

Minebea

TRANSMITTER

CSA-528-80-4

CSA-528-80-2

CSA-528

Instruction Manual

**MINEBEA Co. Ltd.
Measuring Components Business Unit**

EN294-1471

Forward

Thank you very much for purchasing Minebea's Transmitter, model CSA-528-80-4, CSA-528-80-2 and CSA-528. This manual explains installation procedures and connecting method and also operating method for the transmitter. Make use of it properly after reading through the manual carefully. This manual is intended for the technical experts to read.

Marks and arrangements used in this manual

The following marks are put to the explanation on the matters that indicate "Do not 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.
Do not do these things described here.



Caution

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



It is attention and a limitation in the operation and work
Be sure to read the items to prevent the malfunction..

For safe operation

Be sure to read this instruction manual before use.

1. Instration place

Caution

The temperature and humidity must use it in the place within the following ranges.

- Environmental temperature : $-10\text{ }^{\circ}\text{C}$ to $50\text{ }^{\circ}\text{C}$
- Environmental humidity : 85 %RH or less (No condensing)

Warning

Do not set up this instrument in the following places. It might cause an unexpected faulty in the instrument.

① Installation prohibition place.

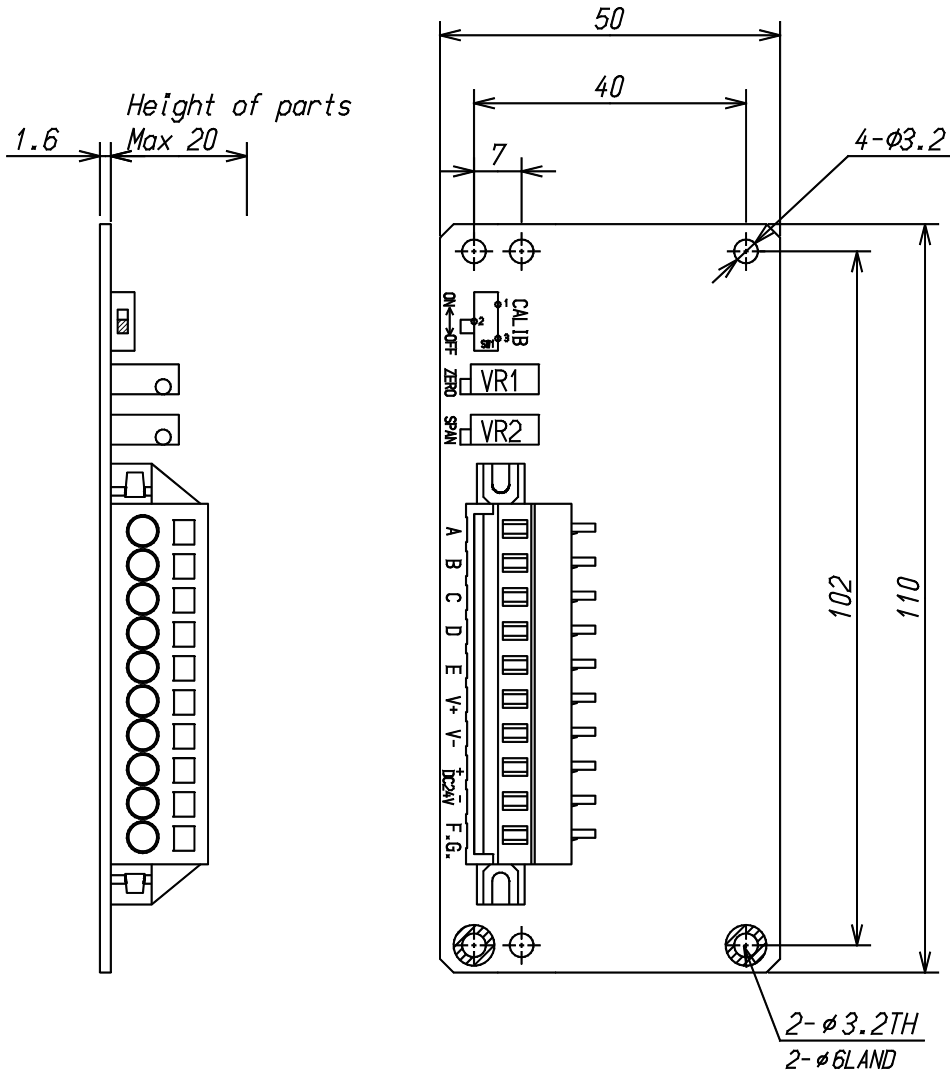
- Do not locate the instrument in direct sunshine and/or high temperature area.
- Do not use the instrument in the high humid area.
- Do not install the instrument in the place with the vibrations and shock.
- Do not use the instrument where there is excess of dusts and fine particles.
- Do not use the 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 When you set up this instrument

Caution

Install based on the following sizes to set up this instrument, and secure the space for surroundings of this container.

Each outline CSA-528 of the instrument and required dimensions for the environmental spaces are as follows:



Side

Parts mounting side

Unit : mm

2. Power supply

Warning

Install each cable while turned off the power supply. Might it get an electric shock, and this instrument be damaged when working with the power supply enters.

Warning

Confirm the power supply voltage of the instrument and the specifications are corresponding to the supplied power supply before turning on the power supply. Consult with MINEBEA when not matching. There is danger of causing damage and the electric shock of this instrument when using it like the uncertainty.

Caution

Groundline should be connected ground securely. When groundline is not connected, it may cause a malfunction of the instrument or electric shock to the operator

3. Application note

Caution

Before this instrument is newly used, or when the strain gage applied transducer is exchanged with a new one, please execute the calibration. If not calibrating, it may cause not obtaining the correct measurement result, or a malfunction in the instrument and there is a possibility of the damage of peripherals. Moreover, there is a similar possibility that the result is incorrect even if the calibration has been already made. Please take the calibration again.

Caution

Please confirm connecting wires is correctly executed when you use this instrument. If it is not connected correctly, it may cause the malfunctions on the instrument, and the damage to the peripheral equipments or even worse serious accidents.

Caution

It causes not obtaining a correct measurement result, and the malfunction when the setting change is carelessly executed while measuring it with this instrument and there is a possibility of the damage of peripherals..

Caution

Please do not give the impact such as throwing the thing at this instrument.
There is a possibility of causing the malfunction on this instrument, or causing the damage of the electric circuit.

Index

<i>FORWARD</i>	<i>I</i>
<i>MARKS AND ARRANGEMENTS USED IN THIS MANUAL</i>	<i>I</i>
<i>FOR SAFE OPERATION</i>	<i>II</i>
1. INSTRATION PLACE.....	<i>II</i>
2. POWER SUPPLY.....	<i>IV</i>
3. APPLICATION NOTE.....	<i>IV</i>
<i>HISTORY OF REVISION</i>	<i>I</i>
1. <i>EACH FUNCTION AND NAME</i>	<i>1</i>
2. <i>CONNECTING METHOD</i>	<i>3</i>
2-1. LAYOUT OF THE TERMINAL BOARDS.....	<i>3</i>
2-2. NOTE ON CONNECTION.....	<i>3</i>
2-3. CONNECTION.....	<i>4</i>
3. <i>CALIBRATION</i>	<i>8</i>
3-1. CALIBRATION METHOD.....	<i>8</i>
3-2. CLIBRATION PROCEDURES.....	<i>9</i>
3-3. ZERO ADJUSTMENT BY MOUNTING RESISTANCE.....	<i>11</i>
4. <i>TROUBLE SHOOTING</i>	<i>14</i>
5. <i>SPECIFICATIONS</i>	<i>20</i>
5-1. SPECIFICATIONS.....	<i>20</i>
5-2. GENERAL SPECIFICATIONS.....	<i>20</i>
5-3. ACCESSORIES.....	<i>20</i>
6. <i>WARRANTY</i>	<i>21</i>
6-1. WARRANTY.....	<i>21</i>
6-2. REPAIR.....	<i>21</i>

1. Each function and name

This instrument is a transmitter for the application of strain gage applied transducer.

