GRAPHTEC

Reassuring to know, Convenient to use

DC Strain Module [GL7-DCB] Method to take advantage

Signal conditioner for the GL7000 corresponding with the sensor using strain gauge

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





DATA PLATFORM GL7000



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GL7-DCB, vol. 2, rev. 0.9 (Apr. 2014)

1. Outline and Connection of GL7-DCB module (1/3)

The DC strain module GL7-DCB is the signal conditioner for the GL7000. It is the isolated 4 channel, correspond with the sensor using the strain gauge, and support the voltage and resistance measurement. Input signal type can be set individually for each channels.

- Incorporates the elements (120/350 ohms) for bridge circuit, easy to measure micro distortion using strain gauge
- Incorporates the source of excitation for the sensor
- Supports the sensor corresponding the TEDS
- Supports precision measurement by reduce noise supporting a low-pass and anti-aliasing filter
- Supports the remote-sensing and the shunt calibration to measure in high accurate



GL7000 Product Information (GL7-DCB, vol. 2, rev. 1.0)

1. Outline and Connection of GL7-DCB module (2/3)

The input terminal of the DC strain module GL7-DCB is the rectangle connector (D-Sub type). An adapter for the circular connector (NDIS type) and screw terminal are available for easy connection. Configuration of wiring varies by the type of signal and sensor.



	Signal a	ssignment of input co	onnector	
Input connector pin number	Signal symbol	Description	Screw terminal (B-650)	NDIS connector (B-651)
1	B-	Excitation voltage (-)	1	С
2	IN-	Input signal (-)	2	В
3	S+	Sense (+)	3	N/A
4	Т-	TEDS (-)	4	G
5	R+	Shunt resistance	5	N/A
6	S-	Sense (-)	6	N/A
7	IN+	Input signal (+)	7	D
8	B+	Excitation voltage (+)	8	A
9	T+	TEDS (+)	9	F
Shell	N/A	Shield	FG	E

Accessory for input terminal

Rectangular connector (D-Sub type) (Standard accessory)

Screw terminal adapter (Option B-650)

NDIS connector adapter (Option B-651)



Wires from the sensor are soldered to connector. (Connection diagram varies by the type of sensor.)

Wires from the sensor are fixed to terminal by screw when this adapter is used. It makes connection easy.

When sensor has cable with the circular connector (NDIS type), it is connected using this adapter.

GL7000 Product Information (GL7-DCB, vol. 2, rev. 1.0)

1. Outline and Connection of GL7-DCB module (3/3)

The input of each channels can be configured by the settings of the switch. The switch needs to be set according to the type of measurement and configuration of the sensor.

Se	tting of switch to se	et the	e inp	out c	han	nel c	confi	igura	ation						
Turne of monopulation and	Configuration	Use	ed th	e 120) ohm	is stra	in gau	uge	Use	ed the	e 350	ohm	is stra	in ga	uge
Type of measurement	Conliguration	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	Single gauge, 2 wires	1	1	1	1	1	1	1	1	1	1	1	1	0	0
	Single gauge, 3 wires	1	1	0	0	1	1	1	1	1	0	0	1	0	0
	Single gauge, 4 wires	1	1	0	0	1	1	1	1	1	0	0	1	0	0
Measuring micro distortion using	Dual gauges, 3 wires	0	1	0	1	1	1	1	0	1	0	1	1	0	0
strain gauge	Dual gauges, 4 wires	0	1	0	1	0	1	1	0	1	0	1	0	0	0
	Dual gauges, 5 wires	0	1	1	1	0	1	1	0	1	1	1	0	0	0
	4 gauges, 4 wires	0	0	0	1	1	1	1	The 3	350 ol	าms s	train	gauge	cann	ot be
	4 gauges, 6 wires	0	0	1	1	0	1	1	used	•					
Measuring the output of sensor	4 wires	0	0	0	1	1	1	1		ottin	n ohou	un in	loft oid	10	
(based on strain gauge)	6 wires	0	0	1	1	0	1	1	Uses	seuną	3 2101	wii lii	ien sic	ie.	
Measuring the voltage or resistan	се	0	0	0	1	1	1	1	Use s	setting	g shov	wn in	left sic	le.	

Switch for configuring input channel. (Located on front panel)



ON: 1 OFF: 0

Measuring micro distortion using strain gauge

When the strain gauge is used, the switches are set according to the type of sensor. The bridge circuit required to use the strain gauge is configured by the settings of switch.

Measuring the voltage or resistance

When the voltage or resistance is measured, the switches needs to be set as the following.



Measuring the output of sensor based on the strain gauge (Load-cell, Acceleration, or other sensors)

When the output of sensor is measured, the switches are set according to the configuration of sensor.

Sensor, 4 wires type

Sensor, 6 wires type





GL7000 Product Information (GL7-DCB, vol. 2, rev. 1.0)

2. Setting of GL7-DCB module, Sets measurement type

The GL7-DCB module can measure the micro distortion using the strain gauge, signal of the sensor based on the strain gauge, voltage, and the resistance. The input signal type is set on the input settings menu in each channels.

