

2

# FnIO G-Series

LED No.	LED Function / Description	LED Color
0	Status	Green
1	Voltage Input Channel 1	Green
2	Current Input Channel 1	Green
3	Voltage Input Channel 2	Green
4	Current Input Channel 2	Green
5	Voltage Input Channel 3	Green
6	Current Input Channel 3	Green

## GT-3901

**GT-3901(3Phase AC Measurement, Lx-Ly 500Vac, 1A)**

## Table of Contents

Table of Contents.....	2
History .....	3
1.Environment Specification .....	4
2.GT-3901 (3Phase AC Measurement, Lx-Ly 500Vac, 1A) .....	5
2.1.GT-3901 Specification.....	5
2.2.Update cycle of process data .....	6
2.3.GT-3901 Wiring Diagram.....	7
2.4.GT-3901 LED Indicator.....	8
2.4.1.LED Indicator .....	8
2.4.2.Channel Status LED .....	8
2.5.Mapping Data into the Image Table .....	9
2.6.Parameter Data .....	15

**History**

<b>REV.</b>	<b>PAGES</b>	<b>REMARKS</b>	<b>DATE</b>	<b>Editor</b>
1.00	ALL	New Document	03.16.2018	HS KIM
1.01	8,11,14	Add Features	04.26.2018	HS KIM
1.02	17	Add description	05.08.2018	HS KIM
1.03	5	Power Dissipation	05.15.2018	HS KIM

## 1. Environment Specification

<b>Environmental Specification</b>	
Operation Temperature	-40°C ~ 70°C
UL Temperature	-20°C ~ 60°C
Non-Operating Temperature	-40°C ~ 85°C
Relative Humidity	5% ~ 90% Non-condensing
Operating Altitude	2,000m
Mounting	DIN Rail
<b>General Specification</b>	
Shock Operating	IEC 60068-2-27
Vibration Resistance	<p>Sine Vibration (Based on IEC 60068-2-6)</p> <ul style="list-style-type: none"> <li>- 5 ~ 25Hz : ±1.6mm</li> <li>- 25 ~ 300Hz : 4g</li> <li>- Sweep Rate : 1 Oct/min, 20 Sweeps</li> </ul> <p>Random Vibration (Based on IEC 60068-2-64)</p> <ul style="list-style-type: none"> <li>- 10 ~ 40 Hz : 0.0125 g<sup>2</sup>/Hz</li> <li>- 40 ~ 100 Hz : 0.0125 → 0.002 g<sup>2</sup>/Hz</li> <li>- 100 ~ 500 Hz : 0.002 g<sup>2</sup>/Hz</li> <li>- 500 ~ 2000 Hz : 0.002 → 1.3 x 10<sup>-4</sup> g<sup>2</sup>/Hz</li> <li>- Test time : 1hrs for each test</li> </ul>
EMC Resistance Burst/ESD	<p>EN 61000-6-2 : 2005</p> <p>EN 61000-6-4/A11 : 2011</p>
Installation Pos. / Protect. Class	Variable/IP20
Product Certifications	UL

