

# CONFIGURATION SETTING FOR INPUT SELECTION OF RISH CON SI-101

**Table 1: Standard current input ranges**

Standard current input ranges		
Input(mA)	JUMPER SETTING	RESISTOR CHANGES
0....20	B101,B105,B106,B111	NO CHANGE
1.....5	B101,B104,B106,B109,B112	NO CHANGE
4....20	B101,B105,B106,B107,B108,B111,B112	NO CHANGE

**Table 2: Non-standard current input ranges**

Non standard current input ranges		
Input(mA)	JUMPER SETTING	RESISTOR CHANGES
0...0.1	B101,B105,B106,B111	R7=SMD RES 3 KOHM / 1% / 0.25 W / 50PPM / 1206
0...0.2	B101,B105,B106,B111	R7=SMD MFR 1.5 KOHM/ 1%/ 0.25 W / 50PPM / 0204 MINIMELF
0...0.5	B101,B104,B109,B110,B111	NO CHANGE
0.....1	B101,B104,B107,B110,B111	NO CHANGE
0.....2	B101,B104,B108,B111	NO CHANGE
0.....5	B101,B105,B106,B107,B108,B110,B111	NO CHANGE
0....10	B101,B105,B110,B111	NO CHANGE
0....40	B101,B105,B106,B111	R7=SMD MFR 7.5 OHM / 1% / 0.25W/ 50PPM / 0204 MINIMELF
0....80	B104,B105,B106,B111	R7=SMD MFR 2.2 OHM / 1%/ 0.25W / 50 PPM / 0204 MINIMELF, R6=SMD MFR 1.5 OHM / 1% \0.25W / 50PPM / 0204 MINIMELF
0....100	B101,B105,B106,B111	R7= SMD MFR 1.5 OHM \ 1% \0.25W \50PPM / 0204 MINIMELF
0.2....1	B101,B104,B108,B110,B111,B112	NO CHANGE
1.....5	B101,B104,B106,B109,B112	NO CHANGE
2.....10	B101,B105,B106,B107,B110,B111,B112	NO CHANGE

**Table.3 Standard voltage input ranges**

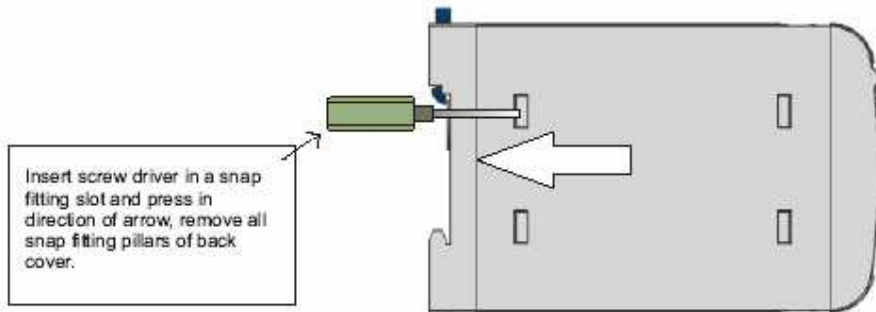
Standard voltage input ranges		
Input(V)	JUMPER SETTING	RESISTOR CHANGES
0....10	B101,B110,B111	NO CHANGE
1.....5	B102,B106,B108,B109,B110,B112	NO CHANGE
2....10	B101,B106,B107,B110,B111,B112	NO CHANGE