Input setting menu for GL7-DCB

Input settings	Channel 1-1
Input	ptt .
Range	500uW
Filter	Off
Scaling	011
Annotation	Channel 1
Sean	+ 250.0 1 - 250.0
Program	Off
Wisc	Condition

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

Setting of signal type (selects to the strain gauge)



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

Strain gauge	
Strain sensor	
DC	
Resistor	

Select the type of input signal.

Insut	- Strain gauge
Bridge type	Quarter bridge
Number of wires	2 wires
Gauge resistor	1202
Polarity inverse	Off
Preserved the DP test	ides as follows

Settings of input type is displayed.

Note:

The description of the setting is the following.

Туре	Description
Strain gauge	Micro distortion (strain) measurement using the strain gauge
Strain sensor	Sensor output measurement (using strain gauges inside of sensor)
DC	Voltage measurement (DC coupling)
Resistor	Resistance measurement

Note:

When the input type is set to the "Strain gauge", "Strain sensor", and "Resistor", the excitation voltage for the sensor or resistor will be outputted from the input connector. If wire connection of the sensor or equipment is not correct, the equipment or the GL7-DCB module might have a damage.

3-1. Setting of GL7-DCB module, Uses the Strain Gauge, Configure of gauge (1/2)

When signal is measured using the Strain Gauge, the bridge circuit is required. The element of the bridge circuit is incorporated in the GL7-DCB module. The GL7-DCB module supports the strain gauge configured with the Single gauge (Quarter bridge), Dual gauge (Half bridge), and Four gauge (Full bridge) with multiple type of wiring in the gauge. The incorporated bridge circuit of each channels can be configured by the settings of the switch.

Dual gauge configuration (Half bridge)

Used strain gauge Used strain gauge Configuratio Configuratio Connection **Bridge circuit** Connection **Bridge circuit** n 120 ohms 350 ohms 120 ohms 350 ohms Remote-sensing: Non (It is affected by temperature, etc.) Remote-sensing: Non (It is affected by temperature, etc.) 1214547 1234567 123458 1234567 2 wires 3 wires E: Excitation voltage e: Output signal, e: Output signal, R: Elements of bridge R: Elements of bridge circui Remote-sensing: Yes (It is not affected by temperature, etc.) Remote-sensing: Yes (It is not affected by temperature, etc.) 1234567 123455 1234567 1284867 3 wires 4 wires F: Excitation voltage E: Excitation voltage, e: Output signal, e: Output signal, R: Elements of bridge R: Elements of bridge circuit Remote-sensing: Yes (It is not affected by temperature, etc.) Remote-sensing: Yes (It is not affected by temperature, etc.) 234557 1234867 1236567 4 wires 5 wires E: Excitation voltage. E: Excitation voltage e: Output signal e: Output signal R: Elements of bridge R: Elements of bridge

Single gauge configuration (Quarter bridge)

GL7000 Product Information (GL7-DCB, vol. 2, rev. 1.0)

3-1. Setting of GL7-DCB module, Uses the Strain Gauge, Configure of gauge (2/2)

Four (4) gauge configuration (Full bridge)



3-2. Setting of GL7-DCB module, Uses the Strain Gauge, Setting of menu (1/7)

When the micro distortion is measured using the strain gauge, the bridge circuit needs to be configured. The elements for the bridge circuit is incorporated in the GL7-DCB module. It needs to be configured for the used strain gauge.

Input setting menu for GL7-DCB

Input settings	Channel 1-1
Input	014
Range	500JW
Eilter.)	Off
Scaling	011
Annotation	Channel 1
Sean	+ 250.0 1 - 250.0
Prosram	Off
Misc	Condition

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

In this example, the micro distortion (strain) is measured using the strain gauge.

Setting of strain gauge configuration

Input select settings	Channel 1-
Insut	Strain gauge
Bridse type	Quarter bridge
Number of wires	2 wires
Gauge resistor	1202
Polarity inverse	Off
Piece of the DP or	totes as fullows.
C Prev CH Be	et FH a

Set the "Input" to the "Strain gauge".

Ineut	Strain sause
Eridse type	Quarter bridge
Number of wires	2 wires
Gauge resistor	1202
Polarity inverse	011
Please set the DP	etites as follows

Select the "Bridge type" for setting the used number of strain gauge.

Quarter bridge	
Half bridge	
Full bridge	

Select the type of bridge.Note: Type of bridge - Number of gaugesQuarter bridge:using single (1) gaugeHalf bridge:using dual (2) gaugesFull bridge:using four (4) gauges



Select the "Number of wires" for setting the type of the gauge.



Select the number of wires from the gauge.

Note: Displayed number of wires are varied by setting of Bridge type.



Select the "Gauge resistor" for setting the type of strain gauge.



Select the resistance of the used gauge.

3-2. Setting of GL7-DCB module, Uses the Strain Gauge, Setting of menu (2/7)

The elements for the bridge circuit is incorporated in the GL7-DCB module. It is configured by settings of the switch. The setting pattern will be displayed on the screen after setting parameters are entered.

The excitation power for the bridge circuit needs to be applied. The range of measurement varies by the setting of excitation source. Setting of excitation for bridge circuit



Select the "Polarity inverse" for setting polarity of signal.



Select the ON or OFF. Note: If polarity of the phenomena and measured signal is not the same, this setting needs to be changed.

