

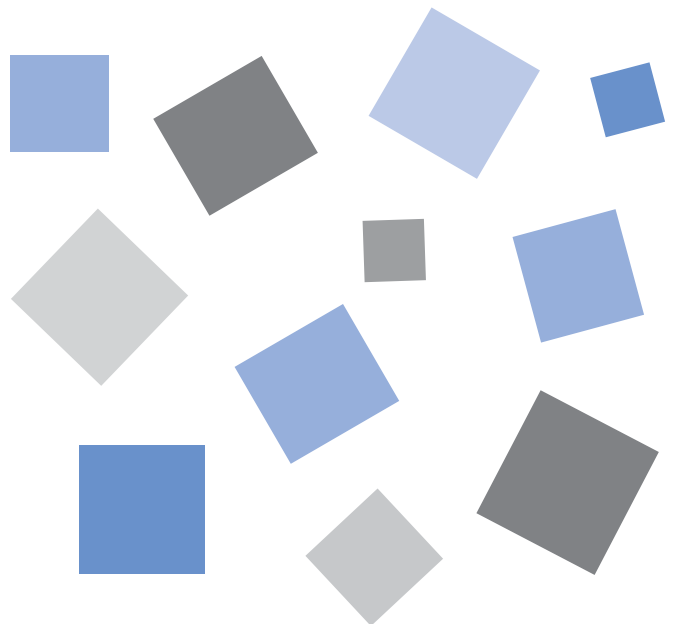
# GL400/350

## midi LOGGER

## USER'S MANUAL

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MANUAL NO. GL400-UM-151



# GRAPHTEC

# Introduction

Thank you for purchasing the GL400/350 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 GL400/350 midi LOGGER.

### 1. Note on the CE Marking

The GL400/350 complies with the EN61326 (1997+A1:1998+A2:2001 Class A) standard based on the EMC directive (89/336/EMC). It also conforms to the EN61010-1 (1993/A2:1995) standard based on the LV directive (72/73/EEC).

Although the GL400/350 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 GL400/350 by incorrect procedures may result in damage to the GL400/350 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 GL400/350.
- (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 GL400/350'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 GL400/350 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 GL400/350 in the vicinity of other devices which are susceptible to electromagnetic interference.
- (6) Measured results may not conform to the stated specifications if the GL400/350 is used in an environment which is subject to strong electromagnetic interference.
- (7) Insofar as possible, position the GL400/350 input signal cables away from any other cables which are likely to be affected by electromagnetic interference.
- (8) For stabilized measurement, allow the GL400/350 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 GL400/350, 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 GL400/350.
- 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 GL400/350 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 GL400/350.



#### **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 GL400/350's power cord.

- After checking that the Power switch is turned off, connect the power cord's female plug to the GL400/350 and then connect its male plug into the electrical socket.
- Use of the GL400/350 without the power cord securely plugged into the electrical socket may result in electrical shock due to current leakage.
- Before running the GL400/350 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<sup>2</sup>.  
When using the GL400/350 in an environment where grounding is not possible, ensure that the voltage to be measured is no greater than 50 V (DC or rms).



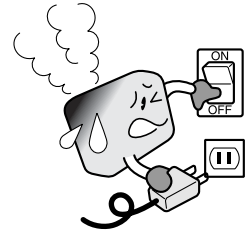
Securely connect the power cord  
Make sure that the socket has a good protective ground

#### If the GL400/350 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 GL400/350 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

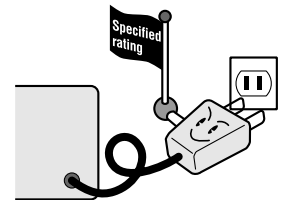


#### Before turning on the GL400/350, ensure that the electric socket's supply voltage conforms to the GL400/350's power rating.

- Use of a different supply voltage may cause damage to the GL400/350 or a fire hazard due to electrical shock or current leakage.



Use of a different supply voltage prohibited



#### Never disassemble or remodel the GL400/350.

- Such action may cause a fire hazard due to electric shock or current leakage.
- Contact with a high-voltage component inside the GL400/350 may cause electric shock.
- If repair is required, contact your sales representative or nearest Graphtec vendor.



No disassembly



#### Avoid using the GL400/350 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

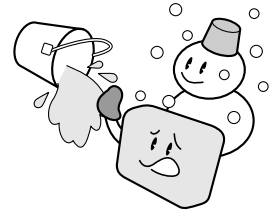
Avoid using the GL400/350 in places where it may be exposed to water such as bathrooms, locations exposed to wind and rain, and so on.



Avoid water



Watch out for  
electrical shock



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

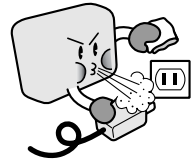
- Adhesion of foreign matter may cause a fire hazard due to electrical shock or current leakage.



No foreign matter



Watch out for  
electrical shock

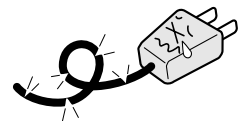


### Never use a damaged power cord.

- 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

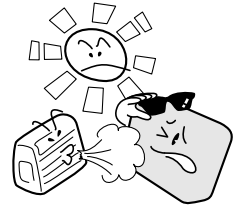


## Safety Precautions

### CAUTION

**Do not use or store the GL400/350 in a location exposed to direct sunlight or the direct draft of an air conditioner or heater.**

- Such location may impair the GL400/350's performance.



**Do not place coffee cups or other receptacles containing fluid on the GL400/350.**

- Fluid spilling inside the GL400/350 may cause a fire hazard due to electrical shock or current leakage.



Avoid fluids



Watch out for  
electrical shock

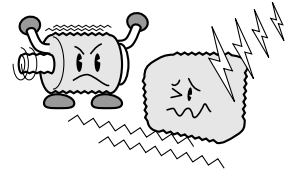


**Do not use the GL400/350 in a location subject to excessive mechanical vibration or electrical noise.**

- Such location may impair the GL400/350's performance.



Use prohibited

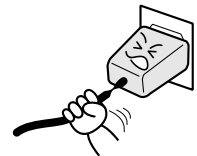


**To insert or disconnect the power cord or a signal input cable, grasp the power cord's plug or the signal input cable's connector.**

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



No pulling

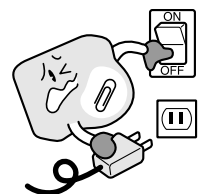


**If fluid or foreign matters enters inside the GL400/350, turn off the Power switch and disconnect the power cord from the electrical socket.**

- 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 GL400/350'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 GL400/350's mechanisms.**

- Such action may cause the GL400/350 to break down.



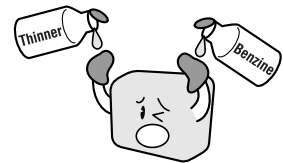
No lubrication

**Never clean the GL400/350 using a volatile solvent (such as thinner or benzene).**

- Such action may impair the GL400/350's performance.
- Clean off any soiled areas using a soft dry cloth.



No volatile solvents





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# CHAPTER 1

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## ***General Description***

This chapter provides a general description of the GL400/350 and its features.

- 1.1 Overview**
- 1.2 Features**
- 1.3 Operating Environment**
- 1.4 Notes on Temperature Measurement**
- 1.5 Notes on Using the Monitor (GL400)**
- 1.6 Changing the Display Language**

## 1.1 Overview

The GL400 (with color monitor and internal memory) and the GL350 (with internal memory) are compact, lightweight data loggers.

Both models are equipped with a PCMCIA card slot to enable the direct capture of a large volume of data to PCMCIA cards. Furthermore, the data loggers can be connected to a PC via USB or LAN to enable on-line settings, measurement, and data capture.

## 1.2 Features

### Input

- (1) The adoption of plug-in type input terminal units lets you choose amps to suit a variety of objects for measurement.
- (2) The GL400 enables settings to be made using dedicated keys and interactive menus, using just one hand.

### Display

- (1) With the GL400's 4.7-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 PCMCIA card.
- (2) With the GL400, even after saving a large volume of data, use of the Search function lets you easily retrieve the required portion of the data.

### Data Control & Processing

- (1) The software provided lets you set conditions and monitor data on a computer using the USB or TCP/IP interface.
- (2) Captured data can be read from the software to files and displayed for processing.
- (3) Data can be transferred off-line to a computer using memory media (PCMCIA cards).

## 1.3 Operating Environment

This section explains the operating environment for the GL400/350.

### Ambient Operating Conditions

- (1) Ambient temperature and humidity (the GL400/350 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.)
  - Locations in direct sunlight or with high humidity, such as near heaters
  - 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 GL400/350 conforms to the IEC664 installation category I



If condensation occurs...

Condensation occurs in the form of water droplets on the device surfaces and interior when the GL400/350 is moved from a cold to a warm location. Using the GL400/350 with condensation will cause malfunctioning. Wait until the condensation has disappeared before turning on the power.

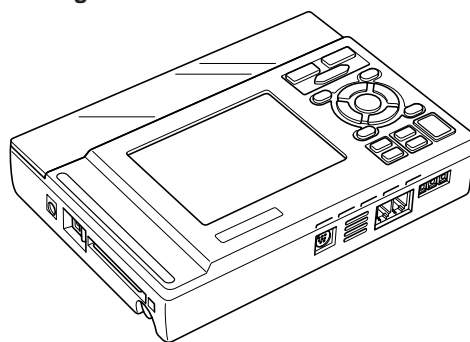
### Warming-up Before Use

The GL400/350 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.

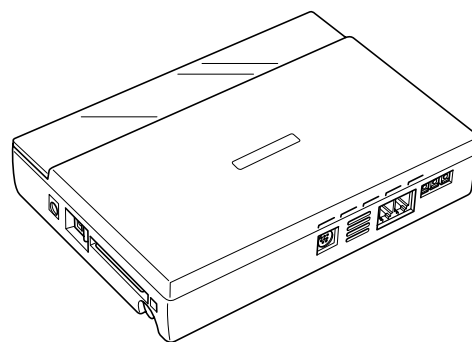
### Configuration When in Use

Do not use the GL400/300 standing upright or at an angle. It must always be laid flat.

#### Usage Configuration



GL400



GL350



Do not block the air vent on the GL400/350, as this will cause malfunctioning.

## 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 GL400/350.
- (2) For stabilized temperature measurement, allow the GL400/350 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 GL400/350.

## 1.5 Notes on Using the Monitor (GL400)

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



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.

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### CAUTION

- Condensation may form on the LCD screen if the GL400/350 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 or Japanese as the language displayed on the screen. The default display language is set to English when the GL400/350 is shipped overseas. To change the display language, see the instructions in "Changing the Display Language".

# CHAPTER 2

## *Checks and Preparation*

This chapter explains how to check the GL400/350's external casing and accessories, and how to prepare the GL400/350 for operation.

- 2.1 Checking the Outer Casing**
- 2.2 Checking the Accessories**
- 2.3 GL400/350 Part Names and Functions**
- 2.4 Monitor Part Names and Functions (GL400)**
- 2.5 Control Panel Key Part Names and Functions**
- 2.6 Connecting to a PC**
- 2.7 Connecting the Power Cable and Turning on the Power**
- 2.8 Using the Battery Pack (Option)**
- 2.9 Inserting and Removing a PCMCIA Card**
- 2.10 Mounting and Removing the Input Terminal Unit**
- 2.11 Connecting the Signal Input Cables to the Input Terminal Unit**
- 2.12 Precautions to Observe When Performing Measurement**
- 2.13 Noise Countermeasures**
- 2.14 Logic/Alarm Functions**
- 2.15 Trigger/Pulse Functions**



## 2.1 Checking the Outer Casing

After unpacking, check the GL400/350'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. The accessories included will differ depending on the model purchased.

### Standard Accessories

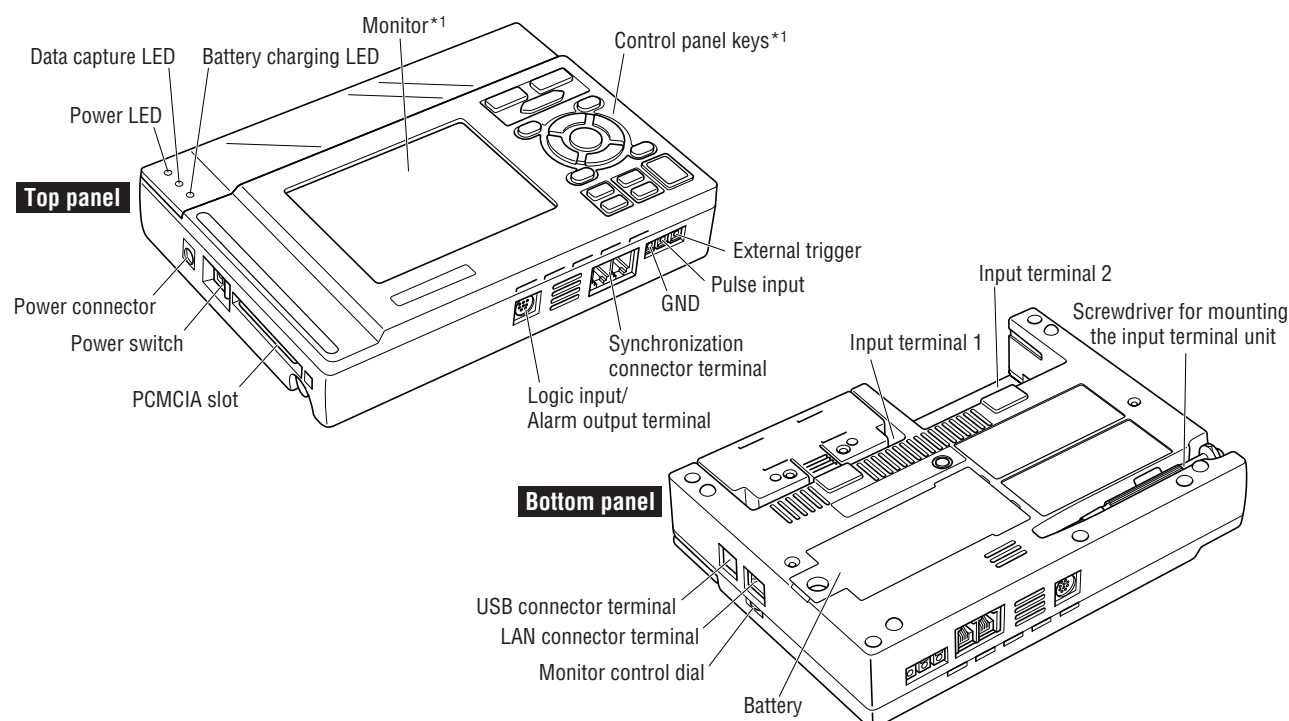
Item	Remarks	Quantity
Quick Start Guide	GL400-UM-851	1
CD-ROM	User's Manual, Application software	1
AC cable/AC adapter	100 to 240 VAC, 50/60 Hz	1
Screwdriver for input terminal unit	Fits inside the main unit	1
10-ch input terminal unit	Input terminals for 10 channels (2 input terminal units can be mounted in the main unit)	1

### Optional Accessories

Item	Option No.	Remarks
10-ch input terminal unit	10SU	Input terminals for 10 channels
20-ch input terminal unit	20SU	Input terminals for 20 channels (can be mounted in the main unit)
50-ch input terminal unit	50SU	Input terminals for 50 channels (used outside the main unit)
Battery pack	B-511	
Battery charger	B-512	
Logic/alarm cable	B-513	Bare tips (2 m)
DC drive cable	B-514	Bare tips (2 m)
Connection cable (to connect two main units together)	B-515	1-m length (for synchronized sampling during PC measurement)

## 2.3 GL400/350 Part Names and Functions

This section describes the names and function of parts of the GL400/350

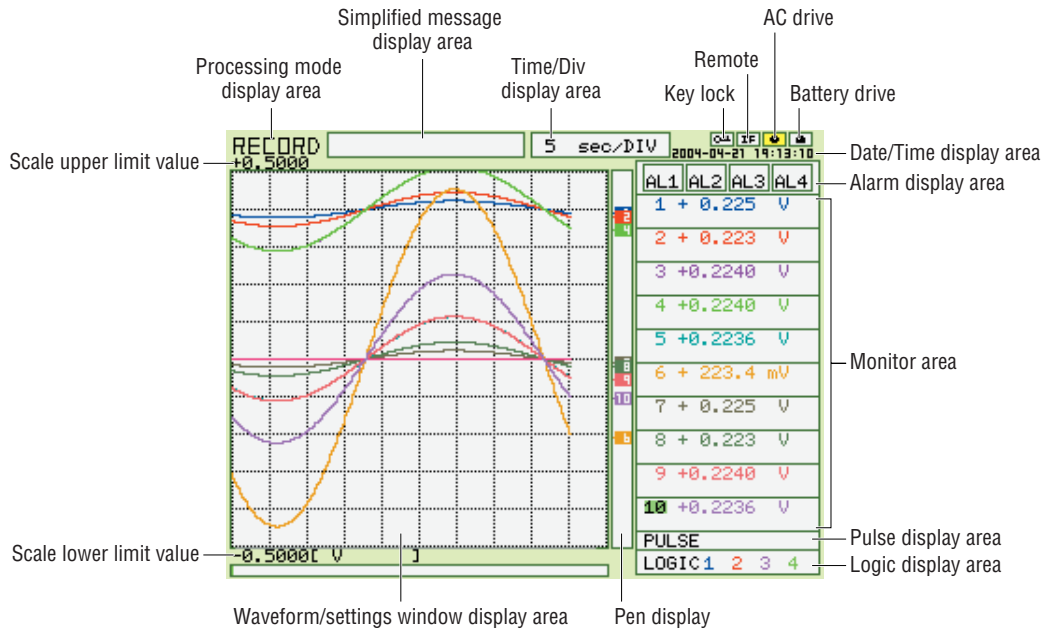


Power LED .....	This LED is lit when the power switch is in the 'On' status.
Data Capture LED .....	This LED is lit while data is being captured.
Battery Charging LED .....	This LED is lit when the battery is being charged.
Monitor* <sup>1</sup> .....	Displays the setting menus and measurement data.
Control panel keys* <sup>1</sup> .....	Used for the main operations, including settings, and starting and stopping measurement.
Power connector .....	Terminal for connecting the AC/DC power cables.
Power switch .....	Switch for turning on the power.
PCMCIA slot .....	Used for inserting the PCMCIA card.
Logic input/Alarm output terminal .....	Used for logic input and alarm output.
Synchronization connector terminal .....	Terminals for connecting and synchronizing additional GL400/350 units (used with the functions in OPS022).
GND terminal .....	Connects the main unit to ground.
Pulse input .....	Terminal for the measurement of pulse signals.
External trigger .....	Terminal for the input of external triggers.
Input terminal 1 & 2 .....	Used to connect the 10-, 20-, and 50-ch input terminal units.
USB connector terminal .....	Terminal for connecting the USB cable.
LAN connector terminal .....	Terminal for connecting the LAN cable.
Monitor control dial .....	Used to adjust the monitor contrast.
Battery .....	Backup battery used in the case of an AC or DC power failure.
Screwdriver for mounting the input terminal unit .....	Used to connect the signal input cables to the input terminal unit.

\*<sup>1</sup> The monitor and control panel keys come with the GL400 main unit only.

## 2.4 Monitor Part Names and Functions (GL400)

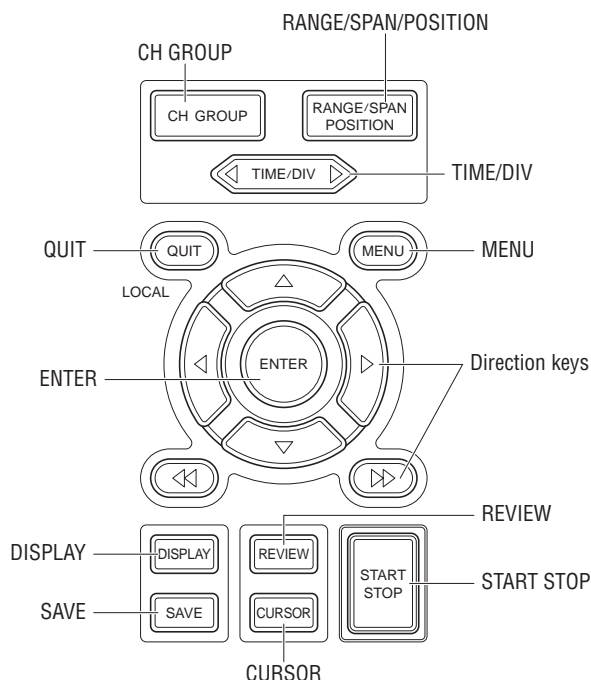
This section describes the monitor unit on top of the GL400.



- Processing mode display area  
..... Displays the processing mode currently set
- Simplified message display area  
..... Displays the system status. ("Free Running") is usually displayed. For example, "Armed" is displayed when waiting for a trigger signal.
- Time/Div display area ..... Displays the current time scale.
- Date/Time display area ..... Displays the current date and time.
- Monitor area ..... Displays the input signal values for each channel.
- Waveform settings/window display area  
..... Displays the measurement signal waveforms. The menu windows are also displayed when the condition setting keys are pressed.
- Scale upper limit/lower limit  
..... Displays the measurement scale for the range set.
- Key lock ..... Lit when the GL400 is in key lock status. To enable key lock status, hold down the [ << ] [ >> ] key for at least three seconds.
- Remote ..... Lit when the GL400 is in remote status
- AC drive ..... Lit when the AC is in use.
- Battery drive ..... Lit when the battery is in use.
- Pulse display area ..... Displays the measured values.
- Logic display area ..... Displays the action status.
- Pen display ..... Pens are displayed for each group.

## 2.5 Control Panel Key Part Names and Functions

This section describes the control panel keys.



CH GROUP key ..... Switches between channel groups.

RANGE/SPAN/POSITION key

..... Switches through the RANGE, SPAN, and POSITION settings on the monitor display. These settings can be specified for each channel.

TIME/DIV key ..... Used to switch the time axes.

QUIT key ..... Used to cancel the displayed setting item. It is also used to cancel the REMOTE status.

MENU key ..... Switches through the various setting menus.

Direction keys (  $\triangleleft \triangleright \triangleup \triangleleft$  ) ..... These keys move the cursor on the screen in the direction indicated.

Direction keys (  $\ll \gg$  ) ..... Press these keys to scroll the memory data waveforms and move the cursor. Hold down both keys together for at least three seconds to enable key lock status. To cancel key lock status, press them again for at least three seconds.

ENTER key ..... Enters the details set in the current setting window.

DISPLAY key ..... Switches through the Waveform, Enlarged Waveform, and Digital Data screens.

REVIEW key ..... replays the captured data.

SAVE key ..... Used to save data and make a copy of the displayed screen.

CURSOR key ..... Used to switch through the Single Cursor, Dual Cursor, and Off settings.

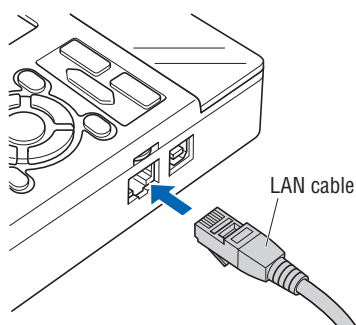
START/STOP key ..... Press this key to start measurement or to stop measurement when measurement is in progress.

## 2.6 Connecting to a PC

The GL400/350 can be connected to a PC via a LAN cable or a USB cable.

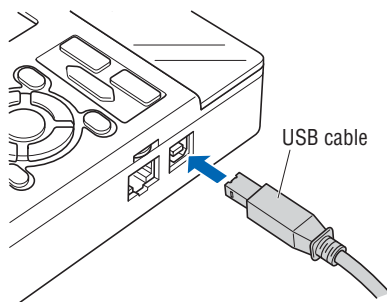
### Connection Using a LAN Cable

Use the LAN cable to connect the GL400/350 to a PC.



### Connection Using a USB Cable

Use the USB cable to connect the GL400/350 to a PC.



If the USB cable is used, the USB driver must be installed in your PC. Please refer to Section 4.2 "Installing the USB Driver" for the installation procedure.

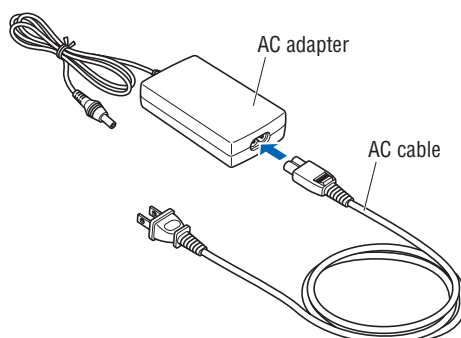
## 2.7 Connecting the Power Cable and Turning on the Power

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.

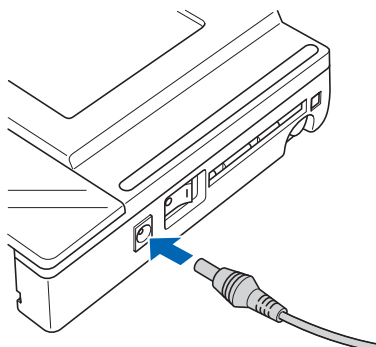
### Connecting to an AC Power Supply

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

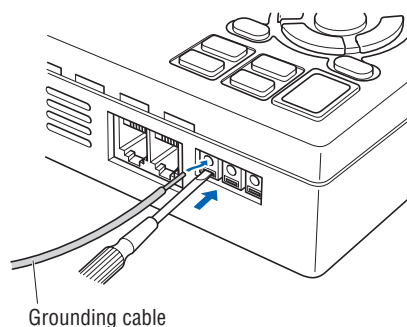
- (1) Plug the AC cable into the AC adapter.



- (2) Connect the output side of the AC adapter to the connector on the GL400/350.



- (3) Using the screwdriver provided as a standard accessory, press against the button underneath the ground terminal while connecting the grounding cable to the GL400/350. 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 GL400/350 to the ON side to turn on the power.

### **CAUTION**

Always connect the GND terminal and refer to the safety precautions. The GL400/350 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).

