Minebea

Transmitter
CSA-591

Instruction Manual

EN294-1141-G

Foreword

Thank you very much for purchasing our Transmitter CSA-591.

This manual explains installation procedures and connecting method and also operating method for the Transmitter CSA-591.Make use of it properly after reading through the manual carefully.

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

Marks and arrengements 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.

Marking	Description
⚠**WARNING**	Warning may cause injury or accident that may harm to the operator. Don't do these things described here.
	Caustion durning operation and working. Be sure to read the item to prevent malfunction.

For safe operation

Be sure to read this instruction manual before use.

1. Installation place

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

Environmental temperature : 0 °C ～ 50 °C
Environmental humidity : Less than 80 %RH (with no condensation)

（1） Location where installation is not allowed.

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

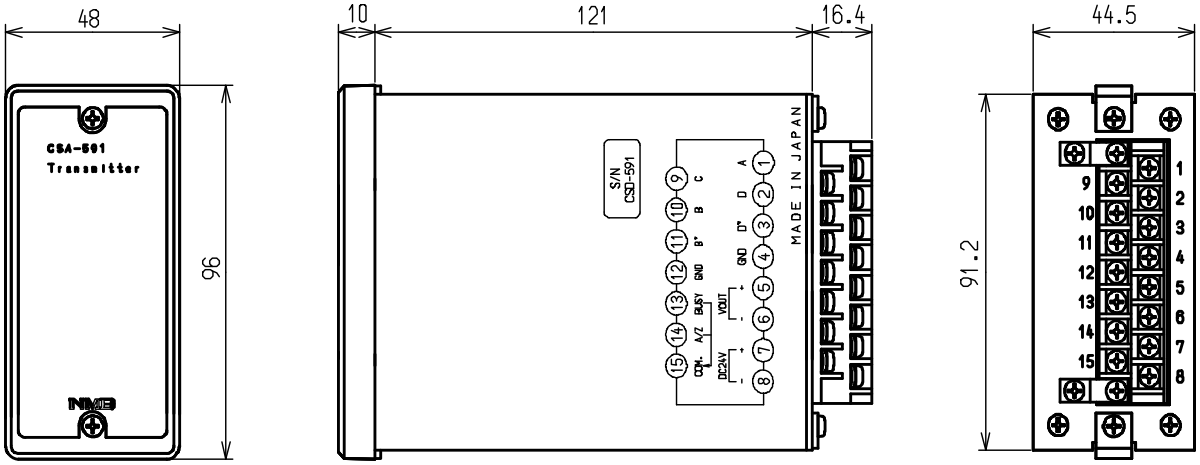
- Don't locate the instrument in direct sunshine and/or high temperature area.
- Don't use the instrument in a high humid area.
- Don't install the instrument where there are vibrations and shocks.
- Don't use the instrument where there is excess of dusts and fine particles.
- Don't use the instrument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

(2) Installation

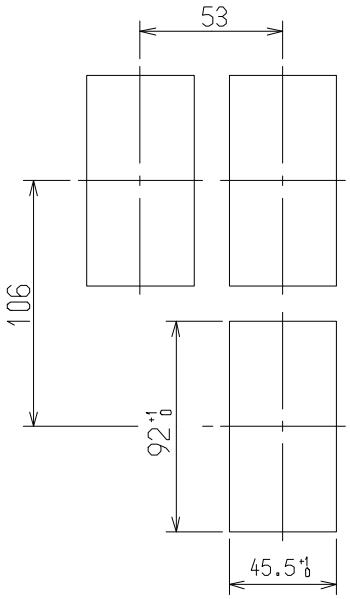
When installing the instrument, install as referring to the following figures and secure the space around the instrument.

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

Outline dimensions



Panel cut size



Unit : mm

2. Power supply

⚠**WARNING**	Be sure to check that the power supply is off in connecting each cable. If the work is done while the power is on, there may have the case that electric shock to the operator or even may have damage to the instrument.
⚠**WARNING**	Before supplying the power, check that the indication of power supply voltage / specifications for the instrument and the power going to supply should be the same. If they are not equal, contact us. If you use the instrument wihout 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, eve 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 durning 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 insturuments.
⚠**WARNING**	Do not shock the instrument such as thowing something on it. If neglected, It may cause destruction of the parts and damage to the electrical circuits.

Revision History

Date	Manual No.	Revision details
2006/02	EN294-1141	New
2007/01	EN294-1141-A	Due to ECN No.FN06−01050 − Correction − former name −> “tie bar gage”
2007/08	EN294-1141-B	Due to ECN No.FN07−02094 − Change − 4−3. Connection Extension cable “FA409−357“→“FA409−404”
2010/02	EN294-1141-C	Due to ECN FN10−02026 − Change − Front cover’s logo is changed.
2010/10	EN294-1141-D	Due to ECN FN10−02140 − Change − Minebea logo is changed.
2018/02	EN294-1141-E	Due to ECN FN17-02017 ・Delete the company name in the cover page. ・Delete the company name in the contents.
2018/03	EN294-1141-F	Due to ECN FN18-02019A −Correction− INDEX P10 5-2 Calibration procedure ①CSA−591 calibration by the actual load → CSA−591 calibration procedure by the actual load ②CSA−591 (with automatically zero function) by the actual load.→CSA−591-99 (with automatically zero function calibration. procedure) by the actual load. 5−2−1. Calibration procedure by the actual load → CSA-591 Calibration procedure by the actual load P12 5-2-2 Electrical calibration by the actual load (CSA−591−99)→CSA−591-99 (with automatically zero function) calibration. procedure by the actual load. P13 Procedures −Correction drawing− P9 5-1. The front panel was removed. P12 The front panel was removed. P13 Procedures

Date	Manual No.	Revision details
2023/04	EN294-1141-G	Due to ECN.FN23-0116 ・Marks and arrengements used in this manual Removed "Mark durning operation" and its description, because there is no corresponding point. ・“ZERO” coarse adjustment rotary switch changed to “ZERO (TARE)” coarse adjustment rotary switch. <Changed content> ・2.Name and function of each point 2.1 Front panel② -Before the change- “ZERO” coarse adjustment rotary switch -After the change- “ZERO(TARE)” coarse adjustment rotary switch ・“ZERO” adjustment rotary switch changed to “ZERO (TARE)” adjustment rotary switch. <Changed content> ・5.2.1CSA-591 Calibration procedure by the actual load. and 5.2.2.CSA-591-99(with automatically zero function) calibration procedure by the actual load. Procedures 1 -Before the change- rotary switch for zero adjustment -After the change- “ZERO (TARE)” adjustment rotary switch Procedures 2 Zero adjustment ②Not adjustable case -Before the change- Set the “ZERO” adjustment rotary switch -After the change- Set the “ZERO (TARE)” adjustment rotary switch Illustration -Before the change- “ZERO” adjustment rotary switch -After the change- “ZERO (TARE)” adjustment rotary switch