It can obtain the analog output corresponding to the load, pressure, and the torque, etc., by amplifying the output of various strain gage applied transducers.

① "CALIB" switch

Used when the CALIB value is turned on or off.

② "ZERO" trimmer

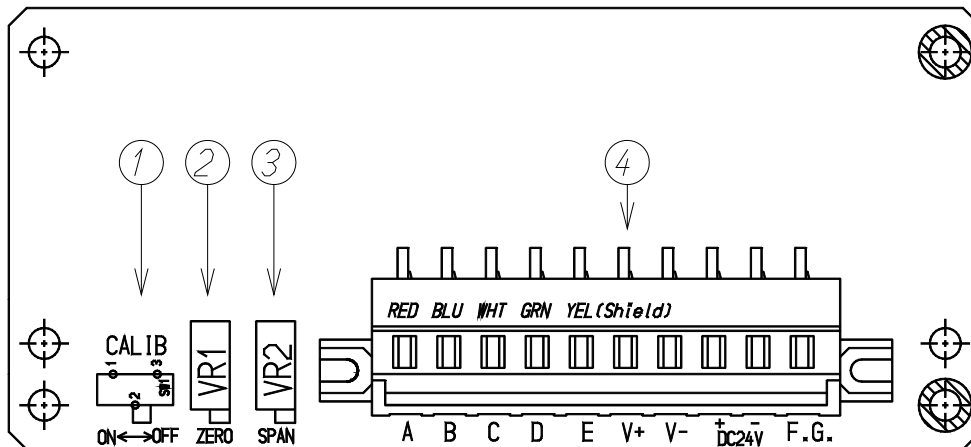
Adjust Zero balance voltage.

③ "SPAN" trimmer

Adjust output voltage by load.

④ Terminals

DC power supply, the ground line, the output voltage signal line, and the strain gage applied transducer are connected.



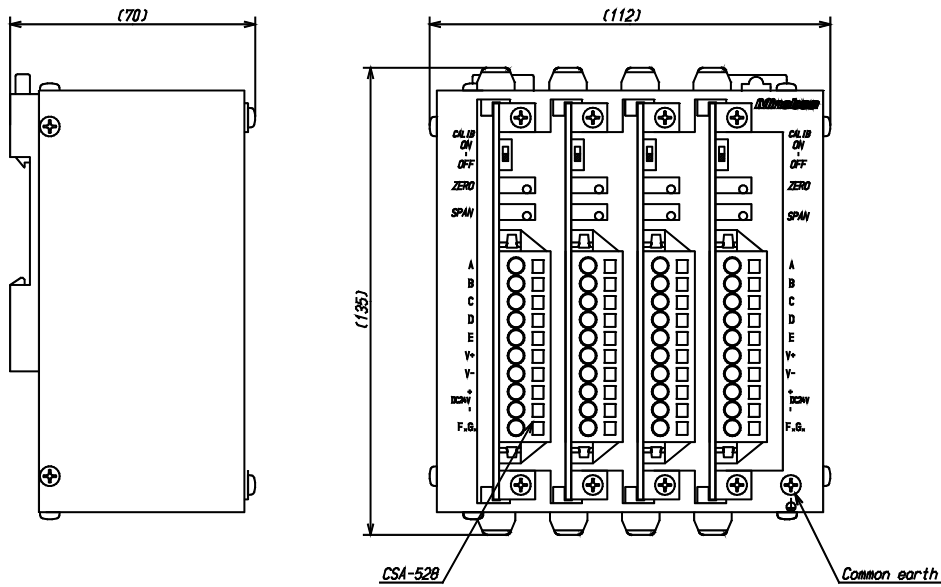
⑤ Case

The case is available for use to DIN rail.

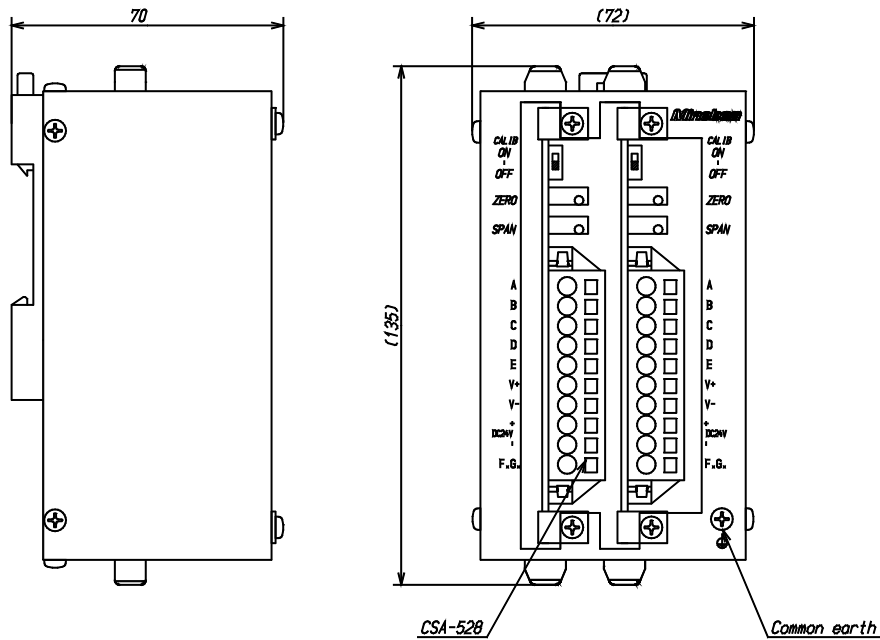
Never fail to connect ground line with the common earth in front of the case.

It will be D type single earth.

P/N : CSA-528-80-4, Installed CSA-528, 4 pcs.



P/N : CSA-528-80-2, Installed CSA-528, 2 pcs.



2. Connecting method

2-1. Layout of the terminal boards

No	Name of terminals	Description	Applications
1	A	Bridge power supply(+)	Strain gage applied transducer
2	B	Amplifier input(-)	
3	C	Bridge power supply(-)	
4	D	Amplifier input(+)	
5	E	Shield	
6	V+	Output voltage terminal(+)	Output voltage
7	V-	Output voltage terminal(-)	
8	DC24V(+)	DC power supply input (+)	Power supply
9	DC24V(-)	DC power supply input (-)	
10	F.G.	F.G.	



Isolated output voltage (-) and DC 24V (-).
"C" of bridge power supply (-) and "V-" of output voltage terminal are connected internally.



Caution

In case of connection with the instrument, keep strictly to the following items.
If neglected, it may cause an unexpected failure or damage to the instrument.

2-2. Note on connection

- Be sure to set the power supply to OFF, when the connection is made.
- Do not turn on the power supply until complete installing.
- The terminal boards front of the instrument is made of resin, take care not to drop it down or not to apply strong impact.
- The electric wire which suits the terminal block of this unit is 0.08 mm²/AWG28 to 2.5 mm²/AWG14.
- The electric wire bare length is 8 mm to 9 mm.
- 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.
- Be sure to connect earth. It should be D type single earth.
- All of the connections should be executed securely by referring to the Instruction manual for the instrument.

