General Purpose Data Acquisition System

Modular Data Acquisition PLATFORM
DATA PLATFORM GL7000

Next Generation Data Acquisition Unit with Touch Panel Control
On-Demand Signal Acquisition
Embedded Monitoring and Datalogging Solution

Relaunches With New Enhancements!

- Attach up to 10 input/output modules in a mixed condition environment
- Corresponds to various measurement types (physical, mechanical, and electrical)
- Supports a variety of storage media including a SSD module with a capacity of 128GB

www.graphteccorp.com
New Generation Data Acquisition Platform - GL7000 -
Display module allows a stand-alone operation or an embedded systems environment with touch-panel control

Input/output module has capacity to attach up to 10 units with mixed signals (temp, high voltage, high speed, strain, vibration, etc.)

Allows up to 112 channels in one main unit by attaching up to 10 units of the input/output modules.**
Detachable display module enables the GL7000 to be used in a stand-alone platform or to be embedded into the acquisition system. Control and monitoring via the PC or display module may be done independently or in conjunctions with one another.

**1. Maximum sampling speed will depend on the data destination. (RAM and optional SSD module is the fastest, Flash memory, SD Card will be slower.)

**2. - If different types of modules are attached, the effective sampling speed of the system is to up to the fastest sampling speed among the installed modules.
  - When the maximum sampling speed of the module is slower than the maximum sampling speed of the fastest amplifier, signal will be sampled with maximum sampling speed of the module. The same data is saved with the system sampling speed until new data is captured on the slower units.
  - The number of modules that can be attached is limited by the type of module. Up to 10 modules (maximum 112ch with 7 GL7-L/P module, max 100ch with GL7-V or GL7-M module).

For Logic/Pulse module (GL7-L/P):
Maximum 7 units allowed using logic option (112ch).
Maximum 2 units allowed using pulse option (32ch). (The mode for logic or pulse can be set for each unit.)

For Strain module (GL7-DCB):
Maximum 8 units allowed with additional two other amplifier units. (Number of channels is limited to 112ch.)

• For the logic/pulse module, the number of channels can be limited by the selected sampling speed when the module is attached together with other amplifier modules.
  - Up to 40 channels can be attached with each amplifier module.
  - The module can be used with the GL7-V, GL7-M, and GL7-HV modules.

Dual-Sampling Feature (Firmware version 2.0 or later)
Dual sampling speed can now be configured at the same time. While recording long intervals on the slow sampling speed, trigger set can start recording dynamic transient signals at a fast sampling speed.

Up to 10 input/output modules can be attached to one main unit *2

Example)
- 10 ch being used, Max. sampling speed 1005/s (10ms interval)

Using Volt/Temp Module
- 20 ch being used, Max. sampling speed 1005/s (10ms interval)
- 40 ch being used, Max. sampling speed 1005/s (10ms interval)

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  - Up to 40 channels can be attached with each amplifier module.
  - The module can be used with the GL7-V, GL7-M, and GL7-HV modules.
Supports multiple types of storage. 128GB SSD is available as an option

1. **Built-in RAM**
   - RAM is built into each of the amplifier modules to allow savings of up to 2 million samples.
   - Increasing the number of channels does not decrease the data capture duration.

2. **SD memory card**
   - SD card slot (supports SDHC, up to 32GB) is standard on the main module.
   - Captured data can be saved directly on the SD card when sampling speed is slower than 1ms (sampling speed: 1k Samples/s). Supports hot-swap where SD memory card can be replaced during recording without any data loss.*
   - The captured data can be transferred easily to the PC during offline condition.

3. **High Voltage Flash memory**
   - 4GB of Flash memory is built into the main module.
   - Captured data can be saved directly to the flash memory when sampling speed is less than 1ms (1k Samples/s). Non-volatile memory (saved data is retained even if the power is turned off).
   - * The storage capacity might differ by its production date.

4. **SSD module (128GB)**
   - Allows multiple recording of large amount of data to be saved when optional SSD module is used. It has a high vibration resistance and the captured data can be saved directly to the SSD when sampling is not faster than 1μs.*
   - SSD module needs to be set next to the main module.
   - * The number of modules are limited.* The storage capacity might differ by its production date.

