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DOCUMENT CHANGE SUMMARY				
REV	PAGE	REMARKS	DATE	EDITOR
1.00	New Document		2020/07/31	CH HONG
1.01	P10, 16, 22, 29	- Count mode ch#0, ch#1, Configuration Parameter Data - Reference Add	2020/10/21	CH HONG
1.02	P10, 16, 22	- Count mode ch#0, ch#1	2021/02/05	CH HONG

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## 1. Important Notes

Solid state equipment has operational characteristics differing from those of electromechanical equipment.

Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls describes some important differences between solid state equipment and hard-wired electromechanical devices.

Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will CREVIS be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, CREVIS cannot assume responsibility or liability for actual use based on the examples and diagrams.

### **Warning!**

**If you don't follow the directions, it could cause a personal injury, damage to the equipment or explosion**

Do not assemble the products and wire with power applied to the system. Else it may cause an electric arc, which can result into unexpected and potentially dangerous action by field devices. Arching is explosion risk in hazardous locations. Be sure that the area is non-hazardous or remove system power appropriately before assembling or wiring the modules.

Do not touch any terminal blocks or IO modules when system is running. Else it may cause the unit to an electric shock or malfunction.

Keep away from the strange metallic materials not related to the unit and wiring works should be controlled by the electric expert engineer. Else it may cause the unit to a fire, electric shock or malfunction

### **Caution!**

**If you disobey the instructions, there may be possibility of personal injury, damage to equipment or explosion. Please follow below Instructions.**

Check the rated voltage and terminal array before wiring. Avoid the circumstances over 50°C of temperature. Avoid placing it directly in the sunlight.

Avoid the place under circumstances over 85% of humidity.



Do not place Modules near by the inflammable material. Else it may cause a fire.

Do not permit any vibration approaching it directly.


Go through module specification carefully, ensure inputs, output connections are made with the specifications. Use standard cables for wiring. Use Product under pollution degree 2 environment.

## 1.1. Safety Instruction

### 1.1.1. Symbols

<p><b>DANGER</b></p> 	<p>Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death property damage, or economic loss</p>
<p><b>IMPORTANT</b></p>	<p>Identifies information that is critical for successful application and understanding of the product</p>
<p><b>ATTENTION</b></p> 	<p>Identifies information about practices or circumstances that can lead to personal injury, property damage, or economic loss. Attentions help you to identify a hazard, avoid a hazard, and recognize the consequences</p>

### 1.1.2. Safety Notes

<p><b>DANGER</b></p> 	<p>The modules are equipped with electronic components that may be destroyed by electrostatic discharge. When handling the modules, ensure that the environment (persons, workplace and packing) is well grounded. Avoid touching conductive components, GBUS Pin.</p>
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### 1.1.3. Certification

c-UL-us UL Listed Industrial Control Equipment, certified for U.S. and Canada

See UL File E235505

CE Certificate

EN 61000-6-2; Industrial Immunity

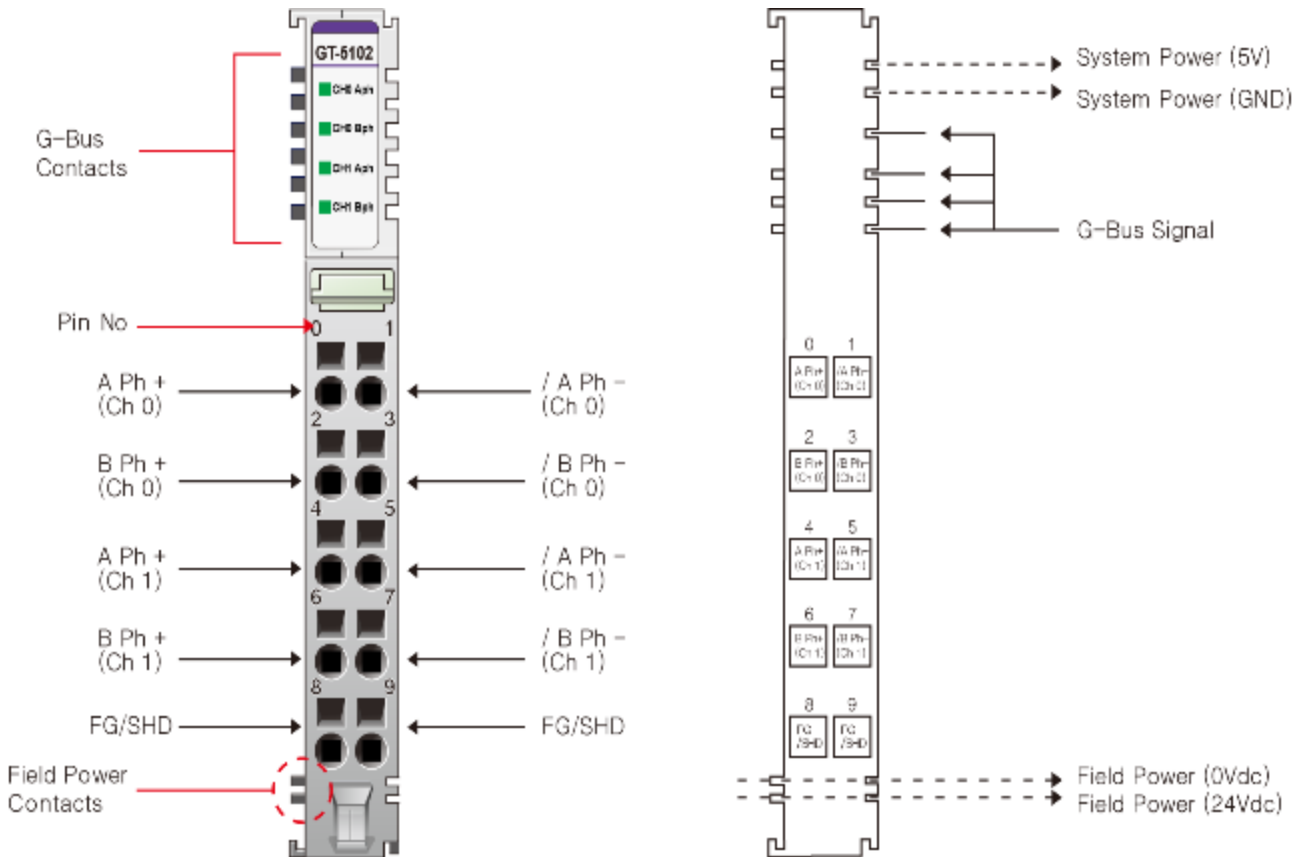
EN 61000-6-4; Industrial Emissions

Reach, RoHS (EU, CHINA)

## 2. Specification

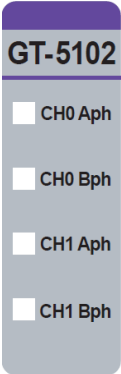
### 2.1. GT-5102

#### 2.1.1. Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Aph Input+ Ch# 0	/Aph Input - Ch# 0	1
2	Bph Input+ Ch# 0	/Bph Input - Ch# 0	3
4	Aph Input+ Ch# 1	/Aph Input - Ch# 1	5
6	Bph Input+ Ch# 1	/Bph Input - Ch# 1	7
8	Shield	Shield	9

