SMARTDAC+®
Data Acquisition & Control

Bulletin 04L55B01-01EN

www.smartdacplus.com

YOKOGAWA

The clear path to operational excellence
Data Acquisition & Control

Your business environment is complex and rapidly changing. You need smart and powerful systems that can adapt to your process. SMARTDAC+ is a fresh approach to data acquisition and control, with smart and simple touch operation as a design priority. Measure, display and archive process data with greater levels of clarity, intelligence and accessibility.

The SMARTDAC+ concept started with the GX/GP, an integrated I/O and recording system with a familiar touch operator interface. Building upon the SMARTDAC+ product family is the highly adaptable, scalable and easy to operate GM data logger.

Now that’s SMART.

Precise, Reliable & Adaptable

Decades of Yokogawa’s innovative measuring technology has resulted in a flexible data logger that offers both reliability and ease of use.

**Scalability**
- Up to 420 ch per system
- Plug and lock modules

**Ease of Use**
- Web-based configuration
- Live Web-based data viewing

**Mobile Connectivity**
- Bluetooth
- Mobile Application

**Open Network**
- Modbus, EtherNet/IP, SLMP, and OPC-UA server

**Reliability**
- Secure data storage
- High accuracy measurement

**Noise Tolerance**
- Electromagnetic relay module
Adaptable

**Smart Architecture**

Enables a scalable data acquisition system

**Smart User Interface**

Provides a smooth, familiar user experience

**Smart Functionality**

Offers a seamless data transfer environment
## Smart Architecture

**Enables a scalable data acquisition system**

### Increase channels by adding additional block modules

- YOKOGAWA proprietary block architecture (patent pending)
- Expand one, or multiple module at a time
- Unique design houses modules in linked module bases
- Module base ensures linkage (slide locks and mounting screws also available)
- Modules can be inserted and removed from the front panel for easy maintenance

### Names of data acquisition module parts

- 7 segment LED (x2) (Displays operation mode, system number, and other information)
- USER key (Executes specified actions)
- SD memory card slot
- Ethernet port (A 10Base-T/100Base-TX port.)
- Status display (Displays system status)
- START/STOP key (Starts/stops recording and computation)
- USB port (USB2.0 compliant port for hardware settings and the GA10, or customer created communication programs)
- Serial communications port (Optional code, /C3)
- SD memory card slot
- Status display
- USB port
- Serial communications port
- Slide lock
- Screw

### Comes standard with support for up to 100 ch of measurement (single-unit configuration)

Up to 10 I/O modules can be linked to a single data acquisition module (GM10)

### Installs anywhere

For the desktop, DIN rails, or wall-mounting. No special attachments required.

- Desktop
- Mounted on DIN rails
- Wall-mounted
Select from a wide range of I/O modules

Select modules according to your application. Noise-resistant, magnetic relay types also available. All modules have removable terminal blocks for easy wiring. The same modules used in the SMARTDAC+ series.

SMARTDAC+ series

### Analog input module scan interval and measurement type

<table>
<thead>
<tr>
<th>Type</th>
<th>Channels</th>
<th>Scan interval (shortest)</th>
<th>Scanned</th>
<th>TC</th>
<th>RTD</th>
<th>DCV</th>
<th>DI</th>
<th>mA</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal (-U2)</td>
<td>10</td>
<td>100ms</td>
<td>SSR</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>Universal</td>
</tr>
<tr>
<td>Low withstand voltage relay (-L1)</td>
<td>10</td>
<td>500ms</td>
<td>SSR</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>Mid-price</td>
</tr>
<tr>
<td>Electromagnetic relay</td>
<td>10</td>
<td>1s</td>
<td>Relay</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>Noise-resistance</td>
</tr>
<tr>
<td>DC current input (-C1)</td>
<td>10</td>
<td>100ms</td>
<td>SSR</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>mA only</td>
</tr>
</tbody>
</table>

✓: Available

### Actual values support high precision measurement

<table>
<thead>
<tr>
<th>Type</th>
<th>Measuring accuracy*1 (typical value)*2</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCV</td>
<td>± (0.01% of reading + 5 μV)</td>
</tr>
<tr>
<td>60mV</td>
<td>± (0.01% of reading + 5 μV)</td>
</tr>
<tr>
<td>6V (1-5 V)</td>
<td>± (0.01% of reading + 2 mV)</td>
</tr>
<tr>
<td>TC</td>
<td>± 1°C</td>
</tr>
<tr>
<td>K</td>
<td>± 0.2°C</td>
</tr>
<tr>
<td>K (-200 to 500 °C)</td>
<td>± 0.2°C</td>
</tr>
<tr>
<td>J</td>
<td>± 0.2°C</td>
</tr>
<tr>
<td>T</td>
<td>± 0.2°C</td>
</tr>
<tr>
<td>N</td>
<td>± (0.01% of reading + 0.2°C)</td>
</tr>
<tr>
<td>RTD</td>
<td>± (0.02% of reading + 0.2°C)</td>
</tr>
<tr>
<td>Pt100</td>
<td>± (0.02% of reading + 0.2°C)</td>
</tr>
<tr>
<td>Pt100 high resolution</td>
<td>± (0.02% of reading + 0.16°C)</td>
</tr>
</tbody>
</table>

