ONO SOKKI

DG-2310

DIGITAL GAUGE COUNTER

Instruction Manual

ONO SOKKI CO., LTD.

Warranty

1. This product is covered by a warranty for a period of one year from the date of purchase.
2. This warranty covers free-of-charge repair for defects judged to be the responsibility of the manufacturer, i.e., defects occurred while the product is used under normal operating conditions according to descriptions in this manual and notices on the unit label.
3. For free-of-charge repair, contact either your sales representative or our sales office nearby.
4. The following failures will be handled on a fee basis even during the warranty period.
   (a) Failures occurring through misuse, mis-operation, or modification
   (b) Failures occurring through mishandling (dropping) or transportation
   (c) Failures occurring through natural calamities (fires, earthquakes, flooding, and lightening), environmental disruption, or abnormal voltage.

* For repairs after the warranty period expired, contact your sales representative or our sales office nearby.

PREFACE

Thank you for selecting the DG-2310 Digital Gauge Counter.

This manual describes functions and specifications of the DG-2310 Digital Gauge Counter as well as connecting procedures and precautions for using it. Be sure to read this manual before use to ensure proper operations of the DG-2310 Digital Gauge Counter.

In particular, the precautions described in this manual include "dangers that may lead to damage to property."

Be sure to follow the instructions and operating procedures described in this manual when operating the equipment. ONO SOKKI, Ltd. bears no responsibility for any warranty regarding damages, failures, or injury resulting from failure to follow instructions given in this manual.

After reading this manual, store it in a safe place.

Notice

1. **The DG-2310 Digital Gauge Counter has been tested under strict inspections for normal operation before shipment.**
2. **When unpacking the unit, make sure that none of the parts have been damaged during transportation and that the product operates normally referencing this manual.**
3. **If any part is damaged or the product does not operate as described in this manual, contact your dealer or ONO SOKKI sales office nearby.**

For Your Safely

To ensure safe proper operations of the DG-2310 Digital Gauge Counter, be sure to read this manual before use.

ONO SOKKI, Ltd. bears no responsibility for any warranty regarding damages, failures, or injury resulting from failure to follow instructions given in this manual.

Failure to follow Cautions may lead serious result depending on the situation. Be sure to observe them because each describes important matters.

■ Warnings and Cautions

In this document precautions are classified into two categories: WARNING and CAUTION. This depends on the degree of danger or damage possible if the precaution is ignored and the product is used incorrectly.

WARNING	This symbol is used to indicate precautions where there is a risk of death or serious personal injury to the operator if the product is handled incorrectly.
CAUTION	This symbol is used to indicate precautions where there is a risk of some personal injury to the operator or only material damage to the product if the product is handled incorrectly.

■ Symbols

In this document directions to be followed are classified into three groups: Attention, Prohibited, and Compulsory. The following symbols are used to mark these descriptions.

Symbols listed here are examples of the symbols used.

	This symbol is used to indicate items where extra attention is required.
	This symbol is used to indicate items that are prohibited and should never be attempted.
	This symbol is used to indicate items that are mandatory and must be performed.

WARNING

BEFORE USING

* Be sure to use the instrument with specified voltage and frequency requirements (100V to 240VAC, 50/60Hz).
  Using voltage other than that specified may cause damage to the instrument.
  Before turning on the power, be sure that the power meets specified voltage requirements. Supply the power from a line separated from other power equipment.

* Do not operate this instrument in locations where there is gas or steam. Using the instrument where there is steam or combustible or explosive gas may cause an explosion.

* Avoid using the instrument in locations with temperature exceeding specified operating temperature range (0 to +40 ℃) because there is a risk of fire.
  Avoid using it in locations with extremely high temperature.
  Avoid using the instrument in locations subject to condensation. Using it with condensation may cause short-circuit or heat development inside it resulting in fire or electric shock.

* Never dismantle or disassemble the instrument.
  Do not remove the casing or take apart the instrument. Using the instrument without its casing or while taken apart may cause damage to the instrument or electric shock. When internal adjustment, inspection or repairs are required, contact your dealer or ONO SOKKI sales office nearby.

* Do not splash or spill water or oil on the instrument because there is a risk of fire or electric shock due to short-circuit or heat development.
  If you get water inside it, immediately unplug the power cord (or AC adapter) and contact your dealer or ONO SOKKI sales office nearby as soon as possible.

WARNING

PRECAUTIONS ON ELECTRIC SHOCK

* Never cut the internal or external protective ground wire or disconnect the wire connected to the protective ground terminal of the instrument because there is a risk of electric shock or damage to the instrument.

* Before connecting the instrument to the device under measurement or an external control circuit, make sure that protective grounding is securely made and that the power is OFF.
  Connecting to external equipment without protective grounding or while the power is still ON may cause electric shock.

* Before touching parts of the instrument where voltage is output or circuits connected to parts where voltage is output, make sure that the power is OFF.
  Touching such parts with the power turned ON may cause electric shock.

* Be sure that the power meets specified voltage and frequency requirements.
  Using power other than that specified may cause electric shock, fire, or damage to the instrument.

* If you hear thunder, do not touch any metal parts of the instrument or the plug because there is a risk of electric shock from conducted lighting.
  Do not use the instrument outdoors if you hear thunder.

WARNING

IF A PROBLEM OCCURS

* If any metal, water, or foreign object should fall inside, unplug the instrument immediately.
  Using the instrument after metal, water, or foreign object has fallen inside may cause fire or electric shock.
  Unplug the instrument immediately, then contact your dealer or ONO SOKKI sales office nearby as soon as possible.

* If you perceive smoke, noise, or abnormal odor coming from the instrument or if you accidentally drop or damage it, unplug the instrument immediately.
  Using the instrument under such conditions may cause fire or electric shock.
  Contact your dealer or ONO SOKKI sales office nearby as soon as possible.

WARNING

ABOUT THE POWER CORD

* Only use the power cord (or AC adapter) supplied with the instrument or one specified by ONO SOKKI.
  Use the supplied AC power cord with 100VAC ± 10%. When operating the instrument on voltage exceeding 110VAC, be sure to use a power cord that suits the operating voltage (prepared as an option).

* If you do not use the instrument for a prolonged period of time, unplug the power cord from the outlet.
  Failure to do so may cause electric shock or damage to the instrument.

* Do not use three-pronged power cords with extension cords which do not have a ground wire because doing so defeats grounding.

WARNING

ABOUT PROTECTIVE GROUND

* Be sure to ground the instrument for safety and noise elimination.
  Grounding with a three-pronged power plug.
  Plug the supplied three-pronged AC power cord into a three-pronged outlet.

CAUTION

ABOUT INSTALLATION AND CONNECTIONS

∗ Do not install the instrument in unstable locations. If the instrument should fall, it may cause injury or damage to the instrument.
∗ Do not place a large or heavy object on top of the instrument. If an object on top of the instrument should fall, it may cause injury or damage to the instrument.
∗ Do not install the instrument in locations where there is oily smoke or steam or where there is high humidity or lots of dust. Electricity could conduct through the oil, water vapor, or dust resulting in fire or electric shock.
∗ Do not install the instrument in locations subject to extremely high temperature or direct sunlight because there is a risk of fire.
∗ Do not use the instrument in locations subject to excessive vibration. Since the instrument is a precision instrument, using it in locations subject to excessive vibration may cause failure. Be careful not to apply vibration to the instrument during transportation and installation.

CAUTION

ABOUT THE POWER CORD

∗ Be sure to hold onto the plug portion when plugging in or unplugging the power cord. Pulling on the cord may damage or break the cord possibly resulting in fire or electric shock.
∗ Do not plug in or unplug the power cord (or AC adapter) or remove the battery while your hands are wet. There is a risk of electric shock.
∗ Keep the power cord away from heaters or appliances which generate high temperature as the cord sheath may melt resulting in fire or electric shock.
∗ To prevent electric shock due to deteriorated insulation or fire due to leakage, if the instrument will not be in use for a prolonged period of time, unplug the power cord (or AC adapter) or turn OFF the breaker on the distribution panel.

Contents

1. Overview

1.1 Overview

The DG-2310 Digital Gauge Counter measures dimensions and displacement in combination with gauge sensors from ONO SOKKI and displays measurement values in digital form.

This DG-2310 is an easy-to-use counter mounting various calculation functions and external output functions stored in a compact DIN case.

1.2 Features

- Legible large-sized red LED display unit
- Sum/difference calculation function
  This function measures displacements of gauge sensors connected to Ach (channel A) and Bch (channel B) and calculates the sum of or difference between the values of the two channels.
- Peak-hold function
  This function calculates and measures maximum measurement value (MAX), minimum measurement value (MIN), or difference (RANGE) from the start of measurement up to the present time.
  This function is performed for modes (A, B, A-B, and A+B) set by the sum/difference calculation function.
- Comparator function
  This function compares a preset value with the current count value to judge magnitude relation.
- Offset function
  This function displays the sum of a measured count value and a desired value.
- Resolution selector function
  Selects the display resolution (10 μm, 1 μm, or 0.5 μm).
- External output functions
  Comparator output, RS-232C communication, analog output, and BCD output

1.3 Applicable Gauge Sensors

GS Series

BS Series

Notice ▪ **HS Series gauge sensors cannot be connected.**

1.4 Checking Accessories

When unpacking the unit, make sure that you have all the following accessories.

If any accessory is missing or damaged, immediately contact your dealer or ONO SOKKI sales office nearby.

