midi LOGGER
GL220 Quick Start Guide

GRAPHTEC

midi LOGGER GL220

Thank you for choose the midi LOGGER GL220.
This Quick Start Guide describes the basic operations.
Please refer to the manual (PDF) in the CD-ROM for more information.

Checking the Outer Casing

After unpacking, check the GL220's Exterior to make sure that
there are no crack or other damage before use.

Checking the Accessories

o Quick Start Guide : 1
o CD-ROM : 1
o AC cable/AC adapter : 1

Don't forget to
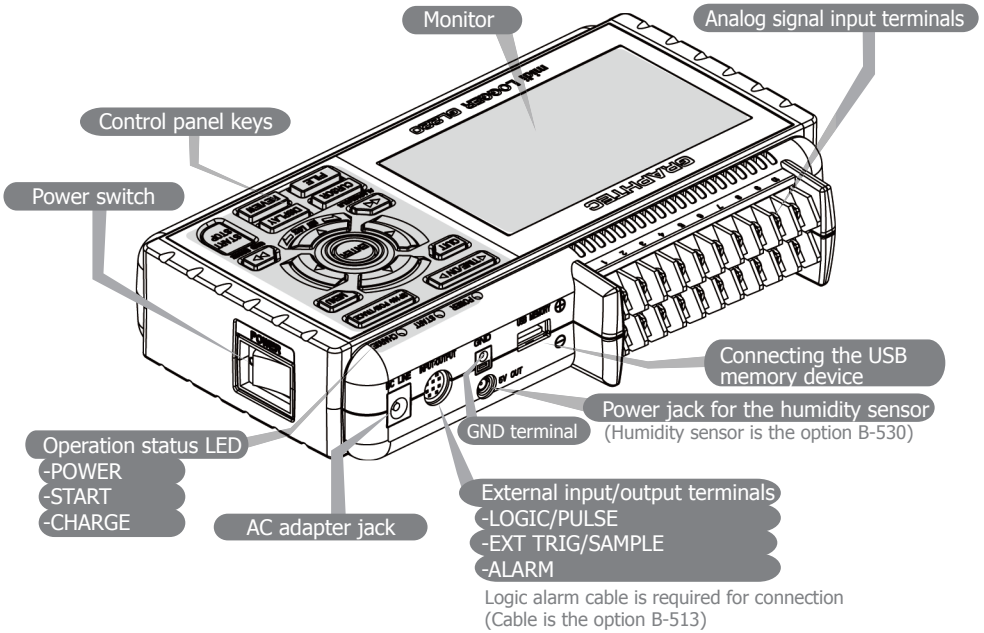check the setting

Setting and Checking the AC Line Frequency

Set the AC line frequency in the "OTHR" menu. This setting
(50 or 60 Hz) affects the noise reduction performance of the device.
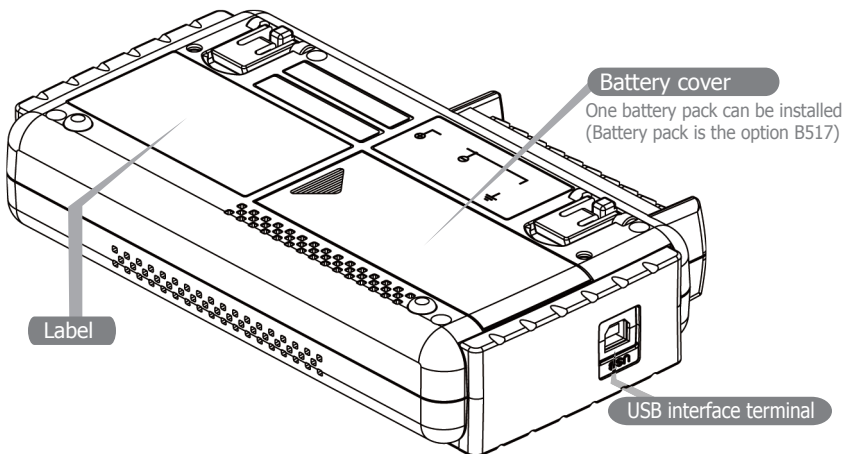
GL220 Contents

GL220 Nomenclature

Top Panel

Monitor

Analog signal input terminals

Control panel keys

Power switch

Connecting the USB memory device

Power jack for the humidity sensor
(Humidity sensor is the option B-530)

GND terminal

Operation status LED
-POWER
-START
-CHARGE

AC adapter jack

External input/output terminals
-LOGIC/PULSE
-EXT TRIG/SAMPLE
-ALARM

Logic alarm cable is required for connection
(Cable is the option B-513)

Bottom Panel

Battery cover
One battery pack can be installed
(Battery pack is the option B517)

Label

USB interface terminal
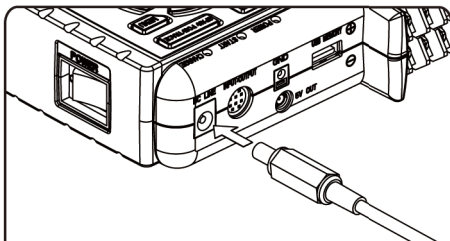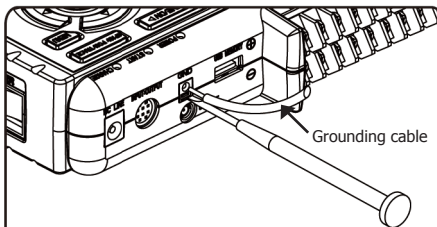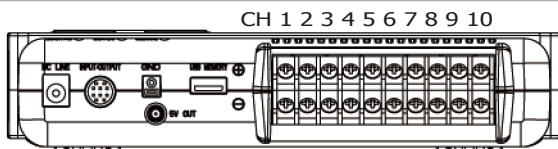
GL220 Connection Procedures

Connecting the AC Adapter

Connect the output side of the AC adapter to the connector indicated as "DC LINE" on the GL220.

