Minebea

DIGITAL INDICATOR
CSD-401

INSTRUCTION MANUAL

EN294-1366-G

FOREWORD

Thank you very much for your purchasing the digital Indicator for digital load cell CSD-401.

This manual is provided to explain installation procedures and checkpoints in operation. We would like you to read through this instruction manual with much care for the best use of our product to avoid malfunctions.

We also would like you to deliver the manual to end user surely to keep it at hand.

Marks and references described in this manual

The following marks are placed for the matters that indicate ‘Do not do this’, ‘Caution’, and ‘For reference’. Please be sure to read following descriptions with marks.

Warning

This is the description in the case of a malfunction occurred, the possibility of lethal accidents or serious injury to operators.
To prevent possible hazard, please avoid operations described here.

Caution

Descriptions that may cause injury or physical damage to operators and such as occurrences of physical damage.

When you are operating the instrument, you have to pay cautions or restrictions related with this description. Be sure to read to prevent from malfunction.

For safe operation

Be sure to read this manual before operation.

1. Location of installation

⚠ Caution

Use the Instrument under the following conditions.

- Environmental temperature : -10 ℃ ~ 50 ℃
- Environmental humidity : 85 %RH or less (No condensing)

⚠ Warning

Do not install the Instrument in following places. It may cause damage to the Instrument.

(1) Place to be avoided.

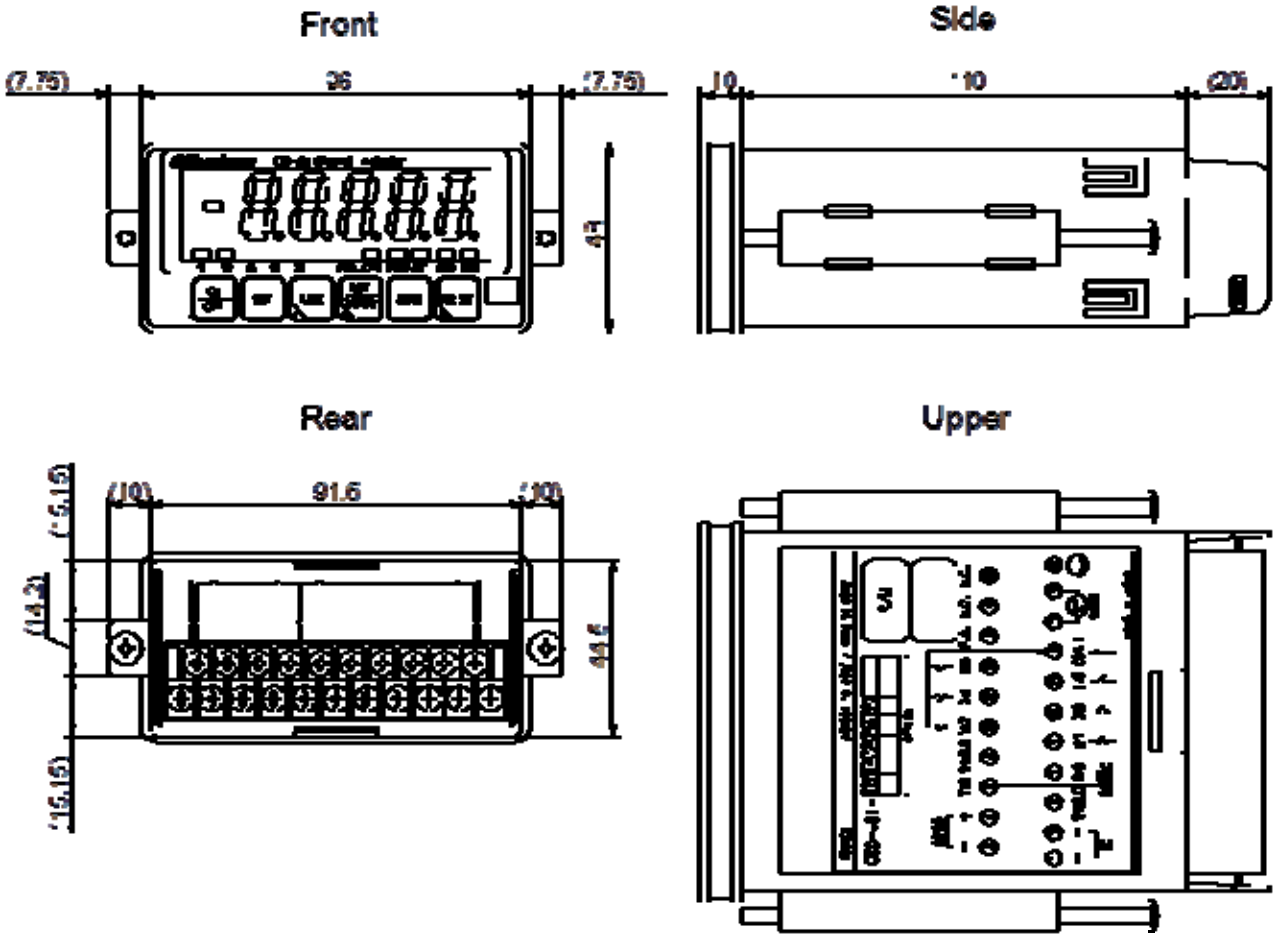
- Do not place in direct sunlight and/or of high temperature
- Do not use in a highly humid area.
- Do not install in the place of vibration or mechanical shock.
- Do not use in the place of full of dust or coarse particulates.
- Do not use in the atmosphere with corrosive gas or salt.
- Do not install in the place with rapid change in temperature and/or humidity.
- Do not install near the devices which generate magnetism or electromagnetic waves.
- Do not install in the place vulnerable to radioactivity or radioactivity rays.
- Avoid locations where chemical reaction may take place such as a laboratory.

(2) Installing the Instrument

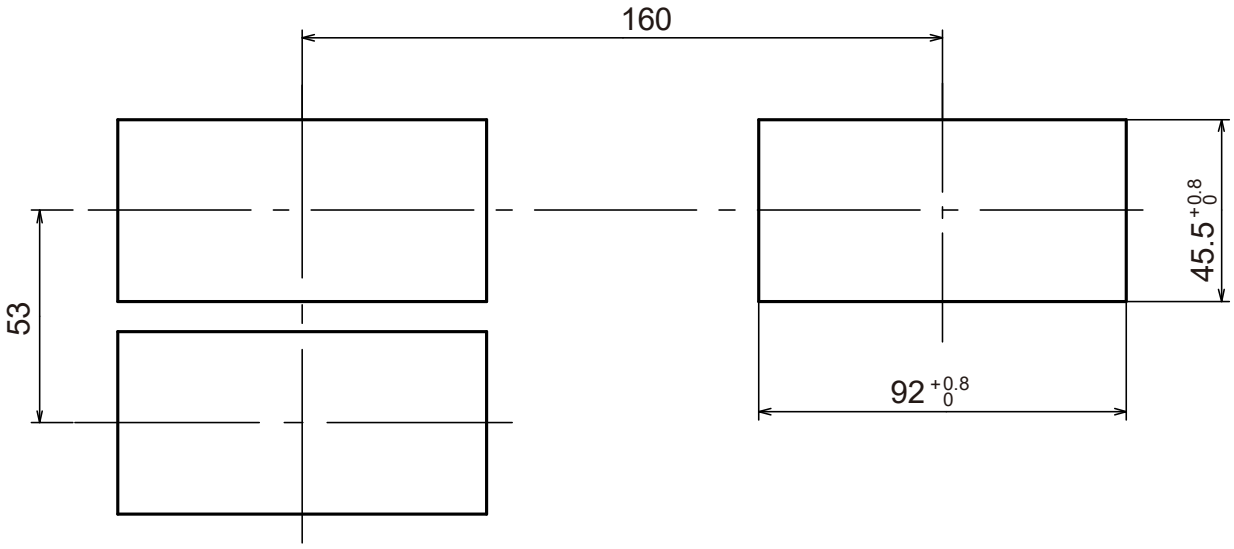
Caution

When you install the Instrument, refer to the following dimensions and secure enough space around the Instrument.

Followings are the dimensions of the Instrument and for environmental spaces required:



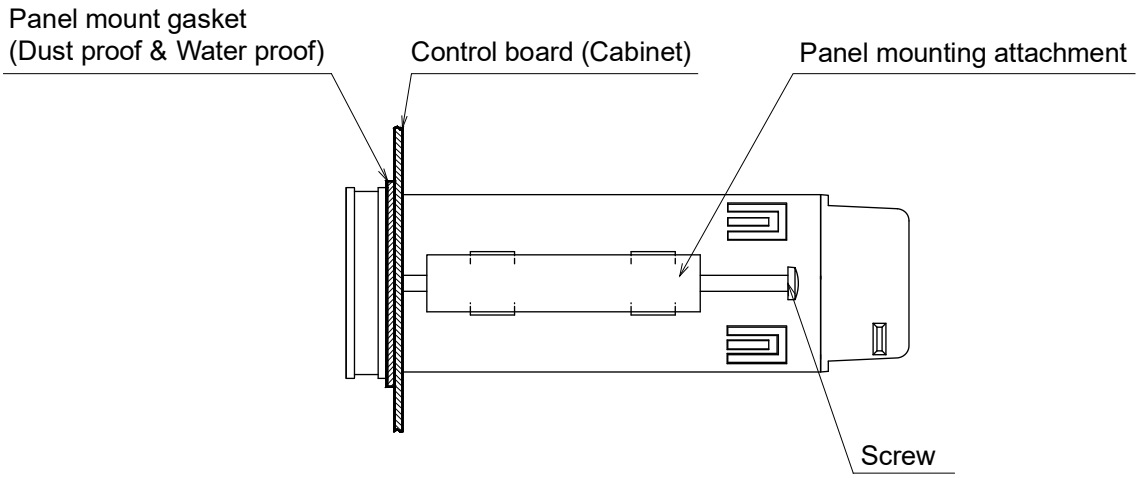
Panel Cut Size



(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 power supply is OFF when installing each cable. If an operator works with power ON, he/she may have an electric shock or the instrument may be destroyed.

Warning

Be sure to ground a grounding wire. If a grounding wire is not grounded, it may cause malfunction of the instrument or an electric shock to an operator.

Caution

Before supplying power, check the indication of power voltage/specifications to be identical with supplied power. If they are not identical, contact with us Without checking the above, operation may cause damage to the instrument or electric shock

3. Instructions for use

Caution

Before using a new instrument, or when exchanging a strain gage applied transducer for a new one, be sure to make calibration. If neglected, it may cause incorrect results in measurement or malfunction in the instrument and moreover may cause damage to peripheral equipments. When similar trouble occurs after calibration, be sure to make calibration again, even if calibration has completed.

Caution

When using the instrument, check that wires are connected properly. If neglected, correct measurement cannot be obtained and it may cause malfunction in the instrument or cause damage to peripheral devices or a critical accident.

Caution

Improper change of setting during operation may cause incorrect measurement or malfunction, or cause damage to peripheral equipments.

Caution

Do not give the instrument such a shock as throwing something at it. It may cause damage or destroy electrical circuits and even have loose resistance to environment or operability.

When in the shipment, there is a clear sheet for protecting on the panel. Remove the clear sheet before use the instrument.

Never push the panel sheet of the instrument with strong force more than necessity is required, or push it with s sharp end of the driver or rap it. The touch panel will have damage and have the possibility of resistance to environment or operability.

4. Conformed standard

This instrument has conformed to the following standard.

Annex D (Performance level H) of JIS B 7611-2:2009
[Non-automatic weighing instruments－Metrological and technical requirements and tests
－Part 2: Measuring instruments used in transaction or certification]

⚠ Caution

Please observe the following conditions strictly when this instrument comply the above mentioned standard.

(1) Shield processing

Cables other than power cable must use all shielded cables.
Refer to relative notes, about method of shield processing.

(2) Function setting

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 2.

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.

Division History

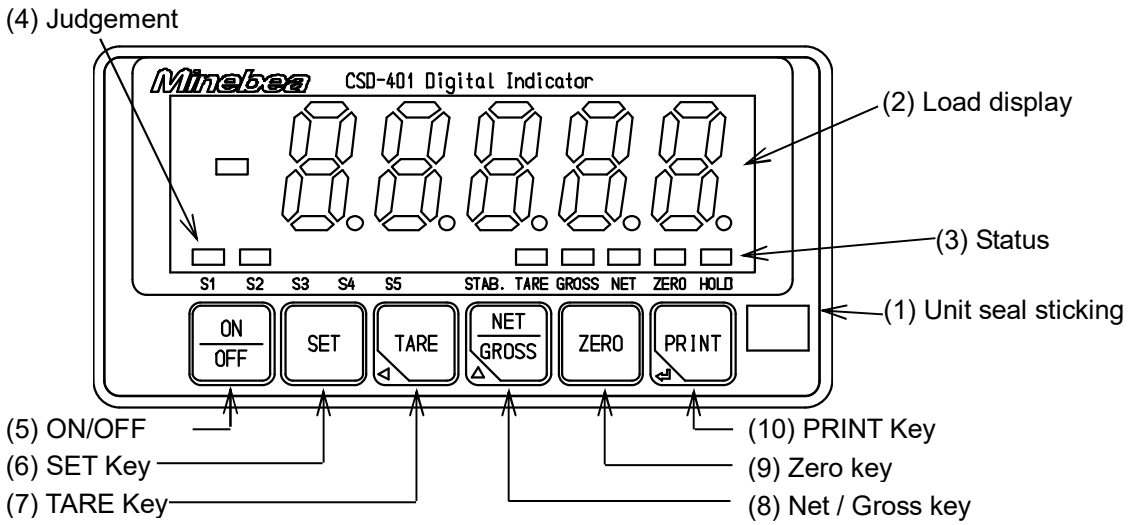
Date	Manual No.	Revised reason (Contents)
2011/09	DRW. No.EN294-1366	First edition ROM Ver. 1.000
2014/01	DRW. No.EN294-1366-A	Due to ECN NO.FN13-02192-A -Change- 12-3-6.Data format in Command mode Change '[OL] is appeared on the load data section at overload application. [-OL] is appeared on the load data section at the condition of gross value is minus.' to 'At the overload, [OL] is output as a load data. When the gross value is less than -20D, [-OL] is output also.' 12-4-6.Data format of Command mode Change 'When the overload is occurred, [OL] shall be shown on the Load data section. [-OL] will be shown on the load data section when the value is minus totally.' to 'At the overload, [OL] is output as a load data. When the gross value is less than -20D, [-OL] is output also. 13-1-5.Scaling of analog output Change -1 display to -20D display. Change +110 % of maximum display to +9D of the maximum display. Delete 'When the set value for CF-03 is set as [2], the BCD output will become the data over condition when the Gross weight is minus value. (in the case of suiting the instrument to JIS standard.)

2014/05	DRW. No.EN294-1366-B	Due to ECN NO.FN14-02041 -Deletion- 2-2.Note on connection Deleted bold-faced underline. 'Please use the shielded cable for the connection with the external control input and also connect the shield with the shield terminal, or the main body.' 13-1-5.Scaling of analog output Deleted the sentence below Use this unit by setting the set value of CF-03 to [2] to comply with corresponding JIS standard. Change the word 'stand-by mode' to 'stand-by condition'. 4-4-4. Corner adjustment Correct the mark. 4-6-2. Fine adjustment of zero and span Correct the mark. 4-7-1. Changeover to digital linearization mode Correct switch picture. 4-7-2. Setting to the digital linearization Correct switch picture. 5-1-2. Refer to the digital load cell output at zero/ span calibration Add the C function mark. 6-12. Digital linearize clear Correct the linearize clear mark 10-1. Setting method of Check mode Correct switch picture. 11-3-3. S1 operation of simple comparison mode (4) In case of selecting [UNDER] for S2 and S3 on function F-22 Correct graph. 13-2-8. Timing chart Add '15 times/s :Approx. 66 ms' Add and correct missing words and writing error.
2016/06	DRW. No.EN294-1366-C	Due to ECN NO.FN16-02057 -Deletion- Delete 'Minebea Co., Ltd. Measuring Components Business Unit' from the front cover.
2017/09	DRW. No.EN294-1366-D	Due to ECN FN17-02017 ・Delete the company name in the contents.
2018/11	DRW. No.EN294-1366-E	Due to ECN FN18-02117 - Correction- 16-6. Accessories　Midget fuse(0.5A)→(2A)
2019/04	DRW. No.EN294-1366-F	Due to ECN FN19-0159 2-4. Correction The following statement is added to the note of the external control input. ・Do not assign the same set value to multiple PIN numbers. This instrument does not work properly.
2021/02	DRW. No.EN294-1366-G	Due to ECN FN21-0113 - Correction- 12-4-6. Data format of Command mode ①Reading out the load data (Host → CSD-401) Corrected because the number in kilogram unit "load data 7 digits" C9 in the table is wrong. "0"→". "

Contents

1. Name and function of each part

1-1. Front panel



(1) Unit seal sticking place

Stick the attached unit seal as necessary.

(2) Load display section

Display the GROSS/ NET, over, error. When the various setting, display the setting value and the status display.

(3) Status display

Display the status of CSD-401.

STAB.	Flickering when the measurement data is stable.
TARE	Flickering when executing the preset tare.
GROSS	Flickering when the load display is GROSS weight.
NET	Flickering when the load display is NET weight.
ZERO	Flickering when the load value of GROSS weight or NET weight is zero and scale interval is within ±1/4.
HOLD	Flickering when the external hold signal input is ON.

(4) Judgement display

Compared results (S1 to S5) by comparator function can be displayed.

S1	Display the S1 compared result.
S2	Display the S2 compared result.
S3	Display the S3 compared result.
S4	Display the S4 compared result.
S5	Display the S5 compared result.

(5) ON/OFF Key

ON/OFF the display.
Electricity is generally supplying in internal indicator and measuring section even the display is OFF.
Status standby when the display is OFF

(6) SET Key

Reset the each mode status before setting.

(7) TARE Key

Executing the preset tare, or carry the figure when setting the value.

(8) 

Key

Switchover the GROSS and NET displaying data, or carry the selecting figure when setting the value.

(9) 

Key

Memorize the present load value as a ZERO and displaying ZERO.

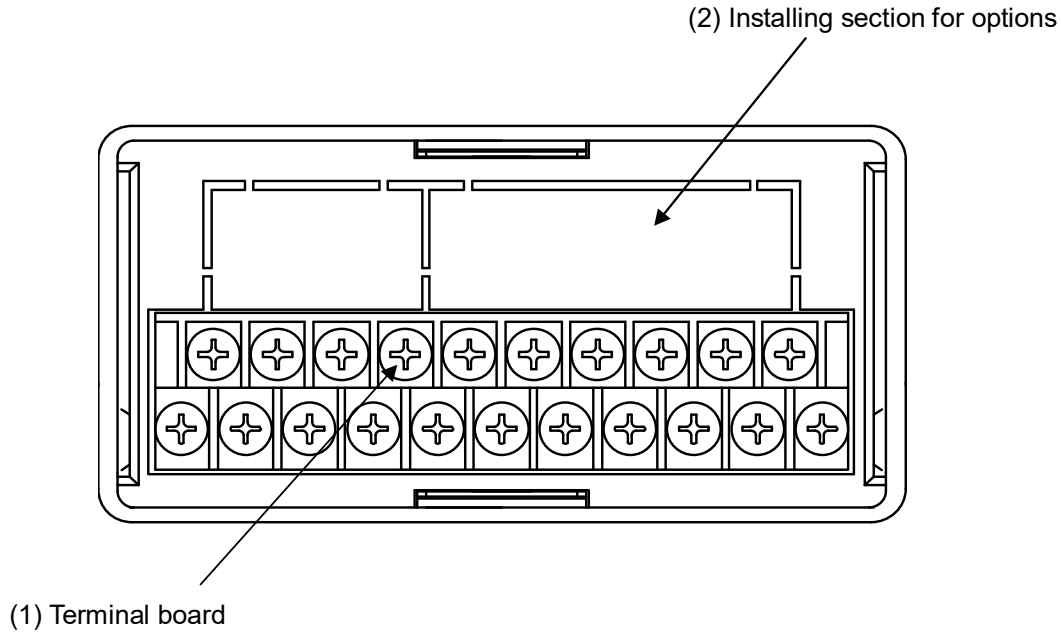
(10) 

Key

Printing out the data, or select various data input and memory the setting value in internal memory.

1-2. Rear panel

1-2-1. Outline of rear panel



(1) Terminal board

Connecting external control input, RS-232C, digital load cell, AC power supply and grounding wire.

(2) Installing section for options

Whichever one can be installed from the optional BCD-OUT, RS-422, serial interface, analog current output or analog voltage output.

2. Wiring

2-1. Terminal board layout

Terminal board 21P is equipped at rear panel of this unit.

Below is the terminal board layout.

Terminal No.	Name	Usage	Terminal No.	Name	Usage
1	DC(+)	Power supply DC12 V(+)	11	IN3	Control input 3
2	RS485(-)	Differential in and output (-)	12	IN4	Control input 4
3	DC(-)	Power supply DC12 V (-)	13	IN5	Control input 5
4	RS485(+)	Differential in and output (+)	14	IN6	Control input 6
5	SHIELD	Shield	15	COM.1	IN1 ~ 6 and RS-232C COM
6	TXD	RS-232C transmit	16	F.G.	Frame ground
7	RXD	RS-232C receipt	17	SOURCE	AC power supply
8	SHIELD	Shield	18	N.C.	
9	IN1	External input 1	19	SOURCE	AC power supply
10	IN2	External input 2	20	N.C.	
			21	⏚	Ground

2-2. Note on connection

⚠ Warning

- **In case of connection with the instrument, keep strictly to the following items. If neglected, it may cause an unexpected failure or damage to the instrument.**
- **Do not connect N.C. terminal.**

- Be sure to set the power supply to OFF, when the connection will be made.
- Do not supply AC power supply until complete installing.
  This instrument has no ON/ OFF exchange power supply switch.
- Connecting cable with the instrument should be away from the noise source such as power supply line and/or I/O line for control and so on as far 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 use the shielded cable for the connection with the external control input and also connect the shield with the shield terminal.
- Recommended torque to tighten the terminal screws for terminal block should be as follows:

Torque to tighten the terminal screws
0.6 N·m

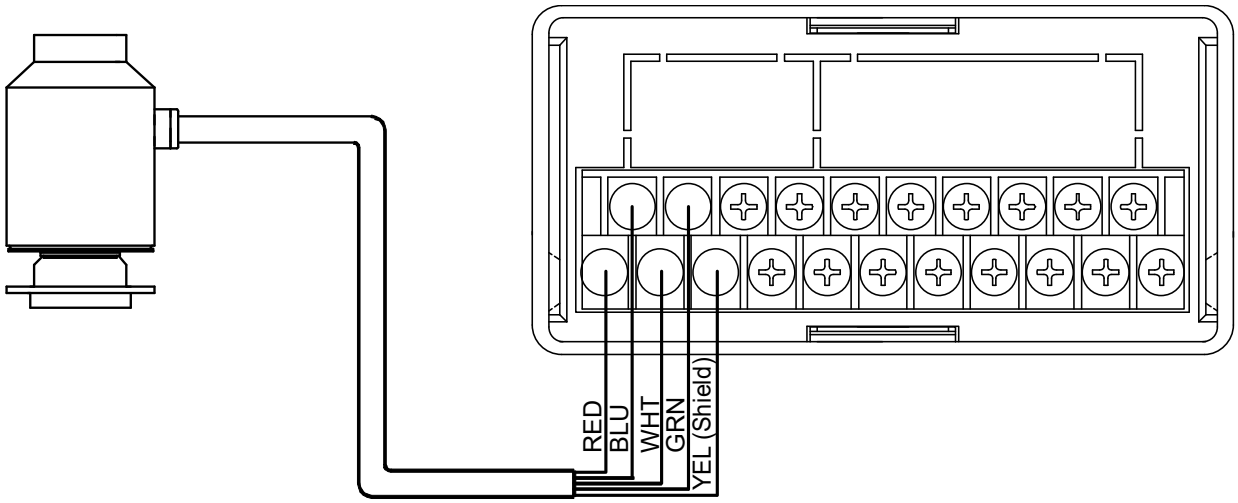
- The suitable crimp type terminal lugs for the terminal board are as follows:

Crimp type terminal lugs range	Suitable crimp type terminal lugs
6.2 mm or less	1.25-3 or Y type 1.25-3.5

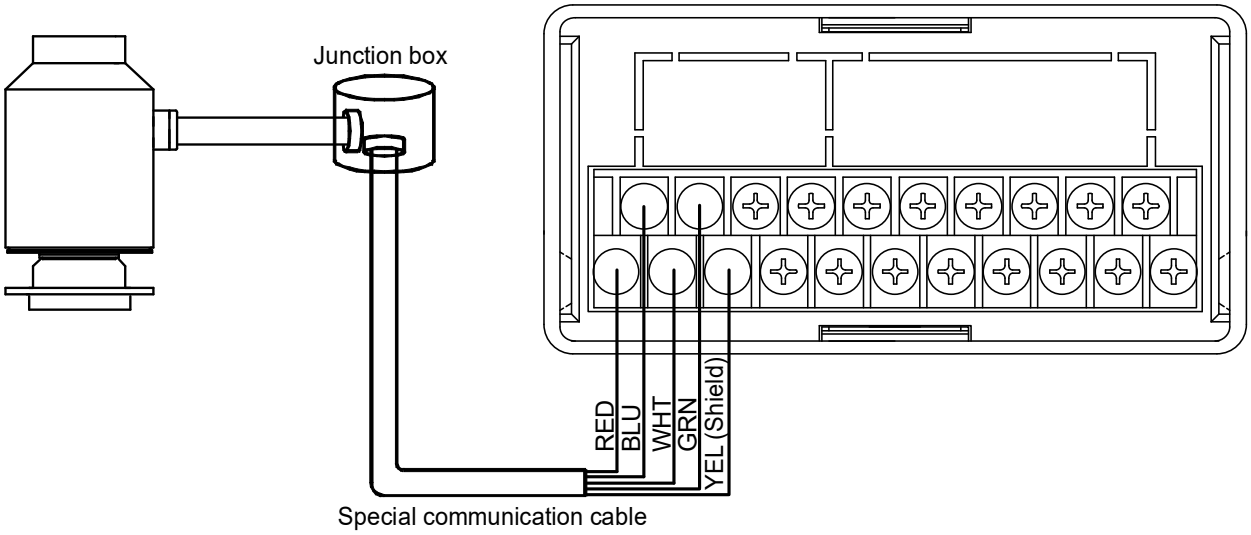
2-3. Connecting with digital load cell

Connect a digital load cell to the terminals as follows:

(1) In case of connecting one load cell



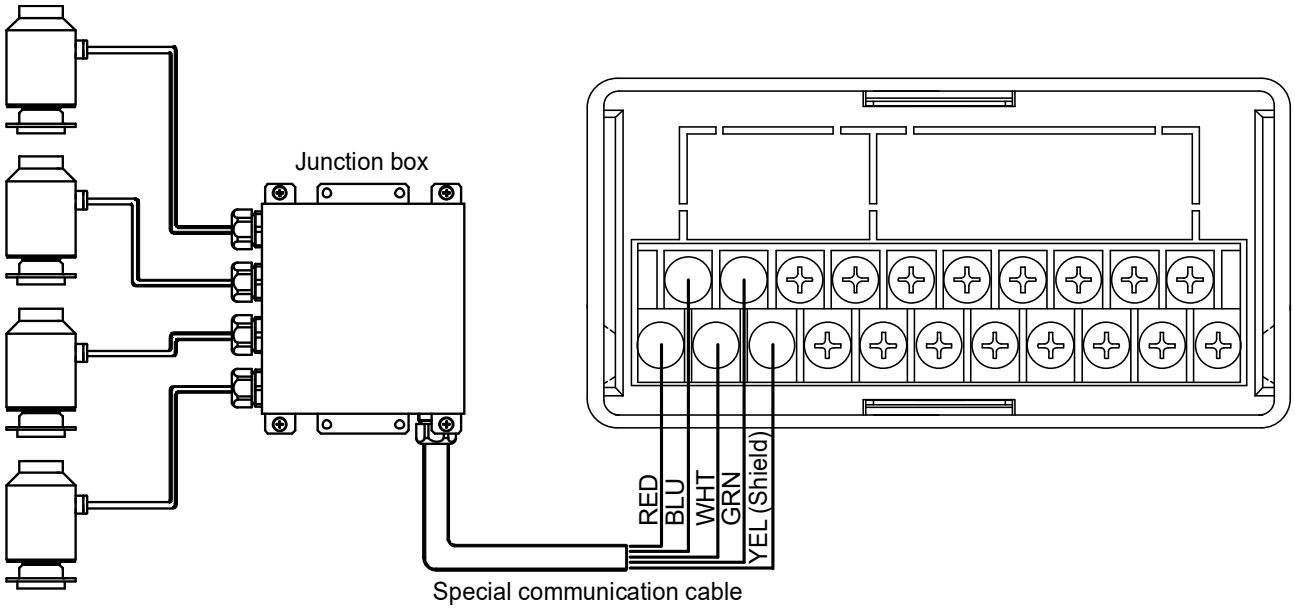
(2) In case of using extension junction box by one to one connecting

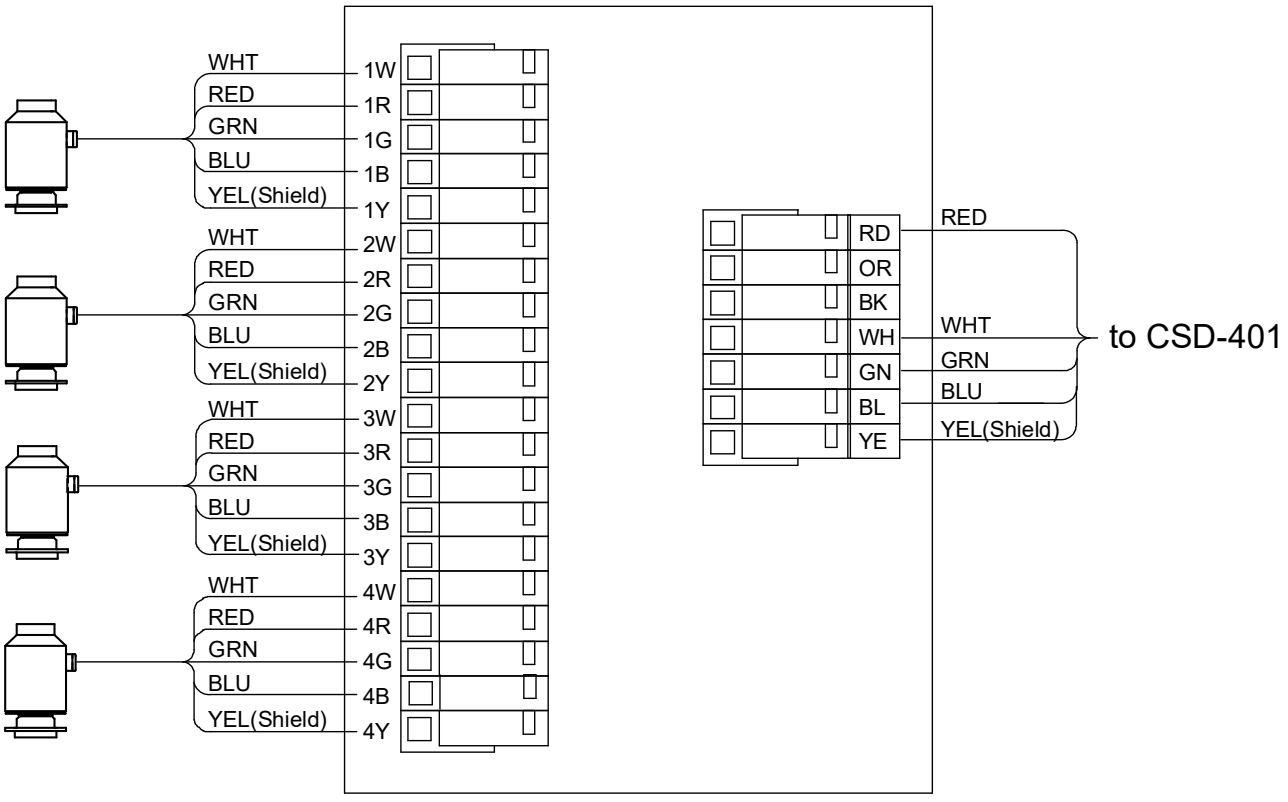


- **Use exclusive corresponding cable. Maximum 200m is able to extend when using recommended cable. Recommended cable :CL2/2464-3599-DS 2P×18AWG(Soar battery)**
- **Do not connect except our digital load cell. It may cause an unexpected failure to the instrument.**

(3) When you connect the digital load cell in parallel

The hopper scale, the track scale, etc., have the case to connect the several pieces of the digital load cell in parallel. The parallel connections can be easily done by using optional DB-307 (Summing type junction box).

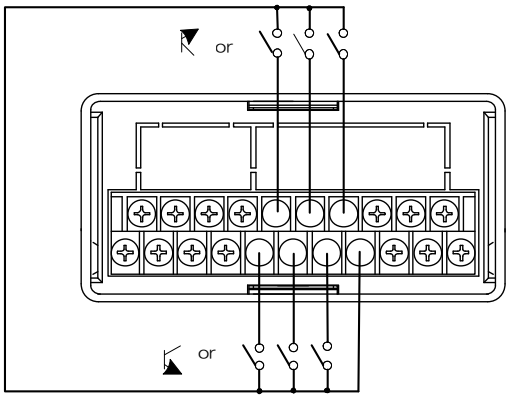


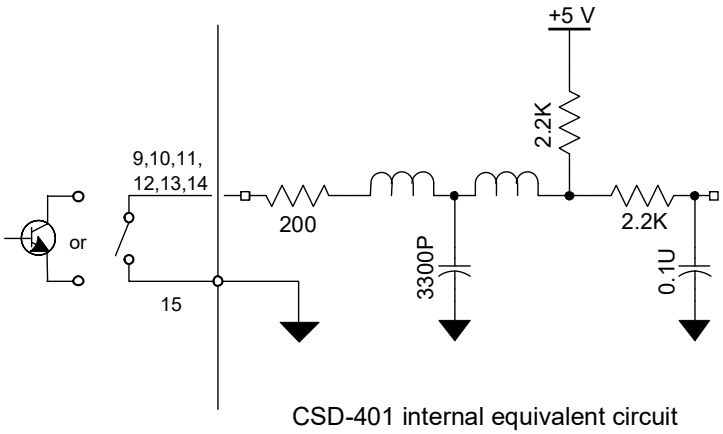


- **Use exclusive corresponding cable. Maximum 200m is able to extend when using recommended cable. Recommended cable: CL2/2464-3599-DS 2P×18AWG(Solar battery)**
- **Do not connect except our digital load cell. It may cause an unexpected failure to the instrument.**
- **Our Junction box CB-307 is building in the terminating resistance of 120 Ω. If you use another junction box, install the terminating resistance of 120 Ω connect between Green and Blue of CSD-401.**

2-4. Connection of the external control input

You can control the function from the outside by using the [Control input (IN)] terminals in rear panel. It is executed by shortening each pin and COM.1 terminals with a contact point or an open collector after the wiring to the connector.





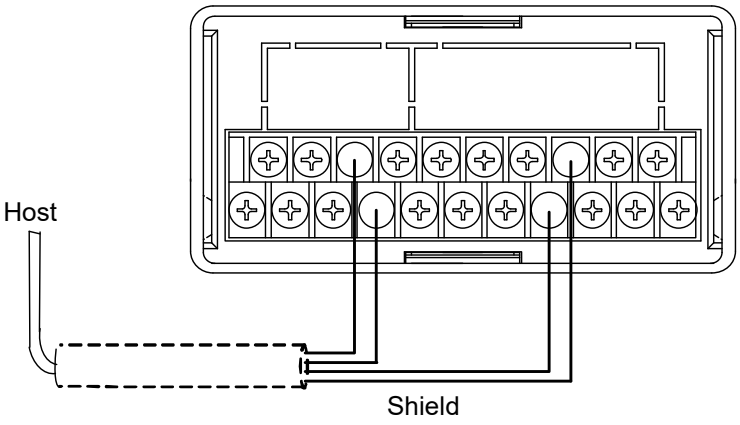
CSD-401 internal equivalent circuit

Layout of control input terminals in terminal board

Terminal No.	Function No.	Setting value and contents	
9	F-60 IN1 function	0	Motion OFF
		1	Same motion as [ON/OFF] key
		2	Same motion as [SET] key
		3	Same motion as [TARE] key
		4	Same motion as [NET/GROSS] key
		5	Same motion as [ZERO] key
		6	Same motion as [PRINT] key
		7	Exchange NET display (valid only measurement mode)
		8	Display hold (valid only measurement mode)
10	F-61 IN2 Function	Selectable as same as F-60 also.	
11	F-62 IN3 Function	Selectable as same as F-60 also.	
12	F-63 IN4 Function	Selectable as same as F-60 also.	
13	F-64 IN5 Function	Selectable as same as F-60 also.	
14	F-65 IN6 Function	Selectable as same as F-60 also.	
15		COM terminal of IN1 to 6	
16		Connecting with shield.	

- **Use a shielded cable for connections with external control inputs, and connect it with shield terminal. If not connected, any malfunction may be caused due to effects by 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 hold of display are level input. Others are pulse input. It becomes effective once at the pulse width of 100 ms or more.**
- **Common of the COM.1 of external control input (terminal No. 15) and RS-232C interface is connected.**
- **Use the shielded cable to conform with the JIS, and connect it with F.G. terminal.**
- **Do not assign the same set value to multiple PIN numbers. This instrument does not work properly.**

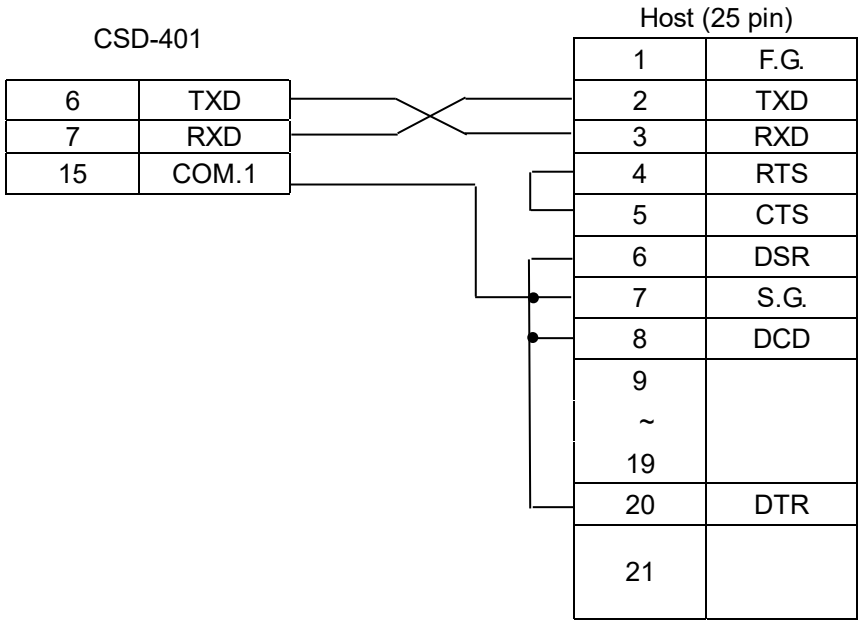
2-5. Connection with RS-232C interface



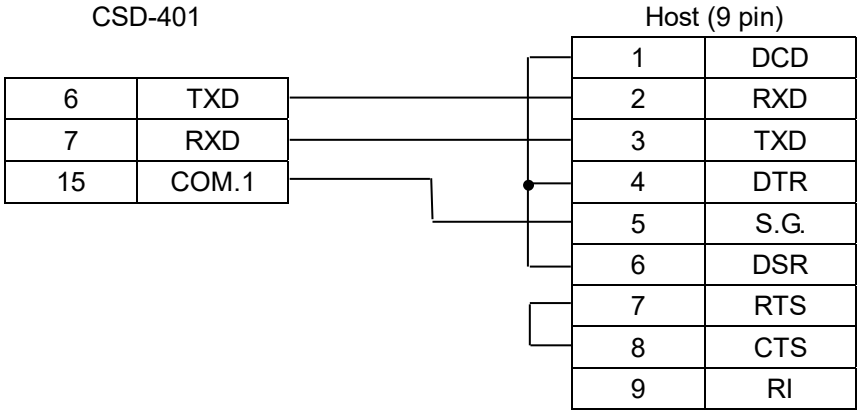
Terminal layout of RS-232C interface

Terminal No.	Signal name
6	TXD
7	RXD
15	COM.1

(1) Connectin-1 of RS-232C interface



(2) Connection-2 of RS-232C interface

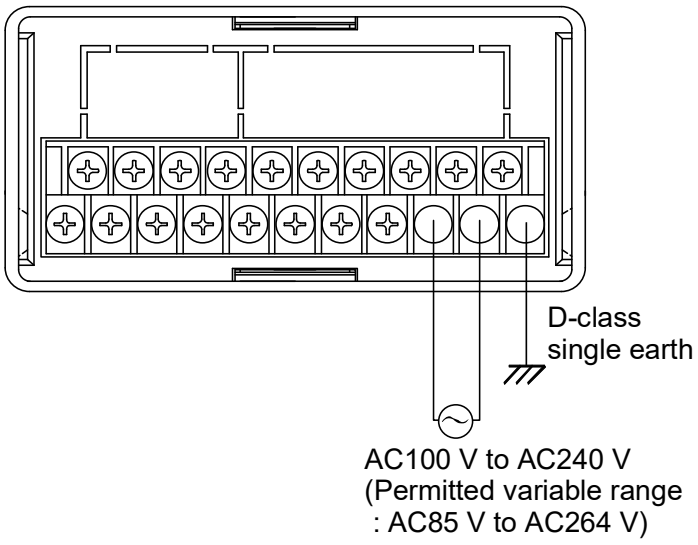


- **Do not connect N.C. terminal.**
- **Common of RS-232C interface circuit and COM.1 (terminal No. 15) of external control input are connected.**
- **Use the shielded cable and connect it with F.G. terminals to conform to JIS.**

2-6. Connection with power supply and earth

Connect power supply cable and grounding cable as shown below figure and use the D class single earth.

