

## *User Guide*

# **Remote I/O**

*RTMoE Ethernet/Modbus  
TCP/IP Bus Coupler, Input  
and Output Modules*

Part Number: 0478-0609-01

Issue: 1

## Original Instructions

For the purposes of compliance with the EU Machinery Directive 2006/42/EC, the English version of this manual is the Original Instructions. Manuals in other languages are Translations of the Original Instructions.

### Documentation

Manuals are available to download from the following locations: <http://www.drive-setup.com/ctdownloads>

The information contained in this manual is believed to be correct at the time of printing and does not form part of any contract. The manufacturer reserves the right to change the specification of the product and its performance, and the contents of the manual, without notice.

### Warranty and Liability

In no event and under no circumstances shall the manufacturer be liable for damages and failures due to misuse, abuse, improper installation, or abnormal conditions of temperature, dust, or corrosion, or failures due to operation outside the published ratings. The manufacturer is not liable for consequential and incidental damages. Contact the supplier of the drive for full details of the warranty terms.

### Environmental policy

Control Techniques Ltd operates an Environmental Management System (EMS) that conforms to the International Standard ISO 14001.

Further information on our Environmental Policy can be found at: <http://www.drive-setup.com/environment>

### Restriction of Hazardous Substances (RoHS)

The products covered by this manual comply with European and International regulations on the Restriction of Hazardous Substances including EU directive 2011/65/EU and the Chinese Administrative Measures for Restriction of Hazardous Substances in Electrical and Electronic Products.

### Disposal and Recycling (WEEE)



When electronic products reach the end of their useful life, they must not be disposed of along with domestic waste but should be recycled by a specialist recycler of electronic equipment. Control Techniques products are designed to be easily dismantled into their major component parts for efficient recycling. The majority of materials used in the product are suitable for recycling.

Product packaging is of good quality and can be re-used. Large products are packed in wooden crates. Smaller products are packaged in strong cardboard cartons which have a high recycled fibre content. Cartons can be re-used and recycled. Polythene, used in protective film and bags for wrapping the product, can be recycled. When preparing to recycle or dispose of any product or packaging, please observe local legislation and best practice.

### REACH legislation

EC Regulation 1907/2006 on the Registration, Evaluation, Authorisation and restriction of Chemicals (REACH) requires the supplier of an article to inform the recipient if it contains more than a specified proportion of any substance which is considered by the European Chemicals Agency (ECHA) to be a Substance of Very High Concern (SVHC) and is therefore listed by them as a candidate for compulsory authorisation.

Further information on our compliance with REACH can be found at: <http://www.drive-setup.com/reach>

### Registered Office

**Nidec Control Techniques Ltd**

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**Powys**

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**UK**

Registered in England and Wales. Company Reg. No. 01236886.

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Issue Number: 2



# EU Declaration of Conformity

## 1. Product identification

### Electronic input/ output modules

<b>Network adaptors</b>
I/O210-BC
<b>Digital input modules</b>
GT-1238, GT-12DF, GT-12FA
<b>Digital output modules</b>
GT-2318, GT2328, GT225F, GT226F, GT-22BA, GT-22CA, GT-2744
<b>Analogue input modules</b>
GT-3114, GT3154, GT-3118, GT-3158, GT3424, GT-3464, GT-3428, GT-3468, GT-3704, GT-3804, GT-3914, GT-3934, GT-3924, GT-3944
<b>Analogue output modules</b>
GT-4114, GT-4154, GT-4118, GT-4158, GT-4424, GT-4464, GT-4428, GT-4468
<b>Special modules</b>
GT-5521,
<b>Power modules</b>
GT-7408, GT-7508, GT-7511, GT-7518, GT-7588, GT7641. END-8121, RTB-8210, RTB-8210SF, RTB-8210F, RTB-8218B

## 2. Name and address of the manufacturer

Nidec Control Techniques Ltd, The Gro, Newtown, Powys, SY16 3BE, UK  
Registered in England and Wales. Company Reg. No. 01236886

## 3. This declaration is issued under the sole responsibility of the manufacturer

## 4. The object of the declaration is in conformity with the relevant European Union harmonisation legislation.

Low Voltage Directive (2014/35/EU)  
Electromagnetic Compatibility Directive (2014/30/EU)  
Restriction of Hazardous Substances Directive (2011/65/EU).

## 5. References to the relevant harmonised standards used

The products listed above have been designed and manufactured in accordance with the following European harmonised standards:

## 6. Signed for and on behalf of:



Jon Holman-White  
Vice President of Research and Development  
Nidec Control Techniques Ltd  
Date: 7th October 2019  
Newtown, Powys, UK.

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# 1 Safety information

## 1.1 Warnings, Cautions and Notes



A Warning contains information which is essential for avoiding a safety hazard.



A Caution contains information which is necessary for avoiding a risk of damage to the product or other equipment.

### NOTE

A Note contains information which helps to ensure correct operation of the product.

## 1.2 Installation and Use

The information given in this publication is derived from tests and calculations on sample products. It is provided to assist in the correct application of the product, and is believed to correctly reflect the behaviour of the product when operated in accordance with the instructions. The provision of this data does not form part of any contract or undertaking. Where a statement of conformity is made with a specific standard, the manufacturer takes all reasonable measures to ensure that its products are in conformance. Where specific values are given these are subject to normal engineering variations between samples of the same product. They may also be affected by the operating environment and details of the installation arrangement.

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation of the equipment.



**WARNING - This warning applies to products intended to be used with variable speed drives.**

The adjustable speed drive uses high voltages and currents, carries a high level of stored electrical energy, and is used to control mechanical plant which can cause injury.

Close attention is required to the electrical installation and the system design to avoid hazards either in normal operation or in the event of equipment malfunction.

System design, installation, commissioning and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and the instruction manual carefully.

Failure to observe the following instructions can cause physical injury or death, or damage to the equipment.

## 1.3 Enclosure

The drive is intended to be mounted in an enclosure which prevents access except by trained and authorized personnel, and which prevents the ingress of contamination.

It is designed for use in an environment classified as pollution degree 2 in accordance with IEC 60664-1. This means that only dry, non-conducting contamination is acceptable.

## 1.4 Competence of the installer

The drive must be installed by professional installers who are familiar with the requirements for safety and EMC. The installer is responsible for ensuring that the end product or system complies with all the relevant laws in the country where it is to be used.

## 1.5 Repairs

Users must not attempt to repair a drive if it is faulty. It must be returned to the supplier of the drive.

## 1.6 Electric Shock and Fire Hazards



### WARNING - Dangerous voltage

Where products are supplied by or connected to mains voltages, the voltages used can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the equipment. Refer to the relevant documentation.

### 1.6.1 AC supply

The AC supply must be isolated before any servicing work is performed, other than adjustments to the settings or parameters specified in the manual.

### 1.6.2 Live terminals

Some types of signal and control lines carry hazardous voltages (120/240 V) and can cause severe electric shock and may be lethal.

### 1.6.3 Isolation device

The AC supply must be removed from the drive using an approved isolation device before any servicing work is performed, other than adjustments to the settings or parameters specified in the manual.

### 1.6.4 Stored charge

The drive contains capacitors that remain charged to a potentially lethal voltage after the power supply has been disconnected. If the drive has been energized, the power supply must be isolated at least ten minutes before work may continue.

## 1.7 Electrical installation

### 1.7.1 Protective Ground (Earth) connection

The ground loop impedance must conform to the requirements of local safety regulations. The drive must be grounded by a connection capable of carrying the prospective fault current until the protective device (fuse or circuit breaker) disconnects the supply. The ground connections must be inspected and tested at appropriate intervals.

### 1.7.2 Fuses

The supply to the drive must be installed with suitable protection against overload and short-circuits. The tables in the relevant documentation show recommended fuse ratings. Failure to observe these installation instructions could result in fire.

### 1.7.3 Cables

The cable sizes in the relevant documentation are only a guide. The mounting and grouping of cables affects their current-carrying capacity, in some cases smaller cables may be acceptable but in other cases a larger cable is required to avoid excessive temperature or voltage drop. Refer to local wiring regulations for the correct size of cables. Failure to observe these installation instructions could result in fire.

### 1.7.4 Terminal connections and torque settings

Loose power connections can be a fire risk. Always ensure that terminals are tightened to the specified torques. Refer to the tables in the relevant documentation.



### WARNING - Fire Risk

Braking resistors operate at very high temperatures for short periods. The following precautions are essential to avoid the risk of fire in the event of unexpectedly high braking energy or loss of control of the braking circuit.

- Locate the braking resistor so that inadvertent personal contact with hot surfaces is not possible
- Do not mount braking resistors on a combustible surface
- Provide adequate ventilation
- Mount the braking resistor or reactor in the orientation specified in the data sheet
- The metal case of the braking resistor must be grounded
- Use cable with insulation that is capable of withstanding high temperatures

- Provide independent protection against a loss of control by the braking control system in the drive - refer to the relevant documentation.

### 1.7.5 High voltage insulation (flash) testing

High voltage insulation (flash) testing should not be carried out on the drive.

### 1.7.6 ELV terminals

The control terminals are only single insulated from the mains supply, and hence must be prevented from human contact by an additional isolation barrier, for example a terminal cover.

### 1.7.7 SELV terminals

Drive terminals that are SELV can be safely connected to other SELV equipment.

ELV terminals require an additional insulation barrier between them and other SELV equipment if it is unacceptable to compromise the SELV classification of the SELV equipment.

### 1.7.8 Products connected by plug and socket

An electric shock hazard exists if the drive is supplied via a plug and socket. When unplugged, the pins of the plug may carry a potentially lethal voltage until the internal capacitors have discharged. This can take up to 10 minutes.

It is recommended that a shrouded plug is used that complies with IEC 60309. If the use of a shrouded plug is not possible, then to avoid any possibility of electric shock from the pins, a means must be provided for automatically isolating the plug from the drive (for example a latching relay).

## 1.8 Setting up, commissioning and maintenance

 <b>CAUTION</b>	<p>It is essential that changes to the drive settings are given careful consideration. Depending on the application, a change could have an impact on safety. Appropriate precautions must be taken against inadvertent changes or tampering. Some specific settings which require particular care are listed below. This is not an exclusive list. Other settings may have an impact on safety in specific applications.</p>
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### 1.8.1 Lifting and handling

Many of the drives weigh in excess of 15 kg (33 lb). Use appropriate safeguards when lifting these models. A full list of drive weights can be found in the installation instructions.

### 1.8.2 Output circuit and motor protection

The Motor Rated Current parameter must be set correctly to avoid a risk of overheating and fire in the event of motor overload. In some applications motor temperature protection may also be required.

### 1.8.3 STOP, Enable and Safe Torque Off functions (where applicable)

These functions do not remove dangerous voltages from the equipment or any external option unit, nor do they isolate the motor from dangerous voltages.

#### Automatic start

Some parameter settings may cause the motor to start unexpectedly.

#### Restore default parameter set

Depending on the application, this may cause unpredictable or hazardous operation.

## 1.9 Safety of machinery, safety-critical applications

Within the European Union all machinery in which this product is used must comply with Machinery Directive 2006/42/EC.

The design of safety-related control systems must only be done by personnel with the required training and experience. The Safe Torque Off function will only ensure the safety of a machine if it is correctly incorporated into a complete safety system. The system must be subject to a risk assessment to confirm that the residual risk of an unsafe event is at an acceptable level for the application.

## 1.10 Electromagnetic compatibility (EMC)

The product is designed to comply with international standards in a typical installation. Installation instructions are provided in the *Power Installation Guide* and EMC data sheet. If the installation is poorly designed or other equipment does not comply with international standards for EMC, the product might cause or suffer from disturbance due to electromagnetic interaction with other equipment. It is the responsibility of the installer to ensure that the equipment or system into which the product is incorporated complies with the relevant EMC legislation in the country of use.

Within the European Union, equipment into which this product is incorporated must comply with the Electromagnetic Compatibility Directive 2014/30/EU.

## 1.11 Copyright

The contents of this publication are believed to be correct at the time of printing. In the interests of a commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance, or the contents of the guide, without notice.

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## 2 Product information

The I/O210-BC Ethernet bus coupler simultaneously supports both RTMoE and Modbus TCP/IP protocols. I/O Modules can be fitted to realize a comprehensive solution, with up to 63 I/O Modules connected to a single Bus Coupler. It is possible to transfer 128 bytes of data in 1 ms with up to 16 I/O modules attached to the Bus Coupler.

Included in the range of I/O Modules are digital input, digital output, analogue input and analogue output variants. Certain I/O Modules, may have their parameters configured if required, therefore providing a high level of flexibility.

Additionally a range of power expansion and distribution modules allow for extensive configurations and managed wiring.

### 3 Mechanical installation

Figure 3-1 Bus Coupler in unlocked position

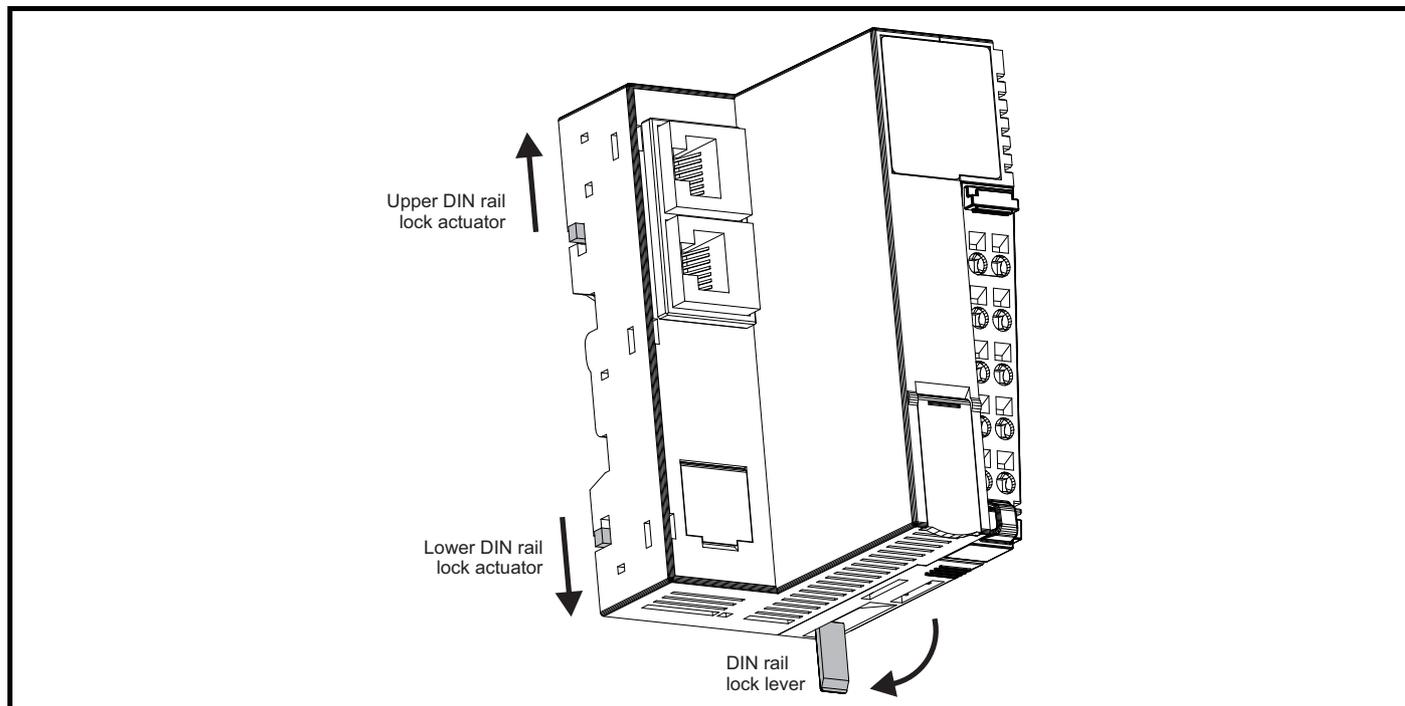
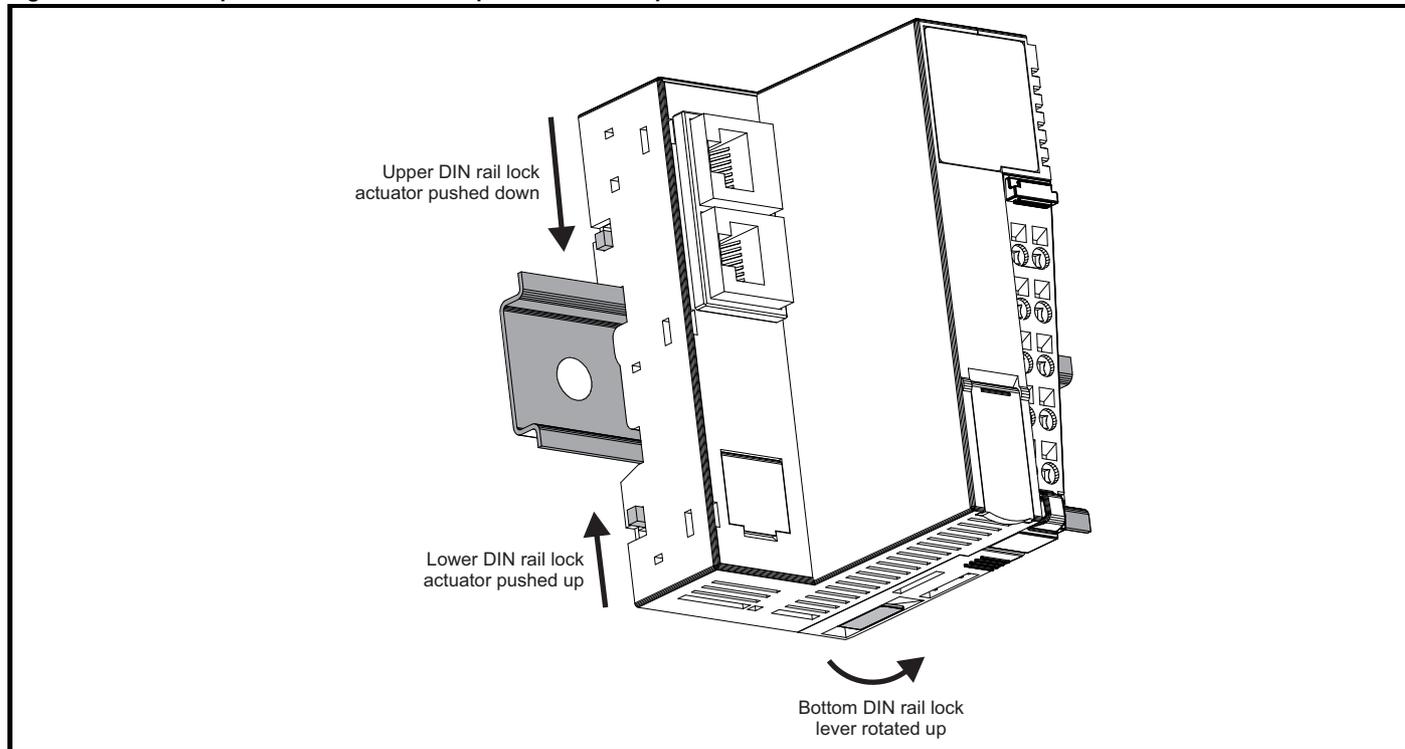
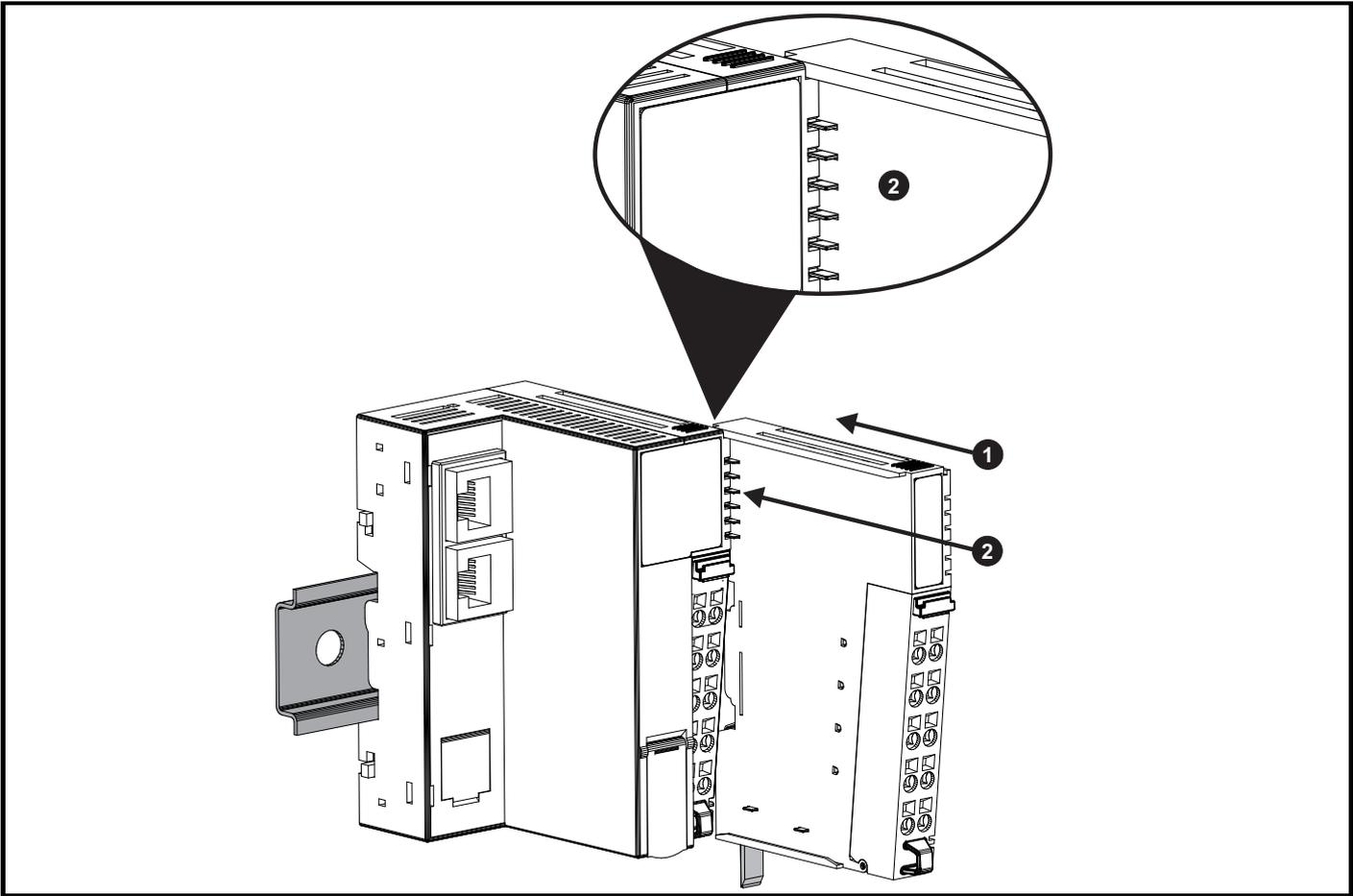


Figure 3-2 Bus Coupler with DIN rail fixed in place and locked position

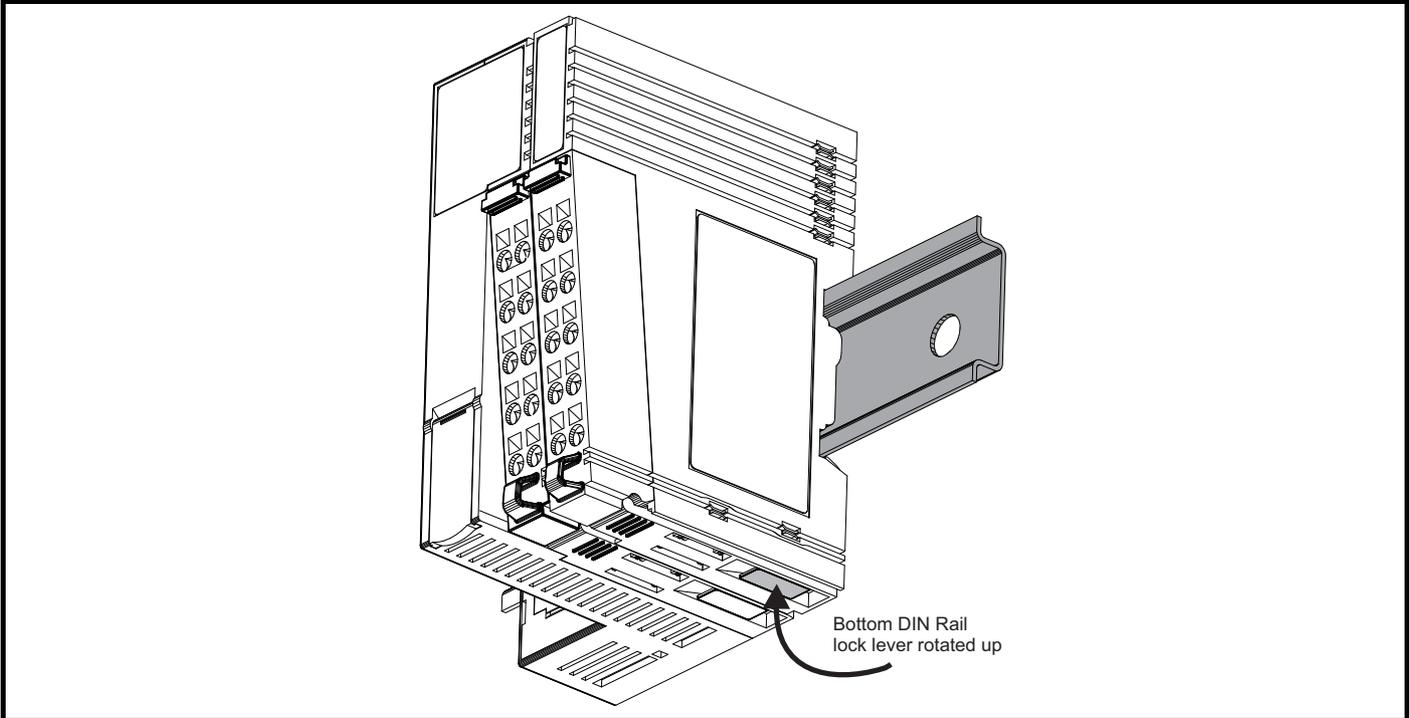


**Figure 3-3 Adding an additional I/O Module to the Bus Coupler**



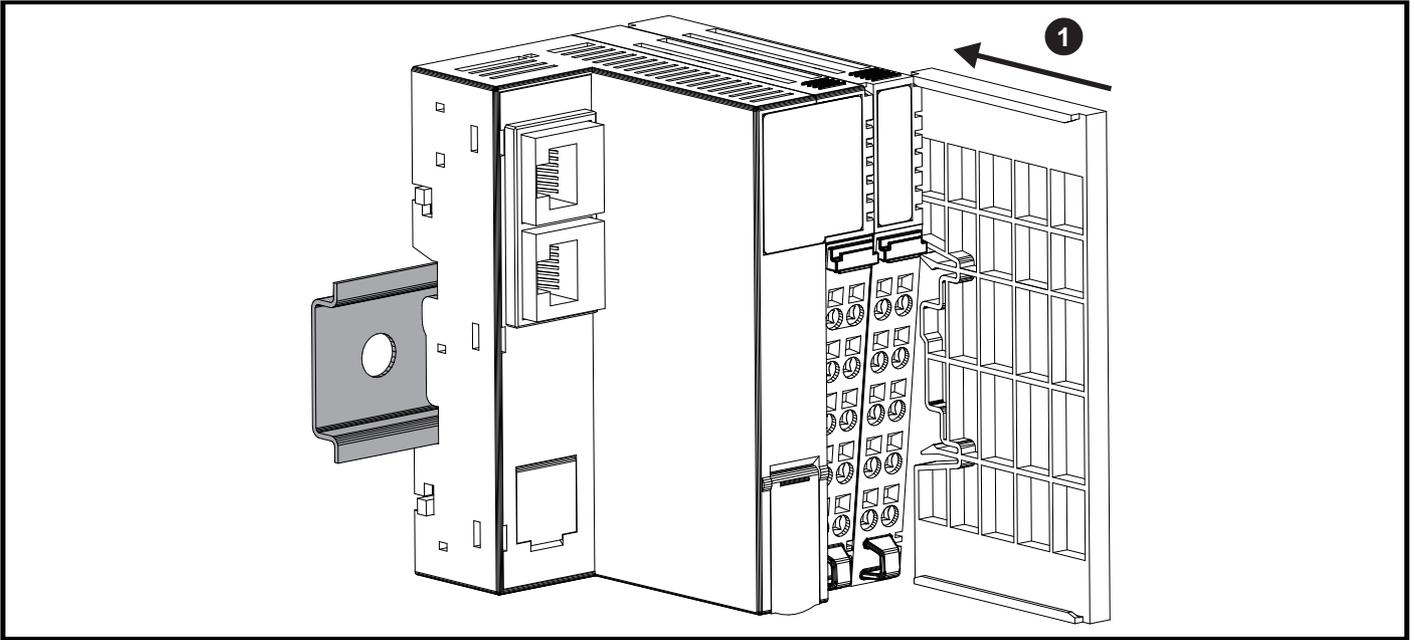
- Slide the I/O Module in the direction shown to attach it to the Bus Coupler (1).
- Align the 6 gold pins on the I/O Module into the slots of the Bus Coupler (2).

**Figure 3-4 Locking the I/O Module onto the DIN rail**



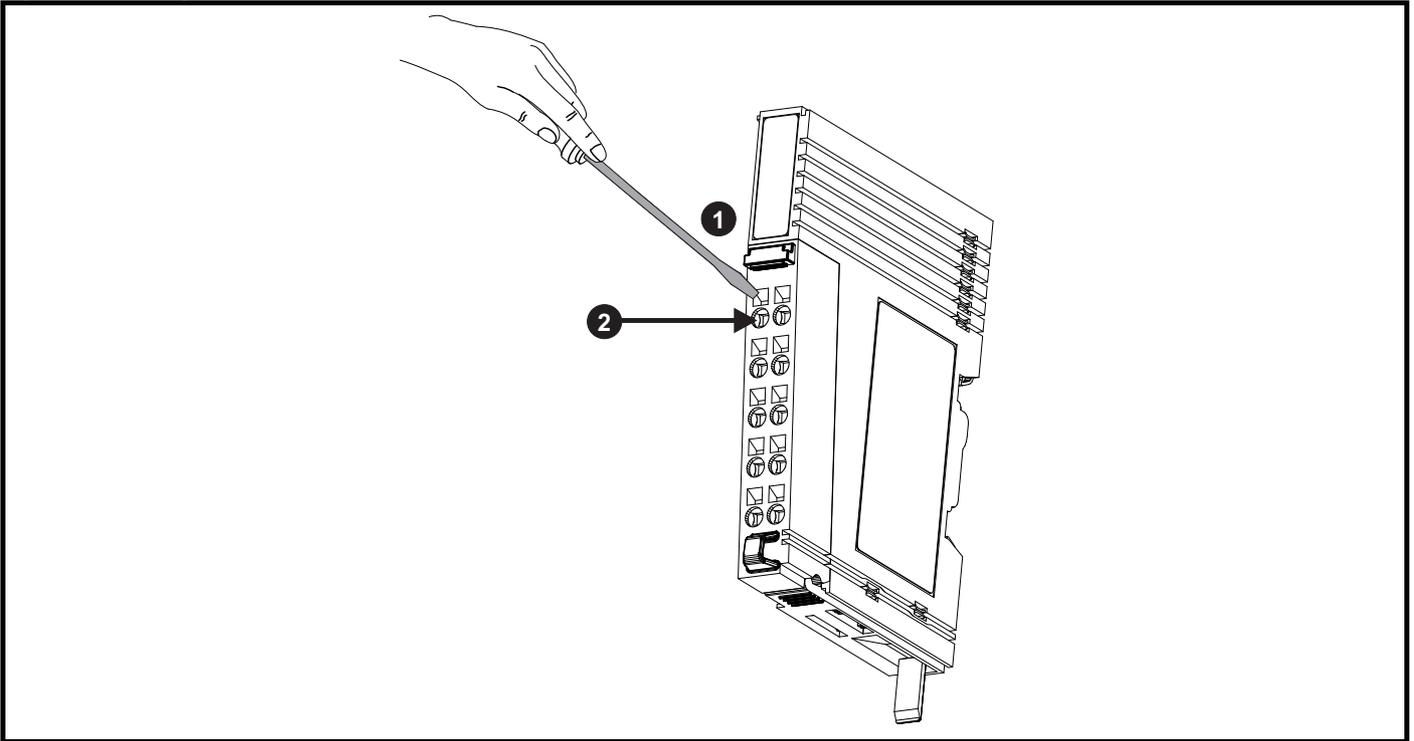
- Rotate the bottom DIN rail lock lever back into the I/O Module body to lock the module to the DIN rail as shown above.

**Figure 3-5 Attaching the End Cover to the final I/O Module**



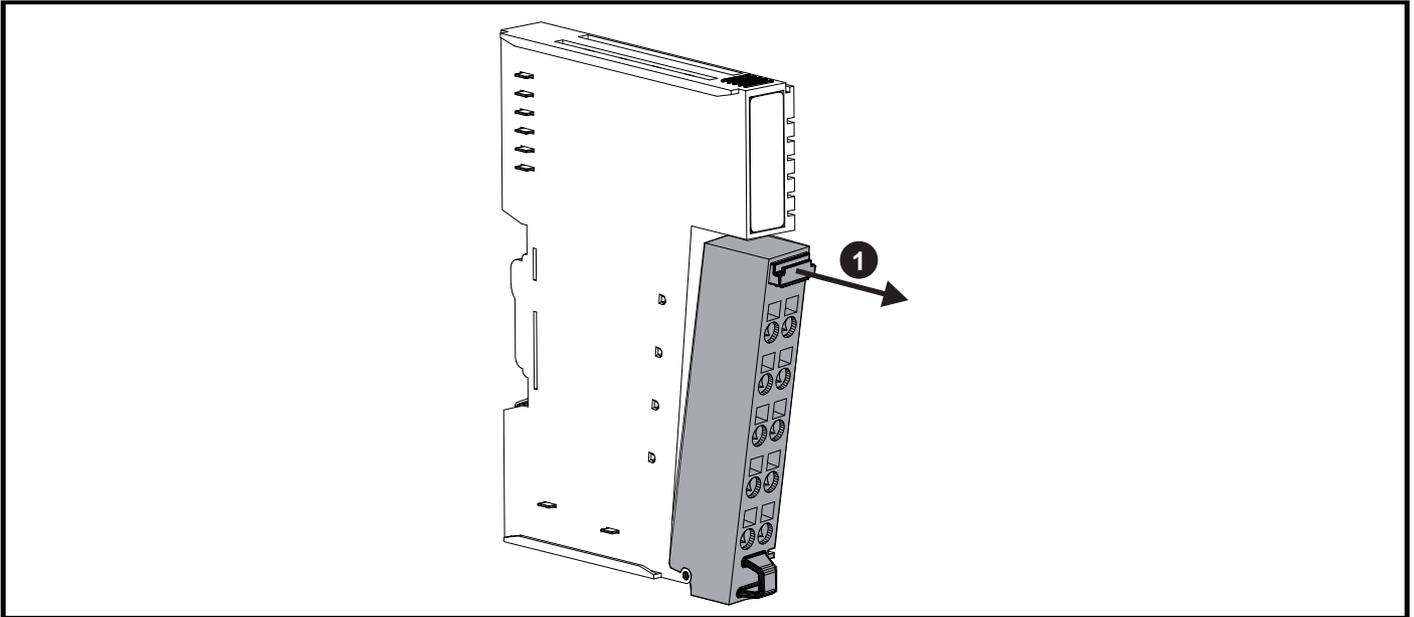
- Attach the End Cover to the final I/O Module by sliding in direction shown (1).

**Figure 3-6 Wiring the connector within the I/O Module**



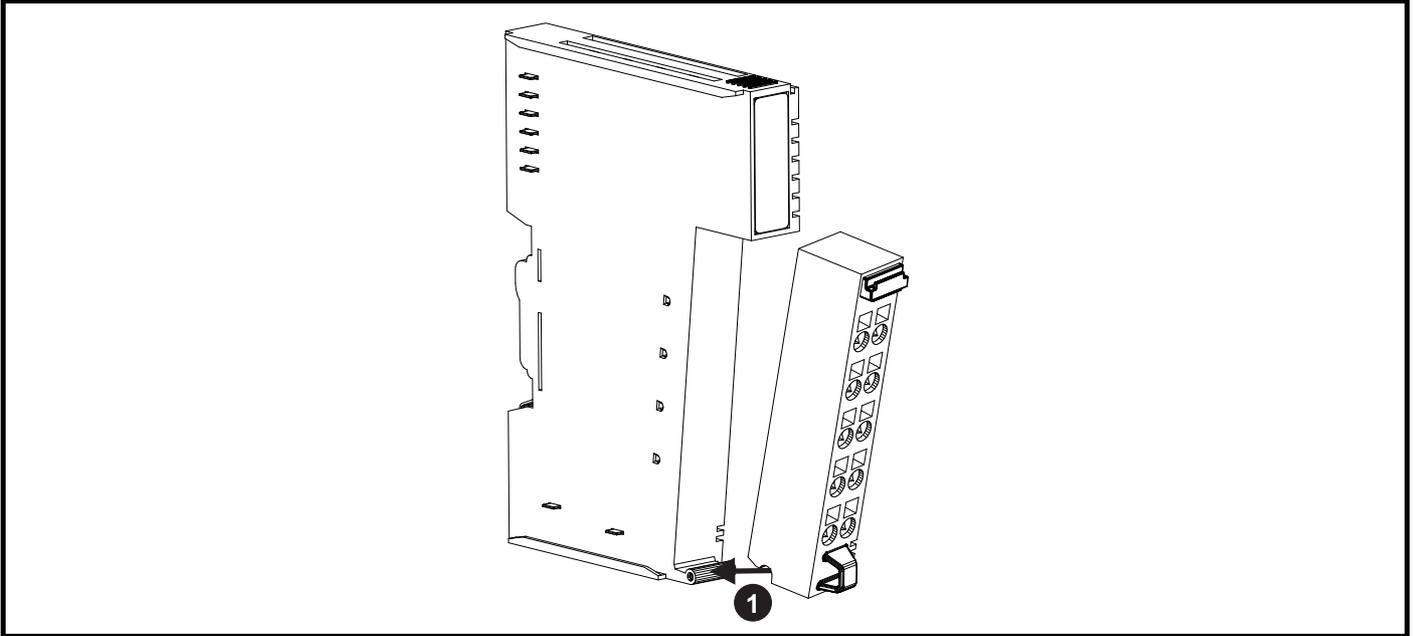
- Push the Insertion tool into the rectangular slot as shown above (1).
- Insert stripped wire into the circular terminal connection, then release / remove the insertion tool to hold wire in place (2).

**Figure 3-7 Removing the Connector from the I/O Module or Bus Coupler**



- Pull the tab in the direction shown to release the Connector from the I/O Module (1).

**Figure 3-8 Installing the Connector to the I/O Module or Bus Coupler**



- The Connector is installed by aligning the circular cut out on the Connector onto the rounded equivalent piece of the I/O Module (1).

## 4 Electrical installation

### 4.1 Power supply requirements

The I/O210-BC Bus Coupler provides user connections for "system power", "field power" and "field ground".

Refer to the individual Bus Coupler sections for details of connection

#### NOTE

System and Field power must be supplied from separated power supplies.

#### 4.1.1 System Power

System power is consumed by the Bus Coupler's circuits, and is also regulated and distributed to be consumed by I/O Modules internal circuits via the "System Power 5 Vdc" and "System Power GND" slide-in connectors mounted to the upper right side of the Bus Coupler and to each upper side of the I/O Modules. Visible on the Bus Coupler is a "System Power" LED that lights green to indicate an external system supply is present.

Each Bus Coupler can provide system power up to a maximum of 1.5 A at 5 Vdc to supply many I/O Modules' internal circuits. It is possible to fit up to 63 I/O Modules to a Bus Coupler. However, if the 1.5 A system power capacity is exceeded by the combined I/O Modules' current demand, then a suitable Expansion Power Module is required. See all the relevant I/O Modules' "Power Dissipation" specifications, and sum their respective values; if the total is in excess of 1.5 A then a suitable Expansion Power Module is required. The GT-7511 Expansion Power Module can provide up to 1 A of system power to further modules (See Chapter 11 *Power module* on page 179).

#### 4.1.2 Field Power

Field Power is distributed from the "Field power 0 Vdc" and "Field Power 24 Vdc" slide-in connections located on the lower right side of the Bus Coupler. Field power is used for example as the supply from output modules to actuators or relays etc, or the supply via switches etc to inputs. Visible on the Bus Coupler is a "Field power" LED that lights green to indicate an external field supply is present.

Each Bus Coupler's Field Supply connector and internal conductor paths between Bus Coupler and I/O Modules can safely pass up to a maximum of 10 A DC.

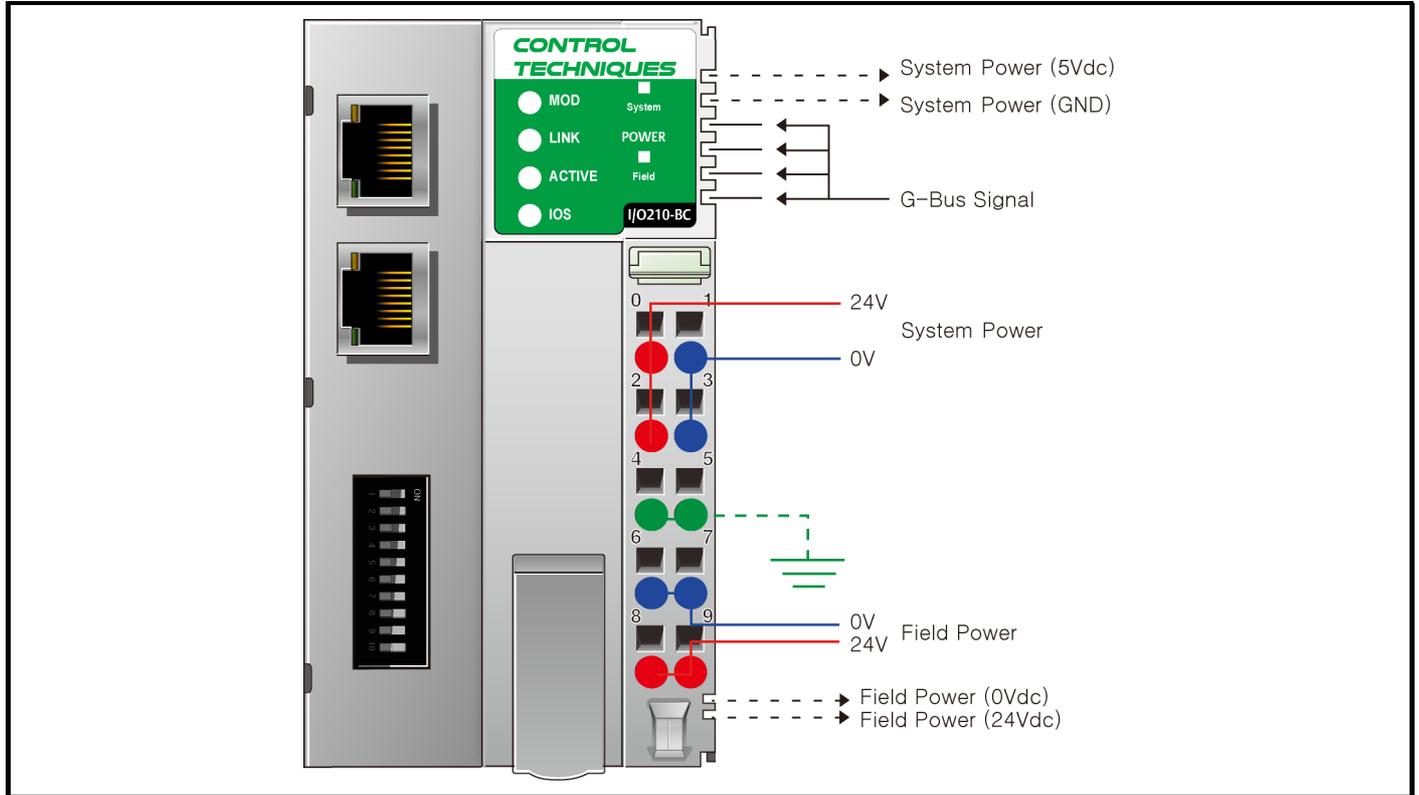
If the combined field power consumed by equipment connected to the relevant I/O Modules exceeds 10 A DC then suitable conductors should provide current directly to relevant I/O Module's field power supply terminals, rather than the internal connections distributing the field power supply.

If different field supplies are required for different sections of I/O, then a suitable Expansion Power Module is required. The GT-7511 Expansion Power module can provide further field power distribution up to 10 A DC (See Chapter 11 *Power module* on page 179).

Field Ground is an individual connection located on the Bus Coupler and on I/O Modules.

# 5 RTMoE Ethernet Bus Coupler

## 5.1 I/O210-BC



Pin number	Signal description	Signal description	Pin number
0	System Power, 24 V	System 0 V	1
2	System Power, 24 V	System 0 V	3
4	Functional Ground	Functional Ground	5
6	Field 0 V	Field 0 V	7
8	Field Power, 24 V	Field Power, 24 V	9



The modules are not hot swappable and must not be removed when the power is on.



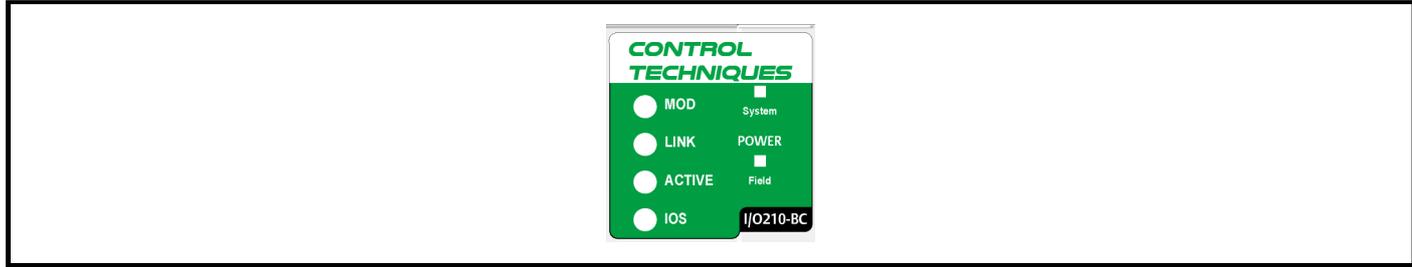
System and Field power must be supplied from separated power supplies.

**Table 5-1 Environmental specification**

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
UL Temperature	-20 °C to 60 °C
Relative humidity	5 % to 95 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Adapter Type	RT Ethernet
Maximum Expansion Module	63 slots
Maximum Length Bus Line	Up to 100 m from Ethernet Switch
Maximum Nodes	Limited by Ethernet Specification
Refresh performance 1 to 16 IO modules	1 ms to refresh 128 bytes
Refresh performance 17 to 32 IO modules	2 ms to refresh 128 bytes
Refresh performance 33 to 63 IO modules	4 ms to refresh 128 bytes
Baud Rate	10/100 Mbps, Auto-negotiation, Full duplex
Protocol	Modbus TCP/IP, RTMoE
IP-Address Set-up	Static via DIP switch or Control Techniques Discovery protocol
IP-Address Range	xxx.xxx.xxx.1 to 254
Interface Connector	RJ45 socket x 2
Indicator	6 LEDs 1 Green/Red, Module Status (MOD) 1 Green, Physical Connection (LINK) 1 Green, Exchange Data/Traffic Present (ACTIVE) 1 Green/Red, Expansion I/O Module Status (IOS) 1 Green, System Power Status 1 Green, Field Power Status 2 LEDs (each RJ45 Connector) 1 Green, Link 1 Yellow, Active
Field Power Detection	Approximately 14 Vdc
General specifications	
System Power	Supply Voltage: 24 Vdc nominal Supply Voltage Range: 15 to 32 Vdc Protection: Output Current limit (minimum 1.6 A) Reverse polarity protection
Power Dissipation	70 mA typical @ 24 Vdc
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Sweeps</li> </ul> Random Vibration (Based on IEC 60068-2-64) <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
Current for I/O Module	1.5 A @ 5 Vdc
EMC Resistance Burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, UL, RoHS
Isolation	System power to internal logic: Non-isolation System power I/O driver: Isolation
Field Power	Supply Voltage: 24 Vdc nominal (Maximum 32 Vdc) Field Power Range is different depending on I/O Module series, Refer to I/O Modules Specification
Maximum Current Field Power Contact	DC 10 A Max
Weight	162 g
Module size	54 mm x 99 mm x 70 mm

## 5.2 I/O210-BC LED Indicator

Figure 5-1 LED Indicator



LED name	LED Function / Description	LED Colour
MOD	Bus Coupler's Status	Green/Red
LINK	Ethernet electrical link detected	Green
ACTIVE	Ethernet message exchange detected	Green
IOS	Internal Bus Status	Green/Red
System Power	Power supplied for system control circuits, coupler and modules	Green
Field power	Power supplied for the module IO points	Green

Table 5-2 Module Status LED (MOD)

LED is:	Description
Off	Power is not supplied to the unit
Green	Operational state. Coupler configuration is valid and operating as expected.
Flashing Green	Preoperational state. Coupler configuration is being processed.
Flashing Red	Configuration error detected.
Red	Unrecoverable device fault.

Table 5-3 Physical Connection LED (LINK)

LED is:	Description
Off	Device may not be powered or Ethernet is not physically connected
Green	Ethernet is physically connected

Table 5-4 Exchange Data/Traffic present LED (ACTIVE)

LED is:	Description
Off	Device may not be powered or Ethernet is not physically connected
Flashing Green	Data exchange present

**Table 5-5 Extension Module Status LED (IOS)**

LED is:	Description
Off	Device has no expansion module or may not be powered
Green	Exchanging I/O data
Flashing Green	G-Bus is normal but does not exchange I/O data
Flashing Red	One or more module in fault state <ul style="list-style-type: none"> <li>• Changed module configuration.</li> <li>• G-Bus communication failure.</li> </ul>
Red	Failed to initialize module <ul style="list-style-type: none"> <li>• Detected invalid module ID.</li> <li>• Input/Output size too big.</li> <li>• Too many modules.</li> </ul>

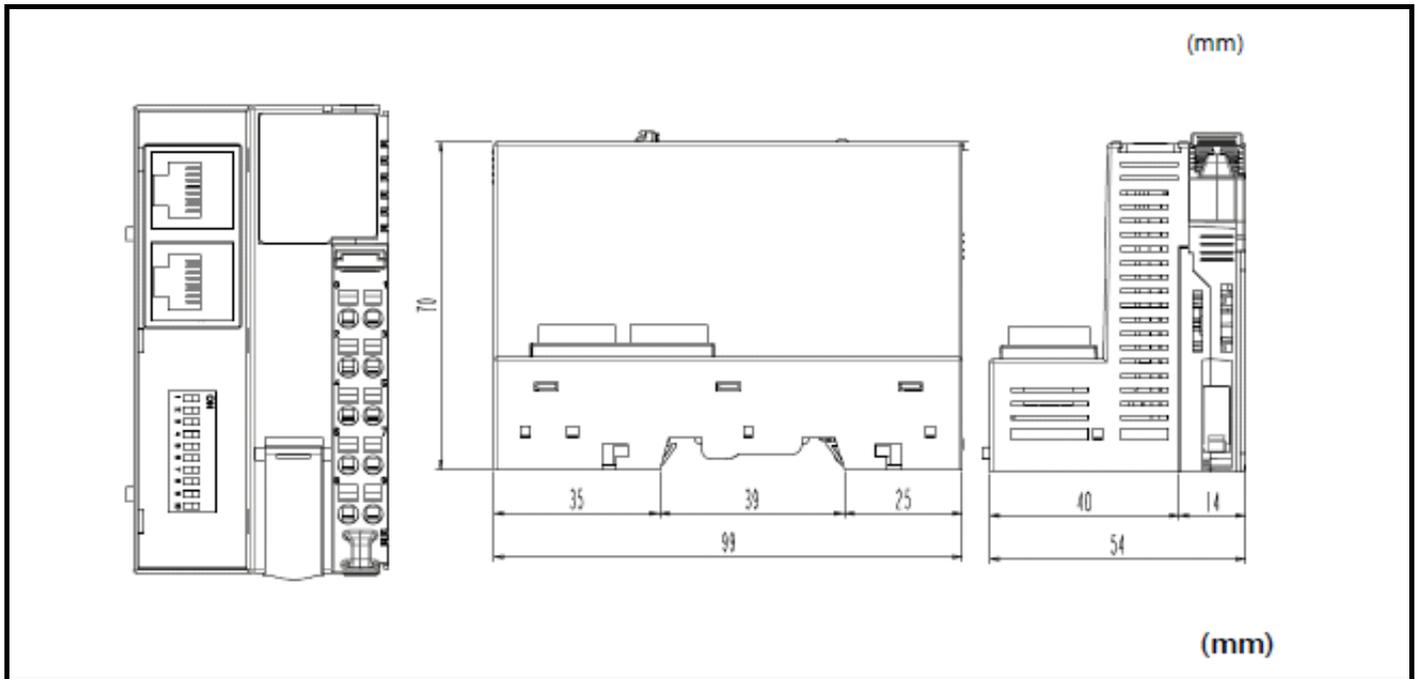
**Table 5-6 System Power Supplied LED (System Power)**

LED is:	Description
Off	Module is not supplied with 24 Vdc system power
Green	Module is supplied 24 Vdc system power

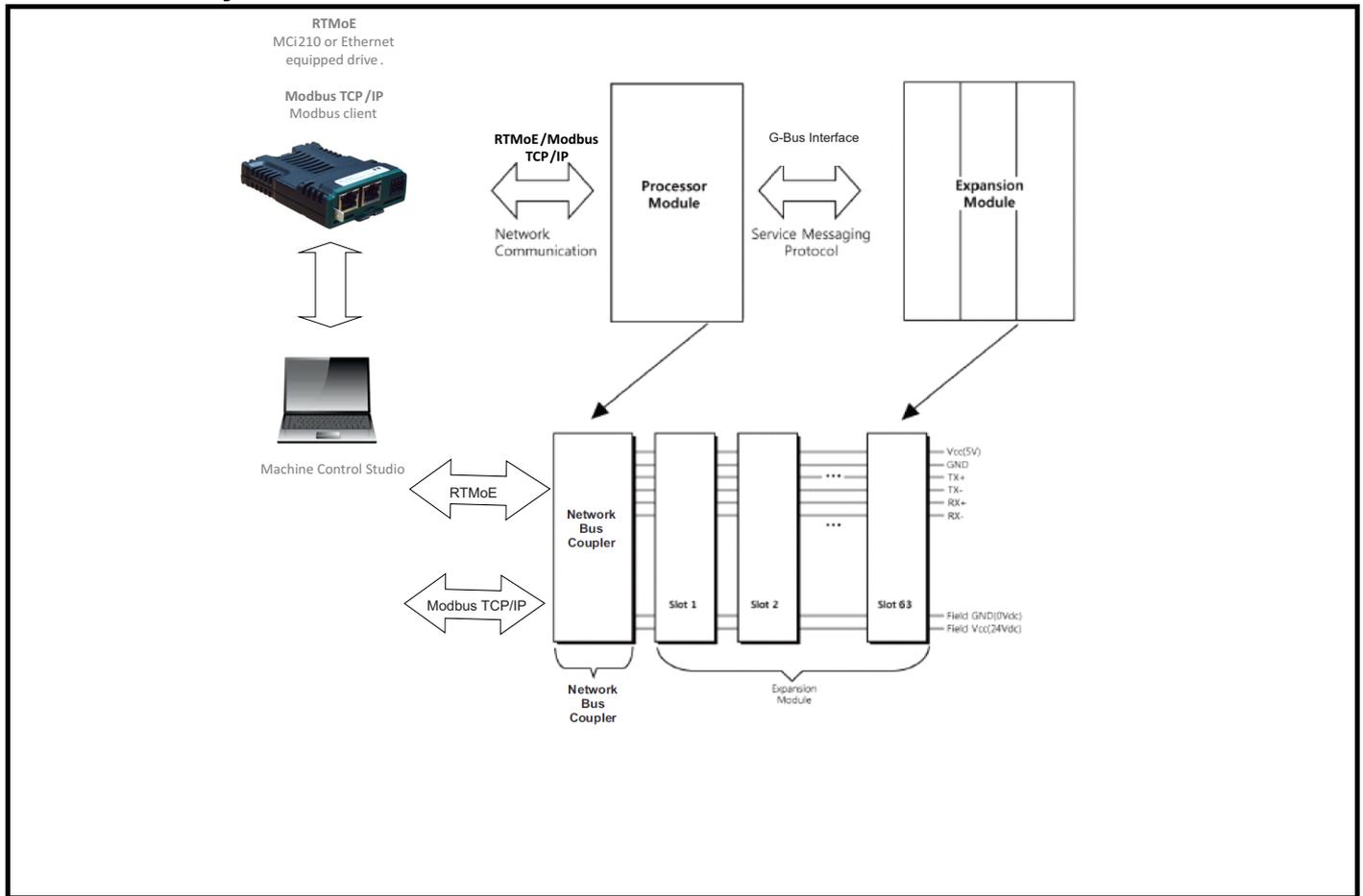
**Table 5-7 Field Power Supplied LED (Field Power)**

LED is:	Description
Off	Module is not supplied with 24 Vdc field power
Green	Module is supplied 24 Vdc field power

### 5.3 Dimensions



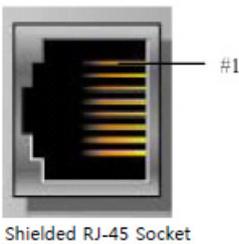
## 5.4 G-Bus System



Data is exchanged between the Fieldbus protocol and the internal G-Bus protocol. The user does not need to concern themselves with the G-Bus protocol specifics, as this is handled internally within the I/O210-BC.

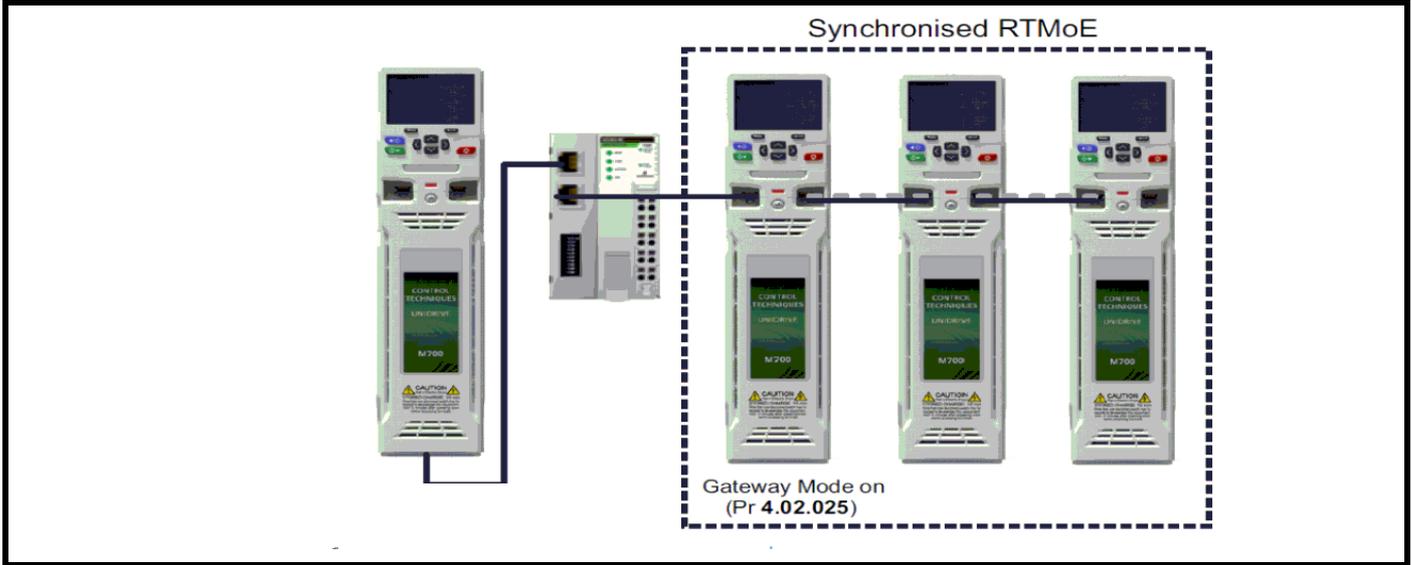
### 5.4.1 I/O210-BC RJ-45 socket

RJ-45	Signal name	Description
1	TD+	Transmit+
2	TD-	Transmit-
3	RD+	Receive+
4	-	-
5	-	-
6	RD-	Receive-
7	-	-
8	-	-



## 5.5 RTMoE synchronised networks

If synchronous cyclic links are used within an RTMoE network, for best reliability it is sensible to segregate the network. This is accomplished by assigning one drive to be a Gateway and thus ensuring no indeterminate latency is added by non RTMoE devices such as the I/O210-BC. Therefore in such situations the I/O210-BCs should be outside of the real-time segment. An example of how to connect the I/O210-BC outside the synchronised network is shown below. The I/O210-BC's Status Word bit 10 will indicate if the I/O210-BC has been placed within a synchronized network.



## 5.6 IP Address configuration

**NOTE**

When making changes to DIP switch settings, power must be cycled to the I/O210-BC before changes become active.

**NOTE**

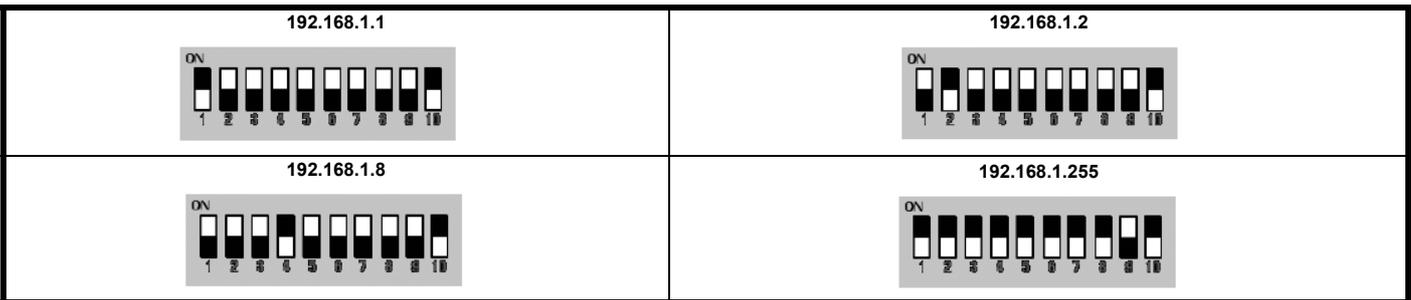
DIP switch 9 is reserved.

**Default IP address**

The factory default IP address is 192.168.1.100, and the subnet mask is 255.255.255.0. (DIP switch 10 should be off).

**IP address setting of the last octet**

When DIP switch 10 is in the on position then the last octet of the IP address 192.168.1.xxx is modified via DIP switches 1 through to 8. These DIP switches correspondingly represent bit 0 to bit 7 of an 8-bit binary integer. The subnet mask is 255.255.255.0.



**IP address set-up using Machine Control Studio**

When DIP switch 10 is off, then when the device is powered-up or reset the IP address is set from Machine Control Studio.

## 5.7 Configuring and using the IO with Machine Control Studio and the Advanced cyclic Link editor.

Machine Control Studio provides a graphical method to configure and access the remote IO. If the physical Bus Coupler and IO Module constitution is assembled and connected then Machine Control Studio can scan the hardware and create the required hardware representation within the Devices tree. Alternatively Bus Couplers and IO modules may be added manually to the project.

The Advanced cyclic Link Editor can be used to graphically create cyclic data exchange links between Bus Couplers, their associated IO Modules and MCI210 modules and or factory equipped Ethernet drives and SI-Ethernet option modules. By default, all Bus Coupler and MCI mappings are created automatically and are accessible as data structures representing the Bus Coupler and individual IO Modules.

### 5.7.1 RTMoE Bus Coupler Control Word

Bit 0 of the control word will attempt a reset of a fault, all other bit fields are reserved and have no function. Thus to attempt a reset, write a value of 1 to the control word.

### 5.7.2 RTMoE Bus Coupler Status Word

B15	B14	B13	B12	B1	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
0	0	0	0	0	NF	FP	SF	0	0	0	0	Device state			

NF - Network fault

0: No fault identified

1: Identified IEEE1588 synchronisation on both ports. The I/O210-BC does not support synchronisation and so will affect real time behaviour of devices attempting to synchronise through the inbuilt Ethernet switch. System installation must be checked.

FP - Field power fault

0: 24 V is applied (on)

1: 24 V is not applied (off), and considered a field power fault

SF - System fault

0: No fault, system is healthy

1: Fault active.

The Device state bits represent the Bus Coupler's RTMoE state machine:

Decimal value of bits 0 to 3	State	Description
0	Power on	Power-on reset
1	Initialising	Initialise the device hardware
2	Reset application	Initialise the system parameters
3	Reset communications	Initialise the communications interface
4	Preoperational	Load configuration
5	Operational	Run IO and communications

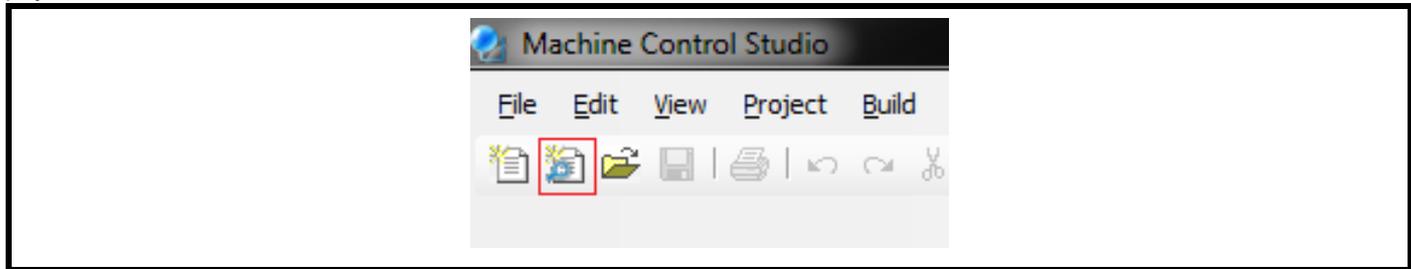
### 5.7.3 Creating links to and MCI210 option module.

**NOTE**

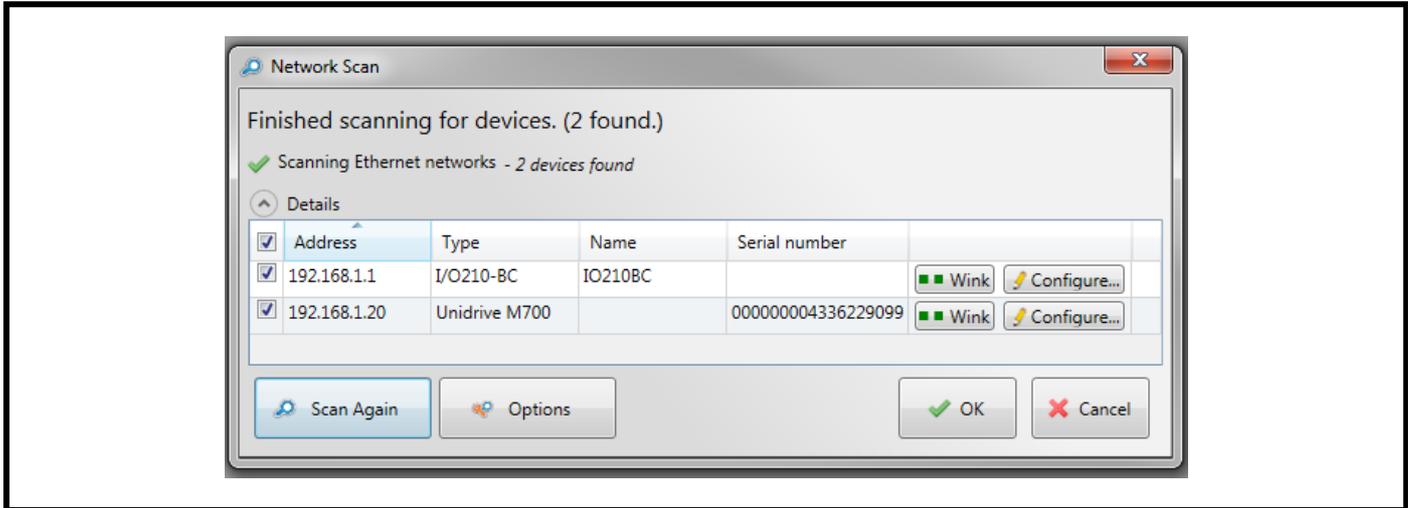
If a previous Advance Link Editor configuration is resident in an MCI210 module, then the IP address stored as part of the link configuration is written after reset and power on. Therefore, a module default is required if you wish to change the module's IP address using Machine Control Studio's Discovery feature or manually via the keypad.

(To default an MCI210 module set S.00.008= On, then set S.00.007 = On).

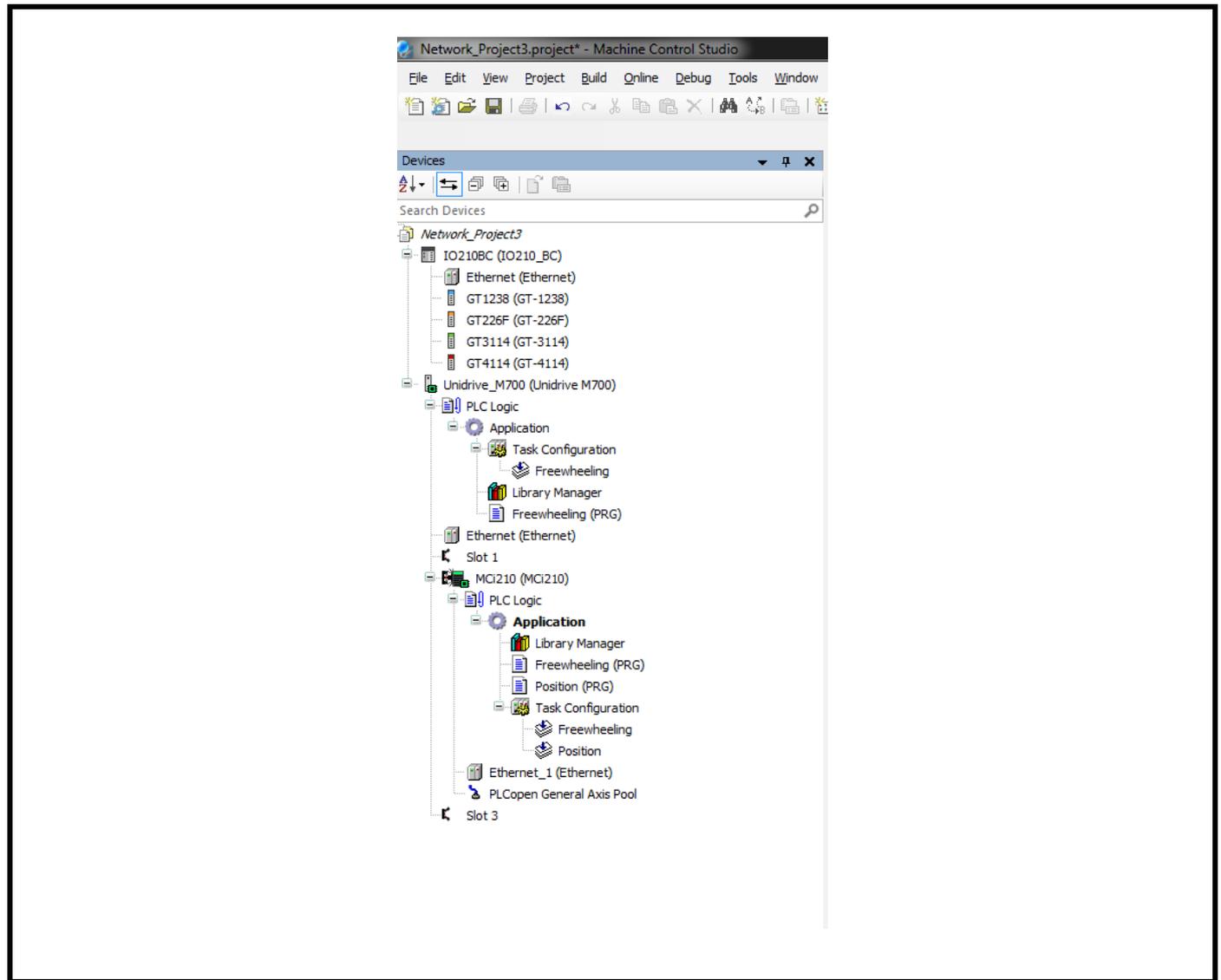
To automatically populate the Device tree with a representation of physically attached hardware, begin with a new project by clicking on the "New project from device scan" button.



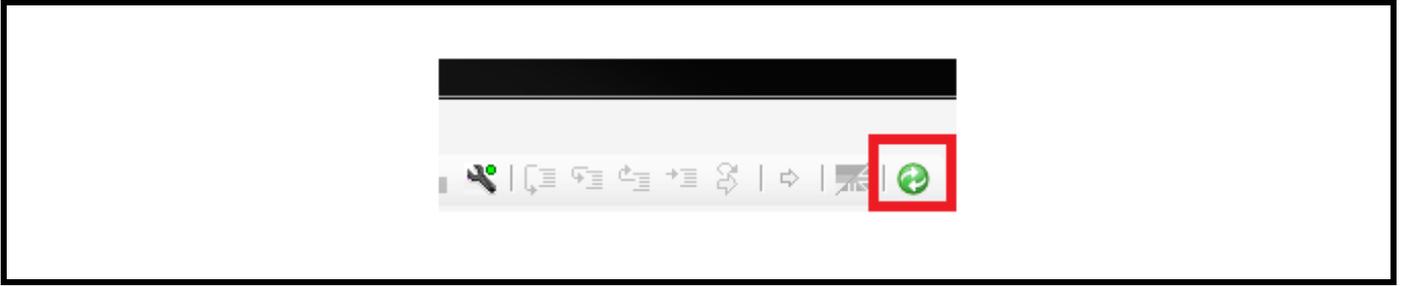
Scan the network, in this example the Ethernet network consists of an M700 with MCI210 module and a I/O210-BC Bus Coupler with associated IO Modules.



