



Data analysis made simple and mobile

Smart Functionality



Predictive monitoring with AI

Equipment/Quality Easy Predictive Detection

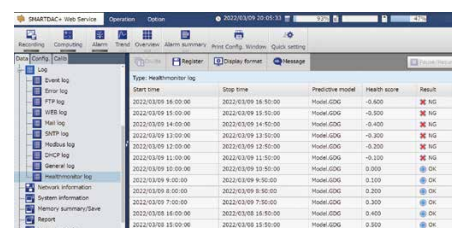
* Creating predictive diagnostic models and profile waveforms requires the Equipment/Quality Predictive Detection tool (sold separately).

Health Monitor Function

By easily creating predictive detection models from past recorded OK/NG data and loading it into GM, you can detect prediction of abnormalities in manufacturing equipment and product quality degradation at an early stage. And because health scores—which show the degree of normal and abnormal data—consider correlations among multiple data to make determinations, they can capture prediction of abnormalities that are difficult for humans to detect.

- Maximum number of channels: 20
- Shortest recording interval: 100 ms
- Target channels: I/O channel, math channel, and communication channel

"NG" means Not Good.

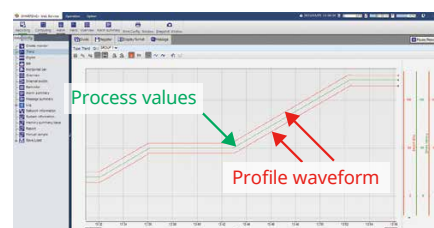


Profile Function

By creating a profile waveform from past recorded data and loading it into GM, this waveform can be used as a threshold for process values. Profile waveforms are useful in applications where process values change over time. Also, you can see the deviation from the reference waveform on the screen.

- Maximum number of channels: 20
- Shortest recording interval: 500 ms

* /MC option required



* Certain restrictions apply with Equipment/Quality Easy Predictive Detection. See the general specifications for details.

High speed measurement (down to 1 ms)

Yokogawa's proprietary A/D converter allows the high speed module to measure data points as fast as 1ms.

- High speed (1 ms) measurement*
- Proprietary A/D converter

* With 1ch per module.
At 2 ms, 2 ch per module, and at 5 ms or more, all 4 ch per module.

Max. channels

Model	Scan interval		
	1ms	5ms	10ms
GM10-1	1ch	5ch	10ch
GM10-2	5ch	25ch	32ch



GX90XA-04-H0
Analog input module (high speed AI)



Proprietary A/D

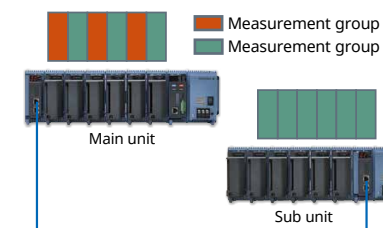
Dual interval measurement with two different scan intervals

Users have the ability to choose two different scan intervals on a single GM system. This allows users the flexibility to measure various types of inputs with two different scan intervals in a single system.

For example, this provides for efficient, simultaneous measurement of signals with slow fluctuations such as temperature, and fast-changing signals such as pressure and vibration. Modules can be assigned to measurement groups.

2 measurement groups

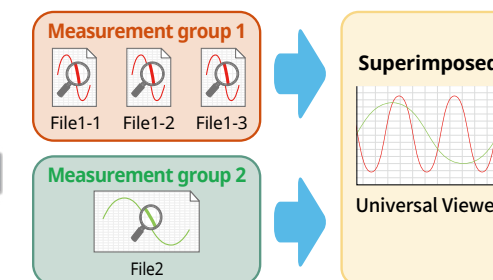
The figure above shows 2 measurement groups by color.



For the sub units, it is as fast as 100 ms.

Superimpose data on Universal Viewer

With Universal Viewer, you can superimpose measured data from 2 measurement groups.



Application examples

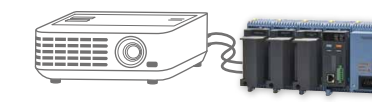
Acquire temperature and vibration data from power plant turbines

- Monitoring and recording of alarms when abnormal temperature or vibration are detected
- At 5 ms sampling, reliably detect abnormalities
- Dual interval multipoint measurement



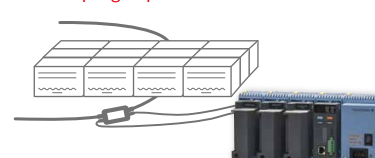
Measures LCD projector overheating

- Evaluates the rise in temperature of parts near the projector lamp, and the drop in temperature after powering OFF
- At 10 to 1 ms sampling, record steep temperature changes in detail



Car battery charge/discharge test

- Measures transient current during charging and discharging
- Sampling requirement: 1 ms



PID control function

Control function

Enables PID and program control

- PID control module
2-loops per module, up to 20 loops per system
- Setpoint program control function (/PG option)
Up to 99 patterns



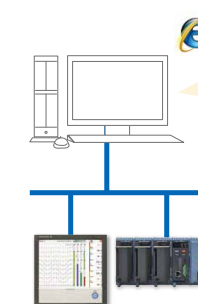
Proprietary A/D



GX90UT
PID control module

Remote operation and monitoring

The web application enables remote operation and monitoring from a browser.



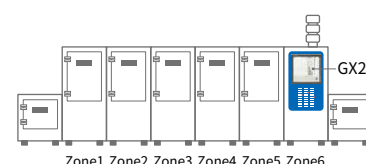
With the Web Server function, simply access the GM from a web browser on a PC for easy operation and monitoring of control loops.



