

***Minebea***

*Digital indicator for tension meter*  
*TMD-100*

# Instruction Manual

MINEBEA Co., Ltd.  
Measuring Components Business Unit

EN294-1181-A

## Introduction

Thank you very much for your purchasing Minebea's Digital Indicator for tension meter, model TMD-100.

This manual explains the handling procedures and the notes when it would be used. Make use of it properly after reading through the manual carefully.

Be sure to deliver the manual to the end user. Moreover, the end user should keep the manual at hand after reading it over.

## Marks and arrangements used in this manual

The following marks are attached to the explanation on the matters that indicate "Don't do this.", "Take care" and "For reference".

Be sure to read these items where these marks are attached



### Warning

Warning may cause injury or accident that may harm to the operator.  
Don't do these things described here.



### Caution

It is the description when danger to which the user owes injury is assumed in your handling mistaken, and When the occurrence only of the physical loss or damage is assumed.



Caution during operation and working.  
Be sure to read the item to prevent malfunctions.

## For safe operation

Be sure to read this instruction manual before use.

### 1. Installation place

#### Caution

Use the instrument where the temperature/humidity specifies with the range as follows :

- Environmental temperature : -10 °C to 50°C
- Environmental humidity : Less than 85 %R.H. (Non condensing)

#### Warning

Don't locate the instrument on the places as follows :  
It may cause an unexpected faulty in the instrument.

#### ① Location where installation is not allowed.

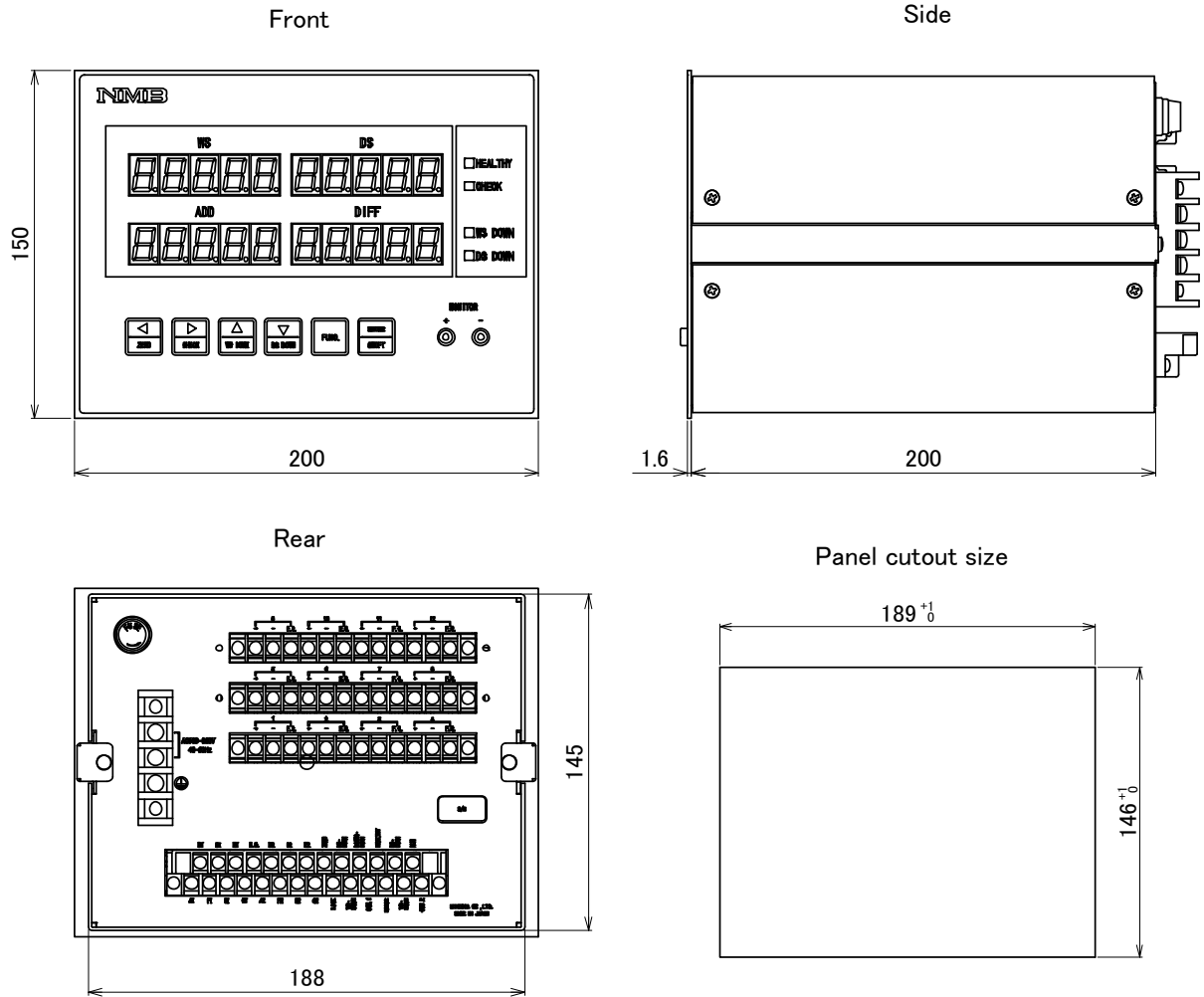
- Do not locate the instrument in direct and/or high temperature area.
- Do not use the instrument in a high humid area.
- Do not install the instrument where there are vibrations and shocks.
- Do not use the instrument where there is excess of dusts and fine particles.
- Do not use the instrument where there are corrosive gas and salt and like that.
- Do not install the instrument where there is rapid change of temperature and humidity.
- Do not install the instrument near the devices that are magnetized or generate an electromagnetic field.
- Do not install the instrument where the instrument may be affected by radioactivity or radial rays.
- Avoid the location where chemical reaction may take place such as in a laboratory, or like that.

② Installation

⚠ Caution

When installing the instrument, install as referring to the following figures and secure the space around the instrument.

Each dimensions of the instrument and required dimensions for the environmental spaces are as follows :



Unit : mm

## 2. Power supply

### Warning

Be sure to check that the power supply is off in connecting each cable. If the work is done while the power is on, there may have the case that electric shock to the operator or even may have damage to the instrument.

### Warning

Before supplying the power, check that the indication of power supply voltage/specifications for the instrument and the power going to supply should be the same. If they are not equal, contact with Minebea.

If you use the instrument without checking them, it may cause a damage in the instrument or electric shock to the operator.

Please consult Co. about the report when not matching. There is danger of causing damage and the electric shock of this instrument when using it like the uncertainty.

### Caution

Earth wire should be grounded securely.

When earth wire is not connected, it may cause a malfunction of the instrument or electric shock to the operator.

## 3. Application note

### Caution

Before using a new instrument or exchanging the strain gage applied transducer for a new one, be sure to make calibration.

If calibration will not be made, the correct measuring results may not be obtained nor which may cause malfunction in the instrument and there may exist damage in peripheral equipments. Besides, even though calibration has been made, there may occur the similar case when the results are not correct, so make calibration, again.

### Caution

In case of using the instrument, check that the connections are executed properly. If not connected properly, the correct measuring result will not be obtained, nor it may cause malfunctions of the instrument, damage to the peripheral equipments or even more serious accidents.

### Caution

When change of setting is made carelessly on the instrument during measurement, correct measured results may not be obtained and it may cause malfunction in the instrument and even have the possibility of damage in peripheral instruments.

### Caution

Don't shock the instrument such as throwing something on it.

If neglected, it may cause destruction of the parts and damage to the electrical circuits.

### Caution

Don't remove the cover of this instrument, don't peel off the panel sheet, and additionally, take this instrument apart.

It may cause a damage on the case and panel sheet, and ruins the environmental factor and operativeness.



At the time of shipment from the factory, the instrument has been plated with a clear sheet on the panel sheet for protective purpose.

In case of application, use the instrument after removing the clear sheet first.



Don't push the panel sheet on the instrument with the excessive strong force nor push it with sharp edge object such as a driver. If neglected, it may cause a damage to the panel switch and even have the possibility of damage to resist to environments or operational performance.



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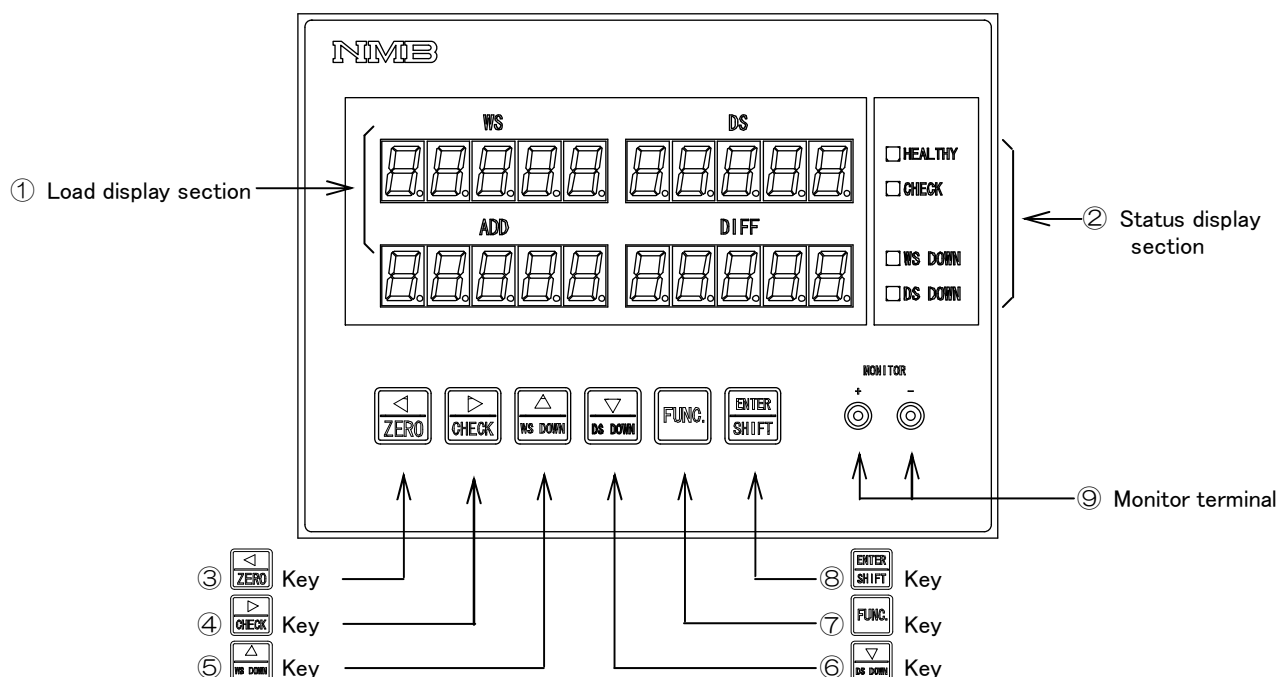
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# 1. Name and function of each point

## 1-1. Front panel



### (1) Load display section

Each load value of WS, DS, ADD, and DIFF is displayed.

### (2) Status display section

**HEALTHY** After the power supply is turned on, it lights with various error being not occurred.

**CHECK** It lights on when the key and the key is pressed together, and CHECK ON.

**WS DOWN** It lights on when the key and the key is pressed together, or when the equivalent signal from the outside is input.

**DS DOWN** It lights on when the key and the key is pressed together, or when the equivalent signal from the outside is input.

### (3) Key

By pressing this key with the key, a present load value is memorized as a zero point, and the display is adjusted to zero. Or, when the value is set, the set digit is carried.


### (4) Key

By pressing this key with the key, the CHECK value is turned on and off. Or, when the value is set, the digit lowers the set digit.

### (5) Key

When the trouble is occurs on the WS side load cell, the WS false signal set beforehand is generated from the inside of the indicator by pressing this key with the key. Or, when the value is set, one set digit is lowered.

(6)  Key

When the trouble is occurs on the DS side load cell, the DS false signal set beforehand is generated from the inside of the indicator by pressing this key with  key. Or, when the value is set, one value of the set digit is lowered.

(7)  Key

Used When shifting to the function mode.

(8)  Key

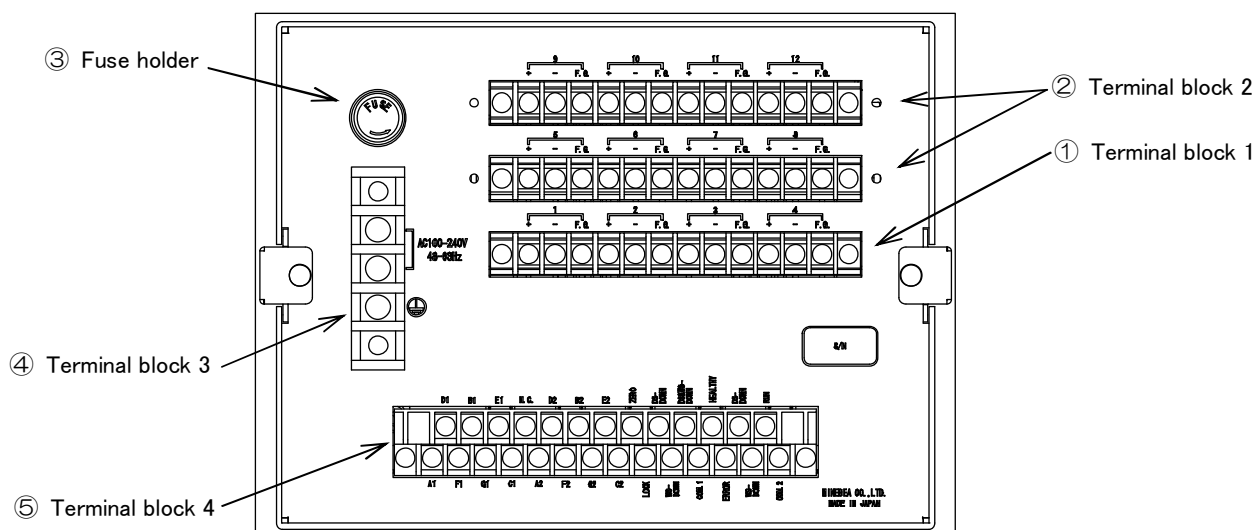
Used for registering set value at the time of various kind of setting.

Also, the shift function of each key becomes effective by pushing each key while pushing this key.

(9) Monitor terminal

The analog output set beforehand can be monitored.

## 1-2. Rear panel



(1) Terminal block 1

The analog output is connected.

(2) Terminal block 2

The optional analog output is mounted.

(3) Fuse holder

The fuse of the specified capacity is mounted.

(4) Terminal block 3

A specified power supply voltage and grounding wire are connected.

(5) Terminal block 4

Various strain gauge type transducers, such as load cell, external control input for "ZERO", "WS DOWN", "DS DOWN", "D S&W S DOWN", "LOCK" and external control output for "WS DOWN", "DS DOWN", "HEALTHY", "ERROR", and "RUN" are connected.

## 2. Connecting method

### 2-1. Notes for connecting wires

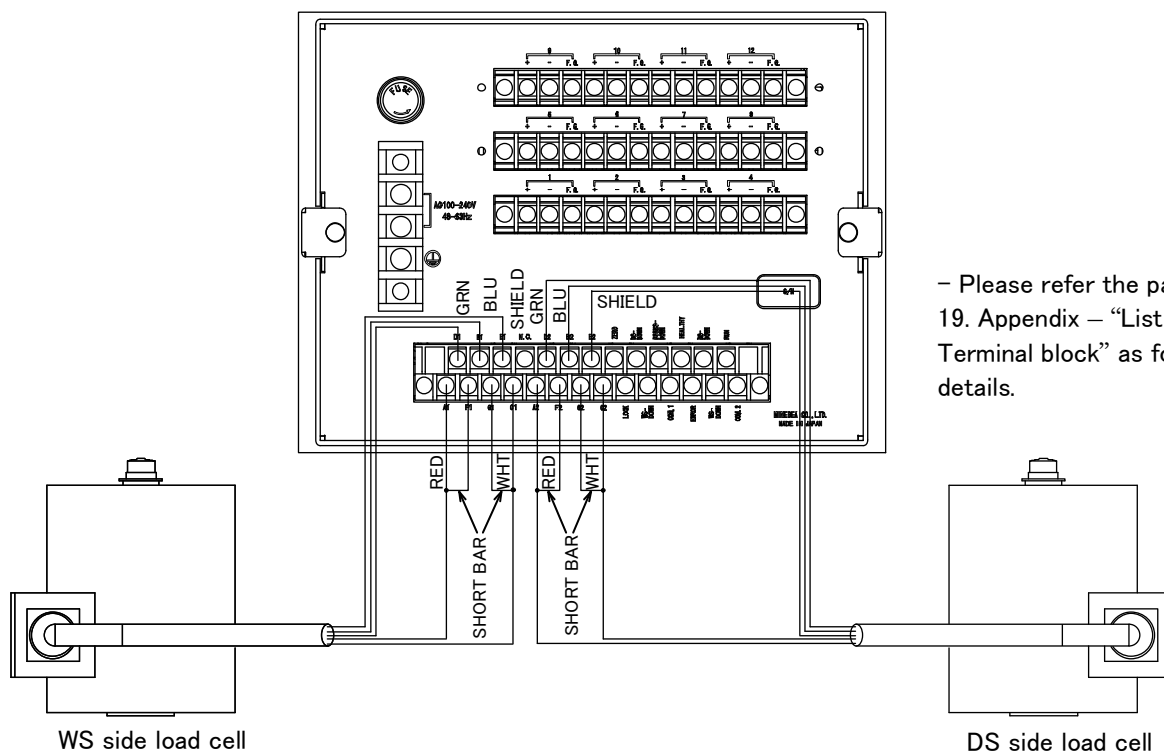
- When you connect wires, please proceed after turning off the power supply without fail.
- Please do not connect AC power supply until the installation is completed. There is no switch that switches power supply ON/OFF in the main body.
- Please keep the cable connected with the main body away from the noise source, such as power supply line and I/O for the control, etc. as much as possible.
- Please set the conduit wiring to be exclusive wiring, and avoid sharing with other lines.
- Please make sure to connect grounding wire, and the earth is to be the D class with single earth. Please do not share with the earth of the power supply system.
- Please apply the shielded cable for connecting with the external control input and contact output, and the shield is to be connected with the shield connector of the terminal, or main body.

### 2-2. Connection with load cell



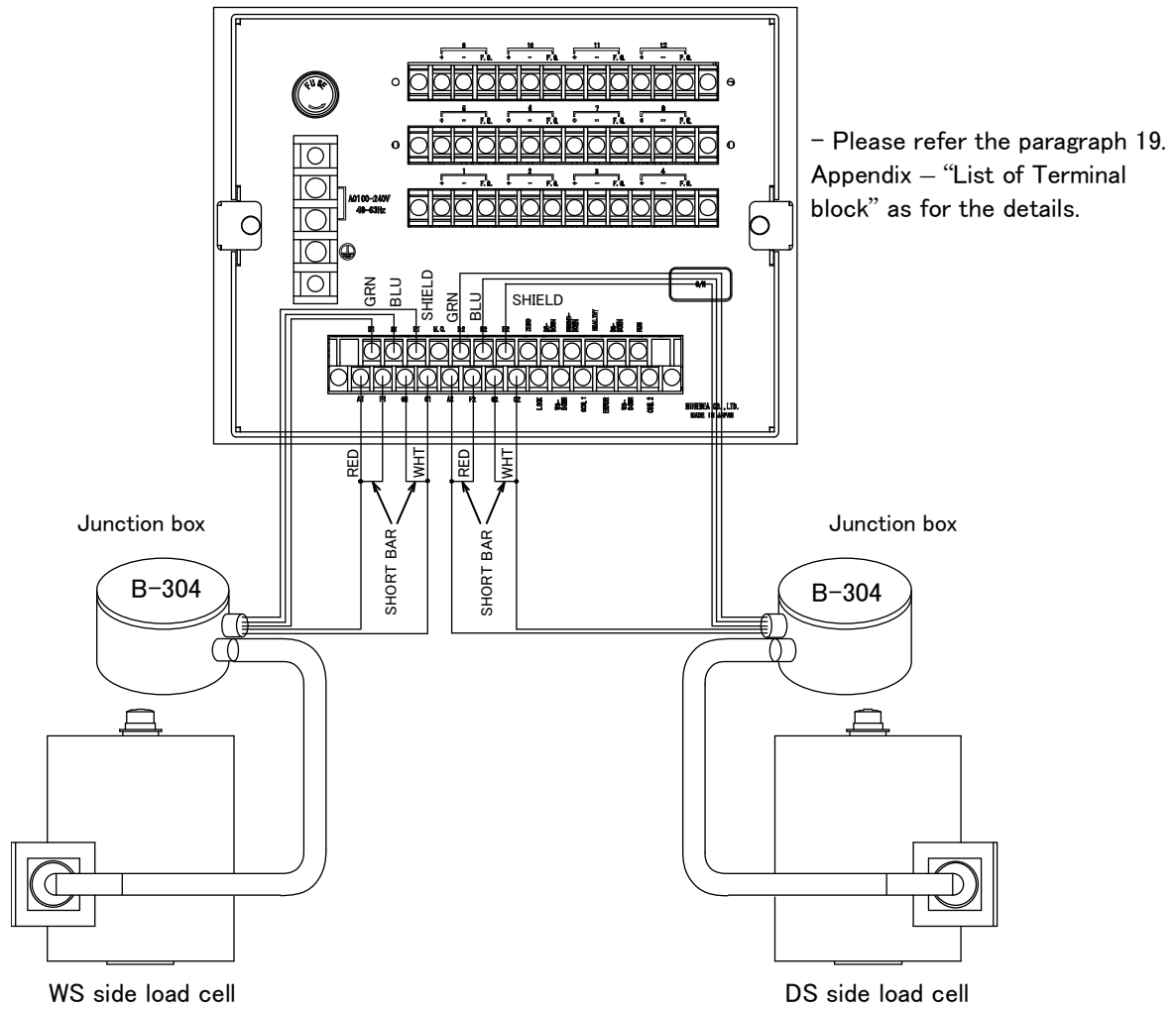
- When the tension force is measured with tension type or tension/compression type load cell, please connect the “green” with terminal No. B1 or B2, and the “Blue” with terminal No. D1 or D2 respectively.
- As there may be the case that the wiring color is different from the standard, please confirm it with the inspection data sheet of the load cell before connecting.
- When the length of CAB-502 is more than 30 m totally, there may have the case the accuracy becomes out of warranty because the resistance of cable makes the input voltage of the instrument decrease.
- When the length of CAB-501 is more than 100 m totally, there may have the case that the remote sensing function will not work enough, and the accuracy becomes out of warranty because of the resistance of cable.

#### (1) Connection of load cell and TMD-100

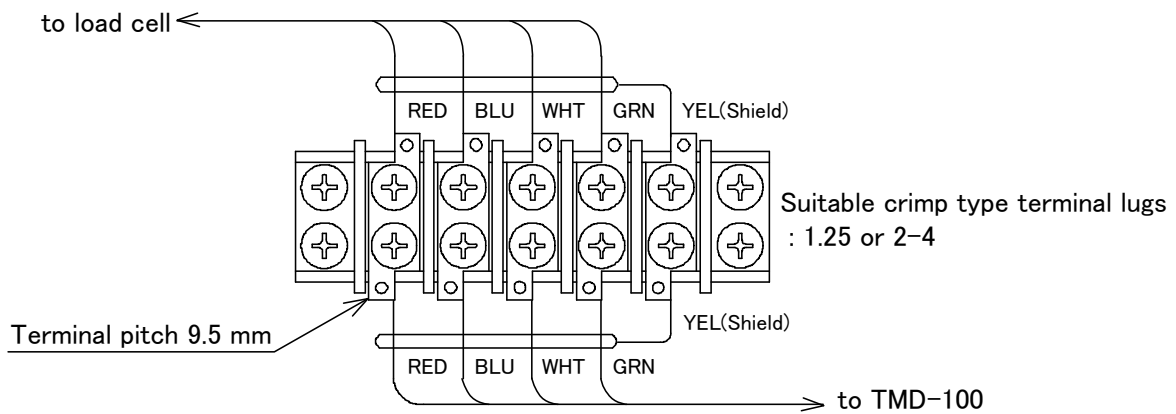


(2) Connection of load cell, junction box B-304 for extension, and TMD-100

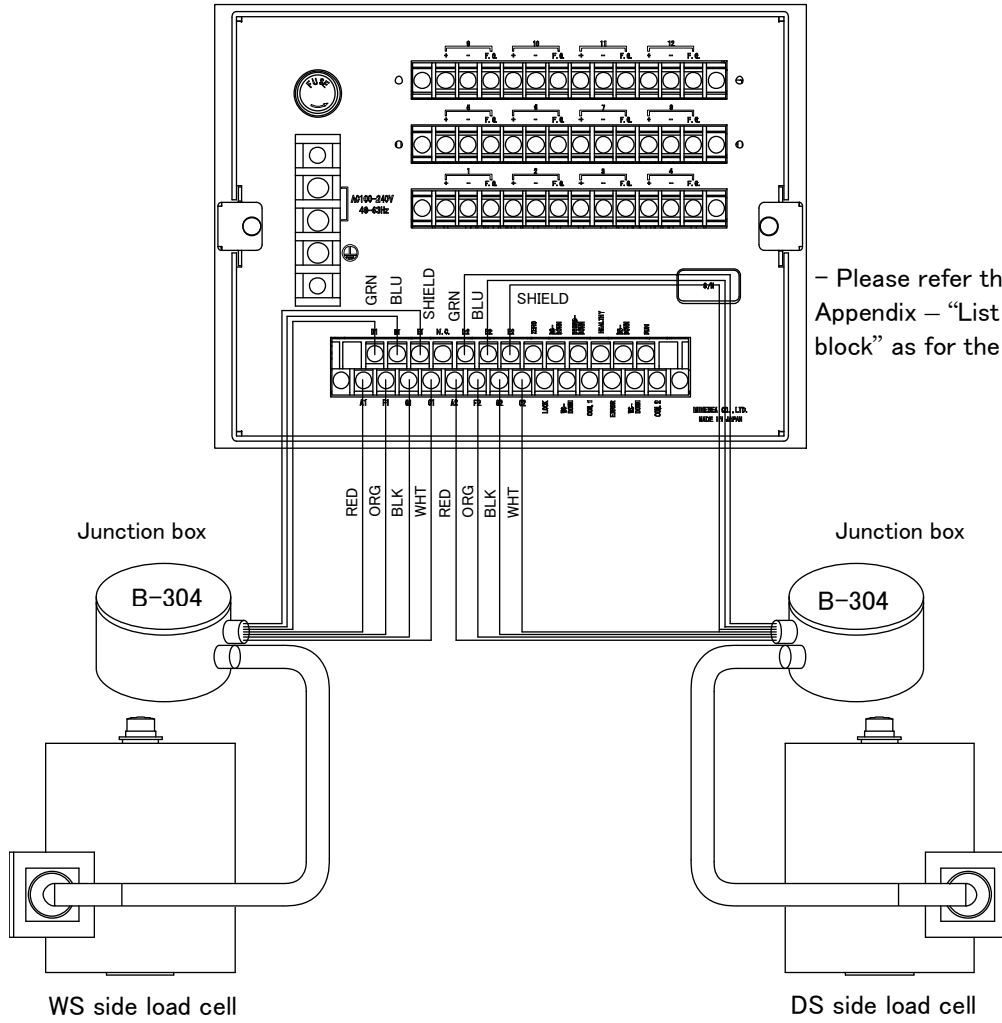
i) When CAB-502 (4-cores cable) is used



Internal terminal connection of B-304

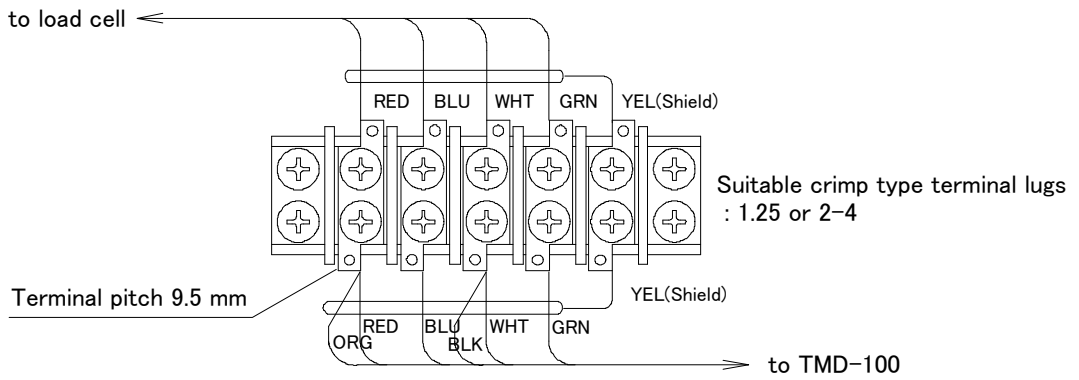


ii) When CAB-501 (6-cores cable) is used



– Please refer the paragraph 19. Appendix – “List of Terminal block” as for the details.

Internal terminal connection of B-304



## 2-3. Connection of analog output

This instrument can select voltage output/current output by the setting with each channel.

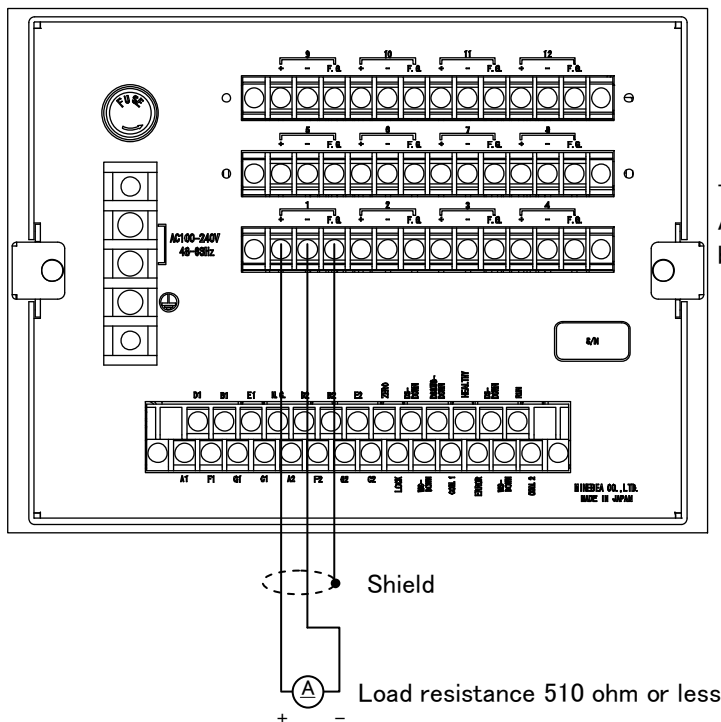
Please refer the paragraph 9-1. Changing method of analog output for setting method.