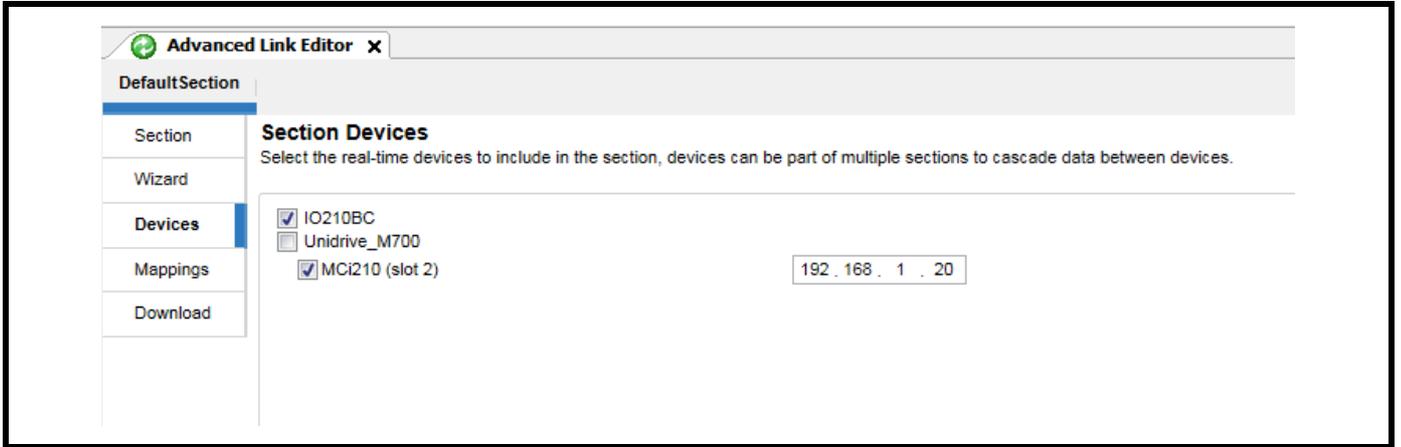
Once the project is created automatically from the scan, the physical structure of the attached Bus Coupler and IO Modules can be seen in the Device tree.



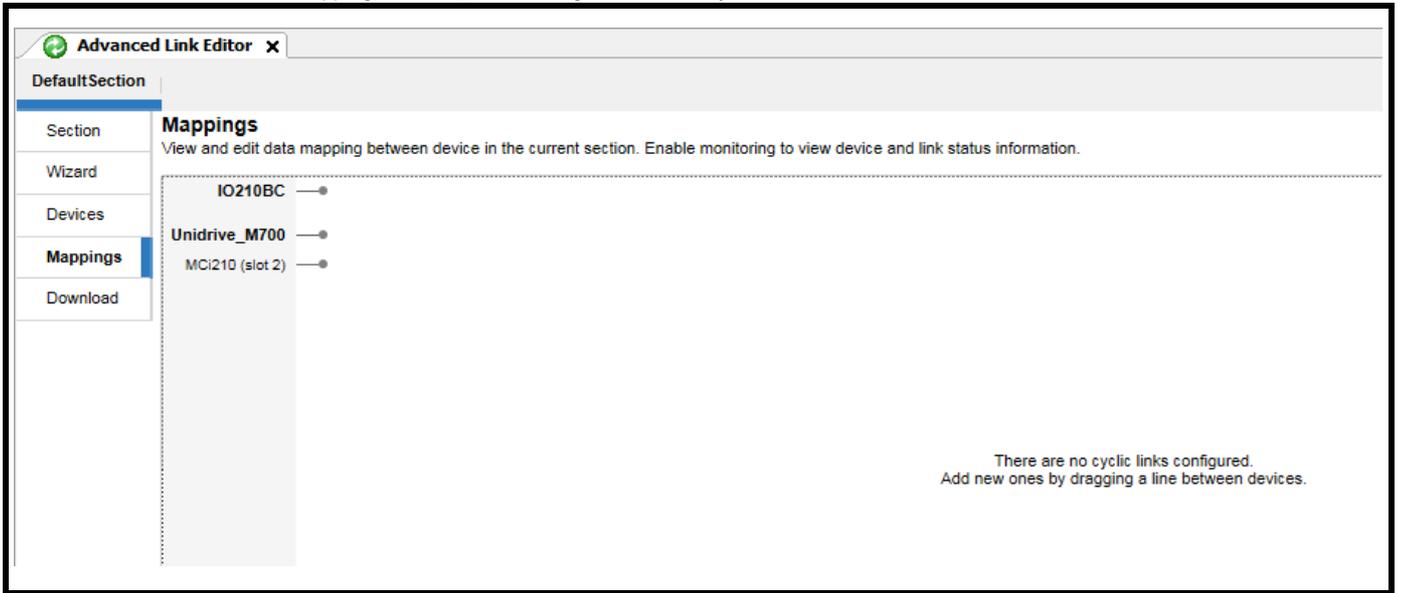
Click on the Advanced Cyclic Link Editor button.



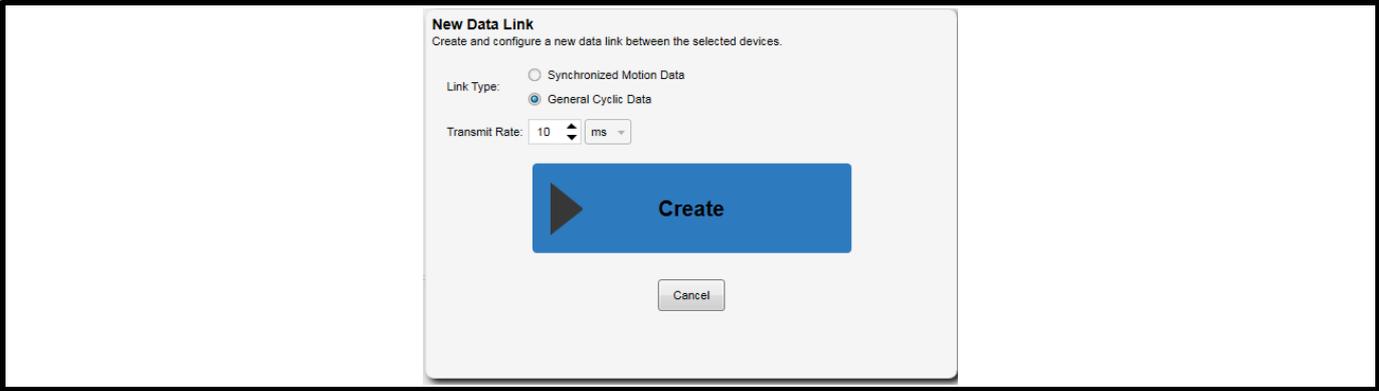
Select the devices that will exchange data.



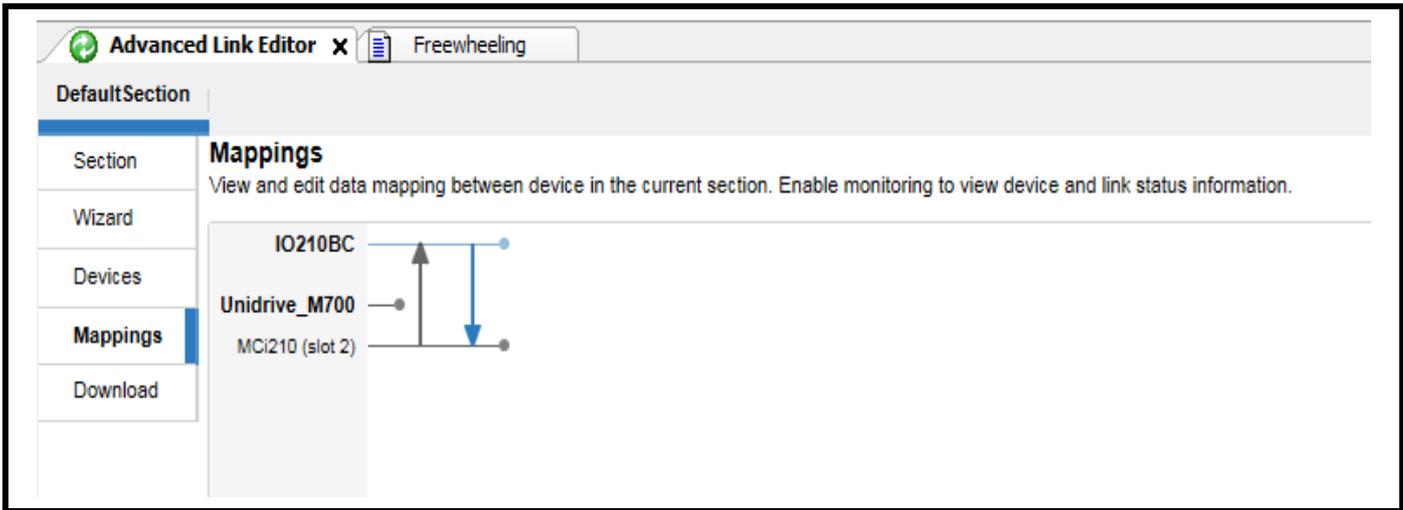
Click on the MCI210 text in the Mappings window, and holding the mouse key down draw a line to the IO210BC.



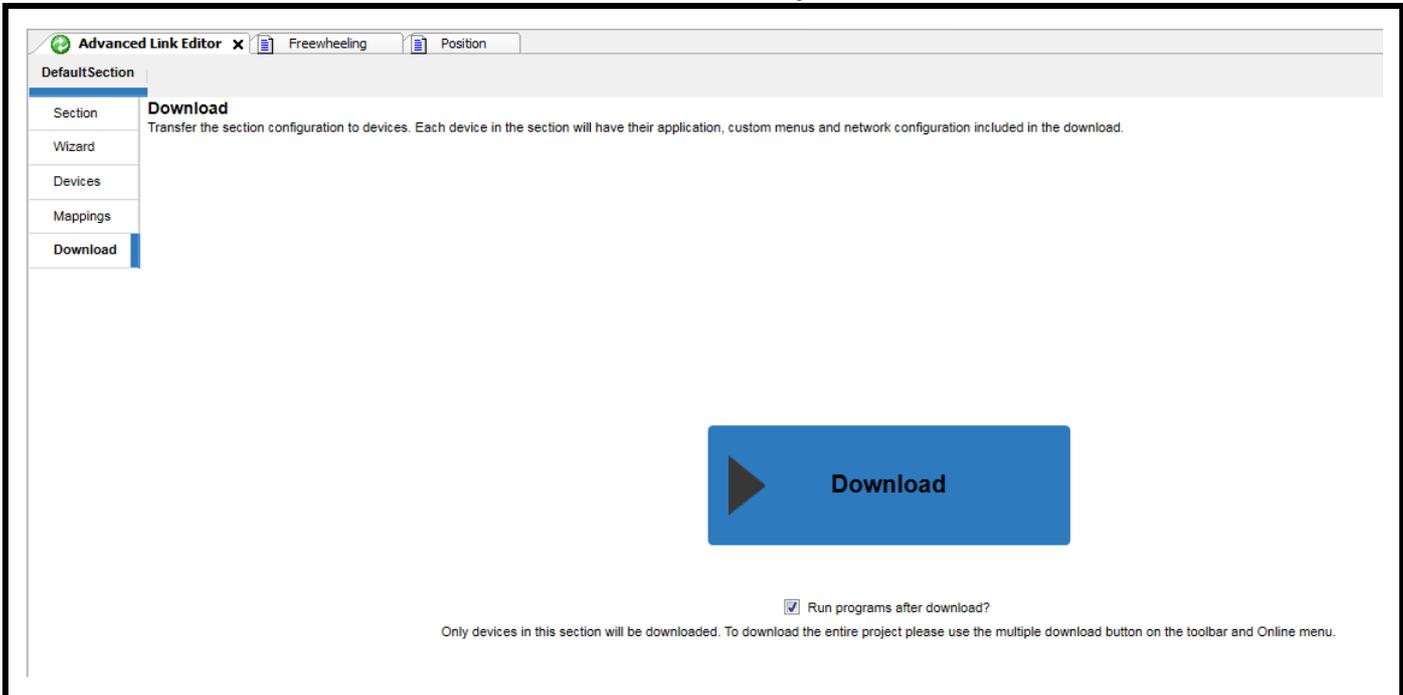
Click the Create button



This creates a cyclic link from the MCI210 module to the IO210BC Bus Coupler. Now draw a link in the other direction from the IO210BC to the MCI210. Variables are automatically created that represent the Bus Couplers and IO Modules' data.



Now select the Download tab and then click on the Download button. The link configuration will be downloaded to the IO210BC and the MCI210.



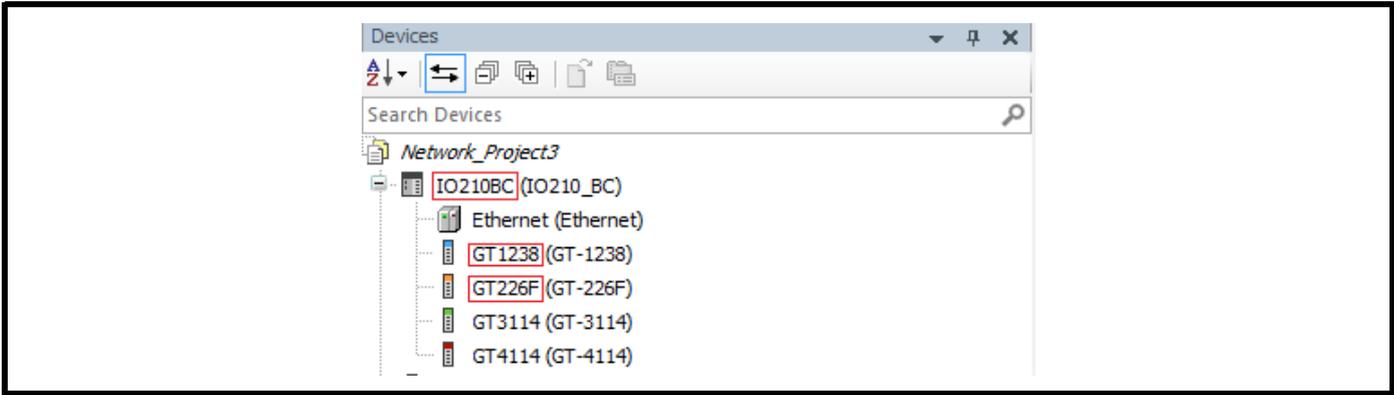
**NOTE**

The Advanced cyclic Link Editor stores data within the MCI210's \_R (Menu 72) and \_S (Menu 73) PLC registers, these registers are shared by the variables that are created as part of the data structures. In this case, menu 72 and Menu 73 should **not** be used for storing user parameters.

For further information on how to use all the features of the Advanced cyclic Link Editor see the Advanced Link Editor section of Machine Control Studio's on-line help.

In the user's program the variables created automatically by the Advanced cyclic Link Editor can be accessed as data within structures, the smart coding features within Machine Control Studio can aid the user in selecting the required variables. The following are examples of how one may control the GT226F digital output IO Module and read the GT1238 digital input IO Module.

Users can rename the Bus Coupler or IO Modules if they desire by clicking on the relevant device in the Device window and typing the new name for the device.



```

Ch0 := IO210BC.GT1238.Channel0;           //Assign the value of digital input channel 0 to Ch0
AllCh := IO210BC.GT1238.AllChannels;      //Assign the unsigned integer representing the state of all channels to AllCh

IO210BC.GT226F.Channel0 := TRUE;         //Turn on channel 0 of the digital output module
IO210BC.GT226F.AllChannels := 65535;     //Turn on all channels of the digital output module
    
```

### 5.7.4 Creating links to factory equipped Ethernet drives and SI-Ethernet option modules.

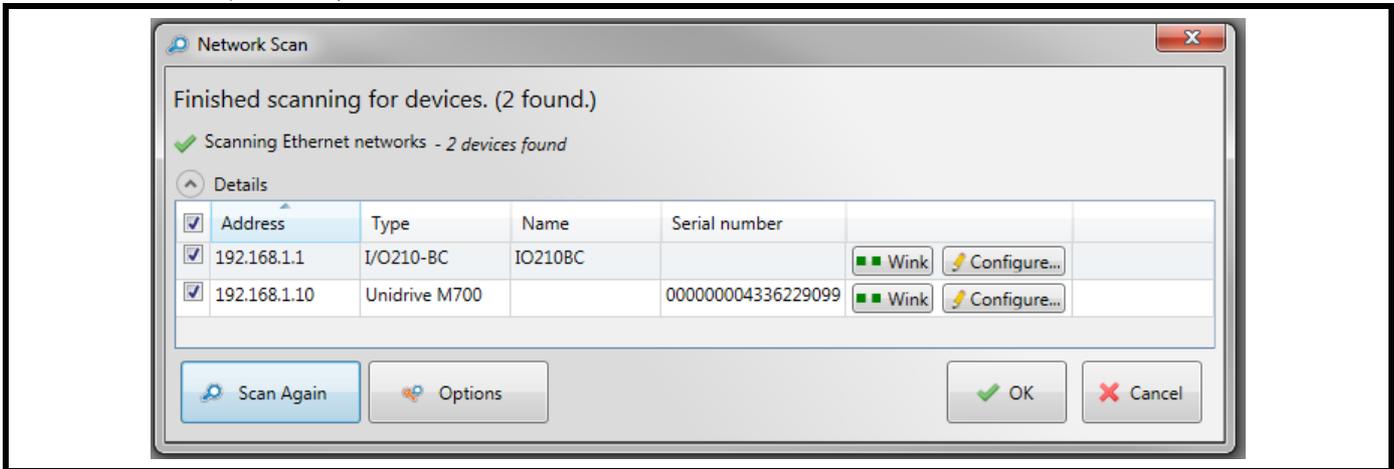
Drives such as the M700 and M750 that are equipped with Ethernet ports and also the SI-Ethernet option module, unlike the MCI210 option module exclusively support Easy Mode Cyclic Links.

**NOTE**

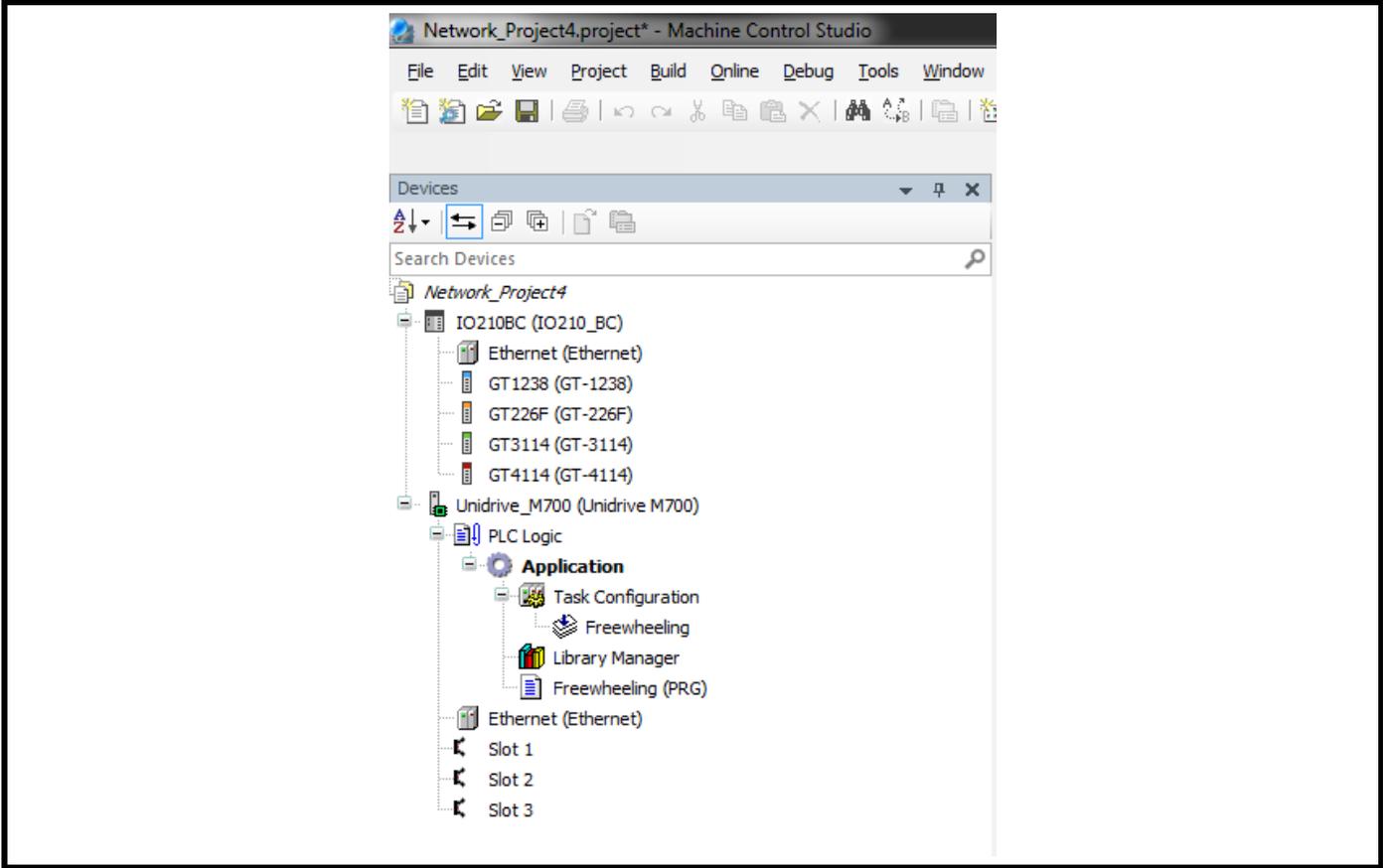
Easy mode links are configured on an Ethernet capable option module in Menu 10. The Advanced cyclic Link Editor DOES NOT configure module parameters. These must be set using the keypad, Unidrive M Connect, in a user's on-board program or in an MCI program.

To automatically populate the Device tree with a representation of physically attached hardware, begin with a new project by clicking on the "New project from device scan" button.

Scan the network, in this example the Ethernet network consist of an M700 and a I/O210BC Bus Coupler with associated IO Modules. (This example therefore refers to slot 4 parameters)



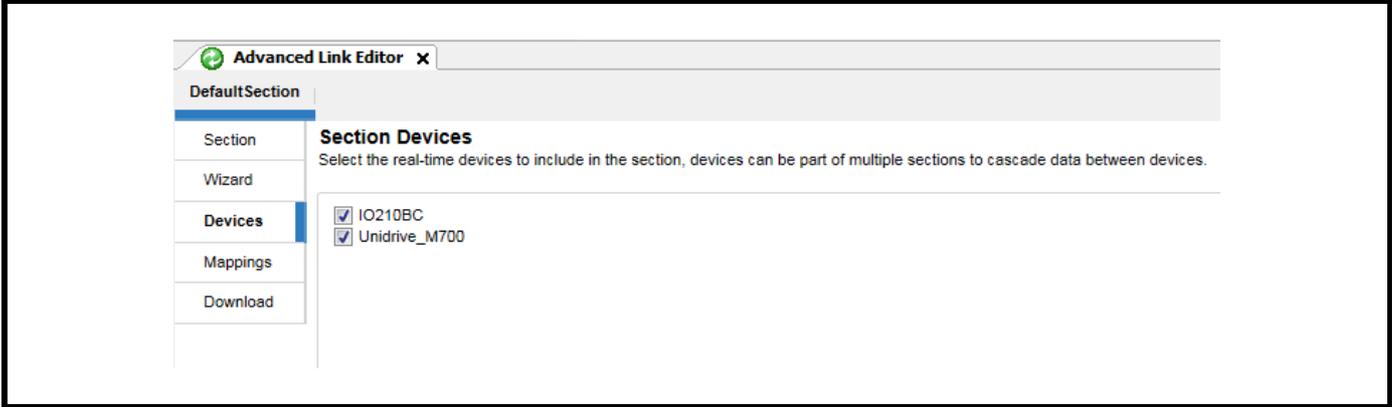
Once the project is created automatically from the scan, the physical structure of the attached Bus Coupler and IO Modules can be seen represented in the Device tree.



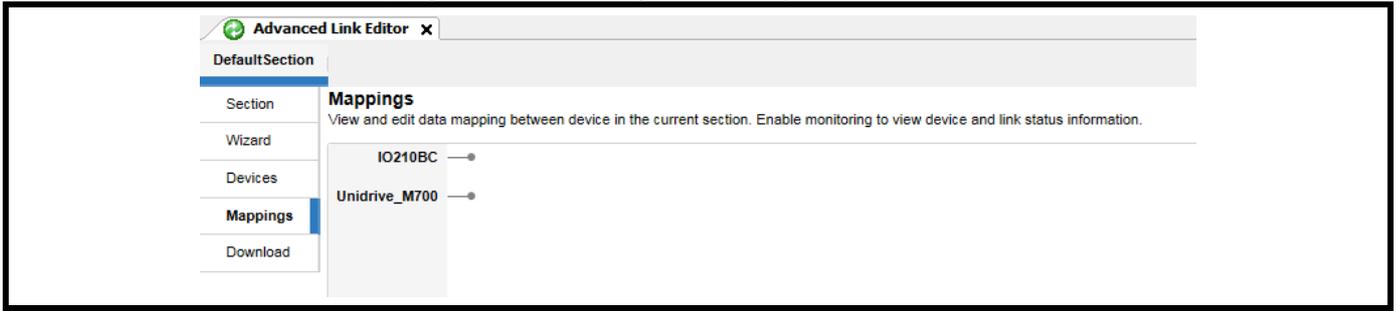
Click on the Advanced Cyclic Link Editor button.



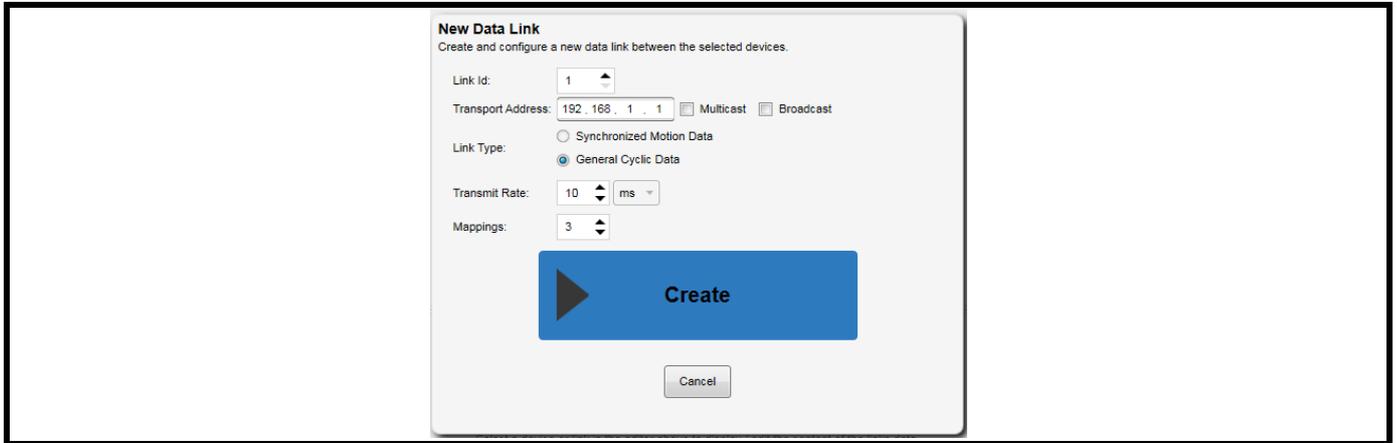
Select the devices that will exchange data.



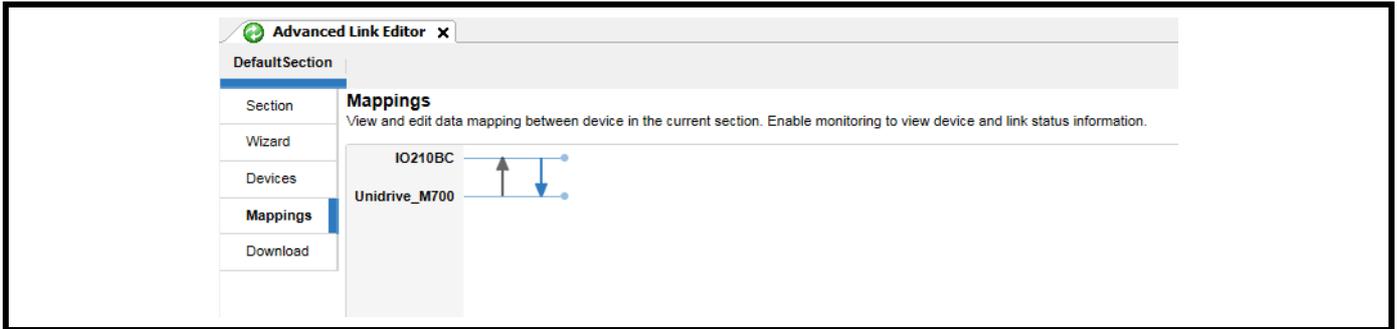
Click on the Unidrive M700 text in the Mappings window, and holding the mouse key down draw a line to the IO210BC.



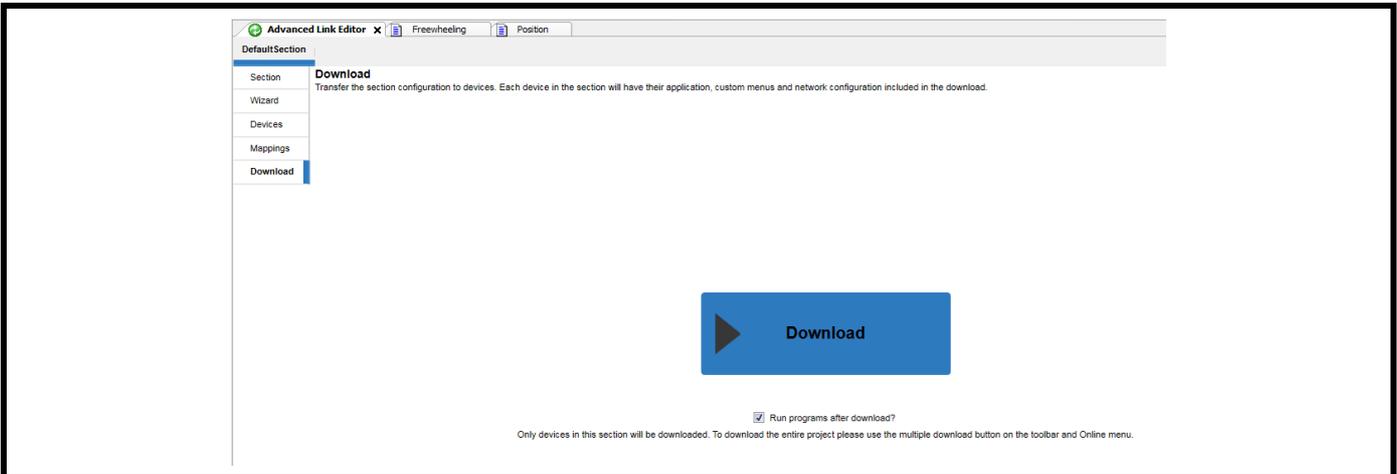
Click the Create button.



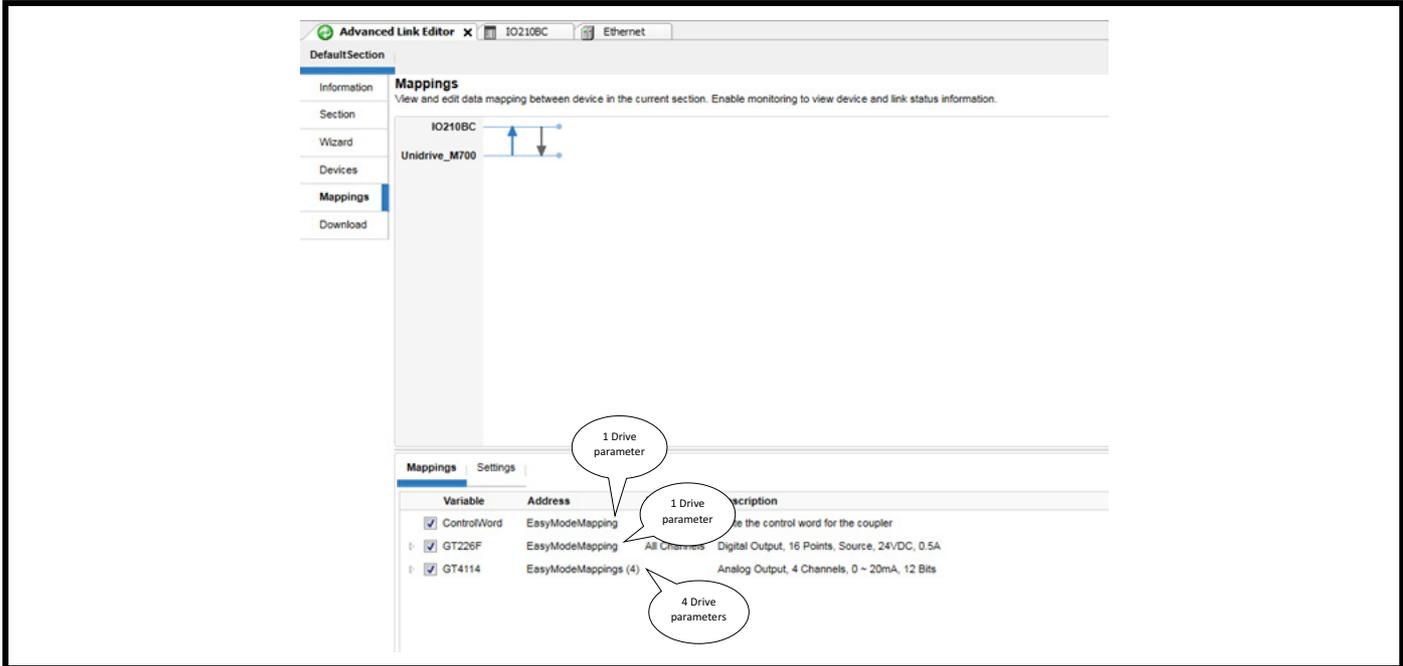
This creates a cyclic link from the Unidrive M700 to the IO210BC Bus Coupler. Now draw a link in the other direction from the IO210BC to the Unidrive M700.



Now select the Download tab and click on the Download button. The link configuration will be downloaded to the IO210BC only and not the Unidrive M700.

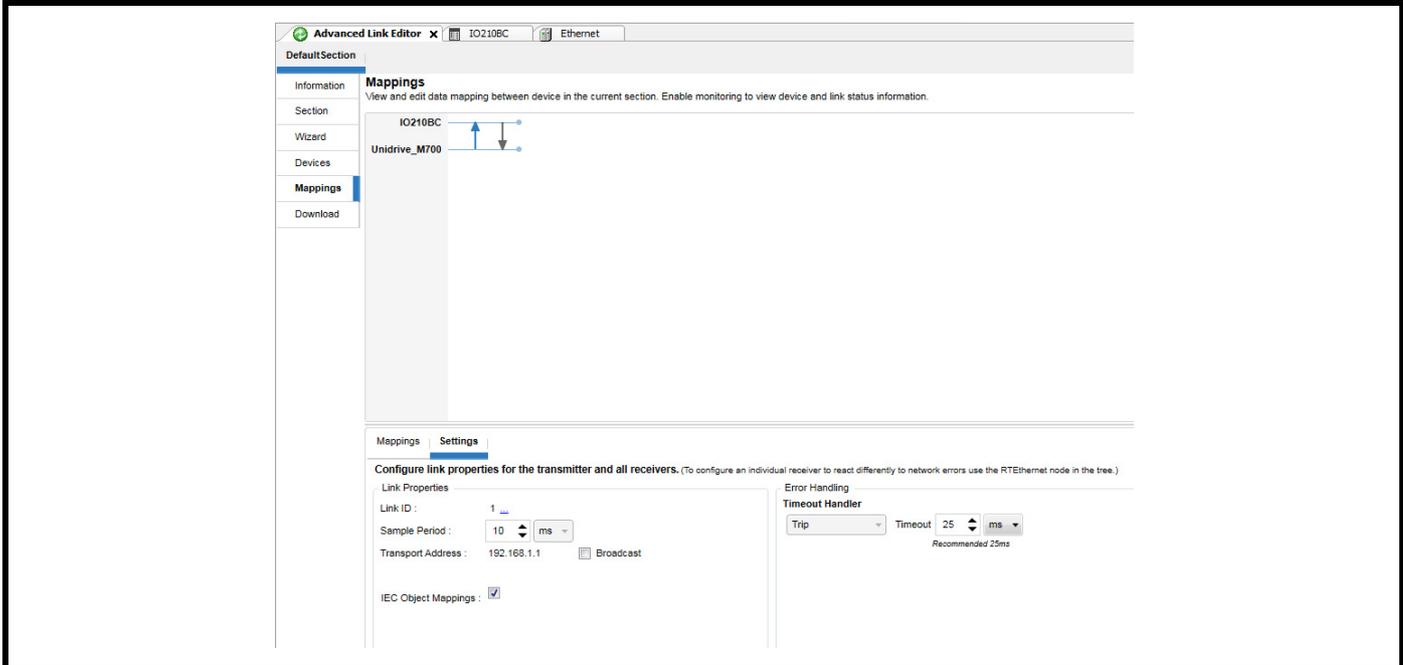


The Easy Mode links must now be set up within the M700 using the Drive's keypad or the Connect PC tool. Each address will require one or more parameters within an Easy Mode link.



Therefore in this example six Drive parameters are required in the transmit Easy Mode link, and six Drive parameters are required in the receive Easy Mode link.

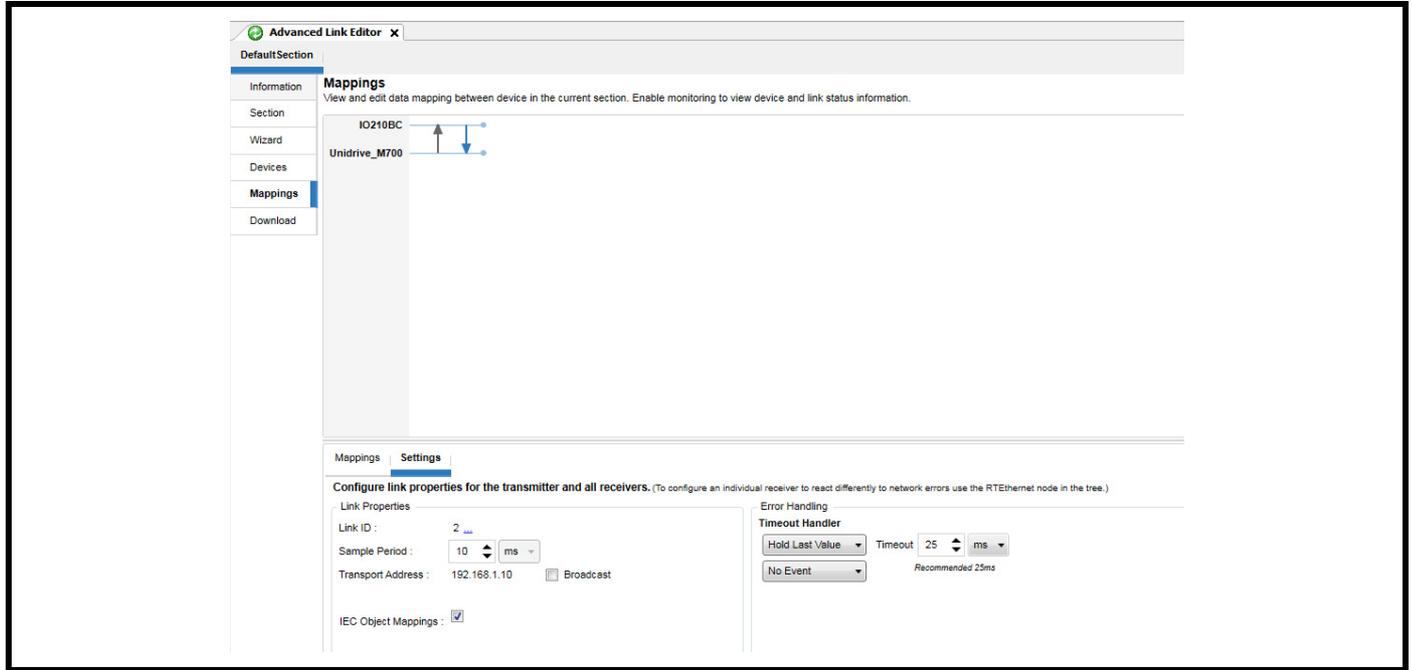
The default link number, Sample period and Broadcast option are shown in the Link's Settings tab.



The transmit link in the M700 has been configured as below using the Tx1 link, with six consecutive transmit parameters beginning at Pr20.021.

Setting/Mapping tabs	Easy Mode link	Drive parameter	Value
	Link profile	4.10.010	Std
Link ID	Link number	4.10.011	1
	Source parameter	4.10.012	20.021
Address	Parameter count	4.10.013	6
	Link transmission type	4.10.014	Unicast
Transport address	Destination address	4.10.015	192.168.1.1
Sample period	Message rate	4.10.016	10

Easy Mode must be reset for the parameters entered above to become active (Pr4.10.002).



The receive link in the M700 has been configured as below using the Rx1 link, with six consecutive receive parameters beginning at Pr20.031.

Setting/Mappings tabs	Easy Mode link	Drive parameter	Value
	Link profile	4.10.040	Std
Link ID	Link number	4.10.041	2
	Destination parameter	4.10.042	20.031
Address	Parameter count	4.10.043	6
	Source type	4.10.014	Direct

Easy Mode must be reset for the parameters entered above to become active (Pr4.10.002).

To read and write values from and to the IO210BC the user may read and write to the appropriate Drive parameters.

When writing values to a device that supports a mask, such as the GT-226F Digital Output module in this example, then the user must include the required mask in the highest significant two bytes. The mask can be set depending on the desired outputs to be controlled from the pertinent link.

To control any outputs of the GT-226F, where XXXXX represents the state of the outputs, and as no native UDINT Drive parameter data type exists:  
 $Pr = UDINT\_TO\_DINT(4294901760 + XXXXX) (16\#FFFF0000 + 16\#XXXX)$

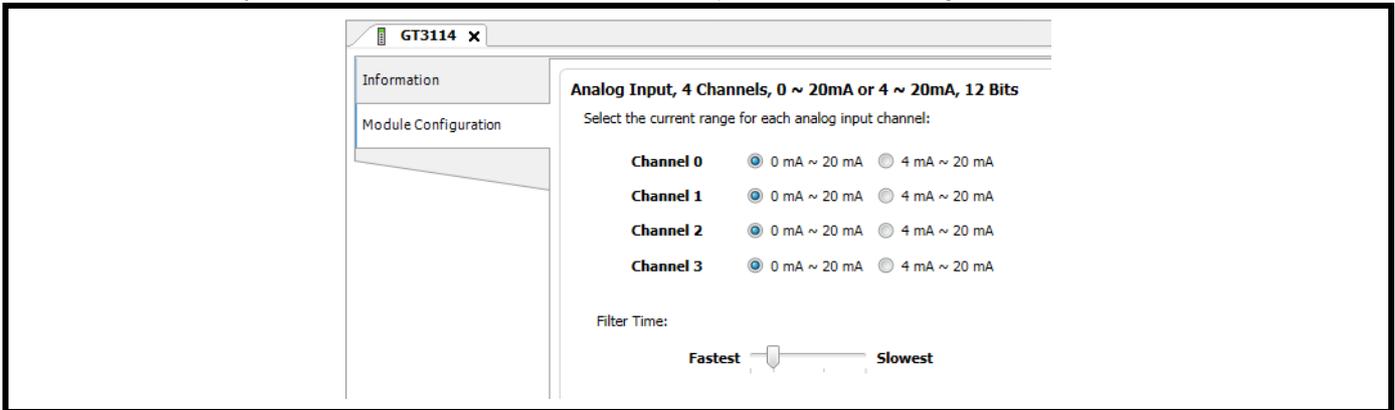
For example, to turn on all of the outputs of the GT-226F:  
 $Pr20.022 = -1$  (For data type DINT,  $-1 = 16\#FFFFFF$ )

To read the inputs of the GT-1238 simply read Pr20.032

### 5.7.5 Configuring an IO Module

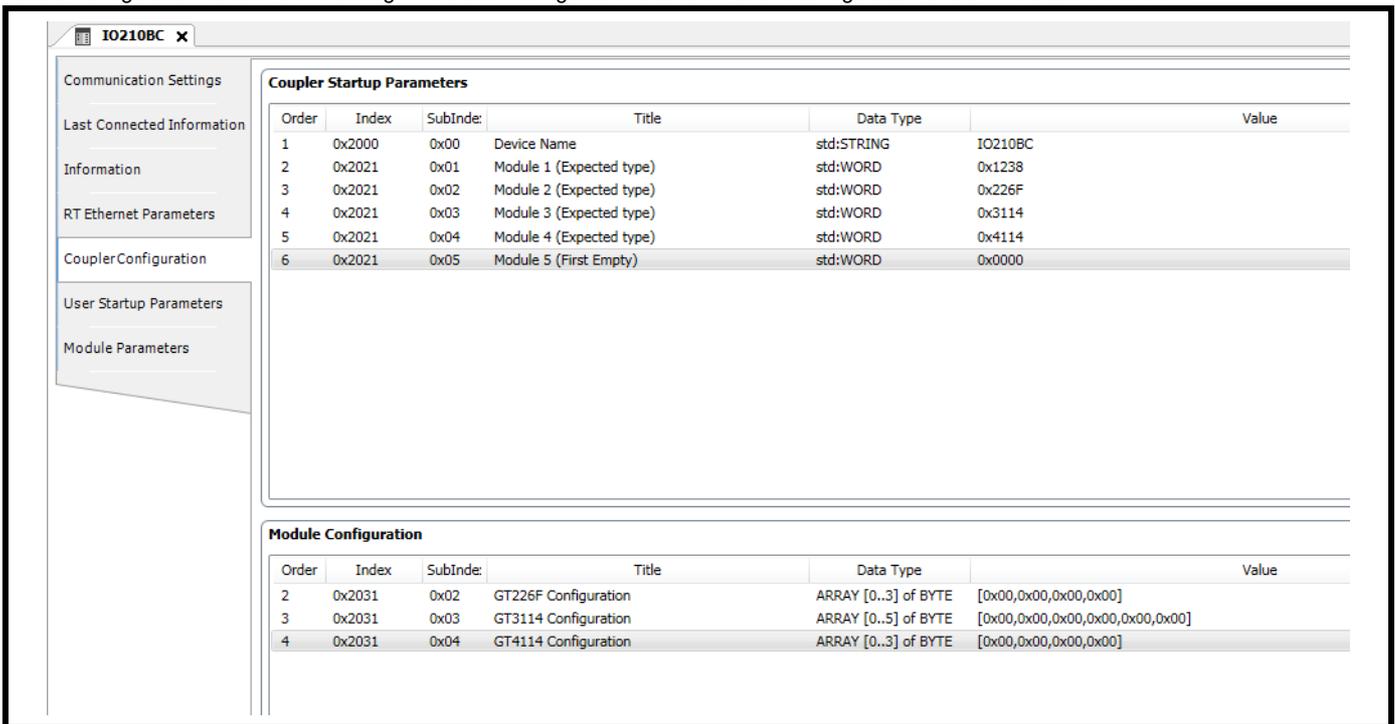
Certain IO Modules have user selectable features, such as fault reaction, input range and measurement types. These features if available within the appropriate module can be configured in the Module Configuration tab of the relevant IO Module. Refer to the applicable IO Module for further information relating to supported features.

For the following GT3114 IO Module, it can be seen that the analog current range can be selected for each channel, and the global filter time applied to each channel can be adjusted. Refer to the GT3114 section for further explanation of these settings.



### 5.7.6 Coupler Configuration

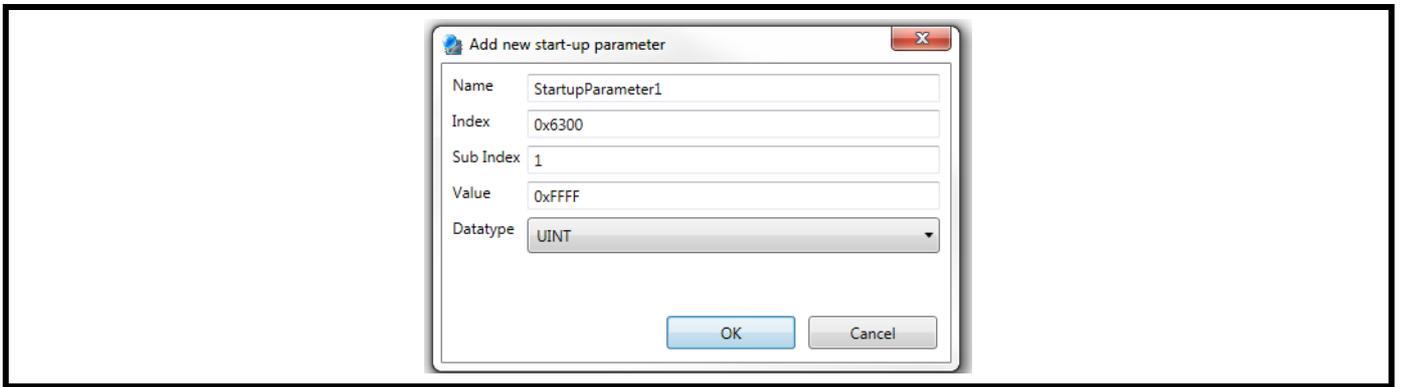
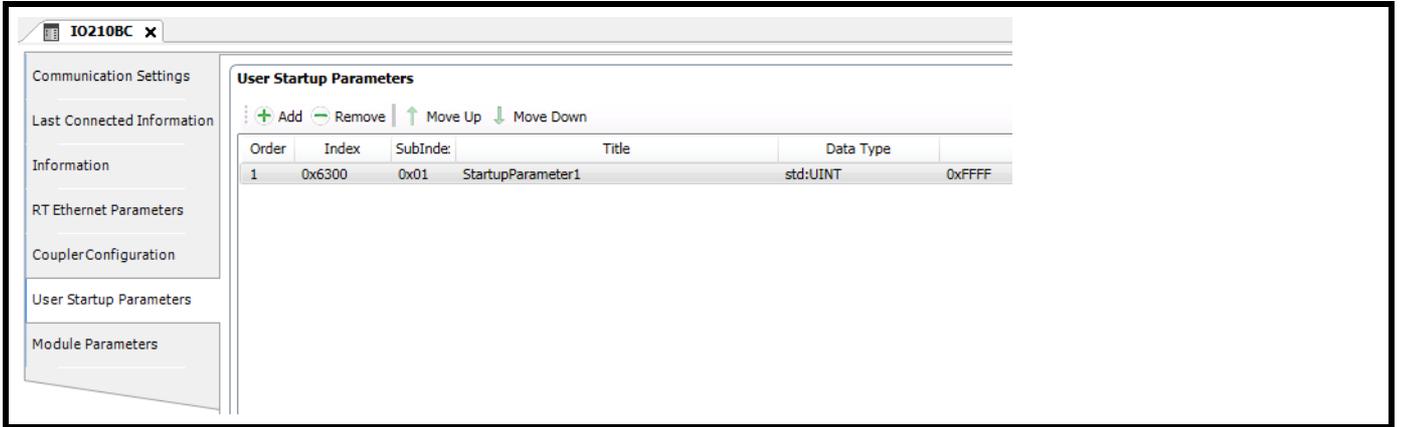
The Coupler Configuration window shows read only values for the object configuration in the Coupler User Startup Parameters section, and in the Module Configuration section the resulting IO Module Configuration based on user's configuration of the IO modules is shown.



### 5.7.7 User Startup Parameters

If required the user can add CiA401 objects to the IO210BC Bus Coupler's User Startup List. Refer to the RTMoE CANopen CiA401 Profile section for further details of the supported objects.

Here the first 16bit digital output IO Module has a value of 65535 written to it at start up.



## 5.8 RTMoE CANopen CiA401 Profile

Support is provided for a subset of the CANopen CiA401 profile objects.

Inputs and outputs fitted to the IO backplane are addressable using the coupler's CANopen object dictionary. Machine Control Studio supports configuring cyclic data exchange with objects as well as non-cyclic library support using the MCI module.

### 5.8.1 Supported CiA401 profile objects

Object	Description	Data Type		Access	Default
		Sub-index	Type		
	Communication profile 0x1000 to 0x1FFF				
0x1001	Error register	0	USINT	RO	-
0x1003	Pre-defined error (number of last sub-index)	0	USINT	RO	0
	Pre-defined error (Standard error field)	1..10	UDINT	RO	-
0x1018	Identity object (number of last sub-index)	0	USINT	RO	2
	Identity object (Vendor ID)	1	UDINT	RO	0xF9
	Identity object (Product code)	2	UDINT		0x10000000
	<i>Manufacturer configuration objects 0x2000 to 0x5FFF</i>				
0x2000	Name	0	STRING	RW	"I/O210-BC"
0x2001	Status Word	0	UINT	RO	-
0x2002	Control Word	0	UINT	RW	0
0x2003	Restore factory Defaults	0	UINT	RO	-
0x2010	Watchdog (number of last sub-index)	0	USINT	RO	2
	Watchdog (duration)	1	UINT	RW	0
	Watchdog (error counter)	2	UINT	RO	0
0x2020	Module list (number of last sub-index)	0	USINT	RO	63
	Module list (id)	1..63	UINT	RO	0
0x2021	Expected module list (number of last sub-index)	0	USINT	RO	63
	Expected module list (id)	1..63	UINT	RW	0
0x2022	Module list valid	0	USINT	RO	0
0x2031	Module configuration bytes (number of last sub-index)	0	USINT	RO	63
	Module configuration bytes	1..63	OCTET	RW	0
0x2040	Backplane update period	0	UDINT	RO	-
0x2041	Backplane update counter	0	UDINT	RO	-
0x2042	Background update period	0	UDINT	RO	-
	<i>Manufacturer IO extension objects</i>				
0x2110	Digital output 16 bit, masked (number of last sub-index)	0	USINT	RO	16
	Digital output 16 bit, masked (bits)	1..16	UDINT	RO	
0x2201	Module IO (number of last sub-index)	0	USINT	RO	0
0x223F	-	-	-	-	-
	<i>CiA401 digital inputs</i>				
0x6000	Digital input 8 bit (number of last sub-index)	0	USINT	RO	32
	Digital input 8 bit (bits accessed as bytes)	1..32	USINT	RO	
0x6100	Digital input 16 bit (number of last sub-index)	0	USINT	RO	16
	Digital input 16 bit (bits accessed as bytes)	1..16	UINT	RO	
0x6120	Digital input 32 bit (number of last sub-index)	0	USINT	RO	8
	Digital input 32 bit (bits accessed as bytes)	1..8	UDINT	RO	
	<i>CiA401 digital outputs</i>				
0x6200	Digital output 8 bit (number of last sub-index)	0	USINT	RO	32
	Digital output 8 bit (bits accessed as bytes)	1..32	USINT	RO	
0x6300	Digital output 16 bit (number of last sub-index)	0	USINT	RO	16
	Digital output 16 bit (bits accessed as bytes)	1..16	UINT	RW	
0x6320	Digital output 32 bit (number of last sub-index)	0	USINT	RO	8
	Digital output 32 bit (bits accessed as bytes)	1..8	UDINT	RW	
	<i>CiA401 analogue inputs</i>				
0x6401	Analogue input 16 bit (number of last sub-index)	0	USINT	RO	100
	Analogue input 16 bit	1..100	INT	RO	
	<i>CiA401 analogue outputs</i>				
0x6411	Analogue output 16 bit (number of last sub-index)	0	USINT	RO	100
	Analogue output 16 bit	1..100	INT	RW	

## 6 Modbus TCP/IP

### 6.1 MODBUS Interface Register / Bit Map

Table 6-1 Register Map

Start Address	Read/Write	Description	Function/Code
0x0000 -	Read	Process input image registers (Real Input Register).	4, 23
0x0800 -	Read/Write	Process output image registers (Real Output Register).	3, 16, 23
0x1000 -	Read	Bus coupler Identification special registers.	3, 4, 23
0x1020 -	Read/Write	Bus coupler Watchdog, other time special register.	3, 4, 6, 16, 23
0x1100 -	Read/Write	Bus coupler Information special registers.	3, 4, 6, 16, 23
0x2000 -	Read/Write	Expansion Slot Information special registers.	3, 4, 6, 16, 23

Table 6-2 Bit Map

Start Address	Read/Write	Description	Function/Code
0x0000 -	Read	Process input image bits. All input registers are addressable by the bit address. Size of the input image bit is the size of the input image register.	2
0x1000 -	Read/Write	Process output image bits. All output register data is addressable by bit address. Size of output image bit is the size of the output register*16.	1, 5, 15

### 6.2 Supported MODBUS Function Codes

Function Code	Function	Description
1 (0x01)	Read Coils	Read output bit
2 (0x02)	Read Discrete Inputs	Read input bit
3 (0x03)	Read Holding Registers	Read output word
4 (0x04)	Read Input Registers	Read input word
5 (0x05)	Write Single Coil	Write one bit output
6 (0x06)	Write Single Register	Write one word output
8 (0x08)	Diagnostics (Serial Line only)	Read diagnostic register
15 (0x0F)	Write Multiple Coils	Write a number of output bits
16 (0x10)	Write Multiple Registers	Write a number of output words
23 (0x17)	Read / Write Multiple registers	Read a number of input words / Write a number of output words

### 6.3 MODBUS Special Register Map

The special register map can be accessed by function code 3, 4, 6 and 16. Also the special register map must be accessed by read/write of every each address (one address).

#### 6.3.1 Bus Coupler Identification Special Register (0x1000, 4096)

Address	Access	Type, Size	Description
0x1003 (4099)	Read	1 word	Firmware Revision Returns XXYYh where XX is the Major Version number and YY is the Minor Version number
0x1004 (4100)	Read	2 words	Product unique serial number
0x1005 (4101)	Read	String up to 34 bytes	Product name string Product Name Returns "I/O210-BC"
0x1006 (4102)	Read	1 word	Sum check of EEPROM
0x1007 (4103)	Read	1 word	Vendor Code
0x1010 (4112)	Read	2 words	Firmware release date
0x1011 (4113)	Read	2 words	Product manufacturing inspection date
0x1012 (4114)	Read	String up to 34 bytes	Vendor name string First 1word is length of valid character string.
0x101E (4126)	Read	15 words	Composite Value of Following Addresses: 0x1050: IP address 0x1051: Subnet Mask 0x1052: Gateway 0x1053: MAC Address 0x1000: Vendor ID 0x1001: Device Type 0x1002: Product Code

String Type consists of valid string length (first 1 word) and array of characters.

### 6.3.2 Bus Coupler Watchdog Time, other Time Special Register (0x1020, 4128)

A watchdog timer can be configured for timeout periods of up to 65535 (1unit=100 ms). The Watchdog timer will timeout (timer decreased, reached 0) if MODBUS operation to the slave node does not occur over the configured watchdog value, then the slave coupler forces that slot output value is automatically set to user-configured fault actions and values.

Address	Access	Type / Size	Description
0x1020 (4128)	Read/Write	1 word	Watchdog Time The base time that is allowed between Modbus communication to the IO210-BC before the Watchdog is tripped. The default is 0, and the value represents multiples of 100ms. Changing this value resets the watchdog error and counter.
0x1021 (4129)		1 word	Watchdog Run Timer The time since the last Modbus communication was received. Decreases every 100ms.
0x1022 (4130)	Read	1 word	Watchdog Error Count The number of watchdog errors that have occurred since the last watchdog reset.
0x1023 (4131)	Read/Write	1 word	Watchdog Auto-Recovery Whether the watchdog automatically recovers when receiving new Modbus communication. 1 to enable. Saved to the EEPROM

Power off and then power on, this value is applied.

### 6.3.3 Bus Coupler information

Address	Access	Type, Size	Description
0x1102 (4354)	Read	1 word	Start address of input image word register. =0x0000
0x1103 (4355)	Read	1 word	Start address of output image word register. =0x0800
0x1104 (4356)	Read	1 word	Size of input image word register.
0x1105 (4357)	Read	1 word	Size of output image word register.
0x1106 (4358)	Read	1 word	Start address of input image bit. = 0x0000
0x1107 (4359)	Read	1 word	Start address of output image bit. =0x1000
0x1108 (4360)	Read	1 word	Size of input image bit.
0x1109 (4361)	Read	1 word	Size of output image bit.
0x110A (4362)	Read	1 word	G-Bus IO Update Time. Unit is in microseconds.
0x110C (4364)	Read	1 word	DIP Switch and Field Power Status Bits 0-9: DIP Switches On/Off Bit 15: Field Power On/Off
0x110D (4365)	Read	1 word	DIP Switch and Field Power Status Bits 0-9: DIP Switches On/Off Bit 15: Field Power On/Off
0x110E (4366)	Read	up to 64 words	IO210-BC and All Slot Module IDs
0x1110 (4368)	Read	1 word	Number of Connected Slots
0x1113 (4371)	Read	up to 64 words	IO210-BC and All Slot Product Codes
0x1119 (4377)	Read	1 word	Modbus and G-Bus Status High Byte: Modbus Status Low Byte: G-Bus Status
0x111D (4381)	Read	1 word	Firmware Revision Returns XXYYh where XX is the Major Version number and YY is the Minor Version number
0x111E	Read	1 word	Vendor Code Returns 0x0009

### 6.3.4 Input and Output Modules, special registers

Each slot has its own set of addresses for special registers, starting from 0x2000 for slot 1 and ending at 0x27DF for slot 63. Each slot has 0x1F addresses. For example, Slot 1 is between 0x2000 and 0x201F, and Slot 2 is between 0x2020 and 0x203F.

Address Offsets	Access	Type/Size	Description
+ 0x02	Read	1 Word	Slot Input Image Start Register Address
+ 0x03	Read	1 Word	Slot Input Start Register Bit Offset The first bit for the slot in the Slot's Input Start Register Address
+ 0x04	Read	1 Word	Slot Output Image Start Register Address
+ 0x05	Read	1 Word	Slot Output Start Register Bit Offset The first bit for the slot in the Slot's Output Start Register Address
+ 0x06	Read	1 Word	Slot Input Image Start Bit Address
+ 0x07	Read	1 Word	Slot Output Image Start Bit Address
+ 0x08	Read	1 Word	Slot Input Size in Bits
+ 0x09	Read	1 Word	Slot Output Size in Bits
+ 0x0A	Read	n Words	Slot Input Data Can return extra data from 8-bit slots
+ 0x0B	Read / Write	n Words	Slot Output Data Can return extra data from 8-bit slots
+ 0x0E	Read	1 Word	Slot Product Code
+ 0x10	Read	1 Word	Slot Parameter Length in bytes
+ 0x11	Read / Write	n Words	Slot Parameters Data Slot parameter layout is defined its data.
+ 0x15	Read	1 Word	Slot Product Code
+ 0x17	Read	2 Words	Slot Firmware Revision High Byte: Major Revision Low Byte: Minor Revision
+ 0x19	Read	2 Words	Slot Firmware Release Date Format: 0xMMDD 0xYYYY

## 6.4 I/O Module verification

The order that individual types of I/O Modules are fitted to the Bus Coupler can be verified to ensure the user's interpretation of the process image is correct. Register 0x110E holds up to 64 words, each word represents the physical module type fitted at its analogous position. The first word (Word 0) always holds the value 0x9284, this corresponds to the I/O210-BC Bus Coupler. The hexadecimal I/O module's identification word represent the I/O module's part number less the "GT" segment.

If the expected contiguous sequence of modules is found beginning at Word 0, then the physical arrangement of I/O Modules can be assumed to be valid for the user's application. Note, if the process image has been extended then further I/O Modules that are not physically present may be identified after the expected configuration.

## 6.5 I/O Module configuration

Certain I/O Modules may be configured via their internal Configuration Parameter bytes. These Configuration Parameters can be accessed via Modbus configuration registers that in turn access the I/O Module's internal Configuration Parameter data bytes via the G-BUS protocol. Please refer to the relevant I/O Module Configuration Parameter section for configuration bytes specific information.

The first physical I/O Module's configuration register is located at 0x2011, an offset of 0x20 is used to identify each subsequent I/O Module thereafter. Therefore to determine the configuration register associated with the desired I/O Module use the following relationship:

$$\text{Configuration register} = 0x2011 + 0x20 \times (\text{slot position} - 1)$$

Where slot position is the enumeration of I/O Modules beginning at a value of one, and commencing from the left most location.

With reference to the desired I/O Module's configuration parameters, write the constructed words to satisfy the configuration bytes required.

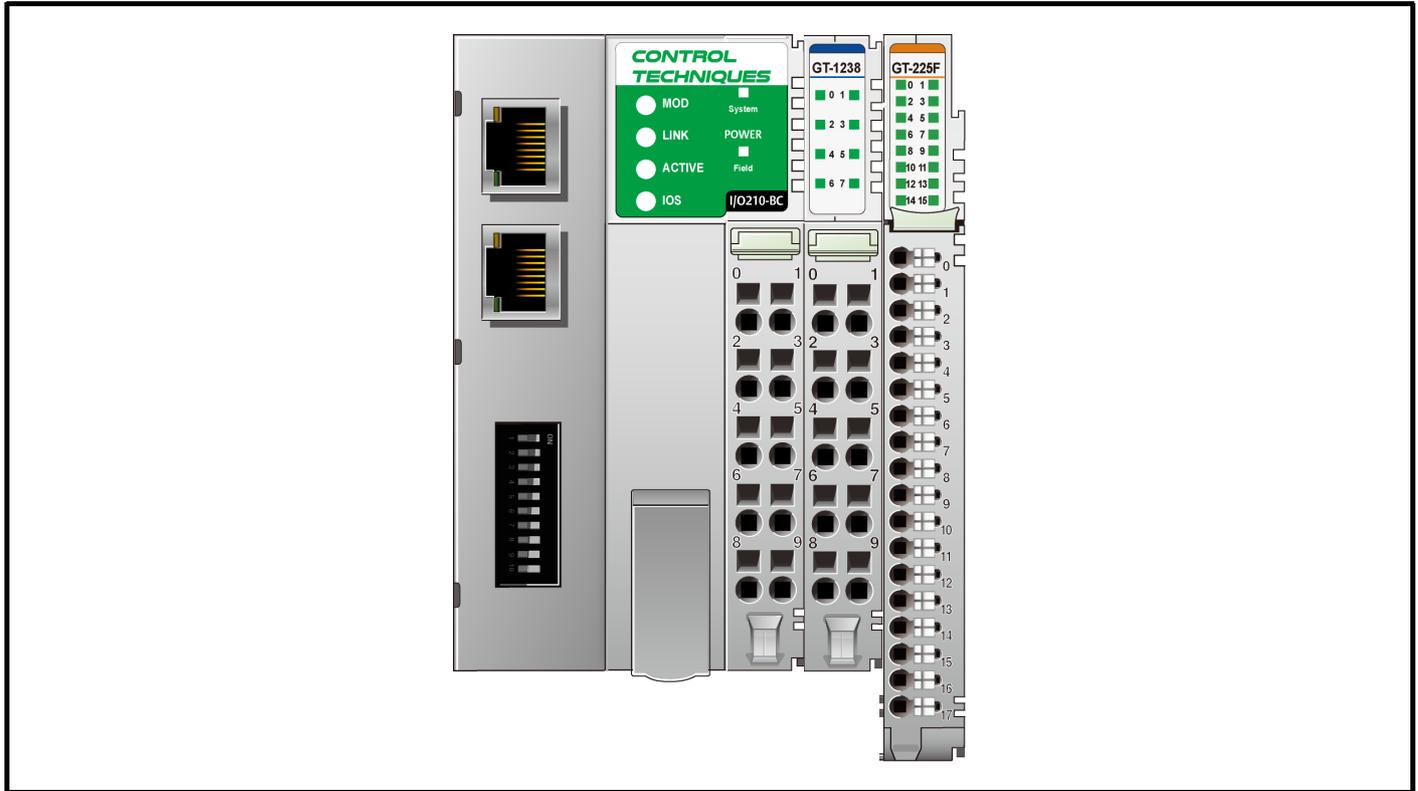
The configuration is effective immediately. I/O module configuration is saved to internal EEPROM.

## 6.6 Modbus TCP/IP Examples

### 6.6.1 Modbus TCP/IP Example 1. Checking hardware fitted, configuring digital output module, and read/writing to the I/O

In this example how to check the hardware, configure an I/O Module's Configuration Parameters, and read and write data using a Modbus TCP/IP client will be demonstrated. Two I/O Modules are assembled with the I/O210-BC as shown below and connected to a Modbus TCP/IP client such as the MCI210 option module.

Figure 6-1 Modbus TCP/IP Bus Coupler with GT-1238 and GT-225F



### 1. Check hardware fitted

Configure the Modbus TCP/IP client to perform a Modbus Function Code 3 (FC3), and read three consecutive registers beginning at 0x110E:

Function code	3
Register	0x110E
Length	3

Three words should be returned from the I/O202-BC server to the client:

Word	Value	Interpretation
Word 0	0x9284	I/O210-BC
Word 1	0x1238	GT-1238
Word 2	0x225F	GT-225F

The first word (Word 0) will always contain the value 0x9284 identifying the I/O210-BC. It can be seen that the following returned words represent the part numbers of the installed I/O modules less the "GT" segment. Therefore in this example the expected hardware configuration agrees with the identification read from the I/O Modules.

#### NOTE

The I/O Module's part number less "GT" is expressed in hexadecimal.

### 2. Configure the I/O Modules

It may be necessary for the user to configure specific I/O Modules for their requirements. In this example we wish to configure the GT-225F module so that all its channels will turn on if a fault condition occurs. Referring to the I/O module Configuration Parameter section for the GT-225F I/O module (See section 8.12 *Parameter data* on page 60 for further information).

Bit	7	6	5	4	3	2	1	0
Channel	7	6	5	4	3	2	1	0
Byte 0	Fault action channels 0 to 7. 0= fault value. 1= hold last value.							
Byte 1	Fault action channels 8 to 15. 0= fault value. 1= hold last value.							
Byte 2	Fault values channels 0 to 7. 0 = Off, 1 = On.							
Byte 3	Fault values channels 8 to 15. 0 = Off, 1 = On.							

For this particular I/O module the fault reaction behaviour can be influenced.

The first physical I/O Module's configuration register is located at 0x2011, an offset of 0x20 is used to identify each subsequent I/O Module thereafter. In our example the GT-225F I/O Module is the second physically installed I/O Module and therefore its configuration register will be 0x2031 (0x2011 + 0x20).

Configure the Modbus TCP/IP client to perform a Modbus Function Code 16 (FC16), and write two words (four configuration bytes) beginning at register position 0x2031:

Function code	16
Register	0x2031
Length	2

Register	Value
0x2031	0x0000
0x2032	0xFFFF

Here the values 0 and 0xFFFF are written, equating to:

Byte	Value	Configuration
0	0	Fault action for channels 0 to 7 = fault value
1	0	Fault action for channels 8 to 15 = fault value
2	0xFF	Fault value for channels 0 to 7 = on
3	0xFF	Fault value for channels 8 to 15 = on

### 3. Read and Write to the Inputs and Outputs

Regardless of the physical order that I/O Modules are inserted, the process image input addresses begin at register 0x0000 and the process image output addresses begin at register 0x0800.

To Read the GT-1238 input module in this example, configure the Modbus TCP/IP client to perform a Modbus Function Code 3 (FC3) to read register 0x0000:

Function code	3
Register	0x0000
Length	1

Because the GT-1238 is an 8 channel digital input module, only bits 0 to 7 of the word returned to the client from the I/O210-BC server are allocated to this I/O module. This word represents the state of the individual inputs. The remaining 8 bits are unused in this example. If a further input module of any type was to be added, then the remaining 8 bits of register 0x0000 would be allocated to this further module, beginning at the lowest significant bit of the added module's data (See section 6-2 *Bit Map* on page 33 for further information).

To write to the GT-225F Output module in this example, configure the Modbus TCP/IP client to perform a Modbus Function Code 6 (FC6) to write one word to the register 0x0800:

Function code	6
Register	0x0800
Length	0xFFFF

Because the GT-225F is a 16 channel output module, the word written to the I/O210-BC server from the client represents the state of the 16 individual outputs, and in this example they will all be turned on.

## 6.6.2 Modbus TCP/IP Example 2. Configuring analog output module, and reading the I/O

Assemble an I/O210-BC Bus Coupler, GT-3934 and GT-3944 I/O Module.

In this example we wish to configure the GT-3944 output module so that all of its channels will operate as -10 to +10 inputs.

### 1. Configure the module

Referring to the I/O module Configuration Parameter section for the GT-3944 I/O module (refer to *section 9.70 Parameter data* on page 142).

Byte 0	Channel 0 range
Byte 1	Channel 1 range
Byte 2	Channel 2 range
Byte 3	Channel 3 range
Byte 4	Filter time

Value	Channel range
0	0 to 10 V
1	0 to 5 V
2	-10 V to +10 V
3	-5 V to +5 V

The first physical I/O Module's configuration register is located at 0x2011, an offset of 0x20 is used to identify each subsequent I/O Module thereafter. In this example the GT-3944 I/O module is the second physically installed I/O Module, and therefore its configuration register will be 0x2031 (0x2011 + 0x20).

Configure the Modbus TCP/IP client to perform a Modbus Function Code 16 (FC16), and write two words (four configuration bytes) beginning at register position 0x2031:

Function code	16
Register	0x2031
Length	2

Register	Value
0x2031	0x0202
0x2032	0x0202

Here the values 0x0202 and 0x0202 are written, equating to:

Byte	Value	Configuration
0	0x02	-10 V to +10 V
1	0x02	-10 V to +10 V
2	0x02	-10 V to +10 V
3	0x02	-10 V to +10 V

## 2. Read the analog inputs

Regardless of the physical order that I/O Modules are inserted, the process image input addresses begin at register 0x0000 and the process image output addresses begin at register 0x0800.

To Read the GT-3934 analog input module in this example, configure the Modbus TCP/IP client to perform a Modbus Function Code 3 (FC3) to read four register beginning at 0x0000:

Function code	3
Register	0x0000
Length	4

Because the GT-3944 is a 15 bit and sign 4 channel analog input module, four words are required to read all the channels. These words represents the value of the individual analog channels, with the first word containing the value of channel 0.

## 6.7 Firmware

The I/O210-BC's firmware is not user programmable.

