BS-235

Digital Indicator

INSTRUCTION MANUAL

BONGSHIN LOADCELL

The Better Way for Weighing & Measurements

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1. Introduction

Thank you very much for purchasing this product.

This product is a model adequate for weighing and measurement system.

This equipment is a product equipped with abundant function and various external interface functions to accommodate diverse wants of user and user can easily use this product with easy handling.

All functions can sufficiently be utilized if you thoroughly read the manual before use.

1-1 Features

BS-235 is high precision high speed indicator of 48x96mm size.

- High precision 24bit Sigma-Delta A/D converter
- High speed A/D and D/A conversion of 2000 time/sec
- A/D external resolution 1/30,000
- Actual load or digital calibration
- Linearity Compensation Function (4 point excluding zero)
- Low, OK, and High relay contact output
- Hold or Peak-hold function
- Serial Output insulation (option 1, 2, 3 - RS-232C & RS-422/485)
- Change in relay setting value is available through communication (max. 16 ID)
- Sensor output check function (failure inspection)
- Analog output insulation (option 4, 5)
- Power Source (85 VAC to 240 VAC +10%, -15% (50/60Hz), or 10 VDC to 30 VDC)

1-2 Before Use

- Check whether or not there was damage in product during the delivery.
- Do not drop or exert server impact on the product.
- Front panel control button is operated with light touch thus do not exert excessive strength.
- Do not use or store product at location with severe temperature change if possible. (-10°C ~ +50°C)
- The operating humidity is Max. 85% RH.
- Do not install the product at location with severe electric noise and vibration.
- Turn off the power switch before connecting peripherals.
- Grounding of equipment shall be conducted in order to prevent electric noise and fall.
- Exertion of voltage or current over maximum allowable value will lead to damage in the product.
- Power voltage shall be set within allowable range.

  Use outside allowable range may cause fire, electric shock, and defect.
- Please understand the fact that contents of manual may be changed without in advance notice.
- Please directly contact the agency or our company regarding the inquiries to the contents of manual.
- Please store the manual at location where it can be seen at any time after reading the manual.

1-3 Safety Precautions

Installation, maintenance and inspection of the BS-235 should be performed by personnel having technical knowledge of electricity.
In order to have an BS-235 weighing controller used safely, notes I would like you to surely follow divide into waring and caution, and are indicated by the following documents.
Notes indicated here are the serious contents related to safely.
Please use BS-235 after understanding the contents well.

WARNING DEFINITIONS

The warnings described in this manual have the following meanings:

⚠WARNING	A potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	A potentially hazardous situation which, if not avoided, may result in minor or moderate injury or damage to the instrument.

⚠WARNING

Warning on design

- For the entire system to function safely when the BS-235 becomes faulty or malfunctions, Provide a safety circuit outside the BS-235.
- Since the BS-235 has no power switch, install a breaker.
- Before using the BS-235 as described below, make sure to consult with our sales personnel.
  - Use in environments not described in the operation manual.
  - Use greatly impacting human lives and assets, such as medical devices, transport devices entertainment devices, and safety devices.

Warning on installation

- Do not disassemble, repair, or modify the BS-235.
  Doing so may cause a fire or an electric shock.
- Do not install in the following environments.
  - Places containing corrosive gas or flammable gas.
  - Where the products may be splashed with water, oil or chemicals.

Warning on wiring

- Do not connect a commercial power source directly to the signal input/output terminals.
- Be sure to ground the protective ground terminal.

  The attached AC cable is designed for domestic use in korea, and its rating is 220 VAC, 16A.
  For use at voltages exceeding the rating and for overseas use, have a separate AC cable prepared.

⚠WARNING

Warning on wiring

- Before performing the following, make sure that no power is applied.
  - Removal and installation of optional connectors and so forth;
  - Wiring and connection of cables to a power input terminal;
  - Wiring and connection of cables to a signal I/O terminal;
  - Connection to protective grounding terminals.
  - A place where a circuit breaker is not installed.
- For connection to the signal input/output terminals, check the signal names and pin assignment numbers, and then carry out wiring properly.
- After wiring, be sure to mount the attached terminal block cover.
  Otherwise, it may cause an electric shock.
- To take measures against lighting surge, install a lighting surge protector (optionally available).
- Do not connect anything to unused terminals.
- Before applying power, carefully check the wiring, etc.

Warning during startup and maintenance

- Use a power supply voltage and load within the specified and rated ranges.
- Do not damage the power cord. Doing so may cause fire or electric shocks.
- Do not touch any signal input/output terminal while applying power.
  Doing so may cause electric shocks or malfunctions.
- If the cover of the main body is opened, it may cause an electric shock internally.
  Even if the power is off, the internal capacitor is charged. Contact us for internal inspection or repair.
- In the case of smoke, an abnormal smell or strange sound, immediately turn off the power, and disconnect the power cable.

⚠CAUTION

Caution on installation

- Use the BS-235 as it is incorporated in a control panel, etc.
- Do not install in the following environments.
  - Locations where temperature or humidity exceeds specifications;
  - Locations subjected to drastic temperature or icing and condensing;
  - Outdoors or locations above 2,000m;
  - Locations exposed to direct sunlight;
  - Locations subject to dust accumulation;
  - Locations with poor ventilation;
  - Locations with a lot of salt and metal powder;
  - Locations where the main unit is subject to direct vibration and shock.

⚠CAUTION

Caution on installation

- Take adequate shielding measures when using at the following locations.
  - Near a power line.
  - Where a strong electric field or magnetic field is formed.
  - Where static electricity, relay noise or the like is generated.
- Install the BS-235 as far away from devices generating high frequency, high voltage, large current, surge, etc., as possible. Also, carry out wiring separately from their power lines.
  Do not carry out parallel wiring and common wiring.
- Do not use it, broken down.

Caution on wiring

- Tighten the screws for the power input terminal at the specified torque.
  If they are loose, shorts, fire or malfunctions may occur.
  Tightening torque: 0.5N·m
- For sensors, external inputs/outputs and options, use shielded cables.
- The temporary overvoltage applied to the power should not exceed 1500V.

Caution during startup and maintenance

- For turning on/off the power, be sure to keep intervals of 5 seconds or more.
- After power-on, make sure to warm up the BS-235 for at least 30 minutes or more before use.
- If the BS-235 is not used by the specified method, its protective performance may be impaired.
- Maintenance
  - When performing maintenance, disconnect the power.
  - Do not wipe with a wet rag, or with benzene, thinner, alcohol, etc. Doing so may cause discoloration or deformation of the BS-235. In the case of heavy contamination, wipe off the contamination with a cloth after dipping it into a diluted neutral detergent and wiring it well, and then wipe with a soft, dry cloth.

Caution during transportation

- When the BS-235 is shipped spacers made of corrugated cardboard are used as cushioning materials. Though it is factory-designed so that shocks can sufficiently be absorbed, breakage may result if shocks are applied when the spacers are reused for transportation. If you send the BS-235 to us for repair, etc., take adequate measures against shocks by using polyurethane materials, etc., separately.

Caution during disposal

- If you dispose of the product, handle it as industrial waste.

1-4 Statements of Conformation to EC Directives

■ **The BS-235 is a CE-compliant product. For use, observe the following.**

The BS-235 Digital Indicator is a CE-marked EC-Directive-conforming product.

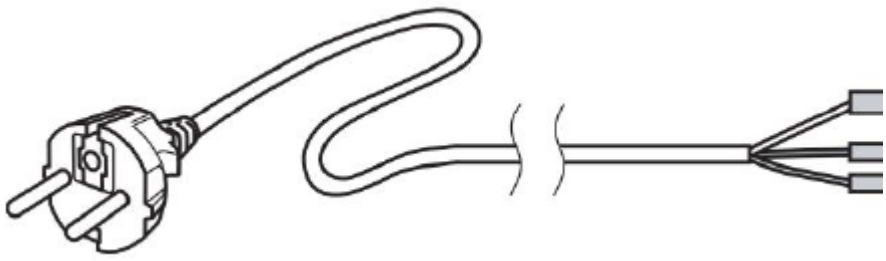
- Low Voltage Directive EN61010-1:2010 (Overvoltage category II, Pollution degree 2)
  EN62311:2008 (test distance: 0cm)

- EMC Directive EN61326-1:2006
  EN55011:2009, A1:2010 Group1, ClassA
  EN61000-3-2:2006, A1:2009, A2:2009
  EN61000-3-3:2008
  EN61000-4-2:2009
  EN61000-4-3: 2006, A1:2008, A2:2010
  EN61000-4-4: 2004, A1:2010
  EN61000-4-5: 2006
  EN61000-4-6: 2009
  EN61000-4-8: 2010
  EN61000-4-11: 2004

When installing, attention should be given to the following.

1. Since the BS-235 is defined as open type (built-in equipment), be sure to use it as installed and fixed to a panel, etc.
2. The power cable attached to this product as standard can be used with 220V AC power in korea. (Nominal rated voltage 220 V AC)
   For using this product in a country outside korea, use a power cable certified in that country.
   EU-outlet-shape 220V AC withstanding cables (following illustration : European standard)

KKP-4819R KOCE-3 0.75mm^2 plug cable 1.83m

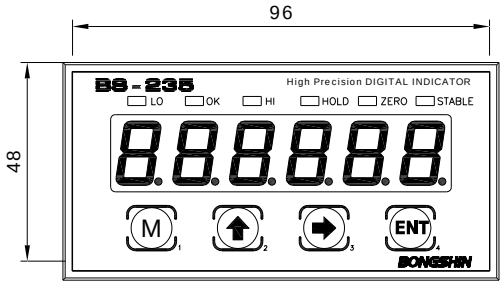


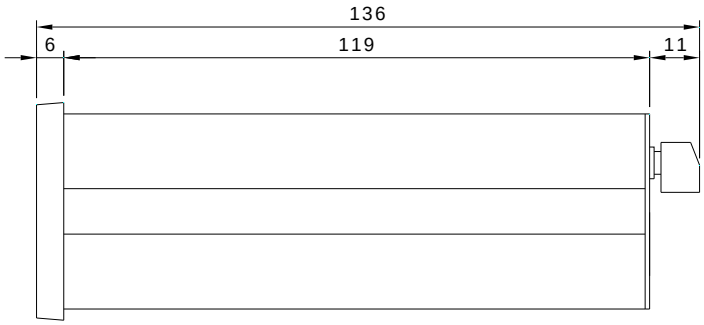
3. For cables other than the power cable (sensor, external input/output, option), use shielded cables.

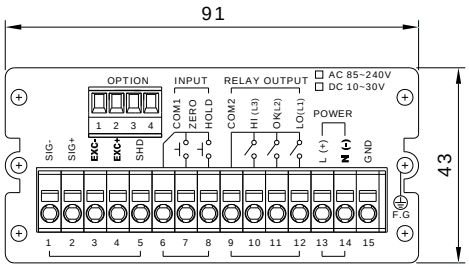
2. Specification

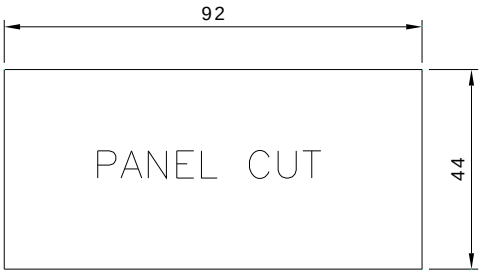
Load Cell excitation	DC 5V, 60mA (350Ω x 4 load cells can be connected)
Min. Input Sensitivity	0.2μV /Digit (min.)
Non-linearity	0.01% F.S. max.
Analog Input Signal Range	-34 mV ~ +34 mV
Temperature drift	Zero: ±0.1μV/°C RTI max. SPAN: 10ppm/°C max.
Input Noise	±0.3μVpp or less
Input Impedance	10MΩ or more
A/D Internal Resolution	24 bits
Max. Display Resolution	1/30,000
A/D Sampling Speed	2,000 times/sec
Display	7-Segment red LED, 6-Digits 14.1mm high 6digit
Range of Max. Display	(-)199999 ~ (+)999999
Display Conversion Speed	1,000 times/sec ~ 1 time/sec
Polarity indication (-)	"-" minus sign
Annunciators	LO, OK, HI, HOLD, ZERO, STABLE
Display increments	1, 2, 5, 10, 20, 50 selectable
Decimal Point Location	0, 0.0, 0.00, 0.000, 0.0000 (selectable to any points)
Power Source	85 VAC to 240 VAC +10%, -15% (50/60Hz), or 10 VDC to 30 VDC
Power Consumption	Approx. 20VA
Range of Use Temperature	-10°C ~ +50°C
Range of Use Humidity	Max. 85% RH (no condensation)
Basic Output	0) Relay 3CH Output
Option Output	1) RS-232C Isolated Serial Output 2) RS-422 Isolated Serial Output 3) RS-485 Isolated Serial Output (Conversion into RS-422/485 is available by user) 4) DC 0 ~ ±10V Isolated Analog Output (Conversion into DC 0 ~ ±5V is available by user) 5) 4 ~ 20mA Isolated Analog Output (Conversion into DC 0 ~ 20mA is available by user)
Product Weight	About 410 g

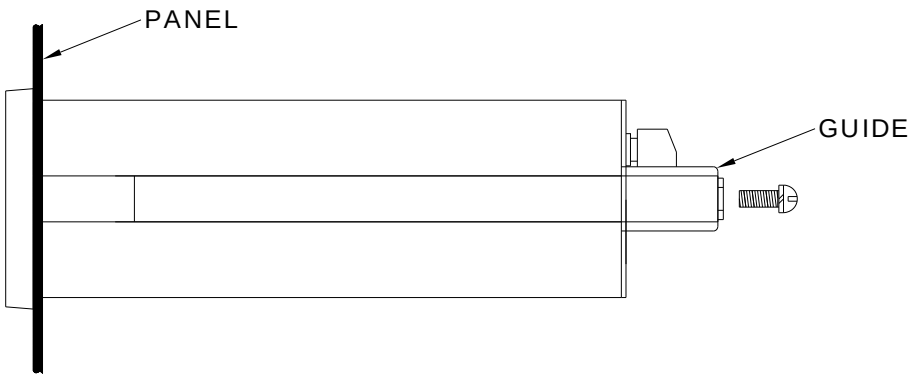
3. External Size



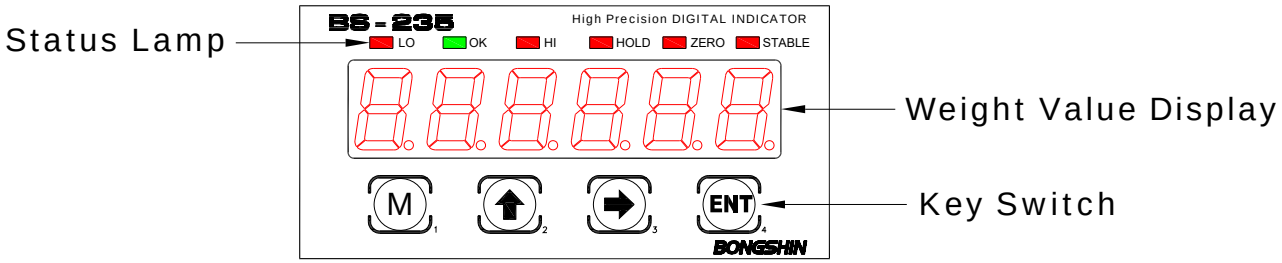




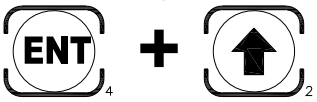
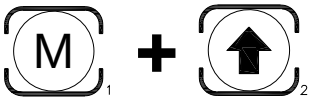
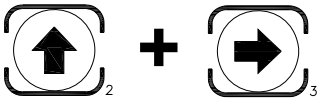
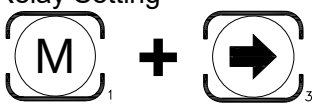
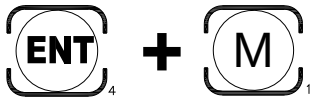
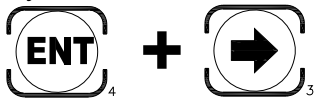
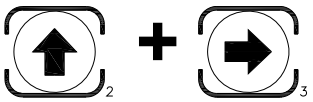




4. Description on Front Panel

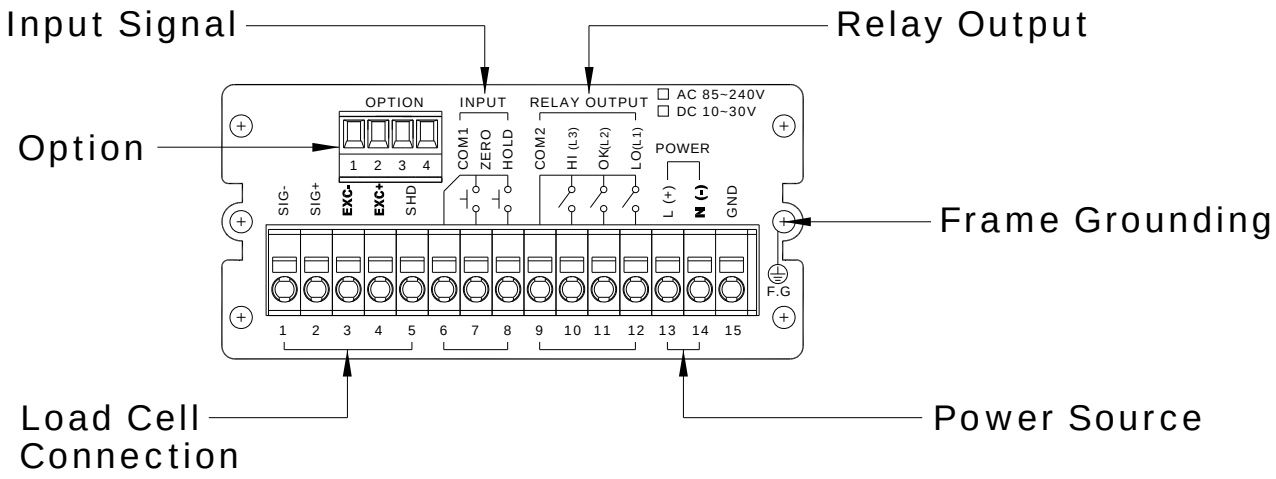


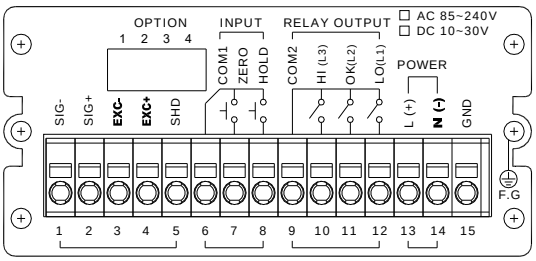
Weight Value Display	Display of measurement data and setting value is conducted. Setting of decimal point is conducted at function mode.
Status Lamp	LO : It flickers when it is lower or higher than rLY1(L1) relay setting value. It flickers when low value ≤ measurement value ≤ max value. OK : It flickers when it is lower or higher than rLY2(L2) relay setting value. It flickers when low value ≤ measurement value ≤ max value. HI : It flickers when it is lower or higher than rLY3(L3) relay setting value. It flickers when low value ≤ measurement value ≤ max value. HOLD : It flickers when hold is conducted. ZERO : It flickers when measurement value is 0 (zero). STABLE : It flickers when measurement value is stable. Peak HOLD : Turns on when the hold function is started. Edge HOLD : Turns on when the value is being held.

Key Switch 	It is used when entering user setting mode from measurement mode. It is used when exiting to measurement mode from user setting mode. (ESC function)
	It is used as a key to increase and decrease the numerical value of selected number line of user setting mode. It is used as calibration mode entry key It is used as check mode entry key
	It is used as location shift key when entering numerical value of user setting mode. It is used as calibration mode entry key It is used as check mode entry key
	It is used when shifting to next menu from user setting mode. It is used to save or exit after entering various setting values. It is used as calibration mode entry key.
ZERO Setting 	It is used for zero setting. (No.2 key while pushing No.4 key or No,.4 key while pushing No.2 key)
Function Mode 	It is used when entering function mode. (No. 2 key while pushing No.1 key or No.1 key while pushing No. 2 key)
Calibration Mode 	It is used when entering calibration mode. (No.3 key while pushing No.,2 key or No,.2 key while pushing No.,3 key)
Relay Setting 	It is used when entering relay setting mode. (No.3 key while pushing No.1 key or No.1 key while pushing No.3 key)
Hold Mode 	It is used when entering hold mode. Hold is cancelled when pushing this key once again. (No.1 key while pushing No.4 key or No.4 key while pushing No.1 key)
Key Lock or Unlock 	It is used for key Lock or unlock. Lock/ unlock is repeated ever time you push this key. (No.3 key while pushing No.4 key or No.4 key while pushing No.3 key)
Check Mode Power OFF  Power ON	It is used when entering check mode. Turn the power on when pushing two keys at once after turning off the power (No.2 key and No.3 key at once)

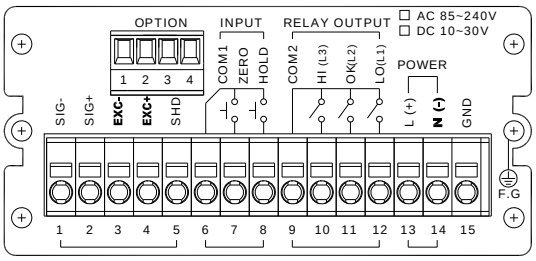
※ It does not matter whether you push one key before another or two keys at once in case of mode to enter by pushing two keys.

5. Description on Rear Panel





[Standard Specification]



[Analog & Serial Output Option]

5-1 Description on Each Terminal Unit

5-1-1 Power (AC IN / DC IN)

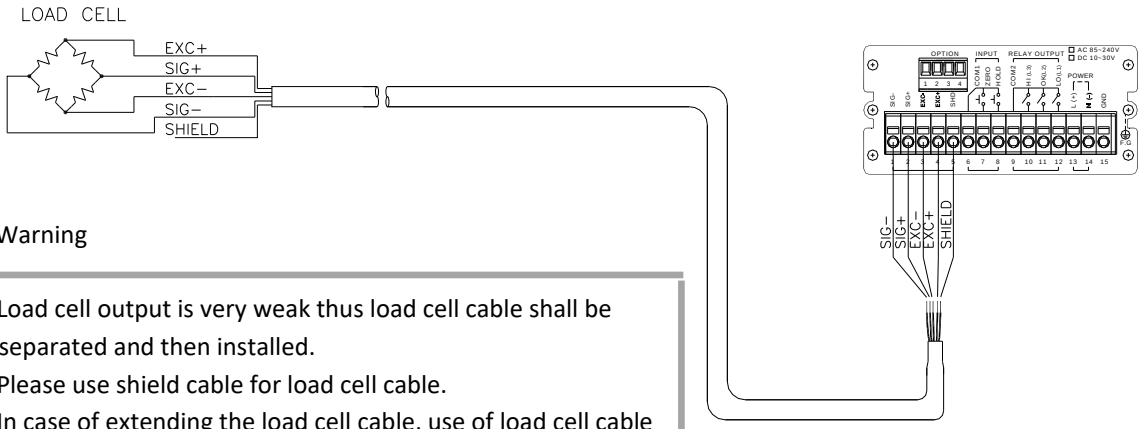
Terminal No.	Name	Contents
13	L (DC +)	AC IN (DC IN +) Power Input Terminal
14	N (DC -)	AC IN (DC IN -) Power Input Terminal
15	GND	Power Ground

Access to AC power code is conducted. Input power is AC85-240V and 50/60Hz.
Access to DC power code is conducted. Input power is DC10-30V.
(DC power supply type is order specification.)

⚠ It does not turn on if the polarity is reversed during DC power supply.

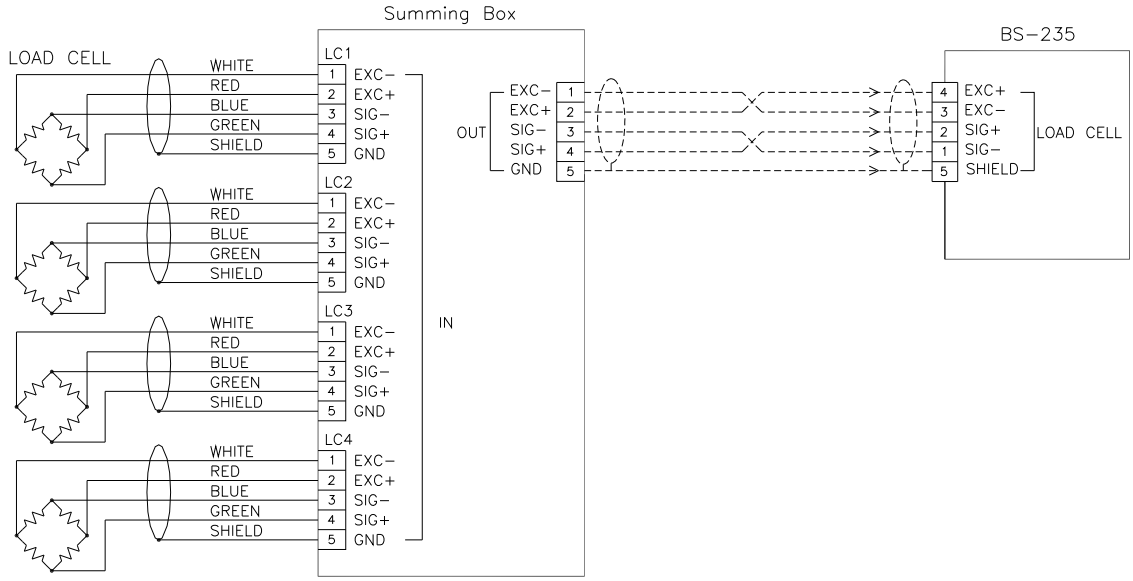
5-1-2 LOAD CELL Connection (1) (2) (3) (4) (5)

Terminal No.	Name	Contents
1	SIG -	Load Cell Input Voltage (-), Blue wire
2	SIG +	Load Cell Input Voltage (+), Green wire
3	EXC -	Load Cell Voltage (-), White wire
4	EXC +	Load Cell Voltage (+), Red wire
5	SHIELD	Load Cell Grounding



Warning

- Load cell output is very weak thus load cell cable shall be separated and then installed.
- Please use shield cable for load cell cable.
- In case of extending the load cell cable, use of load cell cable of our company is recommended.
- Shield cable of load cell cable shall be connected to BS-235 terminal only.