# Specification

## 2. GT-3901 (3Phase AC Measurement, Lx-Ly 500Vac, 1A)

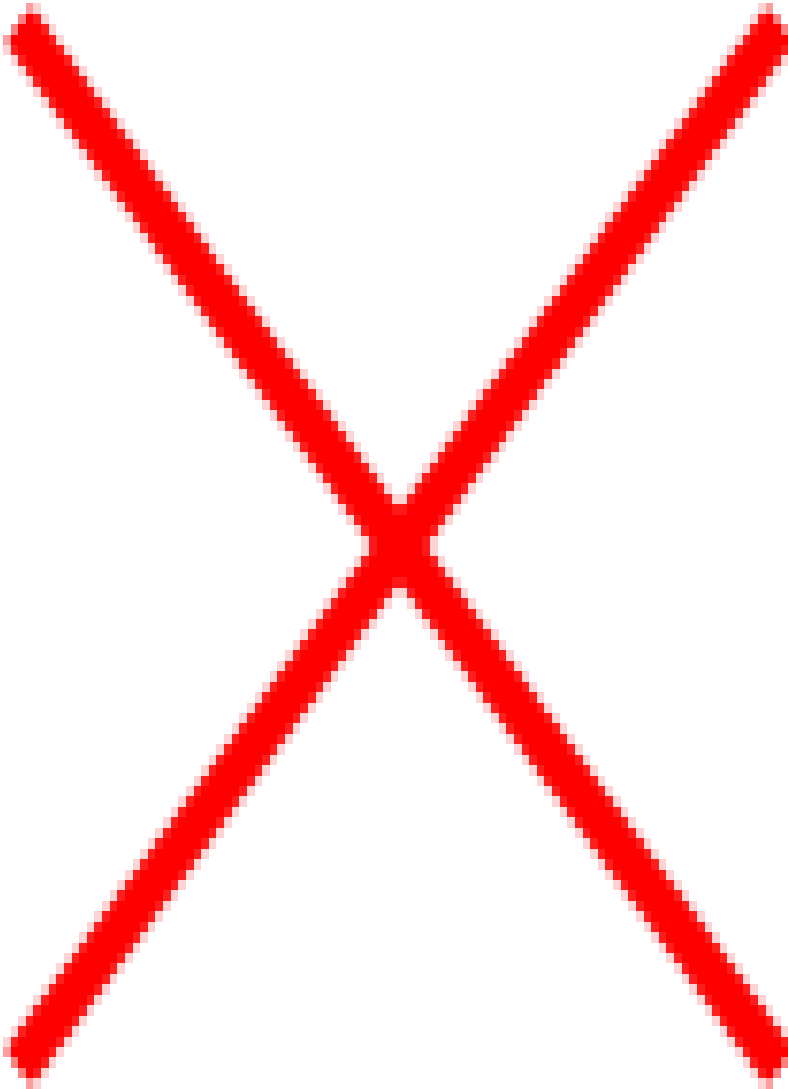
### 2.1. GT-3901 Specification

Items	Specification
<b>Input Specification</b>	
Number of Channel	3Ch Voltage Input, 3Ch Current Input via CT
Indicators	1 Green Status LEDs 3 LEDs : VL1, VL2, VL3 LEDs 3 LEDs : IL1, IL2, IL3
Input Voltage Range	$V_{LN} = 288VAC$ , $V_{LL} = 500VAC$
Input resistance voltage path	1200K $\Omega$
Measuring Current	1A(MAX), CT 1 : 4000(MAX)
Input resistance current path	30m $\Omega$
Resolution	24bits
Input Frequency range	45Hz~65Hz
Measured values	Angle, Voltage, Current, Power, Energy, Frequency, Power Factors
Measuring error	Voltage&Current = 0.5% @ -20°C~50°C Voltage&Current = 1% @ -20°C~60°C Voltage&Current = 1.5% @ -40°C~70°C Frequency = ±0.1Hz Phase angle = ±0.6°
<b>General Specification</b>	
Power Dissipation	Max. 125 mA @ 5Vdc
Isolation	I/O to Logic : Photocoupler Isolation Field Power : Non-Isolation
Field Power	Supply Voltage : 24Vdc nominal Voltage Range : 18~32Vdc Power dissipation: 0mA @32Vdc
Wiring	I/O Cable Max. 2.0mm <sup>2</sup> (AWG#14)
Weight	63g
Module Size	12mm x 109mm x 70mm
<b>Environment Condition</b>	<b>Refer to '1. Environment Specification'</b>

\* The measuring accuracy is reduced, if the extended temperature range is used(-40°C ~ 70°C)

\* If the input value is small, the error of calculation value can be large (Please input 10% or more of the whole range)

## 2.2. Update cycle of process data



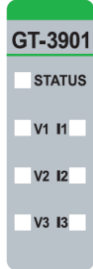
## 2.3. GT-3901 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Voltage Input 0 (L1)	Voltage Input 1 (L2)	1
2	Voltage Input 2 (L3)	Voltage Input Common(Neutral)	3
4	Current Input L1	Current Input N1	5
6	Current Input L2	Current Input N2	7
8	Current Input L3	Current Input N3	9

