Graphic Multi Meter

Hardware Setup Manual

(Strain Gauge / Process)

Contents

1. Introduction

This manual is to ensure safe and correct use of the product. Be sure to read this manual prior to use. Make sure you correctly understand the content when you use the product.

2. Precautions

To ensure safe use of the product, precautions are indicated by the following symbol marks. Be sure to observe the precautions.

⚠ WARNING

Indicates a potentially hazardous situation which, if mishandled, could result in death or serious injury to the user and/or severe damage to property.

⚠ CAUTION

Indicates a potentially hazardous situation which, if mishandled, could result in injury to the user and/or damage to property.

⚠ WARNING

- Do not dismantle the unit to carry out modification or repair work. Doing so may result in fire, electric shock, or injury.
- Be sure to provide an external breaker to ensure the power is cut off in the event of this product or other equipment malfunctioning.
- Be sure to ground the product. (JIS Class 3 grounding)
- Be sure to use the product within its ratings.

  Using the product in ways other than specified may result in a failure of the protection provided for the product.

  * Protection provided for the product refers to the following:

    The product has reinforced insulation between the power supply line and the input and output terminals to protect against electric shocks. (When AC power unit is mounted)

    It also has basic insulation between the power supply line and casing to prevent against electric shocks.
- Functional insulation is provided between each of the input and output terminals.

  If a high voltage is applied to each terminal, there is the risk of an electric shock because insufficient insulation protection is provided between the other input and output terminals.

2. Precautions

⚠ CAUTION

- Use the product in the specified operating environment.
  Using the product in an environment that exceeds the specification range may cause a malfunction or failure.
- Be sure to use the product within its ratings.
  Using the product in a manner that exceeds the specification range may cause a malfunction or failure.
- Do not insert any object via the ventilation holes, etc.
  Doing so may cause a malfunction or failure.
- A touch panel is attached to the LCD.
  Make sure the touch panel is operated with, for example, a stylus pen and is not subjected to extreme mechanical shock. Failing to do so may cause a malfunction or failure.
- When cleaning the display and other parts, do not use substances like thinner, benzine, acetone, and kerosene. Make sure the device is turned off and then wipe it with a soft cloth.

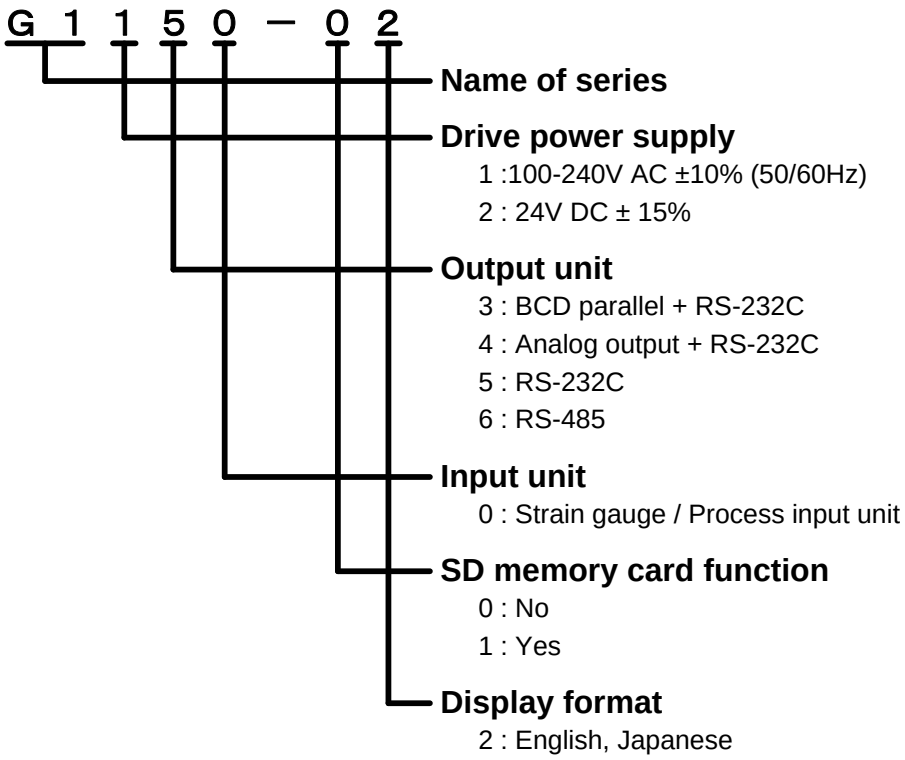
3. Other

- Our company takes no responsibility for special, indirect, and negative damages caused by the use of this product.
- For safety, do not use this product for the purpose of directly or indirectly sensing a human body.
- When using this product in combination with other products, customers themselves need to ensure compliance with applicable standards, laws, and regulations.
  This product has CE marking affixed.
  (Compliance standard: EN61326-1/2006, industrial environment Class A, and IEC/EN61010-1/2001)
-
- Other product names appearing in this document are usually trademarks or registered trademarks of their respective holders.
- Specifications, designs, and other information included in this document may be changed due to modification without prior notice.

