Minebea

DIGITAL INDICATOR
CSD-904-EX

Instruction Manual

EN294-1185-M

Forwards

Thank you very much for your purchasing the Digital Indicator, model CSD-904-EX.

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 a description when the occurrence only of assumption of danger by which the user owes injury when handling is mistaken, and material damage is assumed.

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

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 ℃ to 40 ℃
- Environmental humidity : Less than 85 %RH (Non condensing)

⚠ Warning

As it may cause an unexpected faulty in the instrument., don't locate the instrument on the places as follows :

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.

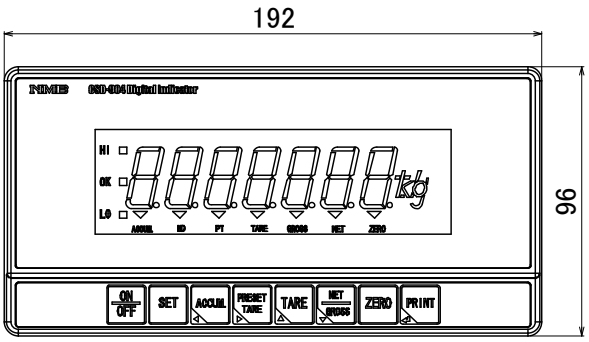
② Installation

Warning

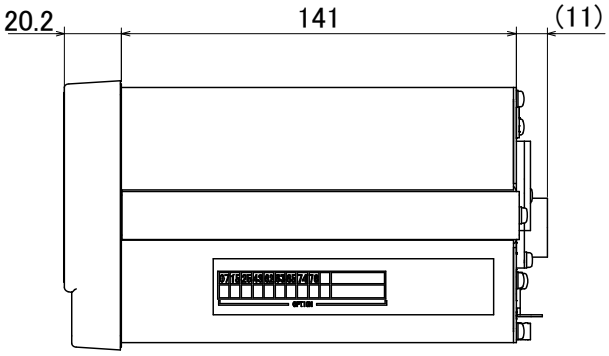
● When installing the instrument, install as referring to the following figures and secure the space around the instrument.

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

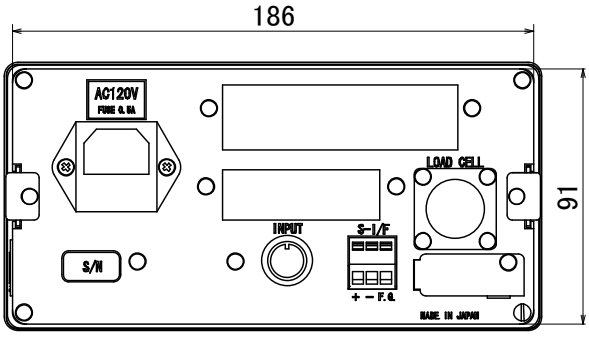
Front



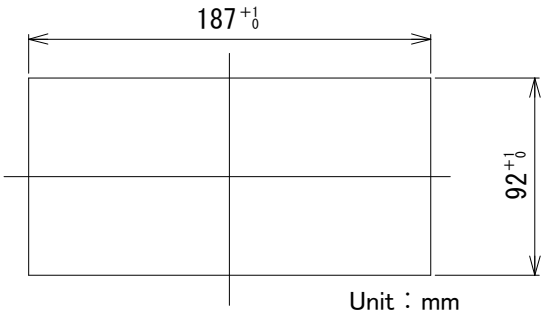
Side



Rear

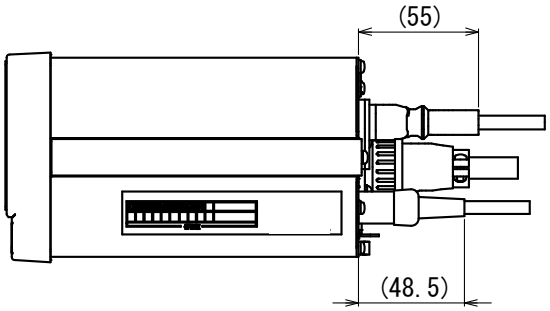


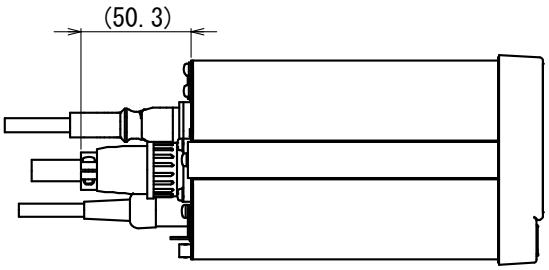
Panel cut size



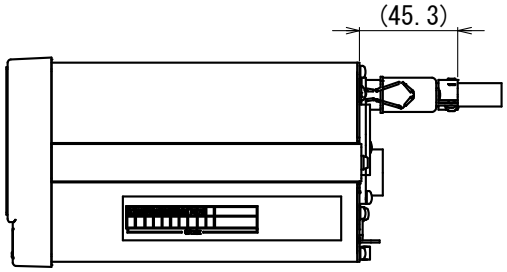
Unit：mm

Side shape when the AC cable, the external control input plug or load cell connecting plug is attached.





Side shape when the BCD plug is attached.



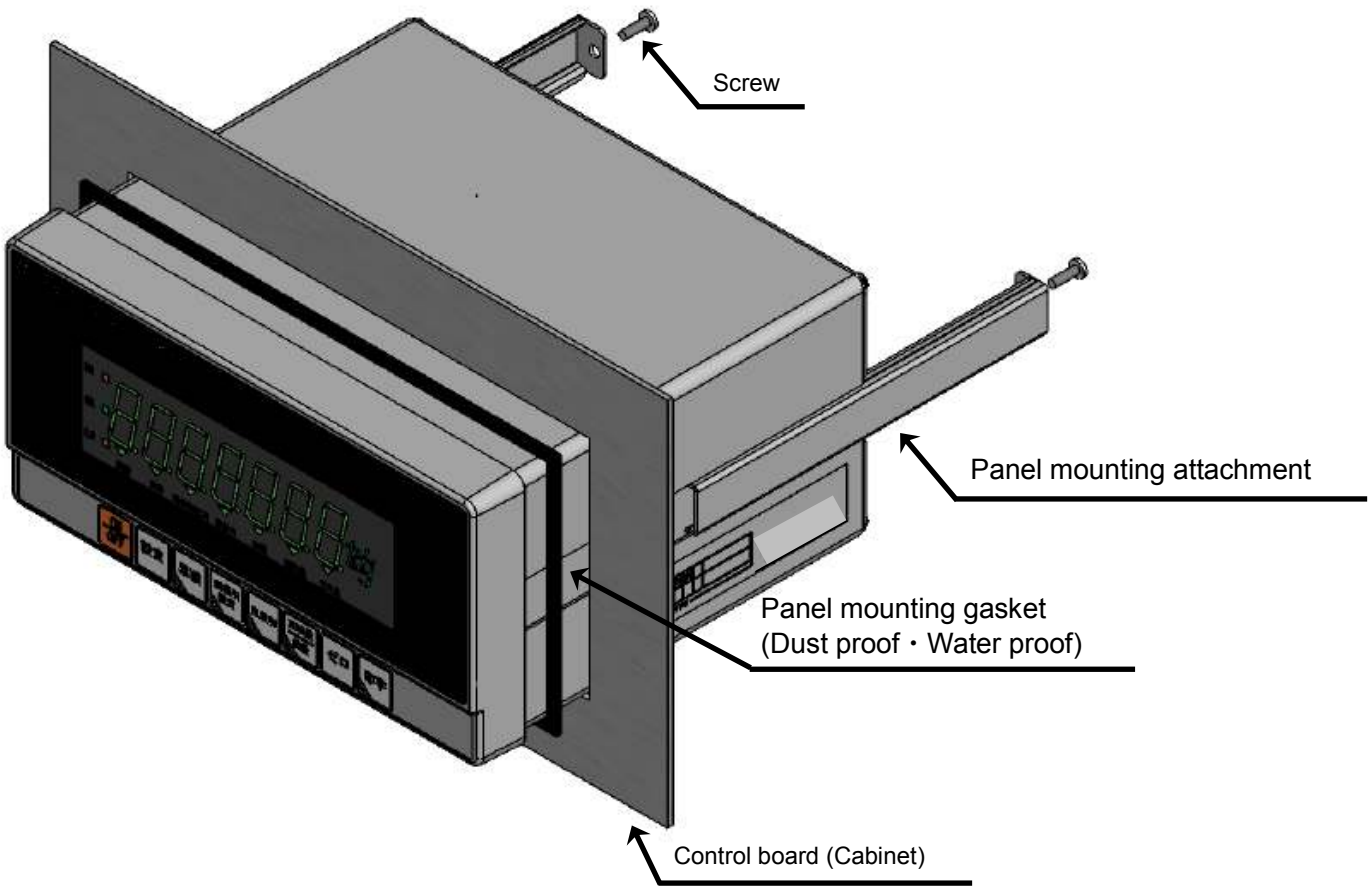
Unit：mm

③ Applicable environment

Warning: The instrument may subject to use in a highly humid area or in full of powder dust.

In such a case, use the instrument by inserting the panel mount gasket attached between the control panel (cabinet) and the main body.

By inserting the panel mount gasket, the front panel section becomes IP65 (International Protection Code) or equivalent in dust-proof and water-proof construction.



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

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 equipment. 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 equipment or even more serious accidents.

Caution

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

Caution

Do not 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

Do not remove the case cover of the instrument, nor peel off the panel sheet nor take the instrument into pieces. If neglected, it may cause a damage to the case and the panel sheet and even have the possibility of damage to resist to environments or operational performances.

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.

Do not 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 damage to the panel switch and even have the possibility of damage to resist to environments or operational performances.

4. Conformed standard

The instrument is conformed to the following standard.

Annex C (Performance level H) of JIS B 7611-2: 2015

"Non-automatic weighing instruments – Metrological and technical requirements and tests –

Part 2: Measuring instruments used in transaction or certification"

⚠ Caution

It conformes to the above standard from the production in May, 2010.
(The logo print of its front panel appears as "Minebea" not as "NMB".)

The using condition to conform this standard is as follows.

⚠ Caution

Please observe the following conditions strictly when this instrument suits the JIS standard.
If neglected, there is a possibility of not suiting the above-mentioned standard.

① Shield processing

Use the shielded cable for all connections expect a power supply cable.

Refer to relative notes, about method of shield processing.

② Setting Functions

As for the details of the function of the value of C Function and Function,

please refer the paragraph 5-2 and 7-2.

CF-03 "Condition of over display" shall be applied with the value of 2.

CF-11 "Effective range of zero set" shall be applied with the value of 0.

CF-13 "Data width of zero tracking" shall be applied with less than 4% of maximum weighing capacity.

F-01 "Digital filter setting" shall be applied with more than the value of 3.

F-05 "Stabilized filter setting" shall be applied with more than the value of 4.

F-06 "Stabilized filter data width" shall be applied with less than the set value of 005.

F-07 "Stabilized filter time width" shall be applied with the set value of more than 01.

F-10 "Detection of stability data range" shall be applied with less than the set value of 4.

F-11 "Detection of stability time range" shall be applied with more than the set value of 2.

At the overload, 'OL' is output as a load data from BCD output, RS-232C interface and RS-422/485 interface.
When the gross value is less than -20D, '-OL' is output also.

5. Function set when this is used in the tank weighing system

When using this as a tank weighing system which does not require JIS standard conformity, and is not a specified measuring instrument or is not used in accordance with specified measuring instrument usage, the setting of the function shall be changed to as below.

This becomes the suitable setting for tank weighing system by easing the condition of [Over display], [Zero set] and [Tare weight cancellation].

Examine this setting based on the user's weighing condition.

① Setting functions

CF-03 Set the value of [Condition of over display] to 1: (Exceeding to the maximum capacity ±110 %).

CF-10 Set the value of [Operating condition of zero set] to 1: (Operation by unconditional).

CF-11 Set the value of [Effective range of zero set] to 1: (±10 % of the maximum capacity).

CF-16 Set the value of [Operating condition of tare weight cancellation] to 1: (Operation by unconditional).

History of revision

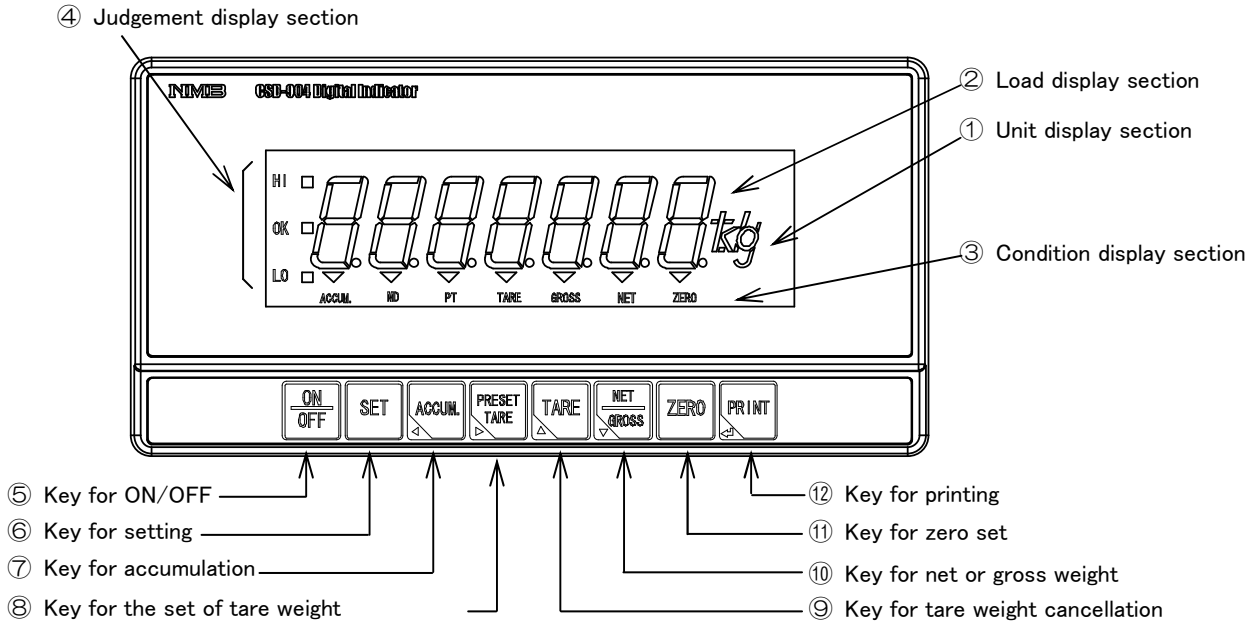
Date	Instruction manual No.	Details of revised point
2003/03	DRW. NO.EN294-1185	First Version Ver.2.000
2003/04	DRW. NO.EN294-1185A	Due to ECN NO. FN03-02048. *Changed the “minimum scale “ to “scale interval”. *Changed the “meter “ to “measuring section”. *Changed the “measurement display “ to “load display” *In the section 6-9-5,changed the “minimum scale” to “scale interval in calibration” *Change the “OVR.” to “OVER” in the section 13-2-8 and 15-3. *Corrected the “ID No.” to “Address” in 13-3-12. *Added “Sending data: binary code BCD” on the table in 12-1.
2003/08	DRW. NO.EN294-1185B	Due to ECN NO. FN03-02107. – Correction – 13-3-13. write “Contents” instead of Japanese
2004/11	DRW. NO.EN294-1185C	Due to ECN No.FN04-02169 ・Correction of the error/mistake in the contents. ・Correction of a gravity acceleration setting value
Nov. 2005	DRW. NO.EN294-1185D	Due to ECN No.FN05-02135 *Add the clause “When this is used in Japan domestic, the voltage that exceeds AC125 V cannot be supplied by the limitation of “Electrical Appliance and Material Safety Law”.
May. 2010	DRW. NO.EN294-1185E	Due to ECN No.FN10-01019A - Addition - Panel mounting gasket is added.
Oct. 2010	DRW. NO.EN294-1185F	Due to ECN No.FN10-02140 - Change - Minebea logo is changed.
Jan. 2011	DRW. NO.EN294-1185G	Due to ECN NO.FN11-02001A - Correction - 13-3-10. “DE-9S-N (JAE)” to “DE-9S-NR by JAE or equivalent.” Due to ECN No.FN11-02016 ROM Ver.3.100 or lator. - Addition - 7-2. “Function of the function date” Key lock F-08 is added to the table. 8-4. “Key lock function” is added. 8-4-1.”Key lock” is added. 19. “Setting table for functions” F-08 is added to the table. Update of Index.
May 2012	DRW. NO.EN294-1185H	Due to ECN No.FN10-02140-D - Change - Minebea logo is changed.

Jun. 2016	DRW. NO.EN294-1185I	Due to ECN No, FN16-02057 -Deletion- Delete 'Minebea Co., Ltd. Measuring Components Business Unit' from the front cover. Due to ECN No, FN10-02140-E -Change- Minebea logo is changed.
Aug 2017	DRW. NO.EN294-1165J	Due to ECN FN17-02017 ・Delete the company name in the contents..
Jun 2018	DRW. NO.EN294-1165K	Due to ECN FN18-02063 ・Add 4.**Conformed standard.**
Dec. 2018	DRW. NO.EN294-1165L	Due to ECN FN18-02122 2-3.Connection of the external control input Add the note. ・Do not assign the same set value to multiple PIN umbers. This instrument does not work properly.
Dec. 2018	DRW. NO.EN294-1165M	Due to ECN FN18-02080 -Addition- ・5.Function set when this is used in the tank weighing system -Index- ・5.Function set when this is used in the tank weighing system

Index

1. Name and function of each point

1-1. Front panel



① Unit display section

The set measuring unit is displayed.

"○" lights on at the unit display section at the stand-by condition(The load display has been turned off while energized.).

② Load display section

It displays "Gross/Net value", "Over" and "Error".

Also it displays the condition or the setting value in proceeding the various setting.

③ Condition display section

It displays the condition of CSD-904-EX.

ACCUM.	It lights on when the accumulation data is made. Also, it blinks when the accumulation data is displayed. The load value and the accumulated display are switched by [SET] key.
MD	It lights on when the measured data is steady.
PT	It blinks while setting a fixed tare weight cancellation. It lights on when a fixed tare weight cancellation is set.
TARE	It lights on when the tare weight cancellation is executed.
GROSS	It lights on when the load display is gross value.
NET	It lights on when the load display is net value.
ZERO	It lights on the load value of gross or net value is a zero, and within ±1/4 of a scales interval.

④ Judgement display section

It displays the comparison result of the comparator function.

⑤ [ON OFF] key

This key turns the display on and off. When the display is turning off, the electric power is supplied to the inside of the indicator and the measuring section. The display becomes the stand-by condition at the time of turning off.

⑥ 

key

It is switched to the accumulation display, and also to the previous state by which the status of each mode is set.

⑦ 

key

It is used for the load value to accumulate, and also it carries up the set digit when the value is set.

⑧ 

key

It is used when the setting of the fixed tare weight cancellation is executed.

And also it carries down the set digit when the value is set.

⑨ 

key

The tare weight cancellation is executed.

And one value of the selected digit is raised when the value is set.

⑩ 

key

It switches the gross value and net value of the displayed data.

And one value of the selected digit is lowered when the value is set.

⑪ 

key

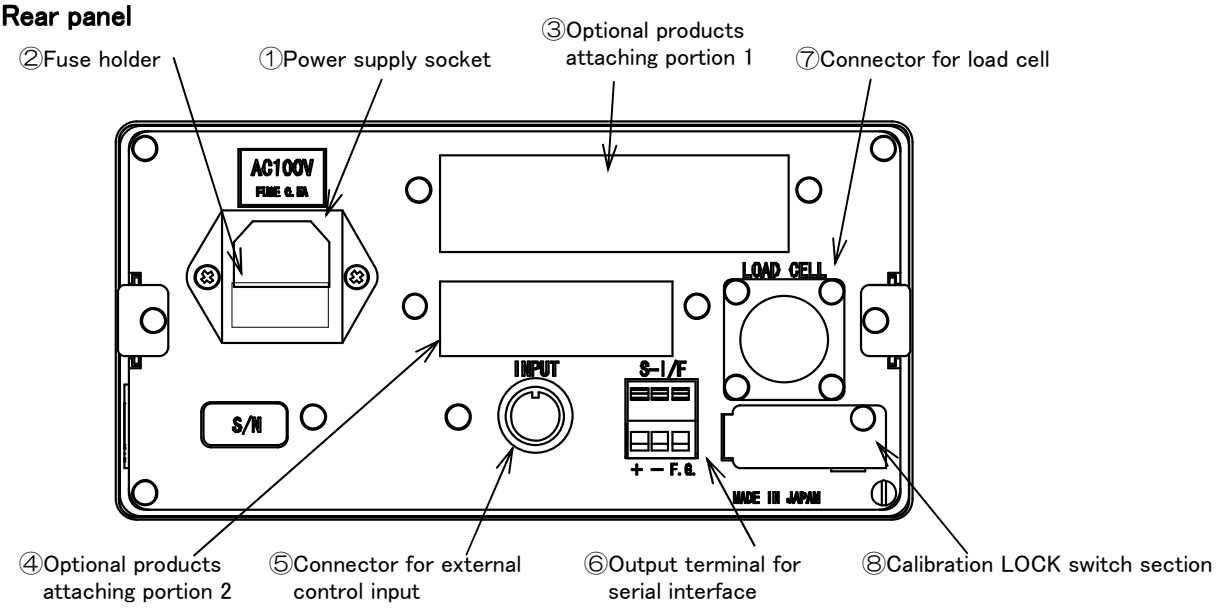
It memorizes a present load value as a zero point, and makes the display a zero.

⑫ 

key

It outputs the printed data. Moreover, it decides various data entries, and memorizes the set value in an internal memory.

1-2. Rear panel



① Power supply socket

Connecting the AC cable regularly attached to this point, the power supply voltage is supplied.

② Fuse holder

The fuse of the specified capacity is installed.

③ Optional products attaching portion 1

One point of either the BCD output, RS-232C, RS-422/485, the analog electric current output or the analog voltage output is installed.

④ Optional products attaching portion 2

The contact output is installed.

⑤ Connector for the external control input

It is an input connector to control the function of this unit with outside contact point or open collector.

⑥ Output terminals for serial interface

It connects with the printer or the external display unit.

⑦ Connector for load cell

It connects with the signal wires from the measuring section (load cell).

⑧ Calibration LOCK switch section

Calibration LOCK switch can be operated by removing the cover.

2. Connecting method

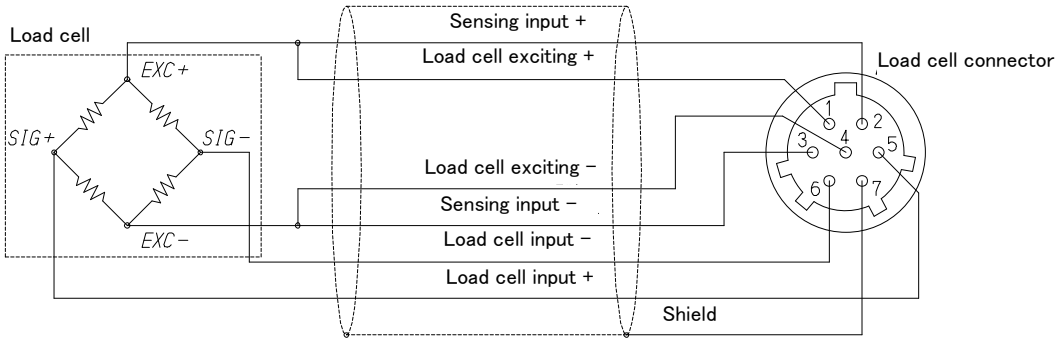
2-1. Notes concerning to the connecting wires

- Be sure to set the power supply to OFF, when the connection will be made.
- Please do not put the plug of the AC power supply until the installation is completed.
  There is no switch which switches power supply ON/OFF in the main body.
- Please separate the cable connected with the main body from the power supply line and noise source of control I/O, etc., as much as possible.
- Conduit wiring should be the type of exclusive one, and avoid using with another line together.
- The grounding wire should be connected. Grounding should be the D class with single earth.
  Please do not share with the grounding and the power supply system.
  Please connect the grounding via the attached AC cable.
- Please use the shielded cable for the connection with the external control input and the contact output, and also connect the shield with the shield terminal or the main body.

2-2. Connection with the load cell

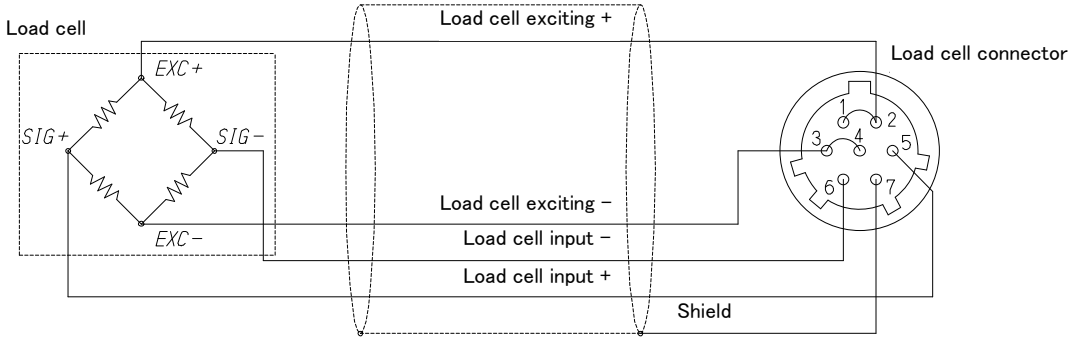
Please connect the plug attached as a load cell connector with the receptacle in the rear panel to connect with the load cell. Suitable plug : NJC-207-PF(by Nanahoshi) or equivalent.

① When the connecting cable is 6 wires method



The connection between the second of sensing input +/connector and the third of the sensing input −/connector should be short-circuited near the main body of the load cell. It will not work as the 6 wires method when the short-circuit is made in the load cell connector.

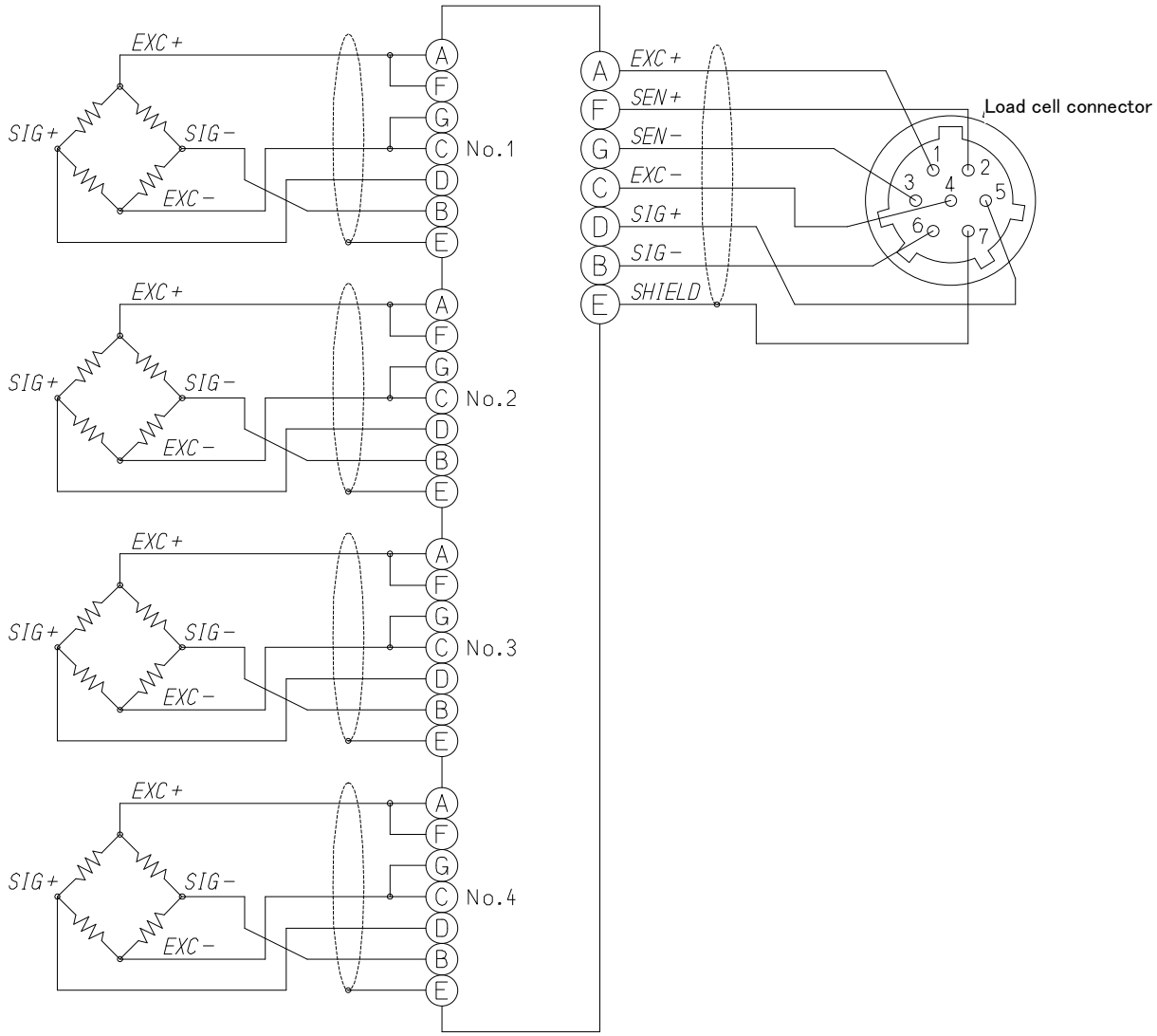
② When the connecting cable is 4 wires method



In case of using with 4 wires method, the connection between No.1 – No.2 and No.3 – No.4 in the connector should be short-circuited.
When No.2 connectors and No.3 are used while opened, CSD-904-EX does not work normal operation.

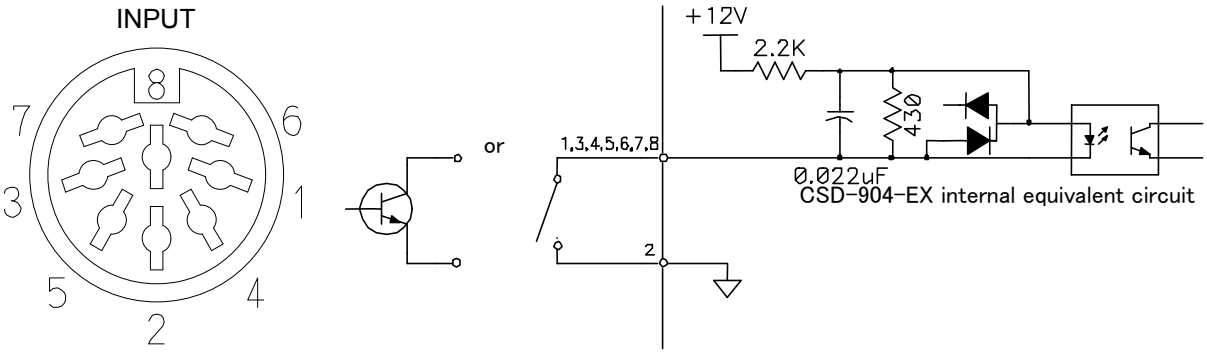
③ When you connect the load cell in parallel

The hopper scale, the track scale, etc., have the case to connect the several pieces of the load cell in parallel. The parallel connection can be easily done by using optional SB-310 and SB-320 (Summing type junction box).



2-3. Connection of the external control input

The function can be controlled from the outside with the "INPUT" connector in the rear panel.
It is executed by shorting each pin and the COM pin with a contact point or an open collector after wiring for the connector.



Layout of INPUT connector pin

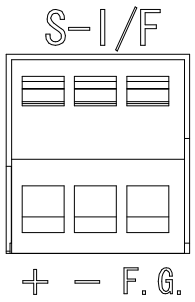
Pin No.	Function No.	Setting value and details	
1	F-60 INPUT1 function	0	Operation OFF
		1	The same operation as ON/OFF key
		2	The same operation as SET key
		3	The same operation as ACCUM. key
		4	The same operation as PRESET TARE key
		5	The same operation as TARE key
		6	The same operation as NET/GROSS key
		7	The same operation as ZERO key
		8	The same operation as PRINT key
		9	Display the net weight (Effective during the measurement mode.)
		10	Display the accumulated value (Effective during the measurement mode.)
2		COM pin of INPUT1～7	
3	F-61 INPUT2 function	Selectable as well as F-60	
4	F-62 INPUT3 function	Selectable as well as F-60	
5	F-63 INPUT4 function	Selectable as well as F-60	
6	F-64 INPUT5 function	Selectable as well as F-60	
7	F-65 INPUT6 function	Selectable as well as F-60	
8	F-66 INPUT7 function	Selectable as well as F-60	
Connect or case		Shield connection	

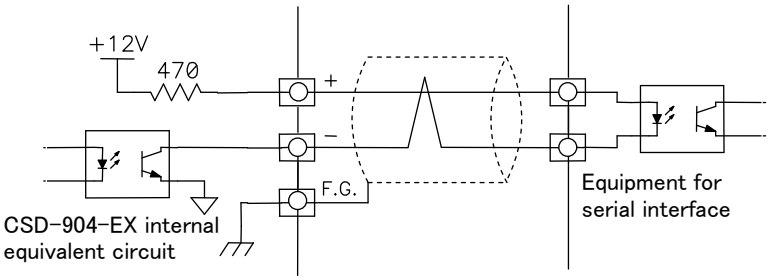
Suitable plug : TCP0586-71-5201(by Hoshiden) or equivalent good.

- **For the connections with external control inputs, be sure to apply shielded cable, and the shield should be connected with the connector case. If not connected, it may cause malfunction due to the effects from external noises and so on.**
- **When "1 to 8" is selected in the setting of function F-60 to 66, each external control input becomes the same operation as the key input operation.**
- **After about 100 ms or more is short-circuited, the operation is executed as for the input signal.**
- **Only the changeover of the net amount display and the changeover function of the accumulated display are the level input. Other than them are pulse input and become effective once at the pulse width of 100 ms or more.**
- **Common of the COM of the external control input (two pins) and serial interface circuits is common.**
- **Do not assign the same set value to multiple PIN umbers.This instrument does not work properly.**

2-4. Connection of the serial interface (S-I/F)

It is a two-wire method serial interface to connect a printer and an external indicator, etc.





- **There are M250 printer etc. made by Unipulse as an equipment for the serial interface.**
- **The cable must use two wires shielded cable as much as possible. Please connect the shield to F.G. terminal.**
  Please make the cable in the twist when you do not use the shielded wire.
  (The length of the cable is within 100 m for shielded wire, and within 20 m for unshielded wire.)
- **Equipment for the serial interface can be connected up to three units in parallel. (The maximum output current Approx.DC20 mA)**
- **Common of the COM of the external control input(two pins) and the serial interface circuit is common.**
- **Internal circuit is isolated through photo-coupler.**

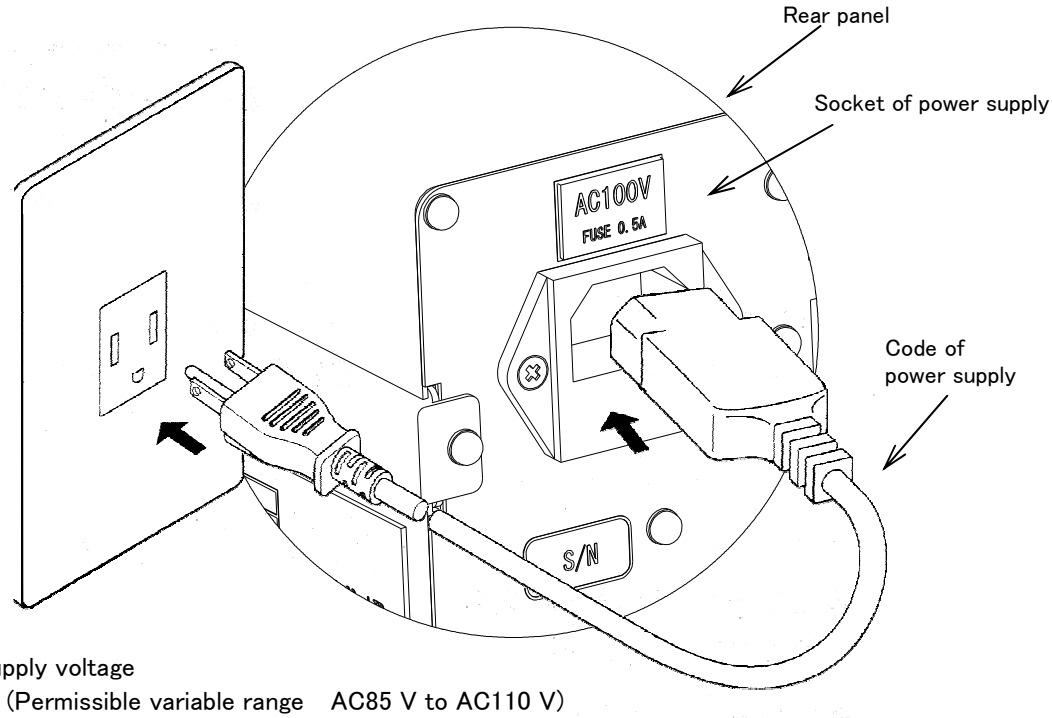
2-5. Connection of the power supply and ground

Please insert the attached AC cable into the socket of power supply in the rear panel.

Plugs of the AC cable are three pins, and pins round-shaped at the center are the ground terminal.

