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# **FnIO G – Series :**

## ***GT-5122***

***GT-5122 (2Channels, High Speed Counter, Encoder Input, 5~24Vdc)***

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Specification

History

Rev	Pages	Remarks	Date	Editor
1.00			2020/12/09	Soyeong, Park
1.01	4-5,7	Edit Certification, Specification/Change Diagram	2023/08/03	Soyeong, Park
1.02	11	Change Mode Specification	2023/09/01	Soyeong, Park
1.03	10	Add status bit description	2023/10/27	Soyeong, Park
1.04	4, 5,12	Add UKCA, Add Encoder 1x Data Size Specification	2024/05/21	Soyeong, Park

# Specification

## 1. ENVIRONMENT SPECIFICATION

Environmental specification	
Operating Temperature	-40°C~60°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
Vibration Resistance	Based on IEC 60068-2-6, 4g
Industrial Emissions	EN61000-6-4/All : 2011
Industrial Immunity	EN61000-6-2 : 2019
Installation Position	Vertical and horizontal installation is available
Product Certifications	CE, UL, UKCA

# Specification

## 2. GT-5122 (2 Channels High Speed Counter / Encoder)

### 2.1. GT-5122 Specification

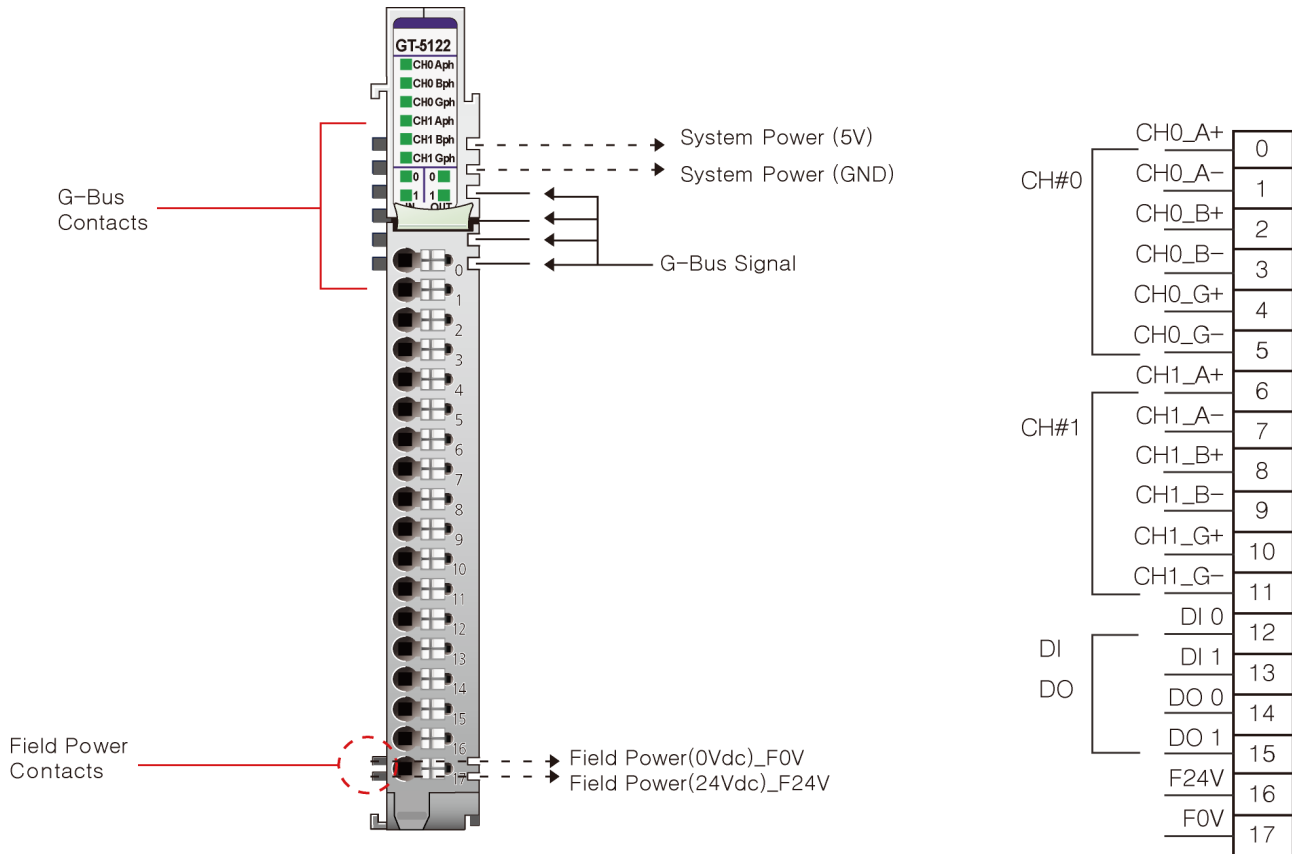
Items		Specification
<b>Input specification</b>		
Number of channel		2 channel
		- High Speed Counter, Encoder, Frequency measurement Pulse width & Period measurement
Indicators		6 green terminal input
Input voltage		5~24Vdc nominal (Max 28.8Vdc)
Input current		4~11mA @ 5~24Vdc
Min on-state voltage		≥ 4.8Vdc
Input frequency	Counter Mode	0~500kHz
	Encoder Mode	0~350kHz @Encoder 1x 0~750kHz @Encoder 2x, Encoder 4x
Counting mode	Counter Mode	1-Input Mode : Up,Down, Frequency Measurement, Pulse Width & Period measurement 2-Input Mode : Up/Inhibit, Up/Reset, Down/Inhibit, Down/Reset, UP/Down,Clock/Direction
	Encoder Mode	2-Input Mode : Encoder 1x, Encoder 2x, Encoder 4x
Gate function mode		Store/Continue Store/Wait/Resume Store-Reset/Wait/Start Store-Reset/Start
Counter size	Encoder 1x	31bit-wide/channel
	Others (Mode)	32bit-wide/channel
<b>Digital Input Specification</b>		
Input per module		2 points sink type
Indicators		2 green input status
Input on-state voltage		24Vdc nominal 15 ~ 28.8Vdc
On-stat current		2.3mA @ 24Vdc 2.7mA @ 28.8Vdc
Input signal delay		OFF to ON : Max. 0.3ms ON to OFF : Max. 0.3ms
Nominal input impedance		10.2kΩ
<b>Digital Output Specification</b>		
Output per module		2 points source type
Indicators		2 green output status
Output voltage range		24Vdc nominal 15 ~ 28.8Vdc
On-state voltage drop		Max 0.5Vdc
Off-state leakage current		Max. 20uA
Output signal delay		OFF to ON : Max. 0.3ms ON to OFF : Max. 0.3ms
Output current rating		Max. 0.3A per channel
Protection		Reverse voltage protection Short circuit protection
<b>General specification</b>		
Power dissipation		Max. 120mA @ 5Vdc
Isolation		I/O to Logic : photocoupler isolation
UL field power		Supply Voltage : 24Vdc nominal, Class 2
Field power		Supply voltage : 24Vdc nominal Voltage range : 15~28.8Vdc