4. Operating Environment

- Installation location : Indoors only
- Rated altitude : Up to 2000 m
- Transient overvoltage : Impulse withstand category II
- Degree of contamination : 2
- Operating ambient temperature : 0 to 40°C (with no condensation)
- Operating ambient humidity : 35 to 40% RH (with no condensation)
- Vibration (resistance) : 10 to 55 Hz, 0.15 mm single amplitude for 30 minute in each of the X, Y, and Z directions
- Mechanical shock (resistance) : 100 m/s^2, three times in each of six directions (top/bottom, front/rear, and left/right)
- Protective structure : IP40 or equivalent
- Length of connected line : I/O signal line and control line = 30m or less

5. Model Codes



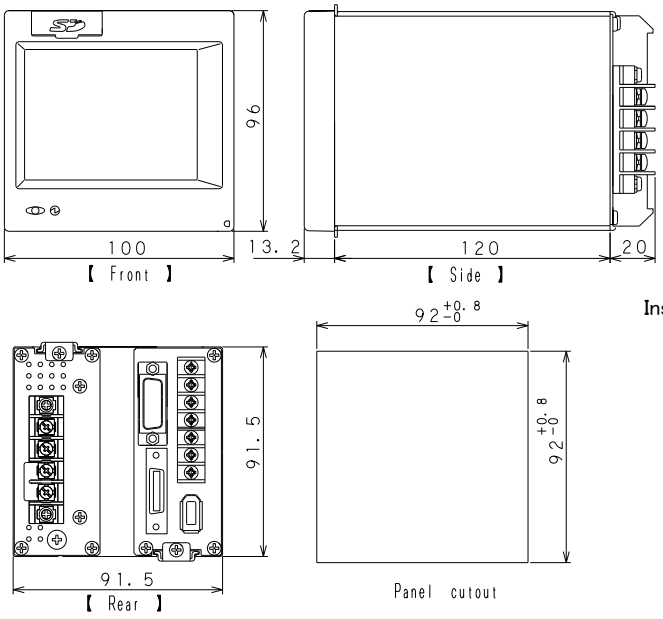
* A comparison output (open collector output) is fitted as standard.

6. Ratings of Device

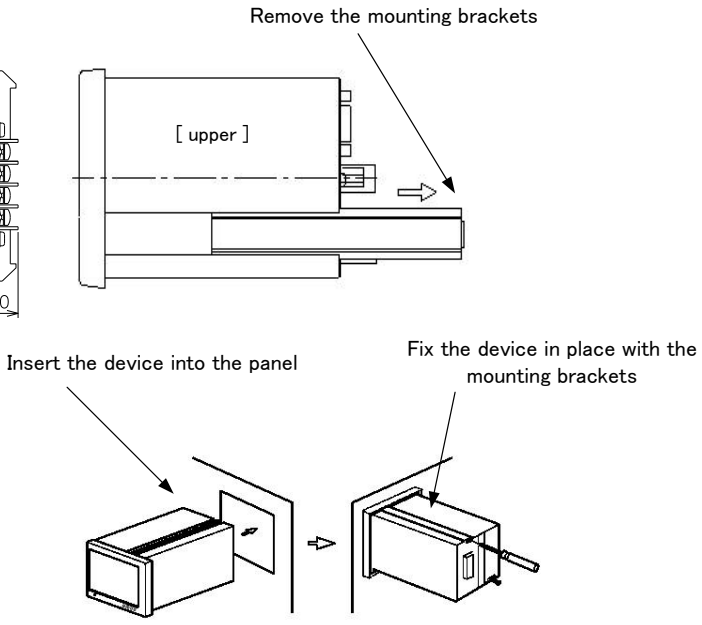
- Power supply : 100 to 240 V AC ±10%, 50/60 Hz (Approx. 32 VA)
  24V DC ± 15% (Approx. 17W)
- Insulation resistance : 100 MΩ (at 500 V DC)
- Withstand voltage : Between the power supply and Protective terminal → 1500 V AC/3 mA for 1 minute
  Between inputs and outputs → 500 V DC/1 mA for 1 minute
  Between inputs and outputs and Protective terminal → 500 V DC/1 mA for 1 minute
- Input channel A : For strain gauge maximum 4 mV/V
  * Sensor power supply: 2.5 V/5 V/10 V, maximum 120 mA
- Input channel B : For displacement sensor, voltage of 0 to ±10 V (maximum 30 V), current of 0 to ±20 mA (maximum 70 mA)
  * Not equipped with a power supply for a displacement sensor.
- Control input: : 5 V DC/–2 mA
- Control output: : 30 V/30 mA or less
  (comparison output, error output, synchronous signal output, BUSY output*)
  Saturation voltage 1.2VDC or less.
  * BUSY output is only available when an SD memory option is installed.

7. External Dimensions and Mounting Procedure

External Dimensions



Attachment Method



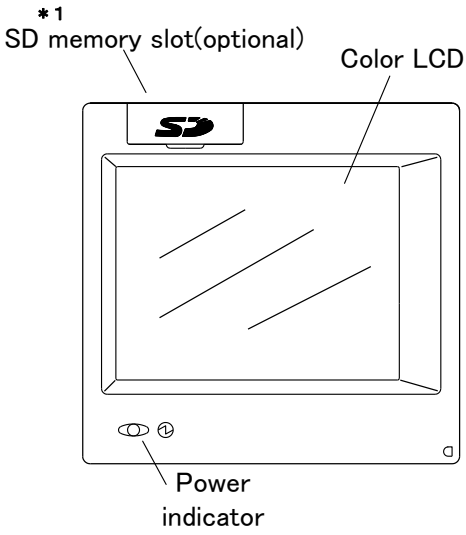
Precautions

The recommended panel thickness is 1 to 5 mm. (Use a metal panel.)

The tightening torque for the mounting brackets is approximately 0.39 Nm.

