Introduction

Thank you for purchasing the SMARTDAC+ GM Data Acquisition System (hereafter referred to as the GM). This manual explains the basic operation, installation, and wiring of the GM.  
- For details on configuring and operating the GM, see the GM Data Acquisition System User’s Manual (IM 04L55B01-01EN) provided in electronic format.
- For details on the settings and operation of the PID control module and program control (PG option), see the Loop Control Function, Program Control Function (PG Option) User’s Manual (IM 04L51B01-31EN) and the SMARTDAC+ STANDARD Hardware Configurator User’s Manual (IM 04L61B01-02EN), provided as electronic manuals.

This manual covers the following products and I/O modules (GX90 series).

<table>
<thead>
<tr>
<th>Model</th>
<th>Product name</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10</td>
<td>Data Acquisition Module for SMARTDAC+ GM</td>
</tr>
<tr>
<td>GM90PS</td>
<td>Power Supply Module for SMARTDAC+ GM</td>
</tr>
<tr>
<td>GM90MB</td>
<td>Module Base for SMARTDAC+ GM</td>
</tr>
</tbody>
</table>

This manual denotes devices with their product names or model (e.g. GM10).

To ensure correct use, please read this manual and the following manuals thoroughly before beginning operation.

Paper Manuals

<table>
<thead>
<tr>
<th>Manual Title</th>
<th>Manual No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Acquisition System GM</td>
<td>IM 04L55B01-02EN (this manual)</td>
</tr>
<tr>
<td>First Step Guide</td>
<td>IM 04L51B01-91EN (included)</td>
</tr>
<tr>
<td>Precaution on the use of SMARTDAC+</td>
<td>IM 04L51B01-91EN (included)</td>
</tr>
<tr>
<td>Regarding the Downloading and Installing for the Software, Manuals and Labels</td>
<td>IM 04L51B01-91EN (included)</td>
</tr>
<tr>
<td>About the Usage of Open Source Software</td>
<td>IM 04L61B01-11EN (included)</td>
</tr>
</tbody>
</table>

Electronic Manuals and General Specifications

You can download these documents from the following web page:


See page 4 in Precaution on the use of SMARTDAC+ (IM 04L51B01-91EN).

General Specifications

<table>
<thead>
<tr>
<th>Title</th>
<th>General Specifications No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Acquisition System GM</td>
<td>GS 04L55B01-01EN</td>
</tr>
<tr>
<td>GX60XA/GX90XD/GX90YD/GX90WD/GX90XP I/O modules</td>
<td>GS 04L53B01-01EN</td>
</tr>
<tr>
<td>GX60 I/O Base Unit (Expandable I/O) / GX90EX Expansion Module</td>
<td>GS 04L53B00-01EN</td>
</tr>
</tbody>
</table>

User Registration Request

Thank you for purchasing YOKOGAWA products.

Please register to the following Partner Portal Member Site. You can use various services such as confirmation of purchased product information, download of related materials, and newsletter.

https://partner.yokogawa.com/global/

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument’s performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
- Copying or reproducing all or any part of the contents of this manual without YOKOGAWA’s permission is strictly prohibited.

Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Edition</th>
<th>Edition</th>
<th>Edition</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 2015</td>
<td>2nd Edition</td>
<td>April 2020</td>
<td>8th Edition</td>
</tr>
<tr>
<td>December 2015</td>
<td>3rd Edition</td>
<td></td>
<td></td>
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<tr>
<td>June 2017</td>
<td>4th Edition</td>
<td></td>
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</tr>
<tr>
<td>July 2018</td>
<td>5th Edition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>October 2018</td>
<td>6th Edition</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Trademarks

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- Microsoft and Windows are registered trademarks or trademarks of Microsoft Corporation in the United States and other countries.
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- The company and product names used in this manual are not accompanied by the registered trademark or trademark symbols (® and ™).

QR code

The product may have a QR Code pasted for efficient plant maintenance work and asset information management. It enables confirming the specifications of purchased products and user’s manuals. For more details, please refer to the following URL.

https://www.yokogawa.com/qr-code

QR Code is a registered trademark of DENSO WAVE INCORPORATED.

Safety Precautions

- Read this manual and “Precaution on the use of SMARTDAC+” (IM04L51B01-91EN) thoroughly and have a clear understanding of the product before operation.
- This manual explains the functions of the product. It does not guarantee that the product will suit a particular purpose of the user.
- Keep “Precaution on the use of SMARTDAC+” and all the related manuals with SMARTDAC+ GM until the end of the use of the product.
- When SMARTDAC+ GM contains GM10 with the optional code of /C8, SMARTDAC+ GM is built in compliance with requirements of R&TTE Directive: We, Yokogawa Electric Corporation hereby declare that this equipment, model GM Data Acquisition system is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The EU declaration of conformity for R&TTE for this product can be found at < http://www.smartdacplus.com/manual/en/ >
• For details on the advanced security function (/AS option), see the GM User’s Manual (IM 04L55B01-01EN) and the Advanced Security Function (/AS) User’s Manual (IM 04L55B01-05EN).

Handling Precautions
• Use care when cleaning this instrument, especially its plastic parts. Use a soft dry cloth. Do not use organic solvents, such as benzene or thinner, or other cleansers. They may cause discoloring and deformation.
• Keep electrically charged objects away from the signal terminals. Doing so may damage the GM.
• Do not apply volatile chemicals to the display, panel keys, etc. Do not allow rubber and vinyl products to remain in contact with the GM for long periods of time. Doing so may damage the GM.
• When not in use, make sure to turn off the power switch.
• If there are any symptoms of trouble such as strange odors or smoke coming from the GM, immediately turn off the power switch and the power supply source. Then, contact your nearest YOKOGAWA dealer.

SD Card Handling Precautions
• SD cards are delicate and should be handled with caution.
• Yokogawa provides no warranty for damage to, or loss of data recorded on the SD card, regardless of the cause of such damage or loss. Please always make backup copies of your data.
• Do not store or use the SD card in places with static electricity, near electrically charged objects, or where electrical noise is present. Doing so can result in electric shock or damage.
• Do not disassemble or modify the SD card. Doing so can result in damage.
• Do not physically shock, bend, or pinch the SD card. Doing so can lead to malfunction.
• During reading/writing of data, do not turn OFF the power, apply vibration or shock, or pull out the card. Data can become corrupt or permanently lost.
• Only use Yokogawa SD cards. Operation cannot be guaranteed with other brands of card.
• When inserting the SD card into the instrument, make sure you orient the card correctly (face up or down) and that you insert it securely. If not inserted correctly, the card will not be recognized by the instrument.
• Never touch the SD card with wet hands. Doing so can lead to electric shock or malfunction.
• Never use the SD card if it is dusty or dirty. Doing so can lead to electric shock or malfunction.
• The SD card comes formatted. SD cards must be formatted according to the standard established by the SD Association (https://www.sdcard.org/home). If using a PC to perform the formatting, use the SD card formatter software available from the above SD Association. The GM does not have a format function.
• You can use SD/SDHC cards (up to 32 GB) on the GM.

SD Card Specifications and Characteristics

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical specifications</td>
<td>Operating voltage: 2.7 V to 3.6 V</td>
</tr>
<tr>
<td>Operating temperature/humidity</td>
<td>-25 to 85°C/20 to 85%RH (no condensation)</td>
</tr>
<tr>
<td>Storage temperature/humidity</td>
<td>-40 to 85°C/5 to 95%RH (no condensation)</td>
</tr>
</tbody>
</table>

Checking the Package Contents
After receiving the product and opening the package, check the items described below. If the wrong items have been delivered, if items are missing, or if there is a problem with the appearance of the items, contact your nearest YOKOGAWA dealer.
Check that the product that you received is what you ordered by referring to the model name and suffix code given on the nameplate on the GM.