**Table.4 Non standard voltage input ranges**

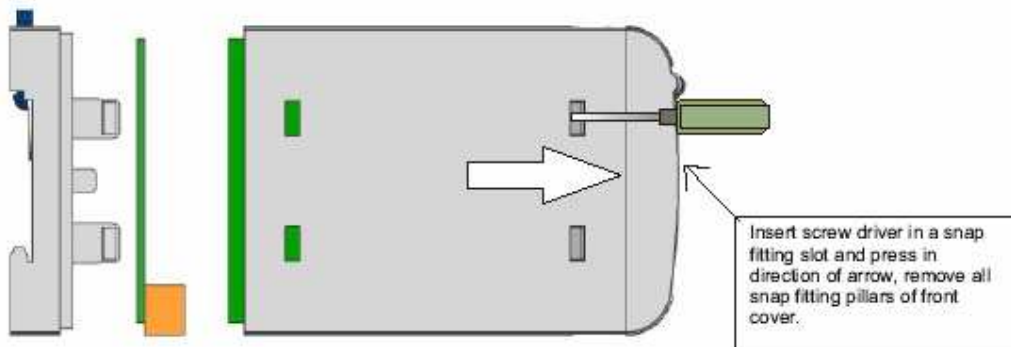
Non standard voltage input ranges		
Input(V)	JUMPER SETTING	RESISTOR CHANGES
0...0.06	B106,B109,B110,B111	NO CHANGE
0.....0.1	B107,B108,B110,B111	NO CHANGE
0.....0.2	B106,B108,B109,B111	NO CHANGE
0.....0.5	B106,B107,B108,B109	NO CHANGE
0.....1	B102,B106,B107,B108,B110,B111	NO CHANGE
0.....2	B102,B107,B108,B109,B111	NO CHANGE
0.....5	B102,B108,B110	NO CHANGE
0.....20	B101,B106,B111	NO CHANGE
0.....40	B101,B108	NO CHANGE
0.2.....1	B102,B109,B110,B111,B112	NO CHANGE
1.....5	B102,B106,B108,B109,B110,B112	NO CHANGE
4.....20	B101,B106,B107,B108,B111,B112	NO CHANGE

## Procedure to change the input configuration

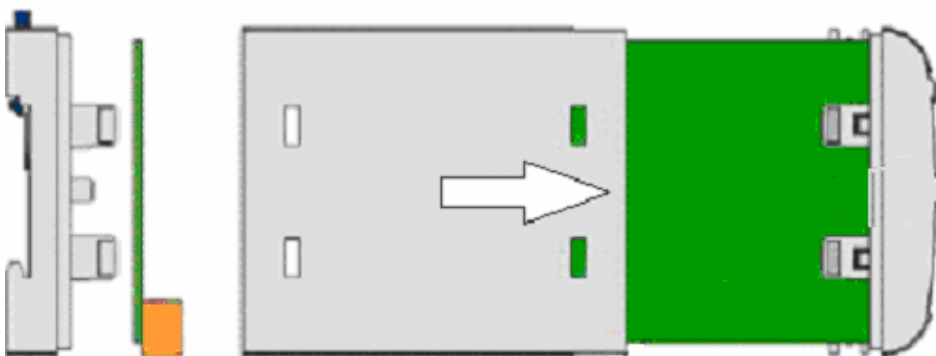
- I) Before making changes ensure that transducer should be electrically dead and all connection wires should be disconnected.
- II) Remove the Back cover of transducer by using screw driver.



- III) Remove the front cover and take the Main card out.

