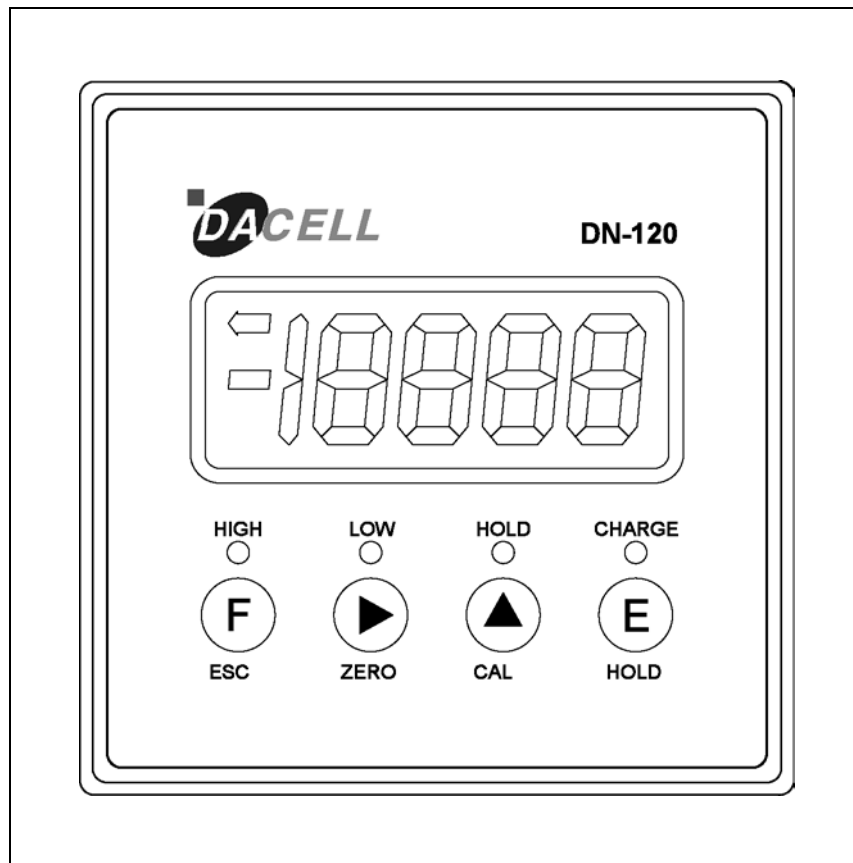


MODEL : DN-120
DIGITAL INDICATOR

USER'S MANUAL



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1. 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 amplifies the minute voltage signals of each sensor and converts them into digital. It is mainly used in Physics quantity measurement for strain gauge, pressure sensor, LVDT, and acceleration sensor, etc. It has the following features.

1-1. Sigma-Delta Conversion System

A medium and high speed A/D conversion device is adopted to detect input signals from the sensor.

1-2. Calibration System

Systems are adopted: calibration system based on real weight(standard weight);

1-3. HI, LO Output

It is possible to set upper limit and lower limit from the keys on the front panel. It is also possible to send the contact signals of the rear panel. Open collector output.

1-4. Data Back-up & Watch-Dog Function

As set value such as span, upper limit and low limit, etc. is stored in FLASH MEMORY, it is not necessary to reset the input data for they are stored in the memory even when the electricity or power is cut off.

The system operation automatic return (Watch-Dog) which is caused by with power change and external noise.

1-5. Option

OP-01 : RS232C

OP-02 : RS485

OP-03 : Back Light

OP-04 : Ni-Mh battery (1200mAh)

1-6. Power Supply

Power of this product built in DC 7.2V battery, charges with DC 12V adapter, Operation it is possible even with charging. (option : 24V)

1. Ni-Cd battery (600mAh)

Charge time : About 3 hours

Use time : About 12 hours (Out of use Back Light)

2. Ni-Mh battery (1200mAh)

Charge time : About 3 hours

Use time : About 24 hours (Out of use Back Light)

1.7. Standard built-in product

1. Body
2. Operating instructions
3. The panel the parts for a fixation
4. DC 12V Adapter

2. Cautions

For optimum performance and safety, please read these instructions carefully. Do not remodel this equipment at one's discretion.

