



This manual describes basic operations, name of each section, and specifications of the DG-5100 Series Digital Gauge Counter.

Be sure to handle the product with the procedures described in this manual.

For details on the menu configuration and parameters stored in each menu of the DG-5100 Series Digital Gauge Counter, refer to the Parameter Reference Manual.

Model	Description
DG-5100	Basic type main unit
DG-0522	BCD Function Option
DG-0530	Analog Output Function Option
TM-0301	DC Power Supply Option
TM-0340	Contact Output Function Option

■ Omission of Issuance of Certificate

This product has been tested under strict inspections for normal operation before shipment. Please note that the issuance of certificate is omitted.

■ Warranty

- This product is covered by a warranty for a period of one year from the date of purchase. This warranty covers free-of-charge repair during the warranty period.
- Even during the warranty period, the following failures will be handled on a fee basis.
 - Failures or damages occurring through misuse, improper repairs, or modification
 - Failures or damages occurring through mishandling (dropping) during transportation after purchase
 - Failures or damages occurring through natural calamities (fires, earthquakes, flooding, and lightning)
 - Failures or damages occurring through environmental disruption or abnormal voltage
 - Replenishment of expendable supplies, spare parts, and accessories

If you have any question about repairs after the warranty period, contact your dealer or Ono Sokki sales office nearby

For Your Safety

Be sure to check warnings and cautions given in this manual including this section before use to ensure safe and proper use of your DG-5100 Series Digital Gauge Counter.

ONO SOKKI CO., LTD. bears no responsibility for nor makes any warranty regarding damages or injury resulting from failure to follow directions relating to warnings and cautions given within this manual during operation.

■ Safety Indications

In this manual and on the warning labels, dangers are classified into two categories according to their degree of severity and the terms "WARNING" and "CAUTION" are used accordingly.

■ **WARNING** Warnings on Attachment

- Do not operate the instrument on locations where there is gas or steam. Using the instrument where steam or combustible or explosive gas is present may result in an explosion.
- Using the instrument in a place of a temperature exceeding the operational temperature range may cause the instrument to catch on fire.
- Do not block the heat radiation. If heat builds up inside the instrument, a fire may be caused. Install the instrument in a place with the best ventilation possible, keeping it away from a wall.
- Do not splash or spill water on the instrument. There is a risk of fire or electric shock caused by short-circuit or heating. If you get water inside the instrument, unplug the power cord immediately and call your dealer or Ono Sokki sales office nearby as soon as possible.

■ **CAUTION** Cautions on Attachment

- Be sure to install the instrument in a metal panel before use.
- Before use, make sure that none of screws of the terminal boards on the rear panel is loose.
- Make sure that there is no damage or flaw on cable coats (particularly in the case of long cables).
- Make sure that the input signal retains the initial signal level.
- When installing the instrument in a panel, note that the rated temperature range (+50°C) is not exceeded not around the panel but around this instrument.
- Refer to the panel cutout dimensions when multiple instruments are to be attached to a panel.
- Do not install the instrument in a place where it is exposed to soot or steam or in a place where there is high humidity or lots of dust. Electricity could conduct the oil, water or dust to cause a fire or electric shock.
- Do not install the instrument in places subject to extremely high temperature or direct sunlight. There is a risk of a fire.

■ **WARNING** Warnings on Wiring

- Do not remove the casing or take apart the instrument. Using the instrument in the opened or disassembled condition may cause a trouble, such as a failure and electric shock. When internal adjustment, inspection or repair is required, contact your dealer or Ono Sokki sales office nearby.
- Be sure that the power always meets specified voltage and frequency requirements. Using power voltages or frequencies other than the

specified ones may cause electric shock, a fire, or damage to the instrument.

- Before touching by hand the voltage output section or a circuit connected to the voltage output section, make sure that the power is off. Touching by hand such circuit while the power is on may cause electric shock. Further, insulate the circuit so that the instrument may withstand the output voltage and current.
- Using the output of the power terminal board and the comparator inserted into slot A may cause electric shock. Therefore, be sure to attach the supplied terminal board cover. Do not touch terminals while the power is on.

