ONO SOKKI

DG-4240

Digital Gauge Comparator

Instruction Manual

ONO SOKKI CO., LTD.

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PREFACE

Thank you for selecting the Ono Sokki DG-4240 Digital Gauge Comparator. To obtain full information of this unit, please carefully read this manual before use.

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

Omission of Test Qualification Issuance

Since this product has been tested through a series of strict inspections and a complete program of quality control, issuance of the test qualification has been omitted.

FOR SAFE OPERATION OF THIS PRODUCT

WARNING

- Do not operate this product in a location where there is gas or steam.
  Using this product where there is steam or combustible or explosive gas may result in an explosion.

- Avoid using in locations of high temperature as there may be a risk of fire.
  Avoid using in locations of extremely high temperature. Using this product in a location having a temperature exceeding the operational temperature range (0 to 40°C) may cause the product to catch on fire.

- Do not remove the casing or take apart this product.
  Use of this product without its casing or while taken apart may result in damage to equipment or electric shock. When internal adjustment, inspection or repairs are required please contact the retail store where you bought the product or your nearest Ono Sokki sales office.

- Do not splash or spill water on the product as doing so may cause fire or electric shock due to short or increased heat.
  If water does happen to get inside the product, unplug the power cord immediately and call the retail store where you bought the product or your nearest Ono Sokki sales office as soon as possible.

WARNING

- Never cut the ground wire of the product or disconnect wires connected to the protective ground terminal of the product as doing so may result in electric shock or damage to the product.

- Before connecting this product to an external device, be sure to check that the product is properly grounded and that the product's power is off.
  Connecting to external equipment while not grounded or while power is still on may result in electric shock.

- Be sure the power always meets specified voltage (90 to 264 V AC) and frequency (50/60 Hz) requirements.
  Use of power other than that specified may result in electric shock, fire, or damage to the product.

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

- Unplug the product immediately if any metal, water, or foreign object should fall inside. Continued use after metal, water, or foreign object has fallen inside may result in fire or electric shock. After unplugging the product immediately, contact the retail store where you bought the product or your nearest Ono Sokki sales office as soon as possible.

WARNING

- Unplug the product if you sense smoke, strange noise or strange smell coming from the product or if you accidentally drop it or damage it.
  Continued used may result in fire or electric shock. After immediately unplugging the product, contact the retail store where you bought the product or your nearest Ono Sokki sales office as soon as possible.

- The ⏚ symbol is used to indicate protective grounding. Be sure that protective grounding is performed by any of the following methods before supplying power to a terminal marked by this symbol.
  Failure to provide protective grounding may result in electric shock.

  - If a three-pronged power cord (one prong for ground) is included with the product, be sure to use the product with a three-pronged outlet which has been grounded. Be sure to connect the protective ground terminal of the product to the protective ground terminal on the power supply side.

    For safety and noise prevention, be absolutely sure to use ground the Ground Terminal (No.3) on the rear panel of the product.

Ground type:	Type 3 ground or better (100 Ω or less)
Ground wire:	2 mm^2 or thicker flexible copper wire (AWG14)
Ground extension:	Max. 20 m

WARNING

- Protective grounding is performed one ground per ground terminal. Do not use crossover wiring.
- Do not supply power when there is no protective grounding or when there is a chance that protective grounding has not been performed properly.

CAUTION

- Do not place large or heavy objects on top of the product.
  If an object on top of the product should fall it may result in injury or damage to equipment.

- Do not install the product in a location 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 product in locations subject to extremely high temperature or direct sunlight as doing so may result in fire.

- Keep the power cord away from space heaters or appliances which generate high temperature as the cord casing may melt resulting in fire or electric shock.

CONTENTS

NOTES ON USAGE

Installation Environment

- Install in the following location:
  - Receiving no oil splash, water drops, and dust
  - Without extreme changes in temperature and humidity
  - Not exposed to direct sunlight
  - Away from strong noise sources such as a motor
  - Without mechanical vibration and impact
  - Without corrosive gases such as sulfurized gases

Power Source

- The DG-4240 starts operating immediately after its power is turned on. Be sure to complete all settings before turning on the power.
- Use within the specified voltage range; 90 to 264 VAC.

Grounding

- For safe operation and EMI noise elimination, be sure to properly ground the unit using the ground terminal on the rear panel.

Noise

- Install the gauge sensor signal cable and the I/O signal cable such as for BCD output away from the power cable as much as possible, and do not extend the cables unless otherwise required.
- Use the shielded cable for the signal cable.

Maintenance

- Remove dirt from the DG-4240 main unit by gently wiping with firmly wrung soft cloth containing water or neutral detergent. Do not use volatile organic solvent such as thinner.
- Periodically check for loosen screws of the terminal block on the rear panel.

Measurement Error (Indicator Blinks)

If a measurement error occurs, the indicator will blink and BCD OUT error output (O.C) will go on. This is not an instrument error.

- Reasons for measurement error
  ① When the velocity of the sensor spindle exceeds the maximum response velocity specified for each sensor.
  When maximum response velocity is exceeded due to impact at the moment the tip of the spindle strikes the object being measured.
  ② When the sensor input signal is affected by external noise.
  ③ When the sensor output signal is 90 degrees out of phase.

- Recommended action
  ① Lower the velocity of the object being measured or the velocity of the sensor to decrease the velocity of the sensor spindle.
  ② • Change the wiring route if the sensor signal cable is laid near a noise-generating source (such as a motor).
  • Do not use a sensor signal cable longer than necessary.
  • Make sure the unit is grounded properly. (Ground using copper wire having a 2 mm^2 cross-section and no longer than 20 m.)
- Recovering from measurement errors
  After eliminating the cause of the error by taking the recommended actions, reset the unit.

Note: If the measurement error does not go away even after taking all actions recommended above, please contact your nearest Ono Sokki sales office.