2-3.Connection

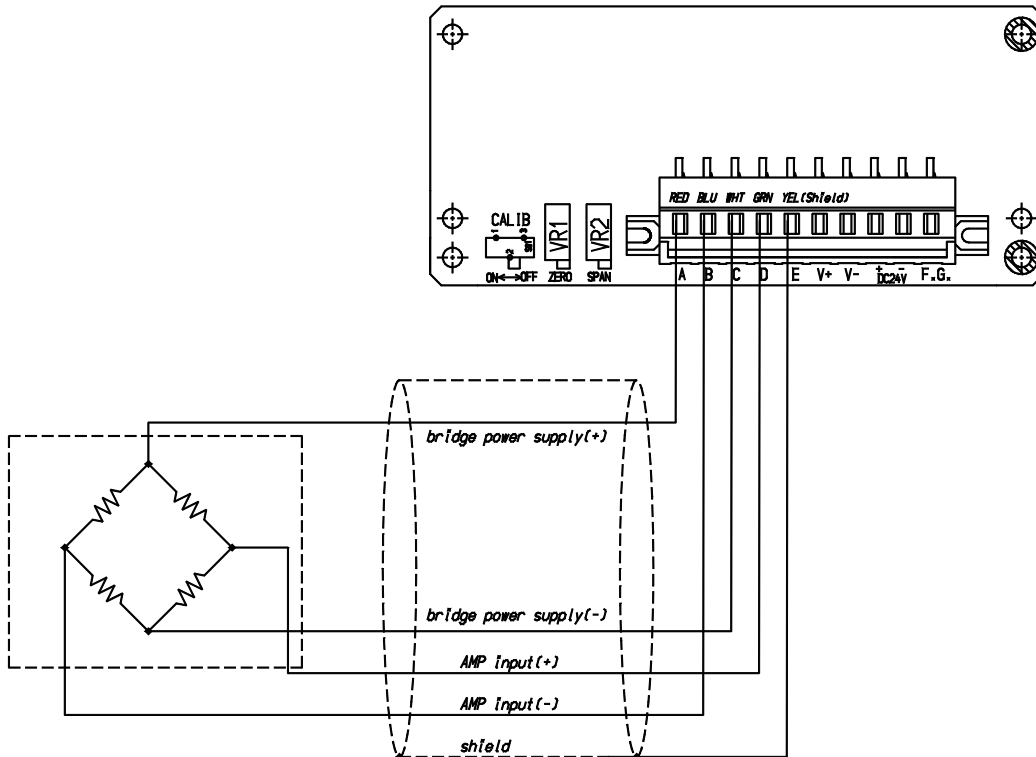


- ※1 When tension is applied with the application of tension type or universal (compression /tension) type of load cell, and display of "+" direction is required, connect "Green" with Terminal B and "Blue" with Terminal D individually. As there is a case which standard wiring color is different, please 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-502 is more than 10 m totally, or the zener barrier is used in the system, CALIB is not applicable.

2-3-1 .Connection with strain gage applied transducers

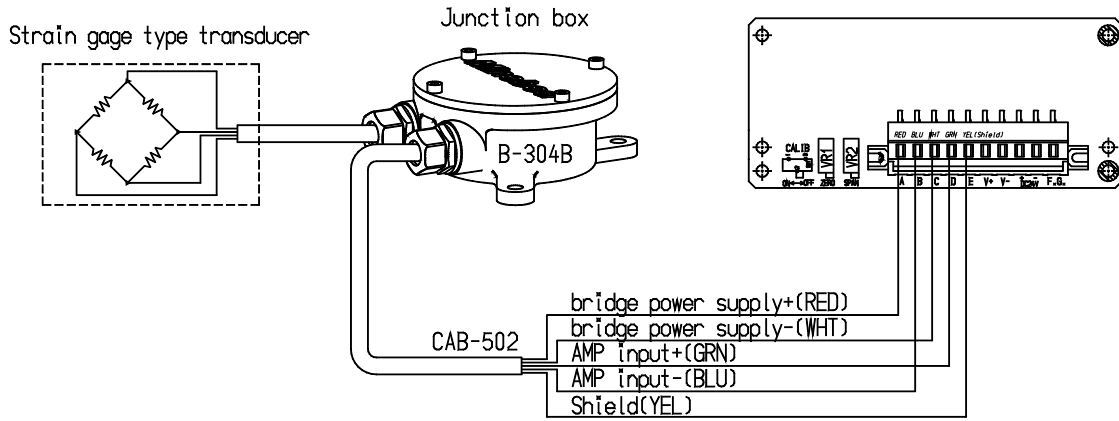
The instrument can connect with strain gage applied transducers, such as load cell, pressure transducer and so on.

Connection with 1 piece of load cell and CSA-528



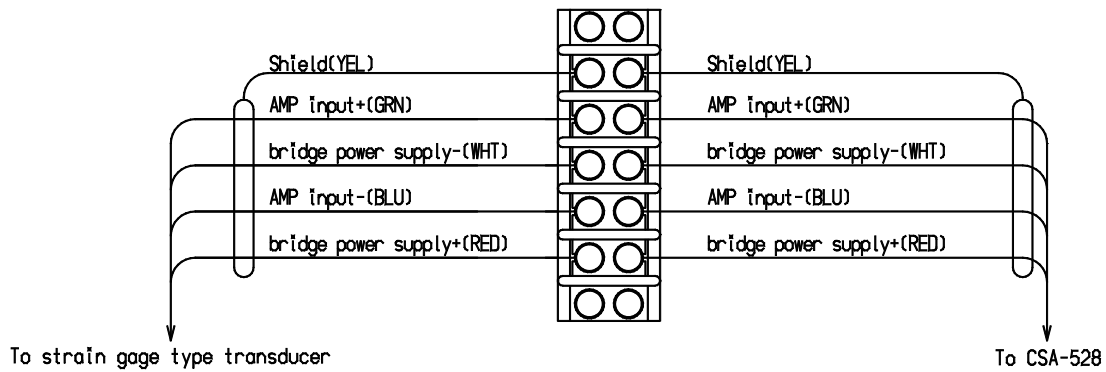
This instrument is available to connect with extension type junction box B-304B. Connect of one gage type transducer, junction box B-304, and CSA-528.