8. Names of Parts

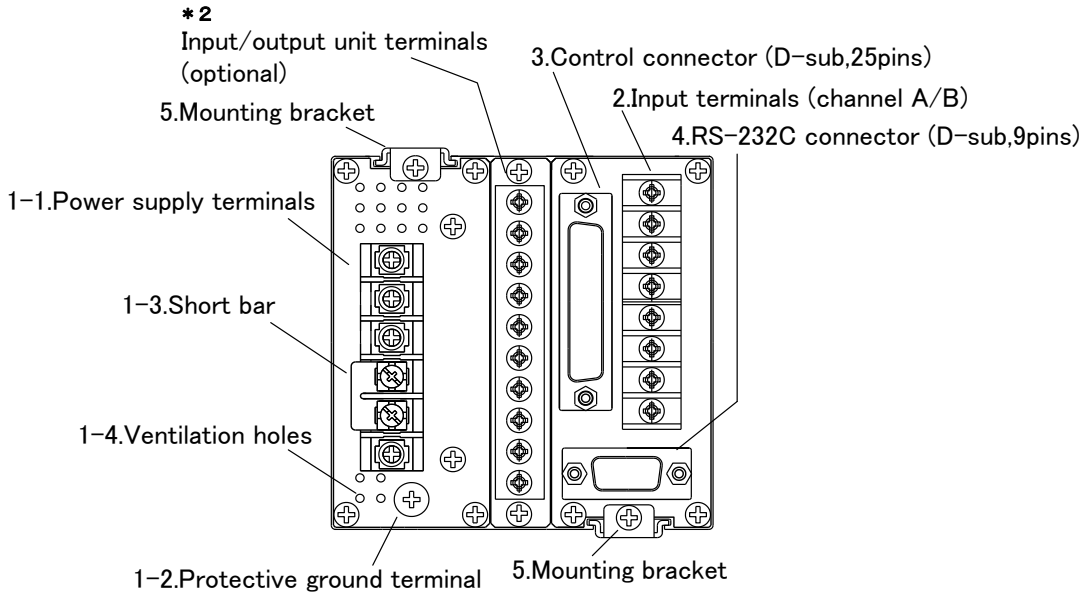
Front



＊1:Installing an SD memory card slot is optional

- Color LCD with touch panel
  STN color LCD:302 × 240 pixels
  Display range:Approximately 74 × 55mm
  Backlight lifespan:40,000 hours at 25℃
- Power indicator
  Light in green when power is applied

Rear



Name	Function
1-1. Power supply terminals	These are the device power supply terminals.
1.2. Protective ground terminal	This is the protective ground terminal. (JIS Class 3 grounding)
1.3. Short bar	This connects the functional ground terminal and frame terminal.
1.4. Ventilation holes	These holes prevent the device from overheating.
2. Input terminals	These are for connecting various types of sensors and other external input/output devices.
3. Control connector	This is for connecting external control devices for external input/output control.
4. RS-232C connector	This is for connecting to a host PC via a serial cable for performing input/output control.
5. Mounting bracket	This is for fixing the device in place when mounting it to a panel.

*2: Installing input/output unit terminals is optional.

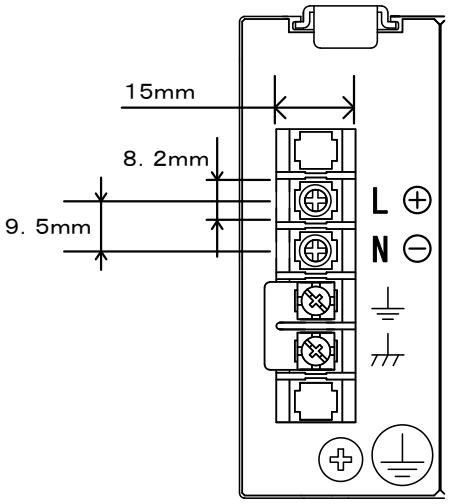
9. Terminal Connection Method

Power Supply Terminals (M3) and Protective Ground Terminal (M4)

■ Explanation of Terminals

AC power unit :Connect the power supply between the L terminal and N terminal. (100 to 240 V AC ±10%, 50/60 Hz)

DC power unit :Connect the power supply between the ⊕ terminal and ⊖ terminal. (24 V DC ±15%)



The ⏚ terminal is coupled at the neutral point between the L terminal and N terminal.

The ⏚ terminal is at the same electric potential as the casing (frame).

The ⏚ terminal and ⏚ terminal are connected by a short bar.

The ⏚ terminal is the protective ground terminal.

Be sure to ground the equipment. (JIS Class 3 grounding)

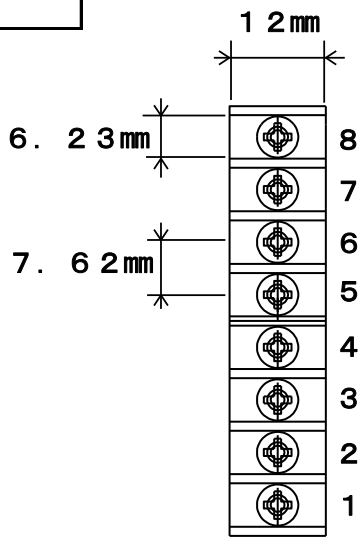
* Use crimp terminals for the connections.

