INSTRUCTION MANUAL

DG-3610

DIGITAL DISPLAY

INTRODUCTION

All Ono Sokki products are shipped after passing a strict quality control program. Please read and follow all instructions thoroughly before using this unit to ensure proper operation.

The DG-3610 includes the following parts:

Main Box
Power Cord

Before using please check that all parts listed are included.

FEATURES

- Serial output
- English/Metric selectable
- Direct RS-232C Output Option
- Large easy-to-read green LED
- 1 Revolution TIR (Max. - Min. = Range)
- Normal, Absolute Zero & Preset Functions

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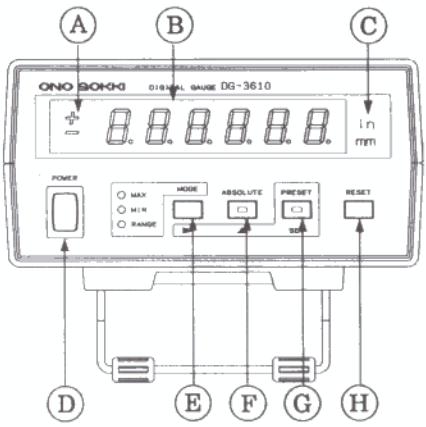
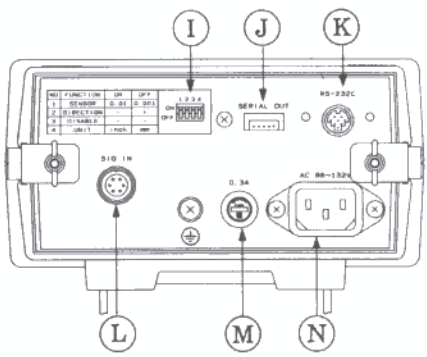
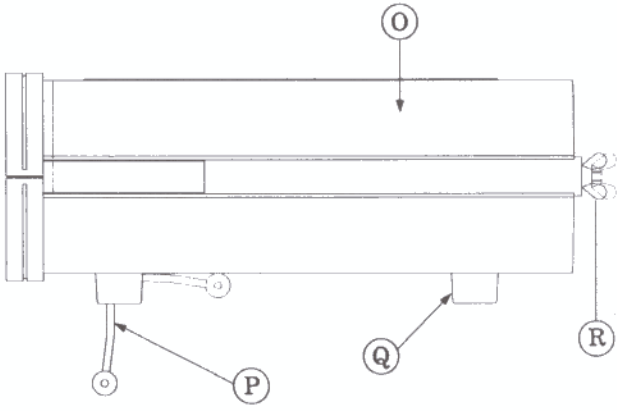
1. NAMES OF PARTS







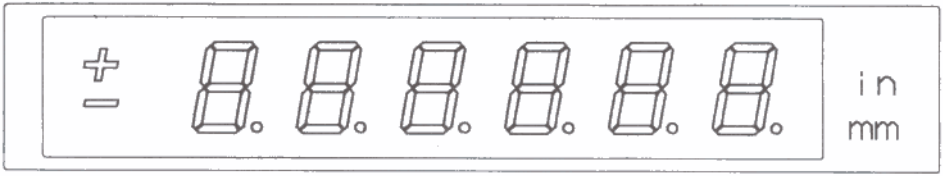
A.) Polarity Mark
B.) Display
C.) In/mm Annunciator
D.) Power Switch
E.) Mode Button
F.) Absolute Button
G.) Preset Button
H.) Reset Button
I.) 1. 0.01/0.001 Select Switch
2. Direction Change Over Switch
3. Disable Switch
4. Uuit Switch (Inch/mm)
J.) Data Output Connector
K.) RS-232C Output Option Connector
L.) SIG IN Connector
M.) 0.3A Fuse Holder
N.) Power Connector
O.) Panel Stopper
P.) Stand
Q.) Foot
R.) Locking Knob