### 2.1.2. LED Indicator



LED No.	LED Function / Description	LED Color
0	Aph Input Ch# 0	Green
1	Bph Input Ch# 0	Green
2	Aph Input Ch# 1	Green
3	Bph Input Ch# 1	Green

### 2.1.3. Channel Status LED

Status	LED is	To indicate
No Signal	Off	Normal Operation
On Signal	Green	Normal Operation

### 2.1.4. Specification

Items	Specification
<b>Input specification</b>	
Number of channel	2 Channel - Encoder, High Speed Counter, Frequency measurement Pulse width & Period measurement
Indicators	4 green terminal input
Input voltage	5Vdc nominal (Max 5.2Vdc)
Input current	13mA @ 5Vdc
Min on-state voltage	≥2.1Vdc
Input frequency	0~750kHz Encoder Mode 0~300kHz Counting Mode
Counting mode	1-Input Mode : Up,Down 2-Input Mode : Encoder 4x, Up/Inhibit, Up/Reset, Down/Inhibit down/Reset, UP/Down, Clock/Direction, Frequency Measurement, Pulse Width & Period measurement
Counter size	32bit-wide/channel
<b>General specification</b>	
Power dissipation	Max. 70mA @ 5Vdc
Isolation	I/O to Logic : photocoupler isolation
UL field power	Supply Voltage : 24Vdc nominal, Class 2
Field power	Not used Field power bypass to next expansion module
Wiring	I/O Cable Max. 2.0mm <sup>2</sup> (AWG 14)
Torque	0.8Nm (7 lb-in)
Weight	60g
Module size	12mm x 99mm x 70mm
<b>Environment condition</b>	<b>Refer to '1. Environment Specification'</b>



### 2.1.5. Mapping data into the image table

#### Input Image Data – 8byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Counter Value Ch#0 LL							
1	Counter Value Ch#0 LH							
2	Counter Value Ch#0 HL							
3	Counter Value Ch#0 HH							
4	Counter Value Ch#1 LL							
5	Counter Value Ch#1 LH							
6	Counter Value Ch#1 HL							
7	Counter Value Ch#1 HH							

- Each channel has 4-byte Input
- Counter value represents counter, frequency(Hz), pulse width (0.1usec) or pulse period (0.1usec).

#### Output Image Data – 2byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	CR 0	CS 0	--	--	Count Mode ch#0			
1	CR 1	CS 1	--	--	Count Mode ch#1			

- CR 0,1 : Counter Reset for Ch#0, Ch#1
- CS 0,1 : Counter Stop ( Inhibit Input ) for Ch#0, Ch#1
- Count Mode Ch#0,1 : Count Mode for Ch#0, Ch#1 respectively

## Count Mode Ch#0, Ch#1

Value	Count Mode	Description
B' 0000 (0x0)	Up	Up Counter - Aph Input acts as Up Clock - Bph Input is not used
B' 0001 (0x1)	Down	Down Counter - Aph Input acts as Down Clock - Bph Input is not used
B' 0010 (0x2)	-	-
B' 0011 (0x3)	-	-
B' 0100 (0x4)	Up Clock & Inhibit	Up Counter with Inhibit - Aph Input acts as Up Clock Input - Bph Input acts as Inhibit function for Up Clock Input
B' 0101 (0x5)	Up Clock & Reset	Up Counter with Reset - Aph Input acts as Up Clock Input - Bph Input acts as Reset function to Counter
B' 0110 ( 0x6 )	Down Clock & Inhibit	Down Counter with Inhibit - Aph Input acts as Down Clock Input - Bph Input acts as Inhibit function for Down Clock Input
B' 0111 ( 0x7 )	Down Clock & Reset	Down Counter with Reset - Aph Input acts as Down Clock Input - Bph Input acts as Reset function to Counter
B' 1000 ( 0x8 )	Up Clock & Down Clock	Up & Down Counter - Aph Input acts as Up Clock Input - Bph Input acts as Down Clock Input
B' 1001 ( 0x9 )	Clock & Direction	Up & Down with Direction - Aph Input acts as Clock Input - Bph Input acts as Direction Input ( Low = Up Count, High = Down Count )
B' 1010 ( 0xA )	Encoder 1x (*1)	Encoder 1x - Frequency Range of the Encoder x1 mode (0x0A) is the same as the counting mode. (Possible Frequency ~300kHz) (*1) - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1011 ( 0xB )	Encoder 2x	Encoder 2x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1100 ( 0xC )	Encoder 4x	Encoder 4x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1101 ( 0xD )	Frequency Measurement (*2) 1 sec Update	Simple Frequency Measurement, updated by 1sec, Hz Unit - Frequency, B' 1101 (0xD) can't be used with other channel's Count Mode = 0x0, 0x1, 0x4 ~ 0xA (*2) - Aph Input acts as Frequency Input - Bph Input is not used
B' 1110 ( 0xE )	Pulse Width Measurement(*3)	Simple Pulse Width Measurement, 0.1usec Unit - Pulse Width(32bit), if 1234, then Pulse High(On) width is

		123.4usec (*3) - Aph Input acts as Pulse Input - Bph Input is not used
B' 1111 ( 0xF )	Pulse Width & Period Measurement(*4)	Simple Pulse Width & Period Measurement, 0.1usec Unit, - Available in case of Pulse Input >= 200Hz(<= 2.5msec, Pulse On Width) - Pulse Width(16bit, Low Word) + Pulse Period(16bit, High Word) (*4) - Aph Input acts as Pulse Input - Bph Input is not used

- Frequency Range of the Encoder x1 mode is the same as the counting mode.
- Frequency, B'1101(0xD) can't be used with other channel's Count Mode = 0x0, 0x1, 0x4 ~ 0x9
- Pulse Width, B'1110(0xE) measures Aph Input's High(On) Pulse Width(32bit) in 0.1usec unit.
- Pulse Width & Period, B'1111(0xF) measures Aph's Pulse High(On) Width(16bit) & Period(16bit) in 0.1usec unit.

