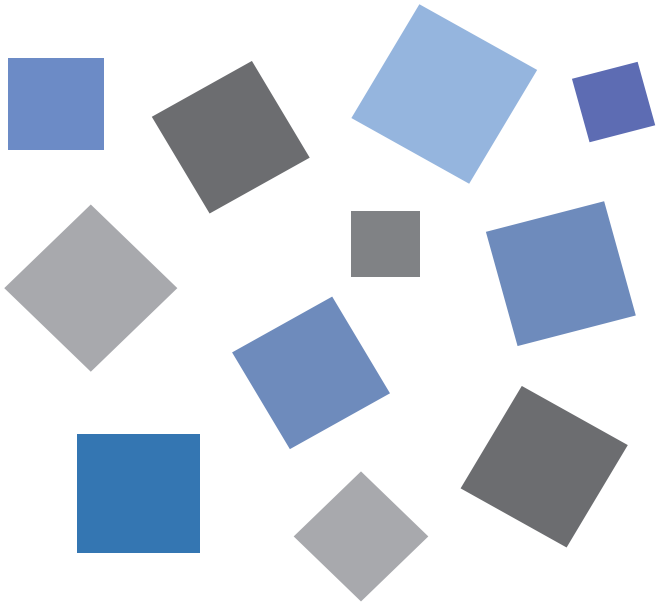
# GL-Connection (GL-Config)

## Application software

# USER'S MANUAL

MANUAL NO. APS(GL-Connection)-UM-157



GRAPHTEC

# Table of contents

# 1. PREFACE

This is the user's manual for the GL-Connection application software and the GL7000 management software, GL-Config. Set up the software according to the following procedures depending on the application environment.

● For customers who will not use the GL7000 Display Module
Step 1: Install the USB driver from the CD-ROM (if using a USB connection)
Step 2: Configure the LAN and USB ID settings in GL-Config.
Step 3: Install and open GL-Connection.

● For customers who will use the GL7000 Display Module and GL-Connection
Step 1: Install the USB driver from the CD-ROM (if using a USB connection)
Step 2: Configure the LAN and USB ID settings on the GL7000.
Step 3: Install and open GL-Connection.

● For customers who will use the GL7000 Display Module and will not use GL-Connection
Step 1: There is no need to install GL-Config and GL-Connection.

● For customers who will use GL220, GL820 and GL900
Step 1: Install the USB driver from the CD-ROM (if using a USB connection)
Step 2: Configure the LAN and USB ID settings on the device.
Step 3: Install and open GL-Connection.

## 1-1. About GL-Config

The GL-Config application software is a software for GL7000 that manages by connecting the GL7000 to a PC.
This software is necessary for configuring transmission settings for the GL7000, especially when the GL7000 Display Module is not used.
(*The GL-Config is available for the GL7000 only. It cannot be used for other modules.)

The main features of GL-Config are as follows. (* A USB connection is required for all features other than firmware version upgrades)
1) USB ID settings and reference
2) LAN settings and reference
3) Version reference
4) Device formats (built-in flash, SD card, and SSD module)
5) USB drive mode device changes
6) Firmware version upgrades

## 1-2. About GL-Connection

The GL-Connection application software is software used to perform USB and LAN connections with the GL, to configure GL settings, and to carry out data recording, data playback and real-time display of input signals. The main functions of GL-Connection are as follows.

1) Multiple module connections to the GL device: Connect up to 10 modules mixing USB and LAN connections.

2) Automatic recognition of the GL device: Automatically recognizes a GL connected to a PC and displays a device icon. Connections are possible with one click.
3) Waveform and digital displays: There are diverse display options including digital values, and Y-T and X-Y displays.
4) Multi-screen functionality: Simultaneously displays different waveforms on up to 4 screens.
5) Data recording function: Records in realtime on the PC with sampling of up to 1 ms in GBD (binary) or CSV (text) formats. Recording is possible (*There are limits to the sampling according to conditions)
6) Data playback function: Plays back recorded GBD (binary) and CSV (text) formatted files. Data recorded on the PC using this software can be played back at high-speed due to data compression.
7) Statistical calculation function: Displays the maximum value, minimum value, average value, peak value and the root mean squared value (*for playback data only) for both real-time and playback data.
8) Group function: A useful function that multilaterally displays the signal and playback data for one device.
9) E-mail notification function: A function that sends mail to a specified address when an alarm occurs due to the alarm function.
10) Direct Excel function: A function that transfers recorded data directly to Excel. Template file path creates a data file with a free format using a template file.
11) Synchronization and simultaneous connection functions: Records data without error using sync cables between multiple GL7000 modules. Also simultaneously starts recording even if the device doesn't support the sync cable. When stopping recording in a synchronous and simultaneously connection state, data can be bound on the same time axis (for Ver.1.60 and after).(*Simultaneous recording may produce data errors)

# 2. Operation Environment for GL-Config and GL-Connection

Install the software on a PC that meets the following requirements.

| Item | Necessary Conditions |
|---|---|
| **OS** | Windows XP (SP2 or higher) or Windows Vista (32-Bit/64-Bit)<br>Windows 7 (32-Bit/64-Bit) (*Starter Edition not supported)<br>Windows 8 / 8.1 (32-Bit/64-Bit) |
| **CPU** | Pentium 4: 1.7 GHz or higher |
| Memory | 512 MB or higher (1GB or higher is recommended) |
| **HDD** | 200MB (1GB recommended) of empty hard drive space is needed to install the software. |
| Display | Display 800x600 resolution or above, 65,535 colors or more (16-bit or above) |
| Others | USB port, an Ethernet port and a CD-ROM drive (when installing from CD) are necessary.<br>Microsoft Excel (For using the Direct Excel function) * EXCEL2003 or later |

* CHECKPOINT

* There are occasions when recording cannot be performed normally due to recording settings or the condition of the PC (such as if another application is running or if there is not enough free space for the recording medium) even if the PC in use has met the operating environment requirements for measured data recording. Close all other applications and record data on an internal hard disk when recording data.
* Depending on how to use (for example, to create multiple tabs), more conditions than the recommended environment may be requirted.
* Do not launch any other applications when using this software. Also do not execute processes or operations other than this software as much as possible. (Ex: screen savers, virus scanners, file copying or moving processes, file search processes, etc.)

# 3. Installing the USB Driver

Installing the USB driver is necessary if connecting GL-Config and/or GL-Connection using USB. USB driver installation will begin when selecting the automatic “USB driver installation” program on the attached CD-ROM.
Launch MultiSetup.exe on the CD-ROM if the program doesn’t launch automatically. For details, refer to the “Read the USB driver installation instructions” in the user’s manual.
Follow the CD-ROM instructions for models other than GL7000.


Installing the USB driver
Read the instruction manual for installing the driver

# 4. Installing GL-Config and GL-Connection

GL-Config and GL-Connection are installed together. One cannot be installed independently.
The GL-Connection installer will launch and the installation will begin when selecting the automatic “GL-Connection Installation” program on the attached CD-ROM. Launch MultiSetup.exe on the CD-ROM if the program doesn’t launch automatically. Continue following the instructions from the installer from this point on.


Installing GL-Connection

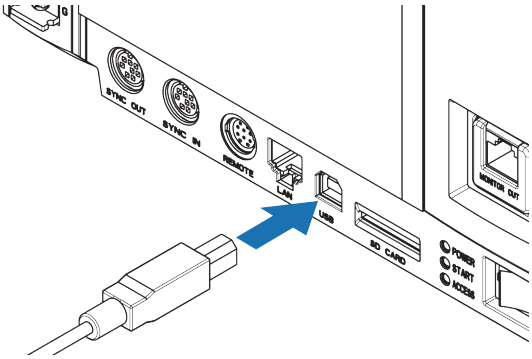
* Caution
Be careful of the following points when connecting a GL device to a PC.
- Install using an administrator level account.
- Do not connect anything other than the mouse and the keyboard to the PC’s USB connection terminals.
- Set the PC’s energy saving function to Off.
- Set the screen saver to Off.
- Set the PC so that it does not go to sleep.
- Notebook PCs may go into stand-by mode when the LCD (screen) is closed, so be sure that it doesn’t go into stand-by mode when the LCD is closed when using this software.
- Set virus and security software’s automatic update function, and Windows’ automatic update functions to Off.

# 5. How to Connect to a PC

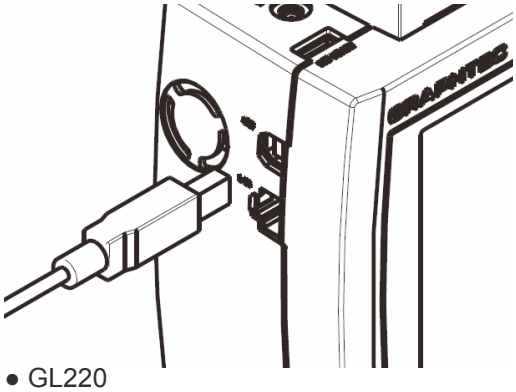
## 5-1. Connecting using USB

This explains how to connect using a USB cable.

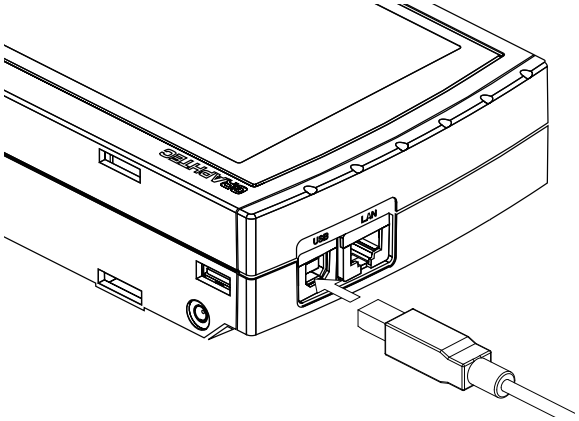
● GL7000



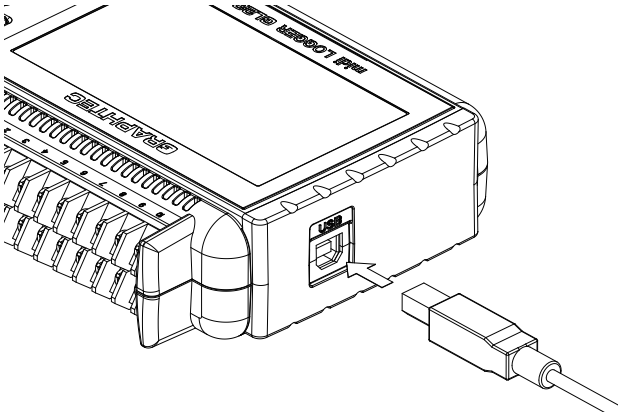

● GL900



● GL820



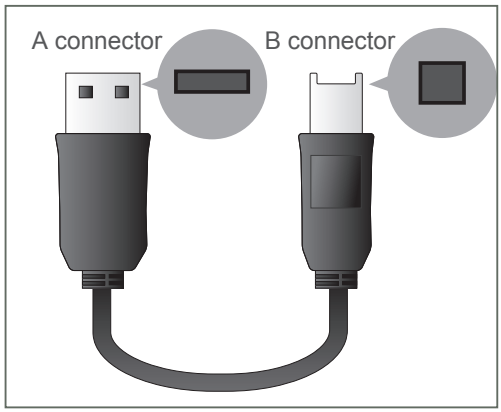

● GL220




* CHECKPOINT

- Installing the USB driver on the PC is necessary when using a USB cable to connect.
  Refer to the “USB driver installation instructions” regarding the installation methods.
- Be sure not to mistakenly insert the USB cable into the wrong terminal since it is adjacent to the LAN connector.

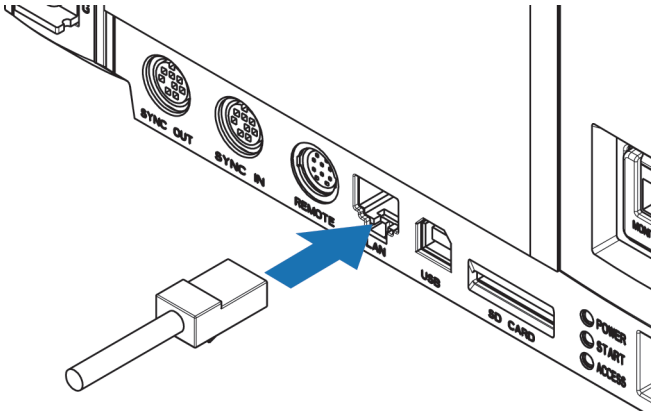
Use an A-B-type cable when connecting the device to the PC.



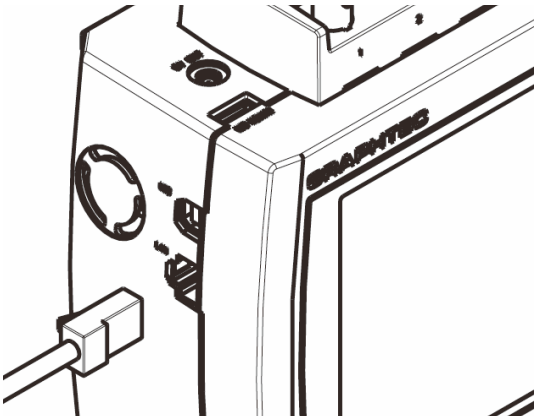
## 5-2. Connecting using a LAN

This explains how to connect using a LAN cable.

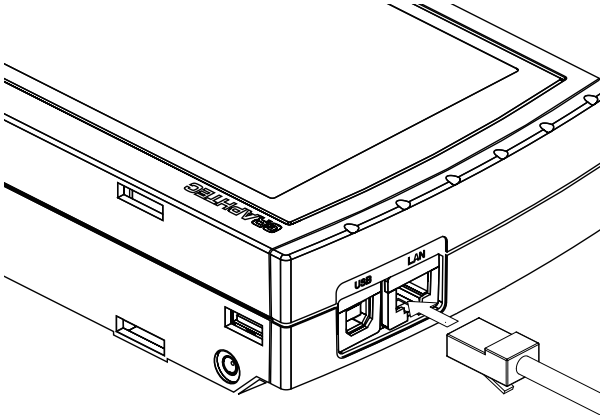
● GL7000




● GL900




● GL820

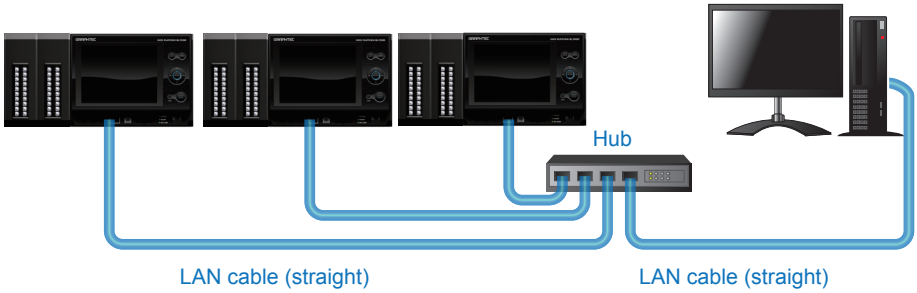



Use the following type of LAN cables depending on the usage context.

• Types of LAN cables

Use a cross over cable if connecting directly to the PC without the use of a hub.


Use a straight cable if using a hub to connect to a PC.




* Use a LAN cable of Category 5 (Cat5) type or later.

## 5-3. Setting the USB ID or the IP Address

Configure the GL device's I/F settings in order to connect it to the PC.

### 5-3-1. When setting the GL7000 with the GL-Config

You can configure the LAN settings and USB settings using the GL-Config software packaged with GL-Connection. Please refer to 6.  GL-Config

### 5-3-2. When setting the GL7000 with the display module

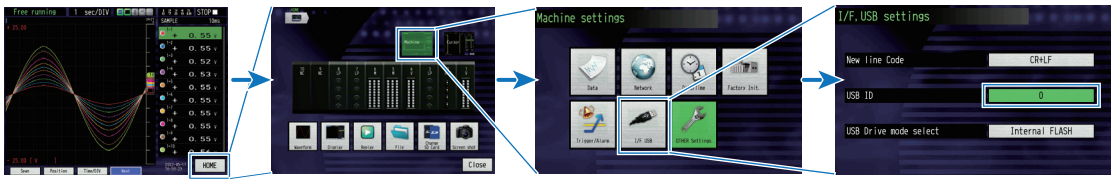
Configures LAN and USB settings using the Display Module options.

- **USBSettings**

Set the USB ID. It can be set between 0 and 9. Assign separate numbers for each GL device so that the USB IDs do not overlap when connecting multiple GL devices with USB.

1. Click [Home] on the bottom-right corner of the screen or press the [Home] key from the launch screen.
2. Click [Main Module] on the screen.
3. Click [I/F USB Settings] on the screen.
4. Set the number by clicking the [USB ID] number section.

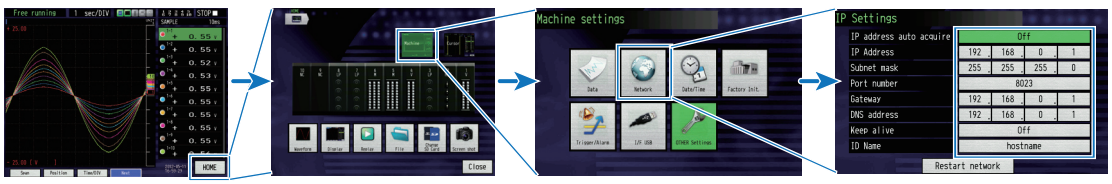
(1) (2) (3) (4)




- **LAN Settrings**

1. Click [Home] on the bottom-right corner of the screen or press the [Home] key from the launch screen.
2. Click [Main Module] on the screen.
3. Click [Network Settings] on the screen.
4. Change each of the network settings.

(1) (2) (3) (4)



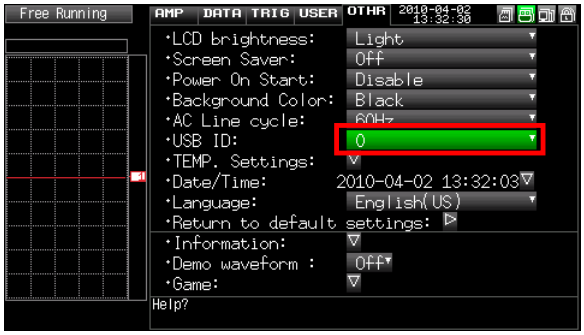

Configure the LAN settings to match the network environment for each PC in use. Refer to the main module user's manual on CD-ROM for a detailed explanation of the LAN setting parameters.

* The IP address can be acquired automatically if a DHCP server is being used in the identical network segment and if it uses automatic IP address acquisition.

### 5-3-3. When setting the USB connection to the GL220 ,GL820 or GL900

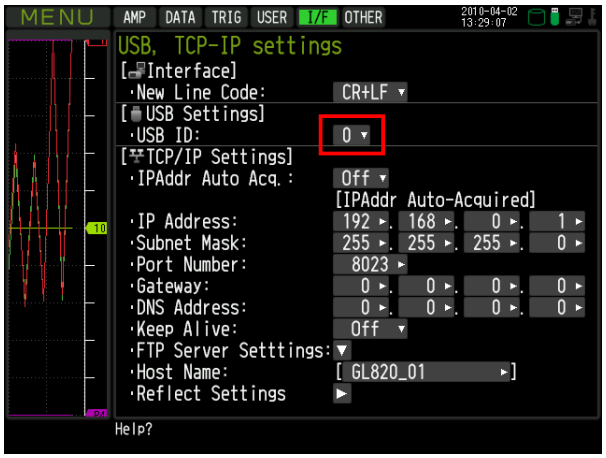
- **GL220**

Press the MENU key five times to open “OTHR Settings". Input the “USB ID".
The settings will be in effect when the power of the device is turned off and restarted.



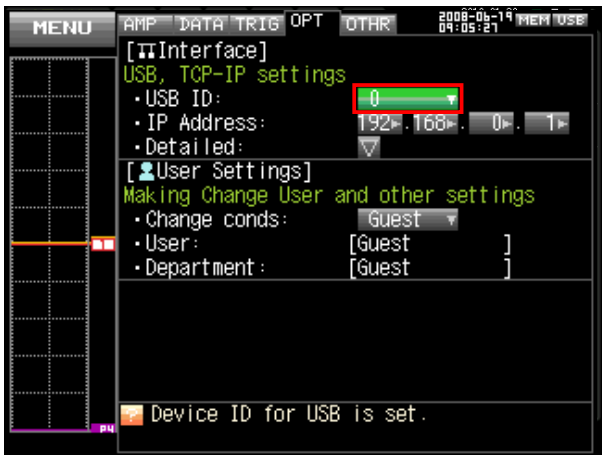

- **GL820**

Press the “MENU” key five times to open “I/F Settings”. Input the “USB ID”.
The settings will be in effect when the power of the device is turned off and restarted.




- **GL900**

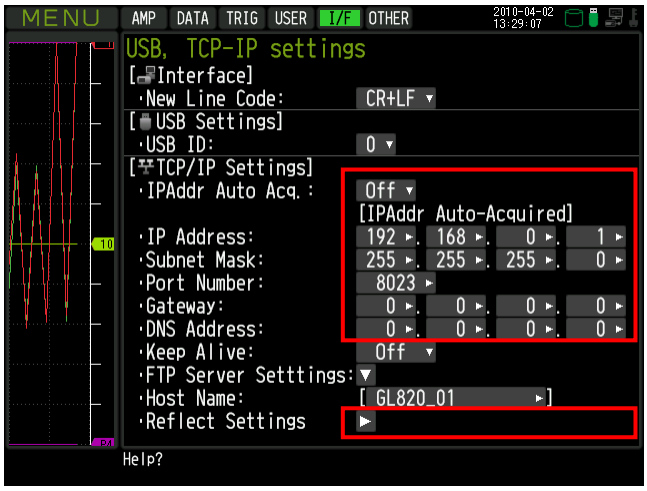
Press the “MENU” key four times to open “OPT”. Input the “USB ID”.
The settings will be in effect when the power of the device is turned off and restarted.




* CHECK POINT
After changing the USB ID setting of this unit, turn off and on the power of this unit.

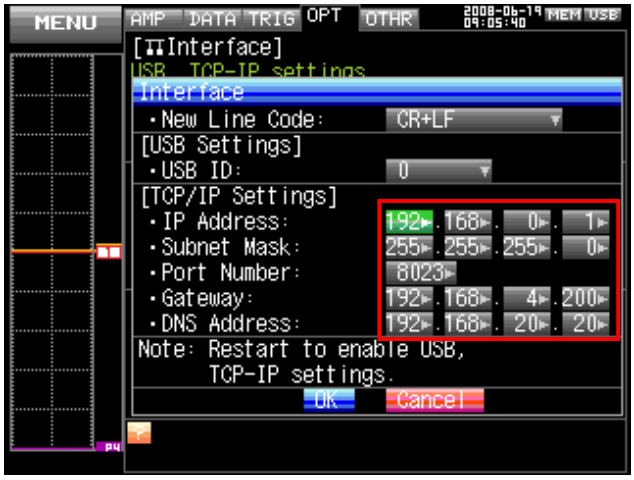
### 5-3-4. When setting the LAN connection to the GL820

Press the [MENU] key five times to open the [I/F] menu.
Set the [IP Address], [Subnet Mask], [Port Number], [DNS Address]
and select [Reflect Settings] to accept the changes.
• Using Auto IP Address Acquisition
If there is a DHCP server in the same segment of the connected network, Auto IP Address Acquisition is available.




### 5-3-5. When setting the LAN connection to the GL900

Press the [MENU] key four times to open the [OPT] menu.
Set the [IP Address], [Subnet Mask], [Port Number], [DNS Address]
The changed settings will be in effect when the power of the module is turned on.



## 5-3-6. PC TCP-IP Settings

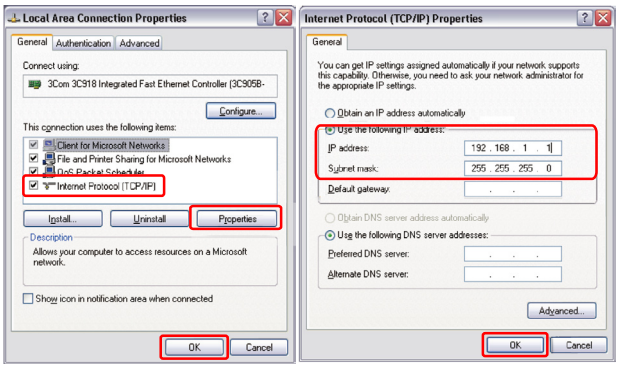
Refer to the following settings when connecting one PC to one GL device (when not connecting to a network such as an internal company LAN). Connect the GL device to the PC using a crossover cable.

| | |
|---|---|
| PC IP address | 192.168.1.1 |
| GL device IP address | 192.168.1.2 |

* CHECKPOINT
Set the subnet mask normally in this case to “255.255.255.0”.
Set the port number normally in this case to “8023”.

- **PC IP Address Settings (for Windows XP)**

[Start Menu]→[Control Panel]→[Network Connections]→[Local Area Connections]→[Properties]→[Internet Protocol (TCP/IP)]→[Properties]→Check “Use the following IP address”→Set the [IP Address] and [Subnet Mask] fields→[OK]

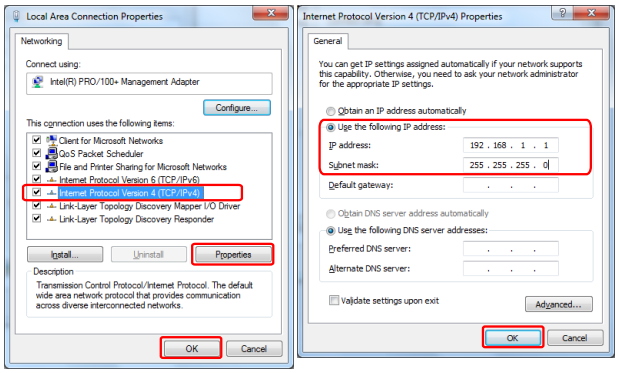



- **PC IP Address Settings (for Windows Vista)**

[Start Menu]→[Control Panel]→[Network and Sharing Center]→[Local Area Connections]→[Status Window]→[Properties]→[Internet Protocol (TCP/IP)]→[Properties]→Check “Use the following IP address” →Set the [IP Address] and [Subnet Mask] fields→[OK]

- **PC IP Address Settings (for Windows 7)**

[Start Menu]→[Control Panel]→[Network and Sharing Center]→[Local Area Connections]→[Properties]→[Internet Protocol (TCP/IP)]→[Properties]→Check “Use the following IP address”→Set the [IP Address] and [Subnet mask] fields→[OK]



# 6. GL-Config

* The GL-Config is available for the GL7000 only. It cannot be used for other modules.

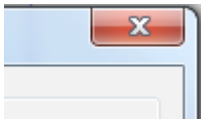
## 6-1. Launching and Terminating GL-Config

### 6-1-1. **Launching**

Launch the software by choosing “Start” on the OS taskbar→”Programs (All Programs)”→”Graphtec”→”GL-Connection”→”GL-Config”. The following screen will display when it’s finished launching.


### 6-1-2. **Terminating**

Click the [X] button on the title bar to terminate the program.

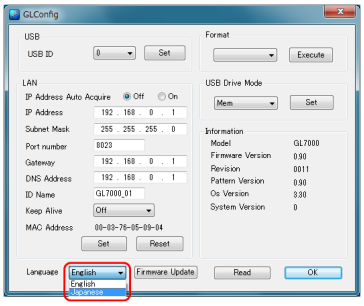


## 6-2. Changing the Display Language

Changes the display language for GL-Config to English or Japanese (the initial setting is English).

Step 1. Launch the software following instructions in “6-1. Launching and Terminating GL-Config”.

Step 2. Change the language by selecting Japanese or English from the “Language” menu.




## 6-3. How to Change the USB ID

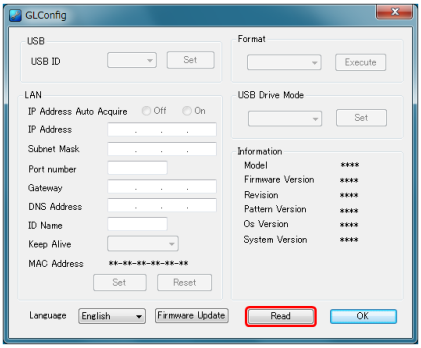
Set each GL7000 main module USB ID one at a time using GL-Config before launching GL-Connection when connecting using USB cables and USB hubs to connect multiple GL7000 main modules (up to 10 modules) to one PC.

Be sure not to overlap each GL7000 main module USB ID when doing this.

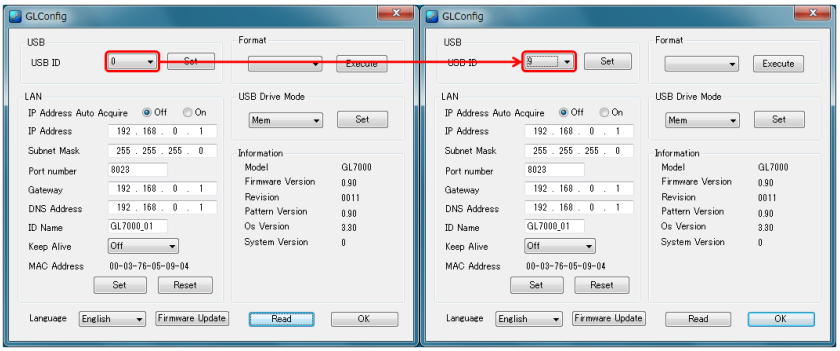
Step 1. Connect one GL7000 main module to the PC using a USB cable, and plug in the GL7000 main module’s power source.

Step 2. Launch the software following instructions in “6-1. Launching and Terminating GL-Config”.

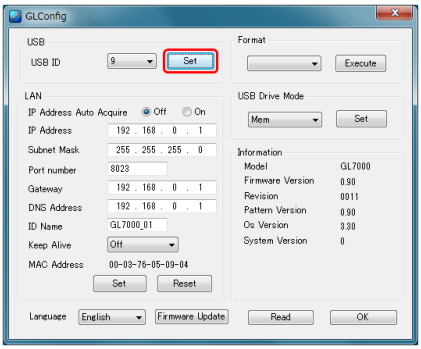
Step 3. Select “Read” to establish communication with the GL7000.




Step 4. The current GL7000’s USB ID will be displayed, so change it to the appropriate value.



Step 5. Select “Set”, and apply settings to the GL7000.

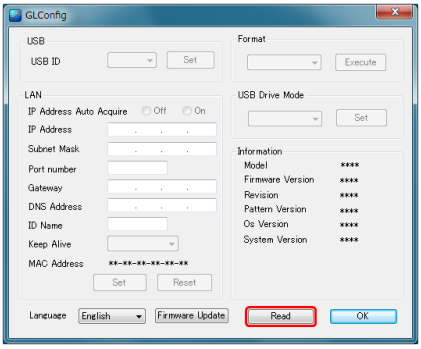



## 6-4. How to Configure LAN-related Settings

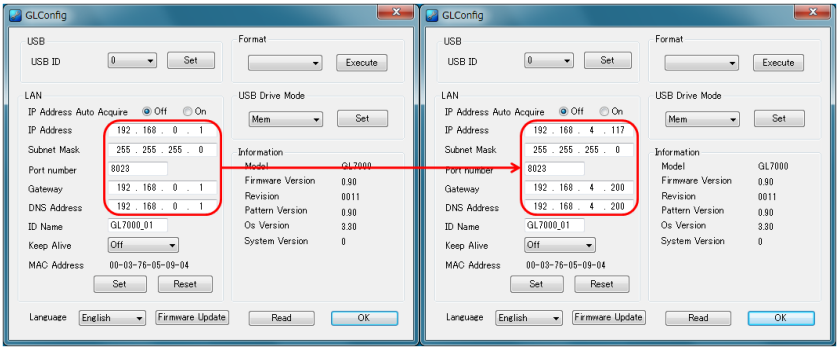
Step 1. Connect one GL7000 main module to the PC using a USB cable, and plug in the GL7000 main module’s power source.

Step 2. Launch the software following instructions in “6-1. Launching and Terminating GL-Config”.

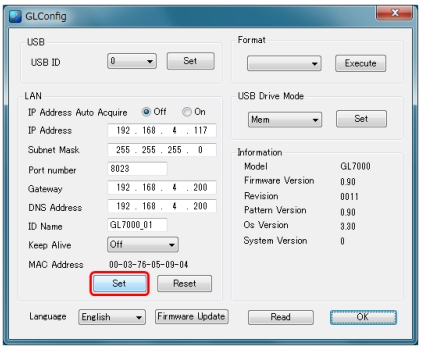
Step 3. Select “Read” to establish communication with the GL7000.




Step 4. The current GL7000’s LAN-related settings will be displayed, so configure the appropriate settings according to the network environment. Refer to the main module user’s manual on the CD for more details on each setting.




Step 5. Select “Set”, and apply the settings to the GL7000 main module.



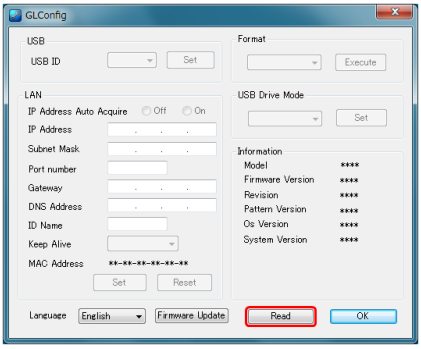
## 6-5. Device Initialization

Initialize the memory device (built-in flash memory/SD Card/SSD Module) that is connected to the GL7000 main module using GL-Config. Be aware that all of the data on the memory device will be deleted when initialized.

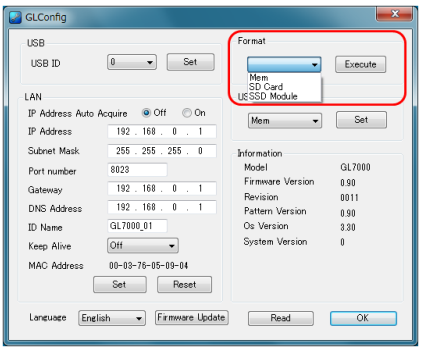
Step 1. Connect one GL7000 main module to the PC using a USB cable, and plug in the GL7000 main module's power source.

Step 2. Launch the software following instructions in "6-1. Launching and Terminating GL-Config".

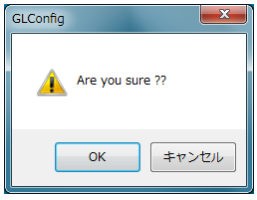
Step 3. Select "Read" to establish communication with the GL7000.



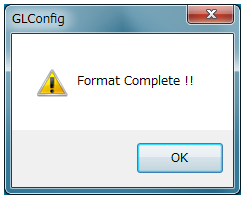

Step 4. Chose the memory device to be initialized from the initialization menu. (Built-in flash memory/SD Card/SSD Module)




Step 5. Select "Execute" and then "OK" when the confirmation screen is displayed.



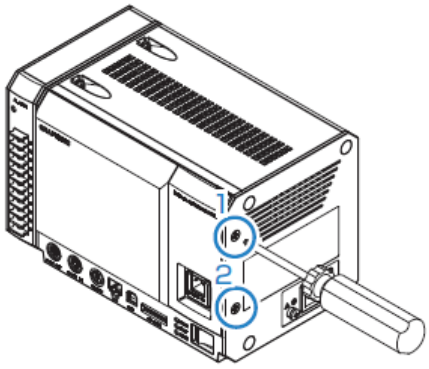

Step 6. Select "OK" when the completion screen is displayed.



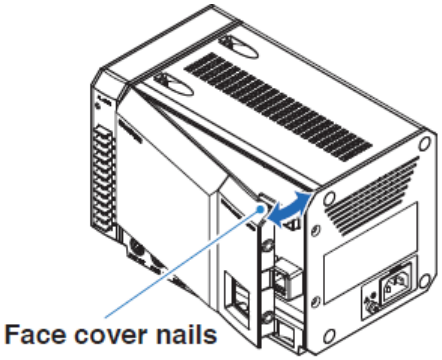
## 6-6. How to Launch the USB Drive Mode

The USB Drive Mode function recognizes a memory device (built-in flash memory/SD Card/SSD Module) compatible with the GL7000 main module as an external drive from the PC. This allows for simple transfers with the PC that feel the same as PC data of data saved on the memory device connected to the GL7000 main module.

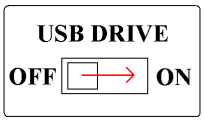
Step 1. Remove the GL7000 main module's fixed screws (in two locations on the side of the module).




Step 2. Pull the upper right tab of the face cover forward, and remove the face cover.

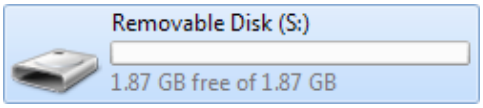



Step 3. Turn the DIP switch for the USB drive that is under the face cover to "ON".




Step 4. Connect one GL7000 main module to the PC using a USB cable, and plug in the GL7000 main module's power source.

Step 5. The GL7000 main module will launch in USB Drive Mode, and will be recognized on the PC as an external drive.(It will launch using the main module's memory in its initial state)



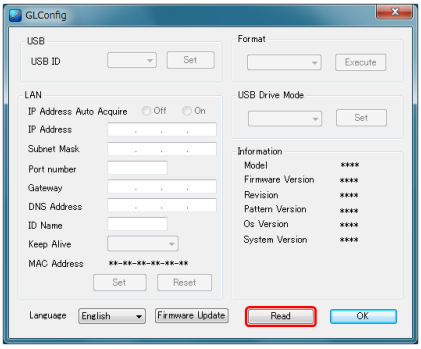
## 6-7. How to Change the Drive in USB Drive Mode

Select the memory device that will launch in USB Drive Mode from the devices connected to the GL7000 main module using GL-Config.

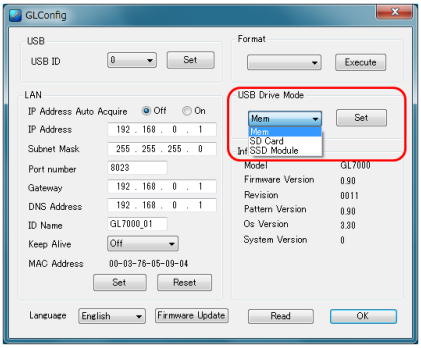
Step 1. Connect one GL7000 main module to the PC using a USB cable, and plug in the GL7000 main module's power source.

Step 2. Launch the software following instructions in "6-1. Launching and Terminating GL-Config".

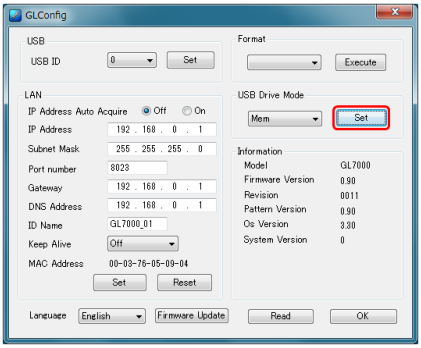
Step 3. Select "Read" to establish communication with the GL7000.




Step 4. Choose the memory device to launch with from the USB Drive Mode menu. (Built-in flash memory/SD Card/SSD Module)




Step 5. Select "Settings", and apply the settings to the GL7000 main module.




Step 6. Remove the main module's power source, then remove the USB cable.

Step 7. The settings will be applied the next time the main module launches. Refer to "6-6. How to Launch the USB Drive Mode" for the procedure for launching USB Drive Mode.

# 6-8. How to Update the Firmware Version

Update the GL7000 main module's firmware version using GL-Config.

## 6-8-1. Precautions when Performing Version Updates

* Update the version when the main module is at hand. If performed when isolated, such as through a network, it may cause a failure to update the version.

* Absolutely do not remove the power source during the version update. If the power source is removed during the operation, the main module's firmware will be destroyed, and it may be impossible to restore.

* The settings will be initialized when carrying out the version update. Save the setting parameters beforehand. Refer to Main Module Data in the GL-Connection manual for how to save the settings.

* The settings in the I/F menu (such as USB-ID, etc.) may change due to the version update. The I/F menu settings cannot be saved to a file. Make a note of the settings beforehand and reconfigure them after the version update.

## 6-8-2. Version Update Procedure

Step 1. Download the latest GL7000 firmware from this company's website (http://www.graphtec.co.jp/).
(*Please answer our simple questionnaire.)

Step 2. Connect one GL7000 main module to the PC using a USB cable or a LAN cable, and plug in the GL7000 main module's power source.

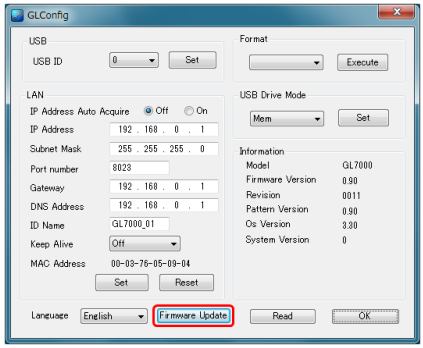
Step 3. Launch the software following instructions in "6-1. Launching and Terminating GL-Config".

Step 4. Select "Read" to establish communication with the GL7000.

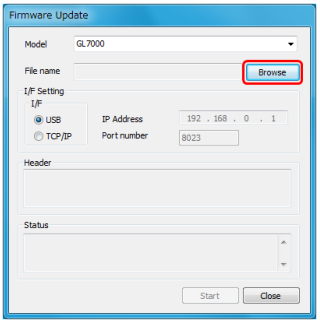
Step 5. The "MainVerxxxRevyyyyAzz.GL7000" file will be created after extracting the downloaded "GL7000Vxxx.exe" by double clicking.

| Name | Explanation |
|---|---|
| xxx: Version Information | 100 → V1.00 |
| yyyy: Revision Information | 0001 → Rev001 |
| zz: Special Item Number | 00 → Reference Standard |

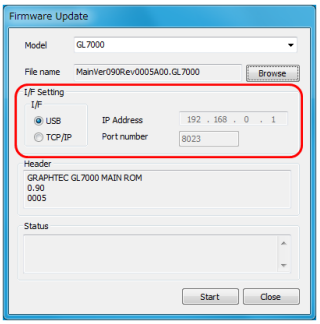
Step 6. Select "Firmware Update" and the firmware update screen will be displayed.



