Minebea
Passion to Exceed Precision

TRANSMITTER
CSA-504SB

Instruction Manual

MINEBEA Co., Ltd.
Measuring Components Business Unit

EN294-1012-C

RECORD OF REVISION

DATE	INSTRUCTION MANUAL NO.	REMARKS
Dec.2009	DRW. NO. EN294-1012	First version
Feb. 2010	DRW. NO. EN294-1012-A	Due to FN10-02026 Front cover`s logo is changed.
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May.2012	DRW. NO. EN294-1012-C	Due to FN10-002140D Minebea logo is changed.

FORWARD

Thank you very much for your purchasing Minebea Transmitter CSA-504SB.
This manual explains installation procedures and connecting method and operating method for Transmitter CSA-504SB
Use properly after reading through the manual carefully.

This manual is intended for technical experts to read.
Be sure to deliver the manual to the end user.
Moreover, the end user should keep the manual at hand after reading it over.

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

- The instrument is covered by a warranty for a period of one (1) year from the date of delivery.

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

	●Notice and limitation during operating and working. Be sure to read the item to prevent malfunction.

For safe operation

Be sure to read this manual before use.

1.Installation place

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

Environmental temperature: 0 ℃ to 50 ℃
Environmental humidity : Less than 85 % R.H.
(Non−condensing.)

(1)Places where installation is not allowed.

Warning ●Do not locate the instrument on the places such as follows:
It causes unexpected faulty in the instrument.

●Don't use the instrument where water/moist exists a lot.

●Don't locate the instrument in direct and/or high temperature area.

●Don't install the instrument where there is high mechanical vibration.

●Do not use the instrument where there are excess of dusts and fine particles.

●Do not install the instrument where there is rapid change of temperature and humidity.

●Do not install the instrument near the devices that become magnetized or generate an electromagnetic field.

●Avoid the location where chemical reaction my cause such as in a labora−tory or like that.

(2)Installing the instrument

●When installing the instrument, secure the space around the instrument.

As for the dimensions, refer to (17) Outline dimensions in Page 17.

⚠Warning ●In order to prevent from damage to the instrument and electric shock to the operator, be sure to check the following point.

• Be sure to check that power supply is off when installing/removing the power supply cable or interface cable.

2.Power supply

⚠Warning ●It's very dangerous for you to operate electric instrument, so take care of yourself not to be injured.

• Permissible range for power supply voltage is from DCV ± 15V ± 5 %

●Be sure to check the indication for power supply voltage for the instrument.
If you find unclear points, please contact with Minebea.

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1. General

The instrument is an ultimate compact amplifier built-in 4 channels card method for the application of transducer.

2. Features

Built-in 4 channels amplifier in one card each, a bridge power supply, SPAN, ZERO adjustment trimmer and CHECK switch are independent in each channel.

3. Specifications

3-1 Specifications

Number of channel	4 channels
Bridge power supply	DC10 V ±1 V
Applicable transducers	Up to 4 pcs of each channel strain gage applied transducers (350Ω) can be connected
Sensitivity	10 V output at 1 mV/V input
Sensitivity adjustment range	1 000 times 1/1 to 0.9 times adjustment
Output load resistance	±10 V 2 kΩ or more
Zero adjustment range	
TARE compensation	Adjustment by internal built-in resistance
ZERO adjustment	±0.1 mV/V adjustment by trimmer
Non-linearity	Within ±0.1 %F.S.
Temperature efficient Zero point	
ZERO point	±2 μV/℃ (input conversion)
Sensitivity	Within ±0.05 %F.S. /℃
CHECK	1 point approx 80 % of rated
Frequency response range	10 Hz (±3 dB)