2-1. Set-up Cautions

- 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(GN)
- 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.

2-2. Cautions

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. Specifications

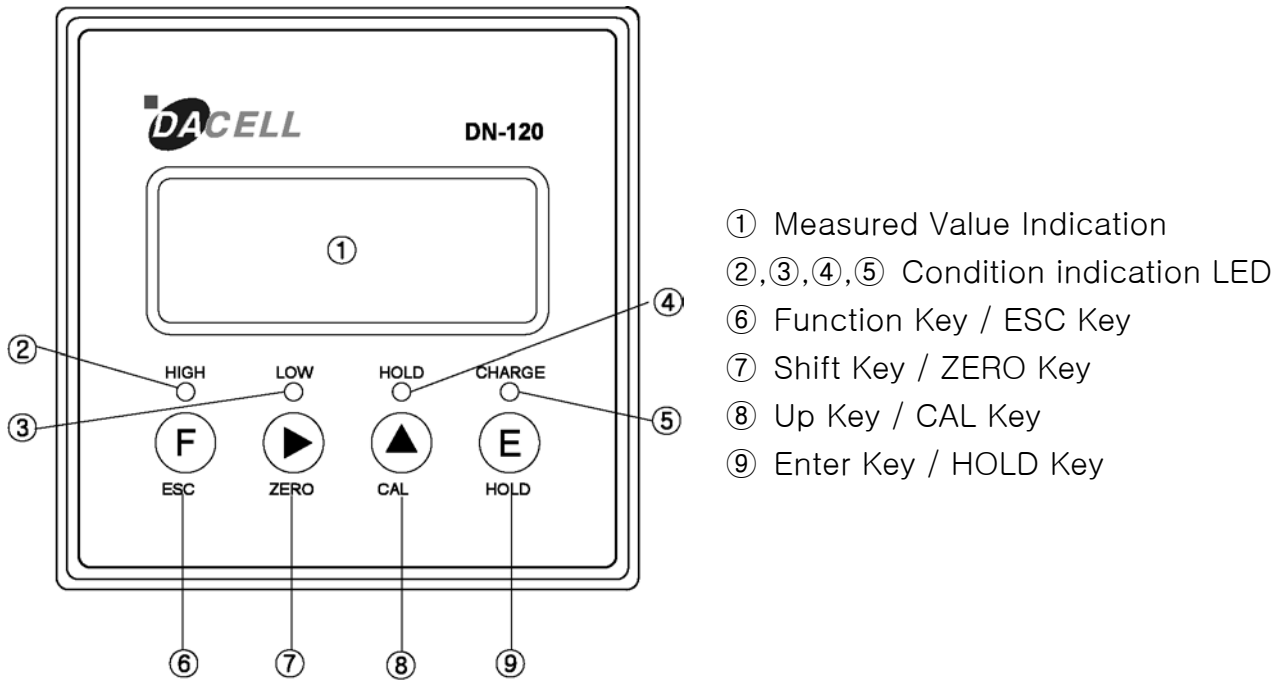
- Available sensor (DC)
 - 1) Micro-voltage output sensor (mV)
 - 2) Strain gage sensor (Bridge 350 Ω , 120 Ω).
- Maximum display
-19999 ~ + 19999
- A/D conversion
100 time/sec
- Front panel
 - Measured value display : 4 1/2 Digit LCD
 - State display LED : Red LED 4 pieces
 - Key switch : 4 pieces
- OUTPUT
: Possible for setting Upper limit(HI) & Lower limit(LO) (OPEN COLLECTOR)

3-1 General Specifications

- Power Supply : DC 7.2V Battery (Recharging), External power DC 12V
- Temperature Range: -10 $^{\circ}$ C ~ 60 $^{\circ}$ C, less than 85% RH
(where there is no dewing.)
- Size : 96 × 96 × 89 mm(W × H × D)
- Cutting Size : 92 × 92
- Weight : about 300 g