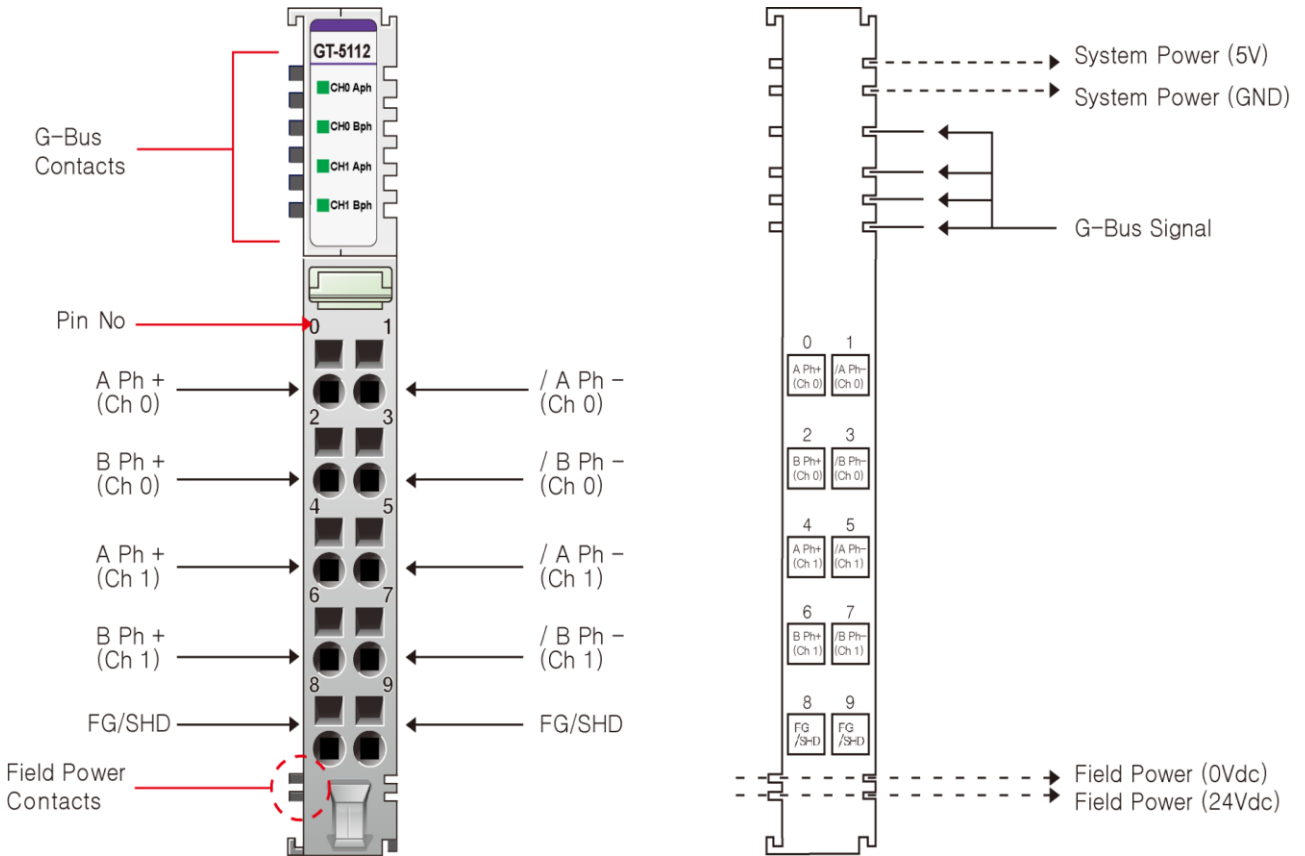
#### Configuration Parameter Data – 4byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0								Reserved
1								Reserved
2								Reserved
3								Reserved

※ Please refer to page 29 in case F/W Rev 1.000, Rev 1.001

## 2.2. GT-5112

### 2.2.1. Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Aph Input+ Ch# 0	/Aph Input - Ch# 0	1
2	Bph Input+ Ch# 0	/Bph Input - Ch# 0	3
4	Aph Input+ Ch# 1	/Aph Input - Ch# 1	5
6	Bph Input+ Ch# 1	/Bph Input - Ch# 1	7
8	Shield	Shield	9

### 2.2.2. LED Indicator



LED No.	LED Function / Description	LED Color
0	Aph Input Ch# 0	Green
1	Bph Input Ch# 0	Green
2	Aph Input Ch# 1	Green
3	Bph Input Ch# 1	Green

### 2.2.3. Channel Status LED

Status	LED is	To indicate
No Signal	Off	Normal Operation
On Signal	Green	Normal Operation

### 2.2.4. Specification

Items	Specification
<b>Input specification</b>	
Number of channel	2 channel - Encoder, High Speed Counter, Frequency measurement Pulse width & Period measurement
Indicators	4 green terminal input
Input voltage	24Vdc nominal (Max 28.8Vdc)
Input current	3mA @ 24Vdc
Min on-state voltage	≥ 16.5Vdc
Input frequency	0~750kHz Encoder Mode 0~300kHz Counting Mode
Counting mode	1-Input Mode : Up,Down 2-Input Mode : Encoder 4x, Encoder 2x, Up/Inhibit, Up/Reset, Down/Inhibit, Down/Reset, UP/Down, Clock/Direction, Frequency Measurement, Pulse Width & Period measurement
Counter size	32bit-wide/channel
<b>General specification</b>	
Power dissipation	Max. 65mA @ 5Vdc
Isolation	I/O to Logic : photocoupler isolation
UL field power	Supply Voltage : 24Vdc nominal, Class 2
Field power	Not used Field power bypass to next expansion module
Wiring	I/O Cable Max. 2.0mm <sup>2</sup> (AWG 14)
Torque	0.8Nm(7 lb-in)
Weight	60g
Module size	12mm x 99mm x 70mm
<b>Environment condition</b>	<b>Refer to '1. Environment Specification'</b>

## 2.2.5. Mapping data into the image table

### Input Image Data – 8byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Counter Value Ch#0 LL							
1	Counter Value Ch#0 LH							
2	Counter Value Ch#0 HL							
3	Counter Value Ch#0 HH							
4	Counter Value Ch#1 LL							
5	Counter Value Ch#1 LH							
6	Counter Value Ch#1 HL							
7	Counter Value Ch#1 HH							

- Each channel has 4-byte Input
- Counter value represents counter, frequency(Hz), pulse width (0.1usec) or pulse period (0.1usec).

### Output Image Data – 2byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	CR 0	CS 0	--	--	Count Mode ch#0			
1	CR 1	CS 1	--	--	Count Mode ch#1			

- CR 0,1 : Counter Reset for Ch#0, Ch#1
- CS 0,1 : Counter Stop ( Inhibit Input ) for Ch#0, Ch#1
- Count Mode Ch#0,1 : Count Mode for Ch#0, Ch#1 respectively

## Count Mode Ch#0, Ch#1

Value	Count Mode	Description
B' 0000 (0x0)	Up	Up Counter - Aph Input acts as Up Clock - Bph Input is not used
B' 0001 (0x1)	Down	Down Counter - Aph Input acts as Down Clock - Bph Input is not used
B' 0010 (0x2)	-	-
B' 0011 (0x3)	-	-
B' 0100 (0x4)	Up Clock & Inhibit	Up Counter with Inhibit - Aph Input acts as Up Clock Input - Bph Input acts as Inhibit function for Up Clock Input
B' 0101 (0x5)	Up Clock & Reset	Up Counter with Reset - Aph Input acts as Up Clock Input - Bph Input acts as Reset function to Counter
B' 0110 ( 0x6 )	Down Clock & Inhibit	Down Counter with Inhibit - Aph Input acts as Down Clock Input - Bph Input acts as Inhibit function for Down Clock Input
B' 0111 ( 0x7 )	Down Clock & Reset	Down Counter with Reset - Aph Input acts as Down Clock Input - Bph Input acts as Reset function to Counter
B' 1000 ( 0x8 )	Up Clock & Down Clock	Up & Down Counter - Aph Input acts as Up Clock Input - Bph Input acts as Down Clock Input
B' 1001 ( 0x9 )	Clock & Direction	Up & Down with Direction - Aph Input acts as Clock Input - Bph Input acts as Direction Input ( Low = Up Count, High = Down Count )
B' 1010 ( 0xA )	Encoder 1x (*1)	Encoder 1x - Frequency Range of the Encoder x1 mode (0x0A) is the same as the counting mode. (Possible Frequency ~300kHz) (*1) - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1011 ( 0xB )	Encoder 2x	Encoder 2x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1100 ( 0xC )	Encoder 4x	Encoder 4x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1101 ( 0xD )	Frequency Measurement 1sec Update (*2)	Simple Frequency Measurement, updated by 1sec, Hz Unit - Frequency, B' 1101 (0xD) can't be used with other channel's Count Mode = 0x0, 0x1, 0x4 ~ 0xA (*2) - Aph Input acts as Frequency Input - Bph Input is not used