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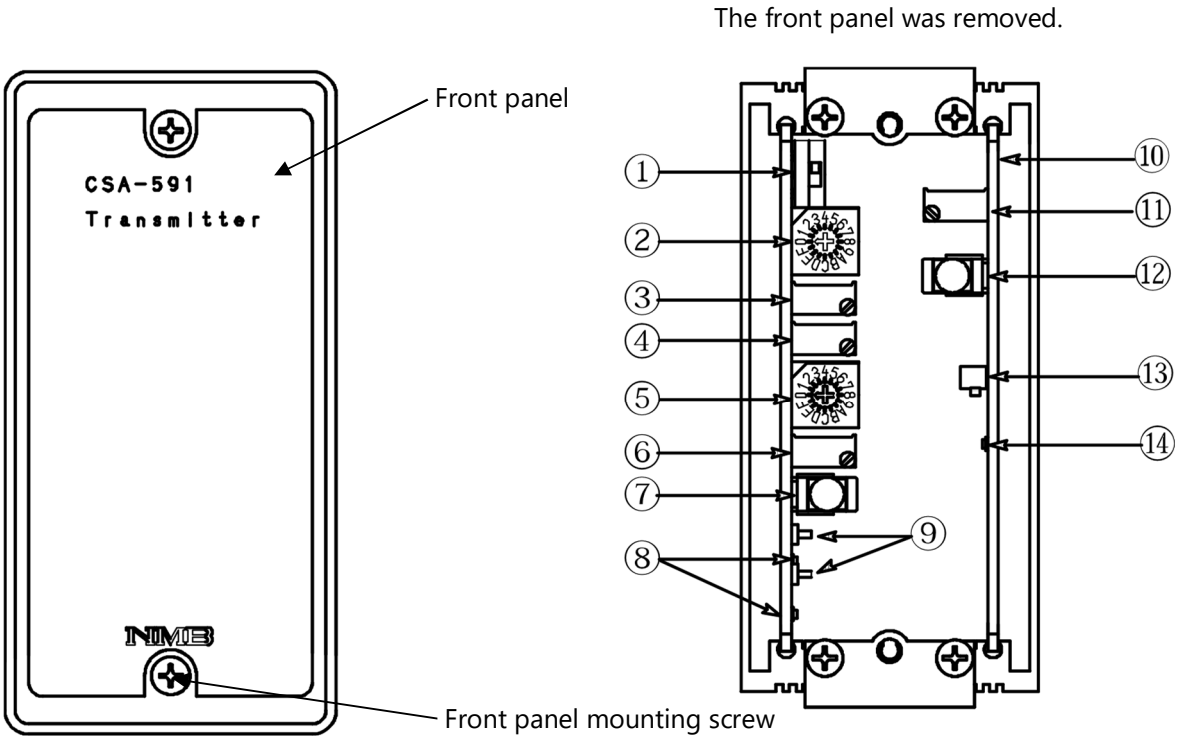
1. General

This insturument is a transmitter for the tie bar gage. (350 Ω, 2 pieces one pair)

2. Name and function of each point

2.1 Front panel



① "ZERO"adjustment polarity switch

It is a polarity switch in executing zero adjustment.

② "ZERO(TARE)" coarse adjustment rotary switch

It is a rotary switch for zero coarse adjustment.

③ "ZERO"coarse adjustment trimmer

It is a trimmer for zero coarse adjustment.

④ "ZERO" fine adjustment trimmer

It is a trimmer for zero fine adjustment.

⑤ "GAIN"coarse adjustment rotary switch

It is a rotary switch for sensitivity coarese adjustment.

⑥ “GAIN”fine adjustment trimmer

It is a trimmer for sensitivity fine adjustment.

⑦ CAL switch

CAL value is output when switch is turned on.

⑧ LED

When both LED are turned off, the analog output is within some ± 50 mV.

⑨ Check pin of analog output

The same voltage as V-OUT of the back terminal is output.

⑩ PC board for automatic zero as an option

When model CSA-591 is specified, PC board for automatically zero is not attached.When model CSA-591-99 is specified as an option, it is attached.

⑪ Trimmer for adjusting automatic zero comparator

It is adjusted at the shipment from factory.Don’t turn it.

⑫ Switch of ON for automatically zero

A/Z (Automatically zero) operates by turning ON.

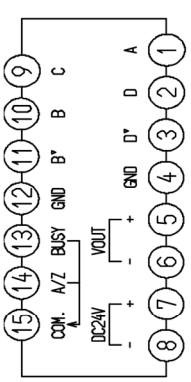
⑬ Switch of OFF for automatically zero

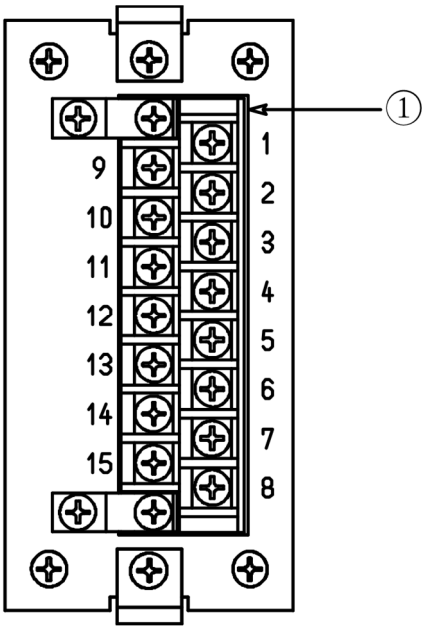
The voltage in which the voltage of PC board for automatically zero is subtracted by turning OFF is output.It is used when the initial zero is adjusted.

⑭ LED

It lights on while the automatically zero is working.

2.2 Rear panel





① Terminal block

It is a terminal block for gage, voltage output, power supply, A/Z, BUSY and COM.

3. Installation method

3.1 Installation place

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

Environmental temperature : 0 °C ～ 50 °C
Environmental humidity : Less than 80 %RH (with no condensation)

3.2 Location where installation is not allowed

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- Don't use the instrument where there are corrosive gas and salt and like that.
- Don't install the instrument where there is rapid change of temperature and humidity.
- Don't install the instrument near the devices that are magnetized or generate an electromagnetic field.
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- Avoid the location where chemical reaction may take place such as in a laboratory, or like that.

