Readout of model information (Type code, phase wire)	
04	Measurement value request	30001 -	Readout of general measurement value 1.	Read input registers
		30101 -	Readout of harmonic measurement value (Voltage).	
		30301 -	Readout of harmonic measurement value (Current).	
		30501 -	Readout of general measurement value 2.	
		30601 -	Readout of general measurement value 2 (Maximum value).	
06	Maximum value reset	40301 -	Reset the maximum value.	Write signal register
08	Loopback test	—	Communication test of master and slave is performed.	Diagnostic

6.2 Abnormal response

In case the message transmitted from the master is judged to be abnormal, this product does the next abnormal answer.

(1) In case it becomes a no answer
    ① : In case a message transmission error occurs. (Overrun, Framing, Parity error, CRC)
    ② : In case the data interval of a message exceeds a regulation value (1.5 characters).
    ③ : In case the message frame exceeding 8 bytes is received.

(2) In case as answered in an error code.
    In the error that does not correspond to (1), the following abnormal response is returned.
    At this case, the code that added 80H to the code of a request is returned to a function code.
    And, the generated error code is returned as data.

Error code list

Error code	Contents
01H	Function code besides regulation is received.
02H	Data address is out of range.
03H	Request data that exceeds the number of data to reply. Out of setting range.

1 byte	1 byte	1 byte	2 byte
Address	Function code (+80H)	Error code	CRC
01H	84H	02H	C2C1H

6.3 Setting value request

Read the setting value from this product. There is no broadcast. Function code designates 03H.

(1) Data request (Query)

In case it performs a setting values request, it is necessary to designate the data address of data to acquire. When a data address is transmitted, please subtract 40001 from the address of a data-address list. The number of data should designate the tale of the data to request.

1	2	3	4	5	6	7	8
Address	Function code	Data address		Number of data		CRC	
01H	03H	0000H		0002H		C40BH	

Data address list

Function code	Data address	Comminication data
03H	40001	VT ratio
	40002	CT ratio
	40003	Demand current interval
	40004	Demand power interval
	40005	Harmonic interval
	40006	Electric energy count value

(2) Response

If data request is performed normally, the following response will be returned from this product side.

Example) Data address : 40001, Number of data : 2.

1	2	3	4	5	6	7	8	9
Address	Function code	Answer byte count	VT ratio		CT ratio		CRC	

● VT ratio

VT ratio data ＝ Primary rated value ÷110 V

Primary rated (V)	Setting value data	Primary rated (V)	Setting value data
110 V	0001H (1)	16.5 kV	0096H (150)
220 V ([2])	0002H (2)	18.4 kV ([3])	00A7H (167)
440 V ([2])	0004H (4)	22 kV	00C8H (200)
880 V	0008H (8)	33 kV	012CH (300)
1100 V	000AH (10)	66 kV	0258H (600)
1650 V	000FH (15)	77 kV	02BCH (700)
2200 V	0014H (20)	110 kV	03E8H (1000)
3300 V	001EH (30)	132 kV	04B0H (1200)
6600 V	003CH (60)	154 kV	0578H (1400)
11 kV	0064H (100)	187 kV	06A4H (1700)
13.2 kV	0078H (120)	220 kV	07D0H (2000)
13.8 kV ([3])	007DH (125)		

Numbers in parentheses indicate decimal number data.

Note([2]) Even for 220 V, 440 V input specifications, VT ratio data = primary rated value ÷ 110 V is output.
Note([3]) Dividing by 110 V generate fraction values, so it will be unique set value data.

- CT ratio

CT ratio data = Primary rated value ÷ 5 A × 10 (4)

Primary rating (A)	Setting value data	Primary rating (A)	Setting value data
5 A	000AH (10)	600 A	04B0H (1200)
6 A	000CH (12)	750 A	05DCH (1500)
7.5 A	000FH (15)	800 A	0640H (1600)
8 A	0010H (16)	900 A	0708H (1800)
10 A	0014H (20)	1000 A	07D0H (2000)
12 A	0018H (24)	1200 A	0960H (2400)
15 A	001EH (30)	1500 A	0BB8H (3000)
20 A	0028H (40)	1600 A	0C80H (3200)
25 A	0032H (50)	1800 A	0E10H (3600)
30 A	003CH (60)	2000 A	0FA0H (4000)
40 A	0050H (80)	2500 A	1388H (5000)
50 A	0064H (100)	3000 A	1770H (6000)
60 A	0078H (120)	4000 A	1F40H (8000)
75 A	0096H (150)	5000 A	2710H (10000)
80 A	00A0H (160)	6000 A	2EE0H (12000)
100 A	00C8H (200)	7500 A	3A98H (15000)
120 A	00F0H (240)	8000 A	3E80H (16000)
150 A	012CH (300)	9000 A	4650H (18000)
200 A	0190H (400)	10000 A	4E20H (20000)
250 A	01F4H (500)	12000 A	5DC0H (24000)
300 A	0258H (600)	15000 A	7530H (30000)
400 A	0320H (800)	20000 A	9C40H (40000)
500 A	03E8H (1000)	30000 A	EA60H (60000)

Numbers in parentheses indicate decimal number data.

Note(4) In case of 1 A input specification, they output it as CT ratio data = Primary rated value ÷ 5 A ×10.

- Demand current interval, Demand power interval

Interval	Communication data	Interval	Communication data	Interval	Communication data
0 s	0000H (0)	1 min	003CH (60)	8 min	01E0H (480)
5 s	0005H (5)	2 min	0078H (120)	9 min	021CH (540)
10 s	000AH (10)	3 min	00B4H (180)	10 min	0258H (600)
20 s	0014H (20)	4 min	00F0H (240)	15 min	0384H (900)
30 s	001EH (30)	5 min	012CH (300)	20 min	04B0H (1200)
40 s	0028H (40)	6 min	0168H (360)	25 min	05DCH (1500)
50 s	0032H (50)	7 min	01A4H (420)	30 min	0708H (1800)

Numbers in parentheses indicate decimal number data.

