ONO SOKKI

Digital Gauge Counter

DG-4300 Series

http://www.onosokki.co.jp/English/english.htm

Instruction Manual

This instruction manual describes the basic handling methods of DG-4300 series digital gauge counters, and lists part names and specifications.

Be sure to follow the instructions and information in this manual when handling a DG-4300 series digital gauge counter.

See the separate instruction manual 'Parameter Reference' for DG-4300 series digital gauge counter menu configurations and detailed parameter information.

Model	Description
DG-4320	With BCD output
DG-4340	With BCD output/comparator output
DG-0430	Optional 12 V detector power supply supporting connection with encoders

■ Warranty

1. This product is covered by a warranty for a period of one year from the date of delivery.
2. This warranty covers free-of-charge repair during the warranty period for defects occurred while the product is used under correct operating conditions according to descriptions in this manual and notices on the unit label.
3. For free-of-charge repair during the warranty period, contact your dealer or your nearest Ono Sokki sales office nearby.
4. Even during the warranty period, the following failures will be handled on a fee basis.
   (a) Failures or damages occurring through misuse, misoperation, repairing without Ono Sokki's approval.
   (b) Failures or damages occurring through mishandling (dropping) during transportation after purchase.
   (c) Failures or damages occurring by an Act of God (fires, earthquakes, flooding, and lightening), environmental disruption, or abnormal voltage.
   (d) Replenishment of expendable supplies, spare parts, and accessories.

■ Omission of Issuance of Certificate

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

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Handling precautions (must read before use for safety)

To use your DG-4300 series digital gauge counter correctly and safely, be sure to check the warnings and cautions in this manual before use.

Ono Sokki assumes no liability or compensation for injury or damage resulting from operation in contravention of a warning or caution in this manual.

■ Safety displays

Each precaution in this manual is labeled WARNING or CAUTION, according to the degree of danger or damage that could result if the information is disregarded and the product used incorrectly.

⚠ WARNING	• Indicates a precaution needed for avoiding a hazard that could cause death or serious injury to the user if the instructions are not followed or the product is handled incorrectly.
⚠ CAUTION	• Indicates a precaution needed for avoiding a hazard that could cause only minor injury to the user or physical damage if the instructions are not followed or the product is handled incorrectly.

■ ⚠ WARNING Mounting warnings

- Do not operate the device in a location of ambient gas or water vapor. Operating the device in an atmosphere of flammable or explosive gas or where ambient water vapor is present may result in explosion.
- Operation in locations with temperatures exceeding the operating temperature range may cause the device to catch fire.
- Do not block the device's heat radiation. Internal heat buildup in the device could lead to fire. Install the device at a sufficient distance from walls, in a location with as much ventilation as possible.
- Do not splash water on the device or allow it to become wet. Short-circuits or overheating may result, causing fire or electric shock.
  If water gets inside the device, shut off the power immediately and contact your place of purchase or nearest Ono Sokki sales office.

■ ⚠ CAUTION Mounting cautions

- DG-4300 series digital gauge counters have no power switch. Installing a circuit breaker in the power supply is therefore recommended.
- The device must be mounted into a metal panel before use.
- Before using the device, check that none of the screw fasteners of the terminal blocks on its rear panel is loose.
- Check that cable jackets are not torn or scratched (particularly for long cables).
- When planning the device's panel installation, take care that the ambient temperature of the device (not the ambient temperature of the panel) will not exceed the rated temperature range (40°C maximum).
- Do not install the device in locations subject to oil smoke or steam, or in atmospheres containing high levels of humidity or dust. Atmospheric moisture or dust could conduct electricity, causing fire or electric shock.
- Do not install the device in locations subject to extremely high temperatures or direct sunlight. Fire may result.
- Never attempt to dismantle or disassemble the device. Use of a partially dismantled or disassembled device may cause product failure, electric shocks or other accidents.
  For internal adjustment, inspection or repair, contact your place of purchase or nearest Ono Sokki sales office.
- The ⏚ symbol indicates the protective ground connection. This terminal must always be connected to a protective ground before the power is turned ON. Failure to provide a protective ground connection can result in electric shock.
  Never turn ON the device when it has no protective ground connection or you are not certain it has a secure protective grounding.
  Connection wiring must have a conductor cross-section of at least 2 mm² and be green/yellow-jacketed. Always use thicker wires than the copper wire used for power supply, grounded with at least Class 1 protective earth.
- Never cut the device's protective ground wire or remove protective ground terminal connections. Electric shock or device damage may result.
- Before connecting the device to an external device, check that the device definitely has a protective ground, and that the device power is OFF.
  Connecting the device without a protective ground or with the device power ON can cause electric shock. Always ensure circuits are electrically isolated to ensure they will withstand sufficient output voltage and current.
- Always use a power supply of the specified voltage (100 to 240 VAC) and frequency (50/60 Hz). Using a non-specified power supply can cause electric shock, fire or device damage.
- Touching the power supply terminal block may result in electric shock. Always mount the terminal block cover provided. Never touch the terminals while the device is ON.

