User Manual
GT-12FA Digital Input Module

32 ch, 24 VDC, sink/source, 40 pt connector

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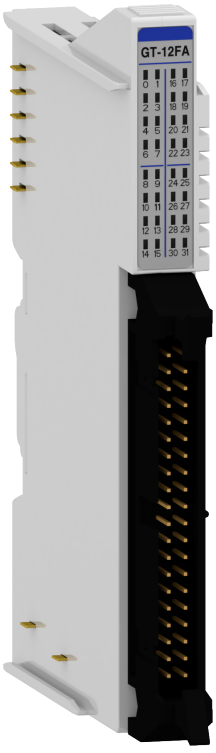

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Table of Contents

1. About This Manual

This manual contains information on the software and hardware features of the Beijer Electronics GT-12FA Digital Input Module. It provides in-depth specifications, guidance on installation, setup, and usage of the product.

1.1. Symbols Used in This Manual

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

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

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

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

IMPORTANT
The Important icon highlights important information.

2. Safety

Before using this product, please read this manual and other relevant manuals carefully. Pay full attention to safety instructions!

In no event will Beijer Electronics be responsible or liable for damages resulting from the use of this product.

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

2.1. Product Certifications

The product has the following product certifications.

2.2. General Safety Requirements

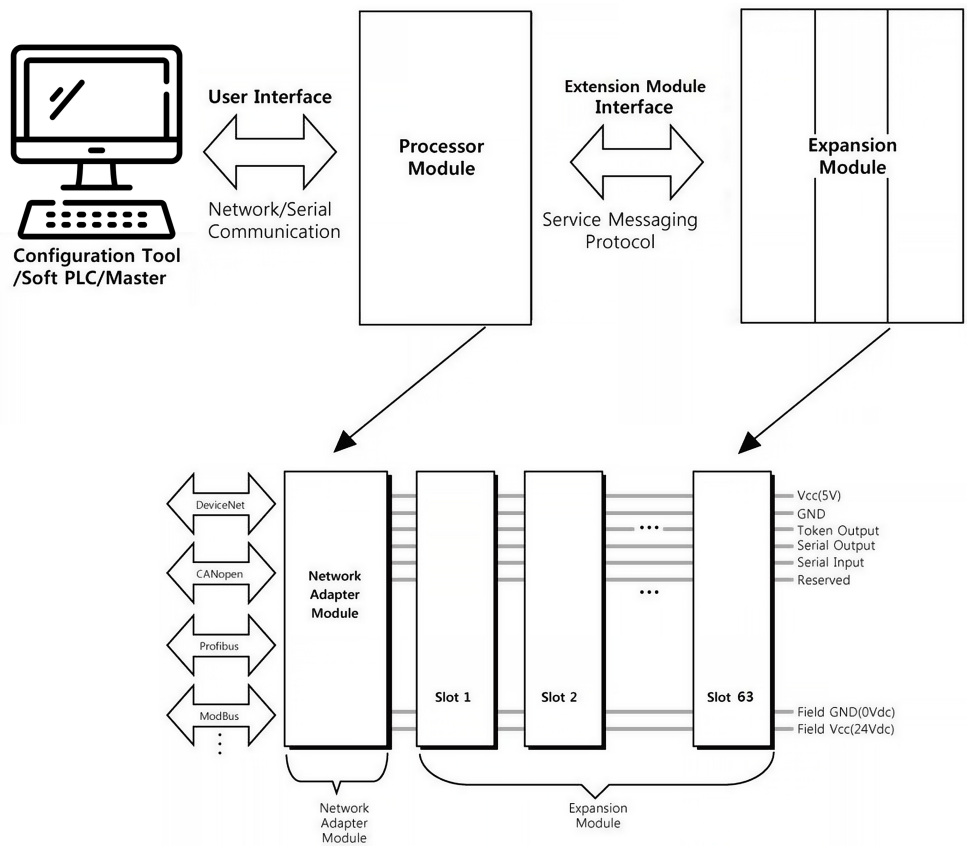