- Harmonic interval

Interval	Communication data
0 min	0000H (0)
1 min	0001H (1)
2 min	0002H (2)
5 min	0005H (5)
10 min	000AH (10)
15 min	000FH (15)
30 min	001EH (30)

- Electric energy count value
  (Magnification of electric energy data)

Electric energy count value	Communication data
×0.00001	FFFBH (−5)
×0.0001	FFFCH (−4)
×0.001	FFFDH (−3)
×0.01	FFFEH (−2)
×0.1	FFFFH (−1)
×1	0000H (0)
×10	0001H (1)
×100	0002H (2)
×1000	0003H (3)

Numbers in parentheses indicate decimal number data.

6.4 Model information request

Read the model information and phase wire from this product. There is no broadcast.
Function code designates 03H.

(1) Data request (Query)

In case it performs a model information request, it is necessary to designate the data address of data to acquire. When a data address is transmitted, please subtract 40001 from the address of a data-address list. The number of data should designate the tale of the data to request.

1	2	3	4	5	6	7	8
Address	Function code	Data address		Number of data		CRC	
01H	03H	01F4H		0002H		8405H	

Data address list

Function code	Data address	Model			
		3P3W	1P3W	1P2W	3P4W
03H	40501	Model information, Type code			
	40502	Model information, Phase wire			

(2) Response

If data request is performed normally, the following response will be returned from this product side.

Example) Data address : 40501, Number of data : 2.

1	2	3	4	5	6	7	8	9
Address	Function code	Answer byte count	Type code		Phase wire		CRC	

● Model information,   Type

Type	Communication data
QT2-500	0030H

● Model information,   Phase wire

Phase wire	Communication data
3P3W [3-phase 3-wire] (2VT2CT)	0001H
1P3W [1-phase 3-wire]	0002H
1P2W [1-phase 2-wire]	0005H
3P4W [3-phase 4-wire] (3VT3CT)	0006H
3P3W [3-phase 3-wire] (2VT3CT)	0007H
3P4W [3-phase 4-wire] (2VT3CT)	0008H

6.5 Measurement value request

Read the measurement value from this product. There is no broadcast. Function code designates 04H.

(1) Data request (Query)

In case it performs setting value request, it is necessary to designate the start address of data to acquire.
If a data address is transmitted, please subtract 30001 from the address of a data-address list.
The number of data should designate the tale of the data to request.

〈 Caution 〉 Electric energy (Wh, varh) consists of 2 words (4 bytes), please set the number of data to 2.
Also, depending on the phase wire, treat the part where measurement value does not exist (data 0000H fixed) as 1 data.

〈 Caution 〉 As for a general measurement value 1 and harmonic measurement value (current / voltage) and general measurement value 2, addresses are different.
Therefore, it cannot read by data request once. Please perform a data request individually.

1	2	3 4	5 6	7 8
Address	Function code	Data address	Number of data	CRC
01H	04H	0000H	0020H	F1D2H

Data-address list : General measurement value 1 (1/2)

Function code	Data address	3P3W	1P3W	1P2W	3P4W
04	30001	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Voltage (L1N)
04	30002	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Voltage (L2N)
04	30003	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Voltage (L3N)
04	30004	Voltage (L12)	Voltage (L1N)	Voltage	Voltage (L12)
04	30005	Voltage (L23)	Voltage (L3N)	0000H (Fixation)	Voltage (L23)
04	30006	Voltage (L31)	Voltage (L13)	0000H (Fixation)	Voltage (L31)
04	30007	Current (L1)	Current (L1)	Current	Current (L1)
04	30008	Current (L2)	Current (N)	0000H (Fixation)	Current (L2)
04	30009	Current (L3)	Current (L3)	0000H (Fixation)	Current (L3)
04	30010	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Current (N)
04	30011	Demand current (L1)	Demand current (L1)	Demand current	Demand current (L1)
04	30012	Demand current (L2)	Demand current (N)	0000H (Fixation)	Demand current (L2)
04	30013	Demand current (L3)	Demand current (L3)	0000H (Fixation)	Demand current (L3)
04	30014	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Demand current (N)
04	30015	Active power	Active power	Active power	Active power
04	30016	Demand power	Demand power	Demand power	Demand power
04	30017	Wh (Incoming) upper	Wh (Incoming) upper	Wh (Incoming) upper	Wh (Incoming) upper
04	30018	Wh (Incoming) lower	Wh (Incoming) lower	Wh (Incoming) lower	Wh (Incoming) lower
04	30019	Wh (Outgoing) upper	Wh (Outgoing) upper	Wh (Outgoing) upper	Wh (Outgoing) upper
04	30020	Wh (Outgoing) lower	Wh (Outgoing) lower	Wh (Outgoing) lower	Wh (Outgoing) lower
04	30021	Reactive power	Reactive power	Reactive power	Reactive power
04	30022	varh (Incoming LAG) upper	varh (Incoming LAG) upper	varh (Incoming LAG) upper	varh (Incoming LAG) upper
04	30023	varh (Incoming LAG) lower	varh (Incoming LAG) lower	varh (Incoming LAG) lower	varh (Incoming LAG) lower
04	30024	varh (Incoming LEAD) upper	varh (Incoming LEAD) upper	varh (Incoming LEAD) upper	varh (Incoming LEAD) upper
04	30025	varh (Incoming LEAD) lower	varh (Incoming LEAD) lower	varh (Incoming LEAD) lower	varh (Incoming LEAD) lower
04	30026	varh (Outgoing LAG) upper	varh (Outgoing LAG) upper	varh (Outgoing LAG) upper	varh (Outgoing LAG) upper
04	30027	varh (Outgoing LAG) lower	varh (Outgoing LAG) lower	varh (Outgoing LAG) lower	varh (Outgoing LAG) lower