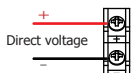## Connecting the Grounding Cable

Grounding cable

Use a flathead screwdriver to push the button above the ground terminal while connecting the grounding cable to the GL220. Connect the other end of the cable to ground.
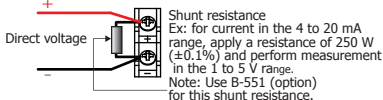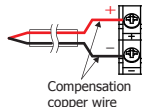
Making Connections to the Analog Input Terminals

CH 1 2 3 4 5 6 7 8 9 10

Direct voltage input

Direct voltage

Direct current input

Direct voltage

Shunt resistance
Ex: for current in the 4 to 20 mA range, apply a resistance of 250 W (±0.1%) and perform measurement in the 1 to 5 V range.
Note: Use B-551 (option) for this shunt resistance.

Thermocouple input

Compensation copper wire
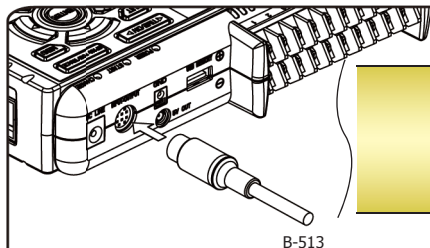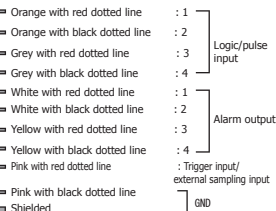
Note: Connect wires to the desired terminals according to the terminal numbers on top of the terminal block.

Making Connections to the External Input/Output Terminals

Connection diagram

Orange with red dotted line	: 1
Orange with black dotted line	: 2
Grey with red dotted line	: 3
Grey with black dotted line	: 4
White with red dotted line	: 1
White with black dotted line	: 2
Yellow with red dotted line	: 3
Yellow with black dotted line	: 4
Pink with red dotted line	: Trigger input/ external sampling input
Pink with black dotted line	
Shielded	GND

Logic/pulse input

Alarm output

B-513

*B-513 (sold separately) cable is required for external input/output.
(For logic/pulse input, alarm output, trigger input, external sampling input

3

Precautions to Observe When Performing Measurement

Maximum input voltage

If a voltage exceeding the specified value is input, the semiconductor relay in the input section will be damaged. Never input a voltage exceeding the specified value even for a moment.
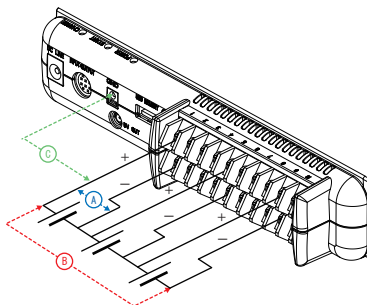
<Between +/– terminals　(A) >
・Maximum input voltage : 60Vp-p
<Between input terminal/input terminal　(B) >
・Maximum input voltage : 60Vp-p
・Withstand voltage　: 350 Vp-p at 1 minute
<Between input terminal/GND　(C) >
・Maximum input voltage : 60Vp-p
・Withstand voltage　: 350 Vp-p at 1 minute

Warming-up

GL220 requests to have approximately 30 minutes warm-up in order to have the specified performance.

Unused channels

The analog input section has high impedance.

If it is open, measured value may vary due to noise.

In such a case, set to "Off" unused channels in the AMP setting menu or short the + and – terminals.

Noise countermeasures

If measured values fluctuate due to extraneous noise, conduct the following countermeasures.

(Results may differ according to noise type.)

Ex 1 : Connect the GL220's GND to ground.
Ex 2 : Connect GL220's GND to measurement object's GND.
Ex 3 : In the AMP settings menu, set filter to any setting other than "OFF".
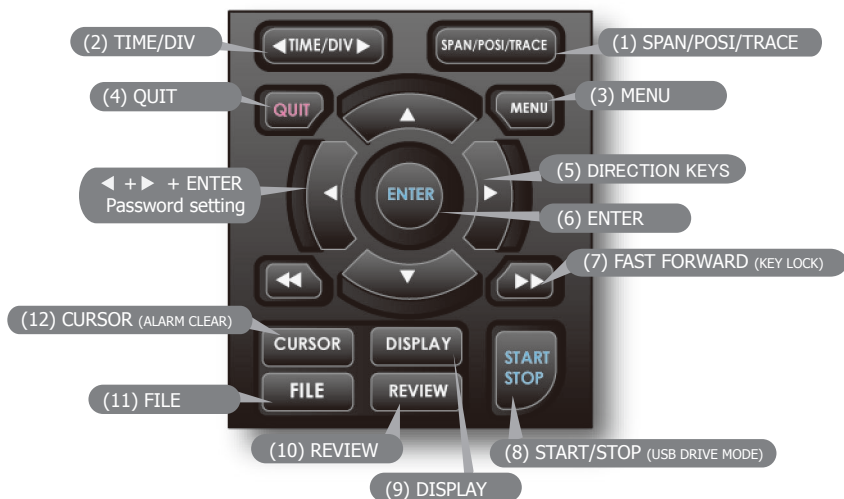Ex 4 : Operate GL220 with batteries (Option: B-517).
Ex 5: Set the sampling interval which enables GL220's digital filter (see table below).