WARNING

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

CAUTION

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

3. About the G-series System

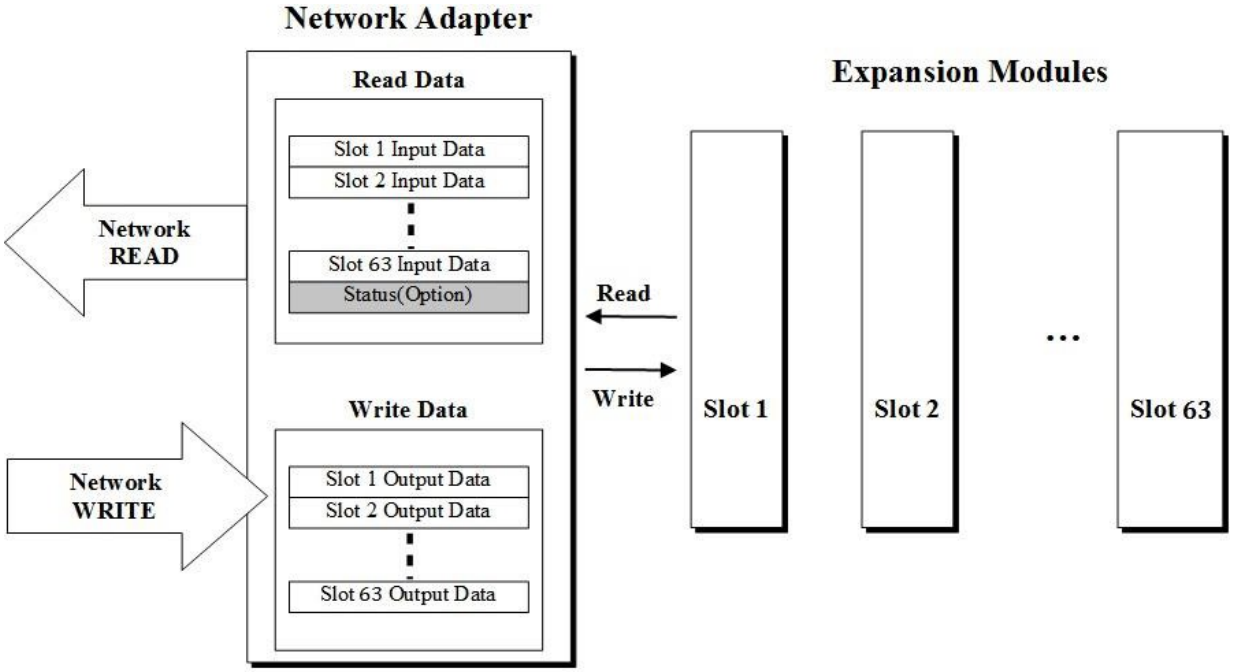


System overview

- **Network Adapter Module** - The network adapter module forms the link between the field bus and the field devices with the expansion modules. The connection to different field bus systems can be established by each of the corresponding network adapter module, e.g., for MODBUS TCP, Ethernet IP, EtherCAT, PROFINET, CC-Link IE Field, PROFIBUS, CANopen, DeviceNet, CC-Link, MODBUS/Serial etc.
- **Expansion Module** - Expansion module types: Digital IO, Analog IO, and Special modules.
- **Messaging** - The system uses two types of messaging: Service messaging and IO messaging.

3.1. IO Process Data Mapping

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



Data flow between network adapter (63 slots) and expansion modules

The input and output image data depend on the slot position and the data type of the expansion slot. The ordering of input and output process image data is based on the expansion slot position. Calculations for this arrangement are included in the manuals for network adapter and programmable IO modules.

