Ver 203A

DIGITAL INDICATOR

USER'S MANUAL

DN-10W (VER 203A)

DN-20W (VER 203A)

DN-25W (VER 203A)

DN-27W (VER 203A)

DN-30W (VER 203A)

DN-50W (VER 203A)

DN-70,80 (VER 203A)

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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

Calibration by actual load (standard weight) and calibration by rated output of sensor.

1-2. Hold and 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

- OP-01 : Parallel BCD output
- OP-02 : RS232C Interface (basic installation)
- OP-03 : RS485 Interface
- OP-10 : Power DC24V 0.3A

Additional optional RS232C, RS485, or BCD outputs are available, and our standard protocol and Modbus RTU protocol can be selected from Function settings.

1-7. Power

AC 90 ~ 240V 50/60Hz 8VA (Option : DC24V 0.3A)

Model DN-70,80 Power: DC24V 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.

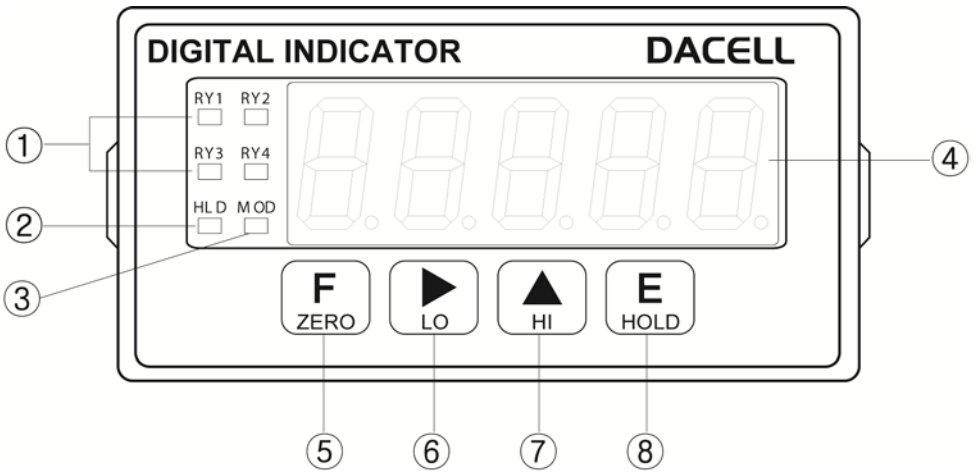
3. Specification

Spec. / Model		DN-10W	DN-50W	DN-30W	DN-70
Available sensor		Strain Gauge sensor		PROXIMITY SENSOR	Strain Gauge sensor
SIGNAL		0.5 ~ 3mV/V		pulse	0.5 ~ 3mV/V
EXCITATION		DC 5V 70mA		12V	DC 5V 70mA
Upper limit Display		-19999 ~ +99999		60pulse/1circle :0~13000 13kHz	-19999 ~ +99999
A/D Converter		24bit 200 times /s	24bit 1000 times /s		24bit 200 times /sec
D/A Converter		16bit			
Temperature Characteristic	Zero	±10ppm/℃			
	Span	±10ppm/℃			
Measured value display		7 segment 5 Digit, Height 14mm Height			
Status display LED		Red LED 6PCS			Red LED 5PCS
Key Switch		4pcs			
Comparison output		4 Relay			4 Relay
Contact Capacity		AC 250V 3A (more than 100,000)			
Analog out		DC 0~±10V or 4~20mA (Selective use)			-
Temperature Range		-10℃~ 60℃, 80% less than 80% RH (no dewing.)			
Sizes		96 × 48 × 128 mm (W × H × D)			48 × 48 × 128mm
Panel cutting size		91.5 × 44.5 mm			45.5 × 45.5 mm
Weight		: about 500g			: about 280g
Power supply		AC 90 ~ 240V 8VA (DC24V 0.3A)			DC24V 0.2A
Option		OP-02 : RS232C (basic installation), OP-03 : RS485 Interface			
		OP-01 : Parallel BCD output OP-10 : Power DC24V 0.3A			OP-06 DC 0~± 10V or 4~20mA
		OP-14: Signal 5mV/V OP-15: Signal10mV/V			

Spec. / Model		DN-20W	DN-25W	DN-27W	DN-80
Available sensor		Voltage, current sensor Potentiometer	HBT(Half type) (Option : LVDT)	Differential trans torque sensor	Potentiometer
SIGNAL		DC0~10V or 4~20mA (Option : ±10V)	AC0~2Vrms	0.5~2mV/V	DC0~10V
EXCITATION		DC10V or 24V 60mA (Option : ±15V 60mA)	AC2Vrms 5kHz		DC5V 70mA
MAX. Display		-19999 ~ +99999			
A/D Converter		24bit 200times/sec			
D/A Converter		16bit			
Temperature Characteristic	ZERO	0.5㎶/℃			
	SPAN	50pm/℃			
Measured value display		7 segment 5 Digit, Height 14mm Height			
Key Switch		4 PCS			
Status display LED		Red LED 6PCS			Red LED 5PCS
Comparison output		4 Relay			3 Relay
Contact Capacity		Contact Capacity AC250V 3A (More than 100000)			
Analog out		DC0~10V or 4~20mA	DC0~±10V or 4~20mA		Option
Temperature range for use		-10℃~ 60, >80% RH (No dewing)			
Sizes		96 × 48 × 128 mm (W × H × D)			48×48×128 mm (W×H×D)
Panel cutting size		91.5 × 44.5 mm			45.5 × 45.5 mm
Weight		About 500g			About 280g
Power supply		AC 90 ~ 240V 8VA (Option : DC24V 0.3A)			DC24V 0.2A
OPTION		OP-02 : RS232C (basic installation), OP-03 : RS485 Interface			
		OP-01 : Parallel BCD output OP-10 : Power DC24V 0.3A			OP-06 : Analog output DC0~±10V or 4~20mA
		OP-12:sensor input ±15V OP-13:sensor signal ±10V	OP-11 : LVDT	-	

4. Front panel

⑴ DN-10W, DN-20W, DN-25W, DN-27W, DN-30W, DN-50W



① comparison output Indication LED: The LED lights up when the Relay is in contact output state.

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 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 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

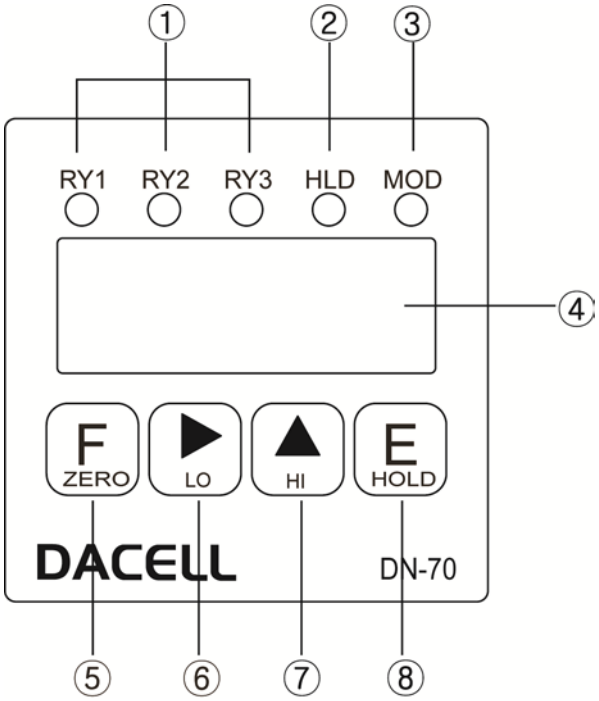
Measuring Mode : Once this Key is pressed, HOLD will be selected and once this key is pressed again, HOLD will be cancelled.

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

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

※ SET-UP Mode: State of entering function menu with key operation

⑵ DN-70, DN-80



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

⑥ HOLD Indication LED: This LED will be lighted when the measured value is on Hold.

⑦ MOD : Measured value stable (on), unstable (off) indication

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

⑤ 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.

⑥ 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.

⑦ 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.

⑧ E HOLD

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

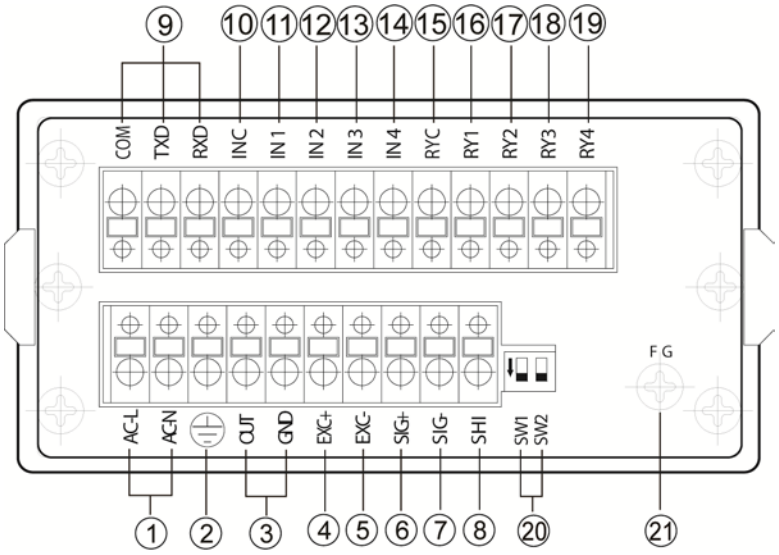
SET-UP Mode : Save each set-up value.

5. Rear panel

⑴ DN-10W, DN-20W, DN-25W, DN-27W, DN-30W, DN-50W

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 IN : Main Power Supply Wiring Terminal
② ⏚ : Ground Terminal (as an independent ground connection.)
③ OUT : Analog (DC 0 ~10V/DC 4 ~ 20mA) Output Terminal
④ EXC+ : Sensor Supply Voltage + Connection Terminal
⑤ EXC- : Sensor Supply Voltage – Connection Terminal
⑥ SIG+ : Sensor Ouput Signal + Connection Terminal
⑦ SIG- : Sensor Output Signal – Connection Terminal
⑧ SHI : SHIELD connection terminal of sensor
⑨ GND, TXD, RXD : RS232C SERIAL INTERFACE (RS485 : TXD → TX+, RXD → TX-)
⑩ INC : External Input Common Terminal
⑪ IN1 : External HOLD Input Terminal
⑫ IN2 : External ZERO Input Terminal
⑬ IN3 : External printer signal Input Terminal (when PT-100 use)
⑭ IN4 : No use
⑮ RYC : RELAY Output Common Terminal
⑯ RY1 : RELAY 1(Lower Limit) Output Terminal

⑰ RY2 : RELAY2 (Upper Limit) Output Terminal
⑱ RY3 : RELAY3(Normal) Output Terminal (OK)
⑲ RY4 : RELAY 4 Output Terminal
⑳ SW1, 2 :

- DN-10W, DN-25W, DN-27W, DN-30W, DN-50W : NC
- DN-20W :

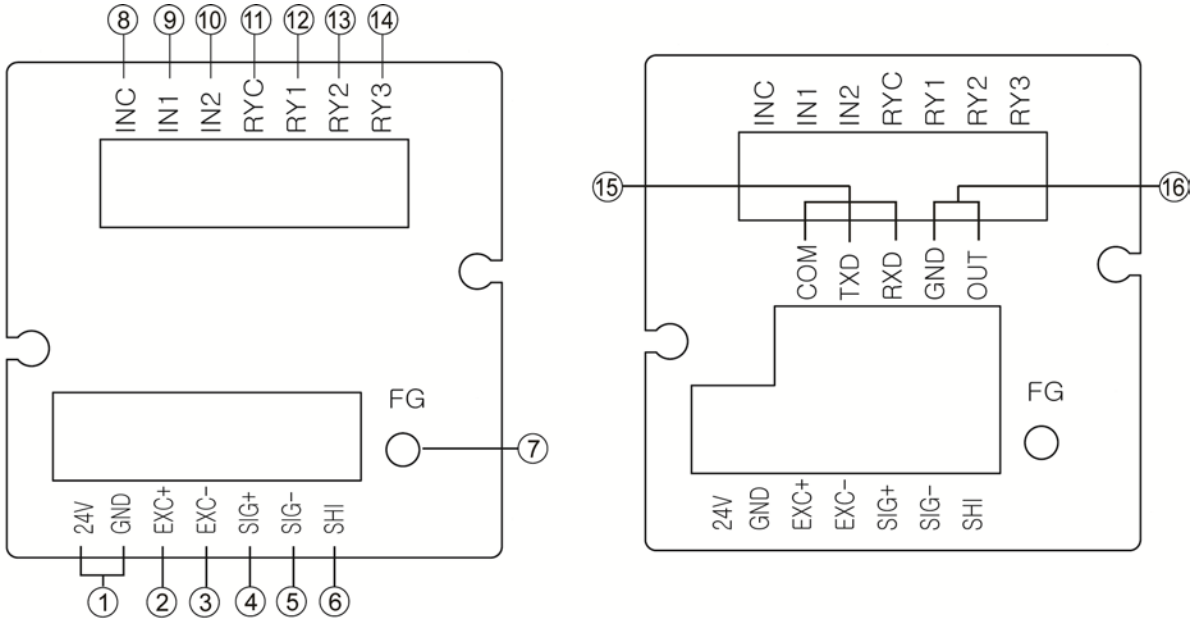
	Sensor supply voltage setting		Sensor output signal setting	
	DC10V	DC24V	0 ~ 10V	4 ~ 20mA
SW1	OFF	ON	-	
SW2	-		OFF	ON

