

# TRANSMILLE EA015 MULTIFUNCTION WORKSTATION

## CALIBRATION MANUAL

## **Warranty**

Transmille guarantees this product to be free from defects in material and workmanship under normal user for a period of one (1) year from the date of shipment. This warranty does NOT cover any required re-calibration/adjustment or standard maintenance actions. This warranty extends only to the original end purchaser and does not apply to fuses, batteries, external cables or to the product if it has been modified, misused, altered or has been subjected to mishandling or misuse.

Transmille's obligation to warranty is limited to repair or replace the product after return to an authorized Transmille service centre within the warranty period and is subject to Transmille's investigation determining that the fault is not caused by misuse, alteration or through mishandling.

If failure occurs, send the product via pre-paid freight, to the service centre as informed by Transmille with a description of the fault only after receiving confirmation from Transmille. At Transmille's option, either repairs will be performed or a replacement unit of similar condition and age will be provided.

Transmille will return the product to the end customer or local distributor via pre-paid freight (with exception of any customs clearance fees).

Transmille accept no responsibility for damage during return shipping for warranty service.

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The EA015 is designed for use with Transmille 3000A and 4000 Series Calibrators. Incorporating a 2, 10 and 50 turn coil, continuity resistance output, insulation resistance output as well as the ability to measure current and voltage the EA015 expands the workload coverage of the base unit

## **Required Equipment For Calibration and Adjustment**

To verify and adjust the EA015 the following equipment (or equivalent) is required

<b>Equipment</b>	<b>Recommended Model</b>
8.5 Digit Multimeter	Transmille 8081 / 8104 or equivalent
Multiproduct Calibrator	Transmille 3041A or equivalent
Optical Tachometer	Testo 460 or equivalent
Clamp Meter	Kewtech K200 or equivalent
Thermocouple Indicator	Transmille 8081 / 8104 with TCLEAD
Male Mini TC to Female 4mm Adapter	

## Verification Thermocouple Output

The EA015 Thermocouple output is derived from the calibrator that it is used with normally. Connect the Calibrator via the connections on the side panel and Enter Workstation Mode and then set Thermocouple Output

Measure the output as DC Voltage using a precision multimeter, taking care to ensure that the multimeter has been zeroed correctly.

The output should be measured with the Cold Junction Compensation set to 0°C

Setting	Output Value (DC Volts)	Tolerance (+/-)
-140°C Type K	-4.669mV	2.5uV
0°C Type K	0mV	3.9uV
200°C Type K	8.138mV	4uV
700°C Type K	29.129mV	4.2uV
1340°C Type K	53.795mV	3.6uV
-180°C Type J	-7.403mV	1.6uV
400°C Type J	21.848mV	16.5uV
750°C Type J	42.281mV	19.2uV
-250°C Type T	-6.180mV	3.2uV
400°C Type T	20.872mV	12.4uV
-50°C Type R	-0.226mV	1000nV
1700°C Type R	20.222mV	14uV
-50°C Type S	-0.236mV	3uV
1700°C Type S	17.947mV	17.6uV
-270°C Type N	-4.345mV	2.6uV
1300°C Type N	47.513mV	14.8uV
600°C Type B	1.792mV	4uV
1820°C Type B	13.820mV	14.3uV
0°C Type E	0mV	47uV
400°C Type E	28.946mV	64uV
800°C Type E	61.017mV	63uV

## Thermocouple Cold Junction Measurement

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The EA015 Cold Junction Compensation is performed by taking a measurement of the temperature at the thermocouple socket. With a handheld probe take a measurement of the ambient temperature near the socket, or set 20°C Type K output and measure the output with a Thermocouple Indicator with an internal temperature measurement. The currently measured temperature is indicated in the top right hand side of the output screen on the calibrator

Setting	Indicated Measurement	Tolerance (+/-)
Cold Junction Measurement	Ambient Temperature	0.2°C

## Tachometer Function

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The EA015 Tachometer output is derived from the frequency output of the calibrator that it is used with. As such the Tachometer verification is a check on operation.