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

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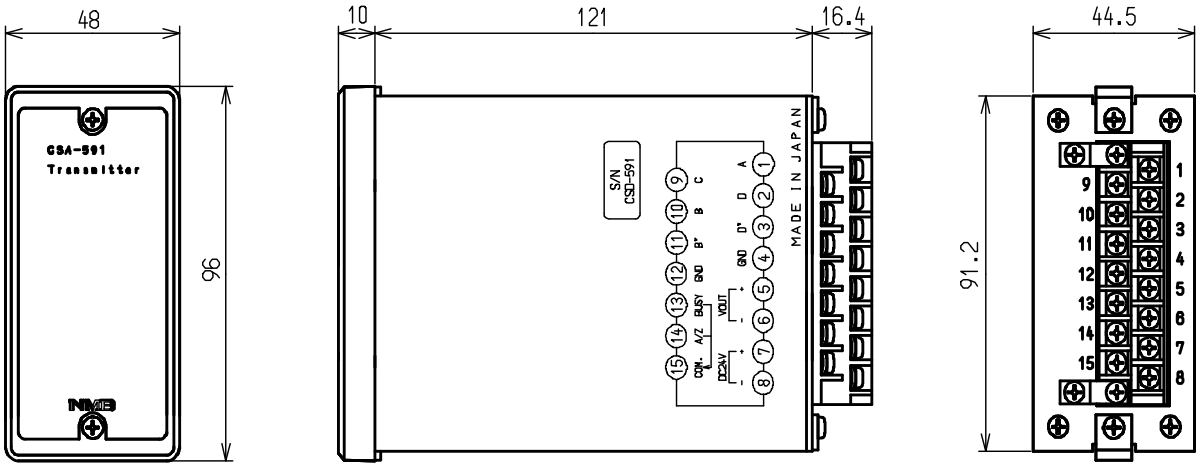
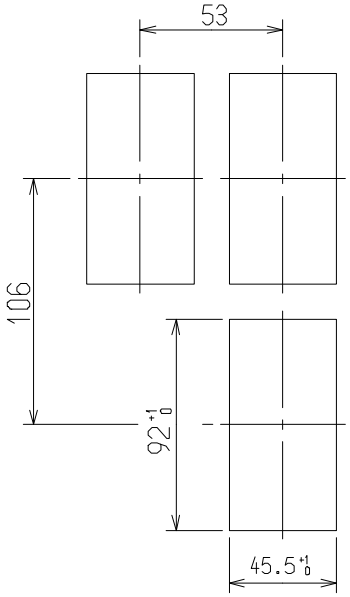


Panel cut size



Unit : mm

4. Conecting method

4.1 Layout of the terminal boards

The layout of each signal of the terminal block is shown in the following table:

• Terminal block

	Terminal	Description	Application
1	A	Input 1 conncting terminal (RED)	Tie bar gage is connected.
2	D	Output 1-1 connecting terminal (BLU)	
3	D′	Output 1-2 connecting terminal (WHT)	
4	GND	Shield (Connected internally with terminal No.12)	Shield of gage is connected. D class single grounding.
5	VOUT +	Voltage output terminal(+)	Voltage output.
6	VOUT -	Voltage output terminal(-)	
7	DC24 V +	Power supply input terminal (+)	DC24 V is connected.
8	DC24 V -	Power supply input terminal (-)	
9	C	Input 1 conncting terminal (RED)	Tie bar gage is connected.
10	B	Output 1-1 connecting terminal (BLU)	
11	B′	Output 1-2 connecting terminal (WHT)	
12	GND	Shield (Connected internally with terminal No.4)	Shield of gage is connected. D class single grounding.
13	BUSY	Output terminal for BUSY signal	Open collector output with approx.400 ms as an option.
14	A/Z	Connecting terminal for external automatically zero	External automatically zero as an option.
15	COM	Common terminal for BUSY/A/Z	

- Terminal No.4 for “GND” and terminal No.12 for “GND” are connected internally.
- Take the D class single ground for No.4 or No.12.

4.2 Note on connection

⚠WARING	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.

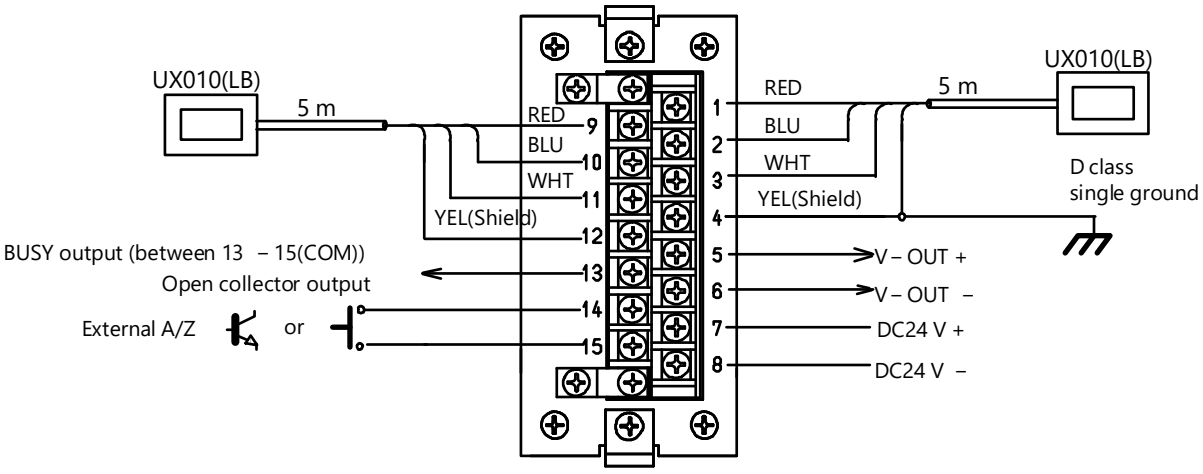
- Be sure to set the power supply to OFF, when the connection is made.
- Since the terminal block at the front of the instrument is made of resin, take care not to drop it down or not to apply strong impact.
- The tightening torque of the screw on the terminal block is 0.8 N・m at the maximum.
- Crimp terminal that suits the terminal block of this unit is shown in the table below.

Width of Crimp terminal	Suitable crimp terminal
6.0 mm or less	1.25-3, or Y-type 1.25-3.5

- Connecting cable with the instrument should be away from the noise sourse such as power supply line and / or I/O line for control and so on as far as possible.
- All of the connections should be excuted securely by referring to the Instruction manual for the instrument.

