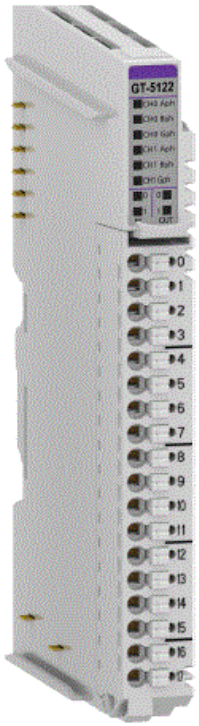
Contents [hide]

Beijer ELECTRONICS GT-5122 High Speed Counter Module



This manual contains information on the software and hardware features of the Beijer Electronics GT-5122 High Speed Counter Module. It provides in-depth specifications, guidance on installation, setup, and usage of the product.

Symbols Used in This Manual

This publication includes Warning, Caution, Note and Important icons where appropriate, to point out safety-related, or other important information. The corresponding symbols should be interpreted as follows:

- **WARNING**

  The Warning icon indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury, and major damage to the product.

- **CAUTION**

  The Caution icon indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, and moderate damage to the product.

- **NOTE**

  The Note icon alerts the reader to relevant facts and conditions.

- **IMPORTANT**

The Important icon highlights important information.

Safety

- Before using this product, please read this manual and other relevant manuals carefully. Pay full attention to safety instructions!
- In no event will Beijer Electronics be responsible or liable for damages resulting from the use of this product.
- The images, examples and diagrams in this manual are included for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Beijer Electronics cannot take responsibility or liability for actual use based on the examples and diagrams.

Product Certifications

The product has the following product certifications.