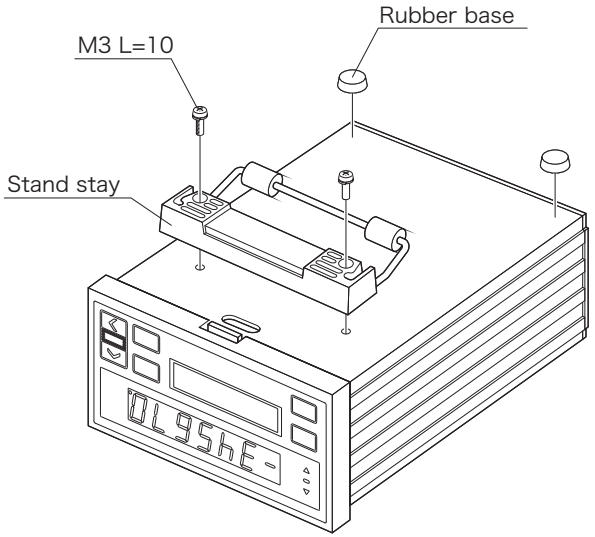
Name	Description	Qty.
Power cable	3P-3P 1.9m (Rated 125VAC)	x1
Panel attachment fitting	–	x1 set
Stand stay	–	x1 set
Rubber base	–	x1 set
Terminal board socket	5 pin	x1
Terminal board socket	10 pin	x1
Unit seal	–	x1
Instruction manual	This manual	* x1

15 Installation procedures

The DG-2310 can be used as a stationary type or a panel-mount type by selecting appropriate accessories.

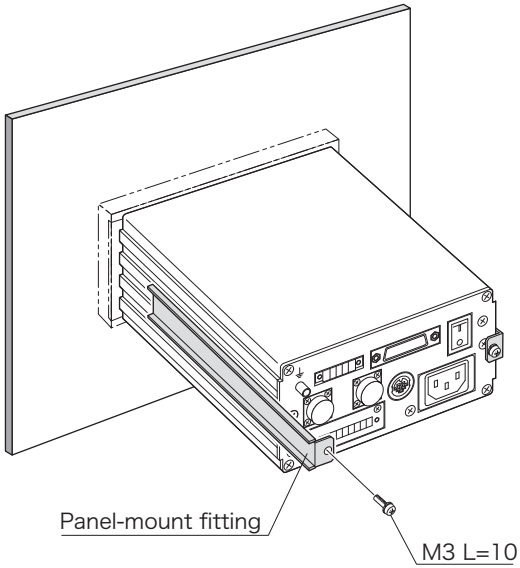
■ Using as a Stationary Type

To use the DG-2310 as a stationary type, attach the stand stay and rubber bases as shown below.



■ Using as a Panel-mount Type

To mount the DG-2310 on a panel face of a rack or large-sized chassis, attach it firmly using the panel-mount fitting.

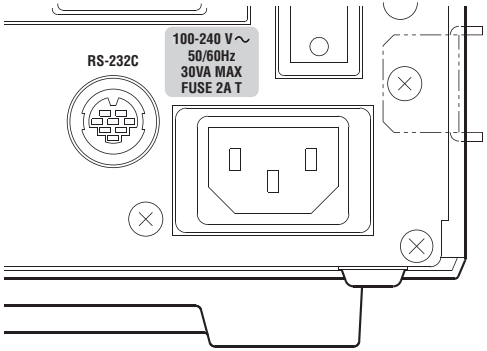


Notice ・ **For panel cutout dimensions, refer to the dimensional outline drawing.**

1.6 Checking the Power Supply

The power voltage of the DG-2310 is 100-240VAC.

The power inlet on the rear panel is shown below.



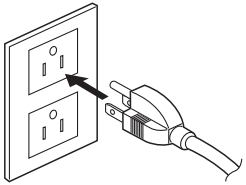
CAUTION・ The power cable supplied with the DG-2310 can be used for 100VAC.
To operate it on voltages other than 100VAC, you need to use a power cable which suits the target operating voltage.

1.7 Grounding Procedures

For safety and noise elimination, be sure to connect the DG-2310 to a good ground according to the grounding conditions of the measurement site.

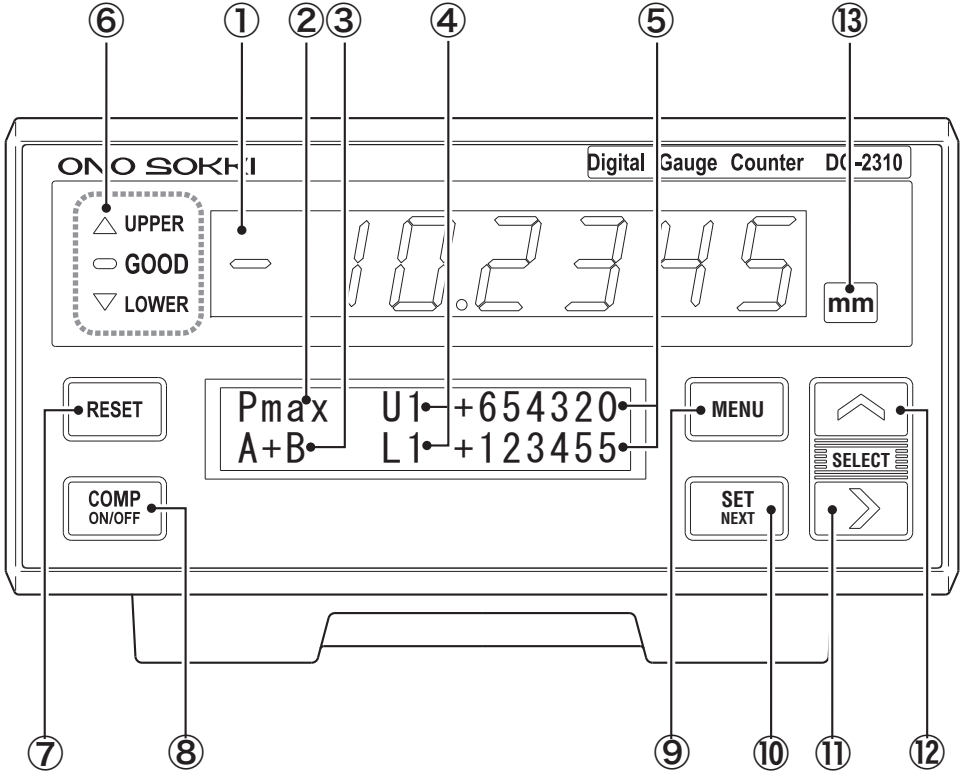
■ Grounding with the Three-pronged Power plug

Plug the three-pronged power plug of the supplied power into a three-pronged outlet.



2. Name and Function of Each Section

2.1 Front Panel



① Main Display (Red 7-segment LED)

Displays counted or calculated measurement values.

The display contents can be selected in the setup mode.

② Sub Display 1 (LCD with Back Light)

Displays the peak-hold measurement status and measurement error status.

Pnor	Indicates that peak-hold measurement is in progress and the NORMAL value is displayed in the main display.
Pmax	Indicates that peak-hold measurement is in progress and the MAX value is displayed in the main display.
Pmin	Indicates that peak-hold measurement is in progress and the MIN value is displayed in the main display.
Pran	Indicates that peak-hold measurement is in progress and the RANGE value is displayed in the main display.
NOR	Indicates that peak-hold measurement is stopped and the NORMAL value is displayed in the main display.
MAX	Indicates that peak-hold measurement is stopped and the MAX value is displayed in the main display.
MIN	Indicates that peak-hold measurement is stopped and the MIN value is displayed in the main display.
RAN	Indicates that peak-hold measurement is stopped and the RANGE value is displayed in the main display.
ERxx	Error code (xx: Maintenance No.)

For details on error code, refer to Section 7, "Troubleshooting."

③ Sub Display 2 (LCD with Back Light)

Displays a selected sum/difference calculation mode.

A	This mode displays measurement values of the Ach sensor.
B	This mode displays measurement values of the Bch sensor.
A+B	This mode displays the sum of measurement values [Ach+Bch].
A-B	This mode displays the difference between measurement values [Ach-Bch].

④ Sub Display 3 (LCD with Back Light)

Displays various parameters and measurement values. The display contents can be selected in the setup mode.

Each symbol has the following meaning:

Symbol	Display Contents
MA	MAX
MI	MIN
RA	RANGE
NO	NORMAL
A	Measurement value of Ach (Not including an offset value)
B	Measurement value of Bch (Not including an offset value)
Ux (x: to 4)	Comparator UPPER setup value
Lx (x: to 4)	Comparator LOWER setup value

⑤ Sub Display 4 (LCD with Back Light)

Displays various parameters and measurement values. The display contents can be selected in the setup mode.

⑥ Comparator Status Display

When the comparator function is activated, any LED lights up to indicate the judgment status.

UPPER, LOWER	Red
GOOD	Green

⑦ RESET Key

This key is used to reset measurement values to zero and recover the DS-2310 from the error status.

⑧ COMP ON/Off Key

This key is used to activate or deactivate the comparator function.

The setup mode (MENU) cannot be activated while the comparator function is activated.

⑨ MENU Key

This key is used to activate or deactivate the parameter setup mode.

Measurement is stopped in the setup mode.

The setup mode cannot be activated while the comparator function is activated.

⑩ SET/NEXT Key

This key is used to apply the settings made by the arrow keys in the parameter setup mode and then select the next setup menu item.

⑪ SELECT ▶ Key

This key is used to select a numerical digit to be set in the parameter setup mode.