- In case of sealing, road cell input cable SIG+ (green) and SIG- (blue) cable shall be connected to No.1 and No.2 respectively.
- There may be abnormality in relay operation and option output when the weight is displayed in (-) value.
- Please check whether or not color of cable for each manufacturer's and load cell model is different or not before the connection.

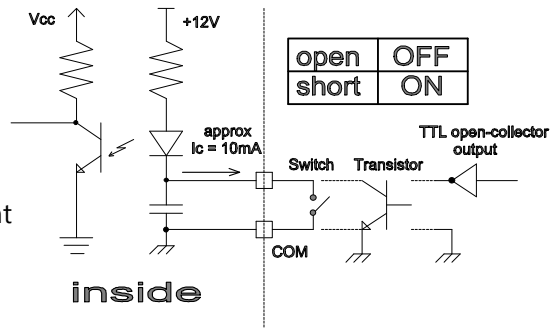
5-1-3 Input (6) (7) (8)

Terminal No.	Name	Contents
6	COM1	Common terminal of external control
7	ZERO	Control terminal of zero function Valid from COM1 terminal and short circuit (or on coin)
8	HOLD	Control terminal of hold function Valid from COM1 terminal and short circuit (or on coin)

Relay contact or switch or contactless switch such as open collector output shall be used.

Arbitrary point hold is conducted at the point of granting external contact point.
Hold is cancelled when grating the contact point.

Peak hold only holds max value during the time contact point is granted and it is cancelled when contact point is not granted.

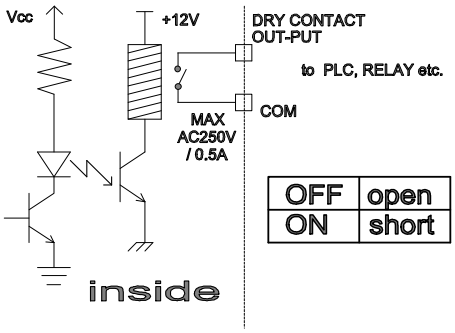


5-1-4 Output (9) (10) (11) (12)

Terminal No.	Name	Contents
9	COM2	Common terminal for relay output
10	HI (L3)	HI (L3) relay output terminal (a, b contact point output based on mode setting)
11	OK (L2)	OK (L2) relay output terminal (a, b contact point output based on mode setting)
12	LO (L1)	LO (L1) relay output terminal (a, b contact point output based on mode setting)

Output method differs based on relay mode setting.
Refer to relay operation mode.

- Relay contact point capacity is 5A 250VAC, 5A 30VDC.



5-1-5 Option (Serial Output)

They are RS-232C/ RS-422/ RS-485 output port. (equipped upon selection)

5-1-6 Option (Analog Output)

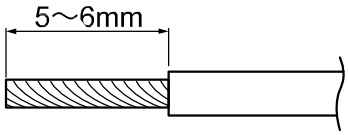
They are analog output DC 0~±5V, 0~±10V, DC 0~20mA, 4~20mA output terminal.
(Selection from function mode)
Analog output option is equipped upon selection.

- Serial output option and analog output option cannot be equipped at the same time.
- In case of using RS-422, RS-485 shall be changed into RS-422 at function mode.

5-2 How to Use Terminal Block and Replace Fuse

5-2-1 How to use terminal block

1) Peel off the sheath at the end of cable.

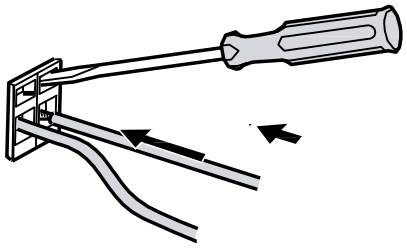


The size of connectable wires is from 0.21 to 3.31mm^2

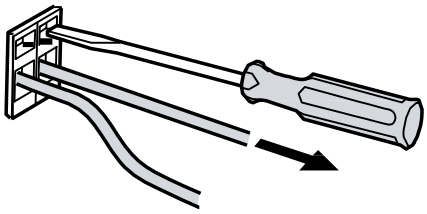
(AWG12 to 24)

Use thick electric wire to ground the frame. (approx. 0.75 mm^2)

2) Terminal is opened when putting driver inside the terminal opening device (top of terminal) and push.

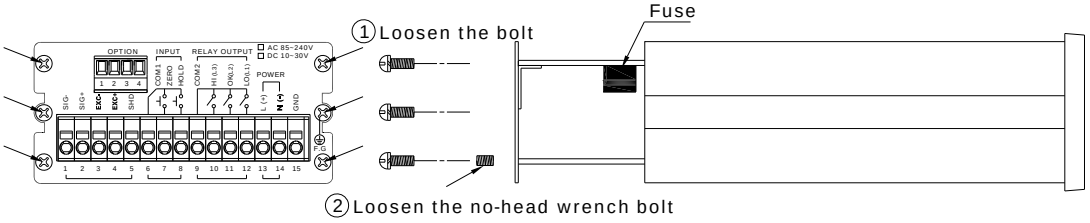


3) Terminal is fastened when inserting the cable and pulls back the driver.

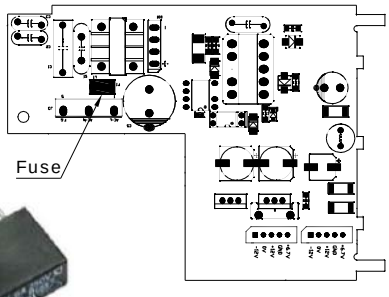


- Forced entry of cable to terminal may cause the damage of terminal.
- Do not insert cable to top of terminal to insert driver.

5-2-2 How to replace fuse



1) Loosen the bolt of rear panel and loosen the no-head wrench bolt. Pull off PCB as illustrated in the figure.
2) Replace the fuse. (Fuse Capacity: 250V 2.0A or 5.0A→DC type)
3) Assembly shall be conducted in reverse of disassembly.



* Fuse spec.
Subminiature Fuses
Cooper Bussmann SS-5-2A

Warning

- It shall be conducted only when the power is turned off.
- If the replacement is due to damage to the fuse, direct soldering should be sent to us.

6. CALIBRATION

There are three types of calibration mode.

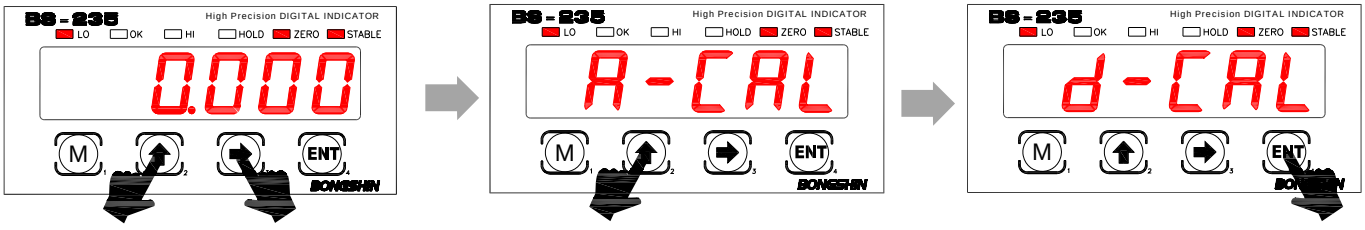
6-1 Calibration Mode

6-1-1 Mode

- Digital calibration mode d-CAL
  Calibration shall be conducted not by using the actual load but entering rated output and rated capacity of sensor with key.
- Actual load calibration mode A-CAL
  It is calibration mode to adjust zero and span with the use of actual load.
- Linearization calibration mode L-CAL
  It is calibration mode to conduct non-linear calibration that reduces the measurement error through calibration of maximum 4 points excluding zero with the use of actual load.

6-1-2 How to select calibration mode

1. It turns into the mode selection status when → key is pushed while pushing ↑ key is pushed at measurement status.
2. Mode change and setting value change is available when ↑ key or → key is pushed at mode selection status.
3. Push ENT key in order to move onto next stage after saving the setting value at mode selection status.
4. Push M key to cancel the setting and return to measurement mode for mode cancellation.



1 When you push No.3 key while pushing No.2 key, entry to calibration mode is available.

2 Change the mode with No.2 or No.3 key.

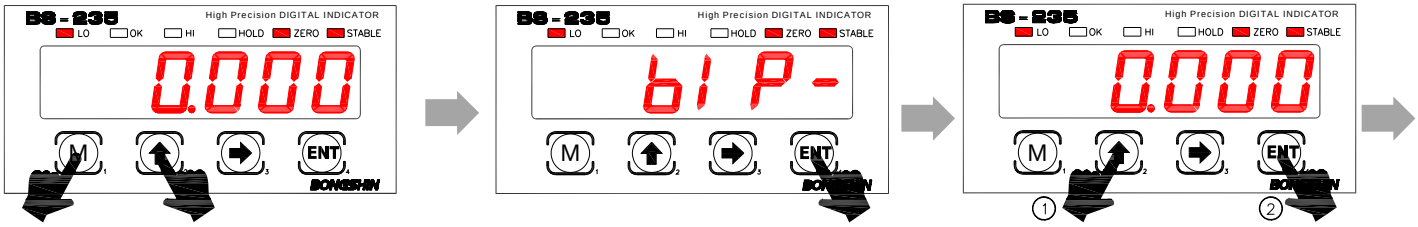
(d-CAL→A-CAL→L-CAL)

3 After selecting the mode, Press No.4 key to proceed with calibration.
Push No.1 key for mode cancellation.

6-2 Digital calibration mode d-CAL

6-2-1 Calibration Method

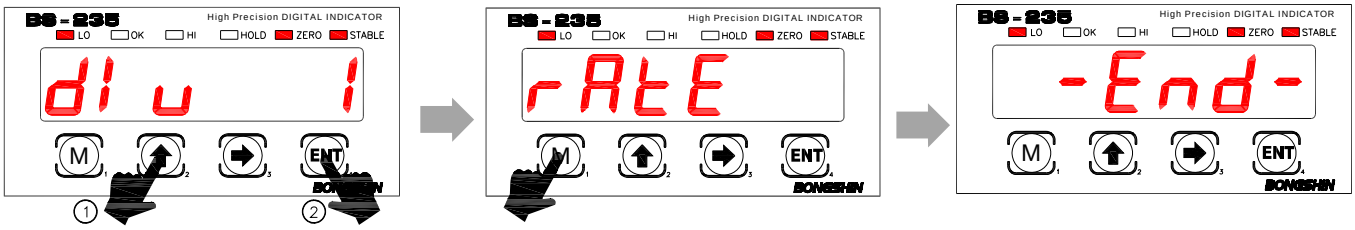
Step 1. Decimal point setting and min. gradation setting



1 When you push No.2 key while pushing No.1 key, entry to function mode is available.

2 It is changed to decimal point mode when you push No. 4 key.

3 After '**dP**' display, Push No.4 key by changing decimal point by pushing No.2 or No.3 key.

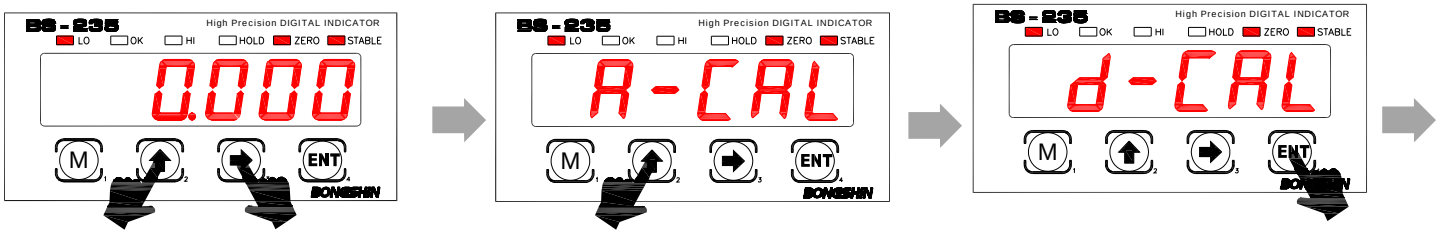


4 After '**dIv**' display, Input is completed when you push No.4 key after changing Min, unit with the use of either No.2 or No.3 key.

5 After '**rAtE**' display, It is changed in measurement mode when you push No. 1 Key.

6 Decimal point change and minimum unit change have been completed.

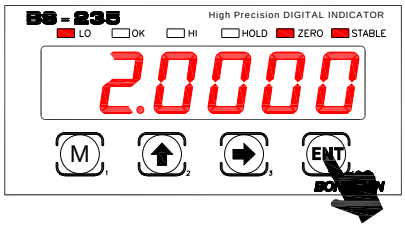
Step 2. Rated output and capacity setting of Load Cell



1 Push No.3 key while pushing No,2 key.

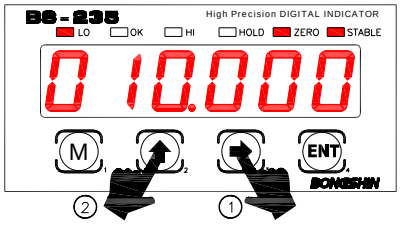
2 Change the mode to d-CAL with either No.2 or No.3 key.

3 Enter into d-CAL mode by pushing No.4 key



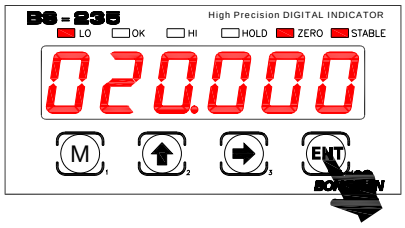
4 After '**LCCAL**' display,
Input load cell rated output using No. 2 and No.3 key and Push No.4 key.

ex) 2.0000 mV/V

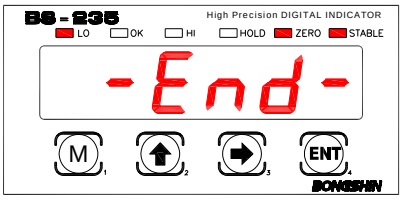


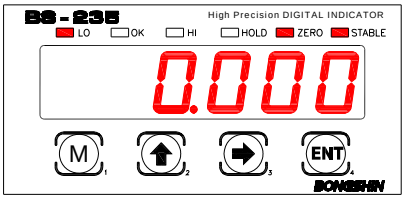
5 After '**CAPA**' display,
Input rated capacity of load cell with the use of No.2 and No.3 key.

ex) 20.000 kg

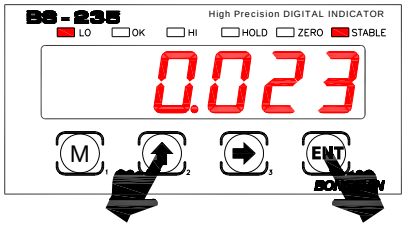


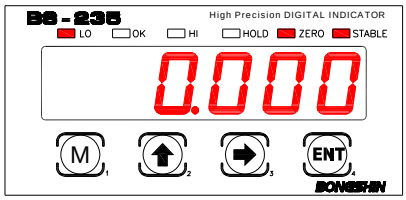
6 Digital input is completed when pushing No.4 key and it returns to measurement mode.





Step 3. Zero Calibration





1 Push No.2 key while pushing No.4 key.

2 Zero calibration is completed.

If zero calibration is performed in an unstable environment, measurement errors may occur.

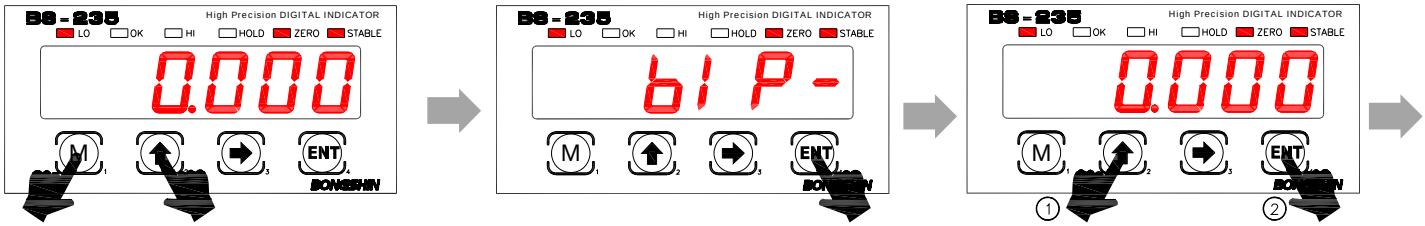
Warning

- The above method is described as an example, so you need to set it up after checking the load cell installed in the field.
- Although the setting range of resolution is 1/30000 or lower but display is conducted even when it exceeds 30000.
- Error may generate for digital calibration mode.
- Conduct regular check on measurement and conduct calibration upon necessity.
- Calibration under instable environment may cause the measurement error.

6-3 Actual load calibration mode A-CAL

6-3-1 Calibration Method

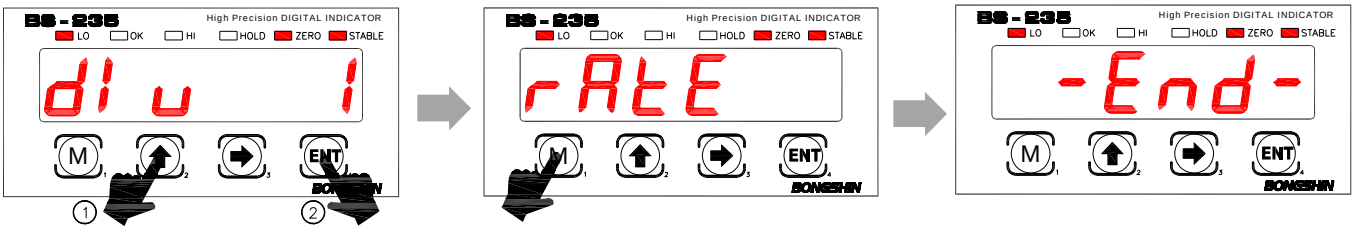
Step 1. Decimal point setting and min. gradation setting



1 Entry to function mode is available when pushing No.2 key while pushing No.1 key.

2 It changes to decimal point mode when pushing No.4 key.

3 After '**dP**' display, Push No. 4 key after changing decimal point by pushing either No.2 or No.3 key.

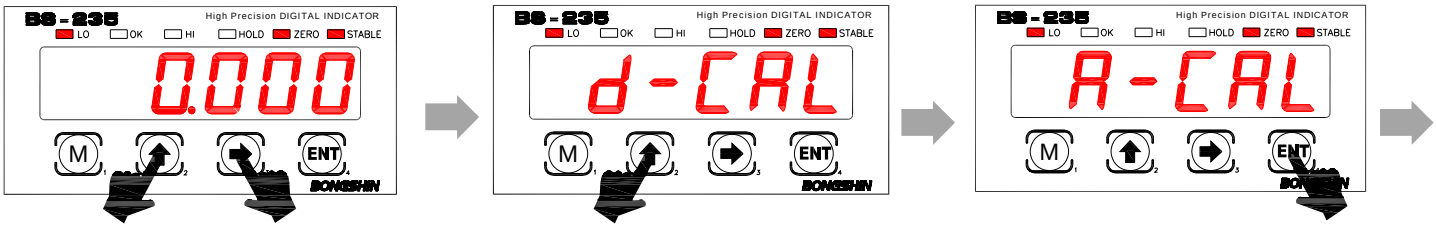


4 After '**dIv**' display, Input is completed when you No.4 key after changing min unit by pushing either No.2 or No.3 key.

5 After '**rAtE**' display, It returns to measurement mode when pushing No. 1 key.

6 Decimal point change and min. unit change have been completed.

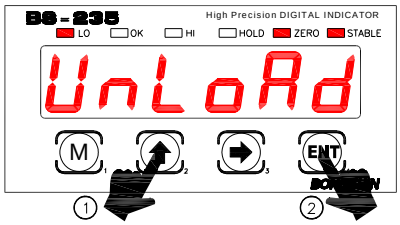
Step 2. Zero calibration and dead weight setting

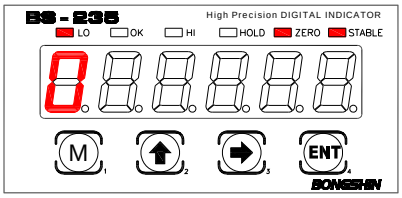


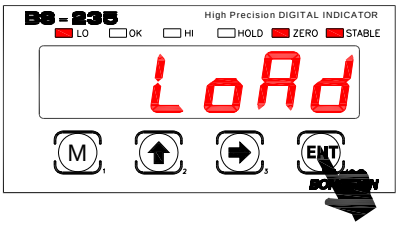
1 Push No.3 key while pushing No. 2 key.

2 Change the mode to A-CAL with either No.2 or No.3 key.

3 Enter into A-CAL mode by pushing No.4 key.





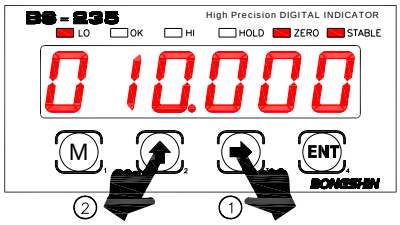


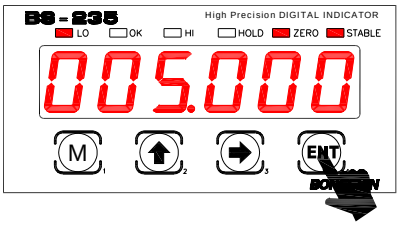
4 Select Unload among Load and Unload with the use of No.2 and No.3 key and push No.4 key when there is nothing on load cell.

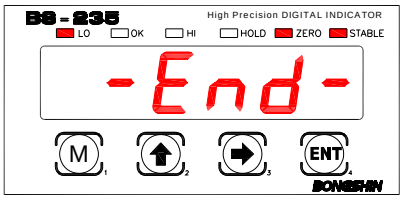
Conduct zero calibration.

5 If the zero setting has already been made and the weight is placed on the weighbridge, you can proceed by selecting load without unloading.

6 It is changed to dead weight value mode when pushing No. 4 key after load display.



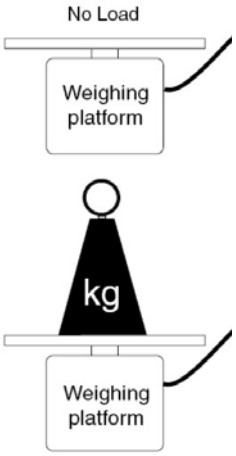




7 Input dead weight value with the use of No. 2 and No,.3 key.

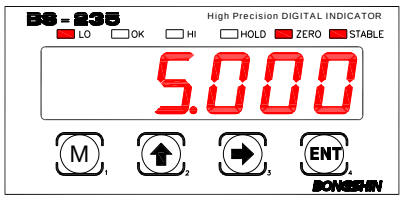
ex) 5.000kg

8 Push No.4 key after exerting actual load to load cell.



9 Actual load calibration has been completed.

Err0 is played and it is turned to LoAd status when load is small or direction of load is applied toward (-) direction.



10 Check the dead weight value indicated to display.
Check the zero point return status after lowering the dead weight and Step2 shall be executed repeatedly when there is abnormality.

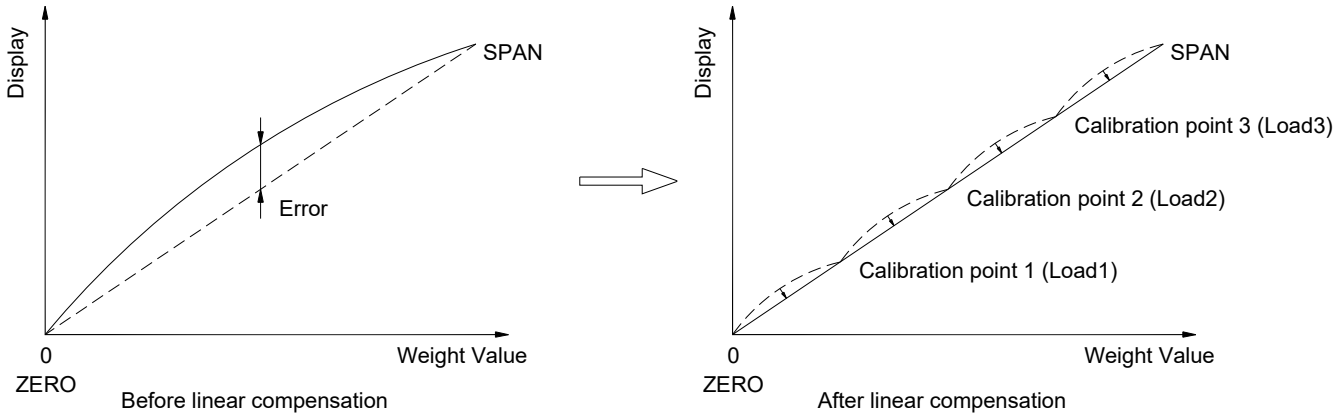
Warning

- Display speed shall be set as slow as possible in function mode during calibration in order to display stable value.
- Although resolution setting range is 1/30000 or lower, display is still conducted when it exceeds 30000.
- Conduct regular check on measurement and conduct calibration upon necessity.
- Calibration under instable environment may cause the measurement error.
- It is recommended that the use of dead weight with over 2/3 of max capacity is recommended in order to reduce the error.