Power supply voltage	AC100V to AC240V (Allowable variable range: AC85V to AC264V)
Frequency for power supply	50/60Hz
Power consumption	4VA(at AC100V)



Caution

- **Connections with the power supply and the earth should be made securely according to the figures and also within the rated capacity of the instrument.**

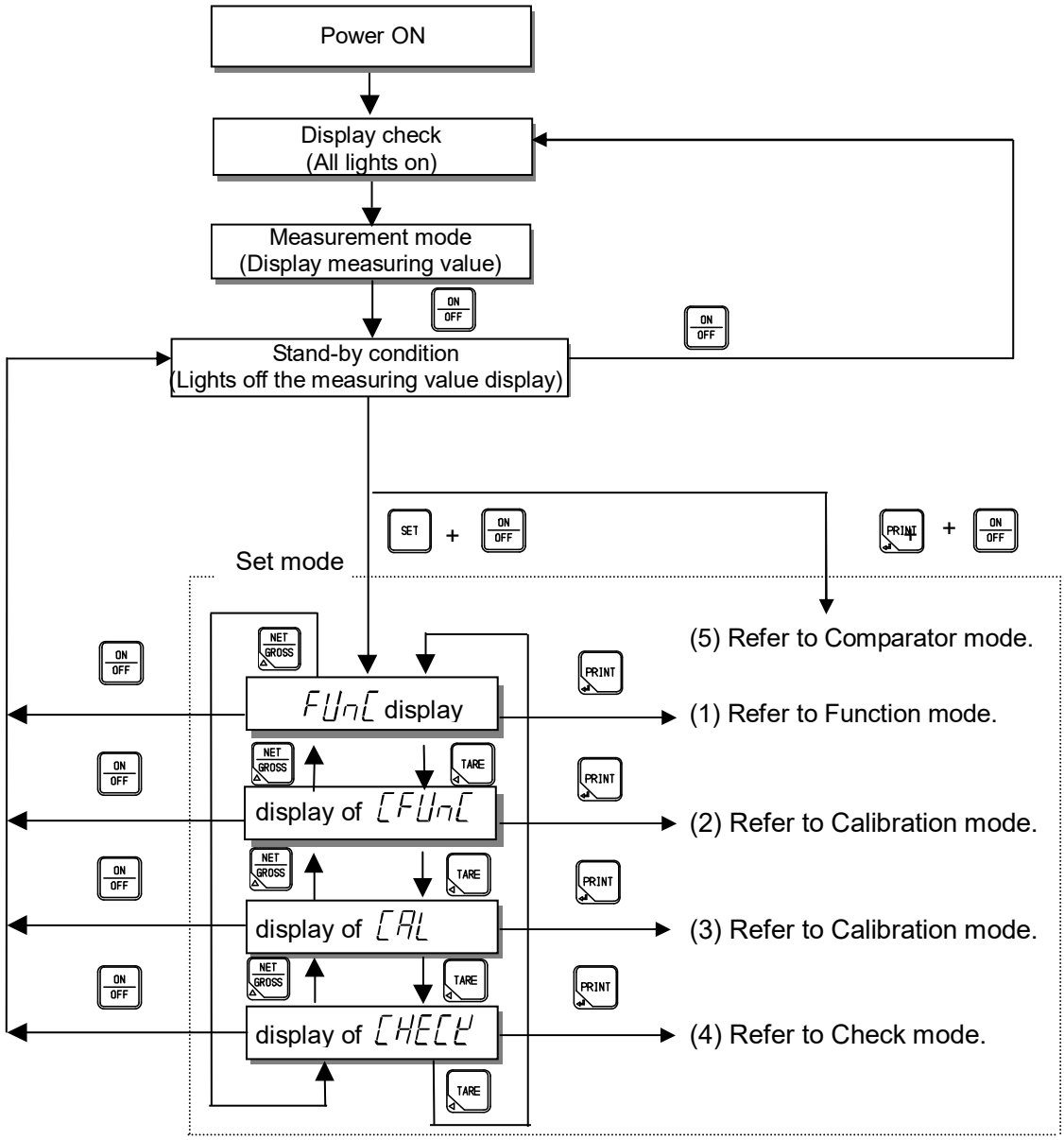
- **Grounding should be the D class with single earth. If neglected, it may cause an unexpected malfunction due to the effects of noise from other equipments.**

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 digital load cell output exceeds ±10 % of weighing by the power on zero function after checking the display, the display becomes the error indication of '- - - - -'. At this time, by pressing SET key, the display compulsorily becomes a load display. Refer to paragraph 6-6. Power on zero.

(1) Function mode (FUnC)

Various functions become effective by setting the function data.

(2) C function mode (CFUnC)

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

(3) Calibration mode (CAL)

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

(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 (S1, S2, S3, S4, S5)

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 6 kinds of value for the target value, the pre-rated weight, fall, near zero, over and under.

4. Calibration

To be able to display the output count from the measuring section (digital 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 before the calibration

Register the S/N (serial No.) of digital load cell for effect the digital load cell connected with the instrument. If there are several digital load cells, register all S/N of digital load cell.

- **This instrument is not able to recognize the digital load cell without register S/N.**

Execute corner adjustment for correcting output balance of each digital load cell in the case of need high precision measurement with using several digital load cells.

- **Balance adjustment is unnecessary in case of difficulty because tank, hopper, etc., is too big or too heavy to move.**

4-2. 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 (dCSP)

It is the maximum weight to be able to measure by the measuring section (digital 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 digital load cell output count] as a calibration method.

(5) Calibration at span (SPAn)

It is a procedure by which execute the calibration of the change in the digital load cell output count 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 digital load cell output count] as a calibration method.

4-3. Items set after the calibration, if necessary.

(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 RS-232C and RS-422/ 485 interface load display of this unit.

(3) Digital linearization (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 6-10. Automatic range switch.

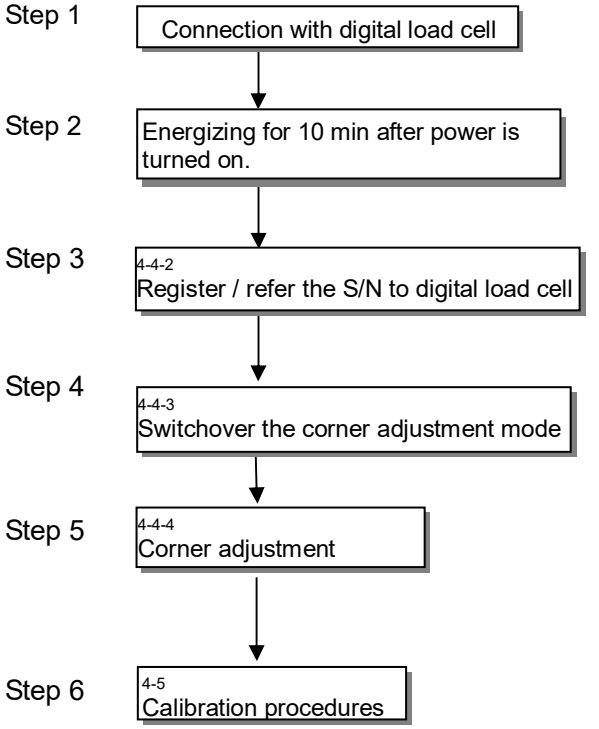
(5) Gravity acceleration compensation (C function: CF-25, CF-26)

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 when the applied environment changes if necessary.**
- **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 weighing to reduce the calibration error.**

4-4. Explanation for set items before calibration

4-4-1. Flow of set items before calibration



Connect the digital load cell with this instrument.

To stabilize this unit and the measuring section (load cell), please make the instrument to the status of energizing for about 10 min.

Register the S/N (serial No.) of digital load cell connecting the instrument. If already registered, refer to the register -ing contents. Go to step 4 if unnecessary to refer the S/N.

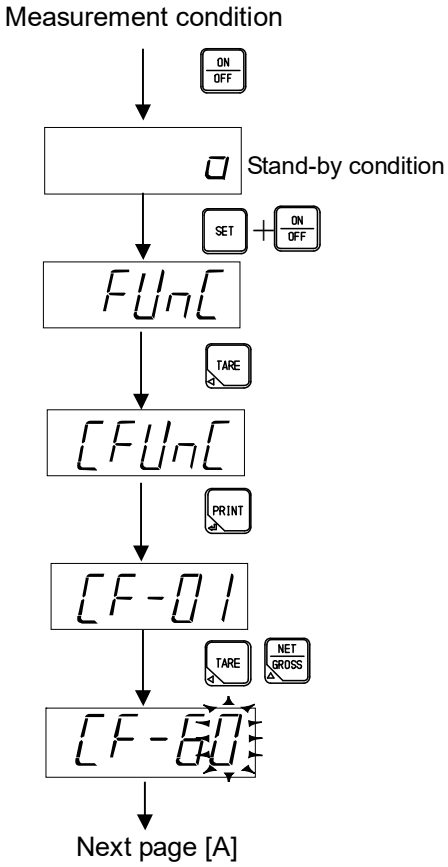
Switchover to the corner adjustment mode.
Go to step 6 if already adjusted or unnecessary to adjust.

Execute corner adjustment.

Switchover to the calibration mode.

- **Display the error code [Er-50] right after power up in case of not register the S/N of digital load cell.**
- **Display the error code [Er-50] right after power up if registered S/N (serial No.) of digital load cell has some fault (X for ID No.)**

4-4-2. Register / refer the S/N (serial No.) to digital load cell



Change from the standard measurement 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 TARE key to display CFUnC then it is going to C function mode.

Press PRINT key to display CF-01.

Select C function No. of executing S/N setting in following the chart below

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

TARE : Select the changed digit.

ZERO : Change the display value to [0].

SET : The setting is interrupted, and return to the display of

PRINT : Memorize the C function NO., and proceed to the next step.

ON OFF : Finish the C function mode.

Function No.	Contents
CF-60	Setting the S/N of ID No. 1.
CF-61	Setting the S/N of ID No. 2.
CF-62	Setting the S/N of ID No. 3.
CF-63	Setting the S/N of ID No. 4.
CF-64	Setting the S/N of ID No. 5.
CF-65	Setting the S/N of ID No. 6.
CF-66	Setting the S/N of ID No. 7.
CF-67	Setting the S/N of ID No. 8.

Example: If the connecting digital load cell is only one, register the S/N of digital load cell in CF-60, and CF-61 to CF-67 will be unregistered (all space).

When connecting digital load cells are 4 pieces, register the serial number as follows;

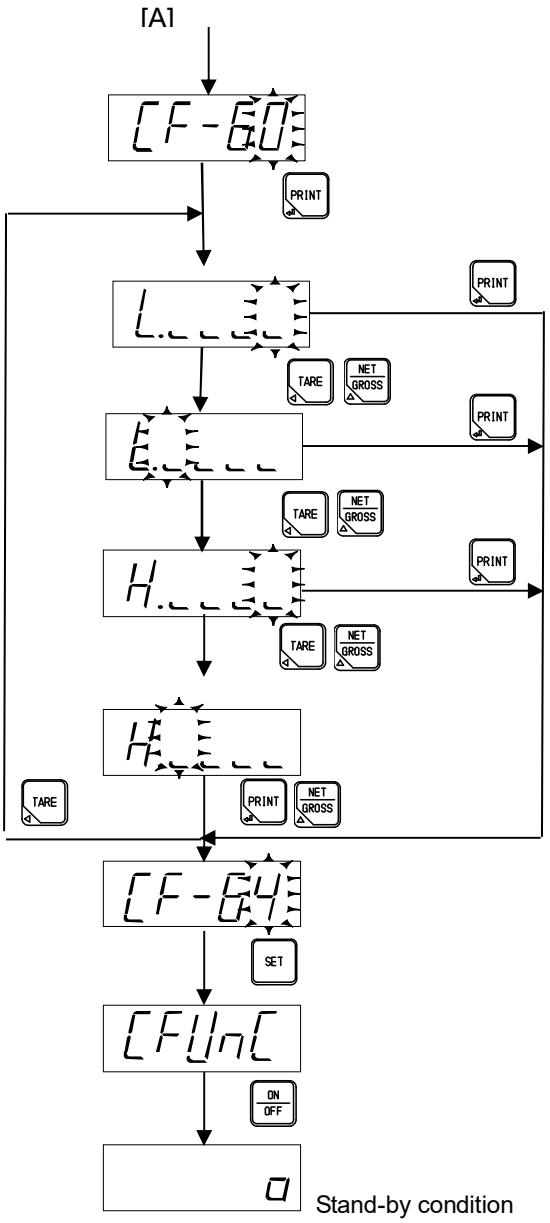
CF-60 is a serial number of the first digital load cell

CF-61 is a serial number of the second digital load cell

CF-62 is a serial number of the third digital load cell

CF-63 is a serial number of the forth digital load cell

And CF-64 to CF-67 will be unregistered (all space)



Pressing PRINT key to display [L.＊＊＊＊].
Set the S/N of digital load cell.

Set S/N's four lower digit in [L.＊＊＊＊].

Set S/N's four higher digit in [H.＊＊＊＊].

NET GROSS : The value of changed digit is changed.

TARE : Changed digit is selected.

ZERO : Change the displaying value to [SPACE]

SET : The setting is interrupted, and return to the display of [CFUnC]

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

ON OFF : Finish the C function mode.

《 Supplementary explanation 》

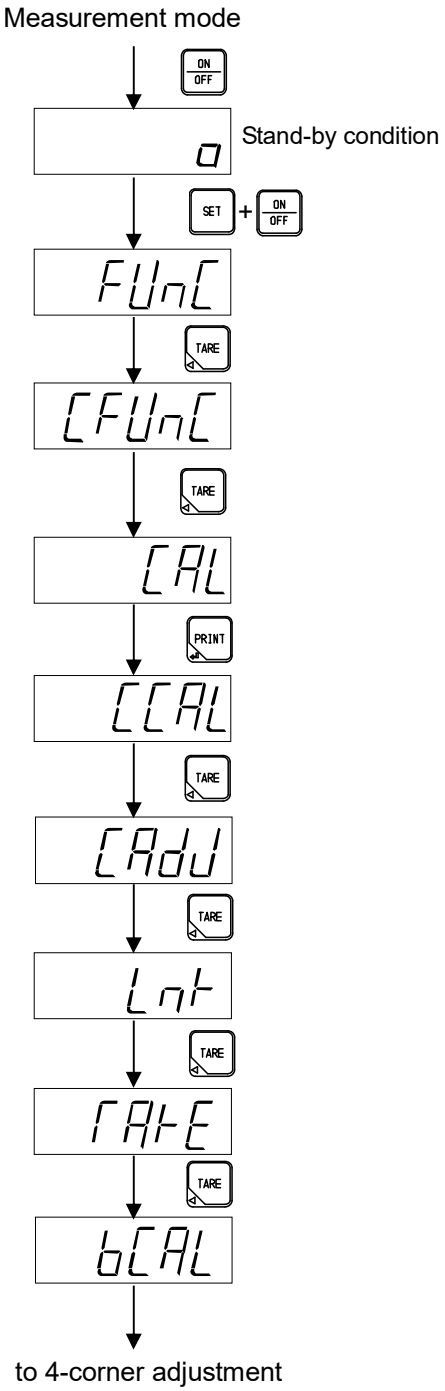
Press TARE on the forth digit of [L.＊＊＊＊], selecting flickering point moves first digit of [H.＊＊＊＊].

Change the setting of flickering digit by NET GROSS key.
Change as [blank] -> [0] -> [1] -> [2] -> ･･･ -> [9] -> [A] -> [B] -> [C] -> ･･･ -> [Y] -> [Z] -> [blank] -> [0] -> ->
About the alphabet, refer to the 19. Display character pattern.

Pressing TARE on the forth digit of [H.＊＊＊＊], selecting flickering point moves first digit of [L.＊＊＊＊].

- **Setting on the right side for the register of S/N (serial No.)**
  Example: In case of S/N K012345, set as [H. 201] and [L.2345] .
- **Memorize the relation of digital load cell's location and the ID No. It needs for executing [4-4-4. Corner adjustment].**

4-4-3. Switchover the corner adjustment



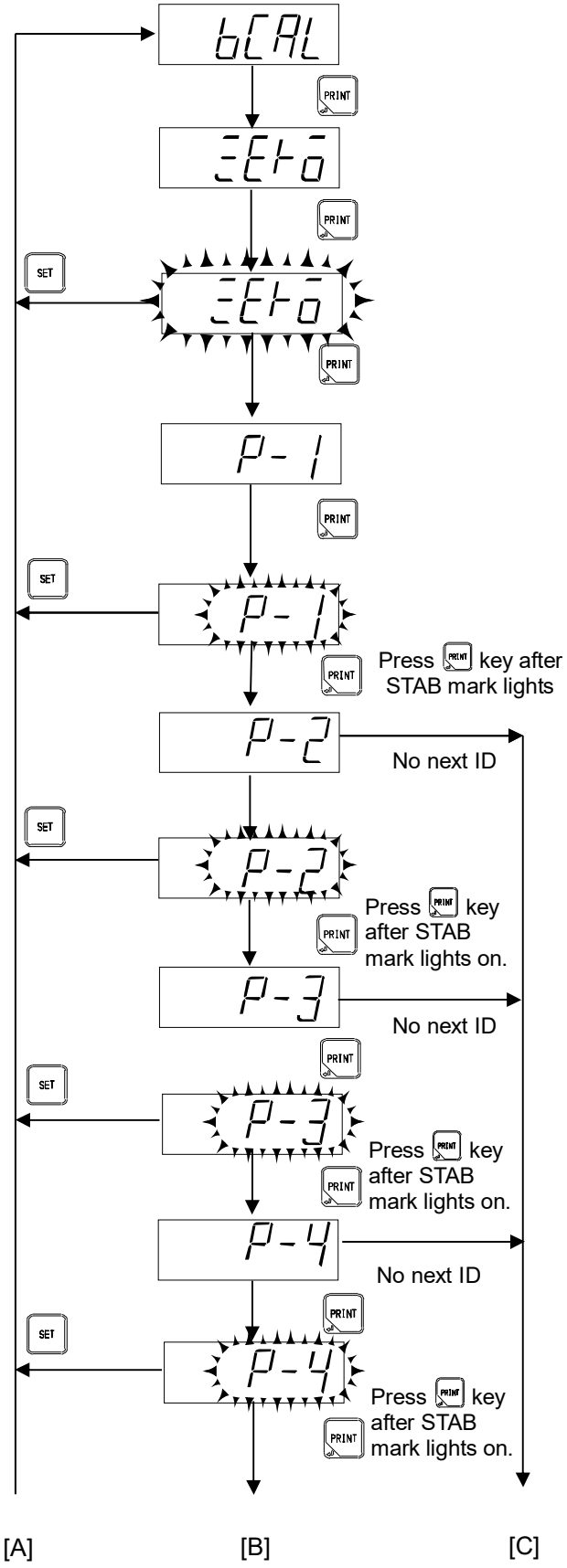
Change from the standard measurement mode to the stand-by condition by the ON OFF key.

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

Press the TARE key twice then press the PRINT key, it displays CCAL

Press the TARE key four times to display bCAL then it is going to corner adjustment mode.

4-4-4. Corner adjustment



From bCAL display to press PRINT key, it displays ZEro

At this point, do not apply any load in metering section without tare weight.

Pressing PRINT key and displays ZEro is flickering then start the zero point calibration.

After [STAB. mark] lights on, press PRINT key.

Cancel the corner adjustment pressing SET key and displays bCAL

Complete zero point calibration and displays P-1

Put the counterweight for corner adjustment on the ID No. 1 digital load cell, then press the PRINT key.

Press the PRINT key when the P-2 display is flickering and the [STAB. mark] lights on. Memorize each digital load cells data at [P-1] then go to the next step.

Display P-2.

Put the counterweight for corner adjustment on the ID No. 2 digital load cell, then press the PRINT key. Press the PRINT key when the P-2 display is flickering and the [STAB. mark] lights on.

Memorize each digital load cells data at [P-2] then go to the next step.

Display P-3.

Put the counterweight for corner adjustment on the ID No. 3 digital load cell, then press the PRINT key.

Press the PRINT key when the P-3 display is flickering and the [STAB. mark] lights on.

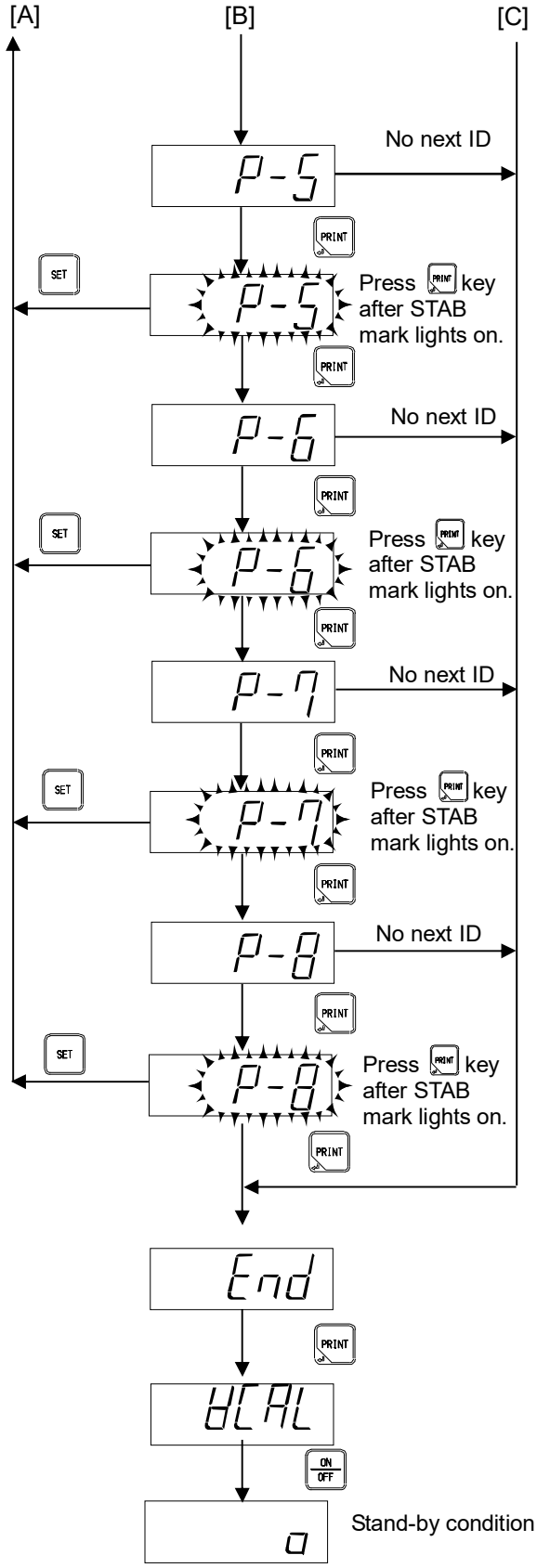
Memorize each digital load cells data at [P-3] then go to the next step.

Display P-4.

Put the counterweight for corner adjustment on the ID No. 4 digital load cell, then press the PRINT key.

Press the PRINT key when the P-4 display is flickering and the [STAB. mark] lights on.

Memorize each digital load cells data at [P-4] then go to the next step.



Display P-5.
Put the counterweight for corner adjustment on the ID No. 5 digital load cell, then press the PRINT key.
Press the PRINT key when the P-5 display is flickering and the [STAB. mark] lights on.
Memorize each digital load cells data at [P-5] then go to the next step.

Display P-6
Put the counterweight for corner adjustment on the ID No. 2 digital load cell, then press the PRINT key. Press the PRINT key when the P-6 display is flickering and the [STAB. mark] lights on.
Memorize each digital load cells data at [P-2] then go to the next step.

Display. P-7
Put the counterweight for corner adjustment on the ID No. 3 digital load cell, then press the PRINT key.
Press the PRINT key when the P-7 display is flickering and the [STAB. mark] lights on.
Memorize each digital load cells data at [P-3] then go to the next step.

Display. P-8
Put the counterweight for corner adjustment on the ID No. 4 digital load cell, then press the PRINT key.
Press the PRINT key when the P-8 display is flickering and the [STAB. mark] lights on.
Memorize each digital load cells data at [P-4] then go to the next step.

Display End after finish corner adjustment.
Press PRINT key for finish corner adjustment.

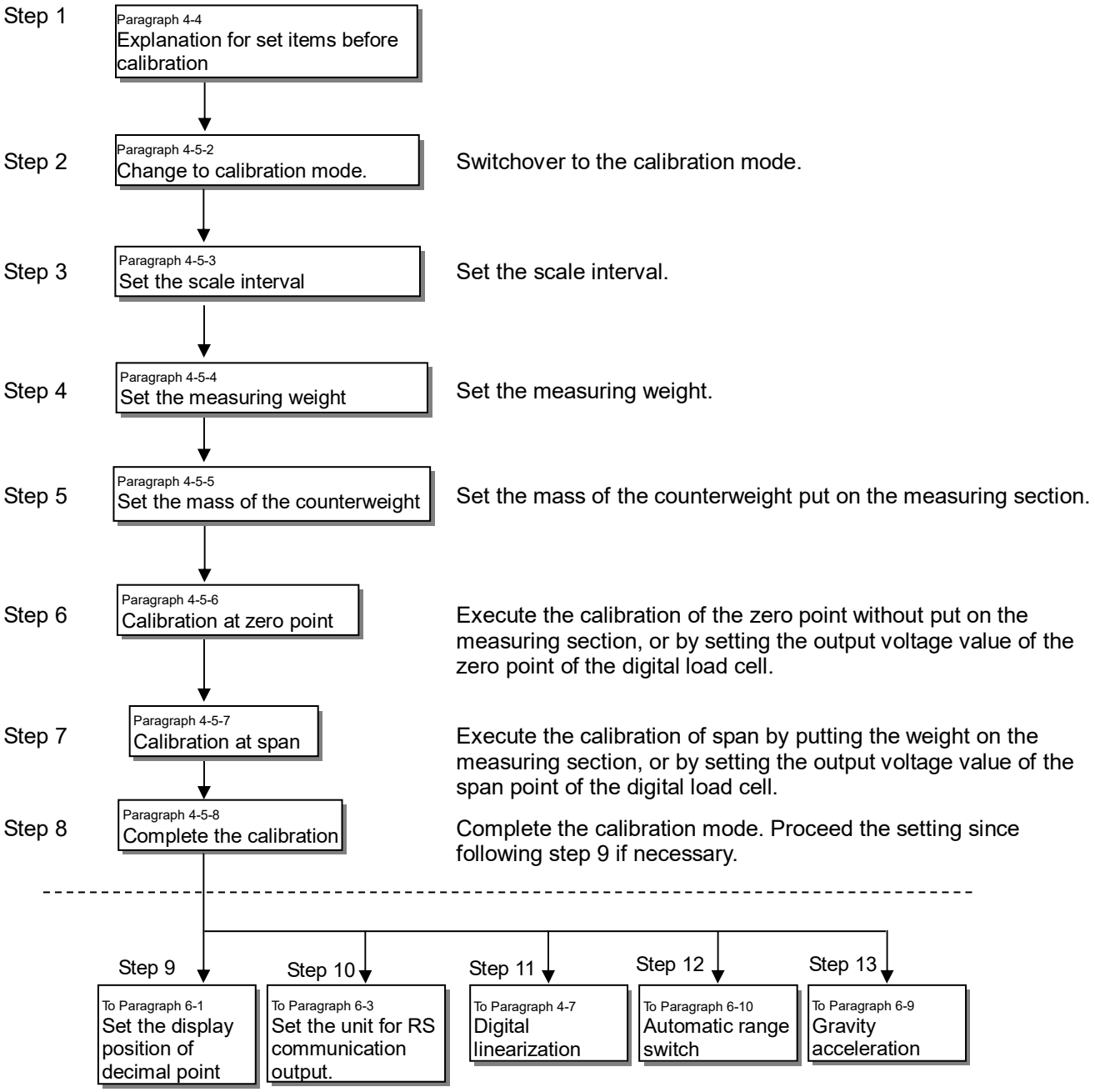
Display UCAL and memorize the setting data in internal memory.

Press ON OFF key to stand-by condition.
Complete the corner adjustment.

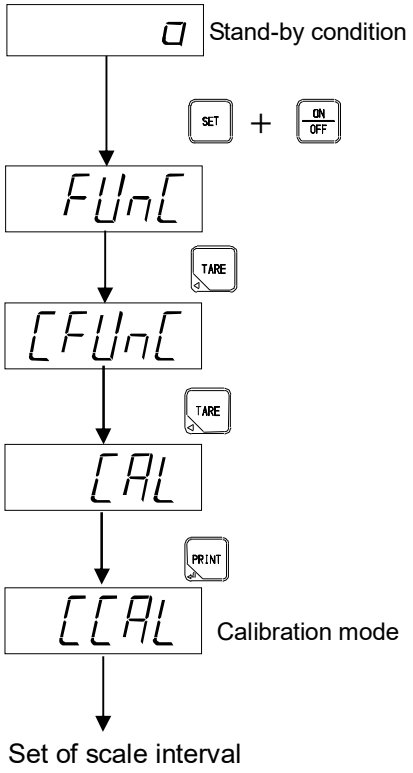
- **Use a counterweight for corner adjustment with minimum 1/20 of the measuring weight to maximum the measuring weight.**

4-5. Calibration procedures

4-5-1. Flow of calibration



4-5-2. Switchover to the calibration mode



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

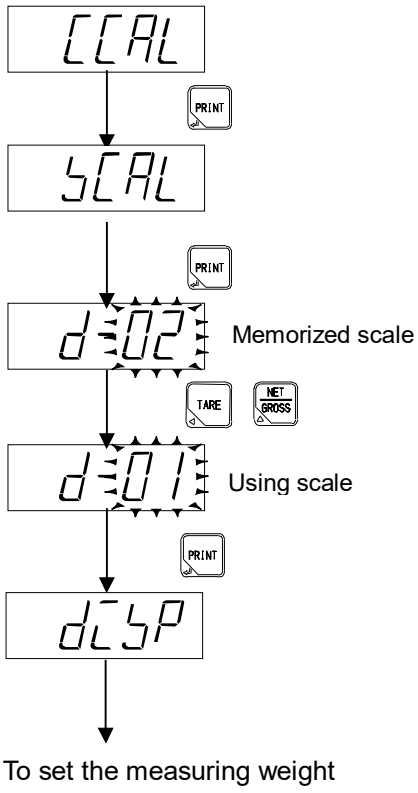
Pressing the ON OFF key with PRINT key pressed, it displays FUnC.

Press TARE key twice.

Displays CAL. Press PRINT key at this point.

Displays CCAL, and it goes to the calibration mode.

4-5-3. Set of the scale interval



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

Select the scale interval from 1, 2, 5, 10, 20 or 50.

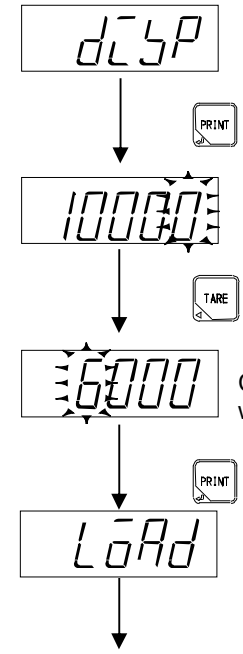
TARE, NET GROSS : Select the scale interval.

SET : Setting is interrupted and returns to CCAL display.

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

Press PRINT key after the set.

4-5-4. Set the measuring weight



Set the mass of the counterweight

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

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

NET GROSS : The value of changed digit is changed.

TARE : Changed digit is selected.

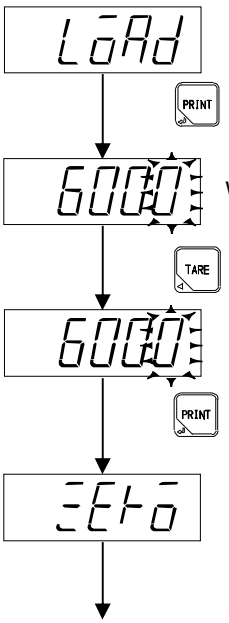
ZERO : The value is changed to [0].

SET : Setting is interrupted and display returns to CCAL.

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

After the setting, press PRINT key.

4-5-5. Set the mass of the counterweight.



Calibration of zero

When PRINT key is pressed from LOAd display, **** is displayed
[****] is the weighting amount.

Set the mass of the weight actually put on the measuring section at this point.
The same setting as the weighting value is executed when there is a weight for weighting

NET GROSS : The value of changed digit is changed.

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 PRINT key.

4-5-6. Calibration at zero point

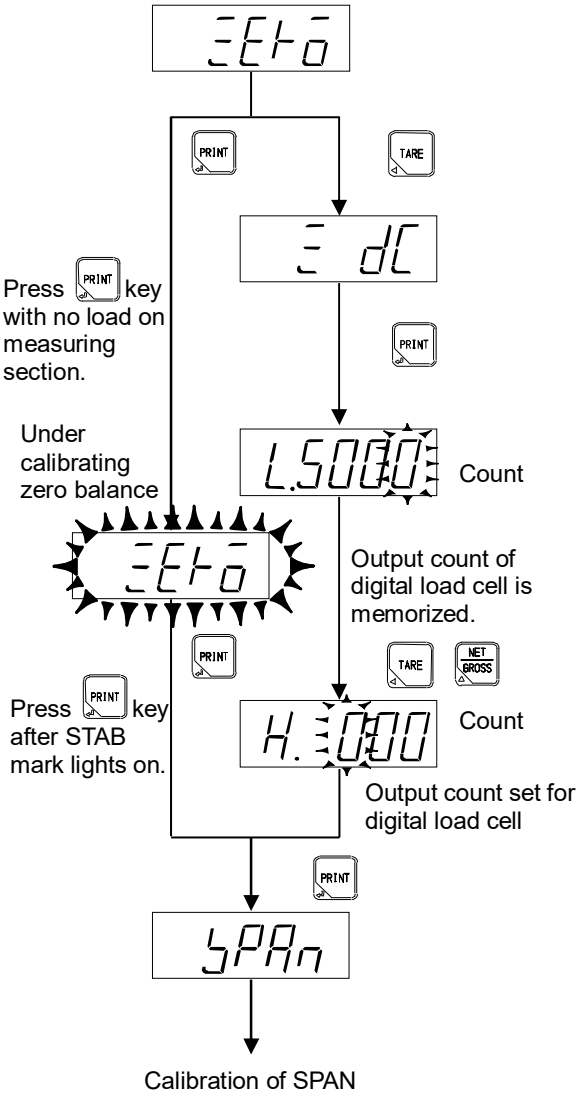
When the zero calibration starts, ZEro is displayed.
Select the zero calibration method.

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

Press PRINT key, and execute the operation of a).
Execute the calibration of zero without put on the measuring section.

(2) Method by the numeric input of the digital load cell output count.

Press TARE key, and execute the operation of b).
Execute the calibration of zero with inputting the output count value of the digital load cell when nothing is put on the measuring section.



a) Method by the measuring data (status of initial load)
Make that nothing is put on the measuring section.

Press PRINT key when ZEro display is flickering, and the STAB. mark lights on. The zero point is memorized, and SPAn is displayed.

b) Method by numeric input of digital load cell output count

When TARE key is pressed, C dC is displayed, and when PRINT key is pressed, L.**** is displayed also.

[L.****] is the memorized output voltage of the load cell. Set the digital load cell output count scale which corresponds to the zero point of the measurement.

[L.****] is set the lower four count value.

[H. ***] is set the higher three count value.

NET GROSS : The value of changed digit is changed.

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 proceeds to the next step.

After the setting, press PRINT key.

《Supplementary explanation》

Flickering point moves to the display L.**** first digit when press TARE key on the fourth digit of display H. ***.

Error display in the calibration of zero point

rE-L The display blinks for about two seconds when the output count of the digital load cell is -1 100 000 x number of connecting digital load cell or less.
(Refer to the paragraph 17. Error display.)

rE-H The display blinks for about two seconds when the output of the digital load cell is -1 100 000 x number of connecting digital load cell or more.
(Refer to the paragraph 17. Error display.)

4-5-7. Calibration at span

When span calibration starts, SPAn is displayed. Please select span calibration method.

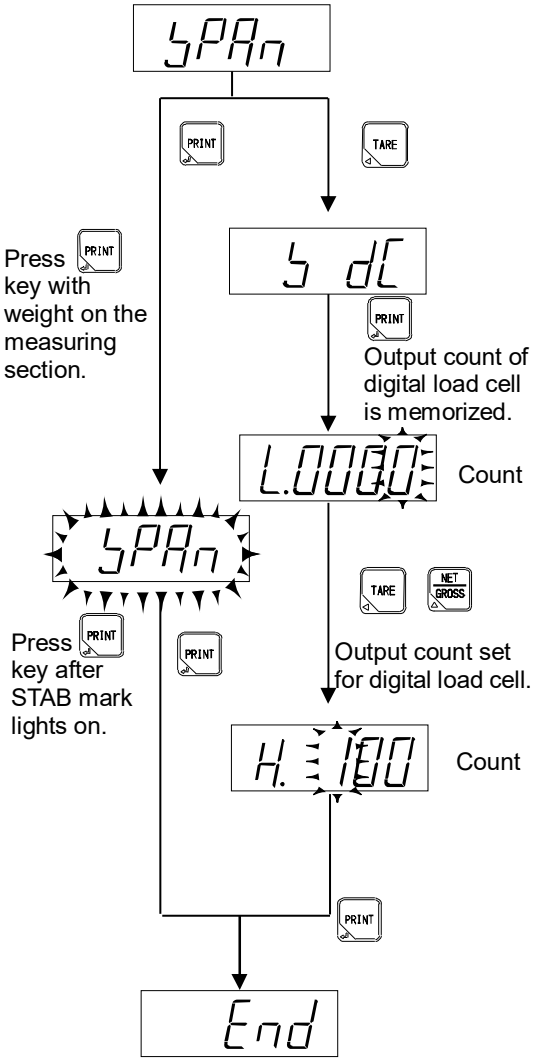
(1) Method by the measuring data ➔ Press PRINT key, and execute the operation of a).

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

(2) Method by the numeric output of the digital load cell output count

➔ Press TARE key, and execute the operation b).

Execute the span calibration by inputting the value which subtract the output count of the digital load cell to zero point of measurement set in paragraph 4-5-6. from the digital load cell output count corresponding to the mass of the counterweight set in paragraph 4-5-5.



a) Method with weight

Put the counterweight corresponds to mass set in the paragraph 4-5-5 on the measuring section.

Press PRINT key when SPAn display blinks, and STAB. mark lights on. Span is memorized and End is displayed.

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

When TARE key is pressed, S dC is displayed, and when PRINT key is pressed, L.**** is displayed also.

[L.****] is memorized output count of a digital load cell. Set the value in count scale which subtract the output count of the digital load cell to zero point of measurement from the output count of the digital load cell corresponding to the mass of the counterweight.

[L.****] is set the lower four count value.

[H. ***] is set the higher three count value.

NET GROSS : The value of changed digit is changed.

TARE : Changed digit is selected.

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

SET : Setting is interrupted and display returns to CCAL

PRINT : Display value is memorized, and it proceed to next step.

After the setting, press PRINT key.

《Supplementary explanation》

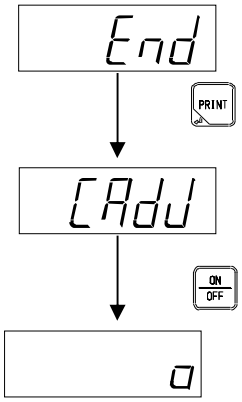
Flickering point moves to the display H. *** first digit when press TARE key on the fourth digit of L.**** display.

Error display in the calibration of zero point

SP-L The display is flickering for about two seconds when ([Digital load cell output count at span] – [Digital load cell output count at zero point]) ≦ 0. (Refer to the paragraph 17. Error display) (Refer to the paragraph 17. Error display.)

SP-H The display is flickering for about two seconds when ([Digital load cell output count at span] – [Digital load cell output count at zero point]) 1 100 000 × number of connecting digital load cell. (Refer to the paragraph 17. Error display.)

4-5-8. Complete the calibration



Stand-by condition

End is displayed when span calibration is completed.

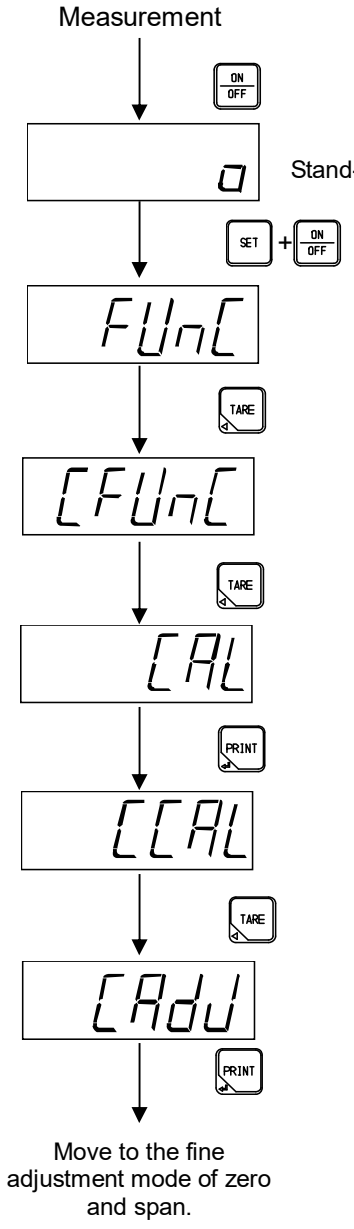
Press PRINT key to quit the calibration mode. The display becomes CAdJ, and the set data is memorized internally.

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

4-6. 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.

4-6-1. Changeover to zero and span fine adjustment mode



Press 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.

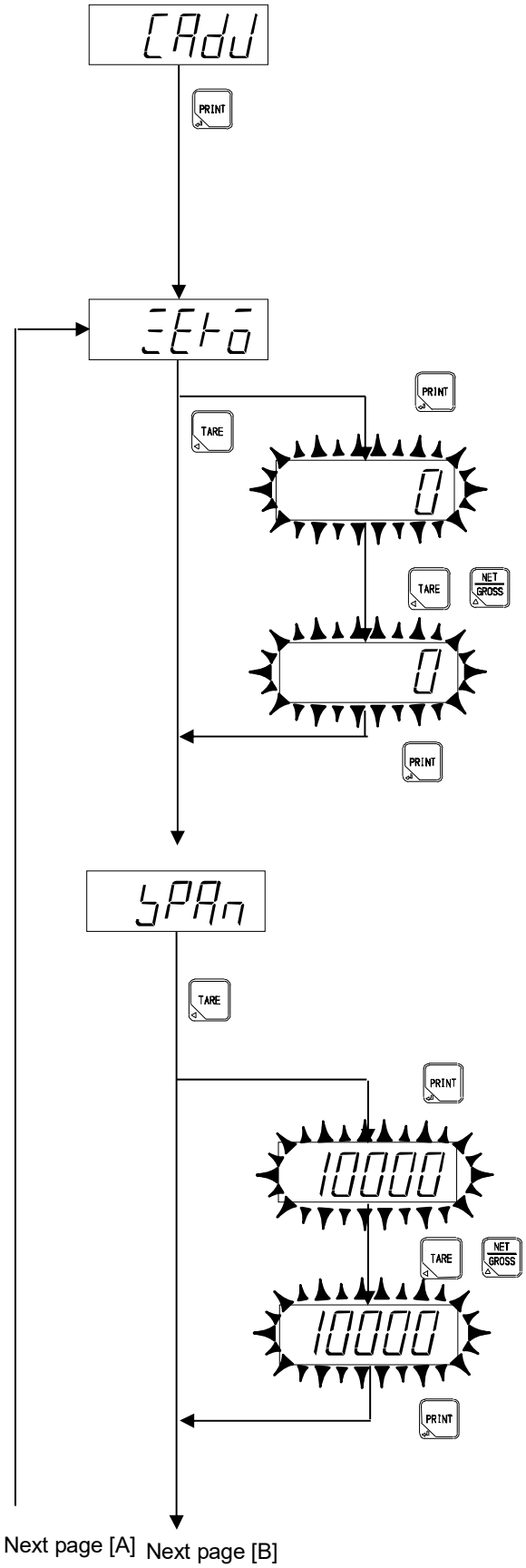
Press TARE key twice.