Inout	Strain sause
Bridge type	Quarter bridge
Number of wires	2.wires
Gauge resistor	1200
Polarity inverse	OH
Please set the 20° set	
C Press City No.	at DE 2

Settings of strain gauge are displayed. Note: Setting pattern of switch for configuring channel is showing. The switch needs to be set in the this pattern.

Input settings	Channel 1-1	
Input	Strain gauge	
Range	20000ut	
Filter	Off	
Scaling	Off	
Amotation	Channel 1	
Span	+10000 : -10000	
Program	011	
Misc	Condition	

Select the "Misc" for setting the condition of bridge circuit.

Other settings	Channel 1-1
Waveform color setting	
Thickness setting	1dot
Auto balance adjustment	Execute
Shunt calibration	Esecuta
Sensor setting	Condition
Strain unit	ur
C Prev. CH. B	est CH > Close

Select the "Sensor setting" for setting the condition of excitation for bridge circuit.



Select the "Bridge power" for setting the type of excitation for bridge circuit.



Select the "Voltage" or "Constant current" for type of excitation.

Note: Usually the Voltage is selected. When lead wire of the gauge is very long, the Constant current is used to avoid the influence of resistance of lead wire.



Select the "Bridge voltage" for setting value of excitation.

3-2. Setting of GL7-DCB module, Uses the Strain Gauge, Setting of menu (3/7)

The measuring range can be set after all parameters of strain gauge are set. The range of signal to be displayed can be set. The captured signal is limited up to the selected measuring range. The displaying signal range can be set separately from the measuring range.



Select the voltage for excitation. Note: The 50V and 10V can select when the gauge of 350 ohms or higher is used.

Setting of unit for strain measurement

her settings	Channel 1-1
Waveform color setting	
Thickness setting	1dot.
Auto balance adjustment	Execute
Shunt calibration	Evecute
Sensor setting	Condition
Strain unit	W
< Prev. Di	Next CH > Clo

Select the "Strain unit" for setting the measurement unit.

-∕µε	
nV/V	

Select the " μ " (micro-epsilon) or "mV/V" for the unit of measurement.

Note: When micro distortion is measured, usually the " μ " is used. When the sensor is used, the "mV/V" is used.

Setting of measuring range



Select the "Range" for setting measuring range.



Note: The span setting affects to range of signal to be displayed. The range of capturing signal is set by the "Range". The captured signal will be saved to specified memory media.

GL7000 Product Information (GL7-DCB, vol. 2, rev. 1.0)

3-2. Setting of GL7-DCB module, Uses the Strain Gauge, Setting of menu (4/7)

The measured signal can be converted to other physical units, and then it is saved and displayed. The scaling function is used for it.



Settings of span are displayed.

Input settings	Channel 1-1
Input	Strain sause
Range	2000041
Filter	Off
Scaling	011
Annotation	Channel 1
Sean	+15000 + -15000
Program	Off
Wisc	Condition

Settings of measurement condition are displayed.

The micro distortion (strain) can be measured in this settings.

If the measured signal needs to be converted to other unit, it can be done using the Scaling function.

Setting of scaling conditions



Select the "Scaling" for setting the scaling condition.



Select the "Scaling" for setting the scaling condition.



Select the "On" to enable the scaling function.



Select the "Upper" or "Lower" of the "Meas. Value".



Enter the value. If set value is out of limit, the setting of the measuring range needs to be changed.

Note: The signal is converted using four (4) reference points that are two (2) points in measurement value and two (2) points in scaled value. The measuring value is calculated by proportional calculation based on the specified four reference points.

3-2. Setting of GL7-DCB module, Uses the Strain Gauge, Setting of menu (5/7)

	-	+10000	Seal. Anton + 1001 0	Decinal	paint 1
i.	MI	-10000	- 1058. 0	1	
Select		Current		Setting	

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



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

scaling	On		
laver Lover	*10000 -10000	4 100 00 - 100 00	Decinal point
Select	Current	3	ietting

Select the "Upper" or "Lower" of the "Sal. Value". It will be the scaled value corresponding to the measurement value to column of the "Upper" and "Lower" of "Meas. Value".



Enter the value for scaling.



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

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3-2. Setting of GL7-DCB module, Uses the Strain Gauge, Setting of menu (6/7)



Select the unit from preset.

Scaline settings Dunnel 1-1 Scaline 0 Wess Wass Wess 200.00 Setting - 200.00 Setting Next CH > Setting of the unit is displayed.

Setting of scaling unit (direct enter)



Select the "Unit" for setting the unit of scaled value.



Enter the unit using displayed keyboard.

Note: If there is not unit in the preset list, unit can be entered directly using keyboard.



Note: The span setting affects to range of signal to be displayed. The range of capturing signal is set by the "Range". The captured signal will be saved to specified memory media.

3-2. Setting of GL7-DCB module, Uses the Strain Gauge, Setting of menu (7/7)



Settings of span are displayed.

B)) //)-Channel 1-1 Input settings Input Strain gast Range 20000ur Off Scatting Annotation innel. Span Program Nise < Prev. Di Next CH

Settings of measurement condition are displayed.