Section 1
General

1.1 General

The DG-4240 Digital Gauge Comparator can be combined with the AS/BS/GS Series Gauge Sensor to compare the preset value with a measured value and perform pass-fail decision during digital display and BCD output of the measured value.
The BCD output can be changed between positive and negative logics by the bit switch, facilitating matching with the sequencer. The DG-4240 can be easily installed on a panel due to its standard size of the DIN 96 x 96 (mm).

1.2 Applicable Gauge Sensor

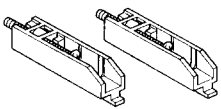
The DG-4240 can be used in combination with the following gauge sensors.

Model Name	Measurement Range	Resolution	Model Name	Measurement Range	Resolution
AS-1012	10mm	1μm	GS-112	10mm	1μm
AS-1012L	10mm	1μm	GS-251/251W	25mm	10μm
AS-2012	10mm	1μm	GS-332	30mm	1μm
BS-102/102W	10mm	10μm	GS-503	50mm	10μm
BS-112/112W	10mm	1μm	GS-551	5mm	1μm
GS-1000	100mm	10μm	GS-5011	50mm	1μm
GS-102	10mm	10μm			

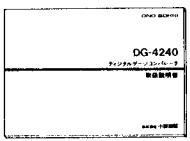
1.3 Accessories

After unpacking the package, verify the following accessories in order.

Name	Quantity
Rack mounting fixture	1 set
Instruction Manual	1 copy



Rack mounting fixture



Instruction Manual

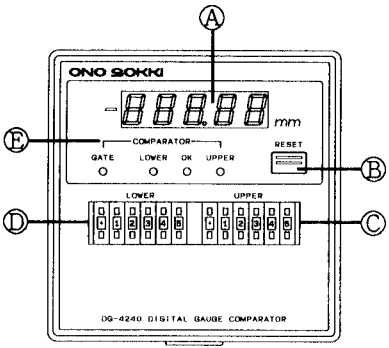
1.4 Option

The DG-4240 is provided with the following options.

Name	Model Name	Remarks
Power cable	AX-204	2.4 m, for 100 VAC, 2 pieces of press-fit terminals
BCD cable	AA-8005	3 m, for RQ-381 Printer
	AA-8006	3 m, for DA-108 D/A Converter
	AA-8007	5 m, one-side open
Terminal block cover	DG-0420	

Section 2
Components and Functions

2.1 Front Panel



(A) Display

Displays a measured value using 5-digit numeric in units of mm. When a measured value is negative, "-" is lit on the left side of the display. When a measurement error occurs, the displayed value blinks.

(B) RESET Switch

Resets the displayed value, BCD output, error indication, and error output when depressed.

(C) UPPER Digital Switch

Specifies the upper limit value for pass-fail decision.

(D) LOWER Digital Switch

Specifies the lower limit value for pass-fail decision.

(E) COMPARATOR Indicator

GATE

Lit in red while the COMPARATOR GATE signal is input from (H) COMPARATOR GATE Input Terminal (No. 8) or the COMPARATOR GATE input (Pin 34) of (P) BCD OUT Connector on the rear panel. While lit, the pass-fail decision is forcedly stopped to set all decision result outputs to OFF.

LOWER

Lit in red when the measured value is smaller than the value specified by (D) LOWER Digital Switch.

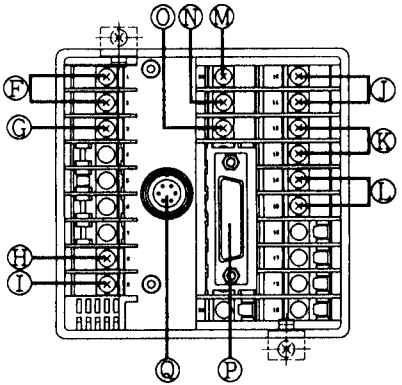
OK

Lit in green when the measured value is larger than the value specified by (D) LOWER Digital Switch and smaller than the value specified by (C) UPPER Digital Switch.

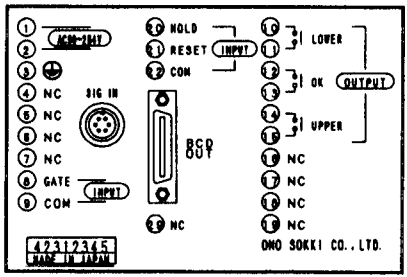
UPPER

Lit in red when the measured value exceeds the value specified by (C) UPPER Digital Switch.

2.2 Rear Panel



Side Panel Terminal Block Explanatory Drawing



(F) Power Input Terminal (No. 1, 2)

Inputs power source of 90 to 264 VAC.

(G) Ground Terminal (No. 3)

Be sure to connect to an approved ground connection for safe operation and EMI noise elimination.

(H) COMPARATOR GATE Input Terminal (No. 8)

COMPARATOR GATE signal input terminal. While this terminal is short-circuited with (I) COM Terminal (No. 9) and the COMPARATOR GATE signal is input, the pass-fail decision is forcedly stopped to set all decision result outputs to OFF.

(I) COM Terminal (No. 9)

COMPARATOR GATE signal common terminal.

(J) LOWER Output Relay (No. 10, 11)

Single make contact output, which turns ON when the measured value is smaller than the value specified by (D) LOWER Digital Switch.

(K) OK Output Relay (No. 12, 13)

Single make contact output, which turns ON when the measured value is larger than the value specified by (D) LOWER Digital Switch and smaller than the value specified by (C) UPPER Digital Switch.

(L) UPPER Output Relay (No. 14, 15)

Single make contact output, which turns ON when the measured value exceeds the value specified by (C) UPPER Digital Switch.

(M) HOLD Input Terminal (No. 20)

HOLD signal input terminal. When this terminal is short-circuited with (P) COM Terminal (No. 22), the displayed value and BCD output are held. However, the pass-fail decision result output is not held.

(N) RESET Input Terminal (No. 21)

RESET signal input terminal. When this terminal is short-circuited with (P) COM Terminal (No. 22), the display value,

BCD output, error indication, and error output are reset.

(O) COM Terminal (No. 22)

HOLD and RESET signals common terminal.