No. (Instrument number)
When contacting the dealer from which you purchased the instrument, please give them the instrument number. The number is inscribed on the nameplate.
## MODEL and SUFFIX Codes

### GM10

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Optional Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10</td>
<td></td>
<td></td>
<td>Data Acquisition Module for SMARTDAC+ GM</td>
</tr>
<tr>
<td></td>
<td>-1</td>
<td></td>
<td>Standard (max. no. of measurement ch: 100)</td>
</tr>
<tr>
<td></td>
<td>-2</td>
<td></td>
<td>Large Memory (max. no. of measurement ch: 500)</td>
</tr>
<tr>
<td></td>
<td>-0</td>
<td></td>
<td>Always 0</td>
</tr>
</tbody>
</table>

### Optional features
- /AH Aerospace heat treatment
- /AS Advanced security function
- /BT Multi-batch function
- /C3 RS-422/485
- /C8 Bluetooth
- /E1 EtherNet/IP communication
- /E2 WT communication
- /E3 OPC-UA server
- /E4 SLMP communication (Mitsubishi PLC)
- /ILG LOG scale
- /LC Communication channel function
- /MT Mathematical function (with report function)
- /IPG Program control
- /WH Integration bar graph function

### GM90PS

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Optional Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM90PS</td>
<td></td>
<td>N</td>
<td>Power Supply Module for SMARTDAC+ GM</td>
</tr>
<tr>
<td></td>
<td>-1</td>
<td>Always -1</td>
<td>Power input with UL/CSA cable</td>
</tr>
<tr>
<td></td>
<td>-0</td>
<td>Always 0</td>
<td>Power input with VDE cable</td>
</tr>
<tr>
<td></td>
<td>-N</td>
<td>Always N</td>
<td>Power input with GB cable</td>
</tr>
<tr>
<td></td>
<td>-L</td>
<td>Always L</td>
<td>Power input with NBR cable</td>
</tr>
<tr>
<td></td>
<td>-Q</td>
<td>Always Q</td>
<td>Power input with BS cable</td>
</tr>
<tr>
<td></td>
<td>-R</td>
<td>Always R</td>
<td>Power input with AS cable</td>
</tr>
<tr>
<td></td>
<td>-W</td>
<td>Always W</td>
<td>Screw terminal (without cable)</td>
</tr>
</tbody>
</table>

### Optional features
- /WH For integration bar graph function

### GM90MB

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM90MB</td>
<td>-01</td>
<td>Module Base for SMARTDAC+ GM</td>
</tr>
</tbody>
</table>

### GX90EX

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90EX</td>
<td></td>
<td>I/O Expansion Module</td>
</tr>
<tr>
<td></td>
<td>-02</td>
<td>2 ports</td>
</tr>
</tbody>
</table>

### I/O module

#### GX90XA

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90XA</td>
<td></td>
<td>Analog Input Module</td>
</tr>
<tr>
<td></td>
<td>-10</td>
<td>10 channels</td>
</tr>
</tbody>
</table>

#### GX90XD

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90XD</td>
<td></td>
<td>Digital Input Module</td>
</tr>
<tr>
<td></td>
<td>-16</td>
<td>16 channels</td>
</tr>
</tbody>
</table>

#### GX90YD

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90YD</td>
<td></td>
<td>Digital Output Module</td>
</tr>
<tr>
<td></td>
<td>-06</td>
<td>6 channels</td>
</tr>
</tbody>
</table>

#### GX90WD

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90WD</td>
<td></td>
<td>Digital Input/Output Module</td>
</tr>
</tbody>
</table>

* Optional code /MT (MATH) required if using the pulse input.
**GX90XP**

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90XP</td>
<td></td>
<td>Pulse Input Module *</td>
</tr>
</tbody>
</table>

**Channels** -10 10 channels

**Type** -11 DC voltage/open collector/non-voltage contact (shared common), rated 5 VDC

- N Always N

**Terminal type** -3 Screw terminal (M3)

- C Clamp terminal

**Area** N General

* When the GM10 has the /MT option, GX90XP can receive pulse integration.

**GX90YA**

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90YA</td>
<td></td>
<td>Analog output Module</td>
</tr>
</tbody>
</table>

**Channels** -04 4 channels

**Type** -C1 Current output (isolated between channels)

- N Always N

**Terminal type** -3 Screw terminal (M3)

- C Clamp terminal

**Area** N General

**GX90UT**

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90UT</td>
<td></td>
<td>PID Control Module</td>
</tr>
</tbody>
</table>

**Number of loops** -02 2 loops

**Function** -11 DI 8 points, DO 8 points

- N Always N

**Terminal type** -3 Screw terminal (M3)

- C Clamp terminal

**Area** N General

**Customized Product**

For customized product, the product is identified by the option code of /S# (where '#' is a number).

Contact your supplier in case your instrument has option /S#, and you are not in the possession of IM [Model code]–S# (where [Model code] means, for example, GX90XA).

**Standard Accessories**

The instrument is shipped with the following accessories. Make sure that all accessories are present and undamaged.

### SD card 773001 1 1 GB (included with the GM10)

### Connector cover B8740GN 1 Included with the GM90PS

### Screws Y9310LB 4 M3 screws for linking modules (included)!

### Power cord A1006WD 1 D: Power cord UL, CSA std

### A1009WD 1 F: Power cord VDE std

### A1024WD 1 R: Power cord BS std

### A1054WD 1 Q: Power cord BS std

### A1064WD 1 H: Power cord GB std

### A1088WD 1 N: Power cord NBR std

**No.** Name | Part Number/Model | Qty. | Notes
---|------------------|------|------
1 | SD card | 773001 | 1 | 1 GB (included with the GM10)
2 | Connector cover | B8740GN | 1 | Included with the GM90PS
3 | Screws | Y9310LB | 4 | M3 screws for linking modules (included)!
4 | Power cord | A1006WD | 1 | D: Power cord UL, CSA std
| | A1009WD | 1 | F: Power cord VDE std
| | A1024WD | 1 | R: Power cord BS std
| | A1054WD | 1 | Q: Power cord BS std
| | A1064WD | 1 | H: Power cord GB std
| | A1088WD | 1 | N: Power cord NBR std

**Optional Accessories (Sold separately)**

| Name | Part Number/Model | Minimum Qty. | Notes
---|------------------|--------------|------
SD card | 773001 | 1 | 1GB
Shunt resistor (for M3 screw terminal) | 415940 | 1 | 250Ω±0.1%
| 415941 | 1 | 100Ω±0.1%
| 415942 | 1 | 10Ω±0.1%
Shunt resistor (for clamp terminal) | 438920 | 1 | 250Ω±0.1%
| 438921 | 1 | 100Ω±0.1%
| 438922 | 1 | 10Ω±0.1%

**GM10 Style Number, Release Number, and Firmware Version Number**

**Style number:**

The GM hardware ID number. This number is written on the nameplate (H column). For hardware style, refer GM90PS.

**Release number:**

The GM firmware ID number. This number is written on the nameplate (S column). This number matches with the integer part of the firmware version number. For firmware style, refer GM10.

**Example:** If the firmware version number is 1.01, the release number is 1.

**Firmware version number:**

You can check this number on the system information screen of the GM. For the procedure, see the User's Manual (IM 04L55B01-01EN).

**Conventions Used in This Manual**

- This manual covers information regarding GMs whose display language is English.
- For details on the language setting, see the SMARTDAC+ GM Data Acquisition System User's Manual (IM 04L55B01-01EN).

- **Unit**
  - K: Denotes 1024. Example: 768K (file size)
  - k: Denotes 1000.

- **The notes and cautions in this manual are indicated using the following symbols.**
  - **WARNING**
    - Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user’s manual for special instructions. The same symbol appears in the corresponding place in the user’s manual to identify those instructions. In the manual, the symbol is used in conjunction with the word “WARNING” or “CAUTION.”