※ When use Potentiometer (Model LPS,LPM) : SW1 and SW2 OFF

㉑ FG : Frame ground terminal

⑵ DN-70, DN-80

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▶

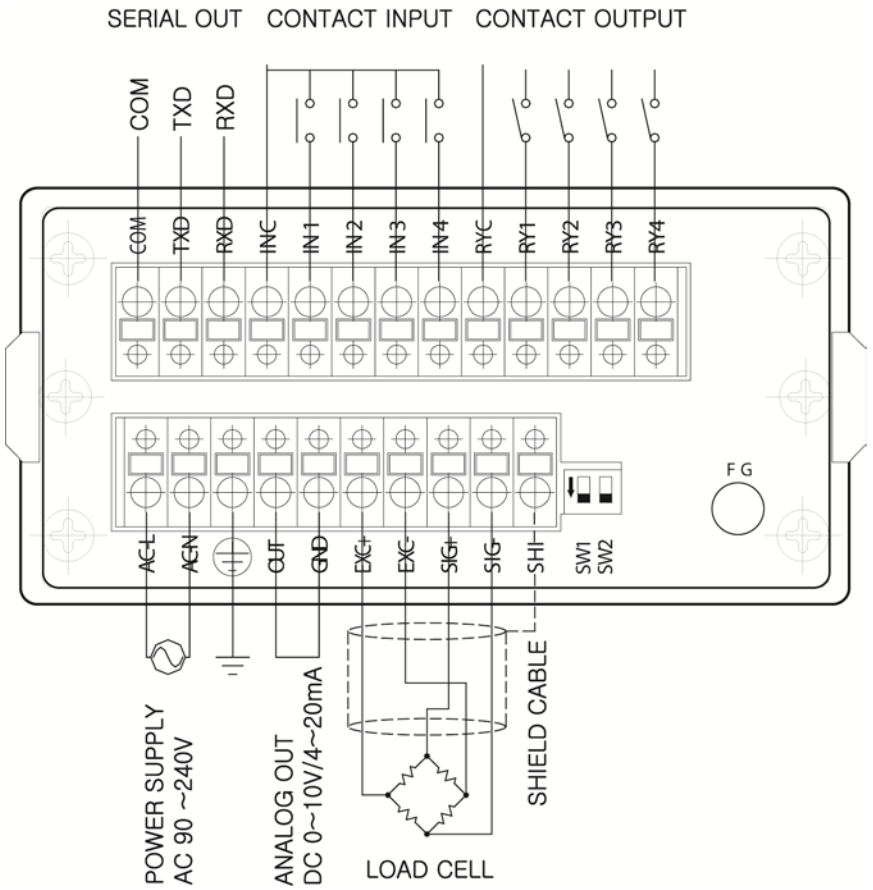
1. When wiring, please pull out the power plug. (Main power supply)
2. Please use the thick calbe for ground terminal (⏚) so that you can avoid any trouble due to the impulse voltage or surge. If possible, please keep it as an independent ground.

(This must be used in the area with heavy noise. If the ground is made with other device, it will be affected by noise.)

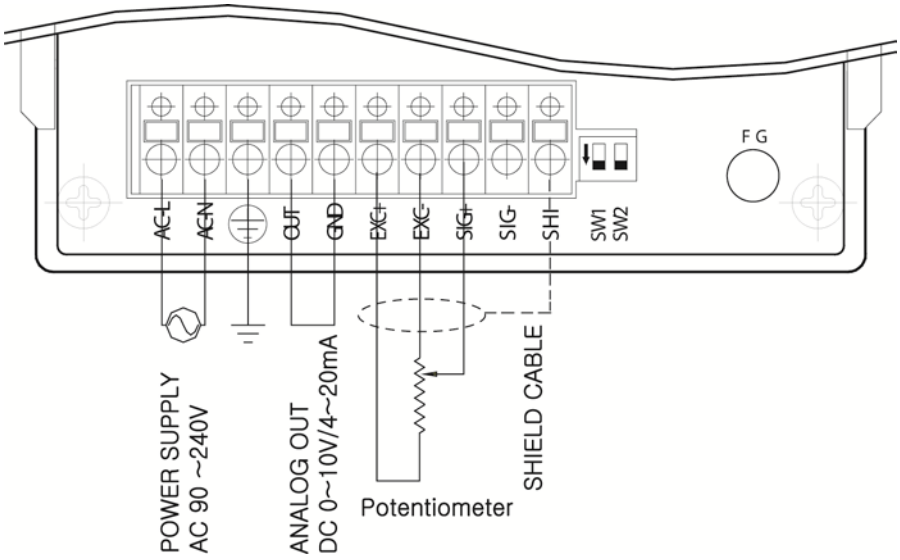
3. Please check the function of the terminal before you do the wiring so that you can prevent any malfunction in advance.
4. Manufacture will be relieved of its responsibility for any damge or injury due to the disassembly and alteration made without any agreement. Also, no A/S will be made.

