DATA ACQUISITION SYSTEM GM

GS 04L55B01-01EN

[Release 4]

OVERVIEW

The Data Acquisition System GM is a data logger that excels in versatility and expandability. The main unit includes on-board 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 is used to mount a variety of modules. SMARTDAC+ GM utilizes the same modules as the GX/GP series of SMARTDAC+.

- High expandability and maintainability: Employs YOKOGAWA’s original block structure, making it easy to rearrange the combination of required modules. The structure also excels in maintainability because even after installation, every module can be removed separately.
- Multichannel measurement: Measures up to 420 analog input channels on the GM10-2 and up to 100 channels even on the GM10-1.
- Flexible system configuration: A wide variety of systems, such as multichannel measurement from 10 to 420 channels or data acquisition through communication, can be configured.
- High environmental tolerance: The guaranteed operating temperature range of -20°C to 60°C allows more freedom in where the system can be installed.
- Mounting: Not only can the system be installed on a desktop, it can also be mounted on DIN rails or a wall.
- Less wiring through distribution: Installation of sub units away from the main unit makes measurement possible without connecting sensor signal wires over a long distance.
- Long-term recording and saving: Large internal memory (500 MB on the GM10-1 and 1.2 GB on the GM10-2) allows long-term recording and saving.
- Secure saving of recording data: An SD card (SD/SDHC) up to 32 GB (1 GB included) can be used for the external storage medium. And the FTP client function can be used to provide data redundancy using a file server.
- Rich I/O interface: Seven types of I/O modules are available: analog input, analog output, digital input, digital output, digital I/O, pulse input and PID control. DCV (DC voltage), TC (thermocouple), RTD (resistance temperature detector), DI (contact or TTL level voltage), mA (DC current) can be assigned to each channel as input signals.
- Web server function: Various settings can be configured online from a Web browser, without using a dedicated software application. Moreover, measured data can be monitored in real time.
- High withstand voltage performance: Safe measurement up to withstand voltage of 600 V between input terminal and ground is possible by using a high withstand voltage analog input module.

- High-speed measurement: Measurement at the shortest interval of 1 ms is possible by using a high-speed analog input module.
- Dual interval measurement: Measurement can be performed by setting two different scan intervals.
- Simple settings: The standard USB port makes it easy to connect with the PC.
- PID control function: PID control on up to 20 loops is possible by installing a PID control module.
- Program control function (IPG option): Program control of up to 99 patterns is possible by using a PID control module and program control function. In addition, up to 32 time event and 32 PV events can be used.
- For details on the PID control module, PID control function, and program control function (IPG), see the GX90UTPID Control Module General Specifications (GS04L53B01-31EN).
- Math function (MT option): Various calculations are possible. The report function enables creation of hourly, daily, and monthly reports and other types of data. Logic computation outputs results of computation as 0s or 1s to internal switches and DO channels.
- Extensive network functions: The standard Ethernet interface allows network features such as various e-mail notifications and FTP file transfer. In addition, Modbus/TCP, Modbus/RTU (/C3), EtherNet/IP (/E1), and CC-Link family SLMP communication (/E4) are supported.
- Universal Viewer software: A free software application is available for displaying and printing waveforms of measured data on a PC.

The contents of this general specifications correspond to the GM with release number 4 and style number 2.

Release number: firmware ID number (GM10)
Style number: hardware ID number (GM90PS)
### Actual values underlying accurate measurements

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Measuring accuracy (^*1) (typical value (^*2))</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCV</td>
<td>±(0.01% of rdg +5 μV)</td>
</tr>
<tr>
<td></td>
<td>±(0.01% of rdg +5 μV)</td>
</tr>
<tr>
<td>20 mV</td>
<td>±(0.01% of rdg +2 mV)</td>
</tr>
<tr>
<td>60 mV</td>
<td>±(0.01% of rdg +2 mV)</td>
</tr>
<tr>
<td>6V (1-5V)</td>
<td>±1.1°C</td>
</tr>
<tr>
<td>TC (^*3)</td>
<td>R, S ±1.1°C</td>
</tr>
<tr>
<td></td>
<td>B ±1.5°C</td>
</tr>
<tr>
<td>K (-200.0 to 1370.0°C)</td>
<td>±(0.01% of rdg +0.2°C for 0.0 to 1370.0°C; ±(0.15% of rdg +0.2°C) for -200.0 to 0.0°C)</td>
</tr>
<tr>
<td>K (-200.0 to 500.0°C)</td>
<td>±0.2°C for 0.0 to 500.0°C; ±(0.15% of rdg +0.2°C) for -200.0 to 0.0°C</td>
</tr>
<tr>
<td>J</td>
<td>±0.2°C for 0.0 to 1100.0°C; ±(0.10% of rdg +0.2°C) for -200.0 to 0.0°C</td>
</tr>
<tr>
<td>F</td>
<td>±0.2°C for 0.0 to 400.0°C; ±(0.10% of rdg +0.2°C) for -200.0 to 0.0°C</td>
</tr>
<tr>
<td>N</td>
<td>±(0.01% of rdg +0.2°C) for 0.0 to 100.0°C; ±(0.22% of rdg +0.2°C) for -200.0 to 0.0°C</td>
</tr>
<tr>
<td>RTD</td>
<td>Pt100 (-200.0 to 850.0°C) ±(0.02% of rdg +0.2°C)</td>
</tr>
<tr>
<td></td>
<td>Pt100 (high resolution) (-150.00 to 150.00°C) ±(0.02% of rdg +0.16°C)</td>
</tr>
</tbody>
</table>

\(^*1\) These values have been calculated from the accuracy testing data at the time of shipment of the instrument from the factory. Applies to GX90XA-10U2, A/D integration time 16.67 ms or more. General operating conditions: 23±2 °C, 55±10% RH, supply voltage 90–132, 180–264 V AC, power frequency within 50/60 Hz ±1%, warm-up of 30 minutes or more, no vibrations or other hindrances to performance.

\(^*2\) For the measuring accuracy (guaranteed), see the module’s general specifications (GS 04L53B00-01EN).

\(^*3\) These values do not include the reference junction compensation accuracy.

### CONFIGURATION

SMARTDAC+ GM handles a wide variety of applications through the combination of various modules.

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

### Unit Types

#### Main Unit (Single Unit)

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)

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

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 directly using LAN cables. The maximum connection distance between two units is 100 m. It can also be used as an expandable I/O for the GX/GP paperless recorder.

\(^*\) See “Restrictions and Cautions” on page 26.

### Module Types

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10</td>
<td>Data Acquisition Module for SMARTDAC+ GM</td>
</tr>
<tr>
<td></td>
<td>A module that acquires data from I/O modules and expansion modules. A main unit requires one module of this type.</td>
</tr>
<tr>
<td>GM90PS</td>
<td>Power Supply Module for SMARTDAC+ GM</td>
</tr>
<tr>
<td></td>
<td>A module that supplies power to the modules connected in the unit. A unit requires one module of this type.</td>
</tr>
<tr>
<td>GX90EX*</td>
<td>Expansion module</td>
</tr>
<tr>
<td></td>
<td>A module that connects units to expand the system. A main unit or a sub unit requires one module of this type.</td>
</tr>
<tr>
<td>GM90MB</td>
<td>Module Base</td>
</tr>
<tr>
<td></td>
<td>This is used to connect modules (excluding the GM90PS).</td>
</tr>
</tbody>
</table>

\(^*\) The firmware version of GX90EX that can be used on the SMARTDAC+ GM must be R1.02.01 or later.

For the detailed specifications of the expansion module, see the following general specifications:

Material No.: GS 04L53B00-01EN
I/O Modules

Input/output modules may need to have their firmware updated.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90YA</td>
<td>Analog output module (number of outputs: 4)</td>
</tr>
<tr>
<td>-U2</td>
<td>A module that can transmit 4 to 20 mA DC or 0 to 20 mA DC signals.</td>
</tr>
<tr>
<td></td>
<td>Output update interval: 100/200/500 ms, 1/2/5 s</td>
</tr>
<tr>
<td></td>
<td>Power consumption: 3.0 W</td>
</tr>
<tr>
<td>GX90YD</td>
<td>Digital output module (number of outputs: 6)</td>
</tr>
<tr>
<td>-C1</td>
<td>A module that can transmit relay contact (c contact) signals.</td>
</tr>
<tr>
<td></td>
<td>Output update interval: 100/200/500 ms, 1/2/5 s</td>
</tr>
<tr>
<td></td>
<td>Power consumption: 1.4 W</td>
</tr>
<tr>
<td>GX90WD</td>
<td>Digital I/O module (number of inputs: 8, number of outputs: 6)</td>
</tr>
<tr>
<td>-L1</td>
<td>A module that can receive open collector or voltage-free contact signals.</td>
</tr>
<tr>
<td></td>
<td>Output update interval: 100/200/500 ms, 1/2/5 s</td>
</tr>
<tr>
<td></td>
<td>Power consumption: 1.6 W</td>
</tr>
<tr>
<td>GX90XP</td>
<td>Pulse input module (number of inputs: 10)</td>
</tr>
<tr>
<td>-H0</td>
<td>A module that can receive open collector, voltage-free contact, or 5 V logic</td>
</tr>
<tr>
<td></td>
<td>signals.</td>
</tr>
<tr>
<td></td>
<td>Output update interval: 100/200/500 ms, 1/2/5 s</td>
</tr>
<tr>
<td></td>
<td>Power consumption: 2.8 W</td>
</tr>
<tr>
<td>GX90UT</td>
<td>PID control module (Number of inputs / outputs: universal input 2, current pulse or voltage pulse output 2, DI 8, DO 8)</td>
</tr>
<tr>
<td></td>
<td>This module can perform PID control on up to 2 loops. It supports the following control modes: single loop, cascade, and loop control with PV switching.</td>
</tr>
<tr>
<td></td>
<td>Control interval: 100/200 ms</td>
</tr>
<tr>
<td></td>
<td>Power consumption: 2.8 W</td>
</tr>
<tr>
<td>GX90WD</td>
<td>Digital I/O module</td>
</tr>
<tr>
<td>-R1</td>
<td>A module that can receive open collector or voltage-free contact signals.</td>
</tr>
<tr>
<td></td>
<td>Output update interval: 100/200/500 ms, 1/2/5 s</td>
</tr>
<tr>
<td></td>
<td>Power consumption: 3.0 W</td>
</tr>
<tr>
<td>-V1</td>
<td>A module that can receive open collector or voltage-free contact signals.</td>
</tr>
<tr>
<td></td>
<td>Output update interval: 100/200/500 ms, 1/2/5 s</td>
</tr>
<tr>
<td></td>
<td>Power consumption: 1.0 W</td>
</tr>
</tbody>
</table>

For the detailed specifications of the I/O modules, see the following general specifications.

