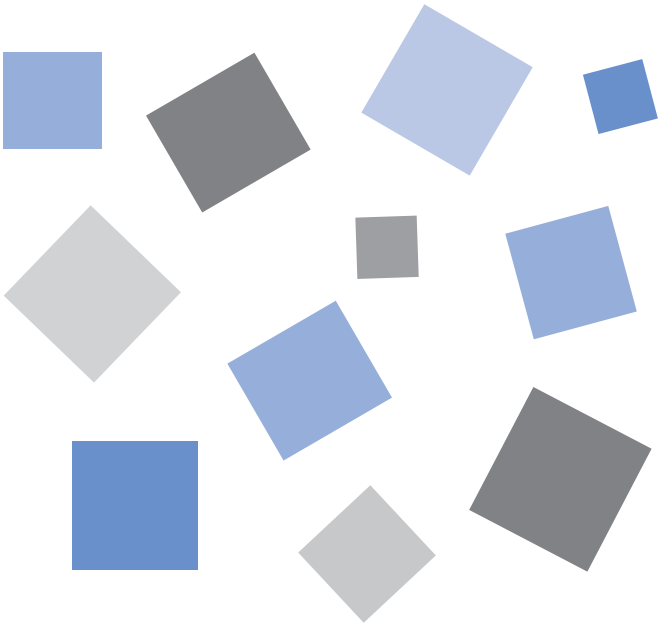
GL200A

midi LOGGER

USER'S MANUAL

MANUAL NO. GL200A-UM-151



GRAPHTEC

Introduction

Thank you for purchasing the GL200A midi LOGGER.
Please read this manual thoroughly before attempting to use your new product to ensure that you use it correctly and to its full potential.

Notes on Use

Be sure to read all of the following notes before attempting to use the GL200A midi LOGGER.

1. Note on the CE Marking

The GL200A complies with the EN61326 (Class A) standard based on the EMC directive (89/336/EMC). It also conforms to the EN61010-1 standard based on the LV directive (72/73/EEC).
Although the GL200A complies with the above-mentioned standards, be sure to use it correctly in accordance with the instructions and notes provided in its User's Manual.
Moreover, use of the GL200A by incorrect procedures may result in damage to the GL200A or may invalidate its safeguards. Please confirm all of its notes regarding use and other related information to ensure correct use.

2. Warning

This is a Class A product according to the EMC directive.
In a domestic environment, this product may cause radio interference or may be affected by radio interference to the extent that proper measurement cannot be performed.

3. Notes for Safe Operation

(1) Be sure to use the Graphtec-supplied AC adapter. In environments where there is a lot of noise or where the power supply is unstable, we recommend that you ground the GL200A.

(2) When a high-voltage signal cable has been connected to the main unit's analog signal input terminal, avoid touching the leads of the input terminal's signal cable to prevent electrical shock due to high voltage.

(3) Ensure that the GL200A's power source is positioned so that it can easily be disconnected.

4. Notes on Functions and Performance

(1) Be sure to connect the main unit to an AC or DC power supply that conforms to the rated range. Connection to a non-rated power supply may cause the main unit to overheat and break down.

(2) Do not block the vent on the main unit.
Continued operation with the vent blocked may cause the main unit to overheat and break down.

(3) To avoid malfunctions and other damage, avoid using the GL200A in the following locations.
- Places exposed to high temperature and/or high humidity, such as in direct sunlight or near heating equipment. (Operating range - Temperature: 0 to 40°C, Humidity: 30 to 80% RH)
- Locations subject to excessive salt spray or heavy fumes from corrosive gas or solvents.
- Excessively dusty locations.
- Locations subject to strong vibrations or shock.
- Locations subject to surge voltages and/or electromagnetic interference.

(4) If the main unit becomes soiled, wipe it off using a soft, dry cloth. Use of organic solvents (such as thinner or benzene) causes deterioration and discoloration of the outer casing.

(5) Do not use the GL200A in the vicinity of other devices which are susceptible to electromagnetic interference.

(6) Measured results may not conform to the stated specifications if the GL200A is used in an environment which is subject to strong electromagnetic interference.

(7) Insofar as possible, position the GL200A input signal cables away from any other cables which are likely to be affected by electromagnetic interference.

(8) For stabilized measurement, allow the GL200A to warm up for at least 30 minutes after turning it on.

To Ensure Safe and Correct Use

- To ensure safe and correct use of the GL200A, read this Manual thoroughly before use.
- After having read this Manual, keep it in a handy location for quick reference as needed.
- Do not permit small children to touch the GL200A.
- The following describes important points for safe operation. Please be sure to observe them strictly.

Conventions Used in This Manual

To promote safe and accurate use of the GL200A as well as to prevent human injury and property damage, safety precautions provided in this manual are ranked into the five categories described below. Be sure you understand the difference between each of the categories.

DANGER

This category provides information that, if ignored, is highly likely to cause fatal or serious injury to the operator.

WARNING

This category provides information that, if ignored, is likely to cause fatal or serious injury to the operator.

CAUTION

This category provides information that, if ignored, could cause physical damage to the GL200A.

HIGH TEMPERATURE

This category provides information that, if ignored, is likely to cause burns or other injury to the operator due to contact with high temperature.

ELECTRICAL SHOCK

This category provides information that, if ignored, is likely to expose the operator to electrical shock.

Description of Safety Symbols

The ⚠ symbol indicates information that requires careful attention (which includes warnings). The point requiring attention is described by an illustration or text within or next to the ⚠ symbol.

The ⃠ symbol indicates action that is prohibited. Such prohibited action is described by an illustration or text within or next to the ⃠ symbol.

The ❗ symbol indicates action that must be performed. Such imperative action is described by an illustration or text within or next to the ❗ symbol.

Safety Precautions

⚠ WARNING

Be sure to securely connect the GL200A's power cord.

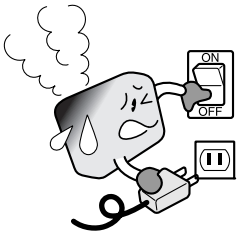
- After checking that the Power switch is turned off, connect the power cord's female plug to the GL200A and then connect its male plug into the electrical socket.
- Use of the GL200A without the power cord securely plugged into the electrical socket may result in electrical shock due to current leakage.
- Before running the GL200A using a DC power supply, be sure to ground the protective ground terminal (⏚) to avoid electrical shock and fire hazards. For grounding, use a ground wire with a diameter of at least 0.75 mm^2.
  When using the GL200A in an environment where grounding is not possible, ensure that the voltage to be measured is no greater than 50 V (DC or rms).

Securely connect the power cord
Make sure that the socket has a good protective ground

If the GL200A generates smoke, is too hot, emits a strange odor, or otherwise functions abnormally, turn off its power and unplug its power cord from the electrical socket.

- Use of the GL200A in such status may result in a fire hazard or electrical shock.
- After checking that smoke is no longer being generated, contact your sales representative or nearest Graphtec vendor to request repair.
- Never try to perform repair yourself. Repair work by inexperienced personnel is extremely dangerous.

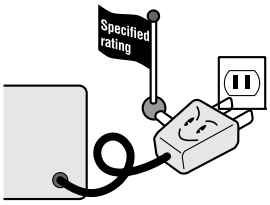
Amateur repair prohibited



Before turning on the GL200A, ensure that the electric socket's supply voltage conforms to the GL200A's power rating.

- Use of a different supply voltage may cause damage to the GL200A or a fire hazard due to electrical shock or current leakage.

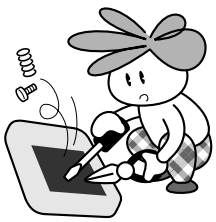
Use of a different supply voltage prohibited



Never disassemble or remodel the GL200A.

- Such action may cause a fire hazard due to electric shock or current leakage.
- Contact with a high-voltage component inside the GL200A may cause electric shock.
- If repair is required, contact your sales representative or nearest Graphtec vendor.

No disassembly

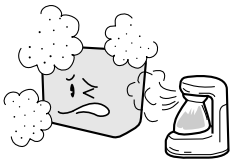


Avoid using the GL200A in extremely dusty or humid places.

- Such use may cause a fire hazard due to electrical shock or current leakage.

Use prohibited

Watch out for electrical shock



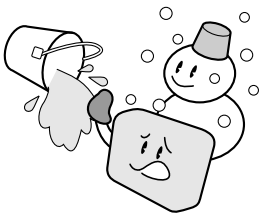
Safety Precautions

⚠ WARNING

Avoid using the GL200A in places where it may be exposed to water such as bathrooms, locations exposed to wind and rain, and so on.


Avoid water


Watch out for electrical shock

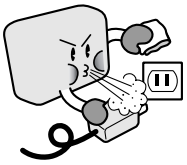


Prevent dust or metallic matter from adhering to the power supply connector.

- Adhesion of foreign matter may cause a fire hazard due to electrical shock or current leakage.


No foreign matter

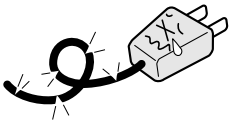

Watch out for electrical shock



Never use a damaged power cord.

- Use of a damaged cord may result in a fire hazard due to electrical shock.
- If the cord becomes damaged, order a new one to replace it.


Unplug the power cord from the socket



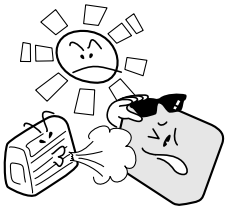
Safety Precautions

⚠ CAUTION

Do not use or store the GL200A in a location exposed to direct sunlight or the direct draft of an air conditioner or heater.

- Such location may impair the GL200A's performance.


Storage/Use prohibited



Do not place coffee cups or other receptacles containing fluid on the GL200A.

- Fluid spilling inside the GL200A may cause a fire hazard due to electrical shock or current leakage.

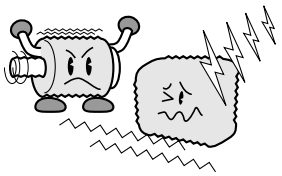

Avoid fluids


Watch out for electrical shock

Do not use the GL200A in a location subject to excessive mechanical vibration or electrical noise.

- Such location may impair the GL200A's performance.

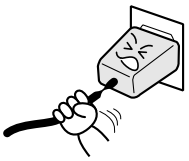

Use prohibited



To insert or disconnect the power cord or a signal input cable, grasp the power cord's plug or the signal input cable's connector.

- Pulling the cord/cable itself damages the cord/cable, resulting in a fire hazard or electrical shock.

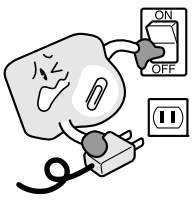

No pulling



If fluid or foreign matters enters inside the GL200A, turn off the Power switch and disconnect the power cord from the electrical socket.

- Use in such status may cause a fire hazard due to electrical shock or current leakage.
- Contact your sales representative or nearest Graphtec vendor to request repair.


Unplug the power cord from the socket



Do not input voltage that exceeds the permissible input voltage range that is specified on the GL200A's label.

- Exceeding the specified voltage input range may cause electrical shock or a fire hazard.


Use prohibited

Safety Precautions

⚠ CAUTION

Do not attempt to lubricate the GL200A's mechanisms.

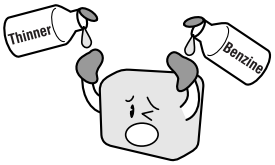
- Such action may cause the GL200A to break down.

No lubrication

Never clean the GL200A using a volatile solvent (such as thinner or benzine).

- Such action may impair the GL200A's performance.
- Clean off any soiled areas using a soft dry cloth.

No volatile solvents



CONTENTS

CHAPTER 1

General Description

This chapter provides a general description of the GL200A and its features.

1.1 Overview

The GL200A (with color monitor and internal memory) are compact, lightweight data loggers.
GL200A are equipped with an Internal memory to enable the direct capture of a large volume of data to USB memory. Furthermore, the data loggers can be connected to a PC via USB to enable on-line settings, measurement, and data capture.

1.2 Features

Input

(1) Adoption of an M3 screw type terminal facilitates wiring.

(2) The GL200A enables settings to be made using dedicated keys and interactive menus, using just one hand.

Display

(1) With the GL200A's 3.5-inch TFT color liquid crystal display, you can confirm the waveforms of measured data and each channel's settings at a glance.

Data Capture

(1) A large volume of measured data can be saved to a USB memory.

(2) The USB memory device can be removed and replaced without terminating data capture operations. This allows any part of the data to be extracted during long capture operations.

(3) Internal memory used for the built-in memory maintains captured data even after the power is turned off.

(4) The Internal memory can be used with disk images thus multiple data items can be maintained.

(5) For voltage and humidity measurements, data can be captured up to a sampling speed of 10 ms/1ch by setting fewer channels for measurement (sampling speed is 100 ms and above for temperature measurements).

Data Control & Processing

(1) The application software provided lets you set conditions and monitor data on on a computer using the USB interface.

(2) The application software allows you to control multiple GL200A units from a single computer to easily perform multi-channel measurements.

(3) The USB drive mode function enables the GL200A's internal memory to be recognized as an external drive by your PC. (Connect the GL200A to your PC and turn on the power supply to the GL200A while holding down the [START] key.)

(4) Captured data can be read from the application software to files and displayed for processing.

(5) Data can be transferred off-line to a computer using USB memory.

1.3 Operating Environment

This section explains the operating environment for the GL200A.

Ambient Operating Conditions

(1) Ambient temperature and humidity (the GL200A must be operated within the following ranges.)
- Temperature range: 0 to 40°C
- Humidity range: 30 to 80% RH

(2) Environment (do not use in the following locations.)
- A Location such as being exposed to direct sunlight
- Locations exposed to salty air, corrosive gases, or organic solvents
- Dusty locations
- Locations subject to vibration or impact
- Locations subject to voltage surge or electromagnetic interference such as lightning or electric furnaces

(3) Installation category (over-voltage category)
- The GL200A conforms to the IEC664 installation category Ⅰ
- This device cannot be used in installation categories Ⅱ, Ⅲ, or Ⅳ.

CHECKPOINT

If condensation occurs...
Condensation occurs in the form of water droplets on the device surfaces and interior when the GL200A is moved from a cold to a warm location. Using the GL200A with condensation will cause malfunctioning. Wait until the condensation has disappeared before turning on the power.

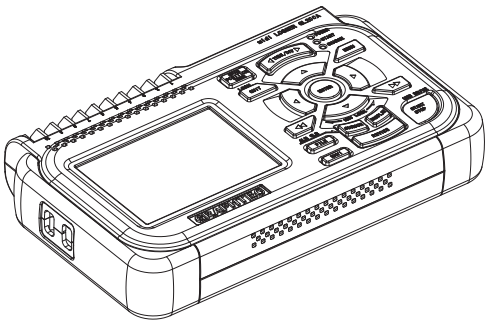
Warming-up Before Use

The GL200A should be allowed to warm up with the power turned on for approximately 30 minutes to ensure that it operates according to the specified performance.

Configuration When in Use

Do not use the GL200A standing upright or at an angle. It must always be laid flat.

Usage Configuration



CAUTION

Do not block the air vent on the GL200A, as this will cause malfunctioning.
Measurement accuracy may not be satisfactory if the system is used in a condition other than described above.

1.4 Notes on Temperature Measurement

Please observe the following precautions when performing temperature measurement.

(1) Do not block the air vents. Always provide a space of at least 30 cm on all sides of the GL200A.

(2) For stabilized temperature measurement, allow the GL200A to warm up for at least 30 minutes after turning it on.

(3) Exposure of the input terminals to direct drafts, direct sunlight, or abrupt changes in temperature may impair the equilibrium of the input parts and result in measurement errors. To measure temperature in such an environment, take appropriate countermeasures such as changing the installation site of the GL200A.

1.5 Notes on Using the Monitor

The monitor is an LCD display unit, and so the display will vary depending on the operating environment.

CHECKPOINT

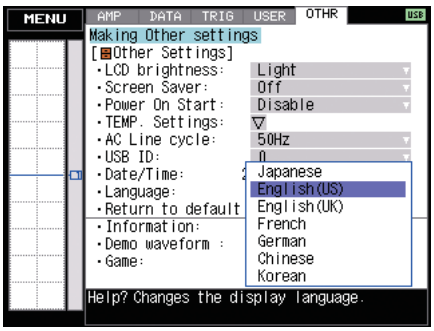
If the screen saver function is used, it will operate and clear the screen if no operations are performed during the preset time. If the screen saver operates, press any key to restore the display.

CAUTION

- Condensation may form on the LCD screen if the GL200A is moved from a cold to a warm location. If this occurs, wait until the LCD screen warms up to room temperature.
- The LCD screen is manufactured to extremely high precision. Black dots may appear, or red, blue, and green dots may not disappear. Likewise, streaks may appear when viewed from certain angles. These phenomena are due to the LCD screen construction, and are not signs of a fault.

1.6 Changing the Display Language

You can choose either English, Japanese, French, German, Chinese, or Korean as the language displayed on the screen. The default display language is set to English when the GL200A is shipped overseas. To change the display language, see the instructions in "OTHR:Language".



CHAPTER 2

Checks and Preparation

This chapter explains how to check the GL200A's external casing and accessories, and how to prepare the GL200A for operation.

2.1 Checking the Outer Casing

After unpacking, check the GL200A's outer casing before use. In particular, please check for the following:

- Surface scratches
- Other flaws such as stains or dirt

2.2 Checking the Accessories

After unpacking, check that the following standard accessories are included.