Data-address list : General measurement value 1 (2/2)

Function code	Data address	3P3W	1P3W	1P2W	3P4W
04	30028	varh (Outgoing LEAD) upper	varh (Outgoing LEAD) upper	varh (Outgoing LEAD) upper	varh (Outgoing LEAD) upper
04	30029	varh (Outgoing LEAD) lower	varh (Outgoing LEAD) lower	varh (Outgoing LEAD) lower	varh (Outgoing LEAD) lower
04	30030	Apparent power	Apparent power	Apparent power	Apparent power
04	30031	Power factor	Power factor	Power factor	Power factor
04	30032	Frequency	Frequency	Frequency	Frequency
04	30033	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30034	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30035	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30036	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30037	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30038	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30039	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30040	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30041	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30042	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30043	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30044	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30045	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30046	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30047	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30048	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30049	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30050	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30051	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30052	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30053	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30054	Maximum demand current (L1)	Maximum demand current (L1)	Maximum demand current	Maximum demand current (L1)
04	30055	Maximum demand current (L2)	Maximum demand current (N)	0000H (Fixation)	Maximum demand current (L2)
04	30056	Maximum demand current (L3)	Maximum demand current (L3)	0000H (Fixation)	Maximum demand current (L3)
04	30057	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Maximum demand current (N)
04	30058	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30059	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30060	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30061	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30062	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30063	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30064	Maximum demand power	Maximum demand power	Maximum demand power	Maximum demand power
04	30065	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30066	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30067	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30068	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30069	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30070	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30071	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30072	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30073	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30074	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)

Data-address list : Harmonic voltage (1)

Function code	Data address	3P3W	1P3W	1P2W	3P4W [5]
04	30101	Fundamental-wave effective value Voltage (L12)	Fundamental-wave effective value Voltage (L1N)	Fundamental-wave effective value Voltage	Fundamental-wave effective value Voltage (L1N)
04	30102	Fundamental-wave effective value Voltage (L23)	Fundamental-wave effective value Voltage (L3N)	0000H (Fixation)	Fundamental-wave effective value Voltage (L2N)
04	30103	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Fundamental-wave effective value Voltage (L3N)
04	30104	Distortion factor Voltage (L12)	Distortion factor Voltage (L1N)	Distortion factor Voltage	Distortion factor Voltage (L1N)
04	30105	Distortion factor Voltage (L23)	Distortion factor voltage (L3N)	0000H (Fixation)	Distortion factor Voltage (L2N)
04	30106	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Distortion factor Voltage (L3N)
04	30107	5th conversion effective value Voltage (L12)	5th conversion effective value Voltage (L1N)	5th conversion effective value Voltage	5th conversion effective value Voltage (L1N)
04	30108	5th conversion effective value Voltage (L23)	5th conversion effective value Voltage (L3N)	0000H (Fixation)	5th conversion effective value Voltage (L2N)
04	30109	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	5th conversion effective value Voltage (L3N)
04	30110	5th conversion content rate Voltage (L12)	5th conversion content rate Voltage (L1N)	5th conversion content rate Voltage	5th conversion content rate Voltage (L1N)
04	30111	5th conversion content rate Voltage (L23)	5th conversion content rate Voltage (L3N)	0000H (Fixation)	5th conversion content rate Voltage (L2N)
04	30112	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	5th conversion content rate Voltage (L3N)
04	30113	3th effective value Voltage (L12)	3th effective value Voltage (L1N)	3th effective value Voltage	3th effective value Voltage (L1N)
04	30114	3th effective value Voltage (L23)	3th effective value Voltage (L3N)	0000H (Fixation)	3th effective value Voltage (L2N)
04	30115	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	3th effective value Voltage (L3N)
04	30116	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30117	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30118	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30119	5th effective value Voltage (L12)	5th effective value Voltage (L1N)	5th effective value Voltage	5th effective value Voltage (L1N)
04	30120	5th effective value Voltage (L23)	5th effective value Voltage (L3N)	0000H (Fixation)	5th effective value Voltage (L2N)
04	30121	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	5th effective value Voltage (L3N)
04	30122	7th effective value Voltage (L12)	7th effective value Voltage (L1N)	7th effective value Voltage	7th effective value Voltage (L1N)
04	30123	7th effective value Voltage (L23)	7th effective value Voltage (L3N)	0000H (Fixation)	7th effective value Voltage (L2N)
04	30124	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	7th effective value Voltage (L3N)
04	30125	9th effective value Voltage (L12)	9th effective value Voltage (L1N)	9th effective value Voltage	9th effective value Voltage (L1N)
04	30126	9th effective value Voltage (L23)	9th effective value Voltage (L3N)	0000H (Fixation)	9th effective value Voltage (L2N)
04	30127	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	9th effective value Voltage (L3N)
04	30128	11th effective value Voltage (L12)	11th effective value Voltage (L1N)	11th effective value Voltage	11th effective value Voltage (L1N)
04	30129	11th effective value Voltage (L23)	11th effective value Voltage (L3N)	0000H (Fixation)	11th effective value Voltage (L2N)
04	30130	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	11th effective value Voltage (L3N)

Data-address list : Harmonic voltage (2)