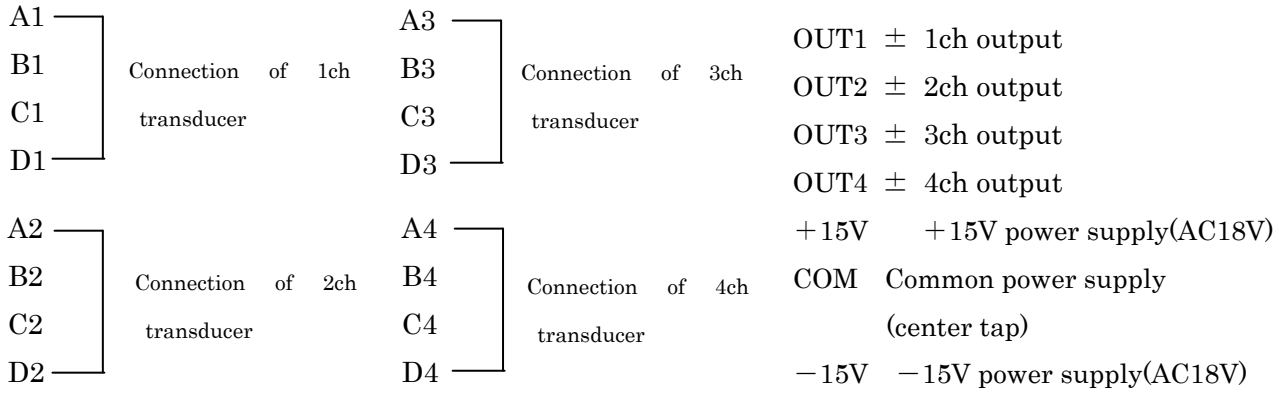
3-2 General specification

Operating temperature and humidity	
Temperature	0 ℃ to 50 ℃
Humidity	85 %RH or less (no condensing)
Power supply	
Power supply voltage	DC±15 V ±0.75 V 550 mA (When transducers of all channels were summed 4 points)
Outline dimensions(W×H×D)	42 mm×176 mm×95 mm (Projections excluded)
Weight	Approx 0.3 kg