4.3 Connection

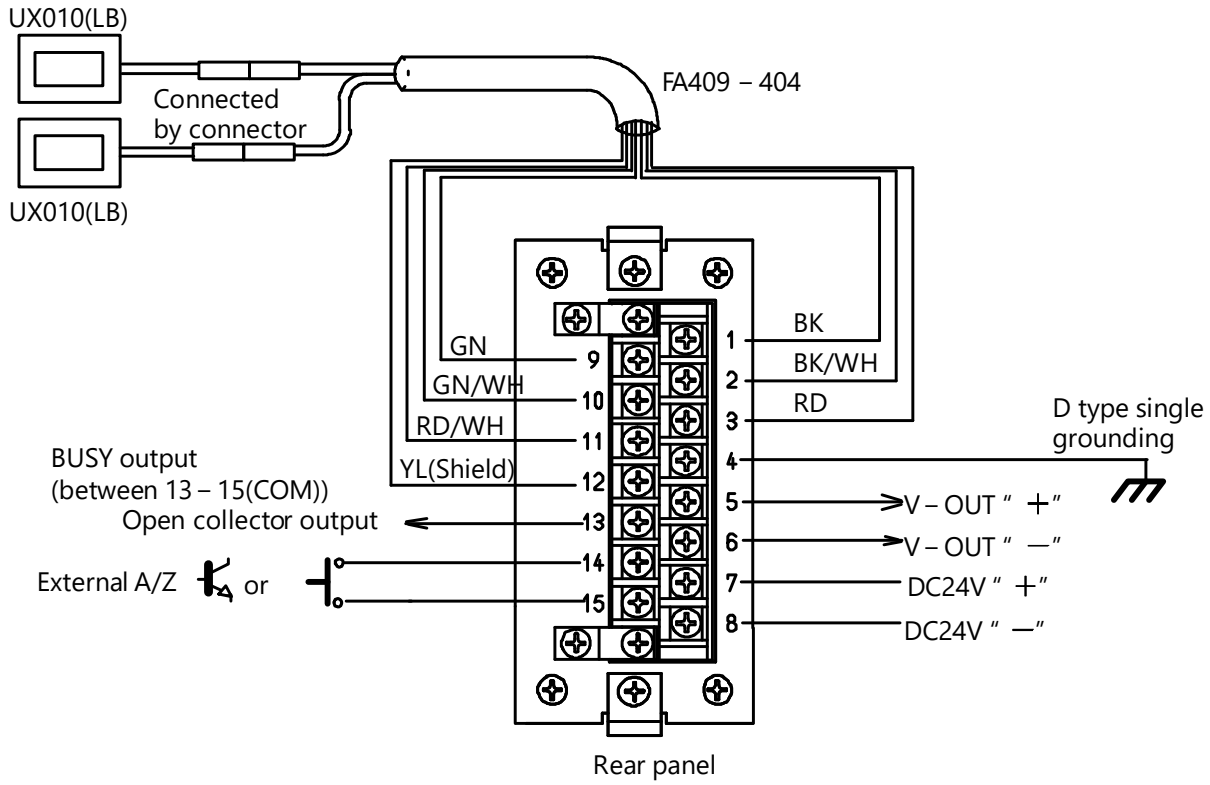
(1) When tie bar gage model UX010 is used.



Rear panel

(Terminal No.4 and No.12 are shortened internally.)

(2) When tie bar gage model UX010 with extention cable model FA409-404 is used.



⚠**WARING**	Connection with external control input should be made securely according to the figures. If neglected, it may cause an unexpected failure and / or malfunction to the instrument.

	• For the connection with external control input / output, be sure to apply shielded cable, and shielded cable should be connected with the GND terminal (Terminal No.4 or No.12) If not connected, it may cause malfunction due to the effects from external noises and so on.

4.3.1 Connection of power supply and ground

Please connect the power supply and the ground (GND) as shown in the figure.
Grounding should be the D class with single earth.
Power supply voltage DC24 V (DC18 V ～ DC36 V)
Power consumption Approx. 0.15 A (at DC24 V)

⚠**WARING**	Connections with voltage outputs should be made securely according to the figures and also within specified load resistance. If neglected, it may cause an unexpected failure and / or malfunction to the instrument.

	• For the connection with voltage outputs, be sure to apply shielded cable, and shielded cable should be connected with the F.G. terminal of the instrument. If not connected, it may cause malfunction due to the effects from external noises and so on.

5. Calibration procedure

⚠**WARING**	Before using the new instrument or after exchanging the tie bar gage, be sure to make calibration. If calibration is not made, the 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 the calibration has made already, there may occur the similar case as above when the results is not correct. So make precise calibration again.

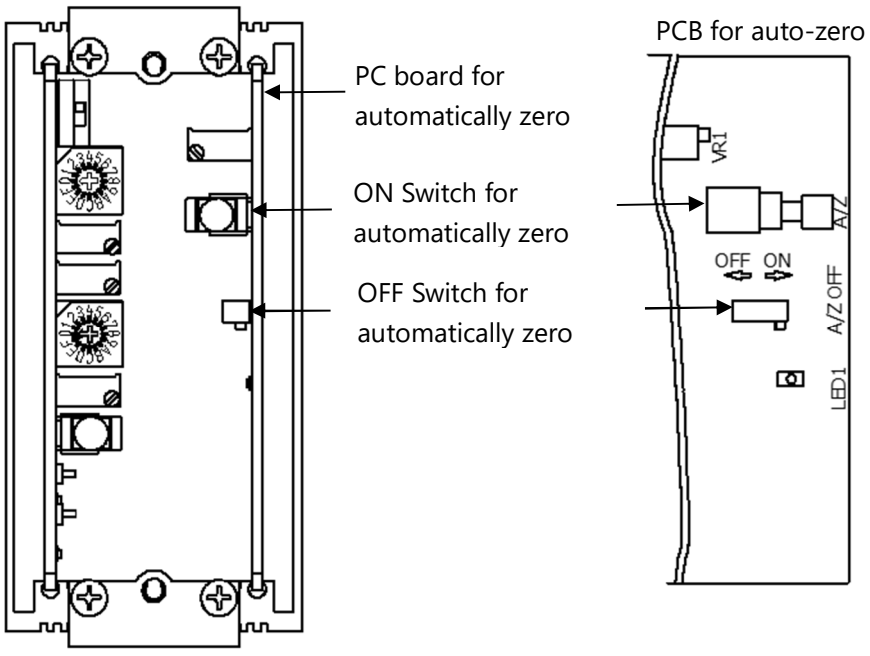
⚠**WARING**	When you connect the tester and digital volt meter, etc., please connect them correctly before turning on the power supply.

5.1 Preparation

① According to the "4.Connection method", connect this unit and tie bar gage correctly, and turn on the power.

② Incase of CSA-591-99 (with automatically zero function), begin the adjustment after set the condition to turn off that function.

The front panel was removed.



