MODEL : DN-70, DN-80
DIGITAL INDICATOR

USER MANUAL

DACELL CO.,LTD.

Contents

1. Features

We thank you for using our product. Please refer to this manual or contact our office if you find any problems during using our product.

This product is an indicator that emplifies the micro voltage signals from each sensor and display in digital. It is mainly used to measure physical quantities of the items using strain guage such as loadcell, pressure sensor, displacement sensor and torque sensor. This product has the following special features.

1-1. Calibration Method

2 types of calibration systems are adopted. Calibration by actual load (standard weight) and calibration by rated output of sensor (mV/V).

1-2. Hold 및 Peak Hold

You can choose peak hold and sample hold as per your need.

1-3. Comparison Output

You can do set-up the maxium and lower limit value by the keys on the front panel and print with contact point signal of the rear panel.

1-4. Data Back-up

All the set-up values will be memorized on the flash memory so the inputted data can be saved and no need to do the re-setting even in case of the interruption of the electric power or power disconnection.

1-5. Watch dog

This function is for automatic reset in case the system is stopped due to the external factors such as noise.

1-6. Option

1)RS232C, 2)RS485, 3)Analog output.

1-7. 전원

DC 24V 0.2A

2. Attention

For the efficient and safe use, please carefully read and be fully aware of the following details before using this product.

It is strictly forbidden to use this product for any other purpose of use or to attempt to make any alteration on this product.

2-1. Attention for installation

- Please keep it out of wet places.
- Do not set it up near vibration & impulse, high temperature and humidity.
  Keep it out of the direct rays of the sun. Set it up where there is less dust, and Keep it out of direct air including salt and ion.
- Do not use when there is inflammable gas or heavy machinery, and smog.
- Ground earth-terminal (⏚).
- Make wire separately from power system wiring and noise wiring.
- Make sure the use of 4 line sealed cable as a sensor cable.
  Too long cable leads to measurement error due to wiring resistance (around 10meters).

2-2. Attention for use

During calibration, Do not input free-load state and real-weight load until it becomes stable. Pressing Enter Key in unstable condition leads to calibration error.

Do not press any Key in use at one's discretion. Please refer to 7. Setting-up mode for the function and method of Key.

3. Specification

- Available sensor
  - DN-70　　　　　　　: Strain Gauge sensor
  - DN-80　　　　　　　: Linear potentionmeter
- SIGNAL
  - DN-70　　　　　　 : 1 ~ 3mV/V
  - DN-80　　　　　　 : 0 ~ 5V
- EXCITATION　　　 : 5V
- Upper limit Display　　　 : -19999 ~ +99999
- A/D Converter　　　　 : 24bit ,200times/sec
- D/A Converter　　　　 : 16bit
- Temperature Characteristic (Amp Characteristic)
  - Zero　　　　　　 : ±10ppm/℃
  - Span　　　　　　 : ±10ppm/℃
- Front Panel
  - Measured value display　　 : 7 segment
  - Status display　　　 : Red LED　5pcs
  - Key Switch　 : 4pcs
- Comparison output : Upper limit(HI), Lower limit(LO), Normal Output(OK)
  - Contact Capacity - AC 250V 3A (more than 100,000)
- Temperature Range : -10℃~60℃, less than 80% RH (no dewing.)
- External dimension : 48 × 48 × 128 mm (W × H × D)
- Panel cutting size　 : 45.5 × 45.5 mm
- Weight　　　　　 : About 280g
- Power Supply　　 : DC 24V
- interface: RS232C , Modbus Protocol RTU Standard installation
- Analog out 0 ~ ±10V (4-20mA) : Standard installation
- Option　　　　　 : RS485 (OP-03)

4. Front panel
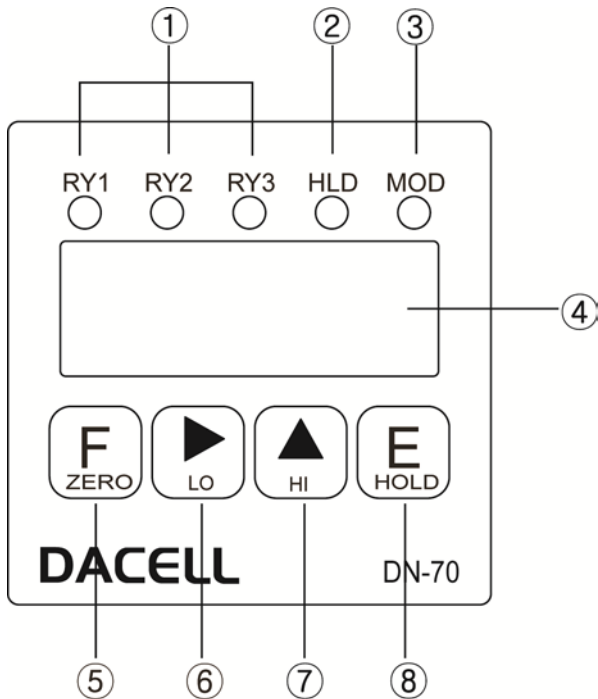
① HI, LO Indication LED: LED will be lighted when measured value exceeds the setting value.

② HOLD Indication LED: This LED will be lighted when the measured value is on Hold.

③ MOD   : Measured value stable (on), unstable (off) indication

④ Measured value Indication: It indicates the measured value and each setting value.

⑤ 🄵

 Measruing Mode   : Once this Key is pressed for more than 1 second, the current measuring value will be Zero (0) and the Analog output will be 0V (4mA) as well.

SET-UP Mode   : Once this is pressed on the Function Set-up Mode, you will return to the measuring mode.

⑥ 🄿

  Measuring Mode   : Once this Key is pressed, the lower limit setting value will be displayed and this value also can be changed.

  SET-UP Mode   : The location of row for the number flickering can be moved.

⑦ 🄰

  Measuring Mode   : Once this Key is pressed, the upper limit setting value will be displayed and the value can be changed.

  SET-UP Mode   : The flickering number will be increased by 1 and 1.

⑧ 🄴

Measuring Mode   : Once this Key is pressed, HOLD will be selected and once this key is pressed again, HOLD will be cancelled.

SET-UP Mode   : Save each set-up value.

5. Rear Panel

Please check the location of terminal and its use. While the projected button is being pressed, please insert the cable into the lower hole completely. As soon as you release the button, the connection will be completed. At the point, please slightly pull the calbe and check whether the cable is come off or not.
(The most suitable calbe is Φ 0.5~1. Linking cable must be brazing or used with 1 terminal)
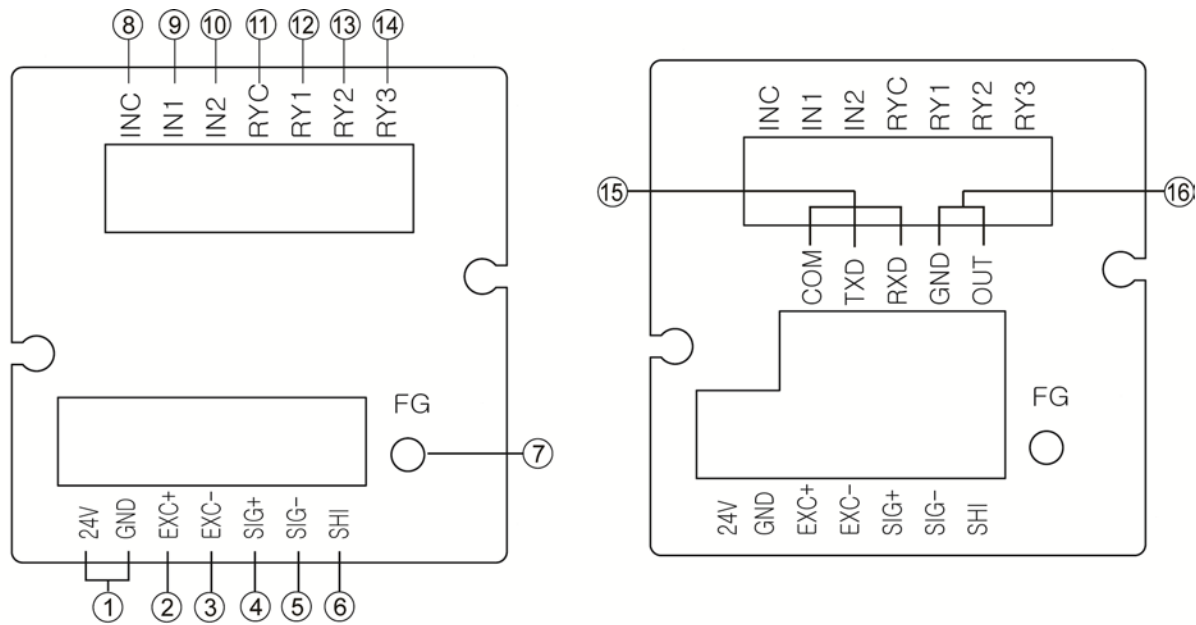
① 24V   : DC24V (Main Power)
② EXC+   : Sensor Supply Voltage + Connection Terminal
③ EXC−   : Sensor Supply Voltage + Connection Terminal
④ SIG+   : Sensor Ouput Signal + Connection Terminal
⑤ SIG−   : Sensor Output Signal − Connection Terminal
⑥ GND   : SHIELD connection terminal of sensor
⑦ ⏚   : Ground Terminal (as an independent ground connection.)
⑧ INC   : External Input Common Terminal
⑨ IN1   : External HOLD Input Terminal
⑩ IN2   : External ZERO Input Terminal
⑪ RYC   : RELAY Common Terminal
⑫ RY1   : RELAY1(Lower Limit) Output Terminal
⑬ RY2   : RELAY2 (Normal) Output Terminal (OK)
⑭ RY3   : RELAY3 (Upper Limit) Output Terminal