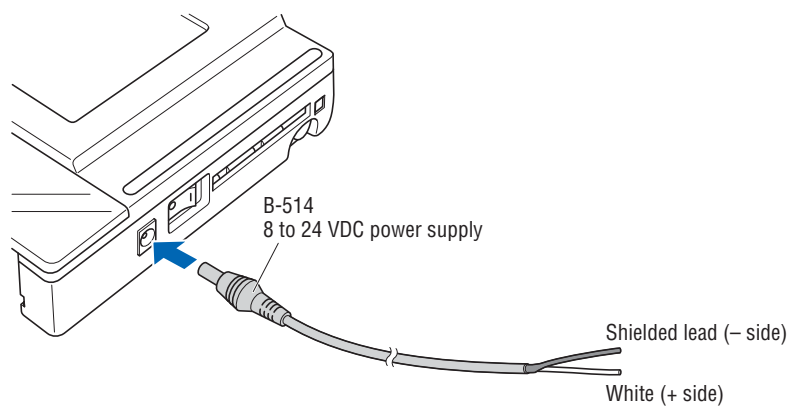
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### **CAUTION**

Use a power supply within the 8 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 GL400/350.



- (3) Connect the DC input side to the DC power supply.
- (4) Press the power switch on the GL400/350 to the ON side to turn on the power.

## 2.8 Using the Battery Pack (Option)

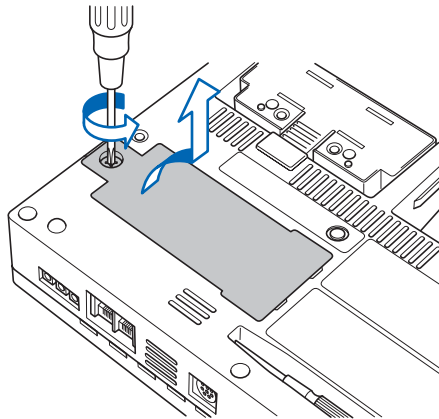
Use the battery pack for data back-up when the AC power supply is interrupted by a power failure or brownout.

Expected operating time when using the battery pack (fully charged status):

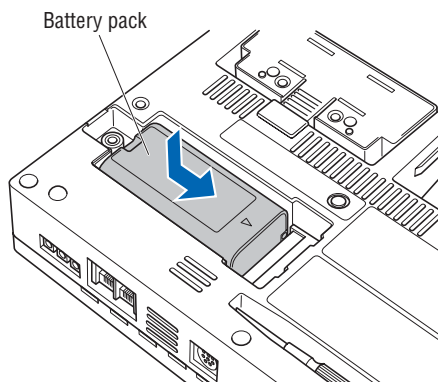
- GL400: 1 hour
- GL350: 2 hours

### Mounting the Battery Pack

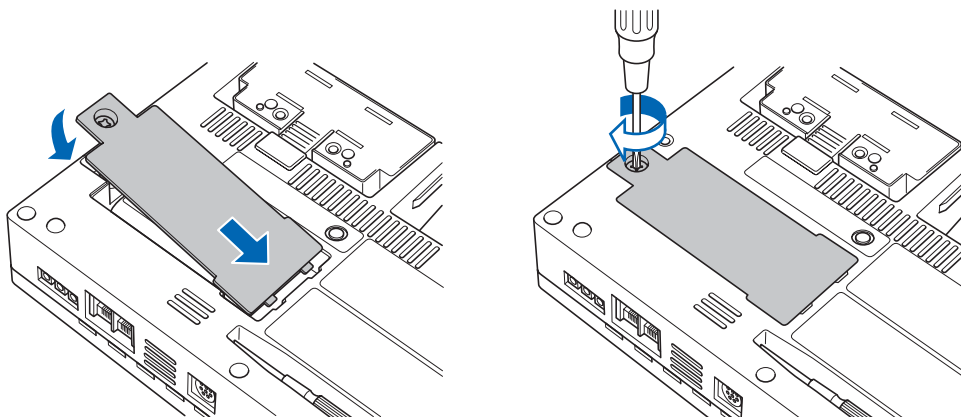
- (1) Use a screwdriver to remove the battery pack cover from the bottom panel.



- (2) Mount the battery pack in the direction shown by the arrow.



- (3) Reattach the cover, and fasten the screw in place.





## Charging the Battery

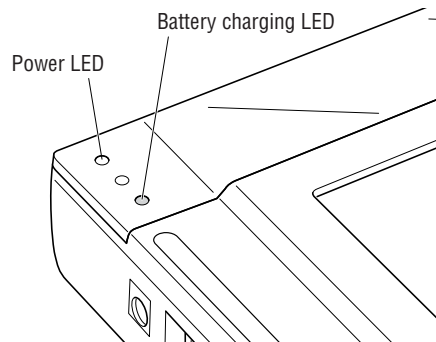
Expected time required for charging:

- GL400/350: 12 hours
- Battery charger: 10 hours

### Using the GL400/350 for Charging

The battery pack is charged by mounting it in the GL400/350, and supplying it with AC power. The battery cannot be charged, however, while the GL400/350 is operating.

- (1) Mount the battery pack in the GL400/350 (see the previous section for the mounting procedure).
- (2) Turn on the power to the GL400/350. (Please see Section 2.7, "Connecting the Power Cable and Turning on the Power").
- (3) Turn the power switch off to start the charging operation. The battery charging LED lights. If the power switch is turned on, the charging operation is aborted, the battery charging LED goes out, and the power LED lights.

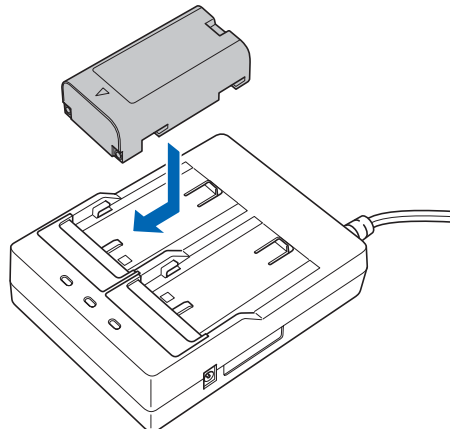


- If battery charging is attempted immediately after the GL400/350 has been used continuously, charging may not be performed. However, charging will start automatically as soon as the GL400/350 has cooled down.  
Charging temperature: 15 to 35°C
- If input is being made directly from the DC power supply instead of the AC adapter, the DC voltage must be at least 16V.

### Using a Battery Charger for Charging

Use the optional battery charger.

- (1) Mount the battery pack in the battery charger.



- (2) Plug the battery charger's AC cable into the mains power outlet.

## 2.9 Inserting and Removing a PCMCIA Card

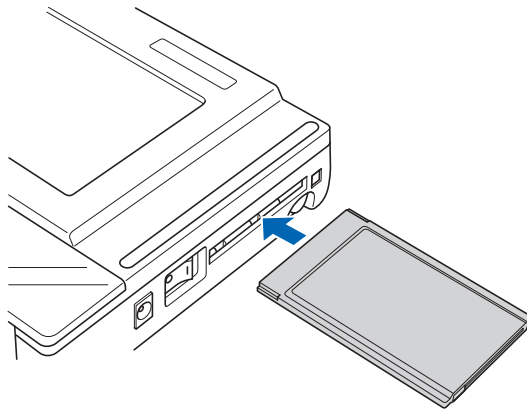
This section describes how to insert a PCMCIA card.

### CAUTION

Adequate precautions against static electricity must be taken when handling PCMCIA cards.

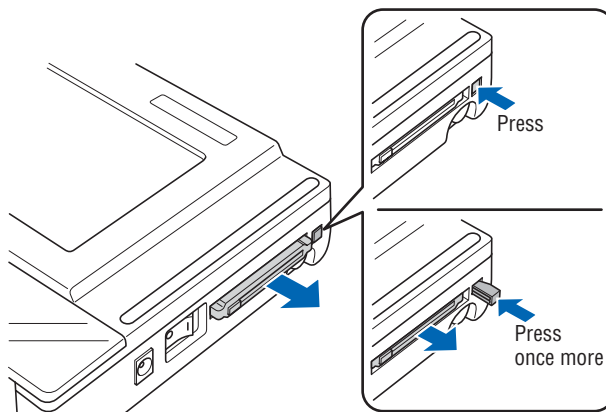
### Inserting a PCMCIA Card

Insert the PCMCIA card into the slot as far as it will go.



### Removing a PCMCIA Card

Press the eject button next to the PCMCIA card slot so that the button protrudes. Press it once more to eject the PCMCIA card.



## 2.10 Mounting and Removing the Input Terminal Unit

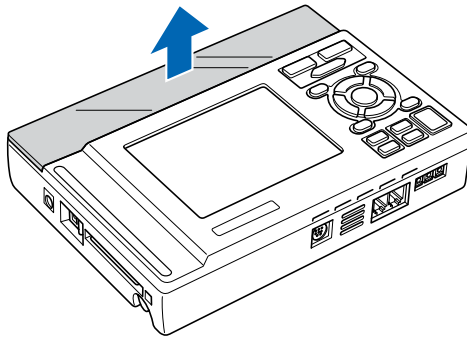
This section describes how to mount and remove the input terminal unit.

### CAUTION

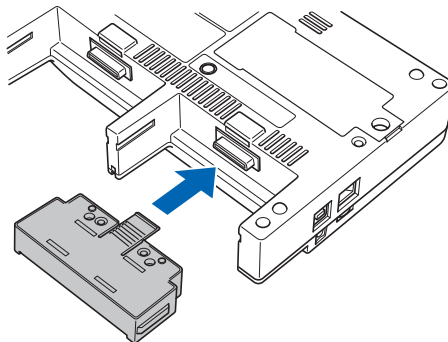
Make sure that the power supply has been turned off before mounting or removing the input terminal unit.

### Mounting the Input Terminal Unit

- (1) Remove the cover from the input terminal mounting area.

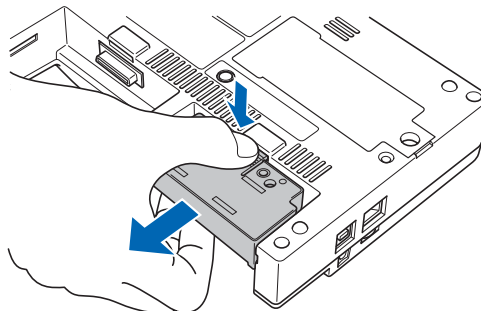


- (2) As shown in the figure below, insert the input terminal unit in the GL400/350. At this time, be sure to check that the terminal unit is locked onto the connector.



### Removing the Input Terminal Unit

- (1) Remove the cover from the input terminal mounting area.
- (2) Press down on the lock button while pulling the input terminal unit towards you. At this time, grip the input terminal unit firmly while removing it.



- (3) Replace the cover for the input terminal mounting area.

## 2.11 Connecting the Signal Input Cables to the Input Terminal Unit

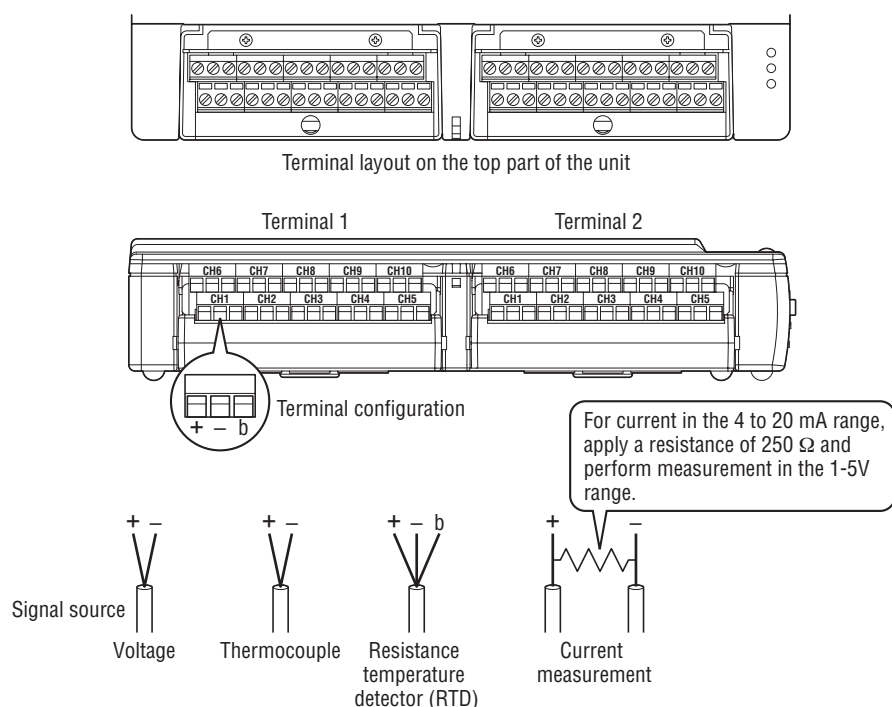
This section describes how to connect the signal input cables to the input terminal unit.

### Input Terminal Unit Types

There are three types of input terminal unit:

- 10-channel input terminal unit (mounted in the GL400/350)
- 20-channel input terminal unit (mounted in the GL400/350)
- 50-channel input terminal unit (used outside the GL400/350)

### Terminal Configuration and Signal Types



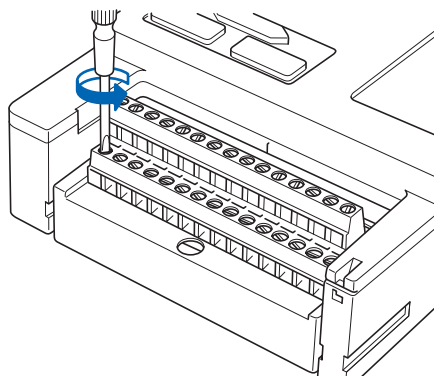
- + ..... High-voltage terminal (terminal for high-voltage input signals)  
 - ..... Low-voltage terminal (terminal for low-voltage input signals)  
 b ..... Terminal used for RTDs only

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)
Resistance Temperature Detector	Pt100, JPt100
Sampling interval*1	100, 200, 500 ms; 1, 2, 5, 10, 20, 30 s; 1, 2, 5, 10, 20, 30 min; 1 h
A/D resolution	16-bit
Filter	On, Off (software filter)

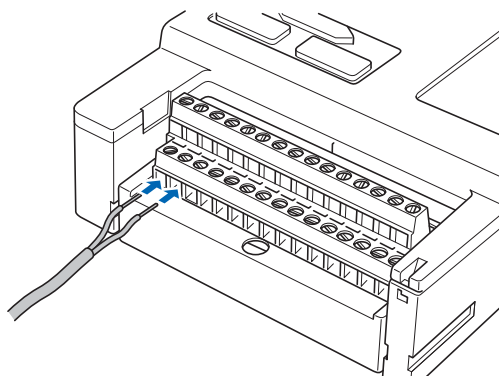
\*1 The maximum sampling interval will depend on the number of channels being used.

### Attaching the Input Cable

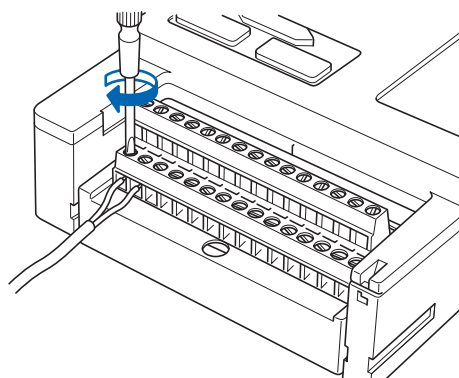
- (1) Use the supplied screwdriver to loosen the terminal screw.



- (2) Insert the cable tips into the terminal to be used.



- (3) Use the supplied screwdriver to tighten the terminal screw.



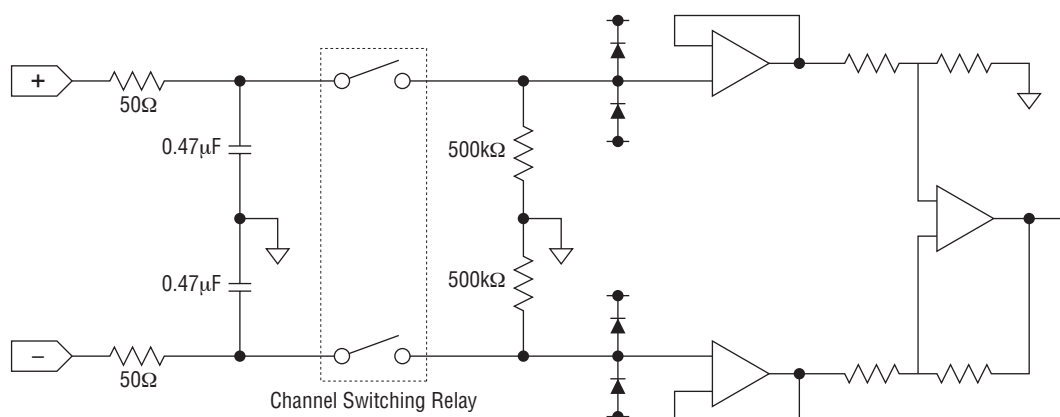
## 2.12 Precautions to Observe When Performing Measurement

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.
- 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)



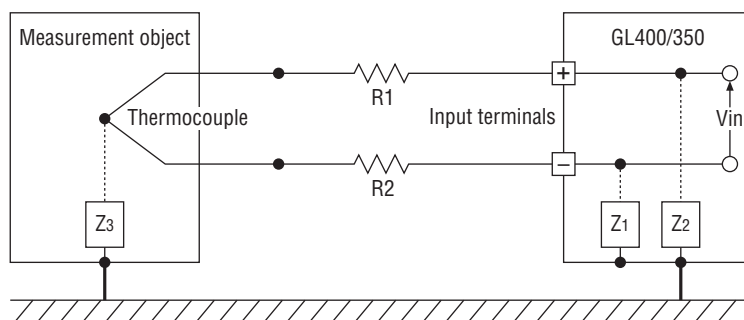
### **⚠ CAUTION**

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.

## 2.13 Noise Countermeasures

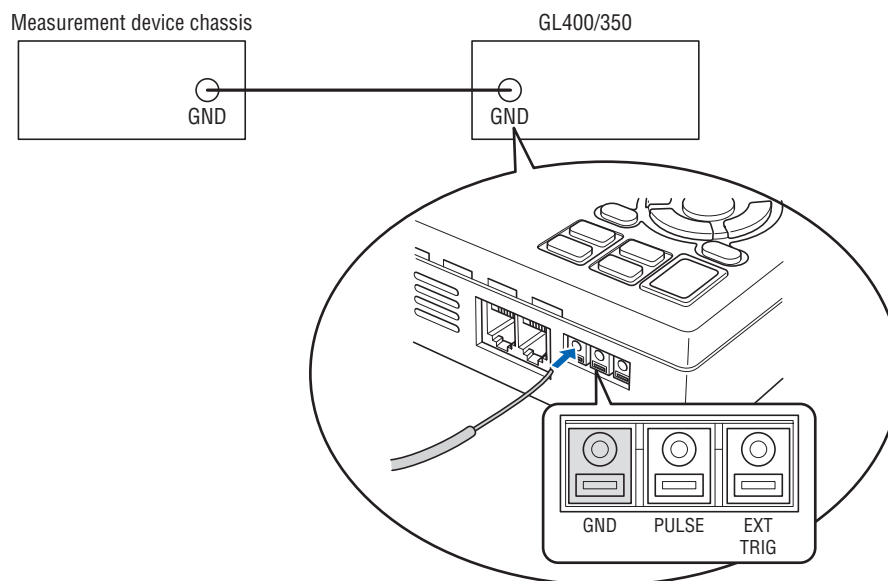
**Be sure to connect the chassis GND of the object to be measured.**

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



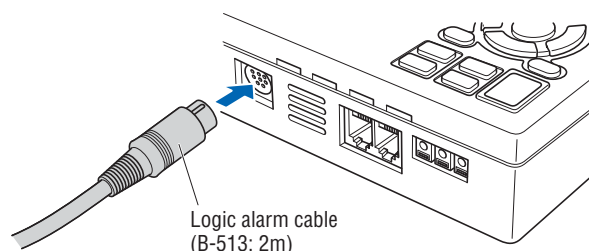
**Connect the signal chassis GND and the measurement device chassis ground.**

Use a short, thick lead to connect the chassis GND of the measurement object to the GL400/350's chassis GND. It will be even more effective if the ground potentials are the same.



## 2.14 Logic/Alarm Functions

Connect the round connector of the logic alarm cable (B-513, option) to the logic Input/alarm output terminal on the GL400/350.



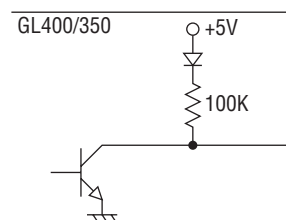
### Logic Functions

Item	Description
Number of channels	4
Input voltage range	0 to +24V max. (single-ended ground input)
Threshold level	+2.5V
Hysteresis	Approx. 1 V (+2 to +3 V)

### Alarm Functions

Item	Description
Number of channels	4
Maximum rating	VCEO (voltage between connector and emitter): 30V IC (connector current): 0.5A

### Alarm Output Circuit



#### Maximum rating

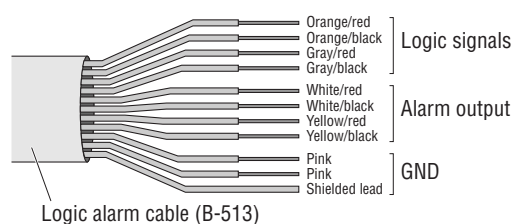
VCEO (voltage between connector and emitter): 30V  
IC (connector current): 0.5A

**Note:** Be sure to not to exceed the maximum ratings

### Wiring

The cables have bare tips. Please perform wiring as required.

Item	Number	Lead Color
Logic signal	1	Orange/red
	2	Orange/black
	3	Gray/red
	4	Gray/black
Alarm output	1	White/red
	2	White/black
	3	Yellow/red
	4	Yellow/black
Common ground	GND	Pink
	GND	Pink
	GND	Shielded lead

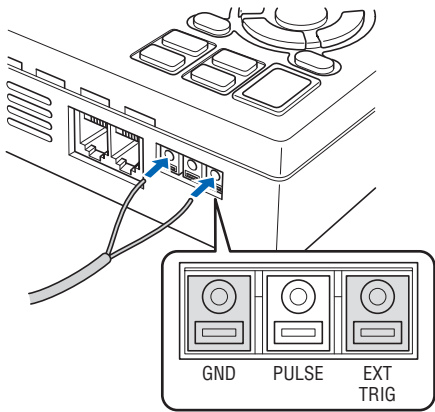




## 2.15 Trigger/Pulse Functions

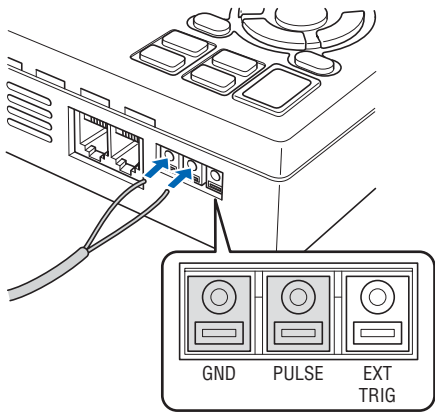
### External Trigger Functions

Item	Description
Number of channels	1
Input voltage range	0 to +24V max. (single-ended ground input)
Threshold level	+2.5V
Hysteresis	Approx. 1 V (+2 to +3 V)



### Pulse Functions

Item	Description
Number of channels	1
Input voltage range	0 to +24V max. (single-ended ground input)
Threshold level	+2.5V
Hysteresis	Approx. 1 V (+2 to +3 V)



# CHAPTER 3

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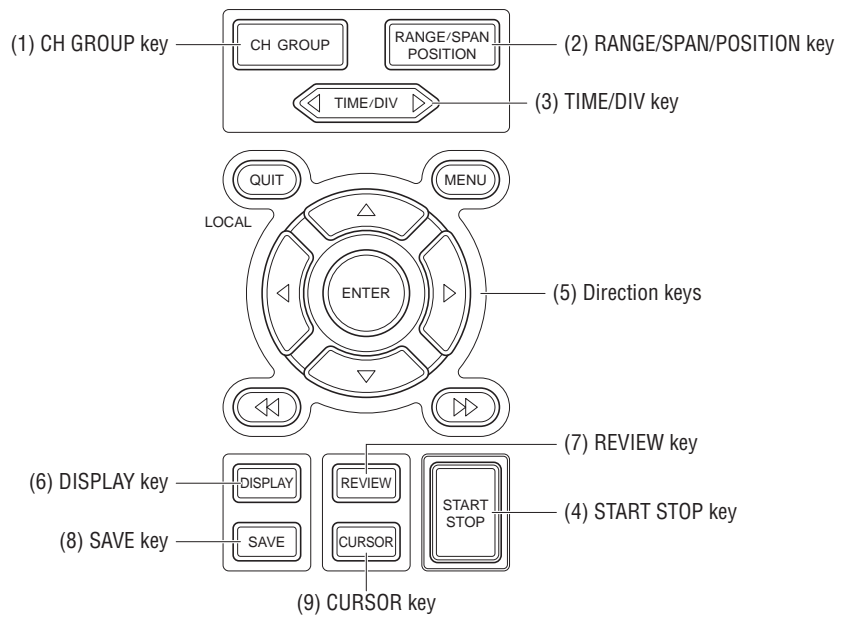
## ***Settings and Measurement***

This chapter describes the setting and measurement procedures for the GL400/350.

- 3.1 Basic Settings and Measurement (GL400)**
- 3.2 Detailed Settings and Measurement (GL400)**
- 3.3 Data Replay**

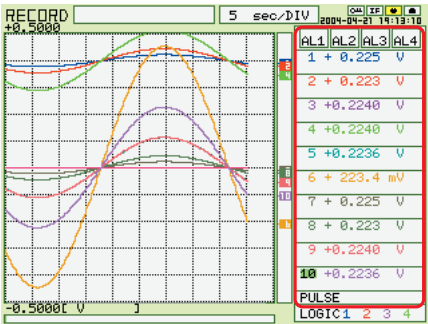
### 3.1 Basic Settings and Measurement (GL400)

With the GL400, control panel keys are provided for easy measurement.

