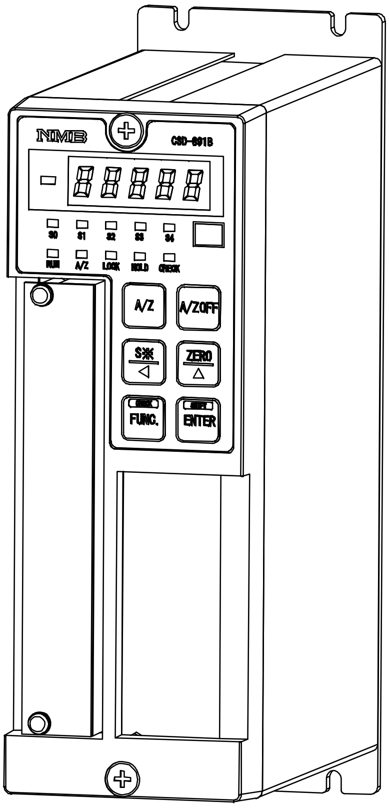
Minebea

MINEBEA CO., LTD.

INSTRUCTION MANUAL

DIGITAL INDICATOR
CSD−891B



Note : Please read this Instruction Manual carefully before use.
Be sure to follow the items that require attention described in the manual.
Keep the manual at hand so that you can pick it up and read it as soon as necessity requires.

EN294−1143−I

Forwards

Thank you very much for your purchasing Minebea's Digital Indicator CSD−891B.
This manual explains installation procedures and connecting method and also operating method for the Digital Indicator CSD−891B. Make use of it properly after reading through the manual carefully.

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

This manual is intended for the technical experts to read.

●The contents of the manual may subject to change for improvement without notice.

Marks and arrangements used in this manual

The following marks are attached to the explanation on the matters that indicate “Don’t do this.”, “Take care.” and “For reference”.
Be sure to read these items where these marks are attached.

⚠Warning

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

❗

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

Mark during operation.

☛

● Press the switch.

For safe operation

Be sure to read this instruction manual before use.

1. Installation place

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

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

(1) Location where installation is not allowed.

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

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

(2) Installation

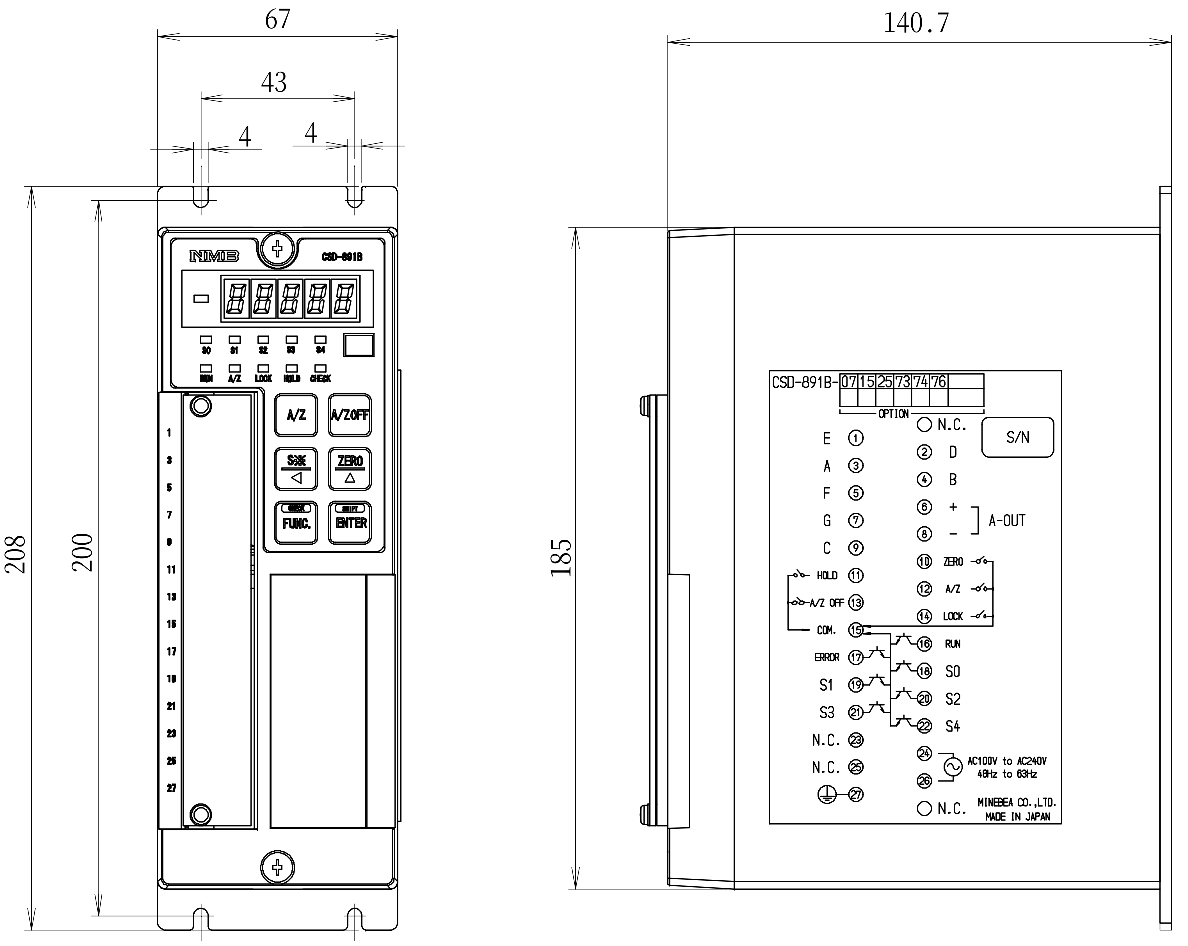
● When installing the instrument, install as referring to the following figures and secure the space around the instrument.

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

Outline dimensions

Front

Side



Unit：mm

2. Power supply

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

● Before supplying the power, check that the indication of power supply voltage/specifications for the instrument and the power going to supply should be the same.
If they are not equal, contact with Minebea.
If you use the instrument without checking them, it may cause a damage in the instrument or electric shock to the operator.

● Earth wire should be grounded securely.
When earth wire is not connected, it may cause a malfunction of the instrument or electric shock to the operator.

3. Application note

⚠Warning ● Before using a new instrument or exchanging the strain gage applied transducer for a new one, be sure to make calibration. If calibration will not be made, the correct measuring results may not be obtained nor which may cause malfunction in the instrument and there may exist damage in peripheral equipments.
Besides, even though calibration has been made, there may occur the similar case when the results are not correct, so make calibration, again.

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

⚠Warning

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

⚠Warning

- Do not shock the instrument such as throwing something on it.
  If neglected, it may cause destruction of the parts and damage to the electrical circuits.

⚠Warning

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

⚠Warning

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

- At the time of shipment from the factory, the instrument has been plated with a clear sheet on the panel sheet for protective purpose.
  In case of application, use the instrument after removing the clearsheet first.

History of revision

Date	Instruction Manual No.	Details of revised point
Oct. 2001	DRW.NO.EN294−1143	First Version ROM Ver. 1.000 or later
Jun. 2002	DRW.NO.EN294−1143−A	Due to ECN No.FN02−02066 − Change − Wiring instruction seal affixation is changed right, and the outline drawing is also changed. − Additional − 8−2., 13−3. Add F−87
Sept. 2004	DRW.NO.EN294−1143−B	Due to ECN No.FN04−02111 − Change − 7−14. "The backup time is over ten years." has changed to "The backup time is about ten years."
Apr. 2005	DRW.NO.EN294−1143−C	Due to ECN No.FN05−02035 − Addition − At the warning column in the wiring section, the clause of " As there is a case which standard wiring color is different, please confirm the inspection data sheet of the load cell being used." is added.
Aug. 2005	DRW.NO.EN294−1143−D	Due to ECN No.FN05−02085 − Correction − 11−8. General specifications Outline dimensions from "208 mm x 67 mm x 143 mm" to "208 mm x 67 mm x 140.7 mm"
Jan. 2010	DRW.NO.EN294−1143−E	Due to ECN No.FN10−02013 ROM Ver. 1.800 or later − Addition − 8−2., 13−3. Add F−84
Feb. 2010	DNO.EN294−1143−F	Due to ECN No.FN10−02013A − Addition − 8−2. F−84 "Restriction and warning" is added.
May. 2010	DRW.NO.EN294−1143−G	Due to ECN No.FN10−02058B − Addition − 7−3−1. Analog filter 7−7. Detection of stability 7−7−1. Range to detect stability 7−7−2. Time to detect stability Due to ECN No.FN10−02026B − Change − Front cover logo is changed.
Oct. 2010	DRW.NO.EN294−1143−H	Due to ECN No.FN10−02140 − Change − MInebea logo is changed.
Jan. 2011	DRW.NO.EN294−1143−I	Due to ECN NO.FN11−02018 − Correction − 9−3−4."DE−9S−N(JAE)" to "DE−9S−NR by JAE or equivalent."

INDEX

1. General

The instrument is a digital indicator for the application of strain gage applied transducer.

1−1. Features

Main features for CSD−891B are as follows :

(1) Compact size

The size of 208 mm×67 mm×143 mm is suitable for storage in the board.

(2) Non−linearity

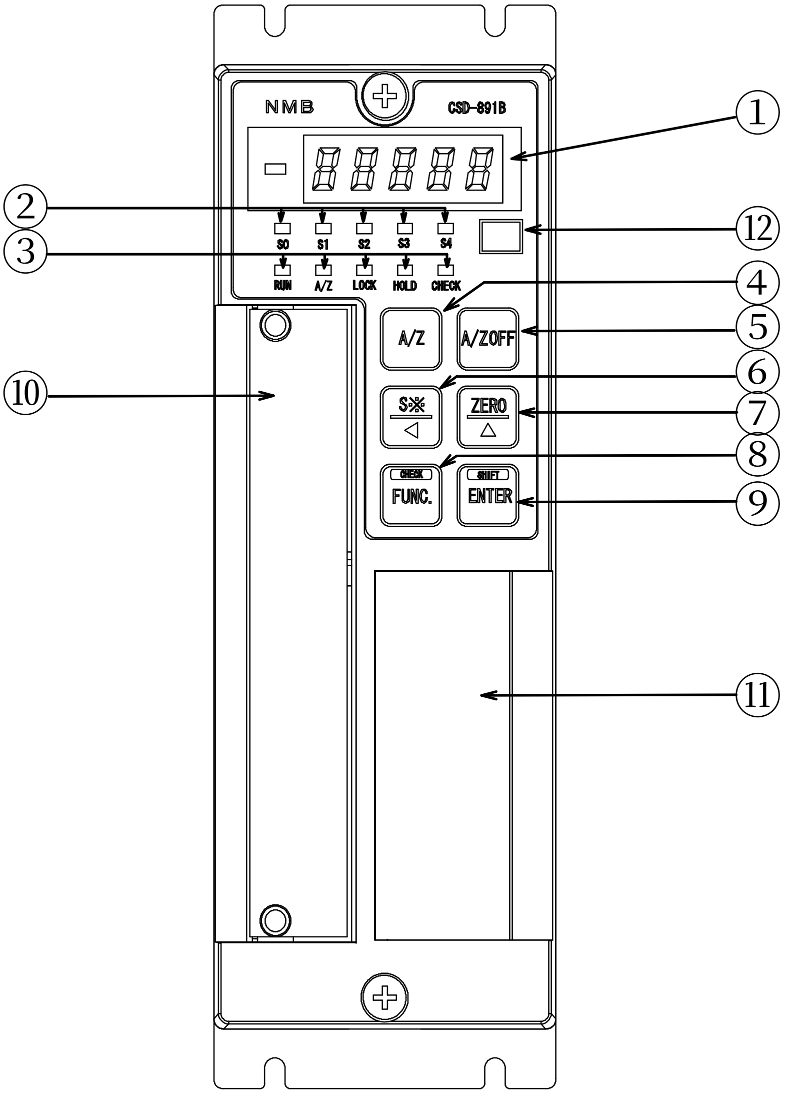
Display 0.01 %F.S.

(3) High speed sampling

High speed sampling as 200 times/s

2. Name and function of each point

2−1. Front panel



① Load display section

The load data is shown in the Measurement mode, and status or set value is shown in various kinds of Calibration mode and Setting mode.

② Judgement display

Compared results by comparator function can be displayed.

③ Status display

RUN	Lights up in the measurement mode.
A/Z	Lights up in executing the tare weight cancellation (A/Z ON). Lights off after clearing the tare weight cancellation (A/Z OFF).
LOCK	Lights up when the input between the HOLD and COM. at the external control is shorted. During light on, any key operation is prohibited.
HOLD	Lights up when the input between the HOLD and COM. at the external control is shorted.
CHECK	Lights up when the CHECK is turned on by pressing the CHECK FUNC. key together with the SHIFT ENTER key.

④ A/Z key

Using for executing the tare weight cancellation(A/Z ON).

⑤ A/Z OFF key

Using for clearing the tare weight cancellation(A/Z OFF).

⑥ S※ ◄ key

Using for calling the change mode of the set value, or carry up the numeric in the various setting.

⑦ ZERO ▲ key

Using for executing the zero set(one touched zero adjustment), or the numeric increment in the various setting.

⑧ CHECK FUNC. key

Using for shifting to the function mode.

Also, using for turning on/off of the check value by pressing the CHECK FUNC. key together with the SHIFT ENTER key.

⑨ SHIFT ENTER key

Using for registering the set values at the time of various settings.

Also, using for turning on/off the check value by pressing CHECK FUNC. key together with the SHIFT ENTER key.

⑩ Terminals

Connects with the external control input, the open collector output, the strain gage applied transducers, such as load cell, the analog output, the AC power supply, and ground.

⑪ Optional products attaching portion

One option either of BCD−OUT, CC−LINK, RS−232C, or RS−422/485 is installed.
The cover is installed when there is no optional products.

⑫ Position where unit seal is pasted

Please put the unit seal of the attachment if necessary.

3. Installation procedures

3−1. Installation place

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

Environmental temperature ：−10 ℃ to 50 ℃
Environmental humidity ：85 %RH or less(Non condensing.)

3−2. Location where installation is not allowed.

⚠Warning ● Don’t locate the instrument on the places such as follows:
It may cause an unexpected faulty in the instrument.

- Do not expose the instrument in direct sunlight and/or high temperature area.
- Do not use the instrument in a high humid area.
- Do not install the instrument where there is high mechanical vibrations and shock.
- Do not use the instrument where there are excess of dusts and fine particles.
- Do not install the instrument where there include any corrosive gas or any salty atmosphere.
- Do not install the instrument where there is rapid change of temperature and humidity.
- Do not install the instrument near the devices that are magnetized or generate an electromagnetic field.
- Do not install the instrument where there may suffer radioactivity or radioactive rays.
- Avoid the location where chemical reaction may take place such as in a laboratory, or like that.

3−3. Installation

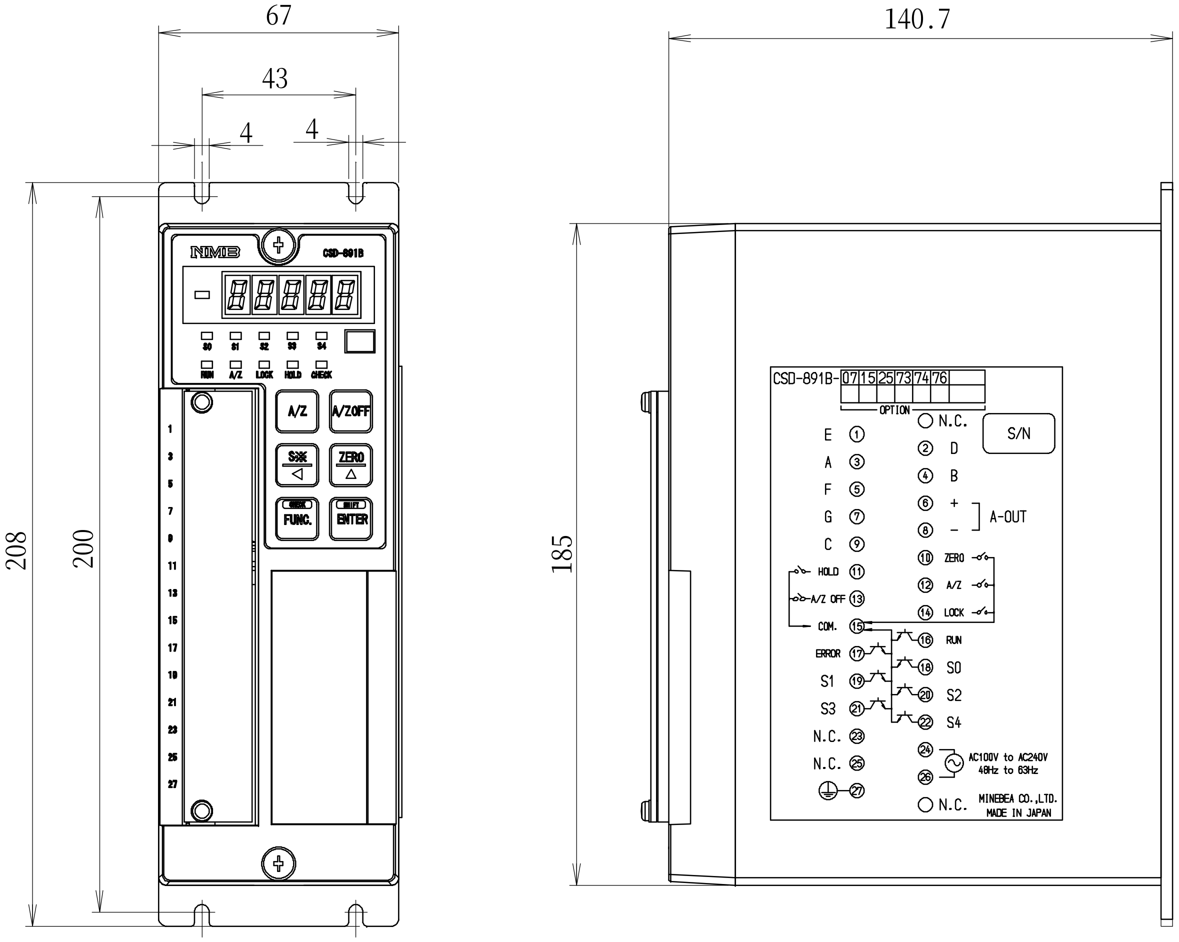
- When installing the instrument, install as the following figures and secure the space around the instrument.

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

Outline dimensions

Front

Side



Unit : mm

4. Connecting method

4−1. Layout of the terminal boards

There is the terminal boards, which has 27 points of terminals.
Layout of terminal boards are shown in the following figure.：

Terminal No.	Descriptions	Applications	Terminal No.	Descriptions	Applications
1	E(Shield)	Strain gage applied transducer	15	COM.	Common for external control input and open collector output
2	D(Amplifier input ＋)		16	RUN	Open collector output
3	A(Bridge power supply ＋)		17	ERROR	
4	B(Amplifier input －)		18	SO	
5	F(Sensing ＋)		19	S1	
6	A−OUT ＋	Analog output	20	S2	
7	G(Sensing －)	Strain gage applied transducer	21	S3	
8	A−OUT －	Analog output	22	S4	
9	C(Bridge power supply －)	Strain gage applied transducer	23	N.C.	
10	ZERO	External control output	24	SOURCE	AC power supply
11	HOLD		25	N.C.	
12	A/Z		26	SOURCE	AC power supply
13	A/Z OFF		27	⏚	Ground
14	LOCK				

- ● The COM.(Terminal No.15) is common for the external control input (Terminal No.10～14) and the open collector output(Terminal No.16 ～22).
- ● Don't connect with N.C. terminals(Terminal No.23 and 25).

4−2. 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 a damage to the instrument.

- Be sure to set the power supply to OFF, when the connection will be made.
- Since the terminal boards at front of the instrument is made of resin, take care not to drop it down or not to apply strong impact.
- Recommended torque to tighten the terminal screws for terminal board should be as follows.

	Torque to tighten the terminal screws
Terminals	0.6 N・m

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

	Width of crimp type terminal lugs	Suitable crimp type terminal lugs
Terminals	6.2 mm or less	1.25−3 or Y−type 1.25−3.5

- 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.
- All of the connections should be executed securely by referring to the Instruction manual for the instrument.

4−3. Connection

4−3−1. Connection with strain gage applied transducers

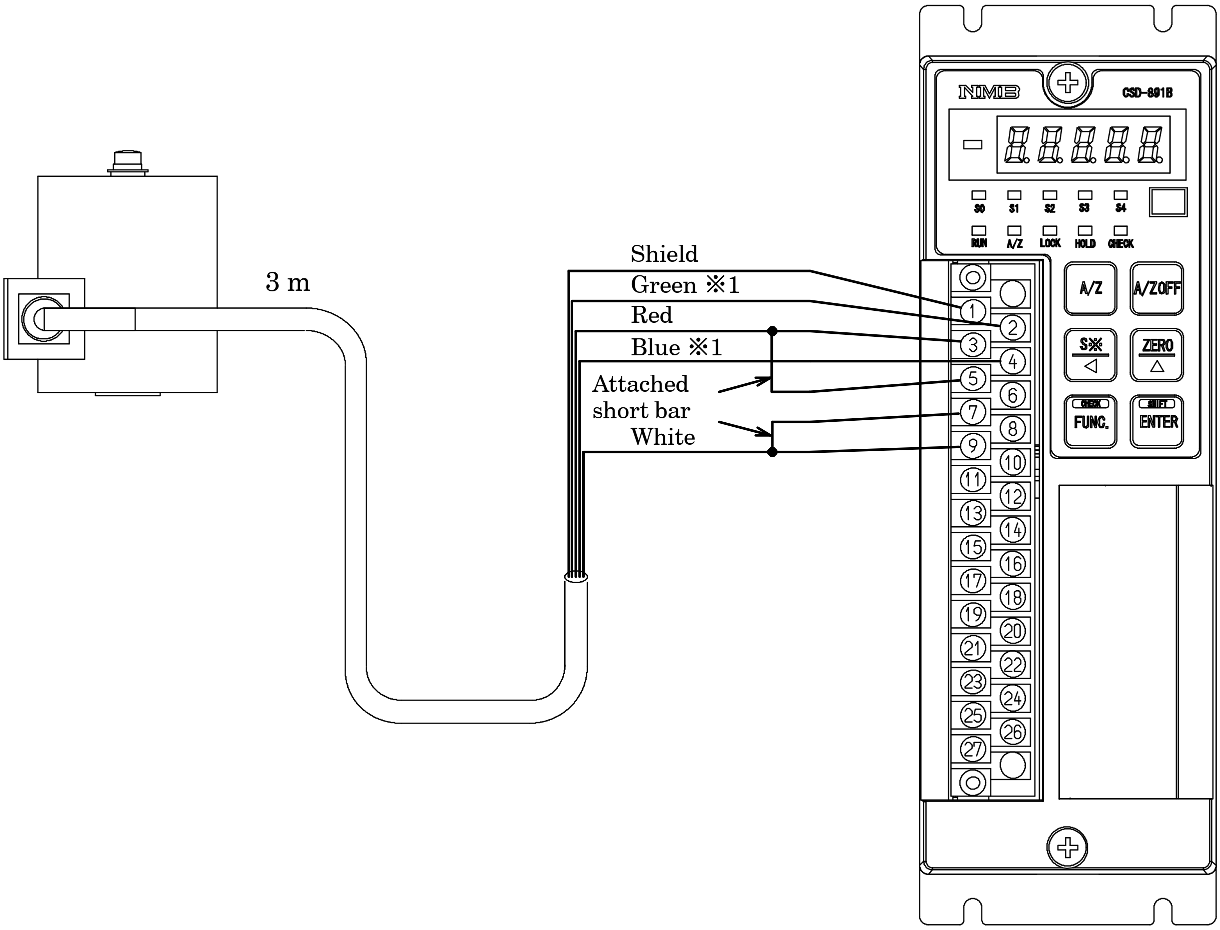
The instrument can connect with strain gage applied transducers, such as load cell, pressure transducer and so on. Here, we will describe the example of connections with load cell, so the connection with another type of strain gage applied transducers shall be proceeded in the same way.

※1 When tension is applied with the application of tension type or universal(compression/tension) type of load cell, and display of "+" direction is required, connect "Green" with Terminal No.4 and "Blue" with Terminal No.2 individually. As there is a case which standard wiring color is different, please confirm the inspection data sheet of the load cell being used.

※2 When the length of CAB−502 is more than 30 m totally, there may have the case that the accuracy is out of warranty because the resistance of cable makes the input voltage of the instrument decreased.

※3 When the length of CAB−501 is more than 100 m totally, there may have the case that the accuracy is out of warranty because the resistance of cable makes the remote sensing function not worked fully.

① Connection with 1 piece of load cell and CSD−891B



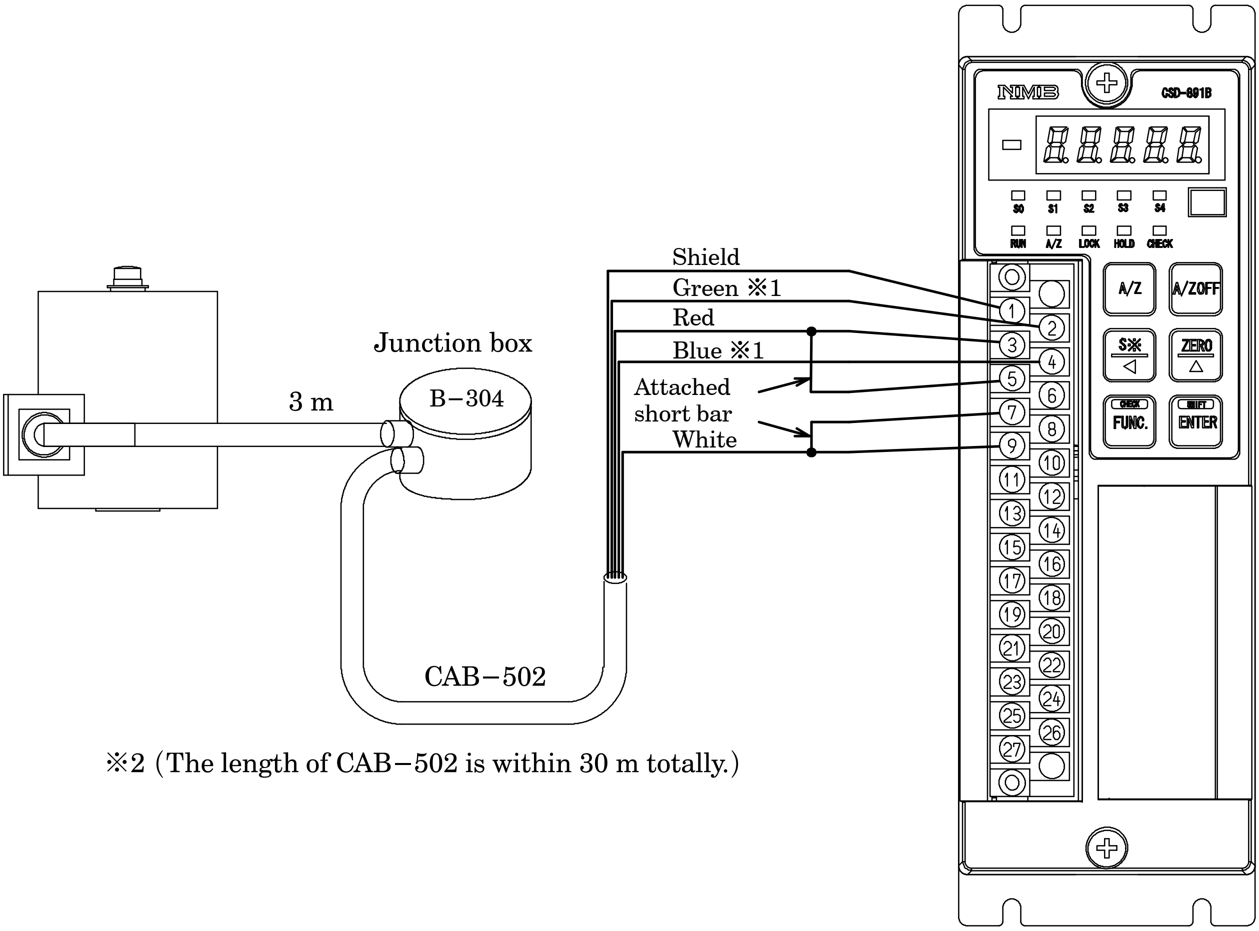
※1 When tension is applied with the application of tension type or universal(compression/tension) type of load cell, and display of "+" direction is required, connect "Green" with Terminal No.4 and "Blue" with Terminal No.2 individually. As there is a case which standard wiring color is different, please confirm the inspection data sheet of the load cell being used.

※2 When the length of CAB−502 is more than 30 m totally, there may have the case that the accuracy is out of warranty because the resistance of cable makes the input voltage of the instrument decreased.

※3 When the length of CAB−501 is more than 100 m totally, there may have the case that the accuracy is out of warranty because the resistance of cable makes the remote sensing function not worked fully.

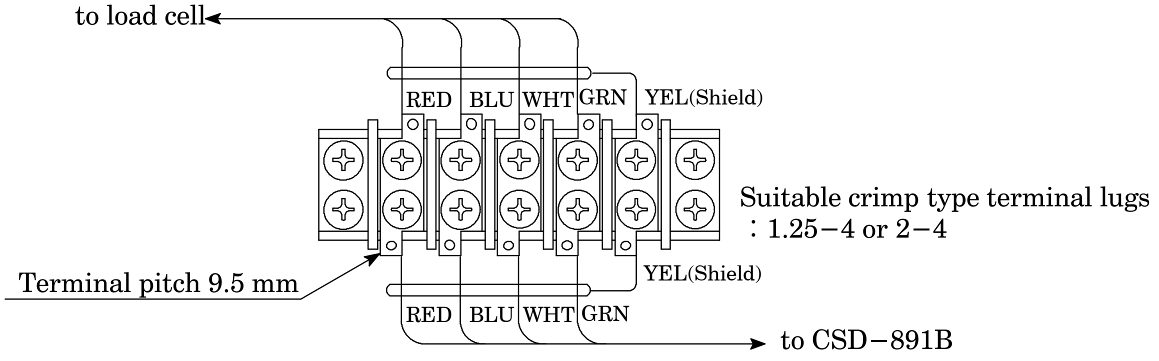
② Connection with 1 piece of load cell and a junction box for extension use(B−304) and CSD−891B

i) When CAB−502(4−cores cable)is used.

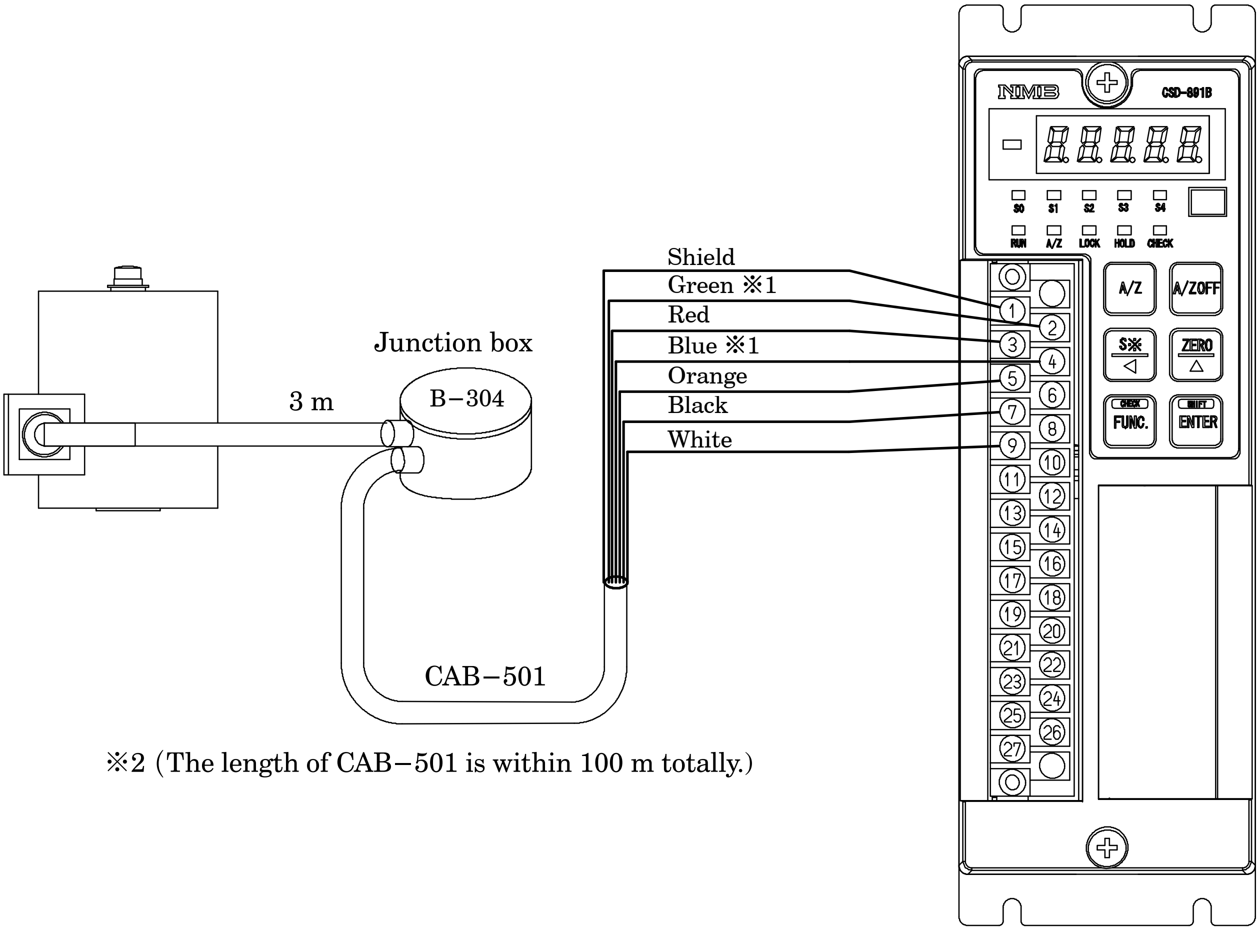


※2 (The length of CAB−502 is within 30 m totally.)

Internal wiring diagram of B−304

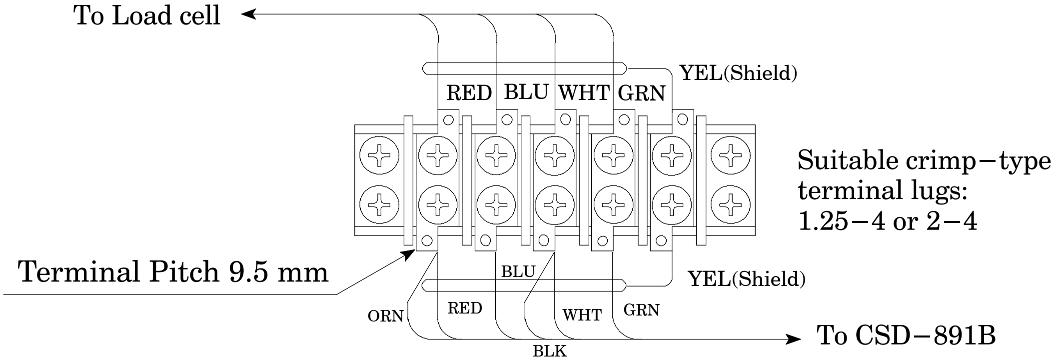


ii) When CAB−501(6−cores cable) is used



※2 (The length of CAB−501 is within 100 m totally.)

Internal wiring diagram of B−304



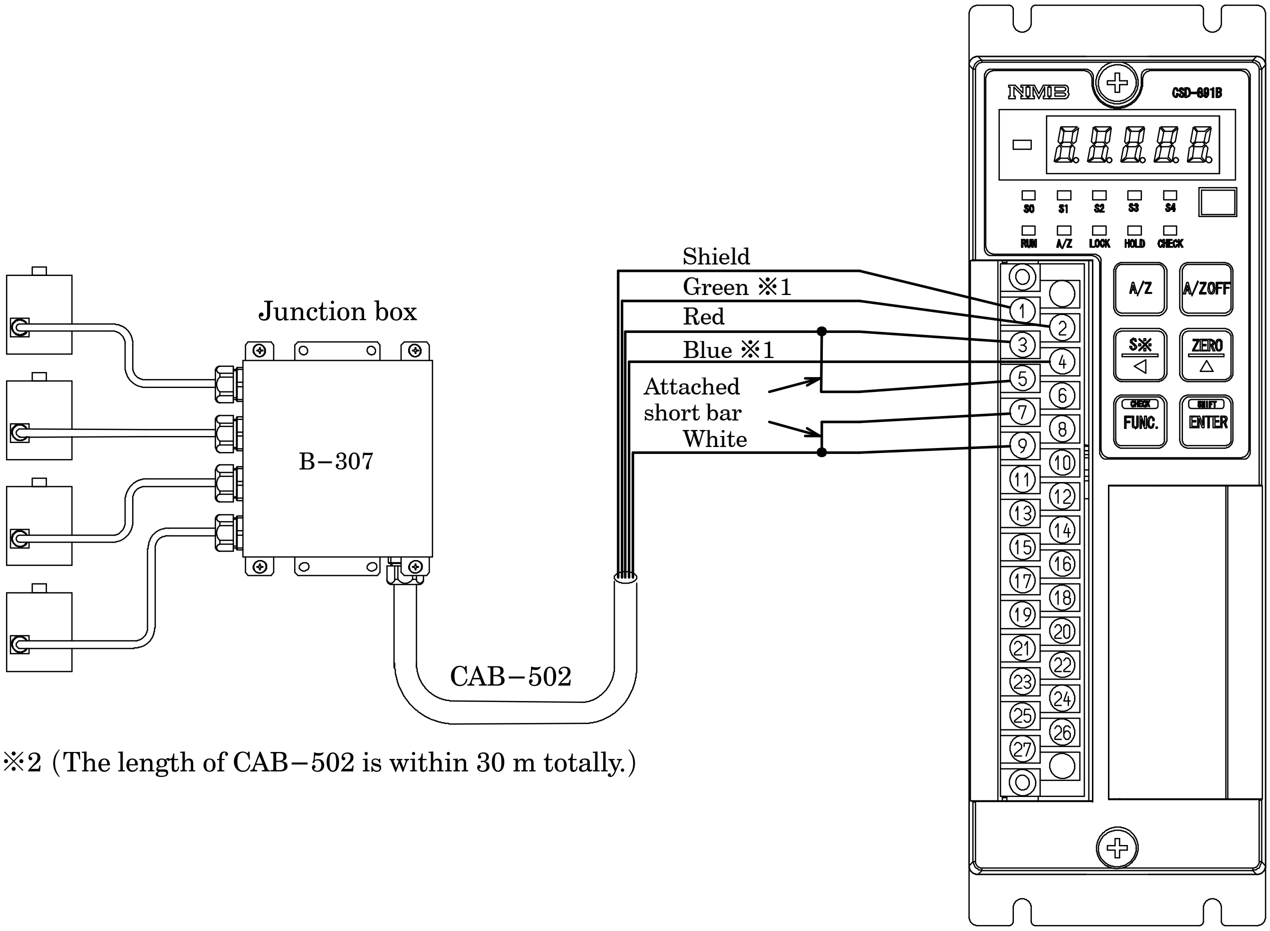
※1 When tension is applied with the application of tension type or universal(compression/tension) type of load cell, and display of "+" direction is required, connect "Green" with Terminal No.4 and "Blue" with Terminal No.2 individually. As there is a case which standard wiring color is different, please confirm the inspection data sheet of the load cell being used.

※2 When the length of CAB−502 is more than 30 m totally, there may have the case that the accuracy is out of warranty because the resistance of cable makes the input voltage of the instrument decreased.

※3 When the length of CAB−501 is more than 100 m totally, there may have the case that the accuracy is out of warranty because the resistance of cable makes the remote sensing function not worked fully.

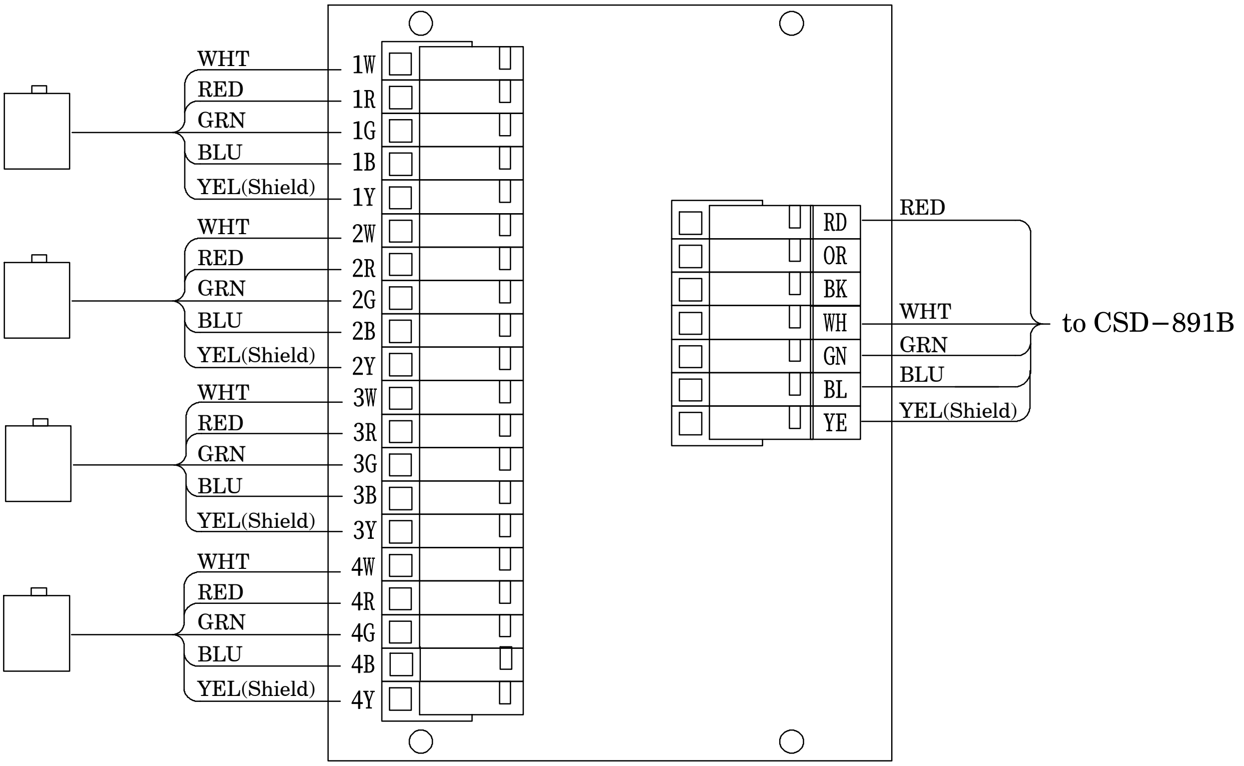
③ Connection with 2 to 4 points of load cells and Summing type junction box(B−307) and CSD−891B

i) When CAB−502(4−cores cable) is used.

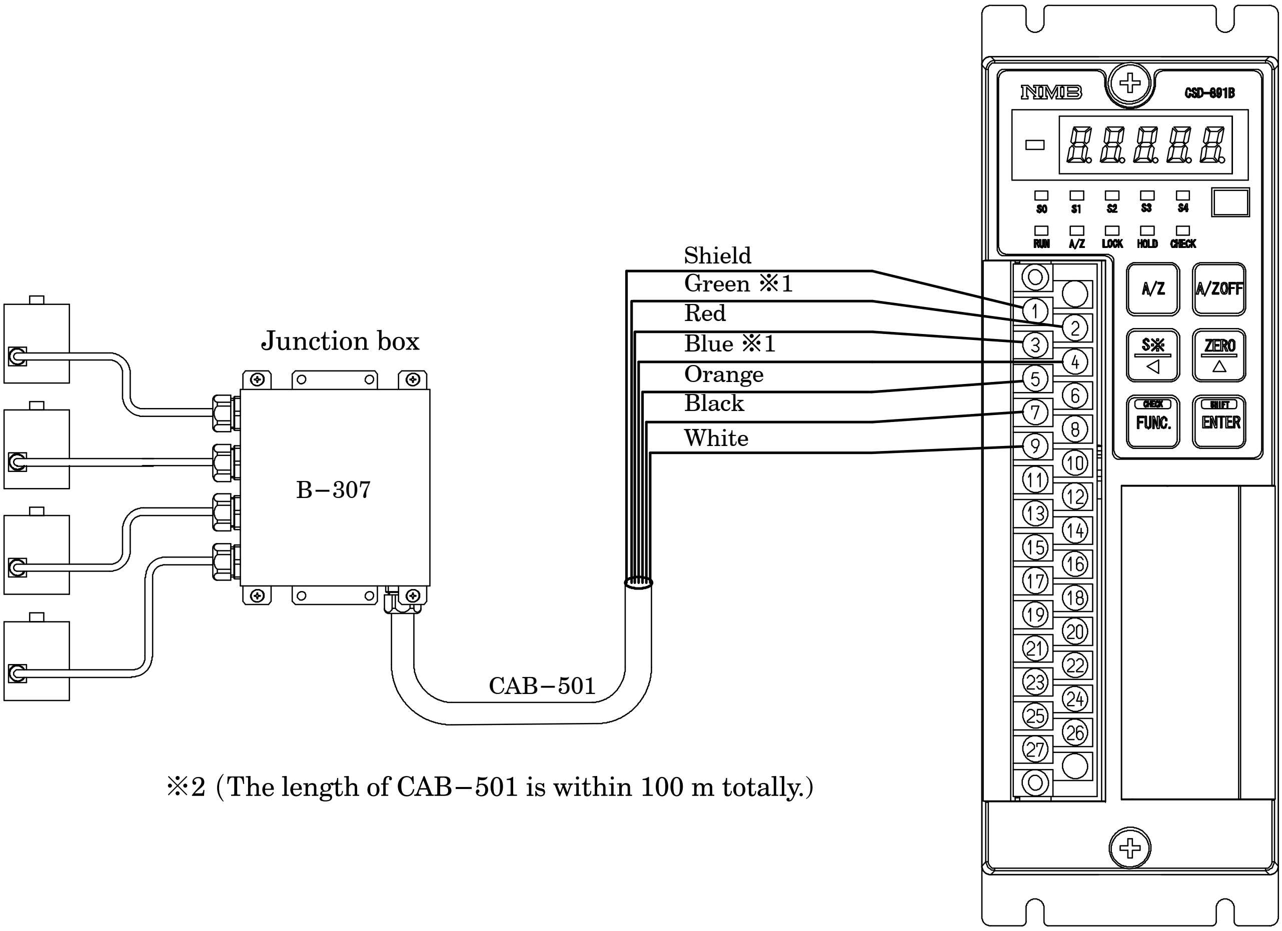


※2 (The length of CAB−502 is within 30 m totally.)

Internal wiring diagram of B−307

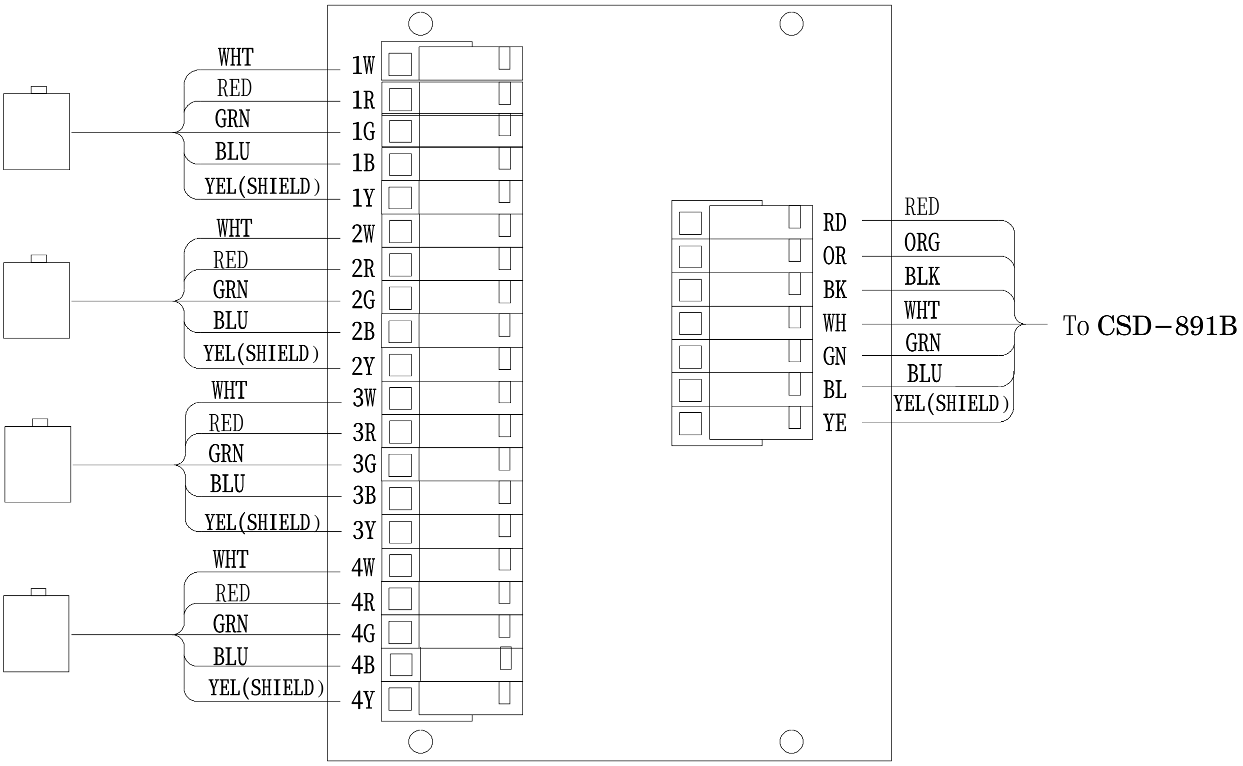


ii) When CAB−501(6−cores cable) is used.



※2 (The length of CAB−501 is within 100 m totally.)

Internal wiring diagram of B−307



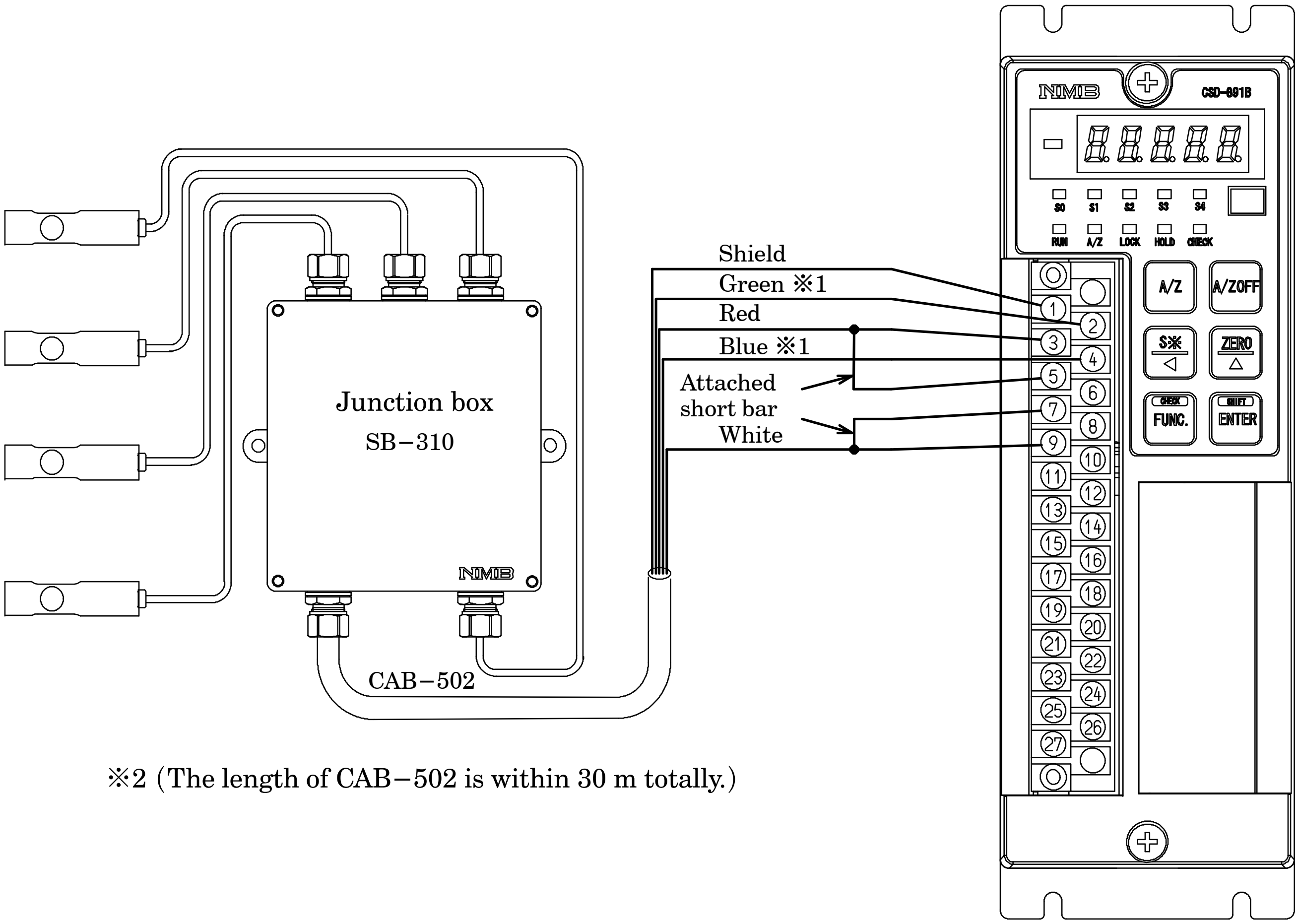
※1 When tension is applied with the application of tension type or universal(compression/tension) type of load cell, and display of "+" direction is required, connect "Green" with Terminal No.4 and "Blue" with Terminal No.2 individually. As there is a case which standard wiring color is different, please confirm the inspection data sheet of the load cell being used.

※2 When the length of CAB−502 is more than 30 m totally, there may have the case that the accuracy is out of warranty because the resistance of cable makes the input voltage of the instrument decreased.

※3 When the length of CAB−501 is more than 100 m totally, there may have the case that the accuracy is out of warranty because the resistance of cable makes the remote sensing function not worked fully.

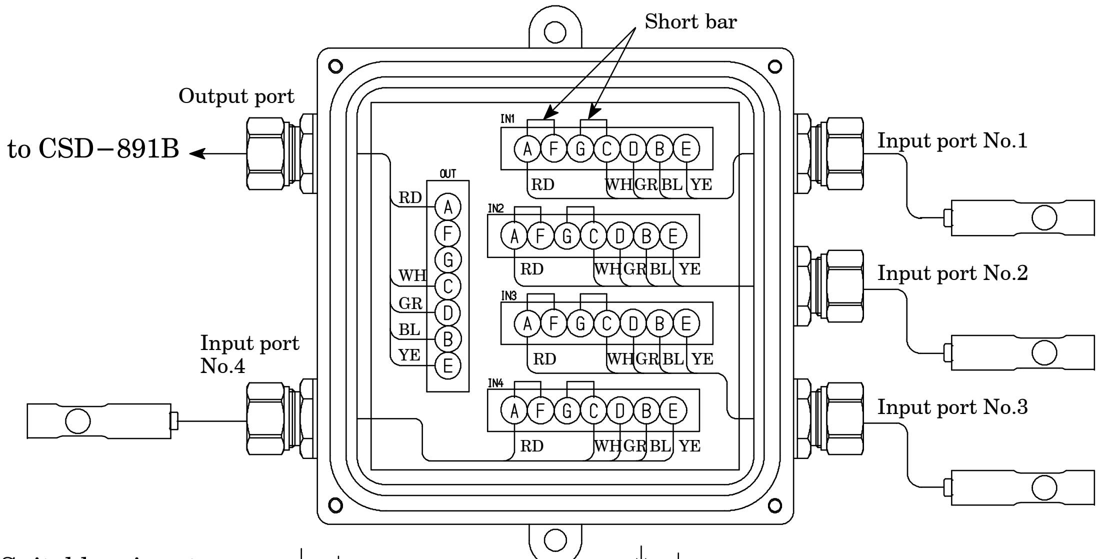
④ Connection with 2 to 4 points of load cells and Summing type junction box (SB−310) and CSD−891B.

i) When CAB−502(4−cores cable) is used.

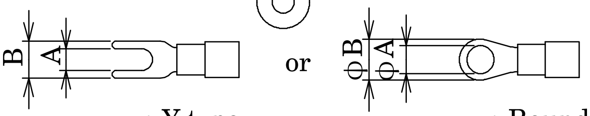


※2 (The length of CAB−502 is within 30 m totally.)