※ OPTION

⑮ GND, TXD, RXD ： RS232C SERIAL INTERFACE Terminal

   (RS485 : TXD -> TX+, RXD -> TX-)

⑯ GND, OUT ： Analog out Terminal (DC ±10V or DC 4~20mA)

◀Attention▶

1. When wiring, please pull out the power plug. (Main power supply)
2. Please use the thick calbe for ground terminal (⏚) so that you can avoid any trouble due to the impulse voltage or surge. If possible, please keep it as an independent ground.
(This must be used in the area with heavy noise. If the ground is made with other device, it will be affected by noise.)
3. Please check the function of the terminal before you do the wiring so that you can prevent any malfunction in advance.
4. Manufacture will be relieved of its responsibility for any damge or injury due to the disassembly and alteration made without any agreement. Also, no A/S will be made.

6. Wiring Diagram

<Wiring Diagram>

<Example – External Input PLC Connection>
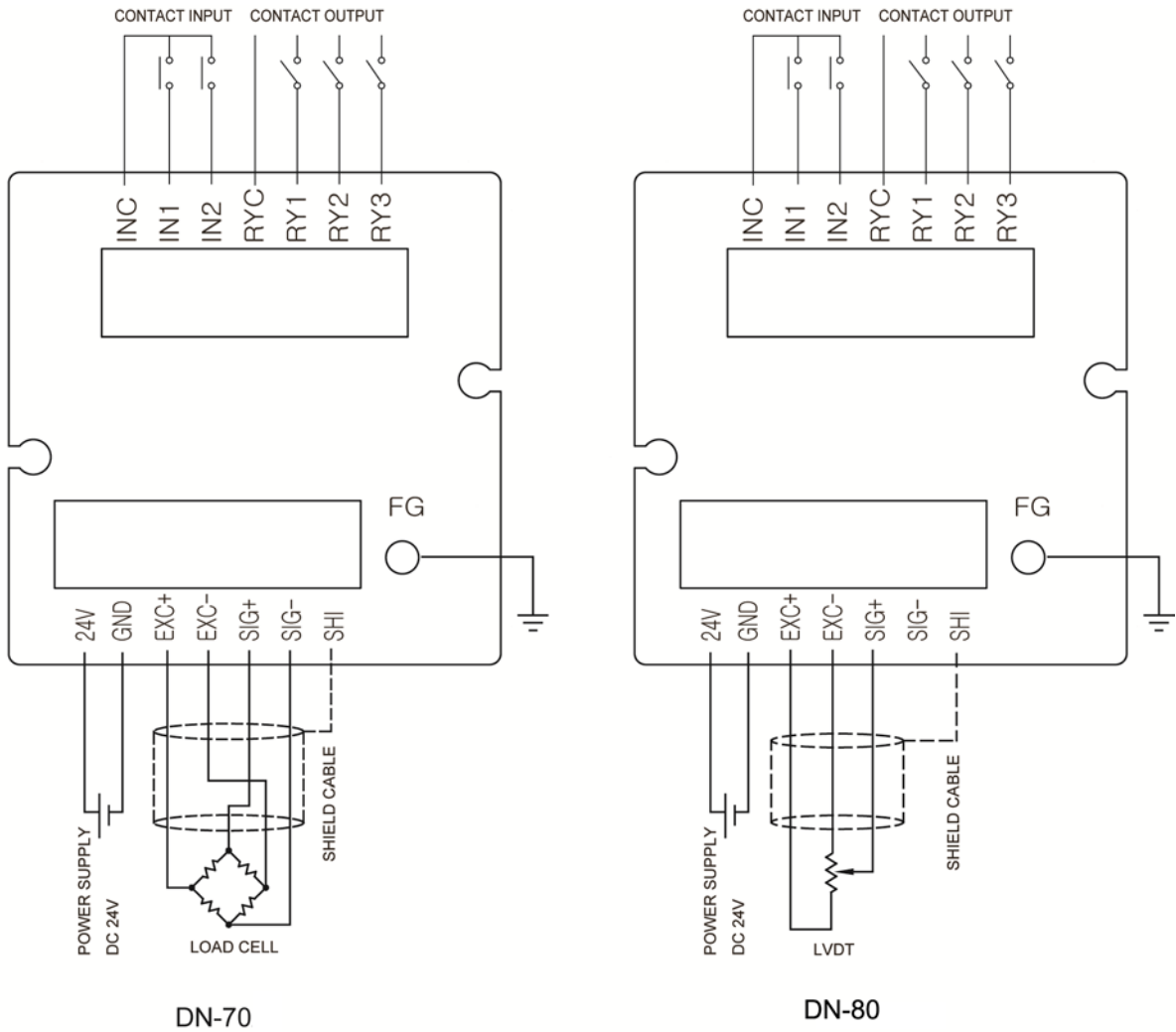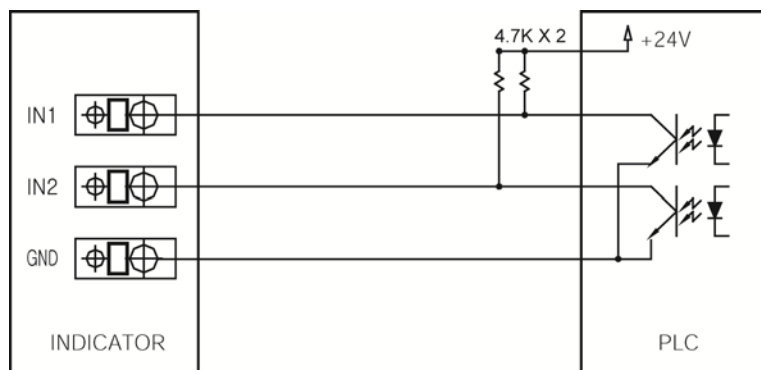
7. Components & Function

7-1. How to use Hold mode

Hold mode is largely divided into Peak Hold and Sample Hold. Please select Peak or Sample. To input Hold, you can use Hold key on the front panel or external input. For the operation method, please refer to the drawing below.

1) Peak Hold : To Hold the maxium value among the measured values.

Peak hold mode : It is to hold and display the maximum value of (+) direction.

Absolute peak hold mode : It is to hold and display the maximum value of the absolute value (+/−).

2) Sample hold : It is to hold and display the value at the time of Hold signal input among the measured values.