General Safety Requirements

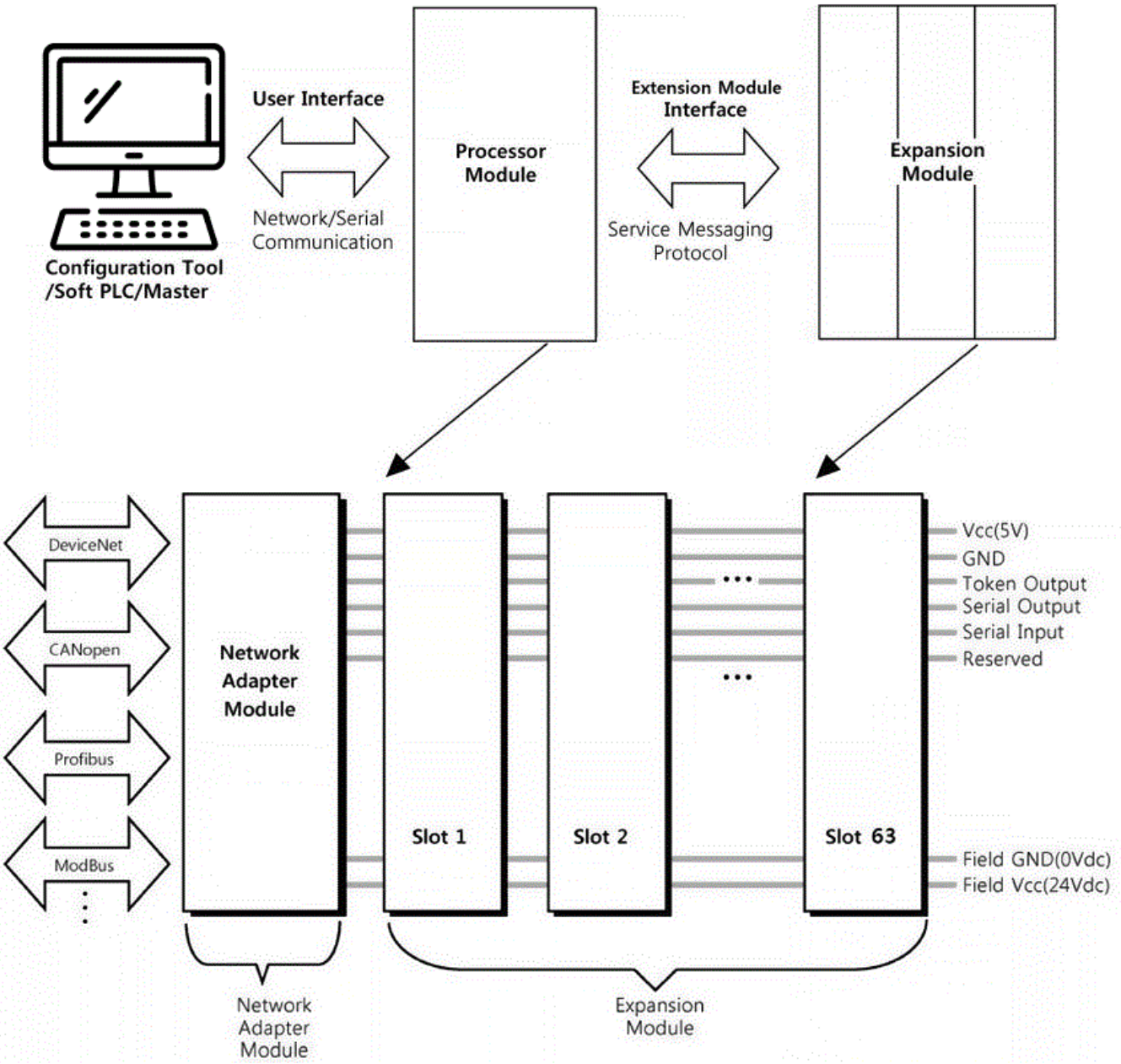
WARNING

- Do not assemble the products and wires with power connected to the system. Doing so cause an “arc flash”, which can result in unexpected dangerous events (burns, fire, flying objects, blast pressure, sound blast, heat).
- Do not touch terminal blocks or IO modules when the system is running. Doing so may cause electric shock, short circuit or malfunction of the device.
- Never let external metallic objects touch the product when the system is running. Doing so may cause electric shock, short circuit or malfunction of the device.
- Do not place the product near inflammable material. Doing so may cause a fire.
- All wiring work should be performed by an electrical engineer.
- When handling the modules, ensure that all persons, the workplace and the packing are well grounded. Avoid touching conductive components, the modules contain electronic components that may be destroyed by electrostatic discharge.

CAUTION

- Never use the product in environments with temperature over 60°C. Avoid placing the product in direct sunlight.
- Never use the product in environments with over 90% humidity.
- Always use the product in environments with pollution degree 1 or 2.
- Use standard cables for wiring.

About the G-series System



System overview

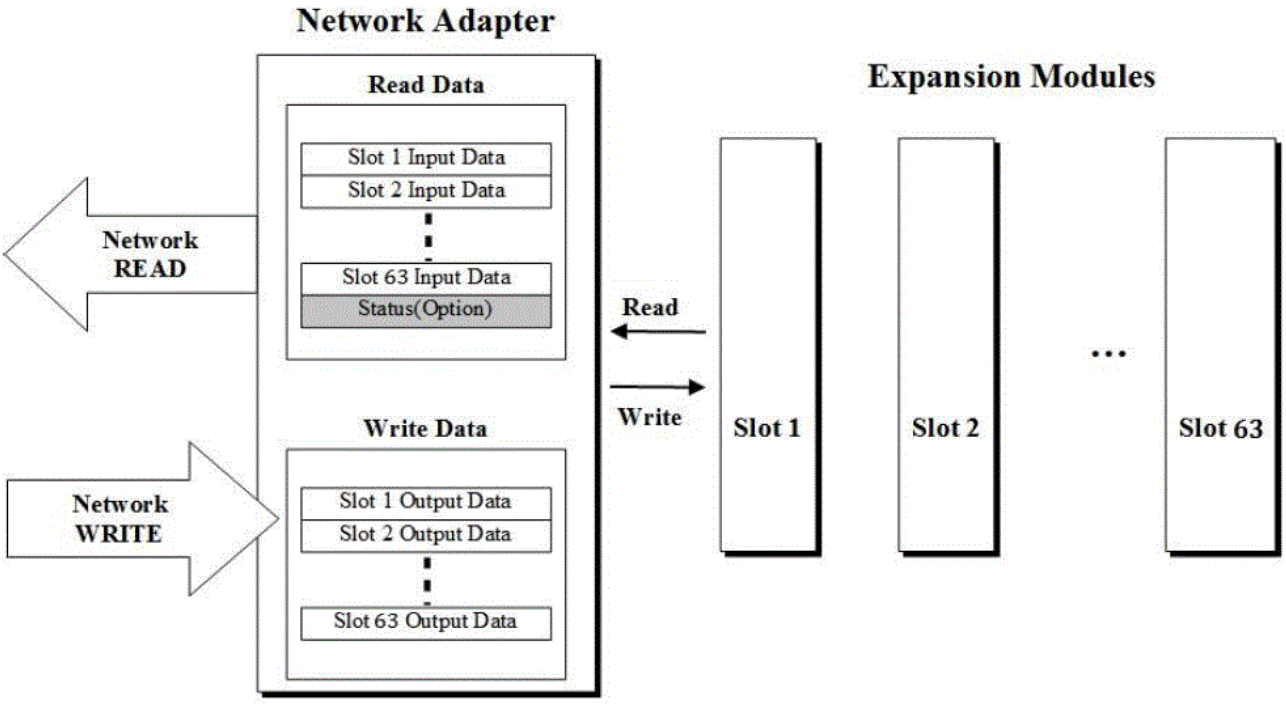
- **Network Adapter Module** – The network adapter module forms the link between the

field bus and the field devices with the expansion modules. The connection to different field bus systems can be established by each of the corresponding network adapter module, e.g., for MODBUS TCP, Ethernet IP, EtherCAT, PROFINET, CC-Link IE Field, PROFIBUS, CANopen, DeviceNet, CC-Link, MODBUS/Serial etc.

- **Expansion Module** – Expansion module types: Digital IO, Analog IO, and Special modules.
- **Messaging** – The system uses two types of messaging: Service messaging and IO messaging.

IO Process Data Mapping

An expansion module has three types of data: IO data, configuration parameter, and memory register. The data exchange between the network adapter and the expansion modules is made via IO process image data by internal protocol.



