Linear Gage Counter EG-101P/D/Z

User's Manual
No.99MBC088A3
SERIES No.542

1. Safety Precautions

To ensure operator safety, use the instrument in conformance with the directions and specifications given in this manual.

2. Foreword

To obtain the highest performance and the longest service life from your Counter, carefully read this User's Manual thoroughly prior to setup and operation. After reading this manual, keep it near the Counter for quick reference. Be sure to follow the precautions below.

3. Conformance to EC Directives

This unit conforms to the following EC directives:
Standard: EN61326:1997+A1:1998 +A2:2001 +A3:2003
Immunity test requirement: Annex A
Emission limit: Class B

* Connect only one counter unit to the power supply unit, using a power supply cable with a length of 30 m or less. Do not connect the counter to a power supply while it is outdoors.

4. Precautions on Use

WARNING

- **Neither remove the cover nor disassemble this unit. Doing so may expose personnel to electric shock or result in damage or fire to this unit due to a short circuit caused by metal chippings or dust.**
- **Note the warning labels on the top surface of this unit.**
- **This unit is a precision instrument. Do not bump or apply excessive force to any part of this unit when setting it up or operating it.**
- **Use this unit in an environment where the temperature is between 0 and 40°C. Temperature variations should be minimized so that there is no condensation.**
- **Avoid operating this unit in the following places:**
  - **Where it will be exposed to cutting chips and oil, dirt, dust, or significant vibrations.**
  - **Where it will be exposed to direct sunlight.**
  - **Near high-voltage/large current power equipment**

5. Warranty

If the Mitutoyo Digimatic Gage Counter (EG-101P/D/Z) should prove defective in workmanship or material, within one year from the date of purchase, it will be repaired or replaced, at our option, free of charge upon its prepaid return. For further information, contact your dealer or local Mitutoyo sales office.

6. Outline

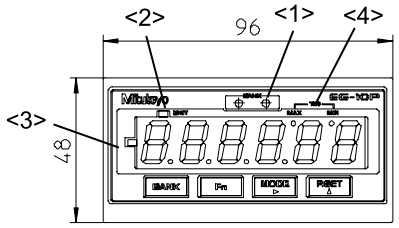
The EG counter is a panel mount type counter that complies with the DIN size (96 × 48) for easy embedding in a system. A tolerance judgment and BCD output function are provided as standard, making this counter suitable for control purposes.
The main functions of this counter are as follows.

Key functions	Presetting, peak measurement, tolerance limit setting (bank) selection
Tolerancing function	3/5-stage tolerance limits: Max. of 3 sets (3 banks)
Output function	Tolerancing output, BCD output (switched by parameter)
Input function	Presetting, hold, bank selection, peak selection

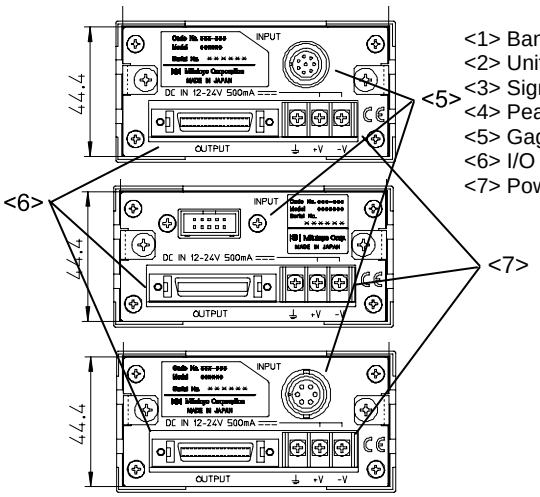
The following three models, each supporting different gages, are available.

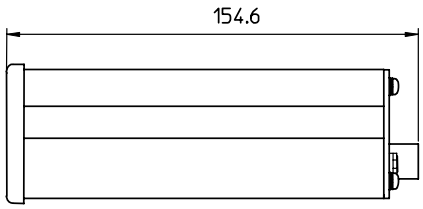
Model	Applicable Gage	Features
EG-101P	LGB, LGF, LGE, LGK, etc.	High resolution of up to 0.1 µm and high-speed response of 1.5 m/s (for use with LGF)
EG-101D	LGD, ID, SD, etc.	ABS function provided, making master calibration each time the power is turned on unnecessary.
EG-101Z	LGF-Z, etc.	Origin function provided for high-speed response and reducing master calibration performed each time the power is turned on.