6. Wiring Diagram

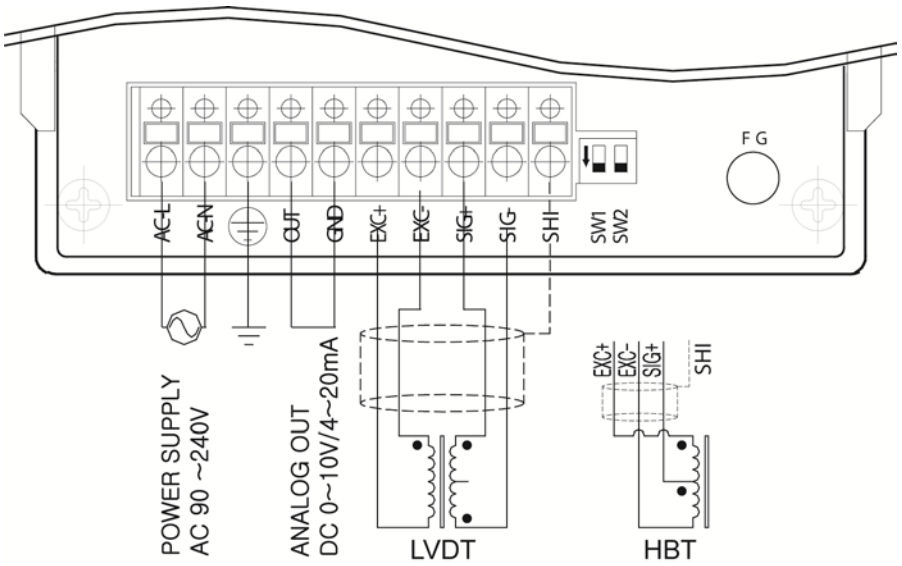
⑴ DN-10W, DN-50W



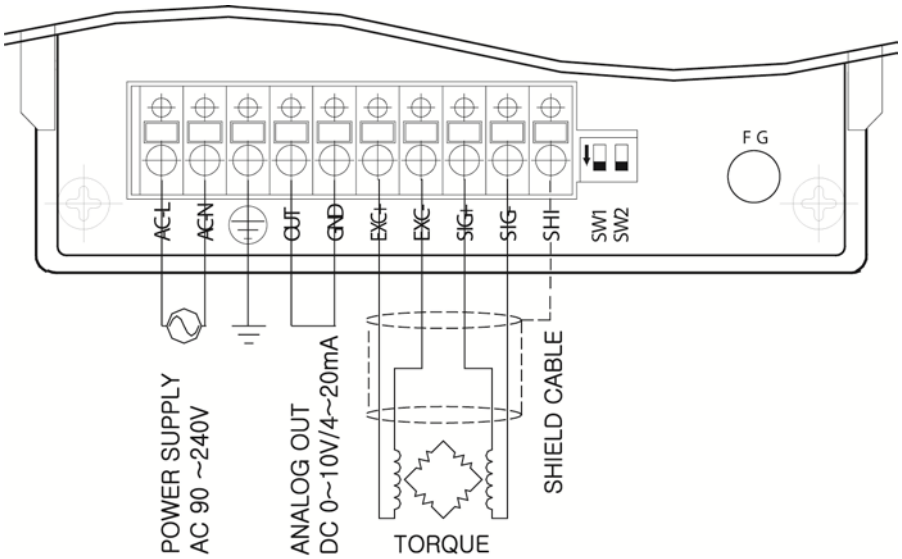
⑵ DN-20W



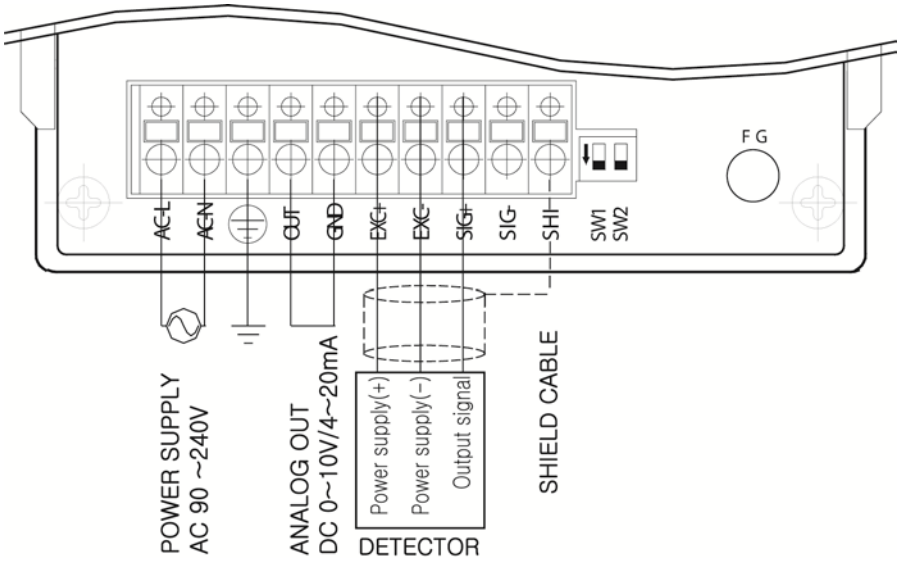
⑶ DN-25W



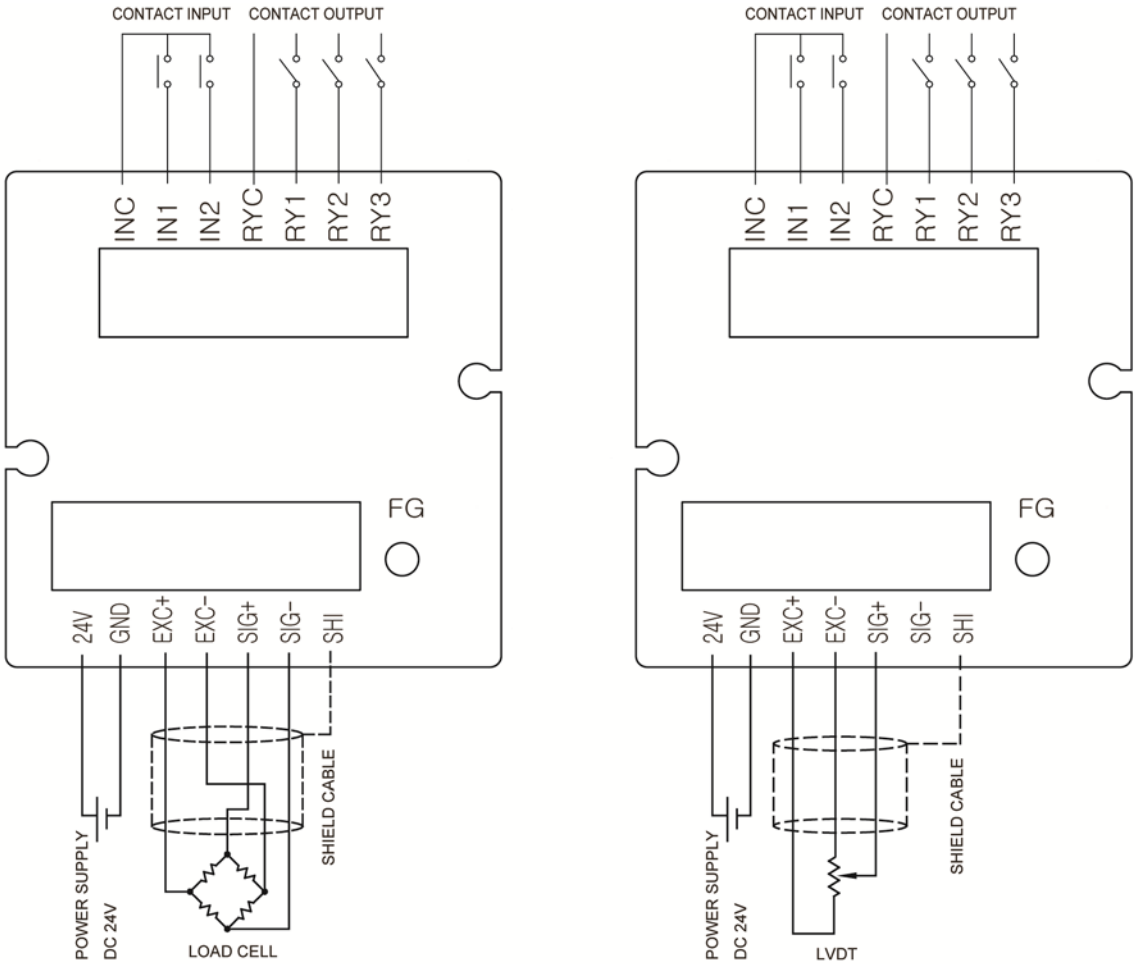
⑷ DN-27W



⑸ DN-30W

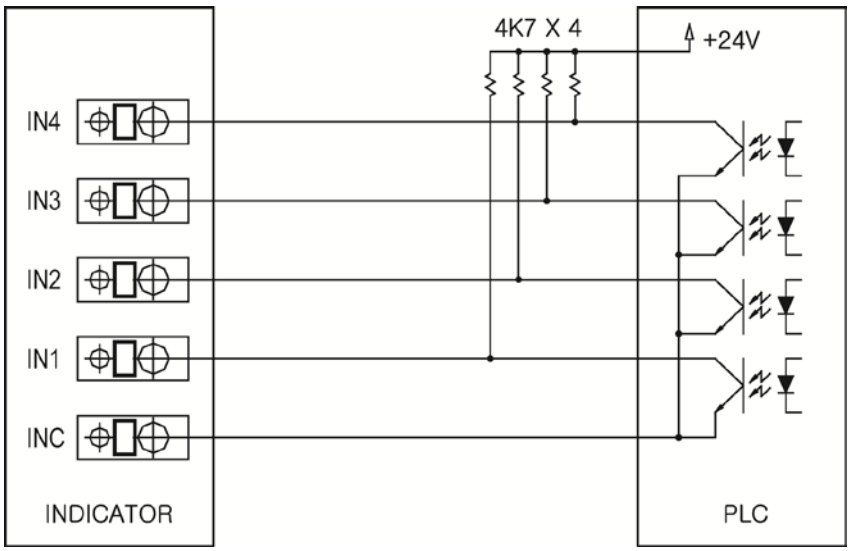


⑹ DN-70, DN-80



DN-70 DN-80

⑺ Example - External Input PLC Connection



7. Components & Function

7-1. How to use Hold mode

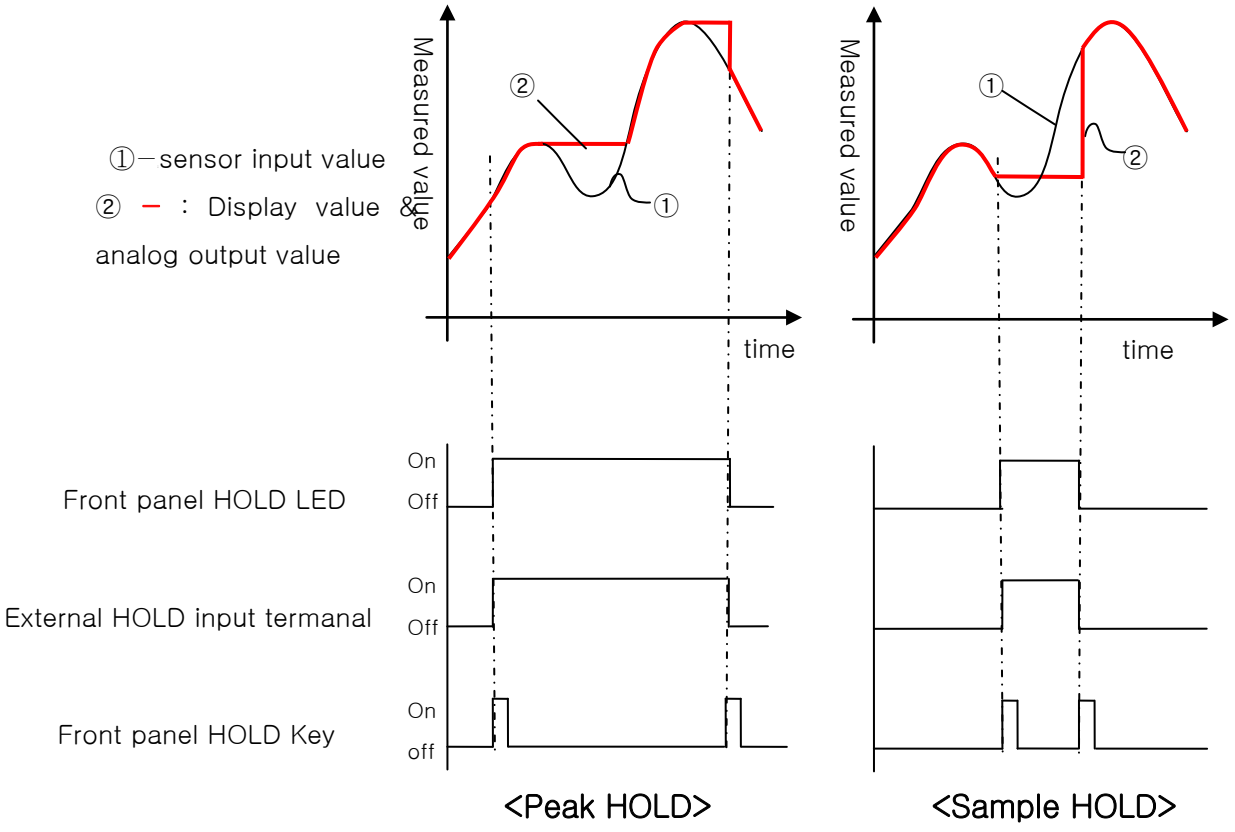
Hold mode is largely divided into Peak Hold and Sample Hold. Please select Peak or Sample. To input Hold, you can use Hold key on the front panel or external input. For the operation method, please refer to the drawing below.

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.



7-2. How to use comparison ouput function

For comparison output function, there are 4 different modes such as Decision, High limit, Low limit, Low&High limit. It displays through the relay of rear panel comparing each setup value.

On limit mode, Hysteresis can be used.

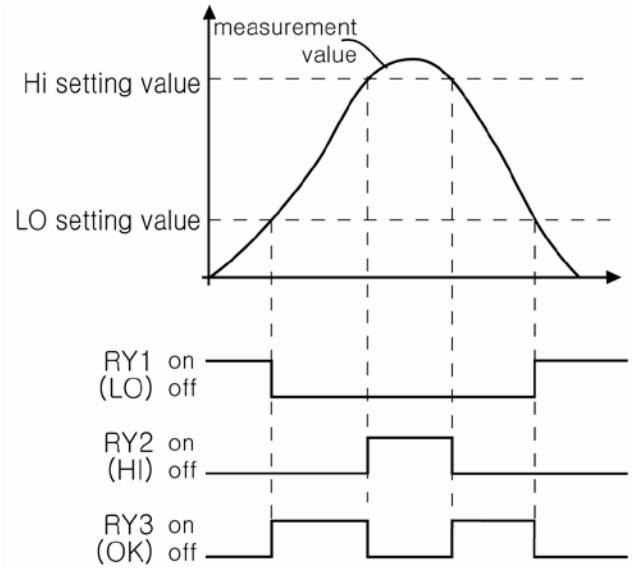
To set up the setting value, please use the key on the front panel..(page21)

1) Decision mode : Measured Value ≤ Lower limit setup value ⇒ RY1 ON (Low)
Measured Value ≥ Upper limit setup value ⇒ RY3 ON (Hi)
Lower limit setup value < Measured value < Upper limit setup value ⇒ RY2 ON (OK)

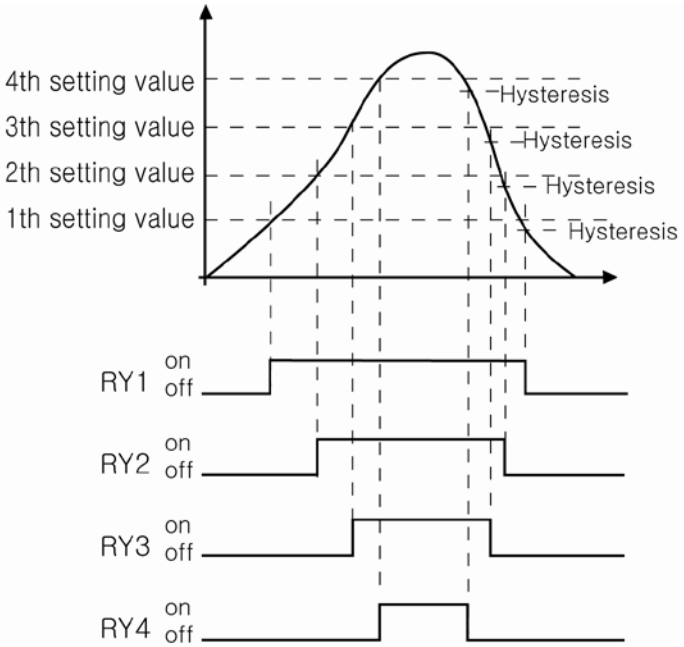
2) High limit mode : Measured Value ≥ RY1 setup value ⇒ RY1 ON
Measured Value ≥ RY2 setup value ⇒ RY2 ON
Measured Value ≥ RY3 setup value ⇒ RY3 ON
Measured Value ≥ RY4 setup value ⇒ RY4 ON
Measured Value < RY1 setup value – Hysteresis value ⇒ RY1 OFF
Measured Value< RY2 setup value – Hysteresis value ⇒ RY2 OFF
Measured Value < RY3 setup value – Hysteresis value ⇒ RY3 OFF
Measured Value< RY4 setup value – Hysteresis value ⇒ RY4 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 ≤ RY4 setup value ⇒ RY4 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
Measured Value > RY4 setup value + Hysteresis value ⇒ RY4 OFF

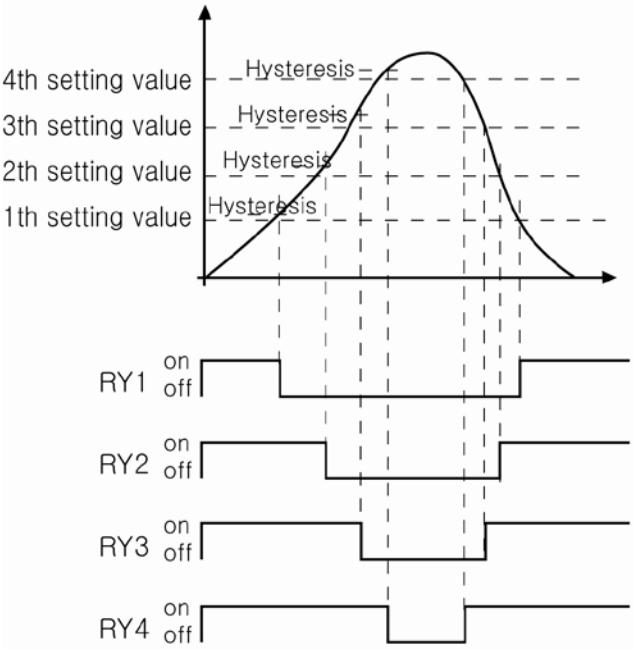
4) Low & High limit mode
Measured Value ≤ RY1 setup value ⇒ RY1 ON
Measured Value ≤ RY2 setup value ⇒ RY2 ON
Measured Value ≥ RY3 setup value ⇒ RY3 ON
Measured Value ≥ RY4 setup value ⇒ RY4 ON
Measured Value > RY1 setup value + Hysteresis value ⇒ RY1 OFF
Measured Value > RY2 setup value + Hysteresis value ⇒ RY2 OFF
Measured Value < RY3 setup value – Hysteresis value ⇒ RY3 OFF
Measured Value < RY4 setup value – Hysteresis value ⇒ RY4 OFF



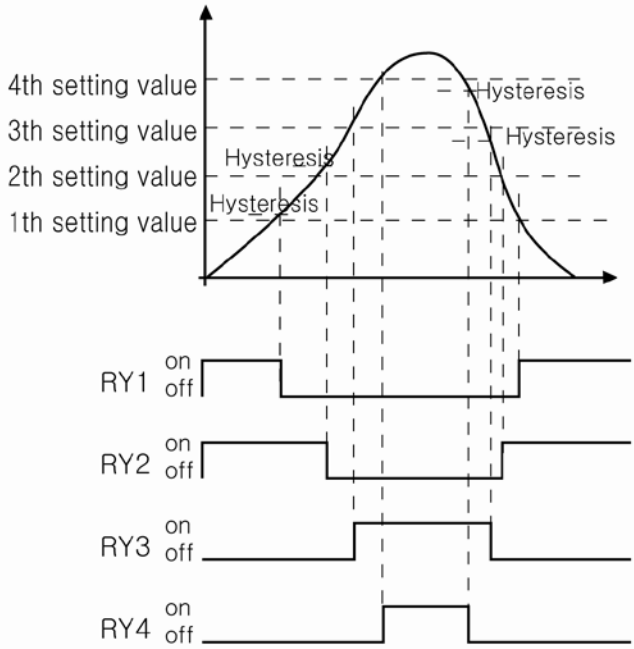
<Decision mode>



<High limit mode>



<Low limit mode>



<Low & High limit mode>

* Note) In Function mode, if the value of F-13 is set the Base Offset (page26) , the comparative output operates as follows.