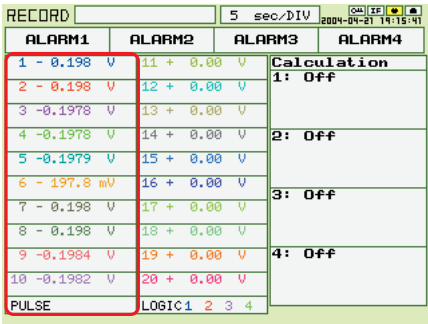


#### (1) CH GROUP key

This key selects the channels in 10-channel groups. Press the key to move to the next group of 10 channels. The number of channels varies according to the type of input terminal unit installed.



Waveform and digital display



Digital display

## (2) RANGE/SPAN/POSITION key

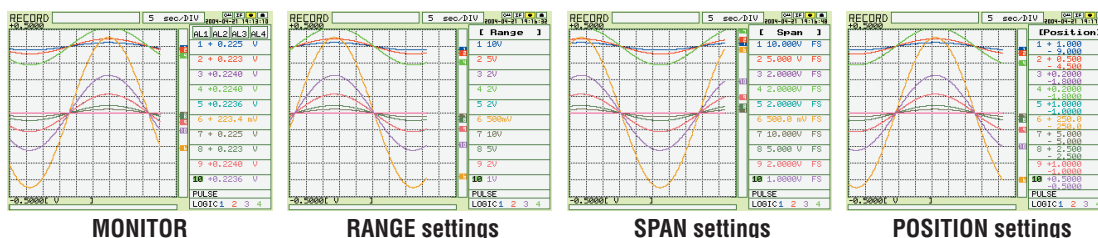
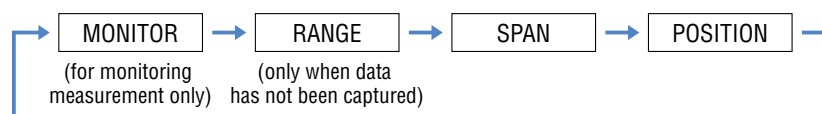
These settings can be made or changed for each channel individually, even while the GL400 is running or performing measurement.



The monitor is used for monitoring the measurement status only, and its settings cannot be changed. In addition, the RANGE setting can only be changed if data has not been captured.

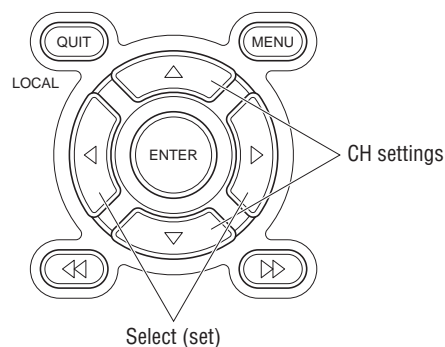
### Selecting the Items

Press the RANGE/SPAN/POSITION key to switch from one setting screen to the next.



### Setting Procedure

Use the direction keys to move to the setting item and to make selections (settings).



### RANGE settings

The voltage and temperature settings vary according to the settings made in MENU (AMP).

#### • 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 • Pt100 • JPt100



SPAN settings

Voltage	20 mV	0.200 to 40.000 mV/F.S.	2 V	0.0200v4.000 V/F.S.
	50 mV	0.50 to 100.00 mV/F.S.	5 V	0.050 to 10.000 V/F.S.
	100 mV	1.00 to 200.00 mV/F.S.	10 V	0.100 to 20.000 V/F.S.
	200 mV	2.00 to 400.0 mV/F.S.	20 V	0.200 to 40.000 V/F.S.
	500 mV	5.0 to 1000.0 mV/F.S.	50 V	0.50 to 100.00 V/F.S.
	1 V	0.0100 to 2.0000 V/F.S.	1-5 V*1	0.040 to 4.000 V/F.S.
Temperature*2		50.0 to 2200.0 °C/F.S.		

\*1 When 1-5V has been specified and the range is changed, it becomes a ± range. If the 1-5V range is required, please select 1-5V for the range setting once again.

\*2 With the temperature ranges, the measurement range will depend on the type of sensors used. If you want to make detailed settings, please set the range again.

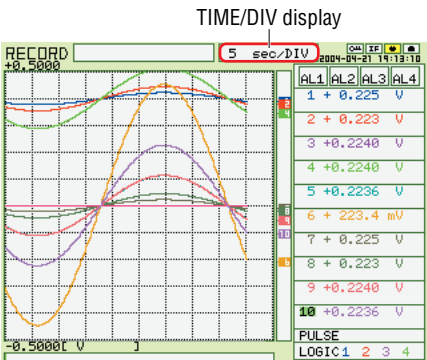
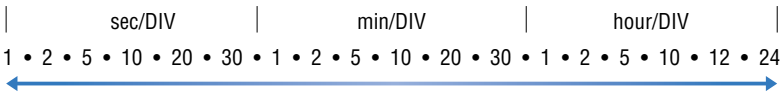
POSITION settings

If the ENTER key is pressed when POSITION has been selected, the position can be moved.

Voltage ranges: In 10% units of the range  
Temperature ranges: In 10% units of the following ranges:  
50.0, 100.0, 200.0, 500.0, 1000.0, 2000.0

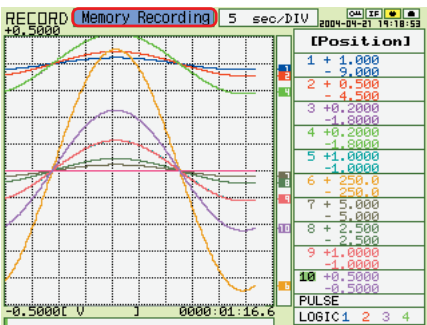
(3) TIME/DIV key

Press the TIME/DIV key to switch through the waveform display speeds.



(4) START/STOP key

Press the START/STOP key to select the START status (Armed). Press it once again to select the STOP status (Free Running).



### (5) Direction keys

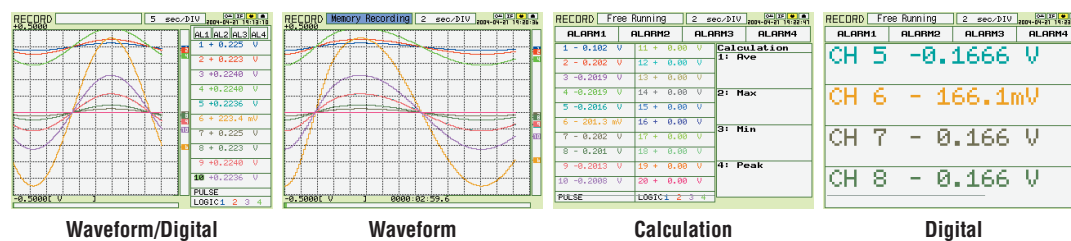
Direction keys (  $\triangleleft \triangleright \nabla \blacktriangledown$  ) ..... These keys move the cursor on the screen in the direction indicated.

Direction keys (  $\triangleleft \triangleright$  ) ..... Press these keys to scroll the memory data waveforms, move the cursor, and specify the position of input values on menu screens.

Direction keys (  $\triangleleft \triangleright \blacktriangleright$  ) ..... Press these keys to scroll the memory data waveforms, move the cursor, to move the position during key lock status and for text settings.

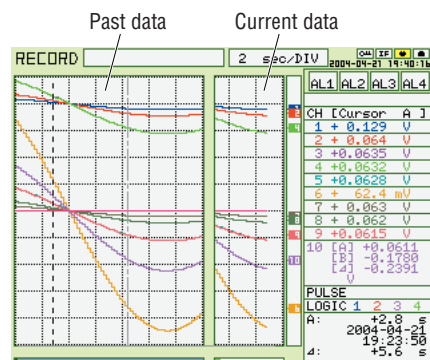
### (6) DISPLAY key

Press this key to switch through the measurement modes: Waveform/Digital, Waveform, Calculation, Digital, and the RECORDER display screens.

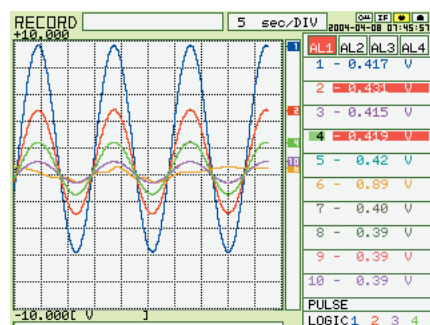


### (7) REVIEW key

Press the REVIEW key during measurement for a dual-screen display of past data alongside the current data.



If the REVIEW key is pressed during the Free Running status (when data is not being captured), the captured data is replayed.



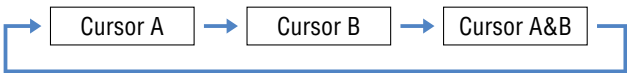
(8) SAVE key

Press the SAVE key to save data and to make a copy of the screen.

Save Execute
[Data Save] File Name: A:\<AUTO.GBD>▼ Execute: ►
[BMP Copy] File Name: A:\<AUTO.BMP>▼ Execute: ►
[QUIT] Exit

(9) CURSOR key

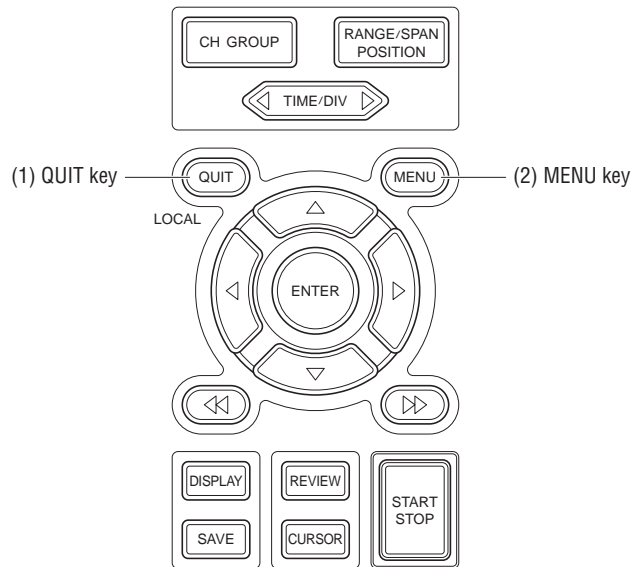
When the REVIEW key has been pressed and the replayed data is displayed, the cursor key can be used to select three cursor modes.



- A: 1 cursor is moved.
- B: 1 cursor is moved.
- A&B: 2 cursors are moved.

## 3.2 Detailed Settings and Measurement (GL400)

The QUIT and MENU keys enable detailed settings to be made.



### (1) QUIT key

Press this key to return the display to its former settings. It is also used to display operations within a setting menu.

- Switches from a menu screen to a monitor screen.
- Closes the selected screen.

AMP	ANNO	DATA	ALM	FILE	I/F	OTHR	INFO
CH: Input	Range	Filter	EU	Color	Misc.		
ALL: DC	10 V	Off					
1: DC	10 V	Off	On				
2: DC	20mV	10 V	Off				
3: DC	50mV	20 V	Off				
4: DC	100mV	50 V	Off				
5: DC	200mV	1-5 V	Off				
6: DC	500mV		Off				
7: DC	1 V		Off				
8: DC	2 V		Off				
9: DC	5 V		Off				
10: DC	1 V		Off				
Pulse: Mode	Range	EU	Slope				
Off		Off					
Logic: Input	Color						
Off	1: 2: 3: 4:						

- Used for operations based on the menu messages.



## (2) MENU key

Press the MENU key to switch through the AMP, ANNO, DATA, ALM, FILE, I/F, OTHR and INFO setting menus. It can also be used to confirm details.



AMP	ANNO	DATA	ALM	FILE	I/F	OTHR	INFO
CH: Input	Range	Filter	EU	Color	Misc.		
ALL: DC	10 V	Off					
1: DC	10 V	Off	On				
2: DC	5 V	Off	Off				
3: DC	2 V	Off	Off				
4: DC	2 V	Off	Off				
5: DC	2 V	Off	Off				
6: DC	500mV	Off	Off				
7: DC	10 V	Off	Off				
8: DC	5 V	Off	Off				
9: DC	2 V	Off	Off				
10: DC	1 V	Off	Off				
Pulse: Mode	Range	EU	Slope				
Off		Off					
Logic: Input	Color						
Off	1: 2: 3: 4:						

### ① AMP Settings Window

#### AMP Menu Structure

Setting	Selections available	Setting method
Input	Off, DC, TEMP	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, Pt100, JPt100	ENTER→Select→ENTER
Filter	Off, On	ENTER→Select→ENTER
EU (Scaling settings)	Function(EU)	Off, On (effective when On has been selected) ENTER→Select→ENTER
	Lower Setting – Value – Upper Unit	Settings • 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→Select→ENTER • Select ENTER→Select→ENTER
	Register	ENTER
	Color	Current Color, Sel Color ENTER→Select→Register
	Misc.	Zero voltage adjustment • Perform Auto Zero ADJ. • Reset Auto Zero ADJ. [Zero point voltage value] Press ENTER to execute
Misc (only when ALL has been selected)	Span All Settings • Upper/Lower	ENTER→Set numeric value→ ENTER→Execute
Pulse	Mode	OFF, Revol., Counts, Inst. ENTER→Select→Register
	Range	Revol.: 500, 5k, 50k, 500k RPM/F.S. Counts: 50k, 500k, 5M, 50M, 500M C/F.S. Inst.: 50k, 500k, 5M, 50M C/F.S. ENTER→Select→ENTER
	EU	Function: Off, On • Scaling settings • Setting values • Unit settings • Unit ENTER→Select→ENTER ENTER→Select→Register (Use direction keys to select numeric value)
	Slope	H, L ENTER→Select→ENTER
Logic	Logic	Off, On ENTER→Select→ENTER
	Color specification	Specified color ENTER→Select→Register



When the CH setting is ALL, the Input, Range and Filter settings are the same for all the channels in that group.

- Input ..... Selects the input coupling status.  
 Off: No signal input is accepted.  
 DC: Used for measuring direct-current voltage.  
 TEMP: Used for measuring temperature.
- Range ..... Specifies the range of signal input to be measured.  
 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, Pt100, JPt100

### Available SPAN Settings

#### <Voltage Ranges>

Range	Maximum SPAN		Minimum SPAN	
	Lower to Upper SPAN [mV]	Lower to Upper SPAN [V]	Upper SPAN minus Lower SPAN	
1		-1.1000 to +1.1000		10 mV
2		-2.2000 to +2.2000		20 mV
5		-5.500 to +5.500		50 mV
10		-11.000 to +11.000		100 mV
20	-22.000 to +22.000	-22.000 to +22.000	0.2 mV	200 mV
50	-55.00 to +55.00	-55.00 to +55.00	0.5 mV	500 mV
100	-110.00 to +110.00		1.0 mV	
200	-220.00 to +220.00		2.0 mV	
500	-550.0 to +550.0		5.0 mV	

#### <Temperature Ranges>

Range	Maximum SPAN	Minimum SPAN
	Lower to Upper SPAN	Upper SPAN minus Lower SPAN
K	-200.0 to +1370.0	50°C
J	-200.0 to +1100.0	50°C
T	-200.0 to +400.0	50°C
R	0.0 to +1600.0	50°C
E	-200.0 to +800.0	50°C
B	600.0 to +1820.0	50°C
S	0.0 to +1760.0	50°C
N	0.0 to +1300.0	50°C
W	0.0 to +2315.0	50°C
PT100	-200.0 to +850.0	50°C
JPT100	-200.0 to +500.0	50°C

- Filter ..... Sets the filter status. Please set the filter to ON when there is likely to be noise in the input.  
 Off, On
- EU ..... Scales the measured values and converts them to other units.
- Function (EU) ..... Sets the EU function to Off or On.

Lower - EU - Upper Unit ..... Sets the EU function's conversion value and unit. If the ENTER key is pressed here, the following window is displayed.

(a) Meas. Value

(b) EU Value

(c) Dec pt

Engineering Unit Setting			
EU:	Off		
Meas. Value		EU Value	
Upper:	+ 50.00	+ 50.00	Dec pt
Lower:	- 50.00	- 50.00	
(e) Select	Select: Pressure	Choose	
(d) Unit	Unit: kPa		
Register			
[ENTER]select/[QUIT]Exit			

(f) Choose

CHECKPOINT

The Scaling operation is calculated using a ratio of the Meas. Value or EU Output Value settings. If a ratio value that the GL400 cannot process is specified, the message below appears.

Out of input range

[ENTER] Apply

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.

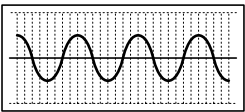
- (a) Meas. Value  
Specifies the numeric value to be converted. Set two points, the Upper and Lower parameters.
- (b) EU Value  
Specifies output after conversion. Set two points, the Upper and Lower parameters.
- (c) Dec pt  
This parameter specifies the decimal point position of the numeral to be specified as the EU value(s).
- (d) 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.
- (e) Select  
Selects the type of engineering unit.
- (f) 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.

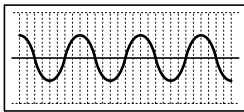
Setting Example

	Upper Value	Lower Value
Specified Value	+2.5000	-2.5000
EU Value	+10.000	-10.000

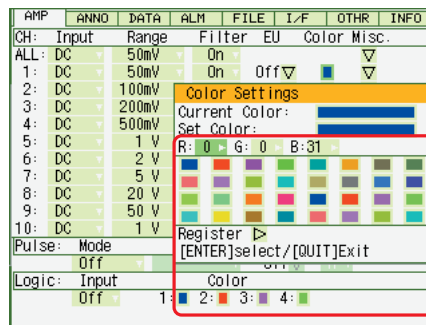
+5 V  
CH.1 10V  
-5 V



+20.00 rpm  
CH.1 Scaling 1  
-20.00 rpm



Color ..... This parameter enables the automatically set value for each channel to be changed manually.



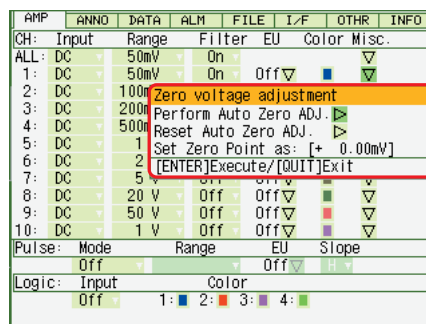
Misc. .... For voltage settings, zero position adjustment can be performed automatically, and the zero position reset.

Perform Auto Zero ADJ.:

Moves the current 'pen' position to the origin point.

Reset Auto Zero ADJ.:

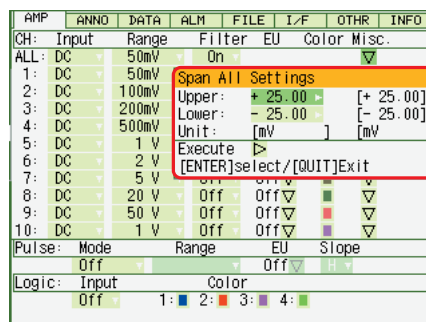
The zero position voltage value resets the displayed voltage value and adjusts the 'pen' to the origin point.



Misc. (ALL) ..... When ALL has been selected, the Misc. menu contains a “Span All Settings” function that enables all the SPAN settings for the same group to be set simultaneously to the same values.

Upper, Lower:

Input the required values on the displayed setting screen.



Pulse ..... The signals that can be input to the pulse input terminal for data processing are Revol., Counts, and Inst.

Modes: Select from OFF, Revol., Counts, and Inst.

- Off: Input is disabled.
- Revol.: Counts the number of pulses at 1-second intervals and converts them to Revolution.
- Counts: Displays the cumulative number of pulses for each sampling interval from the start of measurement.
- Inst.: Counts the number of pulses for each sampling interval.

Range: Can be set for each of the modes.

Mode	Range	Maximum number of pulse inputs
Revol.	500, 5k, 50k, 500k Revol./F.S.	50k/s
Counts	50k, 500k, 5M, 50M, 500M C/F.S.	50k/sampling interval
Inst.	50k, 500k, 5M, 50M C/F.S.	50k/sampling interval

EU: Scales and converts the measured value.

Engineering Unit Setting

EU: Off

Meas. Value EU Value

Setting: 1 1

Select: Freq. Choose

Unit: Hz

Register >

[ENTER]select/[QUIT]Exit

- 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.

Slope: Sets the condition for the input signal operation.

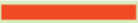
- H: Operates when the signal is a rising signal
- L: Operates when the signal is a falling signal.

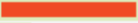
Logic ..... Enables logic amps to be used: Off (disabled), On (enabled).

Color specification for each channel:


This parameter enables the automatically set value for each channel to be changed manually.

Color Settings

Current Color: 

Set Color: 

R: 31 G: 0 B: 0

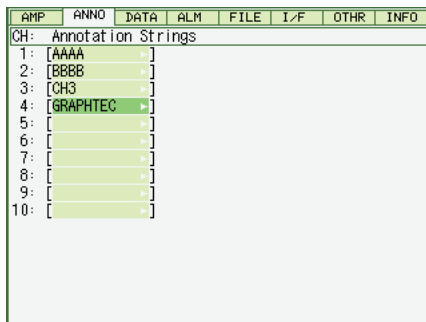


Register >

[ENTER]select/[QUIT]Exit

## ② ANNO Settings Window

Annotation settings can be made for each channel.

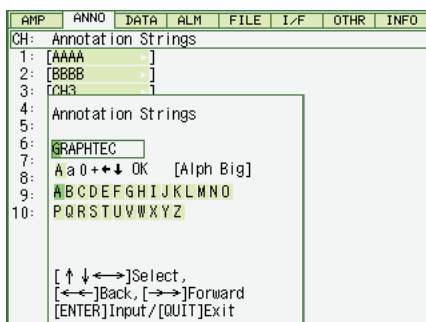


### ANNO Menu Structure

Setting	Selections available	Setting method
Annotation character string	Alphanumerics, symbols	ENTER→Select→OK

### Input procedure

- Up to 11 characters can be input for each channel.
- Text, numerals, and symbols can all be used.
- Display legend
  - A : Select to input upper-case text
  - a : Select to input Lower-case text
  - 0 : Select to input Numerals
  - + : Select to input symbols
  - ← : Select to move the cursor to the left to delete text. The selected character is deleted.
  - ↓ : Select to move the cursor to the position where you want to input text. Text is input at the selected character.
  - OK : Select to save the input text.



### ⚠ CAUTION

If [ \* \* ] displayed on the screen, this indicates that text from the OPS022 software has been input in a format that cannot be displayed on the GL400 monitor.

③ DATA Settings Window

Data capture, Data replay, and Statistical Calculation settings are made here.

AMP	ANNO	DATA	ALM	FILE	I/F	OTHR	INFO
[Record Settings]							
Sampling Interval:		200ms					
Capture Destination:		PC Card					
File Name:		A:\Default.gbd					
Capture Time:		2day20hour28min10sec					
[Replay Settings]							
Replay Source:		Memory					
Sampling Interval:		200ms					
No. of Data:		287Data(57sec)					
[Statistical Calculation]							
No.:	Function	[A]	[B]				
1:	Average	CH 1	CH 5				
2:	Max	CH 2	CH 6				
3:	Min	CH 3	CH 7				
4:	Peak	CH 4	CH 8				

DATA Menu Structure

Setting	Selections available	Setting method
Record Settings	100, 200, 500ms 1, 2, 5, 10, 20, 30s	ENTER→Select→ENTER
• Sampling Interval	1, 2, 5, 10, 20, 30min, 1h	
Capture Destination	Memory, PC Card	ENTER→Select→ENTER
File Name	Specify file (only when PC card has been selected)	
	• File Type: GBD, CSV	ENTER→Select→ENTER
	• Name Type: Auto, User	ENTER→Select→ENTER
	• File: Folder name, file name	ENTER→Specify file→OK
Auto Save	Off, 1 hour, 3 hours, 6 hours, 12 hours, 24 hours (only when internal memory has been selected)	ENTER→Select→ENTER
Replay Settings	Memory, PC Card	ENTER→Select→ENTER
• Replay Source	File selection (only when PC card has been selected)	ENTER→Select→ENTER
Statistical Calculation	Off, Average, Max, Min, Peak, RMS	ENTER→Select→ENTER
• Function		
Calculation channel specification	Select the number of channels from the input terminal unit: 2 ch	ENTER→Select→ENTER

Record Settings

Detailed settings for data capture are performed in this section.

Sampling Interval ..... Specifies the sampling interval for data capture. 16 intervals are provided.

100ms	30s
200ms	1min
500ms	2min
1s	5min
2s	10min
5s	20min
10s	30min
20s	1h



The maximum sampling interval that can be selected depends on the number of channels.

- 10ch: 100 ms
- 20ch: 200 ms
- 30/40/50 ch: 500ms
- 60ch or more: 1 sec

Capture Destination ..... Selects the destination for saving measured data.

Memory
PC Card

Memory: 4 Mbytes (2 Mwords)  
This is the total amount of memory. If the number of channels used is increased, the amount of data that can be captured is reduced.

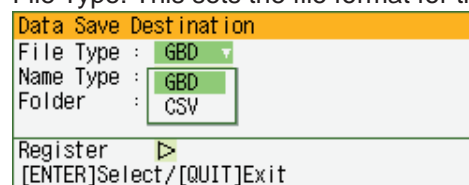
PC Card: Commercially-available PCMCIA cards can be used in the PC slot. The amount of data that can be saved to the card is determined by the card itself. (Please see Specifications for the types of card that can be used.)

### CHECKPOINT

When the captured data is Binary data, the reference to use is 1 data = 2 bytes. Accordingly, if the memory is 12 bytes, approximately 6 Mwords of data can be captured. However, since there is also some auxiliary data, data larger than this reference figure will be captured. In addition, when the Excel data format is used, the data will increase to 7-8 times in size. The data capture time will be shorter than that for Binary data.

