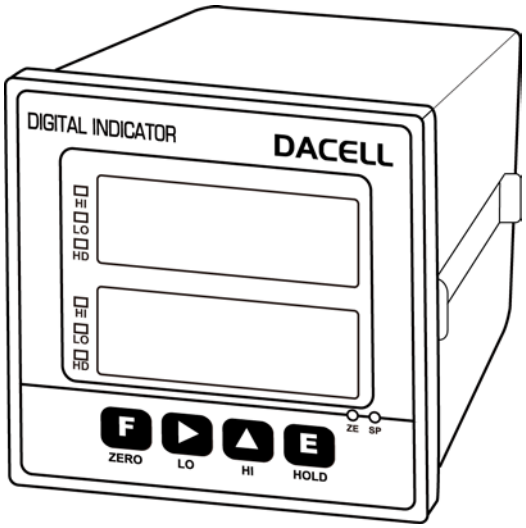
DIGITAL INDICATOR

USER'S MANUAL

DN-130T (VER 4.0)

DN-130L (VER 4.0)

DN-230A (VER 1.0)



DACELL CO.,LTD.

Address : 681-1 Cheoksan-Ri, Nami-Myeon, Cheongweon-Gun, Chung-buk

TEL :82-43-260-2242

FAX : 82-43-260-2245

http://www.dacell.com

E-Mail : info@dacell.com

Contents

1. Sepcial Features ····· 2
1-1. High-speed conversion method ····· 2
1-2. Calibration method ····· 2
1-3. HOLD & PEAK HOLD ····· 2
1-4. Comparison Output ····· 2
1-5. Data Back-up ····· 2
1-6. Watch dog ····· 2
2. Attention ····· 3
2-1. Attention for installation ····· 3
2-2. Attention for use ····· 3
3. Specification ····· 4
4. Front Panel ····· 5
5. Rear Panel ····· 6
6. Wiring Diagram ····· 8
7. Components & Function ····· 10
7-1. How to use Hold mode ····· 10
7-2. How to use comparison output function ····· 11
8. Setting mode ····· 12
8-1. Types of Setting mode & Set-up ····· 12
8-2. Function mode (Function Set-up) ····· 13
1) How to set up function ····· 13
2) How to set up Relay output ····· 14
8-3. Digital calibration (Calibration by sensor output value) ····· 20
1) DN-130T, DN-230A ····· 20
2) DN-130L ····· 21
8-4. Actual load calibration (Real-weight Calibration) ····· 22
1) DN-130T, DN-230A ····· 22
2) DN-130L ····· 23
8-5. SPAN constant calibration (Calibration by Shunt CAL value) ····· 24
1) DN-130T, DN-230A ····· 24
2) DN-130L ····· 25
8-6. Data Back-up & Restore ····· 26
8-7. Lock Set-up ····· 27
9. Product Inspection ····· 28
10. OPTION
Option 02 (RS232C) ····· 29
Option 03 (RS485) ····· 30

1. Special Features

We are grateful to you for picking up our product. If you experience problems while using it, you may refer to the user manual or contact the Technical Support Department of the company.

This product is an indicator which displays Torque and RPM in digital mode and it has the following features.

1-1. High-speed Conversion Method

24bit High-speed A/D converter that can detect the sensor's input signal at a rate of 1000times per second is used. For analog output, 16bit D/A converter with 1000times per second is used so that there is almost no devuatuib betweeb display value and output value.

1-2. Calibration Method

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

1-3. Hold and Peak Hold

You can choose Peak hold or Sample hold as per your need.

1-4. Comparison Output

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

1-5. 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.

1-6. Watch dog

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

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

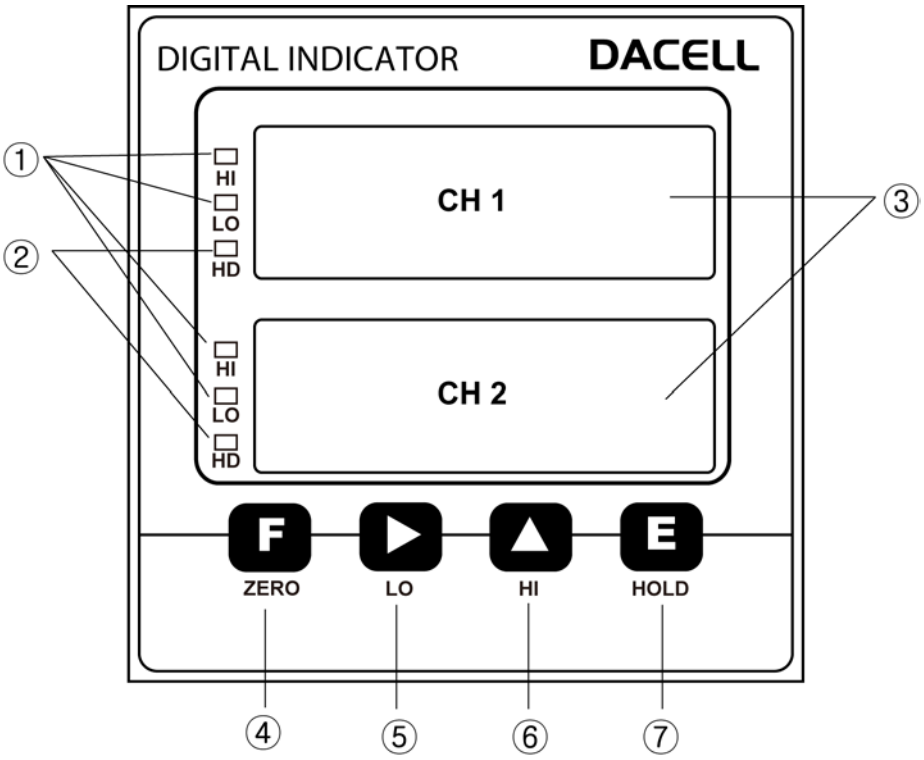
During calibration, Do not input free-load state and real-weight load until it becomes stable. Pressing Enter Key in unstable condition leads to calibration error.

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

SPEC. \ Model		DN-130T	DN-130L	DN-230A
SIGNAL		CH1 : 0.5~3mV/V CH2 : PULSE	CH1,CH2 : 0.5~3mV/V	CH1 : 0~2Vrms CH2 : PULSE
ANALOG OUT		DC 0 ~ 10V, 4 ~ 20mA(in accordance with customer request)		
EXCITATION		CH1 : 5V CH2 : 12V	CH1,CH2 : 5V	CH1 : 2Vrms/5kHz CH2 : 12V
MAX. Display		CH1: -19999~+99999 CH2: 0 ~ 60000	CH1,CH2: - 19999~+99999	CH1 : -19999~+99999 CH2 : 0 ~ 60000
A/D Converter		24bit 1000time/sec		
D/A Converter		16bit, 1000time/sec		
Temperature Characteristic	ZERO	0.5μV/℃		
	SPAN	50ppm/℃		
Measured value display		7 segment LED 14mm		
Status display		Red LED 6 PCS		
Key Switch		4 PCS		
Comparison output		Upper limit(HI), Lower limit(LO)		
Contact Capacity		AC 125V 0.5A		
Temperature Range		-10℃~60℃, less than 80% RH (no dewing.)		
Weight		About 650g		
Power Supply		AC 90 ~ 240V, 50/60Hz		
OPTION		OP-02 : RS232C, OP-03 : RS485		
External dimension		97 × 97 × 141 mm (W × H × D)		
Panel cutting size		92.5 × 92.5 mm		

4. Front Panel



① HI, LO Indication LED

: Hi or LO LED will be lighted when measured value exceeds the setting value.

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

③ Measured value Indication : It indicates the measured value and each setting value.

④ F ZERO

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.

⑤ LO

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.

⑥ HI

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.

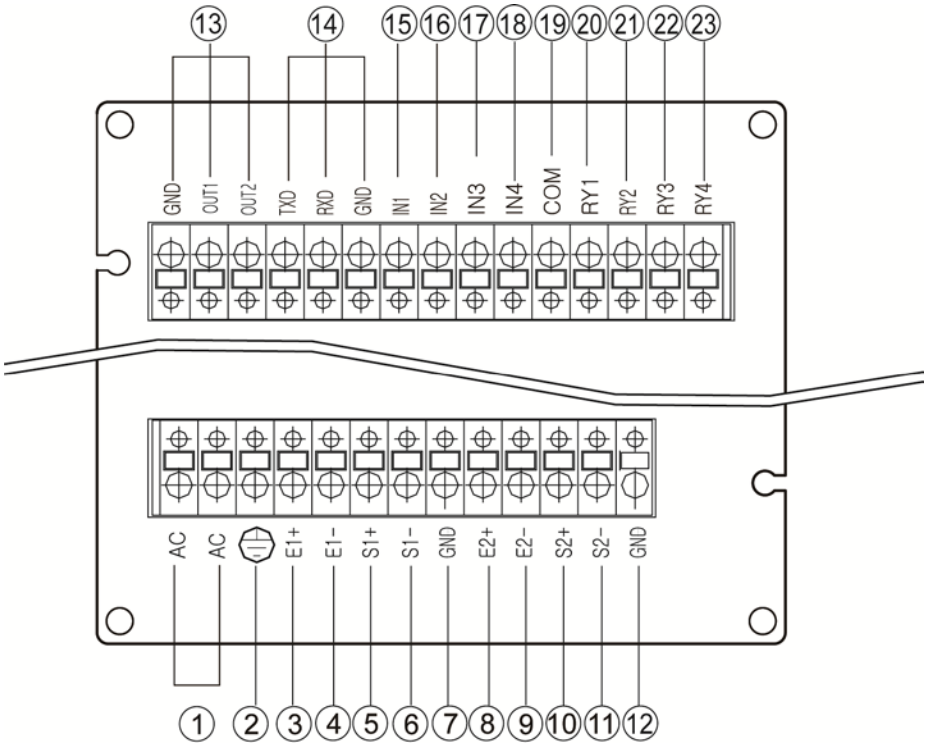
⑦ E HOLD

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 AC_L, N : Main Power Supply Wiring Terminal
② ⏚ : Ground Terminal (as an independent ground connection.)
③ E1+ : CH1 Sensor Supply Voltage + Connection Terminal(FED)
④ E1- : CH1 Sensor Supply Voltage - Connection Terminal(White)
⑤ S1+ : CH1 Sensor Ouput Signal + Connection Terminal(Black)
⑥ S1- : CH1 Sensor Output Signal – Connection Terminal(Green)
⑦ GND : SHIELD connection terminal of sensor (Tare)
⑧ E2+ : CH2 Sensor Supply Voltage + Connection Terminal(Red)
⑨ E2- : CH2 Supply Voltage - Connection Terminal(White)
⑩ S2+ : CH2 Sensor Ouput Signal + Connection Terminal(Black)
⑪ S2- : CH2 Sensor Ouput Signal - Connection Terminal(GREEN)