■ ⚠ CAUTION Power input terminal disconnection caution

- After turning the power supply OFF, use a tester or voltage detector on the device's power terminal to check that the power is definitely OFF.
  After completing the check, disconnect the power input terminal wiring.

■ ⚠ WARNING Device startup and maintenance warnings

- If you hear thunder, do not touch metal parts or terminal blocks on the device. Electric shocks from lightning surges could result.
  Do not use the device outdoors if you hear thunder.
- Shut off the power supply if the device starts to emit smoke, abnormal sounds or odors, or if it falls or becomes damaged.
  Continued use in these cases could result in fire or electric shock.

■ ⚠ CAUTION Wiring cautions

- Tighten the screws of the power input terminal and function terminal block with the specified torque values shown below. Insufficiently tightened screws could result in electric shock, short-circuits, fire or device malfunction.

Terminal block tightening torque	0.6 N•m
Protective ground terminal tightening torque	1.4 N•m
Power cable thickness	AWG 18 min. (UL-certified cable)

- The comparator output terminal on model DG-4320 is designed for comparator output (an unused function).
  Accordingly, never use it as a relay terminal for the power or another signal line, as a mechanical suspension for the device, or for any other reason. Use of this terminal on model DG-4320 may cause the device to smoke, catch fire or fail, and may damage the connected device.
- Never connect a gauge sensor to a device that has the optional DG-0430 12 V detector power supply.
  The difference in power supply voltages could cause the gauge sensor to overheat or fail, or the device to fail.

■ ⚠ CAUTION Cautions for improving noise resistance

- Ensure that device wiring is isolated from power supply lines connected to large-current loads.
- Do not connect wiring with power lines in parallel or on the same line.
- Power supply wiring and signal cables should be connected as far apart as possible.
- Do not make signal cable extension wires any longer than needed.
- Use shielded cables for signal cables.
- Install the device as far away as possible from devices that generate strong radio waves or surges, and use a surge killer or line filter.
- Connect device wiring away from devices that generate strong electric or magnetic fields.

Component names and functions (all DG-4300 series models)

Functions marked with an asterisk (*) are not available on model DG-4320.

GATE (Comparator gate display)*
Displayed when the comparator functions have been stopped by external input.

▶START (Calculation start display)
Displayed when the MAX, MIN or RANGE calculation has started.

+123456 mm (Measurement value display)
Displays the instantaneous values, or MAX, MIN or RANGE calculated values.

MEASURE DISPLAY OUTPUT OTHER (Setting display area)
Displays data when setting or checking parameter values.

MENU (Mode selection)
Used to select the measurement mode or setting mode.

SET/NEXT (Checking condition settings; moving to next item)
Used to check condition settings, or to move to the next item of condition settings.

START (Calculation start; moving down)
START: Used to start the MAX, MIN or RANGE calculation (past data is erased automatically).
∨: Moves down the cursor to set conditions.

■STOP (Calculation stop display)
Displayed when the MAX, MIN or RANGE calculation has stopped.

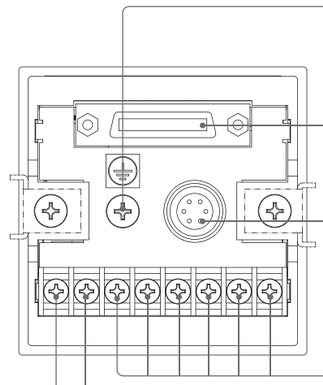
COMP 1 COMP 2 COMP 3 (COMP1, COMP2, COMP3 display)*
Displayed when comparator 1, 2 or 3 output is ON.

MAX MIN RANGE (MAX, MIN, RANGE display)
Displays the calculation mode (MAX, MIN or RANGE).

(Switching to setting condition display mode; moving up)
COND: Used to switch to the setting condition display mode.
∧: Moves up the cursor to set conditions.

(Calculation stop; moving left)
STOP: Used to stop calculation.
<: Moves left the cursor to set conditions.