Set the Calibrator to Workstation mode and then set Tachometer Output

Align the optical tachometer and confirm that readings agree with the set output

Test Title	Output Value	Tolerance (+/-)
240 RPM	240RPM	1RPM
19998 RPM	19998RPM	2RPM

## Insulation Resistance - Resistance Output

The EA015 should be set to Insulation Resistance output, and the resistance measured at the Insulation Resistance output terminals with a precision multimeter.

Ensure that the insulation resistance of the leads used for the measurement is suitable high to avoid errors due to leakage.

Test Title	Output Value	Tolerance (+/-)
10kR	10kR	10.2R
20kR	20kR	20R
40kR	40kR	40R
50kR	50kR	50R
60kR	60kR	60R
100kR	100kR	100R
200kR	200kR	200R
400kR	400kR	400R
500kR	500kR	500R
600kR	600kR	600R
1MR	1MR	1kR
2MR	2MR	2kR
4MR	4MR	4kR
5MR	5MR	50kR
6MR	6MR	60kR
10MR	10MR	100kR
20MR	20MR	200kR
40MR	40MR	400kR
50MR	50MR	500kR
60MR	60MR	600kR
100MR	100MR	1MR
200MR	200MR	2MR
400MR	400MR	4MR
500MR	500MR	5MR
600MR	600MR	6MR
1000MR	1000MR	10MR

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**Insulation Resistance - Voltage Measurement**

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The second portion of verifying the insulation resistance function is checking the input voltage measurement.

Set the Calibrator to Workstation mode, then Set Insulation Resistance Test Voltage mode.

Connect the Source Calibrator to the Insulation Resistance terminals and set the Voltage to the appropriate input value.

Test Title	Input Value	Tolerance (+/-)
50V	50V	250mV
100V	100V	500mV
250V	250V	1.3V
500V	500V	2.5V
1000V	1000V	5V

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**Continuity Resistance - Resistance Output**

Set the workstation to Continuity Resistance output and measure the output of the EA015 with the precision Multimeter. Ensure that 4 Wire Resistance is used to compensate for the resistance of the leads used.

Test Title	Test Value	Tolerance (+/-)
1R	1R	51mR
10R	10R	60mR
19R	19R	69mR
100R	100R	150mR
190R	190R	240mR
1kR	1kR	1.1R

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**Continuity Resistance - Current Measurement**

Set the 1 Ohm output of the Continuity Resistance output and apply the below test values into the EA015 Continuity Resistance terminals

Test Title	Input Value	Tolerance (+/-)
Current into 1R	100mA	500uA



**Current Measurement**

Set the workstation to the Current Measurement function and connect the reference calibrator to the current input terminals. Press the NULL key with no current applied to zero out the current measurement. Apply the listed test currents from the reference calibrator and note the reading

<b>Test Title</b>	<b>Input Value</b>	<b>Tolerance (+/-)</b>
30mA Range	30.000mA	14uA
30mA Range	-30.000mA	14uA
30mA Range	10.000mA	8uA

**Voltage Measurement**

Set the workstation to the Voltage Measurement function and connect the reference calibrator to the Voltage Input terminals. Apply 0V and press the Null key prior to taking measurements on each range. Apply the listed test voltage and note the reading

<b>Test Title</b>	<b>Input Value</b>	<b>Tolerance (+/-)</b>
100mV Range	100mV	70uV
100mV Range	-100mV	70uV
1V Range	0.0000V	500uV
1V Range	1.0V	700uV
1V Range	-1.0V	700uV
1V Range	0.8V	660uV
1V Range	0.6V	620uV
1V Range	0.4V	580uV
1V Range	0.2V	540uV
30V Range	30V	11mV
30V Range	20V	9mV
30V Range	10V	7mV

Set the workstation to current output mode and then press the 'Coil' button. Select the required turns and apply 20A. Measure the indicated current with the clamp meter.