Function code	Data address	3P3W	1P3W	1P2W	3P4W (5)
04	30131	13th effective value Voltage (L12)	13th effective value Voltage (L1N)	13th effective value Voltage	13th effective value Voltage (L1N)
04	30132	13th effective value Voltage (L23)	13th effective value Voltage (L3N)	0000H (Fixation)	13th effective value Voltage (L2N)
04	30133	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	13th effective value Voltage (L3N)
04	30134	15th effective value Voltage (L12)	15th effective value Voltage (L1N)	15th effective value Voltage	15th effective value Voltage (L1N)
04	30135	15th effective value Voltage (L23)	15th effective value Voltage (L3N)	0000H (Fixation)	15th effective value Voltage (L2N)
04	30136	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	15th effective value Voltage (L3N)
04	30137	3th content rate Voltage (L12)	3th content rate Voltage (L1N)	3th content rate Voltage	3th content rate Voltage (L1N)
04	30138	3th content rate Voltage (L23)	3th content rate Voltage (L3N)	0000H (Fixation)	3th content rate Voltage (L2N)
04	30139	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	3th content rate Voltage (L3N)
04	30140	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30141	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30142	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30143	5th content rate Voltage (L12)	5th content rate Voltage (L1N)	5th content rate Voltage	5th content rate Voltage (L1N)
04	30144	5th content rate Voltage (L23)	5th content rate Voltage (L3N)	0000H (Fixation)	5th content rate Voltage (L2N)
04	30145	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	5th content rate Voltage (L3N)
04	30146	7th content rate Voltage (L12)	7th content rate Voltage (L1N)	7th content rate Voltage	7th content rate Voltage (L1N)
04	30147	7th content rate Voltage (L23)	7th content rate Voltage (L3N)	0000H (Fixation)	7th content rate Voltage (L2N)
04	30148	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	7th content rate Voltage (L3N)
04	30149	9th content rate Voltage (L12)	9th content rate Voltage (L1N)	9th content rate Voltage	9th content rate Voltage (L1N)
04	30150	9th content rate Voltage (L23)	9th content rate Voltage (L3N)	0000H (Fixation)	9th content rate Voltage (L2N)
04	30151	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	9th content rate Voltage (L3N)
04	30152	11th content rate Voltage (L12)	11th content rate Voltage (L1N)	11th content rate Voltage	11th content rate Voltage (L1N)
04	30153	11th content rate Voltage (L23)	11th content rate Voltage (L3N)	0000H (Fixation)	11th content rate Voltage (L2N)
04	30154	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	11th content rate Voltage (L3N)
04	30155	13th content rate Voltage (L12)	13th content rate Voltage (L1N)	13th content rate Voltage	13th content rate Voltage (L1N)
04	30156	13th content rate Voltage (L23)	13th content rate Voltage (L3N)	0000H (Fixation)	13th content rate Voltage (L2N)
04	30157	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	13th content rate Voltage (L3N)
04	30158	15th content rate Voltage (L12)	15th content rate Voltage (L1N)	15th content rate Voltage	15th content rate Voltage (L1N)
04	30159	15th content rate Voltage (L23)	15th content rate Voltage (L3N)	0000H (Fixation)	15th content rate Voltage (L2N)
04	30160	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	15th content rate Voltage (L3N)

Note(5) 2VT3CT : 2 phase (L2N) is 0000H (Fixation).

Data-address list : Harmonic current (1)

Function code	Data address	3P3W (6)	1P3W	1P2W	3P4W
04	30301	Fundamental-wave effective value Current (L1)	Fundamental-wave effective value Current (L1)	Fundamental-wave effective value Current	Fundamental-wave effective value Current (L1)
04	30302	Fundamental-wave effective value Current (L2)	0000H (Fixation)	0000H (Fixation)	Fundamental-wave effective value Current (L2)
04	30303	Fundamental-wave effective value Current (L3)	Fundamental-wave effective value Current (L3)	0000H (Fixation)	Fundamental-wave effective value Current (L3)
04	30304	Distortion factor Current (L1)	Distortion factor Current (L1)	Distortion factor Current	Distortion factor Current (L1)
04	30305	Distortion factor Current (L2)	0000H (Fixation)	0000H (Fixation)	Distortion factor Current (L2)
04	30306	Distortion factor Current (L3)	Distortion factor Current (L3)	0000H (Fixation)	Distortion factor Current (L3)
04	30307	Harmonic 5th conversion effective value Current (L1)	Harmonic 5th conversion effective value Current (L1)	Harmonic 5th conversion effective value Current	Harmonic 5th conversion effective value Current (L1)
04	30308	Harmonic 5th conversion effective value Current (L2)	0000H (Fixation)	0000H (Fixation)	Harmonic 5th conversion effective value Current (L2)
04	30309	Harmonic 5th conversion effective value Current (L3)	Harmonic 5th conversion effective value Current (L3)	0000H (Fixation)	Harmonic 5th conversion effective value Current (L3)
04	30310	5th conversion content rate Current (L1)	5th conversion content rate Current (L1)	5th conversion content rate Current	5th conversion content rate Current (L1)
04	30311	5th conversion content rate Current (L2)	0000H (Fixation)	0000H (Fixation)	5th conversion content rate Current (L2)
04	30312	5th conversion content rate Current (L3)	5th conversion content rate Current (L3)	0000H (Fixation)	5th conversion content rate Current (L3)
04	30313	3th effective value Current (L1)	3th effective value Current (L1)	3th effective value Current	3th effective value Current (L1)
04	30314	3th effective value Current (L2)	0000H (Fixation)	0000H (Fixation)	3th effective value Current (L2)
04	30315	3th effective value Current (L3)	3th effective value Current (L3)	0000H (Fixation)	3th effective value Current (L3)
04	30316	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30317	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30318	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30319	5th effective value Current (L1)	5th effective value Current (L1)	5th effective value Current	5th effective value Current (L1)
04	30320	5th effective value Current (L2)	0000H (Fixation)	0000H (Fixation)	5th effective value Current (L2)
04	30321	5th effective value Current (L3)	5th effective value Current (L3)	0000H (Fixation)	5th effective value Current (L3)
04	30322	7th effective value Current (L1)	7th effective value Current (L1)	7th effective value Current	7th effective value Current (L1)
04	30323	7th effective value Current (L2)	0000H (Fixation)	0000H (Fixation)	7th effective value Current (L2)
04	30324	7th effective value Current (L3)	7th effective value Current (L3)	0000H (Fixation)	7th effective value Current (L3)
04	30325	9th effective value Current (L1)	9th effective value Current (L1)	9th effective value Current	9th effective value Current (L1)
04	30326	9th effective value Current (L2)	0000H (Fixation)	0000H (Fixation)	9th effective value Current (L2)
04	30327	9th effective value Current (L3)	9th effective value Current (L3)	0000H (Fixation)	9th effective value Current (L3)
04	30328	11th effective value Current (L1)	11th effective value Current (L1)	11th effective value Current	11th effective value Current (L1)
04	30329	11th effective value Current (L2)	0000H (Fixation)	0000H (Fixation)	11th effective value Current (L2)