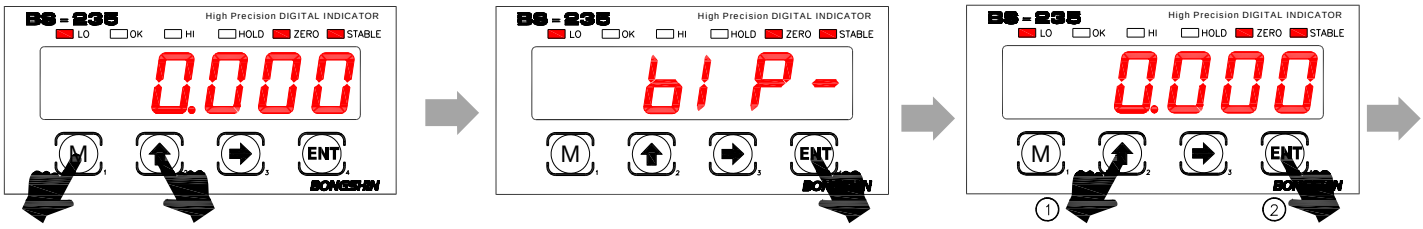
6-4 Linearization Calibration Mode L-CAL

6-4-1 Calibration Method

A little measurement error may occur in between the max capacity due to trait of measurement unit even upon the completion of zero and span calibration. Linearization calibration mode is a type of calibration mode which conducts non-linear calibration that reduces the measurement error by conducting calibration with max 4 points excluding the zero with the use of actual load.



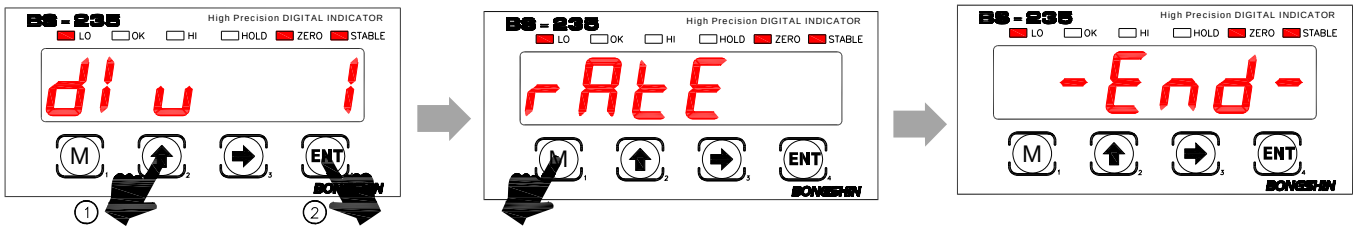
Step 1. Decimal point setting and min gradation setting



1 Enter into function mode by pushing No.2 key while pushing No.1 key.

2 It is changed to decimal point mode when pushing No. 4 key.

3 After '**dP**' display, Push No.,4 key after changing decimal point by pushing either No.2 or No.3 key.

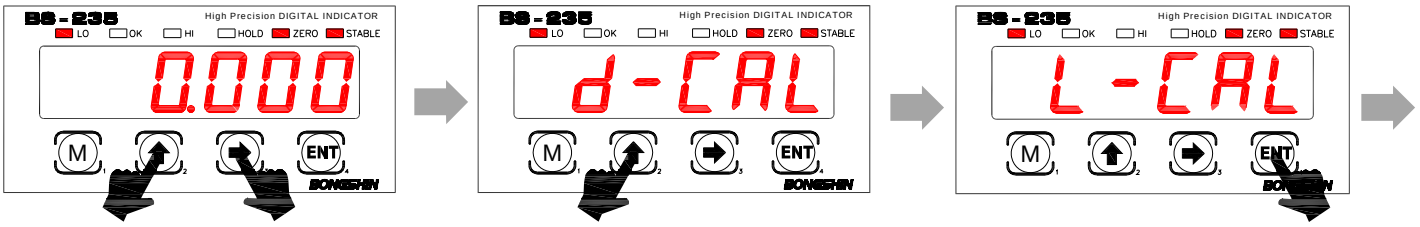


4 After '**dIv**' display, Input is completed when you push No.4 key after changing min unit by pushing either No.2 or No.3 key.

5 After '**rAtE**' display, It is changed to measurement mode when pushing No.1 key..

6 Decimal point setting and min. unit setting have been completed.

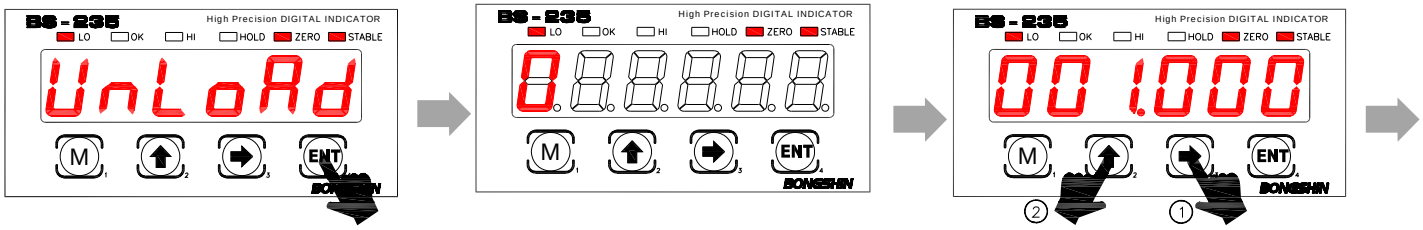
Step 2. Zero calibration and dead weight setting



1 Push No.2 key while pushing No.3 key .

2 It is changed into L-CAL mode when pushing either No.2 or No.3 key.

3 Enter into L-CAL mode by pushing No.4 key.

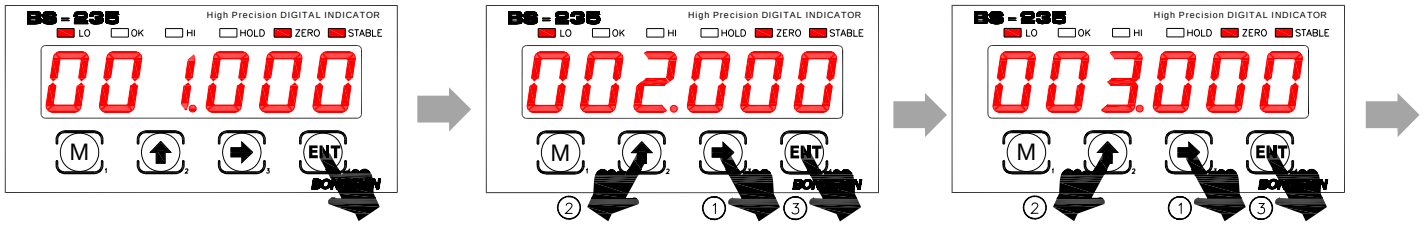


4 Check the stability after display of UnLoad and push No.4 key when there is nothing on load cell.

5 Conduct zero calibration.

6 Input dead weight value by using No.2 and No.3 key after entering 1st dead weight to measurement unit with display of Load 1.

ex) 1.000kg



7 1st dead weight value is stored when you push No.4 key after checking the stability.

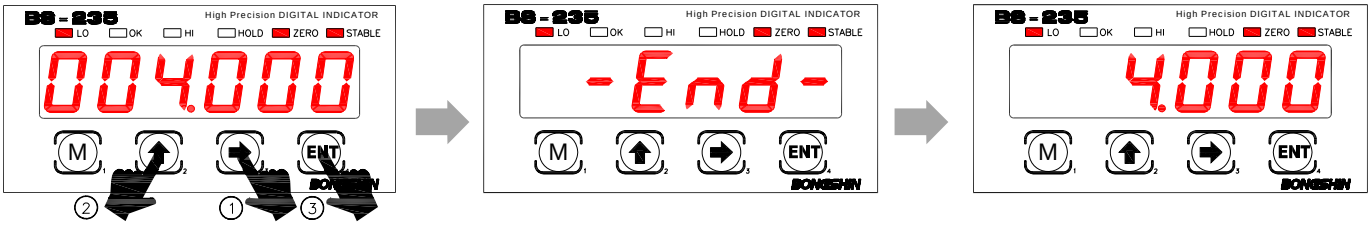
8 Push No.4 key after entering the dead weight value with use of No.2 and No.3 key and entering 2nd dead weight upon display of Load2.

ex) 2.000kg

9 Push No.4 key after entering the dead weight value with the use of No.2 and No.3 key and entering 3rd dead weight upon display of Load3.

ex) 3.000kg

- If only 2 steps (Load2) are prepared for the weight, if you press the 1st key (M) in the Load3 state, calibration is performed with the weight adjusted up to Load2.



10 Push No.4 key after entering dead weight value with the use of No.2 and No.3 key and entering the last dead weight upon the display of SPAn.

ex) 4.000kg

11 Linearization calibration has been completed.

12 Check the dead weight value that is presented at display.

Warning

- Stable value is displayed when the display speed is set as slow as possible from calibration function mode
- Although this function is repetitive, it is not to improve hysteresis.
- Although the setting range of resolution is 1/30000 or lower, display is conducted eve when it exceeds 30000.
- Check whether or not regular measurement is conducted and carry out calibration upon the necessity.
- Calibration under instable environment may cause the measurement error.
- Load 1 + Load 2 shall be input for Load 2 dead weight input value, Load 1 + Load 2 + Load 3 for Load 3 dead weight input value is, and Load 1 + Load 2 + Load 3 + SPAN for SPAN dead weight input value.
- In regards to load in use, it shall be Load 1 〈 Load 2 〈 Load 3.
  When the weight exerted in each stage is small, Err0 shall be displayed.
- When there is a mechanical error, the value of linearization differs from input load point upon completion of span calibration thus the difference with measured value may be increased.
- You can exit the measurement mode when you only conduct Load 1 (Load 1~Load 2) and push No.1 key (M).
- In order to reduce the error of dead weight in use, it is recommended that those with remaining capacity of 2/3 or higher shall be used.
- It shall be used after setting Key Lock as illustrated below upon the completion of calibration.

1 Push No.3 while pushing No.4 key.

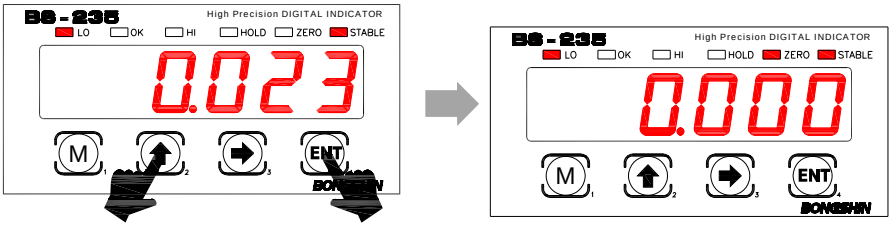
2 LoCK is displayed and it is changed into key lock mode.

6-5 Digital Zero Calibration

6-5-1 Digital Zero Calibration Method

It shall be executed when there is nothing on the load cell.

Range of zero calibration is 100% of max capacity. It is remembered even when the power is turned off.



1 Push No.2 key while pushing No.4 key.

2 Zero calibration is completed.

- Zero calibration cannot be conducted under key lock status thus it shall be executed after cancelling the key lock.
- Zero calibration is not conducted on the hold.
- When offset value is set at function, the value other than offset value shall be executed as zero.
- Setting shall be conducted at function in order execute initial zero when turning on the power.
- Zero calibration may not be conducted when there is mechanical interference or load cell abnormality.

6-5-2 Zero Calibration Method by External Input

It shall be executed when nothing is on the load cell.

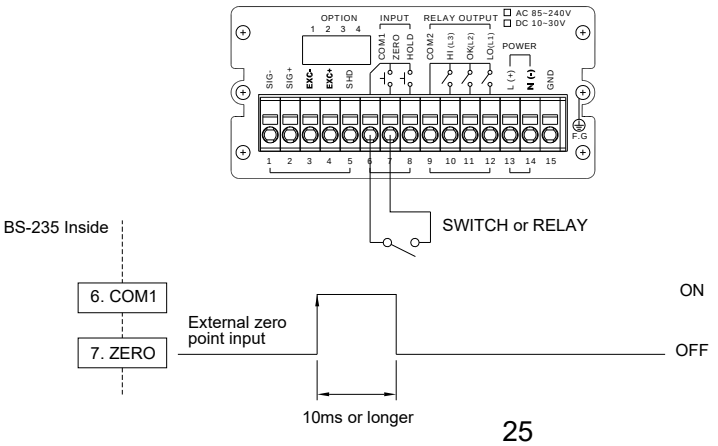
Relay contact point or contactless switch such as switch or open collector shall be used.

Signal shall be cut off after continuous external input of 10ms or longer.

Please take caution as zero is continuously executed when signal is continuously input not as a pulse.

Range of zero calibration is 100% max capacity. It is remembered even when power is turned off.

Terminal No.	Name	Contents
6	COM1	Common terminal of external control
7	ZERO	Control terminal of zero function Valid at COM1 terminal or terminal block (or on coin)

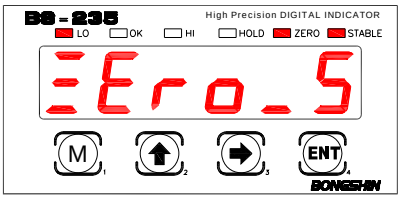
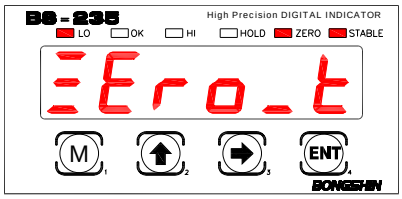


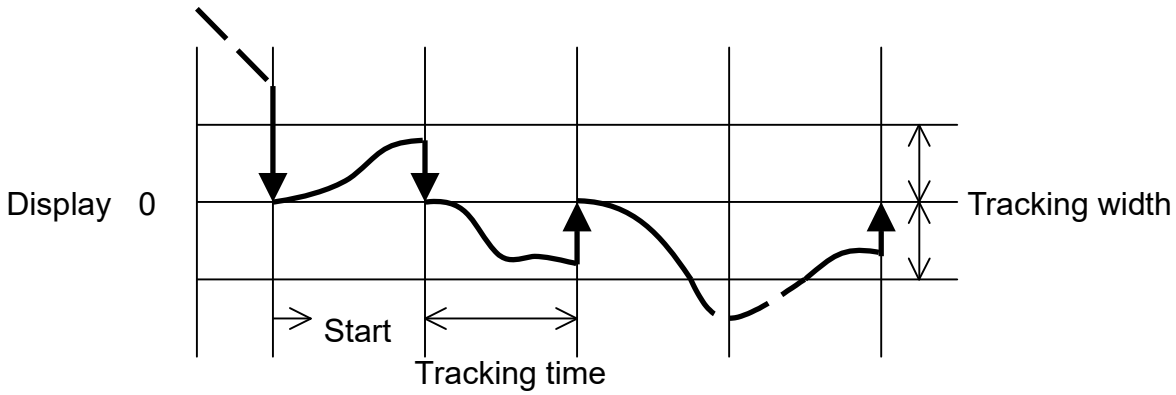
6-5-3 Zero Tracking

Automatic update of zero point shall be conducted by detecting the movement of zero point with the use of zero tracking function (setting shall be conducted at function).

Zero tracking shall only be conducted when width and time function of zero tracking are already set.

Zero tracking is not conducted when zero point is within zero calibration range.

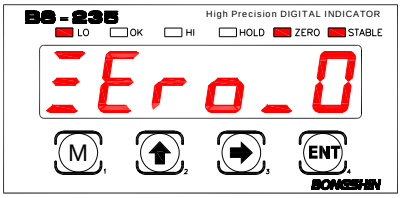
Zero Calibration			
Width of Zero Tracking 	● nonE 0.000	None Setting Range 0 ~ 999	Width of zero tracking shall be set.
Time of Zero Tracking 	00	Setting Range 0 ~ 99	Zero tracking operation time shall be set. 00: Operation within 0.1 sec. 01: 0.1 sec ~ 99: 9.9 sec Warning: When 'None' is selected at zero tracking width setting, zero tracking time setting mode shall not be displayed.



- Zero tracking does not operate when the maximum value of the zero adjustment range exceeds 999.
- Zero tracking is not operated when offset value is set at function.
- When there is a dramatic change in load by vibration even within the range of zero tracking width, zero tracking setting times is doubled thus there may be a delay in conduct of automatic zero calibration.

6-5-4 Power On Zero

Digital zero shall be conducted when the power is turned on.
(setting shall be conducted at function).
Zero calibration shall be conducted based on power input point.
Take caution in use when there are contents such as hopper scale and others.
Range of zero calibration is 100% of max capacity. It is remembered even when the power is turned on.

Item Display	Setting Value	Setting Contents	
Automatic Zero Point Mode 	● nonE	None	It is a function to automatically execute the zero calibration with power input (upon Power On).
	AUto	Automatic Zero Point	

- It cannot be returned when it is turned into zero point after automatic execution of zero point.
- When offset value is set at function, automatic zero point is executed excluding the value that has already been set.
  For instance, -1000 is displayed when offset value is set as 1000 and power is turned off and on again with the display of current value of 5230.

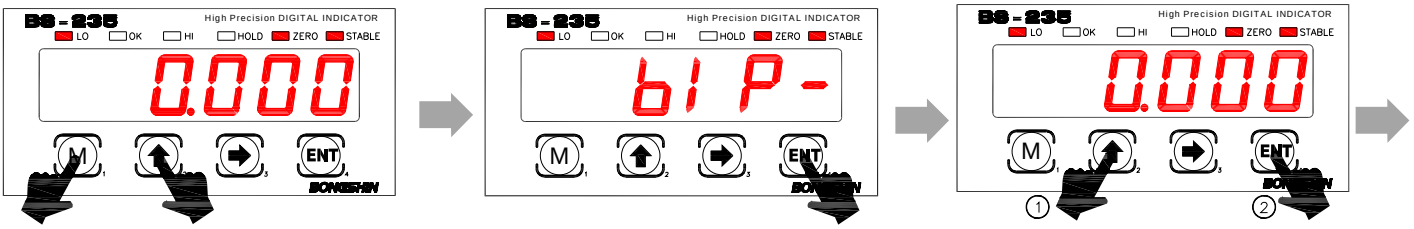
7. Function Mode

It is description on function mode which sets various functions.

7-1 Function Setting Method

7-1-1 Mode Entry Method

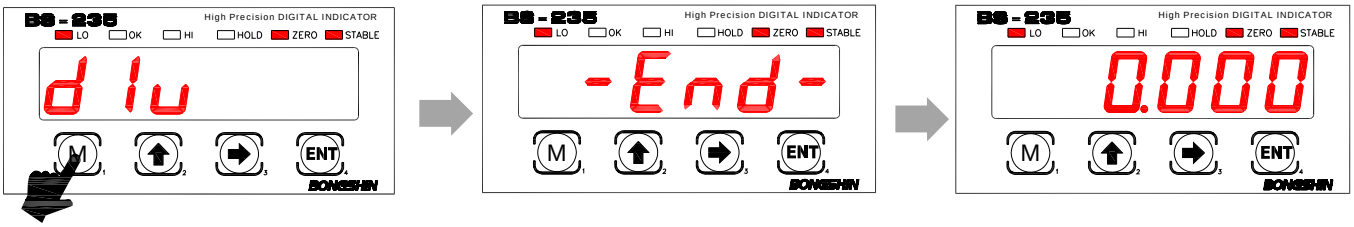
1. It turns into the mode selection status when ▲ key is pushed while pushing M key is pushed at measurement status.
2. Mode change and setting value change is available when ▲ key or ▶ key is pushed at mode selection status.
3. Push ENT key in order to move onto next stage after saving the setting value at mode selection status.
5. Push M key to cancel the setting and return to measurement mode for mode cancellation. At the mode cancelation, the setting until previous stage of cancellation is saved.



1 It is entered into function mode when pushing No.2 key while pushing No.1 key.

2 It proceeds to next stage when pushing No.4 key.

3 After '**dP**' display, It is saved when pushing No.4 key after changing setting value by pushing No.2 or No.3 key.

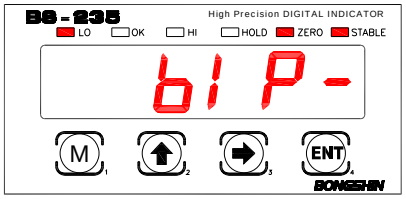
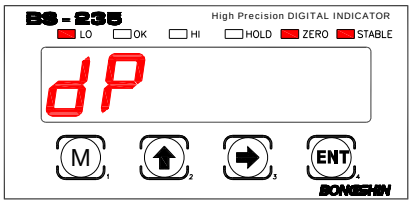
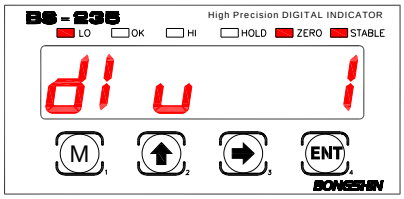
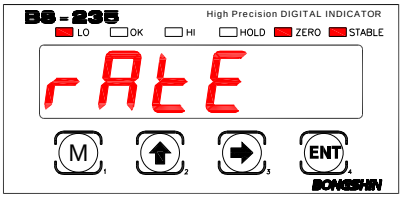
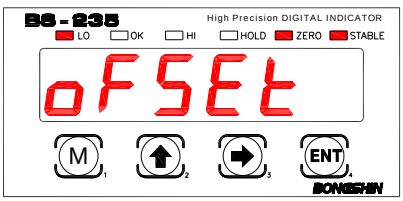


4 It proceeds to next stage when pushing No.4 key and is changed into measurement mode when pushing No.1 key.

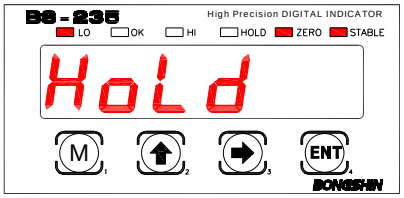
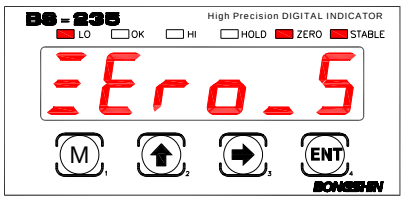
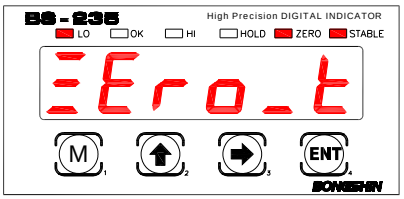
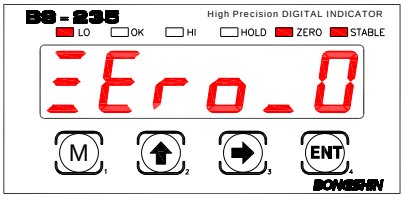
5 Function setting has been completed and setting value is saved.