CAL is displayed, then PRINT key is pressed.

CCAL is displayed.

Press TARE key, CAdJ is displayed, then it enters into the fine adjustment mode of zero and

4-6-2. Fine adjustment of zero and span



When PRINT key pressed from CAdJ display, ZEro is displayed.

In executing the zero fine adjustment, please proceed the operation of a). In case of executing the span adjustment only, press TARE key, and proceed the operation of b) after the SPAn display.

a) Fine adjustment of Zero

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

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

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

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

SET : Interrupts the setting, and returns to display.

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

After the zero fine adjustment, press PRINT key.

Display becomes SPAn. In case of executing the fine adjustment of span, the operation of b is proceeded.).

Otherwise, by pressing PRINT key, the operation of c) is proceeded after the End display.

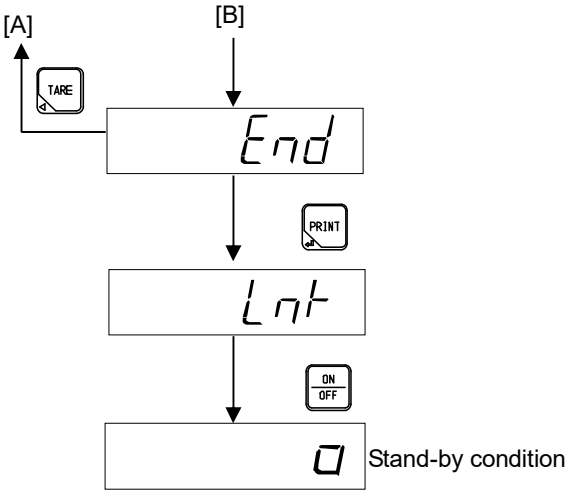
b) Fine adjustment of span

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

***** is displayed by pressing 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 End display by pressing PRINT key.



c) End of fine adjustment mode

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

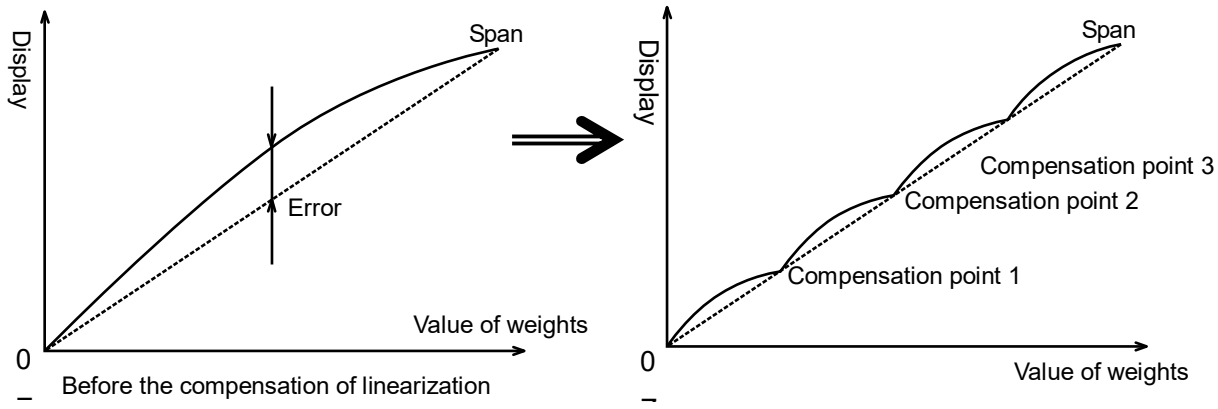
LnE displayed, and the setting data is memorized to the internal memory.

Press ON/OFF key, and move to the stand-by condition.
The fine adjustment mode of zero and span is completed.

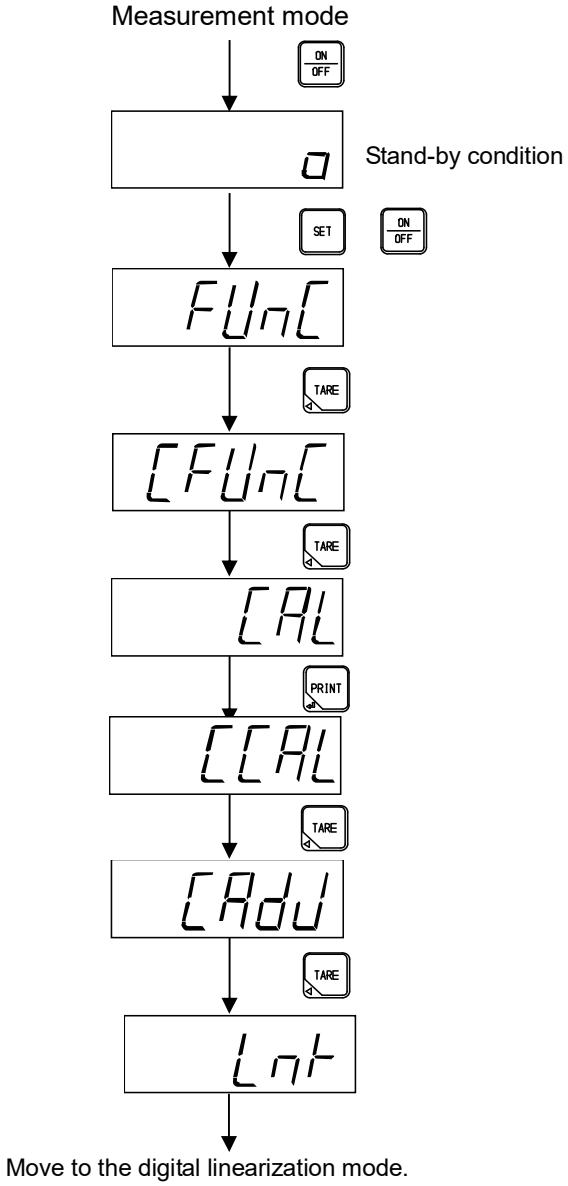
4-7. Digital linearization

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.



4-7-1. Changeover to digital linearization mode



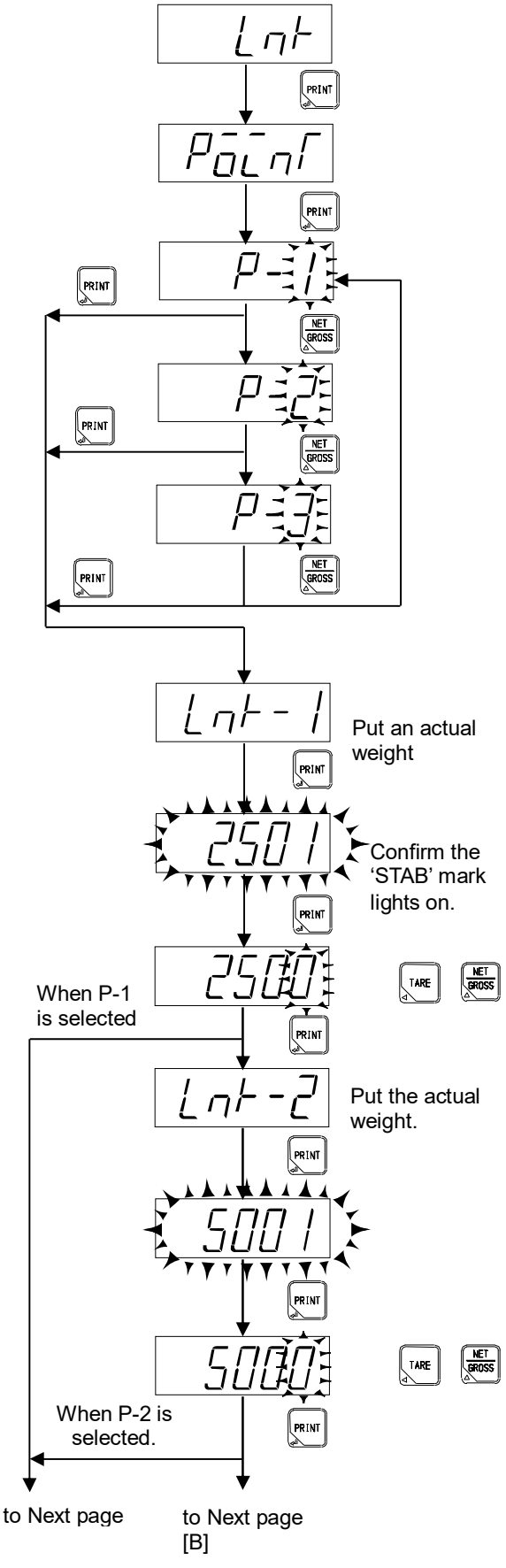
Change the condition from the normal measurement mode to the stand-by condition by pressing ON OFF key.

By pressing ON OFF key with SET key at the same time, FUnC is displayed.

Press PRINT key after pressing TARE key twice, CCAL is displayed.

LnE is displayed after pressing TARE key twice, and enter into the digital

4-7-2. Setting of the digital linearization



By pressing PRINT key twice from LnL display, P-1 comes → by pressing NET GROSS key, please select the numbers of points which wants to compensate linearization, and press 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 LnL-1 on the measuring section and press PRINT key.

As the measuring value blinks, press PRINT key after confirming the STAB. mark lighting on.

As the 10^0 digit of the measuring value blinks, set the same value with the weights put on the measuring section.

NET GROSS : Increase the measuring value.

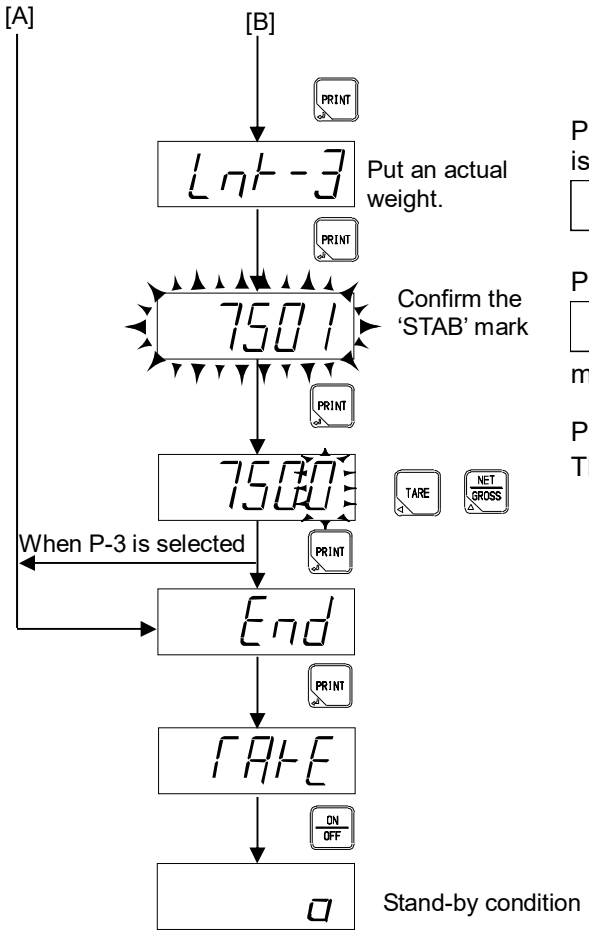
TARE : Decrease the measuring value.

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

SET : The setting is interrupted, and return to the display of LnL.

The display becomes LnL-2 when P-2 is selected, and please execute the compensation of the second point.

Additionally, the display becomes LnL-3 when P-3 is selected, and please execute the compensation of the third point. Make the value of weight as LnL-1 < LnL-2 < LnL-3.



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

End is displayed.

Press 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 ON OFF key. The digital linearization mode is finished.

- **Make the weights to be compensated as Lnt-1 < Lnt-2 < Lnt-3.**
- **The compensation of linearization cannot be executed over the maximum capacity.**
- **The compensation data of the digital linearization can be cleared by C function CF-98.**

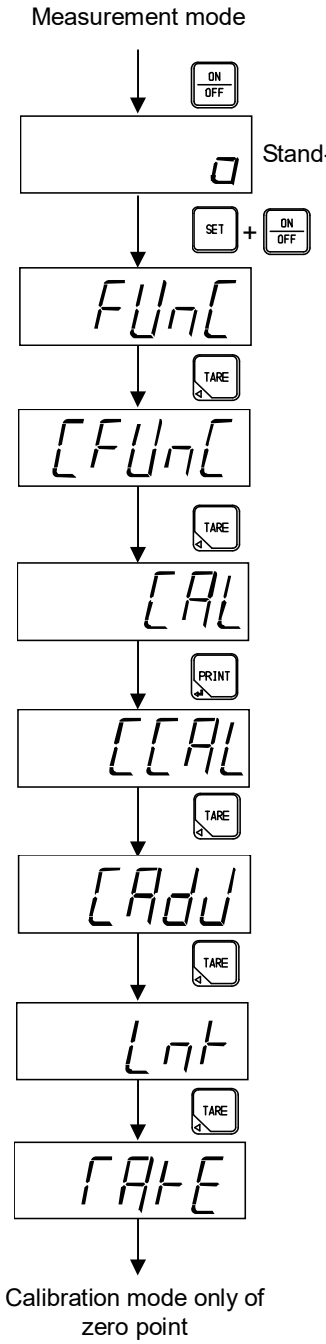
Refer to the paragraph 6-12. Digital linearization clear

- **Digital linearization is function correcting the linearity so that it is not correcting hysteresis.**
- **Linearization does not work properly if the measurement error has repeatability.**

4-8. 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.

4-8-1. Changeover of the calibration mode by zero point



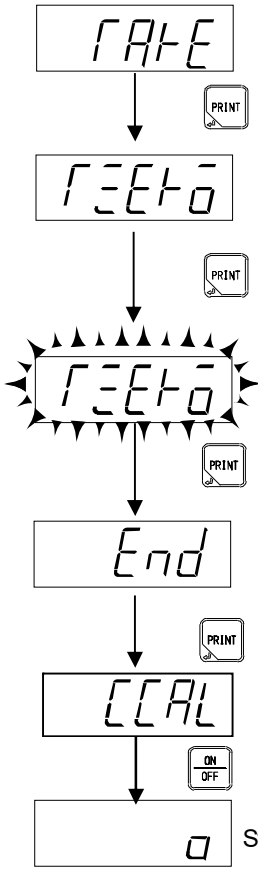
Press ON OFF key to change from the measurement mode to the stand-by condition.

By pressing ON OFF key with SET key, FUnC is displayed.

By pressing PRINT after pressing twice of TARE key, CCAL is displayed.

By pressing TARE key at three times, the display becomes rAtE, you can proceed the calibration mode only for the zero balance.

4-8-2. Calibration mode only of zero point



Stand-by condition

Please make the display to ZERO by pressing PRINT key from the display of TARE.

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

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

Press PRINT key after the stability mark lighting on.

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

Press 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 ON OFF key.

The calibration mode only of zero point is finished key.

Error display of the calibration at zero

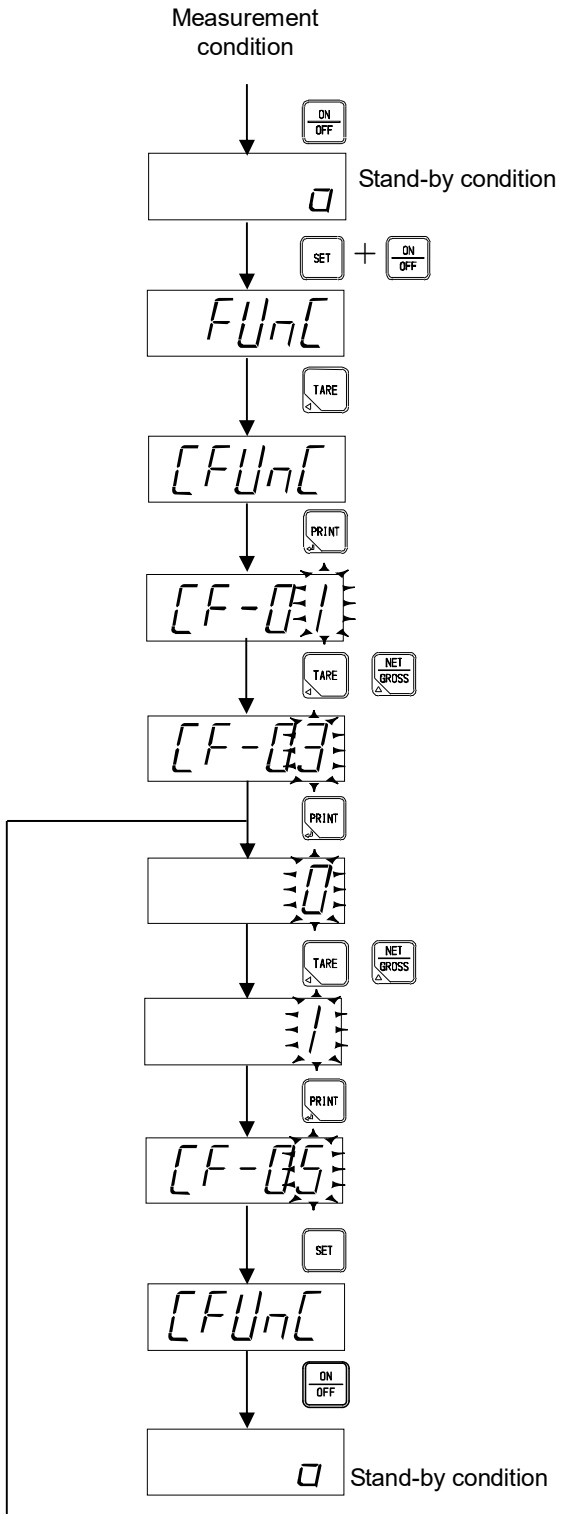
RE-L : The display blinks for about 2 seconds when the digital load cell output count is less than -1100 000 × number of digital load cell connecting.
(Refer to the paragraph 17. Error display.)

RE-H : The display blinks for about 2 seconds when the load cell output is over -1100 00 × number of digital load cell connecting.
(Refer to the paragraph 17. Error display.)

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

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

CFUnC is displayed by pressing TARE key, and C function mode can be entered.

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

NET/GROSS : The value of the changed digit is changed.

TARE : Select the changed digit.

ZERO : Change the display value to [0].

SET : interrupt the setting and return to display of CFUnC.

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

ON/OFF : Finish the C function mode.

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

Press 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.

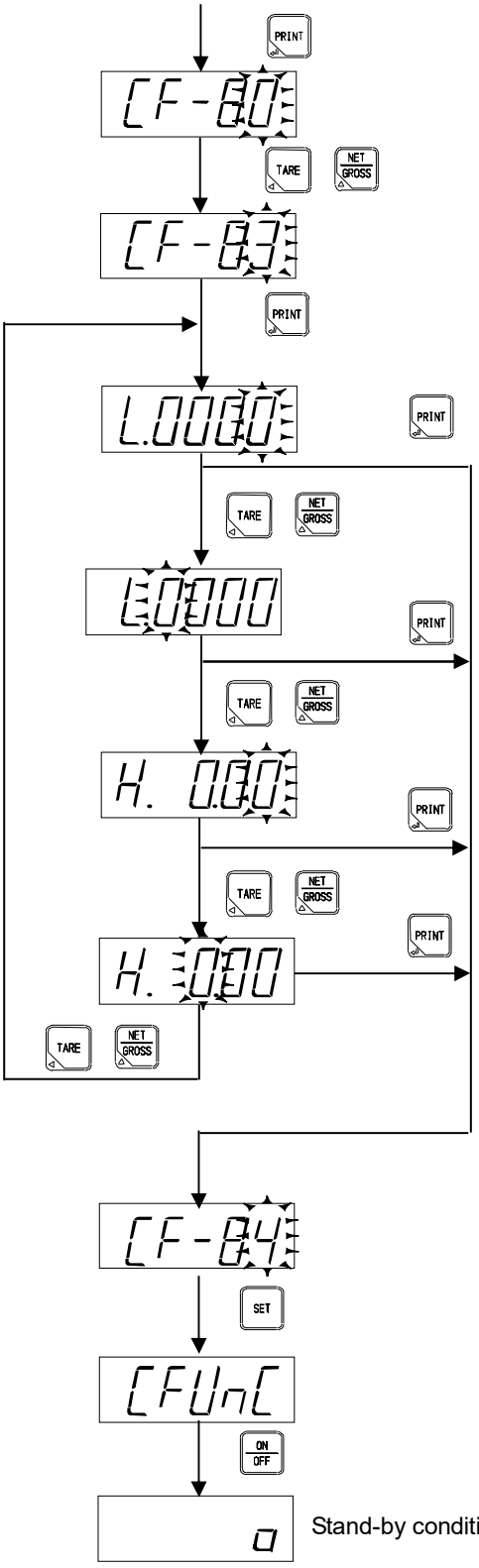
If the SET key is pressed after the registration is completed, CFUnC is displayed.

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

Refer to the [4-4-2 Register of the digital load cell S/N (serial No.)] in the case of [CF-60 to CF-67]
Refer to the 5-1-1 in case of [CF-80 to CF-87]
Refer to the 5-1-2 in case of [CF-93 to CF-94]

5-1-1. Refer/ register the modulus of corner adjustment result

Display the modulus of corner adjustment result by CF-80 to CF-87



Stand-by condition

By pressing PRINT key, CF-80 is displayed.
Select C function No. which wants to refer.

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

TARE : Select the changed digit.

ZERO : Change the display value to [0].

SET : Interrupt the setting and return to the display of CFUnC.

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

ON OFF : Finish the C function mode.

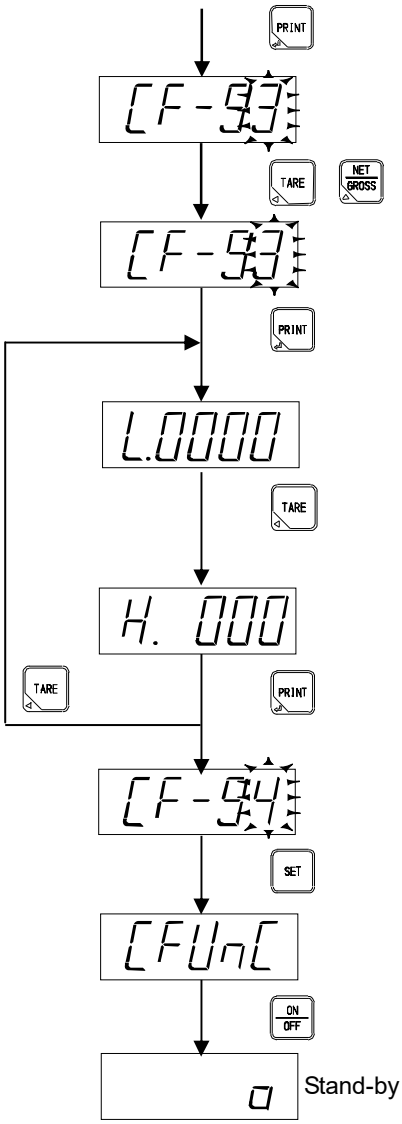
Pressing TARE key on the forth digit of [L.****], selecting flickering point moves first digit of [H.****].
Change the setting of flickering digit by NET GROSS key.
Press NET GROSS key and change to [Space] -> [0] -> [1] -> [2] -> [3] -> ->-> [9] -> [0].

Flickering point moves to the first digit of the display [L.****] when press the TARE key at the display [H.****] code digit is flickering.

Example: H. 100 and L.0000 that modulus will be 1.000000.

5-1-2. Refer to the digital load cell output count at zero/ span calibration

Display the digital load cell output count at zero/ span calibration by CF-93 to CF-94



By pressing the PRINT key, CF-93 is displayed.
Select C function number. which wants to refer

TARE : Select the referring digit.

L.0000 : Display under fourth digit as

H. 000 : Display over third digit as

ZERO : Invalid

SET : Interrupt the refer and return to the CFUnC

PRINT : Proceed to the next step

ON OFF : Finish the C function mode.

Example: H. 1.00 and L.0000 that will be 1000000.

5-2. Contents table of C-function

Item	C-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 %
		*2	Smaller than -20D and larger than maximum capacity ＋9D
Unit (Unit setting at RS corresponding output)	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
Setting the storing memory of the setting data	CF-17	00 ~ 11	0: store in RAM 1: store in EEPROM 10: zero set data 10: tare data
		*00	
Method of setting gravity acceleration compensation	CF-25	*0	Set the district number
		1	Set a numeric value for 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/s2

* : Set as default

Item	Function No.	Setting value	Contents
Gravity acceleration value setting of calibration place	CF-29 (Possible to set at CF25＝1)	9.000 ~ 9.999 *9.797	Unit : m/s2
Range switch operation	CF-40	*0	Range change OFF
		1	Changeable between 2 ranges.
		2	Changeable between 3 ranges
Setting of scale interval of the second range	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	
ID No. 1 S/N (serial No.) setting	CF-60	*[_____]	Set S/N of ID No.1 divides into lower No. and higher No. (Configurable max 8 digits)
ID No. 2 S/N (serial No.) setting	CF-61	*[_____]	Set the S/N of ID No.2 divides into lower No. and higher No. (Configurable max 8 digits)
ID No. 3 S/N (serial No.) setting	CF-62	*[_____]	Set the S/N of ID No.3 divides into lower No. and higher No. (Configurable max 8 digits)
ID No. 3 S/N (serial No.) setting	CF-63	*[_____]	Set the S/N of ID No.4 divides into lower No. and higher No. (Configurable max 8 digits)
ID No. 4 S/N (serial No.) setting	CF-64	*[_____]	Set the S/N of ID No.5 divides into lower No. and higher No. (Configurable max 8 digits)
ID No. 5 S/N (serial No.) setting	CF-65	*[_____]	Set the S/N of ID No.6 divides into lower No. and higher No. (Configurable max 8 digits)
ID No. 6 S/N (serial No.) setting	CF-66	*[_____]	Set the S/N of ID No.7 divides into lower No. and higher No. (Configurable max 8 digits)
ID No. 7 S/N (serial No.) setting	CF-67	*[_____]	Set the S/N of ID No.8 divides into lower No. and higher No. (Configurable max 8 digits)
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

* : Set as default

Item	Function No.	Setting value	Contents
Display value at the analog output of DC20 mA(DC10 V)	CF-72	0 ~ 999999 *10 000	Unit : 1D
ID No. 1, calibration coefficient	CF-80	-9.999999 ~ 9.999999 *1.000000	Display result of the adjustment by corner adjustment. Configurable setting value. Divides into lower No. and higher No
ID No. 2, calibration coefficient	CF-81		
ID No. 3, calibration coefficient	CF-82		
ID No. 4, calibration coefficient	CF-83		
ID No. 5, calibration coefficient	CF-84		
ID No. 6, calibration coefficient	CF-85		
ID No. 7, calibration coefficient	CF-86		
ID No. 8, calibration coefficient	CF-87		
Calibration data of the scale interval (Reference use)	CF-90	*1	
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 count (Reference use)	CF-93	*0	Divides into lower No. and higher No.
Calibration data of span count (Reference use)	CF-94	*1 000 000	Divides into lower No. and higher No.
Number of connecting cells at the calibration	CF-95	*1	(Reference use)
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

* : 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].

[Nothing] is selected as a default.

6-2. Condition of over display (oL or -oL display)

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

[At the time of more than |maximum capacity + 9D|], [at the time of exceeding to the maximum value± 110 %] or [Exceeding to -20D to measuring weight] can be selected.

[Smaller than -20D and larger than maximum capacity ＋9D] is selected as a default.

6-3. Setting of the unit at RS communication output

The RS-232C, RS-422/ 485 and Interface load output unit is selected by C function CF-05.

The unit can be selected from [No unit], [g], [kg], [t] and [lb].

[No unit] is selected as a default.

6-4. Zero set

The zero set function memorizes a present measuring value as zero point when 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.

[Operation at steady] is selected as a default.

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.

[±2 % of the maximum capacity] is selected as a default.

- **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. Target zero tracking

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

[Gross value or net value] or [Gross value] can be selected.

[Gross value] is selected as a default

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

[01] is selected as a default.

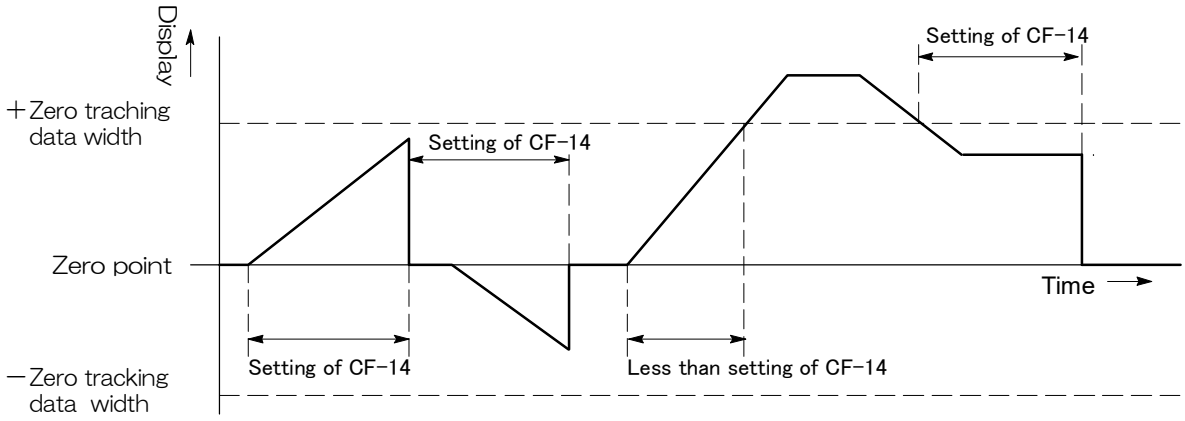
6-5-3. Zero tracking time width

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

Setting range : 0 ~ 9, Unit : 0.5 s, [0] : OFF

[2] is selected as a default.

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.

[Effective] is selected as a default.

- **The zero compensation is not accepted in the following condition when the setting of C functions CF-15 is [Effective power on zero] and when power on zero is starting.**
  (1) When the display is not a stable condition, it becomes as all lighting.
  (2) When the measurement value exceeds ±10 % of the maximum capacity, [– – – – – – –] is displayed. At this time, if 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 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 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 zero set is executed in a condition of gross value display, the tare weight cancellation is cleared.**

6-8. Setting of record place of set data

It is able to switchover the recording of TARE data and zero data as RAM ⇔ EEPROM.

Switchover the recording place of TARE data and zero set data which RAM or EEPROM by C function CF-17. However, the recording place of TARE DATA and zero set data will be RAM in case of the setting of the C function CF-15 is [Valid].

It is preserved almost permanent because EEPROM is nonvolatile.

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

6-9. 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.

6-9-1. 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.

[The district number is set as a default.

6-9-2. 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.

6-9-3. 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 districts.
Please refer to [Gravity acceleration compensation table] in the next page.

6-9-4. 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.

6-9-5. 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)**

6-10. Automatic range switch

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

6-10-1. 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]. [OFF] is selected as a default.

6-10-2. 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 intervals], [5 scale intervals], [10 scale intervals], [20 scale intervals] and [50 scale intervals]. [5 scale intervals] is selected as a default.

6-10-3. 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]. [003000] is selected as a default

6-10-4. 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 intervals], [5 scale intervals], [10 scale intervals], [20 scale intervals] and [50 scale intervals]. [10 scale intervals] is selected as a default.

6-10-5. Setting the boundary value of the third range

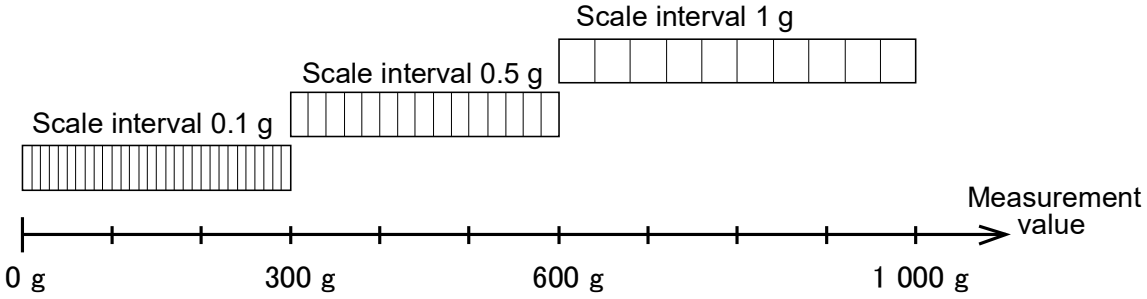
The boundary value of the third range can be set by C function CF-44.
Setting range: [0] ~ [999999]. [006000] is selected as a default

ex.1 In case of gross value

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

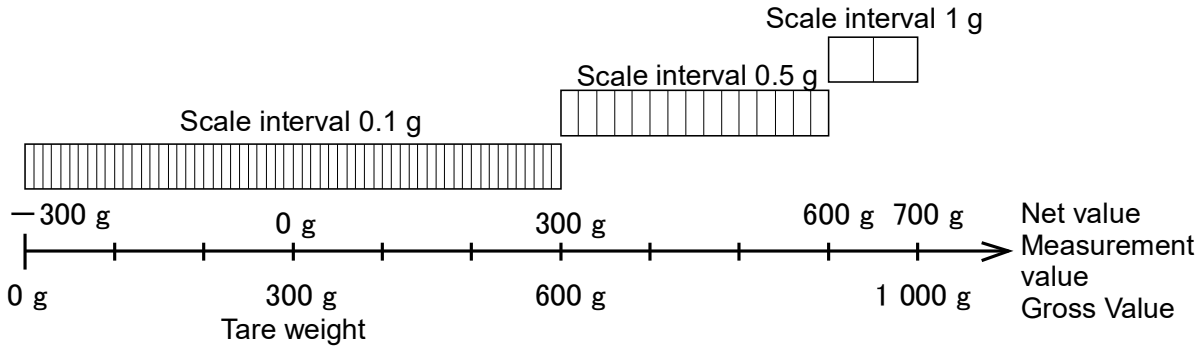
The second range: 600.0 g (Boundary of the third range), scale interval 0.5 g (Scale interval of the second range)

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).

Example.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 1st range＜the 2nd range＜the 3rd 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.**

6-11. 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
[05] is set as a default.

6-12. Digital linearizer clear

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

If key PRINT is pressed with CF-98 display, LnCLr becomes a blinking display.

Press 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 PRINT key is pressed when LnCLr displays blinking, and the operation of digital linearization is completed.

6-13. 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 PRINT key is pressed when CF-99 displays blinking, CFCLr becomes a blinking display. Press ON/OFF key to discontinue the clear memory at this point.

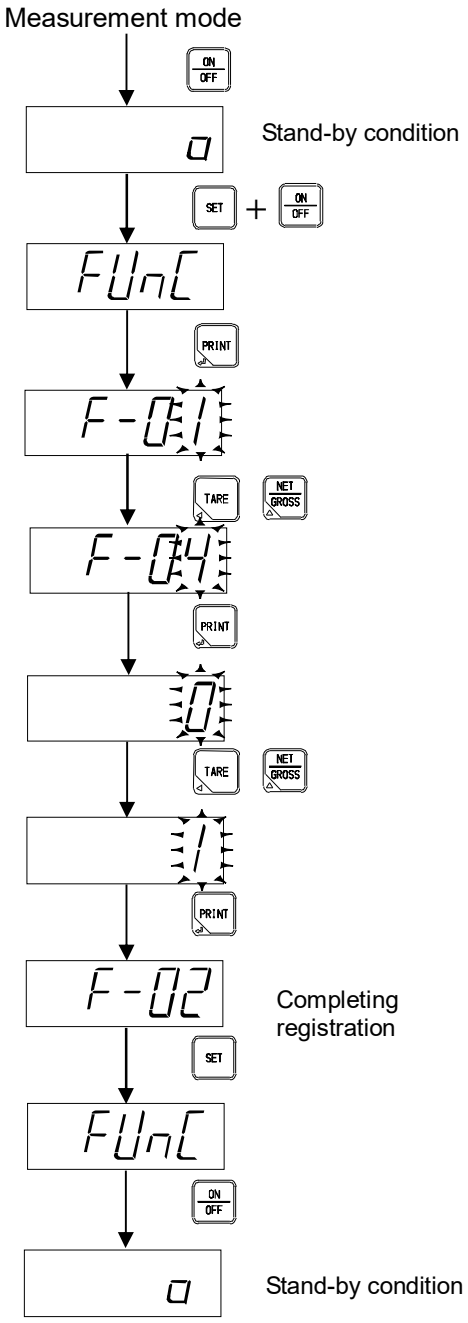
It becomes a stand-by condition, and digital linearization is not clear.

If PRINT key is pressed when CFCLr displays blinking, the display section is turned off and becomes to F-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 ON OFF key.

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

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

NET GROSS : Change the value of changing digit.

TARE : Select the changed digit.

ZERO : Change the display value into [0].

SET : Interrupt the setting and return to the FUnC display.

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

ON OFF : Finish the function mode.

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

Press PRINT key. The setting contents is registered, and the display panel displays the following registered function number. Continue and select the selected function number when you change setting of other function numbers.

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

7-2. Contents table of function

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
Key lock	F-03	00000 ~ 11111 *00000	0 : Permit 1 : Forbidden 10^0 digit : PRINT/ ENTER key 10^1 digit : ZERO key 10^2 digit : NET/ GROSS key 10^3 digit : TARE key 10^4 digit : ON/ OFF key
Display rate	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
Stability detection data width	F-10	1	Effective
Stability detection time width	F-11	0 ~ 9 *4	Unit : 0.5D 0 : Stability detection OFF
		0 ~ 9 *2	Unit : 0.5 s 0 : Stability detection OFF
Automatic print operation	F-16	*0	OFF (operating PRINT key or external control input)
		1	Exceed +5D data only weight is stable
		2	Beyond the range of data -5D to +5D only weight is stable.

* : has been set as default.

Items	Function No.	Setting value	Contents
Comparator comparison operation	F-20	0	OFF
		1	All data
		2	All data only weight is stable
		3	Exceed +5D data
		*4	Exceed +5D data only weight is stable
		5	Beyond the range of data -5D to +5D
		6	Beyond the range of data -5D to +5D only weight is stable.
		7	Throw mode
		8	Discharge mode
Target of comparator comparison operation (Target when F-20 is set by 1 to 6.)	F-21	00000 ~ 22222 *00000	0 : Display interlock 1 : Gross value 2 : Net value 10^0 digit : S1 operating target 10^1 digit : S2 operating target 10^2 digit : S3 operating target 10^3 digit : S4 operating target 10^4 digit : S5 operating target
Direction of comparator comparison operation (Direction when F-20 is set by 1 to 6.)	F-22	00000 ~ 22222 *00000	0 : OFF 1 : OVER 2 : LESS 10^0 digit : S1 operating 10^1 digit : S2 operating 10^2 digit : S3 operating 10^3 digit : S4 operating 10^4 digit : S5 operating
Operation of comparator S1	F-23	0	On at (Gross weight)≧(measuring weight)
		1	On at S2, S3 output
		2	On at S2, S4 output
		3	On at S2, S5 output
		4	On at S3, S4 output
		5	On at S3, S5 output
		6	On at S3, S5 output
		7	On at S4, S5 output
Comparator hysteresis operating conditions	F-24	*0	ON delay
		1	OFF delay
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 PRINT key, external control input or the automatic print.)

* : has been set as default.

Items	Function No.	Setting value	Contents
BCD output target	F-31	*0	Display interlock
		1	Gross value
		2	Net value
		3	Tare weight value
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 102 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
Switchover the communication protocol	F-39	*0	Communication protocol 1
		1	Communication protocol 2
Communication protocol 1 RS-232C operating mode	F-40	*0	Command mode
		1	Stream (outputs synchronizing with the display frequency.)
		2	Synchronizes with the print. (Synchronize with PRINT key, external control input or automatic print.)
Communication protocol 2 RS-232C output target	F-41 (Valid at F-39=0 also F-40=1 or 2)	*0	Interlock display
		1	Total weight
		2	NET
		3	Loading display data with condition
RS-232C/422/485 specification for communication	F-42	*13020	Data bit length 100digit : *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
RS-232C/422/485 transmission data decimal point existence Communication protocol 1	F-46 (Valid at F-39=0)	*0	Nothing
		1	Existing

* : has been set as default.

Items	Function No.	Setting value	Contents
RS-232C operating mode	F-47 (Valid at F-39=1)	*0	Stream (outputs synchronizing with the display frequency.)
		1	Synchronizes with the print. (Synchronize with PRINT key, external control input or automatic print.)
		2	Command mode without address
		3	Command mode with address
Communication protocol 2 RS-232C output target	F-48 (Valid at F-39=0 also F-47=1 or 2)	*0	Interlock display
		1	Total weight
		2	NET
		3	TARE
		4	Total weight, NET, TARE
Communication protocol 2 Switchover the data format	F-49 (Valid at F-39=0)	*00	Switchover the digital format 10^0 digit: *0= format 1, 1= format 2 Setting digit of the unit 10^1 digit : *0= unit 2 digit, 1= unit 3 digit
External control input IN1 operation setting	F-60	*00	Operation OFF
		1	The same operation as ON/OFF key
		2	The same operation as SET key
		3	The same operation as TARE key
		4	The same operation as NET/GROSS key
		5	The same operation as ZERO key
		6	The same operation as PRINT key
		7	Switch the display of net value (Effective only in the measuring mode.)
		8	Hold display (Level operation)
External control input IN2 operation setting	F-61	It is optional as well as F-60.	
External control input IN3 operation setting	F-62	It is optional as well as F-60.	
External control input IN4 operation setting	F-63	It is optional as well as F-60.	
External control input IN5 operation setting	F-64	It is optional as well as F-60.	
External control input IN6 operation setting	F-65	It is optional as well as F-60.	
SI/ F operating set	F-70	*0	Hold at it displays
		1	Display unsynchronized.
For Maintenance	F-90	Do not use	
For Maintenance	F-91	Do not use	
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]. [4 times] is selected as a default.

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

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

8-2. Key lock

Forbid the key operation on measurement mode by setting in function F-03.

Key lock (operation forbidden) condition at corresponding digit is [1].

10^0: PRINT key

10^1: ZERO key

10^2: NET GROSS key

10^3: TARE key

10^4: ON OFF key

If the ON OFF key is forbidden, valid only once ON OFF key by press ON OFF and NET GROSS two key at the same time.

8-3. 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].
[15 times/s] is selected as a default.

8-4. 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.

8-4-1. 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]. [10 times] is selected as a default.

