GRAPHTEC

High Speed 1 MS/s Data logger with Voltage and Temperature Measurements

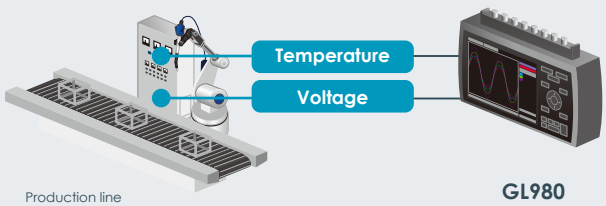
Isolated simultaneous 8 channel Data logger

midi LOGGER GL980 NEW

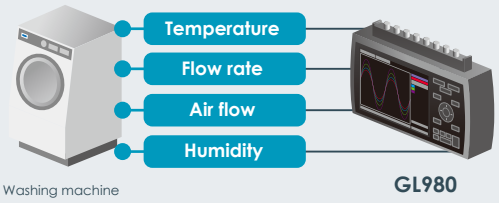
- 8ch High speed simultaneous sampling
- Includes 500 V measurement with 16-bit A/D converter
- Equipped with true-rms measurement
- Large built-in RAM (4 M sampling/ch) and built-in Flash memory (4 GB)
- Large easy-to-read 7-inch LCD

Typical applications

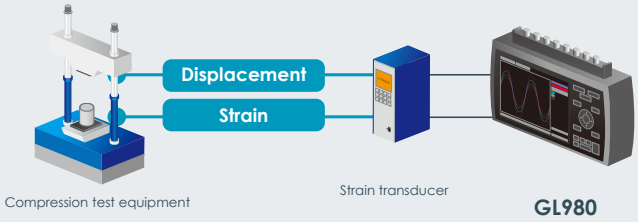
Measurement of control device



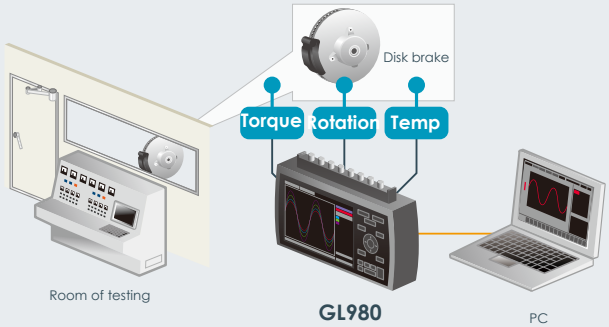
Measurement for testing washer and dryer



Measurement as an XY recorder



Measurement for brake components testing



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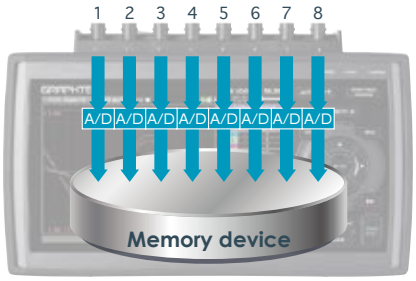
High speed 1 MS/s simultaneous sampling with isolated input

GL980 is equipped with an isolated input mechanism to protect signals from interferences caused by noise from other channels. 16-bit A/D converter adopted to achieve hi-speed and hi-resolution measurement.



Simultaneous sampling — **Sampling interval : 1 µs to 1 min (in steps of 1, 2, 5)**

GL980 utilizes simultaneous sampling to eliminate slowdown in sampling rate by using multiple A/D converters in simultaneous sampling method.
Eight individual A/D converters in each channel sustains the maximum sampling speed for all eight channels to measure high speed rapid voltage fluctuation and multi-channel vibration measurement.

External sampling function — **Maximum input frequency : 100 kHz**

Sampling of the logger is performed in sync with an external device using an external signal input.
* B-513 Input/Output cable for GL is required.

Multifunction input

Voltage, temperature, humidity, logic and pulse measurements can all be taken simultaneously in high speed.

Pulse/Logic

Pulse : 4ch (Instant, Accumulating, RPM)
Logic : 4ch
* Select either Pulse or Logic.
* Required input/output cable for GL (B-513 option).

Screw terminal (size M3.5)

Thermocouple : K, J, E, T, R, S, B, N, W(WRe5-26)
Humidity : 0 to 100 %
* Required humidity sensor (B-530 option).

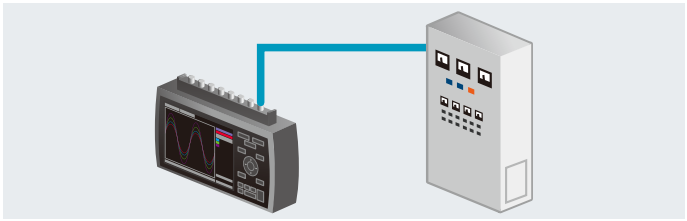
Isolated BNC connector **500 V DC & 250 V True-rms**

Voltage (DC) : 20 mV to 500 V, 1-5 V
Voltage (RMS) : 10 mV to 250 V rms

* Connection can be made individually to BNC or screw terminal. BNC and screw terminal are connected to the same channel.

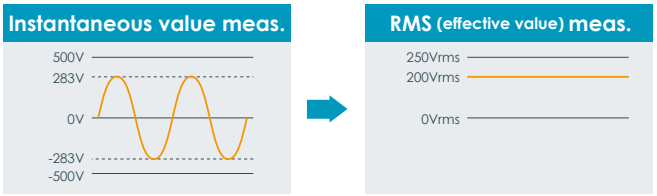
Measure repetitive waveforms such as vibration with instantaneous value and effective value.

Measures either instantaneous value or effective value (RMS).
By utilizing the trigger feature to measure abnormal spikes in the continuous waveform, users can measure vibration abnormalities repeatedly.