- **WARNING**
  - Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.
CAUTION
Calls attention to actions or conditions that could cause light injury to the user or cause damage to the instrument or user’s data, and precautions that can be taken to prevent such occurrences.

Note
Calls attention to information that is important for the proper operation of the instrument.

Module Notation
When necessary, the following notations are used to distinguish the GX90XA analog input modules by type.

<table>
<thead>
<tr>
<th>Type suffix code</th>
<th>Notations</th>
</tr>
</thead>
<tbody>
<tr>
<td>-C1</td>
<td>DC current (mA) input</td>
</tr>
<tr>
<td>-L1</td>
<td>Low withstand voltage relay</td>
</tr>
<tr>
<td>-U2</td>
<td>Universal</td>
</tr>
<tr>
<td>-T1</td>
<td>Electromagnetic relay</td>
</tr>
<tr>
<td>-H0</td>
<td>High-speed universal or High-speed AI</td>
</tr>
<tr>
<td>-R1</td>
<td>4-wire RTD/resistance</td>
</tr>
<tr>
<td>-V1</td>
<td>High withstand voltage</td>
</tr>
</tbody>
</table>

GM Overview
The GM Data Acquisition System is a data logger that excels in versatility and expandability. The GM10 contains memory for data acquisition and also supports SD cards for external storage.

The system consists of a Data Acquisition Module (GM10), Power Supply Module (GM90PS), and Module Base (GM90MB), which houses various modules.

GM can operate with SMARTDAC+ series modules.

GM Configuration
The GM configures a system with a combination of various modules.

The unit that includes the GM10 is called the main unit. A unit connected to the main unit via a GX90EX expansion module is called a sub unit. Modules in a unit can be connected by installing a GM90MB.

Main Unit (single unit system)
A unit consisting of a GM10 and a GM90PS. Up to 10 I/O modules can be connected to a unit.

Main Unit (multi unit system)
A unit consisting of a GM10, a GM90PS and a GX90EX. Up to six I/O modules can be connected to a unit. Up to six sub units can be connected via the GX90EX.

Sub Unit (multi unit system)
A unit consisting of a GM90PS and a GX90EX. Up to six I/O modules can be connected to a unit. The main unit and sub units are connected using LAN cables. The maximum connection distance between two units is 100 m.

Module Version and Notes on Linking
Module Version
The following table lists the module firmware versions that can be used with the GM. For modules not listed in the following table, R1.01.01 and later can be used.

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Firmware version</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90XA</td>
<td>-C1</td>
<td>R1.04.01 or later</td>
</tr>
<tr>
<td></td>
<td>-L1</td>
<td>R1.04.01 or later</td>
</tr>
<tr>
<td></td>
<td>-U2</td>
<td>R1.04.01 or later</td>
</tr>
<tr>
<td></td>
<td>-T1</td>
<td>R1.04.01 or later</td>
</tr>
<tr>
<td></td>
<td>-H0</td>
<td>R1.04.01 or later</td>
</tr>
<tr>
<td></td>
<td>-R1</td>
<td>R1.04.01 or later</td>
</tr>
<tr>
<td></td>
<td>-V1</td>
<td>R1.02.01 or later</td>
</tr>
<tr>
<td>GX90XD</td>
<td></td>
<td>R1.04.01 or later</td>
</tr>
<tr>
<td>GX90WD</td>
<td></td>
<td>R1.04.01 or later</td>
</tr>
<tr>
<td>GX90YD</td>
<td></td>
<td>R1.04.01 or later</td>
</tr>
</tbody>
</table>

Limit to the number of modules per unit
The system will not operate if it exceeds the following limits.

- When GX90XA-10-T1 is included
  - Single unit system: 8
  - Multi unit system: main unit: No limit

- When GX90XA-04-H0 is included
  - Single unit system: 8
  - Multi unit system: main unit: No limit

- When GX90XA-04-H0 and GX90YA are included
  - Single unit system: 7
  - Multi unit system: main unit: No limit

- When GX90UT is included
  - Single unit system: 5
  - Multi unit system: main unit: 5

Limit on Modules
- Up to 10 modules consisting of GX90YD, GX90WD, and GX90UT can be connected to the system.
- One GX90WD module can be connected to each unit.
- Two GX90YA modules can be connected to the main unit and to the sub unit.
- Up to 10 GX90YA modules can be connected to a GM10-1 system and up to 12 to a GM10-2 system.
- If the measurement mode is High speed, a GX90XD or GX90WD module can be connected to the system.
- If the measurement mode is High speed, only GX90XA-04-H0 (high-speed AI), GX90XD (DI), and GX90WD (DIO) are detected. DI and DIO are fixed to remote mode.

Measurement and recording are not possible.

Limit to the Number of Sub Units
- Up to six units can be connected.
- Connection is not possible if the measurement mode is set to High speed.
If the measurement mode is Dual interval, GX90UT is not detected.
Up to 3 GX90UT modules can be connected to a GM10-1 system and up to 10 to a GM10-2 system.

Notes on Module Installation
- If you want to use reference junction compensation on a thermocouple input of a GX90XA-10-U2, GX90XA-10-L1, GX90XA-10-T1, GX90XA-04-H0 or GX90XA-10-V1, do not connect the following module to the right of the GX90XA module as seen from the front.
Doing so may cause the reference junction compensation accuracy to deviate from the guaranteed range.
GX90XA-10-C1 (for mA), GX90XA-04-H0 (high-speed AI),
GX90YA, GX90WD, GX90UT
- If the maximum number of I/O channels are assigned and the last channel is assigned to an intermediate channel of a connected I/O module, that module and subsequent modules will not be identified.

Limitations depending on the Measurement Mode
Depending on the measurement mode, there are limits to the number of measurement channels, the number of recording channels, the supported modules, and so on.
For the specific limitations, see the limitations provided in the following general specifications.
- GM Data Acquisition System General Specifications (GS 04L55B01-01EN)

Channel Names
Operations such as measurement, computation, and recording are performed on channels.
A channel name is assigned a 4-digit number consisting of a unit number, slot number, and channel number.
- Channel names are specific to the system, so they cannot be changed.
- By setting tags or tag numbers to the channels, you can use any names you like.
Operating Procedure

Product user’s manuals can be downloaded from the following URL.
URL: www.smartdacplus.com/manual/ja/

You can download the latest version of the software from the following URL.
URL: www.smartdacplus.com/software/ja/

Download the following software applications.
SMARTDAC+ Standard Hardware Configurator
SMARTDAC+ Standard IP Address Configurator

See the list of electronic manuals on page 4 of IM 04L51B01-91EN, and download them if necessary.

Indicates a reference. A document number is indicated for manuals other than this manual.

Operations on the GM

Prepare modules.
Check the modules. Install the module base. Link the modules.

Configure the system.

Installation

Connect I/O signals and power.

Turn on the power.

“Wiring”

“Wiring”

Operations on the PC

Configure the GM settings.

“Basic Operations”
If you need to set the time zone or DST (Daylight Saving Time) or both, do so before setting the date and time.

Configure functions as necessary.

“Basic Operations”
Start recording/measuring.

System Configuration

GM supports both standalone operation and data acquisition using a PC. Use a PC to configure the GM settings. To download the dedicated software application, you need to connect to the Internet.

Single Unit System
A system configured with only a main unit.

Configuration

Hardware Configurator is required for USB communication or Bluetooth communication (C8 option). A dedicated software application is not required for Ethernet connections. (IP Address Configurator is used during installation.)

Checking the Modules

GM10 GM90MB GM90PS

GX90EX

I/O modules1 (without the terminal covers)

GM10 specifications (see IM 04L55B01-01EN).

1 Some of the modules that can be used with the GM have firmware version conditions. See page 6.
2 The GX90EX is used to configure a multi unit system. The firmware version of the GX90EX that can be used with the GM must be R1.02.01 or later.