File Name ..... This parameter is displayed when PC card is selected as the capture destination.

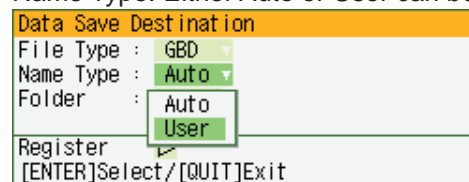
File Type: This sets the file format for the data to be saved.



The screenshot shows the 'Data Save Destination' menu. The 'File Type' is set to 'GBD' and the 'Name Type' is set to 'CSV'. The 'Folder' is set to 'CSV'. The 'Register' button is highlighted. The bottom of the screen shows the prompt '[ENTER]Select/[QUIT]Exit'.

- GBD: Binary format
- CSV: Excel format

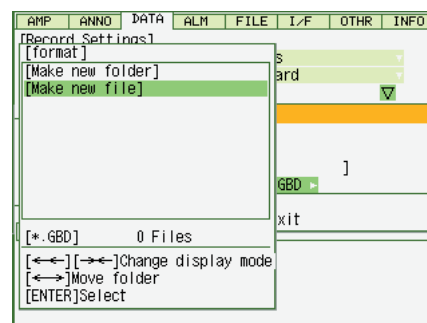
Name Type: Either Auto or User can be selected.



The screenshot shows the 'Data Save Destination' menu. The 'File Type' is set to 'GBD' and the 'Name Type' is set to 'Auto'. The 'Folder' is set to 'Auto'. The 'Register' button is highlighted. The bottom of the screen shows the prompt '[ENTER]Select/[QUIT]Exit'.

Folder: The currently selected folder is displayed. Settings cannot be made here.

File name (User): A new folder and a new file are created here.

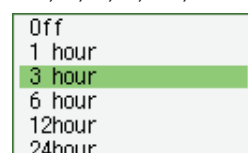


The screenshot shows the 'Data Save Destination' menu. The 'File Type' is set to 'GBD' and the 'Name Type' is set to 'User'. The 'Folder' is set to 'User'. The 'Register' button is highlighted. The bottom of the screen shows the prompt '[ENTER]Select/[QUIT]Exit'.

Capture Time ..... The time is automatically calculated, based on the sampling interval and the data capture volume, and displayed. This item is displayed only, and cannot be specified.

Auto Save ..... When this parameter has been selected, a file is created for each data capture time.

Off, 1, 3, 6, 12, 24 hours



The screenshot shows the 'Auto Save' menu. The options are 'Off', '1 hour', '3 hour', '6 hour', '12hour', and '24hour'. The '3 hour' option is highlighted.



The maximum data capture time that can be selected depends on the sampling interval.

- 24 hours: 1s or less sampling interval
- 12 hours: 500 ms or less sampling interval
- 6 hours: 200 ms or less sampling interval
- 3 hours: 100 ms or less sampling interval

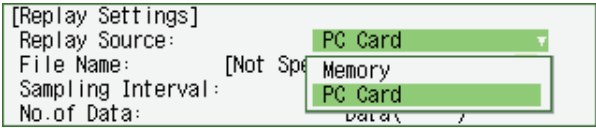
If the allowable data capture time is exceeded, the actual data capture time will be shortened.

Replay Settings

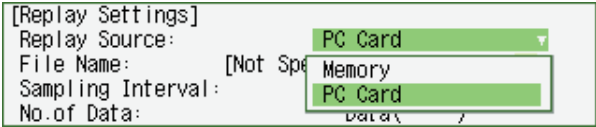
Selects the data replay source for replaying captured data.

Replay Source ..... Selects the source for loading data for replay as Internal Memory or PC card.

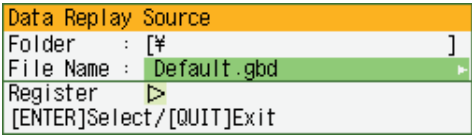
Memory: Replays data captured to the internal memory.



The sampling interval and the number of captured data are displayed.

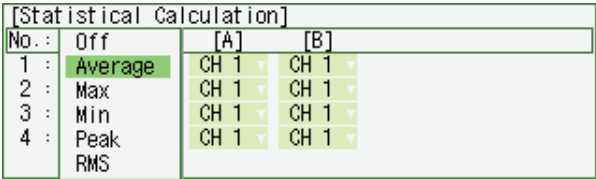


PC card: Replays data captured to a PC card. Select the relevant file.



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

Function: There are five types of between-cursor calculation functions, and four of these can be selected.



Off: Calculation is not performed.

Average: The simple average value of the data between the cursors is displayed.

Max: The maximum value of the data between the cursors is displayed.

Min: The minimum value of the data between the cursors is displayed.

Peak: The peak value of the data between the cursors is displayed.

RMS: The effective value of the data between the cursors is displayed.

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

D: data      n: number of data

Channel specification: Specifies the two channels "A" and "B" for calculation.

#### ④ ALM Settings Window

The Alarm and Trigger settings are made here.

AMP	ANNO	DATA	ALM	FILE	I/F	OTHR	INFO
Combination: OR							
CH:	Mode		Lower-Level-Upper		Output		
1	:	Off					
2	:	H	+	0.0	V		1
3	:	L	+	0.0	V		1
4	:	Win In	+	0.0	+ 12.5 V	▽	1
5	:	Win Out	+	0.0	+ 12.5 V	▽	1
6	:	Off					
7	:	Off					
8	:	Off					
9	:	Off					
10	:	Off					
Pulse: Off							
Logic: 1: X 1 2: X 1 3: X 1 4: X 1							
Trig: Start: Level: CH1 Stop: Time 0hr00min01sec							
Start: H + 0.0 V							

Setting	Selections available	Setting method
Combination	OR, AND	ENTER→Select→ENTER
Mode	H, L, Win In, Win Out	ENTER→Select→ENTER
Lower - Level - Upper	Numeric settings	ENTER→Select→ENTER
Output	1 to 4	ENTER→Select→ENTER
Pulse		
• Mode	L, H, Win In, Win Out	ENTER→Select→ENTER
• Lower - Level - Upper	Numeric settings	ENTER→Select→ENTER
• Output	1 to 4	ENTER→Select→ENTER
Logic		
• Mode	X, L, H	ENTER→Select→ENTER
• Output	1 to 4	ENTER→Select→ENTER
Trigger		
• Start	Off, Level, Alarm, Ext.	ENTER→Select→ENTER
	Alarm output selection: 1 to 4	ENTER→Select→ENTER
• Stop	Off, Level, Alarm, Ext., Time	ENTER→Select→ENTER
	Alarm output selection: 1 to 4	ENTER→Select→ENTER
	Time setting: 1 s to 9999 h	ENTER→Select→ENTER

#### Combination

Determines the alarm output conditions. The logic alarm cable (B-513, option) is required for alarm output.

OR ..... Outputs an alarm when each alarm condition is met.

AND ..... Outputs an alarm when all of the alarm conditions are met.

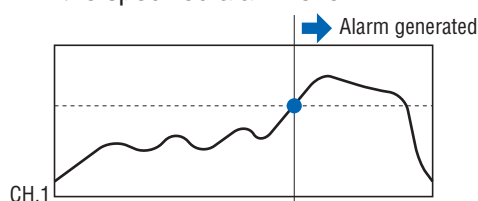
#### Condition settings

Mode ..... Determines the alarm output condition

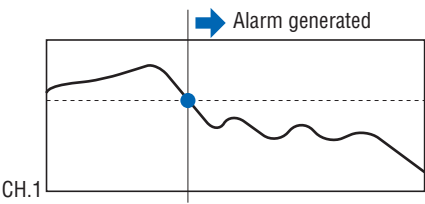
Off
H
L
Win In
Win Out

Off: The alarm function is disabled.

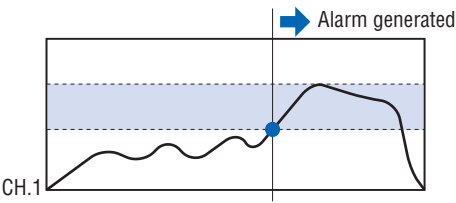
H: An alarm is generated when the signal input rises to (or exceeds) the specified alarm level.



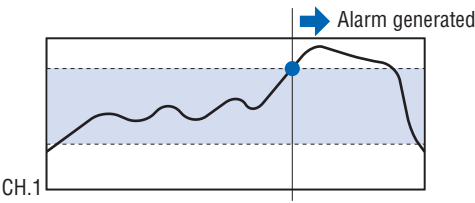
L: An alarm is generated when the signal input falls to (or falls below) the specified alarm level.



Win In: Specifies the upper and lower alarm limits for each channel. When the signal level goes within (or is within) both limits, an alarm is generated.



Win Out: Specifies the upper and lower alarm limits for each channel. When the signal level goes outside (or is outside) both limits, an alarm is generated.



Lower - Level- Upper ..... Specifies the alarm level(s) for the conditions set in Mode.  
L, H: Input a numeric value.

Set Value:	+ 0.0
Limits:	[- 50.0, + 50.0]
[ENTER]Register	

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

Level Settings	
Upper Level:	+ 12.5 V
Lower Level:	+ 0.0 V
Register	▶
[ENTER]select/[QUIT]Exit	

Output ..... Specifies the output channels for alarm generation (4 channels).

1
2
3
4

**Pulse**

Sets the alarms for pulse input settings. These conditions can be set when they have been enabled in the AMP settings.

Mode ..... Sets the same conditions as for "Condition Settings". Please refer to "Condition Settings" in the previous section.

Lower - Level- Upper ..... Specifies the alarm level(s) for the conditions set in Mode.  
L, H: Input a numeric value

Set Value:	0
Upper Limit:	500
Lower Limit:	0
[ENTER]to register	

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

Level Settings	
Upper Level:	100 RPM
Lower Level:	0 RPM
Register	▶
[ENTER]select/[QUIT]Exit	

Output ..... Specifies the output channels for alarm generation (4 channels).

## Logic

Sets the alarms for logic input settings. These conditions can be set when they have been enabled in the AMP settings.

Mode ..... Sets the logic alarm conditions.

X
L
H

X: No alarm conditions set.

L: Enabled when the logic signal goes from High to Low.

H: Enabled when the logic signal goes from Low to High.

## Trigger Settings

Start ..... Specifies the trigger condition that must be met in order to initiate measurement.

Off
Level
Alarm
Ext.

Off: No trigger is used. Instead, measurement is initiated by pressing the START/STOP key.

Level: The start of measurement is triggered when the trigger condition is satisfied.

*Note: The Level condition is the level value set for the specified channel range set (voltage, temperature).*

Alarm: The start of measurement is triggered when the alarm condition is satisfied.

Ext.: The start of measurement is triggered when a signal is input from an external trigger terminal.

Stop ..... Specifies the trigger condition that must be met in order to stop measurement.

Off
Level
Alarm
Ext.
Time

Off: No trigger is used. Instead, measurement is stopped by pressing the START/STOP key.

Level: Measurement is stopped when the trigger condition is satisfied.

*Note: The Level condition is the level value set for the specified channel range set (voltage, temperature).*

Alarm: Measurement is stopped when the alarm condition is satisfied.

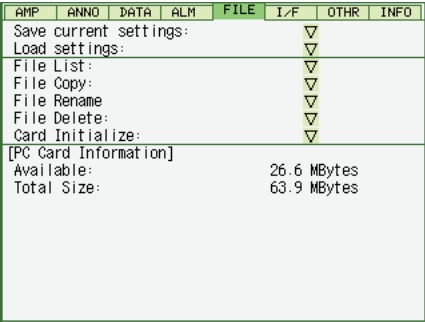
Ext.: Measurement is stopped when a signal is input from an external trigger terminal.

Time: Sets the amount of time from the start until the end of measurement. The time can be specified from 1 second to 9999 hours.

Time:	
Time:	0 hr00 min01 sec
Register	▶
[ENTER]select/[QUIT]Exit	

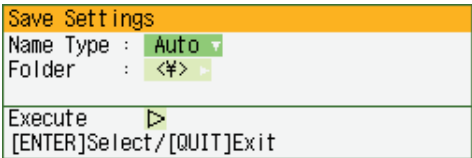
⑤ FILE Settings Window

Saves or loads the PCMCIA card settings or returns them to their factory default settings.



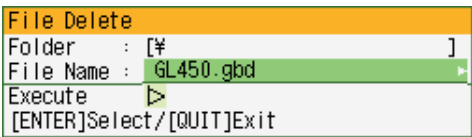
Setting	Selections available	Setting method
Save current settings	Auto, User	ENTER→Select→ENTER
	File name (when User) • File: Folder name, File name	ENTER→Select→EXECUTE
Load settings	Select file	ENTER→Select→EXECUTE
File List	Select file	ENTER→Select→EXECUTE
File Copy	Select file to load	ENTER→Select→EXECUTE
	Select file to write	
File Rename	Select file to convert	ENTER→Select→EXECUTE
	Converted file name	ENTER→Specify file→OK
File Delete	Select file	ENTER→Select→EXECUTE
Card Initialize	Format: Super Floppy, HDD format	ENTER→Select→ENTER
	Type: Quick, Normal	ENTER→Select→ENTER
	Volume Label: Specify a volume label	ENTER→Specify file→EXECUTE

Save current settings ..... Saves the currently selected settings. When this setting is selected, a submenu appears for selecting the save destination and file name.

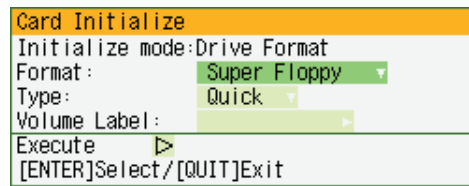


Auto: A file name is created using the date and time.  
User: The user-specified file name is saved.

- Load settings ..... Loads settings from the PCMCIA card. When this setting is selected, a submenu appears for specifying the source and file name.
- File List ..... Displays a list of the files. When this setting is selected, a submenu appears for browsing the folders and specifying files.
- File Copy ..... Copies the specified file. When this setting is selected, a submenu appears for specifying the source file and the destination file.
- File Rename ..... Renames the specified file. When this setting is selected, a submenu appears for selecting the file you wish to rename and its new file name.
- File Delete ..... Deletes the specified file. When this setting is selected, a submenu appears for selecting the name of the file to be deleted.



Card Initialize ..... Reformats the PCMCIA card.



The screenshot shows a menu titled "Card Initialize" with a yellow header. Below the header, the text "Initialize mode: Drive Format" is displayed. There are three main options: "Format:" with a dropdown menu showing "Super Floppy", "Type:" with a dropdown menu showing "Quick", and "Volume Label:" with a text input field. At the bottom, there is an "Execute" button with a right-pointing arrow and a line of text "[ENTER]Select/[QUIT]Exit".

Format: Select from Super Floppy and HDD-compatible format.

Type: Select Quick Format or Normal Format.

Volume Label: This parameter specifies the volume label of the card to be reformatted. Specify a volume label of up to 11 characters.

PC Card Info ..... Displays the volume of data on the PC card. No settings can be made here.

## ⑥ I/F Settings Window

The conditions for connecting to your computer are set here.

AMP	ANNO	DATA	ALM	FILE	I/F	OTHR	INFO
New Line Code:					CR+LF		
Echo Back:					Disable		
[USB Settings]							
USB ID:					1		
[TCP/IP Settings]							
IP Address:					192 . 168 . 19 . 1		
Subnet Mask:					255 . 255 . 255 . 0		
Port Number:					8023		
Note: Restart to enable USB, TCP-IP settings.							

Setting	Selections available	Setting method
New Line Code	CR+LF, LF, CR	ENTER→Select→ENTER
Echo Back	Enable, Disable	ENTER→Select→ENTER
USB ID	0 to 7	ENTER→Select→ENTER
IP Address	Numeric setting	ENTER→Select→ENTER
Subnet Mask	Numeric setting	ENTER→Select→ENTER
Port Number	Numeric setting	ENTER→Select→ENTER

New Line Code ..... Sets the new line code. Select from CR+LF, LF, or CR.

Echo Back ..... This function can be specified as Enable or Disable.

USB ID Setting ..... Sets the ID number for the GL400. Specify a number from 0 to 7.

TCP-IP Settings ..... Sets the TCP-IP.

IP Address: Sets the IP address.

Subnet Mask: Sets the subnet mask.

Port Number: Sets the port number.



Be sure to restart the GL400 after settings have been made or changed. If the GL400 is used as is, the computer connections may not be performed correctly.

## ⑦ OTHR Settings Window

Other miscellaneous settings are made here.

AMP	ANNO	DATA	ALM	FILE	I/F	OTHR	INFO
Grid:						On	
Screen Saver:						Off	
View in large print:						Auto Next Screen	
Power On Start:						Disable	
Room Temp Compensation:						Internal	
External Filter:						Off	
Burn Out:						On	
Date/Time:						2004-04-21 21:22:24	
Language:						English(US)	
Return to default settings: ▶							

Setting	Selections available	Setting method
Grid	On, Off	ENTER→Select→ENTER
Screen Saver	Off, 1, 2, 5, 10, 30, 60 min	ENTER→Select→ENTER
View in large print	Auto Next Screen, Fixed	ENTER→Select→ENTER
Power On Start	Enable, Disable	ENTER→Select→ENTER
Room Temp. Compensation	Internal, External	ENTER→Select→ENTER
External Filter	Off, On	ENTER→Select→ENTER
Burn Out	Off, On	ENTER→Select→ENTER
Date/Time	Date, time settings	ENTER→Select→Confirm
Language	Japanese, English (US), English (UK)	ENTER→Select→ENTER
Return to default settings	Yes, No	ENTER→Select→ENTER

Grid ..... The Grid parameter for display can be specified as either On or Off.

On: The waveforms are displayed on a grid.

Off: Only the waveforms (without any grid) are displayed.

Screen Saver ..... Turns off the display if the GL400 is not operated within the specified interval, thus prolonging the product life of the display.

Off
1min
2min
5min
10min
30min
60min

Off: The screen saver does not operate.

Time: The interval can be specified as 1, 2, 5, 10, 30, or 60 minutes.

View in large print ..... This sets whether or not to switch automatically to the next group of digital display channels.

Auto Next Screen: The display changes automatically to the next group of channels.

Fixed: The display can only be changed manually

Power On Start ..... Initiates measurement as soon as the GL400 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 from either Internal or External room temperature compensation.

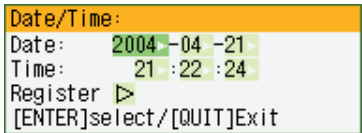
Internal: The GL400's room temperature compensation settings are used.

External: Select this parameter when measuring compensation other than that of the GL400.

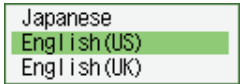
*Note: The Internal setting is normally used.*



- External Filter ..... This parameter sets whether or not to use an external filter.  
Off: An external filter is not used.  
On: An external filter can be used.
- Burn Out ..... This parameter enables or disables the function that moves to full scale to inform of a sensor burnout in a thermocouple.  
Off: The burnout function is disabled.  
On: The burnout function is enabled.  
*Note: We recommend that On be normally used.*
- Date/Time ..... This parameter sets the date and time. When this setting is selected, a submenu appears for setting the date and time.

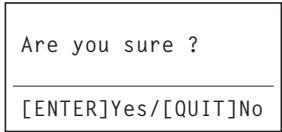


- Language ..... This parameter sets the GL400's display language.



- Japanese: The display is in Japanese.  
English US: The display is in English.  
English UK: The display is in English.

- Return to default settings .... This parameter returns all the settings to the factory defaults.



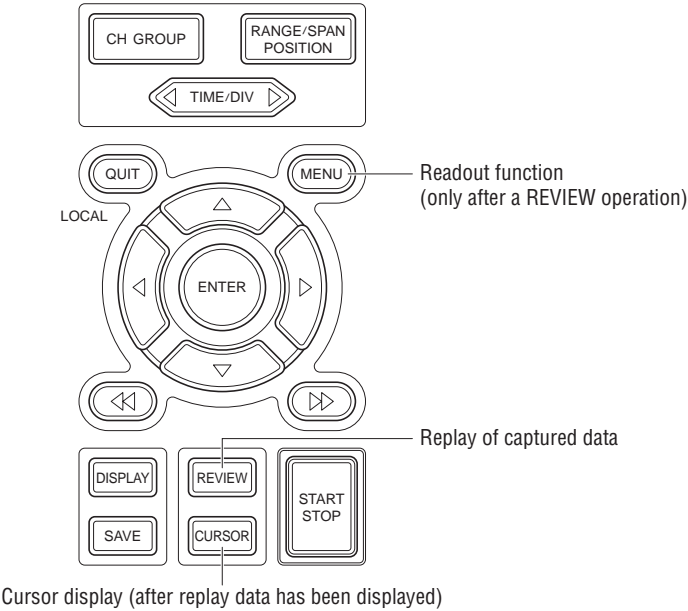
**⑧ INFO Settings Window**

The GL400's system settings are displayed here. Use this window to check the version and other information.

AMP	ANNO	DATA	ALM	FILE	I/F	OTHR	INFO
[Firmware]							
Main CPU Firmware:				Ver.1.00			
[FPGA]							
System Control:				Ver. 0			
[Network]							
MAC Address		:	00.03.76.00.00.05				

### 3.3 Data Replay

Data captured at the GL400 can be replayed on the monitor, and waveform search, statistical calculation, and data save functions performed.

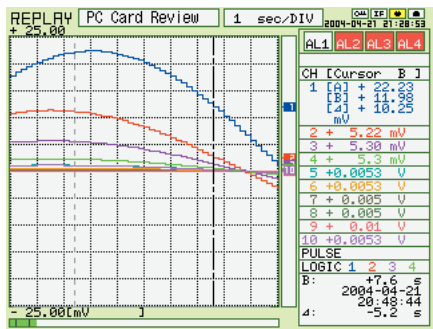


#### Data Replay

Press the REVIEW key to replay data.

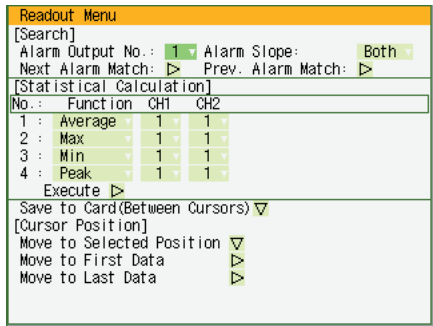


Specify the data to be replayed with the Replay item in the DATA settings window.



Cursor display function ..... Press the CURSOR key to switch through the A, B, and A&B selections. If A&B is selected, the difference between A and B is calculated and displayed. Moreover, the cursors move in parallel.

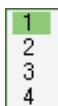
If the MENU key is pressed after a Replay operation, a menu for selecting the data processing operation is displayed.



Setting	Selections available	Setting method
Search • Alarm Output No.	1 to 4	ENTER→Select→ENTER
Alarm Slope	Both, Hi, Lo	ENTER→Select→ENTER
Next Alarm Match		ENTER
Prev. Alarm Match		ENTER
Statistical Calculation • Function	Off, Average, Max, Min, Peak, RMS	ENTER→Select→ENTER
Specify calculation channels	Select channels from the input terminal unit: 2 ch	ENTER→Select→ENTER
Save to Card (Between Cursors)	Specify data save destination (PC card only) • File Type: GBD, CSV • Name Type: Auto, User • File: Folder name, file name • Confirm	ENTER→Select→ENTER ENTER→Select→ENTER ENTER→Specify file→OK ENTER
Move cursor • Move to Selected Position	Move to selected position • Selected method: Position, Time • Position Moved To (Position only) Between Upper and Lower Limit Values (Time only) Specified time • Execute	ENTER→Select→ENTER ENTER→Specify numeric value→ENTER ENTER→Specify numeric value→ENTER ENTER
Move to First Data		ENTER
Move to Last Data		ENTER

Search ..... This function searches for the alarm setting position within the captured data.

Alarm Output No.: Specify a number that has been set for the alarm settings (1 to 4).



Alarm Slope: Specify the generation condition for the alarm search.



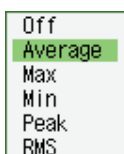
- Both: Both rising and falling
- Hi: Rising only
- Lo: Falling only

Next Alarm Match/Prev. Alarm Match:

Depending on whether Next or Prev. has been selected, matching data from the current cursor position to the next alarm position, or from the previous alarm position to the current cursor position is searched for and displayed.

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

Function: There are five types of between-cursor calculation functions, and four of these can be selected.



- Off: Calculation is not performed.
- Average: The simple average value of the data between the cursors is displayed.

- Max: The maximum value of the data between the cursors is displayed.
- Min: The minimum value of the data between the cursors is displayed.
- Peak: The peak value of the data between the cursors is displayed.
- RMS: The effective value of the data between the cursors is displayed.

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

*D: data N: number of data*

Channel specification: Specifies the two channels "A" and "B" for calculation. Press EXECUTE to display the between-cursor calculation results.

Calculation Results	
1: Average	
CH 1: + 19.12 mV	
CH 1: + 19.12 mV	
2: Max	
CH 1: + 22.41 mV	
CH 1: + 22.41 mV	
3: Min	
CH 1: + 11.98 mV	
CH 1: + 11.98 mV	
4: P-P	
CH 1: + 10.43 mV	
CH 1: + 10.43 mV	
[QUIT]key to close.	

#### Save to Card (Between Cursors)

..... The specified replay data between the cursors can be saved to a specified file format.

File Type: Specifies the file format for saving data.

Data Save Destination	
File Type :	GBD
Name Type :	GBD
Folder :	CSV
Register	▶
[ENTER]Select/[QUIT]Exit	

- GBD: Binary format
- CSV: Excel format

Name Type: There are two methods: Auto or User.

Data Save Destination	
File Type :	GBD
Name Type :	Auto
Folder :	Auto
	User
Register	▶
[ENTER]Select/[QUIT]Exit	

Folder: The currently selected folder is displayed. Settings cannot be made here.