- Data flow between network adapter (63 slots) and expansion modules
- The input and output image data depend on the slot position and the data type of the expansion slot. The ordering of input and output process image data is based on the expansion slot position. Calculations for this arrangement are included in the manuals for network adapter and programmable IO modules.
- Valid parameter data depends on the modules in use. For example, analog modules have settings of either 0-20 mA or 4-20 mA, and temperature modules have settings such as PT100, PT200, and PT500. The documentation for each module provides a

description of the parameter data.

Specifications

Environmental Specifications

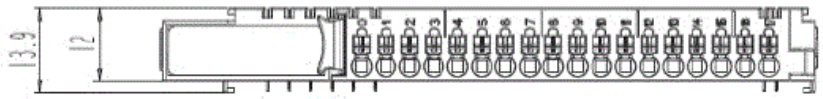
Operating temperature	-20°C – 60°C
UL temperature	-20°C – 60°C
Storage temperature	-40°C – 85°C
Relative humidity	5% – 90% non-condensing
Mounting	DIN rail
Shock operating	IEC 60068-2-27 (15G)
Vibration resistance	IEC 60068-2-6 (4 g)
Industrial emissions	EN 61000-6-4: 2019
Industrial immunity	EN 61000-6-2: 2019
Installation position	Vertical and horizontal
Product certifications	CE, FCC, UL, cUL

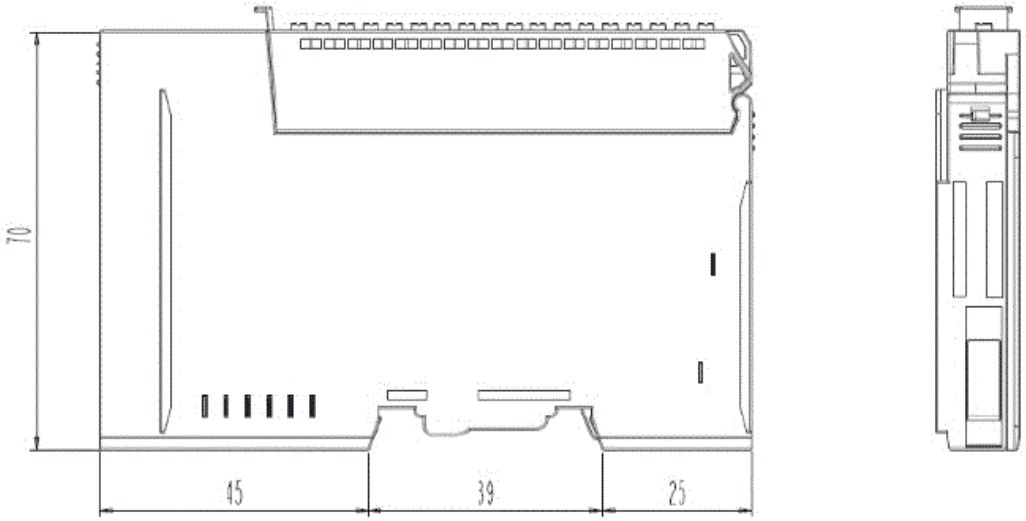
General Specifications

Power dissipation	Max. 120 mA @ 5 VDC
Isolation	I/O to logic: Photocoupler isolation
UL field power	Supply voltage: 24 VDC nominal, Class 2
Field power	Supply voltage: 24 VDC nominal Voltage range: 15 – 28 .8 VDC Power dissipation: 15 mA @ 24 VDC

Wiring	IO cable max. 0.823 mm² (AWG 18)
Weight	63 g
Module size	12 mm x 109 mm x 70 mm

Dimensions





Module dimensions (mm)

Input Specifications

Number of channels	2 Channels. Encoder, High speed counter, Frequency measurement, Pulse width, Period measurement.
Indicators	6 green terminal input
Input voltage	5 – 24 VDC nominal (max. 28.8 VDC)
Input current	4 – 11 mA @ 24 VDC

Min on-state voltage		≥4.8 VDC
Input frequency	**Counter mode**	0 – 500 kHz
	Encoder mode	• 0 – 350 kHz @ Encoder 1x • 0 – 750 kHz @ Encoder 2x, Encoder 4x
Counting mode *	**Counter mode**	1. **Input mode:** Up, Down, Frequency measurement, Pulse width and 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		32 bit-wide/channel

See chapter Mapping Data From the Image Table.

