High Speed 1 MS/s Datalogger with Voltage (DC/AC/RMS) and Temperature Measurement

Isolated simultaneous 8 channel data logger

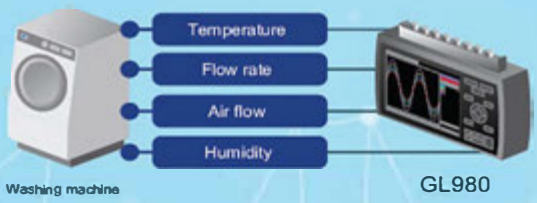
midi LOGGER GL980

- Max 250 Vrms (AC/DC) real time recording and measurement
- 8-ch high speed max 1MS/s simultaneous recording
- 16-bit max 500V p-p monitoring
- Standalone 7.0" TFT-LCD display
- Standard thermocouple and voltage measurement with M3 terminal and Isolated BNC Connection
- Built-in RAM (4MS/ch) and built-in Flash (4GB)

Typical applications

■ Measurement of control device

■ Measurement for testing washer and dryer

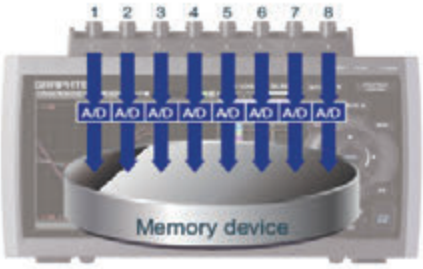


■ Measurement as an XY recorder

■ Measurement for brake components testing

High Speed 1 MS/s Simultaneous Sampling with Isolated Inputs

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



Simultaneous sampling — Sampling interval: 1 µs to 60 sec (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)

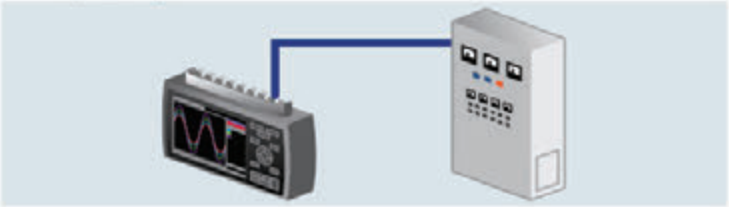
Thermocouple: K, J, E, T, R, S, B, N, W (WRe5-26)
Humidity: 0 to 100 %
* Required humidity sensor (B-530 option).

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.

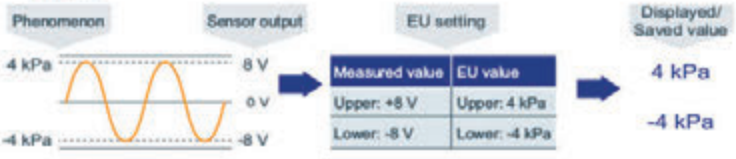
- Measure repetitive waveforms such as vibration with instantaneous value and effective value.
  - Measures either instantaneous value or effective value (RMS). By utilizing the trigger feature to measure abnormal spikes in the continuous waveform, users can measure vibration abnormalities repeatedly.



- 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, Alarm, External, Scheduled time, Scheduled day, Elapsed time, Every hour * 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 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 the following methods.

When alarm is detected

- Display to screen (Digital value of alarm origin channel is displayed in red)
- Save alarm information to measurement data file
- Alarm signal output
  - 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
  - * Required Input/Output cable for GL series (B-513 option) for connecting signal.

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, X-Y 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 (signal in each channel) • 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
	Detection accuracy	± 0.5 % of measurement range
	Pre-trigger	Up to the number of capturing data points (max. 4000000 points) 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
Storage device	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 10000 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 points (*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, 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)

*1: It can set for each channel.
*2: File size of captured data is up to 4 GB in each file.