## 2.4. GT-3901 LED Indicator

### 2.4.1. LED Indicator



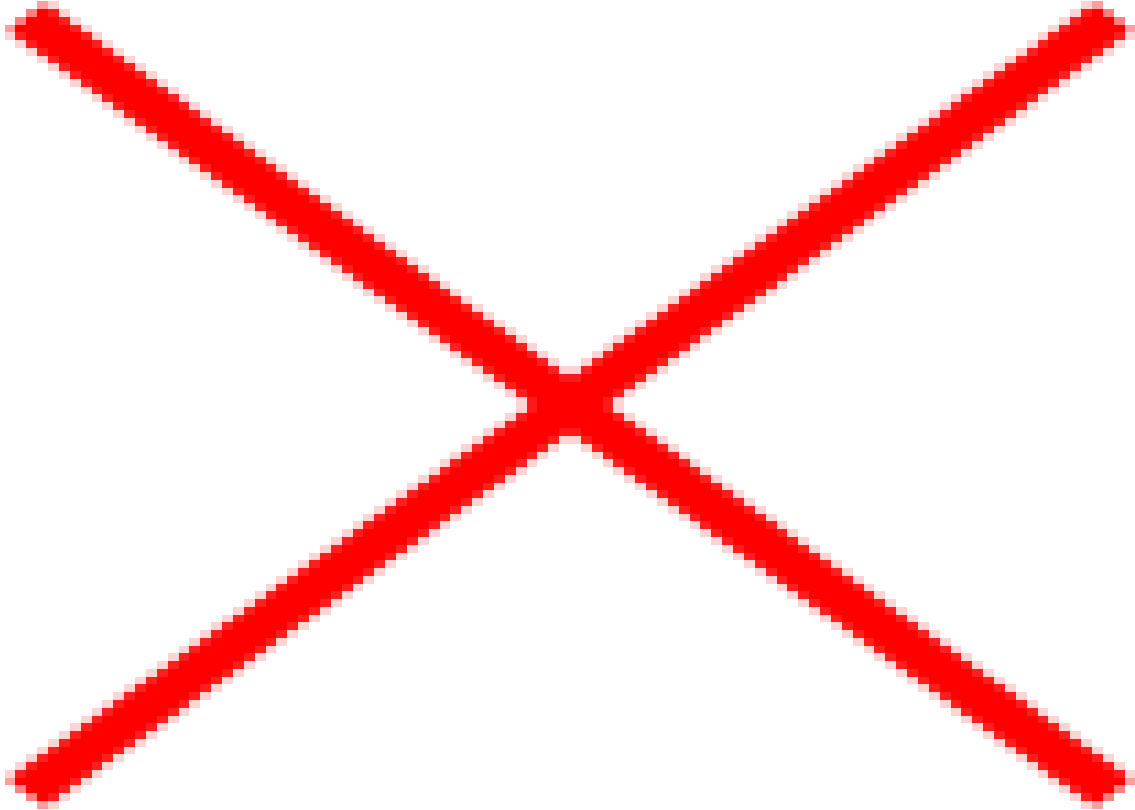
### 2.4.2. Channel Status LED

Status	LED	To indicate
Over Voltage	Voltage Input LED : Off	Error Occurred
	Voltage Input LED : Green	Nomal Operation
Under Voltage	Voltage Input LED : Off	Error Occurred
	Voltage Input LED : Green	Nomal Operation
Over Current	Current Input LED : Off	Error Occurred
	Current Input LED : Green	Nomal Operation
No Signal	Voltage Input LED : Off Current Input LED : Off	Error Occurred
	Voltage Input LED : Green Current Input LED : Green	Nomal Operation
G-Bus Status	Status LED : Off	Disconnection
	Status LED : Green	Connection

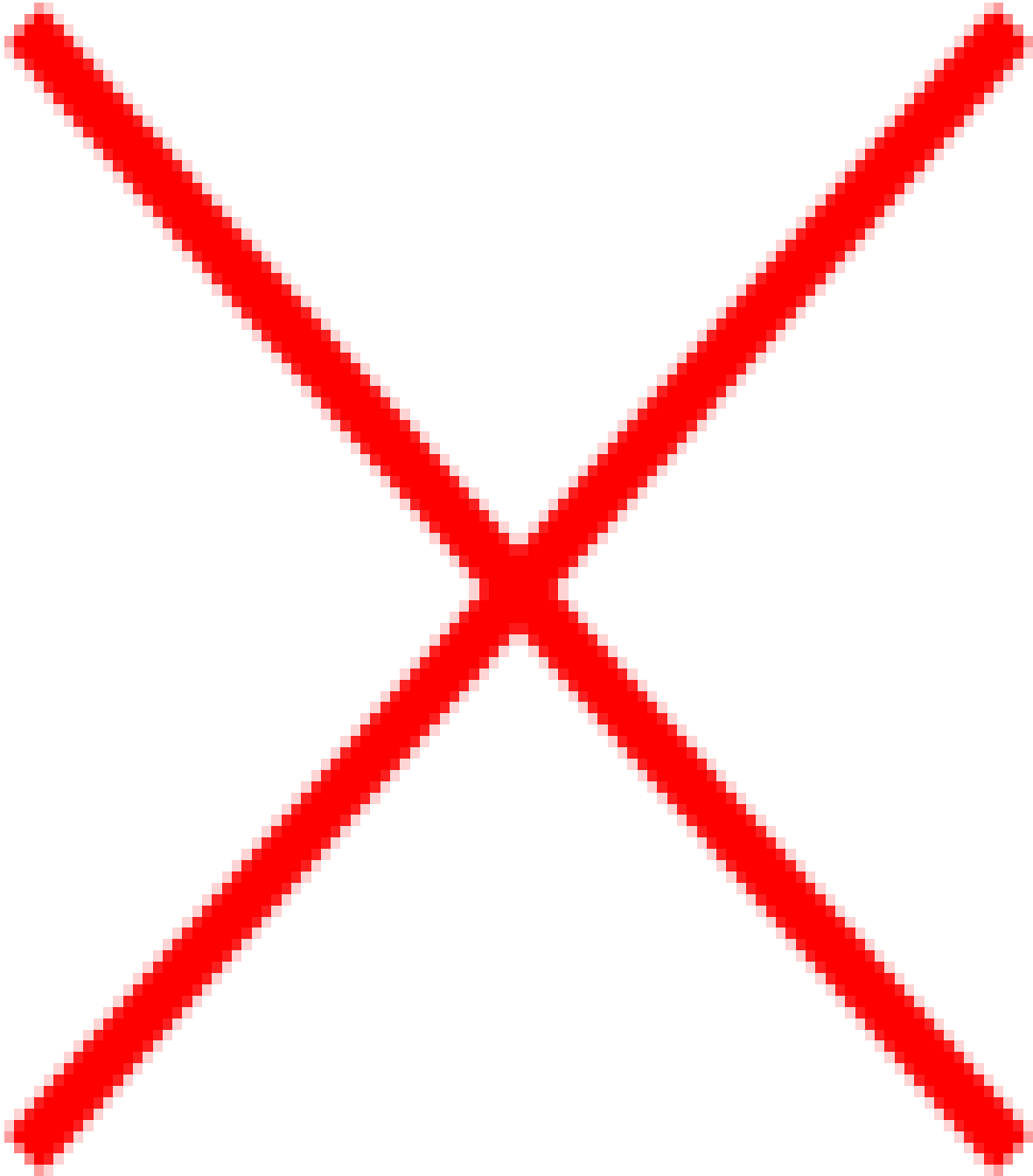
\* Please refer to Input Image Data.(Error Byte)