### Maximum sampling speed and the data capturing time *1

<table>
<thead>
<tr>
<th>Input Module</th>
<th>Storage Device</th>
<th>Number of units, Max. sampling speed (internal)</th>
<th>Capturing time when single module is attached (when 10 modules are attached)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-speed Voltage Module</td>
<td>Built-in RAM (2M samples)</td>
<td>1M/s (1 μs)</td>
<td>2sec. (2sec.) 20sec. (20sec.) 33min. (33min.) 5hrs. (5hrs.) 23days (23days)</td>
</tr>
<tr>
<td>Built-in Flash memory (4GB)</td>
<td>N/A</td>
<td>N/A</td>
<td>83hrs. (11hrs.) 72hrs. (13hrs.) 32days (5days) 3269days (544days) 23days (23days)</td>
</tr>
<tr>
<td>SSD (128GB)</td>
<td>N/A</td>
<td>N/A</td>
<td>109hrs. (15hrs.) 100hrs. (15hrs.) 45days (6days) 4573days (664days) 34days (4days)</td>
</tr>
<tr>
<td>100S/s (10ms)</td>
<td>N/A</td>
<td>N/A</td>
<td>83hrs. (13hrs.) 72hrs. (13hrs.) 32days (5days) 3269days (544days) 23days (23days)</td>
</tr>
<tr>
<td>XY display</td>
<td>N/A</td>
<td>N/A</td>
<td>44min. (6min.) 44min. (6min.) 18days (2days) 1882days (228days) 1882days (228days)</td>
</tr>
<tr>
<td>FFT display</td>
<td>N/A</td>
<td>N/A</td>
<td>44min. (6min.) 44min. (6min.) 18days (2days) 1882days (228days) 1882days (228days)</td>
</tr>
</tbody>
</table>

* Sampling interval should be 100ms or longer.

### Useful functions for data saving and replay

- **High-speed access**
- **Retain the data even when power is off**
- **High vibration resistance**
- **High-speed access**

### Advantage of SSD
- Retain the data even when power is off
- High vibration resistance
- High-speed access

### Supports measurement and simulation testing using the voltage output module (GL7-DCO)

- Allows a simulation testing by outputting the measured data from signals recorded from various input modules and outputs the data through the voltage output module (GL7-DCO).

* Signals that are being captured may not be output at the same time.

The output current is max 10mA for each channel.

Total output current of the unit is 40mA.

If the target object needs to be driven by external power, than a power amplifier may be needed.

---

* Sampling interval should be 100ms or longer.

* The storage capacity might differ by its production date.

* The number of modules are limited. * The storage capacity might differ by its production date.
### Main features
- Easily measure strain gauges using built-in bridge circuit for both 120 and 350 Ohm gauges
- Supports excitation power for bridge circuit in constant voltage or current
- Supports TEDS sensors
- Supports a low-pass and anti-aliasing filter
- Enable high-precision measurement in remote sensing and shunt calibration function

### Supported sensor
- Strain gauge: 1 gauge in 2-wire, 3-wire, or 4-wire
- 2 gauges in 3-wire, 4-wire, or 5-wire
- 4 gauges in 4-wire, or 6-wire
- Strain type sensor: 4-wire or 6-wire

### Connector for input
- Standard accessory:
  - D-SUB type connector (standard accessory: 4pcs)
- Option:
  - Screw terminal adapter (B-560A)

### Compensation for high-precision measurement
- Remote sense: Eliminates the influence from the lead wire resistance
- Shunt calibration: Gain compensation of strain measurement

### DC Strain Module GL7-DCB

### Charge Module GL7-CHA

### Main features
- Supports charge and voltage output type sensors
- Now compatible with microphones (Firmware version 2.0 or later)
- Supports TEDS sensors
- Wide variety of filter functions allows high-precision measurements
- Supports RMS (effective value) measurement

### Sensors and input connector type
- Charge output type sensor: Supported acceleration sensor: 0.01pC/(m/s²) to 999.9pC/(m/s²)

### Voltage Output Module GL7-DCO

### Main features
- Recorded measurement data can be output as an analog voltage, and reproduce the measured anomalies and recorded data (Temperature, humidity, logic/pulse data is excluded.)
- The reference signal for the test created by the GL-Wave Editor (EXCEL macro) can be output into an analog voltage (Signal: Sine wave, pulse wave (any duty ratio), ramp, triangle wave, simple arbitrary waveform, DC.)
- Output voltage: Max. 10V (Output current: Max. ±10mA/ch or ±40mA/unit.)

