

Reassuring to know, Convenient to use

Charge Module [GL7-CHA]

## Method to take advantage

Signal conditioner for the GL7000 corresponding with the sensor using Piezoelectric element

This is a technical guide for measuring by [GL7-CHA]



DATA PLATFORM GL7000



Charge Module  
GL7-CHA

### Contents

1. Outline and Connection of GL7-CHA module	P. 1
2. Setting of GL7-CHA	
2-1. Uses the IEPE type acceleration sensor	P. 3
2-2. Converts the unit using scaling function	P. 5
2-3. Uses the Charge output type sensor	P. 7
2-4. Uses other sensor	P. 8
3. Using TEDS of Acceleration sensor	P. 10
4. Measuring Velocity or Displacement	P. 11



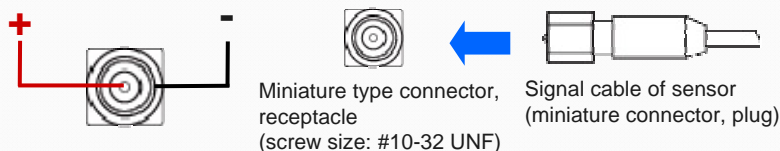
# Charge module GL7-CHA, Method to take advantage

## 1. Outline and Connection of GL7-CHA module (1/2)

The charge module GL7-CHA is the signal conditioner for the GL7000. It is the isolated 4 channel and corresponds with the sensor using Piezoelectric element (charge signal output type and IEPE type), and supports voltage measurement. Input signal type can be set individually for each channels.

- Supports the charge output type sensor, IEPE sensor and also voltage input
- Supports the sensor corresponding the TEDS
- High precision module by reduce noise supporting a low-pass, high-pass, anti-aliasing filter

Input for the charge signal output type sensor



When using the charge output type sensor, connect it to the miniature connector.

**Usable acceleration sensor:** 0.01pC/(m/s<sup>2</sup>) to 999.9pC/(m/s<sup>2</sup>)

Input for IEPE type sensor and voltage



When measuring voltage or using the IEPE sensor, connect it to the BNC connector.

**Usable acceleration sensor:** 0.01mV/(m/s<sup>2</sup>) to 999.9mV/(m/s<sup>2</sup>)

GL7-CHA can be used with the piezoelectric type acceleration sensors as well as various type sensors

Sensor type			Example of sensor sensitivity (Unit of output signal)
Piezoelectric element type sensor	Charge output type	Acceleration sensor	pC/(m/s <sup>2</sup> ), pC/(9.8m/s <sup>2</sup> ), pC/g, pC/G
		Pressure sensor	pC/kPa, pC/bar, pC/(kg/cm <sup>2</sup> ), pC/psi
		Force or Load sensor	pC/N, pC/kgf, pC/kg, pC/lb
	IEPE type	Acceleration sensor	mV/(m/s <sup>2</sup> ), mV/(9.8m/s <sup>2</sup> ), mV/g, mV/G
		Pressure sensor	mV/kPa, mV/bar, mV/(kg/cm <sup>2</sup> ), mV/psi
		Force or Load sensor	mV/N, mV/kgf, mV/kg, mV/lb

**Charge Module  
GL7-CHA (4ch / unit)**



# Charge module GL7-CHA, Method to take advantage

## 1. Outline and Connection of GL7-CHA module (2/2)

The GL7-CHA module can be measure the signal of the piezoelectric type sensors and voltage. The input signal type is set on the input settings menu.

Input setting menu for GL7-CHA



Select the "Input" for setting the type of input signal.



Select the type of input signal.

Type	Description
Charge	Sensor of the Charge output type
IEPE	Sensor of the IEPE type
DC	Voltage measurement (DC coupling)
AC	Voltage measurement (AC coupling)
Charge-RMS	RMS measurement in charge output type sensor
IEPE-RMS	RMS measurement in IEPE type sensor
DC-RMS	RMS measurement in Voltage (DC coupling)
AC-RMS	RMS measurement in Voltage (AC coupling)

Note:

When the input type is set to the "IEPE" or "IEPE-RMS", the excitation current for the sensor will be outputted from the input connector. If equipment other than the IEPE sensor is connected, equipment or the GL7-CHA module might have a damage.

Note:

When the input type is set to the "Charge", "Charge-RMS", "IEPE" or "IEPE-RMS", the available measuring range is automatically set shown in the following table.