8-4-2. 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
[005] is set as a default.

8-4-3. Time width of stabilization filter

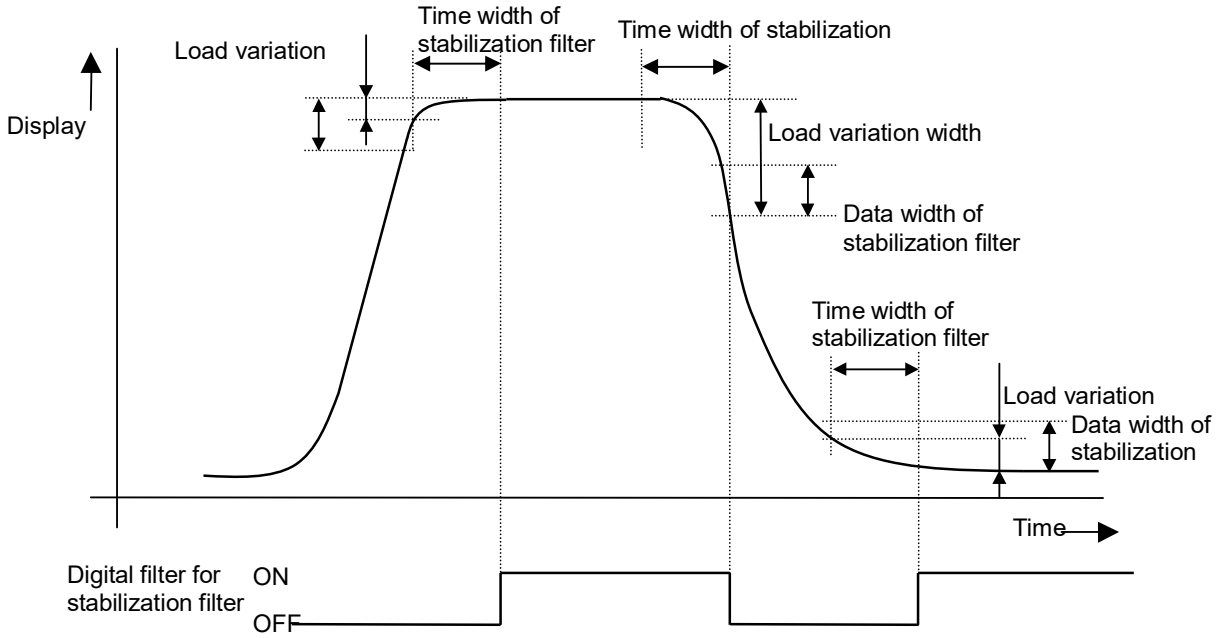
The time width of stabilization filter can be set by the function F-07.

Setting range : [00] ~ [99], Unit : 0.5 s, [00] : OFF

[01] is set as a default.

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] x [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 x 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 average of stabilization filter function (F-05)], after [The moving average of digital filter(F-01)].**

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

[4] is set as a default.

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

[2] is set as a default.

- **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. 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.

8-6-1. 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].

[OFF] is selected as a default, and printing is made by the input of 

key or external control input.

8-7. Setting operation of external control input

You can control the function externally by [control input] terminal at rear panel.

Execute the function setting of each control input by setting function F-60 to F-65.

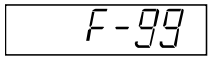
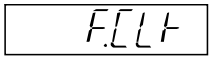
Refer to the [2-3. Connection of external control input].

F-60 to F-65 is all default setting as set as [OFF the operation].

8-8. Memory clear

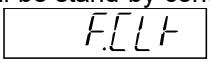
Execute the memory clear by function F-99.

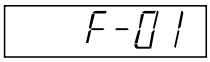
Return the setting contents of function to default setting.

The  display is flickering by displaying  and press PRINT key.

Press ON/OFF key If cancel the memory clear at this point.

Condition will be stand-by condition and memory clear is not enforced.

The display  is flickering, press PRINT key and display section will light down.

Displaying  then complete the memory clear.

9. Stored place for setting data

This instrument memorizes each data as RAM and EEPROM following below.
EEPROM is semi-permanently memorized in instrument by reason of nonvolatile.
Moreover, RAM data will disappear because RAM is not backed up.

9-1. Memorizing data in RAM

TARE data
Zero tracking data
Zero set data

9-2. Memorizing data in EEPROM

Calibration data
Function data
C function data
Comparator setting value

- **Switchover the recording place of TARE data and zero set data which RAM or EEPROM by C function CF-17.**
- **Initialize the all data which record in RAM at power up**
- **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.**

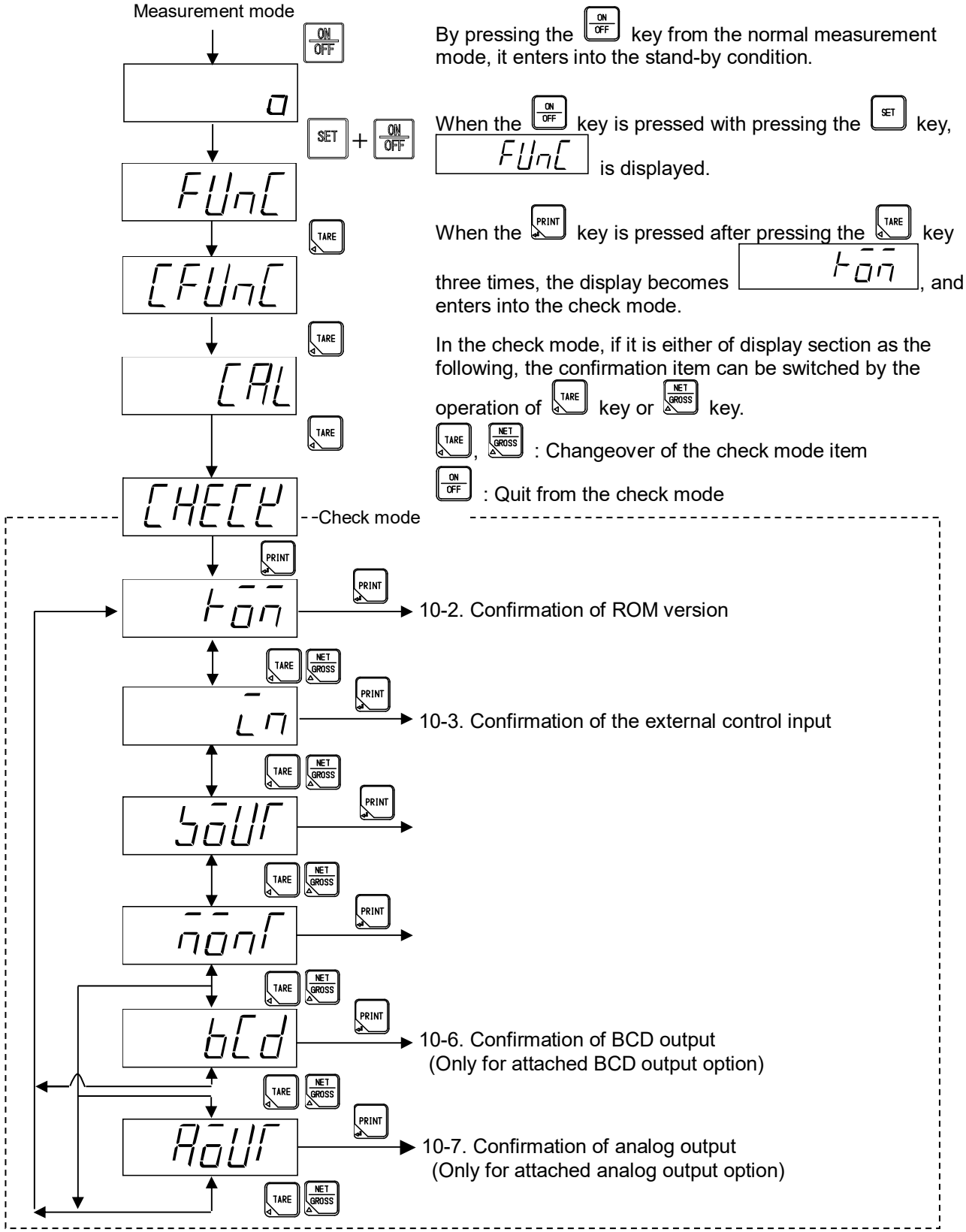
10. Check mode

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.

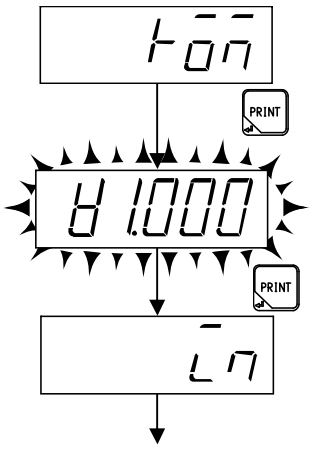
When the PRINT key is pressed after pressing the TARE key three times, the display becomes toN, and enters into the check mode.

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

TARE, NET GROSS : Changeover of the check mode item

ON OFF : Quit from the check mode

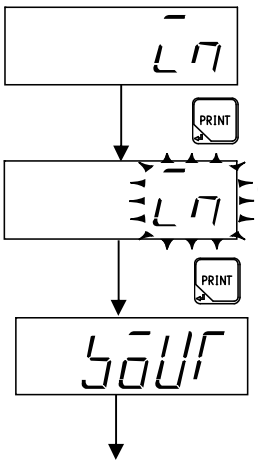
10-2. How to confirm ROM version.



How to confirm an external control input.

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

10-3. How to confirm a external control input



Confirms by external input ON/OFF.

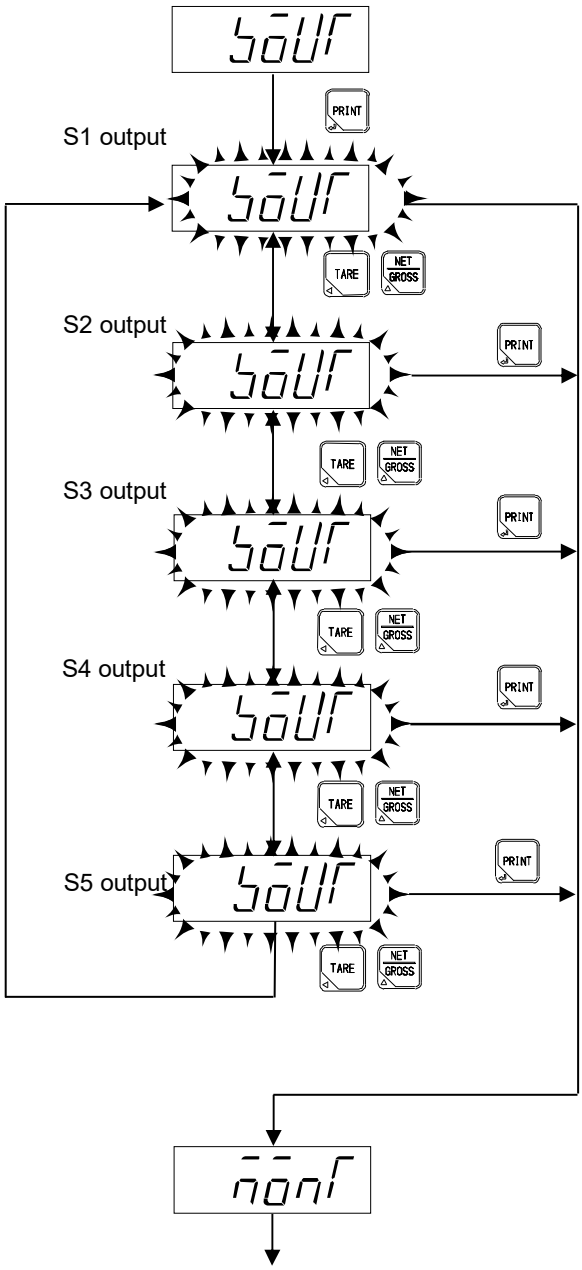
How to confirm comparator output.

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 terminal is turned on.

Terminal No.	Status display
9	STAB. ■ mark
10	TARE ■ mark
11	GROSS ■ mark
12	NET ■ mark
13	ZERO ■ mark
14	HOLD ■ mark

10-4. How to confirm a comparator output



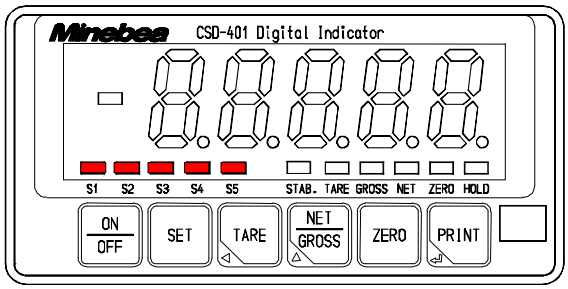
How to confirm an output count of digital load cell

When PRINT key is pressed from display, display blinks.

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

TARE, NET GROSS : Switchover the each comparator output

ON OFF : Quit from the check mode

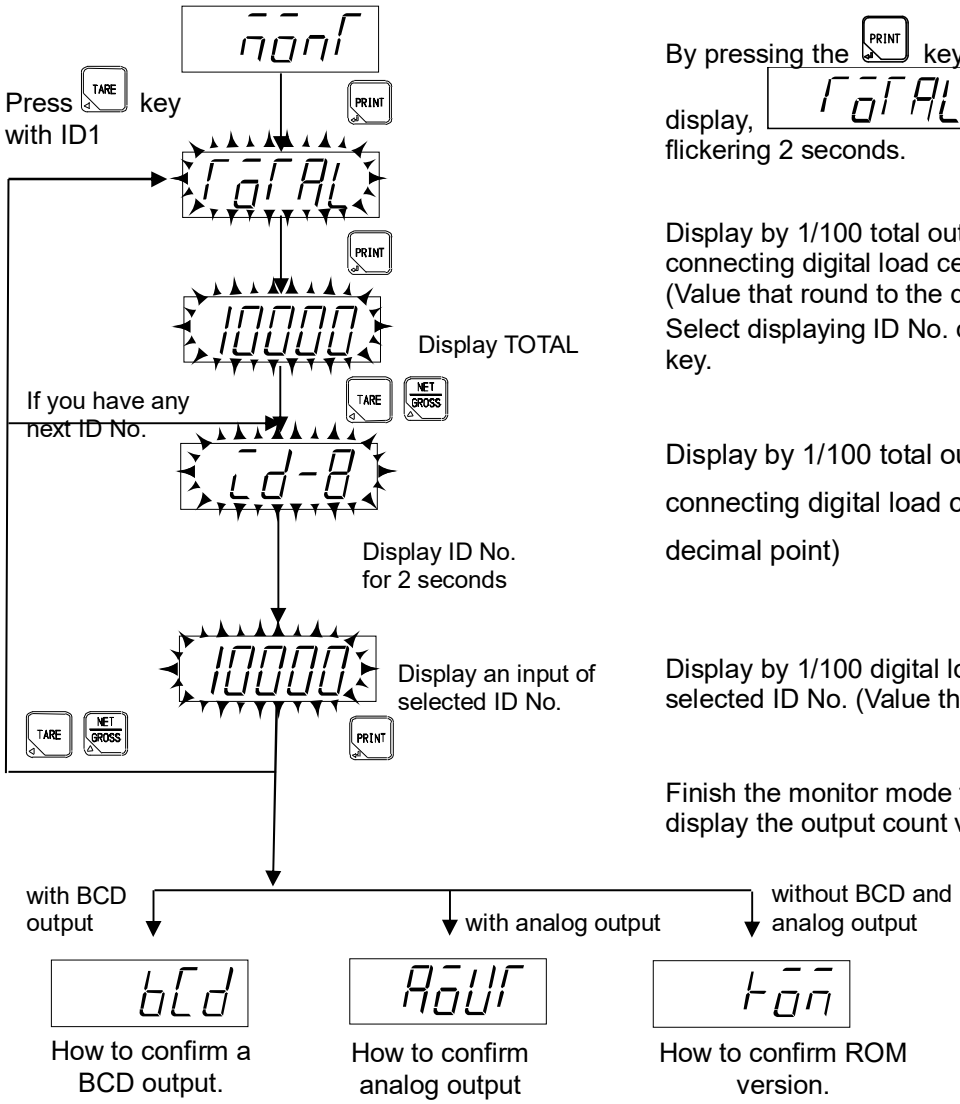


Lights on the LED S1 ~ S5 linking with comparator output.

- **Comparator output is the function that attached to BCD out (CSD401-P15).**
- **When optional product does not install the changeover operation of the display is executed.**

10-5. How to Confirm an output count of digital load cell

In the confirmation of the digital load cell output voltage, the weight put on a present digital load cell is converted into count value.



By pressing the PRINT key from display, displays and it is flickering 2 seconds.

Display by 1/100 total output count value of all connecting digital load cell.
(Value that round to the decimal point)
Select displaying ID No. of digital load cell by press the key.

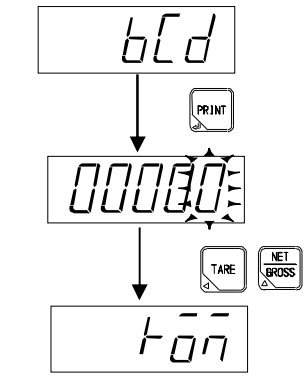
Display by 1/100 total output count value of all connecting digital load cell. (Value that round to the decimal point)

Display by 1/100 digital load cell output count of selected ID No. (Value that round to the decimal point)

Finish the monitor mode to press the PRINT key at display the output count value

- **The displayed digital load cell output count is a reference value.**

10-6. How to confirm the BCD output (When BCD output is equipped with.)



How to confirm the ROM version

By pressing the PRINT key from bCd display, 00000 is displayed, and 100 digit blinks.

At this time, the same value as the display is output from the BCD output.

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

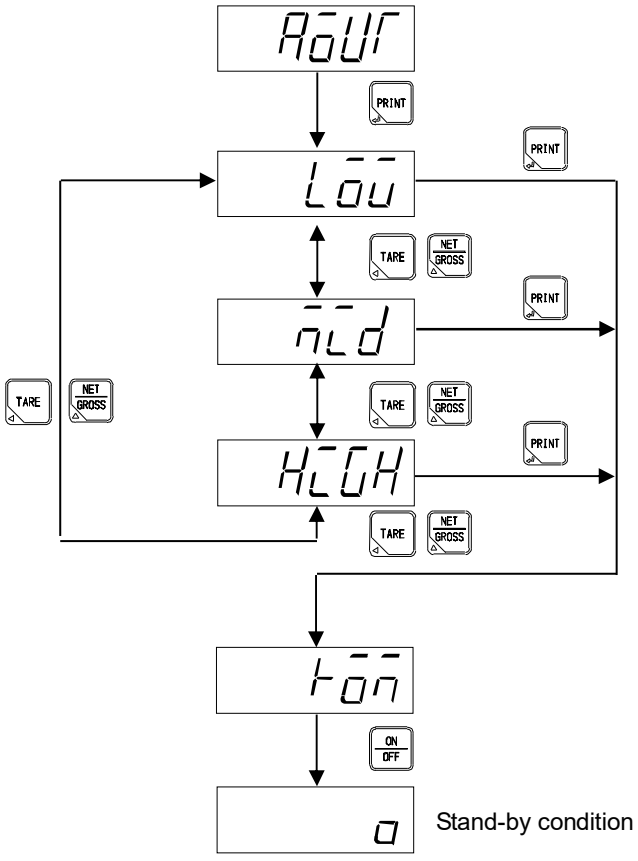
NET GROSS : Change the value of changed digit.

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. How to confirm an analog output (When analog output is equipped with.)



Stand-by condition

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

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 comparator output (BUD 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 [Simple 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	Simple 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	

[Data exceeding ＋5D during stable condition] is selected as a default.

11-2. Target of comparator operation

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

The target of comparator operation can be selected from [Gross value] and [Net value].

Default has selected [Interlocking display].

11-3. Simple comparison mode

Simple comparison mode is the mode that outputting the signal of S1, S2, S3, S4, S5 comparing loading value and setting value.

It is valid at function F-20 is [1 to 6].

11-3-1. Operating condition of simple comparison

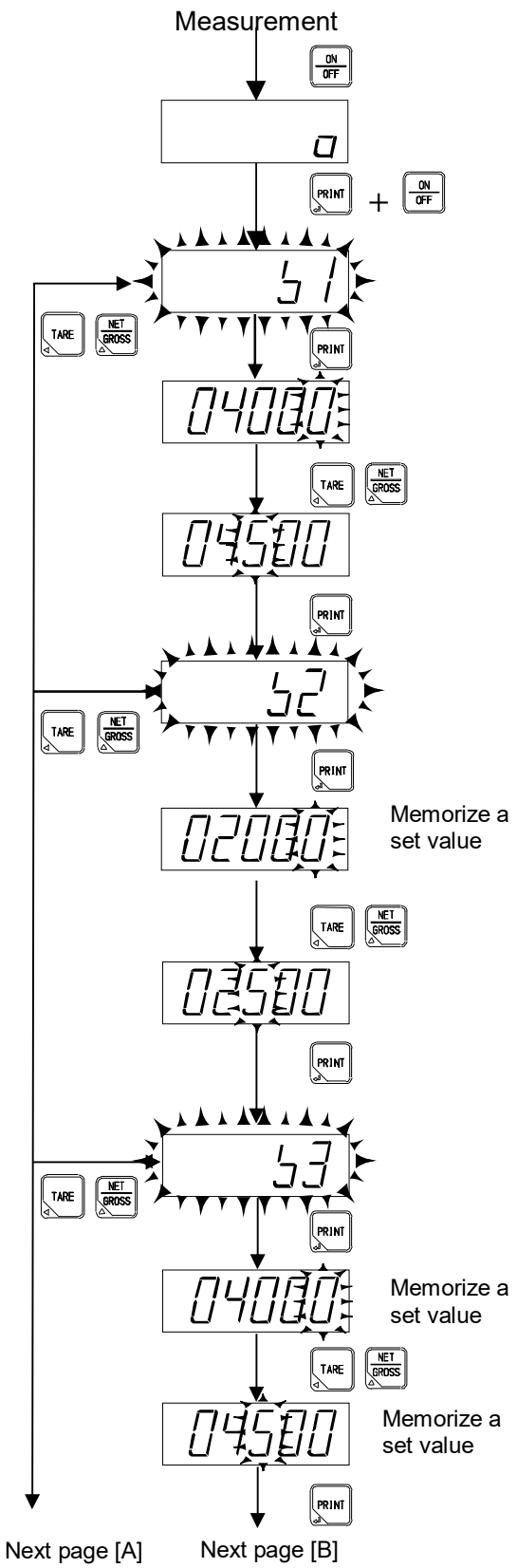
The relation of simple comparison mode and setting value

Comparison output	Operating condition	Comparison test	Contents
S1	By function F-21, F-22, F23	S1	S1 pin
S2	By function F-21, F-22	S2	S2 pin
S3	By function F-21, F-22	S3	S3 pin
S4	By function F-21, F-22	S4	S4 pin
S5	By function F-21, F-22	S5	S5 pin

Function No.	Setting value	Contents
F-21	00000 ~ 22222 *00000	0 : Display interlock 1 : Gross value 2 : Net value 10^0 digit : S1 operating target 10^1 digit : S2 operating target 10^2 digit : S3 operating target 10^3 digit : S4 operating target 10^4 digit : S5 operating target
F-22	00000 ~ 22222 *00000	0 : OFF 1 : OVER 2 : LESS 10^0 digit : S1 operating 10^1 digit : S2 operating 10^2 digit : S3 operating 10^3 digit : S4 operating 10^4 digit : S5 operating
F-23	0	On at (Gross weight) ≧ (measuring weight)
	1	On at S2, S3 output
	2	On at S2, S4 output
	3	On at S2, S5 output
	4	On at S3, S4 output
	5	On at S3, S5 output
	6	On at S3, S5 output
	7	Normal comparator operation

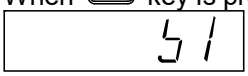
11-3-2. How to set a comparison value.

• Setting of comparison value is valid only set in the function F-20 as [0] to [6] (simple comparison mode).



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

When ON OFF key is pressed with pressing PRINT key,



is displayed.

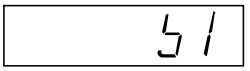
As the S1 setting value memorized at present is displayed when PRINT key is pressed, set the S1 setting value by using the following keys.

NET GROSS : Change the value of the changed digit

TARE : Select the changed digit

ZERO : Change the displayed value to [0]

SET : Interrupt the setting and return to

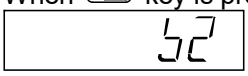


display.

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

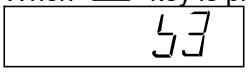
ON OFF : Setting is finished without changing all setting.

When PRINT key is pressed after the S1 setting value is set,



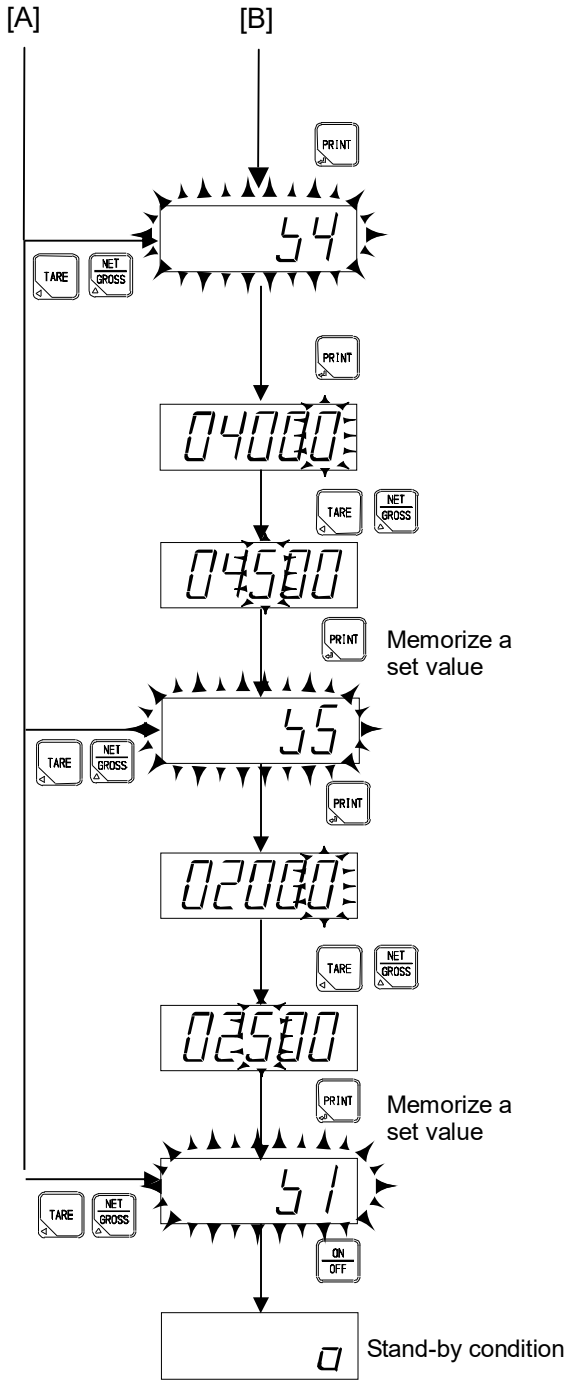
is blinking displayed. As the S2 setting value memorized at present is displayed when PRINT key is pressed, set the S1 setting value similarly.

When PRINT key is pressed after setting the S2 setting value



is blinking displayed.

As the S3 setting value memorized at present is displayed when PRINT key is pressed, set the S1 setting value similarly.



When PRINT key is pressed after setting the S3 setting value,

S4 is blinking displayed.

As the S4 setting value memorized at present is displayed when PRINT key is pressed, set the S1 setting value similarly.

When PRINT key is pressed after setting the S4 setting value

S5 is blinking displayed.

As the S5 setting value memorized at present is displayed when PRINT key is pressed, set the S1 setting value similarly.

When PRINT key is pressed after setting the S5 setting value,

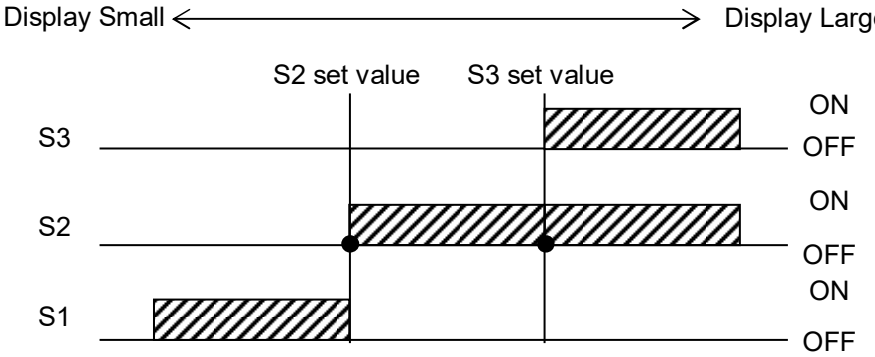
S1 is blinking displayed.

Complete the comparison value setting, press ON/OFF key to stand-by condition.
Finish the comparison value setting mode.

11-3-3. S1 operation of simple comparison mode

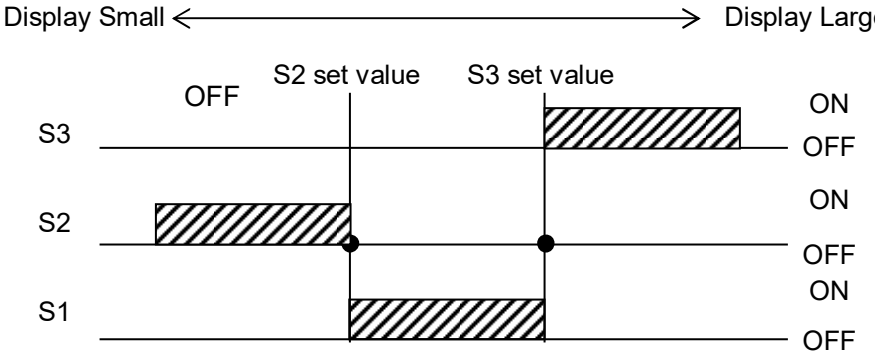
(1) In case of selecting both S2, S3 [OVER] on function F-22.

S2: judge display, open collector output ON at (S2 set value) ≦ (display value)
S3: judge display, open collector output ON at (S3 set value) ≦ (display value)
S1: judge display, open collector output ON at (S2 set value) ＞ (display value) and
(S3 set value) ＞ (display value)



(2) In case of selecting S2 [UNDER], S3 [OVER] on function F-22.

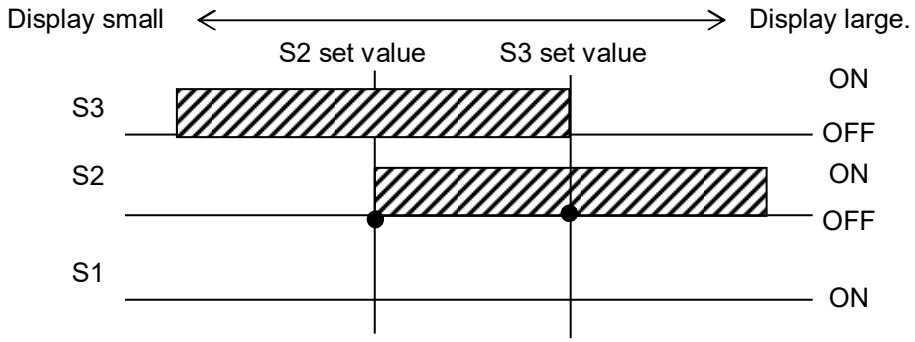
S2: judge display, open collector output ON at (S2 set value) ≧ (display value)
S3: judge display, open collector output ON at (S3 set value) ≧ (display value)
S1: judge display, open collector output ON at (S2 set value) ＜ (display value) ＜ (S3 set value)



- **The upper diagram indicates when (S2 set value) ＜ (S3 set value).**
- **Always OFF when (S2 set value) ≧ (S3 set value), S1 judge display and S1 open corrector output.**

(3) In case of selecting S2 [UNDER], S3 [OVER] on function F-22.

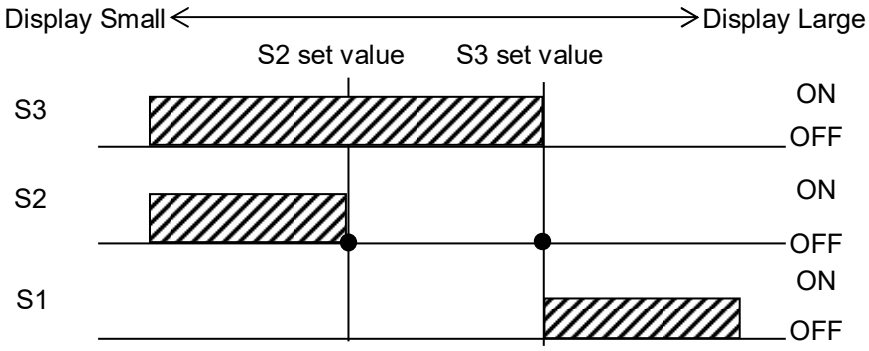
S2: judge display, open collector output ON at (S2 set value) ≧ (display value)
S3: judge display, open collector output ON at (S3 set value) ≧ (display value)
S1: judge display, open collector output ON at (S2 set value) ＜ (display value) ＜ (S3 set value)



- **The upper diagram indicates when (S2 set value) ＜ (S3 set value).**
- **ON when (S2 set value) ≧ (S3 set value), S1 judge display and S1 open corrector output (S2 set value) ＜ (display value) ＜ (S3 set value).**

(4) In case of selecting [UNDER] for S2 and S3 on function F-22.

S2: judge display, open collector output ON at (S2 set value) ≧ (display value)
S3: judge display, open collector output ON at (S3 set value) ≧ (display value)
S1: judge display, open collector output ON at (S2 set value) ＜ (display value) ＜ (S3 set value)



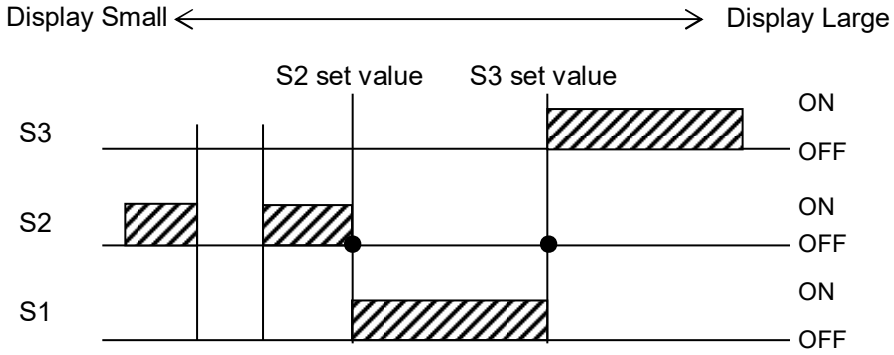
Example: movement of comparator
Function F-20 [5] (Only out of the -5D ~ +5D data and condition is stable)

Target of movement of comparator Function F-21 [1] (Gross)

S3: 5 000

S2: 1 000

S1: ON at (S2 setting value) ＜ (display value) ＜ (S3 setting value)



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].

[On delay] is selected as a default.

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

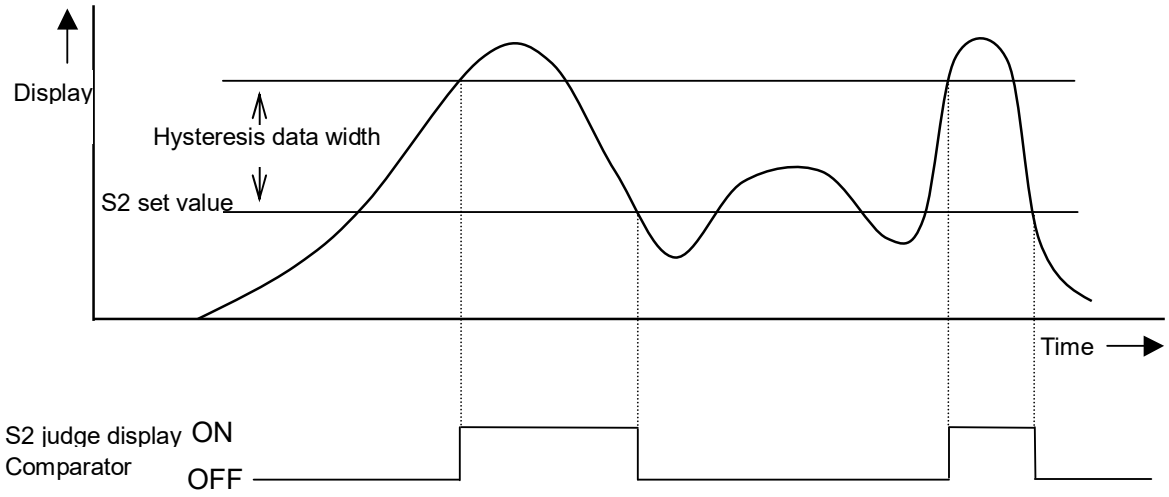
The data width of the comparator hysteresis is set by setting function F-25.

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

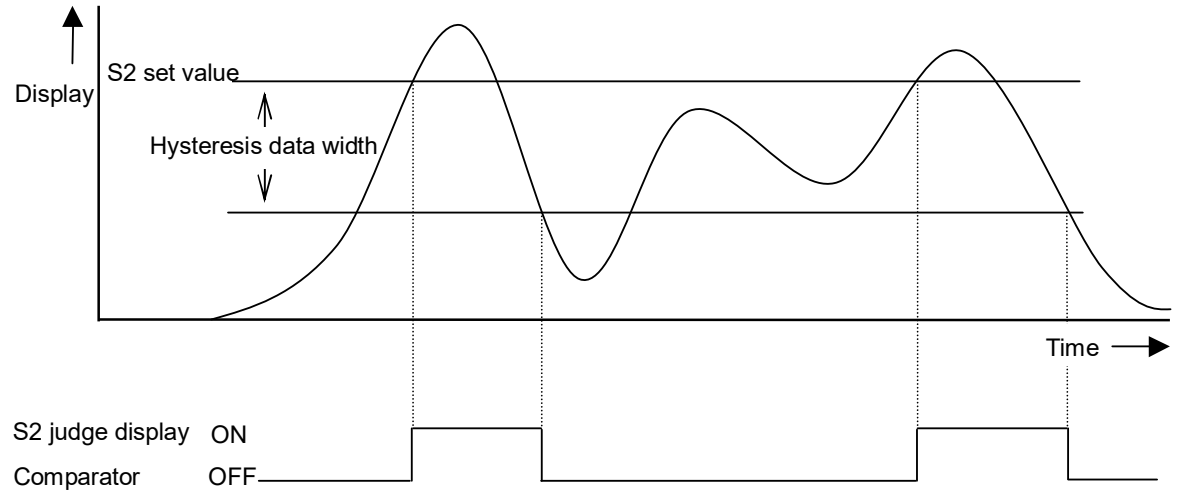
Default has set [00].

ex. About the S2, the operation of the judge display and the comparator 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 set value, fall, pre-set value, near zero, over and under is set, and the signal of small weigh-in (S2 output), large weigh-in (S1 output) or near zero (S3 output) is output according to the comparison result.

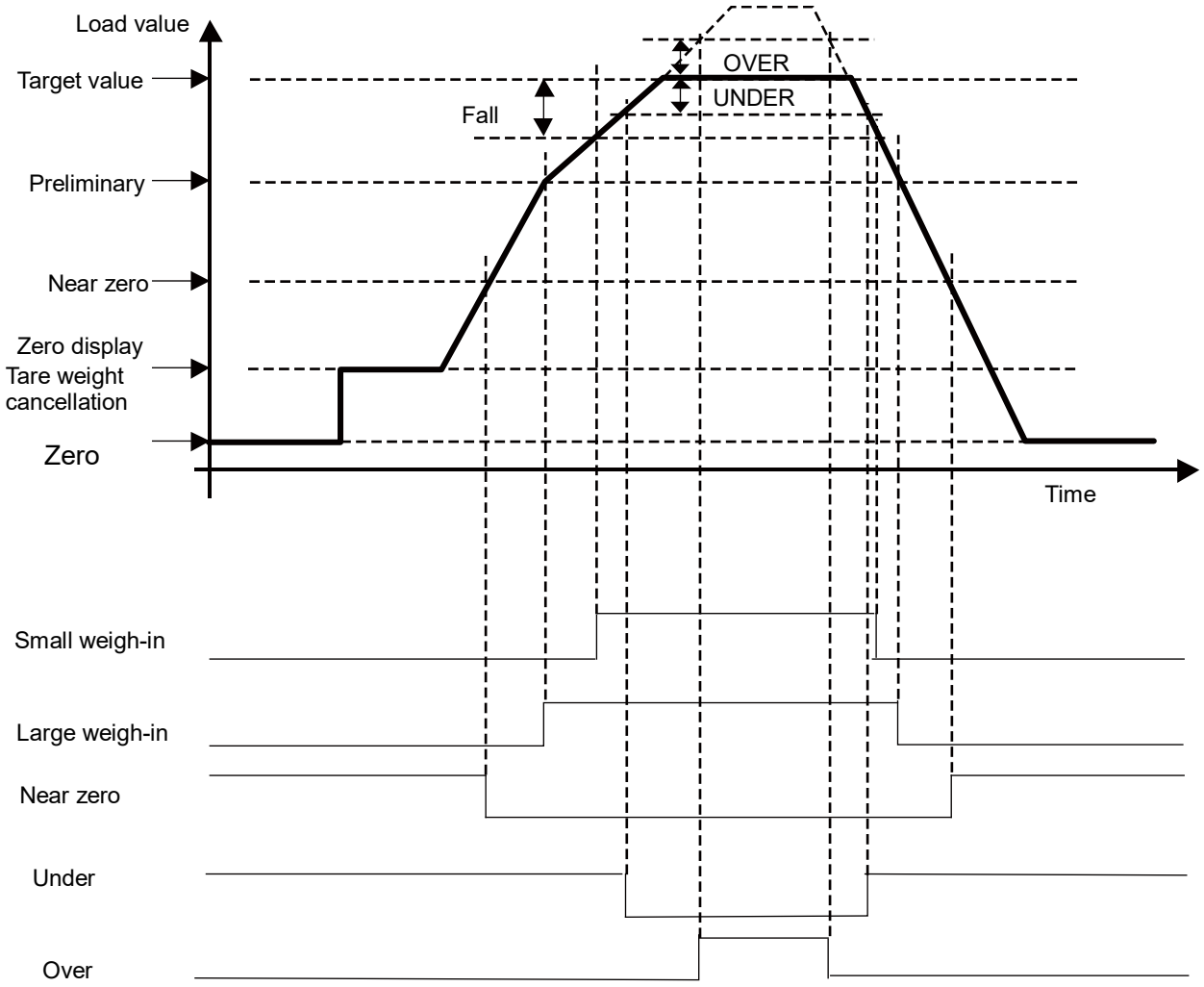
Please set function F-20 in [7] (weigh-in) and [8] (weigh-out) as comparator comparison operation when you use weigh-in/weigh-out mode.

