GRAPHTEC

Modular Type Data Acquisition Unit

DATA PLATFORM GL7000

To measure the selected signal on demand
with the selected number of channels and time interval
The next generation Data Acquisition unit

www.graphteccorp.com

The new generation data acquisition unit

It can measure the desired signal according to the needs and can expand into other applications adding different amplifier modules. It can be attached to a display module having a touch panel, used as a stand-alone unit or embedding into a system.

The amplifier module can be expanded to accommodate a wide variety of measurements

A wide variety of measurements can be supported by the amplifier module

Measurements for different applications can be added to the amplifier module. It is also possible to mix measurements by adding different types of modules.

Maintains sampling speed even if the number of amplifier modules are increased*2

Maintains high-speed and multichannel measurements even if the number of modules are increased.

Volt./Temp. module being used

10 ch being used,
Maximum sampling speed
100S/s (10ms interval)

20 ch being used,
Maximum sampling speed
100S/s (10ms interval)

40 ch being used,
Maximum sampling speed
100S/s (10ms interval)

Expanding

※1 Unit Limitation by Module Type (Logic/Pulse Module: Logic mode 7 units, Pulse mode 2 units. DC Strain Module: 8 units) Total number of modules up to 10 modules.
※2 The sampling speed is limited when the capture data destination is to RAM.
※3 SSD module is an Option The pulse channel number is limited when the Logic/Pulse and High Speed Voltage modules are used.

Amplifier can be attached to up to 10 modules*1

Up to 10 amplifier modules can be attached for multi-channel measurements, with up to 112 channels on one GL7000.

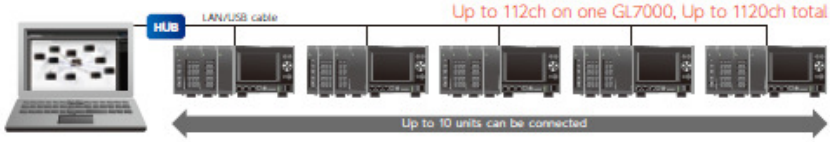
Sampling conversion chart

Amplifier Module	Channels in 1 module	Max. sampling speed in the module	Media type to save data	Max. sampling speed in the GL7000		
				Attached to 1 or 2 modules	Attached to 3 or 4 modules	Attached to 5 to 10 modules
Voltage Module	10ch	1kS/s (1ms)	Built-in RAM Built-in Flash SD memory card SSD*3	1kS/s(1ms)		
Volt./Temp Module	10ch	100S/s (10ms)	RAM Built-in Flash SD memory card SSD*3	100S/s(10ms)		
High-speed voltage Module	4ch	1MS/s (1μs)	Built-in RAM	1MS/s(1μs)		
			Built-in Flash SD memory card	1kS/s(1ms)		
			SSD*3	1MS/s(1μs)	500kS/s(2μs)	200kS/s(5μs)
High Voltage Module	2ch	1MS/s (1μs)	Built-in RAM	1MS/s(1μs)		
			Built-in Flash SD memory card	1kS/s(1ms)		
			SSD*3	1MS/s(1μs)	500kS/s(2μs)	200kS/s(5μs)
DC Strain*1 Module	4ch	100kS/s (10μs)	Built-in RAM	100kS/s(10μs)		
Charge Module			Built-in Flash SD memory card	1kS/s(1ms)		
			SSD*3	100kS/s(10μs)		
Logic*1 / Pulse*1 Module	16ch	In Logic mode 1M Samples/s (1μs interval)	Built-in RAM	1MS/s(1μs)		
			Built-in Flash SD memory card	1kS/s(1ms)		
			SSD*3	1MS/s(1μs)	500kS/s(2μs)	200kS/s(5μs)
		In Pulse mode 10k Samples/s (100μs interval)	Built-in RAM	10kS/s(100μs)	Not Available	
			Built-in Flash SD memory card	1kS/s(1ms)		
			SSD*3	10kS/s(100μs)		

Require more channels

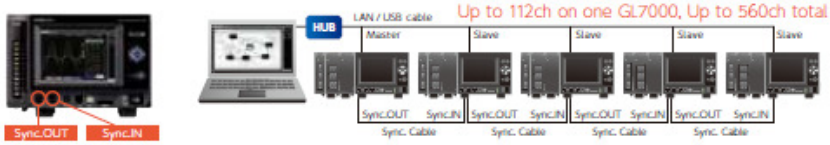
Multi-channel measurement is possible to 1120 channels using the PC

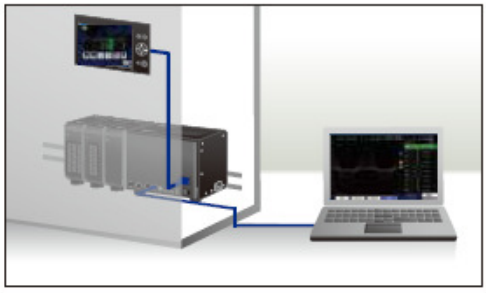
Up to 10 units of the GL7000 can be connected to 1 PC through LAN or USB and controlled using the software.



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.





Embedded in the device to create the system

Connected to the PC for measuring with the GL7000 (no display module)

Software for high performance and easy operation

The GL7000 can be controlled by the GL-Connection software that is included. The software has convenient functions such as saving data tothe PC, replaying captured data, and converting data form. It is an integrated application software for the GL series, the GL900, GL820 and GL220 can also be connected.*

* The version for supporting other GL series will be available within 2013.

Connection screen

Setting menu screen

Setting menu screen for amplifier module

Various measurement screens

The measurement signal can be displayed in various types of screens by the unit, the module or the specific channels that are specified in the group function. It can also be displayed as a combination of 'free running display' (capturing data) and captured data, the Y-T format and the X-Y format, simultaneously. (XY-axis display is only available for real time purposes). Each screen can display up to 112 channels.