■ **WARNING** Warnings on Start-up Maintenance

- If you hear thunder, do not touch any metal part or plug of the instrument. There is a risk of electric shock due to inductive lightning.
- If you perceive smoke, abnormal noise or an abnormal odor, or if you dropped or damaged the instrument, unplug the power cable. Using the instrument under such condition may cause a fire or electric shock.

■ **WARNING** Maintenance and Activation

- After tuning the power on, warm up the instrument for at least about 15 minutes.
- For loading a board into and removing it from a slot, replacing a board with another one, and adding a board to an unused slot, contact your dealer or Ono Sokki sales office nearby.

■ **CAUTION** Cautions on Wiring

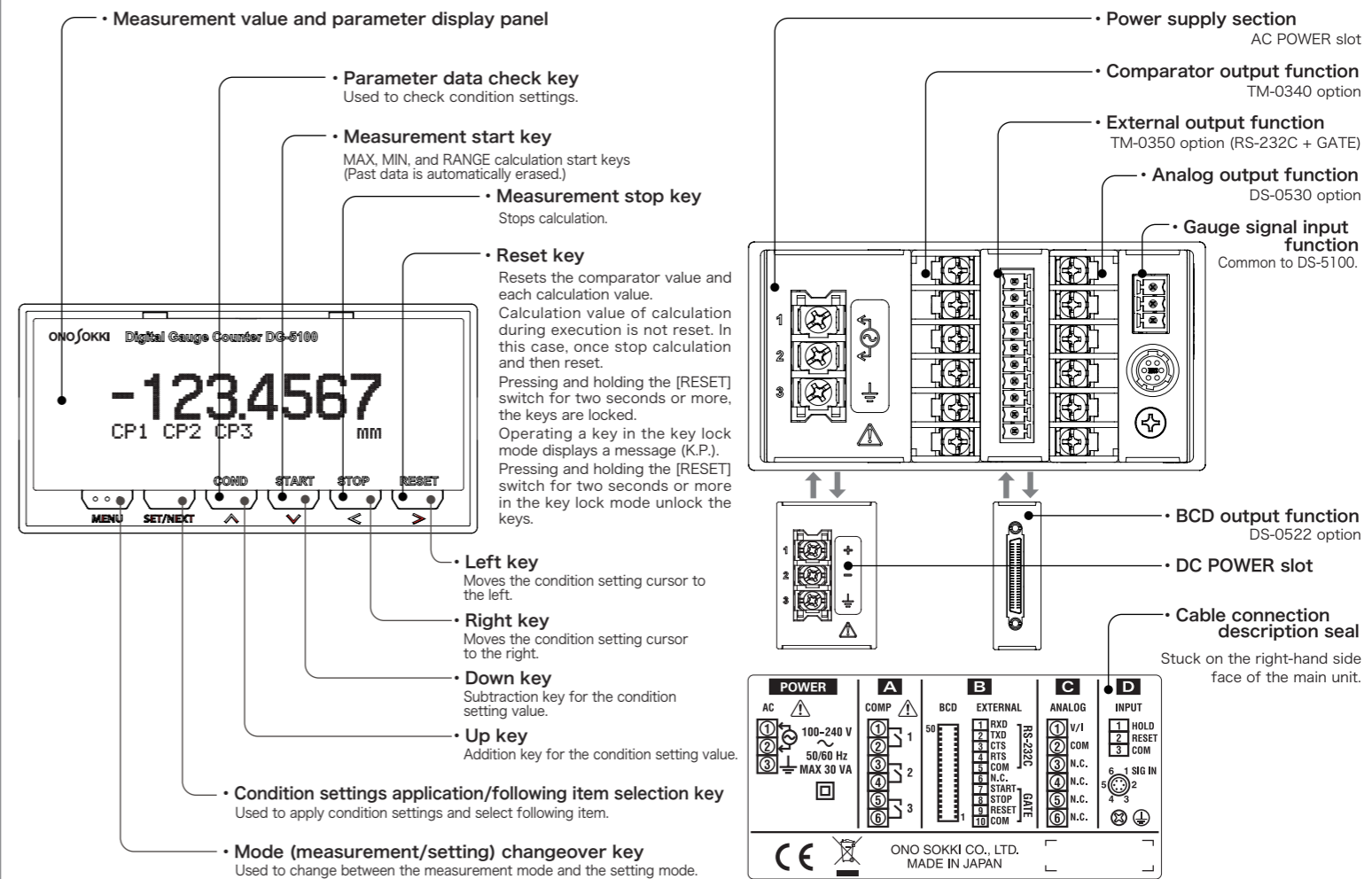
- Fasten the screws of the power input terminals and function terminal board with specified fastening torque. Insufficient fastening may cause short-circuit, fire, or malfunction. For details, refer to the following table:

Power terminal board fastening torque	0.5N · m
Power cable thickness	AWG18 or higher (UL qualified product)
Power cable thickness	1m or less
RS gate terminal board fastening torque	0.22 to 0.25N · m
RS gate cable thickness	AWG26 to 18

■ **CAUTION** CE Marking and EMC Compatibility

- Supply the power from a power circuit which is isolated from high-voltage equipment.
- Use a power cable of AWG18 or higher (UL qualified product) with a length of 1m.
- Avoid wiring in parallel with the power line.
- Separate signal cables from the power cable as far as possible.
- Do not extend signal cables more than necessary.
- Use shielded cables as signal cables.
- Separate the instrument from equipment generating strong high-frequency signals or surges as far as possible. Further, use a surge killer and a line filter.
- Separate wiring from equipment generating strong electric and magnetic fields.
- Connect the shield wire of the instrument to the metal panel, and further connect the metal panel to a good ground.
- ⚡ indicates function grounding.
- Be sure to connect the instrument to a good ground when CE and EMC measures are necessary. For details, refer to "Installation with EMC Compatibility."

Names and Functions of Each Section of the DG-5100 Series

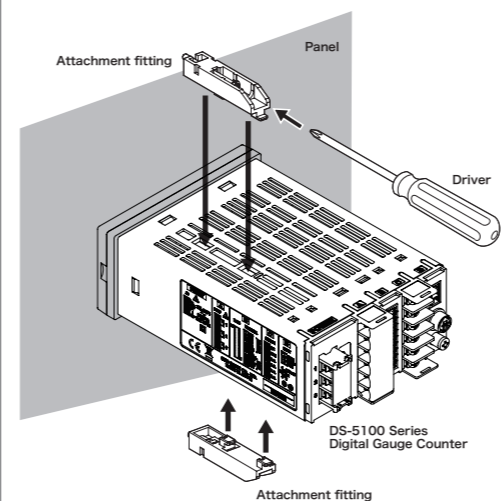


Installing the DG-5100 Series

■ Attachment to Panel

The DG-5100 Series Digital Gauge Counter can be attached to a metal panel having a thickness of about 2 mm to 5 mm.

- Insert the DG-5100 Series Digital Gauge Counter through the attachment hole from the front side of the panel.
- The DG-5100 Series Digital Gauge Counter can be attached to a metal panel having a thickness of about 2 mm to 5 mm by using attachment fittings hooked on the top and bottom faces.
- Fasten the screws of the attachment fittings to firmly fix the unit to the panel.

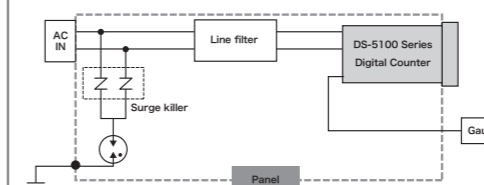


■ Installation with EMC Compatibility

The DG-5100 Series Digital Gauge Counter conforms to EMC requirements for CE marking. EMC-compatible parts are shown below.