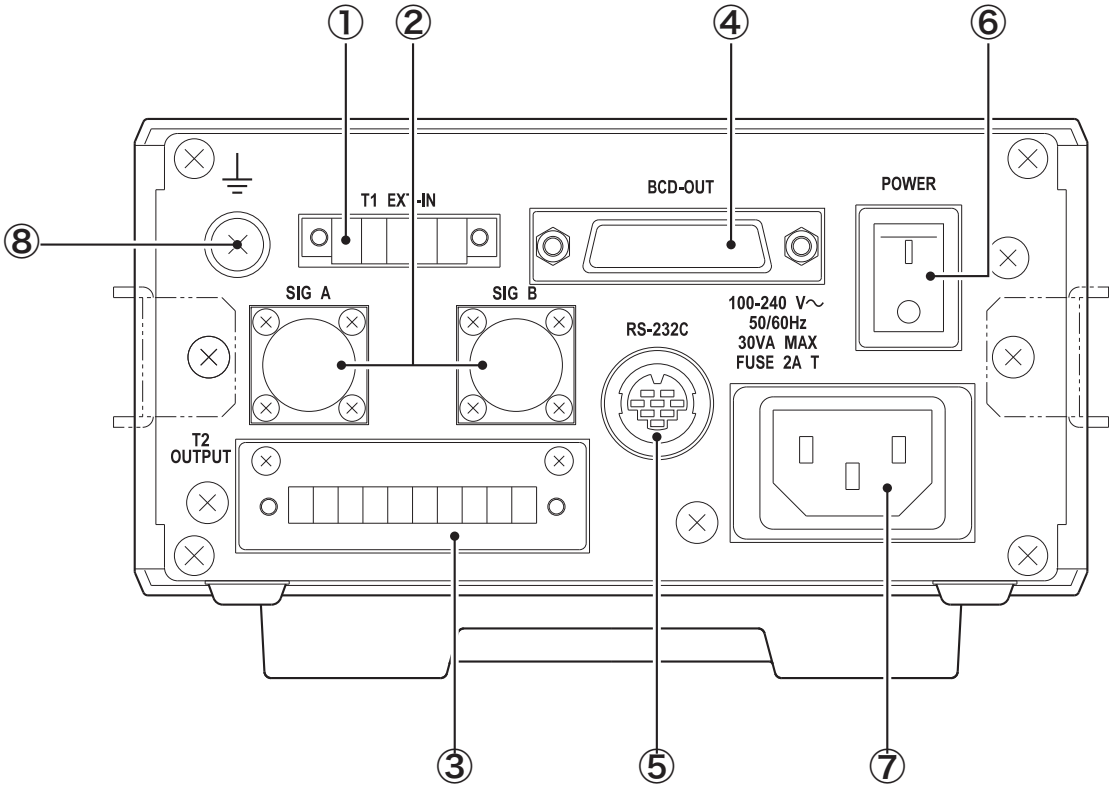
⑫ SELECT ▲ Key

In the parameter setup mode, this key is used to select a numerical value for the selected digit or select a setup item.

⑬ Unit Seal

Remove "mm" from the supplied unit seal and then stick it to this section.

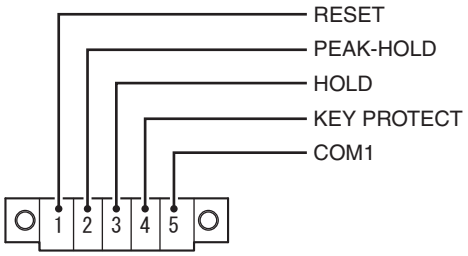
2.2 Rear Panel



① T1 EXT-IN

Terminal board for external command inputs.

The pin at the leftmost position is Pin No.1. The RESET command input is a pulse input and others are level inputs.



1	RESET input	Resets measurement values to zero or recovers the DG-2310 from the error status.
2	PEAK HOLD input	While this input is set to ON, peak-hold measurement is performed.
3	HOLD input	While this input is ON, the main display (LED) and BCD data output values are held.
4	KEY PROTECT input	Disables the MENU key to inhibit parameter set and change operations.
5	COM1	Common terminal for external command inputs

② SIG IN Connector

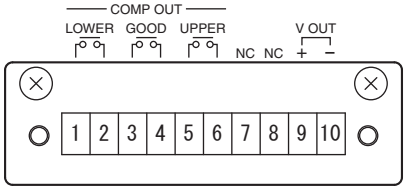
Connector for gauge sensor signal input

The connector on the left is for Ach and the one on the right for Bch.

③ T2 OUTPUT

Terminal board for comparator and analog outputs

The pin at the leftmost position is Pin No.1.



1	LOWER output (a contact)	Comparator LOWER contact output terminal
2	LOWER output (common contact)	Comparator LOWER contact output terminal
3	GOOD output (a contact)	Comparator GOOD contact output terminal
4	GOOD output (common contact)	Comparator GOOD contact output terminal
5	UPPER output (a contact)	Comparator UPPER contact output terminal
6	UPPER output (common contact)	Comparator UPPER contact output terminal
7	NC	Not used
8	NC	Not used

9	Analog output (+)	Analog voltage output (+) terminal
10	Analog output (−)	Analog voltage output (−) terminal

④ BCD OUT

Connector for parallel data (BCD) output and external command input

⑤ RS-232C

Connector for RS-232C communication

⑥ POWER

Power switch of the main unit

⑦ AC-IN

AC power inlet

⑧ Functional grounding terminal

This terminal is used to connect a shield wire of signal cables or the like to a good ground.

2.3 Measurement Procedures

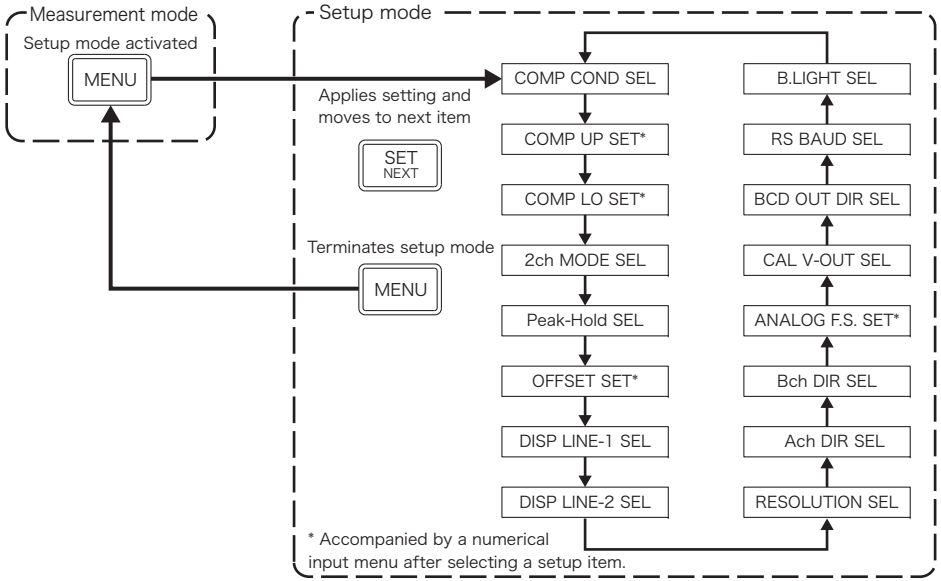
■ Starting Measurement

1. Connect a GS/BS Series gauge sensor to SIG A (SIG IN for Ach) and SIG B (SIG IN for Bch).
   Measurement only with Ach or Bch is also possible without using the sum/difference calculation function (A+B, A-B) through 2-channel sensor connection.
2. Connect the power cable to a power supply (100V-240VAC) and then turn ON the power.
3. Activate the parameter setup function and then set various parameters and measurement mode.
   For operations of the parameter setup function, refer to Section 3, "Parameter Setup Function."
4. Align the GS/BS Series gauge sensor to a reference position and then press the RESET key.
5. Measurement starts according to the measurement mode. Then, measurement values are displayed in the main display and sub display.
   For details on measurement mode, refer to subsection 3.3, Selecting Peak-hold Mode (Measurement Mode)."

■ Ending Measurement

1. Turn off the power switch.

3. Parameter Setup Functions



① Press the MENU key to activate the parameter setup mode.

While the comparator function or key protection is activated, the MENU key is disabled.

There are 16 items in the parameter setup mode as shown. Each time you press the SET/NEXT key, the setting of the current item is applied and then the next item selected. Some of 16 items are accompanied by a sub menu.

Example:
The current item is displayed as "... SEL" like "COMP COND SEL." When a sub menu appears, select a number and then enter a numerical value. For detailed procedures, refer to subsection 3.1, "Comparator Condition Setup."

② To return to the measurement mode, press the MENU key again.

When the measurement mode is entered, the contents of the sub display change from setup mode items to measurement mode items.

③ Measurement stops in the parameter setup mode.

④ The setup mode cannot be activated while the comparator is activated.

3.1 Comparator Condition Setup (COMPARETER CONDITION SEL)

In the parameter setup mode, press the SET/NEXT key several times to display "COMP COND SEL" in the sub display.

Up to four different comparator setup values can be stored as comparator conditions.

At this time, select a condition number.

Select a setup item using the ▲ SELECT key. When you press the SET/NEXT key to apply the setting, a numerical input item is selected. (Subsequently, perform the same operation for item selection.)

0	COMP1
1	COMP2
2	COMP3
3	COMP4

- The comparator output is judged from the selected item value (0 to 4). For example, when 1 is selected, upper and lower limit settings of COMP2 are enabled.
- "0:COMP1" is set at the time of shipment.

3.2 Comparator Upper Limit Setup (COMPARETER UPPER LIMIT SET)

Set a comparator UPPER limit for the condition number selected with the previous setup menu.

