



## 1 Series Description

The Altus G Series of distributed remote I/O systems, which includes the GT-3428 voltage analog input expansion module, was developed to meet the requirements of industrial automation applications that demand high performance, high availability, modularity, and operational flexibility. Designed for modern industrial environments, its architecture enables the implementation of robust and scalable solutions across several market segments, including building automation, machinery and equipment, sanitation, energy, manufacturing, utilities, and general industrial processes. The platform's versatility allows it to adapt to a wide range of project requirements, from compact applications to large-scale distributed systems. Its modular concept facilitates future expansions and simplifies system maintenance, reducing operational costs and downtime. In addition, the G Series provides broad compatibility with different control architectures, enabling efficient integration with PLCs, HMIs, SCADA systems, and industrial networks widely used in the market. Its modern and optimized design delivers high signal density, contributing to more compact and organized projects without compromising performance or reliability.

Designed for DIN rail mounting, the G Series offers a complete range of digital and analog input/output modules, special modules, and network heads compatible with the main industrial communication protocols currently available, such as PROFINET, EtherNet/IP, and MODBUS/TCP. This wide variety of options ensures high interoperability and ease of integration in different automation environments. Another important feature is the practicality of installation and maintenance provided by the RTB (Removable Terminal Block) connectors, which allow fast and safe module replacement without the need to remove field wiring. The modules also feature diagnostic and status indication LEDs, simplifying the identification of faults, operating conditions, and power supply status. DIN rail locking mechanisms ensure secure and stable mounting, while the extremely compact design — with modules starting at 12 mm width — enables significant space savings in electrical panels and automation cabinets. These characteristics make the G Series an efficient solution for both new installations and industrial retrofit or modernization projects.

Another key highlight of the G Series is its high operational performance, provided by a high-speed internal bus capable of operating with update times as low as 1 ms, ensuring fast and accurate responses for critical applications and processes requiring a high level of synchronization and reliability. The platform's slice technology eliminates the need for additional busbars, backplanes, or dedicated cabinets for power distribution and communication between modules, making installation simpler, more cost-effective, and more flexible. This feature reduces the mechanical complexity of the installation and contributes to greater system robustness, while also facilitating future expansions and maintenance activities. The distributed architecture also helps reduce field wiring, simplifying electrical projects and lowering installation costs. By combining performance, modularity, ease of integration, and an excellent cost-benefit ratio, the G Series establishes itself as a modern and reliable solution for industrial applications requiring operational efficiency, scalability, and high availability of automation systems.

## 1.1 Key Features of the Series

- Modular flexibility for system expansion;
- Compact design and space saving in control panels;
- Simple wiring and module replacement;
- Fast and accurate communication between modules;
- Ideal for manufacturing, process, energy, water and wastewater, infrastructure and machinery industries.

## 2 2 Ordering Information

### 2.1 GT-3428

The product must be specified according to the corresponding code below:

| CODE           | DESCRIPTION                                                                  |
|----------------|------------------------------------------------------------------------------|
| <b>GT-3428</b> | Expansion Module, 8 Analog Inputs 0 to 10Vdc / 0 to 5Vdc / 1 to 5Vdc, 12-bit |

The product package contains the following items:

- One Expansion Module.

### 2.2 Related Products

The following chart shows a list of G Series products, which must be purchased separately as needed:

| CODE                        | DESCRIPTION                                                                                          |
|-----------------------------|------------------------------------------------------------------------------------------------------|
| <b>GL-9087</b>              | PROFINET Network Adapter/Head Module. Light version, maximum expansion: 10 slots                     |
| <b>GL-9089</b>              | Modbus/TCP and EtherNet/IP Network Adapter/Head Module. Light version, maximum expansion of 16 slots |
| <b>GT-12DF</b>              | Expansion Module, 16 Digital Inputs 24 Vdc, Sink or Source                                           |
| <b>GT-226F</b>              | Expansion Module, 16 Digital Outputs 24 Vdc/0.3 A, Source                                            |
| <b>GT-3158</b>              | Expansion Module, 8 Analog Inputs 8 to 20 mA / 4 to 20 mA, 16-bit                                    |
| <b>GT-3704</b>              | Expansion Module, 4 RTD Inputs, 16-bit                                                               |
| <b>GT-3804</b>              | Expansion Module, 4 Thermocouple Inputs, 16-bit                                                      |
| <b>GT-4254</b>              | Expansion Module, 4 Analog Outputs 4 to 20 mA, 16-bit                                                |
| <b>GT-4424</b>              | Expansion Module, 4 Analog Outputs 0 to 10 Vdc, 12-bit                                               |
| <b>GT-7511</b>              | Bus Power Supply. 24 Vdc input, 5 Vdc/1 A output                                                     |
| <b>GT-5112</b>              | Expansion Module, 2 Channel: High-speed counting (300kHz) / Encoder (750kHz), 32-bit                 |
| <b>AMJG0808<sup>1</sup></b> | RJ45-RJ45 Cable (2m)                                                                                 |