Internal wiring diagram of SB−310



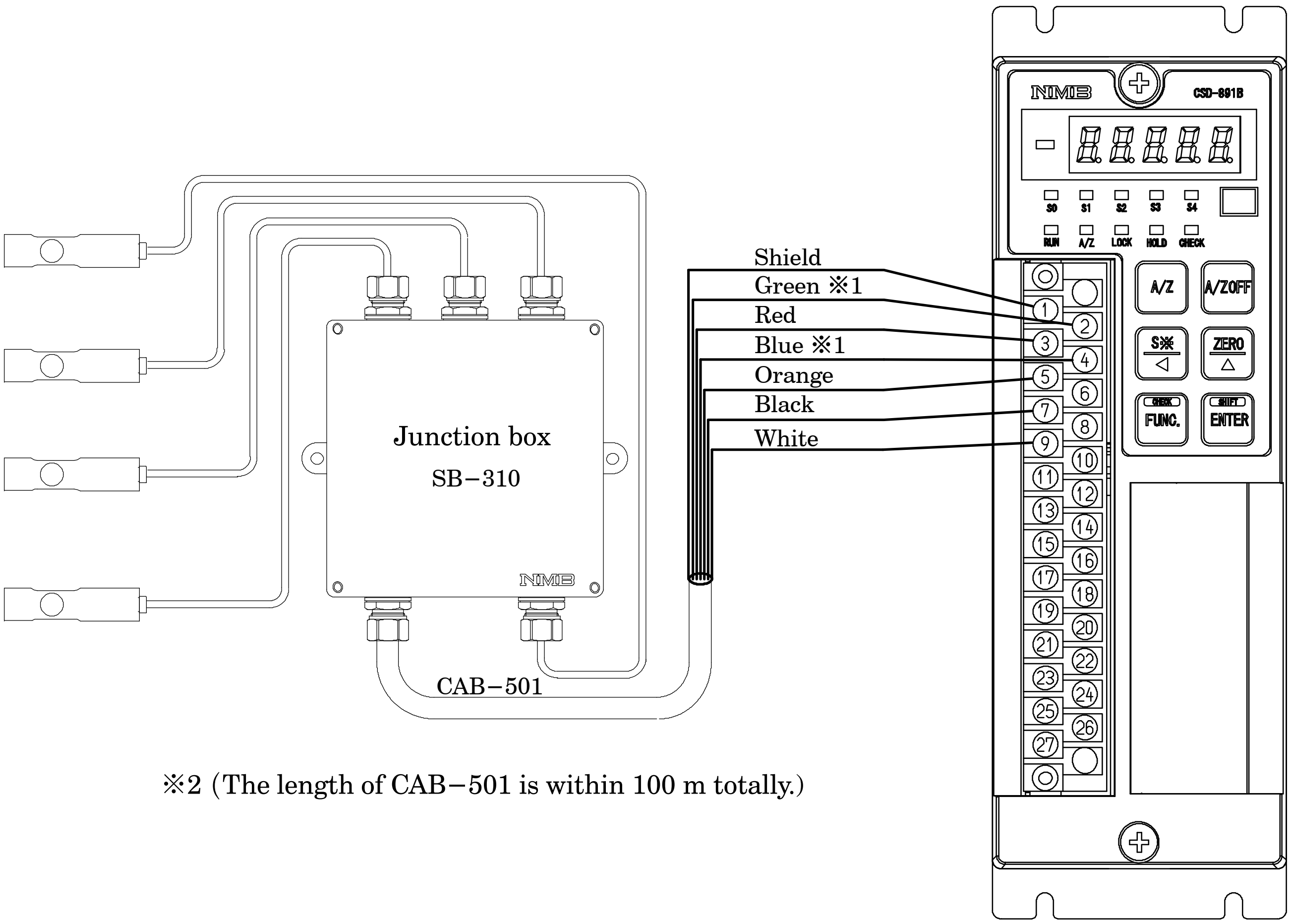
Suitable crimp type terminal lugs：



A：3.2 mm or less
B：7 mm or less

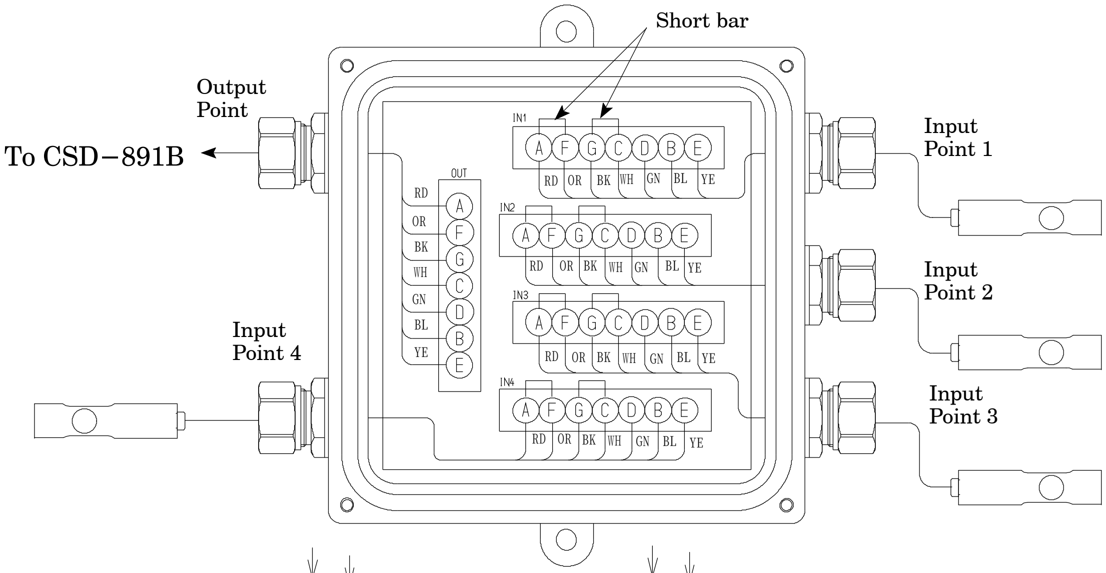
・Y type ・Round type

ii) When CAB−501(6−cores cable) is used.

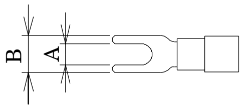


※2 (The length of CAB−501 is within 100 m totally.)

Internal wiring diagram of SB−310

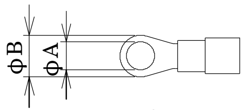


Suitable solderless terminal



·Y type

or

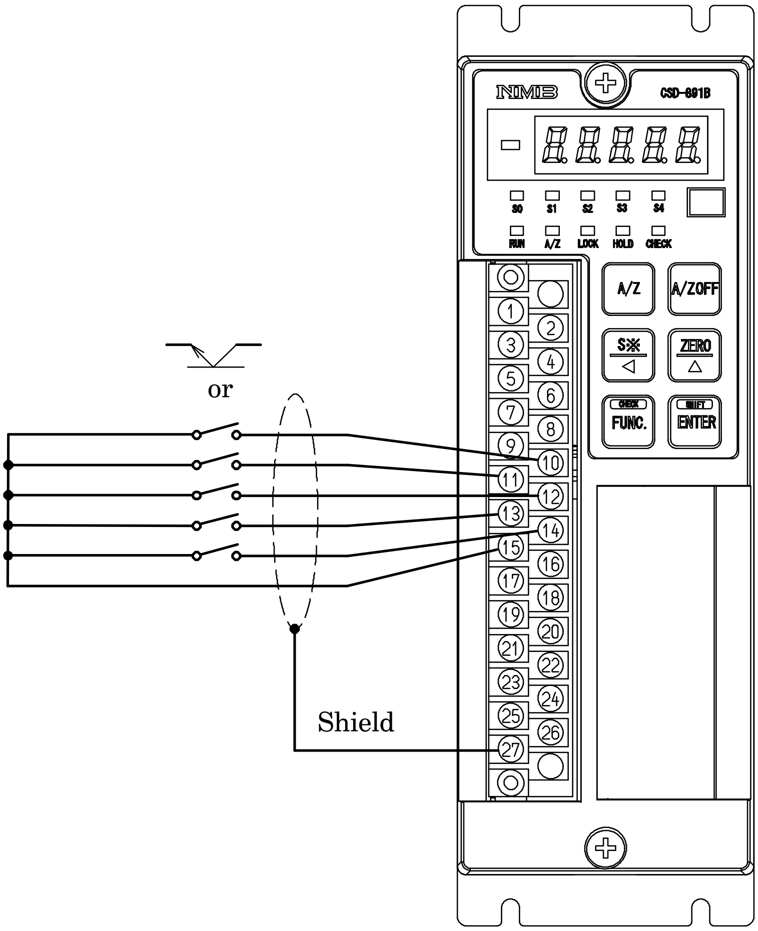


·Round type

A: 3.2 mm or less
B: 7 mm or less

4−3−2. Connection with external control inputs

Connections with external control input “ZERO”, “A/Z”, “A/Z OFF”, “HOLD” and “LOCK” should be made according to the below figures by using a contact or an open collector between the each terminal and terminal No. 15 at “COM.”
Refer to the paragraph 7−1 for the function of each input.



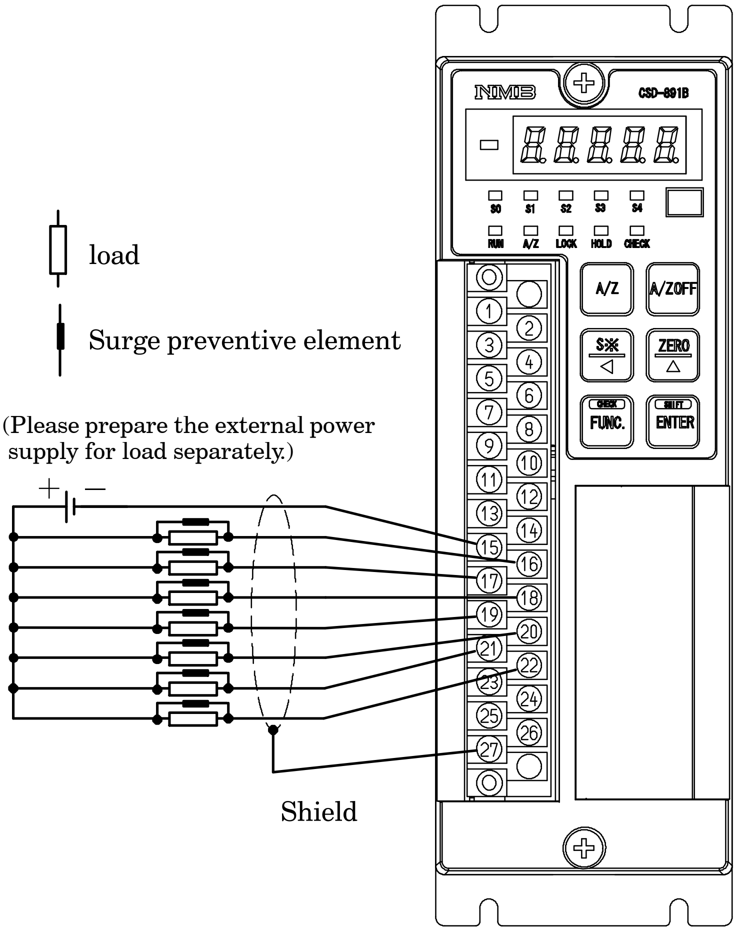
⚠Warning ● Connections with external control outputs should be made securely according to the figures. If neglected, it may cause an unexpected failure and/or malfunction to the instrument.

● For the connections with external control inputs, be sure to apply shielded cable, and the shielded cable should be connected with ⏚ terminal(Terminal No.27)
If not connected, it may cause malfunction due to the effects from external noises and so on.

4−3−3. Connection with open collector output

Connections with open collector outputs “RUN”, “ERROR”, “S0”, “S1”, “S2”, “S3” and “S4” and the external load should be made by using each terminal and terminal No. 15 at “COM.”. At the same time, take care that the load should not exceed the rated load of open collector output.

The rated load of open collector V_{CE}=DC30 V, I_C=DC30 mA MAX.



⚠Warning

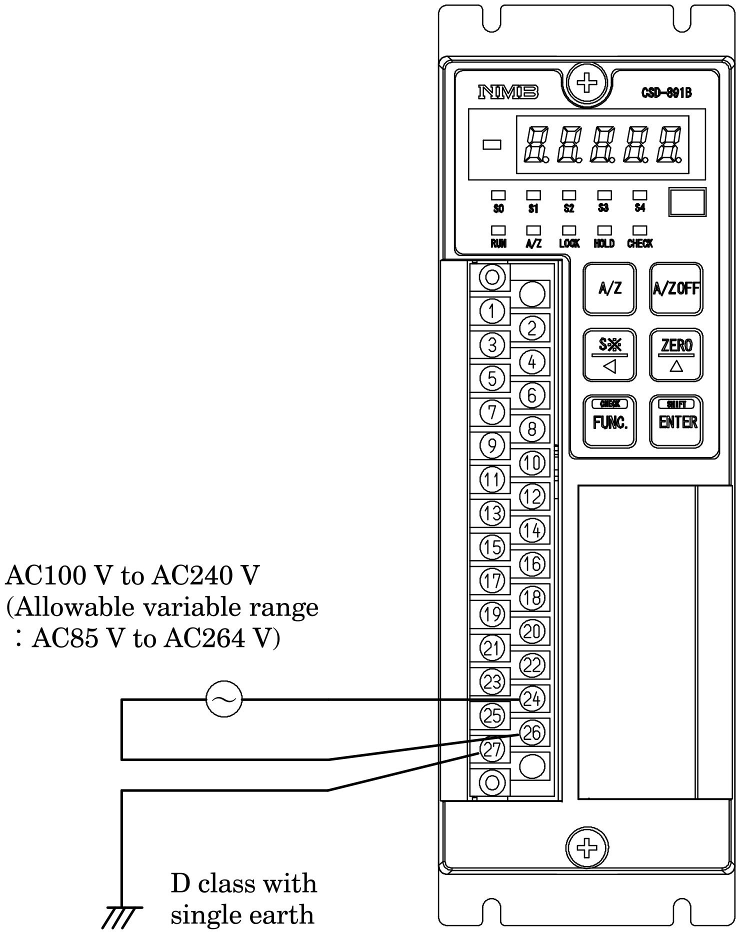
- ● Connections with the open collector outputs should be made securely according to the figures and also within the rated capacity of the open collector. If neglected, it may cause an unexpected failure and/or malfunction to the instrument.
- ● For the protection in the open collector of this instrument, connect the surge preventive element that satisfies the characteristics of external load to connect. If neglected, it may cause unexpected failure and/or malfunction due to the effects from damage/melt down of the open collector output of this instrument.

- For the connections with contact outputs, be sure to apply shielded cable, and the shielded cable should be connected with GND terminal (Terminal No.27) of the instrument. If not connected, it may cause malfunction due to the effects from external noises and so on.

4−3−4. Connection with the power supply and the earth

Connections with the power supply and the earth should be made as the following figure.
Grounding should be the D class with single earth.

Power supply voltage	AC100 V to AC240 V (Allowable variable range：AC85 V to AC264 V)
Frequency for power supply	50/60 Hz
Power consumption	Approx.19 VA at maximum. (at AC100 V)



Warning
- 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. If neglected, it may cause an unexpected error.

- 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.

5. Calibration procedures

⚠Warning

- Before using the new instrument or after exchanging the strain gage applied transducer with a new one, be sure to make calibration.
  If calibration is not made, correct measured results may not be obtained, or it may cause malfunction to the instrument and it may damage the peripheral equipment.
  Moreover, even if calibration has made, there may occur the similar case as above when the result is not correct. So make precise calibration again.
- The calibration for the instrument and "Display value at the time of minimum analog output"(F−21) and "Display value at the time of maximum analog output" (F−22) are not interlocked. In due course, make check on the setting for F−21 and F−22 securely.
  If neglected, correct outputs may not be obtained, or it may cause malfunction to the instrument and it may damage the peripheral equipment.

5−1. Preparations

According to the Chapter 4. Connecting method, connect the instrument and the strain gage applied transducer properly, then supply the power.

5−2. Calibration procedures

Load calibration procedures for the instrument are as follows:

① Calibration method to register the output (conversion with mV/V) of strain gage applied transducer at the time of maximum display (weighing capacity) after setting the load to zero (Initial load condition with tare weight).

② Calibration method (Automatic calibration for Zero and Span) to register the output of strain gage applied transducer (conversion with mV/V) at the time of zero load(Initial load application with tare) at the optional load condition, and also to register the output (conversion with mV/V) of strain gage applied transducer at the time of maximum display (weighing capacity).

③ Calibration method (Actual load calibration) to register by the reading output of strain gage applied transducer, when setting in the condition of zero load applied (Initial load application with tare) and in the condition of actual load applied individually.

④ Fine adjustment on Zero

⑤ Fine adjustment on Span

⑥ Calibration procedures to apply registration again for zero point only(Tare weight cancellation).

- The accuracy of calibration obtained from ① and ② is 1/1 000 or so. If more than the accuracy 1/1 000 is required, make calibration of ③ type.

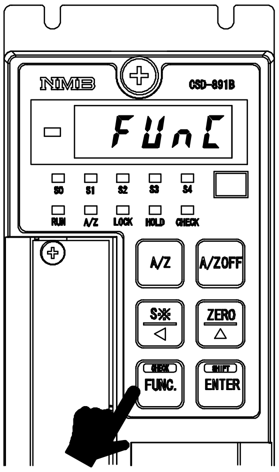
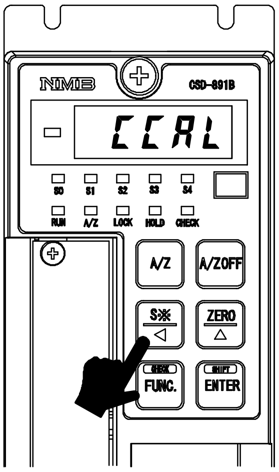
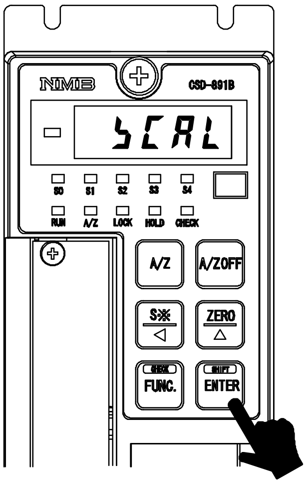
In the following paragraphs, we will describe each calibration procedure by showing the examples with load cell applied.

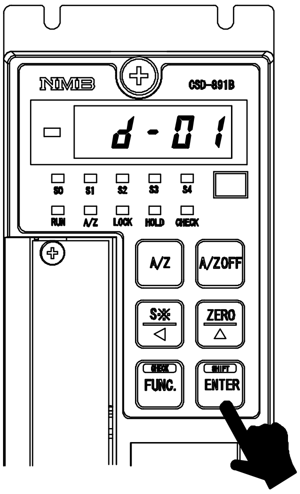
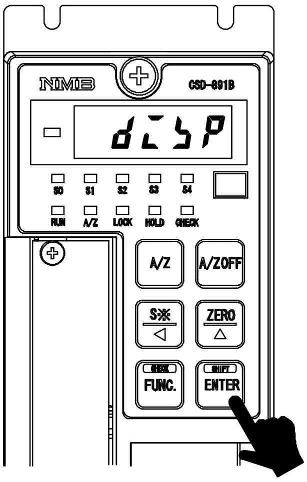
5−2−1. Calibration method to register the output of strain gage applied transducer at the time of maximum display after setting the load to zero.

⚠Warning

- Before using a new instrument or exchanging the strain gage applied transducer for a new one, be sure to make calibration.
  If calibration shall not be made, correct measured results may not be obtained nor it may cause malfunction in the instrument and there may exist damage to the peripheral equipment.
  Besides, even though the calibration has been made, there may occur the similar case when the result is not correct, so make calibration again.
- During the calibration is executing, be sure to set Tare weight cancellation clear, and to make cancellation (Execution of F−98) for compensated data on zero set and set the OFF position of Zero tracking(Setting “00000” on F−08 and F−09), and also set the OFF position o Peak.

- During calibration procedures, press the CHECK FUNC. key in case of interrupting the calibration is required. The calibration data will be kept as they are before entering the calibration and then returns to the Measurement mode.
- Every time the S※ ◄ key is pressed with the load display of “FUNC”, the display will change as the following arrow marks. Furthermore, every time the ZERO ▲ is pressed, the display will change as the reverse direction of the following arrow marks. However, “VCAL” and “VADJ” appears only when the optional analog output is attached.
  “FUNC”→“CCAL”→“ACAL”→“LCAL”→“ZERO”→“SPAN”→
  “TARE”→“CHEK”→“MONT”→“VCAL”→“VADJ”→“FUNC”→
  “CCAL”→・・・・・ (Hereinafter, it will repeat.)

	Procedures	
1	Press the CHECK FUNC. key for about one second The load display shows “FUNC”.	
2	Press the S※ ◄ key twice. It makes the load display proceed as “CCAL”.	
3	Press the SHIFT ENTER key. “CCAL” mode can be entered, then the load display shows “SCAL”.	

	Procedures	
4	Press the SHIFT ENTER key. The load display shows “D−01” and it flashes on and off. When the calibration has completed already, the set value of minimum scale registered at that time is displayed. Set the minimum scale with the right keys. Setting value for the minimum scale are 4 (four) as follows: 1, 2, 5, 10	 ZERO ▲ key ：Set value inclement key
5	Press the SHIFT ENTER key. The load display will show “DISP”.	

Procedures

6

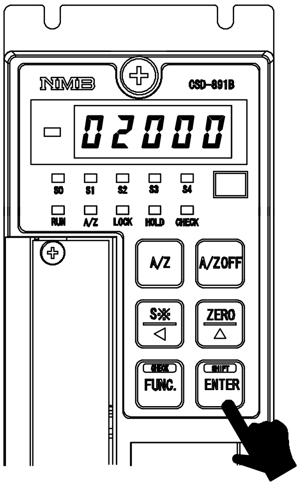
Press the SHIFT ENTER key.
The load display shows ”2000”, and the digit of minimum display flashes on and off.
When the calibration has completed already, the registered value of maximum display at that time is displayed.

> By the setting of minimum scale, the digit of minimum display that flashes on and off are as follows：
>
> | | | |
> |---|---|---|
> | The minimum scale | 1, 2, 5 | 10^0 digit |
> | The minimum scale | 10 | 10^1 digit |

Set the maximum display value with the right keys. The setting range for the maximum display value is (the minimum scale×100)～99 990.
In order to make effective use of the performance, set within the following ranges.
When setting is made over the range as below, there may have a possibility of unstable display and so on.

Setting range for the maximum display value	The minimum scale
100～10 000	1
200～20 000	2
500～50 000	5
1 000～99 990	10

> By pressing the key continuously, increment can be provided continuously.



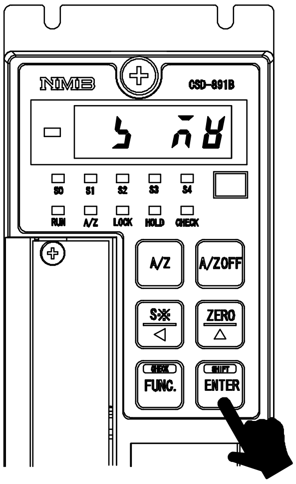
S※ ◄ key ：Set value carry key

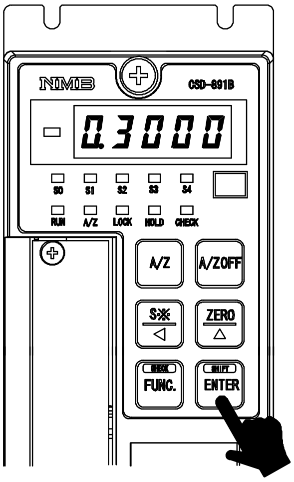
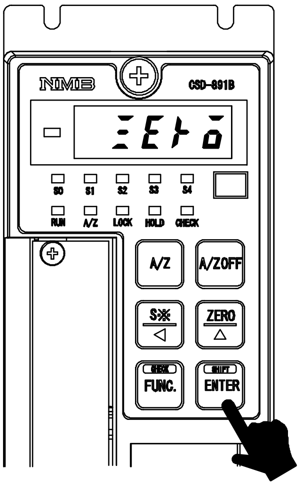
ZERO ▲ key ：Set value inclement key

A/Z key ：Set value initialization key

7

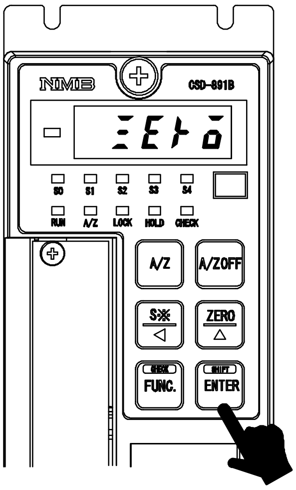
Press the SHIFT ENTER key.
The load display shows ”S MV”.

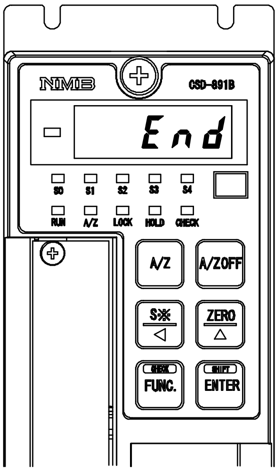


	Procedures	
8	Press the SHIFT ENTER key. The load display will show "0.3000", and the digit of 10^0 flashes on and off. In case that calibration has completed already, the registered output value of load cell at that time is displayed. Set the value with the right keys, which is subtracted the output value of load cell at the time of initial load application from the output value of load cell corresponding to the maximum display value set in the step 6. Though the number of digits has not prepared in the "Inspection data" for load cell so many as shown in the right figure, extra digits are necessary for the compensation with the standard point at internal of the instrument. In case of actual setting, insert "0", into the extra digits. As for the value for extra digit, when tare compensation and fine adjustment on load are applied, it will be rewritten as a compensated value automatically. Setting range for the output of load cell is from 0.200 0 mV/V to 3.100 0 mV/V. By pressing the key continuously, increment can be provided continuously.	 S※ ◄ key : Set value carry key ZERO ▲ key : Set value inclement key A/Z key : Set value initialization key
9	Press the SHIFT ENTER key. The load display showS "ZERO". Here, set the instrument with initial load application.	

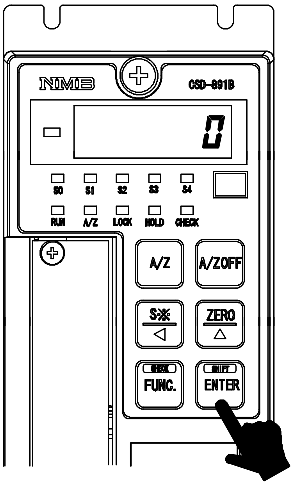
<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td rowspan="2">10</td><td rowspan="2">Press the SHIFT ENTER key.
The load display shows “ZERO” with lighting display on and off, then zero adjustment can be started.

⚠ Warning ： At the same time, take care not to apply load variation due to vibration and so on. When load variation is applied, there will be possibilities that zero point is unstable, and precise reading of zero will not be obtained.

After completed, the load display becomes “END”.
However, when the initial load is not entered within the range from −2.5 mV/V to 2.5 mV/V, the error code shown in the right figure will show for about 2 seconds, then load display will show “ZERO” and return to step 9.
TE−L ：Zero point −OVER
TE−H ：Zero point ＋OVER</td><td>


</td></tr>
<tr><td>Error code


Error code

</td></tr>
<tr><td>11</td><td>Press the SHIFT ENTER key.
After “CCAL” mode is over, the load display shows the present load.</td><td>
</td></tr>
</table>

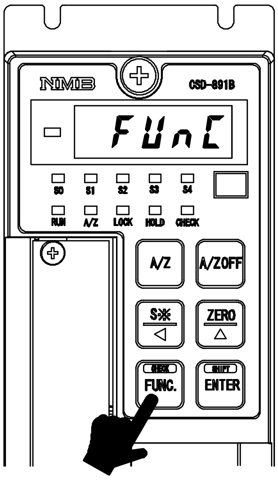
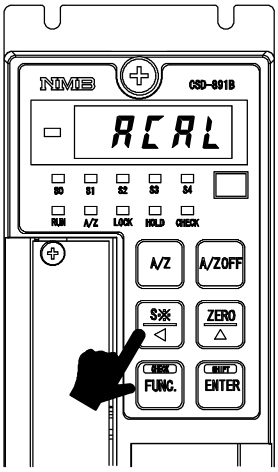
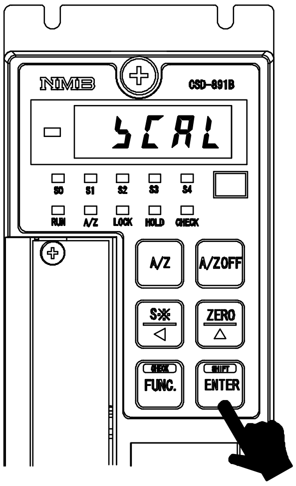
5−2−2. Calibration procedures to register the output of strain gage applied transducer at the time of zero and the maximum display

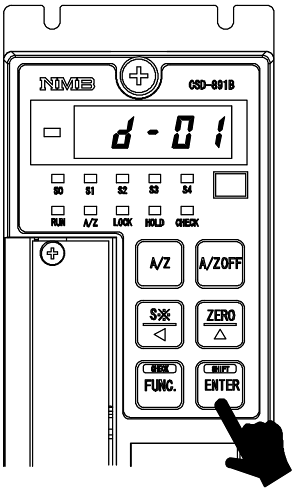
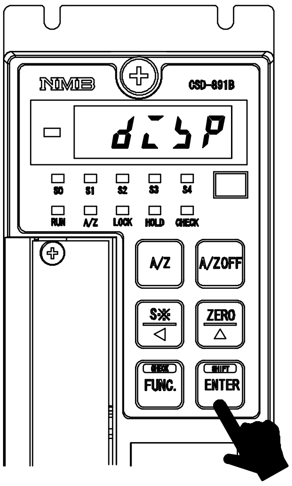
(1) Procedure by key operation

⚠Warning

- Before using a new instrument or exchanging the strain gage applied transducer for a new one, be sure to make calibration.
  If calibration shall not be made, correct measured results may not be obtained nor may cause malfunction in the instrument and there may exist damage in peripheral equipments.
  Besides, even though calibration has been made, there may occur the similar case when the result is not correct, so make calibration again.
- During the calibration is executing, be sure to set Tare weight cancellation clear, and to make cancellation (Execution of F−98) for compensated data on zero set and set the OFF position of Zero tracking(Setting “00000” on F−08 and F−09).

- During calibration procedures, press the CHECK FUNC. key in case of interrupting the calibration is required. The calibration data is kept as they are before entering the calibration and then returns to the Measurement mode.
- Every time the S※ ◄ key is pressed with the load display of “FUNC”, the display will change as the following arrow marks. Furthermore, every time the ZERO ▲ is pressed, the display will change as the reverse direction of the following arrow marks. However, “VCAL” and “VADJ” appears only when the optional analog output is attached.
  “FUNC”→“CCAL”→“ACAL”→“LCAL”→“ZERO”→“SPAN”→
  “TARE”→“CHEK”→“MONT”→“VCAL”→“VADJ”→“FUNC”→
  “CCAL”→・・・・・ (Hereinafter, it will repeat.)

	Procedures	
1	Press the CHECK FUNC. key for about one second The load display shows “FUNC”.	
2	Press the S※ ◂ key twice. It makes the load display proceed as “FUNC”→“CCAL”→“ACAL”.	
3	Press the SHIFT ENTER key. “ACAL” mode can be entered, then the load display shows “SCAL”.	

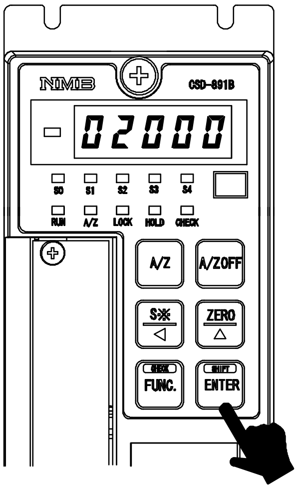
	Procedures	
4	Press the SHIFT ENTER key. The load display shows “D−01” and it flashes on and off. When the calibration has completed already, the set value of minimum scale which has registered at that time is displayed. Set the minimum scale with the right keys. Setting value for the minimum scale are 4 (four) as follows： 1, 2, 5, 10	 ZERO ▲ key ：Set value inclement key
5	Press the SHIFT ENTER key. The load display shows “DISP”.	

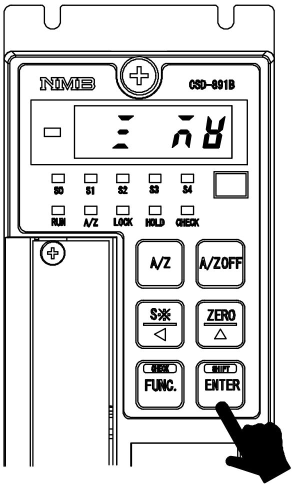
<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>6</td><td>
Press the SHIFT ENTER key.
The load display shows “2000” and the minimum display digit flashes on and off.
When the calibration has completed already, the maximum display value which has registered at that time is displayed.

By the setting of minimum scale, the digit of minimum display that flashes on and off are as follows：
The minimum scale 1,2,5 10^0 digit
The minimum scale 10 10^1 digit

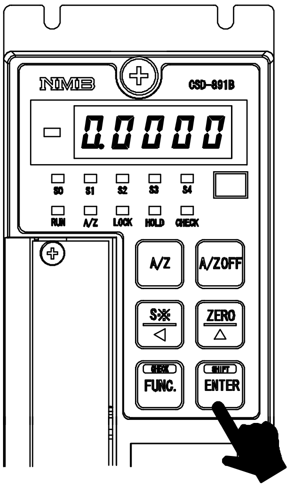
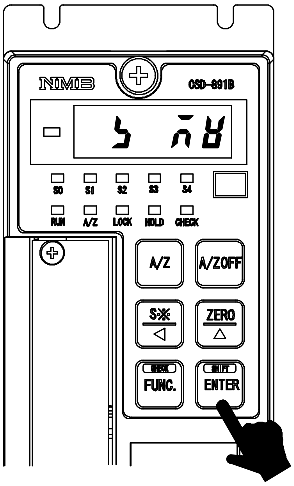
Set the maximum display value with the right keys. The setting range for the maximum display value is (the minimum scale×100)～99 990.
In order to make effective use of the performance, set within the following ranges.
When setting is made over the range as below, there may have a possibility of unstable display and so on.

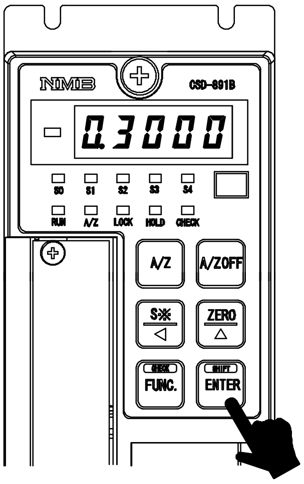
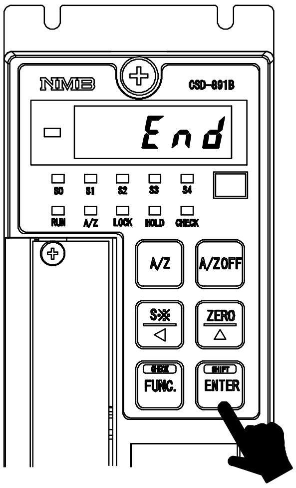
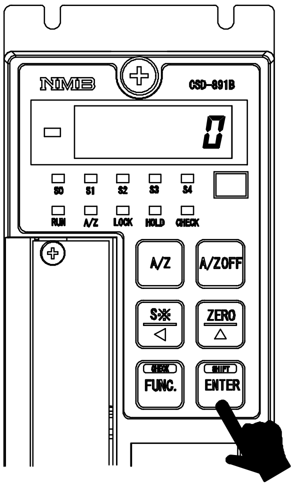
<table>
<tr><th>Setting range for the maximum display value</th><th>The minimum scale</th></tr>
<tr><td>100～10 000</td><td>1</td></tr>
<tr><td>200～20 000</td><td>2</td></tr>
<tr><td>500～50 000</td><td>5</td></tr>
<tr><td>1 000～99 990</td><td>10</td></tr>
</table>

By pressing the key continuously, increment can be provided continuously.
</td><td>


S※ ◄ key ：Set value carry key
ZERO ▲ key ：Set value inclement key
A/Z key ：Set value initialization key
</td></tr>
<tr><td>7</td><td>
Press the SHIFT ENTER key.
The load display will show “Z MV”.
</td><td>


</td></tr>
</table>

	Procedures	
8	Press the SHIFT ENTER key. The load display shows ”0.0000”, and the digit of 10^0 will flash on and off. In case that calibration has completed already, the registered output value of load cell at that time is displayed. Set the output value for load cell with the initial load application with the right keys. Though the number of digits has not prepared in the ”Inspection data” for load cell so many as shown in the right figure, extra digits are necessary for the compensation with the standard point at internal of the instrument. In case of actual setting, insert “0”, into the extra digits. As for the value for extra digit, when tare compensation and fine adjustment on load are applied, it is rewritten as a compensated value automatically. Setting range for the output of load cell is from −2.500 0 mV/V to 2.500 0 mV/V. By pressing the key continuously, increment can be provided continuously.	 S※ ◄ key : Set value carry key ZERO ▲ key : Set value inclement key A/Z key : Set value initialization key
9	Press the SHIFT ENTER key. The load display shows “S MV”.	

	Procedures	
10	Press the SHIFT ENTER key. The load display shows “0.300 0” and the digit at 10^0 will flash on and off. In case that calibration has completed already, the registered output value of load cell at that time is displayed. Set the output value for load cell corresponding to the maximum display value with the initial load application with the right keys. The set value to be set here should be 0.2 mV/V or more than the set value in the step 8. Though the number of digits has not prepared in the Inspection data for load cell as many as the digits in the right figure, extra digits are necessary for the compensation for the internal standard point of the instrument. In case of actual setting, insert “0” into the extra digits. As for the value of extra digits, when tare compensation and fine adjustment on load are applied, it is written as a compensated value automatically. By pressing the key continuously, increment can be provided continuously.	 S※ ◄ key ：Set value carry key ZERO ▲ key ：Set value inclement key A/Z key ：Set value initialization key
11	Press the SHIFT ENTER key. The load display shows the “END”.	
12	Press the SHIFT ENTER key. After “ACAL” mode is over, the load display shows the present load.	

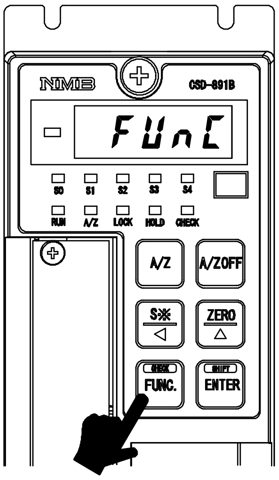
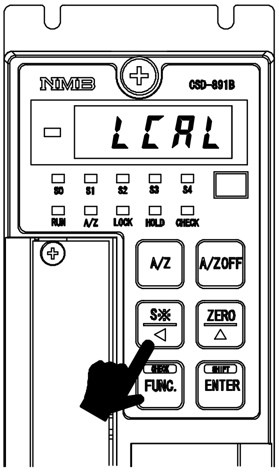
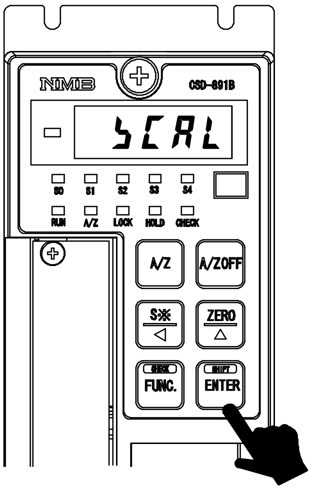
5−2−3. Calibration method to register by reading output value of strain gage applied transducer in the conditions of zero/actual load application individually.

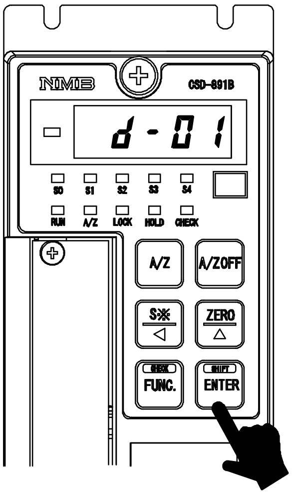
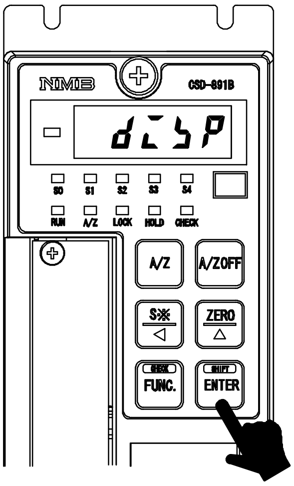
(1) Procedures by the key operation

⚠Warning

- Before using a new instrument or exchanging the strain gage applied transducer for a new one, be sure to make calibration.
  If calibration shall not be made, correct measured results may not be obtained nor may cause malfunction in the instrument and there may exist damage in peripheral equipments.
  Besides, even though calibration has been made, there may occur the similar case when the result is not correct, so make calibration again.
- During the calibration is executing, be sure to set Tare weight cancellation clear, and to make cancellation (Execution of F−98) for compensated data on zero set and set the OFF position of Zero tracking(Setting “00000” on F−08 and F−09).

- During calibration procedures, press the CHECK FUNC. key in case of interrupting the calibration is required. The calibration data is kept as they are before entering the calibration and then returns to the Measurement mode.
- Every time the S※ ◄ key is pressed with the load display of “FUNC”, the display will change as the following arrow marks. Furthermore, every time the ZERO ▲ is pressed, the display will change as the reverse direction of the following arrow marks. However, “VCAL” and “VADJ” appears only when the optional analog output is attached.
  “FUNC”→“CCAL”→“ACAL”→“LCAL”→“ZERO”→“SPAN”→
  “TARE”→“CHEK”→“MONT”→“VCAL”→“VADJ”→“FUNC”→
  “CCAL”→･････ (Hereinafter, it will repeat.)

	Procedures	
1	Press the CHECK FUNC. key for about one second. The load display shows “FUNC”.	
2	Press the S※ ◄ key three times. It makes the load display proceed as “FUNC”→“CCAL”→“ACAL”→“LCAL”.	
3	Press the SHIFT ENTER key. “LCAL” mode can be entered, then the load display shows “SCAL”.	

	Procedures	
4	Press the SHIFT ENTER key. The load display shows “D−01” and it flashes on and off. When the calibration has completed already, the set value of minimum scale registered at that time is displayed. Set the minimum scale with the right keys. Setting value for the minimum scale are 4 (four) as follows： 1, 2, 5, 10	 ZERO ▲ key ：Set value inclement key
5	Press the SHIFT ENTER key. The load display shows “DISP”.	

Procedures

6

Press the SHIFT ENTER key.
The load display shows “2000” and the minimum display digit flashes on and off.
When the calibration has completed already, the maximum display value which has registered at that time is displayed.

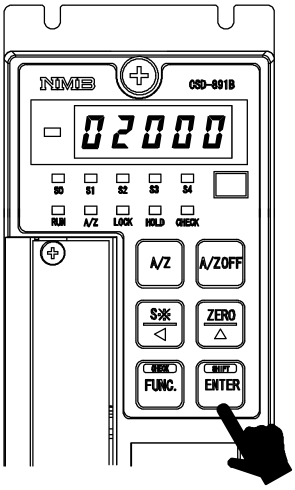
By the setting of minimum scale, the digit of minimum display that flashes on and off will be as follows :

The minimum scale	1,2,5	10^0 digit
The minimum scale	10	10^1 digit

Set the maximum display value with the right keys. Setting range for the maximum display value is (the minimum scale×100)～99 990.
In order to make effective use of the performance, set within the following ranges.
When setting is made over the range as below, there may have a possibility of unstable display and so on.

Setting range for the maximum display value	The minimum scale
100～10 000	1
200～20 000	2
500～50 000	5
1 000～99 990	10

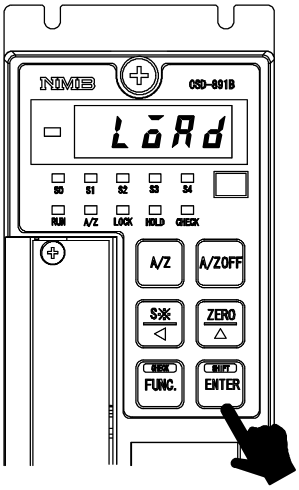
By pressing the key continuously, increment can be provided continuously.

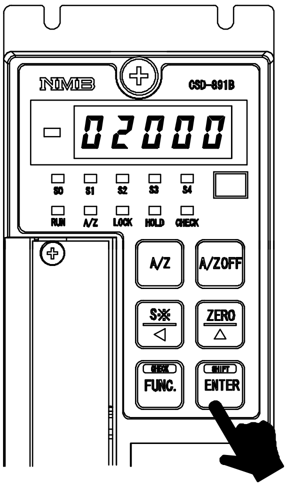
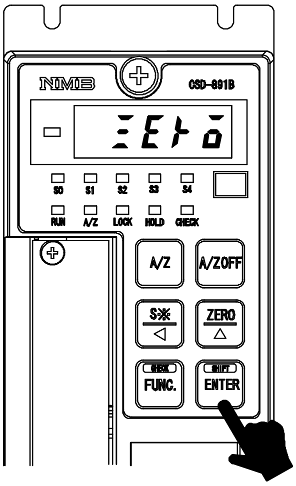


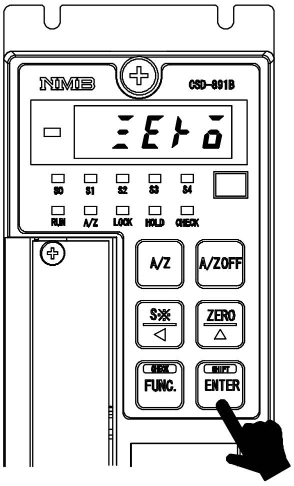
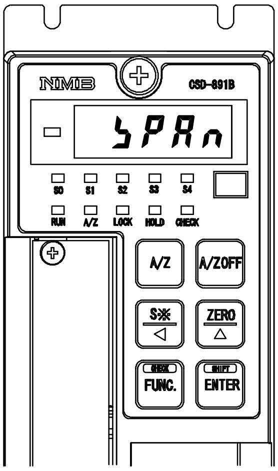
S※ ◄ key : Set value carry key
ZERO ▲ key : Set value inclement key
A/Z key : Set value initialization key

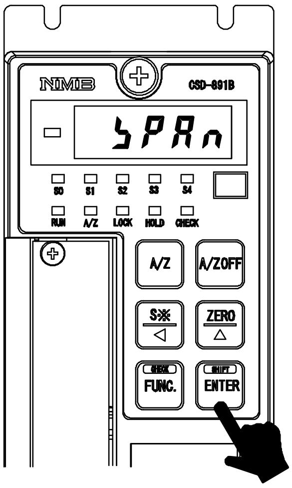
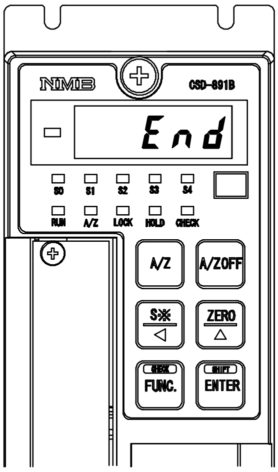
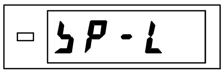
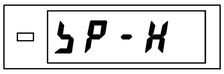
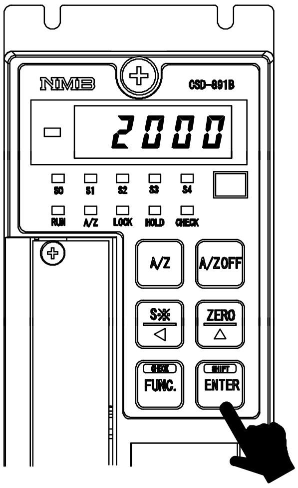
7

Press the SHIFT ENTER key.
The load display shows “LOAD”.



	Procedures	
8	Press the SHIFT ENTER key. The load display shows “2000”, and the digit of 10^0 flashes on and off. In case that calibration has completed already, the registered output value of load cell at that time is displayed. By the setting of minimum scale, the digit of minimum display that flashes on and off will be as follows： The minimum scale 1,2,5 10^0 digit The minimum scale 10 10^1 digit Set the actual load value going to apply on the load cell with the right keys. The load value applied on the load cell should be less than the maximum display value set in the step 6 and should be the maximum load that can apply on the load cell with the range of (the minimum scale ×100)～99 999 as well. By pressing the key continuously, increment can be provided continuously.	 S※ ◄ key ：Set value carry key ZERO ▲ key ：Set value inclement key A/Z key ：Set value initialization key
9	Press the SHIFT ENTER key. The load display shows “ZERO”. Here, set the initial load application.	

	Procedures	
10	Press the SHIFT ENTER key. The “ZERO” on load display flashes on and off, and zero adjustment can be started. ⚠ Warning ： Take care not to apply load variations due to vibrations and so on. If load variation is applied, the zero point will not stabilized, in due course there is a possibility that correct reading of zero won’t be obtained.	 
	When completed, the display on the load display shows “SPAN”. However, when the initial load is not entered the range of −2.5 mV/V to 2.5 mV/V, the right Error code is shown for about 2 seconds, then the display on the load display section is shown as “ ZERO”, and then the step 9 can be entered. TE−L：Zero point −OVER TE−H：Zero point ＋OVER	Error code 
		Error code 
11	Apply the same load on the load cell as set in the step 8.	

	Procedures	
12	Press the SHIFT ENTER key. The "SPAN" on the load display flashes on and off, and span adjustment can be started. ⚠ Warning ： Take care not to apply load variations due to vibrations and so on. If load variation is applied, the span will not stabilized, in due course there is a possibility that correct reading of span won't be obtained.	 
	When completed, the display on the load display shows "END". However, when the value corresponding to the maximum display value does not satisfy the range from 0.2 mV/V to 3.1 mV/V, the right Error code lights up for about 2 seconds, then the display on the load display section shows "SPAN", and then returns to the step 10. SP−L：Span point −OVER SP−H：Span point ＋OVER	Error code  Error code 
13	Press the SHIFT ENTER key. After "LCAL" mode is over, the load display shows the present load.	

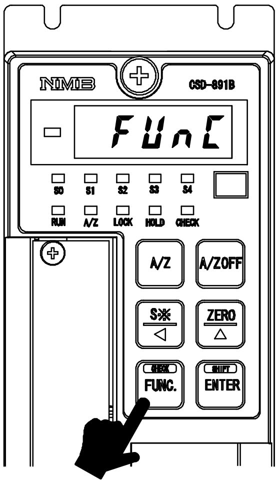
5−2−4. Zero fine adjustment

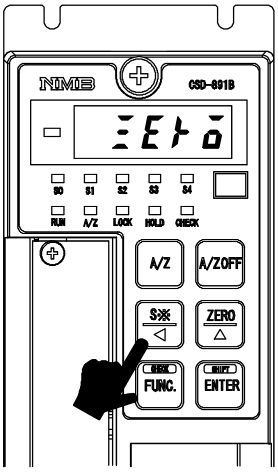
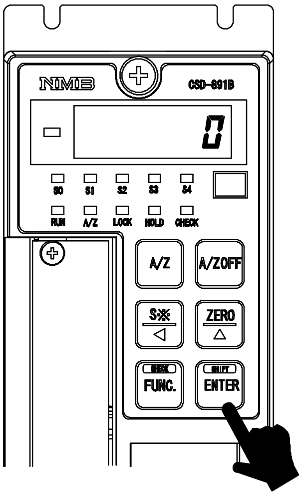
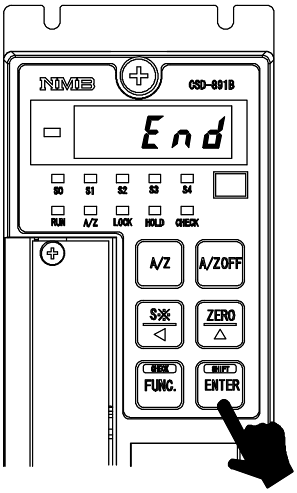
(1) Procedures by key operation

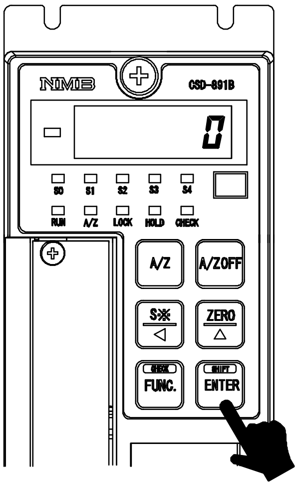
⚠Warning ● When the tare weight cancellation (A/Z) and the setting of zero is executing, and when the zero tracking is effective, the zero fine adjustment cannot be entered(Displays ER−5). After making the tare weight cancellation clear(A/Z OFF), the cancellation of the compensation data(Execution of F−98) and the OFF position of the zero tracking(Setting "00000" on F−08 and F−09), the zero fine adjustment mode can be entered.

● During calibration procedures, press the [CHECK FUNC.] key in case of interrupting the calibration is required. The calibration data is kept as they are before entering the calibration and then returns to the Measurement mode.

● Every time the [S※ ◄] key is pressed with the load display of "FUNC", the display will change as the following arrow marks. Furthermore, every time the [ZERO ▲] is pressed, the display will change as the reverse direction of the following arrow marks. However, "VCAL" and "VADJ" appears only when the optional analog output is attached.
"FUNC"→"CCAL"→"ACAL"→"LCAL"→"ZERO"→"SPAN"→
"TARE"→"CHEK"→"MONT"→"VCAL"→"VADJ"→"FUNC"→
"CCAL"→・・・・・ (Hereinafter, it will repeat.)

	Procedures	
1	Press the [CHECK FUNC.] key for about one second. The load display shows "FUNC".	

	Procedures	
2	Press the S※ ◄ key four times. It makes the load display proceeded as “FUNC”→“CCAL”→“ACAL”→“LCAL” →“ZERO”. Here, set the initial load application.	
3	Press the SHIFT ENTER key. Zero fine adjustment mode can be entered, then the display on load display shows the present load value and lights on and off. At the same time, set the present load value to “0” with the right keys. By pressing the key continuously, increment can be provided continuously. The variation of load value for one push of the right key is less than 1 digit of display. Therefore, a few pushes of these keys are required to get the change of 1 digit of display value.	 S※ ◄ key : Zero fine adjustment display decreasing key ZERO ▲ key : Zero fine adjustment display increasing key
4	Press the SHIFT ENTER key. The indication of load display shows “END”.	

	Procedures	
5	Press the SHIFT ENTER key. After quitting from zero fine adjustment mode, the load display shows the present load value.	

5−2−5. Span fine adjustment

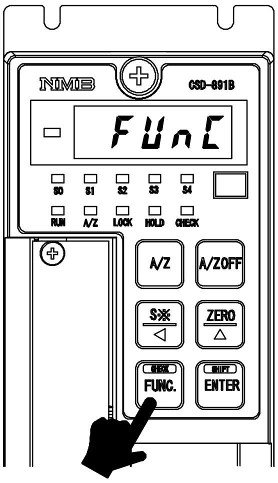
(1) Procedures by key operation

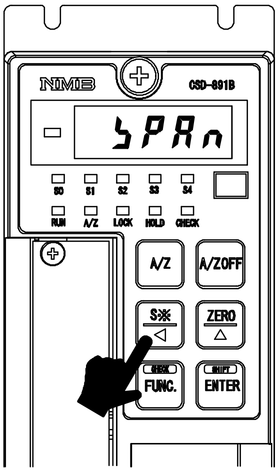
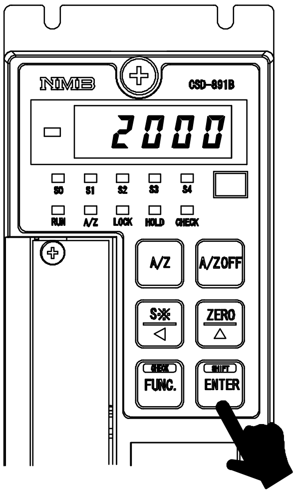
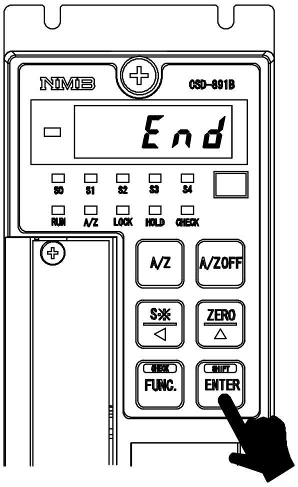
⚠Warning

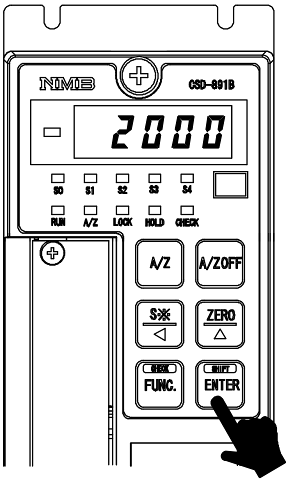
- When the tare weight cancellation (A/Z) and the setting of zero is executing, and when the zero tracking is effective, the span fine adjustment cannot be entered(Displays ER−5). After making the tare weight cancellation clear(A/Z OFF), the cancellation of the compensation data(Execution of F−98) and the OFF position of the zero tracking(Setting “00000” on F−08 and F−09), the span fine adjustment mode can be entered.

- During calibration procedures, press the CHECK FUNC. key in case of interrupting the calibration is required. The calibration data is kept as they are before entering the calibration and then returns to the Measurement mode.

- Every time the S※ ◄ key is pressed with the load display of “FUNC”, the display will change as the following arrow marks. Furthermore, every time the ZERO ▲ is pressed, the display will change as the reverse direction of the following arrow marks. However, “VCAL” and “VADJ” appears only when the optional analog output is attached.
  “FUNC”→“CCAL”→“ACAL”→“LCAL”→“ZERO”→“SPAN”→
  “TARE”→“CHEK”→“MONT”→“VCAL”→“VADJ”→“FUNC”→
  “CCAL”→・・・・・ (Hereinafter, it will repeat.)

	Procedures	
1	Press the FUNC. key for about one second. The load display shows “FUNC”.	

	Procedures	
2	Press the S※ ◄ key five times. It makes the load display proceeded as “FUNC”→“CCAL”→“ACAL”→“LCAL” →“ZERO”→“SPAN”. Here, set the maximum load that can be applied within the maximum value on the load cell.	
3	Press the SHIFT ENTER key. Span fine adjustment mode can be entered, then the display on load display shows the present load value and lights on and off. At the same time, adjust the present load value to be the same load applied on the load cell with the right keys. By pressing the key continuously, increment can be provided continuously. The variation of load value for one push of the right key is less than 1 digit of display. Therefore, a few pushes of these keys are required to get the change of 1 digit of display value.	 S※ ◄ key ：Span fine adjustment display decreasing key ZERO ▲ key ：Span fine adjustment display increasing key
4	Press the SHIFT ENTER key. The indication of load display will show “END”.	

	Procedures	
5	Press the SHIFT ENTER key. After quitting from zero Span fine adjustment mode, the load display will show the present load value.	

5−2−6. Calibration procedure to apply registration again for zero point only

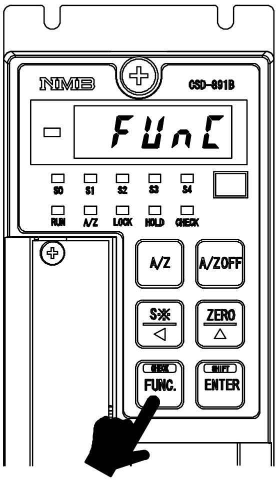
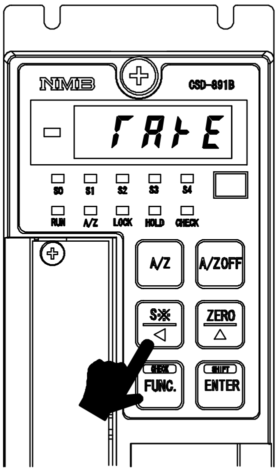
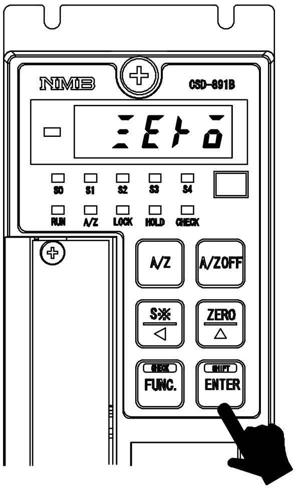
(1) Procedures by key operation

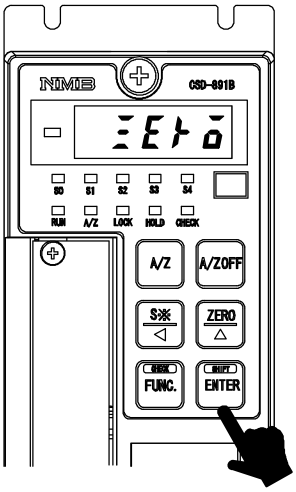
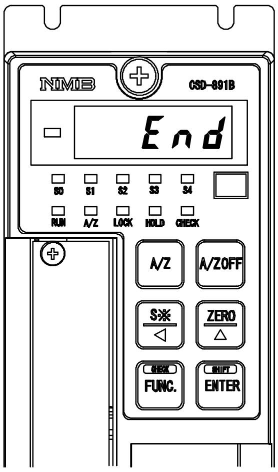
⚠Warning

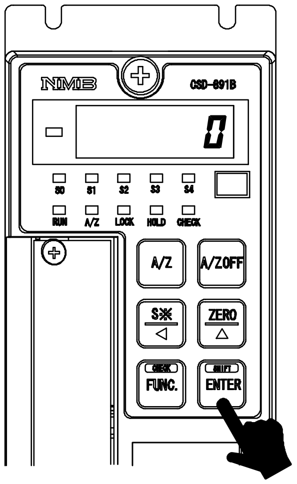
- ● During the execution of calibration, be sure to set the Tare weight cancellation clear, cancellation of the Compensated data at Zero set (Execution of F−98), and set OFF the Zero tacking (Set the F−08 and F−09 to “00000”.) and set the Peak OFF.