Material No.: GS 04L53B01-01EN
For the detailed specifications of the PID control module, see the following general specifications.

Material No.: GS 04L53B01-31EN
• System Configuration
SMARTDAC+ GM supports both standalone operation and data acquisition using a PC.

Restrictions on module connection
* See “Restrictions and Cautions” on page 26.

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

Use as a stand-alone type

Use by connecting a PC

Multi Unit System
A system configured with a main unit connected to sub units*.
* The GX60 expandable I/O can also be used.
Note: The main unit and sub units are connected directly using LAN cables. Hubs and repeaters cannot be used.
• Up to six sub units can be connected to a main unit. Each unit can connect up to six modules.
• For analog input, up to 420 channels (GM10-2) and up to 100 channels (GM10-1) can be measured.

Use as a stand-alone type

Use by connecting a PC

Maximum connection distance between two units is 100 m.
SMARTDAC+ GM COMMON SPECIFICATIONS

- Compliant Standards
  - CSA: CAN/CSA-C22.2 No. 61010-1, overvoltage category II or I \(^1\), pollution degree 2 \(^2\).
  - CAN/CSA-C22.2 No. 61010-2-030
  - CAN/CSA-IEC 61010-2-201\(^4\)
  - UL: UL 61010-1, UL 61010-2-030 (CSA NRTL/C)
    - UL 61010-2-201 (CSA NRTL/C)\(^4\)
  - CE/EMC directives:
    - EN61326-1 compliance, Class A Table 2
    - EN61000-3-2 compliance
    - EN61000-3-3 compliance
    - EN55011 compliance
    - EN61326-1 compliance, Class A Group 1
    - CE/Low voltage directive:
      - EN61010-1, EN 61010-2-030
      - Overvoltage category II or I \(^1\), pollution degree 2 \(^2\)
      - Measurement category II \(^3\)
    - EN 61010-2-201 compliance\(^4\)
  - Australia, New Zealand EMC standard (RCM):
    - EN55011 compliance, Class A Group 1
  - WEEE Directive: Compliant
  - /C8 option
  - RE directive:
    - SAFETY
      - EN61010-1 compliance
      - EN61010-2-030 compliance
      - Overvoltage category II or I \(^1\), pollution degree 2 \(^2\)
      - Measurement category II \(^3\)
    - EN62311 compliance
    - EMC
      - EN301 489-1 compliance
      - EN301 489-17 compliance
    - SPECTRUM
      - EN300 328 compliance
  - Wireless module (/C8 option) certification and the like:
    - FCC Approval, IC Approval, Japanese Radio Law
    - Korea Certification (Radio Wave Act), China Certification (Radio Wave Act)
  - Wireless communication standards of Australia and New Zealand (RCM) (/C8 option):
    - AS/NZS4268, AS/NZS2772.2
  - KC mark: KN11
    - KNE61000-6-2
    - KN301 489-1/-17 (/C8 option)

\(^1\) Overvoltage category: Describes a number which defines a transient overvoltage condition. Implies the regulation for impulse withstand voltage. Applies to electrical equipment which is supplied from the fixed installation like a distribution board.

\(^2\) Pollution degree 2: Describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. “2” applies to normal indoor atmosphere. Normally, only non-conductive pollution occurs.

\(^3\) Measurement category: Depends on the specification of each modules

### Normal Operating Conditions
- Rated supply voltage:
  - 100 to 240 V AC (AC power supply) or 12 to 28 V DC (DC power supply)
- Allowable supply voltage:
  - 90 to 264 V AC (AC power supply) or 10 to 32 V DC (DC power supply)
- Power frequency (AC power supply):
  - 50 Hz ±2 %, 60 Hz ±2 %
- Power consumption:
  - 100 V AC 25 VA 45 VA
  - 240 V AC 35 VA 60 VA
  - 12 V DC 15 VA 24 VA
  - 28 V DC

*When 10 analog input modules are connected*

- Ambient temperature: -20 to 60 °C
  - -20 to 50 °C in the following cases
    - When a GX90YD is used
    - When a GX90WD is used
    - When a GX90XA-T1 (electromagnetic relay type) is used
    - When a GX90YA is used
    - When a GX90UT is used
    - On a GM10 with the /C8 option
- Ambient humidity: 20 to 85 %RH
  - (no condensation)
- Magnetic field: 400 A/m or less (DC and 50/60 Hz)
- Vibration: 5 ≤ f < 8.4 Hz amplitude 3.5 mm (peak) 8.4 ≤ f ≤ 160 Hz acceleration 9.8 m/s\(^2\) or less
- Shock: Power supply ON, 98 m/s\(^2\) or less, 11 ms (excluding GX90YD and GX90WD)

*6 directions (±X, ±Y, ±Z), 3 times in each direction*
• Mounting position: Left and right horizontal, front and back horizontal
• Altitude: 2000 m or less
• Installation location: Indoors
• Warm-up time: At least 30 minutes after power on

● Transport and Storage Conditions
• Ambient temperature: −25 to 70 °C
• Ambient humidity: 5 to 95 %RH (no condensation)
• Vibration: 10 to 60 Hz, 4.9 m/s² maximum
• Shock: 392 m/s² maximum (in packaged condition)

● Construction
Mounting: Wall mount, DIN rail (panel storage, rack), desktop
Note: No stacking
Material: Polycarbonate

GM10 DATA ACQUISITION MODULE SPECIFICATIONS

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

Status display:

<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)

● Functional Specifications

Measuring Function
Number of connectable modules and number of I/O channels:

<table>
<thead>
<tr>
<th>Modules</th>
<th>I/O channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10-1</td>
<td></td>
</tr>
<tr>
<td>Up to 10</td>
<td>Up to 100</td>
</tr>
<tr>
<td>GM10-2</td>
<td></td>
</tr>
<tr>
<td>Up to 42</td>
<td>Up to 500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Modules</th>
<th>I/O channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 42</td>
<td>Up to 500</td>
</tr>
<tr>
<td></td>
<td>(up to 420 if AI only)</td>
</tr>
</tbody>
</table>

• Measurement mode:
  Normal, High speed, Dual interval

  Normal: A mode in which the shortest measurement interval is 100 ms
  Number of scan groups: 1
  File type: Event data, display data
  Data format: Binary, text
  Scan interval: Fastest 100 ms
  Compatible modules: All modules

  High speed: A mode in which the shortest measurement interval is 1 ms
  Number of scan groups: 1
  File type: Event data only
  Data format: Binary only
  Scan interval: Fastest 1 ms

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Channel Specifications

Operations such as measurement, computation, and recording are performed on channels.

- **Channel name**: A channel name is expressed with a 4-digit 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.

<table>
<thead>
<tr>
<th>Sub unit</th>
<th>Main unit</th>
<th>Unit number</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

- **Channel number**
  - Analog input: 01 to 10
  - Analog output: 01 to 04
  - Digital input: 01 to 16
  - Digital output: 01 to 06
  - Digital I/O: 01 to 08
  - Digital output: 09 to 14
  - Pulse input: 01 to 10
  - PID control, I/O: 01 to 26

- **Slot number**: 0 to 9

- **Data type**
  - Save when a medium is inserted.
  - Saves unsaved data files when an external storage medium is inserted.

**Display Function**

Real-time data monitoring is possible using a Web browser.

- **Number of groups**: GM10-1: 50, GM10-2: 60
- **Number of channels that can be assigned to each group**: 20
- **Display types**: Trend, digital, bar graph, horizontal bar graph, overview, alarm summary, message summary, DO channel status, internal switch status, Modbus master status, Modbus client status, WT client status, SLMP client status, memory data list, report data list, manual sampled data list, various error logs, network information, system information.

**Data Saving Function**

Data is recorded to internal memory and external storage medium. When the system recovers from a power failure, the operation that was being performed before the power failure is resumed.

- **Internal memory**: Temporarily saves various types of data.
- **External storage medium**:
  - **Medium**: SD card (SD/SDHC)
  - **Size**: 1 to 32 GB (1 GB included)
  - **Format**: FAT32 or FAT16

**Display update interval**: Minimum 1 second

**Note**: Some intervals will be unavailable depending on the system configuration and modules.

- **Scan intervals shorter than 1 s cannot be specified on electromagnetic relay type (type suffix code: -T1) analog input modules.**
- **Scan intervals shorter than 500 ms cannot be specified on low withstand voltage relay type (type suffix code: -L1) analog input modules.**
- **Scan interval shorter than 100 ms can only be specified when the measurement mode is set to High speed or Dual interval.**

**Module connection limitations**:

- See “Restrictions and Cautions” on page 27.

**Compatible modules**:

- High-speed AI (GX90XA-4-H0)
- A single DI (GX90XD) or DIO (GX90WD) can be connected for remote input. Measurement and recording are not possible.