Input Terminals (M3)

■ Terminal Numbers and Signal Names

Terminal Number	Signal	Description
8	Frame ground	FG
7	+SIG	(Channel A) +input
6	-SIG	(Channel A) -input
5	-EXC	(Channel A) -sensor power supply output(negative side)
4	+EXC	(Channel A) +sensor power supply output(positive side)
3	A/IN	(Channel B) +current input
2	V/IN	(Channel B) +voltage input
1	AG	(Channel B) analog ground

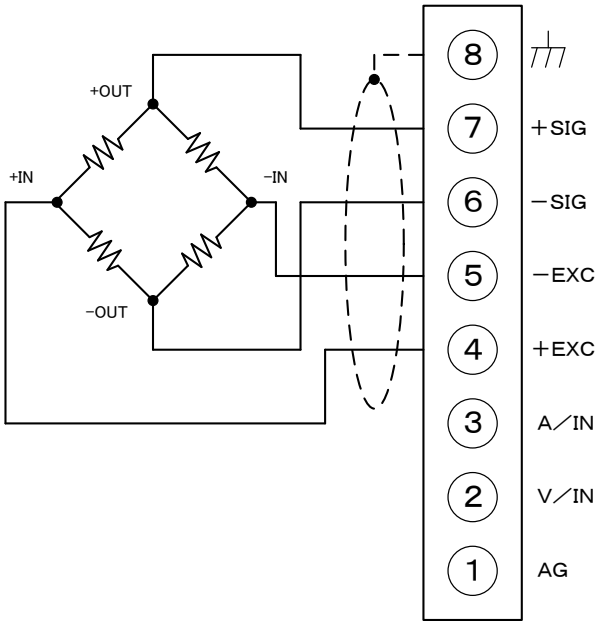
* Use crimp terminals for the connections.