4. Front Panel

4-1. Picture Description of the Display of the Front Panel



4-1. Picture Description of the Display of the Front Panel

- | | |
|----------------------------|---|
| ① Measured Value indicator | : indicates the measured data or set point. |
| ② HIGH indicator LED | : Hi LED will be turned on when measured value is higher than or equal to the set Hi value. |
| ③ LOW indicator LED | : Lo LED will be turned on when measured value is lower than or equal to the set Lo value. |
| ④ HOLD indicator LED | : LED will be turned on when measured data is HOLD. |
| ⑤ CHARGE indicator LED | : LED will be turned on while charging. |

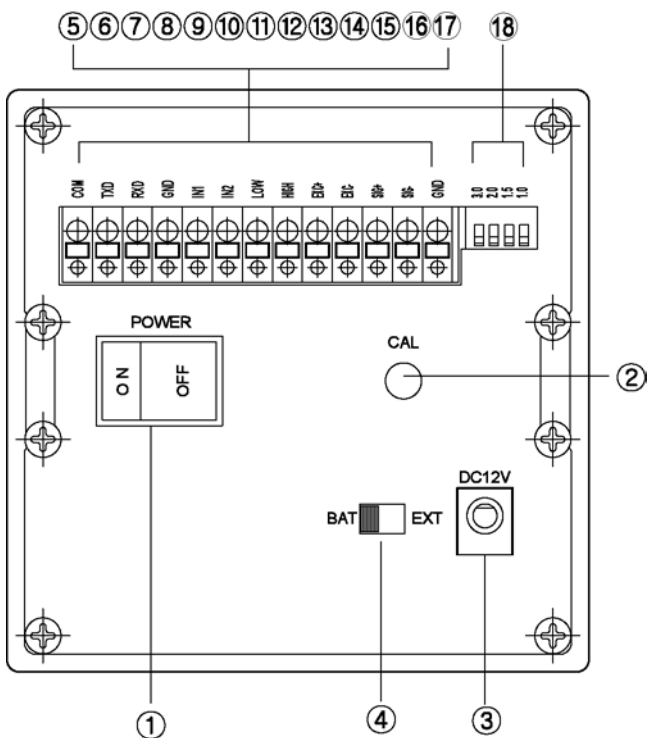
4-3. Description of the Keys on the Display

- ⑥ **F** : If you push this key for more than 3 seconds, the machine will enter the setting mode. If you want to exit to escape from the setting mode, you may use the ESC key.
- ⑦ **▶** : If you want to change the number, you may use this key. And this key adjusts the number to zero regardless of the current value.

- ⑧ ▲ : If you push this key, it will increase the number by one.
And if you want to enter the calibration mode, you should hold this key for 3 seconds.
- ⑨ E : If you are to store the set value, you may use the Enter key.

5. Back panel

5-1. Form of Back panel



5-2. Function & characteristics of back panel by the terminal

- ① Power ON, OFF S/W
- ② CAL
- ③ Adapter Terminal : DC 12V
- ④ Power S/W : Internal charge battery & External power (Charge condition) S/W
- ⑤ COM : RS232C Signal GND
- ⑥ TXD : RS232C Signal TXD, RS485 Signal TX+
- ⑦ RXD : RS232C Signal RXD, RS485 Signal TX-
- ⑧ GND : External Input-output Common Terminal
- ⑨ IN1 : External ZERO Input Terminal

- ⑩ IN2 : External HOLD Input Terminal
- ⑪ LOW : low(lower limit) Output Terminal
- ⑫ HIGH : high(upper limit) Output Terminal
- ⑬ +EXC : Sensor Supply Voltage + Connection Terminal(RED)
- ⑭ -EXC : Sensor Supply Voltage - Connection Terminal(White)
- ⑮ +SIG : Sensor Output Signal + Connection Terminal(Black)
- ⑯ -SIG : Sensor Output Signal - Connection Terminal(Green)
- ⑰ GND : Sensor SHIELD Connection Terminal
- ⑱ Amplification Adjustment Switch
 - SW1 : 1.0mV/V SW2 : 1.5mV/V
 - SW3 : 2.0mV/V SW4 : 3.0mV/V

(Set with the number which gets near to maximum output value of sensor .)