B' 1110 ( 0xE )	Pulse Width Measurement (*3)	Simple Pulse Width Measurement, 0.1usec Unit - Pulse Width(32bit), if 1234, then Pulse High(On) width is 123.4usec (*3) - Aph Input acts as Pulse Input - Bph Input is not used
B' 1111 ( 0xF )	Pulse Width & Period Measurement (*4)	Simple Pulse Width & Period Measurement, 0.1usec Unit, - Available in case of Pulse Input >= 200Hz(<= 2.5msec, Pulse On Width) - Pulse Width(16bit, Low Word) + Pulse Period(16bit, High Word) (*4) - Aph Input acts as Pulse Input - Bph Input is not used

- Frequency Range of the Encoder x1 mode is the same as the counting mode.
- Frequency, B'1101(0xD) can't be used with other channel's Count Mode = 0x0, 0x1, 0x4 ~ 0x9
- Pulse Width, B'1110(0xE) measures Aph Input's High(On) Pulse Width(32bit) in 0.1usec unit.
- Pulse Width & Period, B'1111(0xF) measures Aph's Pulse High(On) Width(16bit) & Period(16bit) in 0.1usec unit.

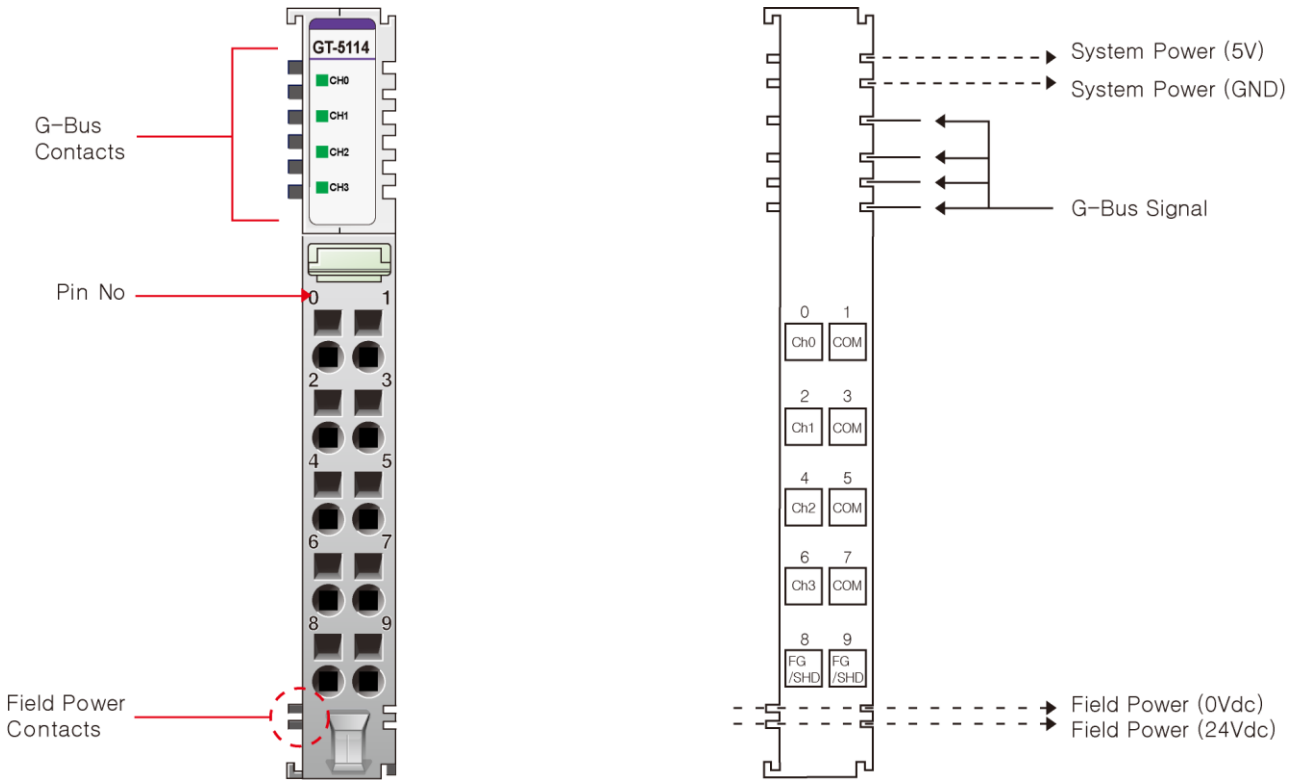
#### Configuration Parameter Data – 4byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0								Reserved
1								Reserved
2								Reserved
3								Reserved

※ Please refer to page 10 in case F/W Rev 1.000, Rev 1.001

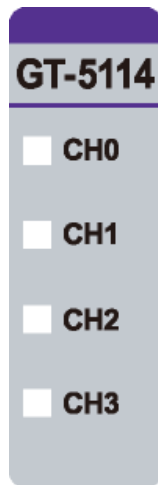
### 2.3. GT-5114

#### 2.3.1. Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Counter Input Ch#0	COM0	1
2	Counter Input Ch#1	COM1	3
4	Counter Input Ch#2	COM2	5
6	Counter Input Ch#3	COM3	7
8	Shield	Shield	9

### 2.3.2. LED Indicator



LED No.	LED Function / Description	LED Color
0	Counter Input Ch#0	Green
1	Counter Input Ch#1	Green
2	Counter Input Ch#2	Green
3	Counter Input Ch#3	Green

### 2.3.3. Channel Status LED

Status	LED	To Indicate
No Signal	Off	Normal Operation
On Signal	Green	Normal Operation

### 2.3.4. Specification

Items	Specification
<b>Input specification</b>	
Number of channel	4 channel - Encoder, High Speed Counter, Frequency measurement Pulse width&Period measurement
Indicators	4 green terminal input
Input voltage	24Vdc nominal (Max. 28.8Vdc)
Input current	3mA @ 24Vdc
Min on-state voltage	≥ 16.5Vdc
Input frequency	0~100kHz Count Mode 0~750kHz Encoder Mode
Counting mode	1-Input Mode: Up, Down, Frequency Measurement, Pulse Width&Period measurement 2-Input Mode: Encoder 4x, Encoder 2x, Up/Inhibit, Up/Reset Down/Inhibit, Down/Reset, Up/Down,Clock/Direction
Counter size	32bit-wide/channel
<b>General specification</b>	
Power dissipation	Max. 70mA @ 5Vdc
Isolation	I/O to Logic : photocoupler isolation
UL field power	Supply Voltage : 24Vdc nominal, Class 2
Field power	Not used Field power bypass to next expansion module
Wiring	I/O Cable Max. 2.0 (AWG 14)
Torque	0.8Nm(7 lb-in)
Weight	60g
Module size	12 x 99 x 70
<b>Environment condition</b>	<b>Refer to 'Environment Specification'</b>

### 2.3.5. Mapping data into the image table

#### Input Image Data - 16byte

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	Counter Value Ch#0 LL							
Byte 1	Counter Value Ch#0 LH							
Byte 2	Counter Value Ch#0 HL							
Byte 3	Counter Value Ch#0 HH							
Byte 4	Counter Value Ch#1 LL							
Byte 5	Counter Value Ch#1 LH							
Byte 6	Counter Value Ch#1 HL							
Byte 7	Counter Value Ch#1 HH							
Byte 8	Counter Value Ch#2 LL							
Byte 9	Counter Value Ch#2 LH							
Byte 10	Counter Value Ch#2 HL							
Byte 11	Counter Value Ch#2 HH							
Byte 12	Counter Value Ch#3 LL							
Byte 13	Counter Value Ch#3 LH							
Byte 14	Counter Value Ch#3 HL							
Byte 15	Counter Value Ch#3 HH							

- Each channel has 4-byte Input
- Counter value represents counter, frequency(Hz), pulse width (0.1usec) or pulse period (0.1usec).