6 It is changed into measurement mode status.

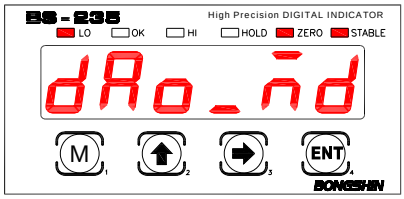
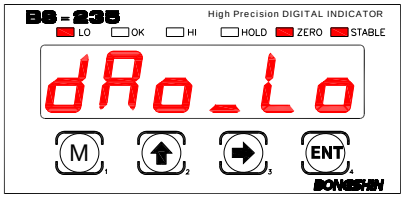
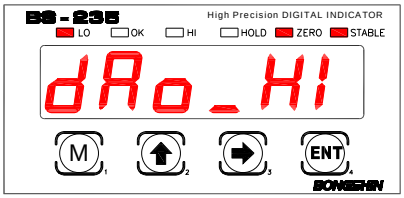
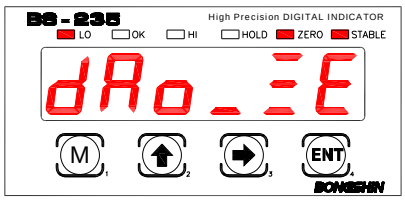
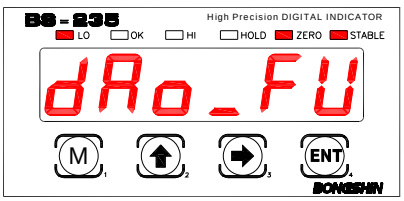
7-2 Function Items

Item Display	Setting Value	Contents of Setting	
Display			
Polarity Display 			Display (-) value shall be selected. Zero lamp is turned off when load display value goes down under (-) value with zero point as its reference in case of UnIP setting. Although load display is 0, it is actually (-) value status.
	● bip-	Display of both +/-	
	UnIP	No display of minus polarity	
Location of Decimal Point 			Location of decimal point shall be selected.
	0	No	
	0.0	1 digit	
	0.00	2 digit	
	● 0.000	3 digit	
	0.0000	4 digit	
Min Gradation 			Min gradation shall be set. Warning: Random change is available even after the completion of calibration. However, the calibration shall be conducted again in case of decimal point change (change in number of digits).
	● 1	0,1,2,3,4 ...	
	2	0,2,4,6,8 ...	
	5	0,5,10,15,20...	
	10	0,10,20,30,40...	
	20	0,20,40,60,80...	
	50	0,50,100,150...	
Display Conversion Speed 			Slow It is display conversion speed of measurement value. Fast
	● 1	4.7 times/sec	
	2	7.5 times/sec	
	2.5	10 times/sec	
	12.5	50 times/sec	
	15	60 times/sec	
	38	150 times/sec	
	75	300 times/sec	
	240	960 times/sec	
	600	2400 times/sec	
	1200	4800 times/sec	
Container Value Setting (OFFSET) 	● 00.000	Setting Range -99999 ~ 99999	Container weight value is set. Setting of (–) value or (+) value shall be displayed. For instance, in case of 01.000 setting, -1.000 is displayed when you exit function mode. (no display under UnIP setting) Warning: Setting of (-) and (+) value shall be maintained even when zero point calibration is conducted. In order to display 0 at measurement mode, All of set container value shall be 0.

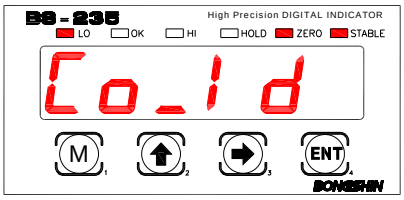
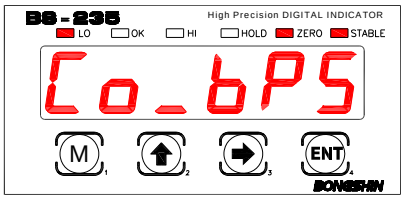
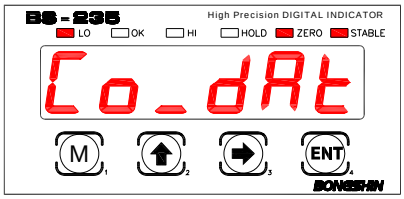
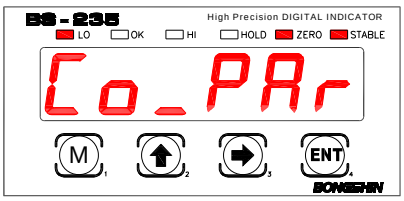
● : Initial Value

Item Display	Setting Value	Contents of Setting	
Hold Mode 	● NonE EdGE PK	None Edge Hold Peak Hold	Select the hold function. Warning : In case it is set as 'None', it does not operate even when signal is given from key hold and external contact point.
Zero Calibration			
Zero Tracking Width 	● nonE 0.000	None Setting Range 0 ~ 999	Zero tracking width shall be set.
Zero Tracking Time 	00	Setting Range 0 ~ 99	Zero tracking time shall be set. 00: Operation within 0.1 sec 0 : 0.1 sec ~ 99 : 9.9 sec Warning : When it is selected as 'None' at zero tracking width setting, zero tracking time setting mode is not displayed.
Automatic Zero Point Mode 	● nonE : Auto :	None Automatic Zero Point	It is a function to execute automatic zero upon power input (Power On).

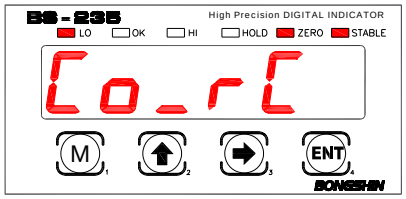
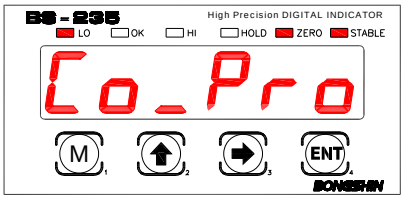
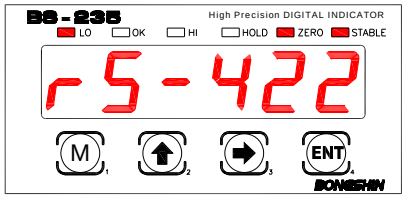
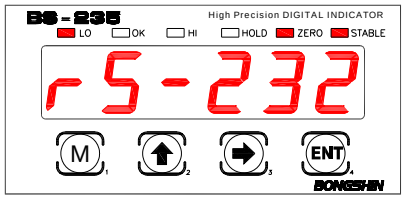
● : Initial Value

Item Display	Setting Value	Contents of Setting	
Analog Output (DAC)	Mode is not displayed when no option is installed or when serial communication option is installed.		
Analog Output Mode 	● 10V	0 ~ 10V output	Analog output mode shall be selected. Warning: Analog output minute calibration shall be conducted again in case of changing output mode.
	±5V	-5V ~ +5V output	
	±10V	-10V ~ +10V output	
	4~20mA	4 ~ 20mA output	
	0~20mA	0 ~ 20mA output	
	5V	0 ~ 5V output	
Analog Lo Output 	● 000.000	Setting Range -199999 ~ 999999	In case analog output is 0V/ 0mA/ 4mA, display value shall be set. Analog output is conducted by force while digit is flickering. (in case only one digit is flickering)
Analog High Output 	● 010.000	Setting Range -199999 ~ 999999	In case analog output is 5V/ 10V/ 20mA, display value shall be set. Analog output is conducted by force while digit is flickering (in case only one digit is flickering)
Analog Lo Output Minute Calibration 	● 0000	Setting Range -9999 ~ 9999	In case it is 0V/ 0mA/4mA, minute calibration of analog output shall be conducted with the change in setting value. Value is increase by 10 while pushing  key. It decreased by 10 while pushing  Key.
Analog Full Output Minute Calibration 	● 0000	Setting Value -9999 ~ 9999	In case it is 0V/ 0mA/4mA, minute calibration of analog output shall be conducted with the change in setting value. Value is increase by 10 while pushing  key. It decreased by 10 while pushing  Key.

● : Initial Value

Item Display	Setting Value	Contents of Setting	
Communication Output	It is displayed only when Serial communication option is installed.		
Communication ID 	● 1	Setting Range 00 ~ 15	Communication address shall be selected.
Communication Speed 	1200 2400 4800 ● 9600 19200 38400 57600 115200	1200 bps 2400 bps 4800 bps 9600 bps 19200 bps 38400 bps 57600 bps 115200 bps	Communication transmission speed shall be set.
Data Length 	7 ● 8	7 bits 8 bits	Communication data length shall be set. Warning : For 7bits setting, the parity bit shall be set as either even or odd. When it is set as none, communication data may be broken.
Parity Bit 	● nonE Odd EvEn	None Odd Even	Communication parity shall be set.

● : Initial Value

Item Display	Setting Value	Contents of Setting	
Number of Communication Output 	● Int 0.10	Stream mode setting range 0.01 ~ 9.99	Number of communication output shall be set. 0.01: 0.01 sec/time ~ 9.99: 9.99 sec/time Data is transmitted for each set time interval. Warning : Transmission is not conducted with the setting of 0.00 and there may be an overlapping of transmission packet when communication speed is set to be slow in high speed transmission. In case of setting transmission speed is conducted as 9600bps or lower, it shall be set as 0.1 sec or longer.
	rECALL	Command mode (transmission mode upon data request)	Refer to communication format (Page 50~57)
Communication format 	● bS235	BONG SHIN Format	Select communication format. Warning : In case of AND Format or BS-7300 setting, command mode is same as the 11-2-2 command mode.
	bS205	BONG SHIN Format	
	bS7300	BONG SHIN Format	
	And	AND Format	
Communication RS-422/485 setting  	r S-422	RS-422	Select RS-422/485 communication. Warning 1 : After changing from RS-485 to RS-422, turn the power off and then use is after turning it on. Please use it after checking the output pin no. Warning 2 : If the option is equipped with RS-232C, you cannot select it in the settings and only RS-232C is displayed.
	● r S-485	RS-485	

● : Initial Value

- Since entry to setting mode is unavailable from Key Lock status, it shall be executed after canceling the key lock.
- There may be a change in display of setting range based on location of decimal point.
- Item to set DAC is not displayed when selecting serial communication option.
- Item to set Serial communication is not displayed when selecting DAC option.
- Function setting value can be initialized at check mode.

8. HOLD

Hold function is a function to stop the display.

Hold and cancellation can be conducted from front key or control terminal.

In order to conduct hold, hold mode shall be selected from the function.

8-1 Hold Mode

8-1-1 Hold Operation

Hold can be operated with the method by hold key, hold input terminal of rear panel, and communication.
When the hold is operated, hold lamp flickers.
First executed operation has the priority in hold operation.

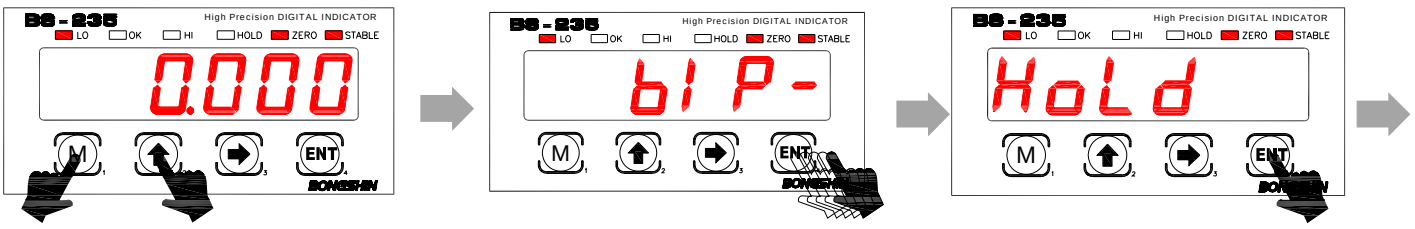
- Method by hold key
  Hold is commenced and hold value is displayed when pushing No.1 key while pushing No.4 key.
  When pushing No.1 key while pushing No.4 key again during the hold, hold is cancelled and measurement value is displayed.

- Method by external hold input terminal
  Hold is commenced when external hold input terminal is turned on (contact point input).
  At the moment, external hold input terminal shall maintain the on status.
  Hold is cancelled when input is conducted at off status.

- Method by serial output **(RS-232C/422/485)** command order
  Hold is commenced by the hold on command with communication and hold is cancelled by hold off command.

8-1-2 Hold mode selection method

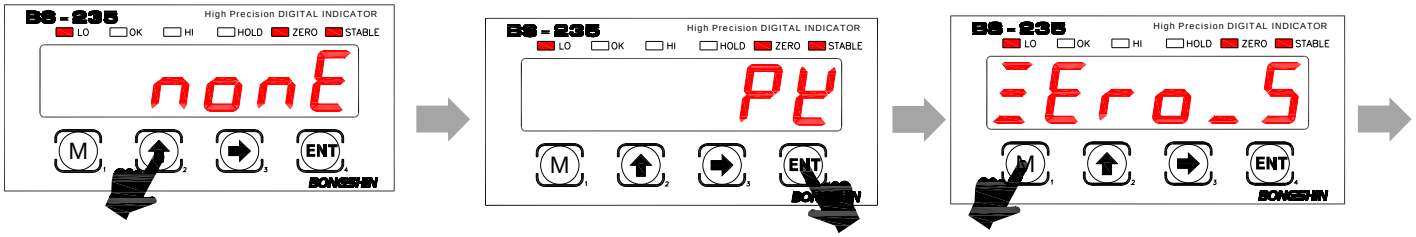
1. It turns into the mode selection status when ↑ key is pushed while pushing M key is pushed at measurement status.
2. Hold mode selection item comes out when you push ENT key 9 times at mode selection status.
3. Mode change and setting value change is available when ↑ key or → key is pushed at mode selection status.
4. Push ENT key in order to move onto next stage after selecting the hold mode and saving.
5. Push M key to cancel the mode and return to measurement mode.



1 It is entered into function mode when pushing No.2 key while pushing No.1 key.

2 After '**biP**' display, Hold mode selection stage is conducted when pushing No.4 key 9 times.

3 After '**HoLd**' display, Change the hold mode by pushing either No.4 key.

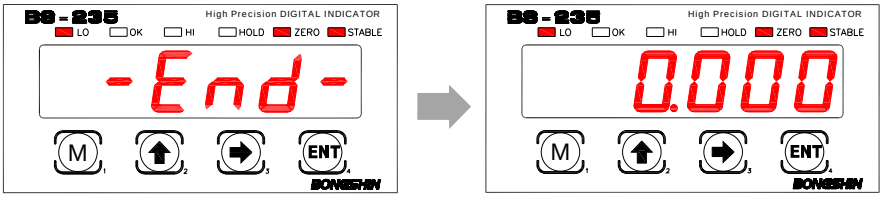


4 It moves onto next stage Change the hold mode by pushing either No.2 or No.3 key.

5 It moves onto next stage after saving option item when pushing No.4 key after changing PK hold change.

ex) Peak Hold

6 After '**ZEro_S**' display, It is changed to measurement mode when pushing No.1 key.



7 Function setting has been completed and setting value shall be saved.

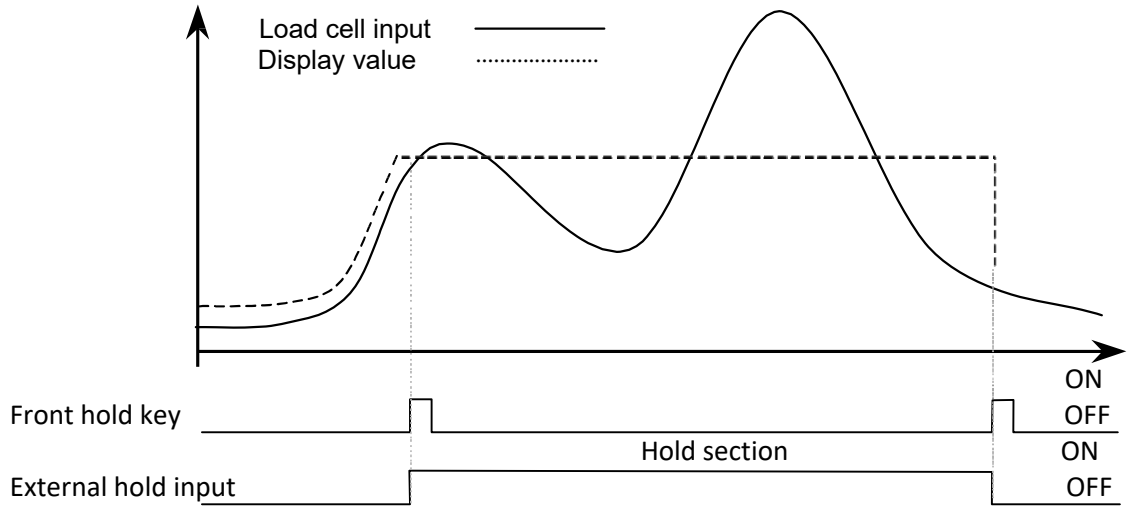
8 It is changed to measurement mode status.

- Entry to setting mode is unavailable under key lock status thus it shall be executed after canceling the key lock.
- Setting range display may differ based on location of decimal point.
- In case of setting hold function as 'None', key hold and external contact point hold are not operated.
- In case of peak hold setting, hold is not conducted for (-) display value. (hold of (-) display value is available in case of edge hold)
- Function setting value can be initialized at check mode.

8-2 Hold Type

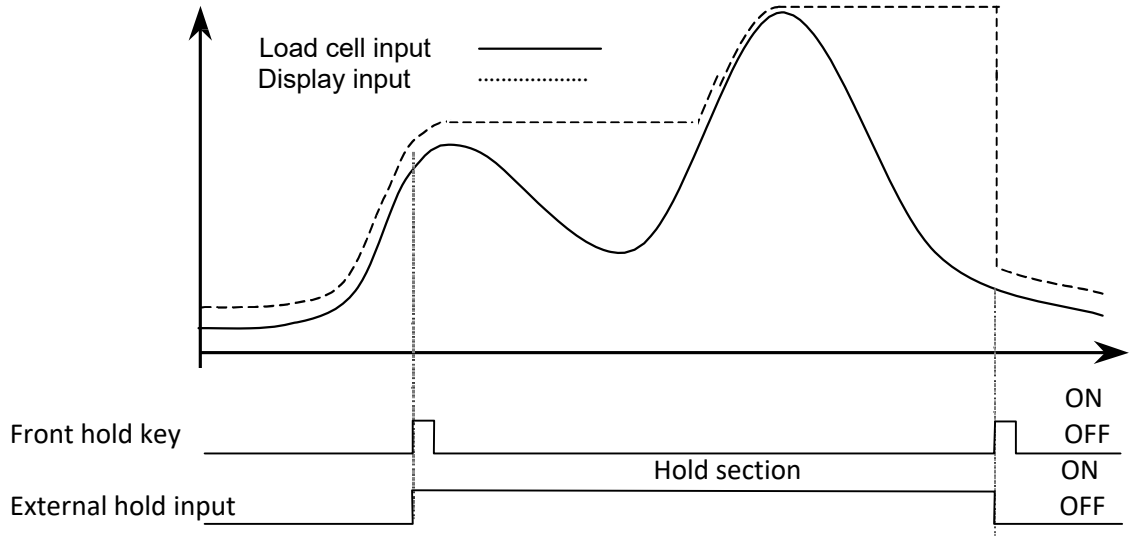
8-2-1 Edge hold mode

Edge hold conduct s hold of display and output at the moment of hold input.



8-2-2 Peak hold mode

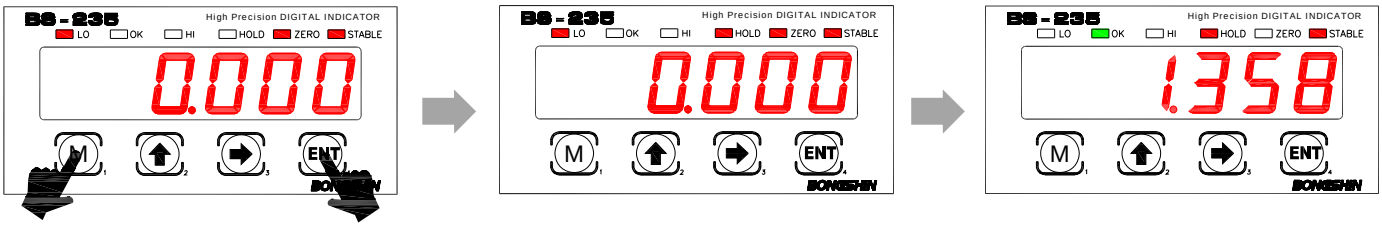
Peak hold conducts hold of peak display and output at the moment of hold input.



8-3 Hold Operation

8-3-1 Operation by hold key (Hold ON)

Hold is commenced when you push No.1 key while pushing No.4 key and hold value is displayed.



1 Hold is commenced when pushing No.1 key while pushing No.4 key.

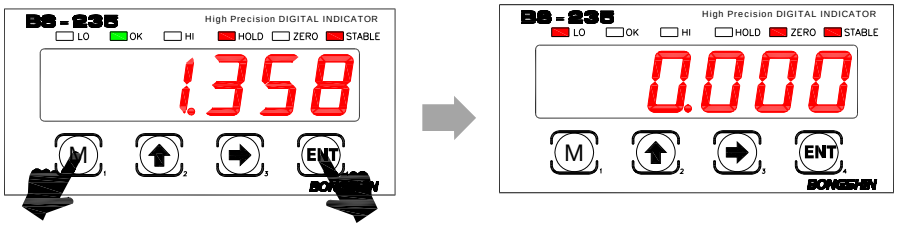
2 Hold lamp is flickered and hold is commenced. Load is exerted in case of peak hold or edge hold.

3 Display is made with peak hold or edge hold.

- In case of edge hold setting, hold is conducted for display and output at the moment of key hold input.
- In case of peak hold setting, holding of peak display and output is conducted before cancelation of hold.

8-3-2 Operation Cancelation by Hold Key (Hold OFF)

Hold is cancelled when pushing No.1 key while pushing No.4 key.



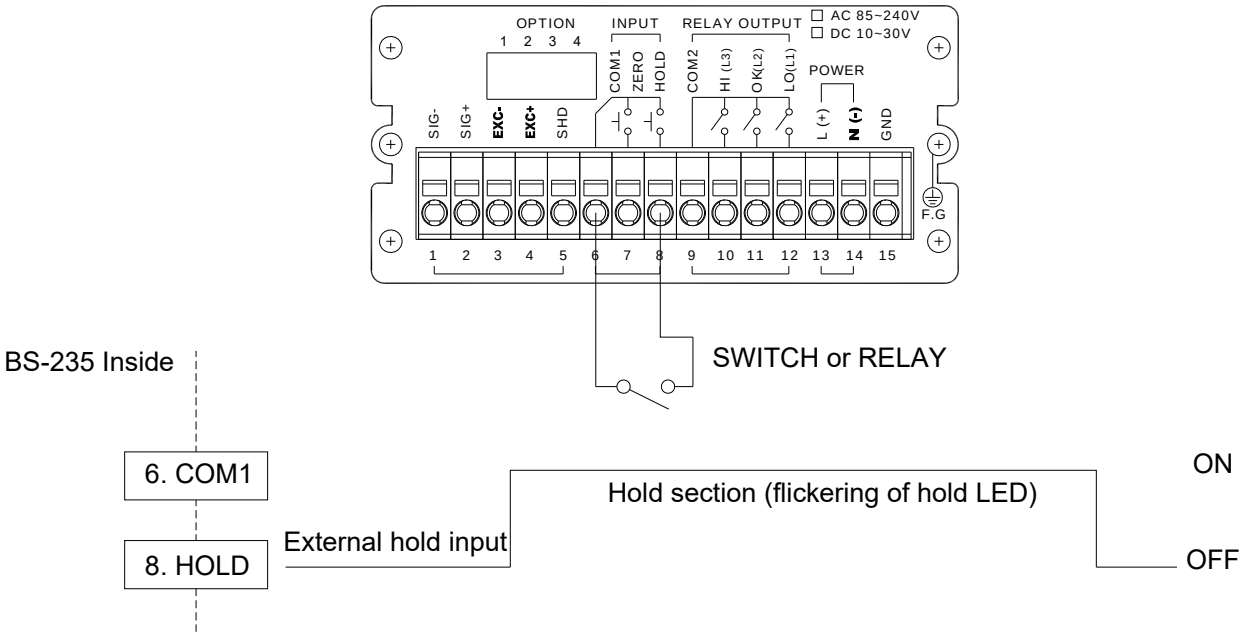
1 Hold is cancelled when pushing No.1 key while pushing No.4 key.

2 Hold lamp is flickered and hold value is cancelled.

- Key hold is not operated under key Lock status. It shall be executed after canceling the key lock.
- Range setting display may differ based on location of decimal point.
- In case of peak hold setting, holding of (-) display value is not conducted. (hold of (-) display value is available in case of edge hold)

8-3-3 Method by external hold input terminal

Hold is commenced when external hold input terminal is turned on (contact point input).
At the moment, external hold input terminal shall maintain on status.
Hold is cancelled when input is conducted under off status.



- Operation is not conducted when hold mode is not set as edge or peak hold from function.
- Switch shall be zero voltage input of machine contact point and semiconductor contact point.
- Zero calibration is not conducted under Hold status.
- ON, OFF time shall be secured for 10ms or longer.
- Please use it within rated load.

8-3-4 Method by serial output (RS-232C/422/485) command

Hold is commenced by hold on command through communication and hold is cancelled by hold off command.
Please refer to **11. Serial Output** for detailed contents.

1. Hold ON command
Hold is commenced.

Command Example

	ID		Command	
1	2	3	4	5
<STX>	0	1	H	<ETX>

※ BS-235 Format

2. Hold OFF command
Hold is cancelled.

Command example

	ID		Command	
1	2	3	4	5
<STX>	0	1	C	<ETX>

※ BS-235 Format

9. Relay Mode

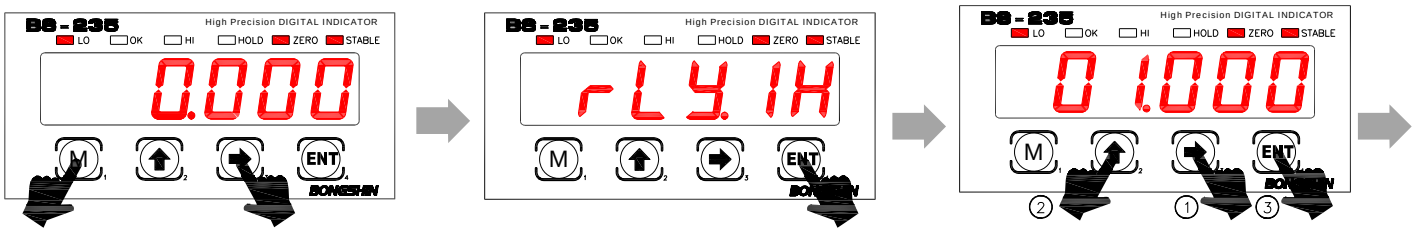
Relay operation mode shall be selected from function.