* In case of using dual screen, total 224 channels can be displayed.

Waveform monitor (single window)

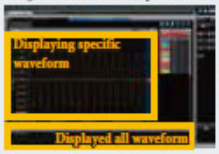
Waveform monitor (quad windows)

Digital monitor screen

Digital monitor screen (Statistics-Display)

Multi-window function, measured waveform can be displayed in various forms using multiple windows

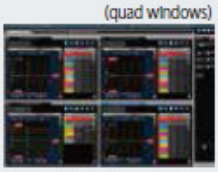
Single-window (factory default)



The complete measured waveform can be displayed on one screen.

Multi-window (dual windows)

(quad windows)



Displayed items in each window can be specified by the unit, the module, or channels. (ex.: waveform measured in the each unit is displayed in the separate screens.)

Useful functions

For real time and the post processing.

- **Statistics•Display** — 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 captured data.
- **File operation** — The data can be converted to the CSV format for a specified period, all data, or multiple files. A file can also be created by compressing or consolidating multiple files.
- **Search** — 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).
- **Send mail** — Alarm warnings can be sent via Email.

Supports four destinations to save the captured data according to the conditions of the measurement

1 Built-in RAM

RAM is built into each amplifier module to allow saving up to 2 million samples. Increasing the number of channels does not decrease the data capture duration.

2 Built-in Flash memory

The 2GB of Flash memory is built into the main module. The captured data can be saved directly to the built-in Flash memory when the sampling is not faster than 1ms (sampling speed: 1 k Samples/s). Saved data is retained even when power is turned off because flash memory is used.

3 SD memory card

SD card slot (supports SDHC, up to 32GB) is standard on the main module. The captured data can be saved directly to the SD memory card when the sampling is not faster than 1ms (sampling speed: 1 k Samples/s). It supports hot-swap, so the SD memory card can be replaced during measurement without data loss.* The captured data can be transferred easily to the PC in offline condition.

* The hot-swap is possible when the sampling is slower than 100ms.

4 SSD module (64GB) Option

Allows multiple large amounts of data to be quickly saved when the optional SSD module is attached. It has a high vibration resistance and the captured data can be saved directly to the SSD when the sampling is not faster than 1µs.*

SSD module is shown next to the main module.

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

* The number of modules are limited.

Capturing times*1 Single module attached (10 module attached)

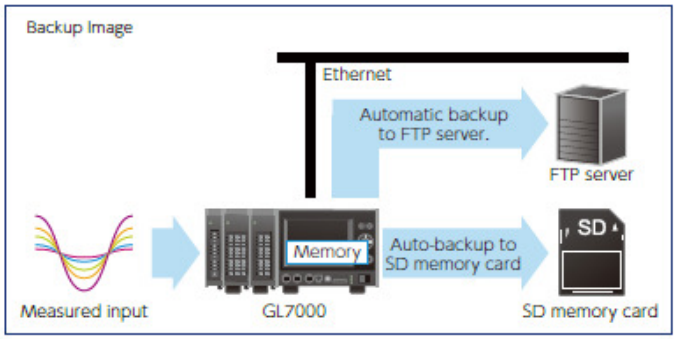
Amplifier Module	Storage Device	Device Capacity	Sampling speed (interval)						
			1MS/s(1µs)	500kS/s(2µs)	200kS/s (5µs)	100kS/s(10µs)	1kS/s(1ms)	100S/s(10ms)	1S/s(1s)
Voltage Module	Built-in RAM	2M samples	N/A	N/A	N/A	N/A	33min. (33min.)	5hrs. (5hrs.)	23days (23days)
	Built-in Flash memory	2GB					21hrs. (2hrs.)	8days (24hrs.)	893days (103days)
	SD memory card*3	32GB is attached					22hrs. (2hrs.)	9days (26hrs.)	955days (110days)
	SSD*3	64GB							
Volt./Temp Module	Built-in RAM	2M samples	N/A	N/A	N/A	N/A	N/A	5hrs. (5hrs.)	23days (23days)
	Built-in Flash memory	2GB						8days (24hrs.)	893days (103days)
	SD memory card*3	32GB is attached						9days (26hrs.)	955days (110days)
	SSD*3	64GB							
High-speed Voltage Module	Built-in RAM	2M samples	2sec. (2sec.)	4sec. (4sec.)	10sec. (10sec.)	20sec. (20sec.)	33min. (33min.)	5hrs. (5hrs.)	23days (23days)
	Built-in Flash memory	2GB	N/A	N/A	N/A	N/A	39hrs. (5hrs.)	16days (2days)	1659days (223days)
	SD memory card*3	32GB is attached					42hrs. (5hrs.)	17days (2days)	1775days (238days)
	SSD*3	64GB	134sec. (N/A)	268sec. (N/A)	671sec. (95sec.)	22min. (3min.)			
High Voltage Module	Built-in RAM	2M samples	2sec. (2sec.)	4sec. (4sec.)	10sec. (10sec.)	20sec. (20sec.)	33min. (33min.)	5hrs. (5hrs.)	23days (23days)
	Built-in Flash memory	2GB	N/A	N/A	N/A	N/A	2days (8hrs.)	23days (3days)	2323days (363days)
	SD memory card*3	32GB is attached					2days (9hrs.)	24days (3days)	2485days (388days)
	SSD*3	64GB	134sec. (N/A)	268sec. (N/A)	671sec. (167sec.)	22min. (5min.)			
DC Strain*2 Module	Built-in RAM	2M samples	N/A	N/A	N/A	20sec. (20sec.)	33min. (33min.)	5hrs.(5hrs.)	23days (23days)
	Built-in Flash memory	2GB				N/A	39hrs. (6hrs.)	16days (2days)	1659days (276days)
	SD memory card*3	32GB is attached					42hrs. (7hrs.)	17days (2days)	1775days (295days)
	SSD*3	64GB				22min. (3min.)			
Charge Module	Built-in RAM	2M samples	N/A	N/A	N/A	20sec. (20sec.)	33min. (.33min.)	5hrs. (5hrs.)	23days (23days)
	Built-in Flash memory	2GB				N/A	39hrs. (5hrs.)	16days (2days)	1659days (223days)
	SD memory card*3	32GB is attached					42hrs. (5hrs.)	17days (2days)	1775days (238days)
	SSD*3	64GB				22min. (3min.)			
Logic/Pulse Module (In Logic mode)	2Built-in RAM	2M samples	2sec.	4sec.	10sec.	20sec.	33min.	5hrs.	23days
	Built-in Flash memory	2GB	N/A	N/A	N/A	N/A	2days	29days	2904days
	SD memory card*3	32GB is attached					3days	31days	3106days
	SSD*3	64GB	134sec.	268sec.	671sec.	22min.			
Logic/Pulse Module (In Pulse mode)	2Built-in RAM	2M samples	N/A	N/A	N/A	N/A	33min.	5hrs.	23days
	Built-in Flash memory	2GB					7hrs.	3days	331days
	SD memory card*3	32GB is attached					8hrs.	3days	355days
	SSD*3	64GB							