Application examples

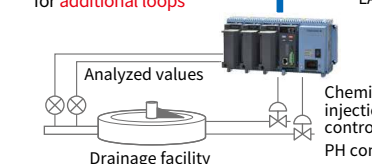
Industrial furnace

- Ideal for centralized control of multiple loops
- Modular structure makes for easy maintenance of individual loops



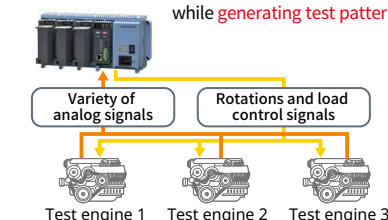
Utility equipment

- Simplifies loop control and remote monitoring of utility equipment
- Readily scalable for additional loops



Engine endurance test bench

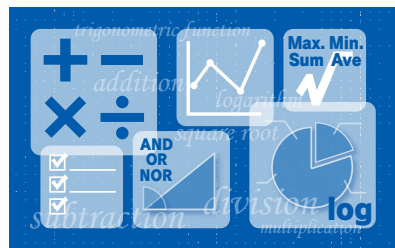
- Measures evaluation data while generating test patterns



MATH (including reports), and event actions

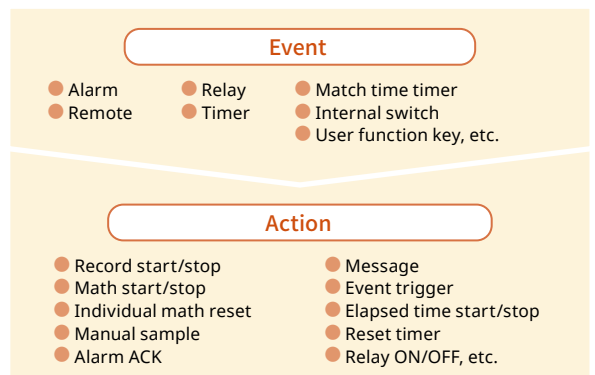
MATH function (/MT option)

Supports various kinds of math computation, including basic math and functions (square root, logarithms, F value, elapsed time, etc.). Elapsed time calculation allows you to measure the amount of time elapsed after a condition is met. Write formulas using variables for measured or computed data and save or display the results—this saves time and effort on post-processing. Create hourly, daily, monthly, and other reports with the Report function.



Event actions

Ability to assign actions tied to specific events during the operation of the data acquisition station.

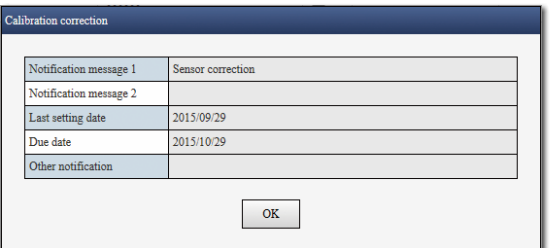


Supports the aerospace industry's AMS2750/NADCAP and the automotive industry's IATF16949/CQI-9 for heat treatment applications

Calibration correction schedule control function (/AH option)

Schedule management for periodically executing calibration correction configuration and the like. You can set the input correction factor as a sensor correction factor and instrument correction factor. For AMS2750, we offer TUS software* that can easily create TUS (Temperature Uniformity Survey) reports.

* For information on TUS software, contact your Yokogawa representative.

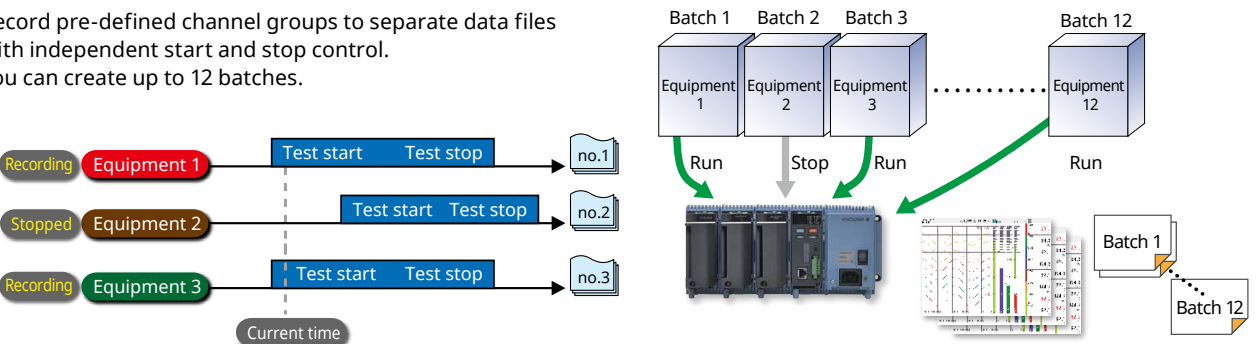


Input calibration is performed in the AI channel setting screen, and the calibration period settings are entered in the schedule management setting screen.