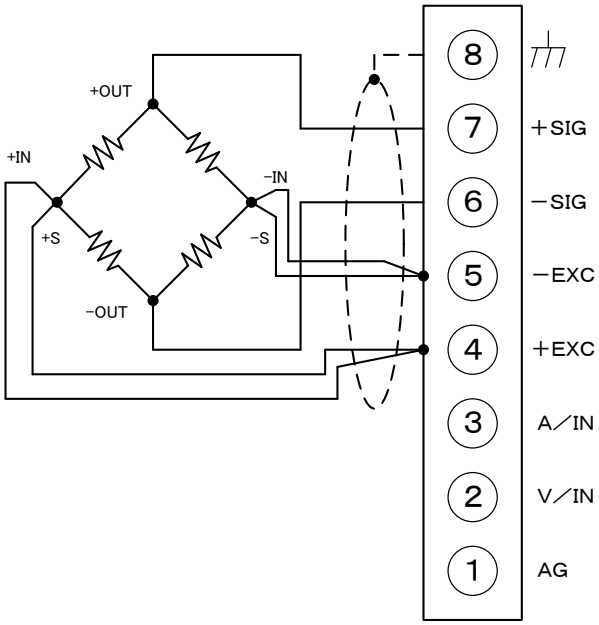
9. Terminal Connection Method

■ Connecting a Strain Gauge Sensor to Channel A

4 Wire Connection Diagram

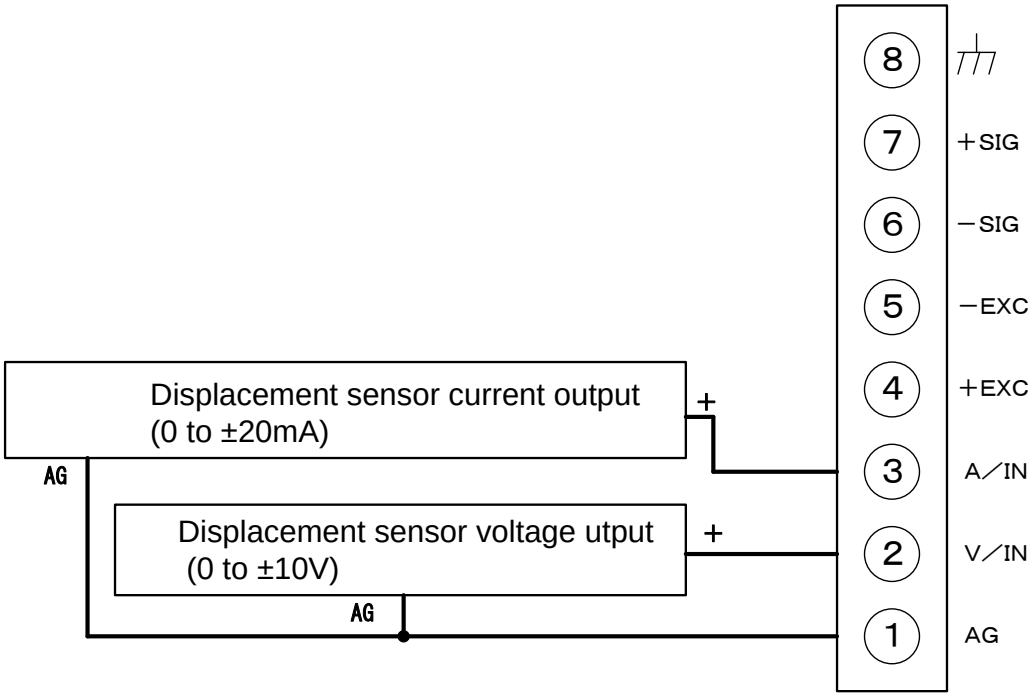


6 Wire Connection Diagram



■ Connecting a Displacement Sensor to Channel B

Connection Diagram



9. Terminal Connection Method

25 Pin D-SUB Female Control Connector

■ Terminal Numbers and Signal Names

Terminal Number	Signal Name	Description	Terminal Number	Signal Name	Description
1 (O)	OUT1	Comparison output (open collector NPN)	14(O)	A-OUTA	Analog output (channel A)
2 (O)	OUT2	Comparison output (open collector NPN)	15(O)	A-OUTB	Analog output (channel B)
3 (O)	OUT3	Comparison output (open collector NPN)	16	AG	Analog ground
4 (O)	OUT4	Comparison output (open collector NPN)	17(O)	BUSY	BUSY output *
5 (O)	OUT5	Comparison output (open collector NPN)	18(I)	P0	Select pattern
6 (O)	ERROR	ERROR signal (open collector NPN)	19(I)	P1	Select pattern
7 (O)	SYNC	Synchronous signal output (open collector NPN)	20(I)	P2	Select pattern
8	E.COM	Open collector output common	21(I)	P3	Select pattern
9 (I)	STA	Hold (channel A)	22(I)	START	Start graphics
10 (I)	STB	Hold (channel B)	23(I)	STOP	Stop graphics
11 (I)	DZA	Digital zero (channel A)	24(I)	RESET	Reset
12 (I)	DZB	Digital zero (channel B)	25	DG	Digital ground
13 (I)	DG	Digital ground			

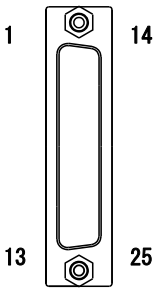
In the table above, (O) and (I) indicate the signal direction: (O) = output and (I) = input.

* BUSY output is only enabled when there is an SD memory card function.

Precautions

Designated connecter

Soldered type: E25-403N-150 with case (Chuomusen Co., Ltd.)



■ Comparison Output (O), Error Output (O), and Synchronous Signal Output (O) Terminals (Numbers 1 to 7)

These are control output terminals. They are open collector outputs (NPN type). (Output capacity: Up to 30 V/30 mA, saturation voltage 1.2v or less)

Use terminal number 8 (E.COM) as a ground common terminal.

The operation of comparison outputs differs depending on the internal settings of the equipment (basic functions/meter settings).

Comparison output / Function	OUT1 1 (O)	OUT2 2 (O)	OUT3 3 (O)	OUT4 4 (O)	OUT5 5 (O)
Channel A meter	HH	HI	GO	LO	LL
Channel B meter	HH	HI	GO	LO	LL
2-channel meter	HI (Channel A)	LO (Channel A)	GO*1	HI (Channel B)	LO (Channel B)
Waveform comparison (Channel A)	HI (Channel A)	LO (Channel A)	GO (Channel A)	---	---
Waveform comparison (Channel B)	---	---	GO (Channel B)	HI (Channel B)	LO (Channel B)
Waveform and displacement comparison	HI (Channel A)	LO (Channel A)	GO (Channel A)	HI (Channel B)	LO (Channel B)

*1: This is only ON when all the HI and LO of both channels are OFF.

For details on operation timing, refer to the advanced version of the instruction manual.

***** Terminal number 17 (BUSY output) is also an open collector output terminal (NPN type).

9. Terminal Connection Method

25 Pin D-SUB Female Control Connector

■ Input Signal (I) Terminals (Numbers 9 to 13 and 18 to 25)

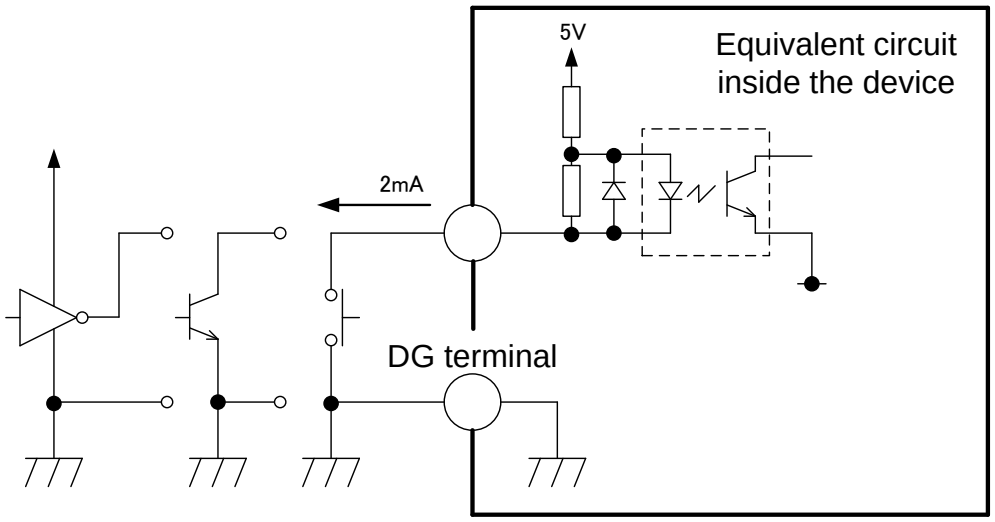
These are control input terminals. Connect each of the control inputs to a transistor (open collector output), IC (buffer, etc.), or non-voltage contact.

Operation is performed with ON/OFF between each of the control inputs and DG terminals.