7. Appearance



Front view (common to all 3 models)





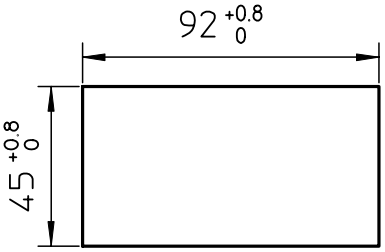
Rear view (common to all 3 models)

8. Setup

8.1 Mounting counter on panel

1) Machining the mounting hole

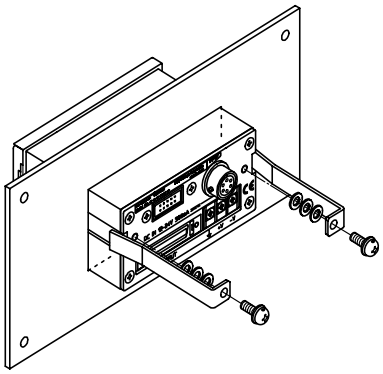
Permissible thickness of mounting panel: 1.0 to 3.2 mm.



2) Mounting on the panel

After removing the fixtures from the counter, insert the counter into the hole from the panel front, and then secure the panel with the fixtures from the panel rear. Adjust the position of each fixture by using the appropriate number of supplied washers according to the panel thickness.

Panel thickness (mm)	1.0 to 1.3	1.4 to 1.7	1.8 to 2.5	2.5 to 3.2
Number of washers	0	1	2	3



8.2 Connecting connectors

CAUTION

When connecting the connectors, be sure to turn off the power to the counter.

1) Connect the Digimatic gage to the INPUT connector.
2) Connect the power cable to the power terminal block. Connect the +V cord to the + power terminal and the –V cord to the GND terminal.
3) Connect the ground wire to the ground terminal.
4) Connect the signal cable to the I/O connector. The user must supply the cable.

When using this counter, pay attention to the following:

CAUTION

- Use a power supply of 12 to 24 VDC with a control output current of 1 A or higher. Do not share the power supply with other equipment requiring a large amount of power.
- Do not route the power cable and gage cable with other power lines through the same piping.
- Use a shielded cable with a length of 3 m or less for the OUTPUT cable.
- Be sure to ground the counter.
- Clamp all cables to the counter body.

8.3 Setting parameters

Set the counter parameters, such as the count direction and resolution.

1) Parameter setting procedure

	Key Operation	Corresponding Display/Output
1	Switch on the power.	The status changes to the count standby status.
2	While holding down the [Fn] key, press the [P.SET] key to enter the parameter mode.	Displays first parameter No. 00. (The flashing digit indicates that the setting can be modified.)
3	Press the [P.SET] key to set the flashing digit (LSD) to 1.	
4	Press the [Fn] key to advance the parameter to a desired parameter.	Press the [Fn] key twice. (EG-D) The current setting of parameter No. 11 will flash.
5	Press the [P.SET] key to set the parameter to the desired setting.	
6	Repeat steps 3 and 4 for each of the parameters to be modified.	
7	Press [P.SET] while holding down [Fn].	Returns to the counter value display with the set parameters.