*1 The capturing time figures are approximate. *2 Reference recording time is for 8 modules due to the number of modules are limited up to 8 modules. *3 Each file is limited to 2GB.

Reliable measurement with useful functions

Backup settings

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



Recording destination	Backup destination		
	SD memory card	SSD	FTP
Built-in flash memory	OK	OK	OK
SD memory card	NG	OK	OK
SSD	OK	NG	OK

Backup intervals Off, 1, 2, 6, 12, 24 hour(s)

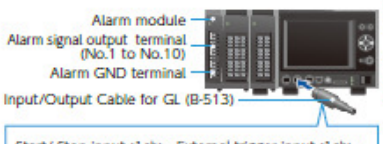
Backup destination

SD memory card, SSD, FTP (The recording data can be backed up to an external storage device.)

※ You can not specify the same location as the backup destination and recording destination.
※ When the recording format is "CSV" , the backup function is not available.
※ When Ring recording is set to on, the backup function is not available.

Input/output Cable Connection for GL

Trigger and exterior sampling input and trigger output functions can be used by using an output cable for the GL input/output cable (B-513: optional). The alarms are output from the alarm signal output terminal on the Alarm module. The output cable for the GL input/output cable (B-513: optional) is connected to the REMOTE terminal as shown on the chart below.



Alarm Signal Output Specifications

Open collector output
(pull-up resistance 10KΩ)
< Maximum rating of the output transistor >

- Voltage between collector and GND : 50V
- Collector current : 2.0 A
- Collector dissipation : 0.6W

Data search

Moves the cursor to the position that satisfies the set conditions.
Search types : Analogue • Pulse • Logic • Alarm

Search condition on setting screen

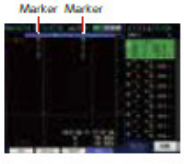
When you are searching for a particular set condition, cursor can move between 'next' and/or 'previous' search condition.

Ring capture

The most recent data is saved to selected data destination (Built-in RAM, Built-in Flash, SD Card, SSD) in ring memory mode.

Message/ Marker functions

The characters set in a marker can be displayed on the screen. Outputs the marker. The outputted marker is displayed on screen and recorded with the data.



The number of channels and measurement types can be added to the amplifier module

Alarm output terminal
(included in the main module)

Main module

Display module (option)

Module is fixed by a screw

Intuitive operation is increased by the touch panel

Attaching the high-definition display module with touch panel allows stand-alone operation or embedding into a system

The detachable display module allows both stand-alone and embedded system configurations

Measurement settings and signal measurement can both be done without a PC by attaching the display module. The display module can be moved to different locations for remote operation by connecting it to the main module with a LAN cable*, it also can be embedded into the system. The module can still be operated by the PC even when the display module is connected.

* Up to 10m using CAT5 LAN cable (straight connection)

Improved ease-of-use with the high-definition display and touch panel

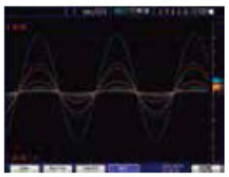
The touch panel makes setting the conditions intuitive, and it can also be operated using the cursor keys similar to the GL series.

Easy operation using the touch panel
Can also be set using the cursor keys

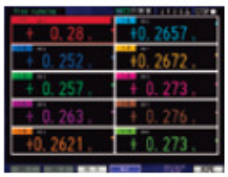
Large easy-to-read 5.7-inch high-definition LCD monitor

Utilises a bright clear 5.7 inch wide TFT color LCD monitor (VGA: 640 x 480 dots). Makes it easy to read data in waveform or digital form and to check measurement parameter settings.

Dual display (Current and Past)



Waveform display (Analog only)



Digital display

Support interface friendly with the PC

Ethernet (10BASE-T, 100BASE-TX) and USB2.0 (Hi-speed) interface are standard. Each interface port is located in the front of the unit for easy cable connection.

WEB and FTP server function

It can be controlled by using a WEB browser such as Internet Explorer. It also supports monitoring the signal, and accessing the captured data in memory devices such as the built-in memory, SD card* and SSD*.

* SD memory card is not included as standard accessory. SSD module is an option.

USB drive mode

The USB drive mode function enables data to be written to the USB drive from the main module's built-in flash memory, SD card memory and SSD and then easily deleted.

FTP client function

Captured data is periodically transferred to the FTP server for backup.

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.