#### Notes:

<sup>1</sup>**AMJG0808**: CAT5 Ethernet network cable with an RJ45 male connector on each end. Designed for a variety of applications, ensuring high-quality communication between the devices that use it (2 meters).



#### ATTENTION:

The GT-3428 module operates only as an expansion for an Altus G Series adapter/network head. It cannot be used without the appropriate adapter/network head.

## 3 Product Features

The GT-3428 module is an I/O module equipped with 8 voltage analog inputs, designed for signal acquisition and monitoring applications in industrial automation systems. Each channel can be individually configured via parameterization registers to operate in the ranges of 0 to 10V, 0 to 5V or 1 to 5V, providing high flexibility for integration with different sensors, transmitters, and instrumentation devices. The independent per-input configuration allows the module to be tailored to the specific needs of each application, simplifying the implementation of systems that use multiple analog signal standards.

To assist with operation, commissioning, and maintenance activities, the GT-3428 features a front panel with 8 status indicator LEDs, one for each analog input. These indicators provide a quick visual reference of the channel's operating conditions, facilitating field diagnostics and helping to reduce the time required to identify and correct faults. Its compact and functional design promotes organized electrical panel layout without compromising accessibility and ease of use during installation and maintenance.

The module is mounted directly on a DIN rail, and the slice technology enables automatic connection to the system's internal bus, eliminating the need for additional wires and cables for power and communication between modules. This architecture reduces assembly complexity, speeds up the installation process, and facilitates future system expansions. Analog signal connections are made via removable RTB (Removable Terminal Block) connectors, enabling quick replacement of the equipment without the need to disconnect the field wiring. In addition, the GT-3428 is designed to operate reliably, in demanding industrial environments, with certifications and compliance standards that attest to its resistance to electromagnetic interference, mechanical vibrations, and wide temperature variations. As a result, the module offers a robust, flexible, and high-performance solution for applications that require accurate and reliable acquisition of analog voltage signals.

### 3.1 Electrical Characteristics

The GT-3428 expansion module consists of 8 analog inputs and offers advanced configuration features, allowing the measurement range to be adjusted to meet the specific requirements of each application. Its technical, functional, and electrical characteristics have been designed to provide flexibility, reliability and high performance in industrial environments, as detailed below:

| Feature                 | Description                                                                             |
|-------------------------|-----------------------------------------------------------------------------------------|
| Number of Inputs        | 8 Voltage Analog Inputs                                                                 |
| Indicators              | 8 green status LEDs (1 for each input)                                                  |
| Isolated Inputs         | No                                                                                      |
| Range                   | 0~10Vdc<br>0~5Vdc<br>1~5Vdc                                                             |
| Resolution              | 12-bit AD conversion<br>2.44V/bit (0~10Vdc)<br>1.22V/bit (0~5Vdc)<br>0.98V/bit (1~5Vdc) |
| Conversion time         | 0.5ms for all inputs                                                                    |
| Error                   | ± 0.1% of full scale @ 25°C<br>± 0.3% of full scale @ -40°C, 70°C                       |
| Input impedance         | 500 kΩ                                                                                  |
| Field adjustment        | Not required                                                                            |
| Common                  | 2 x COM. Common for all 8 inputs                                                        |
| Current consumption     | Maximum 35mA @ 5V                                                                       |
| Field Power Supply (UL) | Supply Voltage: 24Vdc nominal, Class 2                                                  |
| Field Power Supply      | Supply Voltage: 24Vdc nominal<br>Range: 18~30Vdc<br>Current Draw: Max. 35mA @ 24V       |
| Wiring                  | AWG 14 / 2.0mm <sup>2</sup>                                                             |