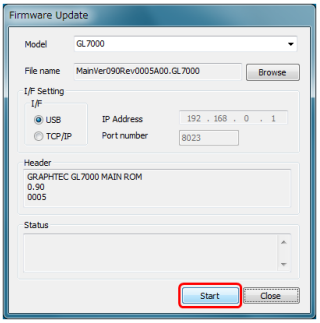
Step 7. Select “Browse” and select the extracted file from step 5.




Step 8. Configure the I/F settings according to the type of cable connected.




Step 9. Select “Start” to start the update. When the confirmation screen is displayed after the update is finished, select “OK”.




Step 10. A buzzer will ring when the update is completed if the GL7000 Display Module is equipped. When the update is complete, the SD Card LED will go from from flashing to solid, even if the Display Module is not equipped.

# 7. GL-Connection

## 7-1. Basic Operation

This software can be used with GL7000, GL220, GL820, GL900.

The basic operation of the GL-Connection software consists of the following 4 configurations.

| Description | Explanation |
|---|---|
| 1. Managing the GL device (main module) | Manages the operations and settings for the main module, and loads the main module's setting information on to this software through the connection between the GL device and the PC. |
| 2. Confirmation of the input data | Confirms the input signals to the main module in real-time using this software's graphical displays through the connection between the GL device and the PC. |
| 3. Data Recording | Saves transmitted data to the PC through the connection between the GL device and the PC. And either the PC or the GL device can be used as a backup due to the ability to save recorded data on the main module. |
| 4. Recorded data playback | Plays back recorded data files on the PC. Also plays back saved data on the main module through the connection between the GL device and the PC. Played back data may be split into important segments and converted to, then saved in other formats. |

## 7-2. Managing the Main Module

This software allows the following management functions.

- Start/stop recording
- Amplifier settings (input, range, filter, etc.)
- Recording settings (sampling interval, main module recording destination, external sampling setting, etc.)
- Trigger and alarm settings (trigger level settings, alarm level settings, etc.)
- Other settings (temperature unit changes, factory settings, etc.)

## 7-3. PC and Main Module Recording

This software allows management of PC and main module recording. PC recording saves data received from the GL device on a file on the PC. Main module recording saves recordings performed on the main module on a recording medium. PC recording and main module recording can be performed simultaneously.

* Recording to the PC cannot be performed if the main module's recording destination is built-in RAM or the SSD Module (optional).

### 7-3-1. PC Recording

The recording capacity depends on the OS limits, but recordings can be over 2TB (terabytes) when using the general Windows XP/Vista/7/8 NTFS file system. PC recording can also be continuously performed even if the disk becomes full on the main module recording. PC recording creates separate Min/Max compression data with the recorded data. This data reduces the number of data reads during playback to improve operability. Forinformation, refer to "P.16-1. Data Compressing Function".

### 7-3-2. **Main Module Recording**

The data is saved to the recording media in the GL7000. The recording destination depends on the GL module's hardware configuration. There are built-in RAM, built-in flash, external SD card, external USB memory, or 64GB extended SSD module (optional) as a recording destination.

- Built-in RAM: Records from a maximum of 1 microsecond due to the equipped amplifier. PC recording cannot be performed simultaneously. (GL900 is available from 10 microsecond)
- Built-in flash memory and SD Cards: Records from a maximum of 1 millisecond. (GL220 and GL820 are available from 10ms/CH.) (SD Cards are GL7000 only)
- USB memory: Possible to record from fastest 10ms/CH. (GL900 is available from 1 milisecond) (GL220 and GL820 only)
- SSD Module: Records from a maximum of 1 microsecond due to the equipped amplifier. PC recording cannot be performed simultaneously.

(*Refer to "15-3-1. Sampling Limits" for the sampling intervals that can be set.)

## 7-4. Recorded Data Playback

Data recorded as GBD (binary) data or CSV (text) data can be played back with this software. It is possible to confirm the played back data's signal level, and to display statistical values such as maximum value or minimum value, etc., for a specified range. There is also a conversion saving function, which splits and saves only important data segments, and a file connection function, which combines multiple connected data segments.

# 8. Launching and Terminating GL-Connection Software

## 8-1. Launching the Software

Launch the software by choosing “Start” on the OS taskbar→”Programs (All Programs)”→”Graphtec”→”GL-Connection”→”GL-Connection”. The following screen will display when it’s finished launching. (The following image is confirming two GL7000 modules.)


* When the software does not launch
Try the following when the software does not launch.
<When it cannot launch initially>
Confirm whether the PC being used meets the operating requirements.
The installation may not have been performed correctly. Delete the program from the control panel and reinstall it.
<When it cannot launch after the initial launch>
There may be competing settings files. Delete the following files and launch the software.
My Documents→ Graphtec → GL-Connection → Delete everything in the Ini folder

## 8-2. Terminating the Software

Click the “X” on the upper right corner of the main screen to terminate the software.

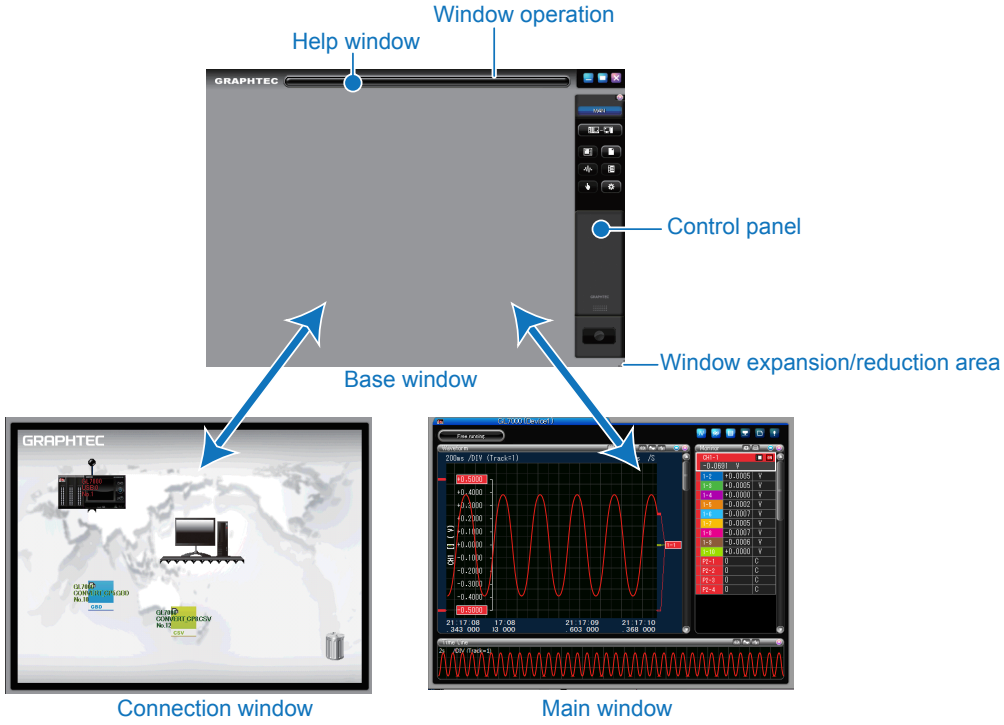
A settings file is created when the software is terminated, but when the software is terminated using any method other than the previous one (i.e. forced termination, etc.), the settings file is not created.

# 9. Application Screen

## 9-1. Configuring the Application Screen

The following screen is this application's screen configuration.

- Base Window
- Connection Window
- Main Window




## 9-2. Base Window

This is the window that acts as a base that includes the connection window and the main window.

### 9-2-1. Window Operations

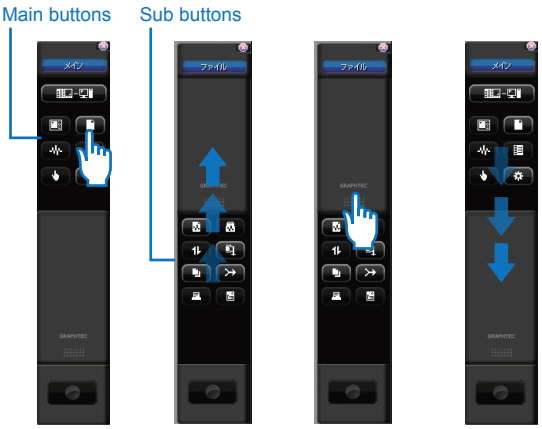

Minimize - Minimizes the application window.
Maximize - Maximizes the application window, and returns to the original size.
Close - Closes and terminates the application window.

### 9-2-2. Help Window


Displays help information for mouse buttons and so forth. The help window allows for efficient browsing of the help file whether scrolling through the numerous character data up, down, left or right.

## 9-2-3. Control Panel


The window that controls both the connection window and the main window. Buttons on the control panel change in relation to the presence of the connection and main windows. Help balloons will appear when the buttons on the control panel are moused over.



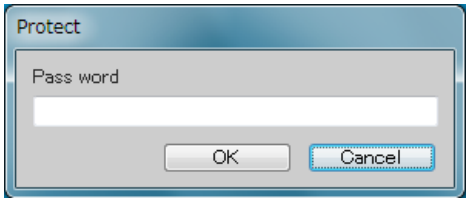

The control panel configures two groups of main buttons and sub buttons. Click the upper main button to change it to the lower sub button like sliding a remote control cover. Click the slide bar to once again change to the main button display.

- **Control Panel and Window Operations Lock**

It is possible to lock operations by closing the control panel. Press the lock from the control panel's option button, input a password and press the OK button to create a password lock. Repeat these operations and re-input the password to remove the lock.

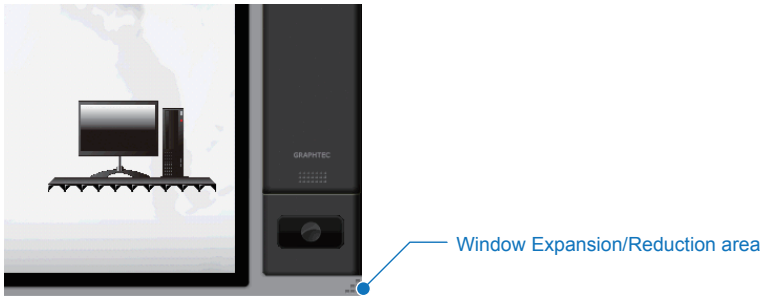
Lock Status

Password Input Screen




* Be sure not to forget the password when using a lock with a password.
The lock status doesn't support the forced termination of this application. The software will launch unlocked the next time it is launched.

### 9-2-4. **Window Expansion/Reduction Area**




Change the screen size by dragging the bottom right (window expansion/reduction area) of the base window. The minimum screen size is 800 x 600 dot. One screen section display is recommended at minimum size. When multi-windows are at their minimum size, they may display overlapped, and may not be forcefully displayed in the internal window. In that case, increase the screen size, or section it into one screen.

## 9-3. Connection Window

For more information about the Connection Window, refer to 10. Connection Screen

## 9-4. Main Window

For more information about the Main Window, refer to 11. Main Screen

# 10. Connection Screen

The GL-Connection can connect up to 10 modules at the same time, regardless of the GL module type and USB / LAN.

## 10-1. Connectable GL modules and limitations

| perModule name | USB connection | LAN connection | Maximum number of modules or channels per one machine |
|---|---|---|---|
| GL7000 | OK | OK | 10 modules (112ch) |
| GL220 | OK | - | 10ch |
| GL820 | OK | OK | 204ch (* Analog 200ch + Logic / Pulse 4ch) |
| GL900 | OK | OK | 8ch |

| perModule name | Module or main module version | Compatible GL-Connection version |
|---|---|---|
| GL7000 | Voltage, Volt./Temp, High-speed, Logic/Pulse module | Ver 1.00 or later |
| | High voltage module | Ver. 1.10 or later |
| | DC strain module | Ver.1.20 or later |
| | Charge module | Ver.1.30 or later |
| | Voltage output module | Ver.1.40 or later |
| GL220 | Ver. 1.06 or later | Ver.1.40 or later |
| GL820 | Ver. 1.08 or later | Ver.1.40 or later |
| GL900 | Ver. 3.01 or later | Ver.1.50 or later |

## 10-2. Automatic Device Recognition

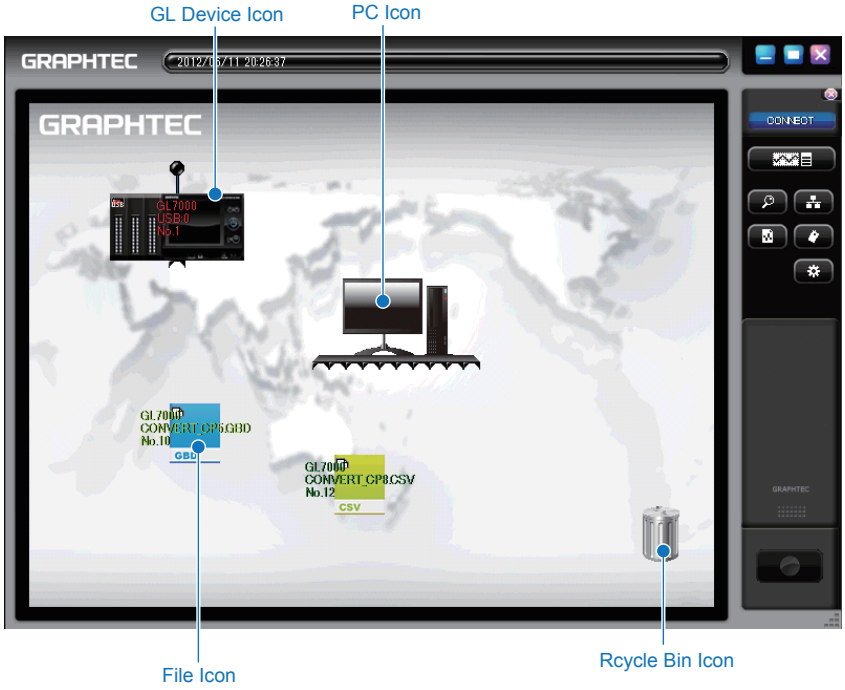
GL-Connection automatically searches for GL devices that are connected when the “Search” button is pressed and launching. The devices found through the automatic search will be displayed as a device icon on the screen. Click the displayed device icon to initiate the connection. Up to 20 icons including files and GL devices (up to 10 GL device icons) can be recognized.

(*When the limit of device and file icons has been reached, new icons won’t be displayed, and connection or playback cannot be performed. In that case, delete icons to reduce their number.)


* Automatic recognition through LAN will only occur within the same network segment.

* Confirm the following and perform these operations when a device is not recognized.
  Confirm whether the GL device’s interface cable is connected correctly.
  Confirm whether the GL device’s power source is plugged in (or plug it in again).
  Confirm that the GL device’s USB ID or IP address is not duplicated.
  Change to another number or address if it is duplicated.
  Confirm whether the devices can be automatically recognized using the LAN.
  Relaunch the application.
  Relaunch the PC.

## 10-3. Connection Screen Explanation




### 10-3-1. PC Icon

Displays the PC being used. Move to a preferred location by dragging it with the mouse. Also, perform the same device search by clicking a PC icon.

### 10-3-2. GL Device Icon

GL7000 GL820 GL220 GL900


This is an icon for a recognized GL device. It is displayed when a GL device is recognized using a USB or LAN connection. Click the icon to initiate the connection.

- **Types of GL Device Icon**

The following types of GL device icons will occur depending on the connection method.

- **USB Connection (States the USB number)**


- **LAN Connection (States the IP address)**


- **Demo Connection (States Demo mode)**


### 10-3-3. PC File Icon

- **GBD File Icon**


- **CSV File Icon**


This is the icon displayed by performing file playback. Use it as a log of files that have been opened previously. (*The icon won't be displayed when main module data playback is performed on the GL device main module)

### 10-3-4. Recycle Bin Icon


Disconnect a GL device or delete a file by dropping its icon on the recycle bin using the mouse.

GL Device Icons: Disconnects a GL device or deletes its icon from the screen. The icon will be redisplayed when a search is performed again.
While disconnected: Deletes the icon
While connected: Disconnects the device then deletes the icon

File Icon: Deletes the icon from the screen and erases the previously opened log. The file itself will not be deleted.

## 10-4. Connection and Disconnection

### 10-4-1. **Connection**

Initiate a connection by clicking a displayed device icon (Clicking a file icon performs file playback). A bar will be displayed above the icon while it acquires the GL device information. Cancel the connection by clicking the icon again while it's connecting. Also, it will automatically configure the GL device's time to the PC's time when connecting.

Connecting

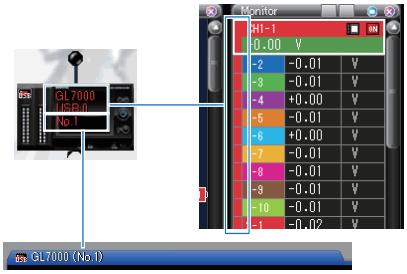
Connection Completee

* CHECKPOINT

- Connections cannot be made when the GL device is in playback. Confirm the GL device's operational status.
- This software can only stop recording for the GL device when connecting while the GL device is recording. Normal operations are possible after recording is stopped.
- When connecting the GL900, change the alarm output setting to the "Alarm output 1".

### 10-4-2. **Device Colors and Device Numbers**

Device colors and device numbers will be assigned automatically in the order the devices are recognized. It is possible to confirm the device by using these device colors and numbers when mixing groups of multiple devices.



## 10-4-3. Linked Connections (Synchronous and Simultaneous Connections)

Manages the simutaneous stopping and starting of recording for multiple GL devices. Linked Connections have two methods, synchronous connections and simultaneous connections.

* Device settings are required for both synchronous and simultaneous connections. Configure the synchronoussettings the same as in 15-3. Data Settings for the data settings and as in 15-4. Trigger Settings for the trigger settings. (* Recording may still be able to be performed even if the settings are not identical, but the data may not be synchronized correctly)

* Files recorded to the PC will be created separately for both synchronous and simultaneous connections.

- **Synchronous Connections**

Synchronous connections can connect up to 5 GL7000 modules using optional sync cables. Recordings without errors are possible using multiple GL7000s by synchronizing the recording start timing with the hardware.

The following things are made in synchronous connections

• A start/stop is synchronized by each main module.

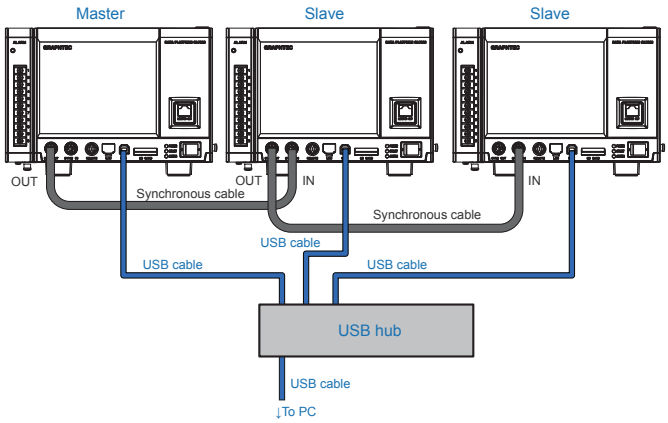
• When Trigger is used, Trigger is synchronized by each main module. (Synchronized Recording start)

• Since a clock is synchronized by each main module, even if it records for a long period of time, the time error of each main module is settled in a fixed interval.

(* The synchronous connection is not available for the GL220 and GL820.)

- **How to Wire Synchronous Connections (Using USB Connections)**

Connect the USB cables and sync cables according to the following diagram for synchronous connections. The device that only has the sync cable connected to the OUT terminal will be the master for planning synchronous timing. (*The sync cable is optional)




* Also in LAN, it becomes the same.

* Mixture of LAN and USB cannot be performed.

Cross-section of the Sync Cable Termina

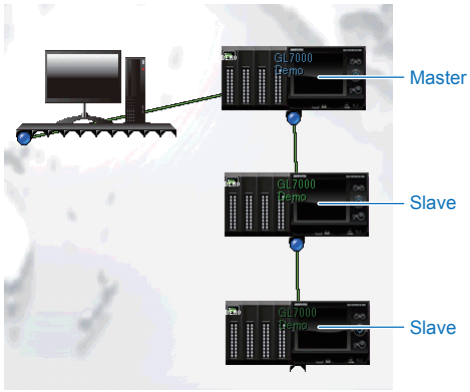
OUT Connector IN Connector

(*Do not connect the same cable into the IN and OUT terminal in one GL7000 module)

- **How to Configure Synchronous Connection Settings**

Configure the connection settings according to the following diagram using this software. Synchronous

connection cannot be performed automatically, so perform the same connections as those using sync cables.




1.Connect the master GL device to the PC.
2. Drag the slave GL device icon's plug to the master device icon.
3. Continue by dragging another slave GL device's plug to the previous slave device.

* Recordings may not be processed correctly if the connections are not performed in the same way as sync cables, so perform the connections in the same order as the sync cables.

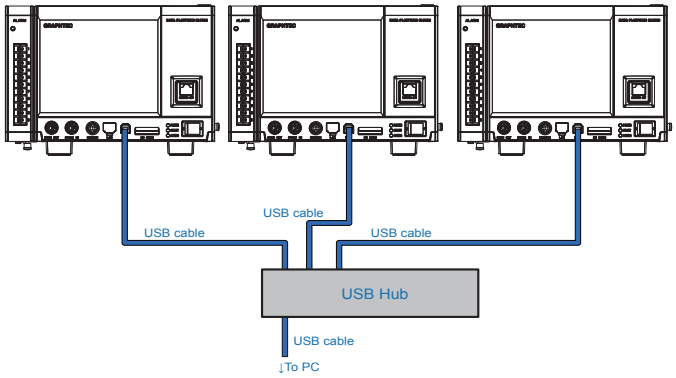
* Waveform display and Recording file creation to PC are performed for every main module during synchronous connection.

- **Simultaneous Connections**

Simultaneous connections is attained when the main module which does not correspond to synchronous connection also makes link connection. Simultaneous connections is by hardware.
Although a synchronization is not performed, operation in which it is mentioned in order and which is carrying out synchronous connections of the start control is possible.
* The simultaneous timing in simultaneous connection is not guaranteed.

- **How to Wire Simultaneous Connections (Using USB Connections)**

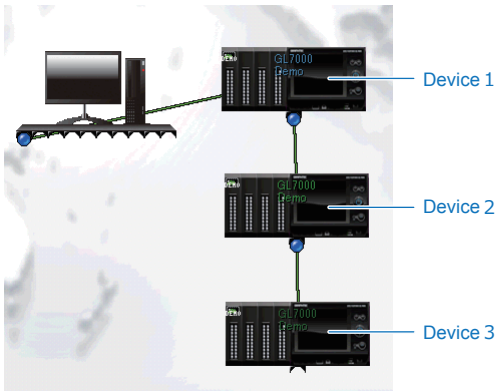
Connect the USB cables and sync cables according to the following diagram for simultaneous connections.




* Also in LAN, it becomes the same.
* Mixture of LAN and USB cannot be performed.

- **How to Configure Simultaneous Connection Settings**

In this application, make the connection settings as shown in the figure below.




1. Connect the GL device 1 to the PC.
2. Drag the GL device 2 icon's plug to the GL device 1 icon.
3. Continue by dragging another GL device 3 icon's plug to the previous GL device 2.

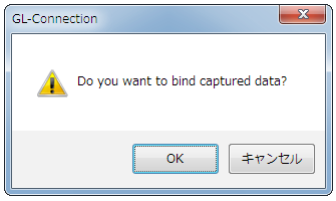
* Waveform display and Recording file creation to PC are performed for every main module during synchronous connection.

- **Data bind function (for Ver.1.60 and after)**

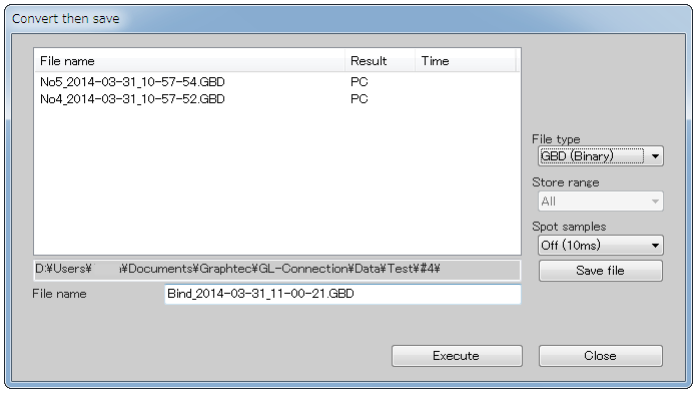
A file can be created for bound data recorded in a synchronous and simultaneously connection state onto the same time axis.

Flow of data bind

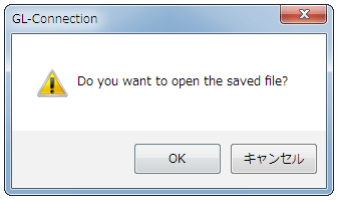
1. Starting synchronous and simultaneous recording
2. Stopping recording
3. Press OK button for message "Do you want to bind recorded data?"




4. Set file format (GBD/CSV), spot settings, and save file, and then press "Execute" button.




5. When the bind processing is completed, the message "Do you want to open the saved file?" will be displayed.  Therefore after confirming the file, playback will be automatically performed when pressing the OK button.




---

* CHECK POINT

*Recording start time, trigger time and marker settings are based on a master device.

*All bound and saved files will be converted to a GL7000 format.

---

In addition to the above method, data bind is possible between recorded files or by arbitrary CH simultaneous combination. Refer to Data bind function (for Ver.1.60 and after) for details.

### 10-4-4. Preserving Device Condition

Played back data files and devices that have been connected at least once will be saved to an internal list, and previous icons will be preserved as when the software is launched the next time. The contents of preserved statuses are as follows.
Saved files are stored in the following location.
My Documents→ Graphtec → GL-Connection → Ini → IniFile.cnd

Saved Contents

- Display locations for PC icons and device icons
- Wallpaper
- Language settings
- Mail settings
- CSV configuration
- File Playback History
- Time/DIV
- T-axis display width for each channel
- FFT settings

*GL device information (such as amplifier settings, recording settings, etc.) will not be saved to the PC. Settings will be read from the GL device when it is connected.
* When a device settings is changed (units, interface), the last state is not loaded.

### 10-4-5. Disconnection and Deletion

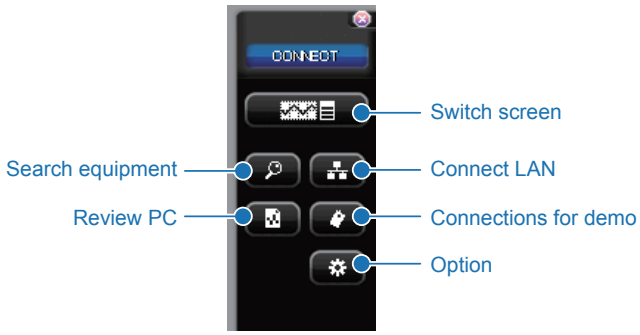
Disconnection and deletion have different operations for device icons and file icons.

Remove a plug connected to the PC to disconnect the transmission. And drop the device icon into the recycle bin to disconnect the transmission and delete the icon. (The device icon will reappear when the device search is performed again)

Drop a file icon into the recycle bin to delete the playback log, and the file icon will no longer be displayed automatically the next time the software is launched. (*The file itself will not be deleted from the PC)

## 10-5. Control Panel for the Connection Screen

This explains the control panel on the connection screen.




### 10-5-1. Switch Screen

Changes the displayed screen.

### 10-5-2. Search GL Devices

Searches for connected devices and displays the icons for the detected devices on the screen. Devices that can be detected using a search are either connected to the PC using USB, or are devices such as the GL7000 that support automatic LAN recognition when connected using LAN.

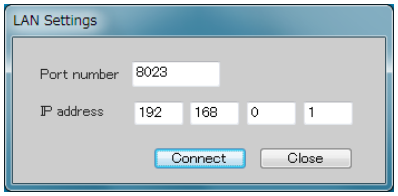
• Module-searchable model: GL7000 and GL820

### 10-5-3. LAN connection

Devices that do not support automatic LAN recognition can be connected using LAN with manual settings. Connect to a GL device by inputting the IP address or port number set in 5-3.  Setting the USB ID or the IP Address

- **Connection Screen**

Set the IP address and port number set on the GL device main module, and press the connect button.



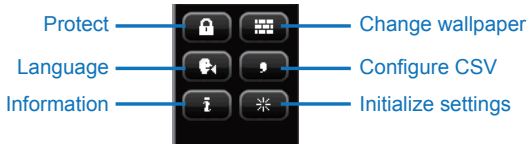

### 10-5-4. Connections for Demo

Repeatedly displays recorded files and displays them as demo waveforms. Default demo waveforms will be installed during this software's installation (Go to My Documents → Graphtec → GL-Connection → Data → Demo.gbd on the PC).
The following operations can be performed using demo connections.

• Waveform display/Waveform operation
• Display the digital monitor
• Browse the settings
• Group Creation

### 10-5-5. **Option Settings**

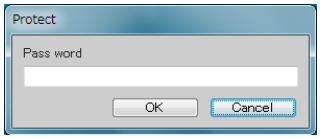
Used for changing the password to lock operations, display language, etc.




- **Protect Setting**

You can set the password used to lock your device. Pressing the OK button will end the application, lock the operation and you will be unable to bring up the control panel, use window controls, or end the application.

Password Input Screen




Device Lock Icon

To release the lock on the device, press the device lock icon, end enter the password. The control panel and window operations will be displayed again, and you may resme operations. In the event of a forced termination of the software, the locked condition will not be preserved. The next time it is started up, it will be unlocked.

- **Change Wallpaper**

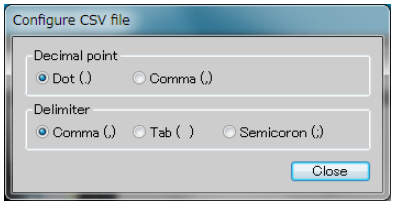
You may load a custom BMP file and set it to be your wallpaper. If you set your wallpaper to a picture of measurement environment, aligning your PC location and GL device location will lead to a closer measurement environment image.

- **Language Setting**

You can change the display language.

- **CSV Configuration Settings**

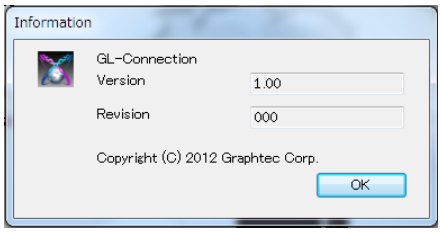
Sends you to CSV Data Delimiter and separator options. Please set to the same language as the PC you are currently using. CSV Config settings for Recording and Output must be the same as CSV data for playback, or else it will not properly play back.




Decimal Point Characters: You can change the character used for decimal points.Please use the (.)
Punctuation Characters: You can change the character used to separate two items.Please use the (,) comma
as the default.

- **Information**

Displays the software's current version and revisions.

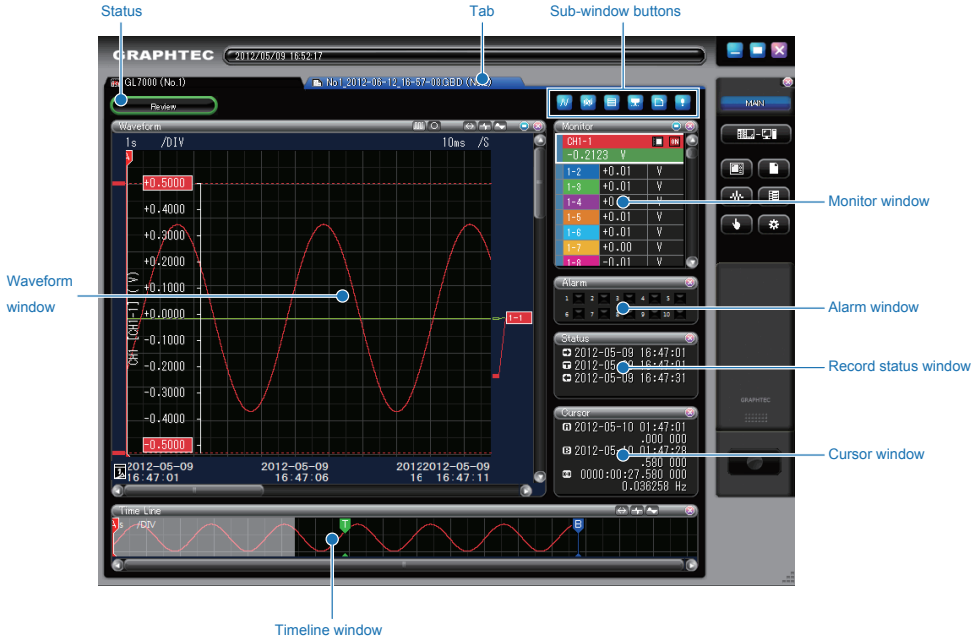



- **Installation Initialization**

You can set initialize the setting for the software. After implemented, the initialization will happen after the next start up. Please see the contents of initialization in 10-4-4. Preserving Device Condition.
* During initialization, the language will be reset to the default, so please set the language again after rebooting.
* System settings will not be initialized.

# 11. Main Screen

You can access the Waveform Display and Digital Display from the main screen. The main screen can separate into up to 4 window displays. On start up 1 window will be displayed. Refer to 11-10-1. Navigation Window.



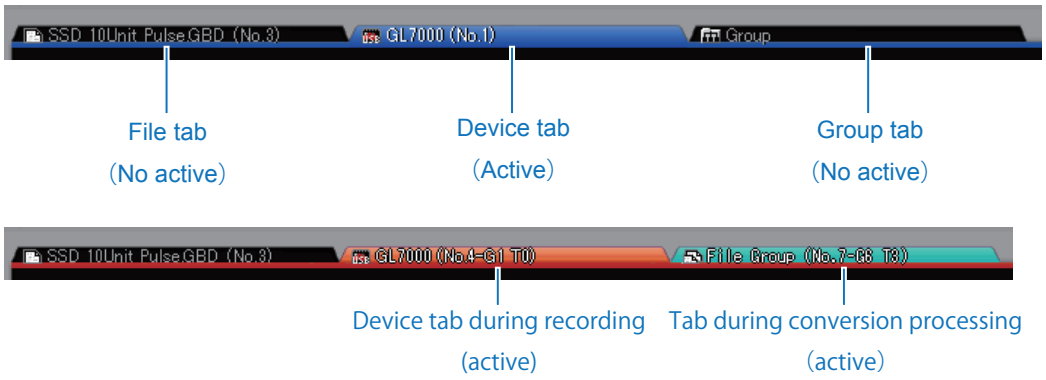

4 Section Display Example

# 11-1. Tabs

Connected GL devices and files will displayed on their own tabs in the Connection Screen. Tabs can be active or inactive, clicking a tab will make it active. You can manipulate active tabs using the Control Panel. If a tab is dragged with the mouse, the navigation window is displayed, and it is possible to use multi-window features, group creation, or deletion. For information on tab features, please see You can access the Waveform Display and Digital Display from the main screen. The main screen can separate into up to 4 window displays. On start up 1 window will be displayed. Refer to 11-10-1. Navigation Window. In 1 window, a maximum of 20 tabs can be created.

## 11-1-1. Tab Elements and Status

There are device tabs, filter tabs, and group tabs. Currently selected tabs will be displayed in blue as active tabs and inactive tabs will be displayed in black. In the device and file tabs, the device number is displayed. This number is like the device color and used to differentiate tabs.




* Device tabs during recording and saving tabs cannot be deleted

## 11-1-2. Tab Icon Types

| Elements | Name | Explanation |
|---|---|---|
| Device Tab | USB Connection Icon | Devices connected by USB are shown. |
| | LAN Connection Icon | Devices connected by LAN are shown. |
| | Demo Connection | Devices connected by DEMO are shown. |
| File Tab | File Icon | Shows tabs with file playback. |
| | Device Playback Icon | Shows tabs with file playback. |
| Group Tab | Empty Group Icon | Shows the Open Group tab. For information on group functions, refer to 16-2. Group functions |
| | Free Running Group Icon | Displays the Free Running Group tab. For information on group functions, refer to 16-2. Group functions |
| | File Group Icon | Displays the File Group tab. For information on group functions, refer to 16-2. Group functions |

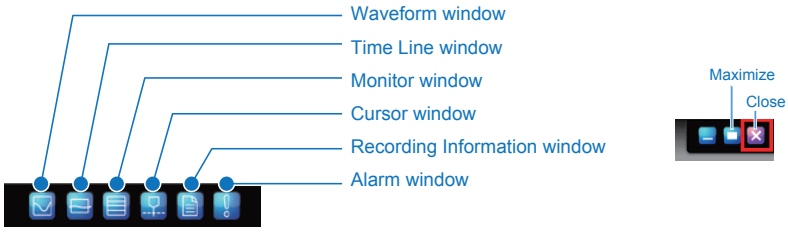
## 11-2. Status

Displays the operational status of the Screen.

| Screen | Name | Explanation |
|---|---|---|
|  | Free-Running Status | When connected to GL functions, this displays waveform. |
|  | Armed Status | In recording state, waiting for trigger detection. |
|  | Timer Holding Status | In recording state, holding for timerdetection. (GL900 only) |
|  | Recording In Progress Status | During recording, the trigger is being detected and will record. |
|  | Review Status | Files of the PC are currently in playback, or the data of the GL device is in playback. |

## 11-3. Sub-Window Button

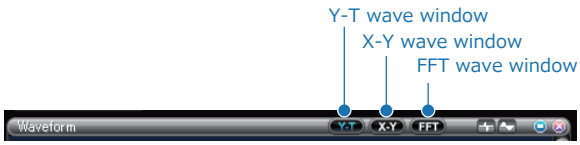
From the main window, 6 windows can be opened or closed. There are also windows that cannot be displayed depending on their current operational status. If the display screen is narrow, there are times where the window will close automatically. Please change it every time to display the windows you find necessary.




| Name | Explanation |
|---|---|
| Waveform Window | Open or close Waveform Window. |
| Time Line Window | Open or close Time Line Window. |
| Monitor Window | Open or close Monitor Window. |
| Cursor Window | Open or close Cursor Window. Only available during playback. |
| Recording Information Window | Open or close Recording Information Window. The content will change depending on the current operational status. |
| Alarm Window | Open or close Alarm Window. |
| Maximizing | Display each window within the full tab window in full view. |
| Close | Close the window. Use the Child Window button to re-open the window. |

## 11-4. Waveform Window

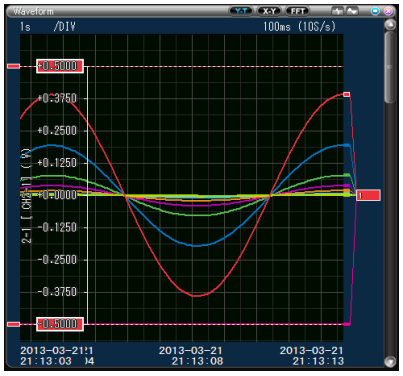
Opens the Waveform Display window. You can switch between Y-T,X-Y, and FFT display options for the Waveform Display Screen. When changing to waveform mode the waveform display information will be cleared, but recording data for recordings in progress will not be erased.




| Name | Explanation |
|---|---|
| Y-T Waveform Window | Change screen to Y-T waveform. For information on Y-T Waveform Window, refer to 12. Y-T Waveform Mode If the waveform display screen is already set to Y-T display, pressing the Y-T Waveform Window button will change the arrangement of the waveform.<br>For information on waveform arrangement, please see 12-4-2. Waveform Operations |
| X-Y Waveform Window | Change screen to X-Y waveform. For information on X-Y Waveform Window, refer to 13. X-Y Waveform Mode If the waveform display screen is already set to X-Y display, pressing the X-Y Wave form Window button will operate to clear the X-Y waveform. Refer to 13-4-2. Action The X-Y waveform window cannot be changed during playback. |
| FFT Waveform Window | Change the current display to the Y-T waveform. For more information about the FFT Waveform Window, refer to 14. FFT Waveform Mode |

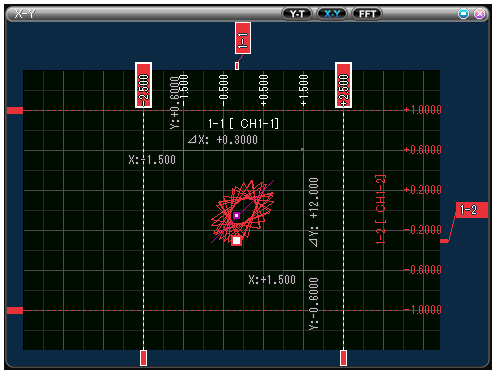
### 11-4-1. **Y-T Waveform Display**

The input signal level is displayed on the Y axis, and time is displayed on the X axis of this graph.



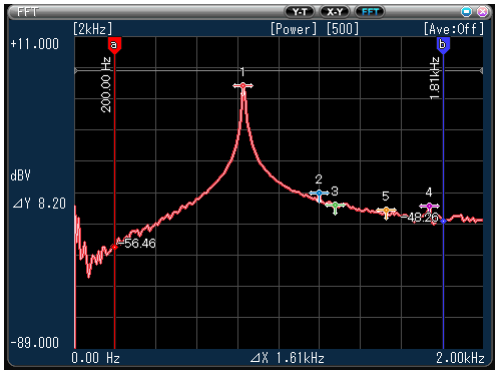

### 11-4-2. **X-Y Waveform Display**

After assigning the input signal to the X axis and the Y axis,the X and Y ‘s signal can correlatively be displayed with wave form display. The X-Y waveform can at maximum show 4 channels. The X-Y waveform can only be displayed during free running and during recording. During playback the X-Y waveform cannot be displayed.