Relay output shall be conducted from output terminal L1(LO), L2(OK), and L3(HI) or rear panel.

9-1 Relay Mode

9-1-1 Relay set up method – rLY1(L1), rLY2(L2), rLY3(L3)

1. It turns into the mode selection status when → key is pushed while pushing M key is pushed at measurement status.
2. If you press the ENT key in the mode selection state, the currently set relay value is displayed.
3. Relay setting value can be changed by using ↑ key or → key.
4. After changing the relay setting value, press the ENT key to save and proceed to the next step.
5. Push M key to cancel the setting and return to measurement mode for mode cancellation.
   At the mode cancelation, the setting until previous stage of cancellation is saved.

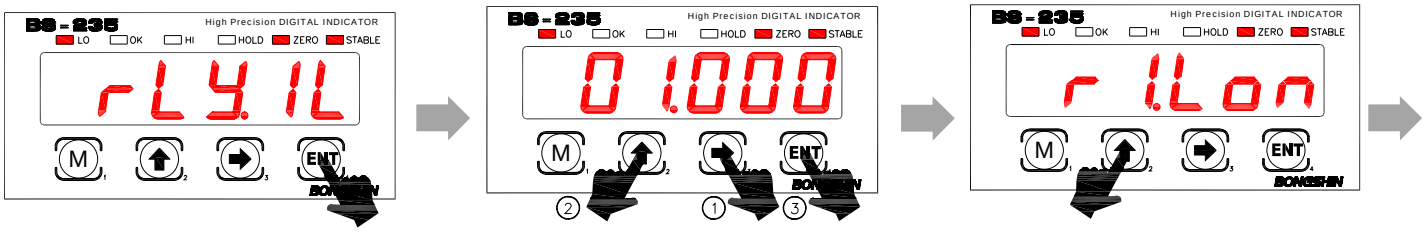


1 It is entered into relay setting value change mode when pushing No.3 key while pushing No.1 key.

2 It proceeds with relay L1 Hi value setting stage when pushing No.4 key.

3 When pushing No.4 key after changing L1 Hi relay setting value with the use of No.2 and No.3 key, it moves onto next stage.

ex) 1.000kg



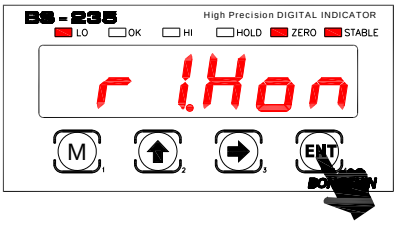
4 It proceeds with relay L1 Low value setting stage when pushing No.4 key.

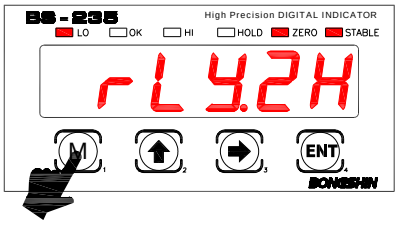
5 When pushing No.4 key after changing L1 Low relay setting value with the use of No.2 and No.3 key, it moves onto next stage.

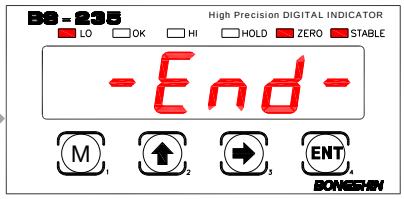
ex) 1.000kg

6 Relay operation mode changed by pushing either No.2 or No.3 key.

r1.Lon (b contact),
r1.ron (range contact),
r1.Hon (a contact)
Three types of settings are possible.







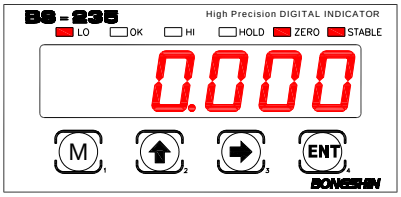
7 It moves onto next stage after saving selected item when pushing No.4 key after the relay operation mode change.

ex) **r1.Hon** (a contact)

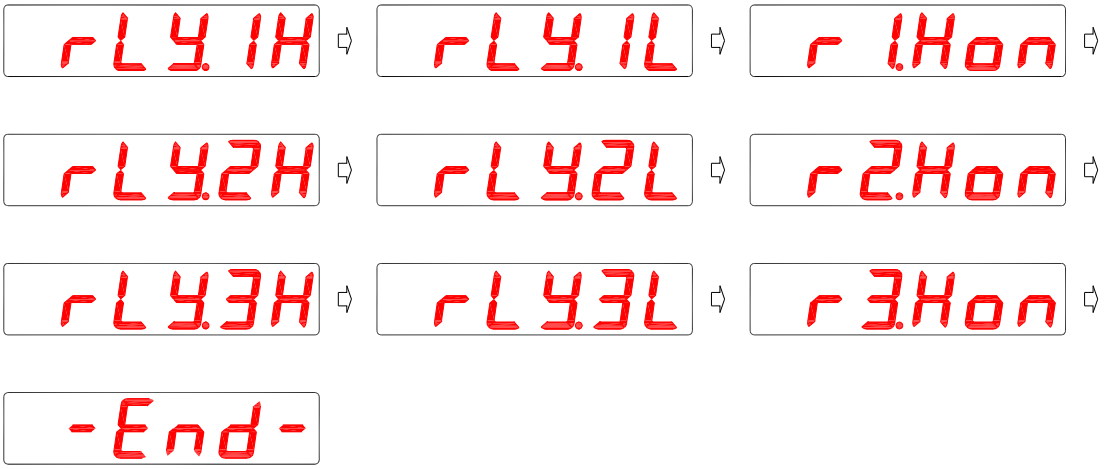
8 You can also set the L2 Hi relay in the same way. After setting is completed, press No.1 key Change to weighing mode.

Set **rLY2(L2), rLY3(L3)** in the same way.
When setting the relay output value, if the Low value is set higher than the Hi value, **Err1** is displayed.

9 Relay setting has been completed and setting value is saved.



10 It turns into measurement mode status.



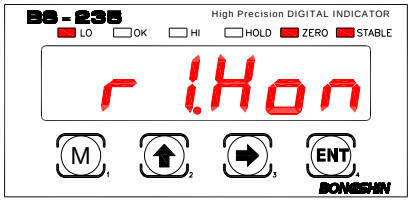
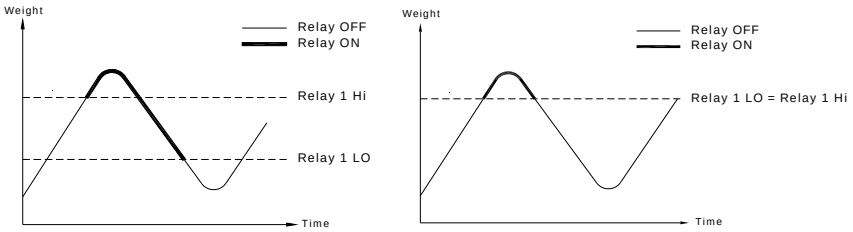
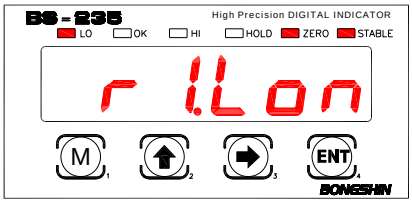
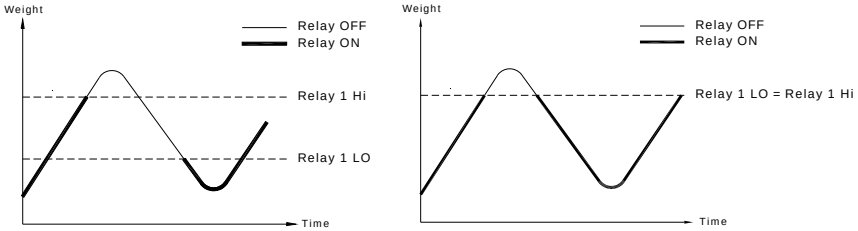
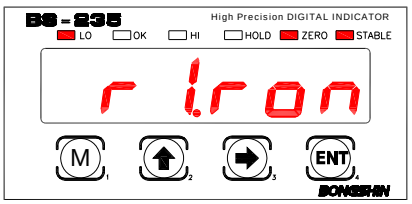
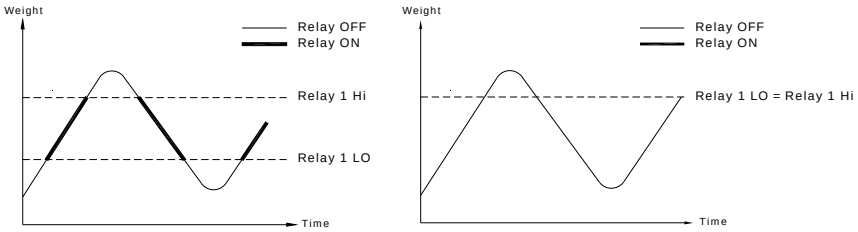
- Entry to setting mode is unavailable under key lock status thus it shall be executed after canceling the key lock.
- Setting range display may differ based on location of decimal point.
- Although meter display unit is 6 digit, Lo and Hi display unit is 5 digit. Therefore, no display is available for setting value of 6 digit. (minus value setting up to -19999 is available)
- Relay setting value can be initialized at check mode.
- You can exit measurement mode when set Lo only and push No.1 key (M).
- OK setting and output are operated within Lo and Hi setting value range.
  (OK setting is not conducted separately)

9-2 Relay Comparator Mode

9-2-1 Relay operation mode

There are three modes and measurement value and setting value is compared and output from relay output terminal (L1, L2, L3) of rear panel.

Display	Relay Operation Mode
r1.Lon, r2.Lon, r3.Lon	b contact
r1.ron, r2.ron, r3.ron	range contact
r1.Hon, r2.Hon, r3.Hon	a contact

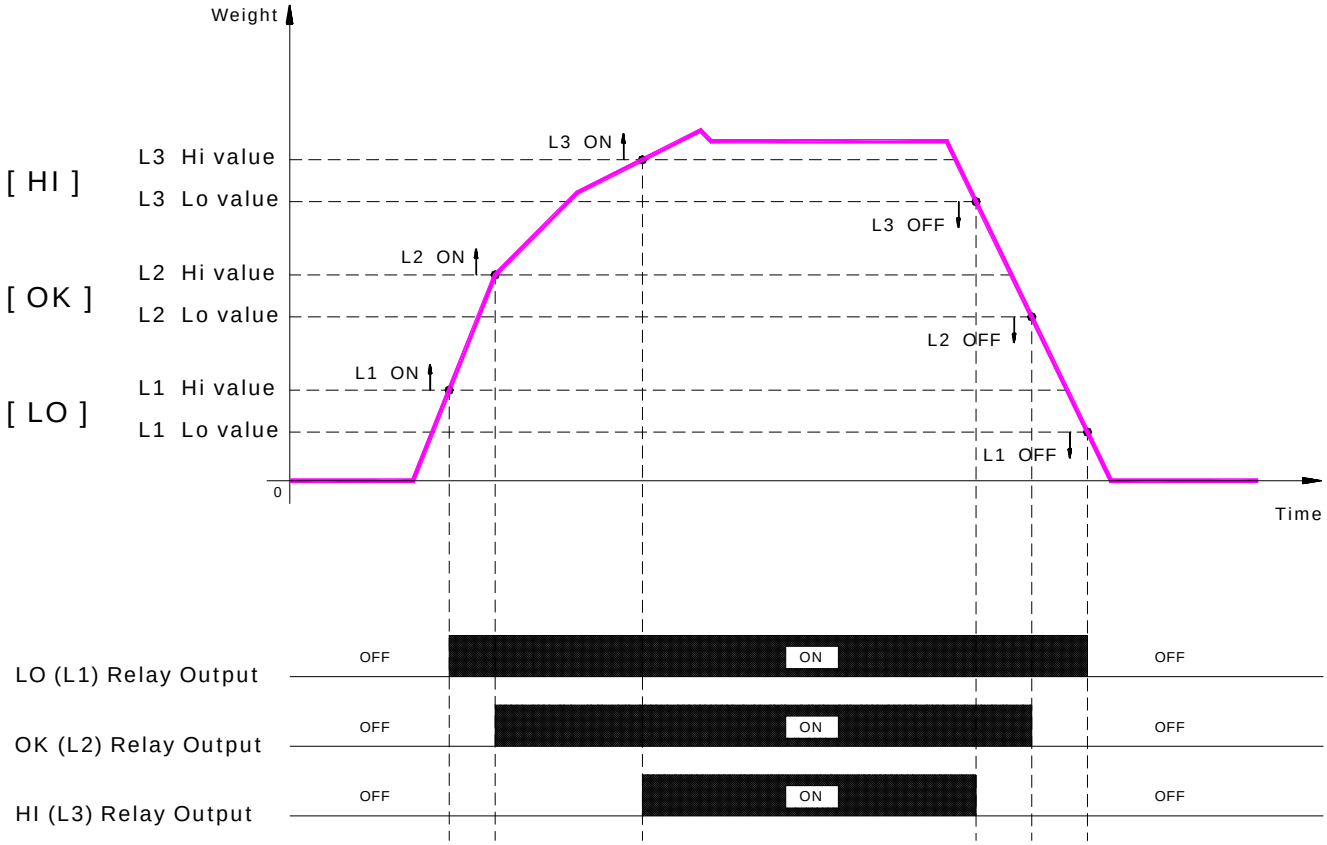
Indication	Contents of Setting
Relay mode (r1.**H**on /r1.**L**on/ r1.**r**on)	
r1**H**.on 	The r1.**H**on mode means the relay 1 motion mode, in which the load within the limits will activate a relay on and the load beyond the limits will activate a relay off. 
r1.**L**on 	The r1.**L**on mode means the relay 1 motion mode, in which the load within the limits will activate a relay off and the load beyond the limits will activate a relay on. 
r1.**r**on 	The r1.**r**on mode means the range mode, in which the load within the limits will activate a relay on and the load beyond the limits will activate LO LED on as a warning of high NG or low NG. 

As above, relays rLY2 and rLY3 also work.

9-2-2 Example of relay operation

■ **H ON** relay motion mode : r1.**H**on, r2.**H**on, r3.**H**on

: The load within the limits will activate a relay **ON.**

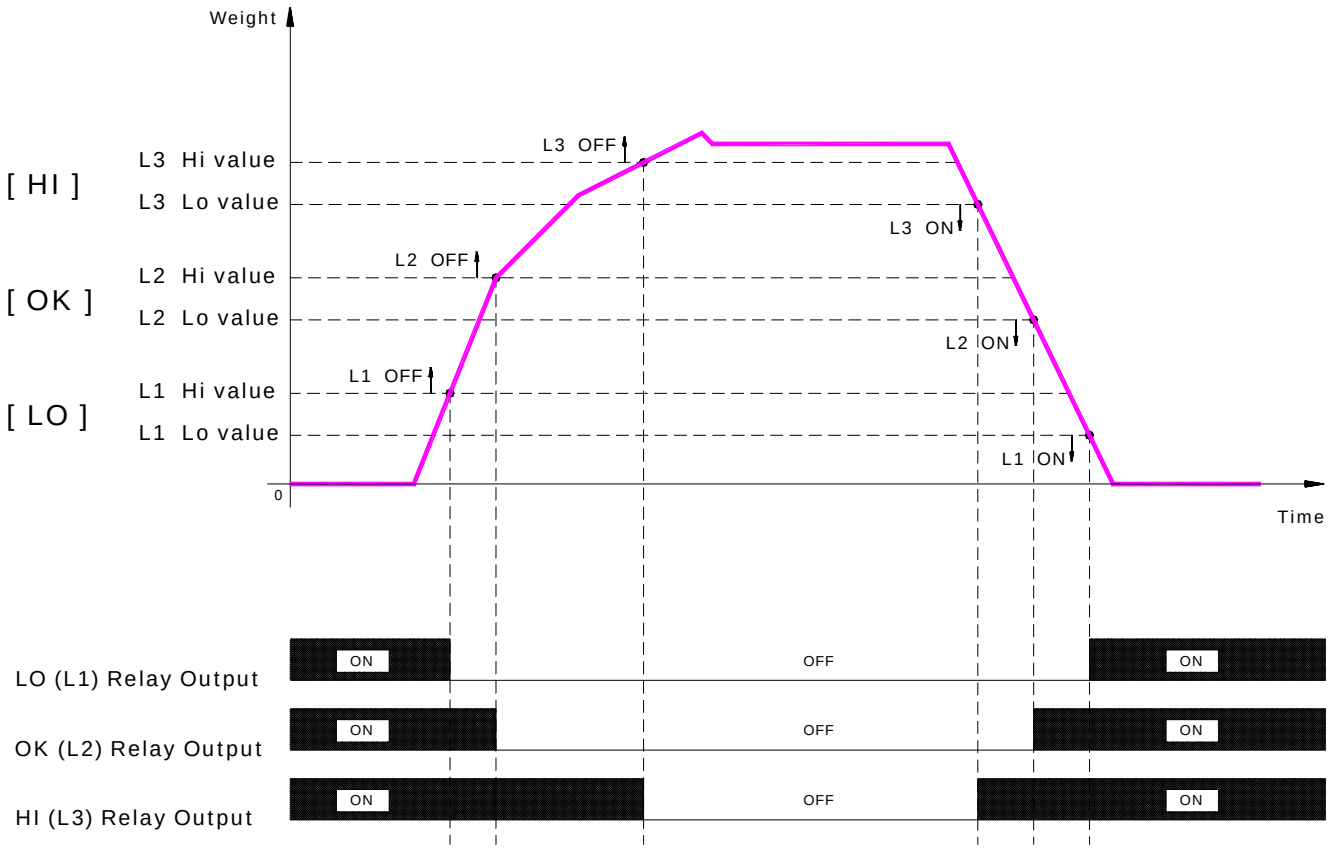


Example)

H ON mode	**rLY.1H**	L1 Hi side judgment value	**1000**	1000 within the limits will activate a relay **ON**
	rLY.1L	L1 Low side judgment value	**900**	900 beyond the limits will activate a relay **OFF**
	rLY.2H	L2 Hi side judgment value	**2000**	2000 within the limits will activate a relay **ON**
	rLY.2L	L2 Low side judgment value	**1900**	1900 beyond the limits will activate a relay **OFF**
	rLY.3H	L3 Hi side judgment value	**3000**	3000 within the limits will activate a relay **ON**
	rLY.3L	L3 Low side judgment value	**2900**	2900 beyond the limits will activate a relay **OFF**

■ **L ON** relay motion mode : r1.**L**on, r2.**L**on, r3.**L**on

: The load within the limits will activate a relay **OFF.**



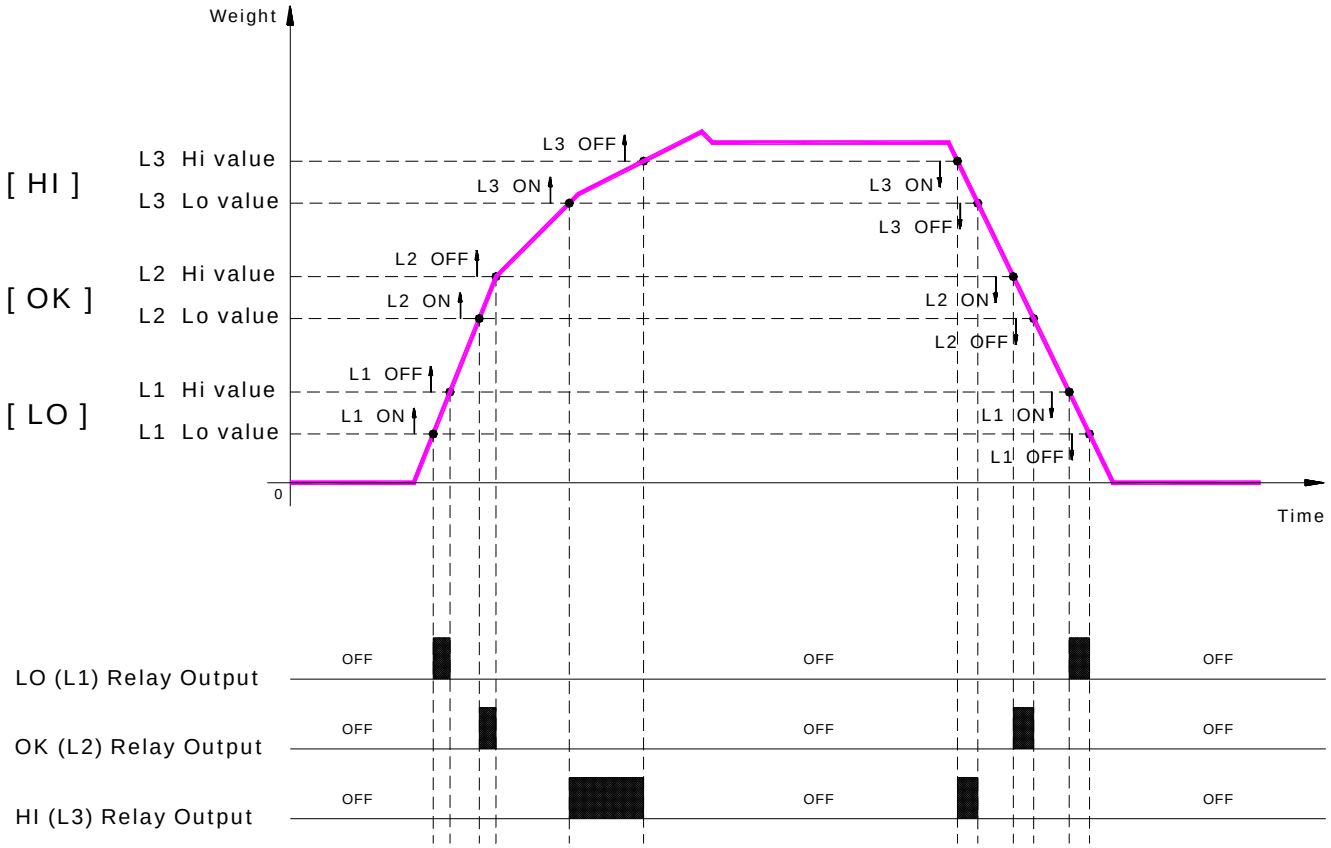
Example)

L ON mode	**rLY.1H**	L1 Hi side judgment value	**1000**	1000 within the limits will activate a relay **OFF**
	rLY.1L	L1 Low side judgment value	**900**	900 beyond the limits will activate a relay **ON**
	rLY.2H	L2 Hi side judgment value	**2000**	2000 within the limits will activate a relay **OFF**
	rLY.2L	L2 Low side judgment value	**1900**	1900 beyond the limits will activate a relay **ON**
	rLY.3H	L3 Hi side judgment value	**3000**	3000 within the limits will activate a relay **OFF**
	rLY.3L	L3 Low side judgment value	**2900**	2900 beyond the limits will activate a relay **ON**

■ **r (range) ON** relay motion mode : r1.**r**on, r2.**r**on, r3.**r**on

: Indicates the result of judgment and turns on.

If Lo judgment value ≦ the measured value ≦ Hi judgment value.