GM90MB GM90PS

GX90EX

GM supports both standalone operation and data acquisition using a PC. Use a PC to configure the GM settings. To download the dedicated software application, you need to connect to the Internet.

Configuration of settings and real time monitoring are possible using a Web application. A PC with Internet Explorer 11 or Google Chrome installed is required.
Installing the Module Base
Insert the module from the front of the GM90MB until a click is heard. Then, fasten the screw.
(Recommended tightening torque: 0.6 N•m)

For wall mounting, mount the GM90MB to the wall first, and then install the modules.

Removing a Module
1. Loosen the screw at the bottom section of the module.
2. While pressing down on the latch at the top of the module, pull the module out.

When carrying the unit, be sure that the modules are securely installed.

Linking the Module Base (Module)
1. Check that the slide lock (vertical) is released (see below), align the four protrusions of the GM90MB to the guides, and push it in.

2. After linking the module base, fix in place using the slide lock or the supplied screw
(Recommended tightening torque: 0.4 to 0.5 N•m)

Multi Unit System
A system configured with a main unit connected to sub units.
Up to six sub units can be connected to a main unit. Each unit can connect up to six modules.
* There is a limitation on the number of channels based on the GM10 specifications (see IM 04L55B01-01EN).

The multi unit system support only cascaded connections. If connected in a ring, none of the sub units will be identified.

GM90PS
Link the GX90EX to the left end on a main unit and next to the GM90PS on a sub unit.

Maximum connection distance between two units is 100 m.

IP Address Configurator Screen Example
- Search for GM10s in the same network segment and list them.
- Set the IP address and other parameters of the GM10.

Hardware Configurator Screen Example
- GM settings can be configured offline from a Web browser.
Basic Operation

The basic operation of the GM is explained briefly here. For details, see the user's manuals.

Names of the GM10 Parts

- 7 segment LED×2
- Status display area
- START/STOP key
- USER key
- USB port
- SD card slot
- RS-422/485 Serial port (/IC3 option)
- Ethernet port

7 segment LED:
Displays the operation mode, system No., self-check operation, key lock, operation error, process running, and module installation information.

Status display area:

<table>
<thead>
<tr>
<th>Item</th>
<th>LED color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDY</td>
<td>Green</td>
<td>System normal indication</td>
</tr>
<tr>
<td>REC</td>
<td>Green</td>
<td>Recording status</td>
</tr>
<tr>
<td>SD</td>
<td>Orange</td>
<td>SD card access status</td>
</tr>
<tr>
<td>FAIL</td>
<td>Red</td>
<td>System error indication</td>
</tr>
<tr>
<td>MATH</td>
<td>Green</td>
<td>Computation status</td>
</tr>
<tr>
<td>SER</td>
<td>Orange</td>
<td>Serial communication status</td>
</tr>
<tr>
<td>BT</td>
<td>Orange</td>
<td>Bluetooth communication status</td>
</tr>
<tr>
<td>ALM</td>
<td>Red</td>
<td>Alarm status</td>
</tr>
</tbody>
</table>

START key: Starts recording and computation
STOP key: Stops recording and computation, clears errors
USER keys (USER1/USER2): Executes specified actions (event action function)

Setting a SD Card

Open the SD card slot cover on the GM10 front panel, and insert an SD card (see the names of the parts).

Note
On models with the advanced security function (/AS option), an SD memory card must be installed.

Configuring the GM via Ethernet Communication

Setting the GM10’s IP address with the IP Address Configurator

1. Start the IP Address Configurator, and click Search. A list of GM10s in the segment appears.

Setting the Measurement Mode

Set the measurement mode to Normal, High speed, or Dual interval. The factory default setting is Normal.

Note
When you change the measurement mode, the following data is initialized.
- All internal data
- All setting parameters except the IP address and other communication settings (including security settings)
- System configuration data

<table>
<thead>
<tr>
<th>Measurement mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>A mode in which the shortest measurement interval is 100 ms</td>
</tr>
<tr>
<td>High speed</td>
<td>A mode in which the shortest measurement interval is 1 ms</td>
</tr>
<tr>
<td>Dual interval</td>
<td>A mode in which measurement is possible by setting different scan intervals on the two scan groups</td>
</tr>
</tbody>
</table>

1. Start the Web browser (IE11 or Chrome).
2. In the Address box, enter “http://” followed by the GM10 IP address. The Web application starts.
3. On the content selection tree, click the Calib tab.
4. On the content selection tree, click Measurement mode.
5. Select a measurement mode, and click Update Configuration in the lower right of the screen.

Reconfiguring (Module identification)

Reconfiguration is used to identify the connected I/O modules to align the system environment to the actual module configuration.

Reconfiguration is necessary in the following situations.
- When the system is used for the first time, when modules are changed (changed to different types of modules), when modules are added or removed, or when the system configuration is changed (connecting a GX90EX)

Do not carry out the following operations while a reconfiguration is in progress.
- Turn the power on or off, remove or insert a module

1. Start the Web browser (IE11 or Chrome).
Setting Measurement and Recording Conditions

The example here explains how to change the recording interval when the following settings are at their default values.

- File type: Event, Scan interval: 1s (or 2s), Recording mode: Free (record data at all times)
- The measurement and recording conditions vary depending on the number of recording channels, recording interval, and so on.

1. Click the **Config.** tab, **Recording settings**, and **Recording basic settings**.

2. Select the recording interval.
   - You cannot select a recording interval that is shorter than the scan interval.
   - If necessary, set the data length. The data length specifies the size of a single recording data file (the save interval).

3. Click **Update Configuration** in the lower right of the screen.
   - A Update Configuration dialog box appears.

4. Click **OK**.

Setting Display Groups

This setting is necessary for displaying measurement data. You can assign channels and the group name to each display group. For details, see the User’s Manual. The example here explains how to assign AI channels 0001 to 0010 to group number 1.

1. Click the **Config.** tab, **Display settings**, **Group settings**, and 1-20.

2. Select the On/Off check box of group number 1, and click the button under Channel set.

3. Click **Update Configuration** in the lower right of the screen.
   - A Update Configuration dialog box appears.

4. Click **OK**.

Configuring a Signal Input

The example here explains how to specify thermocouple type T and 0 to 200°C on channel 1 (0001) of slot (module number) 0.

1. On the content selection tree, click the **Config.** tab.

2. On the tree, click **AI channel settings**, 0001-0010, and **Range**.

3. For channel (CH) 0001, set the following items.
   - Type: TC, Range: T, Span Lower: 0.0, Span Upper: 200.0

4. Click **Update Configuration** in the lower right of the screen.
   - A Update Configuration dialog box appears.

5. Click **OK**.
Configuring the GM via USB Communication

In the case of USB communication, use the Hardware Configurator (hereafter refer to as the software). For details on the features and operating procedures of the software, see the SMARTDAC+ STANDARD Hardware Configurator User’s Manual (IM 04L61B01-02EN).

1. Connect a cable to the GM10 USB port (mini B type) to communicate with the PC. Connect using the following communication conditions.
   - Baud rate: 115200
   - Parity: none
   - Data length: 8 bits
   - Stop bits: 1 bit
   - Handshake: off

Make sure that the PC is connected to the Internet. A USB driver will be downloaded automatically.

2. Start the software.

Reconfiguring (Module identification)

1. On the menu bar, click the **Operation** tab and then **Reconfiguration**.

   A Communication [Reconfiguration] dialog box appears.

2. Enter the information, and click **OK**.

   You can check the port USB number using Windows Device Manager.

3. When a confirmation dialog box appears, click **OK**. A reconfiguration completion dialog box appears.

4. Click **OK**.

Configuring Various Items

For details on settings, see the Web application.

1. On the menu bar, click the **Setting** tab and then **Receive Settings**.

2. When a Communication [Reconfiguration] dialog box appears, click **OK**.

   The setup data of the connected GM will appear.