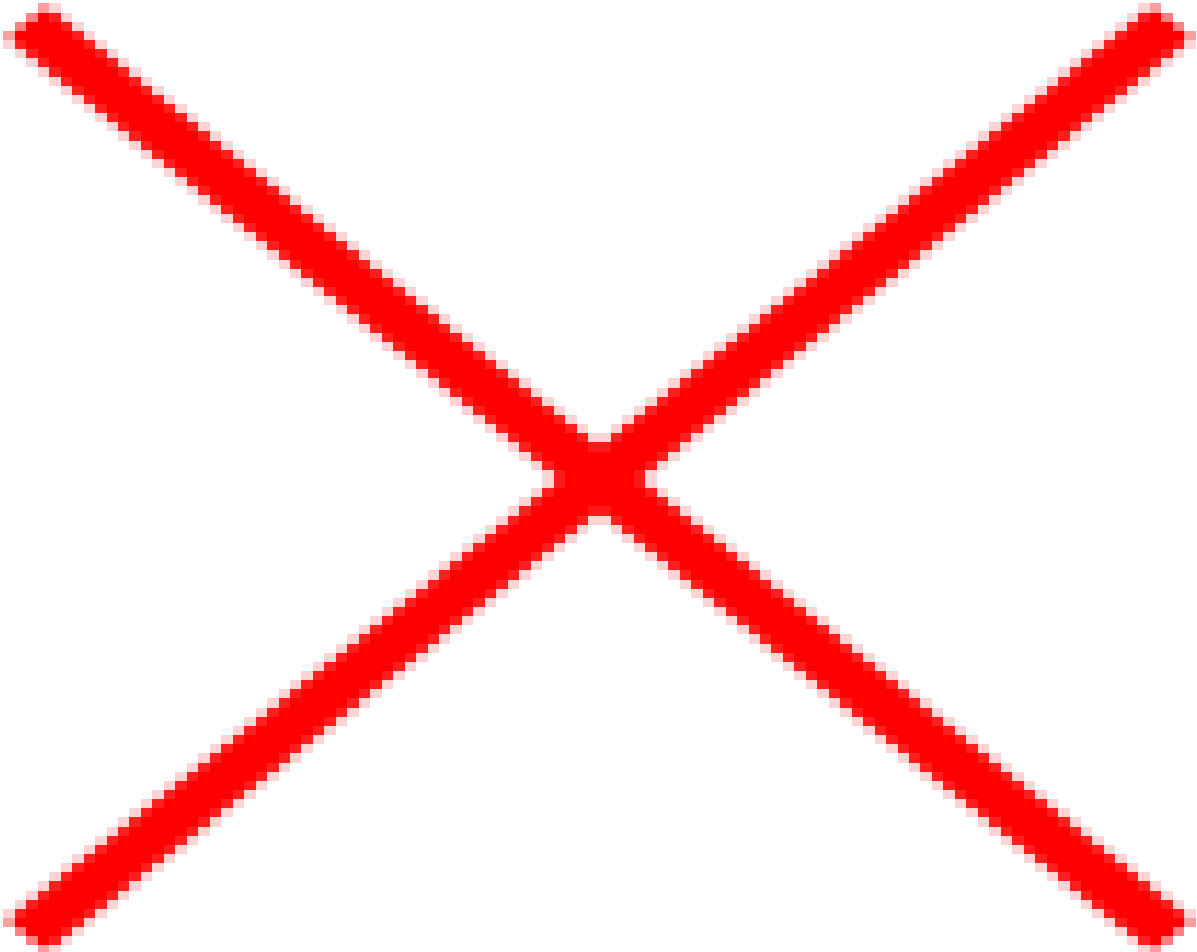


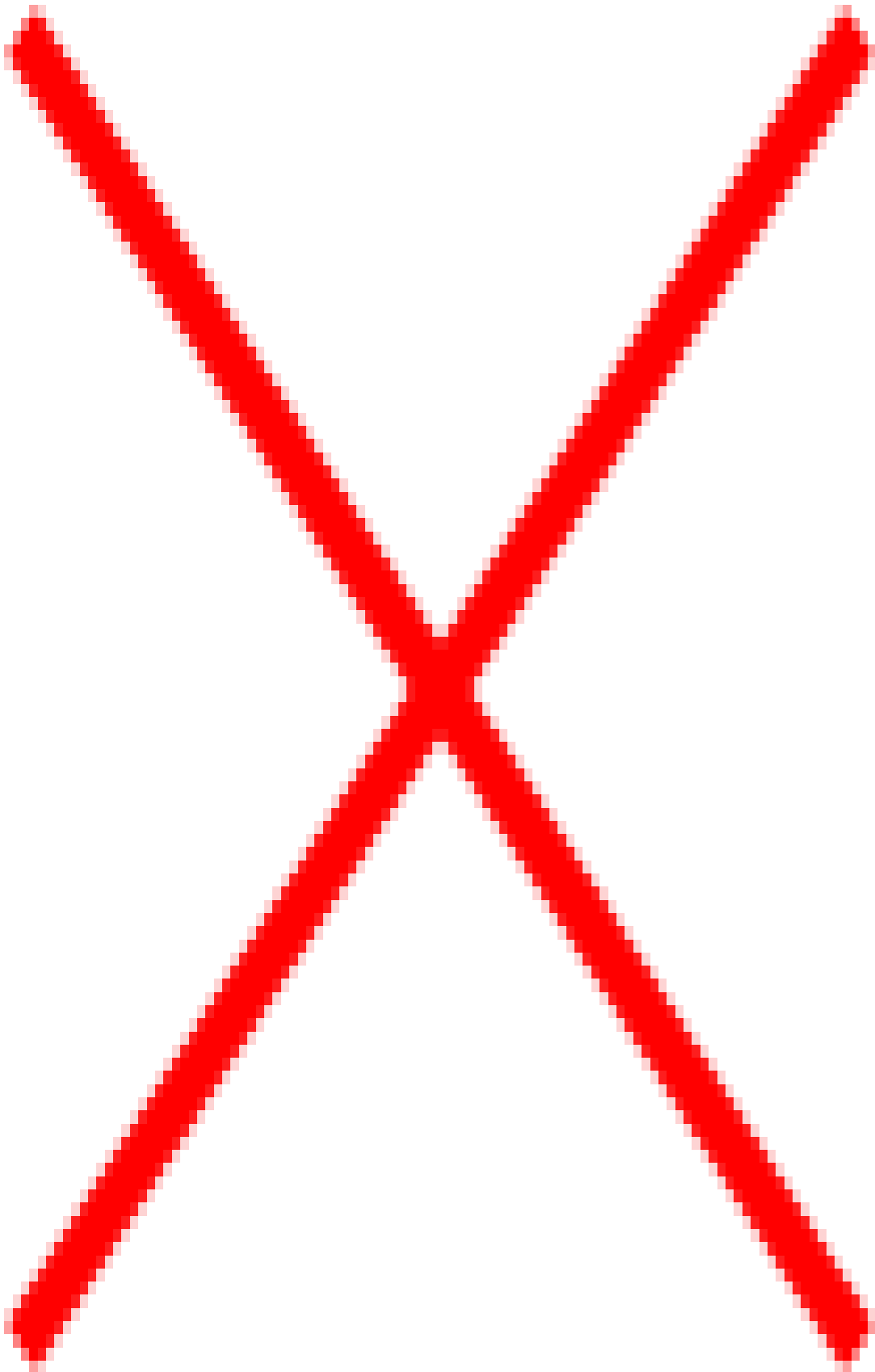
## 2.5. Mapping Data into the Image Table