⑫ GND : SHIELD connection terminal of sensor(Tare)
⑬ OUT1, 2 : Analog (DC 0 ~10V/DC 4 ~ 20mA) Output Terminal
⑭ TXD, RXD : RS232C SERIAL INTERFACE (RS485 : TXD → TX+, RXD → TX-)GND
: External Input Common Terminal
⑮ IN1 : External HOLD Input Terminal (CH1)
⑯ IN2 : External ZERO Input Terminal (CH1)
⑰ IN3 : External HOLD Input Terminal (CH2)
⑱ IN4 : External ZERO Input Terminal (CH2,DN130L)
⑲ COM : RELAY Output Common Terminal
⑳ RY1 : CH1 Lower Limit Output Terminal
㉑ RY2 : CH1 Upper Limit Output Terminal
㉒ RY3 : CH2 Lower Limit Output Terminal
㉓ RY4 : CH2 Upper Limit Output Terminal

◀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.)

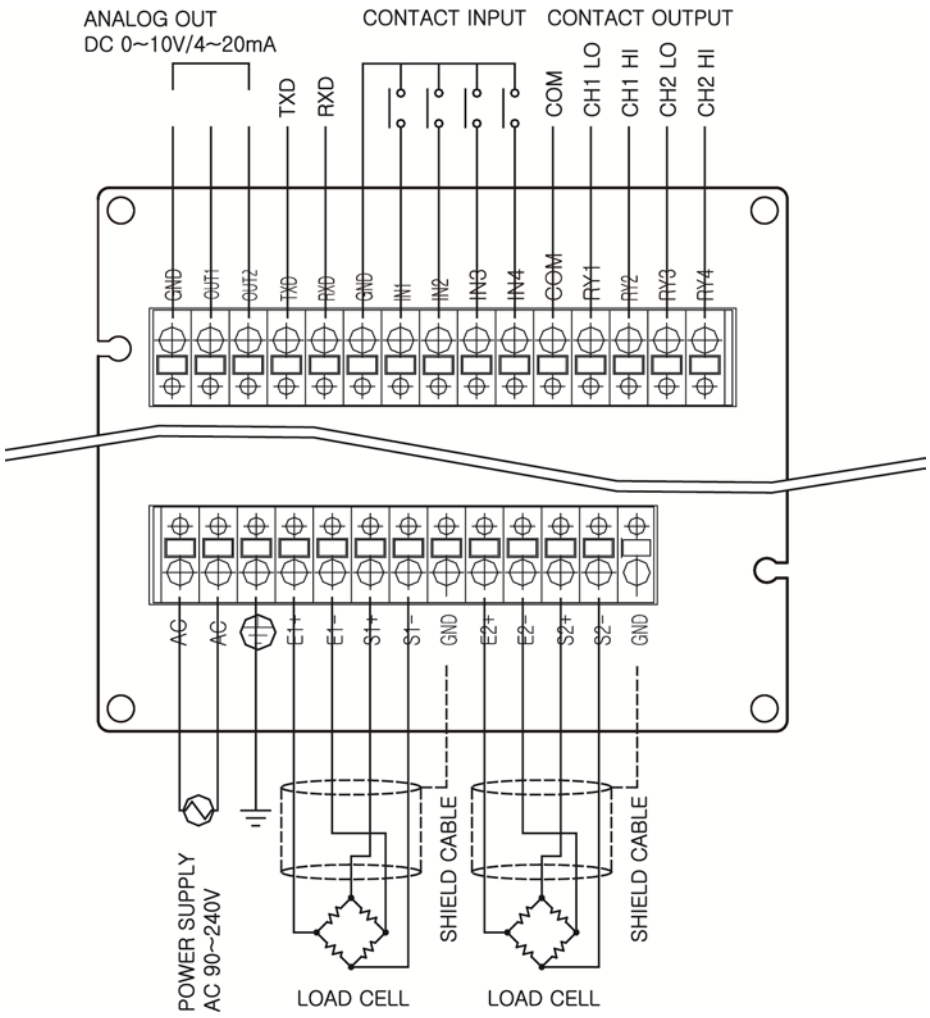
3. Please check the function of the terminal before you do the wiring so that you can prevent any malfunction in advance.
4. Manufacture will be relieved of its responsibility for any damge or injury due to the disassembly and alteration made without any agreement. Also, no A/S will be made.

5. Rear Panel

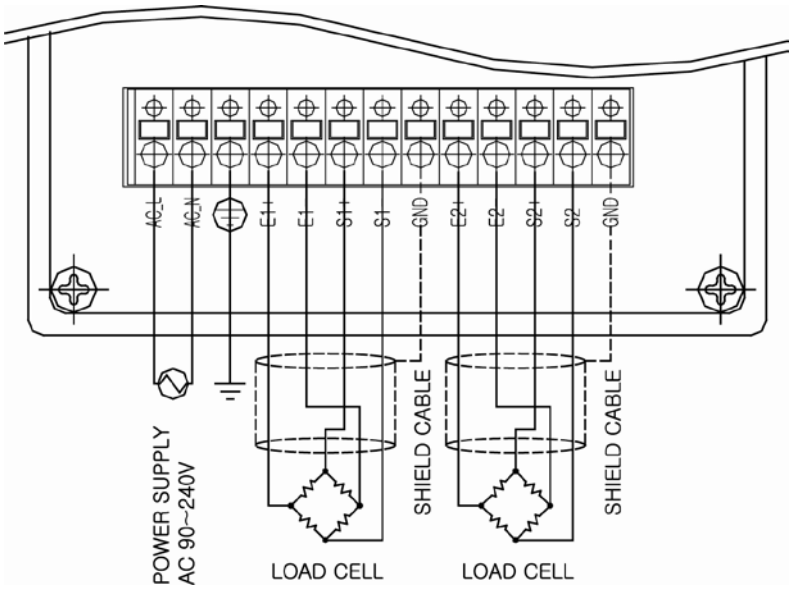
Please check the location of terminal and its use. While the projected button is being pressed, please insert the cable into the lower hole completely. As soon as you release the button, the connection will be completed. At the point, please slightly pull the calbe and check whether the cable is come off or not.

(The most suitable calbe is Φ 0.5~1. Linking cable must be brazing or used with 1 terminal)

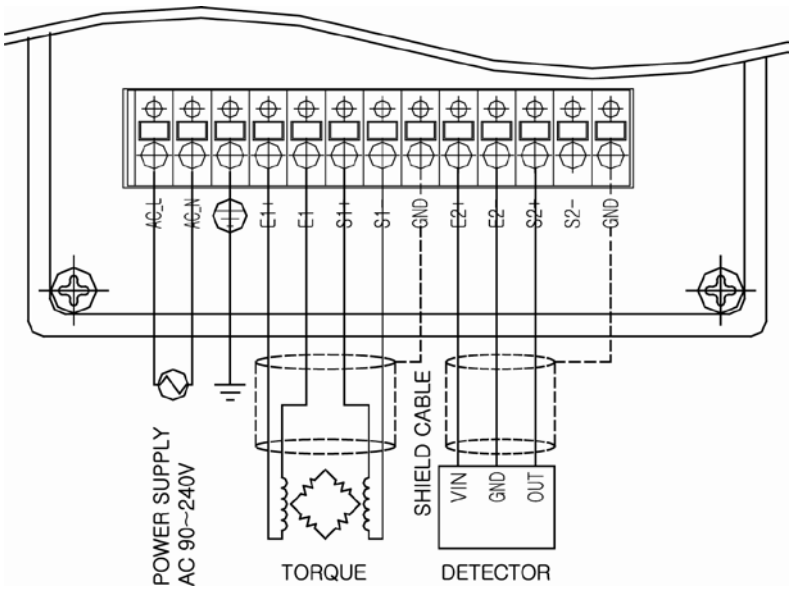
1) DN-130T



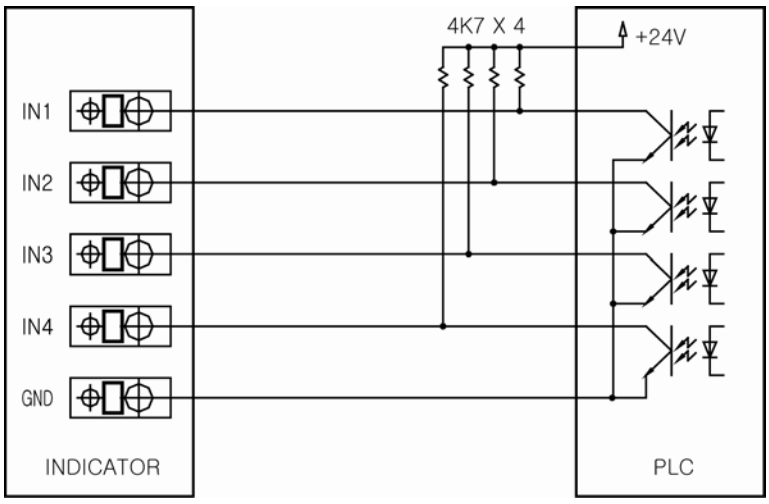
2) DN-130L



3) DN-230A



1) <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 Analog, Digital or Display Hold as per your purpose of use (Hi or Low Speed)