Rabge	Charge signal output type sensor, Sensitivity (unit: pC/(m/s²))										IEPE type sensor, Sensitivity (unit: mV/(m/s²))														
	0.0100 to 0.5000	0.5001 to 2.0000	2.0001 to 5.0000	5.0001 to 10.0000	10.0001 to 20.0000	20.0001 to 50.0000	50.0001 to 100.0000	100.0001 to 200.0000	200.0001 to 500.0000	500.0001 to 999.9999	0.0100 to 0.0200	0.0201 to 0.0500	0.0501 to 0.2000	0.2001 to 0.5000	0.5000 to 1.0000	1.0001 to 2.0000	2.0001 to 5.0000	5.0001 to 10.0000	10.0001 to 20.0000	20.0001 to 50.0000	50.0001 to 100.0000	100.0001 to 200.0000	200.0001 to 500.0000	500.0001 to 999.9999	
1 m/s²	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X
2 m/s²	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X
5 m/s²	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	X	
10 m/s²	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	X	X	
20 m/s²	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	X	X	N/A	
50 m/s²	N/A	N/A	N/A	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A	X	X	X	X	X	X	X	X	N/A	N/A	
100 m/s²	N/A	N/A	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	X	X	N/A	N/A	N/A	
200 m/s²	N/A	N/A	X	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A	
500 m/s²	N/A	X	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	
1000 m/s²	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	
2000 m/s²	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
5000 m/s²	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10000 m/s²	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
20000 m/s²	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
50000 m/s²	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	





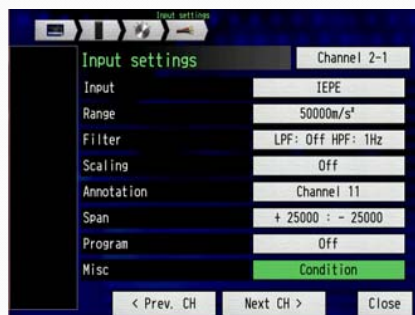
# Charge module GL7-CHA, Method to take advantage

## 2-1. Setting of GL7-CHA module, Uses the IEPE type acceleration sensor (1/2)

When the IEPE type acceleration sensor is used, the sensor excitation current and sensor sensitivity need to be set for measuring acceleration signal. The excitation current is required to drive the IEPE sensor. The sensor output is converted to the acceleration signal using the sensor sensitivity. The default setting of the unit on this module is set to the "m/s<sup>2</sup>" that is the unit of the International System of Units (SI unit) for acceleration.

When the sensor other than the acceleration is used, the scaling function needs to be used. If the acceleration sensor is scaled in other than the "m/s<sup>2</sup>", such as the "g" (gravity), the scaling function needs to be used. Please refer the section 2.4 (page 8).

### Input setting menu for GL7-CHA

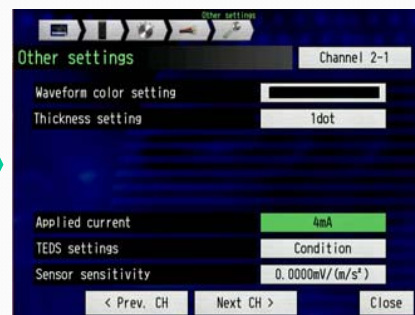


Select the "Misc" for setting the condition of the sensor.

In this example, the IEPE type acceleration sensor that has the sensitivity of 10.00mV/(m/s<sup>2</sup>) is used.

Note: The sensitivity of sensor is written on the data sheet of the sensor. The value is entered to the GL7-CHA setting menu.

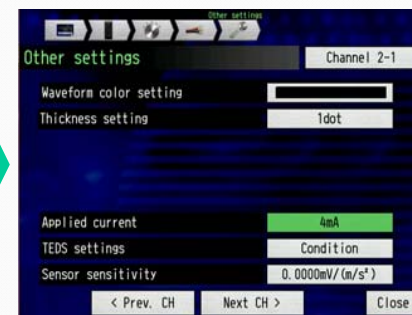
### Setting of sensor excitation



Select the "Applied current" for setting the condition.