**Dual interval**: A mode in which measurement is possible by setting different scan intervals on the two scan groups.

**Number of scan groups**: 2

**File type**: Event data only

**Data format**: Binary only

**Scan interval**:

<table>
<thead>
<tr>
<th>Model</th>
<th>Scan group 1</th>
<th>Scan group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10-1</td>
<td>Fastest 5 ms</td>
<td>Fastest 100 ms</td>
</tr>
<tr>
<td>GM10-2</td>
<td>Fastest 1 ms</td>
<td>Fastest 100 ms</td>
</tr>
</tbody>
</table>

**Master scan interval**:

- Scan group 1 or scan group 2

**Master scan interval is used for the following**:

- Math function’s scan interval, communication channel function’s scan interval, manual sampling function’s detection timing, logic math interval, instantaneous values included in e-mails

**Compatible modules**: Modules other than the PID control module

- **Scan interval**: 1 ms / 2 ms / 5 ms / 10 ms / 20 ms / 50 ms / 100 ms / 200 ms / 500 ms / 1 s / 2 s / 5 s / 10 s / 20 s / 50 s / 1 min / 2 min / 5 min / 10 min / 15 min / 20 min / 30 min / 1 h

**Data saving to the external storage medium**:

- Select whether to save automatically or when a medium is inserted for event data, display data, manual sampled data, and report data.

**Auto save**: Automatically saves to the internal memory when a data file is created.

**Save when a medium is inserted**:

- Saves unsaved data files when an external storage medium is inserted.

**Data type**:

<table>
<thead>
<tr>
<th>Data type</th>
<th>Saved content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display data</td>
<td>Maximum and minimum values per recording interval</td>
</tr>
<tr>
<td>Event data</td>
<td>Instantaneous values at recording intervals</td>
</tr>
<tr>
<td>Alarm summary data</td>
<td>Summary of warnings</td>
</tr>
<tr>
<td>Manual sampled data</td>
<td>Instantaneous values at a user specified time</td>
</tr>
<tr>
<td>Setup data</td>
<td>GM10 and I/O module settings</td>
</tr>
<tr>
<td>Report data</td>
<td>(MT option) Report at each scheduled time of report</td>
</tr>
</tbody>
</table>

**Event data**:

- **Target**: Measurement (I/O module)/math (MT)/communication (MC) channels, alarm summary, message summary

**Recording interval**: 1 ms / 2 ms / 5 ms / 10 ms / 20 ms / 50 ms / 100 ms / 200 ms / 500 ms / 1 s / 2 s / 5 s / 10 s / 15 s / 20 s / 30 s / 1 min / 2 min / 5 min / 10 min / 15 min / 20 min / 30 min selectable

**Note**: Some intervals will be unavailable depending on the scan interval and number of channels.

**Number of channels**: Determined by the scan interval and recording data type.
### Measurement mode: Normal

<table>
<thead>
<tr>
<th>GM10-1</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recording interval</strong></td>
<td></td>
</tr>
<tr>
<td>100 ms</td>
<td>100</td>
</tr>
<tr>
<td>200 ms</td>
<td>200</td>
</tr>
<tr>
<td>500 ms or longer</td>
<td>500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GM10-2</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recording interval</strong></td>
<td></td>
</tr>
<tr>
<td>100 ms</td>
<td>500</td>
</tr>
<tr>
<td>200 ms</td>
<td>500</td>
</tr>
<tr>
<td>500 ms</td>
<td>1000</td>
</tr>
<tr>
<td>1 s or longer</td>
<td>1000</td>
</tr>
</tbody>
</table>

### Measurement mode: High speed

<table>
<thead>
<tr>
<th>GM10-1</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recording interval</strong></td>
<td></td>
</tr>
<tr>
<td>1 ms</td>
<td>2</td>
</tr>
<tr>
<td>2 ms</td>
<td>4</td>
</tr>
<tr>
<td>5 ms</td>
<td>10</td>
</tr>
<tr>
<td>10 ms</td>
<td>20</td>
</tr>
<tr>
<td>20 ms</td>
<td>40</td>
</tr>
<tr>
<td>50 ms</td>
<td>100</td>
</tr>
<tr>
<td>100 ms</td>
<td>1000</td>
</tr>
<tr>
<td>200 ms</td>
<td>200</td>
</tr>
<tr>
<td>500 ms</td>
<td>500</td>
</tr>
<tr>
<td>1 s or longer</td>
<td>1000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GM10-2</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recording interval</strong></td>
<td></td>
</tr>
<tr>
<td>1 ms</td>
<td>2</td>
</tr>
<tr>
<td>2 ms</td>
<td>4</td>
</tr>
<tr>
<td>5 ms</td>
<td>10</td>
</tr>
<tr>
<td>10 ms</td>
<td>20</td>
</tr>
<tr>
<td>20 ms</td>
<td>40</td>
</tr>
<tr>
<td>50 ms</td>
<td>100</td>
</tr>
<tr>
<td>100 ms</td>
<td>1000</td>
</tr>
<tr>
<td>200 ms</td>
<td>200</td>
</tr>
<tr>
<td>500 ms</td>
<td>500</td>
</tr>
<tr>
<td>1 s or longer</td>
<td>1000</td>
</tr>
</tbody>
</table>

### Measurement mode: Dual interval

<table>
<thead>
<tr>
<th>GM10-1</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recording interval</strong></td>
<td></td>
</tr>
<tr>
<td>1 ms</td>
<td>---</td>
</tr>
<tr>
<td>2 ms</td>
<td>---</td>
</tr>
<tr>
<td>5 ms</td>
<td>5</td>
</tr>
<tr>
<td>10 ms</td>
<td>10</td>
</tr>
<tr>
<td>20 ms</td>
<td>20</td>
</tr>
<tr>
<td>50 ms</td>
<td>50</td>
</tr>
<tr>
<td>100 ms</td>
<td>100</td>
</tr>
<tr>
<td>200 ms</td>
<td>100</td>
</tr>
<tr>
<td>500 ms</td>
<td>250</td>
</tr>
<tr>
<td>1 s or longer</td>
<td>250</td>
</tr>
</tbody>
</table>

### Data size (binary):

- Analog input data: 6 bytes/ch.
- Analog output data: 6 bytes/ch.
- Digital I/O data: 2 bytes/ch.
- Math channel data: 6 bytes/ch.
- Communication channel data: 6 bytes/ch.

### File size (binary):

- Up to 18 MB

### Number of files (including display data) (internal memory)

- GM10-1: Up to 500
- GM10-2: Up to 1000

### Internal memory operation: FIFO (First In First Out)

### Data format:

- Binary or text

### Mode:

- Free: Records data at all times
- Trigger: Starts recording data when a certain event occurs and records for the specified interval
- Repetition trigger: Repeat Trigger mode

### Event data file sample time (estimated)

<table>
<thead>
<tr>
<th>GM10-1 (when recording interval is 1 s)</th>
<th>I/O channels</th>
<th>Total sample time</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Approx. 29 days</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Approx. 9 days</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GM10-2 (when recording interval is 1 s)</th>
<th>I/O channels</th>
<th>Total sample time</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Approx. 71 days</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Approx. 23 days</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>Approx. 7 days</td>
<td></td>
</tr>
</tbody>
</table>

### Display data:

- Target: Measurement (I/O module)/math (MT)/communication (MC) channels, alarm summary, message summary
- Trend interval (/div) (recording interval): 5 s / 10 s / 15 s / 20 s / 30 s / 1 min / 2 min / 5 min / 10 min / 15 min / 20 min / 30 min selectable
- Note: Some intervals will be unavailable depending on the scan interval and number of channels.

### Number of channels:

- Determined by the trend interval and recording data type

### GM10-1

<table>
<thead>
<tr>
<th>Trend interval setting (/div)</th>
<th>Recording interval</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 s</td>
<td>100 ms</td>
<td>100</td>
</tr>
<tr>
<td>10 s</td>
<td>200 ms</td>
<td>200</td>
</tr>
<tr>
<td>15 s or longer</td>
<td>500 ms or more</td>
<td>500</td>
</tr>
</tbody>
</table>

### GM10-2

<table>
<thead>
<tr>
<th>Trend interval setting (/div)</th>
<th>Recording interval</th>
<th>Number of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 s</td>
<td>100 ms</td>
<td>200</td>
</tr>
<tr>
<td>10 s</td>
<td>200 ms</td>
<td>200</td>
</tr>
<tr>
<td>15 s or longer</td>
<td>500 ms or more</td>
<td>1000</td>
</tr>
<tr>
<td>30 s or longer</td>
<td>1 s or longer</td>
<td>1000</td>
</tr>
</tbody>
</table>

### Data size (binary):

- Analog input data: 12 bytes/ch.
- Analog output data: 12 bytes/ch.
- Digital I/O data: 4 bytes/ch.
- Math channel data: 12 bytes/ch.
- Communication channel data: 12 bytes/ch.

### File size (binary):

- Up to 18 MB

### Number of files (including event data) (internal memory)

- GM10-1: Up to 500
- GM10-2: Up to 1000

### Internal memory operation: FIFO (First In First Out)

### Data format:

- Binary or text

### Display data file sample time (estimated)

<table>
<thead>
<tr>
<th>GM10-1 (when recording interval is 1 min)</th>
<th>I/O channels</th>
<th>Total sample time</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Approx. 914 days (2.5 years)</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Approx. 239 days (9 months)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GM10-2 (when recording interval is 1 min)</th>
<th>I/O channels</th>
<th>Total sample time</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Approx. 2184 days (5.9 years)</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Approx. 702 days (1.9 years)</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>Approx. 239 days (7 months)</td>
<td></td>
</tr>
</tbody>
</table>