(P) BCD OUT Connector

Connector for BCD output, pass-fail decision result output, and external command signal input.

(Q) SIG IN Connector

Inputs a signal from the gauge sensor. Connects the gauge sensor signal cable.

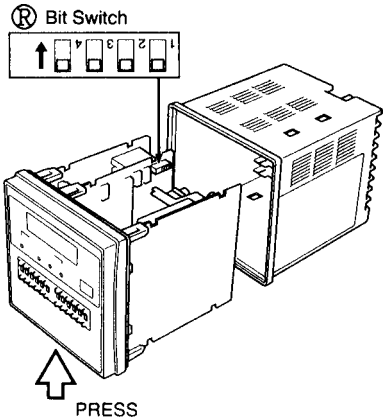
Select the positive (+) or negative (-) count to be used when the gauge sensor spindle is pushed in.

2.3 Interior

By pressing the lug marked with PRESS at the bottom of the front panel, the DG-4240 main unit can be easily removed from its case.

<CAUTION>

Before removing the main unit from the case, be sure to disconnect the signal cable from the SIG IN Connector and the BCD cable from the BCD OUT Connector, respectively, on the rear panel.



(R) Bit switch

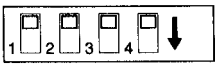
Changes the decimal point position, positive/negative count with the spindle pushed in, and BCD positive/negative logic. It is set to OFF when shipped.

Section 3
Settings

3.1 Bit Switch

No.	FUNCTION	ON	OFF
1	SENSOR	1 μm	10 μm
2	DIRECTION	—	+
3	BCD OUT	—	+
4	DISABLE		
ON ←			

Set the bit switch inside the main unit depending on the gauge sensor to be connected and the measurement purpose. Bit Switch 4 is not used; requiring no setting.



All set to OFF when shipped.

■ Bit Switch 1 (SENSOR)

Set to ON to connect the gauge sensor with the resolution of 1 μm or set to OFF to connect the one with the resolution of 10 μm. When set to ON, the decimal point is shown as 0.000 and a measured value is displayed in units of 1 μm. When set to OFF, the decimal point is shown as 0.00 and a measured value is displayed in units of 10 μm.

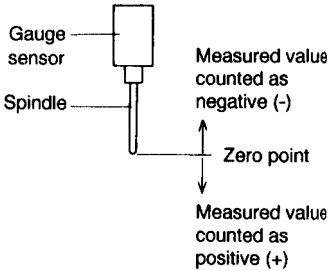
Switch	Gauge Sensor
ON	AS-1012, AS-1012L, AS-2012, BS-112 GS-112, GS-332, GS-551, GS-5011
OFF	BS-102, GS-001, GS-102, GS-251, GS-503

■ Bit Switch 2 (DIRECTION)

Select the positive (+) or negative (-) count to be used when the gauge sensor spindle is pushed in.

Switch	Count
ON	Negative (-) count when the spindle is pushed in
OFF	Positive (+) count when the spindle is pushed in

For example, when set to ON, the displayed value's polarity and the spindle are in the relationship shown on the right. When set to OFF, the polarity is reversed.



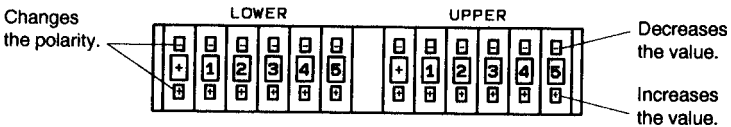
■ Bit Switch 3 (BCD OUT)

Select the positive or negative logic for BCD output, polarity output, and decimal point output from the BCD OUT Connector on the rear panel.

Switch	Positive/Negative Logic
ON	Negative logic
OFF	Positive logic

3.2 Preset Value

Specify the upper and lower limit values for pass-fail decision criteria using the UPPER and LOWER Digital Switches.

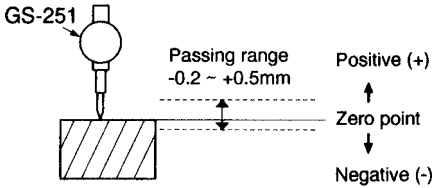


Pass-fail decision is implemented as follows:

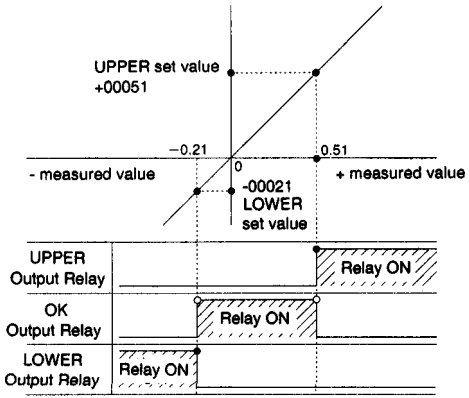
Criteria	Decision	Decision Result Display/Output
LOWER set value ≥ Measured value	LOWER	• COMPARATOR Indicator LOWER LED is lit in red. • LOWER Output Relay (No. 10, 11) ON • BCD OUT Connector LOWER Output (Pin 21) ON
LOWER set value < Measured value < LOWER set value	OK	• COMPARATOR Indicator OK LED is lit in green. • OK Output Relay (No. 12, 13) ON • BCD OUT Connector OK Output (Pin 22) ON
UPPER set value ≤ Measured value	UPPER	• COMPARATOR Indicator UPPER LED is lit in red. • UPPER Output Relay (No. 14, 15) ON • BCD OUT Connector UPPER Output (Pin 23) ON

When specifying the upper and lower limit values, consider the positive (+)/negative (-) counting with the gauge sensor spindle pushed in and the decimal point display position.