## 6.8 Diagnostics

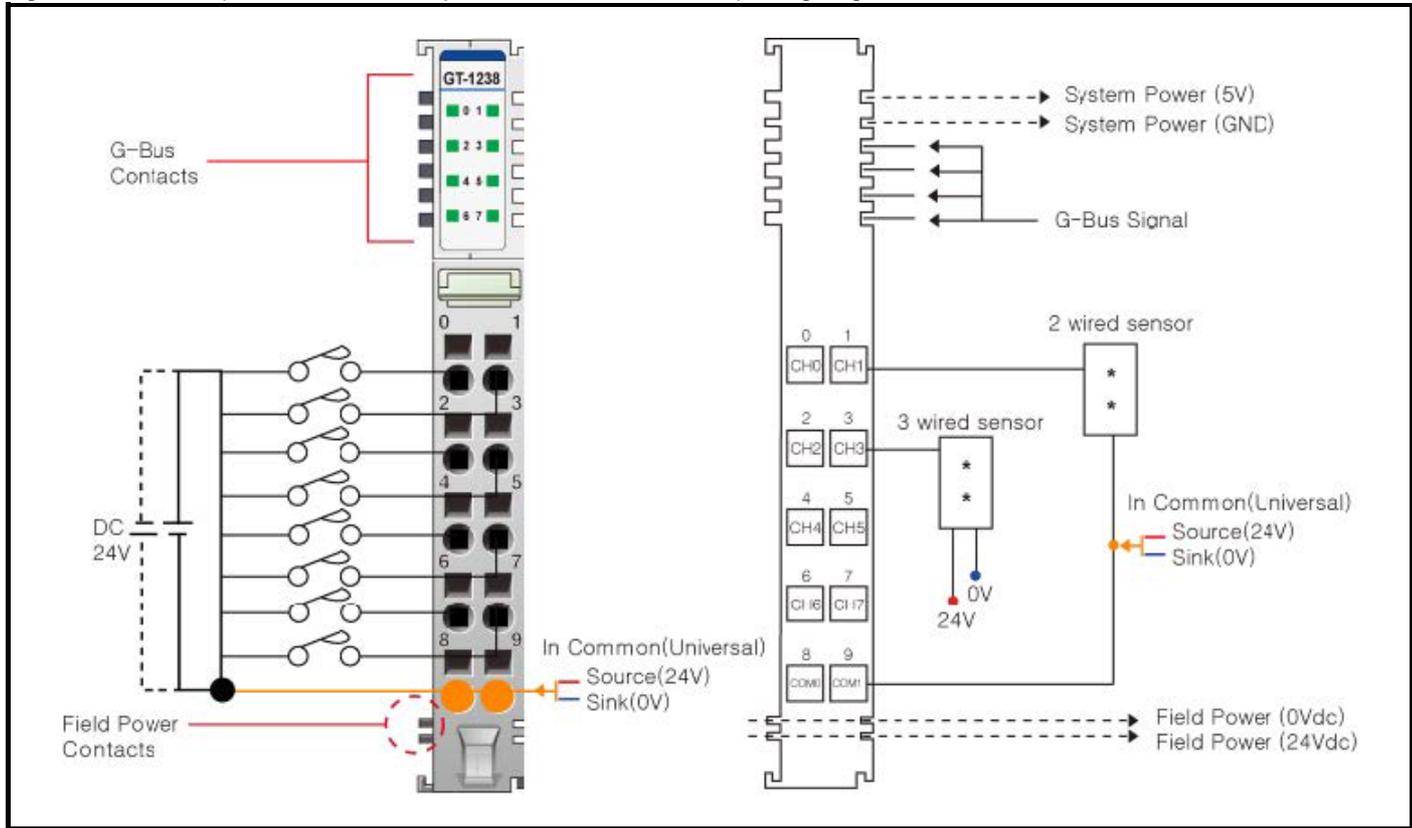
Table 6-3 LED diagnostics

LED Status	Cause	Action
All LEDs off	No power.	Check main power.
	System power is not supplied.	Contact supplier of the device.
MOD LED flashes green	Failure to initialize EEPROM parameters.	Contact supplier of the device.
MOD LED flashes red	Excessive I/O modules attached to coupler Wrong configuration in coupler.	Use a maximum of 63 I/O modules. Check physical configuration of I/O modules.
MOD LED is red	Critical error in firmware.	Contact supplier of the device.
IOS LED turns off	No I/O module detected.	Check connector status.
IOS LED flashes red	Failure to configure baud rate.	Check communication cable.
	Failure to initialize I/O.	Use a maximum of 63 I/O modules. Unidentified expansion module ID. Check status of expansion module.
IOS LED is red	Failure to exchange I/O data.	Check status of expansion I/O connection.
LINK LED turns off	Communication connection lost.	Check communication cable.

# 7 Digital Input

## 7.1 GT-1238 Digital Input

Figure 7-1 GT-1238 (8 Points, Universal Input Terminal, 24 Vdc, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Common (Sink 0 V /Source 24 V)		9

**Table 7-1 Specification**

Environmental specifications	
Operation temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	8 Points Universal Type
Indicators	8 Green Input Status LEDs
ON-state Voltage	24 Vdc (Min. 15 Vdc to Max. 32 Vdc)
ON-state Current	Max. 3.03 mA / point @ 32 Vdc
Field Power OFF-state voltage	8.3 Vdc @ 25 °C
Input Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.3 ms
Nominal Input Impedance	10.2 kΩ typical
Common Type	8 Points / 2 Common (universal)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Protection Class	Variable/IP20
Installation position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 35 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 15 to 32 Vdc Power Dissipation: 0 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	39 g
Module size	12 mm x 99 mm x 70 mm

## 7.2 GT-1238 LED Indicator

Table 7-2 LED Indicator

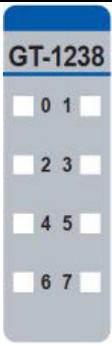
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	
	4	INPUT Channel 4	
	5	INPUT Channel 5	
	6	INPUT Channel 6	
	7	INPUT Channel 7	

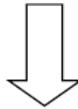
Table 7-3 Channel Status LED

Status	LED	To indicate
Off	Off	No Input Signal
On	Green	Input signal received

## 7.3 Mapping data into the image table

- Input module data

D7	D6	D5	D4	D3	D2	D1	D0
----	----	----	----	----	----	----	----



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0

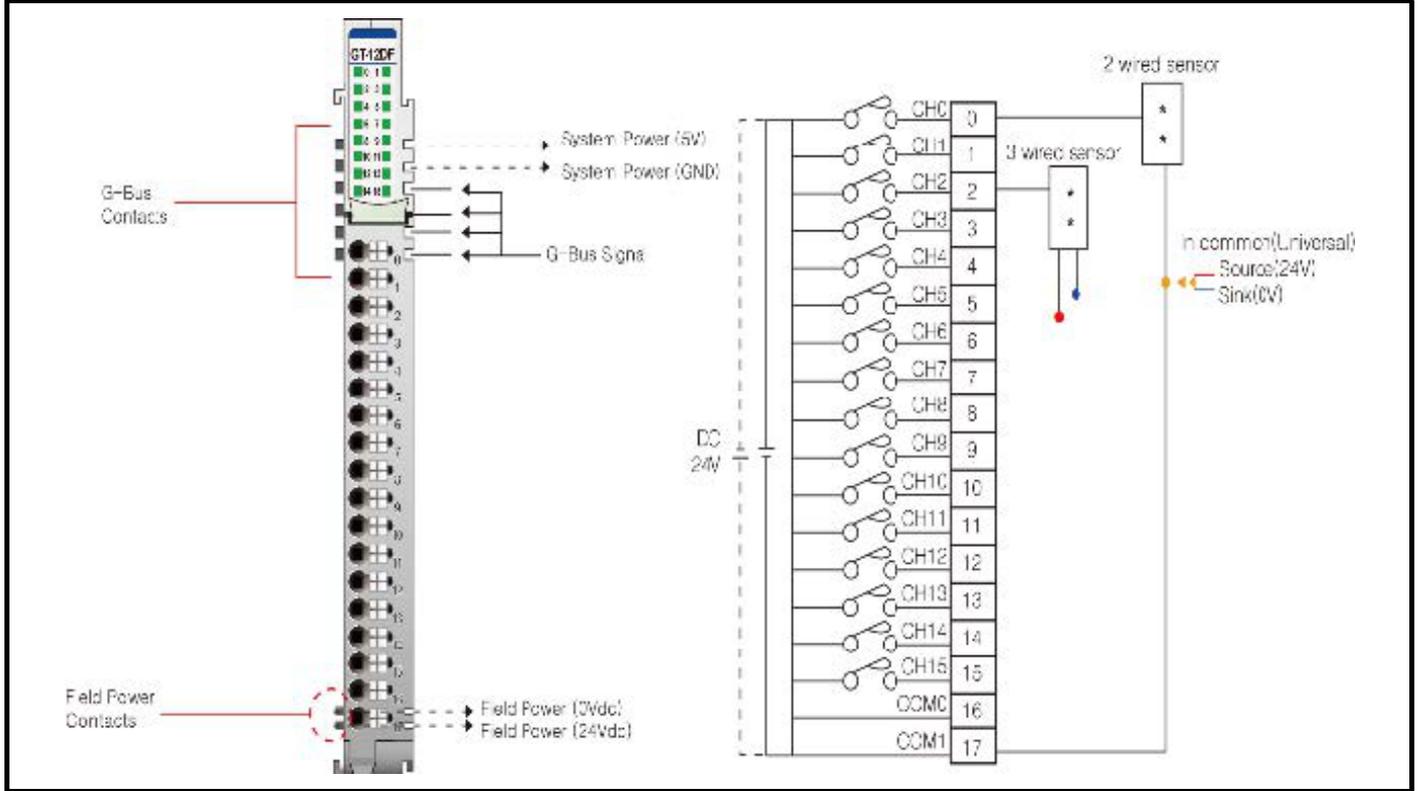
## 7.4 Parameter data

- Valid Parameter length: 2 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Input Filter Value : 0 to 10(unit : ms)							
Byte 1	Reserved							

## 7.5 GT-12DF Digital Input

Figure 7-2 GT-12DF (16 Points, Universal Input Terminal, 24 Vdc, 18 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Input Channel 8	Input Channel 9	9
10	Input Channel 10	Input Channel 11	11
12	Input Channel 12	Input Channel 13	13
14	Input Channel 14	Input Channel 15	15
16	Common (Sink Oper.0 V /Source Oper.24 V)		17

\* Although the image above is GT-(Universal input module), it does not matter to refer to wiring diagram. Refer to the Sink (0 V).

Safety information	Product information	Mechanical installation	Electrical installation	RTMoE Ethernet Bus Coupler	Modbus TCP/IP	<b>Digital Input</b>	Digital Output	Analog Input	Analog Output	Power module
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**Table 7-4 Specification**

<b>Environmental specifications</b>	
Operation temperature	-40 °C to 70 °C
Non-Operating Temperature	-40 °C to 85 °C
Relative humidity	5 % to 95 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
<b>Input specification</b>	
Inputs Per Module	16 Points Universal Digital Type
Indicators	16 Green Input State
ON-state Voltage	24 Vdc nominal @70 °C - Min. 15 Vdc to Max 28.8 Vdc @60 °C - Min. 15 Vdc to Max. 32 Vdc
ON-state Current	3.05 mA maximum / point@ 32 Vdc
Field Power OFF-state voltage	7.3 Vdc @ 25 °C
Input Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.3 ms
Nominal Input Impedance	14.9K ohm typical
Common Type	16 Points / 2 COM (Single Common)
<b>General specifications</b>	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup> /Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
Industrial Emissions	EN 61000-6-4: 2007 +A1:2001
Industrial Immunity	EN 61000-6-2 : 2005
Installation Position	Vertical and horizontal installation is available.
Product certifications	CE, UL
Power Dissipation	Max. 50 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 15 to 32 Vdc Power dissipation:0 mA @ 32 Vdc
Wiring	I/O Cable Max. 0.75 mm <sup>2</sup> (AWG 22)
Weight	63 g
Module size	12 mm x 109 mm x 70 mm

## 7.6 GT-12DF LED Indicator

Table 7-5 LED Indicator

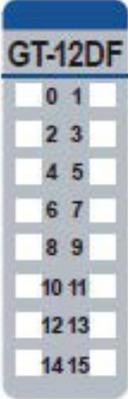
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	
	4	INPUT Channel 4	
	5	INPUT Channel 5	
	6	INPUT Channel 6	
	7	INPUT Channel 7	
	8	INPUT Channel 8	
	9	INPUT Channel 9	
	10	INPUT Channel 10	
	11	INPUT Channel 11	
	12	INPUT Channel 12	
	13	INPUT Channel 13	
	14	INPUT Channel 14	
	15	INPUT Channel 15	

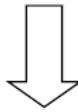
Table 7-6 Channel Status LED

Status	LED	To indicate
Off Signal	Off	Normal Operation
On Signal	Green	Normal Operation

## 7.7 Mapping data into the image table

- Input module data

D7	D6	D5	D4	D3	D2	D1	D0
D15	D14	D13	D12	D11	D10	D9	D8



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
Byte 1	D15	D14	D13	D12	D11	D10	D9	D8

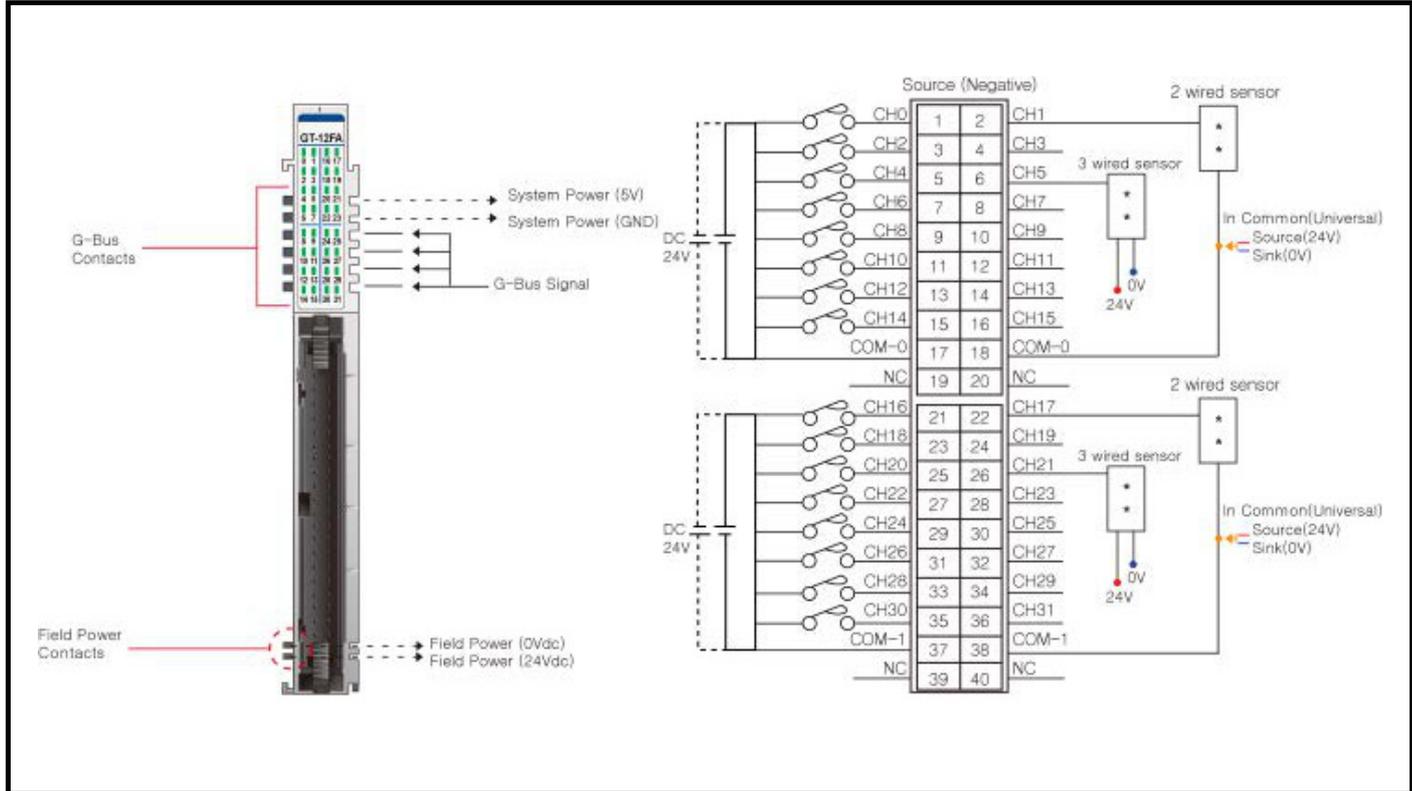
## 7.8 Parameter data

- Valid Parameter length: 2 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Input Filter Value : 0 to 10(unit : ms)							
Byte 1	Reserved							

## 7.9 GT-12FA Digital Input

Figure 7-3 GT-12FA (32 Points, Universal Input Terminal, 40P Connector) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Input Channel 8	Input Channel 9	9
10	Input Channel 10	Input Channel 11	11
12	Input Channel 12	Input Channel 13	13
14	Input Channel 14	Input Channel 15	15
16	Common (Sink Oper.0 V / Source Oper.24 V)		17
18	NC		19
20	Input Channel 16	Input Channel 17	21
22	Input Channel 18	Input Channel 19	23
24	Input Channel 20	Input Channel 21	25
26	Input Channel 22	Input Channel 23	27
28	Input Channel 24	Input Channel 25	29
30	Input Channel 26	Input Channel 27	31
32	Input Channel 28	Input Channel 29	33
34	Input Channel 30	Input Channel 31	35
36	Common (Sink Oper.0 V / Source Oper.24 V)		37
38	NC		39

\* Although the image above is GT-(Universal input module), it does not matter to refer to wiring diagram. Refer to the Sink (0 V).

**Table 7-7 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	32 Points Universal Digital Type
Indicators	32 Green Input Status LEDs
ON-state Voltage	24 Vdc (Min. 15 Vdc to Max. 32 Vdc)
ON-state Current	Max. 3 mA / point @ 32 Vdc
OFF-state voltage	9.1 V @ 25 °C
Input Signal Delay	OFF to ON: Max. 0.2 ms ON to OFF: Max. 0.2 ms
Input Filter	Adjustable, up to 10 ms
Nominal Input Impedance	10.2 KΩ typical
Common Type	32 Point / External 8 COM (Universal)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
Industrial Emissions	EN 61000-6-4: /All:2011
Industrial Immunity	EN 61000-6-2 : 2005
Installation Position	Vertical and horizontal installation is available.
Product certifications	CE, UL
Power Dissipation	Max. 55 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 15 to 32 Vdc * Power dissipation:0 mA @ 24 Vdc
Wiring	Module connector : HIF3BA-40D-2.54R
Weight	59 g
Module size	12 mm x 109 mm x 70 mm

\* Operating temperature

- 40 °C to 70 °C temperature range specification can be guaranteed under the following conditions.

Supply voltage : 26.4 V below.

Otherwise, temperature specification can be guaranteed with -40 °C~ 60 °C.

## 7.10 GT-12FA LED Indicator

Table 7-8 LED Indicator

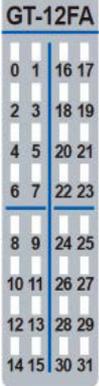
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	...	...	...
	31	INPUT Channel 31	Green

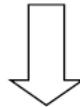
Table 7-9 Channel Status LED

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

## 7.11 Mapping data into the image table

- Input module data

D7	D6	D5	D4	D3	D2	D1	D0
D15	D14	D13	D12	D11	D10	D9	D8
D23	D22	D21	D20	D19	D18	D17	D16
D31	D30	D29	D28	D27	D26	D25	D24



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
Byte 1	D15	D14	D13	D12	D11	D10	D9	D8
Byte 2	D23	D22	D21	D20	D19	D18	D17	D16
Byte 3	D31	D30	D29	D28	D27	D26	D25	D24

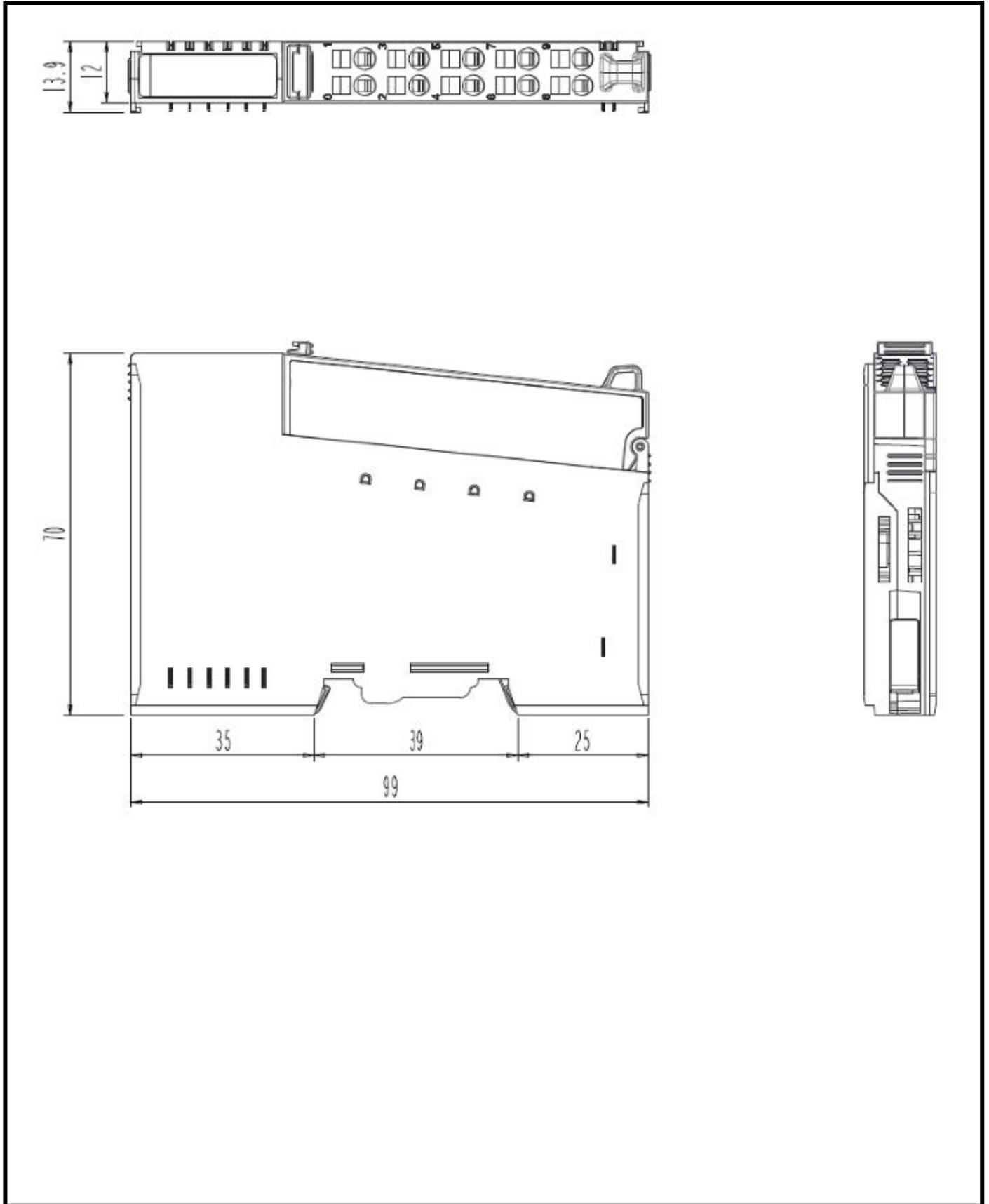
## 7.12 Parameter data

- Valid Parameter length: 2 Bytes
- Parameter data

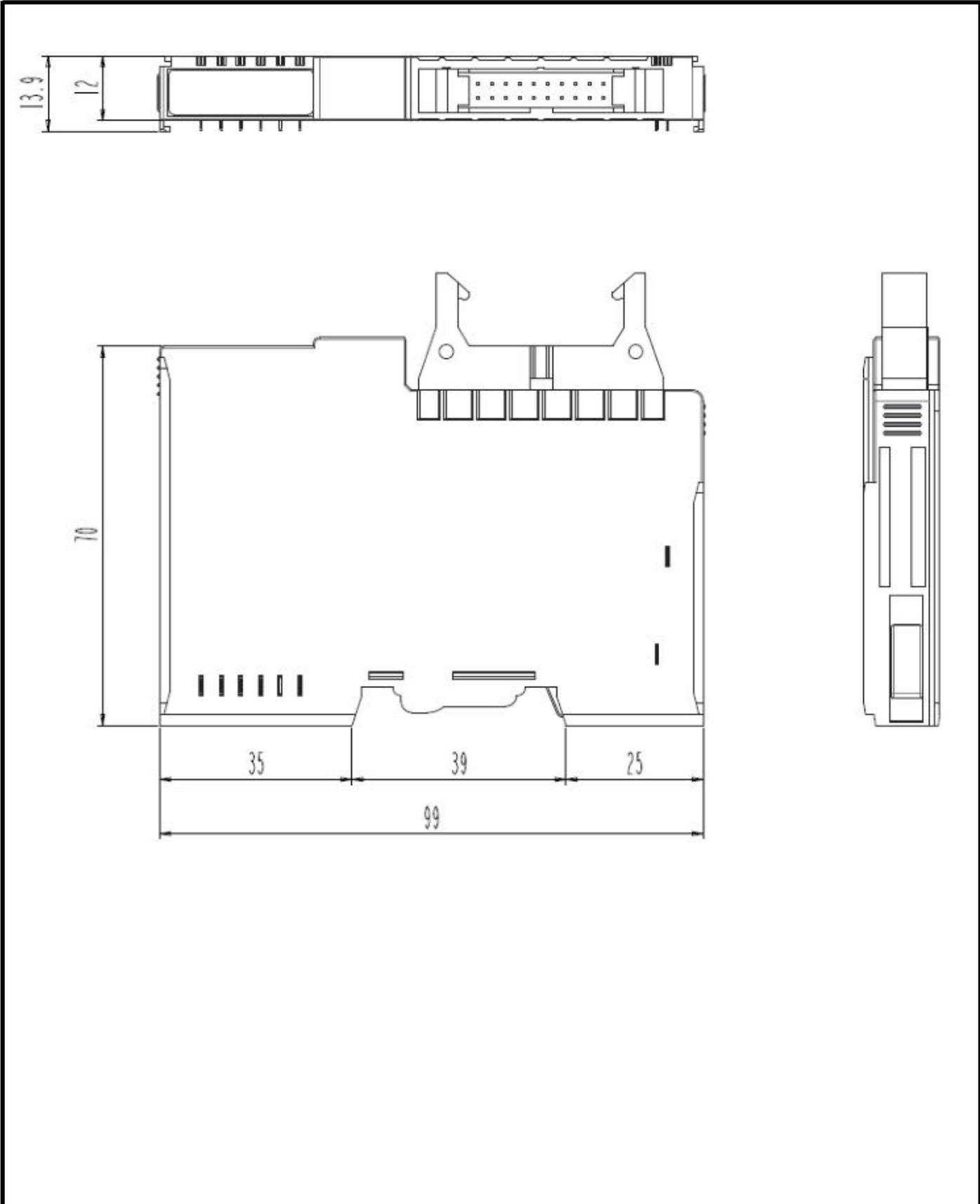
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Input Filter Value : 0 to 10 (unit : ms)							
Byte 1	Reserved							

## 7.13 Dimension

### 7.13.1 GT-1xx4 (RTB), GT-1xx8 (RTB) (mm)

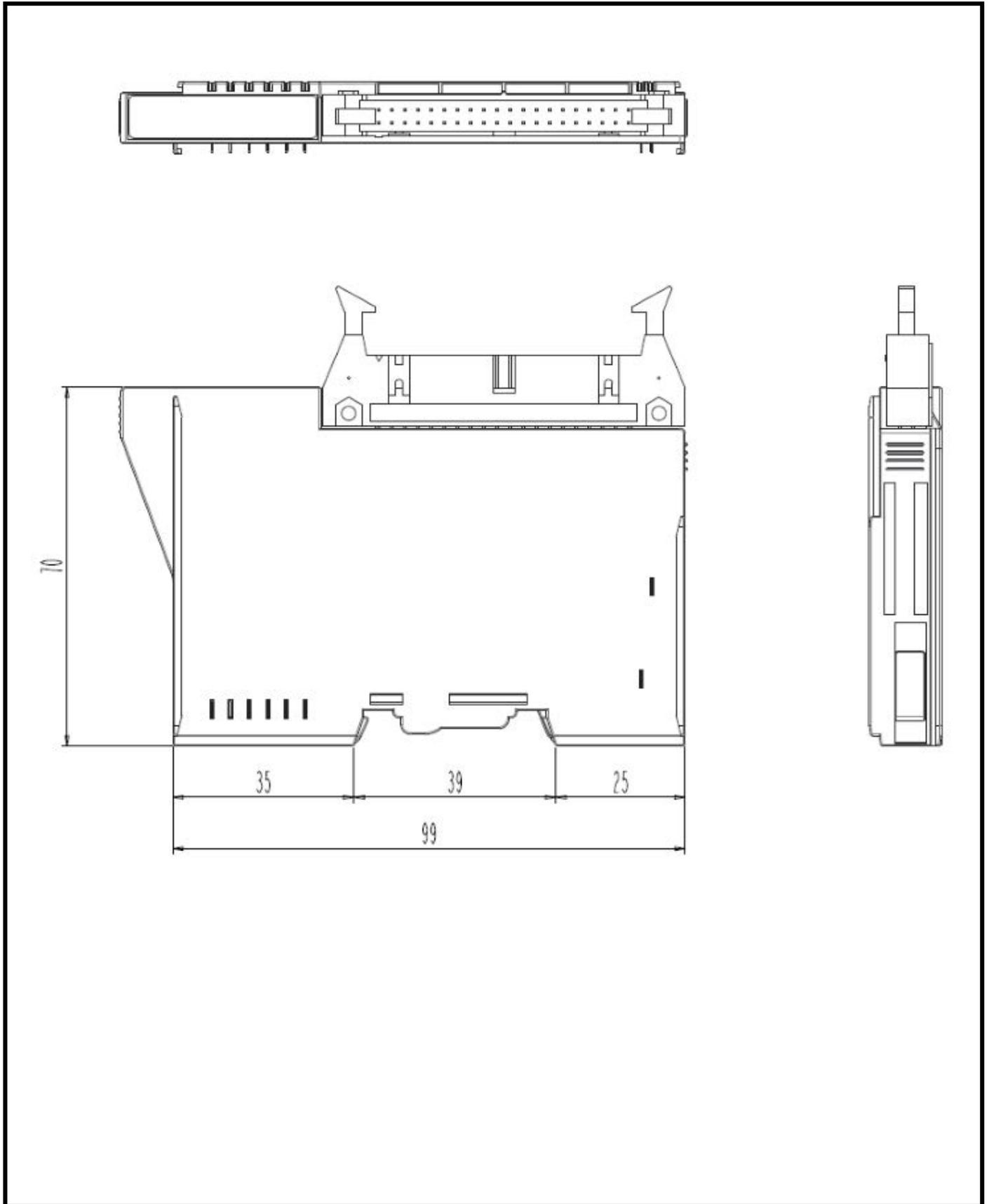


**7.13.2 GT-1xxF (20P Connector)**



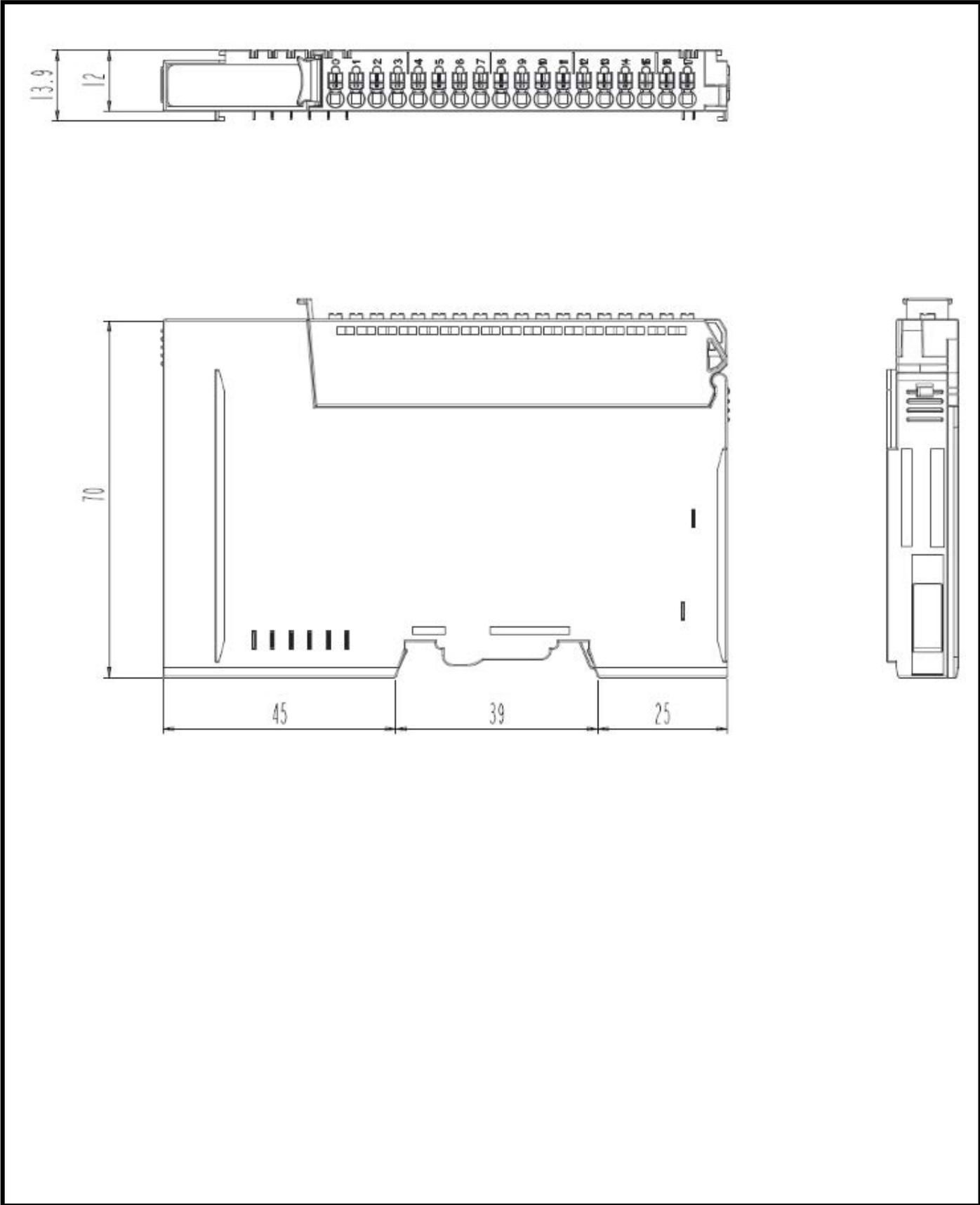
### 7.13.3 GT-1xxA (40P Connector)

(mm)



**7.13.4 GT-12DF**

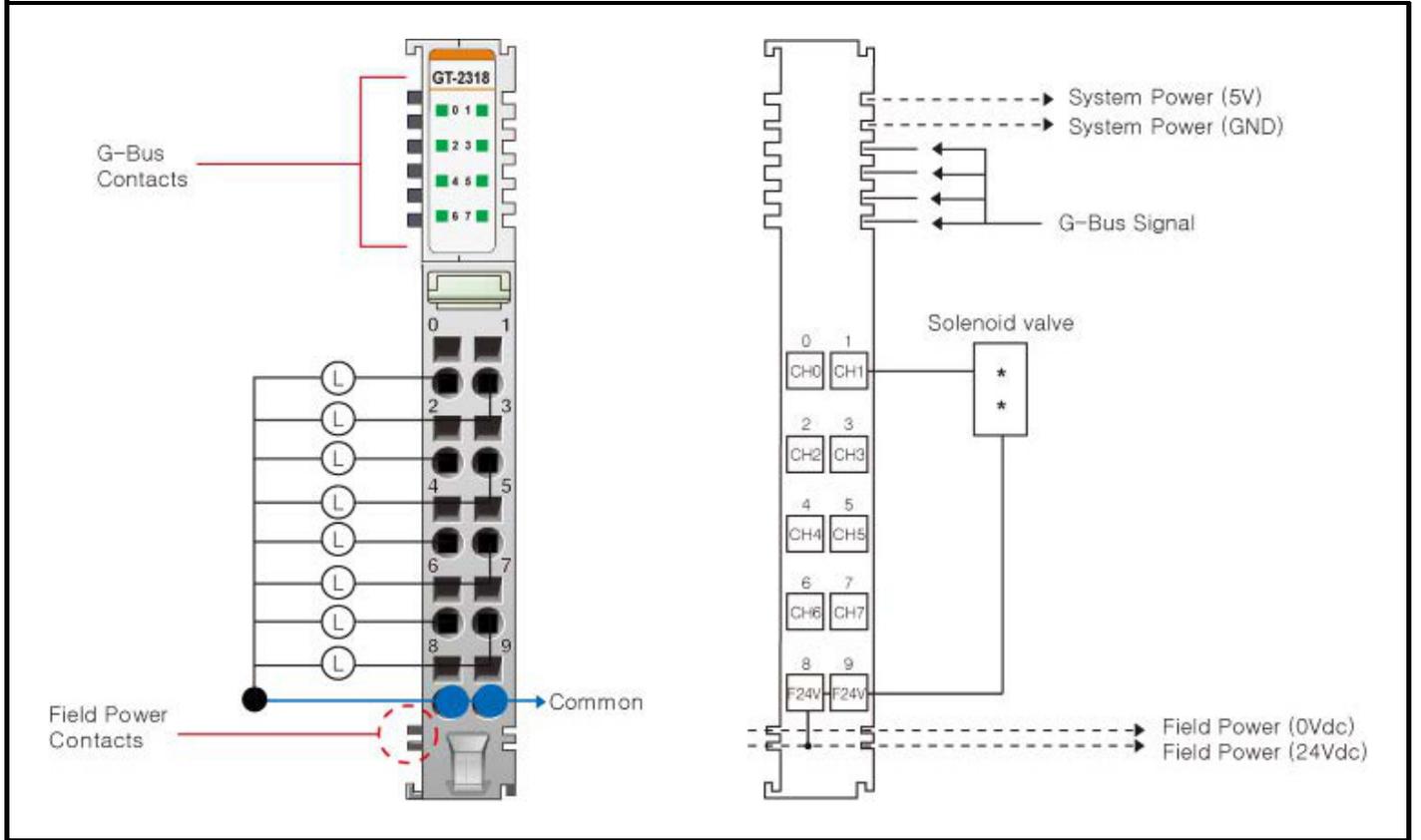
(mm)



# 8 Digital Output

## 8.1 GT-2318 Digital Output

Figure 8-1 GT-2318 (8 Points, Sink Output Terminal, 24 Vdc, 0.5 A, 10 RTB)



Pin number	Signal description	Signal description	Pin number
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Common (Field Power 24 V)	Common (Field Power 24 V)	9

**Table 8-1 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Points, Sink Type
Indicators	8 Green Output Status
Output Voltage Range	Nominal 24 Vdc (Min. 15 Vdc to Max. 32 Vdc)
ON-state Voltage Drop	Max. 0.5 Vdc @ 25 °C, 70 °C, -40 °C
ON-State Min. Current	1 mA per Channel
OFF-State Leakage Current	Max. 25 uA
Output Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.3 ms
Output Current Rating	Max. 0.5 A per Channel / Max. 4 A per unit
Protection	Over Current limit: Min. 3.5 A @ 25 °C per channel Thermal Shutdown : Min 3 A @ 25 °C per channel Short circuit protection
Common Type	8 points / Internal 2 Com
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
Industrial Emissions	EN 61000-6-4/A11: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is available.
Product certifications	CE, UL
Power Dissipation	45 mA maximum @ 5.0 Vdc
Isolation	I/O to Logic : Isolation Field power : Non-isolation
Field Power	Supply voltage : 24 Vdc nominal Voltage range : 15 V to 32 V Power dissipation: 5 mA @24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	39 g
Module size	12 mm x 99 mm x 70 mm

## 8.2 GT-2318 LED Indicator

Table 8-2 LED Indicator

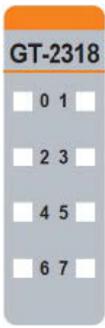
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	
	4	OUTPUT Channel 4	
	5	OUTPUT Channel 5	
	6	OUTPUT Channel 6	
	7	OUTPUT Channel 7	

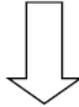
Table 8-3 Channel Status LED

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

## 8.3 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0



- Output Module Data

D7	D6	D5	D4	D3	D2	D1	D0

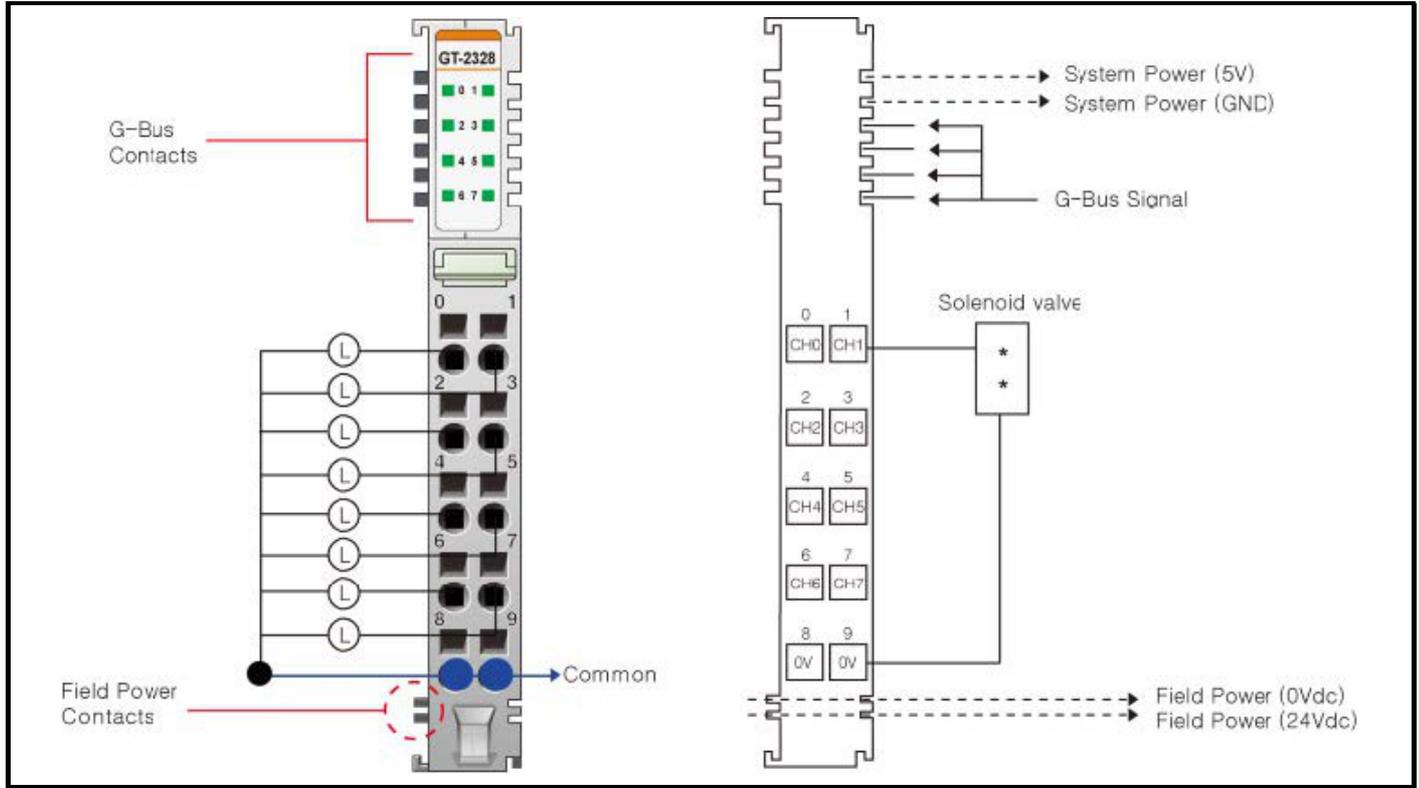
## 8.4 Parameter data

- Valid Parameter length: 2 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action (ch0 to ch7) 0: Fault value, 1: Hold last state							
Byte 1	Fault value (ch0 to ch7) 0: Off, 1: On							

## 8.5 GT-2328 Digital Output

Figure 8-2 GT-2328 (8 Points, Source Output Terminal, 24 Vdc, 0.5 A, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Common (Field Power 0 V)	Common (Field Power 0 V)	9

**Table 8-4 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Points Source Type
Indicators	8 Green Output State
Output Voltage Range	Nominal 24 Vdc, Min. 15 Vdc to Max. 32 Vdc
ON-state Voltage Drop	Max. 0.5 Vdc @ 25 °C, 70 °C, -40 °C
Field Power OFF-state voltage	4.6 Vdc @ 25 °C
ON-State Min. Current	1 mA per Channel
OFF-State Leakage Current	Max. 25 uA
Output Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.3 ms
Output Current Rating	Max. 0.5 A per channel / Max. 4 A per unit
Protection	Over Current limit : Min 6.5 A @ 25 °C per channel Thermal Shutdown : Min 4 A @ 25 °C per channel Short circuit protection
Common Type	8 Points / Internal 2 Com
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
Industrial Emissions	EN 61000-6-4/All: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is available.
Product certifications	CE, UL
Power Dissipation	Max. 40 mA @ 5 Vdc
Field Power	Supply voltage : 24 Vdc nominal Voltage range : 15 to 32 Vdc Power dissipation: 10 mA @ 24 Vdc
Isolation	I/O to Logic : Isolation Field Power : Non-isolation
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	40 g
Module size	12 mm x 99 mm x 70 mm

## 8.6 GT-2328 LED Indicator

Table 8-5 LED Indicator

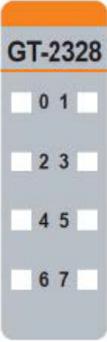
Module	LED number	LED function / description	LED colour
 <p>The image shows a vertical grey module with an orange top section labeled 'GT-2328'. Below the label are eight small square LEDs arranged in two columns of four, numbered 0-7 from top to bottom.</p>	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	
	4	OUTPUT Channel 4	
	5	OUTPUT Channel 5	
	6	OUTPUT Channel 6	
	7	OUTPUT Channel 7	

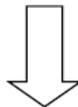
Table 8-6 Channel Status LED

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

## 8.7 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0



- Output Module Data

D7	D6	D5	D4	D3	D2	D1	D0
----	----	----	----	----	----	----	----

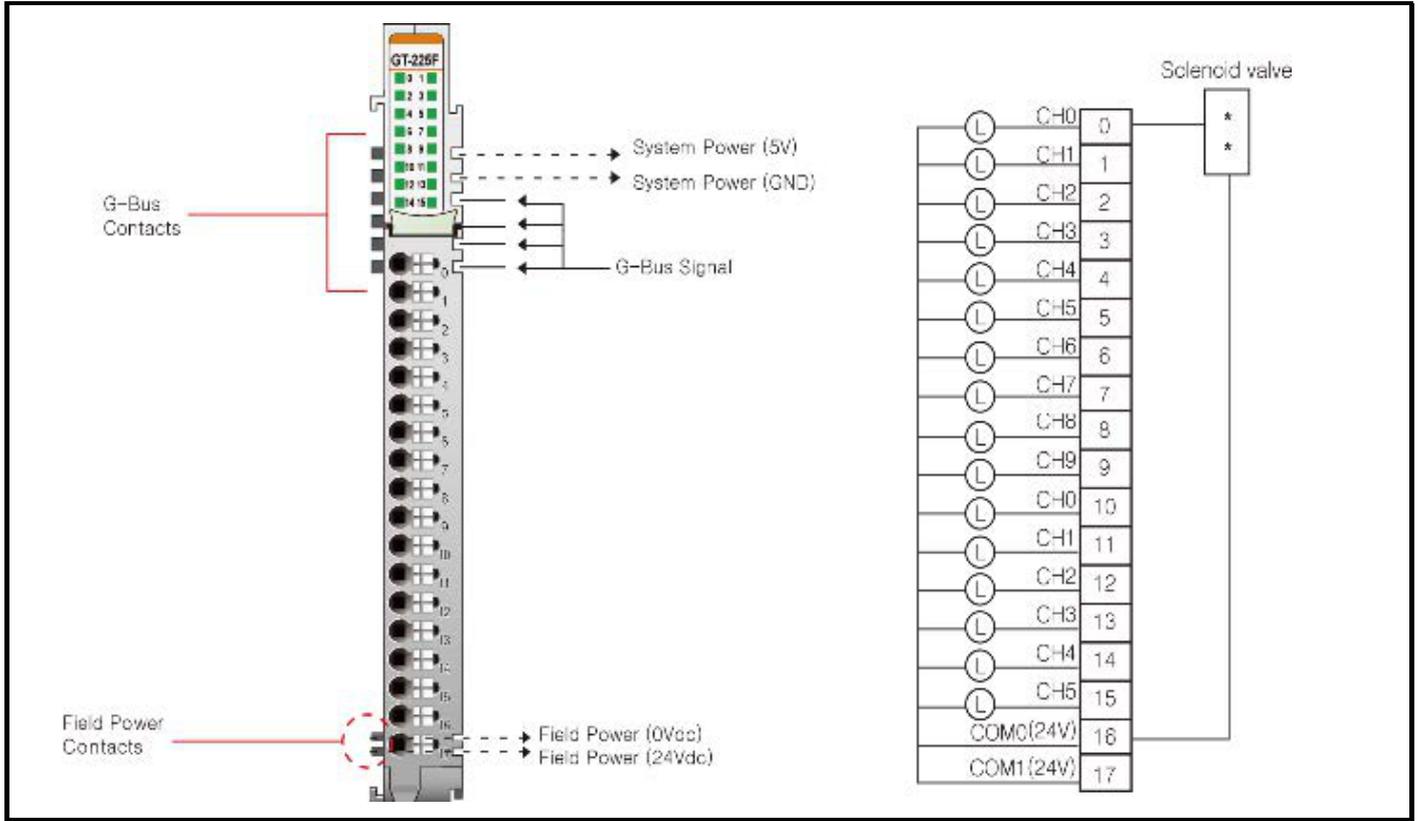
## 8.8 Parameter data

- Valid Parameter length: 2 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action (ch0 to ch7) 0: Fault value, 1: Hold last state							
Byte 1	Fault value (ch0 to ch7) 0: Off, 1: On							

## 8.9 GT-225F Digital Output

Figure 8-3 GT-225F (16 Points, Sink Output Terminal, 18 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Output Channel 8	Output Channel 9	9
10	Output Channel 10	Output Channel 11	11
12	Output Channel 12	Output Channel 13	13
14	Output Channel 14	Output Channel 15	15
16	Common (Field Power 24 V)	Common (Field Power 24 V)	17

**Table 8-7 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 95 % non-condensing
Operating altitude	2000 m
Output specification	
Outputs Per Module	16 Points Sink Type
Indicators	16 Green Output State LEDs
Output Voltage Range	Nominal 24 Vdc (Min. 15 Vdc to Max. 32 Vdc)
ON-state Voltage Drop	Max. 0.3 Vdc @ 25 °C / 0.5 Vdc @ 70 °C
ON-State Min. Current	1 mA / Channel
OFF-State Leakage Current	Max. 20 uA
Output Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.5 ms
Output Current Rating	Max. 0.3 A per Channel / Max 4.8 A per unit
Protection (VNS3NV04D-E)	Over Current limit: Min. 3.5 A @ 25 °C per channel (VNS3NV04D-E) Thermal Shutdown : Min 3 A @ 25 °C per channel (VNS3NV04D-E, Min 150 °C) Short circuit protection
Common Type	16 Points / 2 COM (Single Common)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
Industrial Emissions	EN 61000-6-4:2007 +A1: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installations Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 50 mA maximum @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 15 to 32 Vdc Power dissipation: 30 mA maximum @ 32 Vdc
Wiring	I/O Cable Max. 0.75 mm <sup>2</sup> (AWG 18)
Weight	63 g
Module size	12 mm x 109 mm x 70 mm

## 8.10 GT-225F LED Indicator

Table 8-8 LED Indicator

Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	
	4	OUTPUT Channel 4	
	5	OUTPUT Channel 5	
	6	OUTPUT Channel 6	
	7	OUTPUT Channel 7	
	8	OUTPUT Channel 8	
	9	OUTPUT Channel 9	
	10	OUTPUT Channel 10	
	11	OUTPUT Channel 11	
	12	OUTPUT Channel 12	
	13	OUTPUT Channel 13	
	14	OUTPUT Channel 14	
	15	OUTPUT Channel 15	

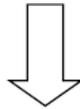
Table 8-9 Channel Status LED

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

## 8.11 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
Byte 1	D15	D14	D13	D12	D11	D10	D9	D8



- Output Module Data

D7	D6	D5	D4	D3	D2	D1	D0
D15	D14	D13	D12	D11	D10	D9	D8

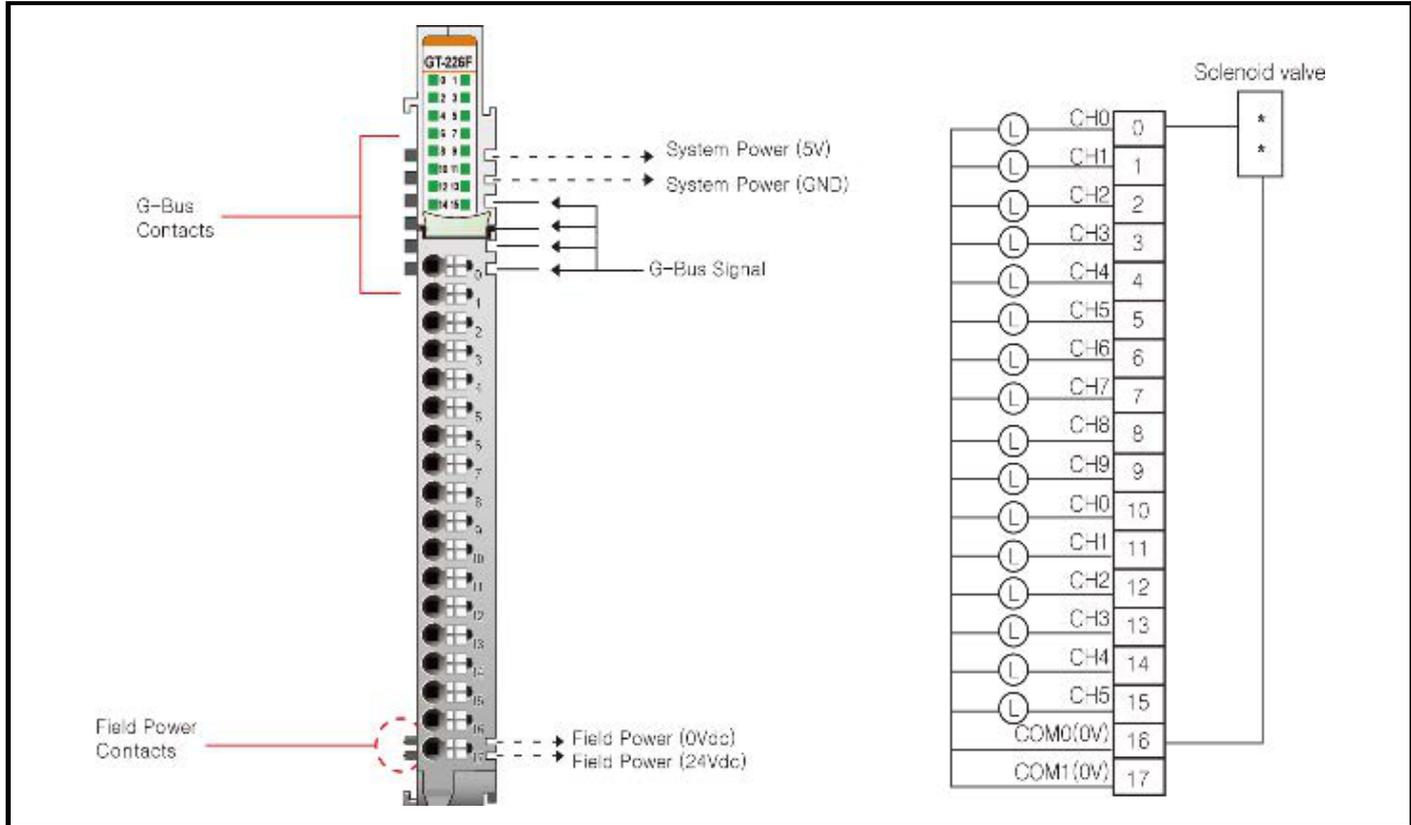
## 8.12 Parameter data

- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action (ch0 to ch7) 0: Fault value, 1: Hold last state							
Byte 1	Fault Action (ch8 to ch15) 0: Fault value, 1: Hold last state							
Byte 2	Fault value (ch0 to ch7) 0: Off, 1: On							
Byte 3	Fault value (ch8 to ch15) 0: Off, 1: On							

### 8.13 GT-226F Digital Output

Figure 8-4 GT-226F (16 Points, Source Output Terminal, 18 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Output Channel 8	Output Channel 9	9
10	Output Channel 10	Output Channel 11	11
12	Output Channel 12	Output Channel 13	13
14	Output Channel 14	Output Channel 15	15
16	Common (Field Power 0 V)	Common (Field Power 0 V)	17

**Table 8-10 Specification**

Environmental specifications	
Operation temperature	-40 °C to 70 °C
Non-Operatin temperature	-40 °C to 85 °C
Relative humidity	5 % to 95 % non-condensing
Operating altitude	2000 m
Output specification	
Outputs Per Module	16 Points Source Type
Indicators	16 Green Output Status LEDs
Output Voltage Range	Nominal 24 Vdc (Min. 15 Vdc to Max. 32 Vdc)
ON-state Voltage Drop	Max. 0.3 Vdc @ 25 °C / 0.5 Vdc @ 70 °C
ON-State Min. Current	1 mA per Channel
OFF-State Leakage Current	Max. 5 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 / Max 4.8 A per unit
Protection (ITS716G)	Over Current limit : Min 6.5 A @ 25 °C per channel (ITS716G) Thermal Shutdown : Min 4 A @ 25 °C per channel (ITS716G, Min 150 °C) Short circuit protection
Common Type	16 Points / 2 COM (Single Common)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
Industrial Emissions	EN 61000-6-4/2007+A1:2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 50 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 15 to 32 Vdc Power dissipation: 40 mA maximum @ 32 Vdc
Wiring	I/O Cable Max. 0.75 mm <sup>2</sup> (AWG 18)
Weight	63 g
Module size	12 mm x 109 mm x 70 mm

## 8.14 GT-226F LED Indicator

Table 8-11 LED Indicator

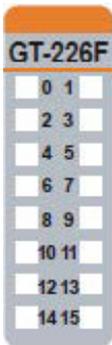
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	
	4	OUTPUT Channel 4	
	5	OUTPUT Channel 5	
	6	OUTPUT Channel 6	
	7	OUTPUT Channel 7	
	8	OUTPUT Channel 8	
	9	OUTPUT Channel 9	
	10	OUTPUT Channel 10	
	11	OUTPUT Channel 11	
	12	OUTPUT Channel 12	
	13	OUTPUT Channel 13	
	14	OUTPUT Channel 14	
	15	OUTPUT Channel 15	

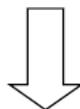
Table 8-12 Channel Status LED

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

## 8.15 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
Byte 1	D15	D14	D13	D12	D11	D10	D9	D8



- Output Module Data

D7	D6	D5	D4	D3	D2	D1	D0
D15	D14	D13	D12	D11	D10	D9	D8

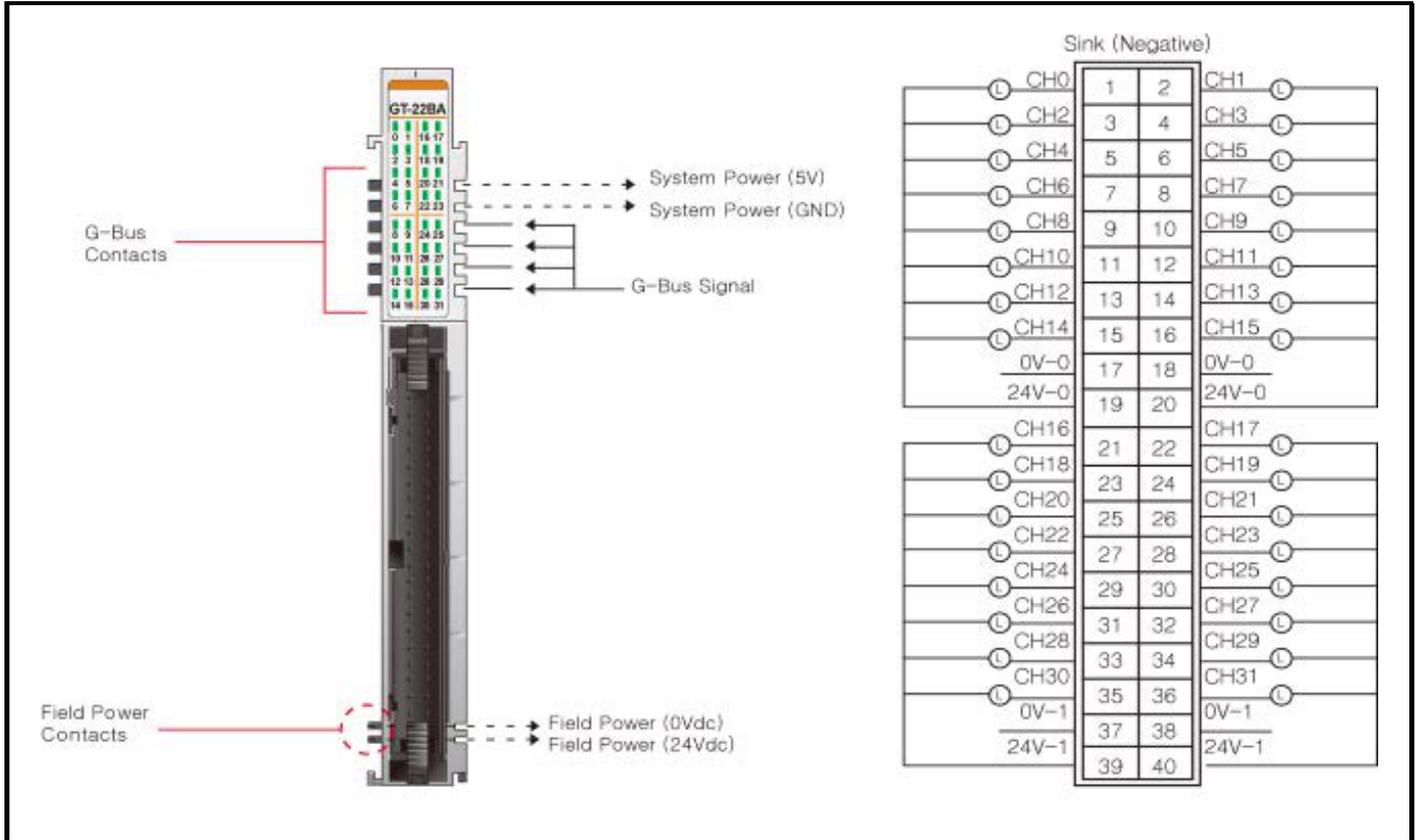
## 8.16 Parameter data

- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action (ch0 to ch7) 0: Fault value, 1: Hold last state							
Byte 1	Fault Action (ch8 to ch15) 0: Fault value, 1: Hold last state							
Byte 2	Fault value (ch0 to ch7) 0: Off, 1: On							
Byte 3	Fault value (ch8 to ch15) 0: Off, 1: On							

## 8.17 GT-22BA Digital Output

Figure 8-5 GT-22BA (32 Points, Sink Output Terminal, 24 Vdc, 0.3 A, 40P Connector)



Pin number	Signal description	Signal description	Pin number
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Output Channel 8	Output Channel 9	9
10	Output Channel 10	Output Channel 11	11
12	Output Channel 12	Output Channel 13	13
14	Output Channel 14	Output Channel 15	15
16	Output Channel 16	Output Channel 17	17
18	Common (Field Power 24 V)	Common (Field Power 24 V)	19
20	Output Channel 20	Output Channel 21	21
22	Output Channel 22	Output Channel 23	23
24	Output Channel 24	Output Channel 25	25
26	Output Channel 26	Output Channel 27	27
28	Output Channel 28	Output Channel 29	29
30	Output Channel 30	Output Channel 31	31
32	Output Channel 32	Output Channel 33	33
34	Output Channel 34	Output Channel 35	35
36	Field Power 0 V	Field Power 0 V	37
38	Common (Field Power 24 V)	Common (Field Power 24 V)	39

**Table 8-13 Specification**

<b>Environmental specifications</b>	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
<b>Output specification</b>	
Outputs Per Module	32 Points Sink Type
Indicators	32 Green Output Status LEDs
Output Voltage Range	24 Vdc (Min. 15 Vdc to Max. 32 Vdc)
ON-state Voltage Drop	Max. 0.3 Vdc @ 25 °C / 0.5 Vdc @ 70 °C
ON-State Min. Current	Min. 1 mA / Channel
OFF-State Leakage Current	Max. 25 uA
Output Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.5 ms 0 ch to 15 ch < 16 ch to 31 ch : max. 20 us
Output Current Rating	Max. 0.3 A / Channel, Max. 6.0 A Per Unit
Protection	Over Current limit : Min. 3.5 A @ 25 °C per channel Thermal Shutdown : Min. 3 A @ 25 °C per channel Short Circuit Protection
Common Type	32 Points / 4 Common
<b>General specifications</b>	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 65 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 15 to 32 Vdc Power Dissipation : 10 mA @ 24 Vdc
Wiring	Module Connector : HIF3BA-40D-2.54R
Weight	59 g
Module size	12 mm x 109 mm x 70 mm

## 8.18 GT-22BA LED Indicator

Table 8-14 LED Indicator

Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	...	...	...
	31	OUTPUT Channel 31	green

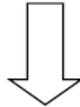
Table 8-15 Channel Status LED

Status	LED	To indicate
Off Signal	Off	No Output Signal
On Signal	Green	Output signal transmitted

## 8.19 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
Byte 1	D15	D14	D13	D12	D11	D10	D9	D8
Byte 2	D23	D22	D21	D20	D19	D18	D17	D16
Byte 3	D31	D30	D29	D28	D27	D26	D25	D24



- Output Module Data

D7	D6	D5	D4	D3	D2	D1	D0
D15	D14	D13	D12	D11	D10	D9	D8
D23	D22	D21	D20	D19	D18	D17	D16
D31	D30	D29	D28	D27	D26	D25	D24

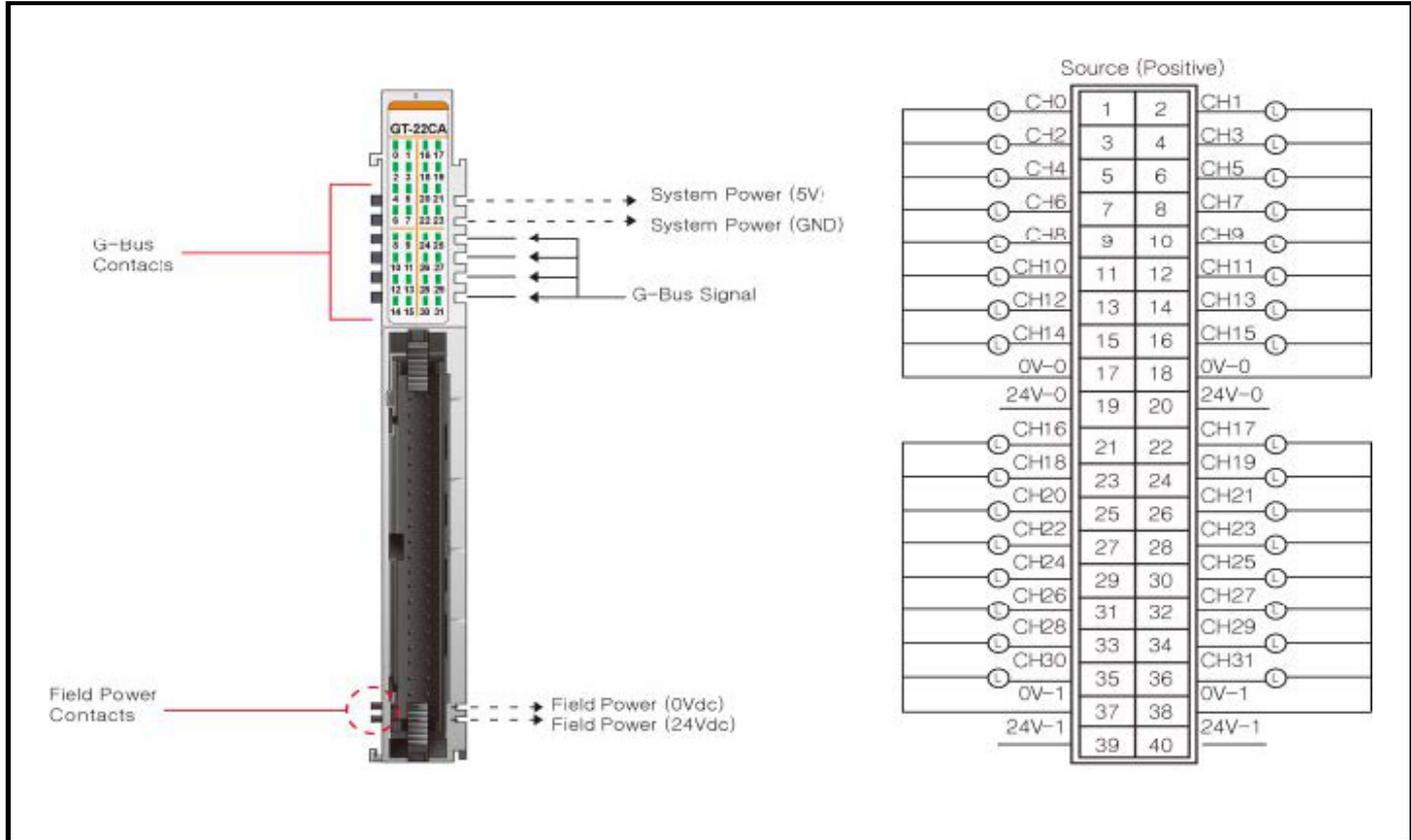
## 8.20 Parameter data

- Valid Parameter length: 2 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action (ch0 to ch7) 0: Fault value, 1: Hold last state							
Byte 1	Fault Action (ch8 to ch15) 0: Fault value, 1: Hold last state							
Byte 2	Fault Action (ch16 to ch23) 0: Fault value, 1: Hold last state							
Byte 3	Fault Action (ch24 to ch31) 0: Fault value, 1: Hold last state							
Byte 4	Fault value (ch0 to ch7) 0: Off, 1: On							
Byte 5	Fault value (ch8 to ch15) 0: Off, 1: On							
Byte 6	Fault value (ch16 to ch23) 0: Off, 1: On							
Byte 7	Fault value (ch24 to ch31) 0: Off, 1: On							

## 8.21 GT-22CA Digital Output

Figure 8-6 GT-22CA (32 Points, Source Output Terminal, 24 Vdc, 0.3 A, 40P Connector)



Pin number	Signal description	Signal description	Pin number
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Output Channel 8	Output Channel 9	9
10	Output Channel 10	Output Channel 11	11
12	Output Channel 12	Output Channel 13	13
14	Output Channel 14	Output Channel 15	15
16	Common (Field Power 24 V)	Common (Field Power 24 V)	17
18	Output Channel 18	Output Channel 19	19
20	Output Channel 20	Output Channel 21	21
22	Output Channel 22	Output Channel 23	23
24	Output Channel 24	Output Channel 25	25
26	Output Channel 26	Output Channel 27	27
28	Output Channel 28	Output Channel 29	29
30	Output Channel 30	Output Channel 31	31
32	Output Channel 32	Output Channel 33	33
34	Output Channel 34	Output Channel 35	35
36	Common (Field Power 0 V)	Common (Field Power 0 V)	37
38	Field Power 24 V	Field Power 24 V	39

Safety information	Product information	Mechanical installation	Electrical installation	RTMoE Ethernet Bus Coupler	Modbus TCP/IP	Digital Input	<b>Digital Output</b>	Analog Input	Analog Output	Power module
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**Table 8-16 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	32 Points Source Type
Indicators	32 Green Output Status LEDs
Output Voltage Range	24 Vdc (Min. 15 Vdc to Max. 32 Vdc)
ON-state Voltage Drop	Max. 0.3 Vdc @ 25 °C / 0.5 Vdc @ 70 °C
ON-State Min. Current	Min. 1 mA / Channel
OFF-State Leakage Current	Max. 5 uA
Output Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.5 ms 0 ch to 15 ch < 16 ch to 31 ch : max. 20 us
Output Current Rating	Max. 0.3 A / Channel, Max. 6.0 A per unit
Protection	Over Current limit : Min. 6.5 A @ 25 °C per channel Thermal Shutdown : Min. 4 A @ 25 °C per channel Short Circuit Protection
Common Type	32 Points / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Protection Class	Variable/IP20
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 65 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 15 to 32 Vdc Power Dissipation : 30 mA @ 24 Vdc
Wiring	Module Connector : HIF3BA-40D-2.54R
Weight	63 g
Module size	12 mm x 109 mm x 70 mm

## 8.22 GT-22CA LED Indicator

Table 8-17 LED Indicator

Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	...	...	...
	31	OUTPUT Channel 31	Green

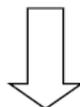
Table 8-18 Channel Status LED

Status	LED	To indicate
Off Signal	Off	No Output Signal
On Signal	Green	Output signal transmitted

## 8.23 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
Byte 1	D15	D14	D13	D12	D11	D10	D9	D8
Byte 2	D23	D22	D21	D20	D19	D18	D17	D16
Byte 3	D31	D30	D29	D28	D27	D26	D25	D24