File name: A new folder and a new file are created here.



Data can only be saved if it has been captured to a PC card. Data in the internal memory will be erased when the power is turned off.

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

Move to Selected Position: Specify the cursor position to be moved to.

Move to Selected Position	
Method:	Position ▾
Move to:	Position 0 s
[Information]	Time
Start Point:	+0.0 s
End Point:	+102.0 s
Execute ▶	
[ENTER]Select/[QUIT]Exit	

- Position: Move at the specified time from the start of measurement.  
Interval until the end of measurement, in 0.1-s units

Move to Selected Position	
Method:	Position ▾
Move to:	+ 0.0 s
[Information]	
Start Point:	+0.0 s
End Point:	+102.0 s
Execute ▶	
[ENTER]Select/[QUIT]Exit	

- Time: Move to the specified date/time.

Date/Time:	
Date:	2004-04-21
Time:	20:48:37
Register ▶	
[ENTER]select/[QUIT]Exit	

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.

# **CHAPTER 4**

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## **Software**

This chapter describes the software installation.

- 4.1 System Requirements**
- 4.2 Installing the USB Driver**
- 4.3 Connecting to a PC**
- 4.4 Installing OPS022**
- 4.5 Setting the IP Address and Device ID**
- 4.6 Menu Configuration and System Settings**
- 4.7 PC Connection Settings**
- 4.8 Measurement Parameters Settings**
- 4.9 View Functions**
- 4.10 Review Device**
- 4.11 Review PC**
- 4.12 Logic, Alarm Display**

## 4.1 System Requirements

Make sure that the computer on which you plan to install the software meets the following requirements.

Item	System requirements
OS	Windows 2000, XP
CPU	Pentium 4, 1.7 GHz or higher
Memory	256 MB or more
HDD	10 MB for installing software, additional space required for data storage
Display	1024 x 768 resolution or higher, 65535 colors or more (16-bit or more)
Other	TCP-IP port, USB port, CD-ROM drive (for installing from CD)



Even when using a PC that meets the system requirements, measurement data may not be captured correctly depending on the PC status (e.g. running other applications or the storage media used). Exit all other applications before capturing data to the hard disk.



## 4.2 Installing the USB Driver

This section describes how to install the USB driver.

### Checking the version of your USB driver

This section describes how to view the version of the USB driver if it is already installed.

- (1) Opening "Device Manager"  
Select "Control Panel" → "System" → "Hardware" tab or right-click "My Computer", select "Properties" → "Hardware" tab → "System Properties" window, then click the "Device Manager".
- (2) In the "Device Manager" window, open "USB (Universal Serial Bus) Controller". Confirm that "Graphtec DM/GL/WR Series USB Driver" is shown. Right-click it and select "Properties".
- (3) Updating the driver  
Select the "Driver" tab and click the "Driver Details" button.
- (4) Select [...GTCUSBR.SYS ] to view the version of the driver file.

## Installing the USB Driver

This section describes how to install the USB driver.

- (1) Insert the GL400/350 User Guide CD-ROM provided as a standard accessory into the PC CD-ROM drive.
- (2) Connecting the GL400/350 to the PC.  
Connect the GL400/350 to the PC using the USB cable, and then turn the power on.
- (3) Install the USB driver. The installation procedure depends on the type of operating system and whether or not you are installing the driver for the first time.  
Windows XP : Driver software is to be installed for the first time.  
                  : Driver software is already installed.  
Windows 2000: Driver software is to be installed for the first time.  
                  : Driver software is already installed.

### **Windows XP: Driver software is to be installed for the first time.**

Installing the USB driver

- (1) Detecting the hardware  
Connect the USB cable to the PC and GL400/350. The "Found New Hardware" message appears.
- (2) Starting the wizard  
In the "Found New Hardware Wizard" window, select "Install from a list or specific location (Advanced)" under "What do you want the wizard to do?" and click "Next".
- (3) In the "Please choose your search and installation options." window, select "Don't search. I will choose the driver to install." and click "Next".
- (4) In the "Select the device driver you want to install for this hardware." window click "Have Disk".
- (5) In the "Install from Disk" window, browse the CD-ROM under "Copy manufacturer's files from", select "USB DRIVER "GTCUSBR.INF" and click "OK".
- (6) In the "Select the device driver..." window, "Graphtec DM/GL/WR Series USB Driver" appears in the "Model" box. Select it and click "Next".
- (7) Installing the driver  
Windows XP starts installing the driver.
- (8) Completing installation  
The "Completing the Found New Hardware Wizard" window appears. Click "Finish" to exit the wizard.

### **Windows XP: Driver software is already installed.**

Updating the USB driver

- (1) Opening "Device Manager"  
Select "Control Panel" → "System" → "Hardware" tab or right-click "My Computer", select "Properties" → "Hardware" tab → "System Properties" window, then click the "Device Manager" button.
- (2) In the "Device Manager" window, open "USB (Universal Serial Bus) Controller". Confirm that "Graphtec DM/GL/WR Series USB Driver" is shown. Right-click it and select "Properties".
- (3) Updating the driver  
Select the "Driver" tab and click "Update Driver".
- (4) Starting the update wizard  
The "Hardware Update Wizard" appears. Select "Install from a list or specific location (Advanced)" under "What do you want the wizard to do?" and click "Next".

- (5) In the "Please choose your search and installation options." window, select "Don't search. I will choose the driver to install." and click "Next".
- (6) In the "Select the device driver you want to install for this hardware." window, click "Have Disk".
- (7) In the "Locate File" window, browse the CD-ROM, select "USB DRIVER" "GTCUSBR.INF" and click "Open".
- (8) Return to the "Select the device driver..." window and click "Next".
- (9) Installing the driver  
Windows XP starts installing the driver. Depending on the OS setting, "The software you are installing for this hardware has not passed Windows Logo Testing to verify its compatibility with Windows XP" message may appear. Simply click "Continue Anyway".
- (10) Completing the Installation  
The "Completing the Hardware Update Wizard" window appears. Click "Finish" to exit the wizard.

### Windows 2000: Driver software is to be installed for the first time.

#### Installing the USB driver

- (1) Starting the wizard  
Connect the USB cable to the PC and the GL400/350. The "Found New Hardware" wizard appears.
- (2) In the "Found New Hardware Wizard" window, select "Search for a suitable driver for my device (Recommended)" under "What do you want the wizard to do?" and click "Next".
- (3) In the "Locate Driver File" window, select "CD-ROM drive" under "Optional search locations" and click "Next".
- (4) Browse the CD-ROM, select "USB DRIVER "GTCUSBR.INF" and click "OK".
- (5) "The wizard found a driver" message appears. Click "Next".
- (6) Completing installation  
The "Completing Found New Hardware Wizard" window appears. Click "Finish" to exit the wizard.

### Windows 2000: Driver software is already installed.

#### Updating the USB driver

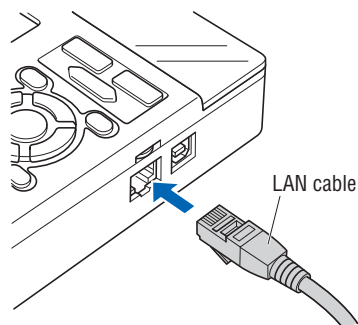
- (1) Opening "Device Manager"  
Select "Control Panel" → "System" → "Hardware" tab or right-click "My Computer", select "Properties" → "Hardware" tab → "System Properties" window, then click the "Device Manager" button.
- (2) In the "Device Manager" window, open "USB (Universal Serial Bus) Controller". Confirm that "Graphtec DM/GL/WR Series USB Driver" is shown. Right-click it and select "Properties".
- (3) Updating the driver  
Select the "Driver" tab and click "Update Driver".
- (4) Starting the update wizard  
"Upgrade Device Driver Wizard" appears. Click "Next".
- (5) In the "Install Hardware Device Drivers" window, select "Display a list of the known drivers for this device so that I can choose a specific driver." under "What do you want the wizard to do?" and click "Next".
- (6) In the "Select a Device Driver" window, click "Have Disk".
- (7) In the "Locate File" window, browse the CD-ROM, select "USB DRIVER "GTCUSBR.INF" and click "OK".
- (8) Return to the "Select a Device Driver" window and click "Next".
- (9) In the "Start Device Driver Installation " window, click "Next".
- (10) Completing installation  
The "Completing the Upgrade Device Driver Wizard" window appears. Click "Finish" to exit the wizard.

## 4.3 Connecting to a PC

The GL400/350 can be connected to a PC via a LAN cable or a USB cable.

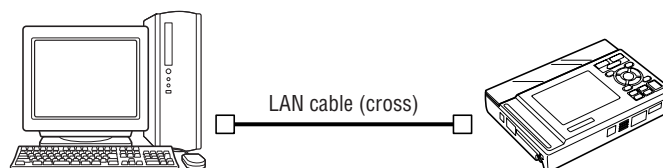
### Connecting Using a LAN Cable

Use a LAN cable to connect the GL400/350 to a PC.

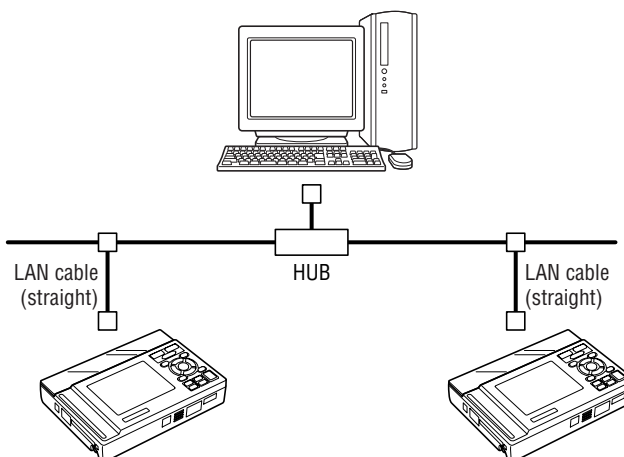


### Connection Methods

When connecting the GL400/350 to a PC directly, use a cross cable.

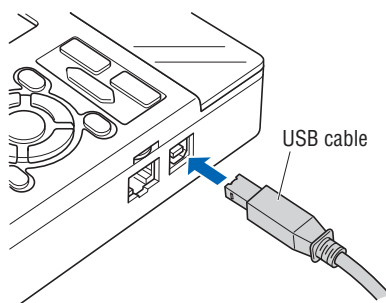


When connecting via a network, use a straight cable and connect through a hub.



## Connecting Using a USB Cable

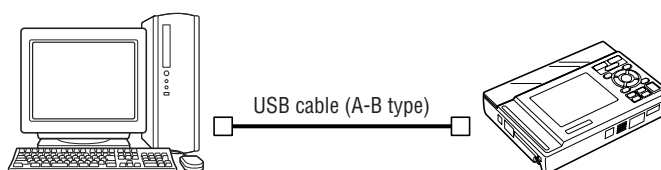
Use a USB cable to connect the GL400/350 to a PC.



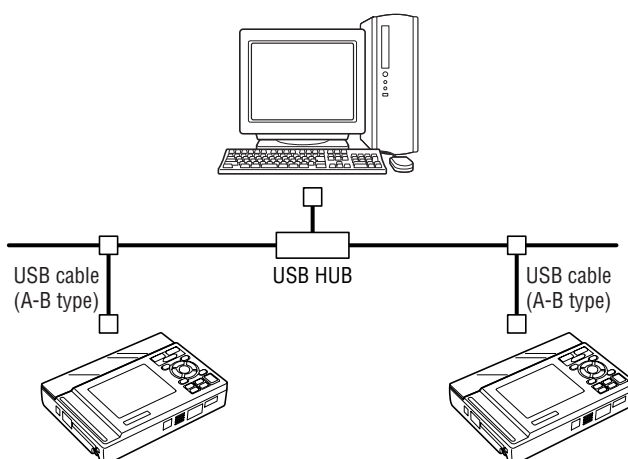
When using a USB cable, a USB driver must be installed in the PC. Please see Section 4.2 "Installing the USB Driver" for the installation procedure.

### Connection Methods

When connecting the GL400/350 to a PC directly, connect using an A-B type cable.



When connecting via a network, use an A-B type cable and connect through a USB hub.



## 4.4 Installing OPS022

This section describes how to install the application software and the system setting tools used to control and set the GL400/350.

- (1) Insert the GL400/350 User Guide CD-ROM provided into the PC CD-ROM drive.
- (2) Click the Taskbar's Start button, then click the Run... icon to open the "Run" window.
- (3) Enter the CD-ROM drive name and \English\OPS022\SETUP.EXE as the name of the file you wish to open. If the disk is in drive D, for example, enter "D:\English\ OPS022\SETUP.EXE" in the box to launch the installer.
- (4) Continue, following the instructions on the screen.

---

### CHECKPOINT

Be sure to observe the following points when connecting the GL400/350 to a PC.

- Do not connect any devices apart from a mouse or a keyboard to any of the other USB terminals on your PC.
  - Set the PC's power-saving functions to Off.
  - Set the Screen Saver to Off.
  - Set the anti-virus software auto update and scan scheduler functions to Off. Also, set the Windows auto update and scheduler functions to Off.
-

## 4.5 Setting the IP Address and Device ID

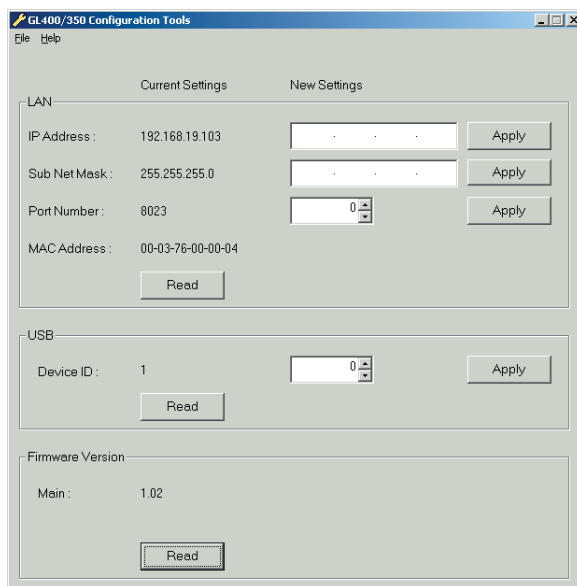
The GL400/350 Configuration Tools window is used to set the IP address, and Device ID. These can also be set using the GL400 (model with a built-in monitor). For details, see Chapter 3, "Settings and Measurement".

IP address:	Used when measuring via a network.
Subnet Mask:	Used when measuring via a network.
Mac Address:	Used to confirm the Mac address.
Port Number:	Used when measuring via a network.
Device ID:	Used when measuring via USB.
Firmware Version:	Used to check each version number.



- When setting the IP address, port number, or device ID using the Configuration Tools, the GL400/350 should be connected directly to the PC using a USB cable.
- When using more than one GL400/350 unit, they should be connected separately, and not via a USB hub.
- When connecting via LAN, make the settings outlined below and then ensure that the computer's system requirements are met before making the connections.

- (1) Connect the GL400/350 to the PC using a USB cable.  
Select "Start" → "Programs" → "OPS022" → "GLCONFIG.EXE" to launch the GL400/350 Configuration Tools and display the window as shown below.



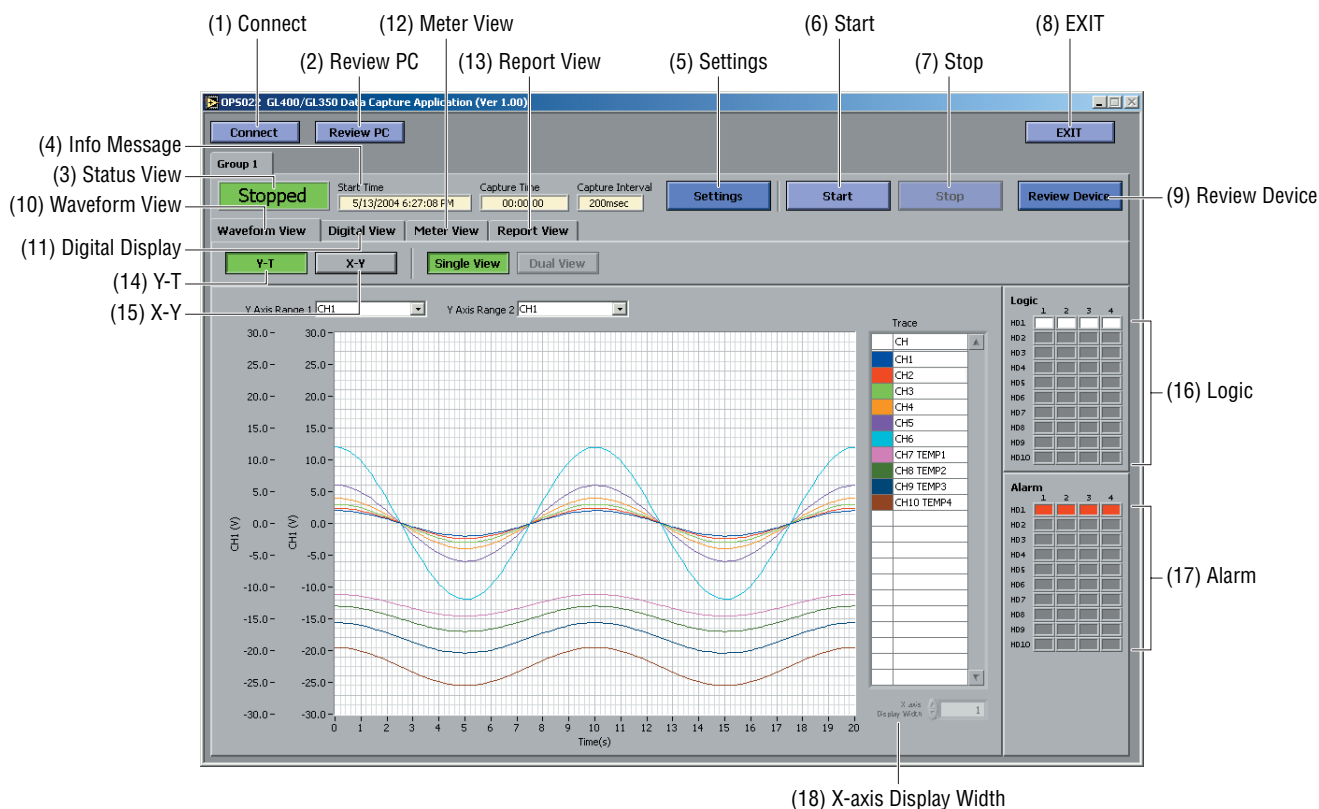
- (2) LAN Settings  
Click "Read" to display the current setting. To set a new IP Address, Subnet Mask and/or Port Number, enter the new settings and then click "Apply".
- (3) USB Settings  
Click "Read" to display the current setting. To set a new Device ID, enter the new Device ID number and then click "Apply".
- (4) Firmware Version  
Click "Read" to display the Main version number. Use this function to check the version number of your equipment.
- (5) After setting, exit from GL400/350 Configuration Tools.



## 4.6 Menu Configuration and System Settings

### Starting the Software

Click "Start" "Programs" "OPS022" to launch OPS022. Once started, the following window is displayed.



### Menu Configuration

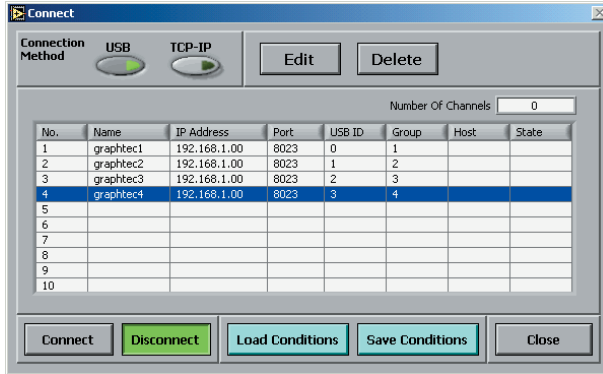
Menu Name	Selections	
(1) Connect	Connection method	USB, TCP-IP
	Edit	No., Name IP Address, Port, USB ID
		Group: Setting groups 1 to 10
		Host: Master, Slave
		Status: OK/NG
	Delete, Connect, Disconnect, Load Conditions, Save Conditions	
(2) Review	Open File	
	Convert then Save	File Path: Format, Path
		Data: All Cursor
	Open in EXCEL	Spot Samples: Off, Select from 2 to 1000 points
		Data: All Cursor
		Spot Samples: Off, Select from 2 to 1000 points
(3) Status Display	Stopped, Awaiting Trigger, Capturing Data, Data Captured	
(4) Info Message	Start Time, Capture Time, Capture Interval	
(5) Settings	AMP	Select CH: From 1-10 to 91-100
		Analog AMP Settings: Line Color, Annotation, Input, Range, Filter, Unit
		All CH: Input, Range, Filter
		Logic/Pulse Settings, Device Number 1 to 10
		Logic: On, Off
		• Line Color: 1 to 4
		Pulse: Line Color, Input, Range, Slope
	X-Y	XY Graph Settings: Disp., Line Color, X Axis, Y Axis

Menu Name	Selections	
(5) Settings	Span	Select CH: From 1-10 to 91-100
		CH Span Settings: Upper, Lower
	Scaling	Select CH: From 1-10 to 91-100
		• Meas. Output: Func, Upper, Lower
		• Scaling Output: Upper, Lower, Unit
	Data	Pulse Settings Device Number.: 1 to 10
		• Meas. Output: Func, Upper, Value
		• Scaling Output: Upper, Lower, Unit
	Alarm	Device Settings: Sampling Interval, Data Capture Setting
		PC Card Settings: File Name, Format, File Path
		PC Settings: Capture File Setting, Auto File Name, Format, File Path
		Auto Backup Settings: Backup Interval
	Trigger	Select CH :From 1-10 to 91-100
		Alarm Settings: Function, Upper, Lower, Alarm Output, Combination
		Alarm: Logic, Pulse Settings, Device Number: 1-10
		Logic: Function, Alarm Output
	File	Pulse: Function, Upper, Lower, Alarm Output
		Trigger Settings
		• Start: Function, Alarm Output
		• Stop: Function, Alarm Output, Time
	Report	Level Trigger Settings
		• Start: CH, Function, Upper, Lower
		• Stop: CH, Function, Upper, Lower
		PC Card Operation
	Other	Data Transfer, Copy File, Delete File, Delete Folder
		Device Number: 1 to 10
		Card Initialize, Path, File
		Daily Capture: Capture Interval, Destination Folder
	Information	Monthly Capture: Capture Interval, Destination Folder
		Device Number: 1-10
		Synchronize PC and device clocks, Room Temp. Compensation, External Filter, Burn out, Power On Start, Factory Default
		Send E-Mail
	Information	Send E-mail when alarm is generated, Mail Address, Comments, SMTP Server, Sender Mail Address
		OPS022 Version, Device Information
(6) Start		
(7) Stop		
(8) EXIT		
(9) Review Device	Open File	Device, Path, Create Folder, Delete, Open Memory Data File, Filter
	Convert then Save	File Path: Format, Path
		Data: All, Cursor
		Spot Samples: Off, Select from 2 to 1000 points
(10) Waveform View	Open in EXCEL	Data: All, Cursor
		Spot Samples: Off, Select from 2 to 1000 points
(11) Digital View	Single View, Dual View (during data capture only)	
(12) Meter View	1-20 to 81-100, 1-50, 51-100	
(13) Report View	1-20 to 81-100	
(14) Y-T	View in EXCEL	
(15) X-Y	Single View Display, Dual View Display, Y Axis Range 1, Y Axis Range 2, X-axis Display Width	
(16) Logic		
(17) Alarm		
(18) X-axis Display Width		

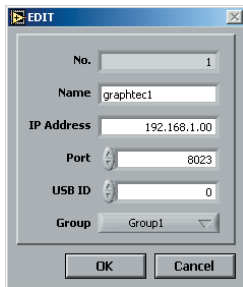
## 4.7 PC Connection Settings

The GL400/350 can be connected to a computer via USB or TCP-IP (LAN).

- (1) Click the "Connect" button on the main menu to display the Connect window.  
Select USB or TCP-IP.



- (2) Edit  
Several settings need to be made to enable connection to your PC.  
No.: Select a number from 1 to 10. When a number is selected, a submenu (settings list) appears.



- Name: Enter a name for device control (any name).
- IP Address: Set the IP address for the GL400/350 connected (when using network).
- Port: Set the port number for the GL400/350 connected (when using network)
- USB ID: Set the ID number for the GL400/350 connected (when using the USB interface)
- Group: When two or more GL400/350 devices are being used for simultaneous measurement, register them in the same group. This setting must be made for simultaneous measurement.

When all the settings have been made, click the "OK" button to complete the setting operation.

- (3) Connect, Disconnect/Load Conditions, Save Conditions

- Connect: Click the "Connect" button to connect the GL400/350 to the computer when all the settings have been made.
- Disconnect: Click this button to cancel the Connect status. If the GL400/350 is not connected and this button is clicked, the "Device not connected" message will appear on the screen.
- Load Conditions: Click this button to load previously-saved settings and enable changes to be made if required.
- Save Conditions: Click this button to save the settings. Please specify the file name and save destination. The file name will have a .cfg extension.