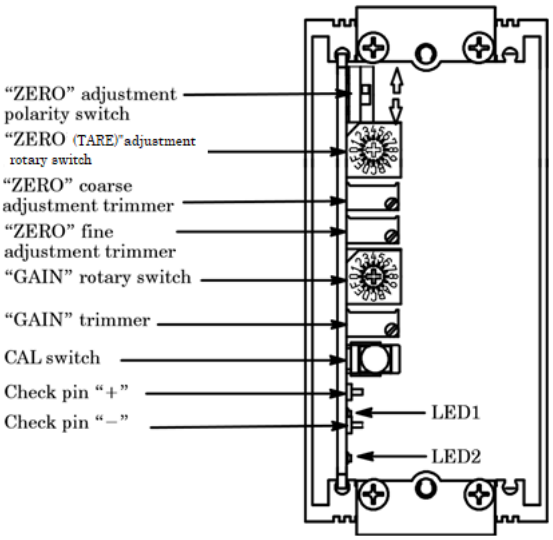
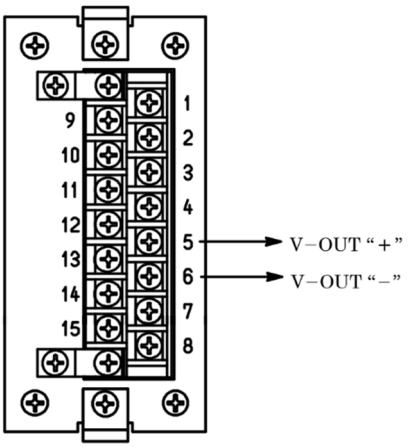
5.2 Calibration procedure

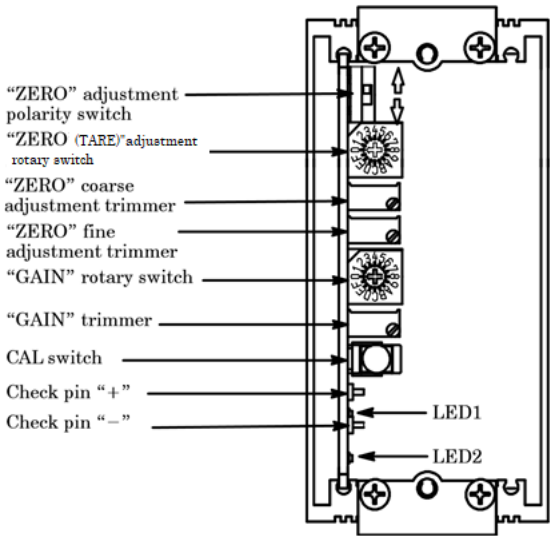
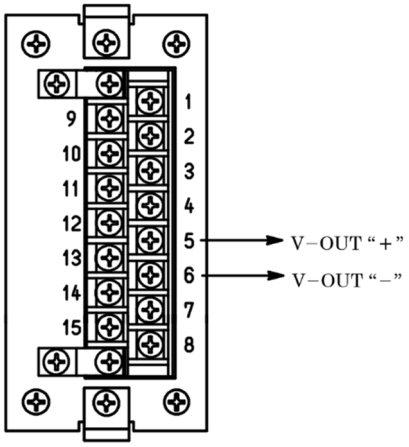
The explanation of actual load calibration procedures for this unit are two as follows:

① CSA-591 caliburation procedure by the actual load → 5.2.1

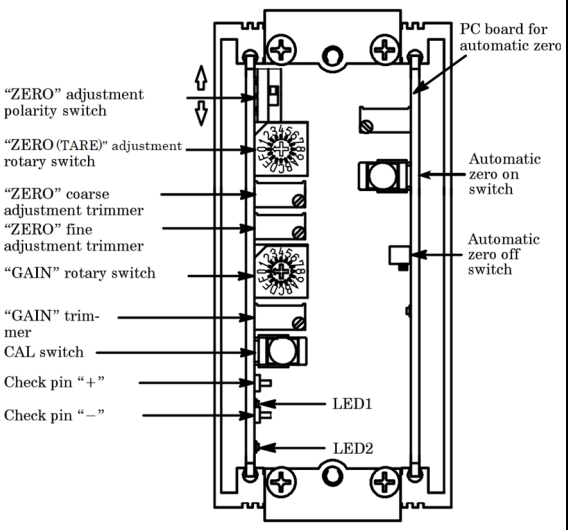
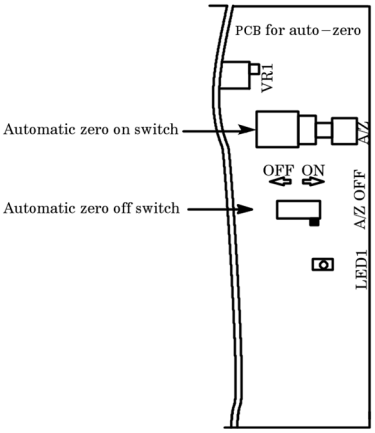
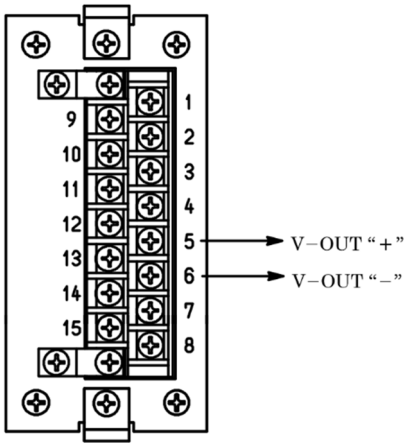
② CSA-591-99 (with automatically zero function) calibration procedure by the actual load. →5.2.2

5.2.1 CSA-591 Calibration procedure by the actual load.

	Procedures	
1	Set the gage onto tie bar, etc. Connect the digital volt meter, tester, etc., between "+" and "-" of the check pin, or between "+" and "-" of the voltage output at rear panel. Set the gage to the condition of zero adjustment. Set the "ZERO (TARE)" adjustment rotary switch to the position of zero.	The front panel was removed. 
2	Zero adjustment Confirm whether the output voltage can be adjustable to ± 0.2 V or less by turning coarse adjustment trimmer. ①Adjustable case Adjust the output voltage to approx. ± 0.2 V or less by "ZERO" coarse adjustment trimmer, and then adjust the output voltage to 0.000 V by "ZERO" fine adjustment trimmer. ②Not adjustable case Set the "ZERO (TARE)" adjustment rotary switch at the position in which the output voltage becomes ± 10 V or less.When the output voltage does not change, set the "ZERO" adjustment polarity switch to the position which the output voltage becomes ± 10 V or less. After that, set the output voltage to approx. ± 0.2 V or less by "ZERO" coarse adjustment trimmer, and adjust the output voltage to 0.000 V by "ZERO" fine adjustment trimmer. ・When both LED1 and LED2 is turned off, the output voltage outputs approx. ± 50 mV or less. ・When LED1 lights on, the output voltage is approx. +50 mV or more. When LED2 lights on, the output voltage is approx. −50 mV or more.	Rear panel 