## 3.2 Environmental Characteristics

The GT-3428 expansion module is designed to operate reliably over a wide range of temperatures and humidity levels, meeting the performance requirements for industrial environments. In addition, its construction complies with applicable standards and certifications, ensuring safety, ruggedness, and operational reliability, as shown in the following table:

| Feature               | DESCRIPTION                                 |
|-----------------------|---------------------------------------------|
| Operating temperature | -40 to 60°C                                 |
| UL Temperature        | -20 to 60°C                                 |
| Storage temperature   | -40 to 85°C                                 |
| Relative humidity     | 5% to 95% (non-condensing)                  |
| Mounting              | DIN rail mounting                           |
| Installation position | Can be installed vertically or horizontally |
| Weight                | 58g                                         |
| Dimensions            | 99mm x 12mm x 70mm (H x W x D)              |

## 3.3 Certifications

The GT-3428 expansion module has certifications that attest to its robustness and reliability in industrial applications, ensuring resistance to electromagnetic interference and vibrations, as well as compliance with construction, safety, and operational requirements established by internationally recognized standards, as shown in the following table:

| Characteristic         | DESCRIPTION                |
|------------------------|----------------------------|
| Mechanical Shock       | IEC 60068-2-27             |
| Vibration Resistance   | Based on IEC 60068-2-6, 4g |
| Industrial Emissions   | EN61000-6-4/All : 2011     |
| Industrial Protection  | EN 61000-6-2 : 2005        |
| Product Certifications | CE, UL                     |

## 4 Installation

The GT-3428 expansion module must be installed in a bus-based system and requires a network adapter to communicate with a controller.

### 4.1 Mechanical Installation

The mechanical installation of the module is straightforward: it is connected to the adjacent module via a side connector and slid toward the DIN rail until it snaps into place.



**CAUTION:**

To prevent damage to the system, perform this procedure with the power disconnected.

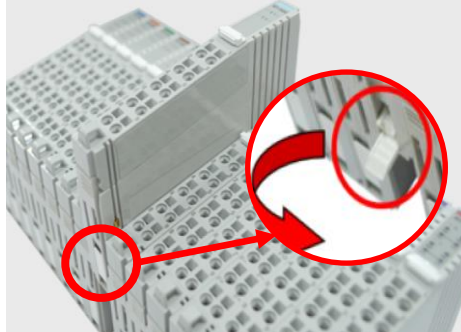


**CAUTION:**

Do not touch the internal bus terminals with your fingers.

The procedure for installing an expansion module is described in the following steps:

- Open (unlock) the DIN rail latch;
- Position the module so that it snaps into place with the adjacent modules;
- Slide the module down until it snaps into the DIN rail;
- Close (lock) the DIN rail latch;



Removing the module is done in a similar manner:

- Open (unlock) the DIN rail latch;
- Unclip the module from the DIN rail and slide it upward until it is completely removed.

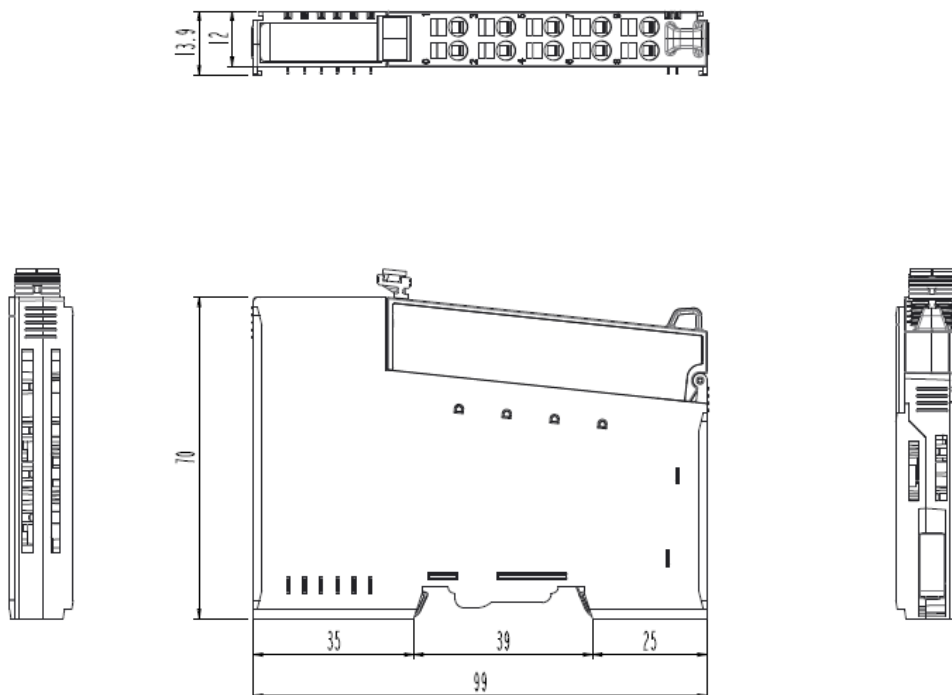
A bus terminator can be installed at the end of the system's last expansion module to protect the internal bus's electrical connections and provide a neater appearance. This part is included with the network adapter in its packaging.