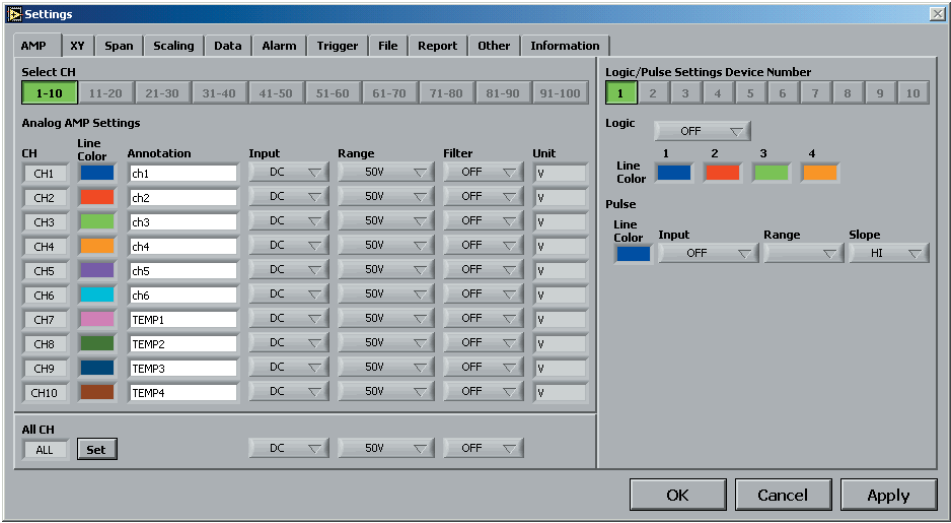
# 4.8 Measurement Parameters Settings

Click the "Settings" button on the main menu to enable device and measurement parameters for the GL400/350 to be made.



The GL400/350 settings are changed whenever the "OK" or "Apply" button is clicked in each setting menu.

## AMP Settings



- (1) Select CH  
Specify a group or groups of channels in the range [1 to 10] through [91 to 100].  
Analog AMP Settings:
- Line Color: Specifies the color for each channel.
  - Annotation: Up to 11 characters can be input for each channel.

### CAUTION

Certain characters used here may not be displayable on the GL400 monitor.

- Input: OFF, DC, Temp  
Sets the input type for each channel.
- Range  
DC: 20, 50, 100, 200, 500 mV, 1, 2, 5, 10, 20, 50 V



For the 1-5V range, select 5V, and then specify 5V for the upper span limit and 1V for the lower span limit.

Temp: Specify one of the following:  
TC-K, TC-J, TC-T, TC-E, TC-B, TC-R, TC-S, TC-N, TC-W, Pt100, JPt100.

- Filter: Off, On  
Select On if you need to cut noise.
- Unit: The measurement unit is displayed during measurement.

All CH: Sets the Input, Range, and Filter values to the same values for all the channels in the displayed group. Click the "Set" button next to "All CH" to make the settings.

(2) Logic/Pulse Settings

Device Number: Specify which of the connected devices to use for logic input.

Logic: Off, On

Select On if a Device Number was specified.

- Line Color: Specifies the colors for channels 1 to 4.

Pulse

- Line Color: Specifies the color.
- Input: OFF, Counts, Revolutions, Inst.  
OFF: Pulses are not measured.
- Revolutions: Counts the number of pulses at 1-second intervals and converts them to revolutions.
- Counts: Displays the cumulative number of pulses for each sampling interval from the start of measurement.
- Inst.: Counts the number of pulses for each sampling interval.

Range: Can be set for each of the modes.

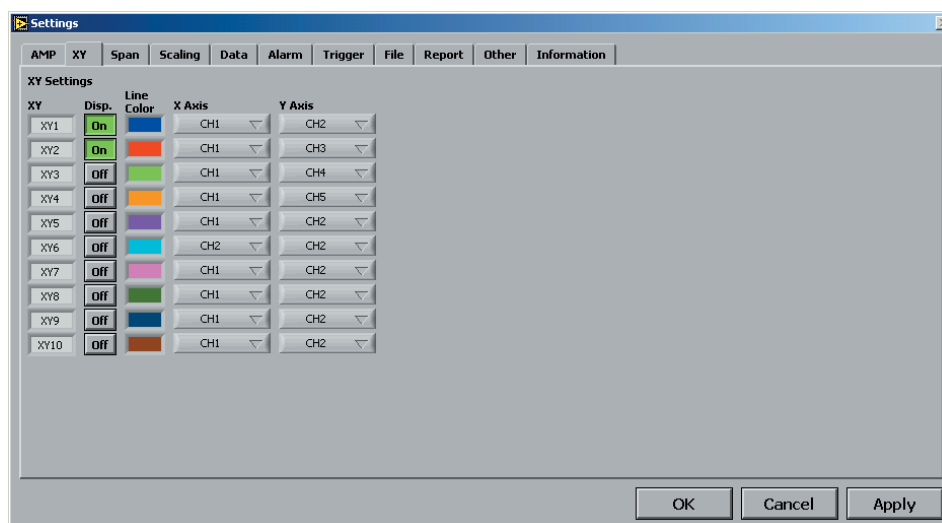
Mode	Range	Maximum number of pulse inputs
Revolutions	50k, 500k, 5M, 50M, 500M C/F.S.	50 k/sampling interval
Counts	500, 5k, 50k, 500k RPM/F.S.	50k/s
Inst.	50k, 500k, 5M, 50M C/F.S.	50 k/sampling interval

Slope: Sets the condition for the input signal operation.

- H: Operates when the signal is a rising signal
- L: Operates when the signal is a falling signal.

## X-Y Settings

Specify a combination of the X channel with one of the Y channels to display measurement data in XY format. 10 combinations are provided.



Disp.: On, Off

Select On for X-Y display of the selected combination.

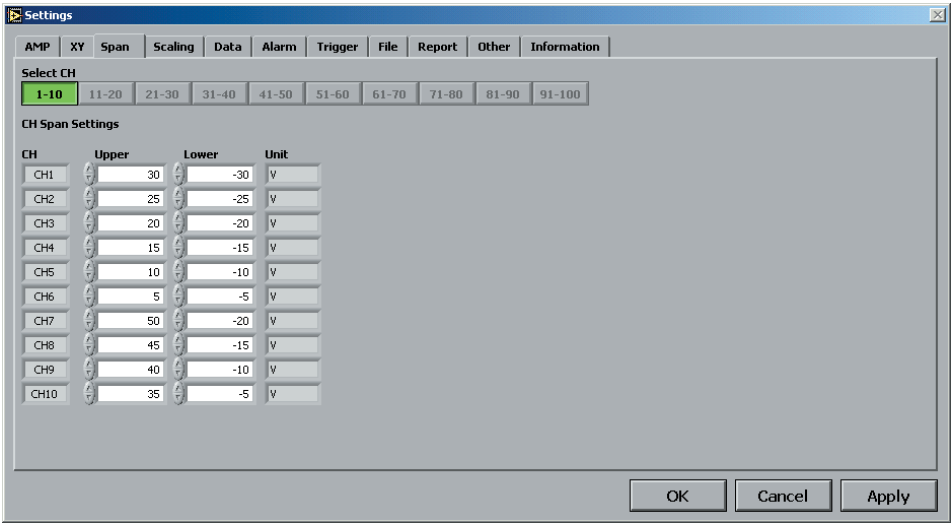
Line Color: Specify the colors

X Axis: Specify the channel for displaying X-axis measurement data.

Y Axis: Specify the channel for displaying Y-axis measurement data.

Span

Click the "Span" button on the main menu to enable Span settings to be made.



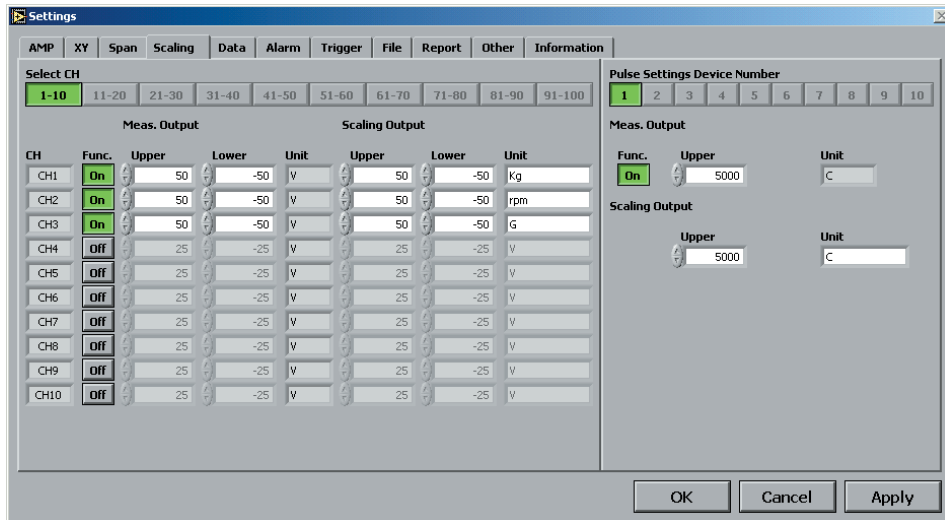
- (1) Select CH  
Specify a group or groups of channels in the range [1 to 10] through [91 to 100].
- (2) CH Span Settings  
Upper: Specify the upper limit value of the set range.  
Lower: Specify the lower limit value of the set range.



For the 1-5V range, select 5V for the Amp Settings range, and then specify 5V for the upper span limit and 1V for the lower span limit.

## Scaling

Use the Scaling function to perform calculation functions on the measured values and the scaling values.



### (1) Select CH

Specify a group or groups of channels in the range [1 to 10] through [91 to 100].

Meas. Output

- Function: Off, On

Select On to enable scaling.

- Upper: Displays the Upper Limit Value of the set span.
- Lower: Displays the Lower Limit Value of the set span.
- Unit: Displays the unit for the set range.

Scaling Output

- Sets the converted numerals and unit when the measured values are scaled.
- Upper: Sets the Upper Limit Value to be converted.
- Lower: Sets the Lower Limit Value to be converted.
- Unit: Input the unit for conversion.

### (2) Pulse settings

Device number: Specify a Device Number from 1 to 10.

Function: Off, On

- Select On to enable scaling.
- Upper: Sets the Upper Limit Value.
- Lower: Sets the Lower Limit Value.
- Unit: Sets the unit.

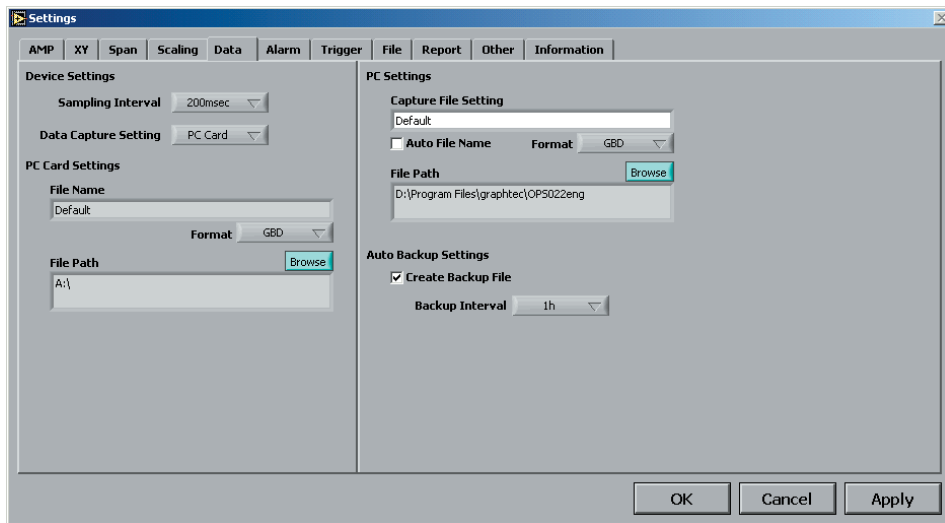
Scaling Output

- Upper: Sets the Upper Limit Value to be converted.
- Lower: Sets the Lower Limit Value to be converted.
- Unit: Input the unit for conversion.



## Data

Click the "Data" button to set measurement parameters, the data capture destination, etc.



### (1) Device Settings

Sampling Interval: 100, 200, 500 ms, 1, 2, 5, 10, 20, 30 s, 1, 2, 5, 10, 20, 30 min, 1 h  
Specifies the sampling speed for the GL400/350.



The maximum sampling interval that can be set is limited by the number of channels installed.

Data Capture Setting: Internal memory, PC card

### (2) PC Card Settings

File Name: Specifies the file name for data capture.

Format: GBD, CSV

Specifies the data format for saving measurement data

File Path: Specifies the file path when saving data to a PC card.

### (3) PC Settings

Capture File Setting: Specifies the file name when data is captured to the computer.

Auto File Name: Specifies a file name automatically. The date and time are appended to the file name.

Format: GBD, CSV

Specifies the data format for saving measurement data

File Path: Specifies the file path when saving data to a computer.

### (3) Auto Backup Settings

Create Backup File: Check this box for auto data backup.

Backup Interval: 1, 3, 6, 12, 24 hours  
Specifies the backup interval.



- The data backup location uses the same file path set in PC Settings. The file name is automatically assigned.
- PC Settings Capture File Name \_xx\_bk.GBD (xx: consecutive numbers).

## Alarm

**Settings**

AMP XY Span Scaling Data **Alarm** Trigger File Report Other Information

Select CH: 1-10 11-20 21-30 31-40 41-50 51-60 61-70 71-80 81-90 91-100

**Alarm Settings**

CH	Function	Upper	Lower	Unit	Alarm Output	Combination
CH1	Hi	25	-25	V	1	OR
CH2	Lo	25	-25	V	2	
CH3	WinIn	25	-25	V	3	
CH4	WinOut	25	-25	V	4	
CH5	Off	25	-25	V	1	
CH6	Off	25	-25	V	1	
CH7	Off	25	-25	V	1	
CH8	Off	25	-25	V	1	
CH9	Off	25	-25	V	1	
CH10	Off	25	-25	V	1	

**Alarm/Logic/Pulse Settings Device Number**

1 2 3 4 5 6 7 8 9 10

**Logic**

	Func.	Alarm Output
1	X	1
2	X	1
3	X	1
4	X	1

**Pulse**

Func. OFF Upper 50 Lower 0 Unit C

Alarm Output 1

OK Cancel Apply

- (1) Select CH  
Specify a group or groups of channels in the range [1 to 10] through [91 to 100].
- (2) Alarm Settings
 

Function: Off, Hi, Lo, Win In, Win Out  
Specifies the condition for alarm generation.

Upper: Specifies the Upper Limit Value for the condition specified in Function.

Lower: Specifies the Lower Limit Value for the condition specified in Function.

Alarm Output: 1-4  
Specifies the number for alarm output to an external device.

Combination: AND, OR  
Specifies the condition for alarm output.
- (3) Logic, Pulse Settings
 

Device Number: Specifies which of the connected devices to use for logic input.

Logic

  - On, Off: Specifies whether or not to enable logic input.
  - X, L, H: X (not used)  
L (enabled when the signal goes low)  
H (enabled when the signal goes high)
- (4) Pulse Settings
 

Function: Off, Hi, Lo  
Specifies the condition for alarm generation.

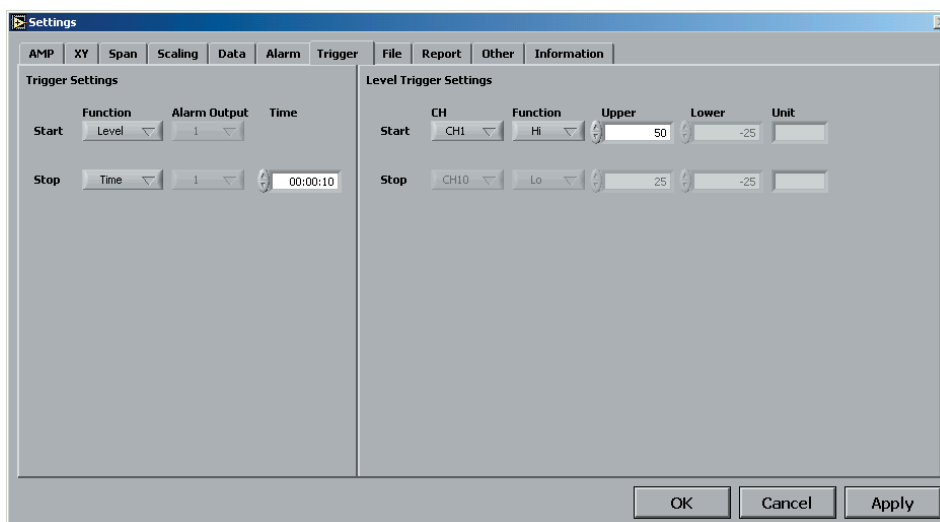
Upper: Specifies the Upper Limit Value for the condition specified in Function.

Lower: Specifies the Lower Limit Value for the condition specified in Function.

Alarm Output: 1-4  
Specifies the number for alarm output to an external device.

## Trigger

The trigger Start/Stop settings are made here.



### (1) Trigger Settings

#### Start

- Function: Sets the Data Capture Start condition.

Off: No trigger is used. Instead, measurement is initiated by pressing the START/STOP key.

Level: The start of measurement is triggered when the trigger condition is satisfied.

Alarm: The start of measurement is triggered when the alarm condition is satisfied.

External: The start of measurement is triggered when a signal is input from an external trigger terminal.

- Alarm Output: Selects the alarm output when the Function is Alarm.

#### Stop

- Function: Sets the Data Capture Stop condition.

Off: No trigger is used. Instead, measurement is stopped by pressing the START/STOP key.

Level: Measurement is stopped when the trigger condition is satisfied.

Alarm: Measurement is stopped when the alarm condition is satisfied.

External: Measurement is stopped when a signal is input from an external trigger terminal.

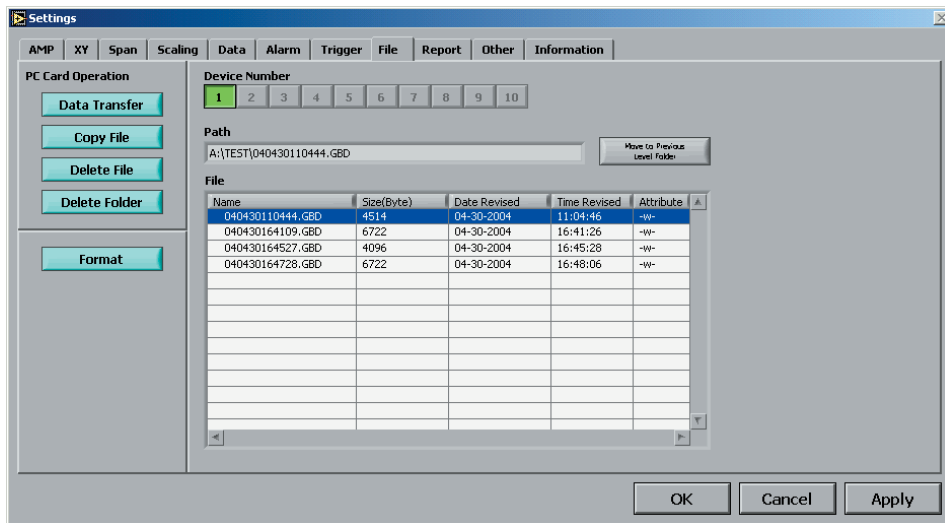
Time: Sets the amount of time from the start until the end of measurement. (The time can be specified in 1-second increments).

Alarm Output: Selects the alarm output when the Function is Alarm.

Time: Sets the end time when "Function" and "Time" have been set.

## File

The settings related to files are made here.

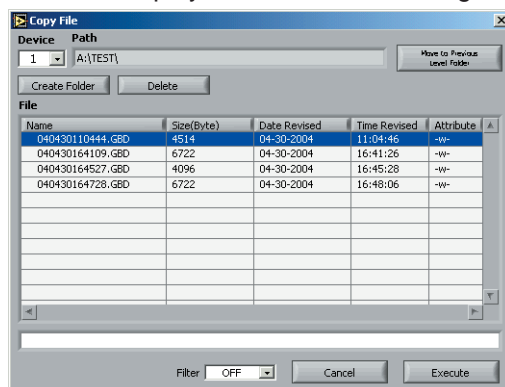


(1) Data Transfer

Data captured at the GL400/350 can be transferred to a computer. Select the required file from the File List, and click the "Data Transfer" button to transfer the data to the specified location.

(2) Copy File

Data captured at the GL400/350 can be copied to another destination. Click the "Copy File" button to display the menu for selecting the file to be copied and the copy destination.



(3) Delete File

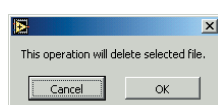
Data captured at the GL400/350 can be deleted. Select the file you want to delete and then click the "Delete File" button to delete it.

(4) Delete Folder

Folders created at the GL400/350 can be deleted. Select the folder you want to delete and then click the "Delete Folder" button to delete it.

(5) Initialize Card

When you click the "Initialize Card" button, a confirmation dialog box will be displayed. Click the OK button to start the initialization process.



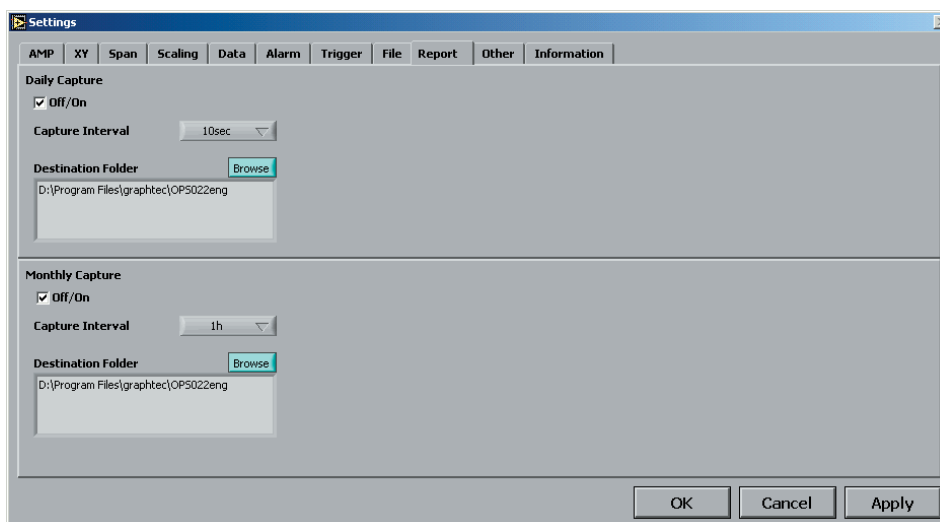
The PCMCIA card will be initialized. All the data captured to the card will be erased. Be sure to make a data backup before initializing the card.

(6) Device Number

Select the devices for Synchronized measurement.

## Report

Daily or monthly reports can be generated during data measurement.



### (1) Daily Capture

Daily Capture: Check this box to enable report data to be generated daily.

Capture Interval: 5, 10, 30 seconds, 1, 5, 10, 30 minutes

The measured data is automatically formatted into a table according to the capture interval specified.

Destination Folder: A folder for saving the daily data can be specified. The file name is "Daily (Date, Time).CSV".

### (2) Monthly Capture

Monthly Capture: Check this box to enable report data to be generated monthly.

Capture Interval: 1, 2, 6, 12, 24 hours

The measured data is automatically formatted into a table according to the capture interval specified.

Destination Folder: A folder for saving the daily data can be specified. The file name is "Monthly (Date, Time).CSV".

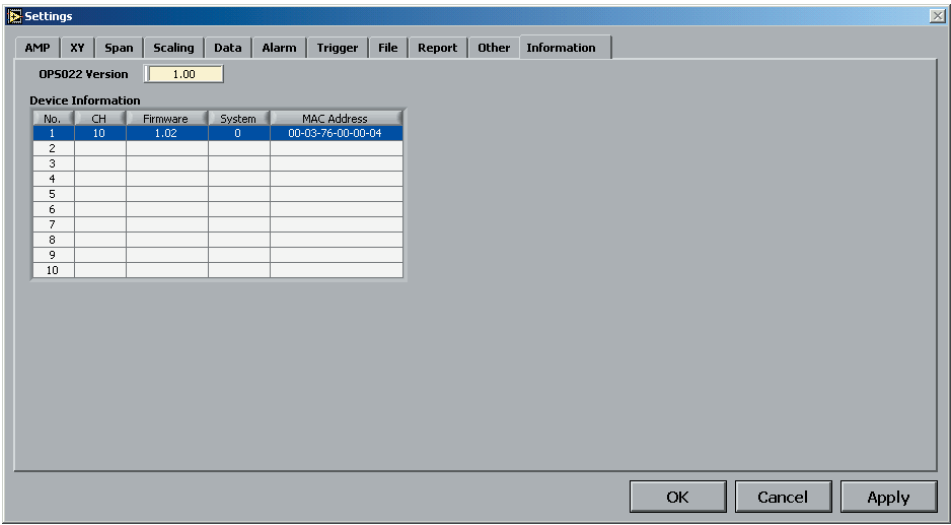
## Other

The GL400/350 device settings and email settings when an alarm has been generated are made here.

- (1) Device Number  
Specifies the Device Control Number for settings.
- (2) Synchronize PC and Device clocks  
Click this button to change the GL400/350's clock setting to match that of the computer.
- (3) Room Temp. Compensation: Off, On  
This function is only used when a temperature range has been specified. "On" is normally selected. When making this setting, there is a choice between Internal (the GL400's room temperature compensation settings are used) or External. Select External when you have the necessary equipment and know-how.
- (4) External Filter: Off, On  
It sets whether or not to use an external filter.
- (5) Burn out: Off, On  
This function is only used when a temperature range has been specified. It is normally set to "On". When a thermocouple sensor has burnt out, that status is displayed on the screen.
- (6) Power On Start: Off, On  
This function enables the settings that were in effect when measurement last ended to be used to start measurement as soon as the power is switched on. (Data being measured using the OPS022 software cannot be captured when the Power On Start function is used).
- (7) Factory Default  
This parameter returns all the settings to the factory defaults. Use this function when you want to start from scratch.
- (8) Send E-mail  
Send E-mail when an alarm is generated: Check this box to enable this function.  
Mail Address: Email can be sent to five locations.  
Please set the addresses in accordance with your computer system.  
Comments: Comments can be recorded for each email setting to explain the contents.  
(Email is actually sent when an alarm is generated.)

Information

The device status control information is displayed. This information can be used for maintenance purposes, but it cannot be input directly.