2. SPECIFICATIONS

Display Digits	:	+/- polarity plus 6 digits numerical value
Display Range	:	0.00000 to ±9.99995 inch/0.000 to ±999.999 mm or 0.0000 to ±99.9995 inch/0.00 to ±9999.99 mm (Switchable from the rear panel)
Display	:	7-segment large-size green LED
"ERROR" display	:	When a measurement error occurs, the word "ERROR" will appear in the display.
Mode Function	:	When this button is pressed, the measurement mode will sequentially change to Max., Min. and Range, then return to normal mode. Each time the mode button is pressed a red light will appear next to the abbreviation Max., Min. or Range depending on which mode has been selected.
Absolute Zero Function	:	When this function is selected, the associated LED will light (the position of the spindle at the time the power is turned on will be taken as the absolute zero point.).
Preset Function	:	When this function is selected, the associated LED will begin to blink on and off. (This is used to add offset values to the measured values for display.)
Direction Change Over	:	This function is used to select the counting direction to either add or subtract.
In/mm	:	This function is used to select the measurement unit between inch and millimeter.
Output	:	Serial (a direct RS-232C output option is available upon request.)
Power Supply Voltage	:	120VAC ± 10%, 50/60 Hz
Operating Temperature	:	0 to 40°C
Dimensions	:	170(w) × 85(h) × 230(d) mm (6.69(w) × 3.35(h) × 9(d) inch)
Weight	:	Approx. 1.2 Kg (2.6 lbs)

3. DISPLAY DESCRIPTION

In addition to the measured value, the display indicates the following types of messages:



In	:	This indicates that the inch measurement unit has been selected.
mm	:	This indicates that the millimeter measurement unit has been selected.
+	:	This indicates that the measurement value is positive.
-	:	This indicates that the measurement value is negative.
ERROR	:	This indicates that the spindle speed is greater than the specified spindle response speed, therefore causing a measurement error.

4. FRONT PANEL FUNCTIONAL DESCRIPTION

POWER SWITCH

When the power switch is turned on the display will read zero and normal mode will automatically be selected.

RESET BUTTON

This button enables you to reset the display value to zero at any desired position. Please note that when the reset button is pressed in the normal mode any values currently held in the Maximum, Minimum or Range mode will also reset to zero. The reset button is inoperative in the Absolute mode.

MODE BUTTON

This button is used to obtain the Maximum, Minimum and Range values. When the mode button is pressed the mode will sequentially change from Max. to Min. and then Range.

DISPLAY

The large Green LED display indicates the measured value. A + or - sign located on the left side of the display indicates that the measurement value is positive or negative, respectively. A In. or mm annunciator located on the right side of the display indicates the chosen unit of measurement.

PRESET BUTTON

This button is used to select a preset value. When this button is pressed the associated LED will blink indicating that the preset value selection mode has been chosen. The direction switch is inoperative in the preset value selection mode; however this switch can be used in the preset measurement mode. In the preset selection mode the unit switch can be used only to change the decimal point position and in/mm annunciators; however in the preset measurement mode use of this switch will also convert the display value from inch to mm or vice versa. (Please refer to switch #2 DIRECTION and switch #4 UNIT under REAR PANEL FUNCTIONAL DESCRIPTION.)

ABSOLUTE BUTTON

This button is used to select an absolute zero point. When the absolute button is pressed the associated LED will light indicating that the absolute mode has been selected. The reset button is inoperative in this mode.

5. REAR PANEL FUNCTIONAL DESCRIPTION

SWITCH NO. 1 (SENSOR)
This switch is used to set the display to the value appropriate to the minimum resolution of the sensor to be connected. If the sensor has a resolution of 0.0004inch/0.01mm the correct setting would be 0.01. If the sensor has a resolution of 0.00004inch/0.001mm the correct setting would be 0.001.

SWITCH NO. 2 (DIRECTION)
This switch is used to select the counting direction. The counting direction can be chosen to either add or subtract when the spindle is pushed in. This switch is inoperative in the preset value selection mode; however this switch can be used in the preset measurement mode. (Please refer to DIRECTION SWITCH under PRESET MODE OPERATION DESCRIPTION).

SWITCH NO. 3 (DISABLE)
No Function

SWITCH NO. 4 (UNIT)
This switch is used to select the unit of measurement between inch and millimeter. The measurement unit is indicated by the annunciator in/mm located on the right side of the display. This switch can only be used to change the decimal point position and in/mm annunciators in the preset selection mode; however in the preset measurement mode this switch will also convert the display value from inch to mm or vice versa. (Please refer to UNIT SWITCH under PRESET MODE OPERATION DESCRIPTION).