3-3. Setting of GL7-DCB module, Uses the Strain Gauge, Shunt calibration (1/1)

The GL7-DCB module has the shunt calibration and remote sensing function. The shunt calibration is available when the input type is selected to the "Strain gauge". It can be executed from the setting menu. The remote sensing function is automatically applied when the input type is selected to the "Strain gauge" or "Strain sensor". Those functions are available in the specific condition.

Input setting menu for GL7-DCB

Input settings	Channel 1-1
Ineut	Strain sause
Range	20000ut
Filter	Off
Scaling	Off
Annotation	Channel 1
Span	+10000 + -10000
Program	011
Hisc	Condition

Select the "Misc" for executing the shunt calibration.

Note: Shunt calibration

The shunt calibration is executed using the shunt resistor that is incorporated in the GL7-DCB module. The shunt resistor is appended to the bridge circuit for simulating the bridge circuit. The compensation value is found by the shunt calibration. It can provide accurate measurement using the compensation value.

Note: Remote sensing

When longer lead wire of the strain gauge or the strain gauge based sensor is used, lead wire affects to the accuracy of the measurement. The remote sensing function finds the resistance of the lead wire, and then the compensation value for the resistance of wire is created. An accurate measurement is provided using the compensation value.

The excitation voltage is required when the signal is measured using the strain gauge or the strain gauge based sensor. If read wire is very long, the actual applied excitation voltage will be smaller by the resistance of the lead wire. It cause an error of measurement.

Setting of shunt calibration

ther settings	Channel 1-
Waveform color setting	
Thickness setting	1dot
Auto balance adjustment	Execute
Shunt calibration	Execute
Sensor setting	Condition
Strain unit	MR.
d Press Cil New	+ FH >

Press the "Execute" of the "Shunt calibration" for executing the shunt calibration.

Note: The shunt calibration and the remote sensing function are available in the following configuration of the strain gauge or the strain gauge based sensor.

Type of input	Configuration	Number of wires	Remote sensing	Shunt calibration
		2 wires	N/A	N/A
	1 gauge	3 wires	Available	Available
	(Quartor bridge)	4 wires	Available	Available
Strain gauge 2 gauges (Half bridge)	3 wires	N/A	N/A	
	4 wires	Available	N/A	
	(Huil Bridge)	5 wires	Available	Available
	4 gauges 4 wires N/A	N/A	N/A	
	(Full bridge)	6 wires	Available	N/A
	based sensor	4 wires	N/A	N/A
Strain gauge	Daseu sensor	6 wires	Available	N/A

4-1. Setting of GL7-DCB module, Uses the Sensor, Configure of sensor (1/1)

Variety of phenomena can be measured using the sensor based on the strain gauge. The strain gauge is used inside of the sensor. When the sensor is used, the excitation power is required. The GL7-DCB can supply the excitation power to the sensor.

For Signal measurement using the Sensor (strain gauge based)

Configuratio n	Connection	Bridge circuit	Switch setting
	Remote-sensing: Non (it is affec	ted by temperature.)	
4 wires	Sensor International B(-)	N/A	CN 1 2 3 4 5 6 7
	Remote-sensing: Yes (It is not af	fected by	
6 wires		N/A	CN 1 2 3 4 3 6 7

4-2. Setting of GL7-DCB module, Uses the Sensor, Setting of menu (1/8)

When variety phenomena is measured using the strain gauge based sensor, the input circuit needs to be configured for it. It can be configured by setting of menu and switch in each channels.

In this example, the pressure is measured using the strain gauge based sensor. The sensor has the following characteristics.

Rated Output: 1.25mV/V Rated Capacity: 50kPa Excitation Voltage: 1 to 3V Output Resistance: 350 ohms

Note;

The rated output value varies by the excitation voltage value. (When excitation voltage is 2V, the rated output is the 2.5mV.)

The rated output value is outputted when the rated capacity is applied to the sensor.

In this case, when the excitation voltage is the 1V and the sensor receives the 50kPa pressure, the sensor outputs the 1.25mV. (sensitivity: 50kPa/1.25mV = 40kPa/mV)

Input setting menu for GL7-DCB

Input settings	Channel 1-1
Input	011
Range	500JW
Filter	Off
Scaling	011
Annotation	Channel 1
Sean	+ 250.0 1 - 250.0
Prosram	Off
Misc	Condition

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

Setting of sensor configuration



Set the Input to the "Strain sensor".



Select the "Number of wires" for setting the configuration of sensor.



Select the number of wires from the sensor.



Select the "Bridge resistor" for setting the configuration of sensor.

Set the resistance of the sensor. Note: The resistance of the sensor is written on the specification sheet of the sensor.

Setting of strain gauge are displayed. Note: Setting pattern of switch for configuring channel is showing. The switch needs to be set in the this pattern.

4-2. Setting of GL7-DCB module, Uses the Sensor, Setting of menu (2/8)

Input settings	Channel 1
Input	Strain sensor
Range	20000uit
Filter	Off
Scaling	Off
Annotation	Channel 1
Sean	+ 0.0000 + + 0.0
Program	Off
Nisc.	Condition

Select the "Misc." for setting the sensor characteristics.

ther settings	Channel 1-1
Waveform color setting	
Thickness setting	a 1dot
Auto balance adjustment	Execute
Shunt calibration	Execute
Sensor setting	Condition
TEDS settings	Condition
Strain unit	sur ur

Select the "Sensor setting" for setting the sensor characteristics.