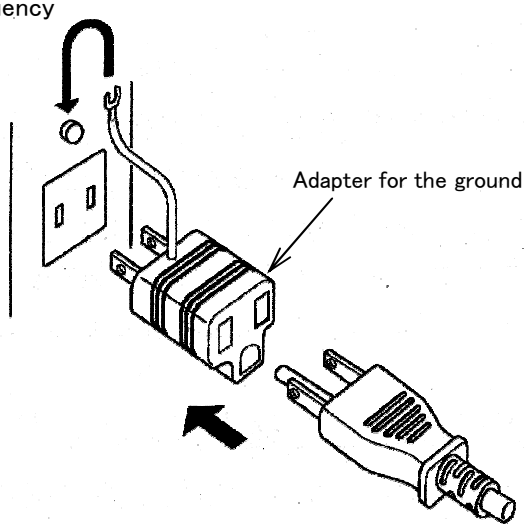
It is inserted in the power supply outlet in the predetermined power requirement.

Please use the attached adapter for ground when the ground terminal is not exist in the outlet.



Power supply voltage
AC100 V (Permissible variable range　AC85 V to AC110 V)

Power supply frequency
50/60 Hz



⚠ Caution

- **Connections with the power supply and the earth should be made securely according to the above figures and also within the rated capacity of the instrument.**
- **Attached AC cable is to be used for AC125 V power supply. When you will use the power supply of AC200 V or AC240 V, please prepare the cable for AC250 V power supply separately.**
- **When this is used in Japan domestic, the voltage that exceeds AC125 V cannot be supplied by the limitation of "Electrical Appliance and <ateroal Safety Law".**

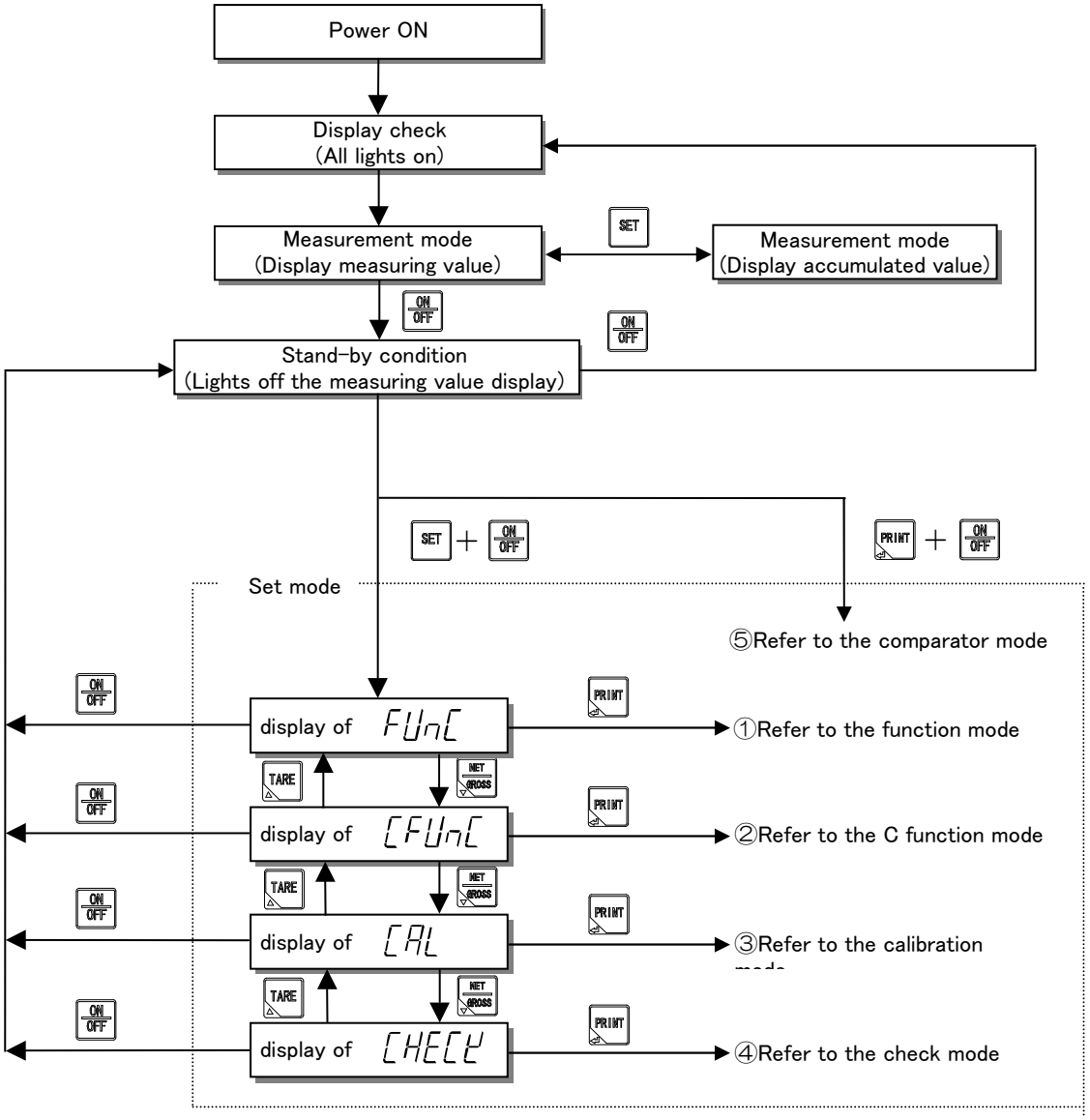
- **Grounding should be the D class with single earth. If neglected, it may cause an unexpected malfunction due to the effects of noise from other equipment.**

3. Operation

3-1. Changeover of mode

This unit has various modes according to the operating situation.

Proceed the changeover of the mode by the key operation.



● **When the load cell output exceeds ±10 % of weighting by the power on zero function after checking the display, the display becomes the error indication of "– – – – – – – ". At this time, if the SET key is pressed, the display compulsorily becomes a load display. Refer to the paragraph 6-6. Power on zero.**

① Function mode (FUnC)

Various functions become effective because of setting the function data.

② C function mode (CFUnC)

Various functions which relate to calibration by setting C function data become effective.

③ Calibration mode (CAL)

By setting the calibration data, the calibration is executed to display the electric signal from the measuring section(load cell) as an accurate load.

④ Check mode (CHECK)

The ROM version, the each input/output operation, the monitor of load cell output value, the BCD output and the analog output can be confirmed by the check mode.

⑤ Comparator mode (HIGH、LOU)

The measured value and the set value are compared by setting the comparator mode.

One is the single comparison mode comparing the measured value with set upper/lower limit value, and another is the weigh-in/weigh-out measurement mode with the output corresponding to the comparison result after setting the four kinds of value for the target value, the pre-rated weight, fall and near zero.

4. Calibration

To be able to display the electrical signal from the measuring section (load cell) as an accurate weight, the operation to match the display of the instrument with the weight loaded on the measuring section is called a calibration.

For example to adjust the display of this instrument to 100.00 accurately when the weight of 100 kg is loaded on the measuring section is said.

4-1. Set items required in the calibration

① Scale interval (d-01, 02, 05, 10, 20, 50)

It is the minimum unit of the measuring value. The value to be set is "1", "2", "5", "10", "20" or "50".

The value of {Weighting value/Scale interval} is the display resolution.

② Weighting value (dISP)

It is the maximum weight to be able to measure by the measuring section (load cell).

③ Mass of weight used at the span calibration (LOAd)

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

Please give setting here as 2/3 or more of weighting to reduce the calibration error.

④ Calibration at zero (ZERO)

It is a procedure of the calibration to become the zero point of the measurement when nothing is put on the measuring section (status of an initial load). There are "Method by the weighing data (status of an initial load)" and "Method by a numeric input of the load cell output voltage" as a calibration method.

⑤ Calibration at span (SPAn)

It is a procedure by which execute the calibration of the change in the electric signal of the load cell when the weight is put on the measuring section to become the display of a correct weighing value.

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

4-2. Procedure set if necessary after calibration

① Display position of decimal point (C function : CF-01)

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

② Unit (C function : CF-05)

The unit is put on the load display of this unit.

③ Digital linearize (Lnr)

It is a function the compensation of three points or less except the zero and span, and to reduce the measurement error. Refer to the paragraph 4-5. Digital linearization.

④ Automatic range switch (C function : CF-40～CF-44)

It is the setting of the second range or the third range for "Multi scale interval scale". The boundary value and the scale interval within the each range are set. Refer to the 6-9. Automatic range switch.

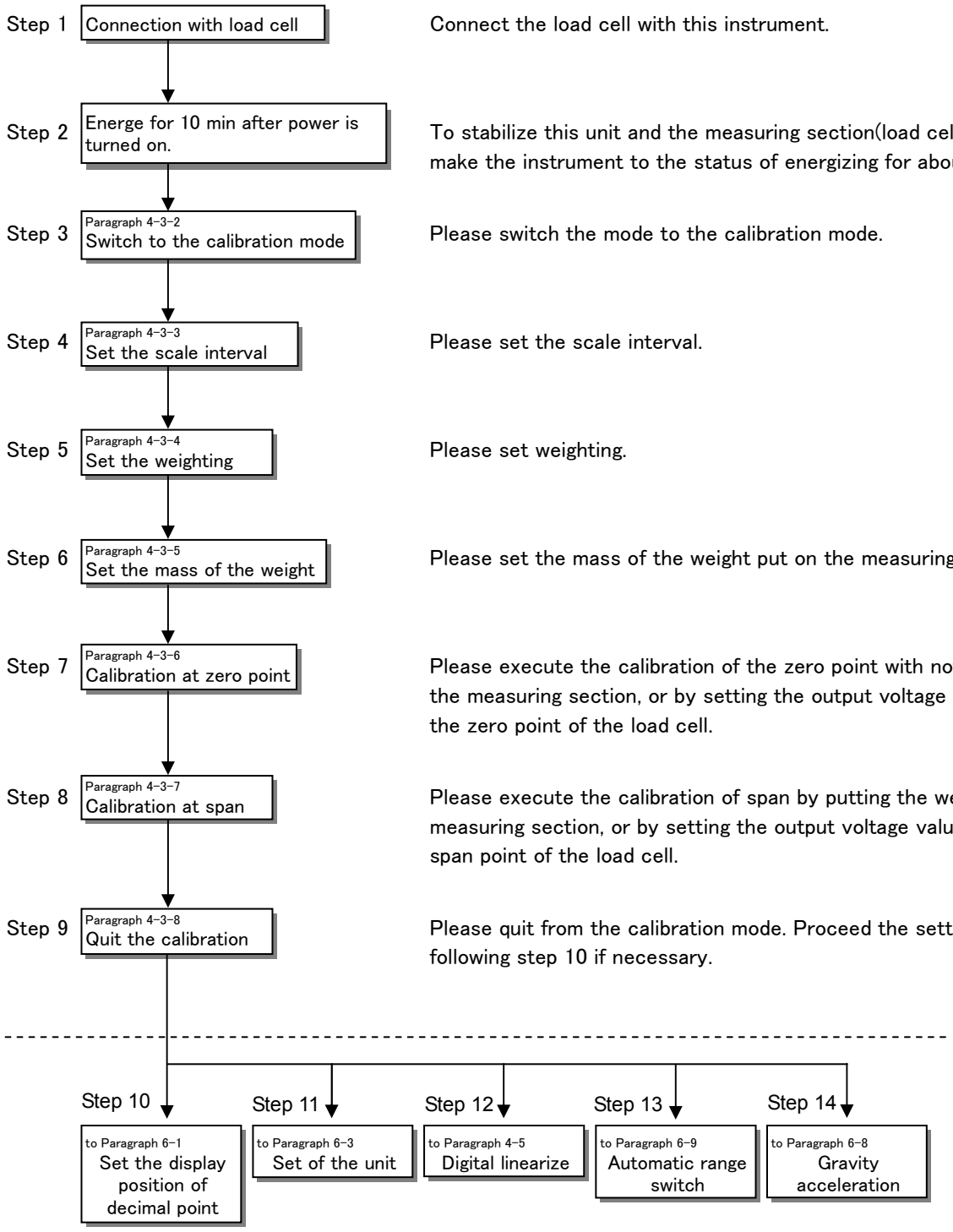
⑤ Gravity acceleration compensation (C function : CF-25、 CF-26)

It is a function for the compensation of the span error by setting the gravity acceleration of the two different districts with a calibration place and a place to be used. Refer to 6-8. Gravity acceleration compensation

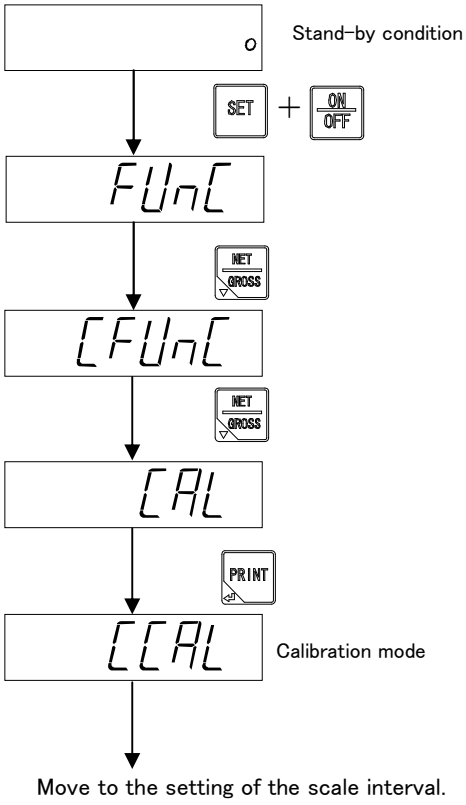
- **Please execute the calibration if necessary when the environment to be used changes.**
- **The display resolution that the performance becomes effective is 10 000 or less.**
  The display resolution is a value into which weighting is divided by the scale interval of the first range.
- **The mass of the weight used in the span calibration must use the one of 2/3 or more of weighting to reduce the calibration error.**

4-3. Calibration procedures

4-3-1. Flow of calibration



4-3-2. Switch to the calibration mode



Change from the standard measurment mode to the stand-by condition by the ON/OFF key.

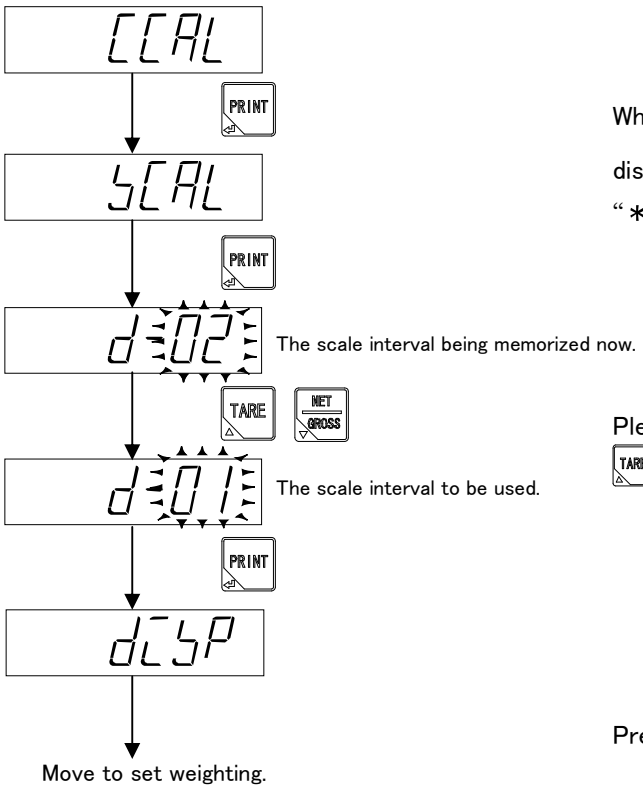
Pressing the ON/OFF key with the SET key pressed, it displays FUnC.

Press the NET/GROSS key twice.

CAL displays.
Press the PRINT key here.

CCAL displays, and it enters into the calibration mode.

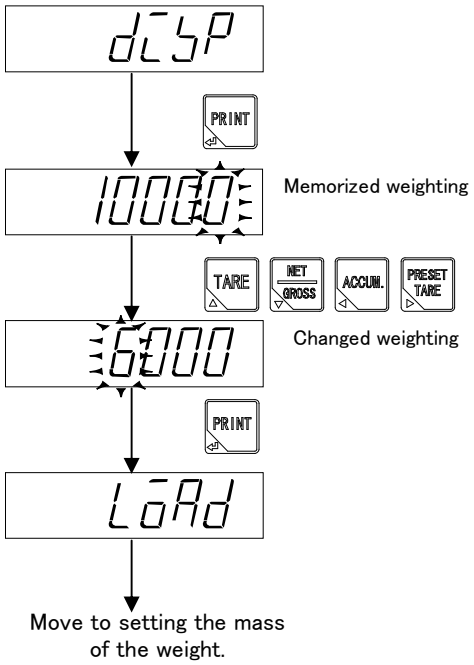
4-3-3. Set of the scale interval



When PRINT key is pressed twice from CCAL display, d-** is displayed.
" ** " is the scale interval being memorized now.

Please select the scale interval from 1, 2, 5, 10, 20 or 50.
TARE NET/GROSS : Selects the scale interval.
SET : Setting is interrupted and returns to CCAL display.
PRINT : The displayed value is memorized, and proceed to the next step.
Press the PRINT key after the set.

4-3-4. Set weighting



When PRINT key is pressed from dISP display, 10000 is displayed.

When the weighting has already been changed, the weighting being memorized now is displayed.
Here, please set the weighting.

TARE NET GROSS : The value of changed digit is changed.

ACCUM. PRESET TARE : Changed digit is selected.

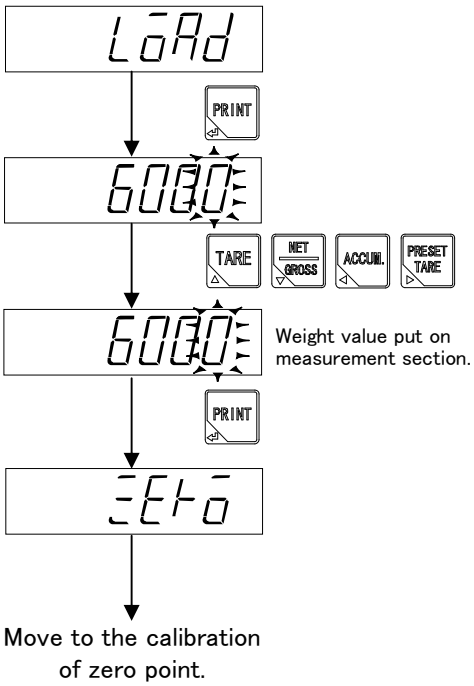
ZERO : The value is changed to "0".

SET : Setting is interrupted and display returns to CCAL.

PRINT : The display value is memorized, and it proceed to the next step.

After the setting, press the PRINT key.

4-3-5. Setting the mass of the weight.



When PRINT key is pressed from LOAd display ****** is displayed

"******" is the weighting amount.
Please set the mass of the weight actually put on the measuring section here.
The same setting as the weighting value is executed when there is a weight for weighting

TARE NET GROSS : The value of changed digit is changed.

ACCUM. PRESET TARE : Changed digit is selected.

ZERO : The value is changed to "0".

SET : Setting is interrupted and display returns to CCAL.

PRINT : The display value is memorized, and it proceed

After the setting, press the PRINT key.

4-3-6. Calibration of zero point

When the zero calibration starts, [ZERO] is displayed.

Please select the zero calibration method.

① Method by the measuring data (status of initial load)

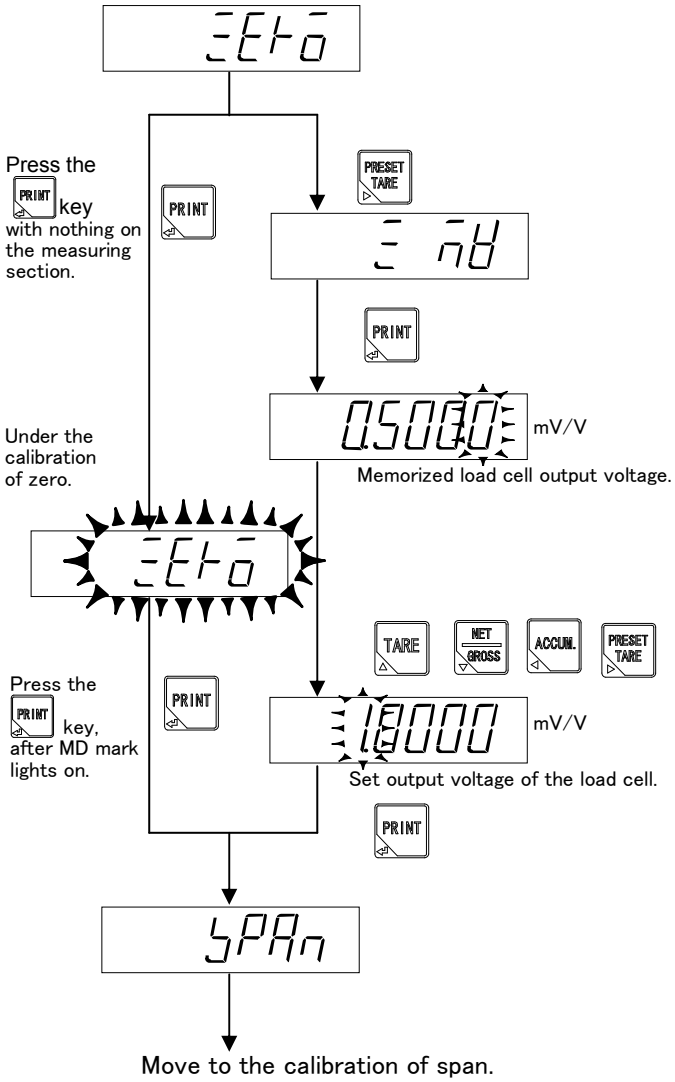
⟹ Press the [PRINT] key, and execute the operation of a).

Execute the calibration of zero with nothing put on the measuring section.

② Method by the numeric input of the load cell output voltage.

⟹ Press the [PRESET TARE] key, and execute the operation of b).

Execute the calibration of zero with inputting the output voltage value of the load cell when nothing is put on the measuring section.



a) Method by the measuring data (status of initial load)

Please make that nothing is put on the measuring section.

Press the [PRINT] key when [ZERO] display blinks, and the MD mark lights on. The zero point is memorized, and [SPAN] is displayed.

b) Method by the numeric input of load cell output voltage.

When [PRESET TARE] key is pressed, [SPAN] is displayed, and when [PRINT] key is pressed, [*.****] is displayed also.

"*.****" is the memorized output voltage of the load cell. Please set the load cell output voltage in mV/V scale which correspond to the zero point of the measurement.

[TARE] [NET GROSS] : The value of changed digit is changed.

[ACCUM.] [PRESET TARE] : Changed digit is selected.

[ZERO] : The displayed value is changed to "0".

[SET] : Setting is interrupted and display returns to [CCAL] .

[PRINT] : The display value is memorized, and it proceed to the next step.

After the setting, press the [PRINT] key.

Error display in the calibration of zero point

[E-L] : The display blinks for about two seconds when the output of the load cell is −2.5 mV/V or less. (Refer to the paragraph 16. Error display.)

[E-H] : The display blinks for about two seconds when the output of the load cell is 2.5 mV/V or more. (Refer to the paragraph 16. Error display.)

4-3-7. Calibration at span

When the span calibration starts, SPAn is displayed.

Please select the span calibration method.

① Method by the measuring data ⟹ Press the PRINT key, and execute the operation of a).

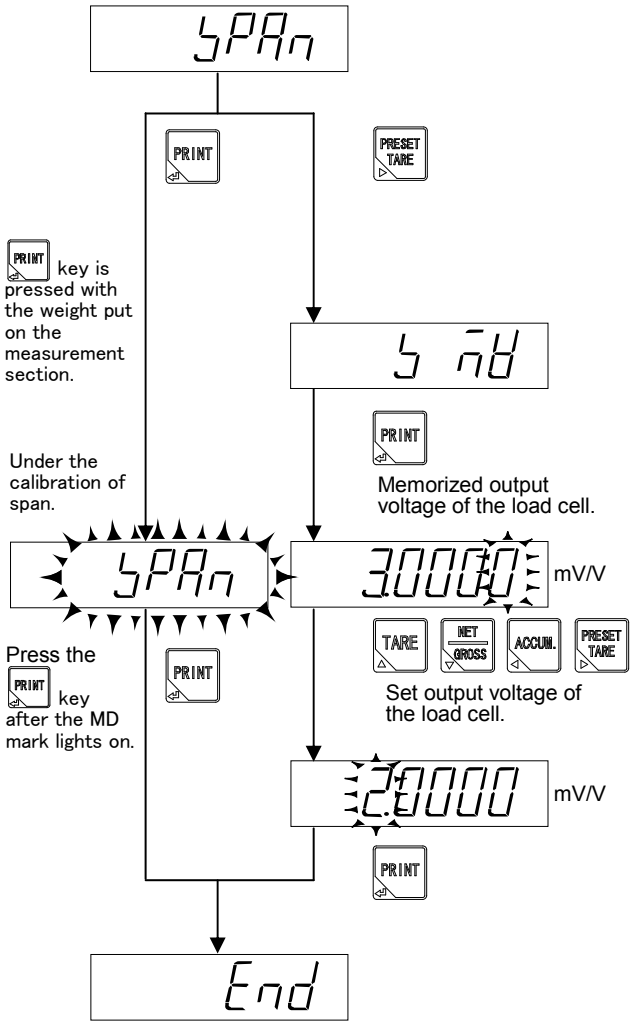
Execute the span calibration with weight put on the measuring section.

② Method by the numeric output of the load cell output

⟹ Press the PRESET TARE key, and execute the operation b).

Execute the span calibration by inputting the value which subtract the output voltage of the load cell to

zero point of measurement set in paragraph 4-3-6. from the output voltage corresponding to the mass of the weight set in paragraph 4-3-5.



a) Method with weight

Please put the weight corresponds to mass set in the paragraph 4-3-5 on the measuring section.

Please press the PRINT key when SPAn display blinks, and the MD mark lights on. Span is memorized and End is displayed.

b) Method by the numeric input of load cell output voltage

When PRESET TARE key is pressed, 5 nU is displayed, and when PRINT key is pressed, *.**** is is displayed also.

" *.**** " is the memorized output voltage of the load cell. Please set the value in mV/V scale which subtract the output voltage of the load cell to zero point of measurement from the output voltage corresponding to the mass of the weight.

TARE NET GROSS : The value of changed digit is changed.

ACCUM. PRESET TARE : Changed digit is selected.

ZERO : The displayed value is changed to zero.

SET : Setting is interrupted and display returns to CCAL .

PRINT : The display value is memorized, and it proceed to the next step.

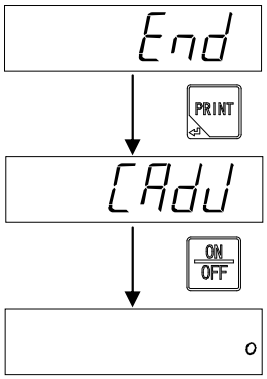
After the setting, press the PRINT key.

Error display in the calibration of span.

SP-L : The display blinks for about two seconds when ("Load cell output voltage at span" – "Load cell output voltage at zero point") ≦ 0.0 mV/V. (Refer to the paragraph 16. Error display)

SP-H : The display blinks for about two seconds when load cell output is 3.1 mV/V or more. (Refer to the paragraph 16. Error display)

4-3-8. Quit the calibration



Stand-by condition.

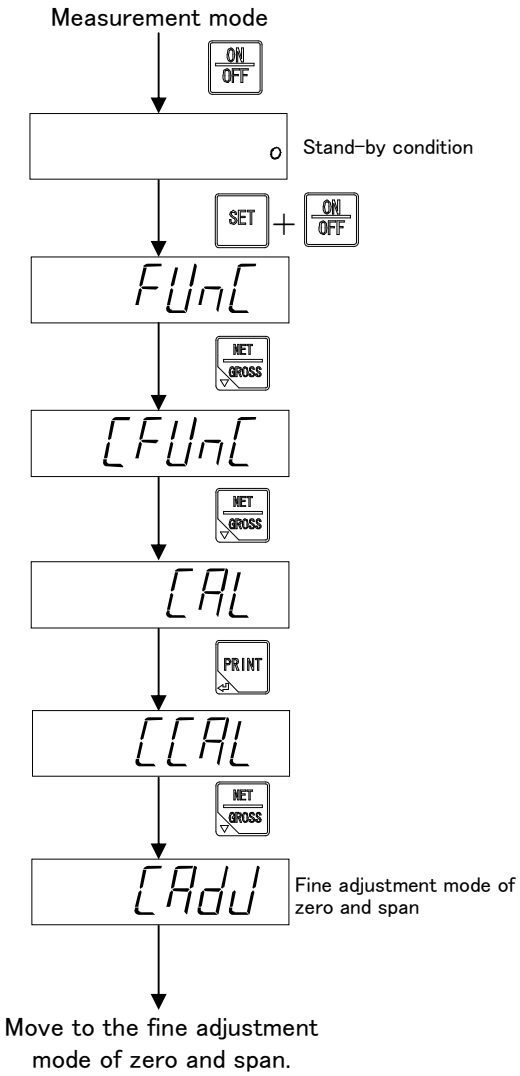
End is displayed when span calibration is completed. Press the PRINT key to quit the calibration mode. The display becomes CAdJ , and the set data is memorized internally.

Press the ON/OFF key to set to the stand-by condition. The calibration mode is completed.

4-4. Fine adjustment of zero and span

It is the function to make the fine adjustment of zero and span when there is a difference between the actual measuring value and the weight.

4-4-1. Changeover to zero and span fine adjustment mode



Press the ON OFF key, and move from a usual measurement mode to the stand-by condition.

When ON OFF key is pressed with SET key, FUnC is displayed.

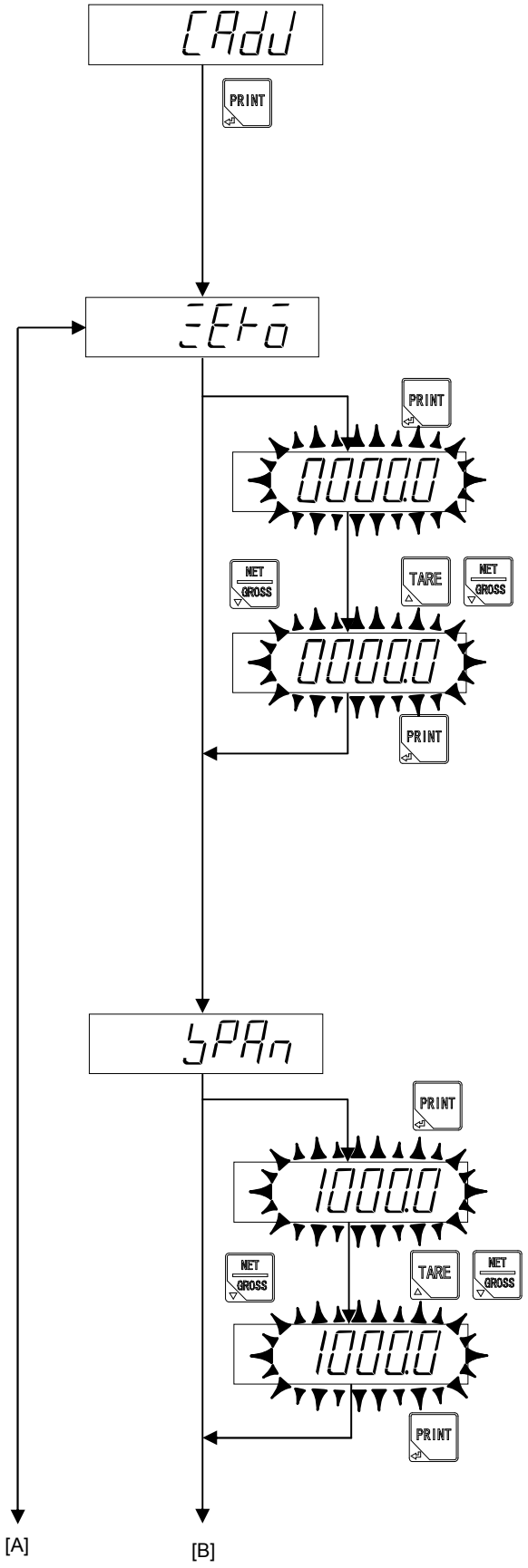
Press the NET GROSS key twice.

CAL is displayed, then PRINT key is pressed.

CCAL is displayed.

Pressing the NET GROSS key, CAdJ is displayed, then it enters into the fine adjustment mode of zero and span.

4-4-2. Fine adjustment of zero and span



When PRINT key pressed from CAdJ display ZEro is displayed.

In executing the zero fine adjustment, proceed the operation of a). In case of executing the span adjustment only, press NET GROSS key, and proceed the operation of b) after displaying SPAn .

a) Fine adjustment of Zero

Press the PRINT key. Display becomes ****.* .

" ****.* " is the present measuring value, and it can be displayed up to 1/10 digit.

ex. Without a decimal point 0 to 6000 –> 0.0 to 6000.0

With a decimal point 0.0 to 600.0 –> 0.00 to 600.00

Please set the display to "zero" after the condition which nothing is put on the measuring point.

TARE : Increase the measuring value.
Increase continuously by keeping key pressed.

NET GROSS : Decrease the measuring value.
Decrease continuously by keeping key pressed.

SET : Interrupts the setting, and returns to CAdJ display.

PRINT : Memorizes the display value, and proceed to the next step.

After the zero fine adjustment, press the PRINT key. Display becomes SPAn . In case of executing the fine adjustment of span, proced the operation of b). Otherwise, press the NET GROSS key, and proceed the operation of c) after displaying End .

b) Fine adjustment of span

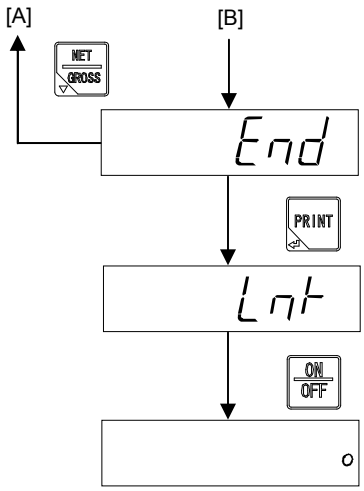
Put the weight which can be put on the measuring section under the maximum capacity.

****.* is displayed by pressing the PRINT key.

" ****.* " is the present measuring value, and it can be displayed up to 1/10 digit.

Please set the display to become the same value with the weight put on the measuring section.

After the fine adjustment of span, proceeds the operation of c) after the End display by pressing PRINT key.



c) End of fine adjustment mode

Press the PRINT key to quit the fine adjustment mode of zero and span.

Lnt displayed, and the setting data is memorized to the internal memory.

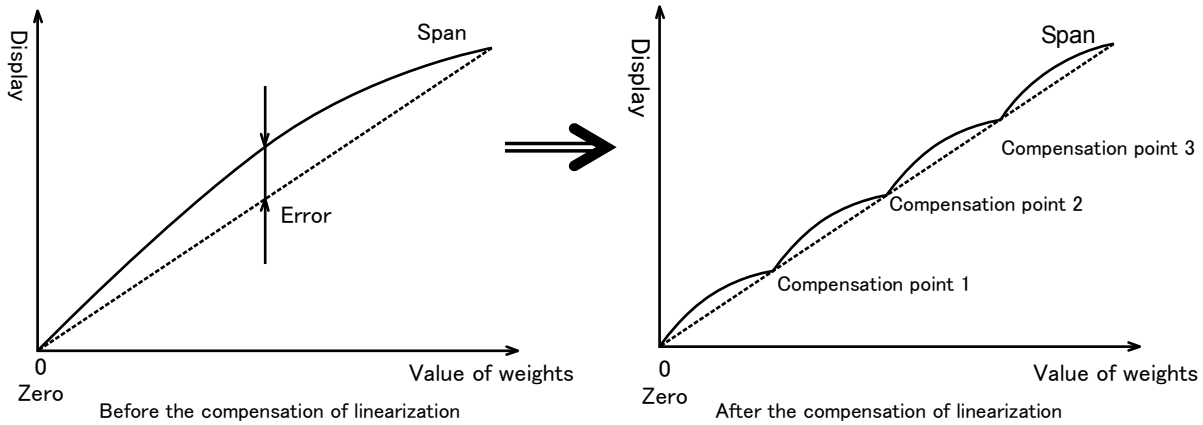
Press the ON/OFF key, and move to the stand-by condition.

The fine adjustment mode of zero and span is completed.

4-5. Digital linearize

After the calibration, the measurement error of some scale interval levels might be caused between the zero and span (maximum capacity) by the influence of the measuring section etc.