Part Name	Manufacturer	Model
Line filter	TDK Corporation	ZHC2203-11
Surge killer	PHOENIX CONTACT	F-MS 12ST
		VAL-MS 230ST
Base		VAL-MS-BE
Ferrite core (for DC POWER)	SEIWA ELECTRIC MFG.	E04SR301334

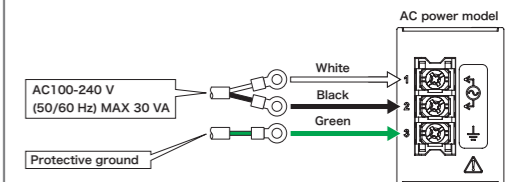
An EMC-compatible wiring diagram is shown below.



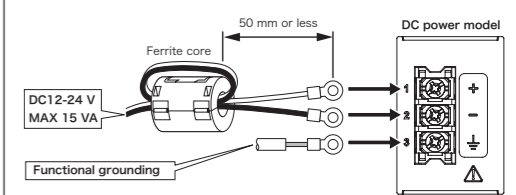
- Be sure to connect the GND terminal of the power supply section to a good ground with the following specifications: type 3 ground or higher (100 ohms or higher) / soft copper wire with a thickness of 2 mm² or larger / maximum grounding extension of 20 m
- Make signal cables as short as possible.
- Limit the negative side wiring of the surge killer to 50 cm or less.
- Connect the shield of all input and output signal cables to a stable ground.

■ Power Cable Connection

Supply the power to the DG-5100 Series Digital Gauge Counter with reference to the following diagram.



- Power cable connections to the AC power module -



- Power cable connections to the DC power module -

● Notes on Cable Connection

- Use a power cable of AWG18 or higher (UL qualified product) with a length of 1m.
- Be sure to use coated M3 solderless terminals (with a width of 5.8 mm or less) and reliably connect each cable to the power supply with the rated voltage.
- Fasten the terminal screws with specified fastening torque 0.5 N·m.

DS-5100 Series Specifications

Common Specifications

Input Section

Specifications of the input section apply to a case when a sensor from Ono Sokki is connected. Specification values cannot be guaranteed when a sensor from other manufacturers is connected.

Input signal type	Voltage signal / Line receiver selectable					
Voltage input	Signal waveform	Two-phase 90-degree phase-difference square wave				
	Signal voltage range	Hi level : +4 to +13.2V Lo level : -1 to +1V				
	Signal frequency range	DC to 300kHz				
	Input impedance	47k Ω or more				
Line receiver	Signal waveform	Line driver: RS422A or equivalent				
	Signal voltage range	Hi level : +2.5V or lower Lo level : 0.5V or lower				
	Signal frequency range	DC to 3MHz				
Input connector	HR10G-7R-6S (73) from HIROSE ELECTRIC					
	Pin	1	2	3	4	5
Direction judgment	Direction judgment from 2-phase phase-difference					
Hold-reset operation	Operates when a Lo-level voltage signal is input.					
	• Even in the hold state, the counting circuits continues counting operation according to the input signal. Therefore, after releasing the hold state, the measurement value at each timing is displayed.					
Applicable detectors	GS Series For other than sensors for line driver output, use a conversion cable.					

Calculation Method

Calculation data	Instantaneous value / Maximum value / Minimum value / Maximum value - Minimum value (RANGE)
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Setting Section

Panel condition memory	Retains condition settings • Stores measurement conditions and 4 conditions.
Resolution setting	0.1 μm/0.5 μm/1 μm/10 μm
Factor	0.001 to 1000
Condition clearance function	Initializes all settings. • Erases all settings including panel conditions.
Offset value setting	• Starts counting with reference to an offset value setting.