Digital Input Specifications

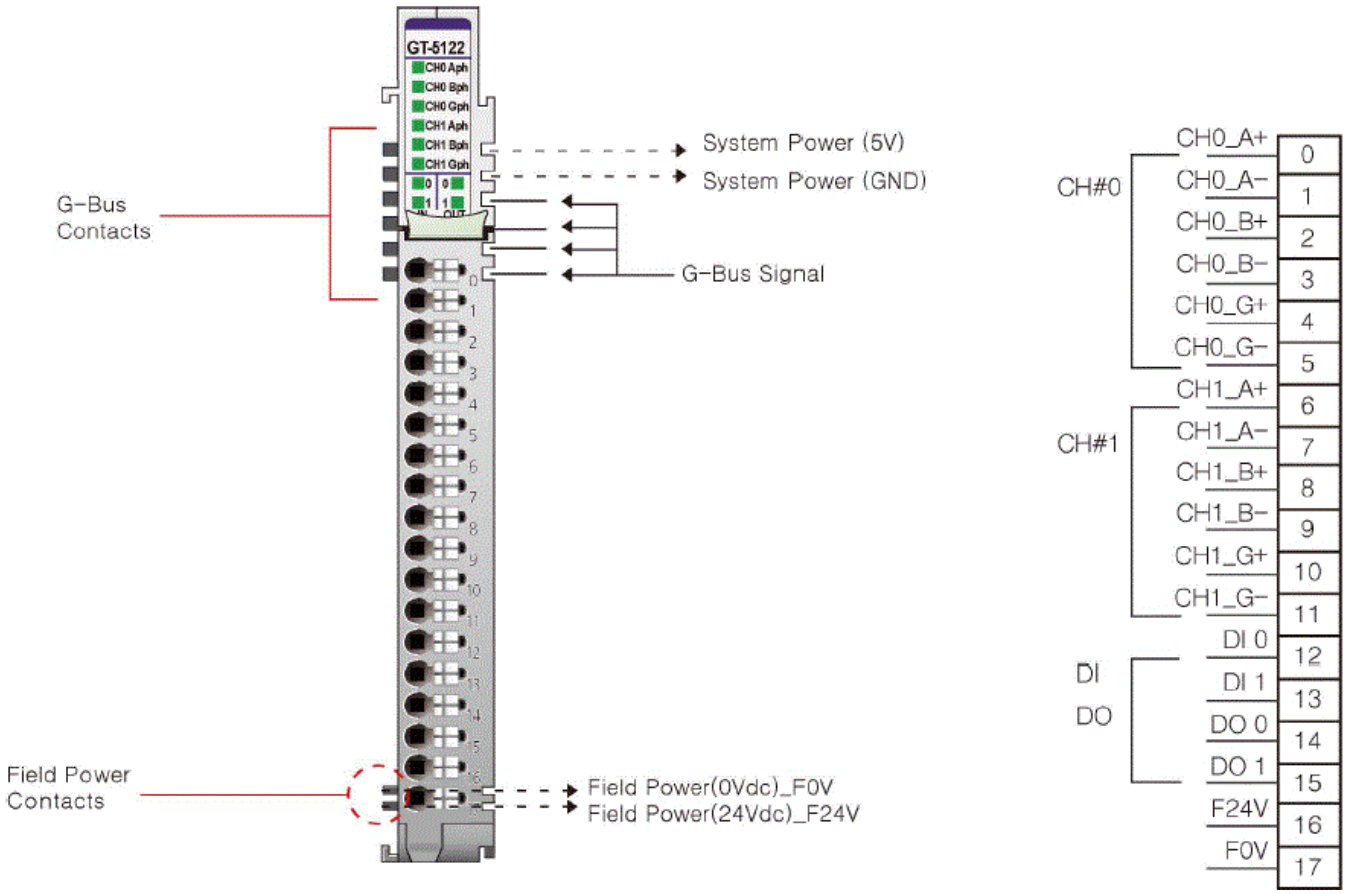
Input per module	2 points sink type
Indicators	2 green input status
Input on-state voltage	• 24 VDC nominal • 15 – 28.8 VDC

On-stat current	• 2.3 mA @ 24 VDC • 2.7 mA @ 28.8 VDC
Input signal delay	• OFF to ON: Max. 0.3 ms • ON to OFF: Max. 0.3 ms
Nominal input impedance	10.2 kΩ

Digital Output Specifications

Output per module	2 points source type
Indicators	2 green output status
Output voltage range	• 24 VDC nominal • 15 – 28.8 VDC
On-state voltage drop	Max 0.5 VDC
Off-state leakage current	Max. 20 uA
Output signal delay	• OFF to ON: Max. 0.3 ms • ON to OFF: Max. 0.3 ms
Output current rating	Max. 0.3 A per channel
Protection	• Reverse voltage protection • Short circuit protection

Wiring Diagram



- **Aph** = Encoder A phase.
- **Bph** = Encoder B phase.

Pin no.	Signal description
0	A ph input+ Ch#0
1	/ A ph input- Ch#0
2	B ph input+ Ch#0
3	/ B ph input- Ch#0
4	G ph input+ Ch#0
5	/ G ph input- Ch#0
6	A ph input+ Ch#1
7	/ A ph input- Ch#1

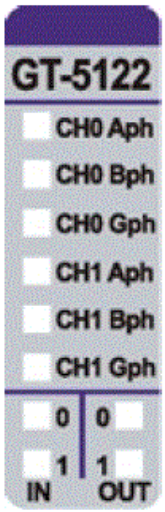
8	B ph input+ Ch#1
9	/ B ph input- Ch#1
10	G ph input+ Ch#1
11	/ G ph input- Ch#1
12	Input channel 0
13	Input channel 1
14	Output channel 0
15	Output channel 1

Pin no.	**Signal description**
16	Field power 24 V
17	Common (field power 0 V)

NOTE

To support encoders with no differential signal i.e. only A+ and B+ channel without A- and B-, then connect A- and B- to the field power 0V. The reason for this is that A+ and B+ receive the signals output from the encoder, while A- and B- serve the role of establishing the reference voltage for the input signals, making their connection essential.

LED Indicator



- **Aph** = Encoder A phase.
- **Bph** = Encoder B phase.