①−sensor input value

② − : Display value & analog output value

<Peak HOLD>   <Sample HOLD>

9

7-2. How to use comparison ouput function
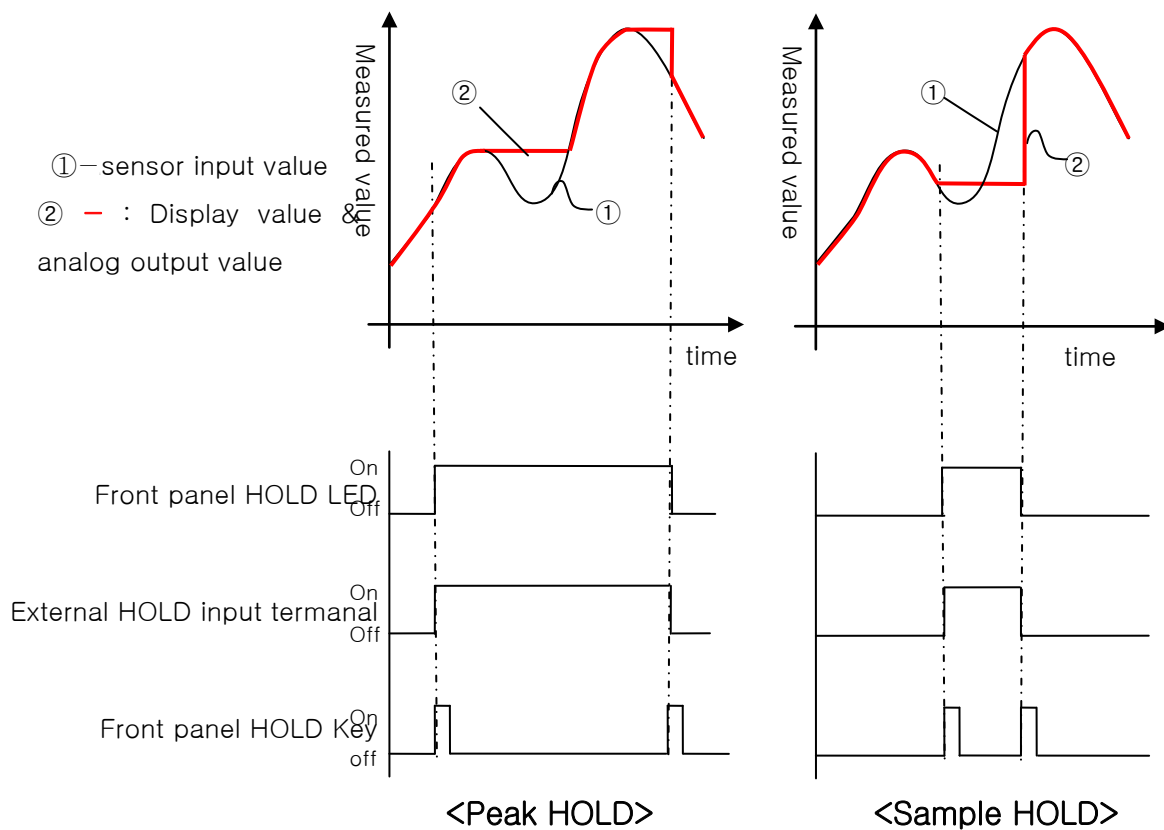
For comparison output function, there are 3 different modes such as Decision, High limit, Low limit. It displays through the relay of rear panel comparing each setup value.
On High limit and Low limit mode, Hysteresis can be used.

To set up upper limit (High) and lower limit(Low), please use the key on the front panel.

1) Decision mode :   Measured Value ≤ Lower limit setup value ⇒ RY1   ON (LO)

                      Measured Value ≥ Upper limit setup value ⇒ RY2   ON (HI)

                      Lower limit setup value < Measured value < Upper limit setup value ⇒ RY3 ON(OK)

2) High limit mode :   Measured Value ≥ RY1 setup value ⇒ RY1   ON

                      Measured Value ≥ RY2 setup value ⇒ RY2   ON

                      Measured Value ≥ RY3 setup value ⇒ RY3   ON

                      Measured Value < RY1 setup value – Hysteresis value ⇒ RY1 OFF

                      Measured Value < RY2 setup value – Hysteresis value ⇒ RY2 OFF

                      Measured Value < RY3 setup value – Hysteresis value ⇒ RY3 OFF

3) Low limit mode :   Measured Value ≤ RY1 setup value ⇒ RY1   ON

                      Measured Value ≤ RY2 setup value ⇒ RY2   ON

                      Measured Value ≤ RY3 setup value ⇒ RY3   ON

                      Measured Value > RY1 setup value + Hysteresis value ⇒ RY1 OFF

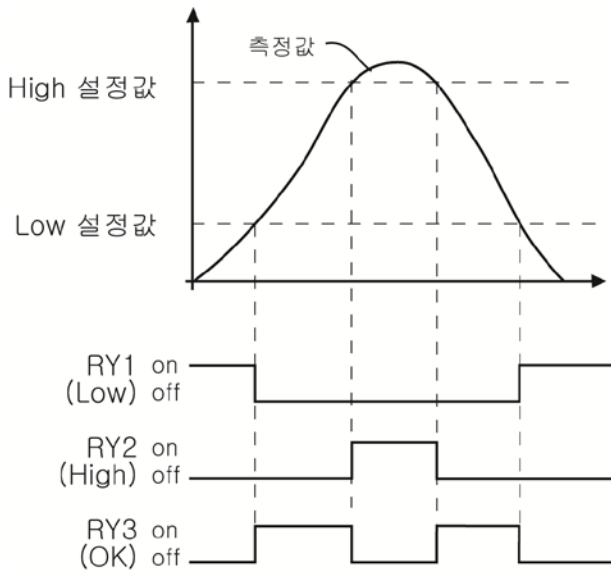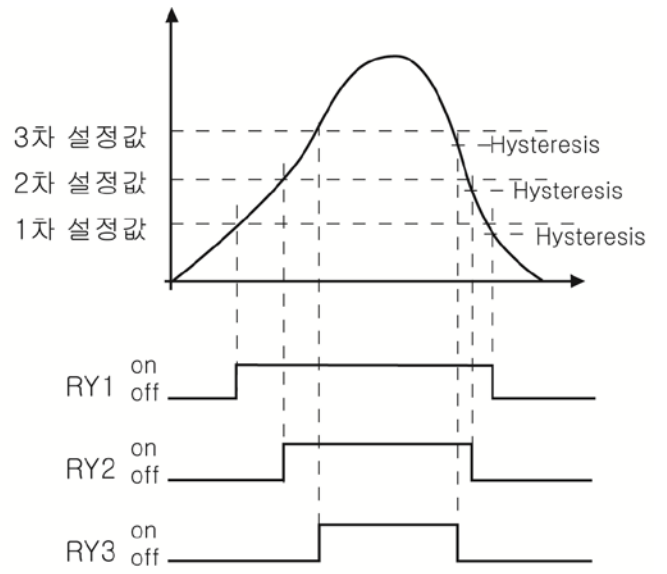   Measured Value > RY2 setup value + Hysteresis value ⇒ RY2 OFF

                      Measured Value > RY3 setup value + Hysteresis value ⇒ RY3 OFF

＊ ＊ Note) When the Base Offset of F-13 is set in Function mode, the comparative output operates as follows.

1) Decision mode: Measured Value≤ (Offset-Lower limit setup value) ⇒ RY1 ON (LO)

                      Measured Value ≥(Offset+Upper limit setup value) ⇒ RY2 ON (HI)

      (Offset-Lower limit setup value) < Measured value < (Offset +Upper limit setup value) ⇒ RY3 ON(OK)