### Support measurement of up to 420 ch (actual input) by expanding channels across multiple units (multi-unit configuration)

Expand up to 420 ch by using the GX90EX expansion module. (GM10-2) On the GM10-2 large capacity type, up to 1000 ch are available for recording when including MATH and communication channels. Connect units with Ethernet cables for dispersed installations.

### Input/output terminals are removable. Cuts down on rewiring time.

### Internal memory and max. I/O channels

<table>
<thead>
<tr>
<th>Type</th>
<th>Internal memory</th>
<th>Max. input/output channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10-1</td>
<td>500MB</td>
<td>Single-unit configuration: 0 to 100 Multi-unit configuration: 0 to 100</td>
</tr>
<tr>
<td>GM10-2</td>
<td>1.2GB</td>
<td>Single-unit configuration: 0 to 100 Multi-unit configuration: 0 to 420</td>
</tr>
</tbody>
</table>

### Reduce wiring with distributed installation

When the data logger is installed offsite (away from the DUT), you can place the sub unit at the site and monitor data without the need for long-distance wiring of thermocouples and other sensors.
Easy access from a Web browser

Through a Web browser you can monitor the GM in real time and change settings. You can easily build a seamless, low-cost remote monitoring system with no additional software.

Enter settings online with a web browser

The setting screen lets you copy AI channel settings and other information to Excel for editing. You can reimport the data into the setting screen after editing.

Trend, digital, and other real-time displays

Provides a smooth, familiar user experience

With the scroll bar, you can seamlessly scroll between past and current trends.


**Dedicated software (free download) is available for loading waveforms and GM settings**

- **Universal viewer**
  - Data files saved on the GM can be viewed and printed.
  - You can perform statistical computation over an area and export to ASCII, Excel, or other formats.

- **Offline setting software**
  - Save settings or transfer them to the GM.
  - Connections can also be made easily via USB or Bluetooth.

**Safe to use in a wide range of temperatures**

With operating temperatures of -20°C–60°C, it supports a wide range of applications in varying installation environments.

**Monitoring and settings can also be done on a tablet**

- Supports Bluetooth (optional code /C8)
- You can enter settings or monitor from a tablet without ever bringing a PC to the site.
- Dedicated applications are available for free download. For more information, visit our website.

- **Powerful applications**
  - **Bluetooth connection**
    - Simple to use for in-vehicle testing.
  - **USB connection**
    - Service staff can easily perform maintenance on the GM.

**Enables monitoring via Bluetooth**

Bluetooth supports Android only.
Wi-Fi supports both Android and iOS.

**Enables monitoring via Wi-Fi**

Monitoring and operation from the driver's seat.

**Service staff can easily perform maintenance on the GM.**

**Environment testing**

Safe to use in a wide range of temperatures

With operating temperatures of -20°C–60°C, it supports a wide range of applications in varying installation environments.

**Simple to use for in-vehicle testing.**
Data acquisition on power measuring instruments (optional codes /E2 and /MC)

Acquire precise digital data on the GM by digital communication connectivity to a power measuring instrument (WT series power analyzers) and record it along with the GM’s measured data. Since it records a device’s power consumption, temperature, and other phenomena at the same time, the GM is ideal for performance evaluation testing.

Models that can be connected
Yokogawa Meters & Instruments Corp. WT300/WT500/WT1800
Max. no. of connections
16

Comes with communication functions that are compatible with the DARWIN data acquisition unit

The GM supports DARWIN communication commands. Use your current DARWIN communication programs as is on the GM. It’s easy to switch from an existing DARWIN unit.

* See your dealer or nearest Yokogawa representative for details.

CENTUM/STARDOM communication package
CENTUM: LFS2432, DARWIN/DAQSTATION Communication package (for ALE111 [Ethernet])
STARDOM: NT365AJ DARWIN connection package

Variety of convenient networking functions

Supports a wide range of networking functions
- Automatic network setup via DHCP
- SNTP based time synchronization
- Email transmission

Increased network security with SSL communication

Safely sends and receives customer data.

