GRAPHTEC

DATA PLATFORM GL7000
Strain and Temperature Measurement Set

Easy Strain and Temperature measurement by DC strain module (GL7-DCB) and multi-input module (GL7-M)

- **Supports Strain gauge & Sensor/Transducer in GL7-DCB module**

- **Supports thermocouple and RTD for measuring temperature in GL7-M module**

- **Converts to Engineering Unit by scaling**

5.7-inch TFT color LCD (with touch panel control)   Ethernet   USB   SD card slot

Strain measurement in equipments testing

Strain
Strain gauge
GL7000
Vehicles

Pressure & temperature measurements

Molding die
← Material
Temp.
Pressure
Injection molding machine   GL7000

Strain & temperature measurements for material testing

Material tensile/ compression tester
Temp.
Strain
Force
Environmental test chamber   GL7000

Easy connect the sensor in GL7-DCB

Supports TEDS
Setting sensor calibration value is unnecessary!

Support a direct connection with the strain gauge & strain gauge based sensor, and allows a wide variety measurements.
- Supports built-in bridge circuit and excitation power
- Supports voltage & resistance measurement
- Faster sampling speed up to 10µs

Strain gauge	Sensor/Transducer	Resistance	Voltage
Micro distortion measurement using Strain Gauge. Supports 1-gauge, 2-gauge, 4-gauge	Various physical phenomena measurement by using a sensor. Load-cell, Acceleration, Pressure, Torque, Force, etc.	Resistance measurement of sensor or electronic device. Displacement sensor, Electronic device, etc.	Voltage measurement. Range: 1mV to 5V

Easy measure temperature in GL7-M

Support multiple input type for voltage and temperature, and allows a wide variety measurements.
- Faster sampling speed up to 10ms
- All isolated input channels (10ch/unit)
- Supports multiple input types
  Voltage: max. 50V (Allows 4-20mA current loop using B-551 shunt)
  Temperature: Thermocouple and RTD
  Humidity: optional sensor (B-530)

Scaling (engineering unit) function
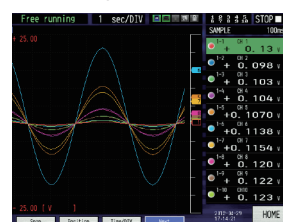
Measured value can be converted to specified engineering unit.

Measure momentary and long-time phenomenon

Support multiple types of storage device realize to capture data in an endurance test of long time and even also an impact test of short time.

Supported storage device
- Built-in RAM
- Built-in Flash
- SD memory card
- SSD (Option)

Strage	Sampling speed/Capturing time Using 14 channels (4ch in GL7-DCB & 10ch in GL7-M)		
	100kS/s(10µs)	1kS/s(1ms)	1S/s(1s)
RAM	20 seconds	Approx. 33 min.	Approx. 23 days
Built-in Flash memory *1	Not Available	Approx. 12 hr. 42 min.	Over 365 days
SD card *2	Not Available	Approx. 12 hr. 33 min.	Over 365 days

*1 : In 2GB data file size, GBD data format.
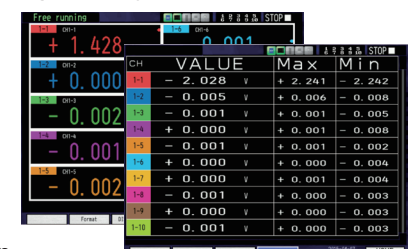*2 : Uses 2GB SD memory card, GBVD data format.

Various type of display

Utilizes a clear 5.7-inch TFT color monitor. Makes it easy to read data in waveform or digital form by multiple type of display method.

Y-T display

Digital display

It is also available X-Y and FFT displays.