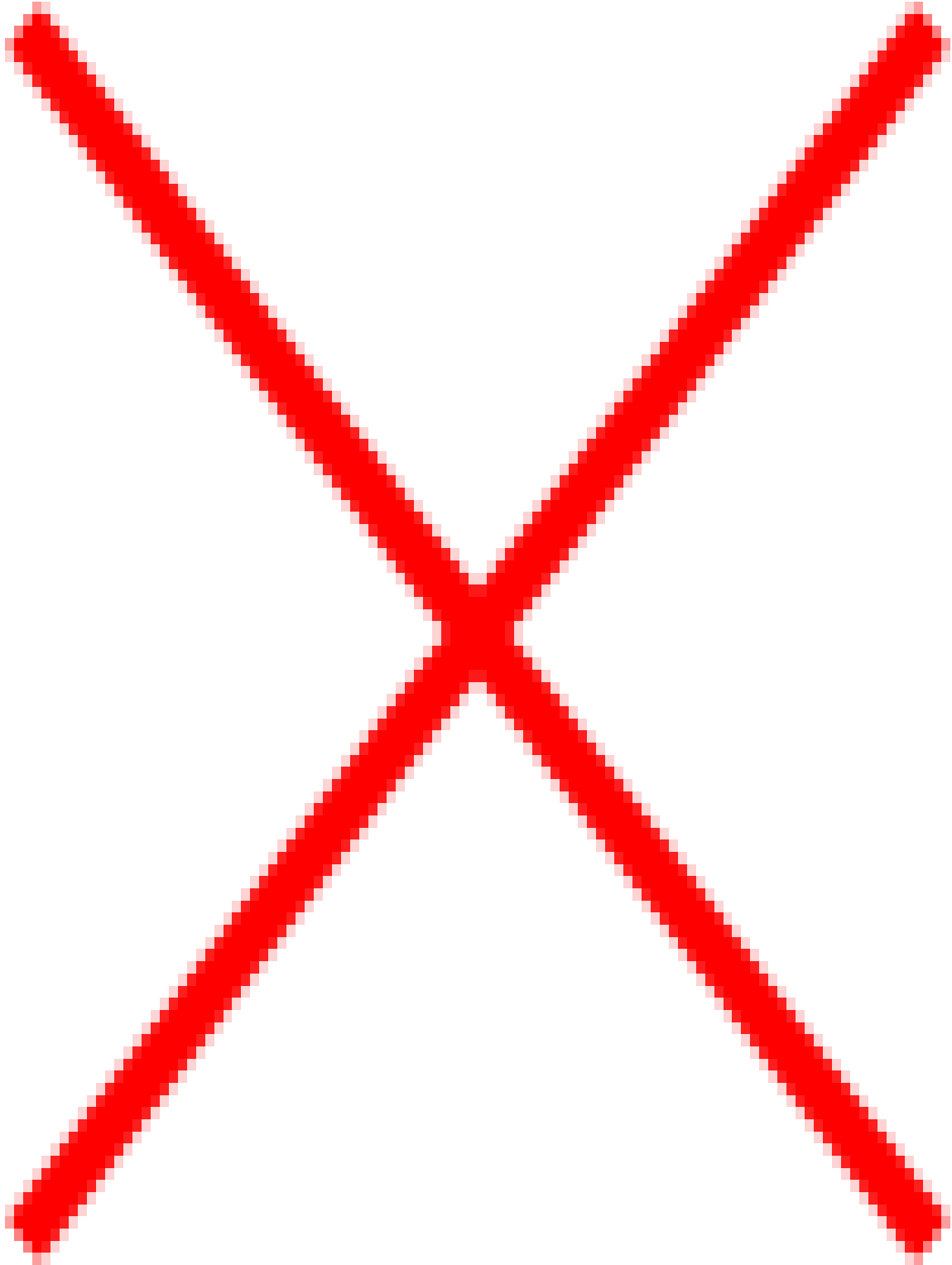
- **Input Image Value**

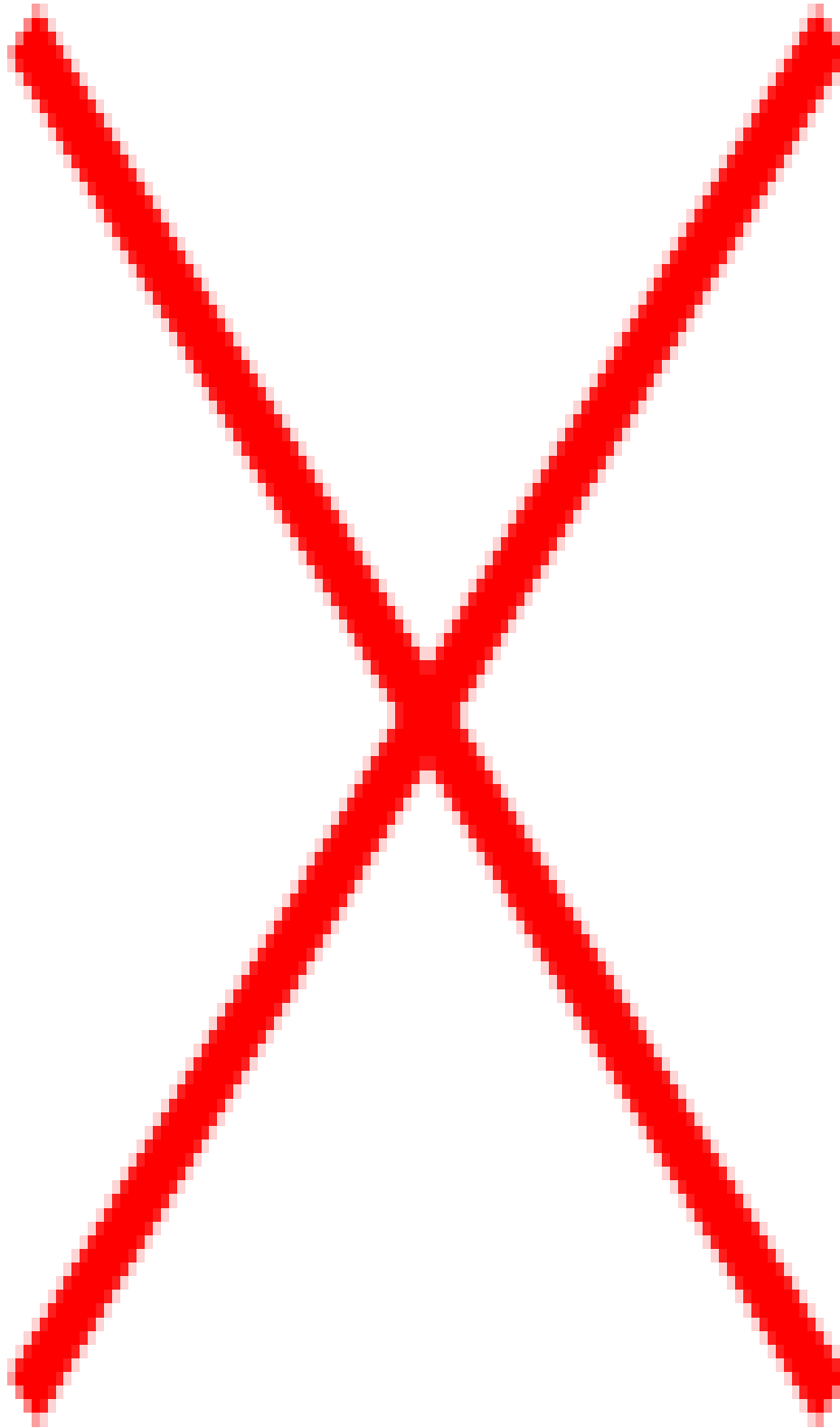


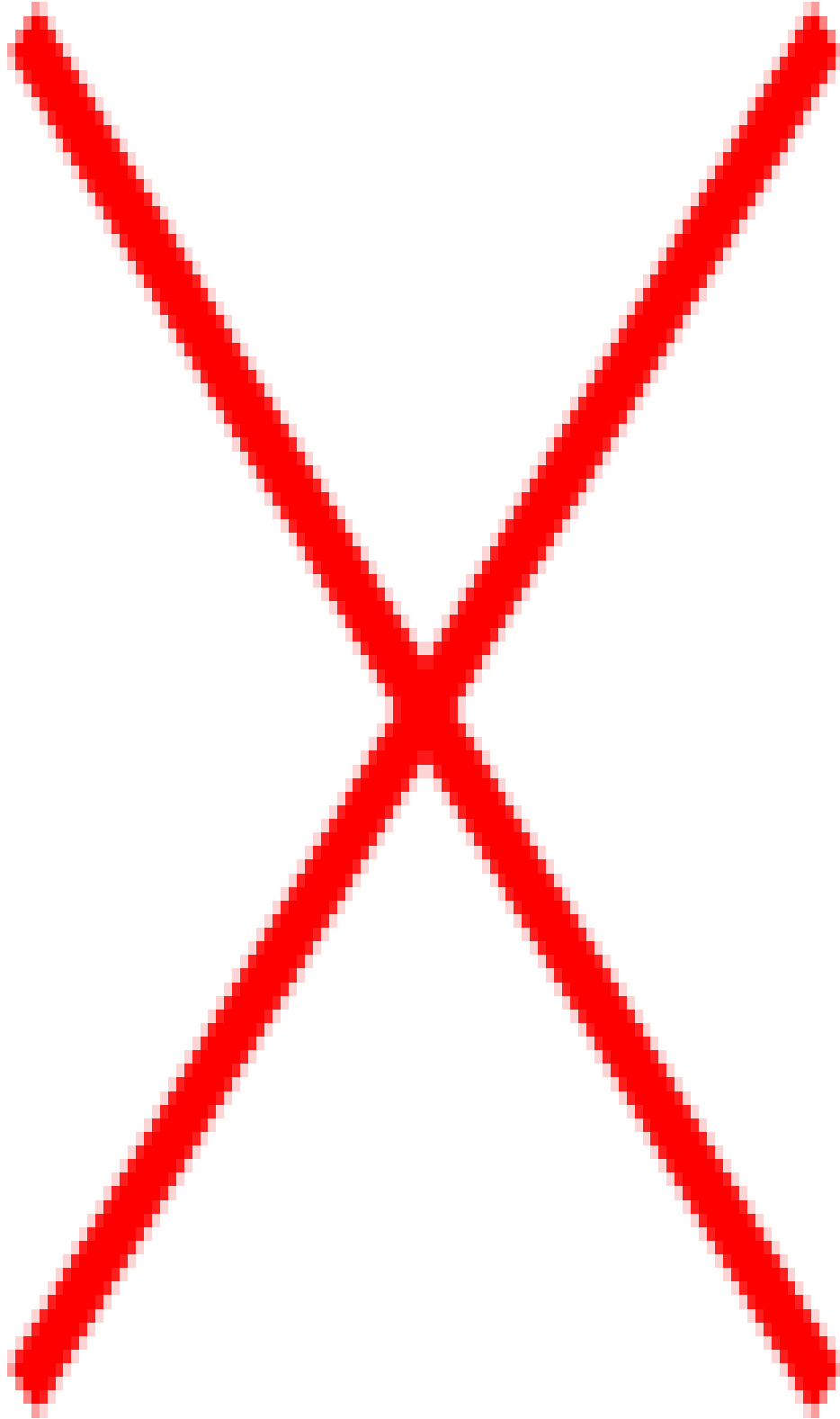


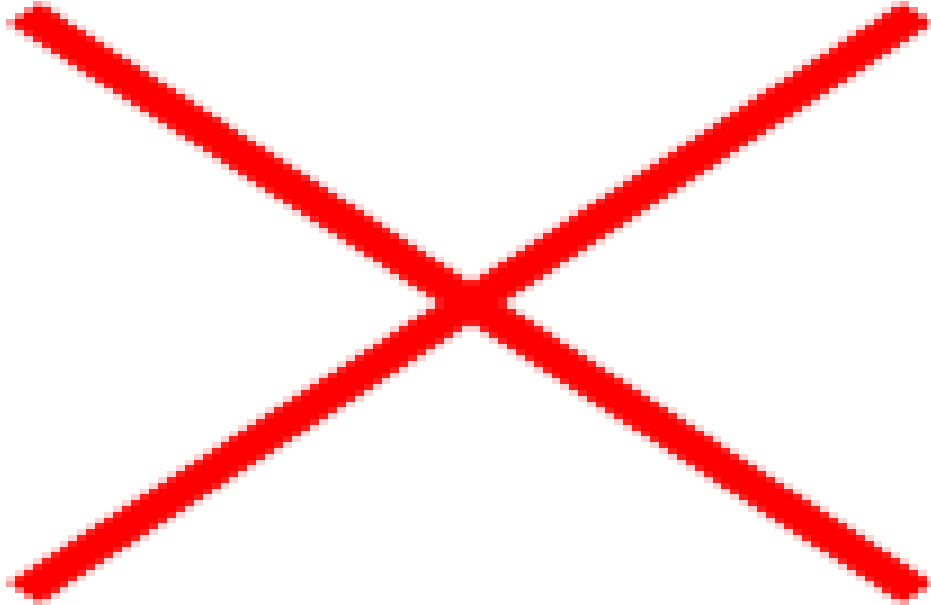


- **Output Image Value**







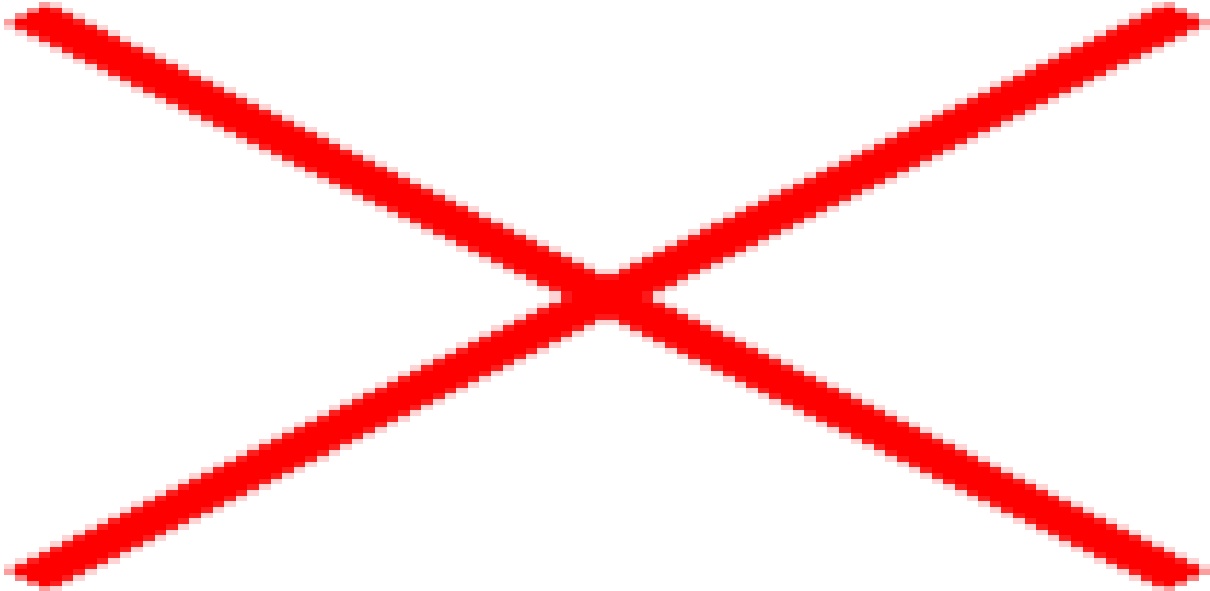




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## 2.6. Parameter Data

- Valid Parameter length : 5 Bytes
- Parameter Data



\* Set Frequency to get the correct Power Factor & Energy.



\*the reactive power measurement is negative when the load is capacitive, and when the load is inductive. The sign of the reactive power can therefore be used to reflect the sign of the power factor.

Power Factor = (Sign Fundamental Reactive Power) \* (abs(Active Power)/Apparent Power)

● **Example of Setting**