SERIAL OUT CONNECTOR
This connector is used for data transfer.

RS-232C CONNECTOR
This is an option. A direct RS-232C output can be obtained for direct interfacing needs to a CPU. This option is available at an additional cost.

SIG CONNECTOR
This connector is used to make connection to your Ono Sokki Linear Gauge Sensor.

FUSE HOLDER
This unit is equipped with a 0.3A fuse.

AC CONNECTOR
This connector is used to make connection to a 120VAC ± 10%, 50/60Hz line power source.

6. OPERATION DESCRIPTION

NORMAL MODE

This is the basic measurement mode, Normal mode continuously displays the measured values. The display can be reset to zero at any desired position by pressing the reset button. In the normal mode, any values that were currently held in the Maximum, Minimum and Range modes will also be reset to zero when the reset button is used. In the normal mode, should an ERROR message appear in the display during measurement, press the RESET BUTTON and perform your measurement again. The ERROR message indicates that the spindle speed has exceeded the specified spindle response speed.

MAXIMUM, MINIMUM & RANGE MODE

These modes hold and display the maximum, minimum and range (Max. - Min. = Range) values. To enter these modes press the MODE BUTTON once. The initial values for maximum and minimum mode will be the value which was displayed in normal mode before the mode button was pressed. These values can be set to zero by pressing the RESET BUTTON. After you press the mode button one time a red light will appear next to the abbreviation Max. located on the front panel next to the mode button. After you start your measurement the up and down movement of the spindle will internally register and hold the maximum, minimum and range values. After you have completed your measurement you will remain in the maximum mode and the maximum value will be displayed. To view the minimum and range values, press the MODE BUTTON a second time for the minimum value and a third time for the range value. Press the MODE BUTTON a fourth time to return to normal mode. After you return to normal mode all values in the maximum, minimum and range modes will be stored in memory until the reset button is pressed, the mode button is used to perform another measurement or the power is switched off.

ABSOLUTE MODE

The spindle position at the time the power is turned on is registered as the absolute zero point. When the ABSOLUTE BUTTON is pressed the associated LED will light. The display will then keep track of the displacement from the absolute zero point and display the difference. The maximum, minimum and range are also operated in the same manner as the normal mode. The reset button is inoperative in this mode; however, if the maximum, minimum and range modes are being used the reset button can be used to reset these values only.

PRESET MODE

This mode allows you to add a preset offset value to the measured values for display.

⟨Preset Value Selection Mode⟩
To enter your preset value press the PRESET BUTTON, the associated LED indicator will light and begin to blink. Press the MODE BUTTON one time, the direction sign (+/-) will light and begin to blink. After the MODE BUTTON is pressed a second time the first digit will light and begin to blink indicating that it is ready for your selection. To select your number press the ABSOLUTE BUTTON until the desired number is reached. Continue this process for each digit. After your selection is completed press the PRESET BUTTON again, the associated LED indicator will stop blinking and remain lit indicating that you are now in the preset measurement mode.

⟨Preset Measurement Mode⟩
During measurement it is possible to reset the display back to the preset value at any desired position by pressing the RESET BUTTON.

⟨Maximum, Minimum and Range Mode⟩
In the preset mode the maximum, minimum and range values can be obtained in the same manner as the normal mode. The initial values for maximum and minimum will be the value which was displayed before the mode button was pressed.

Unit Switch
The unit of measurement between inch and mm can be selected by using the unit switch. In the PRESET VALUE SELECTION MODE the unit switch will only change the decimal point position and in/mm annunciators; however in the PRESET MEASUREMENT MODE this switch will also convert the display value from inch to mm or vice versa.

Direction Switch
A positive or negative counting direction can be selected by using the direction switch. When a positive (+) counting direction is chosen the counting value is added to the preset value for display. When a negative (-) counting direction is chosen the counting value is subtracted from the preset value for display.

Overflow
In the preset mode an overflow can occur during measurement. When this happens the display will stop at 999999 and begin to blink.