LED	LED function / description	LED color
1	Aph input Ch#0	Green
2	Bph input Ch#0	Green
3	Gph input Ch#0	Green
4	Aph input Ch#1	Green
5	Bph input Ch#1	Green
6	Gph input Ch#1	Green
7	Input channel 0	Green
8	Input channel 1	Green
9	Output channel 0	Green
10	Output channel 1	Green

LED channel status

Status	LED is	Indication
No signal	Off	No Input / Output signal
On signal	Green	Input / Output signal detected

Mapping Data From the Image Table

Input image value (input image data: 10 byte)

Bit no.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	• Current counter value Ch#0 LL when IDS = 0 • Store counter value Ch#0 LL when IDS = 1							
1	• Current counter value Ch#0 LH when IDS = 0 • Store counter value Ch#0 LH when IDS = 1							
2	• Current counter value Ch#0 HL when IDS = 0 • Store counter value Ch#0 HL when IDS = 1							
3	• Current counter value Ch#0 HH when IDS = 0 • Store counter value Ch#0 HH when IDS = 1							
4	• Current counter value Ch#1 LL when IDS = 0 • Store counter value Ch#1 LL when IDS = 1							
5	• Current counter value Ch#1 LH when IDS = 0 • Store counter value Ch#1 LH when IDS = 1							

6	• Current counter value Ch#1 HL when IDS = 0 • Store counter value Ch#1 HL when IDS = 1							
7	• Current counter value Ch#1 HH when IDS = 0 • Store counter value Ch#1 HH when IDS = 1							
8	–	SGIN Ch#0	SBIN Ch#0	SAIN Ch#0	SDN Ch#0	SUP Ch#0	Out status Ch#0	Inp status Ch#0
9	–	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 bytes input.

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

NOTE

In encoder x1/x2/x4 Mode, SUP/SDN bit does not operate.

Output image value (output image data: 4 byte)

Bit no.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0

0	Gate function Ch#0				Count mode Ch#0			
1	Gate Function Ch#1				Count mode Ch#1			
2	–	–	HRST 0	CR 0	CS 0	HP 0	DO 0	IDS 0
3	–	–	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).

NOTE

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 mode 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

For more information on Gate mode, see chapter Gate Mode (Gate Function).

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 i nput
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 cloc k 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 cloc k	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 cou nt, high = down count)

- Frequency range of the Encoder x1 mode is different from Encoder x2/x4 mode freq uency range (Encoder 1x : ~300 kHz / Encoder 2x/4x : ~750 kHz).
- Firmware revision 1.000 – 1.002, when using count mode 0xD the other channel ca n only operate in 0xD – 0xF. Using another count mode combination will not enable frequency measurement mode. Starting from firmware 1.003 channels can operate i n different modes independently e.g. CH#0 = 0xD and CH#1= 0x0.
- Pulse width, B’1110(0xE) measures Aph input’s high (on) pulse width (32 bit) in 0.1 us unit.
- Pulse width & period, B’1111(0xF) measures Aph’s pulse high (on) width (16 bit) & period (16 bit) in 0.1 us unit.

Value	Count mode	Description
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 1 s update **	Simple frequency measurement, updated by 1 s, Hz unit • Aph input acts as frequency input • Bph input is not used
B’ 1110 (0xE)	Pulse width measurement	Simple pulse width measurement, 0.1 us unit • Pulse width (32 bit), if 1234, then pulse high (on) width is 123.4 us *** • Aph input acts as pulse input • Bph input is not used

B’ 1111 (0xF)	Pulse width & period measurement	Simple pulse width & period measurement, 0.1 u s unit • Available in case of pulse input >= 200 Hz (<= 2.5 ms, pulse on width) • Pulse width (16 bit, low word) + pulse period (16 bit, high word) **** • 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 freq uency range (Encoder 1x : ~300 kHz / Encoder 2x/4x : ~750 kHz).
- Firmware revision 1.000 – 1.002, when using count mode 0xD the other channel ca n only operate in 0xD – 0xF. Using another count mode combination will not enable frequency measurement mode. Starting from firmware 1.003 channels can operate i n different modes independently e.g. CH#0 = 0xD and CH#1= 0x0.
- Pulse width, B’1110(0xE) measures Aph input’s high (on) pulse width (32 bit) in 0.1 us unit.
- Pulse width & period, B’1111(0xF) measures Aph’s pulse high (on) width (16 bit) & period (16 bit) in 0.1 us unit.

Parameter Data

Valid parameter length: 8 bytes

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

4	Preset value Ch#1 LL
5	Preset value Ch#1 LH
6	Preset value Ch#1 HL
7	Preset value Ch#1 HH

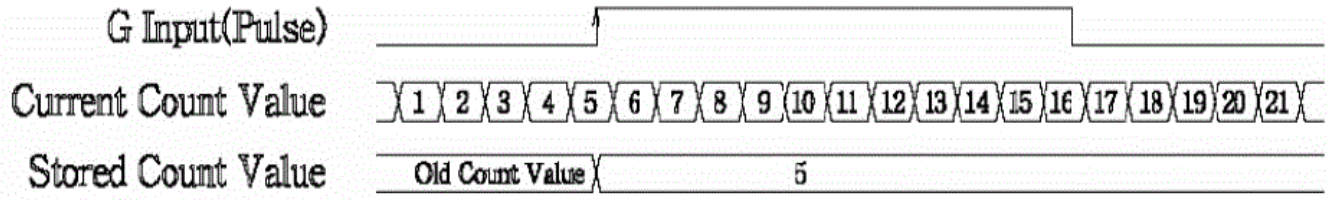
Gate Mode (Gate Function)