Display

Display unit	Fluorescent display tube
Number of counting digits	Reversible counting
Number of display digits	1-digit polarity / 7-digit number
Unit	mm 0.0000 (0.1 μm/0.5 μm)
Number of decimal places	0.000 (1 μm) 0.00 (10 μm)
Number of digits fixed to zero	OFF (factory setting) / Minimum digits 1,2,3,4,5,6 / No decimal point
Error display	Input frequency over / Number of display digits over / Setting error / Board error
Brightness setting	LOW / MID (factory setting) / HI

Power Supply for Detector

Output voltage	DC5V ± 10%
Maximum output current	200mA

General Specifications

Power voltage	AC100V - 240V (50Hz/60Hz)
Power consumption	12-20VA (DG-5100) 20-30VA (ANALOG/BCD/COMP)
Operating temperature range	0 - +50°C
Storage temperature range	-10 - +60°C

Operating humidity range	30 to 80%RH (without condensation)	
Storage humidity range	30 to 85%RH (without condensation)	
Location of use	Indoor (altitude of up to 2000 m)	
Outer dimensions	96 (W) × 48 (H) × 148 (D) mm	
Weight	Approx. 370 g	
Dielectric strength	AC1500V (1min)	
Insulation resistance	10M Ω or higher (with a 500VDC megger)	
Applicable standards	CE marking	Low Voltage Directive: EN61010-1:2001 (2nd) Contamination level 2 / Overvoltage category II
	EMC Directive	EN61326:2006 (panel built-in type)
Marks	CE	Declaration conformity mark for EC Directive
	□	Indicates double-insulation structure.
Option	AX-2050N	100VAC cable

Accessories

Instruction manual	x2 (Instruction Manual / Parameter Reference)
Attachment fitting	x2
Connector	MC1,5/3-ST3,5

DS-0522 BCD Output Specifications

Output Signal

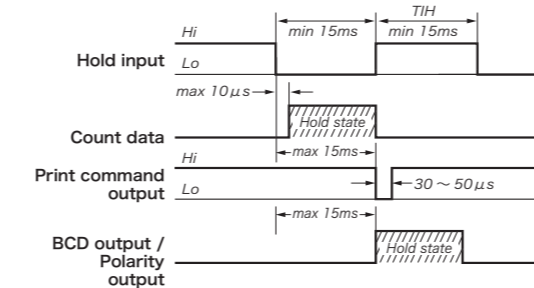
BCD output / Polarity output	Output form	7-digit parallel output, polarity output
	Output type	Open collector
	Sink current	max 32mA
	Output withstand voltage	max 24V
Data refreshing interval	Data refreshing interval	About 10 ms
	Output logic	Positive logic (factory setting) / Negative logic selectable
	Bit output	000000.0 ⇒ 0001 00000.00 ⇒ 0010 0000.000 ⇒ 0011 000.0000 ⇒ 0100 00.00000 ⇒ 0101 0.000000 ⇒ 0110 0000000 ⇒ 0000
Comparator output (TM-0340 installed)	Output type	Open collector
	Sink current	max 32mA
Print command signal	Output withstand voltage	max 24V
	When the hold signal is input and the display value and BCD output are set in hold state, a negative-pulse print command signal is output from the open collector.	
Error output signal	• Output when a counting error occurs.	
	• Continues until reset.	
Connector	• Not output when display value overflows.	
	HDR-EC50LFD1-SLE+ (board)	
	HDR-E50LPA5 (chassis) HDR-E50MAG1+ (connector) HONDA TSUSHIN KOGYO	
Gate output function	Start / Stop / Reset / Hold • Each function operates when a Lo level voltage signal is input.	