<Sample Setting 1>



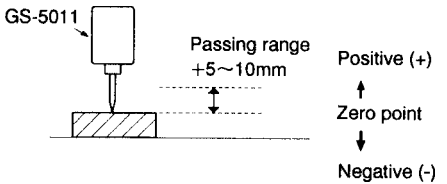
Due to the GS-251 resolution of 10 μm, - 0.20 is displayed when the measured value is the lower limit value, - 0.2 mm, of the passing range; 0.50 is displayed when the measured value is the upper limit value, + 0.5 mm, of the passing range. The value determined as OK does not include the values specified by the LOWER and UPPER Digital Switches. Therefore, when - 00021 is set by the LOWER Digital Switch and + 00051 is set by the UPPER Digital Switch, a value in the range of - 0.2 to + 0.5 mm is determined as OK.



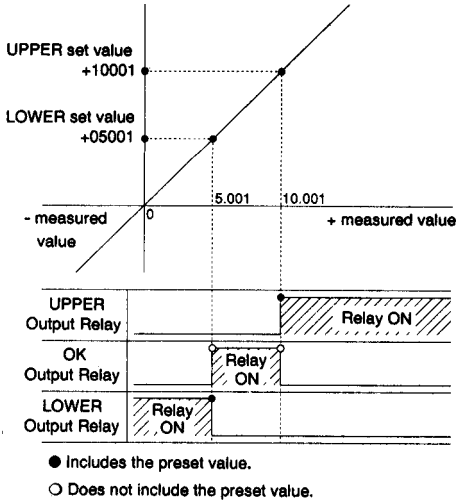
● Includes the preset value.

○ Does not include the preset value.

<Sample Setting 2>

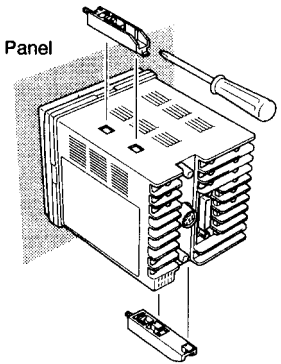


Due to the GS-5011 resolution of 1 μm, 5.000 is displayed when the measured value is the lower limit value, + 5 mm, of the passing range; 10.000 is displayed when the measured value is the upper limit value, + 10 mm, of the passing range. The value determined as OK does not include the values specified by the LOWER and UPPER Digital Switches. Therefore, when + 05001 is set by the LOWER Digital Switch and + 10001 is set by the UPPER Digital Switch, a value in the range of + 5 to + 10 mm is determined as OK.



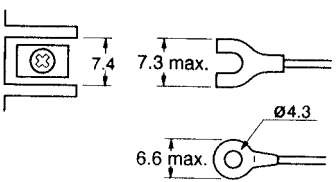
3.3 Panel Installation

The DG-4240 can be installed on a panel cut in the size of $92^{+0.8}_{-0}$ x $92^{+0.8}_{-0}$ mm. The panel should be a steel plate with a thickness of 2 mm or more and 5 mm or less. Firmly fix the main unit at the top and bottom using the attached rack mounting fixture.



3.4 Cable Connection

Connect required cables to the rear panel.
The terminal block uses M3.5 screws. Use the press-fit terminal available for the M3.5 screw to connect to the terminal block. It is recommended to use an eyelet terminal as much as possible to prevent accidental disconnection from the terminal block.



■ Connecting the Power Cable

Connect the power cable to the Power Input Terminal (No. 1, 2) on the rear panel.

<CAUTION>

- Since the DG-4240 operates immediately after its power is turned on, be sure to complete all settings before turning on the power.
- Use the power cable applicable to the specified power voltage range.
- In the case of excessive noise from the power source, it is recommended to attach an additional insulating transformer and use the line filter.
- Avoid bundling the power cables of the primary side and secondary side or passing them through the same distribution head or duct.

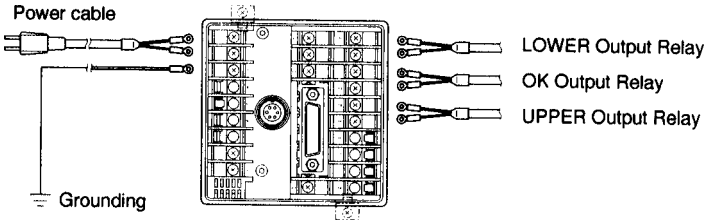
■ Grounding

Be sure to ground at the Ground Terminal (No. 3) on the rear panel for safe operation and EMI noise elimination.

Grounding type:	3rd class grounding or more (100 ohms or less)
Grounding line:	Annealed copper wire of 2 mm^2 or more (AWG14)
Grounding extension:	Max. 20 m

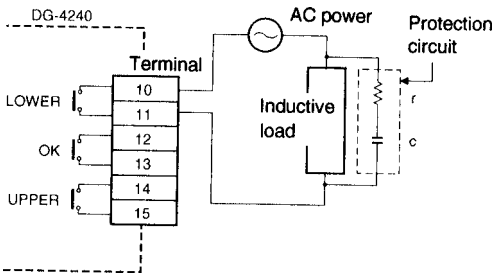
<CAUTION>

- Ground at a single point with the Ground Terminal and do not implement crossover wiring.



■ Connecting the Relay Output

When inductive load is connected to the Relay Output (No. 10 to 15) on the rear panel, the protection circuit can be used to reduce the back electromotive force and prevent damage to the relay contact.



<Element Selection>

Selection guideline for c and r are as follows:

c: 0.5 to 1 μF to contact current 1 A

r: 0.5 to 1 ohm to contact voltage 1 V

However, they do not always coincide due to the properties of load and the unequal relay characteristics. Verify by experimentation after considering that the c takes charge of discharge suppression effects during contact opening and the r plays a role of current limiting during next power-on. In general, select the c with the voltage resistance of 100 to 300 V.

Use the AC capacitor (without polarity) for the AC circuit.

When load is a relay or solenoid, a reset time is delayed.

■ Connecting External Equipment

To input the COMPARATOR GATE signal, HOLD signal, and RESET signal from external equipment, connect the external equipment to the terminal block on the rear panel.

For details on the interface circuit, see "1. Recommended Interface" on page *6-1*.

■ Mounting the Terminal Block Cover (Option)

Mount the optional terminal block cover (DG-0420) on the terminal block if necessary.