The gate function operates in one of the following modes:

- Store / Continue
- Store / Wait / Resume
- Store-reset / Wait
- Store-reset / Start

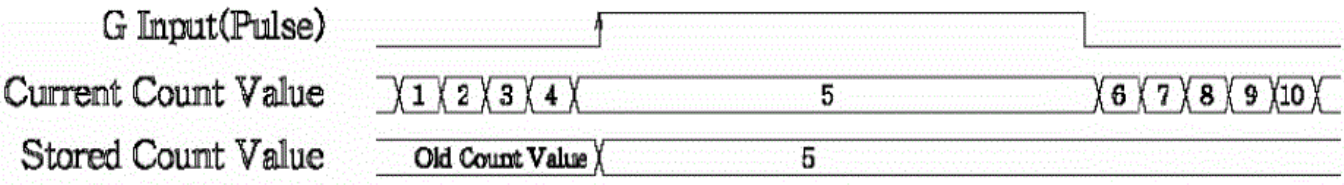
Store / Continue

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.



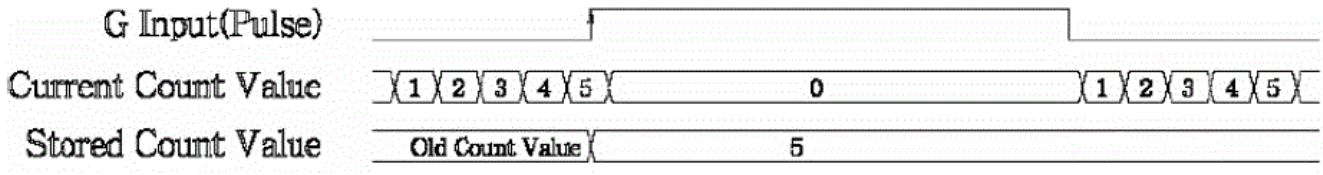
Store / Wait / Resume

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 filling edge and current count value register resume counting. Below example picture shows timing waveforms of Store / Wait / Resume.



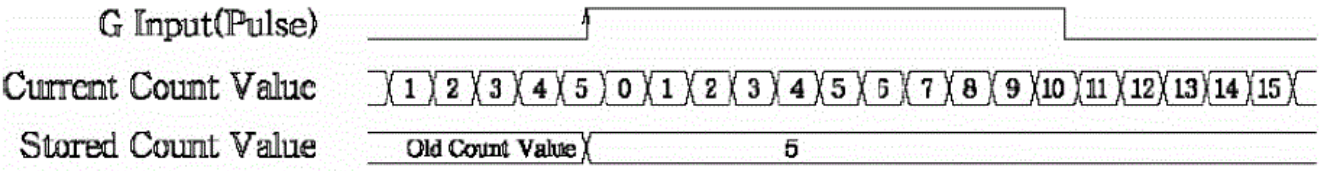
Store-reset / Wait / Start

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 waits 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.



Hardware Setup

CAUTION

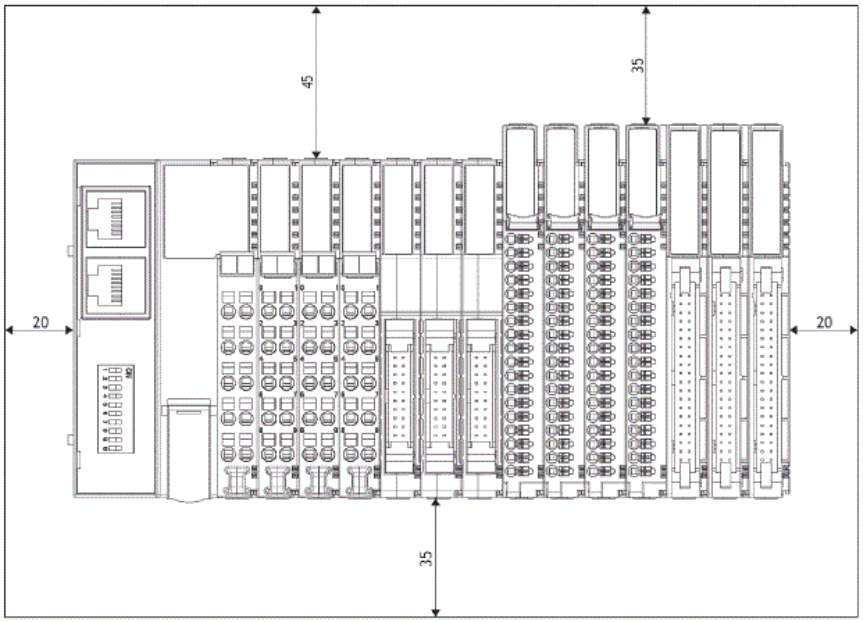
- Always read this chapter before installing the module!
- Hot surface! The surface of the housing can become hot during operation. If the device is used in high ambient temperatures, always let the device cool down before touching it.
- Working on energized devices can damage the equipment! Always turn off the power supply before working on the device.