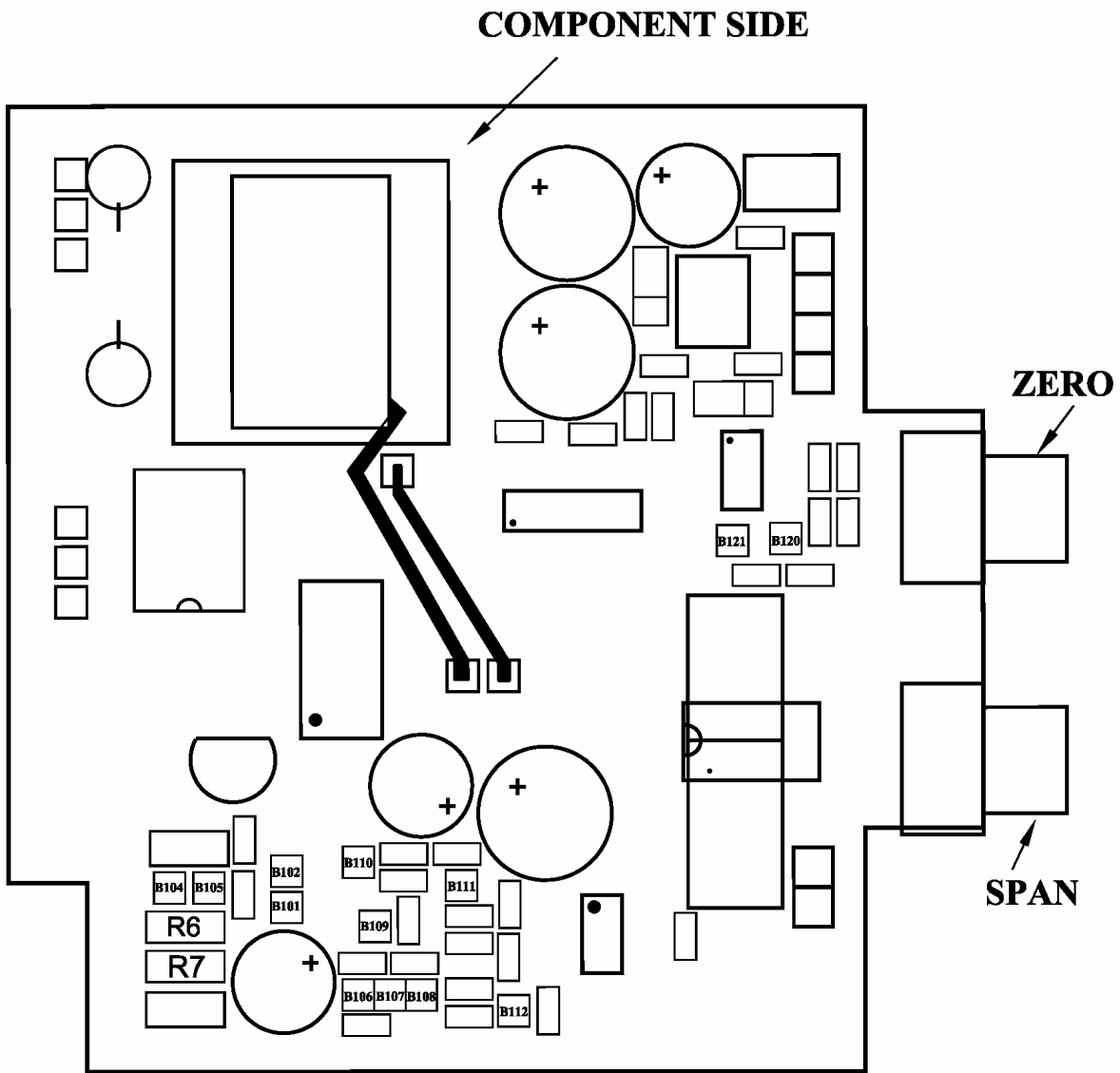


- IV) Remove Main PCB out of middle cover.