1) Decision mode : Measured Value ≤ (Offset-Lower limit setup value) ⇒ RY1 ON (Low)
Measured Value ≥ (Offset +Upper limit setup value) ⇒ RY3 ON (Hi)
(Offset -Lower limit setup value) < Measured value < (Offset +Upper limit setup value) ⇒ RY2 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 +RY4 setup value) ⇒ RY4 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
Measured Value< (Offset +RY4 setup value) - Hysteresis value ⇒ RY4OFF

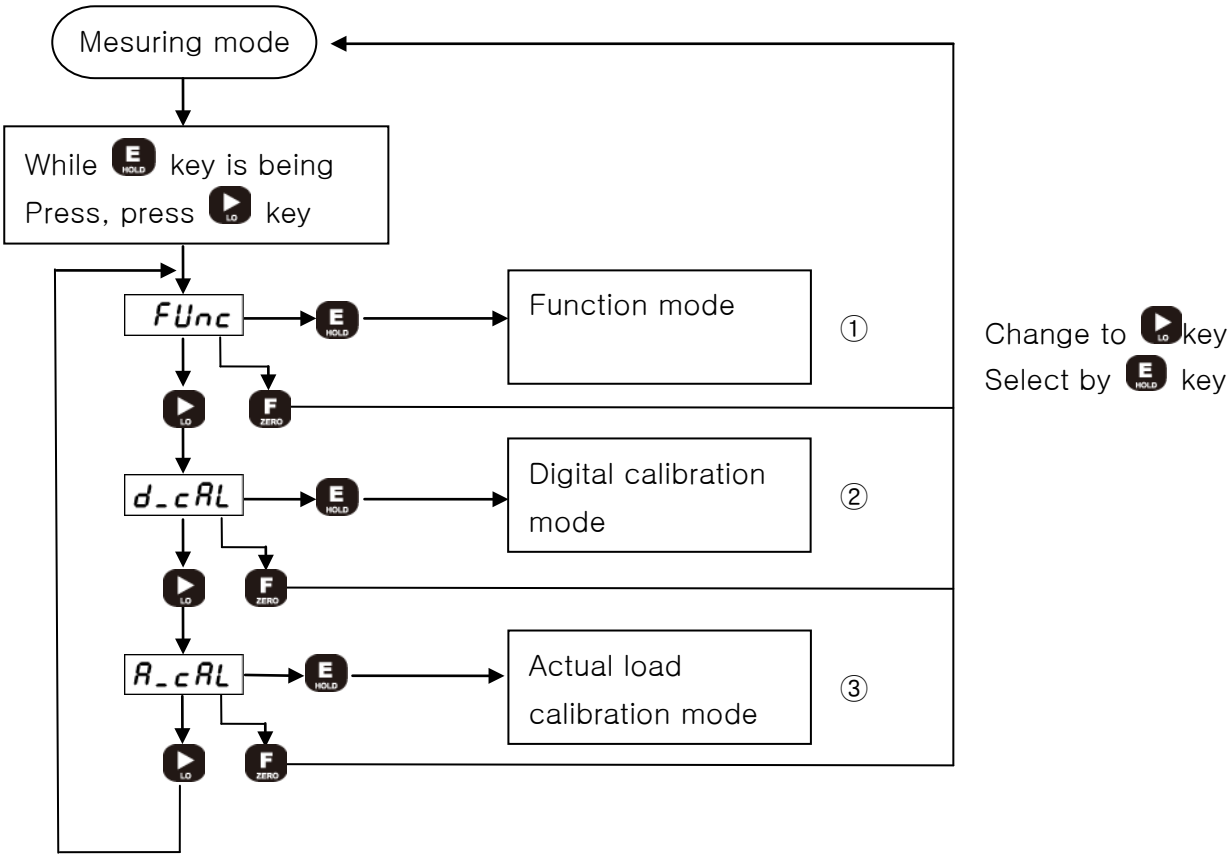
3) Low limit mode : Measured Value ≤ (Offset +RY1 setup value) ⇒ RY1 ON
Measured Value ≤ (Offset +RY2 setup value) ⇒ RY2 ON
Measured Value ≤ (Offset +RY3 setup value) ⇒ RY3 ON
Measured Value ≤ (Offset +RY4 setup value) ⇒ RY4 ON
Measured Value > (Offset +RY1 setup value) + Hysteresis value ⇒ RY1 OFF
Measured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

4) Low & 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 +RY4 setup value) ⇒ RY4 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
Measured Value < (Offset +RY4 setup value) - Hysteresis value ⇒ RY4 OFF

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 and 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 8-4 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 8-5 how to calibrate.

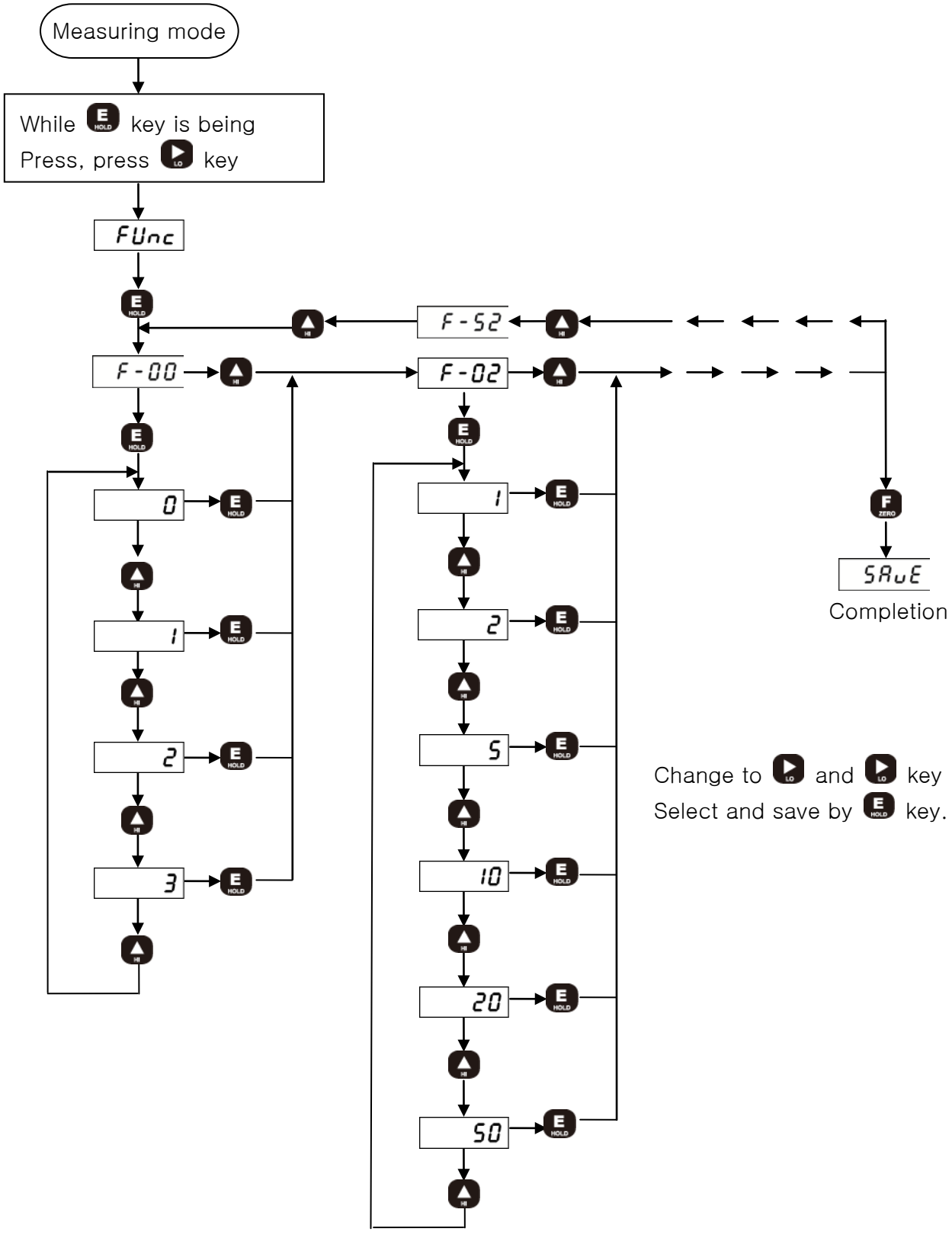
* Measurement mode status is the status of the indicator showing the current value.

※ DN-30W can only set Function mode.

8-2. Function mode

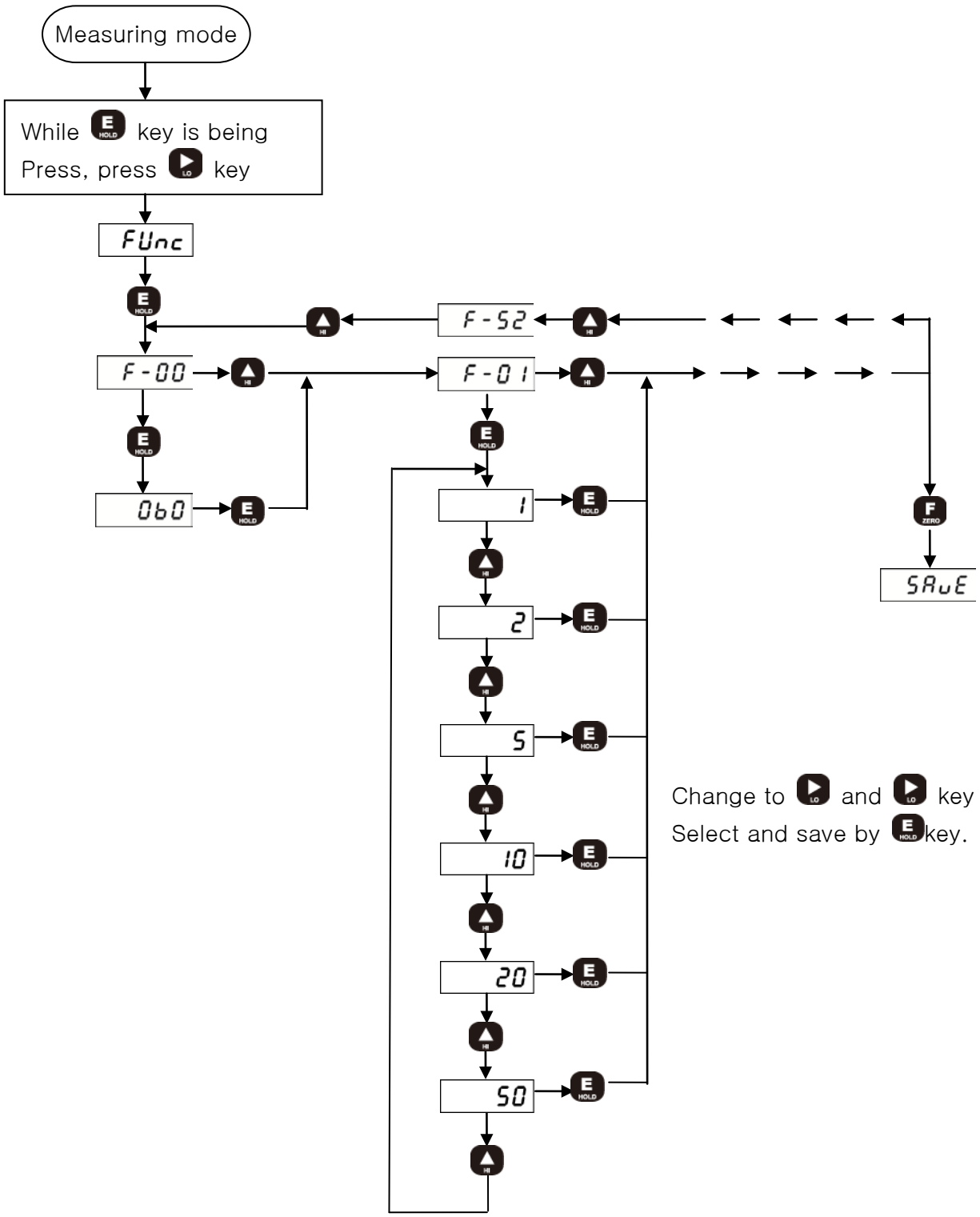
1) **How to set function** (for DN-10W, DN-20W, DN-25W, DN-27W, DN-50W, DN-70,80)