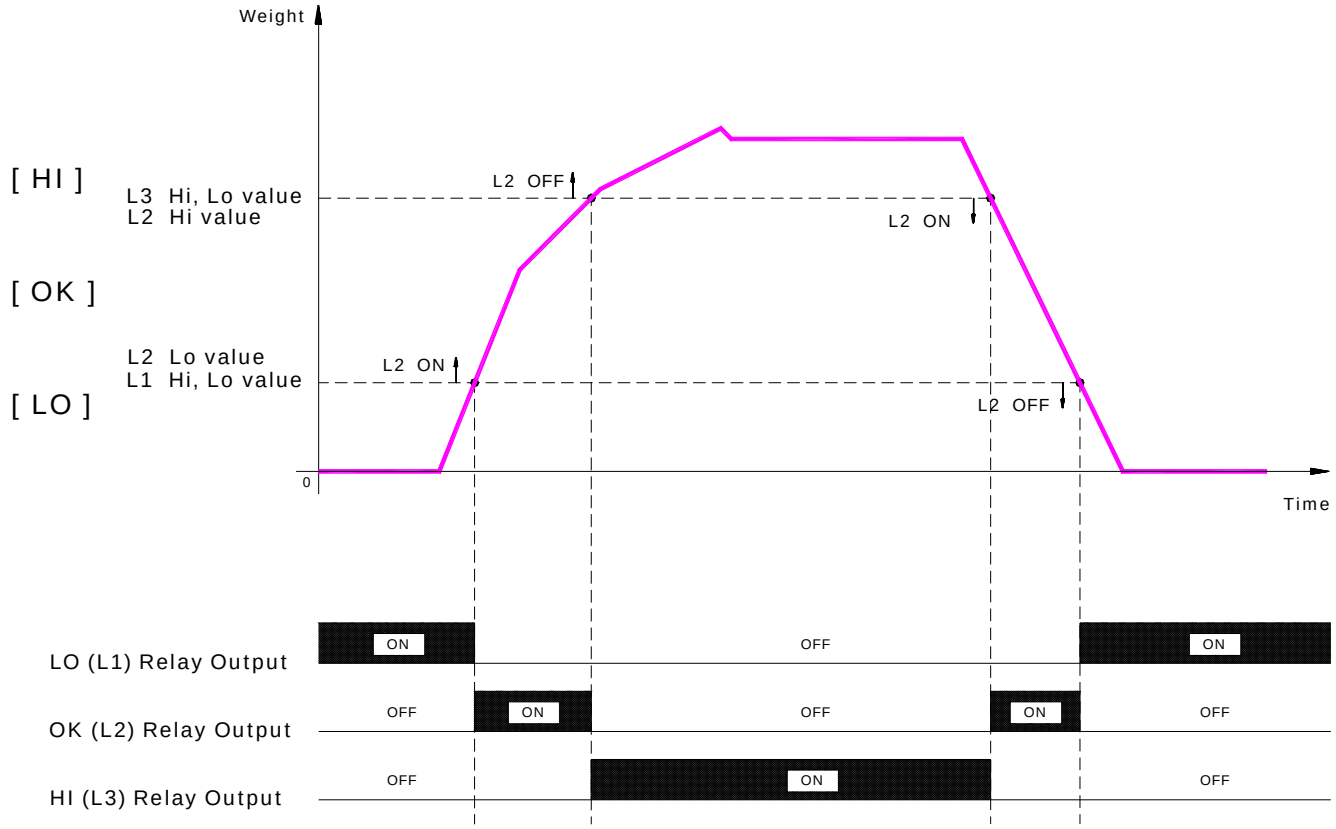
Example)

Range ON mode	**rLY.1H**	L1 Hi side judgment value	**1000**	1000 within the limits will activate a relay **OFF** 900 within the limits will activate a relay **ON**
	rLY.1L	L1 Low side judgment value	**900**	900 beyond the limits will activate a relay **OFF**
	rLY.2H	L2 Hi side judgment value	**2000**	2000 within the limits will activate a relay **OFF** 1900 within the limits will activate a relay **ON**
	rLY.2L	L2 Low side judgment value	**1900**	1900 beyond the limits will activate a relay **OFF**
	rLY.3H	L3 Hi side judgment value	**3000**	3000 within the limits will activate a relay **OFF** 2900 within the limits will activate a relay **ON**
	rLY.3L	L3 Low side judgment value	**2900**	2900 beyond the limits will activate a relay **OFF**

■ Comparator weighing mode : r1.**L**on, r2.**r**on, r3.**H**on

: Indicates the result of judgment and turns on.

If L1 judgment value ≦ L2 judgment value ≦ L3 judgment value.



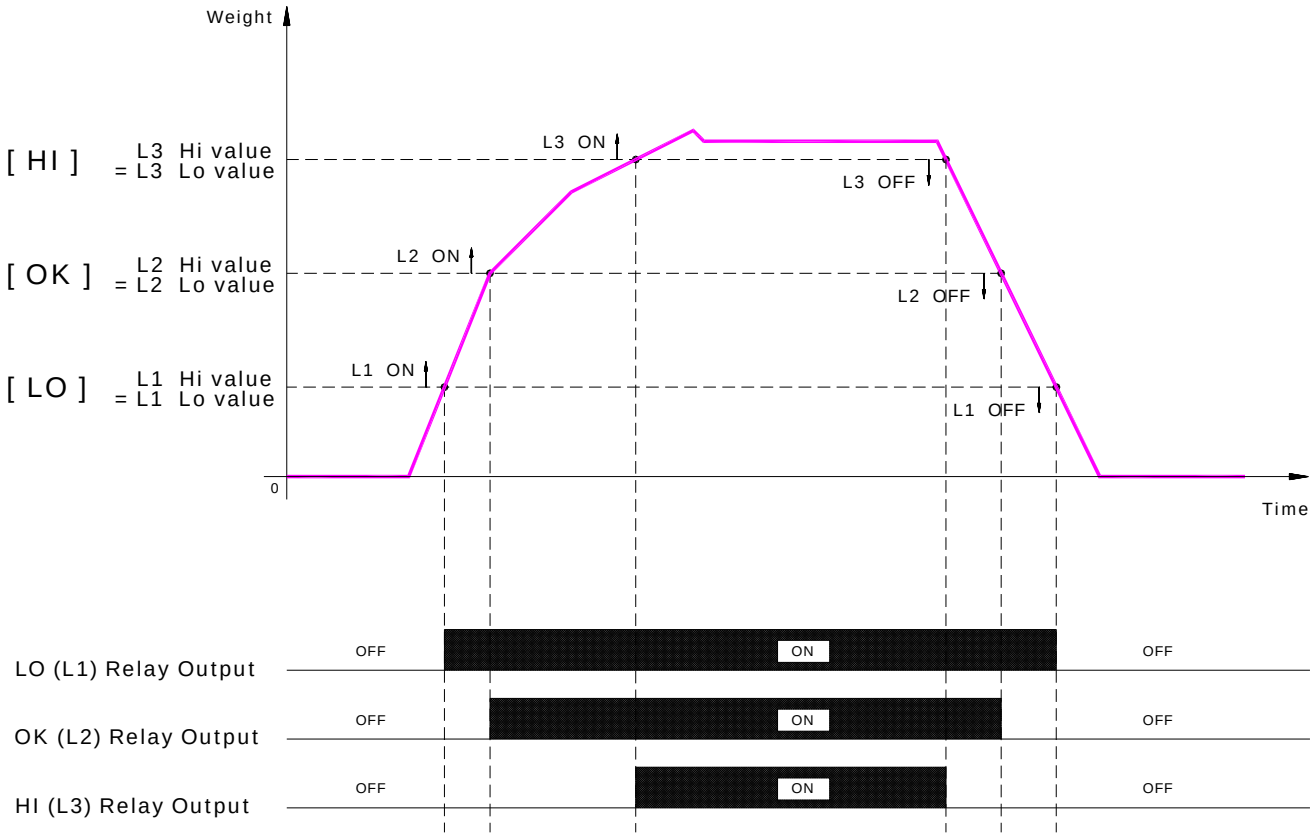
Example)

L1 – L ON mode	**rLY.1H**	L1 Hi side judgment value	**999**	999 beyond the limits will activate a relay **ON** 999 within the limits will activate a relay **OFF**
	rLY.1L	L1 Low side judgment value	**999**	
L2 – Range ON mode	**rLY.2H**	L2 Hi side judgment value	**3000**	3000 within the limits will activate a relay **OFF** 1000 beyond the limits will activate a relay **OFF** In the range of relay **ON**
	rLY.2L	L2 Low side judgment value	**1000**	
L3 – H ON mode	**rLY.3H**	L3 Hi side judgment value	**3001**	3001 within the limits will activate a relay **ON** 3001 beyond the limits will activate a relay **OFF**
	rLY.3L	L3 Low side judgment value	**3001**	

■ Set the Low setting value and Hi setting value to the same,

H ON relay motion mode : r1.**H**on, r2.**H**on, r3.**H**on

: The load within the limits will activate a relay **ON.**



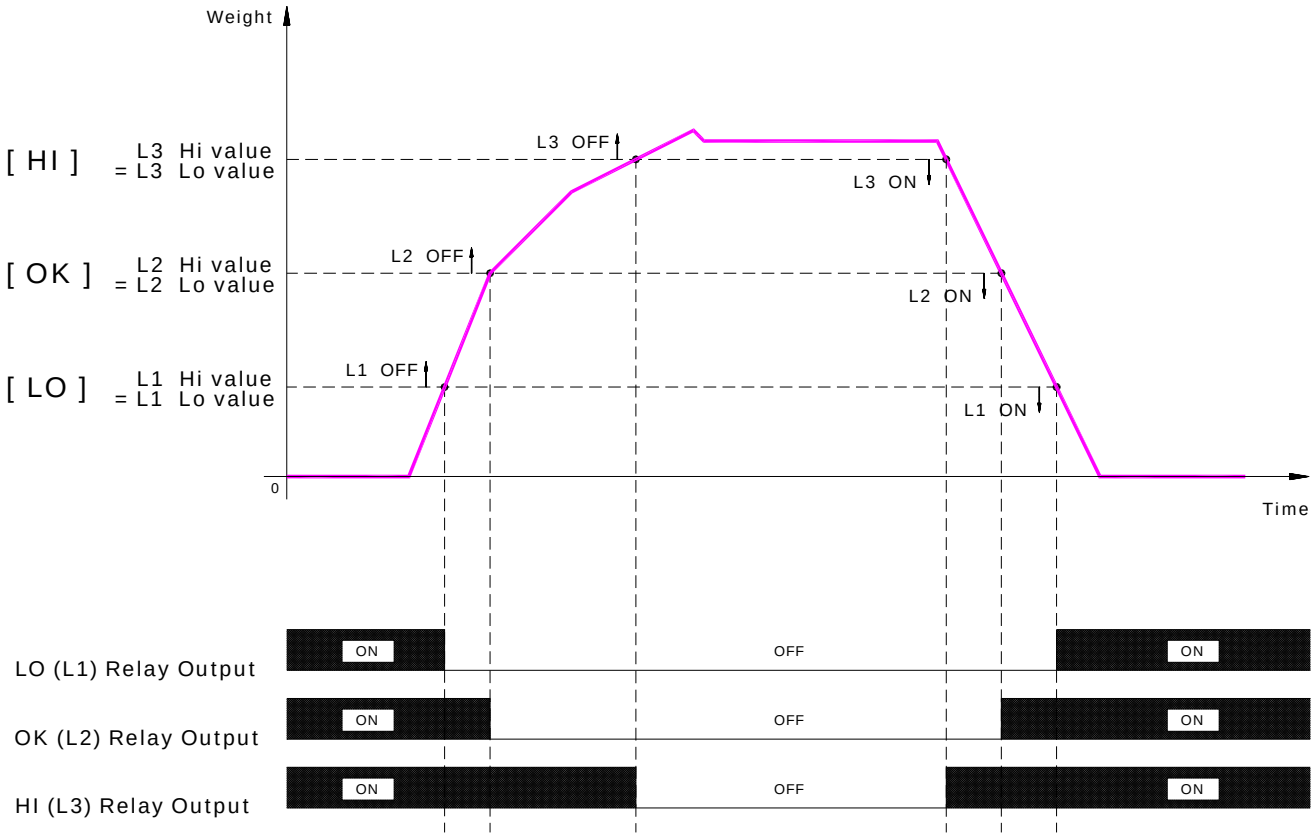
Example)

H ON mode	**rLY.1H**	L1 Hi side judgment value	**2000**	2000 within the limits will activate a relay **ON**
	rLY.1L	L1 Low side judgment value	**2000**	2000 beyond the limits will activate a relay **OFF**
	rLY.2H	L2 Hi side judgment value	**4000**	4000 within the limits will activate a relay **ON**
	rLY.2L	L2 Low side judgment value	**4000**	4000 beyond the limits will activate a relay **OFF**
	rLY.3H	L3 Hi side judgment value	**6000**	6000 within the limits will activate a relay **ON**
	rLY.3L	L3 Low side judgment value	**6000**	6000 beyond the limits will activate a relay **OFF**

■ Set the Low setting value and Hi setting value to the same,

L ON relay motion mode : r1.**L**on, r2.**L**on, r3.**L**on

: The load within the limits will activate a relay **OFF.**



Example)

L ON mode	**rLY.1H**	L1 Hi side judgment value	**2000**	2000 within the limits will activate a relay **OFF**
	rLY.1L	L1 Low side judgment value	**2000**	2000 beyond the limits will activate a relay **ON**
	rLY.2H	L2 Hi side judgment value	**4000**	4000 within the limits will activate a relay **OFF**
	rLY.2L	L2 Low side judgment value	**4000**	4000 beyond the limits will activate a relay **ON**
	rLY.3H	L3 Hi side judgment value	**6000**	6000 within the limits will activate a relay **OFF**
	rLY.3L	L3 Low side judgment value	**6000**	6000 beyond the limits will activate a relay **ON**

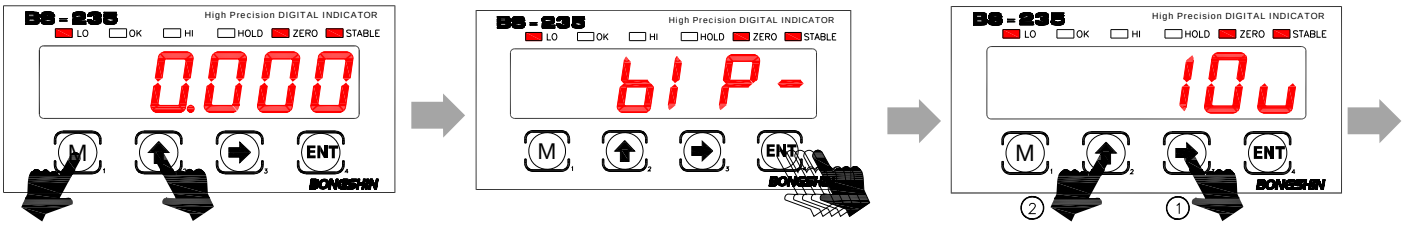
10. Analog Output

There are two types of analog output. Mode selection shall be conducted from function.
Since it is optional specification, it is equipped upon order.
When the serial (RS-232C, 422/485) option is equipped, this mode is not displayed.
Insulation has been conducted for output circuit and main circuit.

10-1 Analog Output Mode

10-1-1 Analog output selection mode

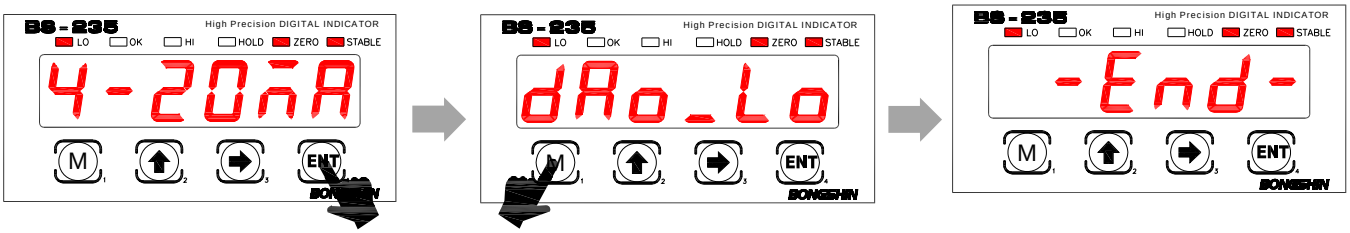
1. It turns into the mode selection status when ▲ key is pushed while pushing M key is pushed at measurement status.
2. Relay mode selection item comes out when you push ENT key 15 times at mode selection status.
3. Mode change is available when ▲ key or ▶ key is pushed at mode selection status.
4. Push ENT key in order to move onto next stage after selecting the analog mode and saving.
5. Push M key to cancel the mode and return to measurement mode.
   At the mode cancelation, the setting until previous stage of cancellation is saved.



1 It is entered into function mode when pushing No.2 key while pushing No.1 key.

2 It moves onto analog mode selection stage when pushing No.4 key 15 times.

3 After '**dAo_Md**' display, Output mode can be changed by pushing either No.2 or No.3 key.



4 When pushing No.4 key after mode change, it moves onto next stage after saving selected item.

ex) 4~20mA

5 After '**dAo_Lo**' display, It is turned into measurement mode when pushing No.1 key.

6 Function setting has been completed and it is turned into measurement mode status.

10-2 Analog output specification and connection method (DAV, DAI)

For DAV(DAI) output, the measurement value is converted into D/A and output as analog voltage (current).

Output range include 0~5V, 0~10V, 0 ~ ±5V, 0 ~ ±10V, 0~20mA, and 4~20mA.

Output scaling and minute calibration is set from function.

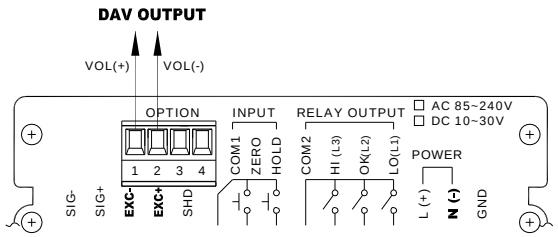
Frequency trait is based on display conversion speed setting of function.

10-2-1 Specification

Range of rated output	–10 V ~ +10 V	4 ~ 20mA
Range of max output :	–12.0 V ~ +12.0 V	0 ~ 24mA
D/A conversion speed :	1000 times/sec	1000 times/sec
Valid resolution :	1/10000	1/10000
Zero drift :	±1 mV/°C typ.	±0.5uA/°C typ.
Gain drift :	±100ppm/°C typ.	±100ppm/°C typ.
Non-linearity :	Within ±0.05%F.S.	Within ±0.05%F.S.
Load resistance ::	5 kΩ or higher	500Ω or higher

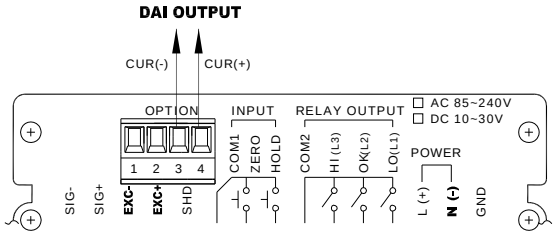
10-2-2 Connection method (DAV)

Terminal No.	Contents
1. VOLT +	Voltage output +
2. VOLT -	Voltage output -



10-2-3 Connection method (DAI)

Terminal No.	Contents
3. CURR -	Current output -
4. CURR +	Current output +



- Analog output is to convert measurement value into D/A for output and display conversion speed shall be changed from function setting in case of wanting 1000 times/sec output.
  It is output based on display conversion speed of function setting.
- In case of DAI analog output(4~20mA) (-) display value is not output.
- Output at function mode entry maintains previous value before entry and there is no output change.
- Voltage and current output cannot be used at once.
  Either voltage or current mode shall be selected from function setting for use. (it is different output terminal).

10-3 Analog Output Zero & Span Calibration

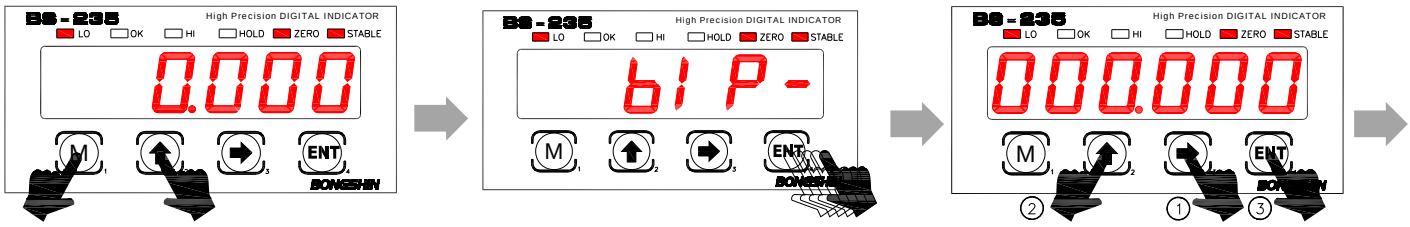
Measurement equivalent to 0V(0mA, 4mA), and 10V(20mA) of DAV (DAI) output is set.

Output scaling is set from function.

This mode is not displayed with the equipment of serial (RS-232C, 422/485) option.

10-3-1 Analog output zero & span calibration

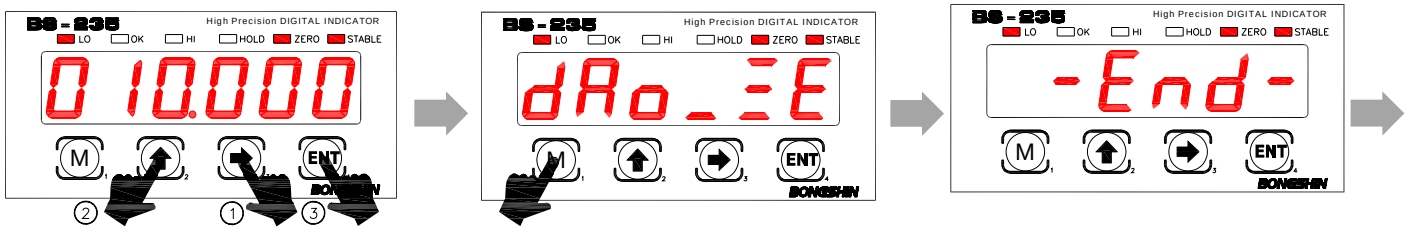
1. It turns into the mode selection status when ▲ key is pushed while pushing M key is pushed at measurement status.
2. Relay mode selection item comes out when you push ENT key 17 times at mode selection status.
3. Mode change is available when ▲ key or ▶ key is pushed at mode selection status.
4. Push ENT key in order to move onto next stage after selecting the analog output setting and saving.
5. Push M key to cancel the mode and return to measurement mode.
   At the mode cancelation, the setting until previous stage of cancellation is saved.



1 It is entered into function mode when pushing No.2 key while pushing No.1 key.

2 It moves onto analog Lo output setting stage when pushing No.4 key 17 times.

3 After '**dAo_Lo**' display, It moves onto next stage when pushing No.4 key after changing Lo input key and saving with the use of No2 and No.3 key.



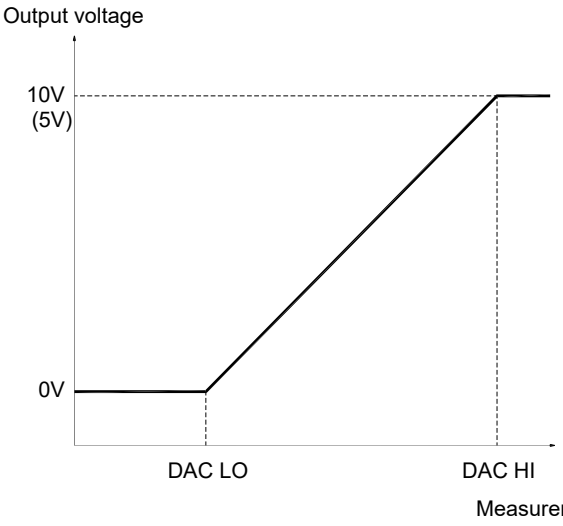
4 After '**dAo_Hi**' display, It moves onto next stage when pushing No.4 key after changing Hi output value with the use of No.2 and No.3 key.

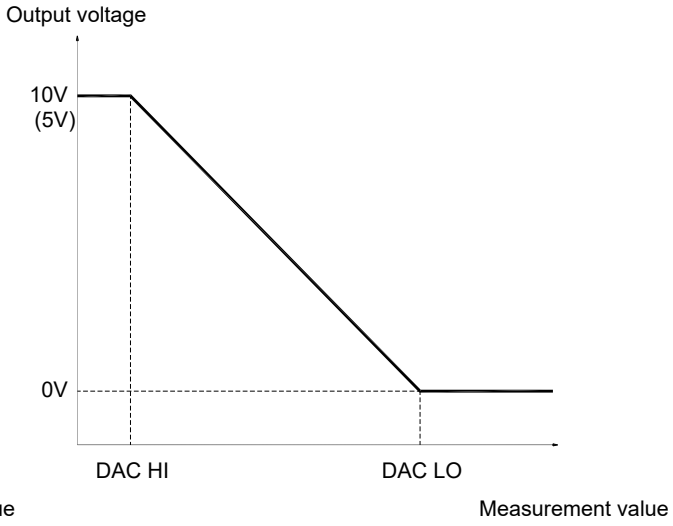
5 It is changed into measurement mode when pushing No.1 key upon completion of setting.

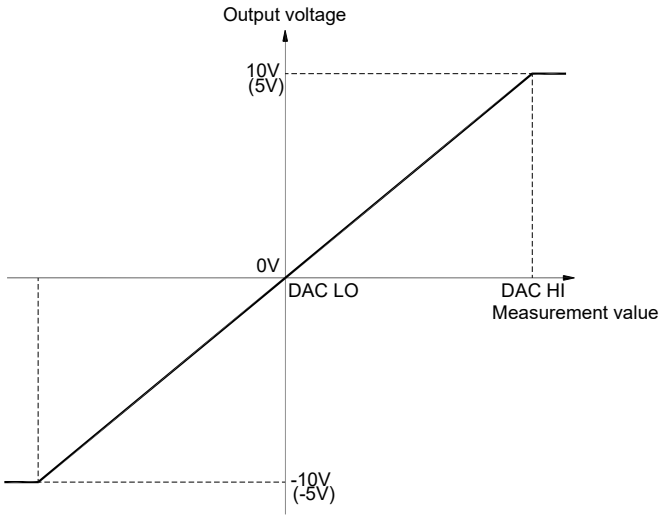
6 Function setting has been completed and it is changed into measurement mode status after saving setting value.

- Entry to setting mode is unavailable under key lock status thus it shall be executed after key lock cancellation.
- Setting range display may differ based on location of decimal point.
- For analog output, output is maintained with value under hold status even at hold status.
- Function setting value can be initialized at check mode.