Setup range: -999999 to +999999

Press the ▲ SELECT to increment the numerical value and the ・ SELECT key to select a digit. When numerical value setup is completed, press the SET NEXT key to apply the setting and select the next setup item. (Subsequently, perform the same operation for numerical input.)

- The decimal point is not displayed.
- For details on judgment conditions, refer to Section 8, "Specifications."
- "+999999" is set at the time of shipment.

3.3 Comparator Lower Limit Setup (COMPARETER LOWER LIMIT SET)

Set a comparator LOWER limit for the condition number selected with the previous setup menu.

Setup range: -999999 to +999999

- The decimal point is not displayed.
- For details on judgment conditions, refer to Section 8, "Specifications."
- "000000" is set at the time of shipment.

3.4 2-channel Sum/Difference Calculation Mode Setup (2ch CALC SEL)

In the parameter setup mode, press the SET/NEXT key several times to select 2ch CALC SEL.

An item (setup mode) selected here is measured and then calculated to form a measurement data item.

0	Ach	Measurement value of Ach sensor
1	Bch	Measurement value of Bch sensor
2	A+B	Measurement value of sum (Ach+Bch)
3	A-B	Measurement value of difference (Ach-Bch)

· "0:Ach" is set at the time of shipment.

3.5 Peak-hold Mode Setup:Measurement Mode (PEAK HOLD MODE SEL)

In the parameter setup mode, press the SET/NEXT key several times to select PEAK-HOLD SEL.

At this time, select the measurement mode.

Measurement for the selected peak-hold mode (MAX/MIN/RANGE) is performed with regard to the setup mode in 3.4, "2-channel Sum/Difference Calculation Mode Setup." For example, when a measurement value of sum operation (Ach+Bch) is selected in the 2-channel sum/difference calculation mode, the maximum value (MAX), minimum value (MIN), or difference (RANGE) measurement is performed with regard to the selected setup mode, then the measurement result is displayed in the main (LED) display. In the normal mode, the current measurement values selected in the setup mode are displayed.

0	NORMAL	Normal mode *
1	MAX	Peak-hold Max *
2	MIN	Peak-hold Min *
3	RANGE	Peak-hold Range (Max-Min) *

*: Including offset calculation.

· "0:NORMAL" is set at the time of shipment.

CAUTION · Each value in the peak-hold mode is refreshed only while the peak-hold function is activated. While this function is stopped, the peak value immediately before it is stopped is held. When the peak-hold function is activated again, the last measurement value is reset and then measurement starts from the current sensor measurement position.

· To activate the peak-hold function, you need to input an external command (Peak-Hold) from the T1 terminal board or BCD connector, or send an activation command through RS-232C communication.

3.6 Offset Value Setup (OFFSET DATA SET)

Set an offset value.

Setup range: -999999 to +999999

· The decimal point is not displayed.
Corresponds to the number of digits in the main display.

· When the counter is reset after setting an offset value, the main display displays the offset value set here.

· "+100000" is set at the time of shipment.

3.7 LCD Top Row Display Item Setup (DISPLAY LINE 1 SEL)

In the parameter setup mode, press the SET/NEXT key several times to select a display item in the top row of the sub display LCD during measurement.

0	UPPER	Displays the comparator upper limit setting.
1	LOWER	Displays the comparator lower limit setting.
2	Ach	Displays the Ach normal count value.
3	Bch	Displays the Bch normal count value.
4	Normal	Displays the normal data after sum/difference calculation and offset calculation.
5	Max	Displays the MAX value of normal data during peak-hold measurement.
6	Min	Displays the MIN value of normal data during peak-hold measurement.
7	Range	Displays the RANGE value (MAX-MIN) of normal data during peak-hold measurement.

∗:Not including offset calculation.

· "0:UPPER" is set at the time of shipment.

3.8 LCD Bottom Row Display Item Setup (DISPLAY LINE 2 SEL)

In the parameter setup mode, press the SET/NEXT key several times to select a display item in the bottom row of the sub display LCD during measurement.

0	UPPER	Displays the comparator upper limit setting.
1	LOWER	Displays the comparator lower limit setting.
2	Ach	Displays the Ach normal count value.
3	Bch	Displays the Bch normal count value.
4	Normal	Displays the normal data after sum/difference calculation and offset calculation.
5	Max	Displays the MAX value of normal data during peak-hold measurement.
6	Min	Displays the MIN value of normal data during peak-hold measurement.
7	Range	Displays the RANGE value (MAX-MIN) of normal data during peak-hold measurement.

∗:Not including offset calculation.

· "1:LOWER" is set at the time of shipment.

3.9 Resolution Setup (RESOLUTION SEL)

In the parameter setup mode, press the SET/NEXT key several times to select a resolution of sensors A and B.

0	1μm	The display resolution is 1μm.
1	10μm	The display resolution is 10μm.
2	0.5μm	The display resolution is 0.5μm.

- The resolution setting is common to Ach and Bch. Use sensors with the same resolution.
- "0:1 μm" is set at the time of shipment.

3.10 Count Direction Setup (SENSOR DIRECTION SEL)

In the parameter setup mode, press the SET/NEXT key several times to select the relationship between the movement direction of the sensor spindle for Ach or Bch and the count direction (+/−).

0	(+)	Counts up when the sensor spindle is pushed in.
1	(−)	Counts down when the sensor spindle is pushed in.

0	(+)	Counts up when the sensor spindle is pushed in.
1	(−)	Counts down when the sensor spindle is pushed in.

3.11 Analog Output Full-scale Setup (ANALOG FULL SCALE SET)

Set a count value corresponding to the full-scale value (10V) of the analog voltage output.

Setup range: 1 to 999999 (When 0 is set, 1 is set automatically.)

D/A conversion of the main display value is performed and then the result is output with a 10V F.S. (full scale).

· "999999" is set at the time of shipment.

3.12 Calibration Signal Output Setup (CALIBRATION SET)

Output a calibration signal for analog voltage output.

0	ZERO	Outputs 0V.
1	+FULL	Outputs +10V.
2	-FULL	Outputs -10V.

· The calibration signal becomes effective only in the menu setup mode. In the measurement mode, an analog signal corresponding to the preset full-scale value is output.

· "0:ZERO" is set at the time of shipment.

3.13 BCD Output Logic Setup (BCD-OUT DIRECTION SET)

Select a logic of the parallel BCD output.

0	(+)	Positive logic at "0" (open-collector output OFF)
1	(−)	Negative logic at "1" (open-collector output ON)

· "0:(+)" is set at the time of shipment.

3.14 RS-232C Baud Rate Setup (RS-232C BAUDRATE SET)

Select the RS-232C baud rate.

0	2400
1	4800
2	9600

· "2:9600" is set at the time of shipment.

3.15 LCD Back Light Lighting Method Setup (BACK LIGHT ON/OFF SET)

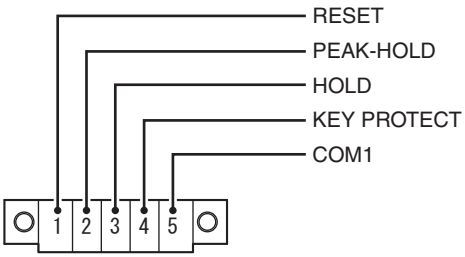
Select the lighting method of the LCD back light.

0	ON	Always on.
1	OFF	Always off.
2	AUTO	Lights up for about 5 seconds when any front panel switch is pressed.

· "2:AUTO" is set at the time of shipment.

4. External Command Input from Terminal Board

4.1 Descriptions of External Command Signals



■ RESET Input

Resets the count value to zero. When an offset value is set, it is displayed. If an error is detected, the DG-2310 is recovered from the error status.

■ PEAK-HOLD Input

· Peak-hold mode

NORMAL value	Current sensor measurement value (value after sum/difference and offset calculations)
MAX value	Maximum measurement value during peak-hold measurement
MIN value	Minimum measurement value during peak-hold measurement
RANGE value	Difference (MAX-MIN) during peak-hold measurement

· Each value (MAX/MIN/RANGE) in the peak-hold mode is refreshed only while the peak-hold function is activated (turned ON).

· When the peak-hold function is activated and measurement starts, the measurement status (displayed at the top left) changes as shown below.

Symbol	Display Contents
NOR → Pnor	NORMAL
MAX → Pmax	MAX
MIN → Pmin	MIN
RAN → Pran	RANGE

· When an inputs is OFF, the value immediately before the function stops is held.

· When an input is set to ON again, the last measurement value is reset and then peak-hold measurement starts from the current sensor measurement value.

CAUTION · To perform peak-hold measurement, you need to input external command ON from the T1 terminal board or BCD connector or to send activation command ON through RS-232C communication.

■ HOLD Input

- While the peak-hold function is ON, the main display (LED) and BCD data output values are held.
- Measurement continues even during activation of the peak-hold function. Therefore, when the peak-hold function is canceled, the main display and BCD data output values are refreshed to the latest value, i.e., sensor measurement value at the time.
- The function can be activated by inputting external command ON from the T1 terminal board and BCD connector or sending activation command ON through RS-232C communication.

■ KEY PROTECT Input

Disables the MENU key on the front panel, inhibiting parameter setup.

4.2 Recommended Interfaces

When connecting an external instrument to the terminal board for external command inputs, make sure that the following interface circuit is formed.

