

# Magnescale®

表示ユニット / Counter Unit / Anzeigeeinheit

# LT20A / LT30 Series

お買い上げいただき、ありがとうございます。  
ご使用前に、この取扱説明書を必ずお読みください。  
ご使用に際しては、この取扱説明書どおりお使いください。  
お読みになった後は、後日お役に立つこともございますので、必ず保管してください。

Read all the instructions in the manual carefully before use and strictly follow them.  
Keep the manual for future references.

Lesen Sie die ganze Anleitung vor dem Betrieb aufmerksam durch und folgen Sie beim Betrieb des Geräts den Anweisungen. Bewahren Sie diese Bedienungsanleitung zum späteren Nachlesen griffbereit auf.

取扱説明書 / Instruction Manual / Bedienungsanleitung

## [For U.S.A. and Canada]

THIS CLASS A DIGITAL DEVICE COMPLIES WITH PART15 OF THE FCC RULES AND THE CANADIAN ICES-003. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS.

- (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND
- (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDERSIGNED OPERATION.

CET APPAREIL NUMÉRIQUE DE LA CLASSE A EST CONFORME À LA NORME NMB-003 DU CANADA.

## [ For EU and EFTA countries ]

### **CE Notice**

Marking by the symbol CE indicates compliance with the EMC directive of the European Community. This marking shows conformity to the following technical standards.

### **EN 55011 Group 1 Class A/1998 A1/1999 A2/2002 :**

"Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment"

### **EN 61000-6-2/2001 :**

"Electromagnetic compatibility (EMC) - Part 6-2 : Generic standards - Immunity for industrial environments"

For DC power-driven products to meet EN 61000-6-2/2001, the following operational conditions must be satisfied.

1. Input and output signal cable length : 30 m or less
2. Cable length for input power source : 10 m or less
3. Scale cable length : 30 m or less

### **Note**

When using the same cable for output signal and input power source, the cable must not be longer than 10 m.

For AC power-driven products to meet EN 61000-6-2/2001, the following operational conditions must be satisfied.

1. Input and output signal cable length : 30 m or less
2. Scale cable length : 30 m or less

### **警告**

本装置を機械指令 (EN 60204-1) の適合を受ける機器にご使用の場合は、その規格に適合するように方策を講じてから、ご使用ください。

### **Warning**

When using this device with equipment governed by Machine Directives EN 60204-1, measures should be taken to ensure conformance with those directives.

### **Warnung**

Wenn dieses Gerät mit Ausrüstungsteilen verwendet wird, die von den Maschinenrichtlinien EN 60204-1 geregelt werden, müssen Maßnahmen ergriffen werden, um eine Übereinstimmung mit diesen Normen zu gewährleisten.

# Safety Precautions

Magnescape Co., Ltd. products are designed in full consideration of safety. However, improper handling during operation or installation is dangerous and may lead to fire, electric shock or other accidents resulting in serious injury or death. In addition, these actions may also worsen machine performance.

Therefore, be sure to observe the following safety precautions in order to prevent these types of accidents, and to read these "Safety Precautions" before operating, installing, maintaining, inspecting, repairing or otherwise working on this unit.

## Warning Indication Meanings

The following indications are used throughout this manual, and their contents should be understood before reading the text.

### **Warning**

Failure to observe these precautions may lead to fire, electric shock or other accidents resulting in serious injury or death.

### **Caution**

Failure to observe these precautions may lead to electric shock or other accidents resulting in injury or damage to surrounding objects.

## Symbols Requiring Attention



CAUTION



ELECTRICAL  
SHOCK

## Symbols Prohibiting Actions



DO NOT  
DISASSEMBLE

## **Warning**



- Do not use this unit with voltages other than the specified supply voltage as this may result in fire or electric shock.
- Do not handle the I/O connector with wet hands as this may result in electric shock.



- Do not open the cover of the counter unit to disassemble or modify the unit, as this may result in burns or injury. These actions may also damage the internal circuitry.
- This device operates with DC power supply. Absolutely do not connect an AC power supply to the I/O connector as this may result in fire or electrical shock. Doing so may also damage the internal circuitry.

## **Caution**



- The unit does not have an explosion-proof structure. Therefore, do not use the unit in an atmosphere charged with inflammable gases as this may result in fire.
- Be sure to turn off the power before connecting or disconnecting power and signal connectors in order to prevent damage or misoperation.
- The unit does not have an earthquake-proof structure. Therefore, do not use the unit in moving areas or areas exposed to strong shocks.



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# 1. Note to users

## 1-1. General precautions

When using Magnescale Co., Ltd. products, observe the following general precautions along with those given specifically in this manual to ensure proper use of the products.

- Before and during operations, be sure to check that our products function properly.
- Provide adequate safety measures to prevent damage in case our products should develop a malfunction.
- Use outside indicated specifications or purposes and modification of our products will void any warranty of the functions and performance as specified for our products.
- When using our products in combination with other equipment, the functions and performance as noted in this manual may not be attained, depending upon the operating environmental conditions. Make a thorough study of the compatibility in advance.
- Design and specifications are subject to change without notice.

## 1-2. Handling instructions

- Do not open the cover of this device or put your hand inside. Otherwise the internal circuit may be broken by static electricity.
- To prevent malfunctions caused by static electricity, always turn off the power when touching other parts than the key switches.
- Do not route the connecting cable through the same duct as the machine power line.
- To prevent misoperation of surrounding equipment due to noise emitted from this counter unit and vice versa, connect the power cable in a twisted manner when supplying DC power.
- When providing DC power, be sure to use within the specified voltage range.
- Absolutely do not connect an AC power supply to the I/O connector. Doing so may damage the internal circuits.
- Do not use connection prohibited I/O connector pins as relay pins.
- When connecting the BCD connector, be sure to wire the connector correctly.  
Failure to do so may damage the internal circuits.

- Place the counter unit more than 0.5 m (20") away from a high voltage source, large current source, large power relay, etc.
- For installation of the counter unit, avoid a location exposed to chips, cutting oil, or machine oil. If unavoidable, take adequate countermeasures.
- Do not put a vinyl cover directly over the counter unit or put it in a closed container.
- The ambient temperature should be in the range of 0 °C to 40 °C (32 °F to 104 °F). Avoid exposure to direct sunlight, hot air currents, or heated air.

### 1-3. Cautions on operation

Carry out the key operations or I/O (BCD, etc.) connections and operations in line with the explanations given in the appropriate sections. Failure to correctly operate this device may result in a malfunction.

### 1-4. Instructions for connecting to the measuring unit

Set the input resolution of the counter unit to match the resolution of the measuring unit. Measuring may not be performed correctly if the resolutions do not match. The input resolution is set by the initial settings. (See "5-1. Initial settings".)

- LT20A
  - The LT20A is a counter unit designed for DG and DL series measuring units with mini DIN type connectors.
  - When the measuring range of the connected measuring unit is 100 mm or more and the display resolution is set on 0.0005 mm, not all the measuring ranges can be displayed. (The highest rank figure becomes the "F" display, which means an overflow.) Therefore, set a display resolution on or below 0.001 mm.
- LT30
  - The LT30 is a counter unit designed for DK series measuring unit with mini DIN type connectors.



## 2. Summary

The counter unit LT20A/LT30 series is designed to be incorporated into assembly lines or jigs, and to be used for measuring components or Go/No Go.

- LT20A

Use in combination with a DG or DL series measuring unit.

Model	Number of input channel	Output		
		Go/No Go	BCD	RS-232C
LT20A-101	1	○		
LT20A-101B		○	○	
LT20A-101C		○		○
LT20A-201	2	○		
LT20A-201B		○	○	
LT20A-201C		○		○

- LT30

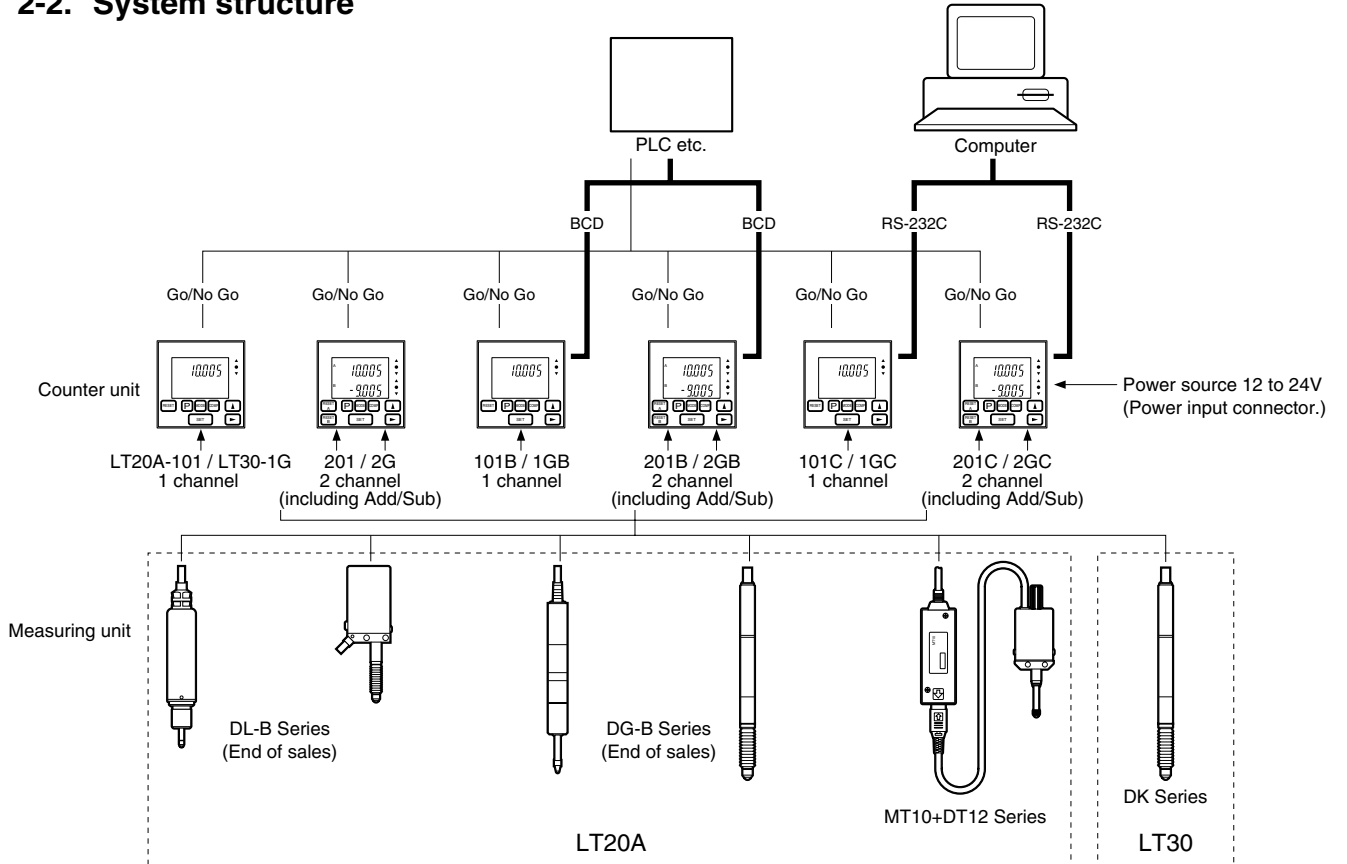
Use in combination with a DK series measuring unit.