FTP-based file transfer

The FTP client/server functions allow you to easily share and manage data from a centralized file server

FTP client function
FTP server function

- FTP client
- FTP server
- Ethernet
- Data files
- Report files
- Internal memory/external storage:
  - Data files
  - Report files...etc.

Primary Secondary FTP server

User original programs (includes DARWIN communication commands)

Ethernet or RS-422/485

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- Internal memory/external storage:
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Primary Secondary FTP server

User original programs (includes DARWIN communication commands)

Ethernet or RS-422/485
EtherNet/IP Function (optional code /E1)

GM supports EtherNet/IP server functions. You can access GM from PLCs or other devices and load measurement/MATH channels or write to communication input channels*. * Communication channel function (optional code, /MC) is required.

Modbus/TCP and Modbus/RTU Communications

GM supports Modbus TCP/IP client and server modes for Ethernet communications and Modbus RTU master and slave modes for optional serial communications.

SLMP Communication (Mitsubishi PLC) (optional code /E4)

Protocol function that enables connection from a GM to Mitsubishi Electric PLCs without sequencer programs.

OPC-UA Server (optional code /E3)

Data acquired by the GM can be accessed through Ethernet communication from a host system (OPCUA client).
Smart Functionality

**Be confident that recorded data is saved**

Supports long-duration and multichannel recording. Measured data is always stored to internal memory, and data is transferred to external storage media at regular intervals. Redundancy can be achieved by sending data to a server with the FTP client function. Securely saves measured data even in the event of a sudden power loss.

### Approximate sample time

<table>
<thead>
<tr>
<th>Number of recording channels</th>
<th>Total sample time</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Approx. 71 days</td>
</tr>
<tr>
<td>100</td>
<td>Approx. 23 days</td>
</tr>
<tr>
<td>300</td>
<td>Approx. 7 days</td>
</tr>
</tbody>
</table>

With an internal memory of 1.2 GB and recording interval of 1 sec.

**Measured data file type**

You can save measured data to editable text files, or to binary files for added security.

**Report template function (optional code /MT)**

This function automatically creates spreadsheets in PDF or Excel format.

Spreadsheets are created according to the template loaded on the main unit. Templates are available for Excel and PDF. PDF spreadsheet templates are created with a free report template builder program. Automatically generated spreadsheets (PDF or Excel) are saved to external storage medium (SD card) at regular intervals. You can also transfer them via FTP.

Spreadsheets generated from PDF spreadsheet templates can be automatically output from the GM to a printer through a PC.

**Record data in separate files per equipment set**

**Multi-batch Function (optional code /BT)**

Record pre-defined channel groups to separate data files with independent start and stop control. You can create up to 12 batches.

### Aerospace Heat Treatment Supports heat treatment application AMS2750/NADCAP

**Calibration correction schedule control function (optional code /AH)**

Schedule management for periodically executing calibration correction configuration and the like.

Input calibration is performed in the AI channel setting screen, and the calibration period settings are entered in the schedule management setting screen.

**21 CFR Part 11 support (optional code /AS)**

With the advanced security function option, GM supports the USA FDA’s Title 21 CFR Part 11 regulation. It gives you access to a login function for requiring user names, IDs, and passwords, plus electronic signatures, audit trails, an anti-tampering function, and other security features.

**Print spreadsheets (PDF) directly**

Spreadsheets generated from PDF spreadsheet templates can be automatically output from the GM to a printer through a PC.
Specifications
For detailed specs, see the general specifications (data acquisition module/power supply module/module base: GS 04L5SB01-01EN, expansion unit/expansion modules: GS 04L5SB00-01EN, I/O modules: GS 04L5SB01-01EN).

GM10 Data Acquisition Module

No. of I/O channels: GM10-1: 1-100 max., GM10-2: 500 max. (or 420 with AI only)
Scan interval: 100/200/500 ms/1,000 s ± Some intervals not available depending on system configuration and modules.
Internal memory (flash memory): GM10-1: 1MB
GM10-2: 2 GB
External storage media: SD memory card (SD/SDHC), up to 1-32 GB (1 GB incl.)
Format: FAT32 or FAT16
Data types: Event, display, alarm summary, manual sample, settings, and report
(see also /MT)
Data format: Binary or text
Alarms: No. Max. 4 alarms per measurement channel
Types: High limit, low limit, difference high limit, difference low limit, rate of change increase, rate of change decrease, delay high, delay low
Event actions: Specific actions can be performed when certain events occur. Number: 50
Events: alarms, remote control input, etc.; Actions: record start/stop, alarm ACK, etc.
Timers: 12
Match time timers: 12
Batch function: Manage data by batch name. Enter text fields and batch comments in data files.
Calibration correction mode: Off, linear approximation, linearizer bias
Security functions: Key lock and login functions.
Insulation resistance: Between RS-422/485/Ethernet terminals and internal circuitry: 20 MΩ or greater (at 500 VDC)