Setting of excitation voltage for sensor

enaor accent	9	Charnel	1-1
Bridge voltage		1V.	
Rated output		51/K/V	
Calibration co	efficient	0.0000 /sN/V	
Select Current		Salact	
Select	Current	- JESTEL	

Select the "Bridge voltage" for setting the excitation condition.

Select the voltage of excitation.

Setting of sensor characteristic

ensor servin	19		Channel 1-1
Bridge voltag	*		TV
Rated output			aux/V
Calibration o	oefficient.	0.1	000 /w//V
	E-street.		Salect
Select	Lurrent		

Select the "Rated output" for setting the sensor characteristic.

	+ 1	250		<	>
7	8	9	1	Dear	
4	5	6	+	Usper	limit [+999999]
1	2	3		Lower	lieit.
)		Enter		[-99999]

Set the number of rated output value.

Note: The rated output is written in the specification sheet of the sensor. The value entered in this menu is in the μ V.

For example, when the rated output in the specification sheet is the 1.25mV/V, the number to be entered in this menu is the "1250".

Rated output; 1.25mV/V = 1250 µ V/V Sensor setting Chunnel 1-1
Bridge voltage 1V
Rated output 1250///V
Calibration coefficient 0.0000 /w/v
Setect Current Select
Unit
< Prev. Dt Next Di > Close

Setting of rated output is displayed.

4-2. Setting of GL7-DCB module, Uses the Sensor, Setting of menu (3/8)

Setting of sensor characteristics (in the measuring unit of the sensor)

sor secci	99		Channel 1-1	
Bridge voltag		1	11	
Rated output		5-	1250 _M /V	
Rated output Calibration o	pefficient .		1250///V 0.0000 ////V	
Rated output Calibration o Select	pefficient Current		1250/W/V 0.0008 //W/V Select	

	0.	0400		¢	>
7	8	9	1	() inter-	
4	5	6	+	Upper	limit (9999, 9999)
1	2	3	-	Lower	linit
1		100	Enter		0.0100

Select the "Calibration coefficient" for setting the sensor characteristics.

Set the value.

Note: The measurement is displayed and saved in the measuring unit of the sensor. The measured voltage is converted to it by this setting.

Note: The entered value is the sensitivity of the sensor. The sensitivity is calculated with the rated output and the rated capacity of the sensor. The unit of sensitivity in this menu is the uV.

In this sensor, the sensor outputs the 1.25mV/V (rated output) when the sensor receives the 50kPa (rated capacity). So. sensitivity is the 50kPa per 1.25mV/V. Sensitivity: 50kPa/1.25(mV/V)

= 40 k Pa/(mV/V)= 0.04kPa/(μ V/V) The number (0.04) is entered in this menu.

The unit (kPa) is entered in the Unit section.

When measurement needs to be displayed in other unit, scaling is required. Go to section 6/8 (page 21).

sor settin	9	Channel	1-1
irldse voltase		14	
lated output		1250 ₄ N/V	
Rated output Calibration co	efficient	1250u//V D:0400 /u//V	

Settings of calibration coefficient (sensitivity of sensor) is displayed.

Setting of measurement unit (select from pre-set) Select Channel 1-1 ensor setting Velocity Acceleration Bridge voltage Frequency 11 Mass Energy Rated output Pressure Calibration coefficient Flow Select Temperature Unit (Prev. DI Next CH > Select the "Select" for setting the type

Select the type of signal for displaying the unit that has been pre-set.

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

Select the "Select" for setting type of the unit.

Select the unit from preset.

of measurement signal.

4-2. Setting of GL7-DCB module, Uses the Sensor, Setting of menu (4/8)

Settings of the unit is displayed.

Setting of measurement unit (direct enter)

Enter the unit using displayed keyboard.

Sensor setting Channel 1-1
Bridge voltage 1V
Rated output 1250W/V
Calibration coefficient 0.0400 /w/V
Select Current Select
Unit eRa
< Prev. DH Next CE > Close

Settings of the unit is displayed.

Select the "Strain unit" for setting the measurement unit of measuring range.

Select the "mV/V". Note: When the sensor is used, usually the "mV/V" is used. When micro distortion is measured, usually the " μ " is used.

her settings	Channel 1-1
Waveform color setting	
Thickness setting	a 1dot
Auto balance adjustment	Execute
Shunt calibration	Execute
Sensor setting	Condition
TEDS settings	Condition
Strain unit	#V/V

Settings of unit is displayed.

Settings of measurement condition are displayed.

Note: If there is not unit in the preset list, unit can be entered directly using keyboard.

4-2. Setting of GL7-DCB module, Uses the Sensor, Setting of menu (5/8)

Setting of measuring range

Input settings	Channel 1-1
Input	Strain sensor
Range	tbeV/V
Filter	0ff
Scaling	011
Annotation	Channel 1
Sean	+ 200.00 : - 200.00
Program	911
Wisc	Condition

Select the "Range" for setting the measuring range.

0.5mV/V	
1mV/V	
2. 5nV/V	i
5mV/V	
✓ 10mV/V	

Select the range. Note: Displayed value of ranges are varied by setting of excitation condition.