Model	Number of input channel	Output		
		Go/No Go	BCD	RS-232C
LT30-1G	1	○		
LT30-1GB		○	○	
LT30-1GC		○		○
LT30-2G	2	○		
LT30-2GB		○	○	
LT30-2GC		○		○

### 2-1. Features

- Compact size suited to inclusion in systems. DIN size (72 × 72 mm). Can be panel-mounted.
- Devices such as PLCs are connectable from the counter unit. Go/No Go output is standard to all models. Models capable of BCD and/or RS-232C also outputs are available.
- Resolution (Selectable)  
Input signal Resolution:  
0.0001 mm/0.0005 mm/0.001 mm/0.005 mm/0.01 mm  
Display resolution:  
0.0001 mm/0.0005 mm/0.001 mm/0.005 mm/0.01 mm  
(0.00002"/0.00005"/0.0002"/0.0005")
- As well as the current value, maximum and minimum values and peak-to-peak values can also be measured.
- Add/Sub calculation is standard feature (only for 2 channel models). Can measure the widths or steps.
- Can carry out Go/No Go test on different lots. (BCD output models.) Four different upper and lower limits can be stored in memory for the Go/No Go comparison.
- Power is compatible to DC 12 to 24V. Provided via the power input connector. Use a power cable less than 10 meters long.

## 2-2. System structure



## 3. Connecting and installing

### 3-1. Connecting the cables

- Secure all connecting cables so as to prevent accidental disconnection.
- Make certain the counter unit's power is off before connecting or disconnecting the measuring unit.

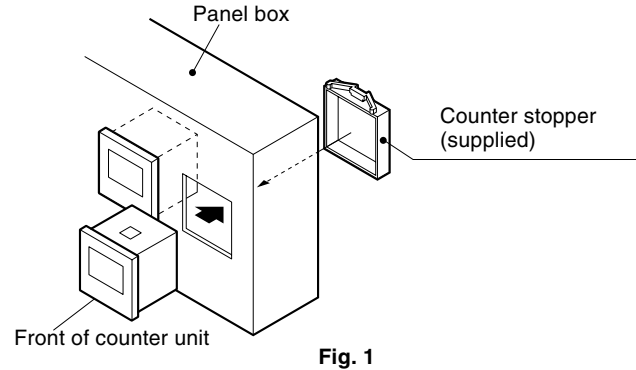
### 3-2. Installing the counter unit

#### When mounting in a panel

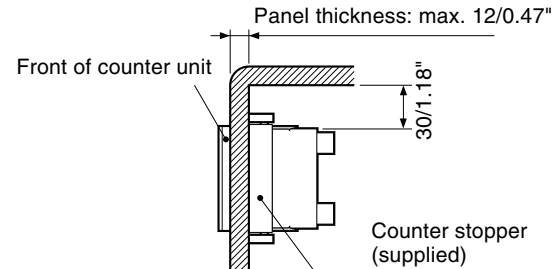
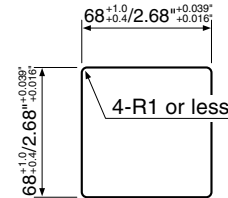
1. Cut out an opening to match the dimensions shown (Fig. 2).
2. Insert the counter unit into the cut-out opening in the panel from the front.
3. Attach the supplied counter stopper from the rear.
4. Press in the counter stopper until it touches the panel.

#### Note

When attaching the counter stopper to the counter unit, leave enough space (min. 30 mm/1.18") between the top and bottom. (Fig. 3)



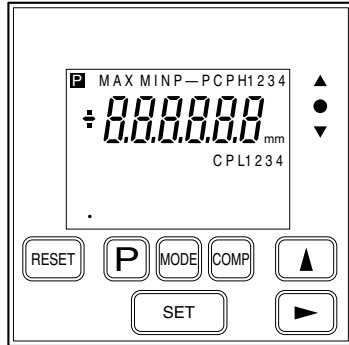
#### Cut-out dimensions



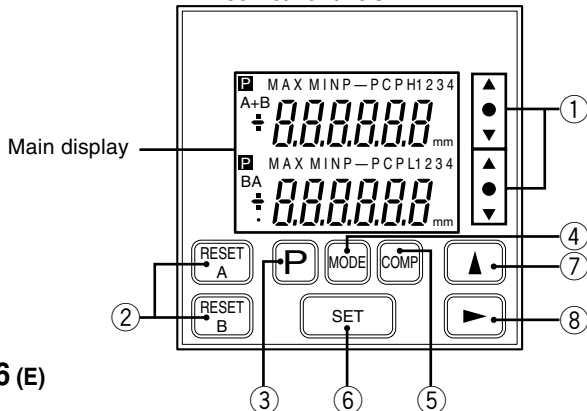
# 4. Name and function of each part

## 4-1. Front panel

1 CH input model : LT20A-101/101B/101C  
LT30-1G/1GB/1GC



2 CH input model : LT20A-201/201B/201C  
LT30-2G/2GB/2GC

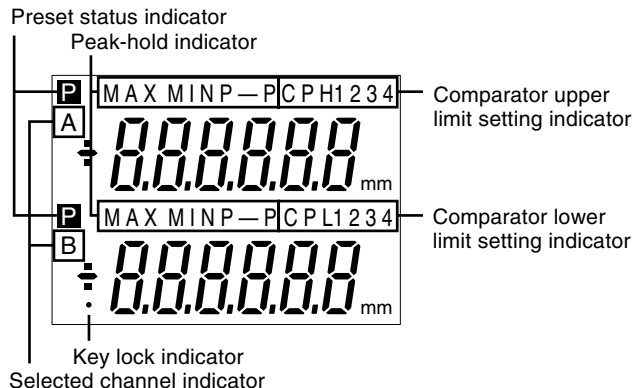


6 (E)

- ① : **Go/No Go test result indicator**  
Gives the result of comparing the displayed value to the comparator's upper and lower limits.  $\Delta$  Over upper limit,  $\circ$  between upper and lower limit,  $\nabla$  under lower limit.
- ② : **Reset key**  
<For the setting which does not uses the reference point>
  - Resets the displayed value to zero.
  - When a value has been preset it returns to this.
 <For the setting which uses the reference point>
  - When held down for two seconds, the unit enters the reference point signal input wait status.
- ③ : **Preset key**  
Enters the preset mode. (For the current value, maximum value, and minimum value.)
- ④ : **Measuring mode setting key**  
Key to enter the mode for selecting one of maximum, minimum, peak-to-peak (maximum–minimum), or current values.
- ⑤ : **Comparator value setting key**  
Key to enter the mode for setting the comparator upper or lower limit.
- ⑥ : **Setting key**  
Set a mode or a value.
- ⑦ : **Number selection key**  
Selects the number for the digit chosen.
- ⑧ : **Digit selection key**
  - Selects the digit to change when setting numeric values.
  - Normally, when it is held down for 5 seconds, key lock is established; alternatively, if key lock is already established, it is released.

## Main display

Displays the measured data, setting data for various modes, or alarms, etc.



## Selected channel indicator (2 channel model)

Choose one of these four.

Upper	A	A+B	A-B	A+B
Lower	B	A	B	-

- A : data from measuring unit, input channel A
- B : data from measuring unit, input channel B
- A+B: sum of data from channel A and B
- In order to carry out calculations such as A-B or -A+B, change the direction of A or B to “+” or “-”. (Initial settings)

LT20A / LT30 Series

## Note

- If upper display A+B and lower display A have been selected, the comparator setting values of channel A will be applied on both the upper and lower limits.
- When the upper display A+B is selected, the lower display only shows the current value of the selected channel and no operation can be made on the lower display.

## Preset status indicator

When **P** is displayed the preset value is set.

## Peak-hold indicator

When MAX/MIN/P-P is displayed the data shown is the maximum/minimum/maximum–minimum value. When neither of them is shown, the current value is displayed.

## Comparator upper limit setting indicator

Displayed when the comparator value has been set. The upper digits are the upper limit.

## Comparator lower limit setting indicator

Displayed when the comparator value has been set. The lower digits are the lower limit.

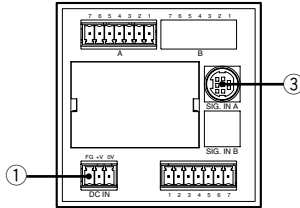
- Up to four different comparator upper and lower limit settings (CPH1 to CPH4 and CPL1 to CPL4) can be stored in the memory for LT20A-101B/201B and LT30-1GB/2GB.
- LT20A-101/201/101C/201C and LT30-1G/2G/1GC/2GC have only one setting each.

## Key lock indicator

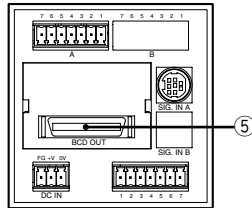
Lighted when key lock is established; off when key lock is released.

## 4-2. Rear panel

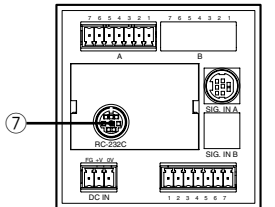
1 channel-models



LT20A-101, LT30-1G

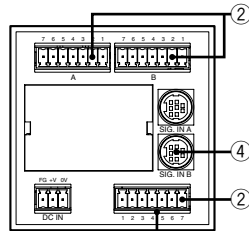


LT20A-101B, LT30-1GB

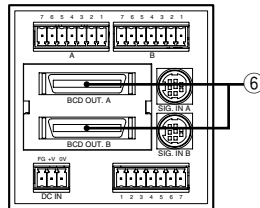


LT20A-101C, LT30-1GC

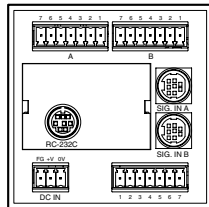
2 channel-models



LT20A-201, LT30-2G Common I/O connector



LT20A-201B, LT30-2GB



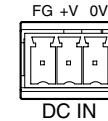
LT20A-201C, LT30-2GC

### ① Power input connector

Connected to the external power supply (+12 V to +24 V DC).

Use a power cable less than 10 meters long.

Connector used : MC1.5/3-ST-3.5 (provided) made by Phoenix Contact



No. 1 2 3

No.	Signal name	Signal
1	FG	Frame ground
2	+ V	Main DC power (+12 V to +24 V) input
3	0 V	GND for power

### ② I/O connectors → See “7. I/O connector”.

There are three kinds of I/O connectors: one type is used for channel A, one for channel B and one for both channels A and B.

Input : Reset, Peak-hold start, Peak-hold pause, RS trigger.

Output: Go/No Go output.

③ **Measuring unit input** : SIG. IN A

④ **Measuring unit input** : SIG. IN B (2 channel models)

⑤⑥ **BCD Output**

With the 2 channel models the upper and lower selections of the front panel's main display correspond to the BCD OUT. A/BCD OUT. B. So if "A+B" is selected the output is to BCD OUT. A.

The following operations are possible when BCD input/output terminal is used.