Number of Measuring Channels*	Allowed Sampling Interval	Sampling Interval which enables Digital Filter
1 chahnnel or less	10 msec or slower**	50 msec or slower
2 chahnnels or less	20 msec or slower**	125 msec or slower
5 chahnnels or less	50 msec or slower**	250 msec or slower
10 chahnnels or less	100 msec or slower	500 msec or slower

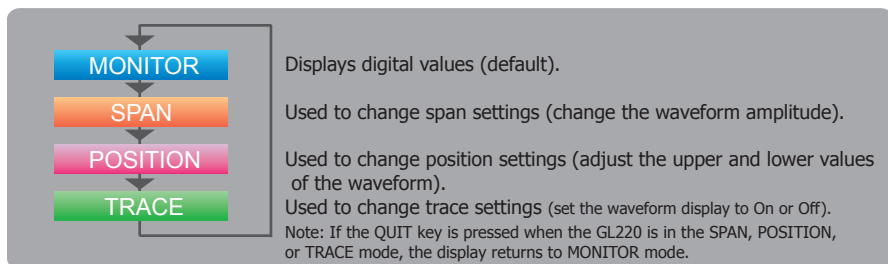*Number of Measuring Channels" is the number of channels in which input settings are NOT set to "OFF".

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

4

GL220 Descriptions of the Control Panel Keys

(2) TIME/DIV
(1) SPAN/POSI/TRACE
(4) QUIT
(3) MENU
◀ + ▶ + ENTER
Password setting
(5) DIRECTION KEYS
(6) ENTER
(7) FAST FORWARD (KEY LOCK)
(12) CURSOR (ALARM CLEAR)
(11) FILE
(8) START/STOP (USB DRIVE MODE)
(10) REVIEW
(9) DISPLAY

1. SPAN/POSI/TRACE

This key enables SPAN, POSITION, and TRACE settings to be made independently for each channel. Each time this key is pressed, the display mode changes in the sequence shown below. Use the ▲ and ▼ keys to select the channel, and the ◀ and ▶ keys to change the setting values.
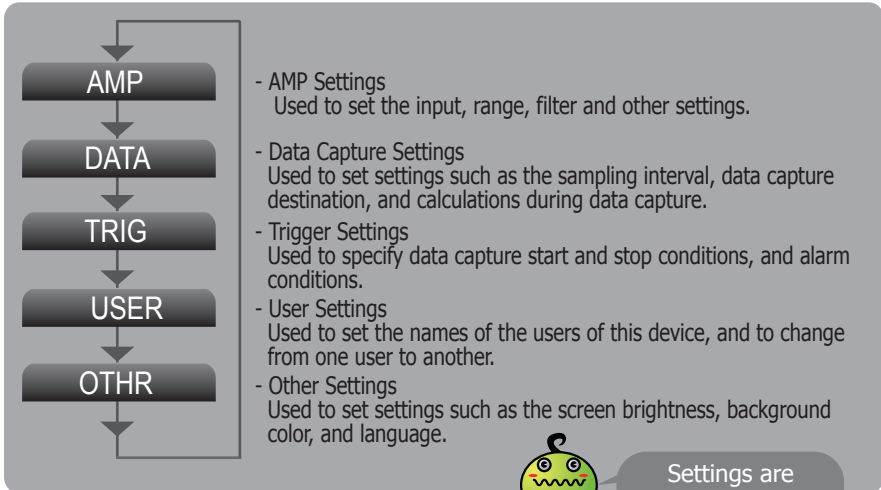
MONITOR	Displays digital values (default).
SPAN	Used to change span settings (change the waveform amplitude).
POSITION	Used to change position settings (adjust the upper and lower values of the waveform).
TRACE	Used to change trace settings (set the waveform display to On or Off).

Note: If the QUIT key is pressed when the GL220 is in the SPAN, POSITION, or TRACE mode, the display returns to MONITOR mode.

2. TIME/DIV

Press the TIME/DIV key to change the time axis display range on the waveform screen.

3. MENU

Press the MENU key to open a setup menu. Each time this key is pressed, the setup screen tabs change in the sequence shown below.

AMP
- AMP Settings
   Used to set the input, range, filter and other settings.

DATA
- Data Capture Settings
   Used to set settings such as the sampling interval, data capture destination, and calculations during data capture.

TRIG
- Trigger Settings
   Used to specify data capture start and stop conditions, and alarm conditions.

USER
- User Settings
   Used to set the names of the users of this device, and to change from one user to another.

OTHR
- Other Settings
   Used to set settings such as the screen brightness, background color, and language.

Settings are complete !

4. QUIT (LOCAL)

Press the QUIT key to cancel the settings and return them to their default status. If the device is in the Remote (Key Lock) status that the device is operated by the computer via the interface,, press this key to return the device to the normal operating status (Local).

5. ⬤ Keys (DIRECTION KEYS)

These keys are used to select menu setup items, to make span settings in the digital display area, to move the cursors during a data replay operation, and so forth.

6. ENTER

Press the ENTER key to enter the settings made in the setup menus, and to confirm your settings.

7. ◂◂ ▸▸ Keys (KEY LOCK)

These keys are used to move the cursor at high speed during a data replay operation, and to change the operation mode in the file settings box. Hold down both keys simultaneously for at least two seconds to enable key lock status. To cancel key lock status, press them again for at least two seconds.

The key lock status can be confirmed by the status of the key lock lamp on the monitor. Note: Pressing these keys simultaneously with the ◁ key + ENTER + ▷ key enables password protection for the key lock operation.

6

8. START/STOP (USB DRIVE MODE)

Press the START/STOP key to perform start and stop of a data capture while the GL220 is in the Free Running status. If this key is held down while the power to the GL220 is turned on, the GL220 goes into USB Drive Mode.

Note: Refer to the User's Manual in the supplied CD-ROM for more information on the setting.

9. DISPLAY
Press the DISPLAY key

Many display modes are available !

Waveform + Digital

Expanded Waveform

Digital + Calc

Waveform + Digital : This is the default screen when the GL220 is turned on, and both waveforms and digital values are displayed. The screen settings can also be changed by using the SPAN/POSITION/TRACE key.

Expanded Waveform : Displays waveforms only.

Digital + Calc : Displays large-size digital values and two types of calculation processing results. The calculation settings are made in the "DATA" menu.
Use the ◀◀ key or ▶▶ key to switch digital display modes.

10. REVIEW

Press the REVIEW key to replay captured data. If the GL220 is in the Free Running status, data files that have already been captured are replayed. If the GL220 is still capturing data, the data is replayed in a 2-screen format.