Ethernet
Electromechanical specifications:
Protocol: TCP, UDP, IP, JEMP, ARC, DHCP, HTTP, FTP, SMTP, SNMP, Modbus, dedicated protocol, SSL, DARWIN-compatible communication

USB communication
Standards conformity:
Connector format
 porta:
mini B/1
Implemented protocol: Dedicated protocol
RS-422/485 (optional code /C3)
Media: EIA RS-422/485 compliant
Implemented protocol: Dedicated protocol, Modbus/PTU, or DARWIN compatible communication

Bluetooth (optional code /C6)
Standards conformity:
Supported profiles:
Communication range:
Approx. 10 m (depending on operating environment) (Class2)
Implemented protocol: Dedicated protocol

Ethernet/IP communications
Supportable profiles: Ethernet/IP compliant
Compliance profile: EtherCAT
Messaging:
Explicit (UCMM Class 3) +I/O (Class 1)
Implementation: Assembly, PCCC, Data Table

WT communication (optional code /E2)
Models supported:
WT1600, WT7500, WT7300
Supported communication: Ethernet
Max. connected units: 16
Communication channel: 500 ms/1 s/2 s/5 s/10 s/20 s/30 s
Acquirable data types: Voltage, current, power, power factor, phase, watt hours, harmonics, and others.
Max. data assignments: 300

OPC-UA Server (optional code /E3)
Communication:
Type: OPC-UA Server
Encoding:
Protocol: OPC-UA TCP
Maximum number of connections:
3 sessions
Profile:
Micro Embedded Device Server
DB acquisition:
Measurement channel, computation channel, communication channel value and alarm status
Data writing:
Measurement channel (IO channel only), communication channel
Port number:
4840 (changeable: 1 to 65535)
Number of items:
300 max. (Monitored/Sessions)
Fastest period:
50 ms

SLMP Communication (Mitsubishi PLC) (optional code /E4)
Number of connection destination servers:
16 max.

Communicable internal data:
Special relay (SM), special register (SR), input (I/O), output (Y), internal relay (M), latch relay (L), annunciator (F), edge relay (F), link relay (BF), data register (D), link register (W), timer contact (TS), timer coil (TC), current timer value (TN), integration timer contact (IS), integration timer coil (IC), current integration timer value (SN), counter contact (CS), counter coil (CC), current counter value (CD), special link relay (SB), special link register (SR), direct access input (DI), direct access output (DY), index register (Z), file register (R, WR), extended data register (ED), extended link register (WL)
Device code is indicated in parentheses.

MATH (with Report function, optional code /MT)

No. of MATH channels:
GM10-1: 100, GM10-2: 200
MATH types:
Basic math, statistics, special operators, conditional statements, and others.
Communication channels (optional code /MC)
No. of communication channels:
GM10-1: 1-300 (C001-C300)
GM10-2: 500 (C001-C500)

Log scale (optional code /LS)
Input types:
LOG input, pseudo log input (that supports pseudo log), LOG linear (linear input within the log decade)
Scalable range:
LOG input: 1.00E-15 to 1.00E+15 (max. 15 decades), (scale low limit) (scale high limit)
Pseudo log input/LOG linear: 1.00E-15 to 1.00E+15 (max. 15 decades), the mantissa of the scale low and high limits are assumed to be the same.

Multi-batch function (optional code /BT)
Number of multi batches:
GM10-1: 6 max., GM10-2: 12 max.

Aerospace Heat treatment (optional code /AH)

No. of manageable schedules:
GM10-1: 1-6 max., GM10-2: 12 max.
Calibration correction mode:
Off, linearization, linearizer bias, correction coefficient
Number of set points:
2 to 12

GM90PS Power Supply Module
Rated supply voltage:
100-240 VAC, 12-28 VDC (GM90PS-IN2W0)
Operating supply voltage:
90-132 VAC, 180-264 VAC, 10-32 VDC (GM90PS-IN2W2)
Power frequency
50 Hz±2%, 60 Hz±2%
(AC power supply)
Insulation resistance:
Between power terminal and earth: 20 MΩ or more (at 500 VDC)
Withstand voltage:
Between power terminal and earth: 3000 VAC (50/60 Hz), 1 minute 1000 VAC (50/60 Hz) for 1 minute (GM90PS-IN2W0)

GX90XA Analog Input Module
Universal input (-U2), low withstand voltage relay (-L1), electromagnetic relay (-T1)