Input : Comparator value selection (4 settings),  
measuring mode (current value, maximum value,  
minimum value, peak-to-peak values) selection

Output: 6 digits

Outputs one of the current, maximum,  
minimum, and peak-to-peak values selected  
via the keys on the front panel and the  
external input.

Alarm output

⑦ **RS-232C interface**

(See "9. RS-232C Interface".)

Reset, peak-hold start, setting/recall of preset values,  
setting the comparator value, selecting and outputting  
the current value/maximum value/minimum value/  
peak-to-peak value.

## 4-3. Function description

### 4-3-1. Reset key

Counter unit	Operation performed when reset key is pressed
Measuring mode (Current value, maximum value, minimum value, peak-to-peak value)	<ul style="list-style-type: none"><li>• <b>For the setting which does not use the reference point</b> Display is set to zero. When a preset value has been set, it is recalled. (Except when the Measuring mode is set to peak-to-peak value)</li><li>• <b>For the setting which uses the reference point</b> At the press of the key, the maximum and minimum values will be set to the current value (peak-to-peak value = 0). When the key remains pressed for two seconds, the unit is set to the reference point signal input wait status.</li></ul>
Preset mode ( <b>P</b> and the selected digit will flash.)	Preset value is set to zero.
"Error" is displayed	<ul style="list-style-type: none"><li>• <b>For the setting which does not use the reference point</b> "Error" is canceled and then returns to the measuring state.</li><li>• <b>For the setting which uses the reference point</b> "Error" is canceled and the unit enters the reference point signal input wait status.</li></ul>

### 4-3-2. Preset functions

- In the case of the setting which does not use the reference point, it is possible to set a preset value for each of the current value, maximum value and minimum value measuring mode; for the setting which uses the reference point, it is possible to set the master values.
- For instructions on setting the preset value, please refer to “5-2-1. Setting the preset value.”

### 4-3-3. Result evaluation

- Go/No Go test is carried out by comparing data from the current measuring mode (current value, maximum value, minimum value, or peak-to-peak value) to the comparator upper and lower limits.
- This result is displayed on the front panel and output from the I/O connector (See “7. I/O connector”).

Result	Display	Condition
High	△	Data > upper limit
Go	○	Upper limit $\geq$ data $\geq$ lower limit
Low	▽	Lower limit > data

### 4-3-4. Peak-hold function

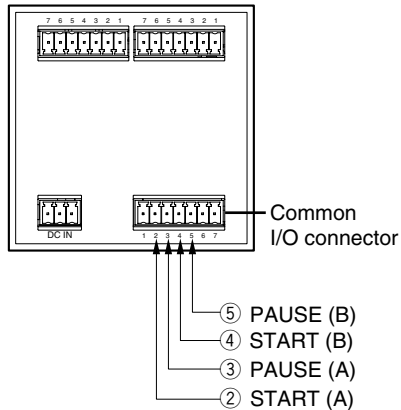
- Stores the maximum, minimum, and peak-to-peak (maximum–minimum) values of the measured values.
- The above mentioned measuring mode is set using the keys on the front panel.
- The device starts storing values either when a start signal is supplied to the start/latch pins (channel A: pin ②, channel B: pin ④) of the lower 7-pin I/O connector (common) (See “7. I/O connector”). or when the reset key has been pressed.

Operation	Result
I/O connector (common) A CH: starts on “L” (ON) signal from pin ②; I/O connector (common) B CH: starts on “L” (ON) signal from pin ④.	Starts storing from the current value.
Reset key is pressed (For the setting which does not use the reference point)	Starts storing from zero. When a preset value is set the device starts storing from the preset value.



### 4-3-5. Peak-hold pause function

- Pause the storing of the maximum, minimum and peak-to-peak (maximum-minimum) values of the measured values.
- When the peak-hold function is to be paused, set the pause pin of the lower 7-pin I/O connector (common) to ON; to resume storing, set it to OFF.



### Peak value data update stop (pause)

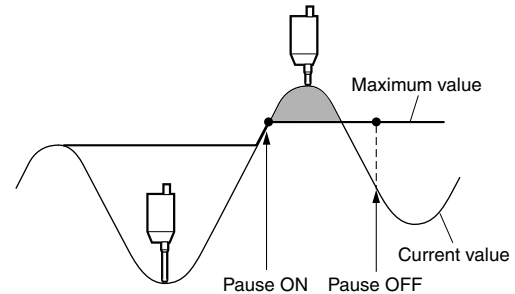
#### When pause is ON

The peak value updating is stopped. The current value is constantly updated.

If the maximum value mode, minimum value mode or peak-to-peak value mode is set as the measuring mode, the Go/No GO judgment output and the output data are not updated even when the measuring unit is operated.

#### When pause is OFF

The peak values are constantly updated.



### 4-3-6. Latch functions

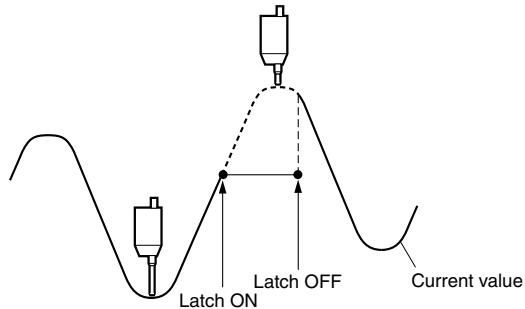
In the current value mode, this function holds output data and Go/No GO output for that value.

[Latch conditions]

- The start input signal is set as the latch input by the parameter setting.
- Current value mode

#### Note

This function does not operate when the measuring mode is peak value mode.



## 5. Operation



This sections uses the 2 channel model in its explanations. The 1 channel model is the same as the 2 channel model without the B channel.

BCD and RS-232C models are noted in the text.


### 5-1. Initial settings



An initialization is carried out at the time of shipping; however it is possible to make the following selections depending on intended use. Details of the settings at the time of shipping are given in each section.

- Changing between inches/mm

Turn on power while holding down  and press  key.

Press  to change between inches/mm.

Press  to set and return to the measuring state.

- Device is set to mm at the time of shipping.
- To change the initial settings hold down the  key and press the  key for approximately 2 seconds.




#### Basic operation

 : to the next item.

 : Select item.

 : Set item.

#### Note

- Even if you select an item with the  key, no changes will be made until you press the  key.
- Once the initial setting mode has been entered it is not possible to return to the measuring state partway through. Press the  key repeatedly to skip the items.

LT20A / LT30 Series

### 5-1-1. Basic settings

#### 1. Setting the display (2 channel models)

One of the following may be chosen:

Upper	A	A+B	A+B	A+B
Lower	B	A	B	—

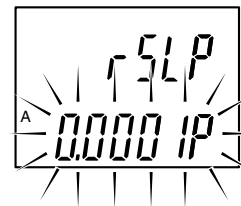


factory-set

When the upper display A+B is selected, the lower display only shows the current value of the selected channel and no operation can be made on the lower display.

#### 2. Setting the input signal resolution (channel A)

- 0.0005 mm is factory-set for the LT20A.
- Set the resolution to match the resolution of the connected measuring unit.



factory-set (LT30)

#### 3. Setting the input signal resolution (channel B, 2 channel models)

0.0001/0.0005/0.001/0.005/0.01 mm

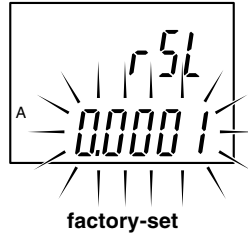
- Set the resolution to match the resolution of the connected measuring unit.

#### 4. Setting the display resolution or direction (channel A)

0.0001/0.0005/0.001/0.005/0.01/  
-0.0001/-0.0005/-0.001/-0.005/  
-0.01 mm

- With the measuring unit's spindle pushed in:
  - +: positive direction
  - : negative direction

\* When set to inches, values are chosen from 0.00002, 0.00005, 0.0002, 0.0005, -0.00002, -0.00005, -0.0002, and -0.0005.



#### Note

The resolution cannot be set higher than the resolution set in step 2.

#### 5. Setting the display resolution or direction (channel B, 2 channel models)

0.0001/0.0005/0.001/0.005/0.01/-0.0001/-0.0005/  
-0.001/-0.005/-0.01 mm.

- With the measuring unit's spindle pushed in:
  - +: positive direction
  - : negative direction
- When displaying A+B:
  - If you set the direction of A to “-” the data displayed is the calculation “-A+B”.
  - The same can be done with B.

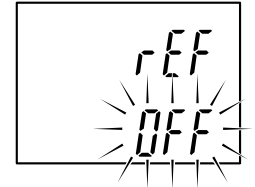
#### Note

- The resolution cannot be set higher than the resolution set in step 3.
- When the addition A+B is chosen the direction for B can be selected, but its resolution will be the same as that of A.

#### 6. Setting the use of the reference point

Set whether to use the reference point of the measuring unit.

- ON* : When the reference point is used
- OFF* : When the reference point is not used

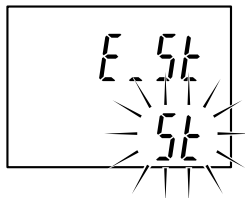


factory-set

## 7. Selecting the start input terminal (I/O connector) function

(See "7. I/O connector".)

**St** : Start function  
Setting this terminal to "L" (ON) sets the peak-hold value to the current value and restarts the storing procedure.



**factory-set**

**LATCH** : Latch function  
When using the current value measuring mode, setting this terminal to "L" (ON) stores the output and display of the Go/No Go comparison at that point in time.

### Note

When the latch is ON, display and Go/No Go output storage by the DRQ input for the BCD model and RS-TRG input for the RS-232C model is invalidated.

**Initial settings are now complete for the standard model.**

Pressing **MODE** .. **Standard model** → Returns to the measuring state.

**BCD model** → Go to section 5-1-2.

**RS-232C model** → Go to section 5-1-3.

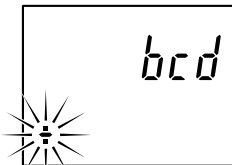
## 5-1-2. BCD model (only LT20A-101B/201B, LT30-1GB/2GB)

Proceeds to the next setting mode from "5-1-1. Basic settings" step 7.

### 1. BCD logic

Setting the BCD output logic.  
"+" is true logic.  
"-" is false logic.

Exception : Logic for the DRQ, READY, and alarm terminals cannot be changed.  
(See "8. BCD output")



**factory-set**

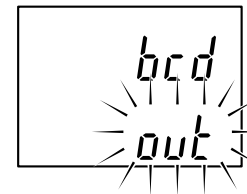
### 2. BCD output format

Setting the BCD output format.

**out** : BCD is output according to the DRQ signal input, and the resulting status is held even if the DRQ signal goes off.

**or** : BCD is output according to DRQ signal input, and assumes high-impedance status when there is no DRQ signal input.

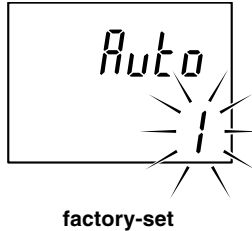
**Auto** : BCD is output at all times at the set time interval without the input of the DRQ signal.




**factory-set**

### 3. Automatic BCD output time interval

This mode is established when *AUTO* has been set in step 2. Select one of the eight time intervals listed below.  
1/2/4/8/16/32/64/128 ms  
(See “8-2. Signal timing” for the BCD input/output timing)



**Initial settings are now complete for the BCD model.**

Press  to return to the measuring state.