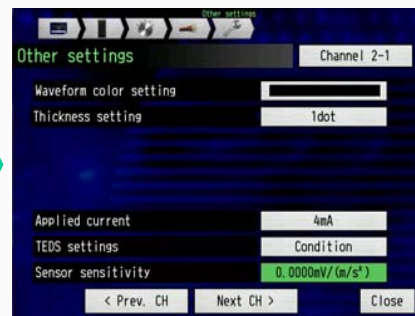


Select the "4mA" or "8mA".



Selected excitation current is displayed.

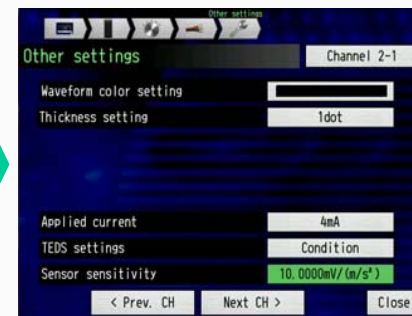
### Setting of sensor sensitivity



Select the "Sensor sensitivity" for setting the condition.



Enter the value of the sensitivity.



Entered sensitivity is displayed.



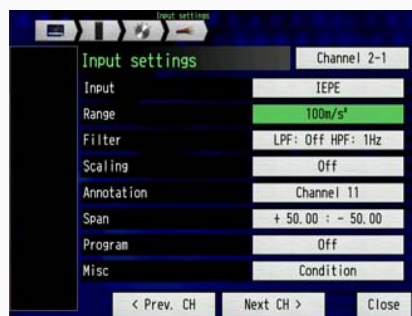
# Charge module GL7-CHA, Method to take advantage

## 2-1. Setting of GL7-CHA module, Uses the IEPE type acceleration sensor (2/2)

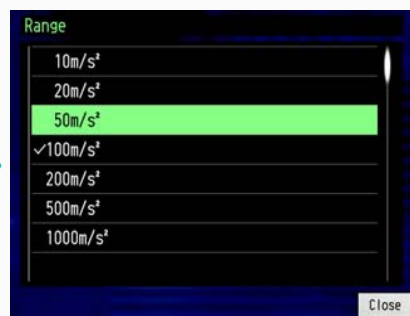
Note: The signal is measured within the selected range. If the "50m/s<sup>2</sup>" is selected, the signal can be measured from -50m/s<sup>2</sup> to +50m/s<sup>2</sup>.  
The available measuring range is automatically displayed. It is related with the setting of sensor sensitivity.

Note: The measured signal is displayed on the screen within the setting of span. The range of signal to be measured is set by the "Range".

### Setting of measuring range



Select the "Range" for setting the measuring range.



Select the signal measuring range from displayed settings.

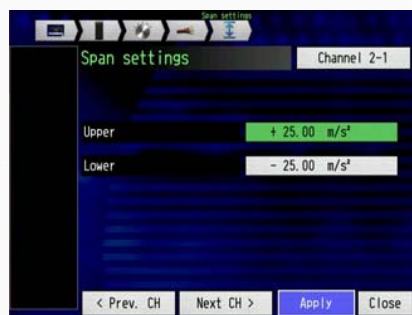


Selected range is displayed.

### Setting of display range of signal (span)



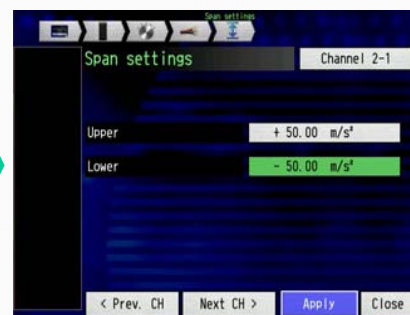
Select the "Span" for setting the displayed range of signal.



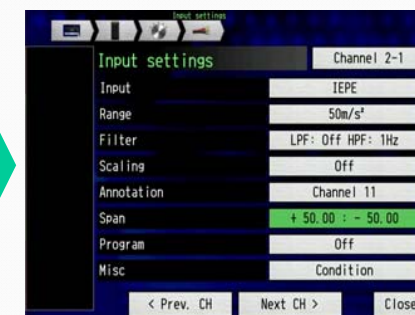
Select the "Upper" or "Lower" for setting the signal display range.



Enter the value of the signal display range.



Confirm the setting value of upper (Max.) and lower (Min.) for signal display range.



Entered value for the signal display range (span) is displayed.