Strain gage type transducer



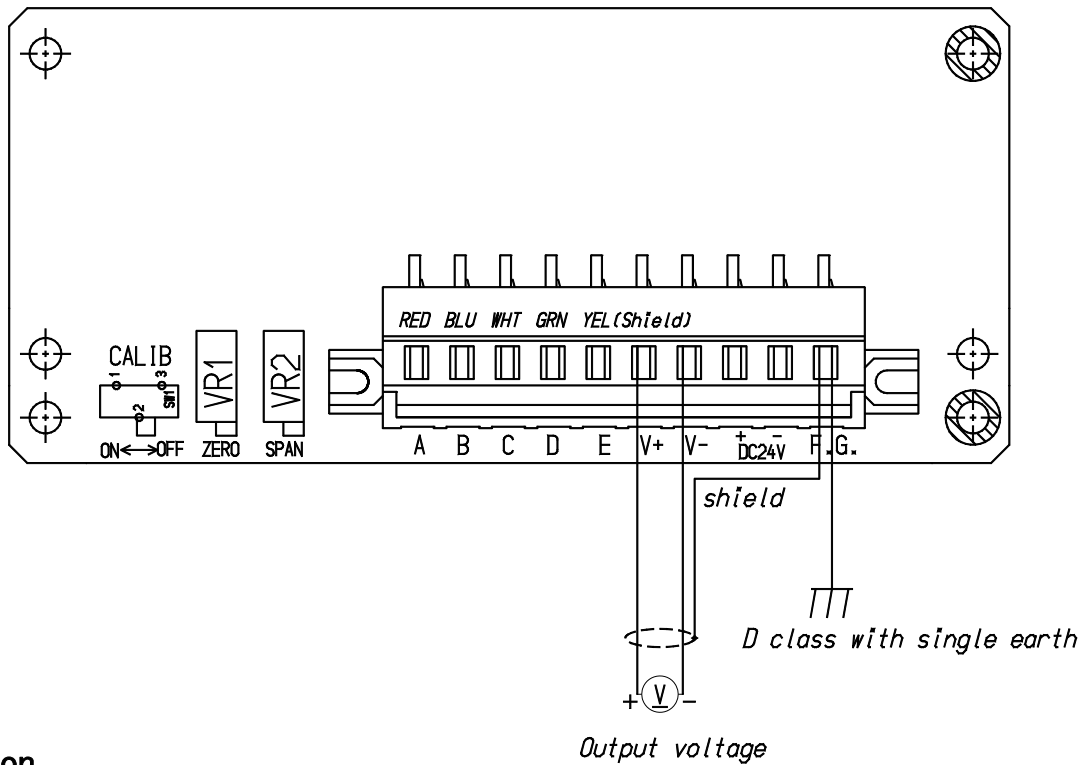
When the total length of CAB-502(our company acknowledged 4 wire type) specifies more than 30 m, the accuracy may be out of warranty because the resistance of cable makes decrease the input voltage of the instrument.

Internal terminal connection of B-304



2-3-2.Connecting output voltage

Connecting output voltage



Caution

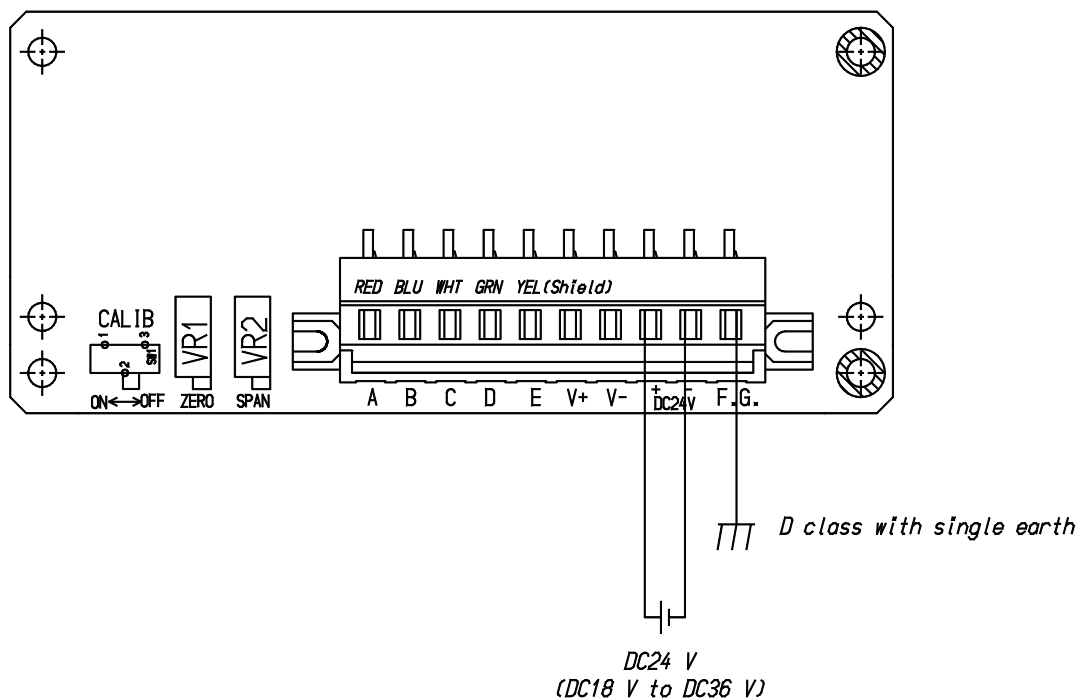
Connection with output voltage should be made securely as the figure indicates and also used within rated capacity for contact. If neglected, it may cause an unexpected failure or damage to the instrument.



When connect with output voltage, be sure to apply shielded cable, and shielded cable should be connected with F.G. terminal of the instrument. If neglected, it may cause an unexpected malfunction due to the effects of noise from other equipments.

2-3-3. Connection with power supply and ground

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



Caution

Connection with power supply and ground should be made securely as the figure indicates and also should be used within the specified condition of power supply. If neglected, it may cause an unexpected failure.



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

3. Calibration

3-1. Calibration method

Load calibration procedures for the instrument are two as follows:

- ① Calibration by the actual load
- ② Electronic calibration by CALIB input.

Caution

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.



In the calibration for CALIB input, the accuracy is 1/500 or so.

According to the Chapter 2 “Connecting method”, connect the instrument and the strain gage applied transducer properly, then supply the power.

3-2. Calibration procedures

3-2-1. Calibration by the actual load

Procedure1

Connecting of strain gage applied transducer
--

Connect the instrument and strain gage applied transducer.



Procedure2

Energizing for 20 min after power is turned on.

To stabilize this unit and the measuring section (loadcell), please make the instrument to the status of energizing for about 20 min.



Procedure3

Zero output adjustment

Set the strain gage applied transducer to the condition at initial load (tare weight). When the initial load (tare weight) is exceeding the ± 0.25 mV/V at the input conversion, cancel the initial load (tare weight) referring to the paragraph 3-3. Adjust the output voltage value to 0.000 V with "ZERO" trimmer.



Procedure4

Span adjustment (output)

Put the rated load (pressure) on the strain gage applied transducer, and adjusts the "SPAN" trimmer to become the output voltage value to be set.



Procedure5

Zero output checking

After removing the standard weight set on step 3, confirm the output voltage value to be at 0.000 V. If not, return to the step 3.

