INSTRUCTION MANUAL
(DETAILED VERSION)

HIGH SPEED MULTI-TRANSDUCER

HSQT2-500

DAIICHI ELECTRONICS CO., LTD.

Contents

Introduction

Thank you for your purchase of DAIICHI product.
Please read this instruction manual carefully before use.
Keep this manual for future reference.
Please contact us in case this manual is lost or damaged.

Safety Precaution

■ Environment conditions

- Please be sure to use this product in a place that meets the following conditions. In places that do not meet this condition, malfunctions and failures, and performance and product life may be reduced.
  ① Within the range of ambient temperature (-10 to 55 ℃), humidity (5 to 90 % RH).
  ② Place free of corrosive gas. (Corrosive gas : SO_2 / H_2S, etc.)
  ③ Place free of dust, salt and oily smoke.
  ④ Location that is not affected by vibration and shock.
  ⑤ Location that is not affected by external noise.
  ⑥ Altitude 2000m or less.
- If the input to this product is an inverter output such as cycle control, SCR phase angle control and PWM control, measurement error may increase.

■ Outdoor use conditions.

① This product is not dustproof, waterproof, and splash proof.
Please avoid the place with much dust. Please do not install in the place directly exposed to the rain and water droplets. (IP code : IP30)
② Please do not install in the place directly exposed to the sun even through the glass.
Discoloration and degradation of a name plate, and deformation of the box by the surface temperature rise may cause.
③ Product life may shorten when the daily average temperature exceeds 40 ℃.

■ Mounting and wiring

Please refer to this instruction manual for installation and the wiring.

CAUTION	● Please refer to connection diagram for the wiring. An improper connection may cause generation of high voltage on the CT secondary side, and which may lead to device malfunction, burning or fire. ● Hot line work is prohibited. There is a risk of explosion by electric shock, device malfunction, burning, fire, or gas. ● Please use an electrical wire size suitable with the rated current. Use unsuitable size electric wire, which may lead to a fire. ● Please check the tightening of the screw. If the screws are loose, it may cause a fire or malfunction. ● The terminal cover is installed for preventing an electric shock accident. Please close terminal cover after wiring work.

■ Preparation

This product must be set before use. Please read this manual and make the setting correctly.
If you make a mistake on the setting it does not operate correctly.

■ Maintenance and inspection

① Inspection during energization is dangerous and prohibited.
② No replacement in periodic inspection.
③ Check for loose wiring and mounting screws.
④ Please wipe off lightly with the dry soft cloth for cleaning.
Please do not use organic solvents such as alcohol, chemicals, or cleaners.

■ Storage

When storing this product for a long period, please keep it in a place that satisfies the following environmental conditions.

- Within the range of ambient temperature (-20 to 70 ℃) and humidity (5 to 90 %RH).
- Place where average daily temperature does not exceed 40 ℃.
- Locations with little dust, corrosive gases, salt and oil smoke.
- A place not subject to vibration or shock.

■ Countermeasures against troubles

We will take back the actual product for repair in principle if it breaks down.

■ Disposal

Please dispose of this product as industrial waste (noncombustible).
Mercury parts and a nickel-cadmium battery are not used for this product.

■ Warranty period

The warranty period of the product is one year after the date of delivery.

■ Warranty scope

In the state of the normal use of product-specification within the range according to this instruction manual, this product in trouble within the warranty period will be performed exchange or repair gratuitously.
However, it is not warranted in the following cases.
① If it breaks down when converted or repaired without us.
② If it breaks down by use out of specification range.
③ If the cause of trouble is based on cause other than this product.
④ Damage and trouble by transportation, movement, and falling.
⑤ In other cases where the supplier is not responsible due to disasters, etc.
This warranty is a warranty only for the delivered product. Cannot warrant the damage induced by trouble of this product.

■ Replacement cycle of the product

We recommend updating the product for 10 years as a rough standard.

■ Change of instruction manual written contents.

This instruction manual changes written contents without a notice by product improvement etc.

Composition of type

Type: HSQT2-500-

Specification code

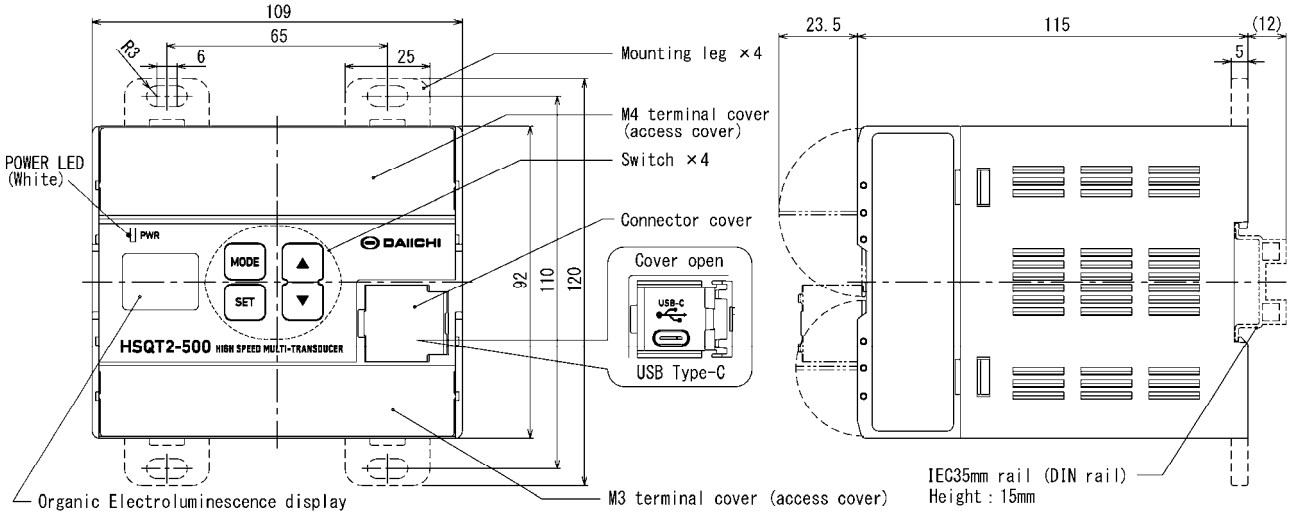
① Auxiliary supply	
1	80 to 264 V AC 80 to 264 V DC For AC and DC use
2	20 to 57 V DC

② Analog output			
1	0 to 5 V DC (600 Ω to ∞)	A	0 to 1 mA DC (0 to 10 kΩ)
2	0 to 10 V DC (2 kΩ to ∞)	B	4 to 20 mA DC (0 to 550 Ω)
3	1 to 5 V DC (600 Ω to ∞)	C	-1 to 1 mA DC (0 to 10 kΩ)
4	-5 to 5 V DC (600 Ω to ∞)	Z	Other (special specification)
5	-10 to 10 V DC (2 kΩ to ∞)		

1. Features of product

- Compliant with IEC60688：2012 (Transducer)、IEC62053：2003 (Static meters for active energy, Static meters for reactive energy).
- CE marking product
- Possible to change by setting. (Wiring type, rated voltage, rated current)
- High-speed response [Input, 1 cycle + 10ms or less/99%, Frequency: Input, 2 cycles + 15ms or less/99%]
- Standard equipment; 10-analog output, 2-pulse output, RS-485 Communication output (MODBUS).
- Connected to a PC with USB, you can write and read settings in dedicated software.
  About the setting software, it is downloadable from our web site.
  URL；https://www.daiichi-ele.co.jp/
- Using an organic electro-luminescence display of high contrast.
  Configuration changes, measurement items can be displayed.
- Wiring after installation can be confirmed in the test output by the front operation. To display the phase angle between the voltage and current, and supports the determination of the wiring mistake points.

2. Dimensions and part names



3. Bundled items

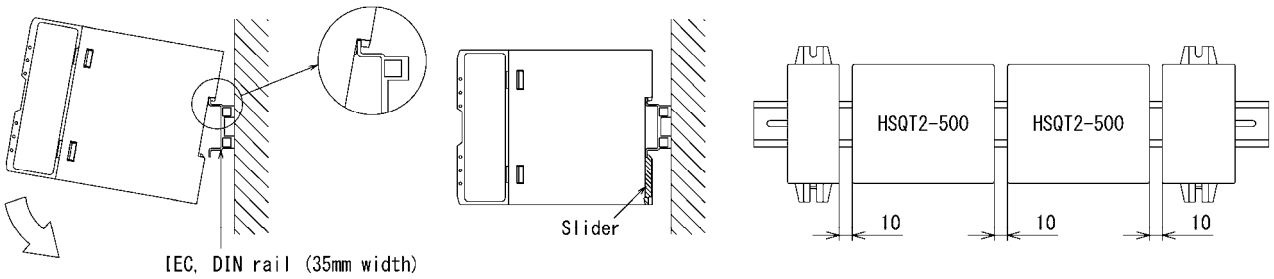
① Instruction Manual (Instruction･Operation) ····· 1
② Attachment tool ····· 4
③ Termination resister for communication (100Ω) ····· 1

4. Installation instructions

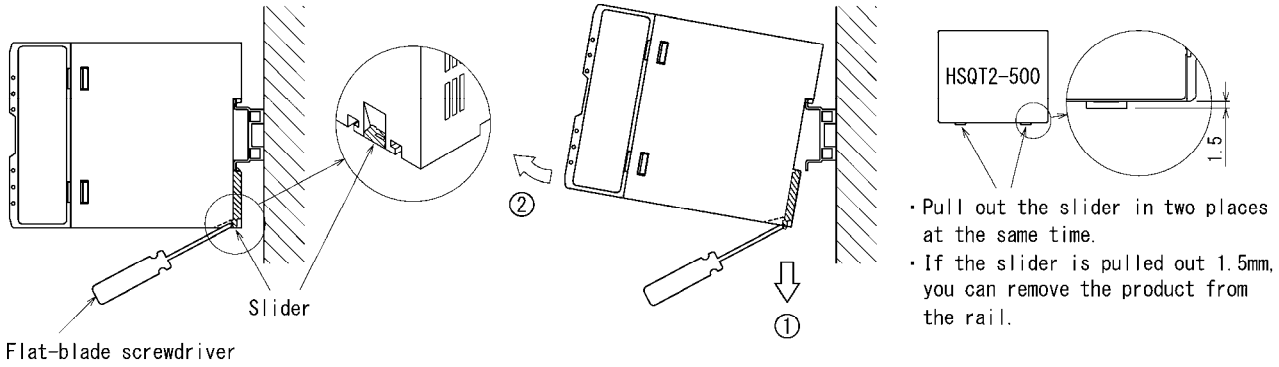
Please select indoors without low mechanical vibration, dust, and corrosive gas.
There is no limit of a mounting position.
A mounting means can be selected from IEC 35 mm rail (DIN rail) mounting and screw mounting.
Please separate the mounting side-by-side interval by 10 mm or more as a measure against heat.
Please consider heat and separate more than 10 mm of the interval of mounting side by side.
Please consider heat and wiring space and separate more than 90 mm of the space above and below.
Please secure the space distance of a terminal and a metal panel 10 mm or more.

<CAUTION> Please do installation of a product and removal after a power supply and an input signal are stopped.

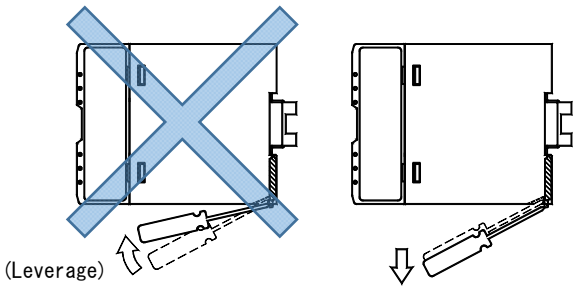
■ Mounting the IEC 35 mm rail (DIN rail)
The product slider is at the bottom. Position the upper hook at the rear side of product on the DIN rail and push in the lower.



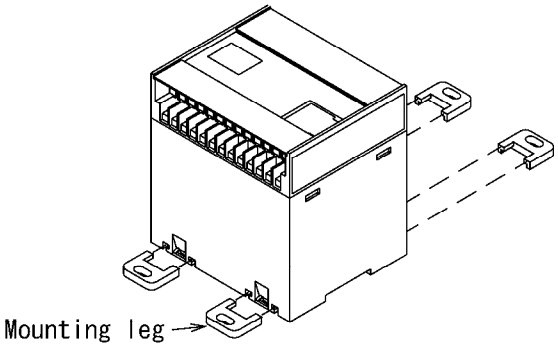
■ Removal from IEC 35 mm rail (DIN rail)
Insert a flat-blade screwdriver into the square holes of the sliders (2 places). While pulling out the two sliders in the direction of ① at the same time, pull up the product in the direction of ②.
The product can be removed from the rail by simply pulling out the slider 1.5 mm.

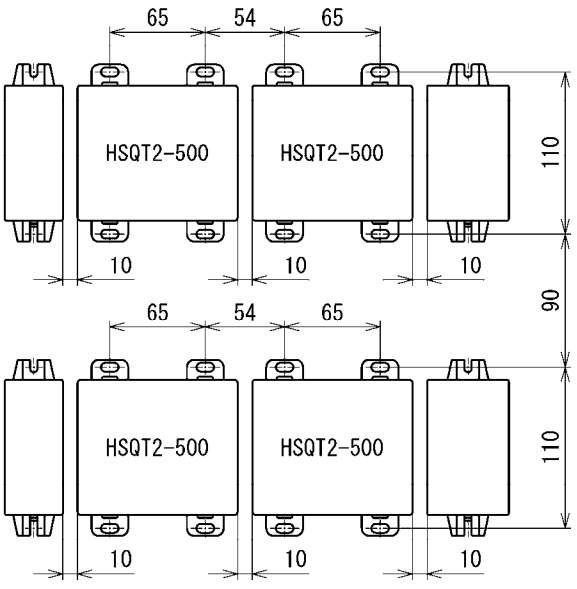


<CAUTION>
If you pull out the slider by moving the screwdriver like a lever, or pull up the product without pulling out the slider, the product may be damaged.



■ Screw mounting
Attach the included mounting leg (×4).
Please install with M4 screw or M5 screw.
Tightening torque, M4 : 1.00 to 1.30 N·m
Tightening torque, M5 : 2.00 to 2.50 N·m



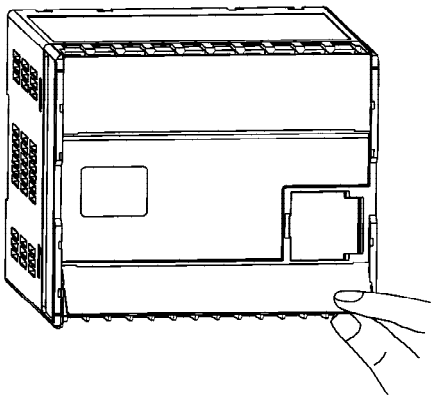


<CAUTION> Please mount a product from the bottom to prevent a fall.

5. Connection

Open the terminal cover, please connections according to the wiring diagram below.
Terminal numbers and names are listed on the back of the terminal cover.

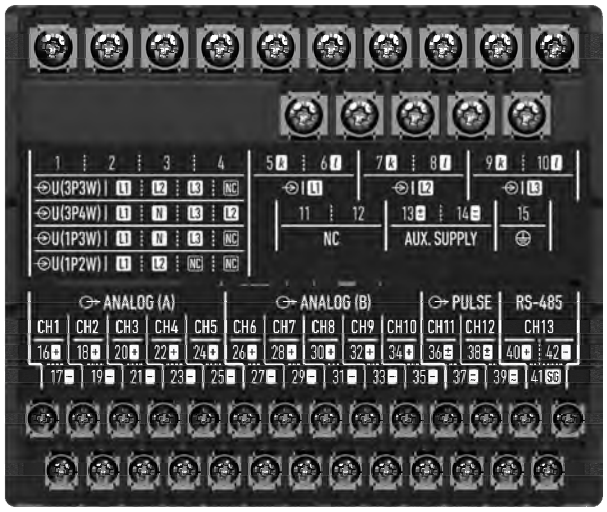
〈Caution〉
When opening or closing the terminal cover, hold the edge area of the cover and operate it without applying excessive force.