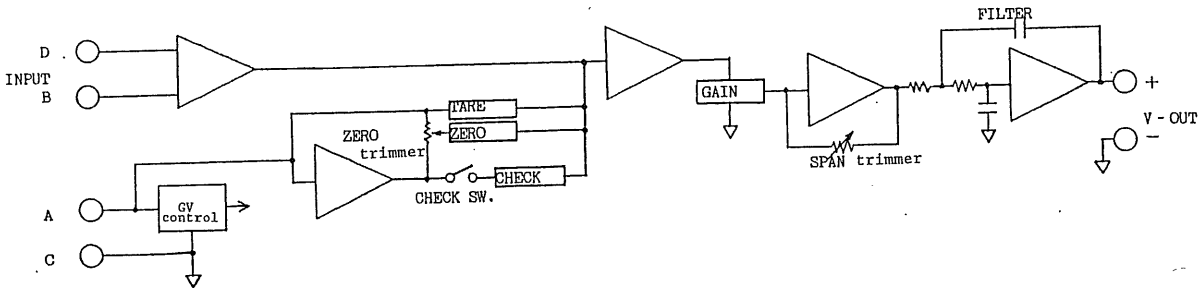
3-3 Option

Power supply voltage	AC36 V center tap attached

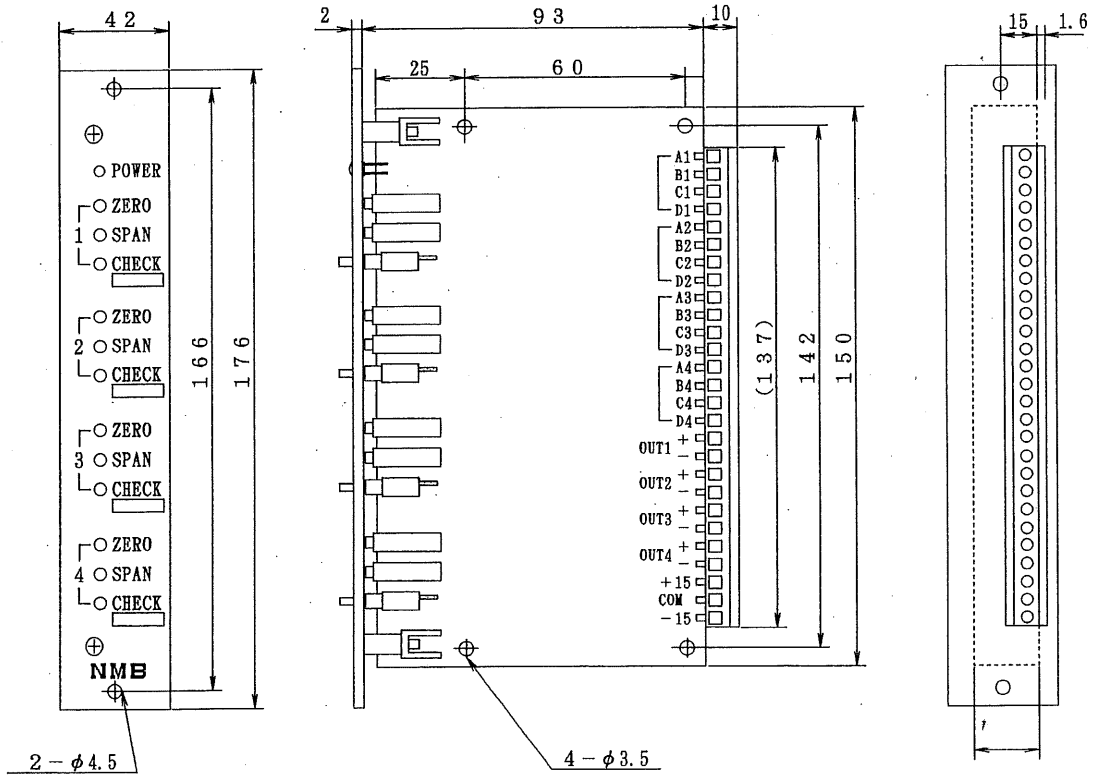
3-4 Terminal board explanation



3-5 Block diagram

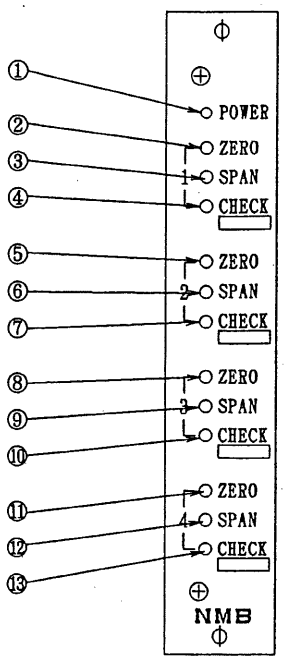


3-6 Outline dimensions



4.. Each name

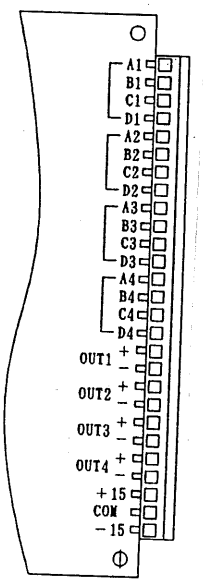
4-1 Front panel



① POWER LED
② For ZERO adjustment trimmer
③ For SPAN adjustment trimmer
④ CHECK switch — For 1ch
⑤ For ZERO adjustment trimmer
⑥ For SPAN adjustment trimmer
⑦ CHECK switch — For 2ch
⑧ For ZERO adjustment trimmer
⑨ For SPAN adjustment trimmer
⑩ CHECK switch — For 3ch
⑪ For ZERO adjustment trimmer
⑫ For SPAN adjustment trimmer
⑬ CHECK switch — For 4ch

4-2 Input terminal

Explanation of terminals(TB1)



A1, B1, C1, D1 — Connection of 1ch transducer
A2, B2, C2, D2 — Connection of 2ch transducer
A3, B3, C3, D3 — Connection of 3ch transducer
A4, B4, C4, D4 — Connection of 4ch transducer