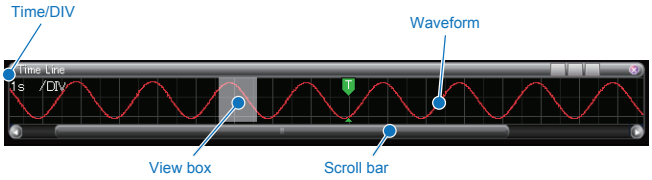

### 11-4-3. **FFT Waveform Display**

The frequency is displayed on the X axis, and the level is displayed on the Y axis of this graph. During free running, the waveform is displayed in real-time, or any range of the waveform can be displayed after replaying the recorded file. Also, check the difference between the levels as well as the frequency width and detect the peak with the cursor A and B.



## 11-5. Time Line Window

You can use the Y-T wave form window to view everything. The digital monitor allows 1 channel's wave form to be displayed. During replaying X-Y or FFT, this window is used to set the processing range.

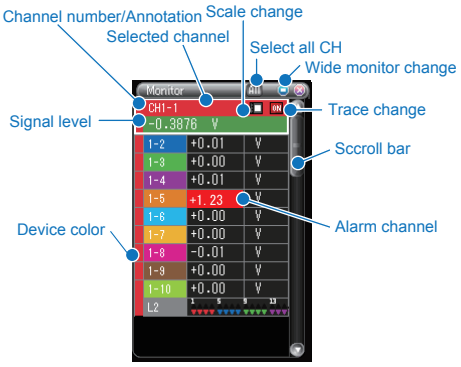



## 11-6. Monitor Window

This window displays the signal's level value. During free running or recording, new information is updated every 0.5 seconds During playback, selecting either cursor A or B will display the signal level value of the chosen cursor. Depending on the window size, all modes (normal, wide, big) can be used.

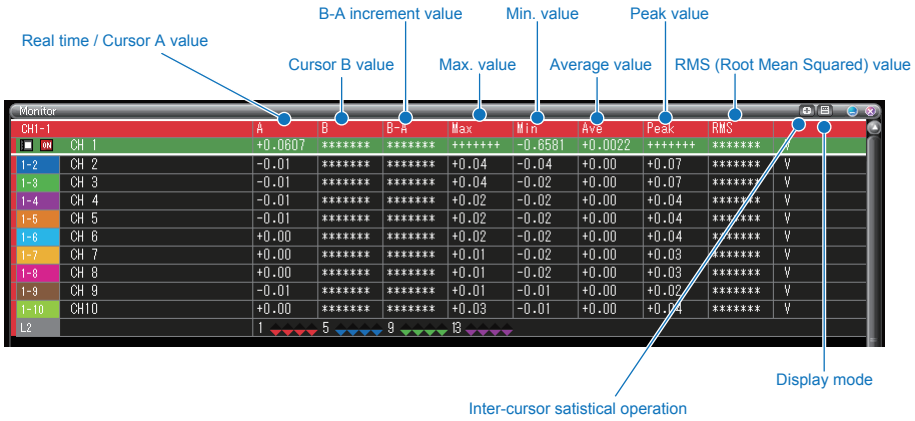
### 11-6-1. **Normal**

This display mode shows wave form displays lined up with each other.




### 11-6-2. **Wide**

This mode is a wide range display that does not show waveform display. In wide display, statistics calculations can be performed.

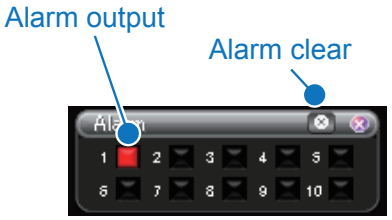


### 11-6-3. **Big**

You can increase the size of the characters during wide display mode.

## 11-7. Alarm Output Window

Displays the Alarm Output Lamp. Displays the alarm data of the selected cursor during playback.

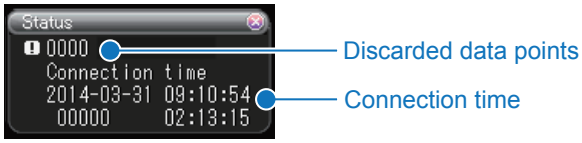



| Name | Explanation |
|---|---|
| Alarm output | The output port of an alarm that has been triggered will be lit up red. |
| Alarm Clear | If the alarm clear is used when alarm hold setting is set to On for free-running or currently recording device, the triggered alarm will be cleared. For Alarm hold settings, please refer to 15-5. Alarm Settings |

## 11-8. Recording Information Window

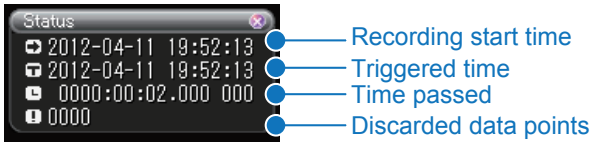
Displays time passed or time remaining during recording. Displays the time of the recording data during playback.

### 11-8-1. Free-running in Progress




| Name | Explanation |
|---|---|
| Discarded Data Points | Discarded Data Count When Free-running data is sent from the device in real time, the amount of data that could not be sent in time is counted and displayed. When the Discarded Data Count is counted up, the free-running recording data are not being sent in time, so please select a lower sampling time. |
| Connection time | Elapsed time will be displayed after device connection<br>Connection date and time (year, date, day, time)<br>Connection elapsed time (date and time) |

### 11-8-2. Recording



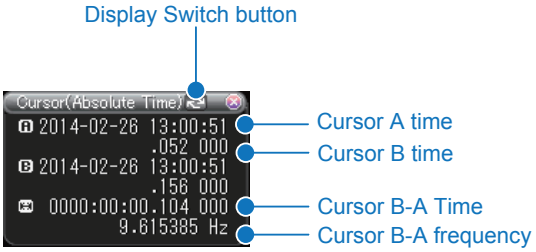

| Name | Explanation |
|---|---|
| Recording Start Time | Displays the time that recording was started. |
| Triggered Time | Displays the time that the start trigger is activated. |
| Time Passed | Displays the amount of time that has passed since the trigger activated. |
| Discarded Data Points | Discarded Data Count When Free-running data is sent from the device in real time, the amount of data that is sent in time is counted and displayed. When the Discarded Data Count is counted up, the free-running recording data are not being sent in time, so please select a lower sampling time. When recording to the GL device itself, there is no effect on the data in the device. |

### 11-8-3. Review


| Name | Explanation |
|---|---|
| Recording Start Time | Displays the time that recording was started. |
| Triggered Time | Displays the time that the start trigger is activated. |
| Recording Stop Time | Displays the time when recording was stopped. |

## 11-9. Cursor Information Window

Displays time information above Cursor A or Cursor B during playback.

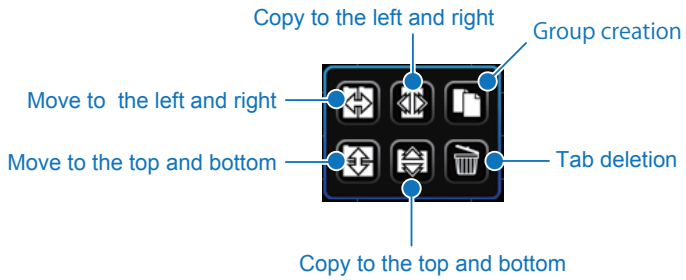


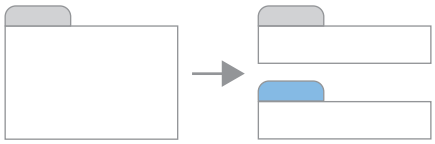
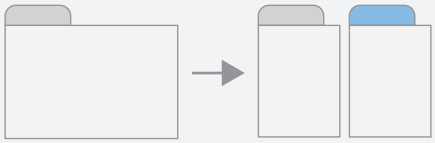
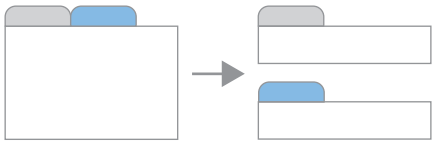
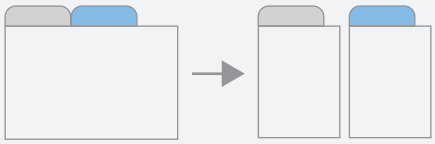
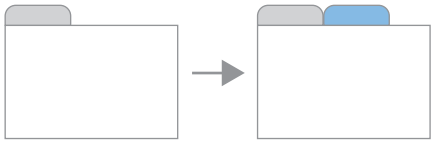
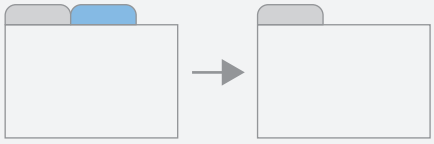

| Name | Explanation |
|---|---|
| Cursor A time<br>Cursor B time | Displays the time informations above the various cursors. Or, if the [A] or [B] is pressed, the A and the B Cursors will move to display waveform and, Cursor A and B's time also changes to the point that was moved to. |
| Cursor B-A Time | Displays the time for Cursor B-A |
| Cursor B-A Time Difference Frequency | Displays the frequency for Cursor B-A |
| Display Switch button | Switches between the Time display and Points display. |
| Time display switching button | Switching is performed in absolute time, relative time and point display. |

## 11-10. Other Windows

### 11-10-1. Navigation Window

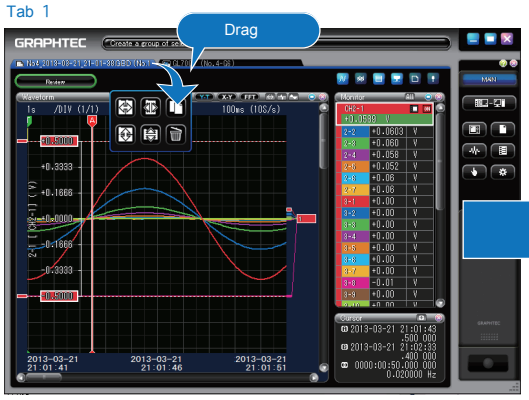
The Drag function for tabs or digital monitor windows can be performed by accessing the Navigation Window. In the Navigation Window, you can divide the screen into sections, or create group tabs. For more information about the grouping function, refer to 16-2. Group functions



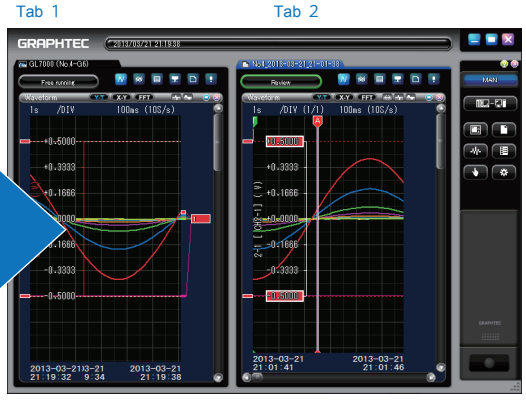

| Name | Explanation |
|---|---|
| Copy to the top and bottom | Divides the selected tab into the two tabs vertically (upper and lower).  |
| Copy to the left and right | Divides the selected tab into the two tabs horizontqally (left and right).  |
| Move to the top and bottom | Move the selected tabs vertically in the movable direction. When two tabs or more is not present in the same window, this function is not available.  |
| Move to the left and right | Move the selected tabs horizontally in the movable direction. When two tabs or more is not present in the same window, this function is not available.  |
| Group Creation | Create the selected tab by dragging on the the tab or the channel in the digital monitor.  |
| Tab Deletion | Drag the tab on the Delete button in the Navigation Window to delete the tab. When the Device tab is deleted, the connection is disabled. When File tab is deleted, the reviewing is finished.  |

- **Divided Screen**

<Default>



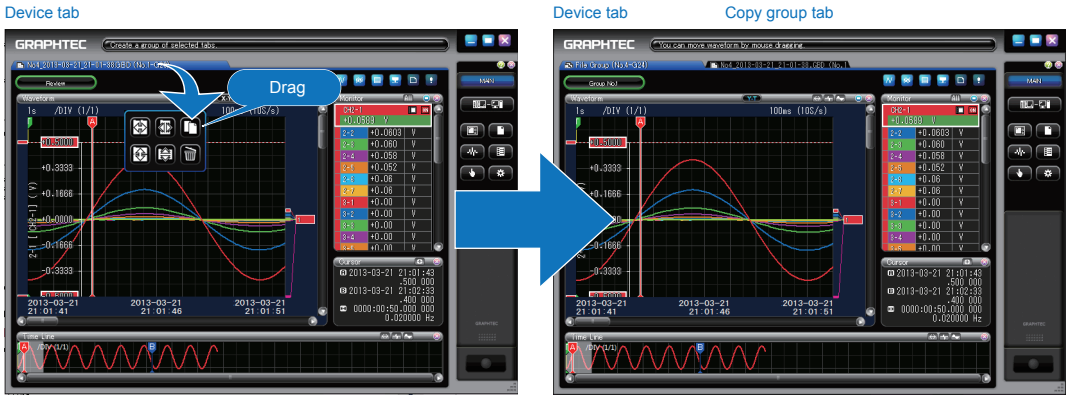

<Divides the tab horizontally>




When the Tab 2 is dragged on “Right Section” in the active navigation window, the two-screen section display that the tab 2 is placed on the right side appears.

- **Screen with Group Tabs**

<Example of group creation from the Device tab>



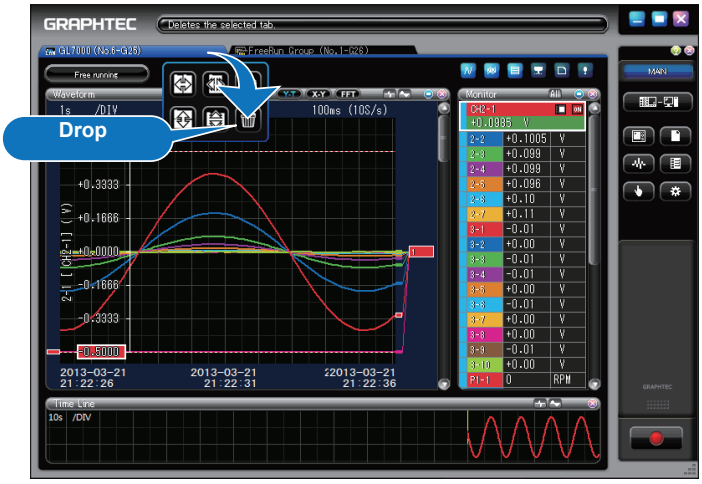

When the Device tab is dropped into “group creation“ in the navigation window, the group tab that the Equipment tab is copied is created.

<Example of group creation from the Monitor Window channel>


When the channel on the monitor window is selected and then dropped into “Group Creation” in the navigation window, the group tab that the selected channel is copied is created,and the Waveform Display with the selected channel only appears.

* When canceling a group window, please delete the group tab using the follow “Tab Deletion Screen”.
* CH cannot copy in the state of Trace OFF. Please copy in the state of Trace ON.

- **Tab Deletion Screen**




By dropping any tab into “Tab Deletion”, the tab display is deleted.

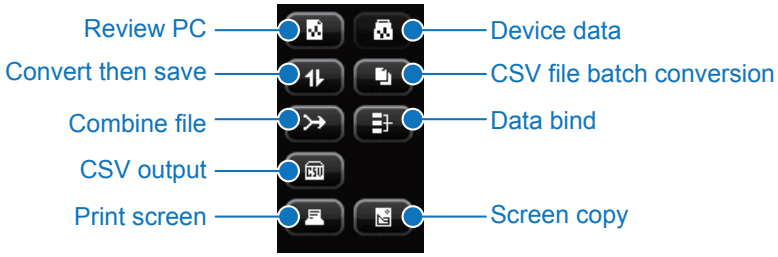
# 11-11. Main Screen Control Panel

## 11-11-1. Main Panel


| Name | Explanation |
|---|---|
| Switch screen | Connection window and Main window are changed. |
| Condition | Set options for main module. This is available when a Device Tab is selected. For Device Settings, please refer to 15. Device Settings |
| File operations | Change to panel related to file. |
| Waveform operations | Change to panel related waveform operation. |
| Monitor operations | Changes to monitor related panel. |
| Action | Changes to action related panel. |
| Option | Changes to option related panel. |
| Recording Start/Stop<br>or conversion saving start/conversion saving stop | To start/stop recording. You can only perform starting and stopping from the Device Tab.<br>When device tab is active: a recording start/stop operation is performed. Recording start/stop is only valid on the device tab.<br>When playback tab is active: save converted file, save binding start/stop will be performed.<br>When playback tab is file playback or device playback: save converted file will be performed.<br>When playback tab is group playback: saving binding or save binding stop will be performed. |

## 11-11-2. File Operations

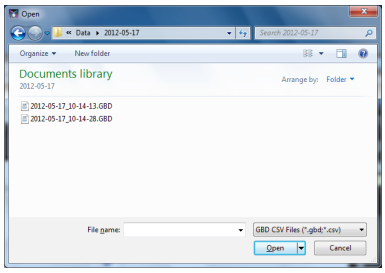
Changes to file related panel.



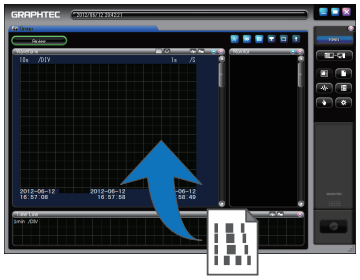

| Name | Explanation |
|---|---|
| Review PC | Play backs a file recorded to the PC |
| Device data | Data from the main module can be manipulated or played back. Only available when the device is connected. |
| Convert then save | Data from the main module can be manipulated or played back. Only available when the device is connected. |
| CSV file batch conversion | Changing the formats of multiple GBD (binary) files to CSV (text) format as a batch. |
| Combine files | Connect multiple GBD (binary) files above the time axis. Only possible for files with the same conditions. |
| Data bind (for Ver.1.60 and after) | An arbitrary number of files can be bound on the same time axis. |
| CSV Output | Record the Cursor A-B state displayed in the Waveform Display Window the file in the CSV format. The output results depend on each Waveform Mode (Y-T and FFT). |
| Print screen | Waveforms can be printed on a printer. To print,the PC must be in a mode that allows printing. |
| Screen copy | The displayed screen will be saved as a BMP file. |

- **Review PC File**

Play back a file recorded to the PC. Please select a file to be played back. To play back a file it must be either a GBD (Binary) format device file supported by GL-Connection, or a CSV (Text) format file.

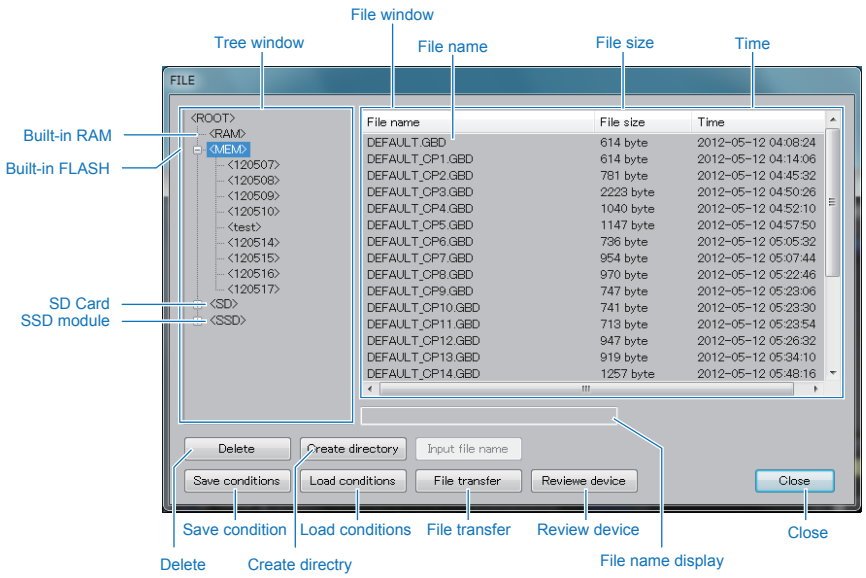



Also, the file can be played by directly dragging and dropping the file to the main window.




- **Main Module Data**

Data from the main module can be manipulated or played back. Only available when the device is connected. It is possible to initialize a device from GL-Config.

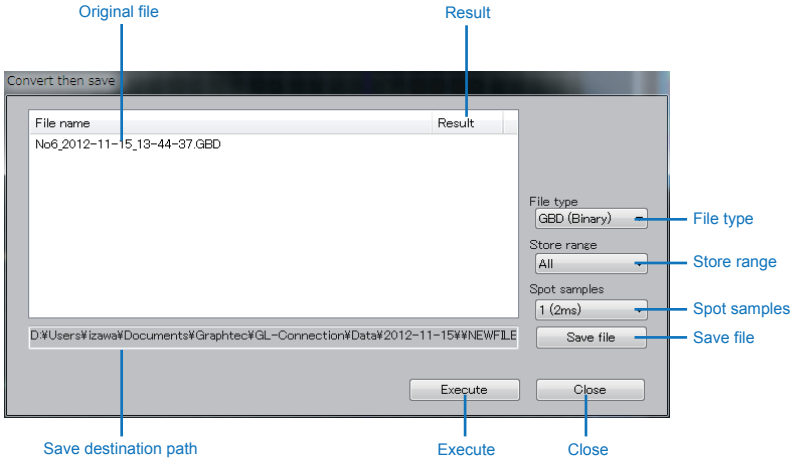



| Name | Explanation |
|---|---|
| Tree Window | Display all devices recognized by the main module.<br>Built-in RAM<br>Built-in Flash<br>SD Card<br>SSD module<br>USB memory (* Displayed when it is connected to the GL220, GL820 or GL900.) |

| | |
|---|---|
| File wndow | A general overview of the contents of the device selected by Tree Window is displayed.<br>File Name<br>File Size<br>Update Time |
| Delete | Deletes a folder or file. |
| Create directory | Creates a new folder in the designate path of the tree window. |
| File name display | Displays the file name entered during File Name Entry. |
| Save conditions | Saves the main settings to the main module. |
| Load conditions | Loads the previously saved settings file.<br>(*Files with a different organization from the device's amp module cannot be loaded). |
| File transfer | Transfers the file on the main module to the PC. |
| Review device | Replays back the device data. |
| Close | Closes the display. |

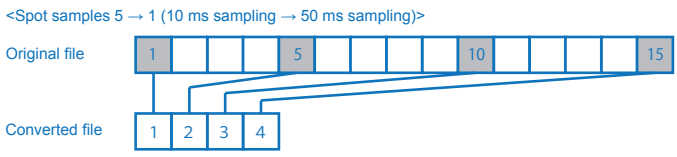
- **Convert then save**

For recorded files, when there is a split and save between Cursor A-B ,the format can be changed to the CSV format.



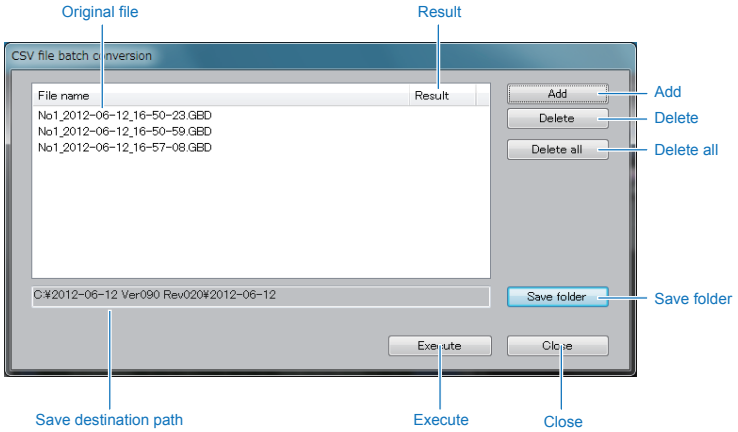

| Name | Explanation |
|---|---|
| Original File | The unchanged file name is displayed. |
| Result | The result of the change is displayed.<br>OK: Displayed when the change has been successful.<br>NG: Displayed when the correct change has not taken place |
| File type | Select the file format to be changed.<br>GBD (Binary Format): Changes to binary file format.<br>*The data converted form CSV into GBD is usable in only GL7-DCO output file<br>CVS (Text Format): Changes to text format |
| Store range | Select the range to save.<br>All: Saves all unchanged files.<br>Cursor Area: Saves the Cursor AB area range. |
| Spot samples | Saves the designated sampling points of the original file. |
| Save file | Sets the save destination for the file. |
| Save Destination Path | Displays the save destination path. |
| Execute | Saves all changes. |
| Close | Closes Save Changes window. |

About Spot Samples



- **CSV file batch conversion**

Changing the formats of multiple GBD (binary) files to CSV (text) format as a batch.




| Name | Explanation |
|---|---|
| Original File | Displays the name of the file being converted. |
| Result | Displays the result of the processing.<br>OK: Displayed when the processing has been successful.<br>NG: Displayed when the correct processing has not taken place. |
| Add | Adds a file to the list of files displayed. |
| Delete | Deletes a file from the list of files displayed. |
| Delete all | Deletes all the files displayed in the list. |
| Execute | Executes conversion procedure. |
| Close | Closes the CSV batch conversion window. |

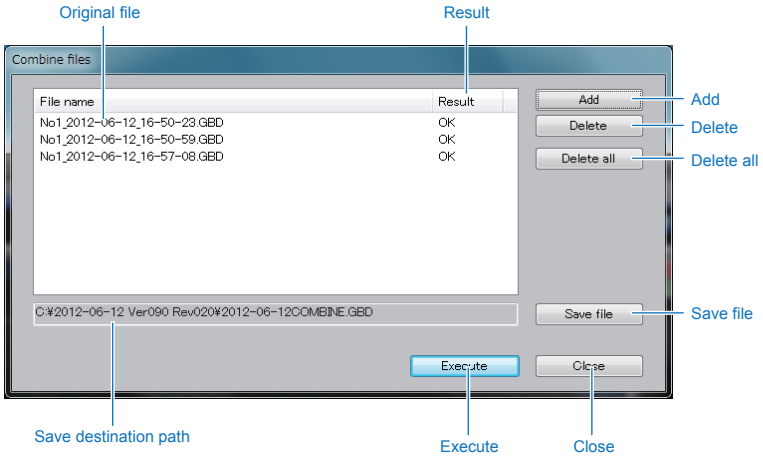
- **Combine Files**

To connect multiple GBD (binary)files along the temporal axis. The requirement for the recorded files is that this only works for identical files.

• Same Amplifier Modules

• Same channel configuration

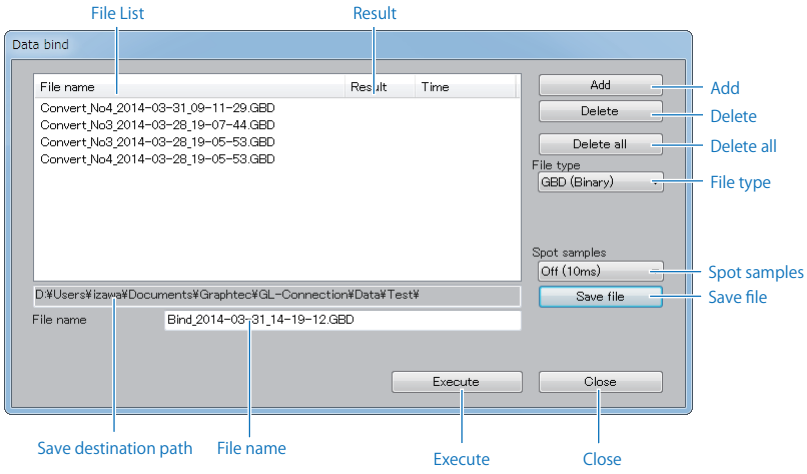
File settings like sampling, annotations and user marks settings will follow those of the file at the top of the list.




| Name | Explanation |
|---|---|
| Original File | Displays the names of files being connected. |
| Result | Displays the result of the processing.<br>OK: Displayed when the processing has been successful.<br>NG: Displayed when the correct processing has not taken place. |
| Add | Adds a file to the list of files displayed. |
| Delete | Deletes a file from the list of files displayed. |
| Delete all | Deletes all the files displayed in the list. |
| Execute | Executes connection procedure. |
| Close | Close the file connection window.s |

- **Data bind function (for Ver.1.60 and after)**

A plurality of files on the PC are bound onto the same time axis to make a single file.  This function is useful when arranging and comparing different devices.




* CHECKPOINT

* When using files that have different sampling intervals, the default performs binding using the shortest file sampling interval, and therefore, when changing the sampling interval, set to a sampling interval that enables setting to the spot function.

* Bound data is converted to a GL7000 format.

* Files are not prepared with the result that the bound file exceeds 100 units, or 1000 channels (analog CH + logic pulse CH).

* The bound combined files are standardized using information for the file at the top of the file list in the figure below (start time, trigger time, marker information, or the like).

| Name | Explanation |
|---|---|
| File list | A file list to be bound is displayed. |
| Result | Displays the result of the processing. |
| Add | Adds a file to the list of files displayed. |
| Delete | Deletes a file from the list of files displayed. |
| Delete all | Deletes all the files displayed in the list. |
| File type | Select the file format to be changed.<br>GBD (Binary Format): Changes to binary file format.<br>*The data converted form CSV into GBD is  usable in only  GL7-DCO output file<br>CVS (Text Format): Changes to text format |
| Spot samples | Saves the designated sampling points of the original file. |
| Save file | Sets the save destination for the file. |
| Save Destination Path | Displays the save destination path. |
| File Name | Sets the file name. |
| Execute | Binding is executed. |
| Cancel | Cancels the printing. |

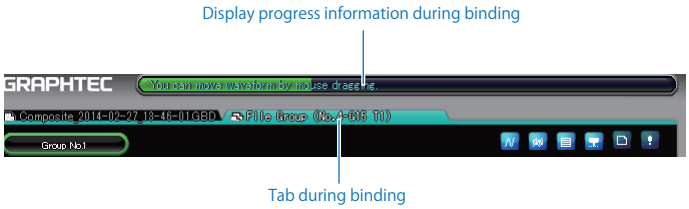
## Operations during binding

<Operations when Starting binding>

1. After making various settings on the data bind window, press "Execute".

<Operations during binding>

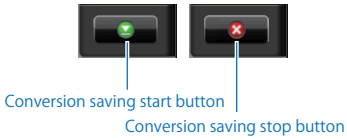
A group tab including the files to be bound is automatically prepared, and binding is performed using this tab. Binding is performed in a background configuration and the software operates normally.
Information regarding progress of the binding is displayed on the help window.  The tab during binding also changes color.




The following operations cannot be performed during binding.

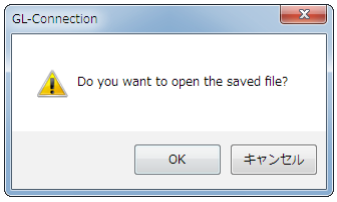
* Delete tab during binding
* Add CH to tab during binding
* Move tab during binding

2. Press save stop button on control panel to stop binding. Press save start button to restart combination.




<Operations during binding Completion>

3. When binding is completed, a confirmation message regarding opening of the bound file is displayed. When the OK button is pressed, playback is performed automatically.



- **CSV Output**

During free running, recording or viewing in Y-T or FFT Waveform Mode, the displayed sate is output to the file in CSV format. In X-Y Mode, the CSV output is not available.

Y-T Waveform Mode

During free running or recording:
- Vendor, model, version, date
- Cursor time
- CH settings (Input, range, filter, scaling, sampling interval)
- Instantaneous value

During viewing:
- Vendor, model, version, date
- Cursor time
- CH settings (Input, range, filter, scaling, sampling interval)
- Levels on cursor A and cursor B
- Calculated statistical values between the cursor A and B (Maximum value, minimum value, average value, peak value, effective value)

FFT Waveform Mode

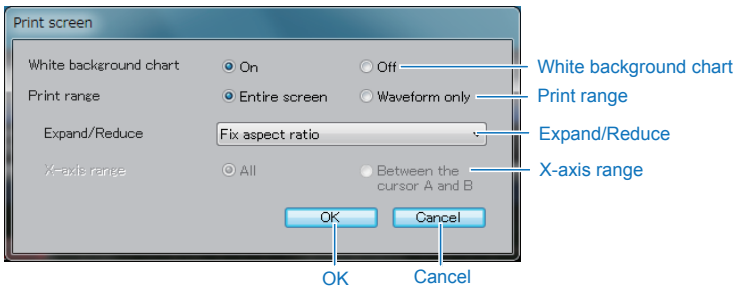
During free running, recording or viewing:
- Vendor, model, version, date
- FFT settings (Analysis frequency, Number of analysis points, Window function, Averaging mode, CH setting)
- Overall
- Peak list (Up to 10)
- All data (Data for the number of analysis points)

- **Print Screen**

To print the screen displayed or waveform data using a printer. To print, the PC must be in a mode that allows printing.
The printing process will occur according to the sequence as follows.

(1) Print window[OK] → (2) Window standard print screen [OK] → (3) Multi-page printing confirmation → (4) Print

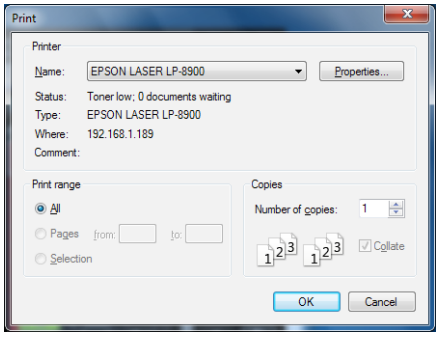
Print window




| Name | Explanation |
|---|---|
| White background chart | Switch on to print the waveform window and digital monitor window with a white background. |
| Print range | To set the range of screen that is to be printed.<br>Entire screen: To print everything that is displayed on the screen. Select this to print everything that you see on the screen.<br>Waveform only: Can only print the waveform window during data playback. Everything including the scroll bar in the waveform window will be printed. |
| Expand/Reduce | Will be effective when the print range is set to full screen.<br>Fix aspect ratio: Fit to printing paper when maintaining the aspect ratio.<br>Fit to vertical width of print sheet: Print by fitting the vertical range of the print screen to that of the printing paper.<br>Fit to horizontal width of print sheet: Print by fitting the horizontal range of the print screen to that of the printing paper.<br>Fit to the print sheet: Print by fitting to the print paper, ignoring the aspect ratio of the print screen.<br>Fit to the print quality: Print by abjecting the screen to the performance of the printer. Cannot set to free-running mode. |
| X axis range | Effective when the print range is set to waveform only.<br>All: Print all the time axis data during data playback. Before printing is initiated, it is possible to choose to print multiple pages by moving the cursor to the place in between A-B or by adjusting the Time/DIV of the wave display.<br>Between Cursor A and B: Print the waveform in between cursor A-B during data playback. |
| OK | Completes the print window settings and displays the Window standard print screen. |
| Cancel | Cancels the printing. |

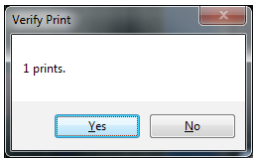
Windows standard print screen

Displays the standard Windows print screen. Choose the printer to be used here. As the properties of printers differ, please refer to individual printer's user's manual.
When done with setting, press the OK button.




Multi-page printing confirmation

The number of pages to be printed will be calculated according to the Print Window Settings and setting in Windows Standard Print Screen. If the number of prints are not suitable, please adjust by changing the setting in Time/DIV or reviewing the settings.



### 11-11-3. Waveform and Data Operations

The operations for the waveform and data depend on the each mode (Y-T, X-Y and FFT). Refer to the chapter of each wave mode.

### 11-11-4. Monitor Operations

The operations for the waveform and data depend on the each mode (Y-T, X-Y and FFT). Refer to the chapter of each wave mode.

### 11-11-5. Action

The operations for the waveform and data depend on the each mode (Y-T, X-Y and FFT). Refer to the chapter of each wave mode.

### 11-11-6. Option

Changes to option related panel. For details on the option panel, please refer to 10-5-5. Option Settings

### 11-11-7. Recording Start/Stop

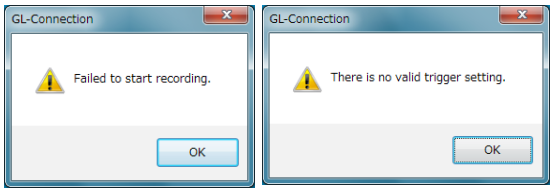
To start/stop recording. You can only perform starting and stopping from the Device Tab.

Start record button

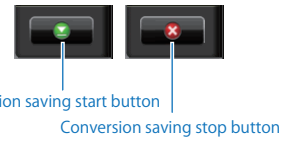
Stop record button

To check if recording has failed, perform the following steps.

- Check if the main module recording destination is correct (for example, even though an SD card is not inserted, recording destination is set as the SD card.)
- Check if PC recording destination is correct (for example, check settings have not been made to non-existent disk and pass)
- Check that the sampling value is suitable (for example, module configuration and format (GBD/CSV) etc.)
- Check the available disk space in the main module recording destination medium (Recording cannot start if the disk is full)
- Check the device tab (Recording cannot start at replay tabs, group tabs, demo etc.)
- Check that trigger conditions are correct (Recording cannot start with incorrect trigger conditions
- Check that the main module is turned on
- Check that this application is running




### 11-11-8. Conversion saving start/conversion saving stop




Various types of conversion saving start/conversion saving stop are performed when playback tab is active. Operations when pressing buttons depend on type of playback tab.

| Active tab | Operations for conversion saving start button | Operations for conversion saving stop button |
|---|---|---|
| PC file playback | Conversion saving playback | No operation since processing is completed on conversion saving window |
| Device file playback | Conversion saving playback | No operation since processing is completed on conversion saving window |
| Group playback | Data bind operation | Stop data bind |

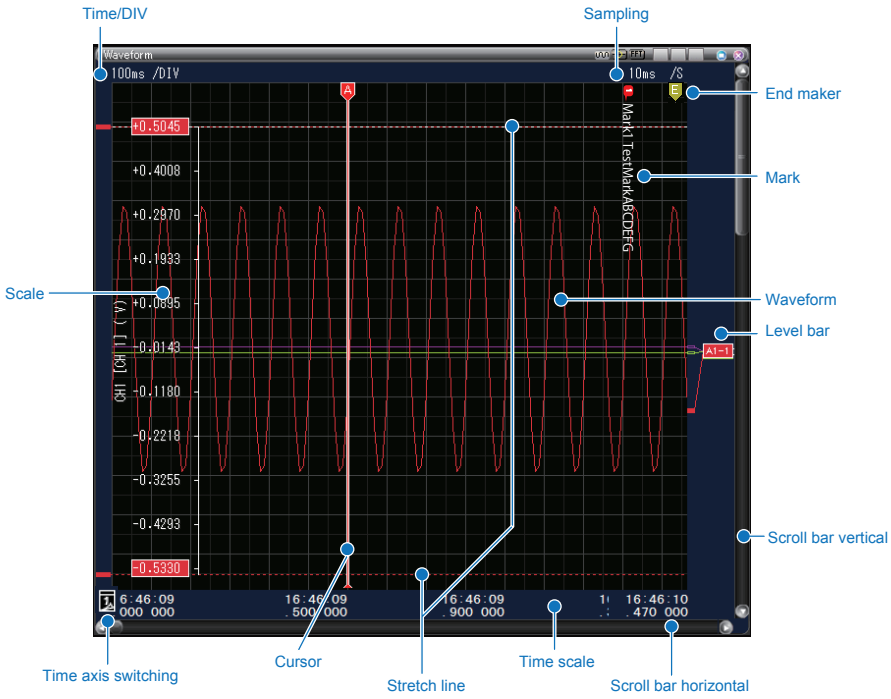
Refer to Convert then save for conversion saving operation.

Refer to Data bind function (for Ver.1.60 and after) for data bind operation.

# 12. Y-T Waveform Mode

The input signal level is displayed on the Y axis, and time is displayed on the X axis of this graph.