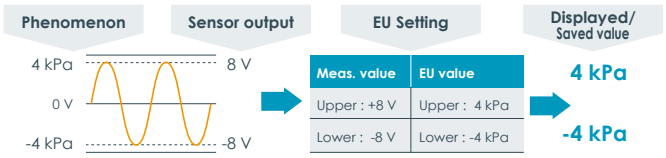
Measures abnormalities in a repeated waveform by effectively measuring the corresponding RMS value.

All RMS measurement range with Crest Factor: up to 2



Scaling (Engineering unit) function

Measured voltage value can be converted to a specified engineering unit. The value can be displayed with the physical measurement value of the sensor and be saved into the data file with the converted values.



Calculation function between channels

Four arithmetic operations (Addition, subtraction, multiplication and division) are available using two analog input channels.
* Data can be saved only in GBD file format.

Example

CH2 = CH3 * CH1

(CH2 is a value obtained by multiplying the values of CH3 and CH1)
* Value of calculated results are displayed and saved into data file.

Trigger function

The trigger in this unit has multiple functions including level trigger of input signal value for each channel.

Trigger action — Start or stop capturing data by triggering

Trigger source — Off, Measured signal level, Alarm, External, Scheduled time, Scheduled day, Elapsed time
* When trigger is used for starting action, level of measured signal can be set for each channel.

Threshold
Analog input : High or Rising, Low or Falling, Window-in, Window-out
Logic input : H or L (4-channel signal pattern)
Pulse input : High or Rising, Low or Falling, Window-in, Window-out
Combination : Level OR, Level AND, Edge OR, Edge AND

Alarm function & signal output

Threshold of an alarm can be set for each channel. When an alarm occurs, notification is sent by following methods.

Alarm threshold
Analog input : High, Low, Window-in, Window-out
Logic input : H or L (signal in each channel)
Pulse input : High or Rising, Low or Falling, Window-in, Window-out

When alarm is detected
- Display to screen (Digital value of alarm's origin channel is displayed in red)
- Save alarm information to measurement data file
- Output alarm signal

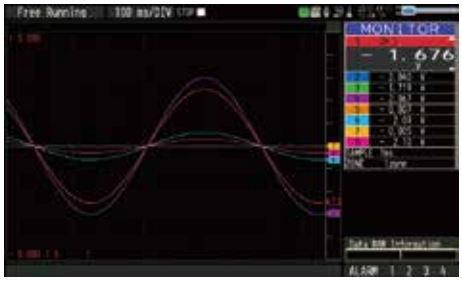
Number of channel : 4 channels (Output channel can be arranged to each source channel in OR condition.)
Signal type : Open collector (pull-up to 5 V with 10 kΩ resistor), maximum load is the 24 V and 100 mA.
* Requires Input/Output cable for GL series (B-513 Option).

Large Easy-to-read 7-inch LCD

Monitor data in multiple methods in addition to digital value display and full waveform display screen.

Y-T waveform monitor screen

Displays data with analog waveform and digital value. Screen can also be split into 1, 2, 4 or 8 zones to display the channels in different zones.

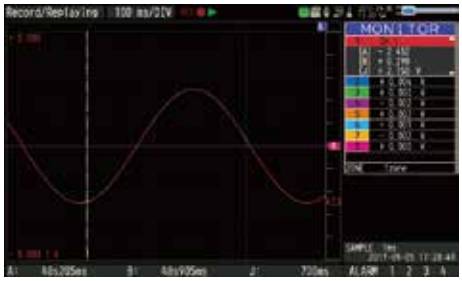


Digital monitor screen

Displays current data in digital value and results of real time statistical calculation.
(Function : Maximum, Minimum, Peak-to-peak, and Average)
When displays only current data, it can be shown in 1, 2, 4 or 8 zones.

Past waveform monitor screen

Display the past part of the data while capturing data. Execute without stopping measurement and also scroll past data. Data screen can be switched with past and current.



XY graph monitor screen

Emulates the classic XY chart recorder.
Also supports features for pen up/down and position movement.

Quick and Easy Set Up Process

Simple operation with cursor and enter keys,
and menu-driven operation with six pre-set menu screens : AMP, DATA, DISP, TRIG, I/F (Interface) and OTHER.

Cursor keys

Move between items on the setting screen and move the cursor on the waveform screen.

ENTER key

Determine the item and value selected with the menu.

FUNCTION (FUNC) key

Execute the specified function with this shortcut button. Frequently used function can be preset.

Only 6 screens

AMP | DATA | DISP
TRIG | I/F | OTHR

Free-running function

The input signal being captured in real time can be monitored on the measurement or setting screen even if recording has not initiated. The measurement voltage range can be set while watching the waveform.

Other helpful functions

Delivers reliable measurements out at a location with unstable power supply.

Equipped with three types of options for power source, AC adapter, DC input, and battery pack. With a battery pack, GL980 runs continuously for approximately 2 hours. If an AC power failure occurs, it will automatically switch from the AC adapter to the battery pack. Additionally, when the voltage of the battery pack reaches low, measurement is automatically stopped after saving the data file preserving the accumulated data. (Requires two battery packs (B-569 option) installed.)

Instrument is in compliance with JIS Vibration Test Method for Automobile Type 1 Class A. (Vibration durability test: 5 m/s²)

Carrying case (B-581)

Portable case to store GL980 and signal input cables for easy handling.

coming soon

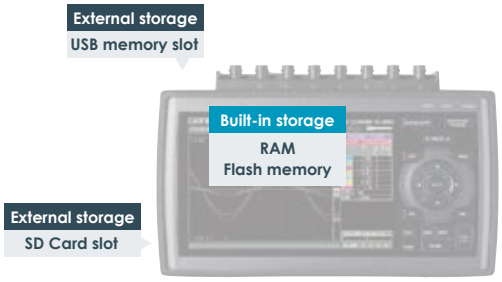
Cover (B-579)

Protect the main body from cosmetic damages and minor impacts.
GL980 is shipped with cover attached.