	Procedures	
3	Sensitivity adjustment ①Take the rated load to the gage, and turn the "GAIN" rotary switch so that the output voltage may approach 10.00 V most. ②Adjust the output voltage to 10.000 V by using the "GAIN" trimmer. The sensitivity adjustment range is ± 10 V of output voltage at the input of ± 300 μ ST ～ ± 2 000 μ ST.	
4	Zero adjustment and Sensitivity adjustment ①Remove the rated load which put on in step 3, and confirm the zero of output voltage. When zero shifts, adjust zero by executing step 2. ②Put the rated load on the gage again, and confirm the sensitivity.When sensitivity shifts, adjust the sensitivity by executing step 3.	The front panel was removed. 
5	Confirm the CAL value When the transmitter is replaced, it is possible to adjust the sensibility of the replaced transmitter in almost the same state of the calibration when CAL switch is turned on and the output voltage is recorded.	Rear panel 
6	Complete the calibration	

5.2.2 CSA-591-99(with automatically zero function) calibration procedure by the actual load.

	Procedures	
1	Set the gage onto tie bar, etc. Connect the tester, digital volt meter, etc., between "+" and "-" of the check pin, or between V-OUT "+" and "-" of the voltage output in the rear panel. Set the automatic zero off switch to the OFF side. Set the gage to the condition of zero adjustment. Set the "ZERO (TARE)" adjustment rotary switch to zero position.	The front panel was removed.   Rear panel 
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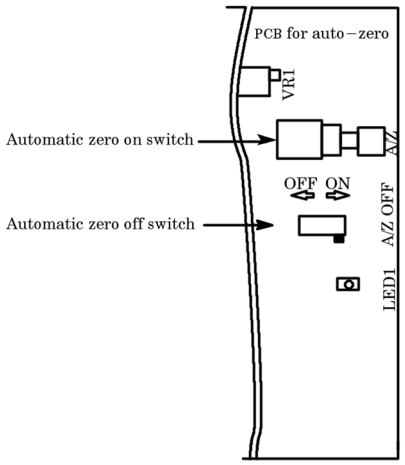
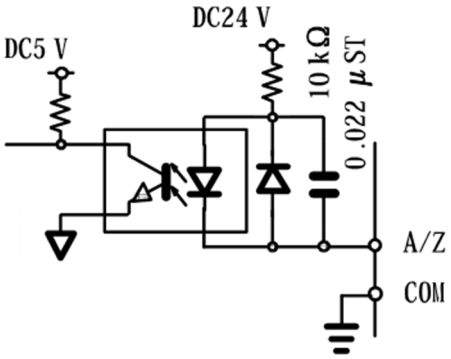
5	Confirm the CAL value When the transmitter is replaced, it is possible to adjust the sensitivity of the replaced transmitter in almost the same state of the calibration when CAL switch is turned on and the output voltage is recorded.	
6	Set the automatic zero off switch to ON side. Turn on the automatic zero on switch (or external automatic zero). Calibration is completed Any difference of automatic zero is changed depending on the input condition (noise etc.).	

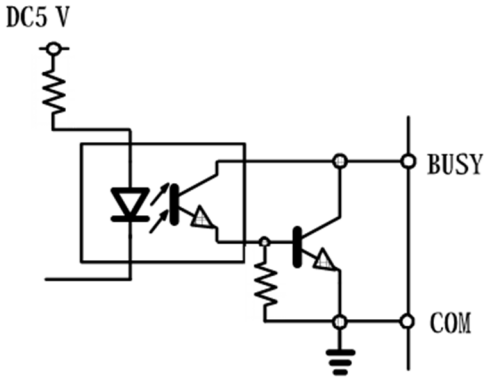
6. Options

6.1 Automatic zero (CSA591-P99)

(1)	Operational range of automatic zero	: Approx.± 2 000 μST
(2)	Required time of automatic zero	: Approx. 500 ms
(3)	Accuracy pf automatic zero	: within ± 20 mV
(4)	Battery backup time	: Approx. 10 years in the room temparature. (Lithium electric cell battery use)
(5)	External input of automatic zero	: 1 point
(6)	BUSY output	: Output while the operation of automatic zero. Open collector output Vce=DC30 V Ic=20 mA

6.1.1 Equivalent circuit of input / output section





6.1.2 Function

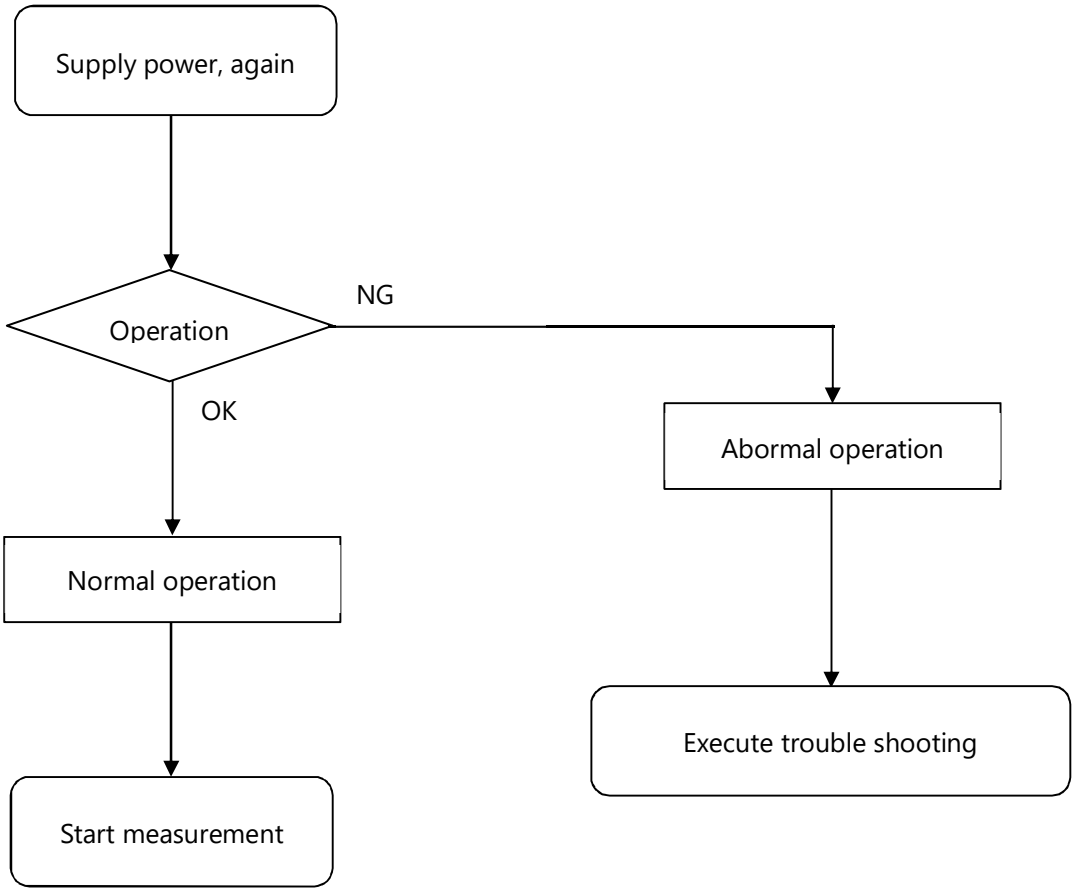
(1) Automatic zero ON :

Automatic zero function works when the connection between A/Z and COM is shorten for about 50 ms or more, and the voltage output becomes zero after about 500 ms. However, the difference of automatic zero is changed depending on the input condition(external noise etc.).