### 5-1-3. RS-232C model (only LT20A-101C/201C, LT30-1GC/ 2GC)

Proceeds to the next setting mode from “5-1-1. Basic settings” step 4.

#### 1. Setting the output data format

- nor* : Normal output  
1st byte : Channel name (A or B)  
2nd byte : Sign (“+”<sup>\*</sup> or “-”)  
3rd to 9th bytes: Numerical data  
(ex.12.3456)
- PARA* : Outputting with measurement mode information  
1st byte : Channel name (A or B)  
2nd byte : Current mode  
(N: Current value,  
P: Peak-to-peak value,  
I: Minimum value,  
A: Maximum value)  
3rd byte : Unit (M: mm, I: inch)  
4th byte : Sign (“+”<sup>\*</sup> or “-”)  
5th to 11th bytes: Numerical data  
(ex.00.0000)

<sup>\*</sup>: (“+” or space)

*E\_PPRR* : Outputting with measuring mode information and comparator Go/No Go result

1st byte : Channel name (A or B)

2nd byte : Current mode  
(N: Current value,  
P: Peak-to-peak value,  
I: Minimum value,  
A: Maximum value)

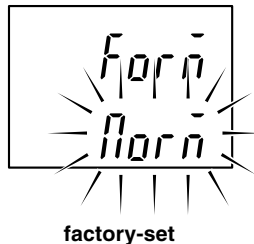
3rd byte : Unit (M: mm, I: inch)

4th byte : Comparator Go/No Go result  
U : Upper limit over  
G : Within range  
L : Lower limit under  
E : When an alarm has occurred

5th byte : Sign (“+”※ or “-”)

6th to 12th bytes : Numerical data  
(ex.00.0000)

Whether, with the 2 channel model, to output B channel data following a space or to divide it with the delimiter is selected by step 9.



※: (“+” or space)

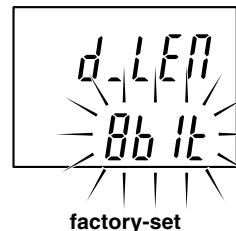
## 2. Setting the data signalling rate

*bPS* is displayed and the data signalling rate can be selected.  
2400/9600/19200/38400 bps



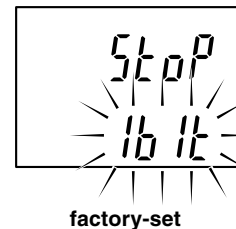
## 3. Setting the data length

*d.LEN* is displayed and the data can be set to 7 or 8 bits.



## 4. Setting the stop-bit

*StoP* is displayed and the stop bit can be set to one or 2 bits.



### 5. Setting the parity

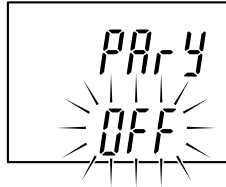
*PAR4* is displayed and the parity can be switched on or off.

*OFF* : No parity

*ON* : Parity

#### Note

When the data length is set to 7 bits in step 3, select "Parity".



factory-set

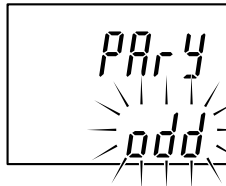
### 6. Selecting odd or even parity

Switches to this mode when

*ON* is chosen above.

*odd* : Odd parity

*EVEN* : Even parity



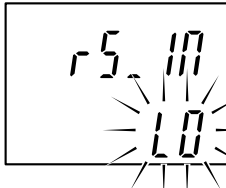
factory-set

### 7. Selecting the function for the RS-TRG terminal

*LO* : Mode for inputting mechanical contact outputs (such as relay and switch outputs).

*HI* : Mode for inputting electronic circuit outputs (such as transistor outputs).

*CYCLE* : To output at a set interval.



factory-set

#### Note

The RS-TRG input cannot be used when *CYCLE* has been selected.

18 (E)

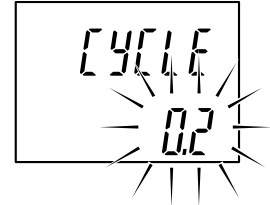
### 8. Selecting the output time interval.

This mode is selected when

*CYCLE* has been chosen in step 7.

One of the following eight intervals can be chosen.

0.2/0.5/1.0/5.0/10/30/60/300 s



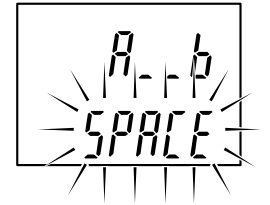
factory-set

### 9. Selecting the data transmission format (2 channel models)

*A\_b* is displayed and one of the following is chosen.

*SPACE* : format (a) given below

*CR LF* : format (b) given below



factory-set

- To output from channel A -12.3456, and from channel B 67.891:

(a) A-12.3456□B+67.8910 *CR LF*

(b) A-12.3456 *CR LF* B+67.8910 *CR LF*

#### Note

□ means a space.



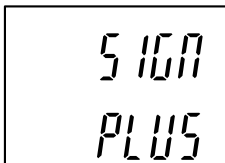
## 10. Plus sign setting of the output data

When the output data is positive, output characters will be set as a plus sign.

This setting will also be reflected in the input data (preset value, comparator value).

*PLUS* : Outputs plus as a sign.

*SPACE* : Outputs space as a sign. (compatible to previous model)



factory-set

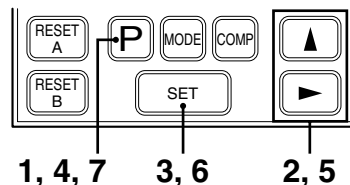
Initial settings are now complete for the RS-232C model.

Press **MODE** to return to the measuring state.

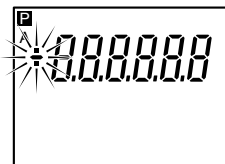
## 5-2. Various settings











In the setting modes there is always an indicator flashing in the main display.

### 5-2-1. Setting the preset value




- 1 Push **P** to select.  
The A channel preset value setting mode.

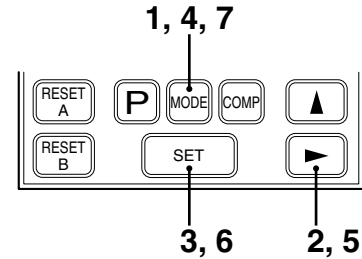



- 2 Push  to select a sign.  
Push  to select a digit to be set.  
The selected digit flashes.  
Push  to select a numeral.
- 3 Push  to set.  
 for A channel flashes.
- 4 Push  to select B channel preset value setting mode.  
B channels sign flashes “+”.  
Single channel models return to the measuring state.
- 5 Same as 2.
- 6 Push  to set.  
Both A/B channel  flashes.
- 7 Push  to returns to the measuring state.  
Both A/B channel  lights.

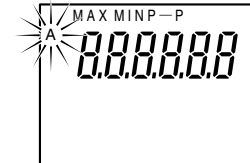
### Note


- If  is not pressed the previous setting is kept.
- In the P-P measuring mode, the preset value cannot be set.


## 5-2-2. Setting the measuring mode





- 1 Push  to select the mode for setting a measuring mode (current value, maximum value, minimum value, or peak-to-peak value) for channel A.  
\* Each of these modes are indicated “A”, “MAX”, “M IN” and “P-P”, respectively.

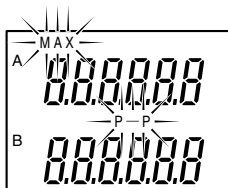



- 2 Push  to select a measuring mode.  
The selected mode's indicator flashes.

- 3 Push  to set.  
Set mode flashes.  
The other channel A modes disappear.




- 4 Push  to select the setting mode for channel B.  
Currently set channel B mode flashes.
- 5 Same as 2.
- 6 Push  to set.  
Modes set for channels A and B flash.

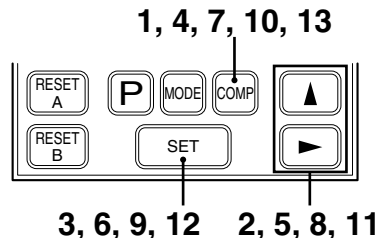



- 7 Push  to return to the measuring state.  
Modes set for channels A and B light.

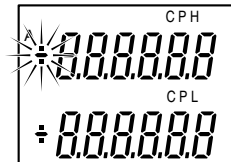
### Note




If you do not press  the previous settings will be kept.  
LT20A / LT30 Series

## 5-2-3. Setting the comparator values



- 1 Push  to select the mode for setting the channel A comparator values. Start from the CPH (comparator upper limit) setting.

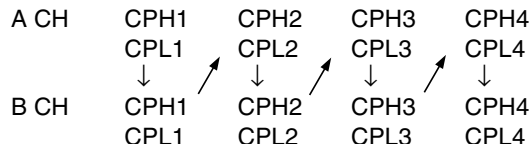


- 2 Push  to select a sign.  
Push  to select digits.  
A selected digit flashes.  
Push  to select a number.

- 3 Push  to set.  
“CPH” flashes.
  - 4 Push  to select the CPL comparator lower limit setting mode. Sign of the CPL value flashes.
  - 5 Same as 2.
  - 6 Push  to set.  
“CPH” and “CPL” flash.
  - 7 Push  to select the mode for setting the channel B comparator values.  
\* Single channel models return to the measuring state.
- 8 }  
9 } Same as 2, 3, 4, 5, 6.  
10 }  
11 }  
12 }
- 13 Push  to return to the measuring state.

### Note 1

With the BCD models four different settings can be stored in memory. The operations are as follows.



- When the 4 settings are not required press  repeatedly.
- Changing the 4 different setting values is carried out via the BCD connector input terminal.
- When the BCD connector is not connected the setting is CPH1 and CPL1.

### Note 2

If  is not pressed the previous setting is maintained.


### Note 3

When the  key is pressed to set the CPL the sign (“+” or “-”) of the CPH value may flash. This is because the CPH (upper limit) is less than the CPL (lower limit), and the device is in the CPH setting mode. In this case, return to and start from the CPH setting.

## 5-2-4. Setting the key lock

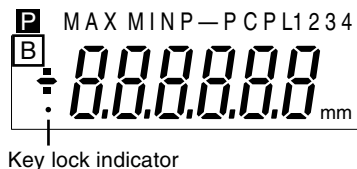
Set the key lock to invalidate the key operations. This stores the displayed values or set values should a key is hit by accident. The key lock can be set during normal operations.

### Setting


1. Press and hold  (for about 5 seconds). Keep pressing until the key lock indicator in the main display changes from flashing to on.

#### Note

The setting is not performed unless the key is pressed while the indicator is flashing.



### Release

1. Press and hold  (for about 5 seconds). Keep pressing until the key lock indicator in the main display changes from flashing to off.

#### Note

The release is not performed unless the key is pressed while the indicator is flashing.

## 6. Reference point

### When the reference point is not used (factory setting)

After the power is turned on, the measuring mode is established automatically.

(Incremental operation)

### When the reference point is used

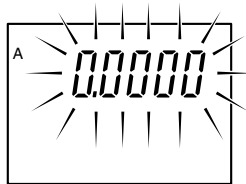
After the power is turned on, the unit automatically enters the reference point signal input wait status, and then automatically enters the measuring mode when the reference point is passed.