10-3-2 Analog output graph (DAV)

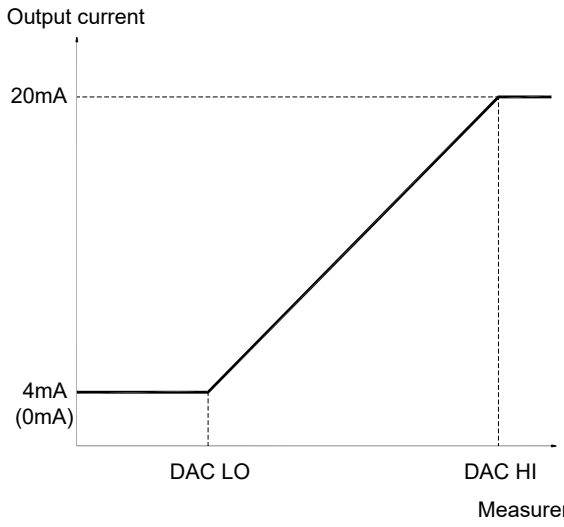


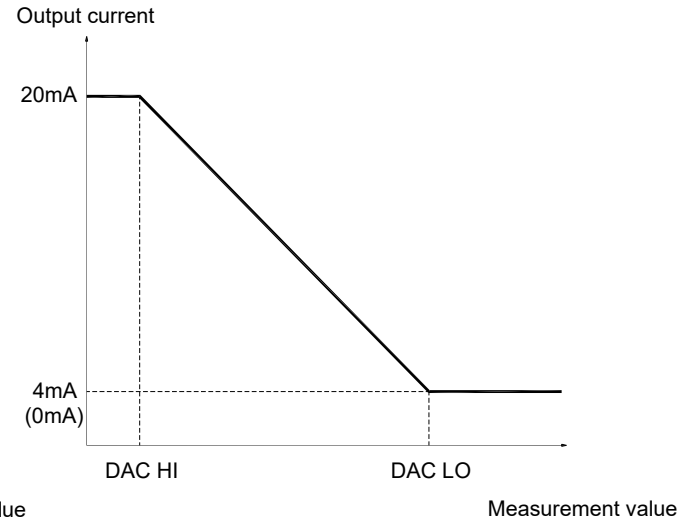




- In case of setting dAo_Lo and dAo_Hi as same value, output does not increase from 0V
- Reverse output is only applicable at 0~10(5V) setting.
  It is not applicable at 0~±5V, 0~±10V, 0~20mA, 4~20mA output.
  For reverse output, in case of setting dAo_Lo setting value and dAo_Hi setting value is each set as 10.000 and 0.000,
  0V and 10V (5V) is each output from 10.000 display value and 0.000 value.

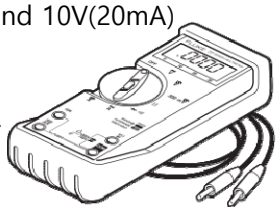
10-3-3 Analog output graph (DAI)





10-4 Analog output zero and span minute calibration

Minute calibration is conducted for measurement value equivalent to 0V(0mA, 4mA), and 10V(20mA) of DAV (DAI) output.
Output minute calibration is set from function.
This mode is not displayed with the equipment of serial (RS-232C, RS-422/485) option.

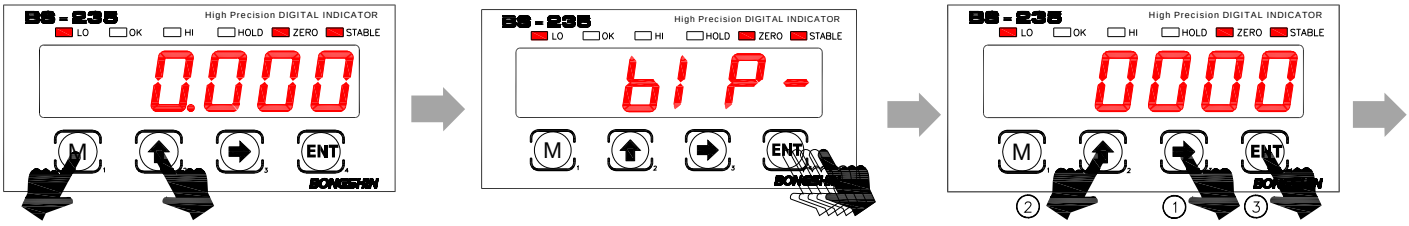


Warning

> This mode shall be used only when there is lack of accuracy even after analog output zero and span calibration. High precision digital multi-meter is necessary in order to conduct calibration since it controls inner calibration factor. There may be deterioration in performance when meter with low precision is used.

10-4-1 Analog output zero & span minute calibration

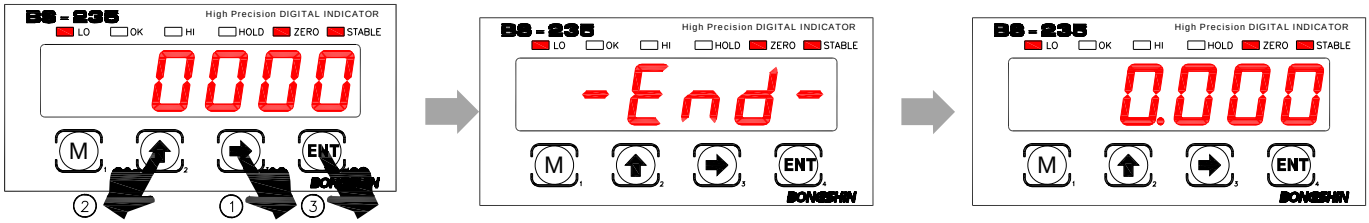
1. It turns into the mode selection status when ▲ key is pushed while pushing M key is pushed at measurement status.
2. Relay mode selection item comes out when you push ENT key 21 times at mode selection status.
3. Mode change is available when ▲ key or ▶ key is pushed at mode selection status.
4. Push ENT key in order to move onto next stage after selecting the analog output setting value and saving.
5. Push M key to cancel the mode and return to measurement mode.
   At the mode cancelation, the setting until previous stage of cancellation is saved.



1 It is entered into function mode when pushing No.2 key while pushing No.1 key.

2 It moves onto stage for minute calibration of analog zero output value when pushing No.4 key 21 times.

3 After '**dAo_ZE**' display, It moves onto next stage when pushing No.4 key after changing zero output value and saving with the use of



4 After '**dAo_FU**' display, It moves onto to next stage when pushing No.4 key when changing span output value with the use of No.2 and No.3

5 It is changed into measurement mode when pushing No.1 key upon setting completion.

6 Function setting has been completed and it is changed into measurement mode status after saving the setting value.

10-4-2 Analog output zero & span minute calibration range

Output mode	Range of minute calibration	Minute calibration setting value	Output change width for minute calibration
0 ~ 10V output	0 ~ 9999 (-9999)	0 **10** (-10) 20 (-20) ~ **100** (-100) 999 (-999) **9999** (-9999)	0V **0.002V** increase (decrease) 0.004V increase (decrease) ~ **0.02V** increase (decrease) 0.2V increase (decrease) **2.0V** increase (decrease)
0 ~ ±10V output	-9999 ~ 9999	0 **10** (-10) 20 (-20) ~ **100** (-100) 999 (-999) **9999** (-9999)	0V **0.004V** increase (decrease) 0.008V increase (decrease) ~ **0.04V** increase (decrease) 0.4V increase (decrease) **4.0V** increase (decrease)
0 ~ 5V output	0 ~ 9999 (-9999)	0 **10** (-10) 20 (-20) ~ **100** (-100) 999 (-999) **9999** (-9999)	0V **0.001V** increase (decrease) 0.002V increase (decrease) ~ **0.01V** increase (decrease) 0.1V increase (decrease) **1.0V** increase (decrease)
0 ~ ±5V output	-9999 ~ 9999	0 **10** (-10) 20 (-20) ~ **100** (-100) 999 (-999) **9999** (-9999)	0V **0.002V** increase (decrease) 0.004V increase (decrease) ~ **0.02V** increase (decrease) 0.2V increase (decrease) **2.0V** increase (decrease)
4 ~ 20mA output	-9999 ~ 9999	0 **10** (-10) 20 (-20) ~ **100** (-100) 999 (-999) **9999** (-9999)	0 mA **0.004 mA** increase (decrease) 0.008 mA increase (decrease) ~ **0.04 mA** increase (decrease) 0.4 mA increase (decrease) **4.0 mA** increase (decrease)
0 ~ 20mA output	0 ~ 9999 (-9999)	0 **10** (-10) 20 (-20) ~ **100** (-100) 999 (-999) **9999** (-9999)	0 mA **0.003 mA** increase (decrease) 0.006 mA increase (decrease) ~ **0.03 mA** increase (decrease) 0.3 mA increase (decrease) **3.0 mA** increase (decrease)

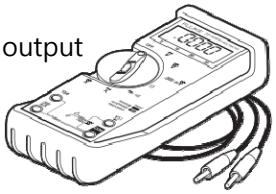
Calibration range of voltage output is max ±4.0V and current output is ±4.0mA.

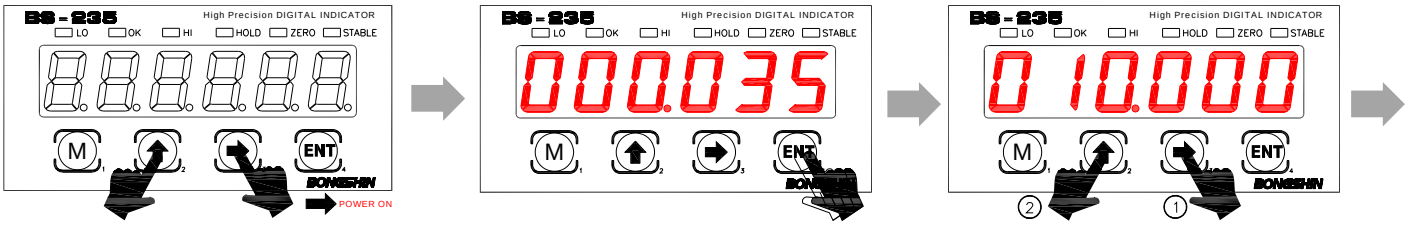
- Entry to setting mode is unavailable under key lock status thus it shall be executed after key lock cancellation.
- Implementation of minute calibration shall be used only when there is lack of accuracy with general scaling.

  There may be a lowering of accuracy when there is a change in the adjusted setting value at forwarding by our company.
- Calibration of output voltage (current) shall be conducted while viewing digital multi-meter.
- Since there may be a difference in calibration factor of each device, it is recommended that calibration factor shall be recorded in-advance when the change is made.
- At this mode, minute calibration is available for only 0V(0mA, 4mA) and 10V(20mA).
  In case of using 0~20mA mode, minute calibration of 0mA is conducted only with (+) value and minute calibration of 20mA is conducted only with (-) value.
- When you continuously push No.2 or No.3 key at minute calibration, figure is quickly increased and decreased by 10.
- Function setting value can be initialized at check mode.

10-5 Analog Output Check

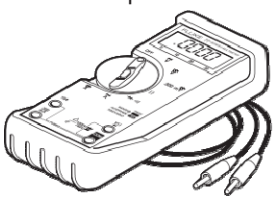
Analog output (voltage or current) corresponding to the analog Hi value is output by key operation.
You can check the linearity by increasing or decreasing the output by changing the display value.
It is possible to check the output even when no load is applied.
The voltage or current value is output according to the specification selected in the analog output mode setting. However, this is only possible when the option (DAV/DAI) is selected.



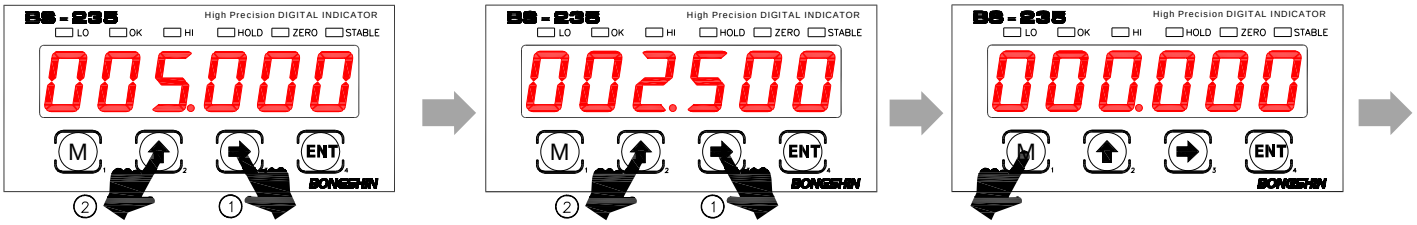


1 It is entered into mode when turning the power on while pushing No.2 and No.3 key under power off status.

2 Load cell output voltage check mode is displayed. Press No.4 key 2 times. Check by connecting a tester to the output terminal.



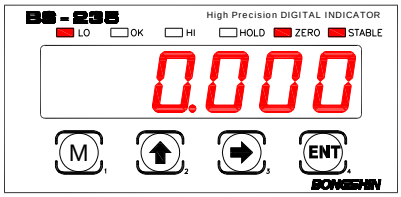
3 Displays the analog Hi value Set in function mode. If you increase/decrease the displayed value using No.2 and No.3 key, the analog output value is output according to the displayed value. The displayed value indicates the weighing value when outputting as voltage or current.



4 For example, if 20mA(10V) is output at 10.000kg, change the display value to 5.000kg, you can see that 12mA(5V) is output. Change it to a different value using the No.2 and No.3 key to confirm.

5 If you change the display value to 2.000kg, you can see that 8mA(2.5V) is output. Change it to a different value Using the No.2 and No.3 key to confirm.

6 If you change the display value to 0.000kg, you can see that 4mA(0V) is output. When the output operation check is completed, press No.1 key to change to the weighing mode.



ex) 10.000 kg → 20mA (or 10V)
5.000 kg → 12mA (or 5.0V)
2.500 kg → 8mA (or 2.5V)
.....
1.000 kg → 5.6mA (or 1.0V)
0.500 kg → 4.8mA (or 0.5V)
0.000 kg → 4.0mA (or 0.0V)

※ The display value change range is -199999 to 999999.

※ As it is only possible to check the operation of analog output, the tested value is not saved.

11. Serial Output

Serial output is an interface which conducts the output of display value as serial data.

It is used to process control, collection, record, and others with access to PLC.

Various setting shall be selected from function mode.
This mode is not displayed with the equipment of analog output (DAI,DAV) option.

11-1 RS-232C/422/485 Serial Interface

11-1-1 Specification

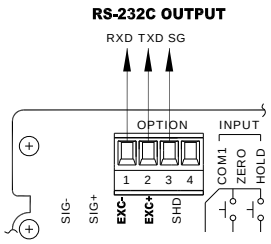
	RS-232C	RS-422/485
Transmission Method	Full duplex, Asynchronous	Semi duplex
Transmission Distance	Max 15m	Max 1km
Transmission Speed	1200 bps ~ 115200 bps	
Data bit	7, 8 bits	
Parity bit	None, Even, Odd	
Stop bit	1bit	
Use code	ASCII	
Terminator	STX, ETX (STX: 02H, ETX: 03H)	
No. of max connection	1	Max 16sets
Connector specification	PHOENIX CONTACT 4 pin connector (BCP-381-4 GN)	

※ Conversion into RS-422/485 is available by user

11-1-2 Connection method

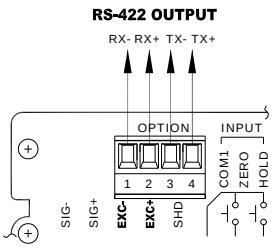
For RS-232C

Pin No.	Signal name	Direction	Description
1	RXD	Input	Receive data
2	TXD	Output	Transmit data
3	SG	-	Signal ground
4			No connection



For RS-422

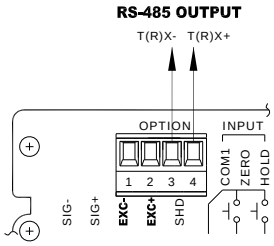
Pin No.	Signal name	Direction	Description
1	RX-	Input	Receive data
2	RX+	Input	Receive data
3	TX-	Output	Transmit data
4	Tx+	Output	Transmit data



Warning : In case of using RS-485, change shall be made from function setting.

For RS-485

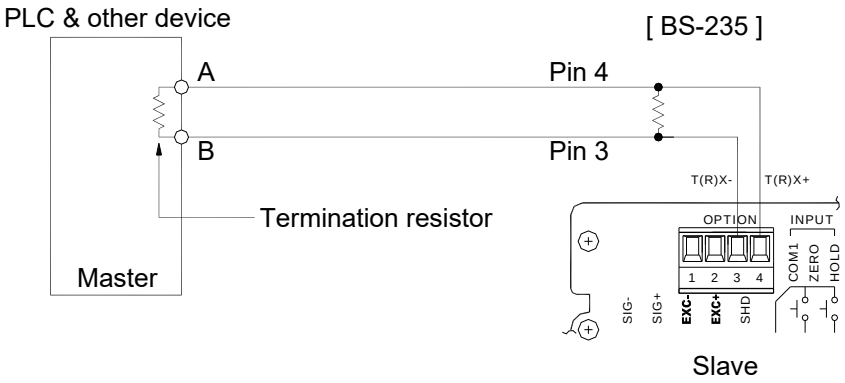
Pin No.	Signal name	Direction	Description
1			No connection
2			No connection
3	T(R)X-	TRb	RS-485 line B
4	T(R)X+	TRa	RS-485 line A



Warning : In case of using RS-422, change shall be made from function setting.

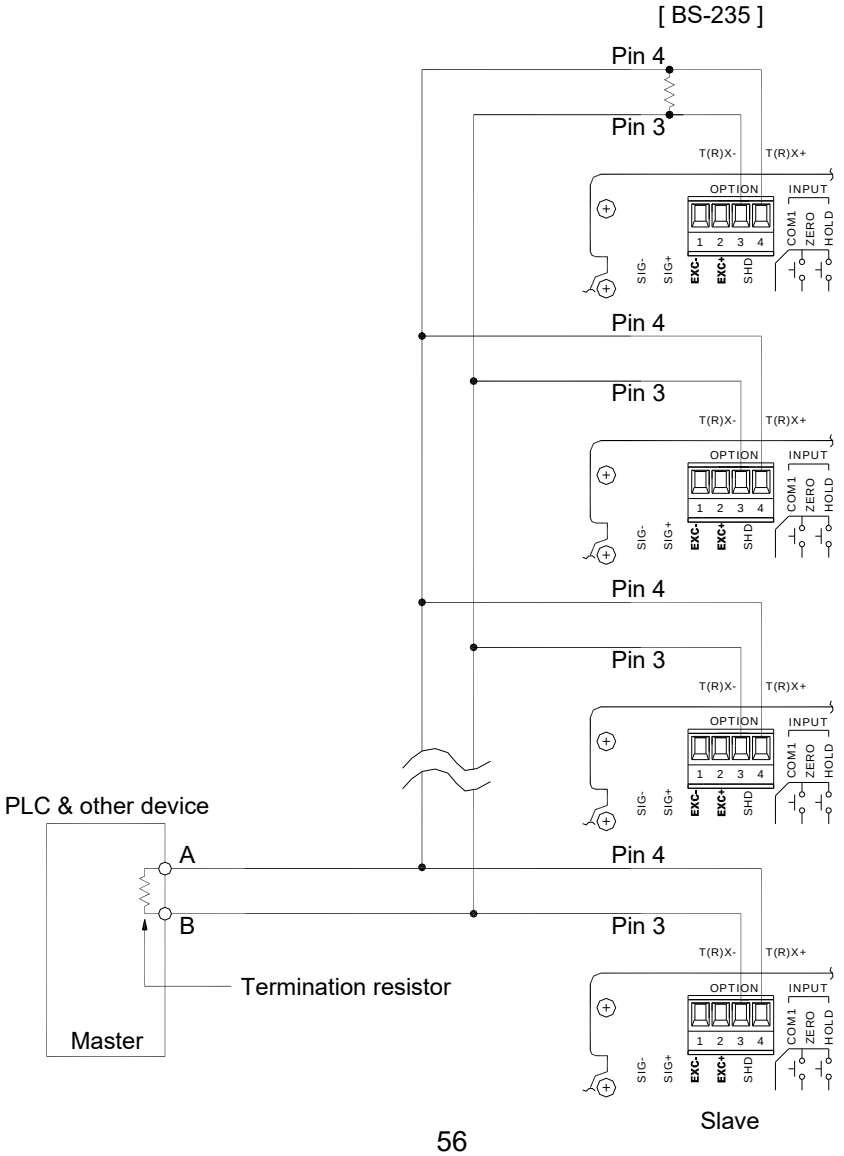
11-1-3 Example of RS-485 connection

1. 1:1 connection with master



- Shield cable and twist pair cable shall be used.
- Longitudinal resistance shall be exerted to both ends of writing. (100Ω ~ 120Ω, 1/2W~2W)
- There may be a reverse display of A and B for some master equipment.
  Connect by changing A and B in case communication is unavailable.

2. Multiple connection of BS-235 to 1 master



11-2 BS-235 Format (BONGSHIN Format)

11-2-1 Stream Mode

	ID		Sign	Weight Data							Decision	
1	2	3	4	5	6	7	8	9	10	11	12	13
<STX>	0	1	±	1	2	3	.	4	5	6	L	<ETX>
<STX>	0	1	±	1	2	3	.	4	5	6	O	<ETX>
<STX>	0	1	±	1	2	3	.	4	5	6	H	<ETX>
<STX>	0	1	±	1	2	3	4	5	6	.	H	<ETX>

Warning : When there is no decimal point in display, decimal point is received at the end of weight data.

11-2-2 Command mode

1. Command to request data
Current value is requested.

Command example

	ID		Command	
1	2	3	4	5
<STX>	0	1	R	<ETX>
02	30	31	52	03

Response example (ASCII)

	ID		Sign	Weight data							Decision	
1	2	3	4	5	6	7	8	9	10	11	12	13
<STX>	0	1	±	1	2	3	.	4	5	6	L	<ETX>
<STX>	0	1	±	1	2	3	.	4	5	6	O	<ETX>
<STX>	0	1	±	1	2	3	.	4	5	6	H	<ETX>
<STX>	0	1	±	1	2	3	4	5	6	.	H	<ETX>

Warning : When there is no decimal point in display, decimal point is received at the end of weight data.

Response example (Hexa)

	ID		Sign	Weight data							Decision	
1	2	3	4	5	6	7	8	9	10	11	12	13
02	30	31	2B	31	32	33	2E	34	35	36	4C	03
02	30	31	2B	31	32	33	2E	34	35	36	4F	03
02	30	31	2B	31	32	33	2E	34	35	36	48	03
02	30	31	2B	31	32	33	34	35	36	2E	48	03

- Output is conducted same as flickering of LED.

L : RY1(LO) relay operation
O : RY2(OK) relay operation
H : RY3(HI) relay operation

A : RY1(LO), RY2(OK) relay operation
B : RY2(OK), RY3(HI) relay operation
C : RY1(LO), RY3(HI) relay operation
F : RY1(LO), RY2(OK), RY3(HI) relay operation (all relays on)
N : RY1(LO), RY2(OK), RY3(HI) relay OFF (all relays off)

2. Zero command

Zero command is executed.

Command example

	ID		Command	
1	2	3	4	5
<STX>	0	1	Z	<ETX>
02	30	31	5A	03

3. Hold ON command

Hold is commenced.

Command example

	ID		Command	
1	2	3	4	5
<STX>	0	1	H	<ETX>
02	30	31	48	03

4. Hold OFF command

Hold is cancelled.

Command example

	ID		Command	
1	2	3	4	5
<STX>	0	1	C	<ETX>
02	30	31	43	03

5. Command to send the Low/High limit values (rLY.1H/rLY.1L, rLY.2H/rLY.2L, rLY.3H/rLY.3L)

Check the set Lo/Hi value through communication.

Command example

	ID		COMMAND				
1	2	3	4	5	6	7	8
<STX>	0	1	R	Y	1	H	<ETX>
<STX>	0	1	R	Y	I	L	<ETX>
<STX>	0	1	R	Y	2	H	<ETX>
<STX>	0	1	R	Y	2	L	<ETX>
<STX>	0	1	R	Y	3	H	<ETX>
<STX>	0	1	R	Y	3	L	<ETX>

Response example (with decimal point)

	ID		COMMAND				Sign	VALUE						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<STX>	0	1	R	Y	1	H	+	0	2	.	0	0	0	<ETX>
<STX>	0	1	R	Y	1	L	+	0	2	.	0	0	0	<ETX>
<STX>	0	1	R	Y	2	H	+	0	4	.	0	0	0	<ETX>
<STX>	0	1	R	Y	2	L	+	0	4	.	0	0	0	<ETX>
<STX>	0	1	R	Y	3	H	+	0	6	.	0	0	0	<ETX>
<STX>	0	1	R	Y	3	L	+	0	6	.	0	0	0	<ETX>

Response example (without decimal point): number of digits is reduced by one.