## 12-1. Waveform Window

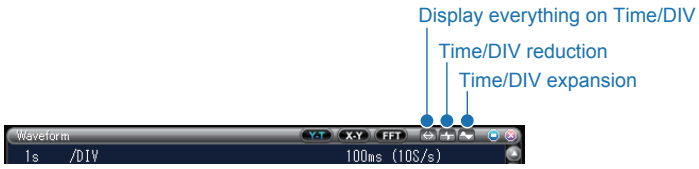



| Name | Explanation |
|---|---|
| Time/DIV | Display the Time/DIV value of the displayed waveform. Time/DIV represents the time in one grid width. When 1sec/DIV is set, the one grid width is 1 sec. The currently used compressed file is displayed during viewing.<br>• 1/1 Currently recorded file<br>• 1/10: 1/10 compreswsed file<br>• 1/100 : 1/100 compreswsed file<br>• 1/10000: 1/10000 compreswsed file<br>For information on the compressing function, refer to 16-1. Data Compressing Function |
| Sampling | Displays the value of sampling from a connected device, or the sampling of a file that is being played back. |
| Waveform | Displays the waveform. |
| Scale | The stretch line displays the channel set to active in the monitor window. The stretch line's upper value is found in the Span Setting's upper value, while the stretch line's lower value is found in the Span Setting's lower value. |
| Stretch line | The stretch line displays the channel set to active in the monitor window. The stretch line's upper value is found in the Span Setting's upper value, while the stretch line's lower value is found in the Span Setting's lower value |
| Level bar | Displays each channel's signal position. If the level bar is dragged with the mouse, the upper and lower values of the waveform can be changed. |
| Time scale | The X axis displays time. The displayed information is changed to match the Time/DIV setting. |
| Cursor | While data is being played back the cursor is displayed, and above the cursor you can see the time frame, signal level, etc. There is an A cursor, and B cursor, and they can be moved left or right by dragging with the mouse. |
| End marker | Display waveform data end. |

| | |
|---|---|
| Marker | During Recording you can record a mark in the waveform display information. Marks set after an alarm goes are are called alarm marks, while marks depicting arbitrary characters are called user marks. There are 8 marks. |
| Scroll bar horizontal | If you drag the scroll bar with the mouse during data playback, you can move the time axis. |
| Scroll bar vertical | If you drag with the mouse, you can move the upper and lower area of the waveform display area. |
| Time axis switching | Switching is performed in absolute time, relative time and point display. |

### 12-1-1. **Time/DIV Button**

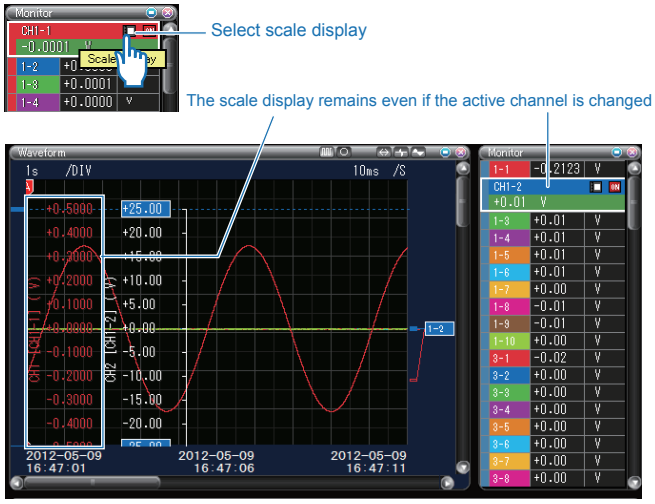
YChanges waveform's Time/DIV during Y-T waveform display.




| Name | Explanation |
|---|---|
| Display everyhing on Time/DIV | Calculate and change to the optimal Time/DIV to display the complete length of the waveform. Only available during playback. |
| Time/DIV reduction | Reduce the Time/DIV setpoint, and display the reduced waveform. |
| Time/DIV expansion | Raise the Time/DIV set point, and display the expanded waveform. |

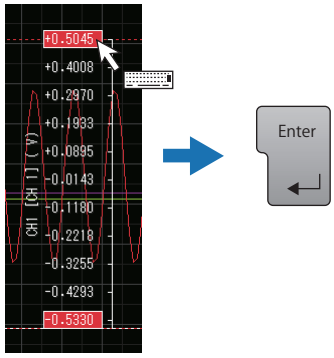
- **Leaving a Scale**

Displays the scale of the channel set to active in the monitor window. If you break the button the leave the scale in the monitor window, you can view several scales at once.



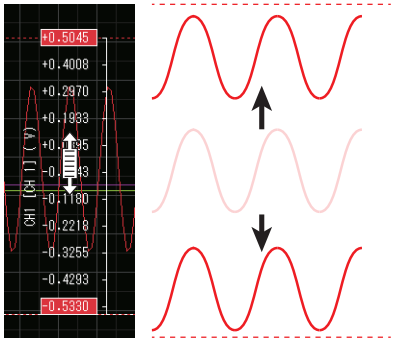

- **Scale Value Entry**

If you click the boxes you can directly enter values. After you are finished entering the values, press the enter key to confirm.



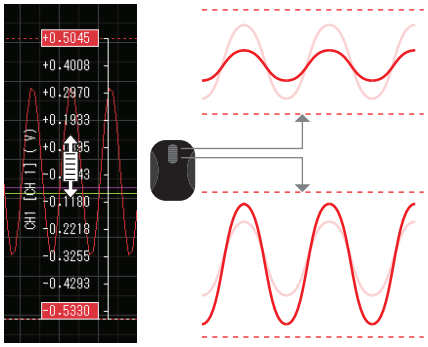

- **Move Scale Position**

The position of the scale can be changed by dragging it with the mouse.



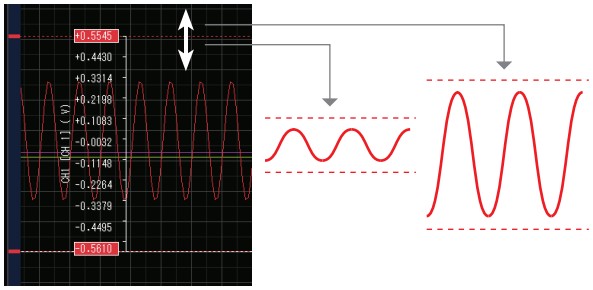
- **Span Zoom In/Out**

When the mouse is above the scale, the mouse wheel can be used to zoom in or out of the span. (For situations where there is no mouse wheel, you can perform the same operations from the waveform section of the Control Panel).



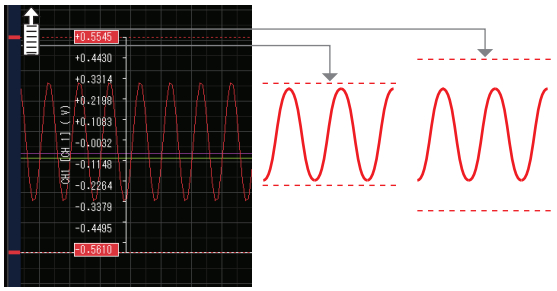

- **Stretch Line Zoom In/Out**

If the stretch line is dragged up or down with the mouse, the wave form display width can be changed.



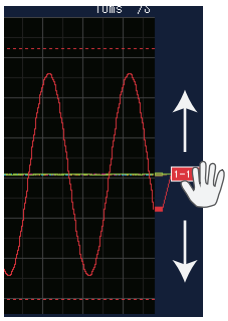

- **Span Slider Control**

The span can be changed by dragging the span slider on the left side of the stretch line up or down with the mouse.(Span slider is then drawn in nearby grid.)



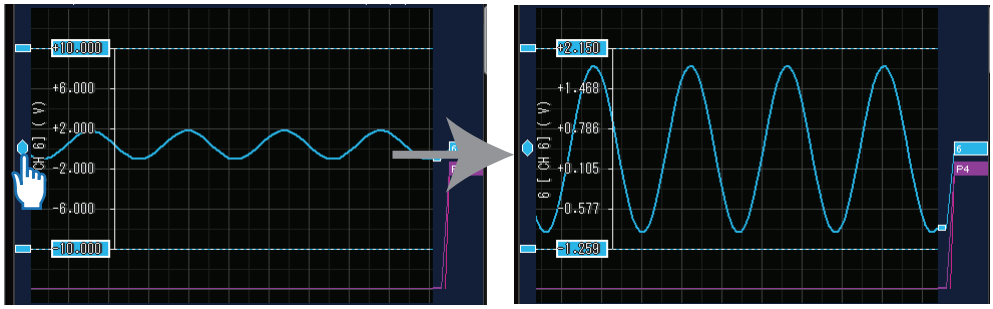

- **Level Bar Operation**

Displays all CH signal value. If the level bar is dragged with the mouse, the upper and lower values of the waveform can be changed.



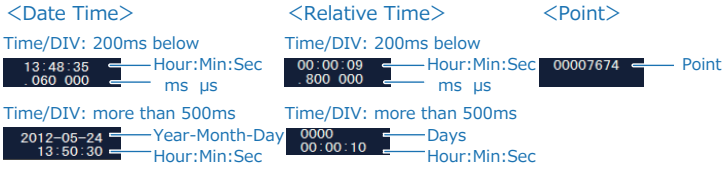
- **Auto span adjustment**

This is a function to adjust the span value after the suitable display width is derived from the waveform signal currently displayed.



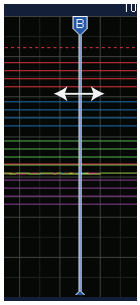
- **Time Scale Display Contents**

The X axis displays time. The displayed information is changed to match the Time/DIV setting.



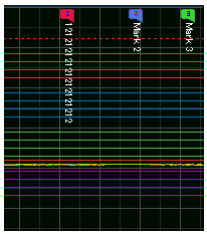

- **Cursor Display**

While data is being played back the cursor is displayed, and above the cursor you can see the time frame, signal level, etc. There is an A cursor, and B cursor, and they can be moved left or right by dragging with the mouse.




- **Mark Display**

During Recording you can record a mark in the waveform display information. Marks set after an alarm goes are are called alarm marks, while marks depicting arbitrary characters are called user marks. There are 8 marks. For information on entering a mark, please refer to Mark insertion




* You cannot change the position of a mark once it's been entered

- **Scroll Bar Horizontal**

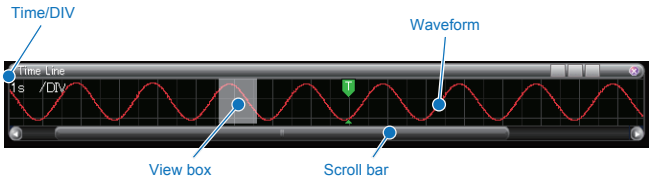
If you drag the scroll bar with the mouse during data playback, you can move the time axis.

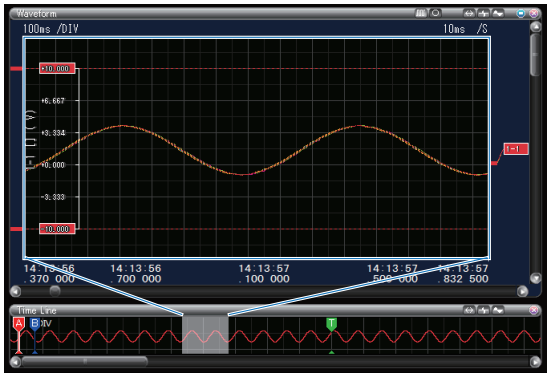
- **Scroll Bar Vertical**

If you drag with the mouse, you can move the upper and lower area of the waveform display area.

## 12-2. Time Line Window

You can use the Y-T wave form window to view everything. The digital monitor allows 1 channel's wave form to be displayed.



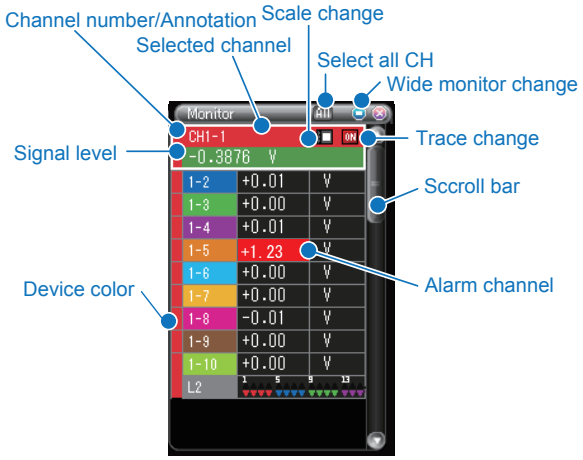

| Name | Explanation |
|---|---|
| Time/DIV | Display the Time/DIV value of the currently displayed waveform. Time/DIV displays time to one 1 grid axis. For 1sec/DIV1 grid's display axis is 1 second. |
| Waveform | Displays the waveform. The active channel's wave form is displayed on the digital monitor. |
| View box | The wave form display windows display range is shown in a semi-translucent box. The wave form display windows display value can be changed by dragging it with the mouse.  |
| Scroll bar | If you drag the scroll bar with the mouse during data playback, you can move the time axis. |

## 12-3. Monitor Window

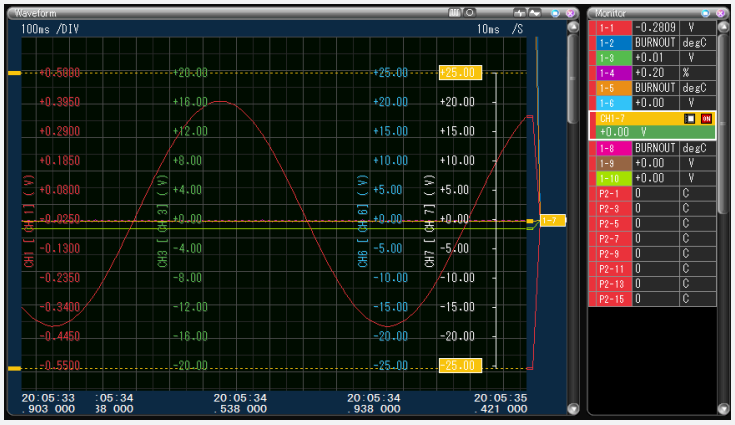
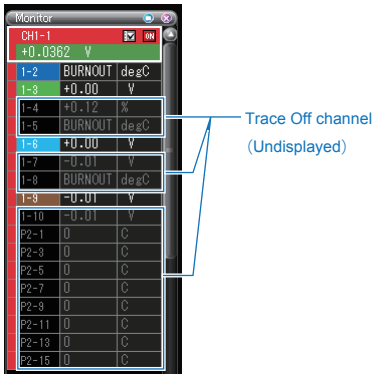
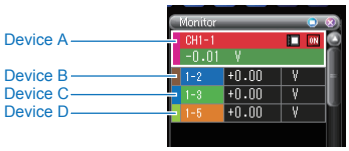
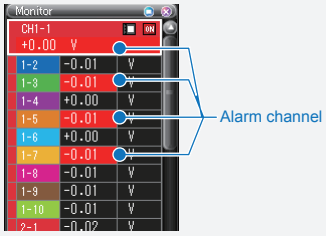
This window displays the signal's level value. During free running or recording, new information is updated every 0.5 seconds During playback, selecting either cursor A or B will display the signal level value of the chosen cursor. Depending on the window size, all modes(normal, wide, big) can be used.

### 12-3-1. **Normal**

This display mode shows wave form displays lined up with each other.

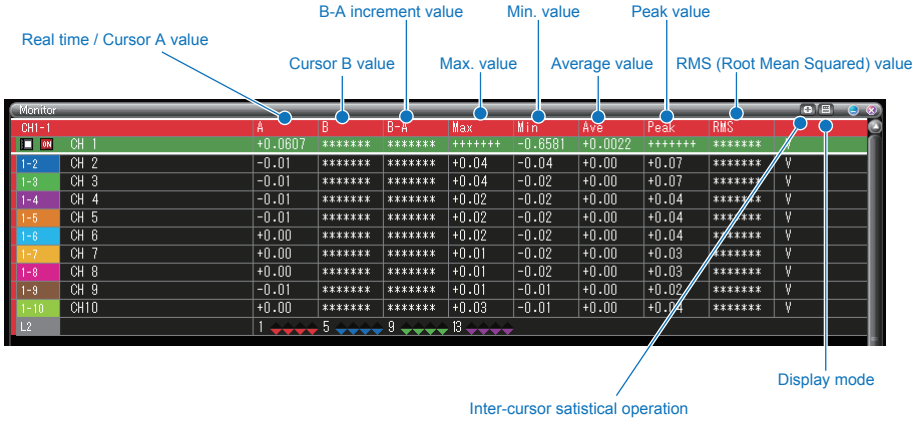



| Name | Explanation |
|---|---|
| Channel number | The displayed channel's number and wave form color are displayed. The channel number is [module Number]-[Channel Number].<br>Analog channel: CH1-5 (For the GL220, GL820 and GL900, CH5 is available.)<br>Pulse channel: P3-12 (For the GL220, GL820 and GL900, P4 is available.)<br>Logic channel: L2 (Module number only is displayed for the logic channel) (For the GL220, GL820 and GL900, L is available.). |
| Selected channel | From the selected channel, you can view the next item, or operate it. By pressing the keyboard's Shift key or Ctrl key and clicking the mouse at the same time, multiple channels can be selected at once.<br>The backgound of the selected channel changes to green.<br>Waveform Window: Display in front, Scale Display, Stretch Line Display<br>Time Line Window: Waveform Display<br>Monitor Window: Scale Change, Trace Change, Group Creation |
| Digital values | Displays signal level during free running, recording, or reviewing.<br>Free-running, Recording: Displays the newest entered signal level from a device. It is refreshed every 0.5 seconds.<br>Reviewing: Selecting either cursor A or B will display the signal level value of the chosen cursor. |

| | |
|---|---|
| Scale change | Pressing the scale button with leave the scale display in the waveform window. You can display the scale of all channels where the scale button has been pushed.<br>  |
| Trace change | Pressing the trace button allows the chosen channel's wave forms to be displayed. Even if it not being displayed, there is no effect on the recording data.<br>  |
| Wide mode change | Changes the display mode to the wide mode. |
| Select all CH | Select all the channels. |
| Scroll bar | The channel display can be moved by dragging it up or down with the mouse. |
| Device color | Connected devices and files being played are automatically assigned colors as device colors. In the event assigned device colors become mixed in monitor windows according to group function, it is possible to view which device the signal belongs to. For information on group functions, refer to 16-2. Group functions<br>  |
| Alarm channel | Channels where an alarm has gone off will be Displayed with a red background.<br>  |

## 12-3-2. **Wide**

This mode is a wide range display that does not show waveform display. In wide display, statistics calculations can be performed.




| Name | Explanation |
|---|---|
| Real time /Cursor A value | Displays the newest real time signal level value from free running or recording in progress. Signal level is displayed above cursor A during playback. |
| Cursor B value | Signal level is displayed above cursor A during playback. |
| B-A increment value | Displays Cursor B and Cursor A's increment value during playback. |
| Max. value<br>Min. value<br>Average value<br>Peak value | Show the Maximum Value, Minimum Value, Average Value, Peak to Peak Value during free running, recording, or reviwing.<br>Free-running: Displays the value after free-running starts.<br>Recording: Displays the value after recording starts and and the trigger is activated.<br>Reviewing: Performs the calculations for statistics where the cursor is, and displays them. |
| RMS (Root Mean Squared) value | Performs statistics operation for the area between cursors in playback, and displays root mean squared value. |
| Inter-cursor statistical operation | Performs the statistics operation for the area between Cursor A and Cursor B during statistics operation playback for cursor area. |
| Display mode | Changes to big mode display. |

### 12-3-3. **Big**

You can increase the size of the characters during wide display mode.

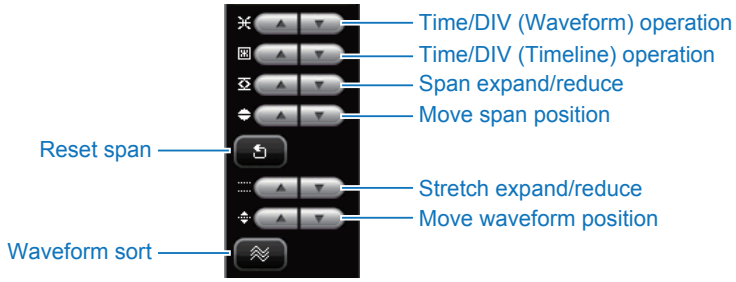
# 12-4. Y-T Waveform Control Panel

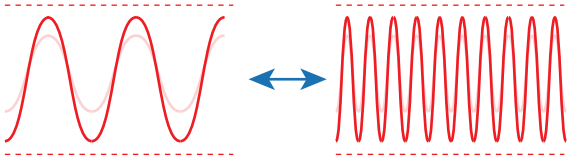
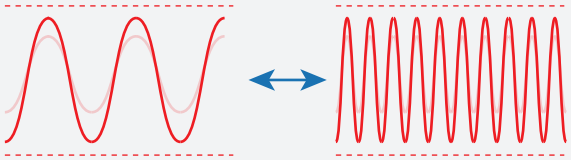
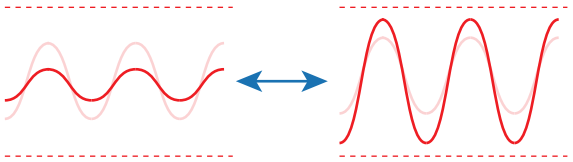
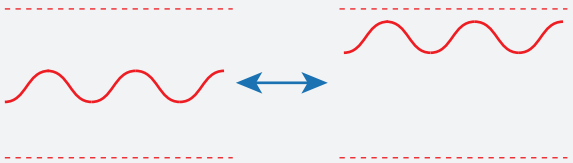
## 12-4-1. **Main Panel**

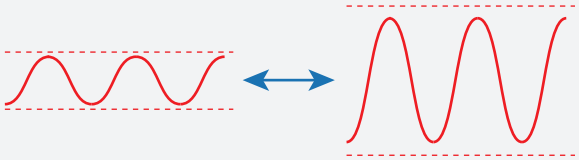
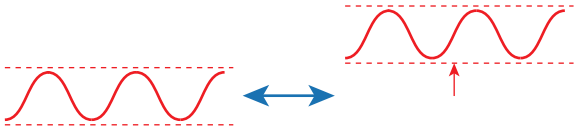
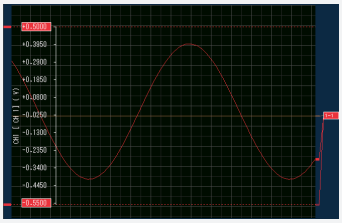
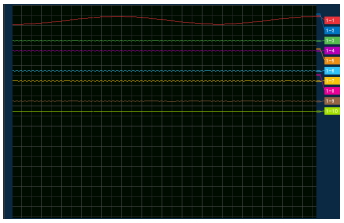
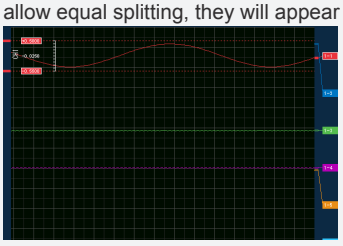

| Name | Explanation |
|---|---|
| Switch screen | Connection window and Main window are changed. |
| Condition | Set options for main module. This is available when a Device Tab is selected. For Device Settings, please refer to 15. Device Settings |
| File operations | Change to panel related to file. |
| Waveform operations | Change to panel related waveform operation. |
| Monitor operations | Changes to monitor related panel. |
| Action | Changes to action related panel. |
| Option | Changes to option related panel. |
| Recording Start/Stop | To start/stop recording. You can only perform starting and stopping from the Device Tab. |

## 12-4-2. **Waveform Operations**

Change to panel related waveform operation.

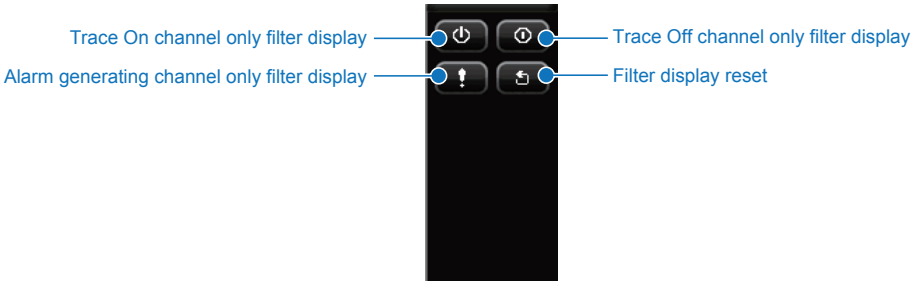


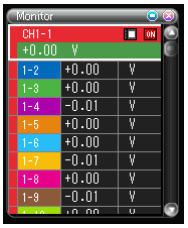
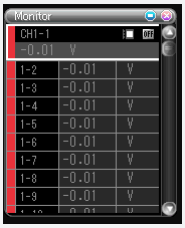
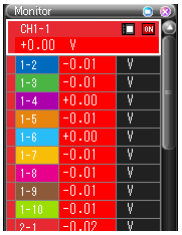

| Name | Explanation |
|---|---|
| Time/DIV (Waveform) operation | Operates the active tab waveform window's Time/DIV.<br>  <br>● Time/DIV operation during free-running or recording<br>Changes the newly scrolled through waveforms.<br>● Time/DIV operation during data playback<br>• When cursor A,B is displayed on the screen<br>Changes the Time/DIV around the active cursor.<br>• When cursor A,B is displayed on the display<br>The Time/DIV around the center of the screen will be changed. |
| Time/DIV (Timeline) operation | Operates the active tab time line window's Time/DIV.<br>  <br>Time Line Window Time/DIV operation |
| Span expand/reduce | Expands/reduces the span of the active channel. Changes ±10% of the full scale amount.<br>  |
| Move span position | Moves the position of the active channel. Changes ±10% of the full scale amount.<br>  |
| Reset span | Changes the span of the active channel back to default.<br>Voltage: ±1/2 of the full scale<br>Temperature: from 2000° C to -200° C |

<table>
<tr><td>Stretch expand/reduce</td><td>Expands/reduces the waveform amplitude of the active channel. The expansion/reduction of the waveform will only change the amplitude and not the span value. 1 grid/2 module will be changed.<br>  </td></tr>
<tr><td>Move waveform position</td><td>Up/down movement of the waveform Moves the waveform of the active channel up/down. The up/down movement of the waveform will only change the position of the waveform and not its span value. 1 grid/2 module will be changed.<br>  </td></tr>
<tr><td>Waveform sort</td><td>Changes the position of the waveform. The 3 modes will change in order. Please note that arranging the waveform will clear the settings of waveform expansion/reduction and up/down movement of the waveform.
<table>
<tr><td>Display everything on display window</td><td>Set to display everything on the waveform field.<br>  </td></tr>
<tr><td>Equal split of full window</td><td>Set to equally split individual channels of the full waveform window. If the number of channels does not allow equal splitting, they will appear stacked.<br>  </td></tr>
<tr><td>Equal split of display window</td><td>Set to equally split individual channels of the displayed waveform field. If the number of channels does not allow equal splitting, they will appear stacked.<br>  </td></tr>
</table></td></tr>
</table>

## 12-4-3. **Monitor Operations**

Changes to panel related to monitors.

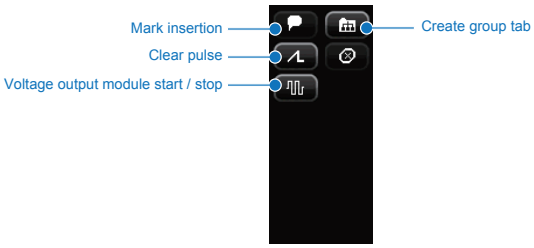



| Name | Explanation |
|---|---|
| Trace On channel only filter display | Extracts and displays only the Trace On channels. All the other channels will not be displayed. Even though they are not displayed, the recorded data will not be affected.  |
| Trace Off channel only filter display | Extracts and displays only the Trace Off channels. All the other channels will not be displayed. Even though they are not displayed, the recorded data will not be affected.  |
| Alarm generating channel only filter display | Extracts and displays only the alarm generating channels. All the other channels will not be displayed. The filter description will not change even though the channel's alarm status has been changed. Even though they are not displayed, the recorded data will not be affected.  |
| Filter display reset | Resets filter status like TraceOn, traceOff, alarm generation to their defult setting. |

## 12-4-4. Action

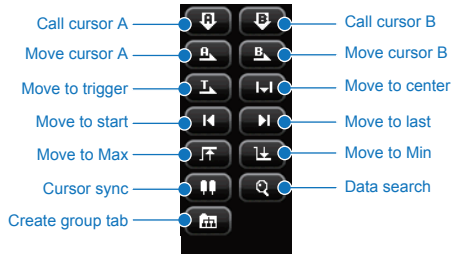
Changes to panel related to action. Depending on free-running, recording and replaying, the different panel contents are displayed.

- **During free-running and recording**




| Name | Explanation |
|---|---|
| Mark insertion | Can insert a mark into a new data position during recording. Able to insert a maximum of 8 user marks. Every user mark has a maximum of 30characters.<br>Refer to “Mark insertion”on page 82.<br>(*This function is not provided in the GL220, GL820 and GL900.) |
| Create group tab | Creates an empty group tab. For information on the group tab functions, refer to 16-2. Group functions |
| Clear pulse | When the pulse input the logic pulse module is set for the accumulation, the accumulated data is cleared to 0 (zero). You can set it during free-running or recording. |
| Voltage output module start / stop | When the Voltage Output Module (GL7-DCO) for GL7000 is installed and the data has been loaded already to the Voltage Output Module, the start or stop of the signal output can be controlled. |

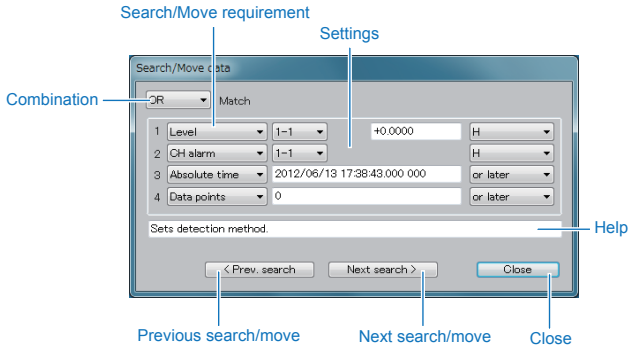
- **During replaying**




| Name | Explanation |
|---|---|
| Call cursor A<br>Call cursor B | Call cursor A or cursor B to the waveform displayed. Cursor A will appear at the place 1/4 from the left of the, screen cursor B will appear at the place 3/4 from the right of the screen. Only available during playback. |
| Move cursor A<br>Move cursor B | To move the position of cursor A or cursor B in the waveform displayed. Only available during playback. |
| Move to trigger | To move the position of the start trigger in the waveform displayed. Only available during playback. |
| Move to center<br>Move to first<br>Move to last | To move the waveform displayed to the respective positions. Only available during playback. |
| Move to max<br>Move to min | To move the position of the maximum (or mininum) int the waveform displayed. Only available during playback. |
| Cursor sync | To move cursor A and cursor B in synchronization with each other. Only available during playback. |
| Data search | By combining the four main requirements, search/move data in various ways. The search starts at the position of the selected cursor and the cursor will be moved to a new position that satisfies the requirements of the search/move. Only available during playback. Refer to “Data search/move” on page 79. |
| Create group tab | Creates an empty group tab. For information on the group tab functions, refier to 16-2. Group functions |

- **Data search/move**

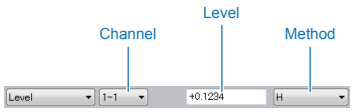
By combining the four main requirements, search/move data in various ways. The search starts at the position of the selected cursor and the cursor will be moved to a new position that satisfies the requirements of the search/move. This function will only be effective during playback.




| Name | Explanation | |
|---|---|---|
| Combination | To start search/move by combining effective search/move requirements. | |
| | OR | Effective when either one of the effective search/move requirements is satisfied. |
| | AND | Effective when all of the effective search/move requirements are satisfied. |
| Search/move requirements | Off | Makes the search/move requirements ineffective. |
| | Level | Search using the level values of analog data, logic data or pulse data. |
| | CH alarm | Search using the alarm generation of each channel in the analog data, logic data or pulse data. |
| | Alarm output | Search using the alarm output. |
| | Absolute time | Search using absolute time. |
| | Relative time | Search using relative time. |
| | Data Points | Search using data Points. |
| | Mark | Search using mark. (*This function is not provided in the GL220, GL820 and GL900.) |
| Previous search/move | Search/move the within the previous range with the cursor selected. | |
| Next search/move | Search/move the within the following range with the cursor selected. | |
| Close | Closes the search/move window. | |
| Help | Explains the contents of each item in the setting. | |

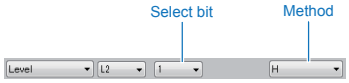
When the search/move requirements are level

<In the case of analog/pulse>




| Name | Explanation |
|---|---|
| Channel | To set the channel code used in search. |
| Level | To set the level used in search. |
| Method | H: Detects when the set level value is exceeded from below the set level value.<br>L: Detects when the set level value falls under from over the set level value.<br>or more: Detects in the range higher than the set level.<br>or less: Detects in the range lower than the set level. |

<In the case of logic>

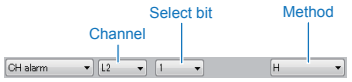



| Name | Explanation |
|---|---|
| Select bit | To set the channel code used in search. |
| Method | H: Detects when the set bit is changed from L to H.<br>L: Detects when the set bit is changed from H to L.<br>HL: Detects when the set bit is changed from L to H or from H to L. |

When the search/move requirements are CH alarm

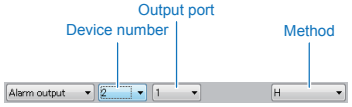
<In the case of analog pulse>


<In the case of logic>



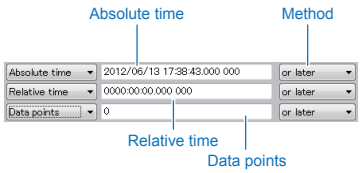

| Name | Explanation |
|---|---|
| Channel | To set the channel code used in search. |
| Select bit | To set the channel code used in search. |
| Method | H: Detects when the set bit is changed from L to H.<br>L: Detects when the set bit is changed from H to L.<br>HL: Detects when the set bit is changed from L to H or from H to L. |

When the search/move requirements are alarm output




| Name | Explanation |
|---|---|
| Device number | To select the device number. The device number is the number written on the tab of the device. In the case of multiple devices with group tabs, please select one device. |
| Output port | To select the alarm output port. |
| Method | H: Detects when the set bit is changed from L to H.<br>L: Detects when the set bit is changed from H to L.<br>HL: Detects when the set bit is changed from L to H or from H to L. |

## When the search/move requirements are absolute time, relative time, data points




| Name | Explanation |
|---|---|
| Absolute time | To set to absolute time. |
| Relative time | To set relative time from the start of the recording. |
| Data points | To set to data points. |
| Method | After:To detect the results that are after the search requirements.<br>Before:To detect the results that before the search requirements. |

It is convenient to use a combination of absolute time, relative time and data points.

For example) Everything is consisten

Search requirement 1: After 1st of October 2012

Search requirement 2: CH1-1 level 0.5V H

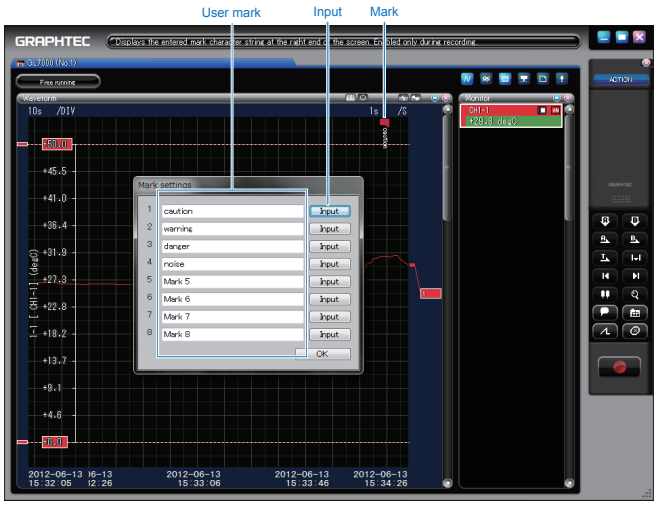
Detail of search: Search results that are after 1st of October 2012 and CH1-1 is higher than 0.5V.

## When the search requirements are marks


| Name | Explanation |
|---|---|
| Select mark | To select the type of marks. |
| Method | Consistence:Register results where the set mark types are consistent. |

- **Mark insertion**

To insert mark while recording. (* This function is not provided in the GL220, GL820 and GL900.)

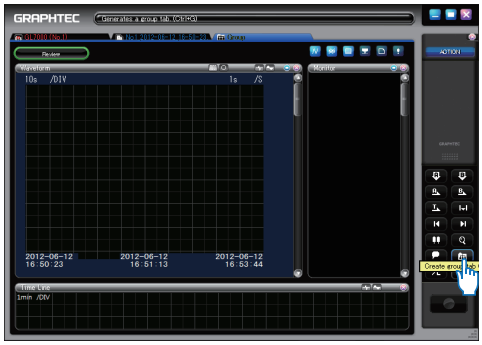



| Name | Explanation |
|---|---|
| User mark | Able to change the user mark character even while recording. However only the last character output will be remembered in the data file. |
| Input | When the input button is pressed, a scroll will appear on the right side of the Y-T waveform. A mark will appear at the same position during data replay. |

- **Create group tab**

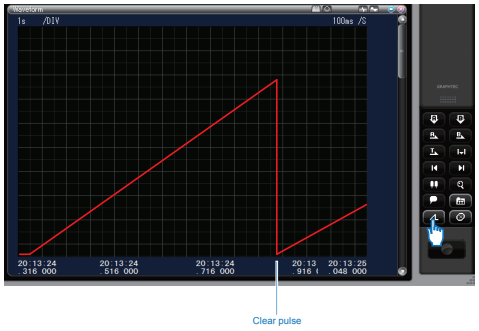
The group function enables combinations of device tabs and file tabs of any channel, thus allowing freedom in presentation methods.

Here, a new group tab can be created. By pressing the group tab button, an empty group tab will be created. By dropping the tabs of other channels into this tab, a tab that only displays the desired channels can be created. For information on group functions, refer to 16-2. Group functions




- **Clear pulse accumulation**

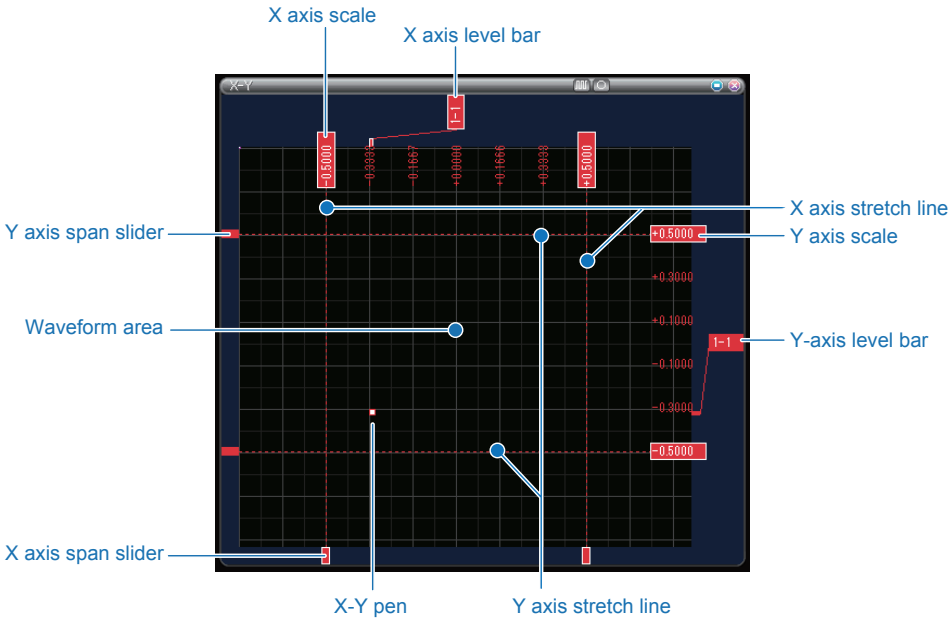
To clear the pulse accumulation value. The value will also be automatically cleared when the recording starts.



# 13. X-Y Waveform Mode

## 13-1. Waveform Window

After assigning the input signal to the X axis and the Y axis,the X and Y ‘s signal can correlatively be displayed with wave form display. The X-Y waveform can at maximum show 4 channels. The X-Y waveform can only be displayed during free running and during recording. During playback the X-Y waveform cannot be displayed.




| Name | Explanation |
|---|---|
| X/Y axis scale | Displays the X-Y channel set to active in the Monitor window on the X and Y axises. |
| X/Y axis level bar | Displays each channel’s signal position. If the level bar is dragged with the mouse, the upper and lower values of the waveform can be changed. |
| X/Y axis stretch line | The stretch line displays the channel set to active in the monitor window. The stretch line’s upper value is found in the Span Setting’s upper value, while the stretch line’s lower value is found in the Span Setting’s lower value. |
| X/Y axis span slider | The wave form’s span axis can be changed by dragging the span slider with the mouse up or down, and left to right. |
| X-Y pen | Displays the plot of the active channel’s signal value. During recording, it is drawn with a solid line. |
| Waveform area | The X-Y wave form is used to draw the range. By dragging the mouse, you can control the X-Y axis values. |
| X-Y cursor | Check the level and difference values at any position of the X-Y waveform. Using the mouse, move the icon to any position. |
| X axis Level value | Displays the level value on X axis. |
| Y axis level value | Displays the level value on Y axis. |

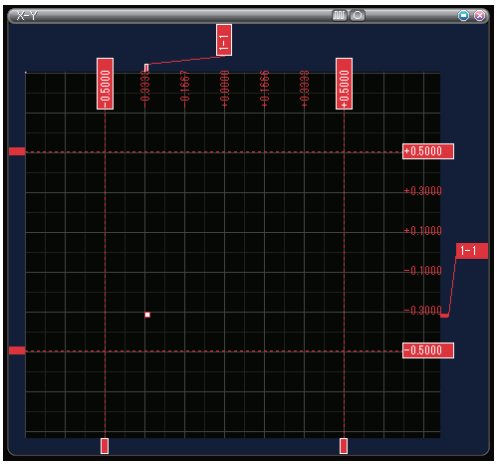
- **X/Y Axis Scale**
- **X/Y Axis Level Bar**
- **X/Y Axis Stretch Line**
- **X/Y Axis Span Slider**

The operation is the same as the Y-T wave form display. For information, refer to 12-1. Waveform Window

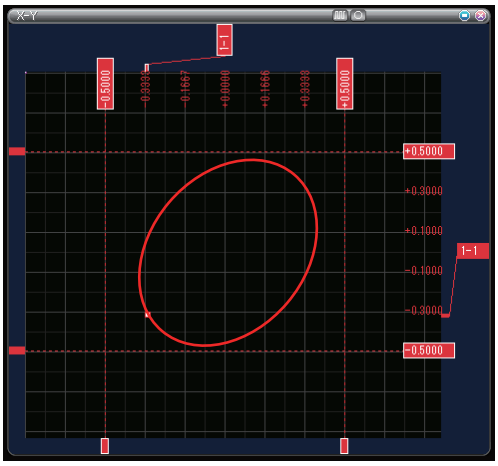
- **X-Y Pen**

The X-Y pen shows tracking of the pen up condition during free running. Tracking is shown after recording starts.