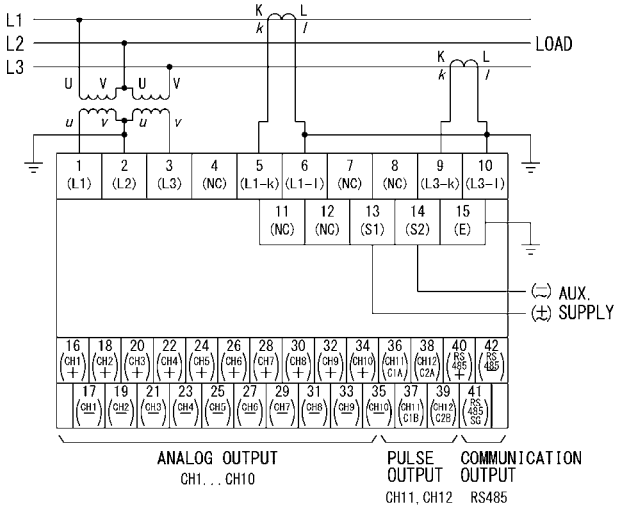
With terminal cover open

■ Upside terminal No.1 to 15
Auxiliary supply, Voltage, Current,
Ground terminal
Screw : M4 screw
Conformity crimp-type terminal
: Crimp-type terminal for M4 screw.
Outside diameter for terminal : 8.5 mm or less
Tightening torque : 1.0 to 1.3 N·m

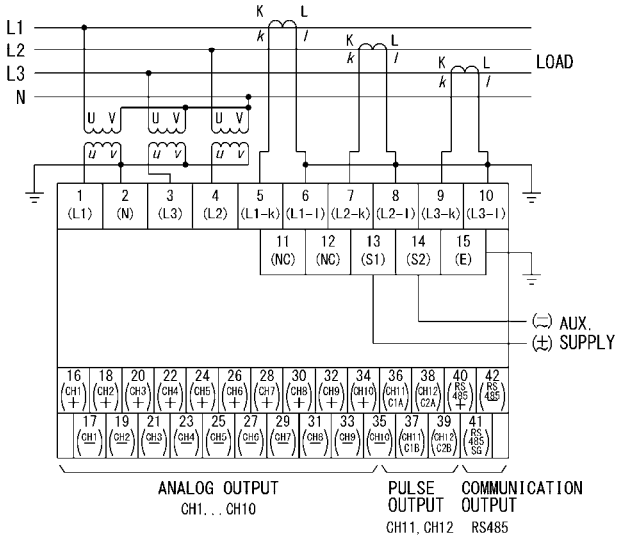
■ Downside terminal No.16 to 42
Analog output, Pulse output,
Communication output terminal
Screw : M3 screw
Conformity crimp-type terminal
: Crimp-type terminal for M3 screw.
Outside diameter for terminal : 6 mm or less
Tightening torque : 0.5 to 0.6 N·m



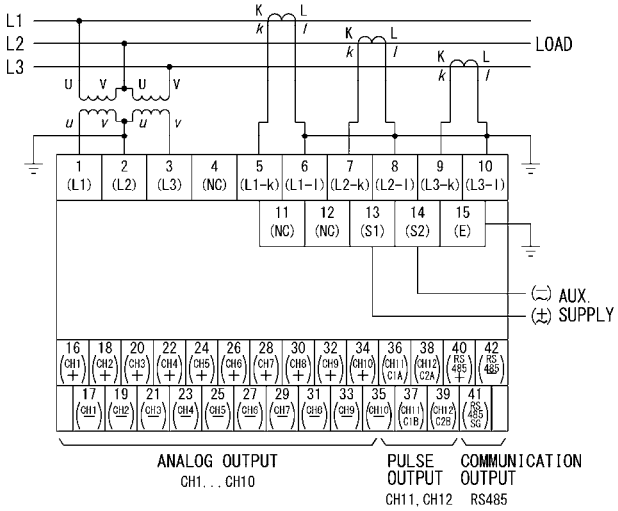
■ 3P3W [3-phase 3-wire] (2VT2CT)



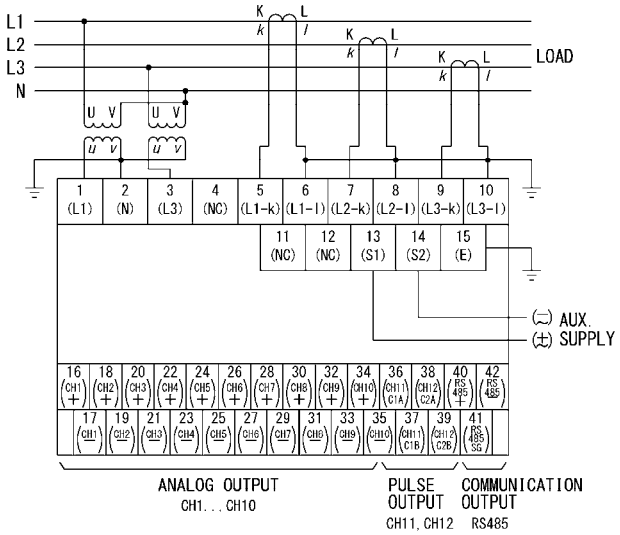
■ 3P4W [3-phase 4-wire] (3VT3CT)



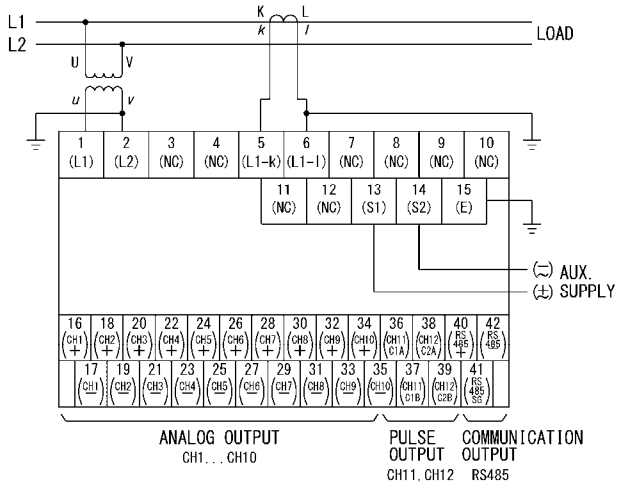
■ 3P3W [3-phase 3-wire] (2VT3CT)



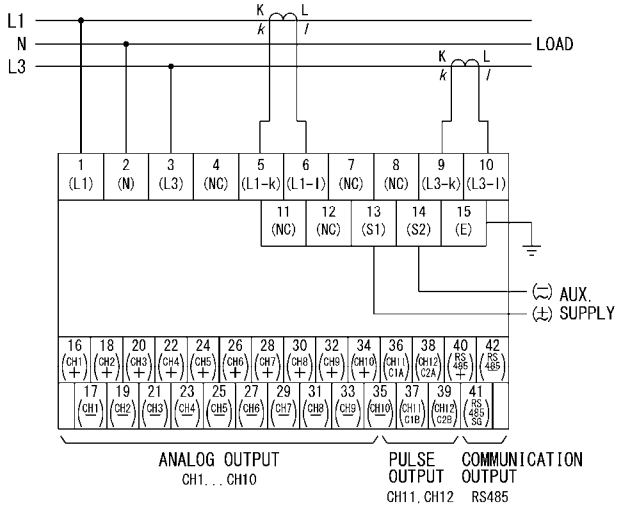
■ 3P4W [3-phase 4-wire] (2VT3CT)



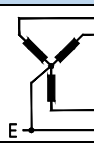
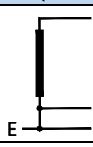
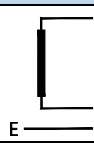
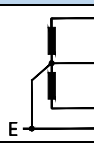
■ 1P2W [1-phase 2-wire]



■ 1P3W [1-phase 3-wire]



・Maximum rated voltage

Wiring type	3P4W	3P3W (Ground)	3P3W (Ungrounded)	1P2W (Ground)	1P2W (Ungrounded)	1P3W
						
Maximum rated voltage	277 V (L-N) 480 V (L-L)	220 V (L-L)	480 V (L-L)	220 V (L-L)	480 V (L-L)	220 V (L-N) 440 V (L-L)

・In the case of the low-pressure circuit (600 V or less), the secondary grounding of VT / CT is not required.

・Ground terminal (No.15), please be sure to ground. Ground is a class D grounding (grounding resistance less than 100 Ω).

・When using with three-phase four-wire (2VT3CT), voltage balance is a condition.

・Output wiring and the noise source (power line, steep voltage, the wire there is a current fluctuation), please release as much as possible. Please use a twisted cable or twisted cable shielded.

・Minus (-) terminals are connected internally of analog output CH1 to 5. (Common, Non-isolated)
Minus (-) terminals are connected internally of analog output CH6 to 10. (Common, Non-isolated)

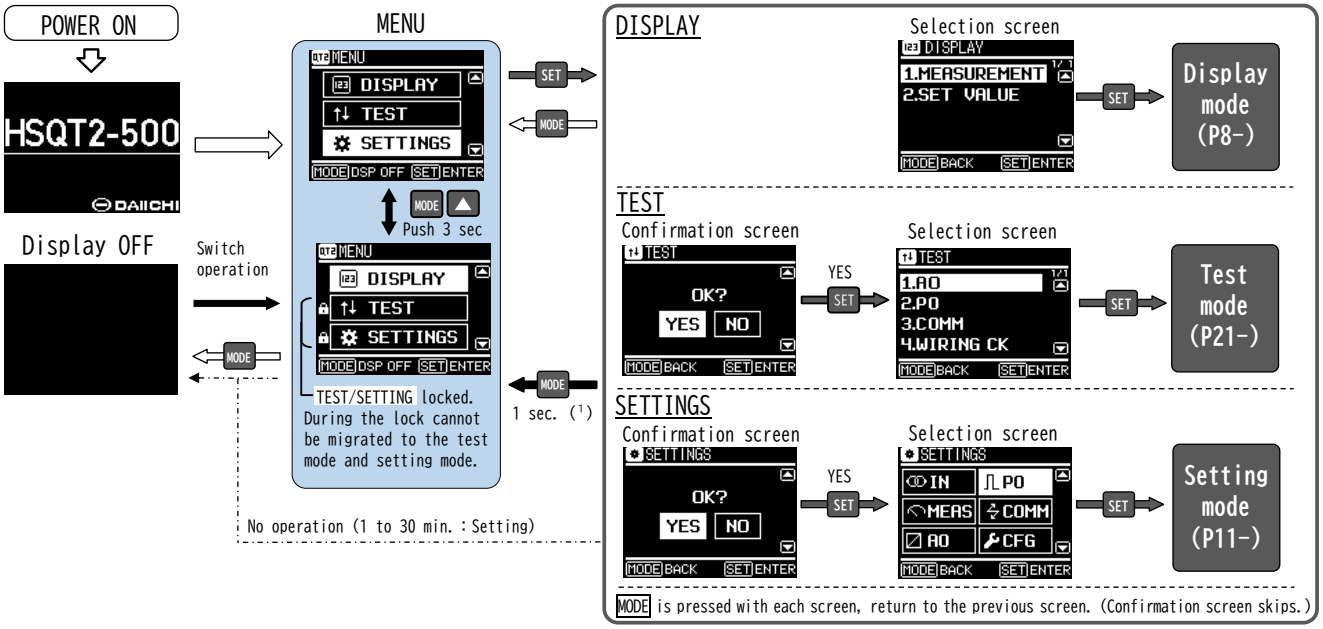
・Be used open the analog output terminal (current output), there is no damage to this product.

・Termination resistor for the communication output, please use at the end of equipment.
Please connect the termination resistor between the RS-485 of (+)(-) terminals.

・After the wiring work, please close the terminal cover.

6. Operation and Screen

6.1 Basic operation

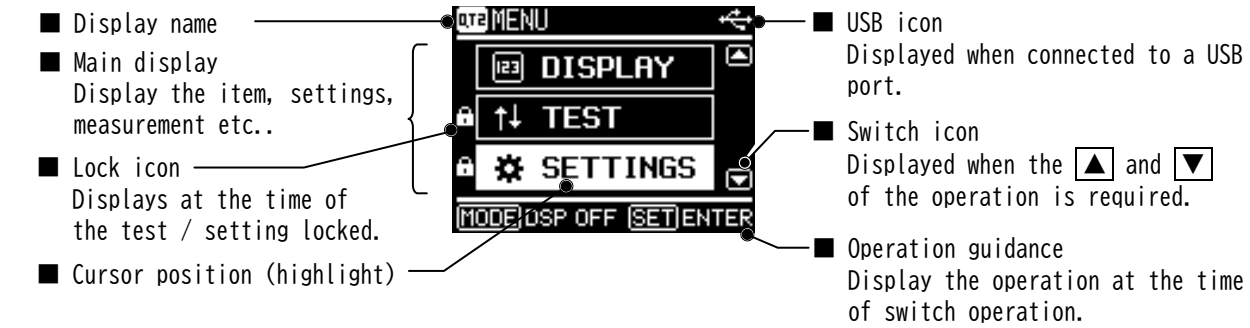


Note ([1]) By pressing and holding the switch for more than one second, it returns from each of the screen to the MENU screen.

6.2 Screen structure

・Screen display

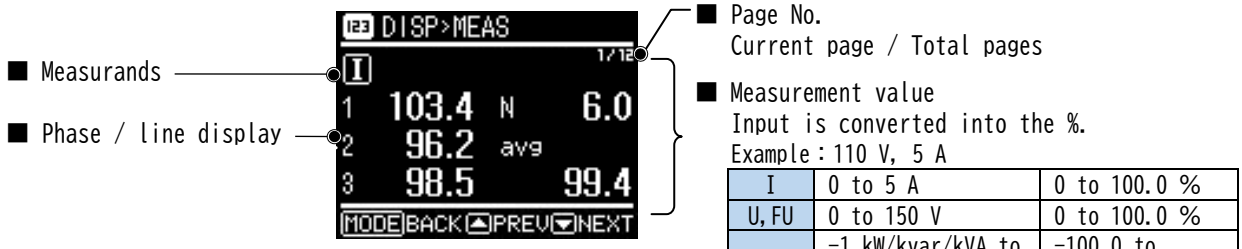
Example : MENU



7. Display modes

7.1 Measurement display

(1) Display



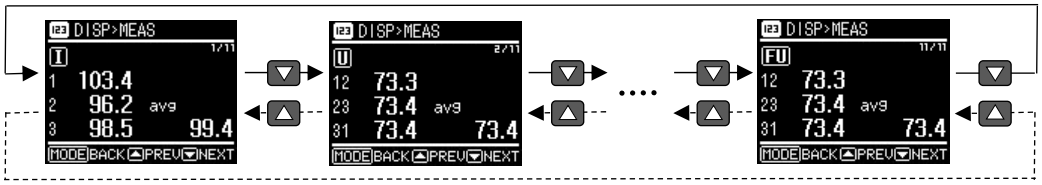
I	0 to 5 A	0 to 100.0 %
U, FU	0 to 150 V	0 to 100.0 %
P/Q/S	-1 kW/kvar/kVA to 1 kW/kvar/kVA	-100.0 to 100.0 %

Displays the actual measured values of power factor, frequency, and active and reactive energy. Refer to section 10.4 for details.

(2) Operation

① 【MENU】→ 「DISPLAY」 SET → 「MEASUREMENT」 SET → Measurement display mode.
② Select the measurement element to be displayed. (▲ ▼ switch)

No.1 Current display　No.2 Line voltage display　No.11 Fundamental voltage display



(3) Measurement item

Page	Measurement	Screen display	Wiring type			
			3P3W	3P4W	1P2W	1P3W
1	Current, Current (power flow)	I	1, 2, 3, avg (2)	1, 2, 3, N, avg (2)	I	1, 3, N
2	Line voltage, Phase voltage	U	12, 23, 31, avg (2)	12, 23, 31, LLavg 1N, 2N, 3N, LNavg (3)	U	13, 1N, 3N
3	Active power	P	Σ (2)	1, 2, 3, Σ (2)	P	Σ (2)
4	Reactive power	Q	Σ (2)	1, 2, 3, Σ (2)	Q	Σ (2)
5	Apparent power	S	Σ (2)	1, 2, 3, Σ (2)	S	Σ (2)
6	Power factor	PF	Σ (2)	1, 2, 3, Σ (2)	PF	Σ (2)
7	Frequency	f	f	f	f	f
8	Active energy	Wh	Incoming (+) / Outgoing (−)			
9	Reactive energy (Incoming)	+varh	LAG / LEAD			
10	Reactive energy (Outgoing)	−varh	LAG / LEAD			
11	Fundamental voltage	FU	12, 23, 31, avg (2)	1N, 2N, 3N, avg (2)	FU	1N, 3N

Note (2) avg : Average, Σ : Total.
Note (3) Since the line voltage and phase voltage that are displayed on two pages, the following page numbers are +1. (3P4W)

7.2 Setting value display

(1) Display

Example : Analog output settings

■ Page No.
Current page
/ Total page

■ Setting value
Display the set value
of the right table.