6. Setting Mode

6-1. Setting Method

If you push the **F** key for about 3 seconds, **.SEt** will appear and then **r.hi** HL will come out.

If you push the **▲** key at that time, the setting mode will change in the following direction, and if you push the **▶** key at that time, the setting mode will change in the opposite direction. If you push the **E** key, the present mode will be chosen.

r.hi ▲ **r.Lo** ▲ **_Po_** ▲ **_dlw** ▲ **h.nd** ▲ **bAud** ▲ **_ld_** ▲ **_bl_** ▲ **bUFF**
 ▲ **RUto** ▲ **tInE** ▲ **c.nd** ▲ **r.hi**

6-2. Setting Hi, Lo

You can set up the upper limit and lower limit of the relay output. HI will work if HI is larger than the HI set value. LO will works if LO is smaller than the LO set value.

- F** If you push the function key, the setting mode will come out.
.SEt
- ▲** If you push the Up key, you can choose **r.hi**, **r.Lo**
r.hi or **r.Lo** (The upper limit -> **r.hi**, The lower limit -> **r.Lo**)
- E** If you push the ENT key, you choose HI or LO setting.
0 1000
- ▶** If you push the Shift key, you can choose the number location.
0 1000 ▶ **0 1000** ▶ **0 1000** ▶ **0 1000** ▶ **0 1000**
- ▲** If you push the Up key, you can change the number as you wish.
0 1000 ▲ **02000** ▲ **03000** ▲ **04000** ▲ **05000** ▲ **06000** ▲ ...
- E** You can save the setting value by pushing the ENT key.
-SRu- -> **r.hi** or **r.Lo**
- F** Press Function key to return to measure mode from setting mode.

6-3. Setting Decimal point

This product operates in a way of fixed decimal point, the decimal point must be preset.

If the decimal point is changed after presetting, displaying value does not increase according to the decimal point.

- F Press Function key and then Up key to become `_Po_`
`_SEt` → `r.hi` ▲ `r.Lo` ▲ `_Po_`
- E Press ENT key to choose decimal point setting.
`00000`
- ▶ Press Shift key to choose the required number.
`0.0` ▶ `0.00` ▶ `0.000` ▶ `0.0000` ▶ `0`
- E Press ENT key to store the number.
`-SRu-` → `_Po_`
- F Press Function key to return to measure mode from setting mode.

6-4. Setting Round off

It is to set the variations of display number. When the value varies considerably, you can set it properly. It is possible to set 1, 2, 5, 10, 20, 50, 100.

- F Press Function key and then Up key to be `_diu`
`_SEt` → `r.hi` ▲ `r.Lo` ▲ `_Po_` ▲ `_diu`
- E Press ENT key to choose round off setting.
`1`
- ▶ Press Shift key to choose the required number.
`2` ▶ `5` ▶ `10` ▶ `20` ▶ `50` ▶ `100` ▶ `1`
- E Press ENT key to store the number.
`-SRu-` → `_diu`
- F Press Function key to return to measure mode from setting mode.

6-5. Setting Peak Hold, Sample Hold

This Product also has Peak Hold Function. So if you need this function, you can use this, with operating as follows. When you are in this mode. You can reset the value by pressing **E** key.

- F Press Function key and then Up key to be `h.nd`
`_SEt` → `r.hi` ▲ `r.Lo` ▲ `_Po_` ▲ `_diu` ▲ `h.nd`
- E Press ENT key to choose Peak Hold setting.
`_oFF` ▲ `PERH` ▲ `SRnP` ▲ `_oFF`
- ▶ Press Shift key
 When using Peak Hold → `PERH`, When it does not use → `_oFF`
- E Press ENT key to store it.