#### Output Image Data - 4byte

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	CR 0	CS 0	--	--	Count Mode Ch#0			
Byte 1	CR 1	CS 1	--	--	Count Mode Ch#1			
Byte 2	CR 2	CS 2	--	--	Count Mode Ch#2			
Byte 3	CR 3	CS 3	--	--	Count Mode Ch#3			

- CR 0~3 : Counter Reset for Ch#0~3
- CS 0~3 : Counter Stop (Inhibit Input) for Ch#0~3
- Count Mode Ch#0~3 : Count Mode for Ch#0~3 respectively

**Count Mode Ch#0, Ch#1**

Value	Count Mode	Description
B' 0000 (0x0)	Up	Up Counter - Aph Input acts as Up Clock - Bph Input is not used
B' 0001 (0x1)	Down	Down Counter - Aph Input acts as Down Clock - Bph Input is not used
B' 0010 (0x2)	-	-
B' 0011 (0x3)	-	-
B' 0100 (0x4)	Up Clock & Inhibit	Up Counter with Inhibit - Aph Input acts as Up Clock Input - Bph Input acts as Inhibit function for Up Clock Input
B' 0101 (0x5)	Up Clock & Reset	Up Counter with Reset - Aph Input acts as Up Clock Input - Bph Input acts as Reset function to Counter
B' 0110 (0x6)	Down Clock & Inhibit	Down Counter with Inhibit - Aph Input acts as Down Clock Input - Bph Input acts as Inhibit function for Down Clock Input
B' 0111 (0x7)	Down Clock & Reset	Down Counter with Reset - Aph Input acts as Down Clock Input - Bph Input acts as Reset function to Counter
B' 1000 (0x8)	Up Clock & Down Clock	Up & Down Counter - Aph Input acts as Up Clock Input - Bph Input acts as Down Clock Input
B' 1001 (0x9)	Clock & Direction	Up & Down with Direction - Aph Input acts as Clock Input - Bph Input acts as Direction Input ( Low = Up Count, High = Down Count )
B' 1010 (0xA)	Encoder 1x (*1)	Encoder 1x - Frequency Range of the Encoder x1 mode (0x0A) is the same as the counting mode. (Possible Frequency ~300kHz) (*1) - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1011 (0xB)	Encoder 2x	Encoder 2x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1100 (0xC)	Encoder 4x	Encoder 4x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1101 (0xD)	Frequency Measurement 1sec Update (*2)	Simple Frequency Measurement, updated by 1sec, Hz Unit Simple Frequency Measurement, updated by 1sec, Hz Unit - Frequency, B' 1101 (0xD) can't be used with other channel's Count Mode = 0x0, 0x1, 0x4 ~ 0xA (*2) - Aph Input acts as Frequency Input

		- Bph Input is not used
B' 1110 ( 0xE )	Pulse Width Measurement (*3)	Simple Pulse Width Measurement, 0.1usec Unit - Pulse Width(32bit), if 1234, then Pulse High(On) width is 123.4usec (*3) - Aph Input acts as Pulse Input - Bph Input is not used
B' 1111 ( 0xF )	Pulse Width & Period Measurement (*4)	Simple Pulse Width & Period Measurement, 0.1usec Unit, - Available in case of Pulse Input >= 200Hz(<= 2.5msec, Pulse On Width) - Pulse Width(16bit, Low Word) + Pulse Period(16bit, High Word) (*4) - Aph Input acts as Pulse Input - Bph Input is not used

- Frequency Range of the Encoder x1 mode is the same as the counting mode.
- Frequency, B'1101(0xD) can't be used with other channel's Count Mode = 0x0, 0x1, 0x4 ~ 0x9
- Pulse Width, B'1110(0xE) measures Aph Input's High(On) Pulse Width(32bit) in 0.1usec unit.
- Pulse Width & Period, B'1111(0xF) measures Aph's Pulse High(On) Width(16bit) & Period(16bit) in 0.1usec unit.

#### Configuration Parameter Data – 4byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0								Reserved
1								Reserved
2								Reserved
3								Reserved

※ Please refer to page 29 in case F/W Rev 1.000, Rev 1.001

### 3. Environment Specification

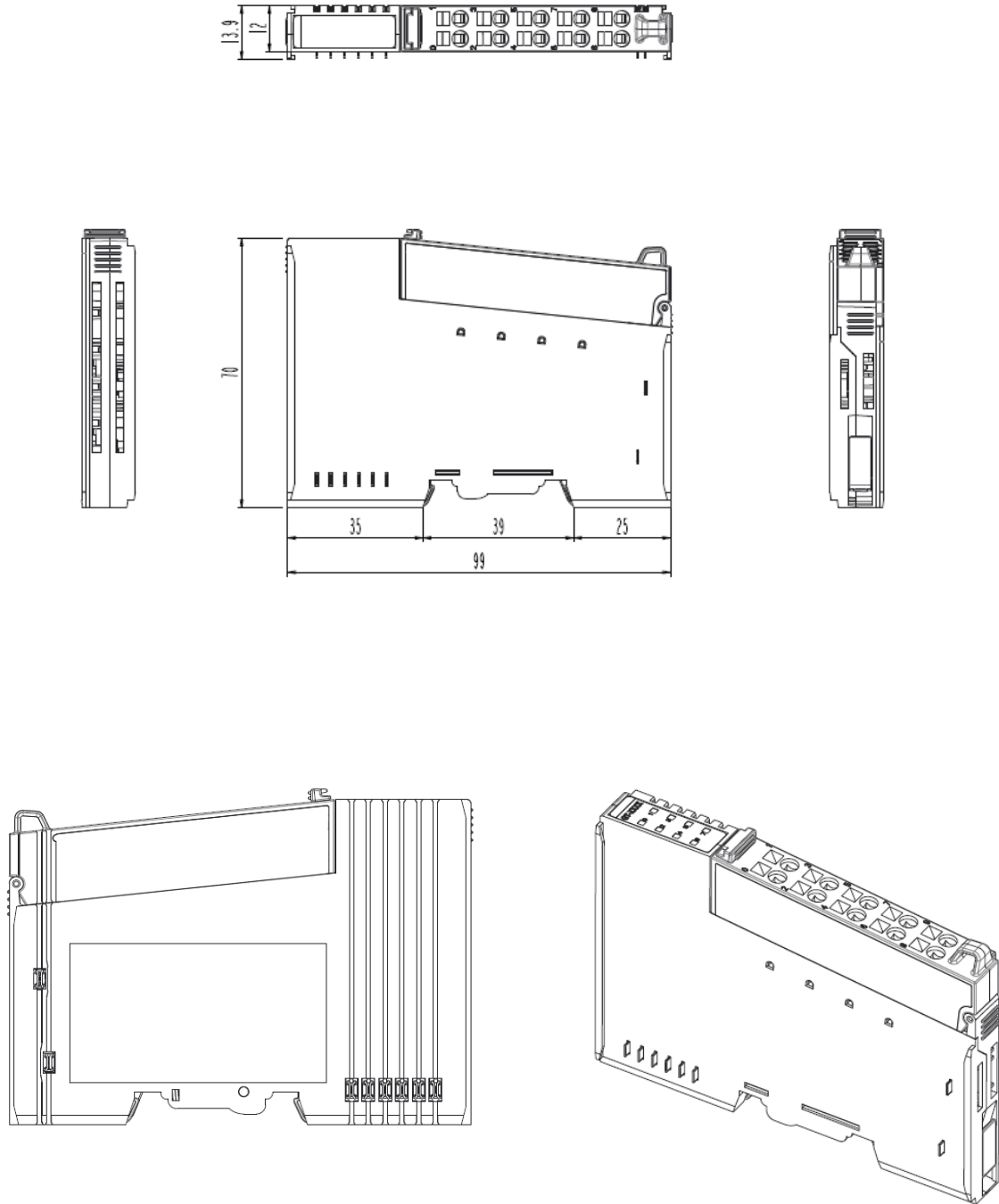
Environmental specification	
Operating Temperature	-20°C~70°C
UL Temperature	-20°C~60°C
Storage Temperature	-40°C~85°C
Relative Humidity	5% ~ 90% non-condensing
Mounting	DIN rail
General specification	
Shock Operating	IEC 60068-2-27 : 2008/15g, 11ms
Vibration Resistance	Based on IEC 60068-2-6 DNVGL-CG-0039 : Vibration Class B, 4g
Industrial Emissions	EN61000-6-4/All : 2011
Industrial Immunity	EN61000-6-2 : 2005
Installation Position	Vertical and horizontal installation is available
Product Certifications	CE, UL, FCC