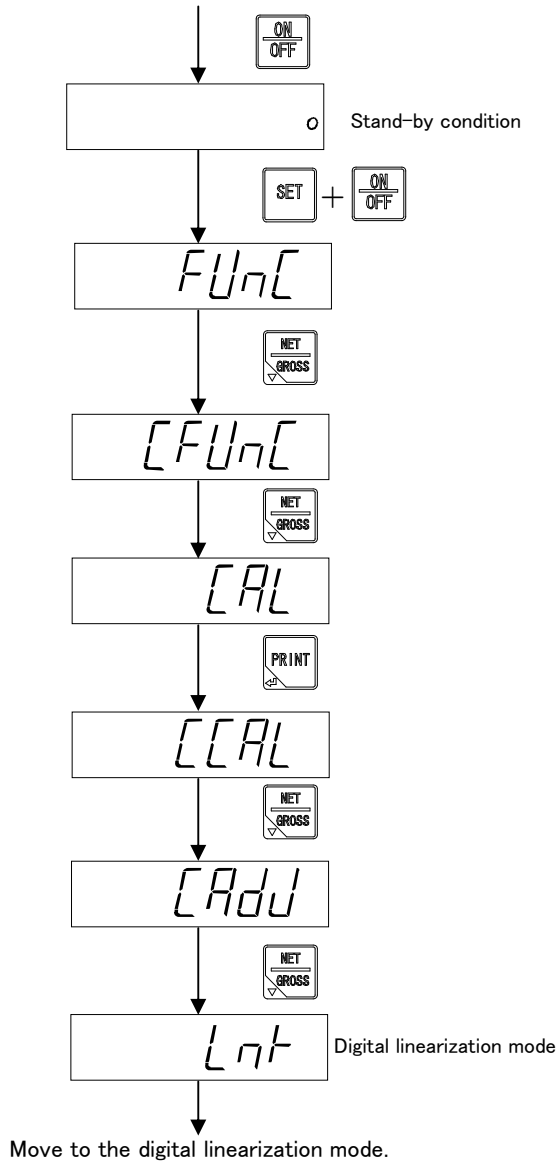
The digital linearization function executes the compensation of three points or less except the zero and span, and to reduce the measurement error.



4-5-1. Changeover to digital linearization mode

Measurement mode

to



Move to the digital linearization mode.

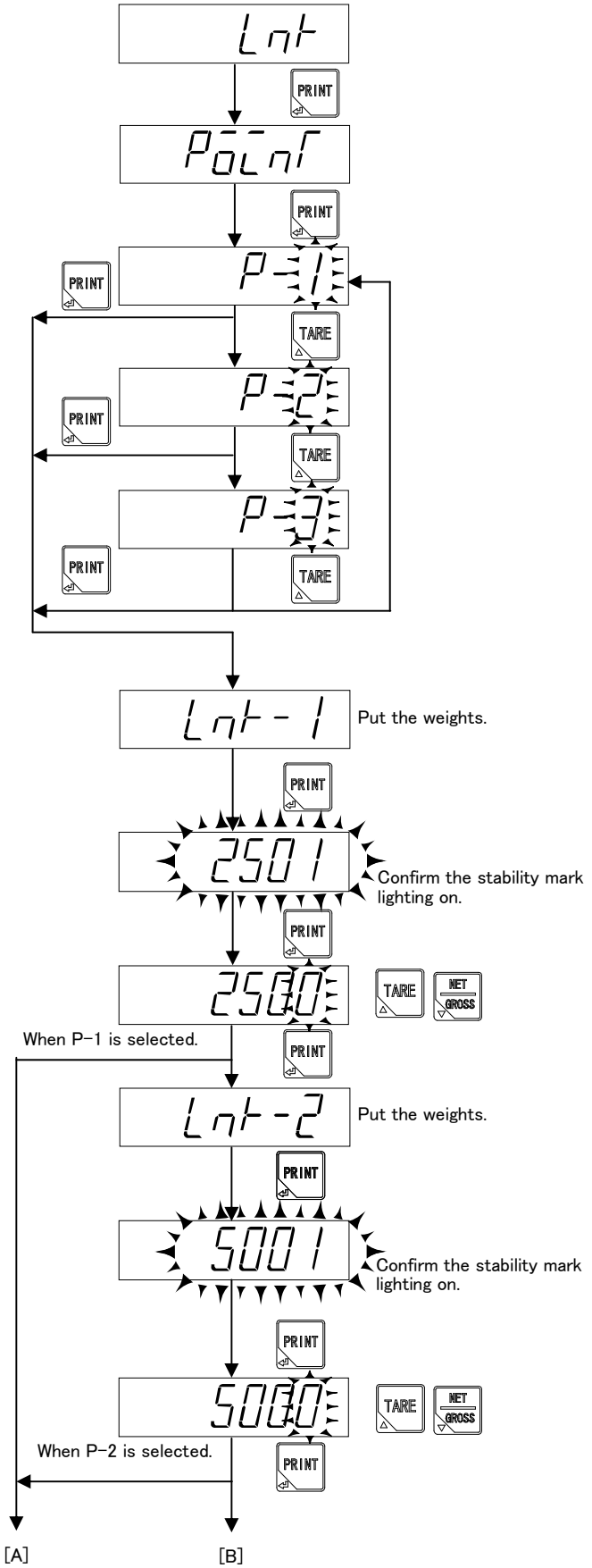
Make the condition from the normal measurement mode the stand-by condition by pressing the ON OFF key.

Press the ON OFF key with pressing the SET key, FUnC is displayed.

Press the PRINT key after pressing the NET GROSS key twice, CCAL is displayed.

LnE is displayed after pressing the NET GROSS key twice, and enter into the digital linearization mode.

4-5-2. Setting of the digital linearization



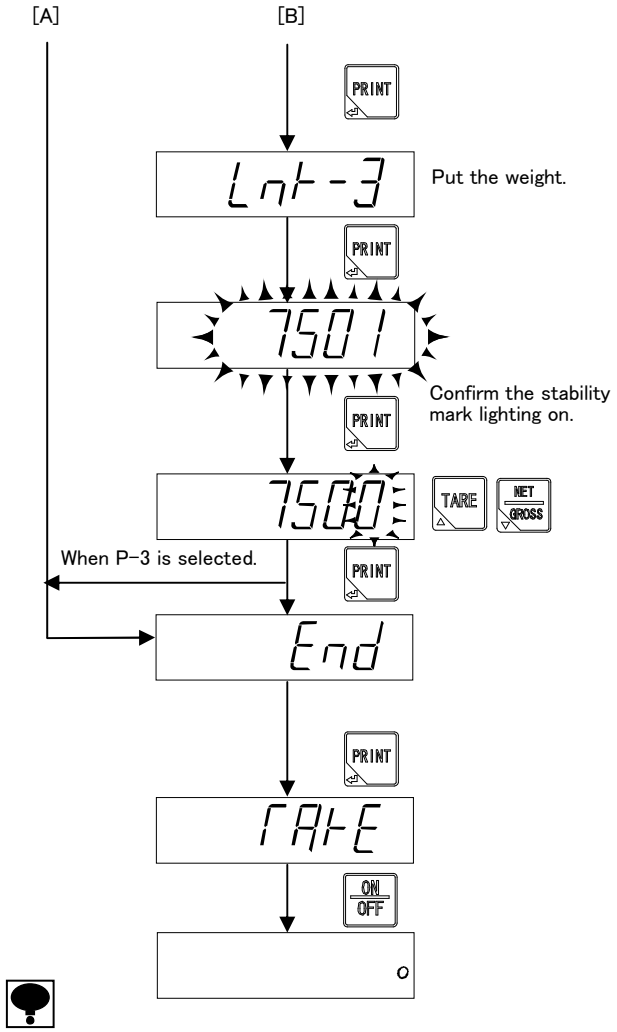
By pressing the PRINT key twice from Lnt display, P-1 is displayed. As the display becomes P-2 → P-3 by pressing the TARE key, please select the numbers of points which wants to compensate linearization, and press the PRINT key.

P-1 : compensation by 1 point
P-2 : compensation by 2 point
P-3 : compensation by 3 point

Please put the weight of the point which should be the compensation after the display becomes Lnt-1 on the measuring section and press the PRINT key.
As the measuring value blinks, press the PRINT key after confirming the stability mark (▼) lighting on.
As the 10^0 digit of the measuring value blinks, set the to the same value with the weights put on the measuring section.

- TARE : Increase the measuring value.
- NET GROSS : Decrease the measuring value.
- PRINT : The displayed value is memorized, and proceed to the next step.
- SET : The setting is interrupted, and return to the display of Lnt.

The display becomes Lnt-2 when P-2 is selected, and please execute the compensation of the second point.
Additionally, the display becomes Lnt-3 when P-3 is selected, and please execute the compensation of the third point.
Please make the value of weight as Lnt-1 < Lnt-2 < Lnt-3.



Please press the PRINT key when the compensation of each point is completed.

End is displayed.

Press the PRINT key to complete the digital linearization mode.

rAtE is displayed, and the setting data is memorized in the internal memory.

Please set to the stand-by condition by pressing the ON OFF key.

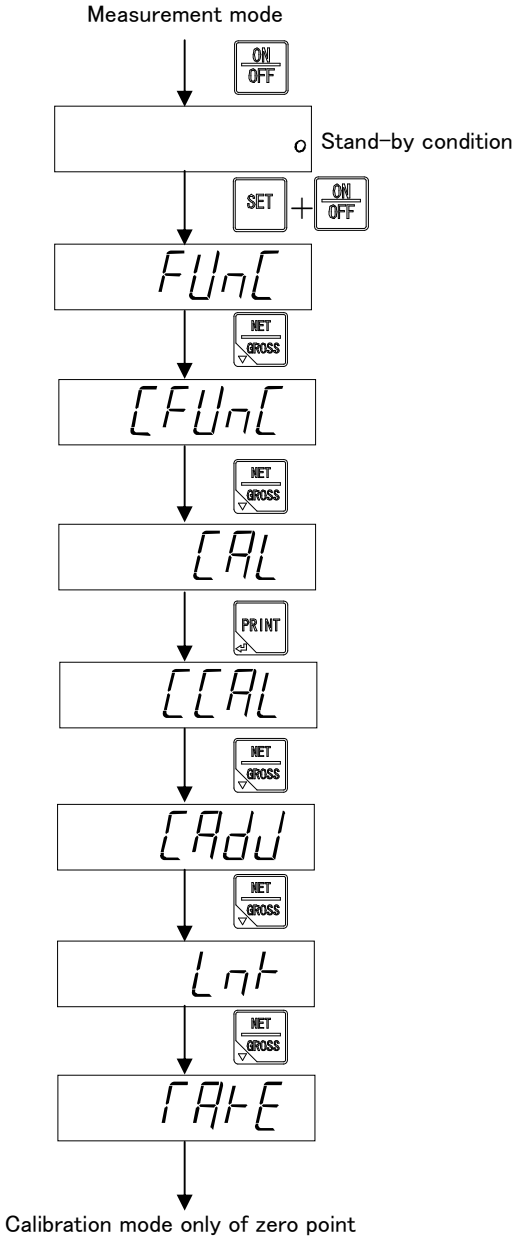
The digital linearization mode is finished.

- **Please make the weights to be compensated as Lnt-1 < Lnt-2 < Lnt-3.**
- **The linearizating compensation cannot be executed over the maximum capacity.**
- **The compensation data of the digital linearization can be cleared by C function CF-98.**
  Please refer to the paragraph 6-11. Digital linearization clear.

4-6. Calibration only of zero point

It is a function for the re-calibration only of the zero point when the amounts of the tare other than the maximum capacity of the measuring section are changed.

4-6-1. Changeover of the calibration mode by zero point



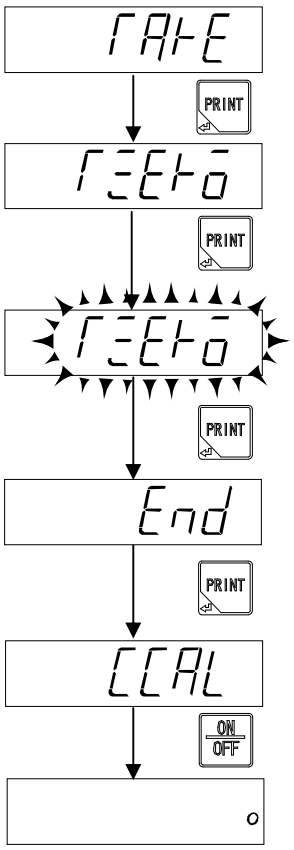
Press the ON OFF key to change from the measurement mode to the stand-by condition.

FUnC is displayed when the ON OFF key is pressed with the SET key.

CCAL is displayed by pressing the PRINT key after pressing the NET GROSS key twice.

rAtE is displayed after pressing the NET GROSS key at three times, and entered into the calibration mode only of the zero point.

4-6-2. Calibration mode only of zero point



Please make the display to rZEro by pressing the PRINT key from the display of rAtE.

Please make to the status where nothing is put on the measuring section here excluding the tare outside maximum capacity.

The display of rZEro blinks by pressing the PRINT key, and start the calibration at zero.

Press the PRINT key after the stability mark lighting on.

The calibration of zero point is completed, and End is displayed.

Press the PRINT key to finish the calibration mode only of zero point.

CCAL is displayed, and the setting data is memorized in the internal memory.

Please set to the stand-by condition by pressing the ON/OFF key.

The calibration mode only of zero point is finished.

Error display of the calibration at zero.

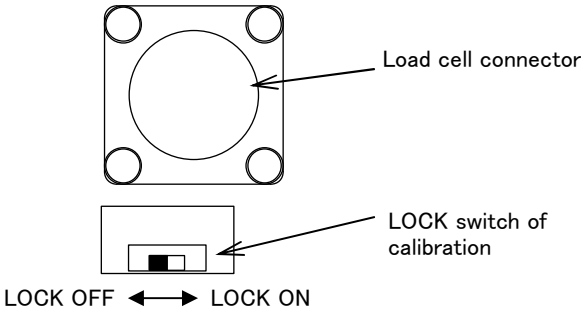
rE-L : The display blinks for about 2 seconds when the load cell output is less than −2.5 mV/V. (Please refer to the paragraph 16. Error display.)

rE-H : The display blinks for about 2 seconds when the load cell output is over 2.5 mV/V. (Please refer to the paragraph 16. Error display.)

4-7. LOCK of calibration

The function change in the calibration and C function can be prohibited by the switch of rear panel.

4-7-1. LOCK by the switch



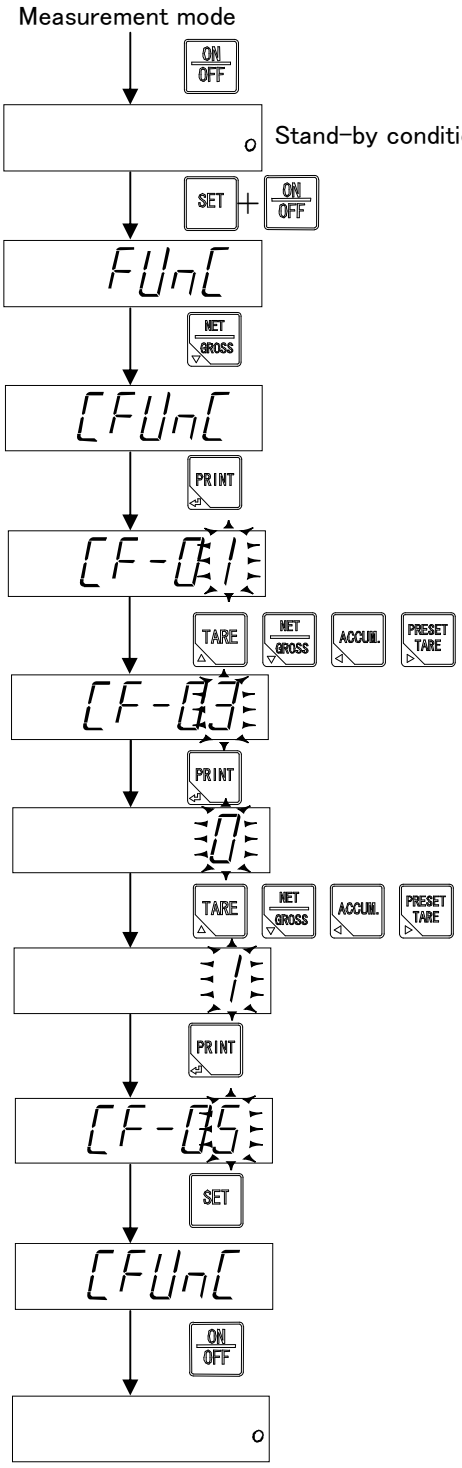
There is calibration LOCK switch in the inside when the cap under the load cell connector of rear panel is removed.
The LOCK effective/invalidity can be set with calibration LOCK switch.

● When the calibration LOCK is at the effective, the mode of "CFUnC" or "CAL" cannot be used.

5. C function mode

The various functions concerning to the calibration become effective by setting the C function data.

5-1. Setting method of C function data



Press the ON/OFF key to change the condition from normal measurement mode to stand-by condition.

When the ON/OFF key is pressed with pressing the SET key, FUnC is displayed.

CFUnC is displayed by pressing the NET/GROSS key, and C function mode can be entered.

By pressing the PRINT key, CF-01 is displayed.
Please select C function number which wants to change.

- NET/GROSS : The value of the changed digit is changed.
- ACCUM. PRESET TARE : Select the changed digit.
- ZERO : Change the display value to “0”.
- SET : Return to the display of CFUnC .
- PRINT : Memorize the display value, and proceed to the next step.
- ON/OFF : Finish the C function mode without changing all setting.

Press the PRINT key, and please change the setting value of selected C function mode.

Press the PRINT key. The changed contents is registered, and the following changed C function number is displayed on the panel.

Please select the changed C function number when you continuously change the setting of the other C function numbers.

If the SET key is pressed after the registration is completed, CFUnC is displayed.

By pressing the ON/OFF key, set to the stand-by condition.

5-2. Function of C function data

Item	Function No.	Setting value	Contents
Display position of decimal point.	CF-01	●0	No decimal point
		1	1234.5
		2	123.45
		3	12.345
Condition of over display	CF-03	●0	Bigger than |The maximum capacity＋9D|
		1	Exceeding to the maximum capacity ±110 %
Unit	CF-05	●0	No unit
		1	g
		2	kg
		3	t
		4	lb
Operating condition of zero set	CF-10	●0	Operation when it is steady
		1	Operation by unconditional
Effective range of zero set	CF-11	●0	±2 % of the maximum capacity
		1	±10 % of the maximum capacity
Target of zero tracking	CF-12	0	Gross value and net value
		●1	Gross value
Data width of zero tracking	CF-13	00～99	Unit : 0.5 D 00 : Zero tracking OFF
		●01	
Time width of zero tracking	CF-14	0～9	Unit : 0.5 s 0 : Zero tracking OFF
		●2	
Operation of power on zero	CF-15	●0	Effective
		1	Invalidity
Operating condition of tare weight cancellation	CF-16	●0	Operation when it is steady
		1	Operation by unconditional
Method of setting gravity acceleration compensation	CF-25	●0	Set the district number
		1	Set the numerical value of gravity acceleration.
District number of using place	CF-26 (Possible to set at CF25＝0)	01～16	Unit : District
		●10	
District number of calibration place	CF-27 (Possible to set at CF25＝0)	01～16	Unit : District
		●10	
Gravity acceleration value setting of using place	CF-28 (Possible to set at CF25＝1)	9.000～9.999 ●9.797	Unit : m/s^2
Gravity acceleration value setting of calibration place	CF-29 (Possible to set at CF25＝1)	9.000～9.999 ●9.797	Unit : m/s^2
Range switch operation	CF-40	●0	Range change OFF
		1	Changeable two ranges
		2	Changeable three ranges

● has been set as default.

Item	Function No.	Setting value	Contents
Setting of scale interval of the second rang	CF-41	0	1 scale interval
		1	2 scale interval
		●2	5 scale interval
		3	10 scale interval
		4	20 scale interval
		5	50 scale interval
Boundary value setting in the second range	CF-42	000000 ～999999 ●003000	
Setting of scale interval of the third rang	CF-43	0	1 scale interval
		1	2 scale interval
		2	5 scale interval
		●3	10 scale interval
		4	20 scale interval
		5	50 scale interval
Boundary value setting in the third range	CF-44	000000 ～999999 ●006000	
Analog output target	CF-70	●0	Display interlock
		1	Gross value
		2	Net value
Display value at the analog output of DC4 mA(DC0 V)	CF-71	0～999999 ●0	Unit : 1D
Display value at the analog output of DC20 mA(DC10 V)	CF-72	0～999999 ●10 000	Unit : 1D
Calibration data of the scale interval (Reference use)	CF-90	●00001	
Calibration data of the maximum capacity(Reference use)	CF-91	●10000	
Calibration data of the weight (Reference use)	CF-92	●10000	
Calibration data of zero mV/V (Reference use)	CF-93	●0.0000	
Calibration data of span mV/V (Reference use)	CF-94	●0.5000	
Stability detection time width at calibration	CF-97	00～99 ●05	Unit : 0.1 s 00 : OFF of stability detection at calibration
Digital linearization clear	CF-98		The data of the compensation by the digital linearization is cleared.
Memory clear	CF-99		C function set content is returned to the default setting

● has been set as default.

6. Various functions by C function data

6-1. Setting of decimal point display position

The decimal point display position is selected by C function CF-01.

The position of the decimal point can be selected from “Nothing”, “1234.5”, “123.45” and “12.345”.

Default has selected “Nothing”.

6-2. Condition of over display($\bar{o}\bar{L}$ or -$\bar{o}\bar{L}$ display)

The over display condition is selected by C function CF-03.

“at the time of more than |maximum capacity + 9D|” or “at the time of exceeding to the maximum value±110 %” can be selected.

Default has selected “at the time of more than |maximum capacity + 9D|”.

6-3. Setting of the unit

The unit is selected by C function CF-05.

The unit can be selected from “No unit”, “g”, “kg”, “t” and “lb”.

Default has selected “No unit”

6-4. Zero set

The zero set function memorizes a present measuring value as zero point when the ZERO key is pressed when the indicated value of the load display section is the gross value and at the same time “Within ±2 % of the maximum capacity” or “Within ±10 % of the maximum capacity”, and adjust the display to zero.

6-4-1. Operating condition of zero set

The selection of operating condition of zero set is selected by C function CF-10. The effective range is common for both of zero set and zero tracking.

“Operation at steady” or “Unconditional operation” can be selected.

Default has selected “Operation at steady”.

6-4-2. Zero set effective range

The selection of the effective range of zero set is selected by C function CF-11

“±2 % of the maximum capacity” or “±10 % of the maximum capacity” can be selected.

Default has selected “±2 % of the maximum capacity”.

- **When the zero compensation for the effective range is executed by the zero set and the zero tracking, the zero set is not accepted.**
- **When the tare weight cancellation or fixed tare weight cancellation is executed, zero set shall be executed after clearing the tare weight cancellation and fixed tare weight cancellation.**

6-5. Zero tracking

Zero tracking feature is a function to which the compensation of the gradual zero drift in a constant condition and the zero point is stabilized.

6-5-1. Zero tracking target

The zero tracking target is selected by C function CF-12.

"Gross value or net value" or "Gross value" can be selected.

Default has selected "Gross value"

6-5-2. Zero tracking data width

The zero tracking data width is selected by C function CF-13.

Setting range : 00～99　Unit : 0.5 D　00 : OFF

Default has selected "01".

6-5-3. Zero tracking time width

The zero tracking time width can be set by C function CF-14.

Setting range : 0～9 Unit : 0.5 s　0 : OFF

Default has selected "2".

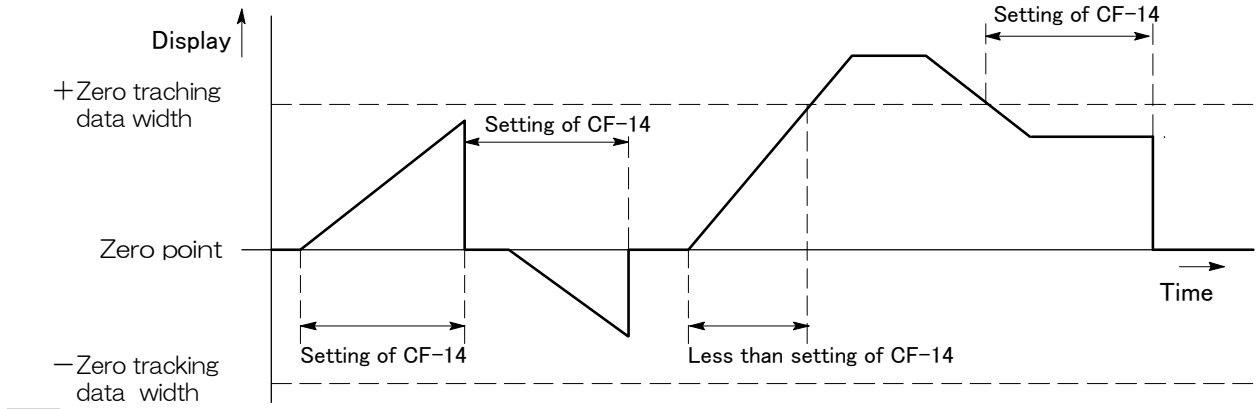
ex. The data width to which the zero tracking is executed by C function CF-13 is set.

The zero tracking data width for each set value "n" is obtained in the display conversion by the following expression.

"Zero tracking data width" = "Set value (n) of CF-13" x 0.5 x " Scale interval"

When the set value of C function CF-13 is "10" and the scale interval is "D = 5", that is

"Zero tracking data width" = 10 x 0.5 x 5D = 25D



- **The zero tracking does not operate when either of setting C function CF-13 or CF-14 is "0".**
- **Please do not use the zero tracking when the load vibrates gradually in the vicinity of the zero point.**
- **Please note that the zero tracking might become effective even if an actual load change is rapid when the load change becomes gradual by strength of the digital filter and the stabilization filter.**
- **The zero tracking will not be operated when the zero compensation is executed for the effective range of portion by the zero tracking and zero set.**

6-6. Power on zero

The power on zero function makes the display to a zero if the changes of display is within ±10 % of the maximum capacity when the power is turn on, or in the stable condition in the operation of display turning on.

6-6-1. The operation of power on zero

"Effective" and "Invalidity" of the power on zero operation are selected by C function CF-15.

- **The zero compensation is not accepted in the following condition when the setting of C function CF-15 is "Effective power on zero" and when power on zero is starting.**
  - **① When the display is not an stable condition, it becomes as all lighting.**
  - **② When the measurement value exceeds ±10 % of the maximum capacity, "- - - - - - - - " is displayed. At this time, if the [SET] key is pressed, it compulsorily becomes a load value display.**
- **When the power on zero is executed, each data of tare weight cancellation , fixed tare weight cancellation , zero set and zero tracking shall be all cleared.**

6-7. Tare weight cancellation

By pressing the [TARE] key, the display of "TARE" and "NET" in the condition display section blinks and change to zero.

To execute the tare weight cancellation clear, press the [TARE] key when the gross value is zero. The tare weight cancellation is cleared and "GROSS" of the condition display section lights on at the same time as becoming a gross value display.

6-7-1. Operating condition of tare weight cancellation

The operating condition of tare weight cancellation is selected by C function CF-16.

"Operation when it is steady" or "Operate unconditionally" can be selected.

Default has selected "Operation when it is steady".

- **The tare weight cancellation is not accepted when gross value is below the zero.**
- **The tare weight cancellation is not accepted when the gross value is larger than the first range.**
- **When the tare weight cancellation is executed with a fixed tare weight cancellation executed, a fixed tare weight cancellation is canceled, and the tare weight cancellation is executed. (A fixed tare weight cancellation cannot be used together with the tare weight cancellation)**
- **When the zero set is executed in the condition of gross value display, the tare weight cancellation will be cancelled.**

6-8. Gravity acceleration compensation

When the calibration place and the using place of the measuring are different, the error is caused in span by the difference of the gravity acceleration of the various place district. The gravity acceleration compensation function is a function for the compensation of this span error by setting the gravity acceleration of two districts with a different calibration place and using place. When the calibration place and the using place are the same, it is not necessary to execute the gravity acceleration compensation.

6-8-1. Setting method of gravity acceleration compensation.

The setting method of the gravity acceleration compensation is selected by C function CF-25.

"The district number is set" or "The numerical value of gravity acceleration is set" can be selected.

Default has selected "The district number is set".

6-8-2. Setting of district number of the using place (When CF-25 : 0)

The setting of the district number of the using place is executed by C function CF-26.

The setting of district number : 01～16

Default has selected 10 district.

Please refer to "Gravity acceleration compensation table" in the next page.

6-8-3. Setting of district number of the calibration place (When CF-25 : 0)

The district number of the calibration place can be set by C function CF-27.

The set of the district number : 01～16

Default has selected 10 district.

Please refer to "Gravity acceleration compensation table" in the next page.

6-8-4. Setting of Gravity acceleration value of the using place (When CF-25 : 1)

The gravity acceleration value of the using place can be set by C function CF-28.

Setting range : 9.000～9.999

Default has selected "9.797"

Please refer to "Gravity acceleration compensation table" in the next page.

6-8-5. Setting of Gravity acceleration value of the calibration place (When CF-25 : 1)

The gravity acceleration value of the calibration place can be set by C function CF-29.

Setting range : 9.000～9.999

Default has set "9.797".

Please refer to "Gravity acceleration compensation table" in the next page.

< Gravity acceleration compensation table in Japan >

District No.	Acceleration (m/s^2)	Pertinent district
1	9.806	Kushiro-shi, Kitami-shi, Abashiri-shi, Rumoi-shi, Wakkanai-shi, Monbetsu-shi, Nemuro-shi, Branch administrative office jurisdiction of Souya, Rumoi, Abashiri, Nemuro, and Kushiro.
2	9.805	Sapporo-shi, Otaru-shi, Asahikawa-shi, Yubari-shi, Iwamizawa-shi, Biubai-shi, Ashibetsu-shi, Ebetsu-shi, Akahira-shi, Shibetsu-shi, Furano-shi, Nayoro-shi, Mikasa-shi, Chitose-shi, Takigawa-shi, Sunagawa-shi, Utashinai-shi, Fukagawa-shi, Eniwa-shi, Branch administrative office jurisdiction of Ishikari, Goboro, Kamikawa, and Sorachi.
3	9.804	Hakodate-shi, Muroran-shi, Obihiro-shi, Tomakomai-shi, Noboribetsu-shi, Date-shi, Branch administrative office jurisdiction of Toshima, Hinoyama, Tanshin, Hidaka and Tokachi
4	9.803	Aomori-ken
5	9.802	Iwate-ken, Akita-ken
6	9.801	Miyagi-ken, Yamagata-ken
7	9.800	Fukushima-ken, Ibaragi-ken, Niigata-ken
8	9.799	Tochigi-ken, Toyama-ken, Ishikawa-ken
9	9.798	Gunma-ken, Saitama-ken, Chiba-ken, Tokyo(excluding branch administrative office jurisdiction of Hachijojima, Ogasawara), Fukui-ken, Kyoto-fu, Tottori-ken, Shimane-ken
10	9.797	Kanagawa-ken, Yamanashi-ken, Nagano-ken, Gifu-ken, Shizuoka-ken, Aichi-ken, Mie-ken, Wakayama-ken, Shiga-ken, Osaka-fu, Hyogo-ken, Nara-ken, Okayama-ken, Hiroshima-ken, Yamaguchi-ken, Tokushima-ken, Kagawa-ken,
11	9.796	Tokyo(Only branch administrative office jurisdiction of Hachijojima), Ehime-ken, Kochi-ken, Fukuoka-ken, Saga-ken, Nagasaki-ken, Oita-ken
12	9.795	Kumamoto-ken, Miyazaki-ken
13	9.794	Kagoshima-ken (excluding branch administrative office jurisdiction of Nase-shi and Oshima-gun
14	9.793	Tokyo(Only branch administrative office jurisdiction of Ogasawara)
15	9.792	Kagoshima-ken(Only branch administrative office jurisdiction of Nase-shi and Oshima-gun)
16	9.791	Okinawa-ken

- **Check the "acceleration of gravity compensation value for the country or district where you want to use,**
- **As for the application in Japan, confirm details of acceleration of gravity by the service of inspection of the gravity data on the homepages of "Science chronology" and Geographical Survey Institute etc. (http://vldb.gsi.go.jp/sokuchi/gravity/grv_search/gravity.pl)**

6-9. Automatic range switch

Automatic range switch function switches automatically and displays the scale interval by the measuring data of the gross or net value by dividing the range of the measurement to the maximum capacity into 2 or 3.

6-9-1. Setting of the range switch operation

The range switch operation can be selected by C function CF-40.

The range switch can be selected from "OFF(without range switch)", "Two range switch" and "Three range switch". Default has selected "OFF".

6-9-2. Setting the scale interval of the second range

The scale interval of the second range can be set by the C function CF-41.

The scale interval can be selected from "1 scale interval", "2 scale interval", "5 scale interval", "10 scale interval", "20 scale interval" and "50 scale interval". Default has selected "5 scale interval".

6-9-3. Setting the boundary value of the second range

The boundary value of the second range can be set by C function CF-42.

Setting range : 0～999999 Default has set "003000"

6-9-4. Setting the scale interval of the third range

The scale interval of the third range can be set by the C function CF-43.

The scale interval can be selected from "1 scale interval", "2 scale interval", "5 scale interval", "10 scale interval", "20 scale interval" and "50 scale interval". Default has selected "10 scale interval".

6-9-5. Setting the boundary value of the third range

The boundary value of the third range can be set by C function CF-44.

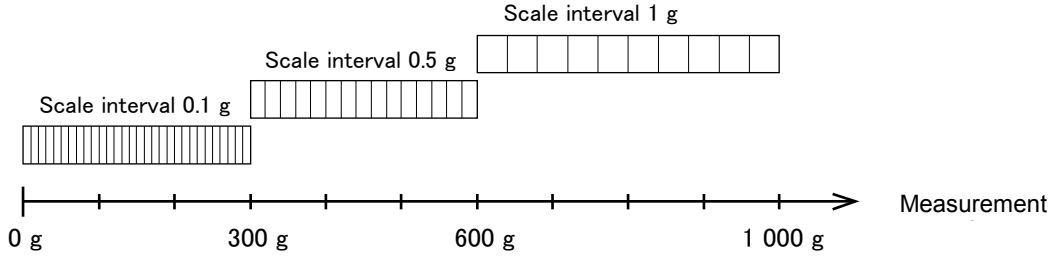
Setting range : 0～999999 Default has set "006000"

ex.1 In case of gross value

The first range : 300.0 g (Boundary of the second range), scale interval 0.1 g (The scale interval in calibration)

The second range : 600.0 g (Boundary of the third range), scale interval 0.5 g (Scale interval of the second range)

The third range : 1 000.0 g (The maximum capacity), scale interval 1 g (Scale interval of the third range)

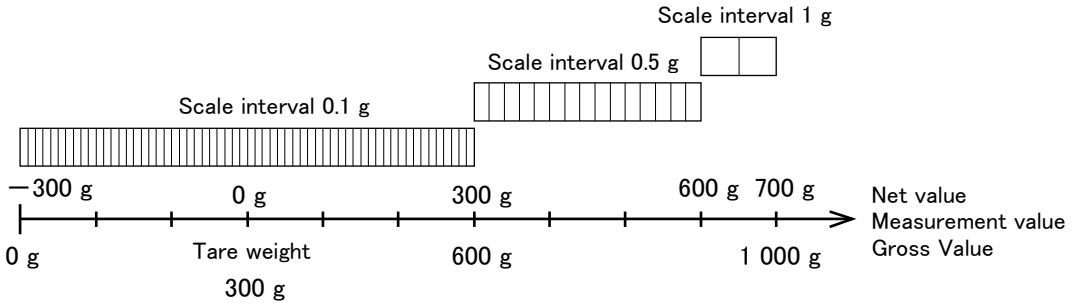


The measurement from 0 to 300 g becomes the first range(scale interval 0.1 g).

The measurement from 300 to 600 g becomes the second range(scale interval 0.5 g).

The measurement from 600 to 1 000 g becomes the second range(scale interval 1 g).

ex.2 In case of net value cancelled 300 g of tare weight set in ex.1



The measurement from −300 to 300 g becomes the first range(scale interval 0.1 g).

The measurement from 300 to 600 g becomes the second range(scale interval 0.5 g).

The measurement from 600 to 700 g becomes the second range(scale interval 1 g).

- **When it is used only within the first range (C function CF-40 : OFF), it is not necessary to set the range.**
- **Please make the relations of the scale interval of the each range as the first range＜the secondd range＜the third range.**
- **Please make the relations of the each boundary value of each range as the second range≦the third range≦the maximum capacity.**
- **The range upper bound within the range of second is a maximum capacity for the switch by two ranges.**
  The range upper bound within the range of third is a maximum capacity for the switch by three ranges.
- **The comparator setting and the fixed tare weight cancellation setting become the scale interval set in the first range.**

6-10. Setting of the stability detection time width in calibration

The stability detection time width in calibration can be set by C function CF-97.

Setting range : 00～99 Unit : 0.1 s

Default has set “05”.

6-11. Digital linearizer clear

The compensation data set in the digital linearization can be cleared by the C function CF-98.

If the key PRINT is pressed with CF-98 display, LnR.CLR becomes a blinking display.

Press the ON/OFF key to discontinue the digital linearization at this point.

It becomes a stand-by condition, and the digital linearization is not clear.

CF-99 is displayed If the PRINT key is pressed when LnR.CLR displays blinking, and the operation of digital linearization is completed.

6-12. Memory clear

A clear memory is executed by C function CF-99, and the setting contents of C function is returned to the default setting.

If the PRINT key is pressed when CF-99 displays blinking, CF.CLR becomes a blinking display.

Please press the ON/OFF key to discontinue the clear memory at this point.