#### Note

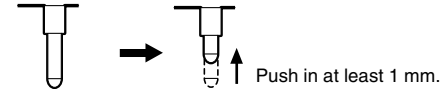
This can be used only when using a measuring unit with a reference point.

[How to set the reference point]

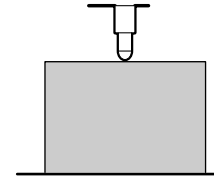
- 1 Turn on the power.  
The count display starts flashing.



- 2 Push the spindle of the measuring unit upward by 1 mm or more, and retract it.  
The count display stops flashing and lights instead.



- 3 Align the measuring unit with the master object to be measured.



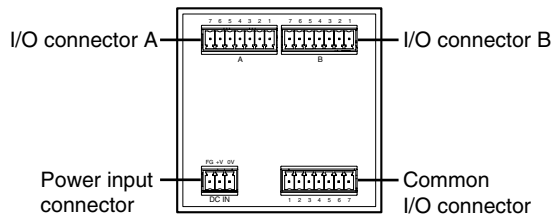
- 4 Input the master value as the preset value. (See "5-2-1. Setting the preset value")

Once this value is set, the reference point will be set automatically after the power is next turned on when the spindle of the measuring unit is pushed upward by 1 mm or more. To reset the reference point, press the reset key for two seconds or set the reset input pin of the I/O connector to ON for two or more seconds. To set it using RS-232C, input the "L" command. Then proceed again from step 1.

## 7. I/O connector

The I/O connector on the rear panel of the counter unit has functions for Go/No Go output based on the comparator function, start input, pause input, RS-232C trigger input and reset input.

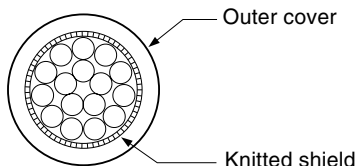
### 7-1. Connector pin assignment



Rear of counter unit

- Use a shielded cable for connection to the FG pin on the rear of the counter unit.  
(Prepare a shield cable by yourself.)

#### Cross section of the cable



Connector used : MC1.5/7-ST-3.5 (provided) made by Phoenix Contact

### Signal

(See “4-3. Function description”.)

#### I/O connector A

Pin No.	Signal name	IN/OUT	Signal
1	GND	–	
2	NC	–	Connection prohibited
3	RESET (A)	IN	Reset input (A CH)
4	LO (A)	OUT	Go/No Go output Low (A CH)
5	GO (A)	OUT	Go/No Go output Go (A CH)
6	HI (A)	OUT	Go/No Go output High (A CH)
7	GND	–	

#### I/O connector B (not provided for 1-channel models)

Pin No.	Signal name	IN/OUT	Signal
1	GND	–	
2	NC	–	Connection prohibited
3	RESET (B)	IN	Reset input (B CH)
4	LO (B)	OUT	Go/No Go output Low (B CH)
5	GO (B)	OUT	Go/No Go output Go (B CH)
6	HI (B)	OUT	Go/No Go output High (B CH)
7	GND	–	

### I/O connector (common)

Pin No.	Signal name	IN/OUT	Signal
1	GND	–	
2	START (A)	IN	Start/latch input (A)
3	PAUSE (A)	IN	Pause input (A)
4	START (B)	IN	Start/latch input (B) *1
5	PAUSE (B)	IN	Pause input (B) *1
6	RS-TRG	IN	RS-232C data output/trigger input *2
7	GND	–	

\*1 : The connection of this pin is prohibited for 1-channel models.

\*2 : The connection of this pin is prohibited except in RS-232C models.

### Go/No Go output

High : displayed value > upper limit → “L” (ON)  
 Go : upper limit  $\geq$  displayed value  $\geq$  lower limit → “L” (ON)  
 Low : lower limit > displayed value → “L” (ON)

#### Note

All Go/No Go outputs are “H” (OFF) when an alarm is set.

### Start/latch input

- The “L” (ON) signal sets the maximum, minimum, and peak-to-peak values to the current value and restarts their storing. (Start function)
- If, when the initial setting of  $SL$  which was set at the time of shipping is changed to  $LATCH$ , the current value mode serves as the measuring mode, the “L” (ON) signal will hold the Go/No Go output (I/O connector) and display. (Latch function)

#### Note

While the Go/No Go output is at the “L” level, reset/preset value recall cannot be effected by reset key or external reset/preset value recall input.

### Reset input

- For the setting which does not use the reference point “L” (ON) sets the measured value to zero. When there is a preset value this is recalled.
- For the setting which uses the reference point. The unit enters the reference point signal input wait status when the input is set to “L” (ON) for two or more seconds.

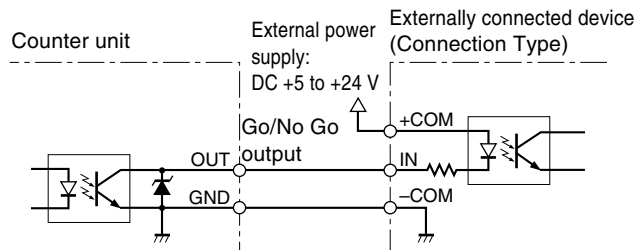
#### Note

Even when the “L” level is held, the Go/No Go output (I/O connector) and the display are not held.



## 7-2. I/O circuitry (I/O connector area)

### Output circuit

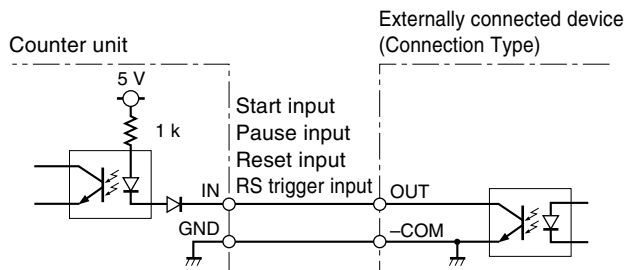


Output signal rating

On:  $V_{OL} = \text{MAX. } 1.4 \text{ V}$  (when output current  $I_{OL} = 10 \text{ mA}$ )

Off:  $V_{OH} = \text{MAX. } 26.4 \text{ V}$  (output current  $I_{OH} = \text{MAX. } 50 \mu\text{A}$ )

### Input circuit



- Output specifications  
NPN open collector output  
DC+5 to +26.4 V 10 mA or less (150 mW or less)

#### Note

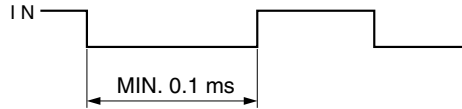
When connecting a device such as a relay to output pins, first check the operational coil rating of the relay. Be sure to connect a back-voltage absorption diode in parallel with the coil.

- Input specifications  
OFF voltage: +4 to +26.4 V or open  
ON voltage : +0.8 V or less  
Between IN and GND, either open (OFF) or short (ON) is possible

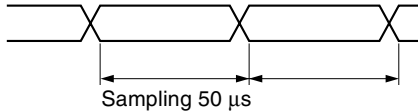
### 7-3. Signal timing

Start input to I/O connector (common) pins ②④

Reset input to I/O connector A pin ③, B pin ③

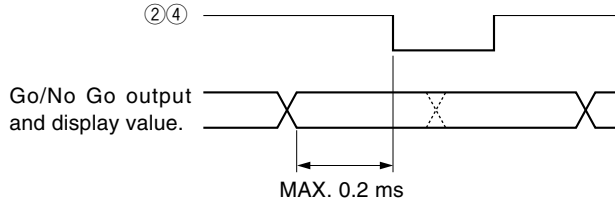


I/O connector A pins ④⑤⑥ B pins ④⑤⑥



#### Note

When the initial settings of the start/latch pins ② and ④ of the I/O connector (common) are *L L L L*, the “L” (ON) signal will hold the Go/No Go output and display value immediately before.



#### Note

High-speed sampling is performed where the Go/No Go output is updated every 50 μs.

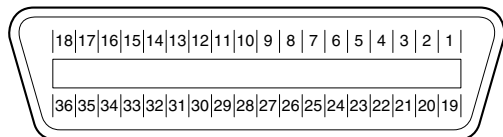
For this reason, when the count value is close to the comparator setting value, the ON-OFF time may be output repeatedly every 50 μs. Be careful because reception may not be possible, depending on the sampling time on the connected device side. In this situation, use the latch function to first store the Go/No Go output and then receive the result.

## 8. BCD output (only BCD model)

The current value, maximum value, minimum value, and peak-to-peak value data is output from the BCD connector. There are also features for alarm output, comparator value selection input and measuring mode (current value, maximum value, minimum value, peak-to-peak value) selection input. The output is all an open collector equivalent to the IC “74LS06”. With the 2 channel model, both channel A and B have the same features.

### 8-1. Connector pin assignment

As seen from the rear of the counter unit.



#### Connector to be procured

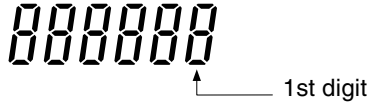
Manufactured by Hirose Electric, Co., LTD  
 DX10-36S (Counter unit receptacle)  
 DX40-36P (Plug: accessory)  
 DX-36-CV (Plug case: accessory)

#### Signal

Pin No.	Signal	Pin No.	Signal
1	1st digit Q1 (A)	19	Q3 (C)
2	Q2 (B)	20	Q4 (D)
3	Q3(C)	21	6th digit Q1(A)
4	Q4 (D)	22	Q2 (B)
5	2nd digit Q1 (A)	23	Q3 (C)
6	Q2 (B)	24	Q4 (D)
7	Q3 (C)	25	M-VALID
8	Q4 (D)	26	GND
9	3rd digit Q1 (A)	27	GND
10	Q2 (B)	28	GND
11	Q3 (C)	29	SIGN output
12	Q4 (D)	30	DRQ input
13	4th digit Q1 (A)	31	READY output
14	Q2 (B)	32	MOD 0
15	Q3 (C)	33	MOD 1
16	Q4 (D)	34	Alarm output
17	5th digit Q1 (A)	35	Comparator value selection A
18	Q2 (B)	36	Comparator value selection B

**Note**

- The counter unit's least significant digit (rightmost digit) is the first digit.  
The letters in parentheses have the following meanings  
A: 1, B: 2, C: 4, D: 8.



- Note that the signal arrangement differs from the LT10/ LT11 series.

**BCD output**

**In the *out* mode, or mode**  
(See “8-2. I/O timing”.)

When DRQ has been received from at ③①, and when the READY output at ③① goes “L” (ON), the BCD data is output.

**In the *Auto* mode**

The data is output at the output time interval which was set as the initial setting even when DRQ is not input.

- Output logic  
True logic or false logic can be selected.  
(See “5-1-2. BCD model”)  
True logic : “L” (ON) is “0”.  
                  “H” (OFF) is “1”.

- Output format  
Whether to hold the BCD output data or to assume high-impedance when there is no DRQ signal input can be selected.  
(See “5-1-2. BCD model”)  
In the *Auto* mode, the unit cannot enter the high-impedance state.

**Measuring mode selection input**

Current value, maximum value, minimum value, peak-to-peak value can be selected.