- Read data : Phase1 Rms Voltage/Rms Current/Apparent power/Active power.
  - Input Value : 220V, 1000A, PF 0.5
  - Parameter : CT 1 : 1000, Input Frequency 55~65Hz, Overvoltage threshold 260V, Other is Default(0).
  - Overvoltage Threshold =  $(260V(\text{User Setting Value}) - 250V(\text{default Setting Value}))/0.2V$ . Resolution : 0.2V
  - ex) OverCurrent Threshold =  $1000A(\text{User Setting CT 1 : 1000}) = ((1A(\text{User Setting Value}) - 0.8(\text{default Setting Value}))/0.001) * 1000(\text{CT})$ . Resolution : 0.001A
- \* All of default value is 0

**-Step#1**

-Set the Parameter

Parameter	Value
CT sensor 1 : x (12 bit)	001111101000 (bit) Set CT 1000
Scaling for energy values (3 bit)	000 (bit) Set 1m Wh/VARh/VAh
Frequency (1 bit)	1 (bit) Set 55~65Hz
Overvoltage Threshold Lx (8 bit)	00110010 (bit) Set 260V
Undervoltage Threshold Lx (8 bit)	00000000 (bit) Set 0V(default)
Overcurrent Threshold Lx(8 bit)	00000000 (bit) Set 0.8A(default)
All of Parameter	E8 83 32 00 00 (Byte hex)

**-Step#2**

-Set the Control Byte (See Output Image Value)

	Bit#7	Bit#6	Bit#5	Bit#4	Bit#3	Bit#2	Bit#1	Bit#0
Control Byte #0	RES	Measure Select (Voltage)			CON_ID (Rms Voltage L1-N)			
	0	0	0	0	0	0	0	0
Control Byte #1	reserved	Measure Select (Current)			CON_ID (Rms Current L1-N)			
	0	0	0	1	0	0	0	0
Control Byte #2	reserved	Measure Select (Power)			CON_ID (Apparent Power L1)			
	0	0	0	2	0	0	0	0
Control Byte #3	reserved	Measure Select (Power)			CON_ID (Active Power L1)			
	0	0	0	2	0	0	1	1

# Specification

**-Step#3**

-Check the Status Byte, When Status Byte and Control Byte are same, the Process value is updated.

	Bit#7	Bit#6	Bit#5	Bit#4	Bit#3	Bit#2	Bit#1	Bit#0
Status Byte #0	RES	Measure Select (Voltage)			CON_ID (Rms Voltage L1-N)			
	0	0	0	0	0	0	0	0
Status Byte #0	reserved	Measure Select (Current)			CON_ID (Rms Current L1-N)			
	0	0	0	1	0	0	0	0
Status Byte #0	reserved	Measure Select (Power)			CON_ID (Apparent Power L1)			
	0	0	0	2	0	0	0	0
Status Byte #0	reserved	Measure Select (Power)			CON_ID (Active Power L1)			
	0	0	0	2	0	0	1	1

**-Step#4**

-Check the Process value

Process value#0(Rms Voltage)	000055F0(Dword hex) 22000(Dec) 220V
Process value#1(Rms Current)	000F4240(Dword hex) 1000000(Dec) 1000A
Process value#2(Apparent power)	014FB180(Dword hex) 22000000(Dec) 220kVA
Process value#3(Active power)	00A7D8C0(Dword hex) 11000000(Dec) 110kW