Standard Accessories

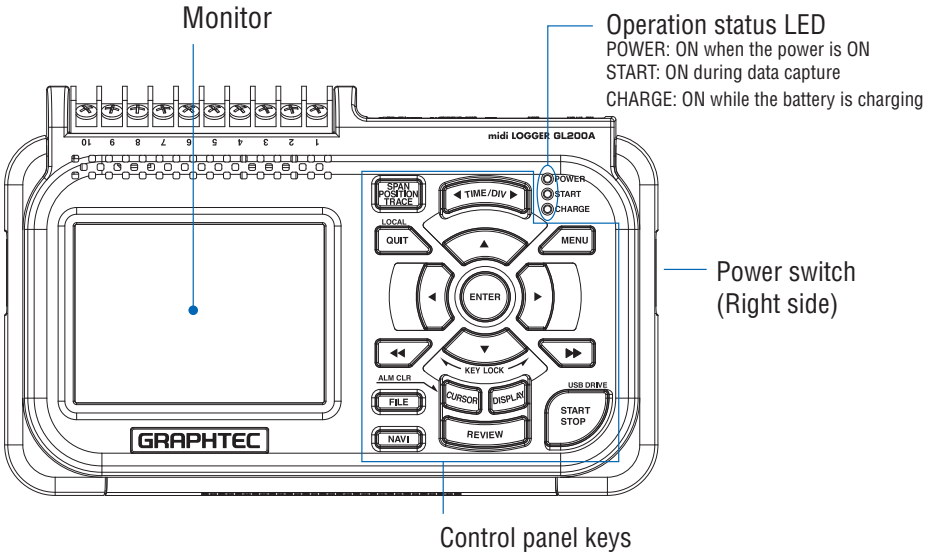
Item	Remarks	Quantity
Quick Start Guide	GL200A-UM-85x	1
CD-ROM	User's Manual, Application software	1
AC cable/AC adapter	100 to 240 VAC, 50/60 Hz	1

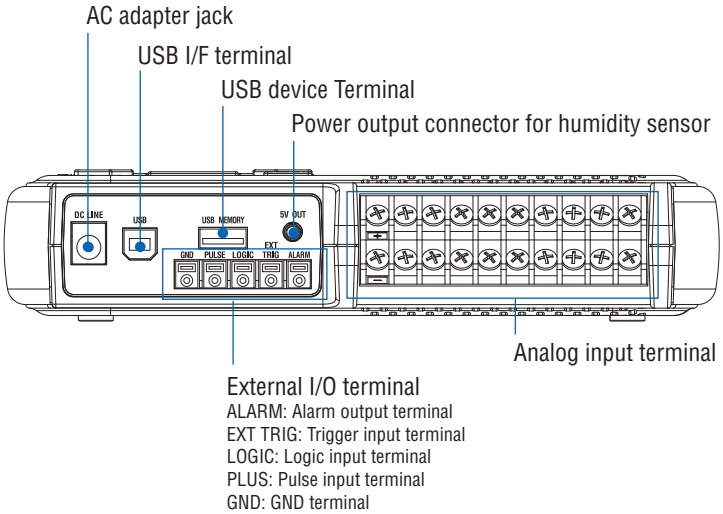
Optional Accessories

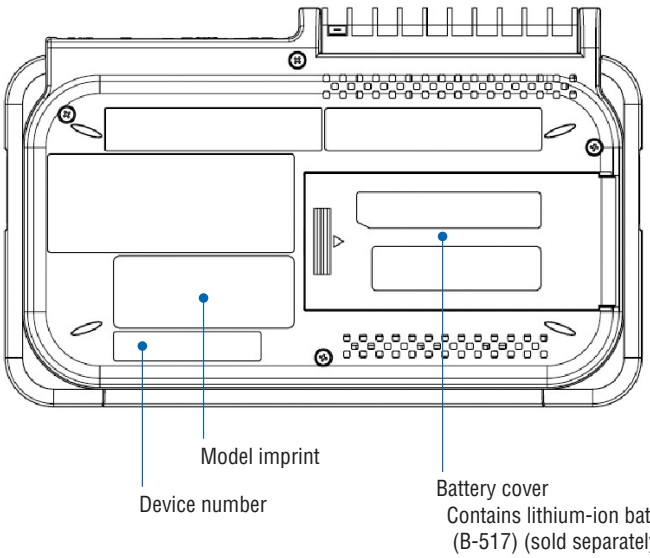
Item	Option No.	Remarks
Battery pack	B-517	
DC drive cable	B-514	Bare tips (2 m)
T-type thermocouple	JBS-7115-5M-T	5-m length, 4 thermocouples per set
K-type thermocouple	JBS-7115-5M-K	5-m length, 4 thermocouples per set
Humidity sensor	B-530	3-m length

2.3 GL200A Part Names and Functions

This section describes the names and function of parts of the GL200A.







2.4 Connecting the Power Cable and Turning on the Power

This section describes how to connect the power cable and turn on the power. The connection method will vary depending on the type of power supply used.

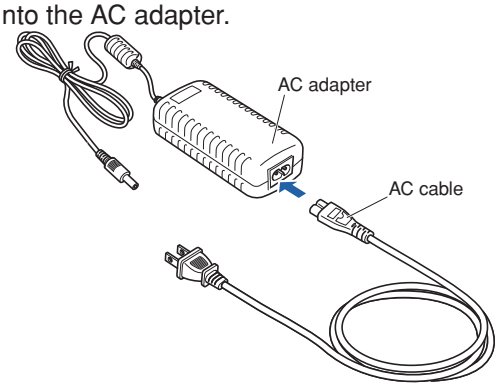
Connecting to an AC Power Supply

Use the AC cable and AC adapter that are provided as accessories.

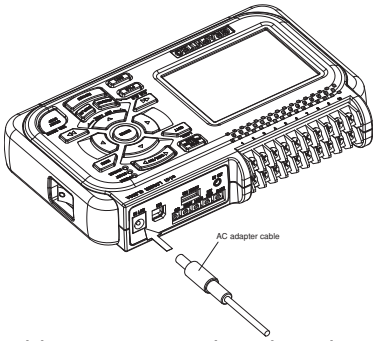
⚠CAUTION

Be sure to use the AC adapter that is supplied as a standard accessory.

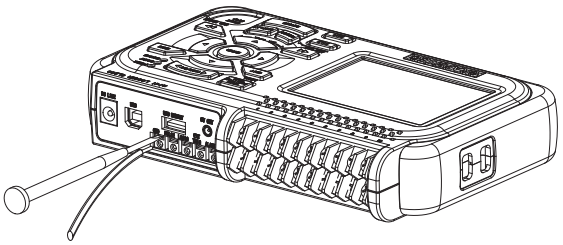
(1) Plug the AC cable into the AC adapter.



(2) Connect the output side of the AC adapter to the connector on the GL200A.



(3) Using the flat-blade screwdriver, press against the minus (-) button above the GND terminal, while connecting the grounding cable to the GL200A. Connect the other end of the cable to ground.



(4) Plug the AC cable into the mains power outlet.

(5) Press the power switch on the GL200A to the ON side to turn on the power.

⚠CAUTION

Always connect the GND terminal and refer to the safety precautions. The GL200A must be grounded even when connected to other devices and sharing a common ground level.

Connecting to a DC Power Supply

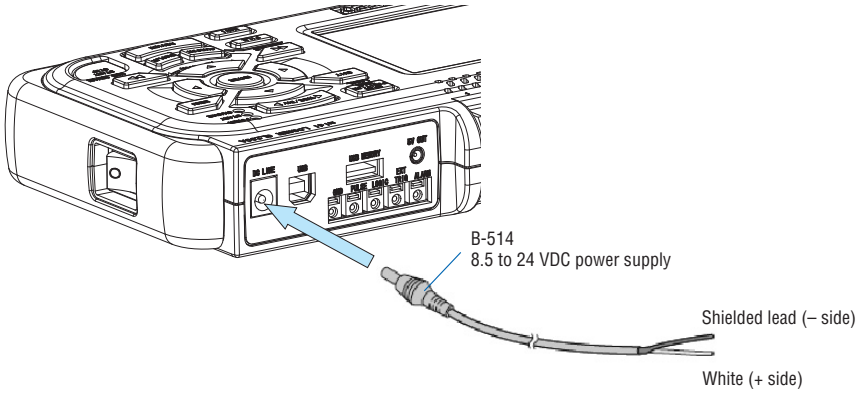
Use the optional DC drive cable (B-514).

⚠CAUTION

Use a power supply within the 8.5 to 24 VDC range.

(1) Configure the tip of the DC drive cable (B-514: 2m) to enable it to be connected to the DC power supply.

(2) Connect the DC output side to the power supply connector on the GL200A.



(3) Connect the DC input side to the DC power supply.

⚠CAUTION

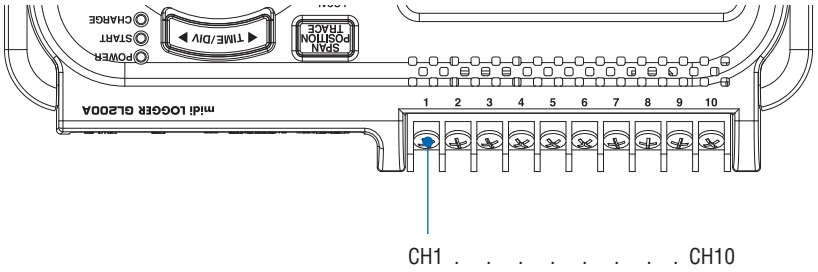
Be sure to check the polarity of the wire tips when performing wiring.

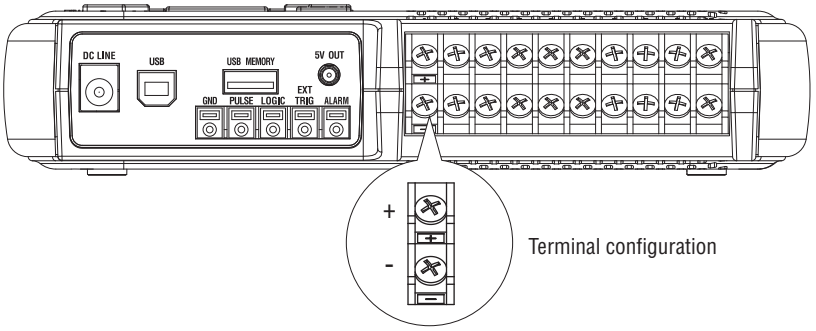
(4) Press the power switch on the GL200A to the ON side to turn on the power.

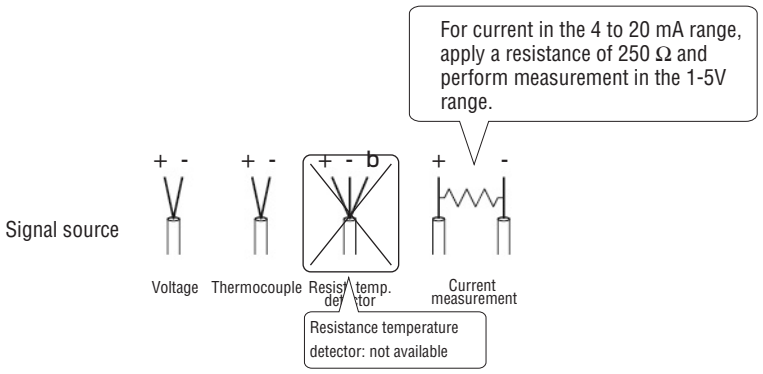
2.5 Connecting the Signal Input Cables

This section describes how to connect the signal input cables.

Terminal Configuration and Signal Types







+ ..... High-voltage terminal (terminal for high-voltage input signals)
– ..... Low-voltage terminal (terminal for low-voltage input signals)

Item	Description
Input configuration	Isolated input, scanning
Analog voltage	20, 50, 100, 200, 500 mV/F.S.; 1, 2, 5, 10, 20, 50 V/F.S.; 1-5V
Thermocouples	K, J, E, T, R, S, B, N, W (WRe 5-26)
A/D resolution	16-bit
Filter	Off, 2, 5, 10, 20, 40 Filter operation is on a moving average basis. The average value of the set sampling count is used.

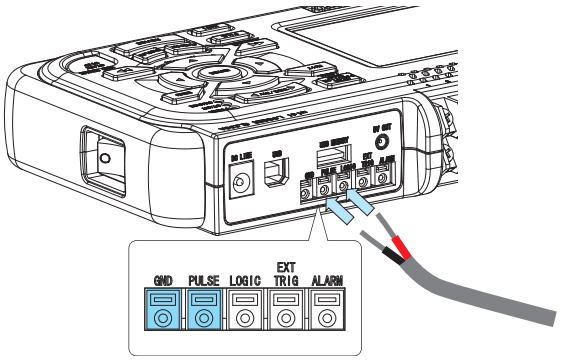
2.6 Connecting the External I/O Cable

Connecting the pulse input cable

To measure pulse signals, wire the cable to the PULSE terminal as shown below.

Use a flat-blade screwdriver to push the minus (-) button above the terminal, insert the wire and then remove the screwdriver.

After finishing wiring, lightly pull the wire to make sure it does not come out.



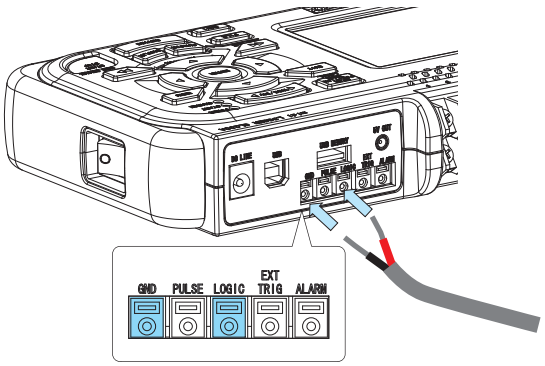
Item	Description
Number of channels	1
Input voltage range	0 to +24V max. (single-ended ground input)
Threshold level	+2.5V
Hysteresis	Approx. 0.5 V (+2.5 to +3 V)

Connecting the logic input cable

To measure logic signals, wire the cable to the LOGIC terminal as shown below.

Use a flat-blade screwdriver to push the minus (-) button above the terminal, insert the wire and then remove the screwdriver.

After finishing wiring, lightly pull the wire to make sure it does not come out.



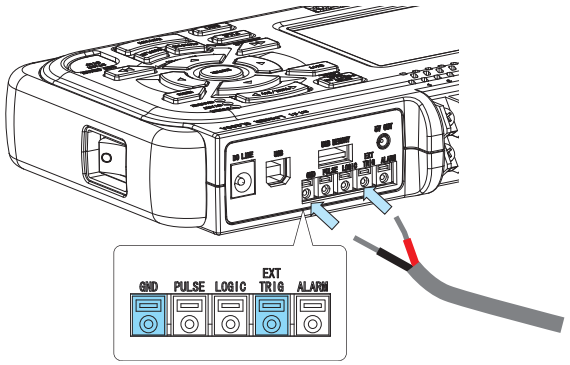
Item	Description
Number of channels	1
Input voltage range	0 to +24V max. (single-ended ground input)
Threshold level	+2.5V
Hysteresis	Approx. 0.5 V (+2.5 to +3 V)

Connecting the trigger input cable

To input trigger signals from an external device, wire the cable to the EXT TRIG terminal as shown below.

Use a flat-blade screwdriver to push the minus (-) button above the terminal, insert the wire and then remove the screwdriver.

After finishing wiring, lightly pull the wire to make sure it does not come out.



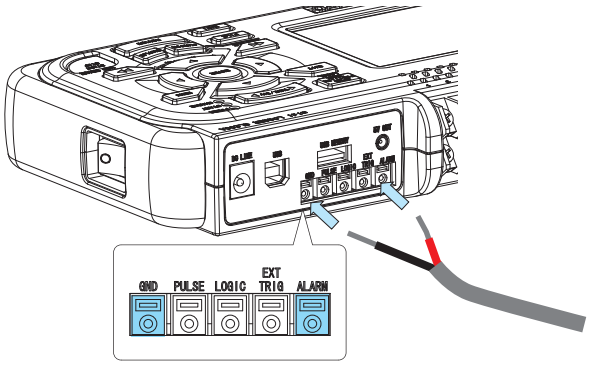
Item	Description
Number of channels	1
Input voltage range	0 to +24V max. (single-ended ground input)
Threshold level	+2.5V
Hysteresis	Approx. 0.5 V (+2.5 to +3 V)

Connecting the alarm output cable

To output alarm signals, wire the cable to the ALARM terminal as shown below.

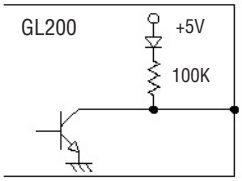
Use a flat-blade screwdriver to push the minus (-) button above the terminal, insert the wire and then remove the screwdriver.

After finishing wiring, lightly pull the wire to make sure it does not come out.