■ Input Signal Interface

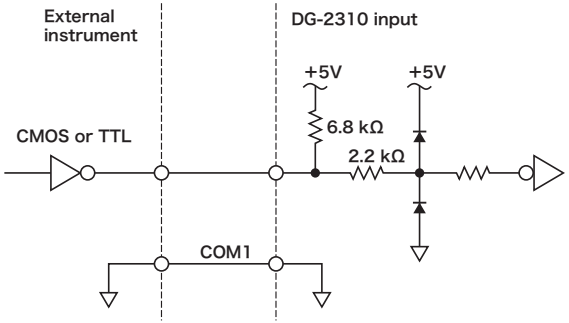
Reset, peak-hold, hold, and key protection inputs.

- Voltage signals

Input Lo level voltage	0 to 1V
Input Hi level voltage	4 to 5.25V

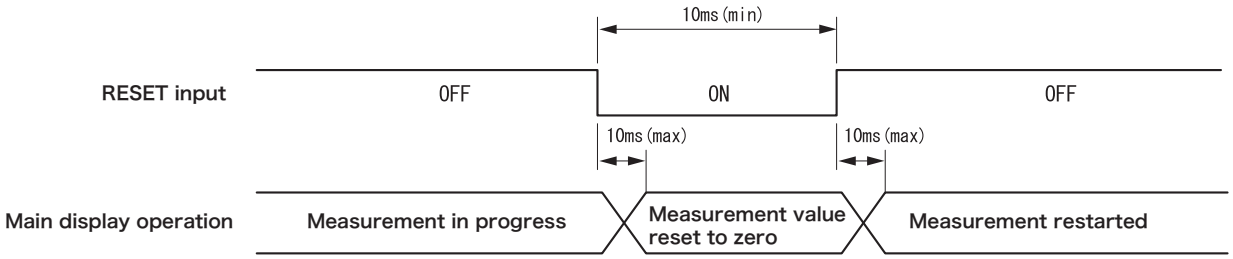
- Non-voltage contact signal

Open voltage	5 ± 0.25VDC max.
Short-circuit current	1mA max.
Contact resistance	50 Ω or less



■ Timing Chart of RESET Input (External Command Input)

The pulse width of reset signal ON needs to be at least 10 ms. The time interval since the reset signal is set to ON until the reset state is settled is up to 10 ms. The time interval since the reset signal is set to OFF until the reset state is canceled is up to 10 ms.



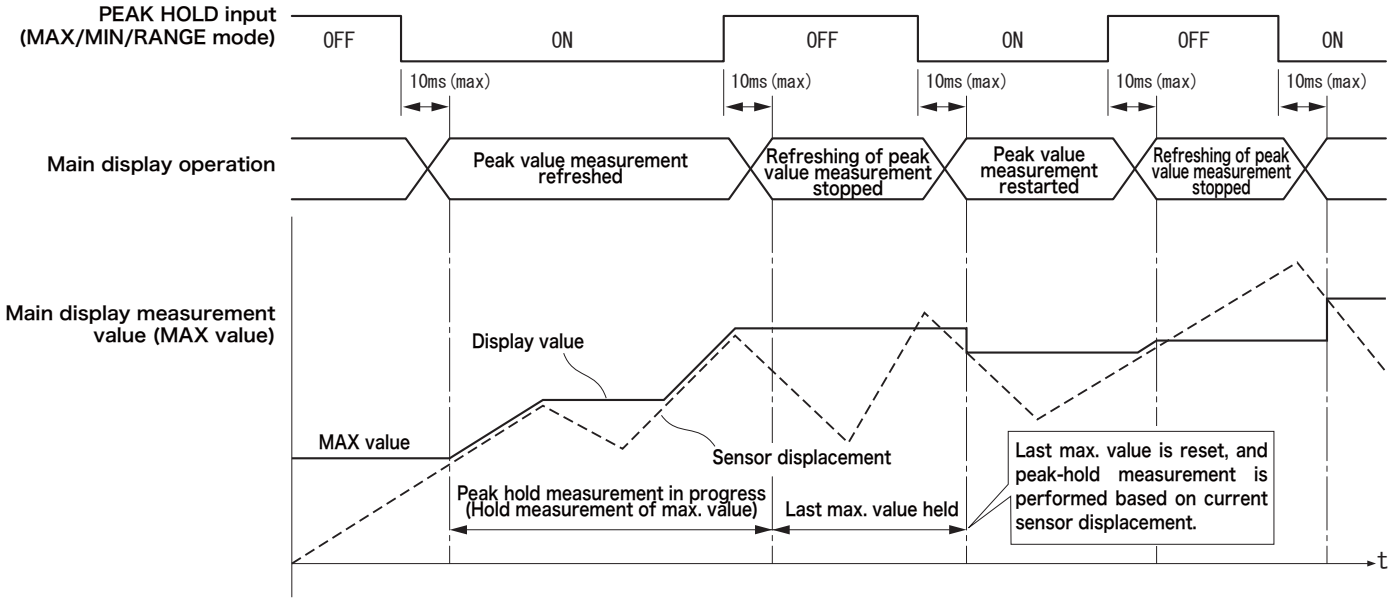
· Input signal
ON input: Closed with the COM terminal or the Lo level signal is input
OFF input: Opened with the COM terminal or the Hi level signal is input

■ Timing Chart of PEAK-HOLD Input (External Command Input)

The time interval since the peak-hold signal is set to ON until peak-hold measurement starts is up to 10 ms. The time interval since it is set to OFF until it stops is up to 10 ms.

While peak-hold measurement stops, the last peak value is held. When measurement restarts, it is reset and measurement starts.

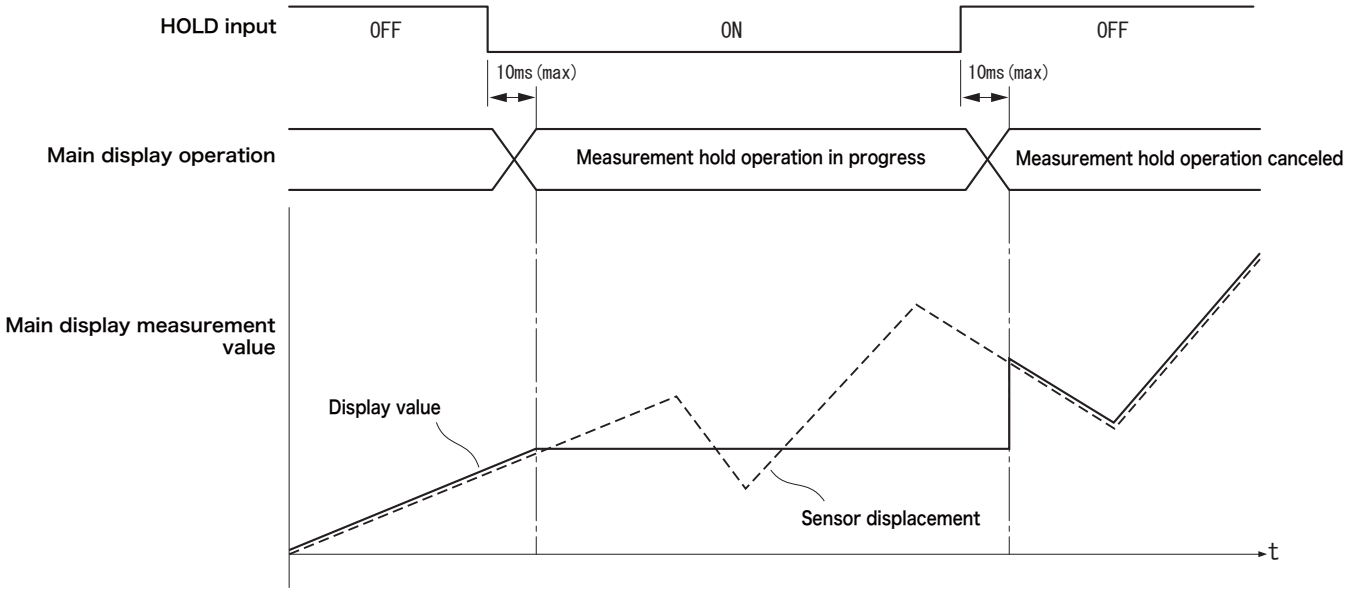
When the RESET signal is input with the peak-hold signal set to ON, the measurement value is reset to zero.



· Input signal
ON input: Closed with the COM terminal or the Lo level signal is input
OFF input: Opened with the COM terminal or the Hi level signal is input

■ Timing Chart of HOLD Input (External Command Input)

The pulse width of hold signal ON needs to be at least 10 ms. The time interval since the hold signal is set to ON until the hold state is settled is up to 10 ms. The time interval since it is set to OFF until it is canceled is up to 10 ms. During hold operation, the main display (LED) and BCD data output values are held. Measurement continues internally. Therefore, when the hold operation is canceled, the main display and BCD data output values are refreshed to the latest value.
When the RESET signal is input with the hold signal set to ON, the BCD OUT value is held and measurement value reset to zero.

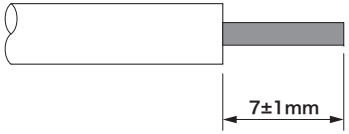


· Input signal
ON input: Closed with the COM terminal or the Lo level signal is input
OFF input: Opened with the COM terminal or the Hi level signal is input

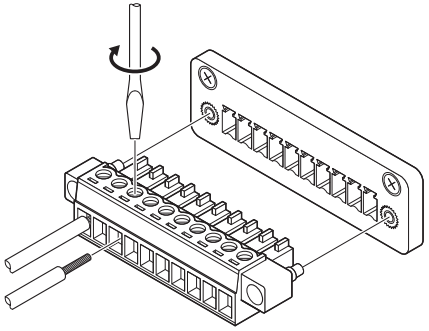
4.3 Connections of Terminal Boards T1 and T2

The T1 and T2 terminal boards of the DG-2310 are pressure clamp terminal boards to which wires are directly connected. Use them properly according to the following connection procedures.