Page	Setting item	Display	Setting contents
1	Input	Top	Wiring type
		Center	VT ratio
		Bottom	CT ratio
2 to 11	Analog output	Top	CH No.
			Output factor
		Bottom	Input range for output value
12 13	Pulse output	Top	CH No.
			Output factor
		Bottom	Output pulse rate
14	Communication output	Top	CH No.
			Protocol
		Center	Address
		Bottom	Bit rate

(2) Operation

① 【MENU】→ 「DISPLAY」 SET → 「SET VALUE」 SET → Measurement display mode.

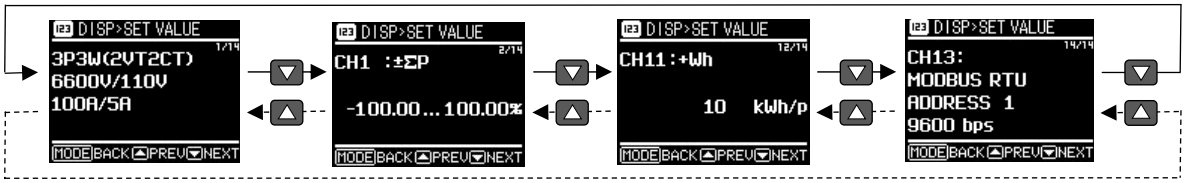
② Select the setting value to be displayed. (▲ ▼ switch)

No.1
Input settings

No.2 to 11
Analog output settings

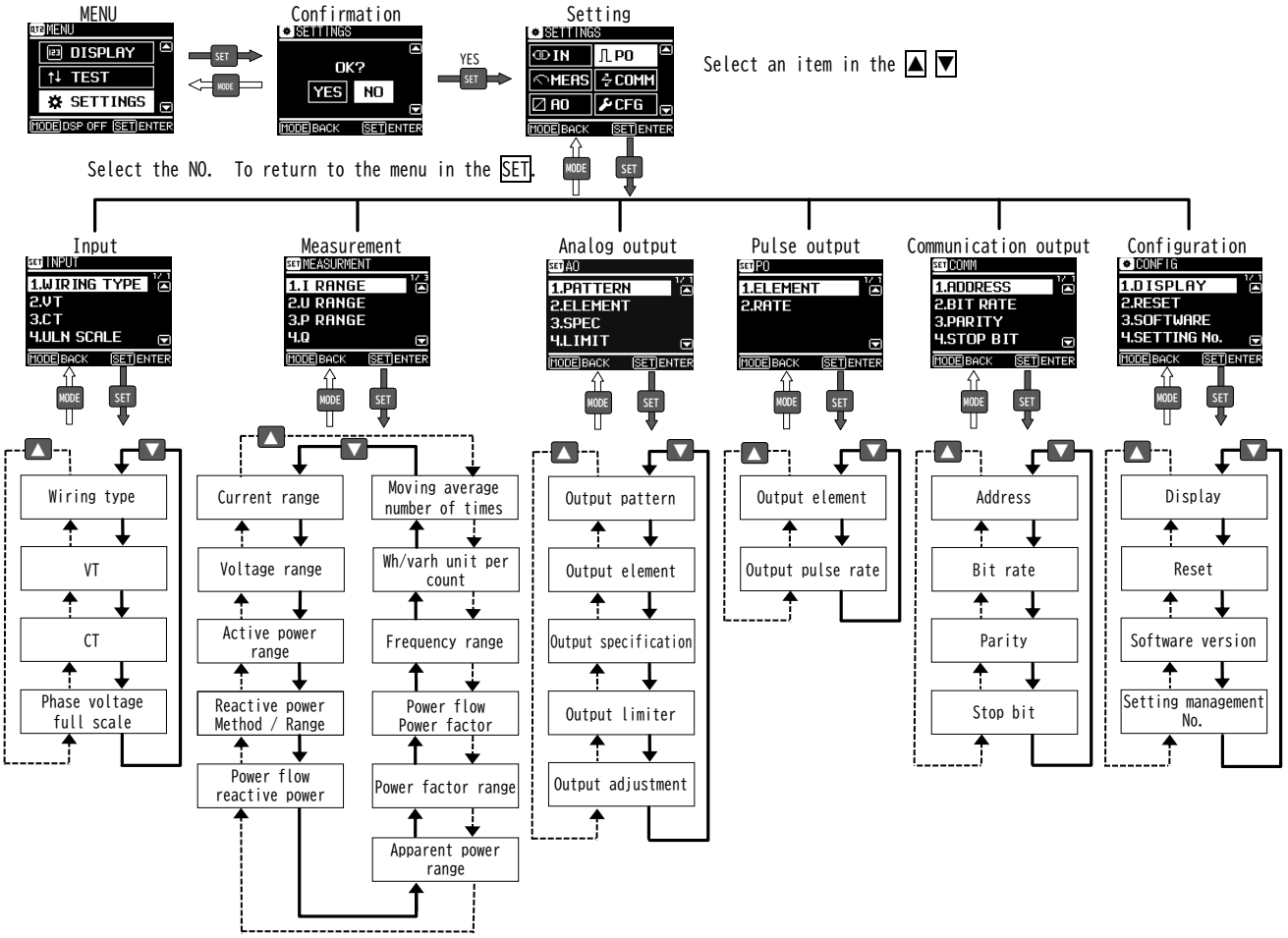
No.12,13
Pulse output settings

No.14
Communication output settings



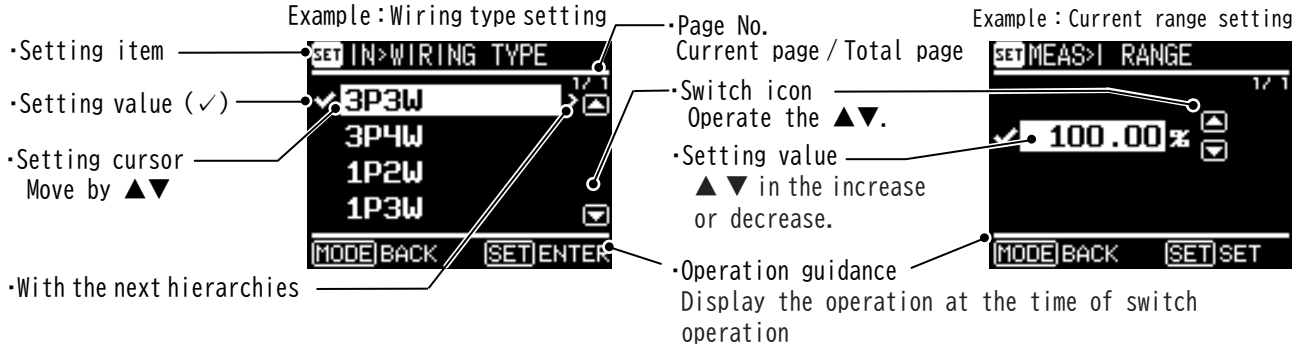
8. Setting modes

8.1 Setting flow



8.2 Setting method

(1) Display



(2) Operation

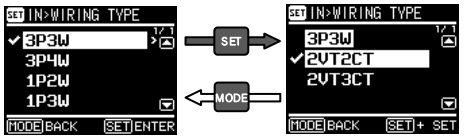
① Each setting display → Setting change of ▲ ▼ → Push SET (When indicating SET +, SET is pushed for more than 1 second.) → Enter

② When the setting is confirmed, to display the "✓" indicating the current setting in place of the changed setting value.

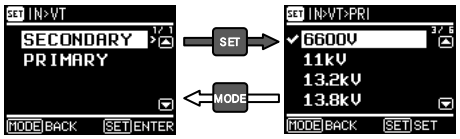
③ When ▲ ▼ is pushed lengthily, the set value changes at high speed.

8.3 Setting menu

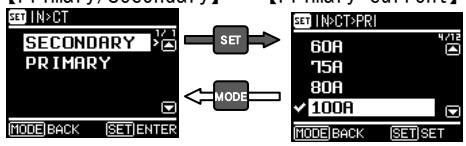
(1) Input setting IN

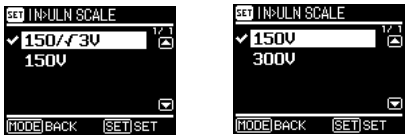
<table>
<tr><th>Setting item</th><th>Description</th><th>Content</th></tr>
<tr><td>Wiring type
【WIRING TYPE】</td><td>Set wiring type of input circuit.
3P3W sets up the number of CT.
3P4W sets up the number of VT.</td><td>
【Wiring type】 【Number of CT】


Thick-frame : Default setting
<table>
<tr><th colspan="3">Setting range</th></tr>
<tr><td rowspan="2">3-phase 3-wire</td><td rowspan="2">3P3W</td><td>2VT, 2CT</td></tr>
<tr><td>2VT, 3CT</td></tr>
<tr><td rowspan="2">3-phase 4-wire</td><td rowspan="2">3P4W</td><td>2VT, 3CT</td></tr>
<tr><td>3VT, 3CT</td></tr>
<tr><td colspan="2">1-phase 2-Wire</td><td>1P2W</td></tr>
<tr><td colspan="2">1-phase 3-wire</td><td>1P3W</td></tr>
</table>

<CAUTION> If this setup is performed, all set points will be initialized. Please set up first.
</td></tr>
<tr><td>VT
【VT】</td><td>Set in accordance with the use VT.
Primary voltage
– PRIMARY,
Secondary voltage
– SECONDARY</td><td>
【VT select】 【Primary voltage】


Default setting
3P3W : 6600 V/110 V
3P4W : 440 V/440 V (Direct)
1P2W : 3300 V/110 V
1P3W : 110 V/110 V (Direct)
<table>
<tr><th colspan="4">Setting range</th></tr>
<tr><th colspan="3">Primary voltage</th><th>Secondary voltage</th></tr>
<tr><td>110 V</td><td>6600 V</td><td>66 kV</td><td>110 V</td></tr>
<tr><td>220 V</td><td>11 kV</td><td>77 kV</td><td>220 V</td></tr>
<tr><td>440 V</td><td>13.2 kV</td><td>110 kV</td><td>440 V</td></tr>
<tr><td>880 V</td><td>13.8 kV</td><td>132 kV</td><td>–</td></tr>
<tr><td>1100 V</td><td>16.5 kV</td><td>154 kV</td><td>–</td></tr>
<tr><td>1650 V</td><td>18.4 kV</td><td>187 kV</td><td>–</td></tr>
<tr><td>2200 V</td><td>22 kV</td><td>220 kV</td><td>–</td></tr>
<tr><td>3300 V</td><td>33 kV</td><td>–</td><td>–</td></tr>
</table>

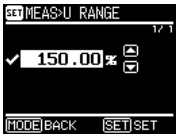
<CAUTION> In direct connection, please set a primary voltage and a secondary voltage as the same value.
</td></tr>
<tr><td>CT
【CT】</td><td>Set in accordance with the use CT.
Primary current
– PRIMARY,
Secondary current
– SECONDARY</td><td>
【Primary/Secondary】 【Primary current】


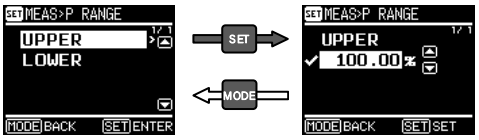
Default setting
3P3W : 100 A/5 A
3P4W : 1500 A/5 A
1P2W : 50 A/5 A
1P3W : 500 A/5 A
<table>
<tr><th colspan="6">Setting range</th></tr>
<tr><th colspan="5">Primary current</th><th>Secondary current</th></tr>
<tr><td>5 A</td><td>60 A</td><td>750 A</td><td>5000 A</td><td>5 A</td></tr>
<tr><td>6 A</td><td>75 A</td><td>800 A</td><td>6000 A</td><td>1 A</td></tr>
<tr><td>7.5 A</td><td>80 A</td><td>900 A</td><td>7500 A</td><td>–</td></tr>
<tr><td>8 A</td><td>100 A</td><td>1000 A</td><td>8000 A</td><td>–</td></tr>
<tr><td>10 A</td><td>120 A</td><td>1200 A</td><td>9000 A</td><td>–</td></tr>
<tr><td>12 A</td><td>150 A</td><td>1500 A</td><td>10 kA</td><td>–</td></tr>
<tr><td>15 A</td><td>200 A</td><td>1600 A</td><td>12 kA</td><td>–</td></tr>
<tr><td>20 A</td><td>250 A</td><td>1800 A</td><td>15 kA</td><td>–</td></tr>
<tr><td>25 A</td><td>300 A</td><td>2000 A</td><td>20 kA</td><td>–</td></tr>
<tr><td>30 A</td><td>400 A</td><td>2500 A</td><td>30 kA</td><td>–</td></tr>
<tr><td>40 A</td><td>500 A</td><td>3000 A</td><td>–</td><td>–</td></tr>
<tr><td>50 A</td><td>600 A</td><td>4000 A</td><td>–</td><td></td></tr>
</table>
</td></tr>
<tr><td>Phase voltage full-scale
【ULN SCALE】</td><td>Set phase voltage values for the upper limit of the analog output rating. (3P4W and 1P3W)
In case of 3P3W and 1P2W, there is no setting item.</td><td>
【3P4W】 【1P3W】


110 V rating
<table>
<tr><th colspan="2">Setting range</th></tr>
<tr><th>3P4W</th><th>1P3W</th></tr>
<tr><td>150/√3 V</td><td>150 V</td></tr>
<tr><td>150 V</td><td>300 V</td></tr>
</table>
Thick-frame : Default setting
Example of setting
<table>
<tr><th>Wiring type</th><th>Setting value</th><th>Input / Output</th></tr>
<tr><td>3P4W</td><td>150/√3 V</td><td>U1N, U2N, U3N 0 to 86.6 V / 4 to 20 mA</td></tr>
<tr><td>1P3W</td><td>150 V</td><td>U1N, U3N 0 to 150 V / 4 to 20 mA</td></tr>
</table>
</td></tr>
</table>

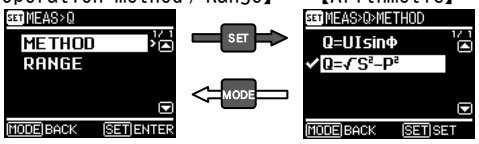
(2) Measurement setting MEAS

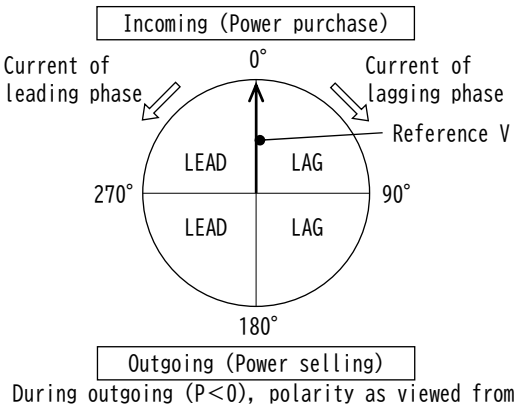
<table>
<tr><th>Setting item</th><th>Description</th><th>Content</th></tr>
<tr><td>Current range
【I RANGE】</td><td>Set current measurement values for the upper limit of the analog output rating range.</td><td>