Data-address list : Harmonic current (2)

Function code	Data address	3P3W (6)	1P3W	1P2W	3P4W
04	30330	11th effective value Current (L3)	11th effective value Current (L3)	0000H (Fixation)	11th effective value Current (L3)
04	30331	13th effective value Current (L1)	13th effective value Current (L1)	13th effective value Current	13th effective value Current (L1)
04	30332	13th effective value Current (L2)	0000H (Fixation)	0000H (Fixation)	13th effective value Current (L2)
04	30333	13th effective value Current (L3)	13th effective value Current (L3)	0000H (Fixation)	13th effective value Current (L3)
04	30334	15th effective value Current (L1)	15th effective value Current (L1)	15th effective value Current	15th effective value Current (L1)
04	30335	15th effective value Current (L2)	0000H (Fixation)	0000H (Fixation)	15th effective value Current (L2)
04	30336	15th effective value Current (L3)	15th effective value Current (L3)	0000H (Fixation)	15th effective value Current (L3)
04	30337	3th content rate Current (L1)	3th content rate Current (L1)	3th content rate Current	3th content rate Current (L1)
04	30338	3th content rate Current (L2)	0000H (Fixation)	0000H (Fixation)	3th content rate Current (L2)
04	30339	3th content rate Current (L3)	3th content rate Current (L3)	0000H (Fixation)	3th content rate Current (L3)
04	30340	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30341	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30342	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30343	5th content rate Current (L1)	5th content rate Current (L1)	5th content rate Current	5th content rate Current (L1)
04	30344	5th content rate Current (L2)	0000H (Fixation)	0000H (Fixation)	5th content rate Current (L2)
04	30345	5th content rate Current (L3)	5th content rate Current (L3)	0000H (Fixation)	5th content rate Current (L3)
04	30346	7th content rate Current (L1)	7th content rate Current (L1)	7th content rate Current	7th content rate Current (L1)
04	30347	7th content rate Current (L2)	0000H (Fixation)	0000H (Fixation)	7th content rate Current (L2)
04	30348	7th content rate Current (L3)	7th content rate Current (L3)	0000H (Fixation)	7th content rate Current (L3)
04	30349	9th content rate Current (L1)	9th content rate Current (L1)	9th content rate Current	9th content rate Current (L1)
04	30350	9th content rate Current (L2)	0000H (Fixation)	0000H (Fixation)	9th content rate Current (L2)
04	30351	9th content rate Current (L3)	9th content rate Current (L3)	0000H (Fixation)	9th content rate Current (L3)
04	30352	11th content rate Current (L1)	11th content rate Current (L1)	11th content rate Current	11th content rate Current (L1)
04	30353	11th content rate Current (L2)	0000H (Fixation)	0000H (Fixation)	11th content rate Current (L2)
04	30354	11th content rate Current (L3)	11th content rate Current (L3)	0000H (Fixation)	11th content rate Current (L3)
04	30355	13th content rate Current (L1)	13th content rate Current (L1)	13th content rate Current	13th content rate Current (L1)
04	30356	13th content rate Current (L2)	0000H (Fixation)	0000H (Fixation)	13th content rate Current (L2)
04	30357	13th content rate Current (L3)	13th content rate Current (L3)	0000H (Fixation)	13th content rate Current (L3)
04	30358	15th content rate Current (L1)	15th content rate Current (L1)	15th content rate Current	15th content rate Current (L1)
04	30359	15th content rate Current (L2)	0000H (Fixation)	0000H (Fixation)	15th content rate Current (L2)
04	30360	15th content rate Current (L3)	15th content rate Current (L3)	0000H (Fixation)	15th content rate Current (L3)

Note(6) 2VT3CT : 2 phase (L2) is 0000H (Fixation).