- Use electric wires with a size of AWG28 to 16 (0.14 to 1.5mm^2).
- Strip the end of wire by 7 ± 1mm.



- Do not make pretinning of the end of wire because it may disturb proper connection.
- When fastening a terminal screw, use a screwdriver which suits the metal slitting size of the terminal screw.
  Using a screwdriver which does not suit it may prevent the terminal screw from being fastened with the specified fastening torque, which may cause damage to it.
- Fasten the terminal screw with a fastening torque of 0.25 Nm to prevent the screw from loosening and the wire from slipping.



5. Descriptions of BCD-OUT

5.1 Pin Arrangements

Pin No.	Signal Type	IN/OUT	Signal Description
1	Data	OUT	1×10^0
2			2×10^0
3			4×10^0
4			8×10^0
5			1×10^1
6			2×10^1
7			4×10^1
8			8×10^1
9			1×10^2
10			2×10^2
11			4×10^2
12			8×10^2
13			1×10^3
14			2×10^3
15			4×10^3
16			8×10^3
17			1×10^4
18			2×10^4
19			4×10^4
20			8×10^4
21			1×10^5
22			2×10^5
23			4×10^5
24	Data	OUT	8×10^5
25			Polarity output (+)
26			Polarity output (−)
27	Judgment output		LOWER output
28			GOOD output
29			UPPER output
30	Control output		Error output
31	Control input	IN	Hold input
32			Reset input
33			Peak-hold input
34			
35	Control output	OUT	Print command output
36	COM	—	COM

- Receptacle: DX10A-36S (connector on the DG-2310 side)
- Applicable plug: DX40-36P (cable side, for soldering)
- Plug cover: DX36-CV1 (cable side)
  (All above from Hirose Electric)
- Recommended cable: AA-8107 (option), 3m, open processing on one side
- Recommended cable when manufacturing a connection cable
  Conductor size: AWG#30
  Conductor configuration: 7/0.1
  Insulator outer diameter: ϕ0.5
  Cable UL style: UL20276 and UL2789

5.2 Signal Descriptions

■ BCD Output

- Pins 1-24
- Positive logic selection: 6-digit parallel output
- Output mode: Open-collector output

■ Polarity Output

- Pin 25: (+)
- Pin 26: (-)
- Output mode: Open-collector output
  When the BCD output logic is set to (-) "negative logic" using a setup parameter
  When measurement value is positive (+)
  Pin 25 (+): ON
  Pin 26 (-): OFF
  When measurement value is negative (-)
  Pin 25 (+): OFF
  Pin 26 (-): ON
  When reset to zero
  Pin 25 (+): ON
  Pin 26 (-): OFF

■ Judgment Output

- Pin 27: LOWER output
- Pin 28: GOOD output
- Pin 29: UPPER output
- Output mode: Open-collector output
- Set to ON at the time of judgment regardless of the BCD output logic setting.

■ Error Output

- Pin 30
- Output mode: Open-collector output
- Set to ON if an error is detected in the DG-2310.
- Error details

  a) Overspeed error
  Occurs if the pulse signal frequency from a sensor largely exceeds the specification value.

  b) Overcount error
  Occurs if the count value exceeds the range from -999999 to +999999. However, note that the display value starts from zero continuously.

■ Control Input

- Pin 31: Hold input
- Only BCD data is held by a voltage signal with the Lo level or a close external contact signal.
- Although the hold state continues while the signal is set to the Lo level, counting operation is performed and therefore the display values are not held.

- Pin 32: Reset input
- The count value is reset to zero by a voltage signal with the Lo level or a close external contact signal.
- The reset state continues while the signal is set to the Lo level.
- Pin 33: Peak-hold input
- The count value is reset to zero when the voltage signal is set to the Lo level or an external contact signal is closed.
- The reset state continues while the signal is set to the Lo level.
- The peak-hold function is activated by a close signal.

■ Control Output

- Pin 35: Print command output
- The print command with a negative pulse is output each time BCD data is refreshed.
- Output mode: Open-collector output

■ Common

- Pin 36: Common pin for signals

5.3 Recommended Interfaces

When connecting an external instrument to BCD-OUT, make sure that the following interface circuits is formed.

■ Output Signal Interface

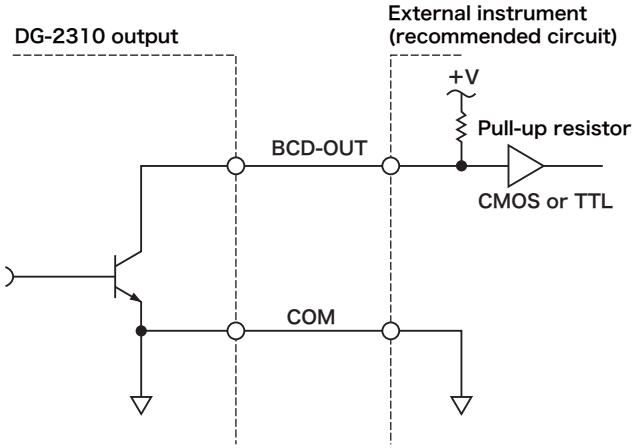
a) Output mode: Open-collector output

b) Output IC: Equivalent to 74LS06

c) Dielectric strength: 30V max.
To improve the reliability, operation on +24V voltage or lower is recommended.

d) Maximum sink current: 32mA max.

e) Residual voltage: 0.5V max.



■ Input Signal Interfaces (Hold, Reset Input)

· Voltage signal

a) Input Lo level voltage: 0 to 1V

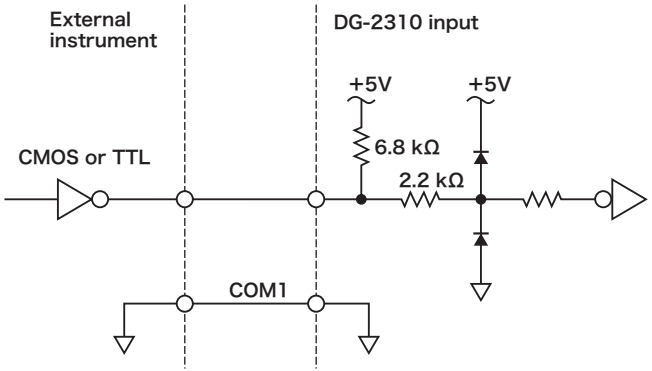
b) Input Hi level voltage: 4 to 5.25V

· Non-voltage contact signal

a) Open voltage: 5 ± 0.25VDC max.

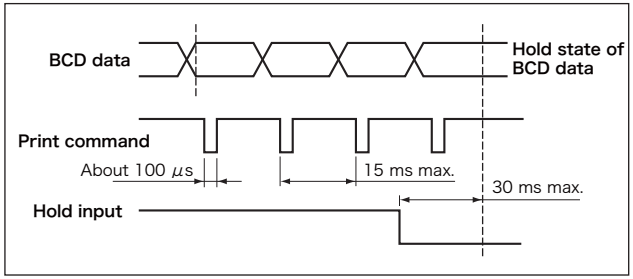
b) Short-circuit current: 1mA max.

c) Contact resistance: 50 ohms or less

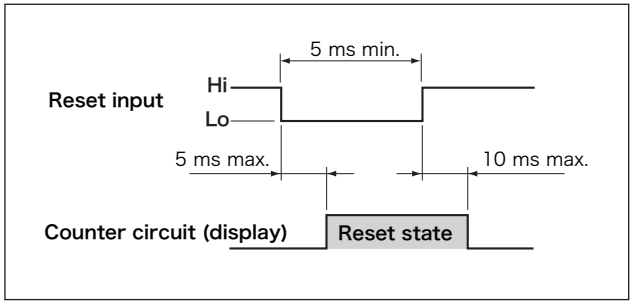


■ Timing Chart

Timing of BCD data, print command, and hold input



Timing of reset, gate, and offset



6. RS-232C Setup

6.1 Overview

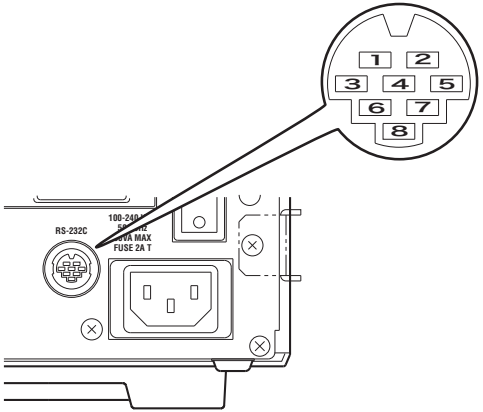
RS-232C is a serial communication interface standardized by the Electronic Industries Association (EIA).

The RS-232C interface makes it possible to read measurement data and set and read parameters using an appropriate program for minicomputers and personal computers.

6.2 Specifications

Communication mode	Asynchronous full-duplex
Transmission rate (baud rate)	2400/4800/9600
Character length	8 bits
Parity check	None
Stop bit length	1 bit
X parameter control	Disabled
Terminator	CR+LF
Character code	ASCII

6.3 Connector Appearance and Specifications



Pin No.	Signal Name	Function	I/O
1	FG(AA)	Signal ground	–
2	RxD(BB)	Receive data	Input
3	TxD(BA)	Send data	Output
4	CTS(CB)	Clear to send	Input
5	RTS(CA)	Request to send	Output
6	DTR(CD)	Data terminal ready	*1
7	COM(AB)	Signal ground	–
8	DSR(CC)	Not Connected	*1

*1:DTR and DSR are connected (short-circuited) internally.