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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 1 of GL7000
External Input/Output signals *2	Input	Start/Stop, External 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 re-armed for the next data capture function
		Disabled (OFF): Data capture is completed in a single trigger
	Trigger source	Start: Off, Measured signal, Alarm, External signal, Clock, Week or Time
		Stop: Off, Measured signal, Alarm, External signal, 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		Message: The registered messages or entered message is able to be recorded for any timing. Up to 8 messages can be pre-registered.
		Marker: Marker is able to record for occurring alarm or power failure.
Resume		Resume automatically in the same condition after power is recovered as when the power failure occurred during data capture *8
FFT analysis function (Firmware ver. 1.20 or later)	Analyzing frequency range	0.08, 0.2, 0.4, 0.8, 1.6, 2, 3.2, 4, 8, 20, 40, 80, 200, 400, 800 Hz, 2, 4, 8, 20, 40, 80, 200, 400 kHz
	Number of points	500, 1000, 2000, 4000, 10000
	Window function	Rectangular, Hanning, Hamming, Blackman, Flat-top, Exponential
	Averaging	Summation average, Exponential averagel, Peak hold
	Channels	4 channels
	Functions	Y-T, Linear, Power, PSD, Cross, Transfer function, Coherence, COP
	Display mode	Single display, Dual display, Nyquist
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 for each channels, 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
	Capturing mode *10	Mode: Off, Normal, Ring, Realy
		Ring*11: Saved most recent data (Number of capturing: 1000 to 2000000 points, Destination of data: Built-in RAM, Built-in Flash, SD memory card, SSD)
		Relay*12: Saved data to multiple file without losing data until capturing data is stopped (Destination of data: Built-in Flash, SD memory card, SSD)
	During data capture *13	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 *14
Operating environment		0 to 45 °C, 5 to 85 % RH (non condensed)
Power source		100 to 240 V AC, 50 to 60Hz
Power consumption		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

Display module specification

Item	Description
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*15
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) *16
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

DC Strain input module specifications

Item		Description
Model number		GL7-DCB
Number of input channels		4 channels
Input method		All channels isolated balanced input, Simultaneous sampling, D-SUB type connector (9 pins, receptacle)
Sampling speed (interval)		100 k Samples/s to 1 Sample/h (10µs to 1hr.)
Built in RAM		2 million samples for each channel
Input type		Voltage, Strain, Resistance value (including potentiometer)
Measure-ment range	Strain	500, 1000, 2000, 5000, 10000, 20000 µε (µε: 10⁻⁶ strain)
		0.2, 0.25, 0.4, 0.5, 1, 2, 2.5, 4, 5, 10 mV/V
		Available ranges vary by the excitation voltage for the bridge.
	Voltage	1, 2, 5, 10, 20, 50, 100, 200, 500 mV, 1, 2, 5 V Full Scale
	Resistance	1, 2, 5, 10, 20, 50, 100, 200, 500 Ω, 1, 2, 5, 10, 20, 50 kΩ Full Scale
Measure-ment accuracy *17	Strain	± (0.2 % of Full Scale + 10 µε)
	Voltage	± (0.2 % of Full Scale + 10 µV)
	Resistance	± 0.5 % of Full Scale
A/D converter		Successive approximation type, 16 bits (effective resolution: 1/40000 of the measuring full range)
Gauge ratio		2.0 constant
Supported sensor	Strain	Strain gauge
		Quarter bridge (single gauge) in 2-, 3- or 4-wire (supports remote sensing in 3- or 4-wire)
		Half bridge (dual gauge) in 3-, 4-, 5-wire (supports remote sensing in 4- or 5-wire)
		Full bridge (quad gauge) in 4- or 6-wire (supports remote sensing in 6-wire)
		Transducer/sensor based on strain gauge
		Full bridge type in 4-wire, Full bridge type in 6-wire (supports remote sensing)
	Resistance	Resistor, Potentiometer
Bridge resistance		50 Ω to 10 kΩ, Available excitation power varies by selection of element.
Built-in element of the bridge		120 or 350 Ω for the quarter- and half-bridge
		Available excitation power varies by selection of element.
Excitation power	Voltage mode	1, 2, 2.5, 5, 10 V DC
		Excitation voltage 5 and 10 V is available when bridge resistance is the 350 Ω or higher.
	Current mode	Constant current: 0.1 to 20 mA (supported voltage is up to 10 V.)
Zero Adjust for	Method	Fully automatic (via push button or setting the condition menu)
Strain gauge	Max. Range	±10000 µε (µε: 10⁻⁶ strain)
Remote sensing		3- or 4-wire in quarter bridge, 4- or 5-wire in half bridge, 6-wire full bridge
Shunt Calibration		Approx. 60kΩ (120Ω gauge), Approx. 175kΩ (350Ω gauge)
Maximum input voltage	Between (+)/(-)terminal	10 V, Common-mode voltage: 10 Vrms AC
	Between channels	10 Vp-p (Between negative (-) terminals in different channels)
	Between channel/GND	60 Vp-p
Max. voltage (withstand)	Between channels	1000 Vp-p (1 minute)
	Between channel/GND	1000 Vp-p (1 minute)
Frequency response		DC to 20 kHz
Filter	Low pass	Off, Line(1.5Hz), 3, 6, 10, 30, 50, 60, 100, 300, 500 Hz, 1k, 3k, 5k, 10k Hz (in -30dB/oct)
	Anti-aliasing	Off, On
Support Standard		IEEE 1451.4 Class2 (Temperate No.33)
TEDS Support		Reading information from the sensor and setting it to module
External dimensions (W x D x H)		Approx. 49 x 136 x 160mm (Excluding Protection)
Weight		Approx. 840 g