Data-address list : General measurement value 2

Function code	Data address	3P3W	1P3W	1P2W	3P4W
04	30501	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Phase voltage (Average)
04	30502	Line voltage (Average)	0000H (Fixation)	0000H (Fixation)	Line voltage (Average)
04	30503	Current (Average)	0000H (Fixation)	0000H (Fixation)	Current (Average)
04	30504	Current (Power flow) (L1)	Current (Power flow) (L1)	Current (Power flow)	Current (Power flow) (L1)
04	30505	Current (Power flow) (L2)	Current (Power flow) (LN)	0000H (Fixation)	Current (Power flow) (L2)
04	30506	Current (Power flow) (L3)	Current (Power flow) (L3)	0000H (Fixation)	Current (Power flow) (L3)
04	30507	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30508	Demand current (Average)	0000H (Fixation)	0000H (Fixation)	Demand current (Average)
04	30509	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Active power (L1)
04	30510	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Active power (L2)
04	30511	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Active power (L3)
04	30512	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Demand power (L1)
04	30513	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Demand power (L2)
04	30514	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Demand power (L3)
04	30515	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Reactive power (L1)
04	30516	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Reactive power (L2)
04	30517	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Reactive power (L3)
04	30518	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Reactive power (Power flow) (L1)
04	30519	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Reactive power (Power flow) (L2)
04	30520	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Reactive power (Power flow) (L3)
04	30521	Reactive power (Power flow)	Reactive power (Power flow)	Reactive power (Power flow)	Reactive power (Power flow)
04	30522	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Apparent power (L1)
04	30523	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Apparent power (L2)
04	30524	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Apparent power (L3)
04	30525	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Power factor (L1)
04	30526	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Power factor (L2)
04	30527	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Power factor (L3)
04	30528	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Power factor (power flow) (L1)
04	30529	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Power factor (power flow) (L2)
04	30530	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Power factor (power flow) (L3)
04	30531	Power factor (power flow)	Power factor (power flow)	Power factor (power flow)	Power factor (power flow)

Data-address list : General measurement value 2 (Maximum value)

Function code	Data address	3P3W	1P3W	1P2W	3P4W
04	30601	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30602	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30603	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30604	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30605	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30606	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30607	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30608	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30609	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30610	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30611	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30612	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30613	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30614	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30615	Demand current (Maximum average)	0000H (Fixation)	0000H (Fixation)	Demand current (Maximum average)
04	30616	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30617	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30618	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30619	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30620	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30621	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30622	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)
04	30623	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Maximum demand power (L1)
04	30624	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Maximum demand power (L2)
04	30625	0000H (Fixation)	0000H (Fixation)	0000H (Fixation)	Maximum demand power (L3)

(2) Response

    If measurement value requirements are performed normally, the following response will be returned from this product side.

    Example) Data address : 30001, Number of data : 32 (3P3W)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Address	Function code	Answer byte count	00	00	00	00	00	00	Voltage (L12)		Voltage (L23)		Voltage (L31)	

16	17	18	19	20	21	22	23	24	25	26	27	28	29
Current (L1)		Current (L2)		Current (L3)		00	00	Demand current (L1)		Demand current (L2)		Demand current (L3)	

30	31	32	33	34	35	36	37	38	39	40	41	42	43
00	00	Active power		Demand power		Wh (Incoming) Upper		Wh (Incoming) Lower		Wh (Outgoing) Upper		Wh (Outgoing) Lower	

44	45	46	47	48	49	50	51	52	53	54	55	56	57
Reactive power		varh (Incoming LAG) Upper		varh (Incoming LAG) Lower		varh (Incoming LEAD) Upper		varh (Incoming LEAD) Lower		varh (Outgoing LAG) Upper		varh (Outgoing LAG) Lower	

58	59	60	61	62	63	64	65	66	67	68	69
varh (Outgoing LEAD) Upper		varh (Outgoing LEAD) Lower		00	00	Power factor		Frequency		CRC	

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Transmission scaling (1/2)

Item				Input	Communication data	Intrinsic error
Voltage	3P3W 1P2W 3P4W			AC0 - 150V, AC0 - 300V, AC0 - 600V (Line)	0000H - 2710H (0 - 10000)	±0.2%
				AC0 - 150/√3V, AC0 - 300/√3V, AC0 - 600/√3V (Phase)	0000H - 168EH (0 - 5774)	
	1P3W			AC0 - 300V, AC0 - 600V (Line)	0000H - 2710H (0 - 10000)	
		AC0 - 150V, AC0 - 300V (Phase)	Phase voltage full-scale 150V, 300V		0000H - 2710H (0 - 10000)	
			Phase voltage full-scale 300V, 600V		0000H - 1388H (0 - 5000)	
Current Demand current Maximum demand current				AC0 - 5A	0000H - 2710H (0 - 10000)	±0.2%
				AC0 - 1A		±0.5%
Current (power flow)				Outgoing AC5A - Incoming AC5A	D8F0H - 0000H - 2710H (-10000 - 0 - 10000)	±0.2%
				Outgoing AC1A - Incoming AC1A		±0.5%
Active power Demand power Maximum demand power	3P3W 1P3W 3P4W	5A	110V	-1kW - 0 - +1kW	D8F0H - 0000H - 2710H (-10000 - 0 - 10000)	±0.3%
			220V	-2kW - 0 - +2kW		
			440V	-4kW - 0 - +4kW		
		1A	110V	-200W - 0 - +200W		±0.5%
			220V	-400W - 0 - +400W		
			440V	-800W - 0 - +800W		
	1P2W	5A	110V	-500W - 0 - +500W	EC78H - 0000H - 1388H (-5000 - 0 - 5000)	±0.3%
			220V	-1kW - 0 - +1kW		
			440V	-2kW - 0 - +2kW		
		1A	110V	-100W - 0 - +100W		±0.5%
			220V	-200W - 0 - +200W		
			440V	-400W - 0 - +400W		
Reactive power Reactive power (power flow)	3P3W 1P3W 3P4W	5A	110V	LEAD1kvar - 0 - LAG1kvar	D8F0H - 0000H - 2710H (-10000 - 0 - 10000)	±0.3%
			220V	LEAD2kvar - 0 - LAG2kvar		
			440V	LEAD4kvar - 0 - LAG4kvar		
		1A	110V	LEAD200var - 0 - LAG200var		±0.5%
			220V	LEAD400var - 0 - LAG400var		
			440V	LEAD800var - 0 - LAG800var		
	1P2W	5A	110V	LEAD500var - 0 - LAG500var	EC78H - 0000H - 1388H (-5000 - 0 - 5000)	±0.3%
			220V	LEAD1kvar - 0 - LAG1kvar		
			440V	LEAD2kvar - 0 - LAG2kvar		
		1A	110V	LEAD100var - 0 - LAG100var		±0.5%
			220V	LEAD200var - 0 - LAG200var		
			440V	LEAD400var - 0 - LAG400var		
Apparent power	3P3W 1P3W 3P4W	5A	110V	0 - 1kVA	0000H - 2710H (0 - 10000)	±0.3%
			220V	0 - 2kVA		
			440V	0 - 4kVA		
		1A	110V	0 - 200VA		±0.5%
			220V	0 - 400VA		
			440V	0 - 800VA		
	1P2W	5A	110V	0 - 500VA	0000H - 1388H (0 - 5000)	±0.3%
			220V	0 - 1kVA		
			440V	0 - 2kVA		
		1A	110V	0 - 100VA		±0.5%
			220V	0 - 200VA		
			440V	0 - 400VA		
Power factor Power factor (power flow)	5A			LEAD 0 - 1 - LAG 0	0000H - 1388H - 2710H (0 - 5000 - 10000)	±1.0%
	1A					±1.5%
Frequency				45 - 55Hz	1194H - 157CH (4500 - 5500)	±0.2%
				55 - 65Hz	157CH - 1964H (5500 - 6500)	
				45 - 65Hz	1194H - 1964H (4500 - 6500)	