- ● During the calibration procedure, press the CHECK FUNC. key to interrupt the calibration. The calibration data will keep the same condition as it is entered before, then returns to the Measurement mode.

- ● When the S※ ◄ key is pressed with the load display of “FUNC”, the display will change as the following arrow marks indicate at every time the key is pressed. However, every time the ZERO ▲ is pressed, the display will change as the reverse direction of the following arrow marks.
  “FUNC”→“CCAL”→“ACAL”→“LCAL”→“ZERO”→“SPAN”
  →“TARE”→“CHEK”→“MONT” →“VCAL”→“VADJ”→“FUNC”
  →“CCAL”→・・・・・(Hereinafter, it will repeat.)

	Procedures	
1	Press the CHECK FUNC. key for about one second. The load display shows “FUNC”.	
2	Press the S※ ◄ key six times. It makes the load display proceeded as “FUNC”→“CCAL”→“ACAL”→“LCAL” →“ZERO”→“SPAN”→“TARE”. Here, set the initial load application.	
3	Press the SHIFT ENTER key. The “TARE” mode can be entered. The display on the load display section shows “ZERO”.	

	Procedures	
4	Press the SHIFT ENTER key. The display of “ZERO” on the load display section flashes on and off, and Tare weight cancellation is entered. ⚠ Warning ： At the same time, care should be taken not to apply load variation due to vibration and so on. If load variation is applied, zero point becomes unstable, so there is a possibility that correct zero can’t be read.	 
	When completed, the indication of load display shows “END”. However, when the initial load isn’t entered within the range of −2.5 mV/V and 2.5 mV/V, the error code in the right will be shown for about 2 seconds, then the display on the load display shows “TARE”, and returns to the step 2.	Error code 
	TE−L：Zero point −OVER TE−H：Zero point ＋OVER	Error code 

	Procedures	
5	Press the SHIFT ENTER key. After quitting from the “TARE” mode, the load display will show the present load value.	

5−3. Calibration method by communication

⚠Warning

- Before using a new instrument or exchanging the strain gage applied transducer for a new one, be sure to make calibration.
  If calibration shall not be made, correct measured results may not be obtained nor may cause malfunction in the instrument and there may exist damage in peripheral equipments.
  Besides, even though calibration has been made, there may occur the similar case when the result is not correct, so make calibration again.
- During the calibration is executing, be sure to set Tare weight cancellation clear, and to make cancellation (Execution of F−98) for compensated data on zero set and set the OFF position of Zero tracking(Setting "00000" on F−08 and F−09). If neglected, it returns the error command (Error command No.02) to the host.
- Also In case that the command not suitable for the procedure is transmitted during the calibration, the error command(Error command No.02) is send back to the host side.
- The calibration of this instrument is not interlocked with the display value at the minimum analog output (F−21) or at the maximum analog output (F−22). Make sure to execute or confirm the setting by F−21 and F−22 when the calibration has been made. If neglected, the correct measured results may not be obtained nor may cause malfunction in the instrument and there may exist damage in peripheral equipments.

- The calibration by the communication is possible when the optional RS−232C interface or RS−422/485 interface is mounted.

5−3−1. Calibration method by communication to register the output of strain gage applied transducer at the time of maximum display after setting the load to zero.

⚠Warning

- Before using a new instrument or exchanging the strain gage applied transducer for a new one, be sure to make calibration.
  If calibration shall not be made, correct measured results may not be obtained nor it may cause malfunction in the instrument and there may exist damage to the peripheral equipment.
  Besides, even though the calibration has been made, there may occur the similar case when the result is not correct, so make calibration again.
- During the calibration is executing, be sure to make available for the calibration set (Setting “00000” on F−97). Tare weight cancellation clear, and to make cancellation (Setting of F−98) for compensated data on zero set and set the OFF position of Zero tracking(Setting “ 00000” on F−08 and F−09). If neglected, it returns the error command (Error command No.01) to the host.
- The error command (Error command No.02) similarly returns to the host when the command not suitable for the procedure is transmitted during the calibration.
- Please match function No.F−50 to F−59 as to the communication to host’s specification and change (Refer to the paragraph 8, 9−3 and 9−4). If neglected, the communication may not be executed correctly.

- This calibration method is possible when the optional RS−232C interface or the RS−422/485 interface is mounted.
- When RS−232C interface is used, the ID No. becomes “00”.
- During the calibration, to interrupt the calibration “Calibration mode interruption command” is transmitted, or press the CHECK FUNC. key.
  The calibration data is kept as before entering the calibration and returns to the measurement mode.

Command Host→CSD−891B

	2		4		6
@	0	0	0	0	Terminator

ID number

Return CSD−891B→Host

	2		4		6		8		10		12		14
@	0	0	0	0									Terminator

ID number

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>1</td><td>Transmit the calibration mode start command from the host.
The display in the load display section displays “−RS−” and “SCAL” alternately.</td><td>Command Host→CSD−891B
<table>
<tr><th></th><th>2</th><th></th><th>4</th><th></th><th>6</th></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>1</td><td>Terminator</td></tr>
</table>
ID No.
Return CSD−891B→Host
<table>
<tr><th></th><th>2</th><th></th><th>4</th><th></th><th>6</th><th></th><th>8</th><th></th><th>10</th><th></th><th>12</th><th></th><th>14</th></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>1</td><td></td><td></td><td></td><td></td><td>C</td><td>C</td><td>A</td><td>L</td><td>Termi-nator</td></tr>
</table>
ID No.</td></tr>
<tr><td>2</td><td>Transmits the minimum digits change command data from the host, and set the minimum digits.
The setting value of the minimum digits is following four kinds.
1, 2, 5, 10
The display of the load display section displays “−RS−” and “DISP” alternately.
Don’t attach the decimal point in the setting value in the command data.
The setting value in the command data is put from the right, and an unnecessary space is given as space.</td><td>Command Host→CSD−891B
<table>
<tr><th></th><th>2</th><th></th><th>4</th><th></th><th>6</th><th></th><th>8</th><th></th><th>10</th><th></th><th>12</th><th></th><th>14</th></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>Termi-nator</td></tr>
</table>
ID No.
The minimum digits
Return CSD−891B→Host
<table>
<tr><th></th><th>2</th><th></th><th>4</th><th></th><th>6</th><th></th><th>8</th><th></th><th>10</th><th></th><th>12</th><th></th><th>14</th></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>Termi-nator</td></tr>
</table>
ID No.
The minimum digits</td></tr>
</table>

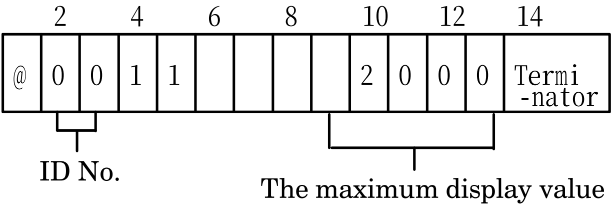
<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>3</td><td>
Transmit the maximum display value change command data from the host, and set the maximum display value. The setting range of the maximum display value is (The minimum digits ×100)～99 999. To use the performance effectively, set the value within the following range. If you set the value exceeding the following ranges, there may cause the unstable displays, etc.,

<table>
<tr><th>The maximum display value setting range</th><th>The minimum digits</th></tr>
<tr><td>100～10 000</td><td>1</td></tr>
<tr><td>200～20 000</td><td>2</td></tr>
<tr><td>500～50 000</td><td>5</td></tr>
<tr><td>1 000～99 990</td><td>10</td></tr>
</table>

The display of the load display section displays "−RS−" and "S MV" alternately.

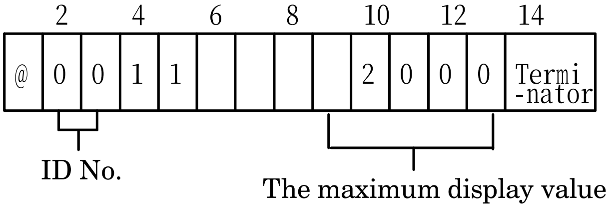
Don't attach the decimal point to the setting value in the command data.

The setting value in the command data is put from the right, and an unnecessary space is given as space.
</td><td>
Command Host→CSD−891B

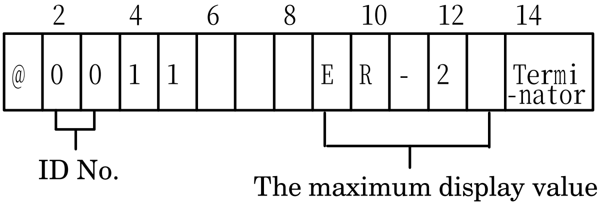


Return CSD−891B→Host

・Normal termination



・Set in error



</td></tr>
</table>

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>4</td><td>
Transmit the command data for span mV/V value change from the host, and set the output value from the load cell corresponding to the value set in step 3.
The display in the load display section displays "−RS−" and "ZERO" alternately.

When the inspection data sheet of the load cell indicates only the digit of "X.XXXX", put "0" for the extra digit. The numeric value of an extra digit, etc., is automatically rewritten as the compensated value after executing the tare weight compensation or the fine adjustment of the load. Though the setting range of the load cell is from 0.200 0 mV/V to 3.100 0 mV/V, the range of the actual setting value is "02000 to 31000" because the decimal point is not added.

Don't attach the decimal point to the setting value in the command data.

The setting value in the command data is put from the right, and an unnecessary space is given as space.
</td><td>
Command Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>5</td><td></td><td></td><td></td><td>0</td><td>3</td><td>0</td><td>0</td><td>0</td><td>Termi
-nator</td></tr>
</table>
ID No.
Output value from load cell

Return CSD−891B→Host
・Normal termination
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>5</td><td></td><td></td><td></td><td>0</td><td>3</td><td>0</td><td>0</td><td>0</td><td>Termi
-nator</td></tr>
</table>
ID No.
Output value from load cell

・Lower than 0.200 0 mV/V
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>5</td><td></td><td></td><td></td><td>S</td><td>P</td><td>-</td><td>L</td><td></td><td>Termi
-nator</td></tr>
</table>
ID No.
error code

・Higher than 3.100 0 mV/V
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>5</td><td></td><td></td><td></td><td>S</td><td>P</td><td>-</td><td>H</td><td></td><td>Termi
-nator</td></tr>
</table>
ID No.
error code
</td></tr>
<tr><td>5</td><td>
Set the initial load condition.
Transmit the start command for "Calibration method to register the output of strain gage applied transducer at the time of maximum display after setting the load to zero." from the host. The return signal is transmitted from this instrument and the zero adjustment is started.

Warning : At the same time, take care not to apply load variation due to vibration and so on. When load variation is applied, there will be possibilities that zero point is unstable, and precise reading of zero will not be obtained.
</td><td>
Command Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>3</td><td>Terminator</td></tr>
</table>
ID No.

Return CSD−891B→Host
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>3</td><td></td><td></td><td></td><td></td><td>Z</td><td>E</td><td>R</td><td>0</td><td>Termi
-nator</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>6</td><td>Transmit the command for "Status reading out during the calibration" from the host. According to the return data, proceed to the following steps.
・The return data is "END"
As termination is in normal, proceed to the next step.
・The return data is "TE−L'
The initial load is less than −2.5 mV/V.
Set the initial load within the range from −2.5 mV/V to 2.5 mV/V, and proceed to step 5.
・The return data is "TE−H".
The initial load is exceeding over 2.5 mV/V.
Set the initial load within the range from −2.5 mV/V to 2.5 mV/V, and proceed to the step 5.
・The return data is "ZERO"
Now under the calibration.
Until the return data becomes except "ZERO", repeat to transmit the command for "Status reading out during the calibration" from the host.
The display in the load display section displays "−RS−" and "END" alternately.</td>
<td>Command　Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td>Terminator</td></tr>
</table>
ID No.
Command　CSD−891B→Host
・Normal termination
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td></td><td></td><td>E</td><td>N</td><td>D</td><td>Termi-nator</td></tr>
</table>
ID No.
・Low input
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td>T</td><td>E</td><td>-</td><td>L</td><td></td><td>Termi-nator</td></tr>
</table>
ID No.
・High input
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td>T</td><td>E</td><td>-</td><td>H</td><td></td><td>Termi-nator</td></tr>
</table>
ID No.
・During the calibration
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td></td><td>Z</td><td>E</td><td>R</td><td>O</td><td>Termi-nator</td></tr>
</table>
ID No.</td></tr>
<tr><td>7</td><td>Transmit the termination command of the calibration from the host.
The calibration data is made effective and the calibration mode is over.
The display in the load display section displays the present load value.</td>
<td>Command　Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>9</td><td>Terminator</td></tr>
</table>
ID No.
Return　CSD−891B→Host
・Normal termination
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>9</td><td></td><td></td><td></td><td></td><td></td><td>E</td><td>N</td><td>D</td><td>Termi-nator</td></tr>
</table>
ID No.</td></tr>
</table>

5−3−2. Calibration procedures by communication to register the output of strain gage applied transducer at the time of zero and the maximum display

⚠Warning

- ● Before using a new instrument or exchanging the strain gage applied transducer for a new one, be sure to make calibration.
  If calibration shall not be made, correct measured results may not be obtained nor it may cause malfunction in the instrument and there may exist damage to the peripheral equipment.
  Besides, even though the calibration has been made, there may occur the similar case when the result is not correct, so make calibration again.
- ● During the calibration is executing, be sure to make available for the calibration set (Setting “00000” on F−97). Tare weight cancellation clear, and to make cancellation (Setting of F−98) for compensated data on zero set and set the OFF position of Zero tracking(Setting “ 00000” on F−08 and F−09). If neglected, it returns the error command (Error command No.01) to the host.
- ● The error command (Error command No.02) similarly returns to the host when the command not suitable for the procedure is transmitted during the calibration.
- ● Please match function No.F−50 to F−59 as to the communication to host’s specification and change (Refer to the paragraph 8, 9−3 and 9−4). If neglected, the communication may not be executed correctly.

- This calibration method is possible when the optional RS−232C interface or the RS−422/485 interface is mounted.
- When RS−232C interface is used, the ID No. becomes “00”.
- During the calibration, to interrupt the calibration “Calibration mode interruption command” is transmitted, or press the [CHECK FUNC.] key.
  The calibration data is kept as before entering the calibration and returns to the measurement mode.

Command Host→CSD−891B

	2		4		6
@	0	0	0	0	Terminator

ID number

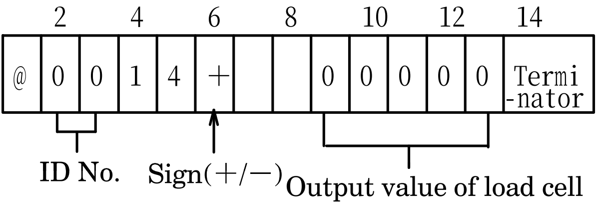
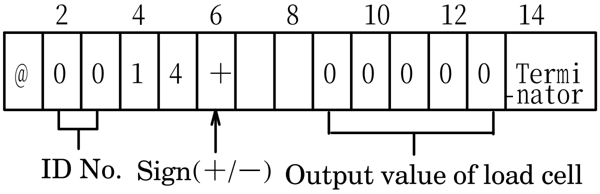
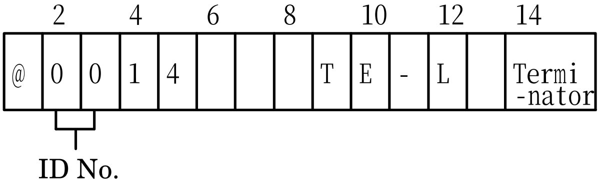
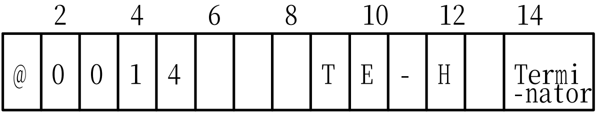
Return CSD−891B→Host

	2		4		6		8		10		12		14
@	0	0	0	0									Terminator

ID number

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>1</td><td>Transmit the start command of the calibration mode from the host.
The display in the load display section displays “−RS−” and “SCAL” alternately.</td><td>Command Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>2</td><td>Terminator</td></tr>
</table>
Return CSD−891B→Host
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>2</td><td></td><td></td><td></td><td></td><td>A</td><td>C</td><td>A</td><td>L</td><td>Termi-nator</td></tr>
</table>
ID No.</td></tr>
<tr><td>2</td><td>Transmit the change command of the minimum digits from the host, and set the minimum digits
The set value of the minimum digits is 4 kinds as follows;
1, 2, 5, 10
The display in the load display section displays “−RS−” and “DISP” alternately.
Don’t attach the decimal point to the setting value in the command data.
The setting value in the command data is put from the right, and an unnecessary space is given as space.</td><td>Command Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>Termi-nator</td></tr>
</table>
ID No. The minimum digits
Return CSD−891B→Host
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>Termi-nator</td></tr>
</table>
ID No. The minimum digits</td></tr>
</table>

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>3</td><td>
Transmit the change command of the maximum display value from the host, and set the maximum display value. The setting range of the maximum display value is (The minimum digits ×100)～99 999. To use the performance effectively, set the value in the following ranges. If you set the value exceeding the following ranges, there may cause the unstable displays, etc.,
<table>
<tr><th>The setting range of the maximum display value</th><th>The minimum digits</th></tr>
<tr><td>100～10 000</td><td>1</td></tr>
<tr><td>200～20 000</td><td>2</td></tr>
<tr><td>500～50 000</td><td>5</td></tr>
<tr><td>1 000～99 990</td><td>10</td></tr>
</table>
The display in the load display section displays “−RS−” and “Z MV” alternately.
Don’t attach the decimal point to the setting value in the command data.
The setting value in the command data is put from the right, and an unnecessary space is given as space.
</td><td>
Command Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td>2</td><td>0</td><td>0</td><td>0</td><td>Terminator</td></tr>
</table>
ID No.
The maximum display value
Return CSD−891B→Host
・Normal termination
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td>2</td><td>0</td><td>0</td><td>0</td><td>Terminator</td></tr>
</table>
ID No.
The maximum display value
・Set in error
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>1</td><td></td><td></td><td></td><td>E</td><td>R</td><td>-</td><td>2</td><td></td><td>Terminator</td></tr>
</table>
ID No.
</td></tr>
</table>

	Procedures	
4	Transmit the change command of zero mV/V value from the host, and set the output value from load cell in the initial load condition. The display in the load display section displays "−RS−" and "S MV" alternately. When the inspection data sheet of load cell indicates only the digit of "X.XXXX", put "0" for the extra digit. When the tare weight compensation and the fine adjustment of the load is done, the numerical value of an extra digit, etc., is automatically rewritten in correction. Though the setting range of load cell is from −2.500 0 mV/V to 2.500 0 mV/V, the range of the actual setting value is "−25000 to 25000" because the decimal point is not added. Don't attach the decimal point to the setting value in the command data. The setting value in the command data is put from the right, and an unnecessary space is given as space.	Command Host→CSD−891B  Return CSD−891B→Host ・Normal termination  ・Less than −2.500 0 mV/V  ・Higher than 2.500 0 mV/V 

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>5</td><td>
Transmit the change command data of span mV/V value from the host, and set the output value corresponding to the maximum display value set in step 3.
The value set here set the value whose 0.200 0 mV/V (“02000” on the actual setting value) is bigger than the value set in step 4.
The display in the load display section displays “−RS−” and “END” alternately.

Warning ： When the inspection data sheet of the load cell indicates only the digit of “X.XXXX”, put “0” for the extra digit.
The numeric value of an extra digit, etc., is automatically rewritten as the compensated value after executing the tare weight compensation or fine adjustment of the load.

Don’t attach the decimal point to the setting value in the command data.

The setting value in the command data is put from the right, and an unnecessary space is given as space.
</td><td>
Command　Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>5</td><td></td><td></td><td></td><td>0</td><td>3</td><td>0</td><td>0</td><td>0</td><td>Termi-nator</td></tr>
<tr><td></td><td colspan="2">ID No.</td><td colspan="5"></td><td colspan="5">Output value of load cell</td><td></td></tr>
</table>
Return　CSD−891B→Host
・Normal termination
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>5</td><td></td><td></td><td></td><td>0</td><td>3</td><td>0</td><td>0</td><td>0</td><td>Termi-nator</td></tr>
<tr><td></td><td colspan="2">ID No.</td><td colspan="5"></td><td colspan="5">Output value of load cell</td><td></td></tr>
</table>
・Less the 0.200 0 mV/V
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>5</td><td></td><td></td><td></td><td>S</td><td>P</td><td>-</td><td>L</td><td></td><td>Termi-nator</td></tr>
<tr><td></td><td colspan="2">ID No.</td><td colspan="5"></td><td colspan="5">Error code</td><td></td></tr>
</table>
・Higher than 3.100 0 mV/V
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>5</td><td></td><td></td><td></td><td>S</td><td>P</td><td>-</td><td>H</td><td></td><td>Termi-nator</td></tr>
<tr><td></td><td colspan="2">ID No.</td><td colspan="5"></td><td colspan="5">Error code</td><td></td></tr>
</table>
</td></tr>
<tr><td>6</td><td>
Transmit the termination command from the calibration mode from the host.
The calibration data is made effective and the calibration mode is over.
The display in the load display section displays the present load value.
</td><td>
Command　Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>9</td><td>Terminator</td></tr>
<tr><td></td><td colspan="2">ID No.</td><td colspan="3"></td></tr>
</table>
Return　CSD−891B→Host
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>9</td><td></td><td></td><td></td><td></td><td></td><td>E</td><td>N</td><td>D</td><td>Termi-nator</td></tr>
<tr><td></td><td colspan="2">ID No.</td><td colspan="11"></td></tr>
</table>
</td></tr>
</table>

5−3−3. Calibration method by communication to register by reading output value of strain gage applied transducer in the conditions of zero/actual load application individually.

⚠Warning

- Before using a new instrument or exchanging the strain gage applied transducer for a new one, be sure to make calibration.
  If calibration shall not be made, correct measured results may not be obtained nor it may cause malfunction in the instrument and there may exist damage to the peripheral equipment.
  Besides, even though the calibration has been made, there may occur the similar case when the result is not correct, so make calibration again.
- During the calibration is executing, be sure to make available for the calibration set (Setting "00000" on F−97). Tare weight cancellation clear, and to make cancellation (Setting of F−98) for compensated data on zero set and set the OFF position of Zero tracking(Setting " 00000" on F−08 and F−09). If neglected, it returns the error command (Error command No.01) to the host.
- The error command (Error command No.02) similarly returns to the host when the command not suitable for the procedure is transmitted during the calibration.
- Please match function No.F−50 to F−59 as to the communication to host's specification and change (Refer to the paragraph 8, 9−3 and 9−4). If neglected, the communication may not be executed correctly.

- This calibration method is possible when the optional RS−232C interface or the RS−422/485 interface is mounted.
- When RS−232C interface is used, the ID No. becomes “00”.
- During the calibration, to interrupt the calibration “Calibration mode interruption command” is transmitted, or press the CHECK FUNC. key.
  The calibration data is kept as before entering the calibration and returns to the measurement mode.

Command Host→CSD−891B

	2		4		6
@	0	0	0	0	Terminator

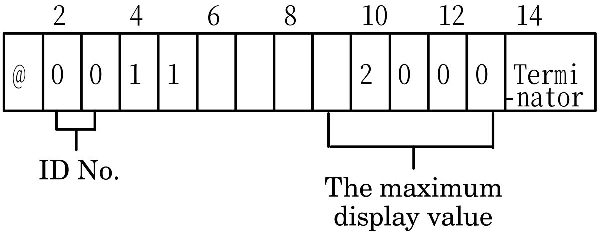
ID number

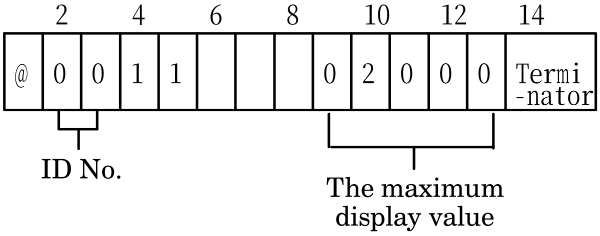
Return CSD−891B→Host

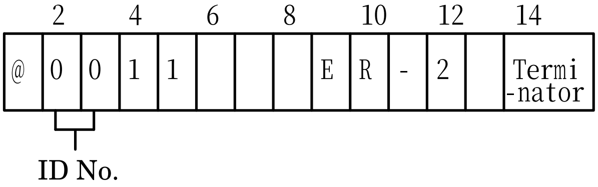
	2		4		6		8		10		12		14
@	0	0	0	0									Terminator

ID number

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>1</td><td>Transmit the start command of the calibration mode from the host.
The display in the load display section displays “−RS−” and “SCAL” alternately.</td><td>Command Host→CSD−891B
<table>
<tr><th></th><th>2</th><th></th><th>4</th><th></th><th>6</th></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>3</td><td>Terminator</td></tr>
</table>
ID No.
Return CSD−891B→Host
<table>
<tr><th></th><th>2</th><th></th><th>4</th><th></th><th>6</th><th></th><th>8</th><th></th><th>10</th><th></th><th>12</th><th></th><th>14</th></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>3</td><td></td><td></td><td></td><td></td><td>L</td><td>C</td><td>A</td><td>L</td><td>Termi-nator</td></tr>
</table>
ID No.</td></tr>
<tr><td>2</td><td>Transmit the change command of the minimum digits from the host, and set the minimum digits.
The setting value of the minimum digits are 4 kinds as follows;
1, 2, 5, 10
The display in the load display section displays “−RS−” and “DISP” alternately.
Don’t attach the decimal point to the setting value in the command data.
The setting value in the command data is put from the right, and an unnecessary space is given as space.</td><td>Command Host→CSD−891B
<table>
<tr><th></th><th>2</th><th></th><th>4</th><th></th><th>6</th><th></th><th>8</th><th></th><th>10</th><th></th><th>12</th><th></th><th>14</th></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>Termi-nator</td></tr>
</table>
ID No.
The minimum digits
Return CSD−891B→Host
<table>
<tr><th></th><th>2</th><th></th><th>4</th><th></th><th>6</th><th></th><th>8</th><th></th><th>10</th><th></th><th>12</th><th></th><th>14</th></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>Termi-nator</td></tr>
</table>
ID No.
The minimum digits</td></tr>
</table>

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>3</td><td>
Transmit the change command of the maximum display value from the host, and set the maximum display value.
The range of the maximum display value is (the minimum digits×100)～99 999.
To make the performance effectively, set the value in the range as follows. If you set the value exceeding the following ranges, there may cause the unstable displays, etc.,
<table>
<tr><th>The setting range of the maximum display value</th><th>The minimum digits</th></tr>
<tr><td>100～10 000</td><td>1</td></tr>
<tr><td>200～20 000</td><td>2</td></tr>
<tr><td>500～50 000</td><td>5</td></tr>
<tr><td>1 000～99 990</td><td>10</td></tr>
</table>
The display in the load display section displays “−RS−” and “LOAD” alternately.
Don’t attach the decimal point to the setting value in the command data.
The setting value in the command data is put from the right, and an unnecessary space is given as space.
</td><td>
Command　Host→CSD−891B


Return　CSD−891B→Host
・Normal termination


・Set in error


</td></tr>
</table>

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>4</td><td>Transmit the change command data of the actual load from the host, and set the load value on load cell. Set the load value on load cell less than the maximum display value set in step 3, and the maximum value which can load in the range of (The minimum digits×100) ～ 99 999.
The display in the load display section displays “−RS−” and “ZERO” alternately.
Don’t attach the decimal point to the setting value in the command data.
The setting value in the command data is put from the right, and an unnecessary space is given as space.</td><td>Command　Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td>2</td><td>0</td><td>0</td><td>0</td><td>Termi-nator</td></tr>
</table>
ID No.　Actual load value
Return　CSD−891B→Host
・Normal termination
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td>2</td><td>0</td><td>0</td><td>0</td><td>Termi-nator</td></tr>
</table>
ID No.　Actual load value
・Set in error
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>2</td><td></td><td></td><td></td><td>E</td><td>R</td><td>-</td><td>2</td><td></td><td>Termi-nator</td></tr>
</table>
ID No.</td></tr>
<tr><td>5</td><td>Set in the initial load condition.
Transmit the start command of the calibration at zero point of “Calibration method to register by reading output value of strain gage applied transducer in the conditions of zero/actual load application individually.”.
The instrument transmit the return signal, and the zero adjustment is started.
The display in the load display section displays “−RS−” and “ZERO” alternately.
Warning ： Take care not to apply load variations due to vibrations and so on.
If load variation is applied, the zero point will not stabilized, in due course there is a possibility that correct reading of zero won’t be obtained.</td><td>Command　Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>3</td><td>Terminator</td></tr>
</table>
ID No.
Return　CSD−891B→Host
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>3</td><td></td><td></td><td></td><td></td><td>Z</td><td>E</td><td>R</td><td>0</td><td>Termi-nator</td></tr>
</table></td></tr>
</table>

Procedures

6

Transmit the command of “Status reading out in the calibration” from the host.
According to the return data, proceed to the following steps.

- When the return data is “END”
  As termination is in normal, you can proceed to the next step.
- When the return data is “TE−L”
  The initial load is less than −2.5 mV/V.
  After setting the initial load within the range from −2.5 mV/V to 2.5 mV/V, proceed to the step 5.
- When the return data is “TE−H”
  The initial load is exceeding over 2.5 mV/V.
  After setting the initial load within the range from −2.5 mV/V to 2.5 mV/V, proceed to the step 5.
- When the return data is “ZERO”
  Now under the calibration.
  Until the return data becomes except “ZERO”, repeat to transmit the command of “Status reading out in the calibration” from the host.

The display in the load display section displays “−RS−” and “SPAN” alternately.

Command Host→CSD-891B

	2		4		6
@	0	0	0	9	Terminator

ID No.

Command CSD−891B→Host

- Normal termination

	2		4		6		8		10		12		14
@	0	0	0	9						E	N	D	Termi-nator

ID No.

- Low input

	2		4		6		8		10		12		14
@	0	0	0	9				T	E	-	L		Termi-nator

ID No.

- High input

	2		4		6		8		10		12		14
@	0	0	0	9				T	E	-	H		Termi-nator

ID No.

- Under the calibration

	2		4		6		8		10		12		14
@	0	0	0	9					Z	E	R	O	Termi-nator

ID No.

7

Give the same value on the load cell set in step 4. Transmit the start command of the calibration of span for “Calibration method to register by reading output value of strain gage applied transducer in the conditions of zero/actual load application individually.” from the host. The return data is transmitted from this instrument, and the span adjustment is started. The display in the load display section displays “−RS−” and “END” alternately.

> ⚠ Warning : Take care not to apply load variations due to vibrations and so on.
> If load variation is applied, the zero point will not stabilized, in due course there is a possibility that correct reading of zero won’t be obtained.

Command Host→CSD−891B

	2		4		6
@	0	0	1	6	Terminator

ID No.

Return CSD−891B→Host

- Normal termination

	2		4		6		8		10		12		14
@	0	0	1	6						S	P	A	N	Termi-nator

ID No.

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>8</td><td>Transmit the command for “Status reading out in the calibration” from the host.
According to the return data, proceed to the following steps.
・When the return data is “END”
As termination is in normal, you can proceed to the next step.
・When the return data is “SP−L”
The load is less than 0.2 mV/V.
After setting the load within the range from 0.2 mV/V to 3.1 mV/V, proceed to the step 7.
・When the return data is “SP−H”
The load is exceeding over 3.1 mV/V.
After setting the load within the range from 0.2 mV/V to 3.1 mV/V, proceed to the step 7.
・When the return data is “ZERO”
Now under the calibration.
Until the return data becomes except “ZERO”, repeat to transmit the command of “Status reading out in the calibration” from the host.
The display in the load display section displays “−RS−” and “SPAN” alternately.</td><td>Command Host→CSD−891B
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td>Terminator</td></tr></table>
ID No.
Command CSD−891B→Host
・Normal termination
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td></td><td></td><td>E</td><td>N</td><td>D</td><td>Termi-nator</td></tr></table>
ID No.
・Low input
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td>S</td><td>P</td><td>-</td><td>L</td><td></td><td>Termi-nator</td></tr></table>
ID No.
・High input
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td>S</td><td>P</td><td>-</td><td>H</td><td></td><td>Termi-nator</td></tr></table>
ID No.
・Under the calibration
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td></td><td>S</td><td>P</td><td>A</td><td>N</td><td>Termi-nator</td></tr></table>
ID No.</td></tr>
<tr><td>9</td><td>Transmit the termination command of the calibration mode from the host.
The calibration data is made effective and the calibration mode is over.
The display in the load display section displays the present load value.</td><td>Command Host→CSD−891B
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr><tr><td>@</td><td>0</td><td>0</td><td>1</td><td>9</td><td>Terminator</td></tr></table>
ID No.
Return CSD−891B→Host
・Normal termination
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr><tr><td>@</td><td>0</td><td>0</td><td>1</td><td>9</td><td></td><td></td><td></td><td></td><td></td><td>E</td><td>N</td><td>D</td><td>Termi-nator</td></tr></table>
ID No.</td></tr>
</table>

5−3−4. Zero fine adjustment by communication

Warning

- During the calibration is executing, be sure to make available for the calibration set (Setting “00000” on F−97). Tare weight cancellation clear, and to make cancellation (Setting of F−98) for compensated data on zero set and set the OFF position of Zero tracking(Setting “ 00000” on F−08 and F−09). If neglected, it returns the error command (Error command No.01) to the host.
- The error command (Error command No.02) similarly returns to the host when the command not suitable for the procedure is transmitted during the calibration.
- Please match function No.F−50 to F−59 as to the communication to host’s specification and change (Refer to the paragraph 8, 9−3 and 9−4). If neglected, the communication may not be executed correctly.

- This calibration method is possible when the optional RS−232C interface or the RS−422/485 interface is mounted.
- When RS−232C interface is used, the ID No. becomes “00”.
- During the calibration, to interrupt the calibration “Calibration mode interruption command” is transmitted, or press the CHECK FUNC. key.
  The calibration data is kept as before entering the calibration and returns to the measurement mode.

Command Host→CSD−891B

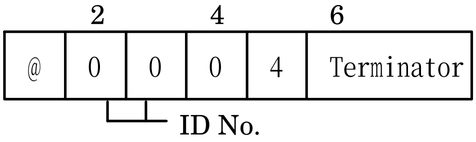
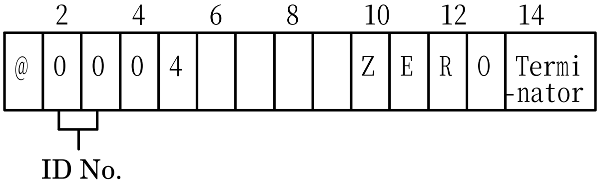
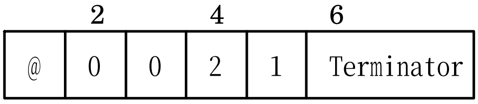
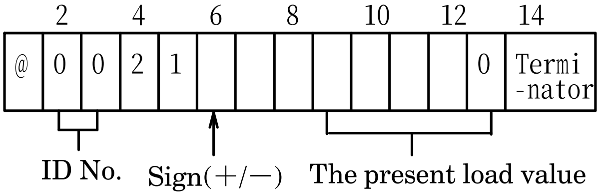
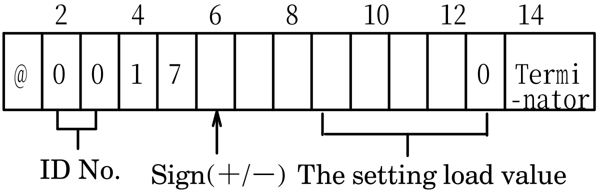
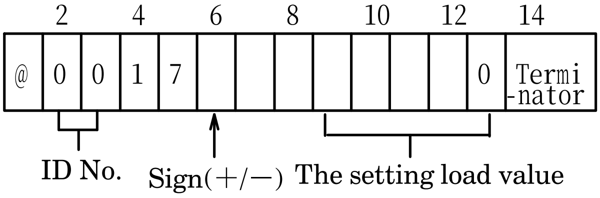
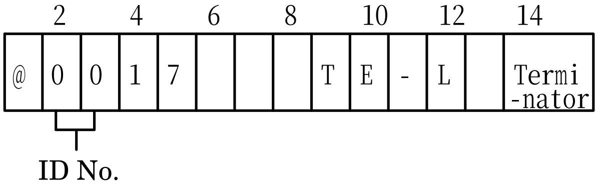
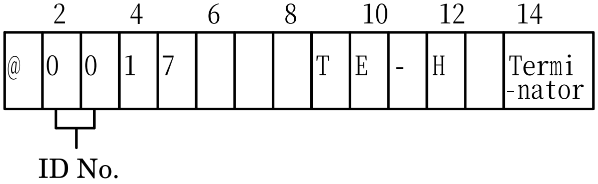
	2		4		6
@	0	0	0	0	Terminator

ID number

Return CSD−891B→Host

	2		4		6		8		10		12		14
@	0	0	0	0									Terminator

ID number

	Procedures	
1	Transmit the start command of the calibration mode from the host. Here, set the initial load condition. The display in the load display section displays “−RS−” and “the present load value” alternately.	Command Host→CSD−891B  Return CSD−891B→Host 
2	Transmit the reading out command of the present load data from the host. As for the load value read by the load data reading out command, the decimal point adheres to the decimal point position in F01 when you set to add the decimal point in F−56.	Command Host→CSD−891B  Return CSD−891B→Host 
3	Transmit the display value to be displayed at present by the command of zero fine adjustment. According to the return data, proceed to the following steps. ・When the Return result is the same as Command As the termination is in normal, proceed to the next step. ・When the return data is “TE−L” The zero fine adjustment range is less than −2.5 mV/V. Set the zero fine adjustment range from −2.5 mV/V to 2.5 mV/V. ・When the return data is “TE−H” The zero fine adjustment range exceeds over 2.5 mV/V. Set the zero fine adjustment range from −2.5 mV/V to 2.5 mV/V.	Command Host→CSD−891B  Return CSD−891B→Host ・Normal termination  ・When the range of zero fine adjustment is less than −2.5 mV/V  ・When the range of zero fine adjustment exceeds over 2.5 mV/V. 

<table>
<tr><th></th><th>Procedure</th><th></th></tr>
<tr><td>4</td><td>Transmit the termination command of the calibration mode from the host.
The calibration data is made effective and the calibration mode is over.
The display in the load display section displays the present load value.</td><td>Command Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>9</td><td>Terminator</td></tr>
<tr><td></td><td colspan="2">ID No.</td><td></td><td></td><td></td></tr>
</table>
Return CSD−891B→Host
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>9</td><td></td><td></td><td></td><td></td><td></td><td>E</td><td>N</td><td>D</td><td>Termi
-nator</td></tr>
<tr><td></td><td colspan="2">ID No.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
</table>

5−3−5. Span fine adjustment by the communication

⚠ Warning

- During the calibration is executing, be sure to make available for the calibration set (Setting “00000” on F−97). Tare weight cancellation clear, and to make cancellation (Setting of F−98) for compensated data on zero set and set the OFF position of Zero tracking(Setting “ 00000” on F−08 and F−09). If neglected, it returns the error command (Error command No.01) to the host.
- The error command (Error command No.02) similarly returns to the host when the command not suitable for the procedure is transmitted during the calibration.
- Please match function No.F−50 to F−59 as to the communication to host’s specification and change (Refer to the paragraph 8, 9−3 and 9−4). If neglected, the communication may not be executed correctly.

- This calibration method is possible when the optional RS−232C interface or the RS−422/485 interface is mounted.
- When RS−232C interface is used, the ID No. becomes “00”.
- During the calibration, to interrupt the calibration “Calibration mode interruption command” is transmitted, or press the CHECK FUNC. key.
  The calibration data is kept as before entering the calibration and returns to the measurement mode.

Command Host→CSD−891B

	2		4		6
@	0	0	0	0	Terminator

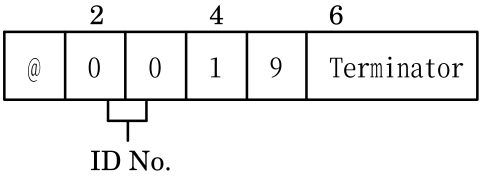
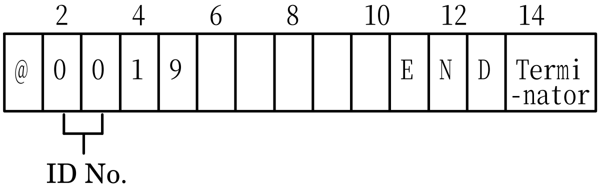
ID number

Return CSD−891B→Host

	2		4		6		8		10		12		14
@	0	0	0	0									Terminator

ID number

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>1</td><td>Transmit the calibration start command from the host.
Here, set the maximum load that can be applied within the maximum value on the load cell.
The display in the load display section displays "−RS−" and "The present load value" alternately.</td><td>Command Host→CSD−891B
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>5</td><td>Terminator</td></tr></table>
ID No.
Return CSD−891B→Host
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>5</td><td></td><td></td><td></td><td></td><td>S</td><td>P</td><td>A</td><td>N</td><td>Termi-nator</td></tr></table>
ID No.</td></tr>
<tr><td>2</td><td>Transmit the present load data reading out command from the host.
As for the load value read by the load data reading out command, the decimal point adheres to the decimal point position in F01 when you set to add the decimal point in F−56.</td><td>Command Host→CSD−891B
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr><tr><td>@</td><td>0</td><td>0</td><td>2</td><td>1</td><td>Terminator</td></tr></table>
ID No.
Return CSD−891B→Host
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr><tr><td>@</td><td>0</td><td>0</td><td>2</td><td>1</td><td>+</td><td></td><td></td><td></td><td>2</td><td>0</td><td>0</td><td>0</td><td>Termi-nator</td></tr></table>
ID No. Sign(+/−) Present load value</td></tr>
<tr><td>3</td><td>Transmit the display value to want to display now by span fine adjustment command.
According to the return data, proceed to the following steps.
・When the return data is as same as command.
As the termination is in normal, proceed to the next step.
・When the return data is "SP−L"
The span fine adjustment range is less than 0.2 mV/V. Set the span fine adjustment range from 0.2 mV/V to 3.1 mV/V.
・When the return data is "SP−H"
The span fine adjustment range exceeds over 3.1 mV/V. Set the span fine adjustment range from 0.2 mV/V to 3.1 mV/V.</td><td>Command Host→CSD−891B
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr><tr><td>@</td><td>0</td><td>0</td><td>1</td><td>8</td><td></td><td></td><td></td><td></td><td>2</td><td>0</td><td>0</td><td>0</td><td>Termi-nator</td></tr></table>
ID No. Sign(+/−) Setting load value
Return CSD−891B→Host
・Normal termination
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr><tr><td>@</td><td>0</td><td>0</td><td>1</td><td>8</td><td></td><td></td><td></td><td></td><td>2</td><td>0</td><td>0</td><td>0</td><td>Termi-nator</td></tr></table>
ID No. Sign(+/−) Setting load value
・When the span fine adjustment range is less than 0.2 mV/V
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr><tr><td>@</td><td>0</td><td>0</td><td>1</td><td>8</td><td></td><td></td><td></td><td>S</td><td>P</td><td>-</td><td>L</td><td></td><td>Termi-nator</td></tr></table>
ID No.
・When the span fine adjustment range exceeds over 3.1 mV/V
<table><tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr><tr><td>@</td><td>0</td><td>0</td><td>1</td><td>8</td><td></td><td></td><td></td><td>S</td><td>P</td><td>-</td><td>H</td><td></td><td>Termi-nator</td></tr></table>
ID No.</td></tr>
</table>

	Procedures	
4	Transmit the termination command of the calibration mode from the host. The calibration data is made effective and the calibration mode is over. The display in the load display section displays the present load value.	Command Host→CSD−891B  Return CSD−891B→Host 

5−3−6. Calibration procedure by the communication to apply registration again for zero point only

⚠Warning

- During the calibration is executing, be sure to make available for the calibration set (Setting “00000” on F−97). Tare weight cancellation clear, and to make cancellation (Setting of F−98) for compensated data on zero set and set the OFF position of Zero tracking(Setting “ 00000” on F−08 and F−09). If neglected, it returns the error command (Error command No.01) to the host.
- The error command (Error command No.02) similarly returns to the host when the command not suitable for the procedure is transmitted during the calibration.
- Please match function No.F−50 to F−59 as to the communication to host’s specification and change (Refer to the paragraph 8, 9−3 and 9−4). If neglected, the communication may not be executed correctly.

- This calibration method is possible when the optional RS−232C interface or the RS−422/485 interface is mounted.
- When RS−232C interface is used, the ID No. becomes “00”.
- During the calibration, to interrupt the calibration “Calibration mode interruption command” is transmitted, or press the CHECK FUNC. key.
  The calibration data is kept as before entering the calibration and returns to the measurement mode.

Command Host→CSD−891B

	2		4		6
@	0	0	0	0	Terminator

ID number

Return CSD−891B→Host

	2		4		6		8		10		12		14
@	0	0	0	0									Terminator

ID number

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>1</td><td>Transmit the calibration mode starting command from the host.
The display in the load display section displays “−RS−” and “ZERO”</td><td>Command Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>6</td><td>Terminator</td></tr>
</table>
ID No.
Return CSD−891B→Host
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>0</td><td>6</td><td></td><td></td><td></td><td></td><td>T</td><td>A</td><td>R</td><td>E</td><td>Termi-nator</td></tr>
</table>
ID No.</td></tr>
<tr><td>2</td><td>Here, set the initial load condition.
Transmit the start command of “Calibration procedure to apply registration again for zero point only” from the host. Transmit the return data from this instrument, and tare weight cancellation is started.
The display in the load display section displays “−RS−” and “ZERO”

As for the load value read by the load data reading out command, the decimal point adheres to the decimal point position in F01 when you set to add the decimal point in F−56.</td><td>Command Host→CSD−891B
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>3</td><td>Terminator</td></tr>
</table>
ID No.
Return CSD−891B→Host
<table>
<tr><td></td><td>2</td><td></td><td>4</td><td></td><td>6</td><td></td><td>8</td><td></td><td>10</td><td></td><td>12</td><td></td><td>14</td></tr>
<tr><td>@</td><td>0</td><td>0</td><td>1</td><td>3</td><td></td><td></td><td></td><td></td><td>Z</td><td>E</td><td>R</td><td>O</td><td>Termi-nator</td></tr>
</table></td></tr>
</table>

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>3</td><td>Transmit the command of “Reading out in the calibration” from the host.
According to the return data, proceed to the following step.
・When the return data is “END“
As the termination is in normal, proceed to the next step.
・When the return data is “TE−L”
The initial load is less than −2.5 mV/V.
After setting the initial load from −2.5 mV/V to 2.5 mV/V, proceed to the step 2.
・When the return data is “TE−H”
The initial load exceeds over 2.5 mV/V.
After setting the initial load from −2.5 mV/V to 2.5 mV/V, proceed to the next step.
・When the return data is “ZERO”
Until the return data becomes except “ZERO”, repeat to transmit the command of “Status reading out in the calibration” from the host.
The display in the load display section displays “−RS−” and “SPAN” alternately.</td><td>Command Host→CSD−891B
2 4 6
<table><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td>Terminator</td></tr></table>
ID No.
Command CSD−891B→Host
・Normal termination
2 4 6 8 10 12 14
<table><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td></td><td></td><td>E</td><td>N</td><td>D</td><td>Termi
-nator</td></tr></table>
ID No.
・When the input is low
2 4 6 8 10 12 14
<table><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td>T</td><td>E</td><td>-</td><td>L</td><td></td><td>Termi
-nator</td></tr></table>
ID No.
・When the input is high
2 4 6 8 10 12 14
<table><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td>T</td><td>E</td><td>-</td><td>H</td><td></td><td>Termi
-nator</td></tr></table>
ID No.
・Under the calibration
2 4 6 8 10 12 14
<table><tr><td>@</td><td>0</td><td>0</td><td>0</td><td>9</td><td></td><td></td><td></td><td></td><td>Z</td><td>E</td><td>R</td><td>O</td><td>Termi
-nator</td></tr></table>
ID No.</td></tr>
<tr><td>4</td><td>Transmit the termination command of the calibration mode from the host.
The calibration data is made effective and the calibration mode is over.
The display in the load display section displays the present load value.</td><td>Command Host→CSD−891B
2 4 6
<table><tr><td>@</td><td>0</td><td>0</td><td>1</td><td>9</td><td>Terminator</td></tr></table>
ID No.
Return CSD−891B→Host
・Normal termination
2 4 6 8 10 12 14
<table><tr><td>@</td><td>0</td><td>0</td><td>1</td><td>9</td><td></td><td></td><td></td><td></td><td></td><td>E</td><td>N</td><td>D</td><td>Termi
-nator</td></tr></table>
ID No.</td></tr>
</table>

5−4. Selection of calibration methods on each condition

The instrument prepares calibration methods shown in the paragraph in 5−2. Calibration procedures, we'll explain some conditions to execute actual calibration here.

(1) When executing calibration on the new instrument.
(In case that Combined Inspection at Minebea has not executed.)

- When load condition and output condition of load cell are clarified.
  (Required accuracy is less than 1/1 000 or so.)
  →Proceed to the paragraph 5−4−1(1)
- When load condition and output condition of load cell are clarified.
  (Required accuracy is more than 1/1 000 or so.)
  →Proceed to the paragraph 5−4−1(2)
- When load condition is clarified, but output condition of load cell is unclear.
  →Proceed to the paragraph 5−4−1(3)
- When exchanging with existing CSD−815 is required.
  →Proceed to the paragraph 5−4−1(4)

(2) When making calibration again.

- When calibration only for tare weight is required.
  (In case that the combined Inspection at Minebea has already executed, and the calibration only for tare weight is required.)
- When fine adjustment on zero and span is required.

5−4−1. In case of executing the calibration on the instrument newly.

When the new instrument is purchased or reuse is desired with the new specific conditions, execute the calibration with whichever procedure as follows :

(1) When the load condition and the output condition of load cell are clarified.
(In case of desired accuracy is less than 1/1000 or so.)

⚠Warning

- The calibration accuracy obtained in this procedure is less than 1/1 000 or so. When precise accuracy more than 1/1 000 is necessary, make calibration with actual load according to the paragraph 5−4−1 (2).
  Besides, the accuracy described here is a combined accuracy of the instrument and the strain gage applied transducer connected.
  If there may exist another factors of error such as mechanical elements and so on, it will become out of warranty, so care should be taken fully.
- The rated output value for load cell applicable by the calculation should be assumed as the value described on the "Inspection data" individually.

For example, we will show the calibration procedures as follows, that is, 3 points of load cells with 3 mV/V of rated output and 5 t of rated capacity.

Tare weight	1.5 t
Weighing capacity	5 t
Maximum display	5 000

① Calculate the output of load cell at maximum display from the above conditions. Check that the calculated value should be within the range from 0.4 mV/V to 3.1 mV/V. If the value is out of the range, calibration can’t be executed.
(Output of load cell at maximum display)

$$= \frac{(\text{Rated output})+(\text{Rated output})+(\text{Rated output})}{\text{Number of load cells}} \times \frac{\text{Weighing capacity}}{(\text{No. of load cells})\times(\text{Rated load})}$$

$$= \frac{3\ \text{mV/V}+3\ \text{mV/V}+3\ \text{mV/V}}{3\ \text{points}} \times \frac{5\ \text{t}}{3\ \text{points}\times 5\ \text{t}}$$

$$= 1\ \text{mV/V}$$

② After making the load cell to the initial load condition (tare weight), execute the calibration according to the paragraph 5−2−1. In this case, input “5000” in the step 6, and input “1.0000” in the step 8 individually. (When the calibration by communication is required, execute it according to the paragraph 5−3−1.)

③ If necessity requires, apply zero/span fine adjustment according the paragraph 5−2−4, and 5−2−5. (When the calibration by communication is required, execute it according to the paragraph 5−3−4 and 5−3−5.)

(2) When the both conditions of load and the output of load cell are clarified.
(In case that required accuracy is more than 1/1 000 or so.)

⚠Warning ● The accuracy obtained through the procedures of this calibration consists from combined accuracy with the instrument and combined strain gage applied transducer, the accuracy of weight used during the calibration, error factors on mechanical and also error factors on calibration works, that is, the total accuracy of these. If high accuracy is required, full considerations should be made on each factor. If neglected, there will be a case that desired accuracy may not be obtained, so care should be taken fully.

When high accuracy is required, actual load calibration by using the weight and so on are required.
For example, we’ll show the calibration procedures in the following conditions, that is, 3 points of load cell with 3 mV/V of rated output and 5 t of rated capacity.

Tare weight	1.5 t
Weighing capacity	5 t
Maximum display	5 000

① Calculate the output of load cell at the maximum display from the above conditions.
Check that the calculated value at this point is within the range from 0.4 mV/V to 3.1 mV/V.
If the value is out of the range, calibration cant' be executed.
(Output of load cell at maximum display)

$$= \frac{\text{(Rated output)}+\text{(Rated output)}+\text{(Rated output)}}{\text{Number of load cells}} \times \frac{\text{Weighing capacity}}{\text{(No. of load cells)}\times\text{(Rated load)}}$$

$$= \frac{3\ \text{mV/V}+3\ \text{mV/V}+3\ \text{mV/V}}{3\ \text{points}} \times \frac{5\ \text{t}}{3\ \text{points}\times 5\ \text{t}}$$

$$= 1\ \text{mV/V}$$

② After making the load cell to the initial load condition (tare weight), execute the calibration according to the paragraph 5−2−3. In this case, input "5000" in the step 6, and input the load value applied on the load cell in the step 8 individually. (When the calibration by communication is required, execute it according to the paragraph 5−3−3.)

③ If necessity requires, apply zero/span fine adjustment according the paragraph 5−2−4, and 5−2−5. (When the calibration by communication is required, execute it according to the paragraph 5−3−4 and 5−3−5.)

(3) When the load condition is clarified but the output condition of load cell is not clarified.

In the case of using the existing load detecting section, and adopting the new digital indicator only, it is necessary to execute calibration after checking the output of load cell when its output is not clarified.
For example, followings are calibration procedures when weighing capacity is 5 t and the others are not clarified.

① Set the instrument in the monitor mode according to the paragraph 7−18. In this condition, the output level of load cell connecting with the instrument can be monitored up to approx. 3.100 0 with the unit of mV/V.

② After making the load cell section to the initial load condition (tare weight), record the display value on load display. This value is the output of load cell at the time of initial load condition.

③ Record the display value on load display after applying 5 t load on the load cell section. This value is the output of load cell with weighing capacity applied.

④ From the load cell output at the time of initial load application recorded at ②, and load cell output recorded at ③ at the time of application of weighing capacity, output of load cell at the time of maximum display can be calculated according to the below formula.
Check that the calculated value is within the range from 0.4 mV/V to 3.1 mV/V. The calibration can't be executed if the value is out of the range.
(Load cell output at the time of the maximum display)
=(Load cell output at the weighing application)−(Load cell output at the initial load)

⑤ Quit the monitor mode of the instrument.

⑥ After making the load cell to the initial load condition (Tare weight), execute calibration according to the paragraph 5−2−1. In this case, the accuracy is less than 1/1 000 or so.
At this moment, input each value, "5000" in the step 5 and another input is the value of "Output of load cell at the maximum display" calculated from the ④ in the step 8. If the accuracy more than of 1/1 000 or so is required, execute calibration according to the paragraph 5−2−3. And at the same time, input "5000" in the step 6 and also input "Load value going to apply on load cell" in the step 8 individually. (When the calibration by communication is required, execute it according to the paragraph 5−3−1 and 5−3−3.)

⑦ As necessity requires, make fine adjustment on Zero and Span according to the paragraph 5−2−4 and 5−2−5. (When the calibration by communication is required, execute it according to the paragraph 5−3−4 and 5−3−5.)

(4) When replacing the existing CSD−891B with a new one.

⚠Warning ● The accuracy in this procedure is less than 1/1 000 or so.
If higher accuracy is required, make calibration by using the actual load according to the paragraph 5−4−1(2).
Moreover, the accuracy described here is a combined accuracy with the instrument and strain gage applied transducer connected.
When another error factors may exist, such as constructional error factors or so, it will become out of warranty for accuracy, so care should be taken fully.

When the load at the section of load cell can't make it with initial load application due to failure on the existing CSD−891B, execute calibration by referring to the procedures as below. However, in case that the initial load condition can be obtained, make calibration according to the procedures of (1) and (2).

① According to the paragraph 8−1, read out and write down the function F−90 "Increment value", the F−91 "Maximum display value", the F−93 "Zero calibration value", and the F−94 "Span calibration value" in the existing CSD−891B.

② According to the paragraph 4, replace the exiting CSD−891B with a normal instrument and make connections.

③ After turning ON the normal instrument, make calibration according to the paragraph 5−2−2. In case of this, input the "Increment value" recorded at ① in the step 3, the "Maximum display value" in the step 5 and the "Zero calibration value" in the step 7 and in the same way, input "Span calibration value" in the step 9. (When the calibration by communication is required, execute it according to the paragraph 5−3−2.)

5−4−2. When the calibration is executed again

When purchasing a new instrument and the combined inspection has executed at Minebea, however, the tare weight has changed, or fine adjustment on zero and span are required, make calibration with whichever the following methods.

(1) Calculation on tare weight only

(When combined inspection has completed at Minebea and calibration on only tare weight is required.)

When the initial load (tare weight) has changed after completing the calibration, or when the combined inspection at Minebea has been made and the calibration only for the initial load(tare weight) is required after the installation, proceed the calibration in the following steps.

① After setting the initial load (tare weight) on load cell section, execute calibration according to the paragraph 5−2−6.(When the calibration by communication is required, execute it according to the paragraph 5−3−6.)