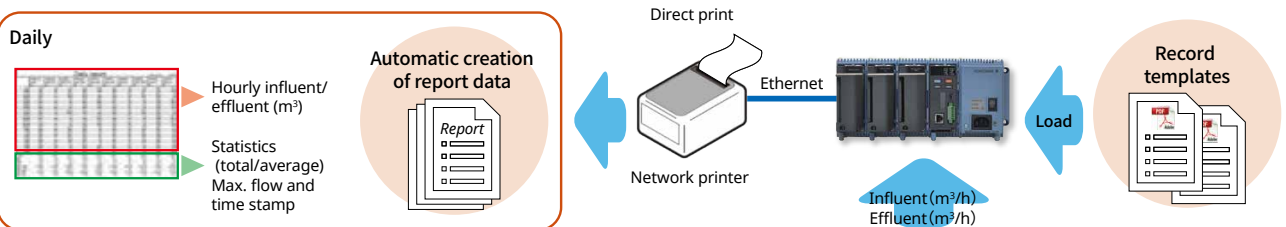
Record data in separate files per equipment set

Multi-batch Function (/BT option)

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



Report creation and network functions (/MT option)



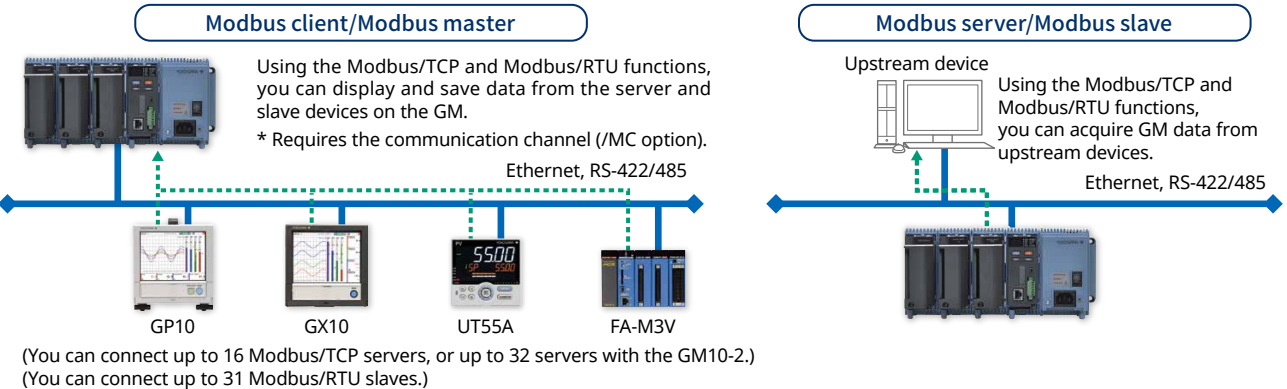
Provides a variety of convenient networking functions

Networking

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.

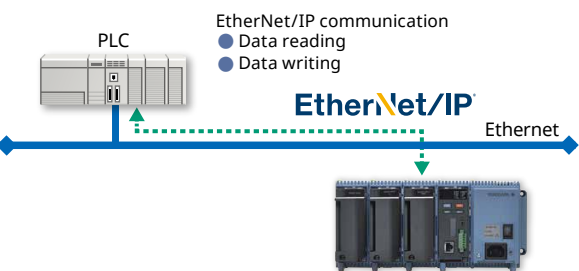
Modbus/TCP (Ethernet connection), Modbus/RTU (RS-422/485 connection)



EtherNet/IP function (/E1 option)

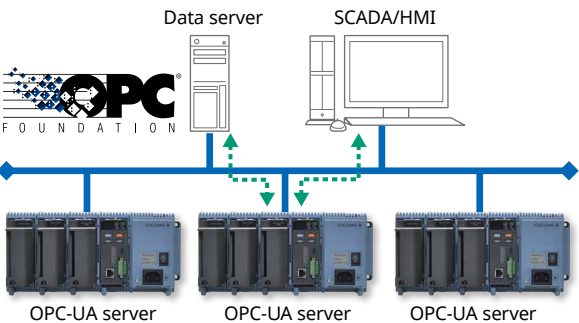
GM supports EtherNet/IP server functions. You can access GM from PLCs or other devices and load measurement/MATH channels or write to communication input channels* (GM10-1: up to 300 ch, GM10-2: up to 500 ch).

* Communication channel function (/MC option) is required.



OPC-UA Server (/E3 option)

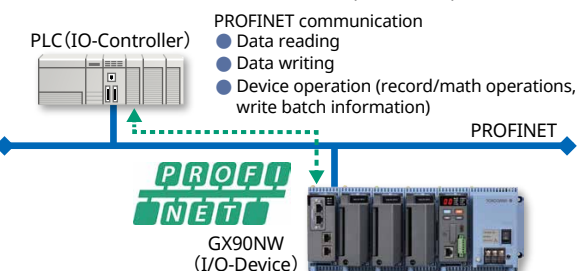
Data acquired by the GM can be accessed through Ethernet communication from a host system (OPCUA client). Writing from upstream systems to GM communication channels requires the communication channel function (/MC option).



PROFINET communication (GX90NW Network Module)

By using the GX90NW network module, you can connect the GM as a secondary I/O device via PROFINET. You can access the GM from the PLC or other I/O controller, read measurement/math channels, and write to communication channels*. You can easily perform necessary operations for batch processes from the PLC.

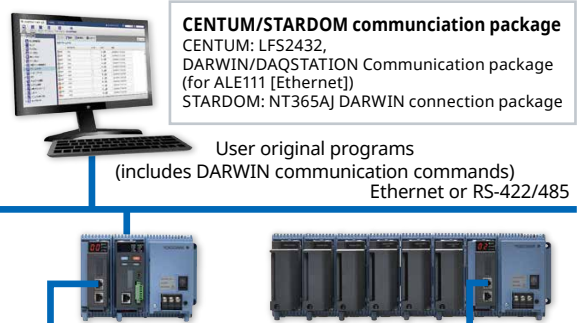
* Communication channel function (/MC option) is required.