(Reset; key protection; moving right)
RESET: Used to reset instantaneous values and calculated values.
Values are not reset when calculation has started. You must first stop calculation to reset values. Pressing and holding this key for at least 2 seconds turns on key protection. When key protection is set, the message KEY PROTECT appears when any key is pressed. To release key protection, press and hold this key again for at least 2 seconds.
>: Moves right the cursor to set conditions.



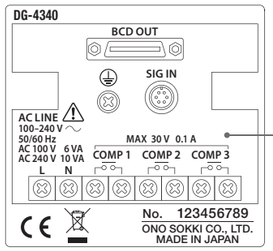
● Protective ground terminal
Always ground the device to prevent electric shocks and eliminate noise.

● BCD OUT connector
The connector for BCD output, control output or external command signal input.

● SIG IN connector
Inputs signals from the gauge sensor or rotary encoder.

● Comparator 1/2/3 output terminals*
When each comparator is ON, its signal is output from one make contact.

● Power input terminal
Inputs the 100 to 240 VAC (50/60 Hz) power supply.



● Cable connections sticker (DG-4340)
A sticker on the top surface of the device that indicates which cable to connect to each terminal and connector.

DG-4300 series specifications

● Input section

The input section specifications given here apply when the device is connected to an Ono Sokki sensor. Note that these values are not guaranteed when the device is connected to a sensor not made by Ono Sokki.

Input signal format	Rectangular-wave voltage signal of single phase or two phases with 90 degree phase difference • For single-phase signal input, SIG1 is the signal and SIG2 is a control signal.
Signal voltage range (rectangular wave)	Hi: 3 to 13.2 V, Lo: 0 to 1 V
Input impedance	47 kΩ min.
Multiplication function	Multiplication by factor of 1, 2 or 4 can be selected (factor of 1 or 2 only for single-phase input signal). • Multiplication factor can be set independently from detector.
Maximum response frequency	DC to 300 kHz (when using Ono Sokki sensor)
	Duty: 50% ± 10%, Phase difference: 90° ± 20°
Direction identification function	Identifies the direction using the phase difference of a two-phase signal. • For a single-phase signal, the signal is input on SIG1, and SIG2 is used to count up (when set to the 'Hi' level), or count down (when set to the 'Lo' level).
Input connector	R03R6F (made by Tajimi Electronics) • Terminal C outputs +12 V when the option is installed.

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

● Function calculation method

Calculation data	Instantaneous value, MAX value, MIN value, RANGE value (MAX - MIN)

● Setting section

Panel condition memory	• Stores condition settings • Stores measurement conditions and other four conditions in memory • Default restore function (see below) Power + RESET key: Resume reset Power + COND key + RESET key: Resume condition reset
Sensor type	Two-phase, single-phase
Count direction	+ / – • When single phase is selected, the '+' setting counts up for SIG2 'Hi', and the '–' setting counts down for SIG2 'Hi'.
Resolution settings	0.5 µm, 1 µm, 10 µm
Factor	0.001 to 1000 • Setting range: 10 to 1000 (in increments of 1), 0.001 to 9.999 (in increments of 0.001) • Display format: A.BCD×10^n (where any digit between 0 and 9 can be set for A, B, C and D, and any digit between -3 and +3 can be set for n)
Offset	When resolution of 0.5 µm is selected: -19.9995 to 19.9995
	When resolution of 1 µm is selected: -199.999 to 199.999
	When resolution of 10 µm is selected: -1999.99 to 1999.99
	When ENCODER is selected: -199999 to 199999
Display selection	Instantaneous value, MAX value, MIN value, RANGE value (MAX - MIN)

● Counter display section

Display	Backlight LCD
Count method	Reversible count
Number of display digits	Polarity + digits ($5^{1/2}$ digits)
Display units	'mm' or 'None' (ENCODER)
Display ranges	0.0000 to ±19.9995 (0.5 µm) 0.000 to ±199.999 (1 µm) 0.00 to ±1999.99 (10 µm) 0 to ±199999 (ENCODER DUAL, ENCODER SINGLE)
Number of decimal places settings	OFF (default), 1, 2, 3, 4, 5 or no decimal places
Error displays	Excessive input frequency, Excessive display digits, Setting error
LCD contrast settings	Any of 10 increments