GRAPHTEC

Extensible Data Acquisition Unit
DATA PLATFORM GL7000
Amplifier Unit Selection Guide

GL7000 features

- The amplifier module can be expanded to accommodate a wide variety of measurements. (Amplifier can be attached to up to 10 modules)
- Attaching the high-definition display module with a touch panel allows both stand-alone operation and embedding into a system.
- 2 interfaces to connect the GL7000 to your PC : USB 2.0, Ethernet.
- 4 destinations to save the recording data. (Built-in RAM, Built-in Flash memory, SD memory card, and SSD module)
- Software for high performance and easy operation (GL-Connection)

Flexible amplifier module combination allows wide range of measurments

Voltage Module GL7-V

Voltage	MAX	Simultaneous sampling	
10ch/unit	1kS/s (1ms)	Isolated	Voltage measurement for sensor output and battery cell. (Displacement, Pressure, Wind speed, etc)

- 1kS/s Simultaneous sampling
- 10 channels / unit
- Maximum input voltage 100V

Voltage/Temperature Module GL7-M

Voltage/ Temperature	MAX	Sigma-Delta type A/D converter	
10ch/unit	100S/s (10ms)	Isolated	Measurement of internal temperature and working voltage of samples within an environmental test chamber.

- 10ms / 10ch High speed scan method
- 10 channels / unit
- Variety of input types (Voltage, Thermocouple, RTD)

High Speed Voltage Module GL7-HSV

High Speed	MAX	Simultaneous sampling	
4ch/unit	1MS/s (1µs)	Isolated	Inverter measurement, Vibration Testing, Drop test

- 1MS/s High speed simultaneous sampling
- 4 channels / unit
- Maximum input voltage 100V

High Voltage Module GL7-HV

Voltage	MAX	MAX Input Voltage1000V	
2ch/unit	1MS/s (1µs)	Isolated	Power supply line, Electric Vehicle battery, etc.

- High withstand voltage (Maximum input voltage: 1,000V)
- Maximum sampling speed 1MS/s
- Real-time RMS measurement

DC Strain Module GL7-DCB NEW

※1 ※2

Strain Voltage	MAX	Strain Gauge TEDS Sensor	
4ch/unit	100kS/s (10µs)		Strain measurement with strain gauge or strain gauge transducer

- Built-in bridge amp enables direct connection to strain guages
- Excitation supply for bridge circuit (Constatnt voltage / Constant current)
- Supports TEDS sensors

※1 Conversion connector between DSUB and screw terminal : B-560(Option)
※2 Conversion cable between DSUB and NDIS : B-561(Option)

Charge Module GL7-CHA NEW

Charge Voltage	MAX	Charge IEPE	
4ch/unit	100kS/s (10µs)		Acceleration is measured with the general accelerometer which is typically used for vibration tests.

- Charge / IEPE / Voltage type sensor compatible
- The wide variety of filter functions allow high-precision measurements.
- Supports TEDS sensors

Voltage Output Module GL7-DCO NEW

※3

Output voltage	MAX	Recording data Arbitrary waveform	
8ch/unit	100kS/s (10µs)		Test with arbitrary waveform for R&D and designing purposes Simulation for the experiment data

- 8 channels / unit
- Output voltage from recorded data
- Output data can be created by dedicated software Output voltage

※3 SMA-BNC conversion cable : B-562(Option)

Logic/Pulse Module GL7-L/P

※4

Logic/ Pulse	MAX	Simultaneous sampling	
(16ch/unit)	1MS/s (1µs)		Measurement of timing, encoder output, rotation, and flow for controlled equipment

- 16 channels / unit (4channels / 4 slots)
- Logic : 1MS/s High speed sampling
  Pulse : 10kS/s High speed sampling

※4 Probe set for Logic input : RIC-10 (Option)

Voltage Module Specifications		Voltage	High Speed Voltage
Model number		GL7-V	GL7-HSV
Number of input channels		10 channels	4 channels
Input method		All channels isolated unbalanced input, Simultaneous sampling, Screw terminal (M3 screw)	All channels isolated unbalanced input, Simultaneous sampling, BNC connector
Sampling speed (interval)		1 k Samples/s to 1 Sample/h (1ms to 1h)	1 M Samples/s to 1 Sample/h (1µs to 1h)
Built in RAM		2M samples	
Measurement range		100, 200, 500 mV,1, 2, 5, 10, 20, 50, 100 V, and 1-5 V/F.S.	
A/D Converter		Successive Approximation type, 16 bits (effective resolution: 1/40000 of measuring full range)	
Input impedance		1 MΩ ± 5 %	
Maximum input voltage	Between (+) / (-) terminal	100mV to 1V range: 60 V p-p, 2V to 100V range: 100 V p-p	
	Between channels	60 V p-p	
	Between channel / GND	60 V p-p	
Maximum voltage	Between channels	1000 V p-p (1 minute)	
	Between channel / GND	1000 V p-p (1 minute)	
Isolation resistance	Between input / GND	Min. 50 MΩ (at 500 V DC)	
Common-mode rejection ratio		Min. 90 dB (50/60 Hz, Signal source impedance: Max. 300 Ω)	
Frequency response		DC to 1 k Hz (at +1/-3 dB)	DC to 200 k Hz (at +1/-3 dB)
Filter (Low pass)		Off,Line(1.5Hz),5,50,500 Hz(at -3dB 6dB/oct)	Off,Line(1.5Hz),5,50,500,5k,50k Hz (at -3dB 6dB/oct)
External dimensions (W×D×H)		Approx. 49.2 x 136 x 160 mm (Excluding projections)	
Weight		Approx. 840 g	Approx. 740 g