The setting value of Function mode (page 22~29) can be changed the key operation below. (F-00~F-52)



2) How to set function (for DN-30W)

The setting value of Function mode (page 22~29) can be changed the key operation below. (F-00~F-52)

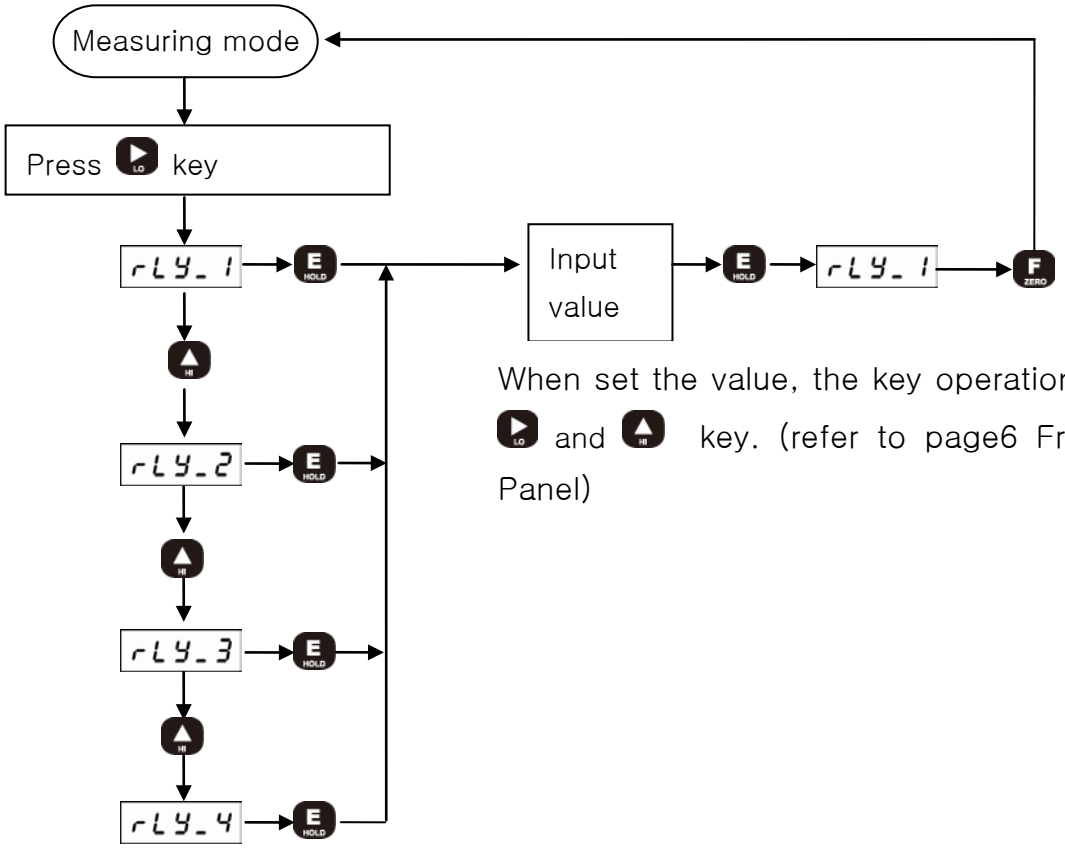


3) How to set RELAY data

① Decision mode (F-20 Decision mode: mode: 0)

In the measuring mode, press the front LO key(RY1) or HI key(RY3) 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 page6 Front Panel)

※ For DN-70,80 models, you can change the settings of the three Relays (RY1, RY2, RY3).

4) Fuction mode list

F-00	Decimal point	0, 1, 2, 3	1
	Pulse/circle (DI-30W)	0 ~ 360	60
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, Peak, Absolute, A/D	1 (Peak)
F-04	BCD Busy time	0.050, 0.100, 0.200, 0.500, 1.000	0.100
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 at start	0, 1	0
F-13	Base offset	-19999 ~ 99999	0
F-20	Comparison mode	Decision, High limit, Low limit, Low&High	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-33	Zero adjustment	-999 ~ 999	000
F-34	Span adjustment	-999 ~ 999	000
F-40	ID Number	000 ~ 255	000
F-41	Baud rate	2.40, 4.80, 9.60, 19.20, 38.40, 57.60, Print	9.60
F-42	Protocol	0, 1	0
F-50	Display reverse mode	0, 1, 2	0
F-51	Unit of force	Kg(kg/㎠), N, ℓb, bar, MPa	0 (Kg)
F-52	Key disabling	Zero key, Lo key, Hi key, Hold key	0000

※ 모델별 기능 표 (X : No Function)

Name			DI-25W,27W		
F-00	Decimal point	○	○	X	○
	Pulse/circle (DI-30W)	X	X	○	X
F-01	Division	○	○	○	○
F-02	Display filter	○	○	○	○
F-03	Hold mode	○	○	○	○
F-04	BCD Busy time	○	○	○	X
F-10	Auto zero tracking	○	○	X	○
F-11	Auto zero tracking time	○	○	X	○
F-12	Auto zero at start	○	○	X	○
F-13	Base offset	○	○	X	○
F-20	Comparison mode	○	○	○	○
F-21	Hysteresis	○	○	○	○
F-30	DAC mode	○	○	○	○
F-31	DAC capacity	○	○	○	○
F-32	DAC speed	○	○	X	○
F-33	Zero adjustment	○	○	○	○
F-34	Span adjustment	○	○	○	○
F-40	ID Number	○	○	○	○
F-41	Baud rate	○	○	○	○
F-42	Protocol	○	○	○	○
F-50	Display reverse mode	○	○	X	○
F-51	Unit of force	○	X	X	○
F-52	Key disabling	○	○	○	○

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

① Decimal point

: DN-10W, DN-20W, DN-25W, DN-27W, DN-50W, DN-70,80

(Standard setup value : 1)

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

Note) The decimal setting moves only the position of the point and does not affect the number of digits displayed.

② Pulse/circle (**Setting Pulse/1 circle**) : DN-30W

(Standard setup value : 60)

0 ~ 360	It sets Pulse/1 circle of Rotary body detection sensor DN30W can set up Pulse number from 1 to 360

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. (DN-10W:200Hz, DN-50W:1kHz)

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.

DN-10W, DN-20W, DN-25W, DN-27W, DN-70,80 : 200Hz
DN-50W : 1kHz

F-04. BCD Busy time (BCD Output time setup)

(Standard setup value : 0.100)

0.050	50 ms
0.100	100 ms
0.200	200 ms
0.500	500 ms
1.000	1000 ms

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 (If the indicator value is less than the set value, it corresponds to the autozero operating range.)

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) (When the indicator is in the autozero operating range, the display is maintained by the operating time setting, and then autozero is performed.)

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)

(Standard setup value : 0)

0	Decision mode	: Relay RY1(Low), RY2(OK), RY3(High) Output
1	High limit mode	: Relay RY1, RY2, RY3, RY4 Output
2	Low limit mode	: Relay RY1, RY2, RY3, RY4 Output
3	Low & High limit mode	: Relay RY1, RY2, RY3, RY4 Output

F-21. Hysteresis : (Refer to 7-2 How to use comparison ouput function)

(Standard setup value : 00)

00	00 : Hysteresis - not used

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

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

① DN-10W, DN-25W, DN-27W, DN-50W, DN-70,80

(Standard setup value : b_10V)

b_05v	-5 ~ +5V output	bidirectional, polarity
b_10v	-10 ~ +10V output	
b_02A	0 ~ 20mA output	unidirectional, unipolar
b_42A	4 ~ 20mA output	
U_05v	0 ~ 5V output	bidirectional, unipolar
U_10v	0 ~ 10V output	
U_02A	0 ~ 20mA output	
U_42A	4 ~ 20mA output	

② DN-20W, DN-30W

(Standard setup value : b_10V)

b_05v	0 ~ 5V 출력	unidirectional, unipolar
b_10v	0 ~ 10V 출력	
b_02A	0 ~ 20mA 출력	
b_42A	4 ~ 20mA 출력	
U_05v	0 ~ 5V 출력	bidirectional, unipolar
U_10v	0 ~ 10V 출력	
U_02A	0 ~ 20mA 출력	
U_42A	4 ~ 20mA 출력	

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 10000>

Display data	F-30 setting data							
	b_05v	b_10v	b_02A	b_42A	U_05v	U_10v	U_02A	U_42A
-10000	-5V	-10V	0	4mA	0	0	0	4mA
0	0	0	0	4mA	2.5V	5V	10mA	12mA
10000	+5V	+10V	20mA	20mA	5V	10V	20mA	20mA

Note) Models DN-20W and DN-30W cannot be negative (-) output.

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

(Standard setup value : 0)

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) **(DN-10W:200Hz, DN-50W:1kHz)**

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.

NOTE) DN-10W, DN-20W, DN-25W, DN-27W, DN-70,80: 200Hz
DN-50W : 1kHz

F-33. Zero adjustment (analog output zero adjustment)

(Standard setup value : 000)

-999 ≀ 999	-0.33V(-0.36mA) ≀ +0.33V(+0.36mA)	: LO key reduction, HI key increase When entering the setup, the analog output displays ZERO value, and adjusts to LO key and HI key .

F-34. Span adjustment (analog output range adjustment)

(Standard setup value : 000)

-999 ≀ 999	-1V(-1.6mA) ≀ +1V(+1.6mA)	: LO key reduction , HI key increase When entering the setup, the analog output displays SPAN value, and adjusts to LO key and HI key

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

(Standard setup value : 000)

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)

(Standard setup value : 9.60)

2.40	2400 bps
4.80	4800 bps
9.60	9600 bps
19.20	19200 bps
38.40	38400 bps
57.60	57600 bps
PRINT	PRINT DATA OUT (PT-100)

F-42. Protocol (Communication Protocol set up)

(Standard setup value : 0)

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)

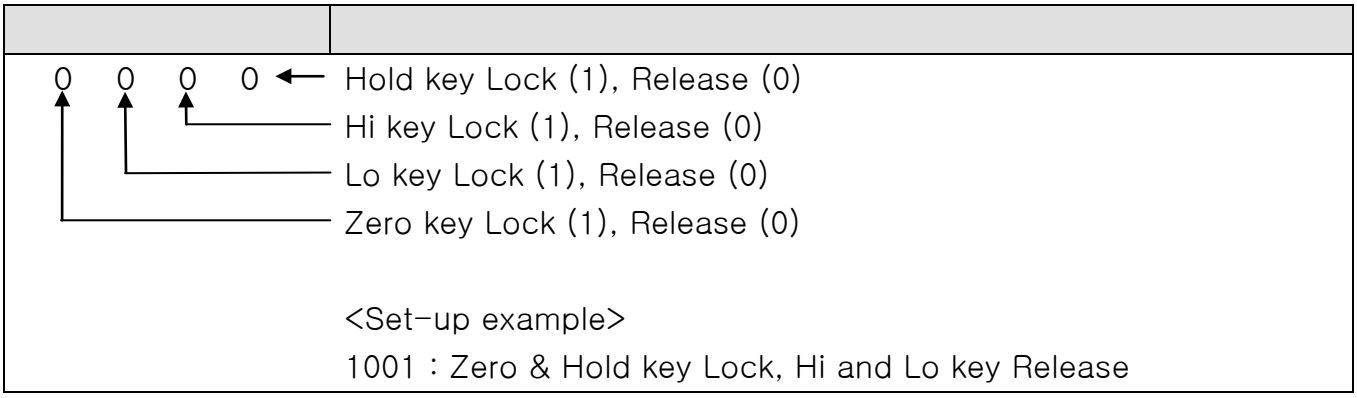
0	kgf		kg/㎠	
1	N	kgf × 9.8	-	-
2	ℓb	kgf × 2.2	-	-
3	-	-	Bar	kg/㎠ × 0.98
4	-	-	MPa	kg/㎠ × 0.098

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)