Item	Description
Number of channels	1
Maximum rating	VCEO (voltage between connector and emitter): 30V IC (connector current): 0.5A

Alarm Output Circuit



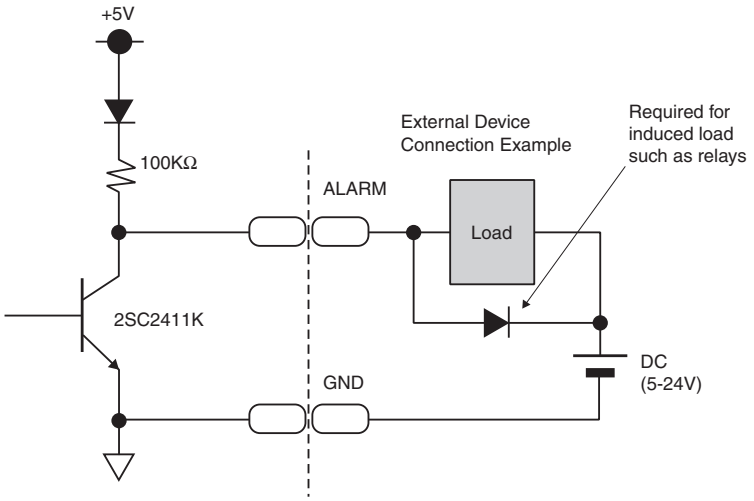
Maximum rating

VCEO (voltage between connector and emitter) : 30V
IC (connector current) : 0.5A
PC (connector lost) : 0.2W

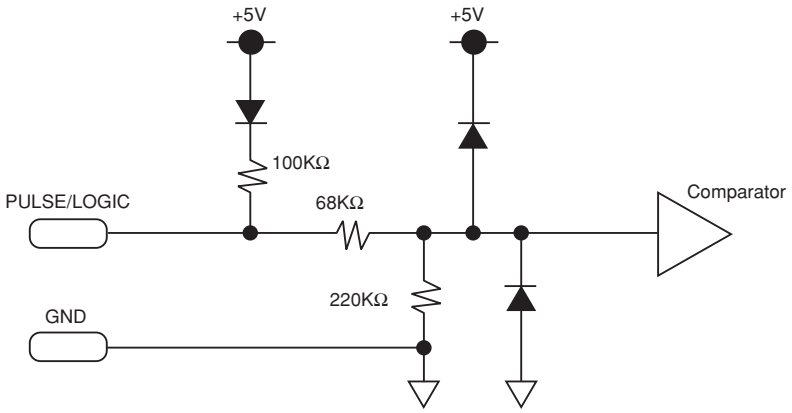
Note: Be sure to not to exceed the maximum ratings

Internal Equivalent Circuit of the Input/Output Circuit

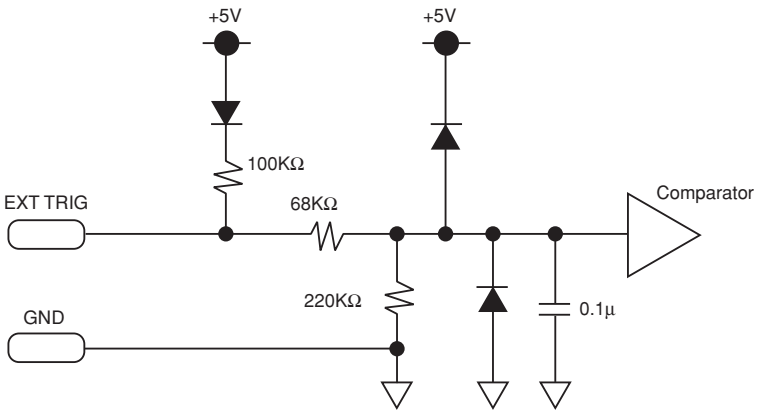
Alarm Output



Logic/Pulse Input



Trigger Input



2.7 Attaching USB Memory

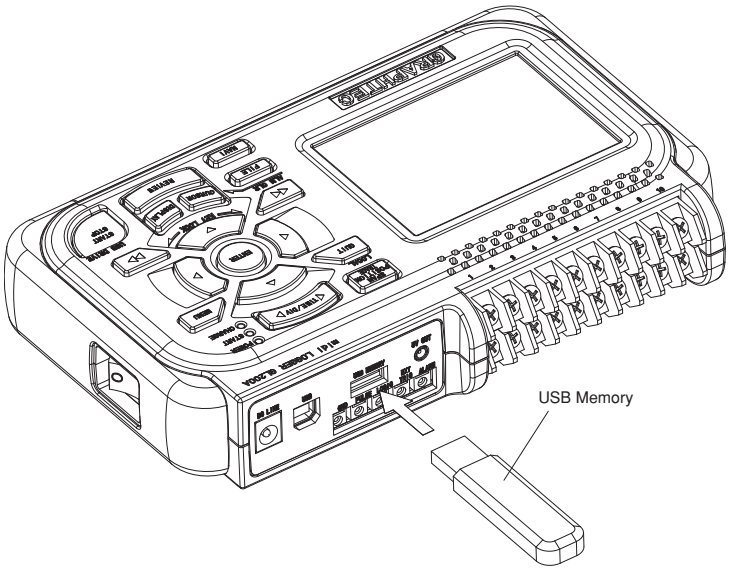
Attaching USB memory to the GL200A allows you store measured data directly.

⚠CAUTION

Adequate precautions against static electricity must be taken when handling USB memory.

Inserting a USB Memory

Attach the USB memory to the USB memory port.



⚠CAUTION

When you attach the USB memory to GL200A, be careful during handling so as not to bump or drop the unit.

Supported USB Memory Specifications

- Power supply: +5 V
- Power consumption: 250 mA or below
- Capacity: no limit (each file must be smaller than 2 GB)

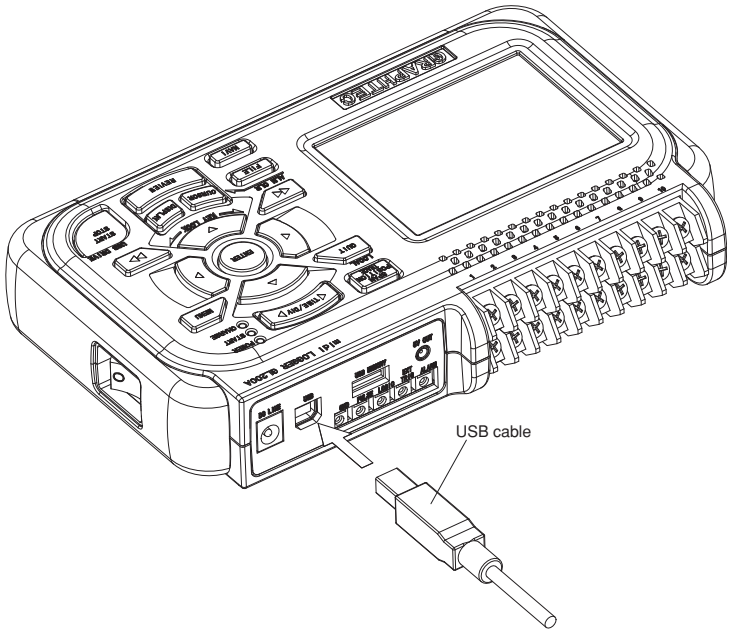
*** USB memory sticks with security functions, such as fingerprint authentication, are not supported.**

2.8 Connecting to a PC

Use the USB cable to connect the GL200A to a PC.

Connection Using a USB Cable

Use the USB cable to connect the GL200A to a PC.



CHECKPOINT

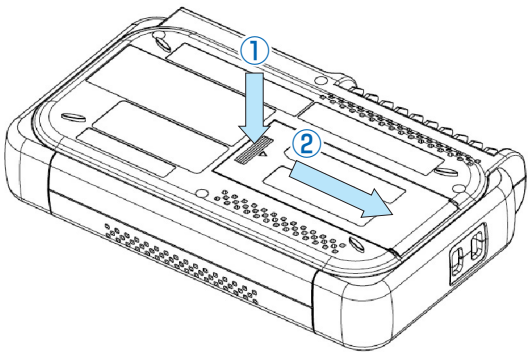
If the USB cable is used, the USB driver must be installed in your PC. Please refer to "Application Software Instruction Manual" for the installation procedure.

2.9 Using the Battery Pack (Option)

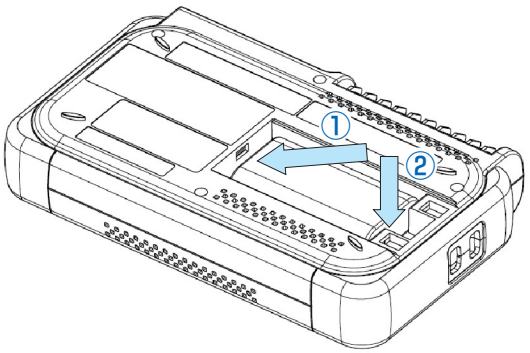
The B-517 battery is the only battery type that can be used with the GL200A.

Mounting the Battery Pack

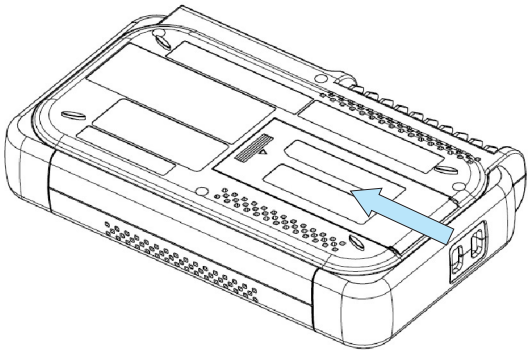
(1) While lightly pushing the grip of the battery cover, slid the cover in the direction indicated by the arrow.



(2) Attach the lithium-ion battery (B-517).



(3) Attach the battery cover.



Charging the Battery

Expected time required for charging:

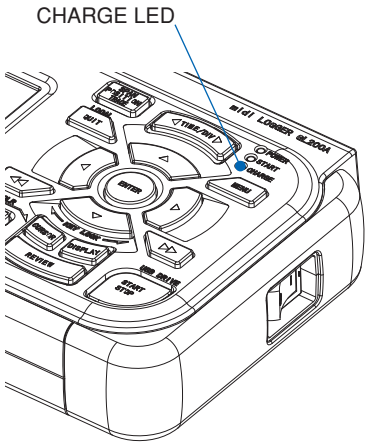
• Approx. 4 hours

The battery pack is charged by mounting it in the GL200A, attaching AC adapter to the GL200A.

(1) Mount the battery pack in the GL200A (see the previous section for the mounting procedure).

(2) Turn on the power to the GL200A. (Please see Section 2.4, "Connecting the Power Cable and Turning on the Power").

(3) The CHARGE LED lights.

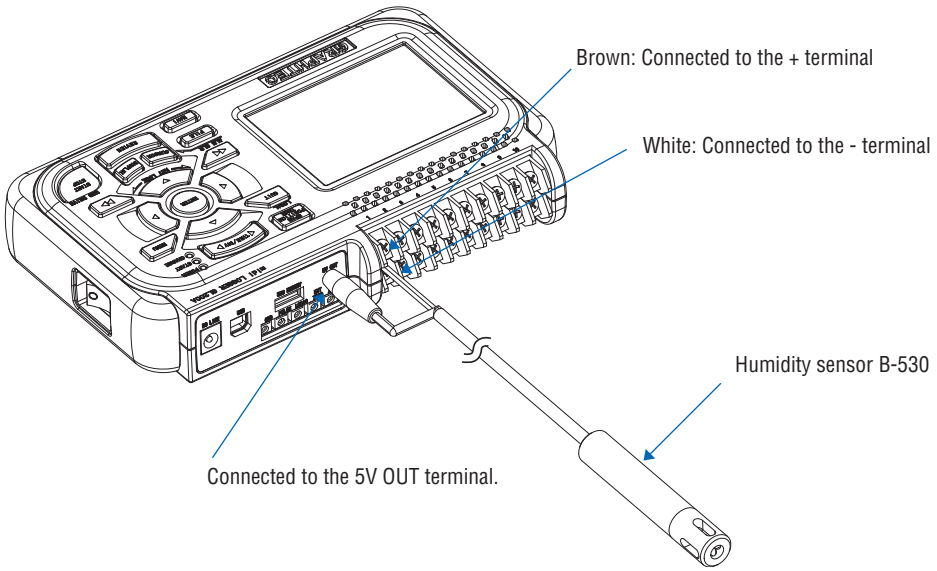


CHECKPOINT

- If battery charging is attempted immediately after the GL200A has been used continuously, charging may not be performed. However, charging will start automatically as soon as the GL200A has cooled down.
  Charging temperature: 15 to 35°C
- If input is being made directly from the DC power supply instead of the AC adapter, the DC voltage must be at least 16V.

2.10 Connecting the Humidity Sensor (Option)

Connect the + and - lead wires of the humidity sensor (the B-530 option) to the desired terminals, and then insert the round connector into the 5V OUT connector on the GL200A.



⚠CAUTION

Do not use the sensor in a strong electrolyte envronment. Measured results may not satisfy to the stated.

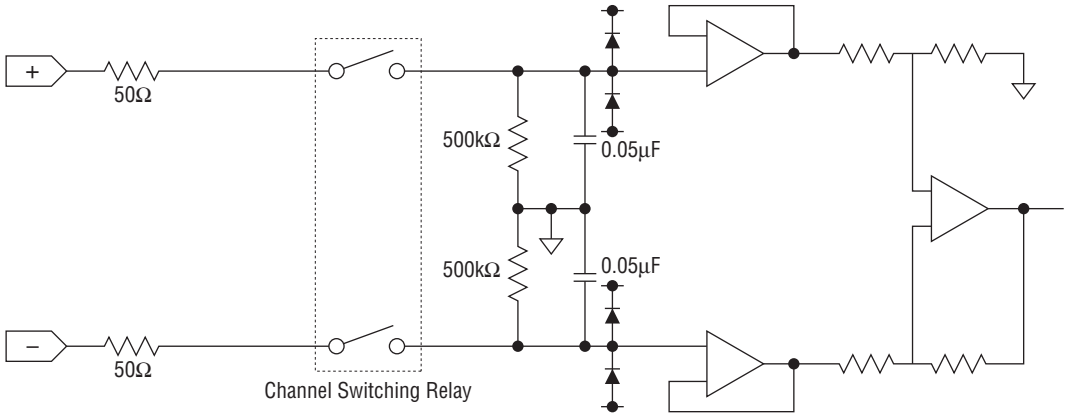
2.11 Precautions to Observe When Performing Measurement

Please be sure to read the following carefully in order to prevent electric shocks or shorts.

⚠DANGER

- Do not input voltages exceeding 30 VAC rms or 60 VDC to any of the individual analog input sections or between the analog input section and the main unit.
- Do not apply high-voltage high-frequency signals (50 kHz and above).
- Be sure to use only the AC adapter provided as a standard accessory. The rated power supply range for the adapter is 100 to 240 VAC, and the rated frequency is 50/60 Hz. Do not use any other voltages.

Input Circuit Diagram for Analog Input (Voltage, Thermocouples)



⚠CAUTION

Capacitors have been incorporated into the input circuit to increase the noise elimination capability. After voltage measurement, when the inputs have been disconnected, there will still be some electric charge remaining. Before starting another measurement operation, short-circuit the + and - terminals to enable self-discharge.
The GL200A has a scan system.
While in the status (open) in which signals are not input to the input terminal, measured results may be influenced by signals from other channels.
In such a case, turn OFF the input setting or short circuit +/-.
If signals are input correctly, measured results are not influenced by other channels.

Noise Countermeasure Examples

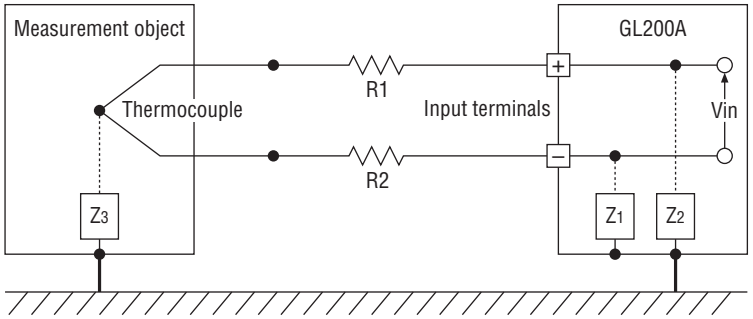
If the measured values fluctuate due to an external noise source, try taking the following countermeasures (effects may vary according to the type of noise source).

Ex1: Connect GL200A's GND to ground.
Ex2: Connect GL200A's GND to measured object's GND.
Ex3: In the AMP settings, set Filter to a value other than Off.
Ex4: Set a sampling interval which enables GL200A's digital filter feature (500 ms or above).
In the OTHR menu, set the frequency of the AC line used.
Refer to page 3-22 for details.

2.12 Noise Countermeasures

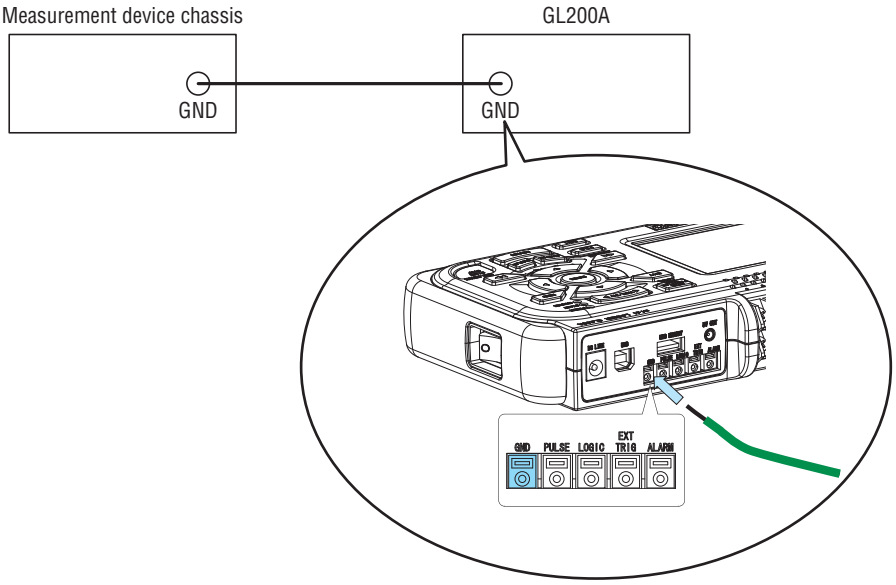
Be sure to connect the chassis GND of the object to be measured.