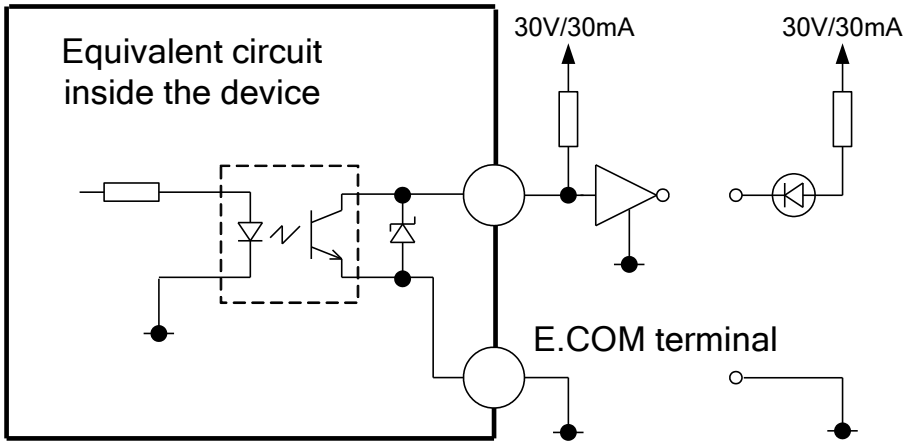
Use the DG terminals (terminal numbers 13 and 25) as ground common terminals.

■ Examples of Connecting to the Equivalent Circuit of a Control Input and Control Output

Control Input



Control Output



* Applying a reverse voltage may cause a failure.

9. Terminal Connection Method

25 Pin D-SUB Female Control Connector

■ Analog Output (O) Terminals (Numbers 14 to 16)

Analog voltages proportional to each of the individual channel inputs are output for monitoring.

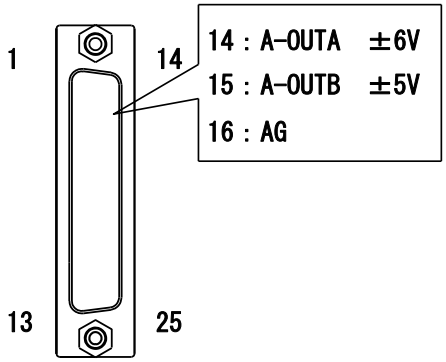
The display value and analog voltage output do not match.

Furthermore, the AG (analog ground) of the input terminal and the AG of the corresponding analog output (16 pins) are at the same electric potential. (No isolation)

Use terminal number 16 (AG) as a ground common terminal.

Signal Name	Output Channel	Output Range
A-OUTA	Channel A	±4mV/V→±6V
A-OUTB	Channel B	±10V→±5V
		±20mA→±5V

* Load resistance: 10 kΩ or more



9 Pin D-SUB Male RS-232C Connector

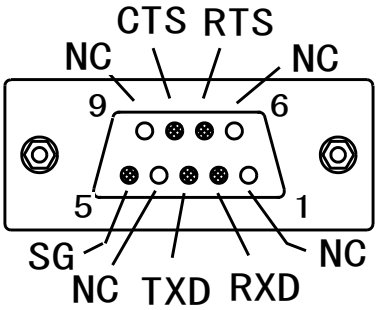
■ Terminal Numbers and Signal Names

Use this connector to connect to a host PC via a serial cable and modify the internal settings of the device.

It can also be used to load measurement data.

(For details on communication settings and commands, refer to the advanced version of the instruction manual.)

Terminal Number	Signal Name	Description
1	NC	Unused
2	RXD	Receive
3	TXD	Send
4	NC	Unused
5	SG	Signal ground
6	NC	Unused
7	RTS	Send request
8	CTS	Send permission
9	NC	Unused



10. Specifications

■ Channel A

Sensor power supply	2.5,5,10VDC ±10%/120mA or less
Compatible sensor	Strain gauge type sensor (4 wires)
	(Up to four 350Ω strain gauge type sensor can be connected in parallel)
Input signal range	-4mV/V to +4mV/V
Display	By digital scaling
Input compensation range	0.1 to 3mV/V (SPIN value)
Display (load) range	100 to 30,000 (when minimum input sensitivity) / (SPAN value)
Minimum input sensitivity	0.25uV/digit (when sensor power supply of 2.5V)
	0.5uV/digit (when sensor power supply of 5V)
	1.0uV/digit (when sensor power supply of 10V)
Non linearity	Within ±0.02% FS + 1 digit (when 3mV/V input) / (25℃±5℃)
Equivalent calibration error	Whitin ±0.2% FS
Temperature coefficient	±(0.005% of rdg + 0.5 digit) / ℃
Analog filter	Select form 10,30,300,and 600 (Hz)

■ Channel B

Range	measurement Range	Display	Input Impedance	Maximum Allowable	Accuracy
0 to 10V	0 to ±10V	By digital scaling	Approx. 1 MΩ	± 30V	±0.1% FS + 1 digit
4 to 20mA	4 to ±20mA	Offset : 0 to 10,000	50 Ω	±70mA	±0.2% FS + 1 digit
0 to 20mA	0 to ±20mA	Full scale : 0 to 10,000			

Non linearity	Whitin ±0.02% FS + 1 digit / (25℃±5℃)
Temperature coefficient	±(0.005% of rdg + 0.5 digit) / ℃
Analog filter	Select form 10,30,300,and 600 (Hz)
measurement range	Range selection can be changed in the settings

■ Functions Common to Channel A and B

Operating system	Δ Σ conversion
Number of input	2 inputs
Sampling rate	10 to 4,000 times per second (can be changed in the settings)
	Maximum sampling rate when using one channel:4,000 times per second
	Maximum sampling rate when using two channels:2,000 times per second
Display update interval	0.5 to 12.5 times per second (can be changed in the settings)
Moving average	OFF,2 to 1024 (can be changed in the settings)
Maximum display	-99999 to 0 to 99999 (all 5 digits)

■ Analog Output for Monitoring

Channel A	Strain gauge input:±4mV/V → Approximately ±6V
Channel B	±10V input → Approximately ±5V
	±20mA input → Approximately ±5V

■ Common specifications

Backup

Setting data: Written to internal flash ROM.