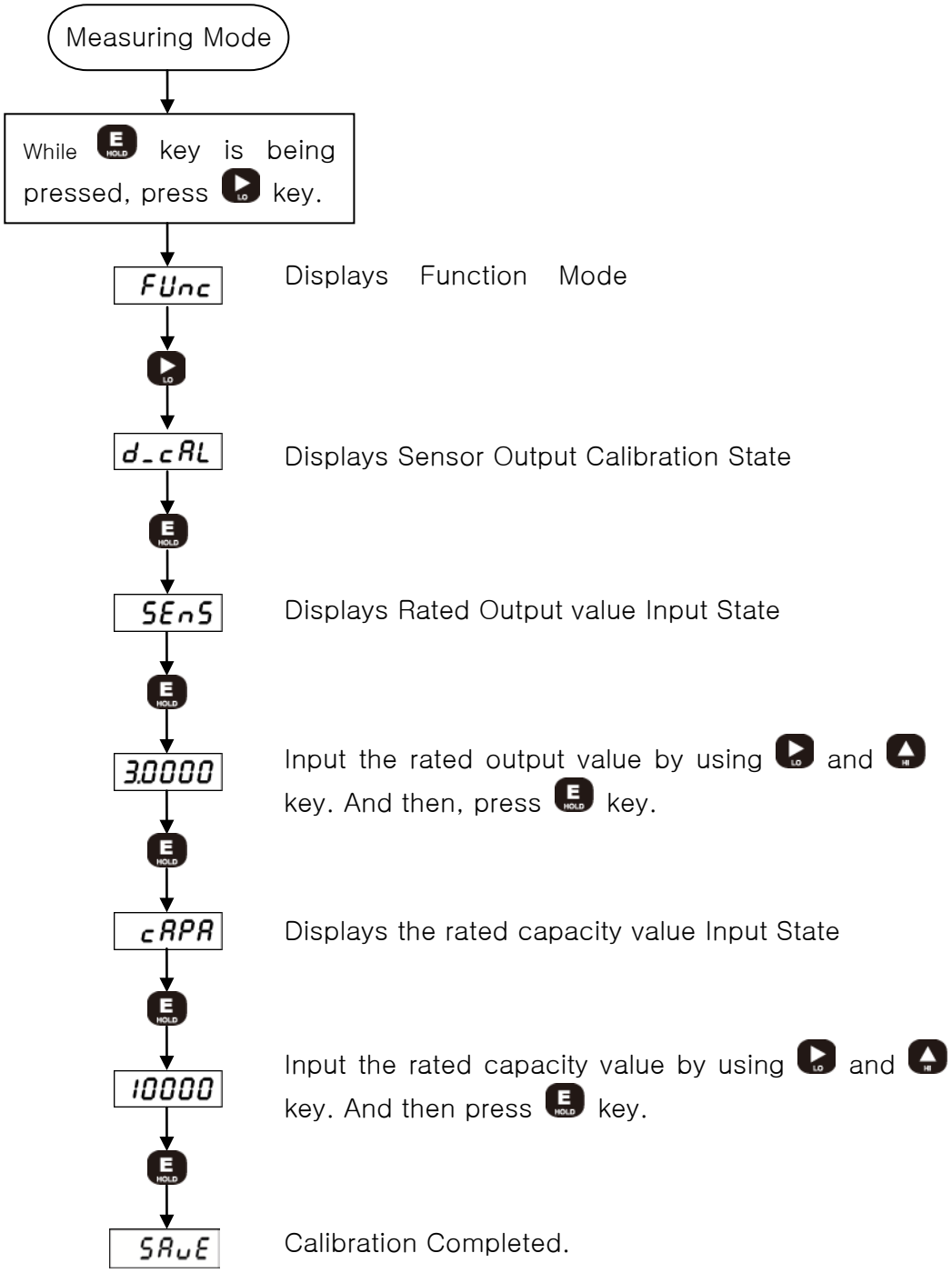
(Standard setup value: 0000)



8-4. Digital calibration (Calibration by sensor output value)

1) DN-10W, DN-27W, DN-50W, DN-70,80

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.



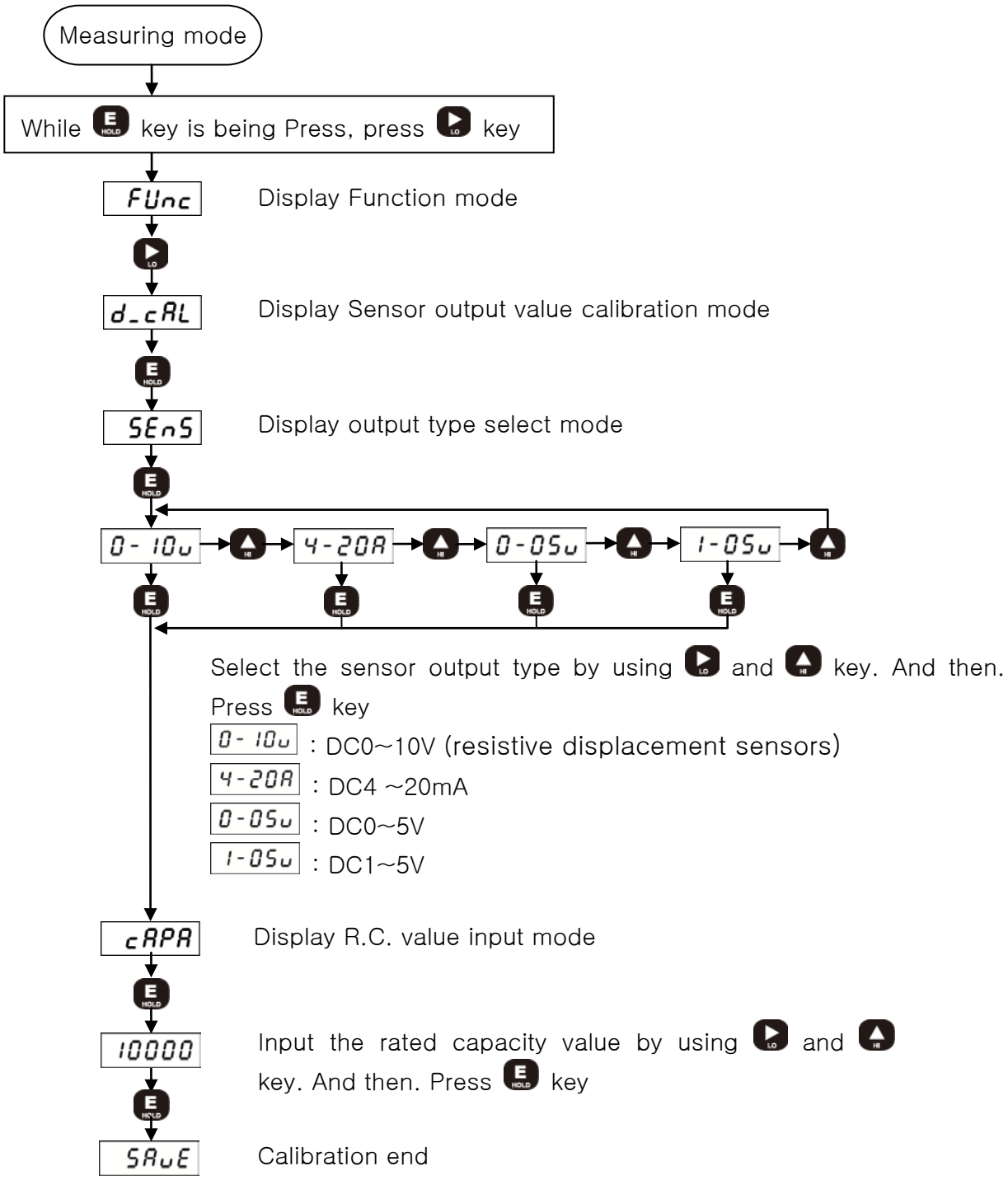
※ Zero position will change after setup is complete.

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

2) DN-20W

At the time of purchasing sensor, the rated capacity (displacement) and rated output (R.O) declared on the calibration sheet can be used for the calibration for easier calibration.

Refer to 8-5.Actual load calibration if you need to correct the error.



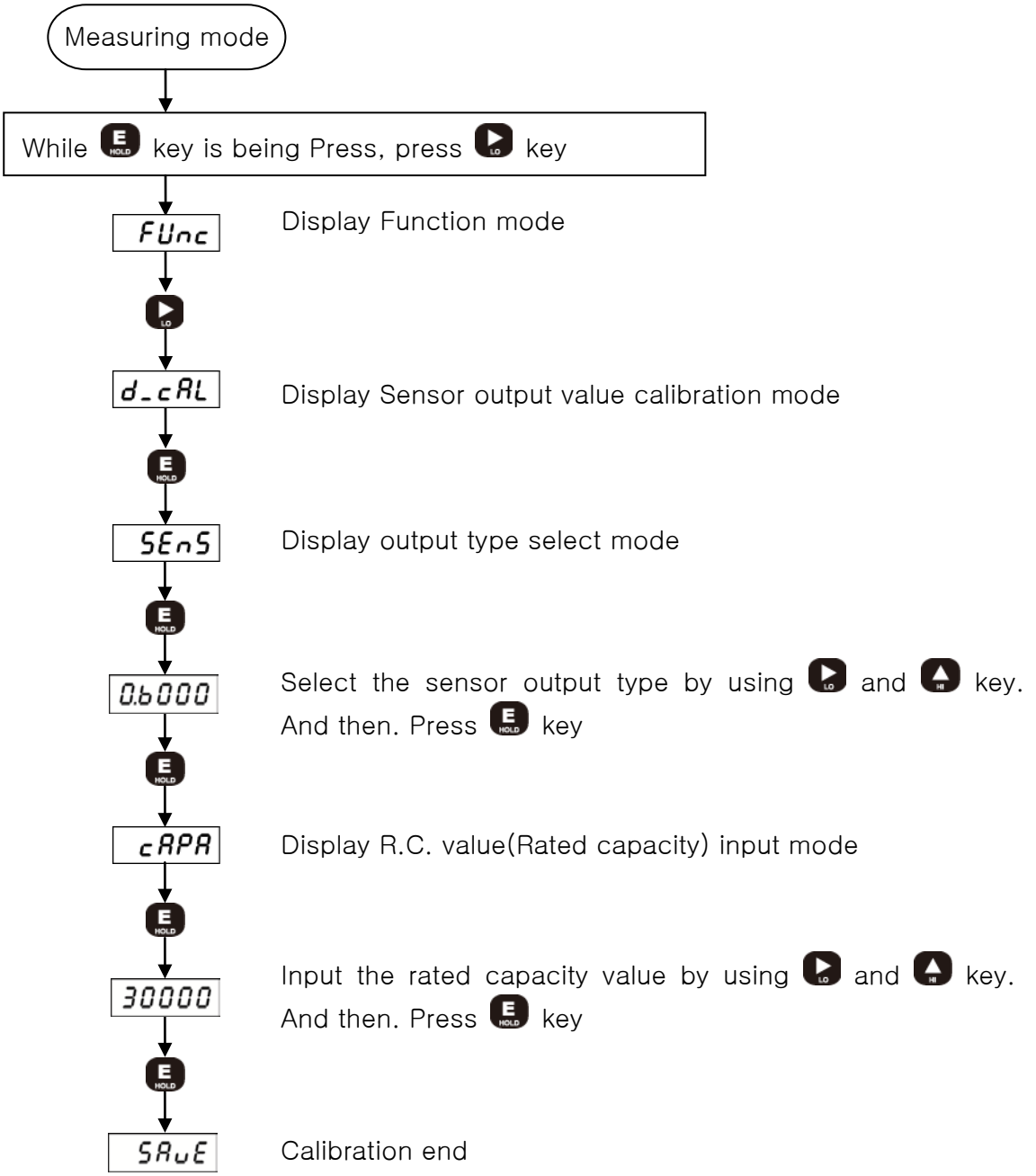
※ Zero position will change after setup is complete.

3) DN-25W

At the time of purchasing sensor, the rated capacity (displacement) and rated output (R.O) declared on the calibration sheet can be used for the calibration for easier calibration.

DP-xx series (Half type (HBT) recommends setting the rated output value to approximately 0.3300.

Refer to 8-5.Actual load calibration if you need to correct the error.



※ Zero position will change after setup is complete.