### (1) Specifications of current output

Specification	Content
Output	DC4 mA to 20 mA
Load resistance	510 ohm or less
Non-linearity	0.05 %F.S.
Resolution	About 1/12 000
Over range	"-OL" display : approx. DC0 mA "OL" display : approx. DC24 mA
Output frequency	Synchronized with A/D sampling speed.



- The analog output of this instrument executes rewriting the output synchronizing with A/D sampling speed.
- After turning on the power supply, the analog output has the output fluctuation element.  
To use it with stable condition, please use it about one hour after turning on the power supply.



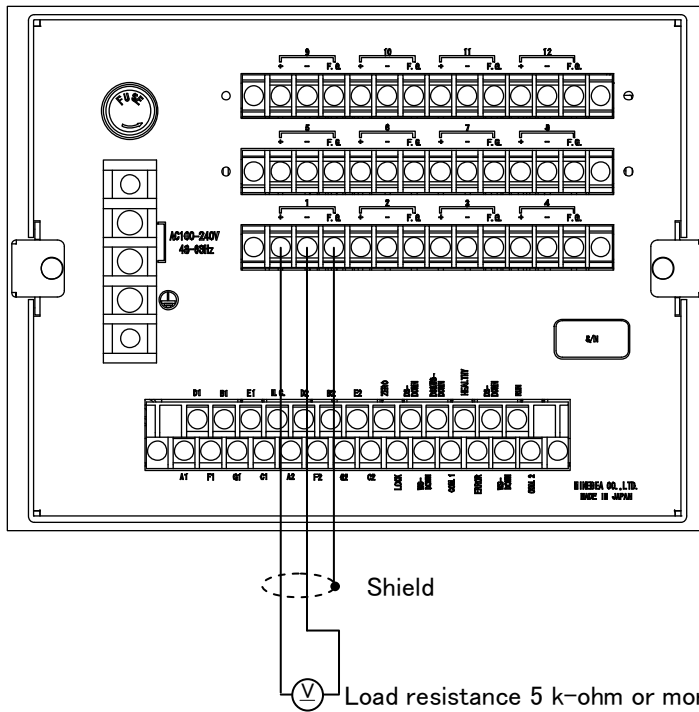
- Please refer the paragraph 19. Appendix – “List of Terminal block” as for the details.

(2) Specifications of voltage output

Specification	Content
Output	Selection from DC0 V to 10 V, DC0 V to 5 V, DC0 V to 1 V, DC±10 V, DC±5 V, and DC±1 V
Load resistance	5 k-ohm or more
Non-linearity	0.05 %F.S.
Resolution	About 1/12 000
Over range	"-OL" display : DC-2.5 V, DC-1.25 V, DC-0.2 V, DC-14.0 V, DC-7.5 V, and DC-1.2 V "OL" display : DC14.0 V, DC7.5 V, DC1.2 V, DC14.0 V, DC7.5 V and DC1.2 V
Output frequency	Synchronized with A/D sampling speed.



- The analog output of this instrument executes rewriting the output synchronizing with A/D sampling speed.
- After turning on the power supply, the analog output has the output fluctuation element.  
To use it with stable condition, please use it about one hour after turning on the power supply.



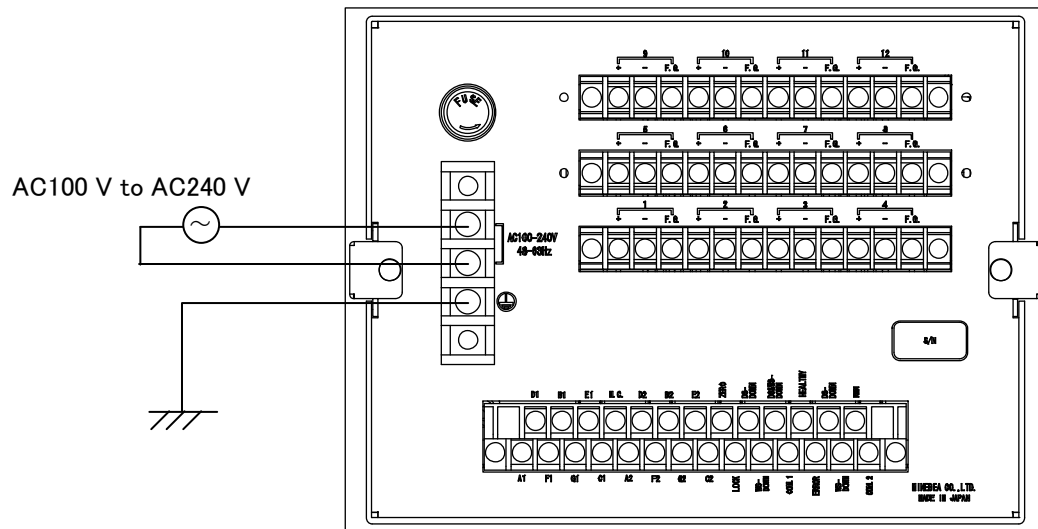
- Please refer the paragraph 19. Appendix – “List of Terminal block” as for the details.

## 2-4. Connection of power supply and earth

Please connect the power supply and the earth as shown in the figure below. Please give the earth as D class single earth.

Power supply voltage: AC100 V to AC240 V(permissible variable range AC85 V to AC264 V)

Power supply frequency: 50/60 Hz



- Connections with power supply and the earth is made securely as showing in the figure, and also within the rated capacity of an instrument.

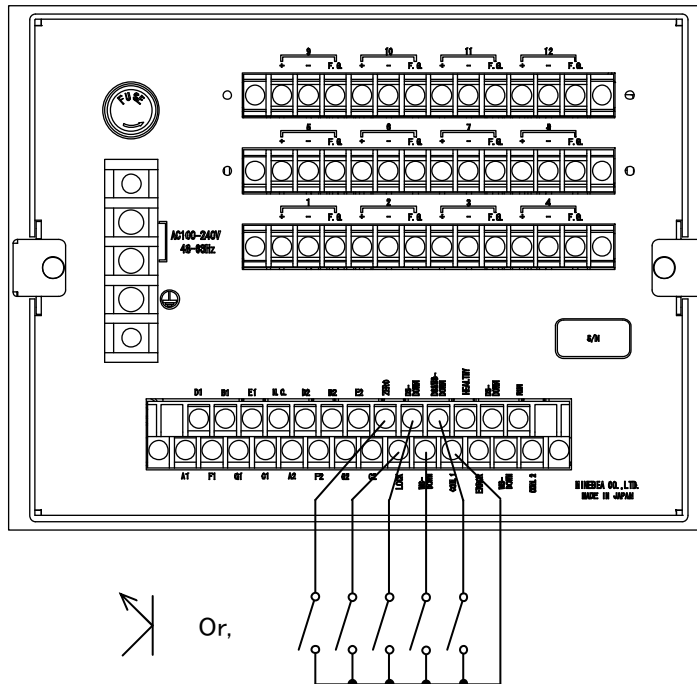


- Grounding is to be the D class with single earth.

There is a possibility of causing an unexpected malfunction by receiving the influence of the noise from other equipment.

## 2-5. Connection of external control input

Each terminal of the external control input of "ZERO", "WS DOWN", "DS DOWN", "DS&WS DOWN", and "LOCK" is connected with "COM.1" by contact output or open collector as shown in the figure below.



- Please refer the paragraph 19. Appendix - "List of Terminal block" as for the details.



Please connect the external control input surely as shown in the above drawing.  
If neglected it causes an unexpected breakdown and the malfunction.

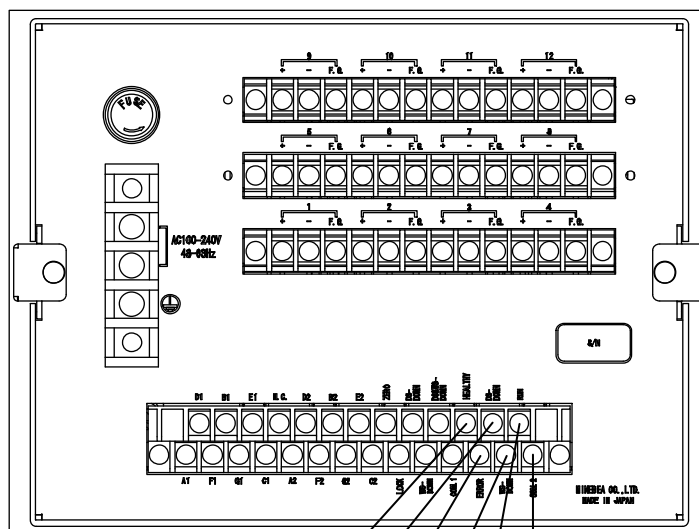


Please use the shielded cable for the connection of external control input, and connect the shield with the terminal E1 or E2 of this instrument.  
If not connected, there is a possibility of causing the malfunction by the influence of the external noise, etc.

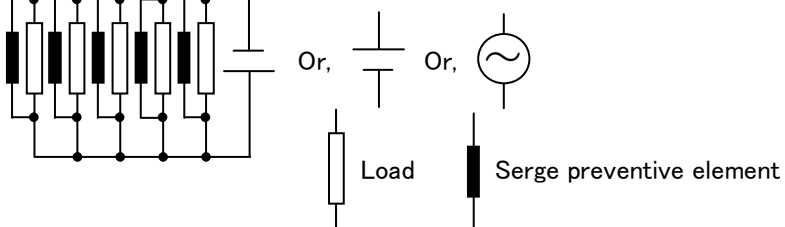
## 2-6. Connection of external control output

Please connect the external control output for "WS DOWN", "DS DOWN", "HEALTHY", "ERROR", and "RUN" within the range of the following specification with "COM.2" as shown in the figure below.

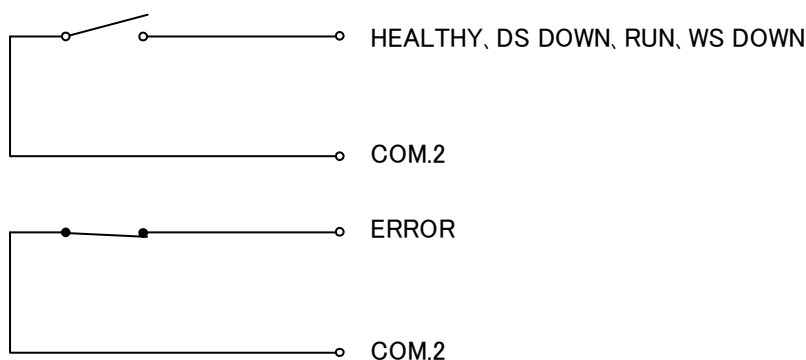
Specification	Content
Composition of contact point	Five points (Only the ERROR is b contact point, and the other is a contact point)
Rated load	AC250 V or DC30 V
Ratings energizing electric current	1 A (load resistance)



- Please refer the paragraph 19. Appendix - "List of Terminal block" as for the details



Equivalent circuit



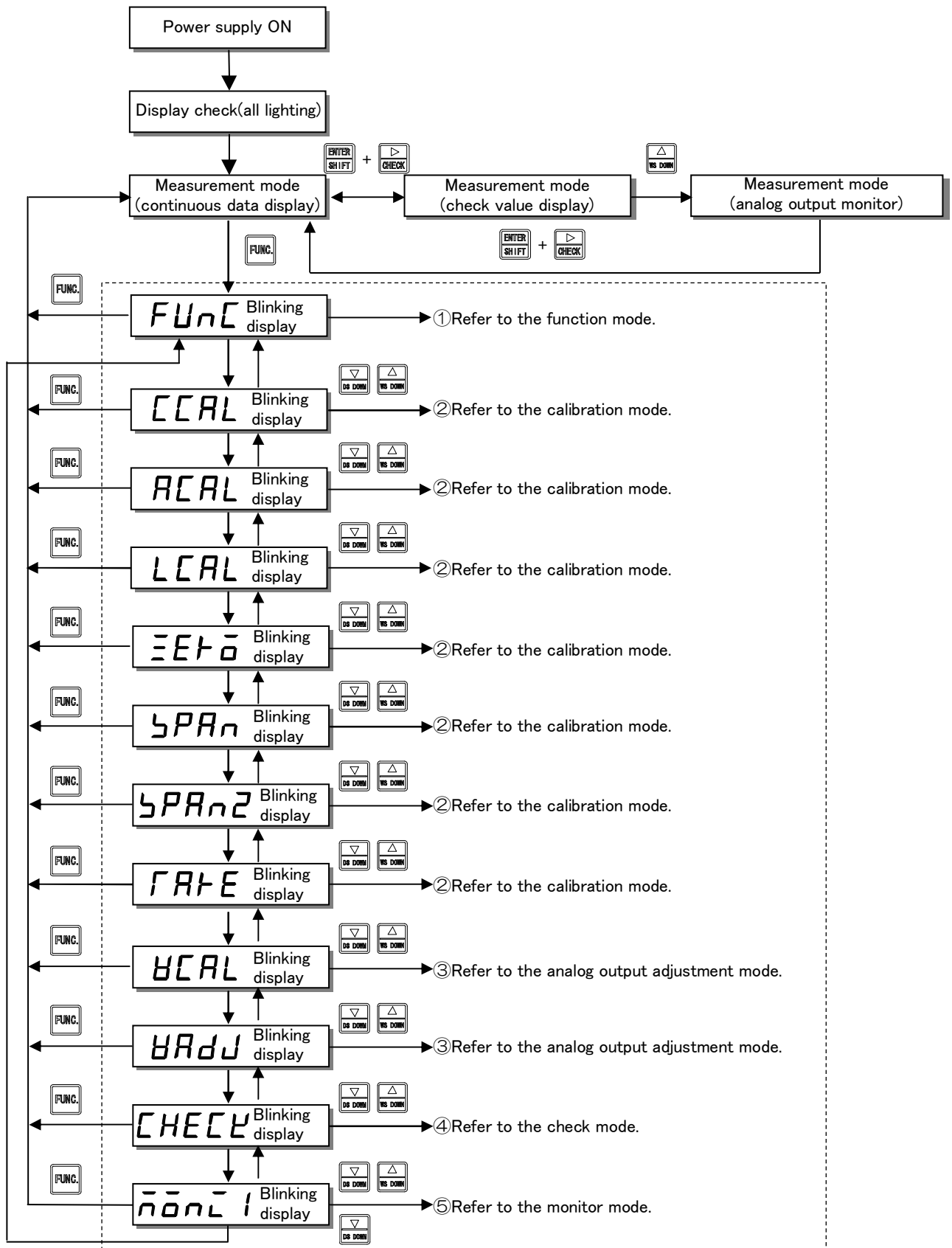
- Please connect the surge preventive element suitable for the characteristic of the connected external load for this protection of contact point. It causes an unexpected breakdown and the malfunction like the loss and welding etc. of this contact point.

### 3. Operation

#### 3-1. Change of mode

This instrument has various modes according to the operating condition.

The mode is changed by the key operation.



(1) Function mode (FUNC)

Various functions become effective by the setting of the function data.

(2) Calibration mode

(CCAL, ACAL, LCAL, ZERO, SPAN, SPAN2, RATE)

By setting the calibration data, the calibration is executed to display the electrical signal from the measuring unit (load cell) as the accurate load value.

(3) Analog output adjustment mode (BCAL, ADJ)

It is adjusted that the analog output reaches a correct value.

(4) Check mode (CHECK)

ROM version, each input/output operation, and the analog output can be monitored by the check mode.

(5) Monitor mode (MONI)

The output value of the load cell can be monitored with the monitor mode.

## 4. Calibration

To display the electrical signal from the strain gauge applied transducer (Hereafter, it is described as the load cell) as an accurate load, the operation that matches the load that applies to the load cell to the display of this instrument is called a calibration.

For instance, it is that the adjustment for the display of this instrument to become a display of 100.00 kg accurately when the weight of 100kg is put on the measurement part.

### 4-1. Kind of calibration method

(1) **CCAL**

Method of registering output value (mV/V) of load cell at the maximum indicated value after measurement part is adjusted to zero (condition of initial weight only of tare), and zero is registered.

(2) **ACAL**

Method of registering the output value (mV/V) of load cell when measurement part is zero (condition of initial weight only of tare), and the output value (mV/V) of load cell when the weight of the maximum indicated value is applied to load cell.

(3) **LCAL**

Method of registering load cell output at the maximum indicated value applying the actual weight onto load cell after measurement part is adjusted to zero (condition of initial weight only of tare), and zero is registered.

(4) **ΞEto**

The fine control of 0 is executed.

(5) **SPAn**

The fine control of span is executed.

(6) **SPAn2**

Method of adjusting the load cell output (mV/V) to the maximum indicated value, after setting indicated value when the actual load is applied.

(7) **ΓATE**

Method of registering only zero point again when tare load changes.



The accuracy by the calibration method of ① and ② is about 1/1000. Please execute the calibration of ③ when the accuracy of 1/1000 or more is required.

## 4-2. Setting items

### 4-2-1. Setting item requested in the calibration

- (1) Minimum scale value (  $d-01, 02, 05, 10$  )

It is a minimum unit of the indicated value. The setting values are "1", "2", "5", and "10".

The value of {maximum indicated value/minimum scale value} becomes a display resolution.

- (2) The maximum indicated value (  $dLSP$  )

It is the maximum weight that can be measured on the load cell.

- (3) Mass of weight used when span is calibrated (  $L\bar{O}A\bar{D}$  ).

The span calibration can be executed with the arbitrary weight. The same setting as the maximum indicated value is executed when there is a weight for the maximum indicated value.

Please give the setting here to me as 2/3 or more of the maximum indicated values to reduce the calibration error.

- (4) Calibration of ZERO (  $\bar{Z}\bar{E}\bar{R}\bar{O}$  )

It is an item that calibrates the display value to zero when nothing is put on the measurement part (condition of the initial weight).

There are "Method by the condition of the initial weight" and "Method by a numeric input of the load cell output voltage" as a calibration method.

- (5) Calibration of SPAN (  $S\bar{P}\bar{A}\bar{N}$  )

It is an item that calibrates the change in the electrical signal of the load cell to become a display of correct measurement value when the weight is applied on the measurement part.

As a calibration method, there are "Method with the weight" and "Method by a numeric input of the load cell output voltage".

### 4-2-2. Item set if necessary after the calibration

- (1) Display position of decimal point (function :  $F-01$  )

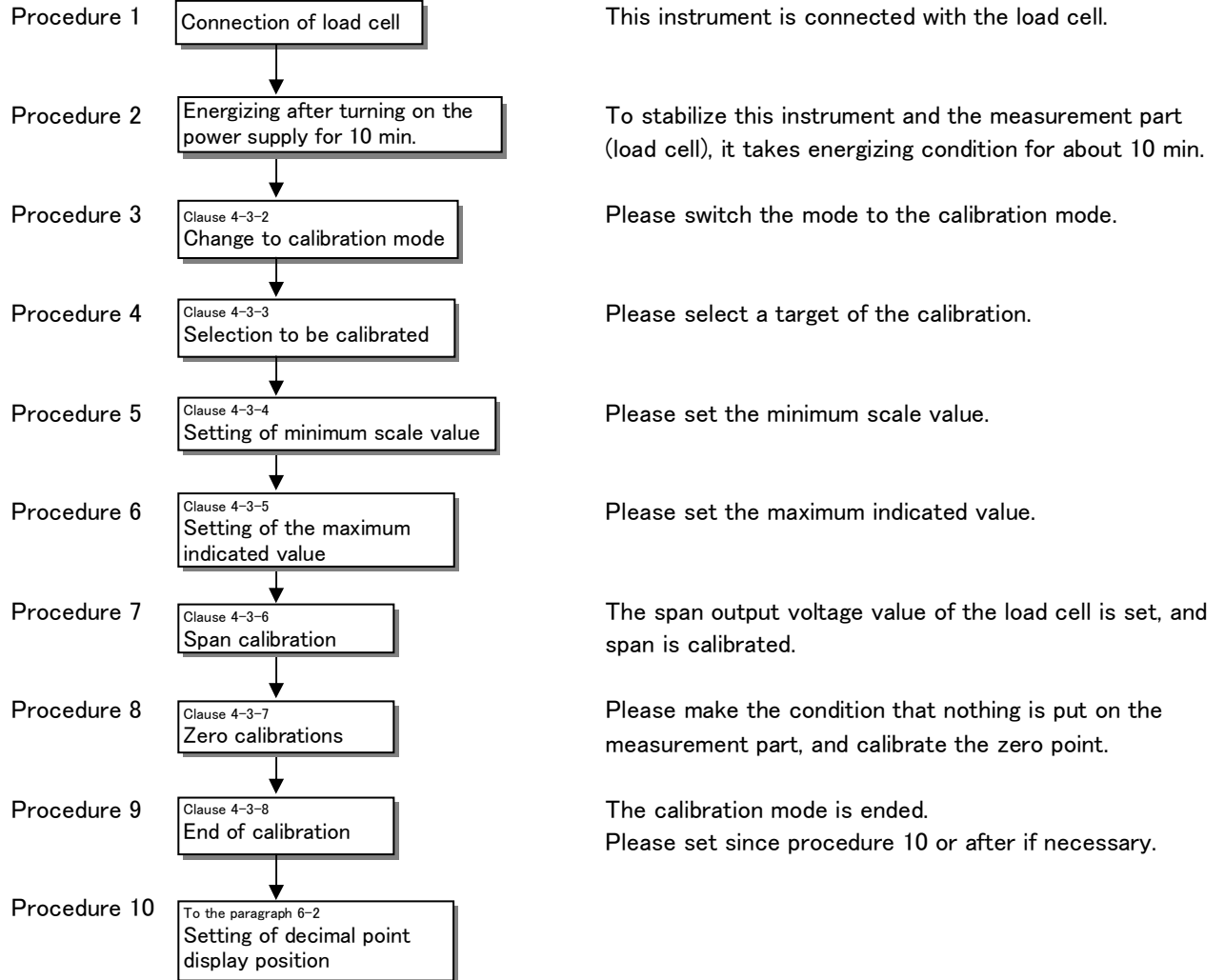
The decimal point is put on the load display of this instrument.



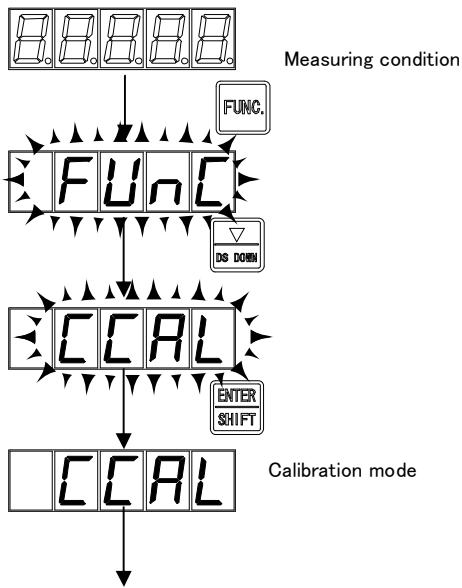
- Please calibrate if necessary when the environment used changes.
- The resolution of the display that the performance becomes effective is 10 000 or less.

### 4-3. Calibration procedure of Digital span calibration mode (CCAL calibration mode)

#### 4-3-1. Flow of calibration



### 4-3-2. Change to calibration mode



Move to the selection mode from a usual measuring condition.

By pressing the **FUNC.** key, **FUNc** is blinking.

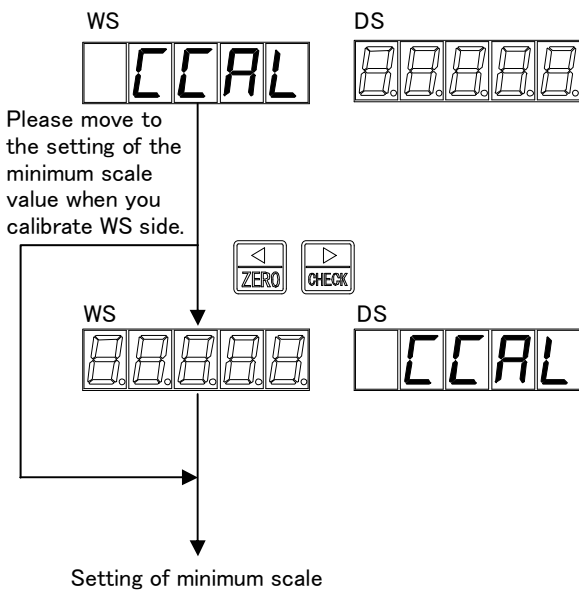
Press the **DS DOWN** key once.

The display becomes **CCAL** blinking.

Press the **ENTER SHIFT** key here.

The display becomes **CCAL**, and it enters into the calibration mode.

### 4-3-3. Selection to be calibrated



Select the calibration target from WS and DS.

When **CCAL** is displayed at the WS side, WS is selected as the calibration target

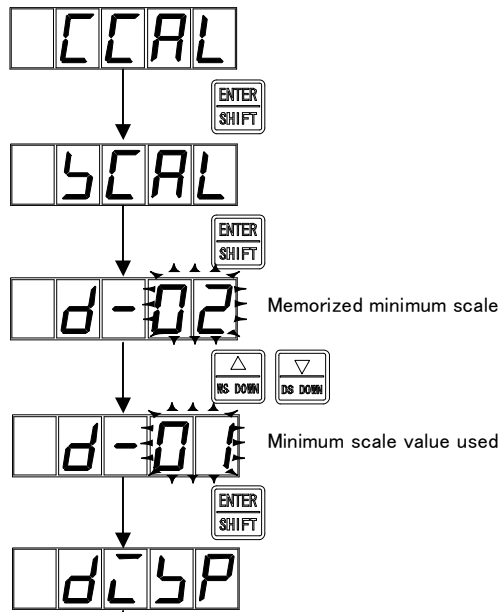
When **CCAL** is displayed at the DS side, DS is selected as the calibration target.

**ZERO** **CHECK** : Select the calibration target.

Change the display position of **CCAL** with WS→DS→WS.

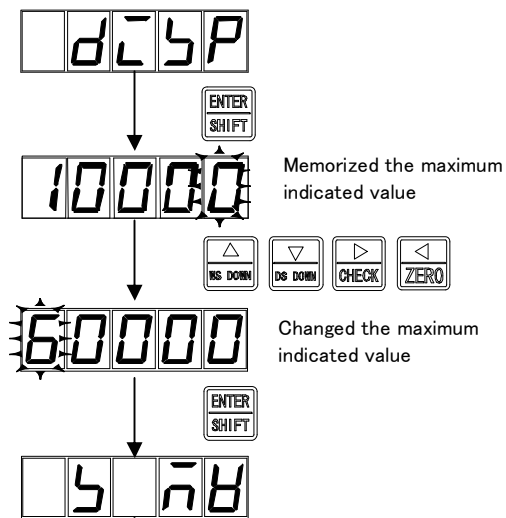
**FUNC.** : Interrupt the setting and move the display of **CCAL** to WS side.

#### 4-3-4. Setting of minimum scale value



To the setting of the maximum indicated value

#### 4-3-5. Setting of the maximum indicated value



To the span calibration

By pressing the key from twice, is displayed.

"\*\*" is a minimum scale value memorized now.

Select the minimum scale from 1, 2, 5, and 10.

- : Select the minimum scale value
- : Interrupt the setting and return to
- : Memorize the displayed value and proceed to the next step.

After the setting, press the key.

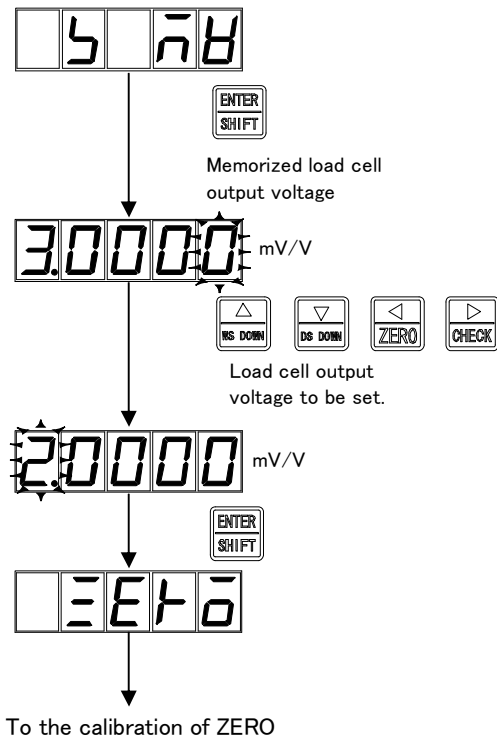
By pressing the key from , (initial value) is displayed.

When the maximum indicated value has already been changed, the present memorized value is displayed. Here, please set the maximum indicated value.

- : Change the value of the changed digit.
- : Select the changed digit.
- : Interrupt the changing and return to blinking
- : Memorize the displayed value and proceed to the next step

After the setting, pushing the key.

### 4-3-6. Calibration of Span



After the display of **5 nH**, **\*.\*\*\*\***

displays by pressing the **ENTER/SHIFT** key.

"\*.\*\*\*\*" means a memorized load cell output voltage.

Set the value of mV/V in which the output voltage of the load cell equivalent to the set value as the maximum display is subtracted from the output voltage of the load cell equivalent to the set value as zero point.

**UP/DN DOWN**, **DOWN/DN DOWN** : Change the value of the changed digit.

**ZERO**, **CHECK** : Select the changing digit.

**FUNC.** : Interrupt the setting, and return to **CAL** blinking

**ENTER/SHIFT** : Memorize the displayed value, and proceed to the next step

After the setting, press the **ENTER/SHIFT** key.