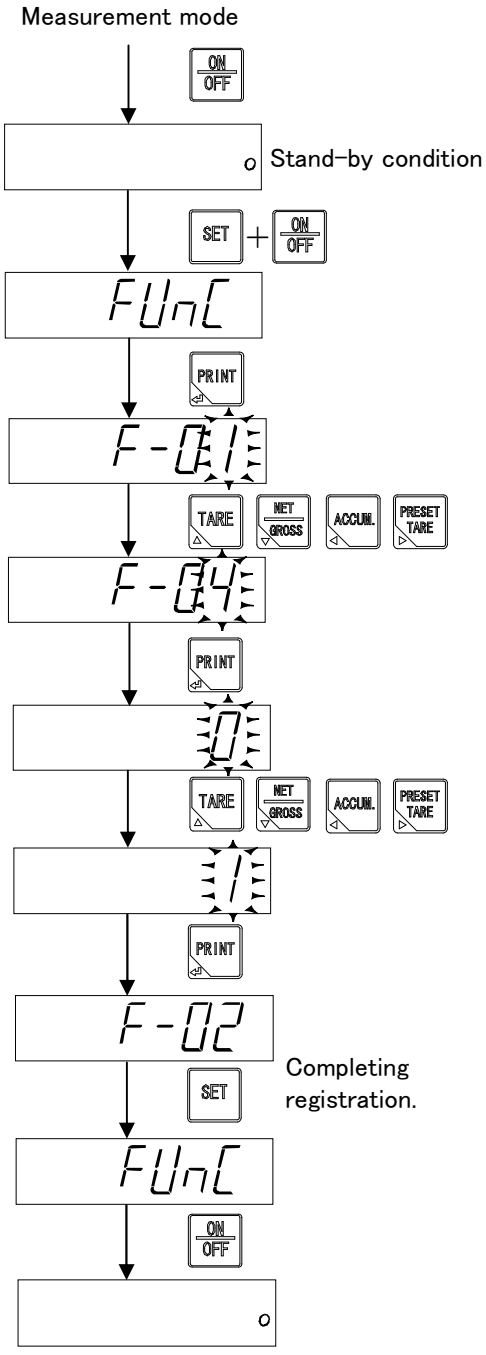
It becomes a stand-by mode, and digital linearization is not clear.

If the PRINT key is pressed when CF.CLR displays blinking, the display section is turned off and becomes to CF-01 display, then the operation of memory clear is completed.

7. Function mode

Various functions become effective by setting the function data.

7-1. Setting method of the function mode



Move from the normal measurement mode to stand-by condition by pressing the ON OFF key.

FUnC is displays by pressing the ON OFF key with the SET key, and enters into the function mode.

By pressing the PRINT key, F-01 is displayed.
Please select function number which you want to change.

TARE NET GROSS : Change the value of changing digit.

ACCUM. PRESET TARE : Select the changed digit.

ZERO : Change the display value into “0”.

SET : Return to the FUnC display.

PRINT : Memorize the display value and proceed to the next step.

ON OFF : The function mode is finished without changing all setting.

Please press the PRINT key, and set the setting value of the selected function number.

Please press the PRINT key. The setting contents is registered, and the display panel displays the following registered function number.

Please continue and select the selected function number when you change setting of other function numbers.

If the SET key is pressed after registration is completed, it becomes FUnC display. Please set to the stand-by condition by pressing the ON OFF key.

7-2. Function of the function data

Items	Function No.	Setting value	Contents
Setting of digital filter	F-01	0	OFF
		1	Moving average times : 2 times
		2	Moving average times : 4 times
		●3	Moving average times : 8 times
		4	Moving average times : 10 times
		5	Moving average times : 12 times
		6	Moving average times : 14 times
		7	Moving average times : 16 times
Display times	F-04	0	5 times/s
		●1	15 times/s
Setting of stabilization filter	F-05	0	OFF
		1	Moving average times : 2 times
		2	Moving average times : 4 times
		3	Moving average times : 8 times
		●4	Moving average times : 10 times
		5	Moving average times : 12 times
		6	Moving average times : 14 times
		7	Moving average times : 16 times
Data width of stabilization filter	F-06	000～999 ●005	Unit : 1D 00 : Stabilization filter OFF
Time width of stabilization filter	F-07	00～99 ●01	Unit : 0.5 s 00 : Stabilization filter OFF
Key lock	F-08	●0	Invalid
		1	Effective
Stability detection data width	F-10	0～9 ●4	Unit : 0.5D 0 : Stability detection OFF
Stability detection time width	F-11	0～9 ●2	Unit : 0.5 s 0 : Stability detection OFF
Operating condition of fixed tare weight cancellation	F-15	●0	Effective
		1	Invalidity
Automatic print operation	F-16	●0	OFF(Operating by the PRINT key or external control input)
		1	Data exceeding +5D, only during stable
		2	Data beyond the limits from –5D to 5D, only during stable
Comparator comparison operation	F-20	0	OFF
		1	All data
		2	All data, only during stable
		3	Data which exceed +5D
		●4	Data which exceed +5D, only during stable
		5	Data beyond the limits from –5D to 5D,
		6	Data beyond the limits from –5D to 5D, only during stable
		7	Weigh in mode
		8	Weigh out mode
Target of comparator comparison operation	F-21	●0	Gross value
		1	Net value
Comparator hysteresis operating conditions	F-24	●0	On delay
		1	Off delay

● has been set as default.

Items	Function No.	Setting value	Contents
Width of comparator hysteresis data	F-25	00～99 ●00	Unit : 1D 00 : Hysteresis OFF
BCD output operation mode	F-30	●0	Stream (outputs synchronizing with the display frequency.)
		1	Synchronizes with the print. (Synchronize with the PRINT key, the external control input or the automatic print.)
BCD output target	F-31	●0	Display interlock
		1	Gross value
		2	Net value
		3	Tare weight value
		4	Accumulation total amount
		5	Accumulation frequency
BCD output logic	F-32	0000～1111 ●0000	0 : Negative logic 1 : Positive logic 10^0 digit : Data output logic (Load data and decimal point) 10^1 digit : Polarity logic 10^2 digit : Flag logic(ERROR, OVER, Stable, Gross) 10^3 digit : P.C.(Print command) logic
BCD P.C. (Print Command) width	F-33	0	125 ms
		●1	25 ms
RS-232C operating mode	F-40	●0	Command mode
		1	Stream mode (Output synchronizes with display frequency.)
		2	Synchronizes with print (Output synchronizing with the PRINT key, an external control input or automatic print.)
RS-232C output target	F-41 (Effective at F-40 = 1 or 2)	●0	Gross value
		1	Net value
		2	Load display data with condition
RS-232C/422/485 specification for communication	F-42	●13020	Data bit length 10^0digit : ●0＝7bit, 1＝8bit Parity 10^1 digit : 0＝No parity, 1＝Even parity ●2＝Odd parity Stop bit 10^2 digit : ●0＝1bit, 1＝2bit Baud rate 10^3 digit : 0＝1 200 bps, 1＝2 400 bps, 2＝4 800 bps, ●3＝9 600 bps, Terminator 10^4 digit : 0＝CR, ●1＝CR＋LF
RS-422/485 Address setting	F-43	00～31 ●00	
Changeover of RS-422/485	F-44	●0	RS-422
		1	RS-485
RS-485 reply data delay time	F-45	0～9 ●1	Unit : 0.1 s

● has been set as default.

Items	Function No.	Setting value	Contents
RS-232C/422/485 transmission data decimal point existence	F-46	●0	Nothing
		1	Existing
Accumulation function operating conditions	F-50	0	OFF
		1	Manual additive only ＋
		●2	Manual additive both ＋/－
		3	Auto additive only ＋
		4	Auto additive both ＋/－
Setting of accumulation prohibition belt	F-51	00～99 ●05	Unit : 1D 00 : Accumulation when stability is detected always
External control input INPUT1 operation setting	F-60	●00	Operation OFF
		1	The same operation as the ON/OFF key
		2	The same operation as the SET key
		3	The same operation as the ACCUM. key
		4	The same operation as the PRESET TARE key
		5	The same operation as the TARE key
		6	The same operation as the NET/GROSS key
		7	The same operation as the ZERO key
		8	The same operation as the PRINT key
		9	Display net value (Effective only in the measurement mode.)
		10	Display accumulated value (Effective only in the measurement mode.)
External control input INPUT2 operation setting	F-61	It is optional as well as F-60.	
External control input INPUT3 operation setting	F-62	It is optional as well as F-60.	
External control input INPUT4 operation setting	F-63	It is optional as well as F-60.	
External control input INPUT5 operation setting	F-64	It is optional as well as F-60.	
External control input INPUT6 operation setting	F-65	It is optional as well as F-60.	
External control input INPUT7 operation setting	F-66	It is optional as well as F-60.	
Memory clear	F-99	Set the function content is returned to setting default.	

● has been set as default.

8. Various functions by function data

8-1. Digital filter

The digital filter function is a steady function by the running average processing of data into which A/D is converted. The running average frequency is selected by setting function F-01.

The running average frequency can be selected from “OFF”, “2 times”, “4 times”, “8 times”, “10 times”, “12 times”, “14 times” and “16 times”. Default has selected “8 times”.

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

Running average frequency	Little	Much
Noise proof	Sharpness ⟷	Stable
Response speed	Quick ⟷	Slow

8-2. Display frequency

The display frequency can be selected by the setting of function F-04.

The display frequency can be selected from “5 times/s” or “15 times/s”.

Default has selected “15 times/s”.

8-3. Stabilization filter

The stabilization filter facility is a function to make the digital filter strong when the change width of the load display, and when the condition continues longer than the fixed time.

8-3-1. Setting of stabilization filter

The moving average frequency for the stabilization filter can be selected by function F-05.

The moving average frequency can be selected from “OFF”, “2 times”, “4 times”, “8 times”, “10 times”, “12 times”, “14 times” and “16 times”. Default has selected “10 times”.

8-3-2. Data width of stabilization filter

The data width of stabilization filter can be set by the function F-06.

Setting range : 000～999 Unit : 1D 000 : OFF

Default has selected “005”.

8-3-3. Time width of stabilization filter

The time width of stabilization filter can be set by the function F-07.

Setting range : 00～99 Unit : 0.5 s 00 : OFF

Default has set “01”.

ex. The data width to which the stabilization filter is executed is selected by the function F-06.

The data width of the stabilization filter for each set value "n" is obtained in the display conversion by the following expression.

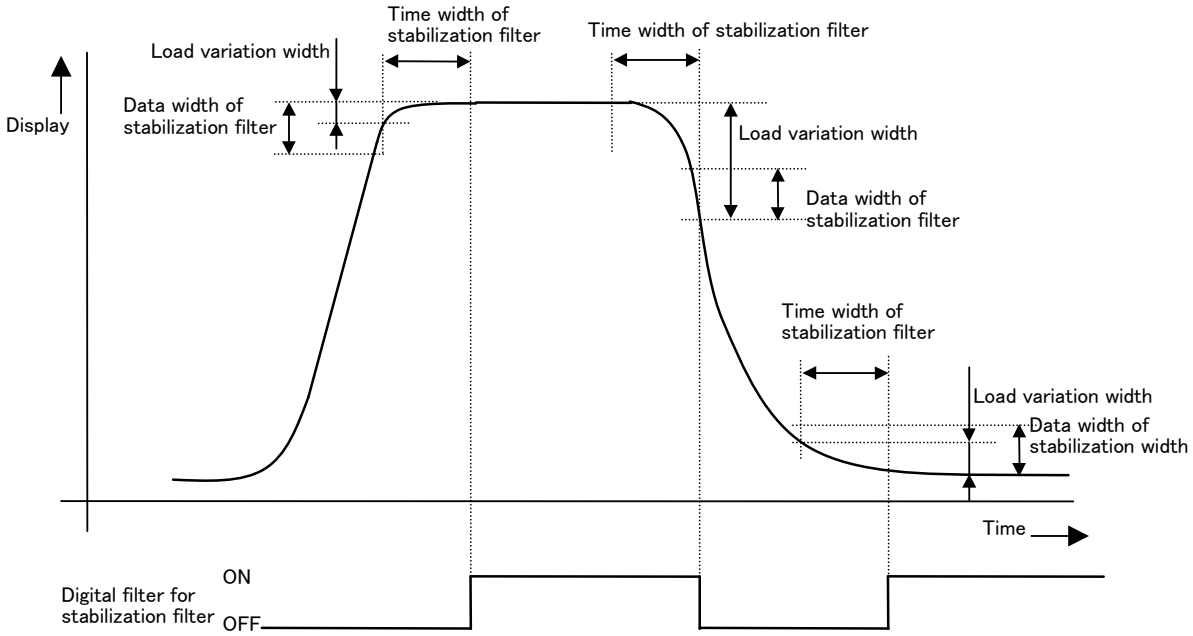
"Data width of stabilization filter"＝ "Setting value of F-06"× "The scale interval"

When the setting by function F-06 is "10", and the scale interval is "D＝5", it will be as follows;

"Data width of stabilization filter" ＝10×5

＝50 D

When the change width of the load display is within the value set by function F-06, and when the condition continues for the time for function F-07 or more, the stabilization filter set by function F-05 becomes effective.



● **When the digital filter is set by function F-01, the moving average process executes "Moving averate of stabilization filter function (F-05) ", after "The moving average of digital filter(F-01)".**

8-4. Key lock function

This function sets whether the operation of each key in the front panel is effective or invalid to prevent the various keys from the wrong operation.

8-4-1. Key lock

The function of F-08 sets whether the key operation of “set”,”Accum./◀”,”PRESET TARE/▶”, ”TARE/▲“ and “NET/GROSS/▼“ is effective or invalid.

The key lock function becomes effective only in the measurement mode.

Default is set “Invalid”.

8-5. Stability detection

When the change width of the load display is within the data width set by function F-10, and when the condition continues for the time set by function F-11 or more, the stability detection is the function to judge the measuring value being stable.

8-5-1. Data width of stability detection

The data width of stability detection can be set by function F-10.

Setting range : 0～9 Unit : 0.5D　0 : OFF

Default has set “4”.

The data width is obtained in the display conversion by the below formula

“Data width of stability detection”＝ “Setting value of F-10” x 0.5 x “The scale interval”

When the setting of function F-10 is “4”, and when the scale interval is “D = 2”, it will become as follows;

“Data width stability detection” = 4 x 0.5 x 2 = 4D

8-5-2. Time width of stability detection

The time width of stability detection can be set by function F-11.

Setting range : 0～9　Unit : 0.5 s　0 : OFF

Default has set “2”.

● **When two range or three range switches have been selected by the automatic range switches, the data width of the stability detection execute**
the display conversion of the data width by the value of the first range scale interval (scale interval in the calibration).

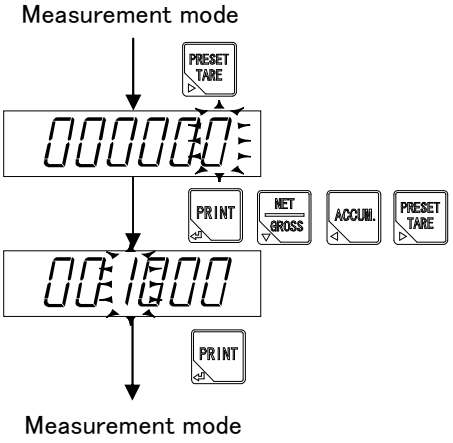
8-6. Input of the fixed tare weight cancellation

The fixed tare weight cancellation function executes the tare weight cancellation according to the set value by which digital is input.

8-6-1. Operating condition of the fixed tare weight cancellation

The operating condition of the fixed tare weight cancellation can be selected by the selection of funciton F-15. Default has set “effective”.

8-6-2. Input of the fixed tare weight cancellation



If the PRESET TARE key is pressed from the normal measurement mode, it becomes the input display of the setting for fixed tare weight cancellation.

As the value being memorized now is displayed while the tare weight cancellation is setting, please set the value of fixed tare weight cancellation by using the following keys.

TARE ACCUM. : Change the value of changing digit.

ACCUM. PRESET TARE : Select the changed digit.

ZERO : Change the display value into “0”.

SET : The displayed value is not memorized, and it returns to the measurement mode.

PRINT : Memorize the display value and proceed to the next step.

ON OFF : The display is turned off without changing all setting, and it becomes the stand-by condition.

After changing, the PRINT key is pressed. A fixed tare weight cancellation is executed, the load display becomes “Net value = Gross value – fixed tare weight setting value”, and “PRESET” and “NET” of the status display lights on.

● **When two range or three range switches have been set by automatic range switches, the setting range where a fixed tare weight cancellation can be input is within the first range.**
● **When a fixed tare weight cancellation is executed with the tare weight cancellation executed, the tare weight cancellation is cleared, and a fixed tare weight cancellation is executed. (The tare weight cancellation cannot be used together with a fixed tare weight cancellation.)**
● **When the zero set is executed in the condition of gross value display, the fixed tare weight cancellation will be cleared.**

8-7. Automatic printing

Automatic printing is used when the print output is automatically done whenever the load hangs to the measuring section by using the two-wires method serial interface, the BCD output, and the RS-232C interface. The load display enters within the range of the output effective, and data is output once at the stable.

8-7-1. Operating condition of automatic printing

The operating condition of automatic printing can be selected by function F-16.

The operating condition of automatic printing can be selectable from "OFF", "Data exceeding +5 counts" and "Data out of the range from – 5 counts to + 5 counts".

Default has selected "OFF", and printing is made by the input of the PRINT key or external control input.

8-8. Accumulation

The accumulation function is a function to add the load data accumulating. Accumulating frequency and total value are memorized.

8-8-1. Operating condition of accumulation function

The operating condition of accumulation function can be selected by function F-50.

The operating condition of accumulation can be selectable from "OFF", "Only the manual accumulation +" and "Both of the manual accumulation +/-". "Only the automatic accumulation +" and "both of the automatic accumulation +/-".

Default has selected "Both of the manual accumulation +/-".

8-8-2. Setting of accumulation prohibited zone

The accumulation prohibited zone is the zone which cannot accumulate, and the next accumulation can be executed after the load value enters into "Accumulation prohibited zone" once.

The accumulation prohibited zone can be set by function F-51.

Setting range : 00～99 Unit : D　00 : Accumulation always when stability is detected.

Default has set "05".

- **The next accumulation becomes in effective after the load value enters into "Accumulation prohibited zone" once.**
- **When the setting of accumulation prohibited zone F-51 is "00", it becomes stability release once from the stable state, it accumulates the load value when becoming an stable state again.**

8-8-3. Execution of accumulation

① Manual accumulation

Only + : When it is the stable condition and the ACCUM. key is pressed in the condition of accumulation prohibited zone < load value, the accumulation is executed.

Both + and – : When it is the stable condition and the ACCUM. key is pressed in the condition of accumulation prohibited zone < |load value|, the accumulating calculation is executed.

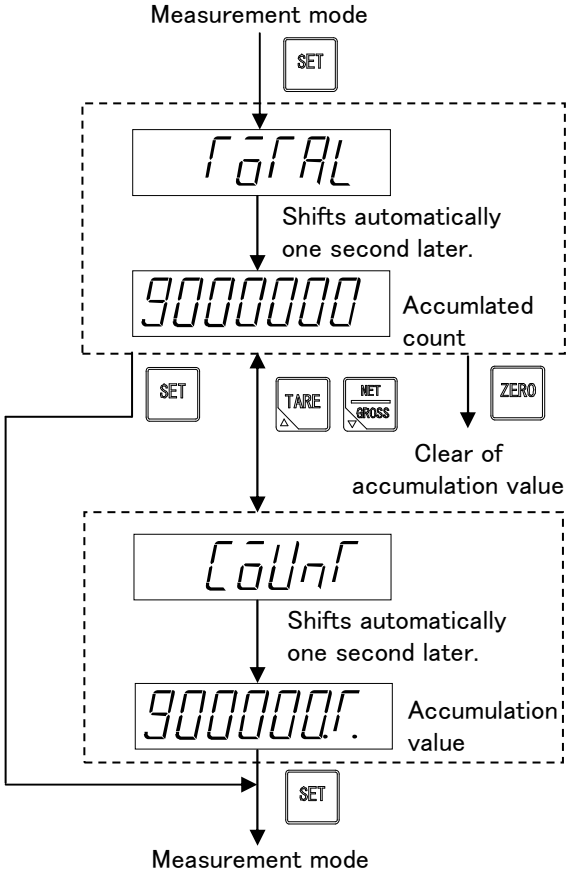
② Automatic accumulation

Only + : When it detects the stable condition in the condition of accumulation prohibited zone < load value, the accumulation is executed automatically.

Both + and – : When it detects the stable condition in the condition of accumulation prohibited zone < |load value|, the accumulating calculation is executed automatically.

- **The load display blinks once in both cases manual operation/automatically in accumulating. At the same time, one accumulated count is added.**
- **When there is an accumulation data, the "ACCUM." mark of the condition display lights on.**
- **When exceeding the display range of the accumulated value or the accumulated counts results, the accumulation is not executed. The "ACCUM." mark of the condition display lights on.**
- **The accumulating operation is prohibited unconditionally at the OL display or the –OL display.**

8-8-4. Switch to accumulation display



By pressing the SET key from the normal measurement mode, the display becomes TOTAL, and the accumulation mode is entered.
The display automatically displays the accumulated value about one second later. (Up to 9 999 999)

By pressing the NET GROSS key, COUNT displays, and the display automatically display the accumulated count about one second later.(Up to 999 999)

The accumulated value and count are switched and displayed with the TARE key and the NET GROSS key.

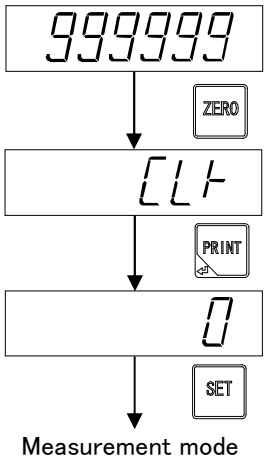
Again, by pressing the SET key, it becomes to the normal measurement mode.

8-8-5. Display range of the accumulated value and count

The display range of the accumulated value is from –1999999 to 9999999.
The display range of the accumulated count is from 0 to 999999.
The upper limit of accumulated value disregards the displayed decimal point.
ex. When the position of decimal point is 0.0, the upper limit of accumulated value is 999999.9.

- **When the accumulated value and the accumulated count exceeding the display range results, the additive of the count is not executed. As the accumulating condition display blinks, please execute to clear the accumulated value and count.**

8-8-6. Clear of the accumulated value and count.



Measurement mode

Press the ZERO key in the condition of the accumulated value display. (During the display of the accumulated count, the clear operation cannot be proceeded.)

CLr is displayed, and press the PRINT key.

0 is displayed, and the accumulated value and accumulated count is cleared at the same time.

Please press the SET key, and return to the measurement mode.

8-9. Setting of the external control input operation

The function can be controlled from the outside by the "INPUT" connector from the rear panel.

The function of each pin is set by function F-60 to F-66.

Please refer to the paragraph 2-3. Connection of the external control input.

Default has set to "Operation OFF" for all from F-60 to F-66.

8-10. Memory clear

Memory clear is executed by function F-99.

The setting contents of the function is returned to the default setting.

When the PRINT key is pressed with F-99 displayed, F.CLr becomes a blinking display.

At this time, please press the ON/OFF key to discontinue a clear memory.

It becomes a stand-by mode, and a clear memory is not executed.

When F.CLr is a blinking display, the display section is turned off by pressing the PRINT key, and it becomes F-01 display, the operation of memory clear is completed.

9. Record place of set data

This unit records each data in RAM and EEPROM as follows;

It is preserved almost permanent because EEPROM is nonvolatile.

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

9-1. Data recorded in RAM

- Tare weight cancellation data
- Zero tracking data
- Zero set data
- Fixed tare weight cancellation data

9-2. Data recorded in EEPROM

- Calibration data
- Function data
- C function data
- Comparator set value
- Accumulated value, Accumulated count data

- **All the data recorded in RAM is initialized when the power is turned on.**
- **When the instrument changes from the stand-by condition to measurement mode, the data recorded in RAM is not initialized, and it operates by the data stored just before the stand-by condition.**

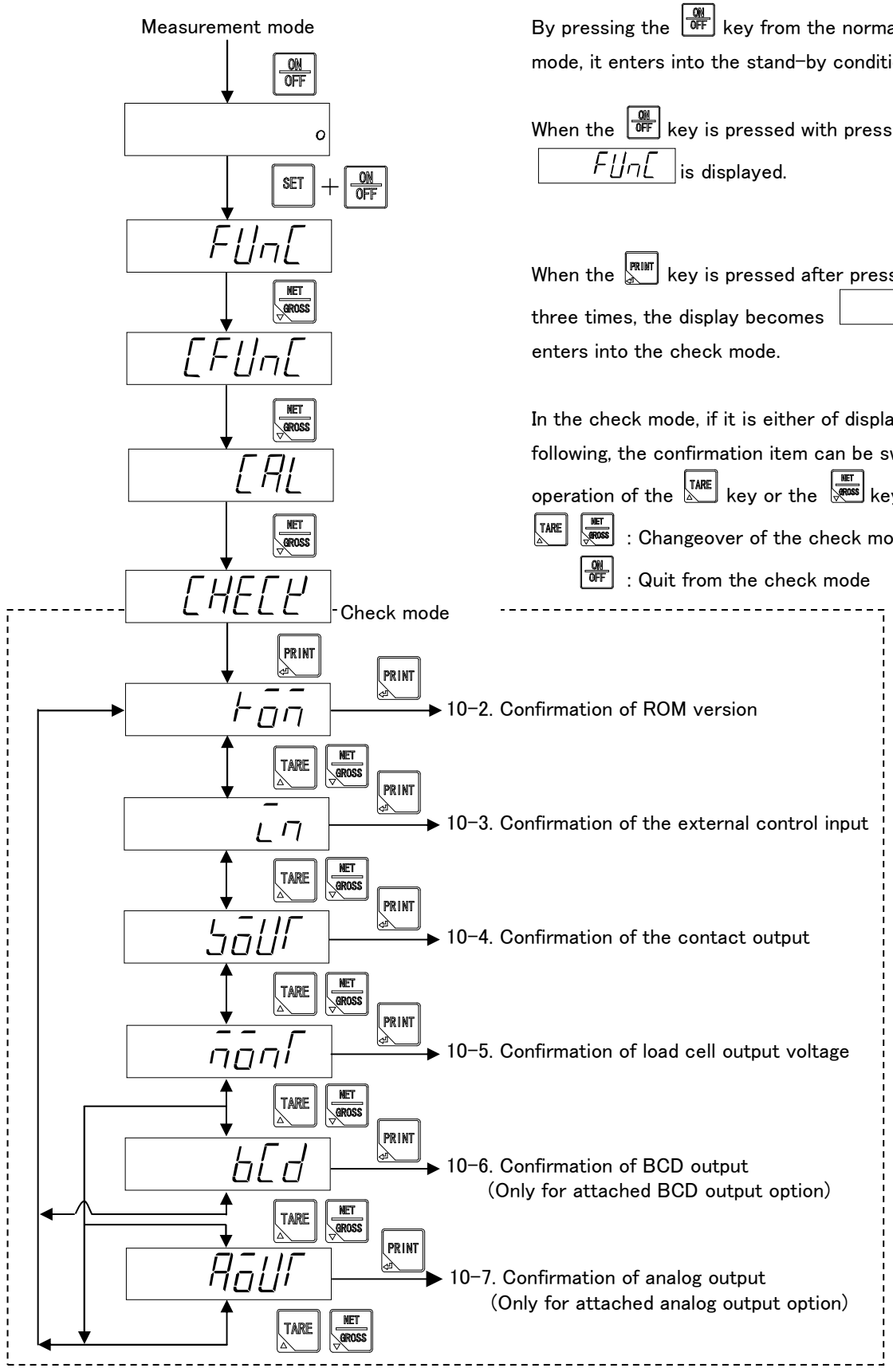
10. Check mode

In the check mode, the following confirmations can be made.

● ROM version ● External control input operation ● Contact output operation (Option)

● Output voltage of the load cell ● BCD output operation (Option) ● Analog output (Option)

10-1. Setting method of Check mode



By pressing the ON OFF key from the normal measurement mode, it enters into the stand-by condition.

When the ON OFF key is pressed with pressing the SET key, FUnC is displayed.

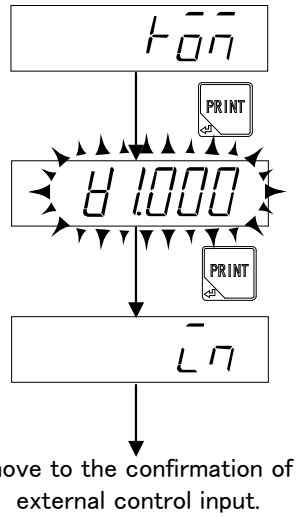
When the PRINT key is pressed after pressing the NET GROSS key three times, the display becomes toN, and enters into the check mode.

In the check mode, if it is either of display section as the following, the confirmation item can be switched by the operation of the TARE key or the NET GROSS key.

TARE NET GROSS : Changeover of the check mode item

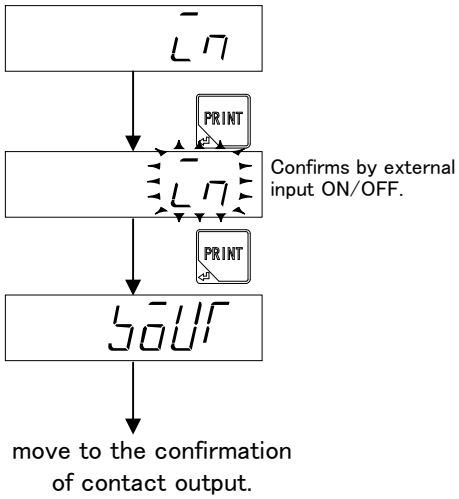
ON OFF : Quit from the check mode

10-2. Confirmation of ROM version



When the PRINT key is pressed from display, ROM version is blinking displayed.

10-3. Confirmation of external control input



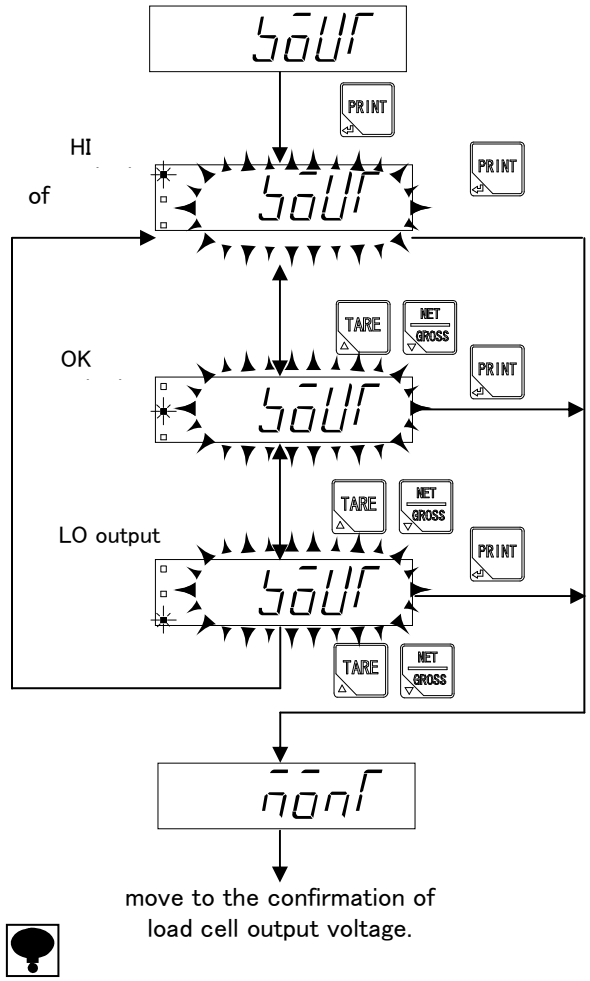
When the PRINT key is pressed from display, display becomes blinking.

At this time, the status of ON/OFF of the external control input signal can be confirmed by the status display section.

The status display lights when each input of the INPUT connector is turned on.

Pin No.	Status display
1	ACCUM. ▼ mark
2	MD ▼ mark
3	PT ▼ mark
4	TARE ▼ mark
5	GROSS ▼ mark
6	NET ▼ mark
7	ZERO ▼ mark

10-4. Confirmation of contact output



When the PRINT key is pressed from SOUT display, SOUT display blinks.

At this time, by operating the following keys, the display each judgement output is switched, and the contact output against the position is turned on.

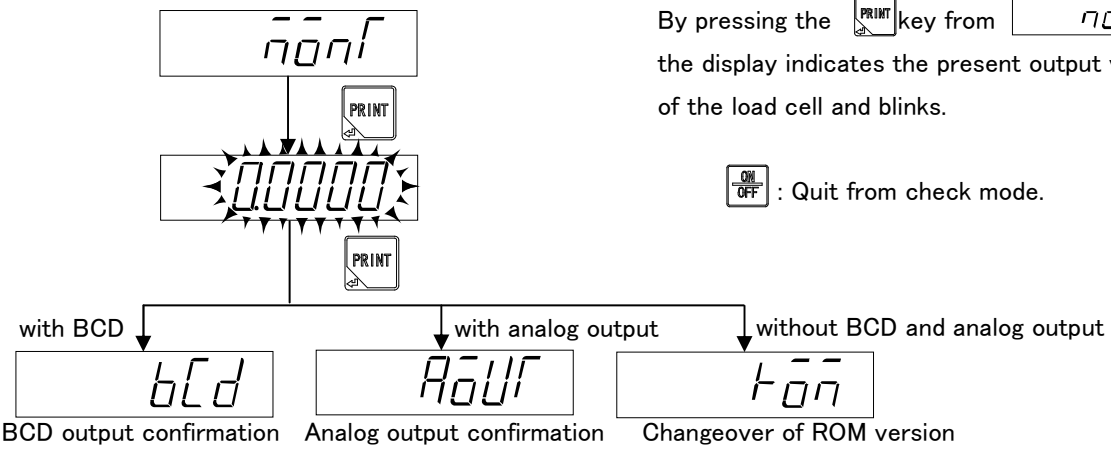
TARE NET GROSS : Changeover the each contact output

ON OFF : Quit from the check mode

● **The contact output is an option. When optional products does not install the changeover operation of the display is executed.**

10-5. Confirmation of load cell output voltage

In the confirmation of the load cell output voltage, the weight put on a present load cell is converted into mV/V. For example, when a uncertain load cell is used, please execute the calibration based on the load cell output value with the actual weight for the tare weight and maximum capacity.

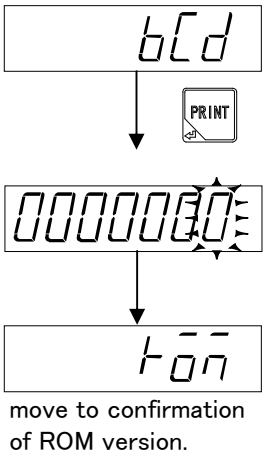


By pressing the PRINT key from non display, the display indicates the present output voltage value of the load cell and blinks.

ON OFF : Quit from check mode.

The displayed load cell output voltage value is a reference value. The display accuracy is about 0.5%.

10-6. Confirmation of BCD output (When BCD output is applied.)



By pressing the PRINT key from bCd display, 0000000 is displayed, and 10^0 digit blinks. At this time, The same value as the display is output

the BCD output.

The BCD output changes, too, when the display is changed with a below mentioned keys.

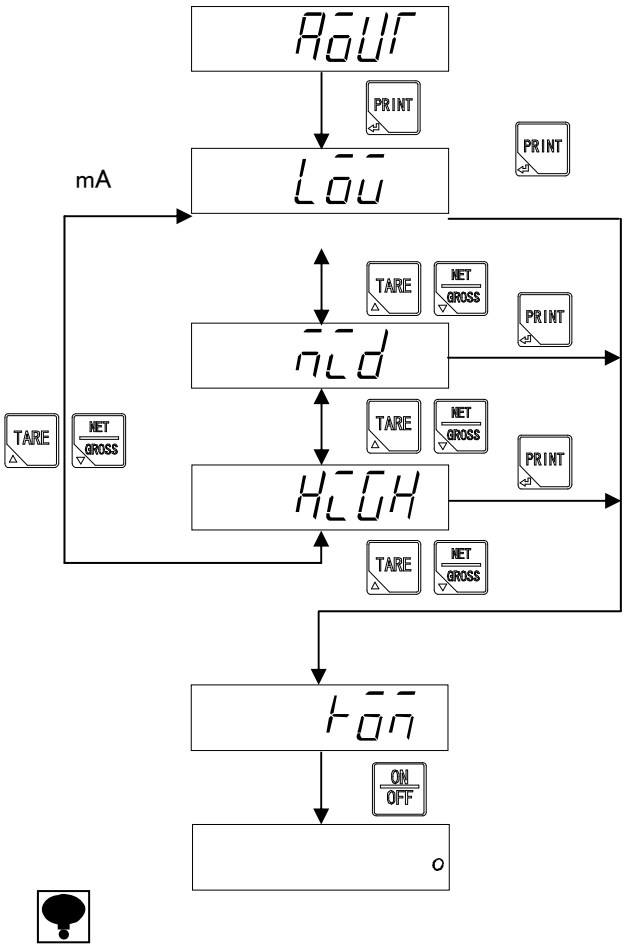
TARE NET/GROSS : Change the value of changed digit.

ACCUM PRESET/TARE : Select the changed digit.

ON/OFF : Finish the check mode.

● When the BCD output is not installed, the BCD output is not confirmed.

10-7. Confirmation of analog output (When the analog output is applied.)



By pressing the PRINT key from AoUt display, LoU is displayed, and the analog output of DC4 mA(DC0 V) is made. At this time, when the under mentioned key is operated, the analog output of DC 12

(DC5 V) is output in nLd display, and the analog output of DC DC20 mA(DC10 V) is output in

HIGH display.

TARE NET/GROSS : Changeover each analog output.

ON/OFF : Finish the check mode.

● When the analog output is not installed, the confirmation of analog output is not executed.

11. Comparator

The comparator function is a function to compare the measured load values and the load value set beforehand.

The comparison result displays in judgement display section, and is output by the optional contact output.