Transmission scaling (2/2)

Item			Input		Communication data	Intrinsic error
Distortion factor, Harmonic nth content rate, Harmonic 5th conversion content rate	Voltage		0.0 - 20.0%		0000H - 00C8H (0 - 200)	±2.0%
	Current	5A	0.0 - 100.0%		0000H - 03E8H (0 - 1000)	±2.0%
		1A				±2.5%
Fundamental-wave effective value Harmonic nth effective value Harmonic 5th conversion effective value	Voltage	3P3W 1P2W	AC0 - 150V, AC0 - 300V, AC0 - 600V		0000H - 2710H (0 - 10000)	±1.0%
		3P4W	AC0 - 150/√3V, AC0 - 300/√3V, AC0 - 600/√3V (Phase)		0000H - 2710H (0 - 5774)	
		1P3W	AC0 - 300V, AC0 - 600V (Line)		0000H - 2710H (0 - 10000)	
			AC0 - 150V, AC0 - 300V (Phase)	Phase voltage full-scale 150V, 300V	0000H - 2710H (0 - 10000)	
				Phase voltage full-scale 300V, 600V	0000H - 1388H (0 - 5000)	
	Current		AC0 - 5A		0000H - 2710H (0 - 10000)	±1.0%
			AC0 - 1A			±2.0%
Electric energy (Incoming / Outgoing)		5A	0 - 999999999		00000000H - 3B9AC9FFH (0 - 999999999) (7)	±1.0%
		1A				±2.0%
Reactive energy (Incoming / Outgoing, LAG/LEAD)		5A	0 - 999999999		00000000H - 3B9AC9FFH (0 - 999999999) (7)	±2.0%
		1A				

Note(7) By multiplying the power amount data by the power amount count value, it becomes kWh (kvarh).

Example) Electric energy (kWh) = Electric energy data × Electric energy count value
= 123456789 kWh × 100 = 12345678900 kWh

Measurement data upper limit and lower limit, and low input cut (1/2)

Item				Input	Upper and lower limiter	Low input cut
Voltage	3P3W 1P2W 3P4W			AC0 - 150V, AC0 - 300V, AC0 - 600V (Line)	120% of full scale (12000)	Less than 1% of full scale (100)
				AC0 - 150/√3V, AC0 - 300/√3V, AC0 - 600/√3V (Phase)	120% of full scale (6928)	Less than 1% of full scale (58)
	1P3W			AC0 - 300V, AC0 - 600V (Line)	120% of full scale (12000)	Less than 1% of full scale (100)
		AC0 - 150V, AC0 - 300V (Phase)	Phase voltage full-scale 150V, 300V		120% of full scale (12000)	
			Phase voltage full-scale 300V, 600V		120% of full scale (6000)	Less than 1% of full scale (50)
Current Demand current Maximum demand current				AC0 - 5A	120% of rated (12000)	Less than 0.2% of rated (20) (8)
				AC0 - 1A		Less than 0.5% of rated (50) (8)
Current (Power flow)				Outgoing AC5A - Incoming AC5A	120% of rated (±12000)	Less than 0.2% of rated (±20) (8)
				Outgoing AC1A - Incoming AC1A		Less than 0.5% of rated (±50) (8)
Active power Demand power Maximum demand power	3P3W 1P3W 3P4W	5A	110V	−1kW - 0 - +1kW	120% of rated (±12000)	Less than 0.3% of rated (±30)
			220V	−2kW - 0 - +2kW		
			440V	−4kW - 0 - +4kW		
		1A	110V	−200W - 0 - +200W		Less than 0.5% of rated (±50)
			220V	−400W - 0 - +400W		
			440V	−800W - 0 - +800W		
	1P2W	5A	110V	−500W - 0 - +500W	120% of rated (±6000)	Less than 0.3% of rated (±15)
			220V	−1kW - 0 - +1kW		
			440V	−2kW - 0 - +2kW		
		1A	110V	−100W - 0 - +100W		Less than 0.5% of rated (±25)
			220V	−200W - 0 - +200W		
			440V	−400W - 0 - +400W		
Reactive power Reactive power (power flow)	3P3W 1P3W 3P4W	5A	110V	LEAD 1kvar - 0 - LAG 1kvar	120% of rated (±12000)	Less than 0.3% of rated (±30)
			220V	LEAD 2kvar - 0 - LAG 2kvar		
			440V	LEAD 4kvar - 0 - LAG 4kvar		
		1A	110V	LEAD 200var - 0 - LAG 200var		Less than 0.5% of rated (±50)
			220V	LEAD 400var - 0 - LAG 400var		
			440V	LEAD 800var - 0 - LAG 800var		
	1P2W	5A	110V	LEAD 500var - 0 - LAG 500var	120% of rated (±6000)	Less than 0.3% of rated (±15)
			220V	LEAD 1kvar - 0 - LAG 1kvar		
			440V	LEAD 2kvar - 0 - LAG 2kvar		
		1A	110V	LEAD 100var - 0 - LAG 100var		Less than 0.5% of rated (±25)
			220V	LEAD 200var - 0 - LAG 200var		
			440V	LEAD 400var - 0 - LAG 400var		
Apparent power	3P3W 1P3W 3P4W	5A	110V	0 - 1kVA	120% of rated (12000)	Less than 0.3% of rated (30)
			220V	0 - 2kVA		
			440V	0 - 4kVA		
		1A	110V	0 - 200VA		Less than 0.5% of rated (50)
			220V	0 - 400VA		
			440V	0 - 800VA		
	1P2W	5A	110V	0 - 500VA	120% of rated (6000)	Less than 0.3% of rated (15)
			220V	0 - 1kVA		
			440V	0 - 2kVA		
		1A	110V	0 - 100VA		Less than 0.5% of rated (25)
			220V	0 - 200VA		
			440V	0 - 400VA		