* The cover is not to protect from hard impact.

Supports large built-in RAM (4MS/ch) and built-in Flash (4 GB)

Long term recording is made possible with 4 M samples/ch built-in RAM and 4 GB built-in Flash memory.
It supports both USB Flash memory and SD Card memory to be used as external storage devices for recorded data for certain sampling intervals.



Approximate recording time

■ 8 channels of analog input. ■ Data is saved as a GBD file.

Memory type	Data capacity	1MS/s(1µs)	100kS/s(10µs)	1kS/s(1ms)	1S/s(1s)
Built-in RAM	4 M samples/ch	4 seconds	40 seconds	66 minutes	46 days
Built-in Flash memory	3.9 GB	N/A	N/A	2 days 6 hrs.	Over 1 year
External memory (SD/USB Flash memory)*	4 GB	N/A	N/A	2 days 11 hrs.	Over 1 year

■ 8 channels of analog input with 4 channels of Pulse input. ■ Data is saved as a GBD file.

Memory type	Data capacity	1MS/s(1µs)	100kS/s(10µs)	1kS/s(1ms)	1S/s(1s)
Built-in RAM	4 M samples/ch	4 seconds	40 seconds	66 minutes	46 days
Built-in Flash memory	3.9 GB	N/A	N/A	1 days 4 hrs.	Over 1 year
External memory (SD/USB Flash memory)*	4 GB	N/A	N/A	1 days 7 hrs.	Over 1 year

* When using 8 GB or larger memory, the size of data file will be up to 4 GB. The Relay mode enables extended recording time.

Convenient Data Recording Functions

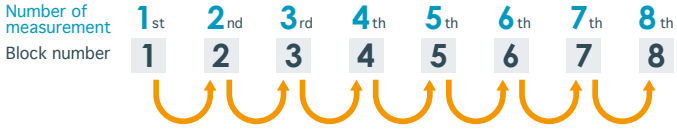
Memory division function

Built-in RAM

Built-in RAM can be divided into 1, 2, 4, or 8 blocks with multiple high-speed recording measurement using the trigger function.

Single block — When multiple measurements are executed, the captured data is overwritten in memory block 1.

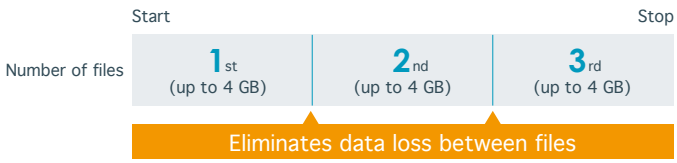
Divided into 8 blocks — When multiple measurements are executed, recorded data is stored in the next memory block.



Relay mode

Built-in Flash, SD card, USB memory

Save data to multiple files with specified capturing time or file size (up to 4 GB) until recording data is stopped.



Maximum sampling speed :
1 kS/s (interval 1 ms) with GBD format,
100 S/s (interval 10 ms) with CSV format

Data backup and hot swaps

Built-in Flash, SD card, USB memory

The recorded data can automatically save to other storage device at specified regular intervals during data capture. (Maximum sampling speed: 1 kS/s (interval 1 ms) with GBD format, 100 S/s (interval 10 ms) with CSV format)
When the backup destination is set to a SD Flash memory card or a USB Flash memory device, memory device can be exchanged before the memory capacity becomes full using the key operation.

Auto save function

Built-in RAM

Recorded data saved in a built-in RAM is automatically copied as data file to a built-in Flash memory, SD Flash memory card or USB Flash memory with auto save function. An SD Flash memory card or a USB Flash memory can be used as a backup location when using the built-in RAM. The process will prevent losing any data captured in the built-in RAM by any overwrite or power cycles.

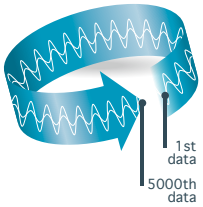
Ring mode

Built-in RAM, Built-in Flash, SD card, USB memory

Saves most recent data of specified number after recording stops.

Number of capturing data 1000 to 10000000 data

* When using built-in RAM, 10 to 4000000 data



Example :
Number of capturing data : set to 5000 points

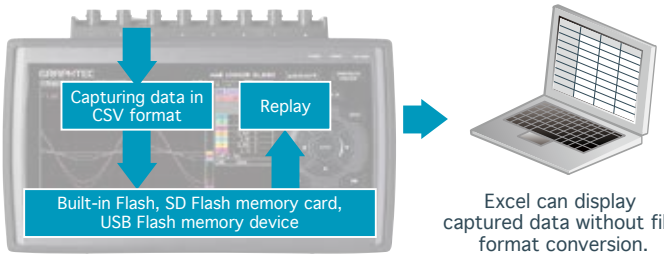
Always save the recent 5000 data
(The oldest data is overwritten by the new data.)

Maximum sampling speed :
1MS/s (interval 1 µs) in built-in RAM,
1kS/s (interval 1 ms) with GBD format in another device,
100S/s (interval 10 ms) with CSV format in another device

Save & replay data in CSV format

Built-in Flash, SD card, USB memory

Captured data can be saved with GBD (binary) and CSV (text) format. CSV format file can be played on GL980 and opened with spreadsheet software.



Excel can display captured data without file format conversion.

Maximum sampling speed :
1 kS/s (interval 1 ms) with GBD format,
100 S/s (interval 10 ms) with CSV format

Search function

Built-in RAM, Built-in Flash, SD card, USB memory

The search function can locate a specific value within the captured data as well as finding abnormal values within data of a long-recorded file.

Search content

Search for analog signal levels, logic signal pattern, pulse signal levels or alarm point in captured data.