Ensure that the chassis GND wire of the measurement object is connected to a good ground.



Connect the signal chassis GND and the measurement device chassis ground.

Use a short, thick lead to connect the chassis GND of the measurement object to the GL200A's chassis GND. It will be even more effective if the ground potentials are the same.



To make use of the GL200A's digital filter function, set the commercial power frequency you use. (Remove 50 Hz or 60 Hz noise.)
The effective sampling speed is 500 ms and up.

For details on the setting method, see on page 3-22.

2.13 Setting the Date and Time

If you are using the GL200A for the first time, charge the internal rechargeable battery and then make the date and time settings.

⚠CAUTION

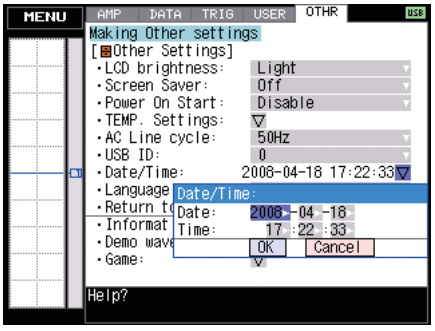
If the GL200A is not used for a period of approximately three months, the internal rechargeable battery may be discharged and the date and time may revert to the initial settings. If this happens, recharge the battery before using the GL200A.

How to Recharge the Rechargeable Battery

Using the AC adapter provided, connect the GL200A to a mains power outlet, turn on the power switch, and then leave the GL200A connected for at least 24 hours.

How to Set the Date and Time

Press the [MENU] key, display the "OTHR" screen, and then set the date and time at the Date/Time Settings sub-menu. For details, see "Date/Time" on page 3-22.

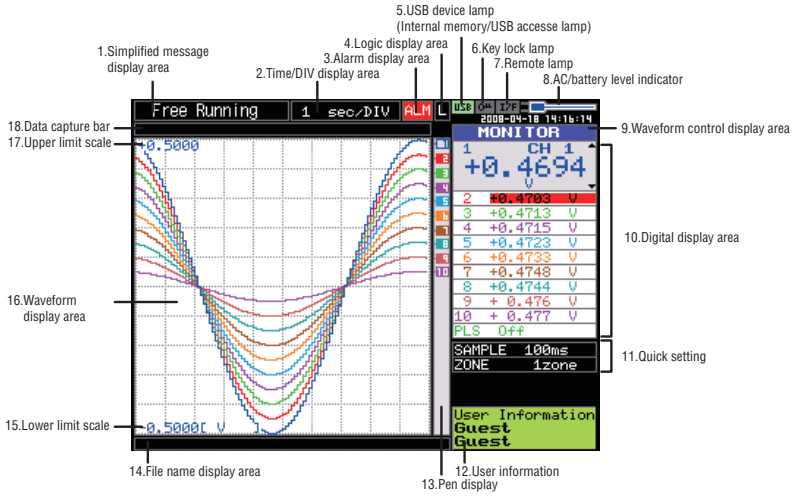


CHAPTER 3

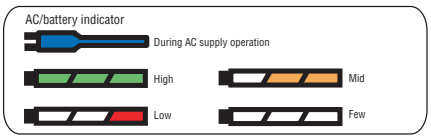
Settings and Measurement

This chapter describes the setting and measurement procedures for the GL200A.

3.1 Window names and functions

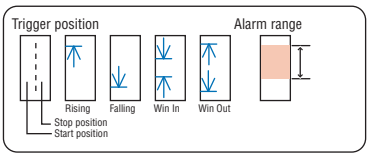


1. Simplified message display area : Displays the operation status.
2. Time/DIV display area : Displays the current time scale.
3. Alarm display area : Displays the alarm output terminal status. (Red = Alarm generated issued, Black = Alarm not generated)
4. Logic display area : Displays the logic signal status. (Blue = Hi, Black = Low)
5. USB device lamp : Lights in green while the USB device is inserted. Lights in red when the main memory and USB device are accessed. Do not turn OFF the device while the USB device is being accessed (indicated in red).
6. Key lock lamp : Displays the key lock status. (Yellow = Locked, Gray = Unlocked)
7. Remote lamp : Lit when the GL200A is in remote mode (Yellow = Remote mode, Gray = Local mode)
8. AC/battery status indicator : Displays the icon when AC power is used and indicates the level when the battery is used.



9. Waveform control display area : Displays the mode when using the SPAN/POSITION/TRACE key to control the waveform.
10. Digital display area : Displays the input value of each channel. Use the ▽△ key to select the channel you want to activate (enlarged display). The waveform of the active channel is displayed at the top.
11. Quick settings : Displays items available for easy operation. Use the ▽△ key to activate the Quick setting area and the ◁▷ key to change values.
12. User information : Displays information about the currently selected user.

13. Pen display : Displays the position of each channel signal, trigger and alarm range.



14. File name display area : Displays the name of the file used to capture data. Displays the replay file name during replay.

15. Lower limit scale : Displays the lower limit scale of the currently active channel.

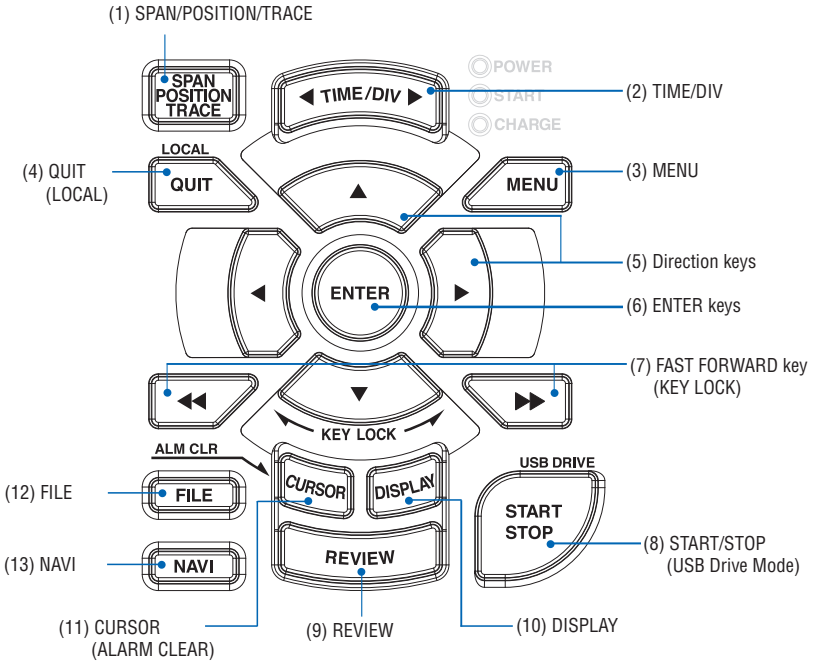
16. Waveform display area : Displays the waveform of the input signal.

17. Upper limit scale : Displays the upper limit scale of the currently active channel.

18. Data capture bar : Indicates the remaining capacity of the capture media during data capture. During replay, indicates information about the displayed position.

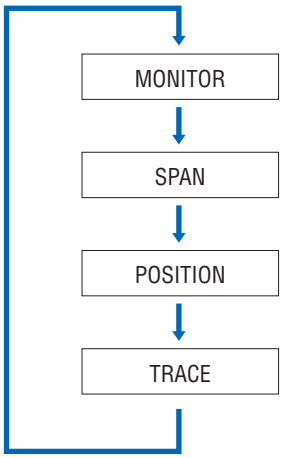
3.2 Key Operation

This section describes key operation.



(1) SPAN/POSITION/TRACE

Switches the display in the digital display area. Used to change the status of the input signal displayed in a waveform during Free Running (when stopped), data capture and data replay. ALL reflects the CH1 settings to all other channels.

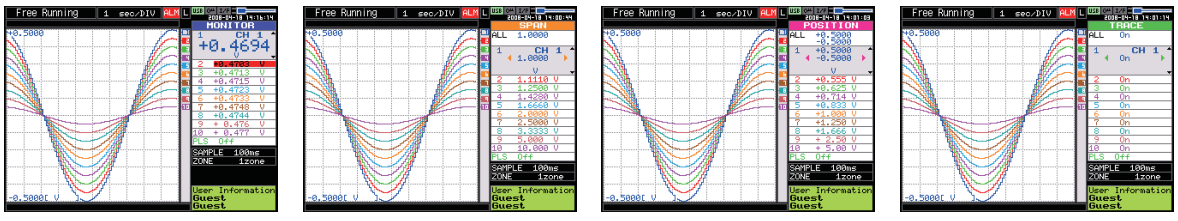


Displays digital values (default status)

Changes the span value (waveform amplitude)
Voltage time: 8 levels
temperature time: 6 levels

Changes the position (waveform up/down position)
Range can be changed in units of 10%

Turns waveform display On/Off (display only)



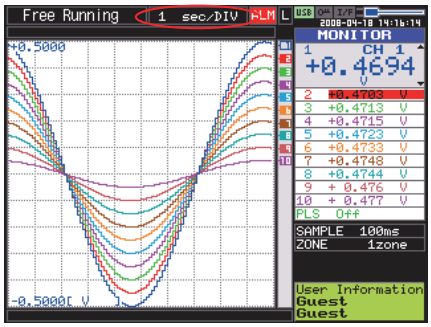
Setting Procedure

1. Switch to the item you want to change (SPAN/POSITION/TRACE key)
2. Adjust to the channel you want to change to (Direction key up/down)
3. Change (Direction key left/right)

Note: When CH1 is off, ALL cannot be selected.

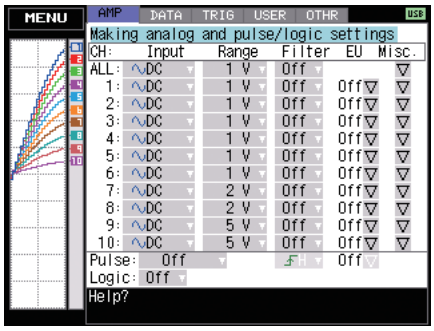
(2) TIME/DIV

Press the left/right key of the TIME/DIV key to change the time axis display width.



(3) MENU

Open the settings window to capture data. For details on settings, see "3.4 Setting Menus" on page 3-13.



(4) QUIT (LOCAL)

This key is primarily used for the following operations.

- To cancel a setting during menu configuration.
- To return to the MONITOR window when the SPAN/POSITION/TRACE window is displayed.
- To return the Enlarged Waveform screen/Digital + Calculation Display screen to the Waveform + Digital screen.
- To cancel remote status (in which keys are disabled) through interface control.
- To close the menu screen.
- To quit data replay.
- To return the Enlarged Waveform Screen/Digital + Calculation Display Screen to the Waveform + Digital Screen.

(5) Direction keys

This key is primarily used for the following operations.

- To move a menu or setting item during menu configuration.
- To move the cursor during replay.
- To move the active channel in the Waveform + Digital screen (up/down keys).
- To change the setting of SPAN/POSITION/TRACE (left/right keys).

(6) ENTER

This key is primarily used for the following operation:

- To finalize setting items during menu configuration or open submenus.

(7) FAST FORWARD key (KEY LOCK)

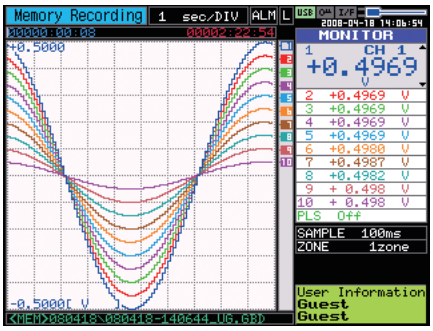
This key is primarily used for the following operations.

- To move the cursor at high speed during replay.
- To change the operation mode in the file box.
- To set key lock (Hold down the left/right FAST FORWARD key for at least two seconds. press again to unlock)

(8) START/STOP (USB Drive Mode)

Press this key to start or stop capture.

- During Free Running, starts capture.
- During capture, stops capture.



- Press the key while turning the power ON to access USB DRIVE Mode.

In USB Drive Mode, the internal memory is recognized by the PC as external storage media.

1. Use a USB cable to connect the GL200A and a PC.
(When the USB driver has not been installed, install it as described in the software manual "Installing the USB Driver".)

2. Connect the USB device to the GL200A.

3. While pressing the GL200A START/STOP key, turn the power ON.

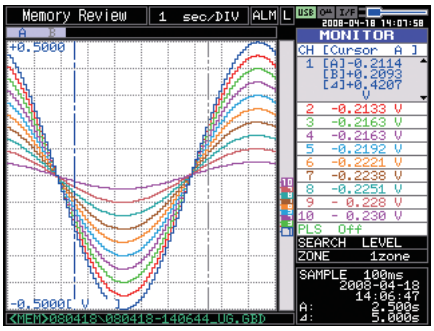
4. The external storage media is recognized by the PC and data exchange becomes possible.

(9) REVIEW

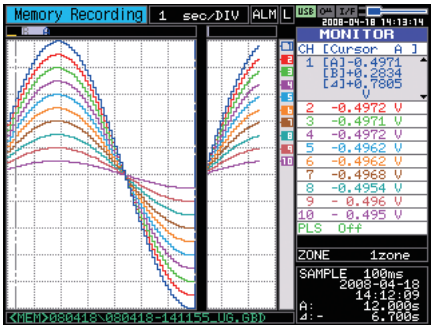
This key is used to replay captured data.

• During Free Running, replays captured data.

The screen used to specify the data replay source file appears; specify the file you want to replay.



• While capturing data, recently captured data is replayed in two windows.

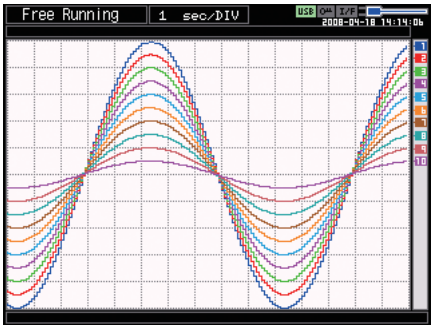


(10) DISPLAY

This key is used to switch the window mode.

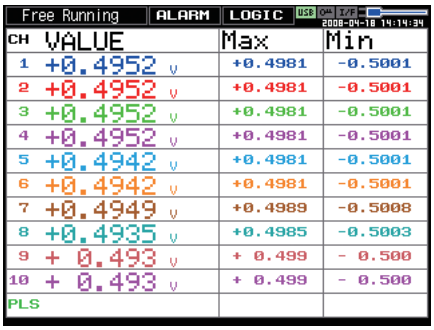
• Waveform + Digital Screen: Default

• Expanded Waveform screen: Displays the waveform in full screen mode.



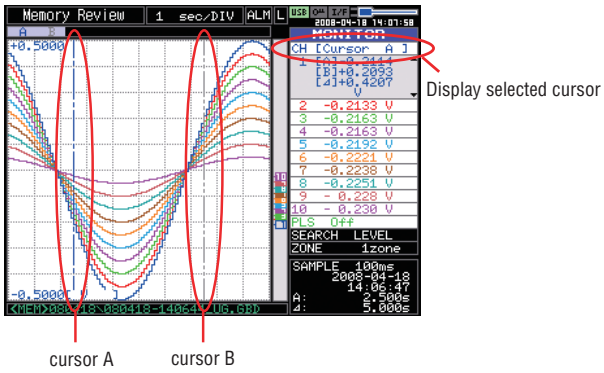
• Digital + Calculation Display screen: Displays digital values and calculation results in large text.

(Calculation results are added up in real time.)

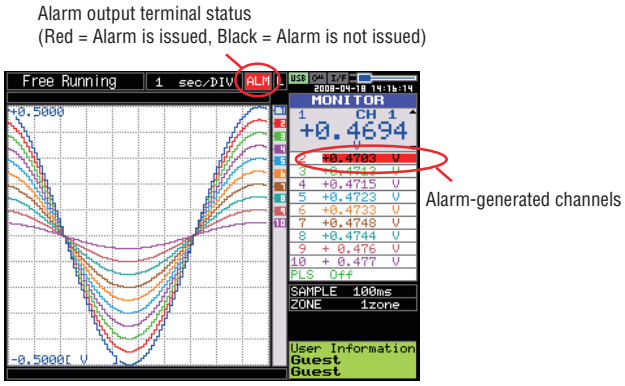


(11) CURSOR (ALARM CLEAR)

• This key is used to toggle between cursors A and B during replay.



• When the alarm setting is “Hold generated Alarm”, the maintained alarm is cleared.



(12) FILE

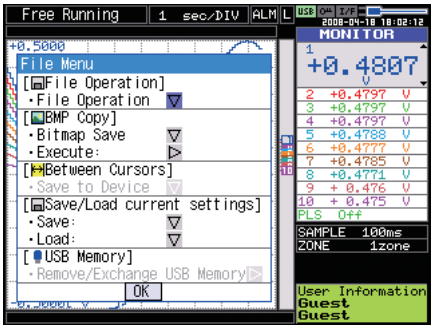
• This key is use for operations related to the Internal memory and USB device (copy and delete).