Note: A data replay operation will not be performed if data has not been captured.

11. FILE

Press the FILE key to save data to the GL220's internal memory or a USB memory device.

12. CURSOR (ALARM CLEAR)

Press the CURSOR key to switch between the A and B cursors during a data replay operation. If the Alarm setting has been specified as "Alarm Hold", press this key to clear the alarm. The alarm settings are made in the "TRIG" menu.

GL220 Descriptions of the Menu Screens
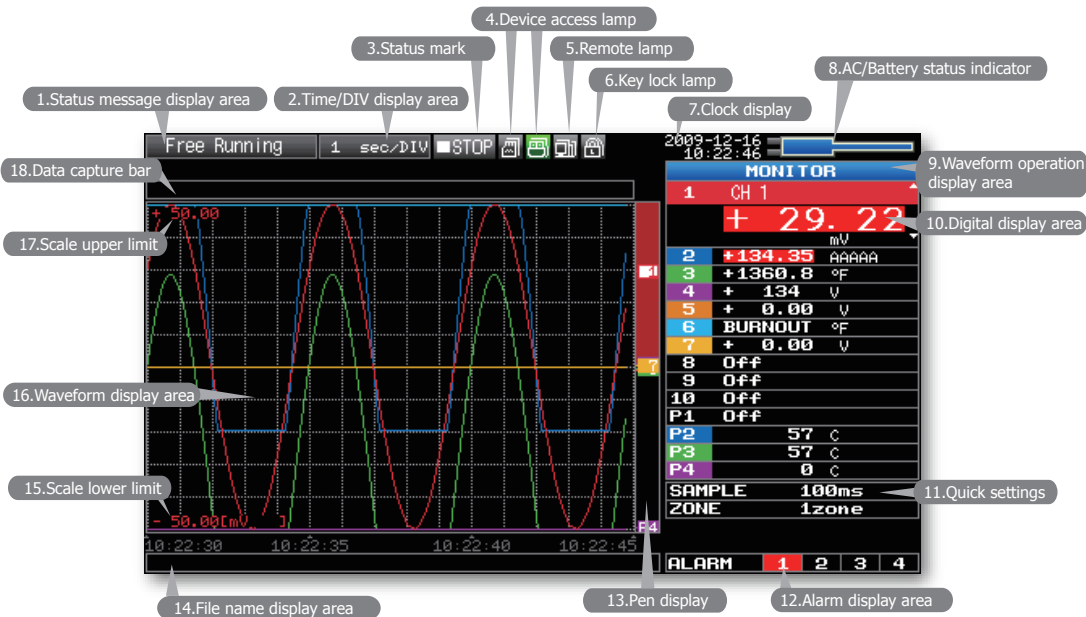
1.Status message display area : Displays the operating status.
2.Time/DIV display area : Displays the current time scale.
3.Status mark : Displays the status mark.
4.Device access lamp : Turns red while the internal memory or USM memory is in access.
   Turns green when a USB memory device has been inserted.
5.Remote lamp : Displays the remote status. (Yellow = Remote status, white = Local status)
6.Key lock lamp : Displays the key lock status. (Yellow = keys locked, white = not locked)
7.Clock display : Displays the current date and time.
8.AC/Battery status indicator : Displays the following icons to indicate the operating status of
   the AC power and the battery. (see right figure)
   Note: Use this indicator as a guideline because remaining battery power is an estimate.
   This indicator does not guarantee the operating time with battery.
9.Waveform operation display area : Displays the mode selected by the SPAN/POSITION/TRACE key.
10.Digital display area : Displays the input values for each channel. The ▼ and ▲ keys can be used to
   select the active channel (enlarged display). Moreover, the selected active
   channel is displayed at the very top of the waveform display.
11.Quick settings : Displays items that can be easily set. The ▲ and ▼ keys can be used to make
   a Quick settings item active, and the ◄ and ► keys to change the values.
12.Alarm display area : Displays the status of the alarm output. (Red = alarm generated, white = alarm not generated)
13.Pen display : Displays the signal positions, trigger positions, and alarm ranges for each channel. (see right figure)
14.File name display area : Displays the data capture file name during the data capture operation.
   When data is being replayed, the display position and cursor
   information is displayed here.
15.Scale lower limit : Displays the lower limit of the scale of the currently active channel.
16.Waveform display area : The input signal waveforms are displayed here.
17.Scale upper limit : Displays the upper limit of the scale of the currently active channel.
18.Data capture bar : Indicates the remaining capacity of the capture media during data capture.
   When data is being replayed, the display position and cursor information is displayed here.

Status mark

■STOP	Free Running status
●REC	Trigger waiting status / Capture end status
●REC	Capturing recording status
►PLAY	Data replay status

AC/Battery Indicator

	When the AC power supply is being used
	Battery power: 100 - 91%
	Battery power: 90 - 61%
	Battery power: 60 - 31%
	Battery power: 30 - o 11%
	Battery power: 10% or less

Trigger position / Alarm range

Rising trigger Start side / Falling trigger Stop side / Within the range / Outside the range

8

GL220 Measurement Procedure

In this section we will provide a simple explanation of the data capture procedure:
Preparations -> Setup -> Data Capture -> Data Replay.
Voltage measurement is performed here.

Purpose of data capture	: To measure the temperature of the target objects
Temperature Range	: T Thermocouple
Voltage range	: 1V
Sampling interval	: 1 sec
Data save destination	: Internal memory device

1. Preparations : How to Make the Preparations Required for Data

1. Connect Thermocouple to the CH 1 terminal (Temperature).
2. Connect wire to the CH 2 terminal (Voltage).
3. Connect the AC power supply.
4. Turn on the power supply.

Connect securely!