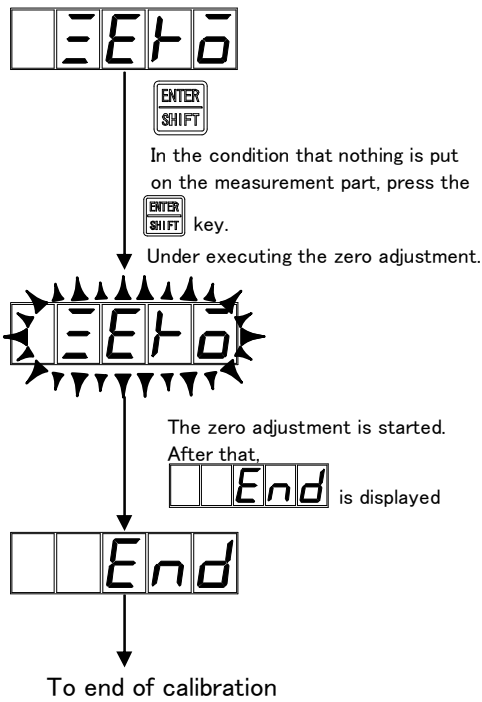
#### Error display of span setting

**SP-L** : ("Load cell output voltage of span" - "Load cell output voltage of zero point") < 0.2 mV/V, it blinks for about 2 seconds. (Please refer to "13. error indication".)

**SP-H** : When the output of load cell exceeds over 3.1 mV/V, it blinks for 2 second.

(Please refer to "13. Error display".)

#### 4-3-7. Calibration of zero



Make the condition that nothing is put on the measurement part.

By pushing the key, blinks and zero adjustment starts.

After the zero adjustment, is displayed.

: Interrupt the setting, and return to blinking.

: Memorize the displayed value, and proceed to the next step.

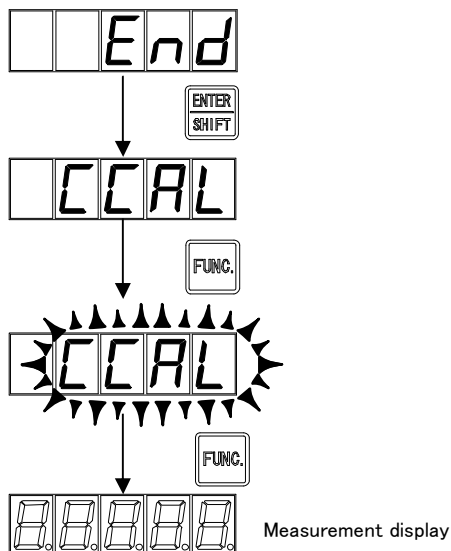
After the setting, press the key.

#### Error display of calibration of zero

: When the output from the load cell is  $-2 \text{ mV/V}$  or less, it blinks for about 2 seconds. (Please refer to "13. Error display".)

: When the output of the load cell is  $2 \text{ mV/V}$  or more, it blinks for about 2 seconds. (Please refer to "13. Error display".)

#### 4-3-8. Calibration end



After the calibration of zero, displays

To finish the calibration mode, press the key.

displays, and the setting data is memorized in the internal memory.

By pressing the key, becomes blinking.

Additionally, by pressing the key to go to the measuring condition.

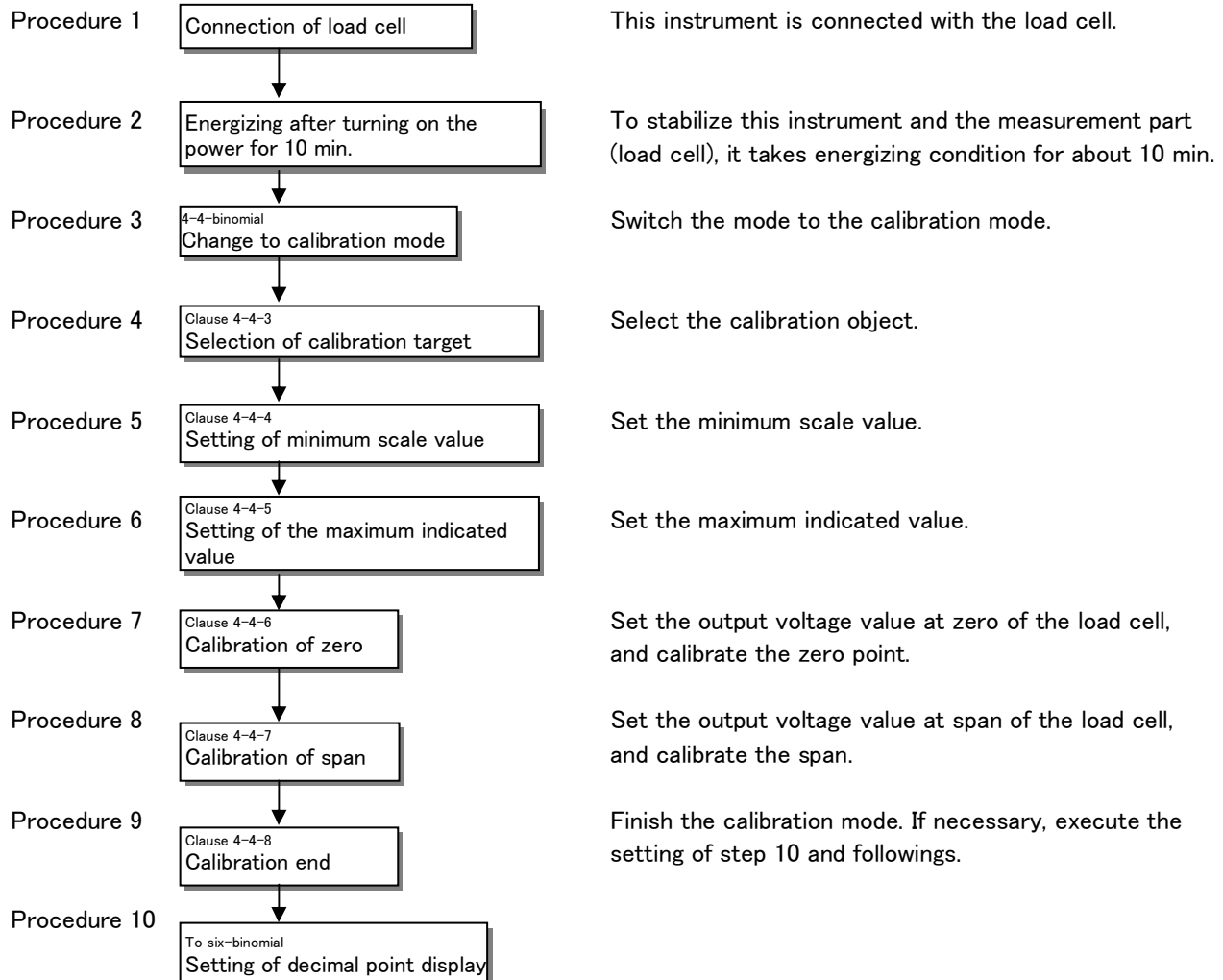
The calibration mode is ended.



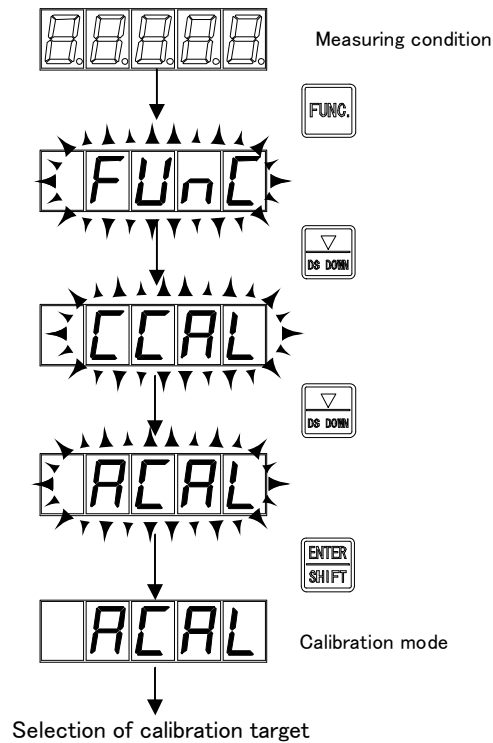
- When the using condition is changed, make the calibration if necessary.
- The display resolution that the performance becomes effective is 10 000 or less.

#### 4-4. Calibration procedure of Digital zero and span calibration mode (ACAL calibration mode)

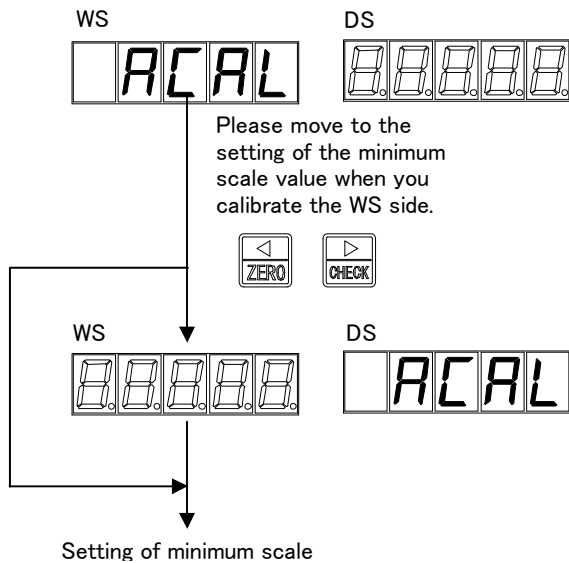
##### 4-4-1. Flow of calibration



#### 4-4-2. Change to calibration mode



#### 4-4-3. Selection of calibration target



By pressing the **FUNC.** key, **FUNC** is blinking

Press the **DS DOWN** key twice.

The display becomes **ACAL** blinking.

Press the **ENTER SHIFT** key, here.

**ACAL** displays, and it enters into the calibration mode.

Please select a target of the calibration from WS and DS.

When **ACAL** displays at WS side, WS is selected as the calibration target.

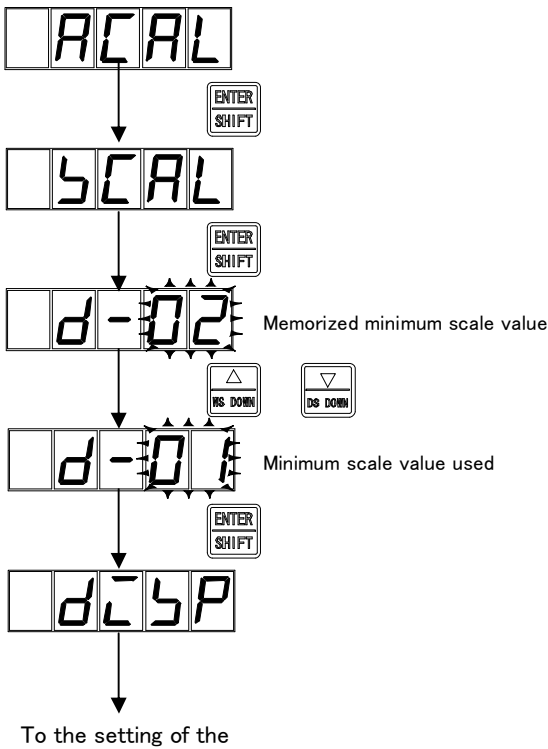
When **ACAL** displays at DS side, DS is selected as the calibration target.

**ZERO** **CHECK**: Select the calibration target

The display position of **ACAL** changes with WS→DS→WS.

**FUNC.**: The setting is interrupted and the blinking of **ACAL** moves to WS side.

#### 4-4-4. Setting of minimum scale value



By pressing the [ENTER/SHIFT] key twice from [ACAL] display, [d-\*\*] is displayed.

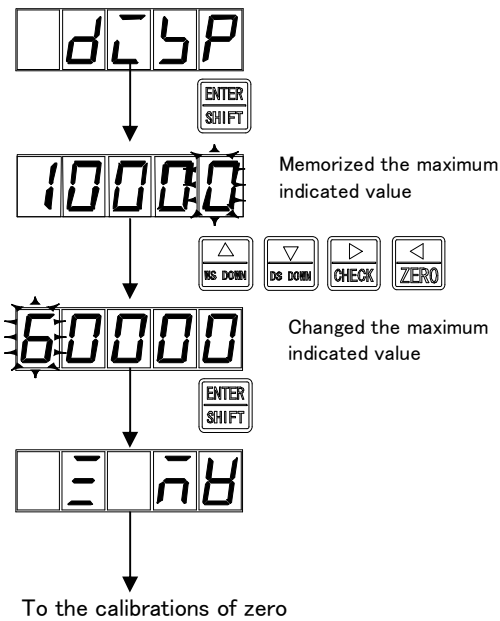
“ \*\* ” is a minimum scale value being memorized now.

Select the minimum scale value from 1, 2, 5, and 10.

- [DS DOWN] [DS DOWN] : Select the minimum scale.
- [FUNC.] : Interrupt the setting and return to the [ACAL] blinking
- [ENTER/SHIFT] : Memorize the displayed value, and proceed to the next step

After the setting, press the [ENTER/SHIFT] key.

#### 4-4-5. Setting of the maximum indicated value



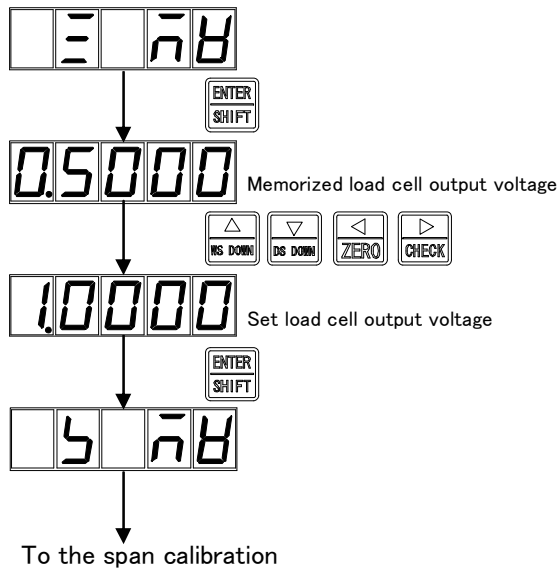
By pressing the [ENTER/SHIFT] key from [dL5P] display, [10000] (initial value) is displayed.

When the maximum display value has been already changed, the maximum display memorized now is displayed.

- [DS DOWN] [DS DOWN] : Change the value of the changed digit.
- [ZERO] [CHECK] : Select the changed digit.
- [FUNC.] : Interrupt the setting and return to the [ACAL] blinking.
- [ENTER/SHIFT] : Memorize the displayed value, and proceed to the next step.

After the setting, the [ENTER/SHIFT] key is pushed.

#### 4-4-6. Calibration of zero

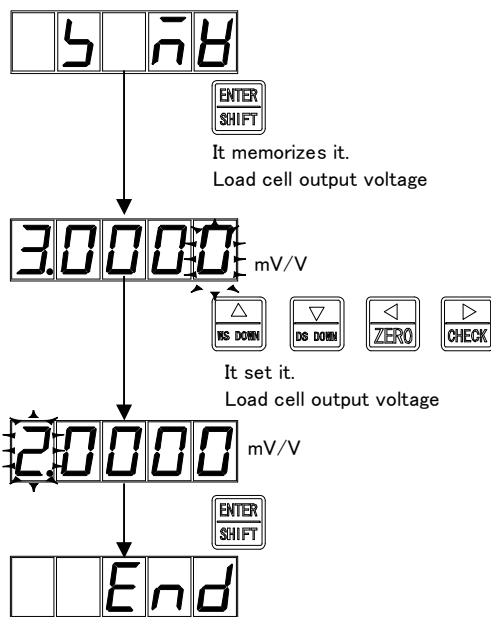


By pressing the key in the display, is displayed. “\*\*\*\*\*” is a memorized load cell output voltage. Set the load cell output voltage in mV/V that corresponds to the zero point. The setting range is from -1.9999 mV/V to 1.9999 mV/V.

- : Change the value of the changed digit.
- : Select the changed digit.
- : Interrupt the setting and return to the blinking.
- : Memorize the displayed value, and proceed to the next step.

After the setting, press the key.

#### 4-4-7. Calibration of span



By pressing the key in the display, is displayed. “\*\*\*\*\*” is a memorized load cell output voltage. Set the value that add the load cell output voltage that corresponds to the maximum display value on the value that corresponds to the zero point in each mV/V

- : Change the value of the changed digit.
- : Select the changed digit.
- : Interrupt the setting and to return to the blinking.
- : Memorize the displayed value and proceed. I to the next step.

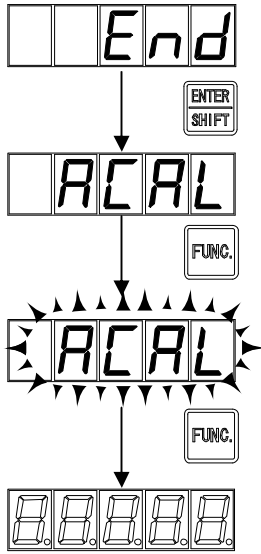
After the setting, press the key.

#### Error display in the setting of span

When (“Load cell output voltage of span” – “Load cell output voltage of zero point”) < 0.2 mV/V, it blinks for about 2 seconds. (Please refer to “Paragraph 13. Error indication”.)

When the load cell output exceeds over 3.1mV/V, it blinks for about 2 seconds. (Please refer to “Paragraph 13. Error indication”.)

#### 4-4-8. End of Calibration



`End` displays after the end of span calibration.

Press the **ENTER/SHIFT** key to end the calibration mode.

`ACAL` displays, and the setting data is memorized to the inside.

By pressing the **FUNC.** key, `ACAL` blinks.

And by pressing the **FUNC.** key, put the condition in the measuring mode.

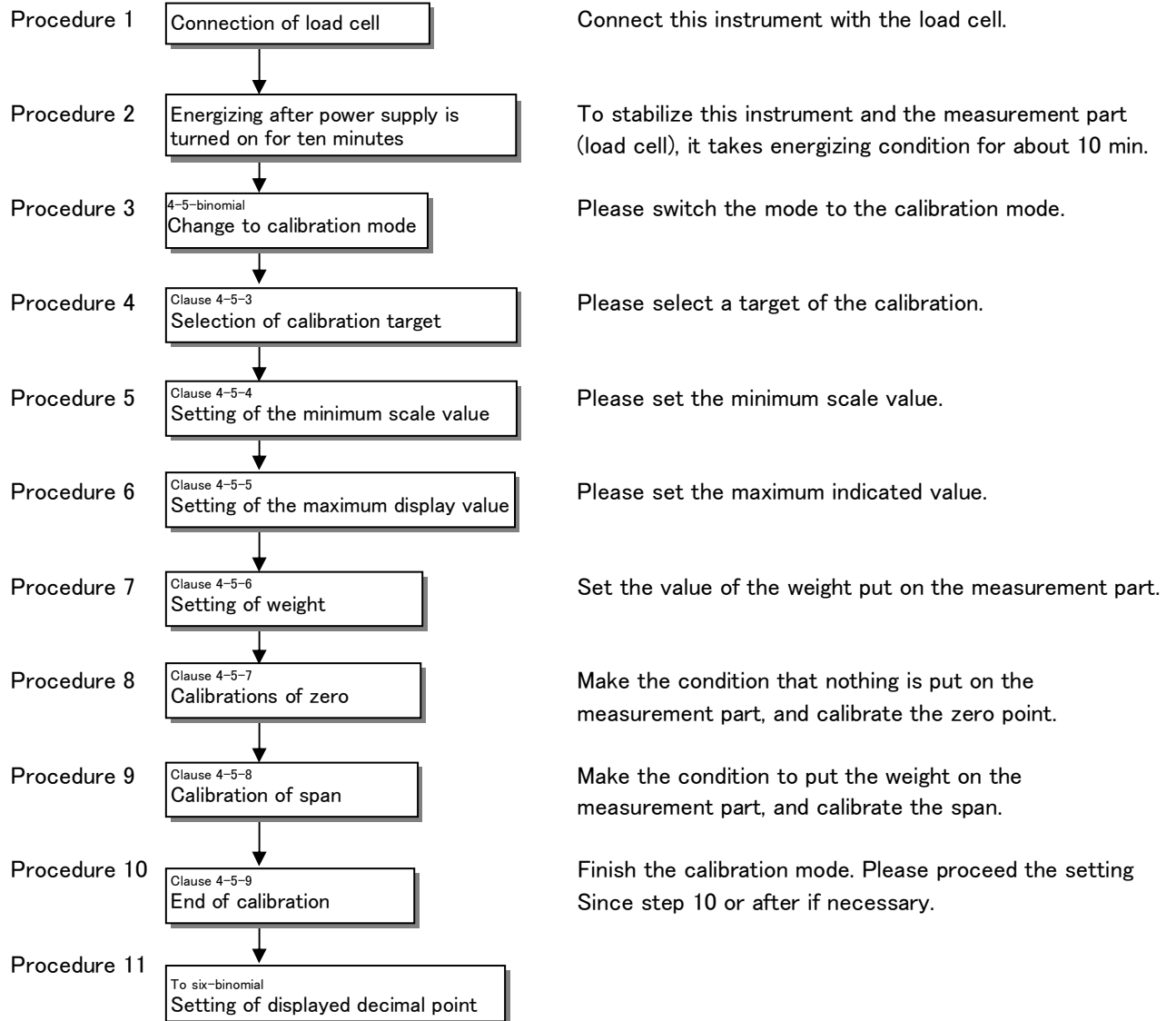
The calibration mode is ended.



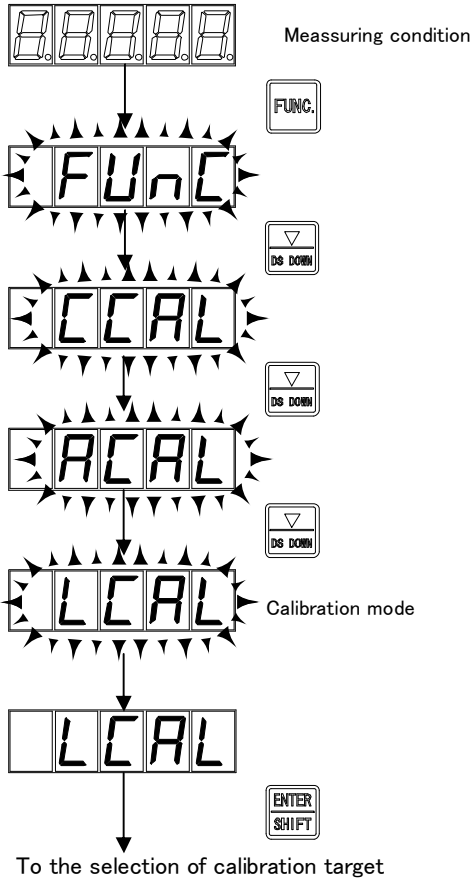
- Please calibrate if necessary when the environment used changes.
- The resolution of the display that the performance becomes effective is 10 000 or less.

#### 4-5. Calibration procedure of actual Zero/Span (LCAL calibration mode)

##### 4-5-1. Flow of calibration



### 4-5-2. Change to calibration mode



By pressing the key, displays blinking.

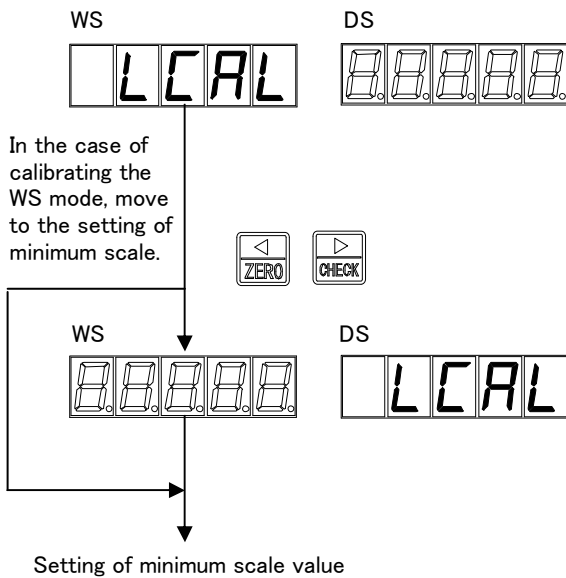
Press the key three times.

becomes a blinking display.

Press the key, here.

displays, and enters into the calibration mode.

### 4-5-3. Selection to be proofread



Select the calibration target from WS and DS.

When is displayed at the WS side, WS is selected as the calibration target.

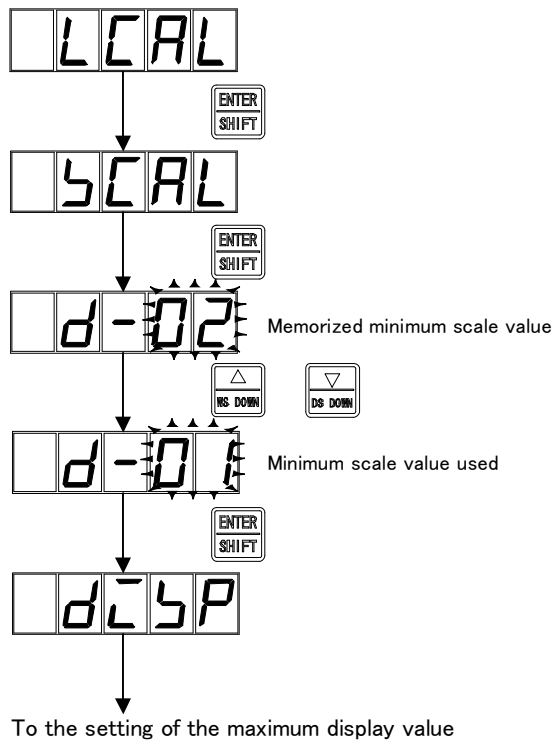
When is displayed at the DS side, DS is selected as the calibration target.

: Select the calibration target.

Change the display position of with WS→DS→WS.

: Interrupt the setting and move the blinking of is moved to WS side.

#### 4-5-4. Setting of minimum scale value



By pressing the key twice from is displayed.  
 "02" is a minimum scale value being memorized now.

Select the minimum scale value from 1, 2, 5, and 10.

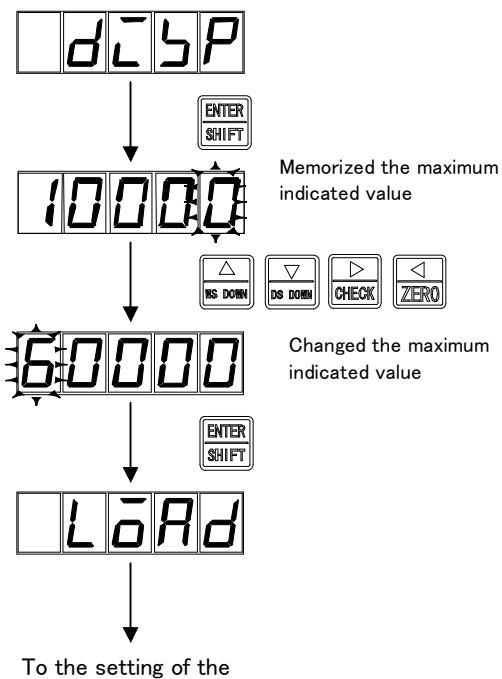
: Select the minimum scale value.

: Interrupt the setting and return to blinking of

: Memorize the displayed value, and proceed to the next step.

After the setting, press the key.

#### 4-5-5. Setting of the maximum indicated value



By pressing the key from the display (initial value) is displayed.

When the maximum indicated value has already been changed, the present memorized value is displayed. Here, please set the maximum indicated value.

: Change the value of the changed digit

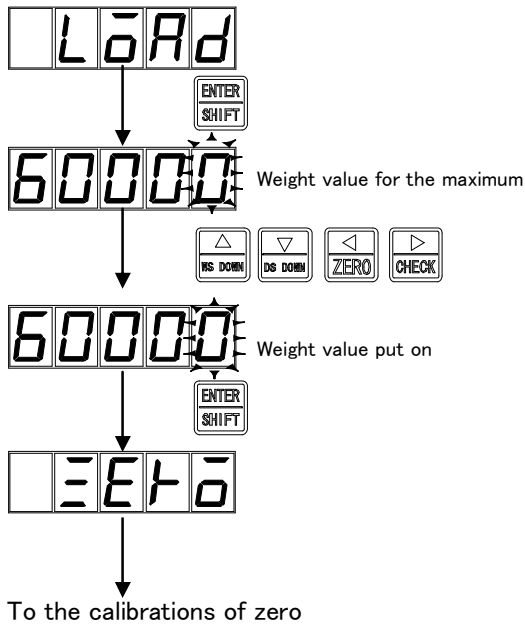
: Select the changed digit.

: Interrupt the setting and return to blinking.

: Memorize the displayed value, and proceed to the next step.

After the setting, press the key.

4-5-6. Setting of mass of weight



By pressing the key from display, is displayed.

"\*\*\*\*\*" is a value of the maximum indicated value. Here, set the weight of mass actually put on the measurement part.

Make the setting as same as the maximum indicated value when there is a weight for the maximum indicated value.

: Change the value of the changed digit.

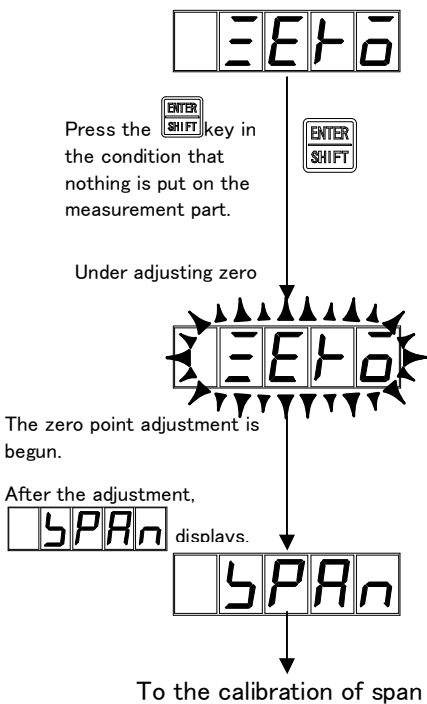
: Select the changed digit.

: Interrupt the setting and return to the .

: Memorize the displayed value, and proceed to the next step.

After the setting, press the key.

4-5-7. Calibration of zero



Please make the condition that nothing is put on the measurement part.

Press the .

blinks, and begins the zero point adjustment.

After completing the zero adjustment, is displayed.

: Interrupt the setting, and returns to the display of .

: Memorize the displayed value, and proceed to the next step.

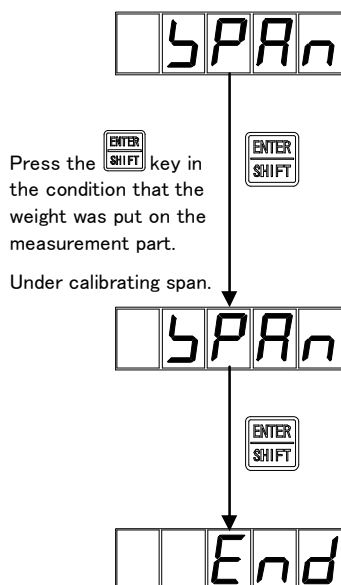
After the setting, press the key.