### Alarm summary:

- Saved item: Alarm of each data item
- Maximum number of items saved to internal memory: 5000
Internal memory operation: FIFO (First In First Out)
Maximum number of items displayed on Web screen: Latest 1000
Save operation: Saves alarm information to internal memory when an alarm occurrence or release is detected
  * Alarm information is saved to the corresponding event or display data file.
Saved content: Target channel name (tag name), time of occurrence or release, warning type, etc.
Save operation methods: Web browser, communication command
  * Message summary:
    Description: Saves a summary of written messages
    Saved item: Message string
    Maximum number of items saved to internal memory: 1000
Internal memory operation: FIFO (First In First Out)
Maximum number of items displayed on Web screen: Latest 450
Save operation: Saves message information to internal memory when message writing operation is performed.
  * Message information is saved to the corresponding display or event data file.
Saved content: Message name, writing interval, user name, write group
  * Manual sampled data:
    Saved item: Measurement (/I/O module)/math (/MT)/communication (/MC) channels
    Number of saved channels:
    GM10-1: Up to 50, GM10-2: Up to 100
    Save operation methods: Web browser, communication command, event action
    Maximum number of events saved to internal memory: 400
Internal memory operation: FIFO (First In First Out)
Auto saving to an external storage medium:
  Every time manual sampling is executed
Data format: Text format
  * Setup data
    Saved item: GM10 and I/O module settings (including setup data of modules connected via GX90EX)
    Saved events: Operation from a Web browser, communication command, event action, setting changes (when the advanced security function (/AS) is on)
    Data format: Text format
    Binary format when the advanced security function (/AS) is on
  * Report data (/MT option):
    Saved item: Measurement (/I/O module)/math/communication channels
    Select from average, maximum, minimum, sum, and instantaneous values
    Type: Hourly, daily, weekly, monthly
    User specified time (batch, day custom)
    Saved events: Timeout time of each report type
    Maximum number of events saved to internal memory: 800
    Internal memory operation: FIFO (First In First Out)
    Auto saving to an external storage medium:
    Save every time of the event
    Data format: Test format
  * User data
    Saved item: Excel report template (/MT), PDF/print report template, SSL communication certificate (server certificate, trusted certificate), electronic signature certificate (/MT)
    Recorded events: Operation from a Web browser, communication command

**Message Write Function**
Messages can be written to event data and display data.
  * Message type:
    Preset message: Writes preset text
    Free message: Writes text that you enter
    Auto message: Writes fixed text when power recovers after a power failure occurs during recording.
  * Preset message, free message:
    Number of displayable characters: Up to 32
    Displayable character types:
    Alphanumeric, Japanese, and Chinese characters
    Number of messages: Preset message: 100
    Free message: 10
    Free messages that you enter are also saved in setup files.
Write method: Operation from a Web browser, communication command, event action
Write destination: Specified event data or display data group or all groups
  * Auto message
    Displayed text: "Power-fail" + the time of failure occurrence
    Example: Power-fail 2014/01/06 09:49:21
Write method: Writes a message when power recovers after a power failure occurs during recording.
Whether or not to write is selectable.
Write destination: All display data or event data groups

**Alarm Function**
  * Number of alarms: Up to four alarms (levels) for each measurement channel
  * Alarm type: High limit, low limit, difference high limit, difference low limit, high limit on rate-of-change, low limit on rate-of-change, delay high limit, and delay low limit
  * Alarm delay time: 1 s to 24 hours (for each channel)
  * Rate-of-change calculation interval of rate-of-change alarms: 1 to 32 times the scan interval (common to all channels)
  * Hysteresis: 0.0 to 5.0% of the span (for each alarm level)
  * Alarm output:
    DO output:
    DO operation: Energize/de-energize, hold/ nonhold, AND/OR, reflash
    Internal switch output:
    Number of internal switches: 100
    Internal switch operation: AND/OR operation selectable
  * Status LED display operation: Select whether or not to hold the indication until an alarm acknowledge operation is performed
• Alarm no logging function: Possible to output only to the DO or internal switch when an alarm occurs (warning display and recording to the alarm summary are not performed)
• Alarm information: Displays a log of alarm occurrences on the alarm summary
• Reflash: The duration for which the reflash relays are deactivated can be set to 500 ms, 1 s, or 2 s.
• Individual alarm ACK function: Alarm display and relay output can be canceled on individual alarms.

Event Action Function
• Description: Execute a specified operation when a given event occurs.
  • Number of settings: 50
  • Events: Remote control input, etc.
  • Timer: Number of timers: 12
  • Match time timer: Number of timers: 12
  • Action: Specify memory start/stop, alarm ACK, etc.

Control Event Action Function
See the GX90UT PID Control Module General Specifications (GS04L53B01-31EN).

Security Function
• Key lock function: All GM10 key operations
• Login function: Only registered users can operate the GM (Ethernet/serial (/IC3) /USB/ Bluetooth (/IC8) operation) (including Web browsers)
• System administrators and users: Up to 50
  Number of Authority of user: 10 levels

Manual Sampling Function
• Description: Measured value at a user specified time
• Target: Measurement (/I/O module)/math (/MT)/ communication (/MC) channels
• Number of recording channels:
  • GM10-1: Up to 50
  • GM10-2: Up to 100
• Maximum number of data values that the internal memory can store: 400
• Data format: Text

Report Function (/MT option)
• Description: Report at each scheduled time of report
• Target: Measurement (/I/O module)/math/ communication channels
• Number of report channels: 60
• Maximum number of data values that the internal memory can store: 800
• Data format: Text

Setup Function
• Description: GM10 and I/O module setup
• Setup method: Web browser, communication commands, Hardware Configurator
• Output/read destination (for saving/loading): External storage medium

Clock Function
• Clock: With a calendar function
  • Accuracy: ±5 ppm
  • Excludes the delay (of 1 second, maximum) caused when the power is turned on.
  • Time difference between units: ±2 ms max. (time difference between a sub unit and main unit)

• Time setting: Using Web operation, communication commands, event action, or SNTP client function
• Time adjustment method:
  Limit in which the time is gradually adjusted:
  Select from the available settings between 5 s and 15 s.
  Whether to change an out-of-limit operation immediately or report it as an error can be selected.
  While memory sampling:
  Corrects the time by 1 ms for each second.
  While memory is stopped:
  Immediately change the time.
• Time zone: Sets the time difference from GMT
• Date format: Select "YYYY/MM/DD", "MM/DD/YYYY", "DD/MM/YYYY" or "DD.MM.YYYY".
• Alarm display and event action, or SNTP client function error - Storage medium error, FTP client function error
  - Recover from power failure
  - Report data generating
  - Recover from power failure
  - Select from the available settings

Ethernet Communication Function
• Electrical specifications: Conforms to IEEE 802.3
• Connection: Ethernet (10BASE-T/100BASE-TX)
• Max. segment length: 100 m
• Max. connecting configuration: Cascade Max. 4 level (10BASE-T), Max. 2 level (100BASE-TX)
• Connector: RJ-45
• Protocols: TCP, UDP, IP, ICMP, ARP, DHCP, HTTP, FTP, SMTP, SNTP, Modbus, dedicated protocols, and DARWIN compatible communication
• E-mail client: Automatically sends e-mail at specified times
  E-mail is sent by events as below.
  - Alarm occurring/alarm canceling
  - Recover from power failure
  - FTP data generating
  - FTP client function error
  - Support for changing the time
• Supported authentication methods:
  • FTP server: Transfers data files to the FTP server
    Applicable files: Event data, display data, report data, etc.
  • FTP server: Transfers data files, delete files, manipulate directories, and outputs file lists
  • Max. number of the simultaneous connections: 4
  • Web server: GM10 real-time monitoring and setting changes/operations can be performed from a Web browser.
  • Max. number of the simultaneous connections: 4
  • SNTP client: Inquires the time to the SNTP server and sets the GM10
  • SNTP server: Outputs the GM10 time.
  • Time resolution: 5 ms
  • DHCP client: Automatically obtains the network address settings from the DHCP server
  • Modbus client: Reads data from another device and writes to the registers (Required /MC option)
Number of connectable servers:
- GM10-1: Up to 16
- GM10-2: Up to 32

- Modbus server: Loads measurement and math channel data
- Some control commands such as memory start
- Filtering to accept connections only from specific IP addresses available

Max. number of the simultaneous connections: 4

- Setting/Measurement server:
  Operate and set the GM10 and output data using a dedicated protocol.

Max. number of the simultaneous connections: 4

- DARWIN compatible communication server:
  Supports some DARWIN commands
  Communication with the GM10 is possible using DARWIN communication commands.

Output-related commands: Outputs measurement channel data, math channel data, relay status, decimal place of measurement channels, decimal place of math channels, system configuration information

Setup-related commands: Range, Scale unit, Alarm, Time, Moving average

Operation-related commands: Reset alarm, Reset timer, Start MATH calculation, Rebuild system, Initialize, Input communication, Output communication, DO, Write message

Note: To control the GM using the DARWIN compatible communication function, you must configure the GM (module type, channel numbers (unit numbers and slot numbers)) to match DARWIN.

**Batch Function**

- Function: Data management using batch names. Enter text fields and batch comments in the data file.
- Batch name: Added to the file name of the event data and display data.

  Structure: Batch number (up to 32 characters) + lot number (up to 8 digits)
  Use/not use selectable for lot number, on/off selectable for auto increment function.

- Text field: Adds text to the event data and display data. There are 24 available text fields.

  Title: Up to 20 characters
  Text: Up to 30 characters per field
- Batch comment: Adds text to the event data and display data. 3 comments (max. 50 characters/comments) are available.

**USB Communication Function**

- Compliant standard: USB2.0
- Interface:
  Connector: mini B type
  Number of ports: 1
  Power supply: Self powered
- Implemented protocol: Dedicated protocol
  Operate and set the GM10 and output data using a dedicated protocol.
- Communication conditions:
  Baud rate: 115200bps, Parity: None, Data length: 8bit, Stop bit: 1bit, Handshake: Off

**FAIL Output Function**

- Function: Relay output from a specified channel of the GX90YD or GX90WD when a CPU error occurs
- Output format: Relay contact
- FAIL output: Relay contact output when any of the various errors is detected
  Normally energized; de-energized when a system error occurs

**Printer Output Function**

- Printers supporting the HP PCL5c language and can print through port 9100 on a LAN connection
  Supports printing using the report template function (/MT).

**SSL Communication Function**

Communication that sends and receives information encrypted by the SSL (Secure Socket Layer) protocol is possible.

- Server function:
  Supported servers: HTTP server and FTP server
  Private key: Can be created on the GM10
  Server certificate: Server certificates created by users can be saved in the internal memory.
  Self-signed certificates can be created on the GM10.
- Client function:
  Supported clients: FTP client and SMTP client
  Trusted certificate: Trusted certificates (up to 80 KB total) can be saved in the internal memory.

**Electronic Signature Function**

Electronic signatures can be added to report files created in PDF format using the PDF form creation function. An electronic signature is provided each time a report file is created.