● Detector power supply

Output voltage	5 VDC ± 10%
Maximum output current	200 mA

● General specifications

Power supply rating	100 to 240 VAC, 50/60 Hz 6 VA (100 VAC), 10 VA (240 VAC)
Withstand voltage	1,500 VAC/1 minute
Insulation resistance	10 MΩ min. with 500 VDC megohmmeter
Operating temperature range	0 to 40°C, 30 to 85% RH (with no condensation)
Storage temperature range	-10 to 55°C
Maximum operating altitude	2,000 m
Installation category	Installation category I
Outer dimensions	72 × 72 × 114 mm (W × H × D)
Weight	300 g approx.
CE marking	EMC directive EN61326-1:2006 Emissions: Class A Immunity: Industrial environment Low voltage directive EN61010-1:2010 Pollution Level 2/Over-voltage Category II
Applicable standards	FCC Part 15 Class A WARNING This equipment has been tested and found to comply with the limits of a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provided reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and radiates radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.
Accessories sold separately	AX-2050A (3-meter cable, compliant to UL/CSA standard)
	AA-8101 BCD output cable (with 3-meter cable; one side open type)

● Option (DG-0430)

Power supply alteration for detector	Changes the 5 VDC detector power supply to a 12 VDC (150 mA) power supply

● Accessories

Instruction manuals	Instruction Manual (this manual): 1
	Parameter Reference: 1
Terminal block cover	Terminal block cover: 1
Panel mounting fixtures	1 set (including fastening screws)

● BCD output signal

Output connector	DX10-36S (made by Hirose Electric)
Output data	Instantaneous measured values, main display values (calculated values)
Output format	+/- (polarity output) + $5^{1/2}$-digit parallel output
Output type	Open collector
Sink current	30 mA max.
Output withstand voltage	24 V max.
Data update cycle	10 ms. approx.
Output logic	Positive logic (default), negative logic
Print command output	When a hold signal or busy signal is input and display values and BCD output are switched to the hold status, a negative-pulse print command signal is output by open collector.
Error output	Output when miscount is generated (output ON/'Lo' level) • Output is stored until reset, then canceled after reset. Not output during display value overflow.
Control input	Start, Stop, Reset, Hold, Busy • Each function operates when a voltage signal of the 'Lo' level is input.

Input for display selection	Input for selecting display and output data	Pin 24	Pin 23
	Instantaneous values	Hi	Hi
	MIN values	Hi	Lo
	MAX values	Lo	Hi
	RANGE values (MAX - MIN)	Lo	Lo
Decimal point output	Two-bit output of decimal places for BCD output	Pin 28	Pin 27
	ENCODER mode (no output)	Hi	Hi
	2 decimal places (10 µm resolution)	Hi	Lo
	3 decimal places (1 µm resolution)	Lo	Hi
	4 decimal places (0.5 µm resolution)	Lo	Lo

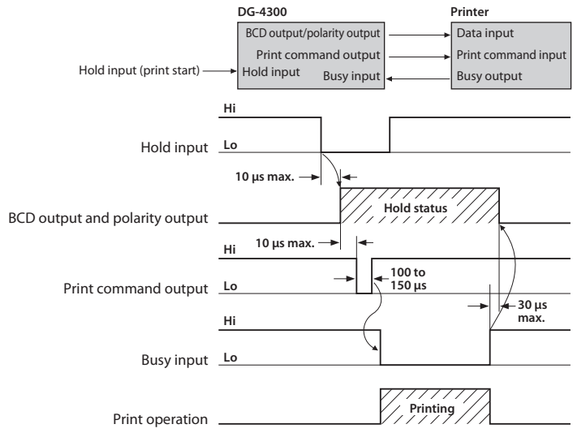
Comparator gate input	Inputting a voltage signal of the 'Lo' level stops comparator evaluation and turns all comparator output OFF.
Input signal level	'Lo' level voltage: 0 to 1.4 V
	'Hi' level voltage: 3 to 5.25 V
	Input impedance: 1 kΩ min.

- Reset signal:
  The pulse width of the reset signal must be at least 20 µs.
  When the reset signal is input, it takes no more than 20 µs for the device to enter reset mode. When the reset signal is canceled, it takes no more than 20 µs for reset mode to be canceled.
- Comparator gate input:
  The pulse width of the comparator signal must be at least 25 ms.
  When the comparator gate signal is input, it takes 25 ms for the function to operate. When the comparator gate signal is canceled, it takes 25 ms for the function to be canceled.