Voltage/Temperature Module Specifications		
Model number		GL7-M
Number of input channels		10 channels
Input method		All channels isolated balanced input, Scans channels for sampling, Screw terminal (M3 screw)
Sampling speed		100 Samples/s at 1-10ch to 1 Sample/h (10 ms with 1-10ch to 1 hr. interval)
Built-in RAM		2M samples
Measurement range	Voltage	20, 50, 100, 200, 500 mV, 1, 2, 5, 10, 20, 50 V, and 1-5 V/F.S.
	Temperature	Thermocouple: K, J, E, T, R, S, B, N, and W (WRe5-26),RTD: Pt100, JPt100 (JIS), Pt1000 (IEC751)
	Humidity *1	0 to 100 % (using scaling function in 1V range, humidity sensor B-530)
R.J. Compensation		Select internal or external
A/D Converter		Sigma-Delta type, 16 bits (effective resolution: 1/40000 of measuring full range)
Input impedance		1 MΩ ± 5 %
Maximum input voltage	Between(+)/(-)terminal	60 V p-p
	Between channels	60 V p-p
	Between channel / GND	60 V p-p
Maximum voltage	Between channels	350 V p-p (1 minute)
	Between channel / GND	350 V p-p (1 minute)
Isolation resistance	Between input / GND	Min. 50 MΩ (at 500 V DC)
Common-mode rejection ratio		Min. 90 dB (50/60 Hz, Signal source impedance: Max. 300 Ω)
Filter		Off, 2, 5, 10, 20, 40 (Moving average in selected number. When the sample is longer than 5 seconds, the data sampled in the sub-sample (5 seconds) will be used for creating the average value.)
5V output		Driving the humidity sensor B-530, 1 channel
External dimensions (W×D×H)		Approx. 49.2 x 136 x 160 mm (Excluding projections)
Weight		Approx. 770 g

High Voltage Module Specifications		
Model number		GL7-HV
Number of input channels		2 channels
Input connector		Isolated BNC connector
Input Method		All channels isolated unbalanced input, Simultaneous sampling
Sampling speed		1MS/s (1µs)～1h
Built-in RAM		2M samples
Input coupling		AC, DC, AC-RMS, DC-RMS
Measurement range	DC、AC	2・5・10・20・50・100・200・500・1000V F.S.
	DC-RMS, AC-RMS	1・2・5・10・20・50・100・200・500Vrms F.S. Crest Factor：1～200Vrms (C.F4) 500Vrms (C.F2)
A/D Convertor		Successive Approximation type, 16bits Effective Resolution: AC, DC coupling 1/40000 of measuring full range AC-RMS, DC-RMS coupling 1/20000 of measuring full range
Input impedance		1MΩ±5%
Input signal source resistance		1kΩ or Less
Maximum input voltage	Between (+) / (-) terminal	1000Vp-p
	Between channels	300VACrms
	Between channel / GND	300VACrms
Maximum voltage	Between channels	2300VACrms (1 minute)
	Between channel / GND	2300VACrms (1 minute)
Isolation resistance	Between input / GND	Min. 50 MΩ (at 500 V DC)
Common-mode rejection ratio		Min. 90 dB (50/60 Hz, Signal source impedance: Max. 300 Ω)
Frequency Response		DC Coupling：DC～200kHz(+1/-3dB) AC Coupling：4Hz～200kHz(+1/-4.5dB)
Filter		OFF・Line (1.5Hz), 5Hz, 50Hz, 500Hz, 5kHz, 50kHz (at -3dB/6dB oct)
External dimension (W x D x H)		Approx. 49.2 x 136 x 160mm (Excluding projections)
Weight		Approx. 740 g

DC Strain Module Specifications		
Model number		GL7-DCB
Number of input channels		4 channels
Input connector		D-SUB 9pins (Female) STD accessories : D-SUB 9pin (Male) x 4pieces Optional accessory : Wiring converter (D-SUB/Universal connector)
Input method		All channels isolated balanced input, Simultaneous sampling
Sampling speed		100kS/s(10µs)～1h
Built in RAM		2M samples
Input type		DC Voltage, Strain, Resistance (Potentiometric)
Measurement range	Strain	500・1000・2000・5000・10000・20000µε(µε：10^{-6} Strain) 0.25・0.5・1.0・2.5・5.0・10.0mV/V
	DC Voltage	1・2・5・10・20・50・100・200・500mV, 1・2・5V
	Resistance	1・2・5・10・20・50・100・200・500Ω, 1・2・5・10・20・50kΩ
A/D Converter		Successive Approximation type, 16 bits Effective Resolution: 1/40000 of measuring full range
Gauge Ratio		2.0 constant
Compatible Sensor	Strain*2	[Strain Gauge] 2- or 3- or 4-wire quarter bridge (3- or 4-wire: Remote sensing) 3- or 4- or 5-wire half bridge (4- or 5-wire: Remote sensing) 4- or 6-wire full bridge (6-wire: Remote sensing) 4-wire full bridge with constant current excitation
	Resistance	Potentiometric, Resistance
Bridge resistance		50～10kΩ
Internal Resistor*3		Quarter, half bridge: 120Ω/350Ω
Excitation voltage		DC1・2・2.5・5・10V
Constant current	Current	0.1～20mA
Bridge excitation	Compliance Voltage	10V
Zero Adjust	Method	Fully automatic (via push button or setting the condition menu)
for Strain gauge	Max. Range	±10,000µε(µε：10^{-6} Strain)
Remote sensing		3- or 4-wire quarter bridge4- or 5-wire half bridge6-wire full bridge
Shunt Calibration		Approx. 60kΩ (120Ω gauge), Approx. 175kΩ (350Ω gauge)
Maximum Input Voltage	Between (+) / (-) terminal	DC10V (balanced input)
	Common-mode voltage	10VACrms
	Between channels	10Vp-p
	Between channel / GND	60Vp-p
With-stand voltage	Between channel / GND	1000Vp-p (1 minute)
Isolation resistance	Between channel / GND	Min. 100MΩ (at 500 V DC)
Common-mode rejection ratio		Min. 80 dB (50/60 Hz, Signal source impedance: Max. 300 Ω)
Frequency Response		DC～20kHz
Filter	LPF	Off・Line (1.5Hz), 3Hz, 6Hz, 10Hz, 30Hz, 50Hz, 60Hz, 100Hz, 300Hz, 500Hz, 1kHz, 3kHz, 5kHz, 10kHz at -30dB/oct
	AAF	Off・On (Anti-aliasing filter)
TEDS	Standard	IEEE 1451.4 Class2 (temperate No.33)
	Information	OUT as rated output
External Dimensions (W x D x H)		Approx. 49.2 x 136 x 160mm (Excluding Protection)
Weight		Approx. 840 g