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

Set item	Set range	Contents
Target value (SET0)	-99 999 ~ 99 999	Set the actual weight value which wants to be packed in the bag etc.
Fall (SET1)	-99 999 ~ 99 999	Set the correction amount for the weight which has fallen in the air.
Pre-set value (SET2)	-99 999 ~ 99 999	Set the weight value by which small weigh-in is made.
Near zero (SET3)	-99 999 ~ 99 999	Use to detect the empty on the measuring section.
Over	-99 999 ~ 99 999	Set the weight value which execute over judge.
Under	-99 999 ~ 99 999	Set the weight value which execute under judge.

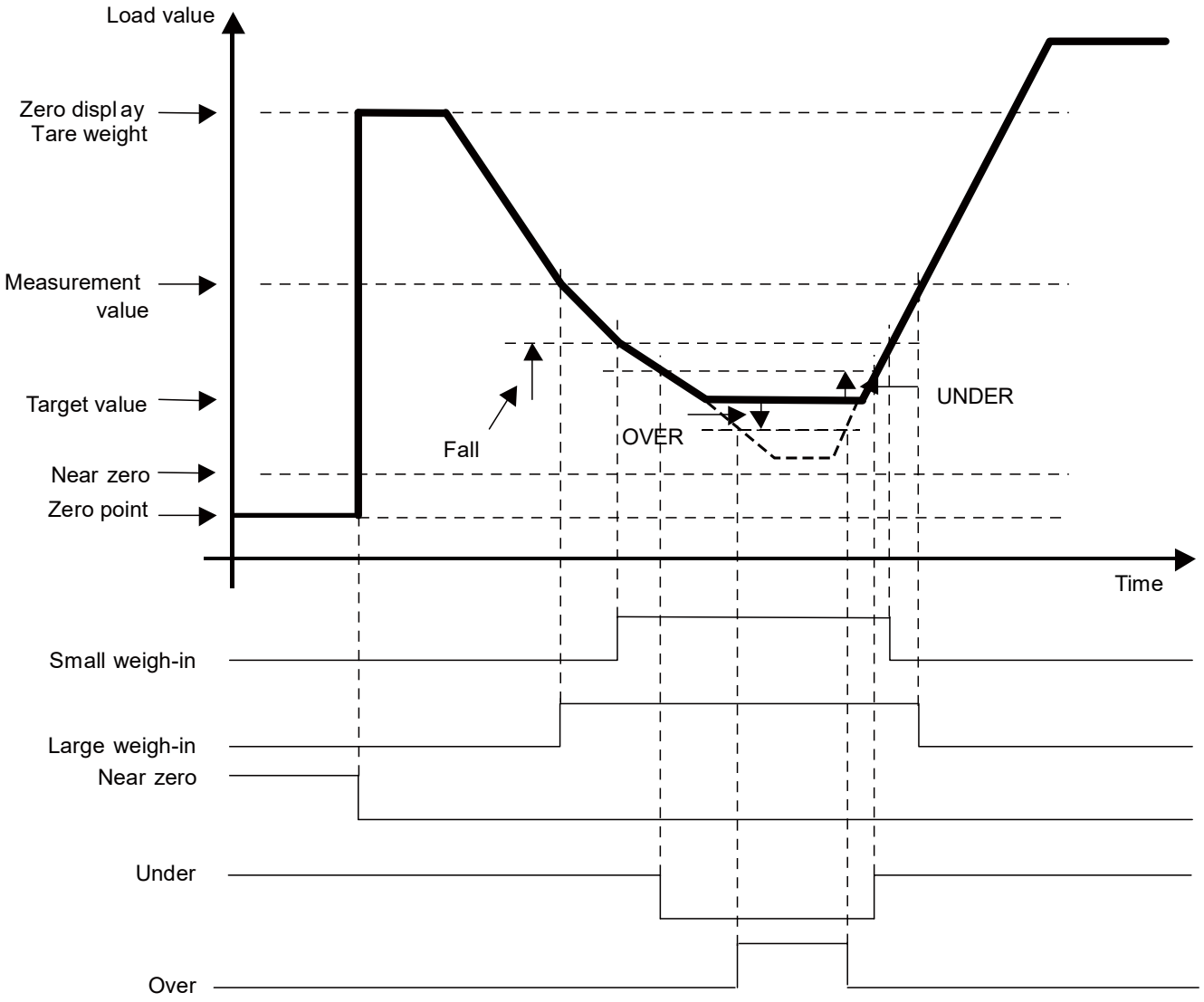
11-4-2. Output condition of weigh in measurement

Output signal	Condition	Output terminal
Small weigh-in	Net value≧(Target value－Fall)	S1
Large weigh-in	Net value≧(Target value－Pre-set value)	S2
Near zero	Gross value≦Set value of near zero	S3
Over	Net value ＞ (Target value－OVER)	S4
Under	Net value ＜ (Target value－UNDER)	S5



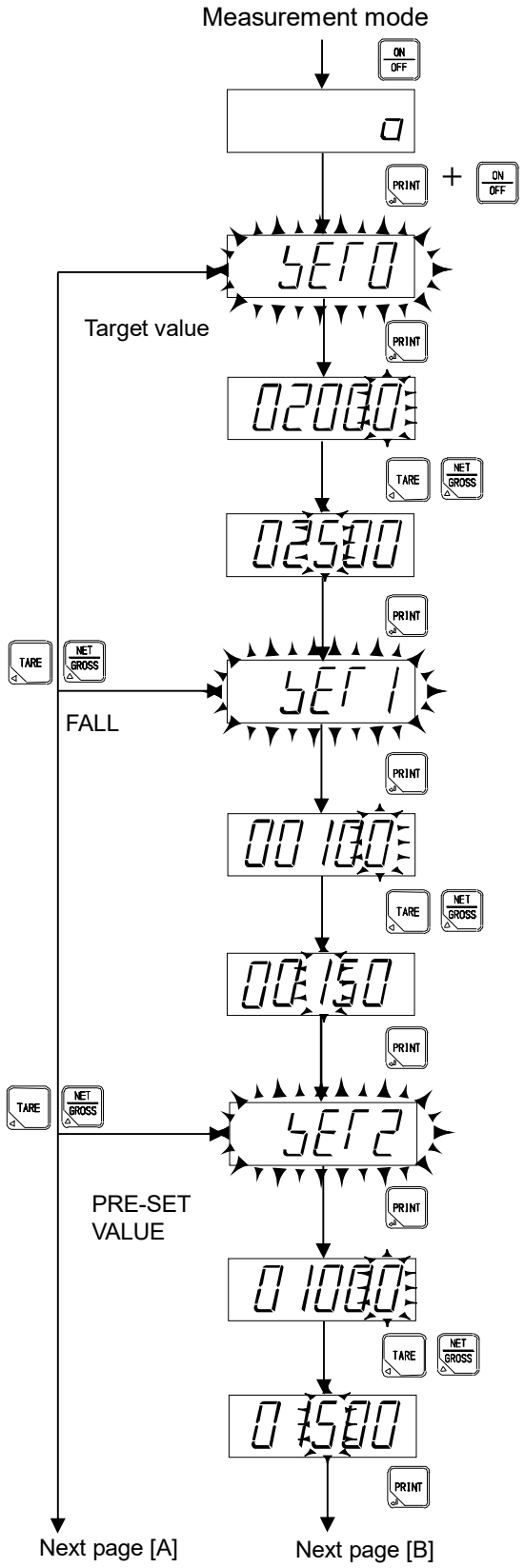
11-4-3. Output condition of weigh-out measurement

Output signal	Condition	Output terminal
Small weigh-in	Net value≦－(Target value－Fall)	S1
Large weigh-in	Net value≦－(Target value－Pre-set value)	S2
Near zero	Gross value≦Set value of near zero	S3
Over	Net value＜－(Target value－Fall)	S4
Under	Net value＞－(Target value－Fall)	S5



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

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



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

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

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

NET GROSS : Change the value of the changed digit

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.

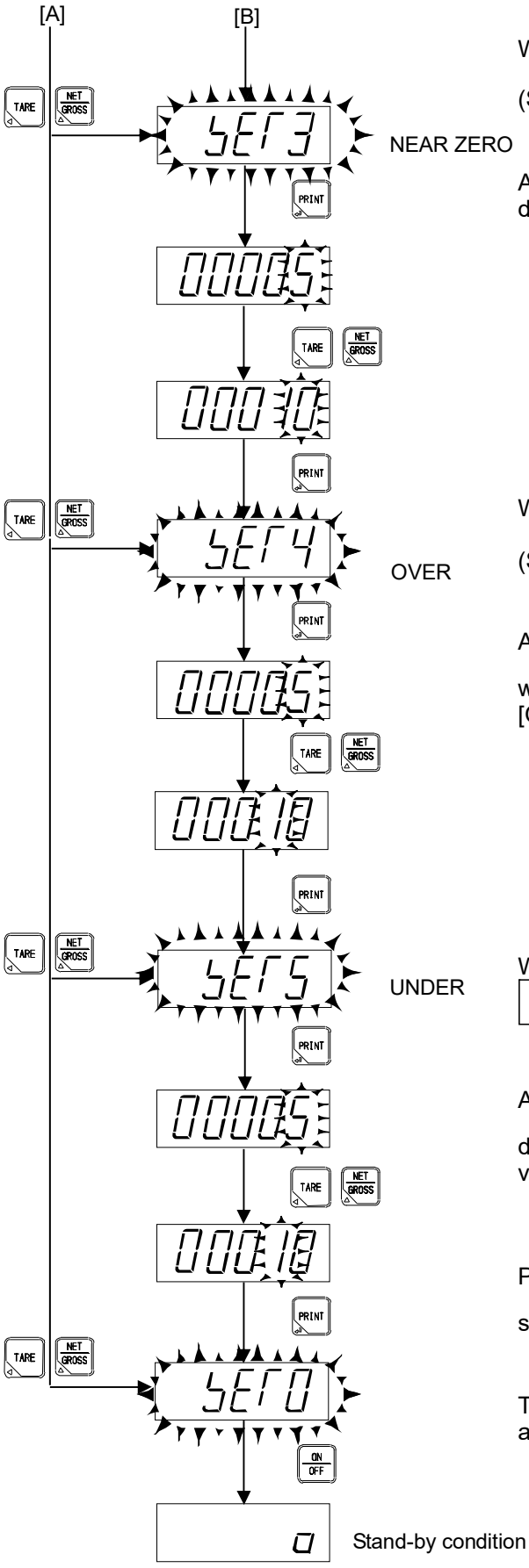
ON OFF : Setting is finished without changing all setting.

When 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 PRINT key is pressed again, please set the fall similarly.

When 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 PRINT key is pressed, please set the [PRE-SET VALUE] similarly.



When PRINT key is pressed after setting the [PRE-SET VALUE] (SET2), SET3 is blinking displayed.

As the value of [NEAR ZERO] memorized at present is displayed when value of [NEAR ZERO] similarly.

When PRINT key is pressed after setting the [NEAR ZERO] (SET3), SET4 is blinking displayed.

As the value of [OVER] memorized at present is displayed when PRINT key is pressed again, please set the value of [OVER] similarly

When PRINT key is pressed after setting the [OVER] (SET4), SET5 is blinking displayed.

As the value of [UNDER] (SET5) memorized at present is displayed when PRINT key is pressed again, please set the value of [UNDER] similarly.

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

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

12. RS-232C interface

12-1. Specifications of RS-232C interface.

Specifications	Contents
Communication method	Half duplex
Synchronous method	Start-stop synchronous method
Baud rate	Select from 1 200、2 400、4 800 and 9 600 bps.
Data bit length	Select from 7 bit and 8 bit.
Parity bit	Select from No Parity, Even number Parity and Odd number Parity.
Stop bit	Select from 1 bit and 2 bit.
Terminator	Select from CR＋LF and CR.
Transmission data	ASCII code
Cable length	Less than 15 m

- **When RS-422/485 interface is installed as an option, the operation of this function (RS-232C Interface) shall become invalid.**

12-2. Change of RS-232C communication Protocol

Select the communication Protocol with the setting of Function F-39.

As for the default, [Communication Protocol 1] has selected.

12-3. Explanation when Communication Protocol 1 is selected. (F-39=0 is selected.)

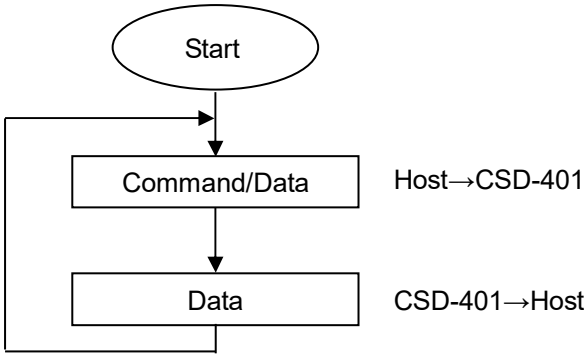
12-3-1. Operation mode of RS-232C Interface

Select the operation mode of RS-232C with the setting of Function F-40.

The operation mode of RS-232C can be selected from the [Command mode], [Stream mode] and [Synchronous with Print]. As for the default, [Command mode] has selected.

(1) Command mode

By sending the fixed Command/Data from the Host (Personal computer, sequencer and so on), the corresponding data to the Command/Data can be send back from the CSD-401. Be sure to make commuication with the following procedures.



(2) Stream mode

When the RS-232C is used, this mode keeps on outpputting the latest data of the output selected with the Function F-41. However, the output frequency may change by setting the display freqyency and baud rate.

(3) Synchronous with print

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

- **The communication operation is made only in the Measurement mode. During the modes other than the Measurement mode, Error command is sent.**
- **No response in the stand-by condition.**
- **The flow control is not performed in the CSD-401.**
- **CTS/RTS signal is not applied.**
- **The X flow control is not performed.**
- **The communication operation is a type of dialogue.**

12-3-2. Selected output in the RS-232C stream mode and in synchronous with print sign

The output is of RS-232C is selected with the set of Function F-41.

The output of RS-232C is selected from [Gross value], [Net value] and [Load display data with state].

[Gross value] is selected as a default.

- **Setting Function F-41 becomes effective when the Function F-39 = [0] and at the same time the Function F-40 is set as [1] or [2].**

12-3-3. Specifications for RS-232C communication

With the set of Function F-42, select the specifications for RS-232C communication.

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

[13020] is set as a default.

12-3-4. Set of address for RS-232C

The address is fixed to [00].

12-3-5. Yes/No of decimal point of RS-232C sending data

With the set of Function F-46, yes or no of decimal point of sending data of RS-232C shall be selected.
[No decimal point] is selected as a default.

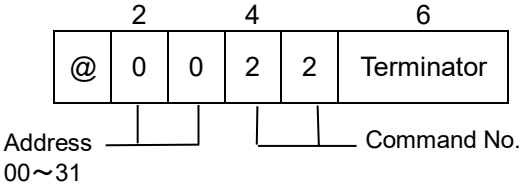
12-3-6. Data format in Command mode

- **The data format is common in RS-232C and RS-422/485 interface.**
- **The address becomes fixed as [00] for the RS-232C interface. And for the case of RS422-485 interface, the Address becomes fixed as [00]. As for the RS-422/485 interface, the Address becomes the set value of Function F-43.**
- **The load data enters in right-aligned.**
- **The sign of [-] for minus and [+] for plus is entered.**
- **The load data performs zero suppress.**
- **The decimal point attaches to a specified position when the decimal point is set with F-46 and at the same time decimal point is specified with CF-01.**
- **When you want to conform the instrument to the JIS standard, please set the setting value of CF-03 to [2].**
- **At the overload, [OL] is output as a load data. When the gross value is less than -20D, [-OL] is output also.**
- **The empty sections are all spaces.**

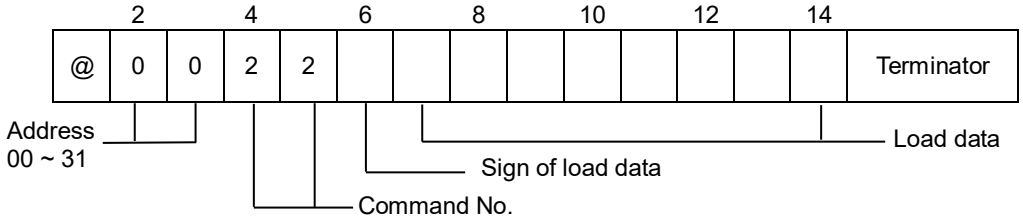
(1) Reading out of load data (Host → CSD-401)

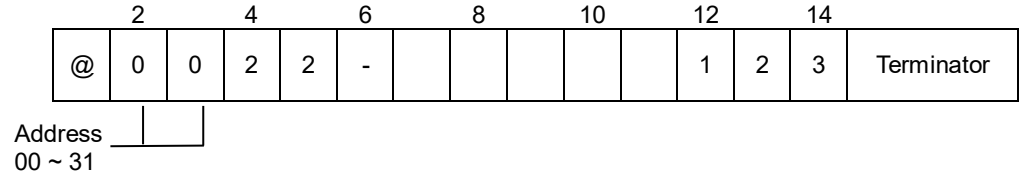
When the command number is from 20 to 25.

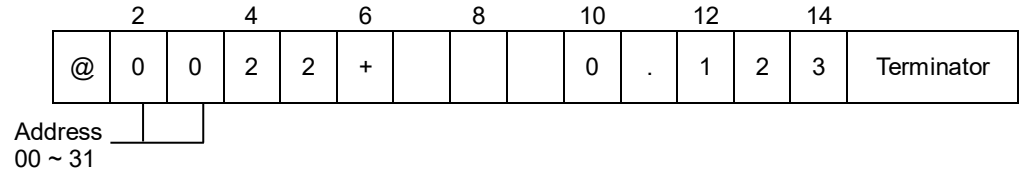
Command No.	Operation
20	Read-out of load display
21	Read-out of gross value
22	Read-out of net value
23	Read-out of tare value
26	Read-out of load display value with condition.

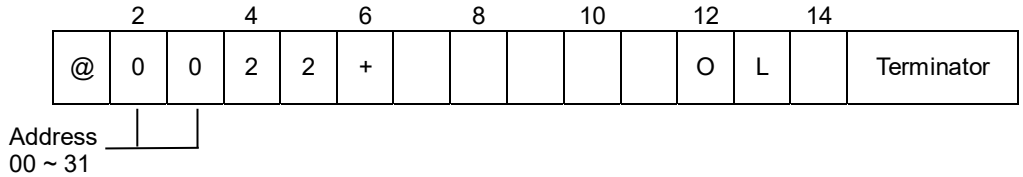


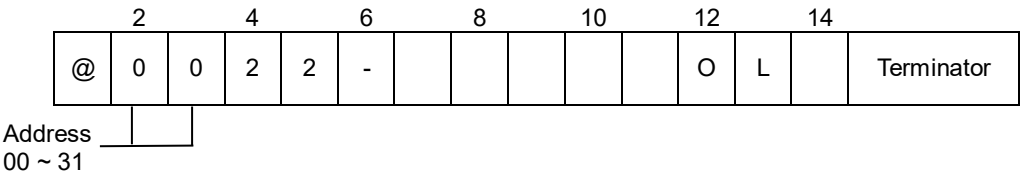
Return (CSD-401 -> Host)



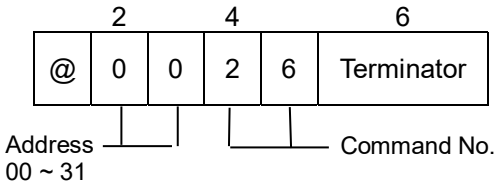




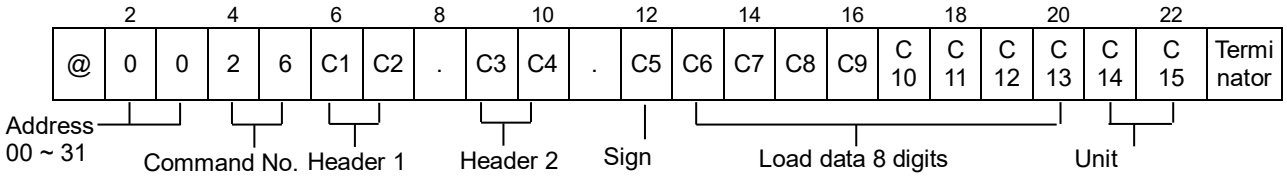




When command No. is 26.

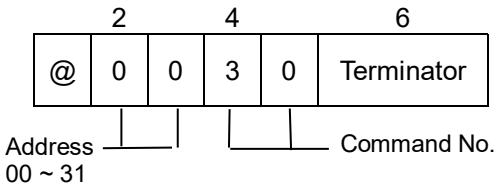


Return (CSD-401 -> Host)



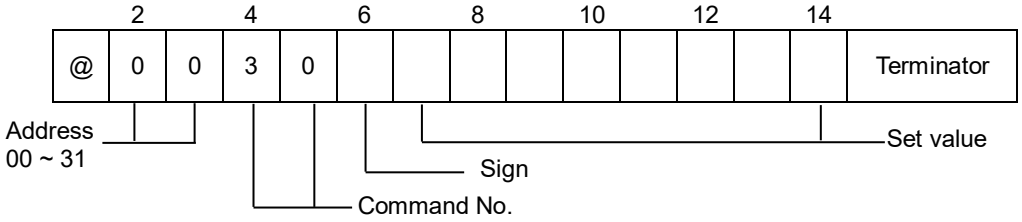
Header 1			Header 2			Sign		Load data 8 digits								Unit		
C1	C2	contents	C3	C4	contents	C5	contents	C6	C7	C8	C9	C 10	C 11	C 12	C 13	C 14	C 15	contents
O	L	Overload	N	T	Net value	+	Plus						1	2	3		g	gram
S	T	stable	G	S	Gross value	−	minus				0	.	1	2	3	k	g	korma
U	S	unstable											O	L		l	b	lb
																	t	ton

(2) Reading out of comparative data (Host -> CSD-401)

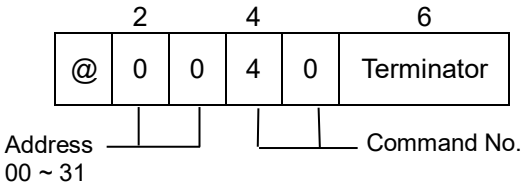


Command No.	Simple comparative mode	Batch / Discharge mode
30	S1	Set value
31	S2	Print to set value
32	S3	Fall
33	S4	Zero band
34	S5	Over
35		Under

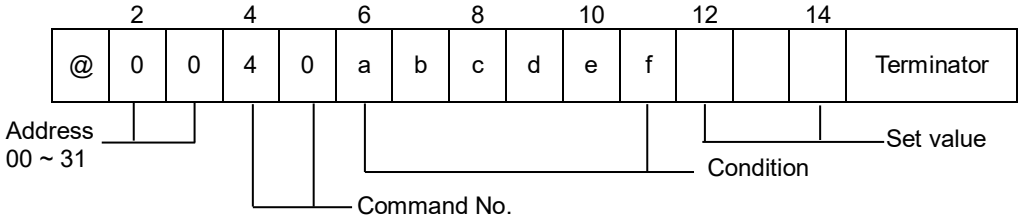
Return (CSD-401 -> Host)



(3) Reading out of condition (Host -> CSD-401)

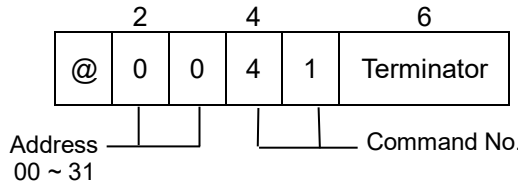


Command No.	Operation
40	Read-out of condition

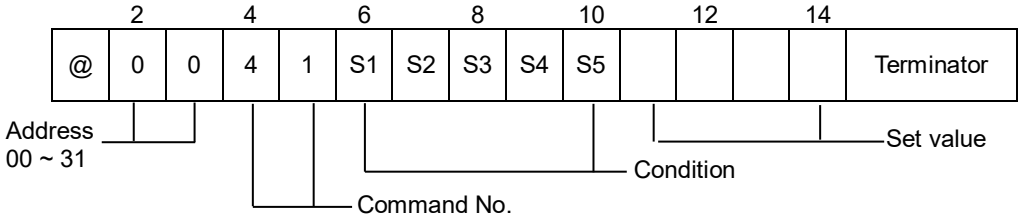


a : STAB. [1] = ON, [0] = OFF
b : TARE [1] = ON, [0] = OFF
c : GROSS [1] = ON, [0] = OFF
d : NET [1] = ON, [0] = OFF
e : ZERO [1] = ON, [0] = OFF
f : HOLD [1] = ON, [0] = OFF

(4) Reading out of comparative result (Host -> CSD-401)



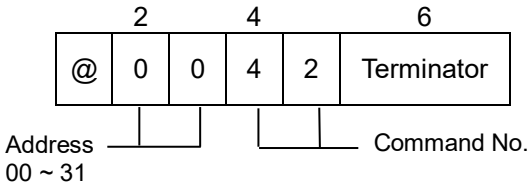
Command No.	Operation
40	Read-out of comparative result



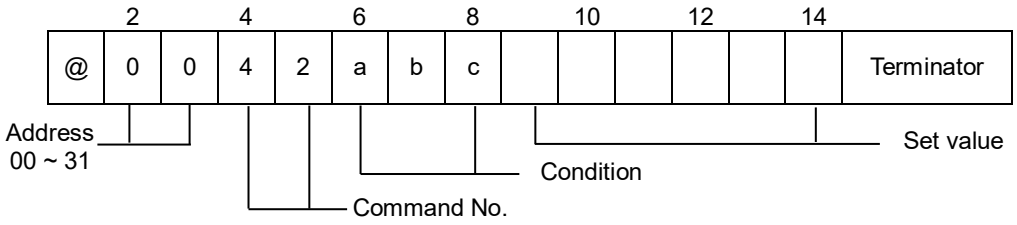
S1 : [1] = ON, [0] = OFF
S2 : [1] = ON, [0] = OFF
S3 : [1] = ON, [0] = OFF
S4 : [1] = ON, [0] = OFF
S5 : [1] = ON, [0] = OFF

- **When the mode is in Batch/Discharge mode, [Dribble flow] corresponds to [S1], [Full flow] to [S2] and [Zero band] to [S3], [Over] to [S4] and [Under to [S5] individually.**

(5) Reading out of Unit (Host -> CSD-401)

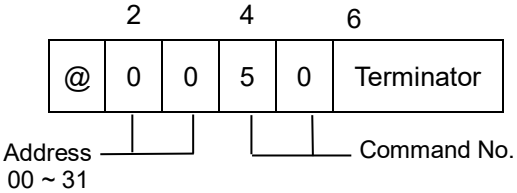


Command No.	Operation
42	Read-out of Unit



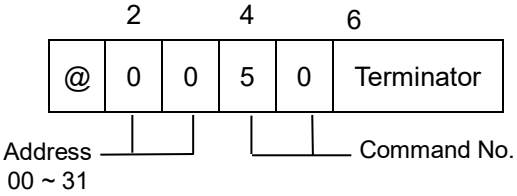
Unit	a	b	c
No Unit	0	0	0
g	0	0	1
kg	0	1	0
t	0	1	1
lb	1	0	0

(6) Change of condition (Host -> CSD-401)

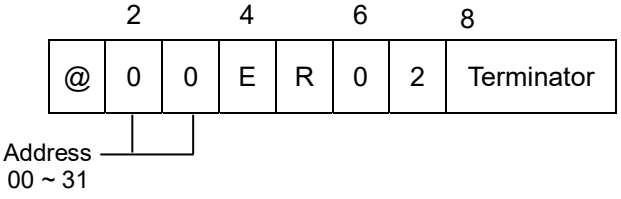


Command No.	Operation
50	Zero set
51	Tare
52	Tare clear
58	Gross display
59	Net display

During normal operation
Return (CSD-401 -> Host)



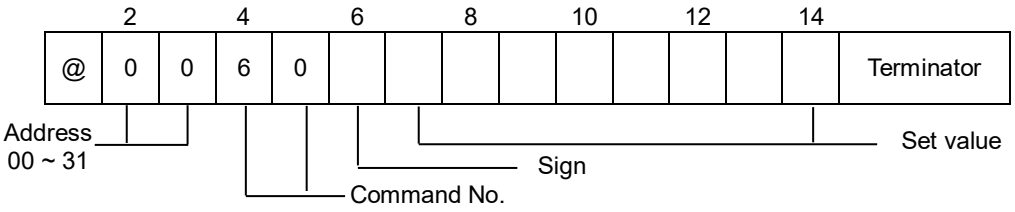
During abnormal operation
Return (CSD-401 -> Host)



The condition of the Error transmission shall be as follows:

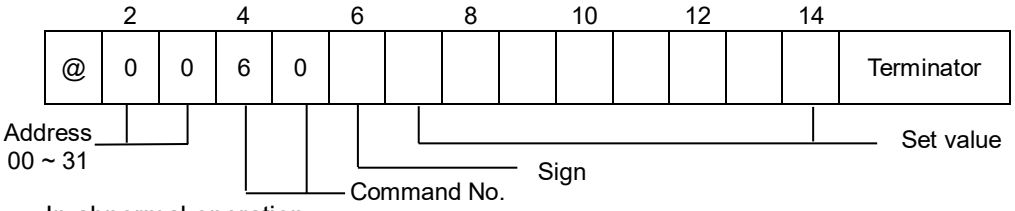
- **When executing Zero set with [Command No. 50], zero set cannot be made out of the effective range of zero set.**
- **When executing Tare with [Command No. 51], Tare can't be made with the [±OL] display.**
- **When executing display of Net weight with the [Command No. 59], Tare is not executed yet and you cannot change it to the Net weight display.**

(7) Writing comparative data (Host -> CSD-401)

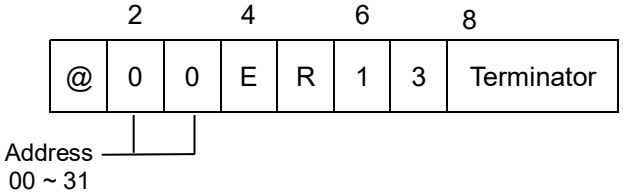


Command No.	Simple comparative mode	Batch / Discharge mode
60	S1	Write Set value
61	S2	Write Preliminary
62	S3	Write Fall
63	S4	Write Zero band
64	S5	Write Over
65		Write Under

In normal operation
Return (CSD-401 -> Host)



In abnormal operation
Return (CSD-401 -> Host)

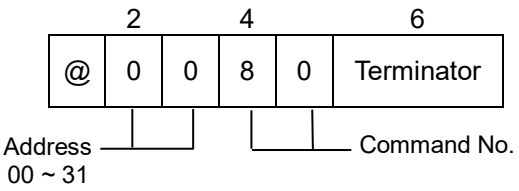


- **The set values enter in right-aligned.**
- **Never add decimal point.**

The conditions of the Error transmission are as follows:

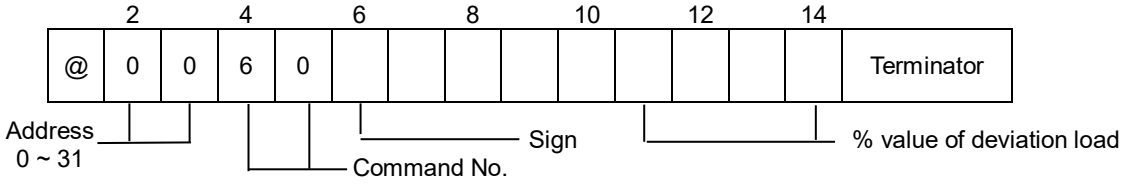
- **In the case of difference is found in Division value.**
- **When setting value is made over the range of ±99 999.**
- **When setting is made other than the numeric value for the set value.**
- **When setting is made other than the ＋/－ for the sign section.**

(8) Reading out the % of deviation load



Command No.	Operation
80	% value of eccentric load of ID No.1
81	% value of eccentric load of ID No.2
82	% value of eccentric load of ID No.3
83	% value of eccentric load of ID No.4
84	% value of eccentric load of ID No.5
85	% value of eccentric load of ID No.6
86	% value of eccentric load of ID No.7
87	% value of eccentric load of ID No.8

Return (CSD-401 -> Host)



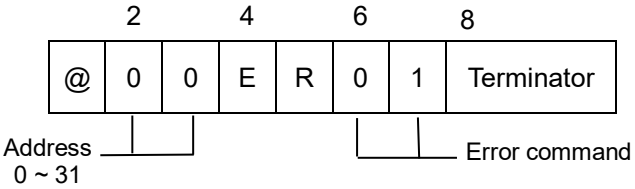
- **The % value of eccentric load is the percentage for the average value which came from the value that the Gross weight value is divided by the number of Digital load cell connected.**
  The calculation of % of eccentric load shall be as follows:
  m : No. of Digital load cells connected.
  Dn: Load value of ID No. n
  Hn: % value of eccentric load of ID No. n

$$Hn = \left(Dn - \frac{D1 + D2 + \cdots Dm}{m} \right) \div \left(\frac{D1 + D2 + \cdots Dm}{m} \right) \times 100 \ [\%]$$

- **The unit is fixed as 0.1%. No decimal point is added.**

(9) Handling of communication error

The instrument returns the Error command to the Host side when the communication Error, Execution Error is/are occurred.



Error Command	Contents	Remarks
01	Error of impossible to execute	When the mode is in Calibration, Function or Check.
02	Another Error of inconvenient of the instrument	When the received command cannot be executed.
10	Parity error	When the parity detection is an error.
11	Framing error	When the stop bit detection is an error.
12	Overrun error	When the incoming reading command is an error.
13	Data code and data length error	When the data code received is not corresponding to data lengthy.
14	No appropriate command	When the incoming command is not corresponding.

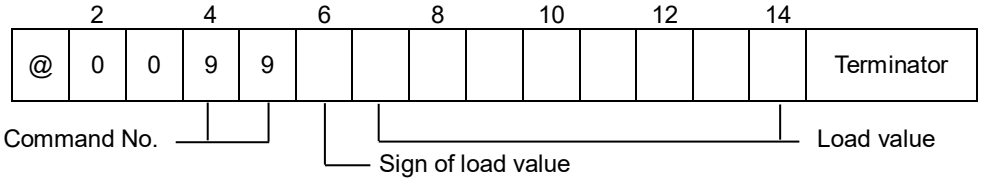
- **The error command is not sent when the address and the finish command (Terminator) cannot be detected.**
- **Please consider dealing on host side when the communication error command is transmitted from the host.**

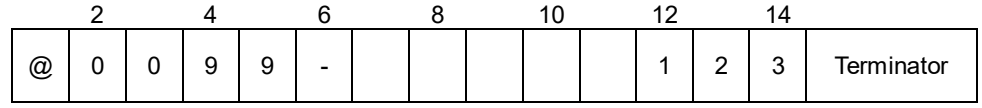
12-3-7. Data format in stream mode synchronized with print signal.

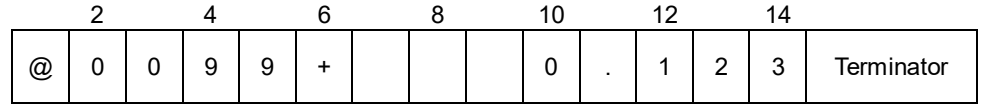
- **The data of load value is justified to the right.**
- **[+] sign enters in positive value, and [-] sign enters in negative value.**
- **The load value is processed by the zero suppression.**
- **When the decimal point is set with the Function F-46, and at the same time decimal point is specified with the CF-01, the decimal point is placed to the specified position.**
- **At the time of overloaded, [OL] is placed at the load data section.**
- **The blank parts are all spaces.**

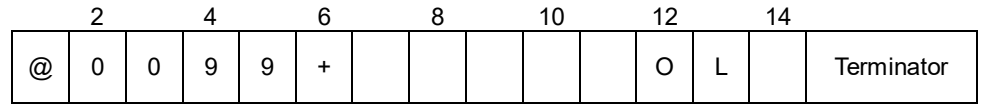
(1) When the set of F-41 is [GROSS] or [NET]

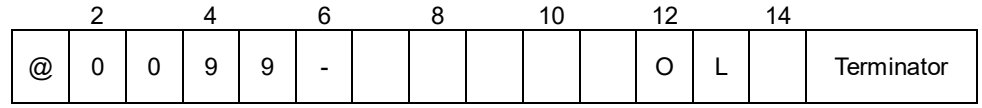
Return (CSD-401 -> Host)



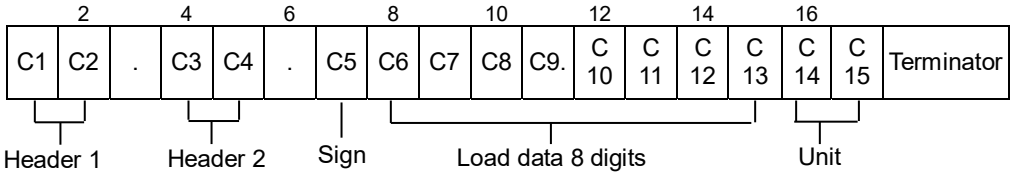








(2) When the set of F-41 is [Load display data with condition]



Header 1			Header 2			sign		Load data 8 digits								Unit		
C1	C2	contents	C3	C4	contents	C5	contents	C6	C7	C8	C9	C 10	C 11	C 12	C 13	C 14	C 15	contents
O	L	Overload	N	T	Net value	+	Plus						1	2	3		g	gram
S	T	stable	G	S	Gross value	−	minus				0	.	1	2	3	k	g	korma
U	S	unstable											O	L		l	b	lb
																	t	ton

12-4. Explanation when the communication protocol2 (F-39=1) is selected.

12-4-1. Operation mode of RS-232C interface

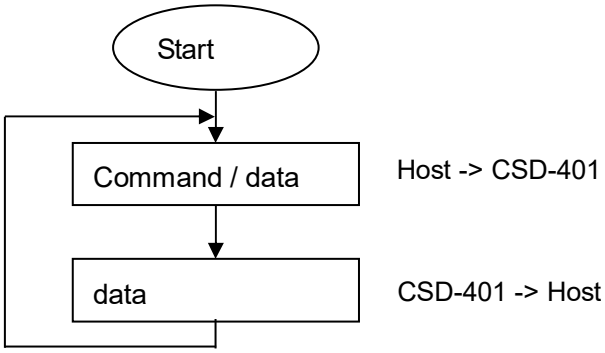
The operation mode of RS-232C interface is selected form [Stream mode], [Synchronize with print sign], [Command mode (without address)] or [Command mode (with address)],

[Stream mode] is selected as default.

(1) Command mode

By sending the fixed Command/data from the Host (Personal computer, sequencer and so on) to the CSD-401, the data shall be send back from the CSD-401 to the side of Host corresponding to the Command / Data.

Please communicate according to the following procedure.



(2) Stream mode

When the RS-232C interface is used, the instrument keeps outputting the latest data of the value set by the selection of F-48. However, the output times shall be changed depending to the setting of display times and baud rate. However, the output frequency changes by setting the display frequency and the baud rate.

(3) Synchronized with print signal

When RS-232C interface is in use, the data set by the selection of F-48 is output synchronizing with print signal (PRINT key, external control input or automatic print).

- **The communication is possible only in the measurement mode. When [Stream mode] is selected, the communication turns [OFF] except for the Measurement mode. When [Command mode] is selected, communication turns OFF in display [OFF], and when the other mode is selected, the Execution Error command is sent.**
- **CSD-401 does not execute the flow control.**
- **CSD-401 does not use the CTS/RTS signals.**
- **CSD-401 does not execute the X flow control.**
- **The operation of communication is interactive.**

12-4-2. Output synchronized with print signal in stream mode of RS-232C interface

Output of RS-232C interface is selected with setting of function F-48.
Output of RS-232C interface is selectable from [Interlocking with display], [Gross], [Net], [Tare] or [Gross, Net and Tare].
[Interlocking with display] is selected as a default.

- **The setting of Function F-48 becomes effective when F-39 is set as [1], and F-47 is set as [0] or [1].**

12-4-3. Communication specification of RS-232C interface

The Communication specification of RS-232C interface is set by function F-42.

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

[13020] is set as a default.

12-4-4. Set of address of RS-232C interface

The address is fixed as [00].

12-4-5. Set of data format and

The data format and Unit / digit is set by function F-49.

Function Nos.	Set value	Contents
F-49	00 ~ 11	0 0 Change of data format 0＝Format 1 1＝format 2 Setting the digit of unit 0＝2 digits for unit, 1＝3 digits for unit

The data format 1 is [7 digits load data with state] and the data format 2 is [8 digits load data with no state].

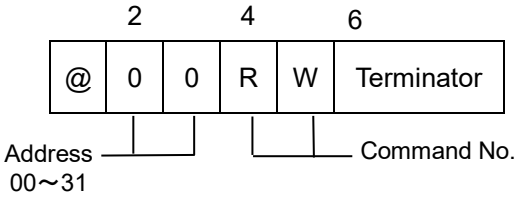
The digit for unit can be selected whichever one from 2 digits for the unit and 3 digits.

[Format 1] and [2 digits for the unit] is selected as a default.

12-4-6. Data format of Command mode

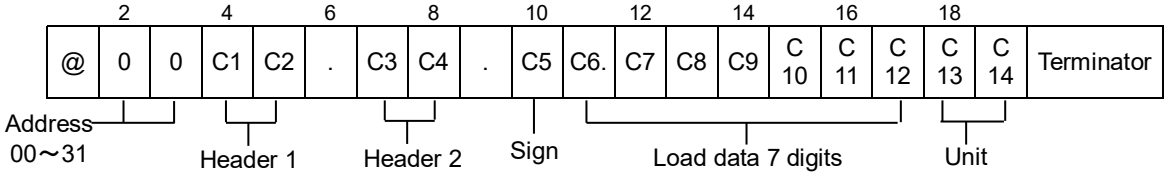
- **When the F-47 [The command with address] is selected, [@00]（00= address）is attached at the top of command and Return. But, when the [The command with no address] is selected with the Function F-47, other than the difference of no attach of [@00] to the top of Command and Return, the same format shall be made for the [Command with address attached] and those returns.**
- **The load data is justified to the right.**
- **The sign enters + for positive and - sign for negative. When [0], the + sign shall be entered.**
- **The load data is not processed by the zero suppression.**
- **When the decimal point is specified at the Function CF-01, then the decimal point attaches to the specified position.**
- **When overload is occurred in Format 1, the Load data section becomes all spaces except for decimal point. The sign enters + to the specified position, whichever polarity the sign will be.**
- **When overload is occurred in Format 2, the load data section becomes [+9999999] whichever the polarity might be.**
- **In the Format 1, you can select the digits of unit whichever [2 digits] or [3 digits] with the Function of F-46. The unit enters in right –aligned, and extra digits become spaces.**
- **The blank are all spaces.**
- **When you want to confirm the instrument to the suitable JIS standard, use it with the CF-03 set value to [2].**
- **At the overload, [OL] is output as a load data. When the gross value is less than -20D, [-OL] is output also.**

(1) Reading out the load data (Host -> CSD-401)



Return (CSD-401 -> Host)

In case of format-1.