To verify the clamp meter prior to use, set 20A direct output from the calibrator and connect the positive current terminal to the negative current terminal (a short). Verify the error of the clamp meter at 20A through a single conductor and apply this error to the indicated measurement through the coil

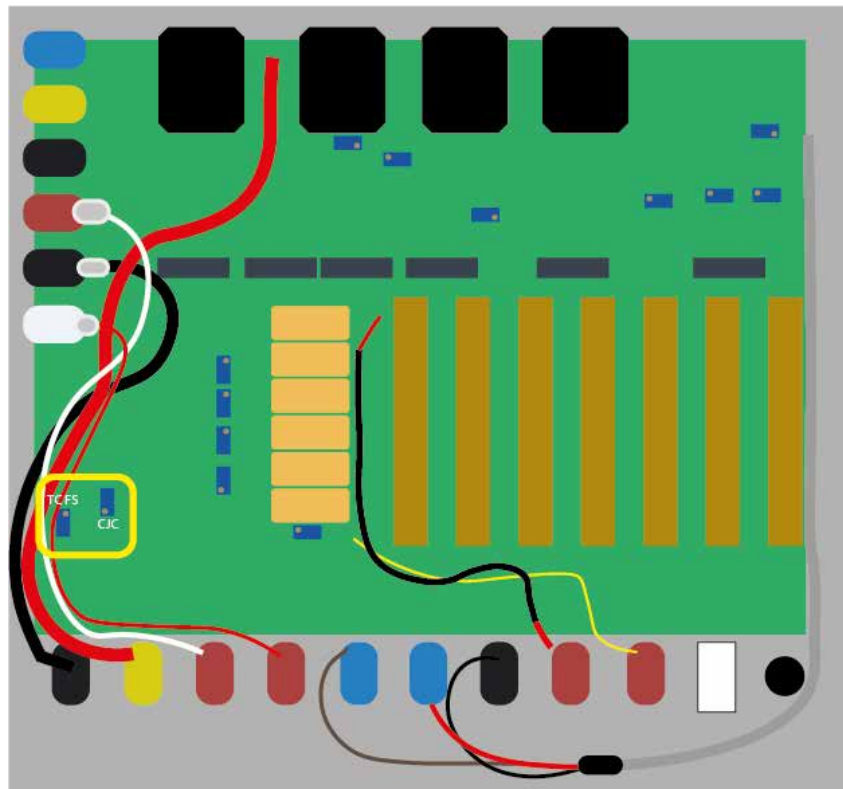
<b>Test Title</b>	<b>Output Value</b>	<b>Output Frequency</b>	<b>Tolerance</b>
2 Turn Coil @ 56Hz	20A	56/Hz	0.078A
10 Turn Coil @ 56Hz	20A	56Hz	0.092A
50 Turn Coil @ 56Hz	20A	56Hz	0.088A

If after performing verification tests the EA015 is found to be outside of tolerance, adjustments should be performed, and then post adjustment verification performed.

## **Thermocouple Output**

The thermocouple output function is related to the voltage output of the calibrator that it is used with. To adjust the output, set the workstation to Thermocouple Output mode, and then switch to Voltage Output and set 5V DC. The Thermocouple output is a 100:1 Divider, and 50mV will appear at the output of the Thermocouple Connector

To adjust to measure 50mV, locate the TC FS adjustment point as highlighted below