Input settings	Channel 1-
Input	Strain sensor
Range	2.5#///
Filter	Off
Scaling	011
Annotation	Channel 1
Sean	+ 50.00 - 50.0
Program	011
Misc	Condition

Settings of measuring range is displayed.

Setting of span (range of signal to be displayed)

Input settings	Channel 1-1
Ineut	Strain sensor
Range	2.5eV/V
Filter	Off
Scaling	011
Annotation	Channel 1
Sean-	+ 50.00 - 50.00
Program	011
Misc	Condition

Select the "Span" for setting display signal range.

laper	+ 50.00 kPa	
Lover	- 50.00 kPa	

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

+ 0.00 < > 7 8 9 - Dee 4 5 6 + User Halt (+ 110.00) 1 2 3 D - D - Dee Lower Halt (- 110.00) Close

OWP

Set the value for display signal range.

Settings of span are displayed.

Settings of measurement condition are displayed.

Note: The span setting affects to range of signal to be displayed. The range of capturing signal is set by the "Range". The captured signal will be saved to specified memory media.

4-2. Setting of GL7-DCB module, Uses the Sensor, Setting of menu (6/8)

When the measured value needs to be displayed and saved in the unit other than the unit of the sensor, the number to be entered to the "Calibration coefficient" need to be converted in the used physical units.

Note: The "Scaling" on the input setting menu is not available when the "Strain sensor" is selected. The scaling function needs to be set in the "Calibration coefficient" parameter. Setting of sensor characteristics (in the unit of other than the sensor)

	0.	407		<	>
7	8	9	11	Dear	
4	5	6	+	Upper	limit. 19999, 99991
1	2	3	-	Lower	limit
1	0		Enter		0.01001

Select the "Calibration coefficient" for setting the sensor characteristics.

Set the value of the sensitivity.

In this example, the pressure is measured using the sensor that is calibrated with the SI unit (kPa). The measured value is displayed in the unit of the "gf/cm2" that is the Physical units used commonly.

Note: The sensitivity of the sensor is calculated by the rated output and the rated capacity. It needs to be converted to the required unit.

In this sensor, the sensitivity of the sensor is the following.

Sensitivity: 50kPa/1.25(mV/V)

= 40kPa/(mV/V) = 0.04kPa/(µ V/V)

The conversion rate between the "kPa" and "kgf/cm²" is the following.

1kPa = 0.0101972kgf/cm² = 10.1972gf/cm² So, the sensitivity in the "kgf/cm²" is the following.

0.04kPa/(μ V/V) = 0.407888(gf/cm²)/(μ V/V)

The number (0.4079) is entered in this menu. The unit (gf/cm²) is entered in the Unit section.

isor setti	19			Channel	1-1
Bridge voltag	-			14	ł
Rated output			u /4	1250JN/V	3
Calibration o	oefficient		0.	4075 /08/9	
	Curr	ent	1	Select.	- 9
Select					

Settings of calibration coefficient is displayed.

Setting of scaling unit (direct enter)

nsor settin	3	Channel 1-1
Bridge voltage		1¥
Rated output		1250uX/V
Calibration coefficient		0.0400 /uW/V
Select	Current	Select
Unit		

Select the "Unit" for setting the unit of measurement value.

Enter the unit using displayed keyboard.

Settings of the unit is displayed.

Settings of measurement condition are displayed.

4-2. Setting of GL7-DCB module, Uses the Sensor, Setting of menu (7/8)

ther settings	Channel 1-1
Waveform color setting	
Thickness setting	Idot
Auto balance adjustment	Execute
Shunt calibration	Esecute
Sensor setting	Condition
TEDS settings	Condition
Strain unit	44

Select the "Strain unit" for setting the measurement unit.

Range

Select the "mV/V". Note: When the sensor is used, usually the "mV/V" is used. When micro distortion is measured. usually the " u " is used.

Waveform color setting Thickness setting	
Thickness setting	
	1dot
Auto balance adjustment	Execute
Shunt calibration	Execute
Sensor setting	Condition
TEDS settings	Condition
TEDS settings	Condition

Settings of strain unit is displayed.

Setting of measuring range

Input settings	Dunnel 1-1
Input	Strain sensor
Range	10eV/V
Filter,	Off
Scaling	Off
Annotation	Channel 1
Sean.	+ 2039.5 - 2039.5
Program	Off
Nisc	Condition

Select the "Range" for setting the measuring range.

0.5mV/V Input 1mV/V 2.5eV/V Range Filter 5eV/V Scaling < 10mW/V Span Program Miss

Select the range. Note: Displayed value of ranges are varied by setting of excitation condition. - 14 -Input settings Channel 1-1 Strain se DEE Annotation hannel Conditio Next OF > < Prev. DI

Settings of range is displayed.

Setting of span (range of signal to be displayed)

Input settings	Channel 1-1
Input	Strain sensor
Range	2.5eV/V
Filter	Off
Scaling	0ff
Annotation	Channel 1
Sean	+ 509.9 - 509.9
Program	011
Misc	Condition
(Pres Di	Next FM > Fines

setting display signal range.

Select the "Span" for setting display signal range.