This indicates the following measurement errors:

1.) The measured value + the preset value have exceeded the maximum display value of 999999. When this happens press the RESET BUTTON and select a new preset value within a range which will not exceed the maximum display value. Please see cause number two below if the display does not clear after the reset button is pressed.

2.) Millimeter to inch conversion has been made during measurement, therefore causing the preset value to exceed the maximum display value of 999999. When this happens press the PRESET BUTTON to return to normal mode. Press the PRESET BUTTON again to enter the preset value selection mode. After you enter this mode dashes will appear across the display. To clear the display and cancel the converted preset value press the RESET BUTTON. Enter a new preset value and perform your measurement again.

The preset value will be stored in memory and held even when the power is turned off.

7. SERIAL OUTPUT SPECIFICATIONS

1. Connector Pin Arrangement

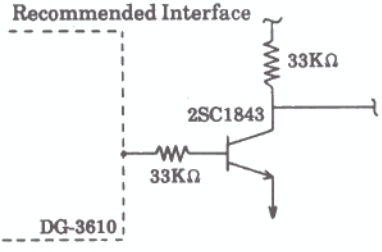
Connector Type: 60-8283-3058-15001 (Female connectors on both sides of AA-963B cable)
008283-00511-00000 (Male connectors on DG-3610 & RQ-281B/C)
Manufacturer: Elco (Japan)

PIN NUMBER	1	2	3	4	5
OUTPUT SIGNAL	S I G N A L COMMON	CLOCK	DATA	$\overline{\text{RESET}}$	$\overline{\text{MODE}}$

2. Output Signal Electrical Characteristics

All signals are output CMOS devices (1 LSTTL load drive capacity)

HIGH : $V_{OH} \rangle 4.0V$ ($V_{cc} = 4.5V, I_{OH} = -10\mu A$)
LOW : $V_{OH} \langle 0.4V$ ($V_{cc} = 4.5V, I_{OL} = 1.8mA$)



3. Output Signal Description

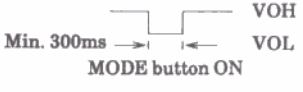
(1) Signal Common: Common line for all signal lines
(2) Clock: Timing clock for the four bits of data (refer to the timing diagram)
Frequency: Approx. 32 KHz

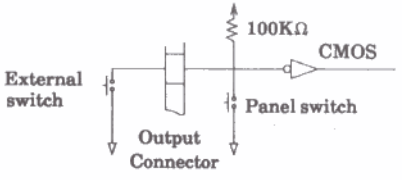
(3) **Data: As shown in the table below, data consists of 12 steps which represents one value, each step consisting of four bits, output in the sequence $2^3 \rightarrow 2^0$.**

Step	Name	2^3	2^2	2^1	2^0	Description
1	F_H	1	1	1	1	Step 1 is indicated by F^H
2	E_H	1	1	1	0	E^H indicates that the next value is the 6th
3	10^5 digit data	2^3	2^2	2^1	2^0	6th digit (10^5) of linear gauge LCD is output
4	10^4 digit data	2^3	2^2	2^1	2^0	5th digit (10^4) of linear gauge LCD is output
5	10^3 digit data	2^3	2^2	2^1	2^0	4th digit (10^3) of linear gauge LCD is output
6	10^2 digit data	2^3	2^2	2^1	2^0	3rd digit (10^2) of linear gauge LCD is output
7	10^1 digit data	2^3	2^2	2^1	2^0	2nd digit (10^1) of linear gauge LCD is output
8	10^0 digit data	2^3	2^2	2^1	2^0	1st digit (10^0) of linear gauge LCD is output
9	Decimal Point	0	0	0		1 2 3 4 5 6.
		0	0	1		1 2 3 4 5.6
		0	1	0		1 2 3 4.5 6
		0	1	1		1 2 3.4 5 6
		1	0	0		1 2.3 4 5 6
		1	0	1		1.2 3 4 5 6
		1	1	0		1 2 3 4 5 6
	Sign				0	"+" sign
					1	"−" sign
10	Unit	0	0	0	0	No Unit
		0	0	0	1	m/s
		0	0	1	0	inch/s
		0	0	1	1	rps
		0	1	0	0	rpm
		0	1	0	1	inch
		0	1	1	0	mm
11	ERROR	E				High when an error occurs.
	MAX			Max.		High for msximum display
	MIN				Min.	High for minimum display
12	END	0	0	0	0	End of output of one value