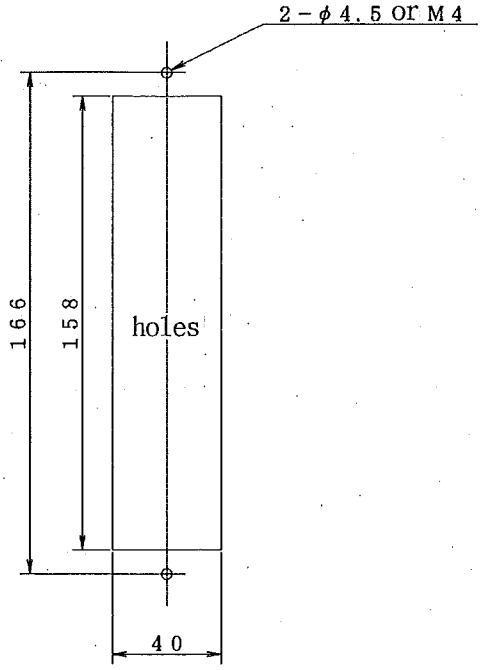
OUT1 ± 1ch output
OUT2 ± 2ch output
OUT3 ± 3ch output
OUT4 ± 4ch output
+15V +15V power supply(AC18V)
COM Power supply common
(center tap) Option AC36V
−15V −15V power supply(AC18V)

§ 5. Installation

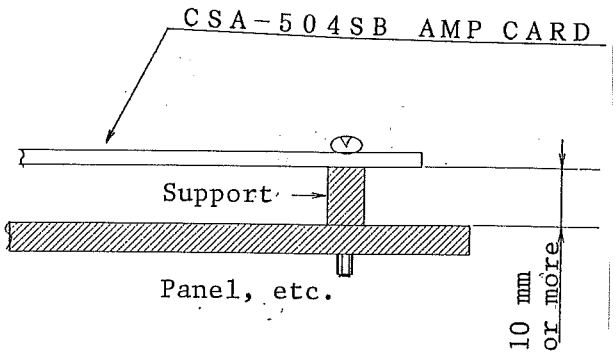
For the safe and complete operation of the instrument, it is important that equipment is installed properly in a suitable location. Ideally, a dry room with a uniform temperature environment will be the most suitable location.

(1) When installing, select a location where mechanical vibration and corrosive gas are minimal, with small temperature change near the normal temperature.
(Temperature range compensated : 0 ~ +50℃)

(2) When installing the transducer in panel, refer to the panel cut diagram below.

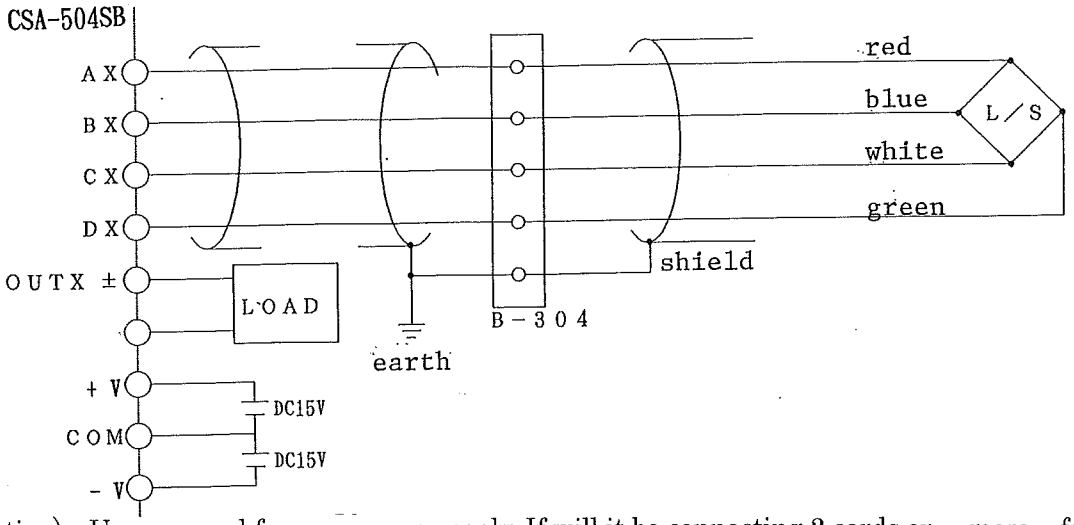


(3) When install an AMP card to the panel directly by using 4 holes worked at the card, place it having the space of 10 mm or more by inserting insulation support. (bakelite, spacer, etc.)