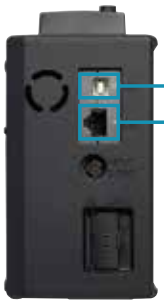
Analog signal channel
Signal levels in each channel
■ Search mode: raising, falling, window-in, window-out

Logic signal channel
Signal level (H or L) in each channel

Pulse signal channel
Signal levels in each channel
■ Search mode: raising, falling, window-in, window-out

Alarm
Alarm detected point on selected alarm signal output channel

Equipped with Ethernet (LAN) and USB interface to communicate with PC



USB2.0
Type B connector

Ethernet
10BASE-T/100BASE-TX

* This interface is for connecting directly to PC only.

Measurement method	Data file format in PC	Available sampling speed
Real time measurement Transfer data captured with GL980 to PC.	Binary or CSV format	1 ms to 1 min
Memory measurement Transfers data to PC after completed capturing data to built-in RAM with GL980.	Binary format	1 µs to 1 min

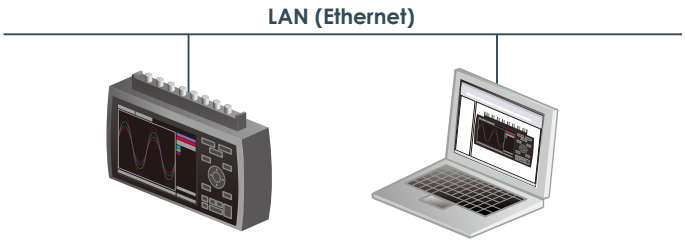
* Captured data can be saved with storage device on GL980 and PC simultaneously.

Convenient function with LAN (Ethernet interface) capability

When GL980 is connected to LAN using the Ethernet interface, networked computer can monitor real-time measured value, transfer files, and change set ups without using application software (GL980_2000-APS software).

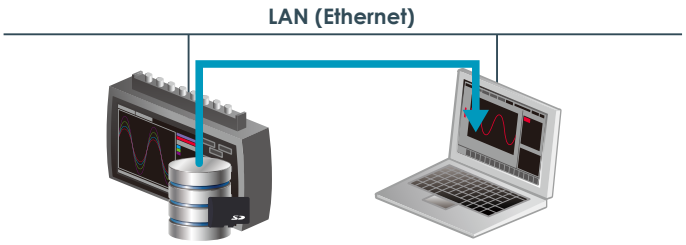
Web server function

GL980 can be controlled externally via a network on the WEB browser, which also supports real-time monitoring and ability to use the menu buttons.



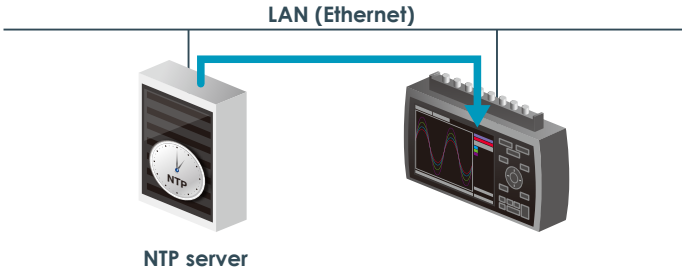
FTP server function

File in available storage device on GL980 except built-in RAM can be transferred or deleted from the PC.



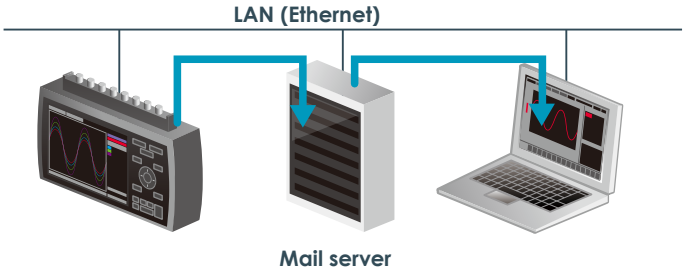
NTP client function

The clock on the GL980 is periodically synchronized with the NTP server.



Email sending function

Send information when alarm occurs, or when battery is low, or when communication speed drops, or to notify when the space becomes limited on the storage device by an e-mail to specified address. Information can also be sent periodically by settings.

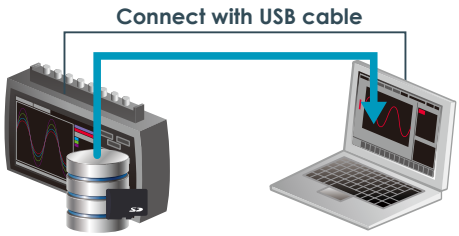


USB Drive Mode to Easily Transfer Files to PC

USB drive mode

The USB drive mode function allows simple data transfer to the PC from built-in Flash memory and SD Flash memory card which acts as USB Flash drive on GL980. It also allows to add, remove, and delete files from storage device on GL980 from PC file browsing explorer.

* Built-in Flash and SD, except USB memory device.



Start USB drive mode by turning the power on while pressing START/STOP key.

Move files by drag & drop feature in PC.

PC measurement with standard PC software included (GL980_2000-APS)

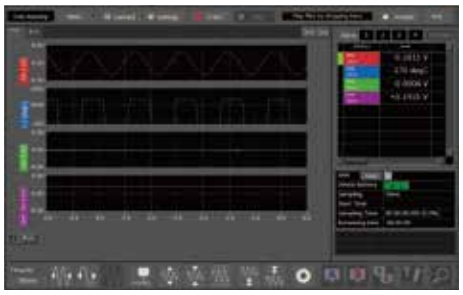
Multiple measurement screens including Y-T waveform, XY chart

Y-T display

Recorded signal is displayed in waveform (Y-T) and digital value for each channel.

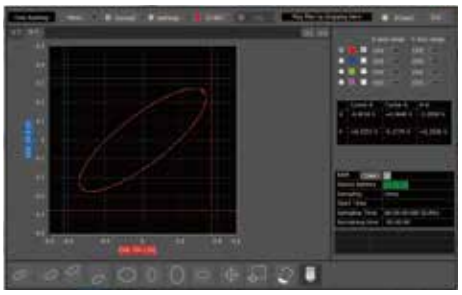
Y-T display (Zone mode)

Screen is divided into multiple zone, and channels can be assigned to each zone.