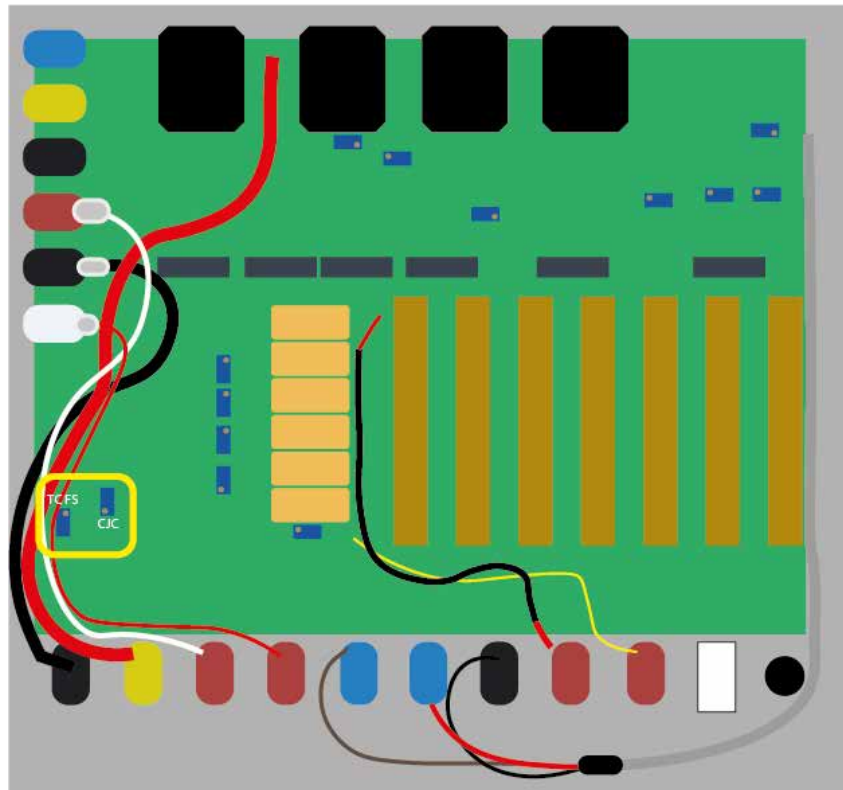


Adjust the TC FS adjustment point for a reading of 50mV on the Multimeter.

Note - Ensure that the multimeter is Zeroed accurately and low thermal leads and interconnections are used

## Thermocouple Cold Junction

The thermocouple cold junction measurement is performed with a temperature sensor mounted in the thermocouple socket on the front panel of the EA015. The measurement indicated on the screen of the calibrator is adjusted via a manual adjustment point as highlighted below

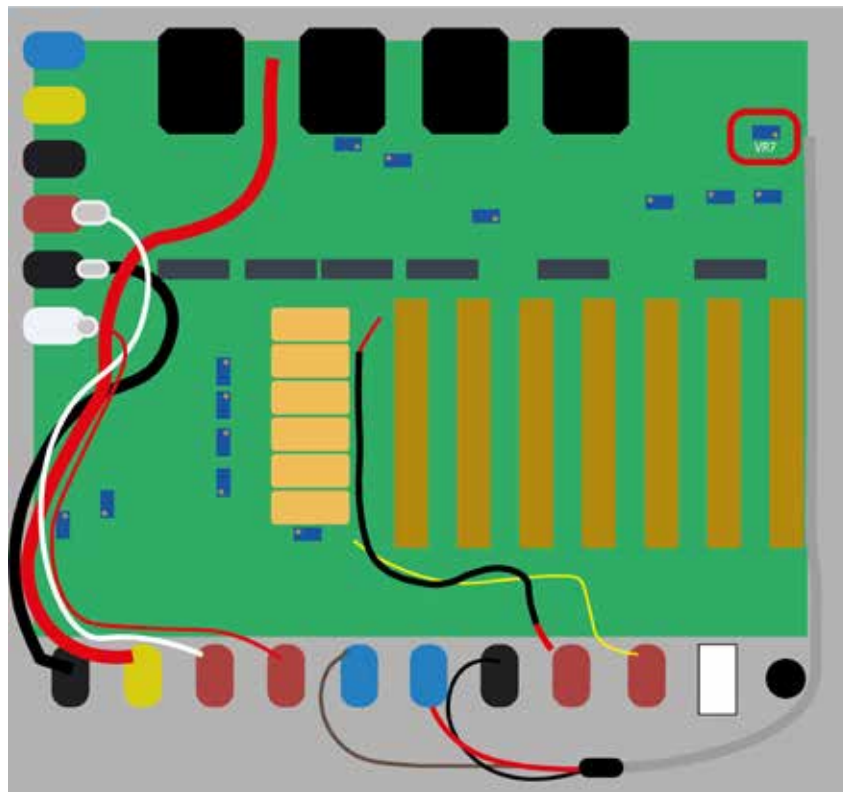


To adjust the Cold Junction Measurement, first take a measurement of ambient temperature as close to the Thermocouple Socket as possible, or source 20°C Type K to a thermocouple indicator. Adjust the adjustment point until the measurement on the screen is equal to that of the ambient temperature or the measurement on the temperature indicator is 20°C

## Insulation Resistance - Resistance Output

The resistance output of the EA015 is built up through multiple resistance decades. In the unlikely event that the resistance value drifts the resistor will have to be replaced. In this case the lowest value resistor that the error occurs on should be replaced