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

8-5. Actual load calibration (Exact Load Calibration)

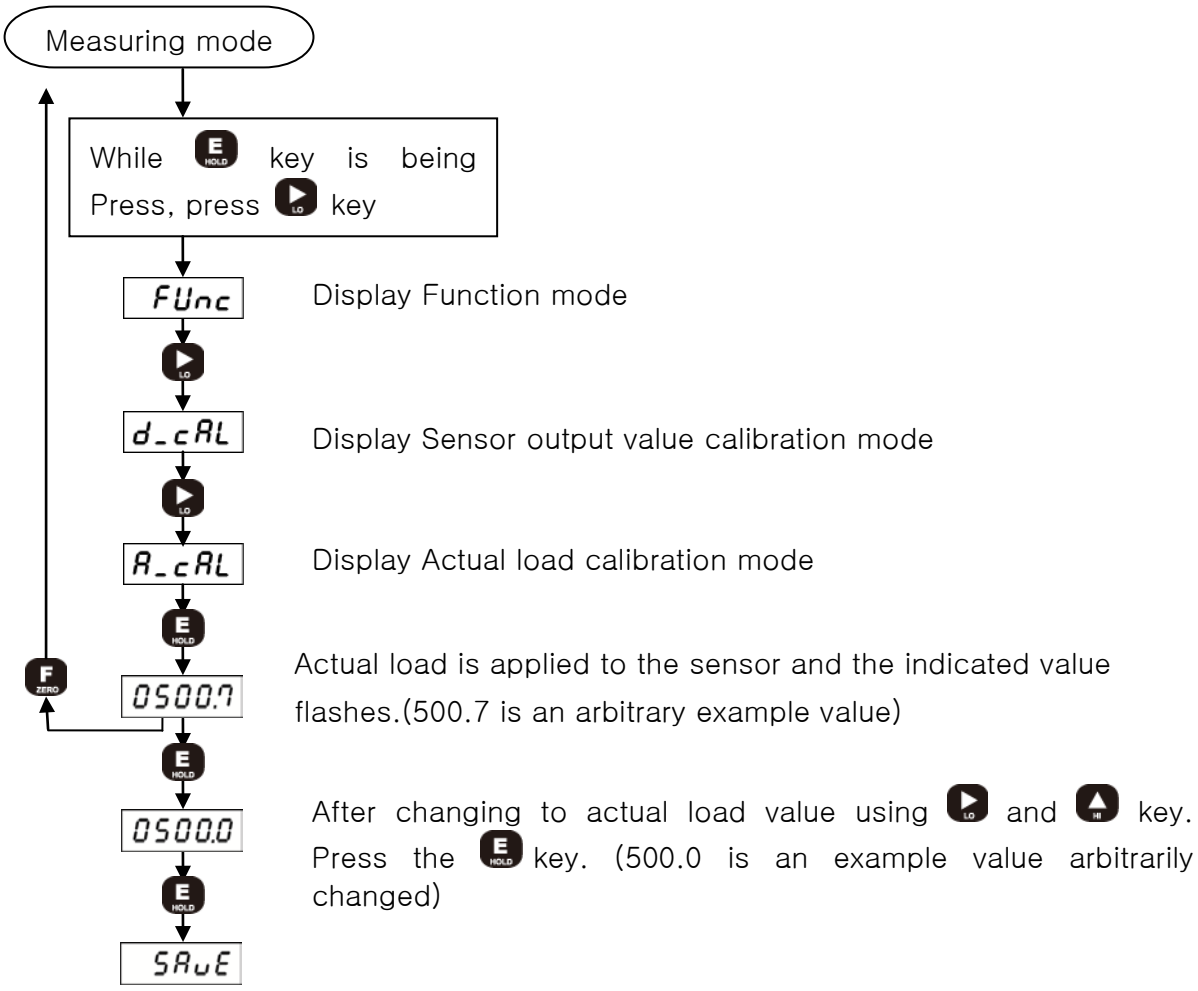
1) Compensation Calibration

(a)Please calibrate by 8-4 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 8-4. Digital calibration, all data of the actual load calibration setting will be deleted.

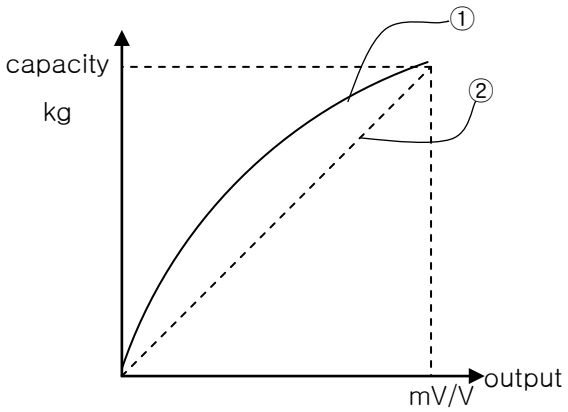
(c) Change the current value to Zero (0) with F key or external Zero input without loading the sensor. After loading with a prepared standard load, change the value displayed in the indicator to the value of the standard load by referring to the setup sequence chart below.



2)Compensation functions and notice

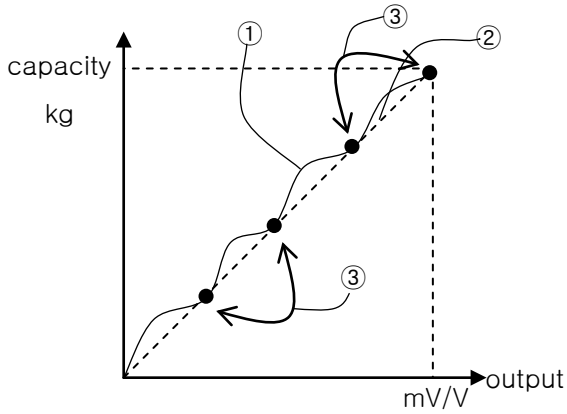
If the actual load (load, displacement, pressure) is applied to the sensor and there is a difference between the value displayed in the indicator and the actual load value, the display value of the indicator can be changed to the actual load value. Up to 9 points can be stored. As the calibration interval 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 8-4 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

3) If the output of sensor is unknown

① Notes for calibrating DN-10W, DN-27W, DN-50W, DN-70

Calibrate with 8-4 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.

**Method of obtaining rated output

a. Load the sensor with a standard load of about half (or more than half) of the sensor capacity.

b.The value shown in the indicator × sensor capacity ÷ standard load = rated output value (R.O).

c.8-4. Calibrate with Digital Calibration.

ex. 1) Assuming that the sensor capacity is 10 kgf and that the value expressed by applying the standard load of 5 kgf is 10013.

10013 × 10 ÷ 5 = 20026 → Rated output: 2.0026 mV/V

ex. 2) Assuming that the sensor capacity is 1tf and that the value indicated by applying the standard load of 400kgf is 3820.

3820 × 1000 ÷ 400 = 9550 → Rated output: 0.9550 mV/V

If there is a difference between the actual load value and the value displayed in the indicator, refer to the calibration setup method.

It is not necessary to obtain and calibrate the rated output value (R.O).

And the user can also calibrate with 8-5 Actual Load Calibration.

② Notes for calibrating DN-25W

Set calibration with 8-4 Digital Calibration to delete the data of the values changed by the actual load calibration.

At this point, the rated output value is 0.6%, and the rated capacity (displacement) of the sensor is set for the sensor.

(For example, if 4mm sensor indicates up to three decimal places, set to 04.000)

Change the current value to Zero (0) without any displacement of the sensor. Apply about half (or more) of the measurement range.

The value shown in the indicator ÷ Standard displacement × 0.6 (Rated output value)= Rated output value.

And calibrate with 8-4 Digital Calibration.

ex.) Assume that the sensor is 4mm and the value expressed as a standard displacement of 2mm is 1.003.

1.003 ÷ 2.000 × 0.6000 = 0.3009 → Rated Output: 0.3009

If there is a difference between the actual load value and the value displayed in the indicator, refer to the calibration setup method.

It is not necessary to obtain and calibrate the rated output value (R.O).

And the user can also calibrate with 8-5 Actual Load Calibration.

4) Notes for calibrating DN-20W

When calibrating with 8-4 Digital Calibration, the error can be reduced by modifying the rated capacity value (displacement). Please correct it using the following method.

a)Set calibration with 8-4 Digital Calibration to delete previous data.

b) At this point, select input form DC0 to 10V and set the rated capacity (displacement) (for example, if a 50mm sensor indicates up to two decimal places, set to 050.00).

c) Change the current value to Zero (0) without displacement of the sensor. Displace the sensor with a standard displacement of approximately half (or more than half) of the measurement range.

Rated Capacity × Standard Displacement ÷ Indicator = Rated Capacity Value

Then, calibrate with 8-4 Digital Calibration.

ex.) Assuming that the sensor rating is 50mm and that the value marked by displacement of 30mm as the standard displacement is 24.90,

50.00 × 30.00 ÷ 24.90 = 60.24 → Rated Capacity: 060.24

If there is a difference between the actual displacement value and the value displayed in the indicator, refer to 8-5 Actual Load Calibration.

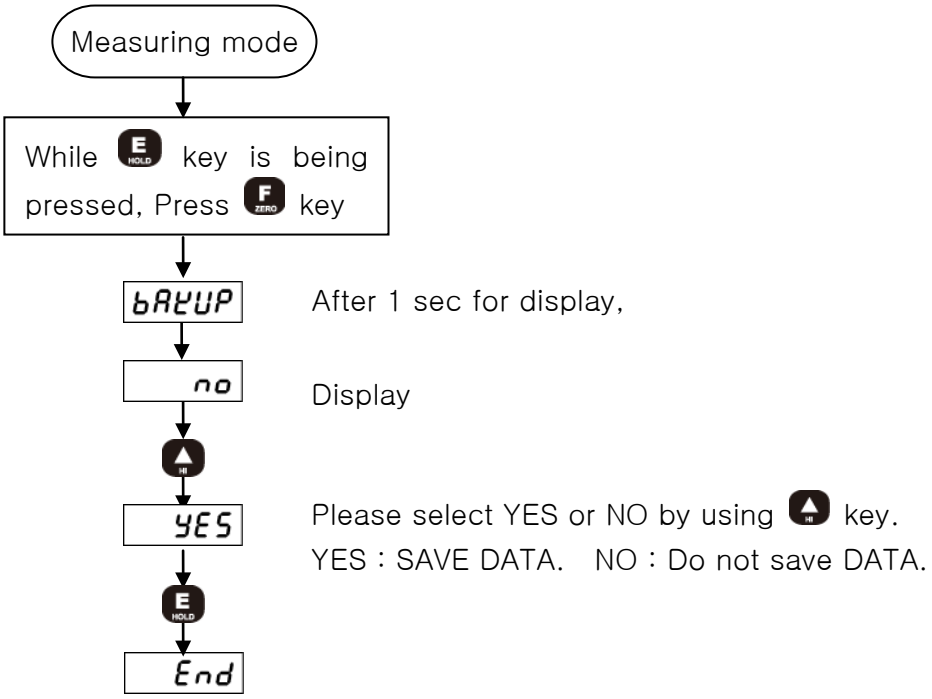
8-5. DATA BACK-UP & RESTORE

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.

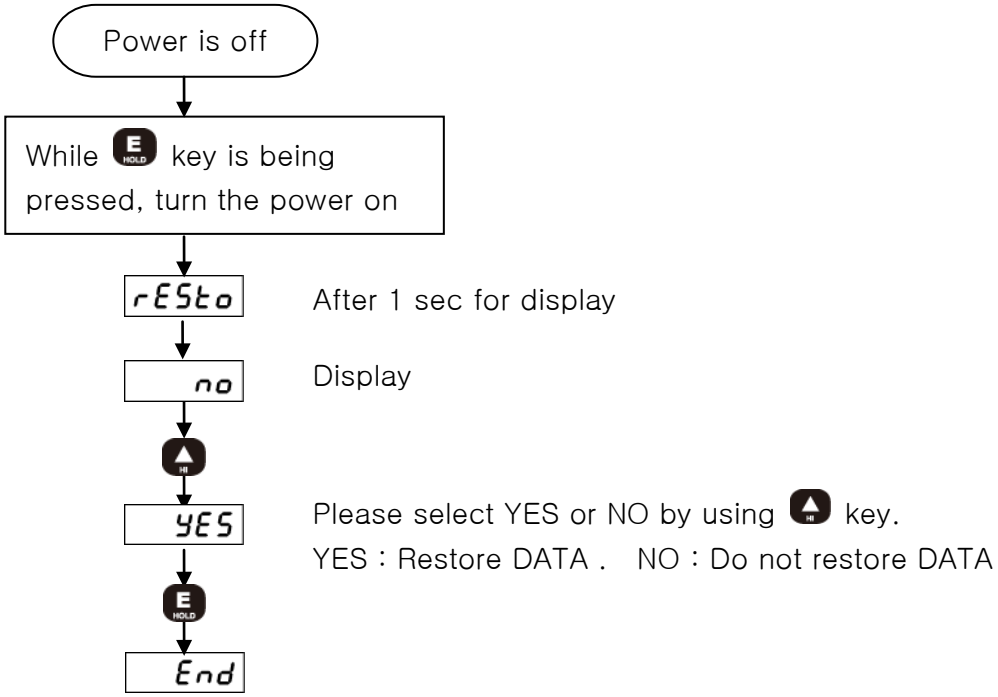
◦ DATA BACK-UP : Save the current set-up state.