2) High limit mode: Measured Value ≥ (Offset+RY1 setup value) ⇒ RY1 ON

                      Measured Value ≥ (Offset+ RY2 setup value) ⇒ RY2 ON

                      Measured Value ≥ (Offset+ RY3 setup value) ⇒ RY3 ON

                 Measured Value <(Offset+ RY1 setup value) – Hysteresis value ⇒ RY1 OFF

                 Measured Value < (Offset+RY2 setup value) – Hysteresis value ⇒ RY2 OFF

                 Measured Value < (Offset+ RY3 setup value) – Hysteresis value ⇒ RY3 OFF

3) Low limit mode: Measured Value ≤ (Offset+ RY1 setup value) ⇒ RY1 ON

                      Measured Value ≤ (Offset+ RY2 setup value) ⇒ RY2 ON

                      Measured Value ≤ (Offset+RY3 setup value) ⇒ RY3 ON

                 Measured Value > (Offset+ RY1 setup value) + Hysteresis value ⇒ RY1 OFF

                 Measured Value > (Offset+ RY2 setup value) + Hysteresis value ⇒ RY2 OFF

                 Measured Value > (Offset+ RY3 setup value) + Hysteresis value ⇒ RY3 OFF

<Decision mode>

<High limit mode>

<Low limit mode>

8. Setting Modes

8-1. Types of Setting mode & Set-up

For Setting mode, there are 3 different types of mode such as Function mode, Digital calibration mode, Actual load calibration mode.
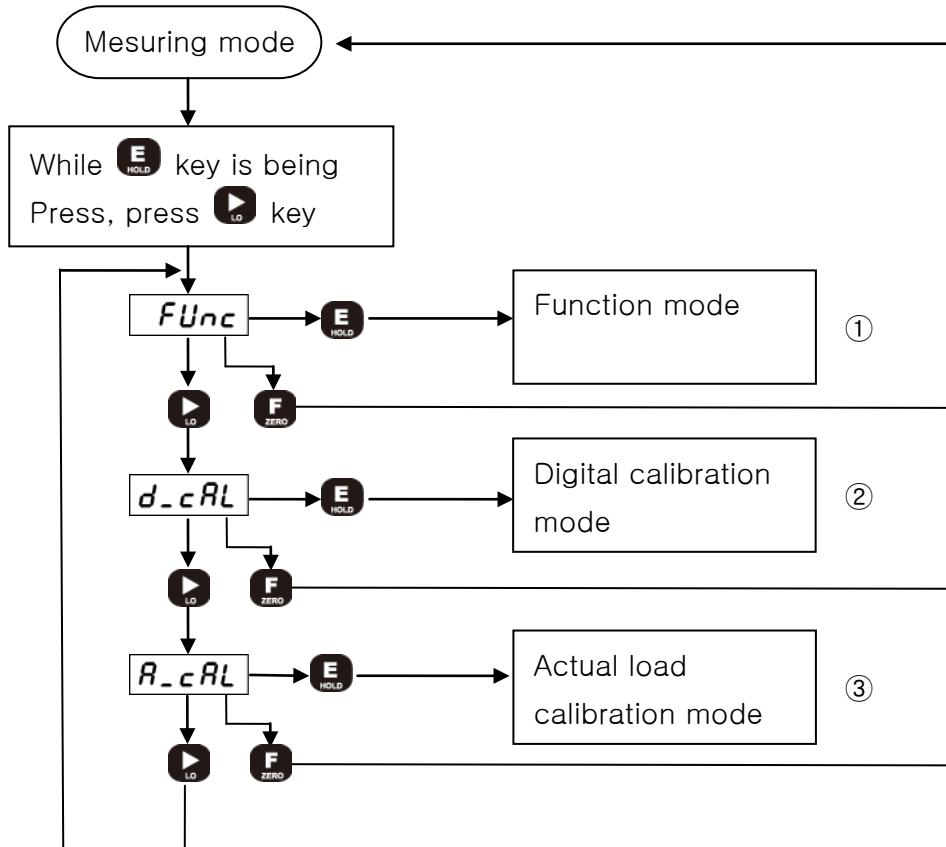
① Function mode
   Acess to each function setup mode. Please refer 8-2 function mode.
② Digital calibration mode
   It is to calibrate into the sensor's output value. No need to prepare for the actual load (stand weight). Please refer 8-3 how to calibrate.
③ Actual load calibration mode
   It is to calibrate by adding the actual load (standard weight or the load you know). Please refer 8-4 how to calibrate.

* Measurement mode status is the status of the indicator showing the current value.

8-2. Function mode

1) How to set function

The setting value of Function mode (page 15~20) can be changed the key operation below.
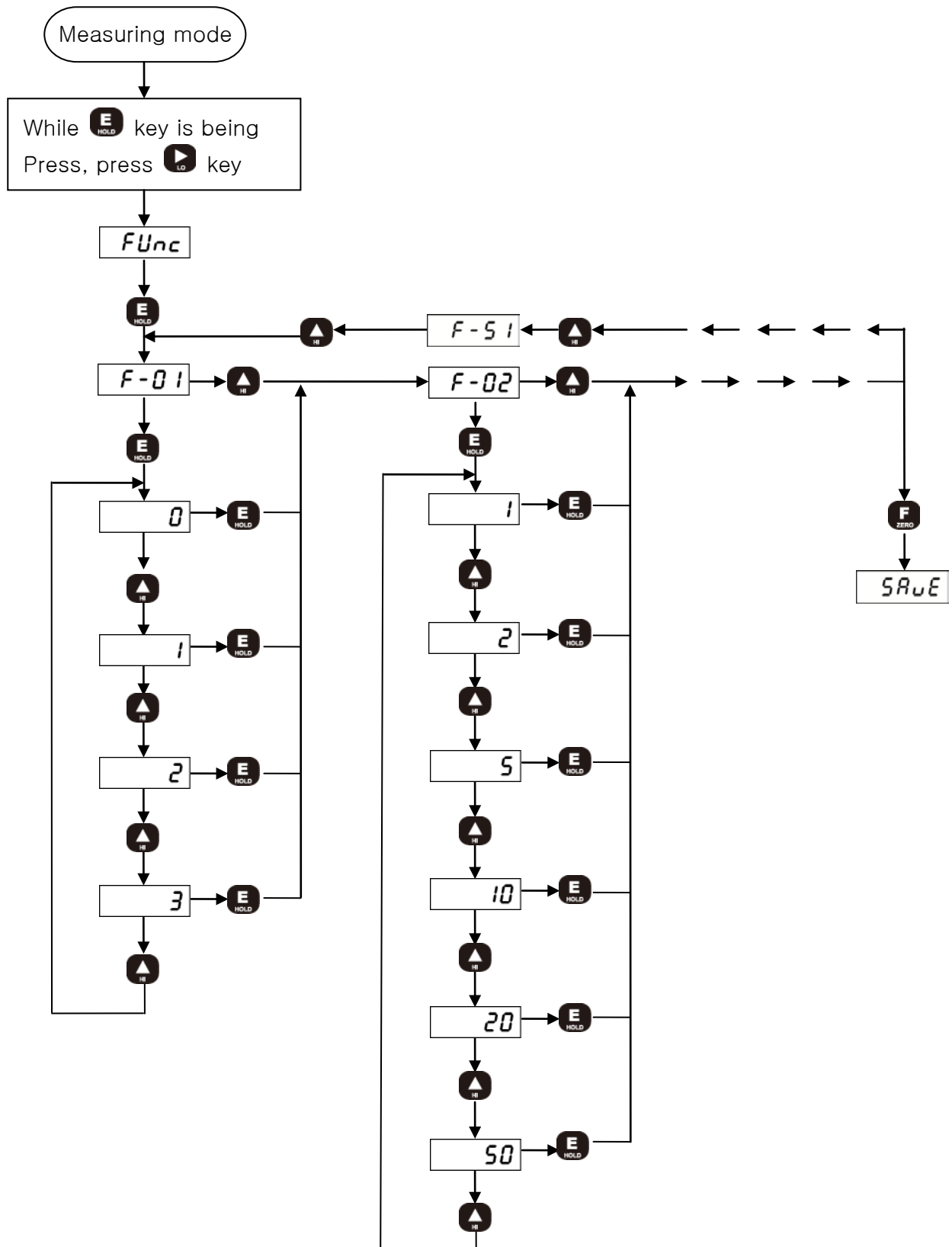
2) How to set   RELAY data

① Decision mode (F-20 Decision mode: mode: 0)
In the measuring mode, press the front ▶(LO) key or ▲(HI) key to display the currently set value, change it to the desired value, and press the E(HOLD) key to save it.

② Limit mode (F-20 comparison mode : 1 ～ 2)
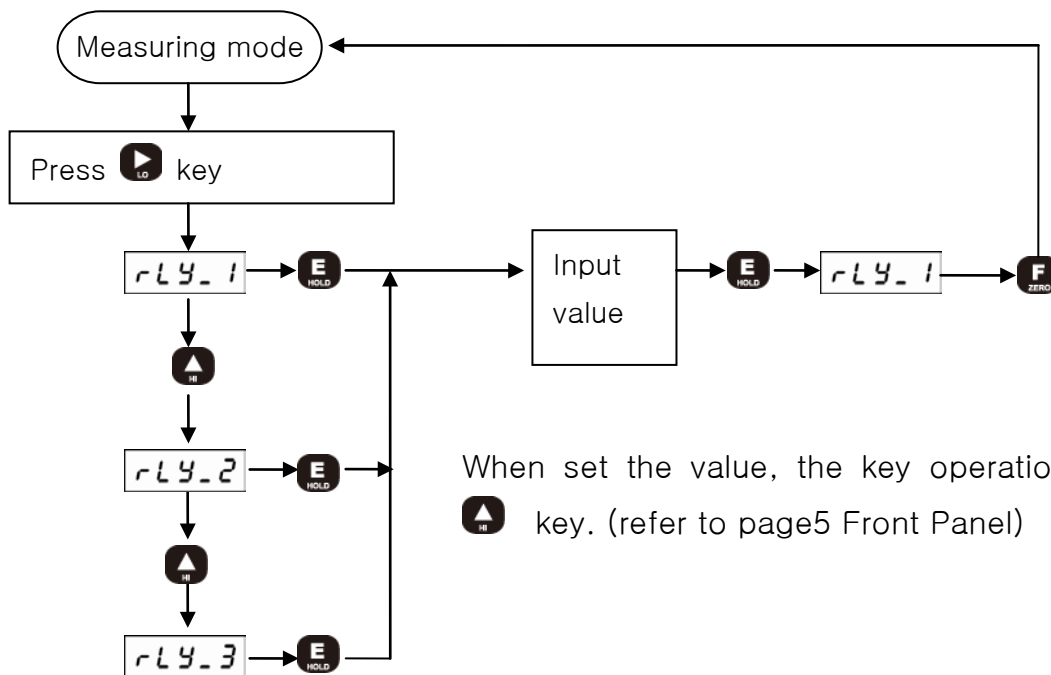
When set the value, the key operation is ▶(LO) and ▲(HI) key. (refer to page5 Front Panel)