- Electronic signature certificate:
  Electronic signature certificates created by certificate issuing organizations can be saved in the internal memory.

**Loop Control Function (when a PID control module is installed)**

See the GX90UT PID Control Module General Specifications (GS04L53B01-31EN).

**Other Function**

- Firmware update function:
  The firmware of the GM10 and connected modules can be updated from the GM10.
- A/D calibration function:
  The A/D calibration of connected modules can be operated from the GM10.

**Web Server Function**

Real-time data monitoring and setting changes/operations can be performed from a Web browser.
PC System Requirements

**Hardware**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Intel Pentium IV, 3GHz or faster x64 or x86 processor</td>
</tr>
<tr>
<td>Internal memory</td>
<td>2 GB or more</td>
</tr>
<tr>
<td>Hard disk</td>
<td>100 MB or more free space, NTFS recommended</td>
</tr>
<tr>
<td>Printer</td>
<td>Printer compatible with the OS</td>
</tr>
<tr>
<td>Mouse</td>
<td>Mouse compatible with the OS</td>
</tr>
<tr>
<td>Display</td>
<td>Display compatible with the OS with 1024x768 dots or better, high color or better</td>
</tr>
<tr>
<td>Communication port</td>
<td>Ethernet port compatible with the OS and TCP/IP protocol</td>
</tr>
</tbody>
</table>

**OS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 7</td>
<td>Home Premium SP1 (32-bit and 64-bit editions)</td>
</tr>
<tr>
<td></td>
<td>Professional SP1 (32-bit and 64-bit editions)</td>
</tr>
<tr>
<td>Windows 8.1</td>
<td>Update (32-bit and 64-bit editions)</td>
</tr>
<tr>
<td></td>
<td>Pro Update (32-bit and 64-bit editions)</td>
</tr>
<tr>
<td>Windows 10</td>
<td>Home (32-bit and 64-bit editions)</td>
</tr>
<tr>
<td></td>
<td>Pro (32-bit and 64-bit editions)</td>
</tr>
<tr>
<td></td>
<td>Enterprise / LTSB (32-bit and 64-bit editions)</td>
</tr>
</tbody>
</table>

Compatible Browsers

Internet Explorer 11, Google Chrome

**Specifications of Options**

Advanced Security Function (IAS)

Security functions, electronic recording and electronic signature functions, and data integrity functions complying with FDA 21 CFR Part11 will be added.

- Enabling/disabling the advanced security function: You can enable or disable the advanced security function.
  - The set values and data stored in the internal memory are initialized each time the function is enabled or disabled.

- Login function: Using the login function described below, you can enter security settings on the instrument.
  - User name, password, and user ID (depending on the use/not use setting)

User level:

- Administrator: No restrictions (all operations)
- Second administrator: Admin property and user property settings can be used to restrict executable operations and signatures.
- User: Operations that can be executed can be set using the authority of user settings.
- Monitor user: Only monitoring and changing passwords are possible.

Number of users: Up to 100 including administrators, second administrators, users, and monitor users (up to 200 on the GM10-2)

Admin property: Restrictions can be placed on GM operations that second administrators are allowed to perform.

Authority of user: Users can be restricted from performing GM operations.

Number of authority of user: 10

Password expiration period: Off, 1 month, 3 months, 6 months or 1 year (no expiration period for monitor users)

Password policy function: The minimum number of characters and the types of characters that must be included can be set.

Advance notice of expiry date: A message encouraging the user to change the password is displayed when the user logs in during the specified notification period (Off, 5 days before, 10 days before).

Signature restriction: Users can be restricted from signing measurement data files.

Number of signature restrictions: 8

- Password control function: Logins are verified by a Kerberos v5 authentication server* (only user name and password)

Encryption method:

- AES128-CTS-HMAC-SHA1-96
- AES256-CTS-HMAC-SHA1-96
- ARCFOUR-HMAC-MD5

Pre-Auth function: use

- Kerberos v5 authentication server* (only Server2012 Active Directory)

- The function has confirmed compatibility with Windows Server2003 SP2/Windows Server2008 SP2/Windows Server2012 Active Directory

- Audit trail function: The history of operations from when the recording was stopped the previous time to when the recording was stopped this time is recorded as event log and saved in measurement data files along with the settings.

Data that are entered when settings are changed or when an alarm is acknowledged are recorded in the event log. This allows you to check the comments and details of the setting changes.

- Data anti-tamper function: Settings and measured data are saved as encrypted binary files.

- Data type: Only for display or event
  - Trigger mode is not possible with event data.

- Signature function*: Includes approval information to measurement data files

  Information that can be included: User name, pass/fail, comment

  Number of signatures: Up to 3 per file

  Signature privileges: Can be set for each user

  Universal Viewer is used to sign measurement data.

  Signing measurement data files is not possible from the GM10.

  Measurement mode limitations: Measurement modes High speed and Dual interval cannot be used.

  Module limitations: PID control modules cannot be used.

Serial Communication Interface (IC3)
Bluetooth Communication Function (/C8)*

Data monitoring, setting, and operation is possible on a tablet, such as a Bluetooth compatible PC or smartphone, through Bluetooth communication. Compliant standard: Bluetooth Ver 2.1+EDR

• Modbus/RTU communication:
  Reading or writing of measurement data on other instruments is available by Modbus protocol.
  Communication channel function (/MC option) is needed to read measurement data from other instruments.

• Modbus operation modes: Master or slave

Bluetooth operation modes: Master or slave

Mathematical Function:

Mathematical Functions with Report Function (/MT)

• Number of math channels: GM10-1: 100, GM10-2: 200
  Note: There is a limitation on the number of math channels when the scan interval is shorter than 100 ms.
  See “Restrictions and Cautions” on page 27.

• Scan interval

<table>
<thead>
<tr>
<th>Measurement mode</th>
<th>Scan interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Scan interval</td>
</tr>
<tr>
<td>High speed</td>
<td>Scan interval</td>
</tr>
<tr>
<td>Dual interval</td>
<td>Master scan interval</td>
</tr>
</tbody>
</table>

• Expression: Up to 120 characters

Operations:

General arithmetic operations:
  Four arithmetic operations (+, -, *, /), square root, absolute, common logarithm, natural logarithm, exponential, and power
  Relational operations: <, ≤, >, ≥, =, and ≠
  Logic operations: AND, OR, NOT, and XOR

Statistical operations:
  TLOG (maximum, minimum, average, sum, P-P values of time series data), CLOG (maximum, minimum, average, sum, P-P values of a specified channel)

Special operations: PRE, HOLD, RESET, CARRY

Conditional operation: [a?b:c]

Bit operation: BIT

Integer extracting operation: INT

Remainder extracting operation: MOD

Trigonometric functions: SIN, COS

CP calculation: CP.O2, CP.CO2

Special CLOG.AVE calculation: CLOG.PAVE

• Computation accuracy: Double-precision floating point

• Data that can be used:
  Channel data:
  Measurement channels: 0001 to 6516
  Math channels: A001 to A100 (GM10-1)
  A001 to A200 (GM10-2)

Communication channels:
  C001 to C300 (GM10-1)
  C001 to C500 (GM10-2)

Communication channel raw data:
  RC001 to RC300 (GM10-1)
  RC001 to RC500 (GM10-2)

Constants: K001 to K100

Variable constant: W001 to W100

Internal switches: S001 to S100

Flags: F01 to F20

Recording state: REC01

Integer data: Z000 to Z999

Logic math function:

A function that outputs calculated results as 0 or 1 to DOs or internal switches

• Number of logic maths: 50

• Math interval: Fastest 100 ms

• Expression: Up to 120 characters

• Math type: Basic arithmetic, relational, logical, conditional, bit

• Data that can be used: All channel data

Logic math:
  LM001 to LM050

• Output destination: Internal switches, DO channels
  (only when set to Manual)

• Setting change: Cannot be changed during recording

Report function:

Report at each scheduled time of report.

• Number of report channels: 60

• Target: Measurement (input/output module)/math/ communication channels

Note: There is a limitation on the number of report channels when the scan interval is shorter than 100 ms.

See “Restrictions and Cautions” on page 27.

• Scan interval

<table>
<thead>
<tr>
<th>Measurement mode</th>
<th>Scan interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Scan interval</td>
</tr>
<tr>
<td>High speed</td>
<td>Scan interval</td>
</tr>
<tr>
<td>Dual interval</td>
<td>Scan interval</td>
</tr>
</tbody>
</table>

• Report types: Hourly + daily, daily + weekly, daily +
monthly, batch, day custom

• Computation types: Average, maximum, minimum, sum, instantaneous value
• Report templates: Office Open XML spreadsheet files (which can be displayed with Microsoft Office Excel) or PDF files can be output or printed out with any LAN-connected printer supporting the HP PCL5c language and the port 9100.

Communication Channel Function (MC)

Data of external devices, such as PLC and PC, can be displayed and recorded.

• Number of communication channels:
  - GM10-1: 300 (C001 to C300)
  - GM10-2: 500 (C001 to C500)

Note: There is a limitation on the number of communication channels when the scan interval is shorter than 100 ms. See “Restrictions and Cautions” on page 27. The minimum communication channel update interval is 100 ms.

• Scan interval

<table>
<thead>
<tr>
<th>Measurement mode</th>
<th>Scan interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Scan interval</td>
</tr>
<tr>
<td>High speed</td>
<td>Scan interval</td>
</tr>
<tr>
<td>Dual interval</td>
<td>Master scan interval</td>
</tr>
</tbody>
</table>

• Calibration correction:
  - Mode: Linearizer approximation, linearizer bias, correction coefficient
  - Number of set points: 2 to 12
  - Only when the /AH option is installed

Log Scale (LG)

A logarithmic voltage that has been converted from a physical value is applied to the GM10, and then the GM10’s Log scale (logarithmic scale) is used to display and record the physical value.