Space Requirements

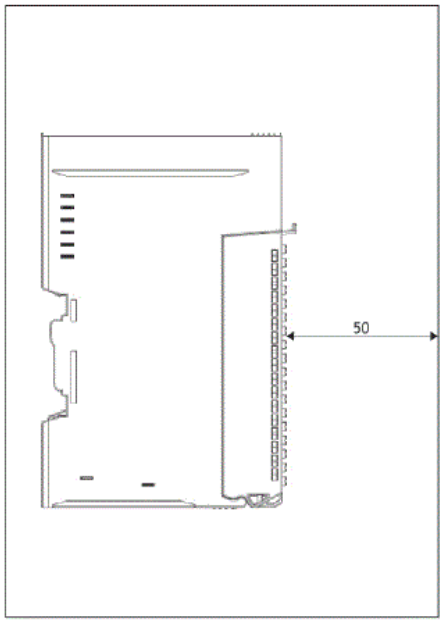
The following drawings show the space requirements when installing the G-series modules. The spacing creates space for ventilation, and prevents conducted electromagnetic interference from influencing the operation. Installation position is valid vertical and horizontal. The drawings are illustrative and may be out of proportion.

CAUTION

NOT following the space requirements may result in damaging the product.



Vertical and horizontal space requirements



Required distance to door

Mount Module to DIN Rail

The following chapters describe how to mount the module to the DIN rail.

CAUTION

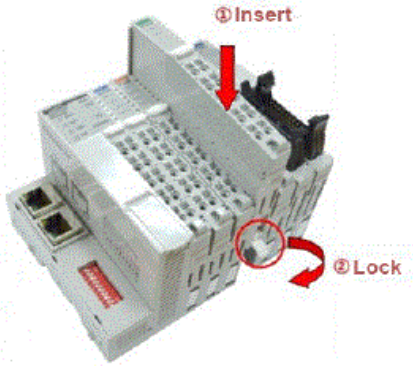
The module must be fixed to the DIN rail with the locking levers.

Mount GL-9XXX or GT-XXXX Module

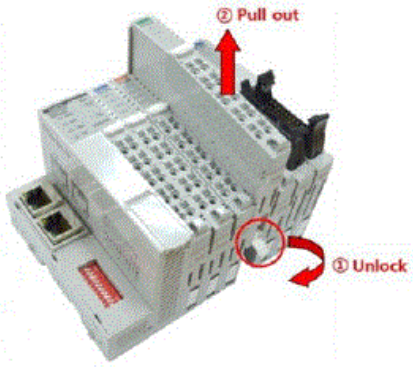
The following instructions apply to these module types:

- GL-9XXX
- GT-1XXX
- GT-2XXX
- GT-3XXX
- GT-4XXX
- GT-5XXX
- GT-7XXX

GN-9XXX modules have three locking levers, one at the bottom and two on the side. For mounting instructions, refer to Mount GN-9XXX Module.



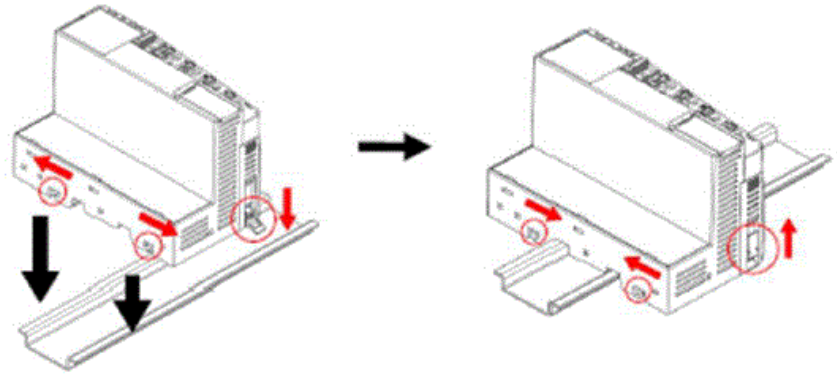
Mount to DIN rail



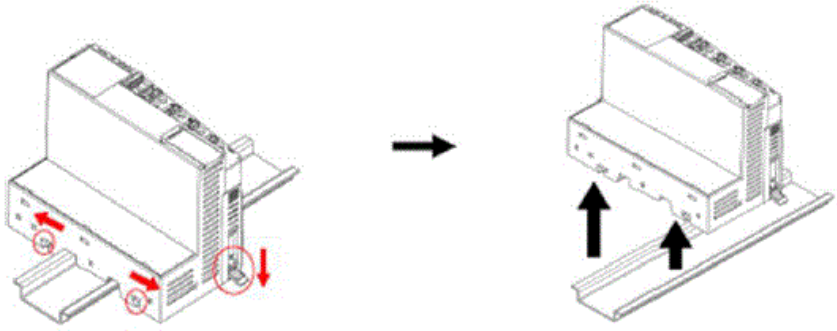
Dismount from DIN rail

Mount GN-9XXX Module

To mount or dismount a network adapter or programmable IO module with the product name GN-9XXX, for example GN-9251 or GN-9371, see the following instructions:



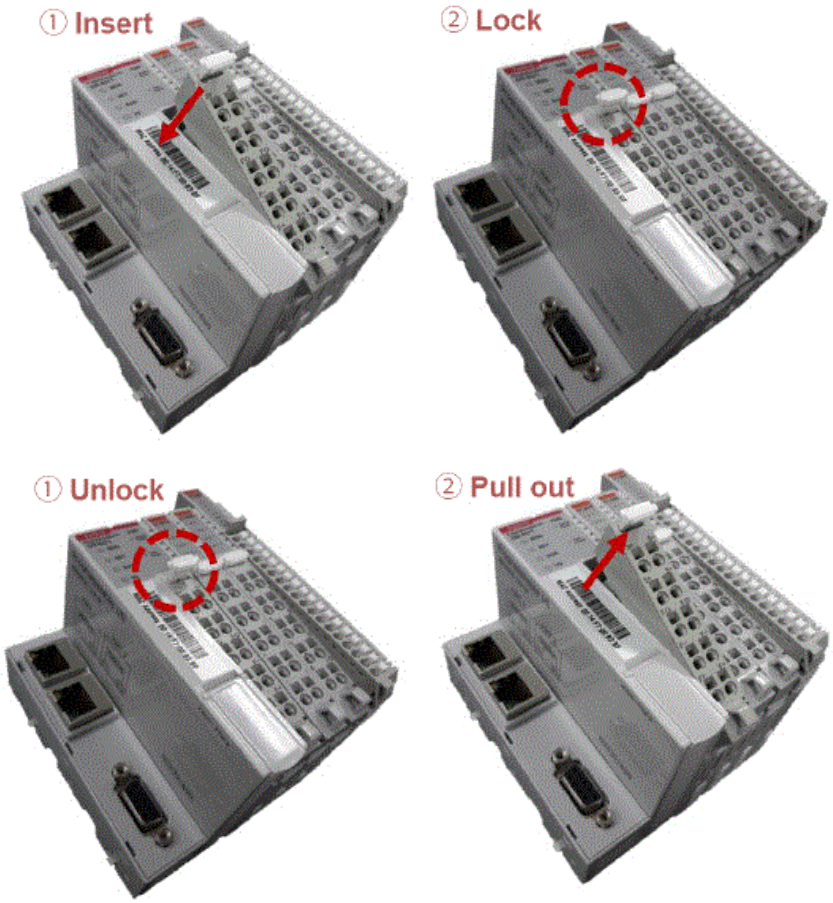
Mount to DIN rail



Dismount from DIN rail

Mount Removable Terminal Block

To mount or dismount a removable terminal block (RTB), see the instructions below.

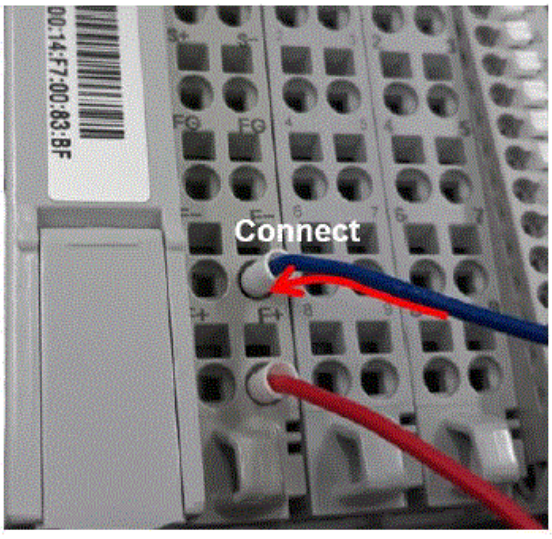


Connect Cables to Removable Terminal Block

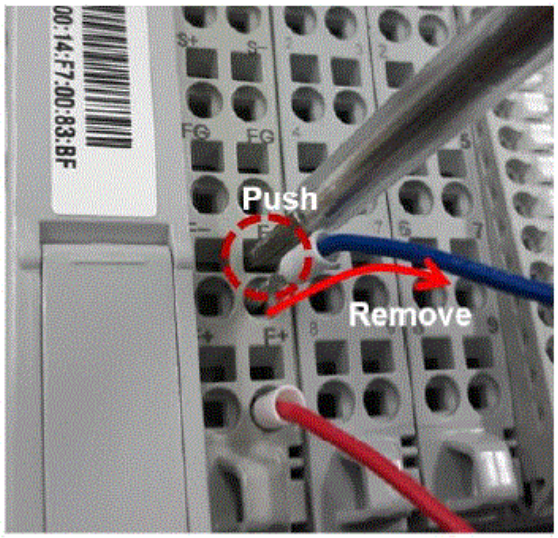
To connect/disconnect cables to/from the removable terminal block (RTB), see the instructions below.

WARNING

Always use the recommended supply voltage and frequency to prevent damage to the equipment and ensure optimal performance.



Connect cable



Disconnect cable

Head Office

- Beijer Electronics AB
- Box 426
- 201 24 Malmö, Sweden
- www.beijerelectronics.com
- +46 40 358600

Documents / Resources

	Beijer ELECTRONICS GT-5122 High Speed Counter Module [pdf] User Manual GT-5122, GT-5122 High Speed Counter Module, High Speed Counter Module, Counter Module, Module

References

- User Manual

Beijer ELECTRONICS

Beijer ELECTRONICS, Counter Module, GT-5122, GT-5122 High Speed Counter Module, High Speed Counter Module, Module

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