Thick-frame : Default setting
<table>
<tr><th colspan="4">Setting range</th></tr>
<tr><td>30.00 to</td><td>100.00</td><td>to 120.00 %</td><td>0.01 % step</td></tr>
</table>
Rated current
=100.00 %
Example of setting (CT ratio : 100 A / 5 A)
<table>
<tr><th>Setting value</th><th>Input / Output</th></tr>
<tr><td>80.00 %</td><td>0 to 80 A (/4 A) / 4 to 20 mA</td></tr>
</table>
</td></tr>
<tr><td>Voltage range
【U RANGE】</td><td>Set voltage measurement values for the upper limit of the analog output rating range.</td><td>


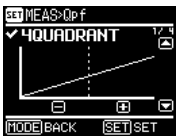
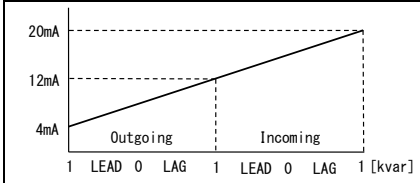
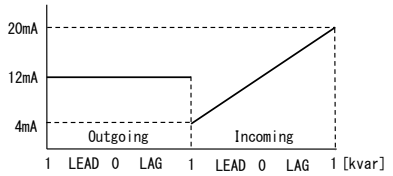
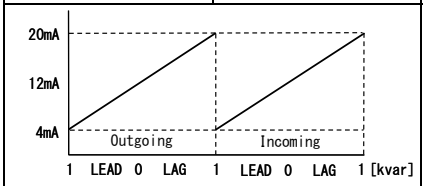
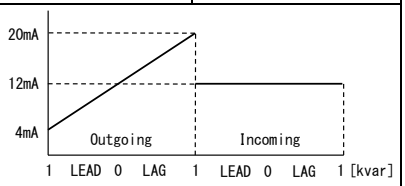
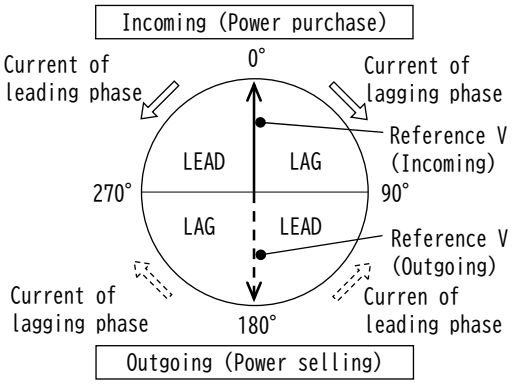
Thick-frame : Default setting
<table>
<tr><th colspan="4">Setting range</th></tr>
<tr><td>100.00 to</td><td>150.00</td><td>to 180.00 %</td><td>0.01 % step</td></tr>
</table>
Rated voltage
=110.00 %
Example of setting (VT ratio : 6600 V / 110 V)
<table>
<tr><th>Setting value</th><th>Input / Output</th></tr>
<tr><td>150.00 %</td><td>0 to 9000 V (/150 V) / 4 to 20 mA</td></tr>
</table>
</td></tr>
<tr><td>Active power range
【P RANGE】</td><td>Set active power measurement values for the upper limit / lower limit of the analog output rating range.</td><td>
【Upper or Lower】 【Upper】


Thick-frame : Default setting
<table>
<tr><th colspan="5">Setting range</th></tr>
<tr><td>Upper</td><td>0.00 to</td><td>100.00</td><td>to 120.00 %</td><td>0.01 % step</td></tr>
<tr><td>Lower</td><td>-120.00</td><td>to</td><td>0.00 %</td><td>0.01 % step</td></tr>
</table>
Rated power
=100.00 %
・The output element when the "+ΣP, +P1, +P2, +P3" is selected, the range is the upper setting from zero. (Lower setting is invalid)
If the upper setting is less than 20 %, the output is the lower limit of the rated output range (in case of 4 to 20 mA, 4 mA).
・If output ranges from the lower setting range to the upper setting, please select the next output element. "±ΣP, ±P1, ±P2, ±P3"
In addition, in the case where the upper setting to 0.00%, will be in the range of lower setting from zero.
Example of setting [Rating 1000 W (110 V, 5 A)]
<table>
<tr><th>No.</th><th>Output factor</th><th>Lower settings</th><th>Upper settings</th><th>Input / output</th></tr>
<tr><td>1</td><td>+ΣP, ±ΣP</td><td>0.00 %</td><td>83.33 %</td><td>0 to 833.3 W / 4 to 20 mA</td></tr>
<tr><td>2</td><td>+ΣP</td><td>-66.67 %</td><td>66.67 %</td><td>0 to 666.7 W / 1 to 5 V</td></tr>
<tr><td>3</td><td>±ΣP</td><td>-50.00 %</td><td>50.00 %</td><td>-500 to 0 to 500 W / -5 to 0 to 5 V</td></tr>
<tr><td>4</td><td>±ΣP</td><td>-25.00 %</td><td>100.00 %</td><td>-250 to 1000 W / 4 to 20 mA</td></tr>
<tr><td>5</td><td>±ΣP</td><td>-50.00 %</td><td>0.00 %</td><td>0 to -500 W / 4 to 20 mA</td></tr>
<tr><td>6</td><td>+ΣP</td><td>-50.00 %</td><td>0.00 %</td><td>4 mA (For the upper limit of less than 20 % at +ΣP)</td></tr>
</table>
<CAUTION> It cannot change into the set point from which the difference of upper set point and lower set point becomes less than 20 %.
</td></tr>
</table>

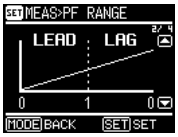
<table>
<tr><th>Setting item</th><th>Description</th><th>Content</th></tr>
<tr><td>Reactive power
【Q】</td><td>Set operation method of reactive power. And, set reactive power measurement values for the upper limit / lower limit of the analog output rating range.</td><td>
【Operation method / Range】 【Arithmetic】


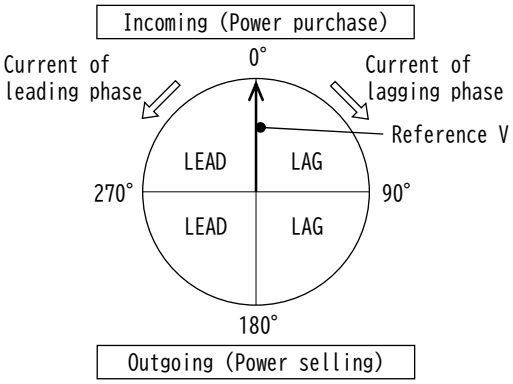
Thick-frame : Default setting
<table>
<tr><th>Setting range</th></tr>
<tr><td>Q=UIsinϕ</td></tr>
<tr><td>Q=√S²−P²</td></tr>
</table>
Thick-frame : Default setting
<table>
<tr><th colspan="5">Setting range (Positive : LAG, Negative : LEAD)</th></tr>
<tr><td>Upper</td><td>0.00 to</td><td>100.00</td><td>to 120.00 %</td><td>0.01 % step</td></tr>
<tr><td>Lower</td><td>−120.00 to</td><td>−100.00</td><td>to 0.00 %</td><td>0.01 % step</td></tr>
</table>
Rated reactive power
= 100.00 %
・In the case where the upper setting to 0.00 %, will be in the range of lower setting (LEAD) from zero.
・If the analog output element is a reactive power (power flow), it will be the lower setting = negative upper setting. (Lower setting is invalid)
If the upper setting is less than 20 %, the output is the lower limit of the rated output range (in case of 4 to 20 mA, 4 mA).
In this case, the upper limit set value is set to 20 % or more.
Example of setting [Rating 1000 var (110 V, 5 A)])
<table>
<tr><th>No.</th><th>Lower settings</th><th>Upper settings</th><th>Input / Output</th></tr>
<tr><td>1</td><td>−75.00 %</td><td>75.00 %</td><td>LEAD 750 to 0 to LAG 750 var / −5 to 0 to 5 V</td></tr>
<tr><td>2</td><td>−25.00 %</td><td>100.00 %</td><td>LEAD 250 to LAG 1000 var / 4 to 20 mA</td></tr>
<tr><td>3</td><td>0.00 %</td><td>83.33 %</td><td>0 to LAG 833.3 var / 4 to 20 mA</td></tr>
<tr><td>4</td><td>−83.33 %</td><td>0.00 %</td><td>0 to LEAD 833.3 var / 4 to 20 mA</td></tr>
</table>
<CAUTION> It cannot change into the set point from which the difference of upper set point and lower set point becomes less than 20 %.
【LAG/LEAD polarity】


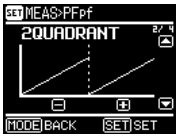
During outgoing (P<0), polarity as viewed from the incoming side (Reference V fixed)
</td></tr>
</table>

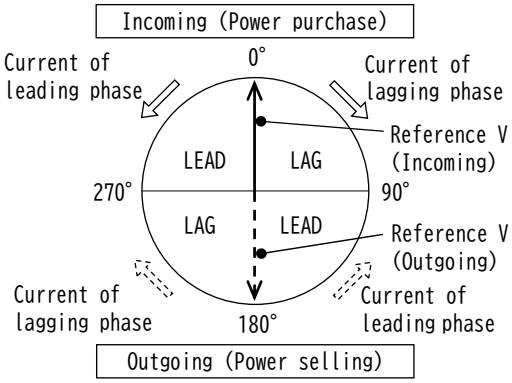
<table>
<tr><th>Setting item</th><th>Description</th><th>Content</th></tr>
<tr><td>Reactive power
(power flow)
【Qpf】</td><td>Set output method of reactive power (power flow).
 
</td><td>Operates with the upper limit setting of reactive power. (Lower limit value = negative upper setting)
Set the upper limit value to 20% or more. If set to less than 20%, the output will be the lower limit of the rated output range.
Thick-frame : Default setting
<table>
<tr><th colspan="4">Setting range</th></tr>
<tr><td>4 quadrant</td><td>4QUADRANT</td><td>2 quadrant
(Incoming)</td><td>2QUADRANT(+)</td></tr>
<tr><td colspan="2"> 
</td><td colspan="2"> 
</td></tr>
<tr><td>2 quadrant</td><td>2QUADRANT</td><td>2 quadrant
(Outgoing)</td><td>2QUADRANT(-)</td></tr>
<tr><td colspan="2"> 
</td><td colspan="2"> 
</td></tr>
</table>
・In the pattern of the two-quadrant (incoming only), is the output of the equivalent Ovar at the time of outgoing.
・In the pattern of the two-quadrant (outgoing only), is the output of the equivalent Ovar at the time of incoming.
【LAG/LEAD polarity】


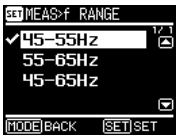
During outgoing (P＜0), polarity as viewed from the outgoing side (Reference V, 180° inversion)</td></tr>
<tr><td>Apparent power range
【S RANGE】</td><td>Set apparent power measurement values for the upper limit / lower limit of the analog output rating range.</td><td>Please set up similarly with reference to a setup (P13) of current range.
Thick-frame : Default setting
<table>
<tr><th colspan="4">Setting range</th></tr>
<tr><td>30.00 to</td><td>100.00</td><td>to 120.00 %</td><td>0.01 % step</td></tr>
</table>
Rated apparent power = 100.00 %</td></tr>
</table>

<table>
<tr><th>Setting item</th><th>Description</th><th>Content</th></tr>
<tr><td>Power factor range
【PF RANGE】</td><td>Set power factor measurement value to the rated output range of the analog output.</td><td>


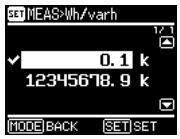
Thick-frame : Default setting
<table>
<tr><th>Setting range</th><th>Output (Example)</th></tr>
<tr><td>LEAD 0.5 to 1 to LAG 0.5</td><td>4 to 12 to 20 mA</td></tr>
<tr><td>LEAD 0 to 1 to LAG 0.5</td><td>1 to 3 to 5 V</td></tr>
<tr><td>LAG 0.5 to 1 to LEAD 0.5</td><td>-1 to 0 to 1 mA</td></tr>
<tr><td>LAG 0 to 1 to LEAD 0</td><td>-5 to 0 to 5 V</td></tr>
</table>


During outgoing (P<0), polarity as viewed from the incoming side (Reference V fixed)
</td></tr>
<tr><td>Power factor (power flow)
【PFpf】</td><td>Set output method of power factor (power flow). Please set up similarly with reference to a setup (P15) of reactive power (power flow).</td><td>


Thick-frame : Default setting
<table>
<tr><th colspan="2">Setting range</th></tr>
<tr><td>4 quadrant</td><td>4QUADRANT</td></tr>
<tr><td>2 quadrant</td><td>2QUADRANT</td></tr>
<tr><td>2 quadrant (Incoming)</td><td>2QUADRANT(+)</td></tr>
<tr><td>2 quadrant (Outgoing)</td><td>2QUADRANT(-)</td></tr>
</table>


During outgoing (P<0), polarity as viewed from the power outgoing side (Reference V, 180° inversion)
</td></tr>
<tr><td>Frequency range
【f RANGE】</td><td>Set frequency measurement value to the rated output range of the analog output.</td><td>


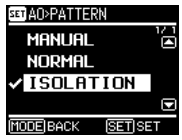
Thick-frame : Default setting
<table>
<tr><th>Setting range</th><th>Output (Example)</th></tr>
<tr><td>45 to 55 Hz</td><td>4 to 20 mA</td></tr>
<tr><td>55 to 65 Hz</td><td>1 to 5 V</td></tr>
<tr><td>45 to 65 Hz</td><td>-1 to 1 mA</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Setting item</th><th>Description</th><th>Content</th></tr>
<tr><td>Wh/varh unit per count
【Wh/varh】</td><td>Set unit per count of Wh/varh (display and communication data).</td><td>


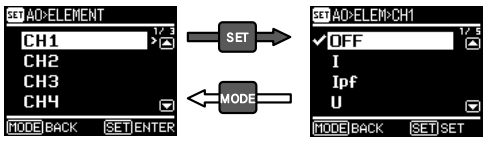
・Integrating the set value as the least significant digit, up to a maximum of 9 digits (999999999). Integrate again from "0" if it exceeds 9 digits.
・Full load power (kW/kvar)
＝ K×VT primary voltage (V)×CT primary current (A)×10^{-3}
K：3P3W,3P4W＝$\sqrt{3}$, 1P2W＝1, 1P3W＝2
Thick-frame：Default setting
<table>
<tr><th colspan="2">Full load power kW/kvar</th><th colspan="4">Output pulse rate, kWh(kvarh)/pulse</th></tr>
<tr><td colspan="2">Below 1</td><td>0.01</td><td>0.001</td><td>0.0001</td><td>0.00001</td></tr>
<tr><td>Over 1</td><td>Below 10</td><td>0.1</td><td>0.01</td><td>0.001</td><td>0.0001</td></tr>
<tr><td>Over 10</td><td>Below 100</td><td>1</td><td>0.1</td><td>0.01</td><td>0.001</td></tr>
<tr><td>Over 100</td><td>Below 1,000</td><td>(4) 10</td><td>1</td><td>0.1</td><td>0.01</td></tr>
<tr><td>Over 1,000</td><td>Below 10,000</td><td>(4) 100</td><td>(4) 10</td><td>1</td><td>0.1</td></tr>
<tr><td>Over 10,000</td><td>Below 100,000</td><td>(4) 1,000</td><td>(4) 100</td><td>(4) 10</td><td>1</td></tr>
<tr><td>Over 100,000</td><td>Below 1,000,000</td><td>—</td><td>(4) 1,000</td><td>(4) 100</td><td>(4) 10</td></tr>
<tr><td>Over 1,000,000</td><td>Below 10,000,000</td><td>—</td><td>—</td><td>(4) 1,000</td><td>(4) 100</td></tr>
<tr><td>Over 10,000,000</td><td>Below 100,000,000</td><td>—</td><td>—</td><td>—</td><td>(4) 1,000</td></tr>
</table>
Note(4) The unit of a display data is MWh/Mvarh.
</td></tr>
<tr><td>Moving average number of times
【CNT AVG】</td><td>Set the moving average number of times for every measurement value.</td><td>

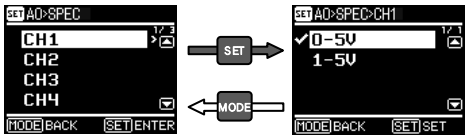

Thick-frame：Default setting
<table>
<tr><th>Setting range</th></tr>
<tr><td>1 TIME (Moving average, none)</td></tr>
<tr><td>2 TIMES</td></tr>
<tr><td>3 TIMES</td></tr>
</table>
</td></tr>
</table>