• Input type: Log input (logarithmic input), pseudo log input (input that supports pseudo logs), log linear input (input that is linear on a logarithmic scale)
• Range: 20mV/60mV/200mV/1V/2V/6V/20V/50V
• Scalable range:
  - Log input: 1.00E-15 to 1.00E+15
  - (15 decades maximum)
  - Scale_L < Scale_U

If the lower limit mantissa is 1.00, the difference between the exponents must be 1 or more.
If the lower limit mantissa is a value other than 1.00, the difference between the exponents must be 2 or more.

Pseudo Log Input/Log linear input

1.00E-15 to 1.00E+15 (15 decades maximum)
The upper limit mantissa is the same as the lower limit mantissa.
If the lower limit mantissa is 1.00, the value must be between 1.00E–15 and 1.00E+15, the difference between the exponents must be 1 or more, and the maximum decades is 15.
If the lower limit mantissa is a value other than 1.00, the value must be between 1.01E–15 and 9.99E+14, the difference between the exponents must be 1 or more and the maximum decades is 15.

• Alarm type: High limit, low limit, delay high limit, delay low limit
• Alarm setting range: The range converted into the LOG scale corresponding to -5% to 105% of the span width.
• Alarm hysteresis: Fixed to 0
• Green band setting range: The lower limit to the upper limit of the scale. However, the lower limit of the display position must be smaller than the upper limit.
• Decimal place: 1 or 2
• Misc: Nonlinear input is possible by correcting the input value.

EtherNet/IP Communication (PLC communication protocol) (E1)

Can join an Ethernet/IP network as an adapter (or a server)

• Loading data of the I/O channel, math channel (/MT) and alarm status.
  - Note: Control alarm status cannot be loaded.
  - I/O channel: GM10-1: 100, GM10-2: 500
  - Math channel: GM10-1: 100, GM10-2: 200
• Loading and writing data from/to the communication channel (MC)
  - Communication channel: GM10-1: 300, GM10-2: 500
  - Implementation level: Level 2
• Operations that can be performed using explicit messages:
  - Communication is performed using the CIP extension feature of the PLC-specific PCCC command by Rockwell Automation.
  - Start and stop recording and computation
  - Write batch information
  - Write messages
  - Load alarm status
  - Write alarm setpoints and alarm types
  - Alarm ACK
  - Note: The following operations are not possible: load control alarm status, write control alarm setpoints and control alarm types, control alarm ACK.
  - Number of the simultaneous connection: Max. 10
  - (Explicit message)
• Supported protocols: EIP/PCCC, EIP/native

WT Communication (E2)

Acquires data by connecting to WT equipment manufactured by Yokogawa Meters & Instruments Corp. via Ethernet communication.

• Supported models: WT1800, WT5000, WT300
• Number of connectable units: 16
• Communication cycle:
  - 500 ms/1 s/2 s/5 s/10 s/20 s/30 s
• Types of data that can be obtained: Voltage, current, power, power factor, phase, electrical energy, high-frequency wave, etc.
• Number of data allocations: 300

Multi-batch Function (BT)

Recording start/stop and data file creation is possible for each batch.

• Number of multi batches
• Batch single operation: Memory start/stop, math reset, message writing
• Batch overview operation: Computation start/stop, report start/stop, manual sampling, setup data save/load
• Scan interval: 500 ms, 1 s, 2 s, 5 s (common to all batches)
• Data type: Display or event only Trigger mode not available for event data.
• Recording interval: Common to all batches
• Data file: Display or event data file created for each batch
• Number of display groups: GM10-1: 6 max. per batch
  Number of channels per group: 20
  GM10-2: 12 max. per batch
  Number of channels per group: 20
  GM10-2: 200
• Batch single settings: Group, trip line, file header, data file name, text field, batch number, lot number
• Measurement mode limitations: Measurement modes High speed and Dual interval cannot be used.

Aerospace Heat Treatment (/AH)
Supports heat treatment application AMS2750/NADCAP
Schedule management for periodically executing calibration correction configuration and the like
In correction coefficient mode of calibration correction, two biases can be specified: one based on thermocouple and another based on device
• Number of manageable schedules
  GM10-1: 6 max., GM10-2: 12 max.
• Calibration correction mode: Off, linearizer approximation, linearizer bias, correction coefficient
• Number of set points: 2 to 12

OPC-UA Server (/E3)
Data acquired by the GM can be accessed through Ethernet communication from a host system (OPC-UA client).
• Communication
  Type: OPC-UA Server
  Encoding: UA Binary
  Protocol: OPC UA TCP
  Maximum number of connections: 3 sessions
  Profile: Micro Embedded Device Server
• Security
  Mode: None
  Encryption: None
• Login: Anonymous, Username
• Data acquisition:
  Measurement value, alarm status, alarm value
  Computation value, alarm status, alarm value
  Communication value, alarm status, alarm value
  Batch information
• Data writing: Measurement channel (DO channel only), communication channel, alarm value, batch information
• Other acquired information: Device name, serial number, time, device status
• Port number: 4840 (changeable: 1 to 65535)
• Number of items: 300 max. (MonitoredItem/Session)
• Fastest period: 100 ms
• Service set:
  Discovery: FindServers, GetEndpoints
  SecureChannel: OpenSecureChannel, CloseSecureChannel

• When a PID control module is installed, loop objects are displayed in place of channel objects.
  Data collection: PV, SP, OUT, R/S, A/M/C, R/L, alarm status in loops
  Data saving: OUT, R/S, A/M/C, R/L

SLMP Communication (Mitsubishi PLC) (/E4)
Protocol function of CC-Link family that enables connection from GM to Mitsubishi Electric PLC without sequencer program.
The GM operates as an SLMP client. Writing GM measurement data to a PLC and reading PLC data into communication channels* are possible.
  * The communication channel function (/MC option) is required.
  * Number of connection destination servers: 16 max.
  * Read cycle: 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, 1 min
  * Number of commands that can be registered:
    GM10-1: 100
    GM10-2: 200
  * Communicable internal data:
    Special relay (SM), special register (SD), input (X), output (Y), internal relay (M), latch relay (L), annunciator (F), edge relay (V), link relay (B), data register (D), link register (W), timer contact (TS), timer coil (TC), current timer value (TN), integration timer contact (SS), integration timer coil (SC), current integration timer value (SN), counter contact (CS), counter coil (CC), current counter value (CN), special link relay (SB), special link register (SW), direct access input (DX), direct access output (DY), index register (Z), file register (R, ZR), extended data register (D), extended link register (W)
  Device code is indicated in parentheses.

Program Control Function (/PG)
See the PID Control Module General Specifications (GS 04L51B31-01EN).

Integration Bar Graph Function (/WH)
The integration bar graph function reads the report file (a hourly report or hourly report / daily report) stored on the SD card of GM 10 and displays the integration bar graph and the integration trend in the web application.
  • Report file monitoring and display update interval: 5 minutes
GM10 HARDWARE SPECIFICATIONS

- **Material:** Polycarbonate
- **Color:**
  - Case: Smoke blue (Munsell 4.1PB 6.0/4.5 equivalent)
  - Front panel: Light charcoal gray (Munsell 10B 3.6/0.3 equivalent)
- **External Dimensions:** 45.1(W)×111(H)×107.1(D) mm
- **Weight:** Approx. 0.25 kg

**Power Supply and Isolation**

- **Power supply:** Supplied from the GM90PS Power Supply Module
- **Power consumption:** 2.8 W maximum
- **Insulation resistance:** Between RS-422/485 terminal and internal circuit and between Ethernet terminal and internal circuit, 20 MΩ or higher at 500 V DC
- **Isolation diagram**

- **Other Specifications**
  - Memory backup: A built-in lithium battery backs up the settings and runs the clock.

**External Dimensions**

- **RS-422/485 terminal ([C3 option])**
- **Internal circuit**
- **GM90PS ground terminal**
- Circuits delimited by lines are mutually isolated.

GM90MB MODULE BASE SPECIFICATIONS

- **Number of installable modules:** 1
- **Power consumption:** Less than 0.01 W
- **Automatic module number assignment function:** Automatically assigns a module number when a module is connected
- **Material:** Polycarbonate
- **Color:** Smoke blue (Munsell 4.1PB 6.0/4.5 equivalent)
- **External Dimensions:** 57.7(W)×135(H)×103.5(D) mm
- **Weight:** Approx. 0.15 kg

**External Dimensions**

- **Units:** mm [approx. inch]
- **Rear view**
  - 9.5 [0.37]
  - 106.8 [4.20]
  - 135 [5.31]
  - 18.8 [0.74]
  - 2×5.5[0.22]×5.9[0.23] Oval hole for wall mounting

- **Latch**
  - For fixing a DIN rail in place
  - When the latch is lowered
GM90PS POWER SUPPLY MODULE
SPECIFICATIONS

Unit: mm

With a power inlet

With power supply terminals (M4)

Power switch

GM90PS-1N1[0]

• Rated supply voltage: 100 to 240 VAC
• Allowable supply voltage: 90 to 264 V AC
• Power frequency: 50 Hz ± 2%, 60 Hz ± 2%
• Power switch: Available
• Terminal type: Inlet or M4 screw terminal
• Allowable interruption time: Less than 1 cycle of the power supply frequency
• Insulation resistance: Between the power supply terminal and earth: 20 MΩ or higher at 500 V DC
• Withstand voltage: Between the power supply terminal and earth: 3000 V AC (50/60 Hz) for 1 minute
• Grounding: Be sure to set a low grounding resistance.
• Material: Polycarbonate
• Color: Smoke blue (Munsell 4.1PB 6.0/4.5 equivalent)
• External Dimensions: 56.8(W)×135(H)×107.1(D) mm
• Weight: Approx. 0.55kg

GM90PS-1N2W0

• Rated supply voltage: 12 to 28 V DC
• Allowable supply voltage: 10 to 32 V DC
• Power frequency: 50 Hz ± 2%, 60 Hz ± 2%
• Power switch: Available
• Terminal type: M4 screw terminal
• Allowable interruption time: 2 ms or less
• Insulation resistance: Between the power supply terminal and earth: 20 MΩ or higher at 500 V DC
• Withstand voltage: Between the power supply terminal and earth: 1000 V AC (50/60 Hz) for 1 minute
• Grounding: Be sure to set a low grounding resistance.
• Material: Polycarbonate
• Color: Smoke blue (Munsell 4.1PB 6.0/4.5 equivalent)
• External Dimensions: 56.8(W)×135(H)×107.1(D) mm
• Weight: Approx. 0.55kg
• External Dimensions