### Method of analog voltage output
- Three functions:
  1. Outputs the stored measuring data
  2. Outputs the generated signal
  3. Outputs the edited measuring data

### Case 1
- Outputs a signal without a PC
  - The GL7000 cannot generate arbitrary data by itself.
  - Data: Saved measurement data, waveform: Sine, pulse, ramp, triangle, or DC

### Case 2
- Outputs a signal using the module and the PC software
  - Data: Arbitrary data generated by the software
  - Waveform: Sine, pulse, ramp, triangle, or DC

### Case 3
- Outputs an edited signal using the module and the PC software
  - Data: Edited measuring data
  - Waveform: Sine, pulse, ramp, triangle, or DC

* GBD is an abbreviation for Graphtec Binary Data.
**High Voltage Module GL7-HV**

**Main features**
- High input voltage (Maximum: 1000V)
- Input coupling of DC and AC
- Real-time value RMS measurement

**Measuring in RMS (effective value)**

<table>
<thead>
<tr>
<th>Voltage ±14.4V</th>
<th>AC RMS measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC RMS mode</td>
<td>100 Vrms</td>
</tr>
</tbody>
</table>

Volume of data to be recorded becomes small because the sampling speed does not need to be as fast recording the RMS value.

**Backup settings**

The GL7000 has a function that periodically back up recording data (refer to the chart below). Here, the user can set the conditions for data backup.

**DC- or AC-coupling**

By using the DC and AC coupling feature, the voltage signal of a small signal superimposed on the input signals or the absolute voltage value can be recorded.

**Voltage Module GL7-V**

**Main features**
- All isolated input channels (10ch/unit)
- 1kHz Simultaneous sampling
- Maximum input voltage 100V
- Supports low-pass filter

<table>
<thead>
<tr>
<th>Voltage ±100V</th>
<th>1kHz sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>1kHz sampling</td>
</tr>
</tbody>
</table>

**Logic/Pulse Module GL7-L/P**

**Main features**
- Switching mode between logic or pulse 16ch/unit
- Logic mode: 1MS/s sampling, Pulse mode: 10kS/s sampling
- Available dedicated cabler

**WEB and FTP server for remote control and data transfer / Direct USB connection to the main unit**

**WEB server**

- Web browser function allows remote control and remote monitoring of waveform analysis.

**FTP server**

- Data can be transferred between the server and GL7000.

**USB drive mode**

- The USB drive mode function enables data to be transferred to the PC from the main module built-in flash memory, SSD card memory or the SSD by drag & drop feature. You can then easily delete the files from the file explorer.

- While using the FTP server or the USB drive mode, data files that are being recorded cannot be transferred to the PC.

- WEB, FTP server function
- USB drive mode

**DHCP client function**

- The IP address of the GL7000 is automatically obtained from the DHCP server.

**NTP client function**

- The clock on the GL7000 is periodically synchronized with the NTP server.
High performance and useful software GL-Connection
It is able to display in the format that cannot be displayed in the GL7000

Recording safety measures include backing up the data on to the PC
Application software allows a real time saving of the data while the data is being captured on to the memory of the GL7000.

Customized screens for Data Acquisition Professionals
Various control and setting screens for simplified operation

<table>
<thead>
<tr>
<th>Setup screen</th>
<th>Setting menu screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is easily recognize the unit to be connected by graphical image on the display.</td>
<td>Setting menu on the GL Connection software is similar to the setup screen on the GL7000.</td>
</tr>
</tbody>
</table>

Data analysis with Oscope/Oscope2 (OANDO 50KII)

GL7000 GBD data can be imported directly to Oscope.

Multiple window option allows waveforms to be displayed in various forms
Splits up to 4 windows and each window can display different format (Y-T, XY, FFT, and digits).

<table>
<thead>
<tr>
<th>Dual windows</th>
<th>Quad windows</th>
<th>Quad windows displaying mixed format</th>
</tr>
</thead>
</table>

GL-Wave Editor (Excel macro)

GL-Wave Editor (Excel macro) with customized data platform for specified measurement.

Useful functions for GL-Connection Software

Supports a user-friendly mouse movement that enables changes in the setting and the related display waveform

Optional Features
Additional functions for data processing.

<table>
<thead>
<tr>
<th>Statistics</th>
<th>File operation</th>
<th>Search</th>
<th>Send mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>The maximum, minimum, peak, and average values are displayed while capturing data. The value between the cursors of the maximum, minimum, peak, average, and RMS will be displayed when replaying selected data span.</td>
<td>Data can be converted to CSV file format for a specified time period, or complete data, or multiple files. A file can also be created by compressing or consolidating multiple files.</td>
<td>The search point can be set by the level, alarm, or time (the beginning of the data, center, end, trigger point, the specified time, instruction time, the number specified).</td>
<td>Alarm warnings can be sent via Email.</td>
</tr>
</tbody>
</table>

Large-scale channel measurements
Up to 1120 channels can be recording using the PC platform
10 units of the GL7000 can be connected through 1 PC software using the LAN or the USB hub.