Measuring mode	③② pin (MOD 0)	③③ pin (MOD 1)	③④ pin (M-VALID)
Current value	L	L	L
Maximum value	H	L	
Minimum value	L	H	
P-P values	H	H	
According to the key switch settings	×	×	H

×: Either setting possible

**SIGN output**

Tells whether the output data is positive or negative.  
With true logic “H” (OFF) is “-”, and “L” (ON) is “+”.

## Alarm output

“H” (OFF) is output when the unit enters the alarm state. This is set to “L” (ON) by pressing the reset key or by the I/O connector reset input after eliminating the various causes of the alarm.

## Comparator value selection input

The four comparator value pairings set in the counter unit can be selected.

Pin ②	Pin ④	Comparator value (Upper limit CPH, lower limit CPL)
H	H	CPH1, CPL1
L	H	CPH2, CPL2
H	L	CPH3, CPL3
L	L	CPH4, CPL4

## DRQ display/output hold feature

While the DRQ signal is “L” (ON) the display and output (BCD, Go/No Go output of I/O connector) of terminals are stored.

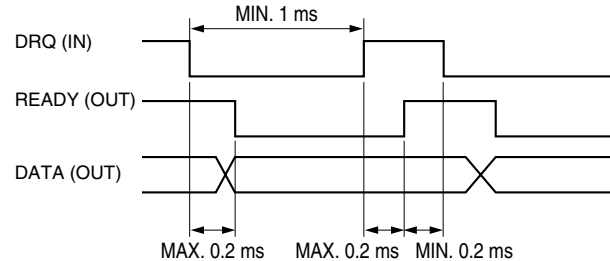
(When the BCD output form is set to *OUT*, only the BCD output data is held on DRQ becoming “H” (OFF).)

However, when the initial settings of pins ② and ④ of the I/O connector (common) are changed from *SET* which was set at the time of shipping to *LELH*, the hold function for the display and I/O connector Go/No Go output is enabled only for pins ② and ④ of the I/O connector (common), and the DRQ hold is valid only for the BCD output data.

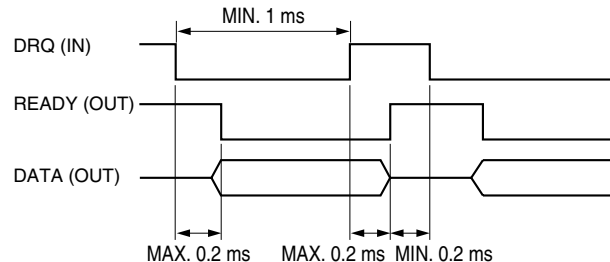
## 8-2. Signal timing

①-②④ Data, ③① DRQ input, ③① READ output

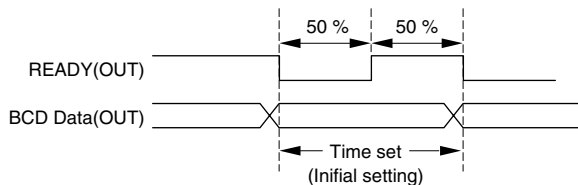
- When Initial setting *OUT* (See P15 for factory-set.)



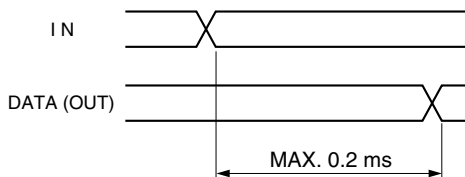
- When Initial setting *OR*



- When Initial setting  $R_{ULT0}$



### ③⑤③⑥ Comparator value selection input



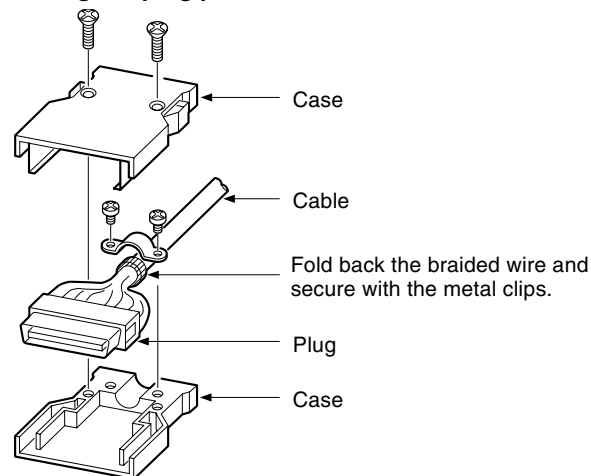
## 8-3. Interface cable

- Use a shielded cable with thickness less than  $\phi 8.7$  mm, and length under 2 m. In addition, connect the shielded cable of the connected equipment to frame GND.
- The plug case is connected to FG of the counter unit. Connect the braided wire to the case after folding back and securing with the metal clips.

### Note

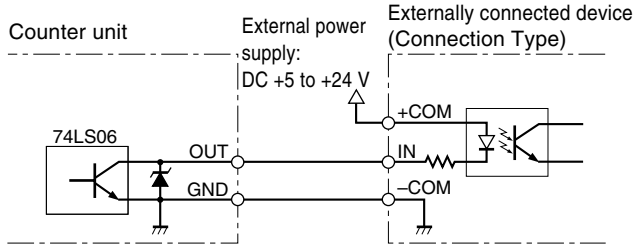
Be sure to insulate (with insulation tubes, etc.) the soldered areas of the plug and cable to prevent a malfunction caused by contact between the case and plug pins.

### Assembling the plug provided



## 8-4. BCD input/output circuits

### Output circuit

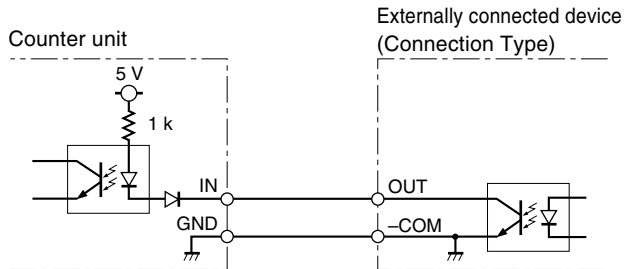


Output signal rating

On:  $V_{OL} = \text{MAX. } 1.4 \text{ V}$  (when output current  $I_{OL} = 10 \text{ mA}$ )

Off:  $V_{OH} = \text{MAX. } 26.4 \text{ V}$  (output current  $I_{OH} = \text{MAX. } 50 \mu\text{A}$ )

### Input circuit



- Output specifications

NPN open collector output

DC+5 to +26.4 V 24 mA or less

- Input specifications

OFF voltage: +4 to +26.4 V or open

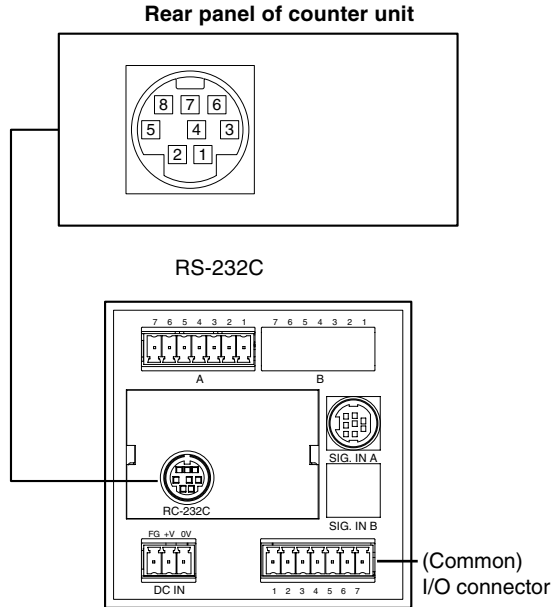
ON voltage : +0.8 V or less

Between IN and GND, either open (OFF) or short (ON) is possible

## 9. RS-232C Interface (only RS-232C model)

The counter unit is connected to a personal computer to use the computer to control the counter unit. (See “5-1-3. RS-232C model”.)

### 9-1. Terminal pin assignment



### Signal

#### • RS-232C

Pin No.	I/O	Signal	Connected equipment side
1		N.C	—
2		SG (Signal GND)	SG
3	I	RXD (Received data)	TXD
4	O	TXD (Transmit data)	RXD
5	I	CTS (Clear to send)	RTS
6	O	RTS (Request to send)	CTS
7		+10 V	DSR
8		N.C	

#### • RS-TRG (I/O connector (Common))

An “L” (ON) input 1 causes the measured values to be output via the RS-232C connector.



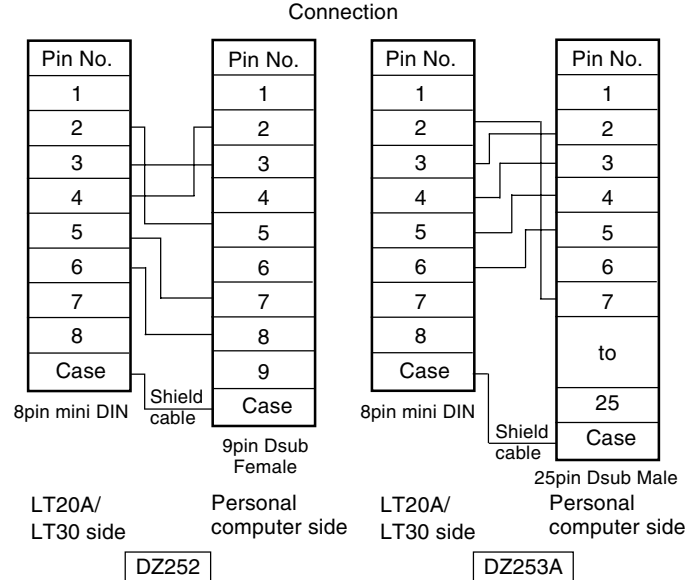
## 9-2. Connecting a personal computer

Use a DZ252 or DZ253A RS-232C cable (sold seperately) for connecting personal computers. (See "9-6. Commands".)

### Note

The shielded cables of the DZ252 and DZ253A connectors are connected to FG of the counter unit.

The DZ252 and DZ253A connectors for the personal computer side are 9 and 25-pin Dsub connectors, respectively. Please check the form of the personal computer's RS-232C connector before purchasing the cable for connection. For further information please consult your dealer.



## 9-3. RS-232C Interface

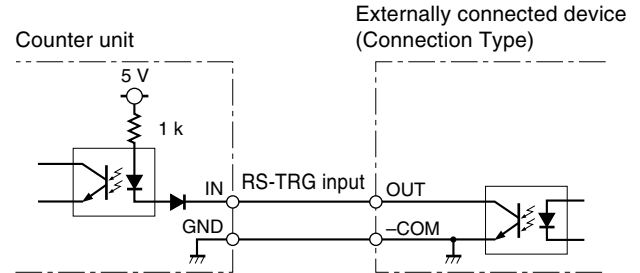
### 1. Signals (Conforming to EIA-RS-232C)

Signals : Asynchronous, start-stop system,  
full duplex system  
Data signalling rate : 2400, 9600, 19200, 38400 bps  
Data length : Switchable between 7 or 8 bits  
Parity : None, odd, or even selectable.  
Stop bits : Switchable between 1 or 2 stop bits  
Cable length : Max.15 m

- Switching of the various parameters is performed in the initial settings (P16).
- The above underlined items are the settings at the time of shipping.