• Copies the window.

• Saves data between cursor A and cursor B during replay (can be set during replay only)

• Saves or reads the currently set condition into the USB device.

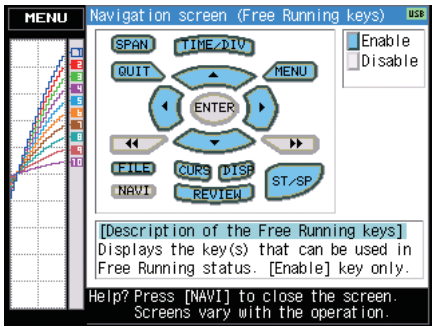
• Used to replace the USB memory device during data capture.



(13) NAVI

This key is used to display the key operation content during Free Running, capture or replay.

During display of the NAVI screen, an explanation of how the key is used is displayed in the window.

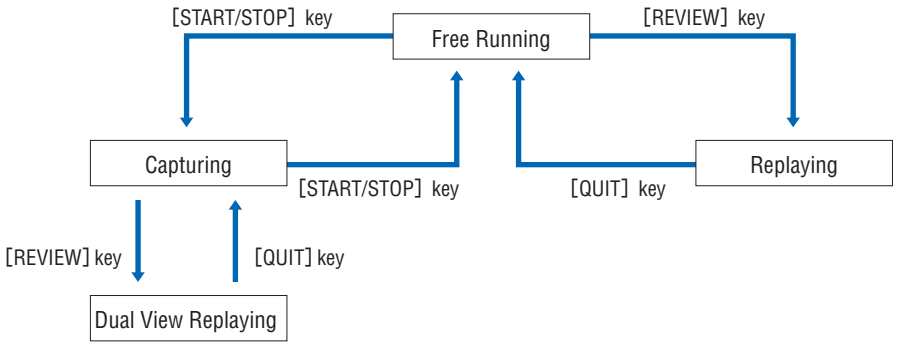


3.3 Operation Modes

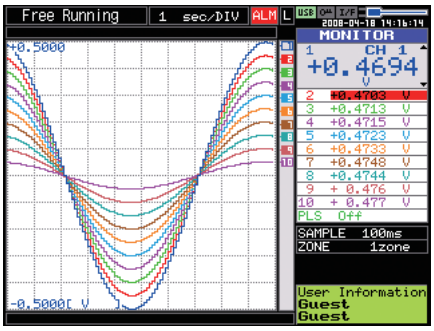
You can check the system operation status in the simplified message display area.

operation	operation	simplified message display
Free Running	**Start up status or data is not being captured**	**Free Running**
Capturing	**Data is being captured in the main memory or USB device.**	**Memory Recording** **USB Drv Recording**
Dual View Replaying	**The current waveform display and data on capturing is being replayed**	**Memory Recording** **USB Drv Recording**
Replaying	**Captured data is being replayed**	**Memory Review** **USB Drive Review**

Operation status transition



(1) Free Running



When in Free Running status, you primarily set up the system to capture data.

You can check the current input signal as a waveform or digital values.

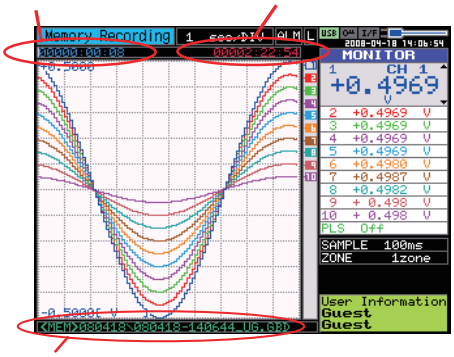
Operations available during Free Running

Measuement parameters settings	The MENU key is used to change various setting items in configuration menus.
SPAN/POSITION/TRACE	The SPAN/POSITION/TRACE key is used to change settings.
Display mode	The DISPLAY key is used to change the display mode.
File operations	The FILE key is used to perform file-related operations.
Data replay	The REVIEW key is used to replay captured data.

(2) Capturing

Time of Capturing

Capture time
Note: "+++++:++:++" is displayed when the capture time is long.



Capture file name

During data capture, data is captured into the Internal memory or USB device.

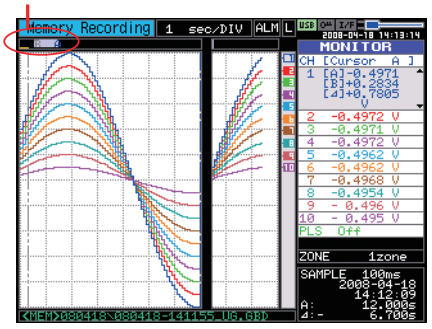
You cannot use the MENU key to change the setting.

Operations available during capture

SPAN/POSITION/TRACE	The SPAN/POSITION/TRACE key is used to change settings.
Display mode	The DISPLAY key is used to change the display mode.
Dual View replay	The REVIEW key is used to replay captured data in two windows at the same time.

(3) Dual View Replaying

Screen buffer usage rate



You can replay data during capture.

Waveform on the right side is the current captured data and the left side is previously captured data. You can use the Direction keys (left/right) to move the cursor to captured data to check digital values.

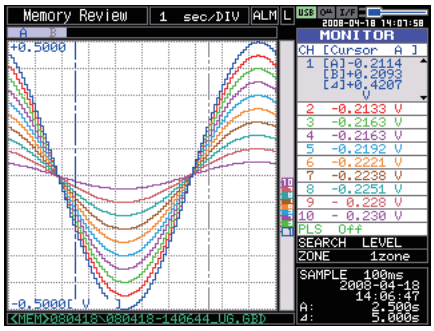
Operations available during dual view replaying

Moving cursor	The CURSOR key is used to switch between cursors A and B. The left/right or FAST FORWARD keys are used to move the cursors.

⚠CAUTION

Captured data can be displayed in full. However, the amount of data that can be displayed on a single screen will be limited to the amount of dedicated buffer memory.
The buffer memory size is 512 KB.

(4) Replaying



Displays captured data.

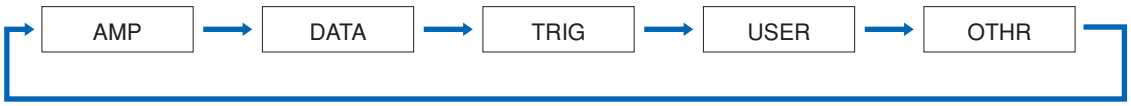
Available operation during replaying

SPAN/POSITION/TRACE	The SPAN/POSITION/TRACE key is used to change settings.
Menu operations during data replay	The MENU key is used to move the cursor, search data and set calculation.
Moving cursors	The CURSOR key is used to switch between cursors A and B. The left/right or FAST FORWARD keys are used to move the cursors
File operations	The FILE key is used to save the data between the cursors.

3.4 Setting Menus

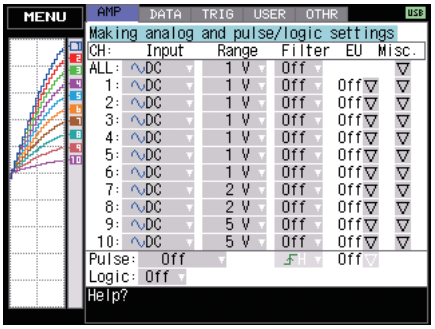
When you press the MENU key during Free Running, the following menu screens appear.

The menu screens are classified by the tab for each setting item.



(1) AMP settings

This menu is used to specify input signal-related settings.



Setting		Selections available	Setting method
Input		Off, Voltage, Temperature, Humidity Humidity: (CAUTION: The voltage is compulsorily set to 1V, and the scaling function set to ON. 0V→0%, 1V→100%)	ENTER→Select→ENTER
Range		Voltage: 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50, 1-5 V Temperature: TC-K, TC-J, TC-T, TC-R, TC-E, TC-B, TC-S, TC-N, TC-W	ENTER→Select→ENTER
Filter		Off, 2, 5, 10, 20, 40	ENTER→Select→ENTER
EU (Scaling settings)	Function	Off, On (effective when On has been selected)	ENTER→Select→ENTER
	Lower – Upper	Settings	
	Unit	Meas. Value (Upper/Lower)	ENTER→Set numeric value→ENTER
		EU Value (Upper/Lower)	ENTER→Set numeric value→ENTER
		Dec pt	ENTER→Select→ENTER
		Unit	ENTER→Text Input→ENTER
		Select	ENTER→Select→ENTER
Misc.		Span setting (Span All Settings) Annotation setting Zero voltage adjustment • Perform Auto Zero ADJ. • Reset Auto Zero ADJ. [Zero point voltage value]	ENTER→Set numeric value→ENTER ENTER→Text Input→ENTER Press ENTER to execute
Pulse	Mode	OFF, Revol., Counts, Inst.	ENTER→Select→Register
	Slope	H, L	ENTER→Select→ENTER
	EU (Scaling settings)	Function: Off, On • Setting values • Unit settings • Unit	ENTER→Select→ENTER ENTER→Set numeric value→ENTER ENTER→Select→ENTER ENTER→Text Input→ENTER
	Logic	Off, On	ENTER→Select→ENTER

When you use CH ALL to set an input range and filter, all channels are set to the same settings if the input is the same. Range is set only for the same input CHs.

Span All Settings, is set only for the same range CHs.

Input ..... Selects input condition.

Off	:	No signal input is accepted.
Voltage	:	Used for measuring direct-current voltage.
Temperature	:	Used for measuring temperature.
Humidity	:	Used for measuring humidity.

Range ..... Specifies the range of signal input to be measured.
Voltage : 20, 50, 100, 200, 500mV, 1, 2, 5, 10, 20, 50, 1-5V
Temperature : TC-K, TC-J, TC-T, TC-R, TC-E, TC-B, TC-S, TC-N, TC-W

Available SPAN Settings
<Voltage Ranges>

Range	Maximum SPAN (Measurement Range)	Minimum SPAN	Minimum Resolution
20mV	–22.000 to +22.000mV	0.200mV	0.001mV
50mV	–55.00 to +55.00mV	0.50mV	0.01mV
100mV	–110.00 to +110.00mV	1.00mV	0.01mV
200mV	–220.00 to +220.00mV	2.00mV	0.01mV
500mV	–550.0 to +550.0mV	5.0mV	0.1mV
1V	–1.1000 to +1.1000V	0.0100V	0.0001V
2V	–2.2000 to +2.2000V	0.0200V	0.0001V
5V	–5.500 to +5.500V	0.050V	0.001V
10V	–11.000 to +11.000V	0.100V	0.001V
20V	–22.000 to +22.000V	0.200V	0.001V
50V	–55.00 to +55.00V	0.50V	0.01V
1-5V	–5.500 to +5.500V	0.050V	0.001V

<Temperature Ranges>

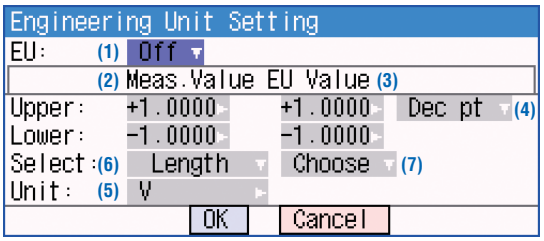
Range	Maximum SPAN	Minimum SPAN (p-p)	Measurement Range	Minimum Resolution
K	–270 to +2000°C	50°C	–200 to +1370°C	0.1°C
J	–270 to +2000°C	50°C	–200 to +1100°C	
T	–270 to +2000°C	50°C	–200 to +400°C	
R	–270 to +2000°C	50°C	0 to +1600°C	
E	–270 to +2000°C	50°C	–200 to +800°C	
B	–270 to +2000°C	50°C	+600 to +1820°C	
S	–270 to +2000°C	50°C	0 to +1760°C	
N	–270 to +2000°C	50°C	0 to +1300°C	
W	–270 to +2000°C	50°C	0 to +2000°C	

<Humidity Range>

Range	Maximum SPAN	Minimum SPAN (p-p)	Minimum Resolution
	0 to +110%	1.0%	0.1%

Filter ..... Sets the filter status. Please set the filter to ON when there is likely to be noise in the input. Filter operation is on a moving average basis.
Off, 2, 5, 10, 20, 40

EU (Scaling)..... Scales the measured values and converts them to other units.



(1) EU
Sets the scaling function to Off or On.

(2) Meas. Value
Specifies the numeric value to be converted. Set two points, the Upper and Lower parameters.

(3) EU Value
Specifies output after conversion. Set two points, the Upper and Lower parameters.

(4) Dec pt
This parameter specifies the decimal point position of the numeral to be specified as the EU value(s).

(5) Unit
Selects the converted unit, which can be specified as a user-defined character string consisting of alphanumerics. The Unit parameter can also be specified by selecting the Select Unit setting.

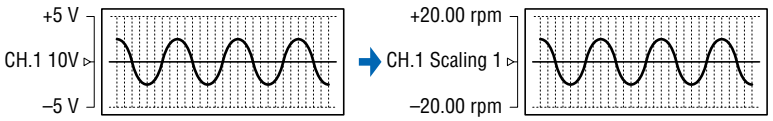
(6) Select
Selects the type of engineering unit.

(7) Choose
Selects the converted unit. The Unit displayed here is the type of unit selected by the Select setting.

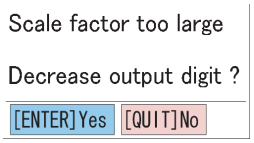
To specify a unit that is not displayed here, specify a user-defined character string as the Unit setting. Moreover, the setting specified here is displayed as the Unit setting.

Setting Example

	Upper Value	Lower Value
Specified Value	+5.00	–5.00
EU Value	+20.00	–20.00



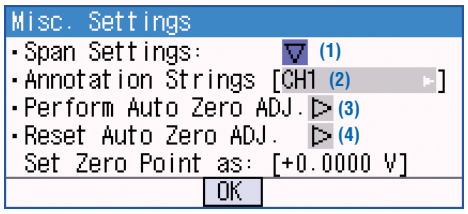
If this message appears, follow the instructions by reducing the number of digits to be output by one, or leaving the number of digits as is and changing the EU value.



CHECKPOINT

The Scaling operation is calculated using a ratio of the Meas. Value or EU Output Value settings. If a ratio value that the GL200A cannot process is specified, the message below appears.

Misc. ..... Sets other settings.



(1) Span Settings
Sets the detailed span for each channel.

(2) Annotation Strings
Sets a comment for each channel.
(For details, see text input on page 3-29.)

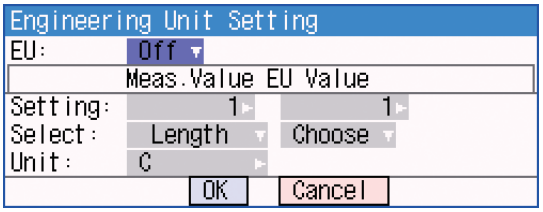
(3) Perform Auto Zero ADJ
Moves the current input voltage to zero position voltage value.

(4) Reset Auto Zero ADJ
Cancels the zero position voltage value and displays input voltage.

Pulse ..... Performs data processing such as revolution, count and inst. on signals connected to the pulse input terminal.
Modes: Select from Off, Revolutions, Counts, and Inst.
• Off: Input is disabled.
  • Revolution: Counts the number of pulses per second and displays the values multiplied by 60 as rpm values.
  • Counts: Displays the cumulative number of pulses for each sampling interval from the start of measurement.
  • Inst. Displays the number of pulses for each sampling interval.

Slope Sets the condition for the input signal operation.
  • H: Operates when the signal is rising.
  • L: Operates when the signal is falling.

EU (Scaling) Scales and converts the measured value.

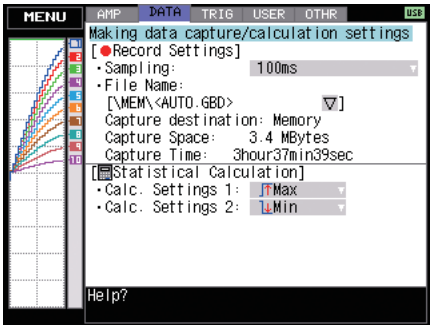


  • Meas. Value: Specifies the numeric value to be converted.
  • EU Value: Specifies output after conversion.
  • Unit: Selects the converted unit, which can be specified as a user-defined character string consisting of alphanumerics. The Unit parameter can also be specified by selecting the Select Unit setting.
  • Select: Selects the type of engineering unit.
  • Choose: Selects the converted unit. The Unit displayed here is the type of unit selected by the Select Unit setting.

Logic ..... Enables logic amps to be used: Off (disabled), On (enabled).

(2) DATA settings

This menu is used to specify capture-related items and calculations.



DATA Menu Structure

Setting	Selections available	Setting method
Record Settings • Sampling Interval	10, 20, 50, 100, 125, 200, 250, 500ms 1, 2, 5, 10, 20, 30s 1, 2, 5, 10, 20, 30min, 1h ** 50 ms or below can be selected under conditions indicated in the table below.*	ENTER→Select→ENTER
File Name	• File: Folder name, file name	ENTER→Select→ENTER
	• Name Type: Auto, User	ENTER→Select→ENTER
	• File Type: GBD, CSV	ENTER→Specify file→OK
Statistical Calculation • Function 1, 2	Off, Average, Max, Min, Peak, RMS	ENTER→Select→ENTER

⚠CAUTION

When you save files, create a folder and then save the files in the folder. Regardless of the remaining capacity, if you try to save files in the root directory, due to file restrictions you may not be able to save files.