3. Set the items.

4. On the menu bar, click the **Setting** tab and then **Send Settings**.

5. When a Communication [Reconfiguration] dialog box appears, click **OK**.

   The setup data will be sent to the connected GM.

   You can also save the setup data to be sent later.

Starting to Measure and Record

Starting from the Web Browser

**From the Web Application**

1. On the menu bar, click the **SMARTDAC+ Web Service** tab and then **Recording**.

2. When a Recording dialog box appears, click **Start recording**. Recording will start.

   • To stop recording, in step 2 above, click **Stop recording**.

**From Hardware Configurator**

1. On the menu bar, click the **Operation** tab and then **Start Recording**.

2. When a Communication [Reconfiguration] dialog box appears, click **OK**. Recording will start.

   • To stop recording, in step 2 above, click **Stop Recording**.

Starting with the GM10 START Key

Hold down the START key on the GM10 front panel for at least 2 seconds.

Recording will start, and “REC” in the GM10 status display area will light in green.

• Stopping the Recording

   Hold down the STOP key for at least 2 seconds. The “REC” indicator will turn off.

   • The “REC” LED also turns on and off when recording is started and stopped from the Web application or Hardware Configurator.

To connect to the GM via Bluetooth, “Bluetooth Connection Procedure (/C8 option)” on page 26 of this guide.
Installation

CAUTION

- Before installing the GM, linking modules, and installing modules, be sure to turn off the power.
- Apply more torque than what is recommended to tighten the screws can deform the case or cause other damage.

Installation Location

This product is designed as open equipment under the CSA/UL/EN 61010-2-201 standards. In order to comply with these standards, install it as follows:

- Install the GM unit / GX60 in a panel with a door.
- The instrumentation panel or panel used for support must comply with CSA/UL/EN 61010-2-201 or must be at least IP1X (degrees of protection) and at least IK09.
- Install the GM/GX60 systems in a panel with a door or in a location where can not touch the output terminal block carelessly, when hazardous voltages(over 30VAC or 60VDC) is inputted into output terminal block.

WARNING

Install the GM / GX60 systems in a panel with a door or in a location where operator or any third person can not operate the power switch carelessly. If the power switch of GM/GX60 systems under operation be turned on or off carelessly, it may result the system down or injury.

WARNING

On the GX90XA-10-V1, the insulation specification is 1000V DC basic insulation when the common mode voltage exceeds 600 V. When using the system in a common mode voltage environment that exceeds 600 V, install it as follows:

- The GM system and all devices without insulation equivalent to 1000V supplementary insulation connected to the GM system must be installed in a panel with a door.
- Do not access the inside of the panel when the measurement target is turned on.
- The panel used for support must comply with CSA/UL/EN 61010-2-201 or must be at least IP1X (degrees of protection) and at least IK09.

Install the GM indoors in an environment that meets the following conditions:

- Ambient temperature range between -20 to 60°C (but -20 to 50°C when any of the following.) When using GM10 (Optional, / C8) and GX90YD, GX90WD, GX90XA-T1 (electromagnetic relay type), GX90YA, GX90UT.
- Ambient humidity between 20 to 85%RH
- No condensation should be present.

Note

Condensation may form when moving the GM from a low temperature or humidity environment to a high temperature or humidity environment, or when there is a sudden change in temperature. Temperature or humidity changes may also result in thermocouple measurement errors. In these kinds of circumstances, wait for at least an hour before using the GM, to acclimate it to the surrounding environment.

- Well-Ventilated Location
  To prevent overheating, install the GM in a well-ventilated location.
- Minimal Mechanical Vibrations
  Install the GM in a location that has minimal mechanical vibrations. Installing the GM in a location that is subject to large levels of mechanical vibration will not only put added stress on its components, it may also impede ordinary measurement.
- Level Location
  Install the GM in a level location so that it is not slanted to the left or the right.
- Altitude 2000m or less
  Do not install the instrument in the following kinds of places.
- Outdoors
  In Direct Sunlight or Near Heat Sources
  Install the GM in a place that is near room temperature (23°C) and that is not subject to large temperature fluctuations. Placing the GM in direct sunlight or near heat sources can cause adverse effects on the internal circuitry.
- Where an excessive amount of soot, steam, moisture, dust, or corrosive gases are present
  Soot, steam, moisture, dust, and corrosive gases will adversely affect the GM. Avoid installing the GM in such locations.
- Near Strong Magnetic Field Sources
  Do not bring magnets or instruments that produce electromagnetic fields close to the GM. Operating the GM near strong magnetic fields can cause measurement errors.

Installation Procedure

The GM can be installed on a desktop or floor, mounted on a DIN rail, or mounted on a wall. Regardless of the installation method, be sure to install it in an upright orientation.

Unit External Dimensions (Unit: mm)

Depth: 146 mm max.
Main Unit (single unit system)

<table>
<thead>
<tr>
<th>Depth</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>638</td>
<td>588</td>
<td>138</td>
</tr>
</tbody>
</table>

GM90MB I/O module GM10 GM90PS
Installing on a Desktop or Floor
The system can be placed upright because the GM90PS and GM90MB have legs. For the module installation procedure, see “Operating Procedure.”

Mounting on a DIN Rail

**CAUTION**

When mounting on a DIN rail, place screws at 70 mm intervals or less. This is necessary to ensure adequate support.

1. Hook the top section of the DIN rail mounting groove on the rear panel of the GM (GM90PS or GM90MB) to the DIN rail.
2. Push the bottom section of the GM until you hear a click. The GM is fixed in place with the latches on the rear panel of the GM.

Check that all the latches are securely fastened to the DIN rail.

Removing from the DIN Rail
1. Lower the latch on the rear panel of the GM using a flat-blade screwdriver or the like. Lower it until you hear a click; the latch will be fixed in place at that position.
2. Pull the GM slightly toward you, and lift up to remove.
**Vertical Dimensions for DIN Rail Mounting**

<table>
<thead>
<tr>
<th>DIN rail</th>
<th>Unit: mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>68.6</td>
<td></td>
</tr>
<tr>
<td>185</td>
<td></td>
</tr>
</tbody>
</table>

**Mounting on a Wall**

**Wall Mount Dimensions**

<table>
<thead>
<tr>
<th>Unit: mm (Tolerance: ±0.3 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>620.5</td>
</tr>
<tr>
<td>570.5</td>
</tr>
<tr>
<td>520.5</td>
</tr>
<tr>
<td>470.5</td>
</tr>
<tr>
<td>420.5</td>
</tr>
<tr>
<td>370.5</td>
</tr>
<tr>
<td>320.5</td>
</tr>
<tr>
<td>270.5</td>
</tr>
<tr>
<td>220.5</td>
</tr>
<tr>
<td>170.5</td>
</tr>
<tr>
<td>120.5</td>
</tr>
<tr>
<td>90.5</td>
</tr>
<tr>
<td>140.5</td>
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<tr>
<td>190.5</td>
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<tr>
<td>240.5</td>
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<tr>
<td>290.5</td>
</tr>
<tr>
<td>340.5</td>
</tr>
<tr>
<td>390.5</td>
</tr>
<tr>
<td>440.5</td>
</tr>
<tr>
<td>490.5</td>
</tr>
<tr>
<td>540.5</td>
</tr>
<tr>
<td>590.5</td>
</tr>
</tbody>
</table>

Prepare enough M4 screws (4 mm or longer) (hereafter referred simply as screws) for wall mounting the modules. You need two screws for each module. Recommended tightening torque: 0.6 to 0.7 N•m

In wall mounting, the GM90PS is the reference. First, as shown in the figure below, fix the GM90PS securely in place with two screws. Next, link GM90MBs to the GM90PS.

Link GM90MBs to the right of the GM90PS as seen from the front. While pressing the GM90MB against the GM90PS, fasten in place with screws.
- GM90MBs can be fixed in place one at a time or at once after they have been linked.