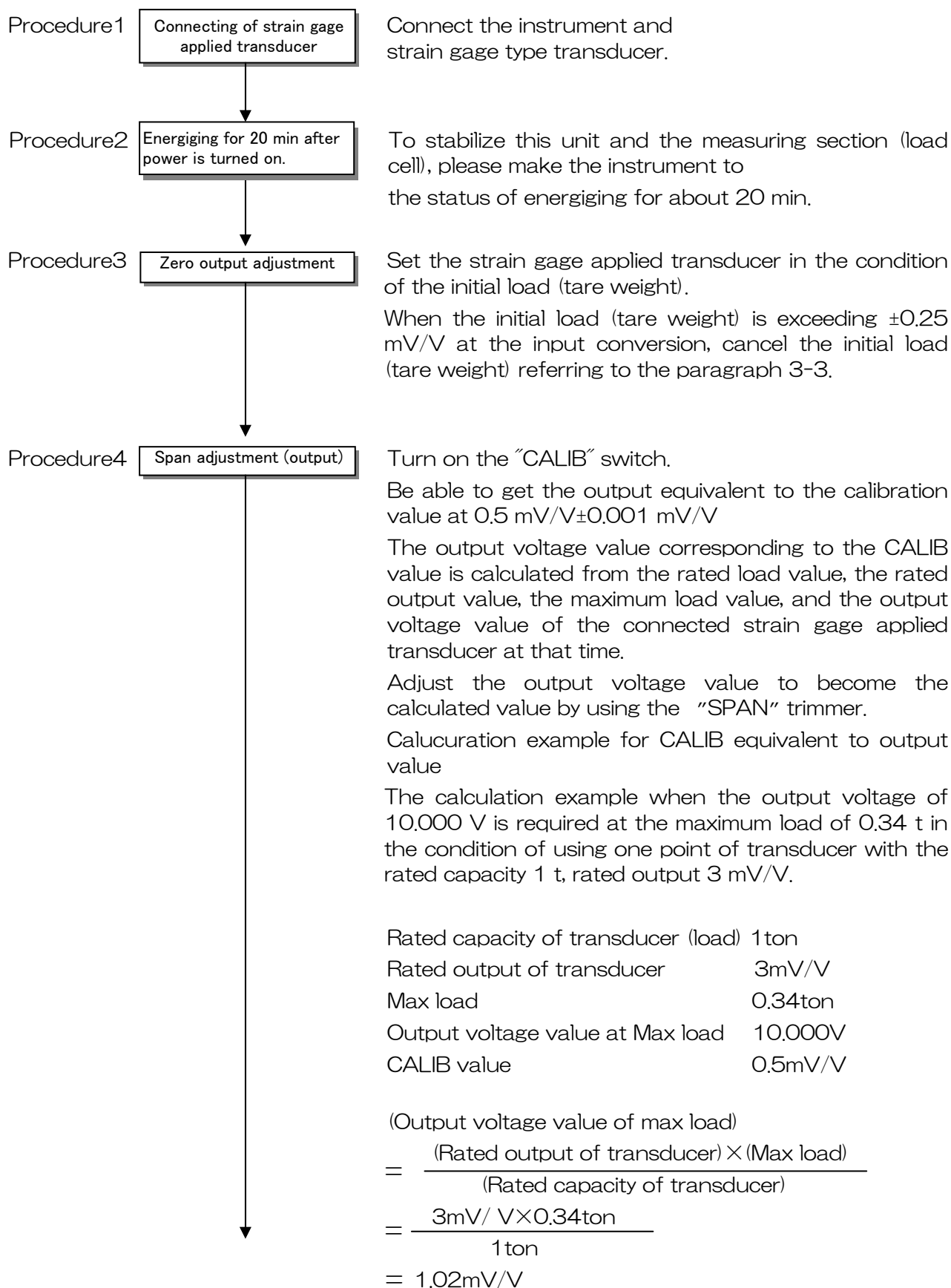


Procedure6

Complete the calibration

Please complete from the calibration mode by actual load.

3-2-2. Calibration by CALIB input



$$\begin{aligned}
 & \text{(CALIB equivalent to output voltage value)} \\
 & = \frac{\text{(Output voltage value of max load)} \times \text{(CALIB value)}}{\text{(Transducer output value of max load)}} \\
 & = \frac{10.000 \text{ V} \times 0.5 \text{ mV/V}}{1.02 \text{ mV/V}} \\
 & \doteq 4.902 \text{ V}
 \end{aligned}$$

Therefore, the output voltage value in turning on CALIB switch is adjusted to 4.902 V.

Procedure5 Zero output checking

OFF the CALIB switch

Check the output voltage value is 0.000 V

If it is not, back to procedure3.

Procedure6 Complete the calibration

Complete from the calibration mode by CALIB input.



Caution

Set the rated output value of the transducer for calculation to the written value of each inspection data sheet.

3-3.Zero adjustment by mounting resistance

3-3-1. Install the resistance

The zero balance adjustable range of this transmitter is 0.25 mV/V ($\pm 500 \mu \epsilon$) or equivalent at the input conversion. Therefore, when an initial load exceeds this range, it is not possible to zero balance adjust it by this unit.

In this case, mount resistance Rz on R22 (When an initial load is plus) or R23 (When an initial load is minus), and cancel an initial load.

Moreover, because the resistance used exerts the influence directly on accuracy, resistance temperature coefficient less than 50 ppm/°C is recommended.

If the one with more excellent resistance temperature coefficient is used, the influence on accuracy by the temperature becomes small when used in the environment with a large temperature change.

The example of resistance for compensation corresponding to the input conversion strain is shown on the next page.

However, the error is actually caused with the rose etc. of the I/O resistance of an actual strain gage applied transducer because this resistance is a theoretical value. Please think the standard to the end.

Input resistance value

Resistance by which the zero adjustment of $\pm 0.25 \text{ mV/V}$ ($\pm 500 \mu\epsilon$) or more is set can be requested by the undermentioned formula.

R_z = Resistance for cancellation $k\Omega$

E_T = Initial load (tare) mV/V

$K = 146$

$$R_z = \frac{1}{E_T \times K} \times 10^3$$

Resistance value (R_z)			
Input conversion strain		When bridge resistance is 350Ω	
$m\epsilon$	mV/V	Calculated value $k\Omega$	Approximate value $k\Omega$ (E96)
200	0.1	68.5	68.1
400	0.2	34.2	34.0
600	0.3	22.8	22.6
800	0.4	17.1	16.9
1000	0.5	13.7	13.7
1200	0.6	11.4	11.5
1400	0.7	9.78	9.76
1600	0.8	8.56	8.66
1800	0.9	7.61	7.68
2000	1.0	6.85	6.81
2200	1.1	6.23	6.19
2400	1.2	5.71	5.62
2600	1.3	5.27	5.23
2800	1.4	4.89	4.87
3000	1.5	4.57	4.53
3200	1.6	4.28	4.32
3400	1.7	4.03	4.02
3600	1.8	3.81	3.83
3800	1.9	3.60	3.60
4000	2.0	3.42	3.40
4200	2.1	3.26	3.24
4400	2.2	3.11	3.09
4600	2.3	2.98	2.94
4800	2.4	2.85	2.87
5000	2.5	2.74	2.74

3-3-2. Initial load checking

Please confirm it by the following procedure when an initial load (tare weight) is uncertain.

- ① Please prepare the digital multimeter which can read 0.1 mV by DC range.
- ② The voltage (power supply voltage of the bridge) between A and C of this unit (C is minus) is measured.
- ③ The voltage (output voltage of the bridge) between D and B of this unit (B is minus) is measured.
- ④ The input conversion value of an initial load is obtained by the undermentioned formula. If the obtained value is "+ polarity", an initial load is plus, and if "- polarity", an initial load is minuses. Mount the resistance according to the paragraph 3-3-1.