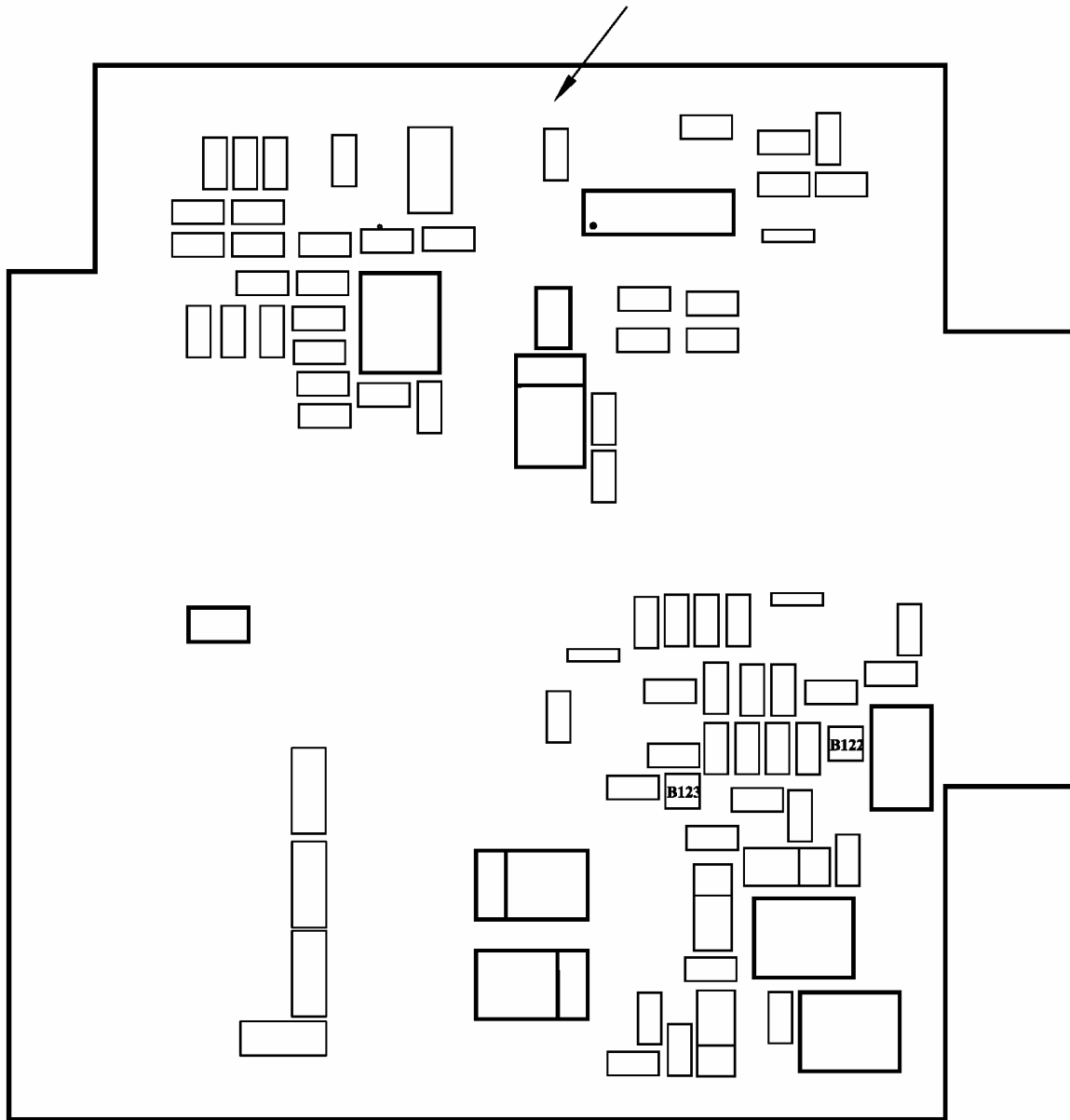
- V) To convert **Standard input ranges** to **Non standard input ranges** or vice versa change the jumper settings and / or resistor values as per **Table 1, Table 2, Table 3 & Table 4.**

- VI) For location of the Jumpers and resistors on PCB refer **Fig. A AND Fig. B**



**Fig. A -Component side of PCB**

**SOLDER SIDE**



**Fig. B -Solder side of PCB**

VII) After configuring the input and output ranges follow the below procedures for calibration of RISHCON SI-101.