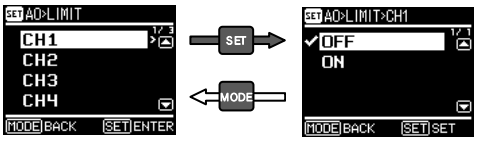
(3) Analog output setting AO

<table>
<tr><th>Setting item</th><th>Description</th><th>Content</th></tr>
<tr><td>Output pattern
【PATTERN】</td><td>The measurement element outputted to CH1 to 10 is set up from the pattern prepared beforehand.</td><td>


Case of elements set individually CH, it will be MANUAL.
Thick-frame：Default setting
<table>
<tr><th colspan="2">Setting range</th><th>Phase</th><th>CH1</th><th>CH2</th><th>CH3</th><th>CH4</th><th>CH5</th></tr>
<tr><td>Individual</td><td>MANUAL</td><td>All</td><td colspan="5">For each element setting</td></tr>
<tr><td rowspan="4">Standard</td><td rowspan="4">NORMAL</td><td>3P3W</td><td>I1</td><td>I2</td><td>I3</td><td>U12</td><td>U23</td></tr>
<tr><td>3P4W</td><td>I1</td><td>I2</td><td>I3</td><td>U1N</td><td>U2N</td></tr>
<tr><td>1P2W</td><td>I</td><td>U</td><td>+P</td><td>Q</td><td>PF</td></tr>
<tr><td>1P3W</td><td>I1</td><td>I3</td><td>IN</td><td>U1N</td><td>U3N</td></tr>
<tr><td rowspan="4">Isolated 2 outputs</td><td rowspan="4">ISOLATION</td><td>3P3W</td><td>Iavg</td><td>FULLavg</td><td>+ΣP</td><td>ΣQ</td><td>f</td></tr>
<tr><td>3P4W</td><td>Iavg</td><td>FULNavg</td><td>+ΣP</td><td>ΣQ</td><td>f</td></tr>
<tr><td>1P2W</td><td>I</td><td>FU</td><td>+P</td><td>Q</td><td>f</td></tr>
<tr><td>1P3W</td><td>I1</td><td>FU1N</td><td>+ΣP</td><td>ΣQ</td><td>f</td></tr>
</table>
<table>
<tr><th colspan="2">Setting range</th><th>Phase</th><th>CH6</th><th>CH7</th><th>CH8</th><th>CH9</th><th>CH10</th></tr>
<tr><td>Individual</td><td>MANUAL</td><td>All</td><td colspan="5">For each element setting</td></tr>
<tr><td rowspan="4">Standard</td><td rowspan="4">NORMAL</td><td>3P3W</td><td>U31</td><td>+ΣP</td><td>ΣQ</td><td>ΣPF</td><td>f</td></tr>
<tr><td>3P4W</td><td>U3N</td><td>+ΣP</td><td>ΣQ</td><td>ΣPF</td><td>f</td></tr>
<tr><td>1P2W</td><td>f</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>1P3W</td><td>U13</td><td>+ΣP</td><td>ΣQ</td><td>ΣPF</td><td>f</td></tr>
<tr><td rowspan="4">Isolated 2 outputs</td><td rowspan="4">ISOLATION</td><td>3P3W</td><td>Iavg</td><td>FULLavg</td><td>+ΣP</td><td>ΣQ</td><td>f</td></tr>
<tr><td>3P4W</td><td>Iavg</td><td>FULNavg</td><td>+ΣP</td><td>ΣQ</td><td>f</td></tr>
<tr><td>1P2W</td><td>I</td><td>FU</td><td>+P</td><td>Q</td><td>f</td></tr>
<tr><td>1P3W</td><td>I1</td><td>FU1N</td><td>+ΣP</td><td>ΣQ</td><td>f</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Setting item</th><th>Description</th><th>Content</th></tr>
<tr><td>Output element
【ELEMENT】</td><td>Set measurement element outputted to CH1 to CH10.
(CH individual)</td><td>
【CH set】 【Element】


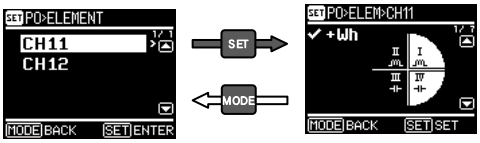
<table>
<tr><th rowspan="2">Measurement</th><th rowspan="2">Measurands</th><th colspan="4">Wiring type</th></tr>
<tr><th>3P3W</th><th>3P4W</th><th>1P2W</th><th>1P3W</th></tr>
<tr><td>Current</td><td>I</td><td>1, 2, 3, avg</td><td>1, 2, 3, N, avg</td><td>I</td><td>1, 3, N</td></tr>
<tr><td>Current (power flow)</td><td>Ipf</td><td>1, 2, 3</td><td>1, 2, 3</td><td>Ipf</td><td>1,3</td></tr>
<tr><td>Line voltage,
Phase voltage</td><td>U</td><td>12, 23, 31,
LLavg</td><td>12, 23, 31, LLavg,
1N, 2N, 3N, LNavg</td><td>U</td><td>13, 1N, 3N</td></tr>
<tr><td rowspan="2">Active power</td><td rowspan="2">P</td><td>+Σ</td><td>+1, +2, +3, +Σ</td><td>+P</td><td>+Σ</td></tr>
<tr><td>±Σ</td><td>±1, ±2, ±3, ±Σ</td><td>±P</td><td>±Σ</td></tr>
<tr><td>Reactive power</td><td>Q</td><td>Σ</td><td>1, 2, 3, Σ</td><td>Q</td><td>Σ</td></tr>
<tr><td>Reactive power
(power flow)</td><td>Qpf</td><td>Σ</td><td>1, 2, 3, Σ</td><td>Qpf</td><td>Σ</td></tr>
<tr><td>Apparent power</td><td>S</td><td>Σ</td><td>1, 2, 3, Σ</td><td>S</td><td>Σ</td></tr>
<tr><td>Power factor</td><td>PF</td><td>Σ</td><td>1, 2, 3, Σ</td><td>PF</td><td>Σ</td></tr>
<tr><td>Power factor
(power flow)</td><td>PFpf</td><td>Σ</td><td>1, 2, 3, Σ</td><td>PFpf</td><td>Σ</td></tr>
<tr><td>Frequency</td><td>f</td><td>f</td><td>f</td><td>f</td><td>f</td></tr>
<tr><td>Fundamental voltage</td><td>FU</td><td>12, 23, 31,
LLavg</td><td>1N, 2N, 3N, LNavg</td><td>FU</td><td>1N, 3N</td></tr>
</table>
・1, 2, 3, N is phase. avg is the average of each phase. Σ represents the total.
・If it is set as OFF, an output will serve as a lower limit value of the rated-output range. (In case of 4 to 20mA is 4mA.)
・In the case of one side of the active power range (0 to +P[W]), please select the +P. In the case of both side of the active power range (±P[W]), please select the ±P.
See the power range setting for more information. (P13)
</td></tr>
<tr><td>Output specification
【SPEC】</td><td>Set rated-output range at the time of output specification (0 to 5 V, 1 to 5 V, 0 to 10 V).
(CH individual)</td><td>
【CH set】 【0 to 5 V/1 to 5 V】 Thick-frame : Default setting


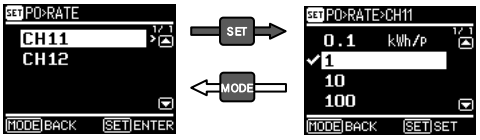
<table>
<tr><th colspan="3">Setting range</th></tr>
<tr><th>0 to 5 V spec.</th><th>1 to 5 V spec.</th><th>0 to 10 V spec.</th></tr>
<tr><td>0 to 5 V</td><td>0 to 5 V</td><td>0 to 10 V</td></tr>
<tr><td>1 to 5 V</td><td>1 to 5 V</td><td>2 to 10 V</td></tr>
</table>
In the case of other output specifications, a setting item is skipped.
</td></tr>
<tr><td>Output limiter
【LIMIT】</td><td>Set ON/OFF of output limiter.
(CH individual)</td><td>
If a setup is ON, an output will be restricted with the following value.
Upper limit : +1 % and lower limit : -1 % for the output span.
【CH set】 【ON/OFF】


Thick-frame : Default setting
<table>
<tr><th>Setting range</th></tr>
<tr><td>OFF</td></tr>
<tr><td>ON</td></tr>
</table>
If the output specification is 4 to 20 mA,
Limiter OFF : Range of 0.80 to 23.20 mA
Limiter ON : Range of 3.84 to 20.16 mA
</td></tr>
<tr><td>Output adjustment
【ADJUST】</td><td>BIAS adjustment and SPAN adjustment of analog output are performed according to CH individual.</td><td>
An output is fluctuated by ▲ ▼ and an adjustment value is decided by SET.
【CH set】 【BIAS/SPAN set】 【SPAN adjustment】


Thick-frame : Default setting
<table>
<tr><th colspan="6">Adjustment range</th></tr>
<tr><th colspan="3">BIAS</th><th colspan="3">SPAN</th></tr>
<tr><td>-10.00 to</td><td>0.00</td><td>to +10.00 %</td><td>90.00 to</td><td>100.00</td><td>to 110.00 %</td></tr>
</table>
Please adjust to connected equipment when matching is required with it.
</td></tr>
</table>

(4) Pulse output setting PO

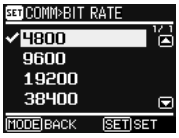
<table>
<tr><th>Setting item</th><th>Description</th><th>Content</th></tr>
<tr><td>Output element
【ELEMENT】</td><td>Set measuring element to pulse output to CH11 and CH12.
(CH Individual)</td><td>【CH set】 【Element set】
 

Thick-frame : Default setting
<table>
<tr><th colspan="3">Setting range</th></tr>
<tr><th></th><th>CH11</th><th>CH12</th></tr>
<tr><td>Pulse OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>Active energy (Incoming)</td><td>+Wh</td><td>+Wh</td></tr>
<tr><td>Active energy (Outgoing)</td><td>-Wh</td><td>-Wh</td></tr>
<tr><td>Reactive energy (Incoming, LAG)</td><td>+varh LAG</td><td>+varh LAG</td></tr>
<tr><td>Reactive energy (Incoming, LEAD)</td><td>+varh LEAD</td><td>+varh LEAD</td></tr>
<tr><td>Reactive energy (Outgoing, LAG)</td><td>-varh LAG</td><td>-varh LAG</td></tr>
<tr><td>Reactive energy (Outgoing, LEAD)</td><td>-varh LEAD</td><td>-varh LEAD</td></tr>
</table></td></tr>
<tr><td>Output pulse rate
【RATE】</td><td>Set output pulse rate of CH11 and CH12.
(CH Individual)</td><td>【CH set】 【Pulse rate】
 

Thick-frame : Default setting
<table>
<tr><th colspan="2">Full load power (kW, kvar)</th><th colspan="4">Output pulse rate, kWh(kvarh)/pulse</th></tr>
<tr><td></td><td>Below 1</td><td>0.1</td><td>0.01</td><td>0.001</td><td>0.0001</td></tr>
<tr><td>Over 1</td><td>Below 10</td><td>1</td><td>0.1</td><td>0.01</td><td>0.001</td></tr>
<tr><td>Over 10</td><td>Below 100</td><td>10</td><td>1</td><td>0.1</td><td>0.01</td></tr>
<tr><td>Over 100</td><td>Below 1,000</td><td>100</td><td>10</td><td>1</td><td>0.1</td></tr>
<tr><td>Over 1,000</td><td>Below 10,000</td><td>1,000</td><td>100</td><td>10</td><td>1</td></tr>
<tr><td>Over 10,000</td><td>Below 100,000</td><td>10,000</td><td>1,000</td><td>100</td><td>10</td></tr>
<tr><td>Over 100,000</td><td>Below 1,000,000</td><td>100,000</td><td>10,000</td><td>1,000</td><td>100</td></tr>
<tr><td>Over 1,000,000</td><td>Below 10,000,000</td><td>1,000,000</td><td>100,000</td><td>10,000</td><td>1,000</td></tr>
<tr><td>Over 10,000,000</td><td>Below 100,000,000</td><td>10,000,000</td><td>1,000,000</td><td>100,000</td><td>10,000</td></tr>
</table></td></tr>
</table>

(5) Communication output setting COMM

<table>
<tr><th>Setting item</th><th>Description</th><th>Content</th></tr>
<tr><td>Address
【ADDRESS】</td><td>Set communication address.</td><td> 

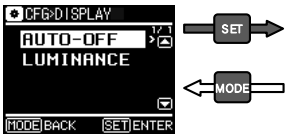
Thick-frame : Default setting
<table>
<tr><th colspan="2">Setting range</th></tr>
<tr><td>1</td><td>to 247</td></tr>
</table></td></tr>
<tr><td>Bit rate
【BIT RATE】</td><td>Set bit rate of communication.</td><td> 

Thick-frame : Default setting
<table>
<tr><th>Setting range</th></tr>
<tr><td>4800 bps</td></tr>
<tr><td>9600 bps</td></tr>
<tr><td>19200 bps</td></tr>
<tr><td>38400 bps</td></tr>
</table></td></tr>
<tr><td>Parity
【PARITY】</td><td>Set parity check method of communication.</td><td> 

Thick-frame : Default setting
<table>
<tr><th colspan="2">Setting range</th></tr>
<tr><td>Even number</td><td>ODD</td></tr>
<tr><td>Odd number</td><td>EVEN</td></tr>
<tr><td>Nothing</td><td>NONE</td></tr>
</table></td></tr>
<tr><td>Stop bits
【STOP BIT】</td><td>Set stop bit of communication.</td><td> 

Thick-frame : Default setting
<table>
<tr><th>Setting range</th></tr>
<tr><td>1</td></tr>
<tr><td>2</td></tr>
</table></td></tr>
</table>

(6) Configuration CFG

<table>
<tr><th>Setting item</th><th>Description</th><th>Content</th></tr>
<tr><td>Display
【DISPLAY】</td><td>Set auto off time and brightness of the display.</td><td>【Auto off time / Brightness】 【Auto off time】
 

Backlight auto-OFF time
Thick-frame : Default setting
<table>
<tr><th colspan="2">Setting range</th></tr>
<tr><td>1 minute</td><td>10 minutes</td></tr>
<tr><td>2 minutes</td><td>15 minutes</td></tr>
<tr><td>5 minutes</td><td>30 minutes</td></tr>
</table>
【Brightness】
 

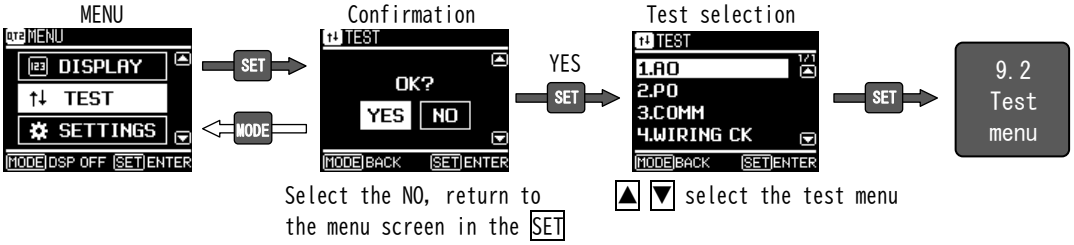
Backlight luminance
Thick-frame : Default setting
<table>
<tr><th colspan="2">Setting range</th></tr>
<tr><td>5</td><td>Bright</td></tr>
<tr><td>4</td><td rowspan="3">⇕</td></tr>
<tr><td>3</td></tr>
<tr><td>2</td></tr>
<tr><td>1</td><td>Dark</td></tr>
</table></td></tr>
<tr><td>Reset
【RESET】</td><td>Reset the electric energy (Wh/varh) and setting values (SETTINGS).</td><td>Selected in the ▲ ▼. Press SET for more than 1 second to reset (initialization).
 