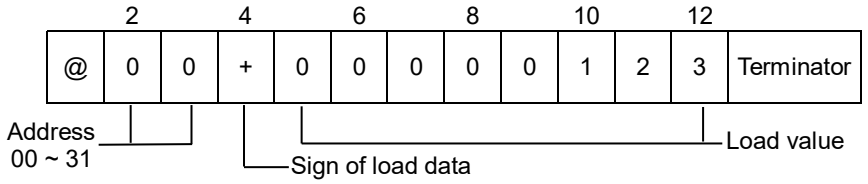


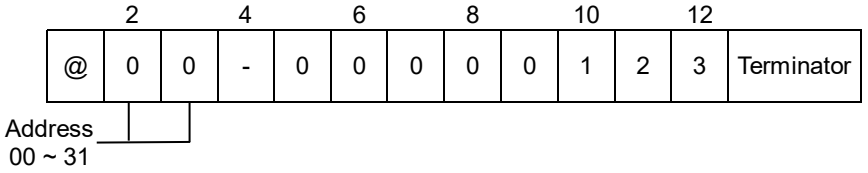
Header 1			Header 2			Sign		Load data 8 digits							Unit			
C1	C2	contents	C3	C4	contents	C5	contents	C6	C7	C8	C9	C 10	C 11	C 12	C 13	C 14	C 15	contents
O	L	Overload	N	T	Net value	＋	Plus	0	0	0	0	1	2	3		g		gram
S	T	stable	G	S	Gross value	－	minus	0	0	0	.	1	2	3	k	g		kilogram
U	S	unstable														t		ton
															l	b		pond
																	g	kilogram*
																k	g	ton*
																l	b	pond*

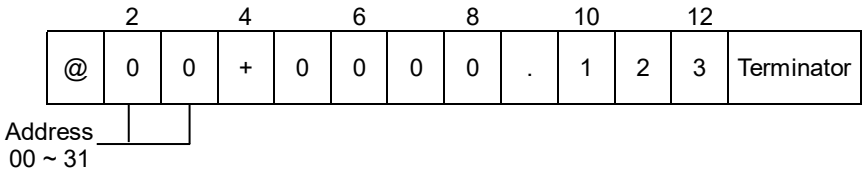
* When a unit is 3 digits.

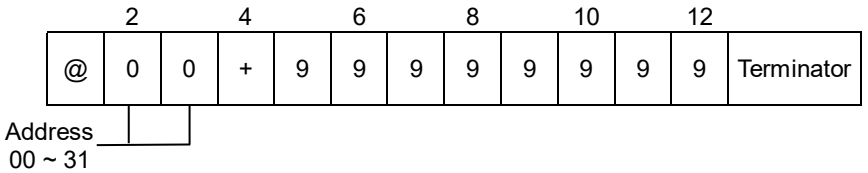
Return (CSD-401 -> Host)

In case of format-2

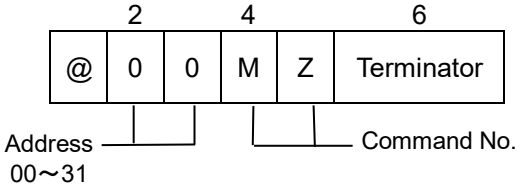






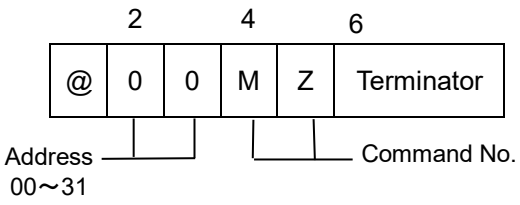


(2) Change of condition (Host -> CSD-401)

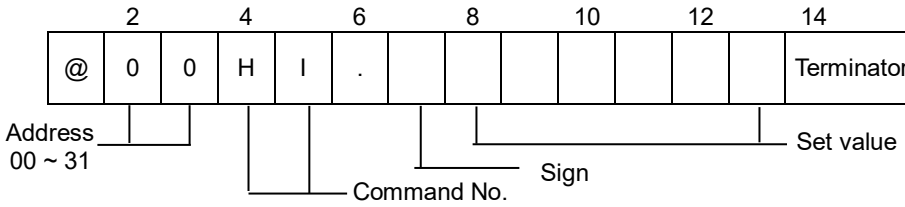


Command No.	Operation
MZ	Zero set
MT	Tare
CT	Tare clear
MG	Display of gross value
MN	Display of net value

Return (CSD-401 -> Host)

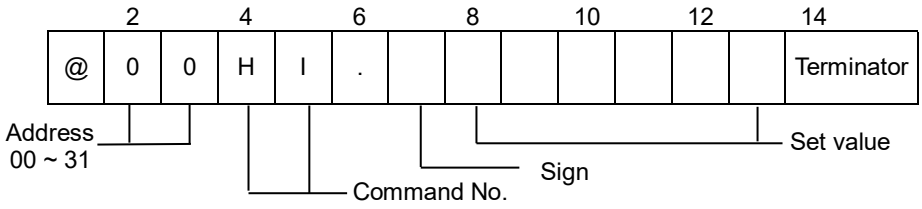


(3) Writing comparison data (Host -> CSD-401)



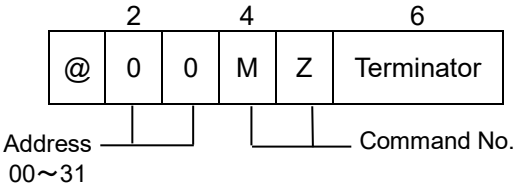
Command No.	Simple comparison mode	Batch/discharge mode
HI	S5	Writing Over（SET4）
LO	Not used.	Writing Under（SET5）
S0	S1	Writing Target value（SET0）
S1	S2	Writing Free fall（SET1）
S2	S3	Writing Preliminary（SET2）
S3	S4	Writing Zero band（SET3）

In normal operation
Return (CSD-401 -> Host)



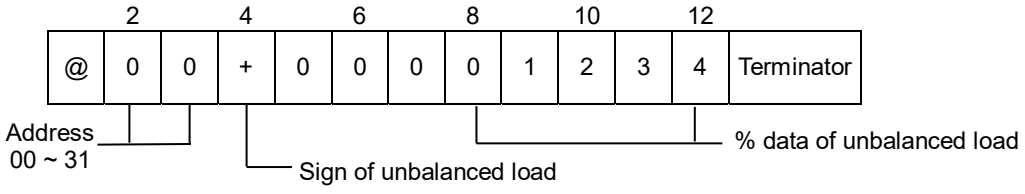
- **The set value is justified to the left.**
- **Never add the decimal point.**
- **The writing of comparison data is variable-length. The length can be set from 1 to 6.**
- **The range of set value for Fixed tare value is more than [0] and less than [The range of the 1st]. Other than the range of set value is -99 999 ~ 99 999.**

(4) Reading out % value of unbalanced load



Command No.	Operation
80	% value of unbalanced load of ID No.1
81	% value of unbalanced load of ID No.2
82	% value of unbalanced load of ID No.3
83	% value of unbalanced load of ID No.4
84	% value of unbalanced load of ID No.5
85	% value of unbalanced load of ID No.6
86	% value of unbalanced load of ID No.7
87	% value of unbalanced load of ID No.8

Return (CSD-401 -> Host)



- **% value of unbalanced load is the ratio of average value which the Gross weight is divided by the number of load cells connected. The calculation of % of unbalanced load shall be as follows:**
  m : Number of digital load cells connected
  Dn: Load value of ID number n
  Hn: % value of unbalanced load of ID No.

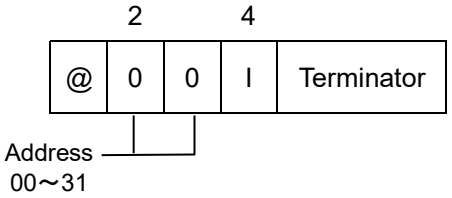
$$Hn = \left(Dn - \frac{D1 + D2 + \cdots Dm}{m}\right) \div \left(\frac{D1 + D2 + \cdots Dm}{m}\right) \times 100 \quad [\%]$$

- **The unit is fixed as 0.1%. No decimal point is attached.**

(5) Process of communication error

The instrument sends back the Error command at the time of Communication error and Execution error.

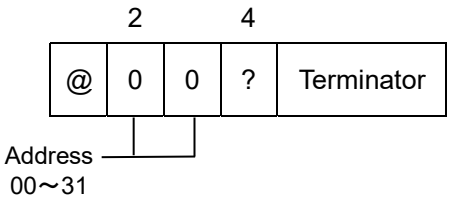
Error command at the time of no execution of operation
Return (CSD-401 → Hosrt)



The conditions of [No execution of operation] are as follows:

- **When received command in other than the Measurement mode. (Measurement value display)**
- **When executing Zero set of [Command MZ], you cannot make Zero set without the effective range of Zero set.**
- **During executing Tare for the [Command MT], you can't make Tare due to [±OL] of display.**
- **When executing Net weight display of [Command MN], you can't change Net weight display due to Tare is undone.**
- **When you cannot execute the receiving Command.**

Error command at the time of receiving undefined command
Return (CSD-401 → Host)



The definition of [Receiving undefined Command] are as follows:

- **When you received [Undefined Command].**
- **When you received the command whose command of data length isn't specified.**
- **When the decimal point is added to the set value data.**
- **When other than the numerical value is entered to the section of set value.**
- **When other than the characters are entered to the section of sign.**

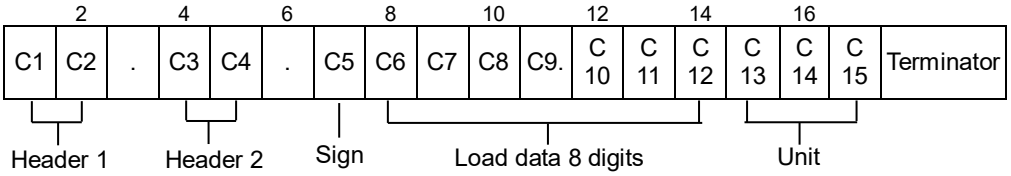
- **When selecting [the command with address attached], if you cannot detect the address no. and End code (terminator), the error code shall not be sent back.**
- **When selecting [Command with no address] the error command shall not be sent back, if you cannot detect the end code (terminator).**
- **When the data length of command data is more than 17 characters, the error command may not be sent back.**
- **When communication error command is sent back from the instrument, consider the measure in the Host side.**

12-4-7. Data format in stream mode synchronized with print signal

- **The load data enters in right-aligned.**
- **For signs, - enters to negative number, and + enters to positive number. When the load data is [0], + sign enters.**
- **In the load data, zero suppression shall not be made.**
- **When the decimal point is specified with the CF-01, the decimal point attaches to the specified position.**
- **When overload is occurred in Format 1, the Load data section becomes all spaces except for decimal point. The sign enters + to the specified position, whichever polarity the sign will be.**
- **When overload is occurred in Format 2, the load data section becomes [+9999999] whichever a polarity might be.**
- **In the Format 1, you can select the digits of unit whichever [2 digits] or [3 digits] with the Function of F-46.**
- **The unit enters in right –aligned, and extra digits become spaces.**
- **The blank are all spaces.**
- **Other than the modes of Measurement mode (Display of measured value) output can't be made.**

(1) When F-48 is set as either one of [Interlocking with display], [Gross], [Net] or [Tare'

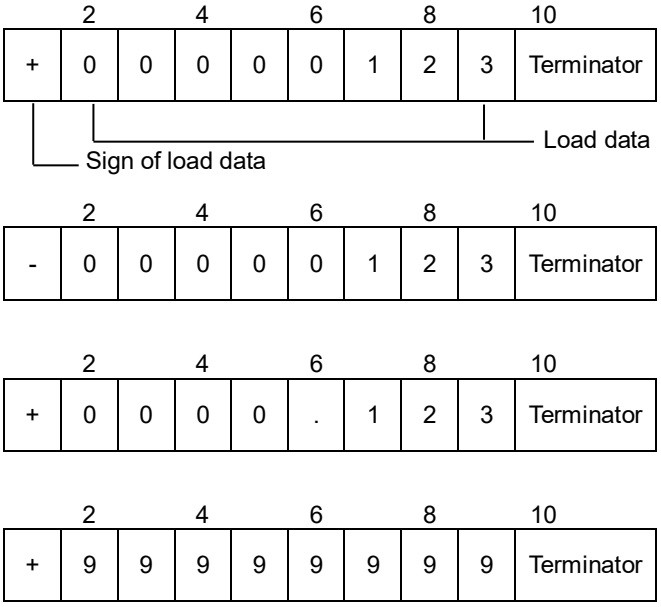
Case : Format-1



Header 1			Header 2			sign		Load data 7 digits							Unit			
C1	C2	contents	C3	C4	contents	C5	contents	C6	C7	C8	C9	C 10	C 11	C 12	C 13	C 14	C 15	contents
O	L	Overload	N	T	Net value	+	Plus	0	0	0	0	1	2	3		g		gram
S	T	stable	G	S	Gross value	−	minus	0	0	0	.	1	2	3	k	g		kilogram
U	S	unstable											O	L		t		ton
															l	b		pound
																	g	gram*
																k	g	kilogram*
																	t	ton*
																l	b	pond*

* When the unit is 3 digit.

Case : Format-2



(2) When setting the Function F-48 sets [Gross + Net + Tare].

According to the format selected, data of [Gross], [Net] and [Tare] can be sent continously. The series of data will become the value of calculated one from the same AD data.

- **In the stream mode, data is outputted synchronous with display times, but there may have the case of asynchronous with the display, due to the mutual relation of setting of baud rate and display times.**

13. Options

13-1. Analog output

13-1-1. Specifications of current output (P/N : CSD-401-P07)

Spec.	Contents
Output	DC4 mA to 20 mA
Load characteristics	260 ohm or less
Non-linearity	0.05 %F.S.
Resolution	Approx. 1/12 000
Over-range	At [- OL] display, approx. DC2.4 mA At [OL] display, approx.DC21.6 mA
Output times	5 times/s, 15 times/s

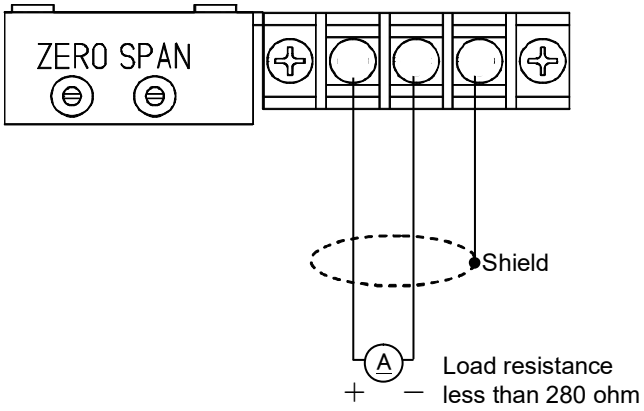
13-1-2. Specifications of voltage output (P/N : CSD401-P25)

Spec.	Contents
Output	DC0 V to 10 V
Load characteristics	5 k-ohm or more
Non-linearity	0.05 %F.S.
Resolution	Approx. 1/12 000
Over-range	AT [-OL] display, approx. DC—1 V. At [OL] display, approx. DC11 V.
Output times	5 times /s,15 times/s

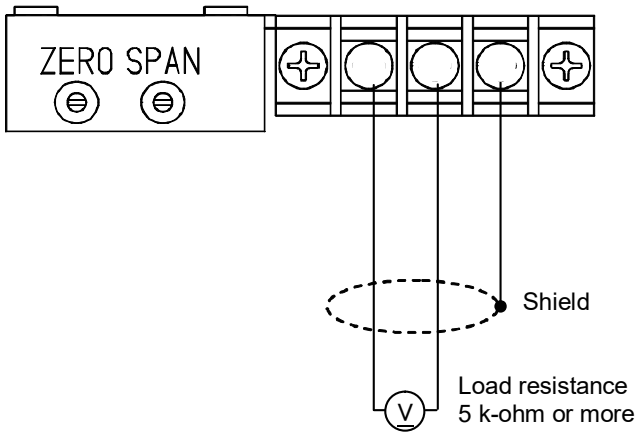
- **The analog output of the instrument executes to rewrite synchronous with the display.**
- **After feeding power, the analog output has output variable factors.**
  For your safe operation, please use the instrument after about one (1) hour later.

13-1-3. Connection with analog output

(1) Current output



(2) Voltage output



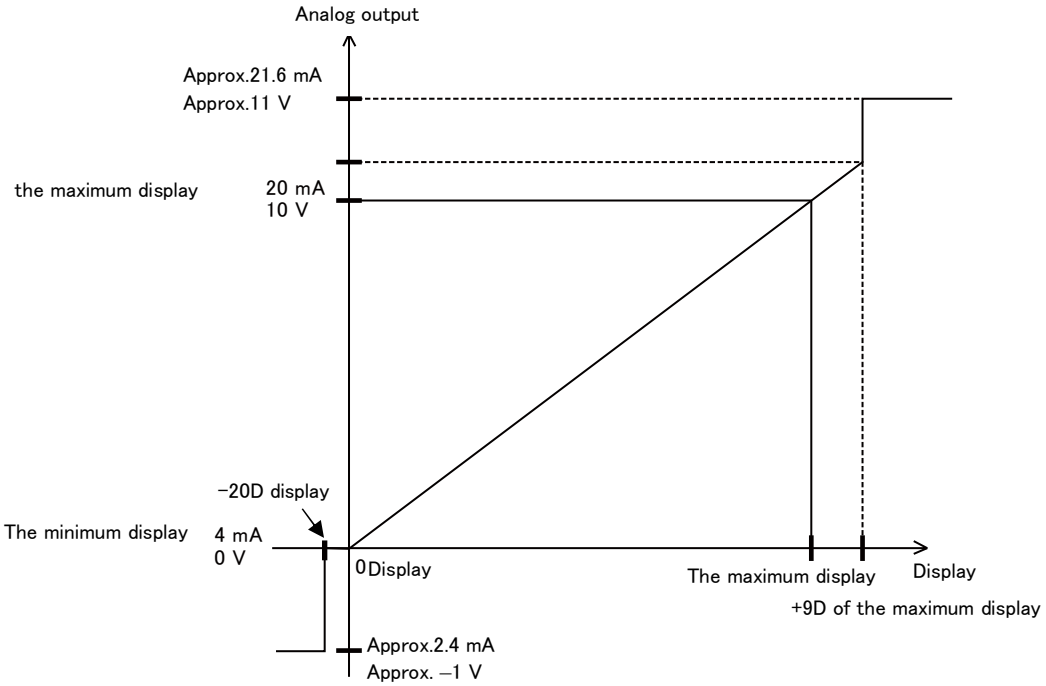
• Use the shielded cable for connection of analog output, and connect it with F.G. terminal.

13-1-4. Selection of analog output

Select the analog output with a set of Function CF-70.
You can select the analog output from [Interlocking display], [Gross] or [Net].
[Interlocking display] is selected as a default.

13-1-5. Scaling of analog output

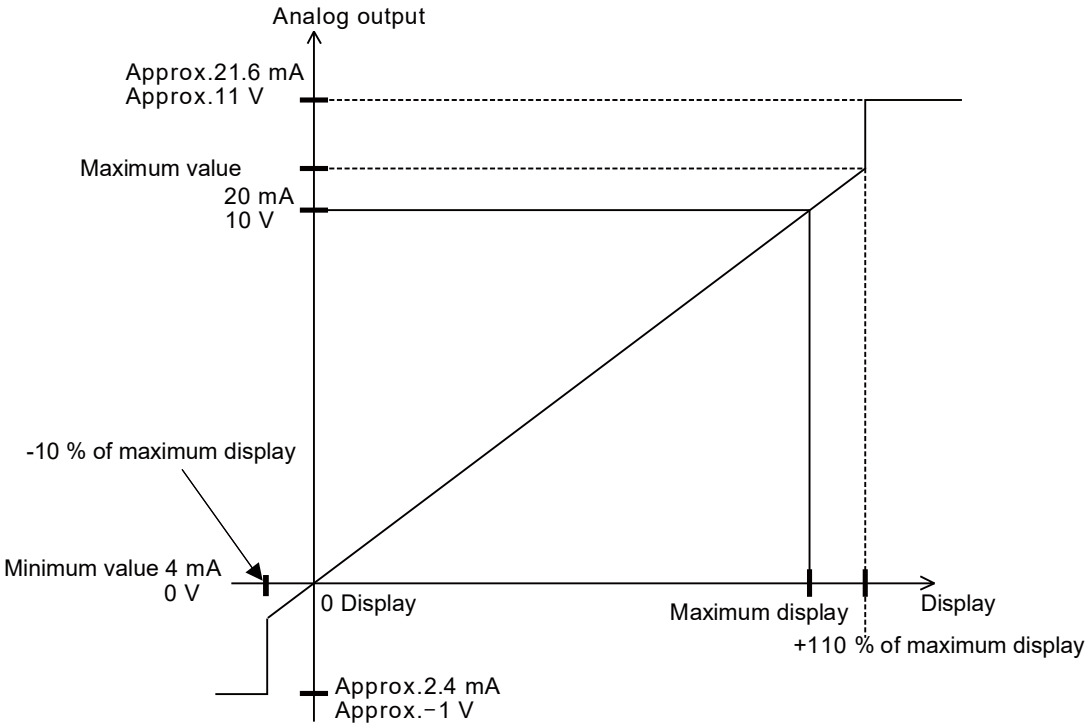
The analog output is set with 0 to 10 000, for the minimum value from the maximum value.
By changing the CF-71 and CF-72, you can make it to an optional value.



The CF-71 sets the display when outputs the minimum value.
The CF-72 sets the display when outputs the maximum value.

• Set the value of CF-72 not to exceed the weighing capacity set in item 4.
• Set the value of CF-71 smaller than the value of CF-71.

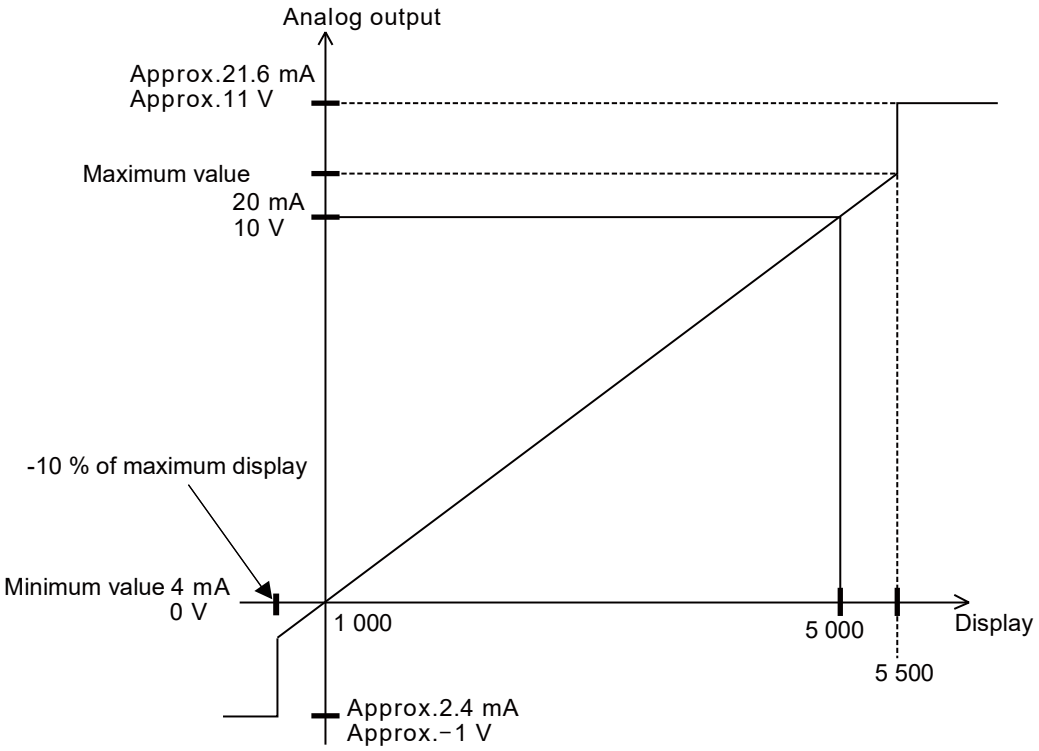
Scaling of analog output when the set value of CF-03 is 0 or 1



By CF-71, set the display when the minimum value is output.
By CF-72, set the display when the maximum value is output.

for example

CF-71: Set to 1 000
CF-72: Set to 5 000
Output the maximum value when the display is 5 000.
Output the minimum value when the display is 1 000.

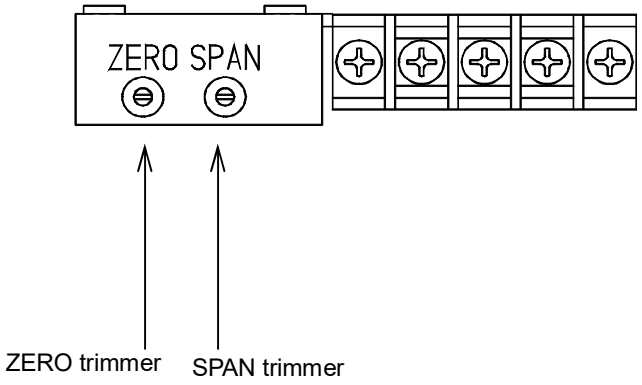


- **Set the value of CF-72 not to exceed the weighing capacity set in item 4.**
- **Set the value of CF-72 smaller than the value of CF-71.**

13-1-6. Fine adjustment on analog output

Makes the fine adjustment with the ZERO trimmer and the SPAN trimmer after scaling is executed for the analog output by setting C function CF-71 and CF-72.

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



13-2. BCD output

13-2-1. Specifications for BCD output (P/N: CSD401-P15)

Specifications	I/O	Contents
BCD data	Output	5 digits parallel output
POL. (polarity)	Output	ON with the output of minus polarity, OFF with the pulse polarity output.
P.C. (Print command)	Output	ON in constant time after conversion of BCD output is over.
ERROR	Output	ON during error has occurred. Refer to the contents of error in paragraph 16.
OVER	Output	ON synchronous with OL display (Overload)
Comparator output	Output	Output for S1, S2, S3, S4 and S5
STAB.(stable)	Output	ON during detection of stable.
GROSS(gross weight)	Output	ON at the time of Gross data is outputting.
BCD-ENABLE	Input	Makes the BCD output in high impedance condition.

13-2-2. Operation mode of BCD output

Select the operation mode of BCD output with the set of Function F-30.

The BCD output operation mode can be selected from the Stream mode (Outputs synchronous with display times) and [Synchronous with Print].

[Stream mode (outputs synchronous with display times)] is selected as a default.

13-2-3. Target of BCD output

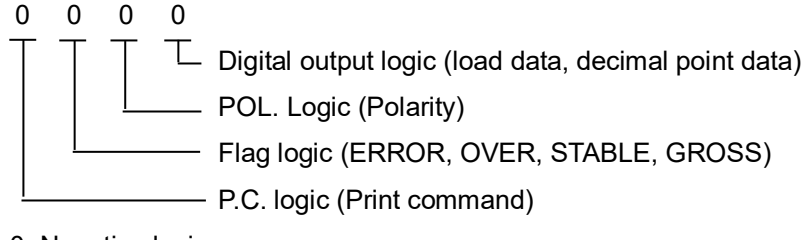
With set of Function F-31, the target of BCD output can be selected.

Function No.	Set value	Contents
F-31	0	interlock with display
	1	Gross
	2	Net
	3	tare

[Interlock with display] is selected as a default.

13-2-4. Logic of BCD output

Select the output logic of BCD with the set of Function F-32.

Function No.	Set value	contents
F-32	0000 ~ 1111	 0: Negative logic 1: Positive logic

[ALL NEGATIVE LOGIC] has selected as a default.

13-2-5. P.C. width (Print command)

Select the width of Print command of BCD output with the Function F-33.
The width of Print command can be selectable from [125 ms] and [25 ms].
[125 ms] is selected as a default.

- **Before and after the rise time of the print command, there may be unstable condition due to conversion of BCD data.**
- **Reading the correct BCD data can be made by the timing of decay of Print command.**

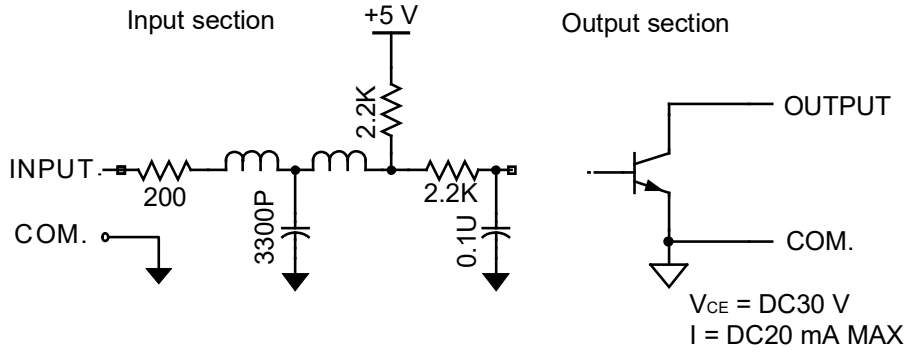
13-2-6. Pin configuration of BCD output connector

Pin No.	I/O	BCD code		Pin No.	I/O	BCD code	
1	-	COM.		21	Output	4	10^4
2	Output	1	10^1	22	Output	8	
3	Output	2		23	Output	POL.	
4	Output	4		24	Output	OVER	
5	Output	8		25	Output	ERROR	
6	Output	1	10^1	26	Output	P.C.	
7	Output	2		27	Output	SATB.	
8	Output	4		28	Output	GROSS.	
9	Output	8		29	Output	N.C.	
10	Output	1	10^3	30	Output	N.C.	
11	Output	2		31	Output	N.C.	
12	Output	4		32	Output	S1	
13	Output	8		33	Output	S2	
14	Output	1	10^3	34	Output	S3	
15	Output	2		35	Input	BCD-ENABLE	
16	Output	4		36	Output	S4	
17	Output	8		37	Output	S5	
18	Output	1	10^4				
19	Output	2					
20	-	COM.					

Suitable plug: DC-37P-N (Made by JAE.)

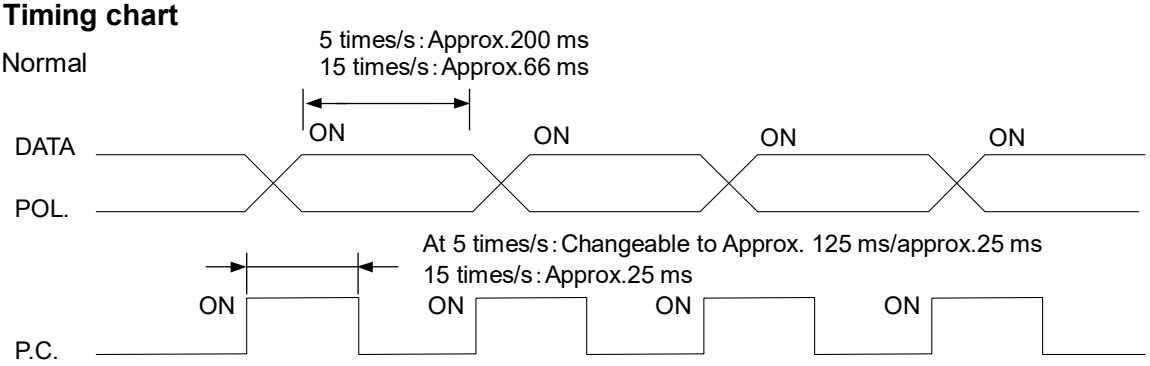
- **Never connect with the N.C. pins.**
- **COM.1 for external control input and the COM. of BCD output are connected.**
- **In other than the modes of Measurement mode, the output is OFF.**
- **To suit the instrument to suitable to JIS standard, use the shielded cable to make contact with the metallic shell section of connector and the shield cable directly by applying the connector with metallic shell.**

13-2-7. Input/Output equivalent circuit



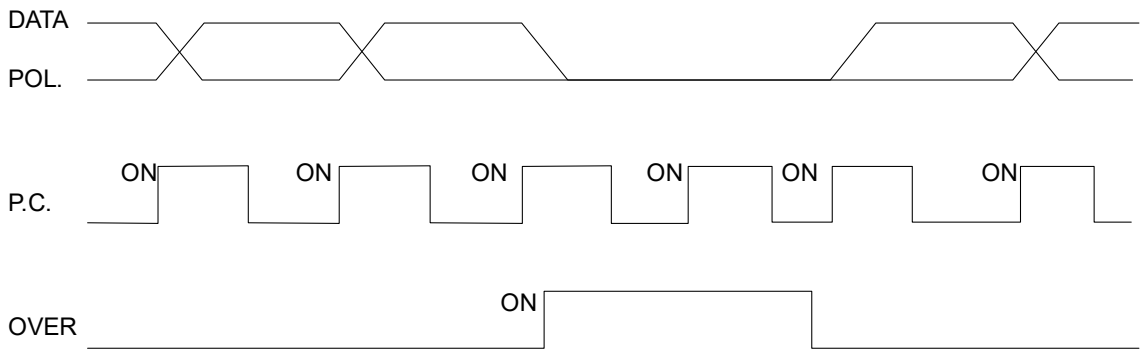
13-2-8. Timing chart

(1) Normal



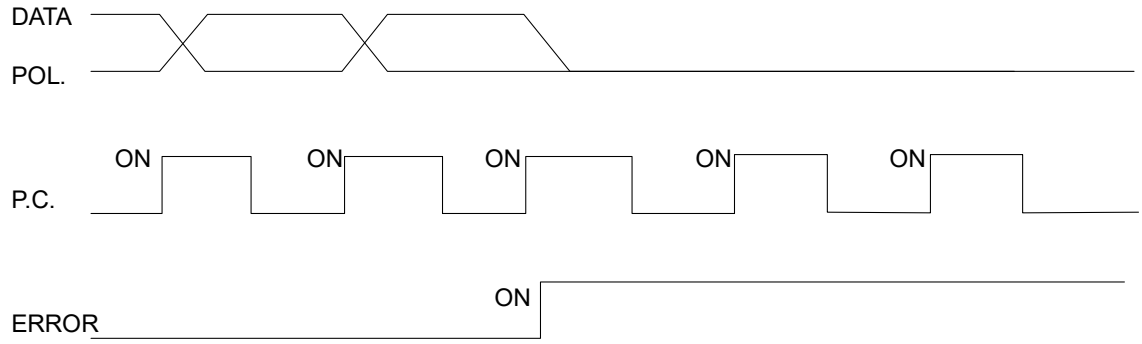
- **At the time of data output of all the P.C., DATA and POL., the output transistor becomes ON. (negative logic electrically).**

(2) When a data is over.



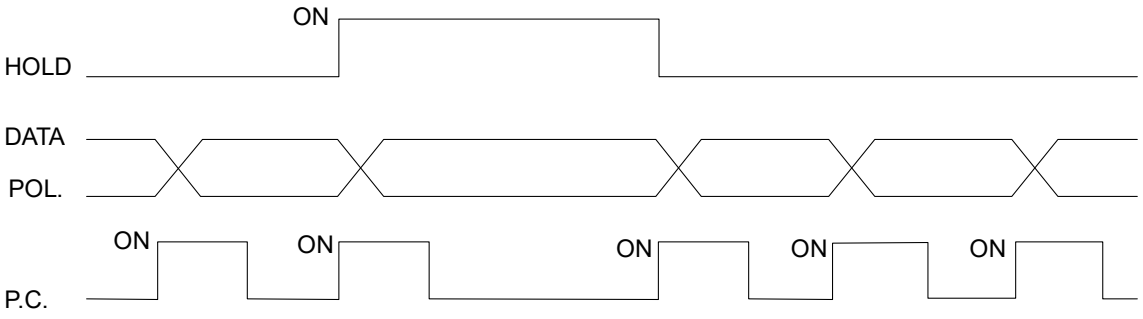
- **At the time of OVER output, the output transistor of OVER signal becomes ON. (negative logic electrically) Also, at the time of OVER output, the all of the DATA of output transistor become OFF condition. (Positive logic electrically) (However, the POL becomes OFF at the time of plus over, and becomes ON at the time of minus over.)**

(3) When the error is occurred.



- **At the time of ERROR output, the output transistor for ERROR signal will become ON. (Negative logic electrically.) Also at the time of ERROR output, all of the DATA and POL. become OFF condition of output transistor. (Positive logic electrically.)**
- **The HOLD signal, can be treated by holding the control input signal that is set at [8] (display hold) with the Function F-60 to F65 within the control input IN1 to IN6.**

(4) When inputting the HOLD signal



- **For the HOLD signal, the operation shall be executed after approx. 100 ms or more is shorted.**
- **At the time of inputting HOLD signal, the output transistor of P.C. is in OFF condition. (Positive logic electrically.) However, as for P.C., it becomes OFF after 1 shot of operation.**

13-2-9. Output condition

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

13-3. RS-422/485 interface

- **When the RS-422/485 interface is/are installed, the operation of standard RS-232C interface becomes ineffective.**

13-3-1. Specifications for RS-422/485 interface (P/N: CSD401-P76)

Specifications	Contents
Transmission method	Half duplex
Synchronous method	Start-stop synchronization
Baud rate	Select from 1 200, 2 400,4 800 and 9 600 bps.
Data but length	Select from 7 bit and 8 bit.
Parity bit	Select from no parity, even parity and odd parity.
Stop bit	Select from 1 bit and 2 bit.
Terminator	Select from CR＋LF and CR.
Transmission data	ASCII code
Cable length	Approx.1 km
Address	Select one among 0 to 31.
Number of connections	32 sets at maximum. (10 sets with the RS-422.)
Terminal resistance	Built-in type (Select yes/no with the short of terminal board.)
I/O monitor	With LED (TXD、RXD)

13-3-2. Explanation when communication protocol 1 (F-39 = 0) is selected.

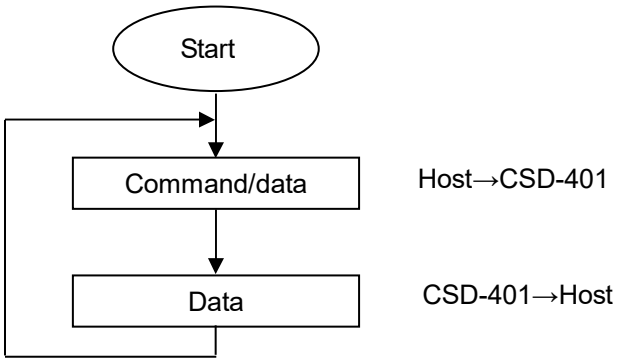
(1) Command mode

Operation mode of RS-422/485

With no relation of setting Function F-40, the operation becomes fixed as [Command mode].

By sending the fixed command/data from the Host (PC, sequencer, etc.) to CSD-401, the data corresponding to the command/data will be sent back to the Host side from the CSD-401.

Be sure to make communication according to the following procedure.



- **Communicating operation is made in the measurement mode only. In the other modes, Error command is sent back.**
- **In the condition of standing−by, the response will not be made.**
- **In the instrument of CSD-401, the Flow control will not be made.**
- **The X flow control will not be made.**
- **The communication operation is the type of Dialogue type.**

(2) Specifications for RS-422/485 communication

Selec the specificatios forRS-422/485 with the set of Function F-42.

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

[13020] is set as a default.

(3) Address setting for RS-422/485

With the set of Function F-43, address setting for RS-422/485 can be made.
Setting range: 00 ~ 31
[00] is set as a default.

(4) Change of RS-422/485

With the set of Function F-44, change of RS-422 and RS-485 can be preformed.
[RS-422] is set as a default.

(5) Delay time of sending back data of RS-485

After sending back from the Host side, you can delay the returning data from the CSD-401 side in the case of sending terminal from the Host side becomes low impedance.
With the setting of F-45, you can set the delay time of sending back data of RS-485.
Setting range: 0 ~ 9 Unit : 0.1 s
[1] is set as a default.

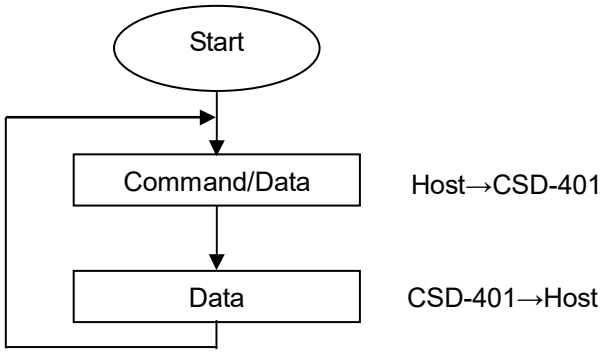
(6) Yes/No of decimal point of sending data of RS-422/485

With the setting of F-46, presence of decimal point for RS-422/485 send data is selected.
[No decimal point] is selected as a default.

13-3-3. Explanation when Communication protocol 2(F-39 = 1) is selected.

(1) Operating mode of RS-232C interface

1) Command mode
By sending the fixed command/data from the Host (PC, sequencer, etc.) to CSD-401, the data corresponding to the command/data will be sent back to the Host side from the CSD-401.
Be sure to make communication according to the following procedure.



2) Stream mode
The latest data of targeted to output selected in the Function F-48 can be output continuously.
However, depending on the setting on display times and bauds rate, the output times might vary.

3) Synchronized with print
The data of output target selected with the Function F-48 can be output synchronous with the print signal (PRINT key, external control input, automatic print).

- **The operation of communication can be made during the Measurement mode only.**
- **When the [Stream mode] is selected, the communication becomes [OFF] except for the Measurement mode. In the [Command mode', communication becomes OFF at the time of display is OFF, and other than the modes, the Execution Error command shall be sent.**
- **The Flow control cannot be made in the instrument of CSD-401.**
- **The CTS/RTS signals are not used.**
- **The X flow control is not made.**
- **The operation of communication is dialogue type.**

4) Output target in RS-232C stream mode synchronized with print signal
With the set of Function F-48, the output target for RS-232C has selected.
The output target for RS-232C is selectable from [Interlocking with display], [Gross], [Net], [Tare] and [Gross, Net, Tare].
[Interlock with display] is selected as a default.

- **Setting of Function F-48 becomes effective when the Function F-39 = [0] or [1].**

(2) Specifications for RS-422/485 interface communication

With the set of Function F-42, select the specifications for RS-422/485 communication.

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

[13020] is set as a default.

(3) Setting address for RS-422/485

With the set of Function F-43, setting address for RS-422/485 can be performed.
Setting range : [00] ~ [31]
[00] is set as a default.