(2) In case of executing fine adjustment on zero and span

Make adjustment according to the paragraph 5−2−4(Fine adjustment on zero), and 5−2−5 (Fine adjustment on span). (When the calibration by communication is required, execute it according to the paragraph 5−3−4. (Fine adjustment on zero) and 5−3−5. (Fine adjustment on span).)

⚠Warning ● The accuracy obtained through the calibration procedures consists from combined accuracy with the instrument and strain gage applied transducer, the accuracy of weight used during the calibration, error factors on mechanical and also error factors on calibration works, that is , total accuracy of these.

If high accuracy is required, full considerations should be made on each factor. If neglected, there will be a case that the desired accuracy shall not be obtained.

5−5. Setting the prohibition against calibration

After completing all of the calibration procedures, setting can be made to prohibit any more calibration again by setting the funciton(Related function F−97).

For details, refer to the paragraph 7−16.

6. Operation procedure

We'll show the operating procedures with keys located on the front panel.

⚠Warning	● Each key operation should be made after interrupting the measurement. If it is made during measurement, it may cause an unexpected malfunction.

	● Key operation in Measurement mode can be effective by pressing it for about one second or so.

6−1. [CHECK FUNC.] key

6−1−1. Operations in Measurement mode

(1) When operating in single

The Function mode can be entered, and the "FUNC" is shown on the load display section.
In this condition, setting on the Function or shifting to another modes can be available.

(2) When operation together with the [SHIFT ENTER] key

After pressing the [SHIFT ENTER] key for more than one second, and operating together with the key, CHECK value set in F−11 turns ON, "CHECK" in the condition display lights on, and then add the load value equivalent to the value set in F−11 on the load display value.

Again, after pressing the [SHIFT ENTER] key for more than one second, operation with pressing this key makes to turn OFF the CHECK value and return to the former condition.

6−1−2. When operating in the other mode

After pressing the [CHECK FUNC.] key in the condition of each setting mode, it returns to the measurement mode.

6−2. [S※ ◄] key

6−2−1. When operating in the measurement mode

The condition which can set the comparator set value is entered, and LED in the load display section light on and off. In this condition, the comparative value No. to be changed can be selected.
And if you keep the instrument untouched for approx. 20 seconds, the Measurement mode can be re−entered automatically.

6−2−2. Operation is made in the other mode

(1) Carrying−over of set value

Pressing the S※ ◄ key in the condition of displaying the various kinds of set value, the digit of the setting value flashing on and off is going up from 10^0 to 10^1, 10^2, 10^3 and 10^4 one by one. (However, the range of carrying−over is different according to number of digits of set value and the presence of sign.)

(2) Changeover of the function, etc.

The changeover of the various kinds of function in the function mode and the check mode can be made.

(3) Decrement in the fine adjustment

When the S※ ◄ key is pressed at the time of making fine adjustment on ZERO, SPAN and analog output, the decrement can be made in the target value.

> - In the operation method of the paragraph 6−2−2(3), when the key is pressed for more than about 1 second, each operation will be executed continuously at a constant interval without ON/OFF operation of the key.

6−3. ZERO ▲ key

6−3−1. Operation is made in the measurement mode

When the display value on load display section is within 10 % against the maximum display value, (Refer to the Chapter 5.), the “0” display will be shown compulsively due to the zero set function of this operation . As for details, refer to the paragraph 7−12.

6−3−2. Operation in the other mode

(1) Increment of the set value

By pressing the ZERO ▲ key with the condition of displaying various kinds of set values, the set value will increase per one count from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0 again in order.

(2) Increment in the fine adjustment

When the ZERO ▲ key is pressed at the time of making fine adjustment on ZERO, SPAN and analog output, the increment can be made in the target value.

> - In the operation method of the paragraph 6−3−2(2), when the key is pressed for more than about 1 second, each operation will be executed continuously at a constant interval without ON/OFF operation of the key.

6−4. A/Z key

6−4−1. Operation in the measurement mode

At the same time when the Tare weight cancellation (A/Z) works and the load display value becomes the net weight display value, the “A/Z” on the status display lights up and load display becomes “0”.

6−4−2. Operation in the other mode

(1) Calibration
The setting value is initialized in the each procedures of the calibration methods.

(2) Function mode
The function number and the setting value of the function is made compulsively to “0” in the function mode.

(3) Setting of comparator
The set value is compulsorily made “0” with the set value of the comparator can set.

6−5. A/Z OFF key

6−5−1. Operation in the measurement mode

At the same time when the function of the tare weight cancellation clear(A/Z OFF) works, and the load display value becomes to the display value of the gross weight, “A/Z” in the condition display section lights off.

6−6. SHIFT ENTER key

When SHIFT ENTER key is pressed, the changed set value is registered internally, and it comes off the condition which can be set.

7. Function and operation

7−1. External control input signal and Open collector output signal

The instrument is available to the external control through various kinds of input signals.

7−1−1. External control input signal

It operates by shortening with COM. (Terminal No.15).

Terminal No.	Name	Operation
10	ZERO	When the indicated value on load display is within 10 % against the maximum display value, zero set function activates by the operation and make the display “0” compulsively. (Same key operation in the paragraph 6−3−1.) As for the operational details, refer to the paragraph 7−12.
11	HOLD	While inputting the signal, the target selected with Function F−10 among display, contact output, analog output and options will be frozen. As for the operational details, refer to the paragraph 7−9.
12	A/Z	After the tare weight cancellation (A/Z) function works, “A/Z” in the condition display lights on with the display of the net weight in the load display section, then the load display value becomes “0”. (Same key operation in the paragraph 6−4−1.) As for operation details, refer to the paragraph 7−11.
13	A/Z OFF	Only when the tare weight cancellation (A/Z) function is working, the tare weight cancellation clear(A/Z OFF) works, and “A/Z” in the condition display lights off with the display of the gross weight in the load display section. (Same key operation in the paragraph 6−5−1.) As for operation details, refer to the paragraph 7−11.
14	LOCK	During this signal input, “LOCK” in the condition display light on with the lock(prohibit) of all keys.
15	COM.	The common of the external control input signal(Terminal No.10 to 14) and the open collector output (Terminal No.16 to 22).

● Operation of the input signal is executed after shortening for more than 50 ms approximately. (Level and pulse width of 2, 5, 10 or 20 ms is changeable. (Related function F−72)

● During the input of HOLD signal, when ZERO, A/Z or A/Z OFF signal (or the ZERO ▲ key on the front panel) is input, operation of HOLD on the target selected in the function F−10 is executed at the same time of cancellation of HOLD signal.

● After inputting the HOLD signal in power−OFF condition, turn ON the power, then the “HOLD” lights on the load display section. The load value is shown simultaneous with the cancellation of HOLD signal.

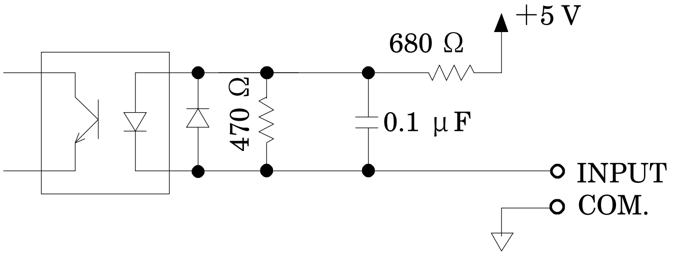
7−1−2. Open collector output signal

Terminal No.	Name	Operation
15	COM.	The common for the external control input signal (Terminal No.10 to 14) and Open collector output(Terminal No.16 to 22).
16	RUN	ON when this instrument is in the measurement mode. OFF when CHECK is OFF.
17	ERROR	ON when the various kinds of error is occurred.
18	S0	Operated with whichever condition as follows by the setting F−33. a) ON when the load display value≧(The maximum display value) b) ON when the open collector output both of S1 and S2 are OFF c) ON when the open collector output both of S1 and S3 are OFF d) ON when the open collector output both of S1 and S4 are OFF e) ON when the open collector output both S2 and S3 are OFF f) ON when the open collector output both S2 and S4 are OFF g) ON when the open collector output both S3 and S4 are OFF h) Operated with whichever "open collector ON at more than the set value" or "open collector ON at less than the set value" i) Interlocked with HOLD LED j) Interlocked with A/Z LED k) Interlocked with LOCK LED l) ON when the detection of stability
19	S1	Open collector output for comparator S1
20	S2	Open collector output for comparator S2
21	S3	Open collector output for comparator S3
22	S4	Open collector output for comparator S4

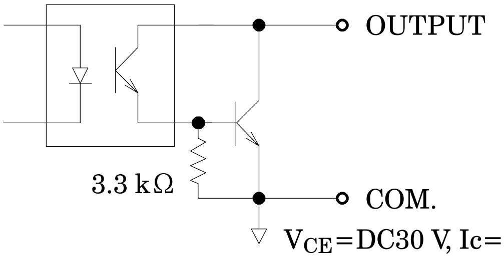
- COM.(Terminal No.15) is the common for the external control input signal (Terminal No.10 to 14) and open collector output(Terminal No. 16 to 22).
- The comparator in the instrument executes comparative operations synchronous with the A/D sampling rate.

7−1−3. Equivalent circuit

(1) External control input section



(2) Open collector output section



V_{CE}=DC30 V, Ic=30 mA MAX.

7−2. Comparator

The instrument prepares comparators that consist of 4 kinds of set values S1, S2, S3 and S4 and comparator S0 that can change the operation by the setting function F−33.

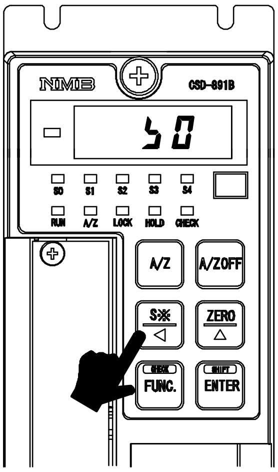
- The comparator of the instrument executes comparative operation synchronous with the A/D sampling rate.
- The change of the comparator set value can be available during the measurement mode.

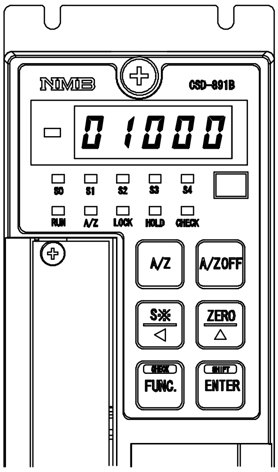
7−2−1. ON/OFF for the Comparator S0, S1, S2, S3 and S4.

Operational selection of ON/OFF can be made for each comparator S0, S1, S2, S3 and S4.
These selection can be made with the function (Related function F−30).
As for default, all of the S0, S1 and S2 are selected ON.

7−2−2. Change of set value

⚠Warning ● When the set value for the comparator is set wrong, or set in the wrong procedures, it may not obtain the correct results from the comparator, and it may cause malfunctions in peripheral equipments and also cause a damage as well.

	Procedures	
1	When the S※/◄ key is pressed in the measurement mode, it shifts to the comparative value selection mode, and the display of the load display section changes to “SO”.	 S※/◄ : Decrement key of load display section. ZERO/▲ : Increment key of load display section. A/Z : Set to “S0” of load display section.
2	Select the number to be changed by S※/◄ key and ZERO/▲ key. To make effective for the SO set value, set the F−33 as “00007 : Comparator operation (Normal operation)”. When the change of set value is required to interrupt, press the CHECK/FUNC. key. It returns to the measurement mode. If you keep the instrument untouched for approx. 20 seconds in the condition of change of setting is available, the Measurement mode can be re−entered automatically.	

	Procedures	
3	When the SHIFT/ENTER key is pressed, the set value corresponding to the selected number is displayed in the load display section, and the minimum display effective digit lights on and off. set the comparator set value of the selected number by the right keys. When the change of set value is required to interrupt, press the CHECK/FUNC. key. It returns to the measurement mode. If you keep the instrument untouched for approx. 20 seconds in the condition of change of setting is available, the Measurement mode can be re−entered automatically. Press the SHIFT/ENTER key after the completed changing. The set value becomes effective, and return to step 1 selection status. When the change of another set value is required, select the number to be change in step 2.	 S※ ◄ : Set value carry on key ZERO ▲ : Set value increment key A/Z : Set value initialization key (Make the set value to 0)
4	Press the CHECK/FUNC. key. it returns to the measurement mode.	

7−2−3. Operation on comparator S1, S2, S3 and S4

The comparator in the instrument, S1, S2, S3 and S4 can select the operation whichever “the open collector output ON at more than the set value”, or “the open collector output ON at less than the set value”. These selections can be made in the Function mode.
(Related function F−32)
As for default, the “the open collector output ON at more than the set value” is selected for both of S1, S2, S3 and S4.

⚠ Warning

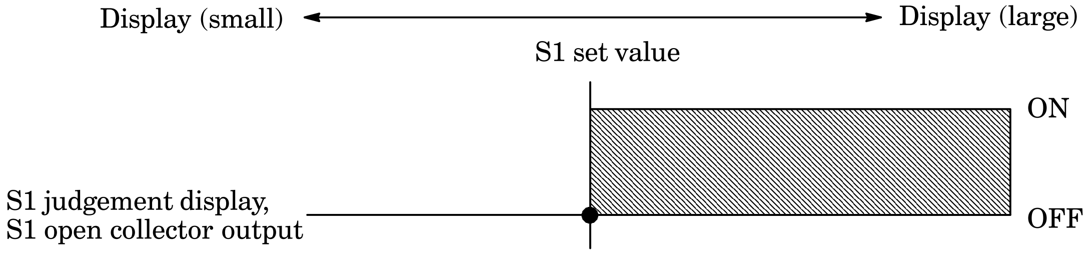
- Depending on the operational selection for comparator, ON/OFF condition for each open collector output may differ. If wrong operation is selected, ON/OFF condition for the open collector output becomes inadequate and it may cause an unexpected accident due to the malfunctions on peripheral instruments, so care should be taken fully.

- When the load display is “OL” or “−OL”, the “display value” for the comparison of comparator is assumed as “+∞(infinity)” and “−∞ (infinity)” individually.

Operation on judgement display section and the open collector output will be shown as follows for the S1 as a sample. The same operation is also made in S2, S3 and S4.

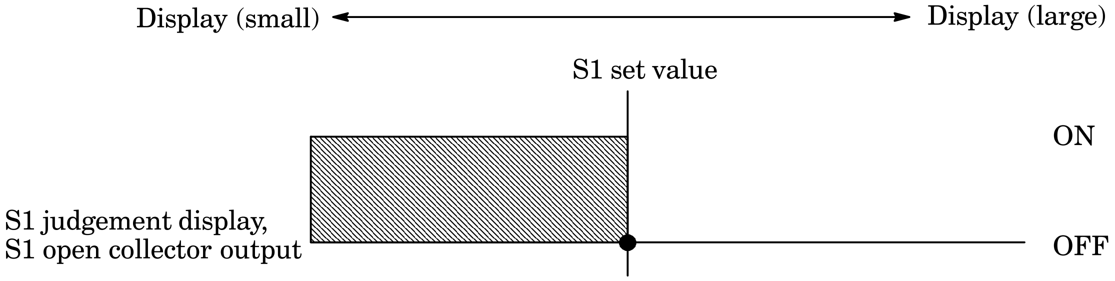
(1) When the operation of “the open collector ON at more than the set value” is selected.

S1 judgement display, S1 open collector output　　ON at (S1 set value)≦(Display value)



(2) When the operation of “the open collector ON at less than the set value” is selected.

S1 judgement display, S1 open collector output　　ON at (S1 set value)≧(Display value)



7−2−4. Comparative target for comparator S1, S2, S3 and S4

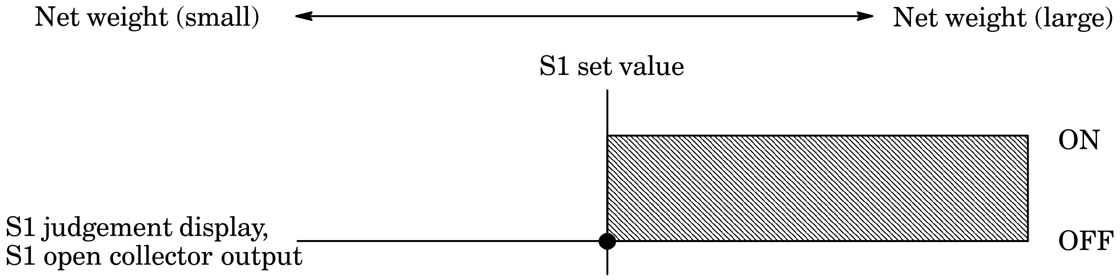
The comparator in the instrument, S1, S2, S3 and S4 individually can select the comparative target from the two, that is, “Gross weight”, “Net weight”. This selection can be made in the Function mode. (Related function FUNC−31).
As for default, the “Gross weight” is selected for both of S1, S2, S3 and S4.

⚠Warning ● Depending on the selection of comparative target for the comparator, ON/OFF condition for each open collector output may differ. If wrong operation is selected, ON/OFF condition for open collector output becomes inadequate and it may cause an unexpected accident due to malfunctions on peripheral instruments, so care should be taken fully.

Operation on judgement display section each comparative target and the operation of the open collector output is shown as follows when the operation of “the open collector ON at more than the set value” is selected by the S1, for an example. The same operation is also made in S2, S3 and S4.

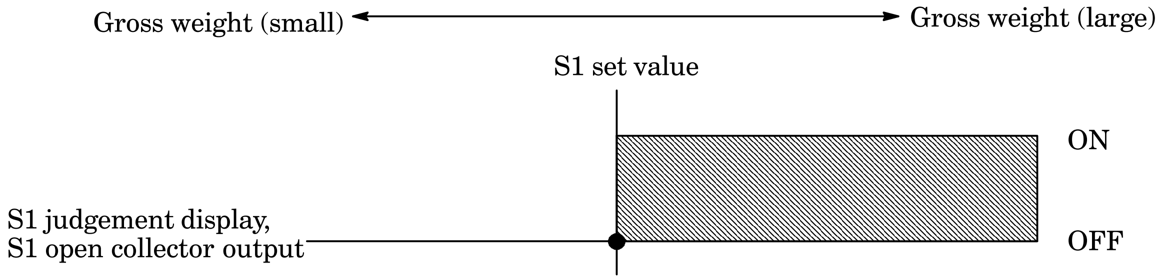
(1) When the operation of “Net weight” is selected.

S1 judgement display, S1 open collector output ON at (S1 set value)≦(Net weight)



(2) When the “Gross weight” is selected.

S1 judgement display, S1 contact output ON at (S1 set value)≦(TRACK/Gross weight)



7−2−5. Operation of comparator S0

The comparator S0 in the instrument can select one among 11 operations from “00000” to “00010”. These selections can be made in the Function mode (Related function F−33)
As for default, the “0000” has selected.

> ⚠Warning ● Depending on the selection of S0 operation, ON/OFF condition for each S0 open collector output may differ. If wrong operation is selected, ON/OFF condition for S0 open collector output becomes inadequate and it may cause an unexpected accident due to malfunctions on peripheral instruments, so care should be taken fully.

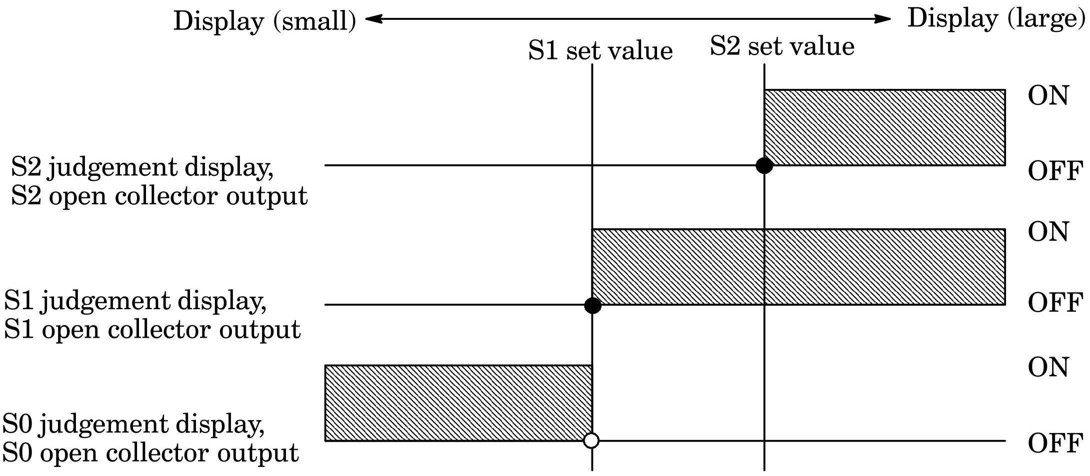
As example, the operation of S0 judgement display and S0 open collector output at the time of whichever is selected from the “00000” to “00010” with the function F−33, are shown in the following table.

Setting of F−33	Operation
00000	ON when (Load display value)≧(The maximum display value)
00001	ON when both of S1 and S2 open collector output are OFF.
00002	ON when both of S1 and S3 open collector output are OFF.
00003	ON when both of S1 and S4 open collector output are OFF.
00004	ON when both of S2 and S3 open collector output are OFF.
00005	ON when both of S2 and S4 open collector output are OFF.
00006	ON when both of S3 and S4 open collector output are OFF.
00007	Operation whichever “open collector ON at more than the set value” or “open collector ON at less than the set value”.
00008	HOLD interlocked with LED
00009	A/Z interlocked with LED
00010	LOCK interlocked with LED
00011	On when the detection of stability (refer to 7−7)

In the next, as for the sample, the operation at S0 judgement display and S0 open collector output selected “00000” with the Function F−33 will be shown as follows. The operation for S0 comparator when the “00002” to “00006” are selected will be the same as the operation of S1, S2, S3 and S4 written in the paragraph 7−2−3, and 7−2−4.

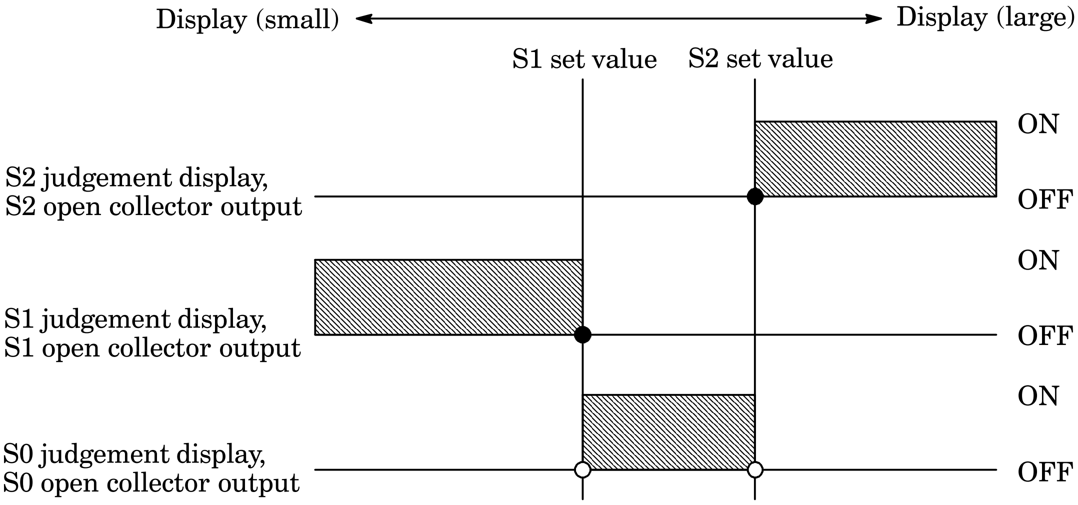
(1) When the both of S1 and S2 select “more than” with the Function F−32.

S1 judgement display, S1 open collector output	ON at (S1 set value)≦(display value)
S2 judgement display, S2 open collector output	ON at (S2 set value)≦(display value)
S0 judgement display, S0 open collector output	ON at (S1 set value)＞(display value) and also (S2 set value)＞(display value) at the same time



(2) When the S1 selects “less than” and the S2 selects “more than” with the Function F−32.

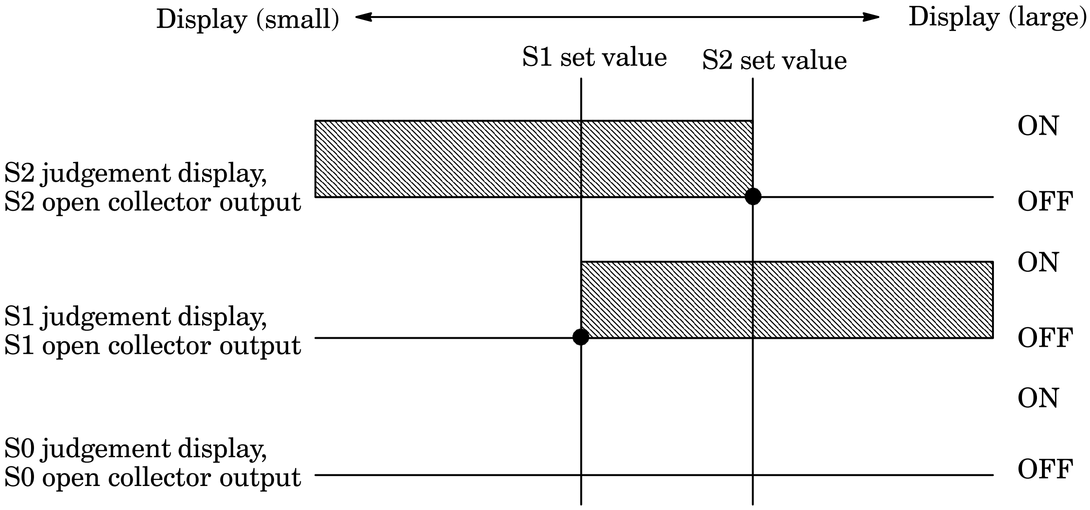
S1 judgement display, S1 open collector output	ON at (S1 set value)≧(display value)
S2 judgement display, S2 open collector output	ON at (S2 set value)≦(display value)
S0 judgement display, S0 open collector output	ON at (S1 set value)＜(display value) ＜(S2 set value)



- Above figure indicates the case of (S1 set value)＜(S2 set value).
  In the case of (S1 set value)≧(S2 set value), the S0 judgement display and the S0 open collector output will be normally OFF.

(3) When the S1 selects "more than", and the S2 selects "less than" at the function F−32.

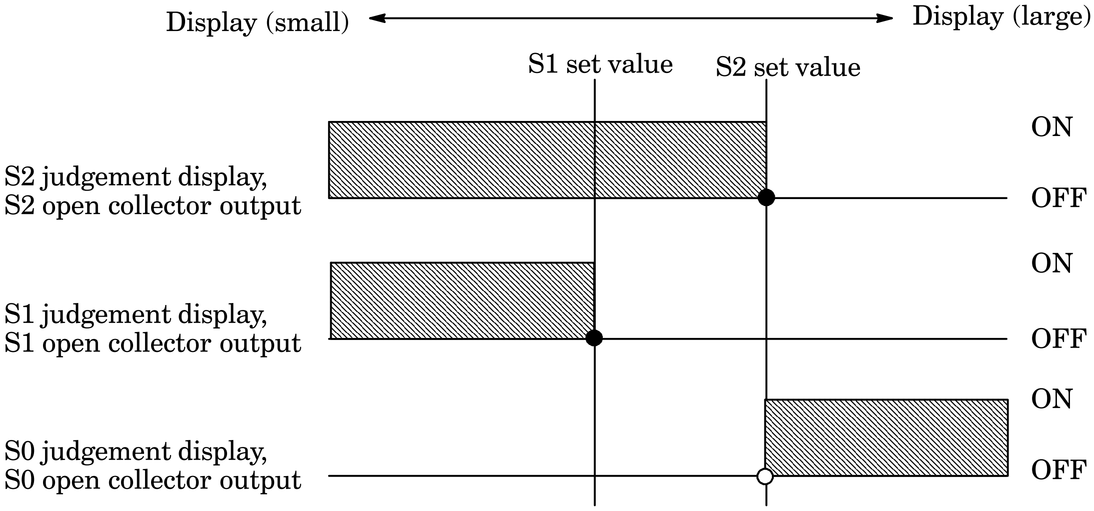
S1 judgement display, S1 open collector output	ON at (S1 set value)≦(display value)
S2 judgement display, S2 open collector output	ON at (S2 set value)≧(display value)
S0 judgement display, S0 open collector output	Normally OFF



● Above figure indicates the case of (S1 set value)＜(S2 set value). In the case of (S1 set value)≧(S2 set value), the S0 judgement display and the S0 open collector output will ON in the condition of (S2 set value)＜(display value)＜(S1 set value)

(4) When both of the S1 and S2 select "less than" at the function F−32

S1 judgement display, S1 open collector output	ON at (S1 set value)≧(display value)
S2 judgement display, S2 open collector output	ON at (S2 set value)≧(display value)
S0 judgement display, S0 open collector output	ON at (S1 set value)＜(display value) and also (S2 set value)＜(display value) at the same time.



7−2−6. Hysteresis on comparator

The comparator S1, S2, S3 and S4 and normal mode for S0 (Function F−33: 00002 setting) can set hysteresis.

Hysteresis can be used by the combined setting of data width and time width. Moreover, effective direction for hysteresis can be selected from either “Off delay” or “On delay”.

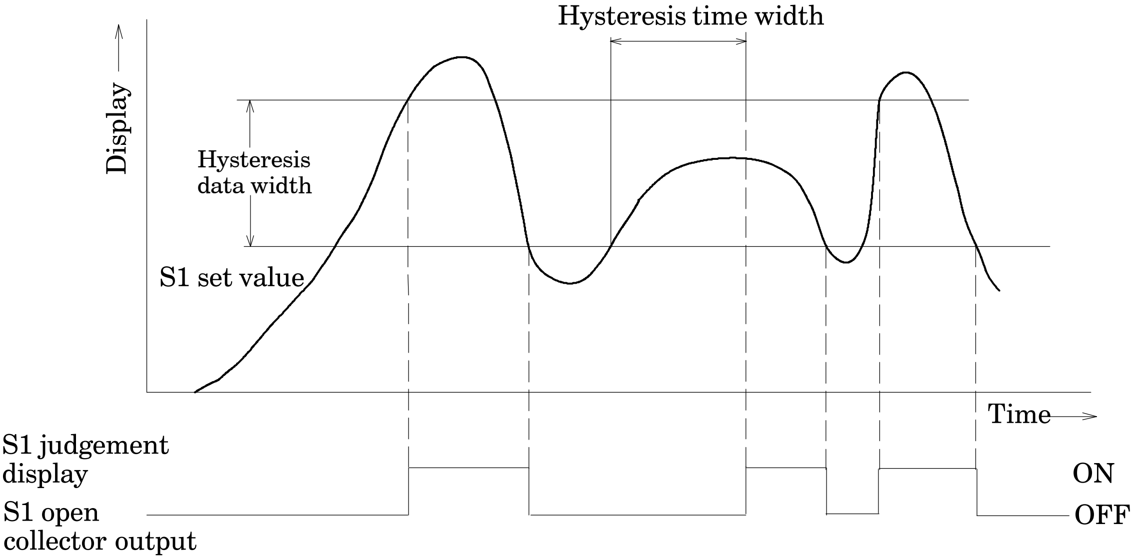
These selections can be made in Function mode. (Related function F−34, F−35, F−36) As for default, hysteresis “OFF” is set.

⚠Warning ● Depending on the setting of comparator hysteresis, ON/OFF condition for each open collector output may differ. If wrong mode is selected, ON/OFF condition for contact output becomes inadequate and it may cause an unexpected accident due to malfunctions on peripheral instruments, so care should be taken fully.

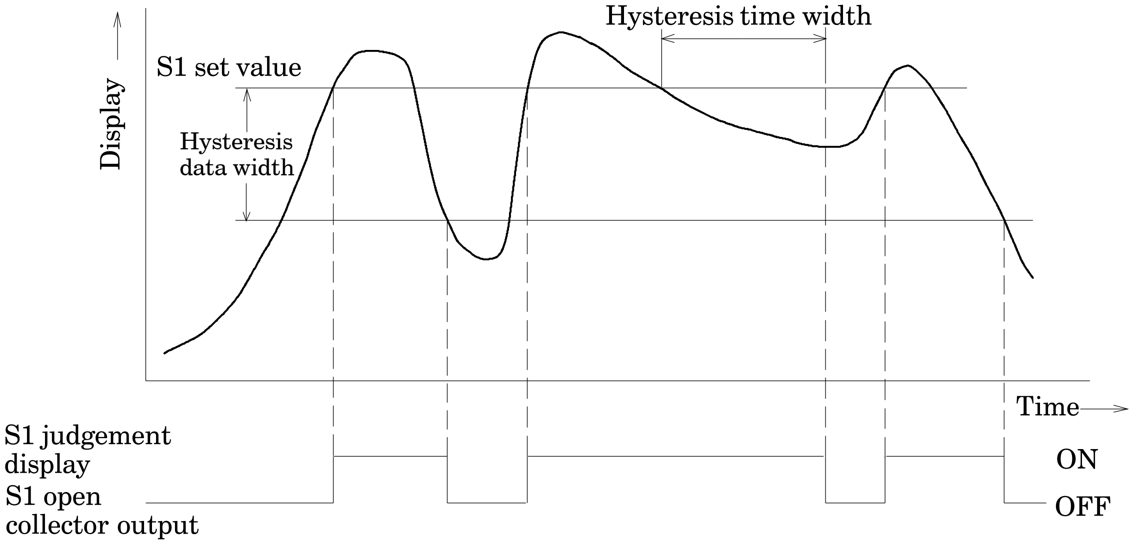
As for the example of S1, the operation of judgement display section and the open collector output when the hysteresis on comparator is set, will be shown as follows :

The same operation will be obtained in the case of “Normal mode” at S2, S3, S4 and S0.

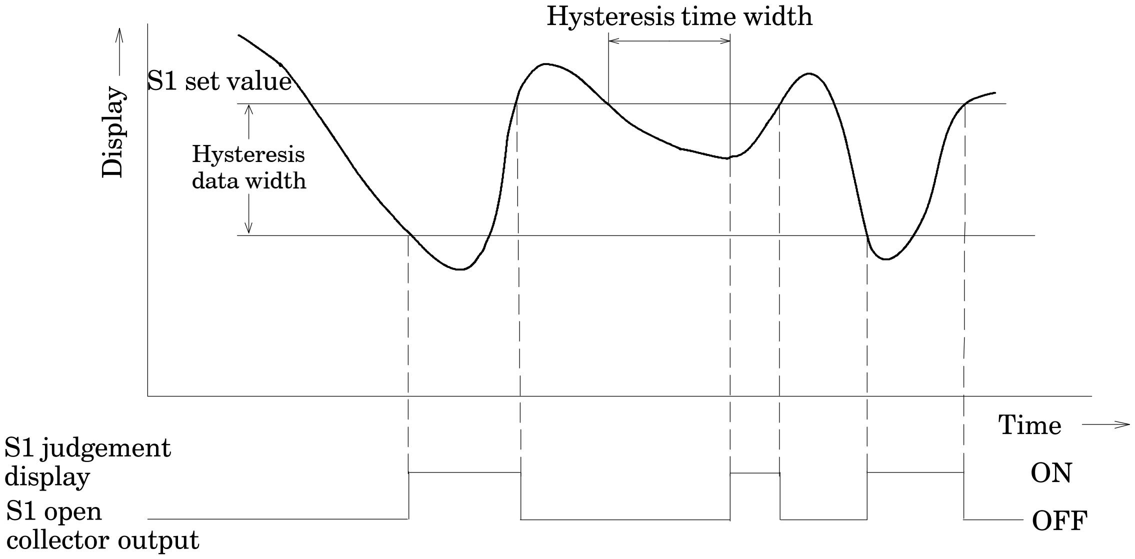
(1) When the operation of “the open collector ON at more than the set value” is selected at S1 and also effective direction for hysteresis is set as “On delay”.



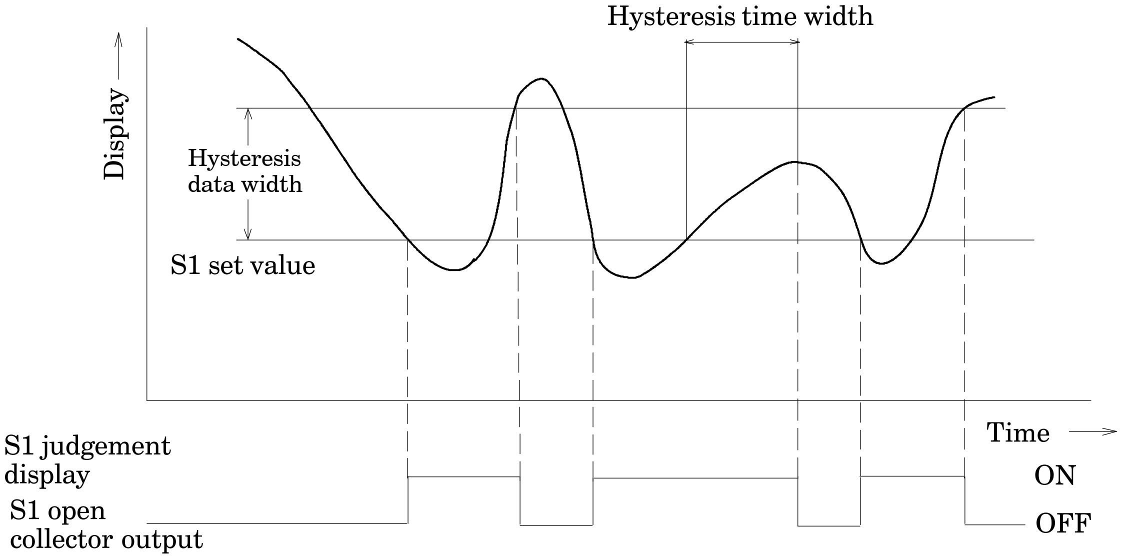
(2) When the operation of “the open collector ON at more than the set value” is selected at S1 and also effective direction for hysteresis is set as “Off delay”.



(3) When the operation of “the open collector ON at less than the set value” is selected at S1 and also effective direction for hysteresis is set as “On delay”.



(4) When the operation of “the open collector ON at less than the set value” is selected at S1 and also effective direction for hysteresis is set as “Off delay”.



7−3. How to use the filter

The instrument prepares the digital filter that stabilizes data converted into digital through calculation process.

⚠Warning ● When setting filter is not suitable, correct measurement can not be made and it may cause an unexpected accident, so care should be taken fully.

7−3−1. Analog filter

The instrument can change the pass band for the analog filter into 4 steps,such as 2 Hz, 4 Hz 6 Hz 8 Hz and 10 Hz. (Related function F−05)
As for default, “4 Hz” is selected.
The tendency of characteristics by the frequency are listed as below：

Averaged out times	2 Hz	4 Hz	10 Hz	100 Hz	2 kHz
Resist to noise	stable		⟺		rapid
Response speed	slow		⟺		quick

7−3−2. Digital filter

The digital filter for the instrument can be set from “00000” to “00006”.
The strength of the digital filter is decided depending on the set value. (Related function F−04)
As for default, “00001” is selected.
The relation between setting of the digital filter and the cut−off frequency is shown in the table below.

A/D sampling rate(F−02)	Setting of digital filter (F−04)						
	00000	00001	00002	00003	00004	00005	00006
200 times/s	Digital filter OFF	2.200 Hz	1.100 Hz	0.740 Hz	0.550 Hz	0.440 Hz	0.350 Hz
100 times/s		1.100 Hz	0.550 Hz	0.370 Hz	0.275 Hz	0.220 Hz	0.175 Hz
50 times/s		0.550 Hz	0.275 Hz	0.175 Hz	0.138 Hz	0.110 Hz	0.088 Hz
20 times/s		0.220 Hz	0.110 Hz	0.070 Hz	0.055 Hz	0.044 Hz	0.035 Hz
10 times/s		0.110 Hz	0.055 Hz	0.037 Hz	0.028 Hz	0.022 Hz	0.018 Hz

- The cut−off frequency can be selected by combining each digital filter setting and the A/D sampling setting. The cut−off frequency corresponds to the decrement of almost −3 dB.
- The cut−off frequency shown in the above−mentioned table is a status to set ”Stabilization filter” in turning off. Filters might strengthen more than cut−off frequency in the above−mentioned table according to the condition when “Stabilization filter” is used according to clause 7−6.

7−4. Selection of A/D sampling rate

This instrument can select the A/D sampling rate from “10 times/s”, “20 times/s”, “100 times/s” and “200 times/s” (Relative function F−02). As for default, “200 times/s” is set.

● The comparator comparison operation and the analog output of this unit have synchronized with the A/D sampling. Therefore, execute the change in the A/D sampling rate when you change the conversion rate of the comparator and conversion rate of the analog output.

7−5. Zero tracking

The instrument prepares the zero tracking in order to compensate for slow drift of zero.

● Effective only when the A/Z mode is selected.

7−5−1. What is zero tracking?

- Zero tracking is a function to cancel the slow drift of zero within the constant conditions, and also to follow the zero point of the instrument in order to stabilize zero point.
- When the data variation within the set time with function F−09 is within the set value set with the function F−08 against the zero point, then the input will be cancelled as the zero point. However, when the zero point compensation for the total “±10 % of the maximum display value” at the zero tracking and zero set are completed until that time, the further directional zero tracking will not executed.

7−5−2. Setting related with zero tracking

- Set the data width that performs zero tracking with the function F−08. The zero tracking width per setting value “n” will be obtained by the calculation of display according to the below formula.

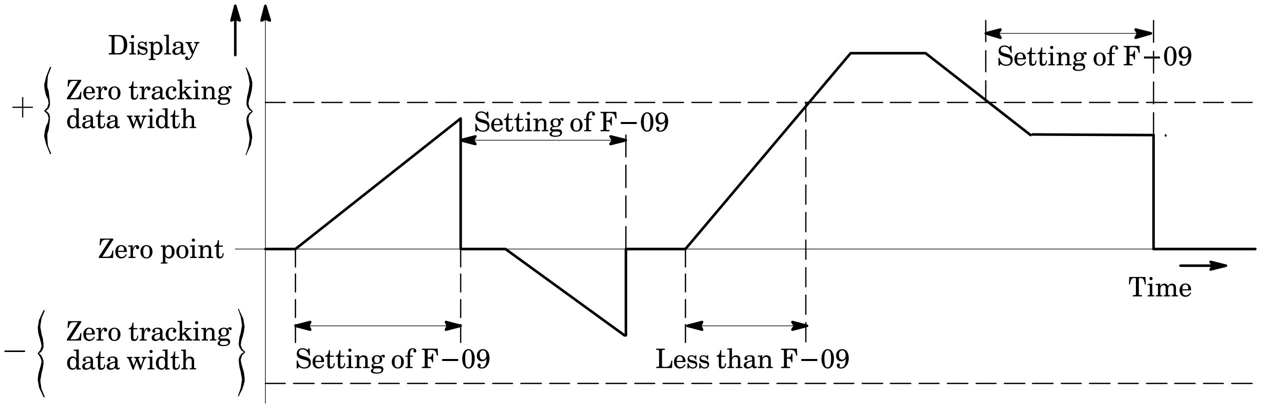
  (Zero tracking data width) =(Set value of F−08)×0.5×(Increment value for display)

  For example, when the setting of function F−07 is “00010” and the increment value for display is “D=5”, then (Zero tracking data width) will be as follows:

  (Zero tracking data width) =10×0.5×5
  =25D

- Set the time width performs zero tracking with the function F−08.

● The zero tracking will not operate whichever the function F−08 or the function F−09 is set as “0”.



● When the load shows slow vibration in the vicinity of zero, never use the zero tracking.

● When the variation of load display becomes moderate due to the strength/weakness of the digital filter and stabilized filter, there may have the case that the zero tracking becomes effective even when the actual load variation is rapid, so care should be taken fully.

7−5−3. Cancellation for compensation by zero tracking

Cancellation for compensated data by zero tracking can be executed with the function F−98.

- When changing the target for zero tracking is required, be sure to cancel the compensated portion by zero tracking once using the function F−98.
- When the load display is a gross weight, the zero tracking of this unit becomes effective. Therefore, the zero tracking does not work at the time of the A/Z ON.

7−6. Stabilization filter

This instrument is equipped with the stabilization filter as a function for a digital filter to work strongly when the state that change width of load indicated value is within the set range continues longer than the fixed time.

7−6−1. What is the Stabilization filter?

The stabilization filter is the function that a digital filter set by F−15 becomes effective when the state continues longer than the time set by F−16 that the change width of load indicated value is within the range set by F−17.

7−6−2. Setting related with the Stabilized filter.

- Set the data to apply the Stabilized filter with the function F−17. The stabilized filter width per set value "n" can be obtained through the display conversion by using the following formula.

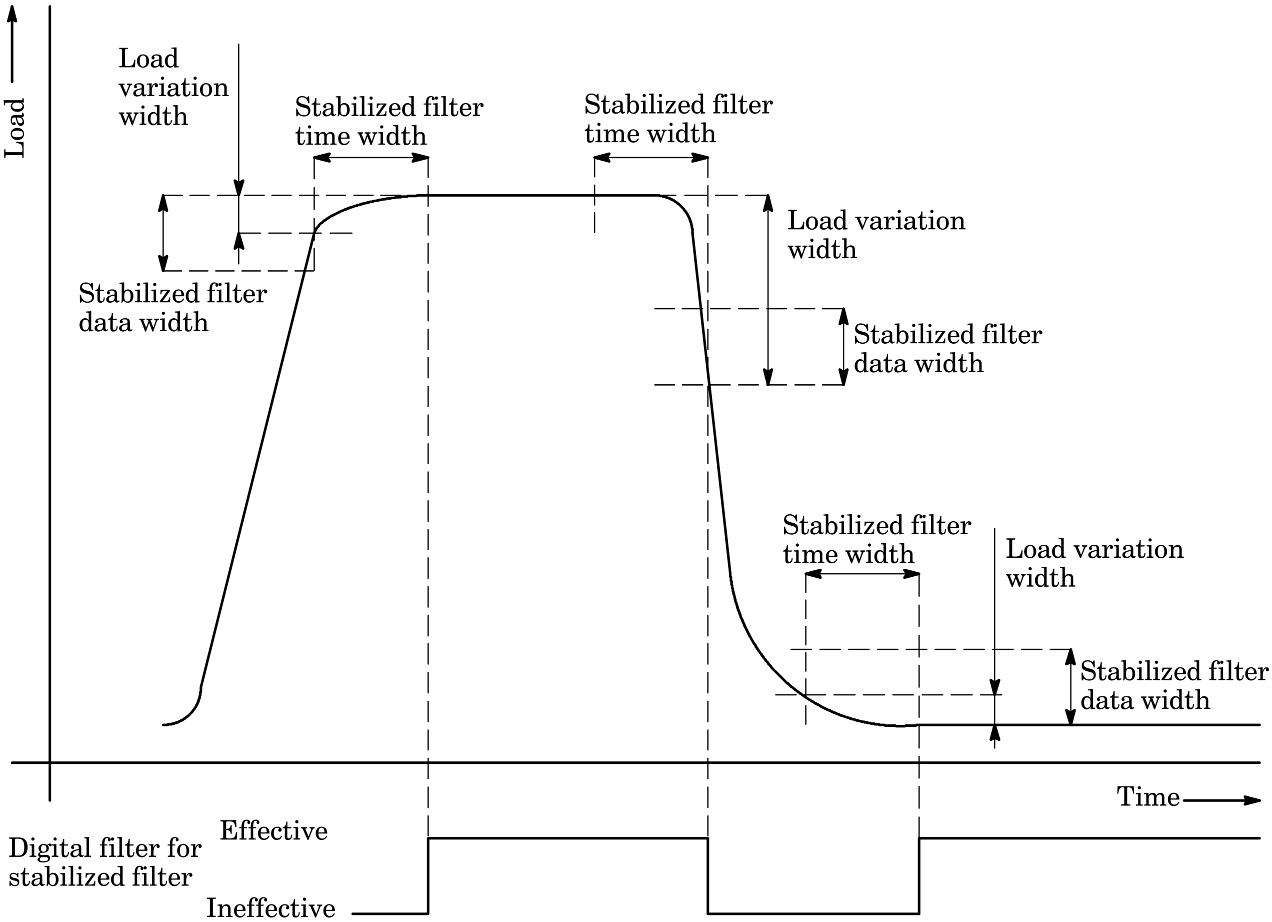
  [Stabilized filter data width] = [Set value of F−17] × [Display increment value]

  For example, when the setting of function F−17 is "00010" and the display increment is "D=5", then

  [Stabilized filter data width] = 10 × 5
  = 50

- Data width supervisory time for the Stabilized filter can be set with the function F−16.
- The digital filter for Stabilized filter can be set with the function F−15.
  Setting from " 00000" to " 00006" is possible, and strength of the stabilization filter is decided depending on the set value. The filter works strongly depends on growing of the set value.
- Moreover, when the digital filter has set with the function F−04, the calculation processing of the stabilization filter is executed as a result of the calculation process being done with the digital filter.

● When the stabilization filter is effective, the filter might strengthen more than cut−off frequency in the paragraph 7−3−1.



7−7. Detection of stability

The function to detect stability is judged that the measuring value is steady when the status that the change width of total load value is within the range set by the data width to detect stability, continues longer than the time set by the time to detect stability.

7−7−1. Range to detect stability

Execute the setting of range to detect stability with the function F−65.
It can be set the range of [00000] ~ [00099] every [0.5]D.
OFF when set the [00000]. Default is set as [00010].
Detection of stability data range of the set value per [n] is calculated the method below in case of showing in display.
[detection of stability data range]= 0.5D × [detection of stability range coefficient n] × [scale interval]
Setting of detection of stability range coefficient is [00040] and minimum divisions are [D=2],
[range to detect stability]= 0.5D × 40 × 2
= 40D

7−7−2. Time to detect stability

Execute the setting of time to detect stability with the function F−65.
It can be set the range of [00000] ~ [00099] every [0.1]s.
OFF when set the [00000]. Default is set as [00005].
[time to detect stability]= 0.1s × [time to detect stability coefficient]

7−8. Various kinds of functions related with the display

7−8−1. Selection of display rate

The instrument can select the display times from the “4 times/s”, “20 times/s”, “50 times/s” and “100 times/s”. This selection is available in the Function mode. (Related function F−03).
As for the default, 20 times/s has selected.

7−8−2. Selection of decimal point display position

The instrument can display the decimal point at the “Load display section” of the instrument. The selection of display can be made in the Function mode. (Related function F−01) As for the default, “No decimal point display” has selected.

7−8−3. Load display range

The load display range for the instrument is fixed from the −10 % to 110 % of the maximum display value at the time of setting during calibration.
When less than the range, “−OL” displays and over the range “OL” displays. For example, when the maximum display value is “1 000”, the load display range will be from −100 to 1 100. Besides, when under −100, the “−OL” displays, and over 1 100, the “OL” will display.

7−9. Selection the target for HOLD

The instrument can select the target for HOLD function among “load display”, “comparator S0 open collector output, LED display”, “comparator S1, S2 open collector output, LED display”, “Analog output” and “Optional BCD output”.
This selection can be made in the Function mode(Related function F−10).
As for the default, “All is selected.” Layout of setting for the F−10 are as follows：

10^0 digit：Load display
10^1 digit：Comparator S0 open collector output, LED display
10^2 digit：Comparator S1, S2 open collector output, LED display
10^3 digit：Optional analog output
10^4 digit：Optional BCD output
※With the ”0” setting, out of the target, and with “1” setting, target of HOLD.

7−10. Change of bridge power supply voltage

The instrument can select the bridge power supply from “10 V”, “5 V” and “2.5 V”. This selection can be made in the Function mode(Related function F−12). As for the default, “10 V” has selected.

● When the bridge power supply voltage is changed, make calibration again.

7−11. Tare weight cancellation (A/Z)

The instrument prepares Tare weight cancellation (A/Z) function.

Pressing the A/Z key makes Tare weight cancellation (A/Z) function operated and when the load display becomes net weight display, at the same time, the “A/Z” lights up on the status display and load display value becomes “0”.

Moreover, when the A/Z OFF key is pressed, Tare weight cancellation clear(A/Z OFF) function will activate and at the same time when the load display value becomes gross weight, the “A/Z” on the status display will turn off.

7−12. Zero set

The instrument prepares the zero set function.
When the display value on load display is within ±10 % against the maximum display value (Refer to the chapter 5.), pressing the ZERO ▲ key makes zero set function operated and the display will show “0” compulsively.
However, zero set will not be accepted when zero compensation for total ±10 % is executed with zero set and zero tracking until that time. (ER−0 display)
Also, the same operation can be made with the operation of “ZERO” at the external control input signal. Cancellation for data applied zero compensation by zero set can be executed with Function F−98.

● When tare weight cancellation (A/Z) is executed (during A/Z display lights up), zero set will not be accepted. It will display “ER−5”. When zero set is desired to execute, execute after making the Tare weight cancellation clear (A/Z OFF).

7−13. Key lock function

The instrument prepares key lock function.
With the Function F−06, execute key lock OFF by setting each digit=0, and executes key lock ON by setting each digit=1. As for default, all is key lock OFF. Besides, the correspondence between the target of key lock and setting digits are as follows:

10^0 桁：ON/OFF of CHECK value(Pressing the CHECK FUNC. key together with the SHIFT ENTER key)

10^1 桁：A/Z ON(A/Z)、A/Z OFF(A/Z OFF)

10^2 桁：Call changing mode of the S※ set(S※ ◄)

10^3 桁：Execution of zero setting(ZERO ▲)

10^4 桁：Call the function mode(CHECK FUNC.)

Moreover, when the call the function mode(CHECK FUNC. key) is locked, the function mode is entered once after pressing the SHIFT ENTER key together with the CHECK FUNC. key for over one seconds.

7−14. CHECK value

After pressing the CHECK FUNC. key together with the SHIFT ENTER key in the measurement mode, the CHECK value corresponding to the set value in the function F−11. At the same time, “CHECK” in the condition display lights on, and the load value corresponding to the set value in the function F−11 is added on the load display value. As for default, 0.3 mV/V has been set.

By pressing the CHECK FUNC. key together with the SHIFT ENTER key again, the CHECK value will be OFF and returns to the former condition as it is.

- When the setting of Function F−11 is “00000”, the load display value will not vary even if the “CHECK” lights up on the condition display. (Because CHECK is 0.0 mV/V.)
- When the CHECK value is ON condition, the RUN output of open collector is OFF and RUN LED in the condition display turns off.

7−15. Record place of set data etc.

This instrument records the each data in the RAM and EEPROM as follows.
As the EEPROM is nonvolatile, it is stored semi−permanently.
Also, RAM is kept by the battery. The backup time is about ten years in the room temperature.

① Data recorded in the RAM

・A/Z data	available to clear by A/Z OFF
・ZERO data	available to clear by the execution of F−98
・ZERO tracking data	available to clear by the execution of F−98

② Data recorded in the EEPROM

・FUNC data	available to initialize by the execution of F−99
・Calibration data	available to re−write by re−calibration
・Fine adjustment data of analog output	available to re−write by fine adjustment again
・Each set value of the comparator S0 to S4	available to clear by the change of each set value

7−16. Prohibition of calibration

The instrument prepares the setting for prohibition of calibration to prevent from excessive calibrations. This setting can be made in the Function mode(Related Function F−97).
As for the default, “Possible to calibrate” has selected.
The targets of prohibition are each calibration described in the Chapter 5, and each fine adjustment on the analog output described in the paragraph 9−1−7 and the paragraph 9−1−8.
When executing the calibration with the set of Prohibition of calibration, the “ER−6” is displayed.

7−17. Check mode

The following confirmations can be made in the Check mode.

- Check on ROM version
- Check on the option installed.
- Check on bridge voltage
- Check on the external control input
- Check on the open collector output
- Check on the analog output(option)
- Check on the BCD output (option)

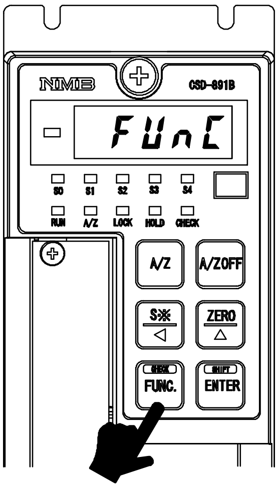
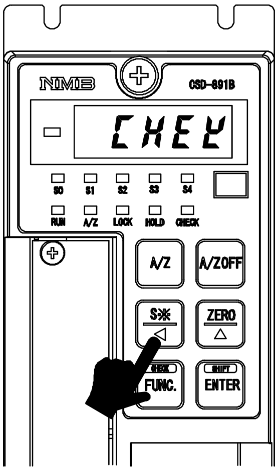
● The confirmation of the analog output can operates only when analog output is installed.

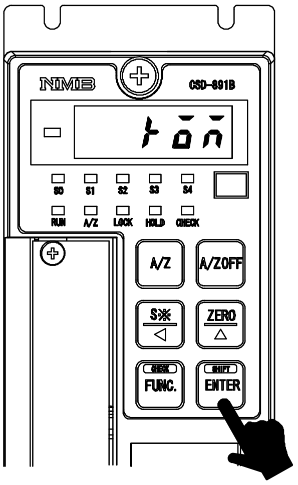
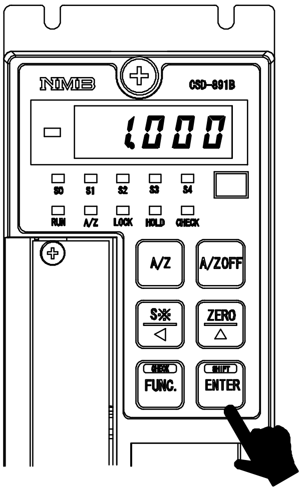
● The check on the BCD output operates when the BCD output is installed.

● The instrument can return to the Measurement mode by pressing the CHECK FUNC. key even in the halfway of the Check mode.

7−17−1. Operating procedure for the check mode

● When the S※ ◄ key is pressed with the load display of “FUNC”, the display will change as the following arrow marks indicate at every time the key is pressed. However, every time the ZERO ▲ key is pressed, the display will change as the reverse direction of the following arrow marks.
“FUNC”→“CCAL”→“ACAL”→“LCAL”→“ZERO”→“SPAN”
→“TARE”→”CHEK”→”MONT”→”VCAL”→”VADJ”→”FUNC”
→ “CCAL”→ ・・・ （Hereinafter over and over again.）

	Procedures	
1	Press the CHECK FUNC. key for one second. The display in the load display section displays "FUNC".	
2	Press the S※ ◄ key 7 times. The load display will change as "FUNC" →"CCAL"→"ACAL"→"LCAL"→"ZERO" →"SPAN"→"TARE"→"CHEK".	