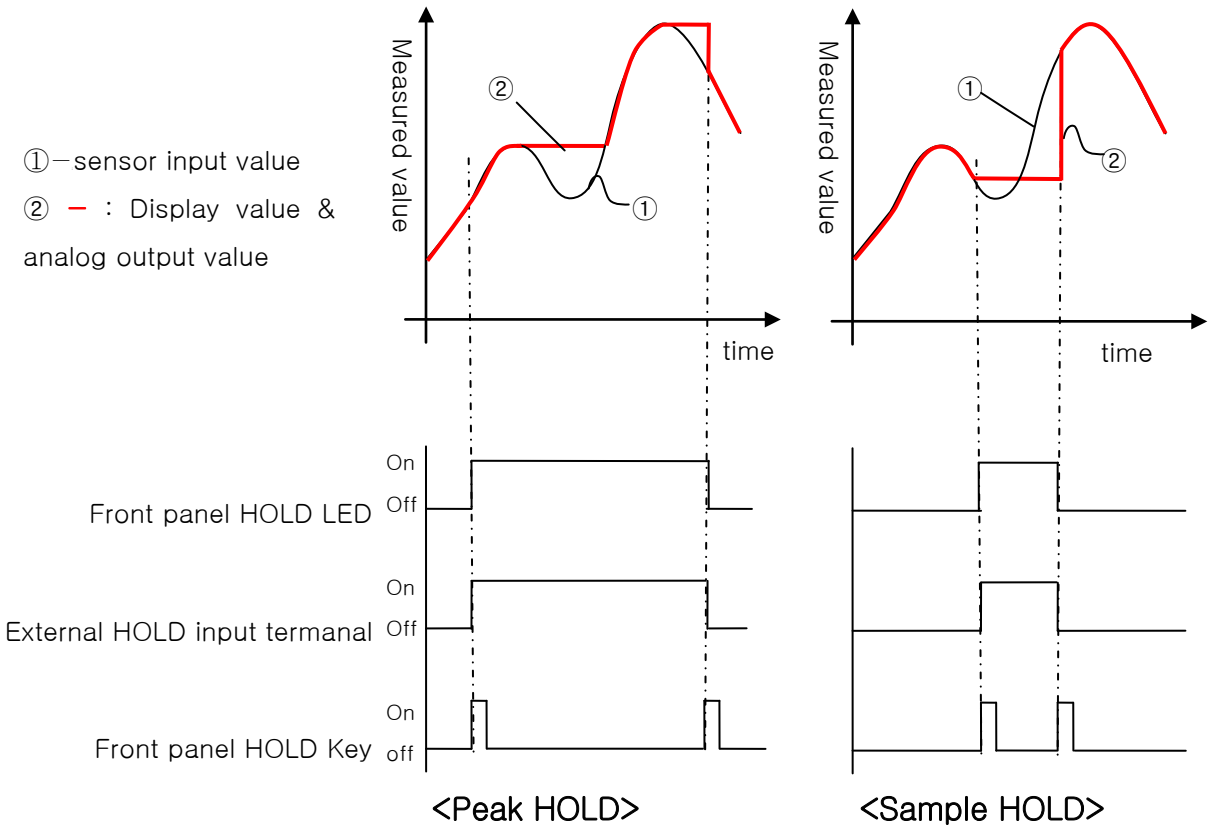
To input Hold, you can use Hold key on the front panel or external input. For the operation method, please refer to the drawing below.

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

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

Absolute peak hold mode : It is to hold and display the 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.



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.

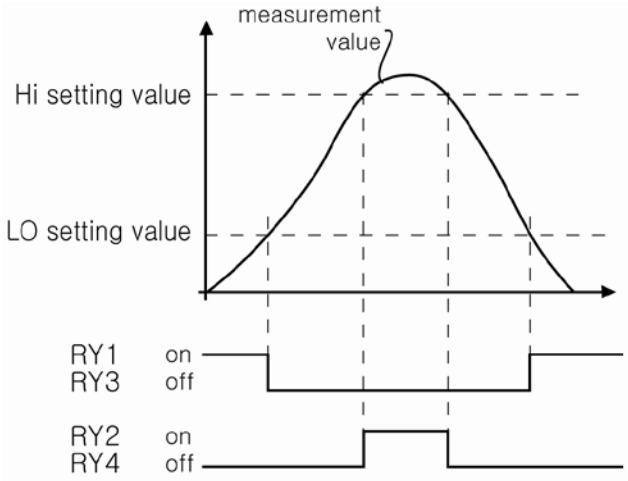
On High limit and Low limit mode, Hysteresis can be used.

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

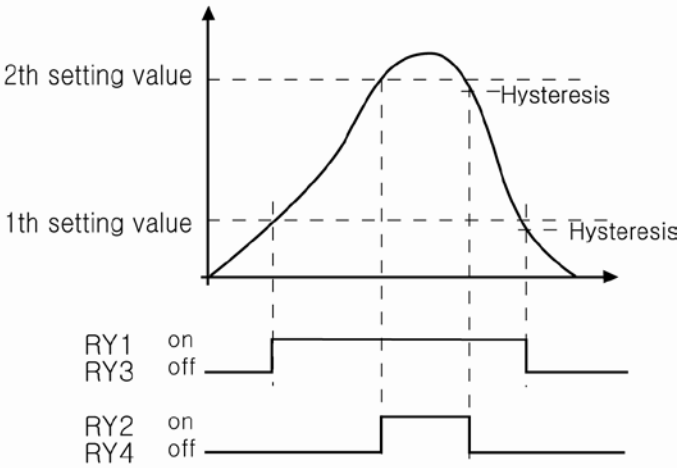
1) Decision mode : Measured Value ≤ Lower limit setup value ⇒ CH1 : RY1 ON, CH2 : RY3 ON
Measured Value ≥ Upper limit setup value ⇒ CH1 : RY2 ON, CH2 : RY4 ON

2) High limit mode : Measured Value ≥ RY1 setup value ⇒ CH1 : RY1 ON, CH2 : RY3 ON
Measured Value ≥ RY2 setup value ⇒ CH1 : RY2 ON, CH2 : RY4 ON
Measured Value < RY1 setup value – Hysteresis value ⇒ CH1:RY1 OFF, CH2:RY3 OFF
Measured Value < RY2 setup value – Hysteresis value ⇒ CH1:RY2 OFF, CH2:RY4 OFF

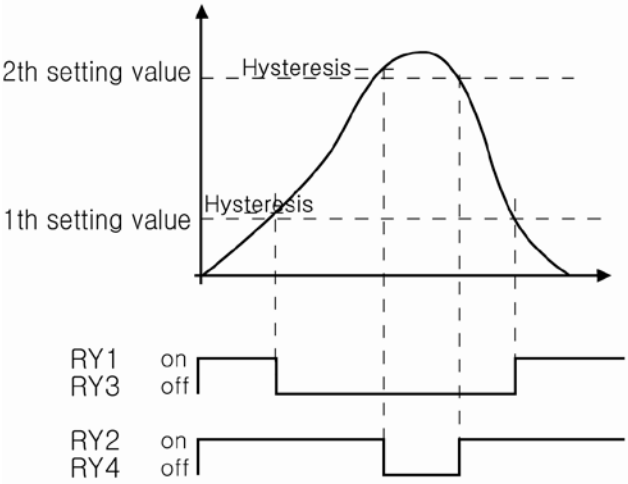
3) Low limit mode : Measured Value ≤ RY1 setup value ⇒ CH1 : RY1 ON, CH2 : RY3 ON
Measured Value ≤ RY2 setup value ⇒ CH1 : RY2 ON, CH2 : RY4 ON
Measured Value > RY1 setup value + Hysteresis value ⇒ CH1:RY1 OFF, CH2:RY3 OFF
Measured Value > RY2 setup value + Hysteresis value ⇒ CH1:RY2 OFF, CH2:RY4 OFF