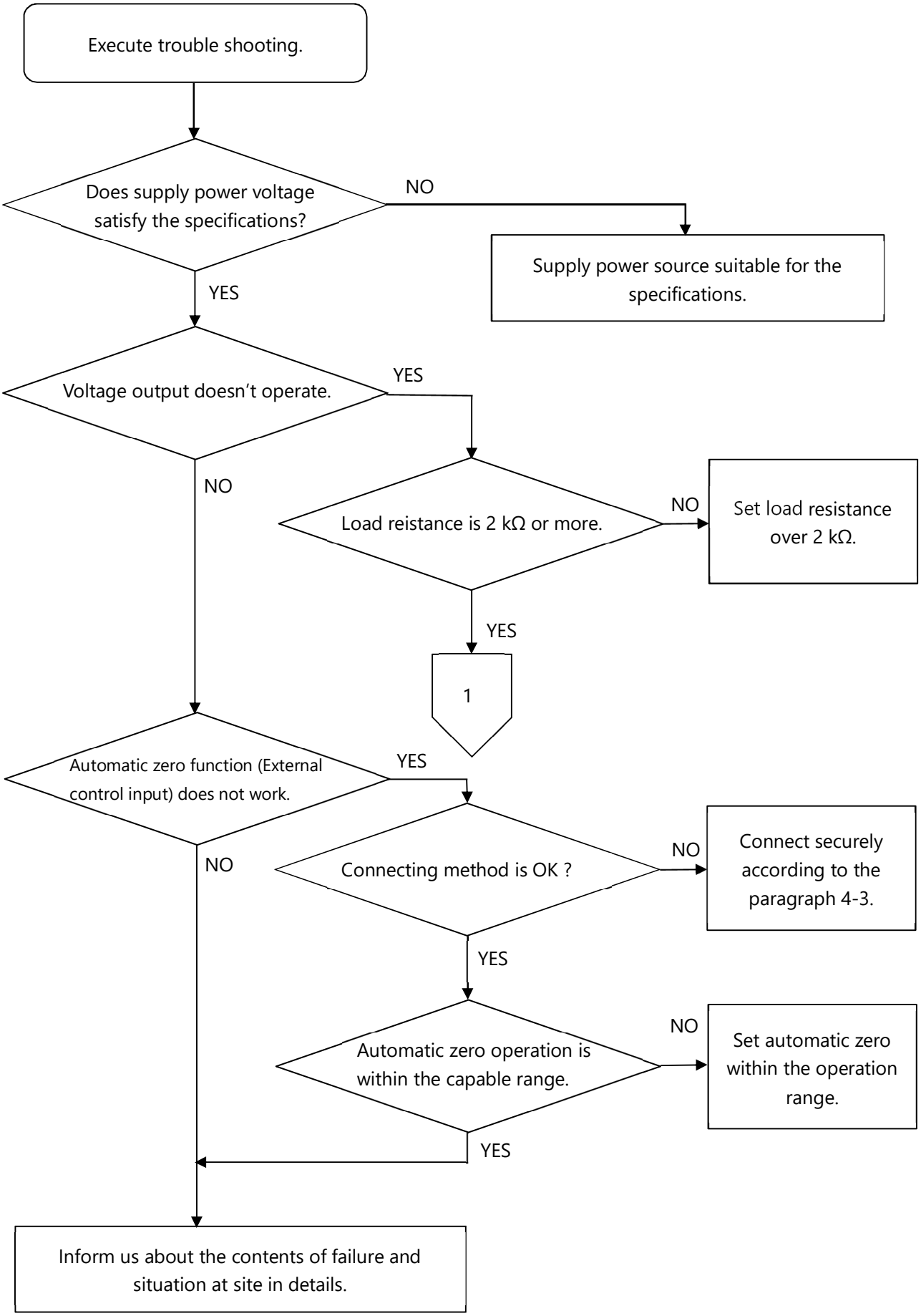
- The operation of automatic zero ON is executed after the input signal is shorten for about 50 ms or more.
- When the condition changes in the external control, please confirm the timing with the actual system, and also please meet the timing by the timer processing if necessary.