## 4. Dimension

### 4.1. GT-51xx

(mm)



## 5. Mounting

### Caution!

#### Hot surface!

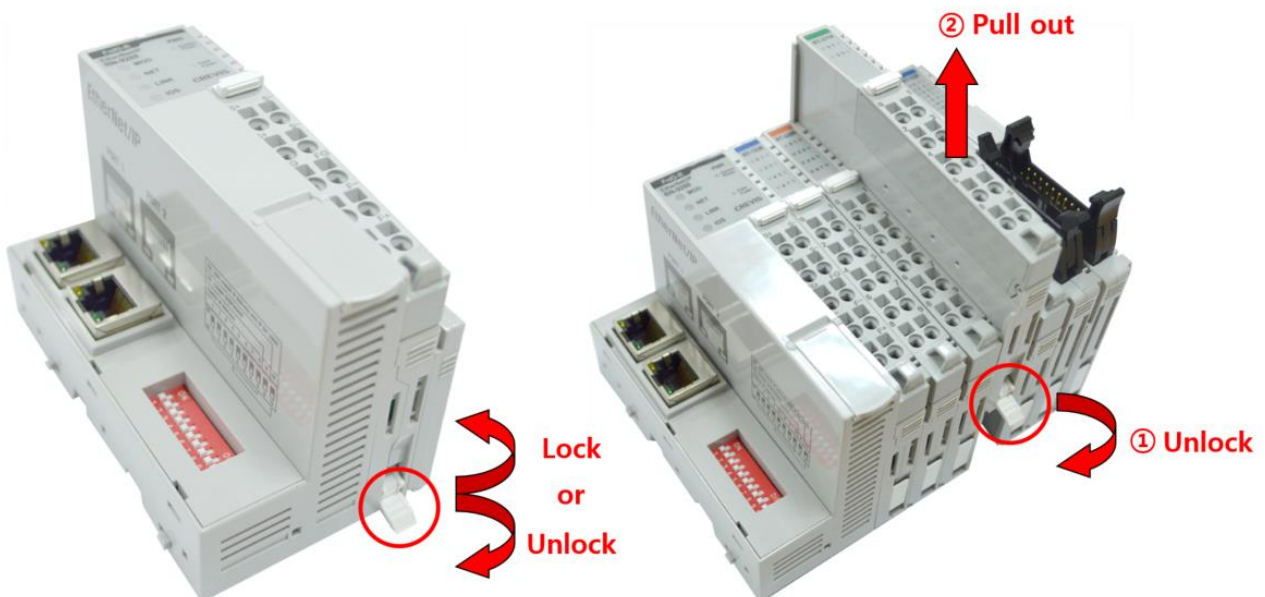
The surface of the housing can become hot during operation. If the device was operated at high ambient temperatures, allow it to cool off before touching it.

### Notice!

#### Perform work on devices only if they are de-energized!

Working on energized devices can damage them. Therefore, turn off the power supply before working on the devices.

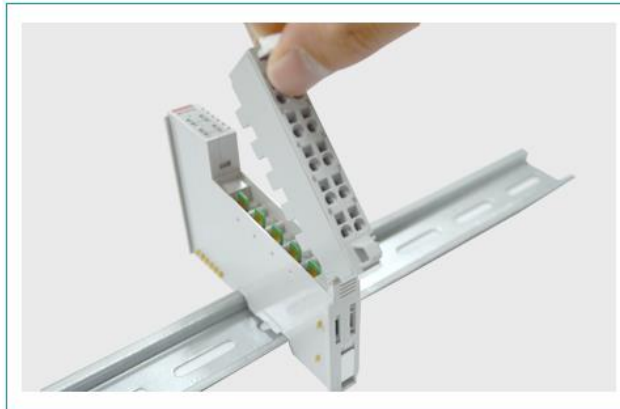
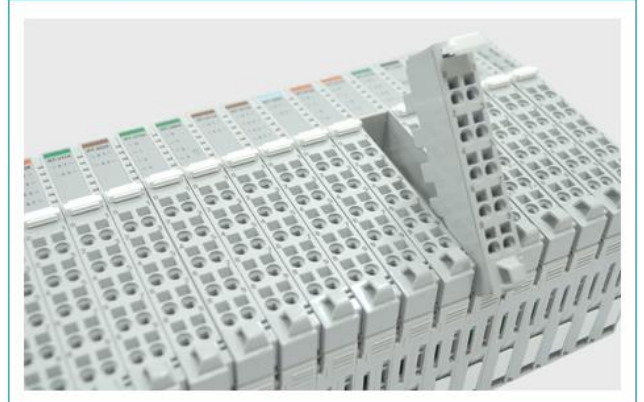
### 5.1 I/O Inserting and Removing Devices



- As above figure in order to safeguard the FnIO module from jamming, it should be fixed onto the DIN rail with locking level. To do so, fold on the upper of the locking lever.

To pull out the FnIO module, unfold the locking lever as below figure.