Measurement object

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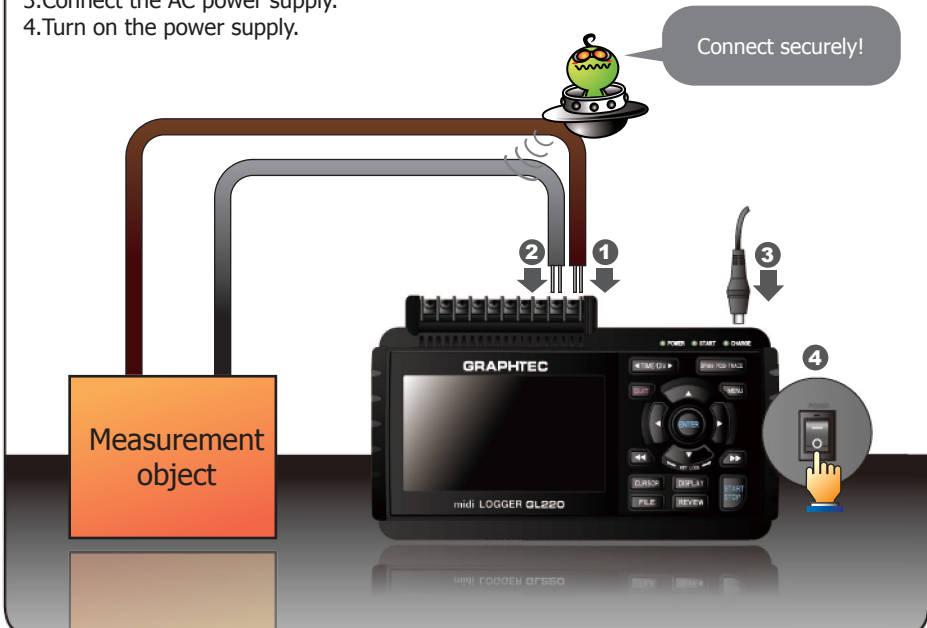
2. Setup: How to Make the Settings

Make the settings required for data capture. Here we will make only those settings that are minimum requirement. The other settings will be not changed from the factory default settings.

Basic Setup Menu Operation

Points to Remember !

The ▼▲◀▶ key, the ENTER key, and the QUIT key are used to set the condition on the setup menu. The current position of the cursor on the setup menu is displayed in green. Use the ▼▲◀▶ keys to move the cursor. If you press the ENTER key at the cursor position, a selection menu or a box of entering value for selected item is displayed. If you press the QUIT key, the screen closes and the settings are canceled.

- Examples of selection menu operations (AMP screen)

1. Use the ▼▲◀▶ keys to move the cursor to the Input parameter of CH 1 and then press the ENTER key.

2. A selection menu is displayed when the ENTER key is pressed. Use the ▼ and ▲ keys to select "TEMP."

3. Press the ENTER key to confirm your selection.
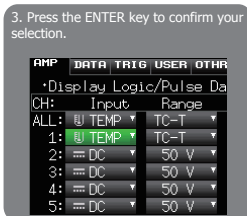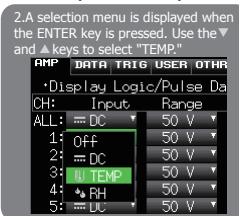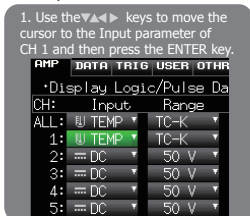
(Note: Select "DC" for voltage measurement, and "Humidity" for humidity measurement.)

1. Press the MENU key to display the setup menu screen.

2. Set Input to "TEMP" and Range to "TC-T" for CH1, and set Input to "DC" and Range to "1V" for CH2.

(1) Move the cursor to CH1 "Input" and select "TEMP" and then move it to "Range" and select "TC-T."
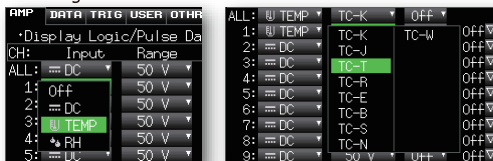
(2) In the same way, move the cursor to CH2 "Input" and select "DC" and then move it to "Range" and select "1V."

3. Select "Off" for all the other channels.

(1) Using the procedure described above, select "Off" for CH 3 to CH 10.
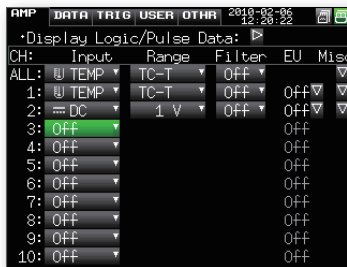
5. Set the sampling interval to "1s".

Move the cursor to "Sampling" and then select "1s".
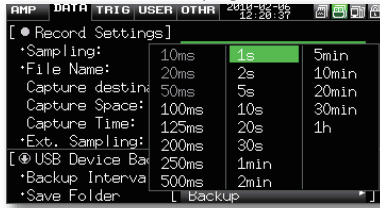
6. Set the Data Capture Destination to "Internal memory".

Here the "TEST" folder is created in the Internal memory device, and then destination for the captured data is set to the TEST folder.

(1) Move the cursor to the File Name parameter and then press the ENTER key.

(2) Move the cursor to the <MEM> item in the following screen, press the ENTER key.
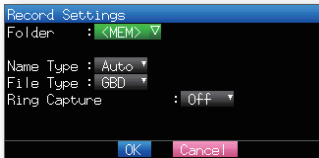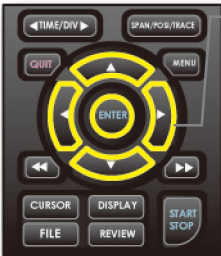
(3) The file settings box shown in the following screen opens. This box is used to specify file names for the GL220's internal memory and for the USB memory device.
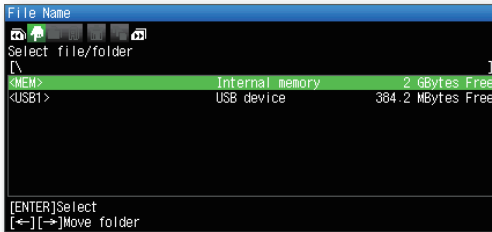
Note: <USB1> is displayed when USB memory is installed.