## 9-4. RS-TRG circuit

Input circuit : Common I/O connector pin ⑥



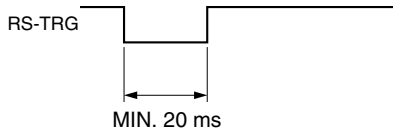
## 9-5. Output

To output measured data from the RS-232C choose one of the following four methods.

### 1. Input to the RS-TRG terminal ①

Initial setting:  $L\bar{L}$  (set at time of shipping)

This mode is for inputting mechanical contact outputs (such as relay and switch outputs). Data is output 20 ms after an “L” level signal has been received.

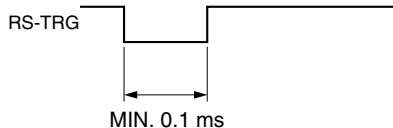


### 2. Input to the RS-TRG terminal ②

Initial setting:  $H\bar{L}$

This mode is for inputting electronic contact outputs (such as transistor outputs).

However, there must be no chattering in the input signal. Data is output after an “L” level signal has been received.



### 3. Output at set interval

Initial setting:  $L\bar{Y}L\bar{L}E$

Eight intervals available, 0.2/0.5/1.0/5.0/10/30/60 and 300 s.

\* This interval is set with the initial settings.  
(See “5-1-3. RS-232C model”.)

### 4. Commands

Data is output by input ASCII code commands. For more details see section 9-6.

Commands are received even in the output method 1, 2 and 3 modes.

- Holding display and output.

While the RS-TRG signal is “L” (ON), the display and output (RS-232C data and I/O connector Go/No Go) are held. However, when the initial settings of pins ② and ④ of the I/O connector (common) are changed from  $S\bar{E}$  which was set at the time of shipping to  $L\bar{A}L\bar{E}L\bar{H}$ , the hold function for the display and I/O connector Go/No Go output is enabled for the inputs of pins ② and ④ of the I/O connector (common), and the RS-TRG input is canceled.

## 9-6. Commands

### 1. Command table (Converted to ASCII code)

Command	Operation
*P-P	Switch to peak-to-peak value mode.
*MAX	Switch to maximum value mode.
*MIN	Switch to minimum value mode.
*REAL	Switch to current value mode.
*RCL	Recall the preset value.
*RES	Reset.
*START	Start.
*P= ¥ ¥ ¥ ¥ ¥ ¥ ¥ ¥ /*P=?	Set/read preset value.
*CH= ¥ ¥ ¥ ¥ ¥ ¥ ¥ ¥ /*CH=?	Set/read comparator upper limit.
*CL= ¥ ¥ ¥ ¥ ¥ ¥ ¥ ¥ /*CL=?	Set/read comparator lower limit.
*r	Request for output for one channel.
R	Request for outputs for 2 channels.
KEYON	Allow use of front panel key.
KEYOFF	Prohibit use of front panel key.
*PAUON	Stop peak value update
*PAUOFF	Release peak value update stop
*LCHON	Latch the current value.
*LCHOFF	Release the current value latch
*L	Reset reference point
*LO=?	Read reference point offset value
VER=?	Read software version

\* : For the 1 channel model or the 2 channel model A channel use "A", for the 2 channel model B channel use "B".

¥ : Value to be set. (Example: 12.3456)

### Note

- In the case of the setting which does not use the reference point, inputting the “reset” command when there is a preset value will set the value to zero. To recall the preset value input the “recall preset value” command.
- In the case of the setting which uses the reference point, the “Reset”, “Set the preset value”, “Recall the preset value” commands are invalid.
- The data set by the commands given in the table will not be stored by the counter unit.  
If the power is turned off the settings must be repeated.
- Provide intervals of at least 5 ms between command inputs.  
However, input the commands after data output is completed for operations accompanied by data output.

## 2. Example of data transmission

- External device → counter unit  
To preset 12.3456 for A channel  
AP=12.3456 CR LF
- Counter unit → external device
  - ① When a 1 channel model has received the “R” command, or a 2 channel model has received the “Ar” command :  
During normal operation : A+\*12.3456 CR LF  
(Output the A channel value of 12.3456)  
When an alarm is triggered : AE CR LF
  - ② When a 2 channel model has received the “R” command :  
During normal operation :
    - (a) A-12.3456 B+\*67.8912 CR LF
    - (b) A-12.3456 CR LF B+\*67.8912 CR LF  
(Output the A channel value of -12.3456 and the B channel value of 67.8912)When an alarm is triggered :
    - (a) AE BE CR LF
    - (b) AE CR LF BE CR LF(a) or (b) can be chosen with the initial settings.  
(See “5-1-3. RS-232C model”).

### Note

□ means a space.

※: (“+” or space)

### 3. The output data format

Changing according to the initial settings (See P16.).

#### ① Normal condition

Initial setting :  $\overline{P0r\bar{n}}$

Normal output (set at time of shipping)

1st byte : Channel name (A or B)

2nd byte : Sign (“+”※ or “-”)

3rd to 9th bytes : Numerical data (ex.12.3456)

Initial setting :  $\overline{PPr\bar{r}}$  (Outputting with measurement mode information)

1st byte : Channel name (A or B)

2nd byte : Current mode  
( N : Current value,  
P : Peak-to-peak value,  
I : Minimum value,  
A : Maximum value)

3rd byte : Unit (M: mm, I: inch)

4th byte : Sign (“+”※ or “-”)

5th to 11th bytes : Numerical data (ex. 00.0000)

Initial setting :  $\overline{E\_PPr\bar{r}}$

Outputting with measuring mode information and comparator Go/No Go result

1st byte : Channel name (A or B)

2nd byte : Current mode  
(N: Current value,  
P: Peak-to-peak value,  
I: Minimum value,  
A: Maximum value)

3rd byte : Unit (M: mm, I: inch)

4th byte : Comparator Go/No Go result

U : Upper limit over

G : Within range

L : Lower limit under

E : When an alarm has occurred

5th byte : Sign (“+”※ or “-”)

6th to 12th bytes : Numerical data  
(ex.00.0000)

※: (“+” or space)

② When an alarm is triggered

Initial setting :  $\overline{A} \overline{O} \overline{r} \overline{n}$

For an overflow alarm

- 1st byte : Channel name (A or B)
- 2nd byte : Sign (“+”※ or “-”)
- 3rd byte : F
- 4th to 9th bytes : Numerical data

For a non-overflow alarm

- 1st byte : Channel name (A or B)
- 2nd byte : E

Initial setting :  $\overline{P} \overline{P} \overline{r} \overline{A}$

- 1st byte : Channel name (A or B)
- 2nd byte : E
- 3rd byte : F (For an overflow alarm)  
O (For a non-overflow alarm)

Initial setting :  $\overline{E} \overline{P} \overline{P} \overline{r} \overline{A}$

For an overflow alarm

- 1st byte : Channel name (A or B)
- 2nd byte : Current mode  
(N : Current value,  
P : Peak-to-peak value,  
I : Minimum value,  
A : Maximum value)
- 3rd byte : Unit (M: mm, I: inch)
- 4th byte : E
- 5th byte : Sign (“+”※ or “-”)
- 6th byte : F
- 7th to 12th bytes : Numerical data  
(ex.2.3456)

For a non-overflow alarm

- 1st byte : Channel name (A or B)
- 2nd byte : Current mode  
(N : Current value,  
P : Peak-to-peak value,  
I : Minimum value,  
A : Maximum value)
- 3rd byte : Unit (M: mm, I: inch)
- 4th byte : E
- 5th to 12th bytes : “□□Error□”

**Note**

- □ means a space.
- For the 2 channel model, whether to output B channel data following a space or to divide it with the delimiter is selected by the initial setting (See P18, step 9.).

※: (“+” or space)

# 10. Alarm display/output

LCD	Item	Output			Cause	Solution
		I/O connectors	BCD	RS-232C <small>(Note)</small>		
-----	Measuring unit is not connected or connection has been cut. Measuring unit speed over.	All "H"	Alarm terminal is "H"	*E CR LF output. (* is A or B.)	The measuring unit was exchanged with the power on.	Reset
					Measuring unit is not connected or connection has been cut	Fix problem and reset.
					The measuring unit's spindle exceeded the maximum response speed.	Reset
Error	Counter unit speed over	All "H"	Alarm terminal is "H"	*E CR LF output. (* is A or B.)	The counter unit's maximum response speed has been exceeded.	Reset
F----- Sixth digit is F	Overflow	—	True logic: sixth digits are all "H". False logic: sixth digits are all "L".	*ΔFXX.XXX CR LF output. (* is A or B, Δ is a plus sign※ or a minus sign, X is a numeral.) ※: ("+" or space)	Value exceeded 6 digits.	Limit input to 6 digits and reset.

(Note) When the output data format is the initial setting  $\overline{P07}$ . See P40, 41 for other formats.

## Note

### If the alarm is again displayed/output after solving the problem

Has the measuring unit or its spindle received some strong shock?

Try replacing with the measuring unit used for the other channel.



# 11. Specifications

## 11-1. LT20A (Specifications)

Item \ Model	LT20A-101	101B	101C	201	201B	201C
<b>Display</b>	6 digit backlit LCD, mode display					
<b>Measuring unit input</b>	1 channel			2 channel		
<b>I/O connectors *1</b>	○					
<b>BCD *2</b>	—	○	—	—	○	—
<b>RS-232C *3</b>	—		○	—		○
<b>RS-TRG *4</b>	—		○	—		○
<b>Reset function</b>	Reset key or external input (I/O connectors)					
	—	—	RS-232C command	—	—	RS-232C command
<b>Preset function</b>	Preset value set with preset key, recalled with reset key.					
	—	—	Set or recalled with RS-232C command	—	—	Set or recalled with RS-232C command
<b>Comparator function</b>	Three-level comparator Comparator value set with keys on the front panel. Result evaluation: LED and I/O connector output (photocoupler)					
	—	Up to 4 values can be set for comparator (key input). Switched with BCD terminal.	Set with RS-232C command	—	Up to 4 values can be set for comparator (key input). Switched with BCD terminal.	Set with RS-232C command

### \* 1: I/O connector

Input : Reset, peak-hold start, peak-hold pause, RS trigger (RS-232C models only)

Output: Result evaluation (photocoupler)

### \* 2: BCD (36 pin half-pitch connector)

Input : Reset, peak-hold start, comparator value selection (4 settings)

Output : Six digits (open collector)

One of current value/maximum value/minimum value/peak-to-peak value selected and output.