<Decision mode>



<High limit mode>

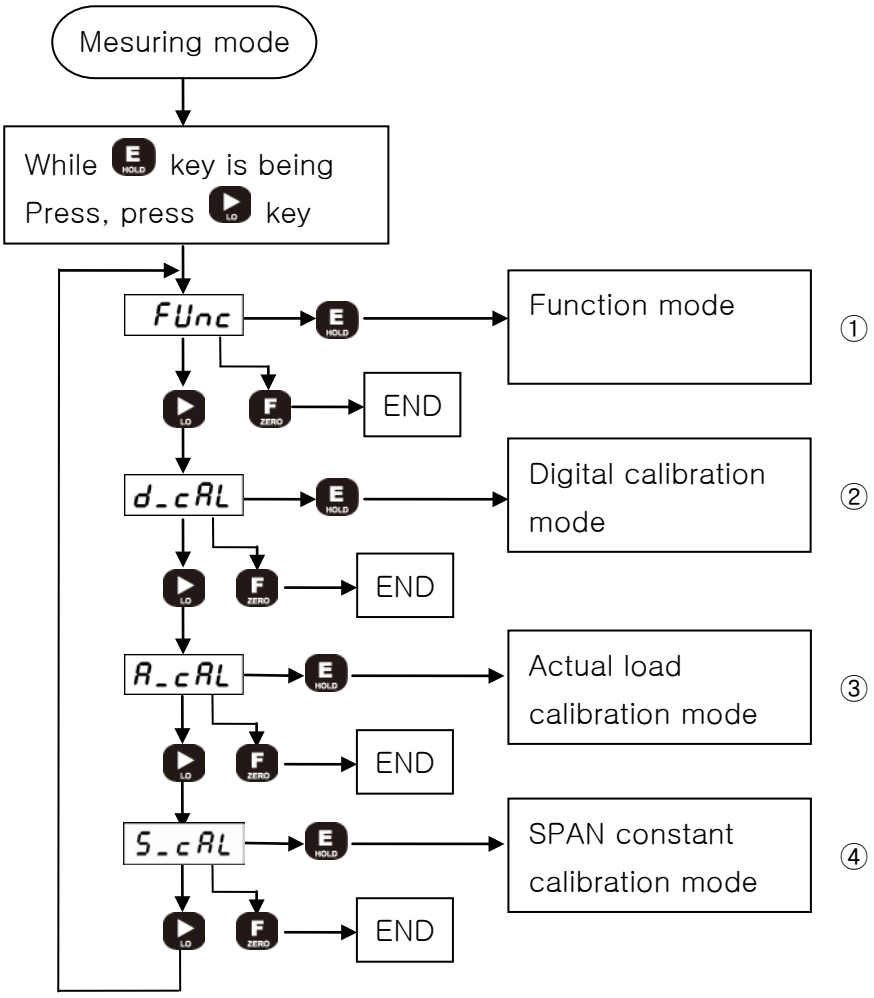


<Low limit mode>

8. Setting Modes

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

For setting mode, there are 4 different types of mode such as Function mode, Digital calibration mode, Actual load calibration mode and SPAN constant calibration mode.



① Function mode
Access 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.

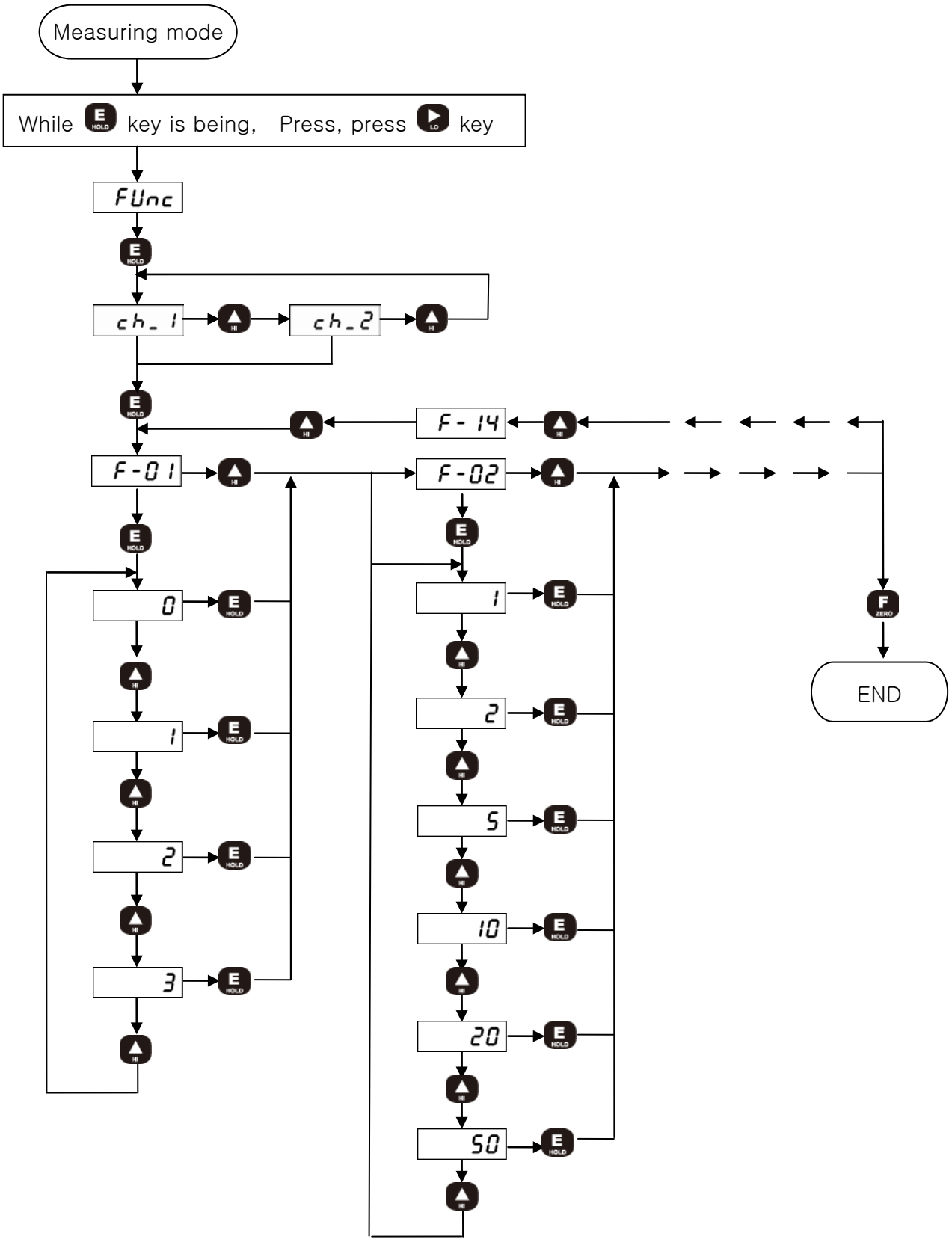
④ SPAN constant calibration mode
t is to calibrate with the S.CAL value written down for load calibration. Please refer 8-5 how to calibrate.

8-2. Function mode

DN-130T, DN-230A : CH1 (TORQUE), CH2 (RPM)

DN-130L : CH1 (LOAD CELL), CH2 (LOAD CELL)

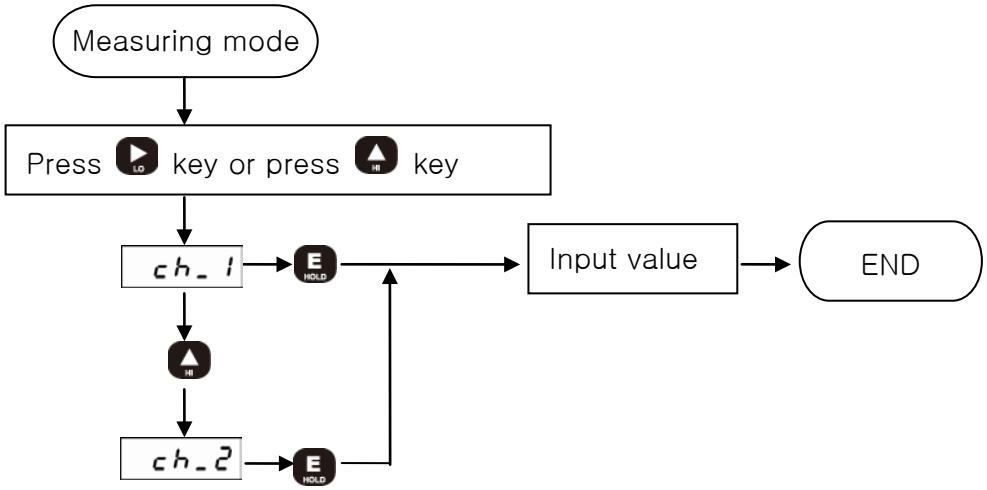
1)How to set function.



3) How to set RELAY data

key : Lower limit setup key

key : Upper limit setup key



Function mode list

			set-up value
F-01	Decimal point	0, 1, 2, 3	1
F-02	Division	1, 2, 5, 10, 20, 50	1
F-03	Display filter	0, 4, 8, 16, 32	8
F-04	Hold mode	Sample hold, Peak hold, Absolute peak hold	Peak hold
F-05	Comparison mode	Decision, High limit, Low limit	Decision
F-06	Hysteresis	0 ~ 99	0
F-07	Pulse/circle	0 ~ 360	60
F-08	DAC capacity	-19999 ~ +99999	10000
F-09	ID Number	0 ~ 32	0
F-10	Baud rate & PRINT	2400, 4800, 9600	9600
F-11	Auto zero tracking	0 ~ 99	0
F-12	Auto zero tracking time	0.0 ~ 5.0 sec	0.0
F-13	Force unit	Kg(kg/㎠), N, ℓb, bar, MPa	Kg
F-14	Key disabling	Zero key, Lo key, Hi key, Hold key	0000

F-01. Decimal point (Decimal point set up)

(Standard setup value: 1)

0	00000 : No decimal point	DN-130T,DN-230A
1	0000.0 : One decimal place	: Only set up CH1 .
2	000.00 : Two decimal places	DN-130D
3	00.000 : Three decimal places	: Set up CH1 and CH2

F-02. Division (Minimum display unit set up)

(Standard setup value: 1)

1	Displayed In 1 (0, 1, 2, 3, 4 …….)	CH1, CH2 Individual setup
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-03. Display filter (Display speed set up)

(Standard setup value: 8)

0	No filter	Only CH1
4	Average time 1/8 sec	
8	Average time 1/4 sec	
16	Average time 1/2 sec	
32	Average time 1 sec	

F-04. Hold mode

(Standard setup value: 1)

0	Sample Hold	: To hold the display value at the time of Hold signal input.	CH1 setup
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.	