Item		Description
Operating environment		0 to 40 °C 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)
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. 256 x 161 x 83 mm (with the rubber protector)
Weight		Approx. 1.5 kg (the protector 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, 60 sec * When using built-in RAM: 1 µs to 60 s, using other storage: 1 ms to 60 s		
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		
	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 - 100 kHz)		
	Temperature (Thermocouple) (*9)	Type	Measurement range	Measurement accuracy
		R/S	0 ≤ TS ≤ 100 °C	± 7.0 °C
			100 < TS ≤ 300 °C	± 5.0 °C
			R: 300 < TS ≤ 1600 °C	± (0.05 % of reading + 3.0 °C)
			S: 300 < TS ≤ 1760 °C	± (0.05 % of reading + 3.0 °C)
		B	400 ≤ TS ≤ 600 °C	± 5.5 °C
			600 < TS ≤ 1820 °C	± (0.05 % of reading + 3.0 °C)
		K	-200 ≤ TS ≤ -100 °C	± (0.05 % of reading + 3.0 °C)
			-100 < TS ≤ 1370 °C	± (0.05 % of reading + 2.0 °C)
		E	-200 ≤ TS ≤ -100 °C	± (0.05 % of reading + 3.0 °C)
			-100 < TS ≤ 800 °C	± (0.05 % of reading + 2.0 °C)
		T	-200 ≤ TS ≤ -100 °C	± (0.1 % of reading + 2.5 °C)
			-100 < TS ≤ 400 °C	± (0.1 % of reading + 1.5 °C)
		J	-200 ≤ TS ≤ -100 °C	± 3.7 °C
			-100 < TS ≤ 100 °C	± 2.7 °C
			100 < TS ≤ 1100 °C	± (0.05 % of reading + 2.0 °C)
		N	-200 ≤ TS < 0 °C	± (0.1 % of reading + 3.0 °C)
			0 ≤ TS < 1300 °C	± (0.1 % of reading + 2.0 °C)
		W	0 ≤ TS ≤ 2315 °C	± (0.1 % of reading + 2.5 °C)
		Reference Junction Compensation (R.J.C.) accuracy: ± 1.0 °C		
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 DC		
	Between channel - GND	60 V DC		
Maximum voltage (withstand)	Between channels	1000 V DC (1 minute)		
	Between channel - GND	1000 V DC (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)		

*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 points
*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, varies with signal frequency in RMS measurement.
- GND terminal is connected to ground.
- It is placed vertically.
- In the RMS measurement, 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.

External input & output signal specifications

Item		Description
External input/output	Input (*1, *2)	Logic or Pulse (4 channels), Trigger or Sampling (1 channel)
	Output (*1, *3)	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 (*1)		Executes specified trigger action
External sampling input (*1)		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 approx. 500 µs width pulse (Low active)

Standard accessories

- AC adapter with power cable
- Quick start guide and Safety guide
- CD-ROM (PC application software, User manual)
- Rubber protector (attached to the main body)
- Tilt stand set (including mounting screws M3.5)

*1: Required Input/Output cable for GL series (B-513) option for connecting signal.
*2: Select either Logic input (4 channels) or Pulse input (4 channels), select either external Trigger input or Sampling input.
*3: Select either Trigger output (1 channel) or Alarm output (1 channel). Available 3 channels Alarm output always.

Options and Accessories

Item	Model No.	Description
Battery pack	B-569	Rechargeable Lithium-ion battery (7.2 V, 2900mAh)
DC drive cable	B-514	2 m long (no clip on end of cable)
Input/Output cable for GL	B-513	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".)
Bracket for DIN rail	B-570	Bracket for DIN rail (GL2000 main body), Build-to-order
Carrying case	B-581	Used with GL980, GL2000, GL240 and GL840
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
Input cable, Banana - BNC (Hi-voltage)	RIC-147	Insulated, 1.6 m long, 1000 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 terminal adapter	SMA-102	Banana (receptacle) to BNC (plug), Insulated
AC Adapter	ACADP-90	Input: 100 - 240 V AC, Output: 24 V DC

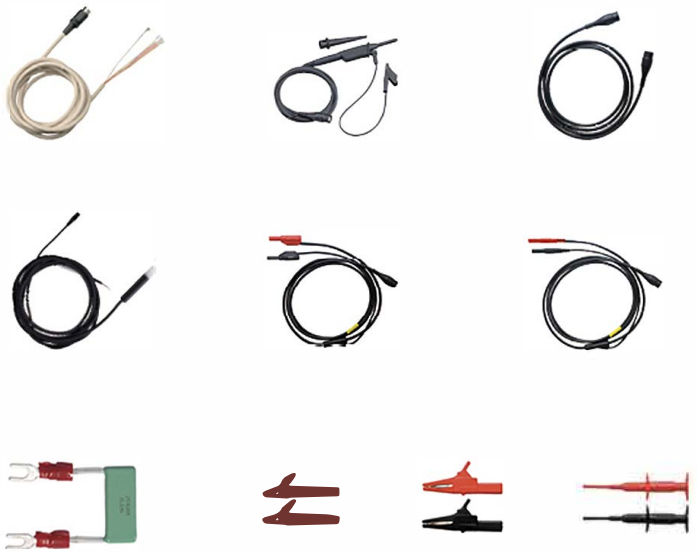
Software specifications

Item		Description
Model name		GL980_2000-APS
Supported OS (*4)		Windows10, 8.1, 8, 7 (SP1 or later)
Functions		Control the GL series, 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 60 s
	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 60 s 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, X-Y graph
File operation		Converting data format to CSV from GBD binary with data between cursors or all data
Dual screen function		Two displays for the current and past data, available at sampling speed 1 kS/s to 1 S/min (interval 1 ms to 60 s)
Statistical calculation		Maximum, Minimum, Average and Peak-to-peak 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.

*4: 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.



- 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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