●The comparator of this unit executes the comparison operation synchronizing with the display.

11-1. Comparison operation of comparator

In the comparator comparison operation of this unit, there are three patterns “Upper/lower limit comparison mode”, “Weigh in mode”, and ”Weigh out mode”.

The selection of the comparator comparison operation is executed by the setting of function F-20.

Function No.	Set value	Contents	
F-20	0	OFF	
	1	All data	Upper/lower limit comparison mode
	2	All data during stable condition	
	3	Data exceeding ＋5D	
	4	Data exceeding ＋5D during stable condition	
	5	Data except from －5D to ＋5D	
	6	Data except from －5D to ＋5D only during stable condition	
	7	Weigh in mode	
	8	Weigh out mode	

Default has selected “Data exceeding +5D during stable condition”.

11-2. Target of comparator comparison operation

The target of the comparator comparison operation is selected by the setting of function F-21.

The target of the comparator comparison operation can be selected from “Gross value” and “Net value”.

Default has selected “Gross weight”.

11-3. Upper/lower limit comparison mode

The upper/lower limit comparison mode is a mode by which the load values are compared with the high limit setting value and the low limit setting value, and the comparison result is output as a signal of HI (overamount), OK (positive amount), and LO (lack).

When the function F-20 is form 1 to 6, it becomes in effective.

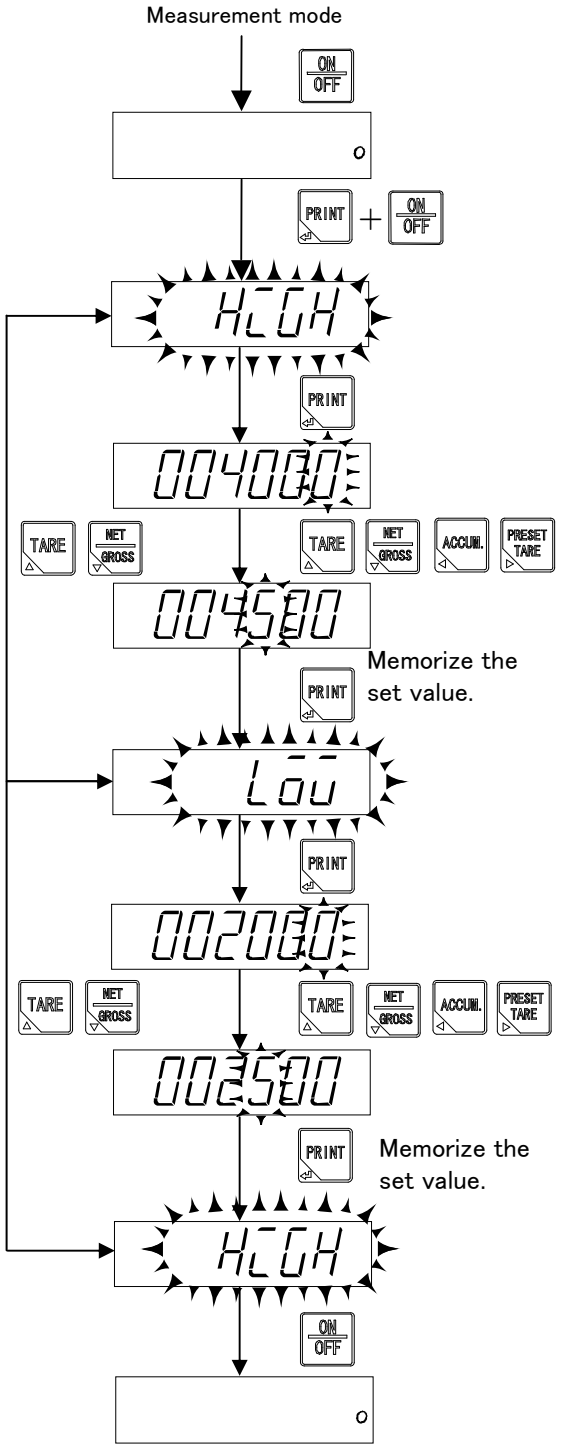
11-3-1. Operating condition of upper/lower limit comparison mode

The relation between the comparison output and the upper/lower limit set value of the upper/lower limit comparison mode is as follows.

Comparison output	Operating condition	Comparison judgement display	Contact output terminal
HI(Over amount)	Upper limit value＜Display value	HI	HI terminal
OK(Positive amount)	Lower limit value≦Display value≦Upper limit value	OK	OK terminal
LO(Lack)	Display value＜Lower limit value	LO	LO terminal

● An over display becomes the HI output during the plus over(OL), and the LO output during the minus output during the minus over(－OL).

11-3-2. Setting for upper limit value/lower limit value.



By pressing the ON OFF key from the normal measurement mode, it becomes the stand-by condition.

By pressing the ON OFF key with the PRINT key, HIGH is displayed with blinking

By pressing the PRINT key, the upper limit (HI) being memorized at present is displayed, and please set the upper limit key by using the following keys.

: Change the value of the changed digit.

: Select the changed digit

: Change the display value to "0".

: Setting is interrupted, and returns to the HIGH display.

: Memorize the display value and proceed to the next step.

: The upper/lower limit setting is finished without changing all setting.

After the upper limits value(HI) is completed, and when the PRINT key is pressed, the setting value is memorized and Lou display blinks.

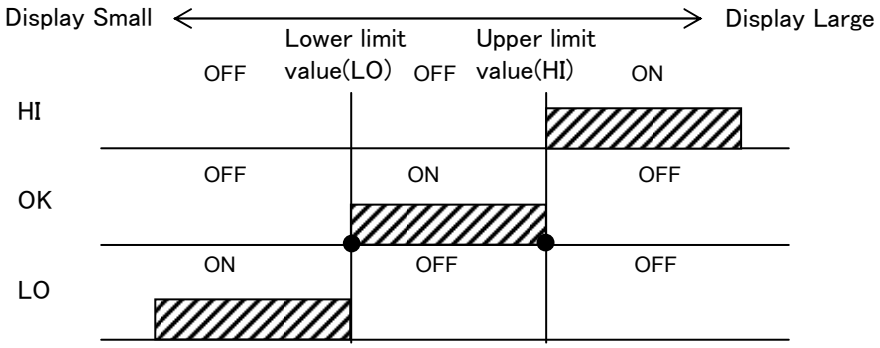
When the PRINT key is pressed, as the lower limit value (LO) memorized at present is displayed, please set as above upper limit value.

After the setting of the lower limit value is completed, please press the PRINT key to memorize the setting value, and display HIGH blinking again.

Upon completing the setting of the upper/lower limit value, press the ON OFF key, and move to the stand-by condition.

Upper/lower limit setting mode is finished.

11-3-3. Operation of upper/lower limit comparison mode



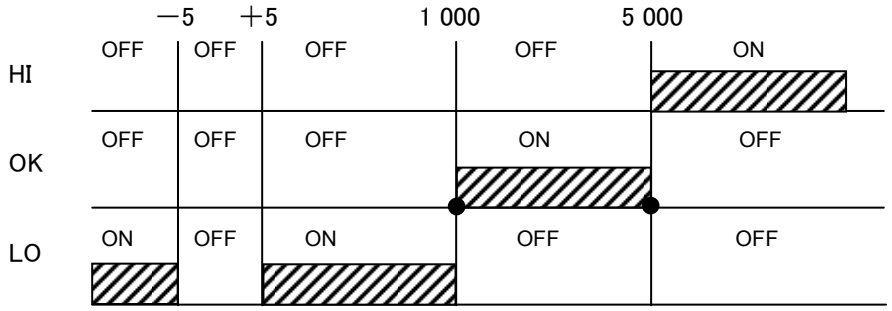
ex. ・Comparator comparison operation Function F-20 “5”

(Except the range from －5D to ＋5D only during the stable condition)

・Target of comparator comparison operation Function F-20 “0”(Gross value)

・Upper limit value 5 000

・Lower limit value 1 000



・Operating condition of HI 5 000＜Display value

・Operating condition of OK 1 000≦Display value≦5 000

・Operating condition of LO Display value＜－5 or 5＜Display value＜1000

11-3-4. Operating condition of the comparator hysteresis

The comparator hysteresis is a function for the chattering prevention of the output relay.

The comparator hysteresis operating conditions is selected by setting function F-24.

The operating conditions of the comparator hysteresis can be selected from “On delay” and “Off delay”.

Default has selected “On delay”.

11-3-5. Data width of the comparator hysteresis

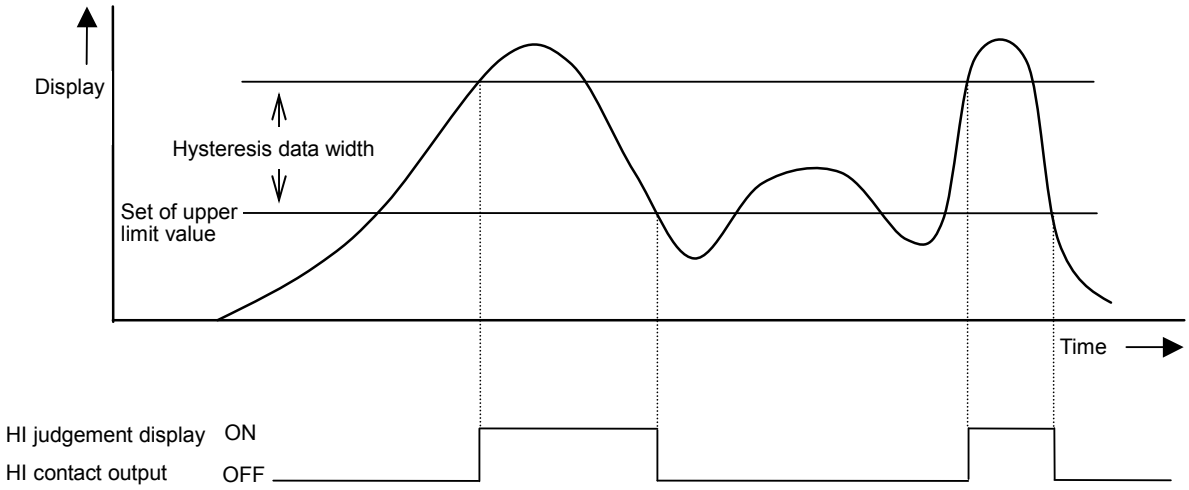
The data width of the comparator hysteresis is set by setting function F-25.

Setting range : 00～99 Unit : 1D　00 : OFF

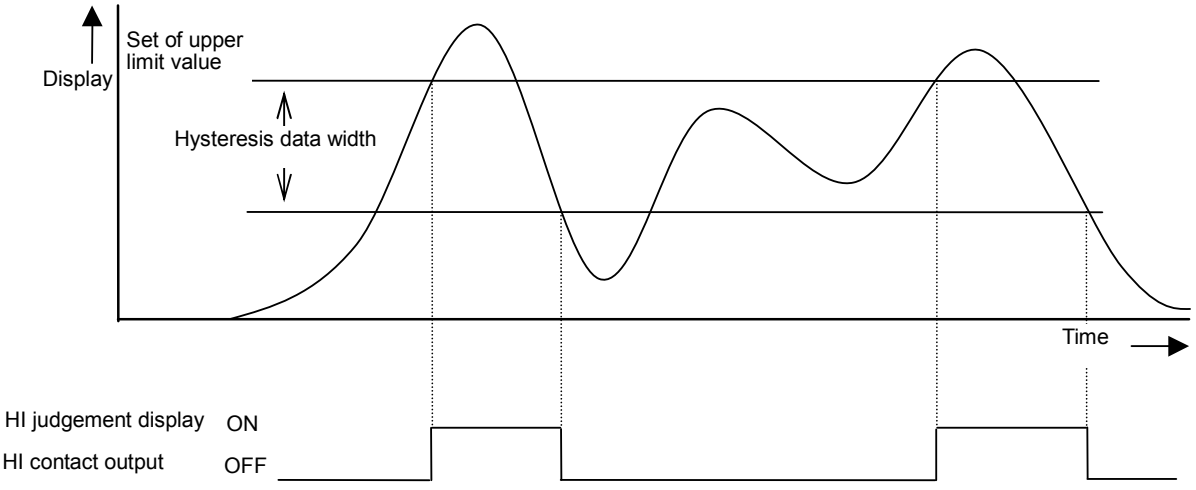
Default has set “00”.

ex. About the upper limit value, the operation of the judgement display and the contact output when the comparator hysteresis is set is shown.

① “On delay”



② “Off delay”



11-4. Weigh in/out mode

Weigh-in/weigh-out measurement is a function to measure the decided amount which is always comparing between a load value and various set values.

The value of target value, fall, pre-set value and near zero is set, and the signal of small weigh-in(HI output), large weigh-in(OK output) or near zero(LO output) is output according to the comparison result.

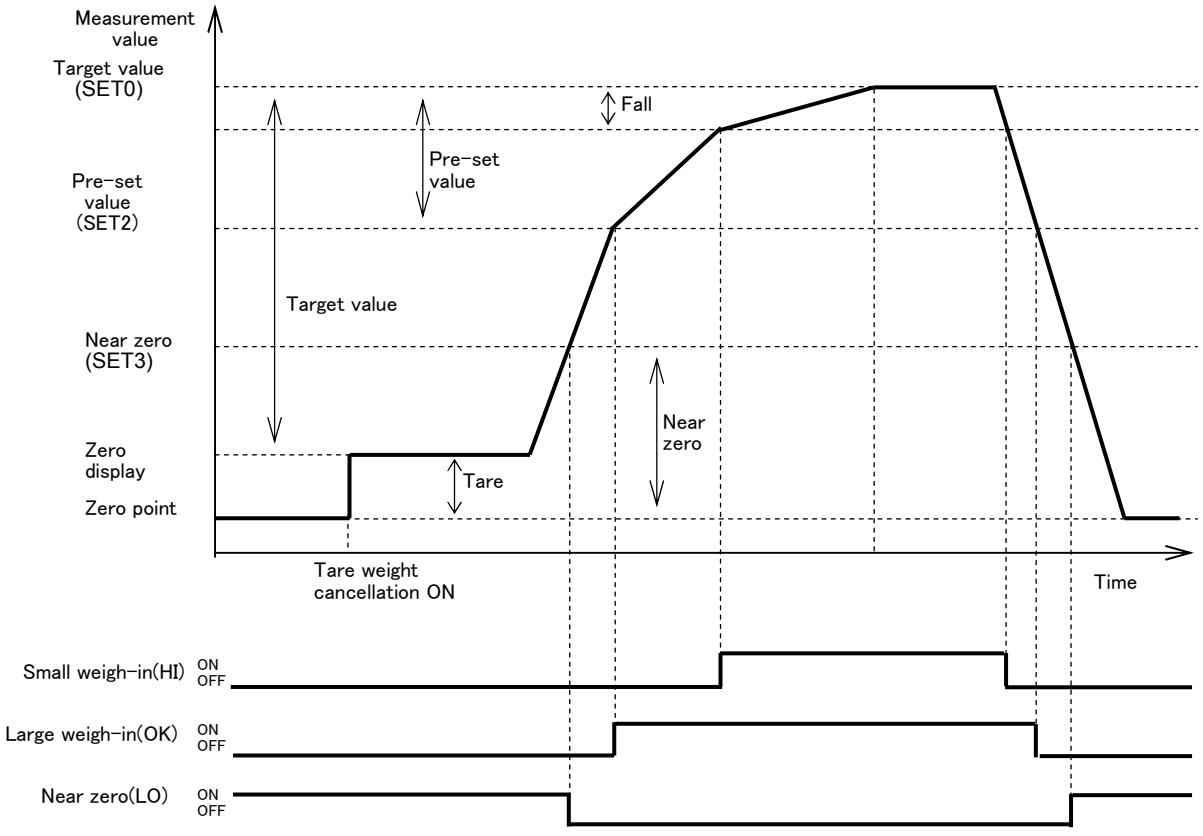
Please set function F-20 in "7" (weigh-in) and "8" (weigh-out) as comparator comparison operation when you use weigh-in/weigh-out mode.

11-4-1. Various setting value of weigh in/out

Setting item	Setting range	Contents
Target value(SET0)	0 ～ 999999	Set the actual weight value which wants to be packed in the bag etc.
Fall(SET1)	0 ～ 999999	Set the correction amount for the weight which has fallen in the air.
Pre-set value (SET2)	0 ～ 999999	Set the weight value by which small weigh-in is made.
Near zero(SET3)	0 ～ 999999	Use to detect the empty on the measuring section.

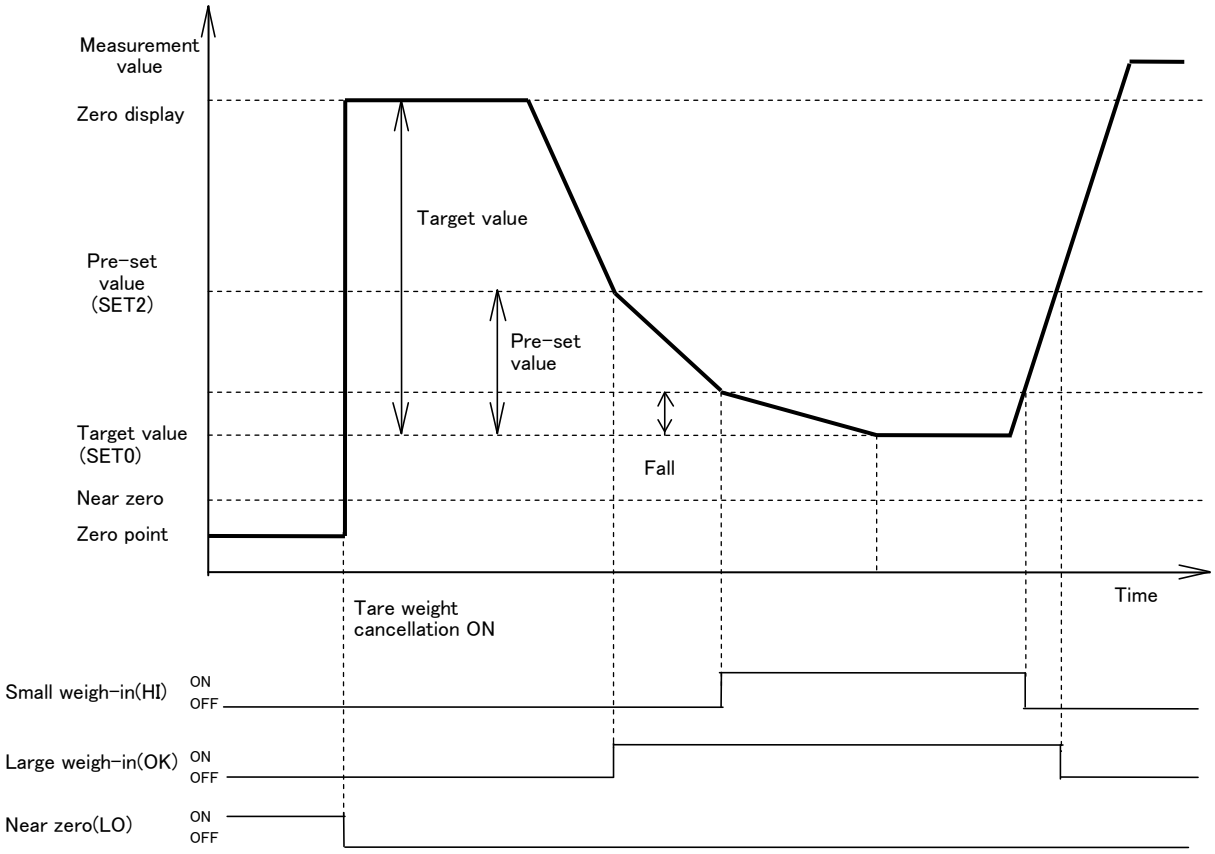
11-4-2. Output condition of weigh in measurement

Output signal	Condition	Output terminal
Small weigh-in	Net value≧(Target value－Fall)	HI
Large weigh-in	Net value≧(Target value－Pre-set value)	OK
Near zero	Gross value≦Set value of near zero	LO

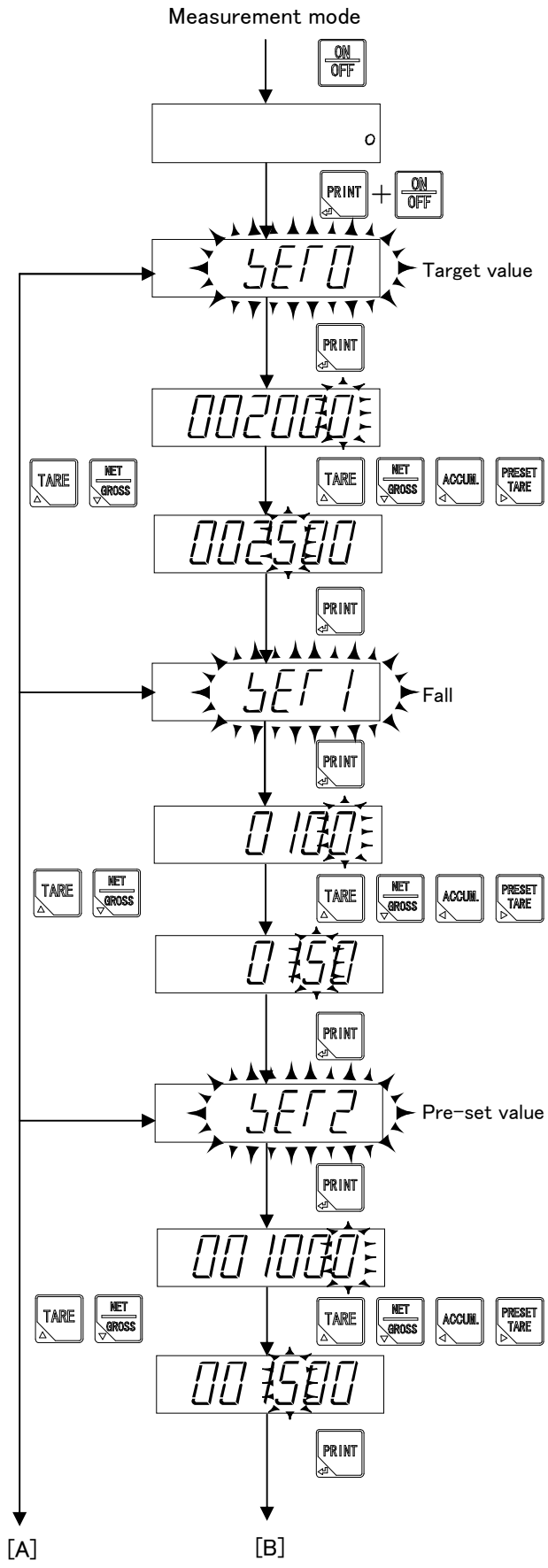


11-4-3. Output condition of weigh-out measurement

Output signal	Condition	Output terminal
Small weigh-in	Net value≦－(Target value－Fall)	HI
Large weigh-in	Net value≦－(Target value－Pre-set value)	OK
Near zero	Gross value≦Set value of near zero	LO



11-4-4. Setting of various set values (Target value, Fall, Pre-set value and Near zero)



By pressing the ON OFF key from the normal measurement mode, it enters into the stand-by condition.

When the PRINT key is pressed with pressing the ON OFF key, SET0 is displayed.

As the target value memorized at present is displayed when the PRINT key is pressed, please set the target value by using the following keys.

TARE NET GROSS : Change the value of the changed digit

ACCUM. PRESET TARE : Select the changed digit

ZERO : Change the displayed value to "0"

SET : Setting is interrupted, and return to SET0 display.

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

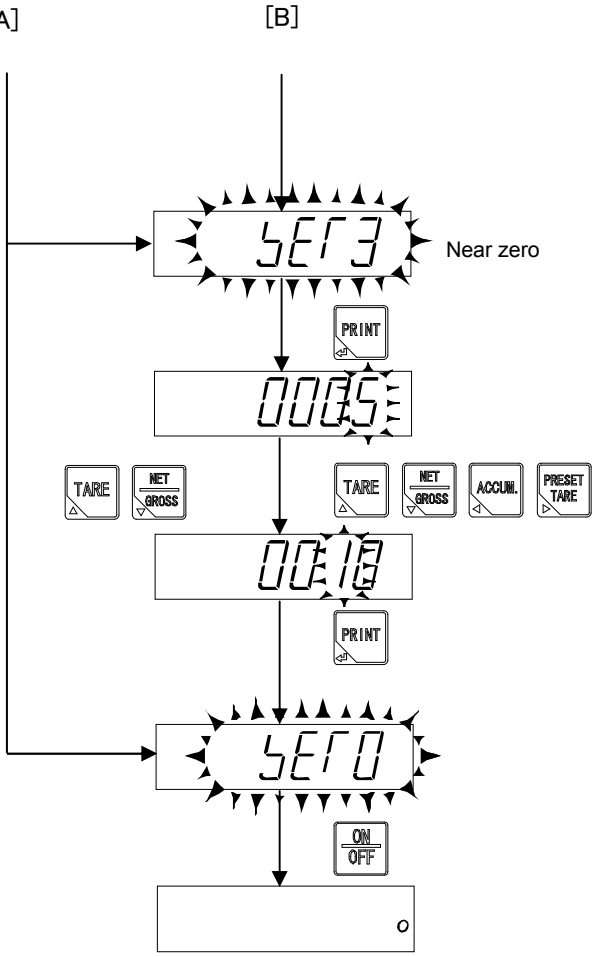
ON OFF : Setting is finished without changing all setting.

When the PRINT key is pressed after the target value(SET0) is set, SET1 is blinking displayed.

As the fall(SET1) memorized at present is displayed when the PRINT key is pressed again, please set the fall similarly.

When the PRINT key is pressed after setting the fall(SET1) SET2 is blinking displayed.

As the "pre-set value"(SET2) memorized at present is displayed when the PRINT key is pressed, please set the "pre-set value" similarly.



When the PRINT key is pressed after setting the "before set value"(SET2), SET3 is blinking displayed.

As the value of "near zero" memorized at present is displayed when the PRINT key is pressed again, please set the value of "near zero" similarly.

Press the PRINT key. SET0 is displayed, and please set to stand-by condition by pressing the ON OFF key.

The various setting modes of weigh-in/weigh-out measurement are finished.

● **The setting of the target value, fall, pre-set value and near zero becomes effective only when the function F-20 is set in "7" (weigh-in mode) and "8" (weigh-out mode).**

12. Serial interface (S-I/F)

12-1. Specification of interface

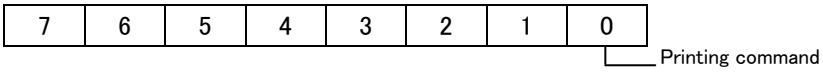
Specifications	Contents
Baud rate	600 bps
Data length	8 bit
Parity bit	ODD
Stop bit	1 bit
Start bit	1 bit
Sending data	Binary code, BCD

12-2. Data format

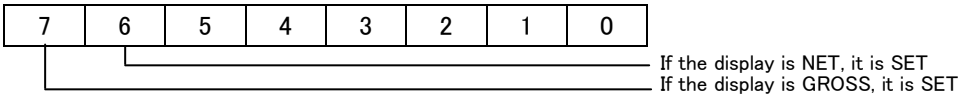
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
INTERVAL	F1	F2	F3	LEN	FUN1	FUN2	ST1	ST2	OVR	ERR	G1	G2	G3	N1	N2	N3	BCC

① INTERVAL Space for 15 bit(25 ms) or more (MARK SIGNAL)
② F1～F3 0FFH code
③ LEN 11H code
④ FUN1 Printing command
⑤ FUN2 00H code
⑥ ST1 00H code
⑦ ST2 00H code
⑧ OVR 00H code
⑨ ERR Condition
⑩ G1～G3 GROSS data
⑪ N1～N3 NET data
⑫ BCC Calculation result from LEN to N3

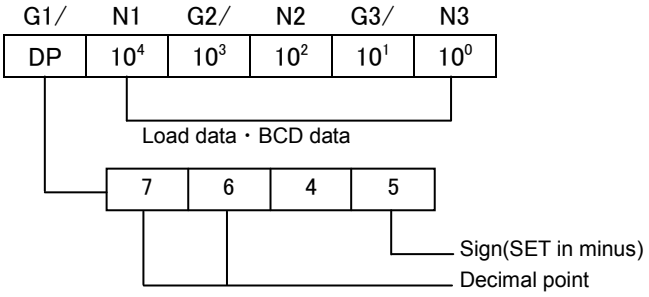
(1) FUN1



(2) ST1



(3) GROSS data/NET data



76	Decimal point
00	Nothing
01	10^1
10	10^2
11	10^3

● The output of the serial data is executed only in the measurement mode.
● The data output of a serial interface stops when the maximum display is set to six digits.
Please set the maximum display within five digits when you use a serial interface.
● Make connection by referring to the 2-4.

12-3. Explanation of format data

(1) Automatic printing bit (FUN1 : bit 0)

This bit can be used as a trigger with the serial interface receiving side equipment.

(2) Display bit (ST1 : bit 7、 bit 6)

bit 7 : When the display of this unit is gross value, "1" is set.

bit 6 : When the display of this unit is net value, "1" is set.

12-4. Explanation of output type

(1) Stream mode

It keeps outputting the data of gross value and the net value etc. at constant intervals.

(2) Automatic printing mode

When the gross value and net value make the stability detection, and meet the requirement "Data exceeding +5D" or "Data except the range from –5D to +5D", the automatic print bit of output format FUN1 is set in "1" and transmits.

● **The automatic printing bit is usually "0".**

(3) Manual printing mode

When there are a stability detection, and the input by the 

key(or the external input), The automatic print bit of output format FUN1 is set in "1" and transmits.

● **The automatic printing bit is usually "0".**

13. Options

13-1. Analog output

13-1-1. Specifications of current output (P/No. : CSD904-P07)

Specifications	Contents
Output	DC4 mA to 20 mA
Load characteristic	510 ohm or less
Non linearity	0.05 %F.S.
Resolution	Approx.1/12 000
Over range	Approx.DC2.4 mA at "-OL" display Approx. DC21.6 mA at "OL" display
Output frequency	5 times/s、15 times/s

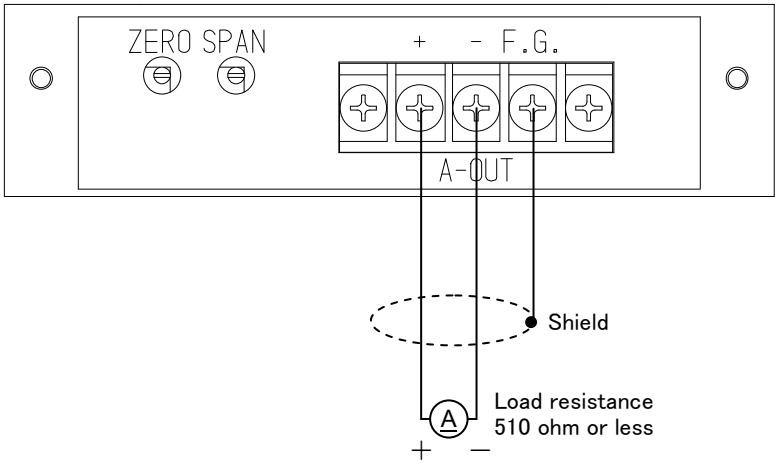
13-1-2. Specifications of voltage output (P/No. : CSD904-P25)

Specifications	Contents
Output	DC0 V to 10 V
Load characteristic	5 k-ohm or more
Non linearity	0.05 %F.S.
Resolution	Approx. 1/12 000
Over range	Approx.DC-1 V at "-OL" display Approx. DC11 V at "OL" display
Output frequency	5 times/s, 15 times/s

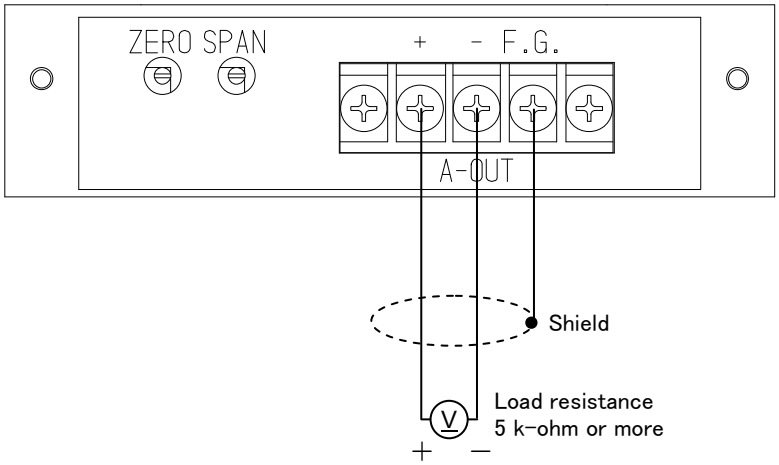
- **The analog output of this unit executes rewriting the output synchronizing with the display.**
- **The internal circuit and photocoupler is insulated.**
- **After turning on the power supply, the analog output has the output change element.**
  Please turn on the power supply for about one hour before to use it in stable condition.

13-1-3. Connection of analog output

① Current output



② Voltage output



● For the connection with the analog output, be sure to apply the shielded cable and shield should be connected with F.G terminal.

13-1-4. Analog output target

The analog output target is selected by C function CF-70.

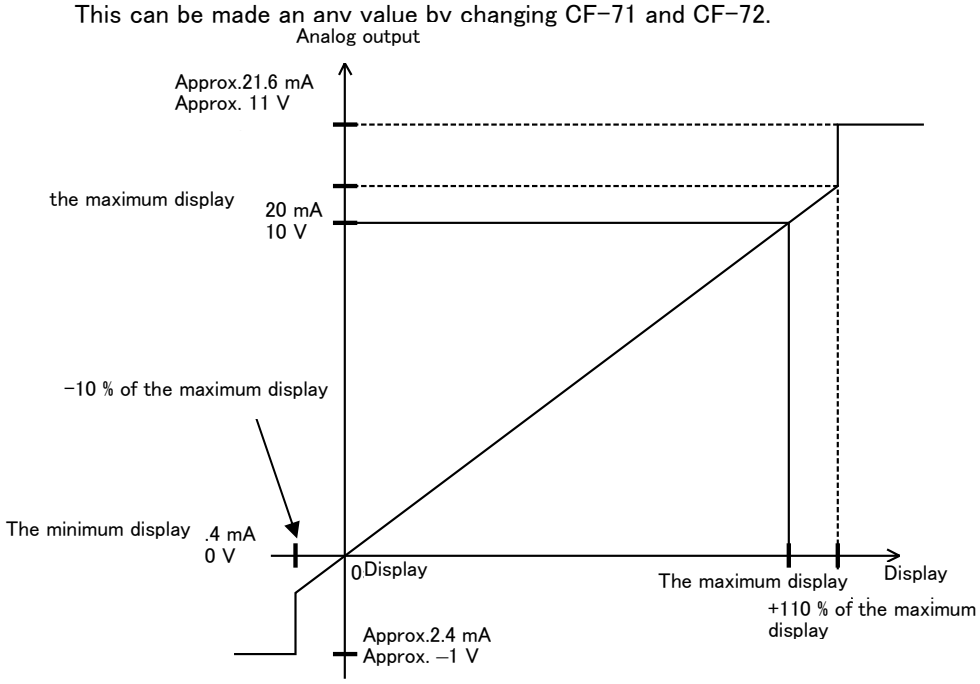
The analog output target can be selected from “Display interlock”, Gross value” and “Net value”.

Default has selected “Display interlock”.

13-1-5. Scaling of analog output

The analog output is set as the minimum value ～ the maximum value by 0 to 10 000.

This can be made an anv value bv changing CF-71 and CF-72.



CF-71 set the display when the minimum value is output.

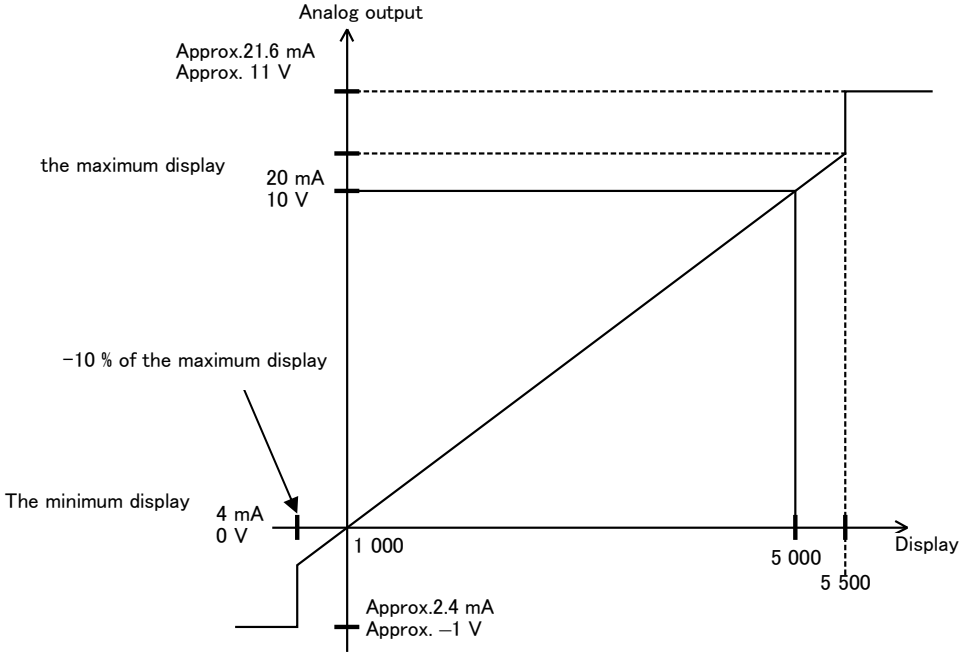
CF-72 set the display when the maximum value is output.

ex) CF-71 : set as 1 000

CF-72 : set as 5 000

When the display is 5 000, the maximum value is output.