Voltage/Temperature input module specifications

Item			Description	
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 (interval)			100 Samples/s with 1-10ch to 1 Sample/h (10 ms with 1-10ch to 1 hr.)	
Built in RAM			2 million samples for each channel	
Measure-ment range	Voltage		20, 50, 100, 200, 500 mV, 1, 2, 5, 10, 20, 50 V, and 1-5 V Full Scale	
	Temperature		Thermocouple: K, J, E, T, R, S, B, N, and W (WRe5-26) RTD: Pt100, JPt100 (JIS), Pt1000 (IEC751)	
	Humidity		0 to 100 % RH, using optional humidity sensor (B-530)	
Measure-ment accuracy *17	Voltage		± 0.1% of Full Scale	
	Tempe-rature	Thermocouple	Measurement range	Measurement accuracy
		R/S	0 ≤ TS ≤ 100 ℃	± 5.2 ℃
			100 < TS ≤ 300 ℃	± 3.0 ℃
			R: 300 < TS ≤ 1600 ℃	± (0.05 % of reading + 2.0 ℃)
			S: 300 < TS ≤ 1760 ℃	± (0.05 % of reading + 2.0 ℃)
		B	400 ≤ TS ≤ 600 ℃	± 3.5 ℃
			600 < TS ≤ 1820 ℃	± (0.05 % of reading + 2.0 ℃)
		K	-200 ≤ TS ≤ -100 ℃	± (0.05 % of reading + 2.0 ℃)
			-100 < TS ≤ 1370 ℃	± (0.05 % of reading + 1.0 ℃)
		E	-200 ≤ TS ≤ -100 ℃	± (0.05 % of reading + 2.0 ℃)
			-100 < TS ≤ 800 ℃	± (0.05 % of reading + 1.0 ℃)
		T	-200 ≤ TS ≤ -100 ℃	± (0.1 % of reading + 1.5 ℃)
			-100 < TS ≤ 400 ℃	± (0.1 % of reading + 0.5 ℃)
		J	-200 ≤ TS ≤ -100 ℃	± 2.7 ℃
			-100 < TS ≤ 100 ℃	± 1.7 ℃
			100 < TS ≤ 1100 ℃	± (0.05 % of reading + 1.0 ℃)
		N	-200 ≤ TS < 0 ℃	± (0.1 % of reading + 2.0 ℃)
			0 ≤ TS ≤ 1300 ℃	± (0.1 % of reading + 1.0 ℃)
		W	0 ≤ TS ≤ 2000 ℃	± (0.1 % of reading + 1.5 ℃)
			Reference Junction Compensation (R.J.C.) accuracy: ± 0.5 ℃	
			* Wire size of thermocouple used is 0.32mm diameter in the T type and 0.65mm diameter in other types.	
		RTD	Measurement range	Driving current	Accuracy
		Pt100	-200 to 850 ℃ (F.S. = 1050 ℃)	1 mA	± 1.0 ℃
		JPt100	-200 to 500 ℃ (F.S. = 700 ℃)	1 mA	± 0.8 ℃
		Pt1000	-200 to 500 ℃ (F.S. = 700 ℃)	0.2 mA	± 0.8 ℃
R.J. Compensation			Select internal or external	
A/D converter			Sigma-Delta type, 16 bits (effective resolution: 1/40000 of the measuring full range)	
Input impedance			1 MΩ ±5%	
Maximum input voltage	Between (+)/(-)terminal		60 Vp-p	
	Between channels		60 Vp-p	
	Between channel/GND		60 Vp-p	
Max. voltage (withstand)	Between channels		350 Vp-p (1 minute)	
	Between channel/GND		350 Vp-p (1 minute)	
Filter			Moving average 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.)	
5 V output			Driving the humidity sensor B-530, 1 channel	
External dimensions (W×D×H)			Approx. 49 x 136 x 160 mm (Excluding projections)	
Weight			Approx. 770 g	