Error display for the setting of zero.

: When the output of the load cell is less than -2 mV/V, it blinks for about 2 second. (Please refer to the paragraph 13. "Error indication".)

: When the output of the load cell exceeds over 2 mV/V, it blinks for about 2 second. (Please refer to the paragraph 13. "Error indication".)

#### 4-5-8. Calibration of span



Set the mass equivalent to the weight set in the paragraph 4-5-6. on the measuring part.

Press the key.

display blinks, and the span adjustment is begun.

After completing the span adjustment, displays.

: Interrupt the setting, and returns to

display.

: Memorize the displayed value, and proceed to the next step

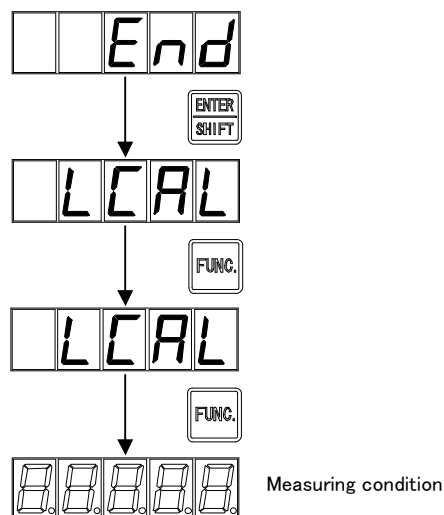
After the setting, press the key.

Error display for span calibration

("Load cell output voltage of span" - "Load cell output voltage of zero point") < 0.2 mV/V  
It blinks for about 2 second. (Please refer to the paragraph 13. "Error indication".)

When the load cell output exceed over 3.1 mV/V, it blinks for about 2 second.  
(Please refer to the paragraph 13. "Error indication".)

#### 4-5-9. End of calibration



After completing the span calibration, is displayed.

To end the calibration mode, press the key.

It becomes a display, and memorize the data into the inside memory.

By pressing the key, blinking of moved to the WS side. Additionally, press the key, and put the condition into the measuring mode.  
The calibration mode is ended.



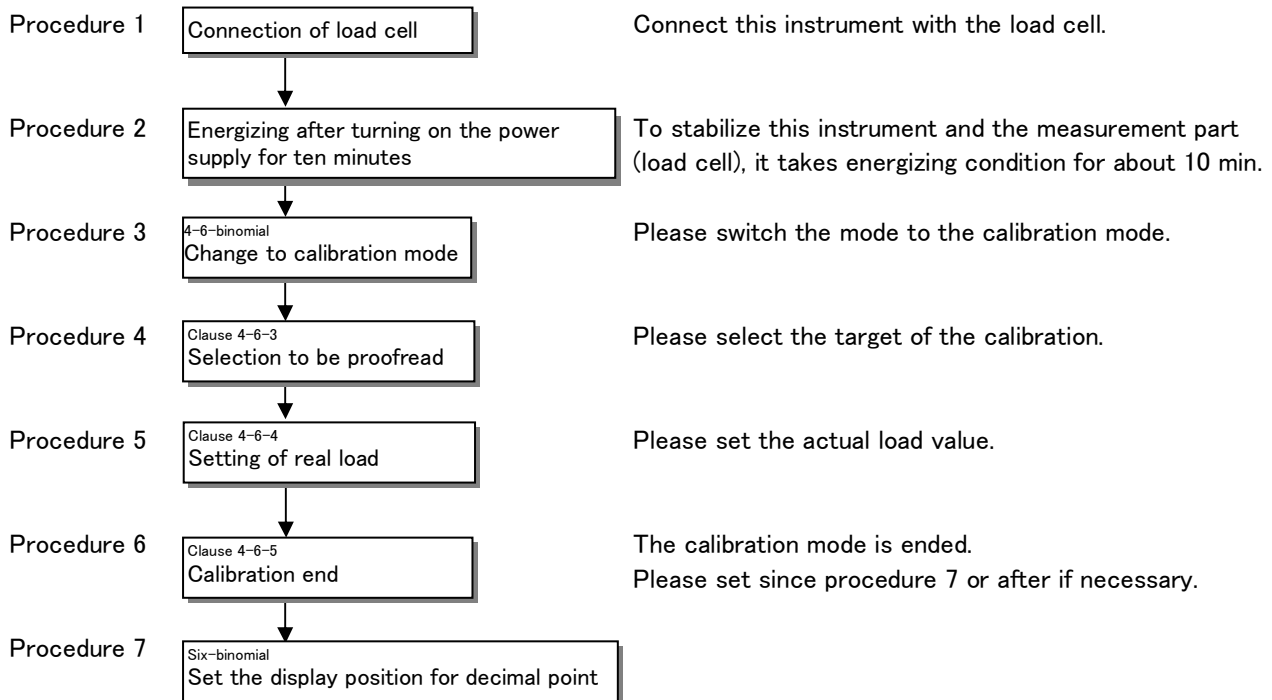
- Please calibrate if necessary when the environment used changes.
- The display resolution that the performance becomes effective is 10 000 or less.

## 4-6. Calibration procedure of digital span calibration mode (SPAN2 calibration mode)

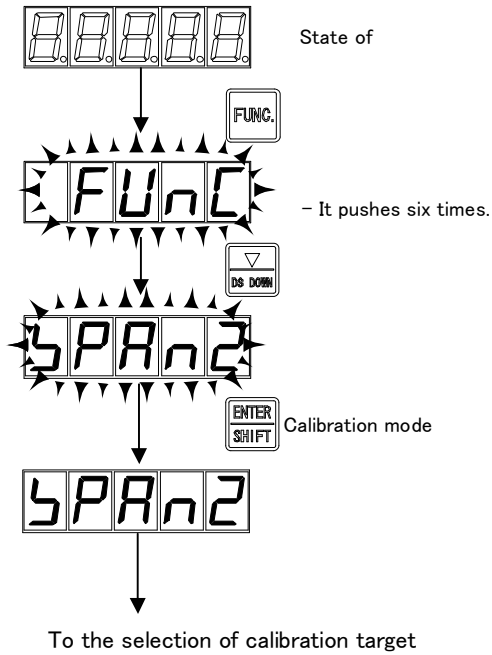


In the calibration procedure, there is a possibility of causing the difference with the indicated value of the target load by the impact and the vibration, etc. When a measurement with a good accuracy is required, that stops measuring and calibrates again is recommended.

### 4-6-1. Flow of calibration



#### 4-6-2. Change to calibration mode



By pressing the **FUNC.** key, the display of **Func** blinks.

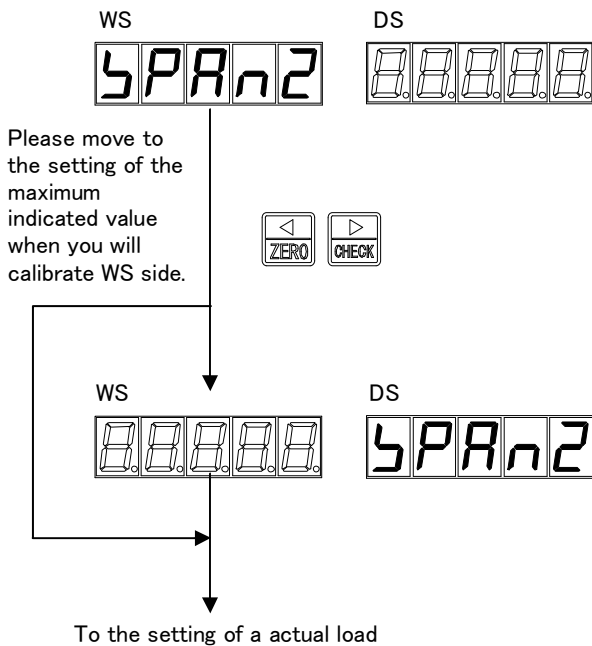
Press the **DS DOWN** key six times.

**SPAn2** becomes a blinking display.

Press the **ENTER SHIFT** key, here.

**SPAn2** displays, and it enters into the calibration mode.

#### 4-6-3. Selection to be proofread



Select the calibration target from WS and DS.

When **SPAn2** is displayed at the WS side, WS is selected as the calibration target.

When **SPAn2** is displayed at the DS side, DS is selected as the calibration target.

**ZERO** **CHECK**: The calibration object is selected.

Change the display position of **SPAn2** with WS→DS→WS.

**FUNC.**: Interrupt the setting, and the blinking of **SPAn2** is moved to WS side.

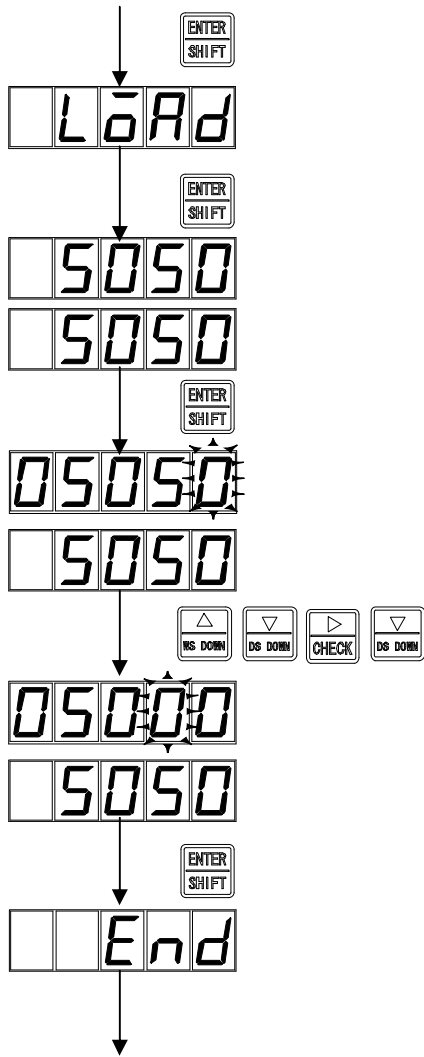
Press the **ENTER SHIFT** key in the display of **SPAn2**

Display becomes **LOAD**.

**FUNC.**: Interrupt the setting, and move the blinking of **SPAn2** to the WS side.

#### 4-6-4. Setting of actual weight

Ex. : When you have calibrated the maximum indicated value by 10 000, it is an operation example to display as “5 000” when the display is “5 050” with the actual weight of 5 000 or equivalent.  
 The setting of load cell output (mV/V) the maximum weight changes if this calibration is executed.  
 In the case that the setting of the maximum load cell output(mV/V) is 2.000, the load cell output (mV/V) becomes 2.0200.



To completing the calibration

Press the key at the display of .

The display becomes a .

: Interrupt the setting, and move the blinking display of to WS side.

Press the key from the display of , the present load is displayed.

In the calibration of WS side, the present load appears at the display of WS (upper part) or ADD (lower side).

In the calibration of DS side, the present load appears at the display of DS (upper part) or DIFF(lower side).

Press the key.

The digit of a minimum indicated value of upside display panel becomes blinking.

At this time, the lower display changes according to the changes of the present load, but the upper display doesn't change.

Set the “Value to change the display of the present load” in the upper display part.

: Select the changed digit.

: Change the value of the changed digit.

: Interrupt the setting, and move to the blinking display of at the WS side.

Press the key. The setting is temporarily registered internally, and move to the blinking display of .



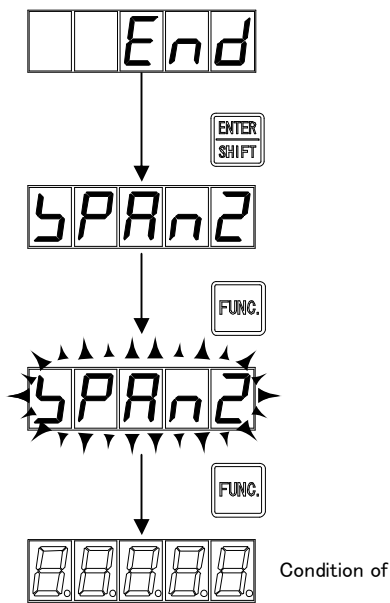
A revokable indicated value in this calibration is  $\pm 10\%$  of the load value now at the time of be displayed. “ET-2” is displayed for about two seconds when changing exceeding this and it returns to the indicated value immediately before.

Display of span calibration error

In (“Load cell output voltage of span” – “Load cell output voltage of zero point”) < 0.2 mV/V, It blinks for about two seconds. (Please refer to “13. Error display”.)

When the load cell output exceeds over 3.1 mV/V, it blinks for about two seconds. (Please refer to “13. Error display”.)

#### 4-6-5. End of calibration



`End` is displayed after the set of the maximum display value.

Press the **ENTER SHIFT** key to finish the calibration mode.

`SPAn2` becomes a display, and the set data is memorized in the internal memory.

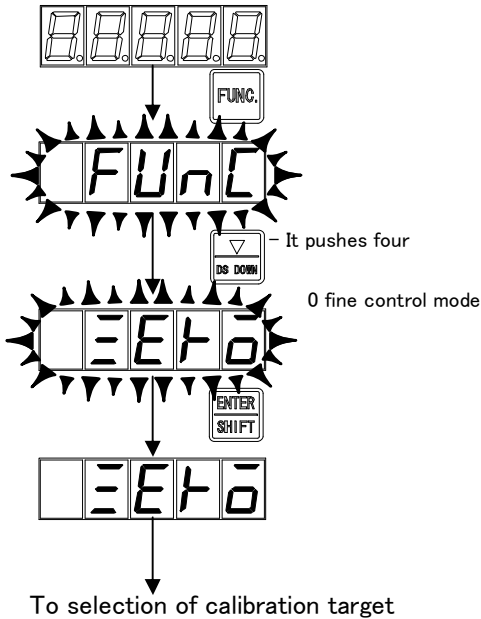
By pressing the **FUNC.** key, `SPAn2` displays blinking.

Next, press the **FUNC.** key, and put the condition into the Measuring mode.

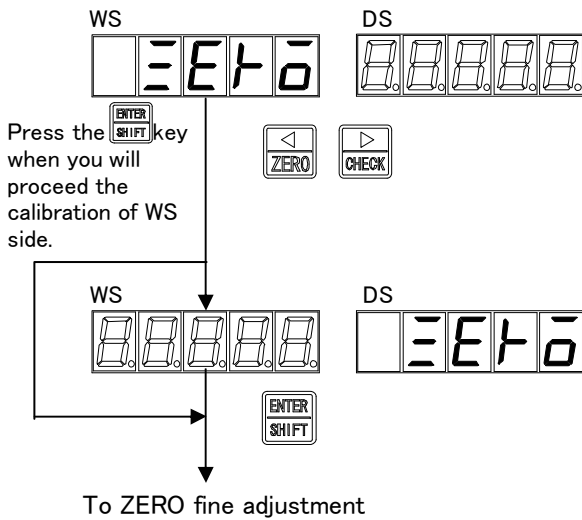
The calibration mode is ended.

## 4-7. Fine adjustment of ZERO

### 4-7-1. Change to ZERO fine control mode



### 4-7-2. Selection to be proofread



Select the calibration target from WS and DS.

When the **00000** is displayed at the WS side, WS is selected as a calibration target.

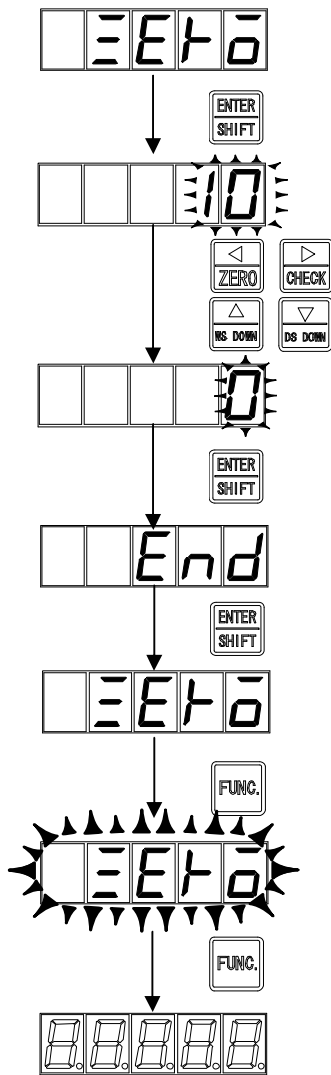
When the **00000** is displayed at the DS side, DS is selected as a calibration target..

**ZERO** **CHECK** : Select the calibration target

Change the display position of **00000** with WS→DS→WS.

**FUNC.** : Interrupt the setting and move the blinking of **00000** is moved to WS side.

### 4-7-3. Fine adjustment of ZERO



By pressing the key from , is displayed.

“\*\*\*\*\*” means a present measuring value. Set the display to zero after the condition that nothing is put on the measuring part.

- : Decrease the measuring value for 10 digits
- : Increase the measuring value for 10 digits.
- : Increase the measuring value for 1 digit.
- : Decrease the measuring value for 1 digit.
- : Interrupt the setting and return to the blinking of .
- : The displayed value is memorized, and it proceeds to the next step.

Press the key after the zero fine adjustment.

is displayed.

Press the key to finish the fine adjustment of ZERO.

It becomes a display, and the set data is memorized into the internal memory

When the key is pressed, the display of becomes blinking display.

By pressing the key, set the condition into the measuring mode.

The fine adjustment of ZERO is completed.

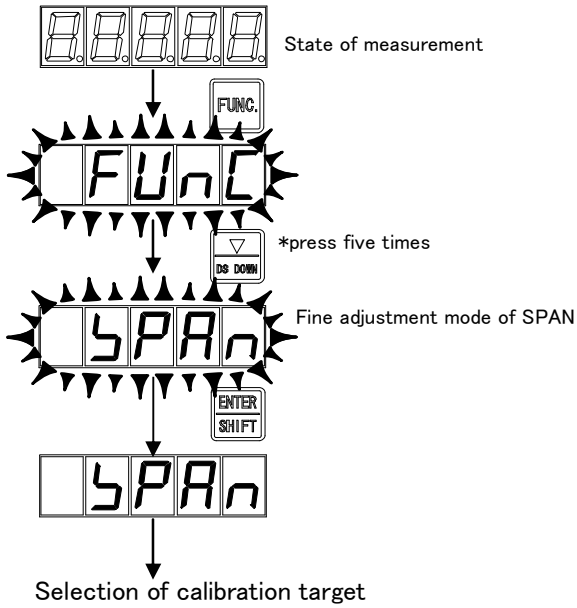
### Error display of ZERO calibration

: When the load cell output is -2.0 mV/V or less, it blinks for about 2 seconds. (Please refer to “13. Error display”.)

: When the load cell output is 2.0 mV/V or more, it blinks for about 2 seconds. (Please refer to “13. Error display”.)

## 4-8. Fine adjustment of SPAN

### 4-8-1. Change to SPAN fine adjustment mode



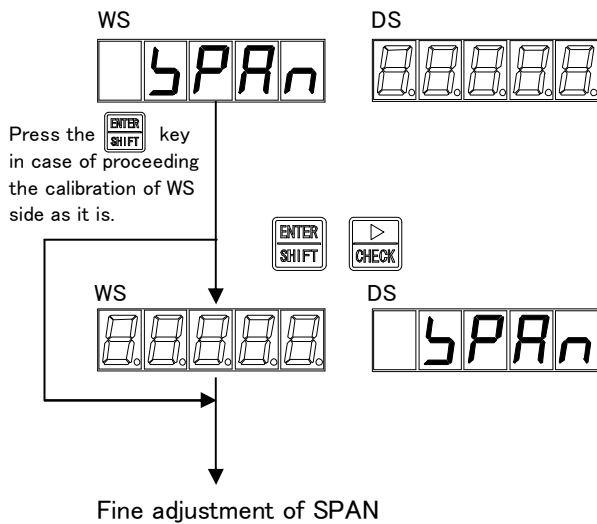
Press the key, and display becomes .

Press the key five times.

The indication becomes blinking, and press the key.

The indication becomes , and enters into The SPAN fine adjustment mode.

### 4-8-2. Selection of calibration target



Select the calibration target from WS and DS.

When the is displayed at WS side, WS is selected as the calibration target.

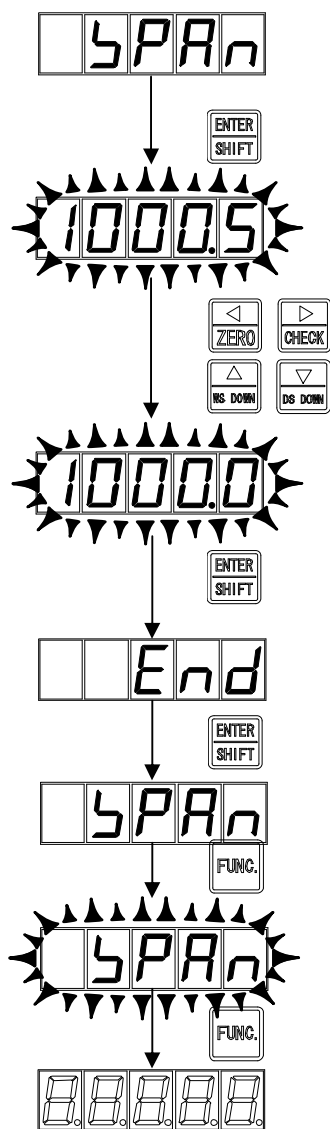
When the is displayed at WS side, WS is selected as the calibration target.

: Select the calibration target

Change the position of with WS→DS→WS.

: Interrupt the setting, and move the blinking of to WS side.

### 4-8-3. Fine adjustment of SPAN



By pressing the key from , is displayed.

“\*\*\*\*\*” means a present measuring value. Put the weight that can be put on measuring part below the maximum indicated value. Adjust the indicated value as same as the weight put on the measuring part.

- : Decrease the measuring value for 10 digits
- : Increase the measuring value for 10 digits.
- : Increase the measuring value for 1 digit
- : Decrease the measuring value for 1 digit.
- : Interrupt the setting and return to the blinking of .
- : The displayed value is memorized, and it proceeds to the next step.

Press the key after the SPAN adjustment. is displayed.

Press the key to finish the fine adjustment of SPAN. It becomes a display, and set data is memorized into the internal memory.

When the key is pressed, the display of becomes blinking display.

By pressing the key, set the condition into the Measuring mode.

The fine adjustment of SPAN is completed.

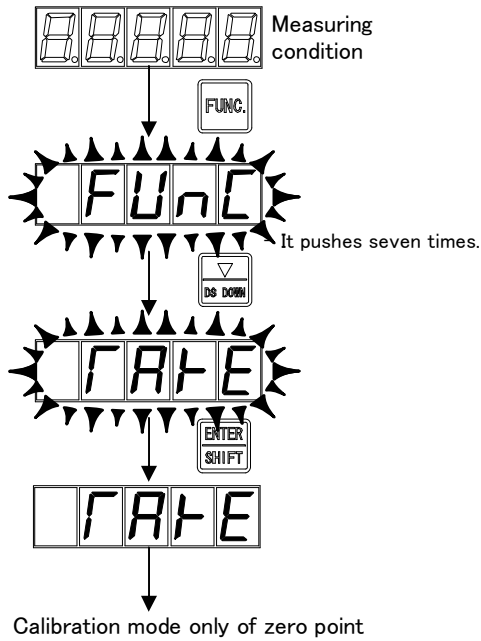
#### Error display of SPAN calibration

When (“Load cell output voltage of SPAN” – “Load cell output voltage of zero point”) < 0.2 mV/V it blinks for about 2 second. (Please refer to “13. Error display”.)

When the load cell output exceeds for 3.1 mV/V or more, it blinks for about 2 second. (Please refer to “13. Error display”.)

## 4-9. Calibration only of ZERO point

### 4-9-1. Change of calibration mode only of zero point



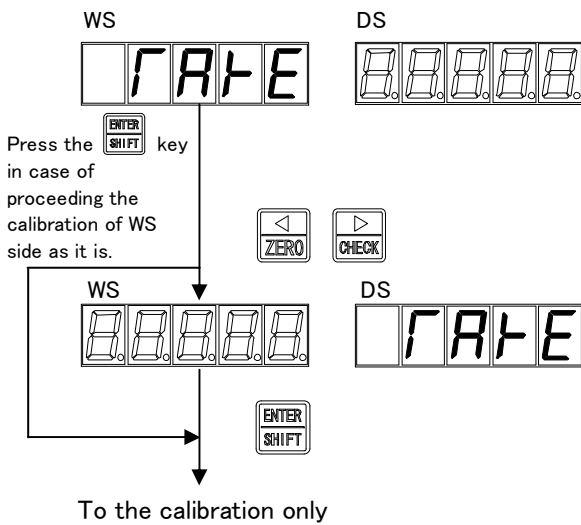
Press the **FUNC.** key, then **FUNC** is displayed.

Press the **DS DOWN** key seven times.

The indication becomes **RATE** blinking, and press the **ENTER SHIFT** key.

The indication becomes **RATE**, and enters into the calibration mode only for ZERO point.

### 4-9-2. Selection of calibration target



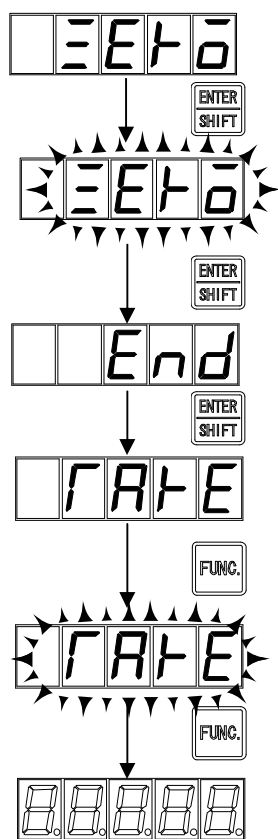
Select the calibration target from WS and DS.

When the **RATE** is displayed at WS side, WS is selected as the calibration target.

When the **RATE** is displayed at DS side, DS is selected as the calibration target.

- ZERO** **CHECK** : Select the calibration target
- Change the position of **RATE** with WS→DS→WS.
- FUNC.** : Interrupt the setting, and move the blinking of **RATE** to WS side.

### 4-9-3. Calibration only of ZERO point



Error display for ZERO calibration

**0E-L** : When the load cell output is  $-2.0 \text{ mV/V}$  or less, it blinks for about 2 seconds.  
(Please refer to "13. Error display".)

**0E-H** : When the load cell output is  $2.0 \text{ mV/V}$  or more, it blinks for about 2 seconds.  
(Please refer to "13. error indication".)

### 4-10. Calibration LOCK

The change in the calibration function can be prohibited by the setting with software. If F-97 is set effectively, calibration LOCK becomes effective.



- Calibration LOCK doesn't enter "CCAL", "ACAL", "LCAL", "00000", "SPAN", "TARE", and the "SPAN2" mode when it is effective.

By pressing the **ENTER/SHIFT** key from **00TARE**, **00000** is displayed.

Here, set the condition that nothing is put on measuring part except the tare weight.

Press the **ENTER/SHIFT** key, then the display of **00000**

blinks, and the ZERO point calibration is started.

**00End** is displayed upon completing the ZERO Point calibration.

When the **FUNC.** key is pressed in the display of **00End** the setting is interrupted and **00TARE** becomes blinking.

Press the key **ENTER/SHIFT** to finish the calibration mode only for ZERO point.

The display becomes **00TARE**, and the set data is memorized in the internal memory

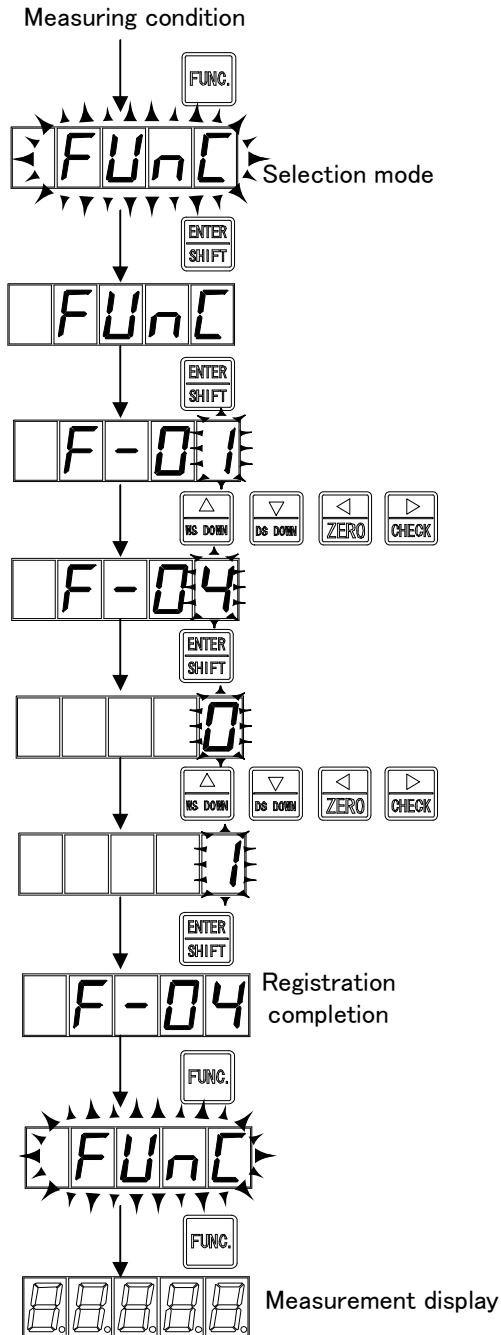
By pressing the **FUNC.** key, **00TARE** becomes blinking.

Move to the measuring condition by pressing the **FUNC.** key. The calibration mode only for the ZERO point is finished.

## 5. Function mode

Various functions become effective because of the setting of the function data.

### 5-1. Method of setting function mode



Pressing the **FUNC.** key, **FUNC** becomes blinking, and it enters into the selection mode.

Additionally, pressing the **ENTER SHIFT** key, **FUNC** is displayed, and enters into the function mode.

By pressing the **ENTER SHIFT** key, **F-00** is displayed. Select the function number that you want to change.

**↑** **↓** : Change the value of digit to be changed.

**←** **→** : Select the digit to be changed.

**FUNC.** : Return to **FUNC** blinking.

**ENTER SHIFT** : Memorize the value displayed, and proceed to the next step.

Press the **ENTER SHIFT** key.

Set the value of function number selected.

**↑** **↓** : Change the value of digit to be changed.

**←** **→** : Select the digit to be changed.

Press the **ENTER SHIFT** key.