Note: The span setting affects to range of signal to be displayed. The range of capturing signal is set by the "Range". The captured signal will be saved to specified memory media.

4-2. Setting of GL7-DCB module, Uses the Sensor, Setting of menu (8/8)

Set the value for displayed signal range.

Settings of span are displayed.

1	put settings	Channe	1.1-1
ti	sut	Strain sets	PPT .
R	inge	2. 5eV/V	
E	ilter:	Off	
8	calling	Off	
R	notation	Channel 1	i
SP	ian ;	+ 500.0 + +	0.0
P	ogram	Off	
H	isc	Condition	i.

Settings of measurement condition are displayed.

4-3. Setting of GL7-DCB module, Uses the Sensor, TEDS of the sensor (1/1)

When the sensor corresponds the TEDS (Transducer Electronic Data Sheet), the GL7-DCB module can read settings 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-DCB

Input settings	Channel 1-1
Input	011
Range	500J/V
Filter	Off
Scaling	011
Annotation	Channel 1
Sean	+ 250.0 1 - 250.0
Program	Off
Hisc	Condition
C Prev. DI	Next CH > Clo

of input signal.

Setting of the TEDS

Select the "TEDS setting" for reading TEDS from the sensor after the "Input" is set to the "Strain sensor". Note: The TEDS is supported when the strain gauge based sensor is selected. If the Strain gauge is selected, the TEDS setting menu is not available.

EDS settings	DN DN	innel 1-1
Read TEDS information	Test	
Release TEDS mode	Reinste	
Save TEDS Information		
Elle name	QIEID	Seve
Name type	Auto	
Read TEDS Information		
File name	Not specified	Los
(Bran Di	Heat CK >	fine

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 IEEEE1451.4 Template ID33 (Strain gauge based sensor). If the sensor does not support this standard, the TEDS of that sensor cannot be used. The setting condition of the sensor needs to be set manually.

5-1. Setting of GL7-DCB module, Measuring the Voltage, Configure of input (1/1)

The voltage can be measured using this module. The input section of channel needs to be configured for measurement of voltage. It is done by setting of the switch.

For Voltage measurement

Configuration	Connection	Bridge circuit	Switch setting
2 Wires	IN(+) IN(-)	N/A	OM 1 2 3 4 5 6 7

5-2. Setting of GL7-DCB module, Measuring the Voltage, Setting of menu (1/4)

Variety of phenomena can be measured using the sensor based on the strain gauge. The strain gauge is used inside of the sensor. When the sensor is used, the excitation power is required. The GL7-DCB can supply the excitation power to the sensor.

Input setting menu for GL7-DCB

Input settings	Channel 1-1
Input	014
Range	500J/V
Filter	Off
Scaling	011
Annotation	Channel 1
Sean	+ 250.0 1 - 250.0
Program	Off
Misc	Condition

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

Setting of input configuration

Set the Input to the "DC" for measuring the voltage.

Note: Setting pattern of switch for configuring channel is showing. The switch needs to be set in the this pattern.

Setting of measuring range

Input settings	Channel 1-
Input	DC DC
Ranse	SCOUV
Filter	Off
Scaling	011
Annotation	Channel 1
Seen	+ 250.0 : - 250.0
Program	DFF
Misc	Condition

Select the "Range" for setting the measuring range.

Select the range.

Setting of Range is displayed.

Setting of span (range of signal to be displayed)

Select the "Span" for setting display signal range.

Set the value for displayed signal range.

Note: The span setting affects to range of signal to be displayed. The range of capturing signal is set by the "Range". The captured signal will be saved to specified memory media.

Select the "Upper" or "Lower" for

setting displayed signal range.

5-2. Setting of GL7-DCB module, Measuring the Voltage, Setting of menu (2/4)

When the output voltage of the sensor is measured, the measuring value needs to be displayed and saved in the physical units. The scaling function can make it.

Settings of span are displayed.

Input settings	Channel 1-1
Input	DC
Range	10e¥
Filter	Off
Scaling	Off
Annotation	Channel 1
Sean	+ 5.000 ± + 0.000
Program	110
Misc	Condition
C Press Cit	Best DLa Clos

Condition settings of measuring are displayed.

The voltage can be measured in this settings.

If the measured signal needs to be converted to other unit, the Scaling function can do it.

Setting of scaling condition

Select the "Scaling" for setting the scaling condition.

In this example, the flow rate is measured using the sensor. The sensitivity of the sensor is the following. 5mV output at 0.5m³/min

Select the "Scaling" for setting the scaling condition.

Select to "On" to enable the scaling function.

Setting of span (range of signal to be displayed)

Select the "Upper" or "Lower" of the "Meas. Value".

Enter the value. If set value is out of limit, the setting of the measuring range needs to be changed.

Note: The signal is converted using four (4) reference points that are two (2) points in measurement value and two (2) points in scaled value. The measuring value is calculated by proportional calculation based on the specified four reference points.

5-2. Setting of GL7-DCB module, Measuring the Voltage, Setting of menu (3/4)

Setting of reference point in measurement is displayed.

(Incom	Reas Value	Scal Talan	I Restaur salast
Lover	+ 0.000	- 1000.9	
Select	Current	3	ietting
unit 👘			

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

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

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

Select the type of signal for displaying

the unit that has been pre-set.