When the display is 1 000, the minimum value is output.

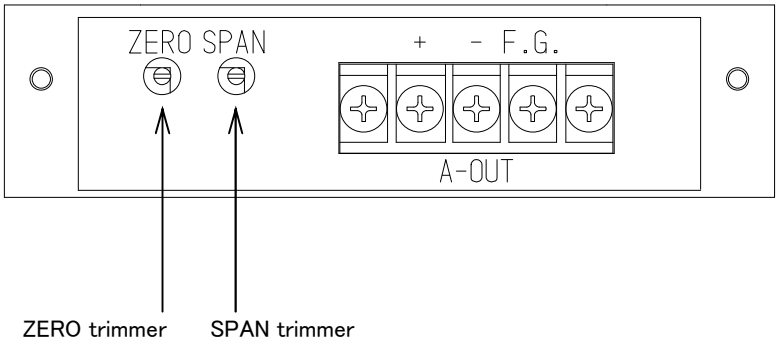


- **The setting of CF-72 must not exceed the maximum capacity set in clause 4.**
- **Please set the smaller value in CF-71 than the value set in CF-72.**

13-1-6. Fine adjustment of analog output

After the analog output scaling is executed by setting C function CF-71 and CF-72, the fine adjustment is executed by the trimmer ZERO and the trimmer SPAN.

The range of the fine adjustment is approx.±10 % against the full scale.



13-2. BCD output

13-2-1. Specifications of BCD output (P/No. : CSD904-P15)

Specifications	Input/Output	Contents
BCD data	Output	7 digit parallel output.
POL. (Polarity)	Output	ON by minus polarity output, and OFF by plus polarity output.
P.C. (Print command)	Output	Turning on during the fixed time after the conversion of BCD output.
ERROR	Output	ON when the error occurs.
OVER	Output	ON synchronizing with the OL display (Over load).
Decimal point 10^1, Decimal point 10^2, Decimal point 10^3	Output	ON synchronizing with the decimal point display setting.
Stable	Output	ON when stability is detected.
Gross value	Output	ON when the gross data is output.
HOLD	Input	HOLD of BCD output.
BCD-ENABLE	Input	The BCD output is compulsorily put into the high impedance condition.

13-2-2. Operation mode of BCD output

The operation mode of BCD output is selected by the setting of function F-30.

The operation mode of BCD output can be selected from “Stream mode(Output synchronizing with the display frequency)” or “Synchronized with print”.

Default has selected “Stream mode(Output synchronizing with the display frequency)”.

13-2-3. Target of BCD output

The target of BCD output is selected by the setting of function F-31.

Function No.	Set value	Contents
F-31	0	Display interlock
	1	Gross value
	2	Net value
	3	Tare value
	4	Accumulated total value
	5	Accumulated count

Default has selected “Display interlock”.

13-2-4. Logic of BCD output

The logic of BCD output is selected by the setting of function F-32.

Function No.	Set value	Contents
F-32	0000～1111	0 0 0 0 Digital output logic(Load data, Decimal point data) POL. logic(Polarity) Flag logic(ERROR OVER, Stable, Gross value) P.C. logic(Print command) 0 : Negative logic 1 : Positive logic

Default has selected “All negative logic”.

13-2-5. Width of P.C.(Print command)

The width of print command is selected by the setting of function F-33.

The width of print command is selected from “125 ms” or “25 ms”.

Default has selected “25 ms”.

● **The print command becomes unstable in the starting period because of converting the BCD data.**
Please read correct BCD data according to the timing of the falling down of the print command.

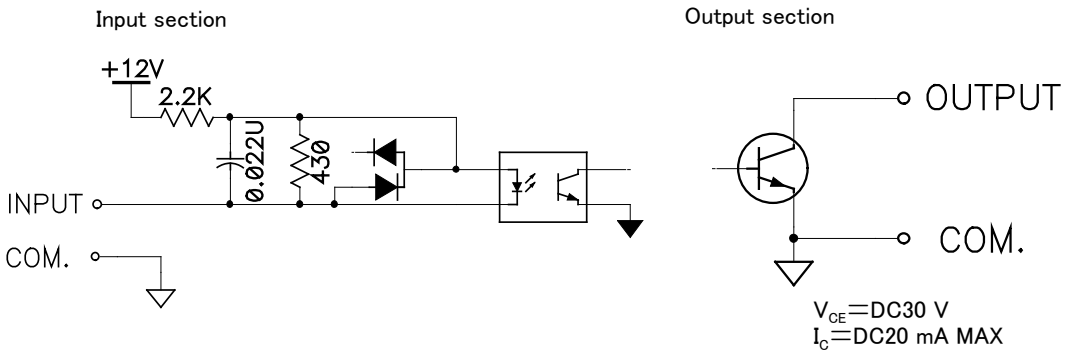
13-2-6. Pin configuration of BCD output connector

Pin No.	Input/Output	BCD code		Pin No.	Input/Output	BCD code	
1	Output	1	10^0	26	Output	1	10^5
2	Output	2		27	Output	2	
3	Output	4		28	Output	4	
4	Output	8		29	Output	8	
5	Output	1	10^1	30	Output	1	10^6
6	Output	2		31	Output	2	
7	Output	4		32	Output	4	
8	Output	8		33	Output	8	
9	Output	1	10^2	34	—	N.C.	
10	Output	2		35	—	N.C.	
11	Output	4		36	—	N.C.	
12	Output	8		37	—	N.C.	
13	Output	1	10^3	38	Output	Decimal point 10^1	
14	Output	2		39	Output	Decimal point 10^2	
15	Output	4		40	Output	Decimal point 10^3	
16	Output	8		41	—	N.C.	
17	Output	1	10^4	42	Output	Stable	
18	Output	2		43	—	N.C.	
19	Output	4		44	Output	Gross value	
20	Output	8		45	Input	BCD-ENABLE	
21	—	N.C.		46	Output	OVER	
22	—	N.C.		47	Output	P.C.	
23	Output	POL.		48	Output	P.C.	
24	—	COM.		49	Input	HOLD	
25	Output	ERROR		50	—	COM.	

Suitable plug : 57-30500 (DDK)

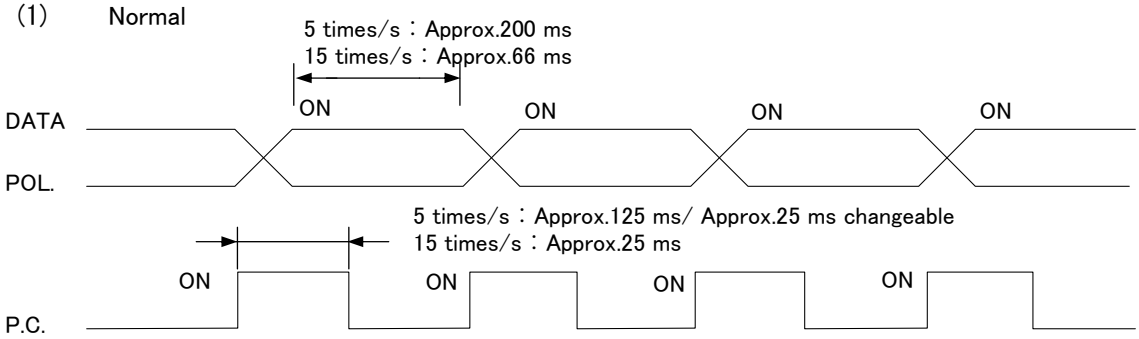
● **Don’t connect with N.C. pin.**
● **The external control input COM. (two pins) and the COM. for BCD output are common.**
● **The internal circuit and photo-coupler is insulated.**
● **In other than the measurement mode, the output will become OFF.**

13-2-7. Equivalent circuit of input/output



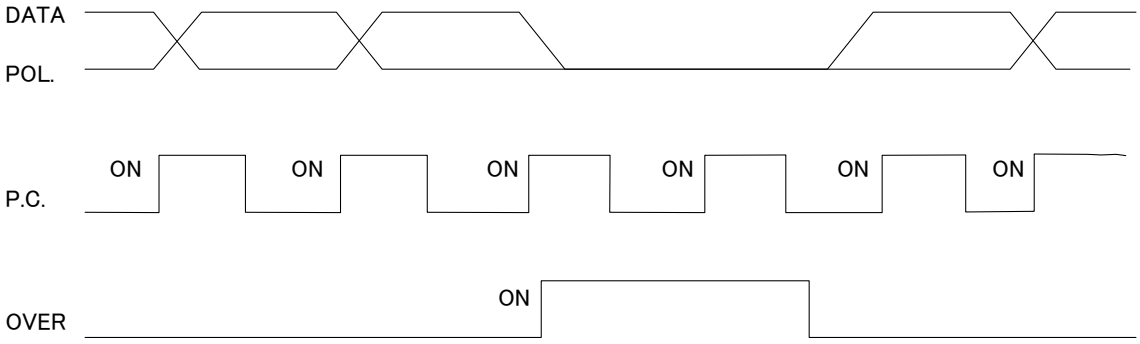
13-2-8. Timing chart

(1) Normal



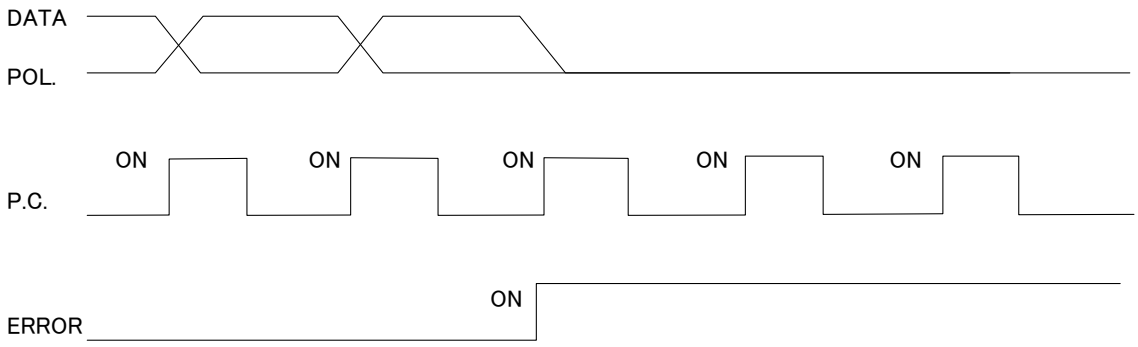
●At the time of data output of each P.C., DATA and POL., output transistor will become ON(Negative logic electrically).

(2) When the data is over



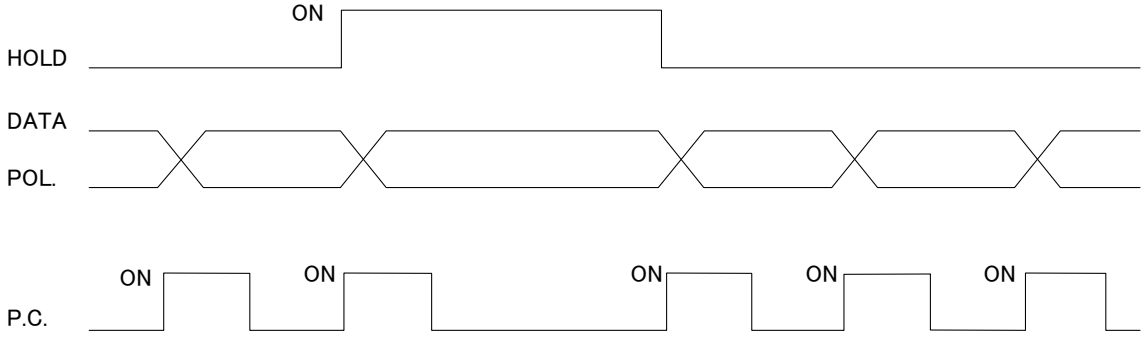
● At the time of OVR output, output transistor will at the OVER signal will become ON(Negative logic electrically). Moreover, for all of the output transistor will become OFF (Positive logic electrically) at the time of OVER output. (However, for the POL., normal OFF at the "OL", DATA, and normal ON at the "—OL").

(3) When error is occurred.



● **At the time of ERROR output, output transistor at ERROR signal will become ON(Negative logic electrically). Moreover, for each DATA, all of the output transistor will become OFF at the time of ERROR output(Positive logic electrically).**

(4) When the hold signal is input.



● **The input operation of HOLD signal is executed after the short circuit for approx. 100 ms or more.**
● **At the time of HOLD signal input, the output transistor of P.C. will be OFF condition(Positive logic electrically). However, as for P.C., OFF condition will be made after one(1) shot of operation.**

13-2-9. Output condition

Setting output logic	Output data	Condition of transistor	Pin-COM level at the time of voltage supply externally.
Negative logic	Yes	ON	L
	No	OFF	H
Positive logic	Yes	OFF	H
	No	ON	L

13-3. RS-232C and RS-422/485 interface

13-3-1. Specification of RS-232C interface (P/N. CSD904-P74)

Specification	Contents
Communication method	Half duplex
Synchronous method	Start-stop synchronous method
Baud rate	Selectable from 1 200, 2 400, 4 800 and9 600 bps.
Data bit length	Selectable from 7 bit or 8 bit.
Parity bit	Selectable from No-parity, Even parity or Odd parity.
Stop bit	Selectable from 1 bit or 2 bit.
Terminator	Selectable from CR＋LF or CR.
Transmission data	ASCII code
Cable length	within 15 m.
Input/Output monitor	with LED(TXD and RXD).

13-3-2. Specification of RS-422/485 interface (P/N. CSD904-P76)

Specification	Contents
Communication method	Half duplex
Synchronous method	Start-stop synchronous method
Baud rate	Selectable from 1 200, 2 400, 4 800 and9 600 bps.
Data bit length	Selectable from 7 bit or 8 bit.
Parity bit	Selectable from No-parity, Even parity or Odd parity.
Stop bit	Selectable from 1 bit or 2 bit.
Terminator	Selectable from CR＋LF or CR.
Transmission data	ASCII code
Cable length	Approx. 1 km
Address	Select one from 0 to 31.
No. of connectable unit	32 units at maximum(RS-422 : 10 units)
Termination resistance	Built-in (Yes/No can be selectable by the connection of terminal boards.)
Input/Output monitor	with LED(TXD and RXD).

13-3-3. Operating mode of RS-232C and RS-422/485

The operation mode of RS-232C is selected by the setting of function F-40.

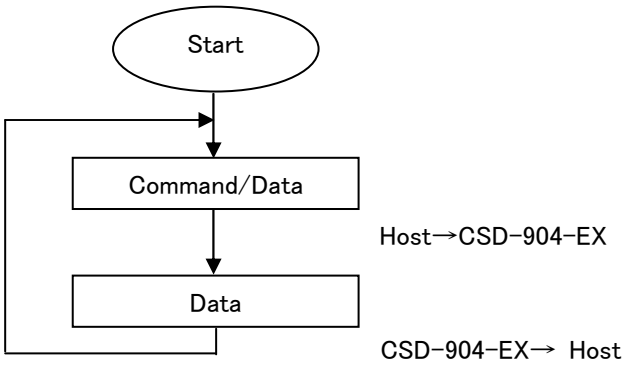
The operation mode of RS-232C can be selectable from “Command mode”, “Stream mode” or “Synchronized with print”. Default has selected “Command mode”.

When RS-422/485 is used, the operation is fixed to “Command mode” regardless of setting of function F-40.

(1) Command mode

Data is sent back from CSD-904-EX to the host side according to the command/data by sending the command/data to CSD-904-EX provided by the host (personal computer or sequencer, etc.).

Please communicate according to the following procedure.



(2) Stream mode

When RS-232C is used, it keeps outputting the latest data of the output target selected by function F-41. However, the output frequency changes by setting the display frequency and the baud rate.

(3) Synchronizing with print

When RS-232C is used, the data of the output target selected by function F-41 is output synchronizing with the print signal (PRINT key, external control input, and automatic print).

- **The communicating operation is executed only in the measurement mode. The error code is transmitted in the other mode.**
- **It does not respond in the stand-by conditon.**
- **The flow control is not executed in the CSD-904-EX.**
- **The CTS/RTS signal isn't applied.**
- **The X flow control isn't performed.**
- **The communication operation is a conversational type.**

13-3-4. Output target in the RS-232C stream mode and in synchronizing with print

The output target of RS-232C is selected by the setting of function F-41.

The output target of RS-232C is selected from "Gross value", "Net value" or "Load display data with state".

Default has selected "Gross value".

- **The setting of function F-41 becomes effective when function F-40 set "1" or "2".**

13-3-5. Specifications of communication by RS-232C and RS-422/485

The specification of the communication by RS-232C or RS-422/485 is selected by function F-42.

Function No.	Set value	Contents
F-42	00000 ～13121	0 0 0 0 0 Data bit length 0 : 7 bit or 1 : 8 bit Parity bit 0 : No parity 1 : Even parity 2 : Odd parity Stop bit 0 : 1 bit or 1 : 2 bit Baud rate 0 : 1 200 bps, 1 : 2 400 bps 2 : 4 800 bps, 3 : 9 600 bps Terminator 0 : CR or 1 : CR＋LF

Default has set “13020”.

13-3-6. Address setting of RS-422/485

The address setting of RS-422/485 is set by the setting of function F-43.

Setting range : 00 to 31

Default has set “00”.

13-3-7. Changeover of RS-422/485

The changeover of RS-422 and RS-485 is executed by the setting of function F-44.

Default has selected “RS-422”.

13-3-8. Delay time of RS-485 return data

When the transmitting terminal on the host side enters the state of low impedance after the host side transmission ends, the return data of the CSD-904-EX side can be delayed.

The delay time of RS-485 return data is set by the function F-45.

Setting range : 0～9 Unit : 0.1 s

Default has set “1”.

13-3-9. Transmission data decimal point existence of RS-232C and RS-422/485

The transmission data decimal point existence of RS-232C is selected by function F-46.

Default has selected “No decimal point”.

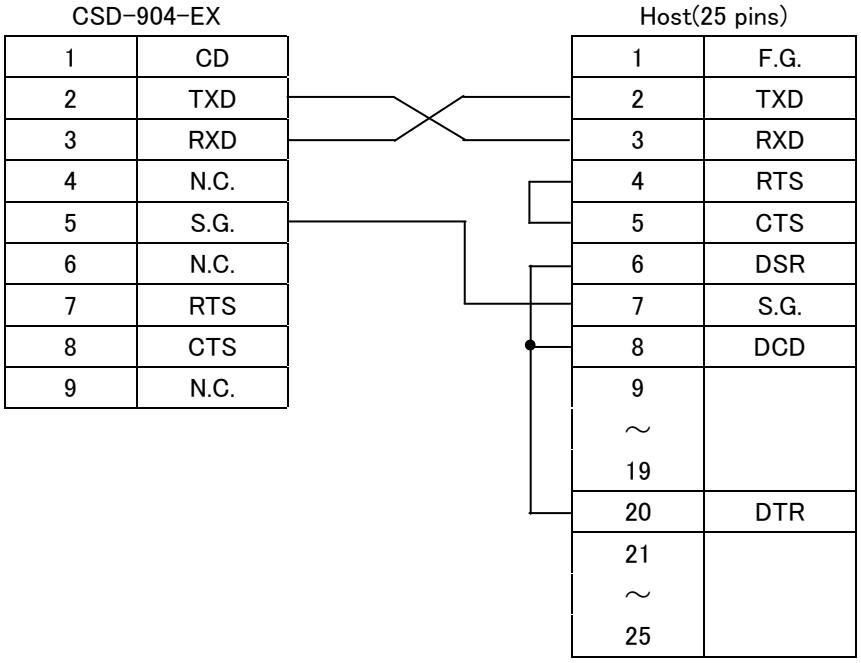
13-3-10. Pin configuration of RS-232C connector

Pin No.	Signal Name
1	CD
2	TXD
3	RXD
4	N.C.
5	S.G.
6	N.C.
7	RTS
8	CTS
9	N.C.

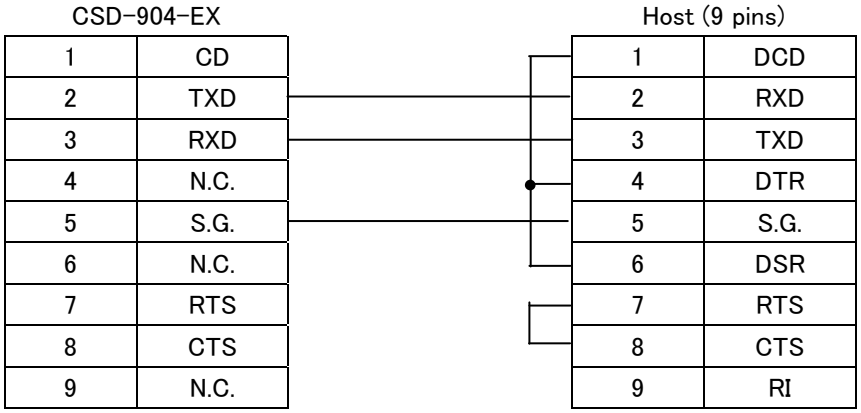
Suitable plug : DE-9S-NR by JAE or equivalent.　※Not attached.

- **The screws for the fixing base of plug at the connector of RS-232C interface is inch type thread.**
- **Don't connect with N.C. pin.**
- **The internal circuit and photo-coupler is insulated.**
- **The external control input COM. (two pins) and S.G. for RS-232C are common.**

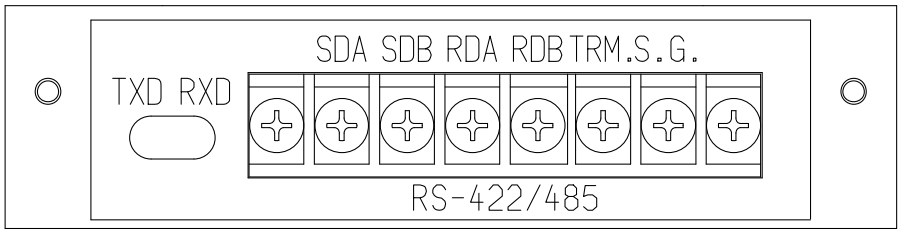
(1) Wiring of RS-232C No.1



(2) Wiring of RS-232C No.2



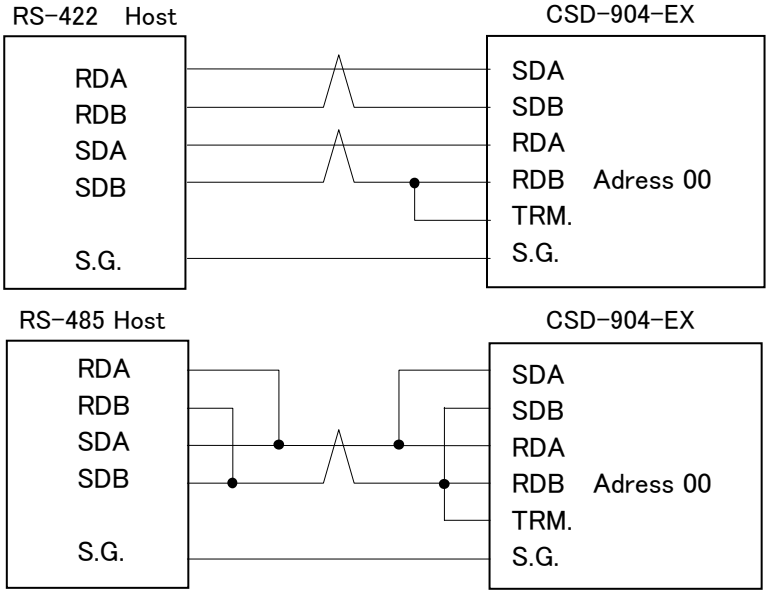
13-3-11. Pin configuration of RS-422/485 terminals



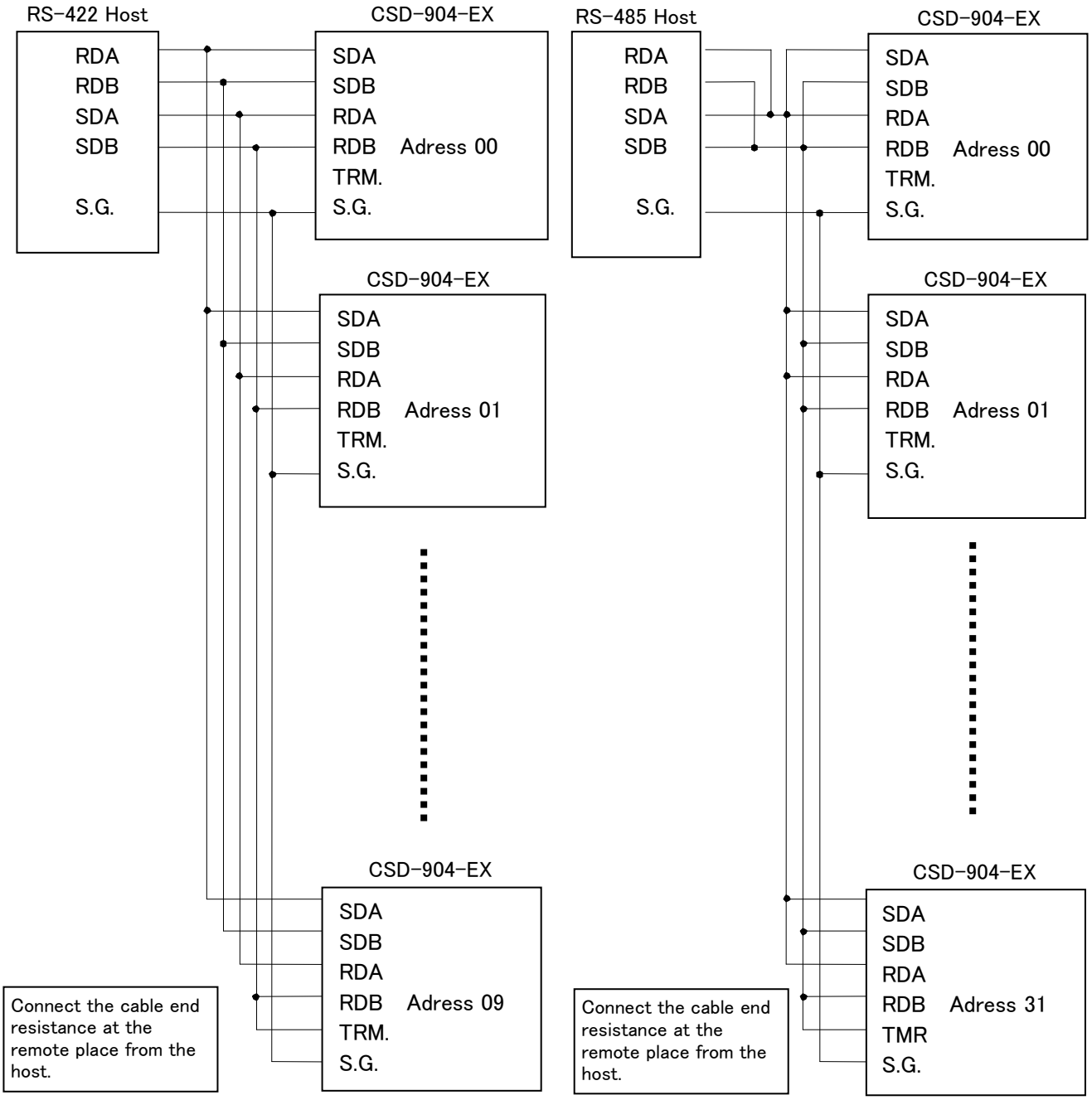
SDA	Difference output(＋)
SDB	Difference output (－)
RDA	Difference input (＋)
RDB	Difference input (－)
TRM	Cable end resistance
S.G.	Signal ground

- **Make the short circuit between TRM terminal and RDB terminal, and connect the built-in cable end resistance at the end of the host looking from the host(personal computer, sequencer, and so on).**
- **For the connection, we recommend to apply twisted pair wires.**
- **The external control input COM. (two pins) and the S.G. for RS-422/485 are common.**
- **Internal circuit and photo-coupler is insulated.**

(1) Wiring of 1 to 1



(2) Wiring of 1 to n



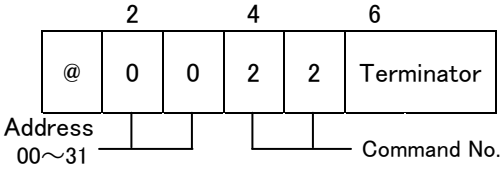
- **The polarity of the signal of the host computer has an opposite case by the equipment.**
- **There might not be a S.G. terminal according to the equipment on the host side.**

13-3-12. Data format of command mode

- The address becomes "00" fixation for the RS-232C interface.
- The load data enters from the right.
- The sign of "−" for minus and "+" for plus is entered.
- The load data performs zero suppress.
- The decimal point adheres to a specified position when the decimal point is set with F-46 and when decimal point is specified with CF-01.
- "OL" is appeared in the load data section at the over load.
- The empty sections are all spaces.

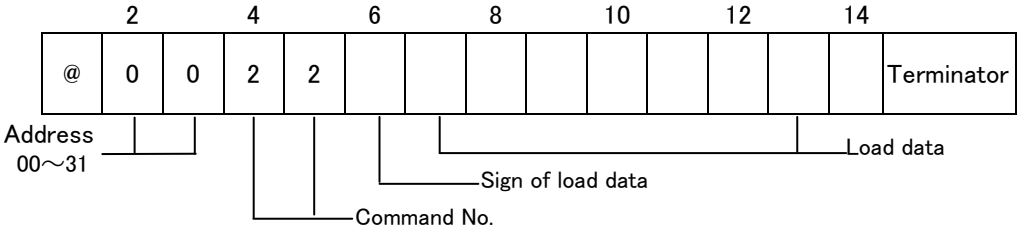
① Reading out the load data (Host → CSD-904-EX)

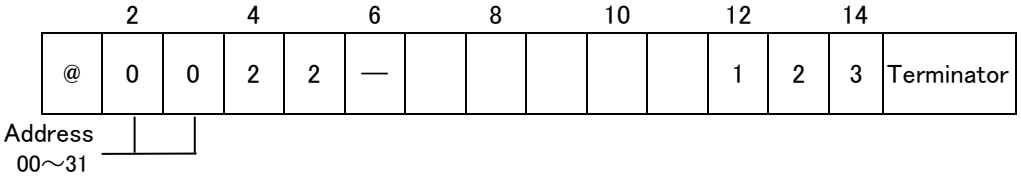
When command number is from 20 to 25

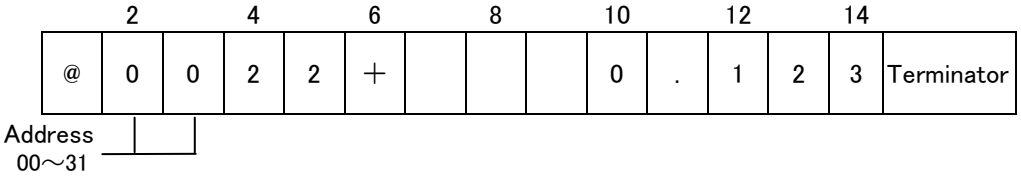


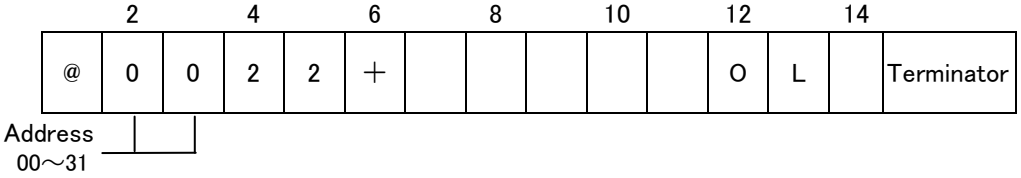
Command No.	Operation
20	Reading out load data
21	Reading out gross value
22	Reading out net value
23	Reading out tare value
24	Reading out accumulation total value
25	Reading out accumulation count
26	Reading out load display data with state

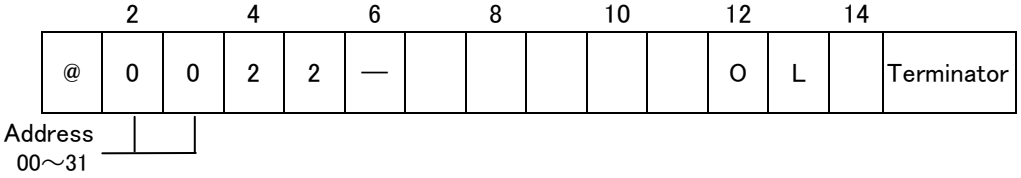
Return (CSD-904-EX → Host)



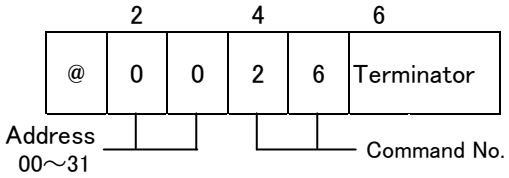




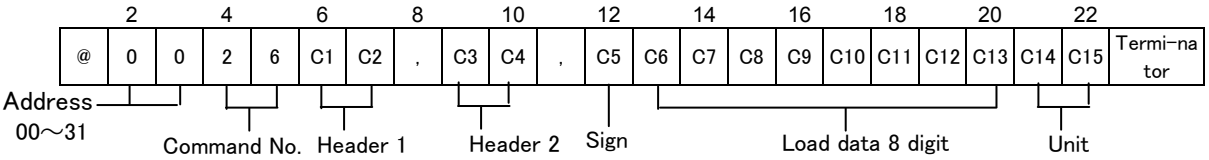




When command number is 26

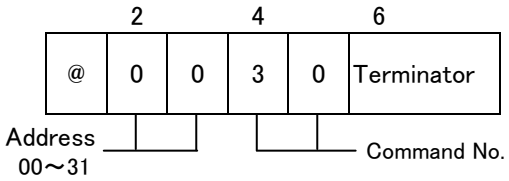


Return (CSD-904-EX → Host)



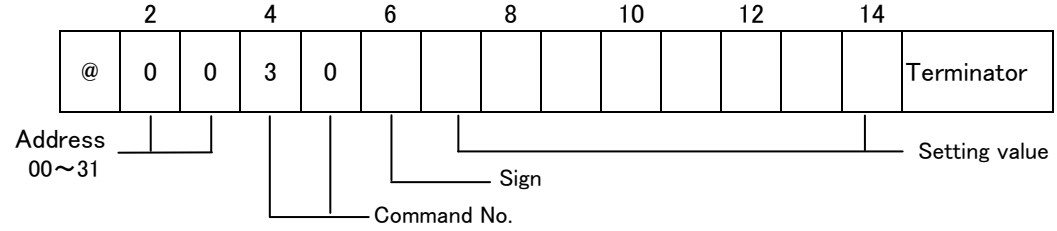
Header 1			Header 2			Sign		Load data 8 digit								Unit		
C1	C2	Contents	C3	C4	Contents	C5	Contents	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	Contents
O	L	Over load	N	T	Net value	+	Plus						1	2	3		g	gram
S	T	Stable	G	S	Gross value	−	Minus				0	.	1	2	3	k	g	Kilo-gram
U	S	Unstable											O	L			t	ton
																l	b	pound

② Reading out the comparison data (Host → CSD-904-EX)

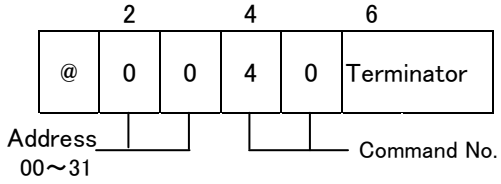


Command No.	Operation
30	Reading out upper limit value (HI)
31	Reading out lower limit value(LO)
35	Reading out target value(SET0)
36	Reading out pre-set(SET2)
37	Reading out fall(SET1)
38	Reading out near zero(SET3)
39	Reading out fixed tare weight value

Return (CSD-904-EX → Host)

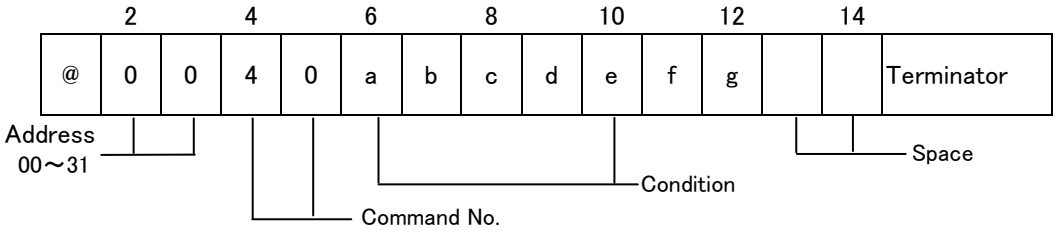


③ Reading out condition (Host → CSD-904-EX)



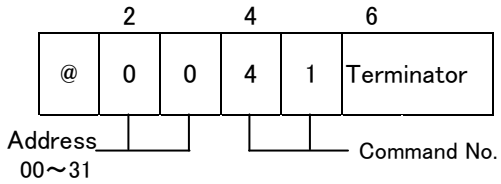
Command No.	Operation
40	Reading out condition

Return (CSD-904-EX → Host)



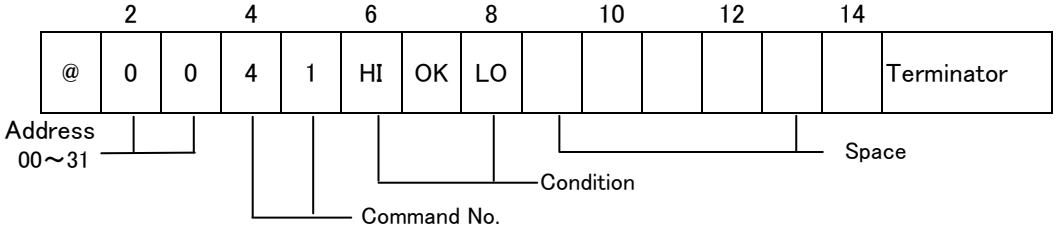
a : Accumulate "1" = ON, "0" = OFF
b : Stable "1" = ON, "0" = OFF
c : Fixed tare weight cancellation "1" = ON, "0" = OFF
d : Tare weight cancellation "1" = ON, "0" = OFF
e : Gross value "1" = ON, "0" = OFF
f : Net value "1" = ON, "0" = OFF
g : Zero "1" = ON, "0" = OFF

④ Reading out comparison result (Host → CSD-904-EX)



Command No.	Operation
41	Reading out comparison

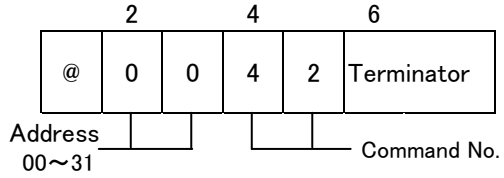
Return (CSD-904-EX → Host)



HI : "1" = ON, "0" = OFF
OK : "1" = ON, "0" = OFF
LO : "1" = ON, "0" = OFF

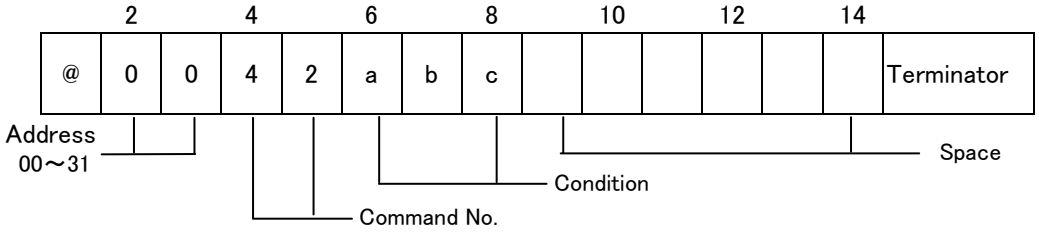
●When it is the weigh-in/Weigh-out mode, each is correspond to as "HI" is small weigh-in, "OK" is large weigh-in, and "LO" is near zero.