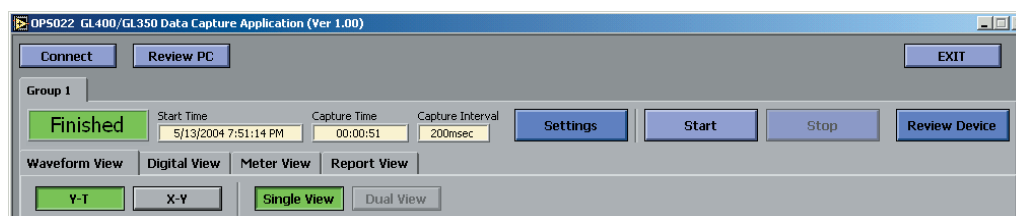
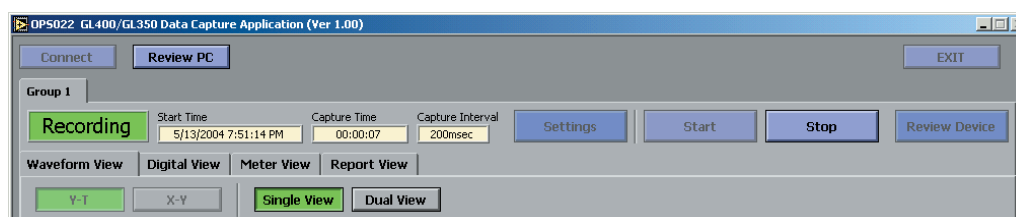


## 4.9 View Functions

The display can be changed to suit the type of measurement being performed. It is also used to perform measurements and make settings.

### Capture Start/Stop

When the measurement conditions have been set, waveforms are displayed even though "Finished" is displayed. However, when the GL400/350 is connected to a computer, the waveforms are monitored. If "Start" is selected in this status, the display changes to "Recording", and measurement starts according to the settings made in the setting menus.





## Waveform View

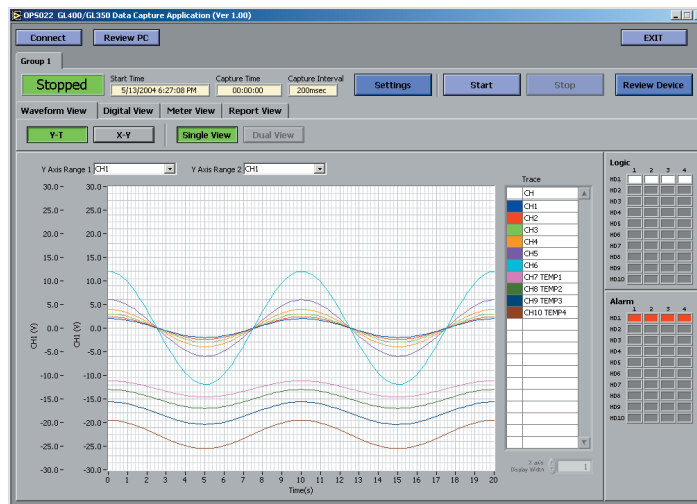
The waveform view "Y-T" display can be selected as "Single View" or "Dual View". When the GL400/350 is in on-line status, the measured waveforms are always displayed. Moreover, when data capture has been started, the data is captured according to the settings made in the setting menus.

### Y-T

Measurements can be displayed with respect to the time axis.

#### (1) Single View Display

The X axis is the time axis, and the Y axis displays the measurement range specified for each channel.



Y Axis Range 1, 2: The Y axis scale can be displayed as the scale for two channels.

Channel If a channel's color display is clicked to turn it off, the waveform for that channel will not be displayed.

X-axis Display Width: The time axis width can be changed if the numeric value is changed.

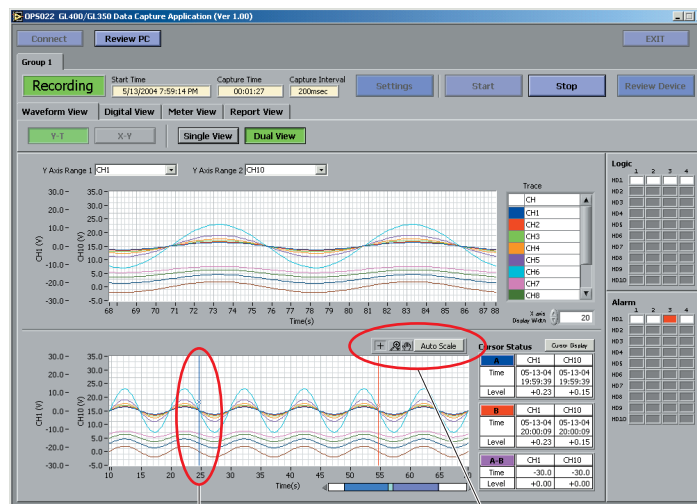
*Note: Measurement data is captured.*

#### (2) Dual View Display

Data captured in the past can be displayed alongside the data that is currently being captured.

*Note: This function can only be used while data is being captured.*

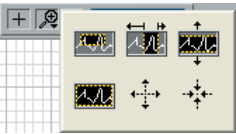
Past data can be enlarged and checked using the on-screen cursors.



When the display is Dual View, the cursor display can be used to search data.

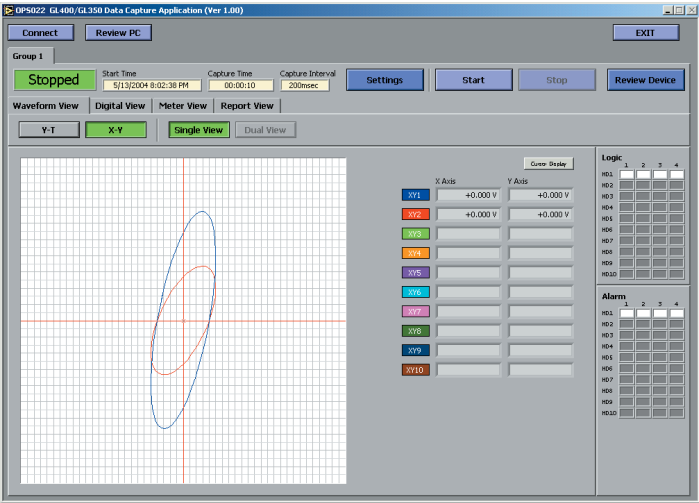
Cursor, Enlarge/Compress, Move Display, Auto Scale

Click on the "Cursor", "Enlarge/Compress", "Move Display" and "Auto Scale" icons to select them.  
**"Enlarge/Compress" selection screen.**



**X-Y**

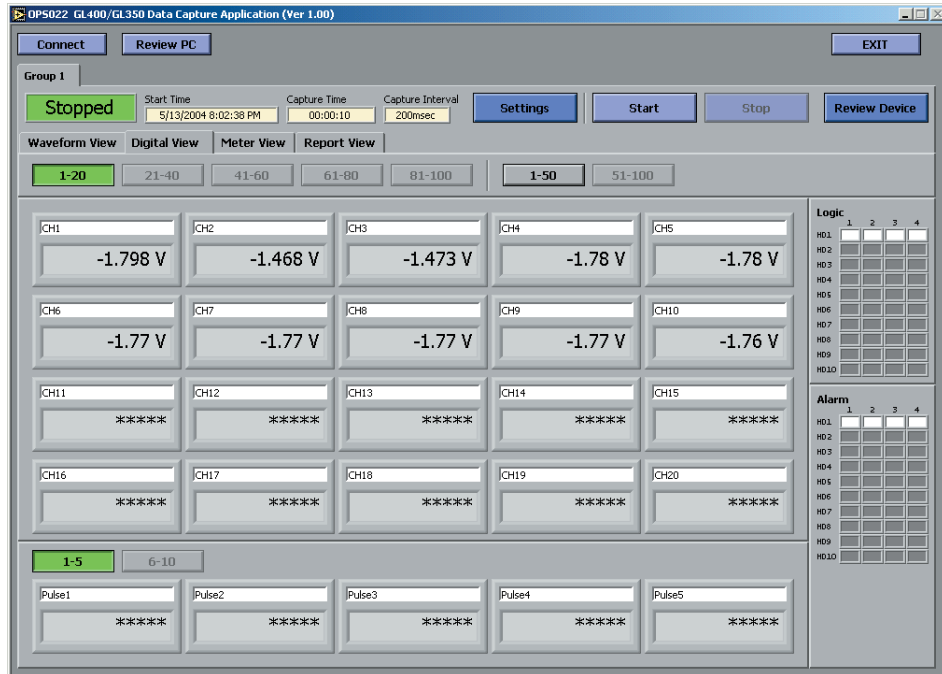
The X axis can be combined with a Y axis for an X-Y display. Specify the X and Y channels in "XY" under "Settings".



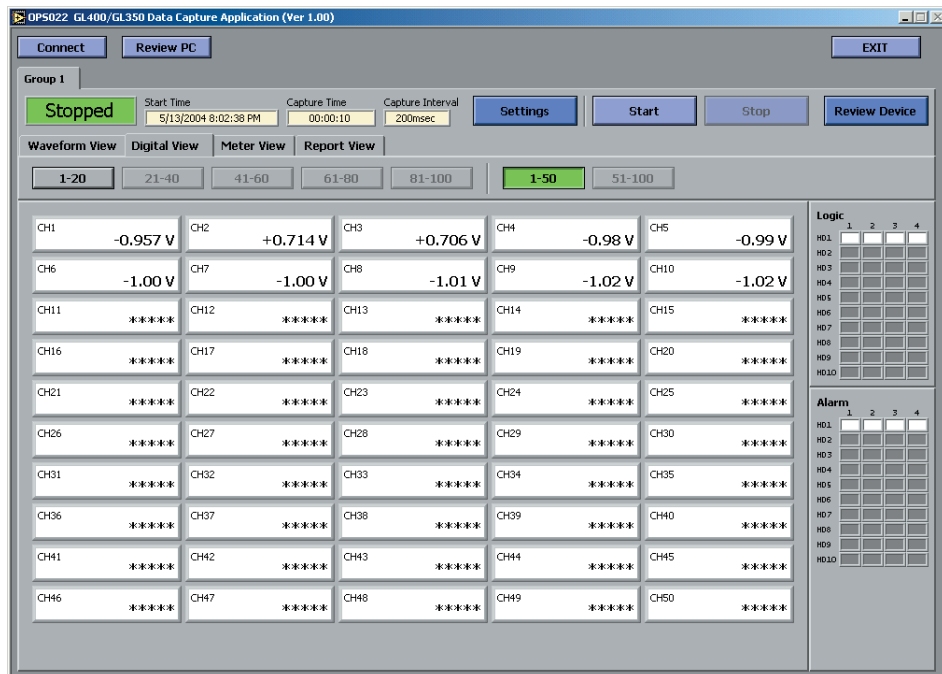
## Digital View

Digital data can be displayed separately for each group. If the group is a 20-channel group, pulse measurements can also be displayed. For a 50-channel group, however, only digital is displayed.

- (1) 20-channel group displays: 1 to 20, 21 to 40, 41 to 60, 61 to 80, 81 to 100.

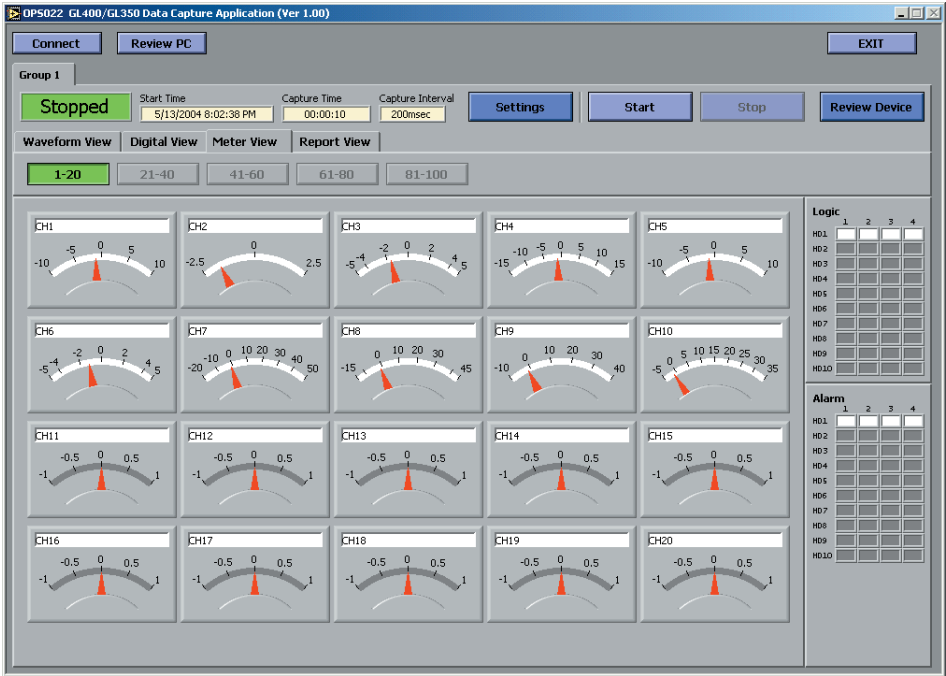


- (2) 50-channel group displays: 1 to 50, 51 to 100.



Meter View

The measured data is displayed in a meter format. Use this view when you want to monitor the status with the feeling of using an analog meter. Moreover, this display can be changed in group lots.



## Report View

The measured data is displayed in a table format according to the specified processing interval. Data is displayed in daily capture intervals or monthly capture intervals. To change the setting, change to the "Capture Interval" and the "Capture Destination Folder" settings in the "Report" tab on the Settings menu.

OPS022 GL400/GL350 Data Capture Application (Ver 1.00)

Connect Review PC EXIT

Group 1

Recording Start Time 5/13/2004 8:19:43 PM Capture Time 00:02:58 Capture Interval 200msec Settings Start Stop Review Device

Waveform View Digital View Meter View Report View

Display in EXCEL Daily Capture Interval 5sec

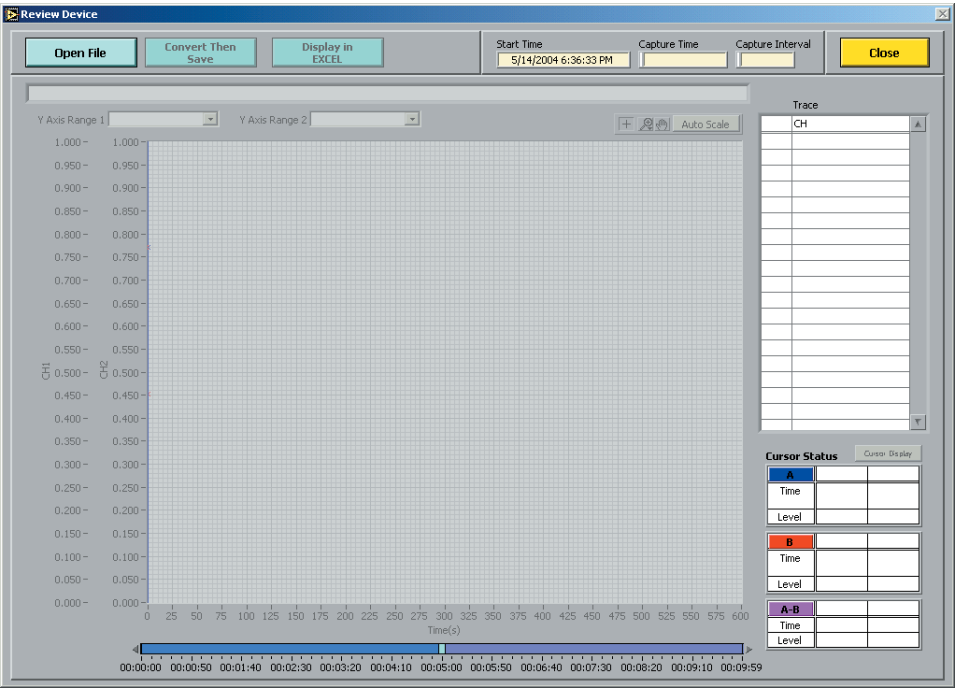
No.	Time	CH1(V)	CH2(V)	CH3(V)	CH4(V)	CH5(V)	CH6(V)	CH7(V)	CH8(V)	CH9(V)	CH10(V)	Pulse
20	05-13-2004 20:21:19	+1.182	+1.687	+1.687	+1.16	+1.15	+1.14	+1.13	+1.13	+1.12	+1.11	*
21	05-13-2004 20:21:24	-0.959	-1.656	-1.655	-0.94	-0.93	-0.92	-0.91	-0.90	-0.89	-0.89	*
22	05-13-2004 20:21:29	+0.971	+1.674	+1.672	+0.94	+0.93	+0.93	+0.92	+0.91	+0.90	+0.90	*
23	05-13-2004 20:21:34	-0.959	-1.656	-1.655	-0.93	-0.93	-0.92	-0.91	-0.91	-0.89	-0.89	*
24	05-13-2004 20:21:39	+0.973	+1.674	+1.672	+0.94	+0.93	+0.92	+0.92	+0.91	+0.90	+0.89	*
25	05-13-2004 20:21:44	-0.959	-1.655	-1.655	-0.94	-0.93	-0.92	-0.92	-0.90	-0.90	-0.89	*
26	05-13-2004 20:21:49	+0.972	+1.674	+1.672	+0.94	+0.93	+0.92	+0.91	+0.91	+0.90	+0.89	*
27	05-13-2004 20:21:54	-1.169	-1.669	-1.670	-1.15	-1.14	-1.14	-1.13	-1.12	-1.12	-1.11	*
28	05-13-2004 20:21:59	+0.973	+1.674	+1.672	+0.94	+0.93	+0.93	+0.92	+0.91	+0.90	+0.89	*
29	05-13-2004 20:22:04	-1.168	-1.669	-1.670	-1.14	-1.14	-1.13	-1.12	-1.12	-1.11	-1.10	*
30	05-13-2004 20:22:09	+1.183	+1.688	+1.687	+1.15	+1.15	+1.14	+1.13	+1.13	+1.11	+1.11	*
31	05-13-2004 20:22:14	-1.171	-1.669	-1.671	-1.15	-1.14	-1.14	-1.13	-1.12	-1.12	-1.11	*
32	05-13-2004 20:22:19	+0.972	+1.674	+1.672	+0.94	+0.93	+0.93	+0.92	+0.91	+0.90	+0.90	*
33	05-13-2004 20:22:24	-0.959	-1.656	-1.655	-0.93	-0.93	-0.92	-0.91	-0.90	-0.89	-0.89	*
34	05-13-2004 20:22:29	+1.184	+1.687	+1.687	+1.15	+1.14	+1.14	+1.13	+1.12	+1.11	+1.11	*
35	05-13-2004 20:22:34	-0.961	-1.655	-1.656	-0.93	-0.92	-0.92	-0.91	-0.90	-0.89	-0.89	*
36	05-13-2004 20:22:39	+1.184	+1.688	+1.686	+1.15	+1.15	+1.14	+1.13	+1.12	+1.11	+1.11	*

		CH1(V)	CH2(V)	CH3(V)	CH4(V)	CH5(V)	CH6(V)	CH7(V)	CH8(V)	CH9(V)	CH10(V)	Pulse
	Average	-0.019	+0.018	+0.017	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03	****
	Max	+1.186	+1.688	+1.687	+1.16	+1.15	+1.14	+1.13	+1.13	+1.12	+1.11	****
	Min	-1.895	-1.670	-1.671	-1.88	-1.88	-1.88	-1.87	-1.87	-1.87	-1.86	****

# 4.10 Review Device

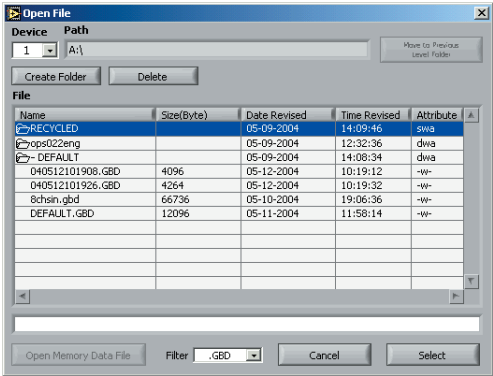
Use this function to replay the data captured at the GL400/350. The captured data can be replayed when the GL400/350 is in online status.

Put the GL400/350 in online status, insert a PCMCIA card in the PCMCIA card slot, and then click the "Review Device" button to start data replay. When the "Review Device" button is clicked, the Review Device submenu appears.



## Opening a File

- (1) Click the "Open File" button to display the data files on the PCMCIA card.

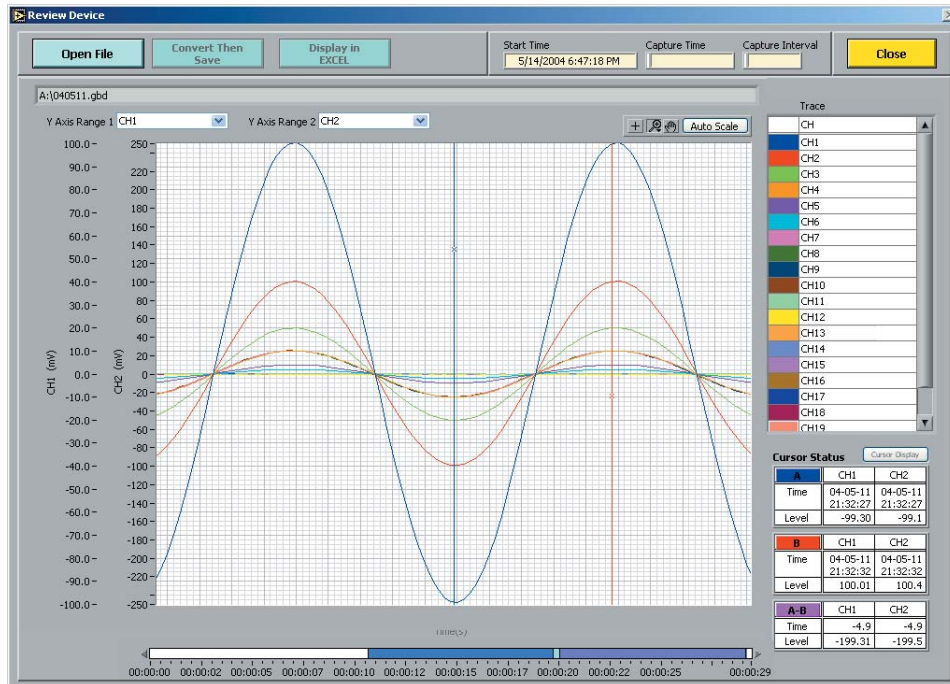


Open Memory Data File: Click this button to replay the data captured to the GL400/350's internal memory. (Cannot be selected if there is no data in the internal memory).

Filter: Displays the replayable file formats (extensions).

GBD: Data saved to the PCMCIA card.

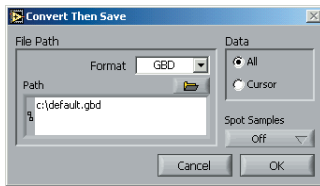
- (2) Select the file to be displayed. The data is displayed on the screen. If waveforms are displayed, the data can be checked and converted if required.



- The capture Start Time, Capture Time, and Capture Interval are displayed at the upper right of the screen. Moreover, the selected file name is displayed in the upper part of the waveform display.
- Two Y Axis. channel ranges can be displayed for Specify the channels as required.
- Waveform Display  
If a waveform display color within the Trace list is clicked once, the waveform display for that channel disappears. Click the color once more to redisplay it. Use this function when you need to distinguish between overlapped waveforms.
- Waveform Display Range  
A scroll bar is displayed underneath the waveform display to indicate which part of the data is displayed. Simply move the scroll bar to the required position for fast display of that data.
- Cursor Status  
Two cursors, A and B, are displayed. The cursor information for the selected two waveform channels is displayed at the lower right.

## Convert Then Save

After data has been converted, click the "Convert Then Save" button to display the following submenu.



(1) Format

GBD: GL400/350 dedicated binary format.

Note: Use this format if you want to replay the captured data via the OPS022 software.

CSV: A TXT format for processing data in Excel.

*Note: If data is converted using this format, data analysis using the OPS022 software cannot be performed.*

(2) Path: Specifies the data capture location for the converted data.

(3) Data

All: All the measured data is converted.

Cursor: Only the data between the A and B cursors is converted.

(4) Spot Samples

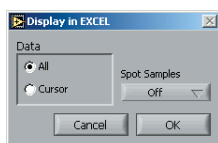
Off: Spot sampling is not performed

2, 5, 10, 20, 50, 100, 200, 500, 1000: Data is sampled at the point interval specified.



## Display in EXCEL

This function displays the captured data being displayed in Excel format.



### (1) Data

All: All the measured data is converted.

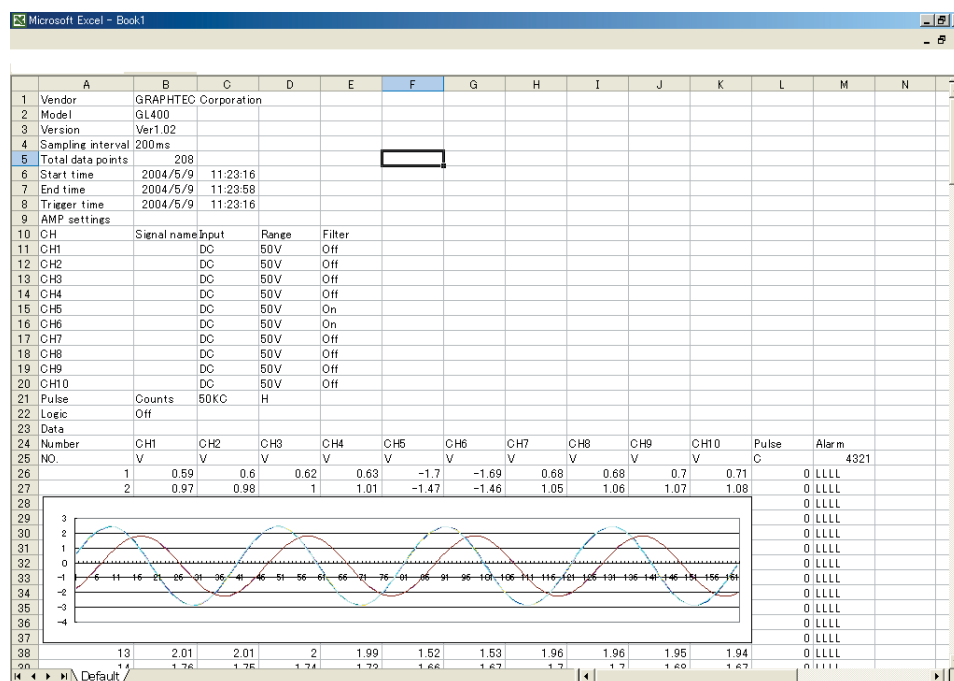
BCursors: Only the data between the A and B cursors is converted.