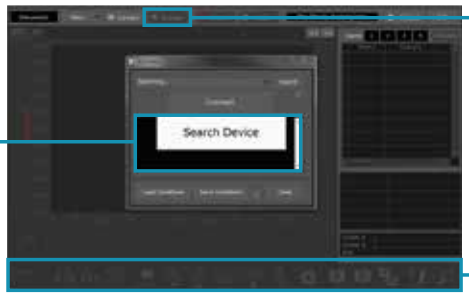


XY display

Four groups of XY charts are displayed.



Easily Connect to the GL980 with Quick Set Up Conditions



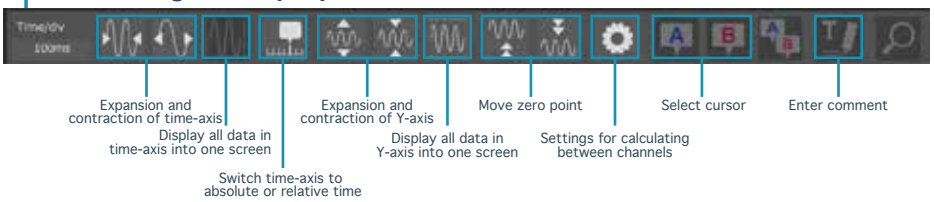
The settings are divided in to four screens with amp, recording, trigger and other.

Includes free running feature similar to the main unit.
Measurement voltage ranges and other ranges can be set while reading an input signal prior to capturing the data.

GL980 is recognized automatically by clicking the connection button regardless of Ethernet or USB.

GL980 supports DHCP

When using Y-T display



Convenient features from the GL980_2000-APS software

File combine and bind function

Superimpose
Data or file recorded on another unit or time can be imported as additional channels when using a SUPERIMPOSE function.
Link
Captured data in multiple files are connected and saved as new file. It is helpful in reviewing data captured with relay mode.
* Measurement parameters of each file must be the same.

Direct Excel function

The GL980_2000-APS software executes recorded data into a file on PC in real time and exports to a specified Excel file at the same time.
This is a valuable tool in creating report requiring post-process calculation with Excel software.

Printing function

The waveform of the playback data can be printed using a default printer. Printing range of the waveform can be set between cursors or all waveforms.

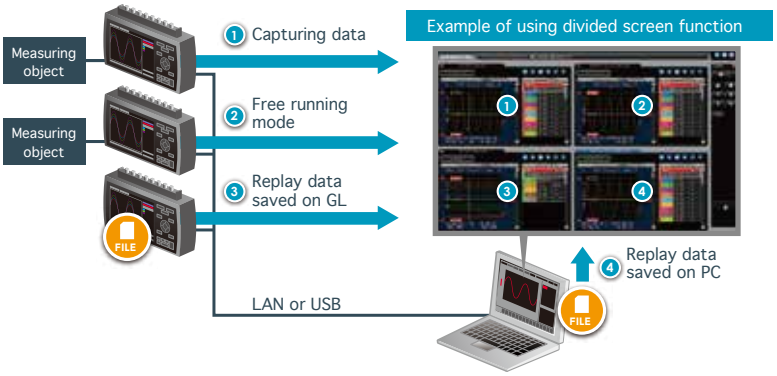
Advanced software GL-Connection (version 2.0)

The high-performance software GL-Connection is included as an accessory

Major features

- Supports connection with other GL units (*) simultaneously
- Supports up to 20 GL units (*)
- Screen division function: 4 screens
- FFT analysis function

* GL220, GL240, GL820, GL840 series, GL900 series, GL7000 series, GL980 and GL2000 can be connected.
* Ethernet (LAN) and USB can be mixed for connection between GL unit and PC.