Up to 5 units of the GL7000 can be fully synchronized using the sync. cable
The start/stop trigger, and sampling can be synchronized in the GL7000 when they are connected by a sync cable. The master and slave units are automatically identified. Data is stored in each main unit individually.

SDK (Software Development Kit) is offered for free
Software Development Kit (SDK) is available for real time data transfer and beyond for custom application developed for your need.

- USB driver
- Manual (Main unit controls, data communication, data file, etc.)
- Sample program (in Visual C++, Visual Basic, .NET framework)
- Key commands have been set as modules for simpler implementation with LabVIEW. (Connection, Waveform Display, Digital Indicator, CSV conversion, file acquisition)
**Input / Output Module Specifications**

**Input Method Specifications**

- **Voltage input:**
  - Unbalanced input: ±24 V
  - Balanced input: ±120 V

- **Excitation:**
  - ±20 mA

- **Frequency response (DC coupling):**
  - ±10 kHz

- **Input impedance:**
  - 1 MΩ ±5%

- **Remote sensing:**
  - 4- or 5-wire in half bridge, 6-wire full bridge

- **Strain:**
  - Strain gauge

- **Microphone:**
  - 1.5 Hz to 45 kHz

- **Output impedance:**
  - Max. 1 Ω

- **Output voltage:**
  - ±1, ±2, ±5, ±10 V Full Scale

**Voltage Module Specifications**

- **Power supply:**
  - ±12 V

- **Sample rate:**
  - 10, 20, 50, 100, 200, 500, 1000 Hz

- **A/D converter:**
  - Successive Approximation type, 16 bits

- **Input range:**
  - ±10 V, Common-mode voltage: ±10 Vrms AC

- **Filter:**
  - Off, Line (1.5 Hz), 3, 6, 10, 30, 50, 60, 100, 300, 500 Hz, 1k, 3k, 5k, 10k Hz (in -30dB/oct)

- **Anti-aliasing:**
  - Off, On

**DC Strain Input Module Specifications**

- **Input method:**
  - All channels isolated unbalanced input, Simultaneous sampling, BNC connector

- **Input impedance:**
  - Min. 100 MΩ (at 500 V DC)

- **Filter:**
  - Off, Line (1.5 Hz), 3, 6, 10, 30, 50, 60, 100, 300, 500 Hz, 1k, 3k, 5k, 10k Hz (in -30dB/oct)

- **Anti-aliasing:**
  - Off, On

**Voltage High Speed Voltage Module Specifications**

- **Input method:**
  - Voltage: DC, AC, AC-RMS

- **Measurement:**
  - Acceleration sensor input: 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000, 50000 m/s²

- **Filter:**
  - Off, 0.15, 1, 10 Hz (It depends on input conditions.)

- **Response:**
  - IEPE type: 1 Hz to 45 kHz

- **IEPE:**
  - Charge type: 1.5 Hz to 45 kHz

- **Isolation:**
  - Between channels: 1000 Vp-p (1 minute)

- **Power:**
  - DC, 1.5 V, 2.5 V, 5 V, 10 V

**Current Input Module Specifications**

- **Input method:**
  - Current: DC, AC, AC-RMS

- **Measurement:**
  - Current: DC, AC, AC-RMS

- **Filter:**
  - Off, Line (1.5 Hz), 3, 6, 10, 30, 50, 60, 100, 300, 500 Hz, 1k, 3k, 5k, 10k Hz (in -30dB/oct)

- **Anti-aliasing:**
  - Off, On

**Input / Output Module Specifications**

- **Input method:**
  - Current: DC, AC, AC-RMS

- **Input range:**
  - ±100 mA, ±200 mA, ±500 mA, ±1 A, ±2 A, ±5 A, ±10 A

- **Filter:**
  - Off, Line (1.5 Hz), 3, 6, 10, 30, 50, 60, 100, 300, 500 Hz, 1k, 3k, 5k, 10k Hz (in -30dB/oct)

- **Anti-aliasing:**
  - Off, On

**Output Included Model Specifications**

- **Output method:**
  - Voltage: DC, AC, AC-RMS

- **Measurement:**
  - Voltage: DC, AC, AC-RMS

- **Filter:**
  - Off, Line (1.5 Hz), 3, 6, 10, 30, 50, 60, 100, 300, 500 Hz, 1k, 3k, 5k, 10k Hz (in -30dB/oct)