- Output Module Data

D7	D6	D5	D4	D3	D2	D1	D0
D15	D14	D13	D12	D11	D10	D9	D8
D23	D22	D21	D20	D19	D18	D17	D16
D31	D30	D29	D28	D27	D26	D25	D24

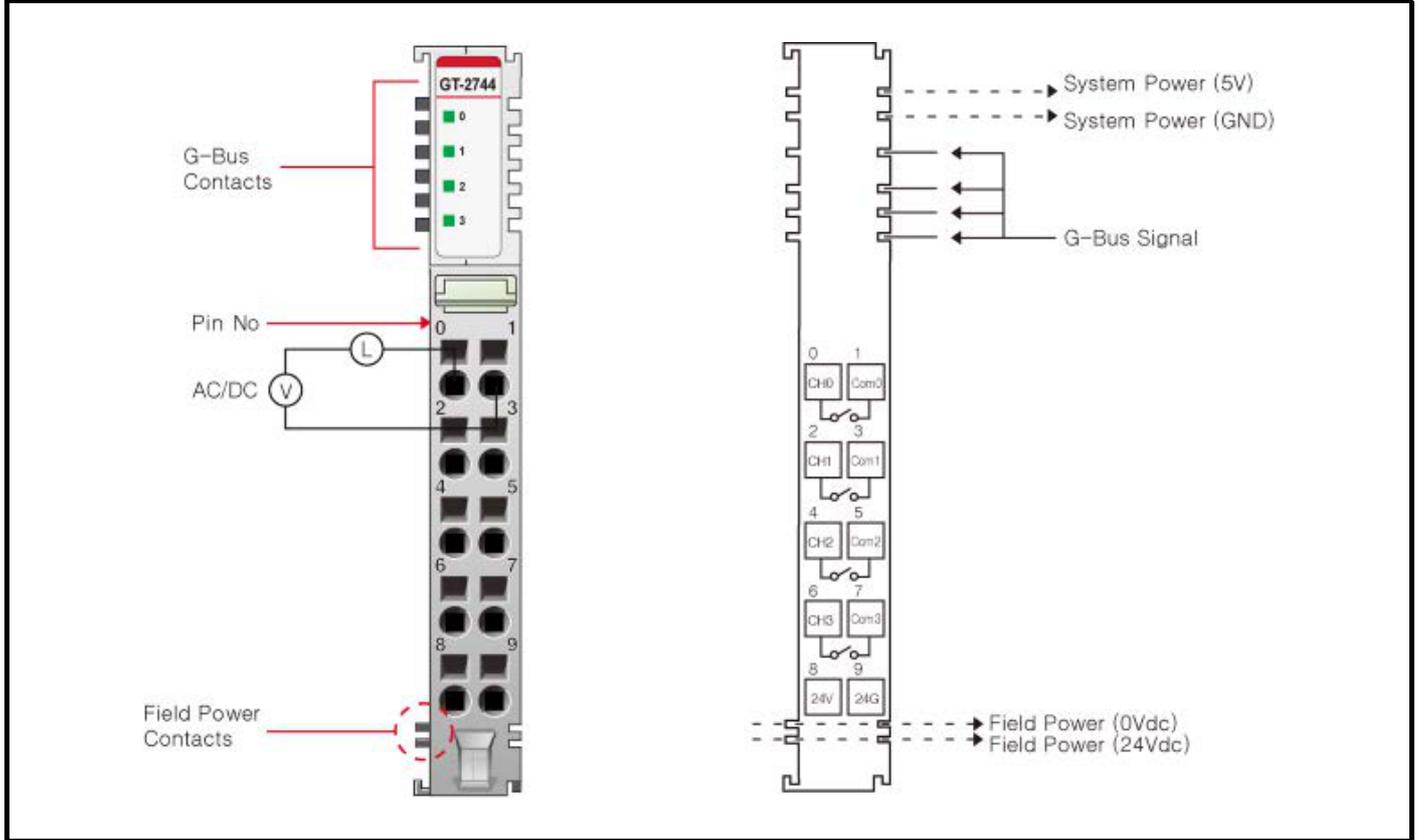
## 8.24 Parameter data

- Valid Parameter length: 8 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action (ch0 to ch7) 0: Fault value, 1: Hold last state							
Byte 1	Fault Action (ch8 to ch15) 0: Fault value, 1: Hold last state							
Byte 2	Fault Action (ch16 to ch23) 0: Fault value, 1: Hold last state							
Byte 3	Fault Action (ch24 to ch31) 0: Fault value, 1: Hold last state							
Byte 4	Fault value (ch0 to ch7) 0: Off, 1: On							
Byte 5	Fault value (ch8 to ch15) 0: Off, 1: On							
Byte 6	Fault value (ch16 to ch23) 0: Off, 1: On							
Byte 7	Fault value (ch24 to ch31) 0: Off, 1: On							

## 8.25 GT-2744 Digital Output

Figure 8-7 GT-2744 (4 Points, Relay, 24 Vdc / 220 Vac, 2 A, 10 RTB)



Pin number	Signal description	Signal description	Pin number
0	Output Channel 0	COM 0	1
2	Output Channel 1	COM 1	3
4	Output Channel 2	COM 2	5
6	Output Channel 3	COM 3	7
8	Common (Field Power 24 V)	Common (Field Power 0 V)	9

**Table 8-19 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Points Bi-directional
Indicators	4 Green Output Status LEDs
Relay Type	Form A, Single Pole Single Throw (SPST)
Output Voltage Range (Load Dependent)	0 to 32 Vdc @ 2 A resistive 48 Vdc @ 0.8 A resistive 110 Vdc @ 0.5 A resistive Max. 240 Vac @ 2 A resistive
Max. On-State Voltage Drop	Max. 0.5 V @ 2A, Resistive Load, 24 Vdc
Output Delay Time (Resistive Load)	OFF to ON : Max. 5 ms @ 24 Vdc ON to OFF : Max. 8 ms @ 24 Vdc OFF to ON : Max. 5 ms @ 220 Vac ON to OFF : Max. 15 ms @ 220 Vac
Output Current Rating (At Rated Power)	2 A @ 0 to 32 Vdc 0.8 A @ 48 Vdc 0.5 A @ 110 Vdc 2 A @ 240 Vac -40 °C to 70 °C (2 A Load 2 ch) -40 °C to 60 °C (2 A Load 4 ch)
Expected Contact Life	20 M Cycles (Resistive)
Frequency Range (Vac)	47 to 63 Hz
Common Type	4 Points / 2 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	35 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 22 Vdc to 26 Vdc Power dissipation : 30 mA @ 24 Vdc (AC Power not used)
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 8.26 GT-2744 LED Indicator

Table 8-20 LED Indicator

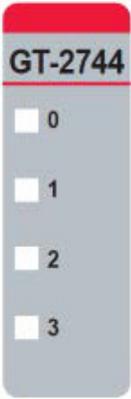
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

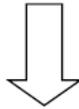
Table 8-21 Channel Status LED

Status	LED	To indicate
Off Signal	Off	No Output Signal
On Signal	Green	Output signal transmitted

## 8.27 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Reserved				D3	D2	D1	D0



- Output Module Data

Reserved				D3	D2	D1	D0
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## 8.28 Parameter data

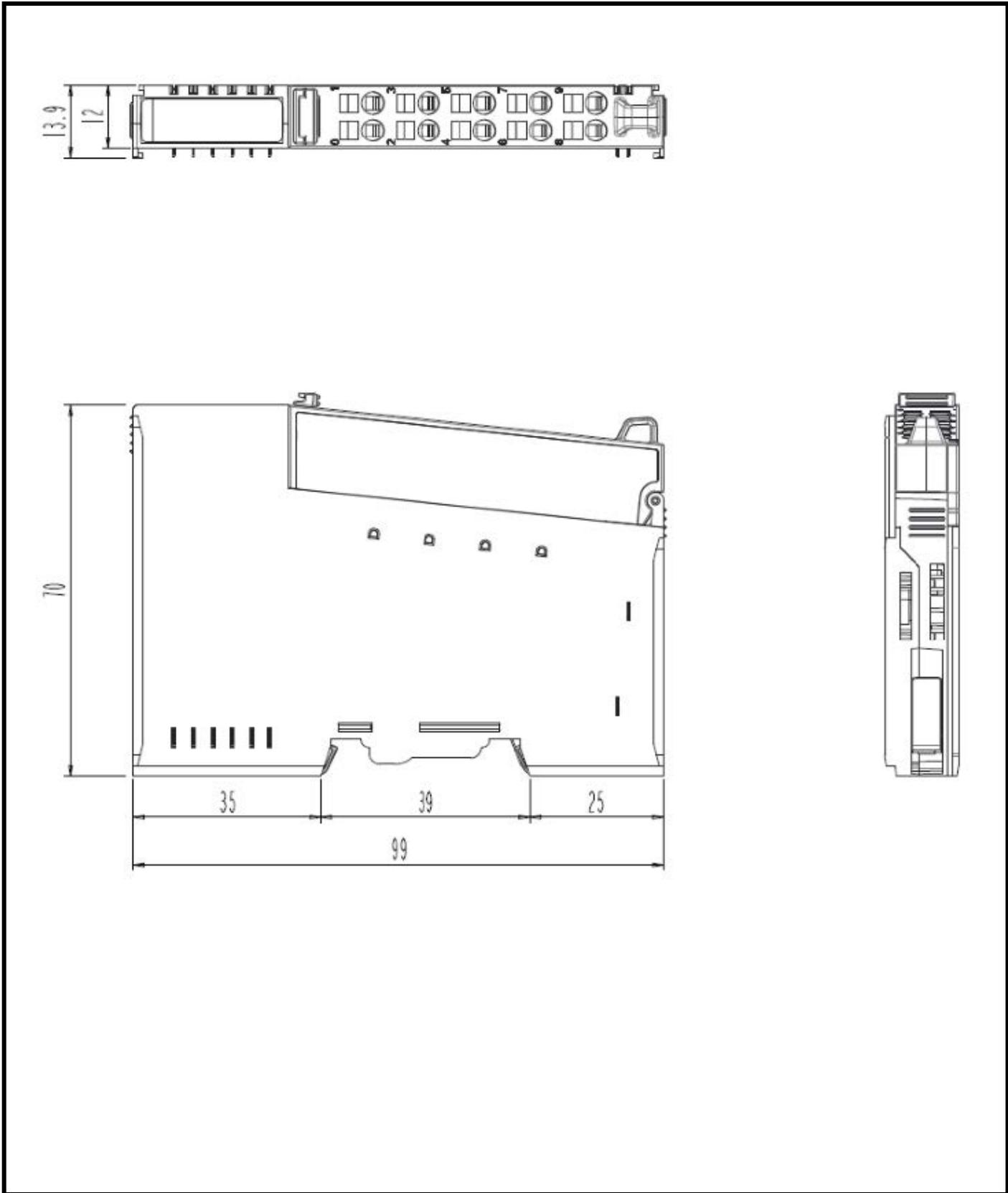
- Valid Parameter length: 2 Bytes
- Parameter data

Offset	Decimal Bit	Description	Default Value
Byte 0	00-03	Fault Action(0 to 3) 0: Fault value, 1: Hold last state	0 (Fault value)
Byte 1	00-03	Fault value(0 to 3) 0: Off, 1: On	0 (Off)

## 8.29 Dimension

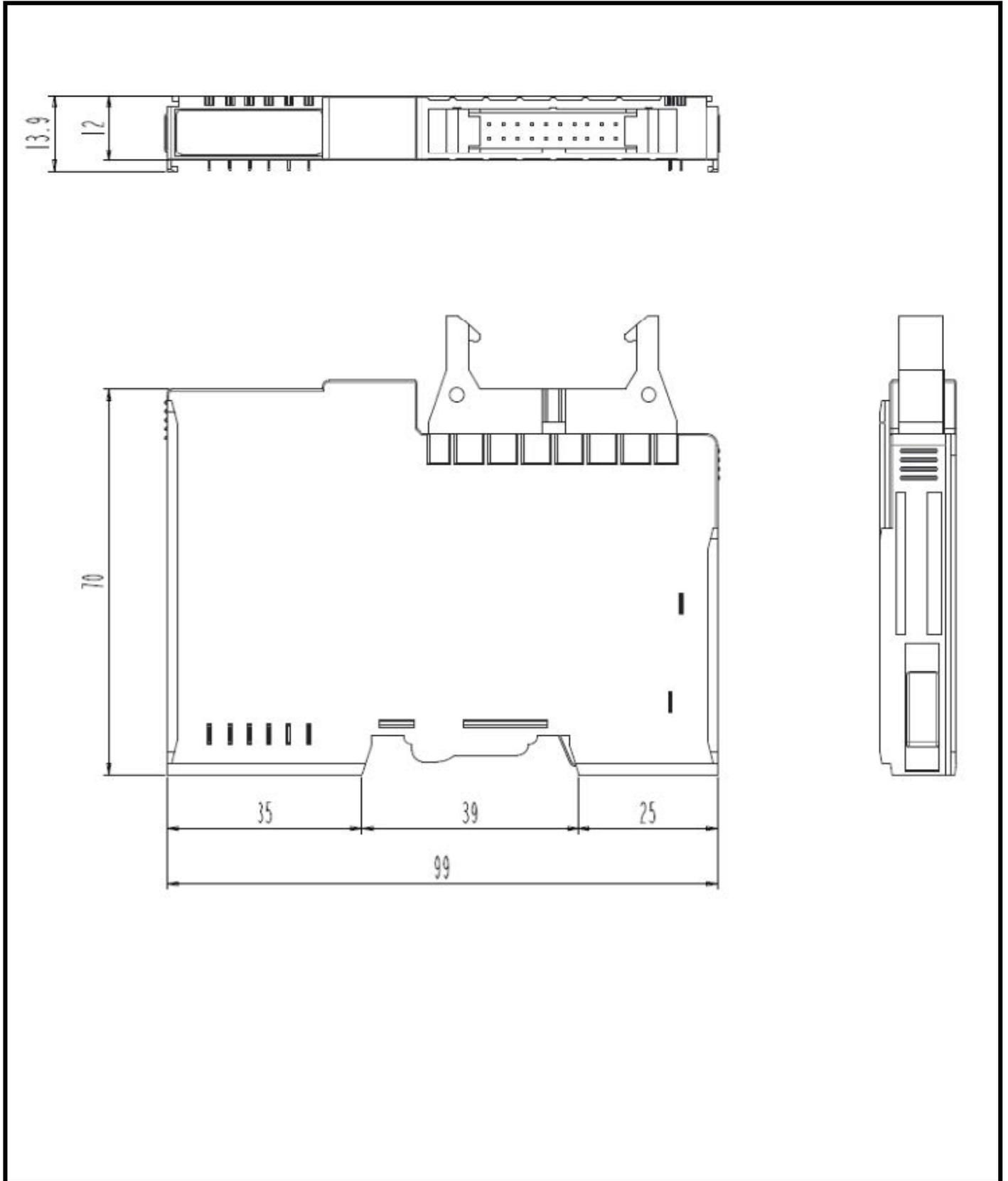
### 8.29.1 GT-2xx4 (RTB), GT-2xx8 (RTB)

(mm)



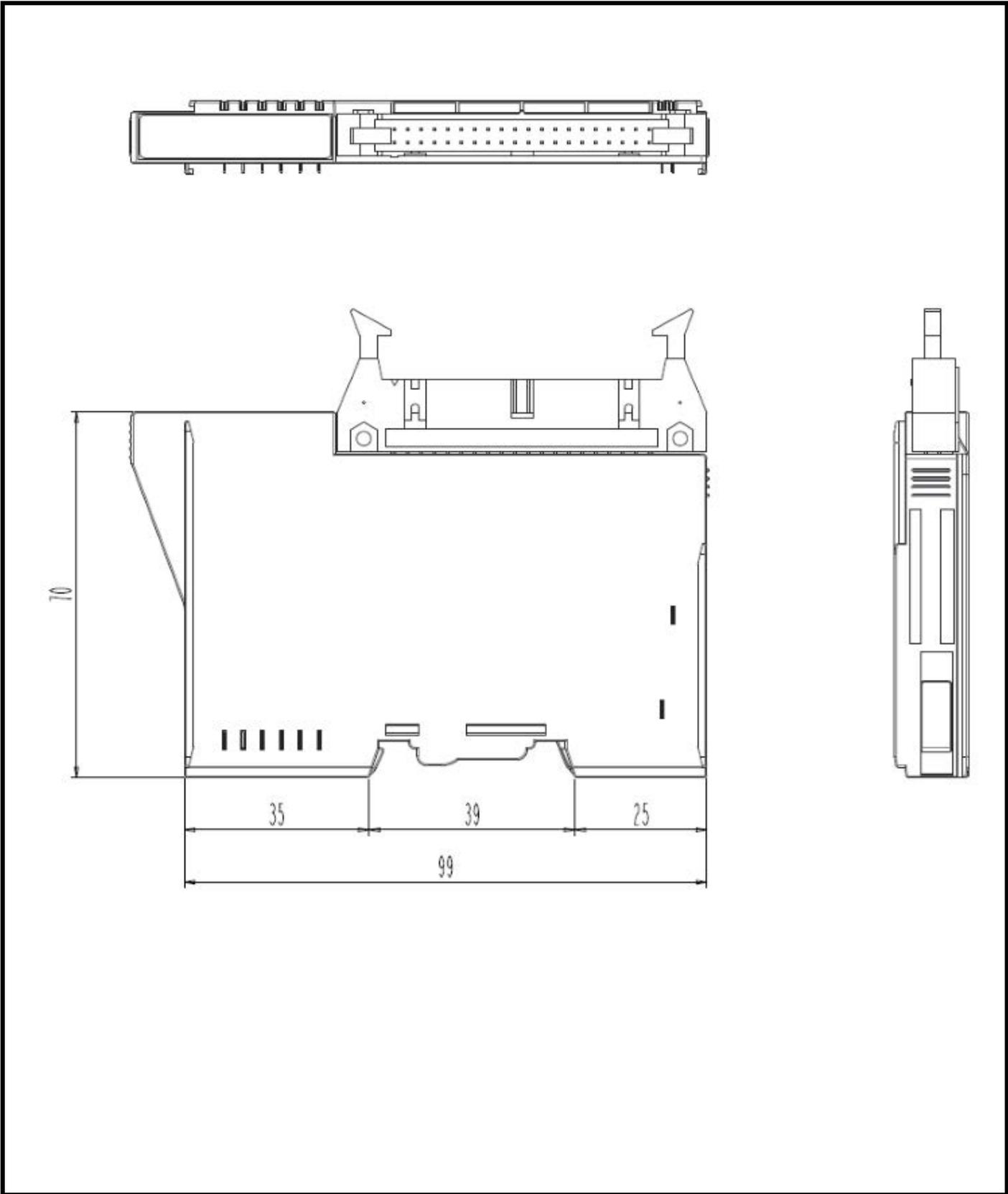
### 8.29.2 GT-2xxF (20P Connector)

(mm)



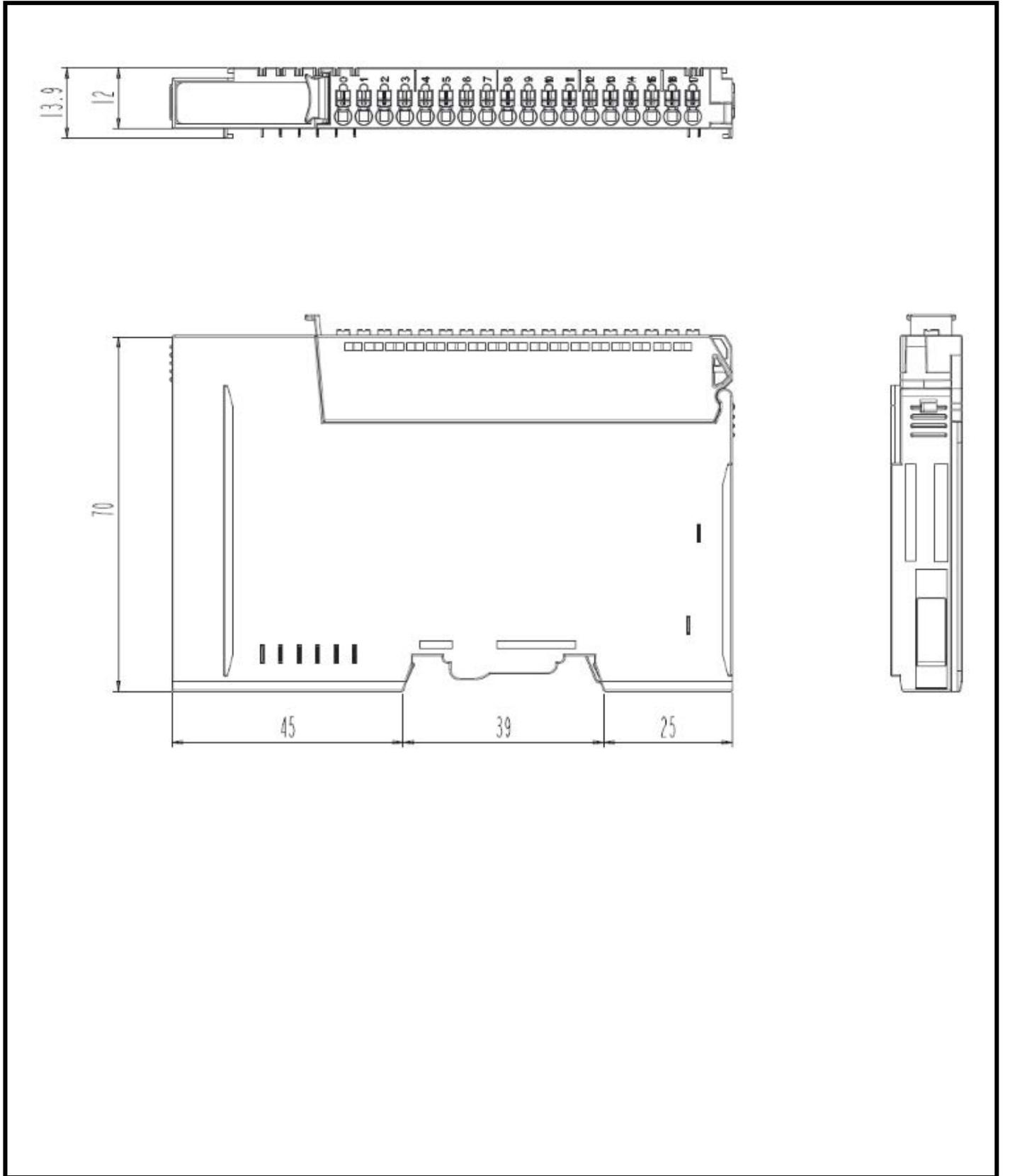
**8.29.3 GT-2xxA (40P Connector)**

(mm)



### 8.29.4 GT-225F/226F (18 RTB)

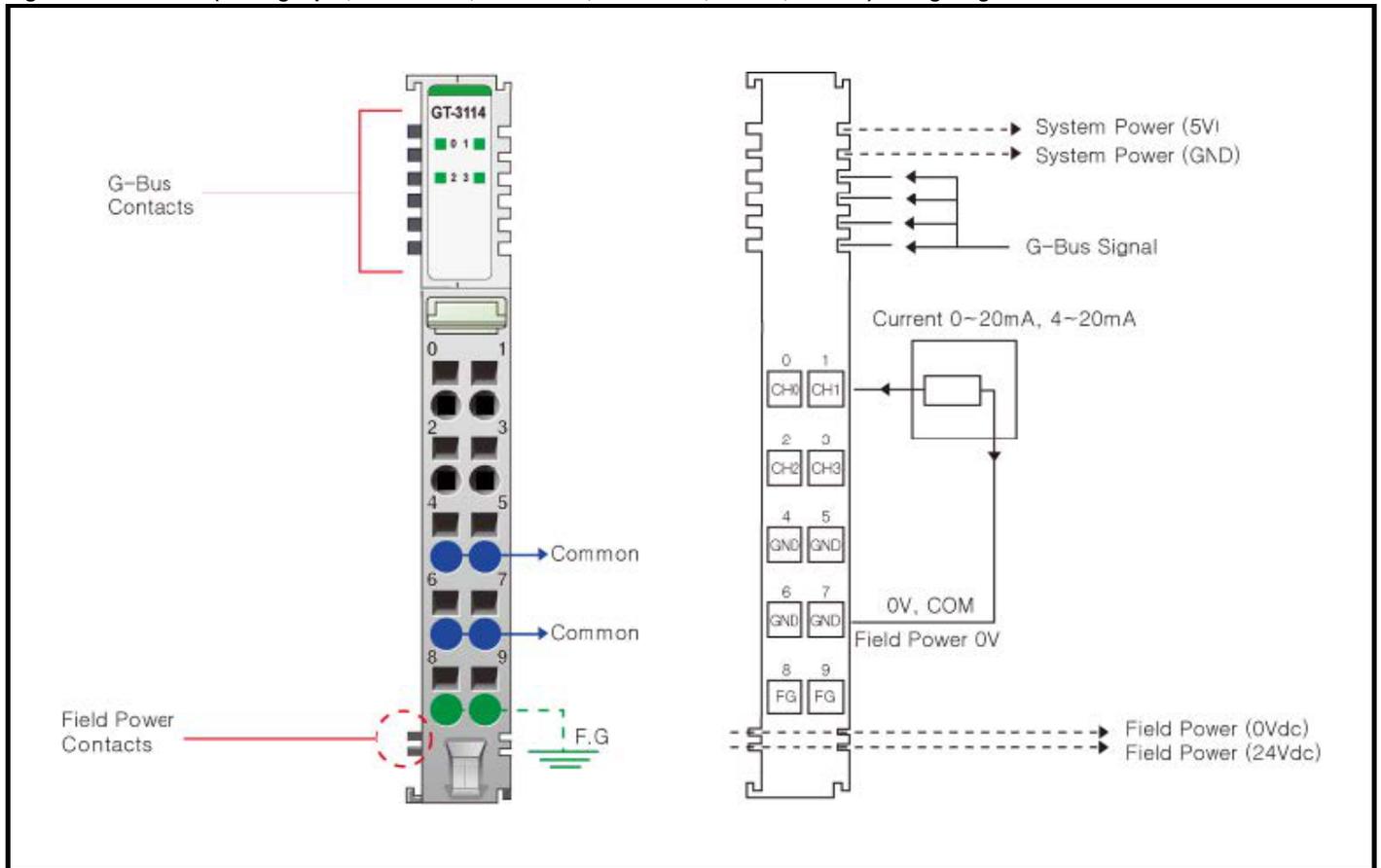
(mm)



# 9 Analog Input

## 9.1 GT-3114 Analog input

Figure 9-1 GT-3114 (Analog input, 4 Channels, 0 to 20 mA, 4 to 20 mA, 12 Bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel Common (AGND)	Input Channel Common (AGND)	5
6	Input Channel Common (AGND)	Input Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Safety information	Product information	Mechanical installation	Electrical installation	RTMoE Ethernet Bus Coupler	Modbus TCP/IP	Digital Input	Digital Output	Analog Input	Analog Output	Power module
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**Table 9-1 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 95 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels single ended, non-isolated between channels
Resolution in Ranges	12 bits: 4.88 uA / bit (0 to 20 mA), 3.91 uA / bit (4 to 20 mA)
Indicators (Logic side)	4 Green Input Status LEDs
Input Current Ranges	0 to 20 mA, 4 to 20 mA
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	121.5 Ω
Diagnostic	Diagnostic Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value) Maximum Range Over: LED Off > 21 mA Minimum Range Over: LED Off < 3 mA (4 to 20 mA)
Conversion Time	800 usec / All Channels
Field Calibration	Not Required
Common Type	4 Common, Field Power 0 V is Common (AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC Resistance Burst/ESD	EN 61000-6-4/All: 2011 EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is available
Protection Class	Variable/IP20
Product certifications	CE, UL
Power Dissipation	Max. 25 mA @ 5 Vdc
Isolation	I/O to Logic: Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation: Max. 25 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.2 GT-3114 LED Indicator

Table 9-2 LED Indicator

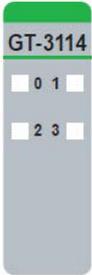
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

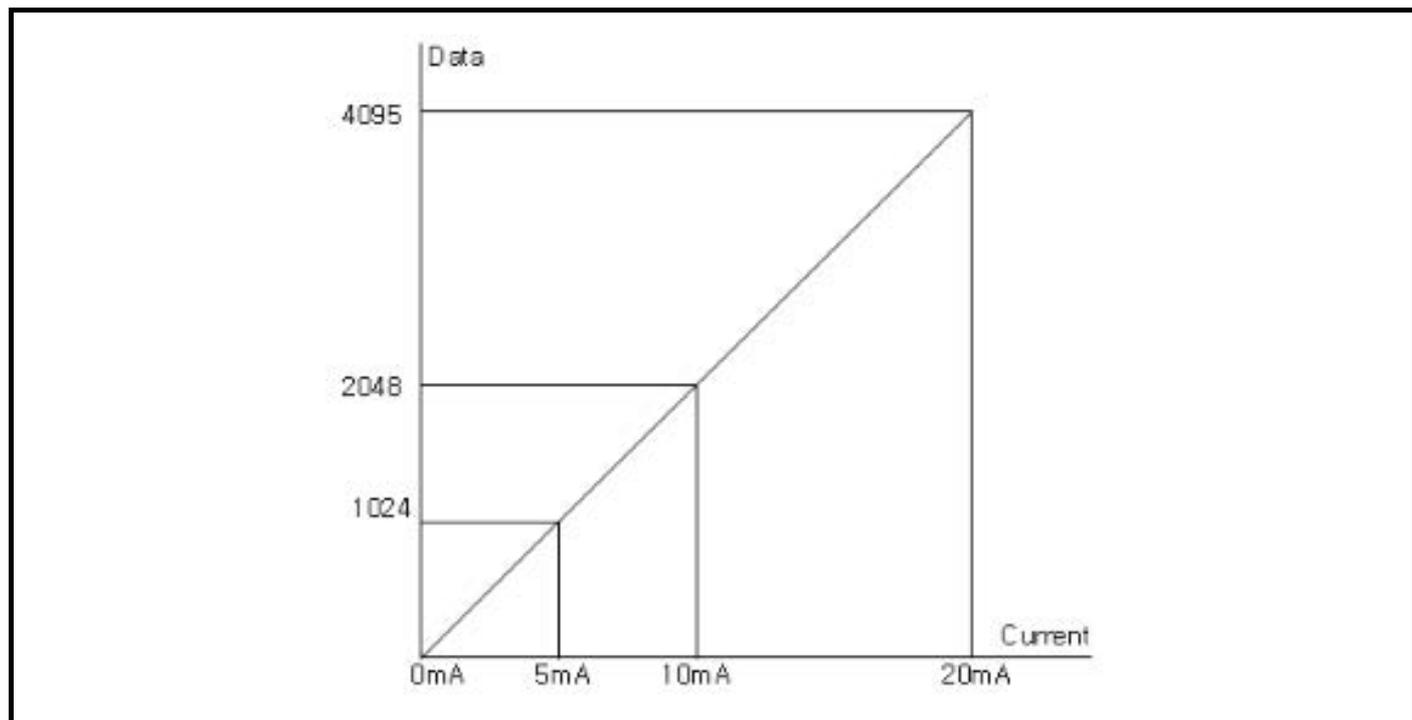
Table 9-3 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5 % (Maximum Input Value)] - Channel OFF [LED On > 0.5 % (Maximum Input Value)] - Channel Green	Normal Operation
Over Range Check	[LED Off > 21 mA (Maximum Range Over – Channel OFF)] [LED On < 3 mA (Minimum Range Over , 4 to 20 mA)] – Channel OFF	Over range Check
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

## 9.3 Data Value / Current

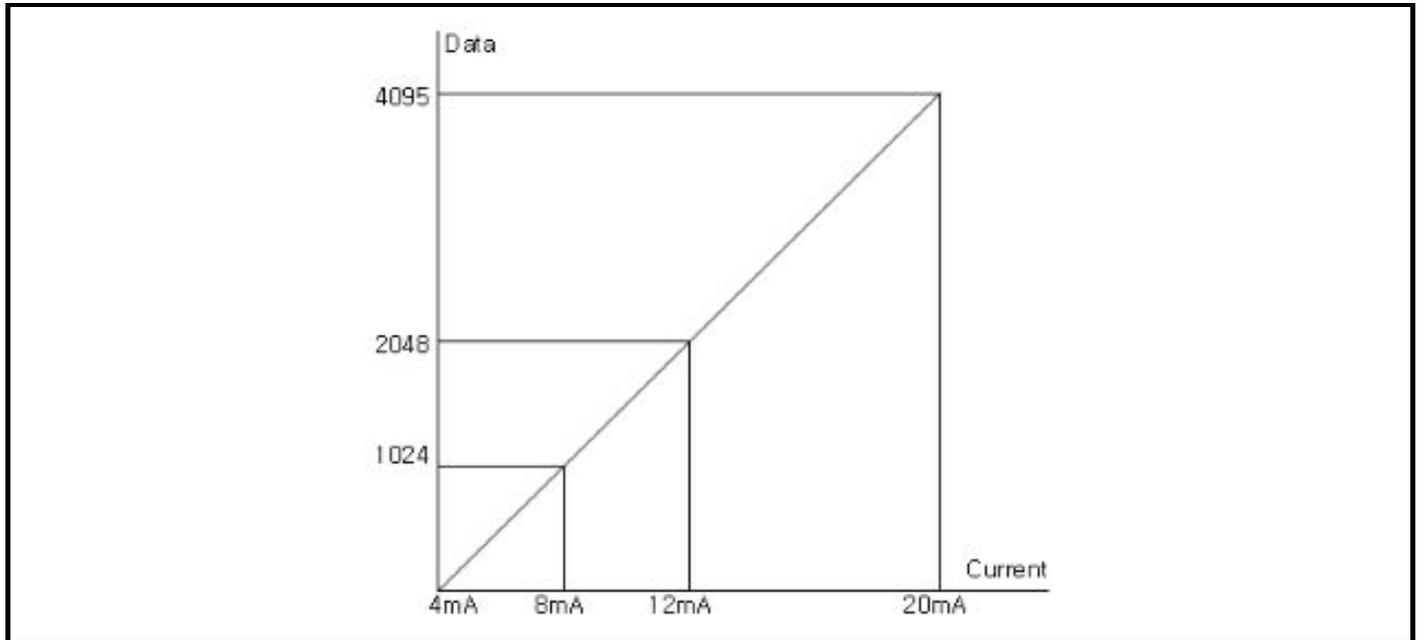
Table 9-4 Current Range: 0 to 20 mA

Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF



**Table 9-5 Current Range: 4 to 20 mA**

<b>Current</b>	<b>4.0 mA</b>	<b>8.0 mA</b>	<b>12.0 mA</b>	<b>20.0 mA</b>
Data (Hex)	H0000	H03FF	H07FF	H0FFF



## 9.4 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								Analog Input Ch0 Low byte
Byte 1								Analog Input Ch0 High byte
Byte 2								Analog Input Ch1 Low byte
Byte 3								Analog Input Ch1 High byte
Byte 4								Analog Input Ch2 Low byte
Byte 5								Analog Input Ch2 High byte
Byte 6								Analog Input Ch3 Low byte
Byte 7								Analog Input Ch3 High byte

## 9.5 Parameter data

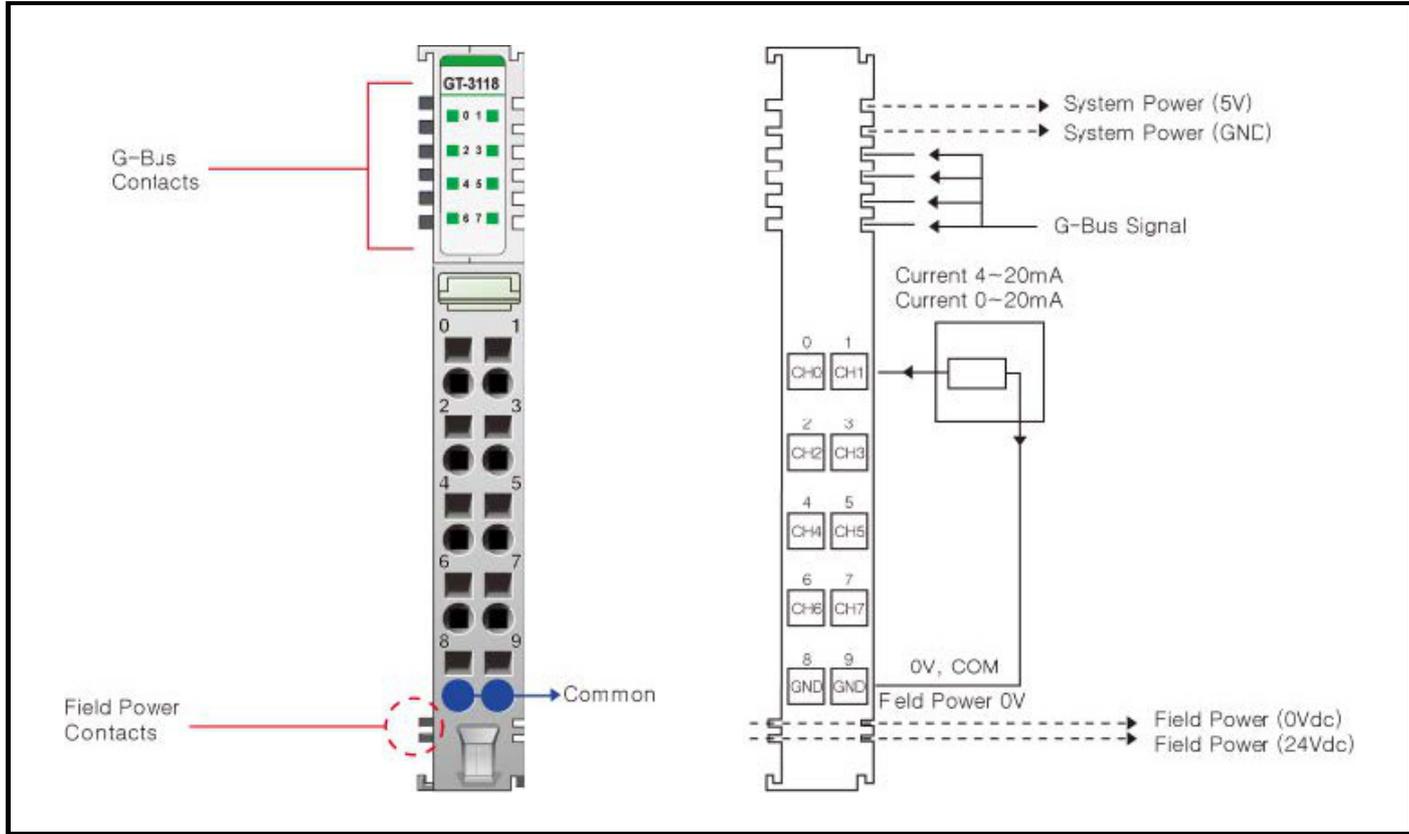
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								Current Range for Channel 0 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 1								Current Range for Channel 1 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 2								Current Range for Channel 2 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 3								Current Range for Channel 3 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 4								Filter Time (H00: Default Filter (=20) / H01: Fastest to / H62: Slowest)
Byte 5								Not used (=00)

All values are stored in Bus Coupler's EEPROM.

## 9.6 GT-3118 Analog input

Figure 9-2 GT-3118 (Analog input, 8 Channels, 0 to 20 mA, 4 to 20 mA, 12 Bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Input Channel Common (AGND)	Input Channel Common (AGND)	9

Safety information	Product information	Mechanical installation	Electrical installation	RTMoE Ethernet Bus Coupler	Modbus TCP/IP	Digital Input	Digital Output	Analog Input	Analog Output	Power module
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**Table 9-6 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	8 Channels single ended, non-isolated between channels
Resolution in Ranges	12 bits: 4.88 uA / bit (0 to 20 mA), 3.91 uA / bit (4 to 20 mA)
Indicators (Logic side)	8 Green Input Status LEDs
Input Current Range	0 to 20 mA, 4 to 20 mA
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	121.5 Ω
Diagnostic	Diagnostic Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value) Maximum Range Over: LED Off > 21 mA Minimum Range Over: LED Off < 3 mA (4 to 20 mA)
Conversion Time	≤1 ms / All Channels, = ≤0.125 ms per Channel
Field Calibration	Not Required
Common Type	2 Common (FieldPower 0 V is the Common = AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC Resistance Burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Protection Class	Variable/IP20
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation : Max. 30 mA@ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.7 GT-3118 LED Indicator

Table 9-7 LED Indicator

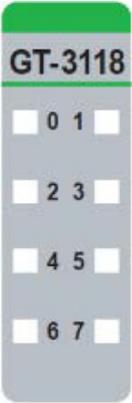
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	
	4	INPUT Channel 4	
	5	INPUT Channel 5	
	6	INPUT Channel 6	
	7	INPUT Channel 7	

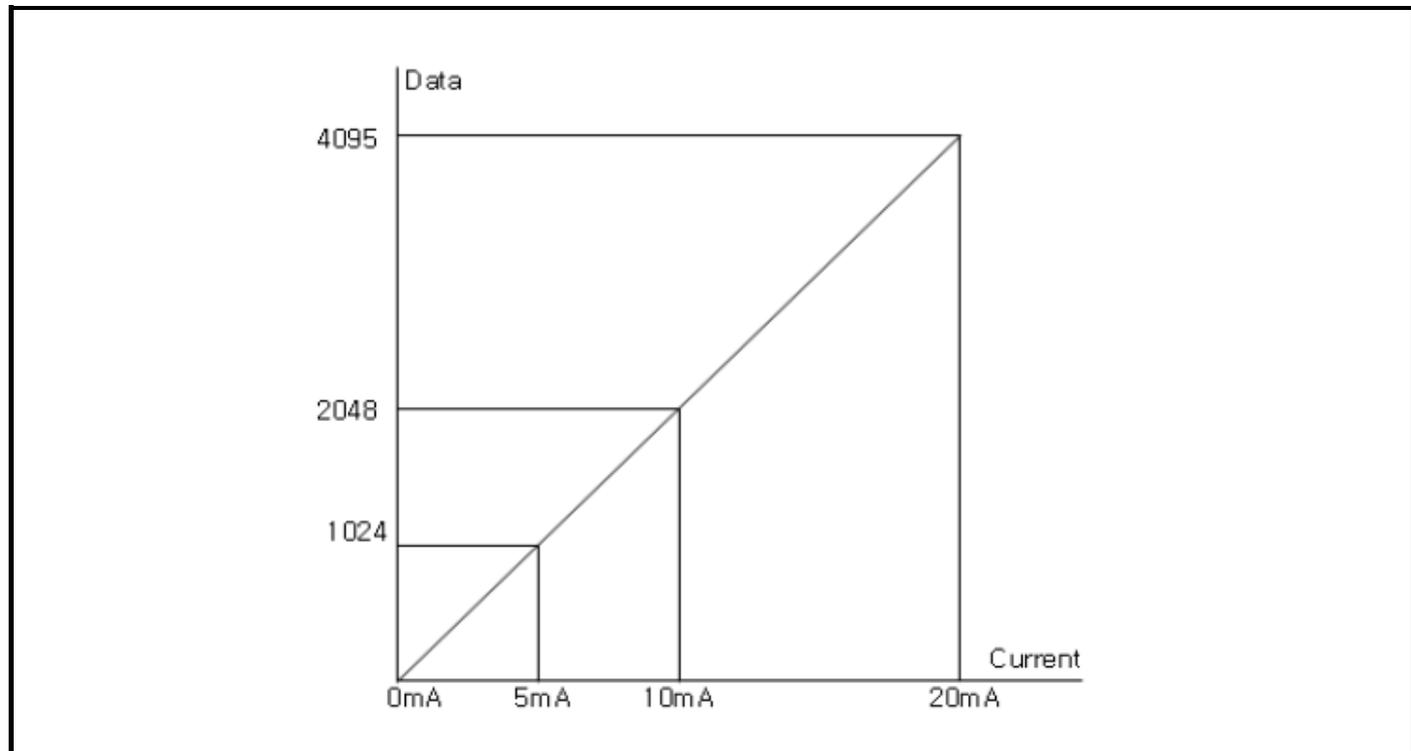
Table 9-8 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5% (Maximum Input Value)] - Channel OFF	Normal Operation
	[LED On > 0.5% (Maximum Input Value)] - Channel Green	
Over Range Check	[LED Off > 21mA (Maximum Range Over - Channel OFF)]	Over Range Check
	[LED Off < 3mA (Minimum Range Over , 4 ~ 20mA)] - Channel OFF	
Field Power Error	All Channel Repeat the Green and Off	Field Power is unconnected

## 9.8 Data Value / Current

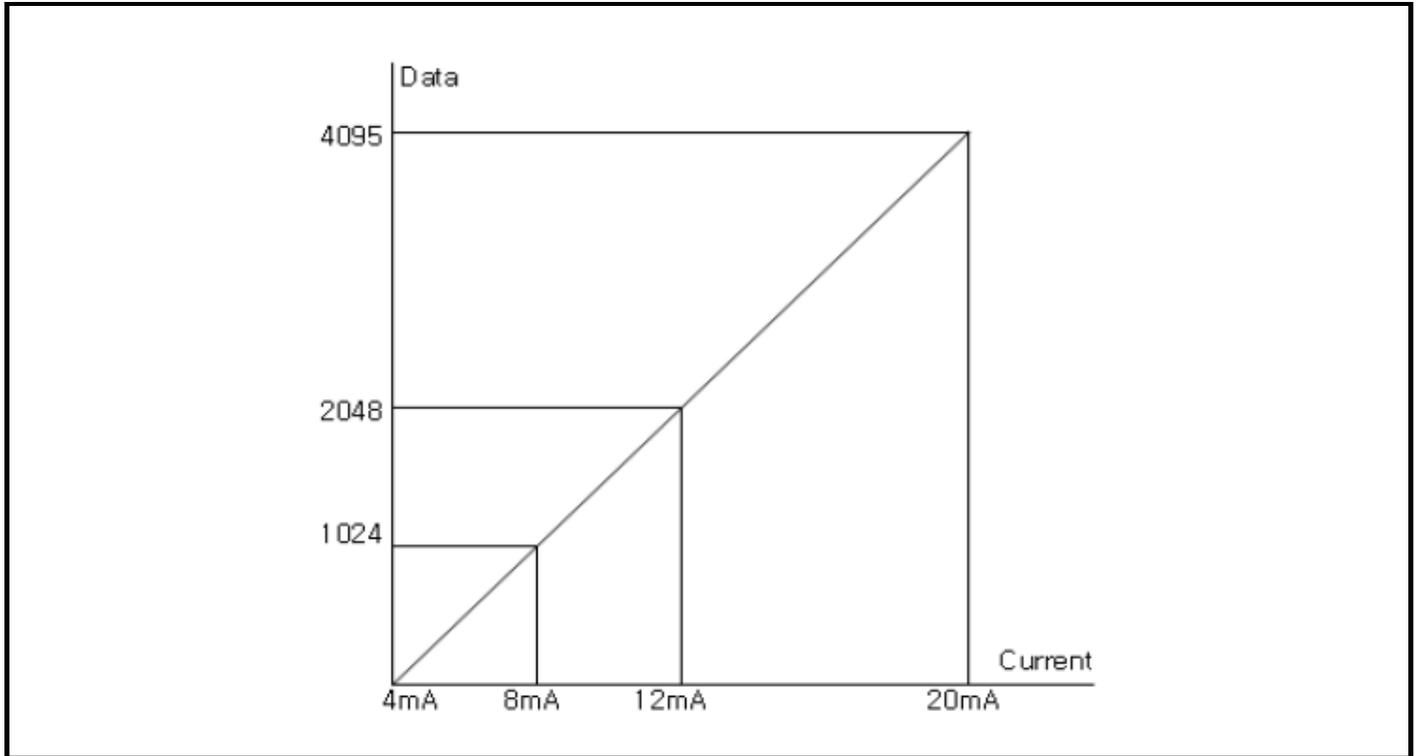
Table 9-9 Current Range: 0 to 20 mA

Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF



**Table 9-10 Current Range: 4 to 20 mA**

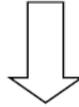
Current	4.0 mA	8.0 mA	12.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF



## 9.9 Mapping data into the image table

- Input module data

Analog Input Ch 0
Analog Input Ch 1
Analog Input Ch 2
Analog Input Ch 3
Analog Input Ch 4
Analog Input Ch 5
Analog Input Ch 6
Analog Input Ch 7



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								Analog Input Ch0 Low byte
Byte 1								Analog Input Ch0 High byte
Byte 2								Analog Input Ch1 Low byte
Byte 3								Analog Input Ch1 High byte
Byte 4								Analog Input Ch2 Low byte
Byte 5								Analog Input Ch2 High byte
Byte 6								Analog Input Ch3 Low byte
Byte 7								Analog Input Ch3 High byte
Byte 8								Analog Input Ch4 Low byte
Byte 9								Analog Input Ch4 High byte
Byte 10								Analog Input Ch5 Low byte
Byte 11								Analog Input Ch5 High byte
Byte 12								Analog Input Ch6 Low byte
Byte 13								Analog Input Ch6 High byte
Byte 14								Analog Input Ch7 Low byte
Byte 15								Analog Input Ch7 High byte

## 9.10 Parameter data

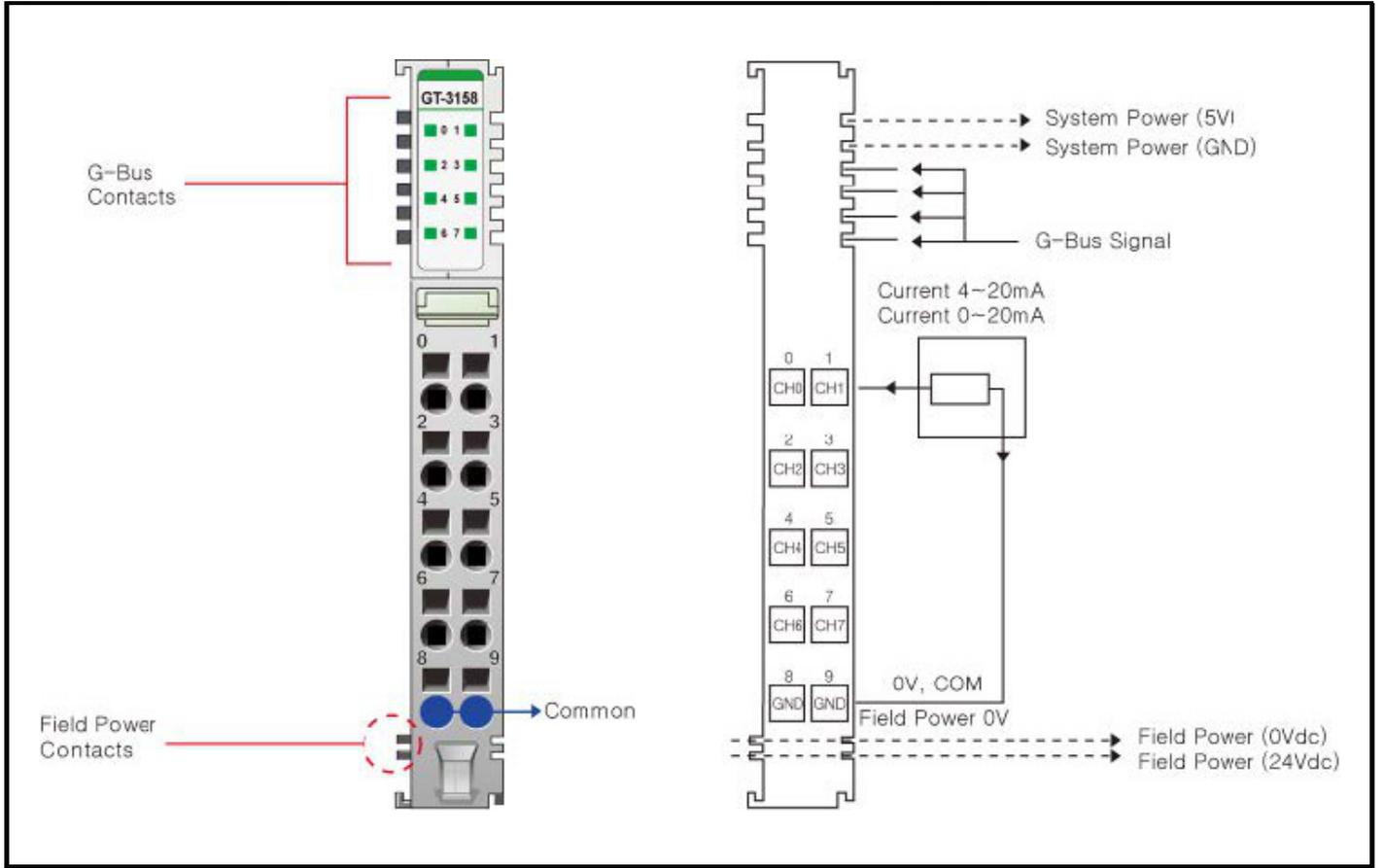
- Valid Parameter length: 10 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								Current Range for Channel 0 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 1								Current Range for Channel 1 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 2								Current Range for Channel 2 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 3								Current Range for Channel 3 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 4								Current Range for Channel 4 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 5								Current Range for Channel 5 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 6								Current Range for Channel 6 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 7								Current Range for Channel 7 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 8								Filter Time (H00: Default Filter (=20) / H01: Fastest to / H62: Slowest)
Byte 9								Not used (=00)

All values are stored in Bus Coupler's EEPROM.

## 9.11 GT-3158 Analog input

Figure 9-3 GT-3158 (Analog input, 8 Channels, 0 to 20 mA, 4 to 20 mA, 16 Bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Input Channel Common (AGND)	Input Channel Common (AGND)	9

**Table 9-11 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	8 Channels single ended, non-isolated between channels
Resolution in Ranges	16 bit (Include Sign) 15 bits: 0.61 uA / bit (0 to 20 mA), 0.49 uA / Bit (4 to 20 mA)
Indicators	8 Green Input Status LEDs
Input Current Ranges	0 to 20 mA, 4 to 20 mA
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	121.5 Ω
Diagnostic	Diagnostic Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value) Minimum Range Over: LED Off < 3 mA (4 to 20 mA)
Conversion Time	≤ 1 ms / All Channels, ≤ 0.125 ms per Channel
Field Calibration	Not Required
Common Type	2 Common (Field Power 0 V is Common AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC Resistance Burst/ESD	EN 61000-6-2: 2005 EN61000-6-4/All : 2011
Installation Pos./ Protect / Class	Variable/IP20
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation: Max. 30 mA@24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.12 GT-3158 LED Indicator

Table 9-12 LED Indicator

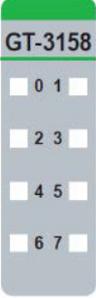
Module	LED number	LED function / description	LED colour
 <p>The image shows a vertical module with a green top section labeled 'GT-3158'. Below it are eight rows of LEDs, each labeled with a number from 0 to 7. Each row has two small square indicators flanking the number.</p>	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	
	4	INPUT Channel 4	
	5	INPUT Channel 5	
	6	INPUT Channel 6	
	7	INPUT Channel 7	

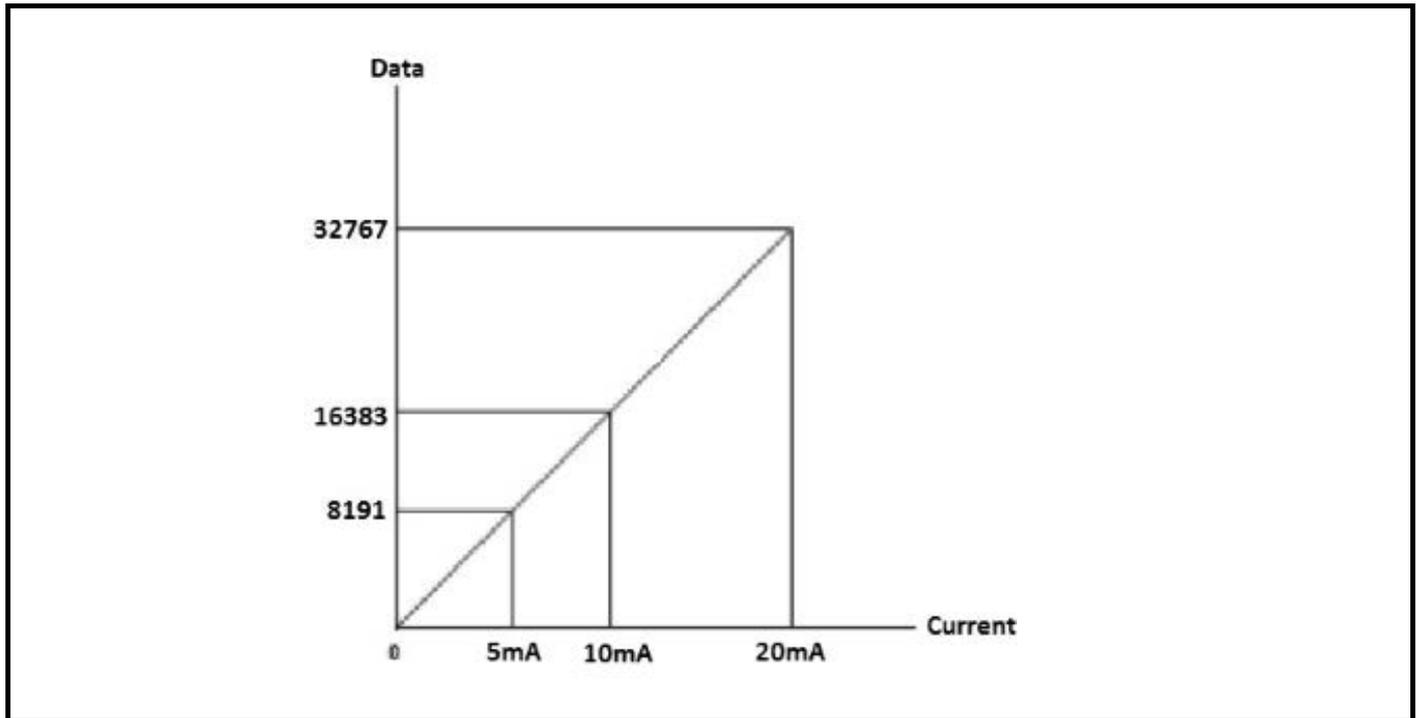
Table 9-13 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5 % (Maximum Input Value)] - Channel OFF	Normal Operation
	[LED On > 0.5 % (Maximum Input Value)] - Channel Green	
Overrun/Underrun	[LED Off < 3 mA (Minimum Range Over , 4 to 20 mA)] - Channel OFF	Range Check
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

## 9.13 Data Value / Current

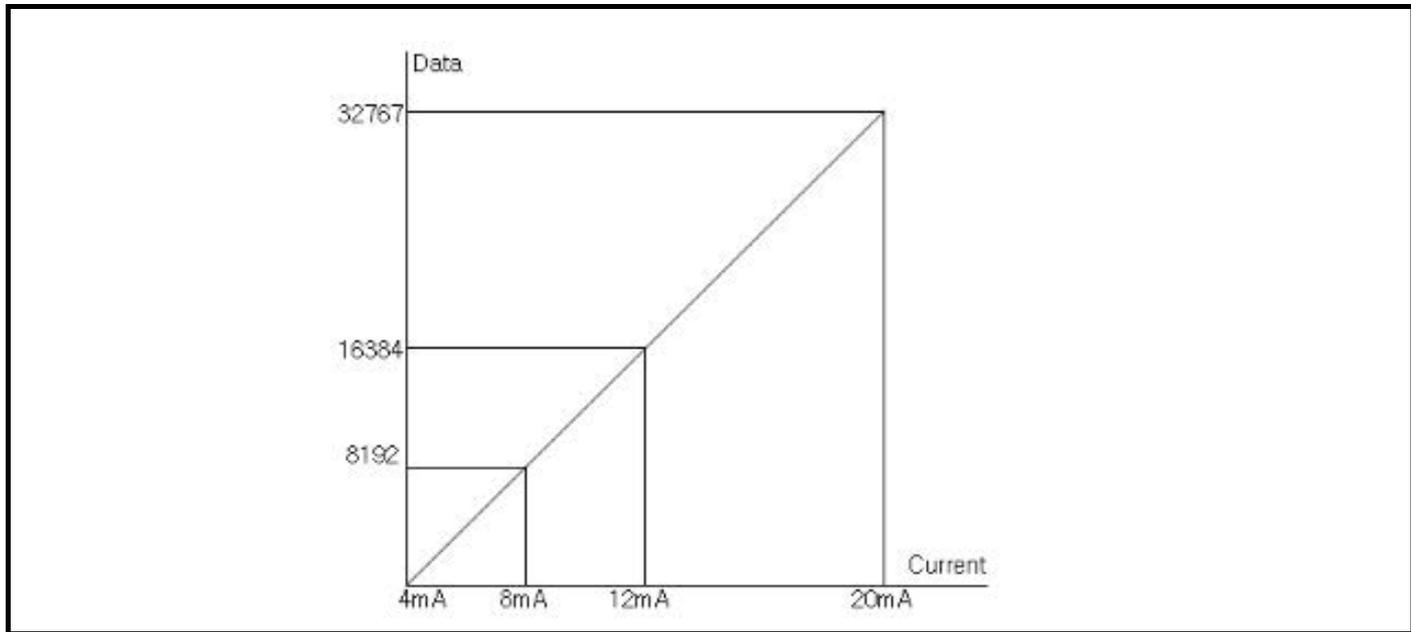
Table 9-14 Current Range: 0 to 20 mA

Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



**Table 9-15 Current Range: 4 to 20 mA**

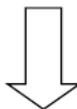
<b>Current</b>	<b>4.0 mA</b>	<b>8.0 mA</b>	<b>12.0 mA</b>	<b>20.0 mA</b>
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



### 9.14 Mapping data into the image table

- Input module data

	Analog Input Ch0
	Analog Input Ch1
	Analog Input Ch2
	Analog Input Ch3
	Analog Input Ch4
	Analog Input Ch5
	Analog Input Ch6
	Analog Input Ch7



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								Analog Input Ch0 Low byte
Byte 1								Analog Input Ch0 High byte
Byte 2								Analog Input Ch1 Low byte
Byte 3								Analog Input Ch1 High byte
Byte 4								Analog Input Ch2 Low byte
Byte 5								Analog Input Ch2 High byte
Byte 6								Analog Input Ch3 Low byte
Byte 7								Analog Input Ch3 High byte
Byte 8								Analog Input Ch4 Low byte
Byte 9								Analog Input Ch4 High byte
Byte 10								Analog Input Ch5 Low byte
Byte 11								Analog Input Ch5 High byte
Byte 12								Analog Input Ch6 Low byte
Byte 13								Analog Input Ch6 High byte
Byte 14								Analog Input Ch7 Low byte
Byte 15								Analog Input Ch7 High byte

## 9.15 Parameter data

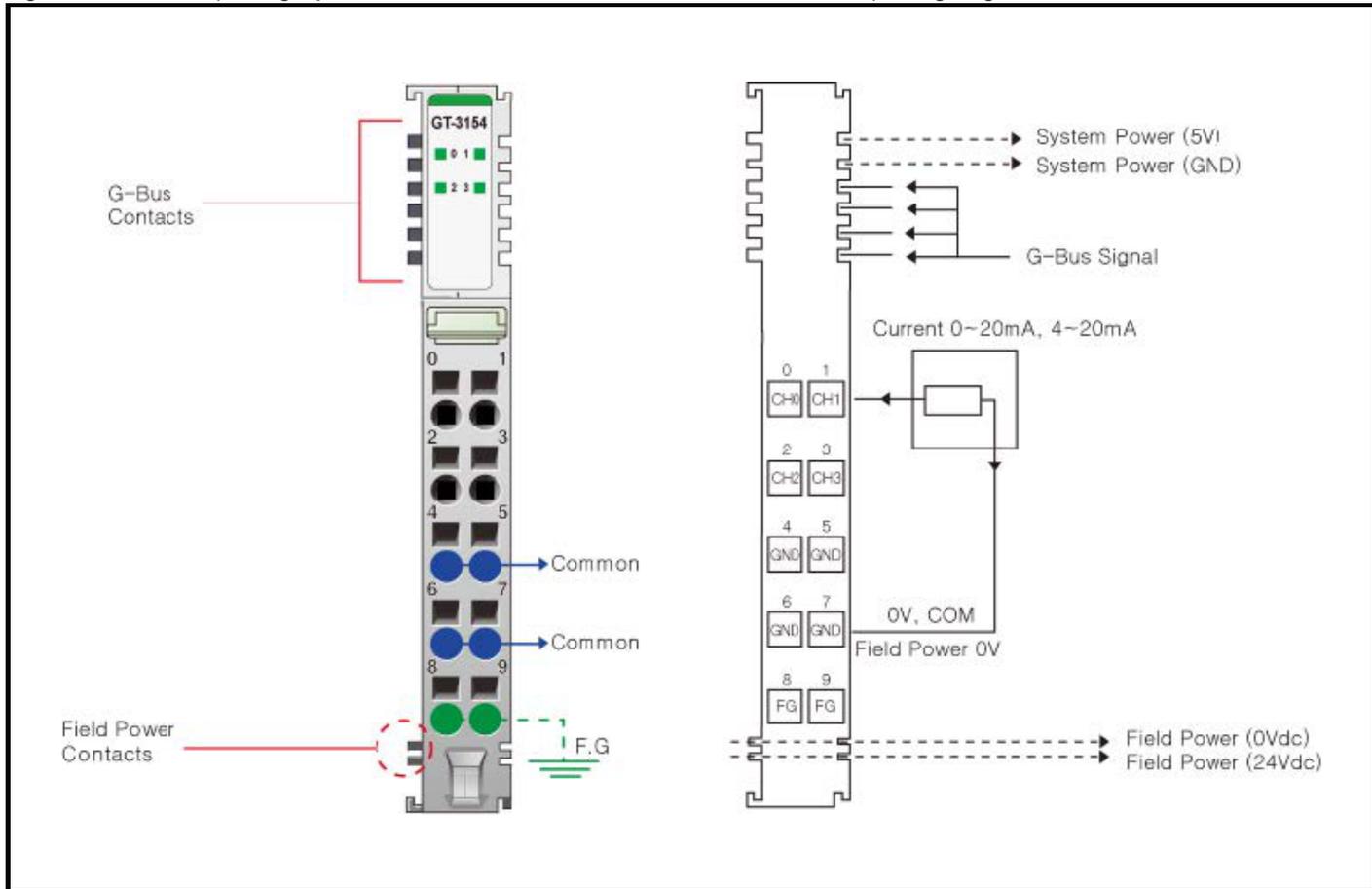
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Current Range for Channel 0 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 1	Current Range for Channel 1 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 2	Current Range for Channel 2 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 3	Current Range for Channel 3 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 4	Current Range for Channel 4 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 5	Current Range for Channel 5 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 6	Current Range for Channel 6 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 7	Current Range for Channel 7 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 8	Filter Time ( H00: Default Filter(=20) / H01: Fastest / H62: Slowest )							
Byte 9	Not used (=00)							

All values are stored in Bus Coupler's EEPROM.

## 9.16 GT-3154 Analog input

Figure 9-4 GT-3154 (Analog input, 4 Channels, 0 to 20 mA / 4 to 20 mA, 16 bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel Common (AGND)	Input Channel Common (AGND)	5
6	Input Channel Common (AGND)	Input Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Safety information	Product information	Mechanical installation	Electrical installation	RTMoE Ethernet Bus Coupler	Modbus TCP/IP	Digital Input	Digital Output	<b>Analog Input</b>	Analog Output	Power module
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**Table 9-16 Specification**

<b>Environmental specifications</b>	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
<b>Input specification</b>	
Inputs Per Module	4 Channels Single Ended, Non-isolated Between Channels
Resolution in Ranges	16 bit (Include Sign) 15 bits: 0.61 uA / bit (0 to 20 mA), 0.49 uA/ bit (4 to 20 mA)
Indicators	4 Green Input Status
Input Current Range	0 to 20 mA, 4 to 20 mA
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	121.5 Ω
Diagnostic	Diagnostic Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value) Minimum Range Over: LED Off < 3 mA (4 to 20 mA)
Conversion Time	650 usec / All channel
Calibration	Not Required
Common Type	4 Common (Field Power 0 V is the Common=AGND)
<b>General specifications</b>	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 cycles</li> </ul> Random Vibration (Based on IEC 60068-2-64) <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC Resistance Burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, UL
Power Dissipation	Max. 25 @ 5 Vdc
Isolation	I/O to Logic: Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation: Max. 20 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.17 GT-3154 LED Indicator

### 9.17.1 LED Indicator

Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

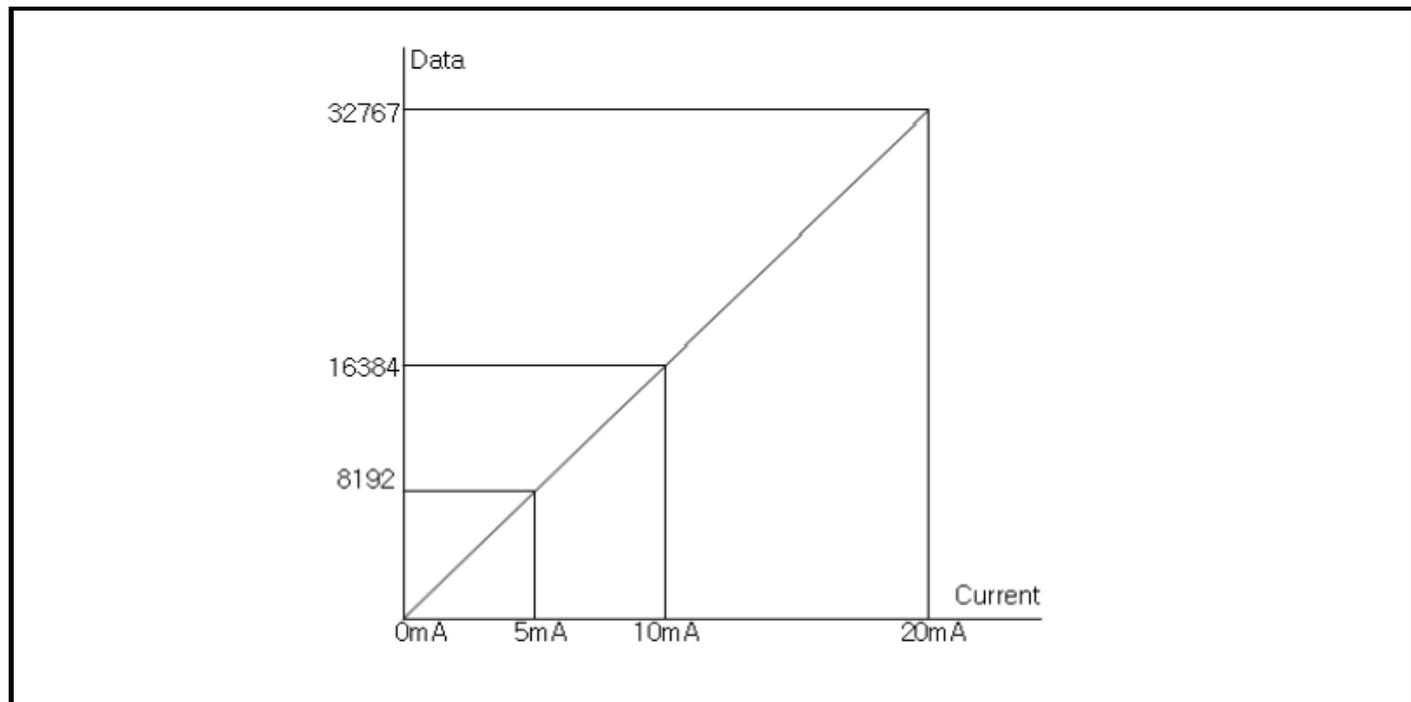
### 9.17.2 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5% (Maximum Input Value)] - Channel OFF	Normal Operation
	[LED On > 0.5% (Maximum Input Value)] - Channel Green	
Overrun/Underrun	[LED Off < 3mA (Minimum Range Over , 4~20mA)] - Channel OFF	
Field Power Error	All Channel Repeat the Green and Off	Field Power is unconnected

## 9.18 Data Value / Current

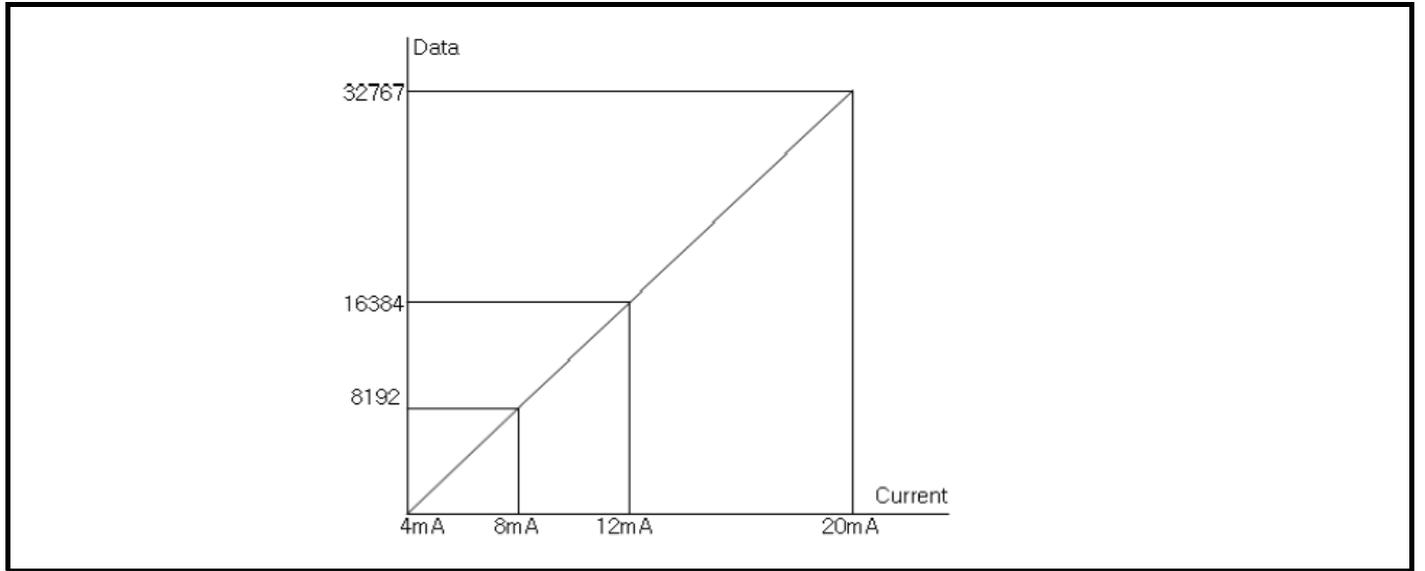
Table 9-17 Current Range: 0 to 20 mA

Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



**Table 9-18 Current Range: 4 to 20 mA**

<b>Current</b>	<b>4.0 mA</b>	<b>8.0 mA</b>	<b>12.0 mA</b>	<b>20.0 mA</b>
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



### 9.19 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								Analog Input Ch0 Low byte
Byte 1								Analog Input Ch0 High byte
Byte 2								Analog Input Ch1 Low byte
Byte 3								Analog Input Ch1 High byte
Byte 4								Analog Input Ch2 Low byte
Byte 5								Analog Input Ch2 High byte
Byte 6								Analog Input Ch3 Low byte
Byte 7								Analog Input Ch3 High byte

### 9.20 Parameter data

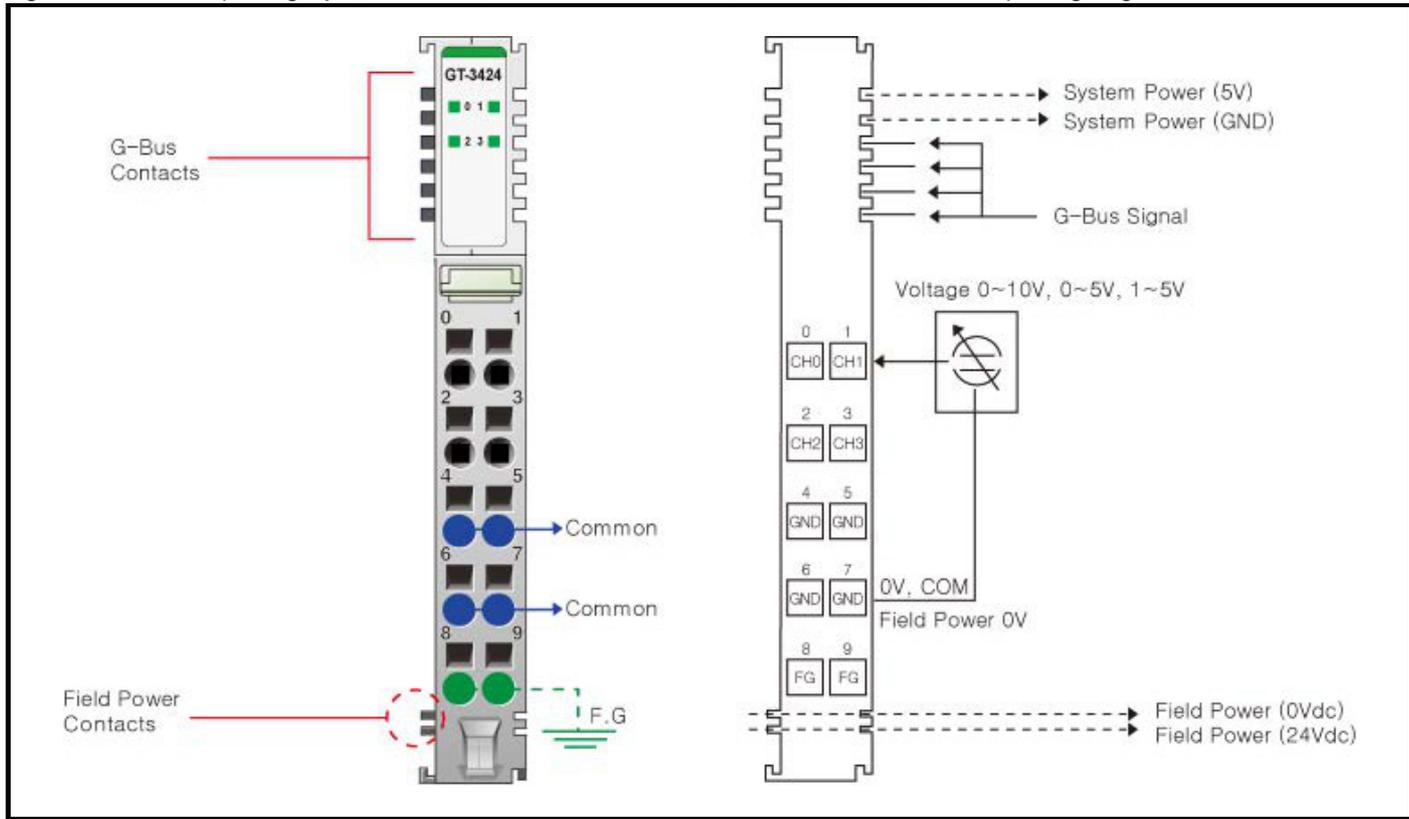
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								Current Range for Channel 0 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 1								Current Range for Channel 1 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 2								Current Range for Channel 2 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 3								Current Range for Channel 3 (H00: 0 to 20 mA, H01: 4 to 20 mA)
Byte 4								Filter Time (H00: Default Filter (=20) / H01: Fastest to / H62: Slowest)
Byte 5								Not used (=00)

All values are stored in Bus Coupler's EEPROM.