- a) Select Load resistance  $R_n$  (Nominal value of load resistance) as per Table A and Table B. If the output is different than the table values use Formula1 OR Formula2 for calculating  $R_n$ ,  $R_{min}$  and  $R_{max}$

**Table A: LOAD RESISTANCE (  $R_b$  ) for Current Output**

Sr.no	Output current (mA)	Minimum value of load Resistance $R_{min}$ ( $\Omega$ )	Nominal value of load Resistance $R_n$ ( $\Omega$ )	Maximum value of load Resistance $R_{max}$ ( $\Omega$ )
1.	0...20	0	300	600
2.	4...20	0	300	600

$$R_{max} = (12V / I_{AN}) \Omega; I_{AN} = \text{Full scale value of the output current} \dots\dots \text{Formula1}$$

$$R_{min} = 0 \Omega$$

$$R_n = (R_{max} / 2) \Omega$$

**Table B: LOAD RESISTANCE ( $R_b$ ) for Voltage Output**

Sr.no	Output Voltage (Volts)	Minimum value of load Resistance $R_{min}$ ( $\Omega$ )	Nominal value of load Resistance $R_n$ ( $\Omega$ )	Maximum value of load Resistance $R_{max}$ ( $\Omega$ )
1.	0....10	2000	4000	$\infty$
2.	2....10	2000	4000	$\infty$

$$R_{min} = U_{AN} / 5mA \Omega; U_{AN} = \text{Full-scale value of the output voltage} \dots\dots \text{Formula2}$$

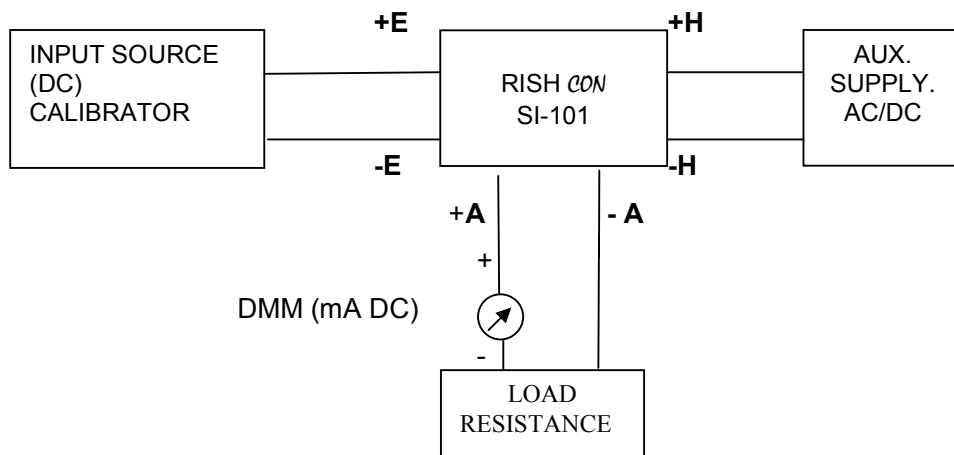
$$R_n = 2 * R_{min} \Omega;$$

$$R_{max} = \infty \Omega;$$

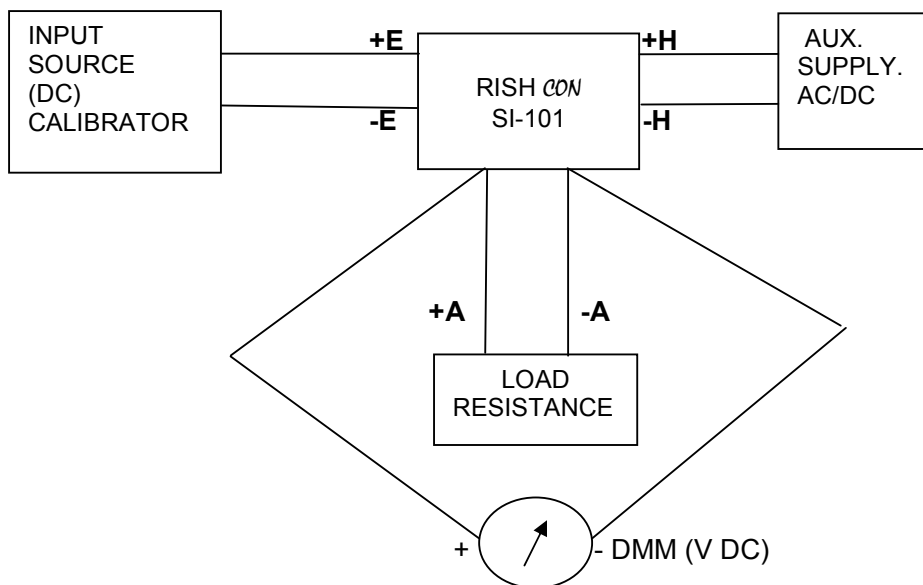
- b) Make the connections as shown in table below.