3)Fuction mode list

			기준설정값
F-00	Decimal point	0, 1, 2, 3	1
F-01	Division	1, 2, 5, 10, 20, 50	1
F-02	Display filter	0.01, 0.02, 0.05, 0.10, 0.20, 0.50, 1.00	0.20
F-03	Hold mode	Sample hold, Peak hold, Absolute peak hold	1 (Peak)
F-10	Auto zero tracking	0 ~ 99	0
F-11	Auto zero tracking time	0.0 ~ 5.0 sec	0.0
F-12	Auto zero during operation	0, 1	0
F-13	Base offset	-19999 ~ +99999	0
F-20	Comparison mode	Decision, High limit, Low limit	0 (Decision)
F-21	Hysteresis	0 ~ 99	0
F-30	DAC mode	b_05v, b_10v, b_02A, b_42A U_05v, U_10v, U_02A, U_42A	b_10v
F-31	DAC capacity	0 ~ +99999	30000
F-32	DAC speed	0, 1	0
F-40	ID Number	000 ~ 255	000
F-41	Baud rate	2.40, 4.80, 9.60, 19.20, 38.40, 57.60	9.60
F-42	Protocol	0, 1	0
F-50	Display reverse mode	0, 1, 2	0
F-51	Force unit	Kg(kg/㎠), N, ℓb, bar, MPa	0 (Kg)
F-52	Key disabling	Zero key, Lo key, Hi key, Hold key	0000

F-00. Decimal point (Decimal point Set-up)

(Standard setup value: 1)

Display data		
0	00000	: No decimal point
1	0000.0	: One decimal place
2	000.00	: Two decimal places
3	00.000	: Three decimal places

F-01. Division (Minimum display unit setup)

(Standard setup value: 1)

1	Displayed In 1	(0, 1, 2, 3, 4 …….)
2	Displayed in 2	(0, 2, 4, 6, 8 …….)
5	Displayed in 5	(0, 5, 10, 15 …….)
10	Displayed in 10	(0, 10, 20, 30 …….)
20	Displayed in 20	(0, 20, 40, 60 …….)
50	Displayed in 50	(0, 50, 100, 150 …….)

F-02. Display filter (Display speed setup)

(Standard setup value: 0.20)

0.01	Average time 0.01sec.
0.02	Average time 0.02sec.
0.05	Average time 0.05sec.
0.10	Average time 0.10sec.
0.20	Average time 0.20sec.
0.50	Average time 0.50sec.
1.00	Average time 1.00sec.

F-03. Hold mode

(Standard setup value: 1)

0	Sample Hold : To hold the display value at the time of Hold signal input.
1	Peak Hold (+) : To hold the maximum value of display values during Hold signal input.
2	Absolute Peak Hold(+/−) : To hold the maximum absolute value of display values during Hold signal input.
3	A/D Peak Hold(+): To hold the maximum A/D value during Hold signal input. Hold.

Note) When set to A/D Peak Hold (+), the Hold operation is performed according to the A/D input (output of the sensor), regardless of the sign of the F-50 Display reverse mode.

F-10. Auto zero tracking (Auto zero operation range setup)

(Standard setup value: 00)

00 ≀ 99	00 : Auto zero is not used 01 ~99 : Set up the operation range of auto zero

F-11. Auto zero tracking time (Auto Zero tracking time setup)

(Standard setup value: 0.0)

0.0 ≀ 5.0	0.0 : Auto zero is not used 0.1 ~5.0 : set up the auto zero operation time (0.1 ~ 5.0 sec)

F-12. Auto zero during operation (Setting Zero when operationg)

(기준설정값 : 0)

0	Not used
1	Autozero only once after power-on

F-13. Base offset (Setting Base value)

(Standard setup value : 00000)

−19999 ≀ +99999	00000 : Base offset is not used
	−19999 ~ +99999 : If set to Base value and is a Zero signal , Base value is displayed. (When Base value 10.00 , the display is 10.00 if you press ZERO button) When setting the reference value, the comparative output operation is operated by sum or difference based on the set value.(see 7-2.How to use comparison ouput function)

F-20. Comparision mode (Comparision output mode setup

0	Decision mode	: Relay RY1(Lo), RY2(OK), RY3(Hi) Output
1	High limit mode	: Relay RY1, RY2, RY3, output
2	Low limit mode	: Relay RY1, RY2, RY3, output

F-21. Hysteresis

(Standard setup value : 00)

00~99	00 : Hysteresis - not used 01 ~99 : Hysteresis - used (Decision mode is not applied)

F-30. DAC mode (Setting Analog output type)

(Standard setup value : b_10V)

b_05v	-5 ~ +5V output	양방향, 양극성
b_10v	-10 ~ +10V output	
b_02A	0 ~ 20mA output	단방향, 단극성
b_42A	4 ~ 20mA output	
U_05v	0 ~ 5V output	양방향, 단극성
U_10v	0 ~ 10V output	
U_02A	0 ~ 20mA output	
U_42A	4 ~ 20mA output	

F-31. DAC capacity (Analog Outupt value setup)

(Standard setup value : 30000)

0 ~ +99999	Set the rated capacity of the Analog output < If Setting value 30000>

Display data	F-30 setting data							
	b_05v	b_10v	b_02A	b_42A	U_05v	U_10v	U_02A	U_42A
-30000	-5V	-10V	0	4mA	0	0	0	4mA
0	0	0	0	4mA	2.5V	5V	10mA	12mA
30000	+5V	+10V	20mA	20mA	5V	10V	20mA	20mA

F-32. DAC speed (Set Analog output speed)

<div align="right">(Standard setup value : 0)</div>

0	Display DAC mode : Analog output by converting the current display value
1	High speed DAC mode : Analog output by converting A/D input values (200Hz)

NOTE 1) When set to High speed DAC, the analog output has the same linearity as the calibration setting of 8-3.Digital calibration.8-4.The value set by Actual Load Calibration is not affected.

NOTE 2) When set to high speed DAC, the analog output is flexible according to the A/D input value (output of the sensor) and is not affected by the Hold action, F-13 Base offset, or the F-50 Display reverse mode setting.

F-40. ID Number (Communication Device Number setup)

<div align="right">(Standard setup value : 000)</div>

000 ≀ 255	000	: Device number is not set-up(Stream mode:always transmit data)
	001 ~255	: Device number is set-up(Command mode:Transmit data by command)

F-41. Baud rate (Communication Speed Setup)

<div align="right">(Standard setup value : 9.60)</div>

2.40	2400 bps
4.80	4800 bps
9.60	9600 bps
19.20	19200 bps
38.40	38400 bps
57.60	57600 bps

F-42. Protocol (Communication Protocol set up)

<div align="right">(Standard setup value : 0)</div>

0	Standard protocol
1	Modbus RTU Protocol

F-50. Display reverse mode (Direction setting, mark reverse)

(Standard setup value : 0)

0	Positive mark
1	Negative mark
2	Display as absolute value

F-51. Force unit (Conversion unit set up)

(Standard setup value : 0)

0	kgf		kg/cm²	
1	N	kgf × 9.8	–	–
2	ℓb	kgf × 2.2	–	–
3	–	–	Bar	kg/cm² × 0.98
4	–	–	MPa	kg/cm² × 0.098

Note1)   When setting the conversion unit (set value: 1 to 4), calibration modes of 8-3 and 8-4 are not available.

After calibrating in kgf (set value:0), set the force unit as desired.

Note2) If F-51 is set to MPa (set value:4), the F-00 Decimal point setting cannot be changed.

F-52. Key disabling (Front key locking set up)

(Standard setup value: 0000)

0 0 0 0 ←	Hold key Lock (1), Release (0)
	Hi key Lock (1), Release (0)
	Lo key Lock (1), Release (0)
	Zero key Lock (1), Release (0)
	<Set-up example>
	1001 : Zero & Hold key Lock, Hi and Lo key Release

8-3. Digital calibration (Calibration by sensor output value)

At the time of purchasing sensor, the rated capacity (R.C) and rated output (R.O) declared on the calibration sheet can be used for the calibration for easier calibration. If you do not know the output value of the sensor or if you need to correct the error after calibration by the output value of the sensor, refer to 8-4 Actual Load Calibration.