# Charge module GL7-CHA, Method to take advantage

## 2-2. Setting of GL7-CHA module, Converts the unit using scaling function (1/2)

When the measured acceleration signal needs to be displayed the unit other than the "m/s<sup>2</sup>" even if the IEPE type sensor is scaled in the "m/s<sup>2</sup>", the scaling function can convert the measured signal to different unit.

Input setting menu for GL7-CHA

Select the "Scaling" for setting the condition.

Setting of scaling value

Enable the Scaling.

Select the "Upper" or "Lower" of the "Meas. Value". It is the measurement value to be converted to the scaled value.

Enter the value. If set value is out of limit, change the setting of the measuring range.

In this example, the sensor scaled in the unit of the "m/s<sup>2</sup>" is used to measure acceleration, and then the measured signal is displayed and saved in the unit of the "g" (gravitational acceleration).

The conversion rate between the "m/s<sup>2</sup>" and "g" is the following.

$$1 \text{ m/s}^2 = 0.10197 \text{ g}$$

$$1 \text{ g} = 9.80665 \text{ m/s}^2$$

Select the "Decimal point" for setting the digits of the scaled value.

Select number of digits above the decimal point. It is style of the scaled value.

Select the "Upper" or "Lower" of the "Scal. Value". It is the scaled value corresponding to the measurement value to column of the "Upper" and "Lower" of "Meas. Value".

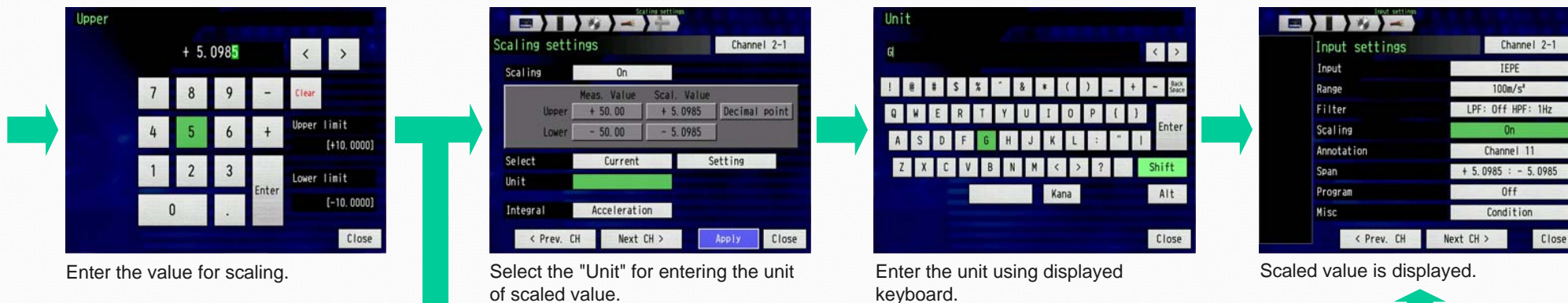


# Charge module GL7-CHA, Method to take advantage

## 2-2. Setting of GL7-CHA module, Converts the unit using scaling function (2/2)

Note: The unit of scaling can be entered directly or it can be selected from the preset unit.

### Setting of scaling unit (direct enter)



### Setting of scaling unit (select from pre-set)







# Charge module GL7-CHA, Method to take advantage

## 2-3. Setting of GL7-CHA module, Uses the Charge output type sensor

When the Charge output type acceleration sensor is used, the sensor sensitivity need to be set for measuring acceleration signal. In the charge output type sensor, the excitation current is not required to drive the sensor. The sensor output is converted to the acceleration signal using the sensor sensitivity. The "Range", "Scaling", "Span" or other setting is set as required. Please refer to the page of the IEPE type sensor as a reference.

When the sensor other than the acceleration is used, the scaling function needs to be used. If the acceleration sensor is scaled in other than the "m/s<sup>2</sup>", such as the "g" (gravity), the scaling function needs to be used. Please refer the section 2.4 (page 8).

Input setting menu for GL7-CHA

Select the "Misc" for setting the condition of the sensor.

Setting of sensor sensitivity

Select the "Sensor sensitivity" for setting the condition.

Enter the value of the sensitivity.

Entered sensitivity is displayed.

In this example, the Charge output type acceleration sensor that has the sensitivity of 10.00pC/(m/s<sup>2</sup>) is used.

Note: The sensitivity of sensor is written on the data sheet of the sensor. The value is entered to the GL7-CHA setting menu.