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.

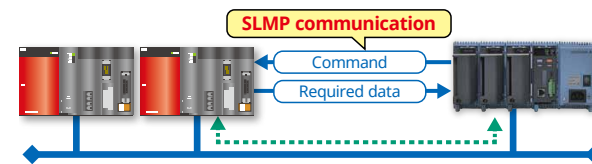
* See your dealer or nearest Yokogawa representative for details.



CC-Link family SLMP communication (/E4 option)

Protocol function that enables connection from a GM to Mitsubishi Electric PLCs without sequencer programs. The GM can run as the SLMP client to write to a GM measured data PLC, or PLC data to communication channels*.

* Requires the communication channel option (/MC option).



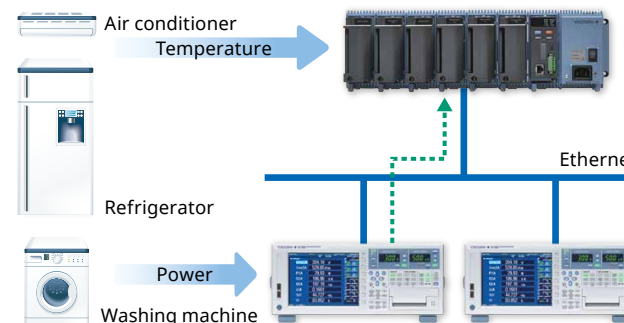
Data acquisition on power measuring instruments (/E2 and /MC options)

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

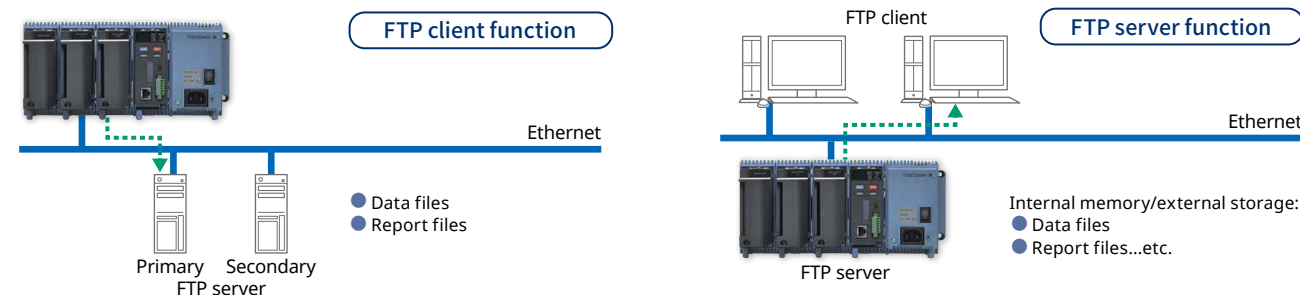
Yokogawa Meters & Instruments Corp.
WT1800/WT1800E (command type WT1800), WT500
WT300/WT300E (command mode WT300)

Max. no. of connections 16



FTP-based file transfer

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

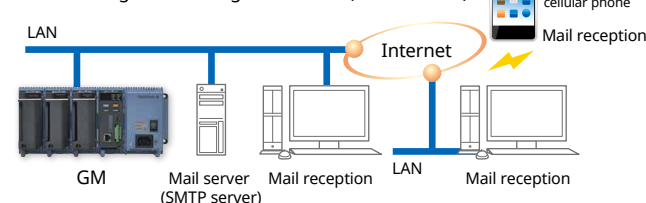


E-mail messaging function

The GM can send a variety of informative e-mail messages that include alarm notification reports, periodic instantaneous data values, scheduled report data and other information.

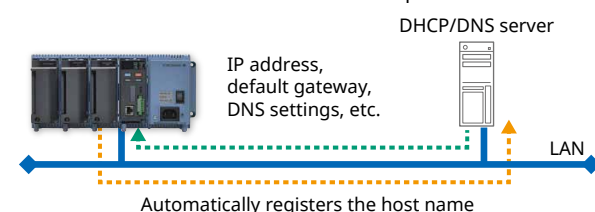
Sending e-mail using an existing mail system

In this type of setup, e-mail messages are sent through an existing mail server (SMTP server).



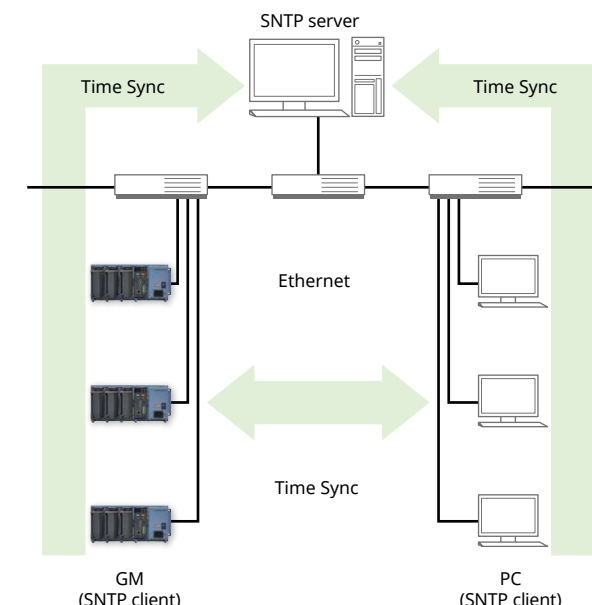
Automatic network setup (DHCP) function

Using Dynamic Host Configuration Protocol (DHCP), the GM can automatically acquire the settings it needs (IP address) for network communications from a DHCP server. This makes it easier than ever to install the unit on a plant network.