	Procedures	
3	・ Check on the ROM version Press the SHIFT/ENTER key. The Check mode can be entered, and the display on the load display section will show "ROM". By pressing the SHIFT/ENTER key again, the ROM version will be shown on the load display section. In the Check mode, when the display on the load display section will be the one in the below, the display can be changed by the S※/◄ key operation. 「ROM」 ↑ ↓ 「OP」 ↑ ↓ 「BV」 ↑ ↓ 「IN」 ↑ ↓ 「S−OUT」 ↑ ↓ 「A−OUT」 ↑ ↓ 「BCD」 ↑ ↓ 「END」 ↑ ↓ 「ROM」 ↑ ↓ S※/◄ key：↓、ZERO/▲ key：↑	 

Procedures

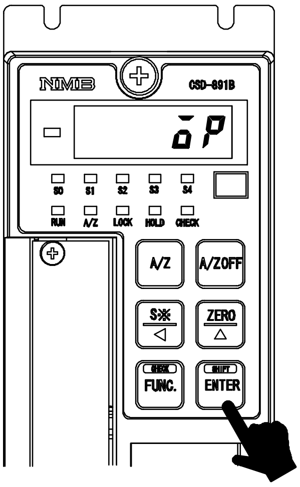
4

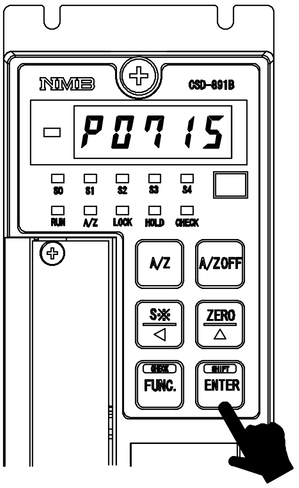
- Check on the options

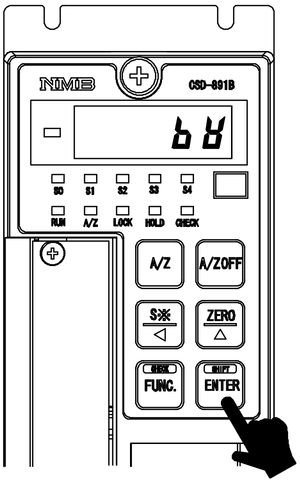
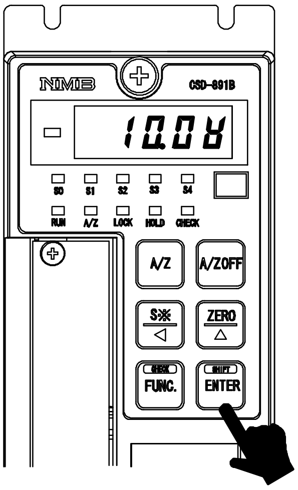
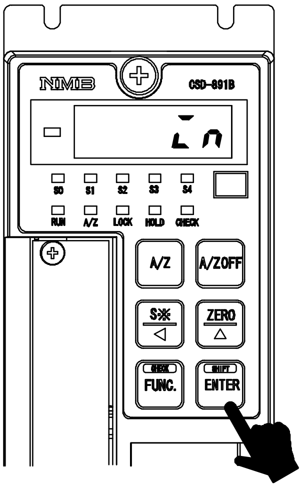
  Press the SHIFT ENTER key.
  The load display shows “OP”.
  Check on bridge power supply voltage

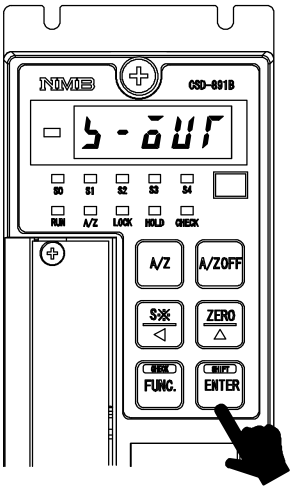
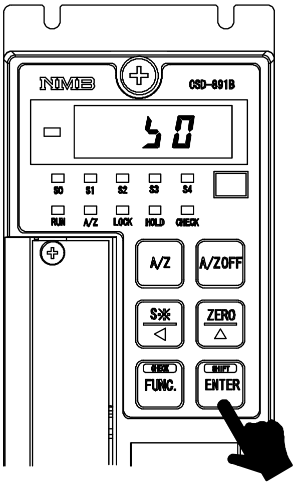
  By pressing the SHIFT ENTER key again, the load display shows the optional number of the option installed at present on the load display. When no option is installed, the “P− − − −” is appeared.

Display	Installed options
07	Current output
15	BCD output
25	Voltage output
73	CC−LINK interface
74	RS−232C interface
76	RS−422/485 interface





	Procedures	
5	・Check on the bridge power supply voltage Press the SHIFT ENTER key. The load display shows “bV”. By pressing the SHIFT ENTER key again, the bridge power supply voltage selected at present is shown on the load display section.	 
6	・Check on the external control input Press the SHIFT ENTER key. The load display shows “IN”. By pressing the SHIFT ENTER key again, the load display section changes into the “IN” flashing on and off. At the same time, the ON/OFF condition of external control input signal can be monitored on the Status display LED. As the input from the key is not accepted during the LOCK input, set the LOCK input OFF after the confirmation.	 RUN display : ZERO input HOLD display : HOLD input A/Z display : A/Z input CHECK display : A/Z OFF input LOCK display : LOCK input

	Procedures	
7	・Check on the open collector output Press the SHIFT ENTER key. The display of the load display section becomes “S−OUT”. Press the SHIFT ENTER key again, the load display section displays “S0” and flashes on and off. At the same time, by the operations of right keys, each open collector output, each judgement display and load display section changes as below: 「RUN」 ↓ ↑ 「ERROR」 ↓ ↑ 「S0」 ↓ ↑ 「S1」 ↓ ↑ 「S2」 ↓ ↑ 「S3」 ↓ ↑ 「S4」	  S※ ◄ key ：Set ON the each open collector output from the above to the below in order on the right figure. ZERO ▲ key ：Set ON the each open collector contact output from the below to the above in order on the right figure. RUN display：RUN output ERROR display：ERROR output S0 display：S0 output S1 display：S1 output S2 display：S2 output S3 display：S3 output S4 display：S4 output

Procedures

8

・Check on analog output

> When the analog output is not installed, proceed to the step 9.

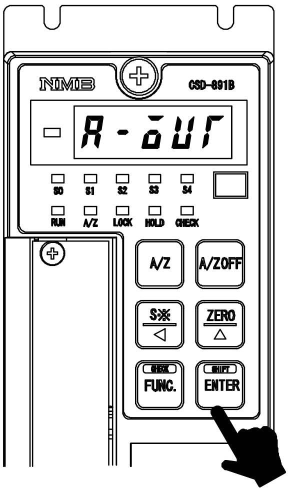
Press the SHIFT ENTER key.
The display in the load display section becomes "A−OUT". Press the SHIFT ENTER key again, then the display shows "LOW" and flashing on and off.
At this time, the analog output makes the value equal to the "LOW" value shown in the below table.

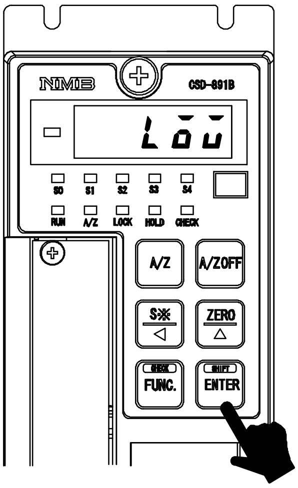
Every time the S※ ◄ key is pressed, the display changes as the arrow marks indicate, and also the analog output changes as shown in the below table.

「LOW」
↓ ↑
「MID」
↓ ↑
「HIGH」

	Options (Current output)	Option (Voltage output)
LOW	4 mA	0 V
MID	12 mA	5 V
HIGH	20 mA	10 V

> The output values here reflect the values adjusted in the paragraph 9−1−7, and 9−1−8.





S※ ◄ key : Change the analog output from up to down in the left column.

ZERO ▲ key : Change the analog output from down to up in the left column.

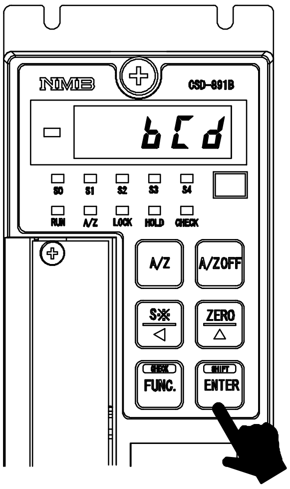
9

・Check on the BCD output

> In case that the BCD output isn't installed, shift to the step 10.

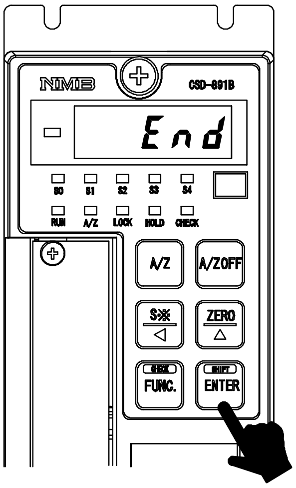
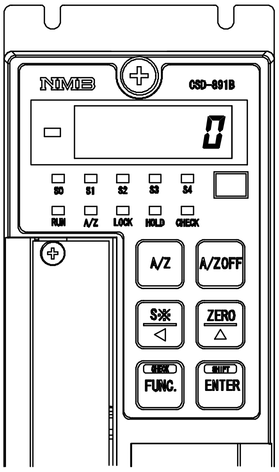
Press the SHIFT ENTER key.
The load display will show "BCD".

By pressing the SHIFT ENTER key again, the display will show "00000" and the digit of 10^0 flashes on and off.
At this moment, the same value as the display will output from the BCD output. When changing the display with the right keys, the BCD output will change corresponding to it.



S※ ◄ key : Set value carry key

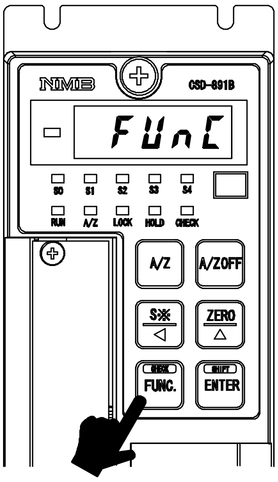
ZERO ▲ key : Set value inclement key.

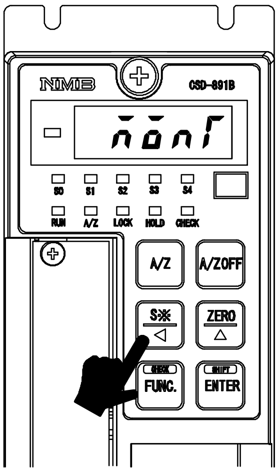
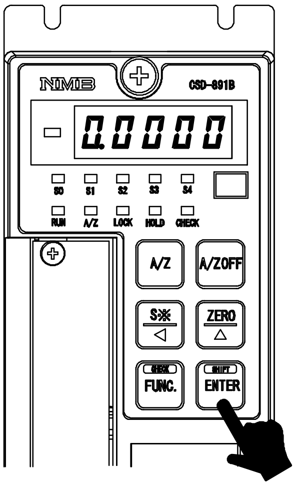
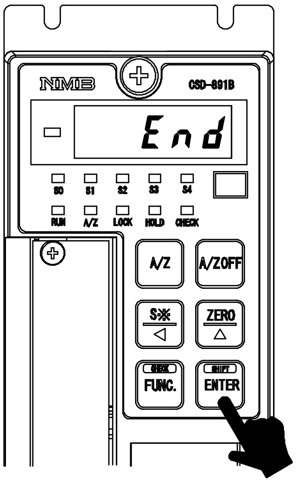
	Procedures	
10	Press the SHIFT ENTER key. The load display shows “END”. By pressing the SHIFT ENTER key again, quits from the Check mode and returns to the Measurement mode to show the load value.	 

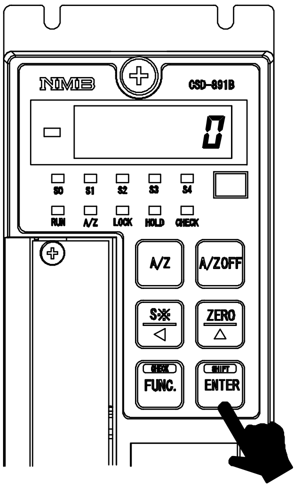
7−18. Monitor mode

In the Monitor mode, the applied load on the strain gage applied transducer at present can be displayed with the converted unit of mV/V.
For example, in case that the load cell is used, and its output value is unclear, apply actual load in order to read the output value at the time of initial load application and also at the time of the maximum load application by using the function and then make calibration with the obtained value as a base.

- ● The display value in the Monitor mode is a reference value.
  The accuracy of display is 0.5 % approximately.
- ● In the Monitor mode, the range which can be monitored is from −3.1 mV/V to 3.1 mV/V approximately.
- ● When the S※ ◄ key is pressed with the load display of “FUNC”, the display will change as the following arrow marks indicate at every time the key is pressed. However, every time the ZERO ▲ is pressed, the display will change as the reverse direction of the following arrow marks.
  “FUNC”→“CCAL”→“ACAL”→“LCAL”→“ZERO”→“SPAN”
  →“TARE”→“CHEK”→“MONT”→“VCAL”→“VADJ”→“FUNC”
  →“CCAL”･･･(Hereinafter, over and over again.)

	Procedures	
1	Press the CHECK FUNC. key for one second. The load display shows “FUNC”.	

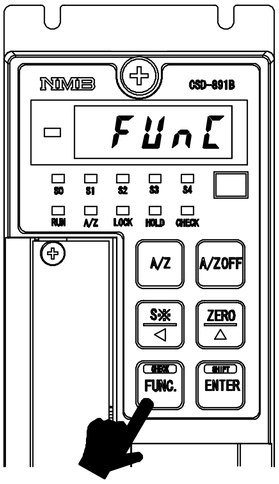
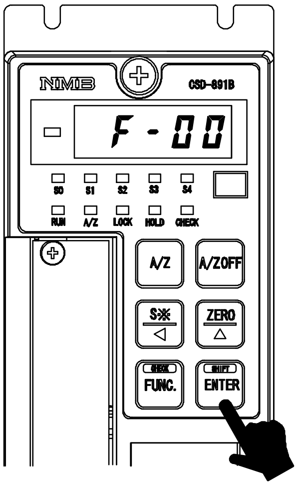
	Procedures	
2	Press the ZERO ▲ key 8 times. The load display will change as “FUNC”→ “CCAL”→“ACAL”→“LCAL”→“ZERO”→ “SPAN”→“TARE”→“CHEK”→“MONT”.	
3	Press the SHIFT ENTER key. The Monitor mode can be entered, and the converted value into mV/V for the present input value for the transducer flashes on and off on the load display.	
4	Press the SHIFT ENTER key. The load display shows “END”.	

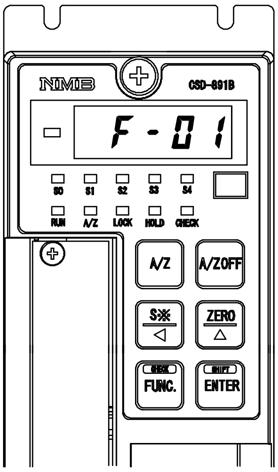
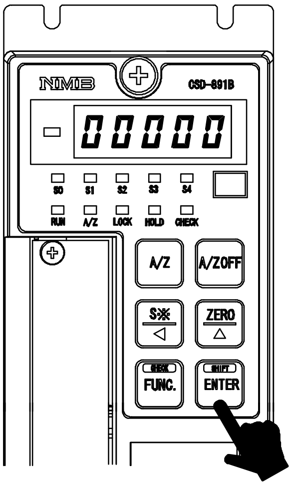
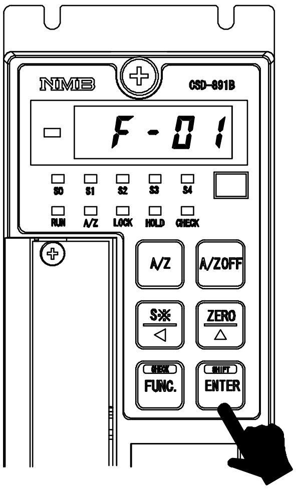
	Procedures	
5	Press the SHIFT ENTER key. The Monitor mode can be over, and the present load is shown on the load display.	

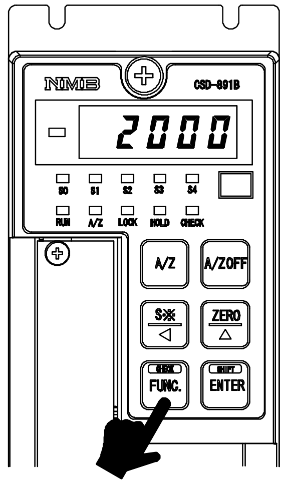
8. Function mode

● During the measurement mode, the setting can change by the function mode.

8−1. Setting method for function mode

	Procedures	
1	Press the CHECK FUNC. key for about one second. The load display shows “FUNC”.	
2	Press the SHIFT ENTER key. The function mode can be entered, then the load display will show “F−**”, and the digit of 10^0 will flash on and off. The last called Function No. is shown at **. Suspend the setting of Function mode, then press the CHECK FUNC. key when returning to the Measurement mode is required.	

	Procedures	
3	Select the Function No. desired to set with the right keys. Suspend the setting of Function mode, then Measurement mode can be re−entered by pressing the CHECK FUNC. key. By pressing the key continuously, continuous increase will be provided.	 S※ ◄ key ：Set value carry key ZERO ▲ key ：Set value inclement key A/Z key ：Set value initialization key
4	Press the SHIFT ENTER key. Content of setting Function that has selected will be displayed and the digit of 10^0 will flash on and off. Change the setting with the right keys. Press the CHECK FUNC. key to suspend the setting of Function mode, then return to the measurement mode. By pressing the key continuously, continuous increase will be provided.	 S※ ◄ key ：Set value carry key ZERO ▲ key ：Set value inclement key A/Z key ：Set value initialization key
5	Press the SHIFT ENTER key. The set contents are registered, then the load display returns to the registered Function No., and the 10^0 digit will flash on and off. Press the CHECK FUNC. key. Setting another Function No. is desired, return to step 3.	

	Procedures	
6	Press the CHECK FUNC. key. Quitting the Function mode, the Measurement mode can be returned.	

8−2. Function of Function data

- F−01　Selection of decimal point at display position

Initial value＝00000　00000＝Non
00001＝10^1
00002＝10^2
00003＝10^3
00004＝10^4

- F−02　Selection of A/D sampling rate

Initial value＝00004　00000：10 times/s
00001：20 times/s
00002：50 times/s
00003：100 times/s
00004：200 times/s

- F−03　Selection of display rate

Initial value＝00001　00000＝4 times/s
00001＝20 times/s
00002＝50 times/s
00003＝100 times/s

- F−04　Setting digital filter

Initial value＝00001　Setting range：＝00000～00006

※Select the average times for digital filter. When the figure grows larger, the filter becomes stronger, then effects from vibrations and so on are shown scarcely on the display. However, if too large figure is selected, the response to variation of input sensor will become worse.

※Using the digital filter where vibrations and so on may exist is effective for removing the deflection on the display.

- F−05　Setting analog filter

Initial value＝00001　00000＝2 Hz
00001＝4 Hz
00002＝6 Hz
00003＝8 Hz
00004＝10 Hz

- F−06 Setting the function key lock

Initial value＝00000 10^0 digit：ON/OFF of CHECK value

(Press the CHECK/FUNC. key together with the SHIFT/ENTER key)

10^1 digit：ON/OFF of the A/Z function

A/Z ON(A/Z)、A/Z OFF(A/Z OFF)

10^2 digit：Call the change mode of S※ setting (S※/◄),

10^3 digit：Execution of zero set(ZERO/▲)

10^4 digit：Call the function mode(CHECK/FUNC.)

※Key lock cancellation is made by setting “0”, and key lock is made by setting “1”. Moreover, when the “Call the function mode” is locked, the function mode can be entered after pressing the the SHIFT/ENTER key for more than 2 seconds together with the CHECK/FUNC. key for more than 1 second.

- F−08 Setting zero tracking data width

Initial value＝00000 00000＝Zero tracking OFF

Setting range：00000～00099

Unit：0.5D

Data width of 49.5D with the setting “00099”.

※Effective only when the value of 00001～00099 is set with the F−09.

- F−09 Setting zero tracking time width

Initial value＝00020 00000＝Zero tracking OFF

Setting range：00000～00099

Unit：0.1 s

Time width of 9.9 s with the setting “00099”.

※Effective only when the value of 00001～00099 is set with the F−08.

- F−10 Setting of the target of HOLD

Initial value＝11111 10^0 digit：Load display

10^1 digit：Comparator S0 open collector output, LED display

10^2 digit：Comparator S1, S2, S3 and S4 open collector output, LED display

10^3 digit：Analog output

10^4 digit：Optional BCD output

※Out of the HOLD target at the setting “0”, and the HOLD target is available at the setting “1”.

- F−11 Setting the CHECK value

Initial value＝00003 Setting range：00000～00024

Unit：0.1 mV/V

Approx. 2.4 mV/V CHECK value at the setting “00024”.

- F－12　Setting bridge power supply voltage

Initial value＝00000　00000：10 V
00001：5 V
00002：2.5 V

- F－15　Setting digital filter for stabilized filter

Initial value＝00002　00000＝Stabilized filter OFF
Setting range：00000～00006

※Strength of the digital filter for the stabilization filter is selected. The influence on the display such as the vibrations decreases so that the filter may strengthen when the figure grows.

※Effective only when setting is made with the value from 00001 to 00099 with the F－16, and the value from 00001 to 00999 is set with the F－17.

- F－16　Setting time width for stabilized filter

Initial value＝00020　00000＝Stabilized filter OFF
Setting rage：00000～00999
Unit：0.01 s
Time width of 9.99 s at the setting of "00999".

※Effective only when the value from 00001 to 00006 with the F－15 and the value from 00001 to 00999 with the F－17 are set.

- F－17　Setting data width for stabilized filter

Initial value＝00020　00000＝Stabilized filter OFF
Setting rage：00000～00999
Unit：1D
Data width of 999D at the setting of "00999".

※Effective only when the value from 00001 to 00006 with the F－15 and the value from 00001 to 00999 with the F－16 are set.

- F－20　Setting the target of analog output

Initial value＝00000　00000：Gross weight
00001：Net weight

- F－21　Display value at the time of the minimum analog output

Initial value＝00000　Setting rage　－99999～99999

- F－22　Display value at the time of the maximum analog output

Initial value＝02000　Setting rage　－99999～99999

- F－30　Setting comparator operation

Initial value＝11111　0＝OFF
1＝ON
10^0 digit：Comparator S0
10^1 digit：Comparator S1
10^2 digit：Comparator S2
10^3 digit：Comparator S3
10^4 digit：Comparator S4

- F−31　Setting the target of comparator

Initial value＝00000　0＝Gross weight
1＝Net weight
10^0 digit：Comparator S0
10^1 digit：Comparator S1
10^2 digit：Comparator S2
10^3 digit：Comparator S3
10^4 digit：Comparator S4

※The comparator S0 is effective in the setting 00007 by F−33.

- F−32　Setting the direction of comparator

Initial value＝00000　0＝or more
1＝or less
10^0 digit：Comparator S0
10^1 digit：Comparator S1
10^2 digit：Comparator S2
10^3 digit：Comparator S3
10^4 digit：Comparator S4

※The comparator S0 is effective in the setting 00007 by F−33.

- F−33　Setting applicable condition for the comparator S0

Initial value＝00000　00000＝ON when load display value≧the maximum display value
00001＝ON when both S1 and S2 open collector output are OFF.
00002＝ON when both S1 and S3 open collector output are OFF.
00003＝ON when both S1 and S4 open collector output are OFF.
00004＝ON when both S2 and S3 open collector output are OFF.
00005＝ON when both S2 and S4 open collector output are OFF.
00006＝ON when both S3 and S4 open collector output are OFF.
00007＝Operation whichever “open collector ON over the set value” or “open collector ON less than the set value”
00008＝Interlocked with HOLD LED
00009＝Interlocked with A/Z LED
00010＝Interlocked with LOCK LED
00011=ON when the detection of stability

- F−34　Setting the condition of Hysteresis operation for comparator

Initial value＝00000　00000＝ON delay
00001＝OFF delay

- F−35　Hysteresis data width OFF

Initial value＝00000　00000＝Hysteresis data width OFF
Setting rage：00000～00099
Unit：1D
Data width of 99D at the setting of “00099”.

- F−36　　Setting Hysteresis time width for comparator

  Initial value＝00000　00000＝Hysteresis time width OFF

  Setting rage：00000～00099

  Unit：0.01 s

  Data width of 9.99 s at the setting of “00999”

- F−40　　Setting the target of BCD output(Effective when the option is installed.)

  Initial value＝00000　00000＝Gross weight

  00001＝Net weight

  00002＝Changeover of external input

- F−41　　Setting the logic of BCD output (Effective when the option is installed.)

  Initial value＝00000　00000＝Negative logic

  00001＝Positive logic

- F−42　　Setting the polarity of BCD output (Effective when the option is installed.)

  Initial value＝00000　00000＝Negative logic

  00001＝Positive logic

- F−43　　Setting the logic of BCD flag output (Effective when the option is installed.)

  Initial value＝00000　00000＝Negative logic

  00001＝Positive logic

- F−44　　Setting the logic of BCD P.C. output (Effective when the option is installed.)

  Initial value＝00000　00000＝Negative logic

  00001＝Positive logic

- F−45　　Setting the BCD P.C. width(Effective when the option is installed.)

  Initial value＝00001　00000＝125 ms

  00001＝25 ms

  00002＝10 ms

  00003＝5 ms

  00004＝2.5 ms

- F−46　　Setting the BCD output rate(Effective when the option is installed.)

  initial value＝00001　00000＝4 times/s

  00001＝20 times/s

  00002＝50 times/s

  00003＝100 times/s

  00004＝200 times/s

- F−50　　Setting the operation mode of RS−232C

  (Effective when the option is installed.)

  Initial value＝00001　00000＝Stream mode

  00001＝Command mode

- F−51 Setting the target of output at the time of stream mode of RS−232C (Effective when the option is installed.)

  Initial value＝00000 00000＝Gross weight
  00001＝Net weight
  00002＝Display interlock

  ※In the Command mode, the data are transferred from the host by the command.
  In the Stream mode, the latest data will be output continuously.

- F−52 Setting the baud rate of RS−232C/422/485 (Effective when the option is installed.)

  Initial value＝00003 00000＝1 200 bps
  00001＝2 400 bps
  00002＝4 800 bps
  00003＝9 600 bps
  00004＝19 200 bps
  00005＝38 400 bps

- F−53 Setting the data bit length and parity of RS−232C/422/485 (Effective when the option is installed.)

  Initial value＝00021 10^0 digit：Setting data bit length
  0＝8 bit
  1＝7 bit
  10^1 digit：Setting parity
  0＝No parity
  1＝Even number parity
  2＝Odd number parity

- F−54 Setting the stop bit of RS−232C/422/485 (Effective when the option is installed.)

  Initial value＝00000 00000：1 bit
  00001：2 bits

- F−55 Setting the terminator of RS−232C/422/485 (Effective when the option is installed.)

  Initial value＝00001 00000：CR
  00001：CR+LF

- F−56 Setting the decimal point of sending code of RS−232C/422/485 (Effective when the option is installed.)

  Initial value＝00000 00000：No decimal point
  00001：Yes of Decimal point

- F−57 Setting the ID number of RS−422/485(Effective when the option is installed.)

  Initial value＝00000 Setting range：00000〜00031

- F−58 Changing RS−422/485(Effective when the option is installed.)

  Initial value＝00000 00000：RS−422
  00001：RS−485

- F−59　Setting the delay time of returning RS−485

Initial value＝00005　Setting range：00000～00999
Unit　1 ms
The delay is 999 ms at the "00999" setting.

- F−65　Setting the detection of stability range

Initial value＝00010　00000：Detection of stability OFF
Setting range：00000～00099
Unit　0.5D
※Effective only when the value from 00001 to 00099 with the F−66

- F−66　Setting the detection of stability time

Initial value＝00005　00000：Detection of stability OFF
Setting range：00000～00099
Unit　0.1s
※Effective only when the value from 00001 to 00099 with the F−65

- F−72　Setting the effective time for external control input

Initial value＝00000　00000：50 ms
00001：20 ms
00002：10 ms
00003：5 ms
00004：2 ms

- F−84　Setting the occupied station number of CC−LINK
(Effective when the option is installed)

Initial value＝00002　00000：1 station
00001：2 stations
00002：4 stations

> ● Change the setting of the occupied station number is corresponded to the software of the instrument after the ROM Ver1.800.
> The occupied station number is fixed as 4 before the ROM Ver1.700.

- F−85　Setting the station number of CC−LINK
(Effective when the option is installed)

Initial value＝00001　Setting range：00001～00061

- F−86　Setting the baud rate of CC−LINK
(Effective when the option is installed)

Initial value＝00000　00000：156 kbps
00001：625 kbps
00002：2.5 Mbps
00003：5 Mbps
00004：10 Mbps

- F−87　Setting of the numeric expression of minus

Initial value＝00000　00000：Expression of standard binary
(−1＝FFFFFFFFH)
00001：At minus, The most significant digit is fixed to "8".
(−1＝80000001H)

- F−90　　Increment value (For reference)
  ※The increment value set when the calibration is applied can be referred to.
  ※The setting can’t be changed in the function.
- F−91　　The maximum display value (For reference)
  ※The maximum display value set when the calibration is applied can be referred to.
  ※The setting can’t be changed in the function.
- F−92　　The actual load value (For reference)
  ※The actual load value set when the calibration is applied(LCAL) can be referred to.
  ※When the calibration except LCAL is made, this value will not change.
  ※The setting can’t be changed in the function.
- F−93　　Zero calibration value (For reference)
  ※The input voltage value that has read as the initial load value at the time of executing calibration can be referred to.
  ※The setting can’t be changed in the function.
- F−94　　Span calibration value (For reference)
  ※The input voltage value at the time of the maximum display can be referred to.
  ※The setting can’t be changed in the function.
- F−97　　Prohibition of calibration
  Initial value＝00000　00000＝Possible to calibrate
  　　　　　　　　　　　00001＝Prohibition from calibration
- F−98　　ZERO clear
  Zero compensated data by zero set function can be cancelled.

  When the SHIFT ENTER key is pressed with “F−98” displayed, “ZCLR” can be displayed. (At the same time, the display lights on and off.)

  At this point, press the CHECK FUNC. key when suspending the ZERO clear is desired. Measurement mode can be returned and Zero clear will not be executed.

  When the SHIFT ENTER key is pressed while “ZCLR” display lights on and off, “F−98” display can be returned. Now, ZERO clear has completed.

- F−99 Memory clear

Setting from F−01 to F−97 recorded at EEPROM will return to the default value.

When the SHIFT ENTER key is pressed with the display of F−99, then “FCLR” display can be obtained. (At the same time, the display lights on and off.) At this point, press the CHECK FUNC. key when suspending memory clear is desired. Measurement mode can be returned and Memory clear will not be executed.

When the SHIFT ENTER key is pressed during “FCLR” load display lights on and off, and after about 1 second, it will become “FUNC” display and the operation of Memory clear has completed.

⚠Warning ● Never use the following functions because they may destroy the functions at internal of the instrument.

F−00	F−07	F−13	F−14	F−18	F−19	F−23	F−24
F−25	F−26	F−27	F−28	F−29	F−37	F−38	F−39
F−47	F−48	F−49	F−60	F−61	F−62	F−63	F−64
F−67	F−68	F−69	F−70	F−71	F−73	F−74	F−75
F−76	F−77	F−78	F−79	F−80	F−81	F−82	F−83
F−88	F−89	F−95	F−96				

9. Options

The options for the instrument are as follows:

① Current output[4 mA to 20 mA]	Parts No. : CSD891B−P07
② BCD output	Parts No. : CSD891B−P15
③ Voltage output [0 V to 10 V]	Parts No. : CSD891B−P25
④ CC−LINK interface [Refer to the instruction manual (DRW. No.294−1146＊) for CSD−891B−73)	Parts No. : CSD891B−P73
⑤ RS−232C interface	Parts No. : CSD891B−P74
⑥ RS−422 interface	Parts No. : CSD891B−P76

	P07	P15	P25	P73	P74	P76
P07	−	○	×	○	○	○
P15	○	−	○	×	×	×
P25	×	○	−	○	○	○
P73	○	×	○	−	×	×
P74	○	×	○	×	−	×
P76	○	×	○	×	×	−

○ : Possible, × : Impossible

9−1. Analog output

⚠Warning

- ● When the this unit power supply is turned on with external HOLD signal short−circuited, the analog output is as follows. When the analog output is assumed to be holding target with F−10, the analog output outputs the minimum value.
- ● Please note the following points when you use the CHECK function. There is a thing which becomes "OL" error display (The analog output is made at OVR . output) by making CHECK effective.

- ● This unit has two kinds of analog outputs, that is, "Voltage output" and "Current output".
- ● This analog output executes rewriting the output synchronizing with the A/D sampling.
- ● The resolution of this analog output is approx. 1/12 000 against 0 V to 10 V of the voltage output and 4 mA to 20 mA of the current output.
- ● The analog output has the output fluctuation element when the power is turned on. To use this instrument with stable condition, use it about one hour after the power is turned on.

9−1−1. Relative function

F−20	Selection of analog output target	Gross weight or Net weight
F−21	Display value at the minimum analog output value	Display value at the output of approx.4 mA or 0 V
F−22	Display value at the maximum analog output value	Display value at the output of approx.20 mA or 10 V.

9−1−2. Specification of current output

Parts No. CSD891B−P07

(1) Output Output : DC4 mA to 20 mA
Over range : Approx.2.4 mA at the display of "−OL"
Approx 21.6 mA at the display of "OL"

(2) Load resistance : 510 Ω or less

(3) Non−linearity : 0.05 %F.S.

(4) Resolution : Approx.1/12 000

(5) Output rate : Synchronized with the A/D sampling.

9−1−3. Specification of voltage output

Parts No. CSD891B−P25

(1) Output Output : DC0 V to 10 V
Over range : Approx.−1 V at "−OL" display
Approx. 11 V at "OL" display

(2) Load resistance : 5 kΩ or more

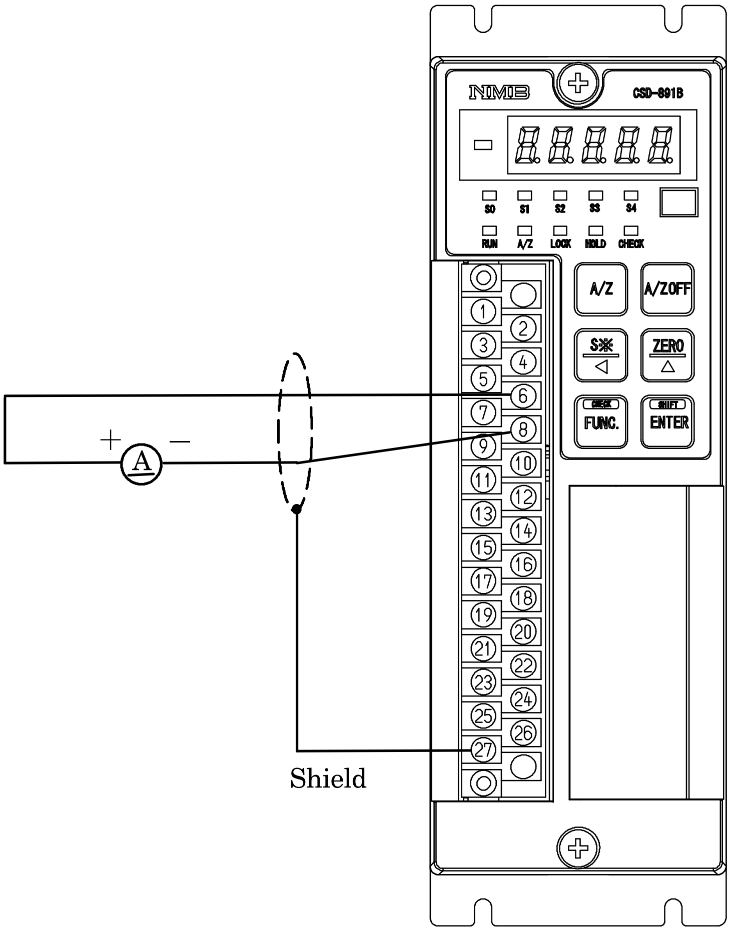
(3) Non−linearity : 0.05 %F.S.

(4) Resolution : Approx.1/12 000

(5) Output rate : Synchronized with the A/D sampling

9−1−4. Connection of the current output

The connection with the current output should be made as follows

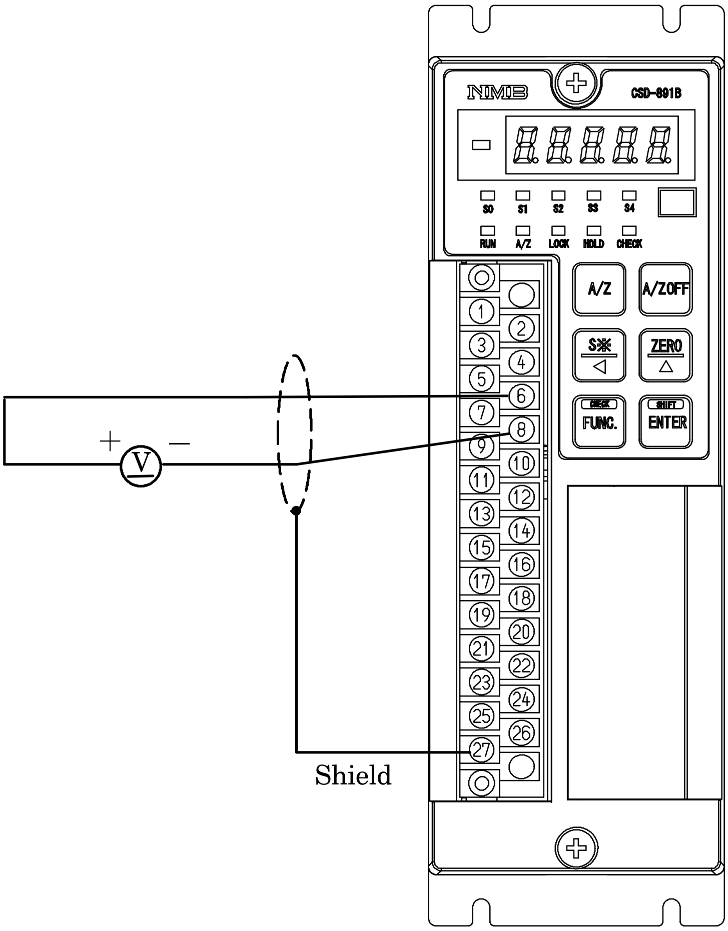


⚠Warning ● The connections with the current output should be made securely according to the figures and also within the specification of the load resistance. If neglected, it may cause an unexpected failure.

● The connection with the current output should be applied with the shielded cable, and the shield should be connected to the ⏚ terminal (Terminal No.27) of this instrument. If neglected, it may cause an unexpected malfunction due to the effects from the external noises and so on.

9−1−5. Connection with the voltage output

The connection with the voltage output should be made as follows.

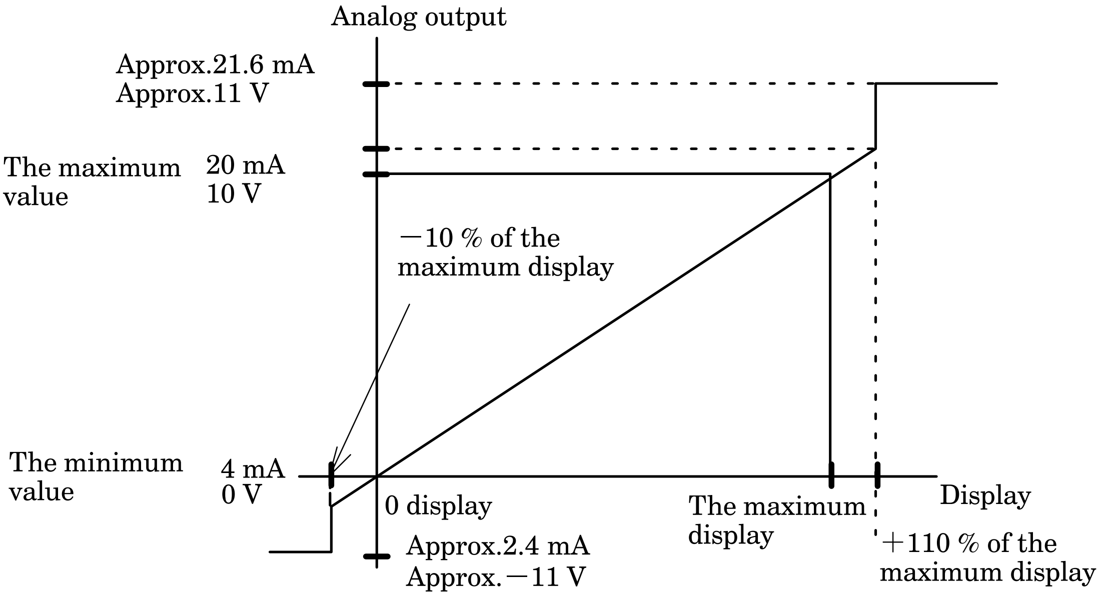


⚠Warning ● The connections with the voltage output should be made securely according to the figures and also within the specification of the load resistance. If neglected, it may cause an unexpected failure.

● The connection with the voltage output should be applied with the shielded cable, and the shield should be connected to the ⏚ terminal (Terminal No.27) of this instrument. If neglected, it may cause an unexpected malfunction due to the effects from the external noises and so on.

9−1−6. Scaling of analog output

The analog output for standard specifications is set between the minimum value and the maximum value with the output of 0 to 2 000.
By changing the F−21 and F−22, optional value can be decided.



F−21 sets the display when the minimum value is desired to output.

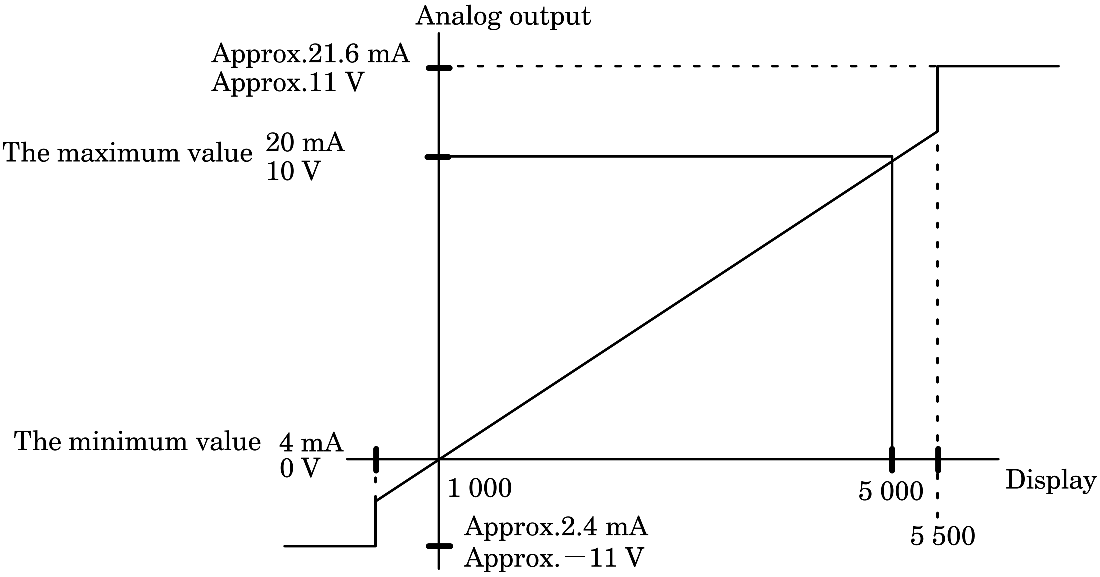
F−20 sets the display when the maximum value is desired to output.

例) F−21：Set as 1 000

F−22：Set as 5 000

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

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



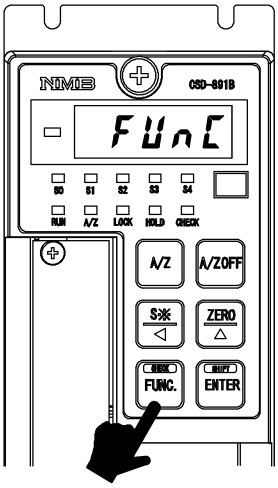
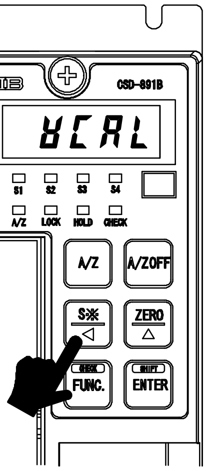
⚠Warning ● Take care that the setting on the F−22 doesn't exceed the maximum display value that has set in the Chapter 5.

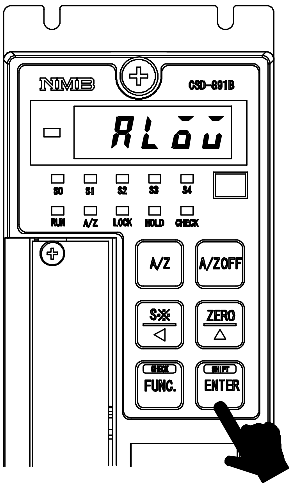
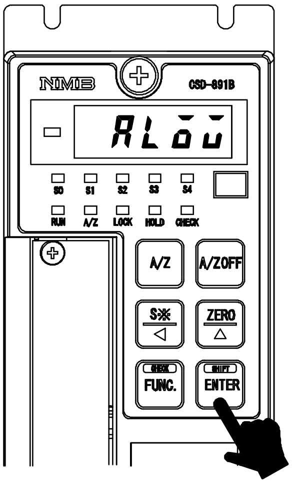
● For the F−21, less value than the value to set for F−22 should be set. If neglected, the correct output can't be obtained.

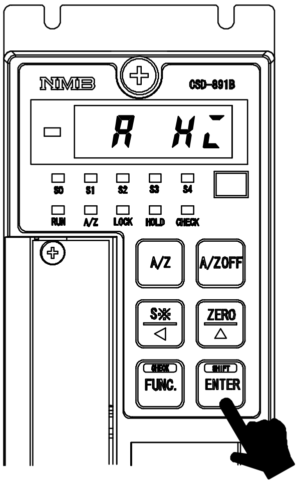
9−1−7. Fine adjustment 1 on analog output

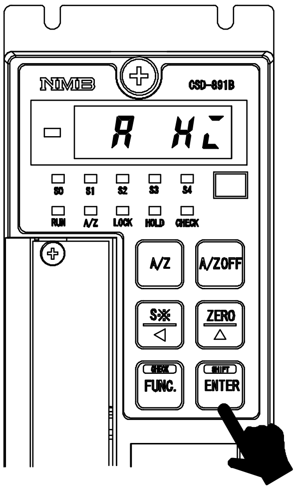
Fine adjustment described here, is the one to arrange each “the minimum value” and “the maximum value” without applying the actual load during the procedures. Refer to the paragraph 9−1−8, for the fine adjustment with actual load applied.

- ● During the application on fine adjustment, if you want to suspend, press the CHECK FUNC. key. The minimum value data, the maximum value data are kept as they were before entering the fine adjustment, and the Measurement mode can be re−entered.
- ● Make fine adjustment one (1) hour or so after feeding the power. You can make fine adjustment with safer conditions.

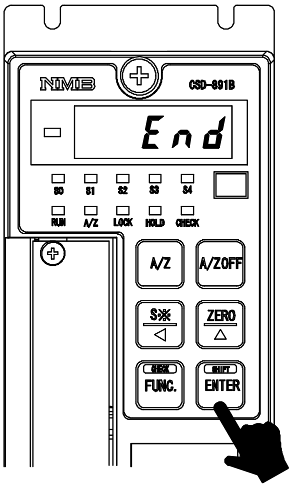
	Procedures	
1	Press the CHECK FUNC. key for about one second. The load display shows “FUNC”.	
2	Press the S※ ◄ key 9 times. The load display changes as “FUNC” →“CCAL”→“ACAL”→“LCAL”→“ZERO” →“SPAN”→“TARE”→“CHEK”→“MONT” →“VCAL”.	

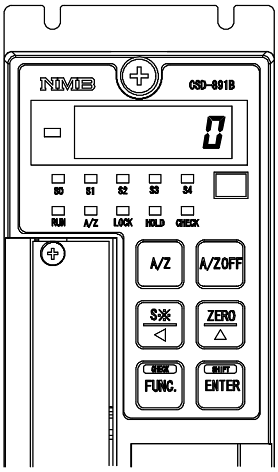
<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>3</td><td>Press the SHIFT ENTER key.
The load display shows “ALOW”.</td><td>
</td></tr>
<tr><td>4</td><td>Press the SHIFT ENTER key.
The load display flashes on and off showing “ALOW”.
At the same time, the analog output equivalent to the minimum value of analog output is obtained.
Adjust so the output will become the minimum value with the right keys.
<table>
<tr><th></th><th>Current output (Optional)</th><th>Voltage output (Optional)</th></tr>
<tr><td>Minimum value</td><td>4 mA</td><td>0 V</td></tr>
</table>
By pressing the key continuously, increment can be provided continuously</td><td>

S※ ◀ key : Decrease the analog output
ZERO ▲ key : Increase the analog output</td></tr>
<tr><td>5</td><td>Fine adjustment on the maximum value of analog output
Press the SHIFT ENTER key.
The display section shows as “A_HI”.</td><td>
</td></tr>
</table>

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>6</td><td>
Press the SHIFT ENTER key.
The load display flashes on and off showing “A_HI”.
At the same time, the analog output equivalent to the maximum value of analog output is obtained.
Adjust so the output will become the maximum value with the right keys.
<table>
<tr><th></th><th>Current output (Optional)</th><th>Voltage output (Optional)</th></tr>
<tr><td>Maximum value</td><td>20 mA</td><td>10 V</td></tr>
</table>
By pressing the key continuously, increment can be provided continuously
</td><td>


S※ ◀ key : Decrease the analog output
ZERO ▲ key : Increase the analog output
</td></tr>
<tr><td>7</td><td>
Press the SHIFT ENTER key.
The load display will show “END”.

By pressing the SHIFT ENTER key again, the Measurement mode can be returned through the VCAL mode, then the present load will be shown.
At this moment, the result of fine adjustment on the minimum/maximum output of analog output can be renewed.
</td><td>




</td></tr>
</table>

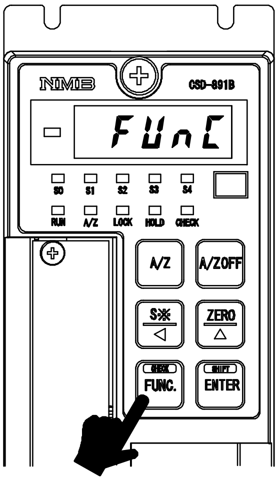
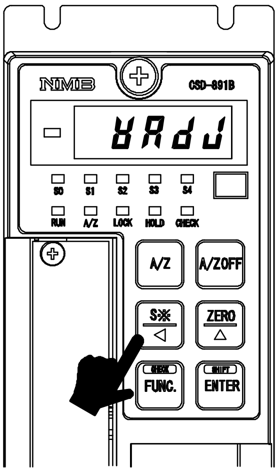
9−1−8. Fine adjustment 2 on analog output

The fine adjustment explained in this paragraph is the procedures with applying the actual weight.

⚠Warning ● Before making the fine adjustment, be sure to make scaling for the analog output by referring to the paragraph 9−1−6.
If neglected, deviation of output can't be adjusted during the fine adjustment.

● During the application on fine adjustment, if you want to suspend the fine adjustment, press the CHECK FUNC. key. The zero data and the span data are kept as they were before entering the fine adjustment, and the Measurement mode can be re−entered.

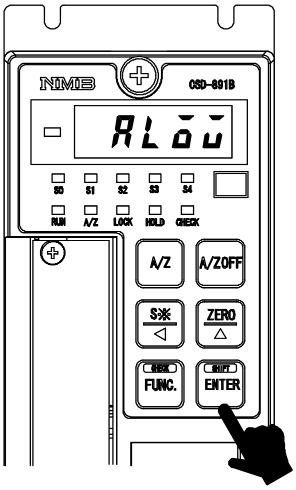
● Make fine adjustment in one (1) hour or so after feeding the power. You can make fine adjustment with safer conditions.

	Procedures	
1	Press the CHECK FUNC. key for one second. The load display shows "FUNC".	
2	Press the S※ ◄ key 10 times. The load display will change as "FUNC" →"CCAL"→"ACAL"→"LCAL"→"ZERO" →"SPAN"→"TARE"→"CHEK"→"MONT" →"VCAL"→"VADJ".	

<table>
<tr><th></th><th>Procedures</th><th></th></tr>
<tr><td>3</td><td>

Press the SHIFT ENTER key.
The load display will show “ALOW”.
At the same time, set the weight equivalent to the minimum output value of the analog output.

</td><td>

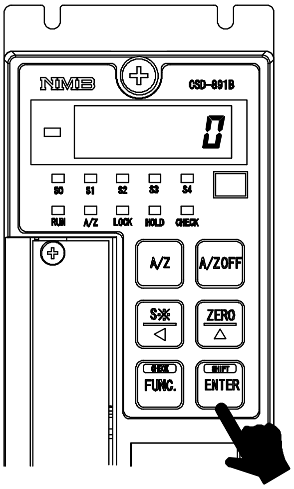


</td></tr>
<tr><td>4</td><td>

Press the SHIFT ENTER key.
The load display flashes on and off showing the present load value.
At the same time, adjust the deviation with the right keys so the analog output will meet with the actual weight.

By pressing the key continuously, increment can be provided continuously.

</td><td>

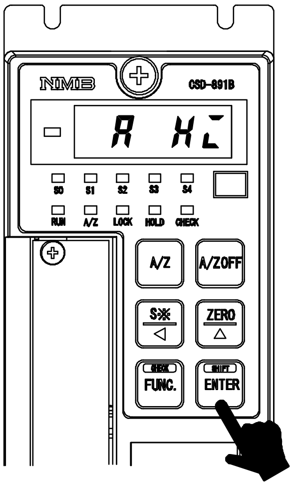


S※ ◄ key : Decrease the analog output
ZERO ▲ key : Increase the analog output

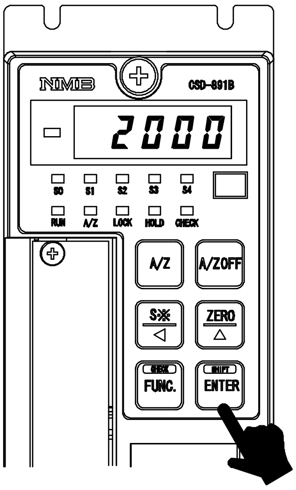
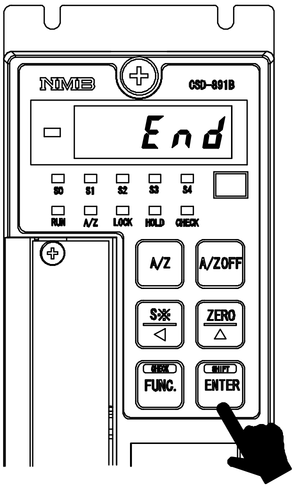
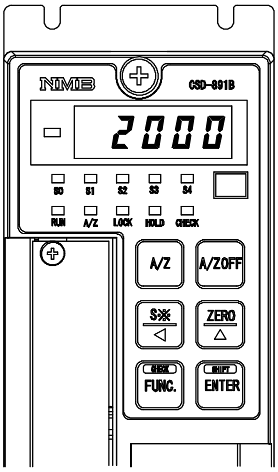
</td></tr>
<tr><td>5</td><td>

Fine adjustment on the maximum value of analog output
Press the SHIFT ENTER key.
The load display shows “A_HI”.
At the same time, set the weight equivalent to the maximum output value of the analog output.

</td><td>



</td></tr>
</table>

	Procedures	
6	Press the SHIFT ENTER key. The load display shows the current load value and flashes on and off. At the same time, adjust the deviation of analog output against the load with the right keys. By pressing the key continuously, increment can be provided continuously.	 S※ ◄ key : Decrease the analog output ZERO ▲ key : Increase the analog output
7	Press the SHIFT ENTER key. The load display shows “END”. By pressing the SHIFT ENTER key again, the Measurement mode can be returned through the VADJ mode, then the present load will be shown. At this moment, the result of fine adjustment on the minimum/maximum output of analog output can be renewed.	 

9−2. BCD output

⚠Warning

- When power is ON for the instrument with the external HOLD signal shorted, the BCD output will be as follows:
  - ① Even when the Display is targeted for the HOLD with the F−10, BCD outputs "00000" if the target for BCD output is set as Display.
  - ② When the BCD output is assumed to be the target of HOLD with the F−10, BCD output outputs "00000".
  - ③ Other than the case above ① and ②, the present load value will output after "00000" has output.
- In other than the Measurement mode, the BCD output will not be renewed. In due course, the "ERROR" for the BCD output won't be ON in other than the mode of the Measurement mode, so care should be taken fully.
- When the CHECK switch is applied, pay attention to the following point. By the ON operation of CHECK, the "OL" error display (BCD output is OVR.) might be shown.

9−2−1. Related function

F−40	Setting the target of BCD output	Changeover of Gross weight, Net weight or External input
F−41	Setting output logic for BCD data	Negative logic, Positive logic
F−42	Setting output logic for BCD polarity	Negative logic, Positive logic
F−43	Setting output logic for BCD flag	Negative logic, Positive logic
F−44	Setting output logic for BCD P.C.	Negative logic, Positive logic
F−45	Setting the width of BCD P.C.	2.5 ms, 5 ms, 10 ms, 25 ms, 125 ms
F−45	Setting the BCD output rate	4 times/s, 20 times/s, 50 times/s 100 times/s, 200 times/s

9−2−2. Specifications for BCD output

(1) Output logic

Relative function　Negative logic, Positive logic can be changeable by the related functions F−41, F−42, F−43 and F−44.

(2) Output data　BCD　5 digits parallel output

POL. (Polarity) ON at minus, and output OFF at plus.

P.C. (Print command)

ERROR

OVR. (Over)

(3) Input data	ZERO	Same as [ZERO ▲] key
	A/Z	Same as [A/Z] key
	A/Z OFF	Same as [A/Z OFF] key
	HOLD	HOLD the target selected by function F−10
	LOCK	Lock (prohibit) all key input
	BCD−ENABLE	Compulsive OFF for the related output with BCD (High−impedance)
	SEL.1、SEL.2	Selection of BCD output target. Effective when BCD output target is changeover of the external input (Setting of F−40：00002)

SEL.1	SEL.2	Output target
Open	Open	Gross weight
Short	Open	Part of A/Z cancel
Open	Short	Net weight
Short	Short	Gross weight

(4) Output target　Change of Gross weight, Net weight and Change of external input can be available with the related function F−40.