Digital zero values and display screens: Stored by the secondary battery for approximately 2 weeks from the time power is shut off. (Time required to fully charge secondary battery: Approximately 80 hours)

11. Options

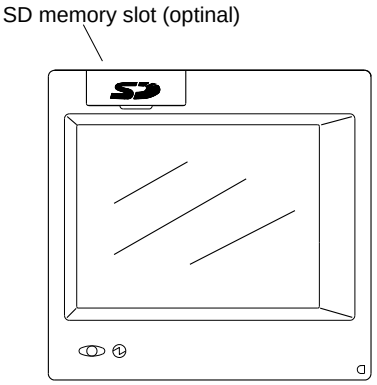
Options by Type

A memory option and input/output options are available.

■ Memory Option

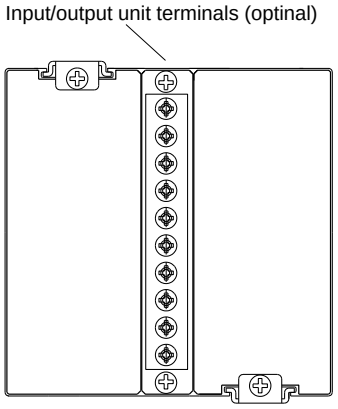
An SD memory option is available.

You can select to have a memory option installed by specifying the model code when ordering. For details, contact an our company sales representative.



■ Input/Output Options

You can select to have an input/output option installed by specifying the model code when ordering. Analog signal output, RS-485, and BCD output options are available.



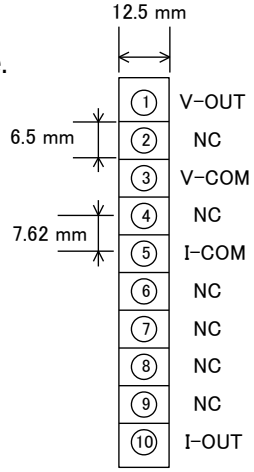
1. Analog Signal Output

A D/A converter is used to output an analog signal.

Select either channel A or B in the internal settings for output proportional to the display value.

Resolution: Equivalent to approximately 16 bits

Output	Range	Allowable Load	Accuracy	Ripple Noise
Voltage	0 to ±10V	10kΩ or more	±0.5% of FS	50mVp-p
Current	4 to 20mA	550Ω or less	±0.5% of FS	25mVp-p



* Accuracy within the range of 23°C ±5°C/35 to 85% RH
* The NC terminal is unused, but do not use it as a junction terminal.
* Use crimp terminals for the connections.

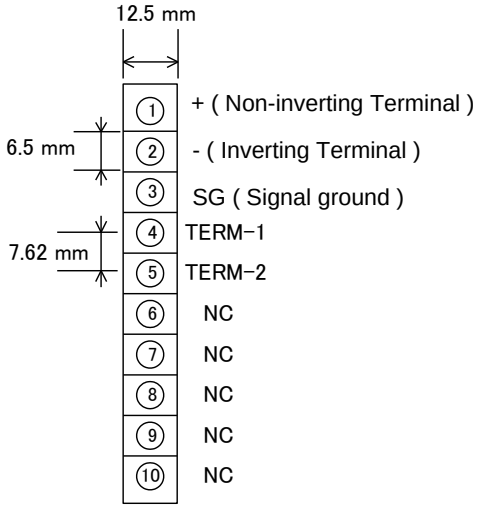
11. Options

Options by Type

2. RS-485

This connector is used to modify the internal settings of the device. It can also be used to load measurement data. (For details on communication settings and commands, refer to the advanced version of the instruction manual.)
Up to 31 devices can be connected in parallel.
Shorting TERM-1 and TERM-2 connects the internal terminator between the lines. (Terminator resistance: 150 Ω)

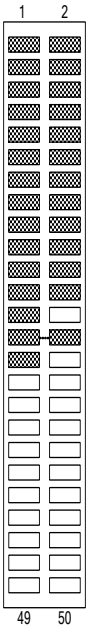
* The NC terminal is unused, but do not use it as a junction terminal.



3. BCD Output

A 5-digit BCD code is output to an open collector (NPN type).
(Output capacity: 30 V/15 mA or less)
Use terminal numbers 27 and 28 (D.COM) as common ground terminals. Select either channel A or B in the internal settings for output proportional to the display value.