Connector Pin Assignment

Pin	Signal	Pin	Signal
1	1 × 10 ⁰	26	2 × 10 ⁶
2	2 × 10 ⁰	27	BCD output
3	4 × 10 ⁰	28	4 × 10 ⁶
4	8 × 10 ⁰	29	8 × 10 ⁶
5	1 × 10 ¹	30	Start calculation
6	2 × 10 ¹	31	Stop calculation
7	4 × 10 ¹	32	NC
			COMP output 1 (when DS-0540 is installed)
8	8 × 10 ¹	33	COMP output 2 (when DS-0540 is installed)

9	1 × 10 ²	34	COMP output 3 (when DS-0540 is installed)
10	2 × 10 ²	35	NC
11	4 × 10 ²	36	Polarity output +
12	8 × 10 ²	37	Polarity output -
13	1 × 10 ³	38	NC
14	2 × 10 ³	39	Number of decimal places is 0 (bit)
			Number of decimal places is 1 (bit)
			Number of decimal places is 2 (bit)
15	4 × 10 ³	40	Number of decimal places is 3 (bit)
			NC
16	8 × 10 ³	41	NC
			NC
			NC
17	1 × 10 ⁴	42	NC
			NC
			NC
18	2 × 10 ⁴	43	NC
			NC
			NC
19	4 × 10 ⁴	44	NC
			NC
			NC
20	8 × 10 ⁴	45	Hold input
			Reset input
			Print command
21	1 × 10 ⁵	46	Error output
			NC
			NC
22	2 × 10 ⁵	47	NC
			NC
			NC
23	4 × 10 ⁵	48	NC
			NC
			NC
24	8 × 10 ⁵	49	NC
			NC
			NC
25	1 × 10 ⁶	50	COM

Timing Chart



DS-0530 Analog Output Specifications

Output signal	Voltage/current selectable (output mode: 12 bits max.)	
	Output voltage range	-10 to 10V
	Output current range	4 to 20mA 0 to 16mA
Load resistance	Voltage output	100k Ω or higher
	Current output	500 Ω or lower
Linearity	± 0.3%/F.S.	
Zero drift	± 0.05%/F.S./°C	
Span drift	± 0.05%/F.S./°C	
Output refresh time	About 10 ms	

TM-0340 Comparator Output Specifications

UPPER setting device	7-digit setting Turns ON relay when UPPER ≤ Display value.
LOWER setting device	7-digit setting Turns ON relay when LOWER ≥ Display value.
WINDOW setting device	Turns ON relay when LOWER ≥ Display value or UPPER ≤ Display value.
Output type	1 makes contact output 3 outputs (COMP1/COMP2/COMP3) • UPPER/LOWER/WINDOW for each
Maximum contact capacity	30DCV/100mA 250VAC/100mA
Output type	Terminal board
Output refresh interval	About 10 ms