Reset of all the items, select the "ALL".
The items reset has been completed, mark (left side) is displayed.
Subsequently, can also be reset the other items.
Set value after a reset is the initial setting of a 3P3W (2VT2CT).</td></tr>
<tr><td>Software version
【SOFTWARE】</td><td>Display version of software.</td><td>Version : 3-digits
 
</td></tr>
<tr><td>Setting management number
【SETTING No.】</td><td>Display setting management number specified in the setting software.</td><td>Setting management No. : 0000 to 9999
 

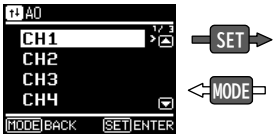
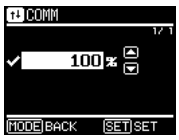
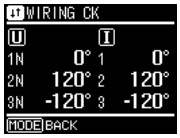
Setting data can be used to manage and collation.
Setting management numbers can not be changed in the HSQT2-500.
When performing other setting changes at HSQT2-500,
configuration management number will be changed to 0000.</td></tr>
</table>

9. Test modes

9.1 Test flow



9.2 Test menu

Test item	Test content
Analog output 【AO】	・Select channel (CH1 to 10) to the test. ・Analog output value (0, 25, 50, 75, 100 %), selected in the ▲ ▼. Output in SET. 【CH select】 【Output select】  <CAUTION> When it becomes CH selection screen, all of the output will be the lower limit. Setting value – Output table Setting / 4 to 20 mA / 0 to 5 V / -5 to 5 V 0 % / 4 mA / 0 V / -5 V 25 % / 8 mA / 1.25 V / -2.5 V 50 % / 12 mA / 2.5 V / 0 V 75 % / 16 mA / 3.75 V / 2.5 V 100 % / 20 mA / 5 V / 5 V
Pulse output 【PO】	・Select channel (CH11, 12) to the test. ・Press the SET, pulse is output at one-second intervals. Once again press the SET, pulse output will stop. Pulse output number is displayed in the lower part. (0 → 1 → 2 →・・・→ 999 → 1000 → 1 →・・・)  <CAUTION> When it becomes CH selection screen, all of the pulse output is stopped.
Communication output 【COMM】	・The communication output value (0, 25, 50, 75, 100%) is selected with ▲ ▼ and confirm with SET. Outputs the selected set value in response to a measurement value request (query).  Setting value – output table (110 V, 5 A, 3P3W, 45...65 Hz) Measurands / / Setting value / Equivalent to input Current / I / 0 to 100 % / 0 to 5 A Current (power flow) / Ipf / 0 to 50 to 100 % / -5 to 0 to 5 A Line voltage / U / 0 to 100 % / 0 to 150 V Active power / Reactive power / P/Q / 0 to 50 to 100 % / -1 to 0 to 1 kW/kvar Apparent power / S / 0 to 100 % / 0 to 1 kVA Power factor / PF / 0 to 50 to 100 % / LEAD 0 to 1 to LAG 0 Frequency / f / 0 to 100 % / 45 to 65 Hz Fundamental voltage / FU / 0 to 100 % / 0 to 150 V Outputs 0, 250000, 500000, 750000, 999999 for the amount of active energy/reactive energy.
Wiring check 【WIRING CK】	・The phase angle between the voltage and current will be displayed. (U12 or U1N reference) 【3P4W】  The following table lists the phase angles at power factor 1 for each phase wire. If significantly different, please check the wiring. Measurands / 3P3W 2VT, 2CT / 3P3W 2VT, 3CT / 3P4W 2VT, 3CT / 3P4W 3VT, 3CT / 1P2W / 1P3W Voltage / U12 / 0 ° / U12 / 0 ° / U1N / 0 ° / U1N / 0 ° / U / 0 ° / U1N / 0 ° Voltage / U23 / -60 ° / U23 / -60 ° / – / – / U2N / 120 ° / – / – / – / – Voltage / – / – / – / – / U3N / -120 ° / U3N / -120 ° / – / – / U3N / 180 ° Current / I1 / 30 ° / I1 / 30 ° / I1 / 0 ° / I1 / 0 ° / I / 0 ° / I1 / 0 ° Current / – / – / I2 / 150 ° / I2 / 120 ° / I2 / 120 ° / – / – / – / – Current / I3 / -90 ° / I3 / -90 ° / I3 / -120 ° / I3 / -120 ° / – / – / I3 / 180 °

10 Specifications

10.1 Rating

Item		Specifications	
Input circuit		3-phase 3-wire [3P3W] (2VT2CT, 2VT3CT) 3-phase 4-wire [3P4W] (2VT3CT, 3VT3CT) 1-phase 2-wire [1P2W] 1-phase 3-wire [1P3W] Common use (Settable)	
Voltage input	3P3W 1P2W	110 V AC, 50/60 Hz 220 V AC, 50/60 Hz 440 V AC, 50/60 Hz Common use (Settable) (5)	
	1P3W	100-200 V AC, 50/60 Hz 200-400 V AC, 50/60 Hz Common use (Settable) (6)	
	3P4W	110/√3 V AC, 50/60 Hz 220/√3 V AC, 50/60 Hz 440/√3 V AC, 50/60 Hz Common use (Settable) (7)	
Current input		5 A AC, 50/60 Hz, 0.1 VA or less 1 A AC, 50/60 Hz, 0.1 VA or less Common use (Settable)	
Auxiliary supply	Auxiliary supply range and power consumption	1) 80 to 264 V AC (Rated voltage. 100/110 V AC) 50/60 Hz, 15 VA (Rated voltage. 200/220 V AC) 50/60 Hz, 18 VA 80 to 264 V DC (Rated voltage. 100/110 V DC) 9 W (Rated voltage. 200/220 V DC) 10 W For AC and DC use	Designate
		2) 20 to 57 V DC (Rated voltage. 24 V DC) 11 W (Rated voltage. 48 V DC) 12 W	
	Rush current (time constant)	110 V AC : 5.5 A or less 220 V AC : 10.9 A or less 110 V DC : 3.9 A or less 220 V DC : 7.7 A or less (Approx. 5 ms)	
		24 V DC : 6.3 A or less 48 V DC : 12.6 A or less (Approx. 8 ms)	

Note(5) Possible up to a maximum rating 480 V.
Power consumption : 0.25 VA or less (110 V), 0.5 VA or less (220 V), 1 VA or less (440 V)
Note(6) Power consumption : 0.25 VA or less (100-200 V), 0.5 VA or less (200-400 V)
note(7) Possible up to a maximum rating 480/√3 V.
Power consumption : 0.25 VA or less (110/√3 V)、0.5 VA or less (220/√3 V)、1 VA or less (440/√3 V)

10.2 Measurement item, Class index

Measurement element	Measurement possible item (1, 2, 3, N : Phase, avg : Average of each phase, Σ : Total)				Class index	
	3P3W	3P4W	1P2W	1P3W	5 A	1 A
Current	I_1, I_2, I_3, I_{avg}	I_1, I_2, I_3, I_N, I_{avg}	I	I_1, I_3, I_N	0.2	0.5
Current (power flow)	I_{pf1}, I_{pf2}, I_{pf3}	I_{pf1}, I_{pf2}, I_{pf3}	I_{pf}	I_{pf1}, I_{pf3}	0.2	0.5
Voltage	U_{12}, U_{23}, U_{31}, U_{LLavg}	U_{12}, U_{23}, U_{31}, U_{LLavg}, U_{1N}, U_{2N}, U_{3N}, U_{LNavg}	U	U_{1N}, U_{3N}, U_{13}	0.2	0.2
Active power	ΣP	ΣP, P_1, P_2, P_3	P	ΣP	0.3	0.5
Reactive power (8)	ΣQ	ΣQ, Q_1, Q_2, Q_3	Q	ΣQ	0.3	0.5
Reactive power (power flow) (8)	ΣQ_{pf}	ΣQ_{pf}, Q_{pf1}, Q_{pf2}, Q_{pf3}	Q_{pf}	ΣQ_{pf}	0.3	0.5
Apparent power (9)	ΣS	ΣS, S_1, S_2, S_3	S	ΣS	0.3	0.5
Power factor	ΣPF	ΣPF, PF_1, PF_2, PF_3	PF	ΣPF	1	1.5
Power factor (power flow)	ΣPF_{pf}	ΣPF_{pf}, PF_{pf1}, PF_{pf2}, PF_{pf3}	PF_{pf}	ΣPF_{pf}	1	1.5
Frequency	f	f	f	f	0.2	0.2
Fundamental voltage	FU_{12}, FU_{23}, FU_{31}, FU_{LLavg}	FU_{1N}, FU_{2N}, FU_{3N}, FU_{LNavg}	FU	FU_{1N}, FU_{3N}	0.3	0.3
Active energy	Incoming, Outgoing				1	2
Reactive energy	Incoming LAG, Incoming LEAD, Outgoing LAG, Outgoing LEAD				2	2

Note(8) The calculation method can be selected. $Q=UI\sin\phi$ or $Q=\sqrt{(S^2-P^2)}$
Note(9) Calculation method. 3P4W : $\Sigma S=U_{1N}\times I_1+U_{2N}\times I_2+U_{3N}\times I_3$, 3P3W : $\Sigma S=\sqrt{3}/2\times(U_{12}\times I_1+U_{23}\times I_3)$,
1P3W : $\Sigma S=U_{1N}\times I_1+U_{3N}\times I_3$

10.3 Detailed specification

Item	Specification, Performance
Conformity standards	Transducer, IEC 60688 : 2012, JIS C 1111 : 2019 Static meters for active energy, IEC 62053-21 : 2003, JIS C1271-1 : 2011 Static meters for reactive energy, IEC 62053-23 : 2003, JIS C1273-1 : 2011 Communication, TIA-485-A (2003)
CE marking	EMC Directive (2014/30/EU) EN 61000-6-2 EN 61000-6-4, EN 55011 classA, Group1 Low Voltage Directive (2014/35/EU) EN61010-1
Safety	IEC 61010-1 : 2010 Measurement Category Ⅲ, Maximum use voltage : 300 V (line to neutral), Pollution degree 2
Operating method	Current, Voltage : RMS value computing type. Active power, Active energy : Time-division multiplication method. Reactive power, Reactive energy : Time division multiplication method ($Q=UI\sin\phi$) or the method for calculating from the power and apparent power ($Q=\sqrt{(S^2-P^2)}$).(Selected in the setting) Apparent power : Calculates from voltage and current. Power factor : Calculates from power and reactive power. Frequency : Zero cross cycle computing type. Fundamental voltage : Fourier transform
Operation period	5ms (Frequency measurement : Input 1 cycle)
Influence of temperature	Usage group Ⅰ 10 to 35 ℃ : Within class index. 0 to 45 ℃ : Within two times of a class index. -10 to 55 ℃ : Within three times of a class index.

<table>
<tr><th colspan="2">Item</th><th colspan="4">Specification, Performance</th></tr>
<tr><td rowspan="9">Analog output</td><td>Output</td><td colspan="4">10ch
Between output 1 to 5 and output 6 to 10, insulation (500V AC, 5 seconds).
From elements of the measurement items of Section 10.2, it can be selected arbitrarily. (Except for active energy and reactive energy)
The same elements can be selected.</td></tr>
<tr><td>Output rating</td><td colspan="3">1) 0 to 5 V DC (600 Ω to ∞) Switchable to 1 to 5 V
2) 0 to 10 V DC (2 kΩ to ∞) Switchable to 2 to 10 V
3) 1 to 5 V DC (600 Ω to ∞) Switchable to 0 to 5 V
4) -5 to 5 V DC (600 Ω to ∞)
5) -10 to 10V DC (2 kΩ to ∞)
A) 0 to 1 mA DC (10 kΩ to ∞)
B) 4 to 20 mA DC (0 to 550 Ω)
C) -1 to 1 mA DC (0 to 10 kΩ)
Z) Other (Special specification)</td><td>Designate</td></tr>
<tr><td rowspan="5">Response time</td><td colspan="4">Response time to be restored on ±1% of a final constant value.</td></tr>
<tr><td>Measurements</td><td colspan="2">Output CH1 to CH4, CH6 to CH9
(High speed response)</td><td>Output CH5, CH10</td></tr>
<tr><td>Current, Voltage
Fundamental voltage
Active power
Reactive power
Apparent power
Power factor</td><td colspan="2">Input 1 cycle + 10ms or less
(Moving average, none)
Input 1 cycle + 15ms or less
(Moving average, 2 times)
Input 1 cycle + 20ms or less
(Moving average, 3 times)</td><td rowspan="3">500ms or less</td></tr>
<tr><td>Current
(power flow)
Reactive power
(power flow)
Power factor
(power flow)</td><td>Input 1 cycle + 10ms or less
(Moving average, none)
Input 1 cycle + 15ms or less
(Moving average, 2 times)
Input 1 cycle + 20ms or less
(Moving average, 3 times)</td><td>Less than 200ms when switching between transmitting and receiving power</td></tr>
<tr><td>Frequency</td><td colspan="2">Input 2 cycle + 15ms or less
(Moving average, none) (fix)</td></tr>
<tr><td>Output ripple</td><td colspan="4">Output ripple is below the double (peak to peak value) of a class index to an output span.</td></tr>
<tr><td>Current (power flow) output pattern</td><td colspan="4">It is configurable to set output pattern of the reactive power (power flow) and power factor (power flow).
Output pattern : 4 quadrant, 2 quadrant, Incoming only measurement (2 quadrant),
Outgoing only measurement (2 quadrant)</td></tr>
<tr><td>Output adjuster</td><td colspan="4">Bias and a span can be adjusted with each output. (For matching with a connection device.) Adjustable range : BIAS and SPAN, ±10 % (% for output span)</td></tr>
<tr><td>Output limiter</td><td colspan="4">The minimum value and maximum value of an output can be restricted. (Settable)
Lower limit value : -1 % of output span. Upper limit value : +1 % of output span.
Example) 4 to 20 mA : Limit the output between 3.84 to 20.16 mA.</td></tr>
</table>