The set content is registered, and display panel displays the registered function number.

Select the function number when you change the setting of other function numbers.

After completing the registration, display becomes **FUNC** blinking by pressing the **FUNC.** key.

Here, by pressing the **FUNC.** key, it returns to the measuring mode.

## 5-2. Function of function data

Item	Function number	Set point	Content
Effective range of ZERO set	F-00	00000 to 00100 *00100	Unit : %F.S. Set the effective range of ZERO operation
Selection of position of decimal point.	F-01	* 00000	No decimal point.
		00001	1234.5
		00002	123.45
		00003	12.345
		00004	1.2345
A/D sampling frequency	F-02	00000	4 times/s
		00001	20 times/s
		* 00002	100 times/s
Display frequency	F-03	00000	4 times/s
		* 00001	20 times/s
Set of digital filter	F-04	00000	OFF
		00001	2 times of moving average frequency
		00002	4 times of moving average frequency
		* 00003	8 times of moving average frequency
		00004	16 times of moving average frequency
		00005	32 times of moving average frequency
		00006	64 times of moving average frequency
		00007	128 times of moving average frequency
DS·WS-DOWN operation input selection	F-05	* 00000	It depends on the front panel key operation.
		00001	It depends on the external control signal.
Setting of keylock	F-06	00000 to 11111 *00000	0 : Unlocking 1 : Lock 10 <sup>0</sup> digits :  key 10 <sup>1</sup> digits :  key 10 <sup>2</sup> digits :  key 10 <sup>3</sup> digits :  key 10 <sup>4</sup> digits :  key - When the  key is locked, by pressing the  key together with the  key for 3 seconds or more, The lock of the  key is released only once
Setting of digital filter for stabilization filter	F-07	00000	OFF
		00001	2 times of stabilization filter
		* 00002	4 times of stabilization filter
		00003	8 times of stabilization filter
		00004	16 times of stabilization filter
		00005	32 times of stabilization filter
		00006	64 times of stabilization filter
		00007	128 times of stabilization filter
Setting of time width for stabilization filter	F-08	00000 to 00999 * 00020	Unit : 10 ms 00 : Stabilization filter OFF
Setting of width of data for stabilization filter	F-09	00000 to 00999 * 00100	Unit : 1D 00000 : Stabilization filter OFF

\* : Default setting

Item	Function number	Set point	Content
Set of analog output target Output 1 to output 4	F-10	01111 to 04444 * 04321	1 : WS 2 : DS 3 : ADD 4 : DIFF 10 <sup>0</sup> digits : Output 1 10 <sup>1</sup> digits : Output 2 10 <sup>2</sup> digits : Output 3 10 <sup>3</sup> digits : Output 4
Set of analog output target Output 5 to output 8	F-11	01111 to 04444 * 04321	1 : WS 2 : DS 3 : ADD 4 : DIFF 10 <sup>0</sup> digits : Output 5 10 <sup>1</sup> digits : Output 6 10 <sup>2</sup> digits : Output 7 10 <sup>3</sup> digits : Output 8 – It becomes effective when the optional analog output board is mounted.
Set of analog output target Output 9 to output 12	F-12	01111 to 04444 * 04321	1 : WS 2 : DS 3 : ADD 4 : DIFF 10 <sup>0</sup> digits : Output 9 10 <sup>1</sup> digits : Output 10 10 <sup>2</sup> digits : Output 11 10 <sup>3</sup> digits : Output 12 – It becomes effective when the optional analog output board is mounted
Set of analog output type Output 1 to output 4	F-13	00000 to 06666 * 00000	0 : 0 V to 10 V 1 : 0 V to 5 V 2 : 0 V to 1 V 3 : -10 V to 10 V 4 : -5 V to 5 V 5 : -1 V to 1 V 6 : 4 mA to 20 mA 10 <sup>0</sup> digits : Output 1 10 <sup>1</sup> digits : Output 2 10 <sup>2</sup> digits : Output 3 10 <sup>3</sup> digits : Output 4
Set of analog output type Output 5 to output 8	F-14	00000 to 06666 * 00000	0 : 0 V to 10 V 1 : 0 V to 5 V 2 : 0 V to 1 V 3 : -10 V to 10 V 4 : -5 V to 5 V 5 : -1 V to 1 V 6 : 4 mA to 20 mA 10 <sup>0</sup> digits : Output 5 10 <sup>1</sup> digits : Output 6 10 <sup>2</sup> digits : Output 7 10 <sup>3</sup> digits : Output 8 – It becomes effective when the optional analog output is mounted.

\* Default setting

Item	Function number	Set point	Content
Set of analog output type Output 9 to output 12	F-15	00000 to 06666 * 00000	0 : 0 V to 10 V 1 : 0 V to 5 V 2 : 0 V to 1 V 3 : -10 V to 10 V 4 : -5 V to 5 V 5 : -1 V to 1 V 6 : 4 mA to 20 mA 10 <sup>0</sup> digits : Output 9 10 <sup>1</sup> digits : Output 10 10 <sup>2</sup> digits : Output 11 10 <sup>3</sup> digits : Output 12 - It becomes effective when the optional analog output is mounted.
Set of ADD DIFF display Effective or invalid	F-18	* 00000	ADD/DIFF displays in the measuring mode.
		00001	No ADD/DIFF displays in the measuring mode.
Set of output ratio in the DOWN period for both DS and WS	F-19	00000 to 00100 * 00100	Unit : %F.S. During both DS and WS being DOWN, the ratio of this setting is applied to the display (Output) against the maximum display in the calibration.
Set of display value when the analog output 1 is the minimum output.	F-20	-19999 to 99999 * 00000	Indicated value
Set of display value when the analog output 1 is the maximum output	F-21	-19999 to 99999 - 02000	Indicated value
Set of display value when the analog output 2 is the minimum output.	F-22	-19999 to 99999 * 00000	Indicated value
Set of display value when the analog output 2 is the maximum output	F-23	-19999 to 99999 * 02000	Indicated value
Set of display value when the analog output 3 is the minimum output.	F-24	-19999 to 99999 * 00000	Indicated value
Set of display value when the analog output 3 is the maximum output	F-25	-19999 to 99999 * 02000	Indicated value
Set of display value when the analog output 4 is the minimum output.	F-26	-19999 to 99999 - 00000	Indicated value
Set of display value when the analog output 4 is the maximum output	F-27	-19999 to 99999 * 02000	Indicated value
Set of display value when the analog output 5 is the minimum output.	F-28	-19999 to 99999 * 00000	Indicated value - When the analog output substrate of another goods for sale is mounted, it becomes effective.
Set of display value when the analog output 5 is the maximum output	F-29	-19999 to 99999 * 02000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 6 is the minimum output.	F-30	-19999 to 99999 * 00000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 6 is the maximum output	F-31	-19999 to 99999 - 02000	Indicated value - It becomes effective when the optional analog output board is mounted

\* Default setting

Item	Function number	Set point	Content
Set of display value when the analog output 7 is the minimum output.	F-32	-19999 to 99999 * 00000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 7 is the maximum output	F-33	-19999 to 99999 * 02000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 8 is the minimum output.	F-34	-19999 to 99999 * 00000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 8 is the maximum output	F-35	-19999 to 99999 * 02000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 9 is the minimum output.	F-36	-19999 to 99999 * 00000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 9 is the maximum output	F-37	-19999 to 99999 * 02000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 10 is the minimum output.	F-38	-19999 to 99999 * 00000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 10 is the maximum output	F-39	-19999 to 99999 * 02000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 11 is the minimum output.	F-40	-19999 to 99999 * 00000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 11 is the maximum output	F-41	-19999 to 99999 * 02000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 12 is the minimum output.	F-42	-19999 to 99999 * 00000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of display value when the analog output 12 is the maximum output	F-43	-19999 to 99999 * 02000	Indicated value - It becomes effective when the optional analog output board is mounted
Set of bridge power supply voltage	F-44	* 00000	10 V
		00001	2.5 V
Set of WS check value	F-50	0.0000 to 3.0000 - 0.0000	Unit : mV/V At the CHECK ON, the check value set to WS is output.
Set of DS check value	F-51	0.0000 to 3.0000 * 0.0000	Unit: MV/V At the CHECK ON, the check value set to DS is output.
Coefficient set value for WS	F-60	0.1000 to 9.9999 *1.0000	The value in which this set coefficient is put is displayed as WS at F-64=00001.
Coefficient set value for DS	F-61	0.1000 to 9.9999 *1.0000	The value in which this set coefficient is put is displayed as DS at F-65=00001.
Coefficient set value for ADD	F-62	0.1000 to 9.9999 *1.0000	The value in which this set coefficient is put is displayed as ADD at F-66=00001.
Coefficient set value for DIFF	F-63	0.1000 to 9.9999 *1.0000	The value in which this set coefficient is put is displayed as DIFF at F-67=00001.

\* Default setting

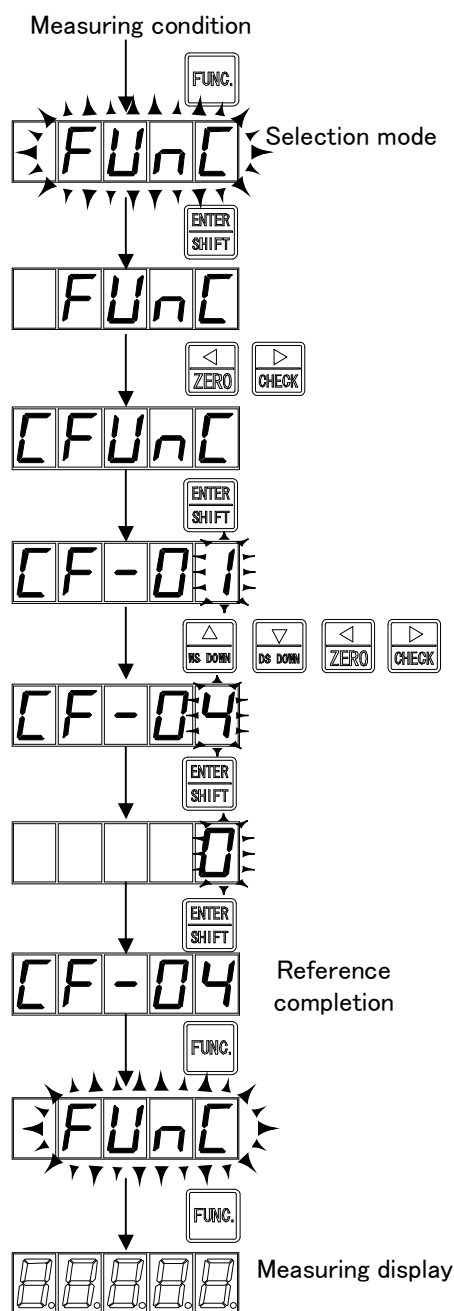
Item	Function number	Set point	Content
Coefficient invalid/effective switch for WS	F-64	* 00000	Invalid : Coefficient is 1.0000 during invalid.
		00001	Effective
Coefficient invalid/effective switch for DS	F-65	* 00000	Invalid : Coefficient is 1.0000 during invalid.
		00001	Effective
Coefficient invalid/effective switch for ADD	F-66	* 00000	Invalid : Coefficient is 1.0000 during invalid.
		00001	Effective
Coefficient invalid/effective switch for DIFF	F-67	* 00000	Invalid : Coefficient is 1.0000 during invalid.
		00001	Effective
DS calibration data (for reference) Minimum scale value	F-85	* 00001	
DS calibration data (for reference) The maximum indicated value	F-86	* 02000	
DS calibration data (for reference) Weight value	F-87	* 02000	
DS calibration data (for reference) 0mV/V value	F-88	* 0.0000	
DS calibration data (for reference) Span mV/V value	F-89	* 0.3000	
WS calibration data (for reference) Minimum scale value	F-90	* 00001	
WS calibration data (for reference) The maximum indicated value	F-91	* 02000	
WS calibration data (for reference) Weight value	F-92	* 02000	
WS calibration data (for reference) 0mV/V value	F-93	* 0.0000	
WS calibration data (for reference) Span mV/V value	F-94	* 0.3000	
Permission/prohibition setting of calibration	F-97	00001	Permission
		* 00000	Prohibition
ZERO clear	F-98		The data zero corrections by zero set function is canceled.
Memory clear	F-99		The content of the function set is returned to the setting of default.

\* Default setting

### 5-3. C function mode

It is used to refer to the data used in H function mode.

Please record all C function data after executing the various calibrations and the fine adjustment of analog output



Pressing the **FUNC.** key, **FUNC** becomes blinking, and it enters into the selection mode.

Pressing the **ENTER SHIFT** key, **FUNC** displays, and it enters into the function mode.

Pressing the **CHECK** key and the **ZERO** key in **FUNC** display, the display becomes **CF-00**.

Pressing the **ENTER SHIFT** key, **CF-00** displays. Select C function number that wants to refer.

**↑** (NS DOWN) **↓** (DS DOWN) : Change the value of the referred digit.

**CHECK** **ZERO** : Select the referred digit.

**FUNC.** : Returns to **FUNC** blinking display.

**ENTER SHIFT** : Proceeds to the next step.

Press the **ENTER SHIFT** key. As selected C function number is displayed, please refer and record it.

Press the **ENTER SHIFT** key. The set value of registered C function Number is displayed.

When you change the setting of other function number select the C function number.



Pressing the **FUNC.** key after completing, **FUNC** is displayed blinking.

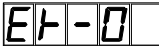
Here, pressing the **FUNC.** key, it returns to the measuring mode.

## 6. Various functions by function data

### 6-1. Effective range of ZERO set

The load ratio to permit the execution of ZERO set by setting function F-00 is decided.

By pressing the  key together with the  key at the same time when the input of both DS and WS is within the ratio set by this setting, or external control input of ZERO, the display of both DS and WS is assumed to be ZERO.

When it is outside predetermined data,  is displayed for a few second and ZERO set is not executed.



It is likely to be able to take it more than zero adjustable range ( $\pm 1.9$  mV/V) in the specification by combining the maximum indicated value setting and the setting for effective range of ZERO set. Moreover, ZERO set is not executed when the coefficient of the output is changed with F-60 and F-61, and when the load is "OL" display

### 6-2. Setting of decimal point display position

The decimal point display position is selected by setting function F-01.

The position of the decimal point can be selected from "No need" and "1234.5", "123.45", "12.345", and "1.2345".

Default has selected as "No need".

### 6-3. A/D sampling frequency

The sampling frequency in one second of A/D is set by setting function F-02.

The A/D sampling frequency can be selected from "4 times/s", "20 times/s", and "100 times/s".

Default has selected "100 times/s".

### 6-4. Display frequency

The display frequency is selected by setting function F-03.

The display frequency can be selected from "4 times/s" and "20 times/s".

Default has selected "20 times/s".

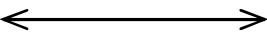
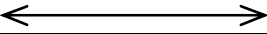
### 6-5. Digital filter

The digital filter function stabilizes data into which A/D is converted by the moving average processing.

The moving average frequency is selected by setting function F-04.

The moving average frequency can be selected from "OFF" and "2 times", "4 times", "8 times", "16 times", "32 times", "64 times", and "128 times". Default has selected "8 times".

The tendency to the characteristic by moving average is shown in the table below.

Moving average frequency	Slow		High
Noise performance	Sharp		Stable
Speed of response	Fast		Slow.

## 6-6. Selection of operational input for DS/WS DOWN

The operation for set of DS/WS DOWN is selected in function F-05 setting and whether it depends on key input or it depends on the external control input is selected.

Default is "Key operation at front panel"

### 6-6-1. DS/WS DOWN function.

It is not possible to operate, and ADD and DIFF become "OL" or "-OL", too, when entering condition (OL,-OL) that two input WS and DS cannot be measured.

When one is normal in the input of DS and WS, the function to give the state to be able to operate ADD and DIFF is DS DOWN, and WS DOWN by that input being substituted for another input that was not able to measure the input.

In the condition that WS input is normal and DS input is bad, please set the condition of DS DOWN to DS. Additionally, In the condition that both WS input and DS input are bad, please set the condition of DS and WS DOWN. Moreover, in the condition that DS input is normal and WS input is bad, set the condition of WS DOWN to WS.



When both DS input and WS input is wrong, by setting the condition of DS DOWN and WS DOWN, the operation of ADD and DIFF can be executed by fixing and displaying the value to WS and DS in which function F-19 predetermined rate against the maximum load in the calibration is put



The method of setting the state of DS DOWN and WS DOWN includes the method by the front panel key operation and the method by the external control input.

### 6-6-2. Method of selecting operation input of DS DOWN and WS DOWN

#### (1) Function F-05 : "00000"

The condition of DS DOWN and WS DOWN is decided by key input.

Press the  key for 2 second or more together with the  key at the same time  
: Change to ight on and off the DS DOWN LED

Press the  key for 2 second or more together with the  key at the same time  
: Change to ight on and off the WS DOWN LED



The condition is protected to memorize the condition of DS DOWN LED and WS DOWN LED in EEPROM

#### (2) Function F-05 : "00001"

The condition is decided in external control input DS DOWN, WS DOWN, and DS & WS DOWN.

	Input status of external control	DS DOWN LED	WS DOWN LED
DS DOWN	OFF	OFF	-
	ON	ON	-
WS DOWN	OFF	-	OFF
	ON	-	ON
DS&WS DOWN	OFF	-	-
	ON	ON	ON

### 6-6-3. Operation by the condition of DS DOWN LED and WS DOWN LED.

	DS DOWN LED	WS DOWN LED	Selection input
DS	OFF	–	DS input
	ON	OFF	WS input
	ON	ON	DS (the maximum indicated value in calibration) × Setting of function F-19
WS	–	OFF	WS input
	OFF	ON	DS input
	ON	ON	WS (the maximum indicated value in calibration) × Setting of function F-19



The input target of the value displayed in WS/DS by the condition of DS DOWN LED and WS DOWN LED is decided.

### 6-7. Key lock

The key operation that various settings and the calibration values are carelessly changed can be prohibited by setting function F-06. Each key switch is prohibited to the key selected by function F-06. Therefore, please select a necessary key lock object by function F-06.

Default is "All key lock OFF."

### 6-8. Stabilization filter

Stabilization filter facility is a function that starts being strong as for the digital filter when the width of the change of the measurement display is constant, and the state continues longer than the fixed time.

#### 6-8-1. Stabilization filter setting

The moving average frequency for the stabilization filter is selected by setting of function F-07.

The moving average frequency can be selected from "OFF" and "2 times", "4 times", "8 times", "16 times", "32 times", "64 times", and "128 times". Default has selected "4 times".

#### 6-8-2. Width of stabilization filter data

The width of the stabilization filter data is set by setting of function F-09.

Setting range : 00000 to 00999 units : 1D and 00000 : Turning off

Default has set "00100".

#### 6-8-3. Time width of stabilization filter

The time width of the stabilization filter is set by setting function F-08.

Setting range : 00000 to 00999 units : 10 ms 00000 : OFF

Default has set "00020".

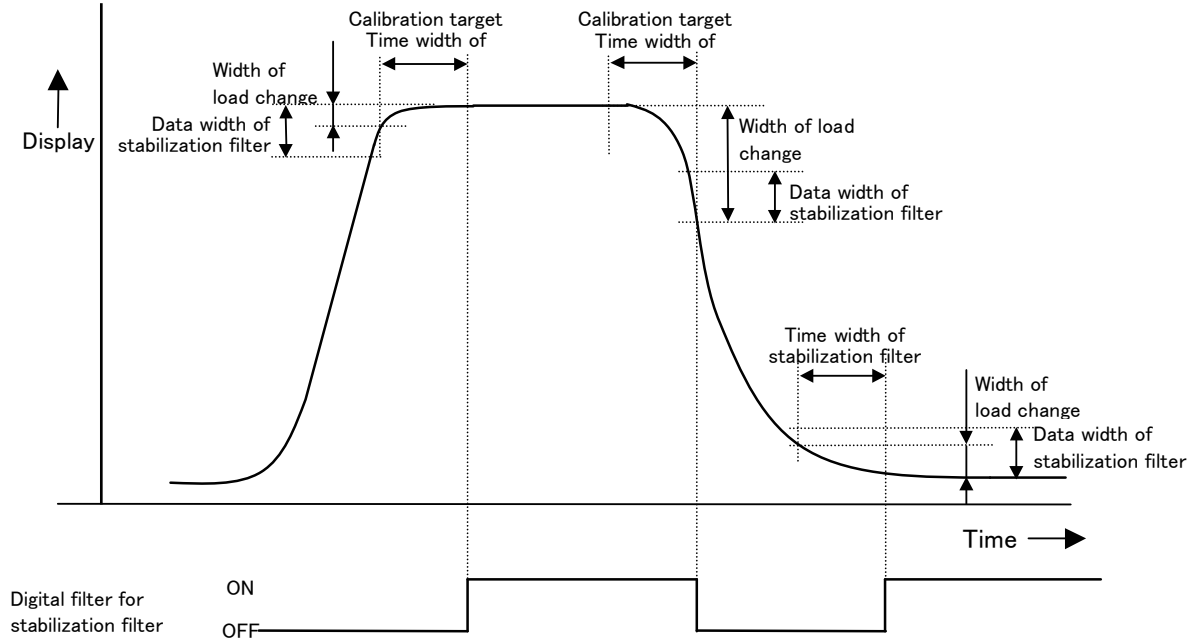
Example The width of data in which the stabilization filter is done by function F-09 is selected.  
 The width of the stabilization filter for each set point "n" data is requested in the display conversion by the following expression.

$$\text{"Data width of stabilization filter"} = \text{"Set point n of F-09"} \times \text{"Minimum scale value"}$$

In the case that "10" for setting by function F-09 and "D=5" for minimum scale value becomes .:

$$\begin{aligned} \text{"Data width of stabilization filter"} &= 10 \times 5 \\ &= 50 D \end{aligned}$$

Therefore, the stabilization filter set in function F-07 becomes effective when the change width of measuring display is within the value set in function F-09, and that condition continues over the time set in function F-08.



- When the digital filter is set by function F-04, the moving average processing execute "Moving average of stabilization filter (F-07)" after executing "Moving average of digital filter (F-04)",

## 6-9. Setting of analog object

Whether either is output for the analog output by setting function F-10 (F-11, F-12) among each display of WS, DS, ADD, and DIFF is set to analog output 1-4 (5-8, 9-12).

Default is as follows.

Analog output 1 : WS

Analog output 2 : DS

Analog output 3 : ADD

Analog output 4 : DIFF

(Analog output 5 : WS)

(Analog output 6 : DS)

(Analog output 7 : ADD)

(Analog output 8 : DIFF)

(Analog output 9 : WS)

(Analog output 10 : DS)

(Analog output 11 : ADD)

(Analog output 12 : DIFF)

## 6-10. Setting of analog output type

The output type of the analog output is set by setting function F-13 (F-14, F-15).

The DIP switch setting that has been described to the type setting of analog output method as an appendix must be corresponding to the type setting in this setting.

Default has set all the outputs as 0 to 10 V.

## 6-11. Setting of effective and invalid for the display of ADD and DIFF

The display of ADD and DIFF can be assumed to be no display (blank) by the setting of function F-18 at the measurement mode. Default has set the ADD and DIFF displays effective by "00000".

## 6-12. Setting of output ratio at both DS and WS DOWN

The value displayed in DS and WS (output) is decided when both DS and WS become DOWN because of function F-19 setting. When both DS and WS become DOWN because of function F-19 setting, the value in which the ratio of function F-19 is multiplied by the maximum indicated value setting in calibrating is output to DS and WS.

Default is set as "00100" (100 %).

## 6-13. Scaling of analog output

The indicated value when the minimum value and the maximum value are output from each analog output is set by function F-20 to F-27 (F-28 to F-35, F-36 to F-43).

## 6-14. Setting of bridge power supply voltage

The load cell power supply voltage can be changed by setting function F-44.

Default has set as "00000" (10 V).

## 6-15. Setting of check value

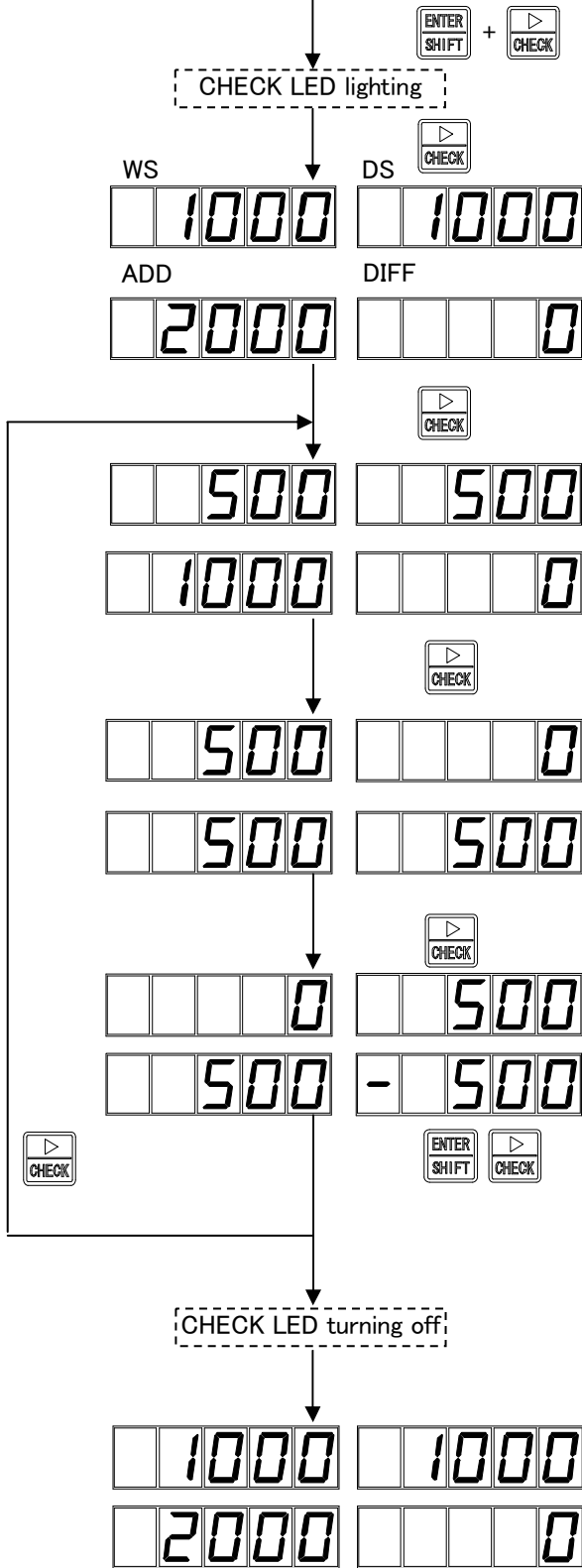
The value (mV/V) displayed at CHECK ON is set by setting function F-50 and F-51.

Default has set as "0.0000" (0.0000 mV/V).

### 6-15-1. Display of check value

It is a function to display (output) the value set with function F-50 and F-51.

Condition of measurement  
(CHECK LED turning off)



Press the key and the key at the same time For 2 second or more during the measuring condition. (CHECK LED turning off).

CHECK LED is light on, and it becomes the condition of CHECK ON.

DS DOWN LED and WS DOWN LED is turning off. (The present value is displayed in DS, WS, ADD and DIFF.)

Press the key continuously. The value set by function F-50 is displayed (output) in WS while pushing. The value set by function F-51 is displayed (output) in DS.

The calculated value is displayed in ADD and DIFF DS DOWN LED is light on, and WS DOWN LED is light on.

This value is output while the key pressing.

When the key is released, a present input value is displayed.

Press the key.

The value set by function F-50 is displayed (output) in WS. 0 is displayed (output) in DS. The calculated value is displayed in ADD and DIFF. DS DOWN LED is light off, and WS DOWN LED is light on.

This value is output while the key pressing.

When the key is released, a present input value is displayed. Press the key.

0 is displayed (output) in WS.

The value set by function F-51 is displayed (output) in DS.

Calculated value is displayed in ADD and DIFF. DS DOWN LED is light on, and WS DOWN LED is light off.

This value is output while the key pressing.

When the key is released, a present input value is displayed.

The following operations are done when assuming the CHECK OFF.

Press the key and the key for 2 second or more At the same time.

In the condition of the CHECK LED turning off, the display doesn't change even if only the key is pressed.

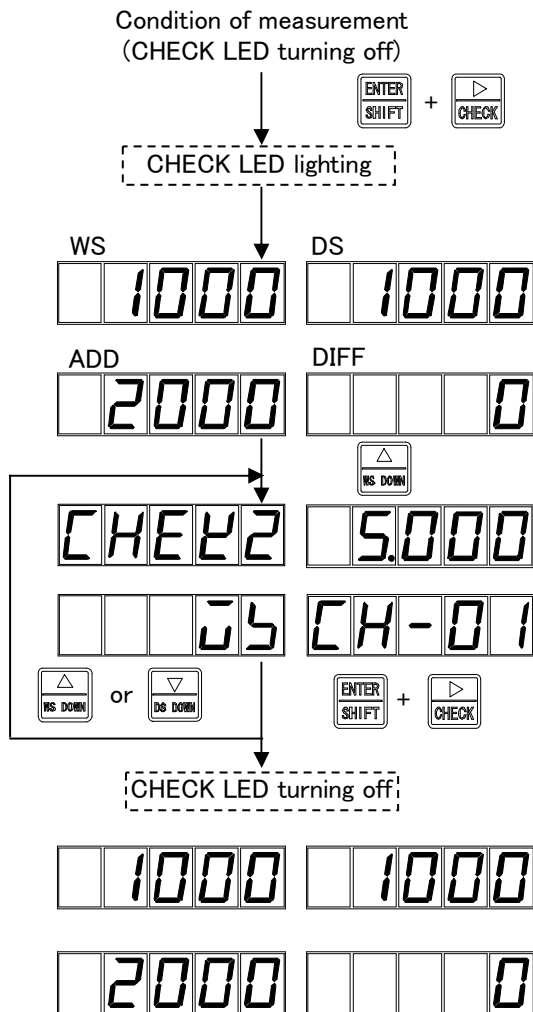


The check value (setting of F-50 and F-51) is not displayed when DOWN is set to both DS and WS. The value of the ratio set with F-19 comes to remain being displayed. When only DS sets DOWN, and only DS DOWN LED lights while displaying the check value, check value "0" is displayed in DS. Moreover, when WS DOWN LED lights, the WS check value displays to both DS and WS as the check value. When only WS sets DOWN, and only WS DOWN LED lights while displaying the check value, check value "0" is displayed in WS. Moreover, when DS DOWN LED lights, the DS check value displays to DS and WS as the check values. Moreover, when the coefficient is assumed to be effective with F-61 to F-67, the value in which the coefficient is put is displayed in the check value.