§ 6. Connecting method

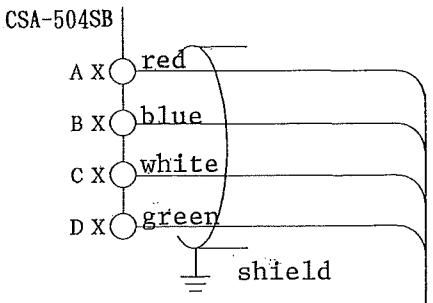
6-1 In case of single transducer's application



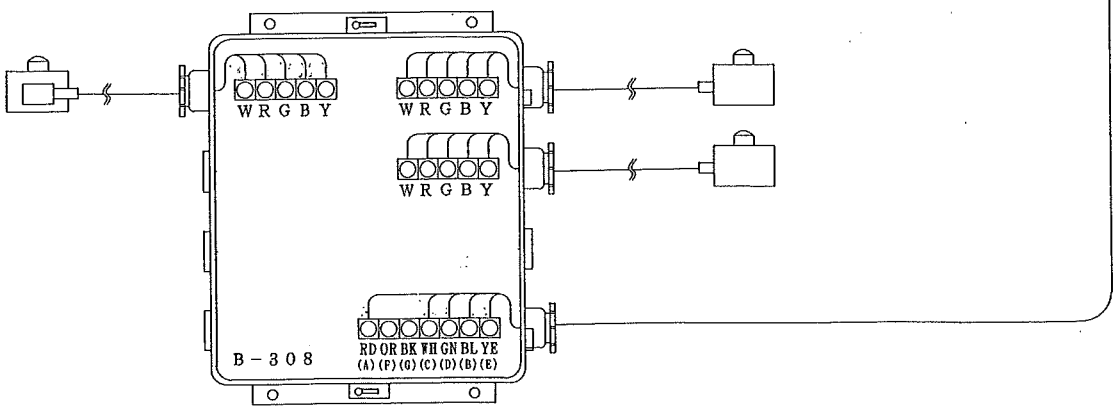
Caution) Use one card for one power supply. If will it be connecting 2 cards or more for one power supply, common (COM) line should be connected one point earth.
(In cascade connection, the data will be interfered easily among each cards.)
If unused channel is there, the input terminal (B-D) should be shorted.
(Due to the oscillation of internal circuit, there may have some effects to the other channels)

There may have the case that wiring colors are different from the standard. Then check the "Specification" of the transducer which you use.

6-2 In case of 2 ~ 4 pcs of transducers' application



(EX) Load cell's 3(three) points addition



B-308 type
Summing type Junction box

§ 7. Adjustment procedures

Although standard internal adjustment (or required specific adjustment) have been made at the time of shipment from the factory, changes can made by the following procedure, if various changes like bridge voltage, GAIN, TARE value and CHECK value are required.

7-1 Standard adjustment

(1) Bridge voltage	10V
(2) GAIN	1000 times
(3) Sensitivity	Outputs 10V at 1mV/V
(4) TARE compensation	0mV/V
(5) CHECK value	Approx. 0.8mV/V (Input conversion)
(6) Supply voltage	DC ±15V ±5%

7-2 Change of supply voltage

When change of input supply voltage from DC ±15V to AC 36V (center tap applied) is required, apply the procedures as below :

Remove the jumper of JP1, JP2, JP3 and JP4 individually.
Solder three terminal regulator at IC1. (Take care of polarity.)
P/N 78L015P Maker : Toshiba
Solder three terminal regulator at IC2. (Take care of polarity.)
P/N 79L015P Maker : Toshiba
Solder diode bridge at B1. (Take care of polarity.)
P/N W-02 Maker : GENREAL INSTRUMENT

7-3 Adjustment of bridge voltage (Standard adjustment : 10V)

Bridge voltage can be set by changing amplifier's resistance value as below :

1 channel	R102
2 channel	R202
3 channel	R302
4 channel	R402

Resistance value to set the required bridge voltage can be obtained according to the below formula.

$$R_b = 376 \times V_b - 470$$

R_b = Resistance value for the setting of bridge voltage [Ω]
V_b = Required bridge voltage [V]

Care should be taken that there are limitations of setting due to impedance of transducer and the number of addition. (Output current should not exceed 200mA.)
Moreover, maximum setting value of bridge voltage should be limited to +12V DC.