The voltage measurement on the insulation resistance has a single adjustment that is performed manually. Remove the back plate from the EA015 and locate VR7 as indicated on the below image

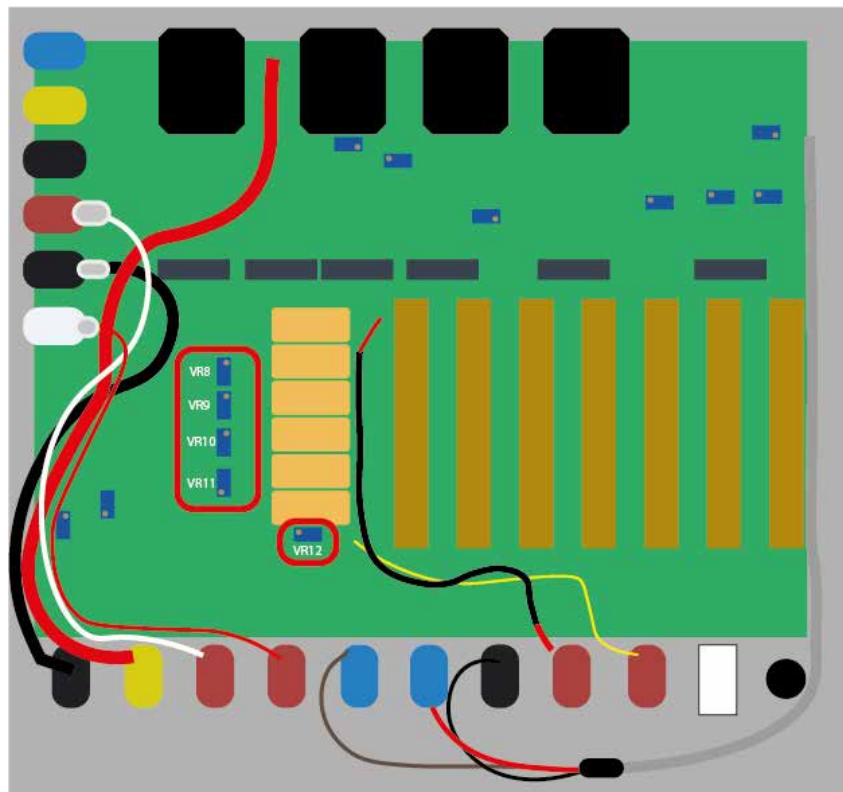


With the Workstation on the 100V Range and an input of 100V, adjust VR7 for a within tolerance measurement

**WARNING - HIGH VOLTAGES ARE PRESENT INSIDE THE WORKSTATION - ENSURE THAT THE INSULATION RESISTANCE TERMINALS ARE CLEAR OF HANDS**

## Continuity Resistance - Resistance Output

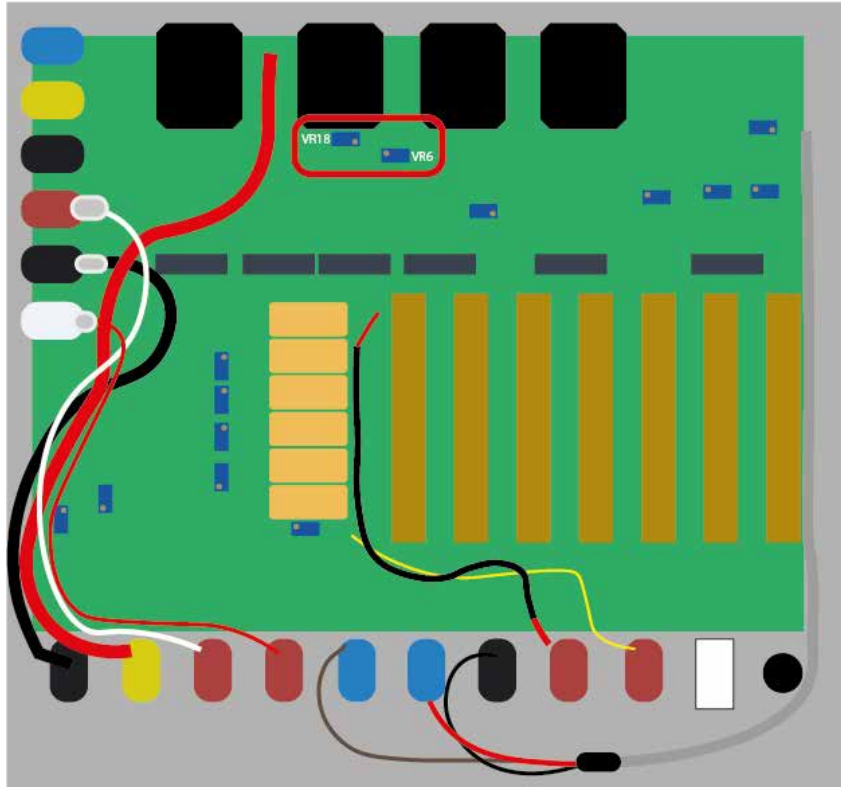
The continuity resistance output of the EA015 is made from discrete resistors that are adjusted for nominal output. Each resistor has an adjustment available as highlighted below