Inputs:
10
Input types:
Universal: DC voltage, standard signal, thermocouple, RTD, DI voltage contact, DC current (with external shunt resistor connected)
Low withstand voltage relay, electromagnetic relay, DC voltage, standard signal, thermocouple, DI voltage contact, DC current (with external shunt resistor connected)

Input range:
Approx. 10 MΩ for thermocouple/DC voltage (1 V range or lower)
Approx. 1 MΩ for DC voltage (2 V range or higher)/standard signal

Input external resistance:
2 kΩ or lower for thermocouples/DC voltage
Effect of signal source resistance:
0.10 ±1/0 V and/or lower for thermocouple/DC voltage (1 V range or lower)
0.10 ±1/0 V and/or lower for DC voltage (2 V range or higher)/standard signal

Allowable wiring resistance:
Max. 10.01 V or less (lead resistance between 3 wires is equal) for RTD input
Effect of wiring resistance:
0.10 ±1/0 V (lead resistance between 3 wires is equal) for RTD input

Reference junction compensation accuracy:
Measurement of 0°C or higher, input terminal temperature, balanced
Type K, J, E, T, N, XQ GSTOST: ±0.5°C (23°C±2°C), ±0.7°C (50°C)
±1.0°C (20°C to 60°C)

Common mode noise voltage:
30 VACs (50/60Hz), or 60 VDC (however, max. common mode noise voltage of measurement input is 250 VAms)

Common max. voltage range:
Universal: electromagnetic relay, 30 VACs (50/60Hz), or 60 VDC (however, max. common mode noise is measured between input measurement channels is 250 VAms)

Effects of ambient temperature:
Changes in the temperature of the cooling air, input signal, the environment, etc.

Effects of ambient temperature:
Applies when internal temperature is 16.7°C or higher, ±0.05% of rdg + 0.5% of range or less fluctuation per 1°C change
Note: Xvmax7F(kF) PR0-40, ±0.05% of rdg + 0.1% of range or less Cu±100 system: ±0.2% of range + 0.1°C or less
Excluding guaranteed function accuracy

Standards supported
UL61010-1
UL61010-2-01
SIL2
SIL3
IEC61010-2-03
IEC61010-2-04
IEC61010-1-11
Insulation resistance:
- Between input terminals and internal circuitry: 20 MΩ or greater (at 500 VDC)
- Between output terminals and internal circuitry: 20 MΩ or greater (at 500 VDC)

Indicators:
- Low voltage (at 500 VDC)
- Low current (at 500 VDC)

Withstand voltage:
- Between input terminals and internal circuitry: 2000 VAC, 1 minute
- Between output terminals and internal circuitry: 2000 VAC, 1 minute
- Between analog input channels: 2000 VAC, 1 minute
- Between input and output terminals: 2000 VAC, 1 minute
- Between input terminals and internal circuitry: 3000 VAC, 1 minute
- Between output terminals and internal circuitry: 3000 VAC, 1 minute
- Between analog input channels: 3000 VAC, 1 minute

No. of common:
- 2 (1 common per 8 channels)

Input calculation:
- Linear scaling, differential calculations

Noise rejection ratio:
- Common mode: 80 dB or more when using the chattering filter
- Differential: 90 dB or more when using the chattering filter

Input range:
- Refer to the measurement range and accuracy tables.

Input resistance:
- 250 Ω

Input types:
- DC current (mA) input
- Input voltage
- Input power

Input calculation:
- Linear scaling, square root, differential calculations

Input format:
- Relay contact (c contact)
- Open collector: Voltage of 0.5 VDC or less when ON, leakage current of 0.5 mA or less when OFF
- Non-voltage contact: Contact resistance of 200 Ω or less when ON, 50 kΩ or more when OFF

Input current:
- 2 A (DC)/2 A (AC), resistive load, each

Input rating:
- 150 VAC or less when connected to the main circuit (first-order power supply)
- 250 VAC or less when connected to a circuit derived from the main circuit (second-order power supply), or 30 VDC or less

Max. load current:
- 2 A DC/0 V A (AC), resistive load, each

Min. load voltage/current:
- 5 VDC/10 mA

No. of common:
- 6 (all outputs independent)

Insulation resistance:
- Between output terminals and internal circuitry: 20 MΩ or greater (at 500 VDC)

Withstand voltage:
- Between output terminals and internal circuitry: 2700 VAC, 1 minute

Rated load voltage:
- 150 VAC or less when connected to the main circuit (first-order power supply)
- 250 VAC or less when connected to a circuit derived from the main circuit (second-order power supply), or 30 VDC or less

Max. load current:
- 2 A DC/0 V A (AC), resistive load, each

Min. load voltage/current:
- 5 VDC/10 mA

No. of common:
- 6 (all outputs independent)

Insulation resistance:
- Between output terminals and internal circuitry: 20 MΩ or greater (at 500 VDC)

Withstand voltage:
- Between output terminals and internal circuitry: 2700 VAC, 1 minute

SmartDac+ GM common specifications

- Standards supported
  - CSA: CSAS22.2 No.101-10, installation category II, pollution degree 2
  - UL: UL61010-1, UL61010-2-030 (CSA NRTL/C)
  - CE: EMC directive
  - Connection between modules: Communication range: 100 m

Wireless communication standards of Australia and New Zealand (RGM):
- Wireless (Bluetooth):
  - Supports radio wave regulations of Japan, America, Canada, Europe (EU), Australia, New Zealand, China, and Korea.