## 5.2 RTB (Removable Terminal Block)



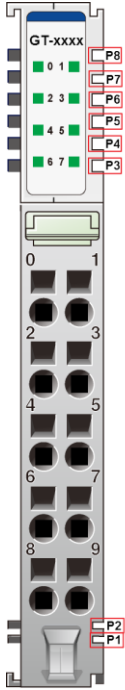
Whole terminal block can be combined and removed for the convenience if its maintenance.

There is a locking switch on the RTB for the easy combination and easy removal.

Easy combination and easy removal for IO modules on the din rail through One Touch Locking Switch.

## 6. G-Bus Pin Description

Communication between the RN series and the expansion module as well as system / field power supply of the bus modules is carried out via the internal bus. It is comprised of 6 data pin and 2 field power pin.



\*Please refer to the table below regarding the pin description from P1 to P8.

No.	Description
P1	Field Power (VCC)
P2	Field Power (GND)
P3	GBUS CLK
P4	GBUS MISO
P5	GBUS MOSI
P6	GBUS Token
P7	System Power (GND)
P8	System Power (VCC)

**DANGER**



Do not touch data and field power pins in order to avoid soiling and damage by ESD noise.

## 7. Reference

※ Regarding F/W Rev 1.000, Rev 1.001, please refer to the table as following;

### Count Mode Ch#0, Ch#1

Value	Count Mode	Description
B' 0000 (0x0)	Encoder 4x	Encoder 4x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 0001 (0x1)	Encoder 2x	Encoder 2x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 0010 (0x2)	Up	Up Counter - Aph Input acts as Up Clock - Bph Input is not used
B' 0011 (0x3)	Down	Down Counter - Aph Input acts as Down Clock - Bph Input is not used
B' 0100 (0x4)	Up Clock & Inhibit	Up Counter with Inhibit - Aph Input acts as Up Clock Input - Bph Input acts as Inhibit function for Up Clock Input
B' 0101 (0x5)	Up Clock & Reset	Up Counter with Reset - Aph Input acts as Up Clock Input - Bph Input acts as Reset function to Counter
B' 0110 (0x6)	Down Clock & Inhibit	Down Counter with Inhibit - Aph Input acts as Down Clock Input - Bph Input acts as Inhibit function for Down Clock Input
B' 0111 (0x7)	Down Clock & Reset	Down Counter with Reset - Aph Input acts as Down Clock Input - Bph Input acts as Reset function to Counter
B' 1000 (0x8)	Up Clock & Down Clock	Up & Down Counter - Aph Input acts as Up Clock Input - Bph Input acts as Down Clock Input
B' 1001 (0x9)	Clock & Direction	Up & Down with Direction - Aph Input acts as Clock Input - Bph Input acts as Direction Input ( Low = Up Count, High = Down Count )
B' 1010 (0xA)	Encoder 4x (*1)	Encoder 4x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1011 (0xB)	Encoder 2x (*1)	Encoder 2x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1100 (0xC)	Frequency Measurement (*2) 1 sec Update	Simple Frequency Measurement, updated by 1sec, Hz Unit - Aph Input acts as Frequency Input - Bph Input is not used
B' 1101 (0xD)	Frequency Measurement 100 msec ( 0.1sec )	Simple Frequency Measurement, updated by 100msec, Hz Unit

	Update	- Available in case of Pulse Input $\geq 10\text{Hz}$ - Aph Input acts as Frequency Input - Bph Input is not used
B' 1110 ( 0xE )	Pulse Width Measurement	Simple Pulse Width Measurement, 0.1usec Unit - Pulse Width(32bit), if 1234, then Pulse High(On) width is 123.4usec (*3) - Aph Input acts as Pulse Input - Bph Input is not used
B' 1111 ( 0xF )	Pulse Width & Period Measurement	Simple Pulse Width & Period Measurement, 0.1usec Unit, - Available in case of Pulse Input $\geq 200\text{Hz}$ ( $\leq 2.5\text{msec}$ , Pulse On Width) - Pulse Width(16bit, Low Word) + Pulse Period(16bit, High Word) (*4) - Aph Input acts as Pulse Input - Bph Input is not used

- This encoder mode is perfectly same with mode B'0000, B'0001. This is for using Encoder module easily.
- Frequency, B'1100(0xC) and B'1101(0xD) can't be used with other channel's Count Mode = 0x2 ~ 0x9
- Pulse Width, B'1110(0xE) measures Aph Input's High(On) Pulse Width(32bit) in 0.1usec unit.
- Pulse Width & Period, B'1111(0xF) measures Aph's Pulse High(On) Width(16bit) & Period(16bit) in 0.1usec unit.

#### Configuration Parameter Data – 2byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0								Reserved
1								Reserved

## APPENDIX A

### A.1. Product List

No.	GT-Number	Description	ID(hex)
<b>Digital Input Module</b>			
1	GT-1238	8 Points, Universal, 24Vdc, 10RTB	1238
2	GT-123F	16 Points, Universal, 24Vdc, 20P connector	123F
3	GT-12DF	16 Points, Universal, 24Vdc, 18RTB	12DF
4	GT-12FA	32 Points, Universal, 24Vdc, 40P connector	12FA
5	GT-1428	8 Sink Input / 8 Source Output with Diagnostic, 24Vdc	1428
6	GT-1804	4 Points, 120Vac, 10RTB	1804
7	GT-1904	4 Points, 240Vac, 10RTB	1904
<b>Digital Output Module</b>			
8	GT-2318	8 Points, Sink, 24Vdc/0.5A, 10RTB	2318
9	GT-2328	8 Points, Source, 24Vdc/0.5A, 10RTB	2328
10	GT-221F	16 Points, Sink, 24Vdc/0.3A, 20P connector	221F
11	GT-222F	16 Points, Source, 24Vdc/0.3A, 20P connector	222F
12	GT-225F	16 Points, Sink, 24Vdc/0.3A, 18RTB	225F
13	GT-226F	16 Points, Source, 24Vdc/0.3A, 18RTB	226F
14	GT-22BA	32 Points, Sink, 24Vdc/0.3A, 40P connector	22BA
15	GT-22CA	32 Points, Source, 24Vdc/0.3A, 40P connector	22CA
16	GT-2418	8 Channels Sink Output with Diagnostics	2418
17	GT-2428	8 Channels Source Output with Diagnostics	2428
18	GT-2618	8 Points, Sink, 24Vdc/2A, 10RTB	2618
19	GT-2628	8 Points, Source, 24Vdc/2A, 10RTB	2628
20	GT-2734	4 Points, MOS Relay, 240Vdc/ac, 0.5A, 10RTB	2734
21	GT-2738	8 Points, MOS Relay Output Terminal, 240Vdc, 0.5A	2738
22	GT-2744	4 Points, Relay, 24Vdc/2A, 240Vac/2A, 10RTB	2744
23	GT-2764	4 Points, MOS Relay, 24Vdc/ac, 2A, 10RTB	2764
24	GT-2768	8 Points, Relay Output Terminal, 24Vdc/ac, 2A	2768
25	GT-2784	4 Points, MOS Relay, 110Vdc/ac, 1A, 10RTB	2784
26	GT-2788	8 Points, Relay Output Terminal, 110Vdc/ac, 1A	2788
<b>Analog Input Module</b>			
27	GT-3002	2ch load cell input unit, strain gauge	3002
28	GT-3114	4 Channels, 0~20, 4~20mA, 12bits, 10RTB	3114
29	GT-3154	4 Channels, 0~20, 4~20mA, 16bits, 10RTB	3154
30	GT-3118	8 Channels, 0~20, 4~20mA, 12bits, 10RTB	3118
31	GT-3158	8 Channels, 0~20, 4~20mA, 16bits, 10RTB	3158
32	GT-311F	16 Channels, 0~20, 4~20mA, 12bits, 20P connector	311F
33	GT-315F	16 Channels, 0~20, 4~20mA, 16bits, 20P connector	315F
34	GT-317F	16 Channels, 0~20, 4~20mA, 12bits, 18RTB	317F
35	GT-319F	16 Channels, 0~20, 4~20mA, 16bits, 18RTB	319F
36	GT-3424	4 Channels, 0~10, 0~5, 1~5Vdc, 12bits, 10RTB	3424
37	GT-3464	4 Channels, 0~10, 0~5, 1~5Vdc, 16bits, 10RTB	3464
38	GT-3428	8 Channels, 0~10, 0~5, 1~5Vdc, 12bits, 10RTB	3428
39	GT-3468	8 Channels, 0~10, 0~5, 1~5Vdc, 16bits, 10RTB	3468
40	GT-342F	16 Channels, 0~10, 0~5, 1~5Vdc, 12bits, 20P connector	342F