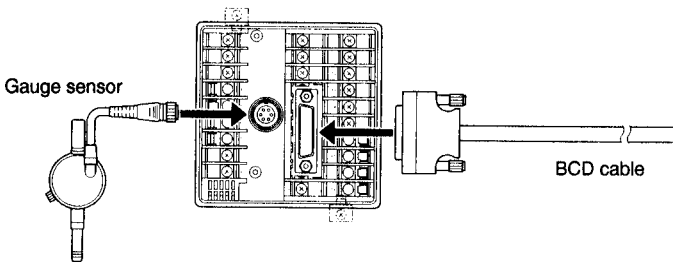
■ Connecting the signal cable

Connect the gauge sensor signal cable to the SIG IN Connector on the rear panel.

■ Connecting the BCD Output

Connect the BCD cable to the BCD OUT Connector on the rear panel.
Applicable plug: DX40-36P (Hirose Electric Co.)
Plug cover: DX36-CV1 (Hirose Electric Co.)
Recommended Cable

Conductor size:	AWG#30
Conductor configuration:	7/0.1
Insulator major dia.:	0.5
Cable UL style:	UL20267 and UL2789



Section 4
Measurement

① Turn on the power. Then, the DG-4240 operates immediately.
② Verify that the value shown on the Display of the front panel is changed by moving the gauge sensor spindle.
③ Move the gauge sensor spindle to a position for the zero point and fix the spindle.
④ Reset the measured value to zero at the zero point using any of the following manners:
- Press the RESET Switch on the front panel.
- Short-circuit between the RESET Input Terminal (No. 21) and the COM Terminal (No. 22) on the rear panel.
- Input a low level voltage signal to the RESET Input (Pin 32) of the BCD OUT Connector on the rear panel.

⑤ Pass-fail decision is implemented at the same time as the measured value is shown on the Display of the front panel.

■ Holding the measured value

It is possible to hold the measured value shown on the Display of the front panel and the BCD output. The following two methods are available:
- Short-circuit between the HOLD Input Terminal (No. 20) and the COM Terminal (No. 22) on the rear panel.
- Input a low level voltage signal to the HOLD Input (Pin 31) of the BCD OUT Connector on the rear panel.

■ Stopping the pass-fail decision result output

When the COMPARATOR GATE signal is input in the following method, the pass-fail decision is forcedly stopped to set all decision result outputs to OFF.

- Short-circuit between the COMPARATOR GATE Input Terminal (No. 8) and the COM Terminal (No. 9).
- Input a low level voltage signal to the COMPARATOR GATE Input (Pin 34) of the BCD OUT Connector on the rear panel.

■ Error message

When miscounting occurs in the counting circuit of the DG-4240, the Display on the front panel blinks and the Error Output (Pin 30) of the BCD OUT Connector turns ON. This error is released by any of the following manners:

- Press the RESET switch on the front panel.
- Short-circuit between the RESET Input Terminal (No. 21) and the COM Terminal (No. 22) on the rear panel.
- Input a low level voltage signal to the RESET Input (Pin 32) of the BCD OUT Connector on the rear panel.

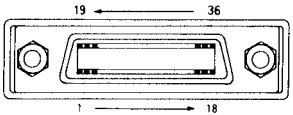
Section 5
BCD OUT

5.1 Pin Arrangement

The BCD OUT Connector has the following pin arrangement:

Pin No.	Signal Contents		Pin No.	Signal Contents
1	$1x10^0$	BCD output	19	$4x10^4$
2	$2x10^0$		20	$8x10^4$
3	$4x10^0$		21	LOWER output
4	$8x10^0$		22	OK output
5	$1x10^1$	BCD output	23	UPPER output
6	$2x10^1$		24	N.C
7	$4x10^1$		25	Polarity output +
8	$8x10^1$		26	Polarity output -
9	$1x10^2$	BCD output	27	D.P3 decimal point output
10	$2x10^2$		28	D.P4 decimal point output
11	$4x10^2$		29	N.C
12	$8x10^2$		30	Error output
13	$1x10^3$	BCD output	31	HOLD input
14	$2x10^3$		32	RESET input
15	$4x10^3$		33	BUSY input
16	$8x10^3$		34	COMPARATOR GATE input
17	$1x10^4$	BCD output	35	Print command output
18	$2x10^4$		36	Common

Receptacle : DX10A-36S (Hirose Electric Co.)
Applicable plug : DX40-36P (Hirose Electric Co.)
Plug cover : DX36-CV1 (Hirose Electric Co.)



5.2 Signals

① BCD Output
- Pin 1 to Pin 20
- Positive/negative logic change 5-digit parallel output
- Open collector output

② Pass-fail Decision Result Output
- Pin 21 (LOWER output): ON when LOWER set value ≥ Measured value
- Pin 22 (OK output): ON when LOWER set value < Measured value < UPPER set value
- Pin 23 (UPPER output): ON when UPPER set value ≤ Measured value
- Open collector output

③ Polarity Output
- Pin 25 (+ output)
- Pin 26 (- output)
- Open collector output
- Polarity output turns ON/OFF as shown in the table on the following page when Bit Switch 3 (BCD OUT) in the main unit is set to ON to select the negative logic.
  When Bit Switch 3 is set to OFF to select the positive logic, polarity output ON/OFF is all reversed.

Pin / Measured Value	25 (+ Output)	26 (- Output)
Positive (+) value	ON	OFF
Negative (-) value	OFF	ON
Reset	ON	OFF

④ Decimal Point Output

- Pin 27 (D.P3[0.00], when Bit Switch 1 (SENSOR) in the main unit is set to OFF to select the resolution of 10 μm)
- Pin 28 (D.P4[0.000], when Bit Switch 1 (SENSOR) in the main unit is set to ON to select the resolution of 1 μm)
- Decimal point output turns ON/OFF as shown in the following table when Bit Switch 3 (BCD OUT) in the main unit is set to ON to select the negative logic.
  When Bit Switch 3 is set to OFF to select the positive logic, polarity output ON/OFF is all reversed.