Sampling Interval ..... Specifies the sampling interval for data capture.

The table below shows the number of measuring channels and sampling interval values that can be set.

If data fluctuate due to noise, set the sampling interval to a value that enables the digital filter function.

Number of Measuring Channels*1	Allowed Sampling Interval	Sampling Interval That Enables Digital Filter
1 channel	10 ms or above*2	50 ms or above
2 channels or less	20 ms or above*2	125 ms or above
5 channels or less	50 ms or above*2	250 ms or above
10 channels or less	100 ms or above	500 ms or above

1 "Number of Measuring Channels" indicates the number of channels in which input settings are NOT set to "OFF".

2 Temperature cannot be measured when the sampling interval is set to 10, 20, or 50 ms.

Captured data file name ..... Select the name of a file to which you want to save captured data.
Set either the main memory or USB device (option).
(See the file box on page 3-24.)

Name Type ..... Set how the file is named.

- Auto: Automatically uses the capture start time as the file name.
  Example: 20050101-123456_UG.GBD
  - Number part: Created on January 1, 2005, 12: 34:56.
  - UG part: Number of user capturing data
    UG: Guest
    U1: User 1
    U2: User 2
    (For details on user setting, see "USER settings" on page 3-22.)
- User: Captures data using a user-defined name.

File Format ..... Set the file format in which data is saved.
- GBD: Binary format
- CSV: EXCEL format (such data cannot be replayed with the GL200A)

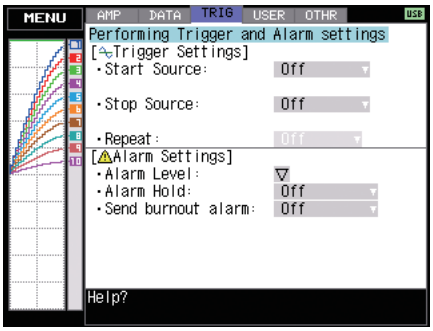
Statistical calculation ..... Two types of operation can be performed on all channels. Operation results are displayed on the Digital + Calculation Display screen.
- Off: Calculation is not performed.
- Average: Displays the simple average value during data capture.
- Max: Displays the maximum value during data capture.
- Min: Displays the minimum value during data capture.
- Peak: Displays the peak value data during data capture.
- RMS: Displays the effective value of the data during data capture.

$$R.M.S = \sqrt{\Sigma D^2/n}$$

D: data *n: number of data*

(3) TRIG settings

This menu is used to specify trigger conditions and alarms.



Setting	Selections available	Setting method
Start side source setting	Off	ENTER→Select→ENTER
	Level	ENTER→Setting menu
	External Input	ENTER→Select→ENTER
	Date	ENTER→Setting menu
Stop side source setting	Off	ENTER→Select→ENTER
	Level	ENTER→Setting menu
	External Input	ENTER→Select→ENTER
	Date	ENTER→Setting menu
	Time	ENTER→Setting menu
Repeated capturing	On, Off	ENTER→Select→ENTER
Alarm level settings		ENTER→Setting menu
Alarm Hold	On, Off	ENTER→Select→ENTER
Send burnout alarm	On, Off	ENTER→Select→ENTER

Start side source settings ... Specifies conditions to start data capture.
- Off: Starts capturing data unconditionally.
- Level: Starts capturing data when a specified level is reached.
- External Input: Starts capturing data when an input signal is received from an external trigger terminal.
- Date: Starts capturing data when a specified time arrives
  (when repeated capturing is set to Off)
  : Starts capturing data when a specified time arrives
  (when repeated capturing is set to On)
  This setting is used when you want to start capturing data at the same time every day.

Stop side source settings .... Specifies conditions to stop data capture.
- Off: Does not stop data capture by a trigger.
- Level: Stops data capture when the specified level is reached.
- External Input: Stops capturing data when an input signal is received from an external trigger terminal.
- Date: Stops capturing data when a specified time arrives (when repeated capturing is set to Off).
  : Stops capturing data when a specified time arrives (when repeated capturing is set to On).
  This setting is used when you want to stop capturing data at the same time every day.
- Time: Stops capturing data at a specified time after starting data capture.

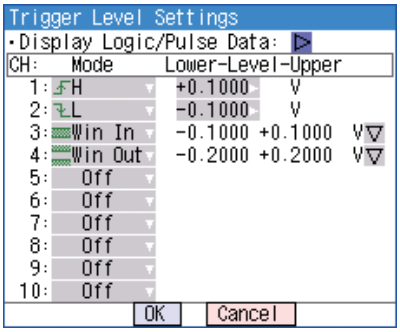
Repeated capturing ..... After a stop side trigger is generated, the next data capture process begins.
- Off: Does not repeat data capture.
- On: Repeats data capture.

Alarm level settings ..... When the setting level conditions are met, the alarm output terminl outputs an alarm.
The channel for which the alarm has been generated is displayed in red on the Digital screen.

Alarm Hold ..... Specifies whether or not to maintain the alarm status when an alarm is generated and then canceled.
- Not Maintained: Alarm status is canceled when the alarm is canceled.
- Maintained: Alarm status is not canceled even though the alarm is canceled.

Send burnout Alarm ..... When burnout (see on page 3-23) occurs, an alarm signal is output to the alarm output terminal.
- Does not occur: Alarm signal is not output to the alarm output terminal when burnout occurs.
- Occurs: Alarm signal is output to the alarm output terminal when burnout occurs.

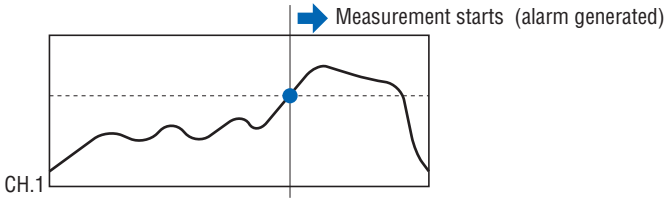
Analog channels trigger (alarm) level settings



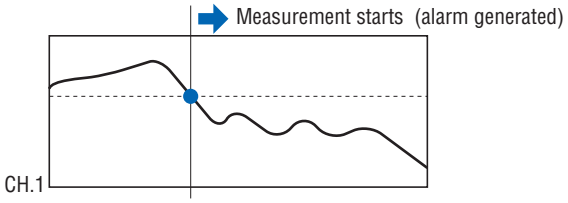
Mode ..... Specifies mode trigger (alarm) generation conditions.

Off: Does not enable trigger (alarm).

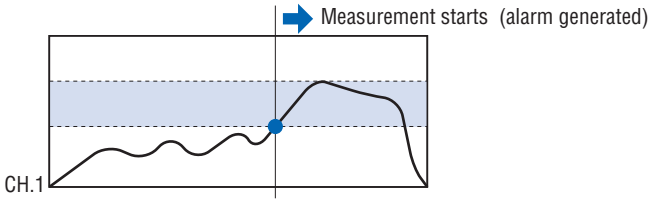
H: An trigger (alarm) is generated when the signal input rises to (or exceeds) the specified level.



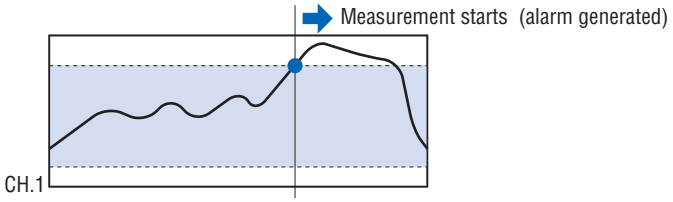
L: An trigger (alarm) is generated when the signal input falls to (or falls below) the specified level.



Win In: Used to specify the upper and lower limits for each channel. When the signal level goes within (or is within) either limit, an trigger (alarm) is generated.

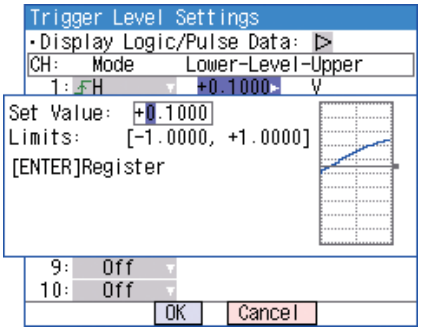


Win Out: Used to specify upper and lower limits for each channel. When the signal level goes outside (or is outside) either limit, an trigger (alarm) is generated.

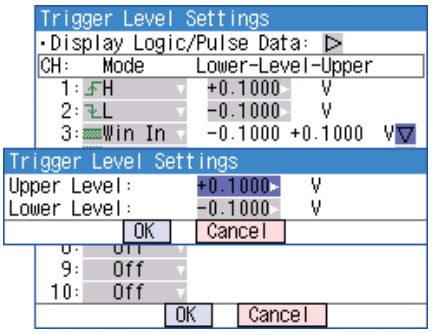


Lower - Level - Upper ..... Specifies the trigger (alarm) level(s) for the conditions set in Mode.

• H, L: Input a numeric value.



• Win In, Win Out: Input a numeric value for the upper and lower limit.



Pulse trigger (alarm) level settings

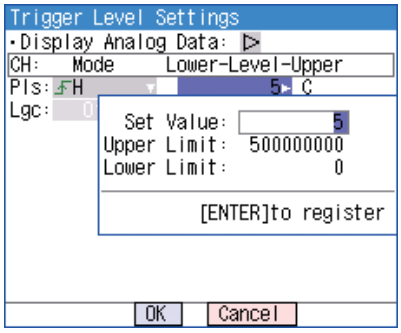
Specifies the trigger (alarm) for pulse input signals.

These conditions can be set when they have been enabled in the AMP settings.

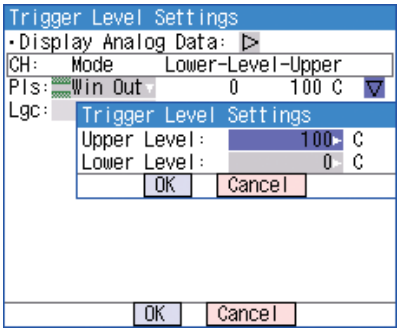
Mode ..... Specifies the same conditions as for analog CH conditions (see on page 3-19).

Lower - Level - Upper ..... Specifies the trigger (alarm) level(s) for the conditions set in Mode.

- H, L: Input a numeric value



- Win In, Win Out: Input numeric values for the upper and lower levels.



Logic trigger (alarm) level settings

Sets the trigger (alarm) conditions for logic input.

These conditions can be set when they have been enabled in the AMP settings.

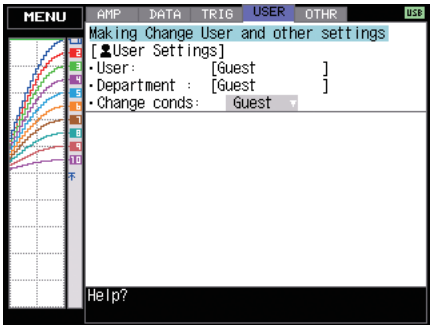
- Off: No trigger (alarm) conditions set.
- L: Trigger (alarm) is generated when logic signal is Low.
- H: Trigger (alarm) is generated when logic signal is High.

(4) USER settings

The USER settings menu is used to store user-specific settings and conditions. Each set of settings can be called up easily by simply switching the user.

This menu is used to specify the user name and switches user setting conditions.

You can specify that the user is a Guest, User 1 or User 2.



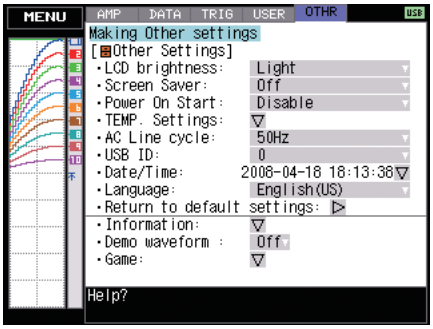
• User: Specify the user name. You cannot specify it as Guest.

• Department name: Specify the department name. You cannot specify it as Guest.

• Setting condition switch: Switches between Guest, User 1 and User 2. Since setting conditions are stored for each user, they can be called up easily by simply switching the user.

(5) OTHR settings

Other miscellaneous settings are made here.



Setting		Selections available	Setting method
LCD brightness		Light, Medium, Dark	ENTER→Select→ENTER
Screen Saver		Off, 10, 30 (sec.), 1, 2, 5, 10, 30, 60 (min.)	ENTER→Select→ENTER
Power On Start		Disable, Enable	ENTER→Select→ENTER
TEMP. Settings	Room Temp. Compensation	Internal, External	ENTER→Select→ENTER
	Temp. Unit	°C, °F	ENTER→Select→ENTER
	Burn Out	Off, On	ENTER→Select→ENTER
AC Line Frequency		50/60Hz (Off, On)	ENTER→Select→ENTER
USB ID		0~9	ENTER→Select→ENTER
Date/Time		Date, time settings	ENTER→Setting menu
Language		Japanese, English (US), English (UK), French, German, Chinese, Korean	ENTER→Select→ENTER
Return to default settings			ENTER
Information		Firmware version Suffix System Control	
Demo Waveform Mode		Off, On	ENTER→Select→ENTER
Game			ENTER

LCD brightness ..... Adjusts the brightness of the LCD backlight. When the battery is used, dimming the LCD extends battery life.

Screen Saver ..... Turns off the display if the GL200A is not operated within a specified interval, thus extending battery life.

Power On Start ..... Initiates measurements as soon as the GL200A is turned on.
- Disable: Disables the Power On Start function.
- Enable: Enables the Power On Start function.

Room Temp. Compensation This parameter enables room temperature compensation settings when thermocouples are used. You can select either internal or external room temperature compensation.
- Internal: The GL200A's room temperature compensation settings are used (usually, you use this parameter).
- External: Select this parameter when measuring compensation other than that of the GL200A.

Temp. Unit..... Toggles the temperature unit between °C and °F.
- °C: Celsius
- °F: Fahrenheit (the scaling function is compulsorily enabled)

Burn Out ..... This parameter enables or disables a function that moves to full scale to inform of a sensor burnout in a thermocouple.
- Off: Disables burnout function.
- On: Enables burnout function.

AC Line Frequency ..... Select the appropriate frequency for the AC line used.

50Hz: For areas using line frequency of 50 Hz

60Hz: For areas using line frequency of 60 Hz

This setting specifies the frequency in which noise can be eliminated with the digital filter function.

Refer to page 3-17 for details on sampling speeds that enable the digital filter function.

USB ID ..... Sets the GL200A's USB ID number.

Select from 0 to 9.

Make sure you set each device with a unique ID number when controlling multiple GL200As from a single computer.

You must restart GL200A after any change is made to a setting value.

Changes are applied upon restart.

Date/Time ..... This parameter sets the date and time.

Language ..... This parameter sets the GL200A's display language.

Return to default settings .... Returns all the settings to the factory defaults.

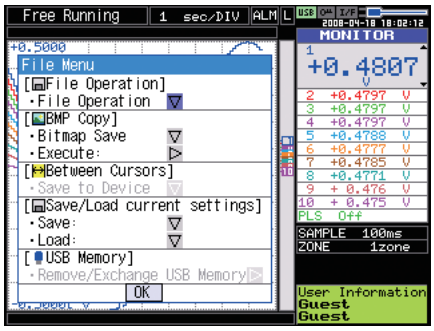
Information ..... Displays system information.

Demo Waveform Mode ..... This parameter displays demo waveforms without analog signal input. Triangular waveforms, rectangular waveforms and noise are displayed in order.
You can capture and replay demo waveforms.
- Off: Do not display demo waveforms.
- On: Display demo waveforms.

Game ..... Games are available. The score is stored for each user.

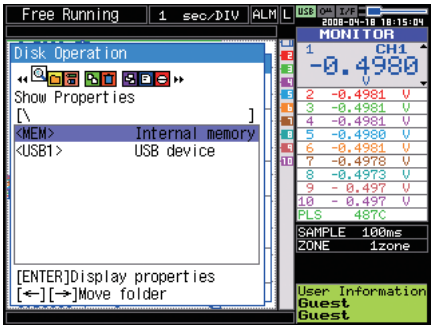
(6) Other menus

FILE

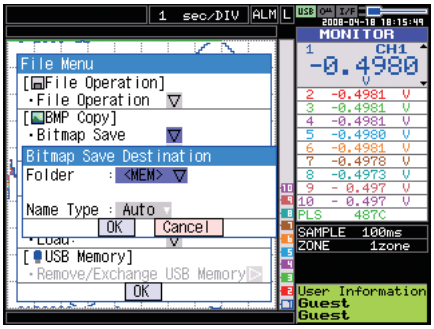


This menu is used to perform file-related operations.

• File Operation Used to operate files in the main memory and USB device.
Refer to page 3-27 for details on file operations.



• BMP Save Saves a copy of the screen as a BMP file.



- Folder/File: Specify a folder when the Name Type is set to Auto.
  Specify a file name when the Name Type is set to User.
- Name Type Specifies how files are named.
  - Auto : Automatically uses the capture start time as the file name.
  - User : Sets to a user-defined name.
- Execute: Executes bitmap save.

• Save Data Between Cursors

Data between cursors A and B is saved during captured data replay.