- Ambient temperature:
  - -20 to 60°C

- Humidity:
  - 20 to 85% RH (no condensation)

- Magnetic field:
  - <400 A/m or less (DC and 50/60 Hz)
<table>
<thead>
<tr>
<th>Input</th>
<th>Type</th>
<th>Range</th>
<th>Measurement accuracy</th>
<th>A/D integration time: 16.7ms or more</th>
<th>A/D integration time: 1.67ms*3</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC current</td>
<td>0-20mA</td>
<td>0.000 to 2.000mA</td>
<td>±0.3 μA</td>
<td>±0.3 μA of rdg ±0 μV</td>
<td></td>
</tr>
<tr>
<td>DC Current</td>
<td>(standard signal)</td>
<td>4-20mA</td>
<td>±0.3 % of rdg +5 μA</td>
<td>±0.3 % of rdg +90 μA</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>0.0 to 1760.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.2 % of rdg ±6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>0.0 to 1760.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.2 % of rdg ±6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0.0 to 1820.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.2 % of rdg ±6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>-270.0 to 1370.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.2 % of rdg ±6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>-270.0 to 1100.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.2 % of rdg ±6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>-200.0 to 900.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.2 % of rdg ±6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>-270.0 to 1300.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.2 % of rdg ±6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>0.0 to 2315.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>0.0 to 1300.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>0.0 to 1300.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>0.0 to 1300.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu10 GE</td>
<td>-20.0 to 130.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu10 BAILEY</td>
<td>-20.0 to 130.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu10 [α°C]</td>
<td>-20.0 to 130.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu10 [α°C]</td>
<td>-20.0 to 130.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu50 [α°C]</td>
<td>-200.0 to 150.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu100 [α°C]</td>
<td>-200.0 to 150.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ni100</td>
<td>-20.0 to 150.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ni120</td>
<td>-20.0 to 150.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pi25</td>
<td>-200.0 to 150.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PI50</td>
<td>-200.0 to 150.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu200 WEDD</td>
<td>-200.0 to 150.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu200 GOST</td>
<td>-200.0 to 150.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu500 GOST</td>
<td>-200.0 to 150.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu1000 GOST</td>
<td>-200.0 to 150.0°C</td>
<td>±0.15 μg/°C</td>
<td>±0.3 % of rdg ±1.5°C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Reference operating conditions: 23±2°C, 55±10% RH, supply voltage 90-132, 180-240 VAC, supply frequency within 50/60 Hz ±1%, warmup 30 minutes or more, no vibrations or other hindrances to performance.
2 10 channel mode with scan interval set to 500 ms or higher, or 2 channel mode
3 10 channel mode with scan interval set to 100 ms or 200 ms
**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>Standard (Max. measurement channels: 100 ch)</td>
</tr>
<tr>
<td></td>
<td>-2</td>
<td></td>
<td>Large memory (Max. measurement channels: 500 ch)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>E</td>
<td>Temp. unit: C, Deg F</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>Always 0</td>
</tr>
</tbody>
</table>

**Optional features**

- /AH: Aerospace heat treatment
- /AS: Advanced security function
- /BT: MURI-Bath function
- /C3: RS-422/485
- /C8: Bluetooth
- /E1: EtherCAT/IP communication (PLC communication protocol)
- /E2: Win communication /E3: OPC-UA server
- /E4: SLMP communication (Mitsubishi PLC)
- /MT: Mathematical function (map function) /MC: Communication channel function
- /LC: Log scale

*1: The Communication Channel function (optional code /MC) is required to specify WT communication (optional code /E3).
*2: Optional code /MT (MATH) is required if using the GX90XD’s or GX90YD’s pulse input.
*3: Optional code /MT (MATH) is required if using the GX90X’s pulse integration.