Parameter List

P. No.	Parameter Name	Setting	Initial
00	Parameter mode selection To set parameters, select 1.	0: Reference 1: Modification (Settings other than 0 and 1 cannot be made.)	0
5	Origin function selection *2 (Only for EG-Z; In EG-P, always set "0")	0: Disabled 1: Enabled	0
10 *1	User parameter clear Initializes the set parameter values.	1: Initialization	0
11	Count direction selection	When the spindle is pushed in: 0: + count 1: – count	0
12 *1	Gage resolution setup (EG-P/EG-Z only)	0: 10 μm 1: 5 μm 2: 1 μm 3: 0.5 μm 4: 0.1 μm 5: 0.1 (LGH)	2
	Gage type setup *4 (EG-D only)	0: INC (LGS) 1:ABS (LGD, ID, SD)	1
14	Startup mode (EG-P/D only)	0: At startup "----" display 1: 0.000	0
	(In EG-Z, only when origin function is enabled)	1: Wait for origin	0
15 *1	mm/inch unit system display selection Not initialized when user parameters are cleared (Inch = 1/25.4 mm)	0: mm 1: Inch 5/100,000 reads 2: Inch 1/10,000 reads 3: mm *7	0
16	Calculation with constant	0: None 1: ×2 2: ×10 3: Arbitrary *5	0
17	Lowest digit blanking	0: Display all digits 1: Blank lowest digit	0
18	Smoothing (EG-P/Z only)	0: None 1: 8 times 2: 16 times	0
20	Tolerance/BCD output mode switching	0: Tolerance judgment 1: BCD output	0
21 *1	Tolerance mode selection Selects the tolerancing output method.	0: 3-stage tolerancing 1: 5-stage tolerancing	0
22	BCD output mode selection	0: Command mode 1: Interval mode	0
23	BCD output speed selection	0: 5 ms 1: 15 ms 2: 20 ms 3: 40 ms	0
24	BCD output logic selection	0:【DATA:H】(SIGN:H) 1:【DATA:L】(SIGN:L) 2:【DATA:H】(SIGN:L) 3:【DATA:L】(SIGN:H) ＊8	0
29	SDP input wait (EG-D only) *6	0: No wait 1: 100 ms wait 2: 200 ms wait	0
35	Key protect Prevents key operation errors.	0: Normal 1: Key entry disabled	0
41	Origin detect direction (EG-Z only)	0: Origin detection at + count 1: Origin detection at – count	0
42	Origin re-detection (EG-Z only) *3	0: Disabled 1: Enabled	0
43	Origin initialize (EG-Z only) Starts with 0 from the origin.	1: Initialize (one-shot)	0

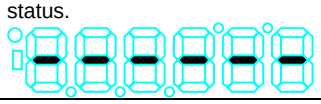
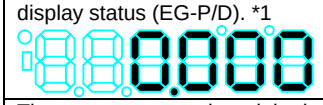
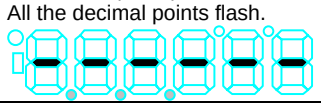
*1. When this parameter is cleared, the preset value/tolerance limits are also cleared.
*2. The gage with origin (LGF-Z) has an original origin within the gage, and when the spindle is moved, a signal is generated the instant the spindle passes through the origin. Based on this fact, the EB-Z reproduces the preset position.
*3. Origin detection is normally performed only when the gage is powered, but re-detection wait occurs upon completion of the preset and tolerance settings when the origin re-detection parameter is enabled, or at the rising edge of the HOLD signal. When the HOLD signal is input again during origin re-detection, origin re-detection is canceled upon error resetting.
*4. ABS type gages store the origin even when the power is off. Perform this setting according to the gage type. To match the gage and counter display, such as ID or SD, set the INC mode.
*5. For the constant setting procedure, refer to **10**.
*6. The display speed can be changed.
*7. In the case of inch gage 1/10,000 connection (EG-D only)
*8. "H" or "L" is a voltage when +000000 is displayed.

Notes

- **To use the origin function in the case of the EG-G, set parameter No. 5 to 1.**
- **In the case of the EG-D, an error may occur when a special gage is connected. In this case, set parameter No. 29 to either 1 or 2. In the case of the EG-P, always set "0".**

9. Operating Counter

9.1 Turning on power

	Key Operation	Corresponding Display/Output
1	Turn the power on.	The counter enters the count standby status. 
2	Press [P.SET].	The counter returns to the count display status (EG-P/D). *1 
		The counter enters the origin detection wait status (EG-Z). All the decimal points flash. 
3	Push in the spindle to pass through the origin (EG-Z only).	The counter returns to the count display status (EG-Z).*2

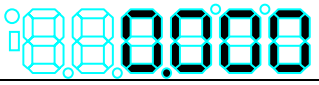
Notes

*1. In the case of the EG-D, the absolute position of the gage is displayed.