### 6-15-2. CHECK2 function

It is a function to output the analog output to the monitor terminal of a front panel.

However, the electric current output is excluded.



Press the key and the key for 2 second or more at the same time.

CHECK LED lights and it enters the condition of CHECK ON. (A present value is displayed in WS, DS, ADD and DIFF.)

Press the key.

**CHEK2** is displayed in WS.

The output value is displayed in DS.

The object analog output (WS, DS, ADD, DIFF) in ADD and the analog output number in DIFF is displayed.

At this moment, the voltage of displayed analog output number(CH) in monitor output terminal at front panel is output.

A present load value (WS, DS, ADD and DIFF) is output as the output voltage.

: Increase the analog output (CH) number  
The number (CH) set as the current output is skipped, and the next(CH) is displayed. When the maximum connection of CH number is exceeded, CH-01 (minimum value) is displayed.

: Decrease the analog output (CH) number  
The number (CH) set as of the current output is skipped, and next (CH) is displayed. Maximum connection (CH) is displayed for less than minimum (CH) number.

Press the key and the key for 2 second to more at the same time to return the measuring mode..

CHECK LED is turned off, and a present value is displayed to WS, DS, ADD, and DIFF.

The monitor terminal output at this time becomes 0 V (invalid).


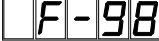
### 6-16. Setting of permission/prohibition of calibration



Permission/prohibition of the calibration function is set by setting function F-97.

Default has set "00000" (permission).

## 6-17. ZERO clearness

The ZERO corrected data in function F-98 ZERO set function is canceled.

Pressing the  key with  display,  becomes a blinking display.

Press the  key when you want to discontinue clear ZERO at this moment.  becomes a blinking display, and the operation of ZERO clear is not executed.

When the  is a blinking display, the display section becomes , and ZERO clear operation is completed.


## 6-18. Memory clearness


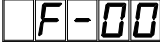

A clear memory is executed by function F-99.

The content of the function set is returned to the default setting.

Pressing the  key with the condition of  display,  becomes a blinking display.

When you want to discontinue a clear memory at this moment, press the  key.

 becomes a blinking display, and the operation of a memory clear is not executed.

By pressing the  key with a blinking display of , the display is turned off, and it becomes , and the operation of memory clear is completed.

## 6-19. Display coefficient

The value in which the coefficient is multiplied on each indicated value of WS, DS, ADD, and DIFF can be displayed by setting function F-60 to F-67.

F-60 : Coefficient for WS

In case of F-64=00001, the value in which coefficient of this setting is multiplied on WS is displayed as WS.

Example : With WS=1000 for F-60=2.0000, the displayed WS becomes  $1000 \times 2.0000=2000$ . "OL" is displayed when the result that multiplies coefficient exceeds 110 % of maximum indicated value (setting in calibration) or 99999, and "-OL" is displayed when falling below -10 % of the maximum indicated value or -19999.

F-61 : Coefficient for DS

In case of F-65=00001, the value in which coefficient of this setting is multiplied on DS is displayed as DS.

Example: With DS=1000 for F-61=2.0000, the displayed DS becomes  $1000 \times 2.0000 = 2000$ . "OL" is displayed when the result that multiplies coefficient exceeds 110 % of maximum indicated value (setting in calibration) or 99999, and "-OL" is displayed when falling below -10 % of the maximum indicated value or -19999.

F-62 : Coefficient for ADD

In case of F-66=00001, value in which coefficient of this setting is multiplied on ADD is displayed as ADD.

The value of ADD is a value in which DS and WS displayed at this time were added.

Example : With ADD = 2000 and F-62 = 2.000, the displayed ADD becomes  $2000 \times 2.0000 = 4000$ . "OL" is displayed when the result that multiplies the coefficient exceeds 9999, and "-OL" is displayed when the result falling below -19999.

F-63 : Coefficient for DIFF

In case of F-66=00001, value in which coefficient of this setting is multiplied on DIFF is displayed as DIFF.

The value of DIFF is a value in which DS is decreased from WS displayed at this time.

Example : with DIFF = 2000 and F-62 = 2.000, the displayed DIFF becomes  $2000 \times 2.0000=4000$ . "OL" is displayed when the result that multiplies the coefficient exceeds 9999, and "-OL" is displayed when the result falling below -19999.



Here, when you execute "Fine control of ZERO", "Fine control of SPAN", "Digital span calibration", and "Fine control 2 of the analog output" with the value in which the coefficient is multiplied by DS, WS, ADD and DIFF as effective, The displayed load doesn't become an actual load because it is displayed with the coefficient multiplied.

## 7. Record place of set data

In this unit, each data is recorded in RAM and EEPROM as follows :

EEPROM is preserved when almost permanent because of nonvolatile.

Moreover, RAM data disappears in power supply OFF because RAM is not backed up.

### 7-1. Data recorded in EEPROM

- Calibration data
- Function data

### 7-2. Data recorded with RAM

- Condition of CHECK ON/OFF



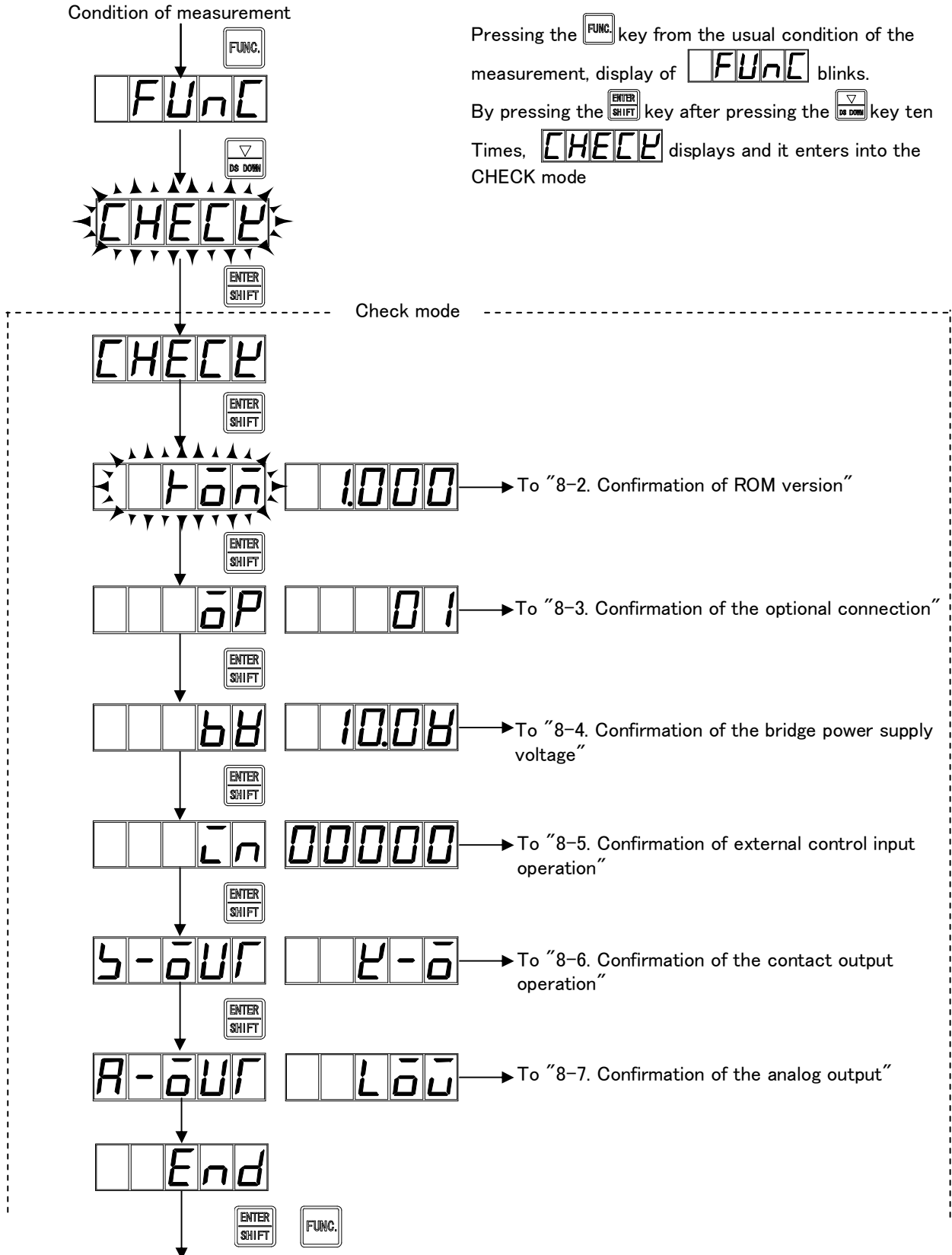
- All the data recorded with RAM is initialized at turning on the power.

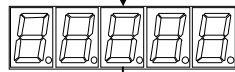
## 8. Check mode

In the check mode, the followings can be confirmed.

- Confirmation of ROM version
- Confirmation of contact output operation
- Confirmation of contact output operation
- Confirmation of optional connection
- Confirmation of bridge power supply voltage
- Confirmation of analog output (option)

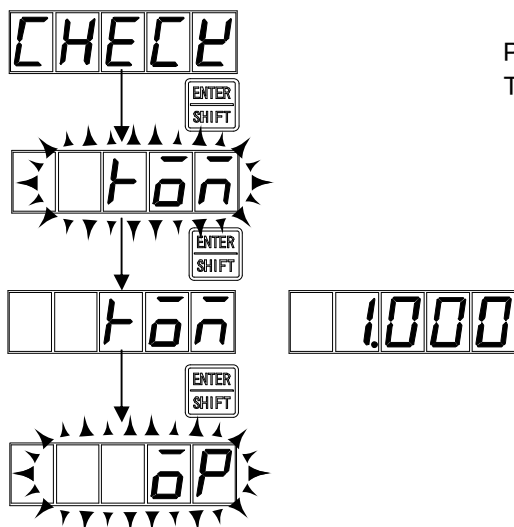
### 8-1. Method of setting check mode






Measurement mode

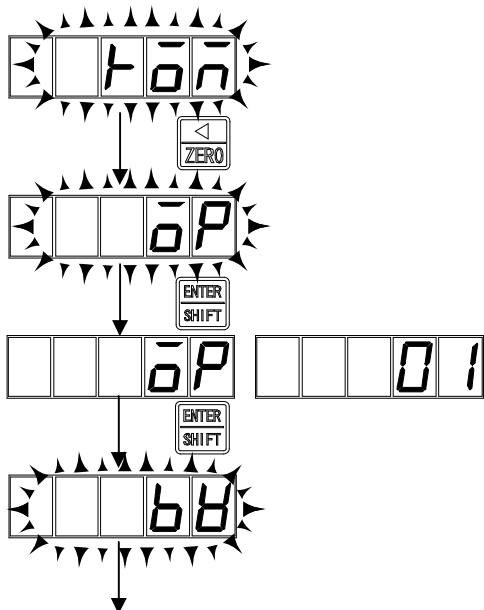
### 8-2. Confirmation of ROM version



Pressing the  key twice from **CHECK**,  
The ROM version is displayed in DS.

Confirmation of optional connection

### 8-3. Confirmation of optional connection



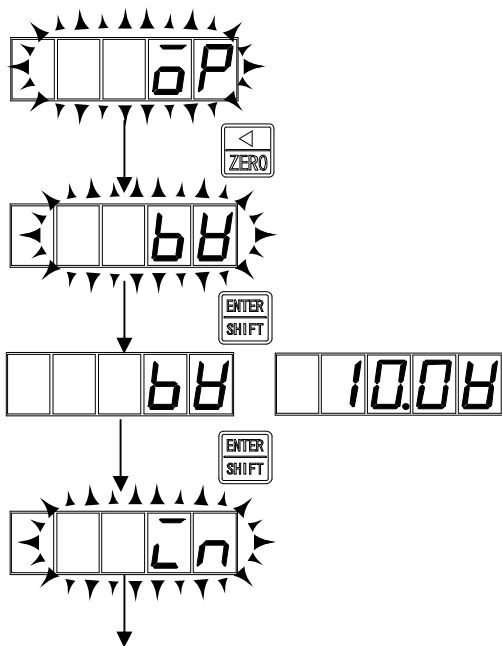
To the confirmation of the bridge power supply voltage

Pressing the key from blinking, display becomes blinking.

Here, by pressing the key, the optional connection is displayed at DS.

DS display	Content
----	There is no option.
01	One option is mounted
11	Two option mounted

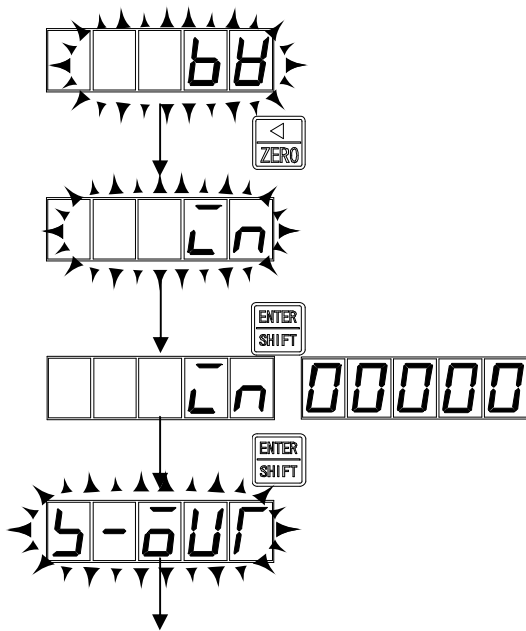
### 8-4. Confirmation of bridge power supply voltage



To the confirmation of the external control input

Pressing the key from blinking, the display of becomes blinking. By pressing the key here, bridge power supply is displayed at DS.

### 8-5. Confirmation of external control input



To the confirmation of the contact output

Pressing the key from blinking, the display of becomes blinking. By pressing the key here, the contact output target is displayed at DS.

Display "0" : open

Display "1" : close

10<sup>0</sup> digits : WS and DS DOWN

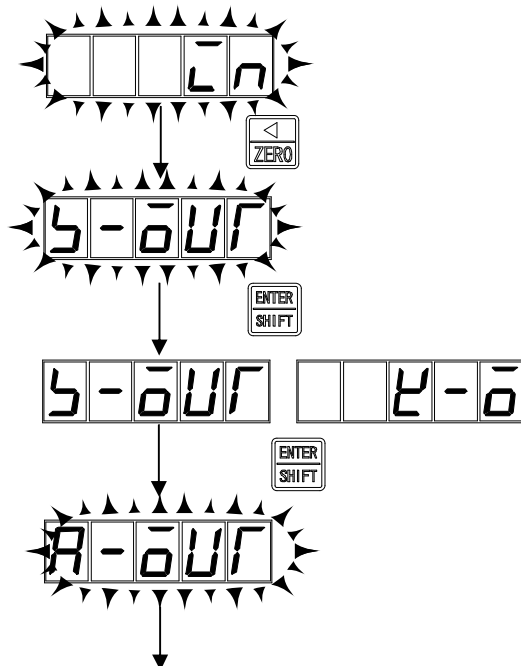
10<sup>1</sup> digits : WS DOWN

10<sup>2</sup> digits : DS DOWN

10<sup>3</sup> digits : LOCK

10<sup>4</sup> digits : ZERO

### 8-6. Confirmation of contact output



To the confirmation of the

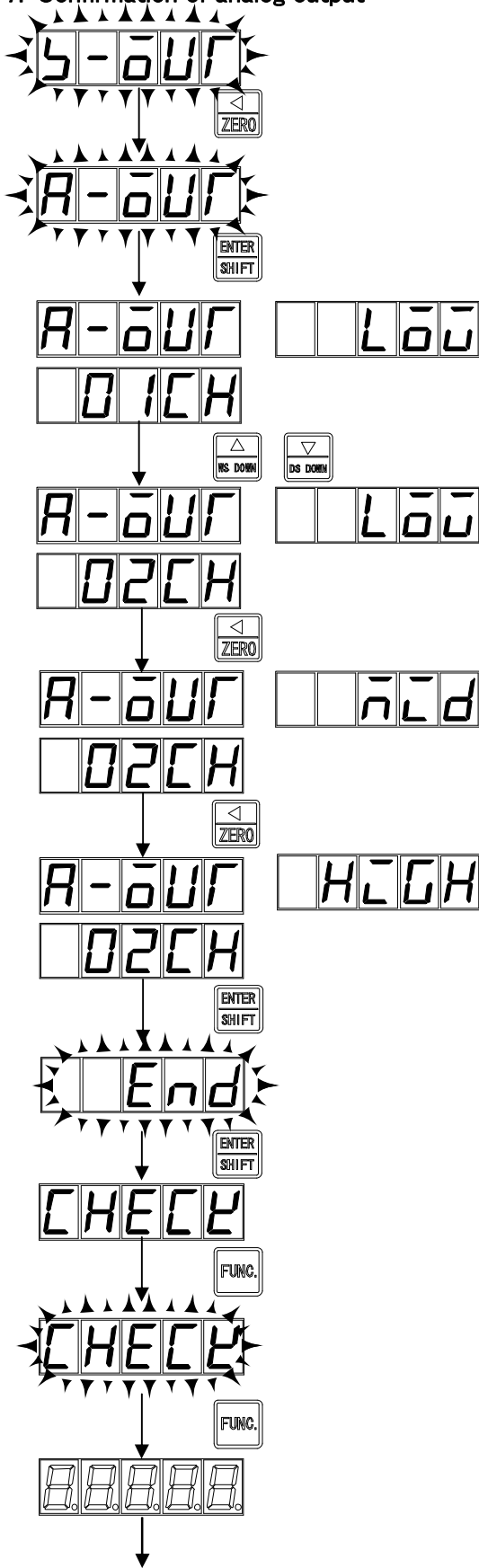
Pressing the key from blinking The display of becomes blinking. By

Pressing the key here, contact output target is displayed at DS

By pressing the key and the key, change the output target.

Display	Output signal name
	RUN
	DS DOWN
	WS DOWN
	ERROR
	HEALTHY

8-7. Confirmation of analog output



To the measurement mode

Pressing the **ZERO** key from **5-OUT** blinking, the display of **A-OUT** becomes blinking. Here, by pressing the **ENTER SHIFT** key, the display becomes **01CH**, and the selected output value is made against the analog output selected.

**MS DOWN**: Increase 1 count of analog output number. If the number exceeds over the maximum number of connected, it becomes "01CH"

**DS DOWN**: Decrease 1 count of analog output number. If the number decrease below "1", "CH" changes to the maximum connected number.

**ZERO** **CHECK**: Change the output value to minimum, middle and maximum value..

**L00**: Minimum value  
**nld**: Middle value  
**H00**: The maximum value

**ENTER SHIFT**: Make the display of **End** blinking

Output type	Minimum value	Middle value	Maximum value
0 V to 10 V	About 0 V	About 5 V	About 10 V
0 V to 5 V	About 0 V	About 2.5 V	About 5 V
0 V to 1 V	About 0 V	About 0.5 V	About 1 V
-10 V to 10 V	About -10V	About 0 V	About 10 V
-5 V to 5 V	About -5V	About 0 V	About 5 V
-1 V to 1 V	About -1V	About 0 V	About 1 V
4 mA to 20 mA	About 4 mA	About 12 mA	About 20 mA

Press the **ENTER SHIFT** key to end the check mode

The display becomes **CHECK**.

Here press the **FUNC.** key. **CHECK** becomes blinking.

Pressing the **FUNC.** key to move to the measuring mode. The check mode is ended.

## 9. Analog output

There is the following types of analog outputs.

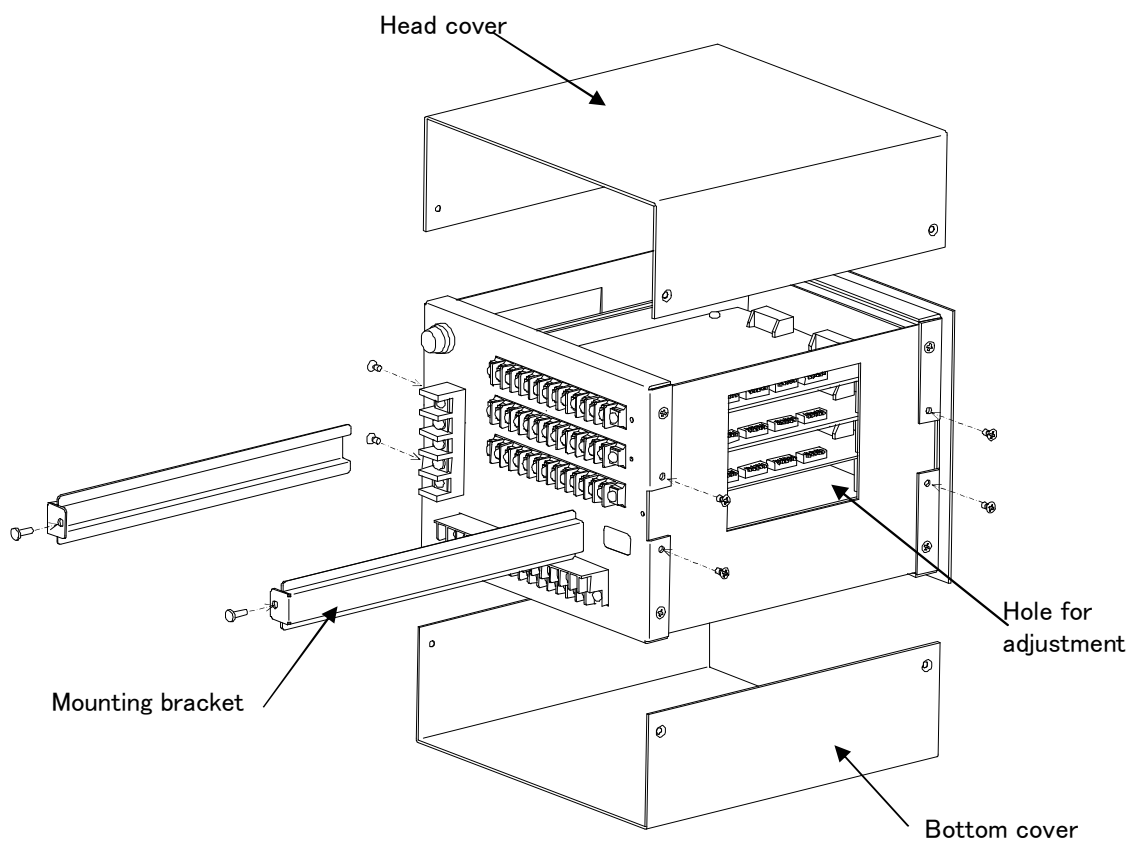
0 V to 10 V
0 V to 5 V
0 V to 1 V
$\pm 10$ V
$\pm 5$ V
$\pm 1$ V
0 mA to 24 mV

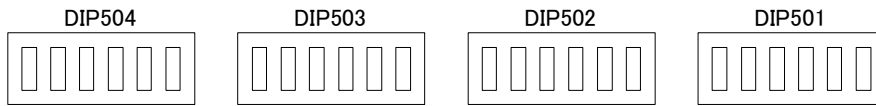
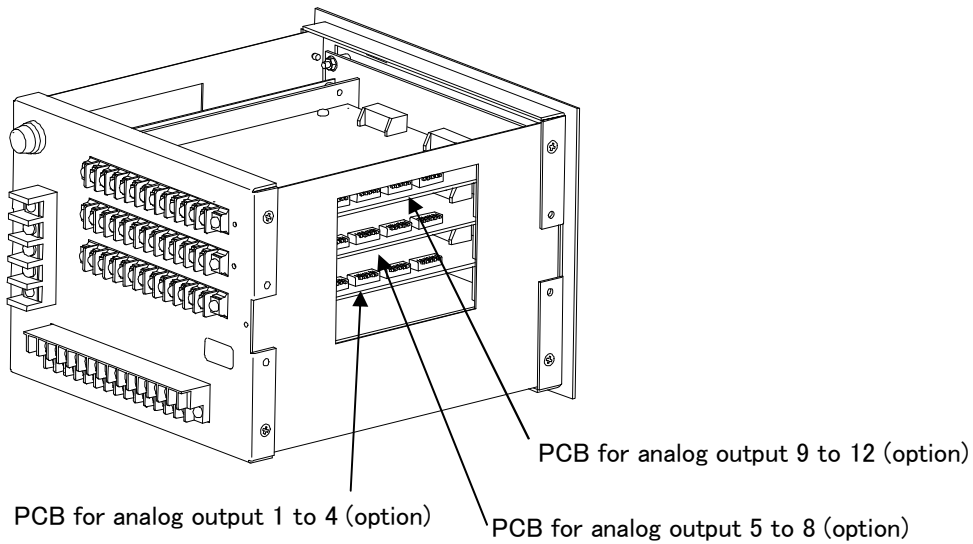
### 9-1. Changing method of analog output

- i) Turn off the power supply to this instrument.
- ii) Detach the 10 screws of this instrument, and remove the top cover, bottom cover, mounting metal.
- iii) Please set the DIP switch corresponding to the output to be changed on the print circuit board according to the using condition.
- iv) Install the mounting bracket, head cover and bottom cover with the screw.
- v) Turning on the power supply, and set the analog output type according to the procedure 5.

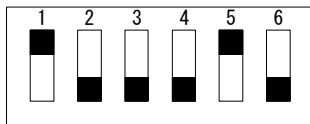


When you change the analog output type, turn on the power supply according to the procedure 5.





< Layout of DIP switch >



\*The under is turning off.

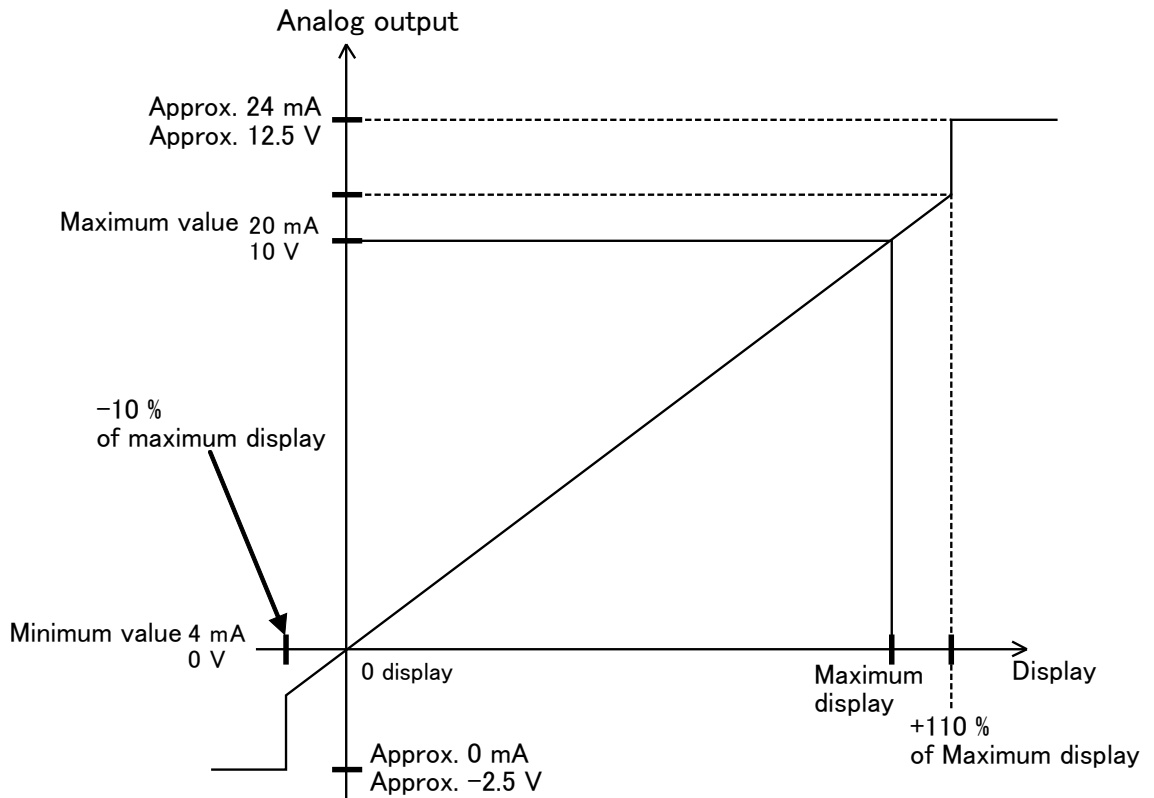
Output type	Set of DIP switch					
	1	2	3	4	5	6
0 V to 10 V	ON	OFF	OFF	OFF	ON	OFF
0 V to 5 V	OFF	ON	OFF	OFF	ON	OFF
0 V to 1 V	OFF	OFF	ON	OFF	ON	OFF
−10 V to 10 V	ON	OFF	OFF	ON	ON	OFF
−5 V to 5 V	OFF	ON	OFF	ON	ON	OFF
−1 V to 1 V	OFF	OFF	ON	ON	ON	OFF
4 mA to 20 mA	OFF	OFF	OFF	OFF	OFF	ON

Object output	Corresponding DIP switch
Analog output 1	Circuit board DIP501 for analog output 1 to 4
Analog output 2	Circuit board DIP502 for analog output 1 to 4
Analog output 3	Circuit board DIP503 for analog output 1 to 4
Analog output 4	Circuit board DIP504 for analog output 1 to 4
Analog output 5	Circuit board DIP501 for analog output 5 to 8
Analog output 6	Circuit board DIP502 for analog output 5 to 8
Analog output 7	Circuit board DIP503 for analog output 5 to 8
Analog output 8	Circuit board DIP504 for analog output 5 to 8
Analog output 9	Circuit board DIP501 for analog output 9 to 12
Analog output 10	Circuit board DIP502 for analog output 9 to 12
Analog output 11	Circuit board DIP503 for analog output 9 to 12
Analog output 12	Circuit board DIP504 for analog output 9 to 12

## 9-2. Scaling of analog output

The analog output of maximum value and minimum value is set by 0 to 2 000.

This can be made an any value by changing a related function.



F-20, F-22, F-24 and F-26 set the display when the minimum value is output.

F-21, F-23, F-25 and F-27 set the display when the maximum value is output.

Ex) F-20 : set as 1 000.