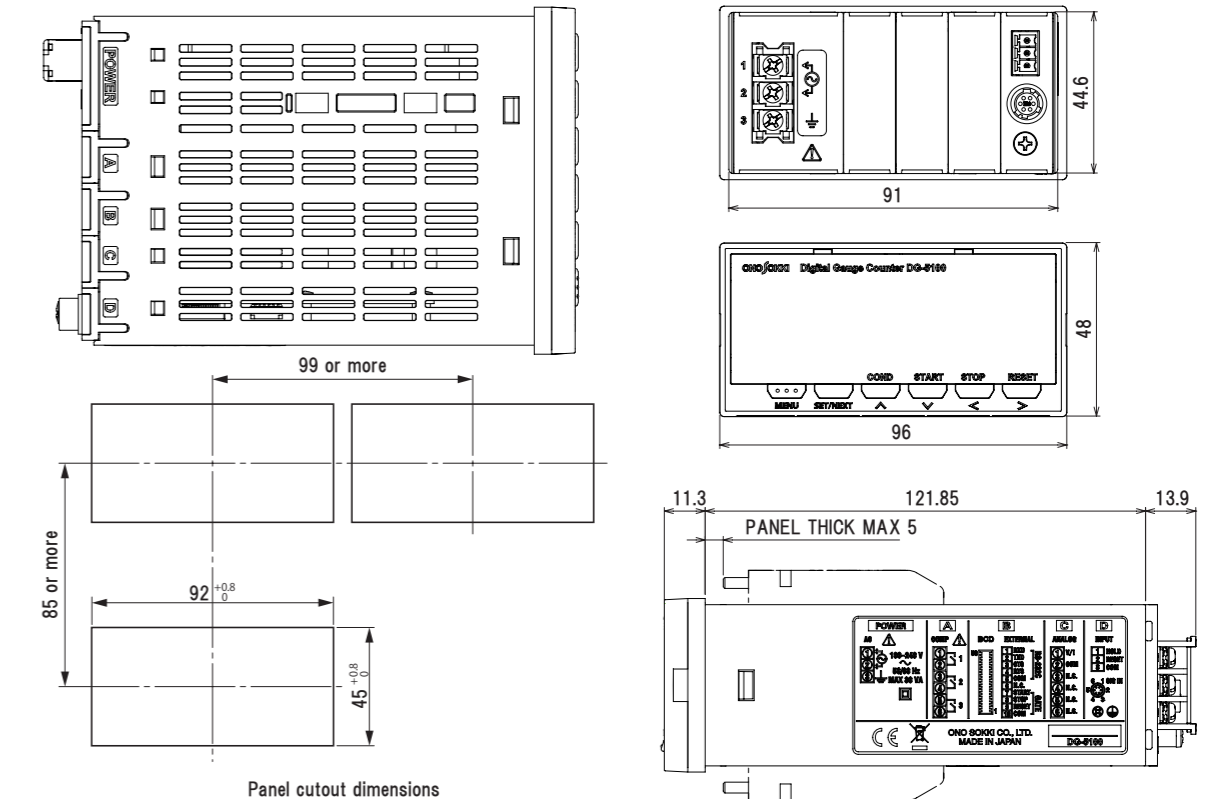
TM-0301 DC Power Supply Specifications

Power voltage	DC12V to 24VDC ± 5%
	7W (DG-5100) 15W (ANALOG/BCD/COMP)

TM-0350 RS-232C/Gate Specifications

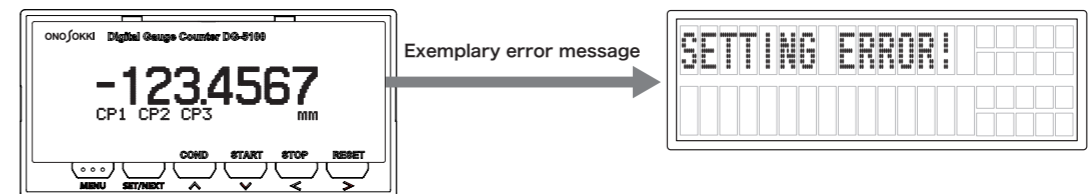
RS-232C communication method	Serial communication (start-stop transmission)
RS-232C baud rate	9600bps/19200bps
RS-232C/gate output connector	Connector terminal board
Gate output function	Start / Stop / Reset
Connector	MC1,5/10-ST3,5

DS-5100 Series Outer Dimensions



Error Messages

If an error occurs in the DG-5100 Series Digital Gauge Counter, any one of the following error messages appears.



Error Messages and Solutions

Error Message	Error Name	Cause and Solution
MEMORY ERROR	Backup memory error	• The backup memory fails. If the error cannot be recovered, contact your dealer or Ono Sokki sales office nearby.
BOARD ERROR !	Board error	• The option board used is abnormally recognized. Contact your dealer or Ono Sokki sales office nearby.
SETTING ERROR !	Setting value error	• Indicates that there is an inconsistency in multiple condition settings related to multiple setting items such as comparator upper- and lower-limit settings. Recheck condition settings.

Setting the Bit Switch (SENSOR TYPE)

Before connecting a sensor, set the bit switch (LINE DRIVER/VOLTAGE) located on the bottom face according to the output type of the sensor.

Note that improper setting of the bit switch may cause failure of the sensor.

A seal of bit switch setting is stuck on the left-hand side face of the DG-5100 Series Digital Gauge Counter.

Bit Switch Settings

Sensor Type	Bit Switch Setting
Line driver output type	LINE DRIVER 1 to 4 : ON
Voltage output type	VOLTAGE 5/6 : ON