*2. During origin detection, be sure to pass the spindle through the origin. If the spindle vibrates in the vicinity of the spindle, detection may not be reliable.

9.2 Presetting and error resetting

The origin is set with the [P.SET] key or external [P.SET] signal. The preset value can be changed and set freely to any value. (Refer to **9.6 Setting a preset value and tolerance limits**.)

	Key Operation	Corresponding Display/Output
1	Press the [MODE] key beforehand to change the peak mode to the normal measurement mode.	MAX, MIN: Turned off  When counter value = 1.000
2	Press [P.SET].	Peak value are also cleared. The counter sets the MAX and MIN values to the current values and the TIR value to 0. 

* If an error occurs, press the preset key to reset the error.

Notes

- **The effective preset count in the case of the EG-D (ABS) and EG-Z (origin function enabled) is 1,000,000 times.**
- **When error resetting is performed in the case of the EG-D, all the decimal points flash for approx. 8 seconds.**

9.3 Peak mode setting

The counter stores the maximum value (MAX), minimum value (MIN), and TIR value (MAX value – MIN value). During peak mode setting, select the display value from among MAX, MIN, TIR, and the current value.

	Key Operation	Corresponding Display/Output	
	Press the [MODE] key to select a display value in the peak mode.	TIR MAX ○ MIN ○	Current value: The value at the current spindle position
		TIR MAX ● MIN ○	MAX: The maximum value after clearing the peak value
		TIR MAX ○ MIN ●	MIN: The minimum value after clearing the peak value
		TIR MAX ● MIN ●	TIR: The value of [MAX – MIN]

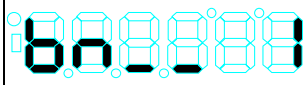
9.4 Clearing peak value

The peak value can be cleared in the peak mode.

	Key Operation	Corresponding Display/Output
1	Press the [MODE] key to select either the MAX, MIN, or TIR indicator.	The peak indicator lights.
2	Press the [P.SET] key to clear the peak values.	The peak values are cleared to the following: MAX = MIN = current value TIR = 0

9.5 Selecting tolerance banks

The EB counter stores a maximum of 3 banks of tolerancing data for 3/5-stage tolerance limits for independent setting. It is also possible to select tolerance limits using keys or external signals.

	Key Operation	Corresponding Display/Output
1	Press the [BANK] key to display a bank number.	While the key is held down, the bank number is displayed.  When the key is released, the count display mode is restored.
2	Repeat pressing the [BANK] key.	Each time the key is pressed, the display changes from bank 0 to bank 3.

A bank number is displayed to the BANK indicator.

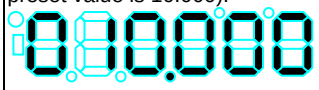
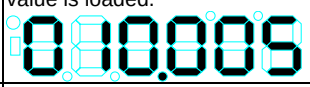
BANK No.	BANK Indicator Display	BANK No.	BANK Indicator Display
BANK 0	BANK ○ ○	BANK 2	BANK ● ○
BANK 1	BANK ○ ●	BANK 3	BANK ● ●

* The tolerance judgment function is disabled when the bank number if 0 (BANK0).

9.6 Setting a preset value and tolerance limits

Freely set the origin to the desired value and the tolerance limits.

1) Setting a preset value

	Key Operation	Corresponding Display/Output
1	Press the [BANK] key to select BANK 0.	All LEDs of the BANK indicator go off.
2	Press the [Fn] key to enter the setup mode.	The most recent preset value is displayed (when the most recent preset value is 10.000).  L1 of the LMIT indicator flashes.
3	Preset value input method: Press the [MODE] key to move the flashing digit. Press the [P.SET] key to input a numeric value. Press the [Fn] key to cancel the input value.	The current value setting digit flashes.  The ±sign can also be set at the most significant digit (MSD). MSD 0 => 9 => –0 => –9 => 0
4	Repeat the procedure in step 3 until the least significant digit (LSD) has been set. Press the [Fn] key to cancel the input value.	
5	Press the [MODE] key to complete the input.	The LSD stops flashing and the input value is loaded. 
6	Press the [Fn] key to quit the setup mode.	After quitting the setup mode, the counter returns to the count display mode.