## 9.21 GT-3424 Analog input

Figure 9-5 GT-3424 (Analog input, 4 Channels, 0 to 10 Vdc / 0 to 5 Vdc, 1 to 5 Vdc, 12 bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel Common (AGND)	Input Channel Common (AGND)	5
6	Input Channel Common (AGND)	Input Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Safety information	Product information	Mechanical installation	Electrical installation	RTMoE Ethernet Bus Coupler	Modbus TCP/IP	Digital Input	Digital Output	Analog Input	Analog Output	Power module
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**Table 9-19 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Single Ended, Non-isolated Between Channels
Resolution in Ranges	12 bits: 2.44 mV / bit (0 to 10 V), 1.22 mV / bit (0 to 5 V), 0.977 mV / bit (1 to 5 V)
Indicators	4 Green G-Bus Status LEDs
Input Current Ranges	0 to 10 Vdc, 0 to 5 Vdc, 1 to 5 Vdc
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	500 kΩ
Diagnostic	Diagnostic Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value)
Conversion Time	≤ 350 usec / All channel
Field Calibration	Not Required
Common Type	4 Common (Field Power 0 V is the common=AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration- <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/2007+A1:2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, UL
Power Dissipation	Max. 25 mA @ 5 Vdc
Isolation	I/O to Logic: Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation: Max. 25 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.22 GT-3424 LED Indicator

Table 9-20 LED Indicator

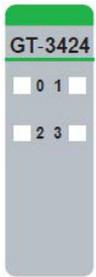
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

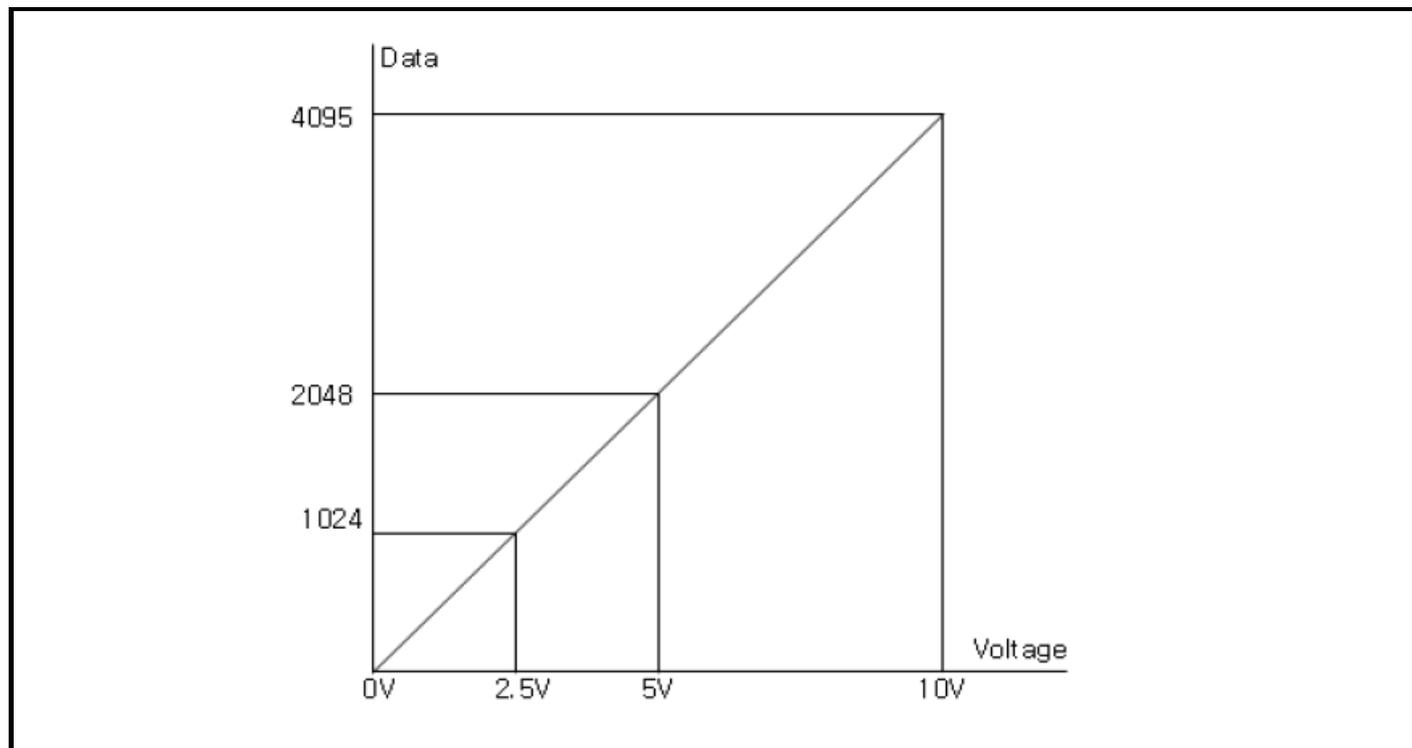
Table 9-21 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5% (Maximum Input Value)] - Channel OFF	Normal Operation
	[LED Off < 0.5% (Maximum Input Value)] - Channel Green	
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

## 9.23 Data Value / Voltage

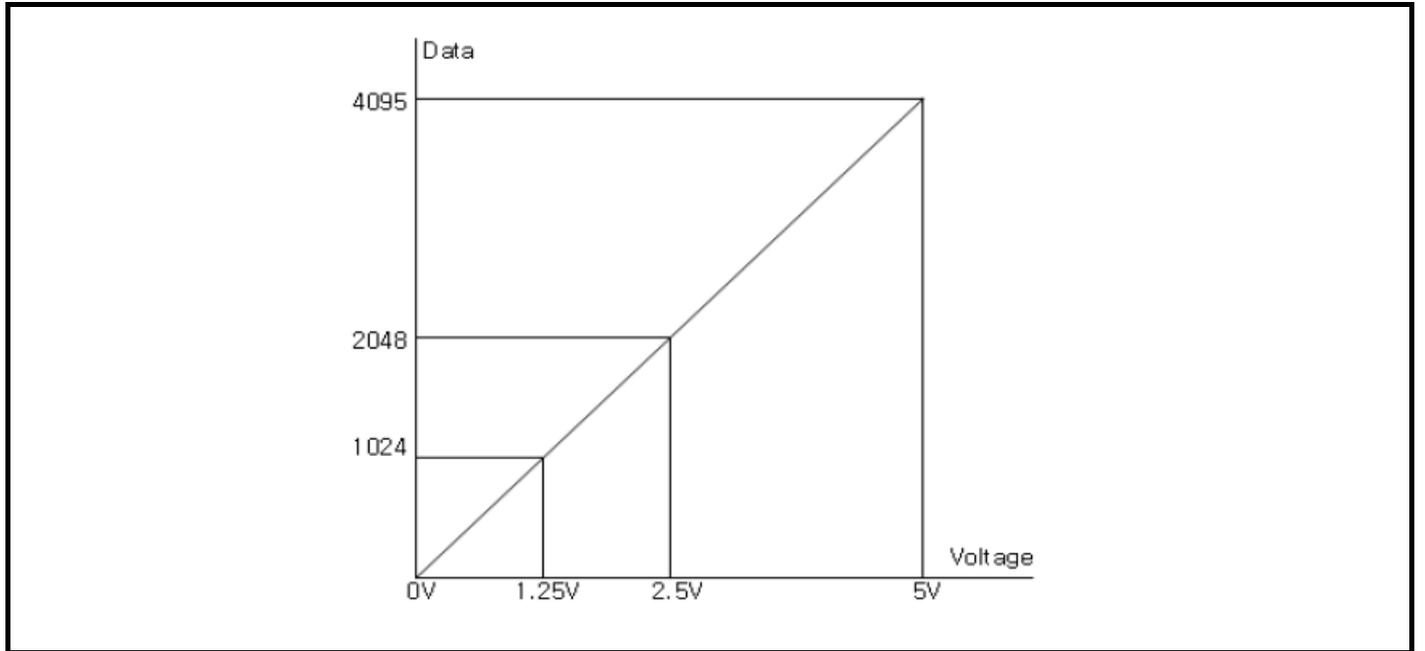
Table 9-22 Current Range: 0 to 10 Vdc

Voltage	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



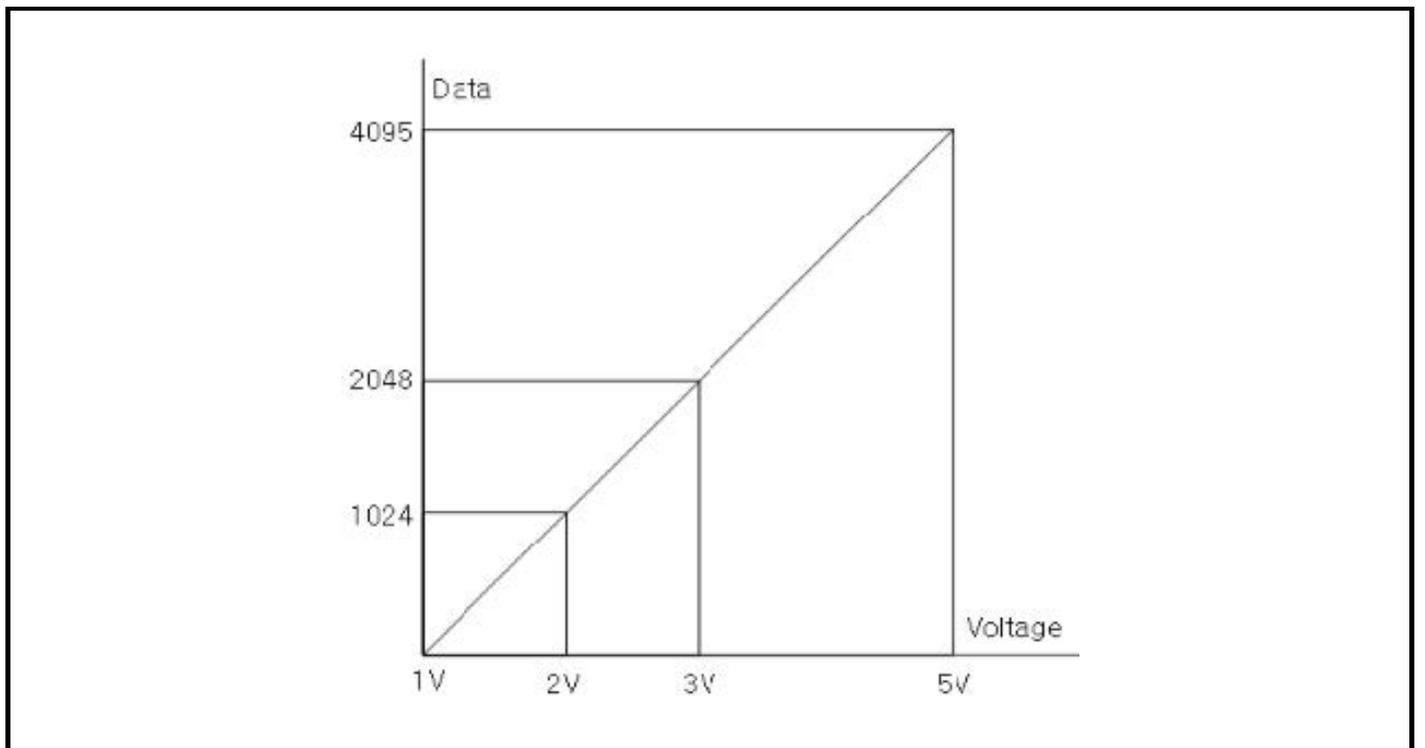
**Table 9-23 Voltage Range: 0 to 5 Vdc**

<b>Voltage</b>	<b>0.0 V</b>	<b>1.25 V</b>	<b>2.5 V</b>	<b>5.0 V</b>
Data (Hex)	H0000	H03FF	H07FF	H0FFF



**Table 9-24 Current Range: 1 to 5 Vdc**

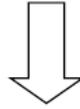
<b>Voltage</b>	<b>1.0 V</b>	<b>2.0 V</b>	<b>3.0 V</b>	<b>4.0 V</b>
Data (Hex)	H0000	H03FF	H07FF	H0FFF



## 9.24 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

## 9.25 Parameter data

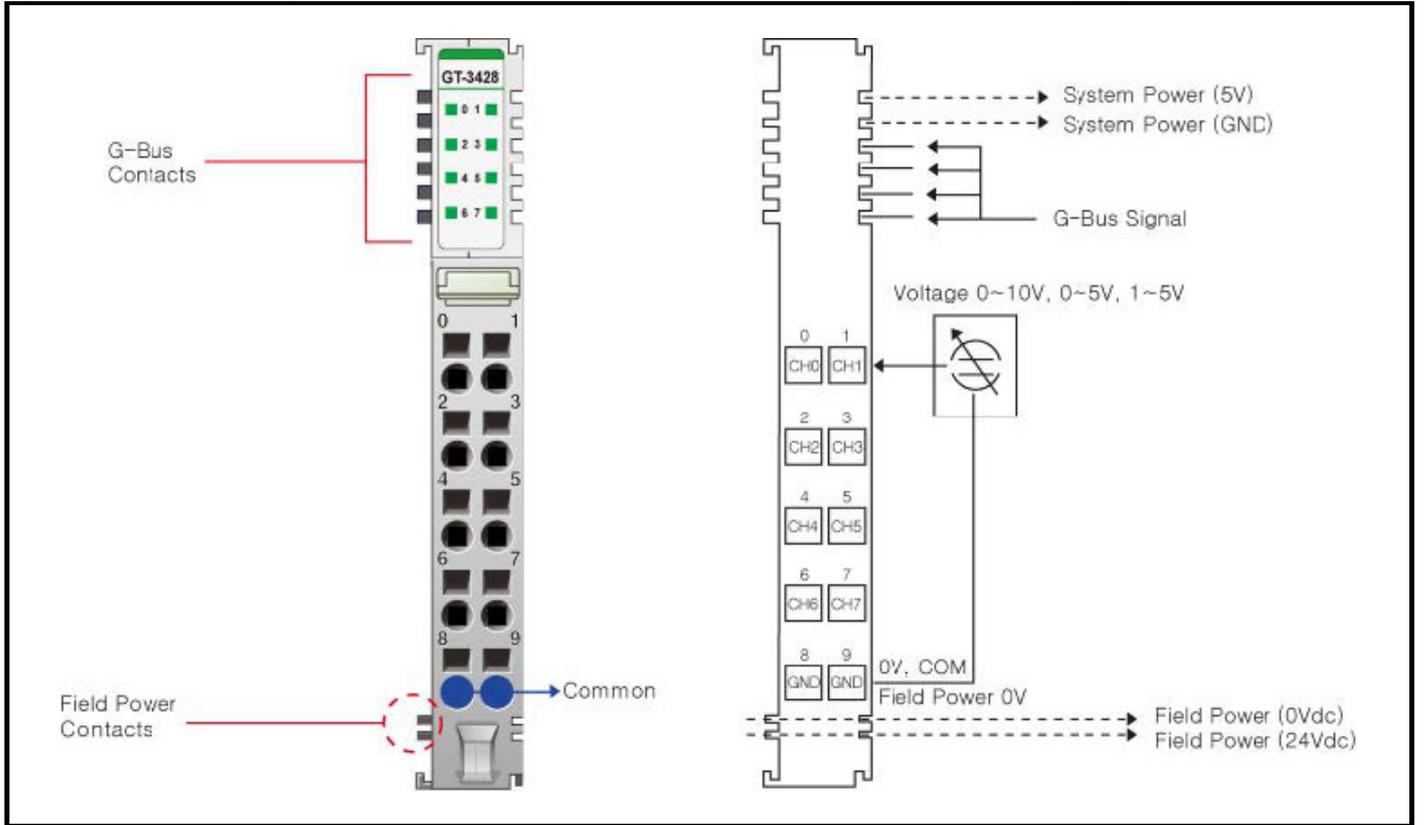
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Voltage Range for Channel 0 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 1	Voltage Range for Channel 1 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 2	Voltage Range for Channel 2 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 3	Voltage Range for Channel 3 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 4	Filter Time (H00: Default Filter (=20) / H01: Fastest to / H62: Slowest)							
Byte 5	Not Used (=00)							

All values are stored in Bus Coupler's EEPROM.

## 9.26 GT-3428 Analog Input

Figure 9-6 GT-3428 (Analog Input, 8 Channels, 0 to 10 Vdc / 0 to 5 Vdc, 1 to 5 Vdc, 12 bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Input Channel Common (AGND)	Input Channel Common (AGND)	9

**Table 9-25 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	8 Channels Single Ended, Non-isolated Between Channels
Resolution in Ranges	12 bits: 2.44 mV / bit (0 to 10 V), 1.22 mV / bit (0 to 5 V), 0.98 mV / bit (1 to 5 V)
Indicators	8 Green Input Status LEDs
Input Current Ranges	0 to 10 Vdc, 0 to 5 Vdc, 1 to 5 Vdc
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	500 kΩ
Diagnostic	Diagnostic Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value)
Conversion Time	≤1 ms / All Channels (≤0.125 ms per Channel)
Calibration	Not Required
Common Type	2 Common (Field Power 0 V is the common=AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration- <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Installation position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation: Max. 30 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.27 GT-3428 LED Indicator

Table 9-26 LED Indicator

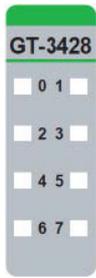
Module	LED number	LED function / description	LED colour
 <p>The image shows a vertical module with a green top section labeled 'GT-3428'. Below it are eight input channels, each with a small square LED indicator and a number: 0 1, 2 3, 4 5, and 6 7.</p>	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	
	4	INPUT Channel 4	
	5	INPUT Channel 5	
	6	INPUT Channel 6	
	7	INPUT Channel 7	

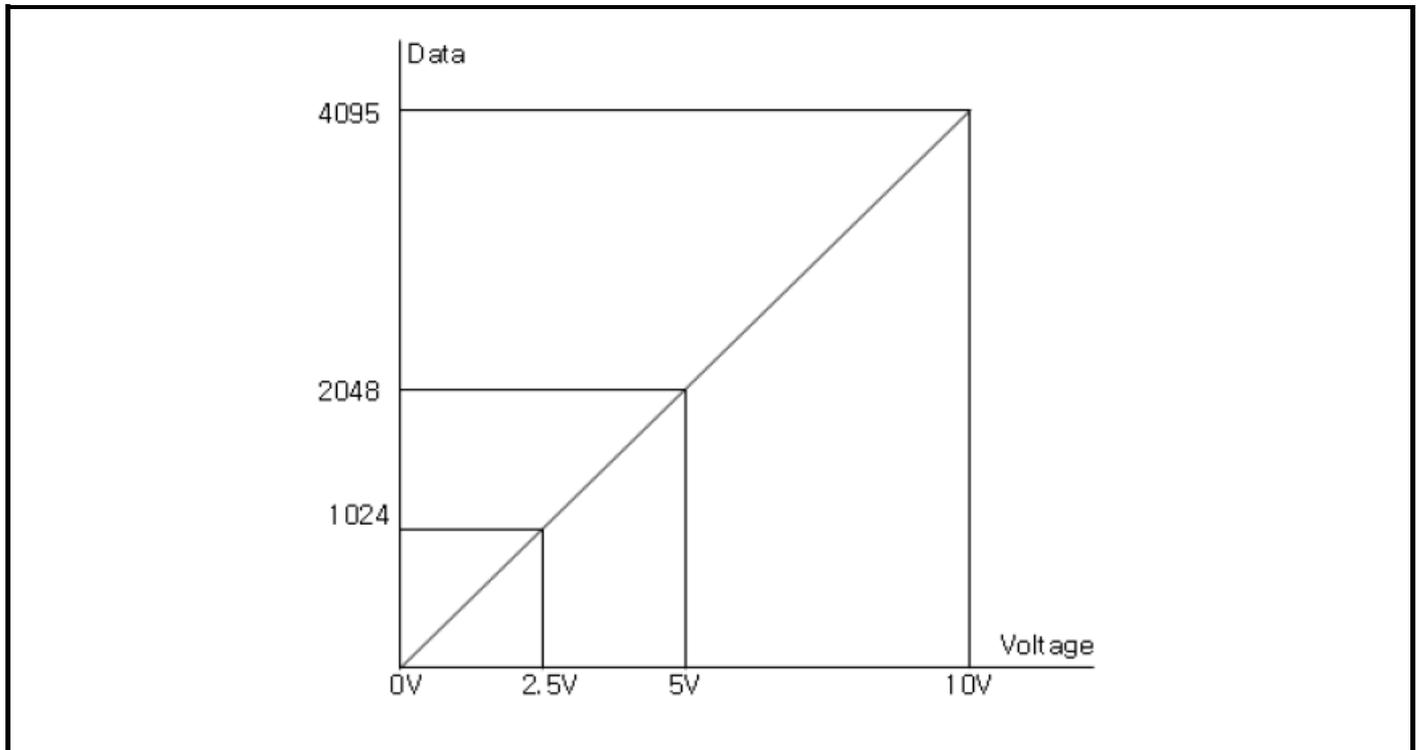
Table 9-27 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5% (Maximum Input Value)] - Channel OFF	Normal Operation
	[LED On > 0.5% (Maximum Input Value)] - Channel Green	
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

## 9.28 Data Value / Voltage

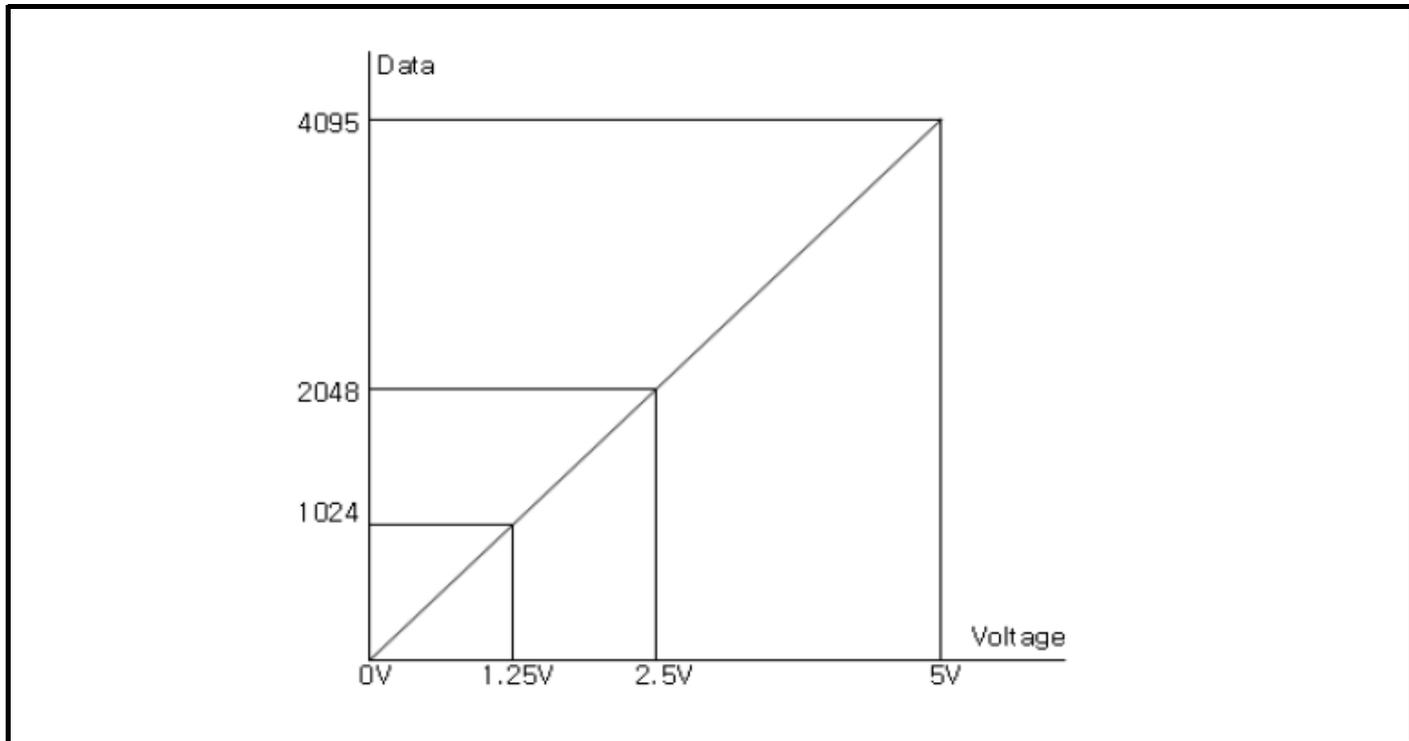
Table 9-28 Current Range: 0 to 10 Vdc

Voltage	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



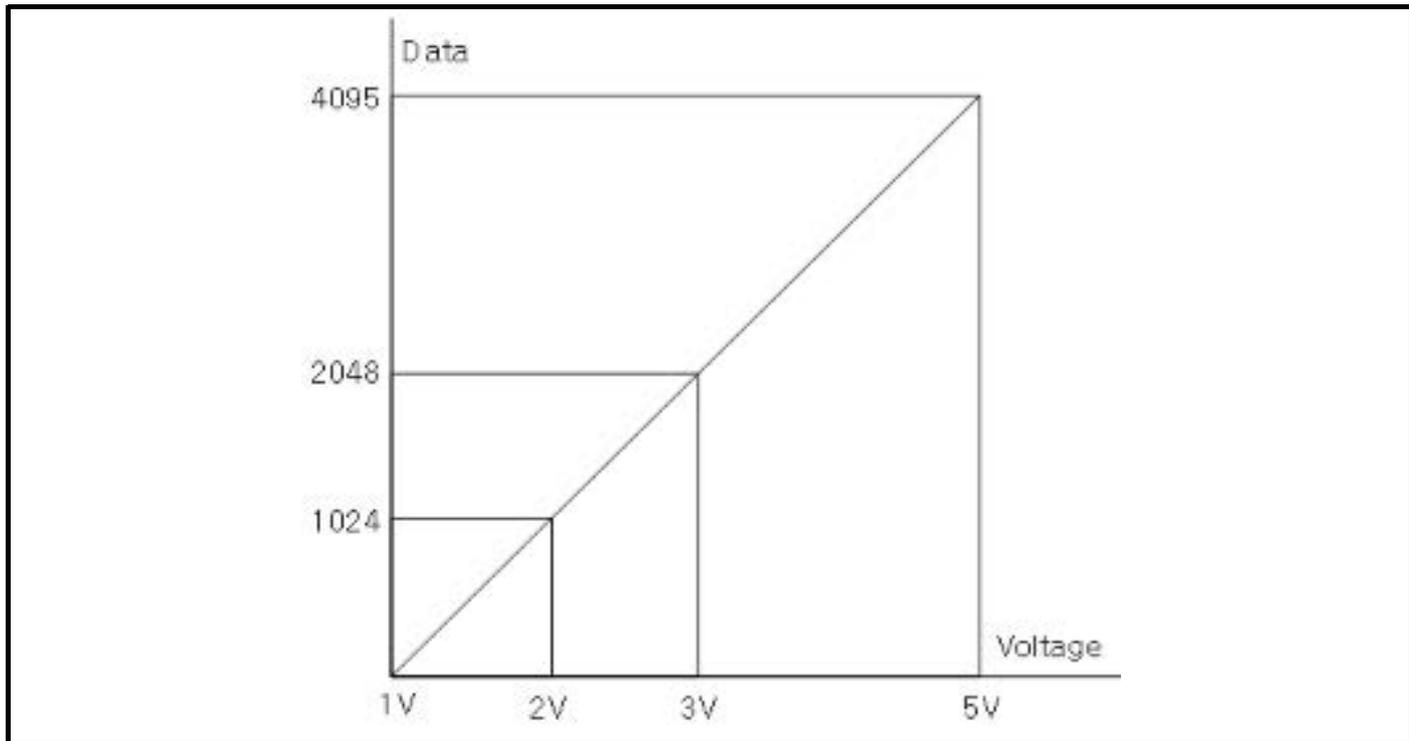
**Table 9-29 Voltage Range: 0 to 5 Vdc**

Voltage	0.0 V	1.25 V	2.5 V	5.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



**Table 9-30 Voltage Range: 1 to 5 Vdc**

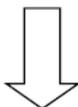
Voltage	1.0 V	2.0 V	3.0 V	5.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



## 9.29 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3
Analog Input Ch4
Analog Input Ch5
Analog Input Ch6
Analog Input Ch7



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							
Byte 8	Analog Input Ch4 Low byte							
Byte 9	Analog Input Ch4 High byte							
Byte 10	Analog Input Ch5 Low byte							
Byte 11	Analog Input Ch5 High byte							
Byte 12	Analog Input Ch6 Low byte							
Byte 13	Analog Input Ch6 High byte							
Byte 14	Analog Input Ch7 Low byte							
Byte 15	Analog Input Ch7 High byte							

## 9.30 Parameter data

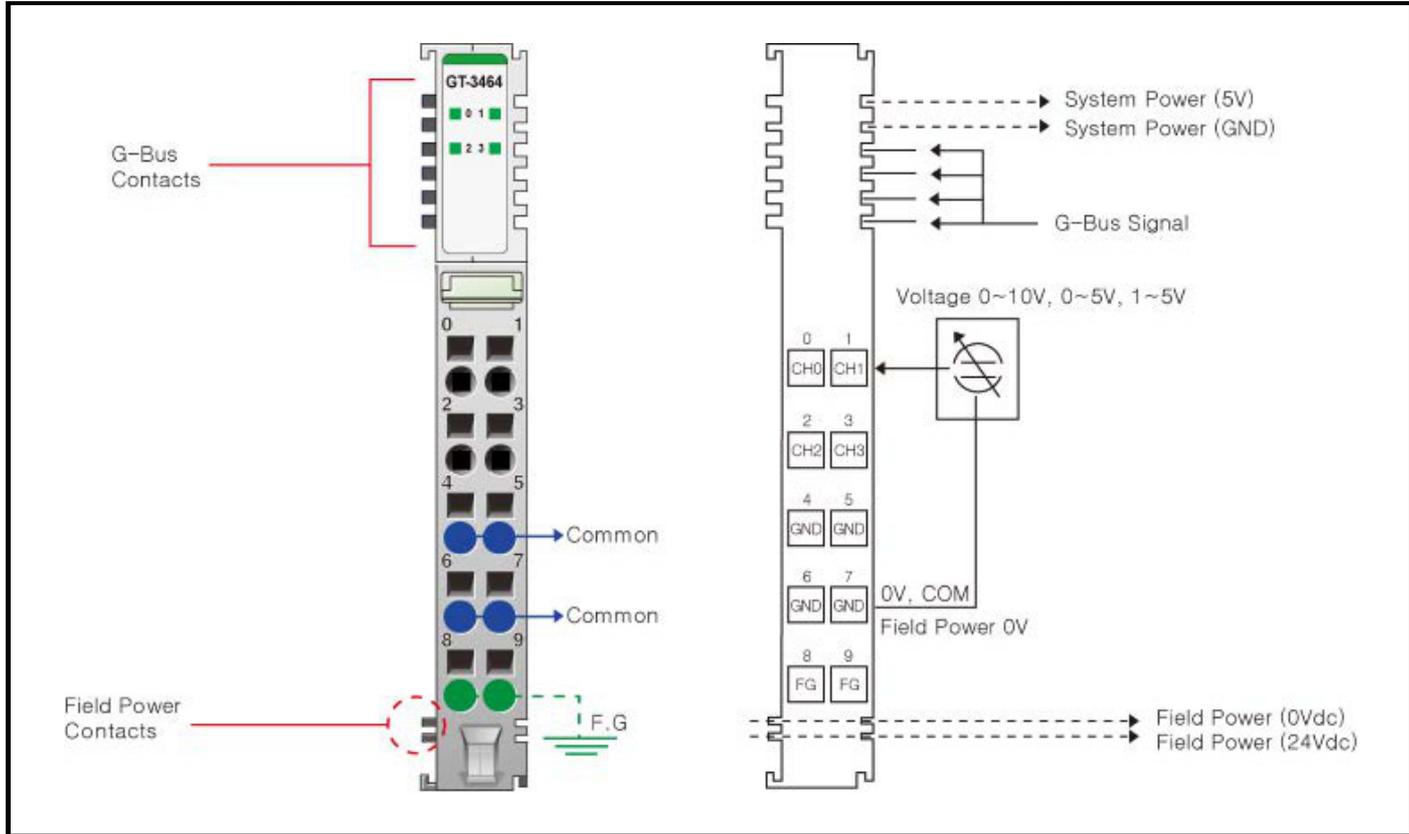
- Valid Parameter length: 10 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Voltage Range for Channel 0 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 1	Voltage Range for Channel 1 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 2	Voltage Range for Channel 2 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 3	Voltage Range for Channel 3 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 4	Voltage Range for Channel 4 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 5	Voltage Range for Channel 5 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 6	Voltage Range for Channel 6 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 7	Voltage Range for Channel 7 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 8	Filter Time (H00: Default Filter (=20) / H01: Fastest to / H62: Slowest)							
Byte 9	Not used (=00)							

All values are stored in Bus Coupler's EEPROM.

### 9.31 GT-3464 Analog input

Figure 9-7 GT-3464 (Analog input, 4 Channels, 0 to 10 Vdc / 0 to 5 Vdc, 1 to 5 Vdc, 16 bits 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel Common (AGND)	Input Channel Common (AGND)	5
6	Input Channel Common (AGND)	Input Channel Common (AGND)	7
8	Field Ground	Field Ground	9

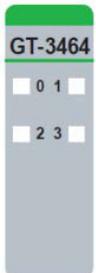
Safety information	Product information	Mechanical installation	Electrical installation	RTMoE Ethernet Bus Coupler	Modbus TCP/IP	Digital Input	Digital Output	Analog Input	Analog Output	Power module
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**Table 9-31 Specification**

<b>Environmental specifications</b>	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
<b>Input specification</b>	
Inputs Per Module	4 Channels Single Ended, Non-isolated Between Channels
Resolution in Ranges	16 bit (Include Sign) 15 bits: 0.31 mV / bit (0 to 10 Vdc) 0.15 mV / bit (0 to 5 Vdc), 0.12 mV / bit (1 to 5 Vdc)
Indicators	4 Green G-Bus Status LED
Input Voltage Range	0 to 10 Vdc, 0 to 5 Vdc, 1 to 5 Vdc
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	500 kΩ
Diagnostic	Diagnostic Field Power Off : LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value)
Conversion Time	≤ 350 usec / All channel
Field Calibration	Not Required
Common Type	4 Common (Field Power 0 V is the Common=AGND)
<b>General specifications</b>	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4:2007+A1:2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, UL
Power Dissipation	Max. 25 mA @ 5 Vdc
Isolation	I/O to Logic: Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation: Max. 25 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.32 GT-3464 LED Indicator

### 9.32.1 LED Indicator

Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

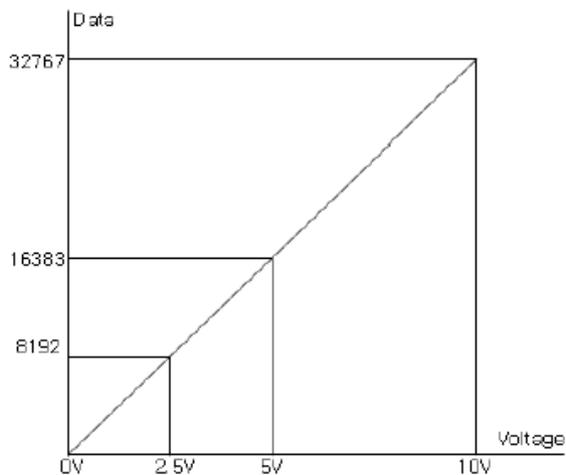
### 9.32.2 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED OFF < 0.5% (Maximum Input Value)] - Channel OFF	Normal Operation
	[LED On > 0.5% (Maximum Input Value)] - Channel Green	
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

## 9.33 Data Value / Voltage

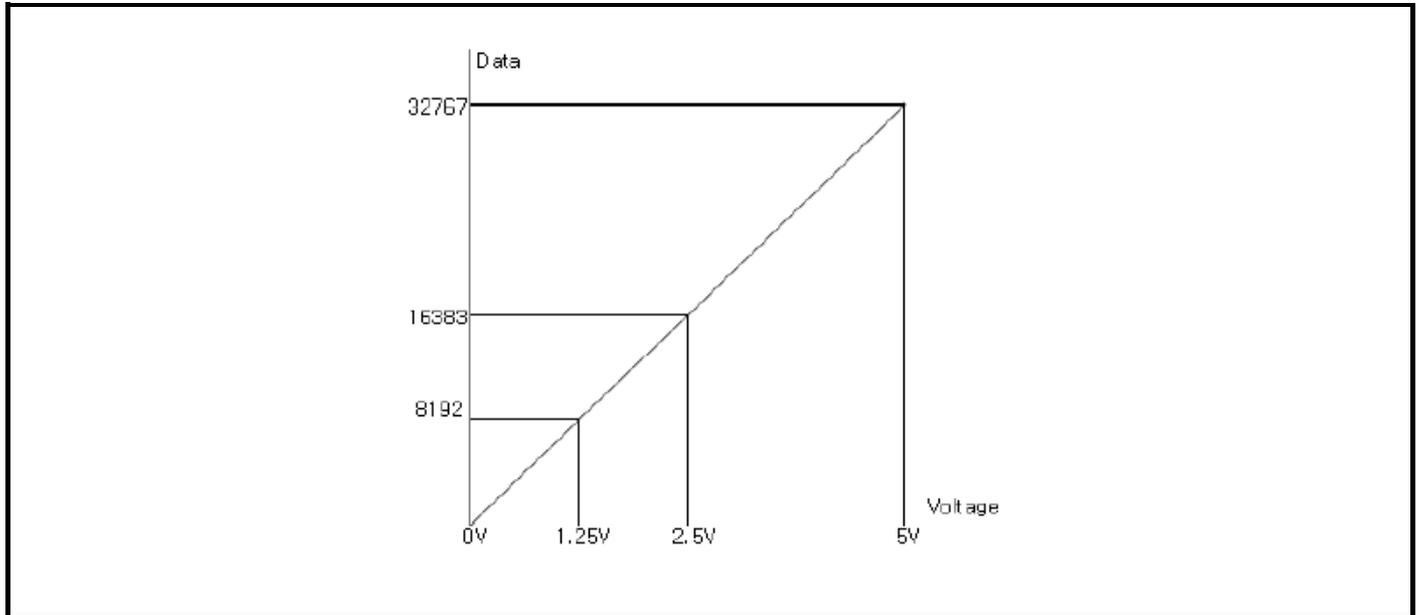
Table 9-32 Voltage Range: 0 to 10 Vdc

Current	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



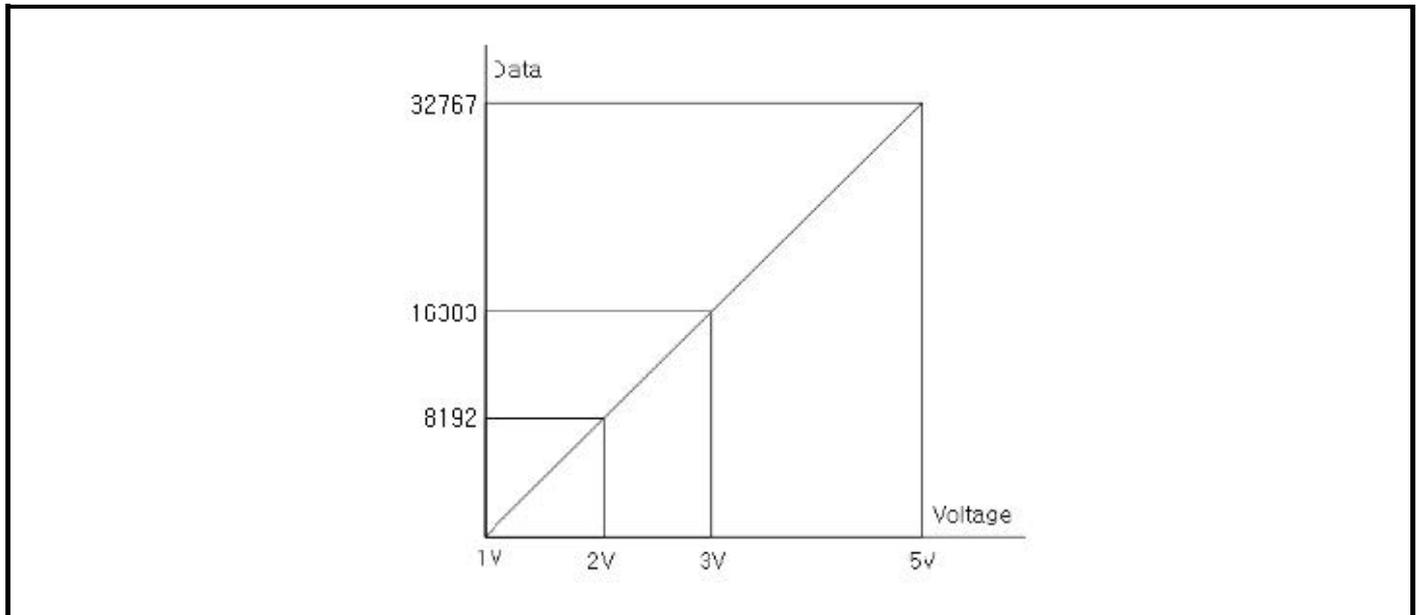
**Table 9-33 Voltage Range: 0 to 5 Vdc**

<b>Voltage</b>	<b>0.0 V</b>	<b>1.25 V</b>	<b>2.5 V</b>	<b>5.0 V</b>
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



**Table 9-34 Voltage Range: 1 to 5 Vdc**

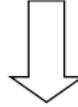
<b>Voltage</b>	<b>1.0 V</b>	<b>2.0 V</b>	<b>3.0 V</b>	<b>4.0 V</b>
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



### 9.34 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

### 9.35 Parameter data

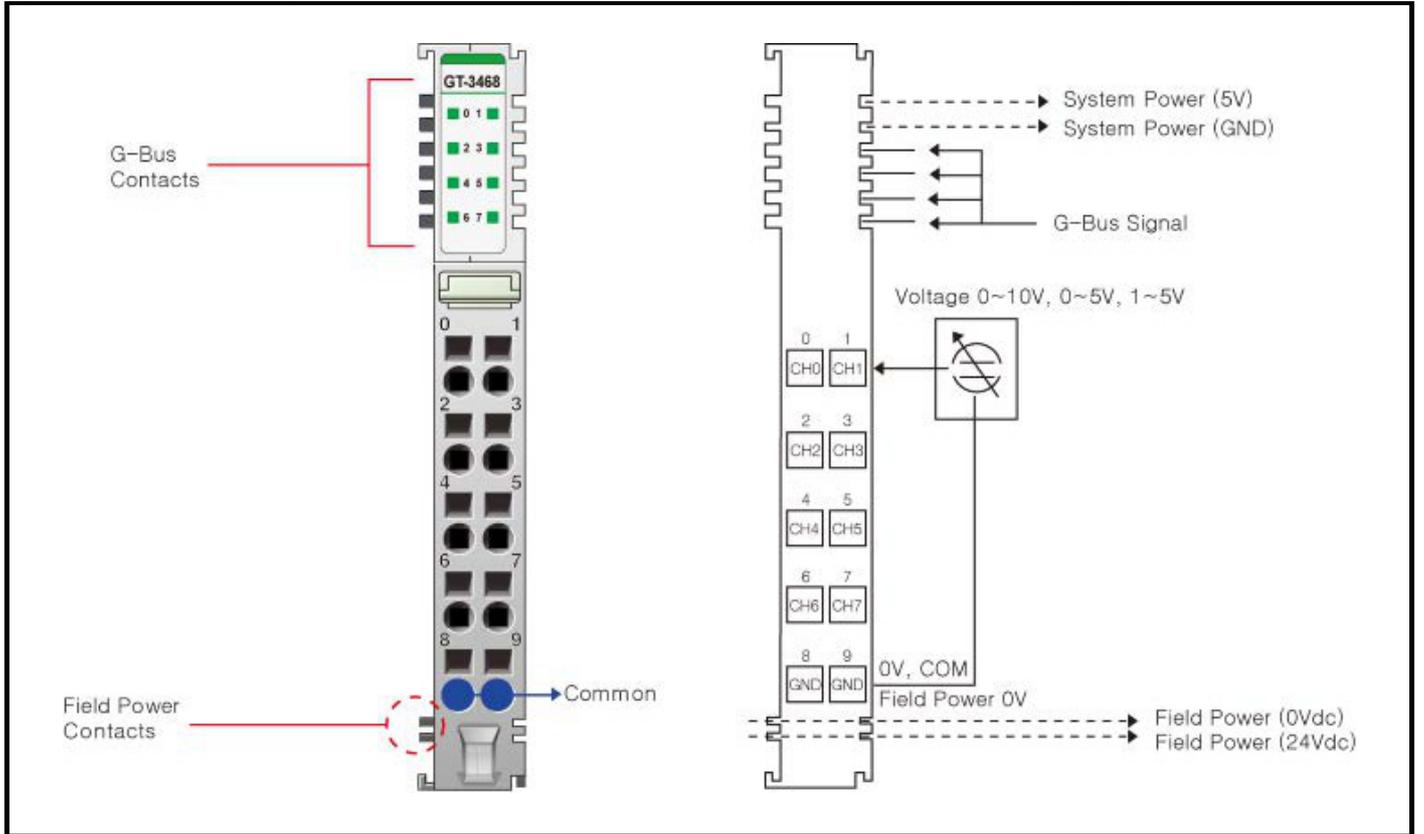
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Voltage Range for Channel 0 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 1	Voltage Range for Channel 1 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 2	Voltage Range for Channel 2 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 3	Voltage Range for Channel 3 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)							
Byte 4	Filter Time ( H00: Default Filter(=20) / H01: Fastest to / H62: Slowest )							
Byte 5	Not used(=00)							

All values are stored in Bus Coupler's EEPROM.

### 9.36 GT-3468 Analog Input

Figure 9-8 GT-3468 (Analog Input, 8 Channels, 0 to 10 Vdc / 0 to 5 Vdc, 1 to 5 Vdc, 16 bits, 10 RTB) wiring diagram



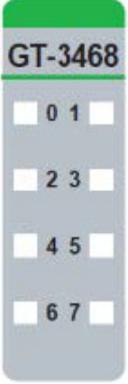
Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Input Channel Common (AGND)	Input Channel Common (AGND)	9

**Table 9-35 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	8 Channels Single Ended, Non-isolated Between Channels
Resolution in Ranges	16 bit (Include Sign) 15 bits: 0.31 mV / bit (0 to 10 V) 0.15 mV / bit (0 to 5 V), 0.12 mV / bit (1 to 5 V)
Indicators	8 Green Input Status LEDs
Input Voltage Range	0 to 10 Vdc, 0 to 5 Vdc, 1 to 5 Vdc
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	500 kΩ
Diagnostic	Diagnostic Field Power Off : LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value)
Conversion Time	≤1 ms / All channels (≤ 0.125 ms per Channel)
Calibration	Not Required
Common Type	2 Common (Field Power 0 V is the Common=AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4:/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation: Max. 30 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.37 GT-3468 LED Indicator

### 9.37.1 LED IndicatorChannel Status LED

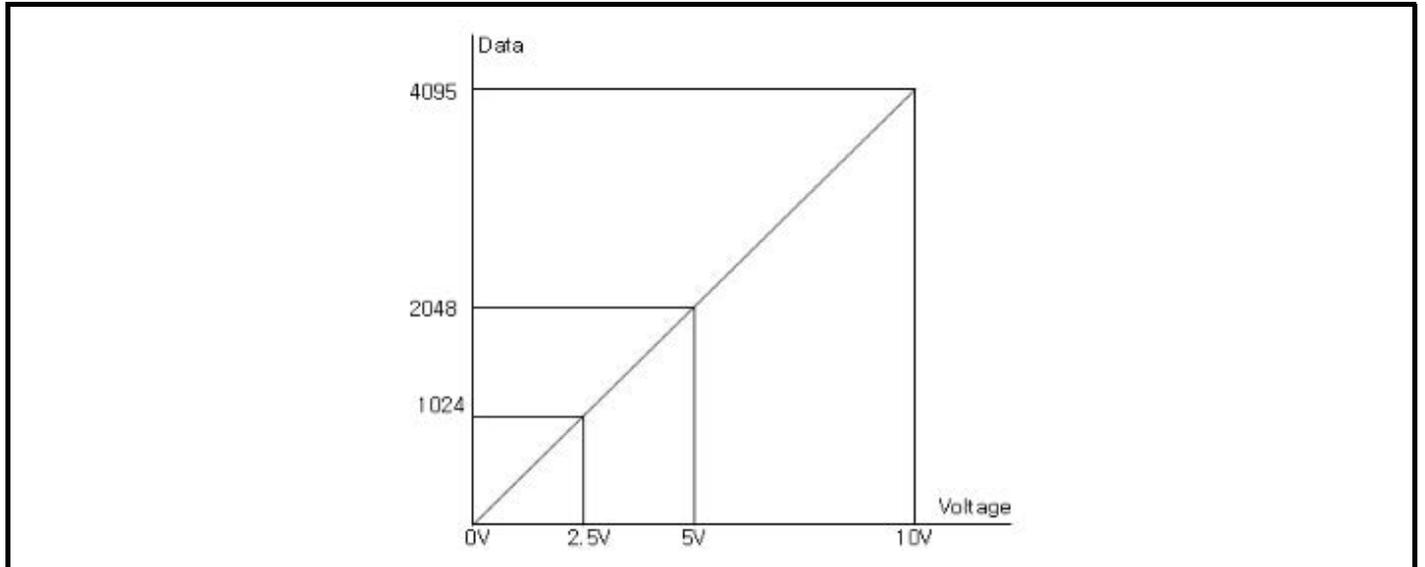
Module	LED number	LED function / description	LED colour
 <p>GT-3468</p> <p>0 1</p> <p>2 3</p> <p>4 5</p> <p>6 7</p>	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	
	4	INPUT Channel 4	
	5	INPUT Channel 5	
	6	INPUT Channel 6	
	7	INPUT Channel 7	

Status	LED	To indicate
Normal Operation	[LED OFF < 0.5% (Maximum Input Value)] - Channel OFF	Normal Operation
	[LED On > 0.5% (Maximum Input Value)] - Channel Green	
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

## 9.38 Data Value / Voltage

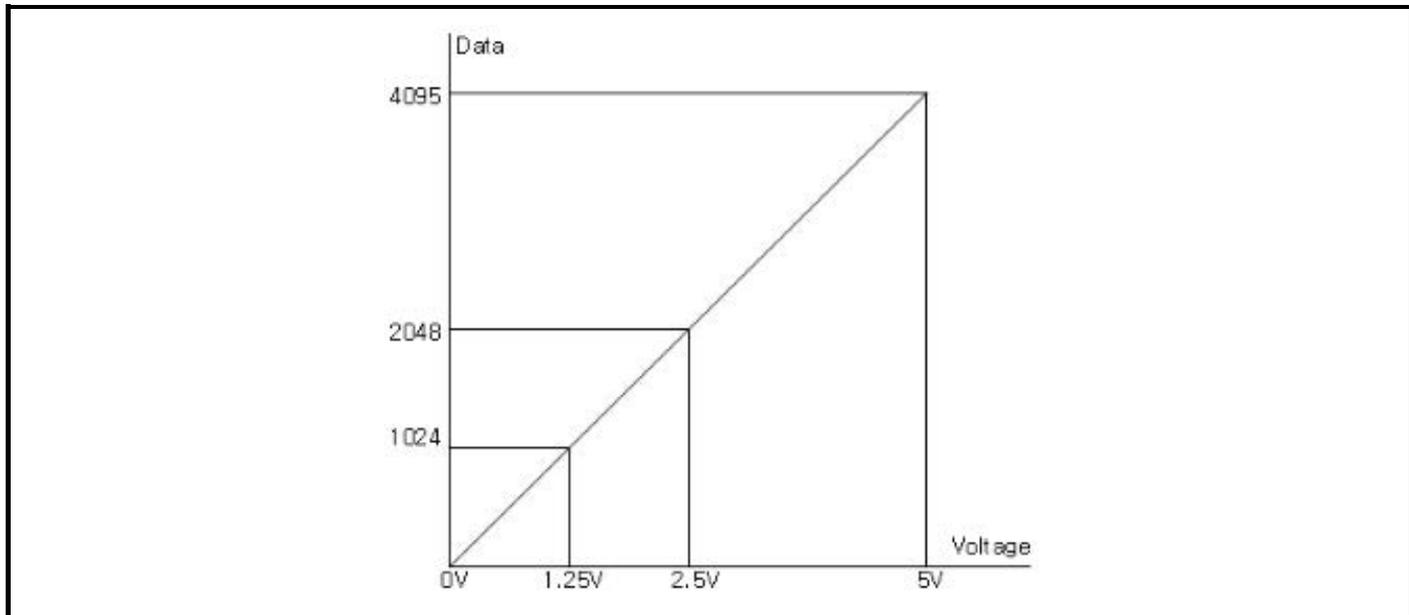
Table 9-36 Voltage Range: 0 to 10 Vdc

Current	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



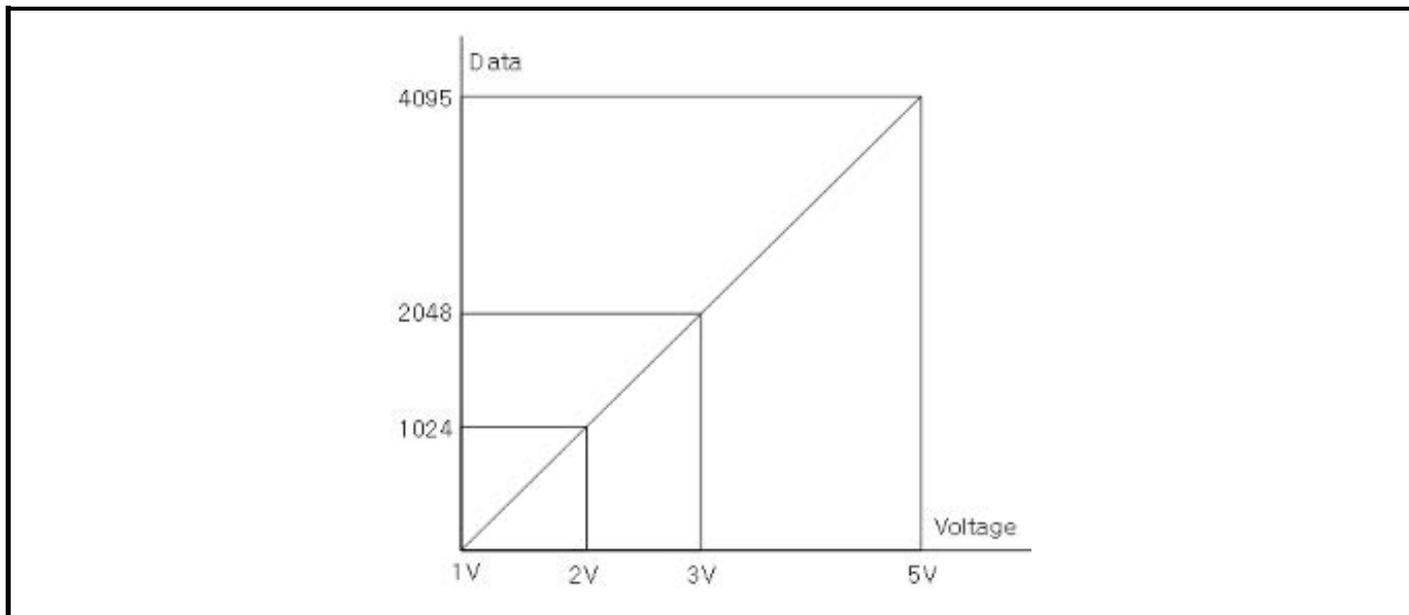
**Table 9-37 Voltage Range: 0 to 5 Vdc**

<b>Voltage</b>	<b>0.0 V</b>	<b>1.25 V</b>	<b>2.5 V</b>	<b>5.0 V</b>
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



**Table 9-38 Voltage Range: 1 to 5 Vdc**

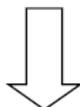
<b>Voltage</b>	<b>1.0 V</b>	<b>2.0 V</b>	<b>3.0 V</b>	<b>5.0 V</b>
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



### 9.39 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3
Analog Input Ch4
Analog Input Ch5
Analog Input Ch6
Analog Input Ch7



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								Analog Input Ch0 Low byte
Byte 1								Analog Input Ch0 High byte
Byte 2								Analog Input Ch1 Low byte
Byte 3								Analog Input Ch1 High byte
Byte 4								Analog Input Ch2 Low byte
Byte 5								Analog Input Ch2 High byte
Byte 6								Analog Input Ch3 Low byte
Byte 7								Analog Input Ch3 High byte
Byte 8								Analog Input Ch4 Low byte
Byte 9								Analog Input Ch4 High byte
Byte 10								Analog Input Ch5 Low byte
Byte 11								Analog Input Ch5 High byte
Byte 12								Analog Input Ch6 Low byte
Byte 13								Analog Input Ch6 High byte
Byte 14								Analog Input Ch7 Low byte
Byte 15								Analog Input Ch7 High byte

### 9.40 Parameter data

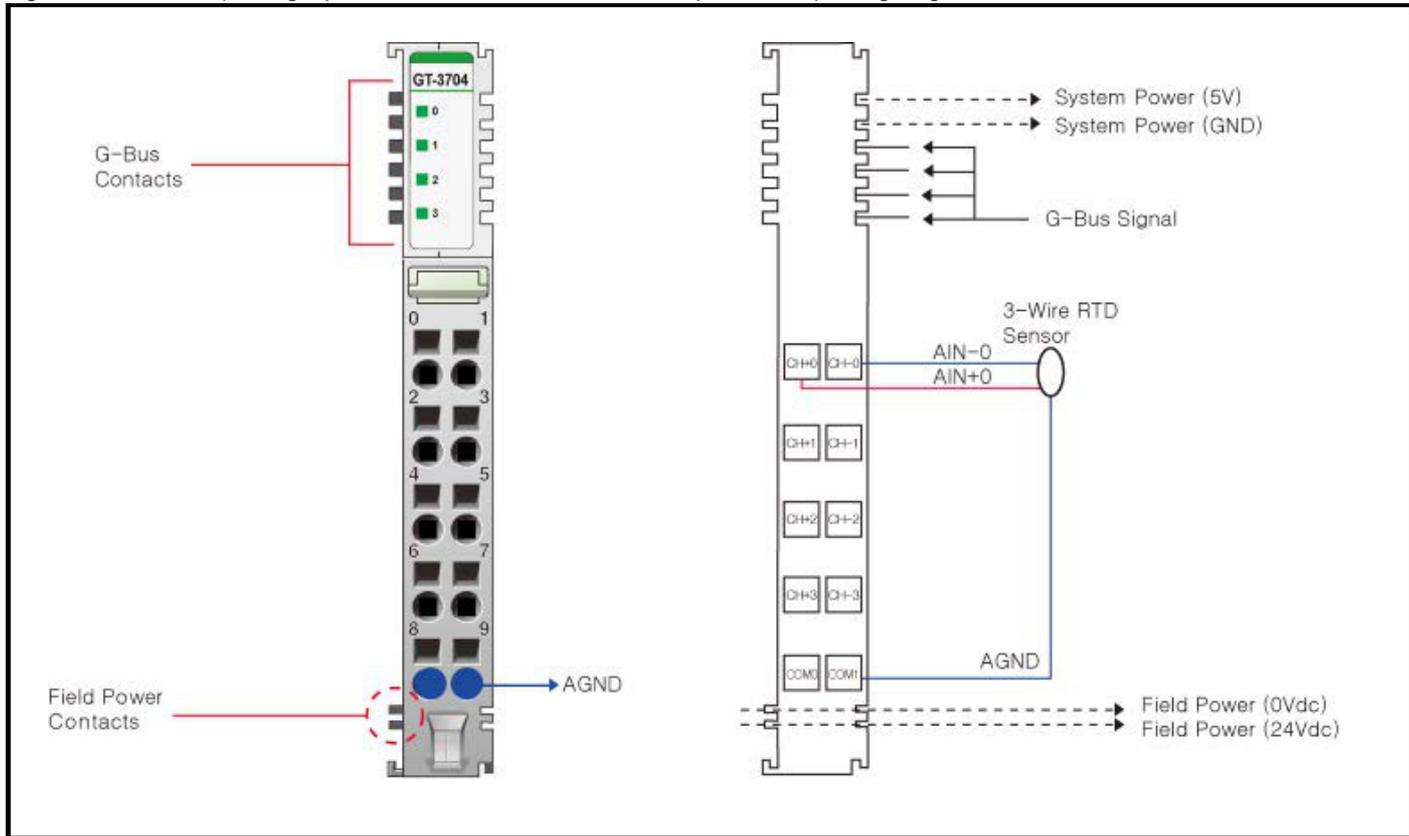
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								Voltage Range for Channel 0 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)
Byte 1								Voltage Range for Channel 1 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)
Byte 2								Voltage Range for Channel 2 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)
Byte 3								Voltage Range for Channel 3 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)
Byte 4								Voltage Range for Channel 4 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)
Byte 5								Voltage Range for Channel 5 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)
Byte 6								Voltage Range for Channel 6 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)
Byte 7								Voltage Range for Channel 7 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc, H02: 1 to 5 Vdc)
Byte 8								Filter Time ( H00: Default Filter(=20) / H01: Fastest to / H62: Slowest )
Byte 9								Not used(=00)

All values are stored in Bus Coupler's EEPROM.

### 9.41 GT-3704 Analog Input

Figure 9-9 GT-3704 (Analog input, 4 Channels, RTD / Resistance Input, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	RTD Channel 0+	RTD Channel 0-	1
2	RTD Channel 1+	RTD Channel 1-	3
4	RTD Channel 2+	RTD Channel 2-	5
6	RTD Channel 3+	RTD Channel 3-	7
8	AGND	AGND	9

Safety information	Product information	Mechanical installation	Electrical installation	RTMoE Ethernet Bus Coupler	Modbus TCP/IP	Digital Input	Digital Output	Analog Input	Analog Output	Power module
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**Table 9-39 Specification**

Environmental specifications		
Operating temperature	-40 °C to 70 °C	
UL Temperature	-20 °C to 60 °C	
Storage temperature	-40 °C to 85 °C	
Relative humidity	5 % to 90 % non-condensing	
Mounting	DIN rail	
Input specification		
Inputs Per Module	4 Channels	
Indicators	4 Green Input Status LEDs	
Sensor types	<b>RTD Input Range</b>	
	<b>RTD Input</b>	<b>Input Range</b>
	PT100, PT200, PT500, PT50	-200 to 850 °C
	PT1000	-200 to 350 °C
	JPT100, JPT200, JPT500, JPT50	-200 to 640 °C
	JPT1000	-200 to 350 °C
	NI100, NI200, NI500	-60 to 250 °C
	NI1000	-60 to 180 °C
	NI120	-80 to 260 °C
	NI1000LG	-50 to 120 °C
	<b>Resistance Input</b>	<b>Input Range</b>
	100 m Ω/Bit	0 to 2000 Ω
	10 m Ω/Bit	0 to 327 Ω
	20 m Ω/Bit	0 to 620 Ω
50 m Ω/Bit	0 to 1200 Ω	
Excitation Current	About 1 mA	
Connection method	3-Wire	
Data Format	16 bits Integer (2' compliment)	
Module Accuracy	PT100, PT1000 Type Input Range 0.5 °C Full Scale @ 25 °C ambient All Type Input Range ±0.1% Full Scale @ 25 °C ambient ±0.3% Full Scale @ -40, 70 °C ambient	
Diagnostic	Sensor open or range over, then conversion data = 0x8000(-32768)	
Resolution of Data	RTD Type : ±0.1% / F, Resistance Type : 100 MΩ, 10 MΩ, 20 MΩ, 50 MΩ	
Conversion Time	< 150 ms, All channel	
Calibration	Not Required	
General specifications		
Shock operating	IEC 60068-2-27	
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul>	
	Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> </ul>	
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4:/All: 2011	
Protection Class	Variable/IP20	
Installation Position	Vertical and horizontal installation is available	
Product certifications	CE, UL	
Power Dissipation	Max. 130 mA @ 5 Vdc	
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Not Connected	
Field Power	Not used, Field Power passes through to the next module	
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)	
Weight	60 g	
Module size	12 mm x 99 mm x 70 mm	

## 9.42 GT-3704 LED Indicator

### 9.42.1 LED Indicator Channel Status LED

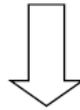
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

Status	LED	To indicate
No Signal	Off	Input Sensor Open or Input Range Over
Normal Operation		Normal Operation
On Signal	Green	Sensor Connected and Input Range Valid
Normal Operation		Normal Operation

## 9.43 Mapping data into the image table

- Input module data

Analog Input Ch 0
Analog Input Ch 1
Analog Input Ch 2
Analog Input Ch 3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch 0 Low byte							
Byte 1	Analog Input Ch 0 High byte							
Byte 2	Analog Input Ch 1 Low byte							
Byte 3	Analog Input Ch 1 High byte							
Byte 4	Analog Input Ch 2 Low byte							
Byte 5	Analog Input Ch 2 High byte							
Byte 6	Analog Input Ch 3 Low byte							
Byte 7	Analog Input Ch 3 High byte							

If the input channel is open or over-ranged, its conversion data will be 0x8000 (-32678)

## 9.44 Configuration Parameter - 10 Bytes

Byte	Decimal Bit	Description	Default Value
0	00-07	The selection Sensor Type =00h:PT100, 0.00385, -200 to 850 °C, 0.1 °C /count =01h:PT200, 0.00385, -200 to 850 °C, 0.1 °C/count =02h:PT500, 0.00385, -200 to 850 °C, 0.1 °C/count =03h:PT1000, 0.00385, -200 to 350 °C, 0.1 °C/count =04h:PT50, 0.00385, -200 to 850 °C, 0.1 °C/count =10h:JPT100, 0.003916, -200 to 640 °C, 0.1 °C/count =11h:JPT200, 0.003916, -200 to 640 °C, 0.1 °C/count =12h:JPT500, 0.003916, -200 to 640 °C, 0.1 °C/count =13h:JPT1000, 0.003916, -200 to 350 °C, 0.1 °C/count =14h:JPT50, 0.003916, -200 to 640 °C, 0.1 °C/count =20h:NI100, 0.00618, -60 to 250 °C, 0.1 °C/count =21h:NI200, 0.00618, -60 to 250 °C, 0.1 °C/count =22h:NI500, 0.00618, -60 to 250 °C, 0.1 °C/count =23h:NI1000, 0.00618, -60 to 180 °C, 0.1 °C/count =30h:NI120, 0.00672, -80 to 250 °C, 0.1 °C/count =53h:NI1000LG, 0.00500, -50 to 120 °C, 0.1 °C/count =80h:Resistance Input, 1 to 2000 Ω, 100m Ω /1count =81h:Resistance Input, 1 to 327 Ω, 10m Ω /1count =82h:Resistance Input, 1 to 620 Ω, 20m Ω /1count =83h: Resistance Input, 1 to 1200 Ω, 50m Ω/1count =Others: Reserved	0:PT100
1	00	Temperature Type 0: Celsius (°C), 1: Fahrenheit (°F)	0:Celsius (°C)
	01	Reserved	0
	02	Data Resolution 0: 0.1 °C, °F/Bit, 1: 1 °C, °F/Bit	0
	03	Reserved	0
	04	Filter Type 0: Normal Filter, 1: Enhanced Filter	0: Normal Filter
	05-07	Reserved	0
2 to 3	-	CH0 Offset Value	0
4 to 5	-	CH1 Offset Value	0
6 to 7	-	CH2 Offset Value	0
8 to 9	-	Ch3 Offset Value	0

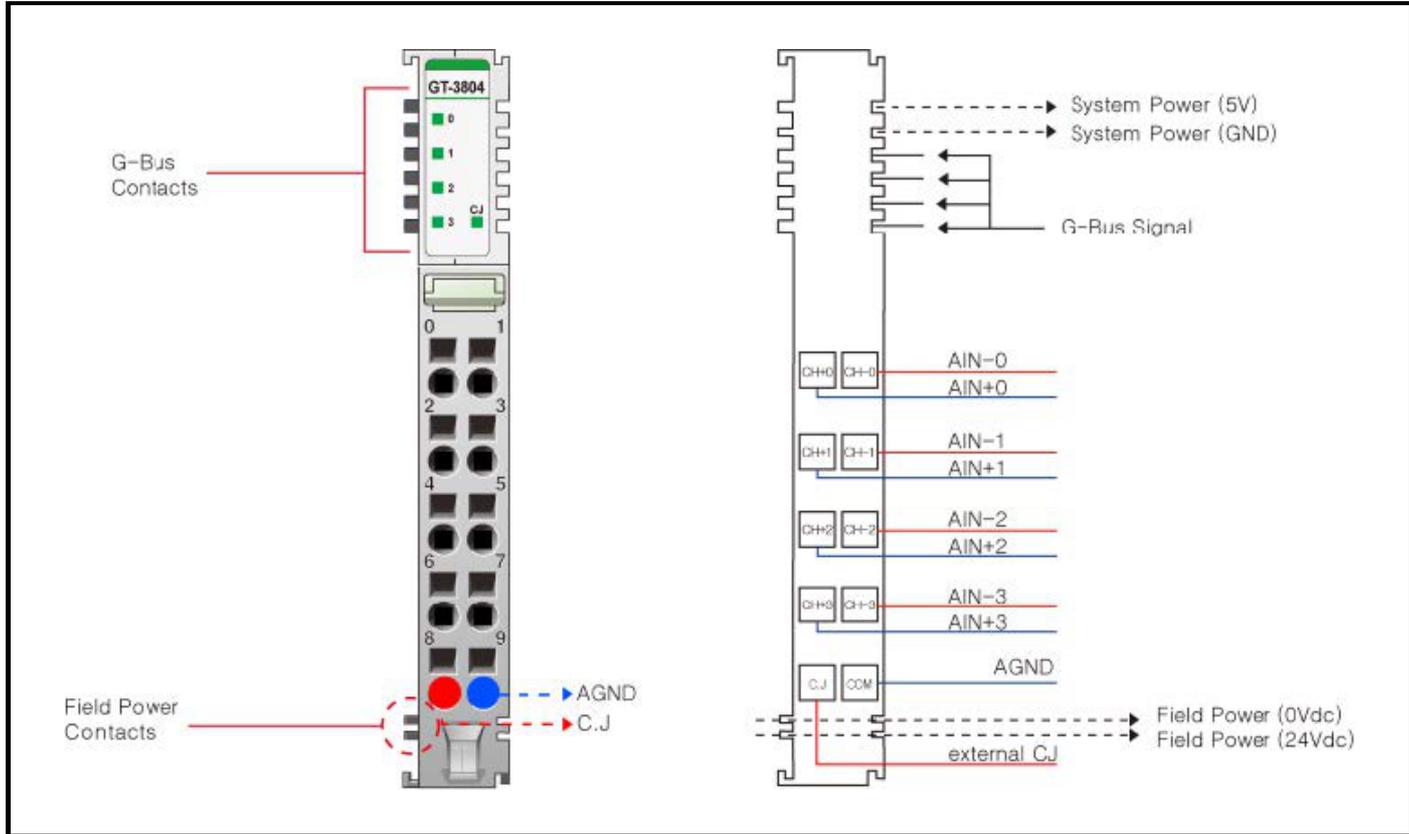
## 9.45 Data Value

Resistance Temperature Detector Input Range	
Type	Input Range
P100	-200 to 850 °C
PT200	-200 to 850 °C
PT500	-200 to 850 °C
PT1000	-200 to 850 °C
PT50	-200 to 850 °C
JPT100	-200 to 850 °C
JPT200	-200 to 850 °C
JPT500	-200 to 850 °C
JPT1000	-200 to 850 °C
JPT50	-200 to 850 °C
NI100	-200 to 850 °C
NI200	-200 to 850 °C
NI500	-200 to 850 °C
NI1000	-200 to 850 °C
NI120	-200 to 850 °C
N1000LG	-200 to 850 °C

Resistance Input Range	
Type	Input Range
100 mΩ / Bit	0 to 2000 Ω
10 mΩ / Bit	0 to 327 Ω
20 mΩ / Bit	0 to 620 Ω
50 mΩ / Bit	0 to 1200 Ω

## 9.46 GT-3804 Analog Input

Figure 9-10 GT-3804 (Analog input, 4 Channels, Thermocouple . mV Input, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	TC Channel 0+	TC Channel 0-	1
2	TC Channel 1+	TC Channel 1-	3
4	TC Channel 2+	TC Channel 2-	5
6	TC Channel 3+	TC Channel 3-	7
8	Cold Junction Sensor	AGND	9

**Table 9-40 Specification**

Environmental Specifications		
Operating temperature	-40 °C to 70 °C	
UL temperature	-20 °C to 60 °C	
Storage temperature	-40 °C to 85 °C	
Relative humidity	5 % to 90 % non Condensing	
Mounting	DIN Rail	
Input Specifications		
Inputs Per Module	4 Channels	
Indicators	4 Green Input Status LEDs, 1 Green Input CJ Status LED	
Sensor types	Thermal Couple Input Range	
	Type	Maximum Input Range
	K	-270 to 1372 °C
	J	-210 to 1200 °C
	T	-270 to 400 °C
	B	30 to 1820 °C
	R	-50 to 1768 °C
	S	-50 to 1768 °C
	E	-270 to 1000 °C
	N	-270 to 1300 °C
	L	-200 to 900 °C
	U	-200 to 600 °C
	C	0 to 2310 °C
	D	0 to 2490 °C
	10 uV Input	-81.0 to 81.0 mV, 10 uV/1 Count
	1 uV Input	-32.7 to 32.7 mV, 1 uV/1 Count
	2 uV input	-65.5 to 65.5 mV, 2 uV/1 Count
Connection method	2-Wire	
Data Format	16 bits Integer (2' Complement)	
Module Accuracy	Recommend Input Range ±0.01% Recommended Scale @ 25 °C ambient ±0.3% Recommended Scale @ -40 °C to 70 °C  C/D Type Recommend Input Range ±0.3% Recommended Scale @ -40 °C to 70 °C External Cold Junction(PT100) ± 2 °C Recommended Scale @ -40 °C to 70 °C	
Diagnostic	Sensor open or range over, then conversion data = 0x8000(-32768) *Connected External CJ : CJ LED On. Not Connected External CJ : CJ LED Off.	
Conversion time	Average Conversion Time < 200 ms	
Calibration	Not required	
Cold Junction Temperature	Internal TMP275AIDGKR : -40 °C to 125 °C External PT100 : -45 °C to 95 °C	

General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: <math>\pm 1.6</math> mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: <math>0.0125</math> g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: <math>0.0125 \rightarrow 0.002</math> g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: <math>0.002</math> g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: <math>0.002 \rightarrow 1.3 \times 10^{-4}</math> g<sup>2</sup>/ Hz</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4:/All: 2011
Protection Class	Variable/IP20
Installation position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 130 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Not Connected
Field Power	Not used, Field Power passes through to the next module
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	60 g
Module size	12 mm x 99 mm x 70 mm

\* To increase precision of measurement, the connection between GT-3804 and compensation reference sensor is recommended by using terminal block.