Measuring Mode

↓

While 🄴 key is being pressed, press ▶ key.

↓

FUnc Displays Function Mode

↓ ▶

d_cAL Displays Sensor Output Calibration State

↓ 🄴

SEnS Displays Rated Output value Input State

↓ 🄴

3.0000 Input the rated output value by using ▶ and ▲ key. And then, press 🄴 key.

↓ 🄴

cAPA Displays the rated capacity value Input State

↓ 🄴

10000 Input the rated capacity value by using ▶ and ▲ key. And then press 🄴 key.

↓ 🄴

SAuE Calibration Completed.

※ Measuring Mode : The state in which the current measurement is being displayed

8-4. Actual load calibration (Real weight calibration)

1) Compensation Calibration
  (a)Please calibrate by 8-3 Digital Calibration.
And, if there is a difference from the actual load value, you can change the indicator's display value to the actual load value by referring to the actual load calibration setup flow chart below.
  (b) If indicator re-calibrate with 8-3. Digital calibration, all data of the actual load calibration setting will be deleted.

Measuring mode

While 🄴 key is being Press, press 🄳 key

| FUnc | Display Function mode |

| d_cRL | Display Sensor output value calibration mode |

| R_cRL | Display Actual load calibration mode |

| 0500.7 | Actual load is applied to the sensor and the indicated value flashes.(500.7 is an arbitrary example value) |

| 0500.0 | After changing to actual load value using 🄳 and 🄰 key. Press the 🄴 key. (500.0 is an example value arbitrarily changed) |

| SRuE | |

2)Compensation functions and notice

If the actual load (load, displacement, pressure) is applied to the sensor and there is a difference between the value displayed in the indicator and the actual load value, the display value of the indicator can be changed to the actual load value. Up to 9 points can be stored. As the calibration interval is differentiated, the linearity of the sensor can be increased. In the actual load calibration mode, calibration is possible at the forward (+) output of the sensor and calibration is not possible at the reverse (-) output of the sensor.

If an incorrect value is entered during setup, re-calibration with 8-3. Digital calibration, delete all data of the values changed to the actual load calibration setting. Then re-run the actual load calibration setting.
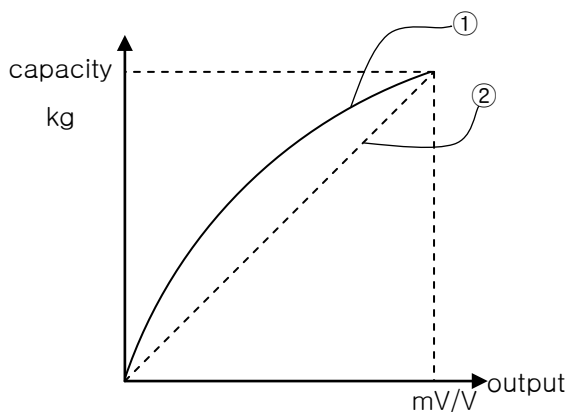
< Before Compensation >
① Sensor output(display data)
② Real load data
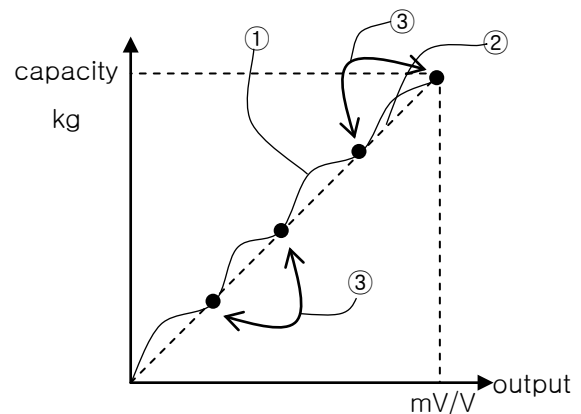
< After Compensation >
① Sensor output(display data)
② Real load data
③ Values stored with calibration settings

1) If the output of sensor is unknown
Calibrate with 8-3 Digital Calibration. Deletes the data of the actual load calibration value. Then enter the output and capacity values as default (3.0000/30000).
Under No Load, change the current value to Zero (0).
After loading the sensor with a prepared standard load, change the value displayed in the indicator to the value of the standard load by referring to the actual load calibration setup flow chart.

8-5. DATA BACK-UP & RESTORE

You can save all the set-up values of the device and then restore them to the current set-up state as per your need.

◦ DATA BACK-UP : Save the current set-up state.
◦ RESTORE   : Restore the current set-up state

1) DATA BACK-UP

```
┌─────────────────┐
│  Measuring mode │
└────────┬────────┘
         │
┌────────▼─────────────┐
│ While 🅔 key is being │
│ pressed, Press 🅕 key │
└────────┬─────────────┘
         │
     ┌───▼────┐
     │ bAcUP  │    After 1 sec for display,
     └───┬────┘
         │
     ┌───▼────┐
     │   no   │    Display
     └───┬────┘
         │
        🔼
         │
     ┌───▼────┐
     │  YES   │    Please select YES or NO by using 🔼 key.
     └───┬────┘     YES : SAVE DATA.   NO : Do not save DATA.
         │
        🅔
         │
     ┌───▼────┐
     │  End   │
     └────────┘
```

2) RESTORE

```
┌─────────────────┐
│  Power is off   │
└────────┬────────┘
         │
┌────────▼──────────┐
│ While 🅔 key is being │
│ pressed, turn the power on │
└────────┬──────────┘
         │
     ┌───▼────┐
     │ rESto  │    After 1 sec for display
     └───┬────┘
         │
     ┌───▼────┐
     │   no   │    Display
     └───┬────┘
         │
        🔼
         │
     ┌───▼────┐
     │  YES   │    Please select YES or NO by using 🔼 key.
     └───┬────┘     YES : Restore DATA .   NO : Do not restore DATA
         │
        🅔
         │
     ┌───▼────┐
     │  End   │
     └────────┘
```
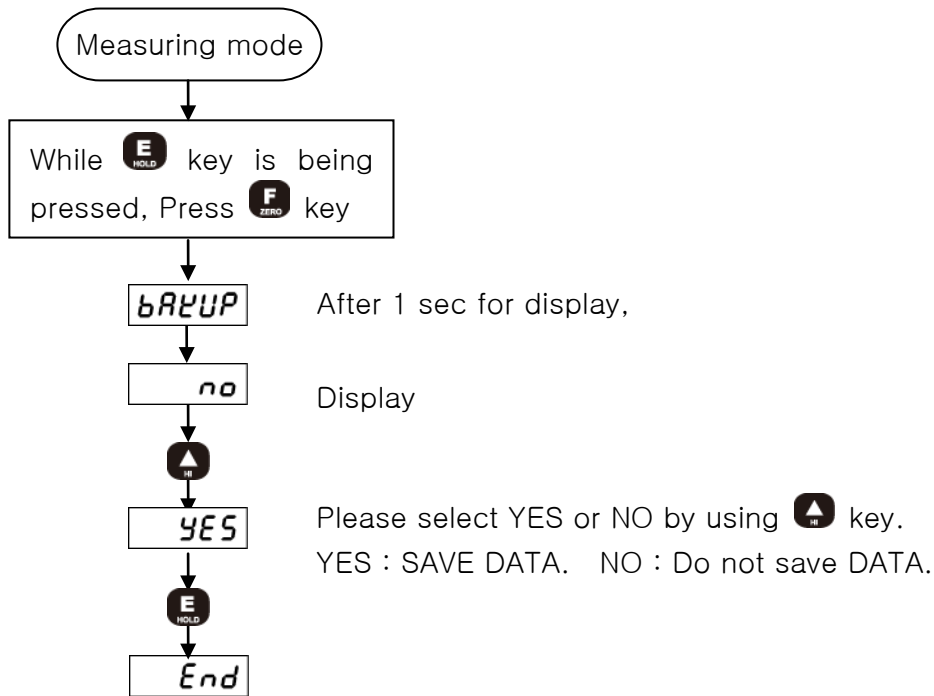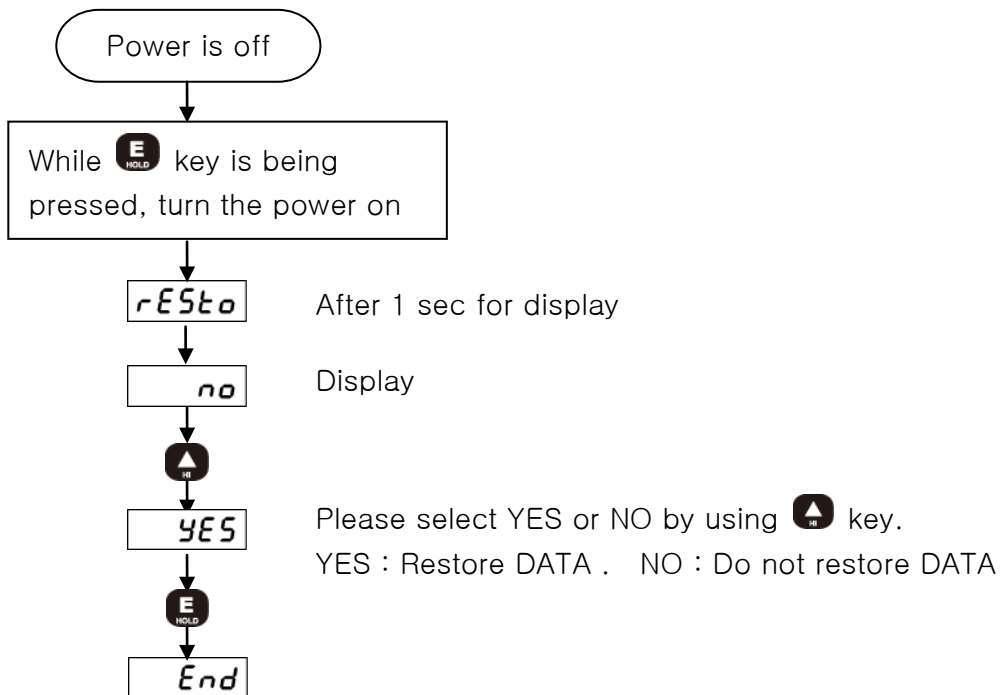
8-6. Lock Set-up