Free running

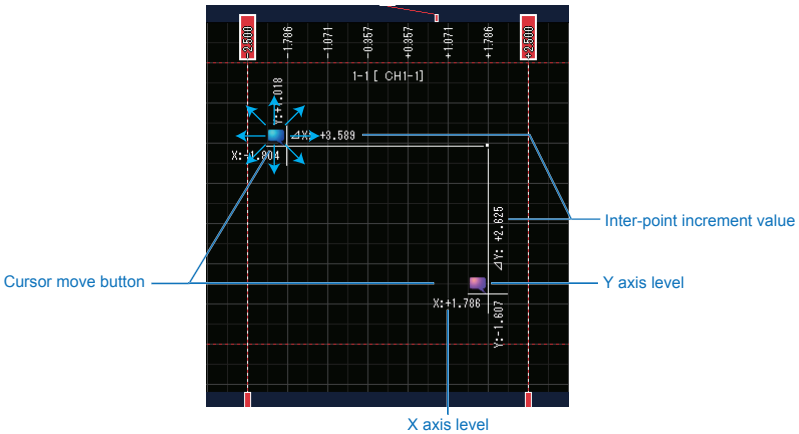



Recording..




- **Cursor Display**

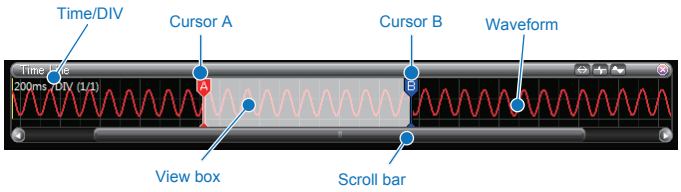
Check the signal level, level difference between the two points, etc. using the cursor displayed in the waveform screen.

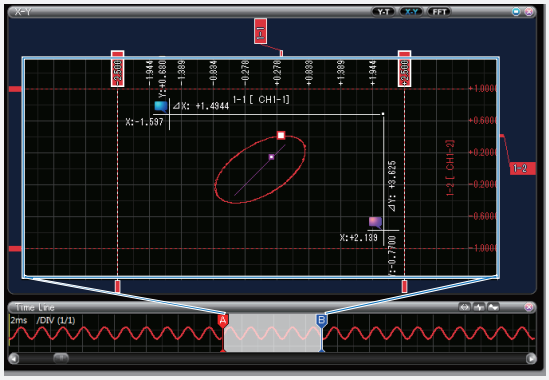



| Name | Explanation |
|---|---|
| Cursor move button | The Cursor Move button allows you to move to any position within the waveform between the two cursor points. |
| Inter-point increment value | Displays the level increment between the X axis and Y axis between the two cursor points. |
| X axis level | Displays the X axis level on the point specified by each Cursor Move button. |
| Y axis leve | Displays the Y axis level on the point specified by each Cursor Move button |

## 13-2. Time Line Window

You can use the Y-T wave form window to view everything. The digital monitor allows 1 channel's wave form to be displayed.



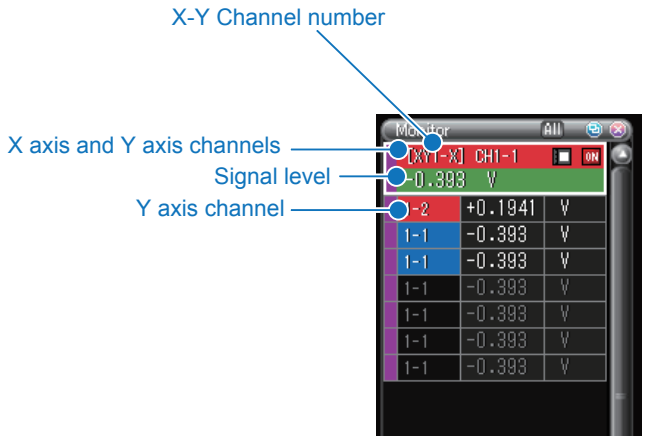

| Name | Explanation |
|---|---|
| Time/DIV | Display the Time/DIV value of the currently displayed waveform. Time/DIV displays time to one 1 grid axis. For 1sec/DIV1 grid's display axis is 1 second. |
| Waveform | Displays the waveform. The active channel's wave form is displayed on the digital monitor. |
| Cursor A and B | The cursor A and B is displayed during viewing. Move them arbitrarily. The data between the cursor A and B is subject to the X-Y process during X-Y viewing. However, the process depends on the averaging setting. |
| View box | The display range between the cursor A and B is displayed with the translucent box. The X-Y Waveform within the translucent range is displayed.  |
| Scroll bar | If you drag the scroll bar with the mouse during data playback, you can move the time axis. |

## 13-3. Monitor Window

This is a window that displays the signal's level value. A single X-Y channel, which consists of the CH of the X side and CH of the Y side, is displayed in the X-Y display. During free-running or recording, the most up-to-date data is updated every 0.5 seconds. The signal level value on the cursor selected by the cursor A or B in Timeline Window is displayed during viewing. Depending on the window size, the mode of each type (normal, wide, big) can be set.

### 13-3-1. Normal

This display mode shows wave form displays lined up with each other.

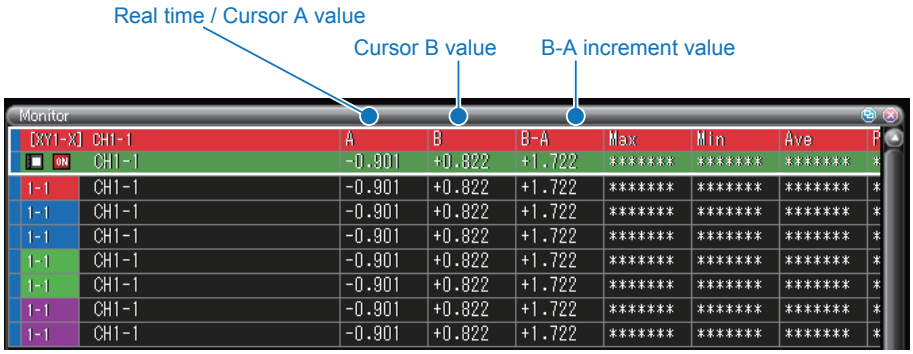



| Name | Explanation |
|---|---|
| X-Y Channel number | Up to 4 channels of X-Y number ([XY No. – X or Y]) are displayed. |
| X axis and Y axis channels | The analog channel is assigned to X axis and Y axis in a single X-Y channel respectively, and the each level value is displayed. |
| Signal level | Displays signal level during free running, recording, or reviewing. |

| | |
|---|---|
| Free running<br>Recording | Displays the newest entered signal level from a device. It is refreshed every 0.5 seconds. |
| Reviewing | Selecting either cursor A or B will display the signal level value of the chosen cursor. |

### 13-3-2. **Wide**

This mode is a wide range display that does not show waveform display. In wide display, statistics calculations can be performed.

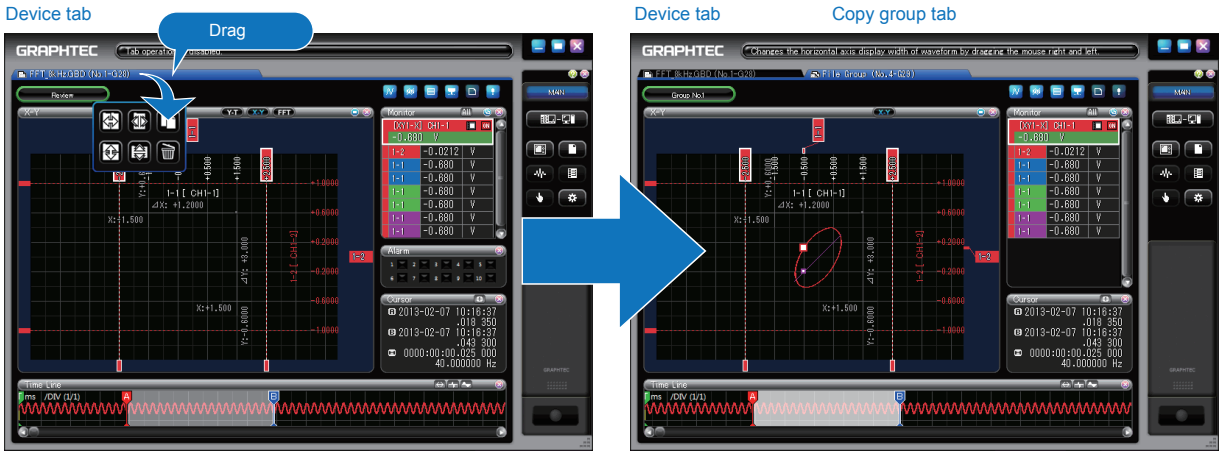



| Name | Explanation |
|---|---|
| Real time / Cursor A value | Displays the newest real time signal level value from free running or recording in progress. Signal level is displayed above cursor A during reviewing. |
| Cursor B value | Signal level is displayed above cursor B during reviewing. |
| B-A increment value | Displays Cursor B and Cursor A's increment value during ewviewing. |

- **Group Creation in X-Y Mode**

The copy tab group only can be created In X-Y Mode. The different devices and the channel data in the file can not be mixed as well as Y-T Mode.

<Example of copy group creation from the Device tab>



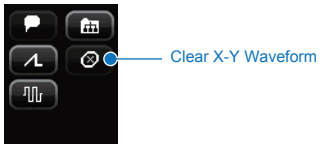
## 13-4. X-Y Waveform Control Panel

### 13-4-1. **Main Panel**


| Name | Explanation |
|---|---|
| Action | Changes to the panel associated with the action. |

## 13-4-2. Action

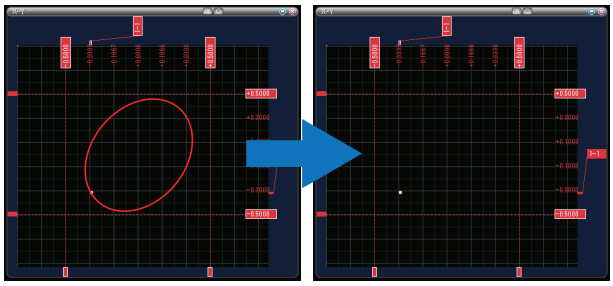
Changes to the panel associated with the action.




| Name | Explanation |
|---|---|
| Clear X-Y waveform | Clear X-Y Waveform display during recording. The displayed waveform is cleared, the data itself is not cleared. |

- **X-Y Waveform Clear**

Clear the X-Y Waveform display.

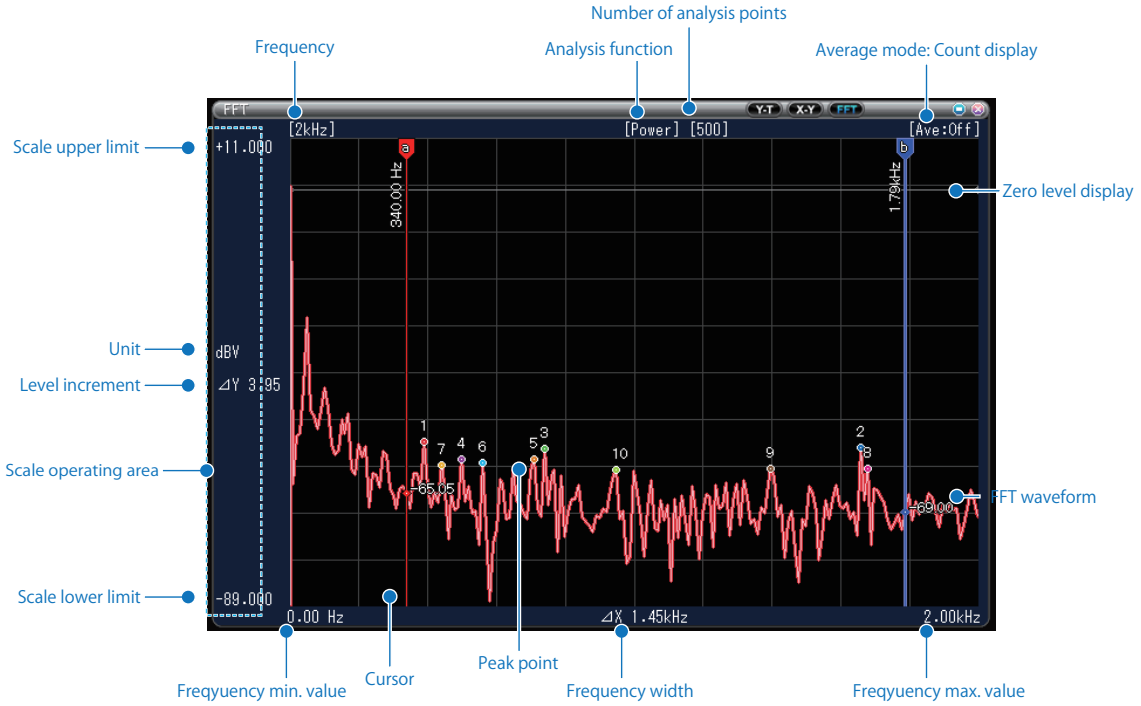


# 14. FFT Waveform Mode

The frequency is displayed on the X axis, and the level is displayed on the Y axis of this graph in FFT Display Mode. During free running, the waveform is displayed in real-time, or any range of the waveform can be displayed after viewing the recorded file. Also, Check the difference between the levels as well as the frequency width and detect the peak with the cursor A and B.

* The settings in the FFT Waveform Mode do not interact mutually with the device such as GL7000. The settings are enabled only in the software.

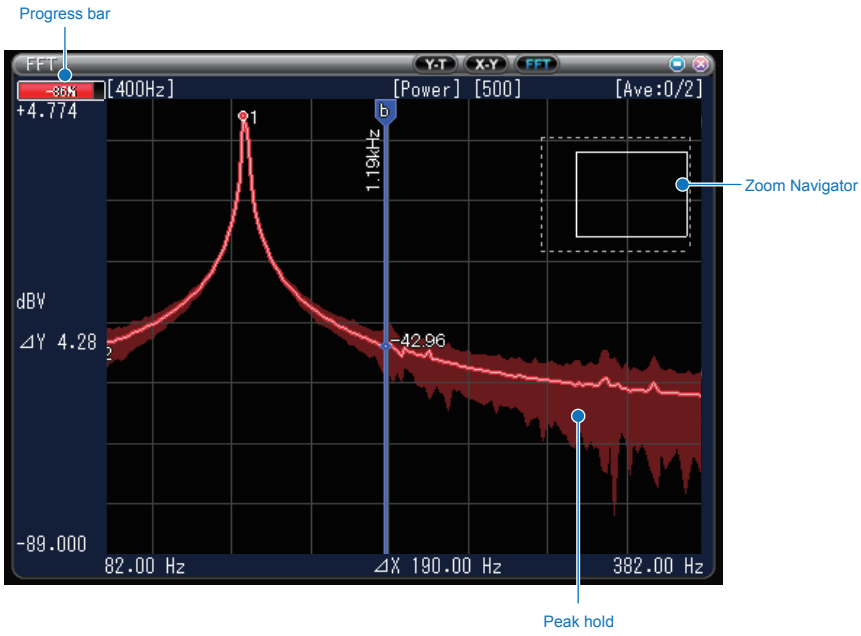
## 14-1. Waveform Window




| Name | Explanation |
|---|---|
| Frequency | Display the analysis frequency. |
| Analysis function | Displays the analyzing function. |
| Number of analysis points | Displays the analyzing points. |
| Average mode: Count display | Average mode: Displays the averaging process.<br>Count display: Displays the average count. |
| Level value | Displays the level value. |
| Frequency value | Displays the frequency value. |
| Level increment | Displays the level increment. |
| Frequency increment | Display the frequency increment. |
| Zero level display | Draws the line at zero level. |
| Cursor | There are two movable cursors (A and B) in FFT Window. The frequency value, level value of intersected active channel, and point value from the beginning by placing the mouse on the cursor is displayed by placing the mouse on the cursor. Also, specify the range of peak point. For details, refer to Cursor |
| Scale operating area | The scale operation can be performed by dragging up or down or operating the wheel. |
| FFT waveform | Displays FFT waveform. Up to 4 channels can be displayed. Display the active channel in the Monitor Window on the top. |

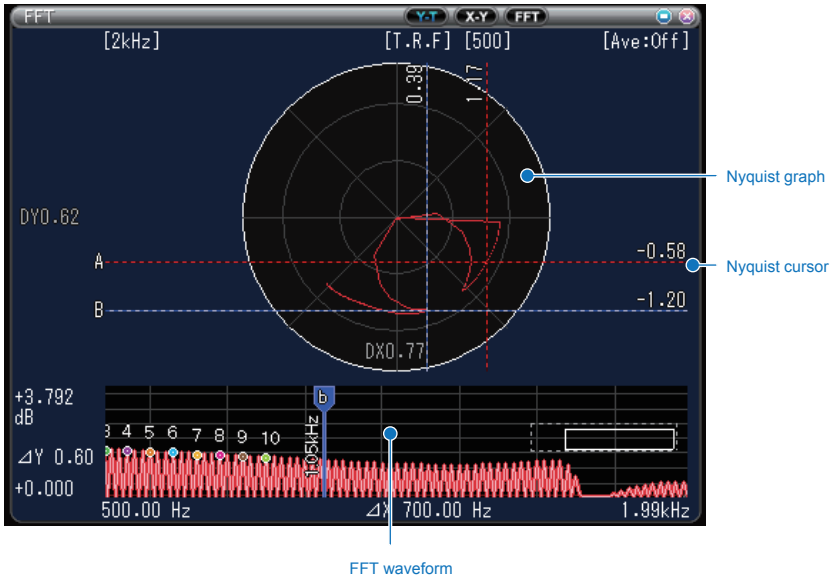
| | |
|---|---|
| Peak point | Up to 10 points are displayed after detecting the peaks within the waveform. For how to detect the peak points, refer to Peak filter pad and peak filter point |

<Enlarged waveform during viewing>




| Name | Explanation |
|---|---|
| Peak hold | When the peak hold function is enabled during free running, recording or viewing, the range between the maximum and minimum values is filled and displayed.<br>During free running or recording: All the waveforms are applied to the peak hold in real time.<br>During viewing: When the average mode is enabled, the peak hold is applied. |
| Zoom Navigator | The Zoom Navigator is displayed when operating the waveform in Control Panel or enlarging the waveform with the mouse wheel. The dotted line represents the entire size of the Waveform Window, a solid line represents the range currently displayed. |
| Progress bar | The progress bar is displayed when FFT process is performed.<br>  : This bar is displayed until the number of analysis points appear in the initial display. During this period, the Waveform display will be undefined.<br>  : This bar is displayed until the number of analysis points completely appear in the second display and subsequent display. |

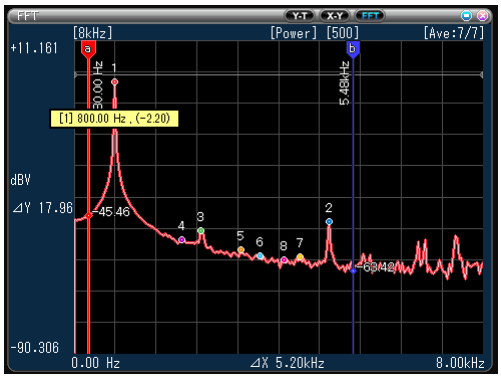
<Nyquist display>




| Name | Explanation |
|---|---|
| Nyquist graph | This is a waveform displayed when switching to Nyquist Mode. The display can be changed in FFT settings. |
| Nyquist cursor | This is a cursor used for Nyquist FFT display. |
| FFT waveform | This is a FFT waveform used for Nyquist FFT display. |

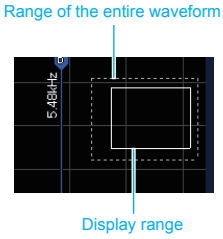
## 14-1-1. Peak Point

The peak between the FFT Waveform-shaped cursor A and B is detected and up to 10 peak points are displayed. Check the frequency and level values by placing the mouse on the each peak point. Also, unnecessary peak points can be filtered by setting the peak filter in Control Panel.




## 14-1-2. Zoom Navigator

When enlarging the waveform in Control Panel or with mouse wheel, the Zoom Navigator is displayed on the waveform. Check the position in the entire waveform.



### 14-1-3. Operations in Waveform Window

- **Waveform Scaling**

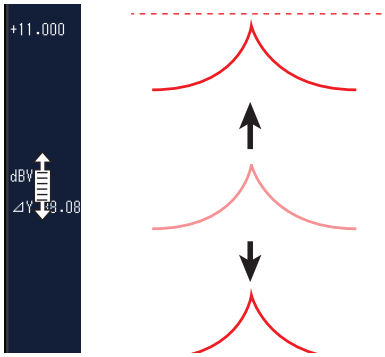
The waveform scaling can be performed by operating the mouse wheel on the waveform. The Zoom Navigator is displayed during scaling. Check the display position in the entire waveform.

- **Waveform Moving**

In waveform scaling operation, the waveform can be moved by dragging the mouse to the desired position within the waveform. Use Zoom Navigator to check the scaling state.

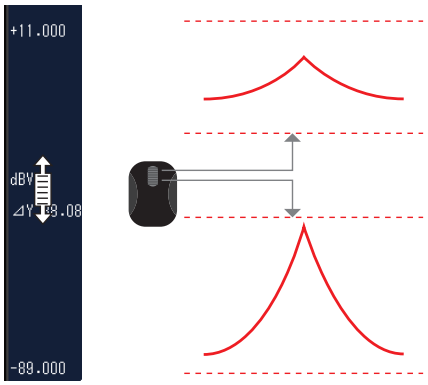
- **Scale Position Moving**

The scale position can be moved by dragging the mouse on the scale.



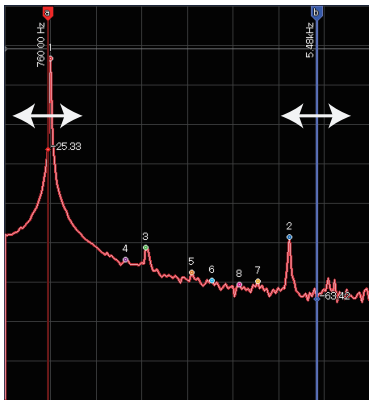

- **Scaling**

The waveform scaling is possible by operating the mouse wheel when the mouse is on the scale.

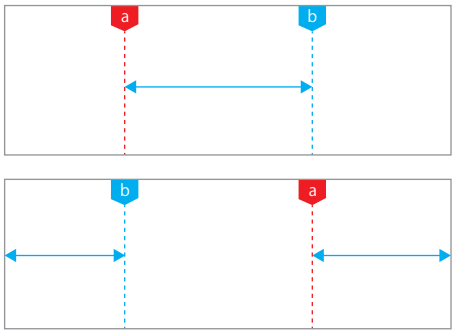


- **Cursor**

There are two cursors (A and B) in the window. Each cursor can be freely moved by dragging the mouse within the waveform. The frequency and level values on the position of the cursor are displayed. In addition, the pop-up is displayed by placing the mouse on the cursor. Check the data points from the leftmost.

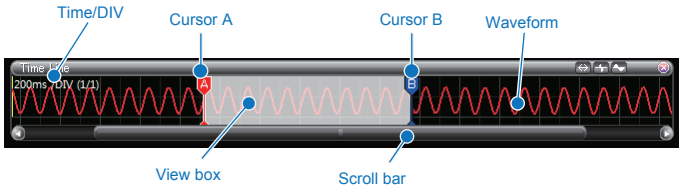


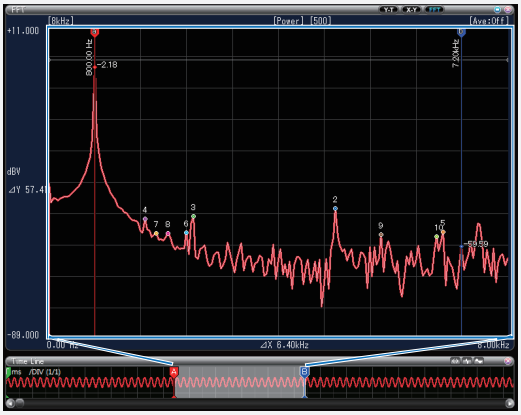
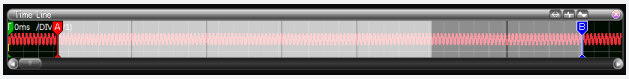

Simultaneously, the cursor A and B can be used to specify the detection range of the peak points on the waveform.
The detection range “a<->b” and “b<->a” are different, the range is reversed.
*When the X axis is assigned to the period display, the detection range is reversed.



## 14-2. Timeline Window

During free running or recording, this window is displayed as well as Y-T Waveform Mode. During viewing, the range of FFT process can be set with the timeline cursor A and B.




| Name | Explanation |
|---|---|
| Time/DIV | Displays the Time/DIV value of the displayed waveform. Time/DIV represents the time in one grid width. When 1sec/DIV is set, the one grid width is 1 sec. |
| Waveform | Displays the waveform. The waveform of the active channel in the digital monitor is displayed. |
| Cursor A and B | The cursor A and B is displayed during viewing. Move them arbitrarily. The data between the cursor A and B is subject to the FFT process during FFT viewing. However, the process depends on the averaging setting. |
| View box | The display range between the cursor A and B is displayed with the translucent box. The FFT waveform within the translucent range is displayed.  When the average mode is enabled, the data analysis and waveform display is performed for each number of analysis points.  |
| Scroll bar | The time base can be moved by dragging the scroll bar with the mouse during data viewing. |

### 14-2-1. Operations in Timeline Window

- **Scrolling the waveform**

The time base can be moved by dragging the scroll bar with the mouse during viewing.

- **Changing the Time/DIV**

Press the Time/DIV button to change the Time/DIV. Also, the Time/DIV can be changed by operating the mouse wheel when the mouse pointer is on the Timeline Window.

- **Moving the cursor**

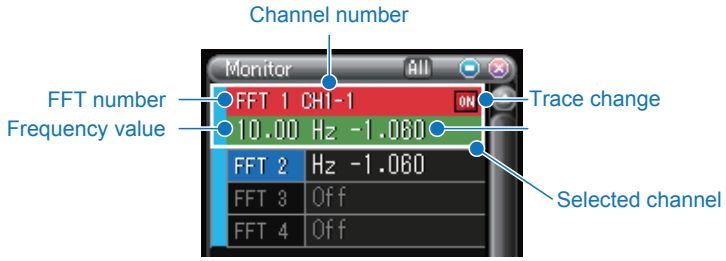
During viewing, the cursor A and B can be moved. The cursor behavior varies depending on the averaging setting in FFT settings.
Averaging Off: The cursor A and B are fixed within the number of analysis points in FFT settings. The cursor A and B can be moved in synchronization.
Averaging On: The cursor A and B can be moved individually. The average count of the data points within the cursor range is calculated with the number of analysis points of FFT settings and then the averaging process is performed.

## 14-3. Monitor Window

Display the peak and frequency values from the FFT calculation result. During free-running or recording, the most up-to-date data is updated every 0.5 seconds. During viewing, the last FFT process value is displayed. The mode of each type (normal, wide, big) can be set.

### 14-3-1. Normal

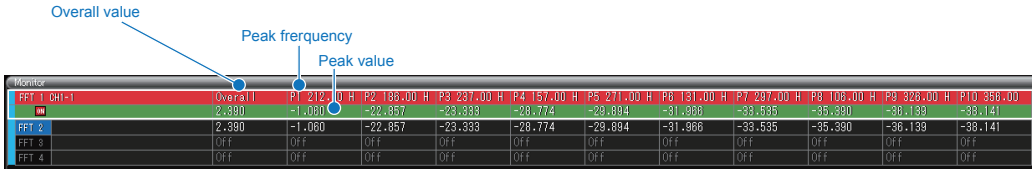
This is a display mode used when displaying side-by-side with the Waveform display.




| Name | Explanation |
|---|---|
| FFT number and Channel number | FFT number: Displays the FFT number 1 to 4.<br>Channel number: Displays the Channel number of the FFT channel A set in the setting menu. The number is structured as [Module No.]-[Channel No.]. |
| Selected channel | The following items in respect of the selected channel are displayed or operated. More than one channel can be selected by click the mouse while holding down the Shift key or the Ctrl key on the keyboard. The background of the selected channel changes to green.<br>Waveform Window: Displayed in front; Level display; Frequency display; Level difference of X axis and Y axis<br>Timeline Window: Waveform display |
| Maximum peak value | Displays the frequency of the maximum peak value. |
| Frequency value | Displays the frequency of the maximum peak value. |
| Trace change | Changes On/Off for each FFT channel. |

### 14-3-2. **Wide**

This is a wide horizontal display mode that the Waveform display is hidden. Switch the normal display to the wide display by pressing the maximize button. Switching to the wide display can display the statistical calculation.

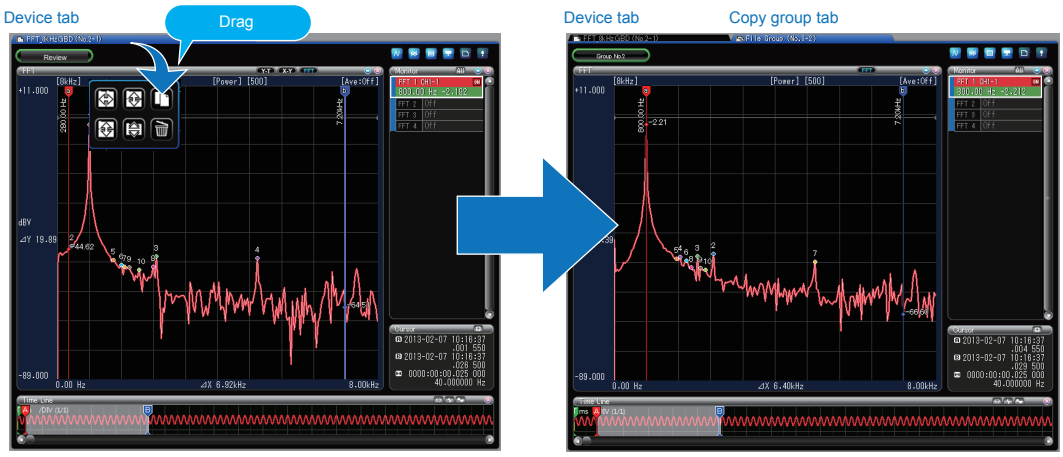



| Name | Explanation |
|---|---|
| Overall value | Displays the total value of each frequency component. |
| Peak frequency | Displays up to 10 peak values detected. For how to detect the peak point, follow the range of the cursor (A and B) and the peak filter (Refer to Peak filter pad and peak filter point). |
| Peak value | Displays the peak value. |

- Group creation at FFT Mode

The copy tab group only can be created in FFT Mode. The different devices and the channel data in the file can not be mixed as well as Y-T mode.

<Example of group creation from the Device tab>



## 14-4. Main Screen Control Panel

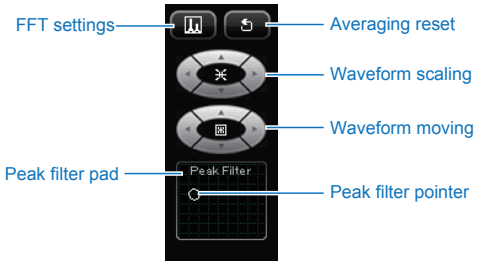
### 14-4-1. **Main Panel**


| Name | Explanation |
|---|---|
| Waveform Operation | Changes to the panel related to the waveform operation. |

For more information about the other buttons, refer to 11-11. Main Screen Control Panel

## 14-4-2. Waveform Operation

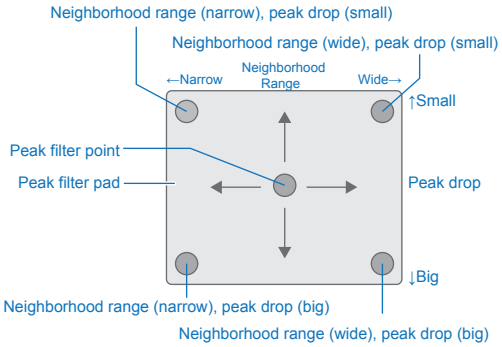
Changes to the panel related to the waveform operation.




| Name | Explanation |
|---|---|
| FT settings | Open FFT Setting Window. For more information about the FFT settings, refer to “FFT settings”. |
| Averaging reset | The averaging reset is performed during free running and recorded. This is applied when the averaging process is enabled. |
| Waveform scaling | Perform the waveform scaling. |
| Waveform moving | Moves to the top and bottom, the left and right within Waveform Window. |
| Peak filter pad | Filters the peak detect conditions depending on the position of the peak point within the peak pad. |
| Peak filter pointer | Filters the peak points by dragging the peak filter pointer with the mouse. For details, refer to Peak filter pad and peak filter point |

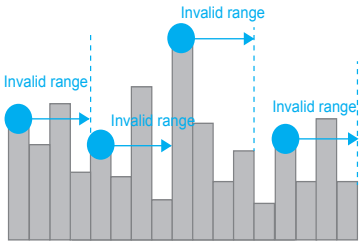
- **Peak filter pad and peak filter point**

Filters the peak points by combining the neighborhood range and the peak drop.



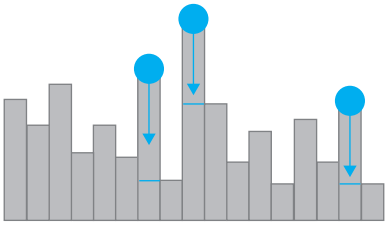

Neighborhood Range

Filters the X-axis ranges of certain interval in the order in which they found from the left side.



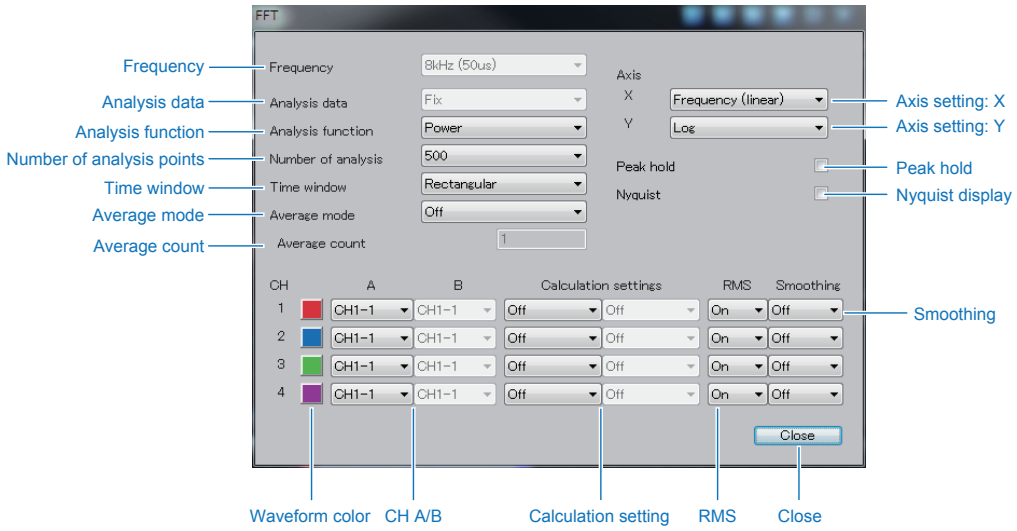

Peak Drop

Filtesr the peak points below peak drop set arbitrarily.



## 14-5. FFT Settings

You can perform the FFT settings to display the FFT Waveform.




| Name | Explanation |
|---|---|
| Frequency | Set the analysis frequency. |
| Analysis data | Select the analysis data.<br>Fix: The number of analysis points will be newly processed every time.<br>Move: In this process, the number of analysis points is increased or decreased as a moving average. |
| Analysis function | Select the analyzing function. Linear, Power, PSD, Cross, TRF (transfer function), Coherence, COP (coherence output power), and Y-T can be set. |
| Number of analysis points | Set the number of analysis points to be recorded in a single measurement.<br>The number of analysis points can be set to one of 500, 1000, 2000, 4000 and 10000. |
| Time window | Set the Time window. Select one of Rectangular, Hanning, Hamming, Blackman, Flattop and Exponential for the Time window. |
| Average mode | Set how to perform the averaging process. The averaging process varies depending on the state.<br>During free running or recording: Off, Summation (moved), Summation (fixed), Exponential (fixed)<br>During viewing: Off, Summation (fixed), Exponential (fixed) |
| Average count | Set the average count. The range between 2 and 999 can be set as the average count. |
| Axis setting: X | Set the scale on X axis. Frequency (linear), frequency (logarithm), period (linear), period (logarithm) can be selected. |
| Axis setting: Y | Set the scale on Y axis. Linear, LOG or Phase can be selected |
| Peak hold | Set On/Off for the Peak hold. When On is set, the maximum and minimum values at the analysis point are filled and then they are displayed. |
| Nyquist display | Changes to the Display Mode of the Nyquist diagram. |
| CH A/B | Set the channel to be analyzed with each analyzing function.<br>When CH A only is used: Linear, Power, PSD, Y-T<br>When CH A/B is used: Cross, TRF, Coherence, COP |
| Calculation settings | Set this settings to the channel only set to Linear, Power, PSD, Cross, TRF, Coherence, COP in the settings of the analyzing function.<br>None, Differential, D-Differential, Integral and D-Integral can be selected as the settable calculation. |
| RMS | Set this settings when Linear, Power, PSD, Cross is set in the analyzing function setting. Set On/Off for RMS. The default is On. |

| | |
|---|---|
| Smoothing | For the calculation result of the FFT, perform the moving average with arbitrary frequency width, and then smooth the waveform. The frequency width can be selected in the items calculated from the analysis frequency and the number of analysis points. |
| Close | Closes the window. |

### 14-5-1. Analyzing Function

- **Linear (Linear Spedctrum)**

Based on the results of the time axis data processed with FFT calculation, the amplitude or phase of each frequency is displayed.

- **Power (Power Spectrum)**

Based on the results of the time axis data processed with FFT calculation, the power of eqach frequency component is displayed.

- **PSD (Power Spectrum Density)**

The power spectrum per unit interval of frequency is known as PSD. Since the results of the FFT analysis is the value of integral for the spectrum distributed on the bandwidth (Range of the frequency resolution) determined from the analysis frequency and number of analysis points, the power spectrum of the signal such as a continuous spectrum is a value that varies depending on the settings of the analysis frequency range and the number of analysis points. When there is the signal that the spectrum is distributed in such a broad band and the signal is measured with the power spectral density, the cross spectrum measured regardless of the analysis frequency range and the number of analysis points is multiplied by the spectrum of two signals for each frequency component, and the magnitude of the power and the correlation of two signals are displayed.

- **Cross (Cross Spectrun)**

The cross spectrum measured is multiplied by the spectrum of two signals for each frequency component, and the magnitude of the power and the correlation of two signals are displayed. The cross spectrum allows you to reduce greatly the effects of noise, as compared with the case where only the power spectrum of the output signal is measured, by averaging the measured cross spectrum of the input and output signals even if there are a system that the noise is mixed in the input signal.

- **TRF (Transfer Function)**

The TRF showing the relationship between the input and output signals can be determined by calculating the ratio of the cross spectrum of the input and output signals and the power spectrum of the input signal. Similar to the cross spectrum, the averaging process allows you to reduce the effects of noise mixed in the system. However, the input signal contains frequency component across the analysis frequency is required to measure the TRF across the analysis frequency.

- **Coherence (Coherence Function)**

Coherence (Coherence Function)
The coherence is determined by calculating the ratio of the squared amplitude of the cross spectrum of the input and output signal and the product of the power spectrum of the input and output signals, and then the causal relationship between the input and output signals are displayed. The value of the coherence function is between 0 and 1. When the coherence function is 1, all the output signal is caused by the input signal, and when it is 0, the output signal is independent of the input signal at all. The measurement of the coherence function allows you to confirm the reliability of the measurement, such as the TRF. Note that,

when the averaging process is not performed, all the value of the coherence function is 1. When using the coherence function, make sure to perform the averaging process.

- **COP (Coherent Output Power)**

The product of the coherence function and the power spectrum of the output side is displayed.

- **Y-T**

When X Axis is fixed to the Time, Y Axis is fixed to the Linear, the change of the input signal with respect to the time axis is displayed.

## 14-5-2. Time Window

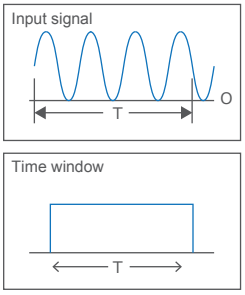
- **Desidctions of Time Window**

The input signal to be FFT analyzed is an infinite continuous signal, however only the signal within the finite time called Time window in infinitely continuous signal is subject to analysis. In FFT mode of the module, there is the following relationship to the time window length and analysis frequency.

$$\text{Time Window Length} = \frac{0.4}{\text{Frequency [Hz]}} \times \text{Number of analysis points [sec.]}$$

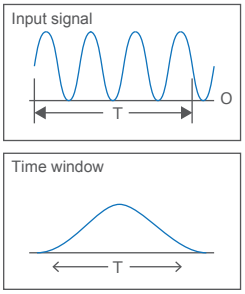
- **Rectangular**

No action is taken for the signal that is cut away with the time window. When the time window is used to cut the normal continuous waveform, the signal is affected by cutting with the Time window. However, when using the signal such that the length of waveform and time window match to an integer multiple of the period by attenuating within the time window, the result not affected by the time window can be obtained.



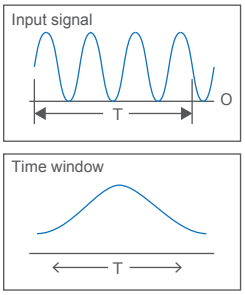

- **Hanning**

The time window displays so that the input signal is zero smoothly at start and end points in consecutive. Since the input is zero at both ends of the time window, even if the continuous waveform is cut, the effects of the cut can be minimized.



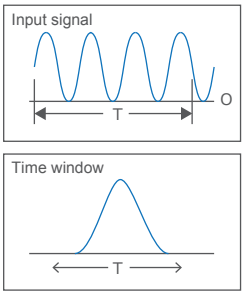

- **Hamming**

The hamming window is suitable to separate the signals in close proximity in comparison to the Hanning window. Make an attempt to use the Hamming If you can not improve sufficiently the frequency resolution.