F-05. Comparision mode (Comparision output mode set up)

(Standard setup value: 0)

0	Decision mode	: Relay RY1, RY2, RY3, RY4 output	CH1, CH2 Individual setup
1	High limit mode	: Relay RY1, RY2, RY3, RY4 output	
2	Low limit mode	: Relay RY1, RY2, RY3, RY4 output	

F-06. Hysteresis

(Standard setup value: 00)

00 ≀ 99	00 : Hysteresis – not used 01 ~99 : Hysteresis – used(Decision mode is not applied)	CH1,CH2 Individual setup

F-07. Pulse/circle (Set up pulse per circle)

(기준설정값 : 60)

01 ~ 360	Set up pulse per circle	DN-130T,DN-230A : Set up CH2

F-08. DAC capacity (Analog Outupt value set up)

(Standard setup value: 10000)

<table>
<tr><td></td><td></td><td></td></tr>
<tr><td>-19999
≀
+99999</td><td>Analog output capacity set-up

<Setting value & output>
<table>
<tr><td rowspan="2">Setting value</td><td colspan="2">Voltage output(±10V)</td><td colspan="2">Current output(4 ~20mA)</td></tr>
<tr><td>Display value</td><td>output</td><td>Display value</td><td>output</td></tr>
<tr><td rowspan="3">+10000</td><td>-10000</td><td>-10V</td><td>-10000</td><td>-</td></tr>
<tr><td>0</td><td>0V</td><td>0</td><td>4mA</td></tr>
<tr><td>+10000</td><td>+10V</td><td>+10000</td><td>20mA</td></tr>
<tr><td rowspan="3">-10000</td><td>-10000</td><td>+10V</td><td>-10000</td><td>20mA</td></tr>
<tr><td>0</td><td>0V</td><td>0</td><td>4mA</td></tr>
<tr><td>+10000</td><td>-10V</td><td>+10000</td><td>-</td></tr>
</table></td><td>CH1, CH2
Individual
setup</td></tr>
</table>

F-09. ID Number (Communication Device Number set up)

(Standard setup value: 00)

00 ≀ 32	00 : Device number is not set-up(Stream mode:always transmit data) 01~32 : Device number is set-up(Command mode:Transmit data by command) CH2 ID Number : CH1 ID Number + 1	CH1 setup

F-10. Baud rate & Print (Communication Speed set up)

(Standard setup value: 9.60)

2.40	2400 bps	O	O	CH1 setup
4.80	4800 bps	O	O	
9.60	9600 bps	O	O	

F-11. Auto zero tracking (zero operation range set up)

(Standard setup value: 00)

00 ≀ 99	00 : Auto zero is not used 01 ~99 : Set up the operation range of auto zero	Only CH1

F-12. Auto zero tracking time (Auto Zero tracking time set up)

(Standard setup value: 0.0)

00 ≀ 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)	Only CH1

F-13. Force unit (Conversion unit set up)

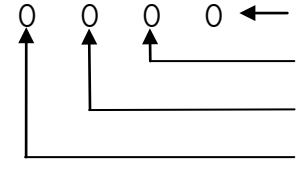
(Standard setup value: 0)

0	kg.f		kg/㎠		Only CH1
1	N	kgf × 9.8	–	–	
2	ℓb	kgf × 2.2	–	–	
3	–	–	Bar	kg/㎠ × 0.98	
4	–	–	MPa	kg/㎠ × 0.098	

Note) During calibration, set up the unit you want after calibrating it into Kg.

F-14. Key disabling (Front key locking set up)

(Standard setup value: 0000)



Hold key Lock (1), Release (0)
Hi key Lock (1), Release (0)
Lo key Lock (1), Release (0)
Zero key Lock (1), Release (0)

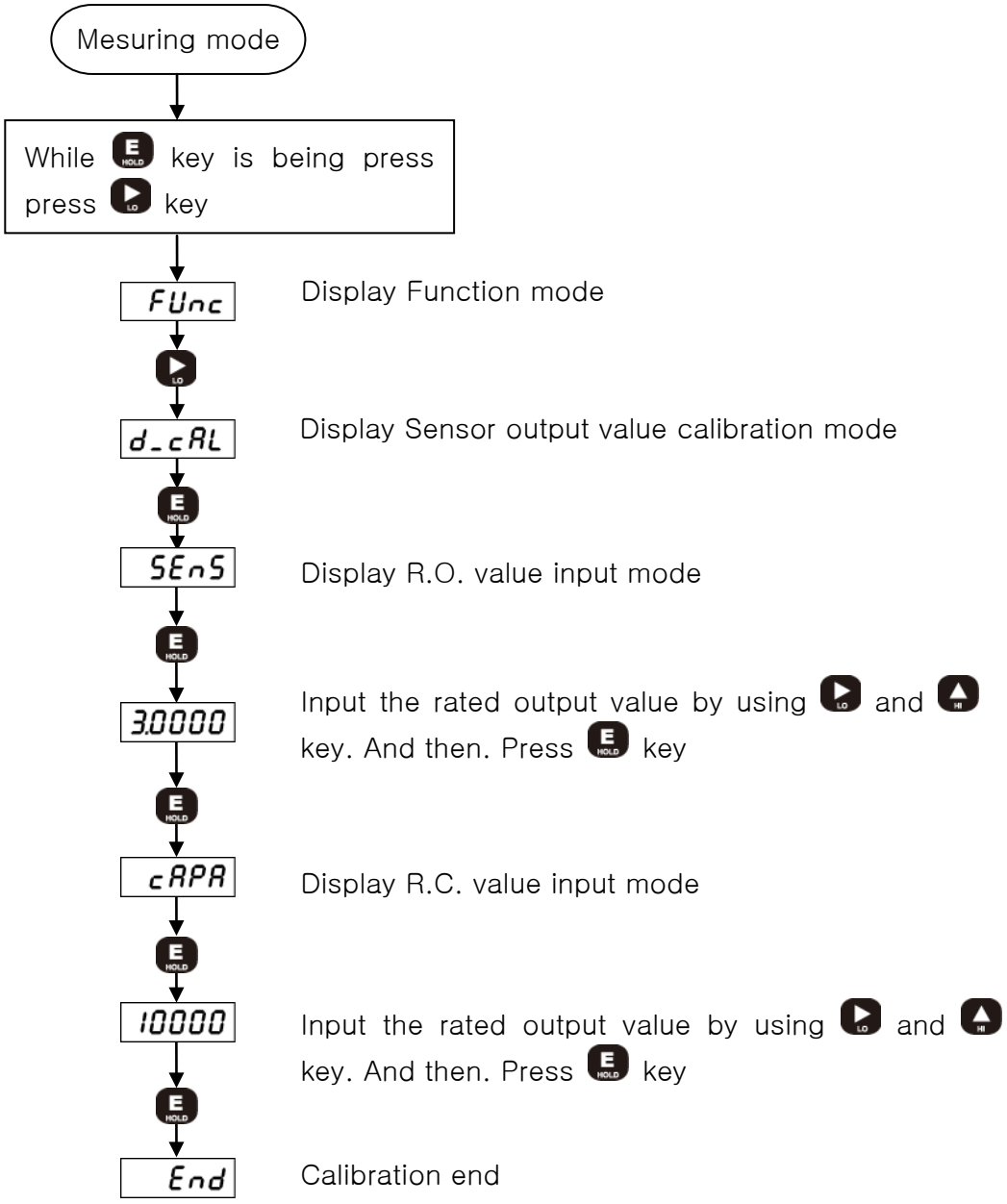
<Set-up example>
1001 : Zero & Hold key Lock, Hi and Lo key Release

CH1 setup

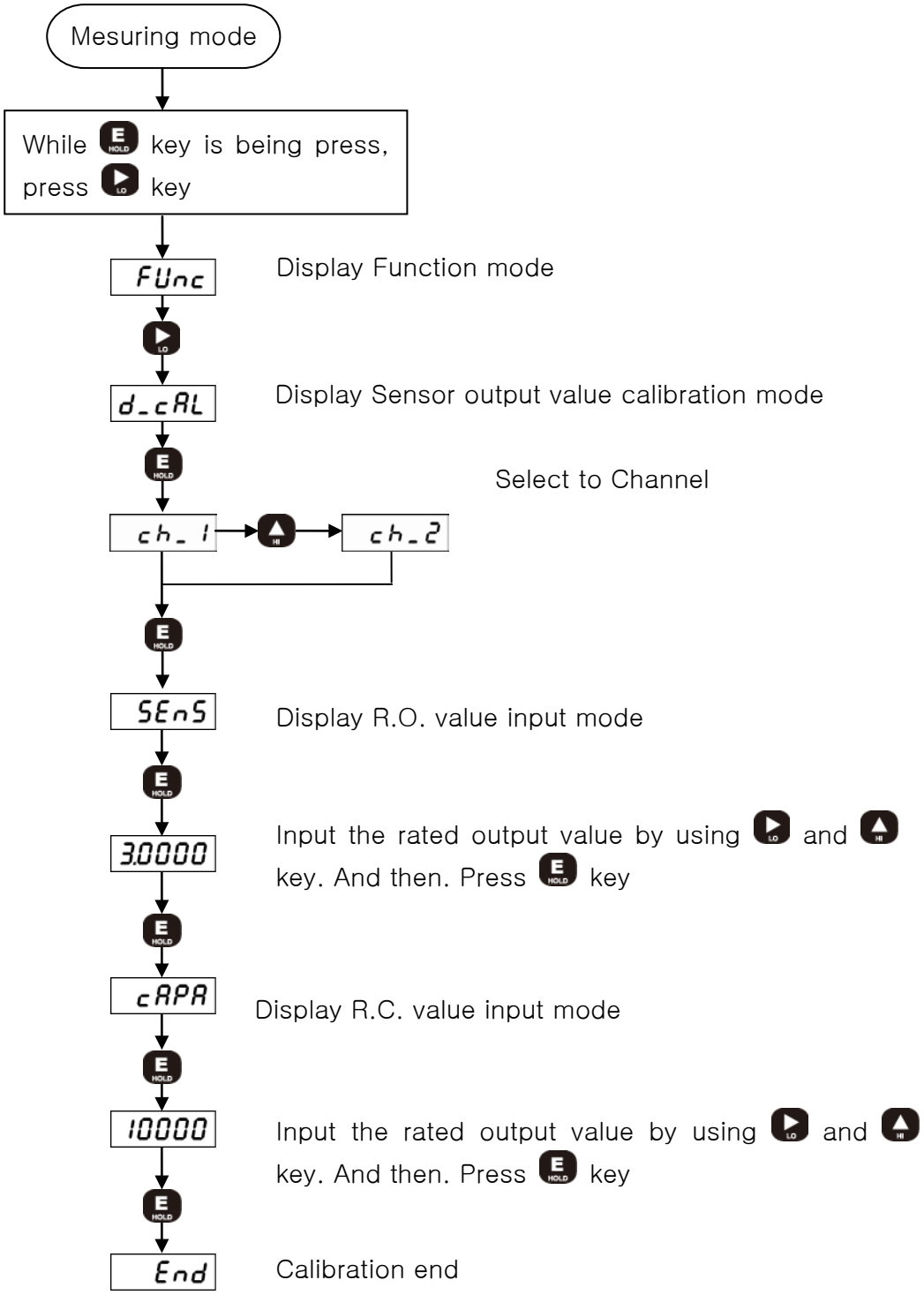
8-3. Digital calibration (Calibration by sensor output value)