(4) Move the cursor to <MEM> and then press the ▶ key.

Press ▶▶ the key to move the cursor to 🗀 and then press the ENTER key.
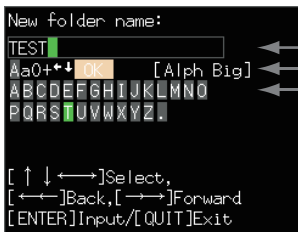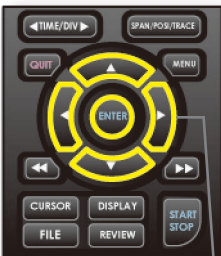
Text input box

Select the text type; delete; insert; confirm

Select the character

(5) A text input box is displayed. Let's create a folder named "TEST".

Input "TEST", move the cursor to OK , and then press the ENTER key to enter your setting.

11

(6) Return to screen (2) and move the cursor to the icon to select the created folder and then press the ENTER key.

(7) Move the cursor to OK and then press the ENTER key.

When this setting has been completed, data will be captured and saved to the <TEST> folder in the internal memory with an automatic file name.

(8) Available space in specified memory device and time for data capture are displayed in the lower part of the Record Settings menu. The data capture time can be checked.
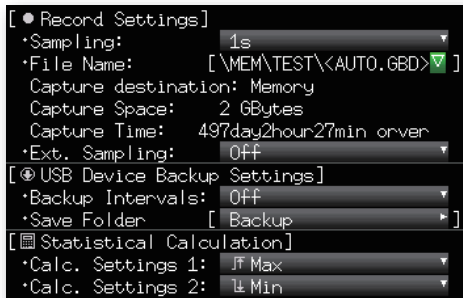
Minimum required setting for data capture is completed.

3. Data Capture: How to Capture Data

All of setting for the data capture have been set, capturing data can be started now.
During the data capture operation, let's also replay some data that was captured previously.
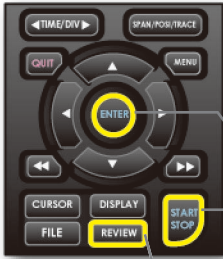
1. Starting data capture

(1) Press the START/STOP key.

(2) A confirmation message is displayed.

Start data capture?

[ENTER]Yes [QUIT]No

(3) Press the ENTER key to start data capture.

2. Screen status during data capture

Once data capture has started, progress of data capture is shown. The displayed
time is counting up or down.

capturing message

Memory Recording 1 sec/DIV ●REC

00000:00:06   06962:30:55

+5000.0

elapsed time   remaining time for data capture
(The indication becomes ++++ when the data capture time is 9999 hours or more.)

Points to Remember !

Data can be replayed while being captured by pressing the REVIEW key. Data
can be replayed during the data capture operation from the beginning to the
point that has been captured. During the replay, you can check arbitrary level
values and such by moving the cursor. You can return to the data capture
screen by pressing the REVIEW key again.

REVIEW
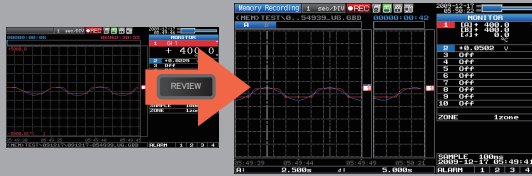
3. Stopping data capture

Press the START/STOP key to end the data capture operation.

(1) Press the START/STOP key.

Stop data capture?

[ENTER]Yes [QUIT]No

(2) A confirmation message is displayed. Press the ENTER key.

(3) Data capture ends, and the GL220 goes into the Free Running status.

The operation of data capture is completed.

4. Data Replay : How to Replay Captured Data

When data capture ends, data is automatically replayed. The automatically replayed data
is the data captured to the internal memory which has been set as the data capture destination.
Press the QUIT key to end the data replay operation.

1.Selecting a file to replay

(1) Press the REVIEW key.

(2) Since the file you want to replay has the file name that was appended automatically
when the data was captured, move the cursor to the OK button and then press
the ENTER key.

Data Replay Source
Folder   :[\MEM\TEST\100206   ]
File Name : 100206-122411_UG.GBD ▽
              OK   Cancel

(3) The Replay screen opens.

2.Replay screen
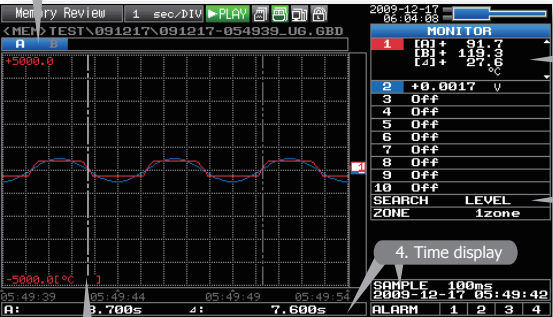
1.Scroll bar

2. Level display area

3. Quick settings

4. Time display

5. Cursor

(1) Scroll bar   : Displays the position within the whole data and the display width.
(2) Level display area : Displays the levels of A and B cursors and the difference
                          between the A and B values.
(3) Quick settings   : Use the ◄► keys to search the previous or next level.
                          (Note: Make search settings in the menu.)
(4) Time display   : Displays the sampling interval and the time of the cursor.
(5) Cursor   : Displays the cursor. (Note: Press the CURSOR key to switch
                          between A and B cursors.)
                          Move the cursor using the ◄► keys or the ◄◄►► keys.
                          Desired level values and time can be checked by moving the cursor.

Press the QUIT key to end the data replay operation.
A confirmation message is displayed. Press the ENTER key.

End data replay?

[ENTER]Yes [QUIT]No

Data replay ends, and the GL220 goes into the Free Running status.