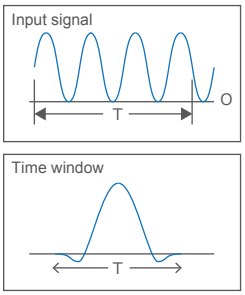

- **Blackman**

The frequency resolution is lower than Hanning and Hamming, however even the smaller signal can be analyze because of a wider dynamic range.




- **Flattop**

The amplitude can be accurately measured by flatting the peaks with the low ripple time window function.




- **Exponential**

Since this exponential is asymmetrical, it is used to perform the time asymmetric waveform analysis such as echo detection.

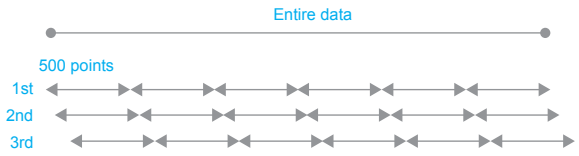
### 14-5-3. Average Mode and Average Count

The noise component contained in the signal can be removed by performing the averaging process. The averaging process varies depending on the state. The summed moving average can be performed during free running or recording. You can check the waveform in quick response without having to wait for the processing of the number of analysis points each time. This function is easy to use because the average count between the cursor A and B is automatically calculated.

- **During free running and recording**

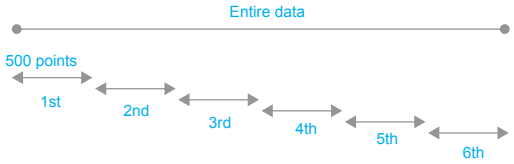
Summation (Moving)

When the average count is 6 times and the number of analysis points is 500 points
The averaging process is performed moving every point for the number of data (500 points x 6 times).



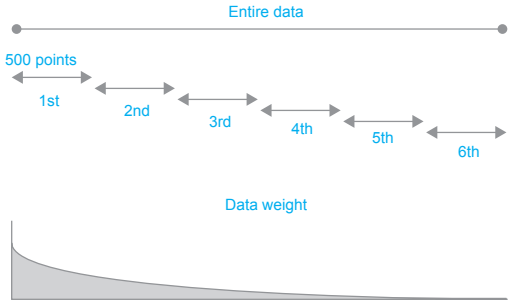

Summation (fixed)

When the average count is 6 times and the number of analysis points is 500 points
FFT process stops when the averaging is performed six times.




Exponential (fixed)

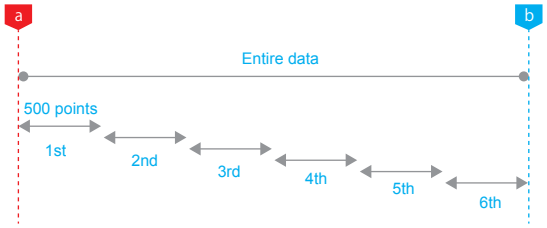
When the average count is 6 times and the number of analysis points is 500 points
The weight to be added is reduced as the average count progresses.




- **During viewing**

Summation (fixed)

When the number of analysis points is 500 points
During viewing, the number of times of the accounts between the cursor A and B divided by the number of analysis points is automatically set as the average count (6 times in the figure).

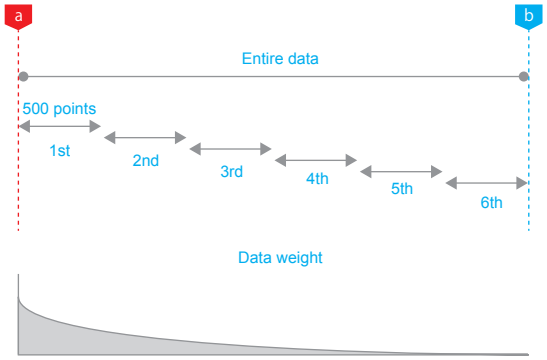


Exponential (fixed)

When the number of analysis points is 500 points

During viewing, the counts between the cursor A and B divided by the number of analysis points is automatically set as the average count (6 times in the figure).

The weight to be added is reduced as the average count progresses.



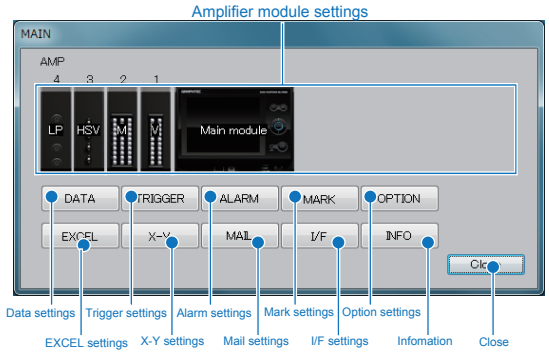
# 15. Device Settings

This is the screen to set recording and connection device settings. Device setting is available when the device is connected and not recording. The settings items in the following settings screen shows the setting of the device transmission when the basic parameters have been changed.

To go to the device setting screen, press the control panel button in the main window.


## 15-1. Main Settings

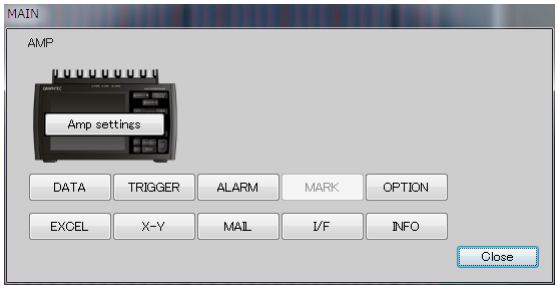
Individual functional buttons are shown in the main setting. By pressing a button, the window of the function will be opened.




GL220


GL820


GL900



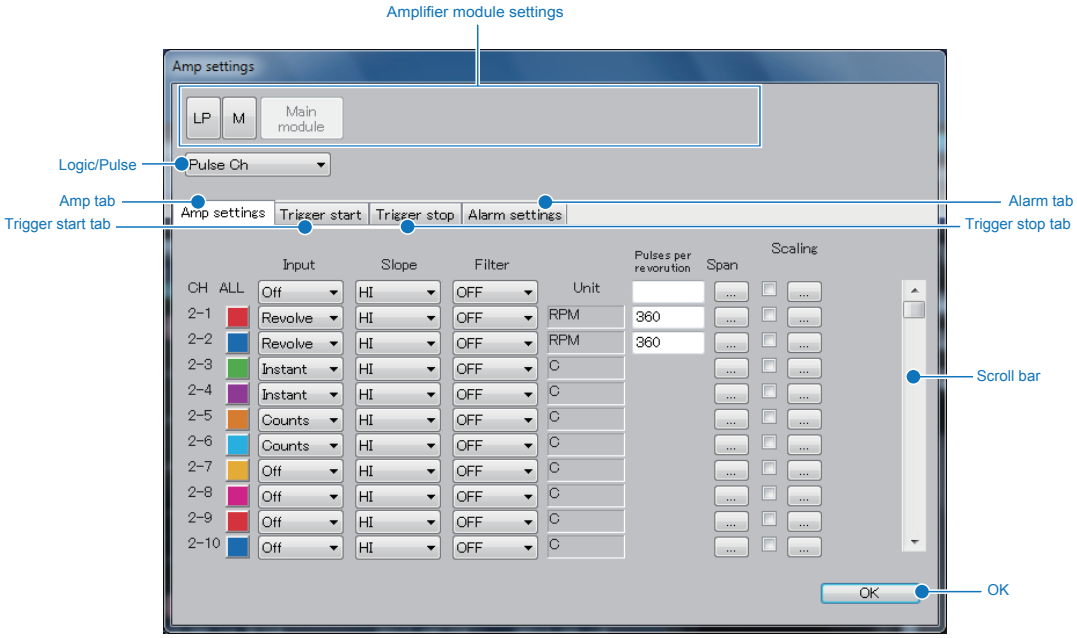
<table>
<tr><th>Name</th><th>Explanation</th></tr>
<tr><td>Amplifier module settings</td><td>Performs connected amplifier module setting, analog input setting, logic pulse input setting, trigger level setting, alarm level setting, etc. By pressing the connected amplifier module setting button, setting window of individual modules will be opened.
<table>
<tr><td>Main module Icon</td><td>  </td><td>Shows the GL7000 device module. Does not operate as a button. It is displayed no matter the settings in option display.</td></tr>
<tr><td>V (Voltage) Icon</td><td>  </td><td>Displayed when the Voltage Module is connected. The amplifier setting screen will be opened by clicking on the icon button.</td></tr>
<tr><td>M (Voltage/ temperature) Icon</td><td>  </td><td>Displayed when the Voltage/temperature Module is connected. The amplifier setting screen will be opened by clicking on the icon button.</td></tr>
<tr><td>HSV (High-speed Voltage) Icon</td><td>  </td><td>Displayed when the High-speed voltage Module is connected. The amplifier setting screen will be opened by pressing on the icon button.</td></tr>
<tr><td>HV (High-voltage) icon</td><td>  </td><td>Display this icon when the High-voltage Module is connected. Click the icon button to open the Amplifier Setting screen.</td></tr>
<tr><td>DCB (DC Strain) icon</td><td>  </td><td>Display this icon when the DC Strain Module is connected. Click the icon button to open the Amplifier Setting screen.</td></tr>
<tr><td>CHA (Charge) icon</td><td>  </td><td>Display this icon when the Charge Module is connected. Click the icon button to open the Amplifier Setting screen.</td></tr>
<tr><td>DCO (Voltage Output) icon</td><td>  </td><td>Display this icon when the Voltage Output Module is connected. Click the icon button to open the Amplifier Setting screen.</td></tr>
<tr><td>LP (Logic/Pulse) Icon</td><td>  </td><td>Displayed when the Logic/Pulse Module is connected. The amplifier setting screen will be opened by pressing on the icon button.</td></tr>
<tr><td>GL220 Icon</td><td>  </td><td>Displayed when the GL220 is connected. The amplifier setting screen will be opened by pressing on the icon button.</td></tr>
<tr><td>GL820 Icon</td><td>  </td><td>Displayed when the GL820 is connected. The amplifier setting screen will be opened by pressing on the icon button.</td></tr>
<tr><td>GL900 Icon</td><td>  </td><td>Displayed when the GL900 is connected. The amplifier setting screen will be opened by pressing on the icon button.</td></tr>
</table></td></tr>
<tr><td>Data settings</td><td>Performs settings related to recording like sampling interval setting, device recording setting, PC recording setting.</td></tr>
<tr><td>Trigger settings</td><td>Set conditional trigger for the start and stop of recording.</td></tr>
<tr><td>Alarm settings</td><td>Set the requirements for signal sending to the alarm output port.</td></tr>
<tr><td>Mark settings</td><td>Set the marks displayed on the waveform.</td></tr>
<tr><td>Option Settings</td><td>Configure option settings.</td></tr>
<tr><td>Excel settings</td><td>Configure direct Excel transfer settings. For this function to work, Microsoft Excel must be installed and able to be used.</td></tr>
<tr><td>X-Y settings</td><td>To set X-Y waveform mode.</td></tr>
<tr><td>Mail settings</td><td>For mails that alerts the occurring of alarms when using the alarm function. To use this function, the PC must allows sending of mails. Depending on the mail-sending SMTP server, there are cases in which mails cannot be sent.</td></tr>
<tr><td>I/F settings</td><td>To perform interface settings.</td></tr>
<tr><td>Information</td><td>Shows information like the device version.</td></tr>
</table>

## 15-2. Amplifier Module Settings

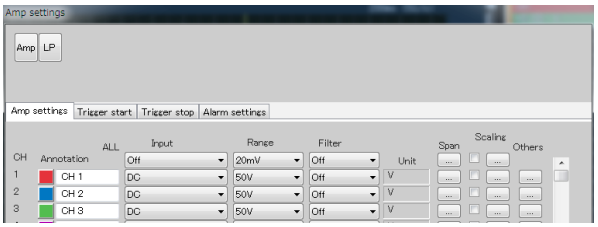
Performs connected amplifier module setting, analog input setting, logic pulse input setting, trigger level setting, alarm level setting, etc. By pressing the connected amplifier module setting button, setting window of individual modules will be opened.

### 15-2-1. Amplifier Module Settings Screen

Can change the tabs related to the amplifier in the amplifier module settings display.



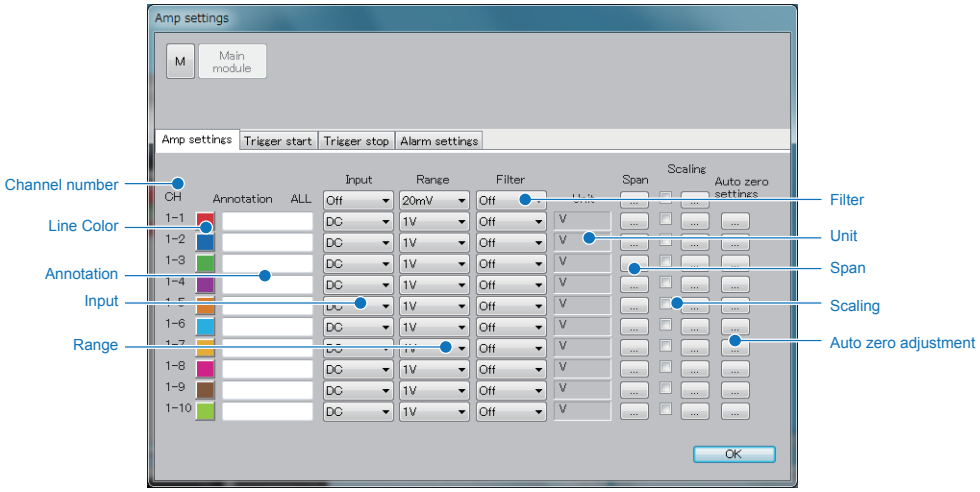

When using the GL220, GL820 and GL900



| Name | Explanation |
|---|---|
| Amplifier module settings | Displays the settings of the connected amplifier module. |
| Logic/Pulse | Switching of logic pulse. Amplifier module only shows logic/pulse modules. |
| Amp tab | Configure input related settings. |
| Trigger start tab | Configure Trigger-start tab related settings. |
| Trigger stop tab | Performs settings related to trigger stop. |
| Alarm tab | Performs settings related to alarm. |
| Scroll Bar | Appears when more than 10 channels are displayed in the amplifier tab and allows the switching between channel lists. |
| OK | Closes the window. |

## 15-2-2. Amplifier Setting tab: Voltage, Voltage/temperature, High-speed Voltage, High-voltage Modules, GL220, GL820 and GL900

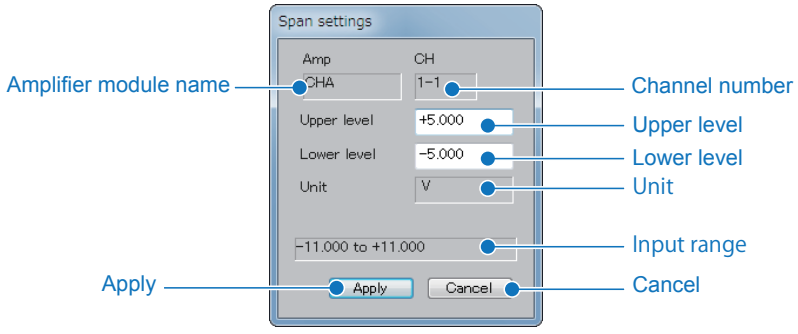
Set the amplifier tab when the Voltage, Voltage/temperature, High-speed Voltage or High-voltage Modules are connected.




| Name | Explanation |
|---|---|
| Channel number | Displays the input signal's module number and channel number.<br>GL7000: [Module number]-[Channel number]<br>GL220, GL820 and GL900 : [Channel number] |
| Line color | It is possible to set the waveform color. (* The line color changing function is not provided in the GL220, GL820 and GL900.) |
| Annotation | It is possible to input signal names to each channel. Up to a maximum of 31 characters can be entered. |
| Input | To select input. There may be difference in the selection value depending on the type of machine or amplifier module. For more details, please refer to the main module's user's manual. |
| Range | To select the input range. There may be difference in the selection value depending on the type of machine or amplifier module. For more details, please refer to the main module's user's manual. |
| Filter | To select a filter There may be difference in the selection value depending on the type of machine or amplifier module. For more details, please refer to the main module's user's manual. |
| Unit | Displays the unit. |
| Span | To set the upper value and lower value of the signal displayed in the waveform window. |
| Scaling | Unit conversion. When the voltage input is set to 4-point, it is possible to set the temperature input as offset. |
| Auto zero adjustment | To adjust the current input value of each channel to the zero-point position. |

- **Span Setting**

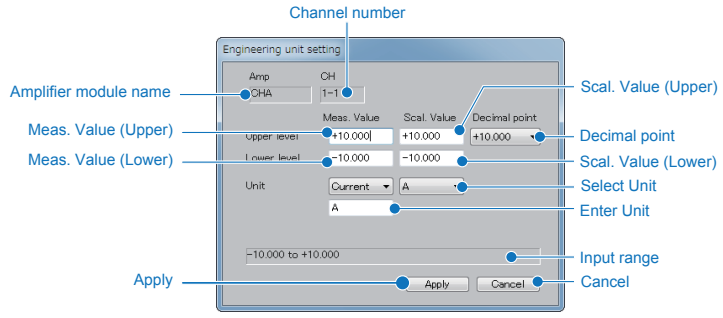
To set the span. The setting is done by inputting numerical values.



| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>GL7000: [Module number]-[Channel number]<br>GL220, GL820, and GL900: [Channel number] |
| Upper level | To input the span upper value. The largest value during voltage input is ±110% of the full scale (range). That temperature input is from +2000ºC to -270ºC (Celsius). That during humidity input is from +110% to -110%. |
| Lower level | To input the span lower value. The largest value during voltage input is ±110% of the full scale (range). That temperature input is from +2000ºC to -270ºC (Celsius). That during humidity input is from +110% to -110%. |
| Unit | Displays the unit. |
| Input range | Display input range. |
| Apply | Transmits entered values to the main module. |
| Cancel | Cancel and close input information.. |

- **Scaling Setting**

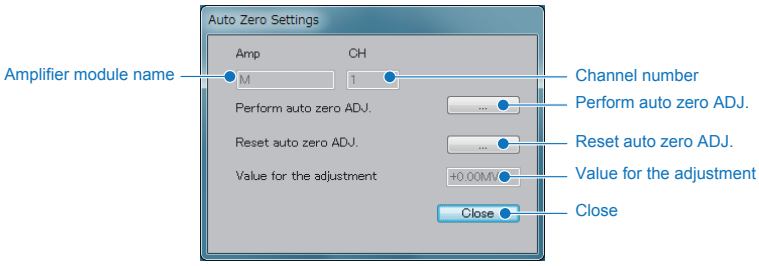
Changes the scaling setting. Setting is done by inputting the upper and lower values of both the input side and the conversion side. It is possible to set 2-point offset during temperature input.




| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>GL7000: [Module number]-[Channel number]<br>GL220, GL820, and GL900: [Channel number] |
| Measured value (Upper/Lower) | To set the upper value/lower value of the original value. There is not difference between the upper value/lower value during temperature input. |
| Scaling value (Upper/Lower) | To set the post-conversion upper value/lower value There is not difference between the upper value/lower value during temperature input. |
| Decimal point | Set decimal point position on output side. |
| Select unit | Select the unit. |
| Enter Unit | To input the post-conversion unit. Up to a maximum of 8 characters can be entered. |
| Input range | Display input range. |
| Apply | Transmits entered values to the main module. |
| Cancel | Cancel and close input information. |

- **Auto zero adjustment**

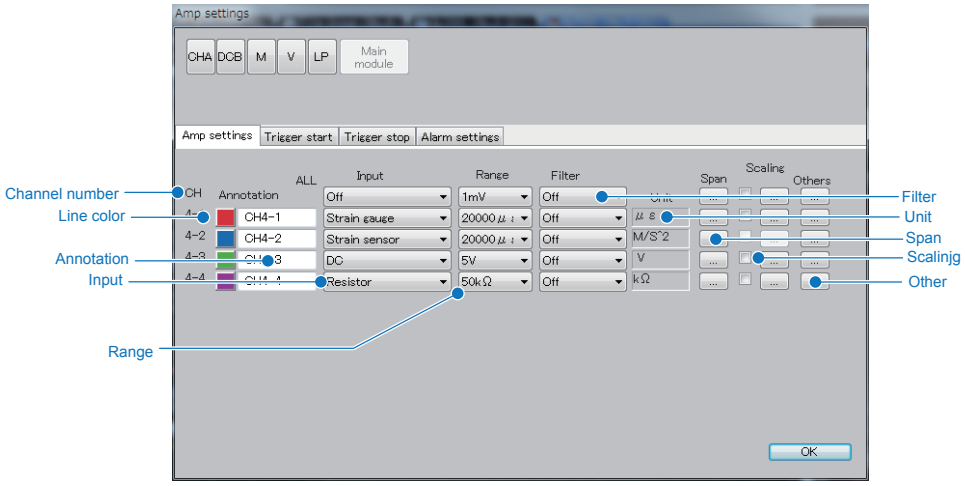
To adjust the current input value to zero-point. The automatic adjustment range is ±10% of the setting range. The automatic adjustment value is reset when the range of the channel is switched.




| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel Number | Displays the input signal's module number and channel number.<br>GL7000: [Module number]-[Channel number]<br>GL220, GL820 and GL900: [Channel number] |
| Perform auto zero adjustment | To perform zero-point automatic adjustment. |
| Reset auto zero adjustment | To delete the zero-point voltage value. |
| Value for the adjustment | Displays the value for the adjustment. |
| Close | Closes the screen. |

## 15-2-3. **Amplifier Setting tab: DC Strain Module**

Set the amplifier tab when the DC Strain Module is connected.

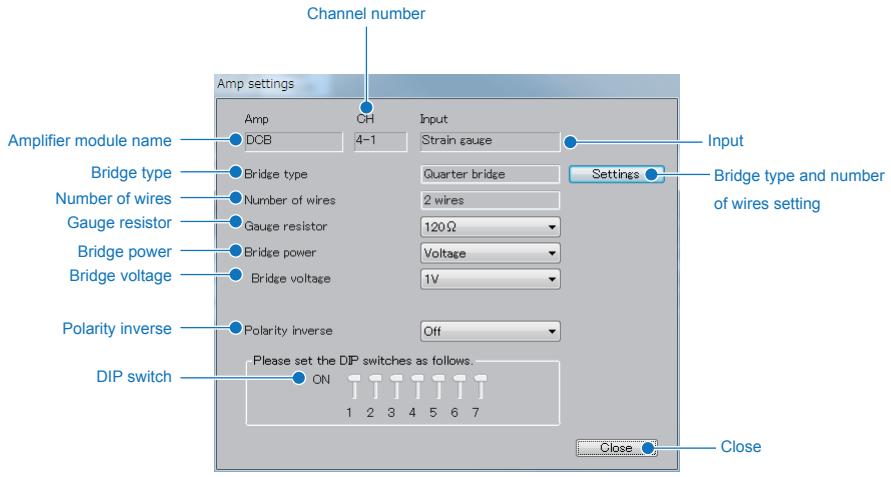



| Name | Explanation |
|---|---|
| Channel number | Displays the input signal's module number and channel number.<br>[Module number]-[Channel number] |
| Line color | It is possible to set the waveform color. |
| Annotation | It is possible to input signal names to each channel. Up to a maximum of 31 characters can be entered. |
| Input | Select the input. The sensor menu is displayed after selecting it. The selected value varies depending on the type of device and amplifier module. |
| Range | To select the input range. There may be difference in the selection value depending on the type of machine or amplifier module. For more details, refer to the main module's User's Manual. |
| Filter | To select a filter There may be difference in the selection value depending on the type of machine or amplifier module. For details, refer to the main module's User's Manual. |
| Unit | Displays the unit. |
| Span | To set the upper value and lower value of the signal displayed in the Waveform Window. |
| Scaling | Unit conversion. When the voltage input is set to 4-point, it is possible to set the temperature input as offset. |
| Other | Set the other settings. In the Other in “All”, the auto-balancing only can be set. |

- **Sensor setting**

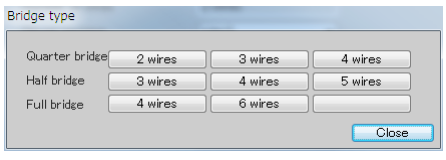
Set the sensor. The settings vary depending on the input state.

When the strain gauge is used




| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>[Module number ]-[Channel number] |
| Input | Displays the settings have been set. |
| Bridge type | Displays the set bridge type. |
| Number of wires | Displays the set number of wires. |
| Bridge type and number of wires settings | Set the bridge type and the number of wires. |
| Gauge resistor | Set the gauge resistor.<br>Bridge type: Quarter bridge / Half bridge — Settings: 120/350 (Ω)<br>Bridge type: Full bridge — Settings: 50 to 10000 (Ω) |
| Bridge power | Set the bridge power.<br>Voltage/Constant current<br>* When the quarter bridge (3 wires, 4 wires), half bridge (4 wires) and full bridge (6 wires) are used, the voltage only can be set. |
| Bridge voltage (Targeted bridge voltage) | Set the bridge voltage (when the bridge power is voltage) and the targeted bridge voltage (when the bridge power is constant current). |
| Polarity inverse | Set the polarity inverse.<br>Off/On |
| DIP switch | Set the DIP switch on the DC Strain Module in accordance with the sensor settings. |

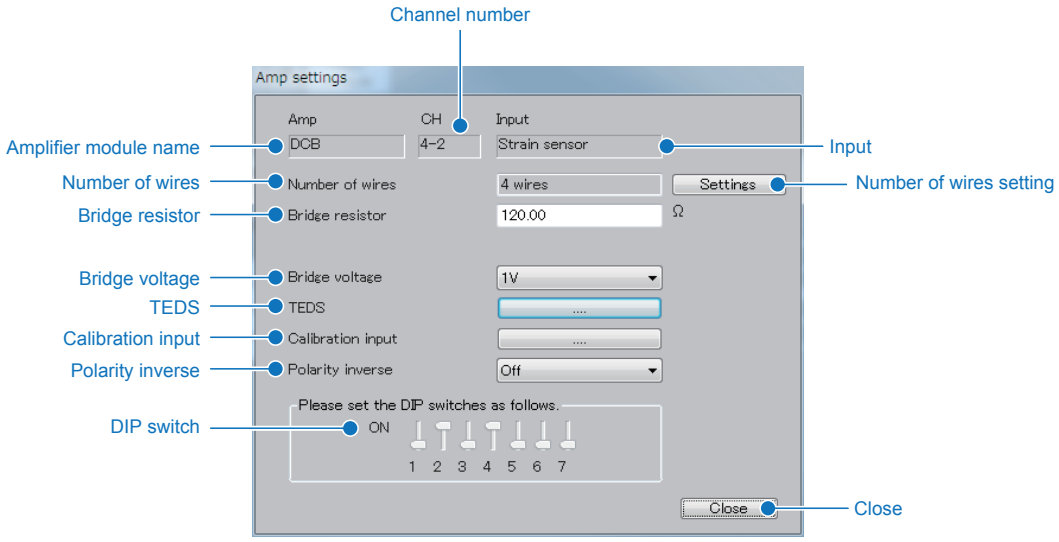
Bridge type and Number of wires




| Bridge type | Settings |
|---|---|
| Quarter bridge | 2 / 3 (S) / 4 (S) wires |
| Half bridge | 3 / 4 / 5 (S) wires |
| Full bridge | 4 / 6 wires |

* (S) indicates that the shunt calibration is available.

When the strain sensor is used



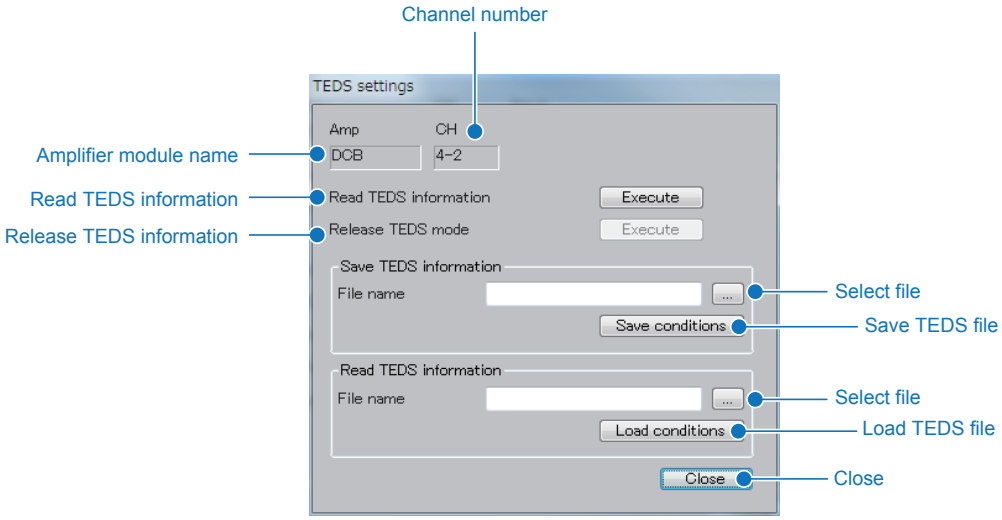

| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>[Module number]-[Channel number] |
| Input | Displays the settings have been input. |
| Number of wires | Displays the number of wires has been set. |
| Number of wires setting | Set the bridge type and Number of wires. |
| Bridge resistor | Set the bridge resistor.<br>50 to 10000 (Ω) |
| Bridge voltage | Set the bridge voltage. |
| TEDS | Open the TEDS menu. |
| Calibration input | Open the Calibration Input menu. |
| Polarity inverse | Set the polarity inverse.<br>Off/On |
| DIP switch | Set the DIP switch on the DC Strain Module in accordance with the sensor settings. |

Number of wires setting

Set the number of wires (4/6 wires).

## TEDS

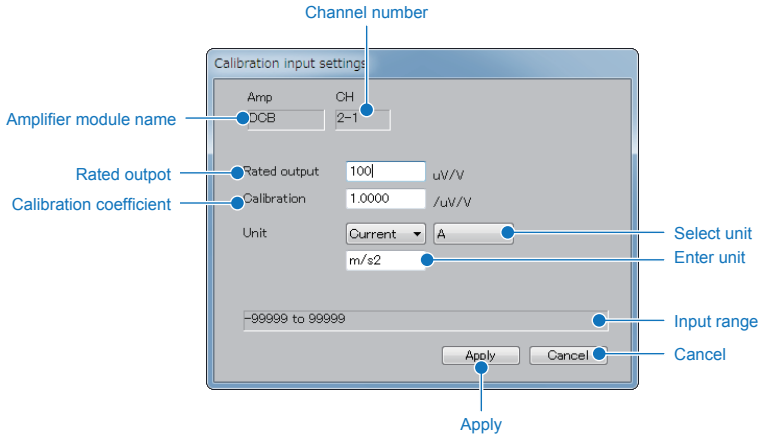
When TEDS-compatible sensor is connected, TEDS information is read, or the file is saved or read.




| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>[Module number]-[Channel number] |
| Read TEDS information | Read TEDS information from the internal TEDS sensor. |
| Release TEDS information | Release TEDS information read from the internal TEDS sensor. |
| Save TEDS file | Save TEDS information in a file. |
| Read TEDS file | Read TEDS information file. |
| Select file | Select a file from the module. |
| Close | Closes the window. |

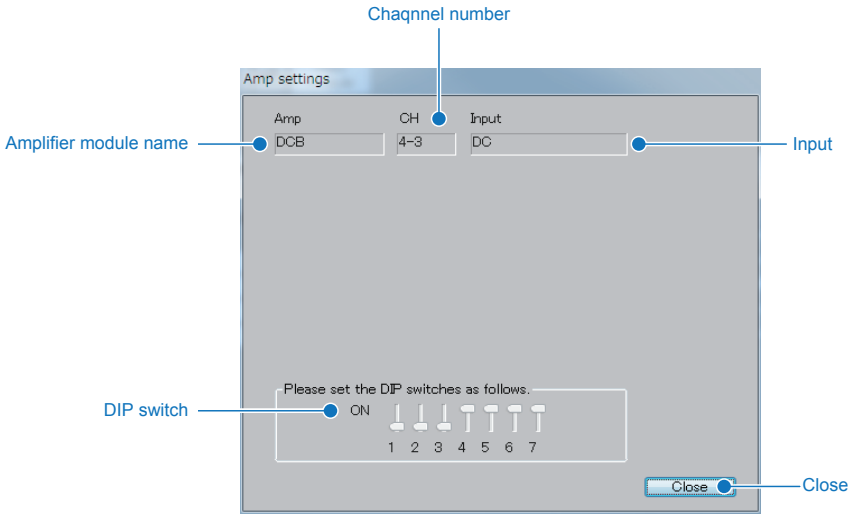
## Calibration input

Perform the calibration input.




| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>[Module Number ]-[Channel Number] |
| Rated output | Input the rated output. |
| Calibration coefficient | Input the calibration coefficient. |
| Select unit | Select the unit. |
| Enter unit | Input the unit. Up to 8 half-width characters are allowed. |
| Input range | Display input range. |
| Apply | Confirm the settings. |
| Cancel | Cancel and close input information. |

When DC voltage and resistance are used

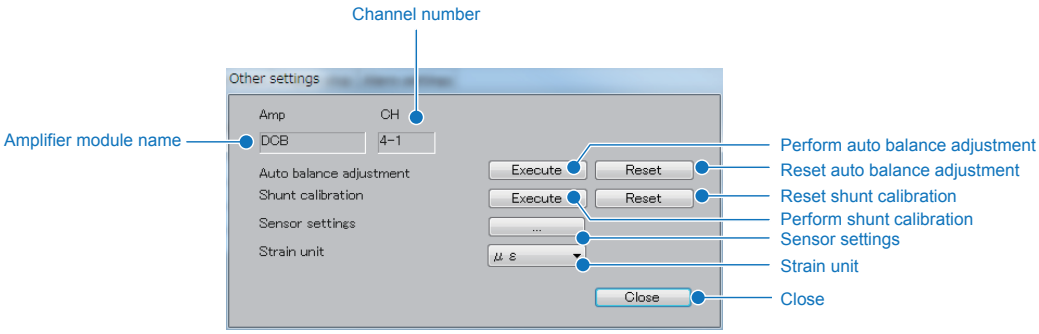



| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>[Module number]-[Channel number] |
| Input | Displays the settings have been input. |
| DIP switch | Set the DIP switch on the DC Strain Module in accordance with the sensor settings. |
| Close | Closes the menu. |

- Other settings

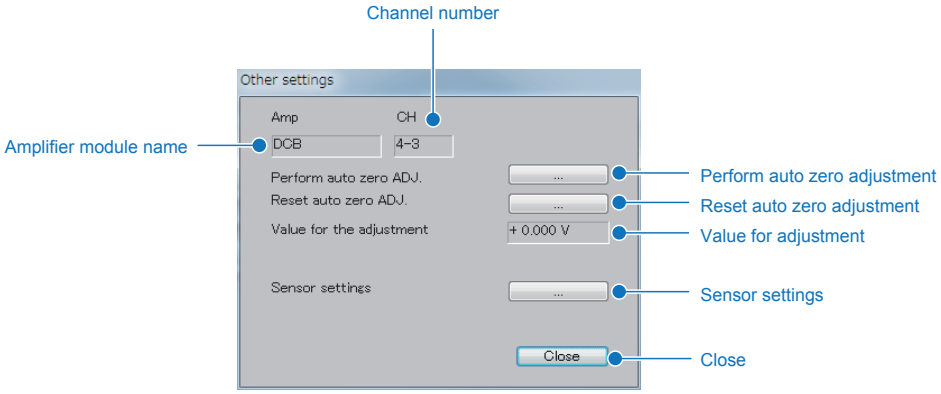
Set the other settings. The settings vary depending on the input state.

When the strain gauge or strain sensor is used




| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>[Module Number]-[Channel Number] |
| Perform auto balance adjustment | Starts the auto-balancing. |
| Reset auto balance adjustment | Resets the auto-balancing. |
| Perform shunt calibration | Starts the shunt calibration.<br>The shunt calibration is used for:<br>Quarter bridge: 3 wires, 4 wires<br>Half bridge: 4 wires<br>when the strain gauge is set. |
| Reset shunt calibration | Resets the shunt calibration. |
| Sensor settings | Open the Sensor Setting menu. |
| Strain unit | Modify the unit of the strain.<br>uE, mV/V |
| Close | Closes the screen. |

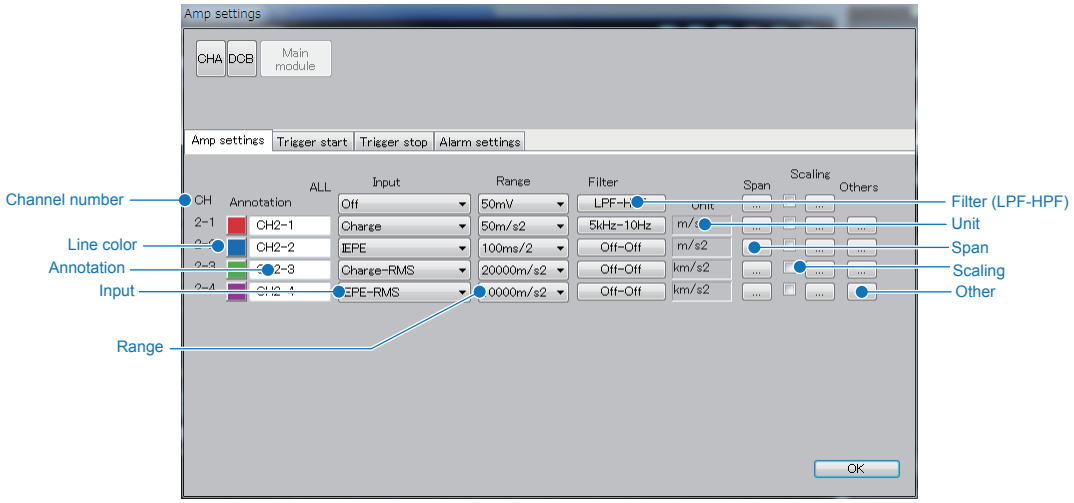
When DC voltage and resistance are used




| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>[Module Number]-[Channel Number |
| Perform auto zero adjustment | To perform zero-point automatic adjustment. |
| Reset auto zero adjustment | To delete the zero-point voltage value. |
| Value for the adjustment | Displays the adjusted voltage value. |
| Sensor settings | Open the Sensor Setting menu. |
| Close | Closes the screen. |

## 15-2-4. **Amplifier Setting tab: Charge Module**

Set the Amplifier tab when the Charge Module is used.

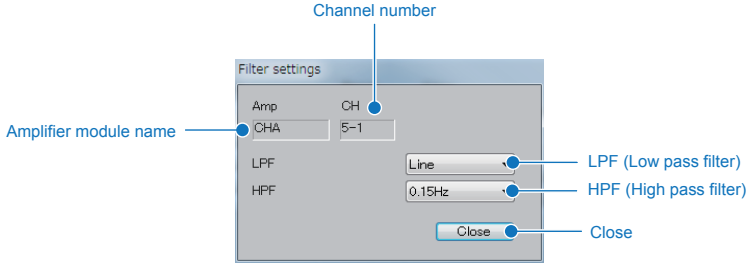



| Name | Explanation |
|---|---|
| Amplifier module name | Displays the input signal's module number and channel number.<br>[Module number]-[Channel number] |
| Line color | Set the waveform color for each channel. |
| Annotation | The signal name can be arbitrarily entered to the each channel. |
| Input | Select the input. The selected value varies depending on the type of device and amplifier module. For details, refer to GL7000 User's Manual. |
| Range | Select the input range. The selected value varies depending on the type of device and amplifier module. For details, refer to GL7000 User's Manual. |
| Filter (LPF-HPF) | Select the filter. The selected value varies depending on the type of device and amplifier module. For details, refer to GL7000 User's Manual. |
| Unit | Displays the unit. |
| Span | Set the upper and lower limit values for the signal displayed in Waveform Window. |
| Scaling | Converts the unit. The 4-point setting for the voltage input and the offset for the temperature input can be set. |
| Other | Set the other settings. |

* WARNING
When the voltage signal is set, change the input setting to DC, AC, DC-RMS, AC-RMS.
If IEPE is set, the power volatge for driving the sensor from the BNC connector is applied. This power voltage may damage the modules and oject to measured

- Filter (HPF-LPF)

Set the HPF (high pass filter) and LPF (low pass filter).

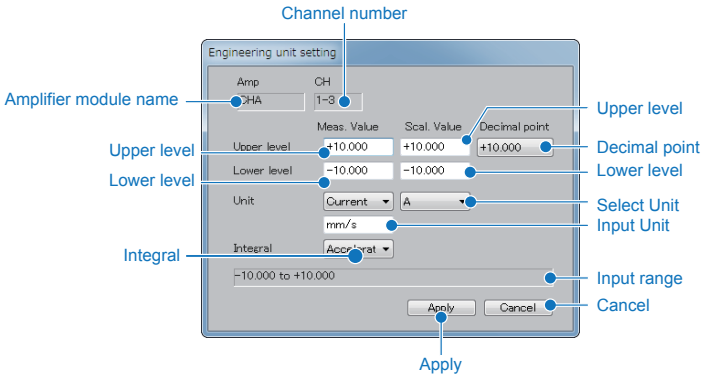



| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>[Module number]-[Channel number] |

| | |
|---|---|
| LPF (low pass filter) | Set the LPF (low pass filter). |
| HPF(high pass filter) | Set the HPF (high pass filter). |
| Close | Closes the screen. |

- **Engineering Settings**

Setting is done by inputting the upper and lower values of both the input side and the conversion side. It is possible to set 2-point offset during temperature input.




| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>[Module number]-[Channel number] |
| Measured value (Upper/Lower) | To set the upper value/lower value of the original value. There is not difference between the upper value/lower value during temperature input. |
| Scaling value (Upper/Lower) | To set the post-conversion upper value/lower value. There is not difference between the upper value/lower value during temperature input. |
| Decimal point | Set decimal point position on output side. |
| Select Unit | Select the unit. |
| Input Unit | To input the post-conversion unit. Up to a maximum of 8 characters can be entered. |
| Integral | Perform the integral calculation for the signal.<br>Acceleration/velocity/displacement |
| Input range | Display input range. |
| Apply | Transmits entered values to the main module. |
| Cancel | Cancel and close input information. |

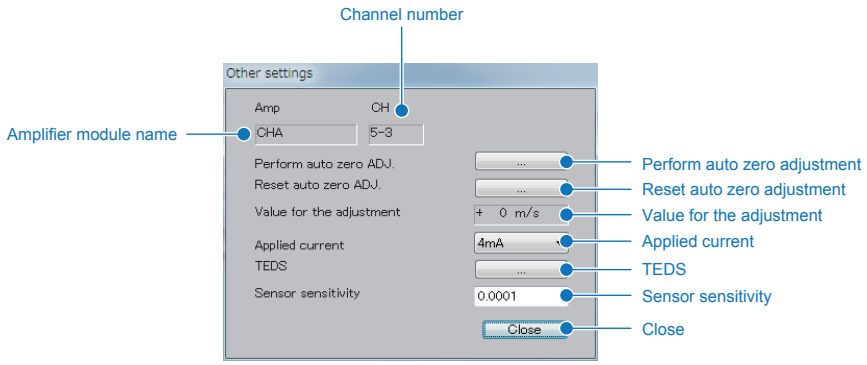
- Other Settings

Set the other settings. The settings vary depending on the input state.