With a power inlet

Width: 126.7 [4.99] mm
Height: 88 [3.46] mm
Depth: 18.8 [0.74] mm

With power supply terminals (M4)

Width: 126.7 [4.99] mm
Height: 88 [3.46] mm
Depth: 18.8 [0.74] mm

Rear view

When the latch is lowered

Unit: mm [approx. inch]
UNIT EXTERNAL DIMENSIONS

- Main unit (single unit)

- Main unit (multi unit)

- Sub unit

<table>
<thead>
<tr>
<th>Unit types</th>
<th>Maximum width for each input / output module to be connected: L (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Main unit (single unit)</td>
<td>138</td>
</tr>
<tr>
<td>Main unit (multi unit)</td>
<td>188</td>
</tr>
<tr>
<td>Sub unit (multi unit)</td>
<td>138</td>
</tr>
</tbody>
</table>
• Vertical Mounting Dimensions for DIN Rail Mounting

Unit: mm [approx. inch]

- DIN rail
  - 68.6 [2.70]
  - 185 [7.28]

• Wall Mount Dimensions

Unit: mm [approx. inch]

- M4 depth 3 mm [0.12 inches] or more

Tolerance: ±0.3 [±0.012]
APPLICATION SOFTWARE
SMARTDAC+ STANDARD
• Universal Viewer
• Hardware Configurator
• IP Address Configurator

Download the latest version of the software from the following URL.
www.smartdacplus.com/software/en/

PC System Requirements
Operating system:

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 7</td>
<td>Home Premium SP1 (32-bit and 64-bit editions)</td>
</tr>
<tr>
<td></td>
<td>Professional SP1 (32-bit and 64-bit editions)</td>
</tr>
<tr>
<td>Windows 8.1</td>
<td>Update (32-bit and 64-bit editions)</td>
</tr>
<tr>
<td>Windows 10</td>
<td>Home (32-bit and 64-bit editions)</td>
</tr>
<tr>
<td></td>
<td>Pro (32-bit and 64-bit editions)</td>
</tr>
<tr>
<td></td>
<td>Enterprise / LTSE (32-bit and 64-bit editions)</td>
</tr>
</tbody>
</table>

Processor and main memory:

<table>
<thead>
<tr>
<th>OS</th>
<th>Processor and main memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 7</td>
<td>32-bit edition: Intel Pentium 4, 3 GHz or faster</td>
</tr>
<tr>
<td></td>
<td>x64 or x86 processor: At least 2 GB.</td>
</tr>
<tr>
<td>Windows 8.1</td>
<td>64-bit edition: Intel Pentium 4, 3 GHz or faster</td>
</tr>
<tr>
<td></td>
<td>x64 processor: At least 2 GB.</td>
</tr>
<tr>
<td>Windows 10</td>
<td></td>
</tr>
</tbody>
</table>

Web browser:
Supported browser: Windows Internet Explorer
Version: Internet Explorer 11
HTTP1.1 and JavaScript are used.

Hard disk:
100MB or more of free space (depending on the amount of data, you may need more memory).

Display:
A video card that is recommended for the OS and a display that is supported by the OS, has a resolution of 1024 x 768 or higher, and that can show 65,536 colors (16-bit, high color) or more.

Universal Viewer
The universal viewer can display the following data generated by data loggers or recorders on the screen and print it out on the printer.
• Display data file
• Event data file
• Report data file
• Manual sampled data file
• Viewer function: Waveform display, digital display, circular display, list display, report display, operation log display, waveform

• Data conversion: File conversion to Excel and ASCII format
• Signature function: Signing measurement data files is possible.

Hardware Configurator
• Offline setting on Web browser
Settings can be configured from Internet Explorer 11.

IP Address Configurator
• GM10 IP address assignment
Edit the GM10's host name, IP address, DNS server, domain name, domain suffix, and so on as well as register the host name to a DNS server.
• GM10 search Search for GMs in the same network segment and list them.
# GM10 Model and Suffix Codes

<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>-1</td>
<td></td>
<td>Data Acquisition Module for SMARTDAC+ GM</td>
</tr>
<tr>
<td></td>
<td>-2</td>
<td></td>
<td>Standard (Max. measurement channels: 100)</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td></td>
<td>Large memory (Max. measurement channels: 500)</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 (PLC communication protocol)
- /E2: WT communication
- /E3: OPC-UA server
- /E4: SLMP communication (Mitsubishi PLC)
- /LG: Log scale
- /MC: Communication channel function
- /MT: Mathematical function (with report function)
- /PG: Program control function
- /WH: Integration bar graph function

*1 If you specify WT communication, you must also specify the communication channel function (/MC option).
*2 Optional code /MT (MATH) is required if using the GX90XD's or GX90WD's pulse input.
*3 Optional code /MC (MATH) is required if using the GX90XP's pulse integration.
*4 When using the advanced security function is set to ON, the scan interval is set to 100 ms or longer. In addition, the dual interval function and PID modules cannot be used.
*5 When using the multi-batch function is set to ON, the scan interval is set to 500 ms or longer. In addition, the dual interval function cannot be used.
*6 A PID control module is required to use the program control function.
*7 If you want to write from a PLC to the GM via EtherNet/IP communication, a separate communication channel (/MC) is required.
*8 A separate communication channel (/MC) is required to perform SLMP communication.
*9 A communication channel (/MC) is required to configure the Modbus client function and for other devices to write to the GM Modbus server.
*10 If you specify WH option, you must also specify the communication channel function (/MC option) and the mathematical function (/MT option).

# GM90PS Model and Suffix Codes

<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>-1</td>
<td></td>
<td>Power Supply Module for SMARTDAC+ GM</td>
</tr>
</tbody>
</table>

**Optional code**

- /W: Power supply connection
- /H: Power input with UL/CSA cable
- /F: Power input with VDE cable
- /N: Power input with GB cable
- /Q: Power input with BS cable
- /R: Power input with AS cable
- /W: Screw terminal (M4) (without power cable)

*1 Only W (Screw terminal (M4)) is available for the power supply connection.
*2 When using with GM10 (/WH option), it is necessary to specify the /WH option (for integrated bar graph function) for GM90PS.

# GM90MB Model and Suffix Codes

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

**Optional code**

- /N: Always zero

# ORDERING INFORMATION

Model, suffix code, and optional codes, when necessary, are required to be specified.

Note 1: For modules other than GM90PS (power supply module), a GM90MB (module base) is required for each module.

Note 2: Before ordering, read “MODEL SELECTION GUIDE” on page 24 and “Restrictions and Cautions” on page 26.

# STANDARD ACCESSORIES

<table>
<thead>
<tr>
<th>Model</th>
<th>Standard accessory name</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10</td>
<td>SD card (1 GB)</td>
<td>1</td>
</tr>
<tr>
<td>GM90PS</td>
<td>Connector cover</td>
<td>1</td>
</tr>
<tr>
<td>GM90MB</td>
<td>Interconnect screw (M3)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>(depends on the suffix code of the power supply connection)</td>
<td></td>
</tr>
</tbody>
</table>
**OPTIONAL ACCESSORIES (SOLD SEPARATELY)**

<table>
<thead>
<tr>
<th>Product</th>
<th>Model/part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD card (1 GB)</td>
<td>773001</td>
</tr>
<tr>
<td>Shunt resistor for M3 terminal (250 Ω ± 0.1 %)</td>
<td>415940</td>
</tr>
<tr>
<td>Shunt resistor for M3 terminal (100 Ω ± 0.1 %)</td>
<td>415941</td>
</tr>
<tr>
<td>Shunt resistor for M3 terminal (10 Ω ± 0.1 %)</td>
<td>415942</td>
</tr>
<tr>
<td>Shunt resistor for clamp terminal (250 Ω ± 0.1 %)</td>
<td>438920</td>
</tr>
<tr>
<td>Shunt resistor for clamp terminal (100 Ω ± 0.1 %)</td>
<td>438921</td>
</tr>
<tr>
<td>Shunt resistor for clamp terminal (10 Ω ± 0.1 %)</td>
<td>438922</td>
</tr>
<tr>
<td>Dummy cover</td>
<td>B8740CZ</td>
</tr>
<tr>
<td>Validation Documents (For /AS option)*1</td>
<td>773230</td>
</tr>
</tbody>
</table>

*1 Provision of Validation Documents A license sheet containing the license key required for installation is provided. Download the validation document from the following URL: http://www.smartdacplus.com/software/en/

**Related Product (Sold Separately)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA10</td>
<td>Data Logging Software</td>
</tr>
</tbody>
</table>

**Test Certificate (QIC, sold separately)**

QIC is available for each model.

**User’s Manual**

Product user’s manuals can be downloaded from the following URL. You will need Adobe Reader 7 or later by Adobe Systems.