Calculation example)

Calculation example when power supply voltage of the bridge is 10.000 V and input voltage is 2.0 mV in the condition of the initial load (tare weight), is as follows:

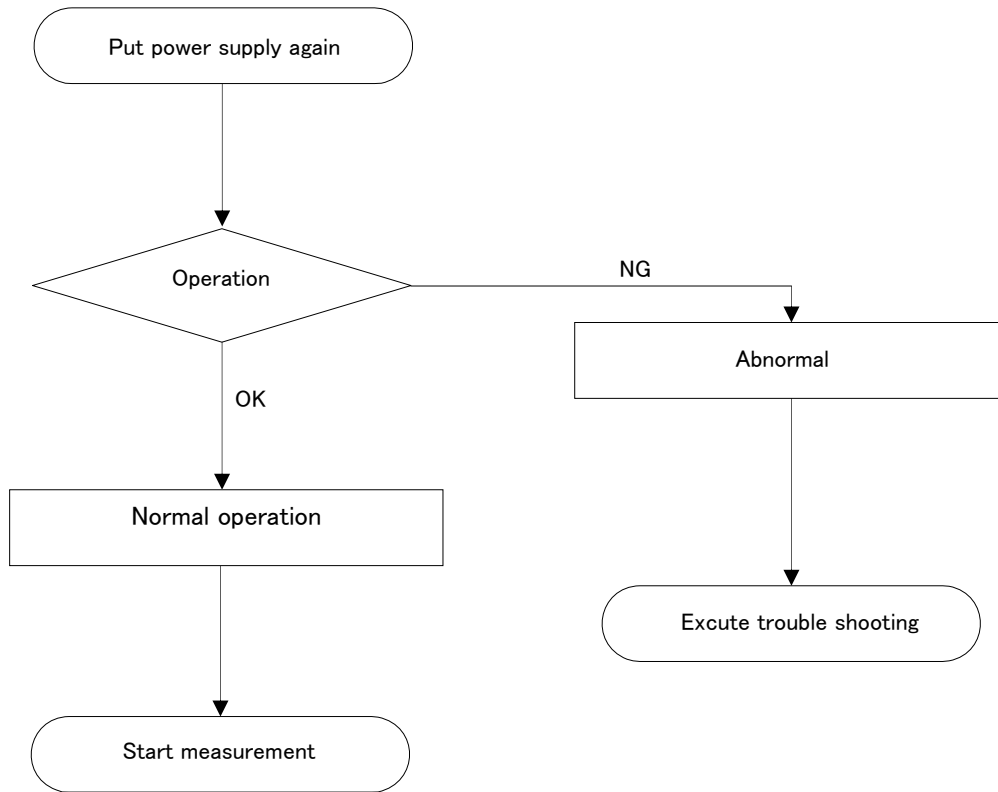
$$\begin{array}{l} \text{(Initial load input} \\ \text{conversion value)} \end{array} = \frac{\text{(Input voltage)}}{\text{(Bridge power supply voltage)}} \Rightarrow \begin{array}{l} \text{(Initial load input} \\ \text{conversion value)} \end{array} = \frac{2.0\text{mV}}{10.000\text{V}}$$

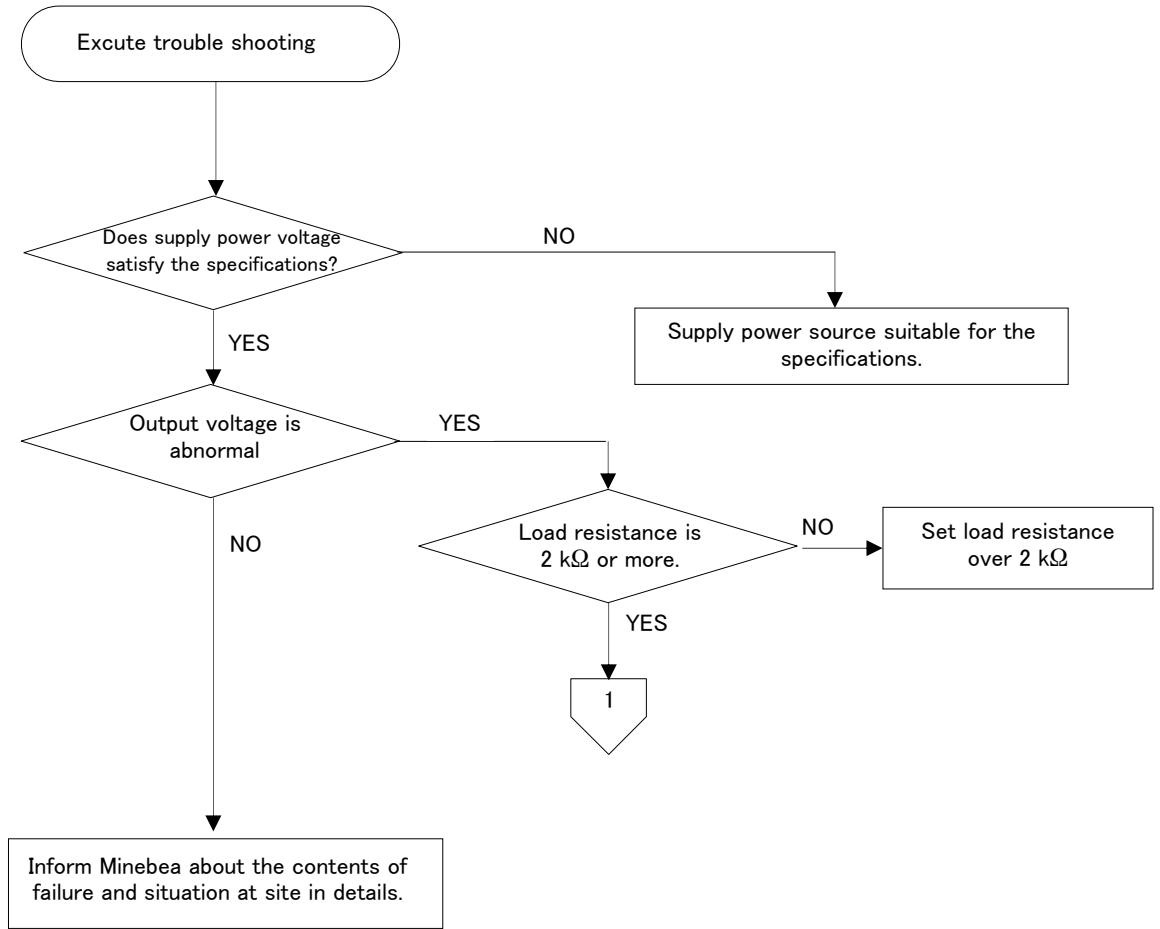
Therefore, according to the paragraph 3-3-1, R_z is calculated to $34.2 \text{ k}\Omega = 0.2\text{mV/V}$