Pin / Resolution	27(D.P3)	28(D.P4)
1 μm (Bit Switch 1 ON)	OFF	ON
10 μm (Bit Switch 1 OFF)	ON	OFF

⑤ Error Output
- Pin 30
- Open collector output
- When miscounting occurs in the counting circuit of the DG-4240, the ON signal is output; which is continued until reset.

⑥ HOLD Input
- Pin 31
- When a low level voltage signal is input, the displayed value and BCD output are held and the print command signal is output.
- While the low level signal is input, the HOLD state is continued. However, counting is still operated in the counting circuit according to the input signal from the gauge sensor while the HOLD state is retained. Therefore, when the HOLD state is released, the displayed value and BCD output are changed to a value measured at that time.

⑦ RESET Input
- Pin 32
- When a low level voltage signal is input, the displayed value, BCD output, error indication, and error output are reset. While the low level signal is input, the RESET state is continued.

⑧ BUSY Input
- Pin 33
- Same as ⑥ HOLD Input

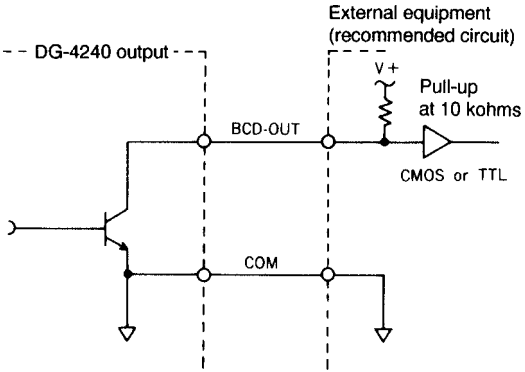
⑨ COMPARATOR GATE Input
- Pin 34
- When a low level voltage signal is input, the pass-fail decision is forcedly stopped to set all decision result outputs to OFF.

⑩ Print Command Output
- Pin 35
- Open collector output
- When the HOLD or BUSY signal is input to hold the displayed value and BCD output, the negative pulse print command signal is output.

5.3 Recommended Interface

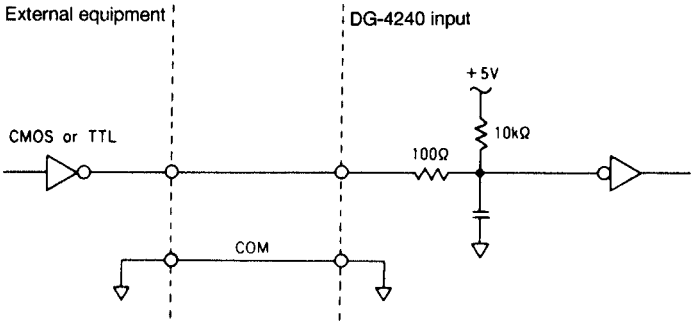
Verify that the external equipment connected to the BCD OUT Connector on the rear panel has the interface circuits described below. For the recommended interface for external command signal input from the terminal block, see page *6-1*.

■ Output signal interface circuit (BCD OUT Connector)



Output Type	Open collector output
Output IC	74LS07
Voltage resistance	24 V max
Max. synch current	32 mA max
Residual voltage	0.5 V max

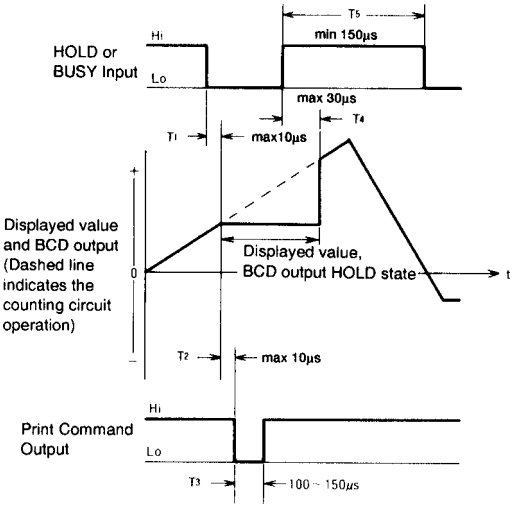
■ Input signal interface circuit (BCD OUT Connector)



Low level input voltage	0 ~ 1.4V
High level input voltage	3 ~ 5.25 V
Input impedance	1 kohm or more

5.4 Timing Chart

■ HOLD Input, BUSY Input, Print Command Output (BCD OUT Connector)



T_1: Time from HOLD signal input to HOLD state of the displayed value and BCD output; max. 10 µs.

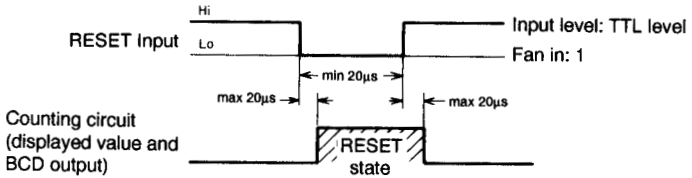
T_2: Time from HOLD state of the displayed value and BCD output to print command signal output; max. 10 µs.

T_3: Print command signal pulse width; 100 to 150 µs.

T_4: Time from HOLD signal release to HOLD state release; max. 30 µs.

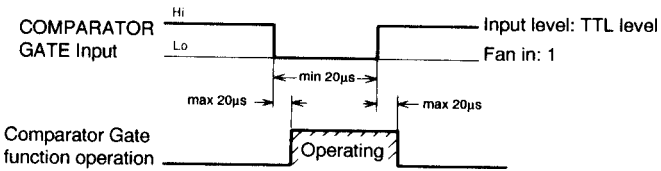
T_5: Time from HOLD signal release to HOLD signal reinput; min. 150 µs. If the HOLD signal is input at an interval shorter than 150 µs, the print command signal may not be output.