Explanation of basic operation in the GL220 is completed.
The GL220 has many other convenient functions. Please refer the next five pages for details.

14

GL220 Convenient Functions

The GL220 has various functions that enable it to be used more effectively.
The selected three functions are described with details in the following.

Trigger Functions to Control Data Capture Start/Stop Operations

Trigger functions can be used to control the timing of the start of a data capture operation, and the timing of the end of a data capture operation.

Points to Remember

For example...
The trigger function performs operations such as the following:
• Start data capture when the voltage exceeds 1 V
• Stop data capture at 1:00 pm
• Perform control via external input

Here data capture is started in the condition as "Start data capture when the CH 1 temperature exceeds 20ºC".

(1) Press the MENU key and open the "TRIG" menu.
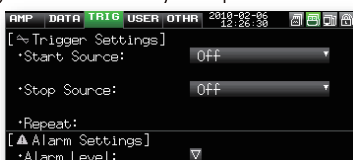
(2) Move the cursor to "Start Source" and select "Level".

(3) Move the cursor to the "Mode" parameter for the CH 1, and then select "Hi".
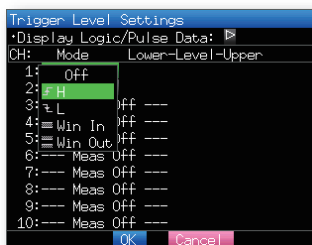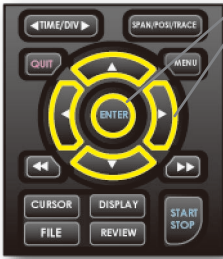
(4) Move the cursor to the "Level" parameter next to the "Mode" parameter and then press the ENTER key.

(5) The input box shown in the following screen is displayed. Select "20".
Use the ◀ and ◀ keys to move to the cursor to the second digit from the right, and the ▲ and ▼ keys to change the value. Press the ENTER key.

```
Set Value:  +    20
Limits:  [-   2700, +  20000]
[ENTER]Register
```
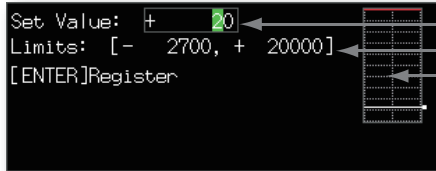
- Numerical value input box
- Lower and upper limit for setting.
- Waveform area for confirmationLower
- Use the ▲ and ▼ keys to change the values.
- Use the ◀ and ▶ keys to move the digit.
- Use the ENTER key to enter the value.
- Use the QUIT key to cancel the setting .

(6) When the screen changes to the following screen, move the cursor to the OK button and then press the ENTER key.

```
Trigger Level Settings
·Display Logic/Pulse Data:  ▷
CH:   Mode    Lower-Level-Upper
  1: F H     ▼  +    20▶  °C
  2:  Off    ▼
  3:--- Meas Off ---
  4:--- Meas Off ---
  5:--- Meas Off ---
  6:--- Meas Off ---
  7:--- Meas Off ---
  8:--- Meas Off ---
  9:--- Meas Off ---
 10:--- Meas Off ---
            OK    Cancel
```
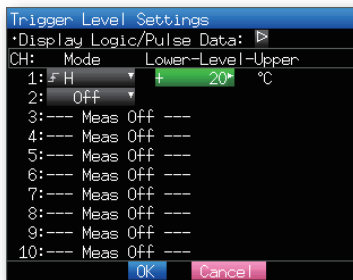
(7) The screen returns to the TRIG menu screen. Press the QUIT key to return the GL220 to the Free Running status.

(8) Press the START/STOP key to start data capture. If the trigger condition has not been satisfied, the GL220 goes into the "Armed" status as shown on the following screen.

```
Armed        1  sec/
00000:00:00

+2000.0
```

When the trigger condition has been satisfied, data capture starts and the "Memory Recording" is displayed. Elapsed time for data capture appears.

```
Memory Recording  1  sec/
00000:00:05

+3000.0
```

These functions enable to make adjustments in order to view individual channels more easily, and to delete waveforms that is not required to view in display.

Points to Remember

The span, position and trace operations can be performed while the GL220 is in the Free Running status, while it capturing data, and while it is replaying data. The changes are applied to the displayed data only, the change is not affected to the captured data.

1.How to Make a Span setting

The Span parameter is used to adjust the amplitude of the input waveform.

This setting is made in the aforementioned Free Running status.

(1) Set the displayed span for CH 1 to 100ºC.

(2) Press the SPAN/POSITION/TRACE key to select the SPAN mode.
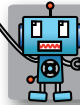
The currently selected mode (SPAN, POSITION or TRACE) can be checked by looking at the "Waveform Operation Display Area".

(3) Use the ▼ and ▲ keys to make CH 1 active (enlarged display).

(4) Use the ◄ and ► keys to change the Span value. Here the value for span is set to 100ºC.
When this setting has been changed, the waveform screen scale will be set to "+100.0 to +0.0".
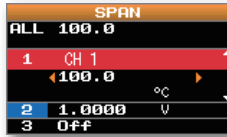
2.How to make a Position setting

The Position parameter is used to adjust the position of displayed waveform that is set by the upper and lower values.

(1) Press the SPAN/POSITION/TRACE key to select the POSITION mode.

(2) Use the ▼ and ▲ keys to make CH 1 active (enlarged display).

(3) Use the ◄ and ► keys to set the Position value to "+80ºC to -20ºC".
When this setting has been changed, the waveform screen scale will be set to "+80ºC to -20ºC".
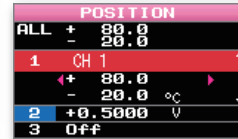
3.How to make a Trace setting.

The Trace parameter can be used to specify the selected waveform to be visible or invisible on the display.

(1) Press the SPAN/POSITION/TRACE key to select the TRACE mode.