Charge Module Specifications		
Model number		GL7-CHA
Number of input channels		4 channels
Input Connector		BNC Terminal / Miniature connector (#10-32UNF)
Input method		All channels isolated unbalanced input, Simultaneous sampling
Sampling speed		100kS/s (10µs)～1h
Built in RAM		2M samples
Input type		Charge type, IEPE type, Charge type-RMS, IEPE type-RMS, AC, DC, AC-RMS,DC-RMS
Measurement range	Acceleration sensor input	1・2・5・10・20・50・100・200・500、1000・2000・5000・10000・20000・50000m/s²
	Voltage input	AC、DC：50・100・200・500mV・1・2・5・10V RMS：20・50・100・200・500mVrms, 1・2・5Vrms Crest factor：Min. 2Vrms (C.F4), Max 5Vrms (C.F2)
Sensor Sensitivity	Charge input	0.01pC/ (m/s²)～999.9pC/ (m/s²)
	IEPE input	0.01mV/ (m/s²)～999.9mV/ (m/s²)
A/D Converter		Successive Approximation type, 16bits Effective Resolution: 1/40000 of measuring full range
Input impedance		100kΩ±5%
Power Supply		22V±10%, 4mA・8mA±20%
Maximum Input Charge		50,000pC
Maximum input voltage	Between (+) / (-) terminal	25Vp-p
	Between channels	25Vp-p
	Between channel / GND	25Vp-p
Maximum voltage	Between channels	300Vp-p (1 minute)
	Between channel / GND	300Vp-p (1 minute)
Isolation resistance	Between input / GND	Min. 50 MΩ (at 500 V DC)
Common-mode rejection ratio		Min. 80 dB (50/60 Hz, Signal source impedance: Max. 300 Ω)
Frequency Response	Charge type	1.5Hz～45kHz
	IEPE type	1Hz～45kHz
Filter	HPF	Off・0.15Hz・1Hz・10Hz
	LPF	Off・Line (1.5Hz), 3Hz, 6Hz, 10Hz, 30Hz, 50Hz, 60Hz, 100Hz, 300Hz, 500Hz, 1kHz, 3kHz, 5kHz, 10kHz at -30dB/oct
	AAF	Off・On (Anti-aliasing filter)
TEDS	Standard	IEEE 1451.4 Class1 (temperate No.25)
	Information	OUT as rated output
Engineering scale function		Integration (Velocity), Double Integration (Displacement)
External Dimensions (W x D x H)		Approx. 49.2 x 136 x 160mm (Excluding projections)
Weight		Approx. 850 g

Voltage Output Module Specification		
Model number		GL7-DCO
Number of output channels		8 channels
Output connector		SMA Connector
Output method		All channels common ground
Sampling speed		100kS/s (10µs)
Output target		Voltage module, Voltage / Temperature module, High speed voltage module, High voltage module, DC strain module, Charge module ※Sampling speed from 10µs. ※Temperature and Humidity data is not compatible. ※Sine wave, pulsed wave (Duty cycle can be set when creating output data)/ ramp wave/triangle wave/Simple arbitrary waveform/DC voltage can be output by creating data with dedicated PC software. ※Input signal can be recorded with input type module during output signal is generated from voltage output module.
Output range	Voltage	±1・2・5・10V F.S.

Logic/Pulse Module specifications		
Model number		GL7-L/P
Number of input channels		16 channels
Input method		All channels common ground, simultaneous sampling, Circular connector (4ch/connector)
Sampling speed	Logic mode	Up to 1 M Samples/s (1µs interval)
	Pulse mode	Up to 10 k Samples/s (100µs interval)
Built-in RAM		2M samples
Measurement mode		Selecting of the Logic input mode or Pulse input mode *4
Mode	Pulse	Rotation count (RPM), Accumulating count, Instant count
Rotation count (RPM)	Function	Counting the number of pulses per sampling interval and then it is converted to RPM
	Span	50, 500, 5000, 50 k, 500 k, 5 M, 50 M, 500 M rpm/F.S.
Accumulating count	Function	Accumulating the number of pulses from the start of measurement
	Span	50, 500, 5000, 50 k, 500 k, 5 M, 50 M, 500 M counts/F.S.
Instant count	Function	Counting the number of pulses per sampling interval (count is reset at each sampling)
	Span	50, 500, 5000, 50 k, 500 k, 5 M, 50 M, 500 M counts/F.S.
Max. input frequency		1 M Hz
Max. number of count		15 M counts (24 bits counter is used)
Input signal	Voltage range	0 to +24 V (common ground)
	Signal type	Contact (Relay), Open collector, Voltage
	Threshold	Approx. 2.5 V
	Hysteresis	Approx. 0.5 V (2.5 V to 3 V)
Filter		Off or On (-3 dB at 50 Hz)
External dimensions (W×D×H)		Approx. 49.2 x 136 x 160 mm (Excluding projections)
Weight		Approx. 700 g

*1 Using optional humidity sensor (B-530)

*2 Remote sensing is not available when a NDIS connector is used When a bridge box is used, the connection needs to be 4-wire or 6-wire full bridge Bridge excitation: Constant current drives a strain gauge type converter or a 4-wire full bridge.
When connecting with a Half bridge (Opposite side), an additional bridge box is required.
The shunt calibration is available only when the connection is using a 3-wire, 4-wire quarter bridge, 5-wire full bridge, or 6-wire full bridge.

*3 When the built-in in bridge resistance is 120Ω, the excitation voltage needs to be set it to 1V, 2V, or 2.5V.
The gauge type and built-in resistance can be selected by a DIP-SW which is located on the front face of the module.