<b>Input terminals</b>	E+	1
	E-	2
<b>Output Terminals</b>	A+	3
	A-	4
<b>Auxiliary Supply</b>	H+	5
	H-	6

**Fig. C: Connection Diagram for current output**



**Fig. D: Connection Diagram for Voltage Output.**



**Reference conditions:**

- |   |  |
|---|--|
| 1) Ambient temperature                  | : 23 <sup>0</sup> C, ± 2K                        |
| 2) Auxiliary Power Supply               | : 230V AC ±10%                                   |
| 3) Load Resistance                      | : Current: 0.5*Rmax.<br>Voltage: 2*Rmin.         |
| $R_{max} [k\Omega] = 12V / I_{AN} [mA]$ | : $I_{AN}$ = full-scale value of output current. |
| $R_{min} [k\Omega] = U_{AN} / 5mA$      | : $U_{AN}$ = full-scale value of output voltage. |

- **ZERO adjustment:**

**Refer Fig. B for position of Potentiometers & Table 4 for limits of ZERO adjustment**

1. Keep Potentiometers RV1 and RV2 in middle position.
2. Set the initial value of input equal to  $X_0$  such that output should be zero.

This means for the output Range: 20...100%,  $x_0 = -25\%$  of the measuring range  
 0...100%,  $x_0 = 0\%$  of the measuring range

Refer Table 5 for selecting input value for setting output value to zero.

3. Vary the potentiometer RV1, and check the Output can be adjusted in  $\pm 2\%$  of the output end value.
4. If it can be adjusted in  $\pm 2\%$  of output end value, then go to step 5.
5. Adjust output (Y) = output zero value  $\pm [0.0005 * \text{Output End value}]$  with Potentiometer P1

Refer Table 5 for limits for ZERO adjustment.

**Table 5: Limits for ZERO adjustment**

Sr. No	$X_0$ Value of input for output=0 (NULL)mA / Volt	Standard Input range	Standard Output Range	Limits for Calibration of output zero value = $\pm (0.0005 * Y_2)$	
1	$X_0 = 0\%$ of InputRange	0	0...10 Volt	0...10 Volt	-0.005 to 0.005 Volt
		0	0...20 mA	0...20 mA	-0.01 to 0.01 mA
2	$X_0 = -25\%$ of Input Range	0	1...5 mA / Volt	2...10 Volt	-0.005 to 0.005 Volt
3		0	2...10 Volt		
4		0	4...20 mA	4...20 mA	

- **SPAN adjustment:**

6. Set the input to the final value of measured Range.
7. Apply input (X) = End value of input (X2), and adjust the Output (Y) = Output End value (Y2)  $\pm$  [0.05 % of output End Value] with Potentiometer RV2.
8. Vary the potentiometer RV2 till the output is adjusted within  $\pm 0.05\%$  of output end value. Refer Table 6 for limits for the span adjustment.