Main unit specifications

Item			Description
Display (LCD)	Size		7-inch TFT color LCD (WVGA: 800 x 480 dots)
	Information		Waveform in Y-T with digital values, Enlarged waveforms, Digital values and Real-time statistical result values, XY graph
	Language		English, French, German, Spanish, Russian, Chinese, Korean, Japanese
Interface to PC	Type		Ethernet (10 BASE-T/100 BASE-TX), USB2.0
	Function		Data transfer to PC (up to 1 ms sampling), Control command to GL980
	Ethernet functions		Web server function, FTP server function, NTP client function, DHCP client function, Email send function
	USB function		USB mode (File transfer and deletion from built-in flash and SD on GL980)
Trigger function	Trigger action		Start or stop capturing data by triggering
	Trigger source	Start	Off, Measured signal, Alarm, External, Scheduled time, Scheduled day, Elapsed time
		Stop	Off, Measured signal, Alarm, External, Scheduled time, Scheduled day, Elapsed time
	Combination		Level OR, Level AND, Edge OR, Edge AND
	Threshold	Analog (*1)	High or Low in level mode, Rising or Falling in edge mode, Window-in, Window-out
		Logic	H or L (4-channel signal pattern)
		Pulse	High or Rising, Low or Falling, Window-in, Window-out
	Repeat action		Off, On (Re-armed automatically)
	Trigger hold out		Hold off repeat action in specified period
		Mode	Previous start to next start, previous stop to next start
		Time	zero second (no hold off) to 9999 hrs. 59 min. 59 sec
	Defection accuracy		± 0.5 % of measurement range
	Pre-trigger		Up to the number of capturing data points (max. 4000000) specified in built-in RAM (only when built-in RAM is used)
Alarm function	Alarm action		Displays and outputs a signal when alarm is detected
	Threshold	Analog input	High, Low, Window-in, Window-out
		Logic input	H or L (signal in each channel)
		Pulse input	High or Rising, Low or Falling, Window-in, Window-out
	Combination		OR (Source channel can be assigned with OR condition to output port)
	Detection cycle		Link with analog sampling
	Alarm holding		On or Off
	Detection accuracy		± 0.5 % of measurement range
Storagve deice	Built-in RAM		Four million samples for each channel
		Memory partition	4 M samples x 1 bank, 2 M sample x 2 banks, 1 M samples x 4 banks, 500 k samples x 8 banks
		Capturing data points	Specified 10 to 4000000
		Data type	Captured data
		Auto-save	Transfer captured data to other devices after capturing is completed (It can be enabled or disabled)
	Built-in Flash		4 GB (for capacity of data: approx. 3.9 GB)
		Data type	Captured data, Condition settings, Screen copy
	External USB (*2)		Support USB Flash memory device (*3) by USB2.0 Type A port, Single port, No memory capacity limit
		Data type	Captured data, Condition settings, Screen copy
	External SD CARD (*2)		Support SDHC memory card (up to 32 GB) by SD Card slot, Single slot
		Data type	Captured data, Condition settings, Screen copy
Capturing mode	Mode		Off (Normal), Ring, Relay
	Off (Normal)		Save data between start to stop
	Ring (*4)		Save most recent data of specified number
		Destination	Built-in RAM, Built-in Flash, USB or SD
		Number of capturing data	1000 to 10000000 data (*5)
		Sampling	up to 1 MS/s (interval 1 µs) in built-in RAM, up to 1 kS/s (interval 1 ms) with GBD format in other device, up to 100 S/s (interval 10 ms) with CSV format in other device
	Relay		Save data to multiple files with specified capturing time or file size (up to 4 GB) until recording data is stopped
		Destination	Built-in Flash, USB or SD
		Sampling	up to 1 kS/s (interval 1 ms) with GBD format, up to 100 S/s (interval 10 ms) with CSV format
Data backup	Interval		Off, 1, 2, 6, 12, 24 hrs., specific time, or any time with key operation
		Sampling	up to 1 kS/s (interval 1 ms) with GBD format, up to 100 S/s (interval 10 ms) with CSV format
	File destination		Built-in Flash, USB or SD
	Hot-swapping external memory		Hot-swapping USB or SD Flash memory with key operation during data backup
Search function	Function		Search for specific point in captured data
	Search factor	Analog	Signal levels in each channel
		Logic	4-channel signal pattern
		Pulse	Rising, Falling, Window-in, Window-out in each channel
		Alarm	Alarm occurring point
Calculation function	Statistical		Real-time : Display digital and statistical values at the same time Function : Maximum, Minimum, Peak-to-peak (P-P), Average Replay : Statistical values between cursors in replay captured data Function : Maximum, Minimum, Peak-to-peak (P-P), Average, RMS
	Between channels		Addition, subtraction, multiplication and division for two analog inputs (only in GBD format)
Scaling (Engineering unit) function			Measured value can be converted to the specified engineering unit
	Analog voltage		Converts using four reference points (gain, offset)
	Temperature		Converts using two reference points (offset)
	Pulse count		Converts using two reference points (gain)
Annotation function			Comment can be set in each channel, up to 31 alphanumeric characters and symbols (Display first 8 characters on screen)
Operating environment			0 to 40 ℃ when driven by AC adapter or battery, 5 to 85 % RH (non condensed)
Power source	AC adapter		100 to 240 V AC, 50/60 Hz
	DC power		8.5 to 24 V DC (required cable option B-514)
	Battery pack		Two battery packs (option B-569) required
Power consumption	AC adapter(in 240 V AC)		Approx. 48 VA (66 VA while charging battery) with disabling screen saver Approx. 43 VA (62 VA while charging battery) with enabling screen saver
	DC drive (24 V)		Approx. 0.6 A (0.9 A while charging battery) with disable screen saver Approx. 0.53 A (0.82 A while charging battery) with enabling screen saver
	DC drive (12 V)		Approx. 1.22 A (Cannot charge battery) with disable screen saver Approx. 1.07 A (Cannot charge battery) with enabling screen saver
	DC drive (8.5 V)		Approx. 1.81 A (Cannot charge battery) with disable screen saver Approx. 1.55 A (Cannot charge battery) with enabling screen saver
External dimensions [W×H×D]			Approx. 260 x 161 x 83 mm (with the cover)
Weight			Approx. 1.7 kg (the cover is attached, AC adapter and battery are not included)
Vibration resistance			Compatible with JIS Vibration test method for automobile Type 1 Class A (Vibration durability test: 5 m/s²)