*4 The measuring mode is set in each module (16 channels) In Logic mode, up to 7 modules can be attached to one main module. (max. 112ch) In Pulse mode, up to 2 modules can be attached to one main modules.
The maximum number of channels are limited to up to 112 channels.

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GL7000 specifications		
Item		Description
Number of module		Attached to up to 10 modules *1
Number of input channels		Max. 112 channels in one GL7000
External Input/Output signals *2	Input	Start/Stop, Trigger, External sampling, Auto balance Signal type: Contact (relay), Open collector, Voltage
	Output	Trigger, Busy, Alarm (10 channels) *3 Signal type: Open collector (pulled-up by resistor 10 kΩ)
Trigger, Alarm function	Trigger action	Start or stop capturing data by the trigger
	Trigger repeat	Enabled (ON): Automatically rearm for the next data capture Disabled (OFF): Data capture is completed in a single trigger
	Trigger source	Start: Off, Measured signal, Alarm, External, Clock, Week or Time Stop: Off, Measured signal, Alarm, External, Clock, Week or Time
	Trigger determination conditions for measured signal	Combination: OR or AND condition at the level of signal or edge of signal Analog: Higher/Rising, Lower/Falling, Window-in, Window-out Logic *4: Higher/Rising, Lower/Falling Pulse *4: Higher/Rising, Lower/Falling, Window-in, Window-out
	Alarm determination condition *5	Combination: OR or AND condition at the level of signal or edge of signal Analog: Higher/Rising, Lower/Falling, Window-in, Window-out Logic *4: Higher/Rising, Lower/Falling Pulse *4: Higher/Rising, Lower/Falling, Window-in, Window-out
	Alarm output	10 channels
	Pre-trigger *6	Number of data before trigger: Up to specified number of captured data
Calculation function	Between channels	Addition, Subtraction, Multiplication and Division for two analog inputs (Sampling speed is limited up to 10 Samples/s (100ms interval). Available arithmetic element and the output destination is the analog input channel 1 to 100.)
	Statistical	Select two calculations from Average, Peak, Max., Min. in real time and replay *7
Move function of the display range		Beginning, center or end of the data, Trigger point, Specific time (absolute, relative), Call cursor
Search function		Search for analog signal levels, logic signal pattern, pulse signal levels or alarm point in captured data
Annotation function		Comment can be set in each channel (up to 31 alphanumeric characters)
Message / Marker Functions		Function: The registered messages are recorded for any timing. Number of registration messages: Max. 8 Message : Unspecified message is input before or during recording
Resume		Resume automatically in the same condition after power is recovered as when the power failure occurred during data capture *8
Interface to PC		Ethernet (10 BASE-T/100 BASE-TX), USB 2.0 (High speed)
Network function		WEB server, FTP server, FTP client, NTP client, DHCP client
USB drive mode		Emulate the USB memory device *9
Storage device	Built-in	RAM (2 million samples, built-in amplifier module), Flash memory (2 GB, built-in the main module)
	External *10	SD card (Support SDHC, up to 32 GB) slot, SSD (Approx. 64 GB) The file for capturing data is limited up to 2 GB.
Data saving function	Captured data*10	Built-in RAM, Built-in Flash, SD memory card, SSD (Data is saved directly to it.)
	Data in built-in RAM	Specified number of data up 2 million samples in increments of 1
	Auto save*10	Available for the built-in RAM Enabled (ON): Data in the RAM is saved automatically to the built-in Flash, SD memory card, SSD Disabled (OFF): Data in the RAM is not maintained after power is turned off
	Ring capturing mode*10*11	Saves most recent data Number of capturing data: 1000 to 2000000 points Destination of data: Built-in RAM, Built-in Flash, SD memory card, SSD
	During data capture*12	Displaying information in two windows, Hot-swapping the SD memory card, Saving data in between cursors.
	Backup*10	Backup interval: Off, 1, 2, 6, 12, 24 hrs. Data destination: SD memory card, SSD, FTP server
Engineering Scale function		Measured value can be converted to the engineering unit Analog voltage: Converts by four reference points (gain, offset) Temperature: Converts by two reference points (offset) Pulse count: Converts by two reference points (gain)
Synchronization between units		Start and Trigger*13
Accuracy of clock (at 23°C)		± 0.002 % (Monthly deviation approx. 50 sec.)
Operating environment		0 to 45 °C, 5 to 85 % RH (non condensed)
Power source		100 to 240 V AC, 50/60 Hz
Power consumption		Approx. 85 VA
Standard accessories		Quick guide, CD-ROM, AC power cable
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)
Weight		Main module: Approx. 2.2 kg, Alarm output terminal: Approx. 350 g

Software specifications		
Model name		GL-Connection
Supported OS		Windows 8 ,Windows 7 (32/64-bits, Except Starter edition), Vista (32/64-bits), XP*14
Functions		Control GL7000, Real-time data capture, Replay data, Data format conversion
Controlled units		Up to 10 units (Max. 1120 channels)
GL7000 Settings control		Input settings, Memory settings, Trigger and Alarm settings, Other settings
Captued data*15		Built-in RAM (Binary format), Built-in Flash memory (Binary, CSV format), SD memory card (Binary, CSV format), SSD (Binary, CSV format) The sampling speed is limited by the number of channels used when data is saved in the CSV format. (1 ms per channel. When 10 channels are set, sampling is limited to 10 ms.)
Displayed information		Analog waveforms, Logic waveforms, Pulse waveforms, Digital values
Display mode		Y-T waveform with digital values, X-Y graph in real time, Cursor information, Capture condition, Alarm information
File operation		Converts binary data to the CSV data (specific period, all data in one file, multiple files), Creates a new file with compression or by consolidating multiple files.
Warning Function		Send e-mail to the specified address when the alarms occur
Statistical calculation		Capturing data: Maximum, Minimum, Peak or Average Replaying data: Maximum, Minimum, Peak, Average or RMS in between cursors
Search function	Level	Specific level in any channels
	Alarm	Occurred alarm in any channel
	Time	Beginning, center, end of the data, Trigger point, Specific time (absolute, relative), Specific number
Operation lock		Operation screen can be locked (It is unlocked with a password.)