**URL:** www.smartdacplus.com/manual/en/
## MODEL SELECTION GUIDE

### Selection of the system configuration and GM10 type

<table>
<thead>
<tr>
<th>Model-Type</th>
<th>Internal memory</th>
<th>System Configuration</th>
<th>I/O channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10-1</td>
<td>500MB</td>
<td>Single Unit</td>
<td>0 to 100ch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multi Unit</td>
<td>0 to 100ch</td>
</tr>
<tr>
<td>GM10-2</td>
<td>1.2GB</td>
<td>Single Unit</td>
<td>0 to 100ch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multi Unit</td>
<td>0 to 420ch</td>
</tr>
</tbody>
</table>

### I/O Modules

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Product name Description</th>
<th>Number of channels</th>
<th>Measurement interval (shortest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90XA</td>
<td>-10-C1N-□N</td>
<td>Analog Input Module Current (mA) input: DC current (mA), DC current standard signal (4-20 mA)</td>
<td>10</td>
<td>100 ms</td>
</tr>
<tr>
<td></td>
<td>-10-L1N-□N</td>
<td>Low withstand voltage relay: DC voltage, standard signal, thermocouple (TC), DI (voltage, contact), and DC current (by adding an external shunt resistor)</td>
<td></td>
<td>500 ms</td>
</tr>
<tr>
<td></td>
<td>-10-U2N-□N</td>
<td>Universal: DC voltage, standard signal, thermocouple (TC), DI (voltage, contact), and DC current (by adding an external shunt resistor)</td>
<td></td>
<td>100 ms</td>
</tr>
<tr>
<td></td>
<td>-10-T1N-□N</td>
<td>Electromagnetic relay: DC voltage, standard signal, thermocouple (TC), DI (voltage, contact), and DC current (by adding an external shunt resistor)</td>
<td></td>
<td>1 s</td>
</tr>
<tr>
<td></td>
<td>-10-V1N-□N</td>
<td>High withstand voltage: DC voltage, standard signal, thermocouple (TC), DI (voltage, contact), and DC current (by adding an external shunt resistor)</td>
<td></td>
<td>100 ms</td>
</tr>
<tr>
<td></td>
<td>-04-H0N-□N</td>
<td>High-speed universal: DC voltage, standard signal, thermocouple, resistance temperature detector (RTD), DI (voltage, contact), DC current (when an external shunt resistor is connected)</td>
<td>4</td>
<td>1 ms</td>
</tr>
<tr>
<td></td>
<td>-06-R1N-□N</td>
<td>4-wire RTD, 4-wire resistance</td>
<td></td>
<td>100 ms</td>
</tr>
<tr>
<td>GX90XD</td>
<td>-16-11N-□N</td>
<td>Digital Input Module Remote control input, pulse input</td>
<td>16</td>
<td>100 ms</td>
</tr>
<tr>
<td>GX90XP</td>
<td>-10-11N-□N</td>
<td>Pulse Input Module Pulse input (flow sum and the like)</td>
<td>10</td>
<td>100 ms</td>
</tr>
<tr>
<td>GX90YD</td>
<td>-06-11N-3N</td>
<td>Digital Output Module Alarm output, etc</td>
<td>6</td>
<td>100 ms (update interval)</td>
</tr>
<tr>
<td>GX90WD</td>
<td>-0806-01N-3N</td>
<td>Digital Input/Output Module Remote control input, pulse input</td>
<td>DI: 8</td>
<td>100 ms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DO: 6</td>
<td></td>
</tr>
<tr>
<td>GX90XP</td>
<td>-10-11N-□N</td>
<td>Pulse Input Module Pulse input (flow sum and the like)</td>
<td>10</td>
<td>100 ms</td>
</tr>
<tr>
<td>GX90YA</td>
<td>-04-C1N-□N</td>
<td>Analog Output Module Transmission output, manual output</td>
<td>4</td>
<td>100 ms (update interval)</td>
</tr>
<tr>
<td>GX90UT</td>
<td>-02-11N-3N</td>
<td>PID Control Module Control of temperature, flow, pressure etc.</td>
<td>2 loops</td>
<td>100 ms (update interval)</td>
</tr>
</tbody>
</table>

### Single unit system configuration (up to 100 channels)

Configuration example (maximum)

- GM10: 1
- GM90PS: 1
- GX90[□□□]: 10
- GM90MB: 11

---

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GS 04L55B01-01EN Dec. 11, 2019-00
Multi unit system configuration (up to 420 channels)

Main unit configuration example (maximum)
GM10: 1  
GM90PS: 1  
GX90\[\]\[\]: 6  
GX90EX: 1  
GM90MB: 8

Sub unit configuration example (maximum)
GM90PS: 6  
GX90\[\]\[\]: 36  
GX90EX: 6  
GM90MB: 42

<table>
<thead>
<tr>
<th>Slot</th>
<th>Main Unit (Unit 0)</th>
<th>Sub Unit (Unit 1)</th>
<th>Sub Unit (Unit 2)</th>
<th>Sub Unit (Unit 3)</th>
<th>Sub Unit (Unit 4)</th>
<th>Sub Unit (Unit 5)</th>
<th>Sub Unit (Unit 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>GM90MB</td>
<td>GM90MB</td>
<td>GM90MB</td>
<td>GM90MB</td>
<td>GM90MB</td>
<td>GM90MB</td>
<td>GM90MB</td>
</tr>
<tr>
<td>4</td>
<td>GM90MB</td>
<td>GM90MB</td>
<td>GM90MB</td>
<td>GM90MB</td>
<td>GM90MB</td>
<td>GM90MB</td>
<td>GM90MB</td>
</tr>
<tr>
<td>3</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
</tr>
<tr>
<td>2</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
</tr>
<tr>
<td>1</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
<td>GX90[][]</td>
</tr>
<tr>
<td>0</td>
<td>GM90PS</td>
<td>GM90PS</td>
<td>GM90PS</td>
<td>GM90PS</td>
<td>GM90PS</td>
<td>GM90PS</td>
<td>GM90PS</td>
</tr>
</tbody>
</table>
RESTRICTIONS AND CAUTIONS

Limit to the number of modules and number of channels in the system

<table>
<thead>
<tr>
<th>System</th>
<th>Measurement mode</th>
<th>Maximum Number of Connections</th>
<th>Maximum Number of Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Module</td>
<td>I/O</td>
</tr>
<tr>
<td>GM10-1</td>
<td>Normal</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>High speed</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Dual interval</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>GM10-2</td>
<td>Normal</td>
<td>42</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>High speed</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Dual interval</td>
<td>42</td>
<td>250</td>
</tr>
</tbody>
</table>

Limit to the number of modules per unit
The following table shows the limits when the module specified under Module is connected to the system. The system will not operate if the limit is exceeded.

<table>
<thead>
<tr>
<th>Module</th>
<th>Single unit system</th>
<th>Multi unit system</th>
</tr>
</thead>
<tbody>
<tr>
<td>When GX90XA-10-T1 is included</td>
<td>8</td>
<td>No limit</td>
</tr>
<tr>
<td>When GX90XA-04-H0 is included</td>
<td>8</td>
<td>No limit</td>
</tr>
<tr>
<td>When GX90XA-04-H0 and GX90YA are included</td>
<td>7</td>
<td>No limit</td>
</tr>
<tr>
<td>When GX90UT is included</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

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.

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.
• 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 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.

- GM10-1

If you want to use the DI of a GX90XD or GX90WD, only a single module installed in the GM main unit can be used.
Limit to the Number of Measurement Channels

There is a limit to the number of channels that can measure at scan intervals shorter than 100 ms.

• When the measurement mode is set to High speed.

<table>
<thead>
<tr>
<th>GM10-1</th>
<th>Channel</th>
<th>1 ms</th>
<th>2 ms</th>
<th>5 ms</th>
<th>10 ms</th>
<th>20 ms</th>
<th>50 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I/O</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Math</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Comm.</td>
<td>3</td>
<td>6</td>
<td>15</td>
<td>30</td>
<td>60</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>Report</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GM10-2</th>
<th>Channel</th>
<th>1 ms</th>
<th>2 ms</th>
<th>5 ms</th>
<th>10 ms</th>
<th>20 ms</th>
<th>50 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I/O</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Math</td>
<td>2</td>
<td>4</td>
<td>10</td>
<td>20</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Comm.</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>50</td>
<td>100</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Report</td>
<td>2</td>
<td>4</td>
<td>10</td>
<td>20</td>
<td>40</td>
<td>60</td>
</tr>
</tbody>
</table>

• When the measurement mode is set to Dual interval.

<table>
<thead>
<tr>
<th>GM10-1</th>
<th>Channel</th>
<th>1 ms</th>
<th>2 ms</th>
<th>5 ms</th>
<th>10 ms</th>
<th>20 ms</th>
<th>50 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I/O</td>
<td>-----</td>
<td>-----</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Math</td>
<td>-----</td>
<td>-----</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Comm.</td>
<td>-----</td>
<td>-----</td>
<td>7</td>
<td>15</td>
<td>30</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Report</td>
<td>-----</td>
<td>-----</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GM10-2</th>
<th>Channel</th>
<th>1 ms</th>
<th>2 ms</th>
<th>5 ms</th>
<th>10 ms</th>
<th>20 ms</th>
<th>50 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I/O</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Math</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Comm.</td>
<td>2</td>
<td>5</td>
<td>12</td>
<td>25</td>
<td>50</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>Report</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>30</td>
</tr>
</tbody>
</table>

*1 Channels that can be used only on one of the two scan groups. They operate at the scan interval specified in the master scan group.
*2 Can be specified from 30 channels.

Limit to the Number of Recording Channels in Each Measurement Mode

I/O channel + math channel + communication channel

<table>
<thead>
<tr>
<th>System</th>
<th>Measurement mode</th>
<th>1ms</th>
<th>2ms</th>
<th>5ms</th>
<th>10ms</th>
<th>20ms</th>
<th>50ms</th>
<th>100ms</th>
<th>200ms</th>
<th>500ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10-1</td>
<td>Normal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High speed</td>
<td>2</td>
<td>4</td>
<td>10</td>
<td>20</td>
<td>40</td>
<td>100</td>
<td>200</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>Dual interval</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GM10-2</td>
<td>Normal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High speed</td>
<td>10</td>
<td>20</td>
<td>50</td>
<td>100</td>
<td>150</td>
<td>150</td>
<td>200</td>
<td>500</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>Dual interval</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td>40</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>600</td>
</tr>
</tbody>
</table>

Dual Interval Searching of Universal Viewer

<table>
<thead>
<tr>
<th>Recording mode</th>
<th>Link dual interval waveform</th>
<th>Show dual interval waveform integrated link view</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free + Free</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Free + Trigger (single-shot, repeated)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Trigger (single-shot, repeated) + Trigger (single-shot, repeated)</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*1 Link dual interval waveform: A function that searches a folder for and displays the file that forms a pair with the displayed file.
*2 Show dual interval waveform integrated link view: A function that displays from the result of Search Open one of the files that forms a pair and displays both trends when it is clicked.

Program Pattern Setting (/PG option)

Hardware Configurator is required for setting program patterns. You cannot set using the Web application.
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