### (2) Spot Samples

Off: Spot sampling is not performed

2, 5, 10, 20, 50, 100, 200, 500, 1000: Data is sampled at the point interval specified.

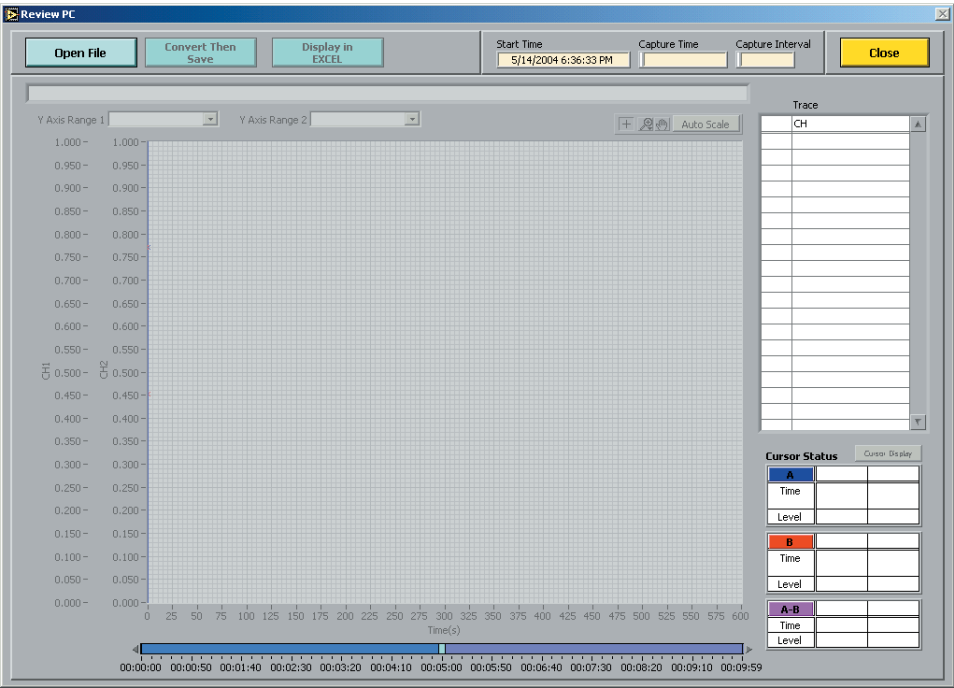
### Example



# 4.11 Review PC

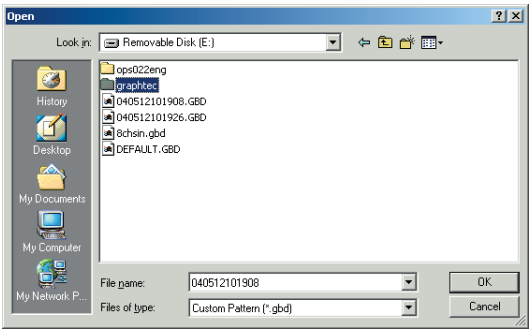
This function replays the data captured in the computer. Data can be replayed in online or offline status.

Replay the data captured in the computer. Click the "Review PC" button to display the Review PC submenu.

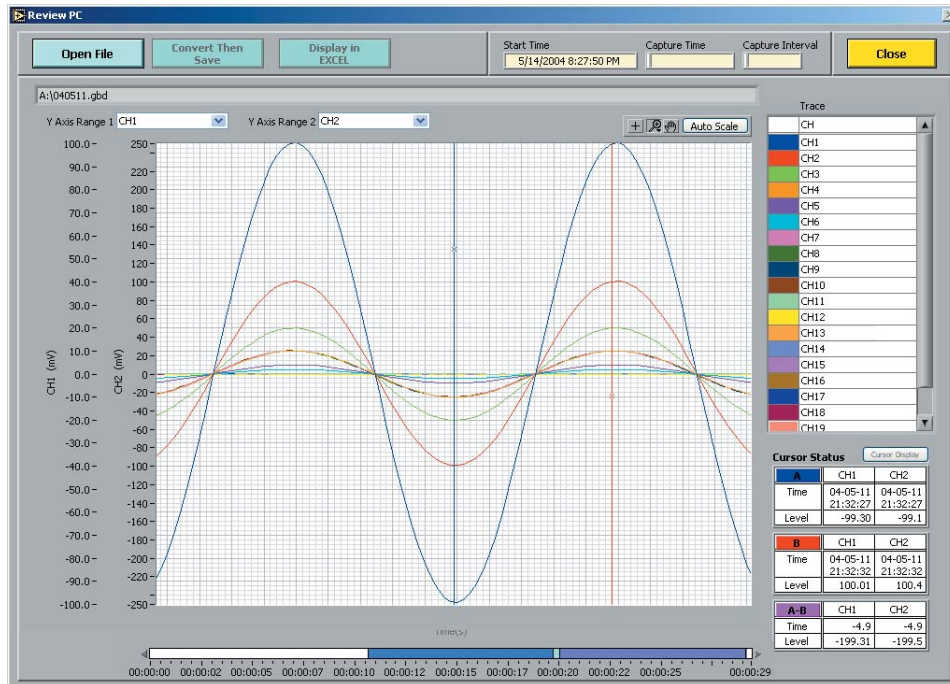


## Opening a File

- (1) Click the "Open File" button to display the connected PC's data files.



- (2) Select the file to be displayed, and then click the OK button. If waveforms are displayed, the data can be checked and converted if required.



- The capture Start Time, Capture Time, and Capture Interval are displayed at the upper right of the screen. Moreover, the selected file name is displayed in the upper part of the waveform display.
- Two Y Axis. channel ranges can be displayed for Specify the channels as required.
- Waveform Display  
If a waveform display color within the Trace list is clicked once, the waveform display for that channel disappears. Click the color once more to redisplay it. Use this function when you need to distinguish between overlapped waveforms.
- Waveform Display Range  
A scroll bar is displayed underneath the waveform display to indicate which part of the data is displayed. Simply move the scroll bar to the required position for fast display of that data.
- Cursor Status  
Two cursors, A and B, are displayed. The cursor information for the selected two waveform channels is displayed at the lower right.

### Convert Then Save

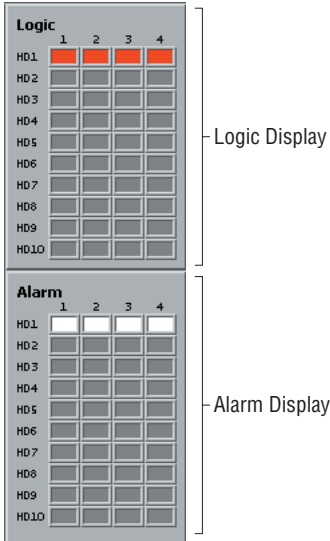
The procedure for converting the displayed data is the same as for "Review Device". Please refer to Section 4.10, "Review Device".

### Display In EXCEL

The procedure for displaying the data in Excel format is the same as for "Review Device". Please refer to Section 4.10, "Review Device".

## 4.12 Logic, Alarm Display

When the GL400/350 is in online status, the logic (4 channels) and alarm (4 channels) status can be monitored on-screen. Logic data can also be monitored as waveforms.



# **CHAPTER 5**

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## ***Specifications***

This chapter describes the basic specifications for the GL400/350.

- 5.1 Standard Specifications**
- 5.2 Function Specifications**
- 5.3 Accessory/Option Specifications**
- 5.4 External Dimensions**

## 5.1 Standard Specifications

### Standard Specifications

Item	GL400	GL350
Number of analog input terminal units mountable	2 units (10 channels x 2 or 20 channels x 2)	
External input/output	Trigger input, Logic input, Pulse input, Alarm output, synchronized main unit signals (sampling, trigger, etc.)	
PC interface	Ethernet (10 Base-T/100 Base-TX); USB (Ver. 1.1) standard	
Internal memory devices	2 Mwords internal memory (total); PCMCIA card slot (Type 2) standard	
Data backup functions	Setup conditions: EEPROM; Clock: lithium secondary battery	
Operating environment	0 to 40°C, 30 to 80% RH	
Withstand voltage	1 minute at 350 Vp-p (between each input channel and main unit chassis)	
Power supply	AC adapter: 100 to 240 VAC, 50/60 Hz DC input: 8 to 24 VDC Battery pack (option): 7.2 VDC (1800 mAh)	
Power consumption	AC drive: Within 15 VA DC drive: Within 7.2 VA	AC drive: Within 10 VA DC drive: Within 5.3VA
External dimensions	212 x 152 x 45 mm	212 x 152 x 40 mm
Weight*1	850 g	710 g
Other	Beeper (key, etc.) Holes to enable mounting on DIN rails	

\*1 Excluding the AC adapter and battery; including the 10-channel terminal

### Internal memory devices

Item	Description
Memory capacity	Internal memory: 2 Mwords (total) PC card slot: Depends on the type of card used
PC card standard	Type 2
Usable card types	ATA Flash (adapter required) Memory Stick (adapter required) MicroDrive (1 GB)
Memory contents	Setup conditions Measured data Screen copy

### PC Interface

Item	Description
Interface types	Ethernet (10 Base-T, 100 Base-TX) USB (Ver. 1.1)
Functions	Data transfer to the PC (realtime, memory) PC control of the GL400/350
Realtime data transfer speed	0.1 s (10 ch) maximum

### Monitor (GL400 only)

Item	Description
Display	4.7-inch STN color LCD (320 x 240 dots)
Displayed languages	English, Japanese
Backlight life	Approx. 36,000 hours (at 23°C, as a reference)
Backlight	Screen saver function provided (1, 2, 5, 10, 30, 60 min.)
Contrast adjustment	Provided

## Input Unit Specifications

Item	Description																																						
Number of input channels	10 channels/terminal unit (2 units mountable for a maximum of 20 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) • Resistance temperature detector: Pt100, Jpt100																																						
Measurement accuracy (23°C ±3°C) when 30 minutes have elapsed after the power was switched on (filter On, 1-s sampling)	Voltage: 0.1% of F.S. Temperature: Add ±1°C to the following values when the contact compensation is internal. <table><tr><th>Thermocouple</th><th>Measurement Temperature Range (°C)</th><th>Measurement Accuracy</th></tr><tr><td rowspan="3">R/S</td><td>0 ≤ Ts ≤ 100</td><td>±5.2°C</td></tr><tr><td>100 &lt; Ts ≤ 300</td><td>±3.0C</td></tr><tr><td>300 &lt; Ts ≤ 1760</td><td>± (0.05% of rdg +2)°C</td></tr><tr><td rowspan="2">B</td><td>400 ≤ Ts ≤ 600</td><td>±3.5C</td></tr><tr><td>600 &lt; Ts ≤ 1820</td><td>± (0.05% of rdg +2°C)</td></tr><tr><td rowspan="3">K/E/T</td><td>-200 ≤ Ts ≤ -100</td><td>± (0.05% of rdg +2°C)</td></tr><tr><td>-100 &lt; Ts ≤ MAX</td><td>± (0.05% of rdg +1°C)</td></tr><tr><td>&lt;MAX&gt; 1370(K), 800(E), 400(T)</td><td></td></tr><tr><td rowspan="3">J</td><td>-200 ≤ Ts ≤ -100</td><td>±2.7°C</td></tr><tr><td>-100 &lt; Ts ≤ 100</td><td>±1.7°C</td></tr><tr><td>100 &lt; Ts ≤ 1100</td><td>± (0.05% of rdg +1°C)</td></tr><tr><td>N</td><td>0 ≤ Ts ≤ 1300</td><td>± (0.1% of rdg +1°C)</td></tr><tr><td>W</td><td>0 ≤ Ts ≤ 2315</td><td>± (0.1% of rdg +1.5°C)</td></tr><tr><td>RTD</td><td>Pt100-200 to 850 JPt100-200 to 500</td><td>± (0.05% of F.S. +0.5°C) Pt: F.S. = 1050°C JPt: F.S. = 700°C</td></tr></table>	Thermocouple	Measurement Temperature Range (°C)	Measurement Accuracy	R/S	0 ≤ Ts ≤ 100	±5.2°C	100 < Ts ≤ 300	±3.0C	300 < Ts ≤ 1760	± (0.05% of rdg +2)°C	B	400 ≤ Ts ≤ 600	±3.5C	600 < Ts ≤ 1820	± (0.05% of rdg +2°C)	K/E/T	-200 ≤ Ts ≤ -100	± (0.05% of rdg +2°C)	-100 < Ts ≤ MAX	± (0.05% of rdg +1°C)	<MAX> 1370(K), 800(E), 400(T)		J	-200 ≤ Ts ≤ -100	±2.7°C	-100 < Ts ≤ 100	±1.7°C	100 < Ts ≤ 1100	± (0.05% of rdg +1°C)	N	0 ≤ Ts ≤ 1300	± (0.1% of rdg +1°C)	W	0 ≤ Ts ≤ 2315	± (0.1% of rdg +1.5°C)	RTD	Pt100-200 to 850 JPt100-200 to 500	± (0.05% of F.S. +0.5°C) Pt: F.S. = 1050°C JPt: F.S. = 700°C
Thermocouple	Measurement Temperature Range (°C)	Measurement Accuracy																																					
R/S	0 ≤ Ts ≤ 100	±5.2°C																																					
	100 < Ts ≤ 300	±3.0C																																					
	300 < Ts ≤ 1760	± (0.05% of rdg +2)°C																																					
B	400 ≤ Ts ≤ 600	±3.5C																																					
	600 < Ts ≤ 1820	± (0.05% of rdg +2°C)																																					
K/E/T	-200 ≤ Ts ≤ -100	± (0.05% of rdg +2°C)																																					
	-100 < Ts ≤ MAX	± (0.05% of rdg +1°C)																																					
	<MAX> 1370(K), 800(E), 400(T)																																						
J	-200 ≤ Ts ≤ -100	±2.7°C																																					
	-100 < Ts ≤ 100	±1.7°C																																					
	100 < Ts ≤ 1100	± (0.05% of rdg +1°C)																																					
N	0 ≤ Ts ≤ 1300	± (0.1% of rdg +1°C)																																					
W	0 ≤ Ts ≤ 2315	± (0.1% of rdg +1.5°C)																																					
RTD	Pt100-200 to 850 JPt100-200 to 500	± (0.05% of F.S. +0.5°C) Pt: F.S. = 1050°C JPt: F.S. = 700°C																																					
Reference contact compensation accuracy	±1°C (internal/external switching)																																						
A/D converter	16 bits (out of which 14 are internally acknowledged)																																						
Temperature coefficient	Gain: 0.01% of F.S./ °C																																						
Input resistance	1 MΩ ±5%																																						
Allowable signal source resistance	Within 300 Ω																																						
Maximum permissible input voltage	Between +/- terminals: 60 Vp-p Between input terminals and casing: 60 Vp-p																																						
Withstand voltage	Between input terminals and casing: 1 minute at 350 Vp-p																																						
Insulation resistance	At least 50 MΩ (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	On* <sup>1</sup> , Off (software filter)																																						
External filter	On* <sup>2</sup> , Off																																						

\*1 When On has been selected, the average value is 20 data samples.

\*2 When the External filter is used

When the external filter has been set to ON, a hardware filter operates automatically. The filter selected depends on the sampling speed. Please see the table below for details. Moreover, combining the hardware filter with the software filter further increases the effectiveness of noise elimination.

Caution: At this time, since the scanning interval between channels is extended, the time lag between channels increases.

Example: When measurement is performed at the rate of 10s/10ch.

Hardware filter OFF: Scanning of channels 1 to 10 is performed in 100 ms (a time lag of 10 ms between channels)

Hardware filter ON: Scanning of channels 1 to 10 is performed in 10 s (a time lag of 1 s between channels)

Maximum No. of channels	Sampling speed															
	100m	200m	500m	1s	2s	5s	10s	20s	30s	1min	2min	5min	10min	20min	30min	1h
10	Off	←	←	Filter1	←	←	Filter2	←	←	Filter3	←	←	←	←	←	←
20		Off	←	←	Filter1	←	←	Filter2	←	←	Filter3	←	←	←	←	←
40			Off	←	←	Filter1	←	←	←	Filter2	←	Filter3	←	←	←	←
50				Off	←	←	Filter1	←	←	←	Filter2	←	Filter3	←	←	←
100					Off	←	←	Filter1	←	←	←	Filter2	←	Filter3	←	←

Hardware filter settings:

Off: Off, Filter1: 20kHz, Filter2: 2kHz, Filter3: 200Hz

## 5.2 Function Specifications

### Standard Specifications

Item	Description
Display screen	Waveform display: Normal, Wide Digital display: Normal, Wide <i>Note: Can be key-toggled</i>
Sampling interval*1	100, 200, 500 ms; 1, 2, 5, 10, 20, 30 s; 1, 2, 5, 10, 20, 30 min; 1 h
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, 20, 30 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 internal memory and automatic save to a PC card Direct capture to a PC card Setup conditions saved to a PC card Copy of data screen saved to a PC card
Statistical calculation	Types of operation: Average value, peak value, maximum value, minimum value, RMS Number of operations: A maximum of 4 can be set simultaneously for 2 channels each Method: Realtime operation <i>Note: The calculation results are displayed in the digital display mode</i>
Search functions	Function: Search the captured data for the required number of points Search type: Alarm search
Annotation input function	Function: A comment can be input for each channel Inputtable characters: Alphanumerics Number of characters: 11
Linked unit operation	Synchronized operation enabled by the use of synchronous cables to link two or more main units together (PC measurement ) Synchronized operations: Start/stop, trigger, reference clock <i>Note: If the sampling interval is the same for all the units, the reference clocks are synchronized to enable long-term measurement without any time lag.</i>

\*1 The sampling interval varies according to the number of channels used.  
10 ch: 100 ms; 20 ch: 200 ms; 30/40/50 ch: 500 ms; 60 channels or more: 1 s

### Trigger Functions

Item	Description
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, Alarm, External Stop: Off, Level, Alarm, External, Time
Alarm judgment modes	Analog, Logic, Pulse AND, Pulse OR • Analog: H, L, Window In, Window Out • Logic: 4-ch pattern • Pulse: H, L



### External Input/Output Functions

Item	Description
Input/output types	Trigger input (1 ch), Logic input (4 ch), Pulse input (1 ch), Alarm output (4 ch)
Input specifications	Maximum input voltage: +24V Input threshold voltage: Approx. +2.5V Hysteresis: Approx. 1 V (+2 to +3 V)
Alarm output specifications	Output format: Open collector output (100 k $\Omega$ pull-up resistance) Output conditions: Level judgment, window judgment, logic pattern judgment, pulse judgment
Pulse input	Revolutions mode (engines, etc.) <ul style="list-style-type: none"> <li>• Function: Counts the number of pulses per second; enables them to be converted to rpms.</li> <li>• Ranges: 500, 5 k, 50 k, 500 k Revolutions/F.S.</li> </ul>
	Counts mode (electric meters, etc.) <ul style="list-style-type: none"> <li>• Function: Displays a count of the number of pulses for each sampling interval from the start of measurement.</li> <li>• Ranges: 50 k, 500 k, 5 M, 50 M, 500 M C/F.S.</li> </ul>
	Inst. mode <ul style="list-style-type: none"> <li>• Function: Counts the number of pulses for each sampling interval. Resets the count value after each sampling interval.</li> <li>• Ranges: 50 k, 500 k, 5 M, 50 M C/F.S.</li> </ul>
	Maximum number of pulse inputs <ul style="list-style-type: none"> <li>• Counts, Inst. modes: 50 k/sampling interval</li> <li>• Revolutions: 50 k/s</li> </ul>

## 5.3 Accessory/Option Specifications

### Control Software

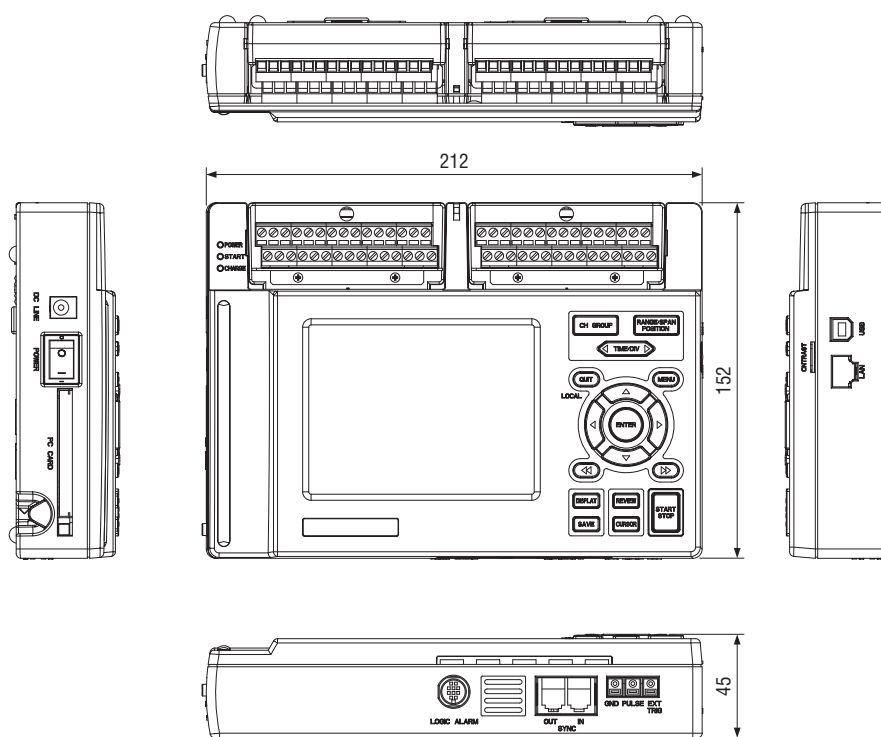
Item	Description
Compatible operating system	Windows 2000/XP
Functions	Main unit control, realtime data capture, data conversion
Main unit settings	Input settings, memory settings, alarm settings, trigger settings
Captured data	Realtime data (CSV, Binary) Memory data (CSV, Binary) PC card data
Display	Analog waveforms, logic waveforms, pulse waveforms, digital values
Displayed items	Record mode: Waveforms and digital values Logging mode: Digital values
File conversion	Between cursors, multiples of 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

### Battery Pack (Option)

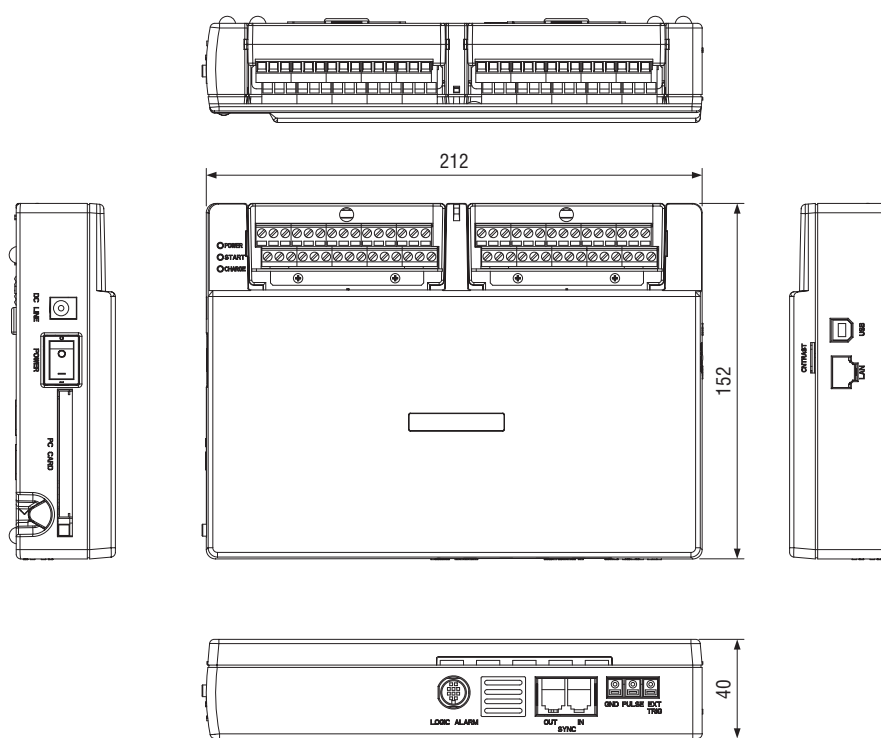
Item	Description
Capacity	7.2V/1800 mAh; mounted in the main unit
Running time	When using the LCD display: approx. 1 hour or more When using the screensaver: approx. 2 hours or more GL350: approx. 2 hours or more <i>Note: The running time depends on the operating environment and the amount of charge left in the battery.</i>
Battery type	Lithium secondary battery
Charging method	Mount in the main unit, or use a separate battery charger <i>Note: If mounted in the main unit for charging, the power switch must be turned off.</i>
Time required for charging	Main unit: approx. 12 hours Battery charger: approx. 10 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. <i>Note: The AC adapter is the primary power source.</i>
Other functions	When the battery is running low, memory data is saved automatically to the PC card. When data is being saved directly to the PC card, the file is closed automatically.

## 5.4 External Dimensions

### GL400



### GL350



Dimensional precision:  $\pm 5$  mm  
Unit: mm

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The specifications, etc., in this manual are  
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