Alarm output

Item \ Model	LT20A-101	101B	101C	201	201B	201C
<b>Peak hold function</b>	Maximum, minimum, and peak-to-peak values. Measuring started by the start input of the I/O connector; update stop by pause input.					
	—	—	RS-232C can set or start.	—	—	RS-232C can set or start.
<b>Input resolution</b>	0.0005 mm, 0.001 mm, 0.005 mm, 0.01 mm selectable					
<b>Display resolution</b>	0.0005 mm, 0.001 mm, 0.005 mm, 0.01 mm (0.00002", 0.00005", 0.0002", 0.0005") selectable					
<b>Direction</b>	Can be switched					
<b>Reference point function</b>	Function use enabled/disabled can be selected (if use is enabled, the unit enters reference point signal input wait status at the same time as power-on).					
<b>Maximum response frequency</b>	20 MHz (A/B phase difference)					
<b>Addition and subtraction function</b>	—			A+B, A-B, B-A can be set with the direction setting.		
<b>Alarm</b>	Speed over or measuring unit cable disconnected (Displayed on LCD or the I/O connector's comparator outputs are all "H" (OFF).)					
	—	BCD alarm terminal "H" (OFF)	See P41	—	BCD alarm terminal "H" (OFF)	See P41
<b>Data storage</b>	Resolution, direction, comparator value, preset value, modes, etc.					
	—	BCD sign, etc	Data signalling rate, etc.	—	BCD sign, etc	Data signalling rate, etc.
<b>Temperature</b>	Operating temperature: 0 to 40°C Storage temperature: -10 to 50°C					
<b>Power consumption</b> <sup>15</sup>	4 W	5 W	4 W	6 W	8 W	6 W
<b>Mass</b>	Approx. 200 g	Approx. 230 g	Approx. 220 g	Approx. 210 g	Approx. 270 g	Approx. 230 g
<b>Power voltage</b>	Power input connector (3 pins) : DC10.8 to 26.4 V.					
<b>Compatible measuring unit</b>	DG-B, DL-B series, MT10 + DT12 series					

**\* 3: RS-232C (8 pin mini-DIN connector)**

Reset, preset value setting/recall, peak-hold start, peak-hold pause, current value hold, reference point reset, reference point offset value read, software version read, comparator value setting, current value/maximum value/minimum value/peak-to-peak measuring mode selection and output, key lock and release.

**\* 4: RS-TRG pin**

Trigger input for RS-232C data output

**\* 5: With measuring unit connected.**

## 11-2. LT30 (Specifications)

Item \ Model	LT30-1G	1GB	1GC	2G	2GB	2GC	
<b>Display</b>	6 digit backlit LCD, mode display						
<b>I/O</b>	Measuring unit input	1 channel			2 channel		
	I/O connectors *1	○					
	BCD *2	—	○	—	—	○	—
	RS-232C *3	—	—	○	—	—	○
	RS-TRG *4	—	—	○	—	—	○
<b>Reset function</b>	Reset key or external input (I/O connectors)						
	—	—	RS-232C command	—	—	RS-232C command	
<b>Preset function</b>	Preset value set with preset key, recalled with reset key.						
	—	—	Set or recalled with RS-232C command	—	—	Set or recalled with RS-232C command	
<b>Comparator function</b>	Three-level comparator Comparator value set with keys on the front panel. Result evaluation: LED and I/O connector output (photocoupler)						
	—	Up to 4 values can be set for comparator (key input). Switched with BCD terminal.	Set with RS-232C command	—	Up to 4 values can be set for comparator (key input). Switched with BCD terminal.	Set with RS-232C command	

### \* 1: I/O connector

Input : Reset, peak-hold start, peak-hold pause, RS trigger (RS-232C models only)

Output: Result evaluation (photocoupler)

### \* 2: BCD (36 pin half-pitch connector)

Input : Reset, peak-hold start, comparator value selection (4 settings)

Output : Six digits (open collector)

One of current value/maximum value/minimum value/peak-to-peak value selected and output.

Alarm output

Item \ Model	LT30-1G	1GB	1GC	2G	2GB	2GC
Peak hold function	Maximum, minimum, and peak-to-peak values. Measuring started by the start input of the I/O connector; update stop by pause input.					
	—	—	RS-232C can set or start.	—	—	RS-232C can set or start.
Input resolution	0.0001 mm, 0.0005 mm, 0.001 mm, 0.005 mm, 0.01 mm selectable					
Display resolution	0.0001 mm, 0.0005 mm, 0.001 mm, 0.005 mm, 0.01 mm (0.00002", 0.00005", 0.0002", 0.0005") selectable					
Direction	Can be switched					
Reference point function	Function use enabled/disabled can be selected (if use is enabled, the unit enters reference point signal input wait status at the same time as power-on).					
Maximum response frequency	20 MHz (A/B phase difference)					
Addition and subtraction function	—			A+B, A-B, B-A can be set with the direction setting.		
Alarm	Speed over or measuring unit cable disconnected (Displayed on LCD or the I/O connector's comparator outputs are all "H" (OFF).)					
	—	BCD alarm terminal "H" (OFF)	See P42	—	BCD alarm terminal "H" (OFF)	See P42
Data storage	Resolution, direction, comparator value, preset value, modes, etc.					
	—	BCD sign, etc	Data signalling rate, etc.	—	BCD sign, etc	Data signalling rate, etc.
Temperature	Operating temperature: 0 to 40°C Storage temperature: -10 to 50°C					
Power consumption <sup>*5</sup>	5 W	5.5 W	5 W	8.5 W	9 W	8.5 W
Mass	Approx. 200 g	Approx. 230 g	Approx. 220 g	Approx. 210 g	Approx. 270 g	Approx. 230 g
Power voltage	Power input connector (3 pins) : DC10.8 to 26.4 V.					
Compatible measuring unit	DK series					

**\* 3: RS-232C (8 pin mini-DIN connector)**

Reset, preset value setting/recall, peak-hold start, peak-hold pause, current value hold, reference point reset, reference point offset value read, software version read, comparator value setting, current value/maximum value/minimum value/peak-to-peak measuring mode selection and output, key lock and release.

**\* 4: RS-TRG pin**

Trigger input for RS-232C data output

**\* 5: With measuring unit connected.**

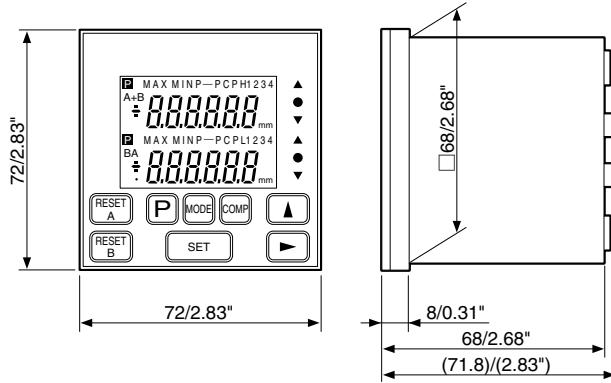
### 11-3. Accessories

Instruction Manual .....	1
Counter stopper .....	1
BCD output connector plug .....	1 (1 ch BCD models only) 2 (2 ch BCD models only)
I/O connectors (7-pin) .....	2 (LT20A-1** / LT30-1**) 3 (LT20A-2** / LT30-2**)
Power input connector (3-pin) .....	1

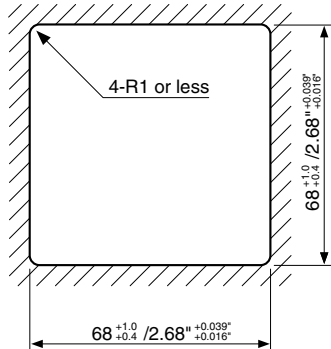
### 11-4. Options

RS-232C connection cable (2 m)	
• Round 8-pin ↔ D-sub 9-pin .....	DZ252
• Round 8-pin ↔ D-sub 25-pin .....	DZ253A
• Round 8-pin ↔ open-end .....	DZ254

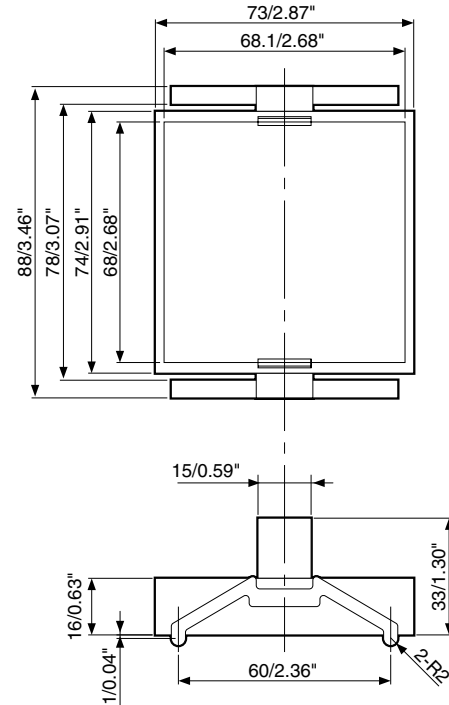
## 11-5. Dimensions



Cut out Opening



Counter stopper



Unit : mm/inch

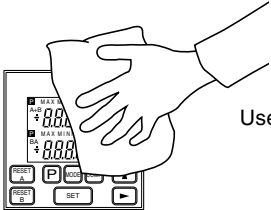

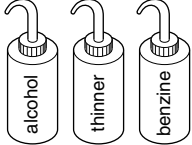
## 12. Troubleshooting

When the unit does not work properly, check the following before calling Magnescale Co., Ltd. Representative for service

The power cannot be turned on.	→	<ul style="list-style-type: none"><li>• Turn off the power and turn it on 1 minute later.</li><li>• Check the connection and continuity of the power line.</li><li>• Check for the proper range of power voltage.</li></ul>
<i>Error</i> is displayed (Alarm)	→	<ul style="list-style-type: none"><li>• Perform resetting operation.</li><li>• Has the measuring unit's cable been disconnected?</li><li>• Is there a large amount of noise?</li></ul>
Channel display is - - - - - (Alarm)	→	<ul style="list-style-type: none"><li>• First carry out the reset procedure.</li><li>• Was the measuring unit exchanged with the power on?</li><li>• Is the measuring unit's connector locked?</li><li>• Is the measuring unit's cable disconnected?</li><li>• Has the maximum response speed for the measuring unit been exceeded?</li><li>• Connect a correctly functioning measuring unit and reset.</li></ul>
Sixth digit is "F" <i>F</i> - - - - -	→	<ul style="list-style-type: none"><li>• Is the preset value too large (Overflow)?</li></ul>
No counting	→	<ul style="list-style-type: none"><li>• Turn off the power switch and turn it on 5 seconds later.</li></ul>

Erroneous counting.	→	<ul style="list-style-type: none"> <li>• Check that the grounding is made correctly.</li> <li>• Is there a large amount of noise?</li> <li>• Check the power voltage is in the specified range.</li> </ul>
Accuracy cannot be obtained	→	<ul style="list-style-type: none"> <li>• Check to see if the unit occasionally miscounts.</li> <li>• Check for any mechanical trouble that may affect accuracy. (Any trouble due to machine adjustment, deflection on play.)</li> <li>• Check to see if the temperature difference between the measuring unit, machine and workpiece is great.</li> </ul>
Data cannot be obtained after replacement of the previous LT model. (when RS-232C output)	→	Is the plus sign of the output data set properly? (previous LT model: output space as a plus sign)

## ■ Cleaning

<p><b>To clean the display and casing</b></p>  <p>Use dry cotton cloth.</p>	<p><b>To remove heavy dirt</b></p> <p>○ Use diluted neutral detergent.</p> 	<p>✗ Do not use.</p>  <p>alcohol thinner benzine</p>
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### 日本からの輸出時における注意

本製品 (および技術) は輸出令別表第1の16の項 (外為令別表16の項) に該当します。キャッチオール規制による経済産業省の許可要否につきましては、輸出者様にてご確認ください。

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LT20A / LT30 Series

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