(5) Output times　Changeable to 4 times/s, 20 times/s, 50 times/s or 100 times/s by relative function F−46

9−2−3. Pin configurations for the BCD output connector

1	COM.	13	8×10^2	25	ERROR
2	1×10^0	14	1×10^3	26	P.C.
3	2×10^0	15	2×10^3	27	HOLD
4	4×10^0	16	4×10^3	28	LOCK
5	8×10^0	17	8×10^3	29	SEL.1
6	1×10^1	18	1×10^4	30	SEL.2
7	2×10^1	19	COM.	31	ZERO
8	4×10^1	20	2×10^4	32	A/Z
9	8×10^1	21	4×10^4	33	A/Z OFF
10	1×10^2	22	8×10^4	34	N.C.
11	2×10^2	23	POL.	35	BCD−ENABLE
12	4×10^2	24	OVR.	36	N.C.

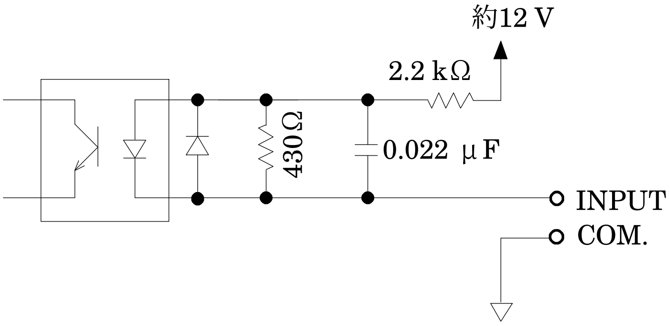
Suitable plug : 57−30360 made by DDK

- Never connects with the N.C. pins.

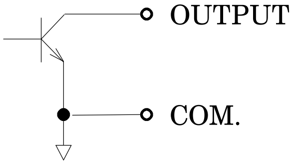
- Never connects with the N.C. pins.
- An internal circuit and photocoupler are insulated.

9−2−4. Equivalent circuit for input/output

(1) Equivalent circuit for input



(2) Equivalent circuit for output

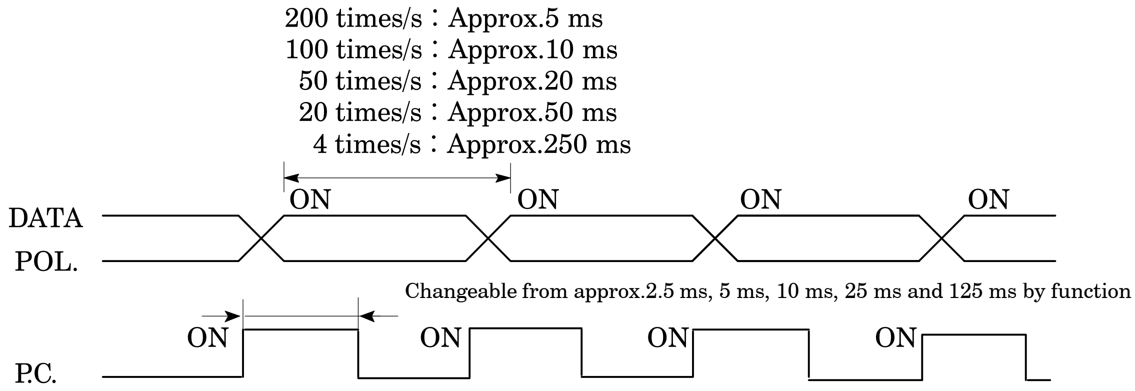


V_{CE}＝DC30 V、Ic＝20 mA MAX.

9−2−5. Timing chart

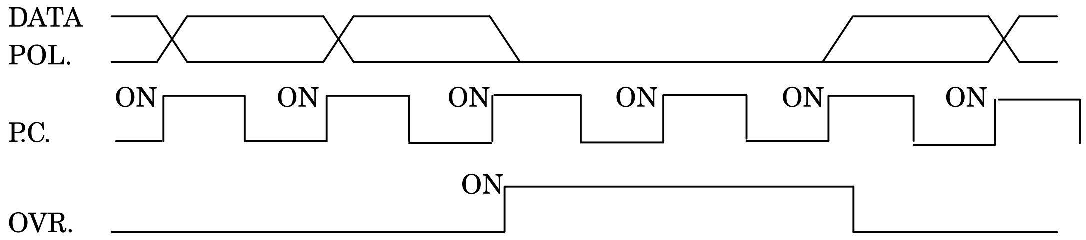
⚠Warning
- In case of reading each output data of the BCD output through the sequencer and so on, read them at the timing of "The edge from ON to OFF" for the P.C. (Print command). Moreover, read the "Input response delay time" for the reading instrument such as a sequencer and so on, with full considerations. If neglected, there may have the possibility that correct reading of data won't be obtained.

(1) Normal



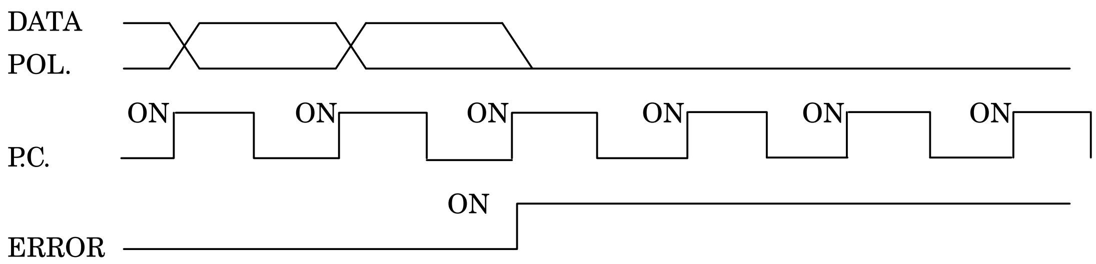
- At the time of data output of each P.C., DATA and POL., output transistor will become ON(Negative logic electrically).

(2) When the data is over−ranged



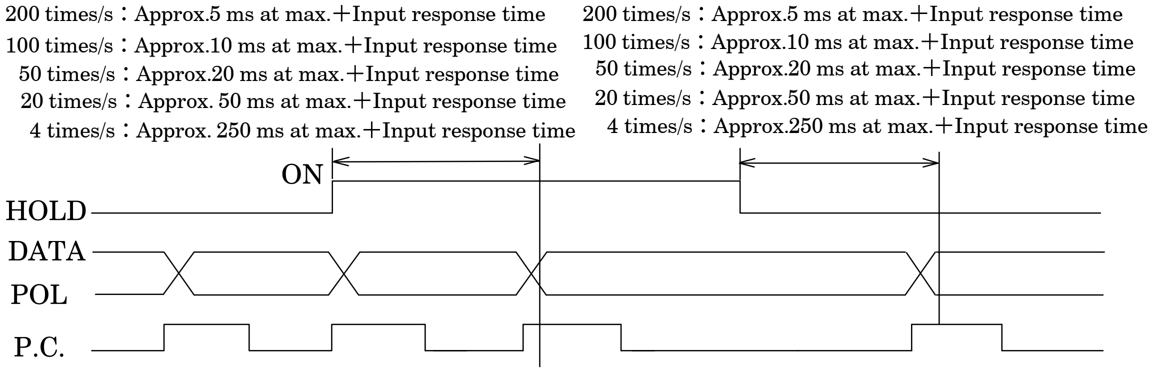
- At the time of OVR output, output transistor will at the OVR signal will become ON(Negative logic electrically). Moreover, for all of the DATA, output transistor will become OFF (Positive logic electrically) at the time of OVR output. (However, for the POL., normal OFF at the "OL", and normal ON at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

(3) When ERROR is occurred



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

(4) When the HOLD signal is input



- At the time of HOLD signal input, output transistor for the P.C. will be OFF condition. (Positive logic electrically.)
- After inputting the HOLD signal, it takes the following response times to freeze the DATA, POL or cancellation of HOLD is executed.
  At 200 times/s : Approx.5 ms at maximum+Input response time
  At 100 times/s : Approx.10 ms at maximum+Input response time
  At 50 times/s : Approx.20 ms at maximum+Input response time
  At 20 times/s : Approx.50 ms at maximum+Input response time
  At 4 times/s : Approx.250 ms at maximum+Input response time

9−2−6. Output condition

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

9−2−7. Selection of output logic for P.C.(Print command), and of its width

Selection of the P.C. logic for BCD output, and its width can be made by setting function. (Related function : F−44, F−45)

Select the P.C. width to meet with the output rate set by F−46, and execute the suitable selection according to the following list.

Output rate(F−46)	P.C. width				
	Approx.125 ms	Approx.25 ms	Approx.10 ms	Approx.5 ms	Approx.2.5 ms
4 times/s	○	○	○	○	○
20 times/s	×	○	○	○	○
50 times/s	×	×	○	○	○
100 times/s	×	×	×	○	○
200 times/s	×	×	×	×	○

○ : Possible to use, × : Impossible to use.(P.C. output doesn't operate correctly.)

⚠Warning ● The selection of P.C. width should be made adequately according to the output times set with the F−46. If neglected, the P.C. output will not operate correctly.

9−3. RS−232C interface

⚠Warning

- In Calibration mode, Fine adjustment, Check mode and Setting mode, the Error command will be sent against the command from the Host.
- When the CHECK switch is applied, pay attention to the following points.

  ① By ON operation of the CHECK, the instrument isn't in the Measurement mode anymore, however RS−232C interface responses to the command from the host.

  ② By ON operation of the CHECK, "OL" error display might be shown. At this time, when reading command for load is executed, the "OL" will be transferred to the host.

9−3−1. Related function

F−50	Setting the operation mode	Stream mode or Command mode
F−51	Setting the output target at the time of stream mode	Gross weight, Net weight or display interlock
F−52	Setting the baud rate	1 200, 2 400, 4 800, 9 600, 19 200 or 38 400 bps
F−53	Setting data bit length & parity	Parity bit ：Non, Even parity or Odd parity Data length ：7 bit or 8 bit
F−54	Setting the stop bit	1 bit or 2 bit
F−55	Setting the terminator	CR or CR+LF
F−56	Setting decimal point for sending code	No or Yes

- Setting of this function makes the setting activated immediately after setting.

9−3−2. Specifications for interface

(1) Method	Corresponds to RS−232C
(2) Communication method	Half duplex
(3) Specifications for signal	
Baud rate	1 200, 2 400, 4 800, 9 600, 19 200 or 38 400 bps
Data length	7 bit or 8 bit
Parity bit	Non, Even parity or Odd parity
Stop bit	1 bit or 2 bit
Terminator	CR or CR+LF
Synchronous method	Start−stop synchronous method
Transmission data	ASCII code
(4) Cable length	Within 15 m
(5) Input/Output monitor	with LED(Placed on the optional P.C. board)

9−3−3. Procedures of data transfer

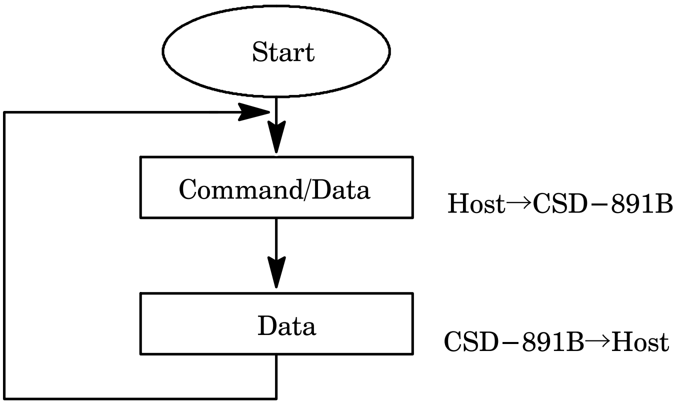
There are two kinds of data transfers in the instrument, that is, stream mode and command mode.

(1) Stream mode

The latest targeted data targeted/selected with the F−51 keep on outputting. However, output times will change depending on the setting of display times and baud rate.

(2) Command mode

By sending the determined command/data from the host (Personal computer, sequencer and so on) to the CSD−891B, the data will be send back to the host side from the CSD−891B corresponding to the command/data.
Be sure to execute communication according to the below procedures.



- The communication operation can be made in all of the modes. However, in the Calibration mode, Fine adjustment mode, Check mode and Monitor mode, the Error command will be sent.
- The flow control is not executed in the CSD−891B.
- The CTS/RTS signal isn't applied.
- The X flow control isn't performed.
- The operating communication is a conversational dialogue type.

9−3−4. Pin configurations for connector pin

(1) Pin configuration

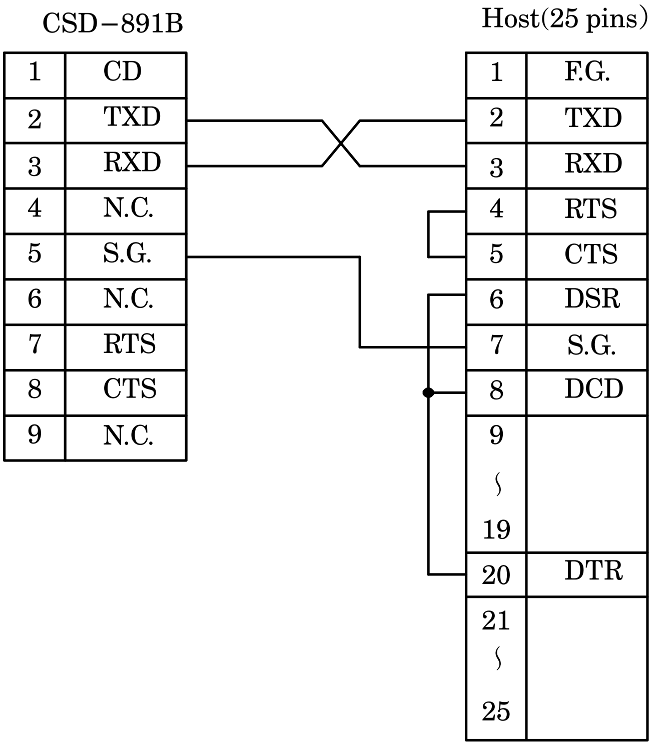
Pin number	Signal name
1	CD
2	TXD
3	RXD
4	N.C.
5	S.G.
6	N.C.
7	RTS
8	CTS
9	N.C.

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

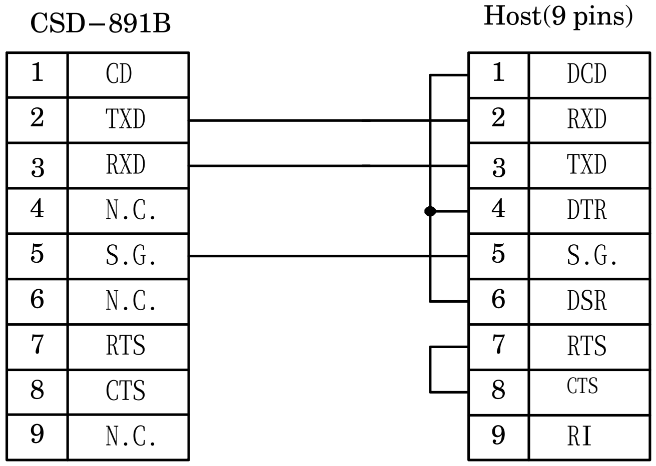
- ● The screws for the fixing base of plug at the connector of RS−232C interface is inch type thread.
- ● An internal circuit and photocoupler are insulated.

(2) Example of connection at the RS−232C interface

① Example 1

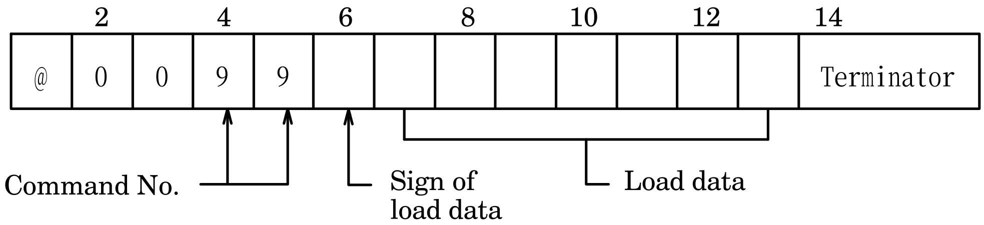


② Example 2



9−3−5. Data format

(1) Stream mode



- The setting with the F−55 can be entered to the terminator.
- Load weighing data enters from the right end.
- When the data is minus, "−" sign, and when plus, "+" sign is added.
- Load weighing data performs zero suppress.
- In case that the decimal point is set with the F−56, and at the same time the decimal point is specified with the F−01, it will be added to the specified position.
- The message is output at the time of overloaded.
- The empty sections are all spaces.

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

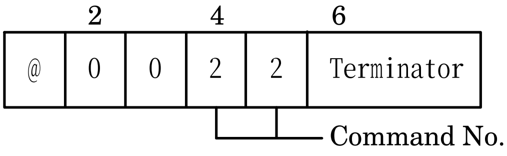
	2		4		6		8		10		12		14
@	0	0	9	9	+			0	.	1	2	3	Terminator

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

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

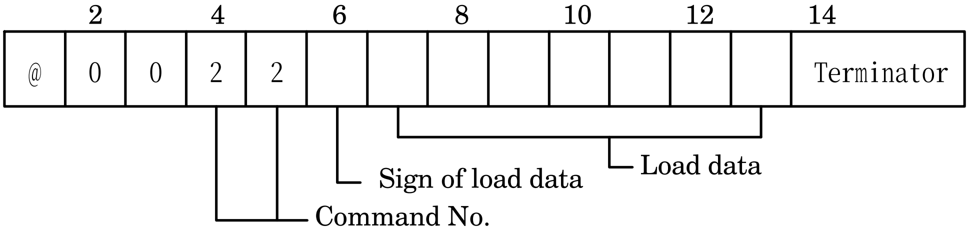
(2) Command mode

① Reading out the load data(Host→CSD−891B)



Command No.	Operation
20	Reading out the display interlocked data
21	Reading out Gross weight data
22	Reading out Net weight data
23	Reading out A/Z cancel data

Return(CSD−891B→Host)



- The load data enters from the right end.
- When the data is minus, "−" sign and when plus, "+" sign is added.
- Load weighing data performs zero suppress.
- In case that the decimal point is set with the F−56, and at the same time the decimal point is specified with the F−01, it will be added to the specified position.
- The message will be output at the time of overloaded.
- The empty sections are all spaces.

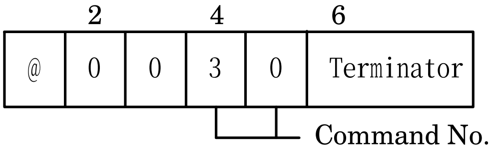
	2		4		6		8		10		12		14
@	0	0	2	2	−					1	2	3	Terminator

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

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

	2		4		6		8		10		12		14
@	0	0	2	2	−					0	L		Terminator

② Reading out comparative data (Host→CSD−891B)



Command No.	Operation
30	Reading out S0 data
31	Reading out S1 data
32	Reading out S2 data
33	Reading out S3 data
34	Reading out S4 data

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	3	0									Terminator

Command No.
Sign
Set value

- The load data enters from the right end.
- When the data is minus, "−" sign and when plus, "+" sign is added.
- The sign data performs zero suppress.
- In case that the decimal point is set with the F−56, and at the same time the decimal point is specified with the F−01, it will be added to the specified position.
- The empty sections are all spaces.

③ Reading−out the condition (Host→CSD−891B)

	2		4		6
@	0	0	4	0	Terminator

Command No.

Command No.	Operation
40	Reading out the condition

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	4	0	a	b	c	d	e				Terminator

Command No.
Condition
Space

a : RUN LED display "1"=ON, "0"=OFF
b : A/Z LED display "1"=ON, "0"=OFF
c : LOCK LED display "1"=ON, "0"=OFF
d : HOLD LED display "1"=ON, "0"=OFF
e : CHECK LED display "1"=ON, "0"=OFF

④ Reading out the comparative results (Host→CSD−891B)

	2		4		6
@	0	0	4	1	Terminator

Command No.

Command No.	Operation
41	Reading out comparative result

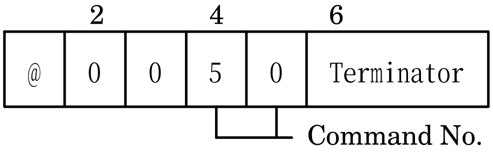
Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	4	1	S0	S1	S2	S3	S4				Terminator

Command No.
Condition
Space

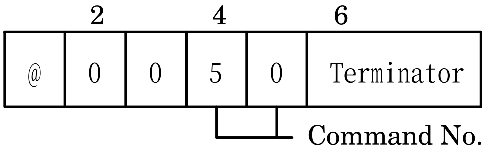
S0 : "1"=ON, "0"=OFF
S1 : "1"=ON, "0"=OFF
S2 : "1"=ON, "0"=OFF
S3 : "1"=ON, "0"=OFF
S4 : "1"=ON, "0"=OFF

⑤ Change of condition (Host→CSD−891B)

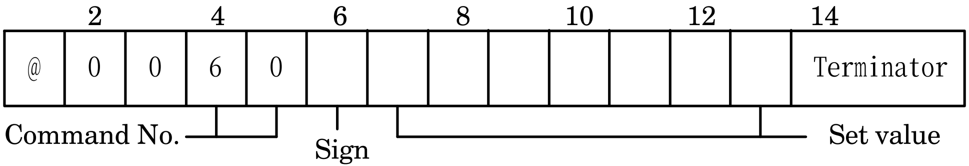


Command No.	Operation
50	Zero set
51	A/Z
52	A/Z OFF

Return(CSD−891B→Host)

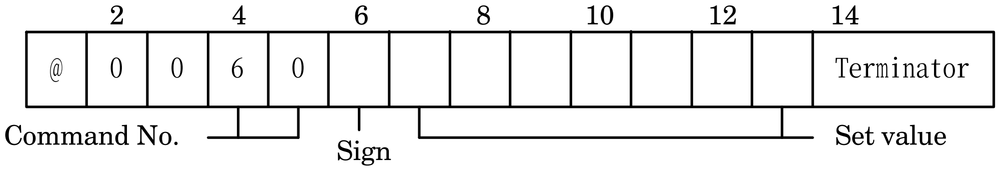


⑥ Writing comparative data (Host→CSD−891B)



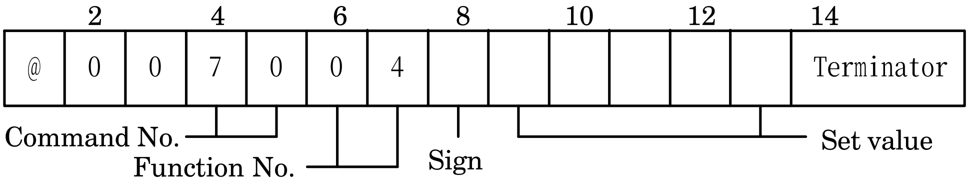
Command No.	Operation
60	Writing S0 data
61	Writing S1 data
62	Writing S2 data
63	Writing S3 data
64	Writing S4 data

Return(CSD−891B→Host)



- The set value enters from the right end.
- Setting range is from −99 000 to 99 999.
- Never add the decimal point.

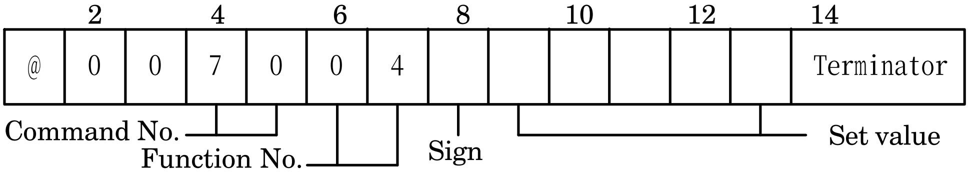
⑦ Writing the function data (Host→CSD−891B)



Function No.	Operation	Setting value
04	Setting of digital filter (Contents of F−04) Setting range：＝00000～00006	00000～00006
05	Setting of analog filter (Contents of F−05) Setting range：＝00000～00004	00000～00004
08	Setting of data width for zero tracking (Contents of F−08) 00000＝Zero tracking OFF Setting time：00000～00099 Unit：0.5D Data width of 49.5 D at the setting of “00099” ※Effective only when 00001～00099 by F−09 is set.	00000～00099

Function No.	Operation	Set value
09	Setting of time width for zero tracking (Contents of F－09) 00000＝Zero tracking OFF Setting range：00000～00099 Unit：0.1 s	00000～00099
15	Setting of the digital filter for the stabilized filter (Contents of F－15) 00000＝Stabilized filter OFF Setting range：00000～00006 ※Strength of the digital filter for the stabilization filter is selected. If the figure grows, the influence such as the vibrations will not appears easily on the display because the filter comes strongly. ※Effective only when 00001 to 00999 is set with F－16 and 00001 to 00999 is set with F－17.	00000～00006
16	Setting of the time width for the stabilized filter (Contents of F－16) 00000＝Stabilized filter OFF Setting range：00000～00999 Unit：0.01 s Time width：9.99s at the setting of "00999" ※Effective only when 00001 to 00006 is set with F－15 and 00001 to 00999 is set with F－17.	00000～00999
17	Setting of the data width for the stabilized filter (Contents of F－17) 00000＝Stabilized filter OFF Setting range：00000～00999 Unit：1D Data width：999D at the setting of "00999" ※Effective only when 00001 to 00006 is set with F－15 and 00001 to 00999 is set with F－16.	00000～00999
20	Setting of the target for the analog output (Contents of F－20) 00000：Gross weight 00001：Net weight	00000～00001
21	Display value at the minimum value for analog output (Contents of F－21) Setting range：－99999 to 99999　Unit：1 count	－99999～99999
22	Display value at the maximum value for analog output (Contents of F－22) Setting range：－99999 to 99999　Unit：1 count	－99999～99999
35	Setting of the data width for the comparator hysteresis (Contents of F－35) 00000＝Hysteresis data width OFF Setting range：00000～00099 Unit：1D Data width：99D at the setting of "00099"	00000～00099
36	Setting the time width for comparator hysteresis (Contents of F－36) 00000＝Hysteresis time width OFF Setting range：00000～00999 Unit：0.01 s Data width：9.99 s at the setting of "00999"	00000～00999

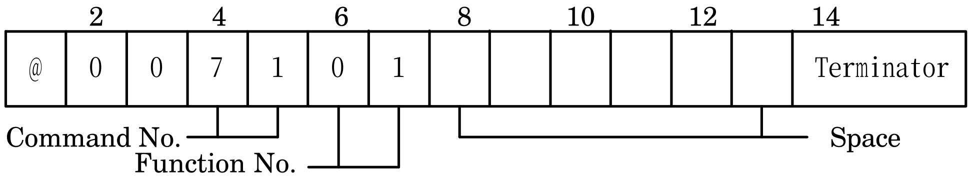
Return(CSD−891B→Host)



	2		4		6		8		10		12		14
@	0	0	7	0	0	4							Terminator

- The set value enters from the right end.
- Setting range is from −99 000 to 99 999.
- Never add the decimal point.

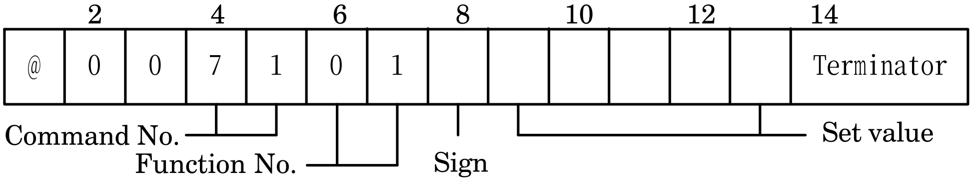
⑧ Reading out the function data(Host→CSD−891B)



Function No.	Operation
01	Reading out the setting value for the display position of decimal point (Contents of F−01)
02	Reading out the setting value of A/D damping rate(Contents of F−02)
03	Reading out the setting value of display rate (Contents of F−03)
04	Reading out the setting value of digital filter (Contents of F−04)
05	Reading out the setting value of analog filter (Contents of F−05)
06	Reading out the setting value of key lock (Contents of F−06)
08	Reading out the setting value of data width for zero tracking (Contents of F−08)
09	Reading out the setting value of time width for zero tracking (Contents of F−09)
10	Reading out the setting value of HOLD target (Contents of F−10)
11	Reading out the setting value of CHECK value (Contents of F−11)
12	Reading out the setting value of Bridge power supply voltage (Contents of F−12)
15	Reading out the setting value of digital filter for stabilized filter (Contents of F−15)
16	Reading out the setting value of time width for stabilized filter (Contents of F−16)
17	Reading out the setting value of data width for stabilized filter (Contents of F−17)
20	Reading out the setting value of analog output target (Contents of F−20)
21	Reading out the setting value of the display value at the minimum value of analog output (Contents of F−21)
22	Reading out the setting value of the display value at the maximum value of analog output (Contents of F−22)
30	Reading out the setting value of comparator operation (Contents of F−30)
31	Reading out the setting value of comparator target (Contents of F−31)
32	Reading out the setting value of comparator direction (Contents of F−32)
33	Reading out the setting value of the application status for comparator S0 (Contents of F−33
34	Reading out the setting value of the application status for comparator hysteresis (Contents of F−34)
35	Reading out the setting value of the application status for comparator hysteresis (Contents of F−35)
36	Reading out the setting value of the time width of comparator hysteresis (Contents of F−36)
40	Reading out the setting value of the BCD output target (Contents of F−40)
41	Reading out the setting value of the BCD output logic (Contents of F−41)
42	Reading out the setting value of the BCD polarity output logic (Contents of F−42)
43	Reading out the setting value of the BCD flag output logic (Contents of F−43)

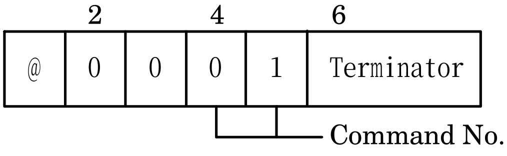
Function No.	Operation
44	Reading out the setting value of the BCD P.C. output logic (Contents of F−44)
45	Reading out the setting value of BCD P.C. width (Contents of F−45)
46	Reading out the setting value of BCD output times (Contents of F−46)
50	Reading out the setting value of RS−232C operation mode (Contents of F−50)
51	Reading out the setting value of RS−232C stream mode (Contents of F−51)
52	Reading out the setting value of RS−232C/422/485 baud rate (Contents of F−52)
53	Reading out the setting value of RS−232C/422/485 data bit length (Contents of F−53)
54	Reading out the setting value of RS−232C/422/485 stop bit (Contents of F−54)
55	Reading out the setting value of RS−232C/422/485 terminator (Contents of F−55)
56	Reading out the setting value of the decimal point of RS−232C/422/485 transmission code (Contents of F−56)
57	Reading out the setting value of ID number for RS−422/485 (Contents of F−57)
58	Reading out the setting value of RS−422/485 changeover (Contents of F−58)
59	Reading out the setting value of the delay times for RS−485 transmission (Contents of F−59)
65	Reading out the detection of stability range (Contents of F−65)
66	Reading out the detection of stability time (Contents of F−66)
72	Reading out the setting value of the effective time for external control input (Contents of F−37)
90	Reading out the increment value (for reference) (Contents of F−90)
91	Reading out the maximum display value (for reference) (Contents of F−91)
92	Reading out the actual load value (for reference) (Contents of F−92)
93	Reading out the zero calibration value (for reference) (Contents of F−93)
94	Reading out the span calibration value (for reference) (Contents of F−94)
97	Reading out the setting value of prohibiting calibration (Contents of F−97)

Return(CSD−891B→Host)



(3) Calibration Command mode

① Start of calibration mode(Host→CSD−891B)



Command No.	Operation
01	Calibration to register the output of strain gage applied transducer at the maximum display after setting the load to zero
02	Calibration to register the output of strain gage applied transducer at zero and the maximum display
03	Calibration to register read the output of strain gage applied transducer read after setting the load to zero or actual load.
04	Zero fine adjustment

05	Span fine adjustment
06	Calibration to register only zero point again

Return(CSD−891B→Host)

a : When @0001＋Terminator is transmitted.

	2		4		6		8		10		12		14
@	0	0	0	1					C	C	A	L	Terminator

b : When @0002＋Terminator is transmitted.

	2		4		6		8		10		12		14
@	0	0	0	2					A	C	A	L	Terminator

c : When @0003＋Terminator is transmitted.

	2		4		6		8		10		12		14
@	0	0	0	3					L	C	A	L	Terminator

d : When @0004＋Terminator is transmitted.

	2		4		6		8		10		12		14
@	0	0	0	4					Z	E	R	O	Terminator

e : When @0005＋Terminator is transmitted.

	2		4		6		8		10		12		14
@	0	0	0	5					S	P	A	N	Terminator

f : When @0006＋Terminator is transmitted.

	2		4		6		8		10		12		14
@	0	0	0	6					T	A	R	E	Terminator

- The empty sections are all spaces.

② Registration of the minimum digits (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	0								1	Terminator

Command No.

The minimum digits

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	0								1	Terminator

Command No.

The minimum digits

- Data of the minimum digits enters from the right end.
- The empty sections are all spaces.

③ Registration of the maximum display value (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	1					2	0	0	0	Terminator

Command No.

The maximum display value

Return(CSD−891B→Host)

a : In normal termination

	2		4		6		8		10		12		14
@	0	0	1	1					2	0	0	0	Terminator

Command No.

The maximum display value

b : Set in error

	2		4		6		8		10		12		14
@	0	0	1	1				E	R	-	2		Terminator

Command No.

Error code

- The maximum display value enters from the right end.
- Never add the decimal point.
- The maximum display value is the amount of the minimum digits.
- The empty sections are all spaces.

④ Register with the actual load value (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	2					2	0	0	0	Terminator

Command No.

Actual load value

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	2					2	0	0	0	Terminator

Command No.

Actual load value

- The actual load value enters from the right end.
- Never add the decimal point.
- The actual load value is the amount of the minimum digits.
- Then empty sections are all spaces.

⑤ Registration of zero point (Host→CSD−891B)

	2		4		6
@	0	0	1	3	Terminator

Command No.

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	3					Z	E	R	0	Terminator

Command No.

- Then empty sections are all spaces.

⑥ Registration of zero mV/V value (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	4				0	0	0	0	0	Terminator

Command No.
Sign
Zero mV/V value

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	4				0	0	0	0	0	Terminator

Command No.
Sign
Zero mV/V value

- Data of zero mV/V value enters up to the fourth place below decimal point (X.XXXX). (Ex： “01000” as 0.100 0 mV/V”.)
- Never add the decimal point.
- When the data is minus, “−” sign and when plus, “+” sign is added.
- The empty sections are all spaces.

⑦ Registration of span mV/V value (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	5				0	2	0	0	0	Terminator

Command No.
Sign
Span mV/V value

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	5				0	2	0	0	0	Terminator

Command No.
Sign
Span mV/V value

- Data of span mV/V value enters up to the fourth place below decimal point (X.XXXX). (Ex： “02000” as 0.200 0 mV/V”.)
- Never add the decimal point.
- When the data is minus, “−” sign and when plus, “+” sign is added.
- The empty sections are all spaces.

⑧ Registration of span (Host→CSD−891B)

	2		4		6
@	0	0	1	6	Terminator

Command No.

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	6					S	P	A	N	Terminator

Command No.

- The empty sections are all spaces.

⑨ Command for zero fine adjustment (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	7								0	Terminator

Command No.
Sign
Data of zero fine adjustment

Return(CSD−891B→Host)

a : In normal termination

	2		4		6		8		10		12		14
@	0	0	1	7								0	Terminator

Command No.
Sign
Data of zero fine adjustment

b : Set in error

	2		4		6		8		10		12		14
@	0	0	1	7				T	E	-	L		Terminator

Command No.
Error code

	2		4		6		8		10		12		14
@	0	0	1	7				T	E	-	H		Terminator

Command No.
Error code

- Data of the fine adjustment enters from the right end.
- Never add the decimal point.
- The actual load value is the amount of the minimum digits.
- Then empty sections are all spaces.

⑩ Command for span fine adjustment (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	8					2	0	0	0	Terminator

Command No.
Sign
Data of span fine adjustment

Return(CSD−891B→Host)

a : In normal termination

	2		4		6		8		10		12		14
@	0	0	1	8					2	0	0	0	Terminator

Command No.
Sign
Data of span fine adjustment

b : Set in error

	2		4		6		8		10		12		14
@	0	0	1	8				S	P	-	L		Terminator

Command No. Error code

	2		4		6		8		10		12		14
@	0	0	1	8				S	P	-	H		Terminator

Command No. Error code

- Data of the fine adjustment enters from the right end.
- Never add the decimal point.
- The actual load value is the amount of the minimum digits.
- Then empty sections are all spaces.

⑪ Command for finish of calibration (Host→CSD−891B)

	2		4		6
@	0	0	1	9	Terminator

Command No.

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	9						E	N	D	Terminator

Command No.

⑫ Command for reading out the calibration status (Host→CSD−891B)

	2		4		6
@	0	0	0	9	Terminator

Command No.

Return(CSD−891B→Host)

a : In normal termination

	2		4		6		8		10		12		14
@	0	0	0	9						E	N	D	Terminator

Command No.

b : In the calibration

	2		4		6		8		10		12		14
@	0	0	0	9				Z	E	R	O		Terminator

Command No.

	2		4		6		8		10		12		14
@	0	0	0	9				S	P	A	N		Terminator

Command No.

c : In error input

	2		4		6		8		10		12		14
@	0	0	0	9				T	E	-	L		Terminator

	2		4		6		8		10		12		14
@	0	0	0	9				T	E	-	H		Terminator

	2		4		6		8		10		12		14
@	0	0	0	9				S	P	-	L		Terminator

	2		4		6		8		10		12		14
@	0	0	0	9				S	P	-	H		Terminator

⑬ Termination command of calibration mode (Host→CSD−891B)

	2		4		6
@	0	0	0	0	Terminator

Command No.

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	0	0									Terminator

Command No.

- Then empty sections are all spaces.

9−3−6. Communication error process

The instrument returns the error command to the host side at the time of Communication error or Execution error.

	2		4		6		8
@	0	0	E	R	0	1	Terminator

Error Command No.

Error Command No.	Contents	Remarks
01	Error of impossible condition of execution	In the case of Function mode, Calibration mode, Fine adjustment mode and Setting mode.
02	Another error caused from the instrument	In the case of impossible to execute the receiving command.
10	Parity error	In the case of detecting the parity error.
11	Framing error	In case of detecting error for stop bit.
12	Overrun error	In the case of reading error for receiving command.
13	Error of data code, data length error	The receiving data code and data length are not the same.
14	No applicable command	The receiving command isn’t the same.

- In case that the Completion code (terminator) is not detected, the error code will not be returned.
- In case that the communication error command is returned from the instrument, consider its remedy at the host side.

9−4. RS−422/485 interface

⚠Warning

- ● The error code will be sent against the command from the host during Calibration mode, Fine adjustment mode, Check mode and Monitor mode.
- ● When CHECK switch is ON status, take care of the following points.
  - ① When CHECK switch will be ON status, the instrument will be out of the Measurement mode, but RS−422/485 interface will make response to the command from the Host.
  - ② By ON operation of CHECK, there may be a case that display will show as “OL” error. At the same time, executing the reading command for load makes the “OL” transmitted to the Host.
- ● The sending terminal is low impedance for 1 ms after finishing sending in the instrument. Therefore, to prevent from competing with other instruments, apply the sending wire (SDA, SDB) at the intervals of 1ms or more.

9−4−1. Related functions

F−52	Setting baud rates	1 200, 2 400, 4 800, 9 600, 19 200 or 38 400 bps
F−53	Setting a data bit length and a parity bit length	Parity bit ：Non, Even or Odd parity Data length ：7 bit or 8 bit
F−54	Setting a stop bit	1 bit or 2 bit
F−55	Setting the terminator	CR or CR+LF
F−56	Setting the decimal point in transmitting code	Non, Exist
F−57	Setting the ID No.	0～31
F−58	Change of RS−421/485	Operation of RS−422 or operation of RS−485
F−59	Setting the delay time for sending back the RS−485	Every 1 ms 0～999 1 ms (unit)

- ● The setting of this function will be effective immediately after setting the function.
- ● The function F−59 will become effective at the time of operation of RS−485. After completing the transmission at the host side by the function, set the time until the transmitting terminal of the instrument becomes high impedance.

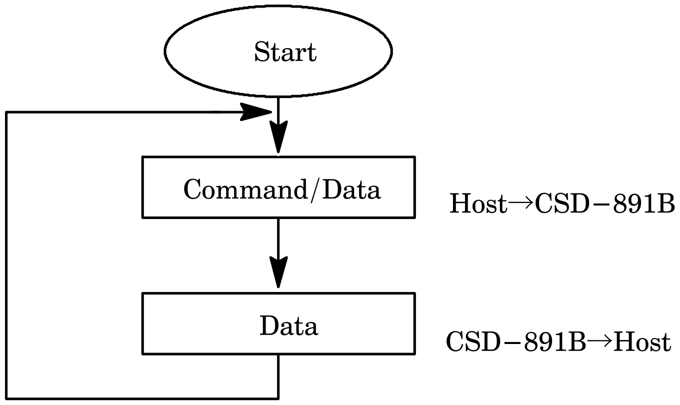
9−4−2. Specifications on interface

(1) Method	Based on RS−422/485
(2) Communication method	Half−duplex
(3) Specifications on Signal	
Baud rate	1 200, 2 400, 4 800, 9 600, 19 200 or 38 400 bps
Data bit length	7 bit or 8 bit
Parity bit	None, Even or Odd parity
Stop bit	1 bit or 2 bits
Terminator	CR or CR+LF
Synchronous method	Start−stop synchronous method
Communication data	ASCII code
Address	00 to 31
(4) Cable length	Approx.1 km
(5) Number of connections	32 sets at maximum (RS−422: 10 sets)
(6) Termination	Built−in (Yes/No can be selectable by the connection of terminal boards.)
(7) Change of RS−422/485	Setting by the function.
(8) Input/output monitor	With LED (The layout is shown on the P.C. board at rear side of terminal board.)

9−4−3. Procedure of data transmission

By sending the determined command/data from the host (personal computer, sequencer and so on) to the CSD−815, data will be sent back to the host side form the CSD−891B corresponding to the command/data.

Be sure to execute communication according to the below procedures.



- The communication operation can be made in all of the modes. However, in the Calibration mode, Fine adjustment mode, Check mode and Monitor mode, the Error command will be sent.
- The flow control is not executed in the CSD−891B.
- The CTS/RTS signal isn’t applied.
- The X flow control isn’t performed.
- The operating communication is a conversational dialogue type.

9−4−4. Pin configurations for connector pin

(1) Pin configuration

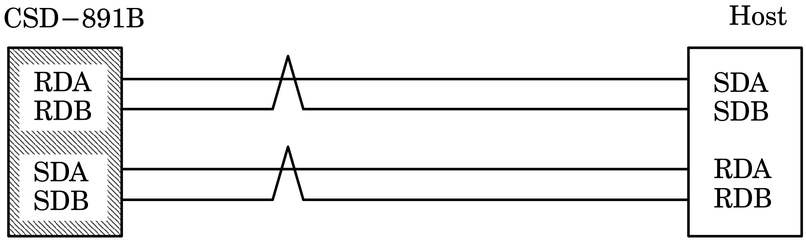
SDA	Differential output （＋）
SDB	Differential output （－）
RDA	Differential input （＋）
RDB	Differential input （－）
TRM.	Terminator
S.G.	Signal ground

- The TRM. is a terminal resistance. Connect the terminal resistance by shorting between the TRM. and RDM. at the last end of the host looking from the host(personal computer, sequencer and so on).
- For the connection, we recommend to apply twisted pair wires.
- An internal circuit and photocoupler are insulated.

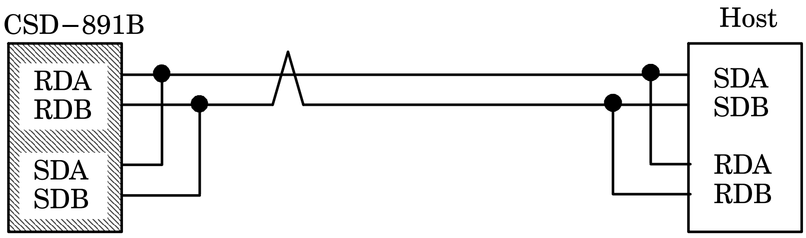
(2) Example of connection

① 1 to 1

RS−422



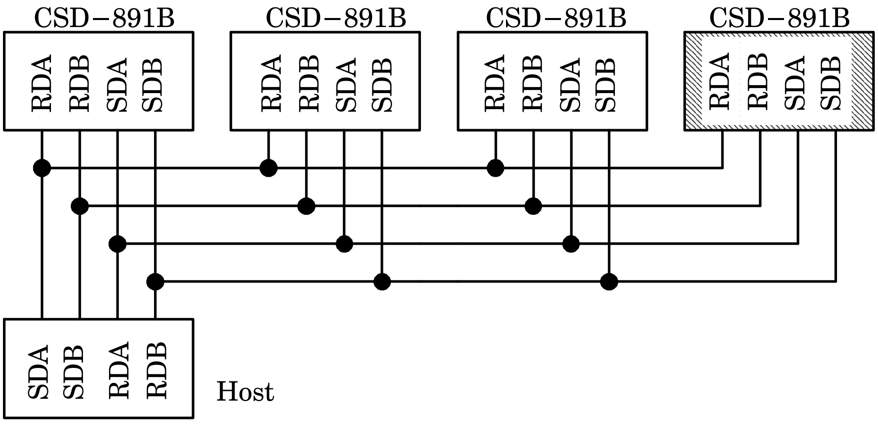
RS−485



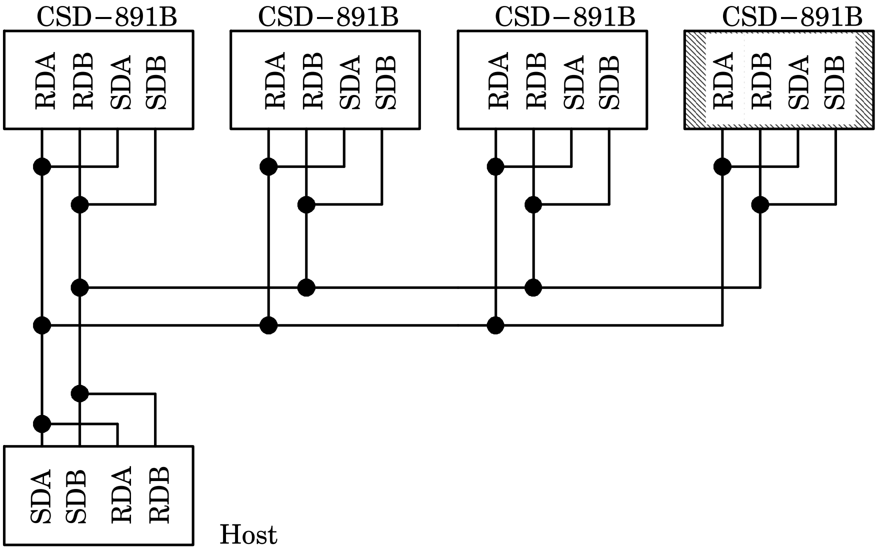
Connect the terminal resistance at the ▨ section.

② 1 to n

RS−422



RS−485

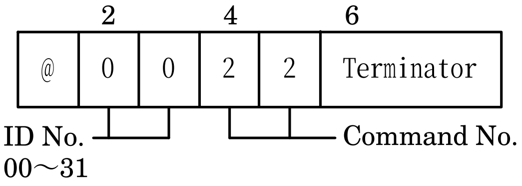


Connect the terminal resistance at the ▨ section.

9−4−5. Data format

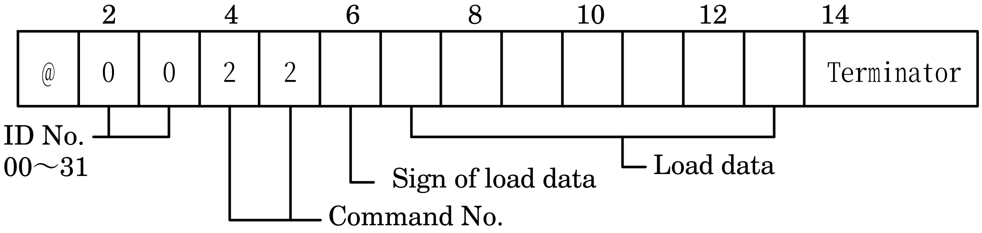
(1) Command mode

① Reading out the load data(Host→CSD−891B)

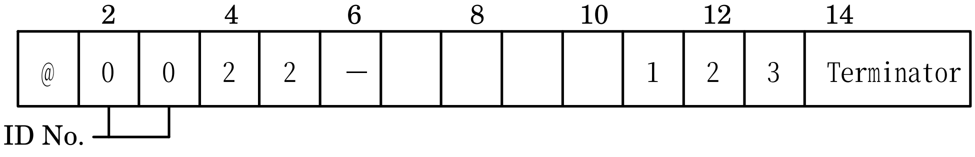


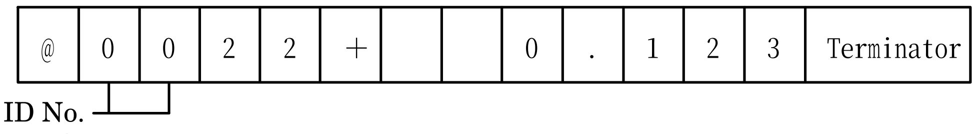
Command No.	Operation
20	Reading out the display interlocked data
21	Reading out Gross weight data
22	Reading out Net weight data
23	Reading out A/Z cancel data

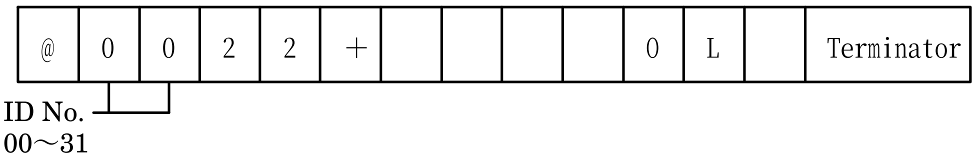
Return(CSD−891B→Host)

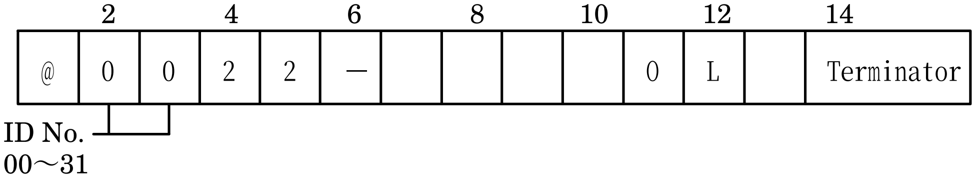


- The load data enters from the right end.
- When the data is minus, "−" sign and when plus, "+" sign is added.
- Load weighing data performs zero suppress.
- In case that the decimal point is set with the F−56, and at the same time the decimal point is specified with the F−01, it will be added to the specified position.
- The message will be output at the time of overloaded.
- The empty sections are all spaces.

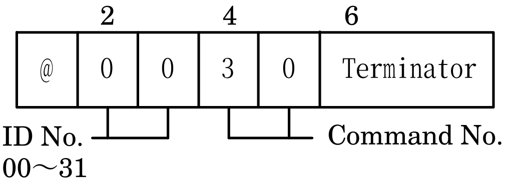






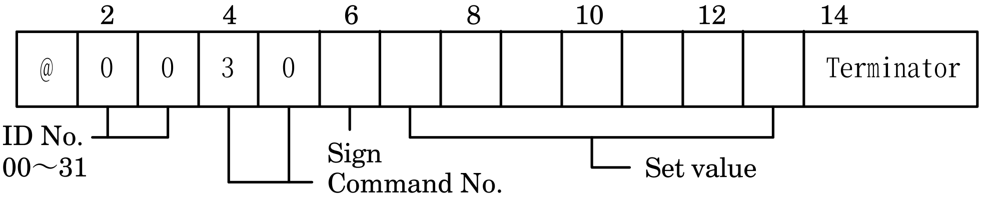


② Reading out comparative data (Host→CSD−891B)



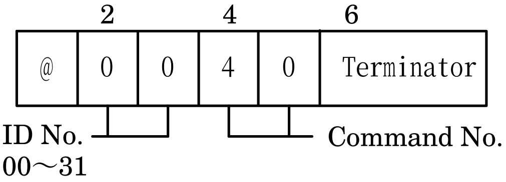
Command No.	Operation
30	Reading out S0 data
31	Reading out S1 data
32	Reading out S2 data
33	Reading out S3 data
34	Reading out S4 data

Return(CSD−891B→Host)



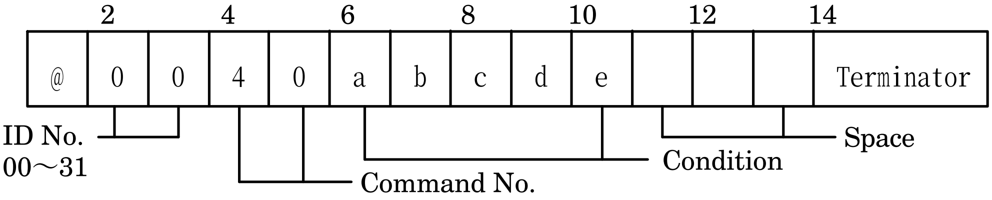
- The load data enters from the right end.
- When the data is minus, "−" sign and when plus, "+" sign is added.
- The sign data performs zero suppress.
- In case that the decimal point is set with the F−56, and at the same time the decimal point is specified with the F−01, it will be added to the specified position.
- The empty sections are all spaces.

③ Reading−out the condition (Host→CSD−891B)



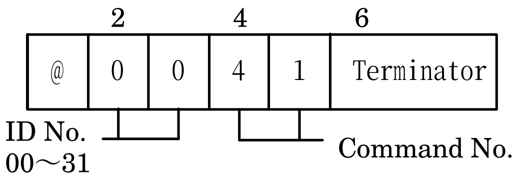
Command No.	Operation
40	Reading out the condition

Return(CSD−891B→Host)



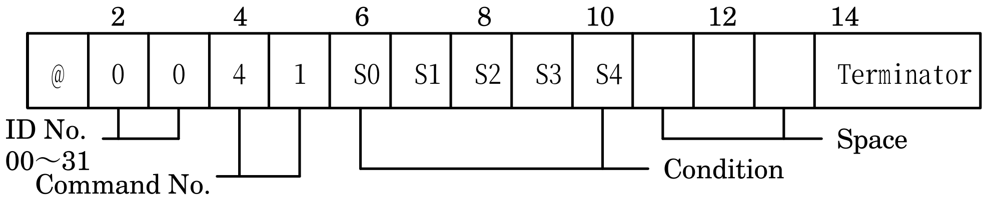
a：RUN	LED display	"1"=ON, "0"=OFF
b：A/Z	LED display	"1"=ON, "0"=OFF
c：LOCK	LED display	"1"=ON, "0"=OFF
d：HOLD	LED display	"1"=ON, "0"=OFF
e：CHECK	LED display	"1"=ON, "0"=OFF

④ Reading out the comparative data(Host→CSD−891B)



Command No.	Operation
41	Reading out comparative data

Return(CSD−891B→Host)



S0： “1”＝ON, “0”＝OFF

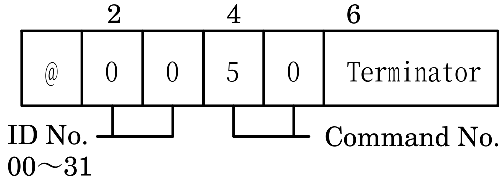
S1： “1”＝ON, “0”＝OFF

S2： “1”＝ON, “0”＝OFF

S3： “1”＝ON, “0”＝OFF

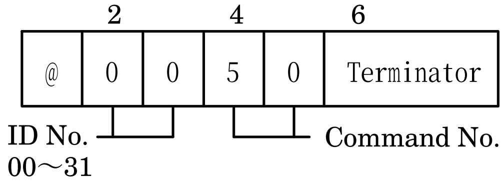
S4： “1”＝ON, “0”＝OFF

⑤ Change of condition(Host→CSD−891B)

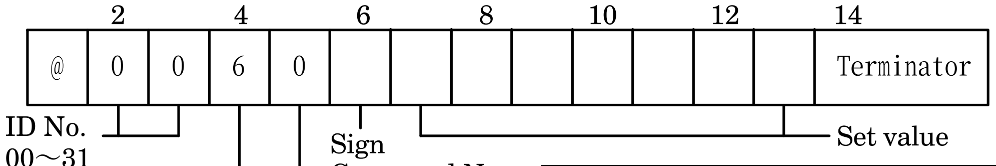


Command No.	Operation
50	Zero set
51	A/Z
52	A/Z OFF

Return(CSD−891B→Host)

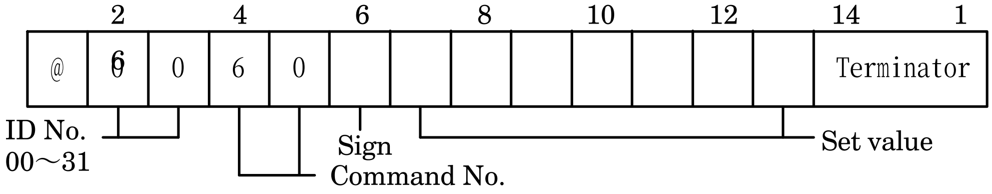


⑥ Writing comparative data(Host→CSD−891B)



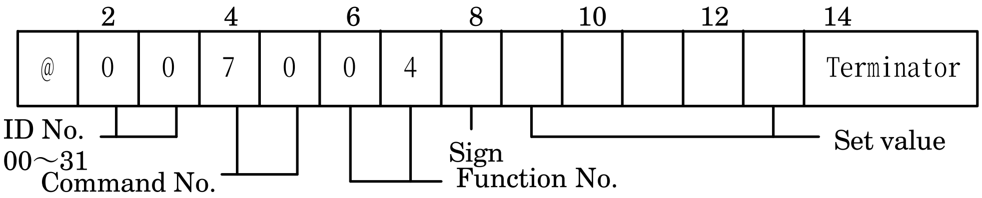
Command No.	Operation
60	Writing S0 data
61	Writing S1 data
62	Writing S2 data
63	Writing S3 data
64	Writing S4 data

Return(CSD−891B→Host)



- The set value enters from the right end.
- Setting range is from −99 000 to 99 999.
- Never add the decimal point.