# Specification

	Power dissipation : 15mA@24Vdc
Wiring	I/O Cable Max. 0.823mm <sup>2</sup> (AWG 18)
Weight	63g
Module size	12mm x 109mm x 70mm
<b>Environment condition</b>	<b>Refer to '1. Environment Specification'</b>

\*Refer to 2.4. Mapping data from the image table

## 2.2. GT-5122 Wiring Diagram

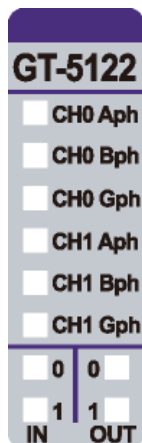


Pin No.	Signal Description
0	Aph Input+ Ch# 0
1	/Aph Input - Ch# 0
2	Bph Input+ Ch# 0
3	/Bph Input - Ch# 0
4	Gph Input+ Ch# 0
5	/Gph Input - Ch# 0
6	Aph Input+ Ch# 1
7	/Aph Input - Ch# 1
8	Bph Input+ Ch# 1
9	/Bph Input - Ch# 1
10	Gph Input+ Ch# 1
11	/Gph Input - Ch# 1
12	Input Channel 0
13	Input Channel 1
14	Output Channel 0
15	Output Channel 1
16	Field Power 24V
17	Field Power 0V (Common)