Time synchronization with network time servers

GM uses SNTP protocol in client mode to acquire time information from a network time-server. This function allows any number of GM units within a facility to have precisely synchronized time; all units will record data with coordinated date and time stamp information. In addition, GM can function as a server, providing time data to other SNTP client units on the network.



Rock-solid hardware and highly secure

Reliability and durability

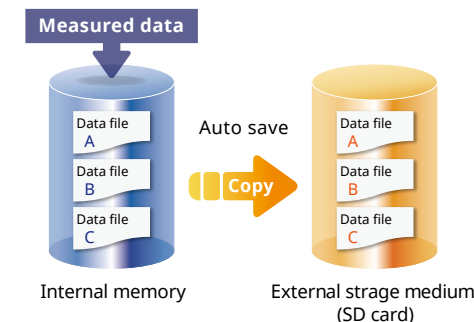
Be confident that recorded data is saved

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

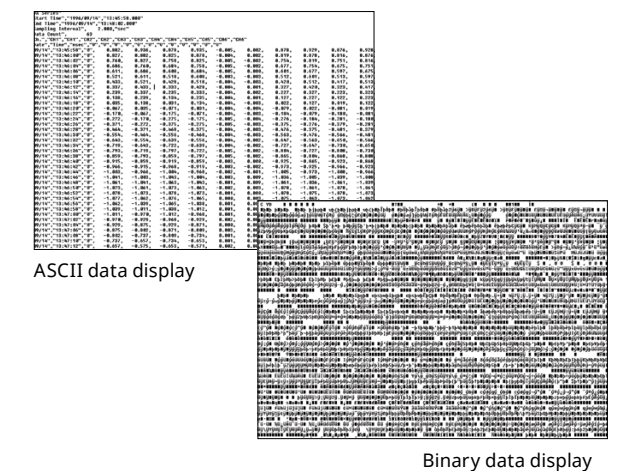
Number of recording channels	Total sample time
30	Approx. 71 days
100	Approx. 23 days
300	Approx. 7 days

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



Select file formats according to your application

For increased security, measured data can be saved in binary format. This format is very difficult to decipher or modify in traditional text editors or other programs. To enable easy and direct opening of the data in text editors or spreadsheet programs, choose text format. This allows you to work with your measurement data without dedicated software.



Security enhancements

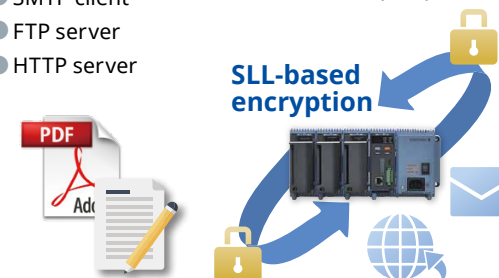
Safely sends and receives customer data.

SSL support function

- FTP client
- SMTP client
- FTP server
- HTTP server

Digital signatures

- Add electronic signatures to records (PDF)



SSL: An encryption protocol for data sent over TCP/IP networks.

Key lock

You can use settings to lock the GM10 operation keys in order to avoid accidental start/stop of measurement or computation.



21 CFR Part 11 support (/AS option)

With the advanced security function, it supports US FDA 21 CFR Part 11 (regulations on electronic recording and electronic signatures) and the Japanese Ministry of Health, Labor, and Welfare's ER/ES guidelines. It also supports data integrity in accordance with ALCOA mentioned in PIC/S, WHO, MHRA and FDA guidance documents. It gives you access to a credentialbased login function, electronic signatures, audit trails, an anti-tampering function, an Active Directorybased password management function, a sign-in function, and other security features.



FDA 21 CFR PART 11

Analog front end module

A proprietary A/D converter delivers high speed, high precision data acquisition. (High-speed AI, PID Control module)



Specifications

For detailed specs, see the general specifications (data acquisition module/power supply module/module base: GS 04L55B01-01EN, expansion unit/expansion modules: GS 04L53B00-01EN, I/O modules: GS 04L53B01-01EN, PID control module: GS 04L53B01-31EN).