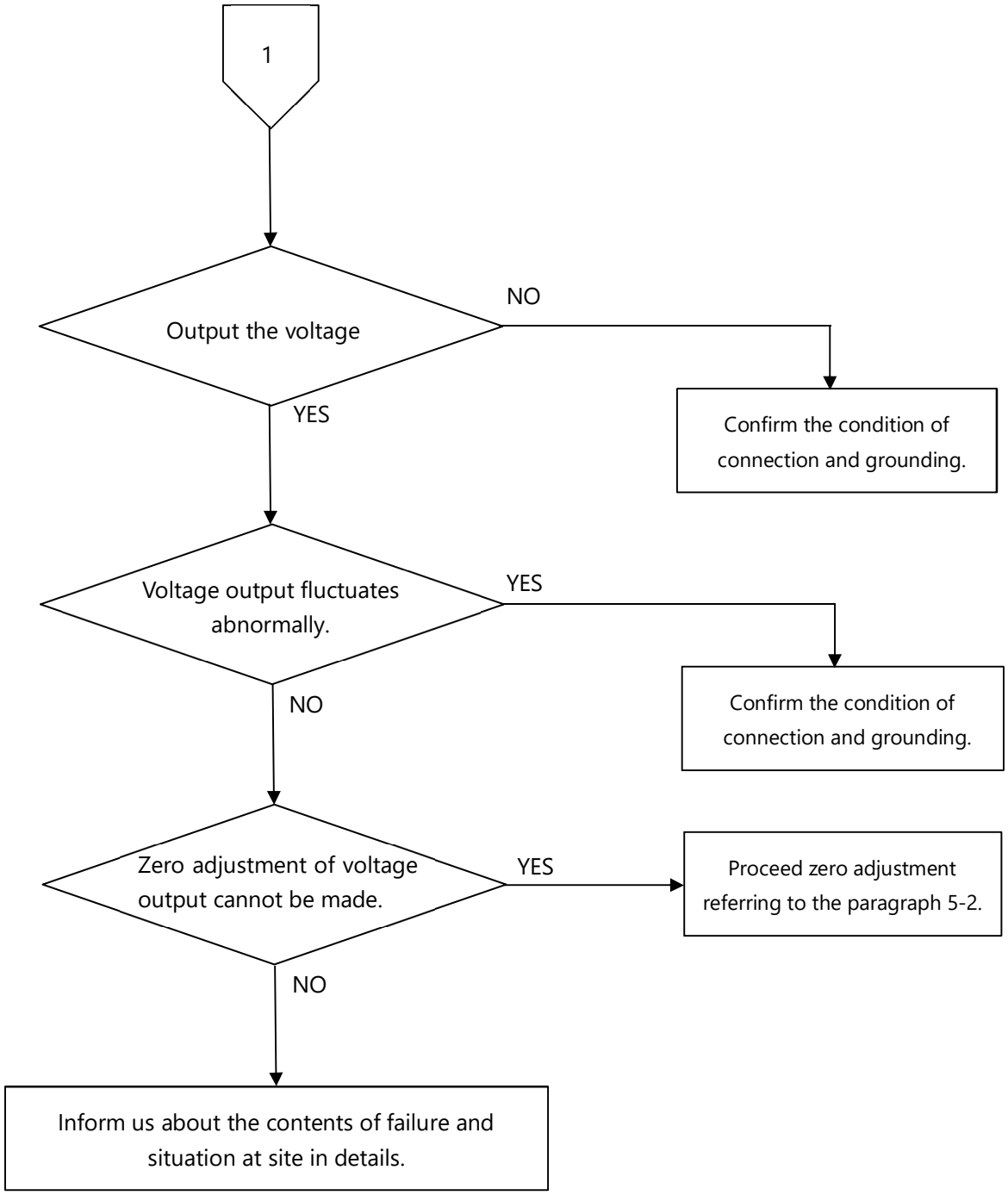
7. Trouble shooting

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



7.1 Execute trouble shooting




1
Output the voltage
NO
YES
Confirm the condition of connection and grounding.
Voltage output fluctuates abnormally.
YES
NO
Confirm the condition of connection and grounding.
Zero adjustment of voltage output cannot be made.
YES
Proceed zero adjustment referring to the paragraph 5-2.
NO
Inform us about the contents of failure and situation at site in details.

8. Specifications

8.1 Specifications

- Bridge power supply — DC8 V± 0.3 V within 30 mA
- Applicable transducers — Tie bar gage (350 ohm type 2 pieces one pair) is connectable.
- Input range — ± 300 μST to ± 2 000 μST
- Output voltage — DC± 10 V
- Output load resistance — 2 kΩ or more
- Zero adjustment range
  - Coarse adjustment — Approx. ± 10 000 μST adjustable by 16 steps of rotary switch
  - Fine adjustment — Approx. ± 3 000 μST adjustable by coarse/fine trimmer
- Sensitivity adjustment range
  - Coarse adjustment — Adjustable by 16 steps of rotary switch
  - Fine adjustment — Adjustable by trimmer
- Non−linearity — 0.1 %F.S.
- Temperature coefficient
  - Zero point — ± 10 μ V/℃(Input conversion)
  - Sensitivity — ± 0.05 %F.S./℃
- CALIB — 300 μST± 15 μST 1 point
- Frequency response range — Approx. 100 Hz or approx. 30 Hz (Selectable by dip switch on PC board)

8.2 General specifications

- Operating temperature/humidity range
  - Temperature — 0 ℃ ～ 50 ℃
  - Humidity — Less than 80 %RH (Non condensing.)
- Power supply voltage — DC24 V (DC18 V ～ DC36 V)
  - Current — Approx. 0.15 A or less (at DC24 V)
- Outline dimensions — W x H x D : 48 mm x 96 mm x 131 mm
- Weight — Approx. 0.5 kg
- Terminals — 236−110(WAG0)：CN1

8.3 Standard specification at the shipment

- Sensitivity — 10 V output at the input of 300 μST
- Frequency response range — Approx. 100 Hz

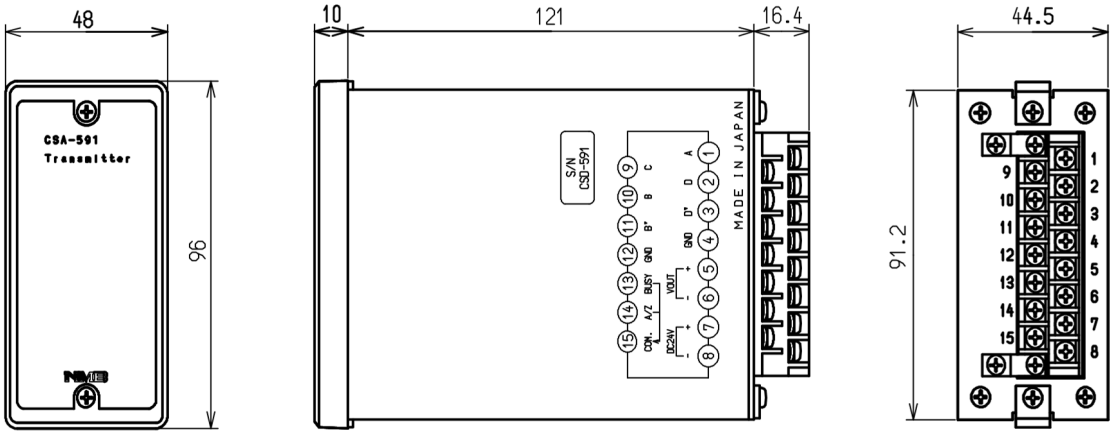
8.4 Accessories

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

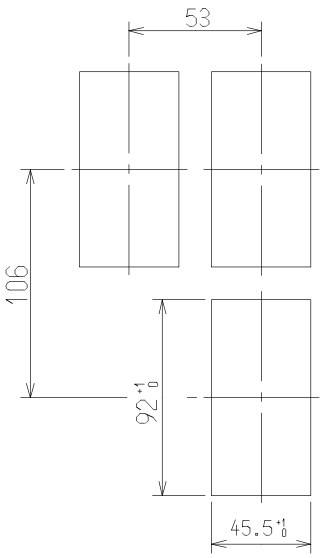
8.5 Option

- Parts No. CSA591−P99
- Automatic zero range ± 2 000 μST
- Automatic zero processing time
  within approx. 500 ms
- Accuracy of automatic zero within 20 mV/V
- Battery backup time Approx. 10 years in the room temperature
  (Lithium electric cell battery use)
- External automatic zero input
  1point
- BUSY output 1 point output during the operation of automatic zero.
  Open collector output

8.6 Outline dimensions



Panel cut size



Unit : mm

9. Warranty

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

9.2 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 gages are disconnected or cut off. After that, still there may be found some defects in the instrument, contact our sales office or sales agency from which you have purchased.

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

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HOMEPAGE ADDRESS

https://product.minebeamitsumi.com/product/category/mcd/