`-SRW-` → `h.nd`.

- F Press Function key to return to measure mode from setting mode.

6-6. Setting Baud Rate

This mode is designed to set up Baud Rate when you engage in serial communication.

You can set up 2400, 4800, 9600, 19200 bps.

- F Press Function key and then Up key to be `bAud`
`SEt` → `r.hi` ▲ `r.Lo` ▲ `-Po-` ▲ `-diu` ▲ `h.nd` ▲ `bAud`
- E Press ENT key to choose baud rate setting.
`009.60`
- ▶ Press Shift key to choose what you want.
`002.40` ▶ `004.80` ▶ `009.60` ▶ `019.20` ▶ `002.40`
- E Press ENT key to store it.
`-SRW-` → `bAud`
- F Press Function key to return to measure mode from setting mode.

6-7. Setting ID Number

In serial communication mode, it is used for giving product specific number for RS-485 serial communication.

- F Press Function key and then Up key to be `.id.`
`SEt` → `r.hi` ▲ `r.Lo` ▲ `-Po-` ▲ `-diu` ▲ `h.nd` ▲ `bAud` ▲ `.id.`
- E Press ENT key to choose ID number setting.
- ▲ Press Up key to change the required number.
(When it presses Up key, the number increases. When it presses Shift key, the number decrease)
`no. id` ▲ `1` ▲ `2` ▲ `3` ▲ `4` ▲ `255`
- E Press ENT key to store it.
`-SRW-` → `.id.`
- F Press Function key to return to measure mode from setting mode.

6-8. Setting Back Light (OPTION)

Setting LCD Back Light ON/OFF.

6-9. Setting Buffer

As setting Display speed and the number of A/D Sampling , it can set up 1~32.

- F Press Function key and then Up key to be **bUFF**.
 .SEt → r.hI ▲ r.Lo ▲ .Po_ ▲ .diu ▲ h.nd ▲ bAud ▲ .Id_ ▲
 .bl_ ▲ **bUFF**
- E Press ENT key to choose buffer setting mode.
- ▲ Press Up key to choose what you want.
 1 ▲ 2 ▲ 3 ▲ 4 ▲ 32
 Fast ←-----→ Slow
- E Press ENT key to store it.
 .SRu- → **bUFF**
- F Press Function key to return to measure mode from setting mode.

6-10. Setting Auto Tracking Value

If the absolute value of the change of measurement is not higher than this value, Auto Tracking Value within Zero Tracking Time (See 6-11 Setting Zero Tracking), measurement will be zero.

According to 6-1, Press Function key and then Up key to be **AUTO**
 .SEt → r.hI ▲ r.Lo ▲ .Po_ ▲ .diu ▲ h.nd ▲ bAud ▲ .Id_ ▲ .bl_ ▲
 bUFF ▲ **AUTO**

- E Press ENT key to choose Auto zero.
- ▲ Press Up key to change the required number.
 0.0 ▶ 0.2 ▶ 0.5 ▶ 1.0 ▶ 2.0 ▶ 5.0 ▶ 10.0
- E Press ENT key to store it.
 .SRu- → **AUTO**
- F Press Function key to return to measure mode from setting mode.

Ex) If Auto Tracking Value is made 10.0 in this setup and the absolute value of the change of measurement within Zero Tracking Time is not higher than 10.0 ,then measurement will be 0.

6-11. Setting Zero Tracking Time

According to 6-1, Press Function key and then Up key to be **tIñE**.
 .SEt → r.hI ▲ r.Lo ▲ .Po_ ▲ .diu ▲ h.nd ▲ bAud ▲ .Id_ ▲ .bl_ ▲

▲ `bUFF` ▲ `Auto` ▲ `LINE`

Ⓔ Press ENT key to choose time mode.

▲ Press Up key to change the required number.