GM10 Data Acquisition Module	
No. of I/O channels:	GM10-1: 100 max. GM10-2: 500 max. (or 420 with AI only)
Measurement mode:	Normal, High speed*, Dual interval * Compatible modules: High-speed AI (GX90XA-04-H0)
Scan interval:	1/2/5/10/20/50/100/200/500ms/1/2/5s * Some intervals not available depending on system configuration and modules.
Internal memory (flash memory):	GM10-1: 500 MB GM10-2: 1.2 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 (/MT option)
Data format:	Binary or text
Alarms:	Number: 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:	Specified actions can be performed when certain events occur. Number: 50 Events: alarms, remote control input, etc.; Actions: record stop/start, 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, linearizer 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	
Electrical/mechanical specifications:	IEEE 802.3 compliant (Ethernet frame type: DIX specification)
Implemented protocols:	TCP, UDP, IP, ICMP, ARP, DHCP, HTTP, FTP, SMTP, SNMP, Modbus, dedicated protocol, SSL, DARWIN-compatible communication
● USB communication	
Standards conformity:	USB 2.0 compliant (recognized as a serial port by the PC)
Connector format/no. of ports:	mini B/1
Implemented protocol:	Dedicated protocol
● RS-422/485 (/C3 option)	
Media:	EIA RS-422/485 compliant
Implemented protocol:	Dedicated protocol, Modbus/RTU, or DARWIN compatible communication
● Bluetooth (/C8 option)	
Standards conformity:	Bluetooth® Ver. 2.1+EDR compliant
Supported profiles:	SPP (serial port profile)
Communication range:	Approx. 10 m (depending on operating environment) (Class2)
Implemented protocol:	Dedicated protocol
● EtherNet/IP communications (/E1 option)	
Can join Ethernet/IP networks as an adapter (server).	
Max. connections:	20 (or 10 max. at TCP/IP level)
Supported protocols:	EIP/PCCS, EIP/native
Messaging:	Explicit (UCMM Class 3) +I/O (Class 1)
Objects:	Assembly, PCCS, Data Table
● WT communication (/E2 option)	
Models supported:	WT1800/WT1800E (command type WT1800), WT500, WT300/WT300E (command mode WT300)
Supported communication:	Ethernet
Max. connected units:	16
Communication interval:	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 (/E3 option)	
Communication:	
Type:	OPC-UA Server
Encoding:	UA Binary
Protocol:	OPC UA TCP
Maximum number of connections:	3 sessions
Profile:	Micro Embedded Device Server
Data acquisition:	Measurement channel, computation channel, communication channel value and alarm status
Data writing:	Measurement channel (DO channel only), communication channel
Port number:	4840 (changeable: 1 to 65535)
Number of items:	300 max. (MonitoredItem/Session)
Fastest period:	100 ms
● SLMP Communication (Mitsubishi PLC) (/E4 option)	
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
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 (/PG option)*	
GX90UT PID control module is required. SMARTDAC + Hardware Configurator is required for program pattern setting.	

Number of program pattern sets:	99 max. (Program patterns of up to 20 loops* can be stored in a single set.)
Number of segments:	99 segments/pattern
● MATH (with Report function, /MT option)	
No. of MATH channels:	GM10-1: 100, GM10-2: 200
MATH types:	Basic math, statistics, special operators, conditional statements, and others.
● Communication channels (/MC option)	
No. of communication channels:	GM10-1: 300 (C001–C300) GM10-2: 500 (C001–C500)
● Log scale (/LG option)	
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 (/BT option)	
Number of multi batches:	GM10-1: 6 max., GM10-2: 12 max.
● Aerospace Heat Treatment (/AH option)	
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
GM90PS Power Supply Module	
Rated supply voltage:	100–240 VAC, 12-28 VDC (GM90PS-1N2W0)
Operating supply voltage:	90-132 VAC, 180-264 VAC, 10-32 VDC (GM90PS-1N2W0)
Power frequency (AC power supply):	50 Hz± 2%, 60 Hz± 2%
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-1N2W0)
GX90XA Analog Input Module	
Universal input (-U2), low withstand voltage relay (-L1), electromagnetic relay (-T1), High-speed universal (-H0), 4-wire RTD/resistance (-R1), High withstand voltage (-V1)	
Inputs:	Universal / Low withstand voltage relay / Electromagnetic relay / High withstand voltage: 10, High-speed universal: 4,4-wire RTD/resistance: 6
Input types:	Universal, High-speed universal: DC voltage, standard signal, thermocouple, RTD, DI (voltage) Low withstand voltage relay, electromagnetic relay, High withstand voltage: DC voltage, standard signal, thermocouple, DI (voltage, contact) 4-wire RTD/resistance: 4-wire RTD, 4-wire resistance
Integral time:	Universal, High withstand voltage: 1.67 ms/16.7 ms/20 ms/36.7 ms/100 ms Low withstand voltage relay, electromagnetic relay: 16.7 ms/20 ms/36.7 ms/100 ms
Input calculation:	Linear scaling, square root, differential calculations
Input range/accuracy:	Refer to the Measurement range and accuracy table.
Input resistance:	10 MΩ or more 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 thermocouple/DC voltage
Effect of signal source resistance:	± 10 μV/1 kΩ or lower for thermocouple/DC voltage (1 V range or lower) ± 0.15%/1 kΩ or lower for DC voltage (2 V range or higher)/standard signal
Allowable wiring resistance:	Max. 10 Ω/1 wire or less (lead resistance between 3 wires is equal) for RTD input
Effect of wiring resistance:	± 0.1°C/10 Ω (lead resistance between 3 wires is equal) for RTD input
Reference junction compensation accuracy:	Measurement of 0°C or higher, input terminal temp. balanced Type K, E, J, T, N, XK GOST: ± 0.5°C (23°C± 2°C), ± 0.7°C (0 to 50°C), ± 1.0°C (-20 to 60°C) Type R, S, W, L, U, W97Re3-W75Re25, platinel 2, NiNiMo, W/WRe26, Ni(AWG14): ± 1.0°C (23°C± 2°C), ± 1.4°C (0 to 50°C), ± 2.0 (-20 to 60°C) Type KpvsAu7Fe: ± 1.0 K (23°C± 2°C), ± 1.4 K (0 to 50°C), ± 2.0 K (-20 to 60°C) Type B, PR20-40: RJC fixed at 0°C * Parentheses () = ambient temperature.
Allowable input voltage:	± 60V DC for DC voltage (2 V range or higher)/standard signal ± 10 V DC for other conditions.
Noise rejection ratio:	Normal mode: 50/60 Hz no rejection (integral time 1.67 ms), 40 dB or more (integral time 16.67 ms or more) Common mode: 80 dB or more (integral time 1.67 ms), 120 dB or more (integral time 16.67 ms or more)
Max. common mode voltage:	30 VACrms (50/60Hz), or 60 VDC (however, max. common mode noise voltage of measurement input is 250 VACrms) High-speed universal: 300V ACrms (50/60Hz) High withstand voltage: 600 VACrms (50/60Hz) or 600 VDC double insulation, 1000 VDC basic insulation
Max. voltage between measurement input channels:	Universal, electromagnetic relay, 4-wire RTD/resistance, High withstand voltage: 30 VACrms (50/60Hz), or 60 VDC (however, max. common mode noise voltage between measurement input channels is 250 VACrms) Low withstand voltage relay: 30 VACrms (50/60Hz), or 60 VDC (however, max. common mode noise voltage between measurement input channels is 60 VACrms) High-speed universal: 300V ACrms (50/60Hz)
Effects of ambient temperature:	Applies when integral time is 16.67 ms or higher, ±(0.05% of rdg + 0.05% of range) or less fluctuation per 10°C change Note, KpvsAu7Fe, PR20-40: ±(0.05% of rdg + 0.1% of range) or less Cu10 Q system: ±(0.2% of range + 0.1°C) or less Excluding guaranteed reference junction accuracy
Insulation resistance:	Between input terminals and internal circuitry: 20 MΩ or greater (at 500 VDC)
Withstand voltage:	Universal, electromagnetic relay, 4-wire RTD/resistance: Between input terminals and internal circuitry: 3700 V AC, 1 minute Between analog input channels: 1000 VAC, 1 minute (excluding b terminal of universal input type) Low withstand voltage relay: Between input terminals and internal circuitry: 1500 VAC, 1 minute Between analog input channels: 400 VAC, 1 minute High-speed universal: Between input terminals and internal circuitry: 3000 V AC, 1 minute Between analog input channels: 3000 V AC, 1 minute High withstand voltage: Between input terminals and internal circuitry: 3700 V AC, 1 minute Between analog input channels: 1000 V AC, 1 minute