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.

1)DN-130T, DN-230A



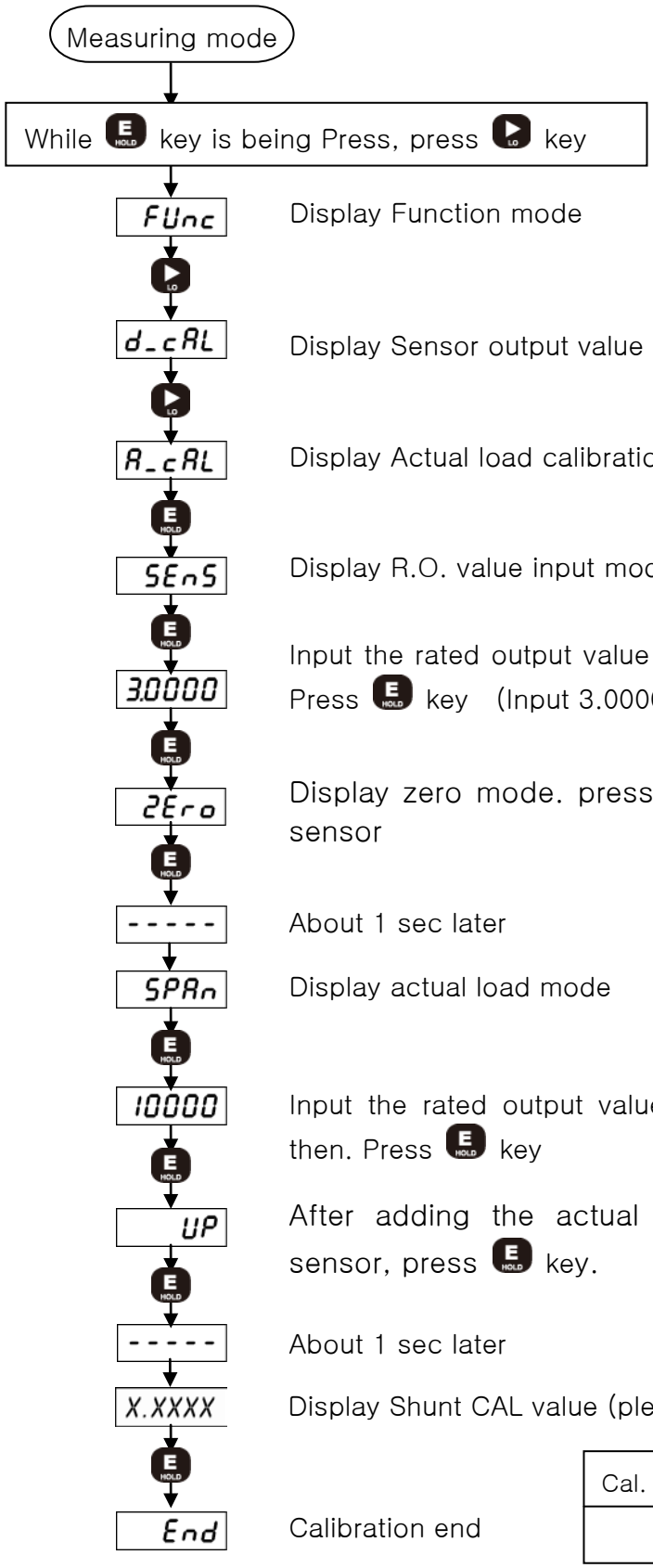
2)DN-130L


Mesuring mode
While E key is being press, press ▶ key
FUnc
Display Function mode
d_cAL
Display Sensor output value calibration mode
Select to Channel
ch_1
ch_2
SEnS
Display R.O. value input mode
3.0000
Input the rated output value by using ▶ and ▲ key. And then. Press E key
cAPA
Display R.C. value input mode
10000
Input the rated output value by using ▶ and ▲ key. And then. Press E key
End
Calibration end

8-4. Actual load calibration

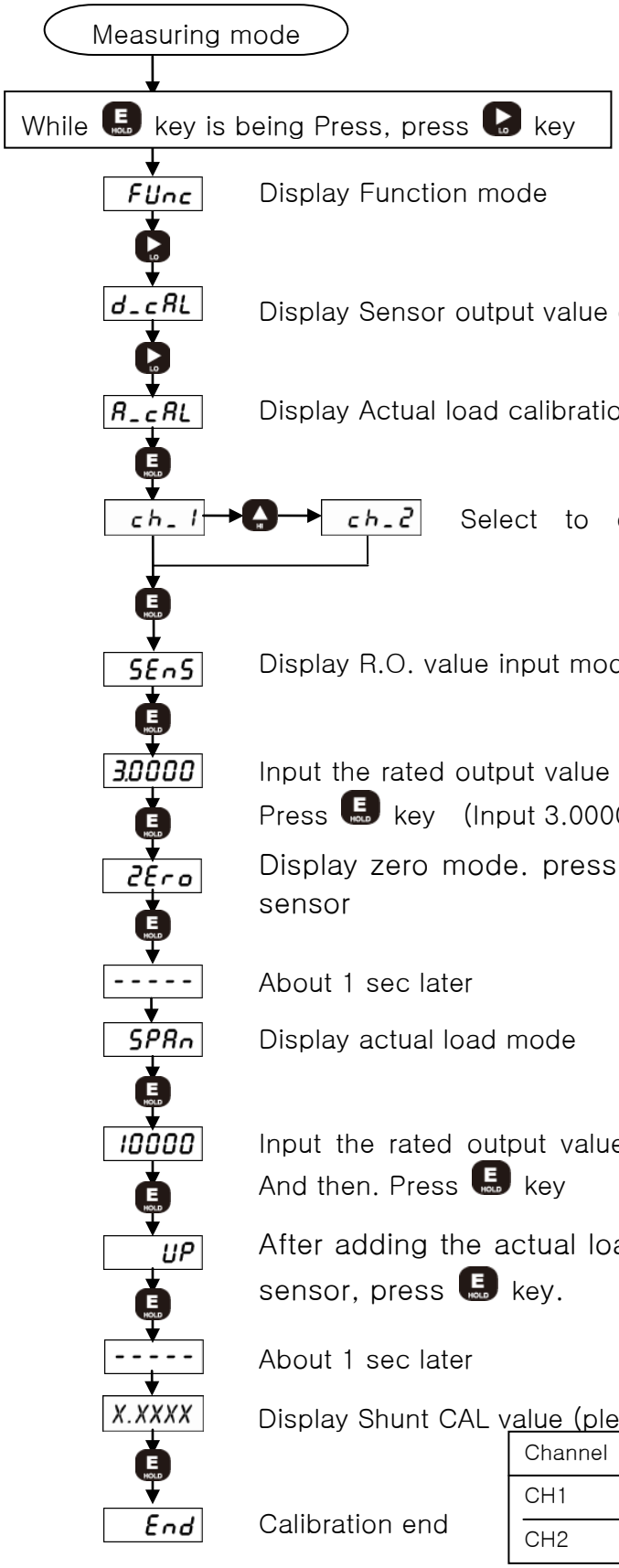
This is a calibration method by adding actual load on the sensor. Standard weight is needed.