2) Setting tolerance limits (3-stage tolerancing)

Set tolerance limits S1 and S4 to perform the following 3-stage tolerancing. (S2 and S3 are not used.)
Three sets of [BANK] are recorded and called with the KEY or BANK signal.

	BANK Indicator	I/O Output
Measurement < S1	Orange LED lights.	L1
S1 ≤ Measurement ≤ S4	Green LED lights.	L3
S4 < Measurement	Red LED lights.	L5

	Key Operation	Corresponding Display/Output	
1	Press the [BANK] key to select a bank number (1, 2, or 3).	The bank indicator lights.	
	Press the [Fn] key to display the item to be set.	S1	Orange LED lights.
		S4	Red LED lights.
3	Press the [MODE] and [P.SET] keys to set the values, in the same way as for preset.	Set the tolerance in the order of S1, (S2, S3), and S4.	

* For settings other than S1 ≤ S4, an error results. In this case, press [P.SET] to reenter the values from S1.

3) Setting tolerance limits (5-stage tolerancing)

Five-stage tolerancing can be performed by selecting the relevant parameter.

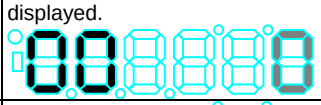
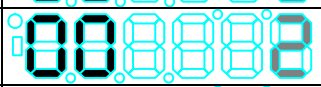
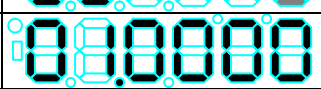
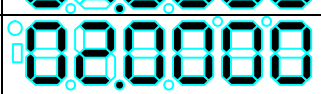
	BANK Indicator	I/O Output
Measurement < S1	Orange LED lights.	L1
S1 ≤ Measurement < S2	Orange LED flashes.	L2
S2 ≤ Measurement ≤ S3	Green LED lights.	L3
S3 ≤ Measurement ≤ S4	Red LED flashes.	L4
S4 < Measurement	Red LED lights.	L5

	Key Operation	Corresponding Display/Output	
1	Press the [BANK] key to select a bank number (1, 2, or 3).	The bank indicator lights.	
	Press the [Fn] key to display the item to be set.	S1	Orange LED lights.
		S2	Orange LED flashes (only 5-stage tolerancing)
		S3	Red LED flashes (only 5-stage tolerancing).
		S4	Red LED lights.
3	Press the [MODE] and [P.SET] keys to set the values, in the same way as for preset.	Set the tolerance in the order of S1, (S2, S3), and S4.	

* Set the tolerance limits in the order of S1, S2, S3, and S4 in the same way as for 3-stage tolerancing.
If the tolerance limits are not set as S1 < S2 < S3 < S4 or S1 = S2 = S3 = S4, an error will result.

10. Setting Arbitrary Constant

Set parameter No. 16 to 3 before setting an arbitrary constant. (The decimal point flashes.)

	Key Operation	Corresponding Display/Output
1	While holding down the [Fn] key, press the [P.SET] key.	The first parameter, No. 00, is displayed. 
2	Press the [P.SET] key twice to make the setting value 2.	
3	Press the [Fn] key to display the set constant value.	
4	Press the [MODE] and [P.SET] keys to set the values, in the same way as for preset.	 Setting range: ±9.9999
	While holding down the [Fn] key, press the [P.SET] key.	Returns to the counter value display.

Note

- The accuracy guarantee is voided if this function is used.

11. Backup Memory Function

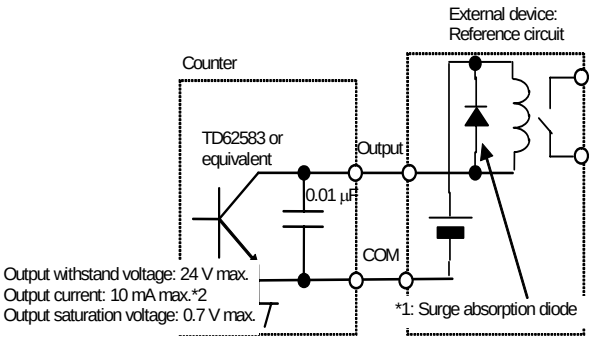
The counter saves the following data even after the power is turned off.