Pin	Signal		Pin	Signal	
1	BCD output	1×10^0	19	BCD output	4×10^4
2		2×10^0	20		8×10^4
3		4×10^0	21	Start input	
4		8×10^0	22	Stop input	
5		1×10^1	23	Display selection input 1	
6		2×10^1	24	Display selection input 2	
7		4×10^1	25	Polarity output: +	
8		8×10^1	26	Polarity output: –	
9		1×10^2	27	Decimal point 1	
10		2×10^2	28	Decimal point 2	
11		4×10^2	29	BCD output	1×10^5
12		8×10^2	30	Error output	
13		1×10^3	31	Hold input	
14		2×10^3	32	Reset input	
15		4×10^3	33	Busy input	
16		8×10^3	34	Comparator gate input	
17		1×10^4	35	Print command output	
18		2×10^4	36	Common	

● Print command output timing chart (BCD OUT connector)

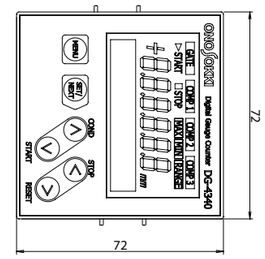
Below is the timing chart when the printer is started with falling hold input. Maintain the hold input at the 'Lo' level until the busy input reaches the 'Lo' level.

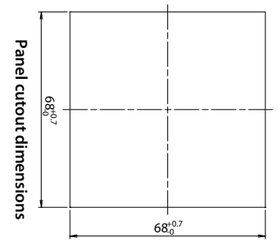


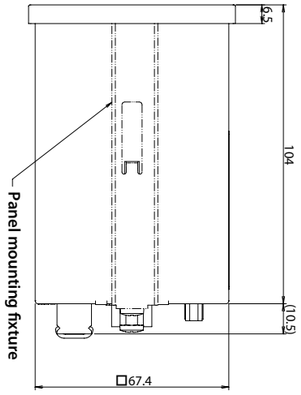
● DG-4340 comparator functions

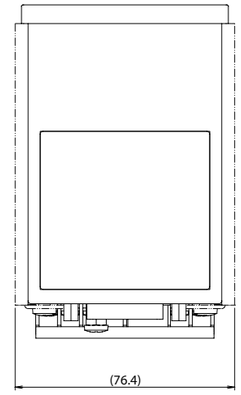
Set number of digits	Polarity + digits ($5^{1/2}$ digits)	
Evaluated data	Instantaneous values, main display values (calculated values)	
Output format	Semiconductor relays (one make contact each) • Three outputs (COMP1, COMP2, COMP3)	
Output conditions	Upper	ON when UPPER setting ≤ count value
	Lower	ON when LOWER setting ≥ count value
	OK/NG	ON when LOWER setting < count value < UPPER setting
	OFF	Disables the comparator setting
Maximum contact capacity	30 VDC, 100 mA max.	
Output format	Terminal blocks: 6 terminals (M3)	
Output update cycle	10 ms approx.	
Backlight display	Green: OK, Red: Error	

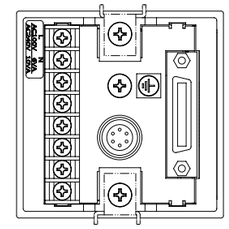
Outer dimensions





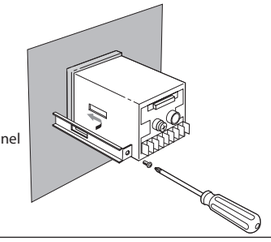






How to use the panel mounting fixtures

The mounting fixtures can be used with panels of between 1 and 3.2 mm thick.
(1) Insert the device from the front of the panel.
(2) Align the device so that its side indentations are held by the fixture guides (projections), then fasten each fixture with the screw provided.



Error message list

When an error is generated, an error message is displayed in the front panel setting section. The displayed error messages and their meanings are given below.

Error message	Error type	Meaning
SETTING ERROR	Setting value error	A value exceeding the specified range has been set for a parameter. Check the measurement conditions again, then change the setting value.
WRITE ERROR	Memory write error	Unable to write condition settings in the internal non-volatile memory. The device needs to be repaired. Contact your place of purchase or an Ono Sokki sales office right away.
READ ERROR	Memory read error	Unable to read condition settings from the internal non-volatile memory. The device needs to be repaired. Contact your place of purchase or an Ono Sokki sales office right away.
DISPLAY OVERFLOW	Display overflow	A measured value exceeds the display range. Set the measurement conditions again so that the value will fit within range.
COUNT OVERFLOW	Count overflow	The value of a counter that was counting a signal from the detector exceeded the counting range. Reset the device, then redo measurement. If the multiplication factor was set to a value other than 1, try a solution such as lowering its value and adjusting the display values with FACTOR.
FREQUENCY OVER	Frequency range exceeded	This is output when the movement speed of the sensor's spindle exceeded the maximum response speed. Can be output when the maximum response speed was exceeded due to the shock of the spindle tip contacting the measured object, or when the sensor output signal's phase drifts from 90 degrees.
KEY PROTECT	Key protection	The front panel keys are protected. Press and hold the RESET key on the front panel for at least 2 seconds to release key protection.