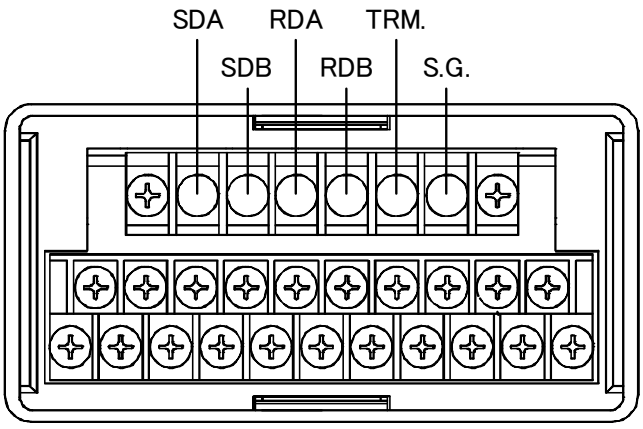
(4) Change of data format of RS-232C and set digit of unit

With the set of Function F-49, set the change of data format and digit of unit.

Function No.	Set value	Contents
F-42	00000 ~ 13121	0 0 Change of data format: 0 : Format 1, 1: Format 2 Set the digit of unit.: 0:2 digits, 1:3 digits

The data format 1 is the [7 digits load data with condition], and the data format 2 is [8 digits load data without condition].
The digits for unit can be selectable from 2 digits or 3 digits at the time of Data format 1.
[Format 1] and [2 digits of unit] is selected as a default.

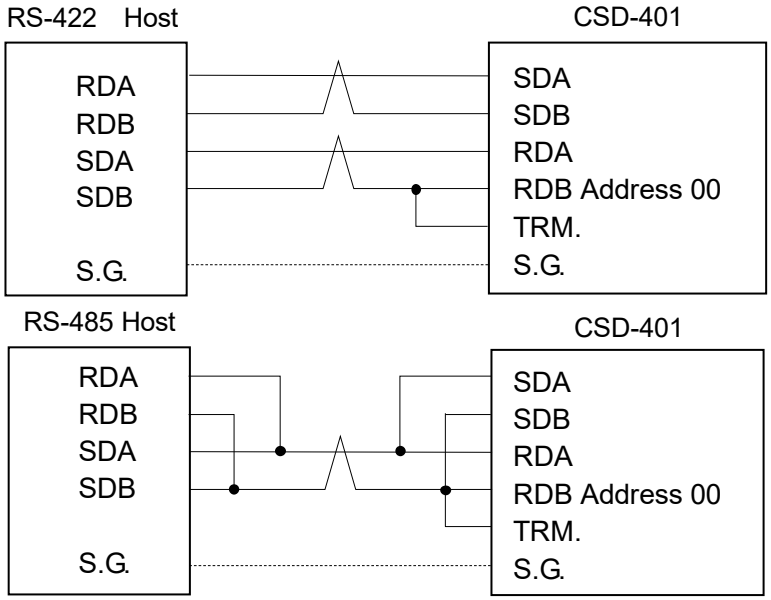
13-3-4. Pin configuration and wiring of terminals



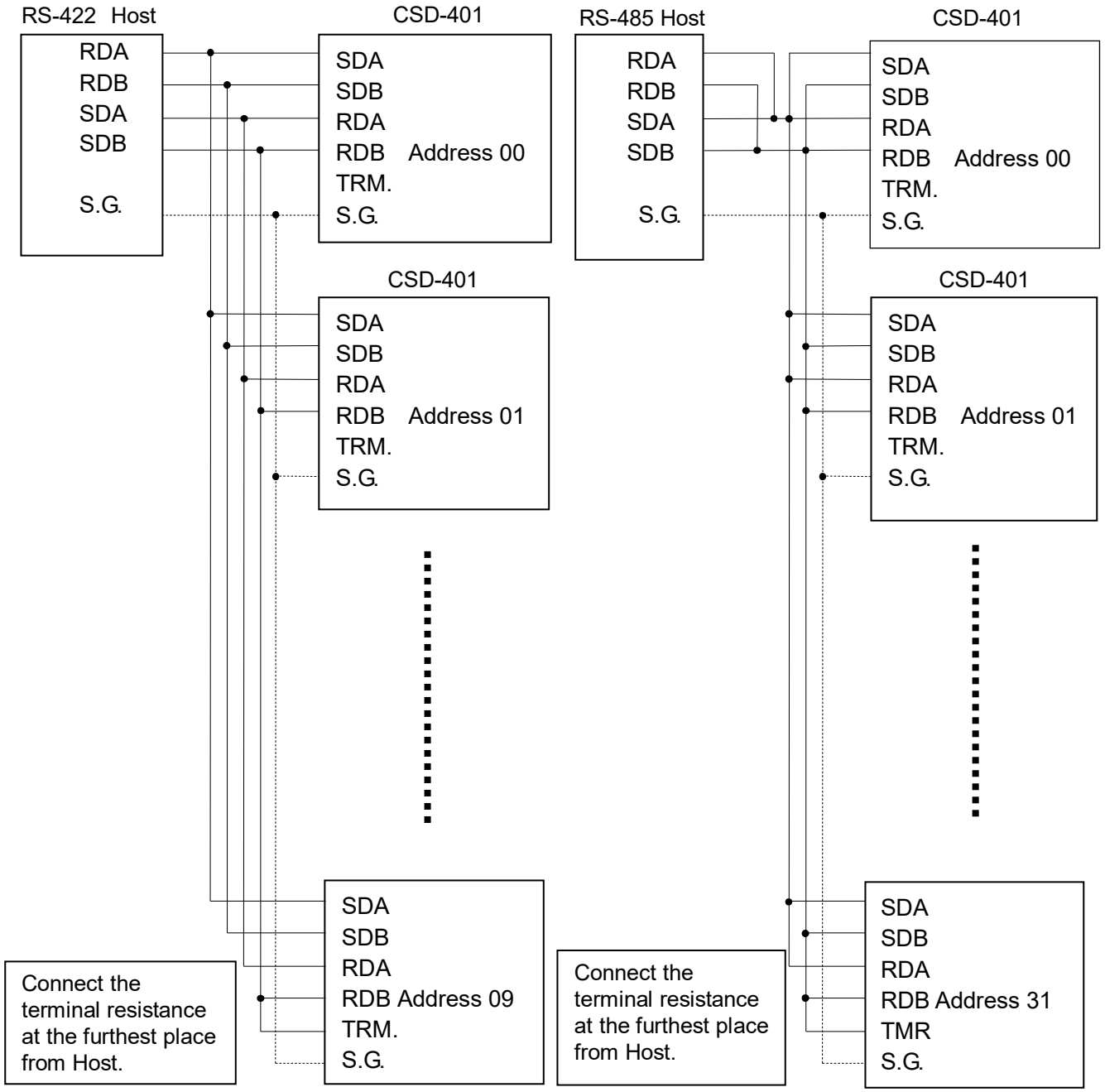
SDA	Differential output(+)
SDB	Differential output(-)
RDA	Differential input(+)
RDB	Differential input(-)
TRM	Terminal resistance
S.G.	Signal grand

- **Located the furthest place from the Host (personal computer, sequencer), make the TRM. Terminal and RDB terminal short, and then connect with the built-in terminal resistance.**
- **For the connection, twisted pair type wire shall be recommended.**
- **The SG of RS-422/485 and the COM.1 of external control input are common.**
- **The internal circuit is isolated from photo coupler.**
- **To suit the instrument to the suitable JIS standard, use the shielded cable, and connect the shielded cable with the FG terminal.**

(1) Connection of 1 to 1



(2) Connection of 1 to n



- **The polarity of signal for host computer might be the case of adverse on due to the kind of instrument.**
- **Depending to the kinds of instrument at Host side, there may be the case of no S.G terminal.**

13-3-5. Data format of command mode

As for the command/data format, please refer to [12. RS-232C interface].

13-4. Serial interface (S-I/F)

13-4-1. Specifications for interface(P/N：CSD401-P77)

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

13-4-2. Data format

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INTERVAL	F1	F2	F3	LEN	FUN1	FUN2	ST1	ST2	OVR	ERR	G1	G2	G3	N1	N2	N3	T1	T2	T3	BCC

(1) INTERVAL 15 bit(25 ms)spaces or more (MARK SIGNAL)

(2) F1 ~ F3 0FFH code

(3) LEN 11H code

(4) FUN1 Print command

(5) FUN2 00H code

(6) ST1 State

(7) ST2 State

(8) OVR 00H code

(9) ERR State

(10) G1 ~ G3 GROSS data

(11) N1 ~ N3 NET data

(12) T1 ~ T3 TARE data

(13) BCC Result of calculation from LEN to T3.

1) FUN1

7	6	5	4	3	2	1	0

Print

2) ST1

7	6	5	4	3	2	1	0

SET for NET display.
SET for GROSS display.

3) ST2

7	6	5	4	3	2	1	0

SET when Fixed Tare is effective.

4) GROSS data / NET data / TARE data

G1/N1/T1		G2/N2/T2		G3/N3/T3	
DP	10^4	10^3	10^2	10^1	10^0

Load data･BCD data

7	6	4	5

Sign (SET when minus)
Decimal point

76	Decimal point
00	Non
01	10^1
10	10^2

• Output of serial data can be made during Measurement mode only.

13-4-3. Explanation of format/data

(1) Print bit (FUN1 : bit 0)

This bit can be used as a trigger at the instrument of receiving side .

(2) Automatic display bit (ST1 : bit 7,bit 6)

bit 7 : When the display of the instrument is Gross weight, set as [1].
bit 6 : When the display of the instrument is Net weight, set as [1].

13-4-4. Explanation of output type

(1) Stream mode

Keeps on outputting the data of gross weight and net weight and so on in constant intervals.

(2) Automatic print mode

When the gross weight and net weight can detect stably and at the same time can satisfy the condition of [data exceeding to +5D] or [data exceeding to -5D ~ +5D], sending can be made by setting the Automatic print bit of output format FUNC1 as [1].

- **The automatic print bit is usually 0.**

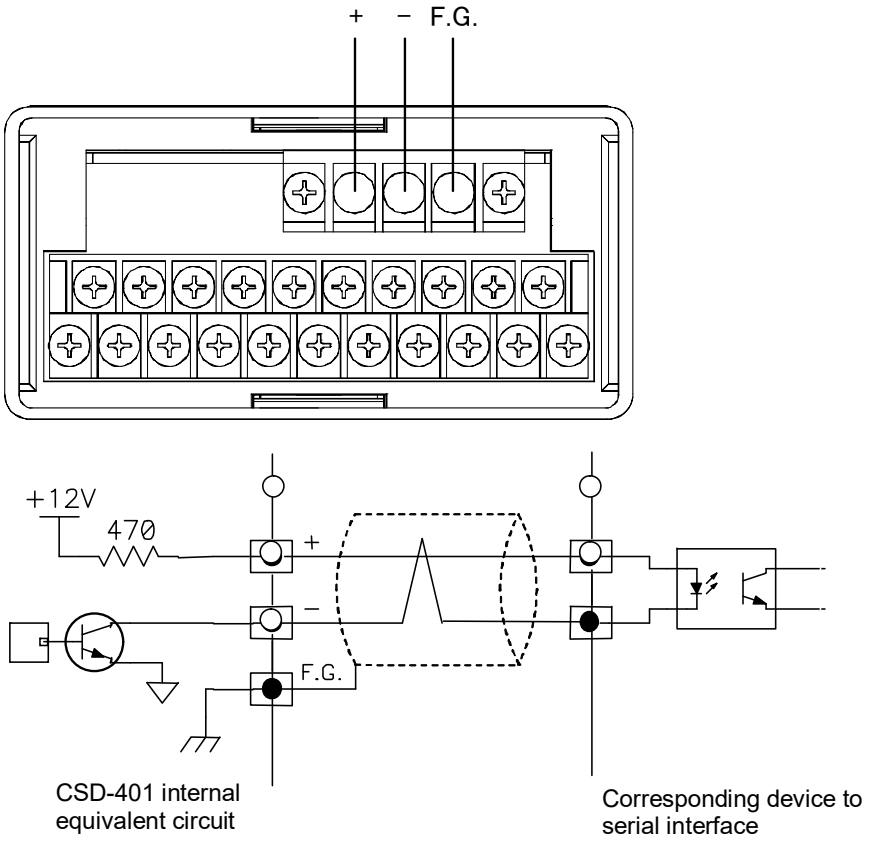
(3) Manual print mode

When detecting stable and the 

key input(or external control input) is made, sending can be made by setting the automatic print bit of output format FUNC1, as [1].

- **The automatic print bit is usually 0.**

13-4-5. Connection with serial interface (S I/F)

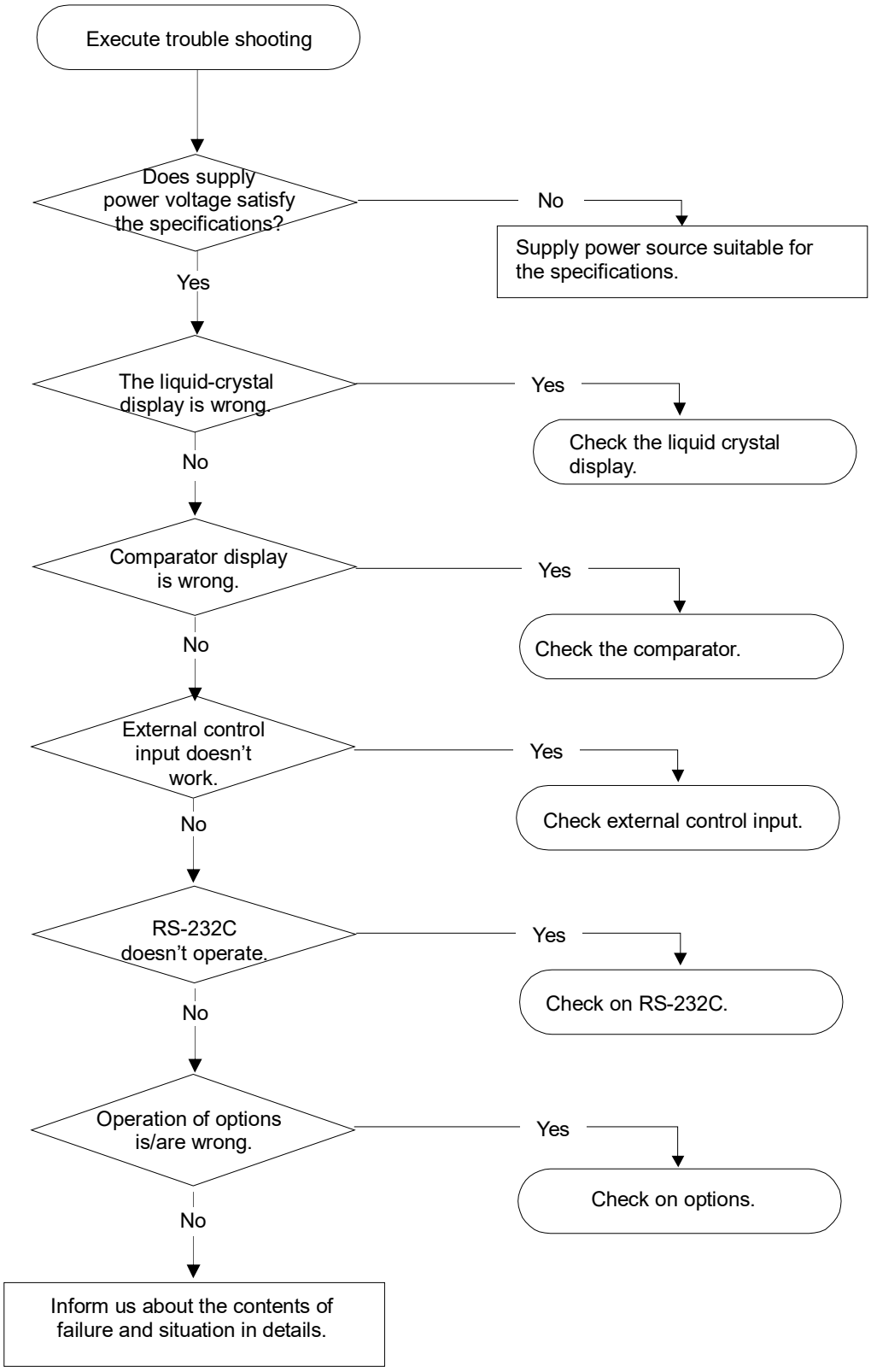


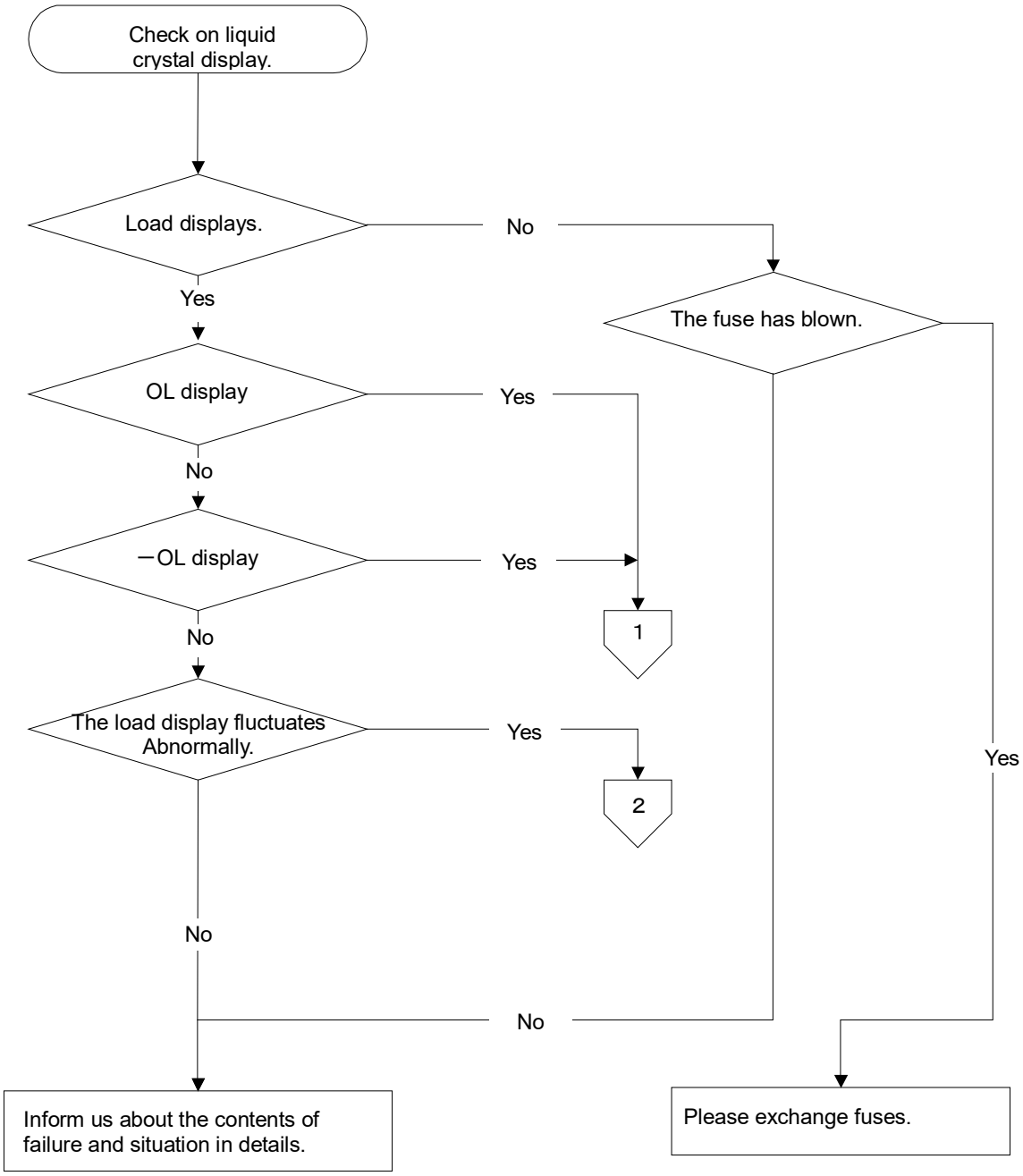
- **Corresponding device for serial interface, there is the M250 type of printer made by Unipulse Co.**
- **Be sure to use the 2 cores shield cable as possible. For the shield, connect with the FG terminals. In case of no use of shield wire, make them twisted. (The cable length is within 100 m when the shielded wire is used, and when no shielded wire is applied, the length is within 20 m.)**
- **The corresponding devices for serial interface can be connectable up to 3 sets in parallel. (The maximum output current : Approx. DC20 mA)**
- **When adopting the instrument to suitable to JIS standard, be sure to use the shielded cable and connect the cable with the FG terminals.**

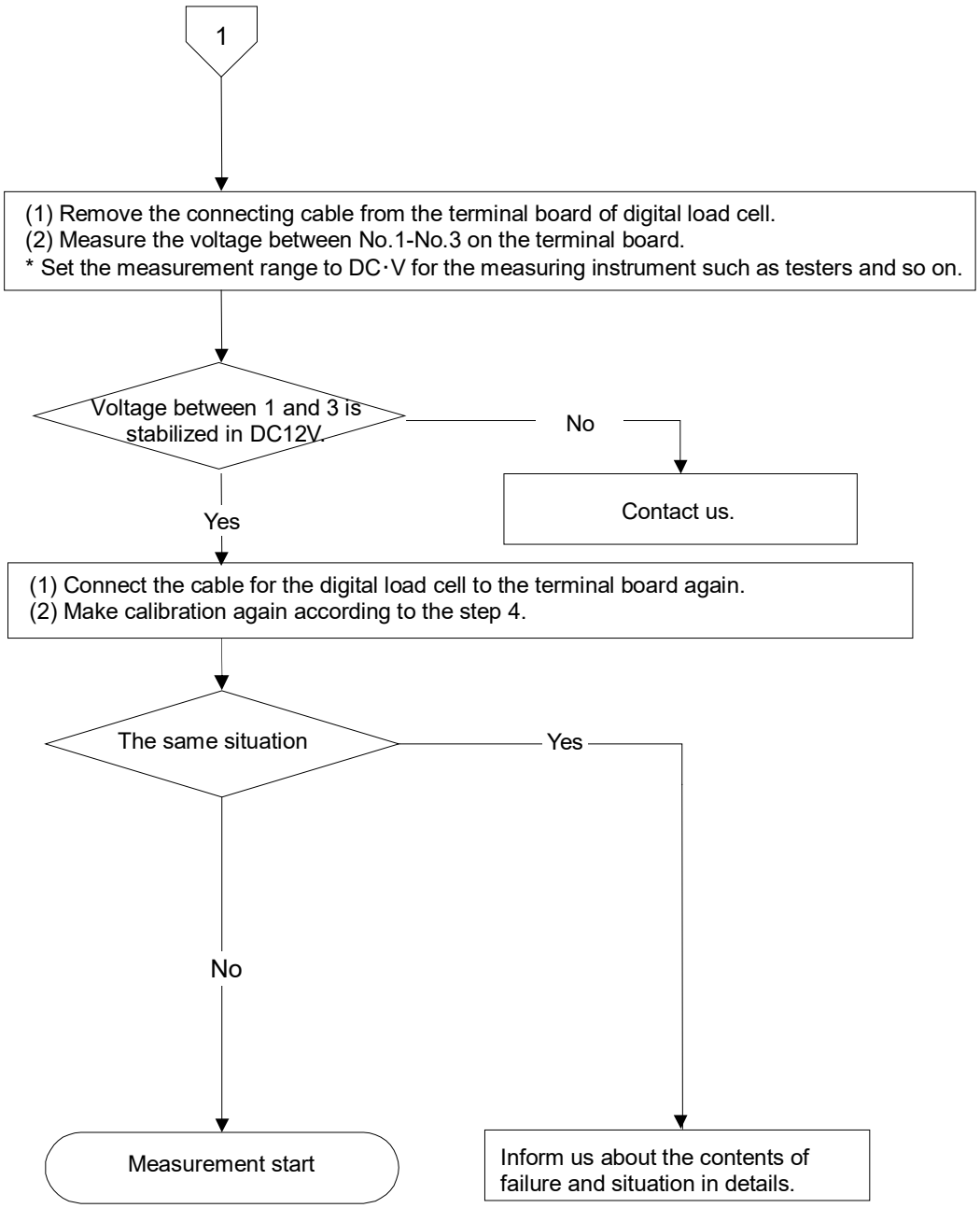
14. Trouble shooting

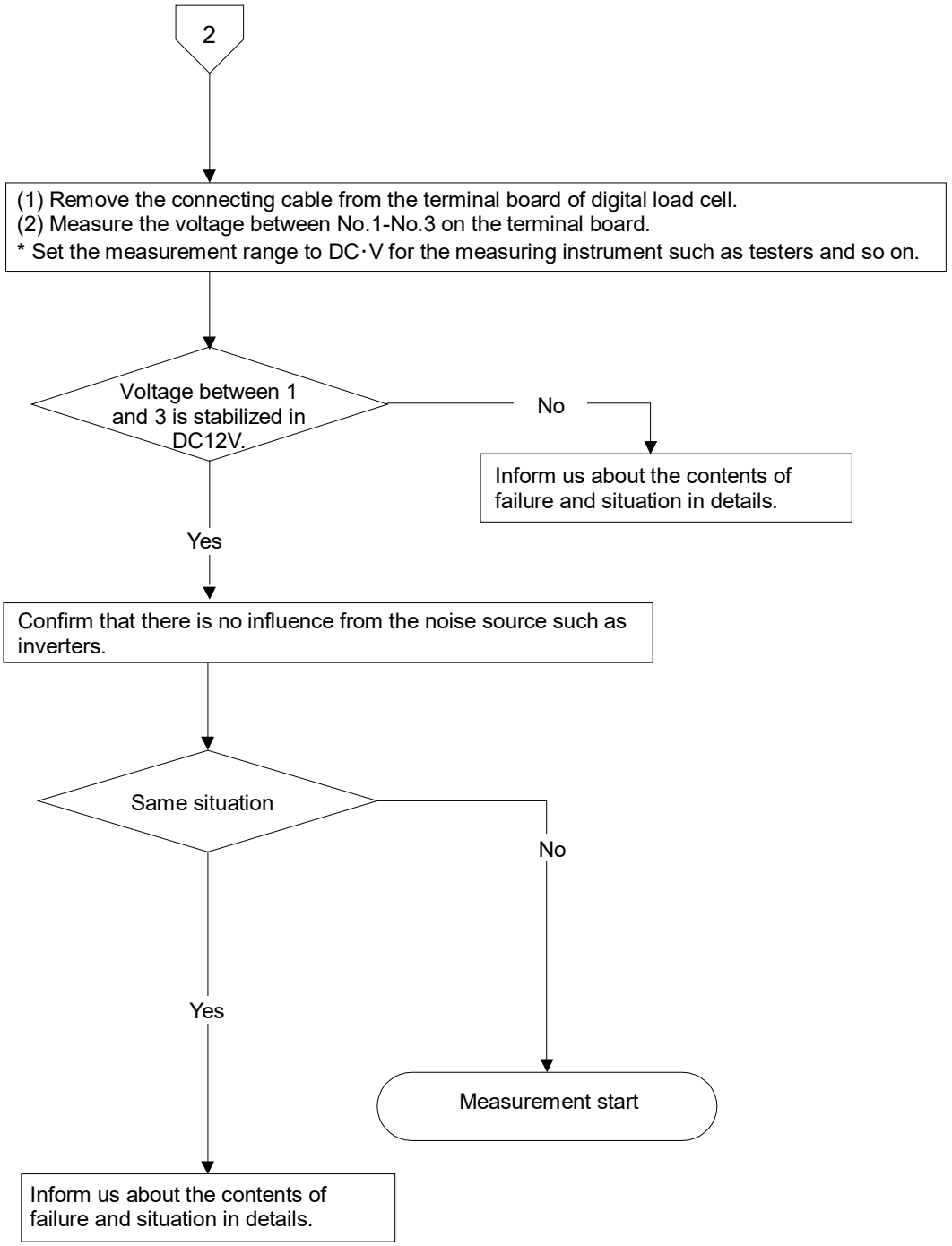
When abnormal point(s) is/are found during the operation of the instrument, check by the following procedures. Moreover, when you cannot find applicable item(s) or solve the symptom of trouble even after you have taken some measures, contact with us.

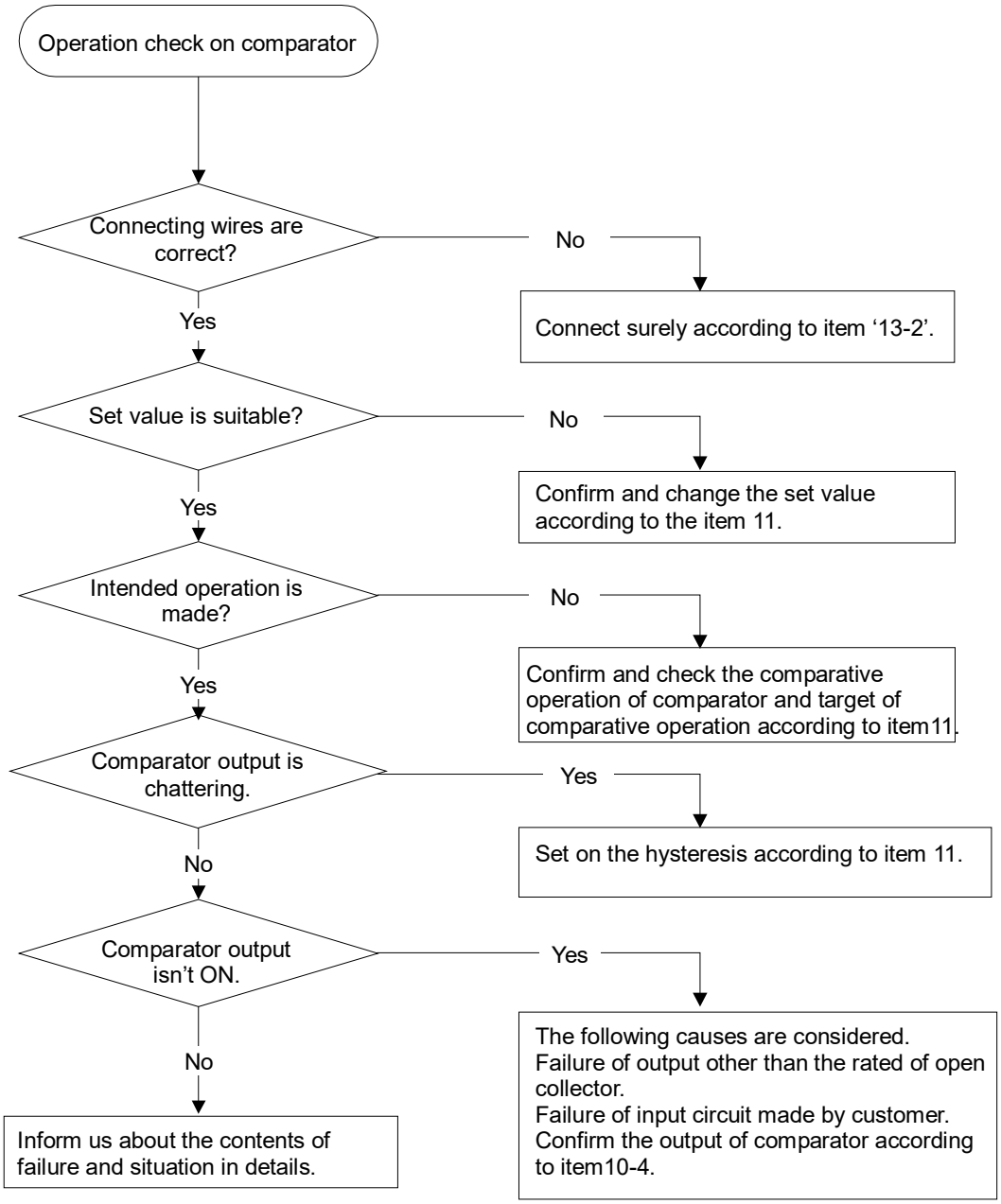
14-1. Executing troubleshooting

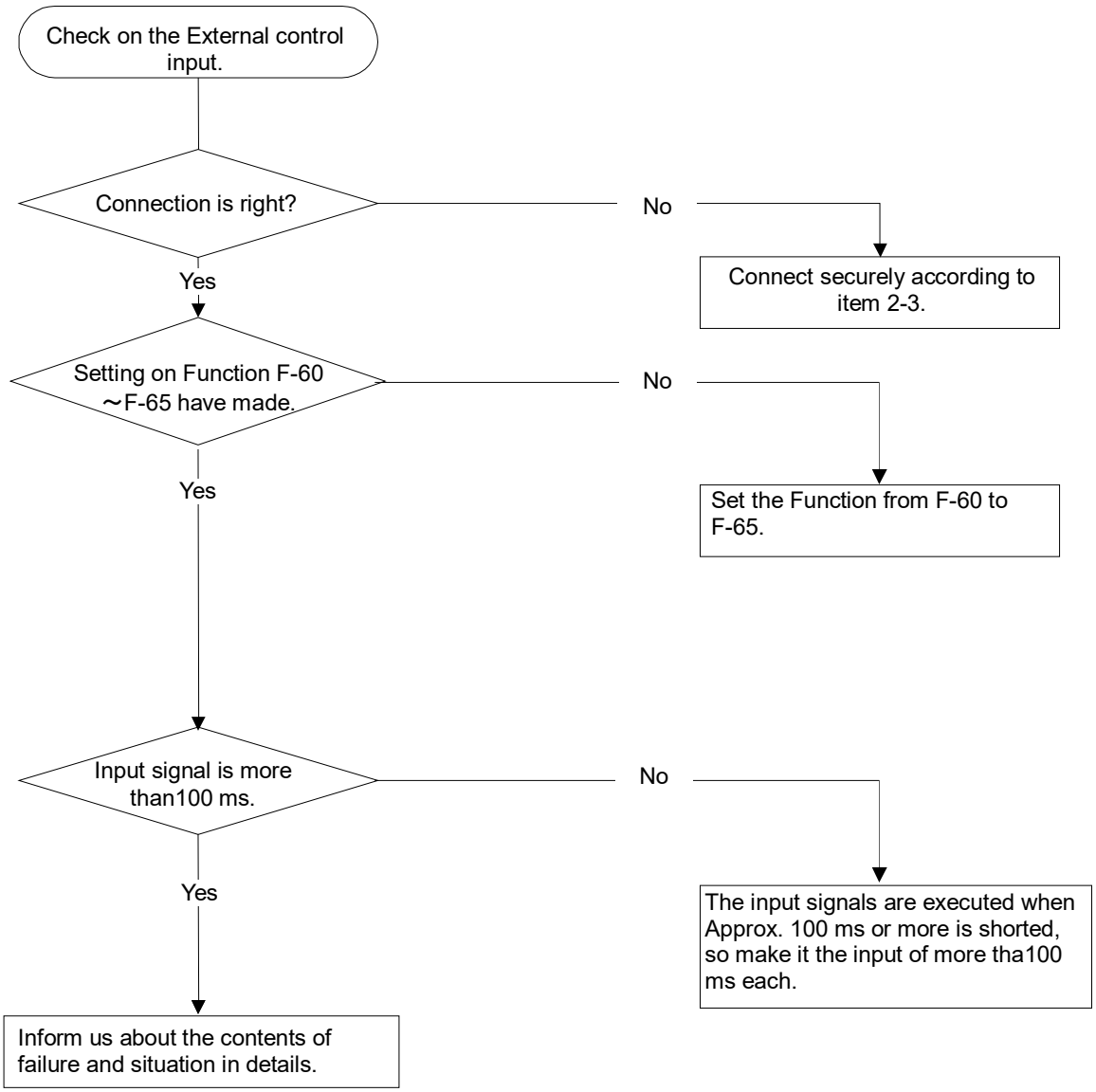


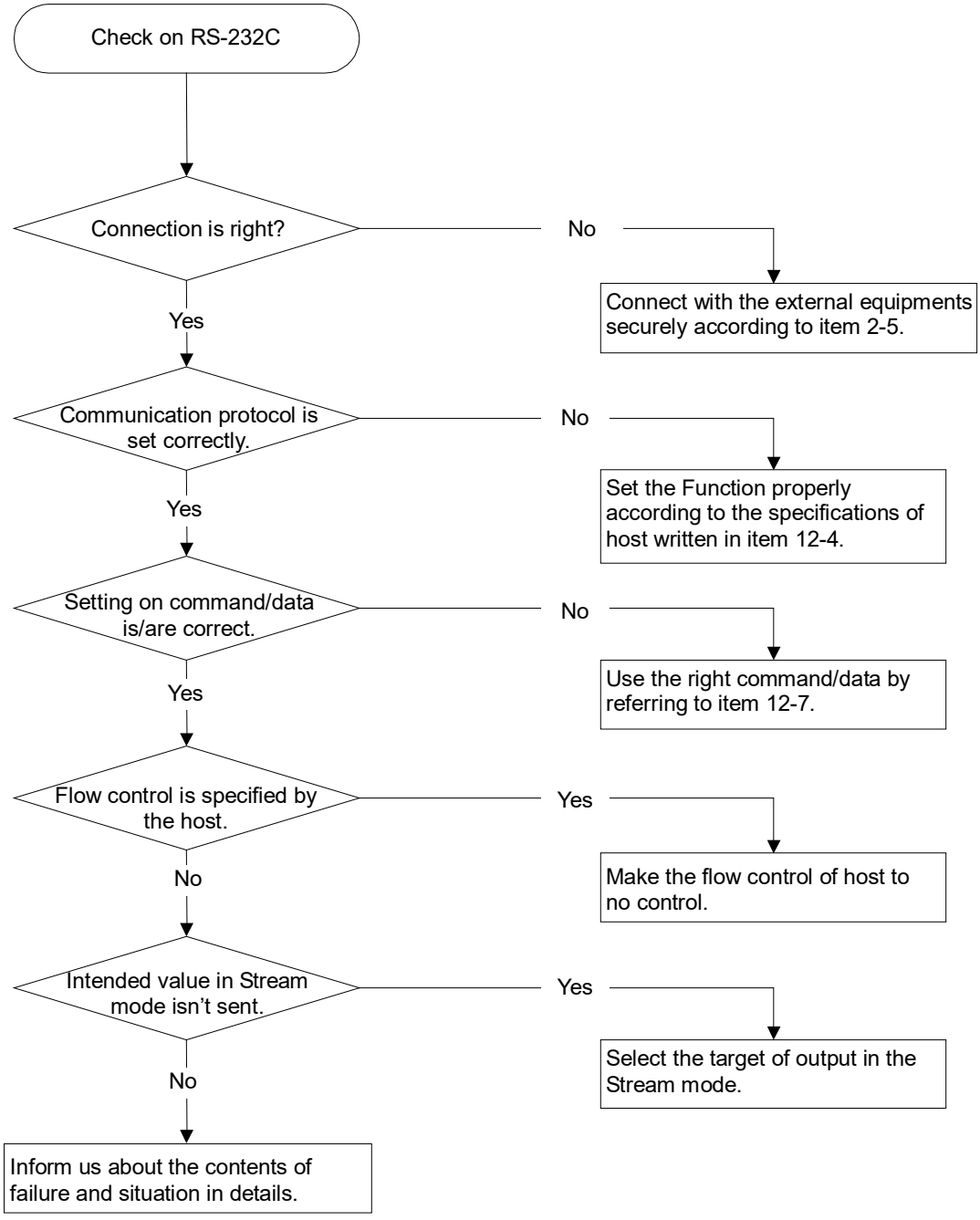

Check on liquid crystal display.
Load displays.
No
Yes
The fuse has blown.
OL display
Yes
No
−OL display
Yes
1
No
The load display fluctuates Abnormally.
Yes
2
Yes
No
No
Inform us about the contents of failure and situation in details.
Please exchange fuses.

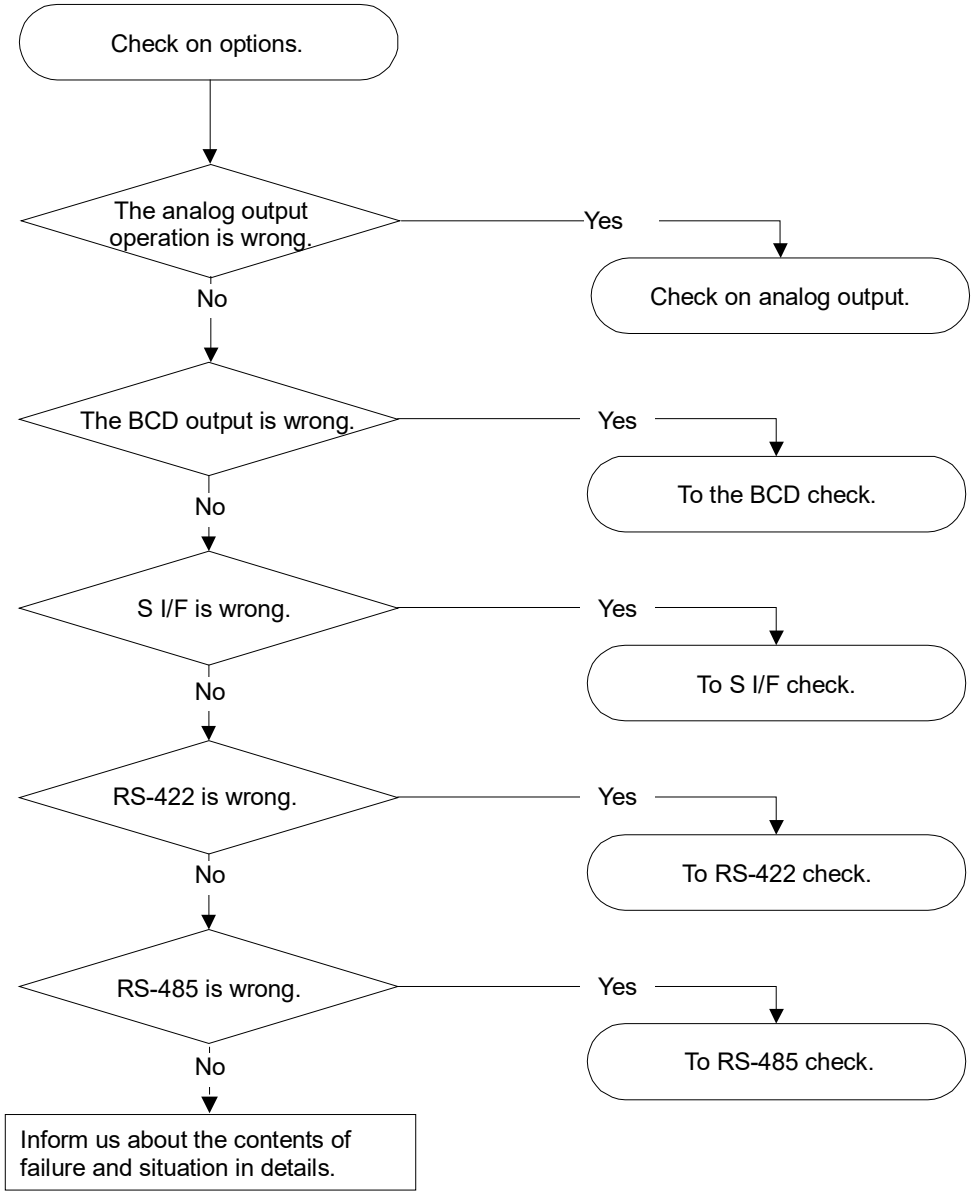

1
(1) Remove the connecting cable from the terminal board of digital load cell.
(2) Measure the voltage between No.1-No.3 on the terminal board.
* Set the measurement range to DC･V for the measuring instrument such as testers and so on.
Voltage between 1 and 3 is stabilized in DC12V.
No
Contact us.
Yes
(1) Connect the cable for the digital load cell to the terminal board again.
(2) Make calibration again according to the step 4.
The same situation
Yes
No
Measurement start
Inform us about the contents of failure and situation in details.