DC current (mA) input (-C1)	
Inputs:	10
Input types:	DC current (20 mA), standard current signal (4–20 mA)
Integral time:	1.67 ms/16.7 ms/20 ms/36.7 ms/100 ms
Input calculation:	Linear scaling, square root, differential calculations
Input range:	Refer to the Measurement range and accuracy tables.
Input resistance:	250 Ω
Allowable input voltage:	± 10 VDC
Allowable input current:	24 mA *50/60 Hz, peak value including the signal portion
Noise rejection ratio:	Normal mode: 50/60 Hz no rejection (integral time 1.67 ms), 40 dB or more (integral time 16.67 ms or more) Common mode: 80 db or more (integral time 1.67 ms), 120 dB or more (integral time 16.67 ms or more)
Max. common mode voltage:	30 VACrms (50/60Hz) or 60 VDC (however, max. common mode noise voltage of measurement input is 250 VACrms)
Max. voltage between measurement input channels:	30 VACrms (50/60Hz) or 60 VDC (however, max. common mode noise voltage between measurement input channels is 250 VACrms)
Effects of ambient temperature:	Applies when integral time is 16.67 ms or more, ±(0.075% of rdg + 0.05% of range) or less fluctuation per 10°C change
Insulation resistance:	Between input terminals and internal circuitry: 20 MΩ or greater (at 500 VDC)
Withstand voltage:	Between input terminals and internal circuitry: 1500 VAC, 1 minute Between analog input channels: 1000 VAC, 1 minute
GX90XD Digital Input Module	
Inputs:	16
Input format:	Open collector or non-voltage contact
Range types	DI, pulse (250Hz (The chattering filter: OFF), 125Hz (The chattering filter: ON), min. pulse width: 2 ms, requires the MATH (optional code /MT)).
ON/OFF detection:	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 calculation:	Linear scaling, differential calculations
Contact rating:	12 VDC, 20 mA or more
Input resistance:	Approx. 1 kΩ
No. of common:	2 (1 common per 8 channels)
Allowable input voltage:	10 V
Insulation resistance:	Between input terminals and internal circuitry: 20 MΩ or greater (at 500 VDC)
Withstand voltage:	Between input terminals and internal circuitry: 1500 VAC, 1 minute
GX90YD Digital Output Module	
Outputs:	6
Output format:	Relay contact (c contact)
Rated load voltage:	30 VDC or 250 VAC or less
Max. load current:	3 A (DC)/3 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: 3000 VAC, 1 minute
GX90WD Digital Input/output Module	
● Digital input (DI) section	
Inputs:	8
Input format:	Open collector or non-voltage contact
Range types:	DI, pulse (250Hz (The chattering filter: OFF), 125Hz (The chattering filter: ON), min. pulse width: 2 ms, requires the MATH (optional code /MT)).
ON/OFF detection:	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 calculation:	Linear scaling, differential calculations
Contact rating:	12 VDC, 20 mA or more
Input resistance:	Approx. 2.4 kΩ
No. of common:	1 (1 common per 8 channels)
Allowable input voltage:	10 V
Insulation resistance:	Between input terminals and internal circuitry: 20 MΩ or greater (at 500 VDC)
Withstand voltage:	Between input terminals and internal circuitry: 1500 VAC, 1 minute
● Digital output (DO) section	
Outputs:	6
Output format:	Relay contact (c contact)
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)/2 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
GX90XP Pulse Input Module	
Number of inputs:	10
Measurement interval:	100 ms (shortest)
Input type:	Contact (open collector, voltage-free contact), level (5 V logic)
Input range:	Up to 20 kHz 30 Hz when the chattering filter is in use (On)
Minimum detection pulse width:	25 μs 15 ms when the chattering filter is in use (On)
Measurement accuracy:	Count ± 1 pulse During integration, the following accuracies are added. Upon MATH start: +1 measuring period Upon MATH stop: -1 measuring period * Integration requires the math function (optional code /MT). Removes chattering up to 5 ms (can be turned on/off on each channel)
Chattering filter:	Approx. 0.2 V
Hysteresis width:	Contact: 15 V DC or higher and 30 mA or higher rating. Minimum applicable load current 1 mA or less.
Contact, transistor rating:	Transistor: With the following ratings: Vce>15 VDC, Ic>30 mA
Maximum input voltage:	± 10 V DC
Insulation resistance:	Between input terminals and internal circuitry: 20 MΩ or greater at 500 V DC
Withstand voltage:	Between input terminals and internal circuitry: 1500 V AC for 1 minute