(2) Use the ▼ and ▲ keys to make CH 1 active (enlarged display).

(3) Use the ◄ and ► keys to select Off.
When this setting has been changed, the CH 1 waveform is not displayed.

17

GL220 Specifications

Standard Specifications

Item	Description			
Number of analog Channels	10			
External input and output functions	Trigger input and External sampling (1ch), Logic input (4ch) or Pulse input (4ch), Alarm output (4ch)			
PC interface	USB (FullSpeed supported) provided as standard features			
Built-in memory device	Internal memory: 2GB or more USB memory slot (FullSpeed supported) is provided as a standard feature			
Sampling interval	10ms/1ch MAX 10*/20*/50*/100/125/200/250/500ms/1/2/5/10/20/30sec/ 1/2/5/10/20/30min/1hour/External Note: Interval setting below 50 ms is available depending on the input settings and the number of measurement channels.			
Back-up functions	Setup parameters: EEPROM/Clock: Lithium battery			
Clock accuracy (ambient temperature 23°C)	±0.002% (approx. 50 seconds per month)			
Operating environment	0~45°C, 5~85%RH (0 to 40°C when operated in batteries/15 to 35°C when battery is charging)			
Power supply	AC adapter : 100 to 240 VAC, 50 to 60 Hz DC input : 8.5 to 24 VDC(26.4 V max.) Battery pack (option) : 7.4 VDC (2200 mAh), 17Wh one pack required			

Power consumption

AC power consumption (*when using the AC adapter provided as a standard accessory)

No	Condition	Normal	During recharging battery
1	When the LCD is on	12VA	29VA
2	When the screensaver is operating	11VA	28VA

DC current consumption

No		Condition	Normal	During recharging battery
1	+24V	When the LCD is on	0.18A	0.6A
2		When the screensaver is operating	0.15A	0.57A
3	+12V	When the LCD is on	0.31A	Recharging battery is not possible.
4		When the screensaver is operating	0.26A	
5	+8.5V	When the LCD is on	0.45A	Recharging battery is not possible.
6		When the screensaver is operating	0.37A	

*Normal condition: LCD brightness is set to MAX.

Item	Description
External dimensions	194×117×42mm
Weight	520g (*Excluding the AC adapter and battery packs)
Vibration-tested conditions	Equivalent to automobile parts Type 1 classification

External Input/Output Functions

Item	Description	
Input specifications (pulse/logic, trigger/External sampling)	Maximum input voltage ： 0 to +24V(single-ended ground input)	
	Input threshold voltage ： approx. +2.5 V	
	Hysteresis ： approx. 0.5 V (+2.5 V to +3 V)	
Alarm output specifications	Output format ： Open collector output (5 V, 10 kΩ pull-up resistance)	
	Refer to the User's Manual in the supplied CD-ROM for more information.	

Input Unit Specifications

Item	Description
Number of input channels	M3 screw type, 10 channels
Method	Photo MOS relay scanning system, all channels isolated, balanced input
Maximum sampling speed	10ms/1ch
Measurement accuracy — Voltage	20m/50m/100m/200m/500m 1/2/5/10/20/50/1-5V F.S.
Measurement accuracy — Temperature	K、J、E、T、R、S、B、N、W（WRe5-26）
Measurement accuracy — Humidity	0 to 100% (voltage 0 V to 1 V scaling conversion) *with B-530 (option)

Measurement accuracy *1 (23°C±5°C)
- When 30 minutes or more have elapsed after power was switched on
- Sampling 1s/10ch
- Filter ON (10)
- GND connected

Voltage
  ±0.1% of F.S.
Thermocouple

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

*1: Thermocouple diameters T: 0.32 Φ, others: 0.65 Φ

Item	Description
A/D converter	16-bit Delta-Sigma A/D converter (Effective resolution: approx. 1/40,000 of ± range)
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.
Maximum input voltage	Between +/− terminals : 60Vp-p Between input terminal/input terminal : 60Vp-p Between input terminal/GND : 60Vp-p
Withstand voltage	Between input terminal/input terminal : 1 minute at 350Vp-p Between input terminal/GND : 1 minute at 350Vp-p
Common mode rejection ratio	At least 90 dB (50/60 Hz; signal source 300Ω or less)
Noise	At least 48 dB (with +/- terminals shorted)

GL220 APS Installation Guide

This guide describes how to install the GL220 application software.

System Requirements

This software can be installed on a PC which fulfills the following conditions.

OS	: WindowsXP, WindowsVista, Windows 7
CPU	: Pentium4 1.7GHz or higher
Memory	: 256MB or more (512MB or more recommended)
HDD	: 200MB (1GB recommended) additional space required for installing the application software
Display	: Resolution 1024 x 768 or higher, 65535 colors or above (16 Bit or higher)
Others	: CD-ROM drive (for installing from CD), USB port required

To Install the USB Driver

To connect this unit to a PC with the USB interface, a USB driver must be installed in the PC.
A USB driver and the USB driver installation manual are stored on the supplied CD-ROM. Install the USB driver according to this manual.
(The manual location: D:\USB Driver\English\GL-USB-UM152.PDF)
Note: D: drive name of CD-ROM. The letter of CD-ROM drive vary it with the CD-ROM drive of your PC.

To Install GL220 Application Software

To install the application software which sets and controls the GL220, follow the directions below.
1. Insert the accompanying midi LOGGER GL220 CD-ROM in the PC's CD drive. Select [Start] -> [Run] to open the [Run] window.
2. In the [Open:] field, type in "D:\English\GL220_820APS\SETUP.EXE" and press [OK].
3. The installer starts.
   ("D:" represents the CD-ROM drive. Change this letter to the drive letter representing your CD-ROM drive, if necessary.)
4. Follow all directions displayed by the installer to continue.

Note: D: drive name of CD-ROM. The letter of CD-ROM drive vary it with the CD-ROM drive of your PC.

GRAPHTEC

Specifications are subject to change without notice.