6.4 Communication Procedures for Parameter Setup

Connecting the RS-232C cable
Before connection, turn OFF the power of the personal computer and DG-2310.
Turn ON the power of the personal computer first.

▼

Setting the RS-232C baud rate
Set baud rate in the parameter setup mode of the DG-2310 as required.
After setup, exit the setup mode and set the measurement mode.
Note: Commands are not accepted during manual parameter setup.

▼

Sending an RS-232C setup command
Send the "MON" command (setup mode activation).
When the command is received normally, a message is displayed in the LCD display.
Note: When the comparator function is ON, the "MON" command is not accepted.

▼

Sending setup commands
Send necessary commands.
When the DG-2310 receives a command normally, it returns "G" or response data.
Be sure to send the next command after receiving response data.

▼

Terminating setup
Send the "MOF" command (setup mode deactivation) to deactivate the setup mode.

6.5 RS-232C Commands

■ Command Restrictions

- Setup using RS-232C communication cannot be performed during manual parameter setup.
- When the comparator function is activated, the menu setup function cannot be activated. Stop the comparator function first.
- Parameter setup commands are effective only when the menu function is activated by the "MON" command.
- When the menu function is activated by the "MON" command, a message is displayed in the LCD.
- After normal reception, the "G" command or response data will be returned. Be sure to receive response data before sending the next command.

■ Type 1

- Commands without numerical setup
- Can be received during measurement.
- Level type signal input (ON/OFF pairs are formed)
  ON/OFF operation is repeated each time you sends a command.

Command	Function
CON	Activates the CON comparator function.
COF	Deactivates the COF comparator function.
MON	Activates the MON menu setup function.
MOF	Deactivates the MOF menu setup function.
HON	HON HOLD ON (Equivalent to an external command signal.)
HOF	HOF HOLD OFF (Equivalent to an external command signal.)
PON	PON PEAK ON (Equivalent to an external command signal.)
POF	POF PEAK OFF (Equivalent to an external command signal.)

■ Type 2

- Commands without numerical setup
- Can be received during measurement.
- Pulse type signal input

Command	Function
RST	RESET ON (Equivalent to an external command signal.)

■ Type 3

- Commands 1 with numerical setup
- Can be received during measurement.
- Setup value: 1-digit sign + 6-digit number

Command	Function
OFSx	Sets the OFFSET value.
LWSx	Set the LOWER value.
UPSx	Set the UPPER value.

x: Numerical value setup -999999 to +999999

■ Type 4

- Commands 2 with numerical setup
- Can be received during measurement.
- Setup value: Unsigned 6-digit number

Command	Function
FSSx	Sets ANALOG F.S.

x: Numerical value setup 1 to 999999

■ Type 5

· Commands 3 with numerical setup

· Can be received during measurement.

· Setup value: Unsigned 1-digit number

Command	Function	x: Numerical value setup							
		0	1	2	3	4	5	6	7
CCSx	Selects the comparator condition number.	COMP1	COMP2	COM3	COMP4				
L1Sx	Selects the LCD display (top row).	UPPER	LOWER	Ach	Bch	Normal	Max	Min	Range
L2Sx	Selects the LCD display (bottom row).	UPPER	LOWER	Ach	Bch	Normal	Max	Min	Range
BDSx	Selects the BCD OUT output logic.	(+)	(-)						
BLSx	Selects the back light condition.	ON: Turns ON.	OFF: Turns OFF.	AUTO					
RESx	Selects the display resolution.	1 μm	10 μm	0.5 μm					
SASx	Selects the Ach sensor direction.	(+)	(-)						
SBSx	Selects the Bch sensor direction.	(+)	(-)						
MPSx	Sets the peak-hold measurement mode.	NOR	MAX	MIN	RANGE				
M2Sx	Sets the 2-channel sum/difference measurement mode.	Ach	Bch	A+B	A-B				

x: Numerical value setup 1 to 7

■ Type 6

· Commands with receive data

· Measurement value: 1-digit sign + 6-digit number

Command	Function
CDR	Reads the main display data.
NOR	Reads the normal data.
MAR	Reads the peak-hold MAX value.
MIR	Reads the peak-hold MIN value.
RAR	Reads the peak-hold RANGE value.

Note ▪ **Not including the decimal point**

■ Type 7

· Commands with receive data

· Setup value: 1-digit sign + 6-digit number

Command	Function
UPR	Reads the UPPER setup value.
LWR	Reads the LOWER setup value.
OFR	Reads the OFFSET value.

■ Type 8

· Commands with receive data

· Setup value: Unsigned 6-digit number

Command	Function
FSR	Reads the analog full-scale value.

■ Type 9

· Commands with receive data

· 1-digit measurement value

Command	Function	x: Response data				
		0	1	2	3	4
CJR	Reads the comparator judgment result.	GOOD	UPPER	LOWER	UP&LO	NO COMP

UP&LO: UPPER and LOWER are set to ON simultaneously.

NO COMP: The comparator function is stopped.

■ Type 10

· Commands accompanied by receive data

· 1-digit setup value

Command	Function	x: Read numerical value							
		0	1	2	3	4	5	6	7
CCR	Reads the comparator condition number.	COMP1	COMP2	COM3	COM4				
L1R	Reads the LCD display (top row).	UPPER	LOWER	Ach	Bch	Normal	Max	Min	Range
L2R	Reads the LCD display (bottom row).	UPPER	LOWER	Ach	Bch	Normal	Max	Min	Range
BDR	Reads the BCD OUT output logic.	(+)	(-)						
BLR	Reads the back light condition.	ON: Turns ON.	OFF: Turns OFF.	AUTO					
RER	Reads the display resolution.	1 μm	10 μm	0.5 μm					
SAR	Reads the Ach sensor direction.	(+)	(-)						
SBR	Reads the Bch sensor direction.	(+)	(-)						
MPR	Reads the peak-hold measurement mode.	NOR	MAX	MIN	RANGE				
M2R	Reads the 2-channel sum/difference measurement mode.	Ach	Bch	A+B	A-B				

■ Type 11

· Commands accompanied by receive data (fixed character data)

Command	Function	Response data
IDR	Reads the product type number.	DG-2310
VER	Reads the software version number.	VER x.xx

x.xx: Software version number

■ Type 12

· GOOD response command

Command	Function
G	Normal reception

■ Type 13

· ERROR response commands

Command	Function
ER01	Ach sensor overspeed error
ER02	Ach sensor overcount error
ER11	Bch sensor overspeed error
ER12	Bch sensor overcount error
ER21	Communication failure detected by the CPU
ER22	Time-out error
ER23	Command receive buffer overflow
ER24	Undefined command
ER25	Numerical value setup out of range
ER26	Invalid command reception, SET mode not activated
ER31	Display digit over error

7. Troubleshooting

If you perceive a failure, check the following points.

If the DG-2310 does not operate normally after check, contact your dealer or ONO SOKKI sales office nearby.

Symptom	Cause	Solution
Error message ER01	An overspeed error occurred in the Ach sensor.	(1) Decrease the operating speed so that the sensor spindle does not move faster than the specification value. (2) Shock or vibration may have been applied to the sensor spindle resulting in disturbed sensor signal. Check whether there is any problem in the operating condition of the sensor. ＊ If normal operation cannot be regained, the sensor may possibly be defective.
Error message ER11	An overspeed error occurred in the Bch sensor.	
Error message ER02	An overcount error occurred in the Ach sensor.	(1) Disturbance noise is contained in the sensor signal.Keep a power cable, AC motor, or other noise sources away from the sensor cable. (2) Malfunction of the counter integrator circuit of the main unit or counter failure may be assumed. ＊ If normal operation cannot be regained, the sensor or counter may possibly be defective.
Error message ER12	An overcount error occurred in the Bch sensor.	
Error message ER31	Measurement value exceeded the number of display digits (6 digits).	Check the following settings so that the measurement value does not exceed the number of display digits. ＊ Is the offset value large ? Make setting so that the sum of the Ach measurement value, Bch measurement value, and offset value is not larger than 999999 (decimal point omitted). ＊ Does the sensor resolution agree with the resolution setting of the counter ? ＊ If normal operation cannot be regained, the counter may possibly be defective.
Display values remain unchanged even if the sensor is moved.	＊ The peak-hold function is activated. ＊ The peak-hold measurement mode is selected but peak-hold measurement is stopped.	(1) If hold command ON is input, once turn OFF peak-hold function to cancel the hold state. (2) The peak value is not refreshed while peak-hold measurement is stopped.Start peak-hold measurement or select normal mode display.

The parameter setup mode cannot be activated.	(1) The comparator function is operating.While this function is activated, the parameter setup mode cannot be activated. (2) The key protection function is operating.	(1) Once stop the comparator function and then activate the parameter setup mode. (2) Turn OFF external command input KEY-PROTECT of the T1 terminal board.
The comparator judgment result is not output.	Even if the comparator judgment value is set in the parameter setup mode, the judgment result is not output unless the comparator function is activated.	Turn ON the "COMP ON/OFF" key on the front panel to activate the comparator function.