Setting of measuring range

Setting of scaling

Setting of span (display range of signal)





# Charge module GL7-CHA, Method to take advantage

## 2-4. Setting of GL7-CHA module, Uses other sensor (1/2)

The IEPE type sensor other than the acceleration sensor can be used to measure signal. The value and the unit on the sensor sensitivity need to be set in the GL7-CHA module. The signal of the sensor is converted to the correct measurement value having the correct unit.

Input setting menu for GL7-CHA

Select the "Misc" for setting the condition of sensor.

Setting of sensor sensitivity

Select the "Sensor sensitivity" for setting the sensitivity of the sensor.

Enter the value of the sensitivity in the sensor.

Note: If the acceleration sensor that is scaled in the "g" (Gravitational acceleration) is used, the measuring condition can be set with this method.

In this example, the IEPE type force sensor that has the sensitivity of 100.00mV/N is used.

Note:

- The sensitivity of sensor is written to the data sheet of the sensor.
- The numerical value of sensor sensitivity is entered to the "Sensor sensitivity" on GL7-CHA setting menu.
- The character of unit on the sensor sensitivity is entered to the "Unit" on the GL7-CHA menu.

Setting of scaling value

Select the "Scaling" for setting the unit of the measurement.

Enable the scaling function.

Set the value of the "Scal. Value" to the same number as the displayed "Meas. Value".

Note: The value in the "Meas. Value" and the "Scal. Value" need to be the same.



# Charge module GL7-CHA, Method to take advantage

## 2-4. Setting of GL7-CHA module, Uses other sensor (2/2)

### Setting of scaling unit

Enter the unit of measurement to the "Unit".

Scaled value is displayed.

### Setting of display range of signal (span)

Select the "Span" for setting the displayed range of signal.

Scaled value is displayed.  
Select the "Upper" or "Lower" for setting the signal display range.

Enter the value of the signal display range.

Confirm the setting value of upper (Max.) and lower (Min.) for signal display range.

Entered value for the signal display range (span) is displayed.





# Charge module GL7-CHA, Method to take advantage

## 3. Setting of GL7-CHA module, Using TEDS of Acceleration sensor

When the sensor corresponds the TEDS (Transducer Electronic Data Sheet), the GL7-CHA module can read setting information from the sensor. The information of the rated capacity, rated output and etc. are included in the TEDS. The sensor sensitivity and other informations are set automatically. The "Range", "Filter", "Scaling" or other setting needs to be set as required after the TEDS is read.

Input setting menu for GL7-CHA

Select the "Misc" for setting the condition of the sensor.

Setting of the TEDS

Select the "TEDS setting" for reading TEDS from the sensor.

Select the "Read TEDS information" for executing the reading of the information from the sensor.

**Note:** The TEDS in the sensor needs to be compatible to the standard of IEEE1451.4 Template ID25 (Acceleration sensor).  
If the sensor does not support this standard, that sensor cannot be used. The setting condition of the sensor needs to be set manually.



# Charge module GL7-CHA, Method to take advantage

## 4. Setting of GL7-CHA module, Measuring Velocity or Displacement

The GL7-CHA module can measure the velocity and displacement using the acceleration sensor scaled in the "m/s<sup>2</sup>". The measured acceleration can be converted to the velocity or displacement using the integral function. The integral function is built into the GL7-CHA module.

Input setting menu for GL7-CHA

Select the "Scaling" for setting the type of measurement.

Setting of the integral function

Select the "Integral" for setting the type of measurement.

Select the type of measurement.

### Note;

- When the "Velocity" or "Displacement" is measured, the "Range" needs to be set as small as possible within the available measuring range. When the sensitivity of the sensor is set, the available measuring range is automatically set. It is shown on page 2. The signal must be measured without overscale in the selected measuring range.
- When the "Integral" is set to "Velocity" or "Displacement", the scaling value is automatically set. The scaling value cannot be changed.
- In the GL7-CHA module, the unit of the acceleration is in the "m/s<sup>2</sup>", velocity is in the "mm/s", and displacement is in the "mm".
- The saved data is in the velocity or the displacement.
- The velocity can be converted within the range of 10 to 180 Hz.
- The displacement can be converted within the range of 10 to 60 Hz.
- This function is available when the acceleration signal is capturing. When the data captured in the acceleration is replayed, the acceleration can not be converted to the velocity or displacement using this function.