## 9.47 GT-3804 LED Indicator

### 9.47.1 LED IndicatorChannel Status LED

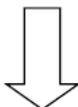
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	
	CJ	Input Channel CJ	

Status	LED	To indicate
No Signal	Channel Off , CJ Off	Input Sensor Open or Input Range Over
Normal Operation		Normal Operation
On Signal	Channel On, CJ Off	Sensor Connected and Input Range Valid
Normal Operation		Normal Operation
On Signal	Channel On, CJ On	Sensor Connected and Input Range Valid
Normal Operation		Normal Operation
Connected External CJC		External CJ Enable

## 9.48 Mapping data into the image table

- Input module data

Analog Input Ch 0
Analog Input Ch 1
Analog Input Ch 2
Analog Input Ch 3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0				Analog Input Ch 0 Low byte				
Byte 1				Analog Input Ch 0 High byte				
Byte 2				Analog Input Ch 1 Low byte				
Byte 3				Analog Input Ch 1 High byte				
Byte 4				Analog Input Ch 2 Low byte				
Byte 5				Analog Input Ch 2 High byte				
Byte 6				Analog Input Ch 3 Low byte				
Byte 7				Analog Input Ch 3 High byte				

- If the input of channel is open or over-ranged, its conversion data will be 0x8000(-32678)

## 9.49 Configuration Parameter - 10 Bytes

Byte	Decimal Bit	Description	Default Value
0	00-07	The selection Sensor Type =00 h: Type K, 0.1 °C/count =01 h: Type J, 0.1 °C/count =02 h: Type T, 0.1 °C/count =03 h: Type B, 0.1 °C/count =04 h: Type R, 0.1 °C/count =05 h: Type S, 0.1 °C/count =06 h: Type E, 0.1 °C/count =07 h: Type N, 0.1 °C/count =08 h: Type L, 0.1 °C/count =09 h: Type U, 0.1 °C/count =0A h: Type C, 0.1 °C/count =0B h: Type D, 0.1 °C/count =80 h: 10 uV Input, -81.0 to 81.0 mV, 10 uV / 1 count =81 h: 1 uV Input, -32.7 to 32.7 mV, 1 uV / 1 count =82 h: 2 uV Input, -65.5 to 65.5 mV, 2 uV / 1 count =Others: Reserved	00 : Type K
1	00	Temperature Type 0: Celsius (°C), 1: Fahrenheit (°F)	00 : Celsius (°C) Cold Junction Compensation 0.1 °C Normal Filter
	01*	0: Cold Junction Compensation 1: Disable Cold Junction Compensation	
	02	Data Resolution 0: 0.1 °C, oF/bit, 1: 1 °C, °F/bit	
	03	Reserved	
	04	Filter Type 0: Normal Filter, 1: Enhanced Filter	
	05 - 07	Reserved	
2	00 - 07	Internal Cold Junction [1] Offset Data Low Byte	0000
3		Internal Cold Junction [1] Offset Data Low Byte	
4	00 - 07	Internal Cold Junction [2] Offset Data Low Byte	0000
5		Internal Cold Junction [2] Offset Data Low Byte	
6	00 - 07	External Cold Junction Offset Data Low Byte	0000
7		External Cold Junction Offset Data High Byte	

Unit of Cold Junction Temperature is 0.1 °C/°F. Value 254 means 25.4°C or 25.4°F

\*0: Compensation Cold junction Temperature = Cold junctions Temperature - Cold Junction Temperature Offset

\*1: Compensation Cold Junction Temperature = Cold Junction Temperature Offset

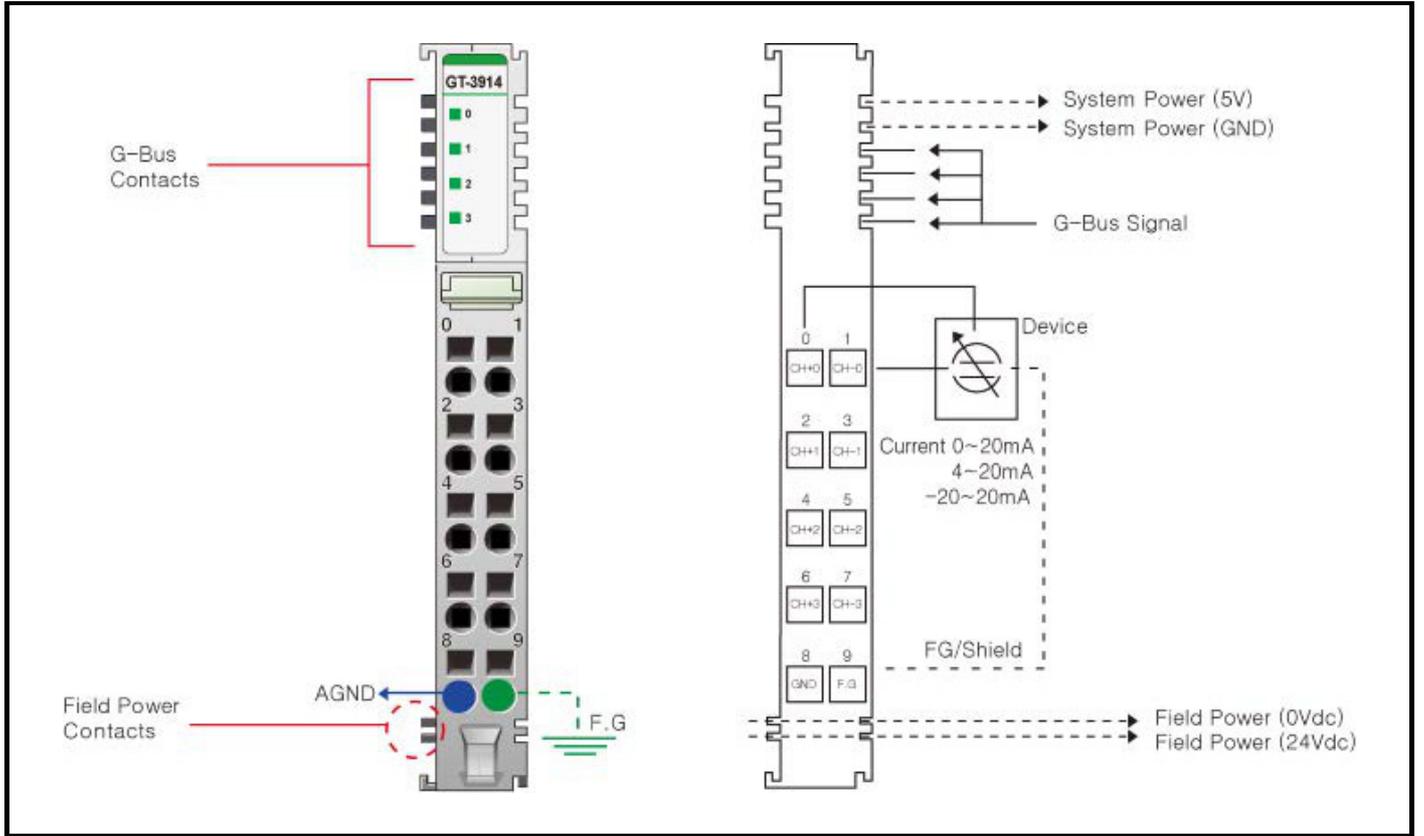
## 9.50 Data Value

Thermocouple Input Range		
Type	Maximum Input Range	Recommended Input Range
Type K	-270 to 1372 °C	-200 to 1200 °C
Type J	-210 to 1200 °C	-40 to 1100 °C
Type T	-270 to 400 °C	-200 to 350 °C
Type B	30 to 1820 °C	600 to 1700 °C
Type R	-50 to 1768 °C	0 to 1600 °C
Type S	-50 to 1768 °C	0 to 1600 °C
Type E	-270 to 1000 °C	-200 to 800 °C
Type N	-270 to 1300 °C	-200 to 1250 °C
Type L	-200 to 900 °C	-100 to 850 °C
Type U	-200 to 600 °C	-100 to 550 °C
Type C	0 to 2310 °C	100 to 2100 °C
Type D	0 to 2490 °C	100 to 2200 °C
10 uV	-81.0 to 81.0 mV, 10 uV/ 1 Count	
1 uV	-32.7 to 32.7 mV, 1 uV/ 1 Count	
2 uV	-65.5 to 65.5 mV, 2 uV/ 1 Count	

°F = 18 °C + 32

## 9.51 GT-3914 Differential type

Figure 9-11 GT-3914 (Differential type, 4 Channels, 0 to 20, 4 to 20, +/-20 mA, 12 Bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel0(+)	Input Channel0(-)	1
2	Input Channel1(+)	Input Channel1(-)	3
4	Input Channel2(+)	Input Channel2(-)	5
6	Input Channel3(+)	Input Channel3(-)	7
8	Input Channel Common (AGND)	Field Ground	9

**Table 9-41 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Differential, Non-isolated Between Channels
Resolution in Ranges	12 bits: 4.88 mV/ bit (0 to 20 mA) 3.91 mV/ bit (4 to 20 mA), 9.77 mV / bit (-20 to 10 mA)
Indicators	4 Green Input Status LEDs
Input Range	0 to 20 mA, 4 to 20 mA, -20 to 20 mA
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	121.5 kΩ
Diagnostic	Diagnostic Field Power Off : LED Blinking Field Power On: LED Off < 0.5% (Maximum Input Value) Field Power On: LED Off > 0.5% (Maximum Input Value) Maximum Range Over : LED Off > 21 mA Maximum Range Over : LED Off < 3 mA(4 to 20 mA)
Conversion Time	1 ms / All Channels
Calibration	Not Required
Common Type	1 Common (Field Power 0 V is the Common=AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4:/All: 2011
Protection Class	Variable/IP20
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non Isolation
Field Power	Supply Voltage : 24 Vdc nominal Voltage Range : 70 °C: 18 to 26.4 Vdc 50 °C ; 18 to 32 Vdc Power Dissipation : Max. 40 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.52 GT-3914 LED Indicator

Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

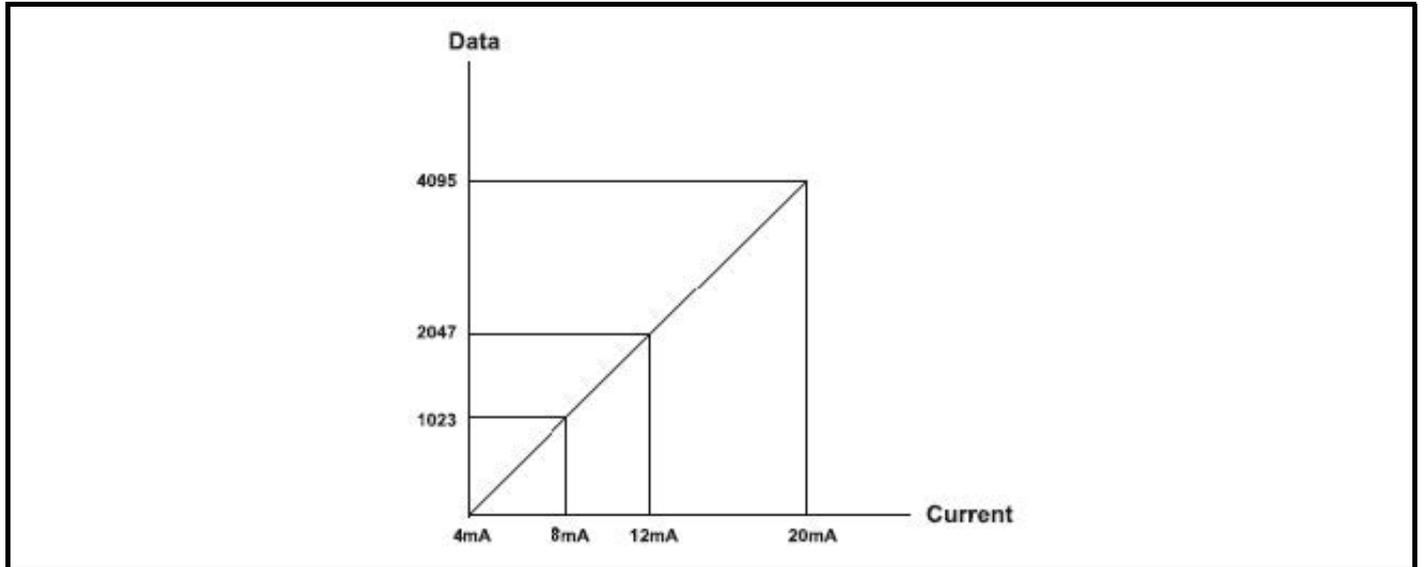
### 9.52.1 LED Indicator Channel Status LED

Status	LED	To indicate
G-Bus Status	Off	[LED Off < 0.5% (Maximum Input Value)]
	Green	[LED On > 0.5% (Maximum Input Value)]
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

## 9.53 Data Value / Voltage

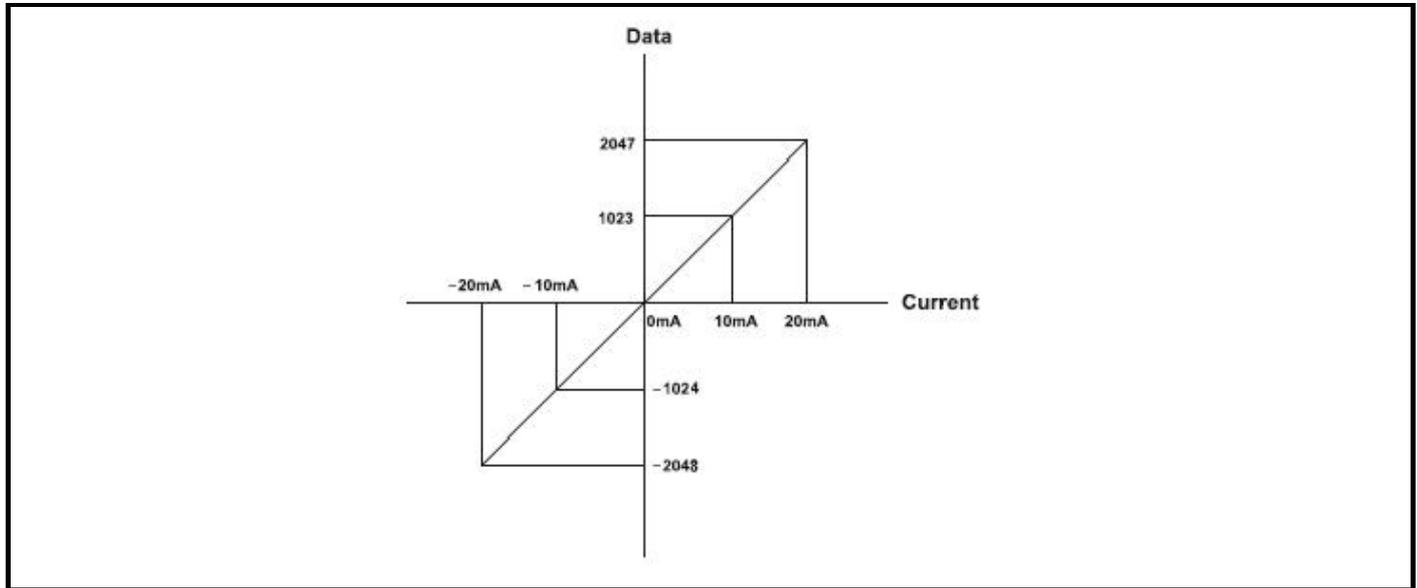
Table 9-42 Voltage Range: 4 to 20 Vdc

Current	4.0 mA	8.0 mA	12.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF



**Table 9-43 Voltage Range: -20 to 20 mA**

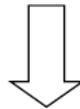
Voltage	-20.0 mA	-10.0 mA	0 mA	+10.0 mA	+20.0 mA
Data (Hex)	HF800	HFC00	H0000	H03FF	H07FF



### 9.54 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

### 9.55 Parameter data

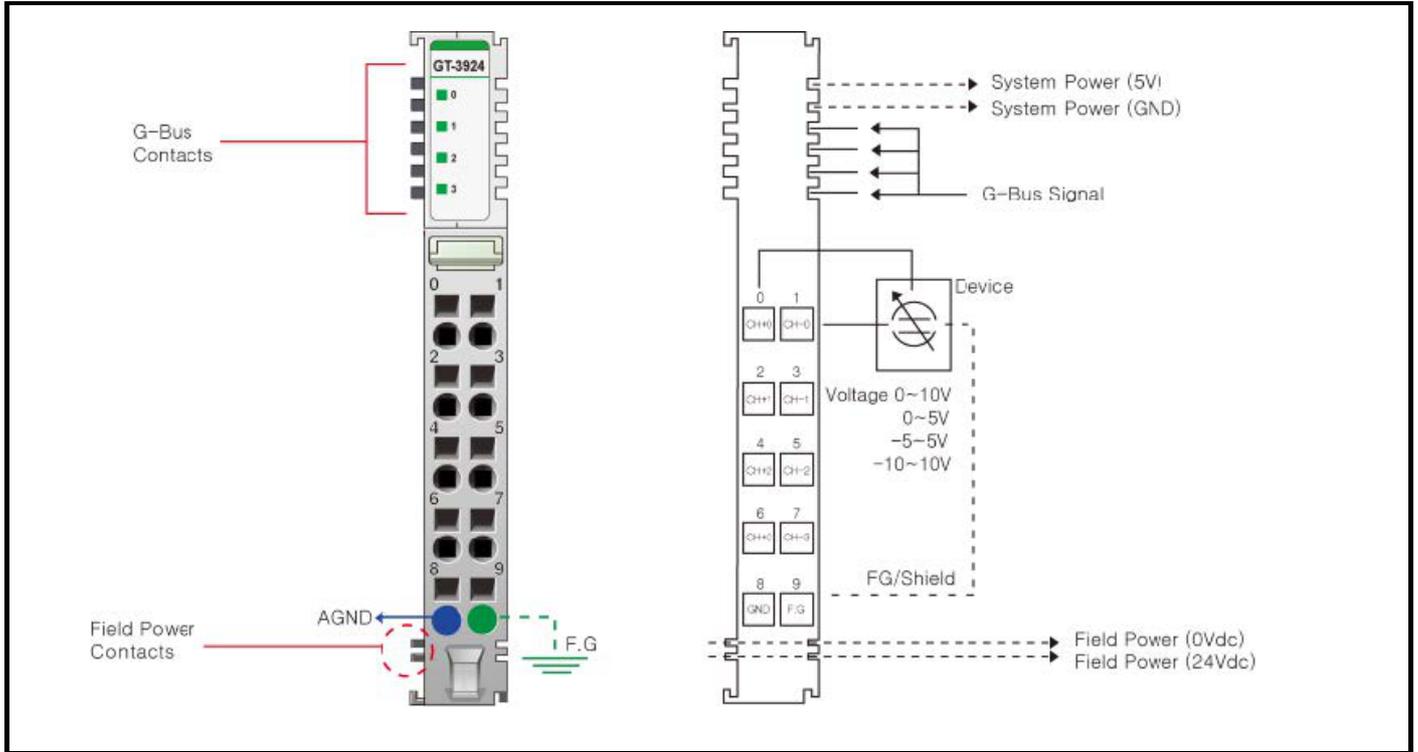
- Valid Parameter length: 18 Bytes
- Parameter data

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Ch#0 Command(H00: 0 to 20 mA, H01 : 4 to 20 mA, H02 : -20 to 20 mA)							
1	Ch#1 Command(H00: 0 to 20 mA, H01 : 4 to 20 mA, H02 : -20 to 20 mA)							
2	Ch#2 Command(H00: 0 to 20 mA, H01 : 4 to 20 mA, H02 : -20 to 20 mA)							
3	Ch#3 Command(H00: 0 to 20 mA, H01 : 4 to 20 mA, H02 : -20 to 20 mA)							
4	Filter Time(H00 : Default Filter(=20), H01 : Fastest to H62 : Slowest)							
5	Reserve							

All values are stored in Bus Coupler's EEPROM

## 9.56 GT-3924 Differential type

Figure 9-12 GT-3924 (Differential type, 4 Channels, Input, 0 to 5, 0 to 10, -10 to +10, -5 to +5 Vdc, 12 bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0 (+)	Input Channel 0 (-)	1
2	Input Channel 1 (+)	Input Channel 1 (-)	3
4	Input Channel 2 (+)	Input Channel 2 (-)	5
6	Input Channel 3 (+)	Input Channel 3 (-)	7
8	Input Channel Common (AGND)	Field Ground	9

**Table 9-44 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Differential, non-isolated between channels
Resolution in Ranges	12 bits: 2.44 mV / bit (0 to 10 V) 12 bits: 1.22 mV / bit (0 to 5 V) 12 bits: 4.88 mV / bit (-10 to 10 V) 12 bits: 2.44 mV / bit (-5 to 5 V)
Indicators	4 Green Input Status LEDs
Input Range	0 to 10 V, 0 to 5 V, -10 to 10 V, -5 to 5 V
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	667 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value)
Conversion Time	1 ms / All channels (<0.25 ms per channel)
Calibration	Not Required
Common Type	1 Common, Field Power 0 V is Common (AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC Resistance Burst/ESD	EN 61000-6-2: 2005 EN61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation : Max. 45mA @ 24Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.57 GT-3924 LED Indicator

Table 9-45 LED Indicator

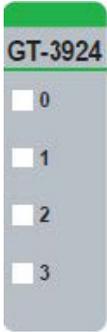
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

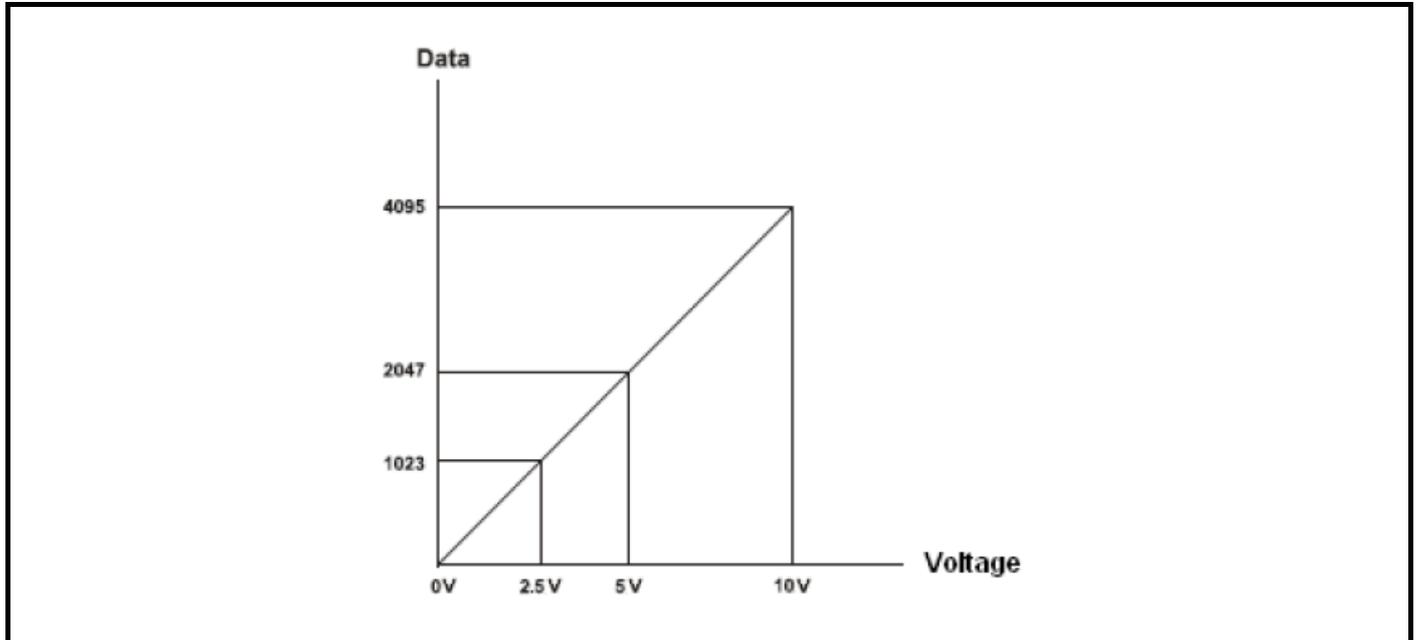
Table 9-46 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5 % (Maximum Input Value)] - Channel OFF	Normal Operation
	[LED On > 0.5 % (Maximum Input Value)] - Channel Green	
Field Power Error	All Channel Repeat the Green and OFF	Field Power is unconnected

## 9.58 Data Value / Voltage

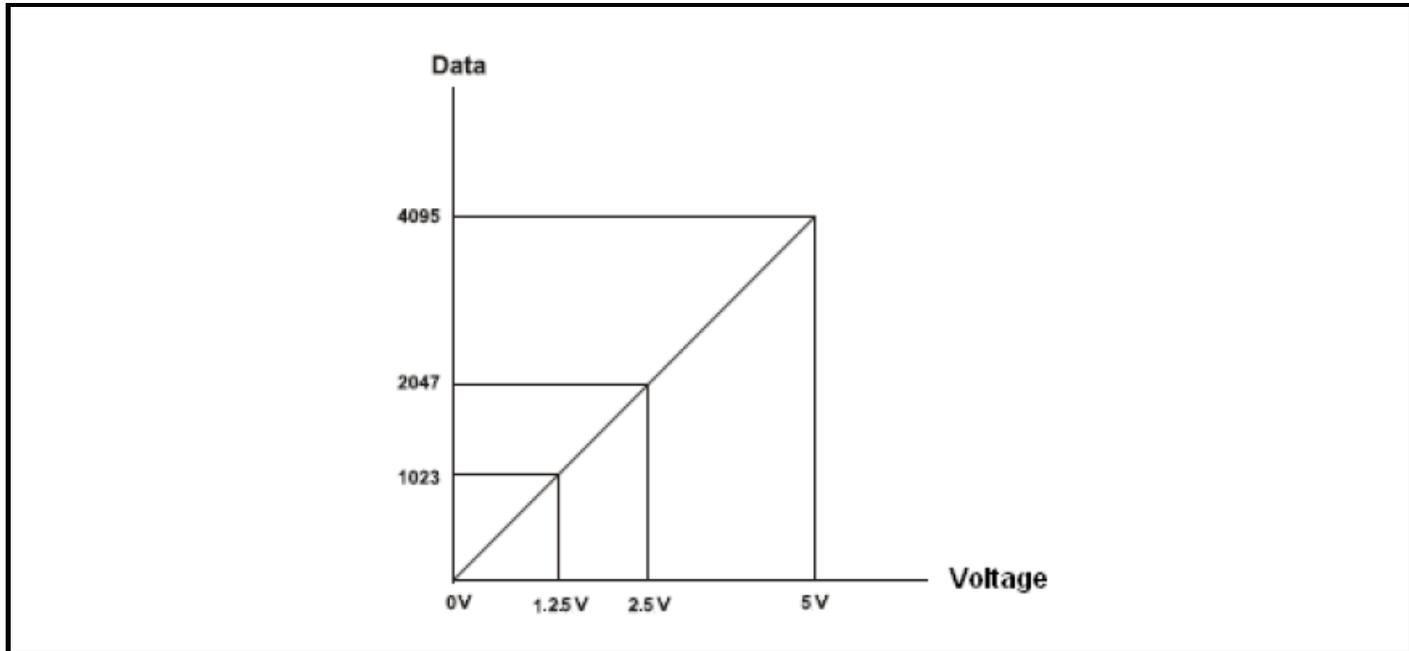
Table 9-47 Voltage Range: 0 to 10 V

Current	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



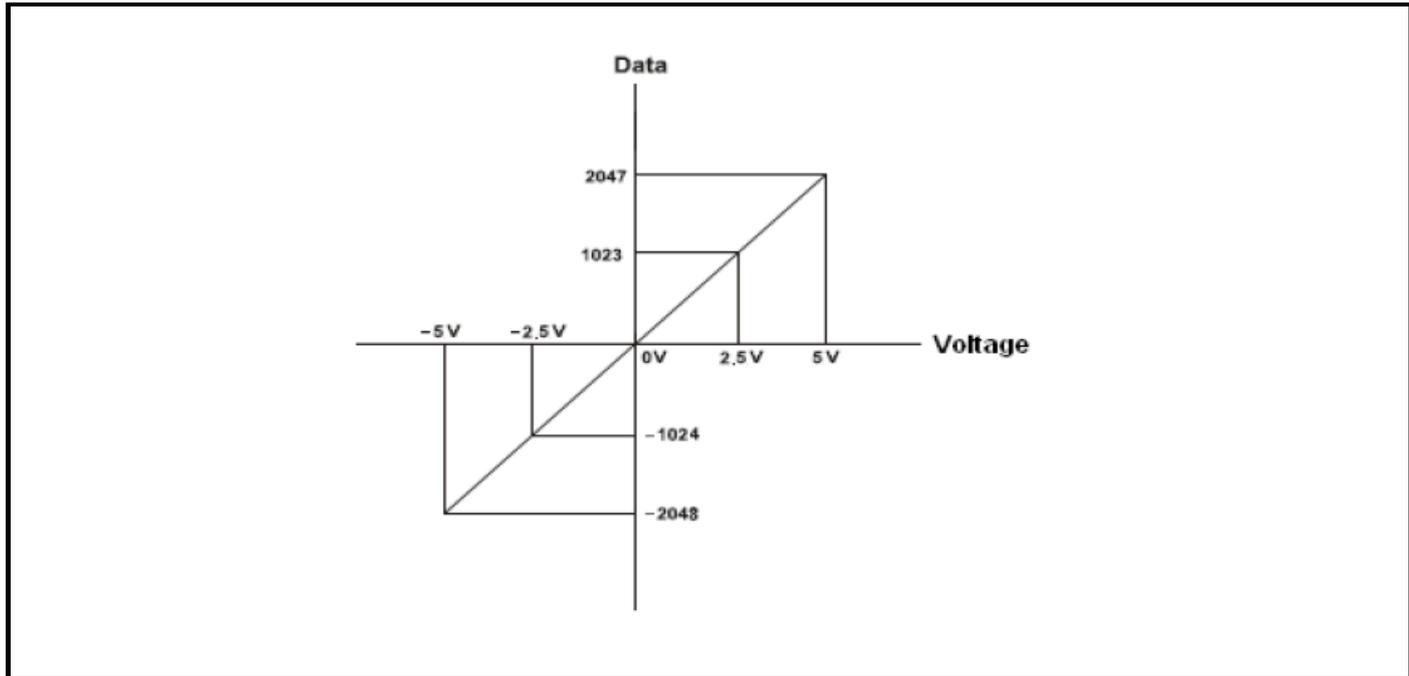
**Table 9-48 Voltage Range: 0 to 5 V**

Voltage	0.0 V	1.25 V	2.5 V	5.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



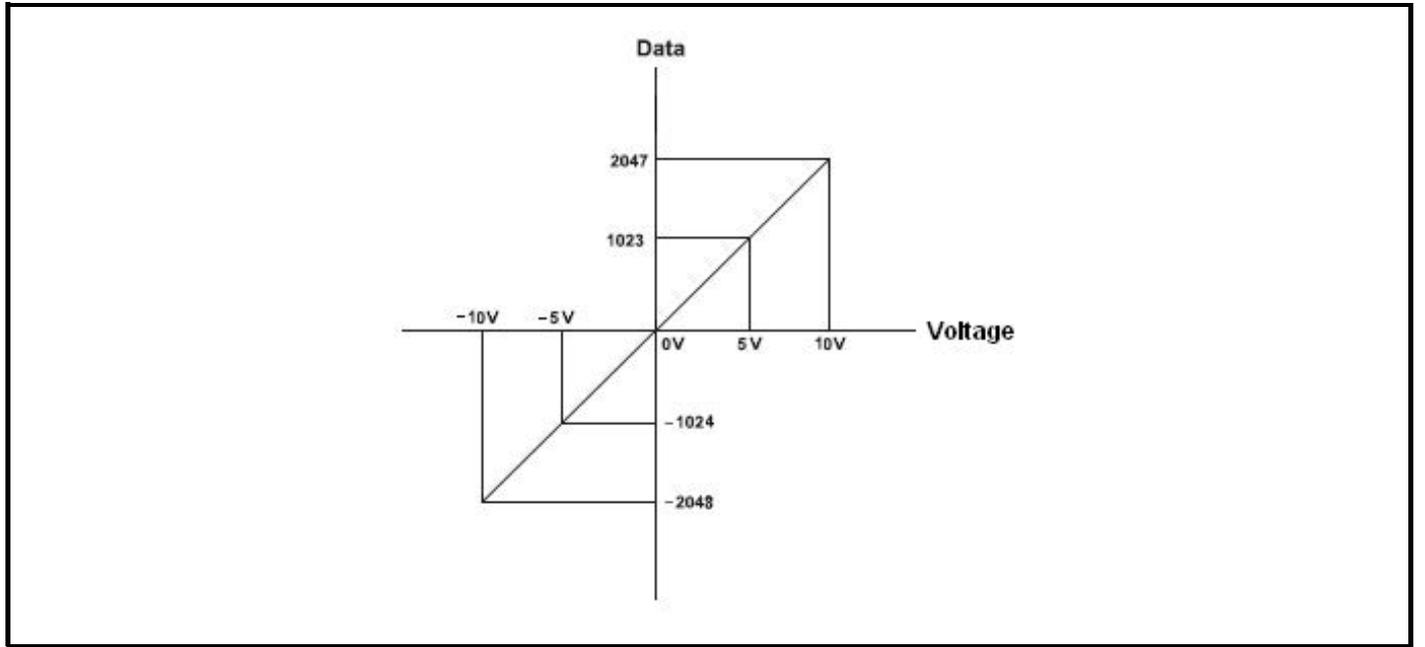
**Table 9-49 Voltage Range: -5 to 5 V;**

Voltage	-5.0 V	-2.5 V	0 V	2.5 V	5.0 V
Data (Hex)	HF800	HFC00	H0000	H03FF	H07FF



**Table 9-50 Voltage Range: -10 to 10 V;**

<b>Voltage</b>	<b>-10.0 V</b>	<b>-5.0 V</b>	<b>0 V</b>	<b>+5.0 V</b>	<b>+10.0 V</b>
Data (Hex)	HF800	HFC00	H0000	H03FF	H07FF



## 9.59 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

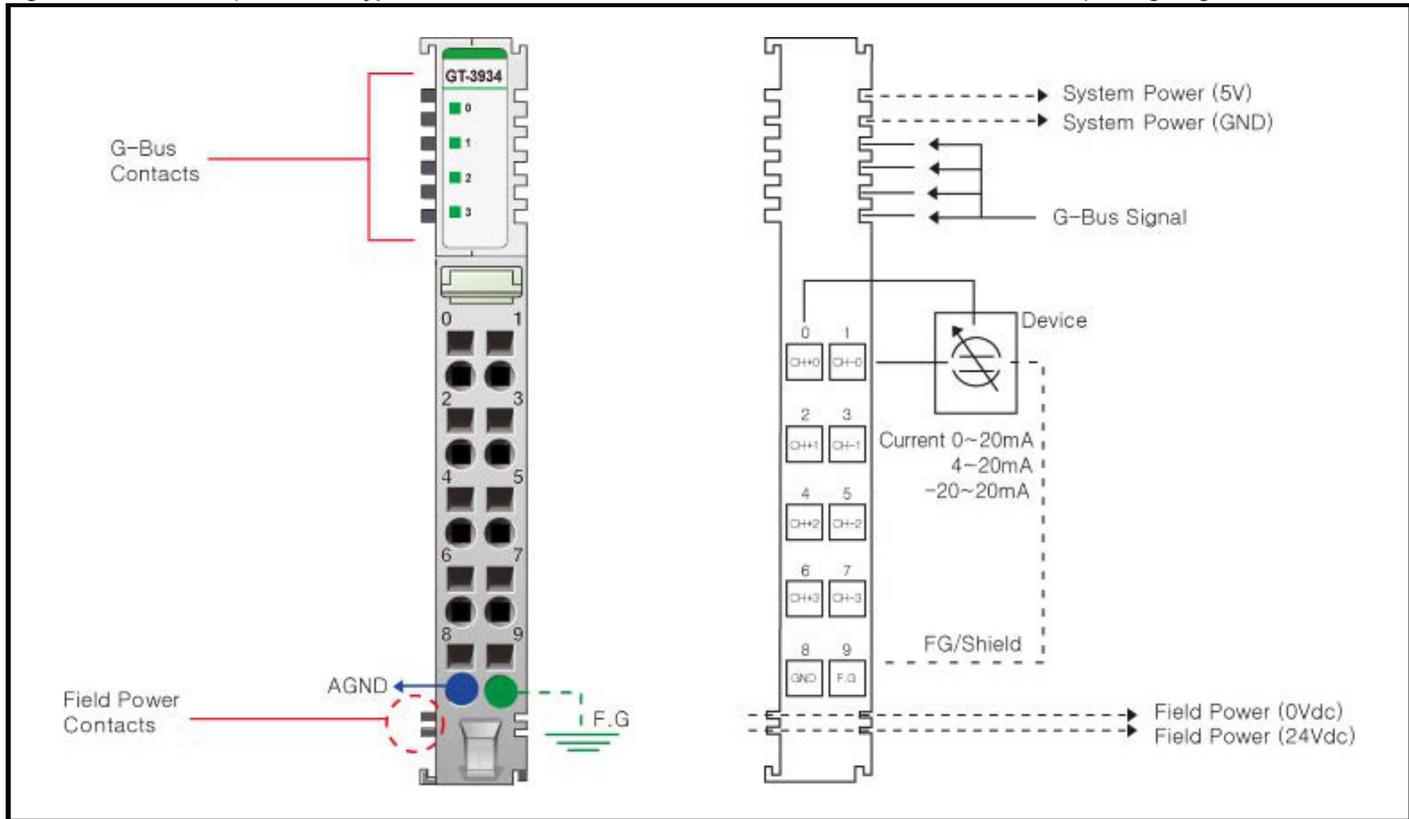
## 9.60 Parameter data

- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Ch#0 Command (H00: 0 to 10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 1	Ch#1 Command (H00: 0 to 10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 2	Ch#2 Command (H00: 0 to 10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 3	Ch#3 Command (H00: 0 to 10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 4	Filter Time (H00: Default Filter (=20), H01: Fastest to H62: Slowest)							
Byte 5	Reserve							

### 9.61 GT-3934 Differential type

Figure 9-13 GT-3934 (Differential type, 4 Channels, 0 to 20 mA / 4 to 20 mA / -20 to 20 mA, 16 bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0 (+)	Input Channel 0 (-)	1
2	Input Channel 1 (+)	Input Channel 1 (-)	3
4	Input Channel 2 (+)	Input Channel 2 (-)	5
6	Input Channel 3 (+)	Input Channel 3 (-)	7
8	Input Channel Common (AGND)	Field Ground	9

Safety information	Product information	Mechanical installation	Electrical installation	RTMoE Ethernet Bus Coupler	Modbus TCP/IP	Digital Input	Digital Output	Analog Input	Analog Output	Power module
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**Table 9-51 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Differential, non-isolated between channels
Resolution in Ranges	16 bit (Include Sign) 15 bits : 0.61 uA / bit (0 to 20 mA) 15 bits : 0.49 uA / bit (4 to 20 mA) 15 bit (Include Sign) 15 bits : 1.22 uA / bit (-20 to 20 mA)
Indicators	4 Green Input Status LEDs
Input Range	0 to 20 mA, 4 to 20 mA, -20 to 20 mA
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	121.5 Ω
Diagnostic	Field Power Off : LED Blinking Field Power On : LED Off < 0.5 % (Maximum Input Value) Field Power On : LED On > 0.5 % (Maximum Input Value) Minimum Range Over : LED Off < 3 mA (4 to 20 mA) Maximum Range Over : LED Off > 21 mA (-20 to 20 mA) Minimum Range Over : LED Off < -21 mA (-20 to 20 mA)
Conversion Time	1 ms / All channels
Calibration	Not Required
Common Type	1 Common, Field Power 0 V is Common (AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
Industrial Emissions	EN61000-6-4/All: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is available
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic : Photocoupler Isolation Field power : DC/DC Converter Isolation
Field Power	Supply Voltage : 24 Vdc nominal Power Dissipation : Max.40 mA @24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.62 GT-3934 LED Indicator

Table 9-52 LED Indicator

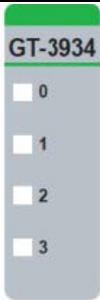
Module	LED number	LED function / description	LED colour
 <p>The image shows a vertical module with a green header labeled 'GT-3934'. Below the header are four square LEDs labeled 0, 1, 2, and 3 from top to bottom.</p>	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

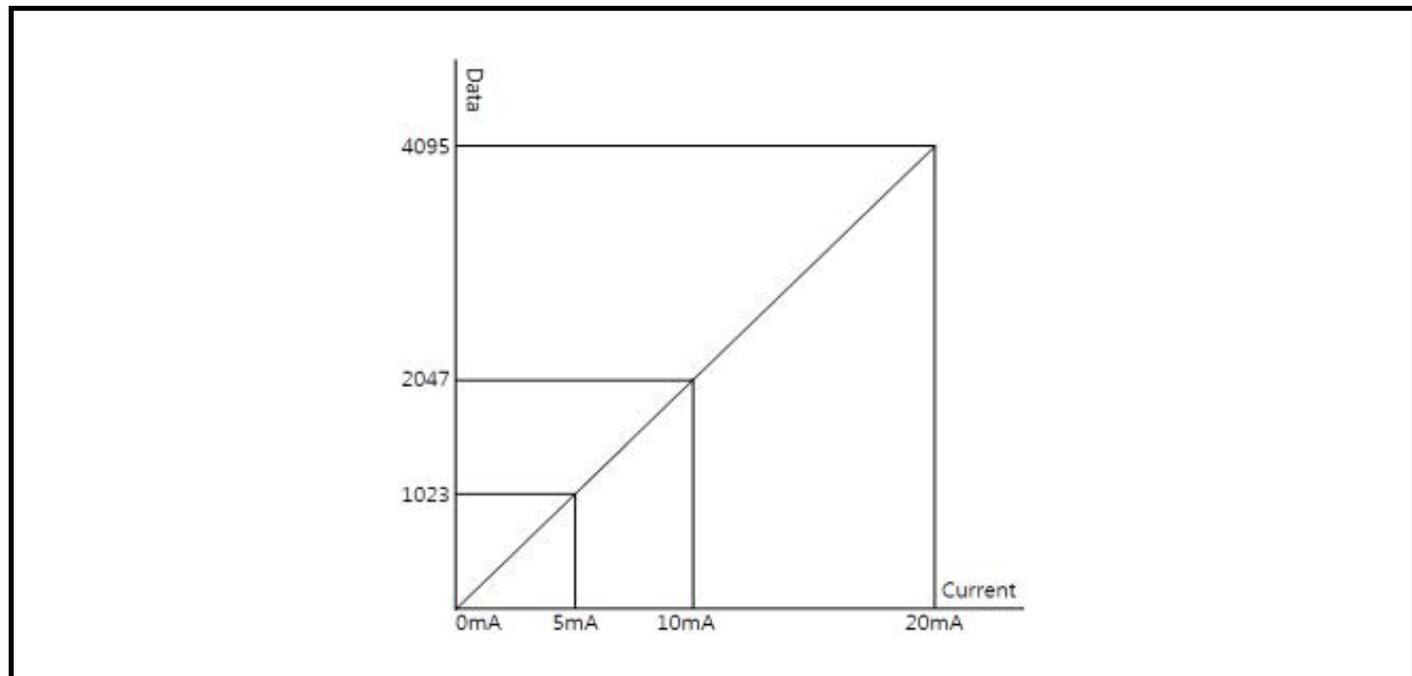
Table 9-53 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5% (Maximum Input Value)] - Channel OFF	Normal Operation
	[LED On > 0.5% (maximum Input Value)] - Channel Green	
Over range check	4 to 20 mA : LED Off < 3 mA	Over range check
	-20 to 20 mA : LED Off > 21mA, LED Off <-21mA	
Field Power Error	All Channel Repeat the Green and OFF	Field Power is unconnected

## 9.63 Data Value / Current

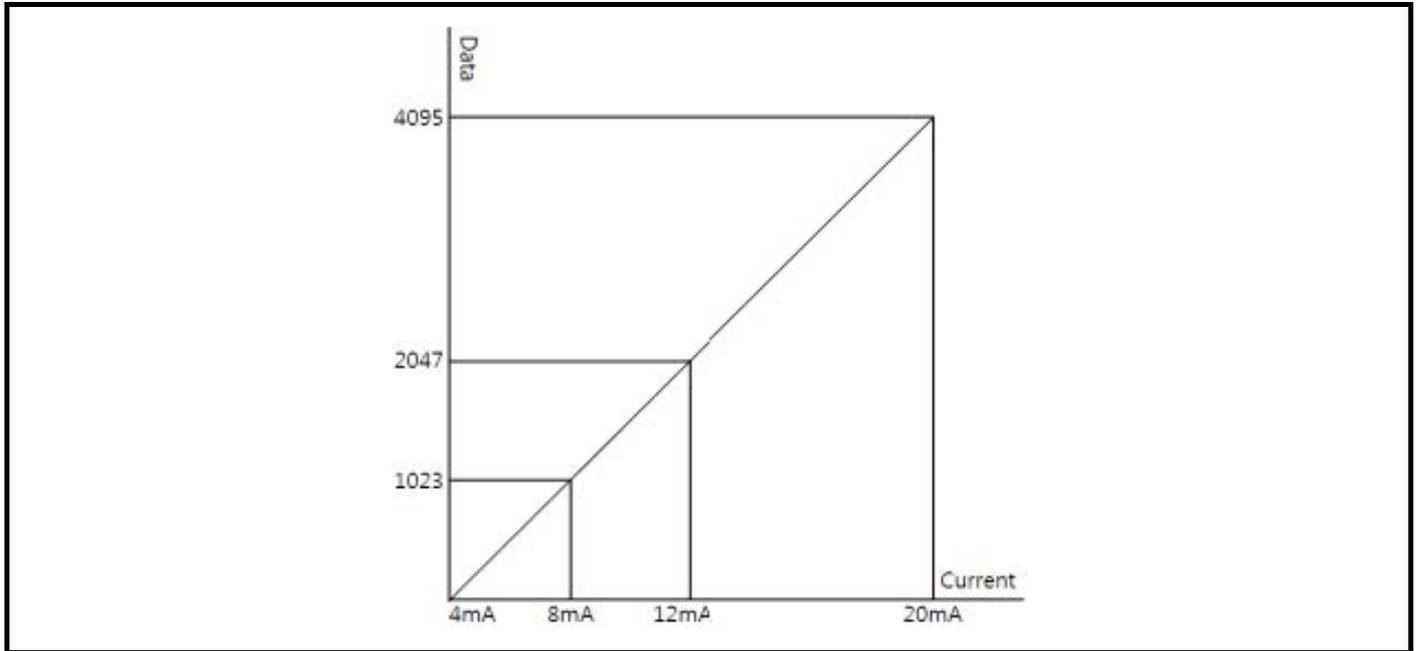
Table 9-54 Current Range: 0 to 20 mA

Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



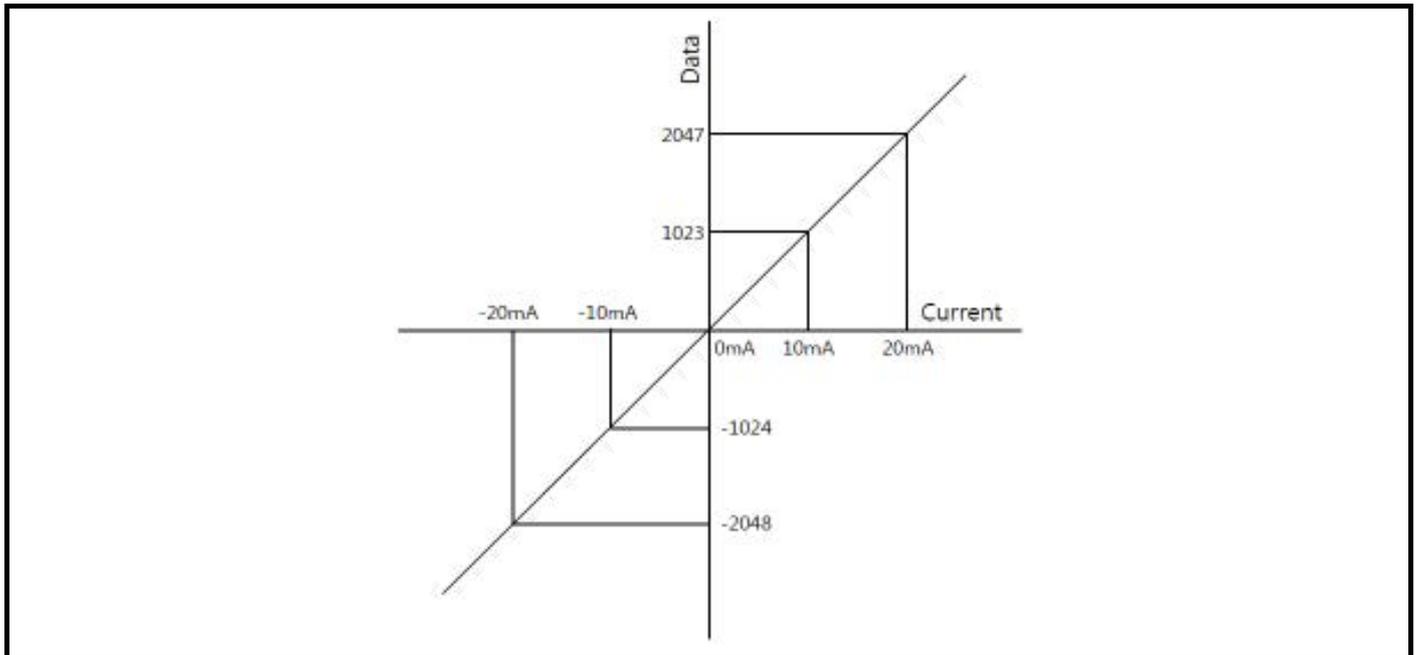
**Table 9-55 Current Range: 4 to 20 mA**

Current	4.0 mA	8.0 mA	12.0 mA	20.0 mA
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



**Table 9-56 Current Range: -20 to 20 mA**

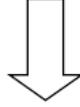
Current	-20.0 mA	-10.0 mA	0 mA	+10.0 mA	+20.0 mA
Data (Hex)	HC000	HE000	H0000	H1FFF	H3FFF



## 9.64 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

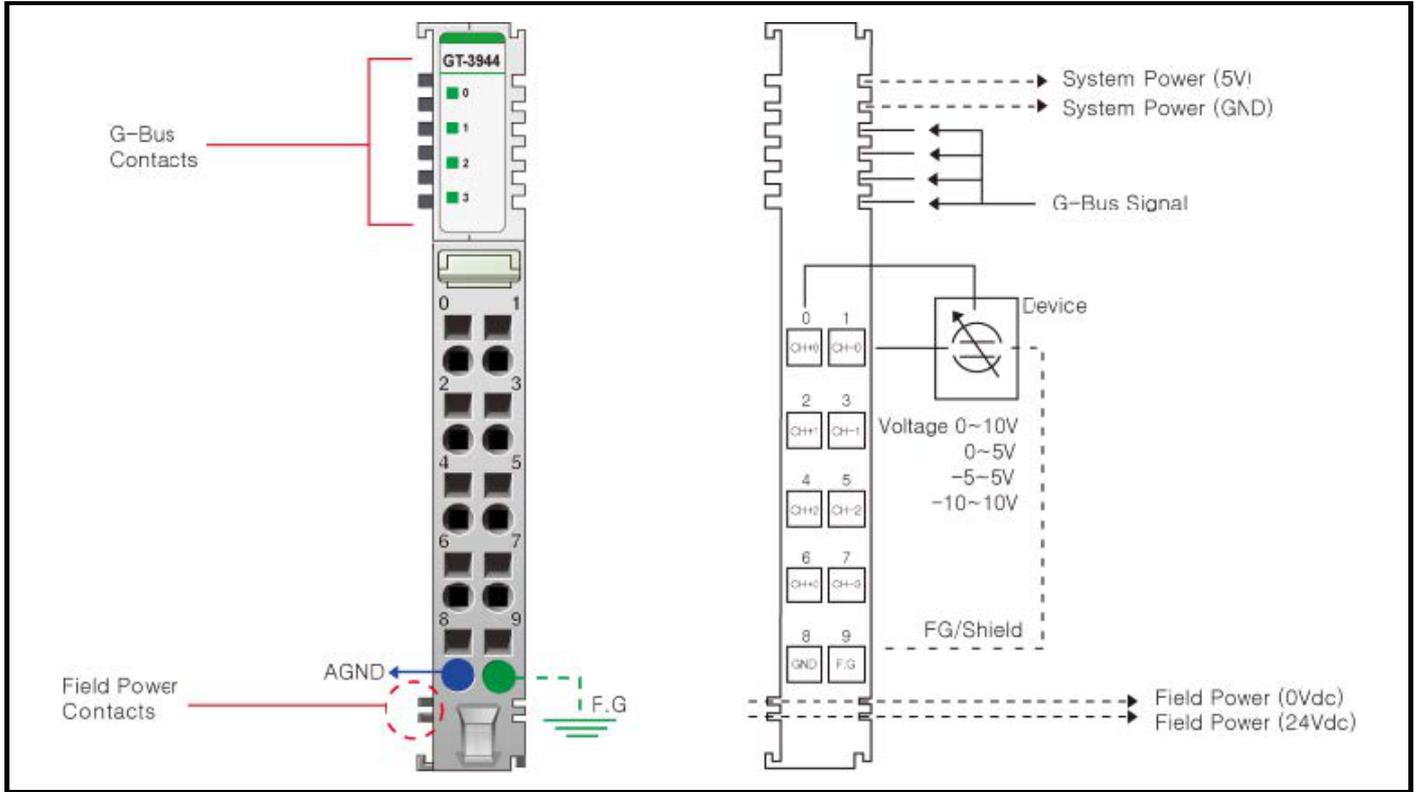
## 9.65 Parameter data

- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Ch#0 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 1	Ch#1 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 2	Ch#2 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 3	Ch#3 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 4	Filter Time (H00: Default Filter (=20), H01: Fastest to H62: Slowest)							
Byte 5	Reserve							

## 9.66 GT-3944 Differential type

Figure 9-14 GT-3944 (Differential type, 4 Channels, 0 to 5 V, 0 to 10 V, -10 to 10 V, -5 to 5 V, 16 bits, 10 RTB)



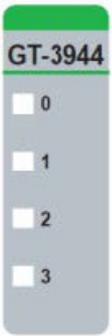
Pin number	Signal description	Signal description	Pin number
0	Input Channel 0 (+)	Input Channel 0 (-)	1
2	Input Channel 1 (+)	Input Channel 1 (-)	3
4	Input Channel 2 (+)	Input Channel 2 (-)	5
6	Input Channel 3 (+)	Input Channel 3 (-)	7
8	Input Channel Common (AGND)	Field Ground	9

**Table 9-57 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Differential, non-isolated between channels
Resolution in Ranges	16 bit (Include Sign) 15 bits : 0.31 mV / bit (0 to 10 V) 15 bits : 0.15 mV / bit (0 to 5 V) 15 bit (Include Sign) 15 bits : 0.61 mV / bit (-10 to 10 V) 15 bits : 0.31 mV / bit (-5 to 5 V)
Indicators	4 Green Input Status LEDs
Input Range	0 to 10 Vdc, 0 to 5 Vdc, -10 to 10 Vdc, -5 to 5 Vdc
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -40 °C, 70 °C
Input Impedance	667 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value)
Conversion Time	1 ms / 4 channels (0.25 ms per channel)
Calibration	Not Required
Common Type	1 Common, Field Power 0 V is Common (AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
Industrial Emissions	EN61000-6-4/All: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is available
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: DC/DC Converter Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation : Max.45 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 9.67 GT-3944 LED Indicator

Table 9-58 LED Indicator

Module	LED number	LED function / description	LED colour
 <p>GT-3944</p> <p>0</p> <p>1</p> <p>2</p> <p>3</p>	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

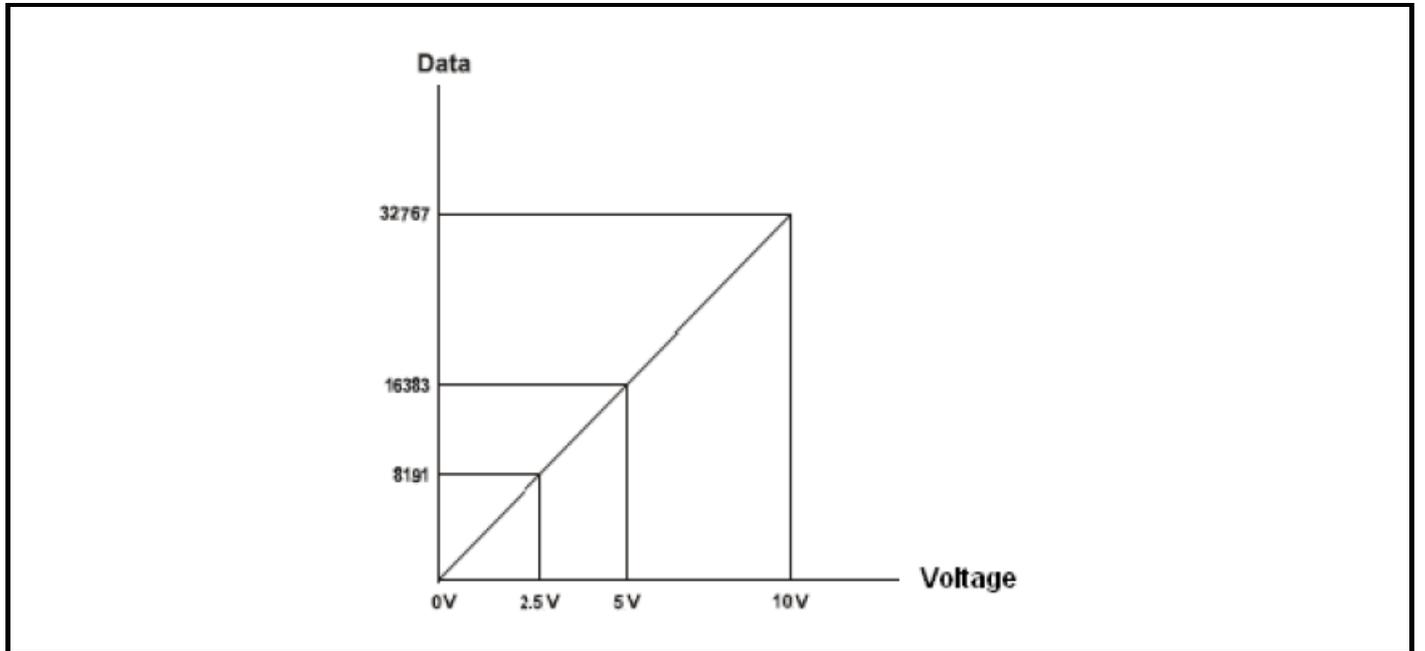
### 9.67.1 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5 % (Maximum Input Value)] - Channel OFF	Normal Operation
	[LED On > 0.5 % (Maximum Input Value)] - Channel Green	
Field Power Error	All Channel Repeat the Green and OFF	Field Power is unconnected

## 9.68 Data Value / Voltage

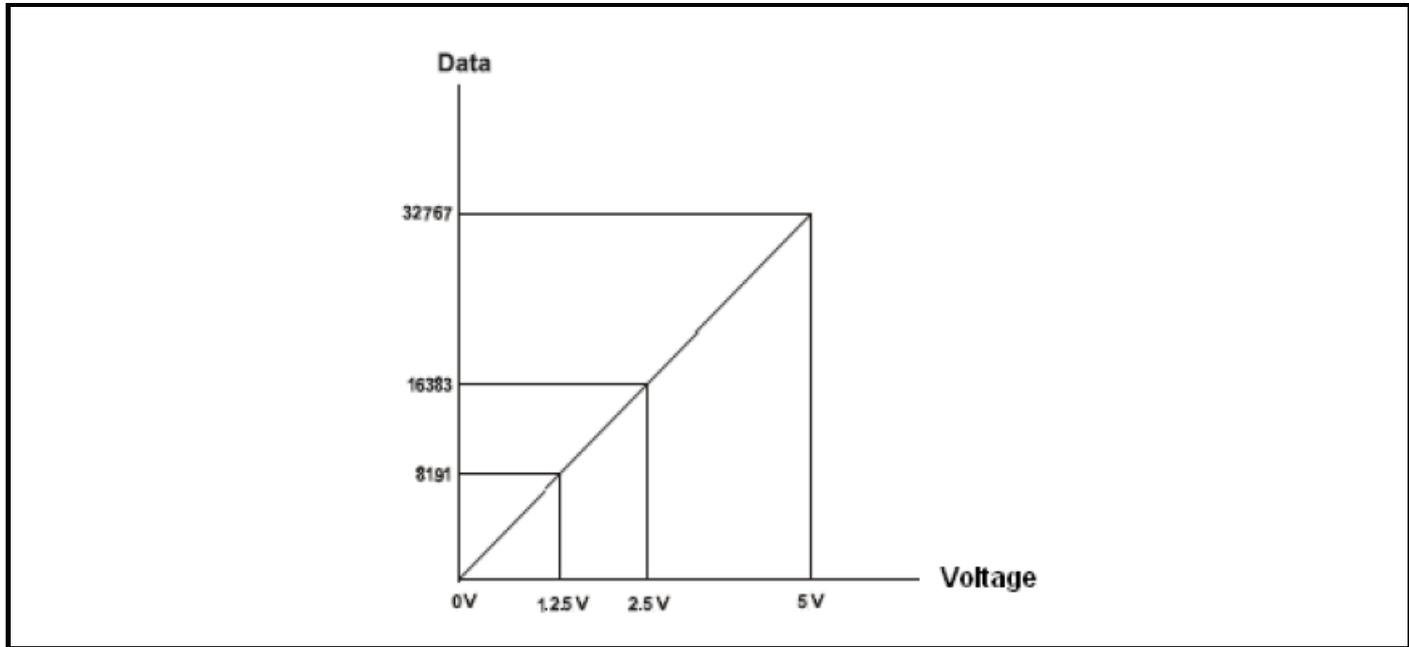
Table 9-59 Voltage Range: 0 to 10 V

Current	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



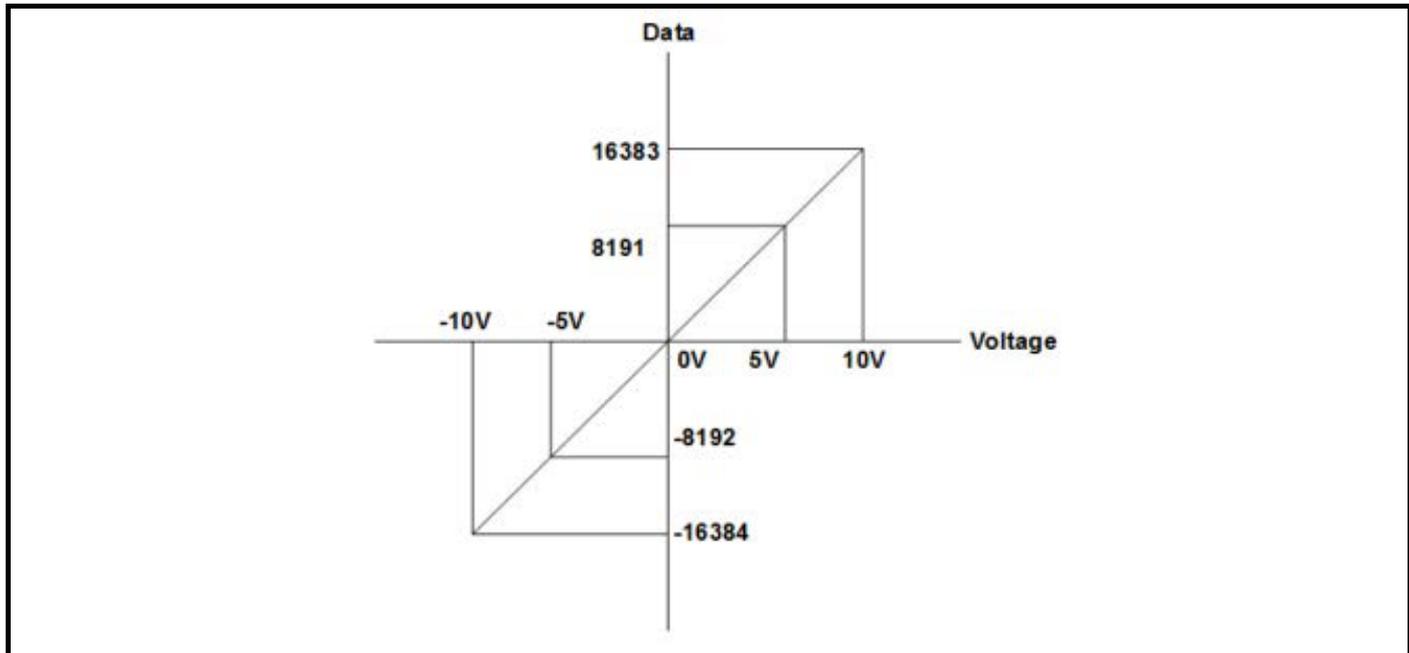
**Table 9-60 Voltage Range: 0 to 5 V**

Voltage	0.0 V	1.25 V	2.5 V	5.0 V
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



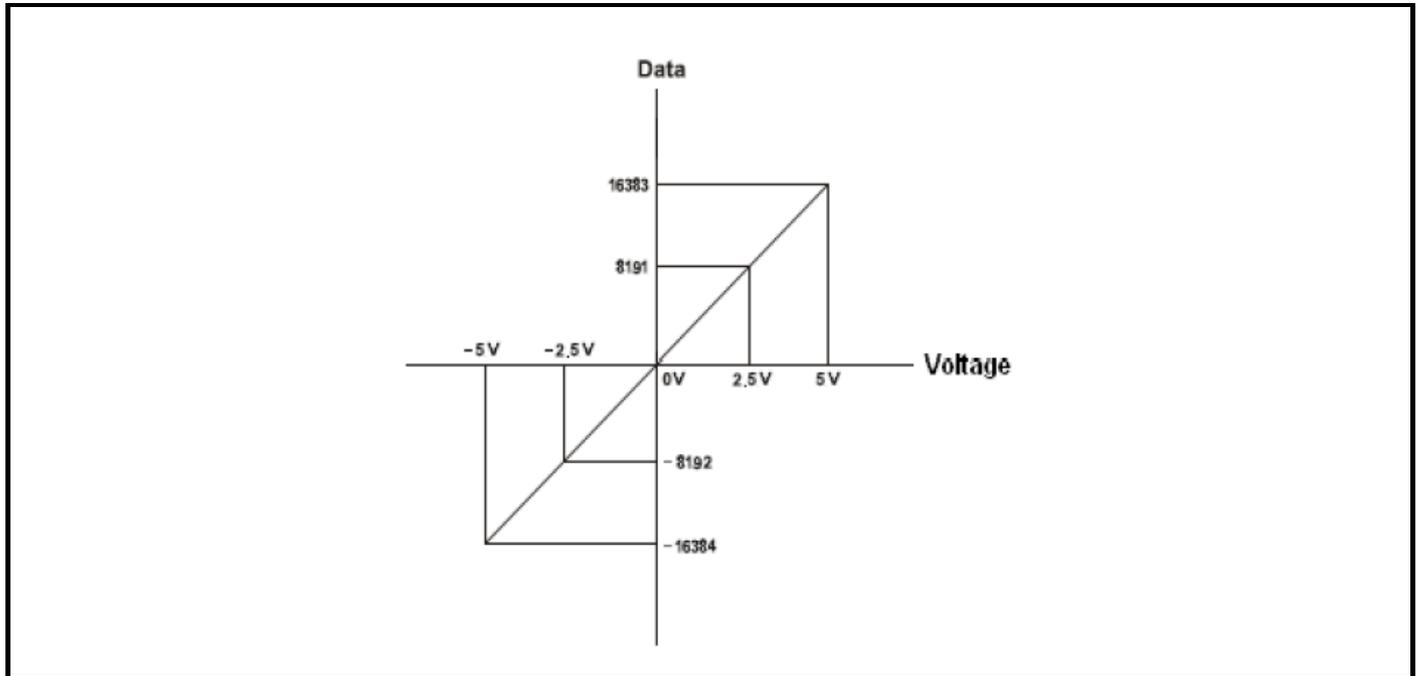
**Table 9-61 Voltage Range: -10 to 10 V**

Voltage	-10.0 V	-5.0 V	0 V	+5.0 V	+10.0 V
Data (Hex)	HC000	HE000	H0000	H1FFF	H3FFF



**Table 9-62 Voltage Range: -5 to 5 V**

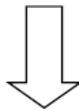
<b>Voltage</b>	<b>-5.0 V</b>	<b>-2.5 V</b>	<b>0 V</b>	<b>+2.5 V</b>	<b>+5.0 V</b>
Data (Hex)	HF800	HE000	H0000	H1FFF	H3FFF



### 9.69 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0				Analog Input Ch0 Low byte				
Byte 1				Analog Input Ch0 High byte				
Byte 2				Analog Input Ch1 Low byte				
Byte 3				Analog Input Ch1 High byte				
Byte 4				Analog Input Ch2 Low byte				
Byte 5				Analog Input Ch2 High byte				
Byte 6				Analog Input Ch3 Low byte				
Byte 7				Analog Input Ch3 High byte				

### 9.70 Parameter data

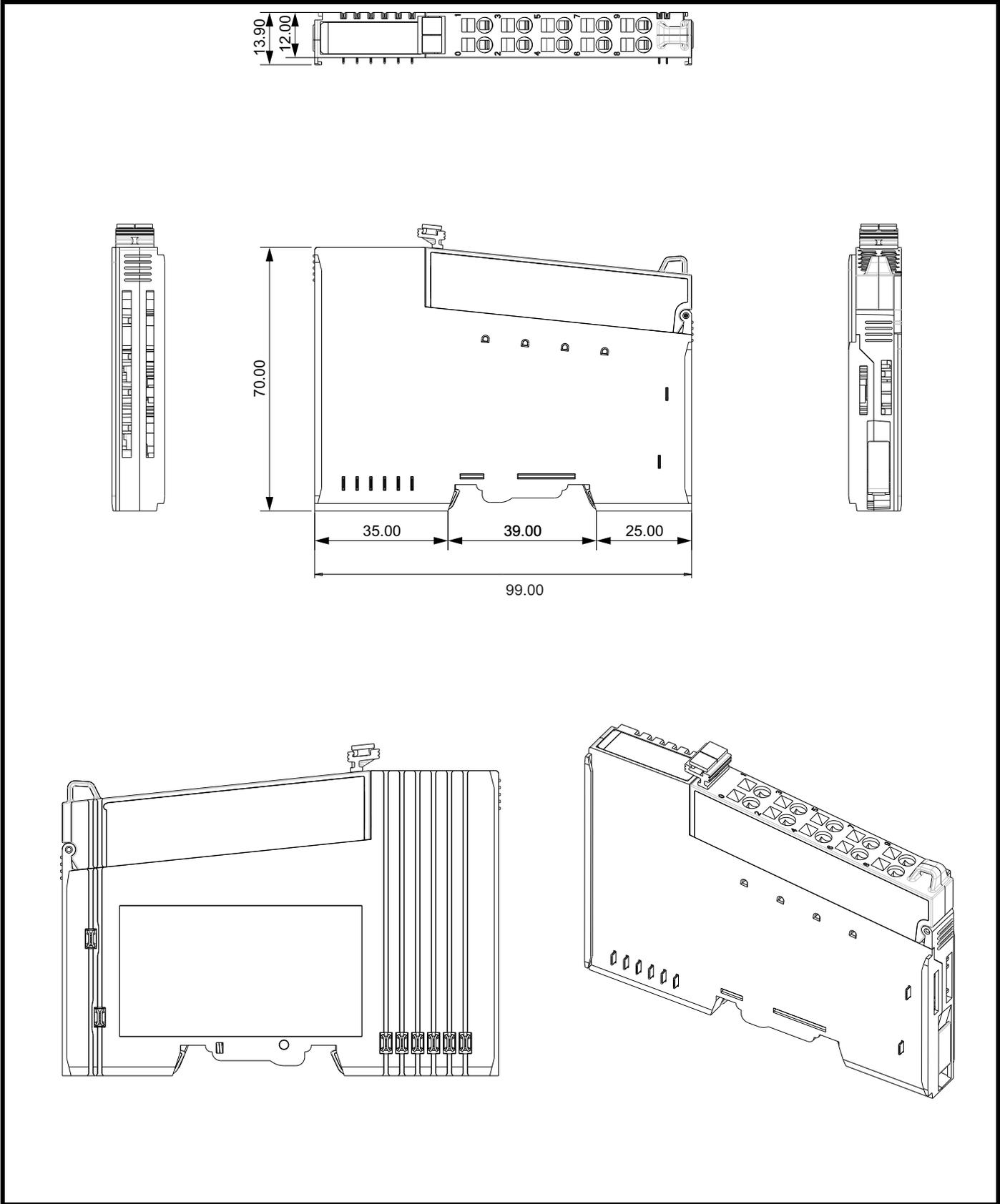
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0		Ch#0 Command (H00: 0 to 10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)						
Byte 1		Ch#1 Command (H00: 0 to 10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)						
Byte 2		Ch#2 Command (H00: 0 to 10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)						
Byte 3		Ch#3 Command (H00: 0 to 10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)						
Byte 4		Filter Time (H00: Default Filter (=20), H01: Fastest to H62: Slowest)						
Byte 5		Reserve						

## 9.71 Dimension

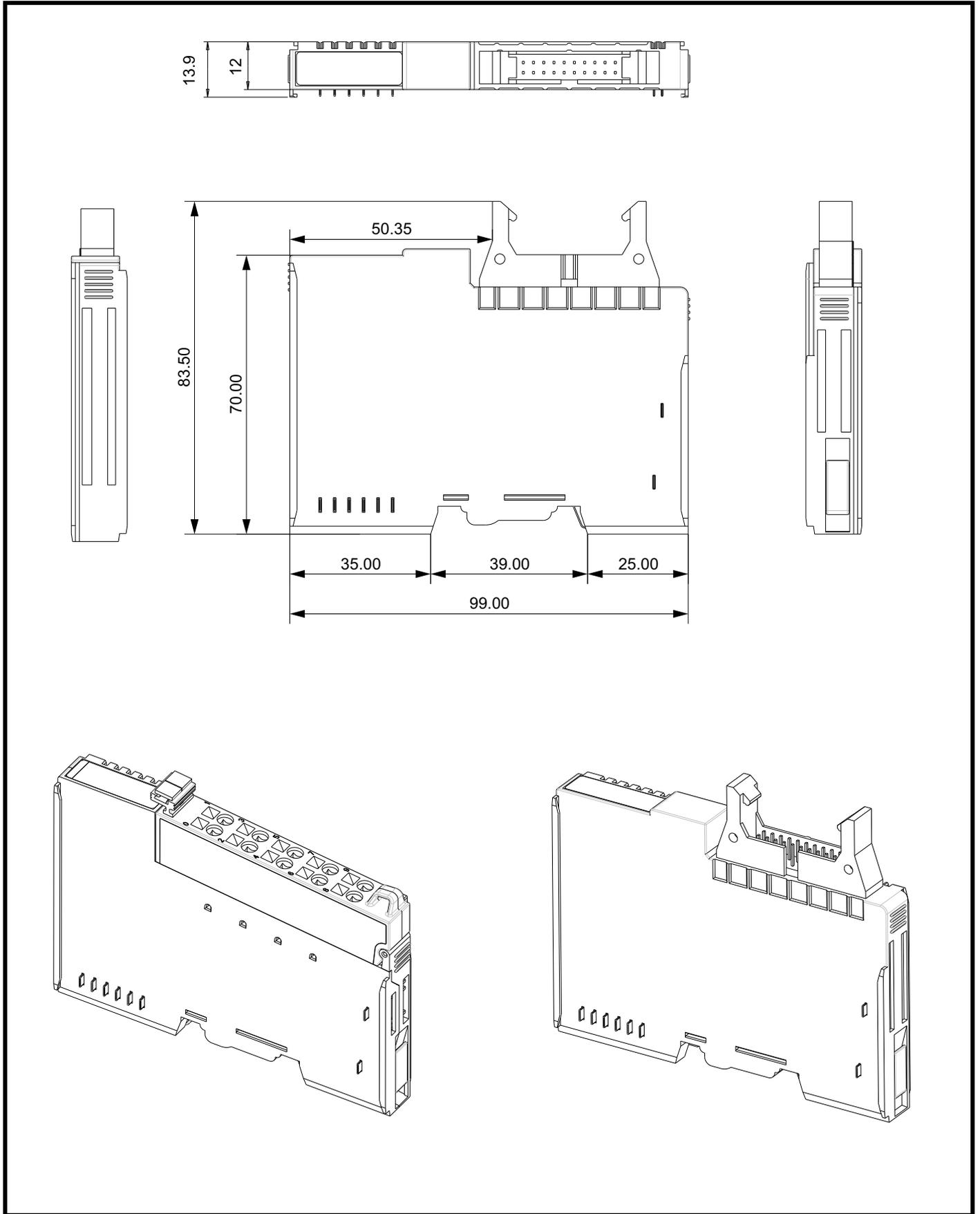
### 9.71.1 GT-3xx4 (RTB), GT-3xx8 (RTB)

(mm)



### 9.71.2 GT-3xxF (Connector)

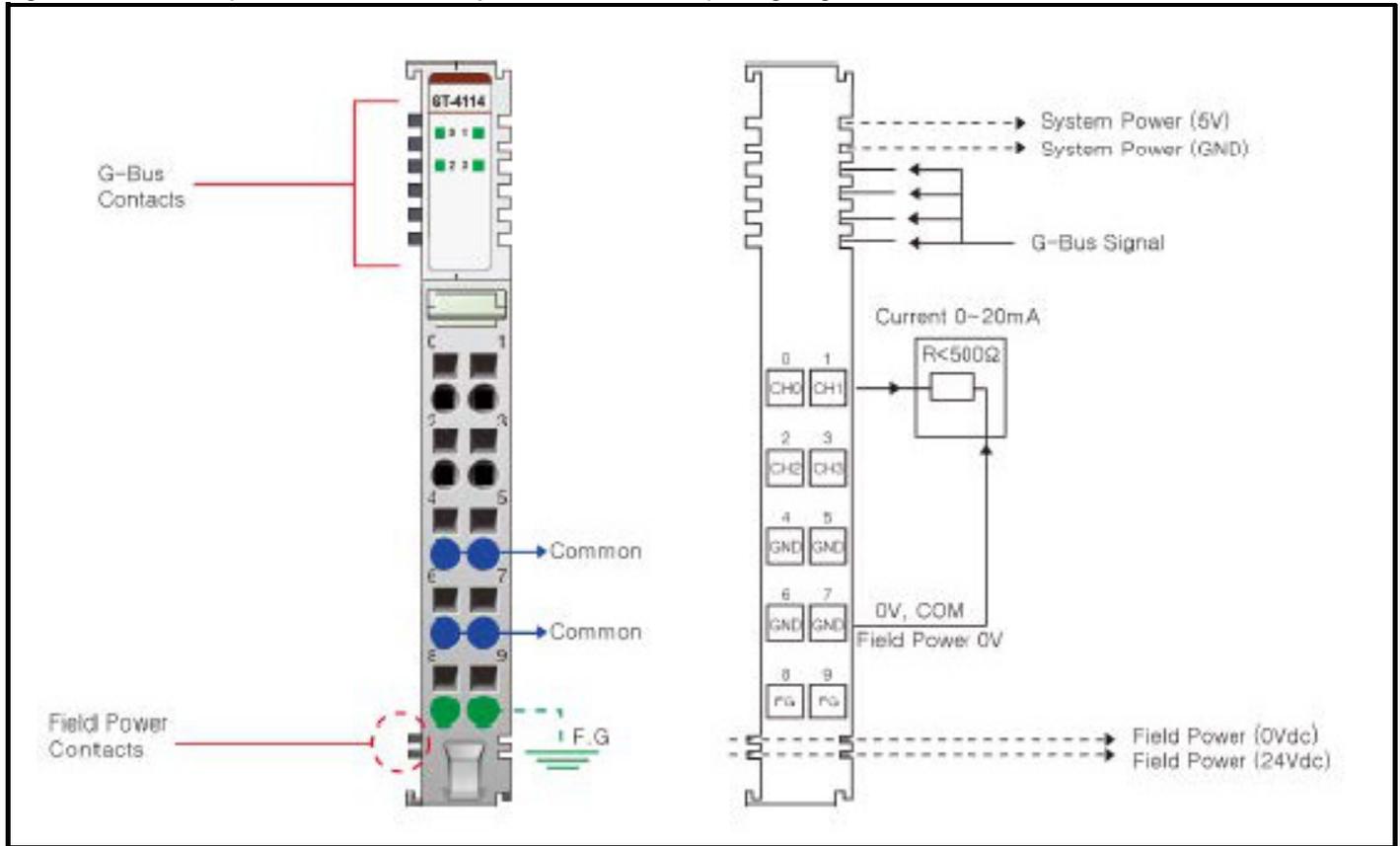
(mm)



# 10 Analog Output

## 10.1 GT-4114 Analog Output

Figure 10-1 GT-4114 (4 Channels, Current Output, 0 to 20 mA, 12 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

**Table 10-1 Specification**

Environmental specifications	
Operation Temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage Temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % Non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended, Non-Isolated Between Channels
Indicators (Logic side)	4 Green Output Status LEDs
Resolution in Ranges	12 bits: 4.88 uA / bit
Output Range	0 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 70 °C
Load Resistance	Max. 250 Ω *
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	Max. 150usec / All Channel
Field Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Protection Class	Variable/IP20
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic : Photocoupler Isolation Field Power : Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation: Max. 80 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

\* Operating temperature

-40 °C to 70 °C temperature range specification can be guaranteed under the following conditions.