## 4.2 Physical Dimensions

The GT-3428 expansion module measures 12mm wide, 99mm high and 70mm deep when installed vertically (with the DIN rail in a horizontal position).

The 2D (DWG) and 3D (STEP) files are available on the Altus website.

The following image illustrates the module's views, shown in mm (millimeters).

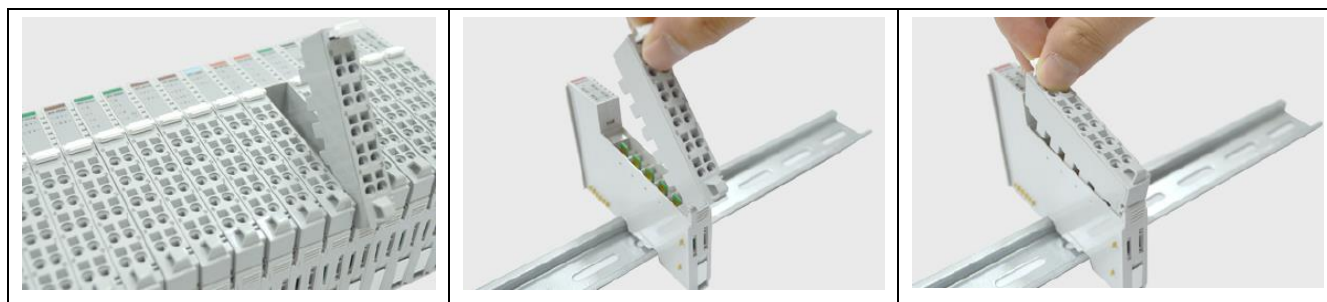


## 4.3 Electrical Connections

The G Series I/O expansion modules do not require additional electrical connections for power, since both the system power supply and the field power supply for the inputs and outputs (I/Os) are provided directly by the remote unit's internal bus. This feature simplifies installation, reduces the need for cabling, and contributes to a faster and more organized setup. The following table lists and describes all the electrical connections available for the module.

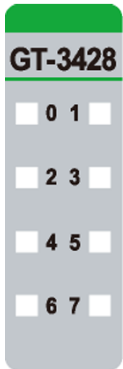
| Front View                                                                        | Connector | Description                       |
|-----------------------------------------------------------------------------------|-----------|-----------------------------------|
|  | 0         | Analog Input 0 Connector          |
|                                                                                   | 1         | Analog Input 1 Connector          |
|                                                                                   | 2         | Analog Input 2 Connector          |
|                                                                                   | 3         | Analog Input 3 Connector          |
|                                                                                   | 4         | Analog Input 4 Connector          |
|                                                                                   | 5         | Analog Input 5 Connector          |
|                                                                                   | 6         | Analog Input 6 Connector          |
|                                                                                   | 7         | Analog Input 7 Connector          |
|                                                                                   | 8         | Common connector (for all inputs) |
|                                                                                   | 9         | Common connector (for all inputs) |

To facilitate electrical installation, the modules are equipped with RTB (Removable Terminal Block) connectors, which, in the event of a module replacement, eliminate the need to disconnect and reconnect the electrical connections in the field.