Parameters, preset value, tolerance limits	Always saved.
Peak mode, bank number	Saved only when set using keys.
Count value (excluding peak values)	Saved only by the EG-D (ABS mode) and EG-Z (origin mode).

12. I/O Connector Terminal Function

12.1 Output circuit

Operation: The transistor turns on when "L" is input (open collector).

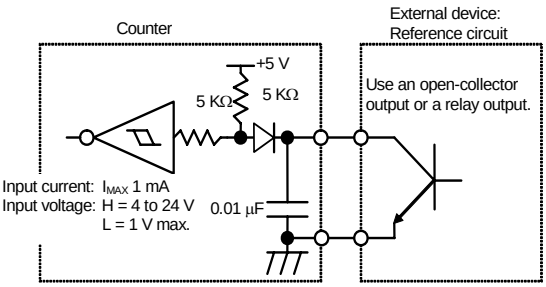


Notes

*1. When using a relay for output circuit protection, use either a surge absorption diode or a relay with built-in surge absorption circuit.
*2. 20 mA max. during tolerancing output

12.2 Input circuit

Operation: An input becomes valid when it is “L”.



12.3 Pin assignment

The pin functions differ for the tolerancing mode and BCD output mode.

1) Tolerancing mode

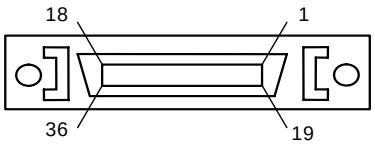
Pin No.	I/O	Name	Function
1, 2		COM	Internally connected to GND.
3	O	L1	Tolerancing output: The relevant output terminal becomes "L". [L1 = L5 = 1]
4	O	L2	
5	O	L3	
6	O	L4	
7	O	L5	
10	O	NOM	Normal output Output in the normal mode = L
27	I	SET1	BANK, peak analog range se: The set value is input beforehand by SET and determined by MODE and BANK.
28	I	SET2	
29	I	MODE	Peak switching determination: Composite with SET
34	I	HOLD	Hold input
35	I	P.SET	Normal measurement mode: Presetting Peak measurement mode: Peak clear
36	I	BANK	BANK switching determination: Composite with SET
		NC	Other than above: Do not connect.

2) BCD output mode

Pin No.	I/O	Name	Pin No.	I/O	Name	Pin No.	I/O	Name
1		COM	13	O	$4X10^2$	25	O	$4X10^5$
2		COM	14	O	$8X10^2$	26	O	$8X10^5$
3	O	$1X10^0$	15	O	$1X10^3$	27	I	SET1
4	O	$2X10^0$	16	O	$2X10^3$	28	I	SET2
5	O	$4X10^0$	17	O	$4X10^3$	29	I	MODE
6	O	$8X10^0$	18	O	$8X10^3$	30	–	NC
7	O	$1X10^1$	19	O	$1X10^4$	31	O	SGN
8	O	$2X10^1$	20	O	$2X10^4$	32	O	NOM
9	O	$4X10^1$	21	O	$4X10^4$	33	O	REDY
10	O	$8X10^1$	22	O	$8X10^4$	34	I	HOLD
11	O	$1X10^2$	23	O	$1X10^5$	35	I	PSET
12	O	$2X10^2$	24	O	$2X10^5$	36	I	INH

* For pins No. 3 to 26 and pin No. 31, the logic level can be inverted with the output logic parameter.
* SIGN: + time "H", - time "L" with counter value sign.
* REDY: During output data setting, "L".
* INH: During input, pins No. 3 to 26 and pin No. 31 outputs are set to "H".
* External input pin is enabled when "L".
* NOM, HOLD, and PSET are the same functions as in the tolerancing mode.