Valid parameter data depends on the modules in use. For example, analog modules have settings of either 0-20 mA or 4-20 mA, and temperature modules have settings such as PT100, PT200, and PT500. The documentation for each module provides a description of the parameter data.

4. Specifications

4.1. Environmental Specifications

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

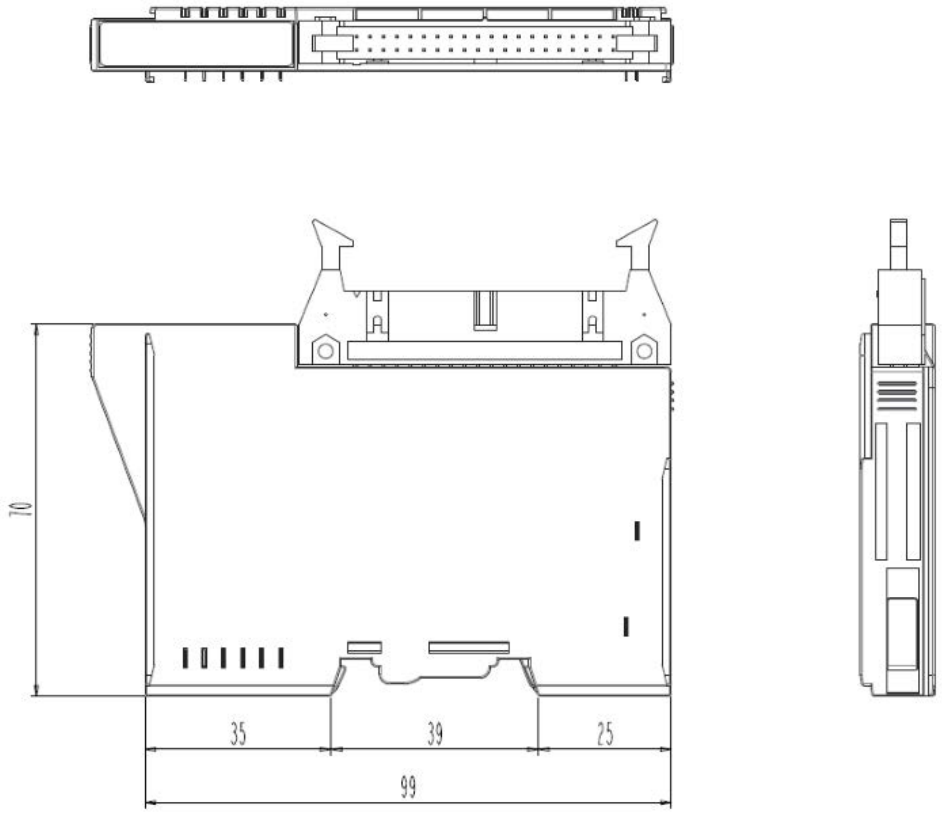
4.2. General Specifications

Power dissipation	Max. 50 mA @ 5 VDC
Isolation	I/O to logic: Photocoupler isolation
UL field power	Supply voltage: 24 VDC nominal, class 2
Field power	Supply voltage: 24 VDC nominal Voltage range: 15 - 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 - 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 - 60 °C.