Note(8) When 3P4W and 1P3W, the low input cutting value of N phase is double.

Measurement data upper limit and lower limit, and low input cut (2/2)

Item			Input		Upper and lower limiter	Low input cut
Power factor Power factor (power flow)		5A	LEAD 0 - 1 - LAG 0		0 - 5000 - 10000 (LEAD 0 - 1 - LAG 0 fixed)	Less than 20% of voltage full scale or less than 2% of rated current
		1A				
Frequency			45 - 55Hz		120% of span (4300 - 5700)	Less than 20% of voltage full scale
			55 - 65Hz		120% of span (5300 - 6700)	
			45 - 65Hz		120% of span (4100 - 6900)	
Distortion factor, Harmonic nth content rate, Harmonic 5th conversion content rate	Voltage		0.0 - 20.0%		100% (1000)	By harmonic effective value
	Current	5A	0.0 - 100.0%		200% (2000)	
		1A				
Fundamental-wave effective value (9) Harmonic nth effective value Harmonic 5th conversion effective value	Voltage	3P3W 1P2W	AC0 - 150V, AC0 - 300V, AC0 - 600V		120% of full scale (12000)	Less than 0.3% of full scale (30)
		3P4W	AC0 - 150/√3V, AC0 - 300/√3V AC0 - 600/√3V (Phase)		120% of full scale (6928)	Less than 0.3% of full scale (18)
		1P3W	AC0 - 300V, AC0 - 600V (Line)		120% of full scale (12000)	Less than 0.3% of full scale (30)
			AC0 - 150V, AC0 - 300V (Phase)	Phase voltage full-scale 150V, 300V	120% of full scale (12000)	
				Phase voltage full-scale 300V, 600V	120% of full scale (6000)	Less than 0.3% of full scale (15)
	Current		AC0 - 5A		120% of rated (12000)	Less than 0.3% of rated (30)
			AC0 - 1A			

Note(9) Low input cut of fundamental wave effective value is less than 3% of full scale.
       At this time, the all order of harmonic measurement is 0.

6.6 Maximum value reset request

Reset the maximum value of this product. When 00H is specified as the address, it becomes broadcast.
Function code designates 06H.

(1) Maximum value reset request (Query)

When making a maximum value reset request, it is necessary to specify the start address, the number of data,
and the number of bytes written of the data to be reset.
If a data address is transmitted, please subtract 40001 from the address of a data-address list.

1	2	3	4	5	6	7	8
Address	Function code	Data address		Write data		CRC	

Data address list

Function code	Data address	3P3W	1P3W	1P2W	3P4W
06H	40301	Maximum value reset			

● Maximum value reset, Bit allocation of write data ([10])

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

No.	Contents of output	No.	Contents of output
1	—	9	Maximum demand current
2	—	10	Maximum demand power
3	—	11	—
4	—	12	—
5	—	13	—
6	—	14	—
7	—	15	—
8	—	16	—

Note([10]) Data other than the corresponding bit will not be reset even if ON (1).

(2) Response

If data change is performed normally, the following response will be returned from this product side.
If broadcast (address 00H) is specified, there is no response.

1	2	3	4	5	6	7	8
Address	Function code	Data address		Change data		CRC	

The same data as the write data of the maximum value reset element is sent to the change data.

6.7 Loopback test

The loopback test is the function that tests communication of a master and a slave (QT2-500).
Arbitrary data is answered as is. There is no broadcast. Function code designates 08H.

(1) Request of loopback (Query)

In case it performs a loopback test, it is necessary to transmit the data used for a diagnostic code and diagnostic. Diagnostic code should designate 0000H.
For diagnostic data, specify an arbitrary value from 0000H to FFFFH.

1	2	3	4	5	6	7	8
Address	Function code	Diagnostic code		Diagnostic data		CRC	
01H	08H	0000H		04D2H		6296H	

(2) Response

If loopback request is performed normally, the following response will be returned from this product side.

1	2	3	4	5	6	7	8
Address	Function code	Diagnostic code		Diagnostic data		CRC	

The same data as the master transmitted by (1) is returned to diagnostic code and diagnostic data.