DC, AC, DC-RMS, AC-RMS

This is the same as the voltage-type amplifier.

Charge, IEPE, C-RMS, IEPE-RMS

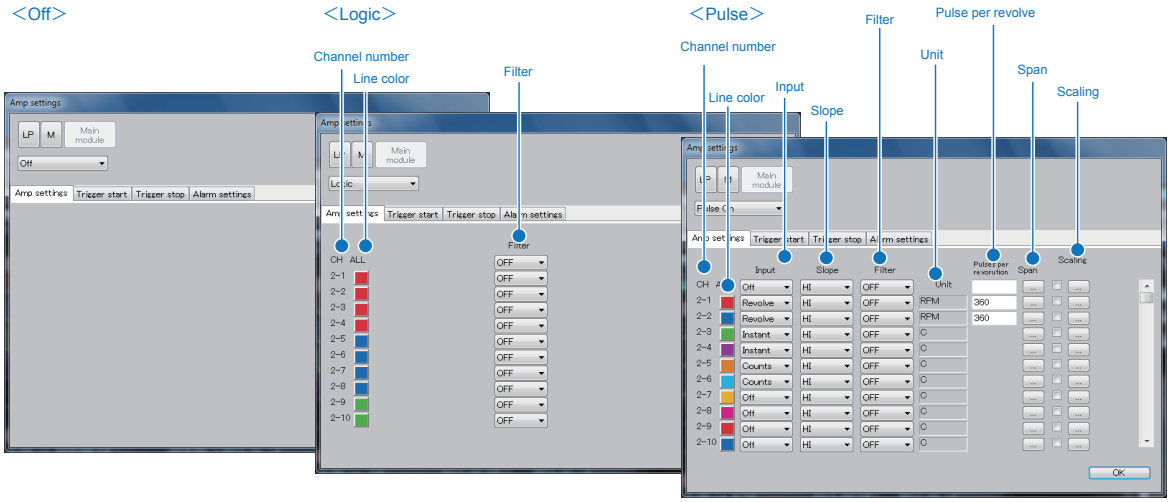



| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |

| | |
|---|---|
| Channel number | Displays the input signal's module number and channel number.<br>[Module number]-[Channel number] |
| Perform auto zero adjustment | Perform the automatic zero point adjustment |
| Reset auto zero adjustment | Reset the zero point adjustment |
| Value for the adjustment | Displays the Value for the adjustment. |
| Applied current | Set the applied current. The Voltage and V-RMS only can be set.<br>4/8 (mA) |
| TEDS | Open the TEDS settings. |
| Sensor sensitivity | Set the sensor sensitivity.<br>Charge, C-RMS: 0.0001 mV to 100.0000 mV (m/s2)<br>Buit-in amplifier, Buit-in amplifie-RMS: 0.0001 pC to 100.0000 pC (m/s2) |
| Close | Closes the screen. |

## 15-2-5. Amplifier Setting tab: Logic/Pulse Module

To set amplifier tab during Logic/Pulse Modules. The setting screen changes with the switch of Logic/Pulse.




- **When Off Setting**

Logic/Pulse is set as Off. Nothing will be displayed.

- **When Logic Setting**

The logic pulse setting is set to logic.

| Name | Explanation |
|---|---|
| Channel number | Displays the input signal's module number and channel number.<br>GL7000: [Module number]-[Channel number]<br>GL220, GL820 and GL900: [Channel number] |
| Line color | It is possible to set the waveform color. Depending on the connected device, some devices might not save the waveform color to the main module. If this occurs, the waveform color will reverted to the default color. |
| Filter | To select a filter. There may be difference in the selection value depending on the type of machine or amplifier module. For more details, refer to the main module's User's Manual. |

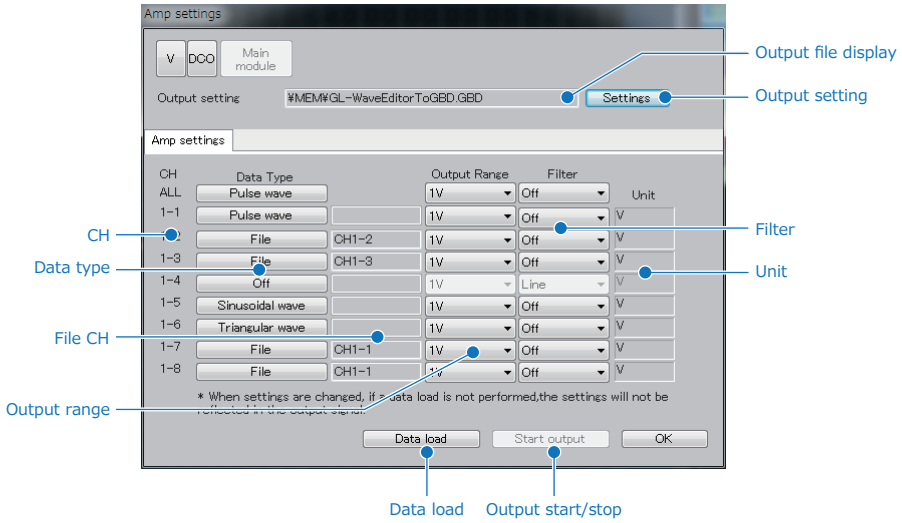
- **Pulse Setting**

The Pulse Setting is automatically set to Logic Pulse defaults

| Name | Explanation |
|---|---|
| Channel number | Displays the input signal's module number and channel number.<br>GL7000: [Module number]-[Channel number]<br>GL220, GL820 and GL900: [Channel number] |
| Line color | It is possible to set the waveform color. Depending on the connected device, some devices might not save the waveform color to the main module. If this occurs, the waveform color will reverted to the default color. |
| Input | Revolve: Pulses generated per minute will be counted.<br>Counts: Will estimate and count the generation of internal sampling pulses.<br>Instant: Will count the generation of internal sampling pulses. |
| Slope | High: Tallies signal build-up.<br>Low: Tallies signal decay. |
| Filter | Setting the pulse filter. The filter conforms approximately -3dB at 30Hz. |
| Unit | Displays the unit. |
| Pulse per revolve. | Set the number of pulses in a single rotation. Available for input only when under "Number of Rotations". (GL7000 only) |
| Span | Setting the pulse span. Please refer to the analog amplifier span. |
| Scaling | Unit conversion. Refer to the analog amplifier scaling. |

## 15-2-6. Amplifier Setting tab: Voltage Output Module

To set amplifier tab during the Voltage Output Modules. (GL7000 only)

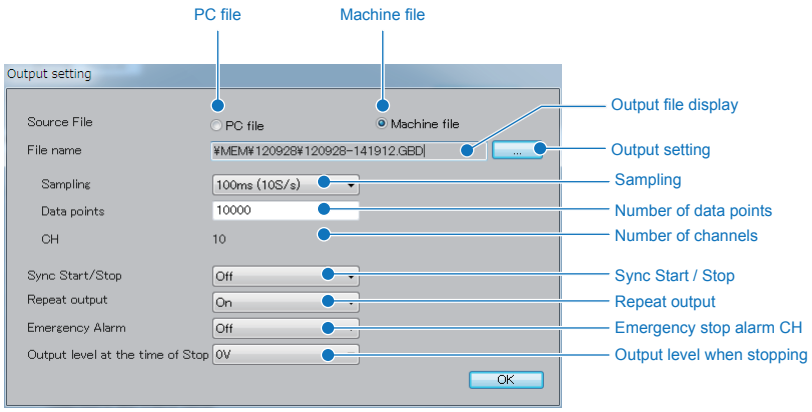



| Name | Explanation |
|---|---|
| Channel number | Displays the input signal's module number and channel number.<br>[Module number]-[Channel number] |
| Data type | Set the data type to be output. |
| Output range | Select the output range. |
| File CH | When the data type is set to Data file, the number of channels for the data file is displayed |
| Output file display | Select the filter. |
| Output setting | Set the output file and associated items. |
| Unit | Display the unit. |
| Data load | Transfer the data to the Voltage Output Module in the GL7000. |
| Output start / Output stop | Start or stop the signal output from the Voltage Output Module in the GL7000. |

* The CSV waveform editing macro "GL-WaveEditor" supplied with this software generates the wave (Sinusoidal wave or Triangular wave) using the CSV file recorded by this software and GL7000. The GL-WaveEditor can be found in "My Documents" → "Graphtec" → "GL-Connection" → "Temp". Microsoft EXCEL (Office 2003 or later) must be installed.

- **Output setting**

Set the output file and associated operation controls.



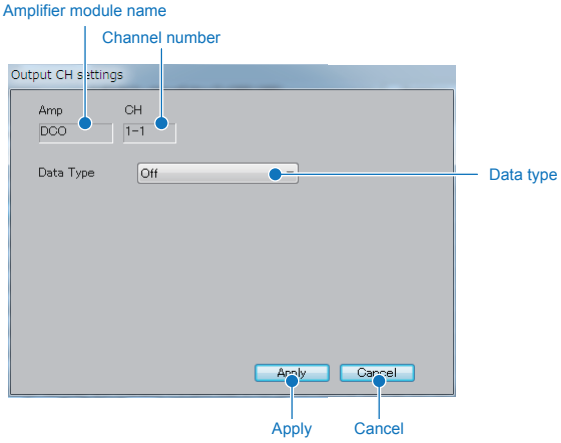

| Name | Explanation |
|---|---|
| PC file | Select when outputting the file in the PC. |
| Machine file | Select when outputting the file in the GL machine module. |

| | |
|---|---|
| Output file display | Display the file name to be output. |
| Sampling | Display the sampling interval of the file displayed in the output file. The sampling of the signal to be output to the Voltage Output Module can be changed. |
| Number of data points | Display the number of data points of the file displayed in the output file. Set the number of signal points to be voltage output to the Voltage Output Module. |
| Number of channels | Display the number of channels of the file displayed in the output file. |
| Sync Start / Stop | The signal output from the Voltage Output Module is started at the same time as the recording start. The signal output from the Voltage Output Module is stopped when stopping the recording. |
| Repeat output | When the outputs of number of data points are completed, set whether repeatedly outputting from the beginning of the data or not. |
| Emergency stop alam CH | When the alarm occurs, set whether stopping the signal output from the Voltage Output Module or not. |
| Output level when stopping | When the output is stopped, set whether retaining the signal level at that time or switching to 0 levels. |

- **Output CH setting**

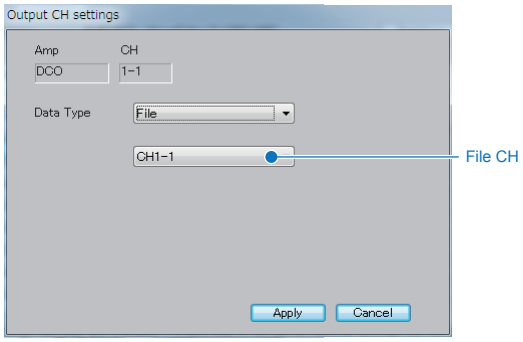
Set the channel that transfers the data to the Voltage Output Module.

Data type: Off



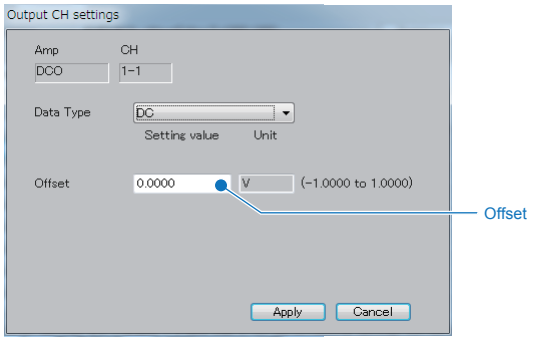

| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Display the module number and channel number. [Module number]-[Channel number] |
| Data type | Set the data type to be output.<br>Off, Data file, DC, Sinusoidal wave, Triangular wave, Ramp wave, Pulse wave |

Data type: Data file



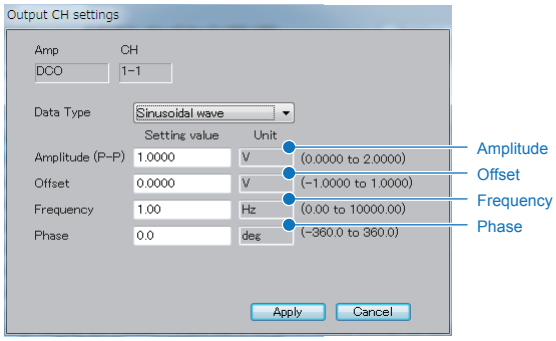

| Name | Explanation |
|---|---|
| File CH | When the data type is set to Data file, select which channel in the data file is output. |

## Data type: DC



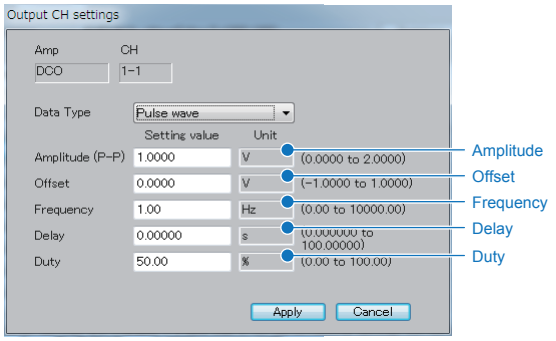

| Name | Explanation |
|---|---|
| Offset | Set the offset (Range: Within the (±) setting range). |

## Data type: Sinusoidal wave, Triangular wave, Ramp wave



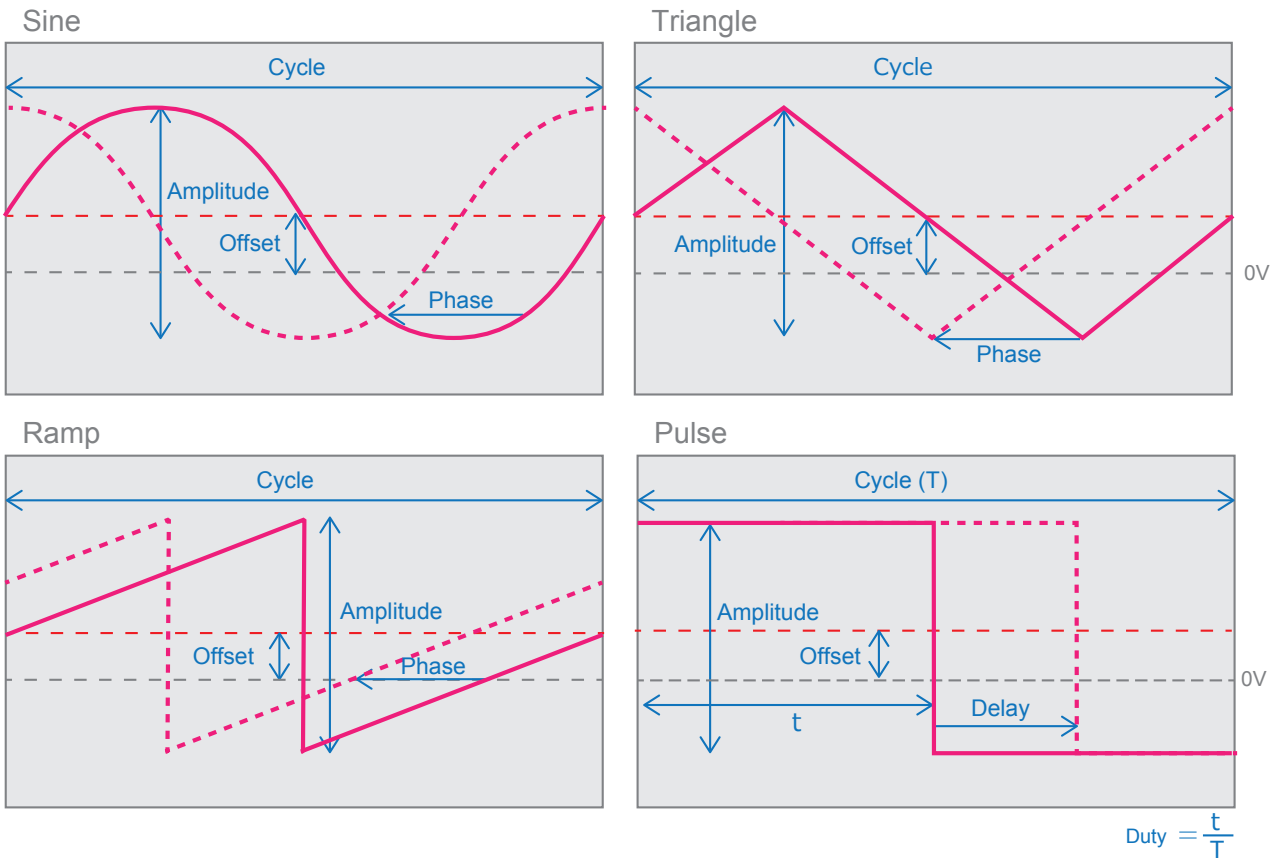

| Name | Explanation |
|---|---|
| Amplitude | Set the amplitude (P-P) (Max. value: up to 2 times of the setting range).<br>(Example) Amplitude 1V: +0.5 to -0.5 |
| Offset | Set the offset (Range: Within the (±) setting range). |
| Frequency | Set the frequency (Range: 0.00 to 10000.00 Hz).<br>Approx. 1/10 cycle of the sampling interval is a criteria.<br>(Example) Sampling 1ms (1kHz): 0 to 100Hz |
| Phase | Set the phase (Range: ±0.0 to 360.0 deg.). |

## Data type: Pulse wave



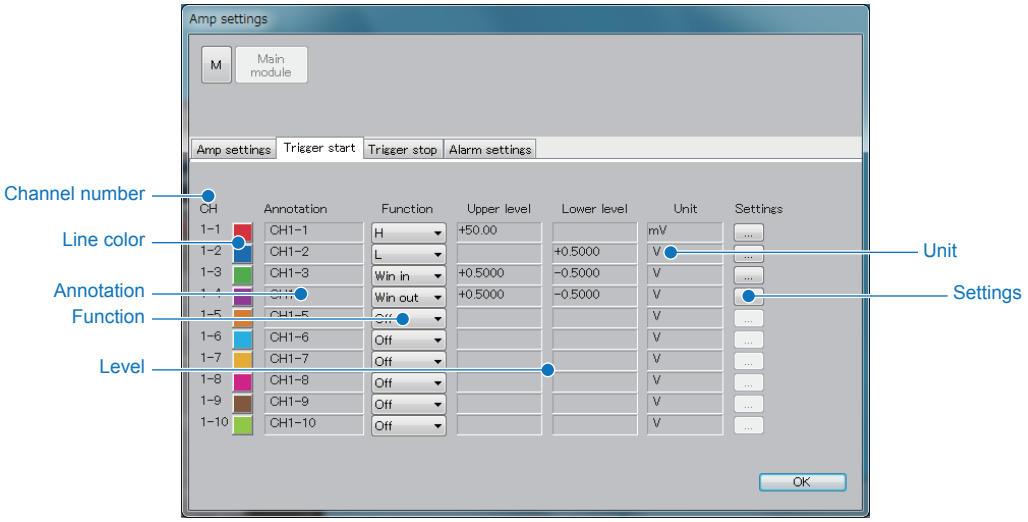

| Name | Explanation |
|---|---|
| Amplitude | Set the amplitude (P-P) (Max. value: up to 2 times of the setting range).<br>(Example) Amplitude 1V: +0.5 to -0.5 |
| Offset | Set the offset (Range: Within the (±) setting range). |
| Frequency | Set the frequency (Range: 0.00 to 10000.00 Hz).<br>Approx. 1/10 cycle of the sampling interval is a criteria.<br>(Example) Sampling 1ms (1kHz): 0 to 100Hz |
| Delay | Set the delay (Range: 0.00000 to 100.00000 sec.). |
| Duty | Set the duty (Range: 0.00 to 100.00%). |

- **Signal waveform generated**



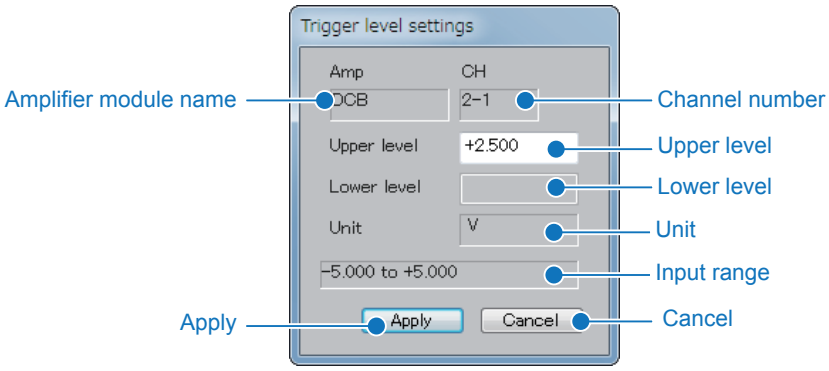
## 15-2-7. **Trigger-start/stop Setting Tab**

Setting the trigger level for each channel.




| Name | Explanation |
|---|---|
| Channel Number | Displays the input signal's module number and channel number.<br>GL7000: [Module number]-[Channel number]<br>GL220, GL820 and GL900: [Channel number] |
| Line Color | Displays the waveform color for each channel. |
| Annotation | Displays the annotation for each channel. |
| Function | Off: Is invalid<br>High: A trigger will activate in response to an input signal exceeding it's set level.<br>Low: A trigger will activate in response to an input signal falling below it's set level.<br>Window In: A trigger will activate in response to the input signal falling inside it's set level.<br>Window Out: A trigger will activate in response to the input signal falling outside it's set level. |
| Level | Displays the level setting. |
| Unit | Displays the unit. |
| Settings | Displays a screen for setting upper and lower limits. |

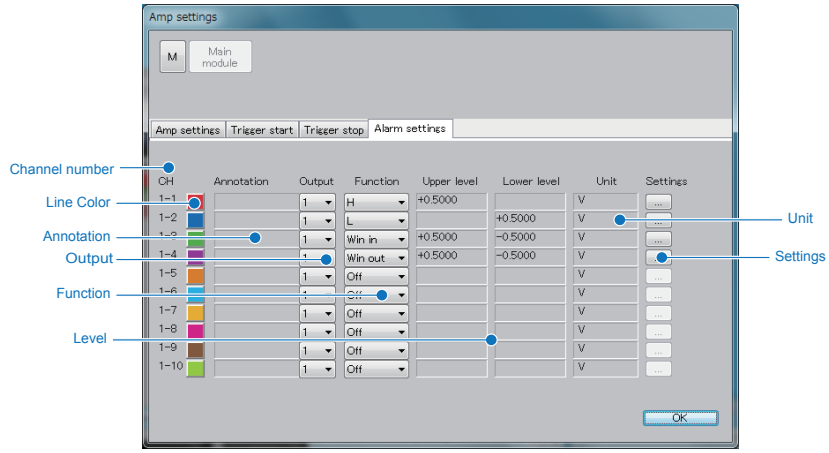
- **Trigger-level Setting**




| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>GL7000: [Module number]-[Channel number]<br>GL220, GL820 and GL900: [Channel number] |
| Upper level (input range) | Inputs during build-up setting, and Window In/Out setting. Displays the setting range of the input within the (). |
| Lower level (input range) | Inputs during decay setting, and Window In/Out setting. Displays the setting range of the input within the (). |
| Unit | Displays the unit. |
| Input range | Display input range. |
| Apply | Transmits entered values to the main module. |
| Cancel | Cancel and close input information. |

## 15-2-8. **Alarm Setting Tab**

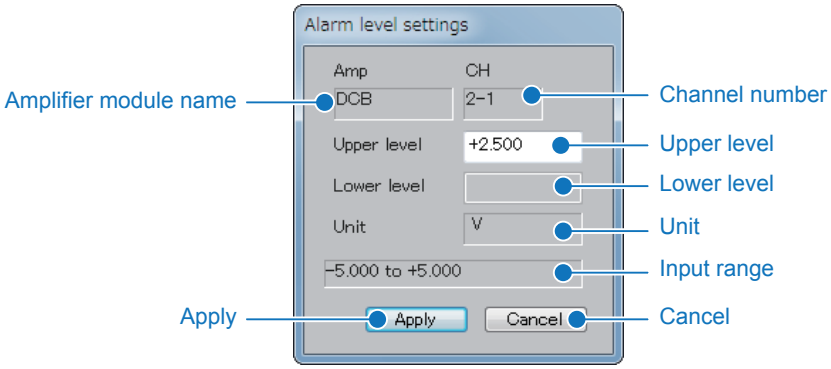
Setting the alarm level for each channel.




| Name | Explanation |
|---|---|
| Channel number | Displays the input signal's module number and channel number.<br>GL7000: [Module number]-[Channel number]<br>GL220, GL820 and GL900: [Channel number] |
| Line color | Displays the waveform color for each channel. |
| Annotation | Displays the annotation for each channel. |
| Output | Displays the alarm module's output channel. If multiple channels are set to the same number, the unit will output as <1> or <2> |
| Function | Comparative mode will be set to each channel's alarm level. Set combinations for conditional level triggers for each channel. |
| Level | Displays the level setting. |
| Unit | Displays the unit. |
| Settings | Displays the screen for setting the upper and lower alarm level limits. |

| | |
|---|---|
| Off | Alarm is not set to channel. |
| High | An alarm will activate in response to the set input signal exceeding its level. |
| Low | An alarm will activate in response to the set input signal falling below its level. |
| Window In | An alarm will activate in response to the set input signal internalizing. |
| Window Out | An alarm will activate in response to an input signal that goes outside its set level. |

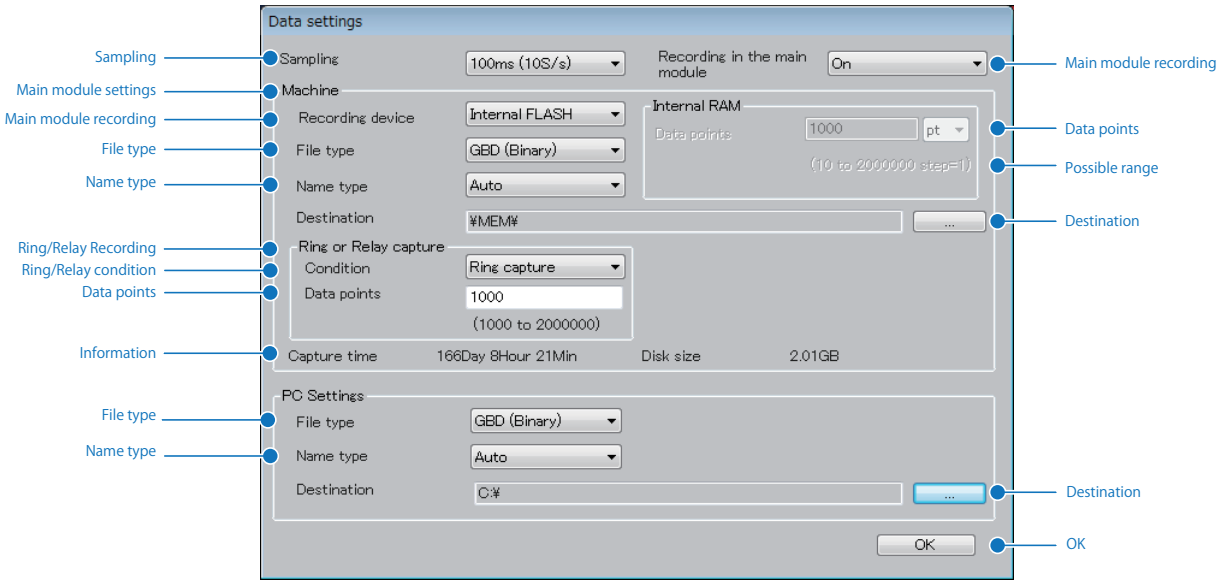
- **Alarm Level Settings**




| Name | Explanation |
|---|---|
| Amplifier module name | Displays the names of all module amplifiers that are being configured. |
| Channel number | Displays the input signal's module number and channel number.<br>GL7000: [Module number]-[Channel number]<br>GL220, GL820 and GL900: [Channel number] |
| Upper level (input range) | Inputs during rise setting, and Window In/Out setting. Displays the setting range of the input within the (). |
| Lower level (input range) | Inputs during fall setting, and Window In/Out setting. Displays the setting range of the input within the (). |
| Unit | Displays the unit. |
| Input range | Display input range. |
| Apply | Transmits entered values to the main module. |
| Cancel | Cancel and close input information. |

## 15-3. Data Settings

Set the sampling, main module recording destination, and method of data recording on the PC.




| Name | Explanation |
|---|---|
| Sampling | Set the data recording intervals. The sampling intervals and connected amplifiers will adjust depending on the number of channel settings and the save-destination of the recording medium. For information, refer to “12-3-1. Sampling limits”. Also, transfers may be incomplete when exceeding sampling limits due to network delays, etc. When recording to PC by connecting to a device in real-time, please confirm the discarded data count under Recording Information Window during free-running mode. When the discarded data is counted, the data is discarded due to incomplete data transfer. If this occurs, please reset the sampling rate to a lower speed. |
| Main module settings | Set the option to record the data to the connecting main module. |
| Main module recording | On: Saves data to the connecting main module.<br>Off: Data is not saved. |
| Recording devices | Set the recording destination.<br>Built-in RAM: Saves to Build-in RAM. Data saved to the Built-in RAM will be erased when power to the GL main module is lost. Please set Built-in RAM when doing high speed recording under 1ms (fastest sampling speed conforms to module). The PC cannot record real-time data during Built-in RAM setting. (GL7000, GL900 only)<br>Built-in flash: Records onto Built-in drive. Records sampling slower that 1ms. (GL220 and GL820 are available from 10ms/CH.)<br>SD card: Records to the external SD card. We ask all our customers to please have your SD card ready. (GL7000 only)<br>SSD module: Records to the SSD module (64GB) (Option) The PC cannot record real-time data during SSD module recording. (GL7000 only)<br>USB memory: Record to the external USB memory. USB memory should be prepared by the customer. (GL220, GL820 and GL900 only)<br>Off: Data of device is not saved. (GL900 only) |

<table>
<tr><td>Data points</td><td>Set the recording data points during Built-in RAM setting.You can switch setting for units (Ver.1.60)<table><tr><td>pt</td><td>Set sampling points.</td></tr><tr><td>s</td><td>Set seconds.</td></tr><tr><td>ms</td><td>Set milliseconds.</td></tr><tr><td>us</td><td>Set microseconds.</td></tr></table></td></tr>
<tr><td>Possible range</td><td>Displays the recording data points range of the Built-in RAM.</td></tr>
<tr><td>File type</td><td>Set the format of recorded data.<table><tr><td>GBD (binary)</td><td>Records as our unique binary data. Data can be played back at high speed because the recording size is comparatively smaller than CSV.</td></tr><tr><td>CSV (Text)</td><td>Records as text format that can be displayed by Excel, etc. Compared to GBD, the data size is larger and data playback cannot be displayed at high speed.</td></tr></table></td></tr>
<tr><td>Name type</td><td>Set how to name files.<table><tr><td>Automatic</td><td>Creates dated folders in the designated folder and creates files. (Example: No1_2012-04-04_12-34-56.GBD)</td></tr><tr><td>Unspecified</td><td>Set the name of unspecified folders.</td></tr></table></td></tr>
<tr><td>Destination</td><td>Set the save-destination of the data recorded to the main module.</td></tr>
<tr><td>Save destination path</td><td>Displays the saving destination path.</td></tr>
<tr><td>Ring/Relay condition</td><td>Select off, ring or relay capture. Ring capture captures data while deleting old data when captured points exceed set points. Relay capture captures data while separating files in units of 2GB.<br>For details, refer to the instruction manual of the main device.<br>(The relay capture function is supported by GL-Connection V1.62 and GL7000 V1.45 or later)</td></tr>
<tr><td>Data points</td><td>Set recording data points during ring recording. For more details, please refer to the main module’s user’s manual.</td></tr>
<tr><td>Possible range</td><td>Displays the setting range of the ring recording data points.</td></tr>
<tr><td>Information</td><td>Displays the possible recording time and total remaining disk space at the recording destination.</td></tr>
<tr><td>PC file type</td><td>Set the PC file format.<br>Refer to the file format of the main module.</td></tr>
<tr><td>PC name type</td><td>Set how to name files.<table><tr><td>Automatic</td><td>Creates dated folders in the designated folder and creates files. (Example: No1_2012-04-04_12-34-56.GBD)</td></tr><tr><td>Unspecified</td><td>Set the name of unspecified folders.</td></tr></table></td></tr>
<tr><td>PC destination</td><td>Set the save-destination of the data recorded to the PC.</td></tr>
<tr><td>PC save destination path</td><td>Displays the saving destination pass.</td></tr>
<tr><td>OK</td><td>Closes the screen.</td></tr>
</table>

### 15-3-1. **Sampling Limits**

High speed sampling is limited by the number of recording channels, connected modules, and the recording destination, etc. Even within the following limits, transmission may be incomplete due to transmission delays with multiple module connections, especially with LAN connections. If this occurs, please reduce the sampling rate. For more details on the GL device limits, please refer to the main module user's manual on CD-ROM.

- **GL7000**

<table>
<tr><th>Name</th><th>Explanation</th></tr>
<tr><td>Module-based limits<br>(GL device limits)</td><td>
<table>
<tr><td>Voltage module</td><td>1 ms</td></tr>
<tr><td>Voltage / Temperatuer module</td><td>10 ms</td></tr>
<tr><td>High Speed Voltage / High Voltage module</td><td>1 us</td></tr>
<tr><td>DC Strain / Charge module</td><td>10 us</td></tr>
<tr><td>Logic / Pulse module</td><td>Logic: 1 us / pulse: 100 us</td></tr>
</table>
</td></tr>
<tr><td>Recording destination-based limits<br>(GL device limits)</td><td>
<table>
<tr><td>Built-in RAM</td><td>1 us</td></tr>
<tr><td>Built-in flash</td><td>1 ms</td></tr>
<tr><td>SD card</td><td>1 ms</td></tr>
<tr><td>SSD module</td><td>1 to 2 modules:1 us; however, the pulse runs only until 8ch<br>3 to 4 modules: 2 us; however, the pulse is only until 16ch<br>Over 5 modules: 5 us</td></tr>
</table>
</td></tr>
<tr><td>Main module recording format-based limits<br>(GL device limits)</td><td>
<table>
<tr><td>GBD (binary)</td><td>1 us</td></tr>
<tr><td>CSV (Text)</td><td>10 ms</td></tr>
</table>
</td></tr>
<tr><td>Ring recording-based limit.<br>(GL device limits)</td><td>Ring recording-based limit. (GL device main module limits)<br>When ring recording is on:100ms (Only when Built-in Flash, SD card, SSD module)</td></tr>
<tr><td>Calculation function-based limits<br>(GL device limits)</td><td>100 ms<br>* The GL device's calculation function cannot be used with this application. There is no calculation function in this application.</td></tr>
<tr><td>Transmission-based limits<br>(Application limits)</td><td>The PC's recorded sampling capacity is limited based on transmission volume limits.<br>* Even within the following limits, there are occasions when transmission will be incomplete when connecting LAN to the existing network. If this occurs, please slow the sampling setting.
<table>
<tr><td rowspan="2">USB connection</td><td>GBD (binary) format</td><td>1 ms / 1 module (*)</td></tr>
<tr><td>CSV (text) format</td><td>1 ms / 1 module (*)</td></tr>
<tr><td rowspan="2">LAN connection</td><td>GBD (binary) format</td><td>1 ms / 1 module (*)</td></tr>
<tr><td>CSV (text) format</td><td>1 ms / 1 module (*)</td></tr>
</table>
(* The number of channels includes channels that are off. The HSV, HV, DCB and CHA amplifier is treated as 10ch Example 1) when using a USB connection, recording destination built-in flash, GBD recording, an analog 5 modules 50ch recording to PC: Fastest 5ms sampling.<br>Example 2)when there are two GL devices (analog 3 modules amplifier, analog 4 amplifier modules), recording GBD recording to PC, using LAN connection (total 70ch): Fastest 10 ms sampling.</td></tr>
</table>

- **GL220, GL820**

<table>
<tr><th>Name</th><th>Explanation</th></tr>
<tr><td>Limitations by amplifier (Limitations of the GL module side)</td><td>
<table>
<tr><td>Number of CH available</td><td>Fastest sampling</td></tr>
<tr><td>1</td><td>10 ms</td></tr>
<tr><td>2</td><td>20 ms</td></tr>
<tr><td>3 to 5</td><td>50 ms</td></tr>
<tr><td>6 to 10</td><td>100 ms</td></tr>
<tr><td>11 to 20</td><td>200 ms</td></tr>
<tr><td>21 to 50</td><td>500 ms</td></tr>
<tr><td>51 to 100</td><td>1 s</td></tr>
<tr><td>101 to 200</td><td>2 s</td></tr>
</table>
</td></tr>
<tr><td>Main module recording format-based limits (GL device limits)</td><td>
<table>
<tr><td>GBD (binary)</td><td>10 ms</td></tr>
<tr><td>CSV (Text)</td><td>100 ms</td></tr>
</table>
</td></tr>
</table>

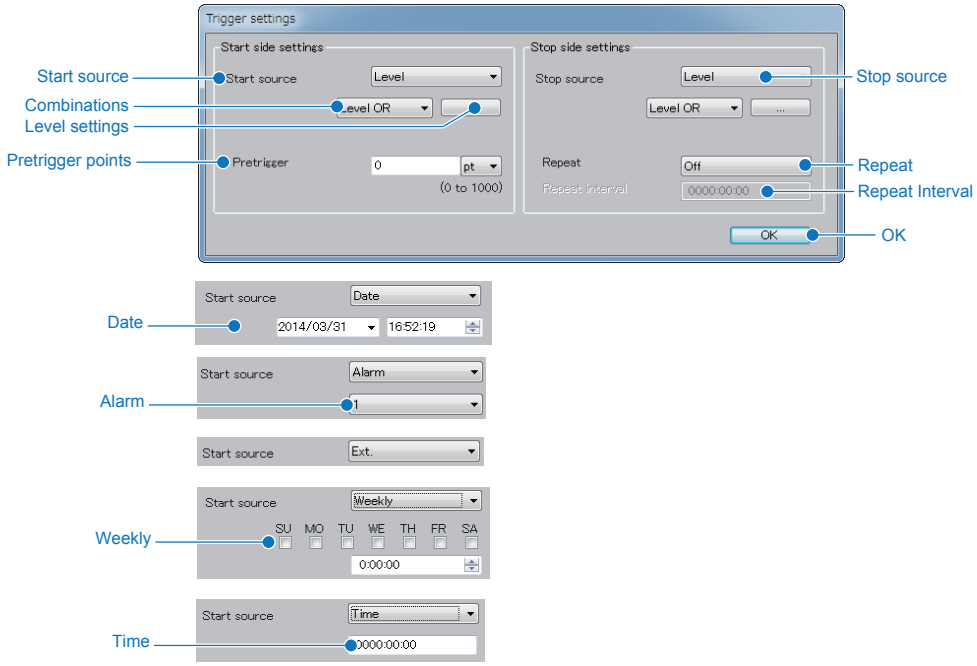
- **GL900**

<table>
<tr><th>Name</th><th>Explanation</th></tr>
<tr><td>Recording destination-based limits (GL device limits)</td><td>
<table>
<tr><td>Built-in RAM</td><td>10 us</td></tr>
<tr><td>Built-in flash</td><td>1 ms</td></tr>
<tr><td>USB memory</td><td>1 ms</td></tr>
</table>
</td></tr>
<tr><td>Main module recording format-based limits (GL device limits)</td><td>
<table>
<tr><td>GBD (binary)</td><td>1 ms</td></tr>
<tr><td>CSV (Text)</td><td>10 ms</td></tr>
</table>
</td></tr>
</table>

# 15-4. Trigger Settings

Set conditional trigger for the start and stop of recording.