4.2.1. Dimensions

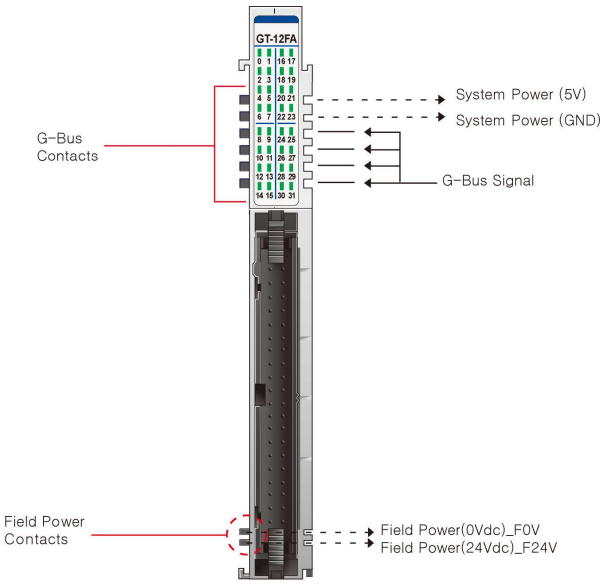


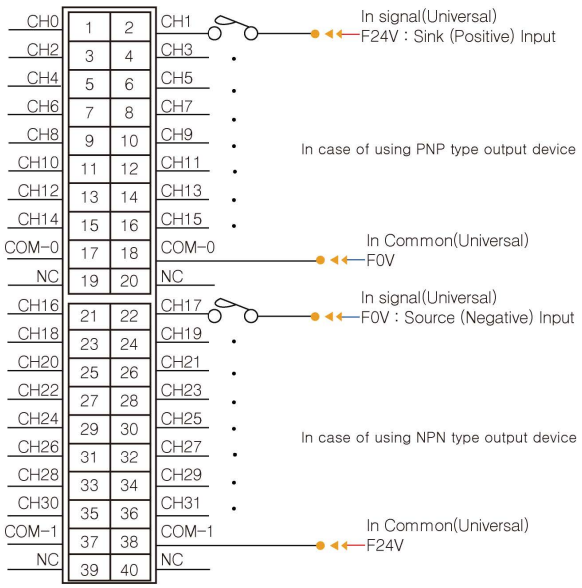
Module dimensions (mm)

4.3. Input Specifications

Inputs per module	32 points universal type
Indicators	32 green input status
On-state voltage	24 VDC nominal 15 - 30 VDC @ 60 °C
On-state current	2.25 mA @ 24 VDC 3 mA @ 30 VDC
Off-state voltage	9.1 VDC @ 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	10.2K Ω typical
Common type	32 points / 4 COM (universal)

5. Wiring Diagram

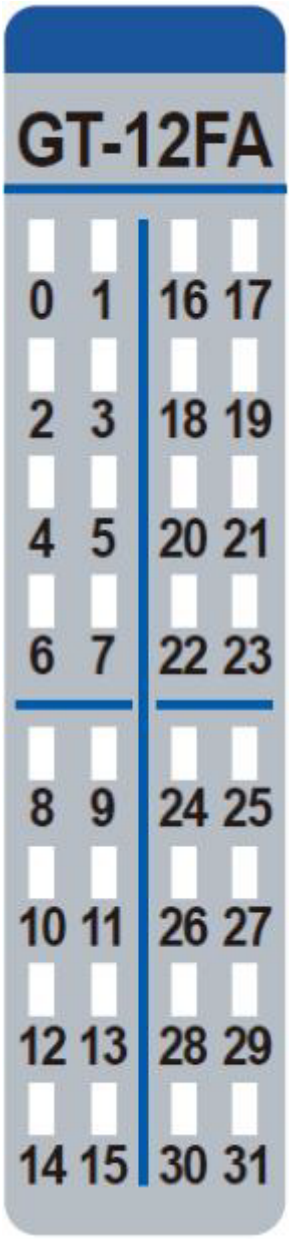




Pin no.	Signal description
0	Input channel 0
1	Input channel 1
2	Input channel 2
3	Input channel 3
4	Input channel 4
5	Input channel 5
6	Input channel 6
7	Input channel 7
8	Input channel 8
9	Input channel 9
10	Input channel 10
11	Input channel 11
12	Input channel 12
13	Input channel 13
14	Input channel 14
15	Input channel 15
16	Common (sink oper. 0 V / source oper. 24 V)
17	Common (Sink Oper. 0 V / Source Oper. 24 V)
18	NC
19	NC
20	Input channel 16
21	Input channel 17
22	Input channel 18