41	GT-346F	16 Channels, 0~10, 0~5, 1~5Vdc, 16bits, 20P connector	346F
42	GT-347F	16 Channels, 0~10, 0~5, 1~5Vdc, 12bits, 18RTB	347F
43	GT-349F	16 Channels, 0~10, 0~5, 1~5Vdc, 16bits, 18RTB	349F
44	GT-3704	4 Channels, RTD, 10RTB	3704
45	GT-3708	8 Channels, RTD, 20P connector	3708
46	GT-3804	4 Channels, Thermocouple, 10RTB	3804
47	GT-3808	8 Channels, Thermocouple, 20P connector	3808
48	GT-3714	4 Channels, TEMP. Controller, RTD Input, SSR Output	3714
49	GT-3734	4 Channels, TEMP. Controller, RTD Input, Current Output	3734
50	GT-3814	4 Channels, TEMP. Controller, TC Input, SSR Output	3814
51	GT-3834	4 Channels, TEMP. Controller, TC Input, Current Output	3834
52	GT-3901	AC Measurement	3901
53	GT-3914	4 Channels, Differential, 0~20, 4~20, +/-20mA, 12Bits, 10RTB	3914
54	GT-3934	4 Channels, Differential, 0~20, 4~20, +/-20mA, 16Bits, 10RTB	3934
55	GT-3918	8 Channels, Differential, 0~20, 4~20, +/-20mA, 12Bits, 18RTB	3918
56	GT-3938	8 Channels, Differential, 0~20, 4~20, +/-20mA, 16Bits, 18RTB	3938
57	GT-3924	4 Channels, Differential, 0~5, 0~10, +/-5, +/-10Vdc, 12Bits, 10RTB	3924
58	GT-3944	4 Channels, Differential, 0~5, 0~10, +/-5, +/-10Vdc, 16Bits, 10RTB	3944
59	GT-3928	8 Channels, Differential, 0~5, 0~10, +/-5, +/-10Vdc, 12Bits, 18RTB	3928
60	GT-3948	8 Channels, Differential, 0~5, 0~10, +/-5, +/-10Vdc, 16Bits, 18RTB	3948
<b>Analog Output Module</b>			
61	GT-4114	4CH, 0~20mA, 12Bits, 10RTB	4114
62	GT-4154	4CH, 0~20mA, 16Bits, 10RTB	4154
63	GT-4118	8CH, 0~20mA, 12Bits, 10RTB	4118
64	GT-4158	8CH, 0~20mA, 16Bits, 10RTB	4158
65	GT-4214	4 Channels, Current Output, 4~20mA, 12bits	4214
66	GT-4254	4 Channels, Current Output, 4~20mA, 16bits	4254
67	GT-4218	8 CHANNELS CURRENT OUTPUT, 4~20mA, 12BIT	4218
68	GT-4258	8 CHANNELS CURRENT OUTPUT, 4~20mA, 16BIT	4258
69	GT-4424	4CH, 0~10Vdc, 12Bits, 10RTB	4424
70	GT-4464	4CH, 0~10Vdc, 16Bits, 10RTB	4464
71	GT-4428	8CH, 0~10Vdc, 12Bits, 10RTB	4428
72	GT-4468	8CH, 0~10Vdc, 16Bits, 10RTB	4468
73	GT-442F	16CH, 0~10Vdc, 12Bits, 20P Connector	442F
74	GT-446F	6CH, 0~10Vdc, 16Bits, 20P Connector	446F
75	GT-447F	16CH, 0~10Vdc, 12Bits, 18RTB	447F
76	GT-449F	16CH, 0~10Vdc, 16Bits, 18RTB	449F
77	GT-4524	AO 4 CHs, ±10Vdc, 12Bits, 10RTB	4524
78	GT-4564	AO 4 CHs, ±10Vdc, 16Bits, 10RTB	4564
<b>Special Module</b>			
79	GT-5102	2CH, Encoder, Input, 5Vdc, 10RTB	5102
80	GT-5112	High Speed Counter, 2CHs, 24Vdc, Encoder Input, 10RTB	5112
81	GT-5114	High Speed Counter, 4CHs, 24Vdc, Encoder Input, 10RTB	5114
82	GT-5211	1CH, RS 232, RTS/CTS, Full Duplex Type, 10RTB	5211
83	GT-5212	2CH, RS 232, Full Duplex Type, 10RTB	5212
84	GT-5221	1CH, RS 485, Full Duplex Type, 10RTB	5221
85	GT-5231	1CH, RS 485, Half Full Duplex Type, 10RTB	5231



86	GT-5232	2CH, RS 485, Half Full Duplex Type, 10RTB	5232
87	GT-5352	2CH, Synchronous Serial Interface Input, 10RTB	5352
88	GT-5442	PWM Output, 2CHs, 0.5A/24Vdc, Source, 18RTB	5442
89	GT-5444	PWM Output, 4CHs, 0.5A/24Vdc, Source, 18RTB	5444
90	GT-5642	Pulse Output, 2CHs, 0.5A/24Vdc, Source, 18RTB	5642
91	GT-5652	Pulse Output, 2CHs, RS422 (Differential), 18RTB	5652
92	GT-5521	1CH, Stepper Module (TBD)	5521
<b>Power Module</b>			
93	GT-7408	Shield Module	7408
94	GT-7508	Common for 0Vdc	7508
95	GT-7511	Power Expansion, In 24Vdc, Out 1A/5Vdc	7511
96	GT-7518	Common for 24Vdc	7518
97	GT-7588	Common for 0Vdc, 24Vdc	7588
98	GT-7641	Field Power, 5/24/48 Vdc, 110/220 Vac	7641
99	GT-7151	Noise Filter Module, 18RTB, None ID Type	7151
100	GT-7851	Noise Filter Module, 18RTB, ID Type	7851

## A.2. Glossary

- System Power: The power for starting up CPU.
- Field Power: The power for input and output line.
- Terminator Resistor: Resistor for prevention reflected wave.
- EDS: Electronic Data Sheet.
- sinking: The method of input and output what device does not have power source.
- sourcing: The method of input and output what device have power source.