	ID		COMMAND				Sing	VALUE					
1	2	3	4	5	6	7	8	9	10	11	12	13	14
<STX>	0	1	R	Y	1	H	+	0	2	0	0	0	<ETX>
<STX>	0	1	R	Y	1	L	+	0	2	0	0	0	<ETX>
<STX>	0	1	R	Y	2	H	+	0	4	0	0	0	<ETX>
<STX>	0	1	R	Y	2	L	+	0	4	0	0	0	<ETX>
<STX>	0	1	R	Y	3	H	+	0	6	0	0	0	<ETX>
<STX>	0	1	R	Y	3	L	+	0	6	0	0	0	<ETX>

- Data reception, command, and response toward command differ based on ID setting and location of decimal point.
- Serial output and command setting can be conducted even under hold status (only zero command cannot be operated)
- Command setting is available even under stream mode setting (operation of zero command is also available)
  However, since data may be broken due to overlapping thus it would be better not to use command under stream mode status.
- Data reception or response is unavailable during entry to function mode (same for stream mode).
- Response to command is unavailable during entry to function mode, calibration mode, and relay mode. (same for stream mode)
- In case of using RS-232C/422 serial output, command is operated even under stream mode.
  (operation is unavailable for RS-485).
- In case of using RS-422, RS-485 shall be changed into RS-422 at function mode.

6. Command to set Low/High limit values (rLY.1H/rLY.1L, rLY.2H/rLY.2L, rLY.3H/rLY.3L)

The Lo/Hi value must be set to Communication.
For sign setting, both (+) and (-) are available.

Command example (with decimal point)

	ID		COMMAND				Sign	VALUE						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<STX>	0	1	R	Y	1	H	+	0	2	.	0	0	0	<ETX>
<STX>	0	1	R	Y	1	L	+	0	2	.	0	0	0	<ETX>

<STX>	0	1	R	Y	2	H	+	0	4	.	0	0	0	<ETX>
<STX>	0	1	R	Y	2	L	+	0	4	.	0	0	0	<ETX>
<STX>	0	1	R	Y	3	H	+	0	6	.	0	0	0	<ETX>
<STX>	0	1	R	Y	3	L	+	0	6	.	0	0	0	<ETX>

Warning: No change can be made for display without decimal point.
(only current setting value is transmitted).

Command example (without decimal point): Number of digit is reduced by one.

	ID		COMMAND				Sing	VALUE					
1	2	3	4	5	6	7	8	9	10	11	12	13	14
<STX>	0	1	R	Y	1	H	+	0	2	0	0	0	<ETX>
<STX>	0	1	R	Y	1	L	+	0	2	0	0	0	<ETX>

<STX>	0	1	R	Y	2	H	+	0	4	0	0	0	<ETX>
<STX>	0	1	R	Y	2	L	+	0	4	0	0	0	<ETX>
<STX>	0	1	R	Y	3	H	+	0	6	0	0	0	<ETX>
<STX>	0	1	R	Y	3	L	+	0	6	0	0	0	<ETX>

Warning: No change can be made for display with decimal point.
(only current setting value is transmitted).

Response example (with decimal point)

	ID		COMMAND				Sign	VALUE						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<STX>	0	1	R	Y	1	H	+	0	2	.	0	0	0	<ETX>
<STX>	0	1	R	Y	1	L	+	0	2	.	0	0	0	<ETX>

<STX>	0	1	R	Y	2	H	+	0	4	.	0	0	0	<ETX>
<STX>	0	1	R	Y	2	L	+	0	4	.	0	0	0	<ETX>
<STX>	0	1	R	Y	3	H	+	0	6	.	0	0	0	<ETX>
<STX>	0	1	R	Y	3	L	+	0	6	.	0	0	0	<ETX>

Response example (without decimal point): number of digits is reduced by one.

	ID		COMMAND				Sing	VALUE					
1	2	3	4	5	6	7	8	9	10	11	12	13	14
<STX>	0	1	R	Y	1	H	+	0	2	0	0	0	<ETX>
<STX>	0	1	R	Y	1	L	+	0	2	0	0	0	<ETX>

- Data reception, command, and response toward command differ based on ID setting and location of decimal point.
- Serial output and command setting can be conducted even under hold status. (only zero command cannot be operated).
- Command setting is available even under stream mode status. (operation of zero command is also available)

11-3 BS-205 Format (BONGSHIN Format)

When set to BS-205 format, the command mode is different from BS-235 Format.

11-3-1 Stream Mode

	ID	Sign	Weight Data						
1	2	3	4	5	6	7	8	9	10
<STX>	1	±	1	2	.	3	4	5	<ETX>
<STX>	1	±	1	2	3	.	4	5	<ETX>
<STX>	1	±	1	2	3	4	.	5	<ETX>
<STX>	1	±	1	2	3	4	5	6	<ETX>

Warning : If there is no decimal point in the display display, the digit after the sign is treated as _ (space).

11-3-2 Command mode

1. Command to request data
Current value is requested.

Command example

ID	Command
1	2
1	R
31	52

Response example (ASCII & Hexa)

	ID	Sign	Weight data						
1	2	3	4	5	6	7	8	9	10
<STX>	1	+	_	7	.	4	8	7	<ETX>
02	31	2B	20	37	2E	34	38	37	03
<STX>	1	+	_	_	7	4	8	7	<ETX>
02	31	2B	20	20	37	34	38	37	03

	ID	Sign	Weight data						
1	2	3	4	5	6	7	8	9	10
<STX>	10	-	_	7	4	8	.	6	<ETX>
02	3A	2D	20	37	34	38	2E	36	03
<STX>	15	-	1	.	7	4	8	6	<ETX>
02	3F	2D	31	2E	37	34	38	36	03

	ID	Sign	Weight data						
1	2	3	4	5	6	7	8	9	10
<STX>	0	+	_	_	_	0	.	0	<ETX>
02	30	2B	20	20	20	30	2E	30	03
<STX>	1	+	_	_	_	_	_	0	<ETX>
02	31	2B	20	20	20	20	20	30	03

Warning : If there is no decimal point in the display display, the digit after the sign is treated as _ (space).

- Data reception, command, and response toward command differ based on ID setting and location of decimal point.
- Serial output and command setting can be conducted even under hold status. (only zero command cannot be operated).
- Command setting is available even under stream mode status. (operation of zero command is also available)
- Relay transmission and setting commands cannot be used in BS-205 Format.

2. Zero command

Zero command is executed.

Command example

ID	Command
1	2
1	Z
31	5A

※ If the ID is 1, it is explained as an example.

3. Hold ON command

Hold is commenced.

Command example

ID	Command
1	2
1	H
31	48

※ If the ID is 1, it is explained as an example.

4. Hold OFF command

Hold is cancelled.

Command example

ID	Command
1	2
1	L
31	4C

※ If the ID is 1, it is explained as an example.

11-4 BS-7300 Format (BONGSHIN Format)

In case of BS-7300 format setting, command mode is same as **11-2-2 command mode.**

11-4-1 Stream Mode

			Sign	Weight Data									
1	2	3	4	5	6	7	8	9	10	11	12	13	14
CR	LF	S	±	1	2	.	3	4	5	6	7	CR	LF
CR	LF	S	±	1	2	3	.	4	5	6	7	CR	LF
CR	LF	S	±	1	2	3	4	.	5	6	7	CR	LF
CR	LF	U	±	1	2	3	4	5	6	7	8	CR	LF

Warning : If there is no decimal point in the display display, the digit after the sign is treated as 0 (zero).

	ASCII code	Hexadecimal	Description
Header	S	[53]	Stable
	U	[55]	Unstable
Sign	+	[2B]	
	-	[2D]	
Data (ASCII code)	0 to 9	[30 to 39]	
	.	[2E]	
Terminator	CR	[0D]	
	LF	[0A]	

11-4-2 Command mode

1. Command to request data
Current value is requested.

Command example

	ID		Command	
1	2	3	4	5
<STX>	0	1	R	<ETX>
02	30	31	52	03

※ The zero command, hold ON and hold OFF commands are the same as in **11-2-2 command mode**.

Response example (ASCII & Hexa)

			Sign	Weight data									
1	2	3	4	5	6	7	8	9	10	11	12	13	14
CR	LF	S	+	0	0	2	0	.	5	0	0	CR	LF
0D	0A	53	2B	30	30	32	30	2E	35	30	30	0D	0A
CR	LF	S	+	0	0	0	5	.	2	7	4	CR	LF
0D	0A	53	2B	30	30	30	35	2E	32	37	34	0D	0A
CR	LF	U	-	0	0	0	0	5	2	7	4	CR	LF
0D	0A	55	2D	30	30	30	30	35	32	37	34	0D	0A

Warning : If there is no decimal point in the display display, the digit after the sign is treated as 0 (zero).

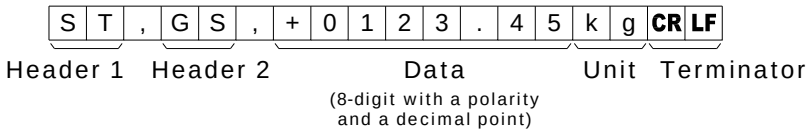
- Data reception, command, and response toward command differ based on ID setting and location of decimal point.
- Serial output and command setting can be conducted even under hold status. (only zero command cannot be operated).
- Command setting is available even under stream mode status. (operation of zero command is also available)
- Relay transmission and setting commands cannot be used in BS-205 format.

11-5 AND Format

11-5-1 AND Format

In case of AND format setting, command mode is same as **11-2-2 command mode.**

Transmission Method	Full duplex, Asynchronous
Transmission Speed	1200 bps ~ 115200 bps
Data bit	7, 8 bits
Parity bit	None, Even, Odd
Stop bit	1 bit
Use code	ASCII
Terminator	CR, LF (CR: 0DH, LF: 0AH)
Connector specification	PHOENIX CONTACT 4 pin connector (BCP-381-4 GN)



	ASCII code	Hexadecimal	Description
Header 1	ST	[53 54]	Stable
	UN	[55 4E]	Unstable
	OL	[4F 4C]	Overload
Header 2	GS	[47 53]	Gross weight
	NT	[4E 54]	Net weight
Separator	,	[2C]	
Data (ASCII code)	0 to 9	[30 to 39]	
	+	[2B]	
	-	[2D]	
	SP (space)	[20]	
	.	[2E]	
Unit	kg	[6B 67]	kg
Terminator	CR	[0D]	
	LF	[0A]	

11-5-2 ASCII Code

	Lower bits								
		0	1	2	3	4	5	6	7
Upper bits	0			Space	0	@	P	Space	p
	1			!	1	A	Q	a	q
	2			“	2	B	R	b	r
	3			#	3	C	S	c	s
	4			$	4	D	T	d	t
	5			%	5	E	U	e	u
	6			&	6	F	V	f	v
	7			‘	7	G	W	g	w
	8			(	8	H	X	h	x
	9			)	9	I	Y	i	y
	A	LF		*	:	J	Z	j	z
	B			+	;	K	[	k	{
	C			,	<	L	¥	l	┃
	D	CR		-	=	M	]	m	}
	E			.	>	N	^	n	●
	F			/	?	O	_	o	○

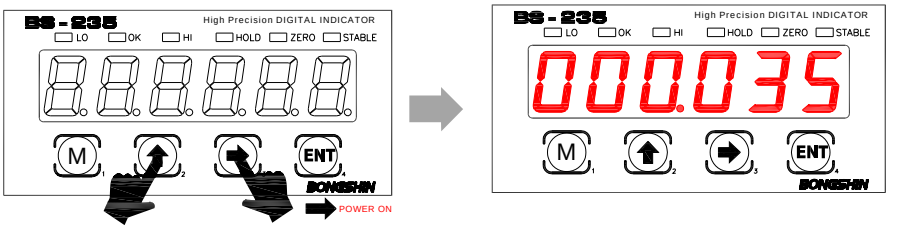
12. Check Mode

It is a mode to check load cell output (mV), check DAC(DAI) output, select option setting, and initialize setting value.

12-1 Operation for each check mode

12-1-1 How to enter check mode

1. It turns into the setting available status when ② key is pushed while pushing ③ key is pushed at measurement status.
2. Push ④ key in order to move onto next stage at mode selection status.
3. Mode change and setting value change is available when ② key or ③ key is pushed at mode selection status.
4. Push ① key to cancel the setting and return to measurement mode for mode cancellation. At the mode cancelation, the setting until previous stage of cancellation is saved.



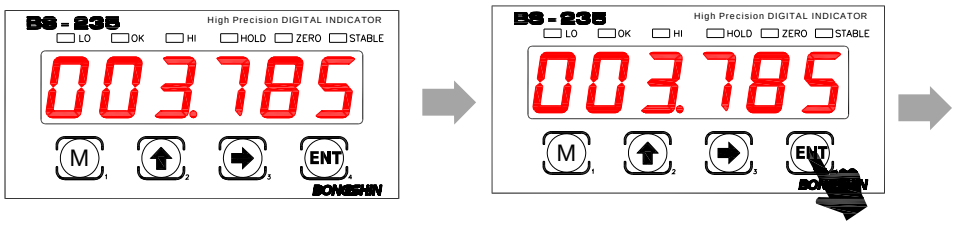
1 It is entered into mode when turning the power on while pushing No,2 and No.3 key under power off status.

Current load cell output voltage is displayed.
000.000mV is displayed under no load and
mV is differently displayed based on dead load
Load cell shall be examined with the display of higher than 015.000mV or display of ovEr(OVER).

12-1-2 Load cell output voltage check

It is mode to check load cell output voltage. Load cell output voltage is displayed on meter display unit. Load cell mV voltage can be checked without digital multi-meter. (ex: 003.785mV)

There is an increase in voltage when load is exerted to load cell. Measurement of up to 035.000mV is available and 'OvEr' is displayed for value exceeding it. Examine the load cell when displaying load cell output voltage of 015.000mV or higher. .



2 Abnormality can be checked by examining load cell output voltage.
(ex: 003.785mV)

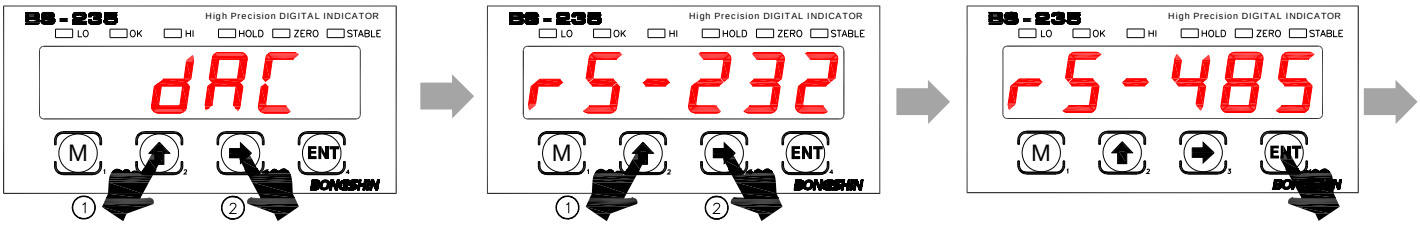
3 It moves onto next stage when pushing No.4 key for 2 sec and push No.1 key for cancellation.

12-1-3 Optional output (DAC, RS-232C, RS-422/485, BCD) selection mode

It is a mode to select optional output.

It shall be selected in case of equipment with change in option.

In case of using analog output voltage (current) and serial output (RS-232C, RS-422/485), it shall be changed into DAC and RS-232 or RS-485 respectively.



4 Select optional output with the use of No.2 and No.3 key.

Select either DAC or RS-232 or RS-485 output.
Selection shall be made based on equipped option.

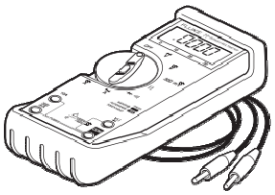
5 It moves onto next stage when pushing No.4 key after selection and push No.1 key for cancellation.

12-1-4 Analog output (DAC) voltage (current) check

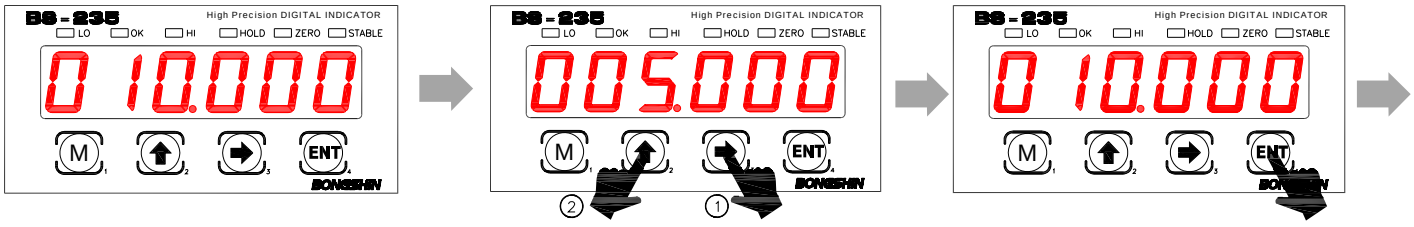
It is a mode to check analog output voltage (current).

Analog high output setting value is displayed to meter display unit.

Check output voltage (current) with the equipment of digital multi meter to the outside.



When there is change in analog high output setting value, output of voltage (current) is conducted based on display value.



6 It is a mode to check analog output voltage (current). Digital multi meter shall be quipped to output terminal.

7 Output of voltage (current) is conducted from analog output terminal based on its value when the change in value is conducted with the use of No.2 and No.3 key.

8 It moves onto next stage when pushing No.4 key and push No.1 key for the cancellation.

- Use the check mode after selecting DAC in **12-1-3 Optional output.**
- For range of setting value change, setting is available within -199999 ~ 999999.
  (Initial value is linked to analog Hi output setting value. Initial value is set as 10.000 at the forwarding)
- In case of checking DAI analog output (current), output is no conducted even when (-) value is set.

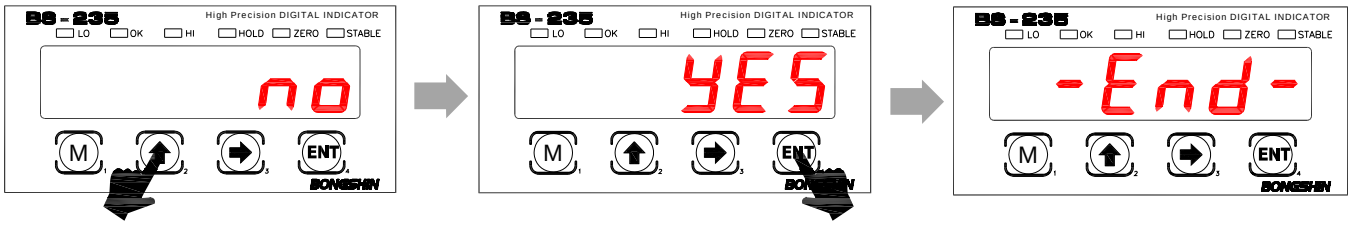
12-1-5 Initialization Mode

Various settings of data are initialized.

All settings including calibration, function setting, optional output setting, and others are initialized.

Take caution since calibration setting is also initialized.

In case of conducting actual load calibration, dead weight may be necessary upon recalibration.



12 Select whether or not to conduct initialization with the use of No.2 and No.3 key. Select Yes for initialization and No for no initialization.

13 If you press No.4 key in YES state, it will be initialized After displaying FACT Int. No initialization is conducted when Pushing No.1 key.

14 Check mode has been completed and it is turned into measurement mode.

- Entry to check mode is available even under key lock status.
- Actual load calibration is initialized and it returns to factory forwarding status.

13. Key Lock Mode

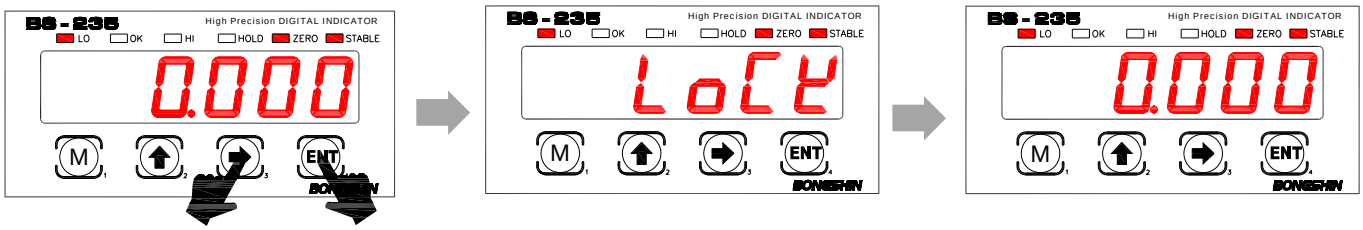
It is a key lock mode.

It is a mode to protect calibration & zero setting and function item setting value.

If it is set to key lock mode, "LoCK" is displayed during calibration and function setting.

When zero and hold signals are operated as input signals, they operate regardless of key lock.

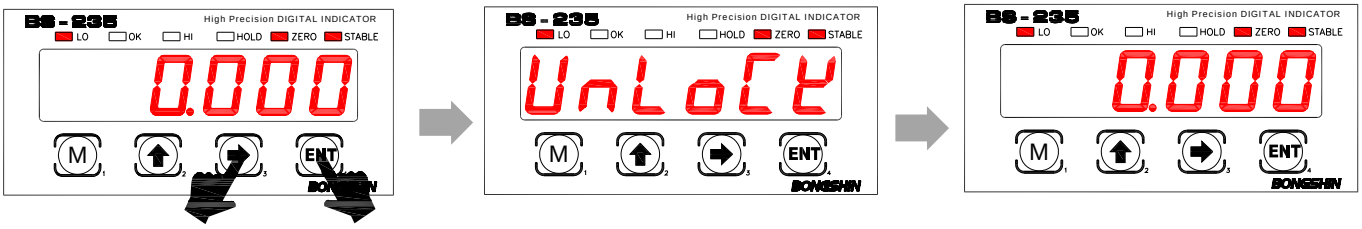
13-1 Key Lock method



1 Push No.3 key while pushing No.4 key.

2 LoCK is displayed and it is turned into key lock mode.

13-2 Key Lock cancellation



1 Push No.3 key while pushing No.4 key.

2 UnLoCK is displayed and key lock is cancelled.

14. Repair

14-1 Error message

In case of error display, please take measure accordingly with the countermeasures.

Error display	Cause	Countermeasure
LoCK	Key lock function is operated.	Conduct key lock cancellation with the use of 13-2 KEY Lock cancellation method.
Err0	1. Dead weight value is small. 2. Voltage of span calibration conducted point is either same or lower than zero point. 3. There is no change in load cell output or change upon small dead weight value.	This error is occurred under calibration status. Calibration shall be conducted using appropriate dead weight. Check the disconnection of load cell since (-) output of load cell is conducted.
Err 1	When setting the relay output value, the Low value is set higher than the Hi value.	Relay output value setting must be set lower than Hi value or set to the same value. ex.) rLY.1H→1000, rLY.1L→ 999 or rLY.1H→1000, rLY.1L→1000
OuEr -OuEr	Load cell output value is high. or Load cell output value is low.	This error is occurred when checking load cell output voltage of check mode. Abnormality of load cell shall be checked since load cell output is 35mV or higher. It shall be less than 15mV or lower in general.
999999 -199999	It exceeded max range of display value.	It exceeded max range of display that is either -199999 or 999999. Conduct calibration again after checking load cell output voltage and disconnection.

14-2 Load cell inspection

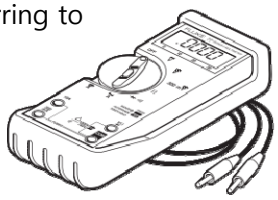
When the load cell in use is instable, following items shall be inspected.

1. Check whether or not load cell terminal is properly connected to the meter.
2. Check whether or not terminal connection within Summing Box and Junction Box is properly conducted.
3. Check whether or not there is mechanical interference.
4. When the zero point value of load cell, namely output value under no load status of load cell, strays off from self-specification range, it may be caused by mechanical transformation by overloading and impact, interference of meter container and structure, damage in inner circuit of load cell, etc.
5. Check whether or not measured resistance between terminals of load cell conforms to the specification (refer to catalogue and report).
6. Measure the insulation resistance between each lead wire (wire in red, white, green, and blue) and earth wire with 50V DC insulation tester and check whether or not it is higher than 100 MΩ.

14-3 Load cell access diagnosis

Disconnection, wiring defect, and others of load cell cable can simply be checked if you have digital multi meter.

When you don't have digital multi meter, check the load cell output value by referring to **12-1-2 load cell output voltage check**.



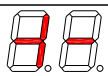
It is part measured when checking the connection of load cell.

In case of using summing box, same measurement shall be conducted inside the summing box as well.

	Diagnosis item	Diagnosis location	Criteria (normal standard)
1	Load cell applied voltage	EXC+ ⟺ EXC-	DC 5V
2	Load cell output voltage	SIG+ ⟺ SIG-	Within ± 15mV
3	Load cell focused voltage	EXC+ ⟺ SIG+	Around DC 2.5V
		EXC- ⟺ SIG-	Around DC 2.5V

14-4 Pattern of display character

Below table illustrates the display pattern of BS-235.

0		D		Q	
1		E		R	
2		F		S	
3		G		T	
4		H		U	
5		I		V	
6		J		W	
7		K		X	
8		L		Y	
9		M		Z	
A		N		±	
B		O		.	
C		P		-	

15. Warranty and A/S

Warranty period is 1 year from the payment date.

In case the cause of defect occurred during this period clearly determined to be ours, we provide A/S free of charge.

Forwarding of this product is conducted through strict quality management and inspection process.

Please contact the agency or our company in case of defect occurrence.

- A/S and Product Inquiry -

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