For the linking procedure, see “Operating Procedure” on page 8 of this guide.

After fixing the GM90MBs in place, install the modules.

**Note**
Install so that nameplate on the right side of the GM90PS is visible.
**Wiring**

**WARNING**

- To prevent electric shock while wiring, make sure that the power supply is turned off.
- If a voltage of more than 30V AC or 60V DC is to be applied to the output terminals, use ring-tongue crimp-on lugs with insulation sleeves on all terminals to prevent the signal cables from slipping out when the screws become loose. Furthermore, use double-insulated cables (dielectric strength of 3000V AC or more) for signal cables through which a voltage of 30V AC or 60V DC or more is to be applied to the output terminals. For all other signal cables, use basic insulated cables (dielectric strength of 1500V AC).
- To prevent electric shock, attach the terminal cover after wiring and make sure not to touch the terminals.
- For signal cables through which a voltage of 30V AC or 60V DC or more is applied to the input terminals, use double-insulated cables that have sufficient withstand voltage performance for the measurement target and that are suitable for the rating. To prevent electric shock, attach the terminal cover after wiring and make sure not to touch the terminals.
- When the output terminals of the GX90WD are connected to a voltage exceeding 150V AC, the connection is limited to a circuit (secondary power source) derived from the mains circuit (primary power source) of up to 300V AC. Since the insulation specification between output channels is basic insulation, connect so that the potential difference between adjacent channels does not exceed 30V AC or 60V DC. If the potential difference from the adjacent channel exceeds 30V AC or 60V DC, insert an unconnected channel between the two channels.
- Applying a strong tension to the input and output signal cables connected to the GM may damage the cables or the GM terminals. To avoid applying tension directly to the terminals, fix all cables to the mounting panel.
- To prevent fire, use signal cables with a temperature rating of 70°C or more.
- The operating environment of this product is pollution degree 2. Do not allow conductive wiring scraps, chips, or the like to enter inside the product. It cause electric shock, fire, failure, or malfunction. Be careful as facing the GM unit/GX60 up during wiring makes it easy for wiring scraps and chips to enter inside the product.
- Do not apply voltages that exceed the following values to the input terminals. Doing so may damage the instrument.

**GX90XA**
- Allowable input voltage:
  - ±10V DC for TC/DC voltage (1V range or less)/RTD/DI (Contact), DC mA
  - ±60V DC for DC voltage (2 to 50V range), DI (voltage) input (except High-speed AI)
  - ±120V DC for DC voltage (2 to 100V range) input, DI (voltage) (High-speed AI)
- Common mode voltage:
  - ±60V DC (under measurement category II conditions)
  - High-speed AI only
    - ±300V AC rms (under measurement category II conditions)

**High withstand voltage only**
- ±600V AC rms / ±600V DC (under measurement category II conditions)
- ±1000V DC (under measurement category II and basic insulation conditions*)

* When the module is used under basic insulation conditions, external supplementary insulation is required for safe use. When using the system in a common mode voltage environment that exceeds 600V, install it as follows to add supplementary insulation:
  - To prevent electric shock, install the GM system and all devices connected to the GM system without insulation equivalent to 1000V supplementary insulation in a panel with a door.
  - To prevent electric shock, do not allow cables other than protective ground and main power supply to be directly connected to the outside of the panel.
  - To prevent fire, insert overcurrent protection devices such as fuses between the measurement target and the H and L input terminals of the high voltage input module. For the overcurrent protection device, select a device that supports the common mode voltage to be used. Replacing it regularly is recommended to accommodate degradation due to aging.
  - For other connections, connect to the outside of the panel after adding insulation equivalent to 1000V supplementary insulation to prevent electric shock.
  - To prevent electric shock, make sure that the panel is connected to protective ground. Connect the panel to protective ground according to the local grounding standard.

**GX90XD and GX90WD**
- Allowable input voltage: ±10V DC
- Allowable input voltage: ±10V DC
- Allowable input voltage: ±10V DC
- Allowable input voltage: ±10V DC for TC/DC voltage (1V range or less)/ RTD/DI (Contact), DC mA ±60V DC for DC voltage (2V range or more), DI (voltage)
- Common mode voltage: ±60V DC (under measurement category II conditions)
Precautions to Be Taken While Wiring

Take the following precautions when wiring the input signal cables.

- With a screw terminal, we recommend that you use a crimp-on lug with an insulation sleeve (M4 for power supply wiring, M3 for signal wiring).

  ![Crimp-on lug with an insulation sleeve](Recommended signal wiring crimp-on lug)

  N1.25-MS3 (JST Mfg. Co., Ltd.)

- When not using crimp-on lug with an insulation sleeve, use a signal wire with a finished outside diameter of ø 5 mm or less.

- With a clamp terminal, we recommend the following wire.

<table>
<thead>
<tr>
<th>Type</th>
<th>Cross-sectional area</th>
<th>Stripped wire length</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90XA</td>
<td>0.05 mm² to 1.5 mm²</td>
<td>5 to 6 mm</td>
</tr>
<tr>
<td>GX90XD, GX90XP, GX90YA</td>
<td>0.2 mm² to 1.5 mm²</td>
<td>9 to 10 mm</td>
</tr>
<tr>
<td>RS-422/485 (C3 option)</td>
<td>0.08 mm² to 1.5 mm²</td>
<td>6 to 7 mm</td>
</tr>
</tbody>
</table>

- When wiring input/output signal cables, observe the minimum bend radius of the cables. For the minimum bend radius, use the specifications indicated by the cable manufacture or six times the cable conductor diameter, whichever is larger.

- Do not allow static electricity to be applied to the terminals.
  - When wiring the terminals, remove static electricity so that static electricity is not applied.
  - If static electricity or similar high-voltage transient noise is applied to the signal line, the system may break.

- Take measures to prevent noise from entering the measurement circuit.
  - Move the measurement circuit away from the power cable (power circuit) and ground circuit.
  - Ideally, the object being measured should not generate noise. However, if this is unavoidable, isolate the measurement circuit from the object. Also, ground the object being measured.
  - Shielded wires should be used to minimize the noise caused by electrostatic induction. Connect the shield to the ground terminal of the GM as necessary (make sure you are not grounding at two points).
  - To minimize noise caused by electromagnetic induction, twist the measurement circuit wires at short, equal intervals.
  - Make sure to earth ground the protective ground terminal through minimum resistance.

- When using internal reference junction compensation on the thermocouple input, take measures to stabilize the temperature at the input terminal.
  - Always use the terminal cover.
  - Do not use thick wires which may cause large heat dissipation (we recommend a cross sectional area of 0.5 mm² or less).
  - Make sure that the ambient temperature remains reasonably stable. Large temperature fluctuations can occur if a nearby fan turns on or off.

- Connecting the input wires in parallel with other devices can cause signal degradation, affecting all connected devices. If you need to make a parallel connection, then:
  - Turn the burnout detection function off.
  - Ground the instruments to the same point.
  - Do not turn other instruments on or off during operation.
  - This can have adverse effects on the other instruments.
  - RTD or resistance input cannot be wired in parallel.
Removing and Attaching a Terminal Cover

Removing the Terminal Cover
Loosen the screw at the bottom section of the terminal cover, and remove the cover.

Attaching the Terminal Cover

1. Insert the two hooks at the top section on the inside of the terminal cover into A, and push the bottom section of the terminal cover.
2. Fasten the screw at the bottom section of the terminal cover to fix the cover in place.

Recommended tightening torque: 0.6 N•m

The shape of the cover varies depending on the module, but the procedure is the same.

Removing and Attaching a Terminal Block

Removing the GX90XA/GX90WD/GX90UT Terminal Block
Push down on the lever at the bottom section of the module, and pull the terminal block out.

Attaching the GX90XA/GX90WD/GX90UT Terminal Block
Insert the terminal block into the module, and push the lever firmly against the module (at the position indicated by the arrow in the figure).