* External input = negative logic; L: Enabled

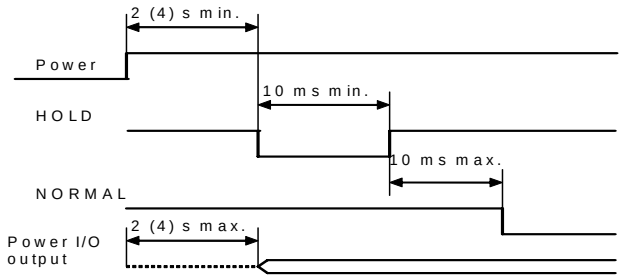


Compatible plug:
Plug: 10136-3000VE (3M)
Cover: 10336-52A0-008 (3M)

Plug: DX40M-36P (Hirose)
Cover: DX30M-36-CV (Hirose)

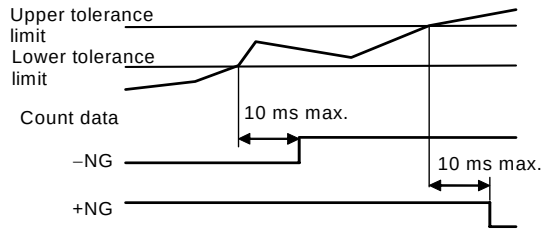
13. Timing Chart

1) Power-on characteristics



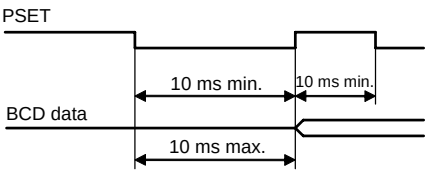
* The values in parentheses indicate the values when EG-D is used.

2) Tolerancing output

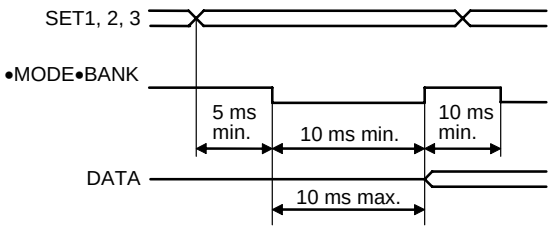


* The EG-D counter data is dependent on the gage.

3) External preset/peak clear



4) Peak mode/bank specification



Bank specification

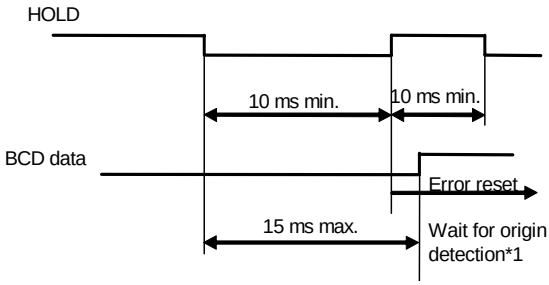
	SET2	SET1
BANK0	H	H
BANK1	H	L
BANK2	L	H
BANK3	L	L

Mode specification

	SET2	SET1
NOMAL	H	H
MAX	H	L
MIN	L	H
TIR	L	L

Input = Active L

5) HOLD timing

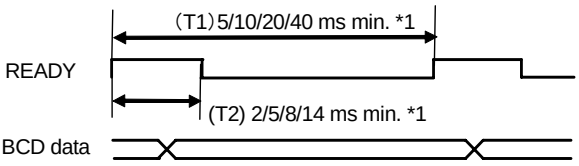


*1. Origin re-input (EG-Z only) (P. No. 42 = 1)

While the HOLD signal is being input, the UNIT LED will flash.

6) Interval mode

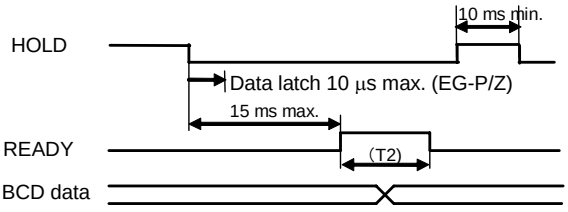
Continuously outputs data using the counter's internal timing.



*1. Depends on the setting of parameter No.23.