## 15-4-1. GL7000, GL220 and GL820




| Name | Explanation |
|---|---|
| Sstart/Stop source | Set conditions for the start and stop of measuring. |

| | |
|---|---|
| Off | Starts unconditional recording. (There are no stopping conditions) |
| Level | Starts (or stops) recording the designated channel's input signal once the set level's conditions are met. |
| Alarm | Recording starts (or stops) once the designated alarm goes off. |
| Date | Recording starts (or stops) once the designated date and time is reached. Active when repeat recording is off. |
| Date (Daily) | Recording starts (or stops) once the designated date and time is reached. Active when repeat recording is on. |
| External input | Recording starts (or stops) with the external terminal signal. There are approximately 2 external drive signals. Recording starts (or stops) when a fall under 5V is detected. Both start/stop cannot be externalized when sampling is externalized. |
| Weekly | Recording starts (or stops) on the set time and day. |
| Time | Recording starts (or stops) when the specified time has lapsed. |

| | |
|---|---|
| Combinations | Set combinations for conditional level triggers for each channel. For more details, please refer to Main module's user's manual on CD-ROM. |

| | |
|---|---|
| Level | Requirements determine operation level. |
| Edge | Requirements determine operation edge. |
| OR | Recording starts (or stops) as long as at least one of the set level requirements is satisfied. |
| AND | Recording starts (or stops) when all the set level requirements are satisfied. |

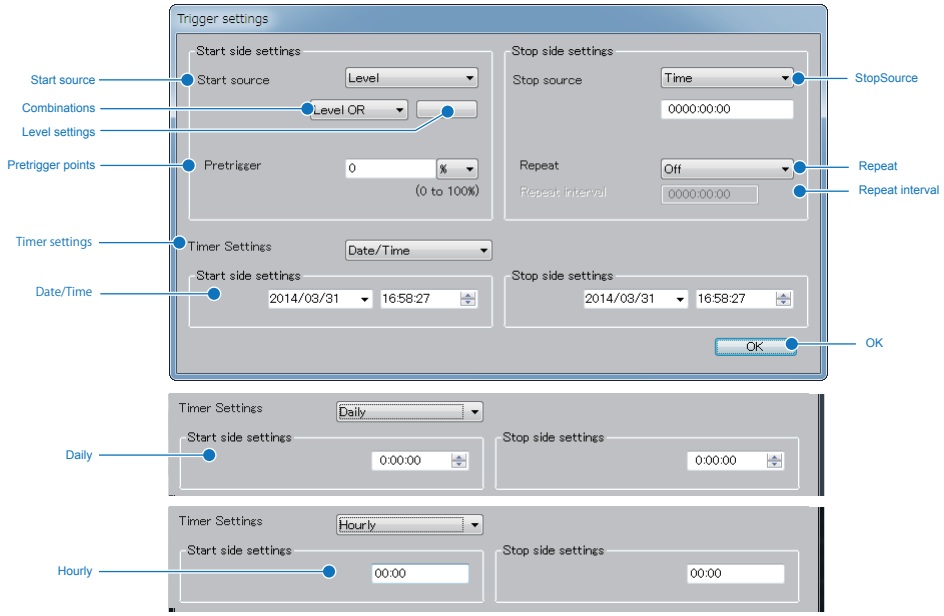
| | |
|---|---|
| Level | Set the level's determined requirements once the start/stop trigger's conditions are "leveled". |
| Alarm | Set the start/stop requirements for the target alarm number once the alarm is set. Possible settings for alarm numbers may differ depending on the device. |
| Date | Determines the start/stop requirements for the date once the "set date" is set. |
| Weekly and Time | Configure with each trigger. |

| | |
|---|---|
| Date requirements | Used to to set the date and time. |
| Time requirements | Used to to set the time. |
| Weekly requirements | Used to to set the time and day. |

| | |
|---|---|
| Pretrigger points | Set data points for recording before a trigger is generated. The pre-trigger function can only set the recording destination to the built-in RAM when the start source setting is off. (* This function is not provided in the GL220 and GL820.)<br>pt: Set sampling points.<br>s: Set seconds.<br>ms: Set milliseconds.<br>us: Set microseconds. |
| Repeat | Starts repeat recording once a trigger stop is generated. |
| Repeat interval | Set time intervals between the time recording begins and the next repeat recording starts. Once a trigger stop is generated, instant repeat recording begins once the time of the existing repeat interval passes. (* This function is not provided in the GL220 and GL820.) |
| OK | Closes the screen. |

* In the GL220 and GL820, the repeat recording is performed in the GL-Connection side. Therefore, the settings of repeat recording are not obtained from the GL module. Also, the specified time when repeat recording is set to On cannot be set to the GL module.

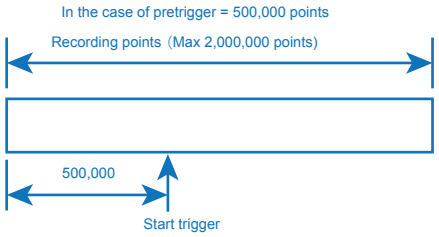
## 15-4-2. **GL900**



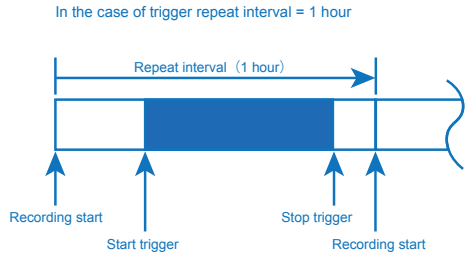

| Name | Explanation |
|---|---|
| Sstart/Stop source | Set conditions for the start and stop of measuring.<br>Off: Starts unconditional recording. (There are no stopping conditions)<br>Level: Starts (or stops) recording the designated channel's input signal once the set level's conditions are met.<br>External input: Recording starts (or stops) with the external terminal signal. There are approximately 2 external drive signals. Recording starts (or stops) when a fall under 5V is detected. Both start/stop cannot be externalized when sampling is externalized.<br>Time: Recording starts (or stops) when the specified time has lapsed. |
| Combinations | Set combinations for conditional level triggers for each channel. For more details, please refer to Main module's user's manual on CD-ROM.<br>Level: Requirements determine operation level.<br>Edge: Requirements determine operation edge.<br>OR: Recording starts (or stops) as long as at least one of the set level requirements is satisfied.<br>AND: Recording starts (or stops) when all the set level requirements are satisfied. |
| Level | Set the level's determined requirements once the start/stop trigger's conditions are "leveled". |

<table>
<tr><td>Pretrigger points</td><td>Set data points for recording before a trigger is generated. The pre-trigger function can only set the recording destination to the built-in RAM when the start source setting is off.</td></tr>
<tr><td>Repeat</td><td>Starts repeat recording once a trigger stop is generated.</td></tr>
<tr><td>Repeat interval</td><td>Set time intervals between the time recording begins and the next repeat recording starts. Once a trigger stop is generated, instant repeat recording begins once the time of the existing repeat interval passes.</td></tr>
<tr><td>Timer settings</td><td>If a trigger is activated in the set period, recording starts.
<table>
<tr><td>Off</td><td>Timer function is not used.</td></tr>
<tr><td>Date/Time</td><td>Date is set as a period.</td></tr>
<tr><td>Daily</td><td>1 day is set as a period. Repeats every day.</td></tr>
<tr><td>Hourly</td><td>1 hour is set as a period. Repeats every hour.</td></tr>
</table></td></tr>
<tr><td>OK</td><td>Closes the screen.</td></tr>
</table>

- **Pretrigger Operation** **(In the GL900, this is set with the proportion of the recording points in the RAM )**

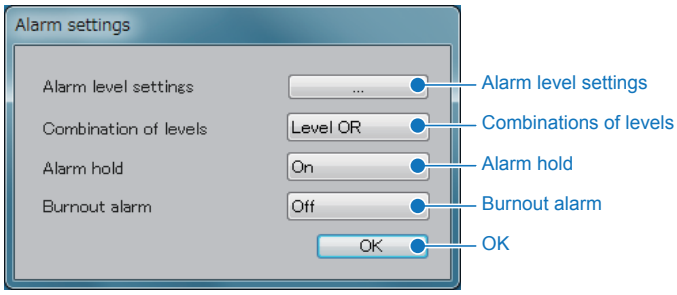



- **Operation of Repeat Intervals**



## 15-5. Alarm Settings

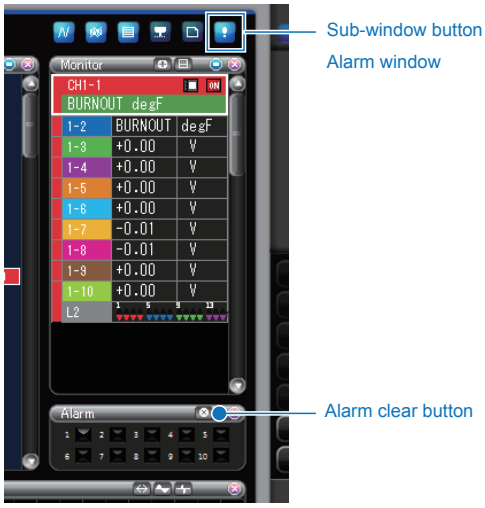
Configures alarm settings.




| Name | Explanation |
|---|---|
| Alarm level settings | Set requirements for alarm generation. |
| Combination of levels | Set combination for alarm requirements for each channel.<br>Level: Requirements determine operation level.<br>Edge: Requirements determine operation edge.<br>OR: Recording starts (or stops) as long as at least one of the set level requirements is satisfied.<br>AND: Recording starts (or stops) when all the set level requirements are satisfied.<br>Though alarm hold was set as Off when combination was edge OR/AND, as for the channel generated once, alarm continues holding alarm.<br>(*This function is not provided in the GL900.) |
| Alarm hold | Set whether or not to clear of preserve a generated alarm status.<br>On: Preserves alarm generation. Click “clear alarm” on the alarm window to clear all channels of alarms.<br>Off: Does no preserve alarm generation. Restores alarm status and output for each CH once the alarm status is released. |
| Burnout alarm | Once this is set to On, an alarm will be generated in response to thermocouple connection temperature measurements registering burn out.<br>(*This function is not provided in the GL900.) |

### 15-5-1. Alarm Clear Button

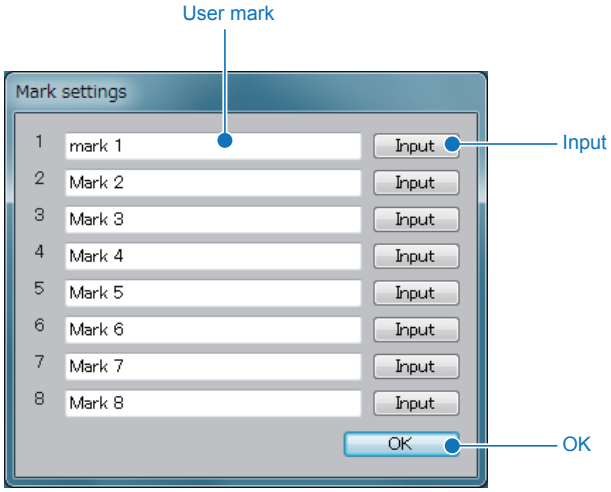
Alarm Clear is only available during free-running or recording when alarm hold is On.



## 15-6. Marker Settings

This function inputs a mark to the unspecified position above the waveform during data recording. The inputted mark can perform searches and confirmations during playback. The inserted characters are configured here. By setting the characters before recording, you can insert other marks quickly and easily while recording (character marks can also be set during recording). While recording, insert mark from the Mark insertion under action on the control panel.

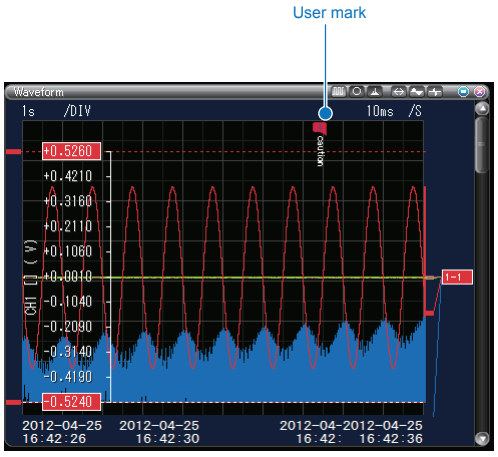
(* This function is not provided in the GL220, GL820 and GL900.)




| Name | Explanation |
|---|---|
| User mark | You can insert 1-8 unspecified characters. Up to a maximum of 30 characters can be entered. Marks inserted during recording will be saved; however, only the characters inserted last will be effective. |
| Input | Clicking the input button shows the location update on the upper-right hand side above the waveform where a user mark was inserted. The mark will show the inserted position during data playback. |
| OK | Clicking OK closes the screen. This transmits the user mark character information to the GL main module. |

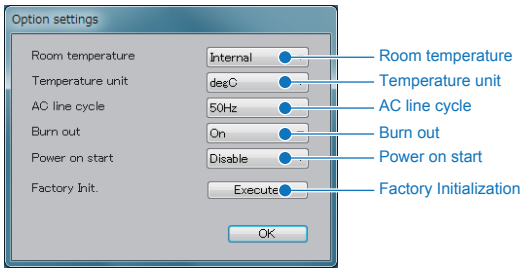
### 15-6-1. Display user mark during recording

Insert mark from the “insert mark” under the action panel in the control panel.



## 15-7. Option Settings

Perform option settings.




| Name | Explanation |
|---|---|
| Room temperature compensation | Set room temperature compensation in response to thermocouple temperature measurements.<br>Set internal temperature when the performs room temperature compensation.<br>(Set interior to default)<br>*Only effective with voltage/temperature modules. |
| Temperature unit | Unit of temperature for the temperature display can be changed between degrees of Celsius (º C) or Fahrenheit (º F)<br>Only effective with *voltage/temperature modules. |
| AC line cycle | Set the power to the main module to the local area frequency.<br>(50Hz or 60Hz)<br>This effects denoising, so please set it correctly. For more details, please refer to the main module user's manual.<br>*Only effective with voltage/temperature modules.<br>(*This function is not provided in the GL900.) |
| Burn out | Will carry out regular checks on the thermocouple connection break when set to On. Please use the thermocouple in OFF mode when other measuring devices are connected parallel to it, as it may effect other devices. A BURN OUT message will be displayed when a connection break is detected.<br>*Only effective with voltage/temperature modules.<br>(*This function is not provided in the GL900.) |
| Power on start | Recording starts once power is applied to the main module. This setting operates only on the main module. Please set default to inactive. |
| Factory Initialization | The main module is set to factory settings. Initialization may occasionally take time. Please wait a little while. |

## 15-8. Excel Settings

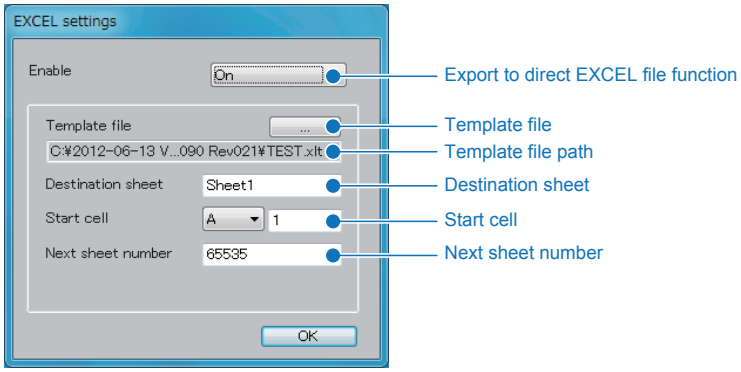
This function transmits data currently being recorded to Excel in real-time. Can be used to create original template files and reports, etc.

*Direct Excel functions cannot be used when the main module recording destination is the Built-in RAM, or SSD module (option).

* Microsoft Excel (EXCEL2003 or later) is required for the use of main module.

* Transfers to the graph cannot exceed 32000 lines.

* Transfers to Excel may occasionally be incomplete depending on sampling and the number of channels. If this occurs, please slow down sampling.

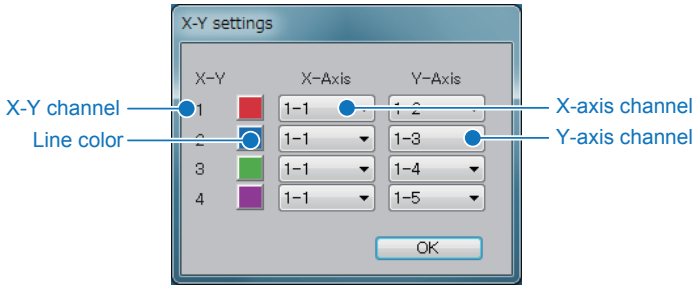



| Name | Explanation |
|---|---|
| Expot direct EXCEL file function | Set direct Excel functions to On or Off. |
| Template file | Performs direct Excel transfer destination template settings. This can be used for “xlt “or “xltx”file types. Standard templates are available under the “Temp” folder under the main software’s installed folder. |
| Template file path | Displays the template path. |
| Destination sheet | Set the sheet name for the designated template folder. |
| Start cell | Set the start cell the data will be transfered to. |
| Next sheet number | Transmits data to a differ sheet when it reaches a set points.<br>* Graph may occasionally not operate correctly when transferred to a different sheet.<br>* Can display up to 65536 lines on versions earlier than Excel 2007.<br>* Can display up to 1048576 line on versions later than Excel 2007.<br>* Cannot transmit more than 32000 points using graphing to a template. |

## 15-9. X-Y Settings

This waveform display can show the correlating waveform after assigning the respective analog input channel to the X and Y axis. There are a maximum of 4 X-Y channels available that can be assigned respective unspecified analog channels. Furthermore, it can also perform span and position controls, etc.

(* Does not support pulse input. The GL220 and GL820 are not possible to communicate with the GL module for the settings.)

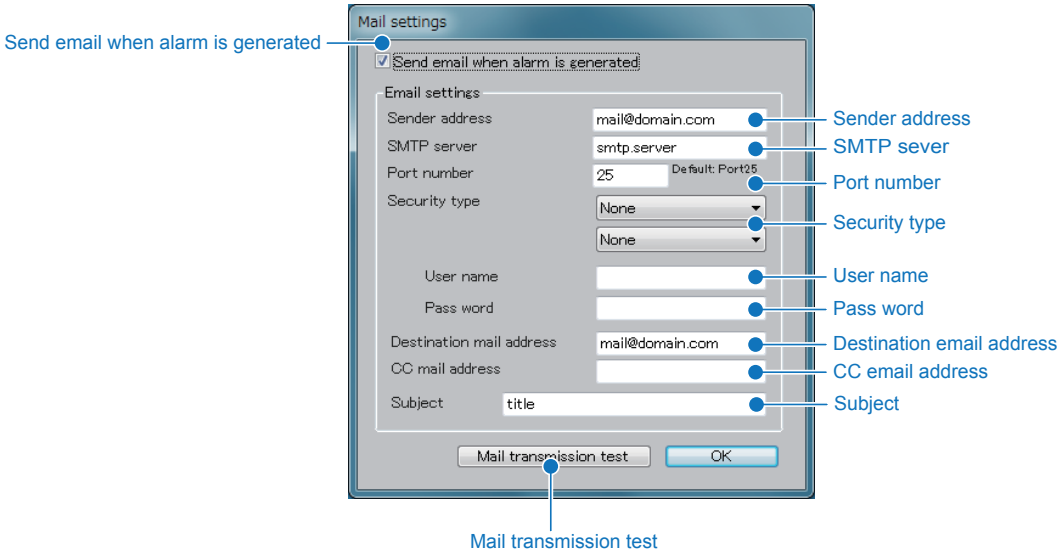



| Name | Explanation |
|---|---|
| X-Y channel | Displays the X-Y channel number. |
| Line color | Displays the X-Y waveform color. |
| X axis channel | Displays the analog channel assigned to the X axis. |
| Y axis channel | Displays the analog channel assigned to the Y axis. |

## 15-10. Mail Settings

You can send emails when an alarm is generated.

* This requires an environment capable of sending emails.
* Emails may not be sent depending on the sending email server's security system.
* Email transmission function effective only during recording.
* Emails cannot be transmitted during free-running even if an alarm is generated.
* Because the system does not transmit large volumes of email, no further emails can be sent for 1 minute after an email is sent. Alarms generated during periods where email is not being sent will send them based on the timing of the next transmission.

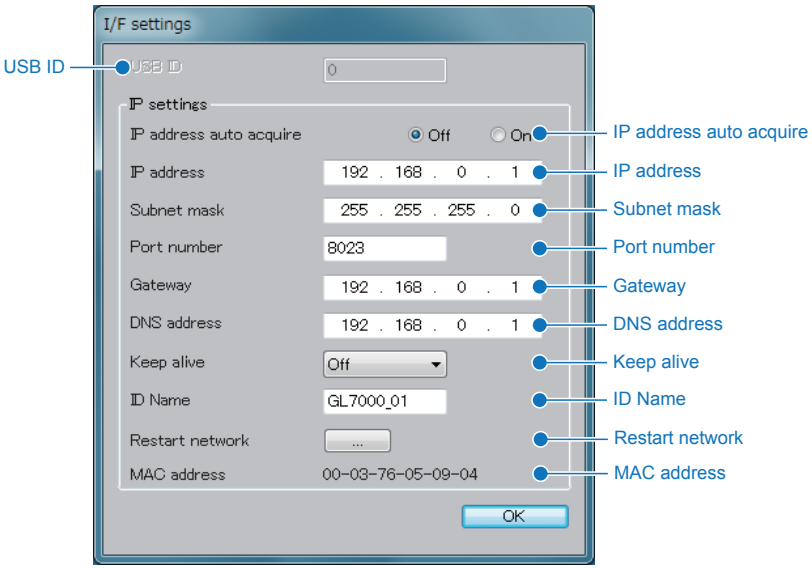



| Name | Explanation |
|---|---|
| Send email when alarm is generated | Checking off "✓ "mark generates an alarm during recording, which then sends emails to the set email address. |
| Sender address | Set the sender's email address. |
| SMTP server | Set the transmitting email server (SMTP). Port number Sets the port number. The port number settings may differ depending on the security type. |
| Port number | Set the port number. The port number settings may differ depending on the security type. |
| Security type | Set security settings as needed depending on the transmitting email server. For security settings, please confirm the email server transmission.<br>None: There is no security.<br>Plain-text passwords: Security is not tight with plain-text password and they flow through the network.<br>CRAM-MD5: Plain-text passwords that are not shared throughout the network are the safest ones.<br>Encryption settings<br>None: Will not encrypt.<br>SSL: Emails are encrypted both sending and receiving. |
| User name | Set security authentication when required. |
| Pass word | Set security authentication when required. |
| Destination email address | Set the transmission destination for emails. |
| CC email addresses | Set the transmission destination for CC emails. |
| Subject | Set the email subject. |
| Mail transmission test | Performs a test transmission |

## 15-11. I/F Setting

Configure USB and LAN setting.

* When connected via USB, only IP can be set.
* When connected via LAN, only USB ID can be set.
* GL220 USB ID only




| Name | Explanation |
|---|---|
| USB ID | Set USB ID number. Please make sure not to copy USB ID when connecting a single PC to multiple devices via USB. |
| IP address auto acquire | Set automatic IP acquisition. A server that is able to assign functions to the connecting network is required. |
| IP address | Set the IP address. |
| Subnet mask | Set the subnet mask. |
| Port number | Set the port number. |
| Gateway | Set the Gateway address. |
| DNS address | Set the DNS address. |
| Keep alive | When set to anything other than Off, the socket connection will be severed automatically if a period of non-transmission time is detected. (*This function is not provided in the GL900.) |
| ID Name | Set the device's identifier.(*This function is not provided in the GL900.) |
| Restart network | Applies IP settings. The connection will be forcibly severed during set- up. It may occasionally take about 1 minute to apply the settings.(*This function is not provided in the GL900.) |
| MAC address | Displays the MAC set to the device. |

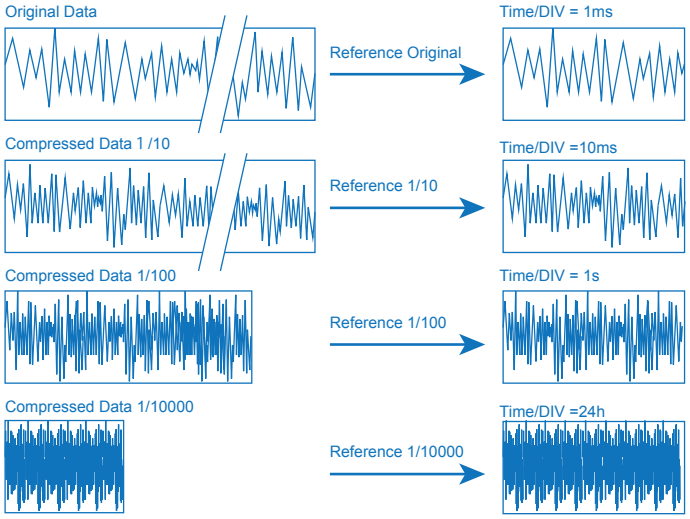
# 16. Other functions

Introduction to other useful functions.

## 16-1. Data Compressing Function

- **Data compressed file**

The compressed file leaving the peak signals is created based on the recorded file. This file is used for improving the response of the waveform display during viewing. This software automatically creates 1/10, 1/100 or 1/10000 compressed file. Even if the data compressed file is deleted, the recorded data is not affect.



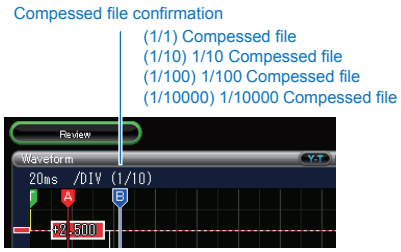
- **Creation of data compressed file**

The data compressed file is created using the following method.
• When performing the data recording with PC: The compressed file is automatically created separately from the recorded file.
• When PC file is replayed: If there is no existing compressed file, the compressed file is automatically created. When PC file is replayed and then the compressed file is created, the processing state is displayed in the Help window.

The data compressed file is saved in “My document → Graphtec → GL-Connection → Data→ Comp” folder.
(* Even if the compressed file is deleted, the recorded data is not affected. Additionally, all the compressed files are deleted by performing “Control Panel → Initializing.)

- **Viewing of the data compressed file**

If the data compressed file has been created already when viewing the PC file, the data compressed file is read in accordance with the Time/DIV settings. Usually, the file viewing and the data compressed file are automatically determined and switched without being aware of it. When the PC file is replayed and then the data compressed file is created, the appropriate compressed file will be displayed at the time the creation was completed. To check the compressed file applied during viewing, check the following screen.



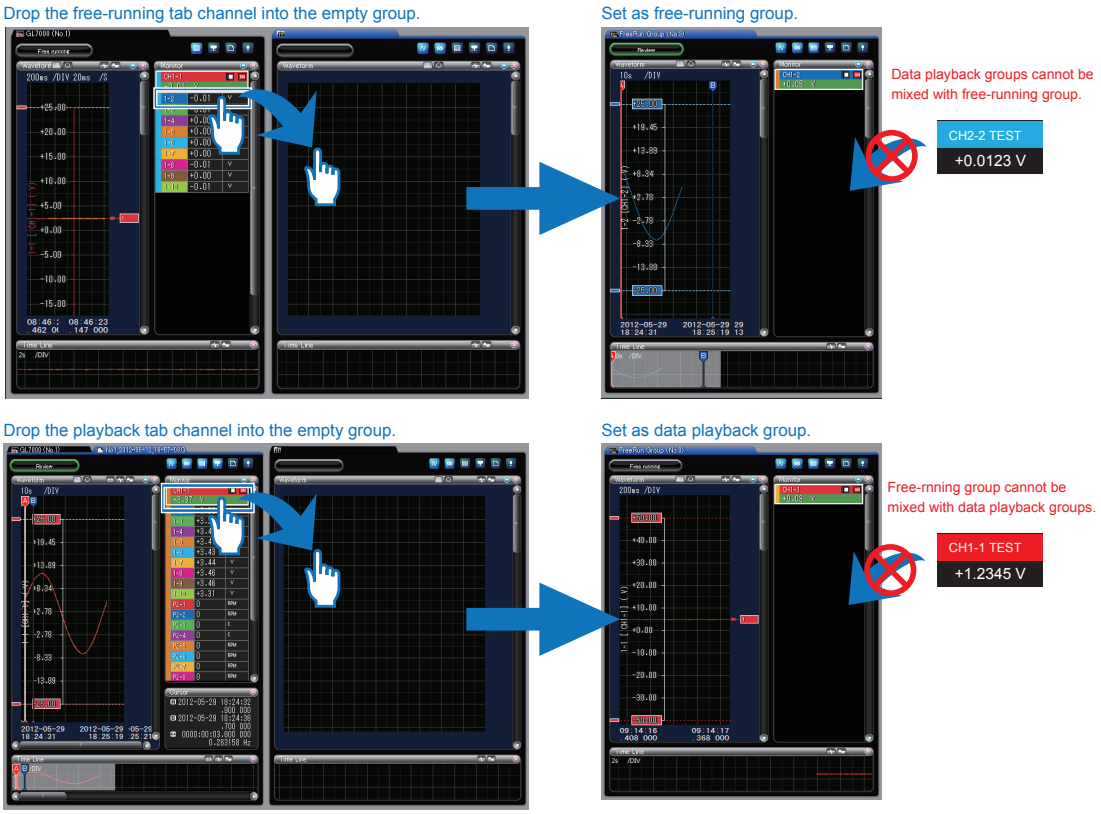
## 16-2. Group functions

Many different waveform display methods are possible using group and screen section functions. Group function creates copies of basic display tabs. It is possible to analyze signals by setting up original tabs and copied abs independently. It is possible to perform different Time/DIV settings, span and stretch settings, Y-T waveform, and X-Y waveforms, etc.

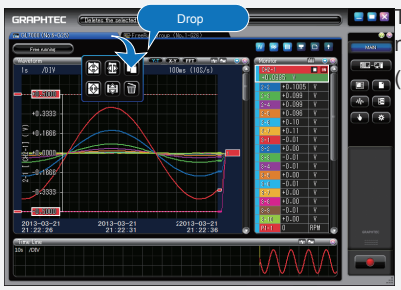
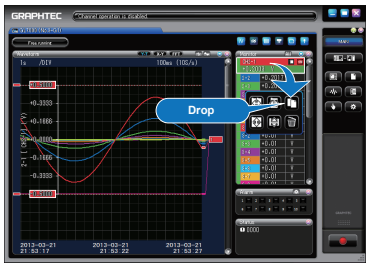
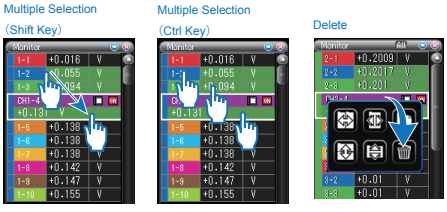
### 16-2-1. Types of group functions

| Name | Explanation |
|---|---|
| Empty (Free) group | Free group tab. Groups are determined when channels from the free-run/ recording tabs or playback tabs are added to groups. |
| Free running/Recording In Progress group | Data can be grouped by the free-running or recording tab. It is possible to mix identical families of data. Data cannot be mixed if it is under the data playback tab.<br>(* The data in the data replay tab can not be mixed.)<br>(* The data on X-Y and FFT waveforms can not be mixed.) |
| Data playback group | This group plays back data. It is possible to mix data from PC playback and the main module playback tab. Data cannot be mixed if it is under the data playback tab.<br>(* The data in the data replay tab can not be mixed.)<br>(* The data on X-Y and FFT waveforms can not be mixed.) |

- **Determination of the data playback group and free-running /recording group from the open group**



## 16-2-2. **Method of group creation**

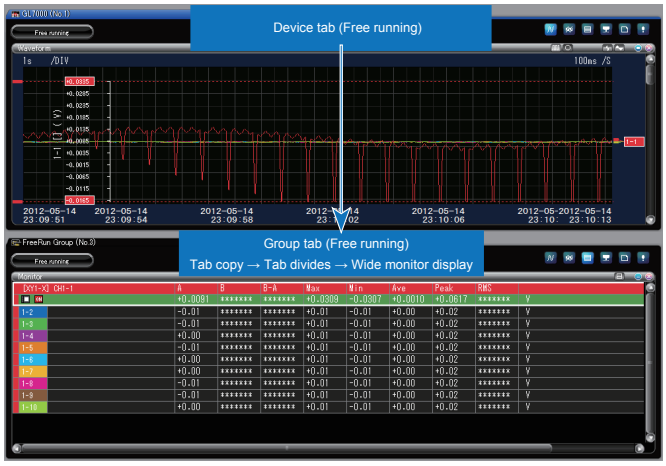
| Name | Explanation |
|---|---|
| Creates Open Free group | Open groups can be created from the action panel under the control panel.<br>  |
| Creates from tab copy | Creates group tab by copying displayed tab. Copies monitor channel and waveform display information under the same requirements.<br>●Free-running/recording tab→ free-running/recording group<br>●Data playback tab→ data playback group<br>  <br>The copied tabs are assigned new device numbers. For example "FreeRun Group (No.1)". |
| Creates from Monitor channel | Groups are created from the chosen monitor channel.<br>●Free-running/recording tab→ free-running/recording group<br>●Data playback tab monitor channel→data playback group<br>  <br>The copied tabs are assigned new device numbers. For example "FreeRun Group (No.1)". |
| Adds group tab monitor channels | Provided the group is of an identical family, it is possible to mix different tabs with the monitor channels.<br>  |
| Deletes group tab monitor channels | Choose more than 1 monitor channel when deleting monitor channel group tabs. Can select multiple monitor channels separately by pressing the PC's shift key to select two points or by using the Ctrl key to select individually. Once they are selected, drag them to the recycle bin using the mouse.<br>  |

## 16-2-3. **Example of Group use**

Here is an example using the group function.

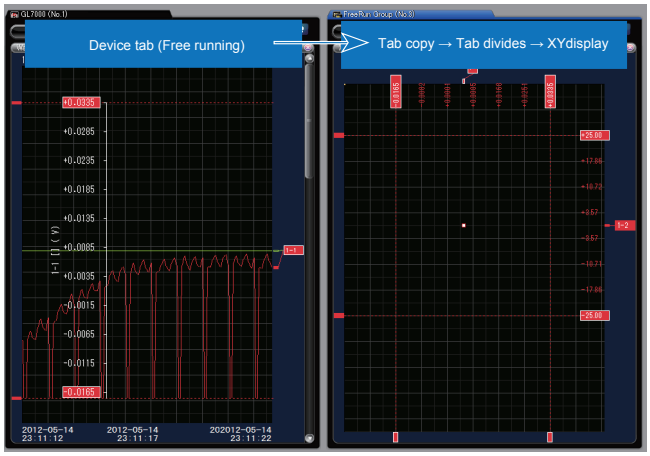
* Group tab settings are not saved by this application or the GL device.

Example 1. Y-T Display and Wide Monitor Display




1) Copy the free running group tab and create a free running group.
2) Separate the free running group to the bottom
3) Wide monitor display for the free running group

Example 2. Y-T Display and X-Y Display




1) In X-Y free running mode, copy the tab contains the free running group from Navigation Window, and then create the other group tab.
2) Separate the free running group to the right from Navigation Window.
3) Switch the free running tab to the Y-T display by pressing the Y-T switch button.

## 16-3. Context Menu

Context menu is displayed by pressing the right mouse button in the window. You can perform various operations from the menu.

| Screen | Function | Explanation |
|---|---|---|
| Base window | Information | Displays the Information Window. |
| Graphtec icon | WEB access | Access the GraphtecWEB site. |
| Connection screen | | |
| PC icon | Search | Searchs the device. |
| Device icon | Connect / Disconnect | Performs the connection and disconnection. |
| | Clear | Clear the icon. |
| File icon | Open the file. | Open the file. |
| | Clear | Clear the file icon.<br>* The file itself is not cleared. |
| File button in Control Panel | File History | Displays up to 10 file histories. Select the file history to open the file.<br>To add a file history, perform the following steps.<br>• Open the PC file.<br>• Record a waveform.<br>• Export it to a file in CSV format.<br>• Save the converted file. |
| | Open the default data folder. | Open the default data folder.<br>(My document → Graphtec → GL-Connection → Data) |
| | Open the folder used previously. | Open the folder used previously. |
| | Review PC | Displays the PC folder dialog. |
| | Module data | Displays the data dialog for this module. |
| Main Window | Window delete | Delete all the tabs in the Main Window. |
| Waveform Window | | |
| Tab | Copy to the same tab. | Copy the tab on the mouse to the same window. |
| | Copy to the left and right | Copy the tab itself to divide into the left and right and then arrange them. |
| | Copy to the top and bottom | Copy the tab itself to divide into the top and bottom and then arrange them. |
| | Move to the left and right | The tab itself is moved to the left and right in the movable direction. When two tabs or more are not present in the same window, this function is not available. |
| | Move to the top and bottom | The tab itself is moved the top and bottom in the movable direction. When two tabs or more are not present in the same window, this function is not available. |
| | Delete | Dragging the tab to the Delete button in the Navigation Window can delete the tab. When the device tab is deleted, the connection is disabled. When the file tab is deleted, the replay is finished. |
| Y-T waveform<br>During free running or recording | Waveform sorting: All | Arrange to display the waveform for the currently displayed region in full view. |
| | Waveform sorting: Equability within the display range | Divides evenly the each channel for the currently displayed region. When the number of channels can not be divided evenly, the channel appears overlapped. |
| | Waveform sorting: Equability in the whole | Divides evenly the each channel for all the Waveform Windows. When the number of channels can not be divided evenly, the channel appears overlapped. |
| | Waveform suspension | Suspend the waveform display. The display is stopped, however the recorded data is not affected. |

| Screen | Function | Explanation |
|---|---|---|
| Y-T waveform<br>During viewing | Cursor: Call the cursor A<br>Cursor: Call the cursor B | Call the cursor A or B in the currently displayed waveform display.<br>The cursor A is arranged at the 1/4 position from the right of the display screen, the cursor B is arranged at the 3/4 position from the right of the display screen. |
| | Cursor: Move to the cursor A<br>Cursor: Move to the cursor B | Move the waveform display to the position of the cursor A or B. |
| | Cursor: Cursor synchronization | The cursor A and B can be moved synchronously. |
| | Data search | Displays the Data Search Window. |
| | Waveform sort | Y-T waveform: Same as free running and recording. |
| X-Y waveform<br>During free running and recording | Waveform clear | Clear the X-Y waveform display. |
| FFT waveform<br>During free running and recording | Waveform suspension | Suspend the waveform display. The display is stopped, however the recorded data is not affected. |
| | Expanding between the cursors<br><br>Cancel the expanding between the cursors | Displays the waveform enlarged between the cursor A and B.<br>Clear the waveform enlarged between the cursor A and B. |
| | Averaging clear | Clear the averaging. This is available when the averaging process is enabled. |
| FFT waveform<br>During free running and recording | Expanding between the cursors<br><br>Cancel the expanding between the cursors | Displays the waveform enlarged between the cursor A and B.<br>Clear the waveform enlarged between the cursor A and B. |
| Monitor Window | | |
| X-Y waveform<br>During free running and recording | Select All CH | Select all the channels. |
| | Monitor: CH enabled | Only the channels switched the trace to On (enabled) are extracted and displayed. The channels other than them are not displayed. Even if not displayed, the recorded data is not affect. |
| | Monitor: CH disabled | Only the channels switched the trace to On (disabled) are extracted and displayed. The channels other than them are not displayed. Even if not displayed, it does not affect the recorded data. |
| | Monitor: The alarms occur in the CH. | Only the channels in which the alarms occur are extracted and displayed. The channels other than them are not displayed. Even if the alarm status is changed, the filter conditions are not changed. Also, even if not displayed, the recorded data is not affect. |
| | Monitor: Reset | Trace On, Trace Off or the filter conditions when the alarms occur is reset and returned to the original. |
| | Group tab creation | Create the group tab with the selected CH. |
| | CH delete | Delete the selected CH. Only the group tab is available. Even if deleted, the recorded data is not affect. |
| X-Y and FTT waveforms<br>During free running or recording | Select All CH | Select all the CHs. |
| | Monitor | Y-T waveform: Same as free running and recording. |

## 16-4. Keyboard Shortcuts

Functions can be accessed quickly using the PC keyboard.

| Function | | | | Assigned Keys |
|---|---|---|---|---|
| Connection Screen | | | Screen Change | F2 |
| | Control Panel | | Device Search | F3 |
| | | | LAN Connection | F4 |
| | | | Information | F12 |
| Multi Screen | | | Screen Change | F2 |
| | | | Open/Close Waveform Window | Ctrl + 1 |
| | | | Open/Close Timeline Window | Ctrl + 2 |
| | | | Open/Close Monitor Window | Ctrl + 3 |
| | | | Open/Close Cursor Window | Ctrl + 4 |
| | | | Open/Close Recording Information Window | Ctrl + 5 |
| | | | Open/Close Alarm Window | Ctrl + 6 |
| | | | Screen Horizontal Scroll<br>(Move the cursor at the FFT) | Ctrl + Left / Right |
| | | | Screen Horizontal Scroll (Big)<br>(Move the cursor at the FFT) | Ctrl + Shift + Left / Right |
| | | | Screen Vertical Scroll | Ctrl + Up / Down |
| | | | Screen Vertical Scroll (Big) | Ctrl + Shift + Up / Down |
| | | | Channel Change | Up / Down |
| | | | Channel Trace | Ctrl + T |
| | Control Panel | Settings | Settings | F5 |
| | | File Name | PC Playback | Ctrl + O |
| | | | Main Module Data | Ctrl + Shift + O |
| | | | Printing | Ctrl + P |
| | | Waveform Operations | Whole Waveform Display (Waveform Window) | A |
| | | | Time/DIV (Waveform Window) | D / U |
| | | | Whole Waveform Display (Time Line Window) | Shift + A |
| | | | Time/DIV (Time Line Window) | Shift + D / U |
| | | | Span Change | Ctrl + Shift + 1 / 2 |
| | | | Position Change | Ctrl + Shift + 3 / 4 |
| | | | Stretch Change | Ctrl + Shift + 5 / 6 |
| | | | Stretch Position Change | Ctrl + Shift + 7 / 8 |
| | | Action | Call Cursor A | Ctrl + A |
| | | | Call Cursor B | Ctrl + B |
| | | | Active Cursor Change | C |
| | | | Cursor Movement | Right / Left |
| | | | Cursor Movement (Big) | Shift + Right / Left |
| | | | Data Search | F3 |
| | | | Create group tab | Ctrl + G |
| | | | Start recording | F7 |
| | | | Stop Recording | F8 |

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● Specifications are subject to change without notice.

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