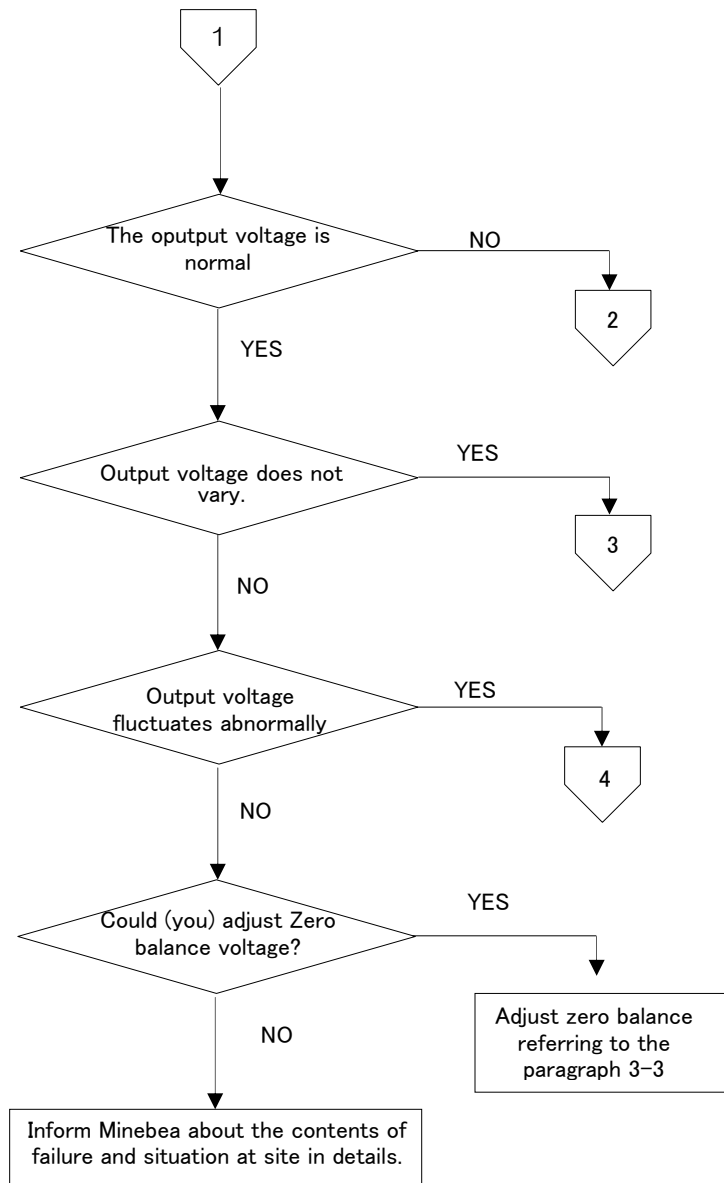
4. Trouble shooting

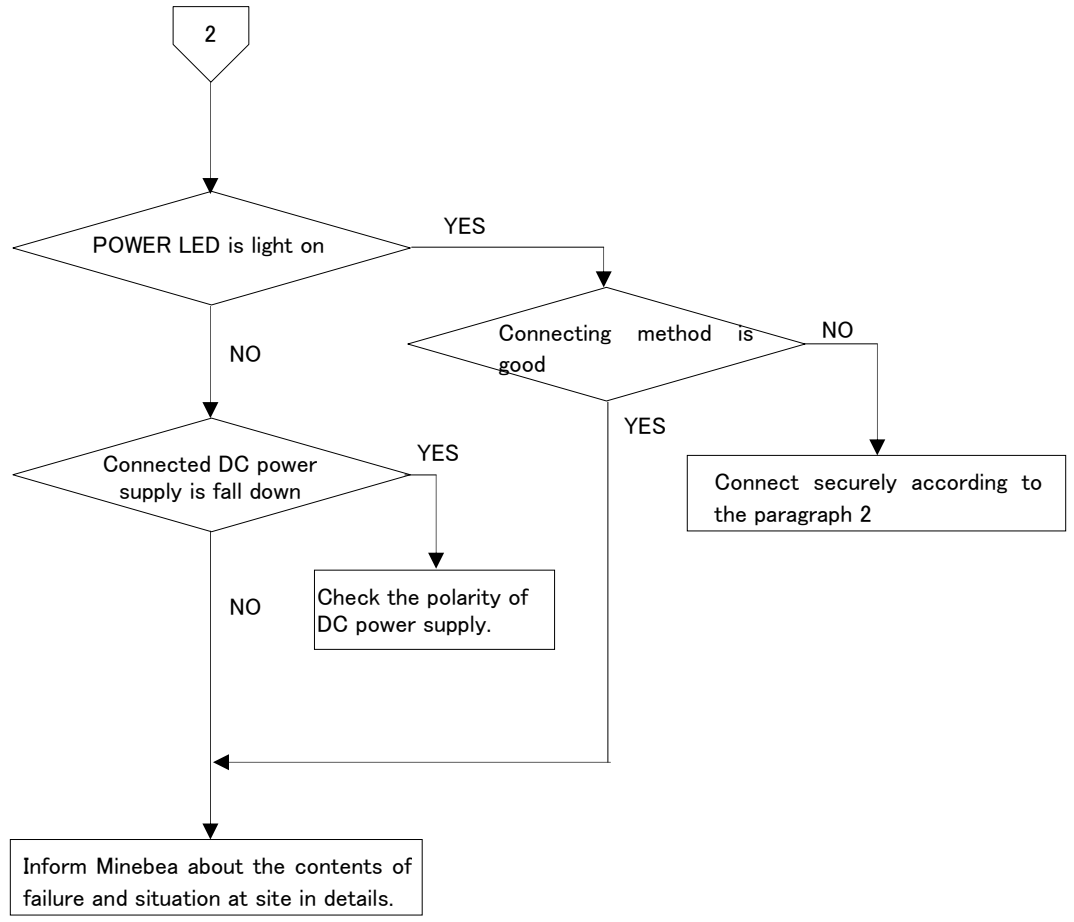
When abnormal point(s) is/are found during the operation of the instrument, check by the following procedures.

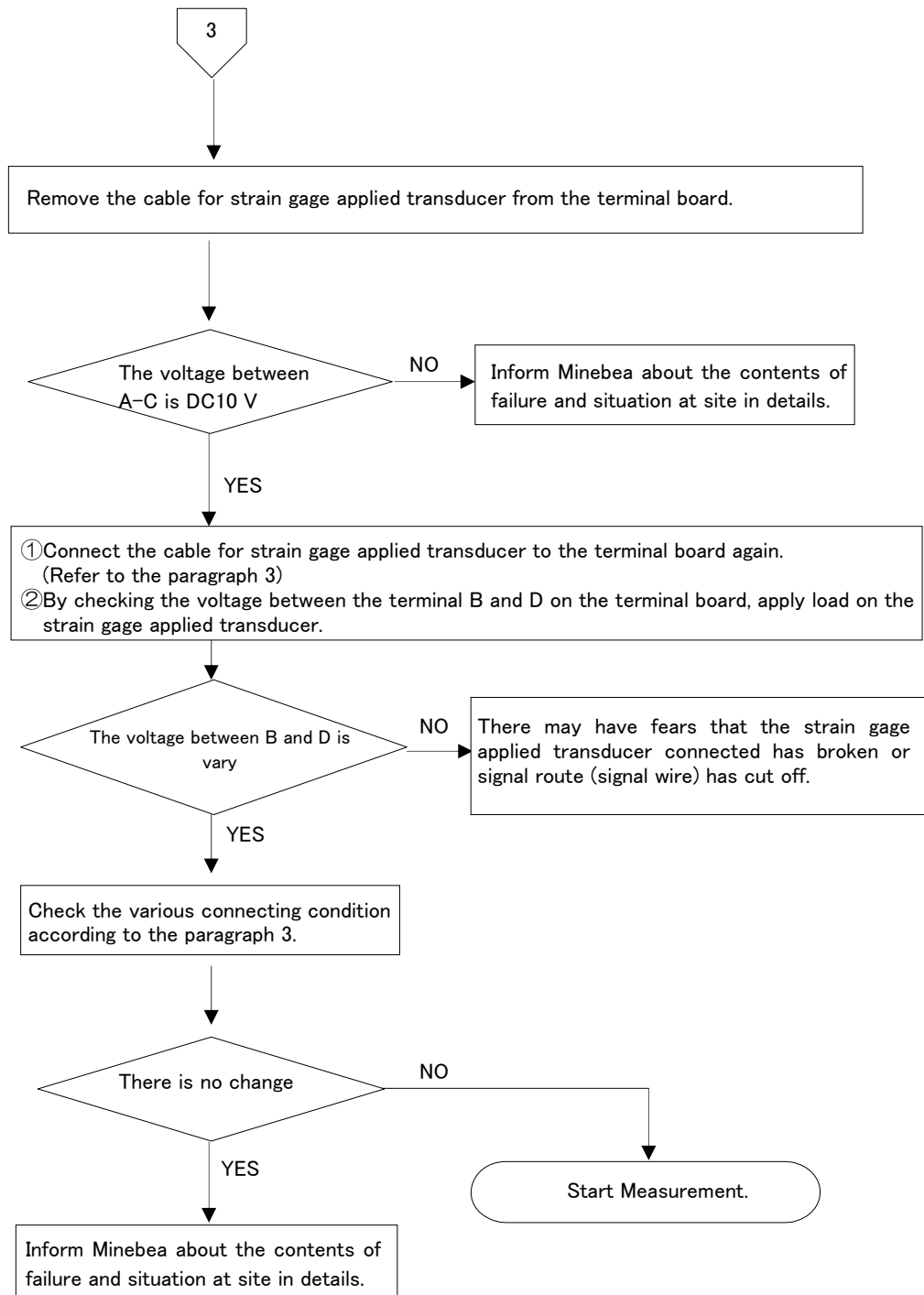
However, when you cannot find applicable item nor solve the symptom of trouble even after you have taken some measures, contact with Minebea.