`0.0` ▶ `0.1` ▶ `0.2` ▶ `0.3` ▶ `0.4` ▶ `0.5` ▶ `1.0` ▶ `2.0` ▶
`5.0` ▶ ...

Ⓔ Press ENT key to store it.

`-5R-` → `LINE`

Ⓕ Press Function key to return to measure mode from setting mode.

7. Calibration

Before calibration, You should select Dip switch to the most near thing in sensor output value and make `_.on_`.

7-1. Real-weight Calibration

Standard weight is necessary. When being used Multiple sensor at one Indicator, It calibrate certainly at Real-weight.

1) Real-weight Calibration Mode Setting

- F** Press Function key about 3 seconds to return to Setup mode.
- ▲** Press Up key to be `c.nd`
`_.SEt_` → `r.hi` ▲ `r.Lo` ▲ `_.Po_` ▲ `_.diu` ▲ `h.nd` ▲ `bAud` ▲ `_.id_` ▲
`_.bl_` ▲ `bUFF` ▲ `RUto` ▲ `tInE` ▲ `c.nd`
- E** Press ENT key to be `_.on_`
 ※ If, when being in `1.0` ▲ `1.5` ▲ `2.0` ▲ `3.0`, press ▲ Up key to be `_.on_`.
`_.on_` ▲ `1.0` ▲ `1.5` ▲ `2.0` ▲ `3.0` ▲ `_.on_`
- E** Press ENT key to store it.
`_.SRu_` → `c.nd`
- F** Press Function key to return to measure mode from setting mode.

2) Zero and Span Setting

- ▲** Press Up key about 3 seconds to return to Real-weight Calibration mode.
`_.cAL_` → `_.Ero`
- E** Leave the sensor free-load and press ENT key to set Zero.
`-----` → `_.SRu_` → `_.Ero`
- ▲** Press Up key to be `_.SPAn`
- E** Press ENT key, It uses **▶** Shift key and **▲** Up Key and it inputs Real-weight value. (Standard weight value it was prepared).
- E** Press ENT key `_.UP_`, put counterweight on.
- E** Press ENT key to set SPAN value.
`-----` → `_.SRu_` → `_.SPAn`
- F** Press Function key to return to measure mode from setting mode.

7-2. Constant value Calibration

Sensor CAPA and Output value are necessary. (When the sensor purchasing, it is becoming marking in Calibration sheet.)

It considers a sensor quality and a circumference condition, use Real-weight calibration for precision measuring.

1) Constant value Calibration mode setting

- F Press Function key about 3 seconds to return to setup mode
- ▲ Press Up key to be c_ñd
_SEt → r_hi ▲ r_lo ▲ _Po_ ▲ _dlu ▲ h_ñd ▲ bRud ▲ _ld_ ▲
bl ▲ bUFF ▲ RUto ▲ tInE ▲ c_ñd
- E Press ENT key to set sensor output value.
After selecting from in _on_ ▲ 1.0 ▲ 1.5 ▲ 2.0 ▲ 3.0
- E Press ENT key to store it.
-SRu- → c_ñd
- F Press Function key to return to measure mode from setting mode.

2) CAPA setting and Sensor output setting

Set it with reference to Calibration sheet, enclosed with the sensor.

- ▲ Press Up key about 3 seconds to return to CAPA mode.
-cAPP
- E Press ENT key, It uses ◀ Shift key and ▲ Up Key and it inputs Sensor CAPA value.
- E Press ENT key to store it.
-SRu- → -cAPP
- ▲ Press Up key to be -volt
- E Press ENT key, It uses ◀ Shift key and ▲ Up Key and it inputs Sensor output value.
- E Press ENT key to store it.
-SRu- → -volt
- F Press Function key to return to measure mode from setting mode.

8. Setting KEY LOCK

It will be able to prevent the optional handling of the user. Must start power off.

- **F** Press Function key
POWER ON → → → or is indicated
- **▲** Press Up key to choose or
- **E** Press ENT key to store it.
If you choose → Only HI, LO setting and ZERO key does operate,
If you choose → Setting is possible.