<table>
<tr><th colspan="2">Item</th><th colspan="6">Specification, Performance</th></tr>
<tr><td rowspan="15">Pulse output</td><td>Output</td><td colspan="6">2ch</td></tr>
<tr><td>Output measurands</td><td colspan="6">Active energy (Incoming / Outgoing),
Reactive energy (Incoming LAG / Outgoing LAG / Incoming LEAD / Outgoing LEAD)</td></tr>
<tr><td>Output form</td><td colspan="6">Optical MOS-FET relay, Normally-open contact</td></tr>
<tr><td>Contact capacity</td><td colspan="6">125 V AC,DC, 70 mA (Resistance load, Inductive load)</td></tr>
<tr><td>Pulse width</td><td colspan="6">250±10 ms (When the output pulse period of rated power constitutes speed more than 2 pulse / second by setting of VT primary, CT primary and output pulse rate, an output pulse width is 100 to 130 ms.)</td></tr>
<tr><td rowspan="12">Output pulse rate</td><td colspan="6">Output pulse rate can be selected in the following ranges.
・3P3W, 3P4W :
Full load power (kW, kvar) = √3 × Rated voltage (V) × Rated current (A) × 10^{-3}
・1P3W : Full load power (kW, kvar) = 2 × Rated voltage (V) × Rated current (A) × 10^{-3}
・1P2W : Full load power (kW, kvar) = Rated voltage (V) × Rated current (A) × 10^{-3}</td></tr>
<tr><td colspan="2">Full load power (kW, kvar)</td><td colspan="4">Output pulse rate, kWh(kvarh)/pulse</td></tr>
<tr><td colspan="2">Below 1</td><td>0.1</td><td>0.01</td><td>0.001</td><td>0.0001</td></tr>
<tr><td>Over 1</td><td>Below 10</td><td>1</td><td>0.1</td><td>0.01</td><td>0.001</td></tr>
<tr><td>Over 10</td><td>Below 100</td><td>10</td><td>1</td><td>0.1</td><td>0.01</td></tr>
<tr><td>Over 100</td><td>Below 1,000</td><td>100</td><td>10</td><td>1</td><td>0.1</td></tr>
<tr><td>Over 1,000</td><td>Below 10,000</td><td>1,000</td><td>100</td><td>10</td><td>1</td></tr>
<tr><td>Over 10,000</td><td>Below 100,000</td><td>10,000</td><td>1,000</td><td>100</td><td>10</td></tr>
<tr><td>Over 100,000</td><td>Below 1,000,000</td><td>100,000</td><td>10,000</td><td>1,000</td><td>100</td></tr>
<tr><td>Over 1,000,000</td><td>Below 10,000,000</td><td>1,000,000</td><td>100,000</td><td>10,000</td><td>1,000</td></tr>
<tr><td>Over 10,000,000</td><td>Below 100,000,000</td><td>10,000,000</td><td>1,000,000</td><td>100,000</td><td>10,000</td></tr>
<tr><td rowspan="12">Communication output</td><td>Output</td><td colspan="6">1ch</td></tr>
<tr><td>Communication system</td><td colspan="6">RS-485 Half-duplex two-wire system, asynchronous communication method</td></tr>
<tr><td>Protocol</td><td colspan="6">MODBUS RTU</td></tr>
<tr><td>Bit rate</td><td colspan="6">4800 bps / 9600 bps / 19200 bps / 38400 bps</td></tr>
<tr><td>Transmission code</td><td colspan="6">NRZ</td></tr>
<tr><td>Start bit</td><td colspan="6">1 bit</td></tr>
<tr><td>Data bit</td><td colspan="6">8 bits</td></tr>
<tr><td>Parity</td><td colspan="6">None / Even number / Odd number</td></tr>
<tr><td>Stop bit</td><td colspan="6">1 bit / 2 bits</td></tr>
<tr><td>Transmission character</td><td colspan="6">Binary</td></tr>
<tr><td>Cable length</td><td colspan="6">1000 m (Max.)</td></tr>
<tr><td>Address</td><td colspan="6">1 to 247 (Max. connectable : 31 units)</td></tr>
<tr><td>Error detection</td><td colspan="6">CRC-16 ($X^{16}+X^{15}+X^{2}+1$)</td></tr>
<tr><td>Termination resistor</td><td colspan="6">100 Ω, 1/2 W, Install to the terminal. (Accessory)</td></tr>
<tr><td rowspan="5">USB</td><td>Point</td><td colspan="6">1ch</td></tr>
<tr><td>Function</td><td colspan="6">Read-out and update the setting values are possible by connecting to PC.</td></tr>
<tr><td>Version</td><td colspan="6">USB 2.0</td></tr>
<tr><td>Transfer rate</td><td colspan="6">12Mbps</td></tr>
<tr><td>Connector</td><td colspan="6">USB Type-C</td></tr>
<tr><td rowspan="4">Test function</td><td>Analog output</td><td colspan="6">Without any input, and outputs an analog output (1 to 10 individual).
0, 25, 50, 75% output.</td></tr>
<tr><td>Communication output</td><td colspan="6">Without any input, and outputs an measured value of communication output.
0, 25, 50, 75% output.</td></tr>
<tr><td>Pulse output</td><td colspan="6">Without any input, and outputs an pulse output (1 to 2 individual).
1s/1pulse</td></tr>
<tr><td>Input wiring</td><td colspan="6">The wiring state of the AC input (each input of the phase) is displayed on the screen.</td></tr>
<tr><td rowspan="3">Display</td><td rowspan="2">Display element</td><td colspan="6">OLED display unit, 1 inch , Resolution : 128×96 dots</td></tr>
<tr><td colspan="6">Luminescent color : White
Display automatic turn off (automatic turn off time after no operation can be set)</td></tr>
<tr><td>Function</td><td colspan="6">The measured value (% display) of each measurement item can be checked on the screen display.</td></tr>
</table>

Item	Specification, Performance	
Power interruption backup	Active energy, reactive energy, and each setting value are retained in non-volatile memory.	
Insulation resistance	Between electric circuit and ground.	50 MΩ or more at 500 V DC
	Between AC input and output (analog output, pulse output, communication output) and auxiliary supply.	
	Between analog output and pulse output.	
	Between pulse output and communication output.	
	Between pulse output 1 and pulse output 2.	
	Between analog output1 to 5 and analog output6 to 10 and communication output.	
	Non-insulation (Minus common) : Between analog output 1 to 5, between analog output 6 to 10.	
Voltage test	Between electric circuit and ground.	2210 V AC (50/60 Hz) 5 seconds
	Between AC input and output (analog output, pulse output, communication output) and auxiliary supply.	
	Between analog output and pulse output.	1390 V AC (50/60 Hz) 5 seconds
	Between pulse output and communication output.	
	Between pulse output 1 and pulse output 2.	
	Between analog output 1 to 5, analog output 6 to 10 and communication output.	500 V AC (50/60 Hz) 5 seconds
	Non-insulation (Minus common) : Between analog output 1 to 5, between analog output 6 to 10.	
Impulse voltage test	Between auxiliary power supply, AC input and ground. (Analog output, pulse output, and communication output are grounded)	6kV 1.2/50μs
	Between auxiliary supply and AC input, analog output, pulse output, communication output, ground.	
	Between AC input and auxiliary supply, analog output, pulse output, communication output, ground.	
	Between three-phase voltage input terminals.	
	Between auxiliary supply terminals.	
	Between pulse output and auxiliary supply, AC input, analog output, communication output, ground.	2.5kV 1.2/50μs
	Between external input and auxiliary supply, AC input, analog output, pulse output, communication output, ground.	
Damped oscillatory wave immunity test IEC61000-4-12	Peak voltage : 2.5 kV, frequency : 1 MHz ±10 %, Add 3 times for 30 seconds. Error : Within ±10 %. And, malfunction and communication stop must not occur. ・AC voltage input circuit (Normal / Common) ・AC current input circuit (Common) ・Auxiliary supply circuit (Normal / Common)	
Square impulse immunity test JEA B-402	Add noise (1μs, 100 ns width) repeatedly for 5 minutes. Error : Within ±10 %. And, malfunction and communication stop must not occur. ・Auxiliary supply circuit (Normal / Common) 1.5 kV or more ・AC voltage input circuit (Normal / Common) 1.5 kV or more ・AC current input circuit (Common) 1.5 kV or more ・Pulse output (Common) 1.0 kV or more ・Analog output (Induction) 1.0 kV or more ・Communication output circuit (Induction) 1.0 kV or more	
Radio wave immunity test	Radio wave band : 5W, 1m on 150 MHz, 400 MHz band. Cellular phone, wireless LAN : 2.4 GHz, 5 GHz band. Continued irradiation with radio wave on 0.5 m. Error : Within ±10 %. And, communication should communicate normally after a noise applying stop.	
Electrostatic discharge immunity test IEC 61000-4-2	Usually, it tests by the busy condition. When powered up. Air discharge : 15 kV, Contact discharge : 8 kV, Error : Within ±10 %. And, malfunction and communication stop must not occur. Capacitor charge system	
Vibration	IEC 60068-2-6 : 2007 Frequency range : 10 to 55 Hz, Single amplitude : 0.15 mm, Sweep cycle : 10 times	
Impact	IEC 60068-2-27 : 2008 Peak acceleration : 500 m/s^2 (Screw installation), 300 m/s^2 (DIN rail installation)	

Item		Specification, Performance
Overload capacity	Input	2 times 10 seconds and 1.2 times continuation of rated voltage. 40 times 1 second, 20 times 4 seconds, 10 times 16 seconds, 1.2 times continuation of rated current.
	Auxiliary supply	1.5 times 10 seconds and 1.2 times continuation of rated voltage. (100/110 V AC, 200/220 V AC, 24 V DC, 48 V DC) 1.5 times 10 seconds and 1.3 times continuation of rated voltage. (110 V DC, 220 V DC)
	Output	Voltage output : Short circuit for 1 second by 10 times at 10 seconds interval, and short circuit for 5 seconds, 70 % continuation of rated-output load. Current output : Open continuation, 130 % continuation of rated-output load.
Construction	Case outline	109×92 (With mounting legs, 120)×115 mm (W×H×D)
	Mass	Approx. 700g
	Material	Case : ABS (V-0) Terminal board : ABS (V-0) Terminal cover : PET-GF (HB)
	Terminal screw	Upper side terminal (Auxiliary supply, AC input, Ground terminal): M4 screw Lower side terminal (Analog output, Pulse output, Communication output): M3 screw
	Protection rating	IP30
Operating temperature and humidity limits		-10 to 55℃, 5 to 90% RH (Non condensing)
Storage temperature limits		-25 to 70℃

10.4 Measuring range

Measurands	Rated voltage	Rated current	Measuring range	Low input cut	Display
Current	—	5 A	0 to 5 A	Less than 0.2 % of the rated ([10])	0.0 to 100.0[%]
	—	1 A	0 to 1 A	Less than 0.5 % of the rated ([10])	
Current (Power flow)	—	5 A	Outgoing 5 A to Incoming 5 A ([11])	Less than 0.2 % of the rated ([10])	-100.0 to 100.0[%]
	—	1 A	Outgoing 1 A to Incoming 1 A ([11])	Less than 0.5 % of the rated ([10])	
Line voltage	110 V	—	0 to 150 V (1P3W : 0 to 300 V)	Less than 1 % of full scale	0.0 to 100.0[%]
	220 V	—	0 to 300 V (1P3W : 0 to 600 V)		
	440 V	—	0 to 600 V		
Phase voltage	110 V	—	3P4W : 0 to 150/√3 V 1P3W : 0 to 150 V	Less than 1 % of full scale	3P4W : 0.0 to 57.7[%] 1P3W : 0.0 to 50.0[%]
	220 V	—	3P4W : 0 to 300/√3 V 1P3W : 0 to 300 V		
	440 V	—	3P4W : 0 to 600/√3 V		
Active power	110 V	5 A	-1 to 1 kW ([12])	Less than 0.3 % of the rated	ΣP : -100.0 to 100.0[%]
	220 V		-2 to 2 kW ([12])		
	440 V		-4 to 4 kW ([12])		
	110 V	1 A	-200 to 200 W ([12])	Less than 0.5 % of the rated	P_1, P_2, P_3 : -33.3 to 33.3[%]
	220 V		-400 to 400 W ([12])		
	440 V		-800 to 800 W ([12])		

Note([10]) Low input cut value of the N-phase current is twice.
Note([11]) The polarity of the current (power flow) is the same polarity as the power ΣP.
Less than 20% of the voltage full scale, then output as the incoming side.
Note([12]) 1P2W : Active power measurement range is 1/2 of the above.
3P4W : Each phase of the active power measurement range is 1/3 of the above.
0 to +P or 0 to -P or -P to +P, can be set.

Measurands	Rated voltage Rated current		Measuring range	Low input cut	Display
Reactive power, Reactive power (power flow)	110 V	5 A	LEAD 1 to LAG 1 kvar (13)	Less than 0.3 % of the rated	ΣQ : -100.0 to 100.0[%] Q_1, Q_2, Q_3 : -33.3 to 33.3[%]
	220 V		LEAD 2 to LAG 2 kvar (13)		
	440 V		LEAD 4 to LAG 4 kvar (13)		
	110 V	1 A	LEAD 200 to LAG 200 var (13)	Less than 0.5 % of the rated	
	220 V		LEAD 400 to LAG 400 var (13)		
	440 V		LEAD 800 to LAG 800 var (13)		
Apparent power	110 V	5 A	0 to 1 kVA (14)	Less than 0.3 % of the rated	ΣS : 0.0 to 100.0[%] S_1, S_2, S_3 : 0.0 to 33.3[%]
	220 V		0 to 2 kVA (14)		
	440 V		0 to 4 kVA (14)		
	110 V	1 A	0 to 200 VA (14)	Less than 0.5 % of the rated	
	220 V		0 to 400 VA (14)		
	440 V		0 to 800 VA (14)		
Power factor, Power factor (power flow)	110 V 220 V 440 V	5 A 1 A	LEAD 0 to 1 to LAG 0 LEAD 0.5 to 1 to LAG 0.5 LAG 0 to 1 to LEAD 0 LAG 0.5 to 1 to LEAD 0.5	Less than 20 % of the voltage full scale, or less than 2 % of the rated current. Incoming power factor 1.	LEAD to LAG : -0.0 to 100.0 to 0.0[%] LAG to LEAD : 0.0 to 100.0 to -0.0[%]
Frequency (15)	110 V 220 V 440 V	—	45 to 55 Hz 55 to 65 Hz 45 to 65 Hz	Output lower nominal value in less than 20 % of the full scale voltage (Example : 4 mA)	45.0 to 65.0[Hz] Low input cut : 0.0[Hz]
Fundamental voltage	110V 220V 440V	—	Measuring range is same as "voltage". 3P4W, 1P3W : Phase voltage 3P3W, 1P2W : Line voltage	Less than 1 % of voltage full scale	Measuring range is same as "voltage". 3P4W, 1P3W : Phase voltage 3P3W, 1P2W : Line voltage
Active energy	110 V 220 V 440 V	5 A 1 A	0 to 999999999 kWh(MWh) By the setting and the full load power, position and unit of the decimal point (k/M) is changed	—	0 to 999999999 kWh(MWh)
Reactive energy	110 V 220 V 440 V	5 A 1 A	0 to 999999999 kvarh(Mvarh) By the setting and the full load power, position and unit of the decimal point (k/M) is changed	—	0 to 999999999 kvarh(Mvarh)

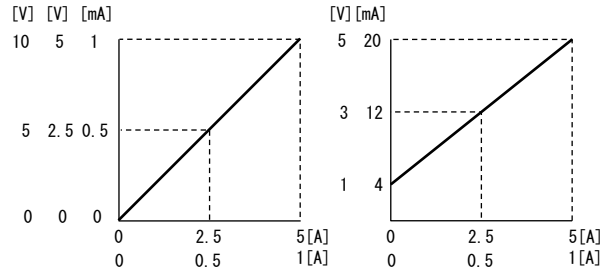
Note(13) 1P2W : reactive power measurement range is 1/2 of the above.
3P4W : Each phase of the reactive power measurement range is 1/3 of the above.
0 to LAG Q or 0 to LEAD Q or LEAD Q to LAG Q, can be set.

Note(14) 1P2W : Apparent power measurement range is 1/2 of the above.
3P4W : Each phase of the apparent power measurement range is 1/3 of the above.

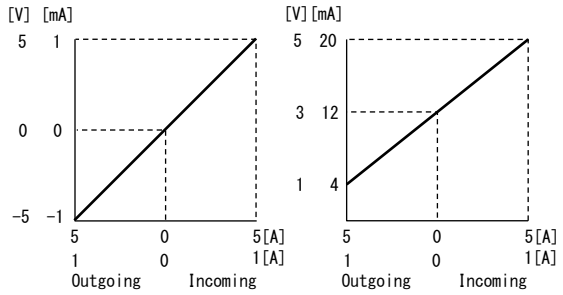
Note(15) Line voltage U_{12} (3P3W, 1P2W) or phase voltage U_{1N} (3P4W, 1P3W) to measure the frequency.
Input frequencies can be measured from 10 to 180 Hz, but accuracy is guaranteed from 45 to 66 Hz.
Also, for measurements of 70 Hz or higher, an input of 40% or more of the voltage full scale is required.