**Table 6: Limits for SPAN adjustment**

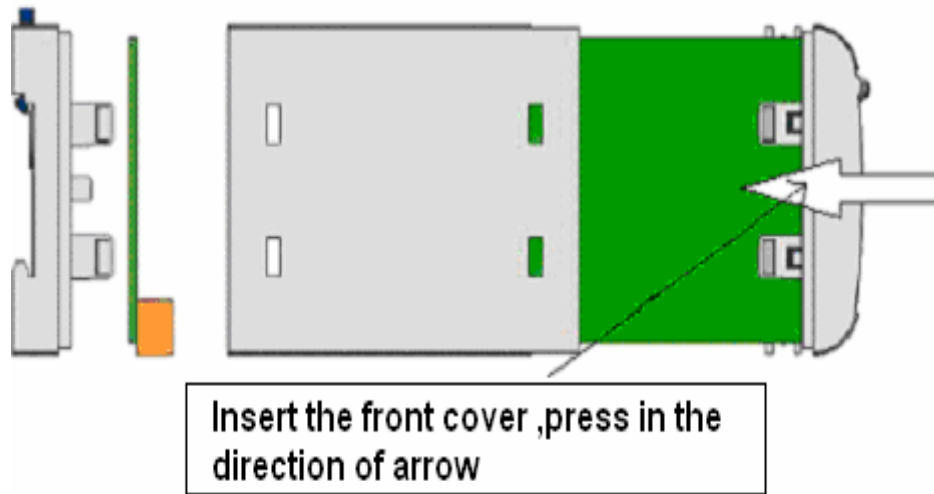
Sr. No.	Output End Value (Y2)	Limits for Calibration of Output End Value (Y2) $\pm$ 0.05% of measuring range
3.	10 Volt	9.995 to 10.005 mA \ Volt
4.	20 mA	19.99 to 20.01 mA

- **Ensuring Zero and Span adjustment:**

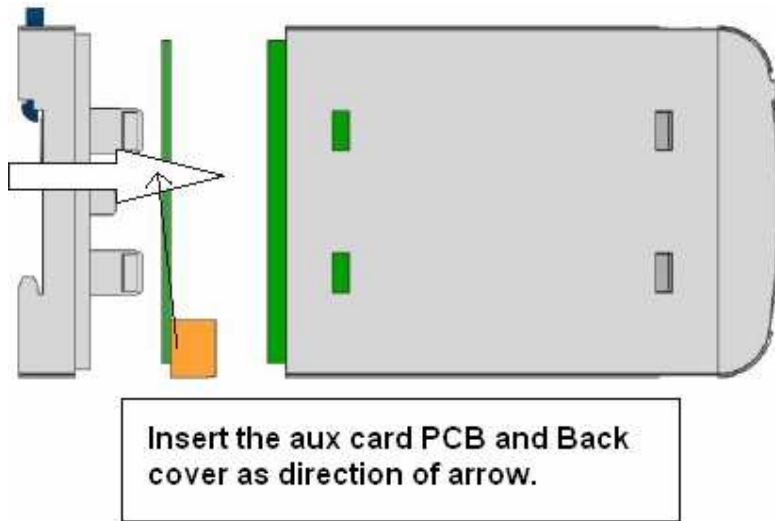
9. In this method it is ensured that the zero and span adjustment remains unchanged.
10. Give input to transducer such that output should be zero i.e. give same input, which Was given for Zero adjustment.
11. Measure the output, if it is not within  $\pm 0.05\%$  of the output end value, repeat step 3.
12. Again give input as end value of input range i.e. give input, which was given for span adjustment.
13. Measure the output. If it is output end value with  $\pm 0.05\%$  of tolerance, then Calibration procedure is completed. If it is not within tolerance of  $\pm 0.05\%$  of output end value, then repeat step 6.
14. Repeat the above step 11, step 12 and step 13 until the output is adjusted within allowable tolerance of  $\pm 0.05\%$  of the output end value.



VIII) After making the input output configuration inserts the front card.



IX) Insert the Aux card and back cover



X) After inserting the Back cover, transducer can be used for required application.