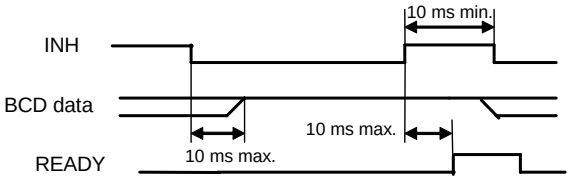
7) Command mode

Outputs data using sync control via HOLD and READY.



8) INH input

BCD data output is switched off during INH input.



14. Error Display

Error Message	NOM Signal	BCD Output	Error Cause	Resetting Method
"- - - - -" lights	H	FFFF15	Count standby mode at power startup Momentary power interruption	Press the [P.SET] key or input external HOLD The power supply needs to be checked for instantaneous power interruption.
Error 10	H	FFFF10	Abnormal power voltage	Connect to the rated power supply.
Error 20	H	FFFF20	Over-speed	Press the [P.SET] key or input external HOLD.
Error 30	H	FFFF30	The count value consists of 8 or more digits.	Change the preset value and then press the [P.SET] key or input external HOLD.
Error 40	H	FFFF40	Abnormal gage	Press the [P.SET] key or input external HOLD. Check the gage connection.
F*****		F*****	The count value consists of 6 or more digits.	Return the count value to within 6 digits. Change the preset value.
All decimal points flash.	L	Count mode	The origin is not detected yet (EG-Z only).	Pass the spindle through the origin.
Error 90	L	Count mode	Tolerance limit setting error	Press the [P.SET] key and re-input the tolerance limits.
Error 95	L	Count mode	Key protect	Set P. No. 35 to 0.

Notes

- At NOM = H, the tolerancing output is L1 = L5 = L (for 3/5-stage tolerance limits).
- If an error occurs while setting a parameter, preset value, or tolerance limit, the error is output after the count mode has been returned to. However, an error is immediately output to the external device when it occurs.
- Errors can be reset with and external [P.SET] signal.

15. Troubleshooting

If the counter's operation seems abnormal, refer to the following troubleshooting examples.

- Abnormal count value (Count does not count)
  - Have the parameters been set according to the gage type?
  - Is the peak mode (MAX or MIN lit) selected? (If yes, deselect)
  - Is the HOLD signal (UNIT flash) input? (If yes, don't input)
  - Is the calculation with a constant function set? (If yes, disable)

- The counter zero-locks unexpectedly
  - Is the momentary power interruption mode (sudden drop in power supply voltage) set?
    (The momentary power interruption mode is set when parameter No. 14 = 1.)

- BCD data output is not possible.
  - Is BCD output (P. No. 20 = 1) selected?
  - Is the output the correct logic?
  - Is the command mode selected (P. No. 22 = 0)? (If yes, select a different mode.)

- Cannot change parameters
  - Is parameter No. 00 set to 1?

- Zerosetting is not possible.
  - Is the preset value a value other than 0?

16. Specifications

Code No.	542-015	542-017	542-016
Model	EG-101P	EG-101Z	EG-101D
Number of display axes	One axis		
Resolution (Count display range)	0.01 (±9999.99) mm		
	0.005 (±999.995) mm		
	0.001 (±999.999) mm		
	0.0005 (±99.9995) mm		
	0.0001 (±99.9999) mm		
	Selection by parameter		Auto-selection according to the gage
Maximum input frequency Maximum count speed	1.25 MHz (2-phase square wave) 5 MHZ		
Power supply Power consumption	+12 V to +24 V (500 mA max.) 6 VA		
Operating temperature Storage temperature	0 to 40°C (20 to 80 % RH with no condensation) –10 to 50°C (20 to 80 % RH with no condensation)		
External dimensions (W × D × H)	96 × 156 × 48 mm		
Mass	400 g		

17. Standard Accessories

Order No.	Part Name	Quantity
–	Washer (plain washer: nominal dia. 4)	6
99MBC088A3	User's Manual (this document)	1
–	Warranty card	1

18. Optional Accessories (Sold Separately)

Order No.	Part Name
02ADB440	I/O output connector (with shell)
527428	AC adapter (AD1012)
02ADD930	Terminal block connection cable (required for connecting the AC adapter)