- Folder/File: Specify a folder when Name Type is set to Auto.
  Specify a file name when the Name Type is set to User.
- File Format Specifies the file format used to save data.
  - GBD : Binary format
  - CSV : EXCEL format (such data cannot be replayed with the GL200A)

- Name Type: Specifies how to name a file.
  - Auto : Automatically uses the capture start time as the file name.
  - User : Sets to a user-defined name.

• Save Current Settings/Load Settings

Saves or loads main unit condition settings.

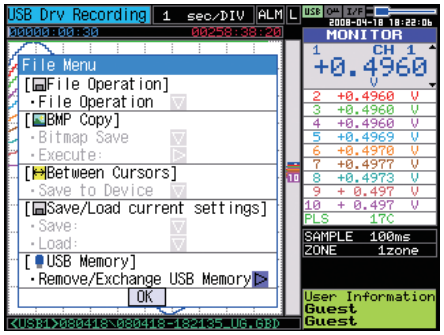
- Folder/File: Specify a folder when Name Type is set to Auto.
  Specify the file name when the Name Type is set to User.
- File Format Specifies the file format used to save data.
  - GBD : Binary format
  - CSV : EXCEL format (such data cannot be replayed with the GL200A)
- Name Type: Specifies how to name a file.
  - Auto : Automatically uses the capture start time as the file name.
  - User : Sets to a user-defined name.

USB Memory

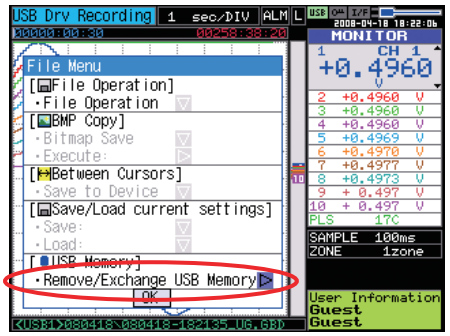
The USB memory device can be removed and replaced during data capture.

Follow the procedures below to replace the device.

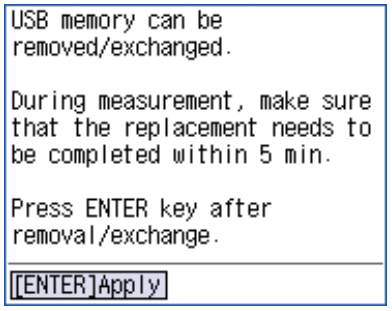
(1) Press the FILE key to open the FILE menu.

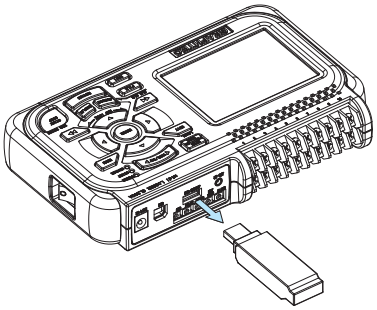


(2) Move the cursor to Remove/Exchange USB Memory and press the ENTER key.

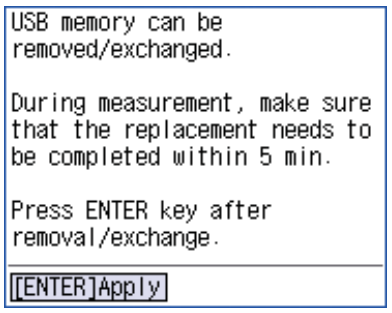


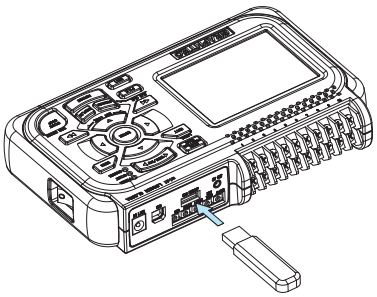
(3) You can remove the USB memory device when the message is displayed.





(4) Insert a new USB memory device.





(5) Press the ENTER key.

CHECKPOINT

"_CHG" and a number will be appended to the file name each time you exchange a USB memory device.
Ex) When data is captured to file "TEST.GBD":
First USB memory device: TEST.GBD
Second USB memory device: TEST_CHG1.GBD
Third USB memory device: TEST_CHG2.GBD

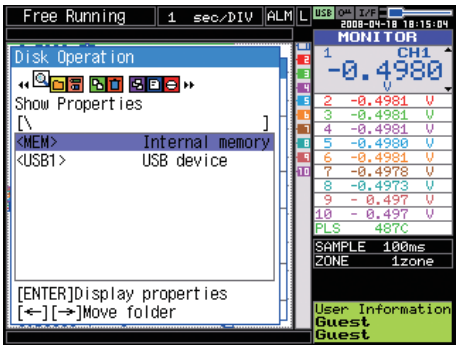
CAUTION

The exchange procedure must be conducted within five minutes.
Data will be lost when five minutes have elapsed.

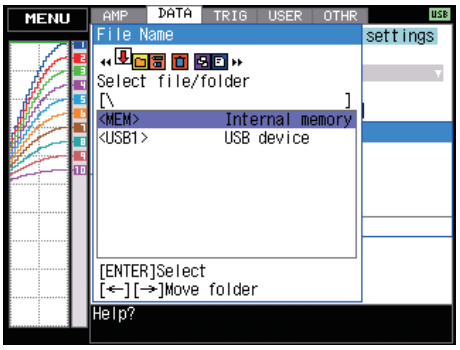
File box

The file box used to set captured data files using the DATA menu or for disk operations accessed using the FILE menu is operated as follows.

<File box by disk operations>



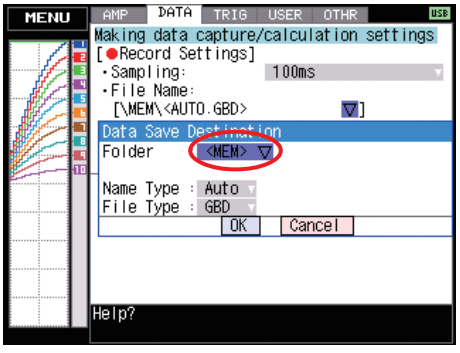
<File box using the DATA menu>



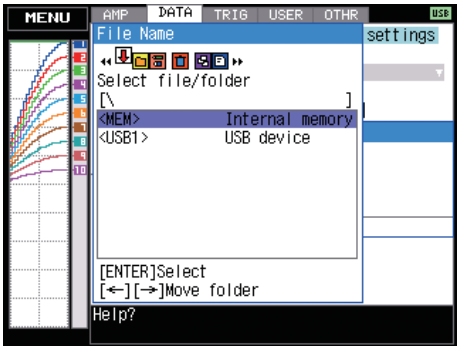
Key	Description
◁◁ ▷▷	Change the operation of the file box. Show properties ..... Display details of a file or folder. Select file/folder ..... Select files or folders to write data. Create new folder ..... Create a new folder. Create new file ..... Create a new file. Rename ..... Change the file or folder name. Copy file/folder ..... Copy files or folders. Select file to copy/delete .... Select the file to copy or delete. Select copy destination and copy . Select the copy destination and copy. Delete file/folder ..... Delete files or folders. Change file sort order ..... Change the order in which files are displayed. View setting ..... Change displaying information for files. Format disk ..... Format the disk. ** Details of allowed operation will depend on the operation target.*
◁ ▷	Moves between folders. ◁ : Move up one folder. ▷ : Move down one folder.
ENTER	Finalize the operation.
QUIT	Close the file box.

<Setting example>

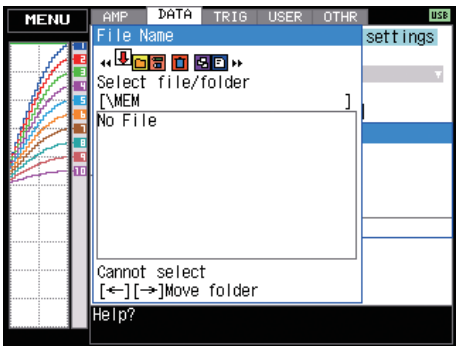
The following shows an operation example where a folder named "TEST" is created for captured data and automatically saved.



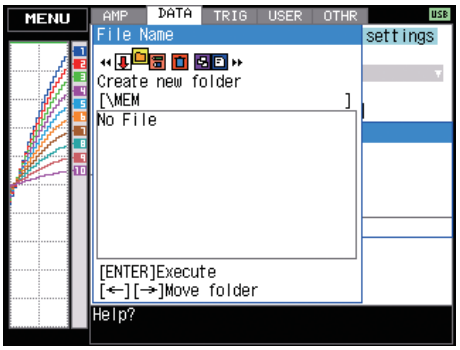
In the [Data save Destination], choose [Select folder] and press the ENTER key.



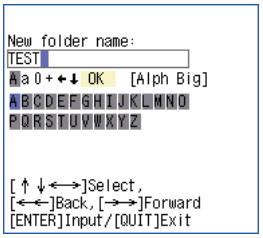
Use the ▷ key to move to the target folder.

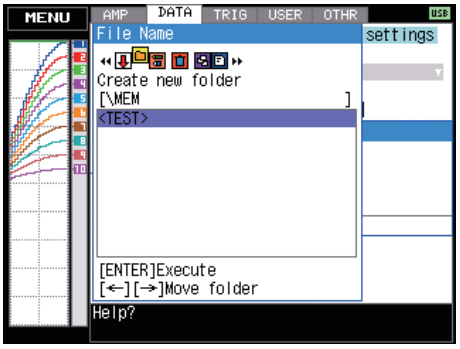


Use the ▷▷ key to select [Create new folder].

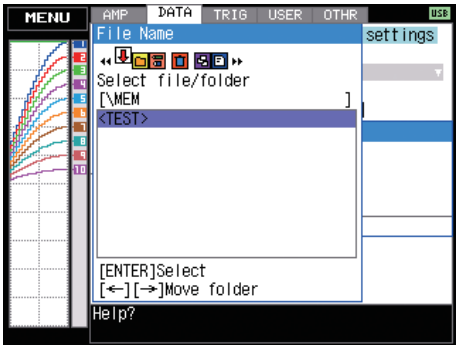


Press the ENTER key.
In the [New folder name] box that appears, type in "TEST".

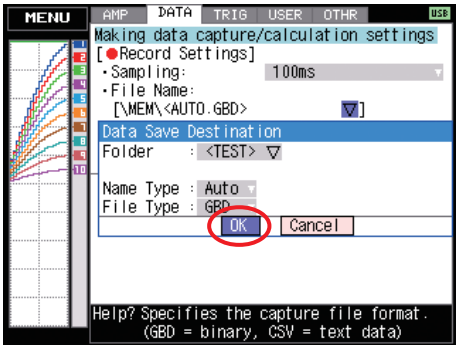




Use the ◁◁ key to choose [Select file/folder].



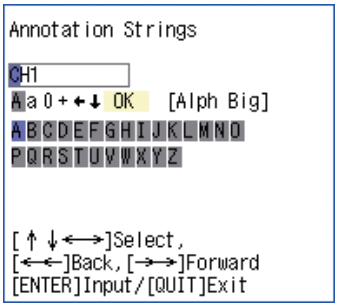
Use the ▽△ key to move the cursor to the created "TEST" folder, and press the ENTER key.



Select [OK] to close the screen.

Text input

Related to text input operations such as annotation, EU (scaling) unit and captured data file name input.

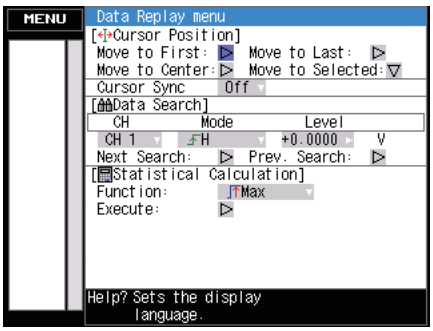


• Operation

Operation mode	Description		Operation method
Text input	A	Upper case alphabet mode	When the cursor key is moved to the uppermost part, operation can be selected using the left/right key. After selecting an operation, use the down key to move the cursor to the desired character.
	a	Lower case alphabet mode	
	0	Numeric mode	
	←	Symbol mode	
	↓	Delete mode	
	-	Insert mode	
	OK	Finalize mode	
When selecting operation	Text used for each operation		When you bring the cursor to a character and press ENTER, the character is entered. After you finish entering characters, move the cursor to OK and then press ENTER.

Data replay menu

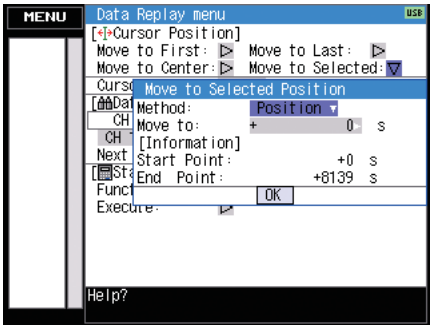
Data replay menus are displayed by pressing the MENU key during replay.



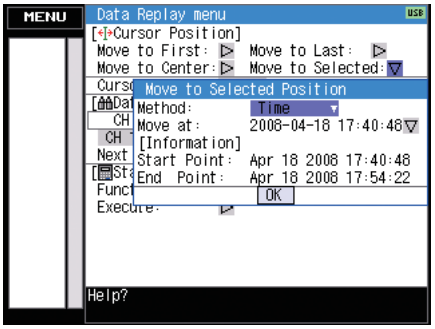
Setting	Selections available	Setting method
Cursor Position Move to First Data		ENTER
Move to Last Data		ENTER
Move to Center		ENTER
Move to Selected Position	Method : Position, Time Move to :(Position only) Upper limit, Lower limit :(Time only) Specified time	ENTER→Select→ENTER ENTER→Input numeric value→ENTER ENTER→Input numeric value→ENTER
Cursor Sync	Off, On	ENTER→Select→ENTER
Date Search	CH1-CH10, Pulse, Logic, Alarm	ENTER→Select→ENTER
	• Mode Analog: H, L Pulse: H, L Logic: H, L Alarm: Both, H, L • Level (only for analog and pulse)	ENTER→Select→ENTER ENTER→Input numeric value→ENTER
Next Search		ENTER
Prev. Search		ENTER
Statistical Calculation	Off, Average, Max, Min, Peak, RMS	ENTER→Select→ENTER
Execute		ENTER

Cursor Position ..... There are other functions for Cursor Move apart from the Alarm search function.

- Move to First Data: Moves the cursor to the start of the data.
- Move to Last Data: Moves the cursor to the end of the data.
- Move to Center: Moves the cursor to the center of the data.
- Move to Selected Position: Specify the cursor position to be moved to.
  - Position: Move at the specified time from the start of measurement. Interval until the end of measurement, in 0.1-s units



• Time: Move to the specified date/time.

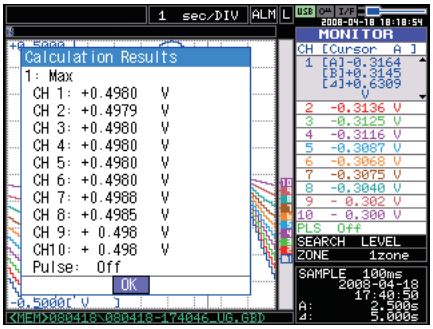


Cursor Sync ..... Moves cursors A and B simultaneously. Cursor A is always the fulcrum.

Date Search ..... This function searches within the captured data using the specified method.

- CH : Select the channel you want to search.
- Mode : Select the mode used for search. The setting is changed depending on the searched channel.
  (For analog CH, pulse, and logic)
  - H : Operates when the searched data rises to a specified level.
  - L : Operates when the searched data falls to a specified level.
  (For alarm)
  - Both : Operates when a searched alarm is generated or canceled.
  - H : Operates when a searched alarm is generated.
  - L : Operates when a searched alarm is canceled.
- Level : Sets the level to be searched for analog CH and pulse.

Statistical calculation between cursors ..... Statistical calculation is performed on the data between the cursors.



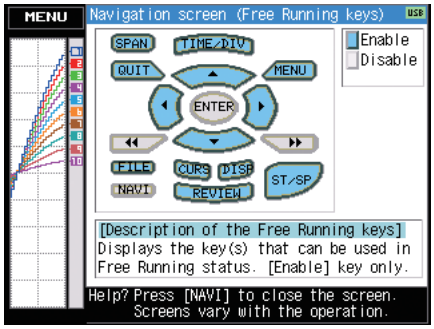
- Function: There are five types of between-cursor calculation functions and one of these can be selected.
  (For details of each function, see on page 3-18.)

NAVI menu

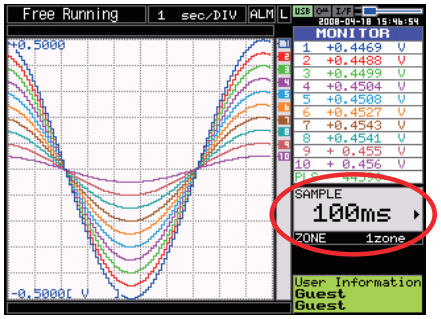
The NAVI menu can be displayed in three modes, Free Running, Recording, and Replay.

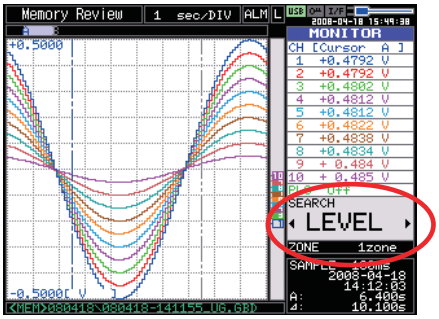
Available key operations for the NAVI menu are explained below.