**GM90PS MODEL AND SUFFIX CODES**

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM90PS</td>
<td>-1</td>
<td>Power Supply Module for SMARTDAC+ GM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Always 1</td>
<td>Always 1</td>
</tr>
</tbody>
</table>

**Supply voltage**

<table>
<thead>
<tr>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Power inlet with UL/CSA cable</td>
</tr>
<tr>
<td>H</td>
<td>Power inlet with GB cable</td>
</tr>
<tr>
<td>N</td>
<td>Power inlet with NBR cable</td>
</tr>
<tr>
<td>O</td>
<td>Power inlet with BS cable</td>
</tr>
<tr>
<td>P</td>
<td>Power inlet with AS cable</td>
</tr>
<tr>
<td>W</td>
<td>Screw terminal (without power cable)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Always 0</td>
</tr>
</tbody>
</table>

*Only W (Screw terminal (M4)) is available for the power supply connection.*

**GM90MB MODEL AND SUFFIX CODES**

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM90MB</td>
<td>-1</td>
<td>Module Base for SMARTDAC+ GM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Always 1</td>
<td>Always 1</td>
</tr>
</tbody>
</table>

**Power supply connection**

<table>
<thead>
<tr>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Power inlet with UL/CSA cable</td>
</tr>
<tr>
<td>H</td>
<td>Power inlet with GB cable</td>
</tr>
<tr>
<td>N</td>
<td>Power inlet with NBR cable</td>
</tr>
<tr>
<td>O</td>
<td>Power inlet with BS cable</td>
</tr>
<tr>
<td>P</td>
<td>Power inlet with AS cable</td>
</tr>
<tr>
<td>W</td>
<td>Screw terminal (without power cable)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Always 0</td>
</tr>
</tbody>
</table>

**GM90XA MODEL AND SUFFIX CODES**

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM90XA</td>
<td>-10</td>
<td>10 channels</td>
</tr>
</tbody>
</table>

**Number of channels**

<table>
<thead>
<tr>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-C1</td>
<td>Current, scanner type (isolated between channels)</td>
</tr>
<tr>
<td>-L1</td>
<td>DCV/TC/DI, low withstand voltage scanner type (isolated between channels)</td>
</tr>
<tr>
<td>-L2</td>
<td>Universal, solid state relay scanner type (5-view RTD 5-terminal common)</td>
</tr>
<tr>
<td>-T1</td>
<td>DCV/TC/DI, Electromagnetic relay scanner type (isolated between channels)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Always N</td>
</tr>
</tbody>
</table>

**Terminal form**

- 3: Clamp terminal
- C: Clamp terminal

<table>
<thead>
<tr>
<th>Unit: mm (inch)</th>
<th>138 [5.43]</th>
<th>146 [5.75]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>113 [4.45]</td>
<td>118 [4.65]</td>
</tr>
</tbody>
</table>

**Calibration certificate (sold separately)**

- A calibration certificate for specific analog input modules.
- A QIC for specific data acquisition modules, power supply modules, module bases, or I/O modules.

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

- A QIC for specific data acquisition modules, power supply modules, module bases, or I/O modules.

**GX90XD MODEL AND SUFFIX CODES**

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

**Number of channels**

<table>
<thead>
<tr>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-11</td>
<td>Open collector/non-voltage, contact (shared common), Rated 5 VDC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Always N</td>
</tr>
</tbody>
</table>

**Terminal form**

- 3: Screw terminal (M3)

**GX90YD MODEL AND SUFFIX CODES**

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

**Number of channels**

<table>
<thead>
<tr>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-11</td>
<td>Relay, SPD/NO-C-NC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Always N</td>
</tr>
</tbody>
</table>

**GX90WD MODEL AND SUFFIX CODES**

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90WD</td>
<td>-08</td>
<td>Pulse Input Module</td>
</tr>
</tbody>
</table>

**Number of channels**

<table>
<thead>
<tr>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-11</td>
<td>DC voltage/open collector/non-voltage contact (shared common), Rated 5 VDC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Always N</td>
</tr>
</tbody>
</table>

**Terminal form**

- 3: Screw terminal (M3)

**GX90XEX MODEL AND SUFFIX CODES**

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX90XEX</td>
<td>02</td>
<td>I/O Expansion Module</td>
</tr>
</tbody>
</table>

**Port**

<table>
<thead>
<tr>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-TP1</td>
<td>Twisted pair cable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Always N</td>
</tr>
</tbody>
</table>

**Standard Accessories**

<table>
<thead>
<tr>
<th>Model</th>
<th>Product</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM10</td>
<td>SD memory card (1GB)</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>Interconnect screw (M3)</td>
<td>4</td>
</tr>
</tbody>
</table>