Recommended torque for tightening the terminal block attachment screws: 0.1 N•m

Wiring Procedure
A terminal cover is screwed in place on the I/O terminal block.
A label indicating the terminal arrangement is affixed to the cover.

1. Turn off the power, and remove the terminal cover.
2. Connect the signal cables to the terminals.

Recommended Screw terminal (M3) 0.5 to 0.6 N•m

<table>
<thead>
<tr>
<th>Clamp terminal</th>
<th>Screwtorque</th>
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<tbody>
<tr>
<td>GX90XA:</td>
<td>0.4N•m</td>
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<tr>
<td>GX90XP:</td>
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</tr>
<tr>
<td>GX90XD:</td>
<td>0.5N•m</td>
</tr>
</tbody>
</table>

3. Replace the terminal cover and fasten it with screws. The recommended tightening torque for the screws is 0.6 N•m.

Note
With a clamp terminal, if you use a single wire whose diameter is 0.3 mm or less, you may not be able to clamp the wire securely to the terminal. Take measures to securely clamp the wire such as by folding the conductor section that will be connected to the clamp terminal in half.

Internal dimensions of the M3 screw terminal (unit: mm)

Wiring the Clamp Terminal
First, loosen the front screw terminal using a flat-blade screwdriver. Insert a wire in the connection port, and tighten the screw terminal.
Wiring to a GX90XA Analog Input Module

Universal / Low withstand voltage relay / Electromagnetic relay / Current (mA) / High withstand voltage type

Terminal Diagram

Wiring Diagram

1: DC voltage input/DI (level) 2: DI (contact)

3: TC input 4: RTD input

5: DC current input (with an external shunt resistor) 6: Current input

Type Input type Wiring
-U2 DC voltage, DI, thermocouple (TC), Resistance temperature detector (RTD), and DC current (by adding an external shunt resistor) 1, 2, 3, 4, 5
-C1 DC current (mA) 6
-L1 DC voltage, thermocouple (TC), DI (voltage, contact), and DC current (by adding an external shunt resistor) 1, 2, 3, 5
-T1
-V1

Terminal Arrangement
M3 screw terminal

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Clamp terminal

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</table>

1 There are no symbol indications for the electromagnetic relay type, current input type, or low withstand voltage type.

The RTD b terminal is connected internally.

High-speed universal

Terminal Diagram

Wiring Diagram

1: DC voltage input/DI (level) * 2: DI (contact) *

3: TC input 4: RTD input

5: DC current input (with an external shunt resistor)

* Be careful because the DI wiring is different between level and contact.

1 There are no symbol indications for the electromagnetic relay type, current input type, or low withstand voltage relay type.
Terminal Arrangement

M3 screw terminal

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Clamp terminal

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Empty terminals may not be used.

4-wire RTD/resistance

Terminal Diagram

M3 screw terminal

Clamp terminal

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Empty terminals may not be used.

Wiring to a GX90XD Digital Input Module

Terminal Diagram

M3 screw terminal

Clamp terminal

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<th>CH No.</th>
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Empty terminals may not be used.
Terminal Arrangement

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Wiring to a GX90YD Digital Output Module

Terminal Diagram

Wiring to a GX90WD Digital I/O Module

Terminal Diagram

Note: Do not apply voltage outside the allowable input voltage range across input terminals. Doing so may damage the GM.

Wiring to a GX90XP Pulse Input Module

Terminal Diagram

Wiring direction

<table>
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Input type: Photocoupler isolation
Shared common (COM)
Allowable input voltage range: 0 to 10 V

Terminal Arrangement

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<th>Symbol</th>
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Wiring direction
Internal circuit

5 V DC
Approx. 5kΩ

Note: Do not apply voltage outside the allowable input voltage range across input terminals. Doing so may damage the GM.
Input type: Photocoupler isolation
Negative terminal (common) potential shared
Allowable input voltage range: ±10 V

Wiring to a GX90YA Analog Output Module

Terminal Diagram
M3 screw terminal

Clamp terminal

Wiring direction

Terminal Arrangement

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Wiring to a GX90UT PID Control Module

Terminal Diagram
M3 screw terminal

DI
DO
AI
AO

Wiring Diagram

Analog input

1: DC voltage input/DI (level) *
2: DI (contact) *
3: TC input
4: RTD input
5: DC current input (with an external shunt resistor)

* Be careful because the DI wiring is different between level and contact.

Analog output

DC current output, voltage pulse, 15 V DC loop power supply

Empty terminals may not be used.

Internal circuit

Note: Do not apply voltage outside the allowable input voltage range across input terminals. Doing so may cause a malfunction.
Input type: Photocoupler isolation
Shared common (DI-COM)
Allowable input voltage range: 0 to 10 V

Graphical representation of terminal arrangement and wiring instructions for the analog output and PID control modules.
Connecting to the RS-422/485 Connector (/C3 option)

Four-wire system
- RDA−
- RDB+
- SDA−
- SDB+
- FG (Frame Ground)
- SG (Signal Ground)

Two-wire system
- SDA−
- SDB+
- RDA−
- RDB+
- FG (Frame Ground)
- SG (Signal Ground)

Electric potential of the shield
- FG
- SDB+
- SDA−
- RDB+
- RDA−

Recommended torque for tightening the screws: 0.2 N•m

Connecting to the USB Port

A USB2.0 port (mini B type) is available. Using a dedicated protocol, you can operate and configure the GM10 and output data.

Connecting to the Ethernet Port

Checking the Connection and Communication Status

You can use the indicators that are located above the GM10 Ethernet port to check the connection status of the Ethernet interface.

- Yellow green: Indicating the connection status of the Ethernet Interface
- Orange: Indicating the data transmission status

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Connection Status of the Ethernet Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lit (yellow-green)</td>
<td>The Ethernet link is established.</td>
</tr>
<tr>
<td>Off (yellow-green)</td>
<td>The Ethernet link is not established.</td>
</tr>
<tr>
<td>Blinking (yellow-green)</td>
<td>Receiving data</td>
</tr>
<tr>
<td>Lit (orange)</td>
<td>Connected at 100 Mbps</td>
</tr>
<tr>
<td>Off (orange)</td>
<td>Connected at 10 Mbps</td>
</tr>
</tbody>
</table>

Wiring the Power Supply

Use a power supply that meets the following conditions:

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated supply voltage</td>
<td>100 to 240 VAC ± 10%</td>
</tr>
<tr>
<td>Allowable power supply voltage range</td>
<td>90 to 264 VAC</td>
</tr>
<tr>
<td>Rated power supply frequency</td>
<td>50/60Hz</td>
</tr>
<tr>
<td>Permitted power supply frequency range</td>
<td>50/60Hz ± 2%</td>
</tr>
<tr>
<td>Power consumption</td>
<td></td>
</tr>
<tr>
<td>Supply voltage 100V AC</td>
<td>25 VA (normal operation*)</td>
</tr>
<tr>
<td></td>
<td>45 VA (maximum)</td>
</tr>
<tr>
<td>Supply voltage 240V AC</td>
<td>35 VA (normal operation*)</td>
</tr>
<tr>
<td></td>
<td>60 VA (maximum)</td>
</tr>
</tbody>
</table>

* When 10 GX90XA-10-U2 are connected

Note

- Do not use a supply voltage of 132 to 180 VAC, as this may have adverse effects on the measuring accuracy.

Notes on the Functional Ground Terminal

- To reduce noise, use a shielded cable for wiring. Connect the shield to the functional ground terminal or the ground terminal of the GM.
- Do not wire the protective grounding cord to the functional ground terminal.

Precautions to Be Taken While Wiring the Power Supply (power supply M4 screw terminals)

Make sure to follow the warnings below when wiring the power supply. Failure to do so may cause electric shock or damage to the instrument.