You can prevent any accidental operation due to the unnecessary key control by Lock set-up. After finishing calibration, it is recommended to set the Lock.
 At the first stage, please start while the power is OFF.
Related Function when Lock is set : Function related to calibration.

Power is OFF

While **F**_{ZERO} key is being pressed, please turn the power ON.

| ƧЕЯ_L | Please keep pressing **F**_{ZERO} key while this is being displayed. |

| on | or | oFF | display |

Please select lock or release by pressing **▲**_{HI} key.
ON : Lock is selected, Off : Lock release is selected.

| oFF |

| on |

| End | Set-up is completed. |
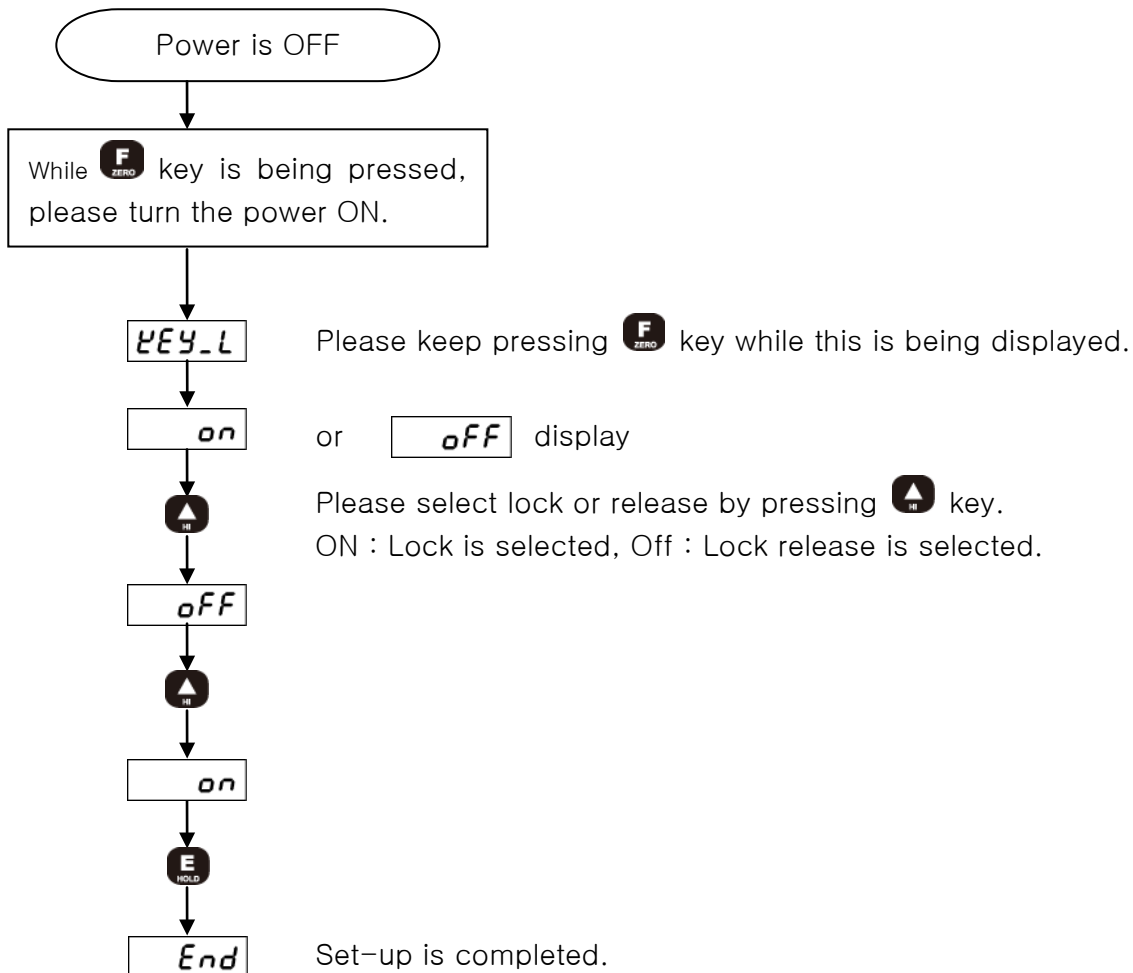
9. Product Inspection

When Display trembles.	• Load cell is damaged. • Load cell insulation resistance. • Indirect occurrence	• Load cell input, output. • Check resistance • Check load cell's insulation resistance.	• Insulation resistance (Cable & Case > 1000 Mohm)
When weight goes up at a regular ratio or zero returns are not made.	• Loadcell faulty	• Check load cell's insulation resistance.	
	• Loadcell connection is insufficient.	• Check the wiring between load cell and the main device. • Check the load cell's calbe's disconnection.	
When weight changes into (−).	• Loadcell wiring is reversed.	• Check load cell's ouput cable connection.	• Output : (+SIG) (−SIG)
Displayed as Lc_Er	• Load cell is damaged. • Load cell connection is bad.	• Check the load cell's condition and calbe connection.	
Displayed as c_Err	• Actual calibration set below zero (−)	• Performing actual load calibration at plus(+)	
If the number on the Display does not match	• Out of maximum display range(−19999 ~ 99999)	• Re-check the 8-3 Digital Calibration setting and the F-51 Force unit setting. • Restore to the settings saved by RESTORE execution	
Pressing ⏵ key in FUNC state does not move to calibration mode.	• Locked State at 8-6 Lock Set-up. •State in which units of conversion at F-51 Force unit is established.	• Unlock from Locking Settings at 8-6 Lock Set-up. • Change to kgf unit (set value :0) at F-51. Force unit	

10. OPTION

10-1. Serial communication

　　Since RS232C Interface is very sensitive of electric noise. So please do the wiring from AC Power and electric wires separately. Also you must use the shield calbe always.