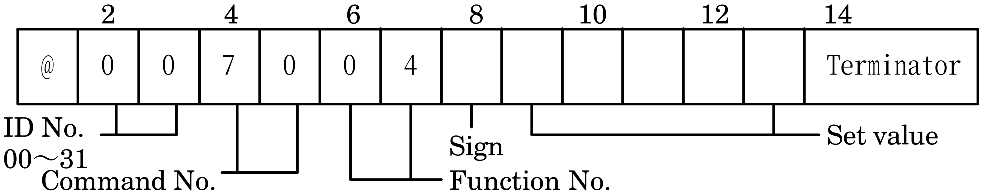
⑦ Writing the function data(Host→CSD−891B)



Function No.	Operation	Setting value
04	Setting of digital filter (Contents of F−04) Setting range：＝00000～00006	00000～00006
05	Setting of analog filter (Contents of F−05) Setting range：＝00000～00004	00000～00004
08	Setting of data width for zero tracking (Contents of F−08) 00000＝Zero tracking OFF Setting time：00000～00099 Unit：0.5D Data width of 49.5 D at the setting of “00099” ※Effective only when 00001～00099 by F−09 is set.	00000～00099
09	Setting of time width for zero tracking (Contents of F−09) 00000＝Zero tracking OFF Setting range：00000～00099 Unit：0.1 s	00000～00099
15	Setting of the digital filter for the stabilized filter (Contents of F−15) 00000＝Stabilized filter OFF Setting range：00000～00006 ※Strength of the digital filter for the stabilization filter is selected. If the figure grows, the influence such as the vibrations will not appears easily on the display because the filter comes strongly. ※Effective only when 00001 to 00999 is set with F−16 and 00001 to 00999 is set with F−17.	00000～00006
16	Setting of the time width for the stabilized filter (Contents of F−16) 00000＝Stabilized filter OFF Setting range：00000～00999 Unit：0.01 s Time width：9.99s at the setting of “00999” ※Effective only when 00001 to 00006 is set with F−15 and 00001 to 00999 is set with F−17.	00000～00999
17	Setting of the data width for the stabilized filter (Contents of F−17) 00000＝Stabilized filter OFF Setting range：00000～00999 Unit：1D Data width：999D at the setting of “00999” ※Effective only when 00001 to 00006 is set with F−15 and 00001 to 00999 is set with F−16.	00000～00999
20	Setting of the target for the analog output (Contents of F−20) 00000：Gross weight 00001：Net weight	00000～00001
21	Display value at the minimum value for analog output (Contents of F−21) Setting range：−99999 to 99999　Unit：1 count	−99999～99999

22	Display value at the maximum value for analog output (Contents of F−22) Setting range : −99999 to 99999 Unit : 1 count	−99999～99999
35	Setting of the data width for the comparator hysteresis (Contents of F−35) 00000＝Hysteresis data width OFF Setting range : 00000～00099 Unit : 1D Data width : 99D at the setting of "00099"	00000～00099
36	Setting the time width for comparator hysteresis (Contents of F−36) 00000＝Hysteresis time width OFF Setting range : 00000～00999 Unit : 0.01 s Data width : 9.99 s at the setting of "00999"	000000～00999

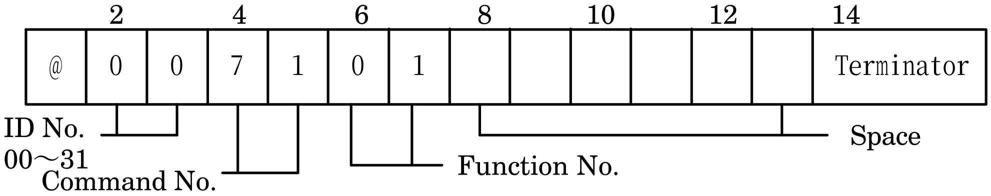
Return(CSD−891B→Host)



	2		4		6		8		10		12		14
@	0	0	7	0	0	4							Terminator

- The set value enters from the right end.
- Setting range is from −99 000 to 99 999.
- Never add the decimal point.

⑧ Reading out the function data(Host→CSD−891B)



	2		4		6		8		10		12		14
@	0	0	7	1	0	1							Terminator

Function No.	Operation
01	Reading out the setting value for the display position of decimal point (Contents of F−01)
02	Reading out the setting value of A/D damping rate(Contents of F−02)
03	Reading out the setting value of display rate (Contents of F−03)
04	Reading out the setting value of digital filter (Contents of F−04)
05	Reading out the setting value of analog filter (Contents of F−05)
06	Reading out the setting value of key lock (Contents of F−06)
08	Reading out the setting value of data width for zero tracking (Contents of F−08)
09	Reading out the setting value of time width for zero tracking (Contents of F−09)
10	Reading out the setting value of HOLD target (Contents of F−10)
11	Reading out the setting value of CHECK value (Contents of F−11)
12	Reading out the setting value of Bridge power supply voltage (Contents of F−12)
15	Reading out the setting value of digital filter for stabilized filter (Contents of F−15)
16	Reading out the setting value of time width for stabilized filter (Contents of F−16)
17	Reading out the setting value of data width for stabilized filter (Contents of F−17)
20	Reading out the setting value of analog output target (Contents of F−20)

21	Reading out the setting value of the display value at the minimum value of analog output (Contents of F−21)
22	Reading out the setting value of the display value at the maximum value of analog output (Contents of F−22)
30	Reading out the setting value of comparator operation (Contents of F−30)
31	Reading out the setting value of comparator target (Contents of F−31)
32	Reading out the setting value of comparator direction (Contents of F−32)
33	Reading out the setting value of the application status for comparator S0 (Contents of F−33
34	Reading out the setting value of the application status for comparator hysteresis (Contents of F−34)
35	Reading out the setting value of the application status for comparator hysteresis (Contents of F−35)
36	Reading out the setting value of the time width of comparator hysteresis (Contents of F−36)
40	Reading out the setting value of the BCD output target (Contents of F−40)
41	Reading out the setting value of the BCD output logic (Contents of F−41)
42	Reading out the setting value of the BCD polarity output logic (Contents of F−42)
43	Reading out the setting value of the BCD flag output logic (Contents of F−43)
44	Reading out the setting value of the BCD P.C. output logic (Contents of F−44)
45	Reading out the setting value of BCD P.C. width (Contents of F−45)
46	Reading out the setting value of BCD output times (Contents of F−46)
50	Reading out the setting value of RS−232C operation mode (Contents of F−50)
51	Reading out the setting value of RS−232C stream mode (Contents of F−51)
52	Reading out the setting value of RS−232C/422/485 baud rate (Contents of F−52)
53	Reading out the setting value of RS−232C/422/485 data bit length (Contents of F−53)
54	Reading out the setting value of RS−232C/422/485 stop bit (Contents of F−54)
55	Reading out the setting value of RS−232C/422/485 terminator (Contents of F−55)
56	Reading out the setting value of the decimal point of RS−232C/422/485 transmission code (Contents of F−56)
57	Reading out the setting value of ID number for RS−422/485 (Contents of F−57)
58	Reading out the setting value of RS−422/485 changeover (Contents of F−58)
59	Reading out the setting value of the delay times for RS−485 transmission (Contents of F−59)
65	Reading out the detection of stability range (Contents of F−65)
66	Reading out the detection of stability time (Contents of F−66)
72	Reading out the setting value of the effective time for external control input (Contents of F−37)
90	Reading out the increment value (for reference) (Contents of F−90)
91	Reading out the maximum display value (for reference) (Contents of F−91)
92	Reading out the actual load value (for reference) (Contents of F−92)
93	Reading out the zero calibration value (for reference) (Contents of F−93)
94	Reading out the span calibration value (for reference) (Contents of F−94)
97	Reading out the setting value of prohibiting calibration (Contents of F−97)

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	7	1	0	1							Terminator

ID No. 00～31
Command No.
Sign
Function No.
Set value

- The sign data perform zero suppress.

(2) Calibration Command mode

① Start of calibration mode(Host→CSD−891B)

	2		4		6
@	0	0	0	1	Terminator

ID No. 00～31
Command No.

Command No.	Operation
01	Calibration to register the output of strain gage applied transducer at the maximum display after setting the load to zero
02	Calibration to register the output of strain gage applied transducer at zero and the maximum display
03	Calibration to register read the output of strain gage applied transducer read after setting the load to zero or actual load.
04	Zero fine adjustment
05	Span fine adjustment
06	Calibration to register only zero point again

Return(CSD−891B→Host)

a : When @0001＋Terminator is transmitted.

	2		4		6		8		10		12		14
@	0	0	0	1					C	C	A	L	Terminator

ID No. 00～31

b : When @0002＋Terminator is transmitted.

	2		4		6		8		10		12		14
@	0	0	0	2					A	C	A	L	Terminator

ID No. 00～31

c : When @0003＋Terminator is transmitted

	2		4		6		8		10		12		14
@	0	0	0	3					L	C	A	L	Terminator

ID No. 00～31

d : When @0004＋Terminator is transmitted.

e : When @0005＋Terminator is transmitted.

f : When @0006＋Terminator is transmitted.

	2		4		6		8		10		12		14
@	0	0	0	4					Z	E	R	O	Terminator

ID No. 00～31

	2		4		6		8		10		12		14
@	0	0	0	5					S	P	A	N	Terminator

ID No. 00～31

	2		4		6		8		10		12		14
@	0	0	0	6					T	A	R	E	Terminator

ID No. 00～31

- The empty sections are all spaces.

② Registration of the minimum digits (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	0								1	Terminator

ID No. 00～31

Command No.

The minimum digits

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	0								1	Terminator

ID No. 00～31

Command No.

The minimum digits

- Data of the minimum digits enters from the right end.
- The empty sections are all spaces.

③ Registration of the maximum display value (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	1					2	0	0	0	Terminator

ID No. 00～31

Command No.

The maximum display value

Return(CSD−891B→Host)

a : In normal termination

	2		4		6		8		10		12		14
@	0	0	1	1					2	0	0	0	Terminator

ID No. 00～31

Command No.

The maximum display value

b : Set in error

	2		4		6		8		10		12		14
@	0	0	1	1				E	R	-	2		Terminator

ID No. 00～31
Command No.
error code

- The actual load value enters from the right end.
- Never add the decimal point.
- The actual load value is the amount of the minimum digits.
- Then empty sections are all spaces.

④ Registration with the actual load value (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	2					2	0	0	0	Terminator

ID No. 00～31
Command No.
Actual load value

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	2					2	0	0	0	Terminator

ID No. 00～31
Command No.
Actual load value

- The actual load value enters from the right end.
- Never add the decimal point.
- The actual load value is the amount of the minimum digits.
- Then empty sections are all spaces.

⑤ Registration of zero point (Host→CSD−891B)

	2		4		6
@	0	0	1	3	Terminator

ID No. 00～31
Command No.

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	3					Z	E	R	0	Terminator

ID No. 00～31
Command No.

- Then empty sections are all spaces.

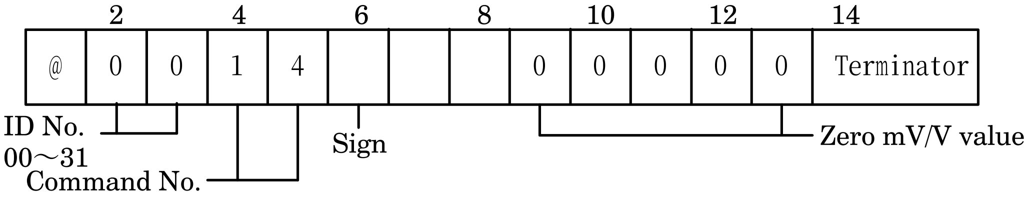
⑥ Registration of zero mV/V value (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	4				0	0	0	0	0	Terminator

ID No. 00～31
Sign
Zero mV/V value
Command No.

Return(CSD−891B→Host)

- Data of zero mV/V value enters up to the fourth place below decimal point (X.XXXX). (Ex： "01000" as 0.100 0 mV/V".)
- Never add the decimal point.



- When the data is minus, "－" sign and when plus, "＋" sign is added.
- The empty sections are all spaces.

⑦ Registration of span mV/V value (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	5				0	2	0	0	0	Terminator

ID No.
00～31
Command No.
Sign
Span mV/V value

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	5				0	2	0	0	0	Terminator

ID No.
00～31
Command No.
Sign
Span mV/V value

- Data of span mV/V value enters up to the fourth place below decimal point (X.XXXX). (Ex： “02000” as 0.200 0 mV/V”.)
- Never add the decimal point.
- The empty sections are all spaces.

⑧ Registration of span (Host→CSD−891B)

	2		4		6
@	0	0	1	6	Terminator

ID No.
00～31
Command No.

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	1	6					S	P	A	N	Terminator

ID No.
00～31
Command No.

- The empty sections are all spaces.

⑨ Command for zero fine adjustment (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	7								0	Terminator

ID No.
00～31
Command No.
Sign
Data of zero fine adjustment

Return(CSD−891B→Host)

a ：In normal termination

	2		4		6		8		10		12		14
@	0	0	1	7								0	Terminator

ID No.
00～31
Command No.
Sign
Data of zero fine adjustment

b : Set in error

	2		4		6		8		10		12		14
@	0	0	1	7				T	E	-	L		Terminator

ID No.
00～31
Command No.
Error code

	2		4		6		8		10		12		14
@	0	0	1	7				T	E	-	H		Terminator

ID No.
00～31
Command No.
Error code

- ● Data of the fine adjustment enters from the right end.
- ● Never add the decimal point.
- ● The actual load value is the amount of the minimum digits.
- ● Then empty sections are all spaces.

⑩ Command for span fine adjustment (Host→CSD−891B)

	2		4		6		8		10		12		14
@	0	0	1	8					2	0	0	0	Terminator

ID No.
00～31
Command No.
Sign
Data of span fine adjustment

Return(CSD−891B→Host)

a : In normal termination

	2		4		6		8		10		12		14
@	0	0	1	8					2	0	0	0	Terminator

ID No.
00～31
Command No.
Sign
Data of span fine adjustment

b : Set in error

	2		4		6		8		10		12		14
@	0	0	1	8				S	P	-	L		Terminator

ID No.
00～31
Command No.
Error code

	2		4		6		8		10		12		14
@	0	0	1	8				S	P	-	H		Terminator

ID No.
00～31
Command No.
Error code

- ● Data of the fine adjustment enters from the right end.
- ● Never add the decimal point.
- ● The actual load value is the amount of the minimum digits.
- ● Then empty sections are all spaces.

⑪ Command for finish of calibration (Host→CSD−891B)

	2		4		6
@	0	0	1	9	Terminator

ID No. 00~31

Command No.

Return(CSD−891B→Host)

	2		4		6		8		10		12	14
@	0	0	1	9						E	N	D	Terminator

ID No. 00~31

Command No.

⑫ Command for reading out the calibration status (Host→CSD−891B)

	2		4		6
@	0	0	0	9	Terminator

ID No. 00~31

Command No.

Return(CSD−891B→Host)

a : In normal termination

	2		4		6		8		10		12		14
@	0	0	0	9						E	N	D	Terminator

ID No. 00~31

Command No.

b : In the calibration

	2		4		6		8		10		12		14
@	0	0	0	9				Z	E	R	O		Terminator

ID No. 00~31

Command No.

	2		4		6		8		10		12		14
@	0	0	0	9				S	P	A	N		Terminator

ID No. 00~31

Command No.

c ：In error input

	2		4		6		8		10		12		14
@	0	0	0	9				T	E	-	L		Terminator

ID No. 00～31

Command No.

	2		4		6		8		10		12		14
@	0	0	0	9				T	E	-	H		Terminator

ID No. 00～31

Command No.

	2		4		6		8		10		12		14
@	0	0	0	9				S	P	-	L		Terminator

ID No. 00～31

Command No.

	2		4		6		8		10		12		14
@	0	0	0	9				S	P	-	H		Terminator

ID No. 00～31

Command No.

⑬ Termination command of calibration mode (Host→CSD−891B)

	2		4		6
@	0	0	0	0	Terminator

ID No. 00～31

Command No.

Return(CSD−891B→Host)

	2		4		6		8		10		12		14
@	0	0	0	0									Terminator

ID No. 00～31

Command No.

- Then empty sections are all spaces.

9−4−6. Communication error process

The instrument returns the error command to the host side at the time of Communication error or Execution error.

	2		4		6		8
@	0	0	E	R	0	1	Terminator

ID No.
00～31

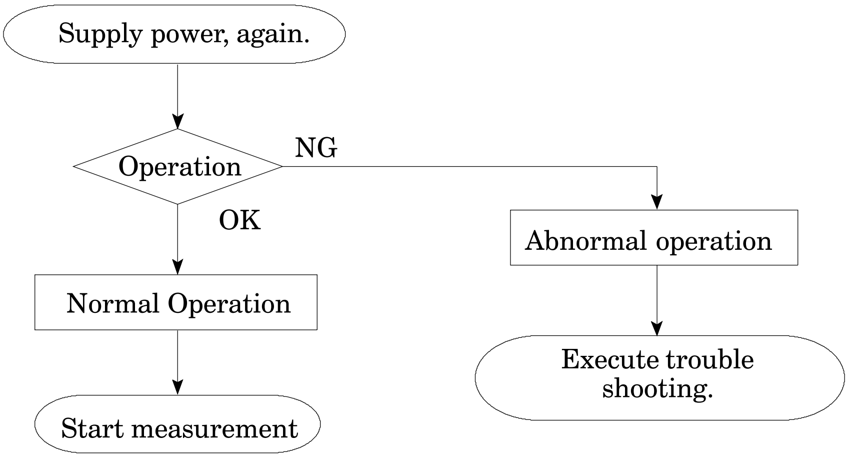
Error Command No.

Error Command No.	Contents	Remarks
01	Error of impossible condition of execution	In the case of Function mode, Calibration mode, Fine adjustment mode and Setting mode.
02	Another error caused from the instrument	In the case of impossible to execute the receiving command.
10	Parity error	In the case of detecting the parity error.
11	Framing error	In case of detecting error for stop bit.
12	Overrun error	In the case of reading error for receiving command.
13	Error of data code, data length error	The receiving data code and data length are not the same.
14	No applicable command	The receiving command isn’t the same.

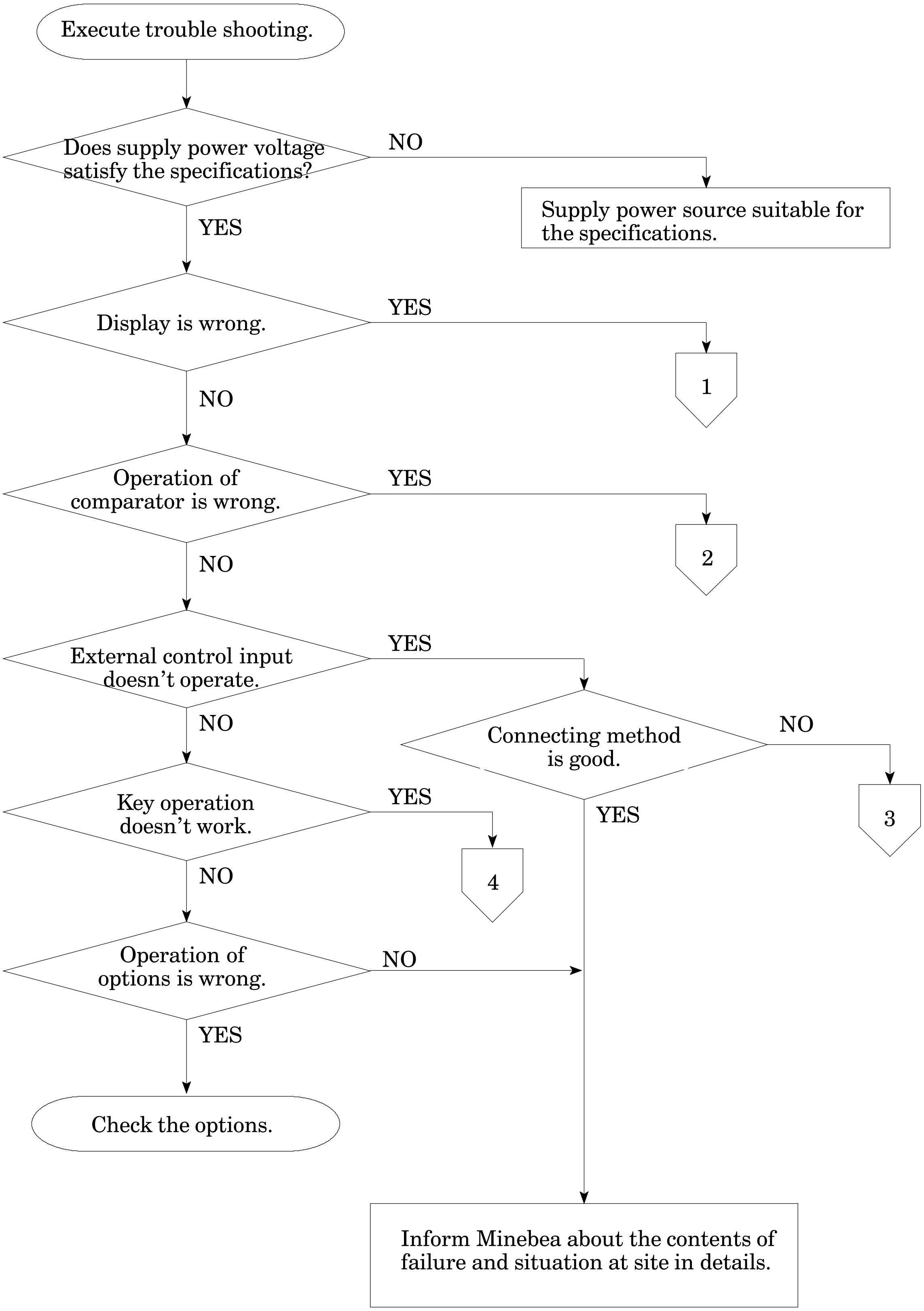
- In case that the Completion code (terminator) is not detected, the error code will not be returned.
- In case that the communication error command is returned from the instrument, consider its remedy at the host side.

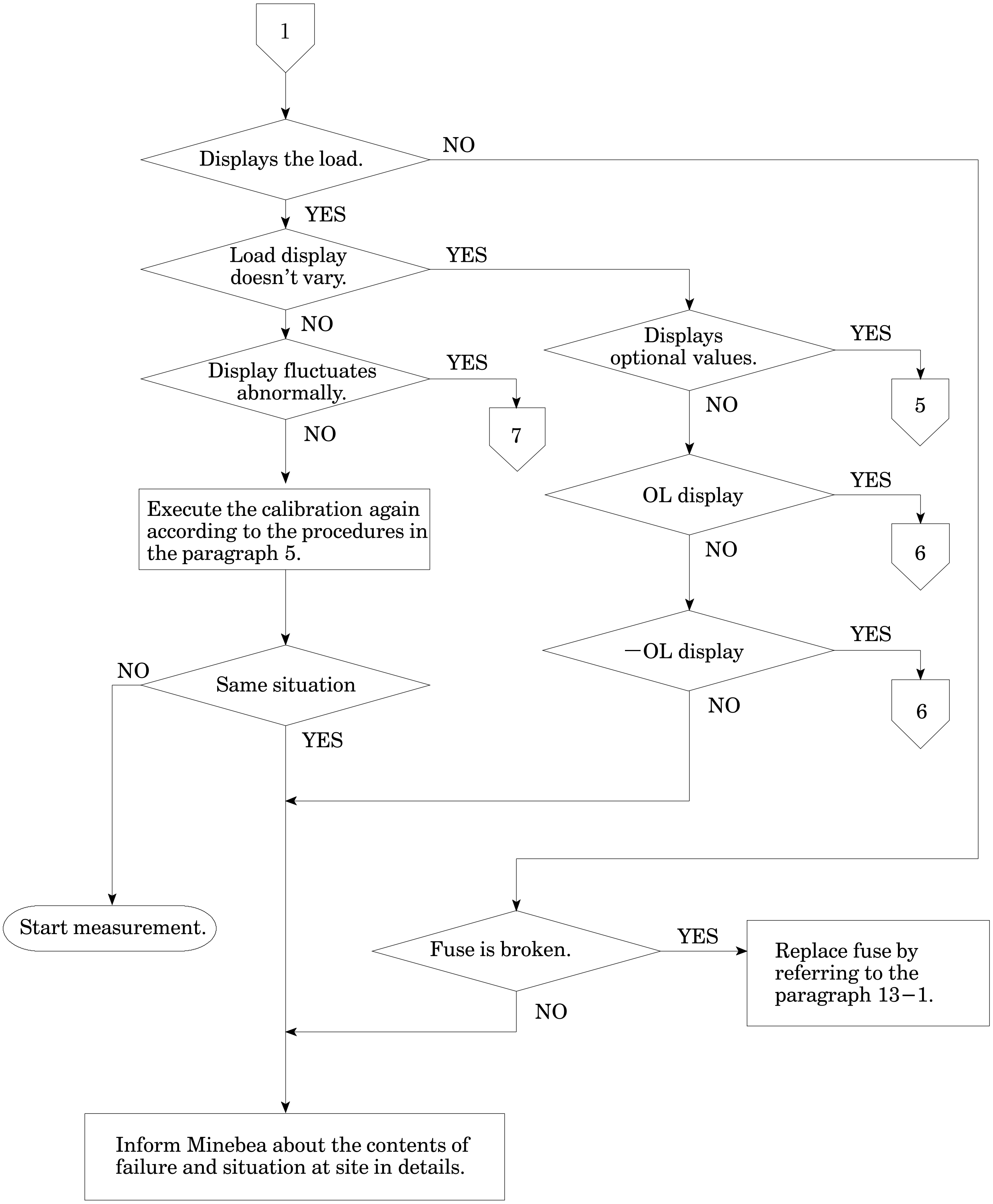
10. Trouble shooting

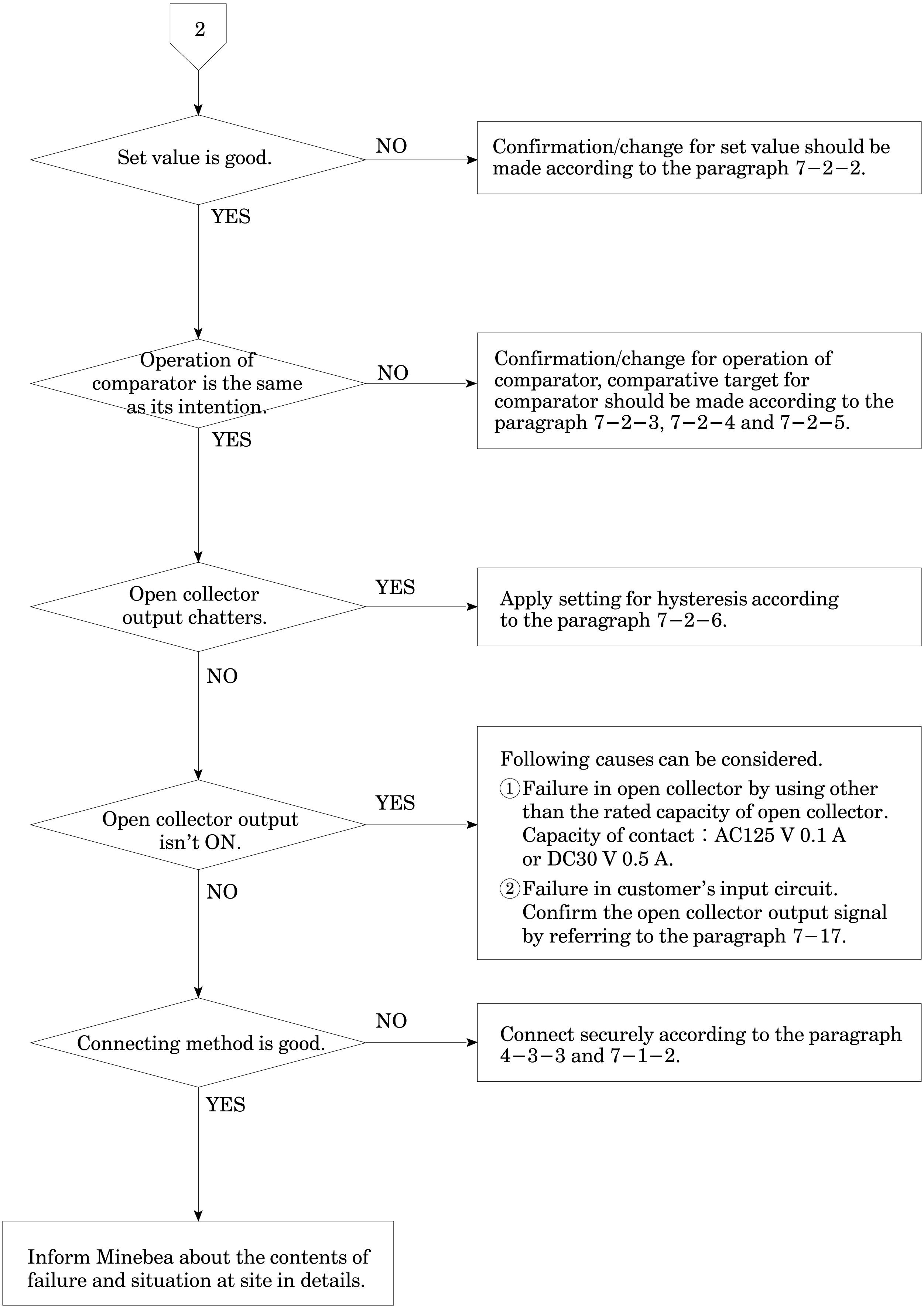
When abnormal point(s) is/are found during the operation of the instrument, check by the following procedures. However, when you can't find applicable item nor solve the symptom of trouble even after you have taken some measures, contact with Minebea.



10−1. Execute trouble shooting




1
Displays the load.
NO
YES
Load display doesn't vary.
YES
NO
Displays optional values.
YES
5
Display fluctuates abnormally.
YES
7
NO
OL display
YES
6
NO
Execute the calibration again according to the procedures in the paragraph 5.
−OL display
YES
6
NO
Same situation
YES
Start measurement.
Fuse is broken.
YES
Replace fuse by referring to the paragraph 13−1.
NO
Inform Minebea about the contents of failure and situation at site in details.



Set value is good.

Confirmation/change for set value should be made according to the paragraph 7−2−2.

Operation of comparator is the same as its intention.

Confirmation/change for operation of comparator, comparative target for comparator should be made according to the paragraph 7−2−3, 7−2−4 and 7−2−5.

Open collector output chatters.

Apply setting for hysteresis according to the paragraph 7−2−6.

Open collector output isn't ON.

Following causes can be considered.

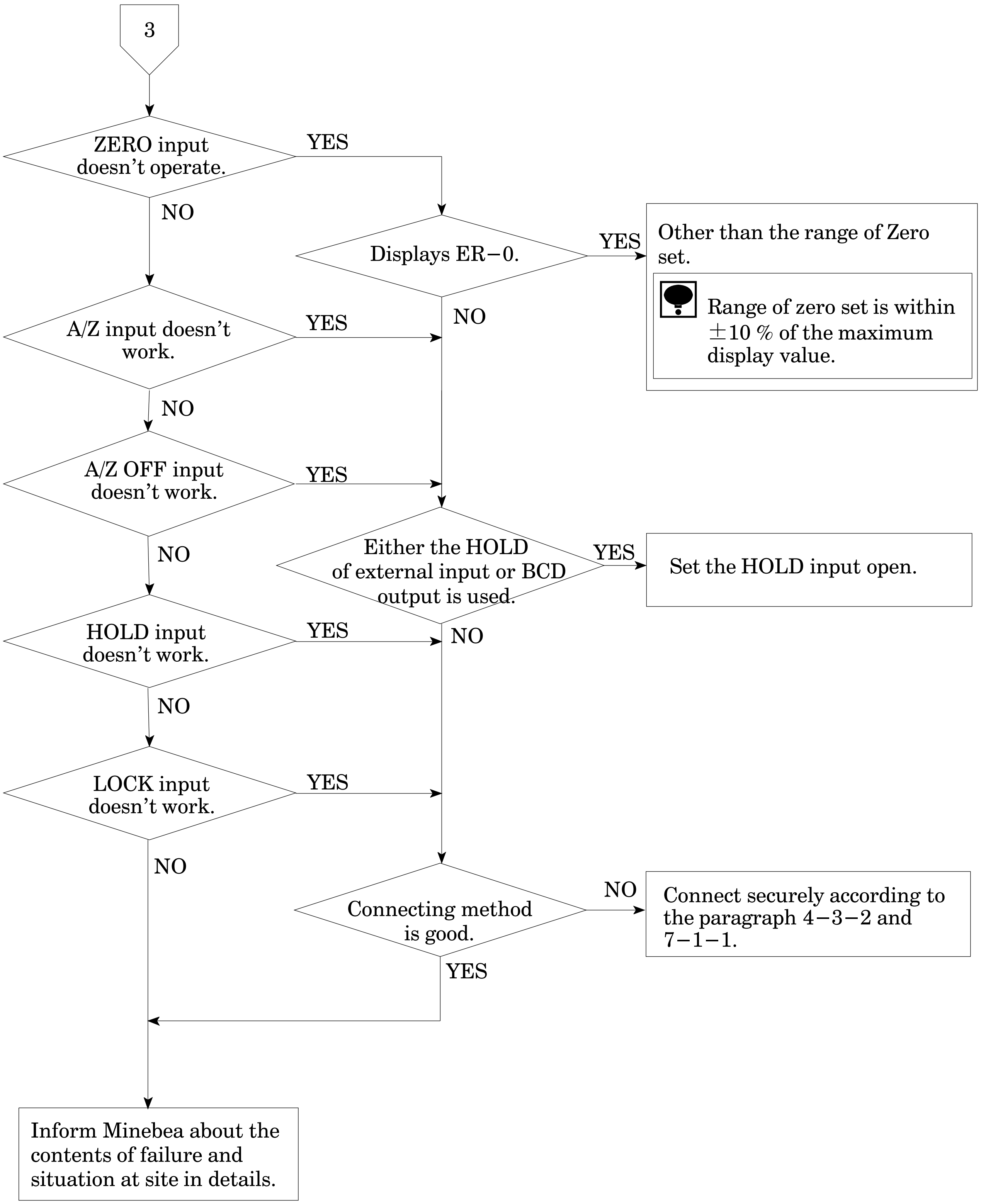
①Failure in open collector by using other than the rated capacity of open collector.
Capacity of contact：AC125 V 0.1 A or DC30 V 0.5 A.

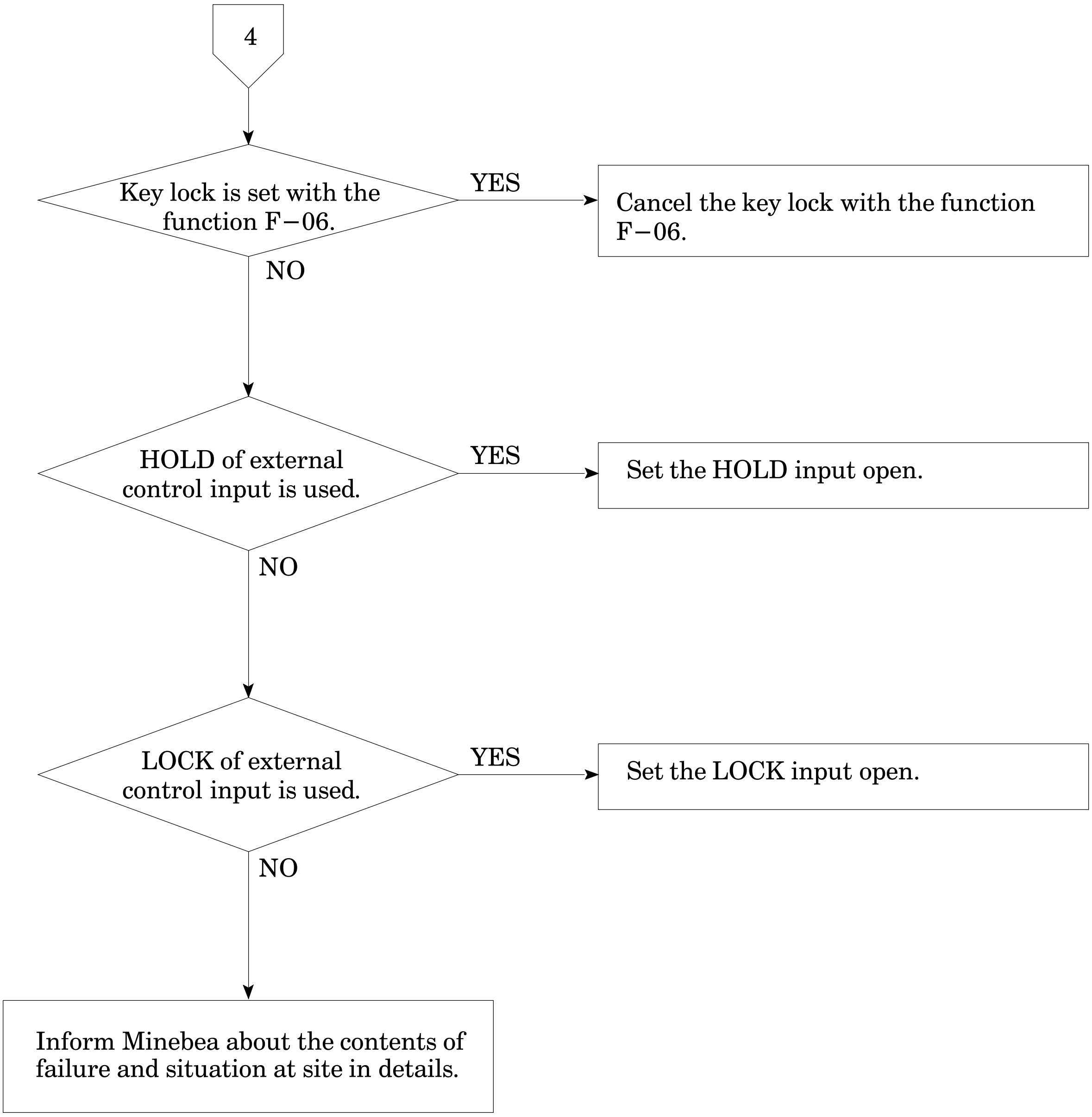
②Failure in customer's input circuit.
Confirm the open collector output signal by referring to the paragraph 7−17.

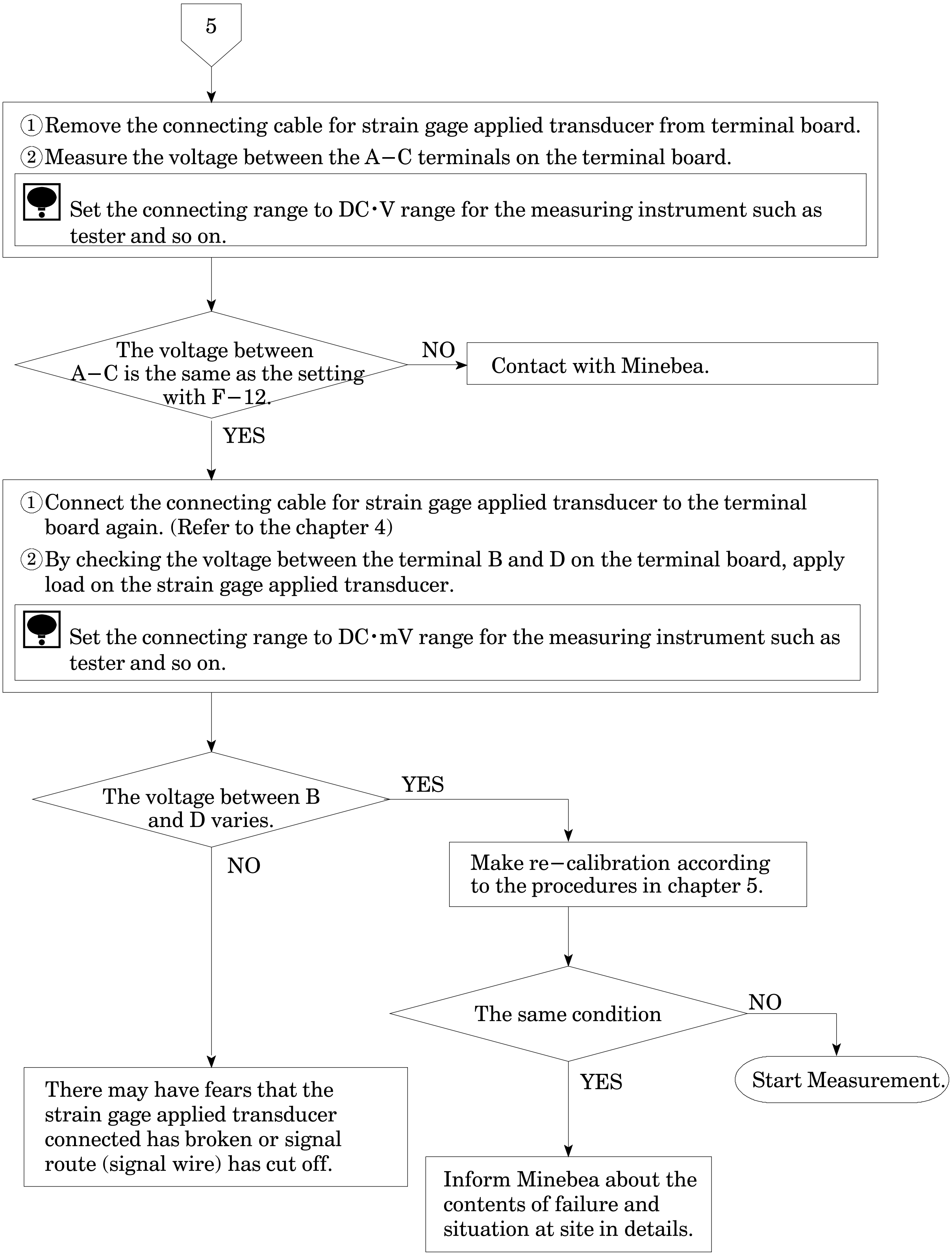
Connecting method is good.

Connect securely according to the paragraph 4−3−3 and 7−1−2.

Inform Minebea about the contents of failure and situation at site in details.


3
ZERO input doesn't operate.
YES
NO
Displays ER−0.
YES
Other than the range of Zero set.
Range of zero set is within ±10 % of the maximum display value.
NO
A/Z input doesn't work.
YES
NO
A/Z OFF input doesn't work.
YES
NO
Either the HOLD of external input or BCD output is used.
YES
Set the HOLD input open.
NO
HOLD input doesn't work.
YES
NO
LOCK input doesn't work.
YES
NO
Connecting method is good.
NO
Connect securely according to the paragraph 4−3−2 and 7−1−1.
YES
Inform Minebea about the contents of failure and situation at site in details.


4
Key lock is set with the function F−06.
YES
Cancel the key lock with the function F−06.
NO
HOLD of external control input is used.
YES
Set the HOLD input open.
NO
LOCK of external control input is used.
YES
Set the LOCK input open.
NO
Inform Minebea about the contents of failure and situation at site in details.



①Remove the connecting cable for strain gage applied transducer from terminal board.

②Measure the voltage between the A−C terminals on the terminal board.

Set the connecting range to DC･V range for the measuring instrument such as tester and so on.

The voltage between A−C is the same as the setting with F−12.

Contact with Minebea.

①Connect the connecting cable for strain gage applied transducer to the terminal board again. (Refer to the chapter 4)

②By checking the voltage between the terminal B and D on the terminal board, apply load on the strain gage applied transducer.

Set the connecting range to DC･mV range for the measuring instrument such as tester and so on.

The voltage between B and D varies.

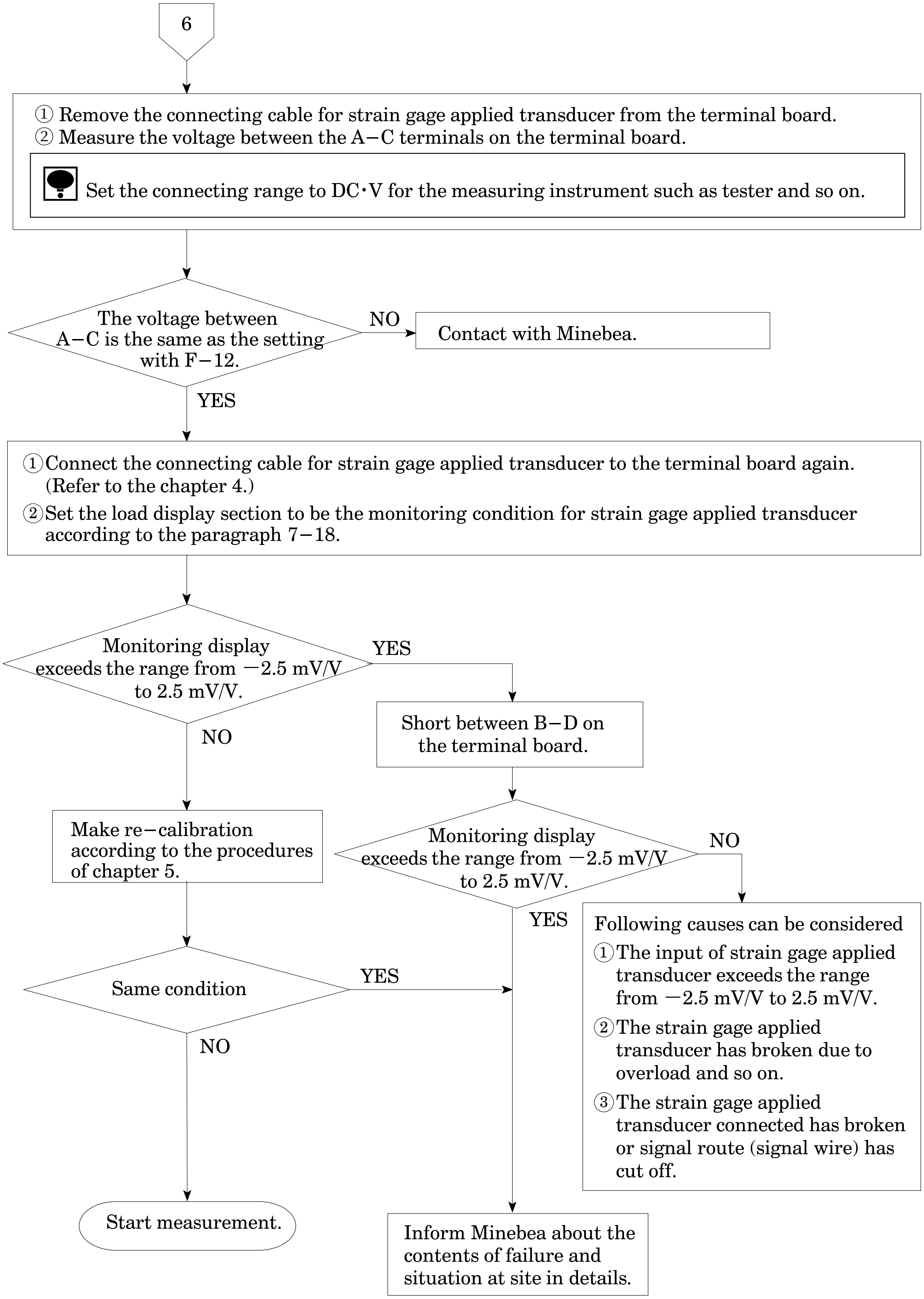
Make re−calibration according to the procedures in chapter 5.

The same condition

Start Measurement.

There may have fears that the strain gage applied transducer connected has broken or signal route (signal wire) has cut off.

Inform Minebea about the contents of failure and situation at site in details.



① Remove the connecting cable for strain gage applied transducer from the terminal board.
② Measure the voltage between the A−C terminals on the terminal board.

Set the connecting range to DC•V for the measuring instrument such as tester and so on.

The voltage between A−C is the same as the setting with F−12.

Contact with Minebea.

①Connect the connecting cable for strain gage applied transducer to the terminal board again. (Refer to the chapter 4.)

②Set the load display section to be the monitoring condition for strain gage applied transducer according to the paragraph 7−18.

Monitoring display exceeds the range from −2.5 mV/V to 2.5 mV/V.

Short between B−D on the terminal board.

Make re−calibration according to the procedures of chapter 5.

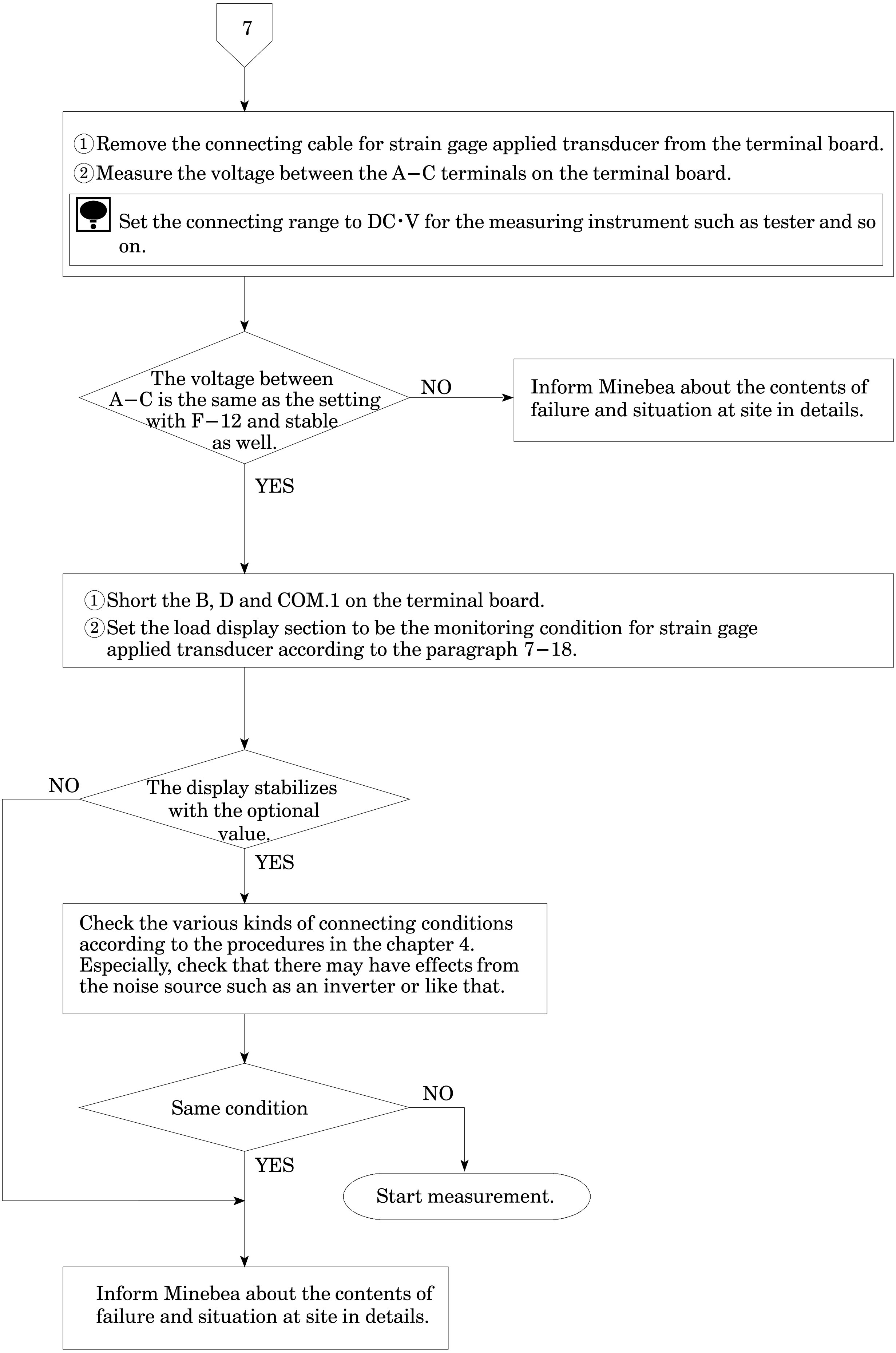
Monitoring display exceeds the range from −2.5 mV/V to 2.5 mV/V.

Following causes can be considered
①The input of strain gage applied transducer exceeds the range from −2.5 mV/V to 2.5 mV/V.
②The strain gage applied transducer has broken due to overload and so on.
③The strain gage applied transducer connected has broken or signal route (signal wire) has cut off.

Same condition

Start measurement.

Inform Minebea about the contents of failure and situation at site in details.



①Remove the connecting cable for strain gage applied transducer from the terminal board.
②Measure the voltage between the A−C terminals on the terminal board.

Set the connecting range to DC･V for the measuring instrument such as tester and so on.

The voltage between A−C is the same as the setting with F−12 and stable as well.

Inform Minebea about the contents of failure and situation at site in details.

①Short the B, D and COM.1 on the terminal board.
②Set the load display section to be the monitoring condition for strain gage applied transducer according to the paragraph 7−18.

The display stabilizes with the optional value.

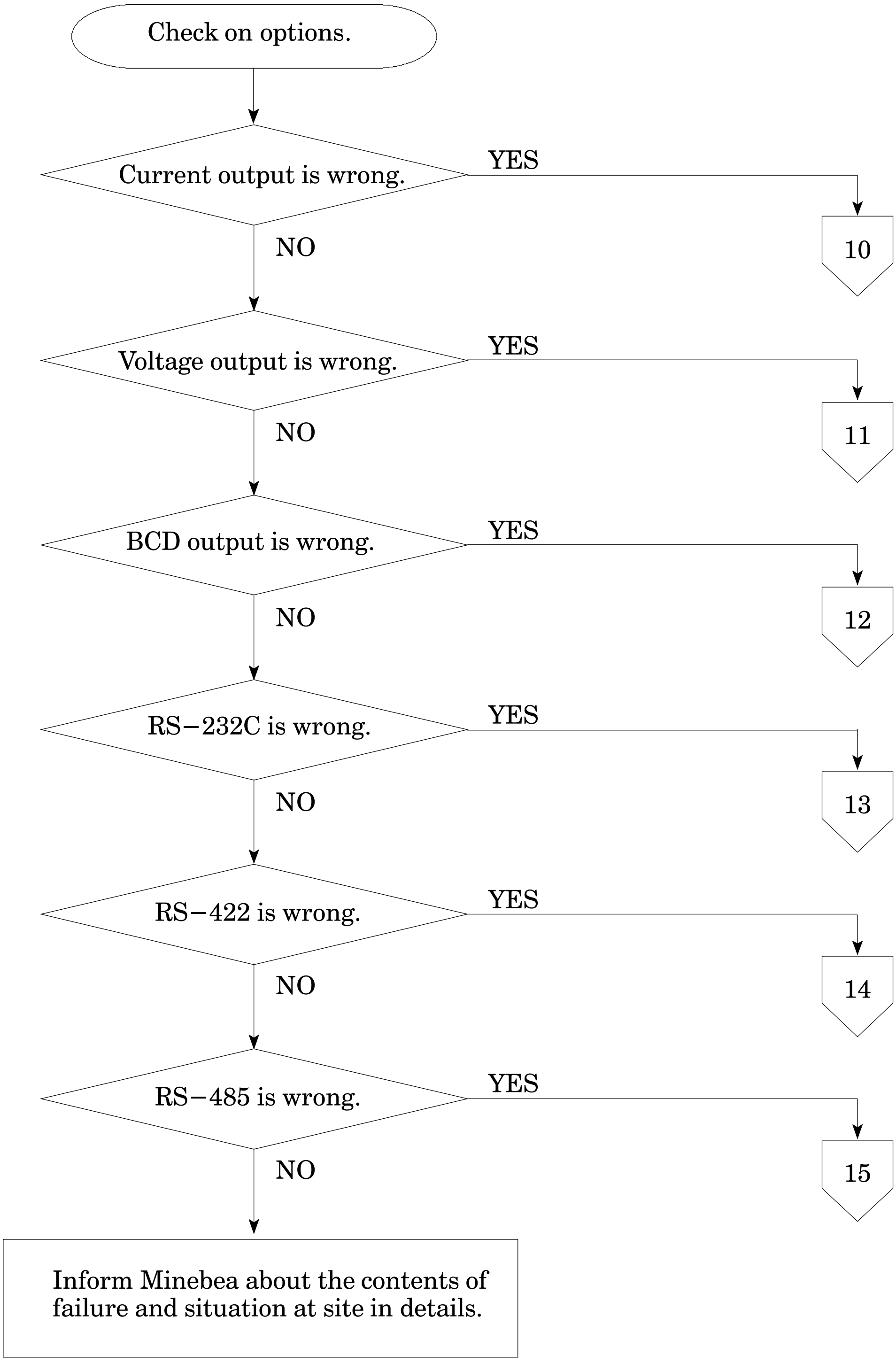
Check the various kinds of connecting conditions according to the procedures in the chapter 4. Especially, check that there may have effects from the noise source such as an inverter or like that.

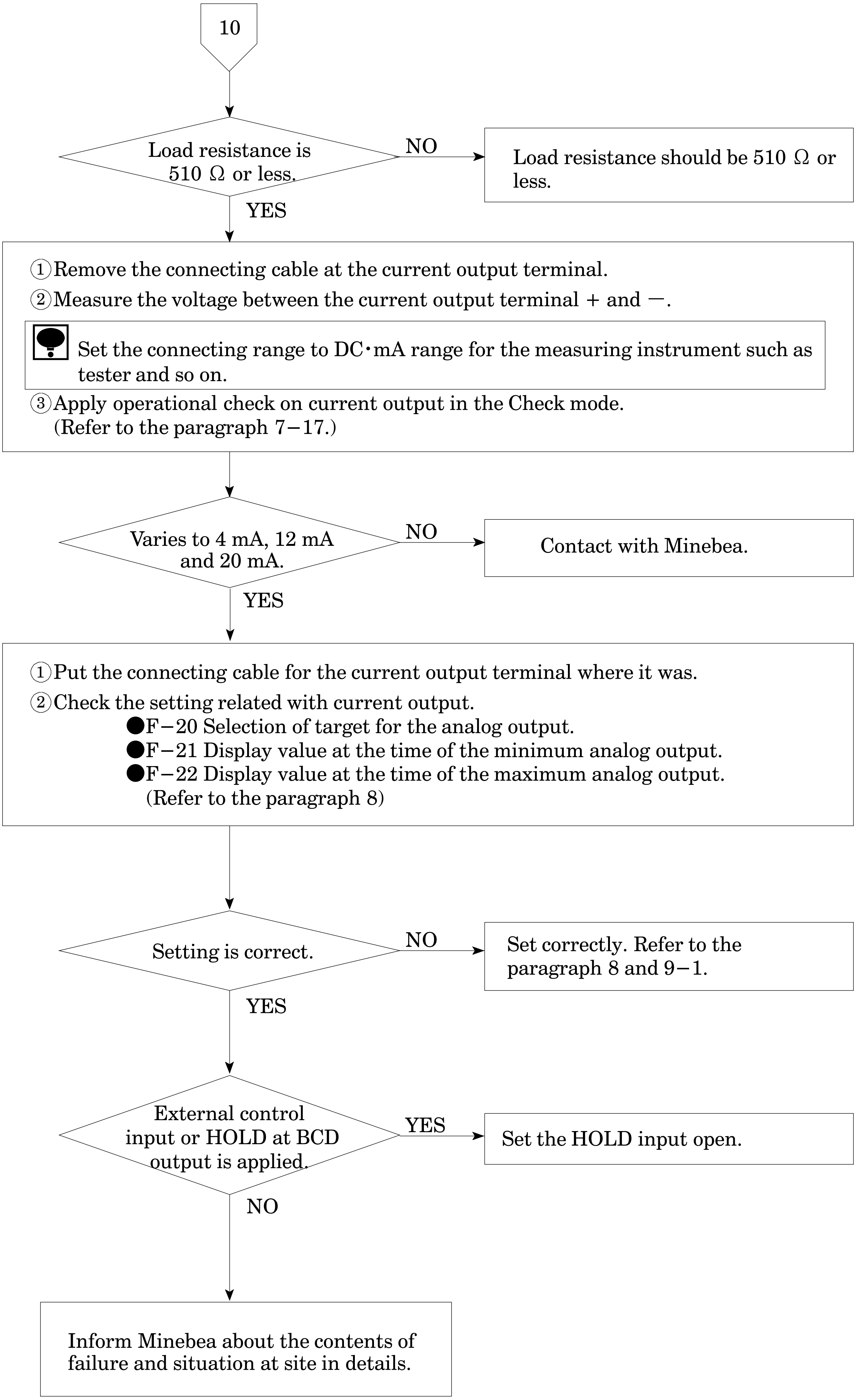
Same condition

Start measurement.