⑤ Reading out the unit (Host → CSD-904-EX)



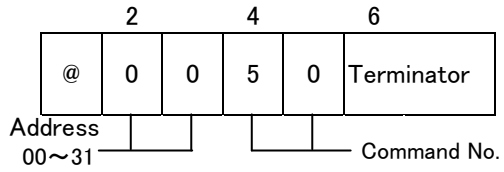
Command No.	Operation
42	Reading out the unit

Return (CSD-904-EX → Host)



Unit	a	b	c
No Unit	0	0	0
g	0	0	1
kg	0	1	0
t	0	1	1
lb	1	0	0

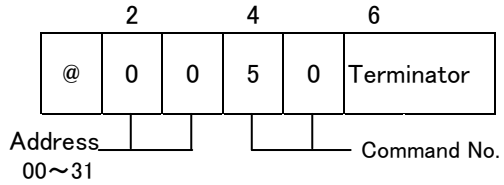
⑥ Change of condition (Host → CSD-904-EX)



Command No.	Operation
50	Zero set
51	Tare weight cancellation
52	Tare weight cancellation clear
53	Accumulation
54	Accumulation value clear
58	Display of gross value
59	Display of net value

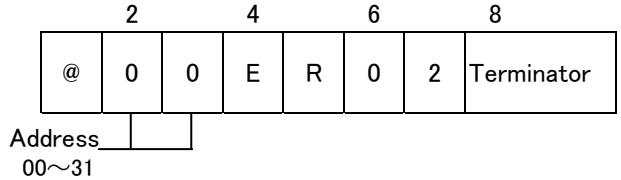
At normal operation

Return (CSD-904-EX → Host)



At abnormal operation

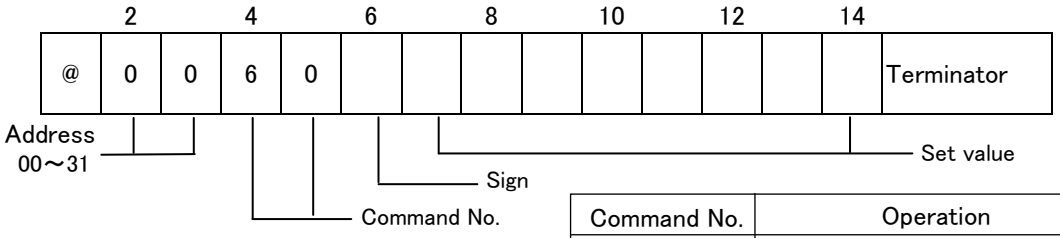
Return (CSD-904-EX → Host)



The condition of the error transmission becomes as follows.

- **When the zero set cannot be executed outside the effective range of zero setting in executing the zero set of "Command No. 50".**
- **When the tare weight cancellation cannot executed with the display of "±OL" in executing the tare weight cancellation of "Command No.51".**
- **When the accumulation cannot be executed by the accumulated value overflow in executing the accumulation of "Command No. 53".**
- **When the switch to the net value display cannot be made by unexecution of tare weight cancellation in executing the net value display of "Command No.59".**

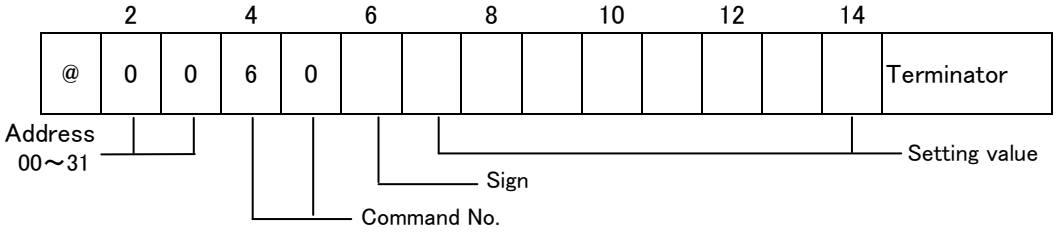
⑦ Writing the comparative data (Host → CSD-904-EX)



Command No.	Operation
60	Writing upper limit value(HI)
61	Writing lower limit value(LO)
65	Writing target value(SET0)
66	Writing pre-set value(SET2)
67	Writing fall value(SET1)
68	Writing near zero value(SET3)
69	Writing fixed tare weight value

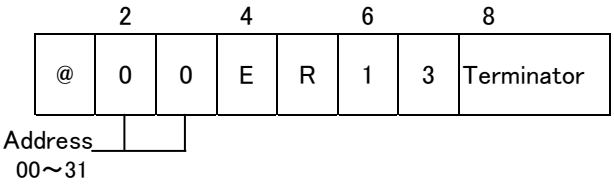
At normal operation

Return (CSD-904-EX → Host)



At abnormal operation

Return (CSD-904-EX → Host)



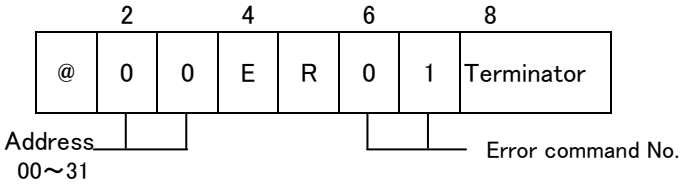
- **The setting data enters from the right end.**
- **Don't add the decimal point.**

The condition of the error transmission becomes as follows.

- **When there is a disagreement in the scale interval value.**
- **When you set the value which exceeds ±999 999.**
- **When you set characters other than the numerical value in the set value.**
- **When you set characters other than +/- in the sign part.**

⑧ Communication error processing

This unit returns the error command to the host side when the communication error or the execution error occurs.



Error command No.	Contents	Remarks
01	Non-executable error	In the calibration mode, the function mode or the check mode.
02	Other errors by convenience of this unit	When the receiving command cannot be executed.
10	Parity error	At the parity detection error.
11	Fleming error	At the stop bit detection error.
12	Over run error	At the receiving command reading error.
13	Data code and data lengthy error	When neither the received data code nor data length are corresponding.
14	No pertinent command	When the receiving command is not corresponding.

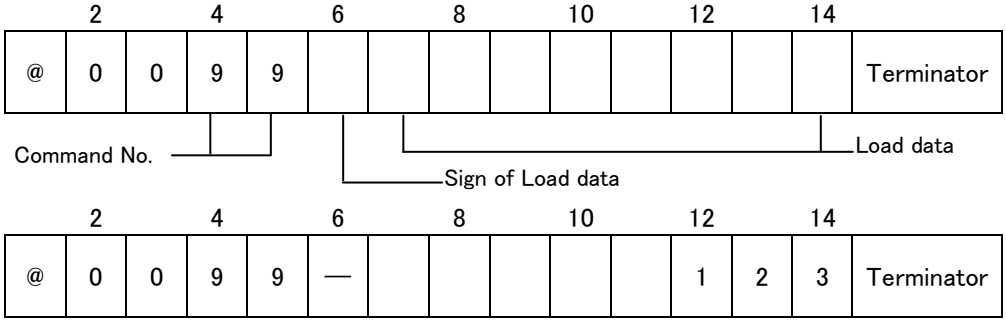
- **The error command is not replied when Address and the completion code(terminator) cannot be detected.**
- **Please consider dealing on the host side when the communication error command is replied from this unit.**

13-3-13. Data format of stream mode synchronous with printing.

- **The load data enters from the right.**
- **The sign of "—" for minus and "+" for plus is entered.**
- **The load data performs zero suppress.**
- **The decimal point adheres to a specified position when the decimal point is set with F-46 and when decimal point is specified with CF-01.**
- **"OL" is appeared in the load data section at the over load.**
- **The empty sections are all spaces.**

① When the setting of function F-41 is set with gross weight and net weight

Return (CSD-904-EX → Host)



	2		4		6		8		10		12		14	
@	0	0	9	9	+				0	.	1	2	3	Terminator

	2		4		6		8		10		12		14	
@	0	0	9	9	+						O	L		Terminator

	2		4		6		8		10		12		14	
@	0	0	9	9	—						O	L		Terminator

② When the setting of function F-41 is set with "Load display data with condition"

	2		4		6		8		10		12		14		16	
C1	C2	,	C3	C4	,	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	Terminator

Header 1 Header 2 Sign Load data 8 digits Unit

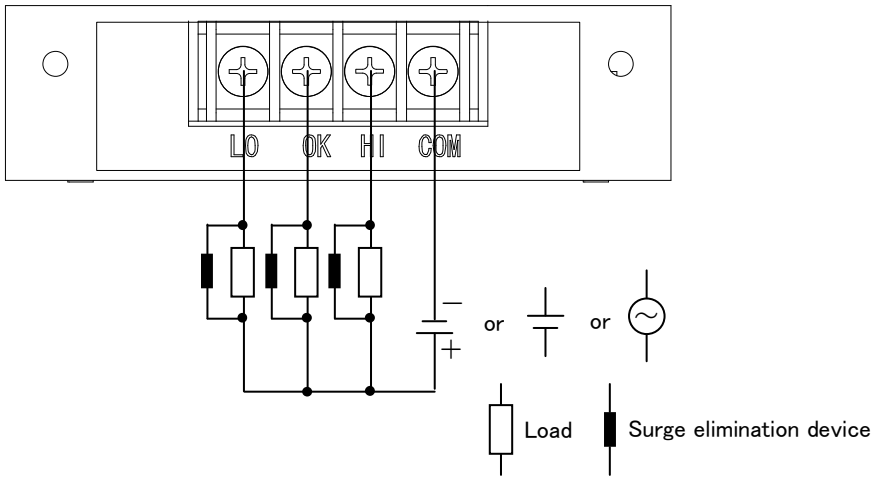
Header 1			Header 2			Sign		Load data 8 digit								Unit		
C1	C2	Contents	C3	C4	Contents	C5	Contents	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	Contents
O	L	Overload	N	T	Net	+	Plus						1	2	3		g	g
S	T	Stable	G	S	Gross	—	Minus				0	.	1	2	3	k	g	kg
U	S	Unstable											O	L			t	ton
																l	b	Pound

13-4. Contact output

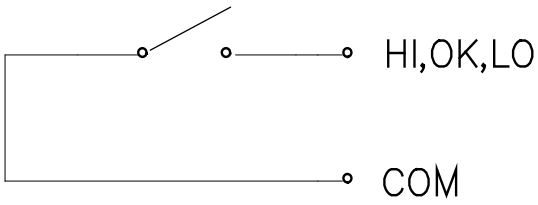
13-4-1. Specification of contact output (P/N. CSD904-P43)

Specification	Contents
Composition of the contact point	3 point (1a contact)
Rated load	AC250 V or DC30 V
Rated energizing current	3 A (Load resistance)

13-4-2. Connection of contact output



Equivalent circuit



● **Please connect the serge elimination device suitable for the characteristic of the connected external load for the protection of this contact point. It causes an unexpected breakdown and the malfunction like the loss and welding etc. of this contact point.**

13-5. Power supply voltage

The power supply voltage of this unit has AC120 V, AC200 V, and AC240 V besides of standard AC100 V.
Please use them within the following specified ranges according to the connecting method in the paragraph 2-5.

13-5-1. Power supply of AC120 V (P/N. CSD904-P62)

Power supply voltage	AC120 V (Allowable variable range AC102 V to AC132 V)
Power supply frequency	50/60 Hz
Power consumption	Approx. 4 VA (without options at AC120 V) Approx. 10 VA (with options at AC120 V)
Suitable fuse	Midget fuse 0.5A

13-5-2. Power supply of AC200 V (P/N. CSD904-P63)

Power supply voltage	AC200 V (Allowable variable range AC170 V to AC220 V)
Power supply frequency	50/60 Hz
Power consumption	Approx. 4 VA (without options at AC200 V) Approx. 10 VA (with options at AC200 V)
Suitable fuse	Midget fuse　0.315A

＊The power cable for AC250 V is not attached.

13-5-3. Power supply of AC240 V (P/N. CSD904-P65)

Power supply voltage	AC240 V (Allowable variable range AC204 V to AC264 V
Power supply frequency	50/60 Hz
Power consumption	Approx. 4 VA (without options at AC240 V) Approx. 10 VA (with options at AC240 V)
Suitable fuse	Midget fuse　0.315A

＊The power cable for AC250 V is not attached.

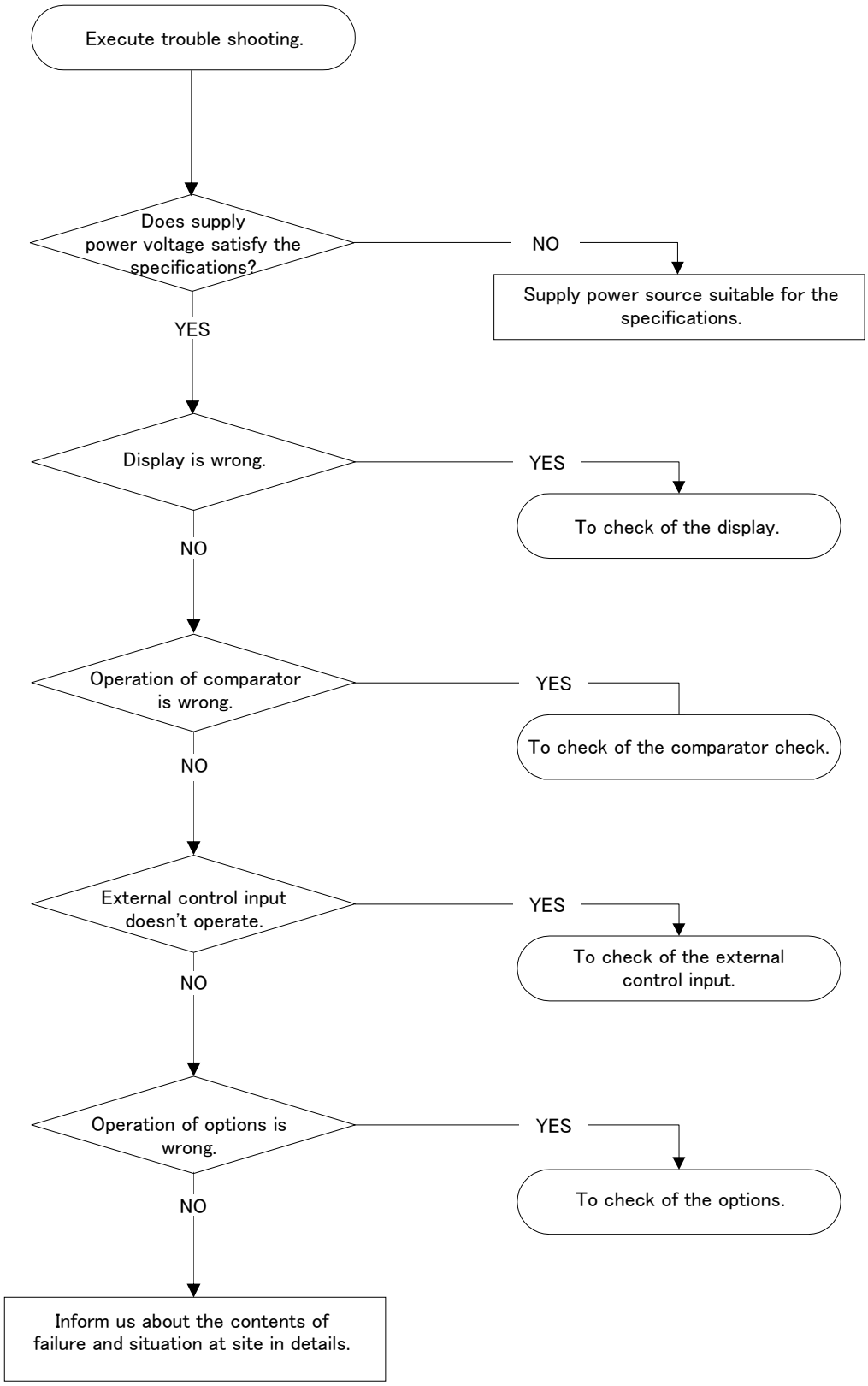
Warning

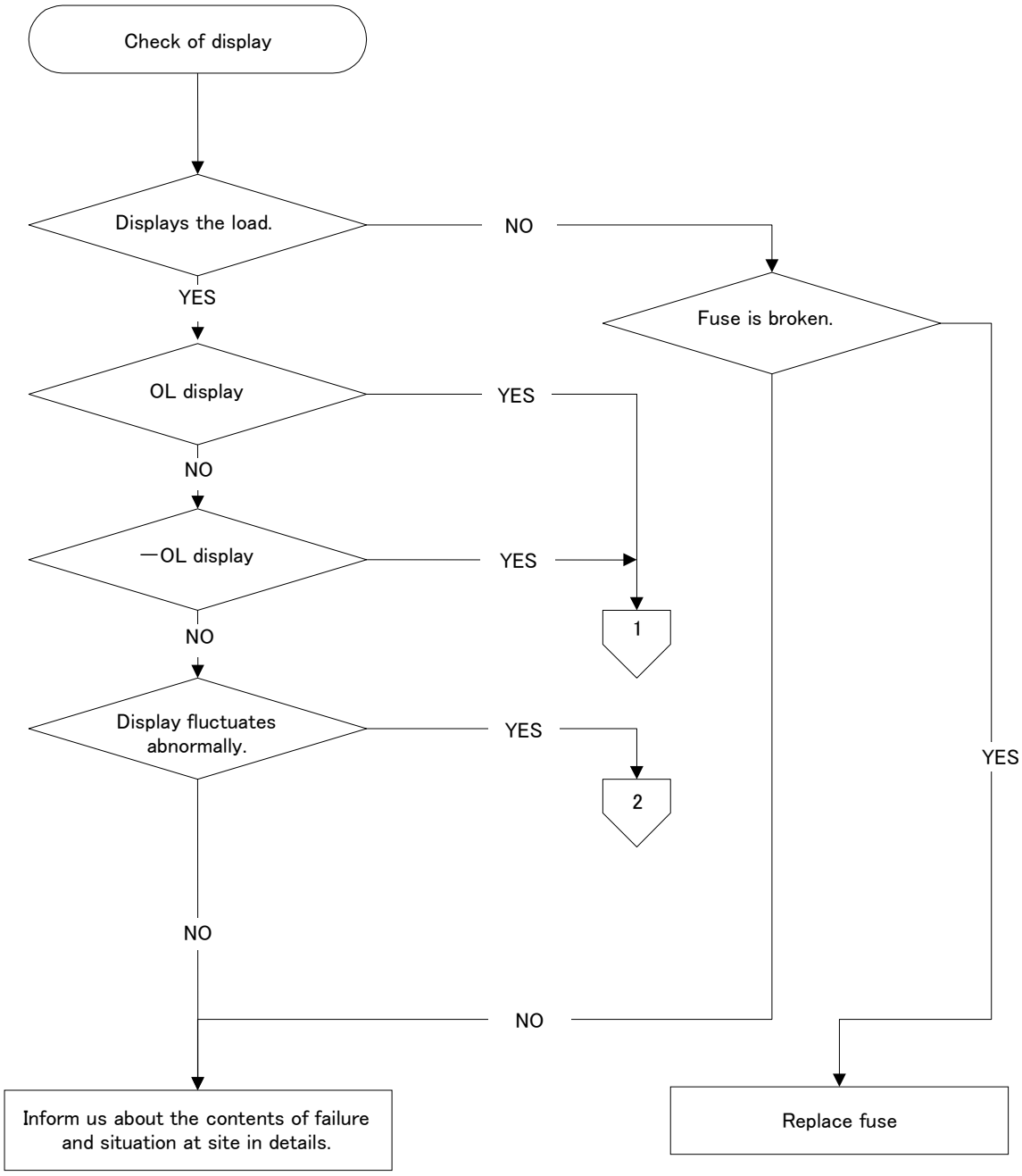
- **Attached AC power cable is to be used for AC125 V. When you will use the power supply of AC200 V or AC240 V, please prepare and use the cable for AC250 V power supply separately.**
- **When this is used in Japan domestic, the voltage that exceeds AC125 V cannot be supplied by the limitation of "Electrical Appliance and Meterial Safety Law".**

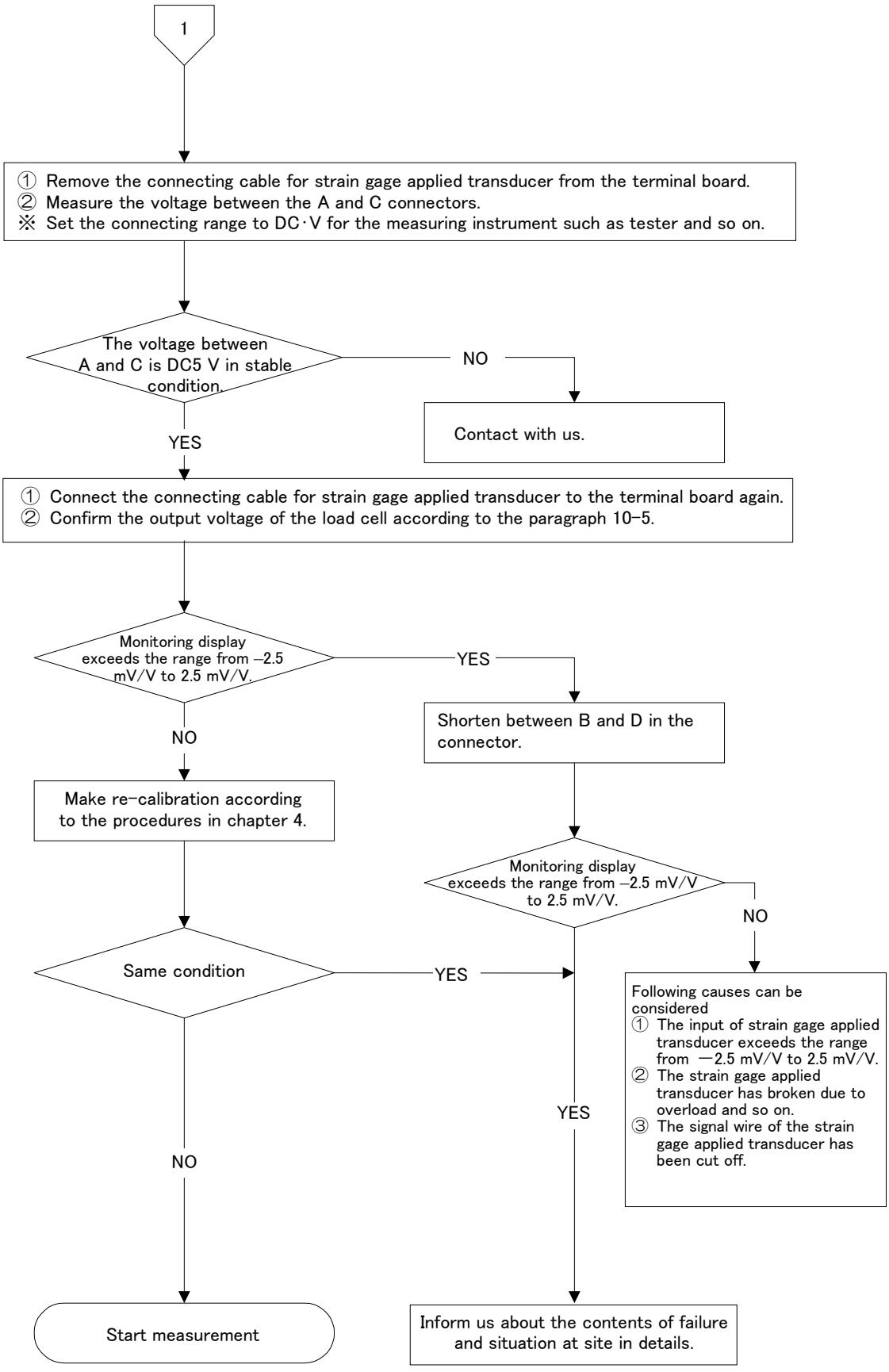
14. Trouble shooting

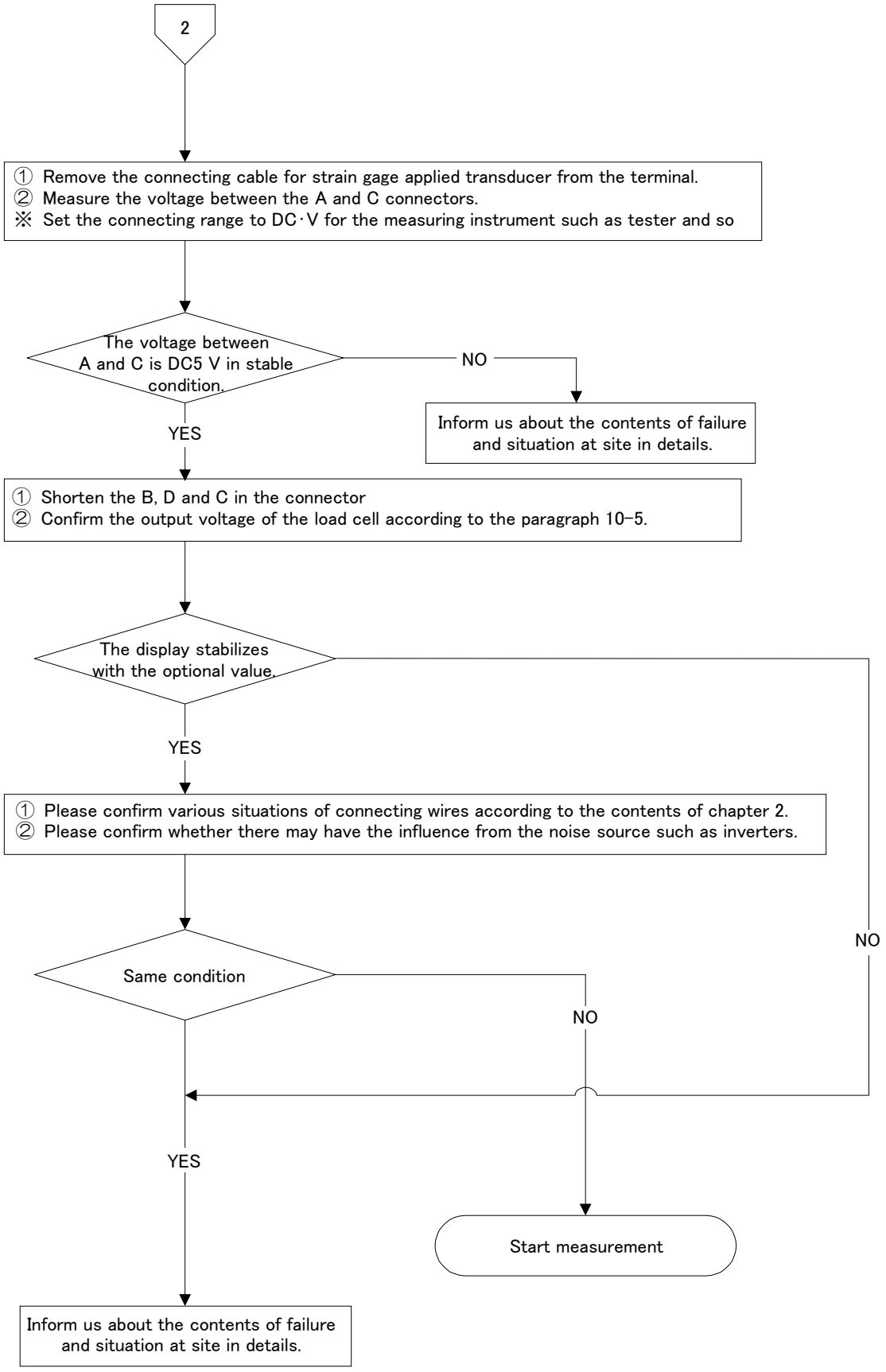
When abnormal point(s) is/are found during the operation of the instrument, check by the following procedures. However, when you can't find applicable item nor solve the symptom of trouble even after you have taken some measures, contact with us.

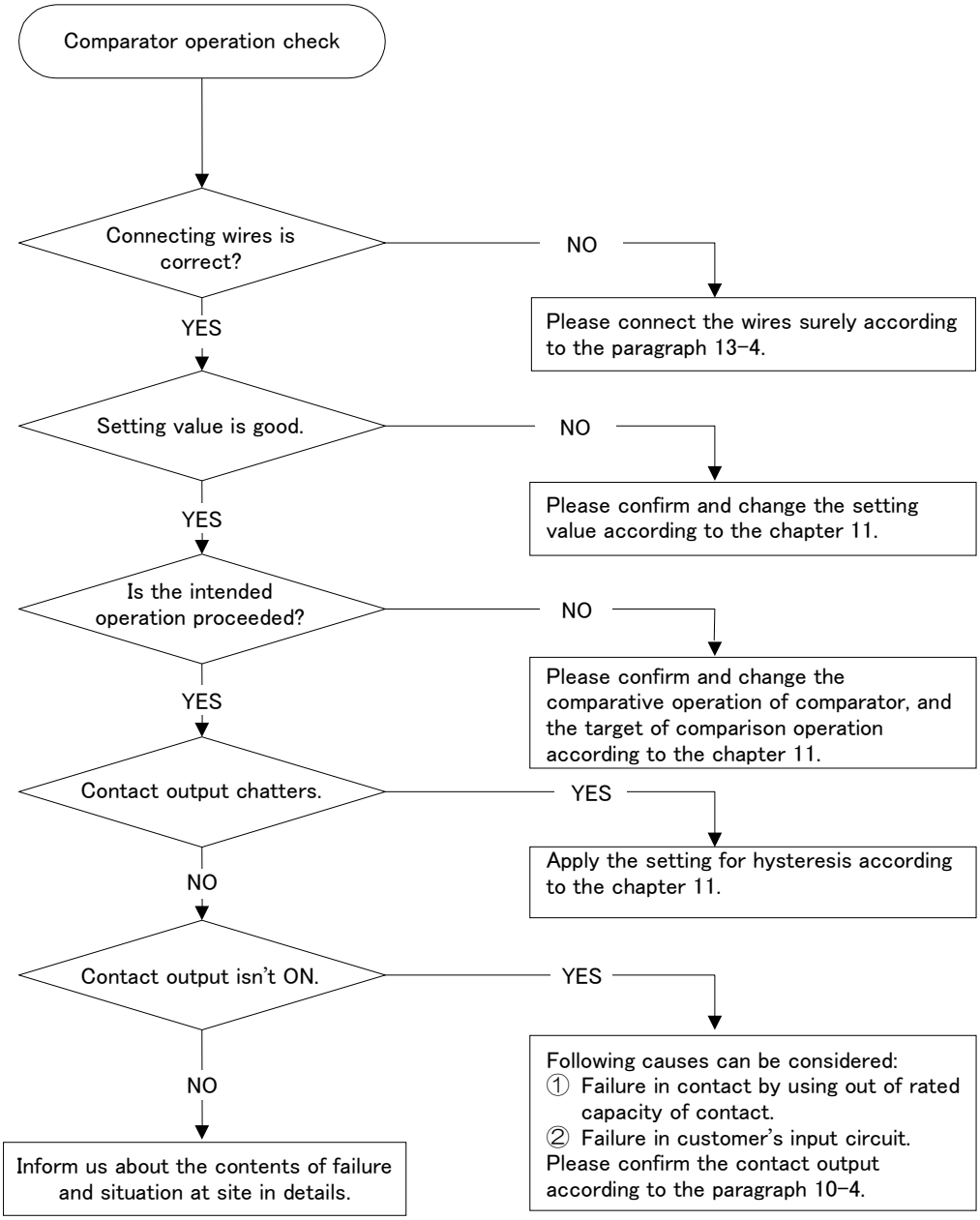
14-1. Execute trouble shooting

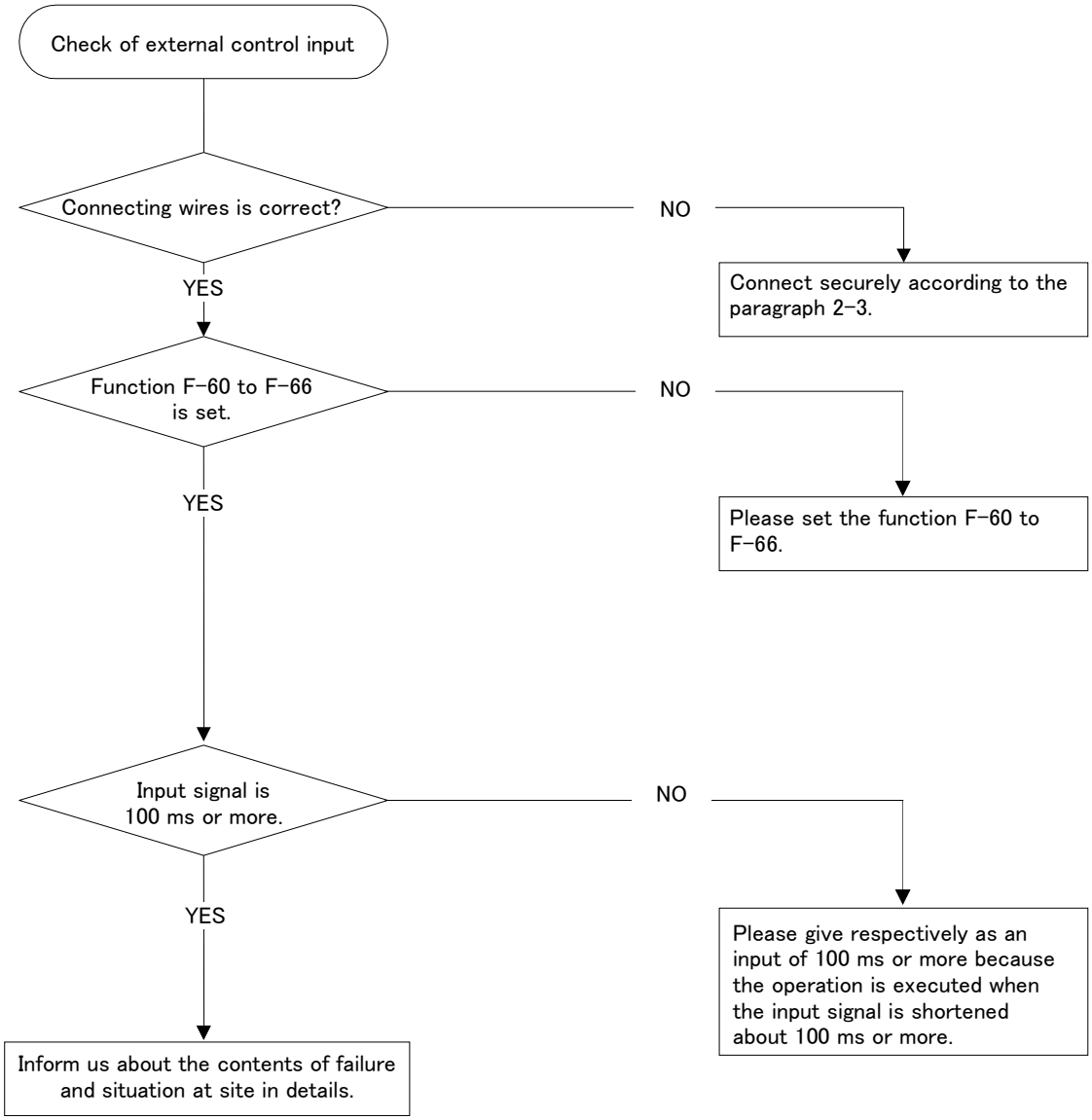


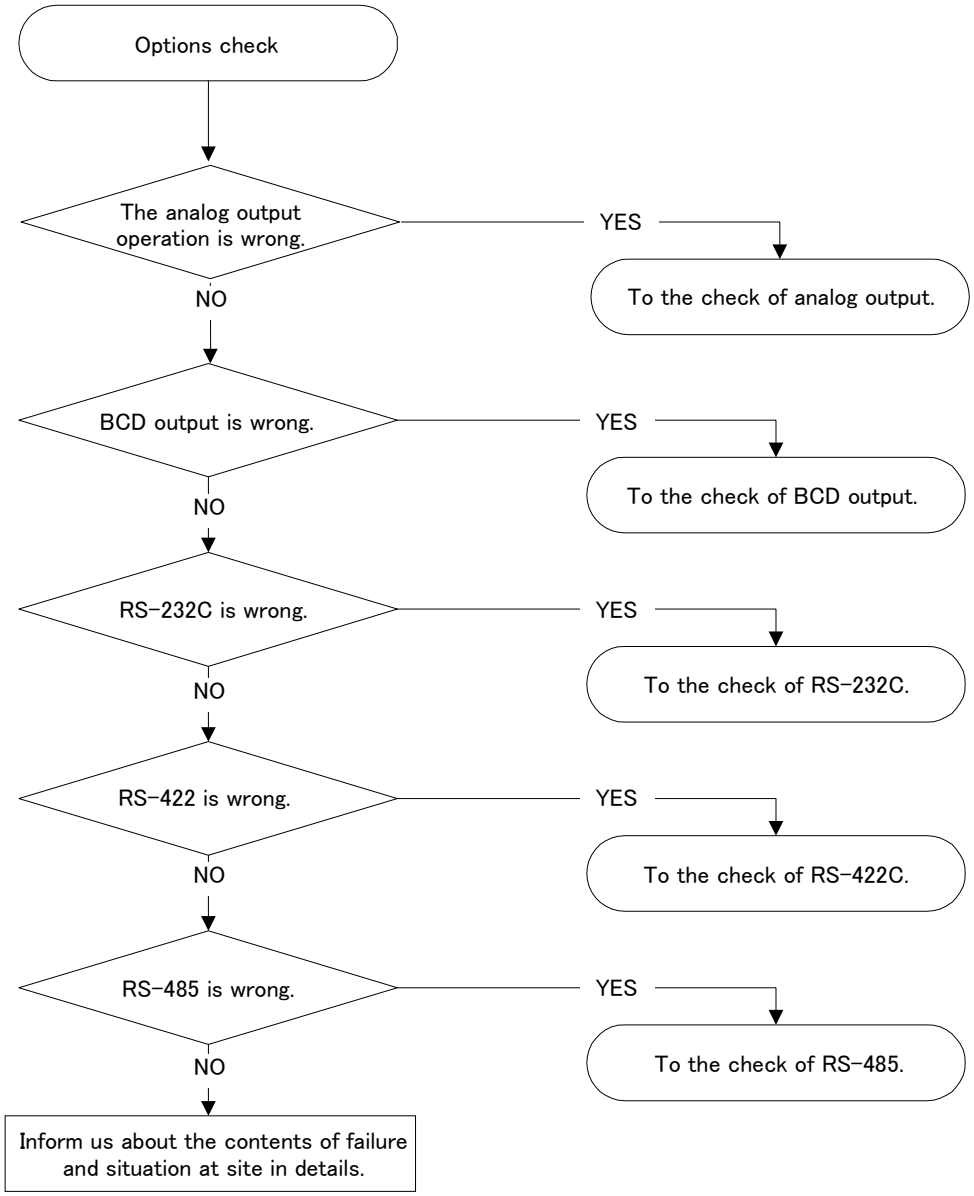

Check of display
Displays the load.
NO
YES
Fuse is broken.
OL display
YES
NO
—OL display
YES
NO
1
Display fluctuates abnormally.
YES
2
YES
NO
NO
Inform us about the contents of failure and situation at site in details.
Replace fuse