Load Resistance : Min 100 Ω, Max 250 Ω

Otherwise, temperature specification can be guaranteed with -40 °C to 60 °C

## 10.2 GT-4114 LED Indicator

Table 10-2 LED Indicator

Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

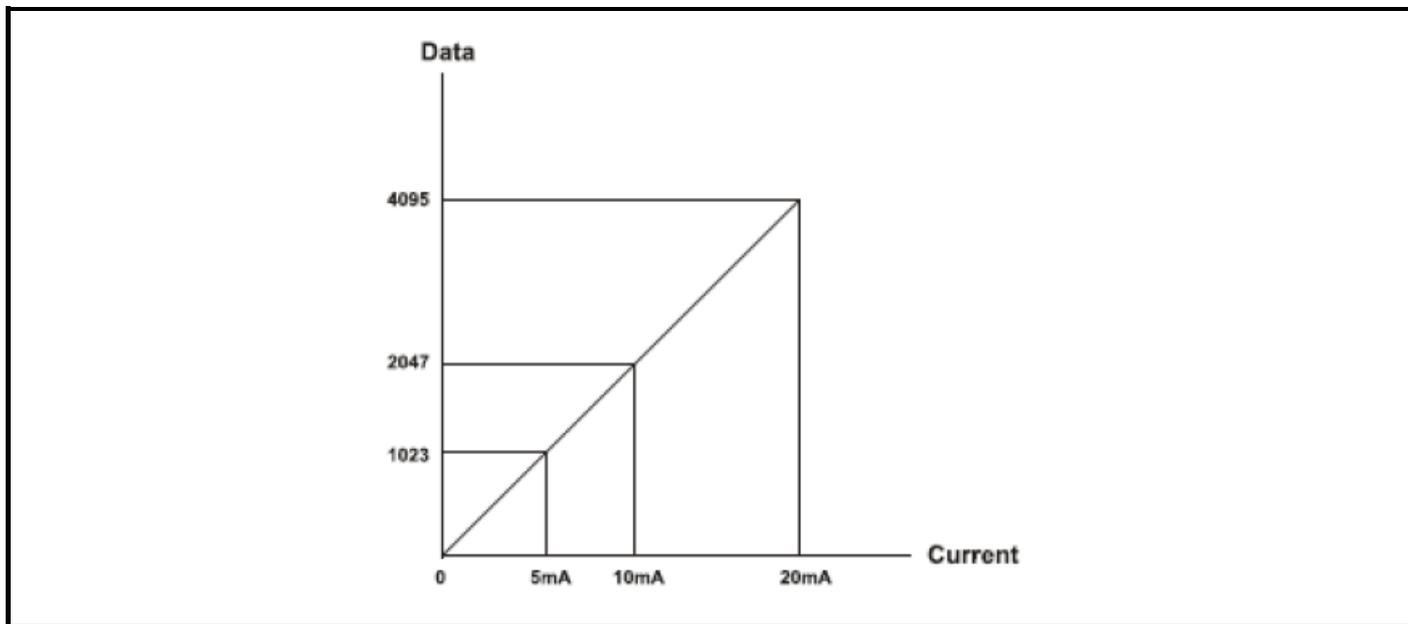
Table 10-3 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

## 10.3 Data Value / Current

Table 10-4 Current Range: 0 to 20 mA

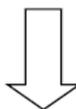
Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF



## 10.4 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8 byte Output Data

Analog Output Ch0							
Analog Output Ch1							
Analog Output Ch2							
Analog Output Ch3							

## 10.5 Parameter data

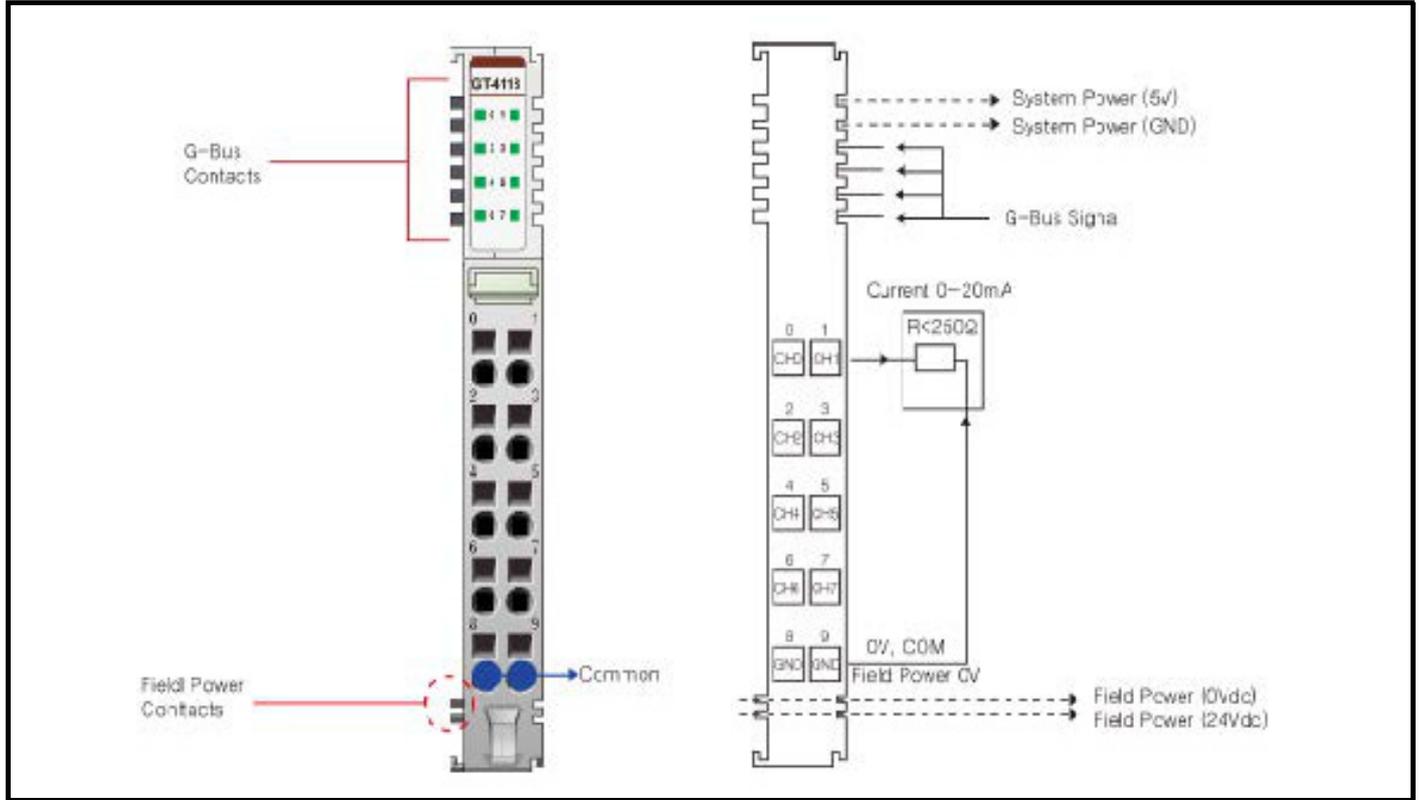
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not used							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler's EEPROM.

## 10.6 GT-4118 Analog Output

Figure 10-2 GT-4118 (4 Channels, 0 to 20 mA, 12 bits, 10 RTB)



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Analog Output Channel 4	Analog Output Channel 5	5
6	Analog Output Channel 6	Analog Output Channel 7	7
8	Analog Output Channel 8	Analog Output Channel 9	9

**Table 10-5 Environmental specification**

Environmental specifications	
Operating temperature	-40 °C to 60 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Channels Single Ended, Non-Isolated Between Channels
Indicators (Logic side)	8 Green Output Status LEDs
Resolution in Ranges	12 bits: 4.88 uA / bit
Output Current Range	0 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -40 °C, 60 °C
Load Impedance	Min. 100 Ω / Max. 250 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	Max. 250 usec / All Channel
Field Calibration	Not Required
Common Type	2 Common, Field Power 0 V is Common (AGND)
General specifications	
Shock Operation	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation Power Dissipation : Max. 80 mA @ 24 Vdc
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 10.7 GT-4118 LED Indicator

Table 10-6 LED Indicator

Module	LED number	LED function / description	LED colour
	0	Output Channel 0	Green
	1	Output Channel 1	
	2	Output Channel 2	
	3	Output Channel 3	
	4	Output Channel 4	
	5	Output Channel 5	
	6	Output Channel 6	
	7	Output Channel 7	

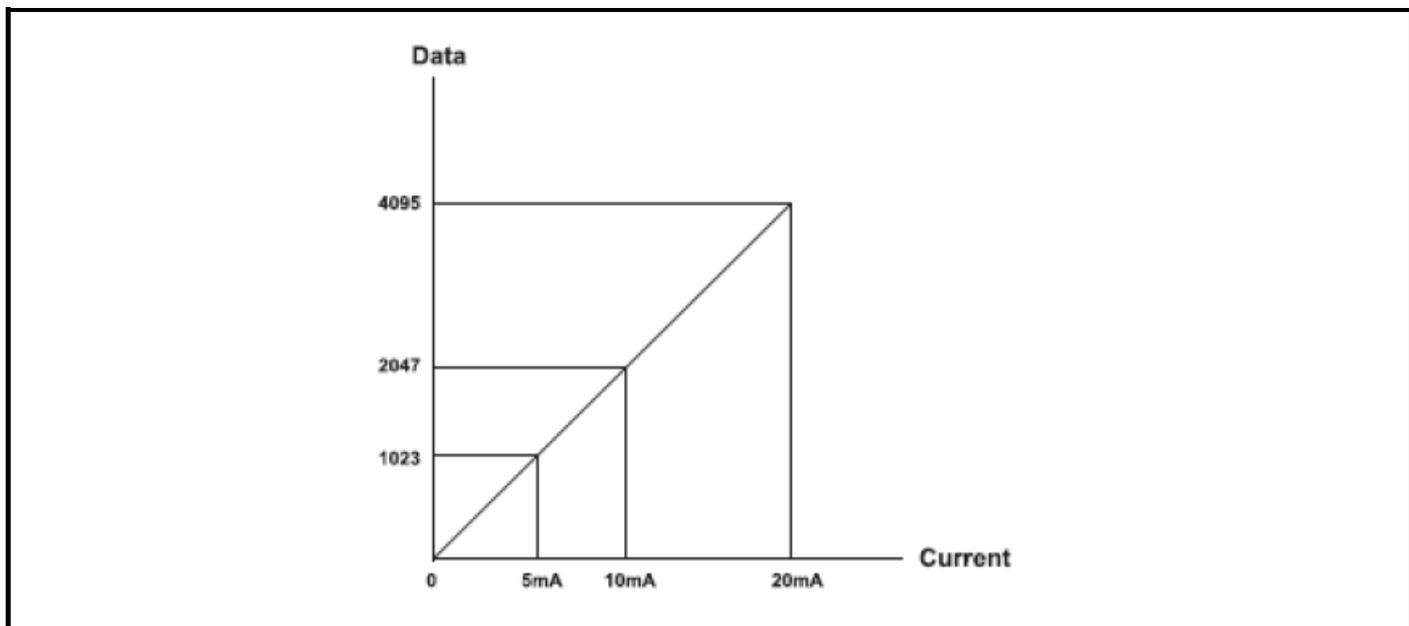
Table 10-7 Channel Status LED

Status	LED	To indicate
Normal Operation	No Output Channel Off	No Output
	Output Channel Green	Output
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

## 10.8 Data Value / Current

Table 10-8 Current Range: 0 to 20 mA

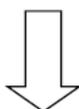
Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF



## 10.9 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0				Analog Output Ch0 Low byte				
Byte 1				Analog Output Ch0 High byte				
Byte 2				Analog Output Ch1 Low byte				
Byte 3				Analog Output Ch1 High byte				
Byte 4				Analog Output Ch2 Low byte				
Byte 5				Analog Output Ch2 High byte				
Byte 6				Analog Output Ch3 Low byte				
Byte 7				Analog Output Ch3 High byte				
Byte 8				Analog Output Ch4 Low byte				
Byte 9				Analog Output Ch4 High byte				
Byte 10				Analog Output Ch5 Low byte				
Byte 11				Analog Output Ch5 High byte				
Byte 12				Analog Output Ch6 Low byte				
Byte 13				Analog Output Ch6 High byte				
Byte 14				Analog Output Ch7 Low byte				
Byte 15				Analog Output Ch7 High byte				



- Output Module Data -16 byte Output Data

	Analog Output Ch0
	Analog Output Ch1
	Analog Output Ch2
	Analog Output Ch3
	Analog Output Ch4
	Analog Output Ch5
	Analog Output Ch6
	Analog Output Ch7

## 10.10 Parameter data

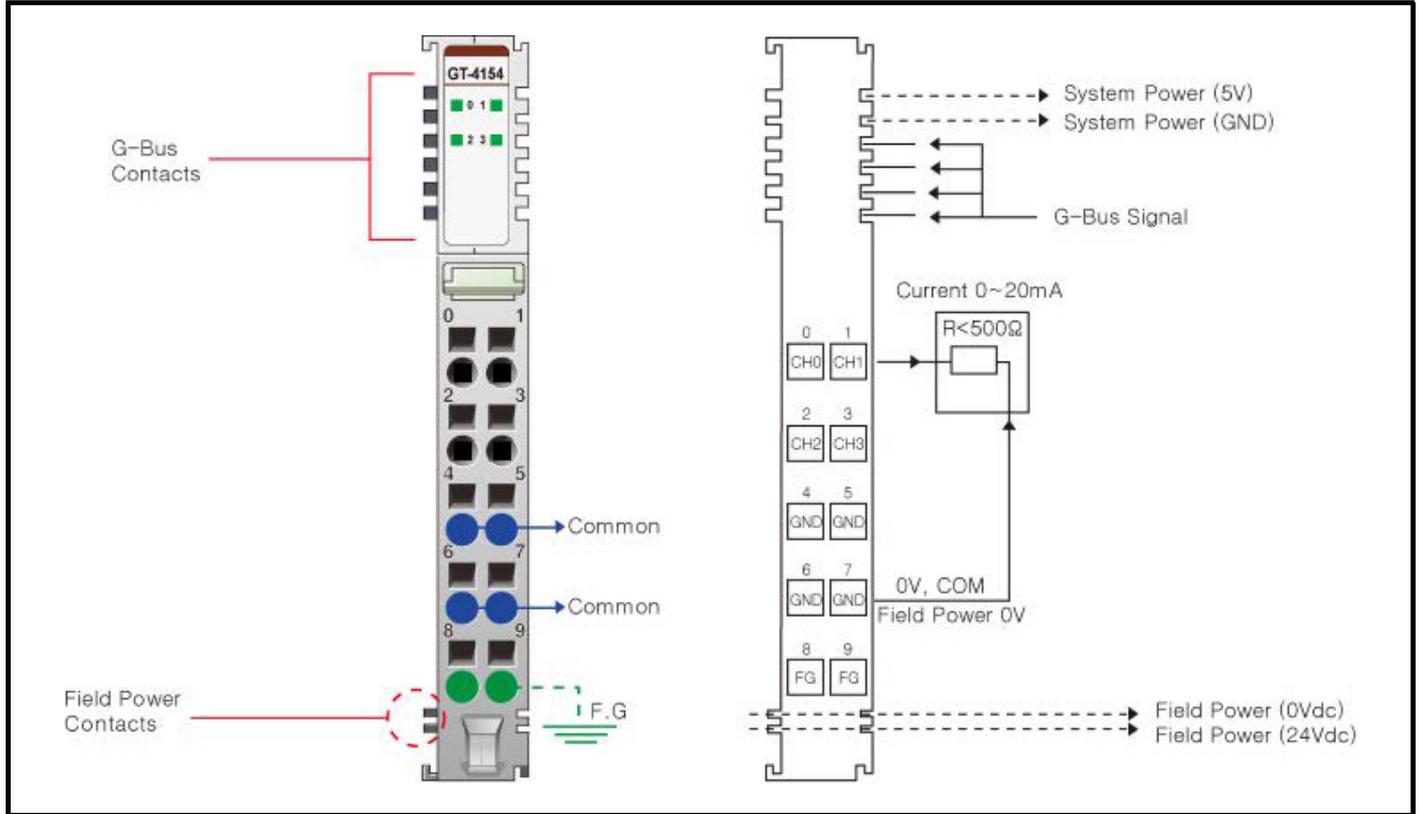
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Fault Action for channel 7		Fault Action for channel 6		Fault Action for channel 5		Fault Action for channel 4	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler's EEPROM.

### 10.11 GT-4154 Analog Output

Figure 10-3 GT-4154 (4 Channels, 0 to 20 mA, 16 bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

**Table 10-9 Specification**

Environmental specifications	
Operation temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended
Indicators (Logic Side)	4 Green Output Status LEDs
Resolution in Ranges	16 Bits (Include Sign) 15 bits: 0.61uA / bit
Output Range	0 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -25 °C, 60 °C
Load Resistance	Max. 250 Ω *
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	Max. 150usec / All Channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Protection Class	Variable/IP20
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic : Photocoupler Isolation Field Power : Non-Isolation
Field Power	Supply Voltage : 24 Vdc nominal Voltage Range : 18 to 32 Vdc Power Dissipation : Max. 80 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

\* Operating temperature

-40 °C to 70 °C temperature range specification can be guaranteed under the following conditions.

Load Resistance : Min 100 Ω, Max 250 Ω

Otherwise, temperature specification can be guaranteed with -40 °C to 60 °C

## 10.12 GT-4154 LED Indicator

Table 10-10 LED Indicator

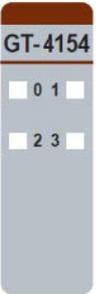
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

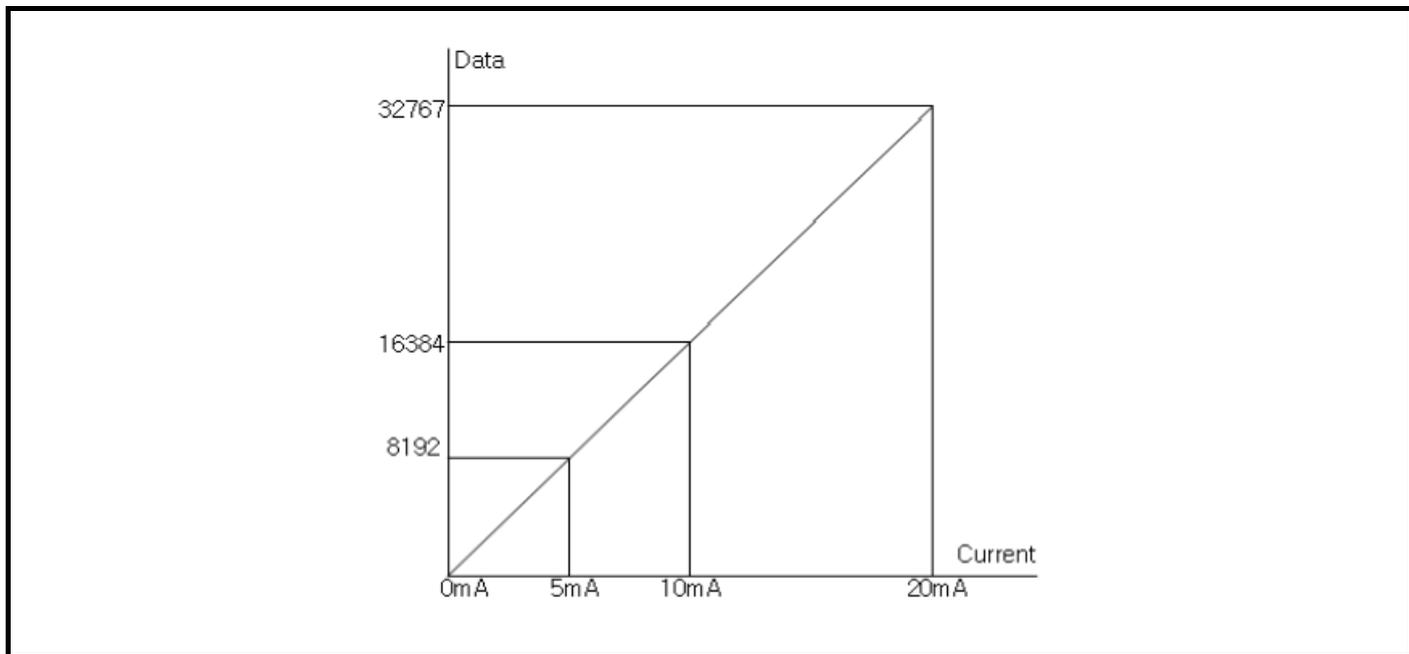
Table 10-11 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat Green and Off	Field power is unconnected

## 10.13 Data Value / Current

Table 10-12 Current Range: 0 to 20 mA

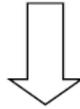
Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H2000	H4000	H7FFF



### 10.14 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8 byte Output Data

Analog Output Ch0							
Analog Output Ch1							
Analog Output Ch2							
Analog Output Ch3							

### 10.15 Parameter data

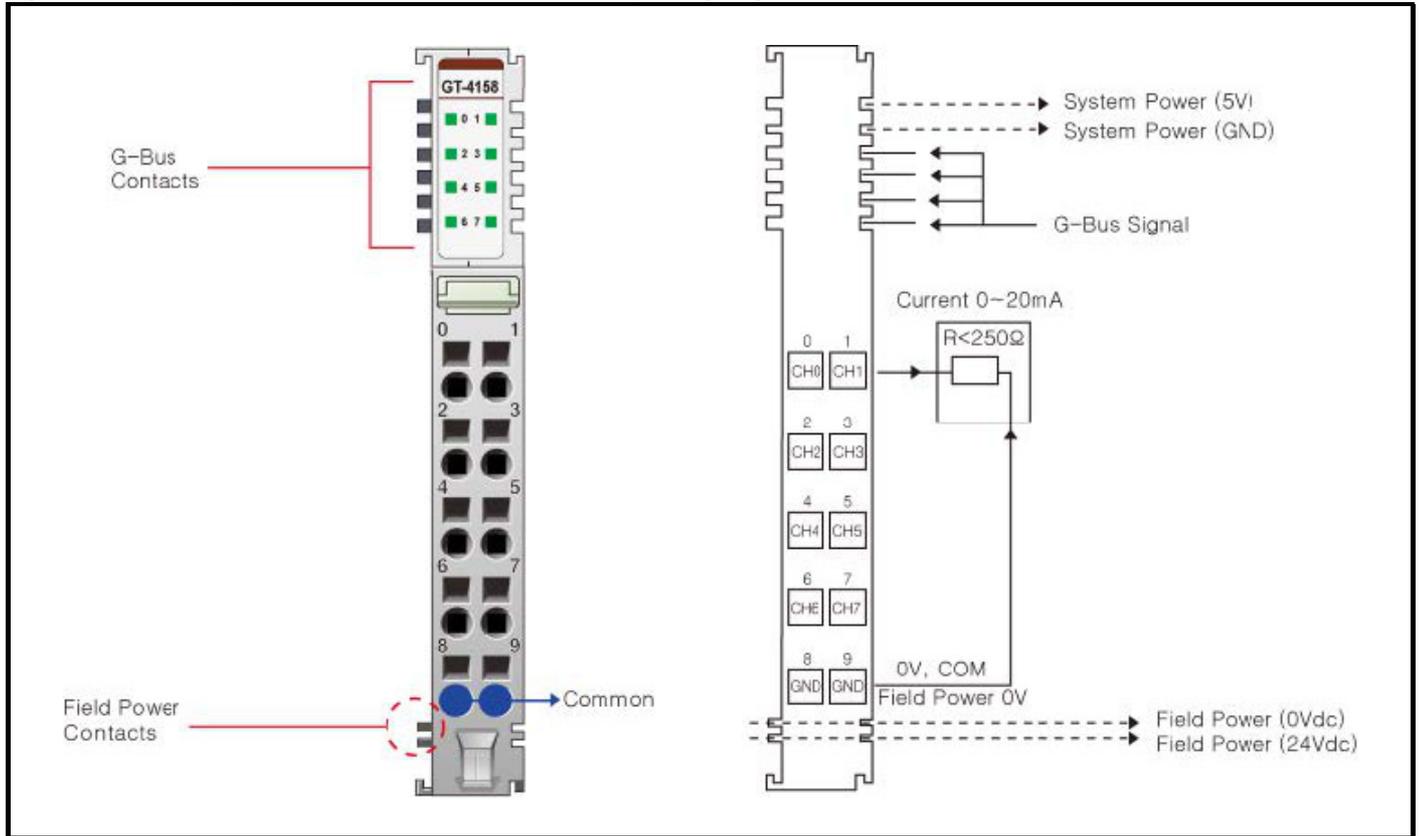
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not Used							
Byte 2	Fault Value Low Byte							
Byte 3	Fault Value High Byte							

All values are stored in Bus Coupler's EEPROM.

## 10.16 GT-4158 Analog Output

Figure 10-4 GT-4158 (4 Channels, 0 to 20 mA, 16 bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Analog Output Channel 4	Analog Output Channel 5	5
6	Analog Output Channel 6	Analog Output Channel 7	7
8	Output Channel Common (AGND)	Output Channel Common (AGND)	9

**Table 10-13 Specification**

Environmental specifications	
Operation temperature	-40 °C to 60 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Channels Single Ended
Indicators (Logic side)	8 Green Output Status LEDs
Resolution in Ranges	16 Bits (Include Sign) 15 bits: 0.61 uA / bit
Output Current Range	0 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 60 °C
Load Resistance	Min. 100 Ω ,Max. 250 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	Max. 250usec / All Channel
Field Calibration	Not Required
Common Type	2 Common, Field Power 0 V is Common (AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A1: 2011
Protection Class	Variable/IP20
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation : Max. 130 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 10.17 GT-4158 LED Indicator

Table 10-14 LED Indicator

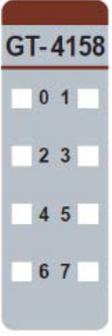
Module	LED number	LED function / description	LED colour
 <p>The image shows a vertical module with a red top section labeled 'GT-4158'. Below it are two columns of three LEDs each, numbered 0-7. LEDs 0-3 are on the left, and LEDs 4-7 are on the right.</p>	0	Output Channel 0	Green
	1	Output Channel 1	
	2	Output Channel 2	
	3	Output Channel 3	
	4	Output Channel 4	
	5	Output Channel 5	
	6	Output Channel 6	
	7	Output Channel 7	

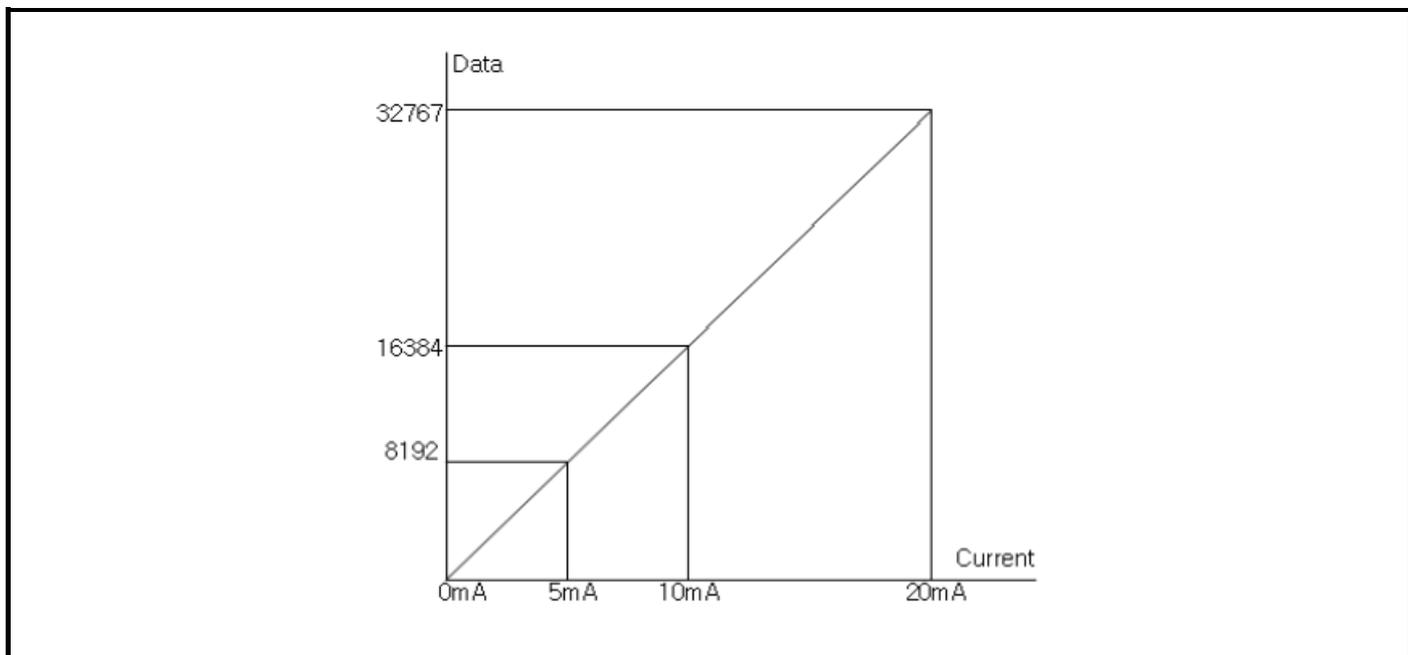
Table 10-15 Channel Status LED

Status	LED	To indicate
Normal Operation	No Output Channel Off	No Output
	Output Channel Green	Output
Field Power Error	All Channel Repeat Green and Off	Field power is unconnected

## 10.18 Data Value / Current

Table 10-16 Current Range: 0 to 20 mA

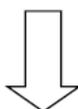
Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H2000	H4000	H7FFF



## 10.19 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0				Analog Output Ch0 Low byte				
Byte 1				Analog Output Ch0 High byte				
Byte 2				Analog Output Ch1 Low byte				
Byte 3				Analog Output Ch1 High byte				
Byte 4				Analog Output Ch2 Low byte				
Byte 5				Analog Output Ch2 High byte				
Byte 6				Analog Output Ch3 Low byte				
Byte 7				Analog Output Ch3 High byte				
Byte 8				Analog Output Ch4 Low byte				
Byte 9				Analog Output Ch4 High byte				
Byte 10				Analog Output Ch5 Low byte				
Byte 11				Analog Output Ch5 High byte				
Byte 12				Analog Output Ch6 Low byte				
Byte 13				Analog Output Ch6 High byte				
Byte 14				Analog Output Ch7 Low byte				
Byte 15				Analog Output Ch7 High byte				



- Output Module Data - 8 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3
Analog Output Ch4
Analog Output Ch5
Analog Output Ch6
Analog Output Ch7

## 10.20 Parameter data

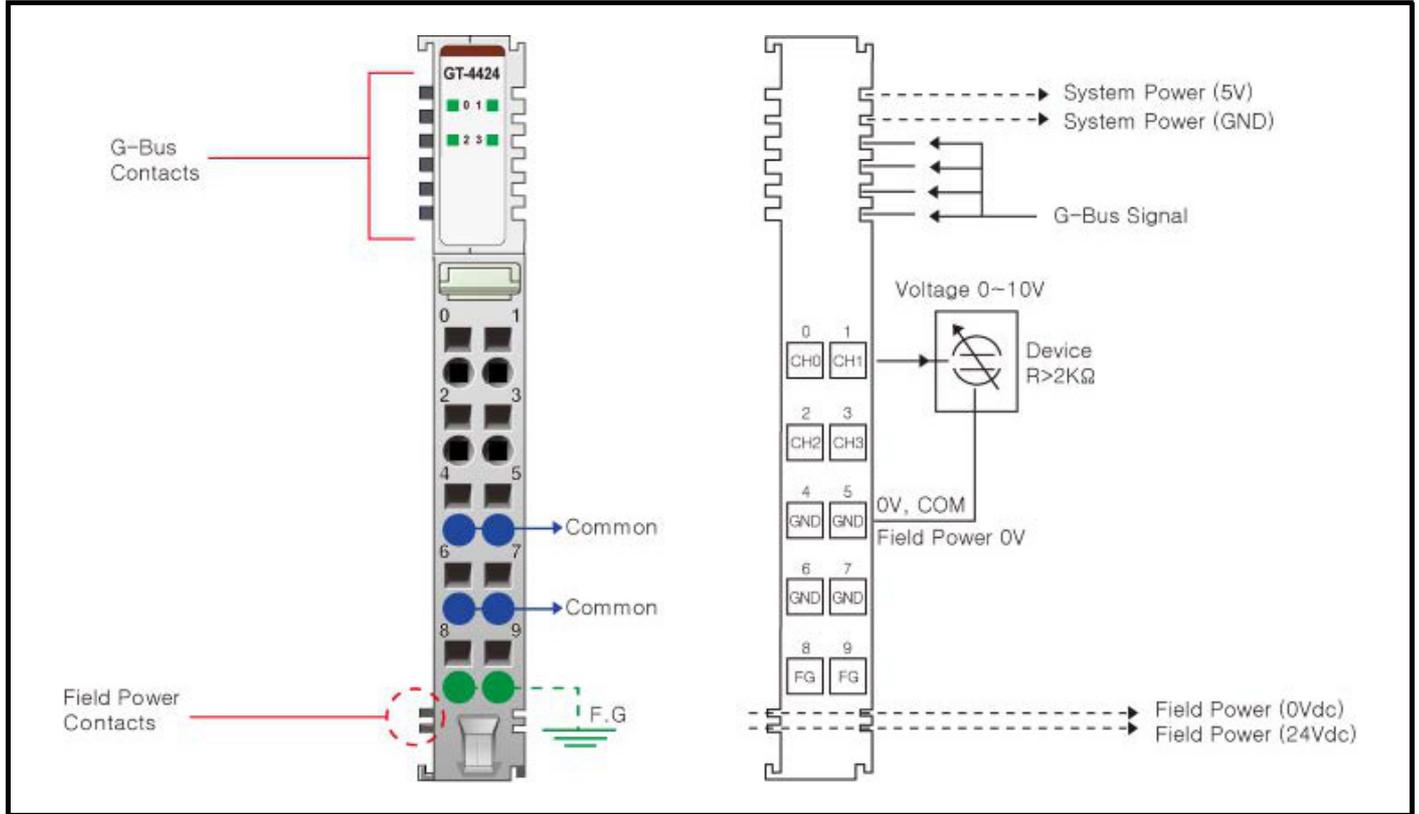
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Fault Action for channel 7		Fault Action for channel 6		Fault Action for channel 5		Fault Action for channel 4	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 2	Fault Value Low Byte							
Byte 3	Fault Value High Byte							

All values are stored in Bus Coupler's EEPROM.

## 10.21 GT-4424 Analog Output

Figure 10-5 GT-4424 (4 Channels, Voltage Output, 0 to 10 Vdc, 12 bits, 10 RTB) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

**Table 10-17 Specification**

Environmental specifications	
Operation temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended, Non-Isolated Between Channels
Indicators	4 Green Output Status LEDs
Resolution in Ranges	12 bits: 2.44 mV / bit
Output Voltage Range	0 to 10 Vdc
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 70 °C
Load Impedance	Max. 2 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	Max. 150 usec/ All channels
Field Calibration	Not Required
Common Type	4 Channels, Field Power 0 V is Common (AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/AII: 2011
Protection Class	Variable/IP20
Installation position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation : Max. 35 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 10.22 GT-4424 LED Indicator

Table 10-18 LED Indicator

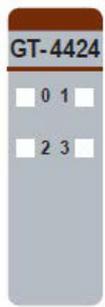
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

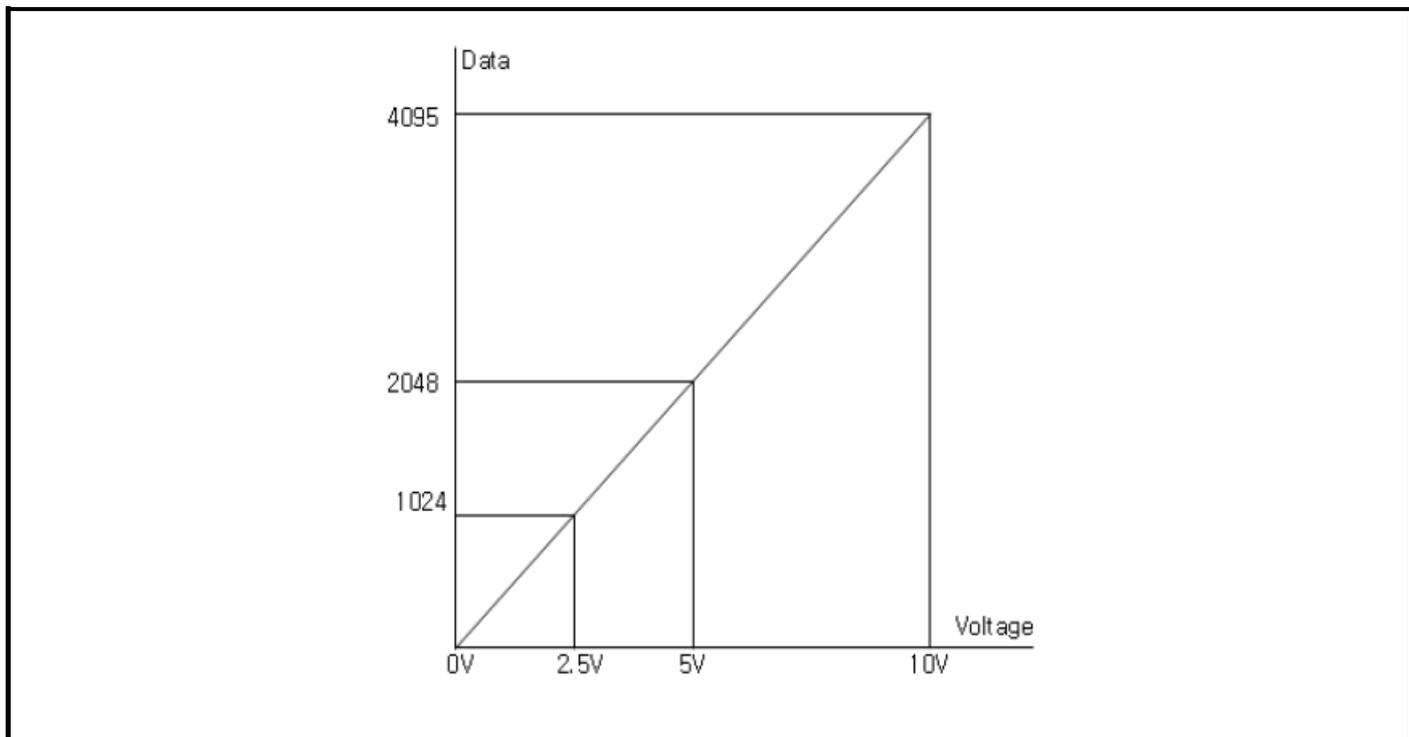
Table 10-19 Channel Status LED

Status	LED	To indicate
Normal Operation	No Output Channel Off	No Output
	Output Channel Green	Output
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

## 10.23 Data Value / Voltage

Table 10-20 Voltage Range: 0 to 10 Vdc

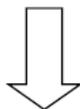
Current	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



## 10.24 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8byte Output Data

Analog Output Ch0							
Analog Output Ch1							
Analog Output Ch2							
Analog Output Ch3							

## 10.25 Parameter data

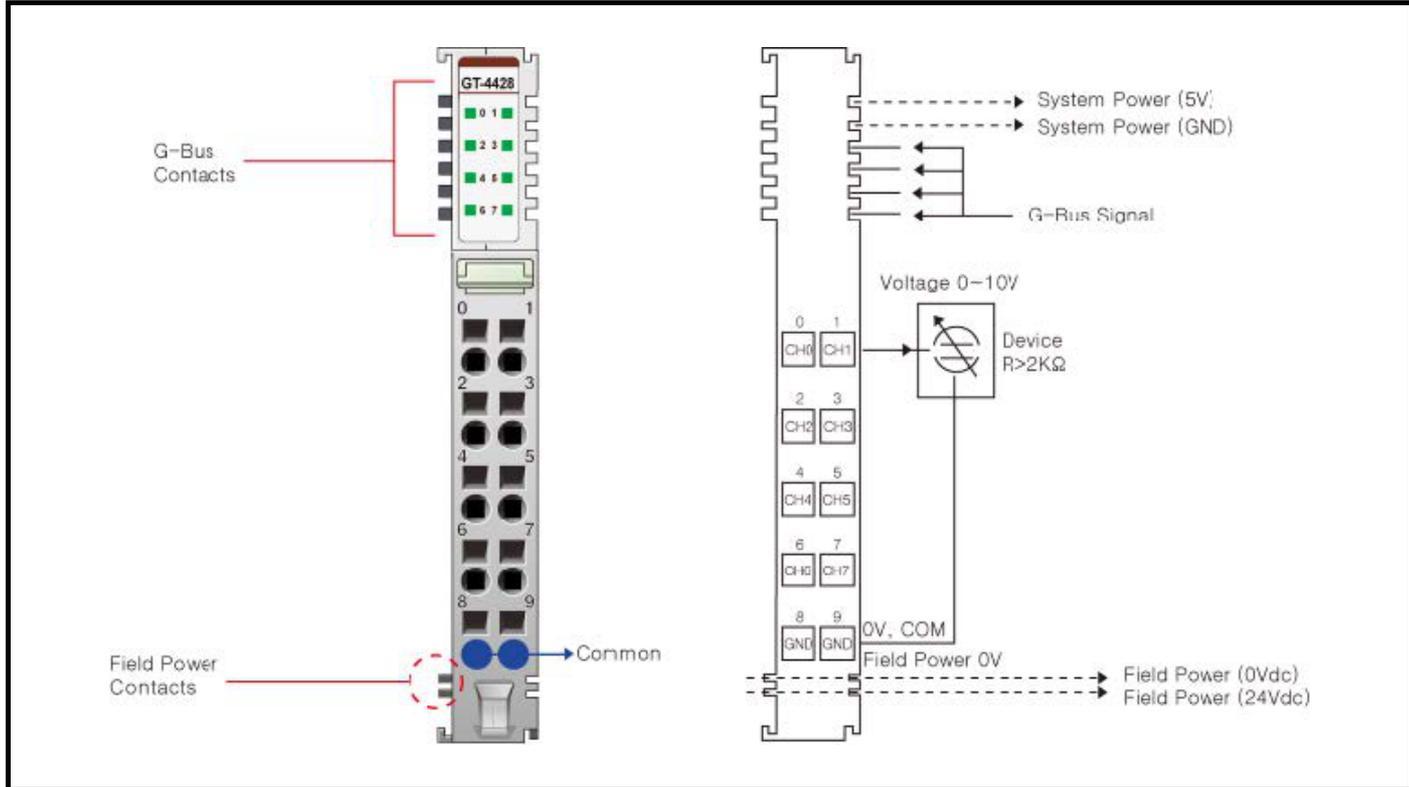
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not Used							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler's EEPROM.

## 10.26 GT-4428 Analog Output

Figure 10-6 GT-4428 (8 Channels, Voltage Output, 0 to 10 V, 12 bits, 10 RTB)



Pin number	Signal Description	Signal Description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Analog Output Channel 4	Analog Output Channel 5	5
6	Analog Output Channel 6	Analog Output Channel 7	7
8	Output Channel Common (AGND)	Output Channel Common (AGND)	9

**Table 10-21 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Channels Single Ended, Non-Isolated Between Channels
Indicators	8 Green Output Status LEDs
Resolution in Ranges	12 bits: 4.88 uA / bit
Output Range	0 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 60 °C
Load Impednce	Min. 100 Ω / Max. 250 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	Max. 250 usec / All Channel
Field Calibration	Not Required
Common Type	2 Common, Field Power 0 V is Common (AGND)
General specifications	
Shock Operation	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation : Max. 80 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

## 10.27 GT-4428 LED Indicator

Table 10-22 LED Indicator

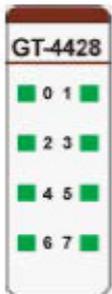
Module	LED number	LED function / description	LED colour
	0	Output Channel 0	Green
	1	Output Channel 1	
	2	Output Channel 2	
	3	Output Channel 3	
	4	Output Channel 4	
	5	Output Channel 5	
	6	Output Channel 6	
	7	Output Channel 7	

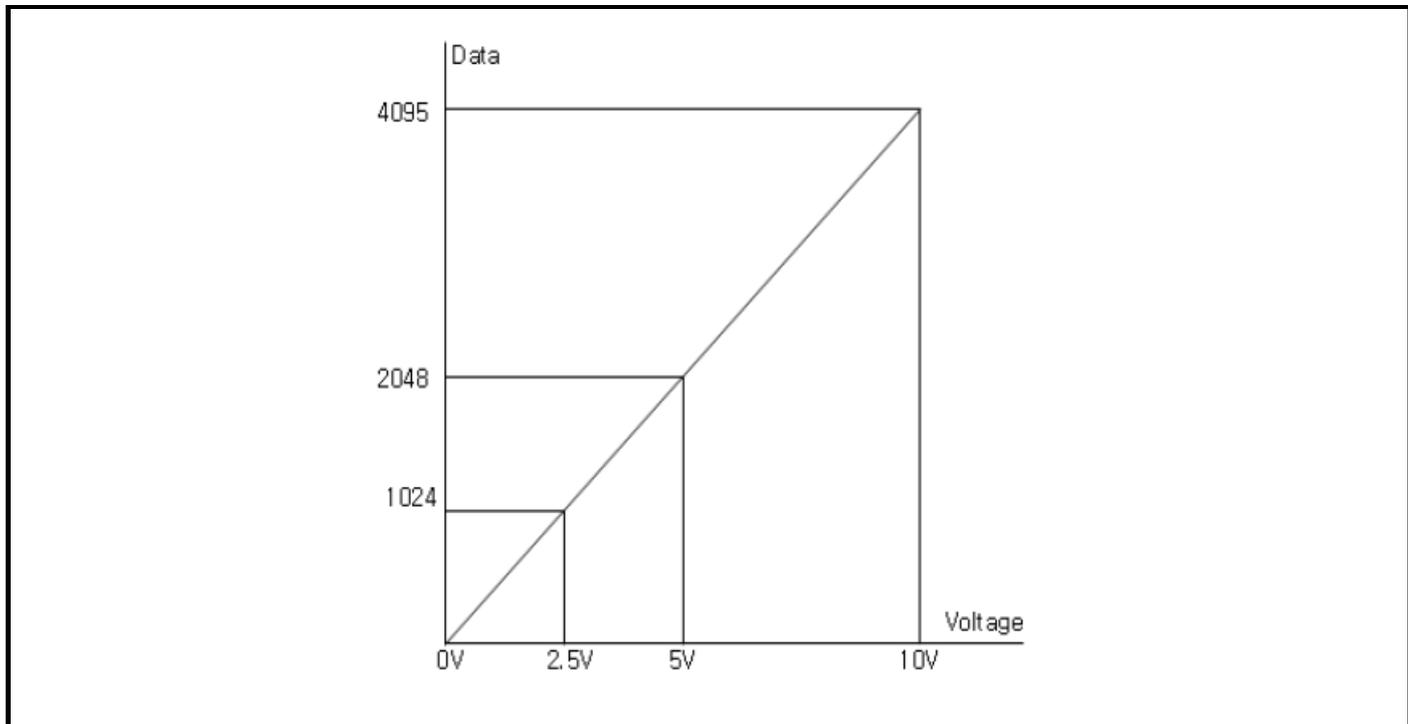
Table 10-23 Channel Status LED

Status	LED	To indicate
Normal Operation	No Output Off	No Output
	Output Channel Green	Output
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

## 10.28 Data Value / Voltage

Table 10-24 Voltage Range: 0 to 10 Vdc

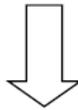
Voltage	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



## 10.29 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0				Analog Output Ch0 Low byte				
Byte 1				Analog Output Ch0 High byte				
Byte 2				Analog Output Ch1 Low byte				
Byte 3				Analog Output Ch1 High byte				
Byte 4				Analog Output Ch2 Low byte				
Byte 5				Analog Output Ch2 High byte				
Byte 6				Analog Output Ch3 Low byte				
Byte 7				Analog Output Ch3 High byte				
Byte 8				Analog Output Ch4 Low byte				
Byte 9				Analog Output Ch4 High byte				
Byte 10				Analog Output Ch5 Low byte				
Byte 11				Analog Output Ch5 High byte				
Byte 12				Analog Output Ch6 Low byte				
Byte 13				Analog Output Ch6 High byte				
Byte 14				Analog Output Ch7 Low byte				
Byte 15				Analog Output Ch7 High byte				



- Output Module Data -16 byte Output Data

	Analog Output Ch0
	Analog Output Ch1
	Analog Output Ch2
	Analog Output Ch3
	Analog Output Ch4
	Analog Output Ch5
	Analog Output Ch6
	Analog Output Ch7

## 10.30 Parameter data

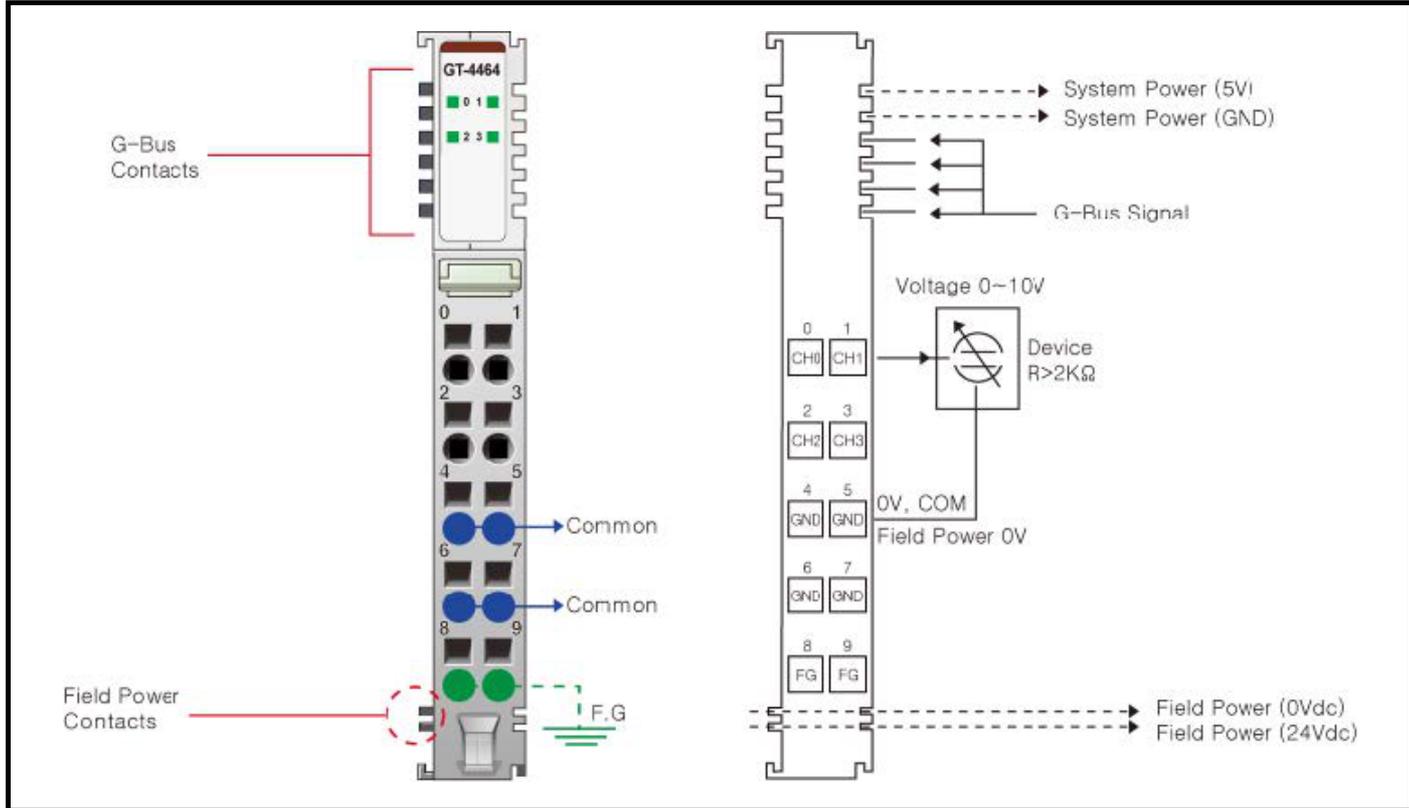
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Fault Action for channel 7		Fault Action for channel 6		Fault Action for channel 5		Fault Action for channel 4	
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler's 7 EEPROM.

### 10.31 GT-4464 Analog Output

Figure 10-7 GT-4464 (4 Channels, Voltage Output, 0 to 10 Vdc, 16 bits, 10 RTB) wiring diagram



Pin number	Signal Description	Signal Description	Pin number
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

**Table 10-25 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended, Non-Isolated Between Channels
Indicators	4 Green Output Status LEDs
Resolution in Ranges	16 bit (Include Sign) 15 bits: 0.31 mV / bit
Output Range	0 to 10 Vdc
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 70 °C
Load Resistance	Max. 2 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	Max. 150usec / All Channel
Field Calibration	Not Required
Common Type	4 Channels , Field Power 0 V is Common (AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Protection Class	Variable/IP20
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation: Max. 35 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

### 10.32 GT-4464 LED Indicator

Table 10-26 LED Indicator

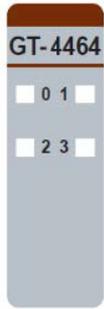
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

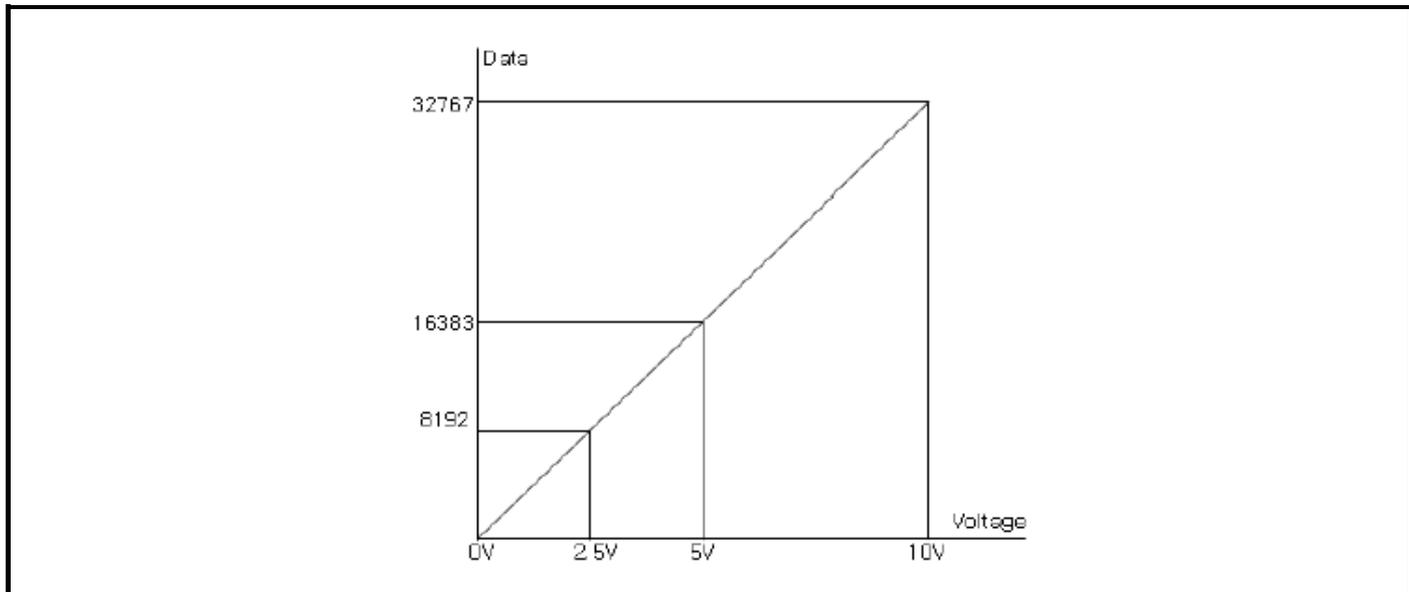
Table 10-27 Channel Status LED

Status	LED	To indicate
Normal Operation	No Output Channel Off	No Output
	Output Channel Green	Output
Field Power Error	All Channel Repeat Green and Off	Field power is unconnected

### 10.33 Data Value / Voltage

Table 10-28 Voltage Range: 0 to 10 Vdc

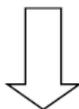
Voltage	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



### 10.34 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8byte Output Data

Analog Output Ch0							
Analog Output Ch1							
Analog Output Ch2							
Analog Output Ch3							

### 10.35 Parameter data

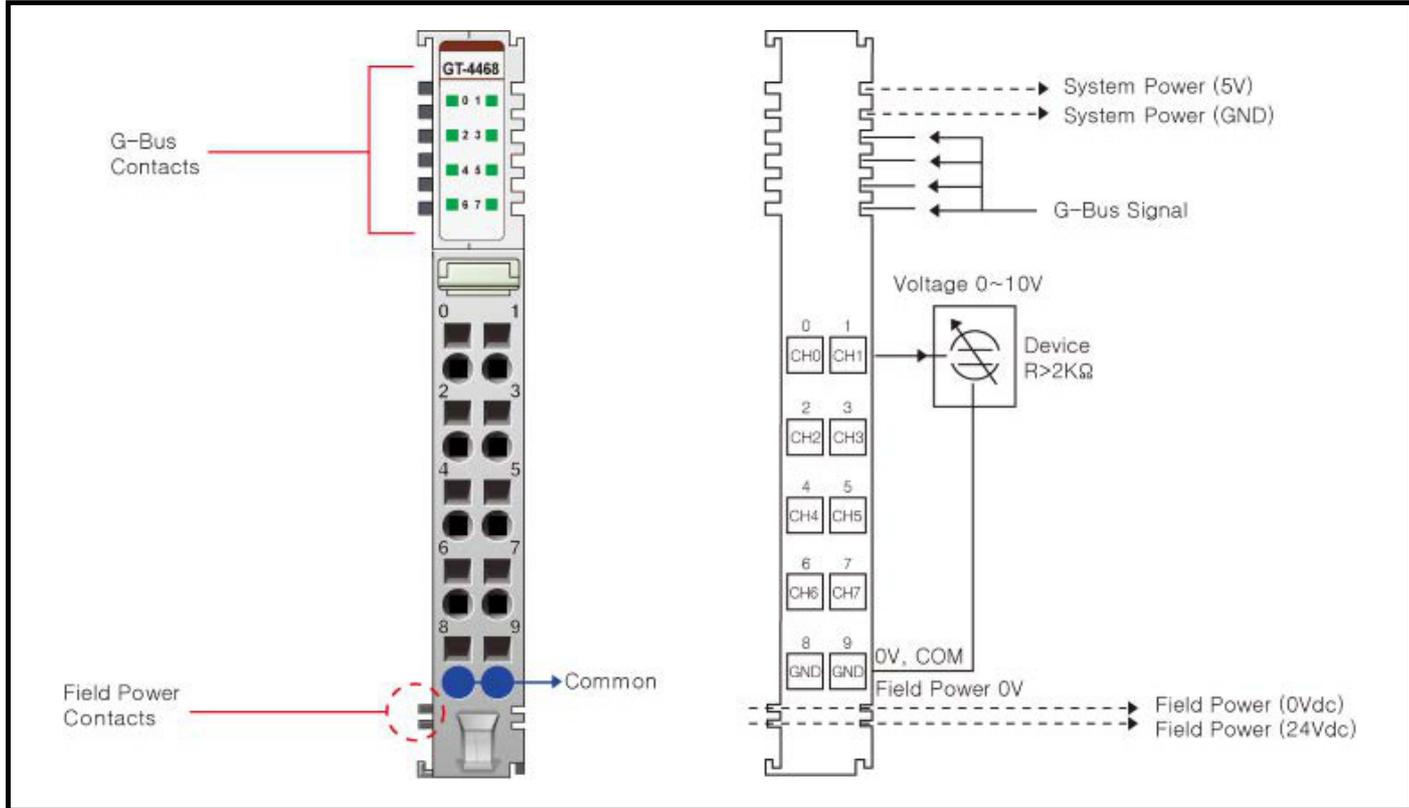
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not Used							
Byte 2	Fault Value Low Byte							
Byte 3	Fault Value High Byte							

All values are stored in Bus Coupler's EEPROM.