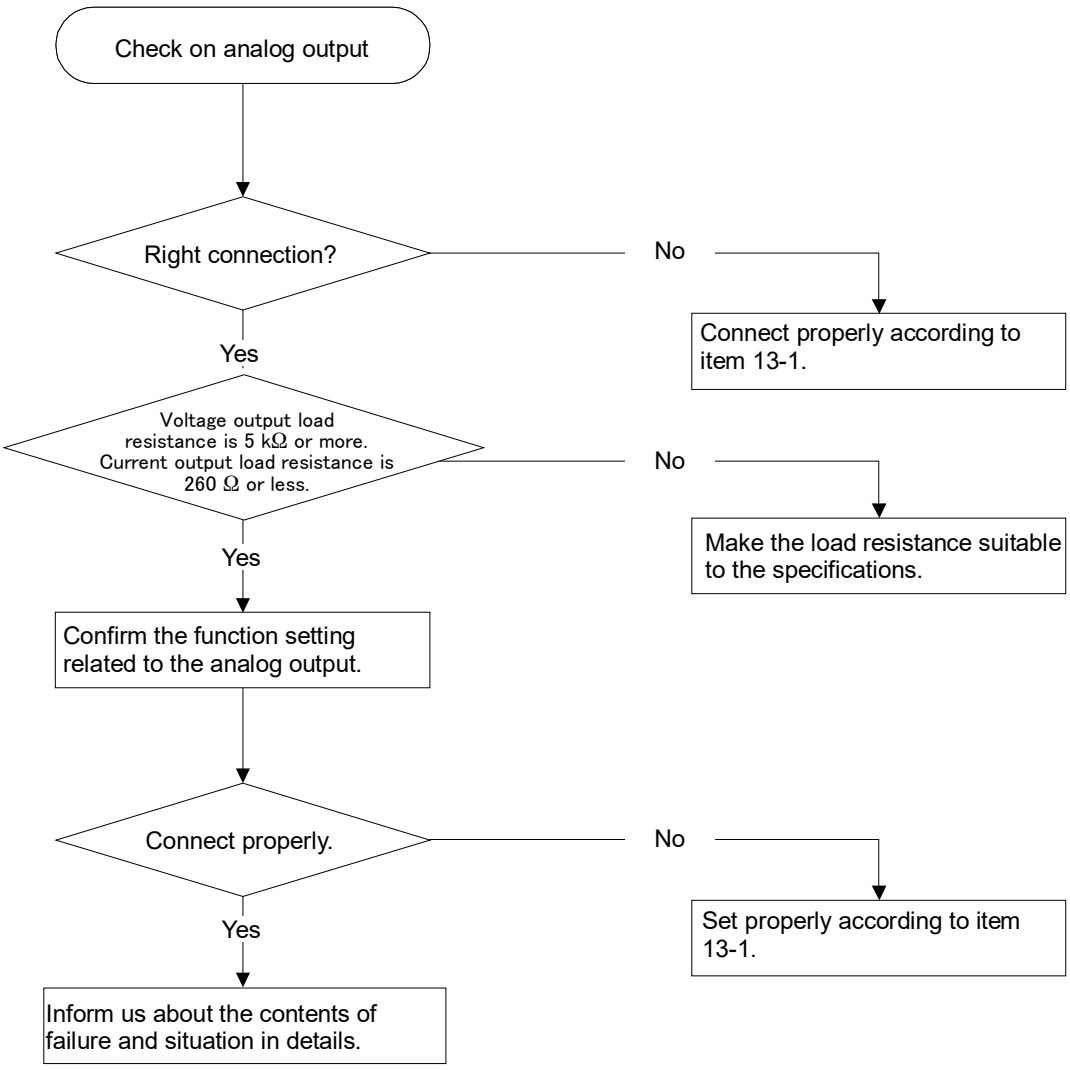

2
(1) Remove the connecting cable from the terminal board of digital load cell.
(2) Measure the voltage between No.1-No.3 on the terminal board.
* Set the measurement range to DC･V for the measuring instrument such as testers and so on.
Voltage between 1 and 3 is stabilized in DC12V.
No
Inform us about the contents of failure and situation in details.
Yes
Confirm that there is no influence from the noise source such as inverters.
Same situation
No
Yes
Measurement start
Inform us about the contents of failure and situation in details.

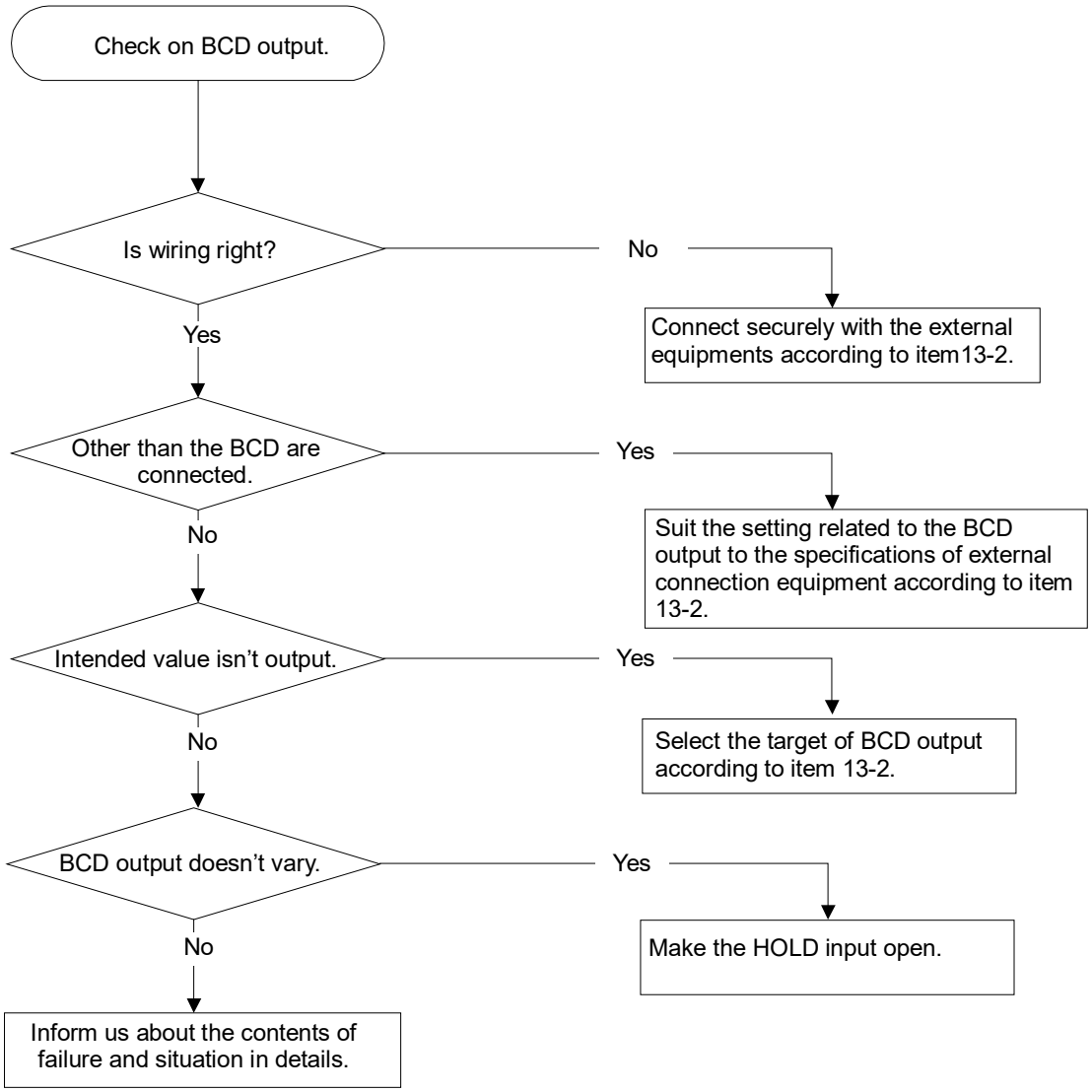

Operation check on comparator
Connecting wires are correct?
No
Connect surely according to item '13-2'.
Yes
Set value is suitable?
No
Confirm and change the set value according to the item 11.
Yes
Intended operation is made?
No
Confirm and check the comparative operation of comparator and target of comparative operation according to item11.
Yes
Comparator output is chattering.
Yes
Set on the hysteresis according to item 11.
No
Comparator output isn't ON.
Yes
The following causes are considered.
Failure of output other than the rated of open collector.
Failure of input circuit made by customer.
Confirm the output of comparator according to item10-4.
No
Inform us about the contents of failure and situation in details.

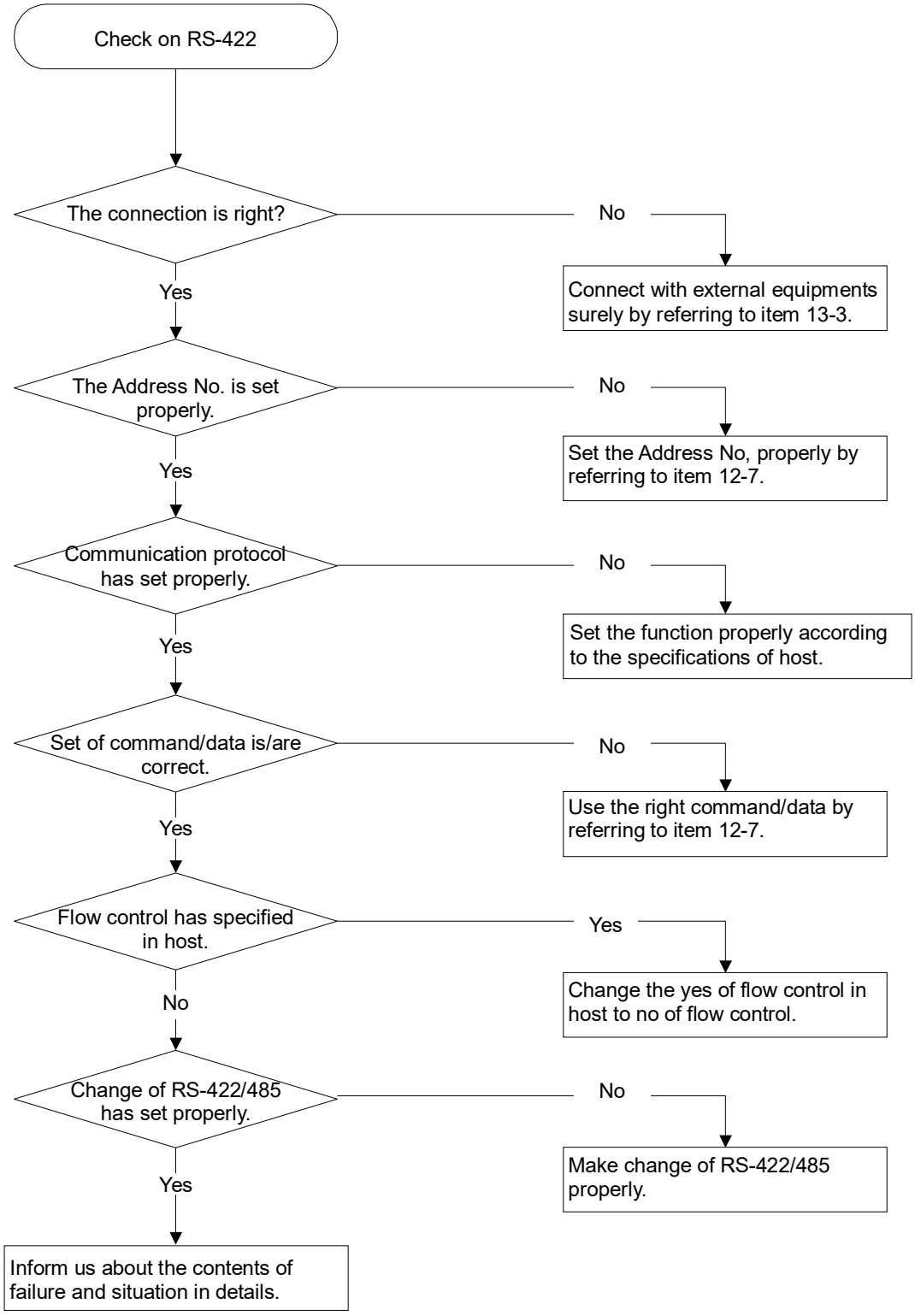

Check on the External control input.
Connection is right?
No
Connect securely according to item 2-3.
Yes
Setting on Function F-60 ～F-65 have made.
No
Set the Function from F-60 to F-65.
Yes
Input signal is more than100 ms.
No
The input signals are executed when Approx. 100 ms or more is shorted, so make it the input of more tha100 ms each.
Yes
Inform us about the contents of failure and situation in details.

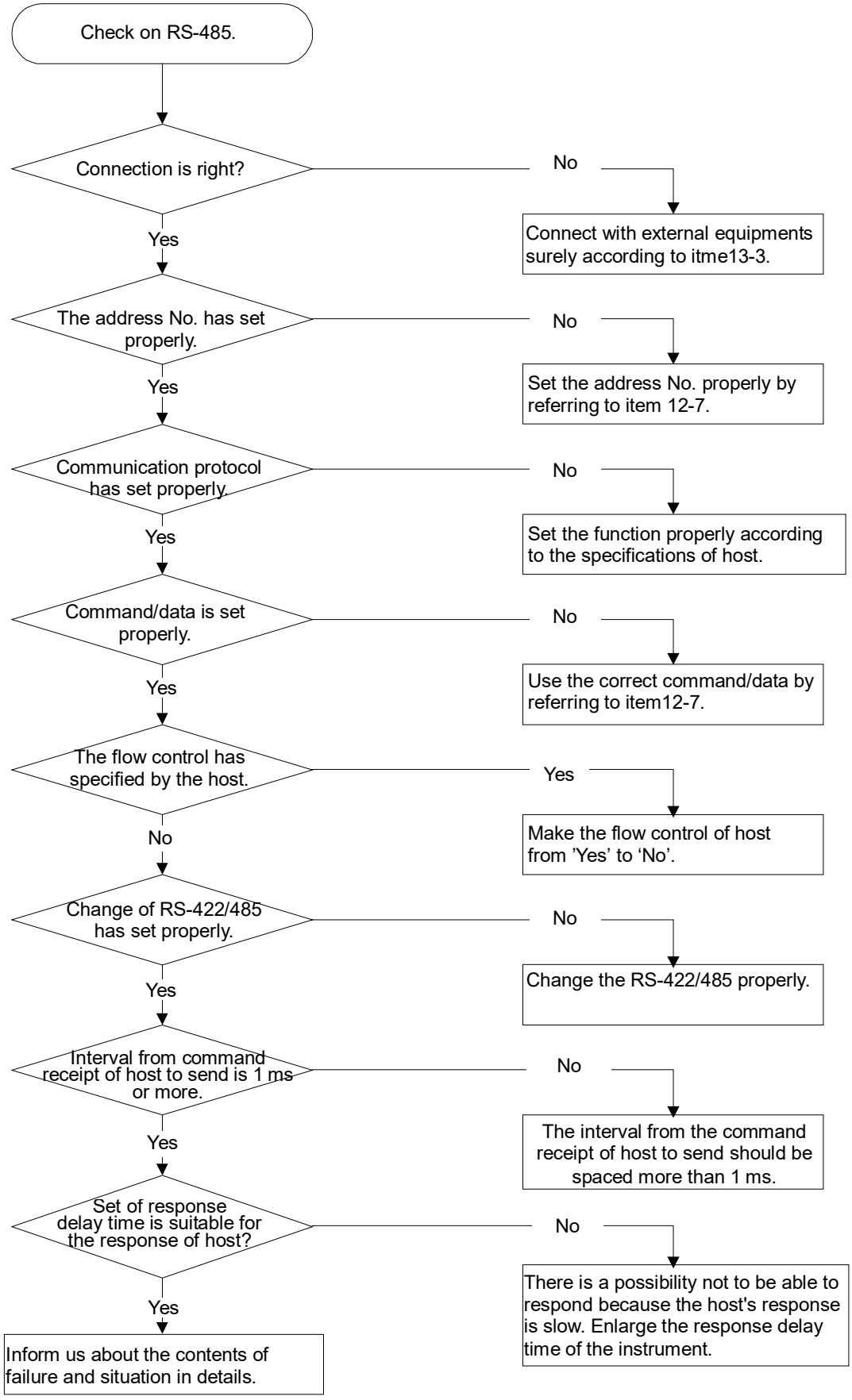

Check on RS-232C
Connection is right?
No
Connect with the external equipments securely according to item 2-5.
Yes
Communication protocol is set correctly.
No
Set the Function properly according to the specifications of host written in item 12-4.
Yes
Setting on command/data is/are correct.
No
Use the right command/data by referring to item 12-7.
Yes
Flow control is specified by the host.
Yes
Make the flow control of host to no control.
No
Intended value in Stream mode isn't sent.
Yes
Select the target of output in the Stream mode.
No
Inform us about the contents of failure and situation in details.

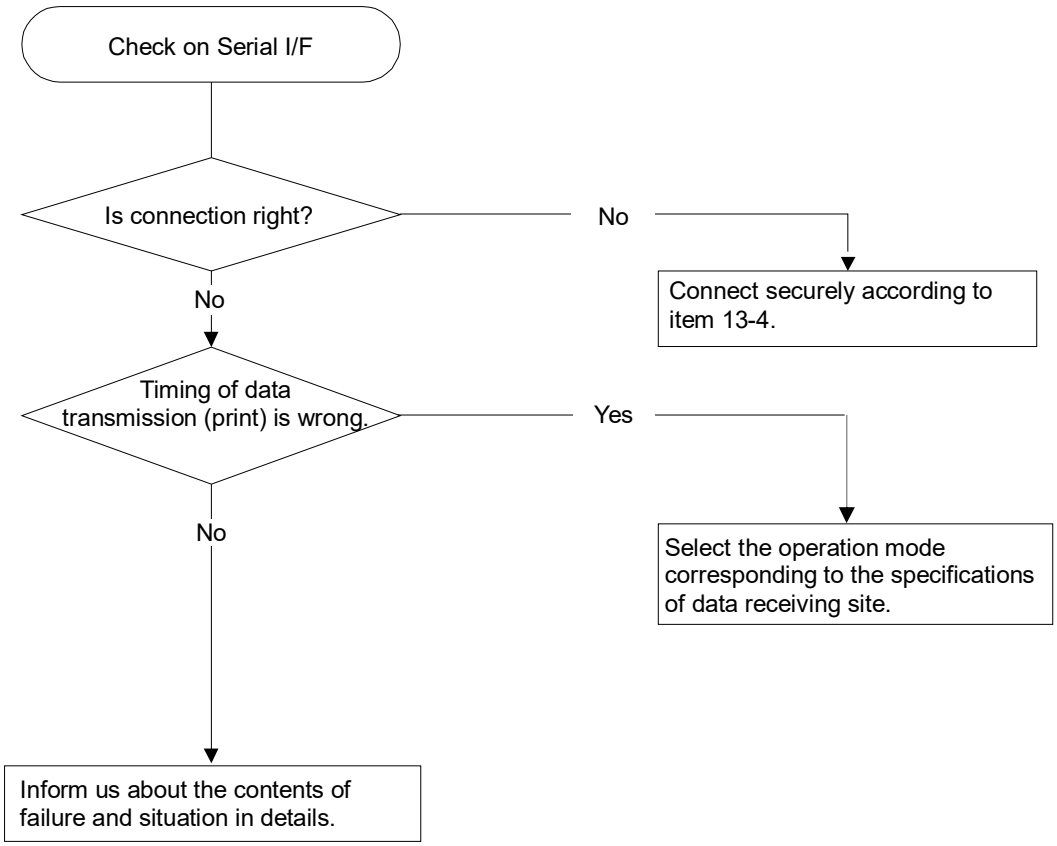

Check on options.
The analog output operation is wrong.
Yes
Check on analog output.
No
The BCD output is wrong.
Yes
To the BCD check.
No
S I/F is wrong.
Yes
To S I/F check.
No
RS-422 is wrong.
Yes
To RS-422 check.
No
RS-485 is wrong.
Yes
To RS-485 check.
No
Inform us about the contents of failure and situation in details.


Check on analog output
Right connection?
No
Connect properly according to item 13-1.
Yes
Voltage output load resistance is 5 kΩ or more. Current output load resistance is 260 Ω or less.
No
Make the load resistance suitable to the specifications.
Yes
Confirm the function setting related to the analog output.
Connect properly.
No
Set properly according to item 13-1.
Yes
Inform us about the contents of failure and situation in details.


Check on BCD output.
Is wiring right?
No
Connect securely with the external equipments according to item13-2.
Yes
Other than the BCD are connected.
Yes
Suit the setting related to the BCD output to the specifications of external connection equipment according to item 13-2.
No
Intended value isn't output.
Yes
Select the target of BCD output according to item 13-2.
No
BCD output doesn't vary.
Yes
Make the HOLD input open.
No
Inform us about the contents of failure and situation in details.


Check on RS-422
The connection is right?
No
Connect with external equipments surely by referring to item 13-3.
Yes
The Address No. is set properly.
No
Set the Address No, properly by referring to item 12-7.
Yes
Communication protocol has set properly.
No
Set the function properly according to the specifications of host.
Yes
Set of command/data is/are correct.
No
Use the right command/data by referring to item 12-7.
Yes
Flow control has specified in host.
Yes
Change the yes of flow control in host to no of flow control.
No
Change of RS-422/485 has set properly.
No
Make change of RS-422/485 properly.
Yes
Inform us about the contents of failure and situation in details.


Check on RS-485.
Connection is right?
No
Connect with external equipments surely according to itme13-3.
Yes
The address No. has set properly.
No
Set the address No. properly by referring to item 12-7.
Yes
Communication protocol has set properly.
No
Set the function properly according to the specifications of host.
Yes
Command/data is set properly.
No
Use the correct command/data by referring to item12-7.
Yes
The flow control has specified by the host.
Yes
Make the flow control of host from 'Yes' to 'No'.
No
Change of RS-422/485 has set properly.
No
Change the RS-422/485 properly.
Yes
Interval from command receipt of host to send is 1 ms or more.
No
The interval from the command receipt of host to send should be spaced more than 1 ms.
Yes
Set of response delay time is suitable for the response of host?
No
There is a possibility not to be able to respond because the host's response is slow. Enlarge the response delay time of the instrument.
Yes
Inform us about the contents of failure and situation in details.


Check on Serial I/F
Is connection right?
No
Connect securely according to item 13-4.
No
Timing of data transmission (print) is wrong.
Yes
Select the operation mode corresponding to the specifications of data receiving site.
No
Inform us about the contents of failure and situation in details.

15. Life time of using parts

15-1. Life time

The parts used in the instrument will have lifetime. It may differ depending to application method and environmental conditions, the lifetime of each shall be as follows:

Parts name	Application	Rough standard of lifetime
EEPROM	Record of set data	Write to EEPROM, one million times
Electrolytic capacitor		Approx. 10years

(1) EEPROM

When writing is made to EEPROM more than the time of lifetime, you can't write to the data anymore, so exchange shall be required.

When using the method descibe below, you may reach the liftime of EEPROM in a short period.

1) The store place for Tare cancellation data and Zero set data is specified as [EEPROM] and high frequency in use of both data are seen.

2) High frequency in use of re-writing comparative data in RS-232C or optional RS-422/485 in interface are seen.

(2) Electrolytic capacitor

It may be influenced largely by some applied using condition such as environmental temperature and so on, but the lifetime shall be for approx. 10 years in normal operating in air conditioned room and continuous operation.

16. Specifications

16-1. Specifications for applicable sensors

Supply source for sensor	Within DC12 V±0.3 V 140 mA
Applicable transducers	Up to 4 pieces of our digital load cell can be connectable.
Input interface	RS-485 (2 wires method)
Baud rate	57 600 bps
Terminal resistance	Attached externally.

16-2. Specifications for digital

Load display	Display range	－99 999 to 99 999
	Display increment	1 (2,5,10,20 and 50 can be changeable)
	Display	7 segment red LED, character's height 14.2 mm
	Over display	[-OL] displays at minus over and [OL] displays at plus over.
	Digital load cell over display of output count value	[-OVF] displays at minus over and [OVF] displays at plus over.
Condition display		STAB.,TARE,GROSS,NET,ZERO and HOLD
Judgement display		S1, S2, S3, S4 and S5
Display times		15 times/s（5 times/s changeable.）
Decimal point display		No display, 10^1,10^2 and 10^3 changeable.

16-3. Interface

External control input	The following 6 pieces of operation can be controlled externally with the Input signals on terminal board. ON/OFF, SET, TARE, NET/GROSS, ZERO, PRINT, NET display, display HOLD
RS-232C	RS-232C interface output
BCD output (option)	Output: BCD 5 digits parallel output, polarity applied, PC (print command), ERROR, OVER, STAB.(Stable), GROSS, Comparator output: S1, S2, S3, S4 and S5 (so far 5 points) *So far open collector output V_{CE}＝DC30 V, I_C＝DC20 mA MAX Input: BCD-ENABLE (Compulsory OFF of the BCD related output: high impedance) *Above are level input, and input is effective during input of shortening more than 100 ms.
Serial interface (Option)	2 wires methods of interface output for connection with printer, external display and so on.
RS-422/485 (Option)	RS-422/485 Interface output *Change of RS-422 and RS-485 can be made by function.
Current output (Option)	DC4 mA to 20 mA, load resistance 260 ohm or less Non linearity 0.05 %F.S.
Voltage output (Option)	DC0 V to 10 V, load resistance is 5 k-ohm or more. Non-linearity : 0.05 %F.S.

16-4. General specifications

Operating temp. range	Temperature	-10 degree-C to 50 degree-C
	Humidity	85 %RH or less (Non-condensing.)
Power supply	Power supply voltage	AC100 V to AC240 V (Allowable variable range AC85 V to AC264 V)
	Power supply frequency	50/60 Hz
	Power consumption	Approx. 13 VA (No options at AC100 V) Approx. 15 VA at max. (With options attached at AC100 V.)
Outline dimensions (W×H×D)		96 mm × 48 mm × 120 mm (Excludes protruding parts.)
Weight		Approx. 0.4 kg (Excludes options.)

16-5. Standard specifications at the time of shipment

Span adjustment	1000000 display at 1000000 counts of output of digital load cell.
Minimum scale	1

16-6. Accessories

Instruction manual	1 piece
Midget fuse	1 piece (2 A)
Unit seal	1 sheet
Panel mount metal	2 pieces
Panel mount packing	1 piece
Plug for BCD output	1 piece (Attached only when optional BCD output is installed.)

17. Error display

Er-1	Flashing displays about 2 seconds when selecting No. whose No. is not existed on the list at the time of setting C function and function is set.
Er-2	During calibration is made, flashing displays about 2 seconds, at the time of setting [Weighing capacity (DISP) < setting weight value (LOAD)].
Er-E	EEPROM writing error. Contact with us.
Er-r	EEPROM reading error. Contact with us.
rE-L	During calibration, flashing displays in about 2 seconds when the output count of digital load cell is less than '- 1 100 000× connecting number of digital load cell' and at the same time more than the Zero adjustment range at minus side.
rE-H	During calibration, flashing displays in about 2 seconds when the output count of digital load cell is more than [1] 100 000× connecting number of digital load cells' and at the same time more than the Zero adjustment range at pulse side.
SP-L	During calibration, flashing displays in about 2 seconds when [Output count of digital load cell of Span] – [Output count of digital load cell at zero point] <0 and also before reaching the span adjustment range.
SP-H	During calibration, flashing displays in about 2 seconds when 'output count of digital load cell of span' - 'output count of digital load cell of zero point' > 1 100 000×number of connection of digital load cell, and also exceeding the span adjustment range.
Ln-L	At the time of digital liberalized compensation is made, flashing displays in about 2 seconds when the output of digital load cell is low.
Ln-H	At the time of digital liberalized compensation is made, flashing displays in about 2 Seconds when the output of digital load cell is high.
-----	(Effective for the C function CF-15 'Power on zero operation') Displays when power is supplied at the time of output of digital load cell exceeds ±10 % of weighing capacity, or when the display is ON. Pressing the PRINT key with the condition of ----- , the load value display shall be appeared compulsively.
oL	Lights on when the load display exceeds '(+ weighing capacity) + 9D', or exceeds '+110 % of weighing capacity'. (Due to the setting of C function CF-03.)
-oL	Lights on when the load display exceeds '(- weighing capacity) - 9D' or exceeds '-20D'. (Due to the setting of C function CF-03.)
oUF	Output of pulse over of digital load cell (Even the output count of digital load cell of one set is 1 100 000 or more.)
-oUF	Output of minus over of digital load cell (Even the output count of digital load cell of one set is less then -1 100 000.)
All lights on.	At the time of feeding power, or display ON, you can't detect the stability. When you make the stability detection OFF with whichever Function F-10 and Function F-11, then all lights on.
Er-50	When S/N (serial No.) of digital load cell isn't registered for the C Function from CF-60 to CF-67, displays soon after power supply is on.
Er-51	When the S/N (serial no.) of digital load cell of ID=1 and the S/N set for the C Function CF-60 is different, displays soon after power supply is on.
Er-52	When the S/N (serial no.) of digital load cell of ID=2 and the S/N set for the C Function CF-61 is different, displays soon after power supply is on.
Er-53	When the S/N (serial no.) of digital load cell of ID=3 and the S/N set for the C Function CF-62 is different, displays soon after power supply is on.

E-54	When the S/N (serial no.) of digital load cell of ID=4 and the S/N set for the C Function CF-63 is different, displays soon after power supply is on.
E-55	When the S/N (serial no.) of digital load cell of ID=5 and the S/N set for the C Function CF-64 is different, displays soon after power supply is on.
E-56	When the S/N (serial no.) of digital load cell of ID=6 and the S/N set for the C Function CF-65 is different, displays soon after power supply is on.
E-57	When the S/N (serial no.) of digital load cell of ID=7 and the S/N set for the C Function CF-66 is different, displays soon after power supply is on.
E-58	When the S/N (serial no.) of digital load cell of ID=8 and the S/N set for the C Function CF-67 is different, displays soon after power supply is on.
E-61	Displays when the digital load cell of ID=1 gives no response, or there is abnormality on the response.
E-62	Displays when the digital load cell of ID=2 gives no response, or there is abnormality on the response.
E-63	Displays when the digital load cell of ID=3 gives no response, or there is abnormality on the response.
E-64	Displays when the digital load cell of ID=4 gives no response, or there is abnormality on the response.
E-65	Displays when the digital load cell of ID=5 gives no response, or there is abnormality on the response.
E-66	Displays when the digital load cell of ID=6 gives no response, or there is abnormality on the response.
E-67	Displays when the digital load cell of ID=7 gives no response, or there is abnormality on the response.
E-68	Displays when the digital load cell of ID=8 gives no response, or there is abnormality on the response.
E-b	Displays when the error on 4 corners adjustment has occurred. （Such the case, in making 4 corners adjustment without no weights, and so on.）

18. Warranty

18-1. 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.

18-2. Repair

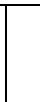
Before asking repairs, check once again that the connection, setting and adjustment for the instrument have finished properly.

Especially, check whether the connections of strain gage applied transducers are disconnected or cut off.

As a result of checking, still there may have some defects in the instrument, contact with our sales office or sales agency from which you have purchased.

19. Pattern of character display

The patterns of 7-segment character display are as follows.

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		-	
space					

20. List of function setting

Make use of then when changing function setting is made by customer side.

Setting table of C Functions

Function Nos.	Initial value	Set value by customer	Function Nos.	Initial value	Set value by customer
CF-01	0		CF-64		
CF-03	2		CF-65		
CF-05	0		CF-66		
CF-10	0		CF-67		
CF-11	0		CF-70	0	
CF-12	1		CF-71	00000	
CF-13	01		CF-72	10000	
CF-14	2		CF-80	1.000000	
CF-15	0		CF-81	1.000000	
CF-16	0		CF-82	1.000000	
CF-17	00		CF-83	1.000000	
CF-25	0		CF-84	1.000000	
CF-26	10		CF-85	1.000000	
CF-27	10		CF-86	1.000000	
CF-28	9.797		CF-87	1.000000	
CF-29	9.797		CF-90	1	
CF-40	0		CF-91	10000	
CF-41	2		CF-92	10000	
CF-42	03000		CF-93	L 0, H 0	
CF-43	3		CF-94	L 0000, H 100	
CF-44	06000		CF-95	1	
CF-60			CF-97	05	
CF-61			CF-98	-	
CF-62			CF-99	-	
CF-63					

Setting Function table

Function Nos.	Initial value	Set value by customer	Function Nos.	Initial value	Set value by customer
F-01	2		F-39	0	
F-03	00000		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-10	4		F-45	0	
F-11	2		F-46	0	
F-16	0		F-47	0	
F-20	4		F-48	0	
F-21	00000		F-49	0	
F-22	00000		F-60	0	
F-23	0		F-61	0	
F-24	0		F-62	0	
F-25	00		F-63	0	
F-30	0		F-64	0	
F-31	0		F-65	0	
F-32	0000		F-70	0	
F-33	0		F-99	---	

MEMO

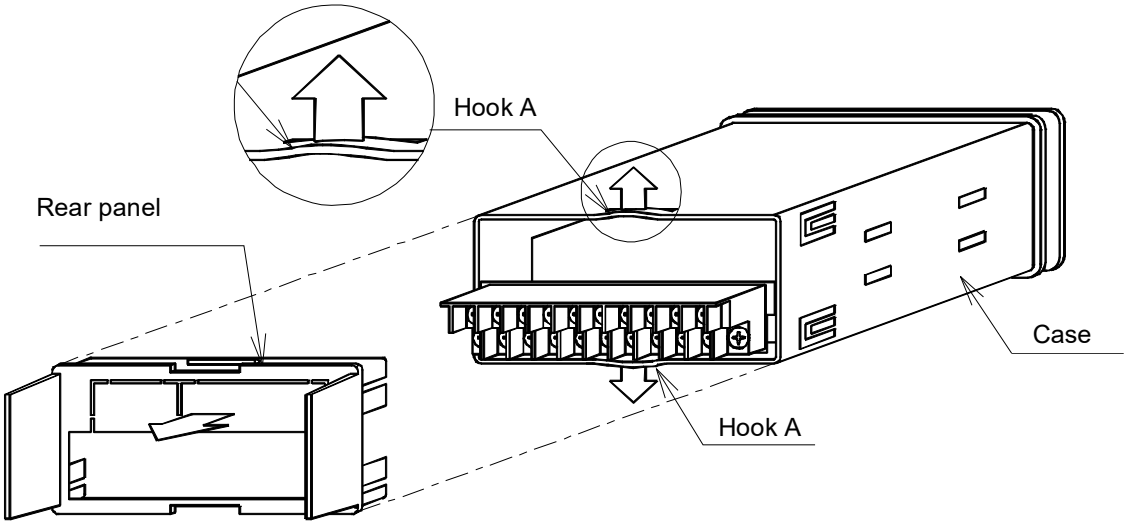
21. Appendix

21-1. Fuse exchanging method

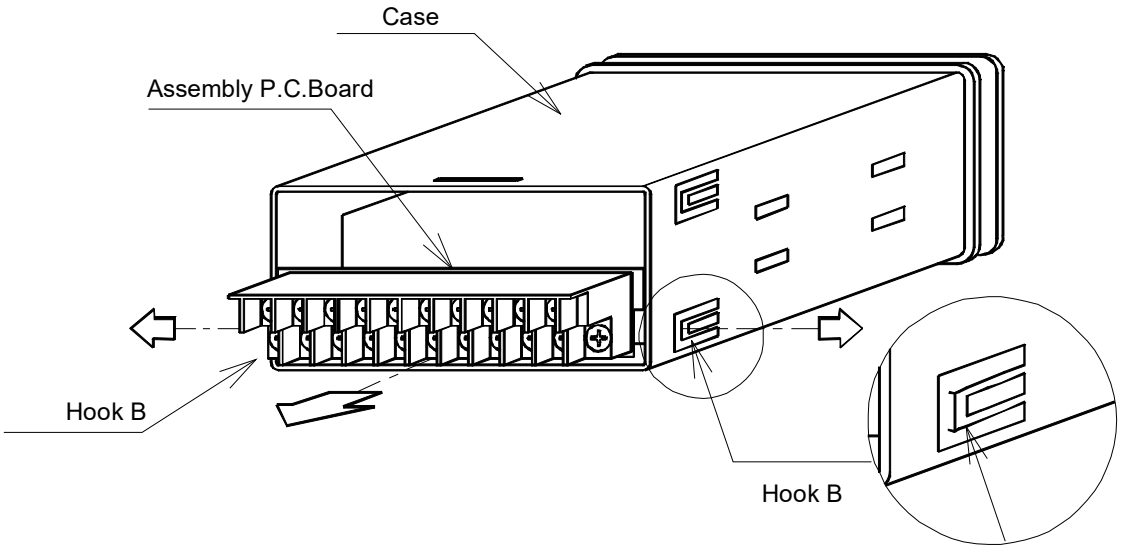
• When installation method for the fuse is wrong and/or capacity of installed fuse is inadequate, it causes an unexpected faulty of the instrument.

(1) Turn OFF the power supply for the instrument.

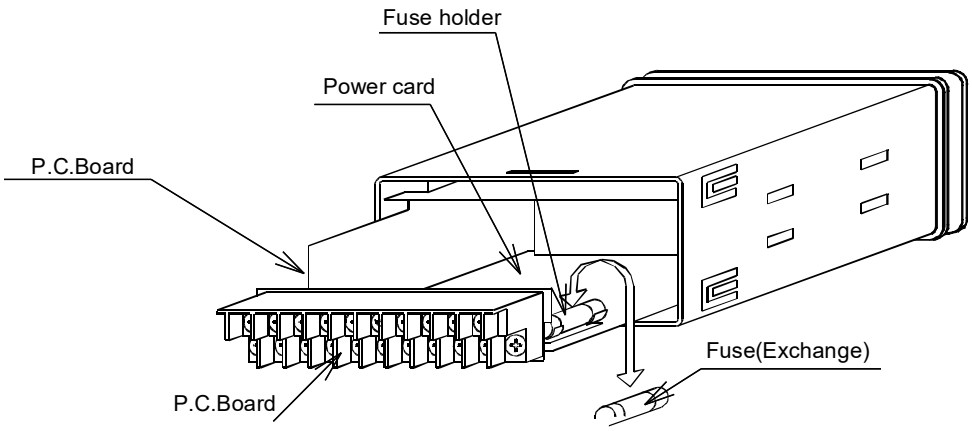
(2) Open a hook A section of the case, and remove a rear panel to the arrow direction.



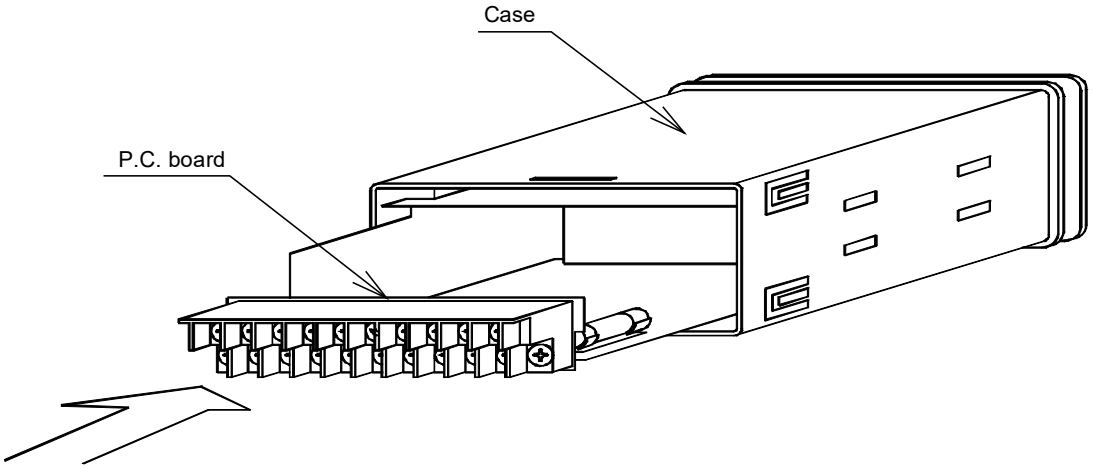
(3) Open the hook B of the case to the arrow direction, then draw out the assembly PC board to the arrow direction.



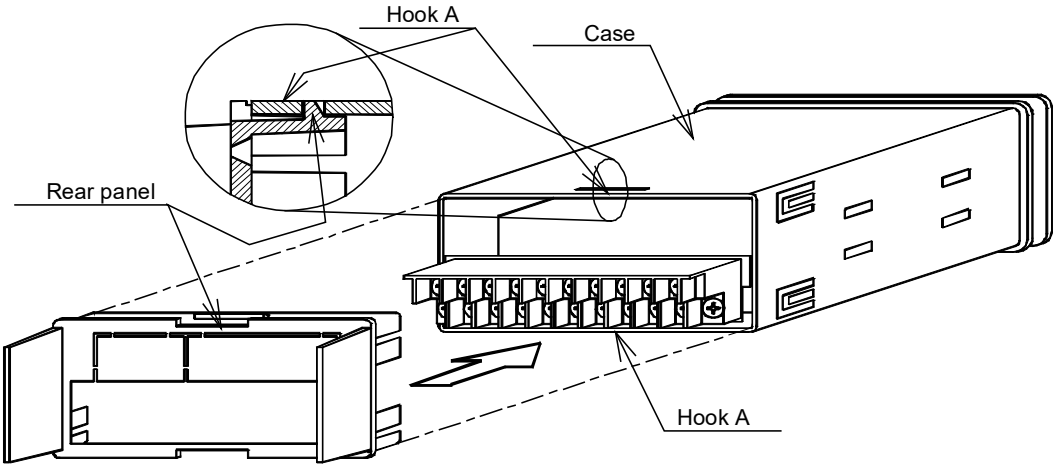
(4) Exchange the fuse attached on the POWER CARD.



(5) After exchanging the fuse, insert the assembly P.C. board to the position where it stuck with the hook B.



(6) Insert the rear panel to the position stuck with the hook A on the case.



• There may have the possibilities that you cannot get key click feeling or you cannot make key operation if the rear panel is not attached to the case tightly.

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

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