Operation	Description
Open	Press the NAVI key to open the NAVI menu.
Close	Press the NAVI key to close the NAVI menu.
Browse explanation	Explanation is displayed when an enabled key is pressed.



Quick settings





You can easily set two items on the digital area of the Waveform + Digital screen.

To set items, use the up/down key to go to the Quick setting area.

Content differs depending on the operation mode.

Operation mode	Content	Explanation
Free Running	SAMPLE	Left/right key can be used to change the sampling interval.
	ZONE	Left/right key can be used to change the zone division.
Recording	ZONE	Left/right key can be used to change the zone division.
Replaying	SEARCH	Left/right key can be used to perform search. Left: Searches past side Right: Searches future side
	ZONE	Left/right key can be used to change the zone division.

CHAPTER 4

Specifications

This chapter describes the basic specifications for the GL200A.

4.1 Standard Specifications

Standard Specifications

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Number of analog input</td><td>10 channels</td></tr>
<tr><td>External input/output</td><td>Trigger input, Logic input, Pulse input, Alarm output</td></tr>
<tr><td>PC interface</td><td>USB (Full speed) standard</td></tr>
<tr><td>Internal memory devices</td><td>3.5 MB internal memory</td></tr>
<tr><td>Data backup functions</td><td>Setup conditions: EEPROM; Clock: lithium secondary battery</td></tr>
<tr><td>Operating environment</td><td>0 to 40°C, 30 to 80% RH</td></tr>
<tr><td>Withstand voltage</td><td>Between each input channel and GND : 1 minute at 350 Vp-p
Between each input channels : 1 minute at 350 Vp-p</td></tr>
<tr><td>Power supply</td><td>AC adapter: 100 to 240 VAC, 50/60 Hz
DC input: 8.5 to 24 VDC
Battery pack (option): 7.4 VDC (2200 mAh)</td></tr>
<tr><td>Power consumption</td><td>AC power consumption (when the supplied AC adapter is used)
<table>
<tr><th>No.</th><th>Condition</th><th>Normal consumption</th><th>Consumption during battery recharge</th></tr>
<tr><td>1</td><td>When the LCD is ON</td><td>12 VA</td><td>28 VA</td></tr>
<tr><td>2</td><td>When the screensaver is operating</td><td>11 VA</td><td>27 VA</td></tr>
</table>
DC power consumption
<table>
<tr><th>No.</th><th>DC voltage</th><th>Condition</th><th>Normal consumption</th><th>Consumption during battery recharge</th></tr>
<tr><td>1</td><td>+24 V</td><td>When the LCD is ON</td><td>0.18 VA</td><td>0.6 VA</td></tr>
<tr><td>2</td><td>+24 V</td><td>When the screensaver is operating</td><td>0.15 VA</td><td>0.57 VA</td></tr>
<tr><td>3</td><td>+12 V</td><td>When the LCD is ON</td><td>0.30 VA</td><td>Recharging not possible</td></tr>
<tr><td>4</td><td>+12 V</td><td>When the screensaver is operating</td><td>0.25 VA</td><td>Recharging not possible</td></tr>
<tr><td>5</td><td>+8.5 V</td><td>When the LCD is ON</td><td>0.42 VA</td><td>Recharging not possible</td></tr>
<tr><td>6</td><td>+8.5 V</td><td>When the screensaver is operating</td><td>0.35 VA</td><td>Recharging not possible</td></tr>
</table></td></tr>
<tr><td>External dimensions</td><td>194 x 122 x 41 mm</td></tr>
<tr><td>Weight*1</td><td>480 g</td></tr>
<tr><td>Other</td><td>Beeper (key, etc.)</td></tr>
</table>

1 Excluding the AC adapter and battery

Internal memory devices

Item	Description
Memory capacity	Internal memory: 3.5 MB USB memory: Depends on the type of memory used
Memory contents	Setup conditions Measured data Screen copy

PC Interface

Item	Description
Interface types	USB (Full speed)
Functions	Data transfer to the PC (realtime, memory) PC control of the GL200A
Realtime data transfer speed	10 ms/1ch maximum

Monitor

Item	Description
Display	3.5-inch TFT color LCD (320 x 240 dots)
Displayed languages	English, French, Japanese, German, Chinese, Korean
Backlight life	10000 hr (25 ±5°C with continuous lighting)
Backlight	Screen saver function provided (10, 30 s, 1, 2, 5, 10, 30, 60 min.)

Input Unit Specifications

Item	Description
Number of input channels channels)	10 channels
Input method	Photo MOS relay scanning system; all channels isolated
Scan speed	0.1s/10 ch maximum
Measurement ranges	Voltage: 20, 50, 100, 500 mV; 1, 2, 5, 10, 20, 50 V; 1-5 V F.S. Temperature • Thermocouples: K, J, E, T, R, S, B, N, W (WRe5-26) Humidity: 0 to 100% (Voltage 0V to 1V scaling conversion) **Accuracy (see B-530 in the Options section)*
Measurement accuracy (23°C ±5°C) when 30 minutes have elapsed after the power was switched on (filter On (10), 1 s sampling)	Voltage: 0.1% of F.S.

Thermo couple	Measurement Temperature Range (°C)	Measurement Accuracy
R/S	0 ≤ Ts ≤ 100	±5.2°C
	100 < Ts ≤ 300	±3.0°C
	R: 300 < Ts ≤ 1600°C	±(0.05% of rdg +2.0°C)
	S: 300 < Ts ≤ 1760°C	±(0.05% of rdg +2.0°C)
	Reference contact compensation accuracy	±0.5°C
B	400 ≤ Ts ≤ 600	±3.5°C
	600 < Ts ≤ 1820°C	±(0.05% of rdg +2.0°C)
	Reference contact compensation accuracy	±0.5°C
K	–200 ≤ Ts ≤ –100	±(0.05% of rdg +2.0°C)
	–100 < Ts ≤ 1370°C	±(0.05% of rdg +1.0°C)
	Reference contact compensation accuracy	±0.5°C
E	–200 ≤ Ts ≤ –100	±(0.05% of rdg +2.0°C)
	–100 < Ts ≤ 800°C	±(0.05% of rdg +1.0°C)
	Reference contact compensation accuracy	±0.5°C
T	–200 ≤ Ts ≤ –100	±(0.1% of rdg +1.5°C)
	–100 < Ts ≤ 400°C	±(0.1% of rdg +0.5°C)
	Reference contact compensation accuracy	±0.5°C
J	–200 ≤ Ts ≤ –100	±2.7°C
	–100 < Ts ≤ 100	±1.7°C
	100 < Ts ≤ 1100°C	±(0.05% of rdg +1.0°C)
	Reference contact compensation accuracy	±0.5°C
N	0 ≤ Ts ≤ 1300°C	±(0.1% of rdg +1.0°C)
	Reference contact compensation accuracy	±0.5°C
W	0 ≤ Ts ≤ 2000°C	±(0.1% of rdg +1.5°C)
	Reference contact compensation accuracy	±0.5°C

Reference contact compensation accuracy	Internal/External switching
A/D converter	16 bits (out of which 14 are internally acknowledged)
Temperature coefficient	Gain : 0.01% of F.S./°C Zero*: 0.02% of F.S./°C **** Occurs when sampling speed is 10, 20, or 50 ms.***
Input resistance	1 MΩ ±5%
Allowable signal source resistance	Within 300 Ω
Maximum permissible input voltage	Between +/– terminals: 60 Vp-p Between each input channel and GND: 60 Vp-p Between each input channels: 60 Vp-p
Withstand voltage	Between each input channel and GND: 1 minute at 350 Vp-p Between each input channels: 1 minute at 350 Vp-p
Insulation resistance	Between each input channel and GND: 50 MΩ or above (at 500 VDC)
Common mode rejection ratio	At least 90 dB (50/60 Hz; signal source 300 Ω or less)
Noise	At least 48 dB (with +/– terminals shorted)
Filter	Off, 2, 5, 10, 20, 40 Filter operation is on a moving average basis. The average value of the set sampling count is used.

4.2 Function Specifications

Standard Specifications

Item	Description
Display screen	Waveform display: Waveform screen + Digital screen, Waveform screen Digital display: Waveform screen + Digital screen, Digital screen + Calculation Display screen ***Note: Can be key-toggled***
Sampling interval*1	10, 20, 50, 100, 125, 200, 250, 500 ms; 1, 2, 5, 10, 20, 30 s; 1, 2, 5, 10, 20, 30 min; 1 h **** 50 ms and below can be selected according to input settings and number of measured channels.***
Waveform expansion /contraction	Time axis: 1, 2, 5, 10, 20, 30 sec/Div 1, 2, 5, 10, 20, 30 min/Div 1, 2, 5, 10, 12, 24 h/Div Voltage axis: variable span
Scaling function	4 points can be set for each channel
Review function	Data replay during data capture (dual-screen display)
Data save functions	Capture to internal memory Capture to USB memory The setup data can be saved Copy of data screen saved
Statistical calculation	Types of operation: Average value, peak value, maximum value, minimum value, RMS Number of operations: 2 can be set simultaneously Method: Realtime operation ***Note: When the Digital screen + Calculation Display screen has been specified, the calculation results are displayed.***
Search functions	Function: Search the captured data for the required number of points Search type: Channel Pulse, Logic, Alarm search
Annotation input function	Function: A comment can be input for each channel Inputtable characters: Alphanumerics Number of characters: 11 **** Displayed up to 8 characters***

Trigger Functions

Item	Description
Repeat Trigger	Off, On
Trigger types	Start: Data capture starts when a trigger is generated. Stop: Data capture stops when a trigger is generated.
Trigger conditions	Start: Off, Level, Date Stop: Off, Level, Date, Time
Alarm judgment modes	Analog, Logic, Pulse • Analog: H, L, Window In, Window Out • Logic: H, L • Pulse: H, L

External Input/Output Functions

Item	Description
Input/output types	Trigger input (1 ch), Logic input (1 ch), Pulse input (1 ch), Alarm output (1 ch)
Input specifications	Maximum input voltage: +24V Input threshold voltage: Approx. +2.5V Hysteresis: Approx. 0.5 V (+2.5 to +3 V)
Alarm output specifications	Output format: Open collector output (100 kΩ pull-up resistance) Output conditions: Level judgment, window judgment, logic pattern judgment, pulse judgment
Pulse input	Revolutions mode (engines, etc.) • Function: Counts the number of pulses per second; enables them to be converted to rpms. • Spans: 50, 500, 5000, 50 k, 500 k, 5 M, 50 M, 500 M PRM/F.S.
	Counts mode (electric meters, etc.) • Function: Displays a count of the number of pulses for each sampling interval from the start of measurement. • Spans: 50, 500, 5000, 50 k, 500 k, 5 M, 50 M, 500 M C/F.S.
	Inst. mode • Function: Counts the number of pulses for each sampling interval. Resets the count value after each sampling interval. • Spans: 50, 500, 5000, 50 k, 500 k, 5 M, 50 M, 500 M C/F.S.
	Maximum number of pulse inputs • Counts, Inst. modes: 50 k/sampling interval • Revolutions: 50 k/s

4.3 Accessory/Option Specifications

Control Software

Item	Description
Compatible operating system	Windows 2000/XP/Vista
Functions	Main unit control, realtime data capture, data conversion, data replay
Main unit settings	Input settings, memory settings, alarm settings, trigger settings
Captured data	Realtime data (CSV, Binary) Memory data USB memory data
Display	Analog waveforms, logic waveforms, pulse waveforms, digital values
Display modes	Y-T View, X-Y View, Digital View, Meter View, Report View
File conversion	Between cursors, All data
Monitor functions	Alarm monitor enables sending of email to the specified address
Dual-screen function	Displays the current data alongside past data
Report function	Automatic creation of daily or monthly files
Maximum/Minimum	The maximum, minimum and current values are displayed during measurement

Battery Pack (Option)

Item	Description
Capacity	7.4 V/2200 mAh; mounted in the main unit
Running time	When using the LCD display: approx. 5 hours When using the screensaver: approx. 6 hours ***Note: When capturing to internal memory at 1 s, sampling*** ***Note: The running time depends on such as the operating environment, the amount of charge left in the battery and connecting USB memory.***
Battery type	Lithium secondary battery
Charging method	Mount in the main unit, or use a separate battery charger ***Note: If mounted in the main unit for charging, the power switch must be turned off.***
Time required for charging	Main unit: approx. 4 hours
Switchover in the case of a power failure	Because the battery is used together with the AC adapter, the power supply will be switched automatically to the battery in the event of a power failure. ***Note: The AC adapter is the primary power source.***
Other functions	When the battery is running low, measured data is saved and the file is clised automatically.

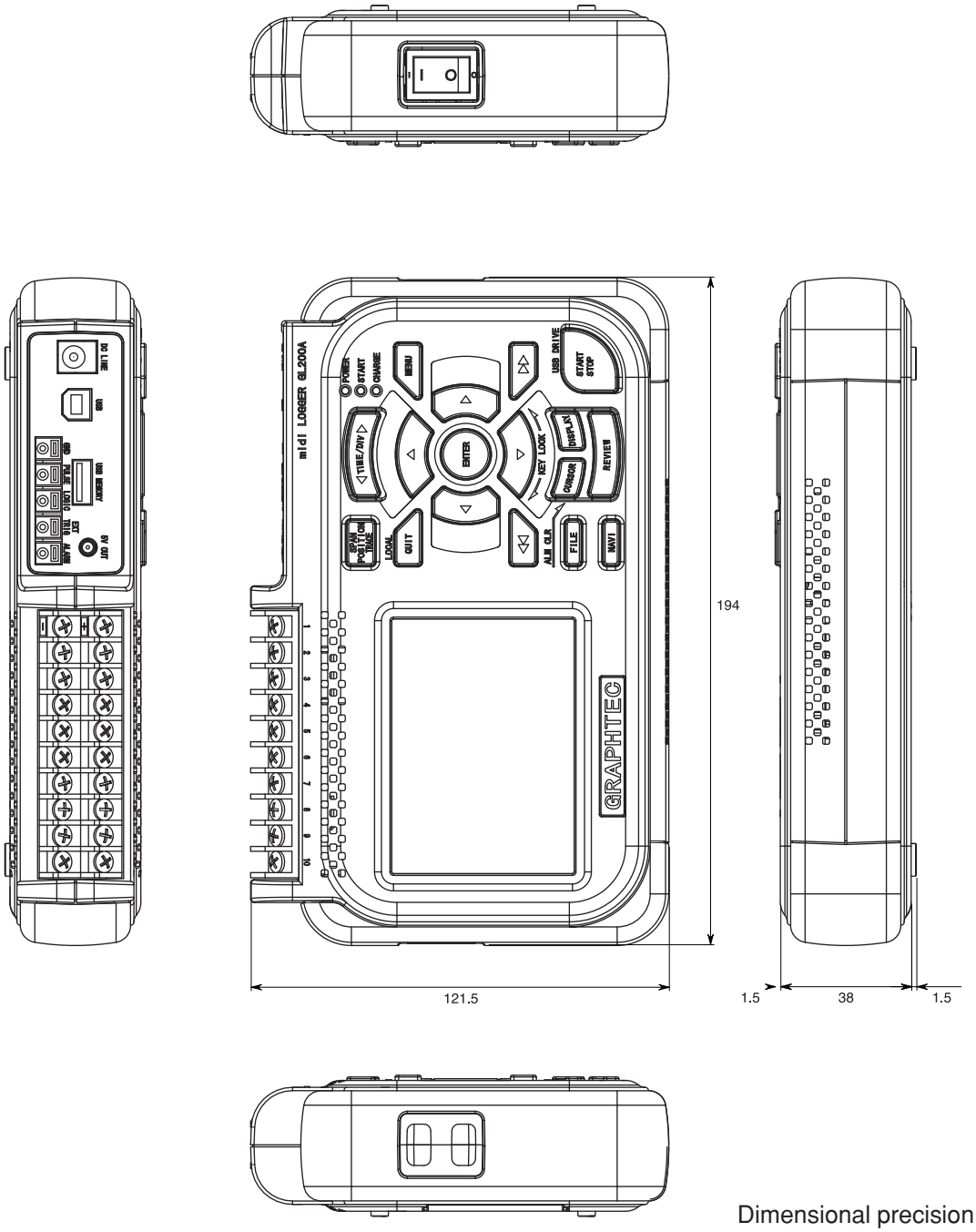
Humidity Sensor B-530 (Option)

Item	Description
Allowable temperature range	-25 to +80°C
Allowable humidity range	0 to 100% RH
Relative humidity measurement accuracy	±3% RH (5 to 98% RH at 25°C)

Method	Capacitance Method	
	Measured Environment	Measurement Accuracy
Relative humidity measurement accuracy (5 to 98 %)	0 to 10°C	±5 % RH
	10 to 20°C	±4 % RH
	20 to 30°C	±3 % RH
	30 to 40°C	±4 % RH
	40 to 50°C	±5 % RH
	50 to 60°C	±6 % RH
	60 to 70°C	±7 % RH
	70 to 80°C	±8 % RH

Response time	15 s (90% response when membrane filter installed)
Sensor output	0 to 1 VDC
External dimensions	ϕ14 mm x 80 mm (excluding cable)
Cable length	3 m

4.4 External Dimensions



Dimensional precision: ±5 mm
Unit: mm

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U

W

The specifications, etc., in this manual are subject to change without notice.

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