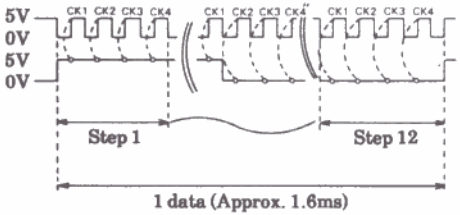
(4) $\overline{\text{RESET}}$: Reset function can be externally controlled by inputting a low-level signal to the output connector pin No. 4.

(5) $\overline{\text{Mode}}$: Mode function can be externally controlled by inputting a low-level signal to the output connector pin No. 5.





4. Timing Diagram

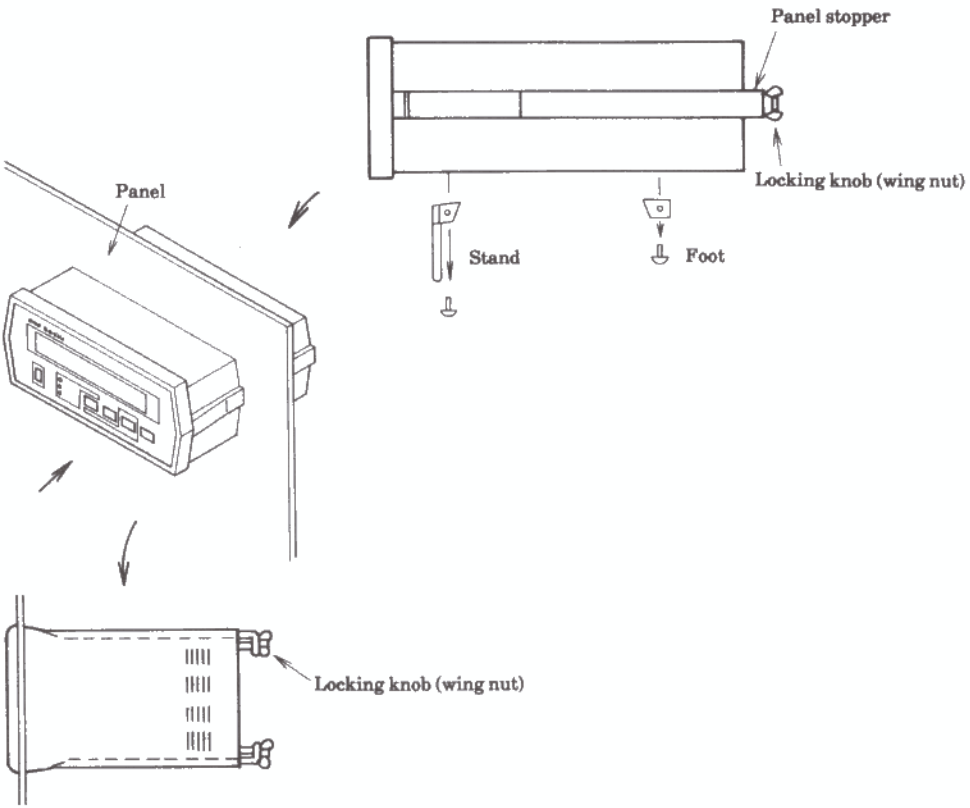


8. APPLICABLE SENSORS

Model Number	MEASURING RANGE	RESOLUTION
BS-102	0.4"/10mm	0.0004"/0.01mm
BS-112	0.4"/10mm	0.00004"/0.001mm
GS-001	4.0"/100mm	0.0004"/0.01mm
GS-102	0.4"/10mm	0.0004"/0.01mm
GS-112	0.4"/10mm	0.00004"/0.001mm
GS-251	1.0"/25mm	0.0004"/0.01mm
GS-332	1.2"/30mm	0.00004"/0.001mm
GS-503	2.0"/50mm	0.0004"/0.01mm
GS-551	0.2"/5mm	0.00004"/0.001mm

GS-1513
GS-1530
GS-1613
GS-1630
GS-1000

9. PANEL MOUNTING METHODS



(1) Remove the feet and stand and loosen the locking knob (wing nut), then slide the panel stopper backward to make enough room for the panel.