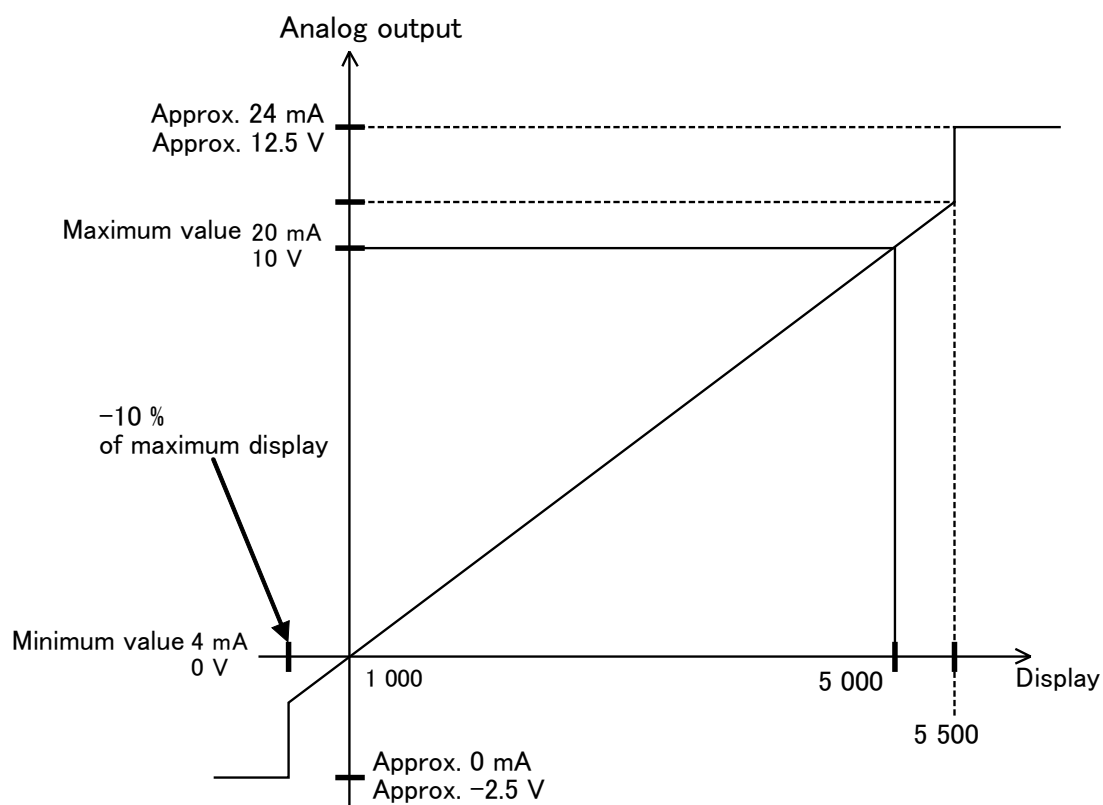
F-21: set as 5 000.

The maximum value is output at 5 000 display.

The Minimum value is output at 1 000 display.

The output for the minimum value and the maximum value has been decided depending on the type of the analog output.

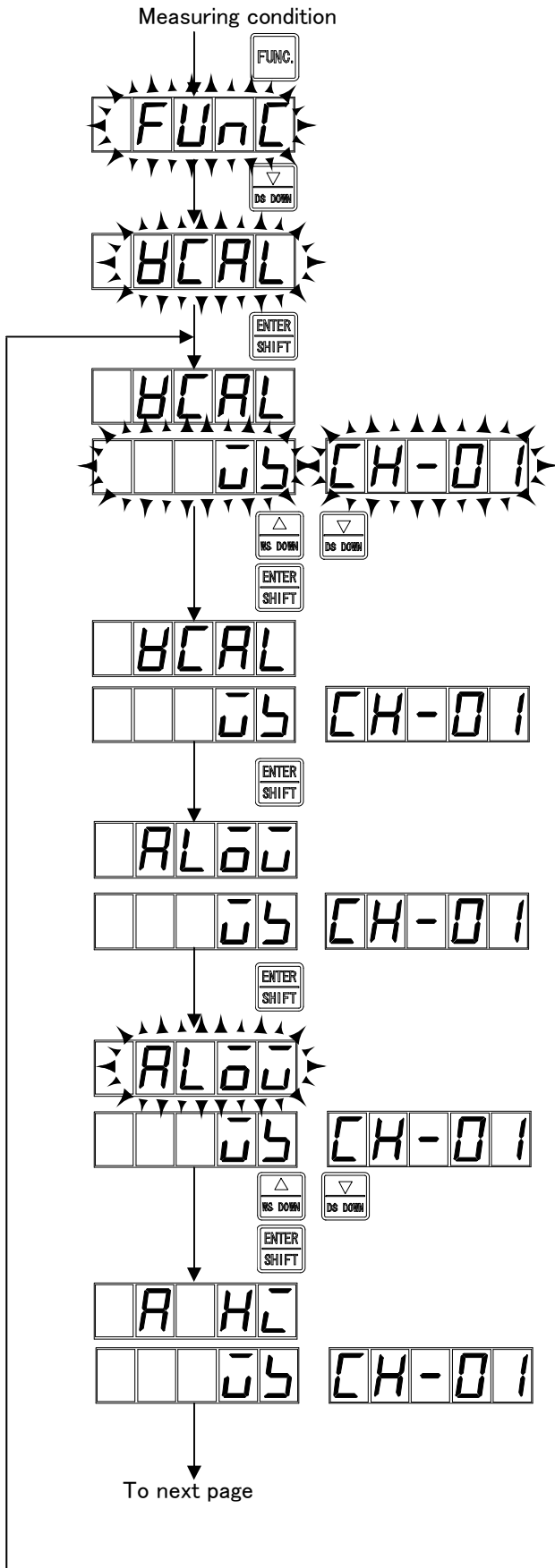
Output type	The minimum value	The maximum value
0 V to 10 V	About 0 V	About 10 V
0 V to 5 V	About 0 V	About 5 V
0 V to 1 V	About 0 V	About 1 V
-10 V to 10 V	About -10V.	About 10 V
-5 V to 5 V	About -5V.	About 5 V
-1 V to 1 V	About -1V.	About 1 V
4 mA to 20 mA	About 4 MA	About 20 MA



- Please set a value of that is smaller than the value set with F-21, F-23, F-25, and F-27 to F-20, F-22, F-24, and F-26.

### 9-3. Fine control 1 of analog output

Actually without applying the load, "Minimum value" and "Maximum value" are matched respectively.



By pressing the key, the display of becomes blinking.

Press the key eight times.

becomes a blinking display.

Press the key here.

displays, and it enters into the fine adjustment mode of analog output.

The output target is displayed in ADD, and (CH) number of analog output to be adjusted is displayed in DIFF

- : Increase (CH) number of analog output to be adjusted.
- : Decrease (CH) number of analog output to be adjusted.
- : Proceed to the next step.

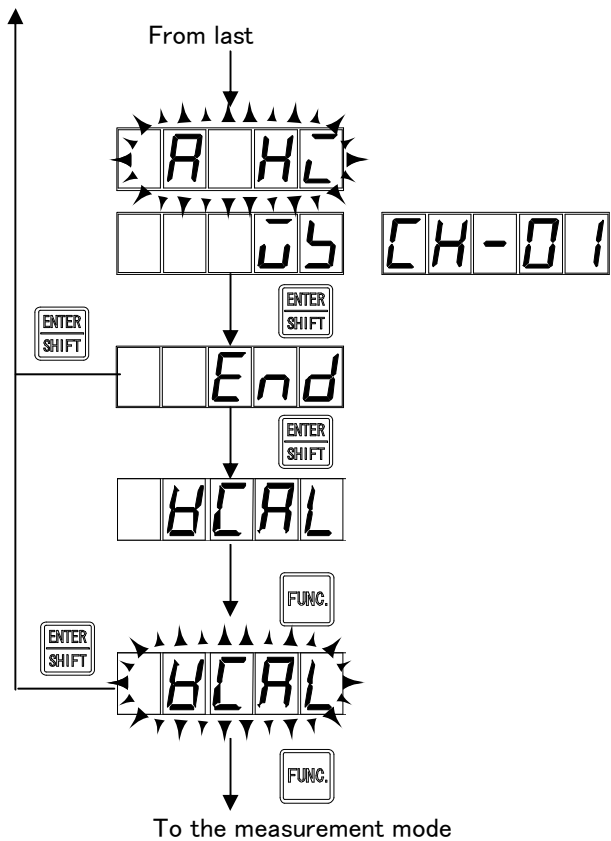
displays, then press the key.

becomes blinking display.

At this time, the output at the minimum output becomes adjustable.

- : Increase the analog output value.
- : Decrease the analog output value.
- : Proceed to the next step.

displays, then press the key.



**AHL**

becomes blinking display.

The output at the maximum output becomes adjustable, here.



: Increase the analog output value



: Decrease the analog output value



: Register the adjustment, and proceed to the next step.

Press the **ENTER SHIFT** key after the adjustment of output at the maximum output.

**End**

is displayed.

**bCAL**

displays after pressing the **ENTER SHIFT** key, and it becomes the selection of the next (CH) number.

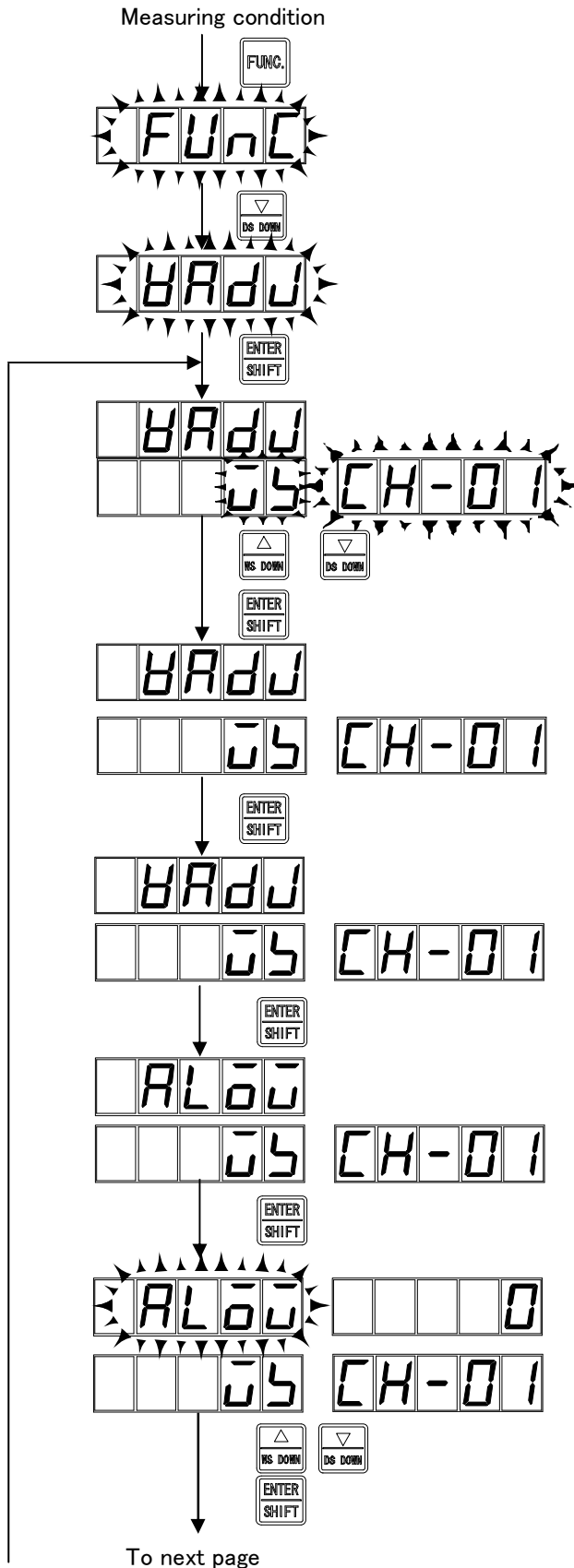
As the display becomes **bCAL** by pressing the **FUNC.**

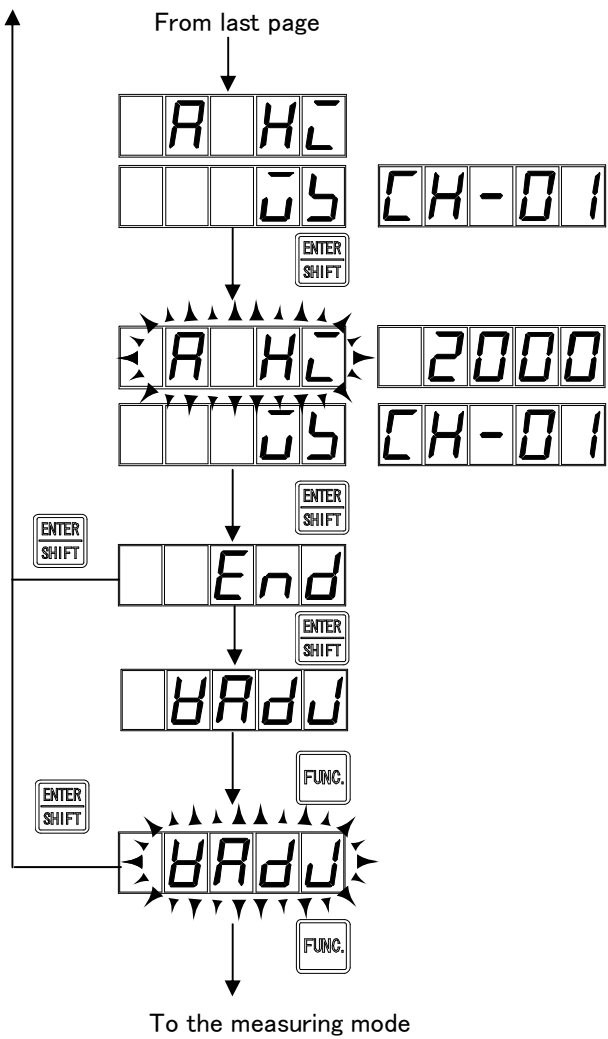
key, move to the measuring mode by pressing the **FUNC.** key

The fine adjustment of the analog output is ended.

## 9-4. Fine control 2 of analog output

"Minimum value" and "Maximum value" are matched respectively while actually applying load.





The display becomes `A Hz`.

Press the `ENTER SHIFT` key.

At this time, set the analog output value to be the maximum load.

Press the `ENTER SHIFT` key.

`A Hz` is displayed blinking.

`▲` / `MS DOWN`: Increase the analog output value.

`▼` / `DS DOWN`: Decrease the analog output value.

`End` is displayed.

`BADU` is displayed after pressing the `ENTER SHIFT` key, and it becomes the selection of the next (CH) number.

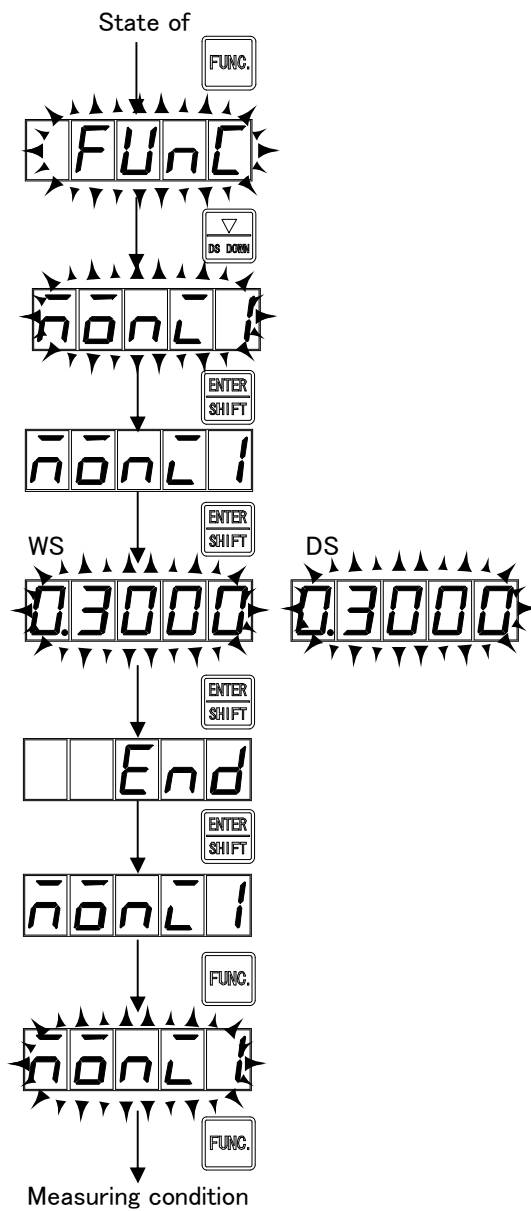
As `BADU` becomes blinking after pressing the `FUNC.` key, set to measuring condition by pressing the `FUNC.` key.

Analog output fine control 2 is ended.

## 10. Monitor mode

In the monitor mode, a present load cell input value can be confirmed.

### 10-1. Method of setting monitor mode



By pressing the **FUNC.** key, **FUNC** becomes blinking.

By pressing the **DS DOWN** key, the display of **nOnLi** becomes blinking and enters into the monitor mode.

Press the **ENTER SHIFT** key.

**nOnLi** is displayed, and it becomes monitor mode.

Press the **ENTER SHIFT** key.

A present input value from load cell converted into the unit of mV/V is displayed blinking at WS and DS.

Press the **ENTER SHIFT** key.

The display becomes **End**.

Press the **ENTER SHIFT** key.

The display becomes **nOnLi**.

Press the **FUNC.** key.

The display becomes **nOnLi** blinking.

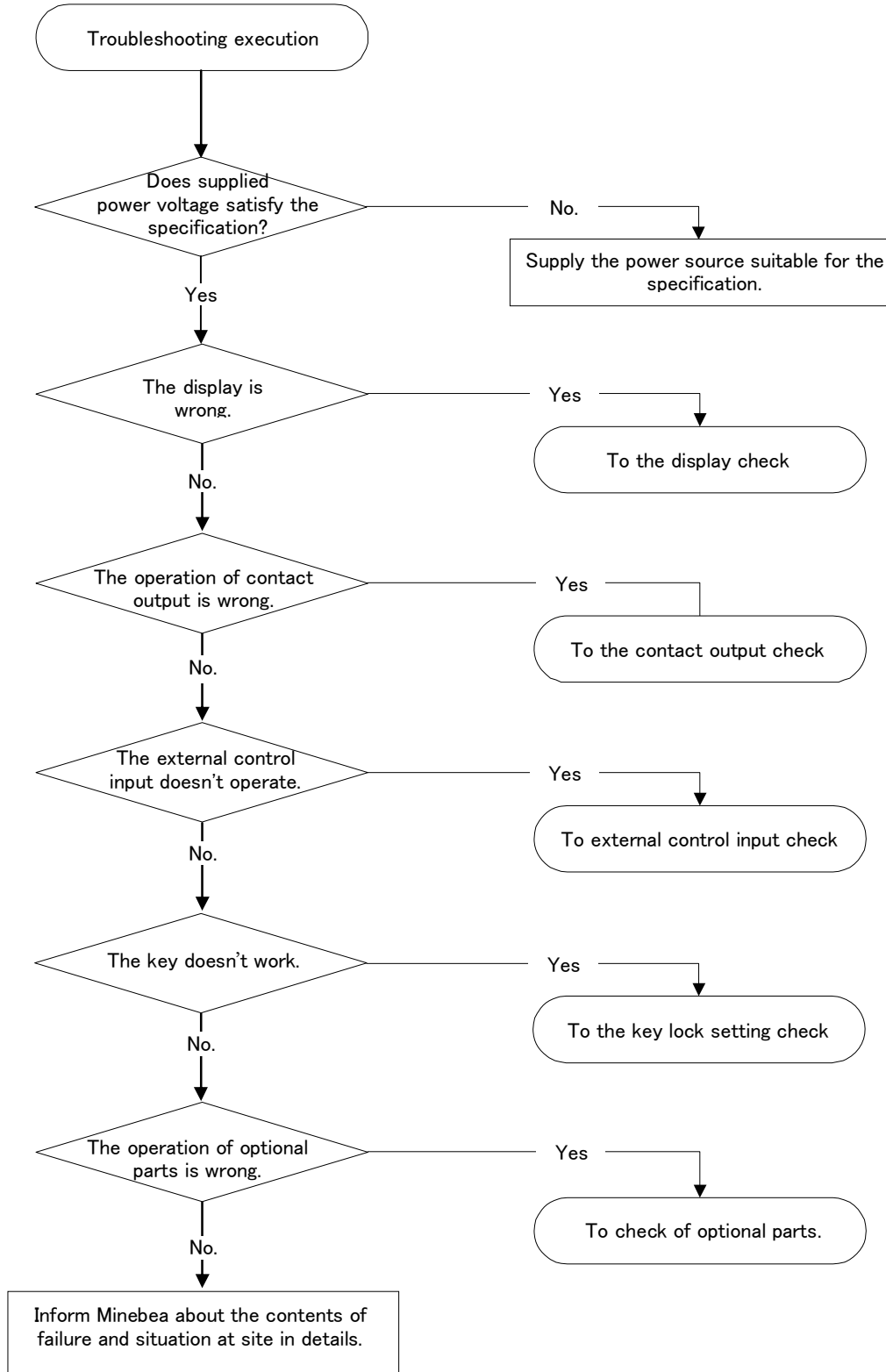
Press the **FUNC.** key.

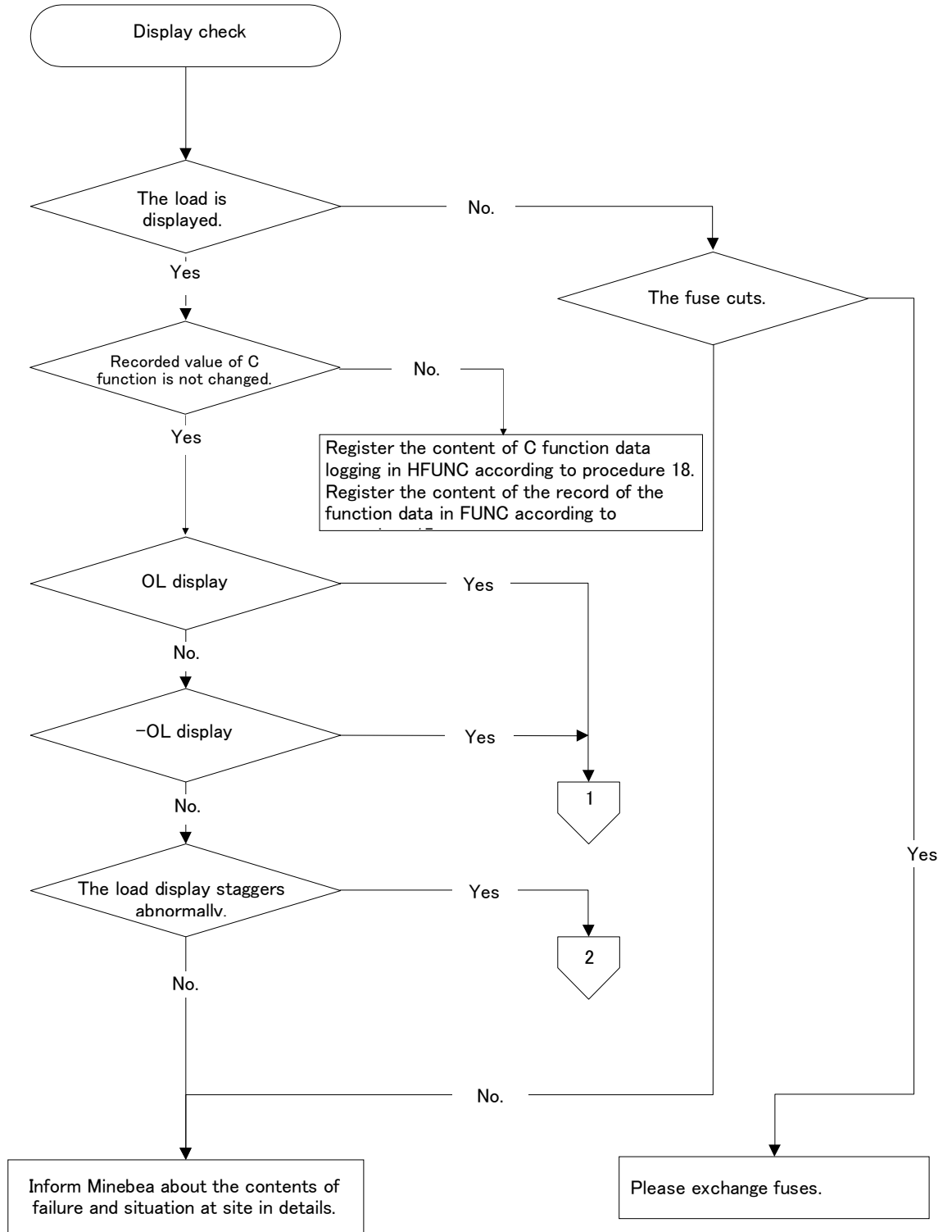
it returns to the measuring condition.

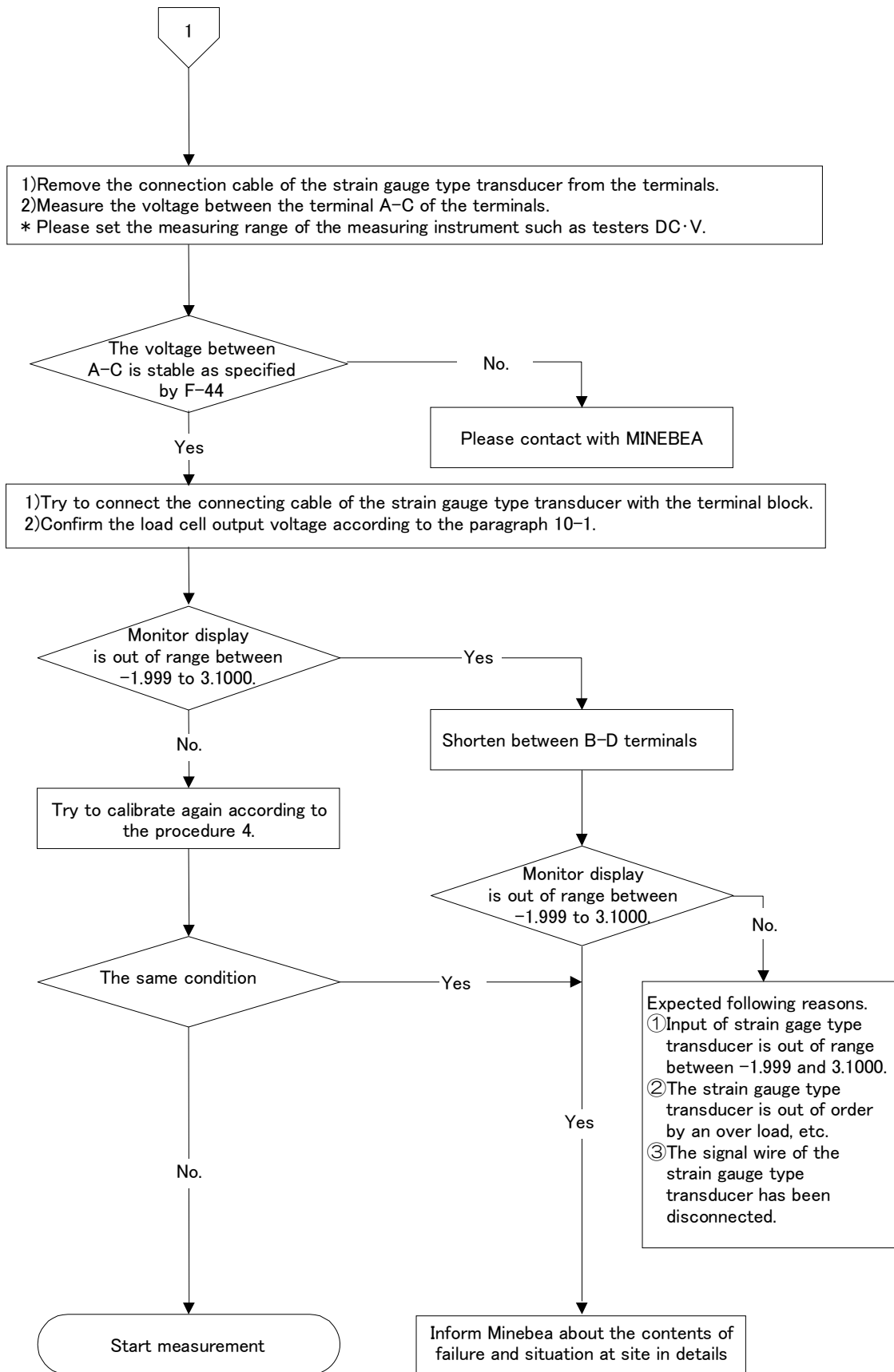
## 11. Troubleshooting

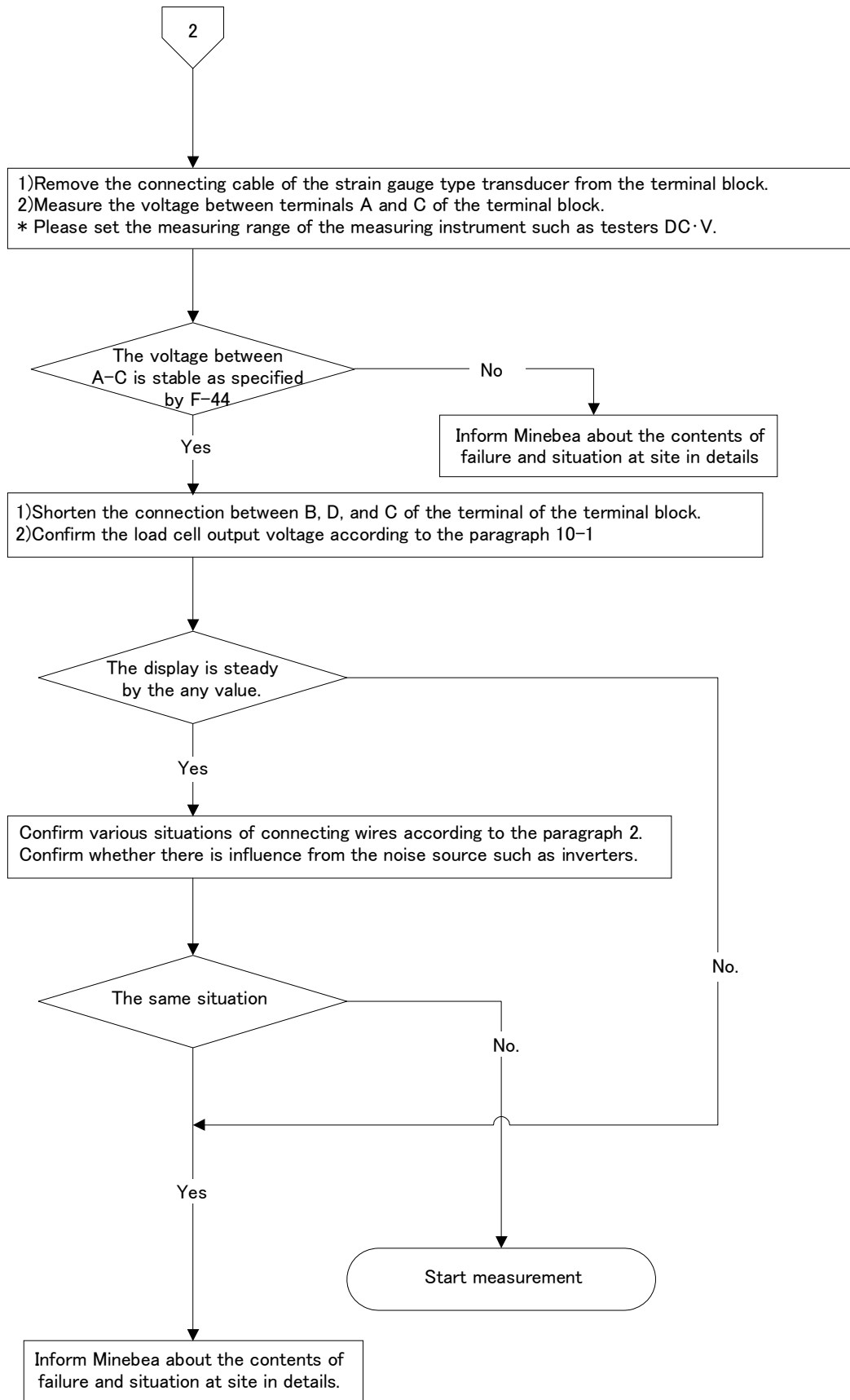
Please check the instrument according to the following procedures when abnormality is found in operation. Moreover, please contact with MINEBEA when there is no corresponding item, and the symptom does not disappear even if the solution is done.