Analog input specifications

Item			Description
Number of input channels			8 channels
Type of input terminal			Isolated BNC connector and Screw terminal (M3.5 screw) (*6)
Input method			All channels isolated unbalanced input, Simultaneous sampling
Sampling speed (interval)			1 M Samples/s to 1 Sample/min (1 µs to 1 min) and External (*7)
	Sampling interval		1, 2, 5, 10, 20, 50, 100, 200, 500 µs, 1, 2, 5, 10, 20, 50, 100, 200, 500 ms, 1, 2, 5, 10, 20, 30 sec, 1 min * When using built-in RAM: 1 µs to 1 min, using other storage: 1 ms to 1 min
Frequency response			DC to 200 kHz (within +1/-4 dB)
Measurement range	Voltage (DC)		20, 50, 100, 200, 500 mV, 1, 2, 5, 10, 20, 50, 100, 200, 500 V, and 1-5V F.S.
	DC-RMS (DC coupling and rms value meas.)		10, 25, 50, 100, 250, 500 mV rms, 1, 2.5, 5, 10, 25, 50, 100, 250 V rms F.S. • Crest Factor: up to 2 • Frequency response: 20 Hz to 10 kHz • Measures the accumulated value of the DC and AC components in effective value, that is a true-RMS
	Temperature		Thermocouple: K, J, E, T, R, S, B, N, W (WRe5-26)
	Humidity		0 to 100 % RH - using the humidity sensor (option B-530)
Filter (Low pass)			Off, Line (1.5 Hz), 5, 50, 500 Hz, 5, 50 kHz (at -3dB, -6dB/oct)
A/D converter			16-bit (effective resolution: 1/40000 of the measuring full range)
Measurement accuracy (*8)	Voltage (DC)		± 0.25% of Full Scale
	Voltage (RMS)		± 1.5% of Full Scale (Sine wave in 20 Hz - 10 kHz)
	Temperature (Thermocouple) (*9)	Type	Measurement range / Measurement accuracy
		R/S	0 ≤ TS ≤ 100 ℃ / ± 7.0 ℃ 100 < TS ≤ 300 ℃ / ± 5.0 ℃ R: 300 < TS ≤ 1600 ℃ / ± (0.05 % of reading + 3.0 ℃) S: 300 < TS ≤ 1760 ℃ / ± (0.05 % of reading + 3.0 ℃)
		B	400 ≤ TS ≤ 600 ℃ / ± 5.5 ℃ 600 < TS ≤ 1820 ℃ / ± (0.05 % of reading + 3.0 ℃)
		K	-200 ≤ TS ≤ -100 ℃ / ± (0.05 % of reading + 3.0 ℃) -100 < TS ≤ 1370 ℃ / ± (0.05 % of reading + 2.0 ℃)
		E	-200 ≤ TS ≤ -100 ℃ / ± (0.05 % of reading + 3.0 ℃) -100 < TS ≤ 800 ℃ / ± (0.05 % of reading + 2.0 ℃)
		T	-200 ≤ TS ≤ -100 ℃ / ± (0.1 % of reading + 2.5 ℃) -100 < TS ≤ 400 ℃ / ± (0.1 % of reading + 1.5 ℃)
		J	-200 ≤ TS ≤ -100 ℃ / ± 3.7 ℃ -100 < TS ≤ 100 ℃ / ± 2.7 ℃ 100 < TS ≤ 1100 ℃ / ± (0.05 % of reading + 2.0 ℃)
		N	-200 ≤ TS < 0 ℃ / ± (0.1 % of reading + 3.0 ℃) 0 ≤ TS < 1300 ℃ / ± (0.1 % of reading + 2.0 ℃)
		W	0 ≤ TS ≤ 2315 ℃ / ± (0.1 % of reading + 2.5 ℃)
			Reference Junction Compensation (R.J.C.) accuracy: ± 1.0 ℃
R.J. Compensation			Internal or External
Burnout			Detecting burnout of Thermocouple with menu operation in free-run mode
Input impedance			1 MΩ ±5%
Signal source impedance			up to 1 kΩ
Maximum input voltage	Between(+) - (-) terminal		20 mV to 2 V range: 30 V DC, 5 V to 500 V range: 500 V DC
	Between channels (-) - (-) terminals		60 V P-P
	Between channel - GND		60 V P-P
Maximum voltage (withstand)	Between channels		1000 V P-P (1 minute)
	Between channels - GND		1000 V P-P (1 minute)
Isolation resistance			Min. 50 MΩ (at 500 V DC) with between input and GND
Common-mode rejection ratio			Min. 90 dB (50/60 Hz, signal source impedance: max. 300 Ω)
Signal-noise ratio (S/N)			20 mV range : - 40 dB (when input terminals + and - are shorted) Other range : - 50 dB (when input terminals + and - are shorted)

External input & output signal specifications

Item			Description
External input/output	Input (*10, *11)		Logic or Pulse (4 channels), Trigger or Sampling (1 channel)
	Output (*10, *12)		Alarm (4 channels) or Trigger (1 channel) with Alarm (3 channels)
Input signal specification	Logic and Pulse	Voltage range	0 to +30 V (common ground)
		Threshold	Approx. +2.5 V
		Hysteresis	Approx. 0.5 V (+2.5 to +3 V)
	External trigger and sampling	Voltage range	0 to +30 V (common ground)
		Threshold	Approx. +1.9 V
		Hysteresis	Approx. 0.2 V (+1.9 to +2.1 V)
Logic measurement			Measures the status (H or L) of the signal input to each channel
Pulse measurement	Measurement		Counts pulse signals input to each channel
	Pulse count detection cycle		10 µs to 1 hr. (Set separately from analog signal sampling interval)
	Maximum pulse input		Maximum input frequency : 100 kHz, Maximum count number : 15 M count (24 bit counter)
	Measurement mode		Rotation : Counts the number of pulses per detection cycle and then converts measured value to rotation in rpm • Span : 0 to 500 M rpm/F.S.
			Accumulating: Accumulates the number of pulses count per detection cycle from the start of measurement • Span : 0 to 20 M count/F.S. (Span is set automatically)
			Instant : Counts the number of pulses per detection cycle • Span : 0 to 20 M count/F.S.
External trigger input (*10)			Executes specified trigger action
External sampling input (*10)			Executes sampling of measurement signal with each external sampling signal • Maximum input frequency: 100 kHz (Time error: 1 µs or less)
Output signal	Alarm output		Open collector (pull-up to 5 V with 10 kΩ resistor) • Maximum load is the 24 V and 100 mA
	Trigger output		When a trigger is detected, output terminal releases approximately 500 µs width pulse (Low active)