■ RESET Input (BCD OUT Connector)



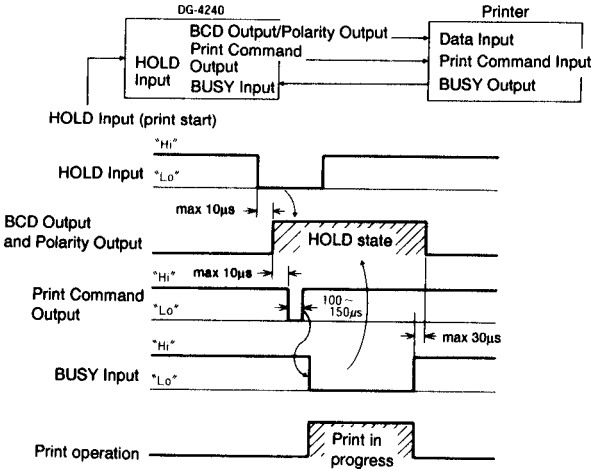
The RESET signal must have a pulse width of minimum 20 µs. It takes up to 20 µs from RESET signal input to RESET state and from RESET signal release to RESET state release, respectively.

■ COMPARATOR GATE Input (BCD OUT Connector)



The COMPARATOR GATE signal must have a pulse width of minimum 20 µs. It takes up to 20 µs from COMPARATOR GATE signal input to its functional operation start and from COMPARATOR GATE signal release to function release, respectively.

■ Print Command Output (BCD OUT Connector)



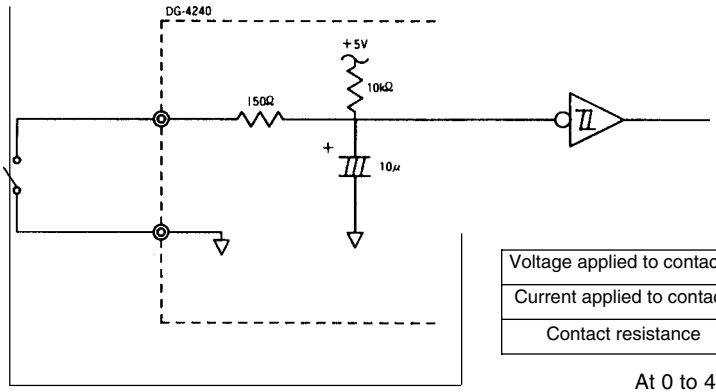
This timing chart shows that the printer is started at the rising of the print command signal. Retain the HOLD Input at the low level until the BUSY Input becomes the low level.

Section 6
External Command Signal Input from Terminal Block

6.1 Recommended Interface

■ **Input signal interface circuit (terminal block)**

The input diagram (terminal block input) of COMPARATOR GATE, HOLD, and RESET is as follows. See this diagram for inputting an external command signal.

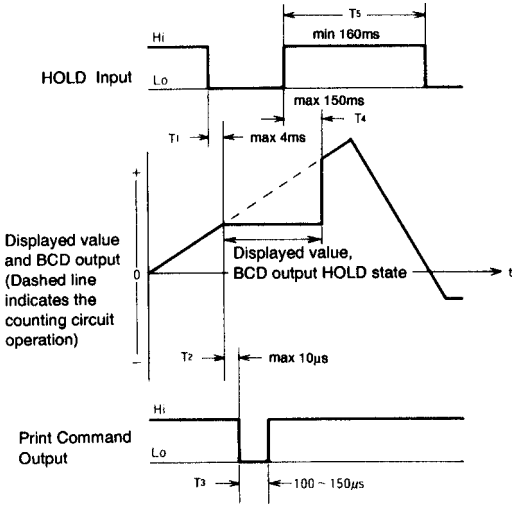


Voltage applied to contact	DC5 V ± 0.25 V
Current applied to contact	50mA max
Contact resistance	100 ohms or less

At 0 to 40 deg.C

6.2 Timing Chart

■ HOLD Input, Print Command Output (Terminal Block)



T_1: Time from HOLD signal input to HOLD state of the displayed value and BCD Output; max. 4 ms.

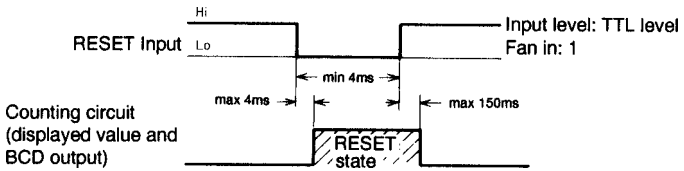
T_2: Time from HOLD state of the displayed value and BCD Output to print command signal output; max. 10 μs.

T_3: Print command signal pulse width; 100 to 150 μs.

T_4: Time from HOLD signal release to HOLD state release; max. 150 μs.

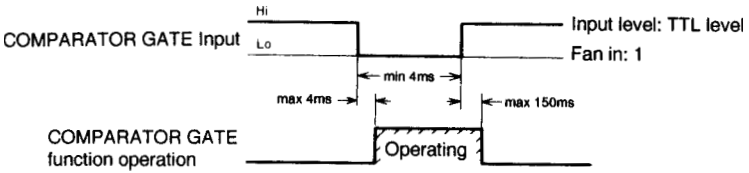
T_5: Time from HOLD signal release to HOLD signal reinput; min. 160 ms. If the HOLD signal is input at an interval shorter than 150 μs, the print command signal may not be output.

■ RESET Input (Terminal Block)



The RESET signal must have a pulse width of minimum 4 ms. It takes up to 4 ms from RESET signal input to RESET state. It takes up to 150 ms from RESET signal release to RESET state release.

■ COMPARATOR GATE Input (Terminal Block)



The COMPARATOR GATE signal must have a pulse width of minimum 4 ms. It takes up to 4 ms from COMPARATOR GATE signal input to its functional operation start. It takes up to 150 ms from COMPARATOR GATE signal release to functional release.