**Optional Accessories (Sold Separately)**

<table>
<thead>
<tr>
<th>Product</th>
<th>Part Number/Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD memory card (1GB)</td>
<td>773001</td>
</tr>
<tr>
<td>Shunt resistor for screw terminal [M3] (10 Ω ± 0.1%)</td>
<td>X010-D010-3</td>
</tr>
<tr>
<td>Shunt resistor for screw terminal [M3] (100 Ω ± 0.1%)</td>
<td>X010-D010-3</td>
</tr>
<tr>
<td>Shunt resistor for clamp terminal (100 Ω ± 0.1%)</td>
<td>X010-250-3</td>
</tr>
<tr>
<td>Shunt resistor for clamp terminal (250 Ω ± 0.1%)</td>
<td>438922</td>
</tr>
<tr>
<td>Shunt resistor for clamp terminal (100 Ω ± 0.1%)</td>
<td>438921</td>
</tr>
<tr>
<td>Dummy cover</td>
<td>8674023</td>
</tr>
<tr>
<td>Validation Documents (For /AS option)</td>
<td>773230</td>
</tr>
</tbody>
</table>

**Application Software (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>

**URL**


Product user’s manuals can be downloaded or viewed at the following URL.
Configuration example
(with a supply voltage of 100-240 VAC, power inlet, universal input, and clamp terminal)

**Single-unit configuration example**

**30 ch (analog input)**

- GM10-1E0 x 1
- GM90PS-1N1D0 x 1
- GX90XA-10-U2N-CN x 3
- GM90MB-01N0 x 4

**60ch (analog input)**

- GM10-1E0 x 1
- GM90PS-1N1D0 x 1
- GX90XA-10-U2N-CN x 6
- GM90MB-01N0 x 7

**100ch (analog input)**

- GM10-1E0 x 1
- GM90PS-1N1D0 x 1
- GX90XA-10-U2N-CN x 10
- GM90MB-01N0 x 11

**Multi-unit configuration example**

**120ch (analog input)**

- GM10-2E0 x 1
- GM90PS-1N1D0 x 2
- GX90XA-10-U2N-CN x 12
- GX90EX-02-TP1N-N x 2
- GM90MB-01N0 x 15

**300ch (analog input)**

- GM10-2E0 x 1
- GM90PS-1N1D0 x 5
- GX90XA-10-U2N-CN x 30
- GX90EX-02-TP1N-N x 5
- GM90MB-01N0 x 36

**420ch (analog input)**

- GM10-2E0 x 1
- GM90PS-1N1D0 x 7
- GX90XA-10-U2N-CN x 42
- GX90EX-02-TP1N-N x 7
- GM90MB-01N0 x 50

100ch (analog input)

- GM10-1E0 x 1
- GM90PS-1N1D0 x 1
- GX90XA-10-U2N-CN x 10
- GM90MB-01N0 x 11

- GM10-2E0 x 1
- GM90PS-1N1D0 x 5
- GX90XA-10-U2N-CN x 30
- GX90EX-02-TP1N-N x 5
- GM90MB-01N0 x 36

- GM10-2E0 x 1
- GM90PS-1N1D0 x 7
- GX90XA-10-U2N-CN x 42
- GX90EX-02-TP1N-N x 7
- GM90MB-01N0 x 50
GA10 is a PC based software package that acquires real time data from SMARTDAC+ data acquisition systems and other devices connected to a network. Connected PCs can monitor real time and historical data, which can be stored on a PC harddrive or centrally on a network drive.

Max. connectable units: **100**
Max. recording tags (channels): **2000**
Scan interval: **100 ms or higher**

**Application example**

Saves testing/manufacturing equipment data on a PC. In addition to simultaneous acquisition, the multilogging function lets you acquire multiple data at different timing.

**Aggregated data for monitoring!**

Easy to read screen layouts provide operator friendly real time monitoring.
- Group channels any way you like
- Play back data up to recording start, even during measurement
- Instantly recognize alarms (in red)

**Save the data all together!**

Data is stored in a binary tamper proof format preventing unauthorized access. Data can also be exported to excel format for data manipulation and analysis.

**Multilogging**

<table>
<thead>
<tr>
<th>Equipment A</th>
<th>Equipment B</th>
<th>Equipment C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recording</strong></td>
<td><strong>Stopped</strong></td>
<td><strong>Recording</strong></td>
</tr>
<tr>
<td>Test start</td>
<td>Test start</td>
<td>Test start</td>
</tr>
<tr>
<td>Test stop</td>
<td>Test stop</td>
<td>Test stop</td>
</tr>
</tbody>
</table>

**Current time**

no.1
no.2
no.3

**Effect:** Manage all data on the PC, one set of equipment at a time!

**Sight up for our free e-mail newsletter**

[www.yokogawa.com/ns/](http://www.yokogawa.com/ns/)

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Before operating the product, read the instruction manual thoroughly for proper and safe operation.

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