- **Anti-aliasing:**
  - Off, On

**Input / Output Module Specifications**

- **Input method:**
  - Voltage: DC, AC, AC-RMS

- **Input range:**
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- **Anti-aliasing:**
  - Off, On

**Frequency Response Module Specifications**

- **Input method:**
  - Frequency: DC to 1 kHz

- **Measurement:**
  - Voltage: DC-RMS, AC-RMS

- **Filter:**
  - Off, Line (1.5 Hz), 3, 6, 10, 30, 50, 60, 100, 300, 500 Hz, 1k, 3k, 5k, 10k Hz (in -30dB/oct)

- **Anti-aliasing:**
  - Off, On

**Input / Output Module Specifications**

- **Input method:**
  - Frequency: DC to 1 kHz

- **Measurement:**
  - Voltage: DC-RMS, AC-RMS

- **Filter:**
  - Off, Line (1.5 Hz), 3, 6, 10, 30, 50, 60, 100, 300, 500 Hz, 1k, 3k, 5k, 10k Hz (in -30dB/oct)

- **Anti-aliasing:**
  - Off, On

**Measurement Module Specifications**

- **Input method:**
  - Voltage: DC, AC, AC-RMS

- **Measurement:**
  - Voltage: DC, AC, AC-RMS

- **Filter:**
  - Off, Line (1.5 Hz), 3, 6, 10, 30, 50, 60, 100, 300, 500 Hz, 1k, 3k, 5k, 10k Hz (in -30dB/oct)

- **Anti-aliasing:**
  - Off, On

**Input / Output Module Specifications**

- **Input method:**
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- **Measurement:**
  - Voltage: DC, AC, AC-RMS

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- **Anti-aliasing:**
  - Off, On
The GL7000 can be used in various measurement applications and has a variety of features and specifications. Here is a detailed description of its capabilities and specifications:

**Data Storage and Sampling**
- **Sampling Speed**: The maximum sampling speed is limited to 50 thousand samples/s (20 µs interval) when 1 or 2 modules are attached.
- **Data Capture**: The sampling speed in limited up to 50 thousand samples/s (20 µs interval) when the sampling interval is longer than 5 seconds and reported.
- **Alarm**: The alarm is detected every 5 seconds when the sampling interval is longer than 5 seconds and reported.
- **Sampling Interval**: The sampling interval can be set between 2 ms to 5 seconds and reported. The alarm is detected every 5 seconds when the sampling interval is longer than 5 seconds and reported.
- **Alarm Output**: The alarm output is enabled (ON): Automatically re-armed for the next data capture function.

**Data Transfer and Storage**
- **Data Destination**: Data can be transferred to Built-in RAM, Built-in Flash, SD memory card, SSD.
- **Backup**: The backup interval can be set to Off, 1, 2, 6, 12, 24 hrs.
- **Weight**: The main module weighs approximately 2.2 kg, and the alarm output terminal weighs approximately 350 g.

**Display and Interface**
- **Display Mode**: Single display, Dual display, Nyquist, Y-T waveform with digital values, XY graph.
- **Display Device**: 5.7-inch TFT color LCD monitor.
- **Input Connector**: Screw terminal.
- **Input Cable**: Banana - BNC RIC-147, Insulated, 1.6 m long, 1000 V DC, CAT II.
- **Probe Set**: Probe set for Logic input RIC-10A For Logic/Pulse module (GL7-L/P), 4 channels, Cable with Alligator clip and IC clip.
- **Weight**: Approx. 770 g.

**Power and Dimensions**
- **Power Consumption**: 110VA.
- **Power Source**: 100 to 240 V AC, 50 to 60Hz.
- **Weight**: Approx. 530 g.
- **Dimensions**: External dimensions (W x D x H) Main module: Approx. 193 x 141 x 160 mm (Excluding Projection), Alarm output terminal: Approx. 30 x 136 x 145 mm (Excluding projection).

**Options and Accessories**
- **External Sampling**: External sampling function (version 1.40 or later).
- **Software Specifications**: The software can be used to monitor and control the device remotely. The software supports various functions such as FFT analysis, cursor information, and capture condition.

**For using equipment in correctly and safely**
- **Before using it**: Read the user manual and then use it properly in accordance with the instructions.
- **To avoid an occurrence of malfunction or an electric shock by leakage**: Use the equipment only with the standard accessories.
- **For maintenance and repair**: Service and repair should only be done by authorized personnel.

**Website**: [http://www.graphitecorp.co.jp](http://www.graphitecorp.co.jp)