## 4.4 LED Panel

The GTL-3428 module features a panel with 8 diagnostic and status LED indicators, one for each analog input. The designation and status of each indicator are shown in the table below:

| Panel                                                                               | LED Description | Input | Color | < 0,5 % Range <sup>1</sup> | Normal Operation | No Field Power <sup>3</sup> |
|-------------------------------------------------------------------------------------|-----------------|-------|-------|----------------------------|------------------|-----------------------------|
|  | 0               | AI 0  | Green | Off                        | On               | Flashing                    |
|                                                                                     | 1               | AI 1  | Green | Off                        | On               | Flashing                    |
|                                                                                     | 2               | AI 2  | Green | Off                        | On               | Flashing                    |
|                                                                                     | 3               | AI 3  | Green | Off                        | On               | Flashing                    |
|                                                                                     | 4               | AI 4  | Green | Off                        | On               | Flashing                    |
|                                                                                     | 5               | AI 5  | Green | Off                        | On               | Flashing                    |
|                                                                                     | 6               | AI 6  | Green | Off                        | On               | Flashing                    |
|                                                                                     | 7               | AI 7  | Green | Off                        | On               | Flashing                    |

### Notes:

<sup>1</sup> A turned-off LED indicates normal operation when the input reading is below 0.5% of the range;

<sup>2</sup> When there is no field power supply to the module, all LEDs flash simultaneously.

## 5 Communication

The expansion modules communicate directly with the network adapter via a dedicated internal bus. It is not possible to establish direct communication with the expansion module. Therefore, all communication for reading or writing data or parameters must be initiated through the network adapter, which can operate using either the Profinet or Modbus/TCP protocols.

### 5.1 Profinet

When the module is connected to a Profinet network adapter (GL-9087), it must be added to the project as a component of the adapter, which, in turn, will be associated with a Profinet Controller. Profinet settings for both the network adapter and the expansion module are available in the GSD file integrated into MasterTool, which can also be downloaded from the Altus website. The module's I/O data is available in the "PN Module I/O Mapping" tab, where it can be viewed, read, and linked to project variables. The module's configuration parameters can be viewed and adjusted via the "General" tab, allowing its operation to be tailored to the application's needs.

The tutorial on communication between a Nexto device and a G-Series Profinet network adapter can be accessed at: <https://suporte.altus.com.br/hc/pt-br/articles/40148216672397-Série-G-Configuração-e-comunicação-PROFINET>.

### 5.2 Modbus/TCP

When the module is connected to a Modbus/TCP network adapter (GL-9089), it must be configured in the project by mapping the Modbus device's variables, which will be associated with a Modbus Client. In this mapping, both the input and output (I/O) data and the module's configuration and diagnostic parameters are made available through specific Modbus addresses, allowing the controller to read and write them. This way, access to the module's information is performed directly through the mapped registers, enabling simple and efficient integration and remote parametrization within the application.

The tutorial on communication between a Nexto device and a G-Series Modbus/TCP network adapter can be accessed at: <https://suporte.altus.com.br/hc/pt-br/articles/40132326144525-Série-G-Configuração-e-comunicação-MODBUS-TCP>.

#### 5.2.1 I/O Mapping

According to the GL-9089 Network Adapter documentation, the MODBUS addresses assigned to the digital input (DI) and digital output (DO) expansion modules start at 0x0000 and 0x0800 (0 and 2048), respectively. However, the same document states that for coil read operations, discrete input operations and coil write operations – whether single or multiple – the base addresses should be considered as 0x0000 (0) for input modules and 0x1000 (4096) for output modules.

This way, considering the 1-based addressing convention, access to input and output points now uses addresses starting at 0x0001 and 0x1001 (1 and 4097) respectively. Therefore, it is important to distinguish between the physical addressing specified for the expansion modules and the addressing actually used in MODBUS communication functions, to avoid misinterpretations during system configuration and integration.

The module parameters can be accessed through the mapping of special register addresses for the expansion modules, as shown in the table below. Unlike data mapping, special registers have a fixed address corresponding to the slot number in which the module is located, regardless of its type (input or output).

| Slot | Start Address | End Address |
|------|---------------|-------------|
| 1    | 0x2000        | 0x201F      |
| 2    | 0x2020        | 0x203F      |
| 3    | 0x2040        | 0x205F      |
| 4    | 0x2060        | 0x207F      |
| 5    | 0x2080        | 0x209F      |
| 6    | 0x20A0        | 0x20BF      |
| 7    | 0x20C0        | 0x20DF      |
| 8    | 0x20E0        | 0x20FF      |
| 9    | 0x2100        | 0x211F      |
| 10   | 0x2120        | 0x213F      |
| 11   | 0x2140        | 0x215F      |
| 12   | 0x2160        | 0x217F      |
| 13   | 0x2180        | 0x219F      |
| 14   | 0x21A0        | 0x21BF      |
| 15   | 0x21C0        | 0x21DF      |
| 16   | 0x21E0        | 0x21FF      |