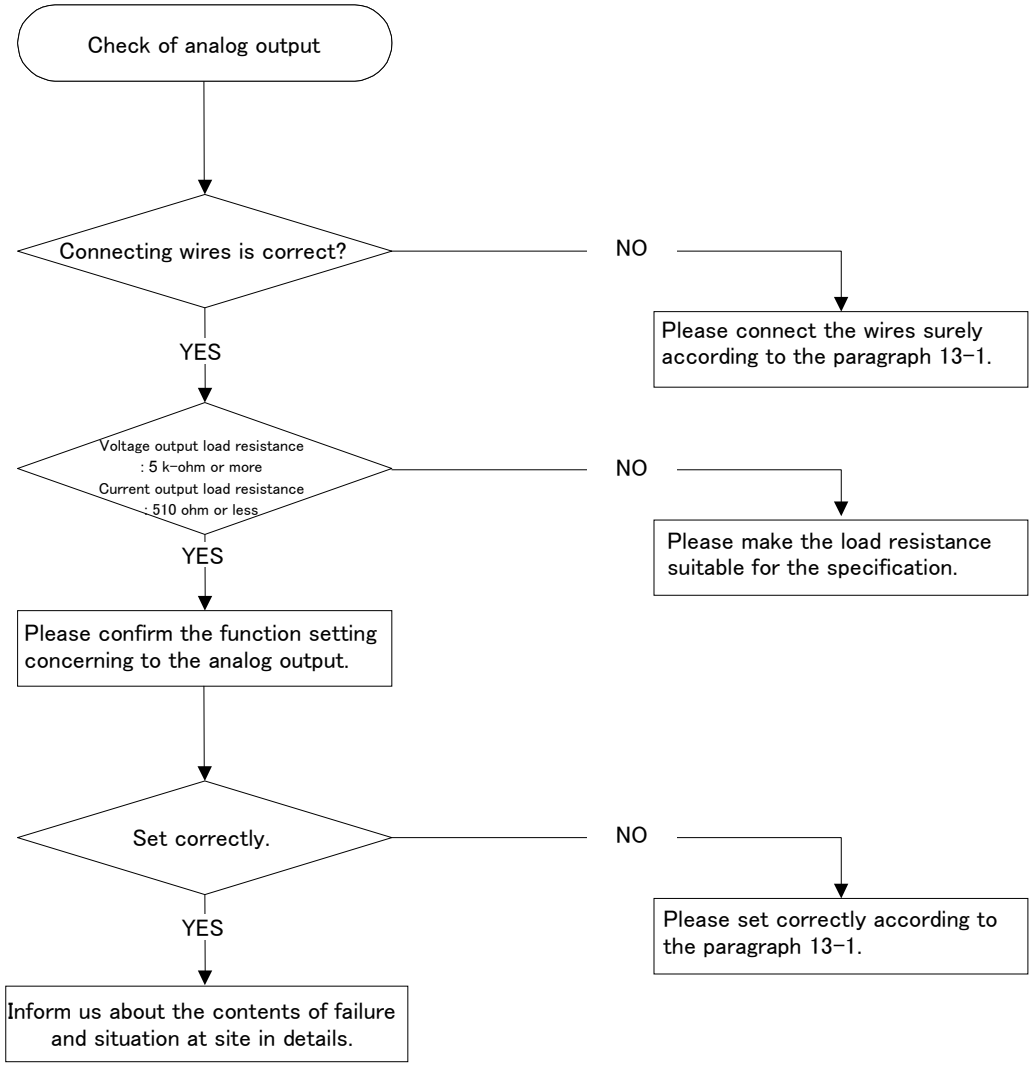

1
① Remove the connecting cable for strain gage applied transducer from the terminal board.
② Measure the voltage between the A and C connectors.
※ Set the connecting range to DC･V for the measuring instrument such as tester and so on.
The voltage between A and C is DC5 V in stable condition.
NO
Contact with us.
YES
① Connect the connecting cable for strain gage applied transducer to the terminal board again.
② Confirm the output voltage of the load cell according to the paragraph 10–5.
Monitoring display exceeds the range from –2.5 mV/V to 2.5 mV/V.
YES
Shorten between B and D in the connector.
NO
Make re–calibration according to the procedures in chapter 4.
Monitoring display exceeds the range from –2.5 mV/V to 2.5 mV/V.
NO
Following causes can be considered
① The input of strain gage applied transducer exceeds the range from —2.5 mV/V to 2.5 mV/V.
② The strain gage applied transducer has broken due to overload and so on.
③ The signal wire of the strain gage applied transducer has been cut off.
Same condition
YES
YES
NO
Start measurement
Inform us about the contents of failure and situation at site in details.

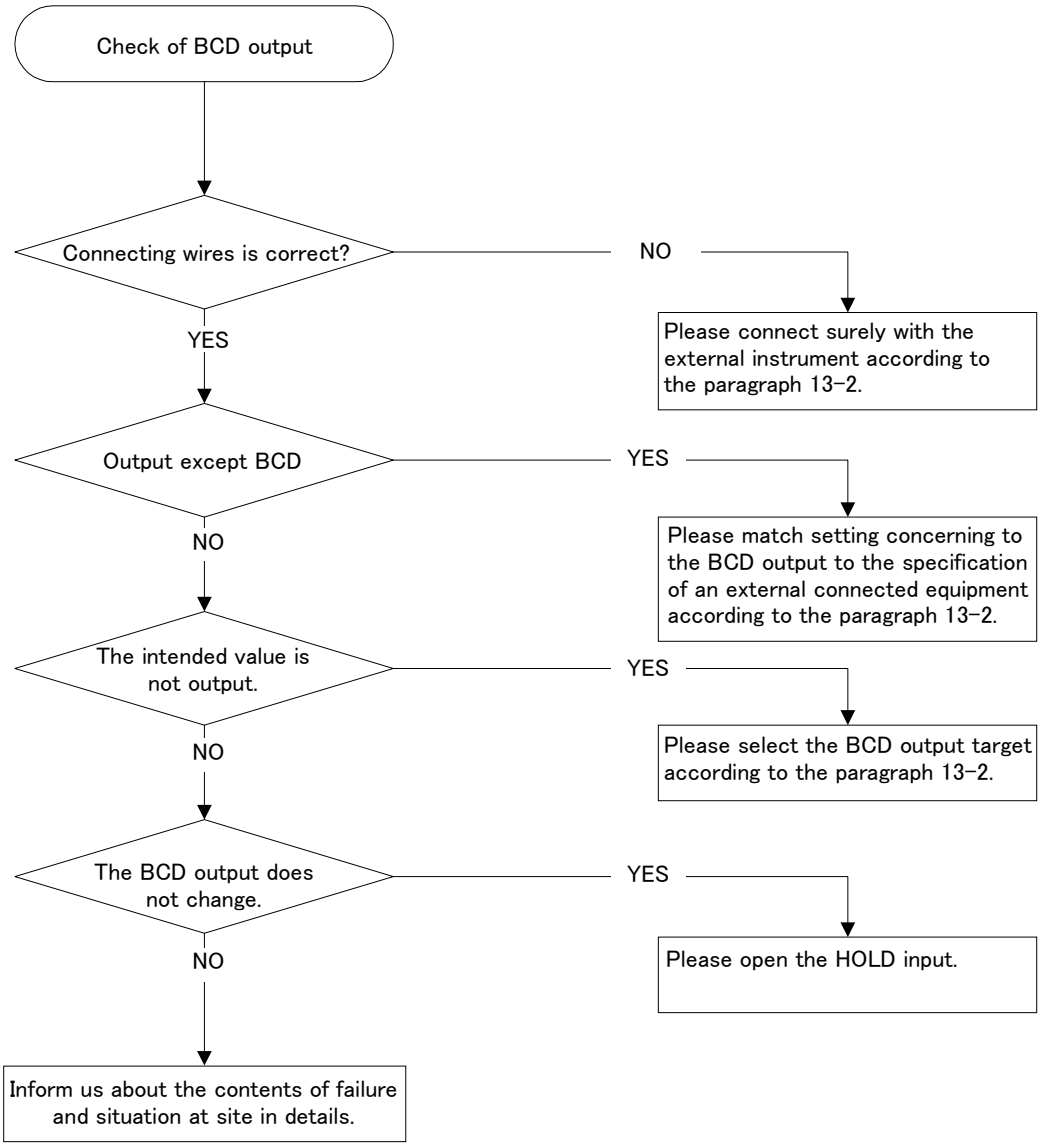

2
① Remove the connecting cable for strain gage applied transducer from the terminal.
② Measure the voltage between the A and C connectors.
※ Set the connecting range to DC･V for the measuring instrument such as tester and so
The voltage between A and C is DC5 V in stable condition.
NO
Inform us about the contents of failure and situation at site in details.
YES
① Shorten the B, D and C in the connector
② Confirm the output voltage of the load cell according to the paragraph 10-5.
The display stabilizes with the optional value.
NO
YES
① Please confirm various situations of connecting wires according to the contents of chapter 2.
② Please confirm whether there may have the influence from the noise source such as inverters.
Same condition
NO
YES
Start measurement
Inform us about the contents of failure and situation at site in details.

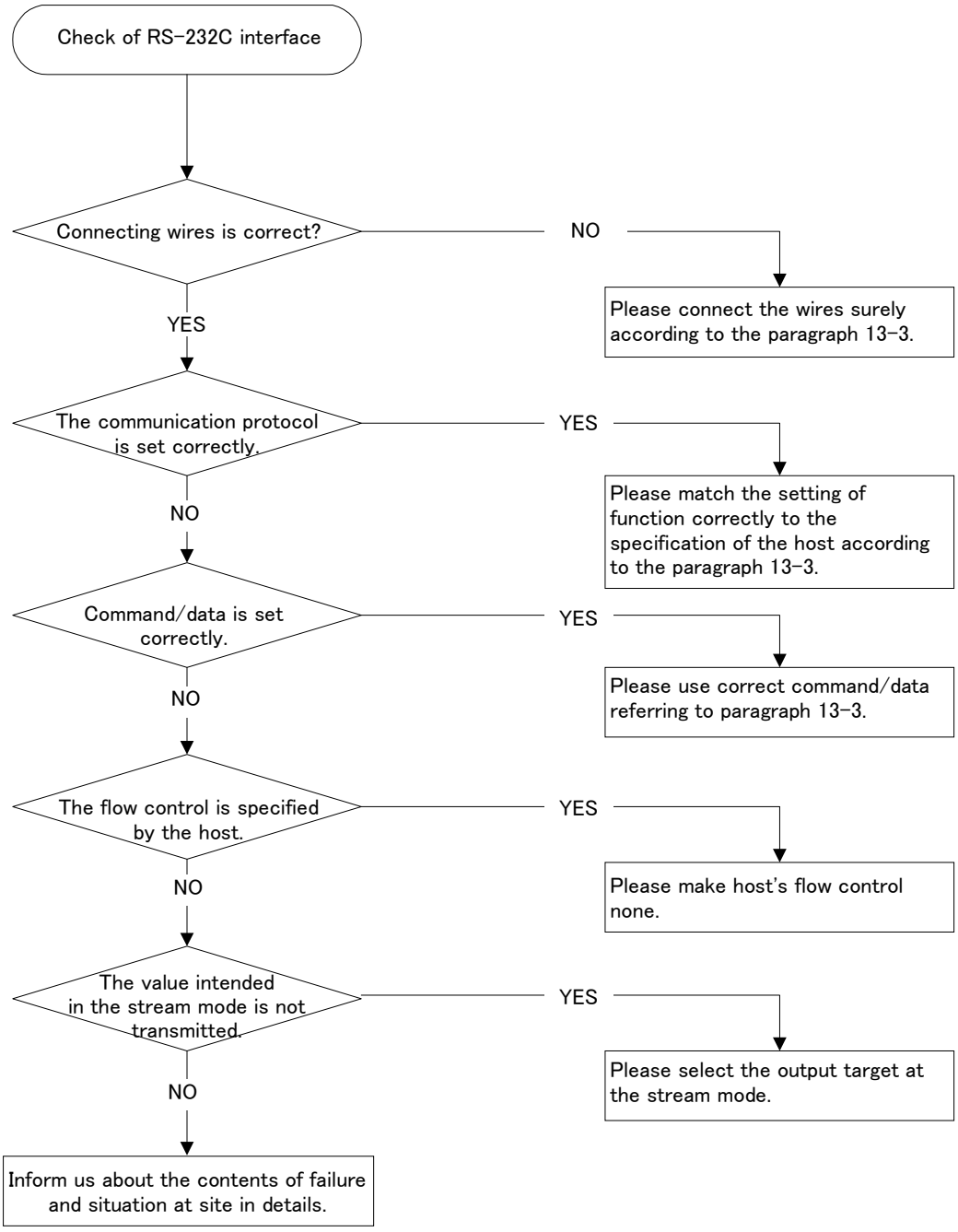

Comparator operation check
Connecting wires is correct?
NO
Please connect the wires surely according to the paragraph 13-4.
YES
Setting value is good.
NO
Please confirm and change the setting value according to the chapter 11.
YES
Is the intended operation proceeded?
NO
Please confirm and change the comparative operation of comparator, and the target of comparison operation according to the chapter 11.
YES
Contact output chatters.
YES
Apply the setting for hysteresis according to the chapter 11.
NO
Contact output isn't ON.
YES
Following causes can be considered:
① Failure in contact by using out of rated capacity of contact.
② Failure in customer's input circuit.
Please confirm the contact output according to the paragraph 10-4.
NO
Inform us about the contents of failure and situation at site in details.

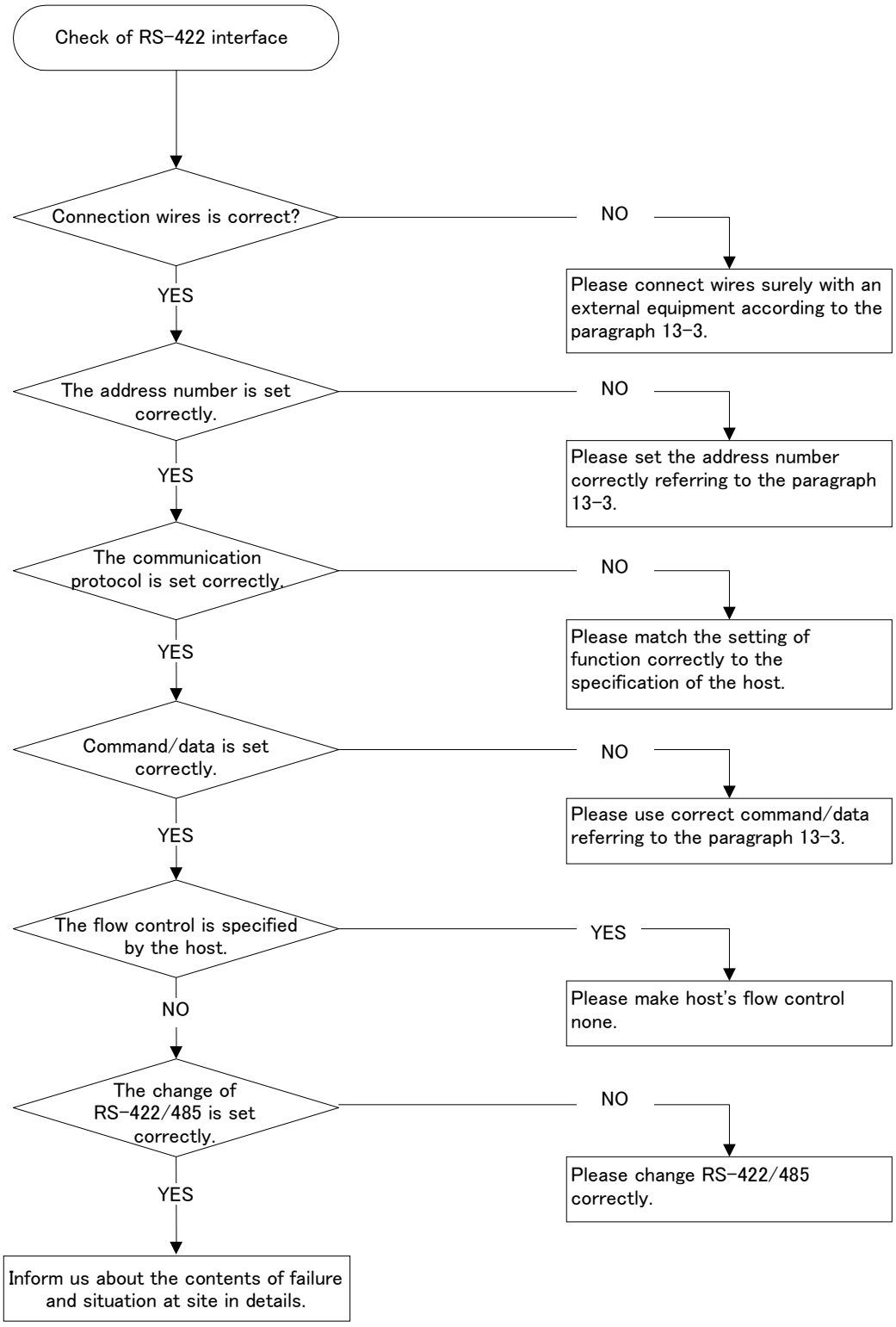

Check of external control input
Connecting wires is correct?
NO
Connect securely according to the paragraph 2-3.
YES
Function F-60 to F-66 is set.
NO
Please set the function F-60 to F-66.
YES
Input signal is 100 ms or more.
NO
Please give respectively as an input of 100 ms or more because the operation is executed when the input signal is shortened about 100 ms or more.
YES
Inform us about the contents of failure and situation at site in details.

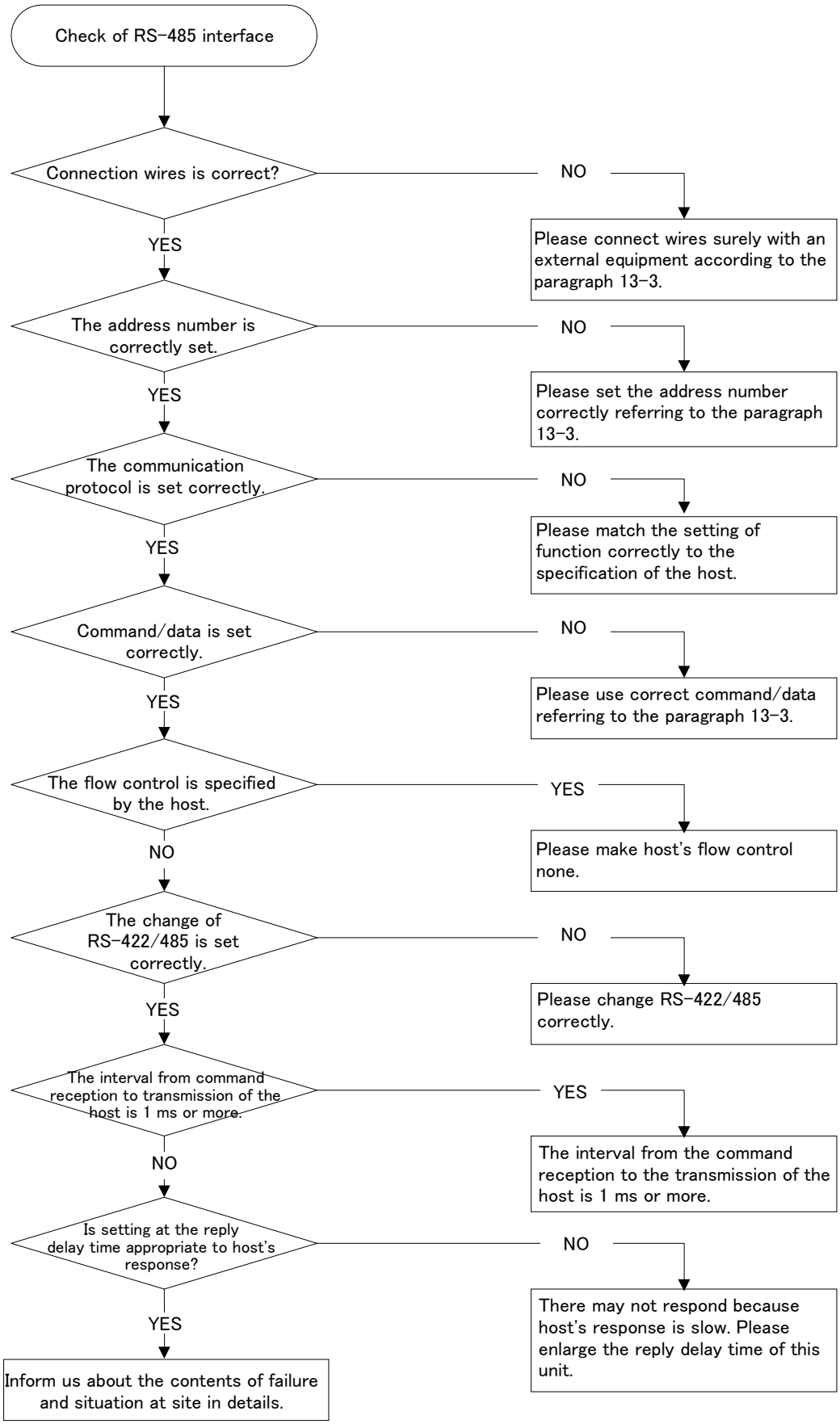

Options check
The analog output operation is wrong.
YES
To the check of analog output.
NO
BCD output is wrong.
YES
To the check of BCD output.
NO
RS-232C is wrong.
YES
To the check of RS-232C.
NO
RS-422 is wrong.
YES
To the check of RS-422C.
NO
RS-485 is wrong.
YES
To the check of RS-485.
NO
Inform us about the contents of failure and situation at site in details.


Check of analog output
Connecting wires is correct?
NO
Please connect the wires surely according to the paragraph 13-1.
YES
Voltage output load resistance
: 5 k-ohm or more
Current output load resistance
: 510 ohm or less
NO
Please make the load resistance suitable for the specification.
YES
Please confirm the function setting concerning to the analog output.
Set correctly.
NO
Please set correctly according to the paragraph 13-1.
YES
Inform us about the contents of failure and situation at site in details.


Check of BCD output
Connecting wires is correct?
NO
Please connect surely with the external instrument according to the paragraph 13-2.
YES
Output except BCD
YES
Please match setting concerning to the BCD output to the specification of an external connected equipment according to the paragraph 13-2.
NO
The intended value is not output.
YES
Please select the BCD output target according to the paragraph 13-2.
NO
The BCD output does not change.
YES
Please open the HOLD input.
NO
Inform us about the contents of failure and situation at site in details.


Check of RS-232C interface
Connecting wires is correct?
NO
Please connect the wires surely according to the paragraph 13-3.
YES
The communication protocol is set correctly.
YES
Please match the setting of function correctly to the specification of the host according to the paragraph 13-3.
NO
Command/data is set correctly.
YES
Please use correct command/data referring to paragraph 13-3.
NO
The flow control is specified by the host.
YES
Please make host's flow control none.
NO
The value intended in the stream mode is not transmitted.
YES
Please select the output target at the stream mode.
NO
Inform us about the contents of failure and situation at site in details.


Check of RS-422 interface
Connection wires is correct?
NO
Please connect wires surely with an external equipment according to the paragraph 13-3.
YES
The address number is set correctly.
NO
Please set the address number correctly referring to the paragraph 13-3.
YES
The communication protocol is set correctly.
NO
Please match the setting of function correctly to the specification of the host.
YES
Command/data is set correctly.
NO
Please use correct command/data referring to the paragraph 13-3.
YES
The flow control is specified by the host.
YES
Please make host's flow control none.
NO
The change of RS-422/485 is set correctly.
NO
Please change RS-422/485 correctly.
YES
Inform us about the contents of failure and situation at site in details.


Check of RS-485 interface
Connection wires is correct?
NO
Please connect wires surely with an external equipment according to the paragraph 13-3.
YES
The address number is correctly set.
NO
Please set the address number correctly referring to the paragraph 13-3.
YES
The communication protocol is set correctly.
NO
Please match the setting of function correctly to the specification of the host.
YES
Command/data is set correctly.
NO
Please use correct command/data referring to the paragraph 13-3.
YES
The flow control is specified by the host.
YES
Please make host's flow control none.
NO
The change of RS-422/485 is set correctly.
NO
Please change RS-422/485 correctly.
YES
The interval from command reception to transmission of the host is 1 ms or more.
YES
The interval from the command reception to the transmission of the host is 1 ms or more.
NO
Is setting at the reply delay time appropriate to host's response?
NO
There may not respond because host's response is slow. Please enlarge the reply delay time of this unit.
YES
Inform us about the contents of failure and situation at site in details.

15. Specifications

15-1. Specifications for analog

Bridge power supply		DC5 V±0.25 V within 120 mA　with sensing
Applicable transducer		Up to 8 pieces of strain gage applied transducers(350 ohm) can be connectable.
Input sensitivity		0.2 μV/d or more (d=The scale interval)
Input range		−3.1 mV/V to 3.1 mV/V
Zero adjustment range		±2.5 mV/V
Non linearity		0.01 %F.S.
Temperature coefficient	Zero	±0.2 μV/℃(At the calibration with input sensitivity 0.2 μV/d or more.)
	Sensitivity	±0.001 5 %F.S./℃(At the calibration with input sensitivity 0.2 μV/d or more.)
Input noise		±0.4 μVp-p or less(At the default setting of digital filter and stabilization filter)
Input filter		Approx. 1 Hz (At the default setting of digital filter and stabilization filter)
A/D sampling		15 times/s

15-2. Specifications for digital

Load display	
Display range	−999 999 to 999 999 (Display of accumulated total value −1 999 999 to 9 999 999, and accumulated counting value 0 to 999 999)
Display increment	1 (changeable to 2, 5, 10, 20 or 50)
Display range	7-segment green colored fluorescent display tube with 22 mm character height
Over display	"-OL" display at minus over and "OL" display at plus over
SAD value over display	"-OVF" display at minus over and "OVF" display at plus ove
Status display	Accumulation, Stable, Fixed tare weight cancellation, Tare weight cancellation, Gross value, Net value, Zero
Judgement display	HI、OK、LO (OK : Green colored fluorescent display tube, HI and LO : Orange colored fluorescent display tube)
Display frequency	5 times/s (Changeable to 15 times/s)
Decimal point display	Changeable to no display, 10^1, 10^2 or 10^3
Unit display	Changeable to nothing, g, kg, t or lb (Green colored fluorescent display)

15-3. Interface

External control input	The external control operation of 7 pieces in the following can be made with INPUT connector. ON/OFF, Setting, Accumulation, Set of tare weight cancellation, tare weight cancellation, Net value/Gross value, Zero, Print, Display of net value, Display of accumulated value.
Serial interface	Two-wires method interface output for connections such as printer, external display, and so on.
Contact output (Option)	Relay contact output : 3 points Specifications of contact : 1a contact, AC250 V　3 A, DC30 V　3 A (Load resistance) Comparator function : Upper/Lower limit comparative mode, Weigh-in mode, Weigh-out mode.

BCD output(Option)	Output BCD 7 digit parallel output, with polarity, P.C.(Print command), Error, OVER, Stable, Gross value ※Above is open collector output V_{CE} = DC30 V, I_C = DC20 mA MAX Input HOLD, BCD-ENABLE ※Above is level input, and effective during the input of short more than 100 ms.
RS-232C (Option)	RS-232C interface output
RS-422/485 (Option)	RS-422/485 interface output ※The changeover of RS-422 and RS-485 is made by the function.
Current output (Option)	DC4 mA to 20 mA Load resistance 510 ohm or less Non linearity 0.05 %F.S.
Voltage output (Option)	DC0 V to 10 V Load resistance 5 k-ohm or more Non linearity 0.05 %F.S.

15-4. General specifications

Operating temperature range	
Temperature	−10℃ to 40℃
Humidity	85 %RH or less (Non condensing.)
Power supply	
Power supply voltage	AC100 V (Permissible variable range AC85 V to AC110 V)
Power supply frequency	50/60 Hz
Power consumption	Approx. 4 VA(without options at AC100 V), 10 VA at maximum (with options at AC100 V)
Power supply AC120 V (Option)	
Power supply voltage	AC120 V (Permissible variable range AC102 V to AC132 V)
Power supply frequency	50/60 Hz
Power consumption	Approx. 4 VA(without options at AC120 V), 10 VA at maximum (with options at AC120 V)
Power supply AC200 V (Option)	
Power supply voltage	AC200 V (Permissible variable range AC170 V to AC220 V)
Power supply frequency	50/60 Hz
Power consumption	Approx. 4 VA(without options at AC200 V), 10 VA at maximum (with options at AC200 V)
Power supply AC240 V (Option)	
Power supply voltage	AC240 V (Permissible variable range AC204 V to AC264 V)
Power supply frequency	50/60 Hz
Power consumption	Approx. 4 VA(without options at AC240 V), 10 VA at maximum (with options at AC240 V)
Outline dimension	192 mm(W) x 96 mm(H) x 165 mm(D) (excludes protruding parts)
Weight	Approx. 1.6 kg (without options)

※ When this is used in Japan domestic, the voltage that exceeds AC125 V by the limitation of "Electrical Appliance and Material Safety Law".

15-5. Specification at the shipment

Bridge power supply	DC5 V
Span adjustment	10 000 display at the input of 0.5 mV/V
The scale interval	1

15-6. Accessories

Instruction manual	1 piece
Midget fuse	1 piece (Power supply voltage AC100 V or AC120 V : 0.5 A、 Power supply voltage AC200 V or AC240 V : 0.315 A)
External control input plug	1 piece
Load cell connecting plug	1 piece
AC power cable	1 piece (to be used for AC125 V)
Earth adapter	1 piece
BCD output plug	1 piece (Only when optional BCD output is installed.)
Panel mounting attachment	2 pieces
Panel mounting gasket	1 piece

16. Error display

Er-1	Display blinking for about 2 seconds when C function or function is set and no number in the list is selected.
Er-2	Display blinking for about 2 seconds when the calibration is executed, and “Display of the maximum capacity(DISP)” < “Set of mass weight value(LOAD)” is set.
Er-3	A/D conversion error. Please contact with us.
Er-E	EEPROM writing error. Please contact with us.
Er-r	EEPROM reading error. Please contact with us.
rE-L	Display blinking for about 2 seconds when the calibration is executed, and output of the load cell and numeric input is –2.5 mV/V or less and exceeding the zero adjustment range at the minus side.
rE-H	Display blinking for about 2 seconds when the calibration is executed, and output of the load cell and numeric input is 2.5 mV/V or more and exceeding the zero adjustment range at the plus side.
SP-L	Display blinking for about 2 seconds when the calibration is executed, and output of the load cell and numeric input is less than 0 mV/V and not reaching within the span adjustment range.
SP-H	Display blinking for about 2 seconds when the calibration is executed, and output of the load cell and numeric input is more than 3.1 mV/V and exceeding the span adjustment range.
Ln-L	Display blinking for about 2 seconds when the digital linearization compensation is executed and the load cell output is low.
Ln-H	Display blinking for about 2 seconds when the digital linearization compensation is executed and the load cell output is high.
- - - - - - -	(When C function CF–15 “Power on zero operation” is effective.) Displayed when the power is turned on or the display is ON with the condition of the load cell output exceeding ±10 % of the maximum capacity. If the SET key is pressed with “ - - - - - - - ” displayed, it compulsorily becomes a load value display.
oL	Light on when the load display is exceeding “(+Maximum capacity) + 9D”, or exceeding “+110 % of the maximum capacity”. (by the setting of C function CF–03)
-oL	Light on when the load display is exceeding “(–Maximum capacity)–9D”, or exceeding “–110 % of the maximum capacity”. (by the setting of C function CF–03)
oUF	The input to A/D converter is plus over.
-oUF	The input to A/D converter is minus over.
Condition display of “Accumulation” is blinking	Display blinking when the result of accumulated value or the accumulated counts is exceeding the display range.
All lights on	When the stability cannot be detected with the power turning on, or the display ON. When the stability detection is turned off either with the function F–10 and F–11, the display becomes all lighting on.

17. Warranty

17-1. Warranty

- 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 our sales office or sales agent from which you have purchased.

17-2. Repair

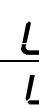
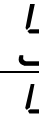
Before asking repairs, make checks once again that the connection, setting and adjustment for the instrument have finished.

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 our sales office or sales agency from which you have purchased.

18. Character's pattern for display

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		–	

19. Setting table for functions

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

Setting table for C function

Function No.	Initial value	Customer's setting	Function No.	Initial value	Customer's setting
CF-01	0		CF-41	2	
CF-03	0		CF-42	003000	
CF-05	0		CF-43	3	
CF-10	0		CF-44	006000	
CF-11	0		CF-70	0	
CF-12	1		CF-71	000000	
CF-13	01		CF-72	010000	
CF-14	2		CF-90	00001	
CF-15	0		CF-91	10000	
CF-16	0		CF-92	10000	
CF-25	0		CF-93	0.0000	
CF-26	10		CF-94	0.5000	
CF-27	10		CF-97	05	
CF-28	9.797		CF-98	---	
CF-29	9.797		CF-99	---	
CF-40	0				

Setting table for function

Function No.	Initial value	Customer's setting	Function No.	Initial value	Customer's setting
F-01	3		F-40	0	
F-04	1		F-41	0	
F-05	4		F-42	13020	
F-06	005		F-43	00	
F-07	01		F-44	0	
F-08	0		F-45	1	
F-10	4		F-46	0	
F-11	2		F-50	2	
F-15	0		F-51	05	
F-16	0		F-60	00	
F-20	4		F-61	00	
F-21	0		F-62	00	
F-24	0		F-63	00	
F-25	00		F-64	00	
F-30	0		F-65	00	
F-31	0		F-66	00	
F-32	0000		F-99	---	
F-33	1				

MEMO

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

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