Enter the value for scaling.

Setting of scaling unit (select from pre-set)

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

Select

Acceleration

Frequency

Mass

Flow

Energy

Pressure

Strain

Temperature

5-2. Setting of GL7-DCB module, Measuring the Voltage, Setting of menu (4/4)

Select the "Setting" for setting type of the unit.

Select the unit from preset.

Setting of scaling unit (direct enter)

Select the "Unit" for setting the unit of scaled value.

Enter the unit using displayed keyboard.

Note: If there is not unit in the preset list, unit can be entered directly using keyboard.

Setting of unit is displayed.

Settings of measurement condition are displayed.

6-1. Setting of GL7-DCB module, Measuring the Resistance, Configure of input (1/1)

The resistance can be measured using this module. The input section of channel needs to be configured for measurement of resistance. It is done by setting of the switch.

For Resistance measurement

Configuratio n	Connection	Bridge circuit	Switch setting
2 Wires		N/A	
4 Wires	B(-) In(-) B(+) B(+) B(+) B(+) B(+) B(+) B(+) B(-) B(-) B(-) B(-) B(-) B(-) B(-) B(-	N/A	1234567

Note: When resistance is measured using two (2) wires, it is required to connect between the pin #1 and #2, and pin #7 and #8. It is shown in above figure.

6-2. Setting of GL7-DCB module, Measuring the Resistance, Setting of menu (1/4)

Variety of phenomena can be measured using the sensor based on the strain gauge. The strain gauge is used inside of the sensor. When the sensor is used, the excitation power is required. The GL7-DCB can supply the excitation power to the sensor.

Input setting menu for GL7-DCB

Input settings	Channel 1-1
Input	011
Range	500JW
Eilter:)	Off
Scaling	110
Annotation	Channel 1
Sean	+ 250.0 1 - 250.0
Program	Off
Nisc	Condition

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

Setting of input configuration

Set the Input to the "Resistor" for measuring the resistance.

Note: Setting pattern of switch for configuring channel is showing. The switch needs to be set in the this pattern.

Setting of measuring range

Input settings	Channel 1-
Input	Registor
Range	50kg (0. 1mA)
Filter	Off
Scaling	110
Annotation	Channel 1
Sean	+ 25.00 1 - 25.00
Prosram	011
Misc	Condition

Select the "Range" for setting the measuring range.

Select the range.

Setting is displayed.

Setting of span (range of signal to be displayed)

Select the "Span" for setting display signal range.

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

Set the value for display signal range.

Note: The span setting affects to range of signal to be displayed. The range of capturing signal is set by the "Range". The captured signal will be saved to specified memory media.

6-2. Setting of GL7-DCB module, Measuring the Resistance, Setting of menu (2/4)

When the output resistance of the sensor is measured, the measuring value needs to be displayed and saved in the physical units. The scaling function can make it.

Settings of span are displayed.

Input settings	Channel 1-1
Input	Resistor
Range	200 0 (1mA)
Filter	Off
Scaling	011
Annotation	Channel 1
Sean	+200,00 + 0.00
Program	011
Nisc	Condition
C Prev DI	Best CH) Close

Condition settings of measuring are displayed.

The resistance can be measured in this settings.

If the measured signal needs to be converted to other unit, the Scaling function can do it.

Setting of scaling condition

Select the "Scaling" for setting the scaling condition.

In this example, the displacement is measured using the potentiometer. The sensitivity of the sensor is the following. 2000hms at 10mm, 1000hms at 0mm, 00hm at -10mm

Select the "Scaling" for setting the scaling condition.

Select to "On" to enable the scaling function.

Setting of span (range of signal to be displayed)

Select the "Upper" or "Lower" of the "Meas. Value".

Enter the value. If set value is out of limit, the setting of the measuring range needs to be changed.

Note: The signal is converted using four (4) reference points that are two (2) points in measurement value and two (2) points in scaled value. The measuring value is calculated by proportional calculation based on the specified four reference points.

6-2. Setting of GL7-DCB module, Measuring the Resistance, Setting of menu (3/4)

Setting of reference point in measurement is displayed.

lbeet	*200.00	Scal - Ballue + 1000.0	Decinal point
Lower	1 0.00	- 1008.0	1
Select	Current	5	ietting

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

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

Scaling	On		
laser	Reas Value +200.00	Bcal. Value + 18.000	Becinal point
Lover	+ 0.00	- 10.900	
Select	Current	5	etting
hit			

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

Select the type of signal for displaying

the unit that has been pre-set.

Enter the value for scaling.

Setting of scaling unit (select from pre-set)

Select the "Select" for setting the type of scaled signal.

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

Select

√Current

Length

Area

Volume

Velocity

Frequency

Mass

Acceleration

6-2. Setting of GL7-DCB module, Measuring the Resistance, Setting of menu (4/4)

Select the "Setting" for setting type of the unit.

Select the unit from preset.

Setting of scaling unit (direct enter)

Select the "Unit" for setting the unit of scaled value.

Enter the unit using displayed keyboard.

Note: If there is not unit in the preset list, unit can be entered directly using keyboard.

Settings of scaling are displayed.

Settings of measurement condition are displayed.