GL7000 model for Strain and Temperature measurement

Item	Model number	Quantity
Main module	GL7000	1
Input module	GL7-DCB, DC Strain input module	1
Input module	GL7-M, Voltage/Temperature input module	1
Display module	GL7-DISP	1

*1. Excluding the function module as the Display module or SSD module. In case of the DC Strain module (GL7-DCB): up to 8 modules. In case of the Logic/Pulse module (GL7-L/P): input mode is selected in the logic or pulse for each module, up to 7 modules when the module is used in the logic mode, up to 2 modules when the module is used in the pulse mode.
*2. The Input/Output cable (B-513) is required for connecting the signal. The Auto balance signal input and the Busy signal output are available in the DC Strain module (GL7-DCB).
*3. The alarm signals are outputted on the terminal block attached to the main module as standard accessory.
*4. It is available on the Logic/Pulse (GL7-L/P) module.
*5. Method of detection
　Volt./Temp. module:
　　The alarm is detected every 5 seconds when the sampling interval is longer than 5 seconds and reported. 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 1 ms when the sampling interval is shorter than 1ms. The alarm is detected in the sampling interval when the sampling interval is 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.
*6. It is available when the captured data is saved to the built-in RAM. The pre-trigger function may not available in combination with the trigger settings.
*7. The result of real time calculation is displayed in the digital display mode. Available sampling speed is the 10 samples/s (100 ms interval).
*8. When the captured data destination is set to the built-in-RAM, the captured data is not maintained after a power failure is occurred. When distination is set to the built-in Flash or the SD memory card, it may have a problem 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 minute while data is being captured. This function is not available when the FFT mode or the Voltage Output mnodule (GL7-DCO) is used.
*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 START/STOP 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 faster. The SSD module (GL7-SSD) 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. Available sampling speed is up to 10 samples/s (100ms interval).
*12. The file size of captured data is limited up to 2 GB. When the captured data distination is set to the built-in Flash or the SD memory card, sampling speed is limited up to 100 samples/s (10 ms interval). In case of using the SSD module (GL7-SSD), sampling speed in limited up to 50 thousand samples/s (20 µs interval) when 1 or 2 modules are attached.

*13. This function is able to be available when sampling speed is set up to 10 samples/s (100 ms interval).
*14. The Sync cable (B-559) is required when this function is used. The GL-Connection software is required when the synchronizing function is used.
*15. Most operations can be selected by both the touch panel and keys.
*16. 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.
*17. Subject to the conditions:
- Room temperature is 23 ℃ ± 5 ℃.　　• When 30 minutes or more have elapsed after power was turned on.
- Filter is set to 10.　　• Sampling rate is set to 1 second.
- GND terminal is connected to ground.

⚠ For using equipment in correctly and safely
- Before using it, please read the user manual and then please use it properly in accordance with the description.
- To avoid malfunction or an electric shock by current leakage or voltage, please ensure a ground connection and use according to the specification.