Pin no.	Signal description
23	Input channel 19
24	Input channel 20
25	Input channel 21
26	Input channel 22
27	Input channel 23
28	Input channel 24
29	Input channel 25
30	Input channel 26
31	Input channel 27
32	Input channel 28
33	Input channel 29
34	Input channel 30
35	Input channel 31
36	Common (sink oper. 0 V / source oper. 24 V)
37	Common (Sink Oper. 0 V / Source Oper. 24 V)
38	NC
39	NC

6. LED Indicator



LED no.	LED function / description	LED color
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	

LED no.	LED function / description	LED color
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	

6.1. LED Channel Status

Status	LED	Indication
Off signal	Off	No input signal
On signal	Green	Normal operation

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
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

8. Parameter Data

Valid parameter length: 2 bytes

Bit no.	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Input filter value: 0 - 10 (unit: ms)							
Byte 1	Reserved							

9. Hardware Setup

CAUTION

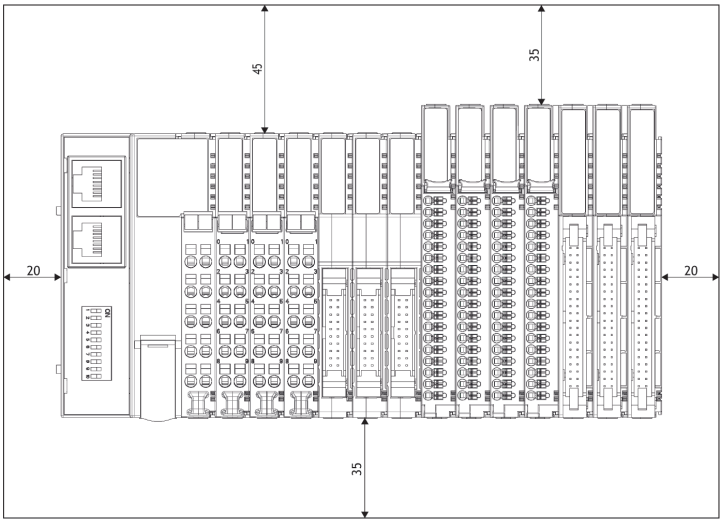
- Always read this chapter before installing the module!
- Hot surface! The surface of the housing can become hot during operation. If the device is used in high ambient temperatures, always let the device cool down before touching it.
- Working on energized devices can damage the equipment! Always turn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

9.1. Space Requirements

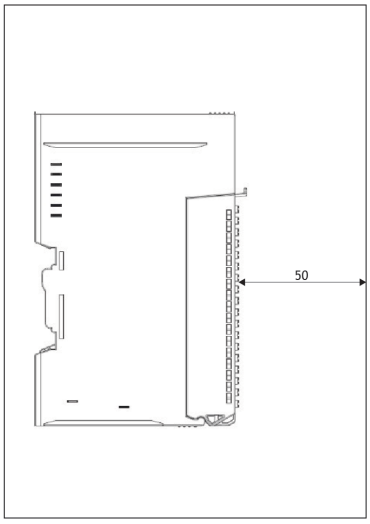
The following drawings show the space requirements when installing the G-series modules. The spacing creates space for ventilation, and prevents conducted electromagnetic interference from influencing the operation. Installation position is valid vertical and horizontal. The drawings are illustrative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

CAUTION

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



Vertical and horizontal space requirements



Required distance to door

9.2. Mount Module to DIN Rail

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

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

9.2.1. Mount GL-9XXX or GT-XXXX Module

The following instructions apply to these module types:

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

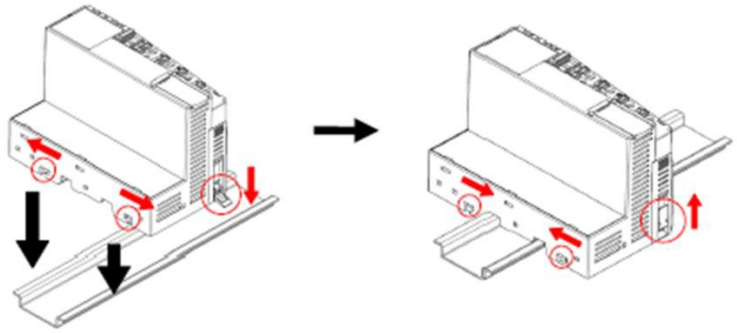
GN-9XXX modules have three locking levers, one at the bottom and two on the side. For mounting instructions, refer to Mount GN-9XXX Module.

Mount to DIN rail

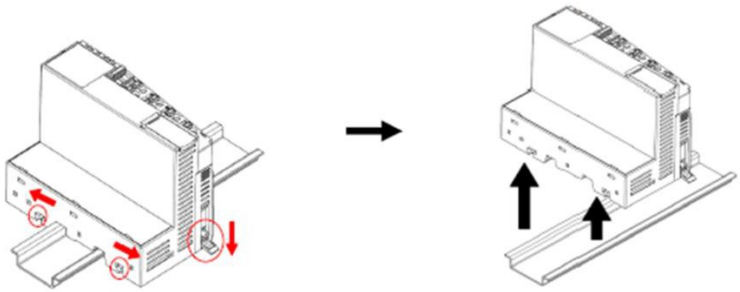
Dismount from DIN rail

9.2.2. Mount GN-9XXX Module

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



Mount to DIN rail



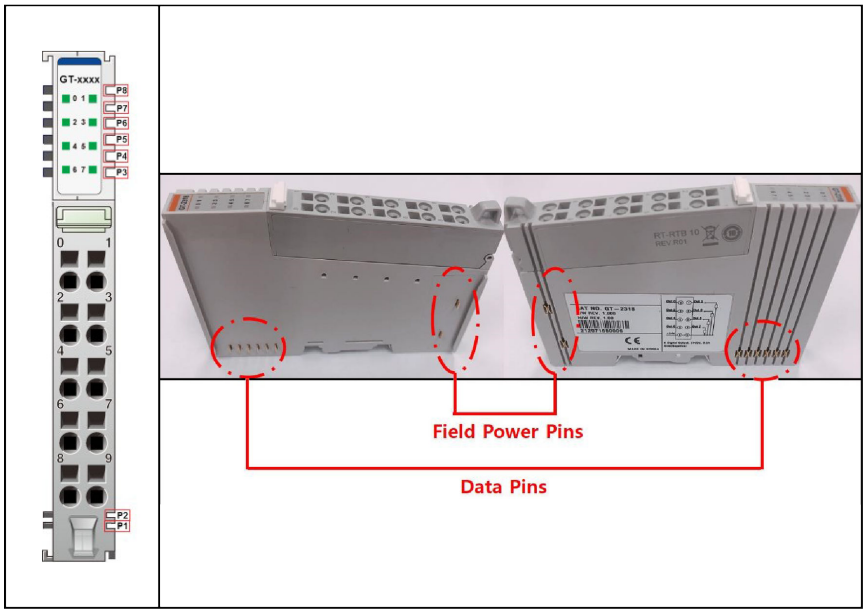
Dismount from DIN rail

9.3. Field Power and Data Pins

Communication between the G-series network adapter 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 **2 Field Power Pins** and **6 Data Pins**.

WARNING

Do not touch the data and field power pins! Touching can result in soiling and damage by ESD noise.



Pin no.	Name	Description
P1	System VCC	System supply voltage (5 VDC)
P2	System GND	System ground
P3	Token output	Token output port of processor module
P4	Serial output	Transmitter output port of processor module
P5	Serial input	Receiver input port of processor module
P6	Reserved	Reserved for bypass token
P7	Field GND	Field ground
P8	Field VCC	Field supply voltage (24 VDC)