8. Specifications

8.1 Signal Input Section

Input signal waveform	Square wave signal with 90-degree phase difference
Amplification format	2-phase waveform shaping
Input impedance	47k Ω or higher
Input voltage level	Lo level: 0 to 0.4V/Hi level: 4.5 to 5.25V
Input frequency	DC to 100kHz
Number of input channels	2 channels max. (Ach and Bch)
Input connector	R03-RB6F (Tajimi Electronics)
Pin assignment	A(SIG1),B(SIG2),C(DC5V),E(COM),F(N.C.)
Applicable sensor	GS/BS Series gauge sensor

8.2 Displays & Switches

MAIN data display	Display unit	Red 7-segment LED
	Display range	Resolution 10 μm: 0.00 to ± 9999.99 Resolution 1 μm: 0.000 to 999.999 Resolution 0.5 μm: 0.0000 to 99.9995 * 6-digit number (max.) only with a - sign * Decimal point displayed for the mm unit
	Character height	14mm
SUB parameter setup section	Display unit	LCD module
	Displays items	Displays the measurement value or parameters (2 items) selected in the setup menu as well as the measurement status.
	LCD type	STN character type
	Number of characters displayed	16 characters x 2 rows
	Back light	LED (Color: Yellow green)
Status display	Display unit	ϕ3 round-shaped LED
	Displays items	Displays comparator judgment result UPPER (red), GOOD (green), LOWER (red)
Switch	Switch type	Membrane type key switch
	Switch type	MENU key: Activates and deactivates the setup mode. SET/NEXT key: Applies the setting and moves to the next item. SELECT ▲ key: Increments numerical value. SELECT ▶ key: Moves the numerical digits. RESET key: Resets the measurement value to zero. COMP ON/OFF key: Activates and deactivates the comparator function.

8.3 Functions

Display resolution selection	Display resolution setup function ＊ To set the resolution according to the resolution of the sensor connected.	Minimum resolution: 0.5 μm Minimum resolution: 1 μm Minimum resolution: 10 μm
	Setup method	Front panel soft key or RS-232C command
Offset function	Adds offset value to count value.	
	Setup range	0 to ± 999999
	Setup method	Front panel soft key or RS-232C command
Comparator function	Comparison with a selected main display value	
	Setup range	0 to ± 999999
	Number of setup rows	2 rows
	Setup method	Front panel soft key or RS-232C command
	Output items	LOWER/GOOD/UPPER
	Output ON condition	LOWER: LOWER setup value ≧ Count value GOOD: LOWER setup value ＜ Count value ＜ UPPER setup value UPPER: UPPER setup value ≦ Count value
	Output format	Semiconductor relay (with a make contact)
	Maximum capacity	30VDC, 0.1A
	Contact ON resistance	50 Ω or less
	Output connector	Connector terminal board (10 pins, 3.81 pitches, Phoenix)
Peak hold function	Can be activated by inputting a command to the T1 terminal board or BCD or through RS-232C communication.	
	MAX,MIN,RANGE(MAX-MIN)	
Sum/difference calculation function	Ach+Bch,Ach-Bch,Ach,Bch	
Analog output	To a selected main display value	
	Conversion method	12 bits, D/A method
	Output voltage range	0 to ± 10V/full scale (variable full scale)
	Load resistance	10kΩ or higher

Analog output	Linearity error	± 0.3% of full scale
	Temperature stability	± 0.05% of full scale/ ℃ (common to ZERO and SPAN)
	Setup error	FULL: ± 0.5% of full scale ZERO: ± 0.3% of full scale
	Calibration function	ZERO and ± FULL voltage value output (without adjustment volume)
	Output refresh time	10 ms or less
	Output connector	Connector terminal board (3.81 pitches, Phoenix)
Count direction selection	Changes the relationship between the movement direction of the sensor spindle and the count direction.	
	Setup method	Front panel soft key or RS-232C command
BCD I/O section	Connector	DX10 to 36S (36 pins, half pitch, Hirose Electric)
	Signal items	Note: Negative logic indicates the ON state of the output transistor (O.C.). BCD output : Positive/negative logic (selectable), 6-digit parallel Polarity output : Positive/negative logic (selectable), 1 bit for (+), 1 bit for (-) Judgment output : Negative logic, LOWER/GOOD/UPPER (one output for each) Error output : Negative logic Print command output: Negative logic Reset input : Negative logic (Pin 32) Hold input : Negative logic (Pin 31) Peak-hold ON input : Negative logic (Pin 33)
	Output format	Open-collector output
		Output IC: Equivalent to 74LS06
		Dielectric strength: 30VDC max.
		Maximum sink current: 32mA max.
	Input format	Hi level: +4 to +5.25V
		Lo level: 0 to +1V
	Output refresh time	10 ms or less

8.4 External Control Signal Inputs

Input signal format	Voltage input	Hi level: +4 to +5.25V
		Lo level: 0 to +1V
	Non-voltage contact input	Open voltage: 5.25V or less
		Short-circuit current: 1mA or less
	Input logic	Negative logic (Lo level or closed contact)
	Pulse width	10 ms min.
Signal type	Reset	Operation: Resets the count value and recovers the DG-2310 from the error status.
		Input: Lo pulse input
	Hold	Operation: Turns the display value hold operation ON or OFF.
		input: ＊ Lo level: Hold state ＊ Hi level: Hold state canceled
	Peak hold	Operation: Activates and deactivates peak-hold measurement.
		input: ＊ Lo level: Activates peak-hold measurement. ＊ Hi level: Deactivates peak-hold measurement.
	Key protection	Operation: Deactivates parameter setup (disables the MENU key).
		input: ＊ Lo level: Activates key protection. ＊ Hi level: Deactivates key protection.
Input connector	Connector terminal board	5 pins, 3.81 pitches, Phoenix

8.5 RS-232C Communication

I/F function to PC (DOS/V type)	Reads measurement data.Set parameters.Reads parameters.	
Protocol	Baud rate	2400/4800/9600
	Character length	8bit
	Stop bit length	1 bit
	Parity check	None
	X parameter control	Disabled
	Terminator	CR+LF
	Connector	Mini-DIN 8-pin (Hirose Electric)

8.6 Sensor Power Supply

5 ± 0.25VDC (100mA max.) common to Ach and Bch

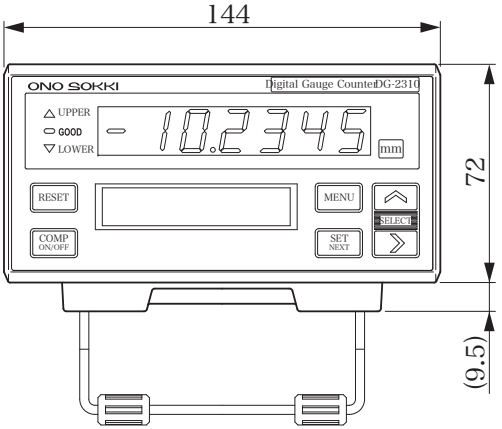
8.7 General Specifications

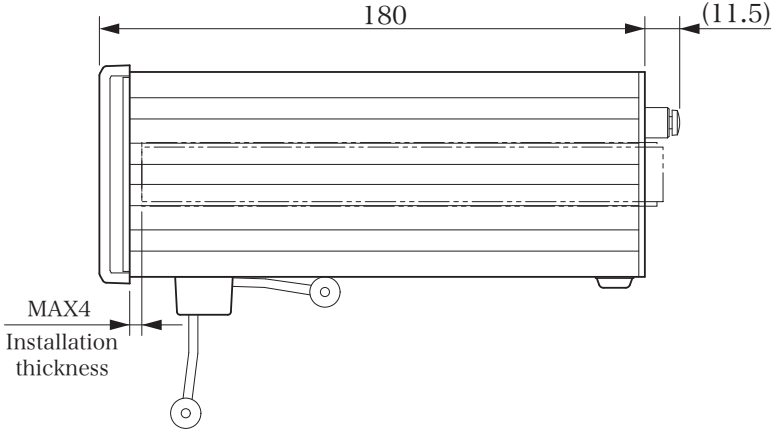
Power supply	100V to 240VAC (50/60Hz)
Power consumption	30VA or less
Operating temperature range	0 to +40 ℃
Storage temperature range	-10 to +55 ℃
Operating humidity range	95% max. (without condensation)
Storage humidity range	
Outside dimensions (chassis)	144(W) x 72(H) x 180(D)
Weight	About 1.3kg
Dielectric strength	1500VAC (between AC power supply and ground for one minute)
Insulation resistance	10M Ω or higher (with a 500VDC megger)

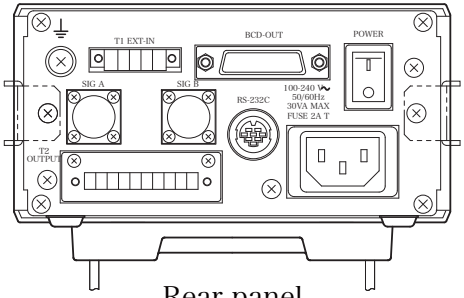
8.8 Options

RS-232C cable	AX-5022 (2m)
BCD cable	AA-8107 (3m)
Digital printer	RQ-1410
BCD cable	For RQ-1410 (3m)

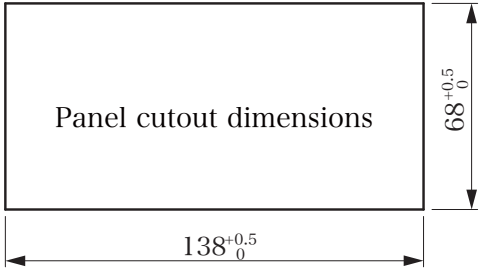
8.9 Outside Dimensions







Rear panel



ONO SOKKI

*Outer appearance and specifications are subject to change without prior notice.
HOME PAGE: http://www.onosokki.co.jp/English/english.htm

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