(Note) Moreover, when sensitivity of transducer exceeds 2mr/v, bridge voltage should be adjusted below 7V or so.

Bridge voltage	RX 02 Resistance value	Impedance of transducer		
		350 Ω	120Ω	
10V	3.3kΩ	1 ~ 4 points addition	Impossible	(Installed as a standard.)
5V	1.5kΩ	1 ~ 4 points addition	1 ~ 2 points addition	
3V	680 Ω	1 ~ 4 points addition	1 ~ 4 points addition	

7-4 Adjustment of GAIN (Standard adjustment : 1000 times)

GAIN can be set by changing amplifier's resistance value as shown below :

1 channel R115

2 channel R215

3 channel R315

4 channel R415

Required GAIN and resistance value can be obtained from the following formulas (1) and (2).

$$(1) \qquad G = \frac{V_o}{V_b \times E} \times 10^3$$

$$(2) \qquad R_G = \frac{G}{3K - G} \times 10$$

G : Required GAIN (Max. 1000) [times]

V_o : Required output voltage (Max. 10) [V]

V_b : Bridge voltage [V]

E : Output of transducer applied (actual output) [mV/V]

R_G : Resistance value for GAIN adjustment [kΩ]

K : Constant due to number of adding transducers (Refer to Table 1.)

No. of addition	B-308 or B-306 is applied.		B-308 nor B-306 isn't applied.	
	Transducer's impedance		Transducer's impedance	
	350 Ω	120Ω	350Ω	120Ω
1	K= 180	K= 190	K= 333	K= 369
2	K= 247	K= 256	K= 360	K= 380
3	K= 281	K= 289	K= 370	K= 383
4	K= 302	K= 309	K= 375	K= 385

(Table 1)

Front panel SPAN adjustment trimmer performs fine adjustment of ±10% of GAIN.

7-5 Adjustment of CHECK value (Standard adjustment : 0.8mV/V)

CHECK value can be set by changing amplifier's resistance value as below :

1 channel R111
2 channel R211
3 channel R311
4 channel R411

Resistance value to set required CHECK value can be obtained according to the below formula.

$$R_C = \frac{10}{E \times K \times X} \times 10^3$$

R_C : Resistance value for setting CHECK value [KΩ]
E : Output of transducer applied (actual output) [mV/V]
K : Constant due to addition of transducers
(Refer to Table 1.)
X : Rate of CHECK value to the output of transducer
Normal X = 0.8
In case of 10% X = 0.1

7-6 Adjustment of TARE compensation value (Standard adjustment : 0mV/V)

This function is for the cancellation of initial load (TARE) of transducer.

TARE compensation value can be set by changing resistance value of amplifier card as below :

1 channel R110
2 channel R210
3 channel R310
4 channel R410

Resistance value to set required TARE compensation value can be obtained according to the below formula.

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

R_T : Resistance value for the setting of TARE compensation value [kΩ]
E_T : Tare weight [mV/V]
K : Constant due to addition of transducers
(Refer to Table 1.)

§ 8. Operating procedures

(1) Make connections between transducer and main body (CSA-504S1).
(Refer to § 6 Connecting method, and take care of supply voltage.)

(Note) In the connections of the instrument, power supply is used with 4CH commonly. However, connection with transducer can be available with single CH operation. (Ex. 2CH only)

(2) Feeding power and make confirmation POWER LED lights.

(3) Adjust output voltage to 0.000V by using ZERO adjustment trimmer.

(4) In order to become the required output voltage, adjust by using SPAN adjustment trimmer with the load applied.

(5) Remove the load and make confirmation of ZERO. If ZERO is not obtained, repeat from the procedure of item (3).

(6) After completing the load calibration, press CHECK SW to record the output voltage. (It is convenient for you to seal the output value in immortal ink on the blank section located at right of the CHECK switch on the front panel.)

(7) Hereinafter, apply SPAN adjustment in order to become this CHECK value.

§ 9. Accessories

(1) Small minus driver ... 1 pce
(2) Instruction manual (this book) ... 1 pce