(2) Insert the equipment into the hole from the back. ($81 \pm^{0}_{0.5} \times 161 \pm^{0}_{0.5}$ mm, $3.19 \pm^{0}_{0.02} \times 6.34 \pm^{0}_{0.02}$inch)

(3) Tighten the locking knob (wing nut) to anchor the display.

10. OPERATING PRECAUTIONS

1. The operating temperature is 0 to 40°C (32 to 104°F); however use in locations which are subject to sudden temperature changes is not recommended. When using the unit mounted in a rack, pay special attention to the ventilation and avoid any equipment that may produce heat.

2. This unit is designed to be semi-dust proof; however it is not totally immune to dust. Take special care that metallic debris and shavings are not allowed to enter the inside of the instrument.

3. The DG-3610 has been designed for high noise immunity; however some installation conditions will result in uncontrollable problems. In order to avoid these types of problems, keep the signal leads from the gauge sensor and the serial output leads far away from power lines and avoid extending the length of these leads any longer than absolutely necessary.

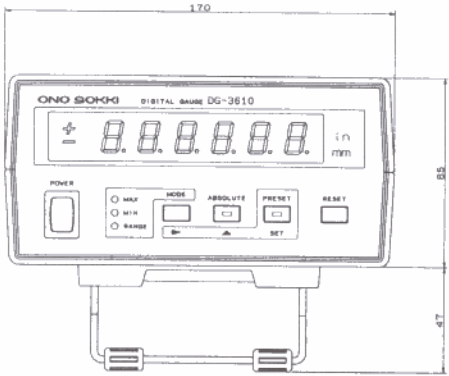
MAINTENANCE PRECAUTIONS

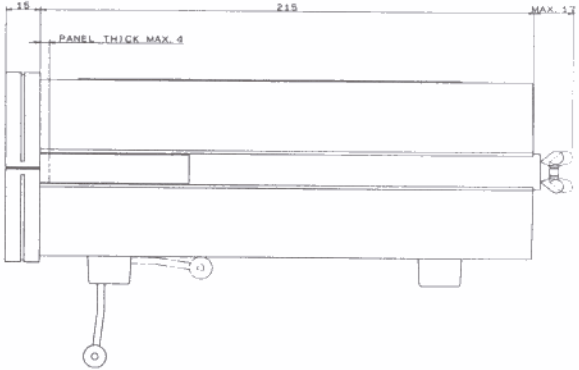
1. This unit has a storage temperature of -10°C to +70°C.

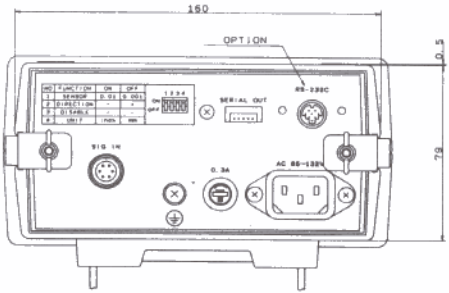
2. Always remove any dust, oil or dirt from the front panel buttons and rear panel switches and connectors to avoid operating difficulties.

3. Never use thinners or similar volatile fluids to clean the panel and housing surfaces. Using these types of liquids may dissolve the plastic used in these parts.

OVERALL VIEW







REAR VIEW

PANEL-CUT DIMENSIONS

WARRANTY

We warrant that within twelve months from the date of shipment, the product manufactured by us and sold by us is in the possession of the original buyer from us (or from an authorized distributor), we will replace or repair, at our option, free of charge, any part or parts which upon examination we find defective in workmanship or material, provided that on our request the product or parts thereof are returned to our plant, along with satisfactory documentation that the products have been installed, used, and maintained in accordance with instructions in the instruction manual and has not been subject to abuse. We shall not be liable or responsible for any expense or liability for repairs, additions, or modifications made upon the product without our written consent.