Analog output module GX90YA	
Number of outputs:	4 (isolated between channels)
Output type:	4 to 20mA or 0 to 20mA
Output update interval:	100 ms (shortest)
Load resistance:	600 Ω or less
Output accuracy:	± 0.1% of F.S. (1mA or more) (F.S.=20mA)
PID control module GX90UT	
● Control loop	
Number of loops	2
● Analog input (measured input)	
Measured points:	2
Measurement type:	DC voltage (DCV)/standardized signal, TC/RTD, DI (LEVEL and non-voltage contact)
Scan (control) interval :	100 ms or 200 ms (system global setting)
● Analog output (control output/transmission output/sensor power supply)	
Outputs:	2
Output type:	Power supply for current, voltage pulse, or sensors. Current output: 4–20 mA or 0–20 mA Voltage pulse output: ON voltage = 12 VDC or more (load resistance 600 Ω or more), OFF voltage = 0.1 VDC or less Can be used as a sensor power supply (13.0–18.3 VDC)
● Digital input (switching the SP, operation mode, etc.)	
Inputs:	8
Input format:	Non-voltage contact and open collector Contact rating: 12 VDC or more, 20 mA or more
● Digital output (of alarms, events, etc.)	
Outputs:	8
Output format:	Open collector (sink type)
Output contact capacity:	Max 24 VDC, 50 mA
Withstand voltage/insulation resistance:	See PID control module general specifications (GS 04L51B01-31EN)
Terminal type:	M3 screw terminals
Weight:	Approximately 0.3kg
GX90EX Expansion Module	
Connects via dedicated communication between main unit and subunits, and between subunits.	
Communication speed:	10Base-T/100Base-TX (Auto)
Ports:	2
Connection cable:	STP cable, CAT5 or later
Connection between modules:	Cascade connection (no ring connection)
Communication range:	100 m
GX90NW Network Module	
● Ethernet port	
Communication speed:	10BASE-T/100BASE-TX (Auto)
Port:	2 ports
Connection cable:	STP cable, CAT5 or later
Communication range:	100m
● PROFINET port	
Communication speed:	100BASE-TX full duplex
Port:	2 ports
Connection cable:	PROFINET communication cable
Communication range:	100m
PROFINET communication specifications:	Type: PROFINET IO-Device Conformance class: B Support for periodic and aperiodic communication
SMARTDAC+ GM common specifications	
Standards supported	
CSA:	CAN/CSA-C22.2 No. 61010-1, overvoltage category II or I, pollution degree 2, CAN/CSA-C22.2 No. 61010-2-030 CAN/CSA-IEC 61010-2-201
UL:	UL 61010-1, UL 61010-2-030 (CSA NRTL/C) UL 61010-2-201(CSA NRTL/C)
CE/EMC directives:	EN61326-1 compliance, Class A Table 2, EN61000-3-2 compliance, EN61000-3-3 compliance, EN55011 Class A Group 1
CE/Low voltage directive:	EN61010-1, EN 61010-2-030, overvoltage category II or I, pollution degree 2
/C8 option	Measurement category II, EN 61010-2-201 compliance
RE directive:	HEALTH&SAFETY EN61010-1 compliance EN61010-2-030 compliance Overvoltage category II or I, pollution degree 2 Measurement category II EN62311 compliance EN301 489-1 compliance EN301 489-17 compliance EN61326-1 compliance EN300 328 compliance
EMC	SPECTRUM EMC Regulatory Arrangement in Australia and New Zealand (RCM): EN55011 Class A Group 1 Wireless communication standards of Australia and New Zealand (RCM) (optional code /C8): AS/NZS4268, AS/NZS2772.2
KC marking:	Electromagnetic wave interference prevention standard, electromagnetic wave protection standard compliance
Environmental performance:	WEEE directive support
Wireless (Bluetooth):	Supports radio wave regulations of Japan, America, Canada, Europe (EU), Australia, New Zealand, China, and Korea.
Normal operating conditions	
Ambient temperature:	-20 to 60°C If less, -20 to 50°C · When using the GX90YD, GX90WD, and GX90XA-T1 (electromagnetic relay type) · With the GM10/C8 (Bluetooth option)
Ambient humidity:	20 to 85% RH (no condensation)
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:	When ON, 98 m/s ² or less, 11 ms, 3 times in 6 directions (±X, ±Y, ±Z), (excluding GX90YD and GX90WD) When OFF, 500 m/s ² or less, approx. 10 ms, 3 times in 6 directions (±X, ±Y, ±Z)
Magnetic field:	400 A/m or less (DC and 50/60 Hz)

Standards supported