1) DN-130T, DN-230A



Cal. Date	R.O. value	calibration constant

2) DN-130L

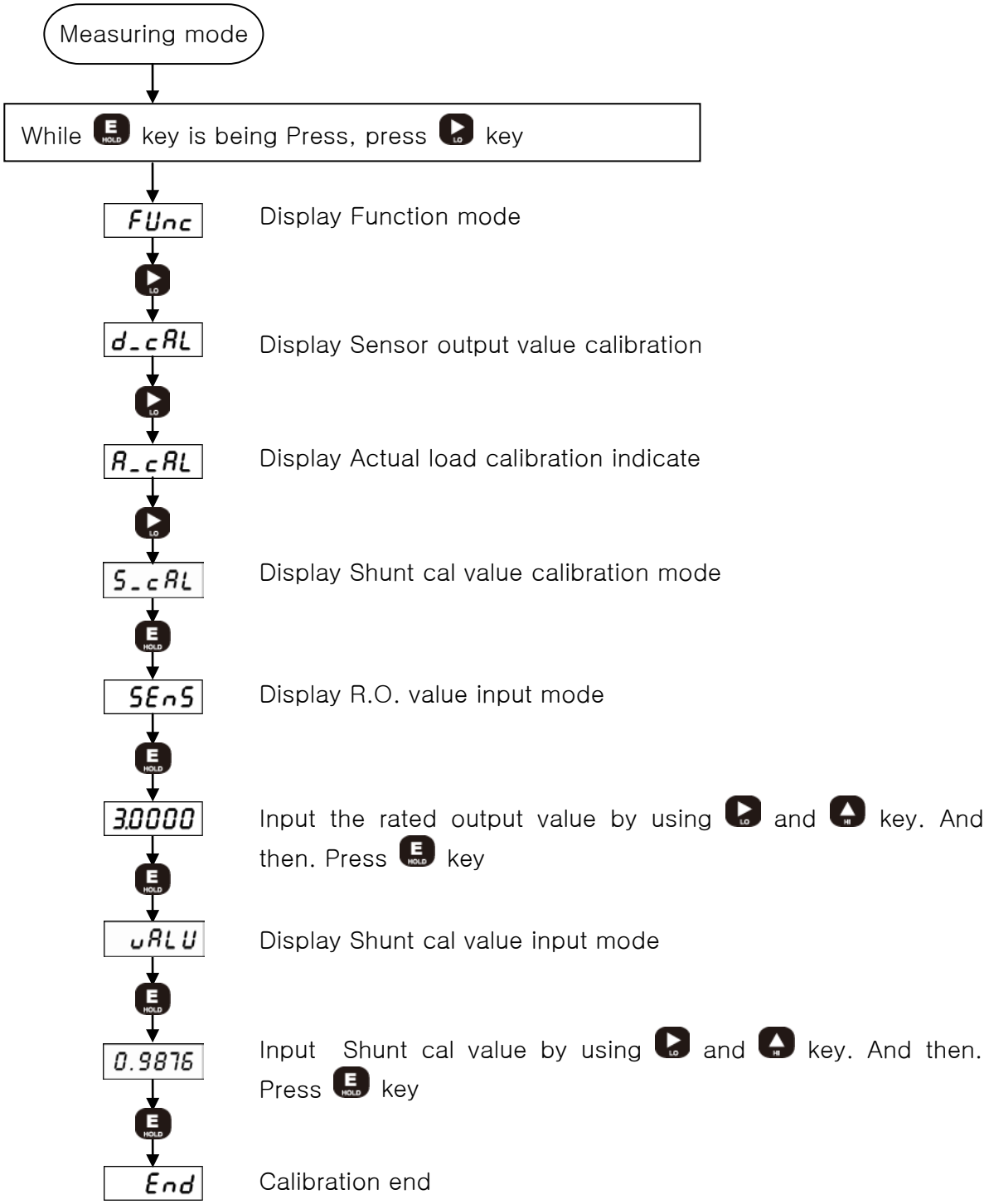


Channel	Date	R.O. Value	Cal. value
CH1			
CH2			

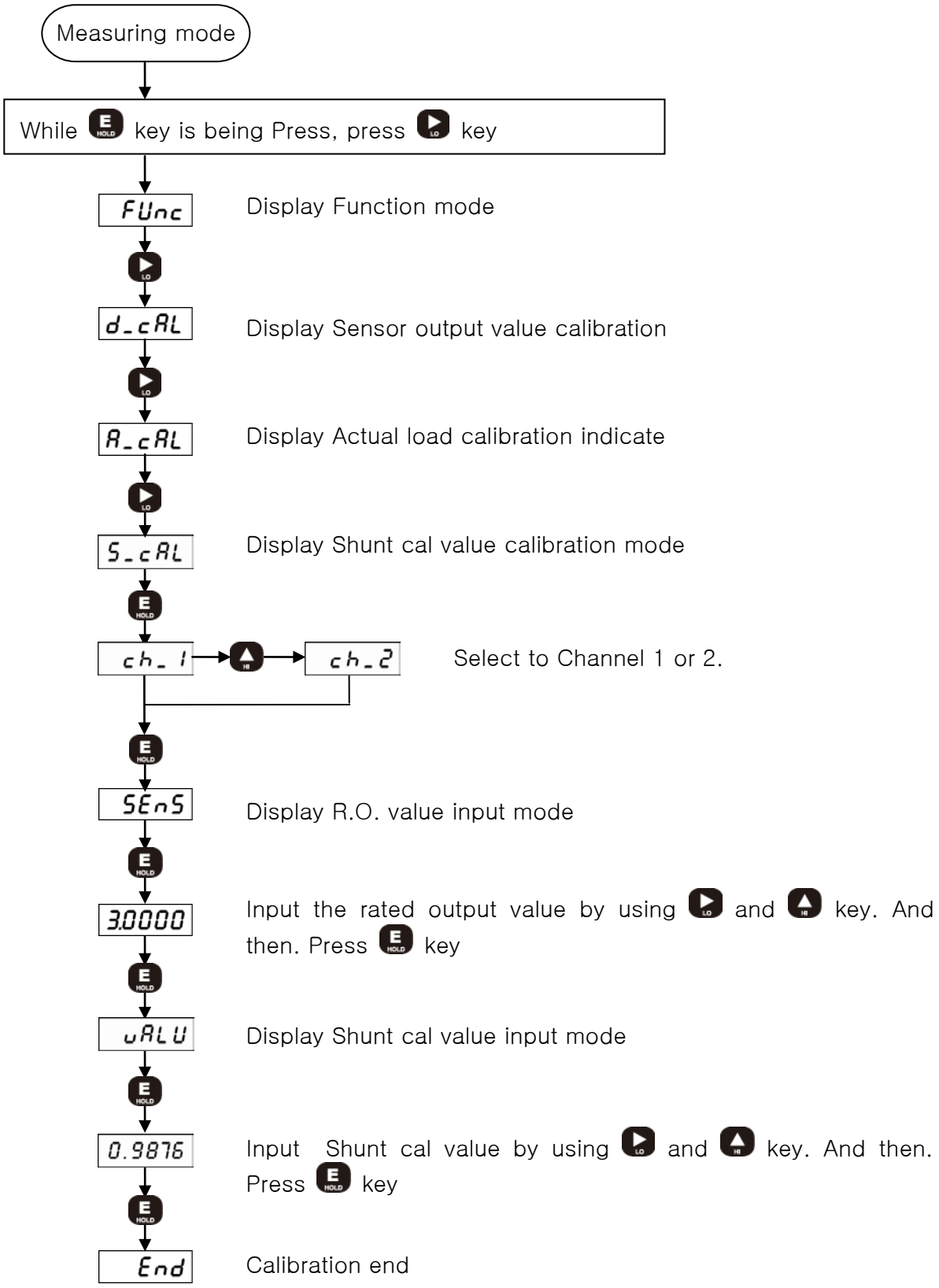
8-5. Calibratuib by Shunt CAL Value

It is to calibrate with the S.CAL value written down for load calibration. You can calibrate without any standard weight.

1) DN-130T, DN-230A



2) DN-130L


Measuring mode
While E key is being Press, press ▶ key
FUnc
Display Function mode
d_cAL
Display Sensor output value calibration
A_cAL
Display Actual load calibration indicate
S_cAL
Display Shunt cal value calibration mode
ch_1
ch_2
Select to Channel 1 or 2.
SEnS
Display R.O. value input mode
3.0000
Input the rated output value by using ▶ and ▲ key. And then. Press E key
uALU
Display Shunt cal value input mode
0.9876
Input Shunt cal value by using ▶ and ▲ key. And then. Press E key
End
Calibration end

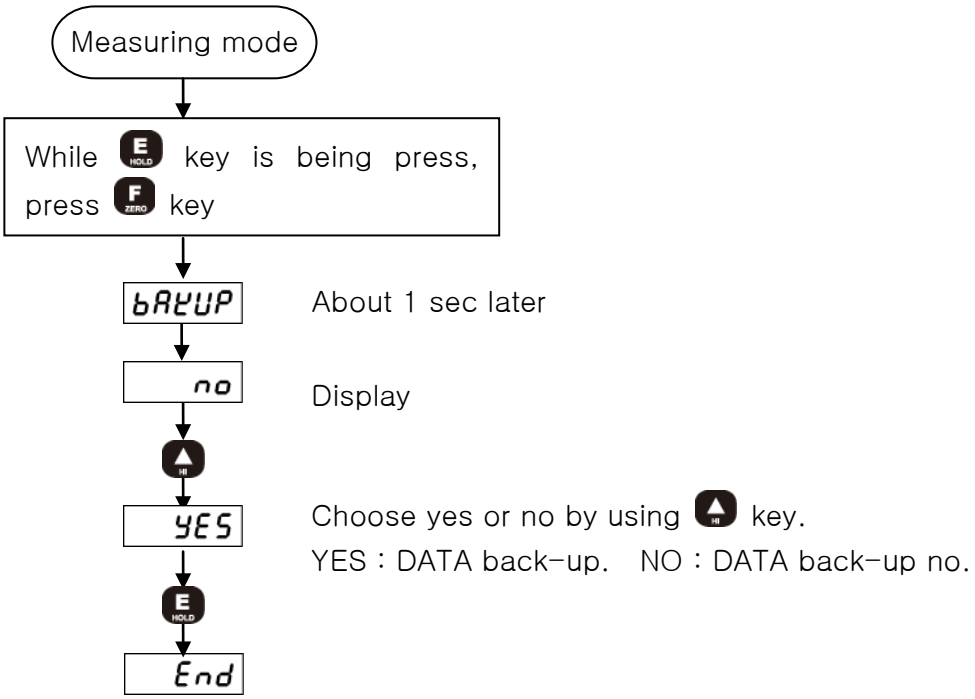
8-6. DATA BACK-UP & RESTORE

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.