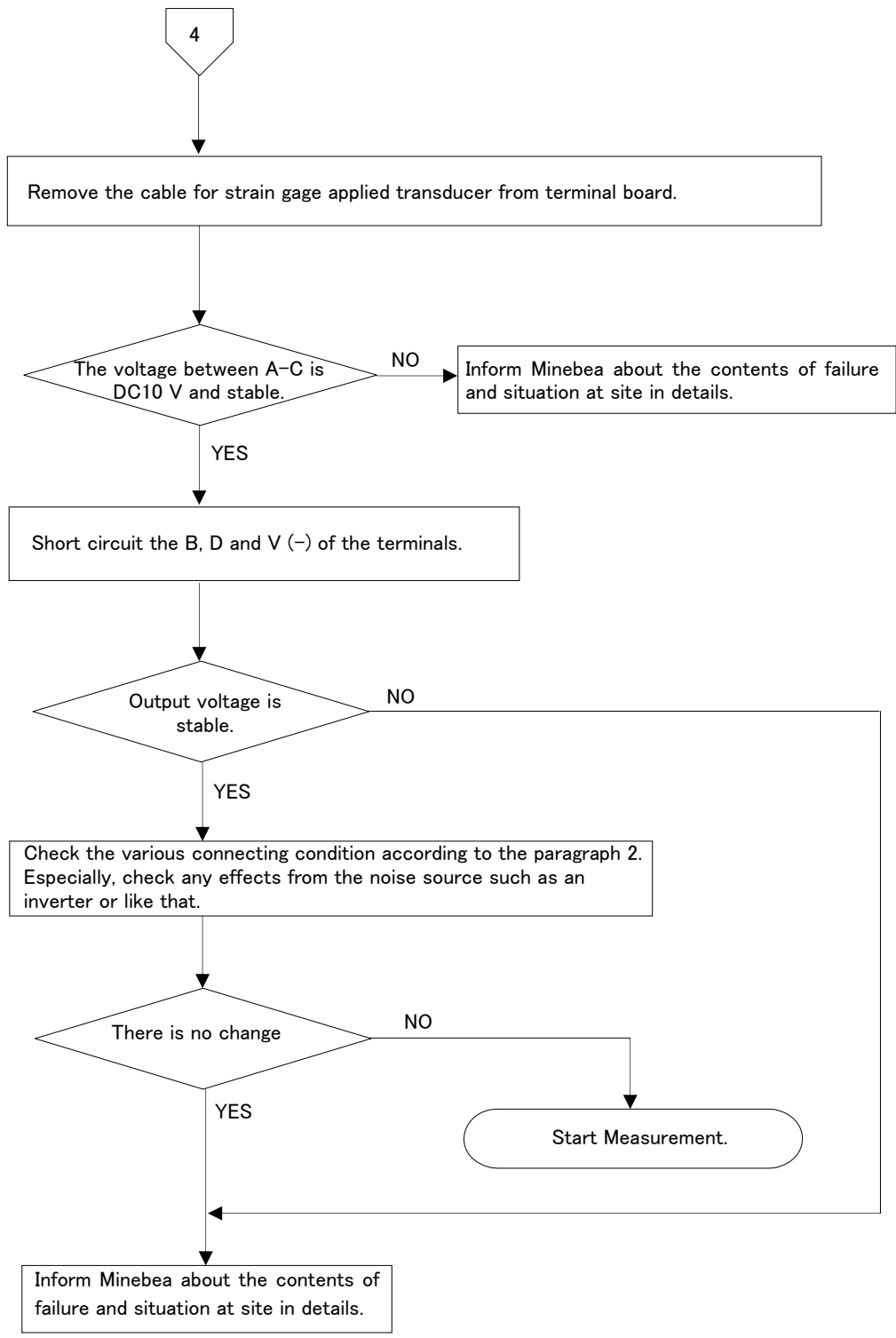








When checking voltage between A-C, set the connecting range to DC·V for the measuring instrument such as digital multimeters
 When checking voltage between B-D, set the connecting range to DC·mV for the measuring instrument such as digital multimeters.



When checking voltage between A-C, set the connecting range to DC·V for the measuring instrument such as testers
 When checking voltage between B-D, set the connecting range to DC·mV for the measuring instrument such as testers.

5. Specifications

5-1. Specifications

• Bridge power supply	DC10V +0.9V, -0.2V
• Applicable transducers	1 piece of strain gage applied transducer (350 Ω) only.
• Input range	0.5mV/V to 1.5mV/V
• Sensitivity	10 V output at the input of 0.5 mV/V
• Sensitivity adjustment range	2 000 times adjustable from 1/1 to 1/4
• Output voltage	±10V
• Output load resistance	2kΩ以上
• Zero adjustment range	Adjustable ±0.25 mV/V by trimmer ※ Adjustable the tare weight compensation by mounting the resistance.
• Non-linearity	0.02%F.S.
• Temperature coefficient	
Zero point	±1 μV/°C (Input conversion)
Sensitivity (SPAN)	±0.01%F.S./°C
• CALIB	0.5mV/V±0.001mV/V
• Frequency response range	1kHz (-3dB±1dB)

5-2. General specifications

• Operating temperature/humidity range	
Temperature	-10°C to 50°C
Humidity	Less than 85 %RH (No condensing.)
• Power supply voltage	DC24V 100mA
• Outline dimensions (W×H×D)	120mm x 140mm x 90mm (CSA-528-80-4 case) 72mm x 135mm x 70mm (CSA-528-80-2 case) 110mm x 50mm x 20mm (CSA-528)
• Weigh	Approx. 800 g (CSA-528-80-4 case) Approx. 500 g (CSA-528-80-2 case) Approx. 50 g (CSA-528)
• Terminals	231-610 (WAGO)

5-3. Accessories

• Instruction manual	1 piece
• Minus driver (small)	1 piece

6. Warranty

6-1.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.

6-2.Repair

Before asking repairs, make checks once again that the connection, setting and adjustment for the instrument have finished properly by referring to 9.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.

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

HEAD QUARTER : **MINEBEA CO., LTD.**

4106-73 Miyota, Miyota-machi, Kitasakugun, Nagano-ken 389-0293, Japan

☎0267-32-2200 FAX.0267-31-1350

Measuring Components Business Unit

FUJISAWA PLANT 1-1-1, Katase, Fujisawa-shi Kanagawa-ken, 251-8531 Japan

☎0466-22-7151 FAX.0466-22-1701

KARUIZAWA PLANT 4106-73 Miyota, Miyota-machi, Kitasakugun, Nagano-ken 389-0293, Japan

☎0267-31-1309 FAX.0267-31-1350

HOME PAGE ADDRESS **<http://www.minebea-mcd.com>**