Inform Minebea about the contents of failure and situation at site in details.

10−2. Optional check





Load resistance is 510 Ω or less.

Load resistance should be 510 Ω or less.

①Remove the connecting cable at the current output terminal.

②Measure the voltage between the current output terminal + and −.

Set the connecting range to DC･mA range for the measuring instrument such as tester and so on.

③Apply operational check on current output in the Check mode. (Refer to the paragraph 7−17.)

Varies to 4 mA, 12 mA and 20 mA.

Contact with Minebea.

①Put the connecting cable for the current output terminal where it was.

②Check the setting related with current output.

- ●F−20 Selection of target for the analog output.
- ●F−21 Display value at the time of the minimum analog output.
- ●F−22 Display value at the time of the maximum analog output.

(Refer to the paragraph 8)

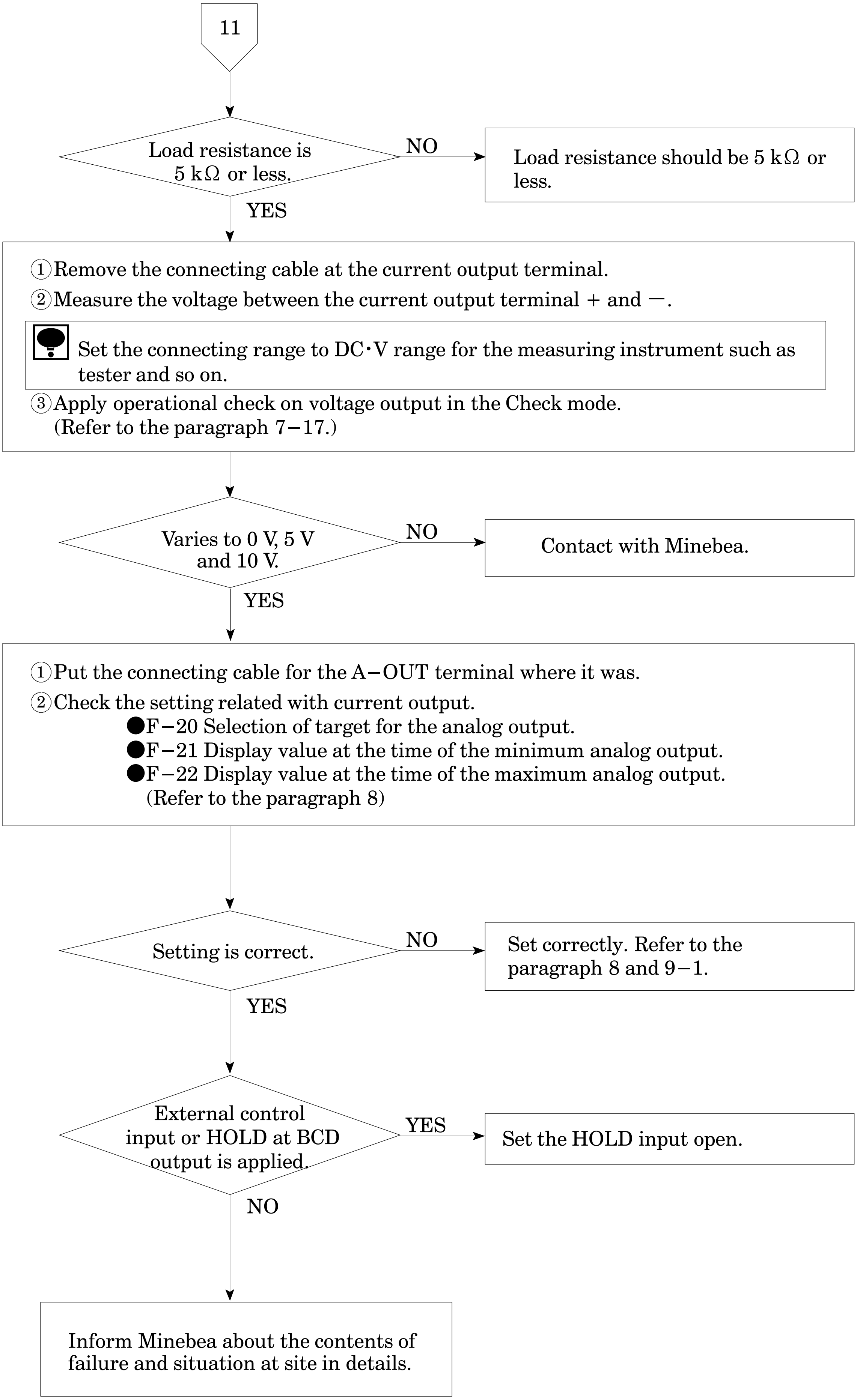
Setting is correct.

Set correctly. Refer to the paragraph 8 and 9−1.

External control input or HOLD at BCD output is applied.

Set the HOLD input open.

Inform Minebea about the contents of failure and situation at site in details.



Load resistance is 5 kΩ or less.

Load resistance should be 5 kΩ or less.

①Remove the connecting cable at the current output terminal.
②Measure the voltage between the current output terminal + and −.

Set the connecting range to DC･V range for the measuring instrument such as tester and so on.

③Apply operational check on voltage output in the Check mode.
(Refer to the paragraph 7−17.)

Varies to 0 V, 5 V and 10 V.

Contact with Minebea.

①Put the connecting cable for the A−OUT terminal where it was.
②Check the setting related with current output.
- F−20 Selection of target for the analog output.
- F−21 Display value at the time of the minimum analog output.
- F−22 Display value at the time of the maximum analog output.

(Refer to the paragraph 8)

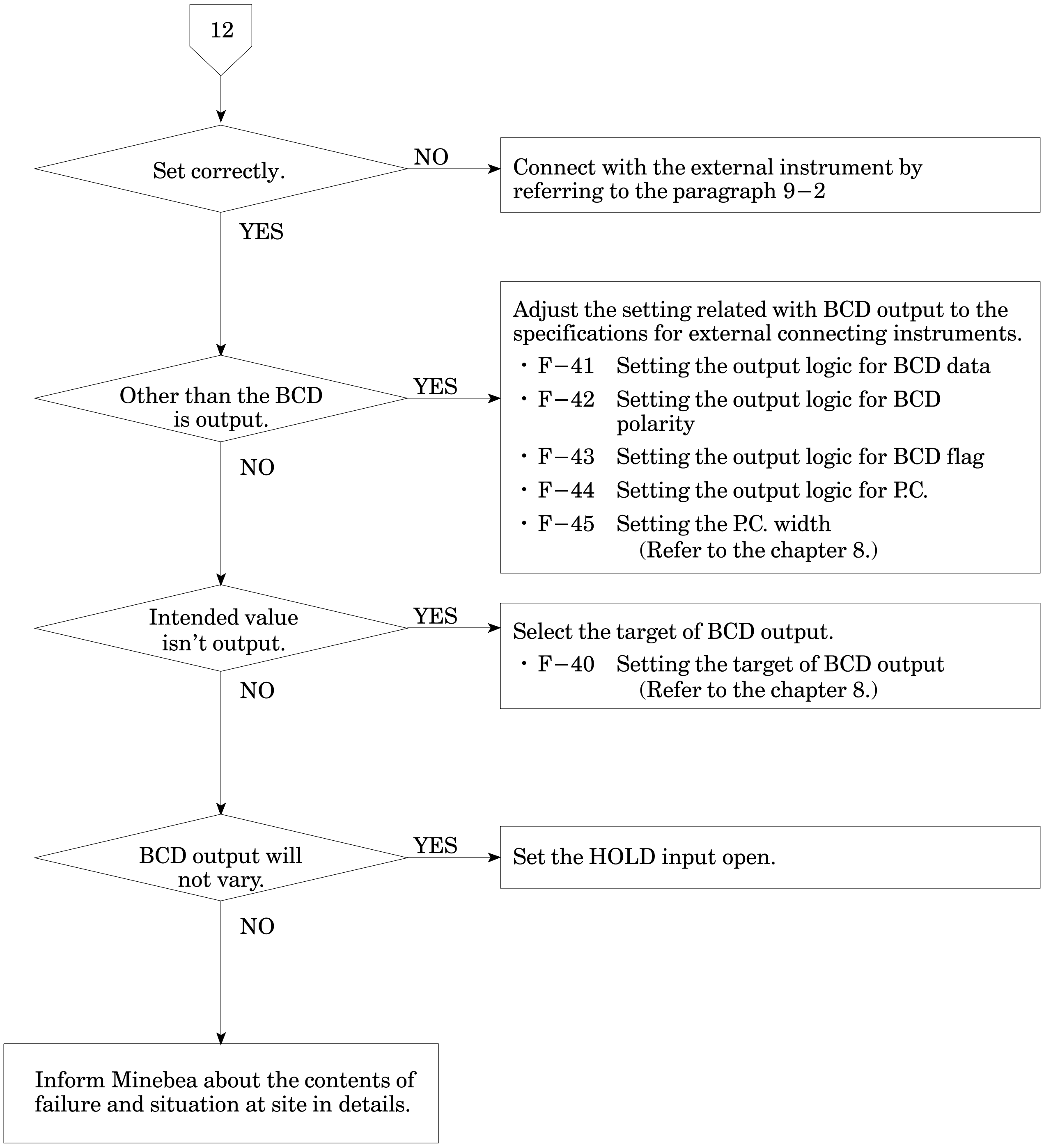
Setting is correct.

Set correctly. Refer to the paragraph 8 and 9−1.

External control input or HOLD at BCD output is applied.

Set the HOLD input open.

Inform Minebea about the contents of failure and situation at site in details.



Set correctly.

Connect with the external instrument by referring to the paragraph 9−2

Other than the BCD is output.

Adjust the setting related with BCD output to the specifications for external connecting instruments.

- F−41 Setting the output logic for BCD data
- F−42 Setting the output logic for BCD polarity
- F−43 Setting the output logic for BCD flag
- F−44 Setting the output logic for P.C.
- F−45 Setting the P.C. width

(Refer to the chapter 8.)

Intended value isn't output.

Select the target of BCD output.

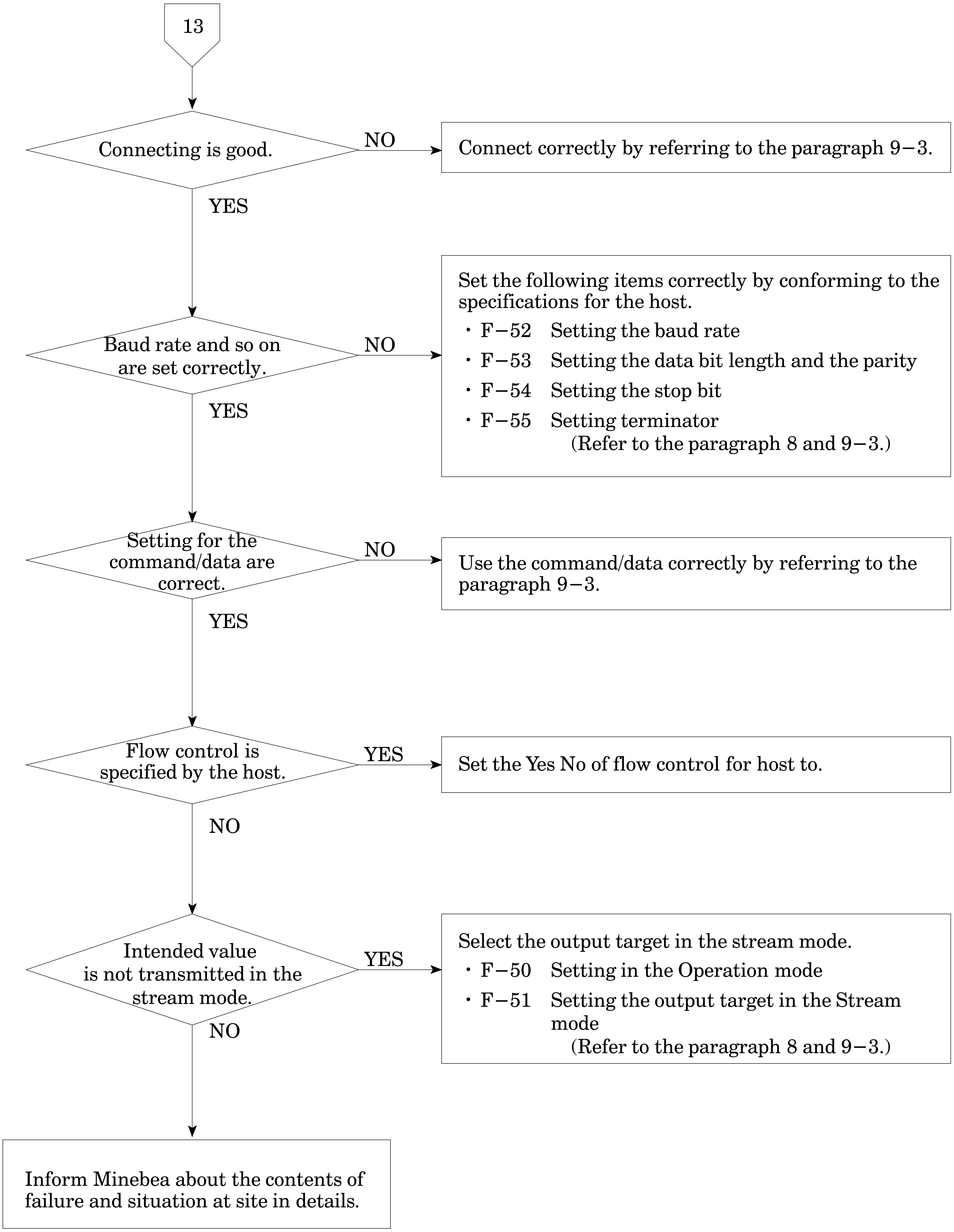
- F−40 Setting the target of BCD output

(Refer to the chapter 8.)

BCD output will not vary.

Set the HOLD input open.

Inform Minebea about the contents of failure and situation at site in details.



Connecting is good.

Connect correctly by referring to the paragraph 9−3.

Baud rate and so on are set correctly.

Set the following items correctly by conforming to the specifications for the host.

- F−52 Setting the baud rate
- F−53 Setting the data bit length and the parity
- F−54 Setting the stop bit
- F−55 Setting terminator

(Refer to the paragraph 8 and 9−3.)

Setting for the command/data are correct.

Use the command/data correctly by referring to the paragraph 9−3.

Flow control is specified by the host.

Set the Yes No of flow control for host to.

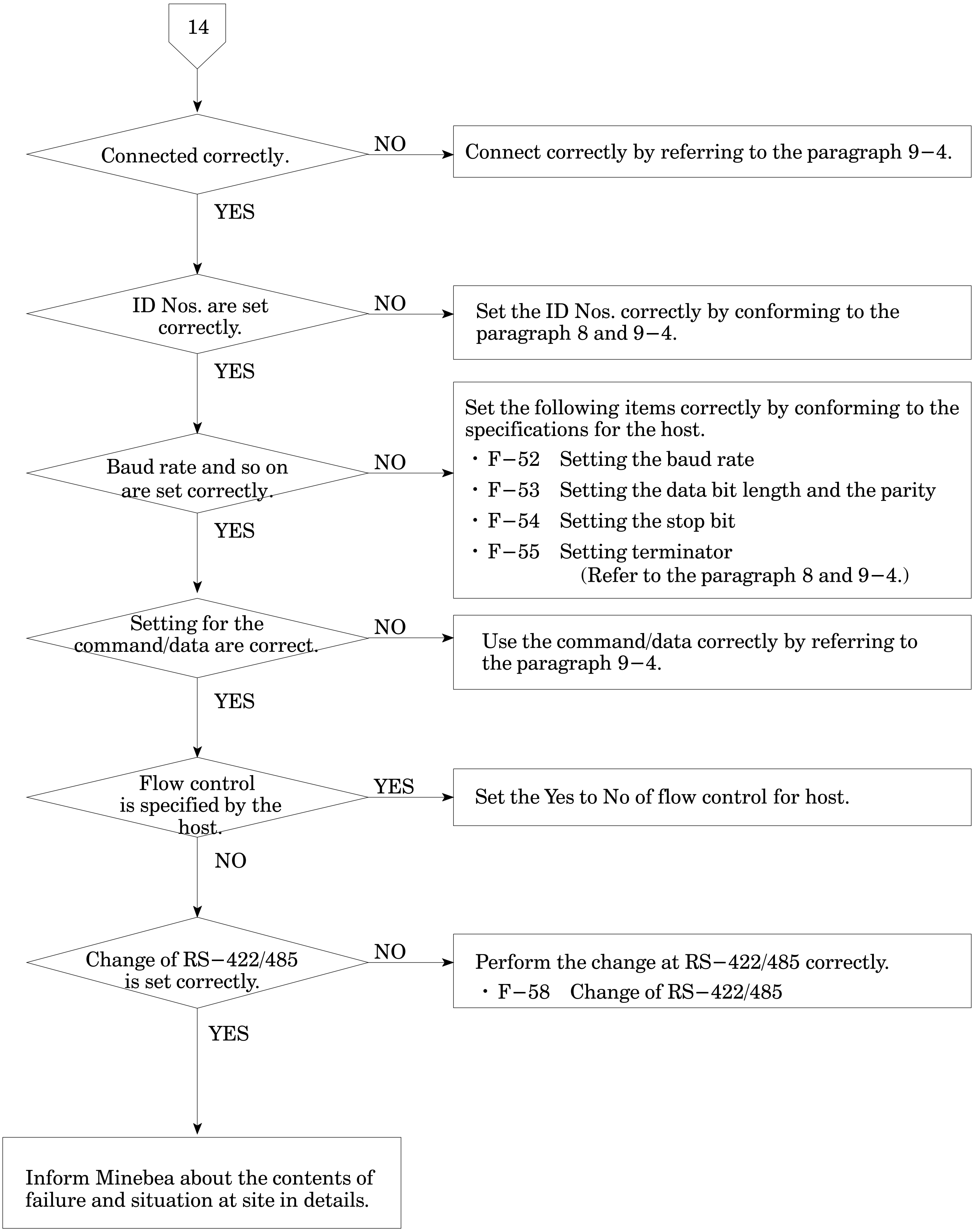
Intended value is not transmitted in the stream mode.

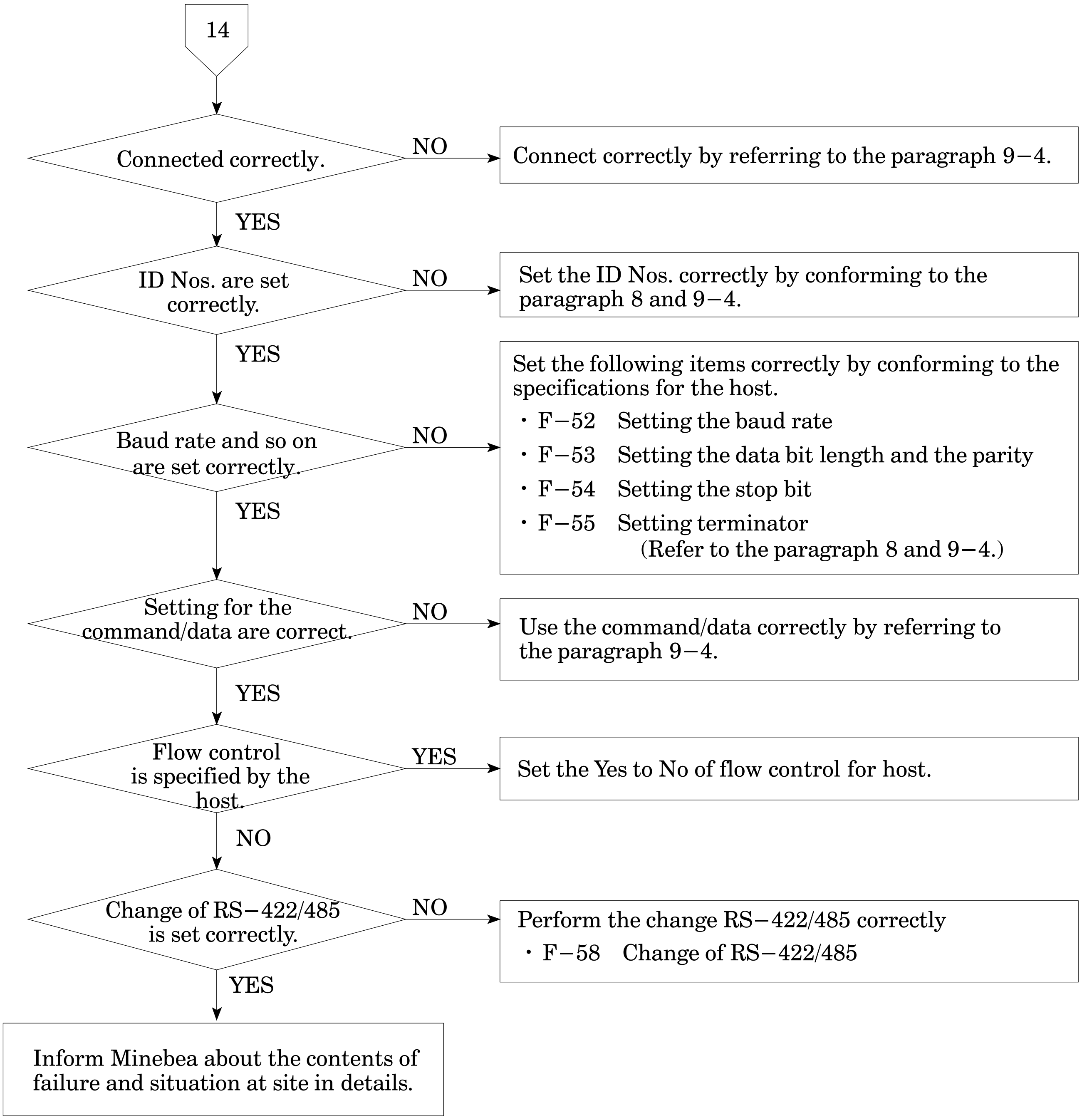
Select the output target in the stream mode.

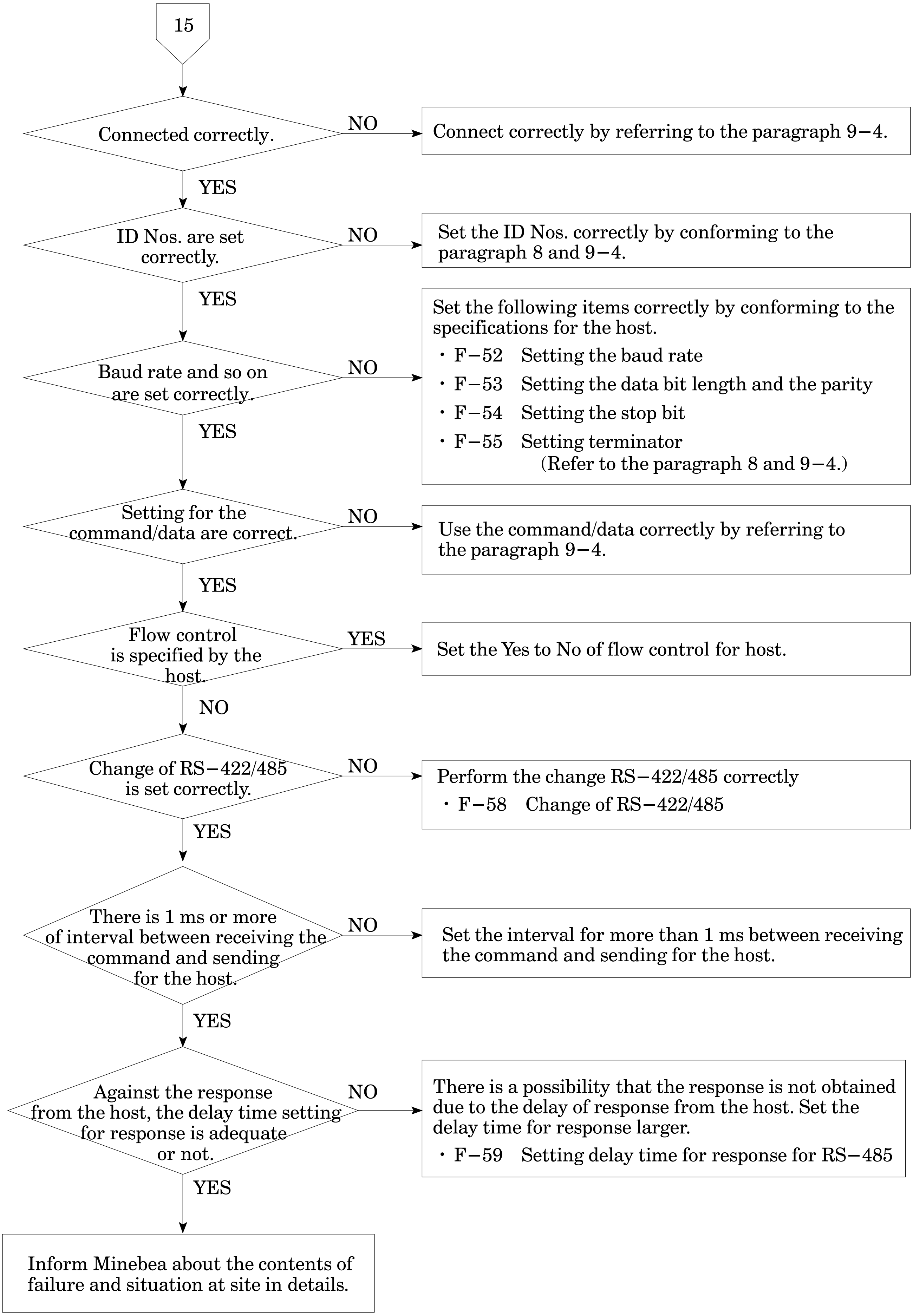
- F−50 Setting in the Operation mode
- F−51 Setting the output target in the Stream mode

(Refer to the paragraph 8 and 9−3.)

Inform Minebea about the contents of failure and situation at site in details.


14
Connected correctly.
NO
Connect correctly by referring to the paragraph 9−4.
YES
ID Nos. are set correctly.
NO
Set the ID Nos. correctly by conforming to the paragraph 8 and 9−4.
YES
Baud rate and so on are set correctly.
NO
Set the following items correctly by conforming to the specifications for the host.
・F−52 Setting the baud rate
・F−53 Setting the data bit length and the parity
・F−54 Setting the stop bit
・F−55 Setting terminator
(Refer to the paragraph 8 and 9−4.)
YES
Setting for the command/data are correct.
NO
Use the command/data correctly by referring to the paragraph 9−4.
YES
Flow control is specified by the host.
YES
Set the Yes to No of flow control for host.
NO
Change of RS−422/485 is set correctly.
NO
Perform the change at RS−422/485 correctly.
・F−58 Change of RS−422/485
YES
Inform Minebea about the contents of failure and situation at site in details.


14
Connected correctly.
NO
Connect correctly by referring to the paragraph 9−4.
YES
ID Nos. are set correctly.
NO
Set the ID Nos. correctly by conforming to the paragraph 8 and 9−4.
YES
Baud rate and so on are set correctly.
NO
Set the following items correctly by conforming to the specifications for the host.
・F−52 Setting the baud rate
・F−53 Setting the data bit length and the parity
・F−54 Setting the stop bit
・F−55 Setting terminator
(Refer to the paragraph 8 and 9−4.)
YES
Setting for the command/data are correct.
NO
Use the command/data correctly by referring to the paragraph 9−4.
YES
Flow control is specified by the host.
YES
Set the Yes to No of flow control for host.
NO
Change of RS−422/485 is set correctly.
NO
Perform the change RS−422/485 correctly
・F−58 Change of RS−422/485
YES
Inform Minebea about the contents of failure and situation at site in details.


15
Connected correctly.
NO
Connect correctly by referring to the paragraph 9−4.
YES
ID Nos. are set correctly.
NO
Set the ID Nos. correctly by conforming to the paragraph 8 and 9−4.
YES
Baud rate and so on are set correctly.
NO
Set the following items correctly by conforming to the specifications for the host.
・F−52 Setting the baud rate
・F−53 Setting the data bit length and the parity
・F−54 Setting the stop bit
・F−55 Setting terminator
(Refer to the paragraph 8 and 9−4.)
YES
Setting for the command/data are correct.
NO
Use the command/data correctly by referring to the paragraph 9−4.
YES
Flow control is specified by the host.
YES
Set the Yes to No of flow control for host.
NO
Change of RS−422/485 is set correctly.
NO
Perform the change RS−422/485 correctly
・F−58 Change of RS−422/485
YES
There is 1 ms or more of interval between receiving the command and sending for the host.
NO
Set the interval for more than 1 ms between receiving the command and sending for the host.
YES
Against the response from the host, the delay time setting for response is adequate or not.
NO
There is a possibility that the response is not obtained due to the delay of response from the host. Set the delay time for response larger.
・F−59 Setting delay time for response for RS−485
YES
Inform Minebea about the contents of failure and situation at site in details.

10−3. Error display

Error code	Contents of error	Remedy
ER−0	Zero set has executed with more than ±10 % of the maximum display value.	Apply zero set after making it within ±10 % of maximum display value.
	When CHECK is ON, zero setting is executed.	After CHECK is OFF, execute the zero setting.
ER−1	Setting mistake	Set correctly.
ER−2	Mistake in setting during calibration	Set correctly.
ER−3	A/D error	Turn off the power once and turn on it again. If the Error is still shown, contact with Minebea.
ER−4	Displays when the calibration(CCAL, ACAL, LCAL, TARE) is executed with CHECK ON.	After setting the CHECK OFF, execute the calibration.
ER−5	Displays while zero set, tare weight cancellation, zero tracking are ON when the fine adjustment on zero or span is adjusted. Displays while tare weight cancellation is ON when zero set is executed.	Set OFF while zero tracking is OFF. Apply ZERO clear(F−98).
ER−6	When prohibiting the calibration is set, calibration or fine adjustment for analog is proceeded.	Release the prohibition of calibration (F−97).
HOLD	Powered ON with the HOLD input is shorted.	Set the HOLD input open.
LOCK	Displays when the key switch which is the target of key function lock is pressed.	Release the LOCK of key function. (F−06)
TE−L	Displays when the initial value at the time of calibration is less than −2.5 mV/V.	Adjust so that the initial load is within the range from −2.5 mV/V to 2.5 mV/V.
TE−H	Displays when the initial load exceeds over 2.5 m V/V, or the total value with the initial value and the load equal to the maximum display value exceeds over 3.1 mV/V during calibration	
SP−L	The value equal to the maximum display value at the time of calibration (LCAL) is less than 0.2 mV/V, or the difference between the initial value and the load equal to the maximum display value is less than 0.2 mV/V.	Adjust so that the load equal to the maximum display value is within the range from 0.2 mV/V to 3.1 mV/V.
SP−H	The value equal to the maximum display value at the time of calibration (LCAL) exceeds 3.1 mV/V, or the difference between the initial value and the load equal to the maximum display value exceeds 3.1 mV/V.	
ER−E	EEPROM error	Contact with Minebea.
ER−R	EEPROM error	Contact with Minebea.
BAT.L	Display when voltage of battery has been decreased.	Press the SHIFT ENTER key to enter the measurement mode. When "BAT.L" appears, request to exchange the battery to Minebea. If you will use without exchanging the battery, the contents of memory(RAM) may breaks. However, memory data never breaks by this after "BAT.L" appears if the power supply keeps energizing.

Error code	Contents of error	Remedy
ER−B	Back−up error. The contents of the memory is broken.	Press the SHIFT ENTER key to enter the measurement mode. (At this time, A/Z data becomes a initial value.) When this error appears at power supply ON every time, contact with Minebea.
OL	Displays when 110 % of the maximum display value is exceeded at the time of measurement or in calibration.	Set so that the load display will be within the range from −10 % to 110 %.
−OL	Displays when −10 % of the maximum display value is exceeded at the time of measurement or in calibration.	

11. Specifications

11−1. Specifications for analog section

Bridge power supply	DC10 V±0.25 V　within 120 mA　(Changeable to DC5 V or 2.5 V) with remote sensing.
Applicable transducers	Up to 4 pieces of strain gage applied transducers(350 Ω) can be connectable.
Input range	F.S. setting is available at the input range from 0.2 mV/V to 3.1 mV/V.(When bridge power supply is DC10 V.)
Zero adjustment range	−2.5 mV/V to 2.5 mV/V
Non−linearity	0.01 %F.S.
Temperature coefficient	
Zero point	±0.2 μV/℃(Input conversion, at the time of F.S. setting at the input from 0.3 mV/V to 3.1 mV/V)
Sensitivity	±0.015 %F.S./℃(Input conversion, at the time of F.S. setting at the input from 0.3 mV/V to 3.1 mV/V)
Input noise	±0.3 μVp−p or less (With the default setting of digital filter and stabilized filter)
Input filter	4 Hz (Changeable to 2 Hz, 6 Hz 8 Hz or 10Hz)
A/D sampling	200 times/s (changeable to 100 times/s, 50 times/s, 25 times/s or 10 times/s)
CHECK	Approx.0.3 mV/V (Setting can be available at the approx. 0.1 mV/V interval within the range from approx.0.1 mV/V to 2.4 mV/V.) ※The extension cable should be applied to Minebea's standard cable CAB-502(4 cores) within the length of 30 m. ※Not applicable when the zener barrier is used.

11−2. Specifications for digital section

Load display	
Display range	−9 999 to 99 999
Display increment	1 (changeable to 2, 5 or 10)
Display	7 segment red LED, with 8 mm character's height
Over display	"−OL" displays at the time of minus(−) over, and "OL" displays at the time of plus (+) over.
Status display	RUN, A/Z, LOCK, HOLD and CHECK
Judgement display	S0, S1, S2, S3 and S4
Display rate	20 times/s (changeable to 4 times/s, 50 times/s or 100 times/s)
Decimal point display	changeable to Non, ,10^1, 10^2, 10^3 or 10^4.

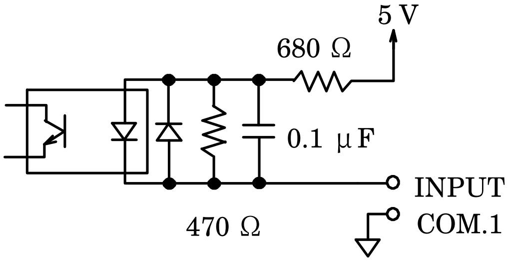
11−3. Front panel sheet key function

CHECK FUNC.	Changeover of the function mode or ON/OFF for check value by pressing with the SHIFT ENTER key at the same time.
S※ ◄	Displays the set value of S※ or carry on the set value.
ZERO ▲	Zero set or increment of set value.
A/Z	Tare weight cancellation
A/Z OFF	Tare weight cancellation clear
SHIFT ENTER	Enter key or shift key

11−4. External control function

ZERO	Same as the ZERO ▲ key ※Above is effective once at the pulse input and the pulse width is 50 ms or more. (Pulse width is changeable to 5 ms, 10 ms or 20 ms.)
A/Z	Tare weight cancellation
A/Z OFF	Tare weight cancellation clear ※Above are pulse input, and effective once at the pulse width 50 ms or more. (Pulse width is changeable to 2 ms, 5 ms, 10 ms or 20 ms)
HOLD	Hold of display, comparative output, analog output and BCD output
LOCK	Prohibition of key operation ※Above are level input, and effective during the input in short for 50 ms or more. (The level is changeable to 2 ms, 5 ms, 10 ms or 20 ms)

Equivalent circuit for the external control input section



11−5. Comparator function

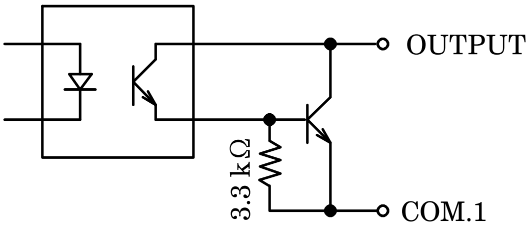
Set value	−9 999 to 99 999
Numbers of setting	5 points of S0, S1, S2, S3 and S4. ※“S0” is set by function.
Set value for hysteresis data	0 to 99 digits
Setting hysteresis time width	0 to 9.9 s
Hysteresis direction	Can be selected whichever “On delay” or “Off delay”.
Conversion times for comparator	200 times/s (Synchronous with display rate.)

11−6. Open collector output signal

S1, S2, S3 and S4	Open collector ON when reached under/over the comparator set value.
S0	The open collector ON with either condition in below by function setting. ・FULL condition (100 % of rated load). ・When the both of two whichever S1, S2, S3 or S4 are OFF condition. ・Operates when reached under/over the S0 set value. (Same as the comparative operation of S1, S2, S3 and S4.) ・ON interlocked with HOLD LED ・ON interlocked with A/Z LED ・ON interlocked with LOCK LED
RUN	ON during the measurement mode of this instrument.
ERROR	ON when the various kinds of errors are occurred.

Specification of open collector V_{CE}=DC30 V,I_C=30 mA MAX

Equivalent circuit for open collector output



11−7. Various kinds of functions

Zero tracking	Stabilizes the variation of zero point within the fixed condition.
Digital filter	Stabilizes the data by the computing process through CPU.
Stabilized filter	Only when the load variation width is within the fixed value, this strengthens/stabilizes the digital filter.
Change of target of HOLD	With the combination of “Display”,“Comparative output”, “Analog output”, “BCD output(Option)”, target of HOLD can be made.
Sheet key lock	Prohibition of operation of optional key.
Change of target of analog output	The target of analog output can be changed either “Gross weight” or “Net weight”.

11−8. General specifications

Operating temperature/humidity range	
Temperature	−10 ℃ to 50 ℃
Humidity	Less than 85 %RH (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. 16 VA(Without option, at AC100 V) Approx. 19 VA at maximum. (With option, at AC100 V to AC240 V)
Outline dimensions(W×H×D)	208 mm x 67 mm x 140.7 mm(Excludes protruding parts.)
Weight	Approx. 1.2 kg(without options)

11−9. Standard specifications at the shipment

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

11−10. Accessories

Instruction manual	1 piece
Midget fuse	1 piece (5 A)
Unit seal	1 piece
Short bar between A−F/C−G	2 pieces
BCD output plug	1 piece（Attached only when optional BCD output is installed.）

11−11. Options

11−11−1. Analog output

(1) Current output

・P/No.	CSD891B-P07
・Specifications	
Output	DC4 mA to 20 mA Load resistance at 510 Ω or less
Non−linearity	0.05 %F.S.
Resolution	Approx.1/12 000
Over range	"−OL" display at approx.DC2.4 mA and "OL" display at approx.DC21.6 mA.
Output times	200 times/s (Synchronized with the A/D sampling frequency.)

(2) Voltage output

・P/No.	CSD891−P25
・Specifications	
Output	DC0 V to 10 V　Load resistance　5 kΩ or more
Non−linearity	0.05 %F.S.
Resolution	Approx.1/12 000
Over range	"−OL" display at approx. DC−1 V and "OL" display at approx.DC11 V
Output rate	200 times/s (Synchronized with the A/D sampling frequency.)

11−11−2. BCD output

- P/No. CSD891B−P15
- Specifications

Output
- BCD 5 digits Parallel output, with polarity(POL.) applied
  (Output ON with minus, and output OFF with plus.)
- P.C.(Print command)
  ON for a fixed time after conversion of BCD output is completed.
- ERROR ON at the time of various errors are occurred.
- OVR(over)

※Above are open collector outputs. V_{CE}=DC30 V, I_C=DC20 mA MAX

Input
- ZERO Same as the ZERO ▲ key.
- A/Z Same as the A/Z key
- A/Z OFF Same as the A/Z OFF key

※Above are pulse input, effective once after the pulse width 50 ms or more.
(Pulse width is changeable to 2 ms, 5 ms, 10 ms or 20 ms.)

- HOLD Hold of display and BCD output
- LOCK Prohibiting the key operation
- SEL.1, SEL.2 The output target of the BCD output is switched as follows by the combination of two input status.

both SEL.1 and SEL.2 are open	Gross weight
only SEL.1 is short	Part of A/Z cancel
only SEL.2 is short	Net weight
both SEL.1 and SEL.2 are short	Gross weight

- BCD−ENABLE Compulsive OFF for the related output of BCD
  (Hi impedance)

※Above are level inputs, and effective by shortening 50 ms or more during inputting. (Level：2 ms, 5 ms, 10 ms or 20 ms changeable.)

11−11−3. RS−232C interface

- P/No. CSD891B−P74
- Specifications

Baud rate：Select from 1 200, 2 400, 4 800, 9 600, 19 200, or 38 400 bps.
Data bit length：Select from 7 bits or 8 bits.
Parity bit：Select from Non, Even or Odd.
Stop bit：Select from 1 bit or 2 bits.
Terminator：Select from CR+LF or CR.
Communication method：Half-duplex
Synchronous method：Start−stop synchronous method
Communication data：ASCII code
Cable length：within 15 m
Input output monitor：with LED

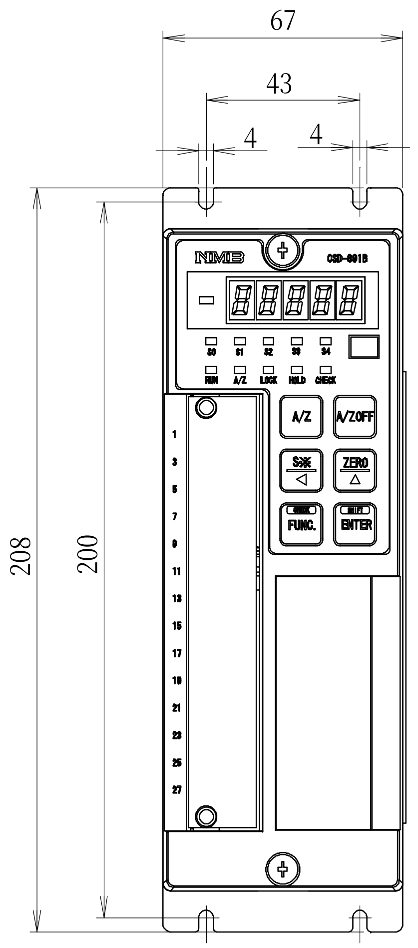
11−11−4. RS−422/485 interface

- P/No.　　　　　CSD891B−P76
- Specifications

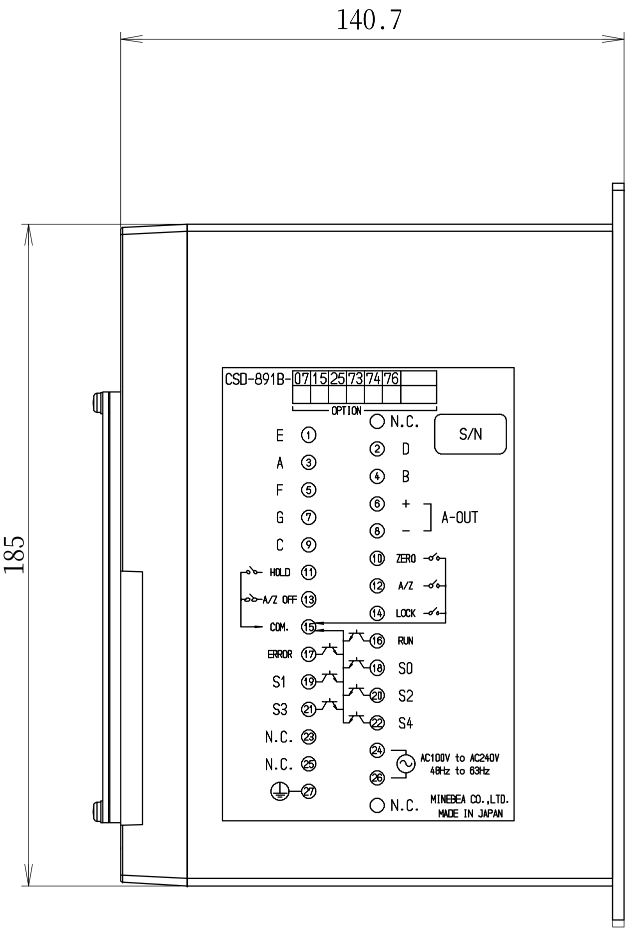
Baud rate : Select from 1 200, 2 400, 4 800, 9 600, 19 200 or 38 400 bps.
Data bit length : Select from 7 bits and 8 bits.
Parity bit : Select from Non, Even or Odd.
Stop bit : Select from 1 bit or 2 bits.
Terminator : Select from CR＋LF and CR.
Communication method : Half−duplex
Synchronous method : Start−stop synchronous method
Address : Select one among 0 to 31.
Communication data : ASCII code
Cable length : Approx. 1 km
No. of connections : 32 sets at max.(RS−422 : 10 sets)
Termination : Built−in (Yes/No can be selected by the connection with terminal board.) With input/output monitor LED.
Input/output monitor with LED
Change of RS−422/485 : Can be set in Function.

11−12. Outline dimensions

Front



Side



Unit : mm

12. Warranty

12−1. 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 Minebea’s sales office or sales agent from which you have purchased.

12−2. Repair

Before asking repairs, make checks once again that the connection, setting and adjustment for the instrument have finished properly by referring to 10. Trouble shooting.
Especially, make checks whether the connections of sensors are disconnected or cut off.
After that, still there may be found some defects in the instrument, contact with Minebea’s sales office or sales agency from which you have purchased.

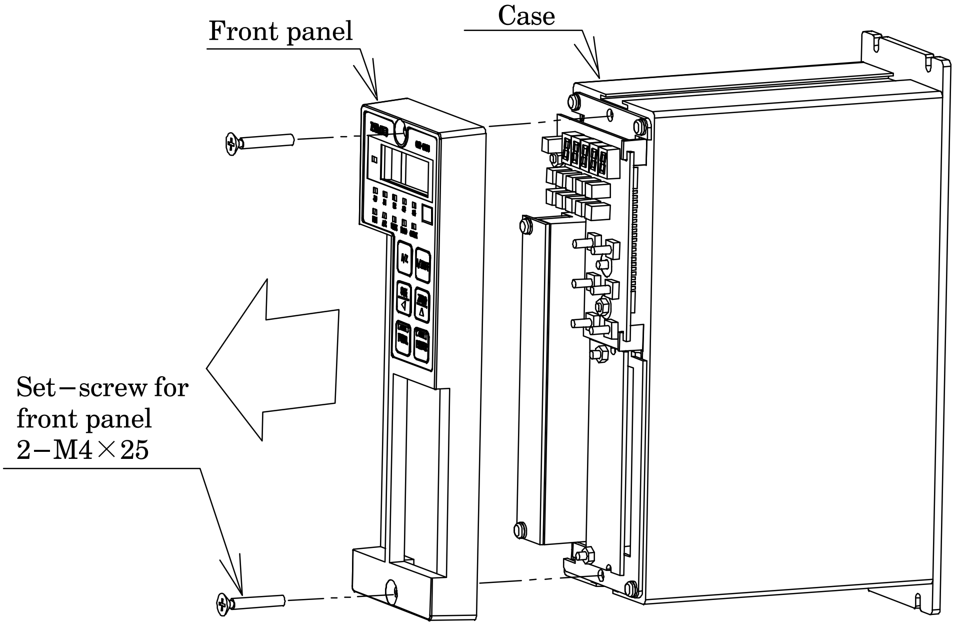
13. Appendix

13−1. Replacement of fuse

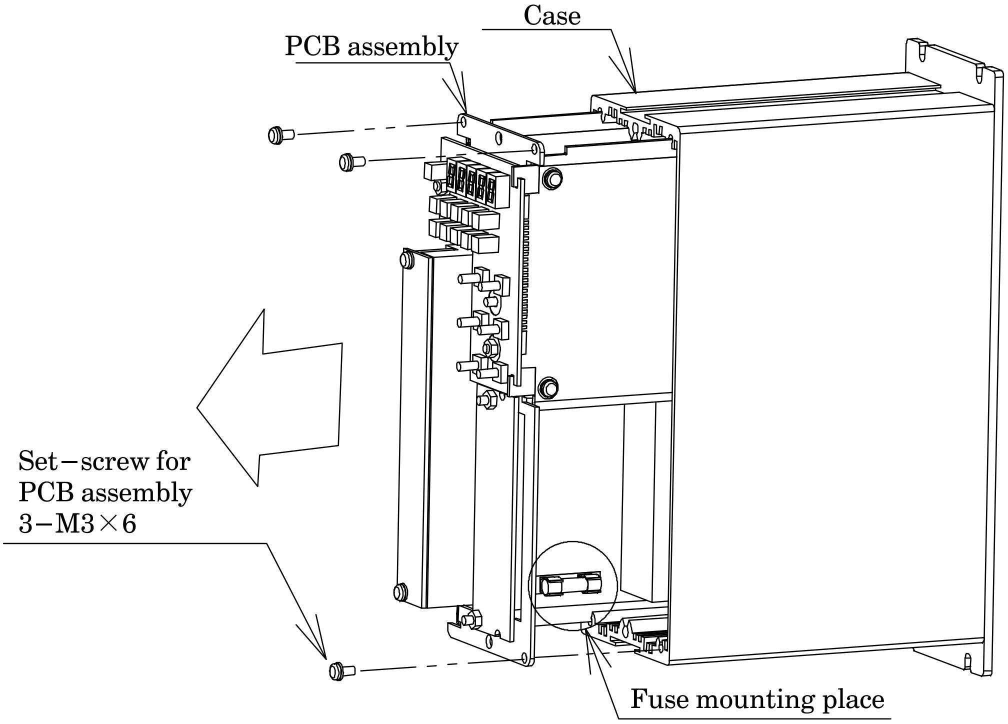
⚠Warning ● When installation method for the fuse is wrong and/or the capacity of installed fuse is inadequate, it causes and unexpected faulty of the instrument.

① Turn OFF the power supply for the instrument.

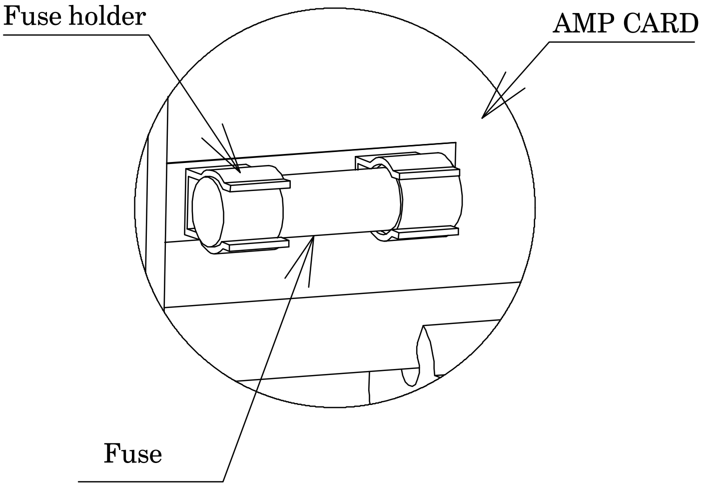
② Remove the 2 pieces of setscrews on the front panel, and remove the front panel to the arrow direction.



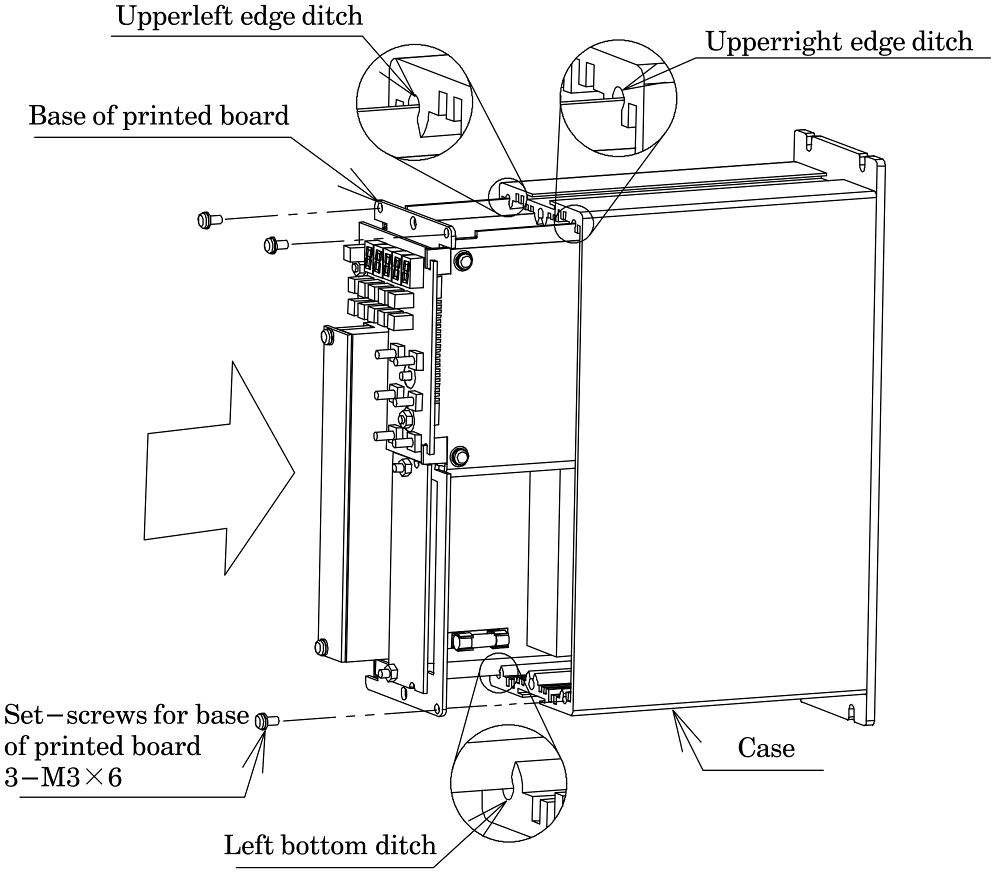
③ Remove 3 pieces of set−screws for printed board, and draw the printed board to the arrow direction.



④ Replace the fuse installed on the AMP CARD



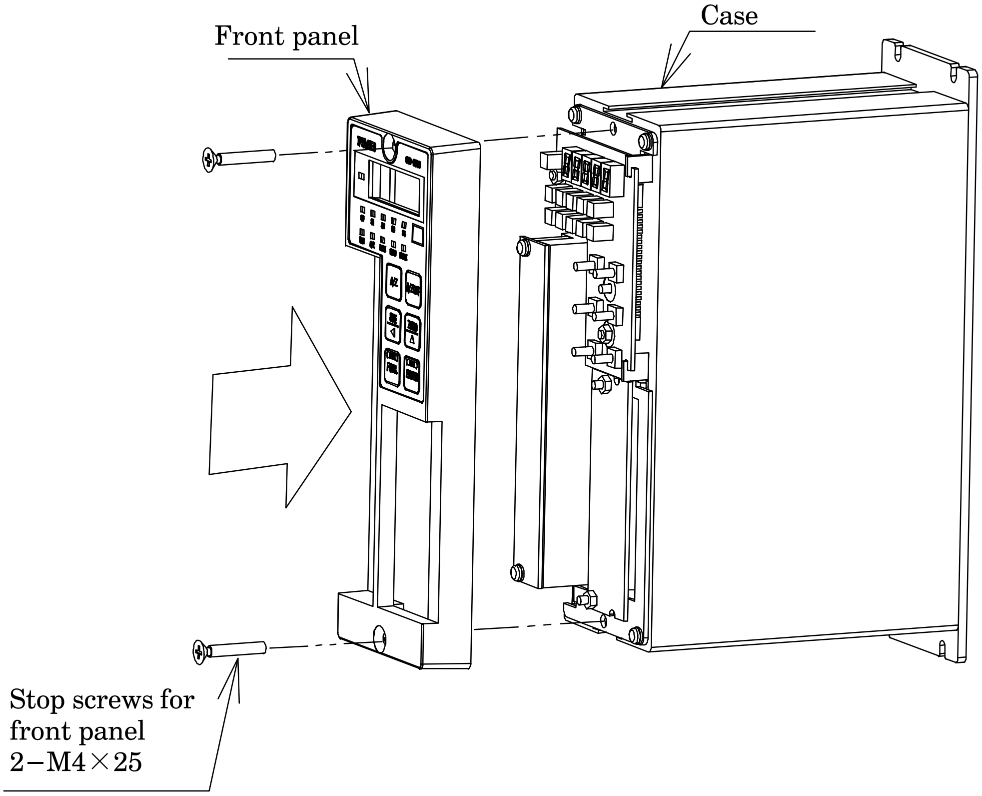
⑤ After the fuse is exchanged, the substrate assembly is slowly inserted in the case.
(At this time, the substrate is passed through the ditch in three places.)



⑥ Three stop screws of the P.C. board assembly are installed. Confirm the metal plate section and the case with the P.C. board assembly have stuck.

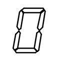
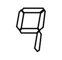
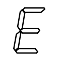
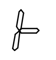
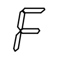
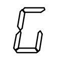
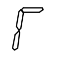
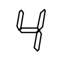
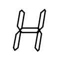
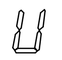
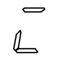
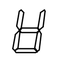
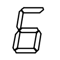
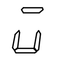
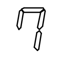
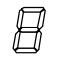
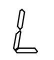
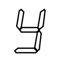
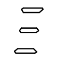
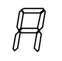
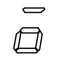
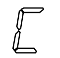
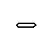
⚠Warning ● When the metal plate section is not attached closely with the case, you can’t feel the click touch and also there may have the possibility that key operation is not made.

⑦ The front panel is installed in the case with two front panel stop screws.



13−2. Character's pattern for display

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

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

13−3. Setting table for functions

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

Function No.	Initial value	Customer's setting	Function No.	Initial value	Customer's setting
F−01	00000		F−44	00000	
F−02	00004		F−45	00001	
F−03	00001		F−46	00001	
F−04	00001		F−50	00001	
F−05	00001		F−51	00000	
F−06	00000		F−52	00003	
F−08	00000		F−53	00021	
F−09	00020		F−54	00000	
F−10	11111		F−55	00001	
F−11	00003		F−56	00000	
F−12	00000		F−57	00000	
F−15	00002		F−58	00000	
F−16	00020		F−59	00005	
F−17	00020		F−65	00010	
F−20	00000		F−66	00005	
F−21	00000		F−72	00000	
F−22	02000		F−84	00002	
F−30	11111		F−85	00001	
F−31	00000		F−86	00000	
F−32	00000		F−87	00000	
F−33	00000		F−90	—	
F−34	00000		F−91	—	
F−35	00000		F−92	—	
F−36	00000		F−93	—	
F−40	00000		F−94	—	
F−41	00000		F−97	00000	
F−42	00000		F−98	—	
F−43	00000		F−99	—	

MEMO

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

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