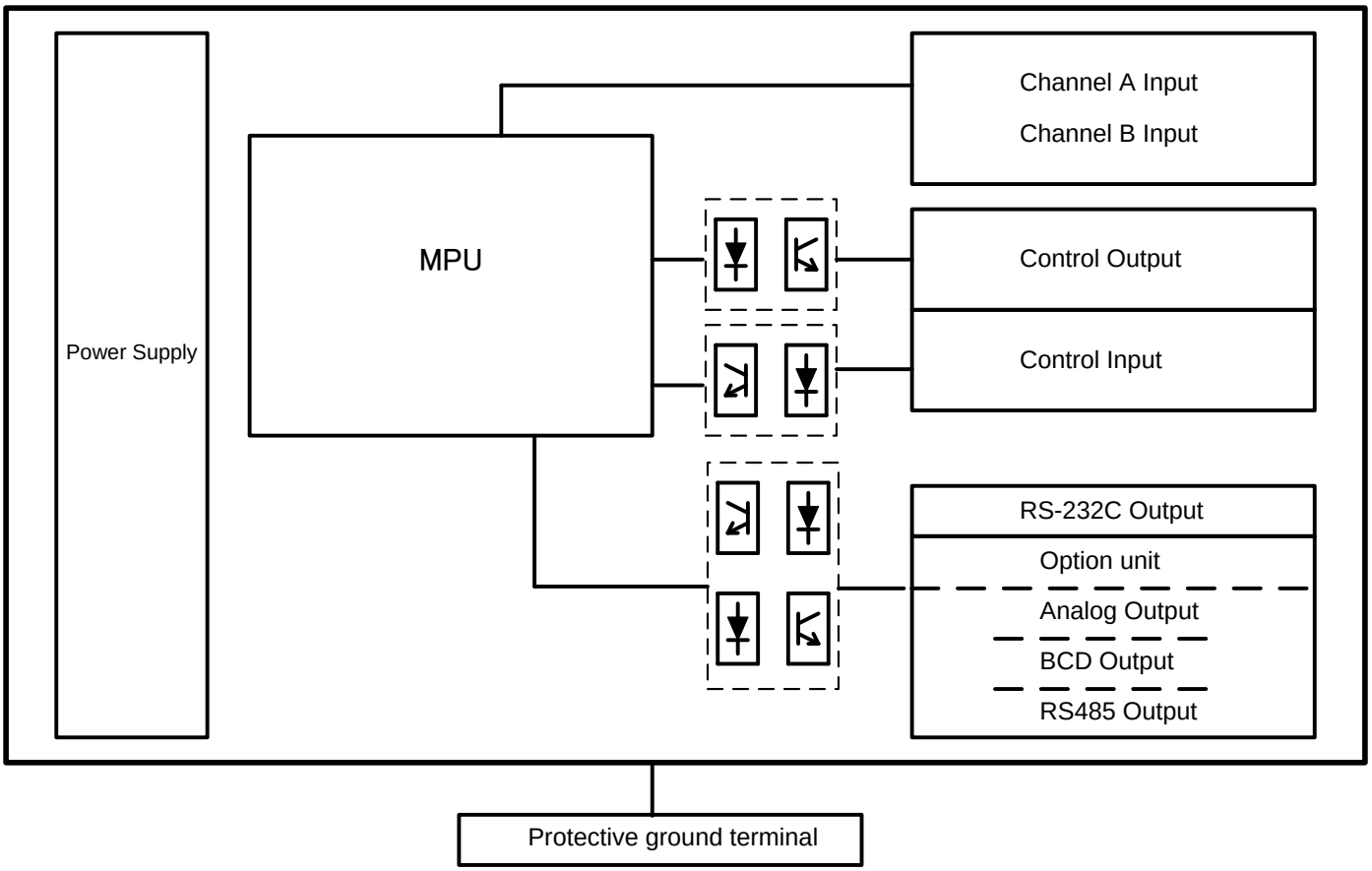
* OVER → Over signal
* POL → Polarity signal
* PC → Synchronous signal (output interval sampling rate)
* ENABLE → The input signal for turning output off.



Terminal No.	I/O Signal	Signal Name	Terminal No.	I/O Signal	Signal Name
1	Output	1	26	---	NC
2	Output	2	27	Common	D.COM
3	Output	4	28	Common	D.COM
4	Output	8	29	Input	+COM
5	Output	10	30	---	NC
6	Output	20	31	---	NC
7	Output	40	32	---	NC
8	Output	80	33	---	NC
9	Output	100	34	---	NC
10	Output	200	35	---	NC
11	Output	400	36	---	NC
12	Output	800	37	---	NC
13	Output	1000	38	---	NC
14	Output	2000	39	---	NC
15	Output	4000	40	---	NC
16	Output	8000	41	---	NC
17	Output	10000	42	---	NC
18	Output	20000	43	---	NC
19	Output	40000	44	---	NC
20	Output	80000	45	---	NC
21	Output	POL	46	---	NC
22	Output	OVER	47	---	NC
23	Input	ENABLE	48	---	NC
24	Input	ENABLE	49	---	NC
25	Output	PC	50	---	NC

* The NC terminal is unused, but do not use it as a junction terminal.
* Connect terminal number 29 (+COM) to the positive side of an external power supply.
* Use the supplied card edge type ribbon cable connector as the connector. (Hirose Electric HIF5C-50DA-2.54R)
* Compatible cable. UL2651/AWG#28

12. Circuit Configuration of Device



13. Warranty and After Service

- Warranty Period

  One year from the date of delivery.

- Warranty Coverage

  Any failure occurring during the warranty period that is judged to be clearly attributable to our company shall be repaired at no cost to you.

- After-sales Service

  This product is manufactured, tested, inspected, and shipped under stringent quality control. Should the product fail, however, contact (or send the product to) your vendor or our sales office directly. (It is advisable that you send a memo describing the failure in as much detail as possible along with the product returned.)

Before use, ensure the safety of equipment and devices.

When using this product under conditions of in an environment not mentioned in this document, or when considering using this product for applications that may have great impact on human life and properties, therefore, requiring special safety, for example, nuclear energy control, railway, aviation, vehicles, fuel systems, medical equipment, entertainment equipment, and safety equipment, ensure that the product is used well below its rated parameters and performance limit, and give consideration to fail-safe and other safety measures.

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