To access the module's parameter information

- [Start Address] + 0x0010 to read the number of bytes of parameters the module has
- [Start Address] + 0x0011 to read/write the module's parameters

## 5.2.2 Data

The GT-3428 voltage analog input expansion module has a 16-byte data set, with 2 bytes for each of the 8 analog inputs.

|         | Bit7                       | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|---------|----------------------------|------|------|------|------|------|------|------|
| Byte 0  | Analog Input 0 – Low Byte  |      |      |      |      |      |      |      |
| Byte 1  | Analog Input 0 – High Byte |      |      |      |      |      |      |      |
| Byte 2  | Analog Input 1 – Low Byte  |      |      |      |      |      |      |      |
| Byte 3  | Analog Input 1 – High Byte |      |      |      |      |      |      |      |
| Byte 4  | Analog Input 2 – Low Byte  |      |      |      |      |      |      |      |
| Byte 5  | Analog Input 2 – High Byte |      |      |      |      |      |      |      |
| Byte 6  | Analog Input 3 – Low Byte  |      |      |      |      |      |      |      |
| Byte 7  | Analog Input 3 – High Byte |      |      |      |      |      |      |      |
| Byte 8  | Analog Input 4 – Low Byte  |      |      |      |      |      |      |      |
| Byte 9  | Analog Input 4 – High Byte |      |      |      |      |      |      |      |
| Byte 10 | Analog Input 5 – Low Byte  |      |      |      |      |      |      |      |
| Byte 11 | Analog Input 5 – High Byte |      |      |      |      |      |      |      |
| Byte 12 | Analog Input 6 – Low Byte  |      |      |      |      |      |      |      |
| Byte 13 | Analog Input 6 – High Byte |      |      |      |      |      |      |      |
| Byte 14 | Analog Input 7 – Low Byte  |      |      |      |      |      |      |      |
| Byte 15 | Analog Input 7 – High Byte |      |      |      |      |      |      |      |

Bytes will be addressed according to the module's position on the bus, in accordance with the mapping criteria already described in 5.2.1.

## 5.2.3 Parameters

The GT-3428 voltage analog input expansion module has a set of 10 bytes of parameters, as follows:

- Byte 0 through Byte 7 for configuring the range of each input individually;
- Byte 8 for the input filter time. Common to all inputs;
- Byte 9 Reserved / Not used.

|        | Bit7                                                          | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|--------|---------------------------------------------------------------|------|------|------|------|------|------|------|
| Byte 0 | Analog Input 0 Range (H00: 0~10Vdc, H01: 0~5Vdc, H02: 1-5Vdc) |      |      |      |      |      |      |      |
| Byte 1 | Analog Input 1 Range (H00: 0~10Vdc, H01: 0~5Vdc, H02: 1-5Vdc) |      |      |      |      |      |      |      |
| Byte 2 | Analog Input 2 Range (H00: 0~10Vdc, H01: 0~5Vdc, H02: 1-5Vdc) |      |      |      |      |      |      |      |
| Byte 3 | Analog Input 3 Range (H00: 0~10Vdc, H01: 0~5Vdc, H02: 1-5Vdc) |      |      |      |      |      |      |      |
| Byte 4 | Analog Input 4 Range (H00: 0~10Vdc, H01: 0~5Vdc, H02: 1-5Vdc) |      |      |      |      |      |      |      |
| Byte 5 | Analog Input 5 Range (H00: 0~10Vdc, H01: 0~5Vdc, H02: 1-5Vdc) |      |      |      |      |      |      |      |
| Byte 6 | Analog Input 6 Range (H00: 0~10Vdc, H01: 0~5Vdc, H02: 1-5Vdc) |      |      |      |      |      |      |      |
| Byte 7 | Analog Input 7 Range (H00: 0~10Vdc, H01: 0~5Vdc, H02: 1-5Vdc) |      |      |      |      |      |      |      |
| Byte 8 | Filter time (H00: Default (20) / H01: fast ~ / H3E: slow)     |      |      |      |      |      |      |      |
| Byte 9 | Reserved                                                      |      |      |      |      |      |      |      |

Bytes will be addressed according to the module's position on the bus, in accordance with the mapping criteria already described in 5.2.1.