10.5 Input - output characteristic example

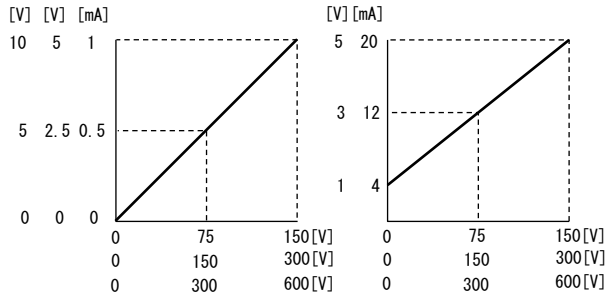
■ Current



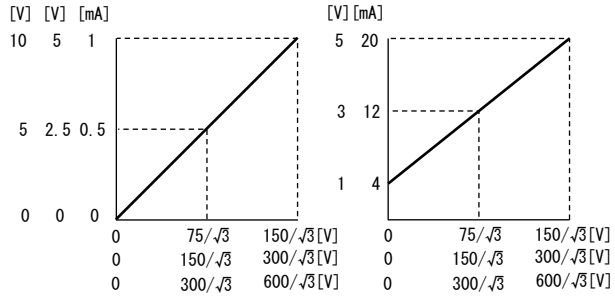
■ Current (Power flow)



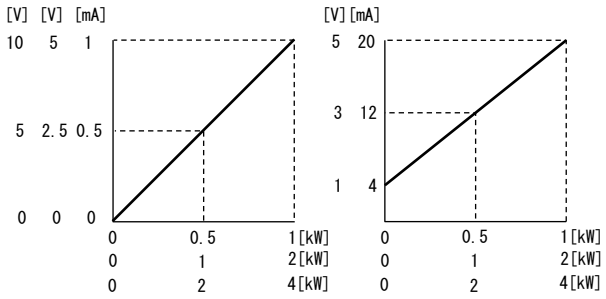
■ Line voltage, Fundamental voltage (Line)



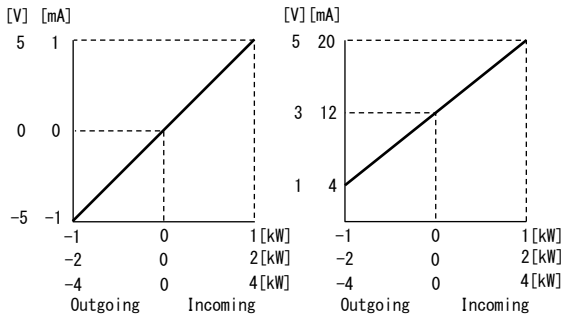
■ Phase voltage (3 phase 4 wire), Fundamental voltage (Phase)



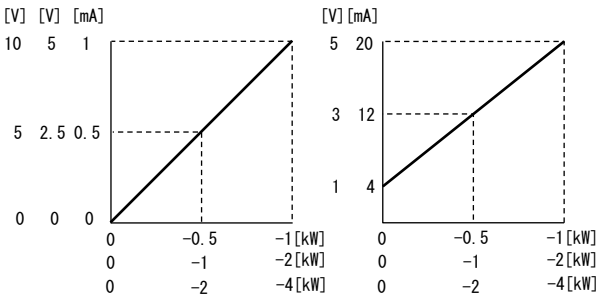
■ Active power (Incoming, 0 to +P[W])



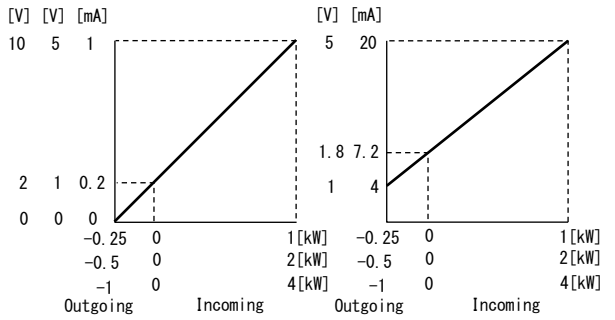
■ Active power (Outgoing and incoming, -P to +P[W])



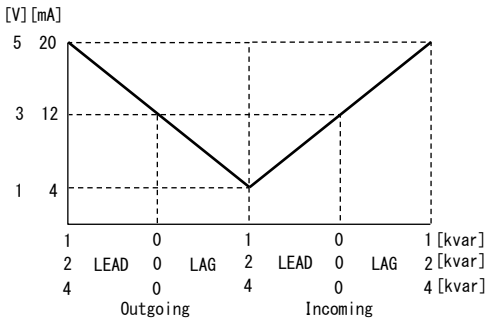
■ Active power (Outgoing, 0 to -P[W])



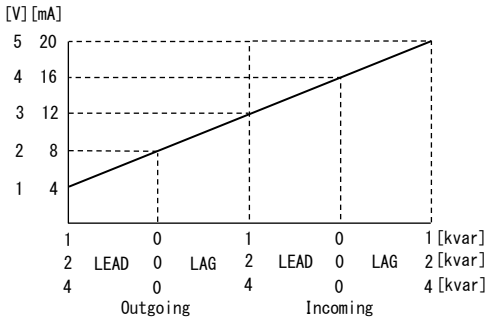
■ Active power (Outgoing and incoming, -P(a) to +P(b)[W])



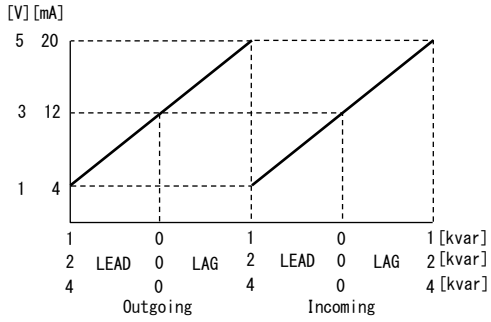
■ Reactive power



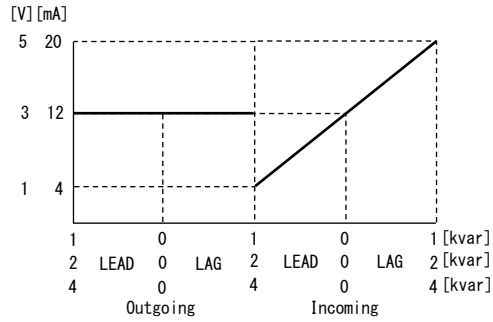
■ Reactive power (Power flow) (4 quadrant)



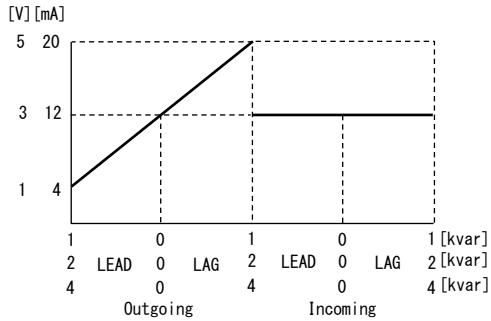
■ Reactive power (Power flow) (2 quadrant)



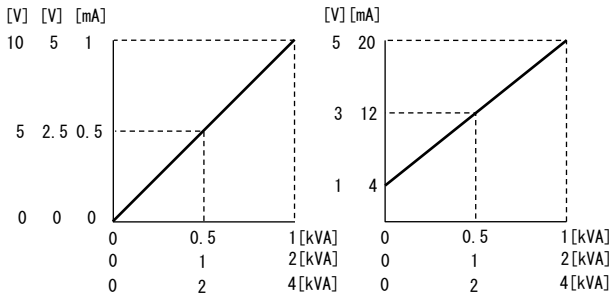
■ Reactive power (Power flow) (2 quadrant, Incoming)



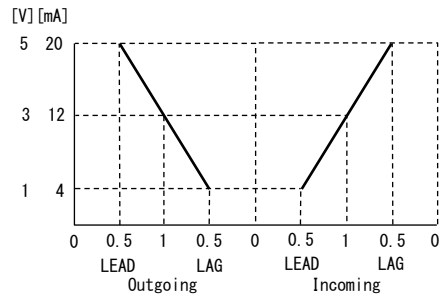
■ Reactive power (Power flow) (2 quadrant, Outgoing)



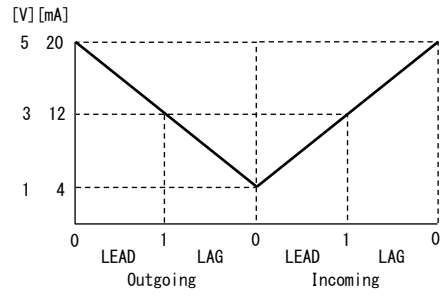
■ Apparent power



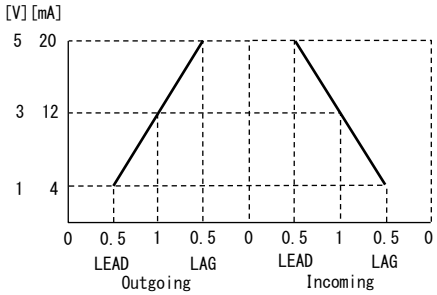
■ Power factor (LEAD 0.5 to LAG 0.5)



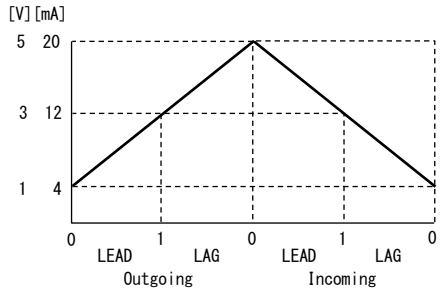
■ Power factor (LEAD 0 to LAG 0)



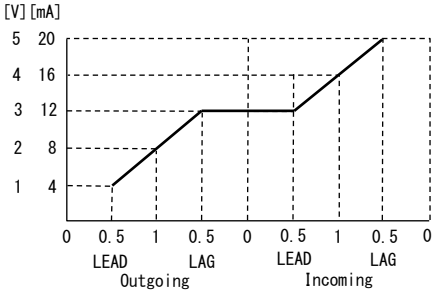
■ Power factor (LAG 0.5 to LEAD 0.5)



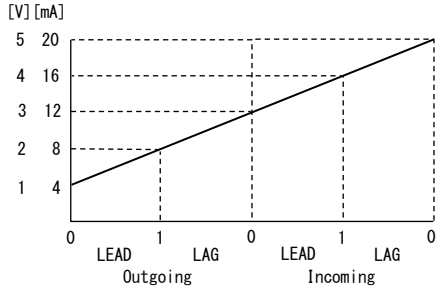
■ Power factor (LAG 0 to LEAD 0)



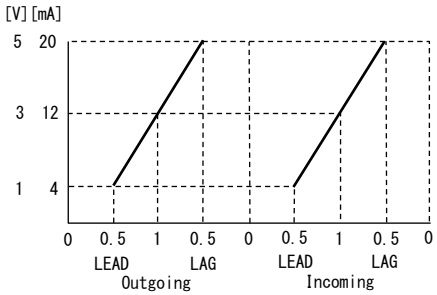
■ Power factor (Power flow)
(4 quadrant, LEAD 0.5 to LAG 0.5)



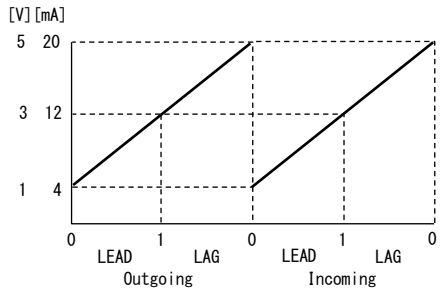
■ Power factor (Power flow)
(4 quadrant, LEAD 0 to LAG 0)



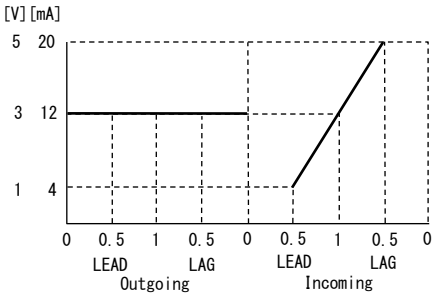
■ Power factor (Power flow)
(2 quadrant, LEAD 0.5 to LAG 0.5)



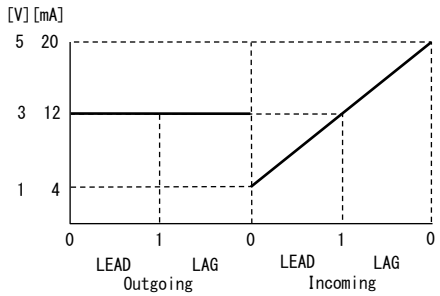
■ Power factor (Power flow)
(2 quadrant, LEAD 0 to LAG 0)



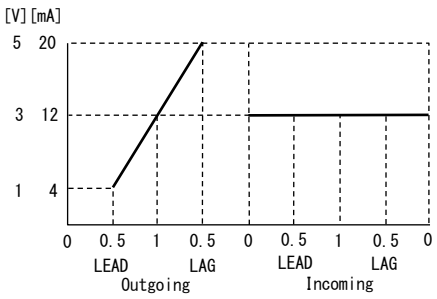
■ Power factor (Power flow)
(2 quadrant, Incoming, LEAD 0.5 to LAG 0.5)



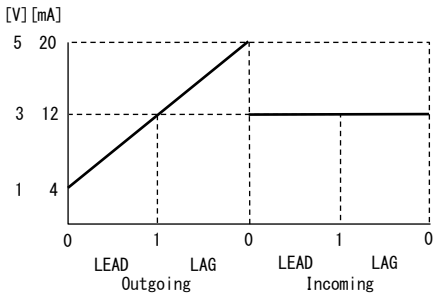
■ Power factor (Power flow)
(2 quadrant, Incoming, LEAD 0 to LAG 0)



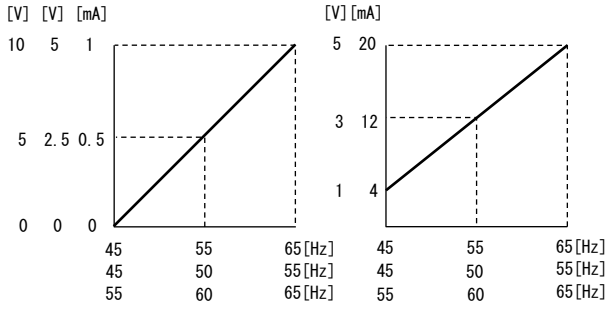
■ Power factor (Power flow)
(2 quadrant, Outgoing, LEAD 0.5 to LAG 0.5)



■ Power factor (Power flow)
(2 quadrant, Outgoing, LEAD 0 to LAG 0)



■ Frequency



11 Multi-transducer setting software (QT2-CS-01)

11.1 Outline

Multi-transducer setting software (QT2-CS-01) is a QT2-500/HSQT2-500 dedicated setup tool.
Software can be downloaded at the WEB site. (URL ; https://www.daiichi-ele.co.jp/)
The following data management is possible by connecting HSQT2-500 and PC with a USB cable.

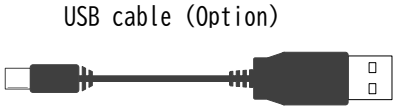
- Edit and save setting data.
- Write setting data into HSQT2-500.
- Read setting data from HSQT2-500.
- Output the setting data in CSV file.

11.2 Hardware requirements

Item	Specification
Personal Computer	PC-AT based computer
Operating System	Windows® 8.1 (32 bits / 64 bits) Windows® 10 (32 bits / 64 bits) Windows® 11 (64 bits)
CPU	32-bits processor : 1 GHz or more 64-bits processor : 1.6 GHz or more
Memory	32-bits processor : 1 GB or more, 64-bits processor : 2 GB or more
HDD	Free space 100 MB or more 〔If the Microsoft .NET Framework 4 Client Profile (32-bit) or Microsoft .NET Framework 4.5 (64-bit) is not installed. Free space of 300 MB or more〕
Display	Resolution : 1024×768 or higher, High Color (65536 colors) or higher
Interface	USB2.0
Communication port	USB (A) port ×1
Other	Mouse, Keyboard

11.3 System configuration

HSQT2-500



PC (QT2-CS-01 installed)

Installation, connection, such as the operation method, please refer to the included manual to QT2-CS-01.

12 Troubleshooting

Trouble	Probable cause	Handling
Power LED is not lights	In the 13th and 14th terminals, auxiliary power supply is not applied.	Please by applying an auxiliary power supply.
Display disappears	By auto off function, display is off	Please press the switch
Does not switch to the setting mode or test mode	By the lock function of the test / configuration.	Please to unlock. Pressing the MODE and SET at the same time for three seconds. Unlock or setting.
Error in analog output	Setting of VT rating and CT rating is wrong	Please check the VT/CT settings
	Output element setting is wrong	Please check the output element setting of each output CH
	Range setting of each measurement items is wrong	Please check the range settings for each measurement items
	Setting of analog output is wrong (0 to 5 V, 1 to 5 V, 0 to 10 V, 2 to 10 V)	Please check the settings of the analog output
	Wiring is wrong	Please check with the test mode wiring check function
Error in communication output	Setting of VT rating and CT rating is wrong	Please check the VT/CT settings
	Wiring is wrong	Please check with the test mode wiring check function
Error in active energy and reactive energy. (Display, Communication, Pulse output)	Setting of VT rating and CT rating is wrong	Please check the VT/CT settings
	Pulse rate setting is wrong	Please check the setting of the output pulse rate
	Wiring is wrong	Please check with the test mode wiring check function

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