Section 7
Specification

■ Counting Signal Input Section

Amplification method : 2-channel waveform shaping
Signal waveform : Rectangular, 90-deg. phase difference
Input impedance : 47 kohms or more
Input level:
Low level : 0 to 1.4 V
High level : 3 to 5.25 V
Frequency range : Up to 75 kHz DC
Input connector : R03-R6F (Tajimi Wire Co.)
Connected as follows:

Pin No.	A	B	C	D	E	F
Signal	SIG1	SIG2	+5V	---	COM	---

■ Count Display Section

Counting method : Reversible counting
Counting digits : Decimal 5 digits
Display digits : 1 digit for polarity, 5 digits for numeric
Display range : 0.000 to ± 99.999, 0.00 to ± 999.99
Min. measurement unit : 1 μm/10 μm
Zero suppress : Numeric of not less than 1 mm
Display device : 7-segment red LED
Character height : 10.16 mm

■ **Status Indication Section**

GATE (Lit at COMPARATOR GATE signal input) : Red LED, ϕ3 mm
LOWER (Lit at LOWER set value ≥Measured value) : Red LED, ϕ3 mm
OK (Lit at LOWER set value < Measured value < UPPER set value) : Green LED, ϕ3 mm
UPPER (Lit at UPPER set value ≤ Measured value) : Red LED, ϕ3 mm

■ **BCD I/O Section**

Input connector : DX10-36S (Hirose Electric Co.)
①BCD Output : Positive/negative logic 5-digit parallel, open collector output
②Pass-fail Decision Result Output : Open collector output
LOWER ; Lit at LOWER set value ≥Measured value
OK ; Lit at LOWER set value < Measured value < UPPER set value
UPPER ; Lit at UPPER set value ≤ Measured value
③Polarity Output : Positive/negative logic, open collector output
④Decimal Point Output : Positive/negative logic, open collector output
⑤Error Output : When miscounting occurs in the counting circuit of the DG-4240, the ON signal is output to the open collector.
⑥Print Command Output : When the displayed value and BCD output enter to the HOLD state after the HOLD or BUSY signal is input, the negative pulse print command signal is output to the open collector.

Common to ① through ⑥

Output Type	Open collector output	Max. synch current	32mA max
Output IC	74LS07	Residual voltage	0.5V max
Voltage resistance	24V max	_	_

⑦ HOLD Input : When a low level voltage signal is input, the displayed value and BCD output are held. While this signal is at the low level, the HOLD state is continued.

⑧ RESET Input : When a low level voltage signal is input, the displayed value, BCD output, error indication, and error output are reset. While this signal is at the low level, the RESET state is continued.

⑨ BUSY Input : When a low level voltage signal is input, the displayed value and BCD output are held. While this signal is at the low level, the HOLD state is continued.

⑩ COMPARATOR GATE Input : When a low level voltage signal is input, the pass-fail decision is forcedly stopped to set all decision result outputs to OFF.

Common to ⑦ through ⑩

Low level input voltage	0 ~ 1.4V
High level input voltage	3 ~ 5.25 V
Input impedance	1 kohm or more

■ Setting Section

● Comparison Section

Setting digits : 1 digit for polarity, 5 digits for numeric (for the decimal point position, same as in Count Display Section on page *7-1*)
Setting stages : 2 stages
Setting method : Digital push-button switch
Output conditions :
LOWER ; Lit at LOWER set value ≥ Measured value
OK ; Lit at LOWER set value < Measured value < UPPER set value
UPPER ; Lit at UPPER set value ≤ Measured value
* However, the pass-fail decision and its result output are forcedly set to OFF when the COMPARATOR GATE signal is input.
Output type:
Contact output : LOWER, OK, UPPER; Single make contact output each
Open collector output : LOWER, OK, UPPER; 1 each

● RESET Switch

Setting method : Simplified membrane method
Data zero-reset. Recovery from error state.

● Bit Switch (Inside Main Unit)
No. 1 (SENSOR) : Resolution change between 10 μm and 1 μm for the gauge sensor to be connected
No. 2 (DIRECTION) : Positive/negative count change for gauge sensor spindle push-in
No. 3 (BCD OUT) : Positive/negative logic change for BCD output

■ **External Control Signal I/O Section (Terminal Block)**

① Comparator Output
LOWER : Single make contact output
OK : Single make contact output
UPPER : Single make contact output
* For output conditions, see Setting Section on page *7-4*.

Max. contact capacity	Resistance load	AC250 V, 2A
	Inductive load	AC250 V, 1A (Cosø=0.4)
Contact output delayed time		20ms max

At 0 to 40˚C

② RESET Input : Used for external contact input. Provided with the same function as ⑧ RESET Input in the BCD Input Section (page *7-2*) by short-circuit with the COM.
③ HOLD Input : Used for external contact input. Provided with the same function as ⑦ HOLD Input in the BCD Input Section (page *7-2*) by short-circuit with the COM.
④ COMPARATOR GATE Input : Used for external contact input.
Provided with the same function as ⑩ COMPARATOR GATE Input in the BCD I/O Section (page *7-2*) by short-circuit with the COM.

Common to ② through ④

Voltage applied to contact	DC5 V ± 0.25 V
Current applied to contact	50mA max
Contact resistance	100 ohms or less

At 0 to 40˚C

■ Power Source Section

Power voltage : 90 to 264 VAC, 50/60 Hz
Power consumption : Approx. 8 VA (100 VAC)
Voltage resistance : 1500 VAC/min.
Insulation resistance : 5 Mohms or more on 500 VDC megger

■ Other Specification

Serviceable temperature range : 0 to 40˚C
Storage temperature range : -10 to 70˚C
External dimensions : 96 (W) x 119.5 (L) x 96 (H) mm
Weight : Approx. 530 g

■ Accessories

Rack mounting fixture : 1 set
Instruction manual : 1 copy

■ Options

BCD cable:
- AA-8005 ; RQ-381 (for printer) 3 m
- AA-8006 ; DA-108 (for D/A converter) 3 m
- AA-8007 ; One-side open 5 m

Power cable : AX-204 (100 VAC 2P) 2.4 m
Terminal block cover : DG-0420

ONO SOKKI

*Outer appearance and specifications are subject to change without prior notice.

ONO SOKKI

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B00000702/IM95040302(4),044(UT)010