Software specifications

Item		Description
Model name		GL980_2000-APS
Supported OS (*13)		Windows10, 8.1, 8, 7 (SP1 or later)
Functions		Control GL980 and GL2000, Real-time data capture, Replay data, and Data format conversion
Supported device		1 unit of GL980 or GL2000
Settings control		Input condition, Capturing condition, Trigger/Alarm condition, other
Transfer of captured data	In memory capturing with GL980	Transfer the captured data to a PC sequentially while data is saved in built-in RAM on GL980 • Sampling interval: 1 µs to 1 min
	In real time capturing	Transfer the captured data to a PC while data is saved in built-in flash memory, SD or USB on GL980 • Sampling interval: 1 ms to 1 min saved in GBD and CSV format
Displayed information		Analog waveform, Logic waveform, Pulse count waveform, Digital value
Display mode		Waveform in Y-T with digital values, Enlarged waveforms, Statistical calculation result values and history, XY graph
File operation		Converting data format to CSV from GBD binary with data between cursors or all data
Past data screen function		Displays the current data or past part of data by switching. Available at sampling speed 1 kS/s to 1 S/m (1 ms to 1 min sampling interval)
Statistical calculation		Maximum, Minimum, Average and Peak-to-peak (p-p) value during data capturing

Battery pack B-569 (option) Specifications

Item	Description
Capacity	7.2 V, 2900 mAh
Battery operating time	Approx. 2 hrs. in displayed signal (LCD: max. brightness) Approx. 2.5 hrs. in screen saver mode (no display) * When two battery packs are installed in GL980. Condition : 1 sample per second (1 s), saving captured data to built-in Flash, use two fully charged battery packs, temperature is 25 °C
Method of charging	Charging on GL980
Charging time	Approx 10 hrs. (charging two batteries)
Other functions	• If an AC power failure occurs, it will automatically switch from the AC adapter to the battery pack. (AC adapter priority use) • When the voltage of the battery pack reaches low, the measurement is automatically stopped after saving data file preserving the accumulated data.

(*1) It can set for each channel.
(*2) File size of captured data is up to 4GB in each file.
(*3) Standard USB memory devices are required.
(*4) Required minimum capturing time is 15 seconds in GDB format, 30 seconds with CSV format.
(*5) When using built-in RAM, 10 to 4000000 data
(*6) Connections can be made individually to BNC terminal or M3.5 screw terminal.
(*7) Required Input/Output cable for GL series (B-513) option for connecting signal.
(*8) Subject to the following conditions:
- Room temperature is 23 °C ± 5 °C.
- When 30 minutes or more have elapsed after power has turned on.
- Filter is set to Line (1.5 Hz) in DC measurement and temperature.
- GND terminal is connected to ground.
- It is placed vertically.
- Average of the measured values is used.

(*9) Wire size of Thermocouple used is 0.32mm diameter in the T and K type, and 0.65mm diameter in other types.
(*10) Required Input/Output cable for GL series (B-513) option for connecting signal.
(*11) Select either Logic input (4 channels) or Pulse input (4 channels), select either external Trigger input or Sampling input.
(*12) Select either Trigger output (1 channel) or Alarm output (1 channel). Available 3 channels Alarm output always.
(*13) Graphtec does not support software/driver used with operating systems that have become obsolete and are no longer supported by the OS developer. In the Windows 7, edition of Ultimate, Enterprise, Professional and Home Premium are supported.

Standard accessories

- AC adapter with power cable
- CD-ROM (PC application software, User manual)
- Tilt stand set (including mounting screws M4)
- Ferrite core (attach to cable for radiation reduction)
- Quick start guide and Safety guide
- Cover (attached to the main body)
- Screws (M3.5) for input terminal

Options and Accessories

Item	Model No.	Description
Input/Output cable for GL	B-513	2 m long (no clip on end of cable)
DC drive cable	B-514	2 m long (no clip on end of cable)
Humidity sensor	B-530	With 3 m long signal cable (with power plug)
Shunt resistor	B-551	250 ohms (Converts signal from “4-20mA” to “1-5V” .)
Battery pack	B-569	Rechargeable Lithium-ion battery (7.2 V, 2900mAh)
Bracket for DIN rail	B-570	Bracket for DIN rail (GL980 main body), Build-to-order
Cover	B-579	Rubber protector (for replacement)
Carrying case	B-581	Comming soon
Input cable, Safe probe - BNC	RIC-141A	Insulated, 1:1 (42pf), 1.2 m long, 300 V DC, CAT II
Input cable, BNC - BNC	RIC-142	Insulated, 1.5 m long, 1000 V DC, CAT II
Input cable, Banana - BNC	RIC-143	Insulated, 1.6 m long, 600 V DC, CAT II
Clip, Alligator (small size)	RIC-144A	For RIC-143, Aperture 11 mm, 300 V DC, CAT II, Max. 15 A
Clip, Alligator (middle size)	RIC-145	For RIC-143/147, Aperture 20 mm, 1000 V DC, CAT II, Max. 32 A
Clip, Grabber	RIC-146	For RIC-143/147, Aperture 5 mm, 1000 V DC,CAT III, Max. 1 A
Input cable, Banana - BNC (Hi-voltage)	RIC-147	Insulated, 1.6 m long, 1000 V DC, CAT II
Input terminal adapter	SMA-102	Banana (receptacle) to BNC (plug), Insulated
AC Adapter	ACADP-20	Input: 100 - 240 V AC, Output: 24 V DC

Input/Output cable for GL
B-513

Input cable, Safe probe - BNC
RIC-141A

Input cable, BNC - BNC
RIC-142

Clip, Alligator (small size)
RIC-144A

Clip, Alligator (middle size)
RIC-145

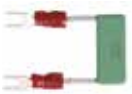
Clip, Grabber
RIC-146

Input cable, Banana - BNC
RIC-143

Humidity sensor
B-530

Input cable, Banana - BNC (Hi-voltage)
RIC-147

Shunt resistor
B-551



- Due to the possibility of equipment or PC failure, the data files on the instrument are not guaranteed to hold memory. Please make a backup of data whenever possible to avoid data loss.
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- Specifications and details are subject to change without notice. For additional information, please check our web site or contact your local representative.

⚠ Use equipment correctly and safely!

- Use only in accordance with product's user manual.
- To avoid malfunction or an electric shock by current leakage or voltage, please ensure ground connection and use according to the specifications.

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