**WARNING**

- To prevent electric shock, ensure that the power supply is turned off.
- To prevent fire, use 600 V PVC insulated wires (AWG20 to AWG16; JIS C3307) or wires or cables with equivalent or better performance.
- Make sure to earth ground the protective ground terminal through minimum resistance before you turn on the power.
- Use crimp-on lugs (designed for 4 mm screws) with insulation sleeves to connect both the power cord and the protective ground.
- To prevent electric shock, be sure to close the transparent cover for the power supply wires.
- Provide a power switch (double-pole type) on the power supply line to separate the GM from the main power supply. Use labels to indicate that this switch is for cutting off the power supply to the GM and to indicate ON and OFF.
Switch specifications
Steady-state current rating  3 A or more
Inrush current rating  70 A or more
Must comply with IEC60947-1 and IEC60947-3.

- Do not add a switch or fuse to the ground line.

Wiring Procedure
1. Turn off the GM90PS power supply, and then remove the transparent power supply terminal cover.
2. Connect the power cord and the protective ground cord to the power supply terminal. Use ring-tongue crimp-on lugs (for M4 screws) with insulation sleeves. The recommended torque for tightening the screws is 1.4 to 1.5 N•m.

3. Attach the transparent power supply terminal cover, and fasten it with screws.

Precautions to Be Taken When Connecting the Power Supply (Power inlet)
Make sure to follow the warnings below when connecting the power supply. Failure to do so may cause electric shock or damage to the instrument.

- Before connecting the power cord, ensure that the source voltage matches the rated supply voltage of the GM90PS and that it is within the maximum rated voltage range of the provided power cord.
- Connect the power cord after checking that the power switch of the GM90PS is turned OFF.
- To prevent electric shock and fire, be sure to use a power cord purchased from Yokogawa Electric Corporation.
- Make sure to connect protective earth grounding to prevent electric shock. Insert the power cord into a grounded three-prong outlet.
- Do not use an extension cord without a protective earth ground. If you do, the instrument will not be grounded.

Connection Procedure
1. Check that the GM90PS power switch is off.
2. Connect the supplied power cord plug to the power inlet.
3. Make that the source voltage is within the maximum rated voltage range of the provided power cord. Then, connect the other end of the cord to the outlet. Use a grounded three-prong outlet.

Precautions to Be Taken While Wiring the Power Supply (Power Supply Suffix Code: 2)
Make sure to follow the warnings below when wiring the power supply. Failure to do so may cause electric shock or damage to the instrument.

- Wire the power cable to the power supply terminal, making sure that the polarity is correct.
- Connect the power cables after checking that the power switch of the GM90PS is turned OFF.
- Using other wires may cause abnormal heating or fire.

Wiring Procedure
1. Turn off the GM90PS power supply, and then remove the transparent power supply terminal cover.
2. Wire the power cable to the power supply terminal, making sure the polarity is correct.
   Use ring-tongue crimp-on lugs (for M4 screws) with insulation sleeves. The recommended torque for tightening the screws is 1.4 to 1.5 N•m.

3. Attach the transparent power supply terminal cover, and fasten it with screws.

Turning the Power On and Off

- If the power switch of GM/GX60 systems under operation be turned on or off carelessly, it may result the system down or injury.

Check the following points before turning on the power switch.
- The power cord or wires are connected properly.
- The GM is connected to the correct power supply.
  If the input wiring is connected in parallel with another instrument, do not turn on or off the GM or other instrument during operation. If you do, measured values may be affected.
  Check the following points before turning off the power switch.
• The GM10 is not accessing the external storage medium.

You can turn the power on and off using the power switch on the front panel of the GM90PS. A self-test takes place for a few seconds, and then the GM will be running.

Connecting GX90EX Expansion Modules

The GX90EX is used to configure a multi unit system.

• For the main unit, link the GX90EX to the left end as seen from the front of the unit.
• For a sub unit, link it next to the GM90PS.

Connect the GX90EXs of the main unit and sub units with Ethernet STP (shielded) cables. Only cascaded connection is supported.

Configuring the GX90EX Expansion Modules

Before setting the GX90EX dipswitches, turn off the unit.

When the GX90EX is connected to the main unit, use master I/O operation. Set dipswitch 6 of the GX90EX to ON (see the figure below). The unit number is set to 0.

When the GX90EX is connected to a sub unit, set the dipswitches as shown in the following table.

Configuring the GX90EX Expansion Modules

Before setting the GX90EX dipswitches, turn off the unit.

When the GX90EX is connected to the main unit, use master I/O operation. Set dipswitch 6 of the GX90EX to ON (see the figure below). The unit number is set to 0.

When the GX90EX is connected to a sub unit, set the dipswitches as shown in the following table.

Unit Numbers and Dipswitch Settings

<table>
<thead>
<tr>
<th>Dipswitch</th>
<th>Unit number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0*</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>4</td>
<td>OFF</td>
</tr>
<tr>
<td>3</td>
<td>OFF</td>
</tr>
<tr>
<td>2</td>
<td>OFF</td>
</tr>
<tr>
<td>1</td>
<td>OFF</td>
</tr>
</tbody>
</table>

* The factory default setting. Unit number 0 is for the main unit.

Fixing the Data Rate to 10 Mbps

To fix the data rate to 10 Mbps, set dipswitch 7 to ON.

7 segment LED

The 7 segment LED displays the unit number and operation errors.

• Unit number indication
  Displays the unit number (00 to 06).
• Operation error indication
  Displays error codes. Ex (where x is a one digit number or an alphabet letter) will blink.
  For the error codes, see “Expansion Module Error Codes” in the User’s Manual.
  * If an “Fx” indication is displayed, servicing is necessary.
    Contact your nearest YOKOGAWA dealer for repairs.

System Status Display LED

Three LEDs indicate the operating status of the GX90EX.

<table>
<thead>
<tr>
<th>Status LED</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDY</td>
<td>Green</td>
<td>Lights during normal operation. Turns off when during a failure.</td>
</tr>
<tr>
<td>MAIN</td>
<td>Green</td>
<td>Lights during master I/O expansion operation.</td>
</tr>
<tr>
<td>FAIL</td>
<td>Red</td>
<td>Lights during an error.</td>
</tr>
</tbody>
</table>
Setting Switches (Dipswitches)
Use the dipswitches to set the unit number of the expansion module, 10 Mbps fixed mode, and operation mode (master/slave).

Dipswitch Settings

<table>
<thead>
<tr>
<th>Dipswitch</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Switches between master I/O expansion and slave I/O expansion modes</td>
</tr>
<tr>
<td>7</td>
<td>10Mbps/100Mbps</td>
</tr>
<tr>
<td>6</td>
<td>Always OFF (cannot be changed)</td>
</tr>
<tr>
<td>5</td>
<td>Always OFF (cannot be changed)</td>
</tr>
<tr>
<td>4</td>
<td>For unit numbers</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Bluetooth Connection Procedure (/C8 option)
The following procedure applies when you are connecting for the first time when the Bluetooth function is set to On (default value).

1. Check that the GM10 BT LED is not lit.

2. Hold down the GM10 USER1 key for at least 3 seconds. The BT LED (orange) will turn on, and the GM will enter the connection standby state.

3. Perform a pairing operation from the PC.
   A 6-digit authentication code appears on the PC screen and GM10’s 7 segment LED. Check that the authentication codes match, and pair the devices. When pairing is complete, a COM port will be assigned. You will need to configure the COM port when connecting.

4. Connect to the GM from the PC.
   When connecting for the first time, you need to enter the password.

5. Enter 1234 (default value).
   The BT LED will blink, and a connection will be established with the GM.

Configure the GM using Hardware Configurator. For the configuration procedure, see the SMARTDAC+ STANDARD Hardware Configurator User’s Manual (IM 04L61B01-02EN).

Note
If the Bluetooth function is set to Off, the GM will not enter the connection standby state even if you hold down the USER1 key for more than 3 seconds.