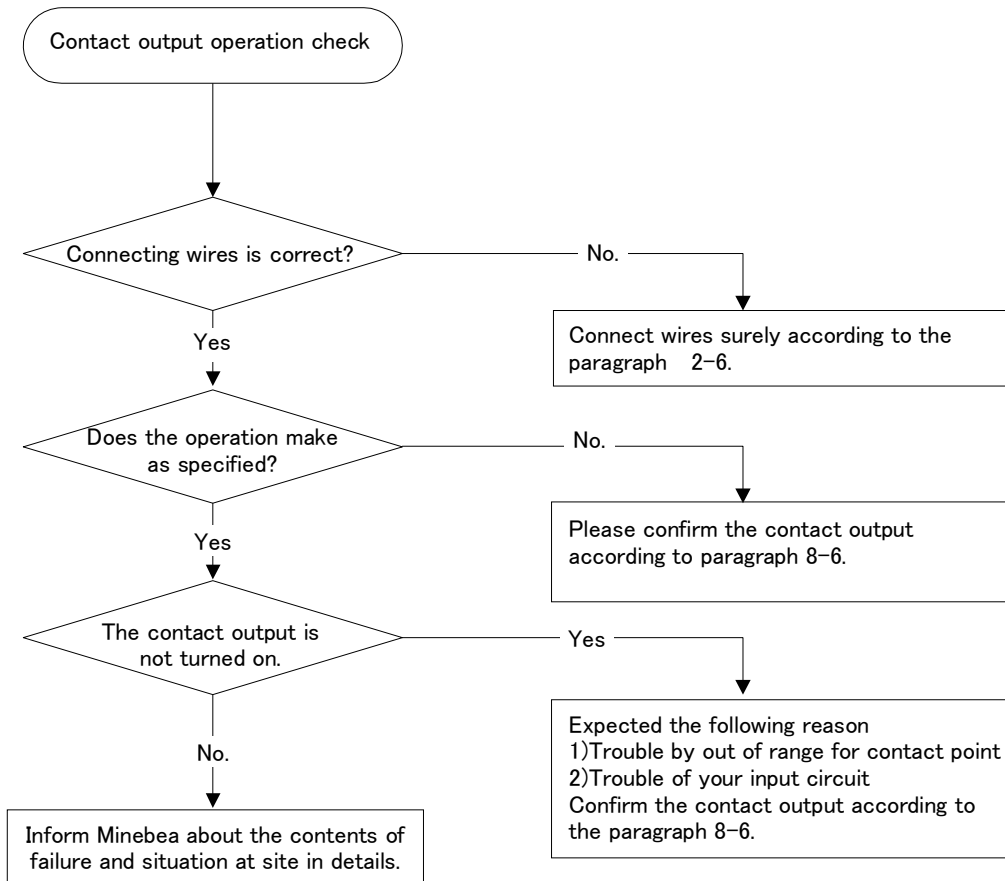
### 11-1. Troubleshooting execution

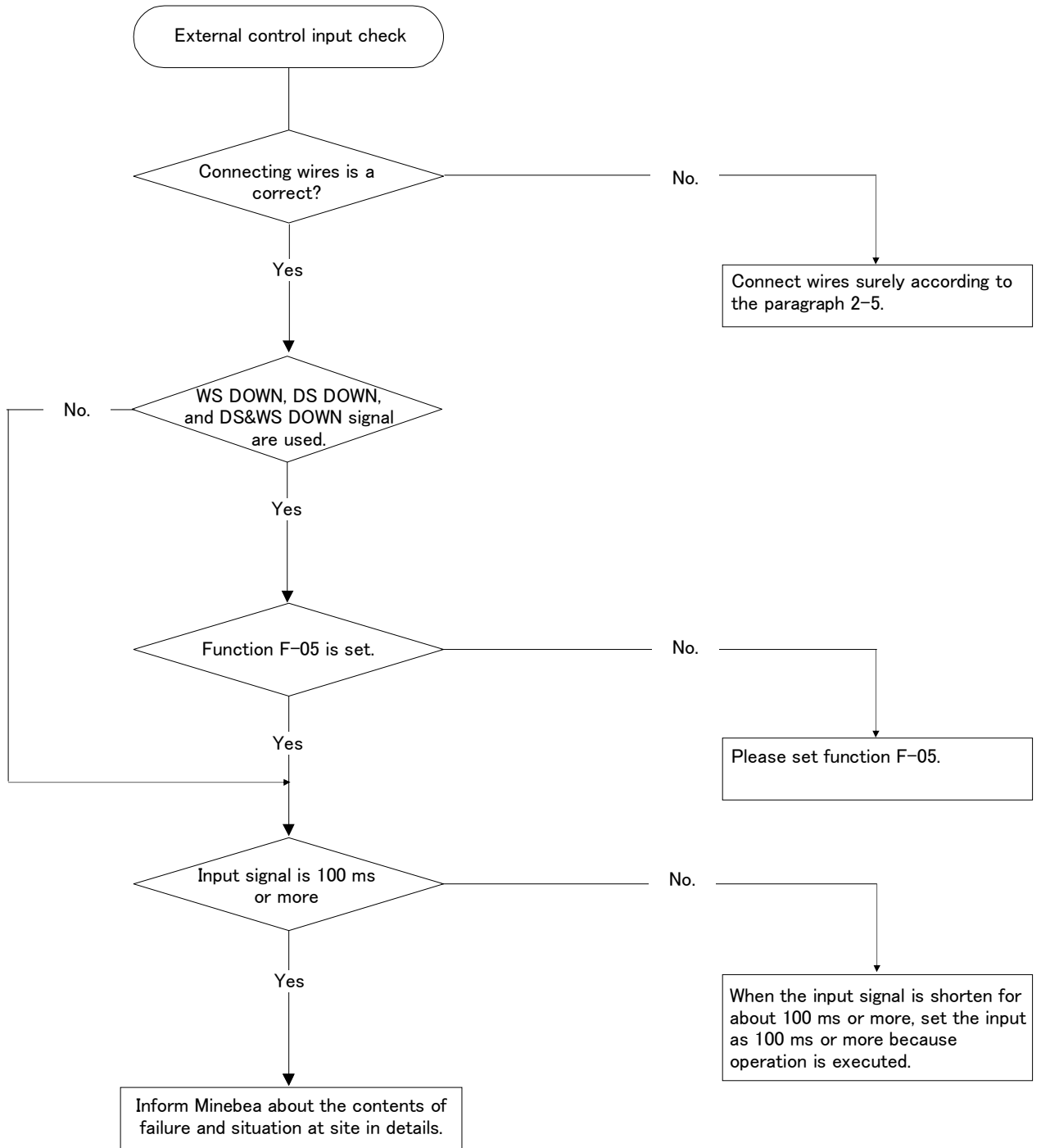


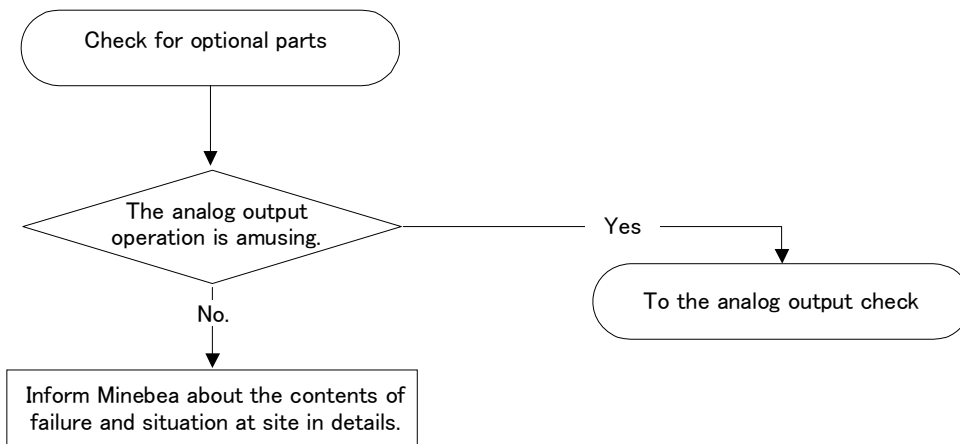
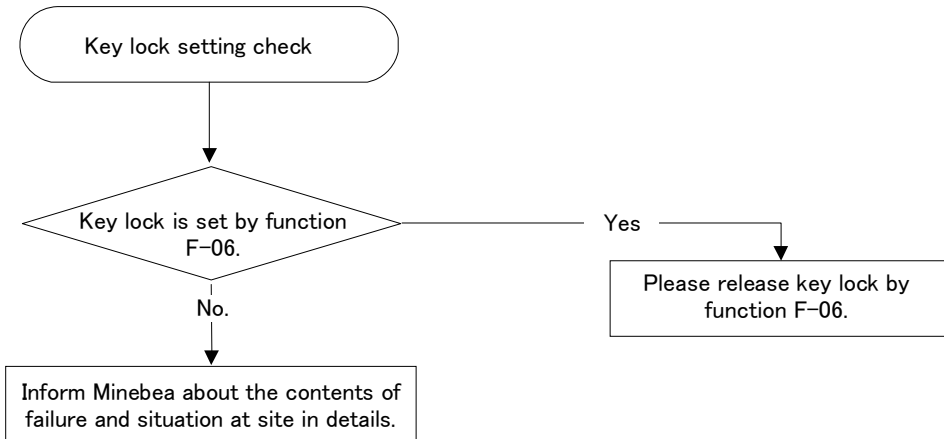


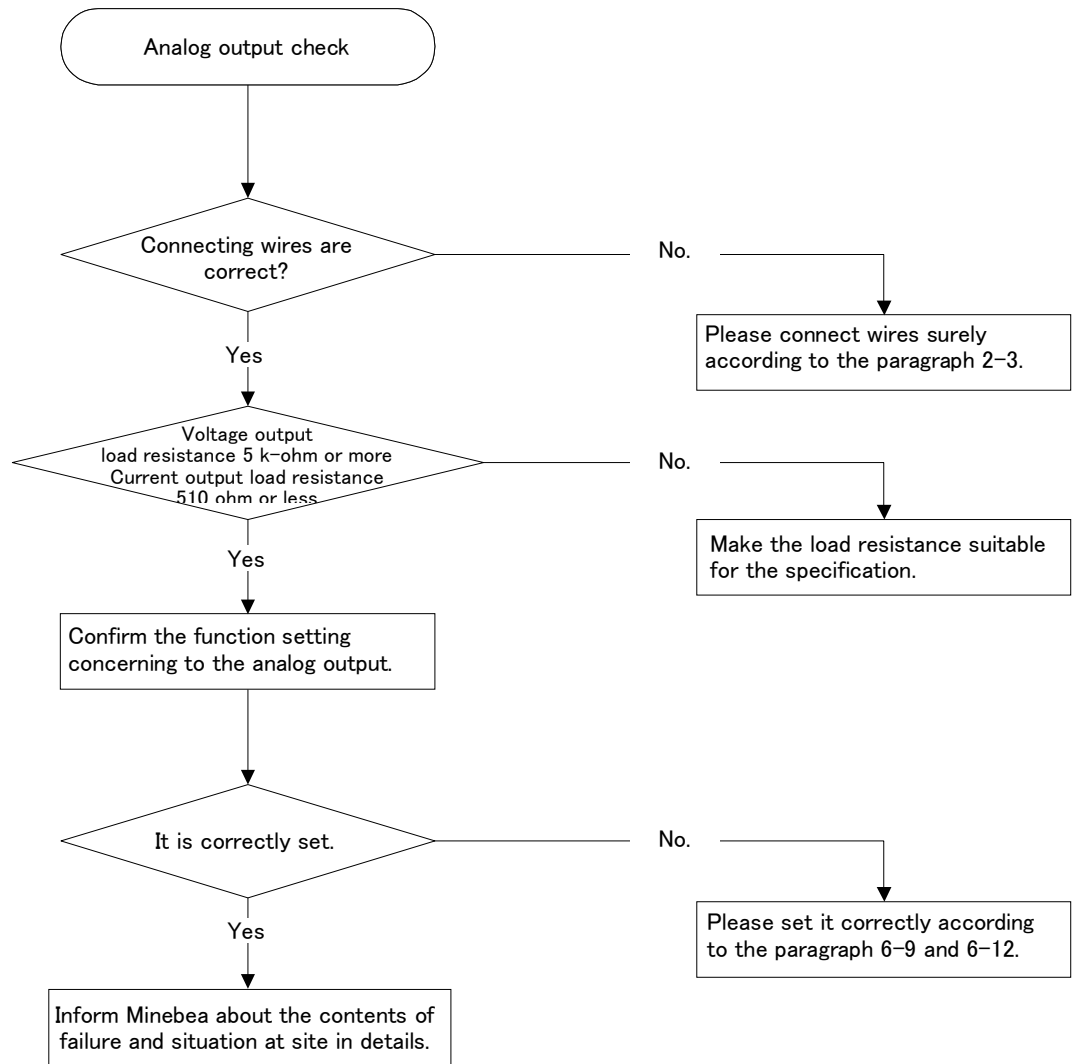












## 12. Specification

### 12-1. Analog specification

Bridge power supply	DC10 V $\pm$ 0.3 V within 30 mA (Changeable to DC2.5 V). with remote sensing
Applicable transducer	Only one piece of strain gage type transducer (350 ohm) is connectable. (each one piece for 2ch input)
Input range	Full scale setting is possible with the input range from 0.2 mV/V to 3.1 mV/V
Zero adjustable range	$\pm$ 1.9 mV/V
Non-linearity	0.01 %F.S.
Temperature coefficient	Zero point $\pm$ 0.2 micro-V/ $^{\circ}$ C (Input conversion, at full scale setting at the input from 0.3 mV/V to 3.1 mV/V)
	Sensibility $\pm$ 0.001 5 %F.S./ $^{\circ}$ C (Input conversion, at full scale setting at the input from 0.3 mV/V to 3.1 mV/V)
Input noise	$\pm$ 0.3 micro-Vp-p or less (at the default value of digital filter and stabilized filter)
Input filter	10 Hz (With the setting of "0" for digital filter and stabilized filter)
A/D sampling	100 times/s (Changeable to 4 times/s or 20 times/s)

### 12-2. Digital specification

Load display	
Range of display	-19 999 to 99 999
Display increment	1 (Changeable to 2, 5 and 10)
Indicator	Red colored 7 segment LED
Over display	"-OL" at minus over and "OL" at plus over
Status display	HEALTHY, CHECK, WS DOWN, DS DOWN
Display frequency	20 times/s (Changeable to 4 times/s )
Decimal point display	Changeable to no display, 10 <sup>1</sup> , 10 <sup>2</sup> , 10 <sup>3</sup> and 10 <sup>4</sup>

### 12-3. Interface

External control input	Following 5 operation are controllable externally. ZERO, LOCK, DS DOWN, WS DOWN, DS&WS DOWN
Contact output	Relay contact output : 5 points Point of contact specification: One make contact and AC250 V 1 A(resistive loading) HEALTH, RUN, DS DOWN, WS DOWN
Spec. for contact point	1b contact, AC250 V 1 A and ERROR
Electric current output	DC4 mA to 20 mA load resistance 510 ohm, Non-linearity 0.05%F.S or less
Voltage output	DC0 V to 10 V, DC0 V to 5 V, DC0 V to 1 V, DC $\pm$ 10 V, DC $\pm$ 5 V or DC $\pm$ 1 V Load resistance 5 k-ohm or more, Non-linearity 0.05 %F.S.

### 12-4. General specification

Operating temp./Humidity range	
- Temperature	-10 $^{\circ}$ C to 50 $^{\circ}$ C
- Humidity	85%RH or less (Non condensing)
Power supply	
- Power supply voltage	AC100 V to AC240 V (Allowable variable range : AC85 V to AC264 V)
- Power supply frequency	50/60 Hz
- Power consumption	About 25 VA (without any option, at AC100 V)
Outside dimension(W $\times$ H $\times$ D)	200 mm $\times$ 150 mm $\times$ 200 mm (Excludes protruding parts.)
Weight	About 4.4 kg (Without any option.)

**12-5. Standard shipment specification**

Bridge power supply	DC10 V
Span adjustment	2 000 display at the input of 0.3 mV/V.
Minimum scale value	1

**12-6. Accessory**

Instruction manual	1 piece
Midget fuse	1 Piece (3 A)
Short bar	4 pieces

### 13. Error indication

ET-1	When the number that doesn't exist in the list is selected at setting the function, it displays blinking for about 2 second.
ET-2	When "Display of maximum indicated value (DISP) < Weight value to be set (LOAD)" are set, it displays blinking for about 2 second.
ET-3	Analog to digital conversion error. Please contact MINEBEA.
ET-E	Writing error to EEPROM. Please contact MINEBEA.
ET-T	Reading error from EEPROM. Please contact MINEBEA.
LE-L	When the output of the load cell and the numeric input in calibration are -2 mV/V or less and exceeds zero adjustable ranges of a minus side, it displays blinking for about 2 second.
LE-H	When the output of the load cell and the numeric input in calibration are 2 mV/V or more and exceeds zero adjustable ranges of a minus side, it displays blinking for about 2 second.
SP-L	When the output of the load cell and the numeric input in calibration are under 0.2 mV/V and don't reach to the span adjustable range, it displays blinking for about 2 second.
SP-H	When the output of the load cell and the numeric input in calibration are over 3.1 mV/V and exceed the span adjustable range, it displays blinking for about 2 second.
OL	When the measurement display exceeds the display range (99 999) or "+110% of the maximum indicated value" is exceeded, it is displayed.
-OL	When the measurement display exceeds the display range (-19 999) or "-110% of the maximum indicated value" is exceeded, it is displayed.
ET-0	When zero set are executed exceeding the setting of F-00, it is displayed.
ET-4	When calibration (CCAL, ACAL, LCAL, TARE and SPAN2) is executed at the time of the CHECK ON, it is displayed.
ET-5	When zero set has been turned on at the zero fine adjustment or span fine adjustment, it is displayed.
ET-6	When the calibration or the analog fine adjustment is executed during effective for calibration LOCK, it is displayed.

## **14. Guarantee**

### **14-1. Guarantee**

- The instrument is covered by a warranty for a period of one year from the date of delivery.
- As for repairs and/or after service is required during the period of warranty, contact with Minebea's sales office or sales agent from which you have purchased.

### **14-2. Repair**

Before asking repairs, make checks once again that the connection, setting and adjustment for the instrument have finished.

Especially, make checks whether the connections of sensors are disconnected or cut off.

After that, still there may be found some defects in the instrument, contact with Minebea's sales office or sales agency from which you have purchased.

### 15. Display character pattern

The followings are the table to show the display pattern used at 7 segments display on the instrument.

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

## 16. Function setting table

Make use of them in case that the customer has changed setting for the function.

Function setting table

Function number	Initial value	Set point of customer	Function number	Initial value	Set point of customer
F-00	00100		F-35	02000	
F-01	00000		F-36	00000	
F-02	00002		F-37	02000	
F-03	00001		F-38	00000	
F-04	00003		F-39	02000	
F-05	00000		F-40	00000	
F-06	00000		F-41	02000	
F-07	00002		F-42	00000	
F-08	00020		F-43	02000	
F-09	00100		F-44	00000	
F-10	04321		F-50	0.0000	
F-11	04321		F-51	0.0000	
F-12	04321		F-60	1.0000	
F-13	00000		F-61	1.0000	
F-14	00000		F-62	1.0000	
F-15	00000		F-63	1.0000	
F-18	00000		F-64	00000	
F-19	00100		F-65	00000	
F-20	00000		F-66	00000	
F-21	02000		F-67	00000	
F-22	00000		F-85	00001	
F-23	02000		F-86	02000	
F-24	00000		F-87	02000	
F-25	02000		F-88	0.0000	
F-26	00000		F-89	0.3000	
F-27	02000		F-90	00001	
F-28	00000		F-91	02000	
F-29	02000		F-92	02000	
F-30	00000		F-93	0.0000	
F-31	02000		F-94	0.3000	
F-32	00000		F-97	00000	
F-33	02000		F-98	-	
F-34	00000		F-99	-	

Memo

## 17. C function data table

Make use of them in case that the customer has changed setting for the function.

Make sure to record the concerned function data when the user has execute the various calibrations (load calibration or adjustment of analog output).



The setting data of C function form CF-00 to CF-65 is necessary to register the data by H function. Please make sure to record all items. The data revival function by H function doesn't operate correctly if there is any mission of the record.

Function number	Data	Function number	Data
CF-00		CF-35	
CF-01		CF-36	
CF-02		CF-37	
CF-03		CF-38	
CF-04		CF-39	
CF-05		CF-40	
CF-06		CF-41	
CF-07		CF-42	
CF-08		CF-43	
CF-09		CF-44	
CF-10		CF-45	
CF-11		CF-46	
CF-12		CF-47	
CF-13		CF-48	
CF-14		CF-49	
CF-15		CF-50	
CF-16		CF-51	
CF-17		CF-52	
CF-18		CF-53	
CF-19		CF-54	
CF-20		CF-55	
CF-21		CF-56	
CF-22		CF-57	
CF-23		CF-58	
CF-24		CF-59	
CF-25		CF-60	
CF-26		CF-61	
CF-27		CF-62	
CF-28		CF-63	
CF-29		CF-64	
CF-30		CF-65	
CF-31		-	
CF-32		-	
CF-33		-	
CF-34		-	

Memo

## 18. H function mode

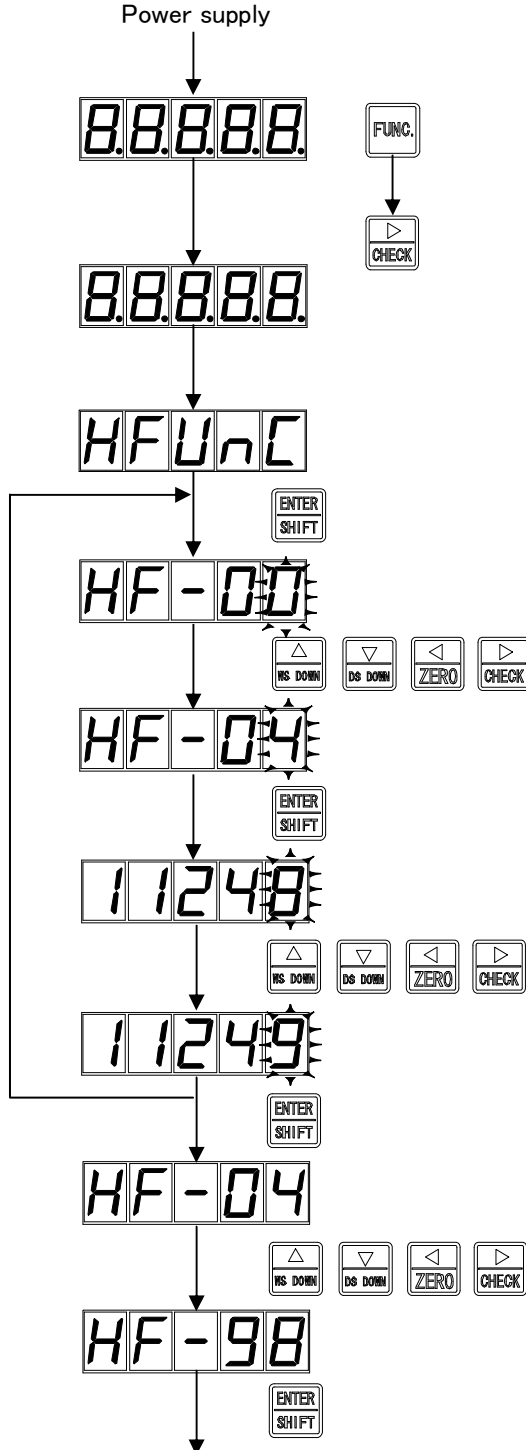
It is a function to write C function data in EEPROM.

When the load is not correctly displayed because the content of the proofreading changed due to a wrong recalibration or some troubles(exclude the damage of EEPROM, this function can display (recover) the load with calibrated condition by registering the data without executing the calibration with using the actual weight, etc.



Please register all content recorded in C function of CF-00 to CF-65 in H function. The data revival function by H function doesn't operate correctly if there is any mission of the record.

### 18-1. Method of setting H function mode



Press the **FUNC.** key and the **CHECK** key immediately after the power is turned on while the front panel LED lights all. (for about two seconds).

The display becomes **HFUNC**, and it enters into the H function mode.

By pressing the **ENTER SHIFT** key, **HF-00** is displayed. Select the H function number to be changed

- DS DOWN** / **DS DOWN**: Change the value of the changed digit.
- CHECK** / **ZERO**: Select the changing digit.
- FUNC.**: Return to **HFUNC** display.

**ENTER SHIFT**: Memorize the displayed value, and proceed to the next step.

Press the **ENTER SHIFT** key.

Set the set value of the selected H function number.

- DS DOWN** / **DS DOWN**: Change the value of the changed and set digit

- CHECK** / **ZERO**: Select the changed digit.

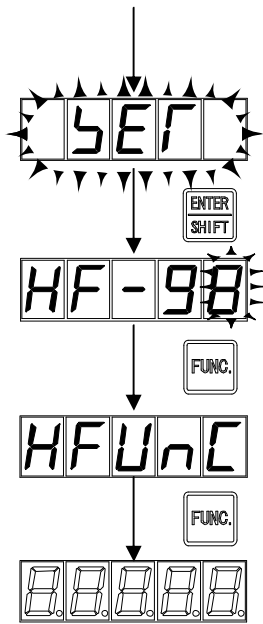
**FUNC.**: Return to the **HFUNC** display.

**ENTER SHIFT**: Memorize the displayed value, and proceed to the next step

Press the **ENTER SHIFT** key.

The set content is temporarily registered in RAM, and display panel displays the registered H function number. Please select the changing H function number when you change the setting of the other H function numbers.

To memorize the content of the set H function in the EEPROM, the display is set to **HF-98**.



becomes a blinking display.

: The temporary registered data of H function is saved to EEPROM, and it proceeds to the next step.

: Return to the display.

Press the key. The display becomes .

By pressing the key, the display becomes .

It returns to the measurement mode when the key is pressed.

## 19. Appendix

Terminal block name list

Terminal name	Usage	Terminal name	Usage
A1(bridge excitation +)	WS side load cell	ZERO	External control input
D1(amplifier input +)		LOCK	External control input
F1(sensing +)		DS·DOWN	External control input
B1(amplifier input-)		WS·DOWN	External control input
G1(sensing)		DS&WS·DOWN	External control input
E1(shield)		COM.1	External control input common
C1(bridge excitation-)		HEALTHY	Contact output
N.C.	Unused	ERROR	Contact output
A2(bridge excitation +)	DS side load cell	DS·DOWN	Contact output
D2(amplifier input +)		WS·DOWN	Contact output
F2(sensing +)		RUN	Contact output
B2(amplifier input-)		COM.2	Contact output common
G2(sensing)			
E2(shield)			
C2(bridge excitation-)			

Terminal name	Usage	Terminal name	Usage
1 +	1ch analog output +	7 +	7ch analog output +
1 -	1ch analog output-	7 -	7ch analog output-
1 F.G.	1ch analog output F.G.	7 F.G.	7ch analog output F.G.
2 +	2ch analog output +	8 +	8ch analog output +
2 -	2ch analog output-	8 -	8ch analog output-
2 F.G.	2ch analog output F.G.	8 F.G.	8ch analog output F.G.
3 +	3ch analog output +	9 +	9ch analog output +
3 -	3ch analog output-	9 -	9ch analog output-
3 F.G.	3ch analog output F.G.	9 F.G.	9ch analog output F.G.
4 +	4ch analog output +	10 +	10ch analog output +
4 -	4ch analog output-	10 -	10ch analog output-
4 F.G.	4ch analog output F.G.	10 F.G.	10ch analog output F.G.
5 +	5ch analog output +	11 +	11ch analog output +
5 -	5ch analog output-	11 -	11ch analog output-
5 F.G.	5ch analog output F.G.	11 F.G.	11ch analog output F.G.
6 +	6ch analog output +	12 +	12ch analog output +
6 -	6ch analog output-	12 -	12ch analog output-
6 F.G.	6ch analog output F.G.	12 F.G.	12ch analog output F.G.

- It becomes effective when option is installed since 5ch.

- The contents of this manual may subject to change without notice.

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