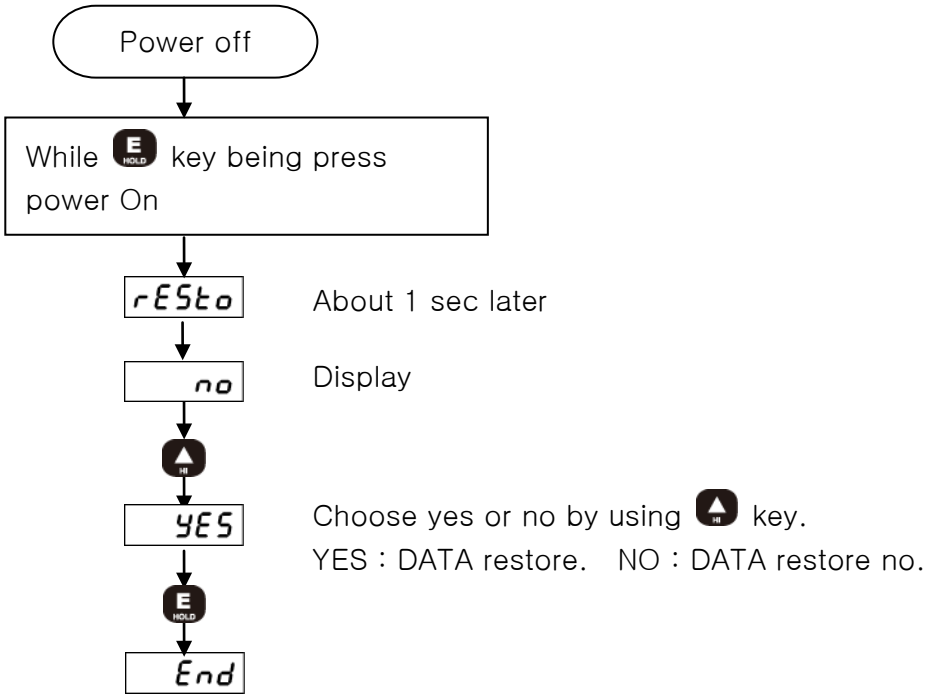
◦ DATA BACK-UP : Save the current set-up state.

◦ RESTORE : Restore the current set-up state.

1) DATA BACK-UP



2) RESTORE

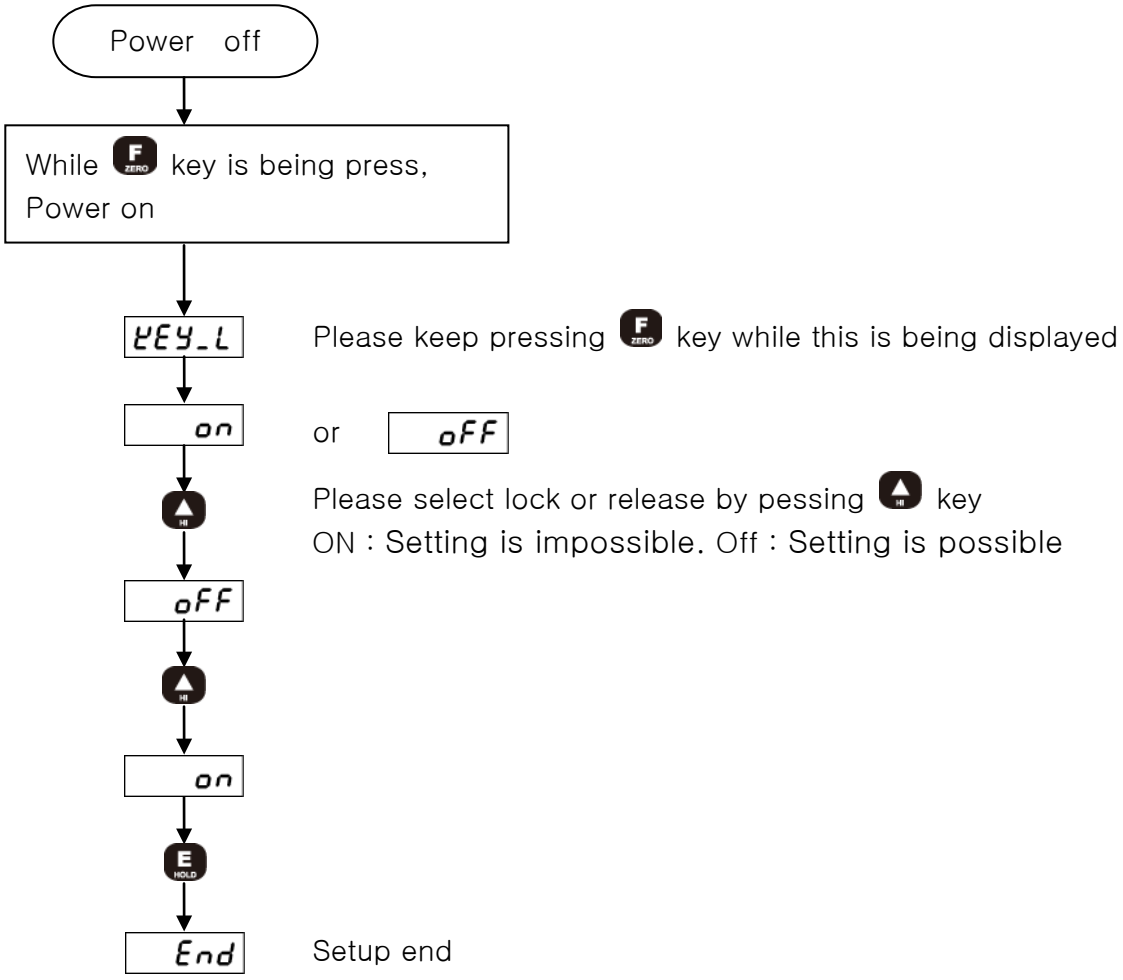


8-7. Lock Set-up

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



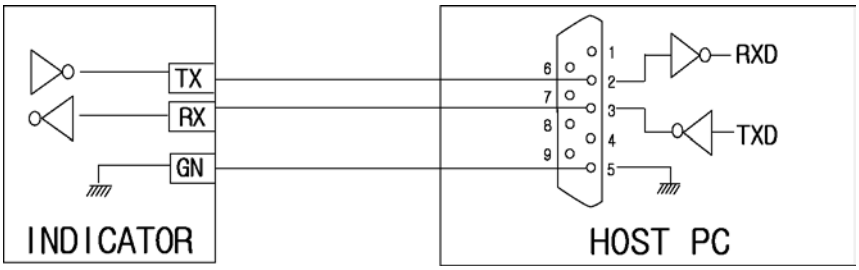
9. Product Inspection

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 "OVER" or "UNDER"	• Load cell is damaged. • Load cell connection is bad.	• Check the load cell's condition and calbe connection.	

10. OPTION

#Option-02 (RS232C)

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



Indicator	Host PC
TX(Transmission Data), No.3 Pin	RXD(Receive Datea), No.2 Pin
RX(Receive Data), No.2 Pin	TXD(Transmission Data), No.3 Pin
GN(Ground), No.1 Pin	GND(Ground), 5 Pin

1. TYPE : EIA-232C
2. Method : Half-duplex, asynchronous method.
3. Baud-rate : Select one of 2400, 4800, 9600, 19200bps
4. Parity : No Parity
5. Data bit : 8 bit
6. Stop bit : 1 bit
7. Stream mode (Ex. Data +1234.5 transmission)

ASCII	S	1	,	N	T	,	+	0
HEX	53H	31H	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 : fixed character (S)
2) BYTE2 : Channel character (CH1 : 1, CH2 : 2)
3) BYTE3 ~ BYTE6 : fixed character (, N T ,)
4) BYTE7 ~ BYTE14 : DATA 8 BYTE(including +/)
5) BYTE15 : CARRIAGE RETURN
6) BYTE16 : LINE FEED

8. Command mode

OP-03 : Refer to RS485

#Option-03 (RS485)

Since RS485 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. TYPE : RS485
2. Method : Half-duplex, asynchronous method.
3. Baud-rate : Select one of 2400, 4800, 9600bps
4. Parity : No Parity
5. Data bit : 8 bit
6. Stop bit : 1 bit

Please set up the device No. referring to INDICATOR Manual.
(Can set up from 1 to 32 channels.)

7. Command form (PC -> INDICATOR)

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

1) BYTE1, BYTE2 : Fixed character (ID)
2) BYTE3, BYTE4 : device number (1 ~ 32)
3) BYTE5 : command order (P, H, R, Z)

8. Command chart

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

9. Transmission DATA form (INDICATOR -> PC)

ASCII	I	D	0	0	1	,	+	0
HEX	53H	54H	30H	30H	31H	2CH	2BH	30H

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

1) BYTE1, BYTE2 : Fixed character (ID)
2) BYTE3 ~ BYTE5 : Device number (1 ~ 32)
3) BYTE6 : Fixed character (,)
4) BYTE7~BYTE14 : DATA 8byte (including +/-)
5) BYTE15 : CARRIAGE RETURN
6) BYTE16 : LINE FEED