Display module specifications	
Model number	GL7-DISP
Display device	5.7-inch TFT color LCD monitor (VGA: 640 x 480 dots)
Operation section	Touch panel and Cursor keys*16
Touch panel	Capacitive type touch panel, Operated by finger or the proprietary pen
Displayed language	English, French, German, Chinese, Korean, Japanese
Screen saver	Turns off backlight by 10, 30 sec., 1, 2, 5, 10, 30, 60 min.
Displayed information	Waveform in Y-T with digital values, Waveform only, Digital value, Waveform in X-Y
Connection cable	LAN cable (CAT5 class, Straight connection, Up to 10m) *17
Standard accessories	Bracket for slanted mount, Connection cable (40cm), Ground cable, Screws
External dimensions (W x D x H)	Approx. 187 x 34.5 x 119 mm (Excluding projection)
Weight	Approx. 530 g

SSD module specifications		
Model number		GL7-SSD
Memory device		Solid state disk (SSD), Form factor: 2.5-inch HDD
Capacity		Approx. 64 GB (The file size of the captured data is limited up to 2 GB.)
Sampling speed*18	Attached to 1 or 2 modules	Max. 1 M Samples/s (1µs)
	Attached to 3 or 4 modules	Max. 500 k Samples/s (2µs)
	Attached to 5 to 10 modules	Max. 200 k Samples/s (5µs)
External dimensions (W x D x H)		Approx. 49.2 x 136 x 160 mm (Excluding projection)
Weight		Approx. 770 g

Options and accessories		
Item	Model number	Remarks
Input/Output cable	B-513	2m, One end is bare wire
Humidity sensor	B-530	3m cables for signal and power
Sync. Cable	B-559	1 m, Synchronizing between GL7000
Conversion connector between DSUB and screw terminal	B-560	For DC Strain Module (GL7-DCB)
Conversion cable between DSUB and NDIS	B-561	For DC Strain Module (GL7-DCB)
SMA-BNC conversion cable	B-562	For Voltage Output Module (GL7-DCO): Cable 2m
Probe set for Logic input	RIC-10	For Logic/Pulse Module (GL7-L/P), 4 channels, Cable with Alligator clip and IC clip
Input cable, BNC - BNC	RIC-112	1.5m, Same or below 60VDC
Input cable, Banana - BNC	RIC-113	1.5m, Same or below 60VDC
Input cable, Alligator clip - BNC	RIC-114	1.5m, Same or below 60VDC
Input cable, BNC - BNC	RIC-142	1.5m, 1,000VDC, CAT II
Input cable, Banana - BNC	RIC-143	1.6m, 600VDC, CAT II
Clip, Alligator (small size)	RIC-144A	Aperture 11mm, 300VDC, CAT II, MAX 15A
Clip, Alligator (middle size)	RIC-145	Aperture 20mm, 1,000VDC, CAT II, MAX 32A
Clip, Grabber	RIC-146	Aperture 5mm, 1,000VDC, CAT III, MAX 1A

Notes :

*1 Excluding the function module as the Display module or SSD module.

*2 The Input/Output cable (B-513) is required for connecting the signal.
The Autobalance signal input and the Busy signal output are used in the DC Strain Module.

*3 The alarm signals are output on the terminal block attached to the main module as standard accessory.

*4 It is available on the Logic/Pulse module.

*5 Method of detection
Volt./Temp. module :
The alarm is detected every 5 seconds when the sampling interval is longer than 5 seconds.
The alarm is detected in the sampling interval when the sampling interval is shorter than 5 seconds and reported.
Other modules :
The alarm is detected every 1ms when the sampling interval is shorter than 1ms and reported.
The alarm is detected in the sampling interval when the sampling interval is set between 2ms to 5 seconds and reported.
The alarm is detected every 5 seconds when the sampling interval is longer than 5 seconds and reported.

*6 It is available when the captured data is saved to the built-in RAM.Maximum sampling interval 100ms.
The pre-trigger function may not work in combination with the trigger settings.

*7 The result of real time calculation is displayed in the digital display mode.

*8 When the captured data destination is set to the built-in-RAM, the captured data is not maintained after a power failure. The built-in Flash or the SD memory card may be damaged by a power failure if it is being accessed to write data. If the memory device is not damaged, the closed data file is maintained. The file is closed every one minute while data is being captured.

*9 The USB drive mode is started by setting of the switch on the main module.
It can be also started when the power is turned on while pressing the key on the display module.

*10 The SD memory card is not included as a standard accessory.
Compatible SD card type: SD, SDHC Speed class 4 or latest.
The SSD module is an option.

*11 The capacity for saving the data is set to one third of available memory when the captured data destination is set to a device other than the built-in-RAM. The sampling speed is limited up to 10 samples (100ms interval).

*12 Maximum sampling interval 100ms when multifunctions are used

*13 The Sync cable (B-559) is required when this function is used. The GL-Connection software is required when the synchronizing function is used.

*14 The SP2 or higher service pack need to be installed.

*15 The captured data that is saved to the built-in-RAM or SSD cannot be saved to the PC in real time. The data in the built-in-RAM or SSD needs to be transferred to the PC after data capture is complete.

*16 Most operations can be selected by both the touch panel and keys.

*17 When the display module is mounted at an angle using the bracket, the display module is connected to the main module by a LAN cable that is attached to the display module as a standard accessory.

*18 The sampling speed in the GL7000 is limited to the fastest sampling speed of attached amplifier module. When the specified sampling speed is faster than the module, the sampling is done in fastest sampling on the module. The same value is stored to the memory device in the specified sampling speed until data is renewed by the next sampling.

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