◦ RESTORE : Restore the current set-up state

1) DATA BACK-UP



2) RESTORE

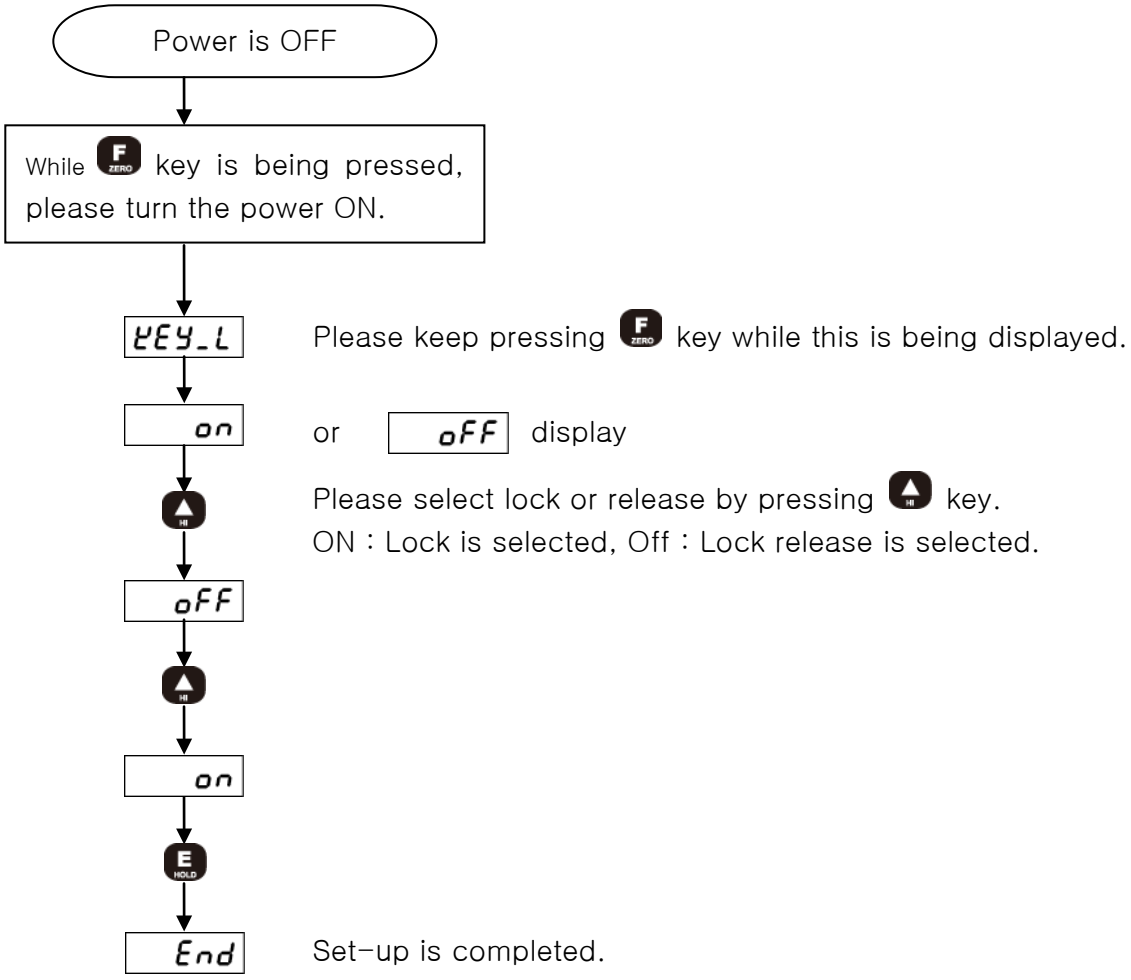


8-6. Lock Set-up

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.



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.
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.
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 8−4 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 8−7 Lock Set−up. •State in which units of conversion at F−51 Force unit is established.	• Unlock from Locking Settings at 8−7 Lock Set−up. • Change to kgf unit (set value :0) at F−51. Force unit
The number of measurements is incorrect	• Maximum Display Range Out of 99999	• Check calibration settings and F−51 settings. (page 30~36), (page 29) • Restore to the settings saved by RESTORE execution (page 37)

When the measurement changes are not constant or insignificant. (DN-20W, 25W)	• Sensor Cable Swapped or Open • Sensor damaged or faulty supply voltage (EXC) occurred • Calibration setup error	• Check cabling status • Checksensor supply voltage (EXC) and output • Check DIP S/W (page 9) (DN-20W) • Check calibration settings (page 30-36)
When the measured value does not increase or increases slightly with rotation. (DN-30W)	• Faulty cable connection • Faulty detection of proximity sensors • Error setting F-00 Pulse (Gear) Count (page 24)	• Prove proximity sensors operation (Lamp) • Check the distance between the proximity sensor and the gear (approximately 1mm) • Confirm F-00 Pulse (Gear) Count setting (page 24)

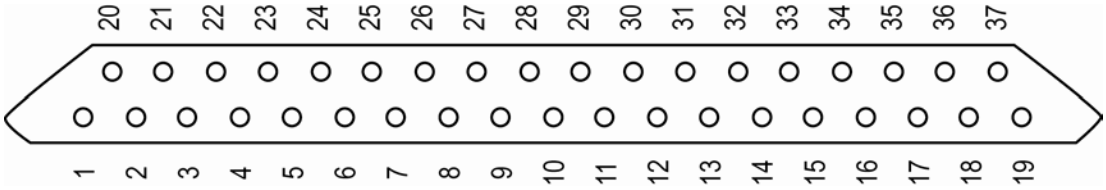
10. OPTION

10-1. BCD OUT INTERFACE

This Programmable BCD interface is the output for the weight value made into BCD coding.

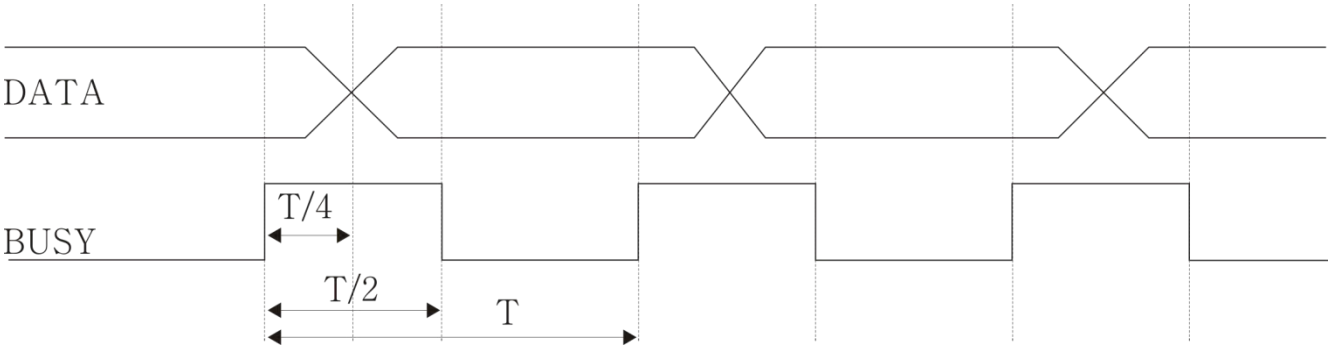
This interface is available for PLC(Programmable Logic Control), Computer.

- PIN Arrangement



1	GND	20	Negative Polarity
2	1×10^0	21	BUSY
3	2×10^0	22	RLY1
4	4×10^0	23	RLY2
5	8×10^0	24	RLY3
6	1×10^1	25	RLY4
7	2×10^1	26	NC
8	4×10^1	27	NC
9	8×10^1	28	IN1(HOLD on/off)
10	1×10^2	29	IN2(ZERO)
11	2×10^2	30	IN3(NC)
12	4×10^2	31	IN4(NC)
13	8×10^2	32	NC
14	1×10^3	33	NC
15	2×10^3	34	NC
16	4×10^3	35	Internal test voltage(+5V)
17	8×10^3	36	NC
18	1×10^4	37	External VCC
19	2×10^4		

• Signal output

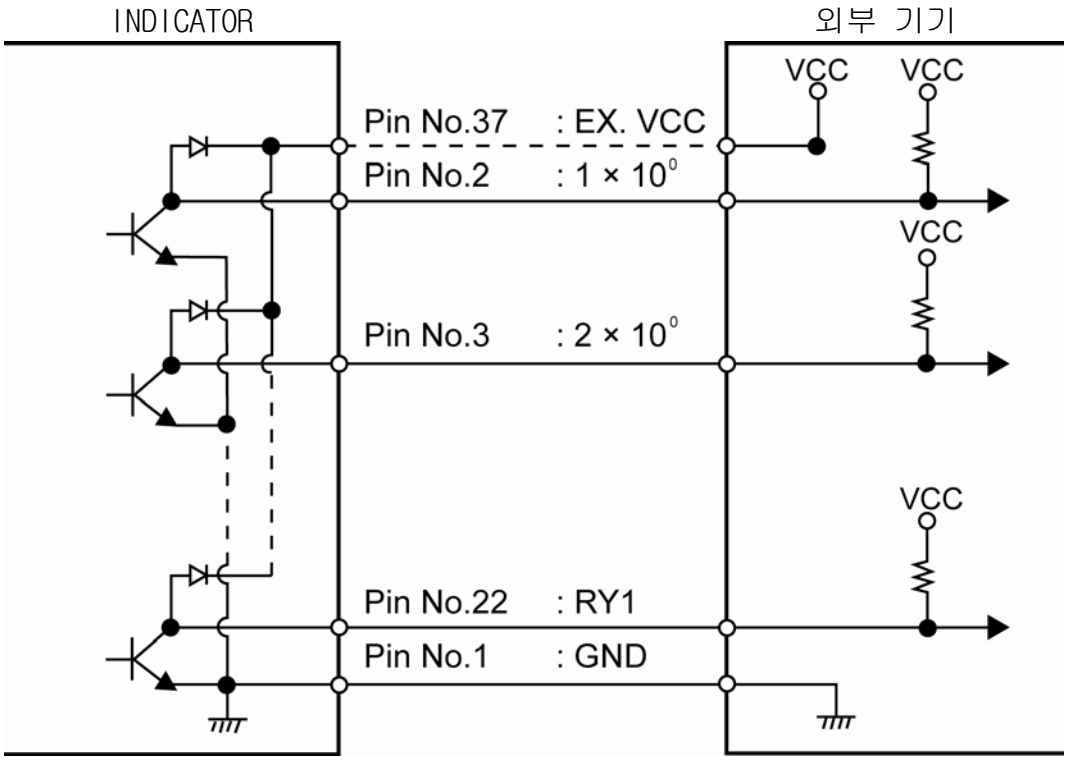


DATA output TIME(T) can set to Function F-04 BCD Mode.
(50, 100, 200, 500, 1000ms)

• Signal logic

① BCD DATA output : Negative logic (Negative)
② BUSY output : DATA READ = L
③ polarity output : “+” = H, “-” = L
④ RALAY output : RY1 ~ RY4 = L

• BCD 출력 회로



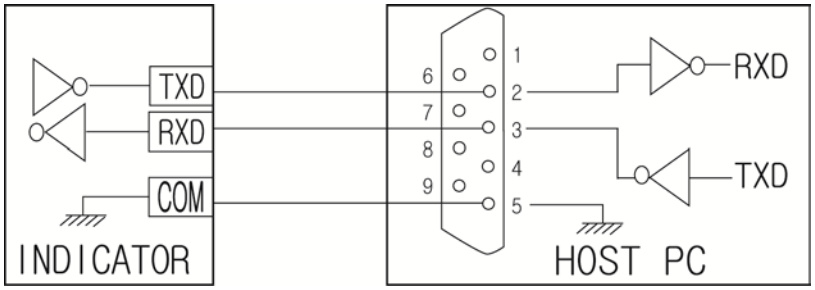
· External VCC : 50V Max
· Current : 500mA Max

10-2. 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.

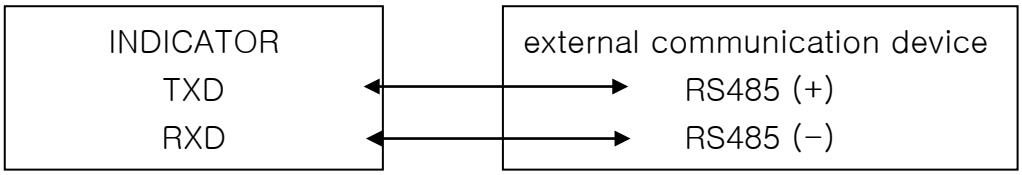
1) Wiring

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	

10-3. 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 0009	0×04	F-13	Base offset	-19999 ~ +99999	R/O	INT32
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 0014	0×04	F-31	DAC capacity	0 ~ 99999	R/O	INT32
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 0031	0×04	Net Display Value		-19999~+99999	R/O	INT32
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 0×0002 : Hold set 0×0004 : Hold reset	W/O	UNIT16
4001 4002	0×03 0×10	Relay Setpoint 1	-19999~+99999	R/W	INT32
4003 4004	0×03 0×10	Relay Setpoint 2	-19999~+99999	R/W	INT32
4005 4006	0×03 0×10	Relay Setpoint 3	-19999~+99999	R/W	INT32
(Decimal)	code				
4007 4008	0×03 0×10	Relay Setpoint 4	-19999~+99999	R/W	INT32
4009 4010	0×03 0×10	Relay Setpoint 5	Option		
4011 4012	0×03 0×10	Relay Setpoint 6			
4013 4014	0×03 0×10	Relay Setpoint 7			
4015 4016	0×03 0×10	Relay Setpoint 8			

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	