# Specification

## 2.3. GT-5122 LED Indicator

### 2.3.1. LED Indicator



LED No.	LED Function / Description	LED Color
0	Aph Input Ch# 0	Green
1	Bph Input Ch# 0	Green
2	Gph Input Ch# 0	Green
3	Aph Input Ch# 1	Green
4	Bph Input Ch# 1	Green
5	Gph Input Ch# 1	Green
6	Input Channel 0	Green
7	Input Channel 1	Green
8	Output Channel 0	Green
9	Output Channel 1	Green

### 2.3.2. Channel Status LED

Status	LED	To indicate
No Signal	Off	No Input / Output Signal
On Signal	Green	Input / Output Signal detected



# Specification

## 2.4. Mapping data from the image table

### ● Input Image Value

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Current Counter Value CH#0 LL when IDS = 0 Store Counter Value CH#0 LL when IDS = 1							
Byte1	Current Counter Value CH#0 LH when IDS = 0 Store Counter Value CH#0 LH when IDS = 1							
Byte2	Current Counter Value CH#0 HL when IDS = 0 Store Counter Value CH#0 HL when IDS = 1							
Byte3	Current Counter Value CH#0 HH when IDS = 0 Store Counter Value CH#0 HH when IDS = 1							
Byte4	Current Counter Value CH#1 LL when IDS = 0 Store Counter Value CH#1 LL when IDS = 1							
Byte5	Current Counter Value CH#1 LH when IDS = 0 Store Counter Value CH#1 LH when IDS = 1							
Byte6	Current Counter Value CH#1 HL when IDS = 0 Store Counter Value CH#1 HL when IDS = 1							
Byte7	Current Counter Value CH#1 HH when IDS = 0 Store Counter Value CH#1 HH when IDS = 1							
Byte8	-	SGIN CH#0	SBIN CH#0	SAIN CH#0	SDN CH#0	SUP CH#0	Out Status CH#0	Inp Status CH#0
Byte9	-	SGIN CH#1	SBIN CH#1	SAIN CH#1	SDN CH#1	SUP CH#1	Out Status CH#1	Inp Status CH#1

- Each channel has 4-byte Input

- Counter value represents counter, frequency(Hz), pulse width (0.1usec) or pulse period (0.1usec).

(When IDS = 0)

- IDS : Input Data Selection (Setting by Output Data)

### • Status Bit

The Status High can only read.

SUP : Status Counter Up

SDN : Status Counter Down

SAIN : Status A Terminal Input

SBIN : Status B Terminal Input

SGIN : Status G Terminal Input

\*In Encoder x1/x2/x4 Mode, SUP/SDN bit does not operate.

# Specification

## ● Output Image Value

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Gate Function Ch#0				Count Mode Ch#0			
Byte1	Gate Function Ch#1				Count Mode Ch#1			
Byte2	-	-	HRST 0	CR 0	CS 0	HP 0*	DO 0	IDS 0
Byte3	-	-	HRST 1	CR 1	CS 1	HP 1	DO 1	IDS 1

- Count Mode Ch#0, 1 : Count Mode for Ch#0, Ch#1 respectively
- HRST 0, 1 : current counter value, stored counter value Reset for Ch#0, Ch#1
- CR 0,1 : Counter Reset for Ch#0, Ch#1
- CS 0,1 : Counter Stop ( Inhibit Input ) for Ch#0, Ch#1
- HP 0,1 : Homing Position Enable/Disable, when this function is enabled, the counter value set to preset value when a pulse is detected on input channel.
- DO 0, 1 : General purpose Digital Output
- IDS : Input Data Selection ( 0 : Current counter value, 1 : Store counter value)

\*When the HP Bit 1 → 0, counter reset is implemented.

If you want to use the HP Function(Homing Position), always keep it at 1.

## ■ Gate Function Ch#0, Ch#1

Value	Description
B' 0000 (0x0)	Gate Function Disabled
B' 0001 (0x1)	Store/Continue
B' 0010 (0x2)	Store/Wait/Resume-
B' 0011 (0x3)	Store-Reset/Wait/Start-
B' 0100 (0x4)	Store-Reset/Start
Others	Gate Function Disabled

# Specification

## ■ 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 *	Encoder 1x - 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	Simple Frequency Measurement, updated by 1sec, Hz Unit - 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

\* Frequency range of the Encoder x1 mode is different from Encoder x2/x4 mode frequency range.