1)　　Wiring

①　　Option-02 (RS232C)

Indicator	Host PC
TXD(Transmission Data)	RXD(Receive Datea), No.2 Pin
RXD(Receive Datea)	TXD(Transmission Data), No.3 Pin
COM(Ground)	GND(Ground), NO.5 Pin
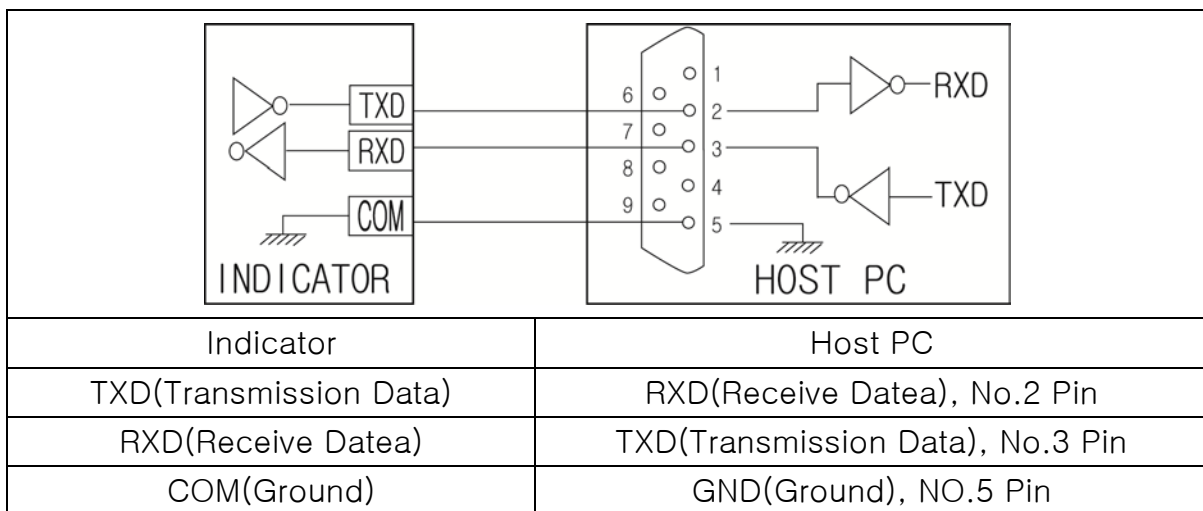
②　　Option-03 (RS485)
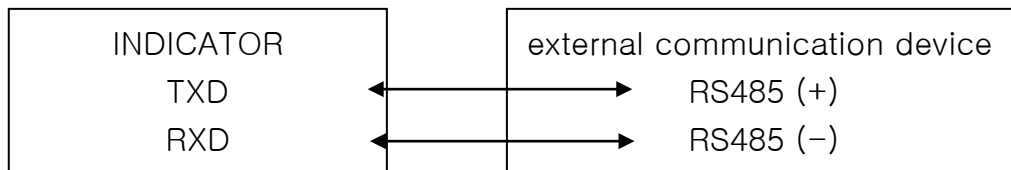
2)　　Port

Type	EIA-232C	EIA-485
Method	Full-duplex, asynchronous method.	Half-duplex, asynchronous method.
Baud-rate	Select one of 2400, 4800, 9600, 19200, 38400, 57600 bps	
Parity	No parity	
Data bit	8 bit	
Stop bit	1 bit	

10-2. Protocol

1) Standard protocol

① Stream mode (F-40, ID Number setup value '000')
(Ex. Data +1234.5 transmission)

ASCII	S	T	,	N	T	,	+	0
HEX	53H	54H	2CH	4EH	54H	2CH	2BH	30H

ASCII	1	2	3	4	.	5	CR	LF
HEX	31H	32H	33H	34H	2EH	35H	0DH	0AH

1) BYTE1 ~ BYTE3   : Fixed Charactor (S T ,)
2) BYTE4, BYTE5   : Normal (N T), Error (E R)
3) BYTE6   : Fixed Charactor (,)
4) BYTE7 ~ BYTE14 : DATA 8 BYTE including +/-)
5) BYTE15   : CARRIAGE RETURN
6) BYTE16   : LINE FEED

② Command mode (F-40, ID Number setup value '001~099')
- Command mode (PC -> INDICATOR)

ASCII	I	D	0	1	P
HEX	49H	44H	30H	31H	50H

1) BYTE1, BYTE2   : Fixed Charactor (I D)
2) BYTE3, BYTE4   : Device number (1 ~ 99)
3) BYTE5   : Command Order (P, Z , H, R)

- Command Chart

P	50H	Transmit the current value of order equipment.
Z	5AH	Operate the current value of order equipment as ZERO.
H	48H	Hold for order equipment.
R	52H	Release hold for order equipment

- Transmission Data Form (INDICATOR -> PC)

ASCII	I	D	,	0	1	,	+	0
HEX	49H	44H	2C	30H	31H	2CH	2BH	30H

ASCII	1	2	3	4	.	5	CR	LF
HEX	31H	32H	33H	34H	2EH	35H	0DH	0AH

1) BYTE1 ~ BYTE3   : Fixed Charactor (I D ,)
2) BYTE4, BYTE5   : Device number (1 ~ 99)
3) BYTE6   : Fixed Charactor (,)
4) BYTE7~BYTE14   : DATA 8byte (Including +/-)
5) BYTE15   : CARRIAGE RETURN
6) BYTE16   : LINE FEED

2) Modbus RTU protocol (R/O : Read only, W/O : Write only. R/W : Read & Write)

(Decimal)	code					
Device Function Value						
0000	0×04	F-00	Decimal Point	0 ~ 3	R/O	UNIT16
0001	0×04	F-01	Division	1 ~ 50	R/O	UNIT16
0002	0×04	F-02	Display Filter	1 ~ 100	R/O	UNIT16
0003	0×04	F-03	Hold Mode	0 ~ 3	R/O	UNIT16
0004	0×04	F-04	BCD BUSY time	50 ~ 1000(x1ms)	R/O	UNIT16
0005	0×04	F-10	Auto Zero Tracking	0 ~ 99	R/O	UNIT16
0006	0×04	F-11	Auto Zero Tracking Time	0 ~ 50 (x100ms)	R/O	UNIT16
(Decimal)	code					
0007	0×04	F-12	Auto Zero during operation	0 ~ 1	R/O	UNIT16
0008	0×04	F-13	Base offset	−19999 ~ +99999	R/O	INT32
0009						
0010	0×04	F-20	Comparison Mode	0 ~ 3	R/O	UNIT16
0011	0×04	F-21	Hysteresis	0 ~ 99	R/O	UNIT16
0012	0×04	F-30	DAC mode	0 ~ 7 ※	R/O	UNIT16
0013	0×04	F-31	DAC capacity	0 ~ 99999	R/O	INT32
0014						
0015	0×04	F-32	DAC Speed	0 ~ 1	R/O	UNIT16
0016	0×04	F-40	ID Number	0 ~ 255	R/O	UNIT16
0017	0×04	F-41	Baudrate	0 ~ 6 ※	R/O	UNIT16
0018	0×04	F-42	Protocol	0 ~ 1	R/O	UNIT16
0019	0×04	F-50	Display reverse mode	0 ~ 2	R/O	UNIT16
0020	0×04	F-51	Force Unit	0 ~ 4	R/O	UNIT16
0021	0×04	F-52	Key Disabling	0000 ~ 1111	R/O	UNIT16
Measurement						
0030	0×04		Net Display Value	−19999~+99999	R/O	INT32
0031						
0032	0×04		Relay Setpoint output	0×0001 : Relay 1	R/O	UNIT16
				0×0002 : Relay 2		
				0×0004 : Relay 3		
				0×0008 : Relay 4		
				0×0010 : Relay 5	Option	
				0×0020 : Relay 6		

			0×0040 : Relay 7		
			0×0080 : Relay 8		
Device Configuration					
4000	0×06	External Input Command	0×0001 : ZERO	W/O	UNIT16
			0×0002 : Hold set		
			0×0004 : Hold reset		
4001	0×03	Relay Setpoint 1	−19999~+99999	R/W	INT32
4002	0×10				
4003	0×03	Relay Setpoint 2	−19999~+99999	R/W	INT32
4004	0×10				
4005	0×03	Relay Setpoint 3	−19999~+99999	R/W	INT32
4006	0×10				
(Decimal)	code				
4007	0×03	Relay Setpoint 4	−19999~+99999	R/W	INT32
4008	0×10				
4009	0×03	Relay Setpoint 5			
4010	0×10				
4011	0×03	Relay Setpoint 6			
4012	0×10				
4013	0×03	Relay Setpoint 7	Option		
4014	0×10				
4015	0×03	Relay Setpoint 8			
4016	0×10				

Fuction code	Command Name	Device Address
03 (0x03)	Read Holding Regigters	4001 (0x0FA1) ~ 4016 (0x0FB0)
04 (0x04)	Read Input Regigters	0000 (0x0000) ~ 0032 (0x0020)
06 (0x06)	Preset Single Regigter	4000 (0x0FA0)
16 (0x10)	Preset Multiple Regigters	4001 (0x0FA1) ~ 4016 (0x0FB0)

※ Reference

Description \ Value	0	1	2	3	4	5	6	7
DAC mode (0012)	b_05v	b_10v	b_02A	b_42A	U_05v	U_10v	U_02A	U_42A
Baudrate (0017)		2.40	4.80	9.60	19.20	38.40	57.60	