### 10.36 GT-4468 Analog Output

Figure 10-8 GT-4468 (8 Channels, Voltage Output, 0 to 10 Vdc, 16 bits, RTB) wiring diagram



Pin number	Signal Description	Signal Description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Analog Output Channel 4	Analog Output Channel 5	5
6	Analog Output Channel 6	Analog Output Channel 7	7
8	Output Channel Common (AGND)	Output Channel Common (AGND)	9

**Table 10-29 Specification**

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Channels Single ended
Indicators	8 Green Output Status LEDs
Resolution in Ranges	16 bit (Include Sign) 15 bits: 0.31 mV / bit
Output Range	0 to 10 Vdc
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -40 °C, 70 °C
Load Resistance	Max. 2 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	Max. 250 usec / All Channel
Field Calibration	Not Required
Common Type	2 Common, Field Power 0 V is Common (AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Based on IEC 60068-2-6 Sine Vibration <ul style="list-style-type: none"> <li>• 5 to 25 Hz: ± 1.6 mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> Random Vibration <ul style="list-style-type: none"> <li>• 10 to 40 Hz: 0.0125 g<sup>2</sup>/ Hz</li> <li>• 40 to 100 Hz: 0.0125 → 0.002 g<sup>2</sup>/ Hz</li> <li>• 100 to 500 Hz: 0.002 g<sup>2</sup>/ Hz</li> <li>• 500 to 2000 Hz: 0.002 → 1.3 x 10<sup>-4</sup>g<sup>2</sup>/ Hz</li> <li>• Test time: 1 hr for each test</li> </ul>
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Protection Class	Variable/IP20
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL
Power Dissipation	Max. 30 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation: Max. 70 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

### 10.37 GT-4468 LED Indicator

Table 10-30 LED Indicator

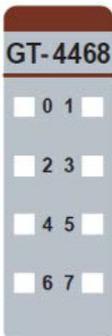
Module	LED number	LED function / description	LED colour
 <p>The image shows a vertical grey module with a red top section labeled 'GT-4468'. Below the label are eight small square LEDs arranged in two columns of four. The top-left LED is illuminated. The LEDs are numbered 0 through 7 from top to bottom, left to right.</p>	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	
	4	OUTPUT Channel 4	
	5	OUTPUT Channel 5	
	6	OUTPUT Channel 6	
	7	OUTPUT Channel 7	

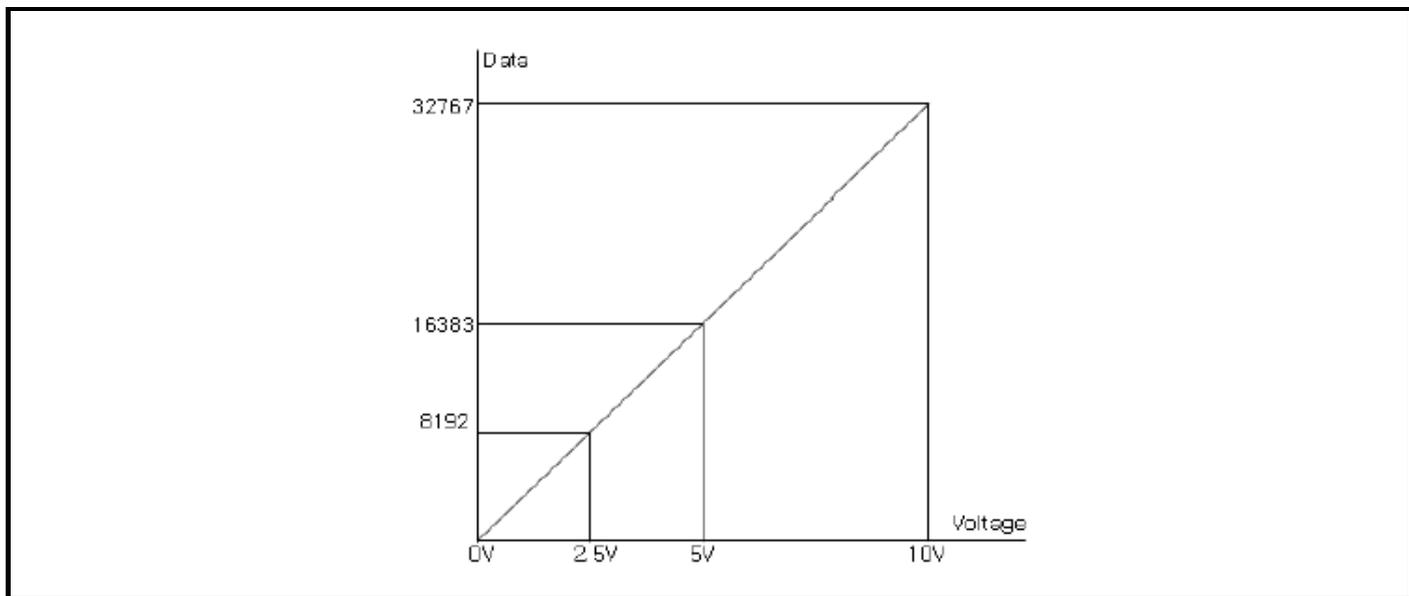
Table 10-31 Channel Status LED

Status	LED	To indicate
Normal Operation	No Output Channel Off	No Output
	Output Channel Green	Output
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

### 10.38 Data Value / Voltage

Table 10-32 Voltage Range: 0 to 10 Vdc

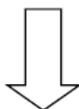
Voltage	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



### 10.39 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								Analog Output Ch0 Low byte
Byte 1								Analog Output Ch0 High byte
Byte 2								Analog Output Ch1 Low byte
Byte 3								Analog Output Ch1 High byte
Byte 4								Analog Output Ch2 Low byte
Byte 5								Analog Output Ch2 High byte
Byte 6								Analog Output Ch3 Low byte
Byte 7								Analog Output Ch3 High byte
Byte 8								Analog Output Ch4 Low byte
Byte 9								Analog Output Ch4 High byte
Byte 10								Analog Output Ch5 Low byte
Byte 11								Analog Output Ch5 High byte
Byte 12								Analog Output Ch6 Low byte
Byte 13								Analog Output Ch6 High byte
Byte 14								Analog Output Ch7 High byte
Byte 15								Analog Output Ch7 High byte



- Output Module Data -8byte Output Data

	Analog Output Ch0
	Analog Output Ch1
	Analog Output Ch2
	Analog Output Ch3
	Analog Output Ch4
	Analog Output Ch5
	Analog Output Ch6
	Analog Output Ch7

### 10.40 Parameter data

- Valid Parameter length: 4 Bytes
- Parameter data

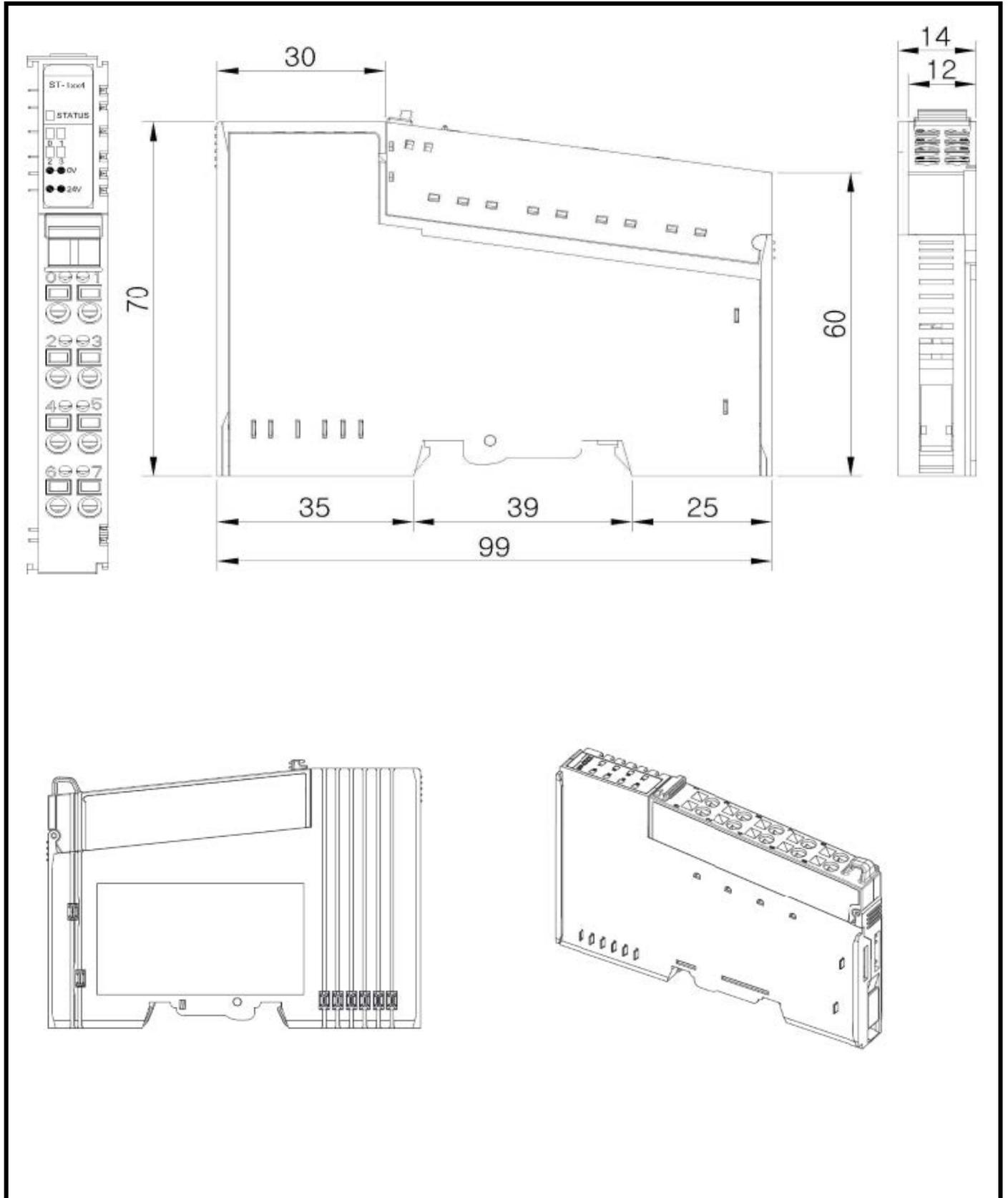
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Fault Action for Channel 7		Fault Action for Channel 6		Fault Action for Channel 5		Fault Action for Channel 4	
Byte 2	Fault Value Low Byte							
Byte 3	Fault Value High Byte							

All values are stored in Bus Coupler's EEPROM.

## 10.41 Dimensions

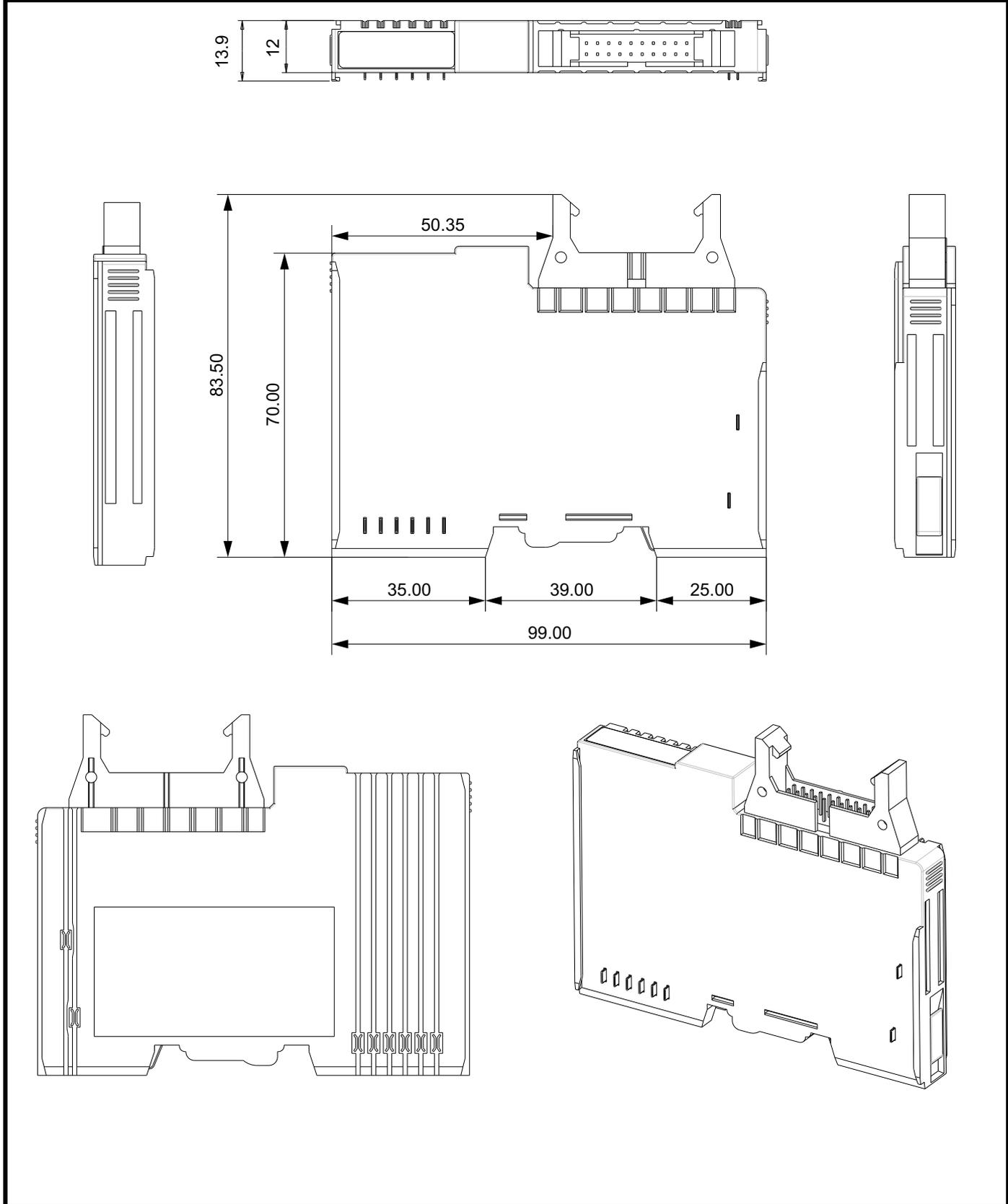
### 10.41.1 GT-4xx4, GT-4xx8

(mm)



### 10.41.2 GT-4xxF

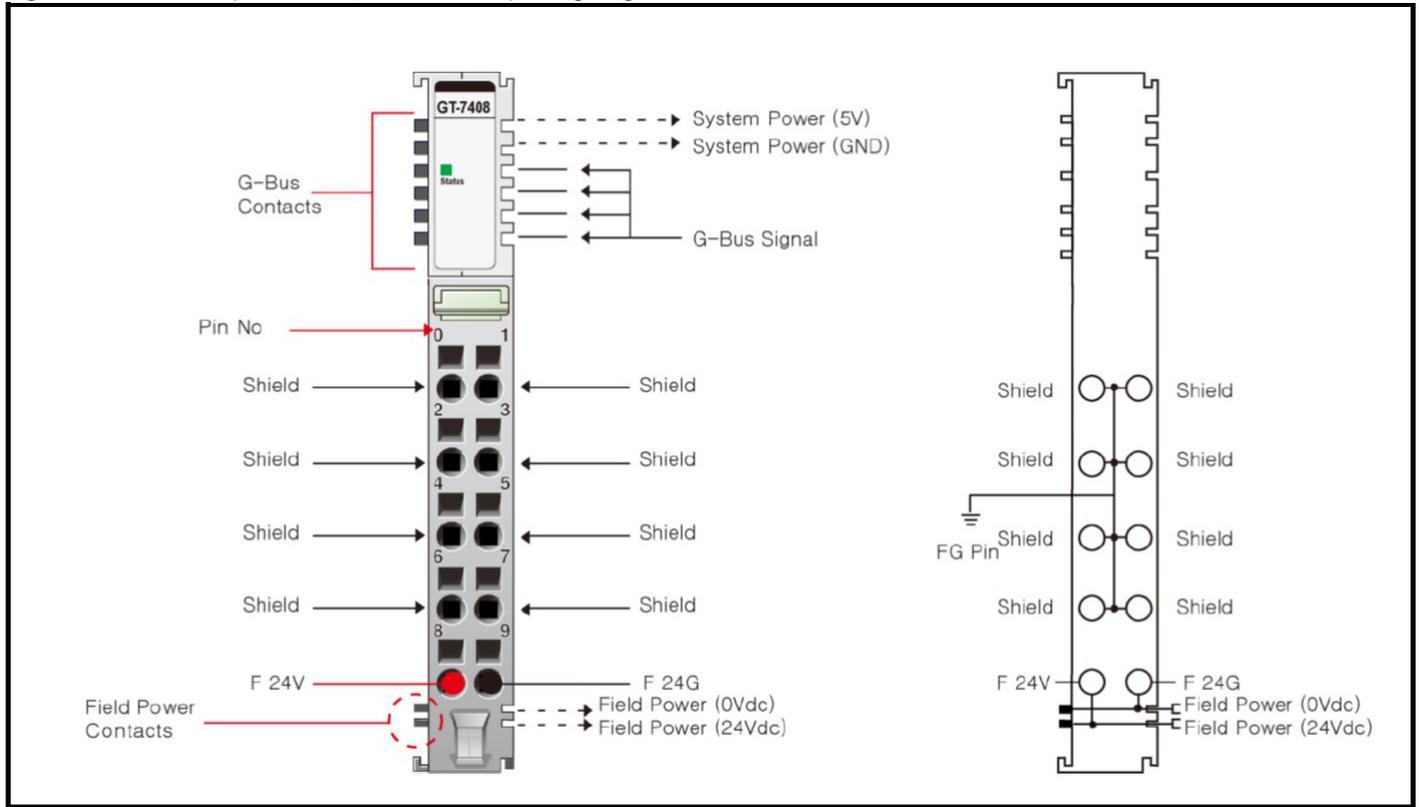
(mm)



# 11 Power module

## 11.1 GT-7408 Power Module

Figure 11-1 GT-7408 (8 Channels, Shield Module) wiring diagram



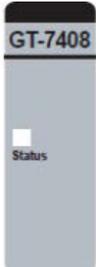
Pin number	Signal description	Signal description	Pin number
0	Shield	Shield	1
2	Shield	Shield	3
4	Shield	Shield	5
6	Shield	Shield	7
8	Field power, 24 V	Field power, 24 G	9

**Table 11-1 Specification**

Technical Data	
Field Power Voltage	Nominal 24 Vdc
Field Power Contacts Current	Max. 10 A Operating Temperature -40 °C to 50 °C : Max. 10 A 50 °C to 70 °C : Max. 7 A
Indicators	1 Green LED 1 Green Internal Bus Status LEDs
R-BUS Power Contactor	Yes
General specifications	
System Power Dissipation	Max. 30 mA @ 5 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	70 g
Module size	12 mm x 99 mm x 70 mm
Environment Condition	Refer to '1. Environment Specification'

## 11.2 GT-7408 LED Indicator

**Table 11-2 LED Non Indicator**

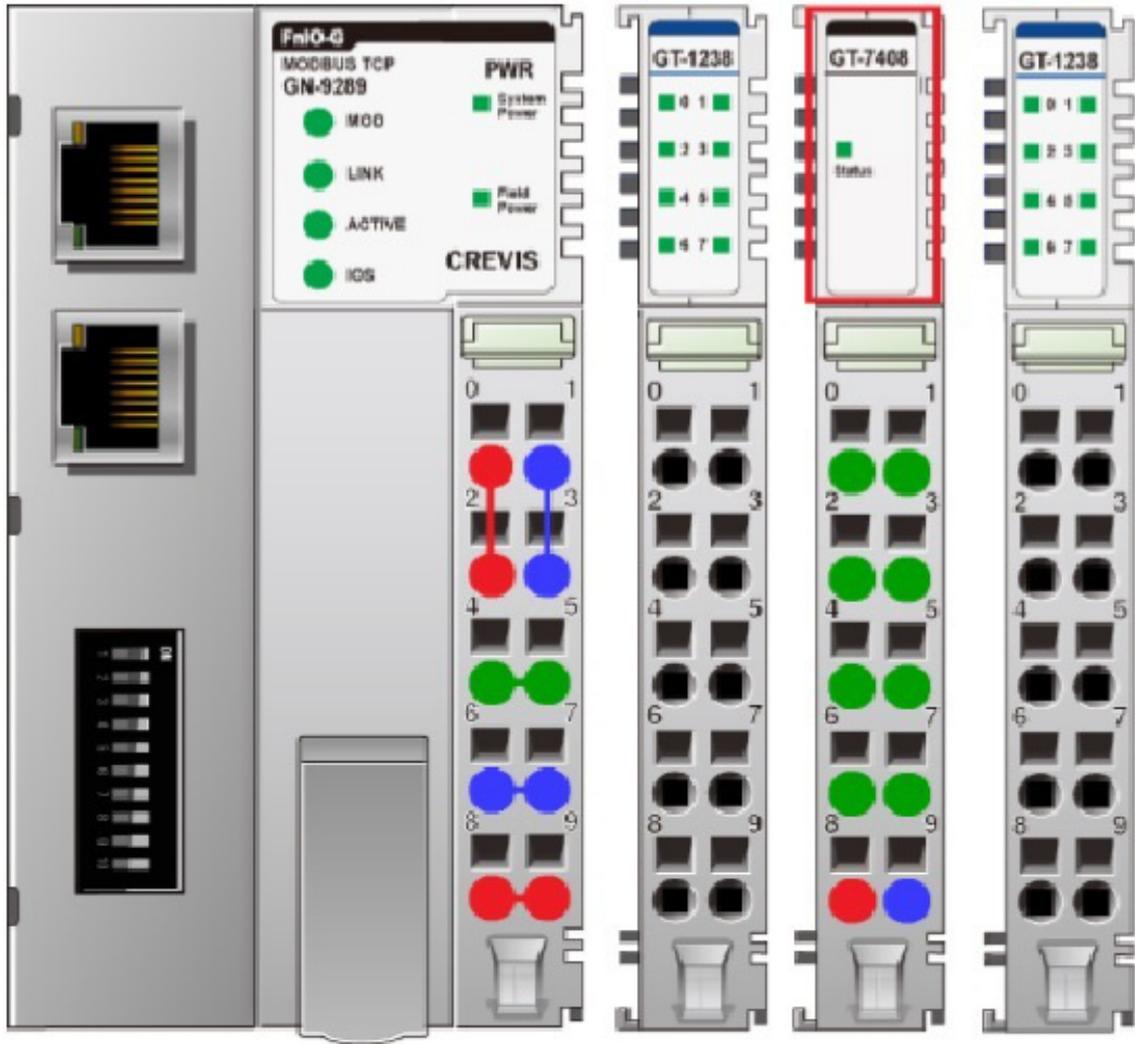
Module	LED number	LED function / description	LED colour
 <p>The image shows a vertical rectangular module with a grey top section labeled 'GT-7408' and a white bottom section with a small square LED labeled 'Status'.</p>	Status	Internal Bus Status	Green

**Table 11-3 Status LED**

Status	LED	To indicate
Normal signal	Green	The unit is operating in normal condition. ( After normal initialization of G-Bus communication, this LED maintains ON status.)
Absence of network adaptor	Off	Network adaptor is not connected to this module.

### 11.2.1 GT-7408 example

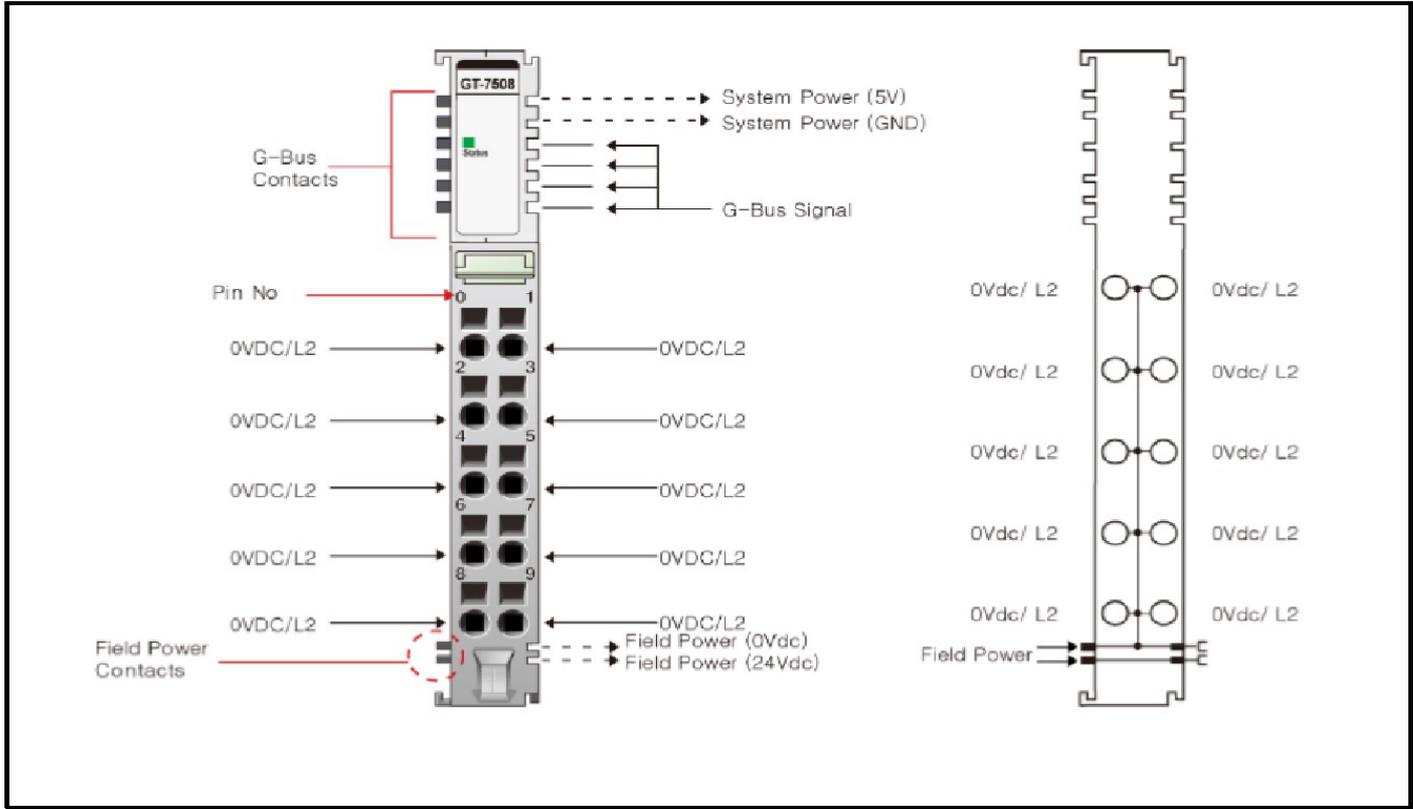
Figure 11-2 The GT-7408 provides Shield



Color	System Power	Field Power
	0, 2	8, 9
	1, 3	6, 7
	4, 5 (F.G)	

### 11.3 GT-7508 Power Module

Figure 11-3 GT-7508 (8 Channels, Common Module, 0 Vdc) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	0 Vdc / L2	0 Vdc / L2	1
2	0 Vdc / L2	0 Vdc / L2	3
4	0 Vdc / L2	0 Vdc / L2	5
6	0 Vdc / L2	0 Vdc / L2	7
8	0 Vdc / L2	0 Vdc / L2	9

**Table 11-4 Environmental specification**

Technical Data	
Field Power Voltage	Nominal 24 Vdc
Field Power Contacts Current	Max. 10 A Operating Temperature -40 °C to 50 °C : Max. 10 A 50 °C to 70 °C : Max. 7 A
Indicator	1 Green LED 1 Green Internal Bus State
General specifications	
System Power Dissipation	Max. 30 mA @ 5 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	59 g
Module size	12 mm x 99 mm x 70 mm
Environment Condition	Refer to '1. Environment Specification'

## 11.4 GT-7508 LED Indicator

**Table 11-5 LED Non Indicator**

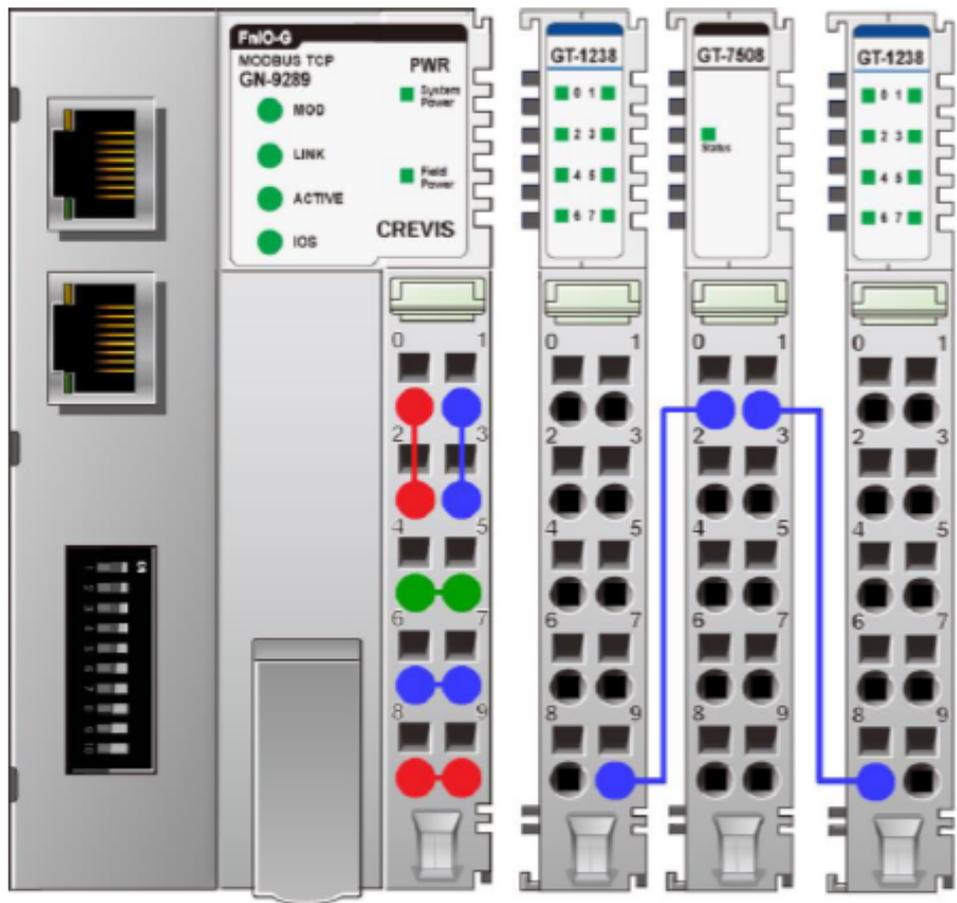
Module	LED number	LED function / description	LED colour
	Status	Internal Bus Status	Green

**Table 11-6 Status LED**

Status	LED	To indicate
Normal signal	Green	The unit is operating in normal condition. (After normal initialization of G-Bus communication, this LED maintains ON status.)
Absence of network adaptor	Off	Network adaptor is not connected to this module.

### 11.4.1 GT-7508 example

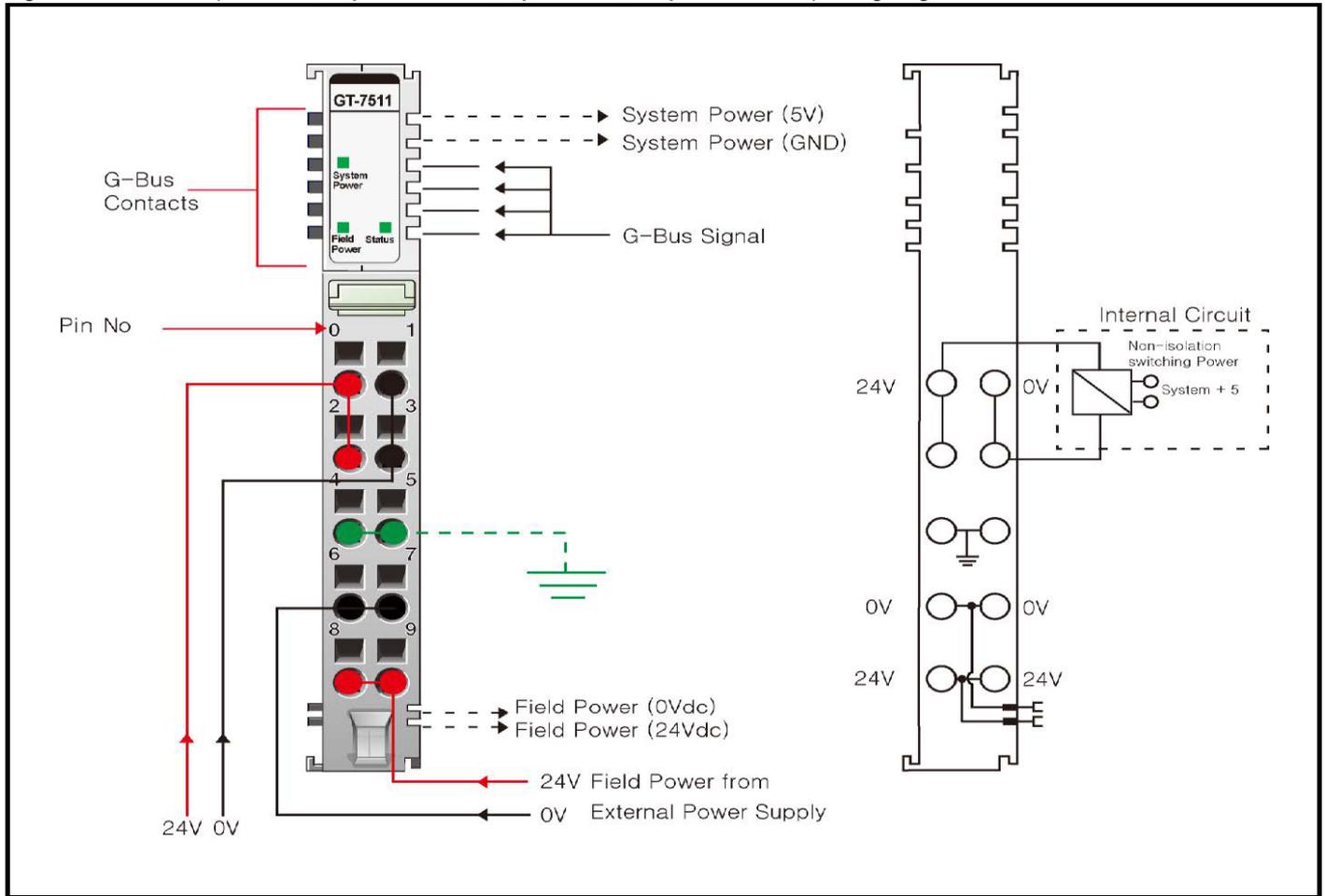
Figure 11-4 The GT-7508 provides 0V dc



Color	System Power	Field Power
	Hole Number 0, 2	8, 9
	Hole Number 1, 3	6, 7
	Hole Number 4, 5 (F.G)	

## 11.5 GT-7511 Power Module

Figure 11-5 GT-7511 (1 Channel, Expansion Power, Input 24 Vdc, Output 1.0 A/5 Vdc) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	System Power, 24 V	System Power, Ground	1
2	System Power, 24 V	System Power, Ground	3
4	F.G	F.G	5
6	Field Power, Ground	Field Power, Ground	7
8	Field Power, 24 V	Field Power, 24 V	9

**Table 11-7 Specification**

Input Specification	
System Input Voltage range	15 Vdc to 32 Vdc
System Power Input Voltage	Normal 24 Vdc
Field Power Contacts Current	Max. 10 A Operating Temperature -40 °C to 50 °C : Max. 10 A 50 °C to 70 °C : Max. 7 A
Indicators	2 Green LEDs for System and Field Power
R-Bus Output Voltage	Max. 5 Vdc, 1 A *
General specifications	
System power Dissipation	Max. 20 mA @ 24 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	59 g
Module size	12 mm x 99 mm x 70 mm

\* Operating temperature

- 40 °C to 70 °C temperature range specification can be guaranteed under the following conditions.

> Current for I/O modules : 0.4 A below.

> Otherwise, temperature specification can be guaranteed with -40 °C to 60 °C.

## 11.6 GT-7511 LED Indicator

**Table 11-8 LED Indicator**

Module	LED number	LED function / description	LED colour
	System Power	System Power	Green
	Field Power	Field Power	Green
	Status	Internal Bus Status	Green

**Table 11-9 System/Field Power LED**

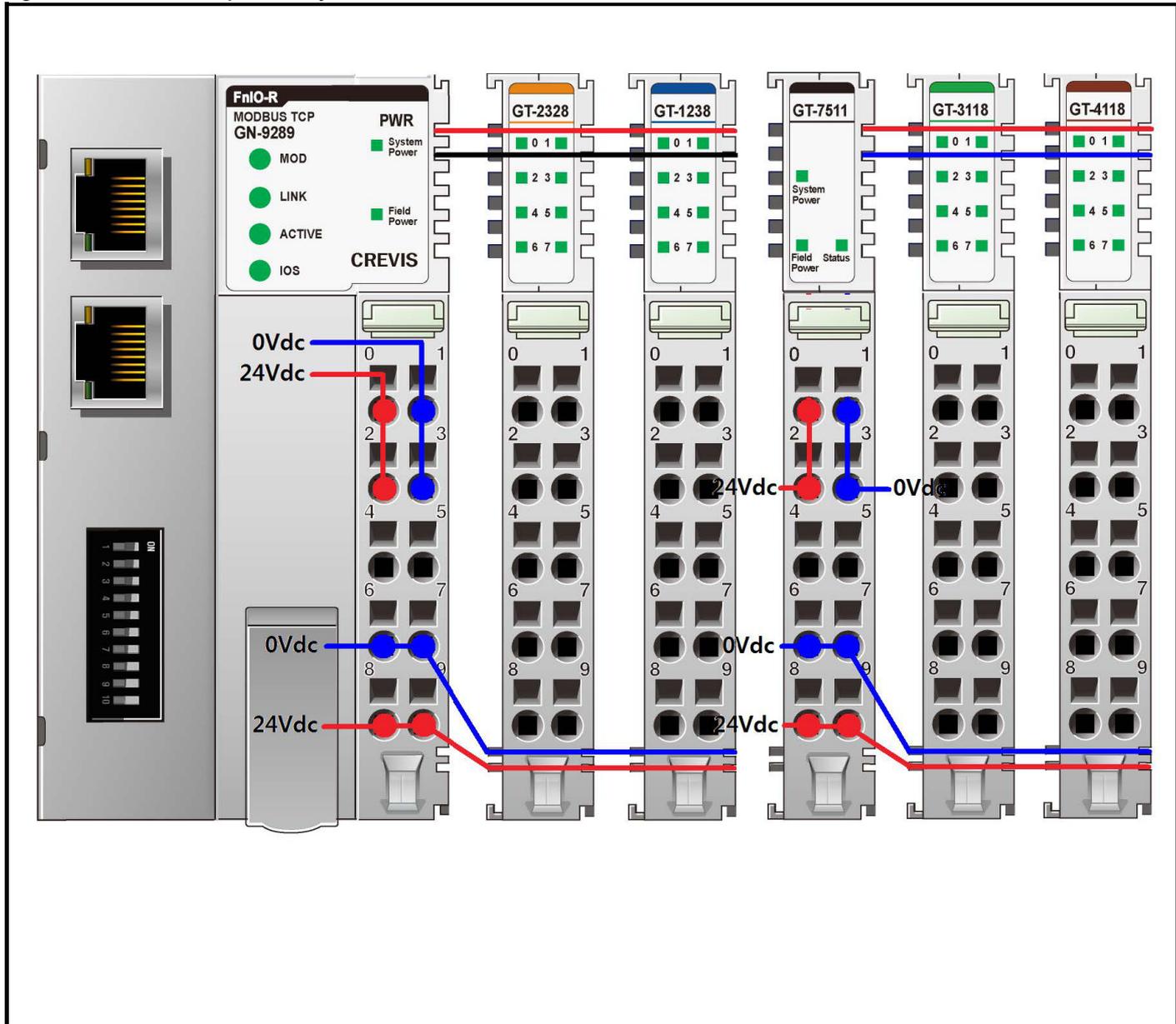
Status	LED	To indicate
Off Signal	Off	No System, Field Power
On Signal	Green	Normal Operation

**Table 11-10 Status LED**

Status	LED	To Indicate
Normal signal	Green	The unit is operating in normal condition. ( After normal initialization of G-Bus communication, this LED maintains ON status.)
Absence of data size.	Flashing green	Although this module is connected normally, there are not input/output data for communication.
Absence of Network adapter	Off	Network adapter is not connected to this module.

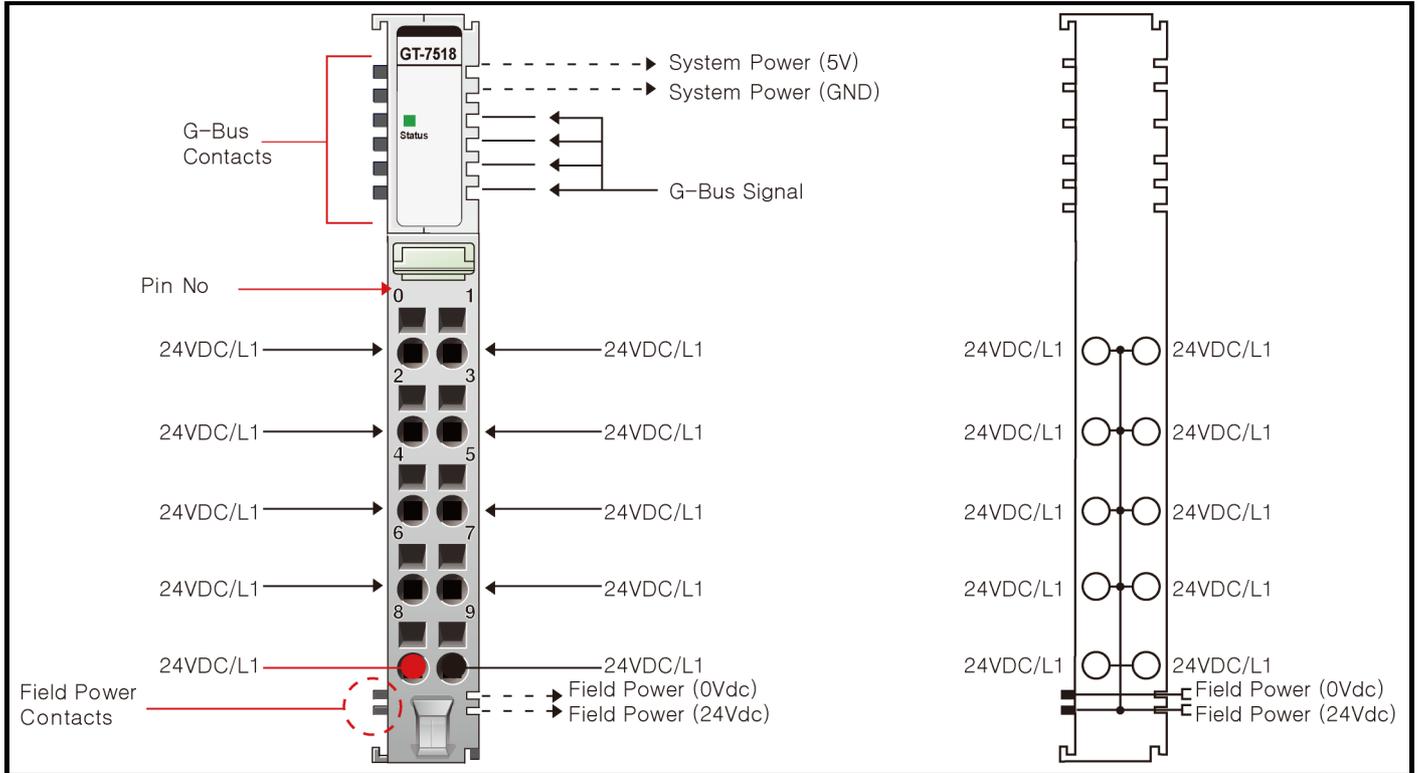
### 11.6.1 GT-7511 Example

Figure 11-6 The GT-7511 provides System Power and Field Power



## 11.7 GT-7518 Power Module

Figure 11-7 GT-7518 (8 Channels, Common Module, 24 Vdc) wiring diagram



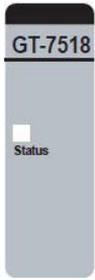
Pin number	Signal description	Signal description	Pin number
0	24 Vdc/L1	24 Vdc/L1	1
2	24 Vdc/L1	24 Vdc/L1	3
4	24 Vdc/L1	24 Vdc/L1	5
6	24 Vdc/L1	24 Vdc/L1	7
8	24 Vdc/L1	24 Vdc/L1	9

**Table 11-11 Specification**

Technical Data	
Field Power Voltage	Nominal 24 Vdc
Field Power Contacts Current	Max. 10A Operating Temperature -40 °C to 50 °C : Max. 10 A 50 °C to 70 °C : Max. 7 A
Indicators	1 Green LED 1 Green Internal Bus State
General specifications	
System Power Dissipation	Max. 30 mA @ 5 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	59 g
Module size	12 mm x 99 mm x 70 mm
Environment Condition	Refer to '1. Environment Specification'

## 11.8 GT-7518 LED Indicator

### 11.8.1 LED Non Indicator

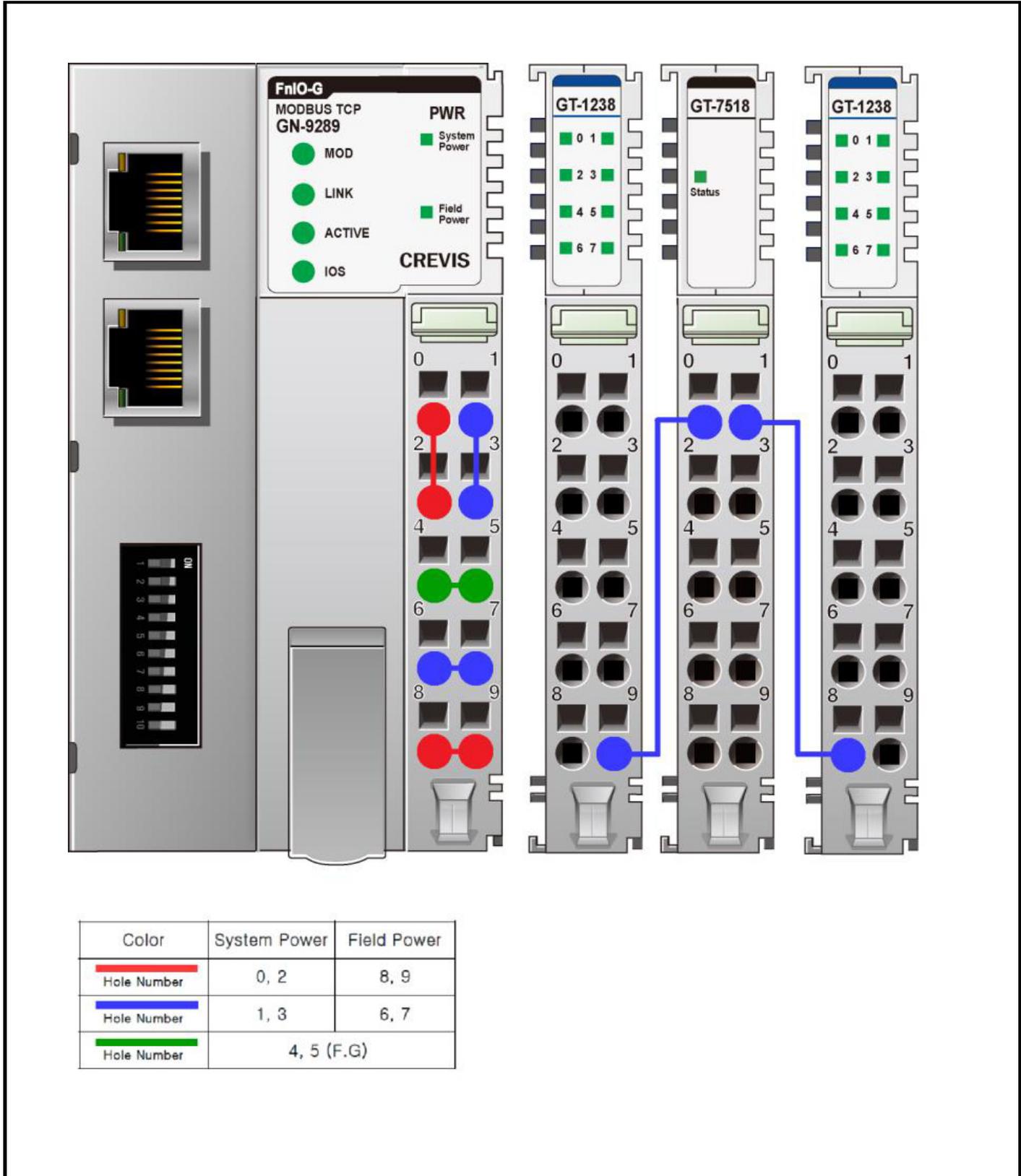
Module	LED No	LED Function / Description	LED Colour
 <p>The image shows a vertical grey module with a black top section containing the text 'GT-7518'. Below this, there is a small white square labeled 'Status'.</p>	Status	Internal Bus Status	Green

### 11.8.2 Status LED

Status	LED	To Indicate
Normal Signal	Green	The unit is operating in normal condition. ( After normal initialization of G-Bus communication, this LED maintains ON status.)
Absence of network adaptor	Off	Network adaptor is not connected to this module.

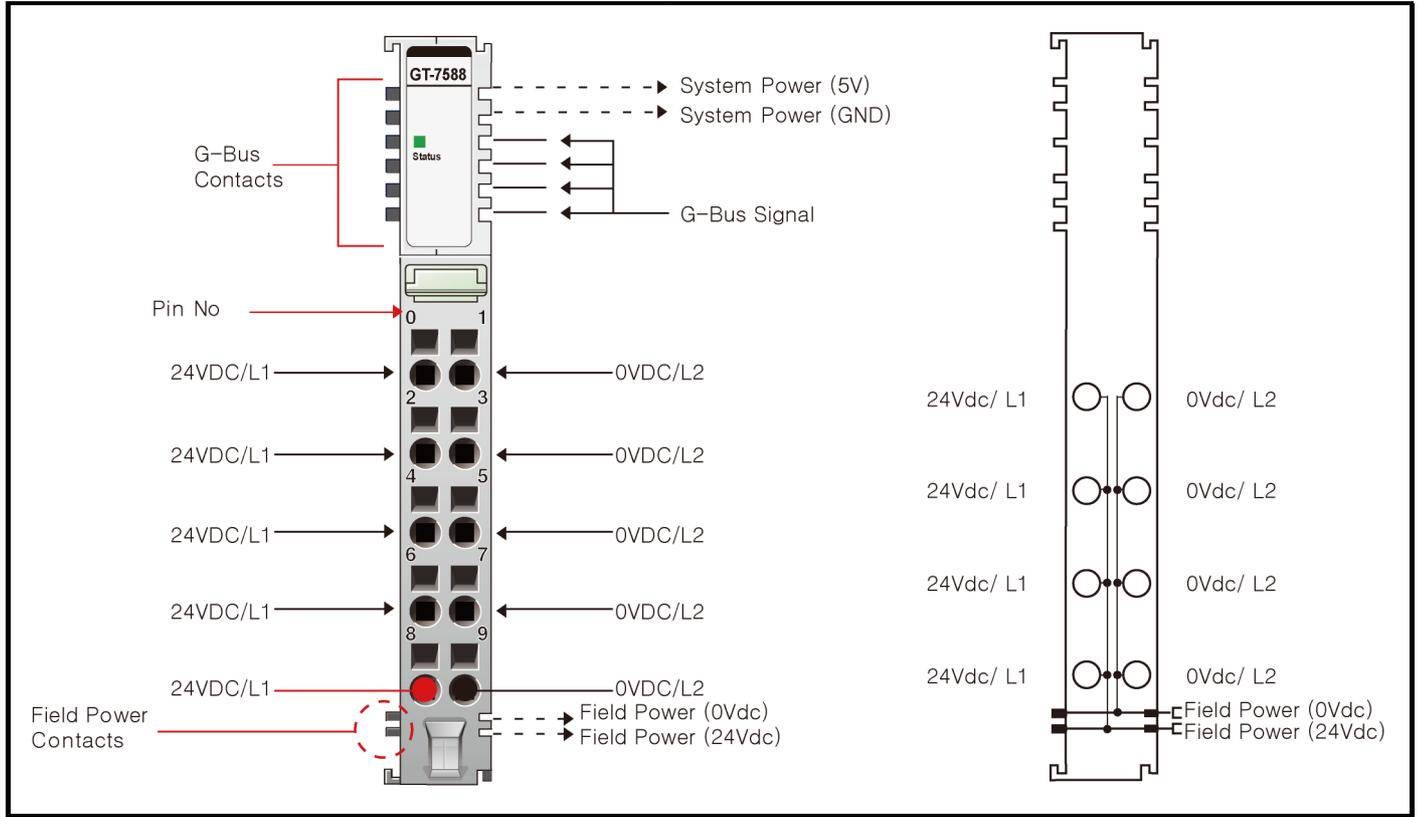
## 11.9 GT-7518 example

Figure 11-8 The GT-7518 provides 24 Vdc



## 11.10 GT-7588 Power Module

Figure 11-9 GT-7588 (8 Channels, Common, 0V dc/24 Vdc) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	24 Vdc/L1	0V dc/L2	1
2	24 Vdc/L1	0V dc/L2	3
4	24 Vdc/L1	0V dc/L2	5
6	24 Vdc/L1	0V dc/L2	7
8	24 Vdc/L1	0V dc/L2	9

**Table 11-12 Specification**

Technical data	
Field Power Voltage	Nominal 24 Vdc
Field Power Contacts Current	Max. 10A Operating Temperature -40 °C to 50 °C : Max. 10 A 50 °C to 70 °C : Max. 7 A
Indicators	1 Green LED 1 Green Internal Bus State
General specifications	
System Power Dissipation	Max. 30 mA @ 5 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	70 g
Module size	12 mm x 99 mm x 70 mm
Environment Condition	Refer to '1. Environment Specification'

## 11.11 GT-7588 LED Indicator

### 11.11.1 LED Non Indicator

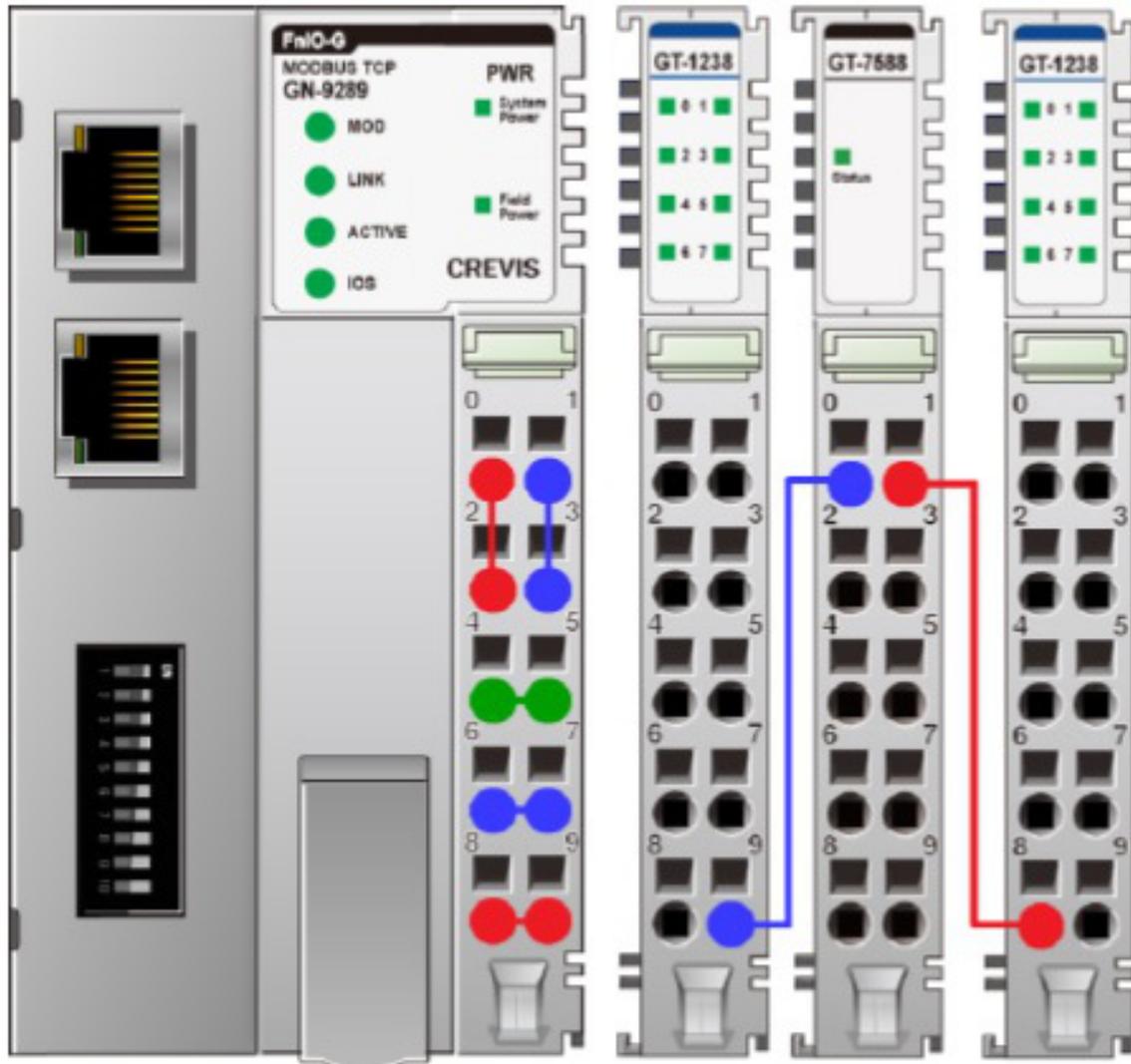
Module	LED number	LED function / description	LED colour
	Status	Internal Bus Status	Green

### 11.11.2 Status LED

Status	LED	To Indicate
Normal Signal	Green	The unit is operating in normal condition. ( After normal initialization of G-Bus communication, this LED maintains ON status.)
Absence of network adaptor	Off	Network adaptor is not connected to this module.

### 11.11.3 GT-7588 example

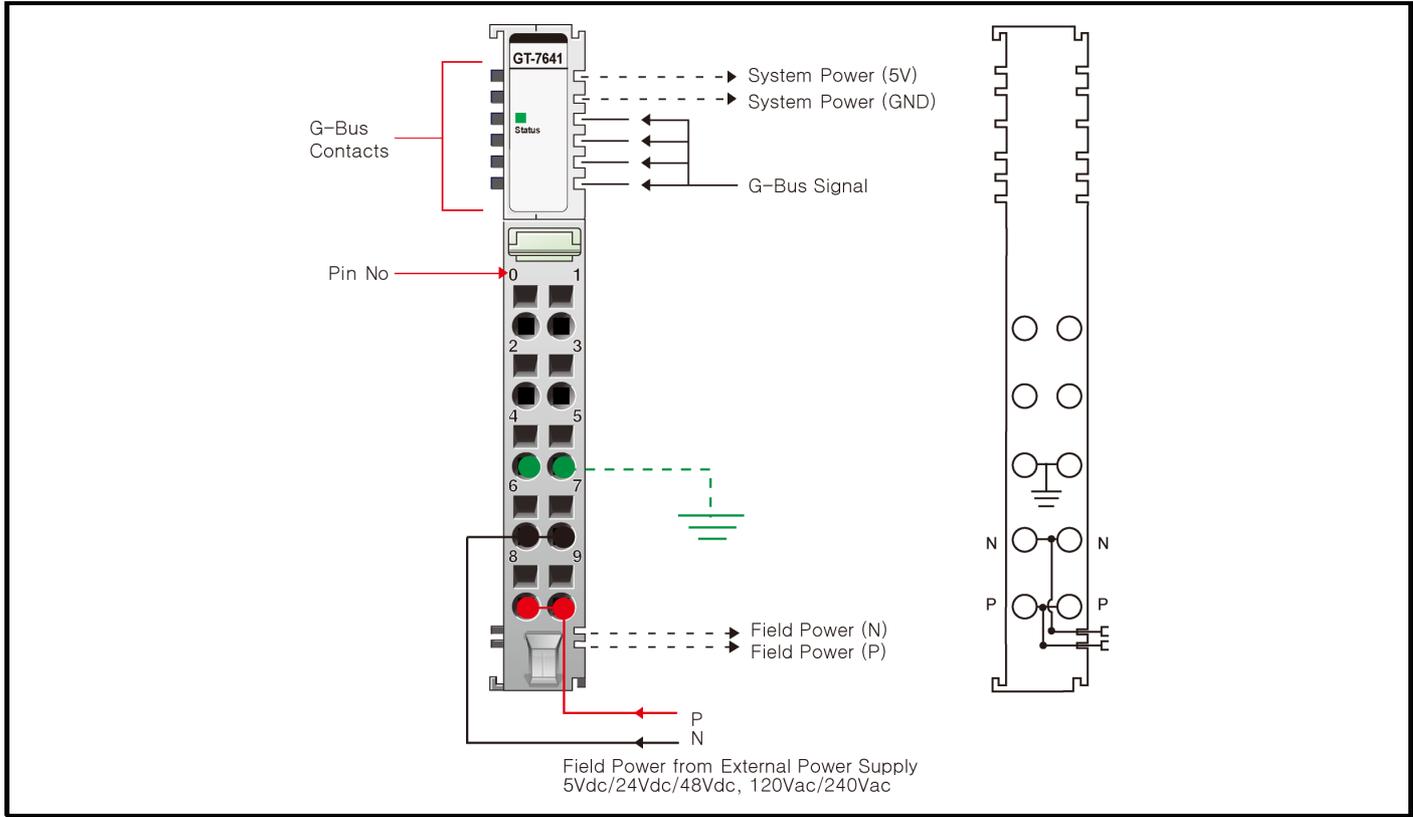
Figure 11-10 The GT-7588 provides 24 Vdc and 0 Vdc



Color	System Power	Field Power
	0, 2	8, 9
	1, 3	6, 7
	4, 5 (F.G)	

## 11.12 GT-7641 Power Module

Figure 11-11 GT-7641 (8 Channels, Common, 0 V dc/24 Vdc) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	NC	NC	1
2	NC	NC	3
4	F.G	F.G	5
6	Field Power, Arbitrary (N)	Field Power, Arbitrary (N)	7
8	Field Power, Arbitrary (P)	Field Power, Arbitrary (P)	9

**Table 11-13 Specification**

Technical Data	
Field Power Voltage	Nominal 24 Vdc
Field Power Contacts Current	Max. 10A Operating Temperature -40 °C to 50 °C : Max. 10 A 50 °C to 70 °C : Max. 7 A
Indicator	1 Green LED 1 Green Internal Bus State
General specifications	
System Power Dissipation	Max. 30 mA @ 5 Vdc
Wiring	I/O Cable Max. 2.0 mm <sup>2</sup> (AWG 14)
Weight	70 g Max
Module size	12 mm x 99 mm x 70 mm
Environment Condition	Refer to '1. Environment Specification'

## 11.13 GT-7641 LED Indicator

### 11.13.1 LED Non Indicator

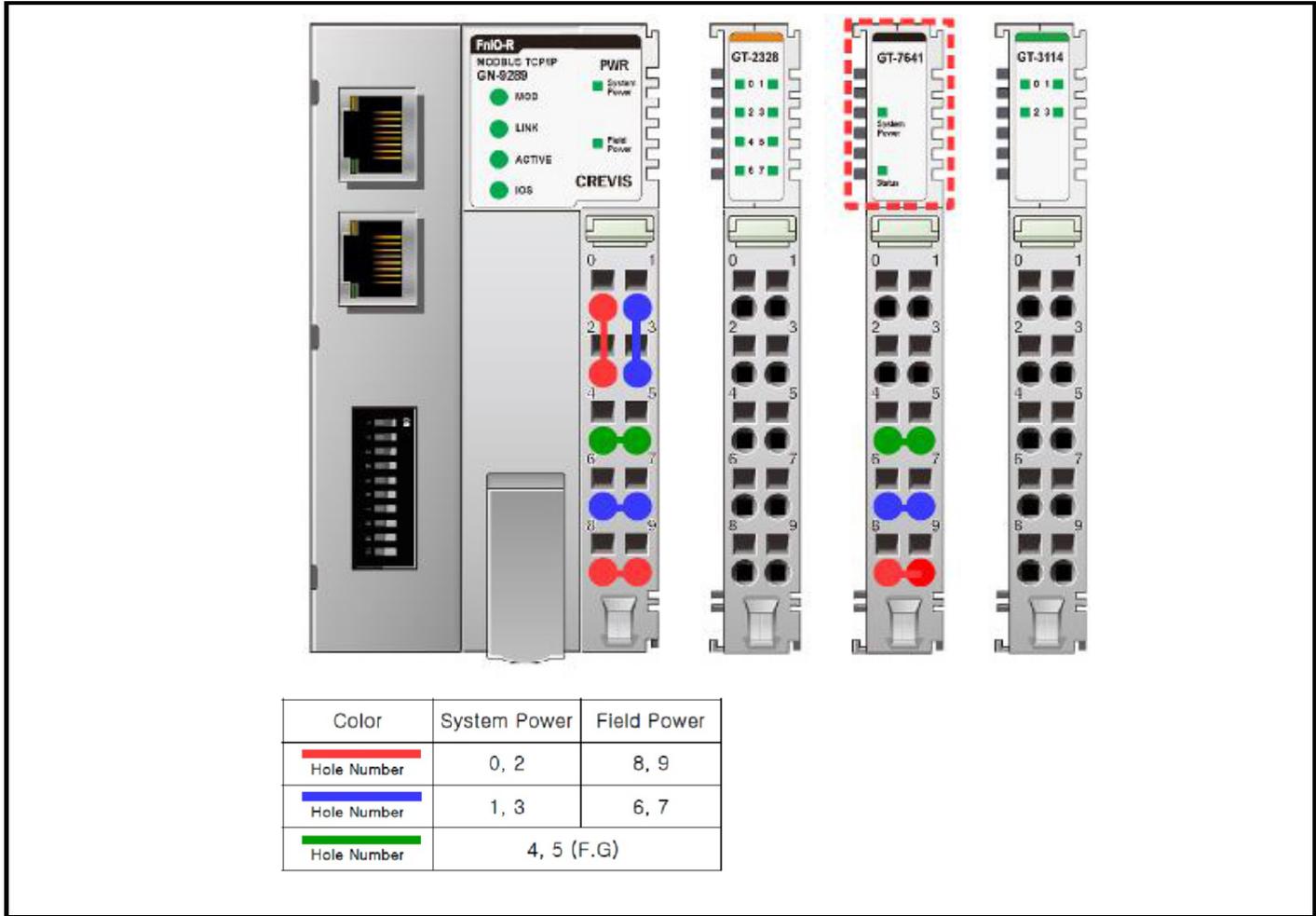
Module	LED number	LED function / description	LED colour
	Status	Internal Bus Status	Green

### 11.13.2 Status LED

Status	LED	To Indicate
Normal Signal	Green	The unit is operating in normal condition. ( After normal initialization of G-Bus communication, this LED maintains ON status.)
Absence of network adaptor	Off	Network adaptor is not connected to this module.

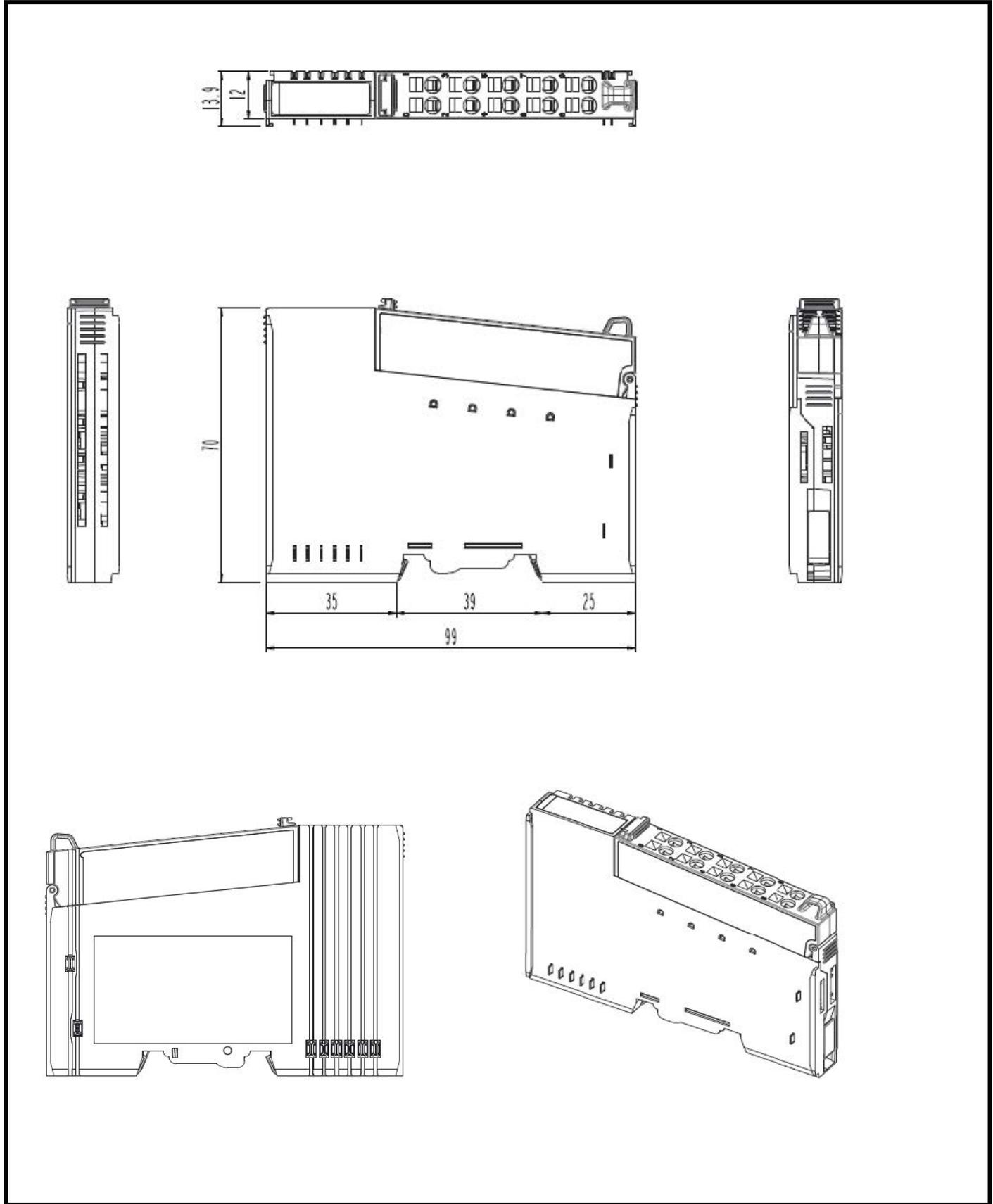
## 11.14 GT-7641 example

Figure 11-12 The GT-7641 provides 24 Vdc and 0 Vdc



## 11.15 Dimension

### 11.15.1 GT-7XXX



## 11.16 Environment Specification

Environmental specifications	
Operating temperature	-40 °C to 70 °C
UL Temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Mounting	DIN rail
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	<p>Based on IEC 60068-2-6</p> <p>Sine Vibration</p> <ul style="list-style-type: none"> <li>• 5 to 25 Hz: <math>\pm 1.6</math> mm</li> <li>• 25 to 300 Hz: 4 g</li> <li>• Sweep Rate: 1 Oct/min, 20 Cycles</li> </ul> <p>Random Vibration</p> <ul style="list-style-type: none"> <li>• 10 to 40 Hz: <math>0.0125 \text{ g}^2/\text{Hz}</math></li> <li>• 40 to 100 Hz: <math>0.0125 \rightarrow 0.002 \text{ g}^2/\text{Hz}</math></li> <li>• 100 to 500 Hz: <math>0.002 \text{ g}^2/\text{Hz}</math></li> <li>• 500 to 2000 Hz: <math>0.002 \rightarrow 1.3 \times 10^{-4} \text{ g}^2/\text{Hz}</math></li> <li>• Test time: 1 hr for each test</li> </ul>
Industrial Emissions	EN 61000-6-4/All: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is available.
Product certifications	CE, UL

## 12 Mounting



### Hot Surface

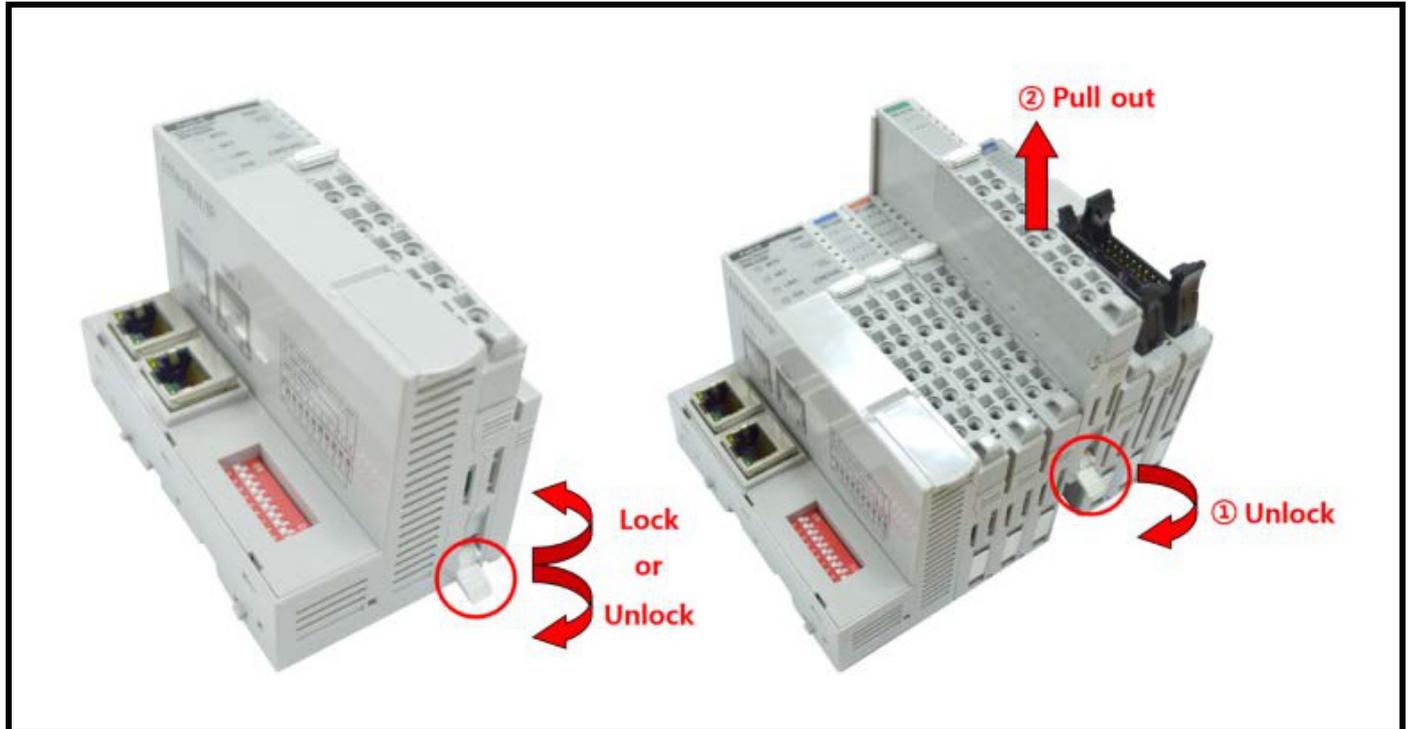
The surface of the housing can become hot during operation. If the device was operated at high ambient temperatures, allow it to be cool before touching it.

### NOTE

#### 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.

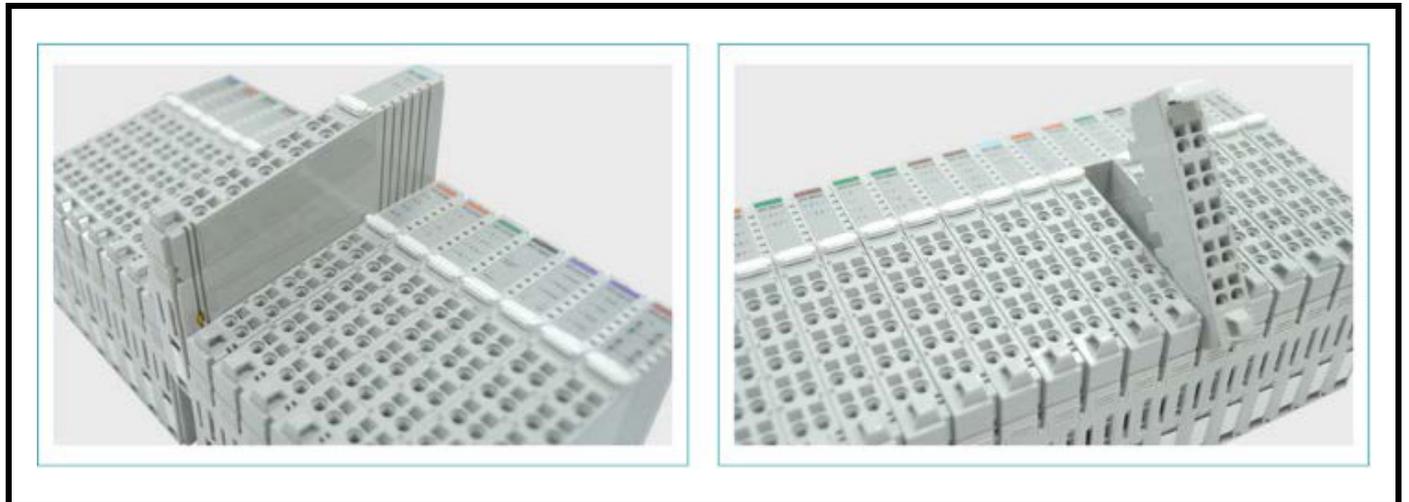
### 12.1 I/O Inserting and Removing Devices



As above figure in order to safeguard the G-Series 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 G-Series module, unfold the locking lever as below figure.

### 12.2 RTB (Removable Terminal Block)





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

# 13 GBus Pin Description

Communication between the GN 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	G-BUS CLK
	P4	G-BUS MISO
	P5	G-BUS MOSI
	P6	G-BUS Token
	P7	System Power (GND)
	P8	System Power (VCC)

 <b>CAUTION</b>	<p>Do not touch data and field power pins in order to avoid soiling and damage by ESD noise.</p>
--------------------	--

## 14 Troubleshooting

LED Status	Cause	Action
EXPLANSION MODULE	Not Power	Device has no expansion Module or may not be powered.
<b>STATUS LED</b>		
Off	No Initialized	The Parameter is not yet initialized
Green	G-Bus Connection	G-Bus normal Operation
Flashing Green	G-Bus Ready	G-Bus ready
Flashing Red	G-Bus Fault	G-Bus Time Out, G-Bus Failed Communication
Red	Device Fault	Device fault
<b>CHANNEL STATUS LED</b>		
Off	Not Signal	Normal Operation
Green	On Signal	Normal Operation

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