(Encoder 1x : ~350kHz / Encoder 2x/4x : ~750kHz)

\*\* 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.

**2.5. Parameter Data**

- **Valid Parameter length : 8Bytes**
- **Parameter Data**

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Preset Value CH#0 LL*							
Byte 1	Preset Value CH#0 LH							
Byte 2	Preset Value CH#0 HL							
Byte 3	Preset Value CH#0 HH							
Byte 4	Preset Value CH#1 LL							
Byte 5	Preset Value CH#1 LH							
Byte 6	Preset Value CH#1 HL							
Byte 7	Preset Value CH#1 HH							

\*If the presetvalue exceeds the data size (in Encoder 1x mode), it operates with the value from which the HP function was previously performed.

Specification

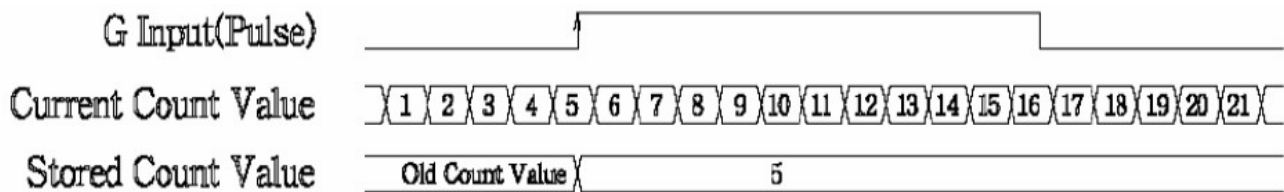
■ Gate Mode (Gate Function)

This Gate Function will operate in one of five modes (Store/Continue, Store/Wait/Resume, Store-Reset/Wait/ and Store-Reset/Start).

\* Store/Continue

When G ph are raising edge, The Stored Count Value register will get counting value by Current Count Value register. Next Current Count Value will do counting continue.

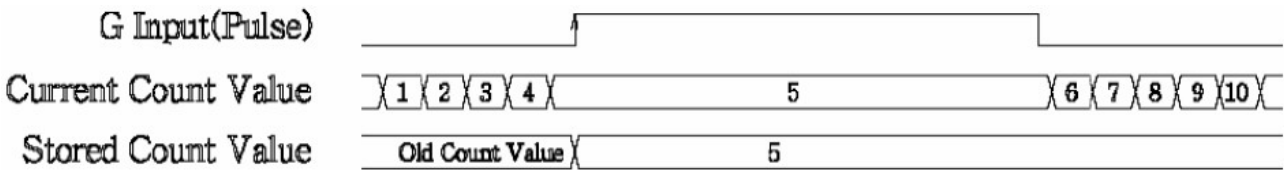
Below example picture shows timing waveforms of Store/Continue.



\* Store/Wait/Resume

When G Ph are rising edge, The Stored Count Value register will get counting value by Current Count Value register and waits the Current Count Value until falling edge. Next G Ph will be falling edge and Current Count Value register resume counting.

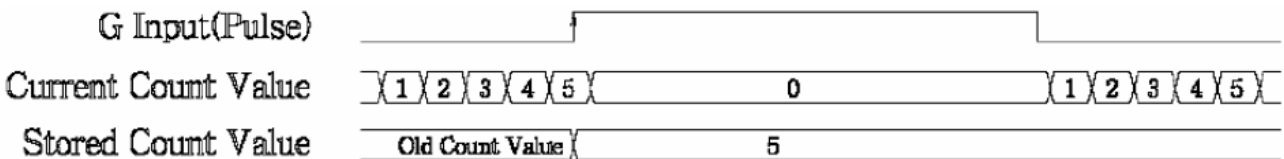
Below example picture shows timing waveforms of Store/Wait/Resume.



\* Store-Reset/Wait/Start

When G Ph are rising edge, The Stored Count Value register will get counting value by Current Count Value register and Current Count Value register reset at the same time. The Current Count Value register wait until G Ph falling edge. Next Current Count Value register start counting.

Below example picture shows timing waveforms of Store-Reset/Wait/Start.



\* Store-Reset/Start

When G Ph are rising edge, The Stored Count Value register will get counting value by Current Count Value register and Current Count Value register reset at the same time and the register start counting.

Below example picture shows timing waveforms of Store-Reset/Start.