- VR8 adjusts the value of the 190R Output
- VR9 Adjusts the value of the 100R Output
- VR10 Adjusts the value of the 19R Output
- VR11 Adjusts the value of the 10R Output
- VR12 Adjusts the value of the 1R Output

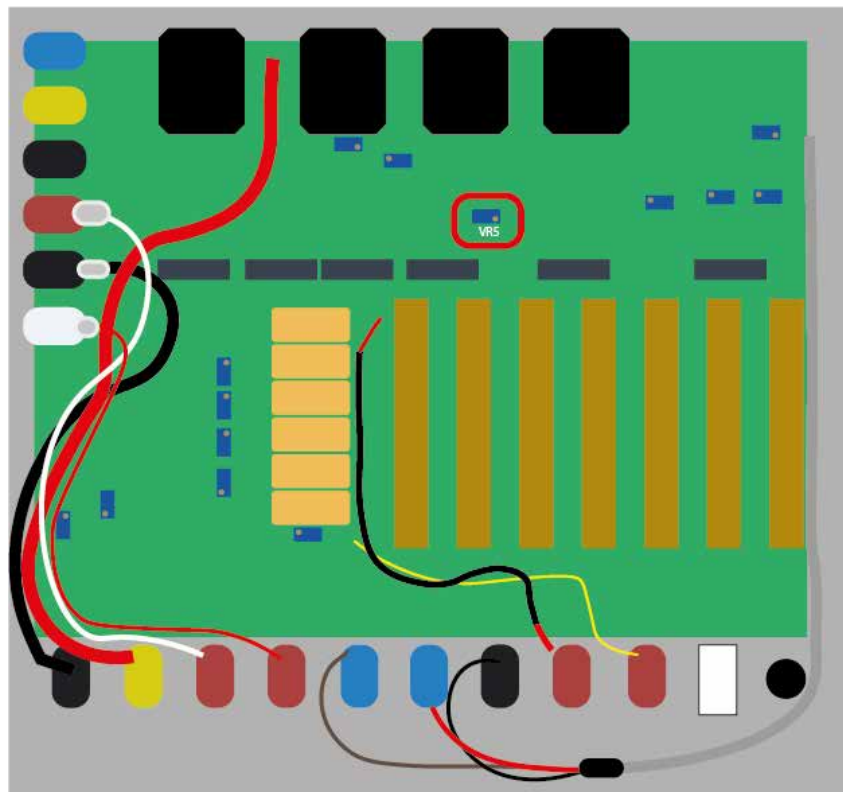
Adjust the appropriate adjustment point while measuring the output with the precision multimeter for an in tolerance reading.

The current measurement portion of the continuity output has two adjustments. One is for the Zero measurement (No Current Input) and the second for Full Scale Input. The two adjustment points are highlighted below



With the workstation set to the 1 Ohm Continuity Range, first adjust VR18 for a Zero measurement. Then apply 100mA and adjust VR6 for an in tolerance measurement.

The current measurement function of the workstation has a single adjustment that is performed manually. Remove the back plate from the EA015 and locate VR5 as indicated on the below image

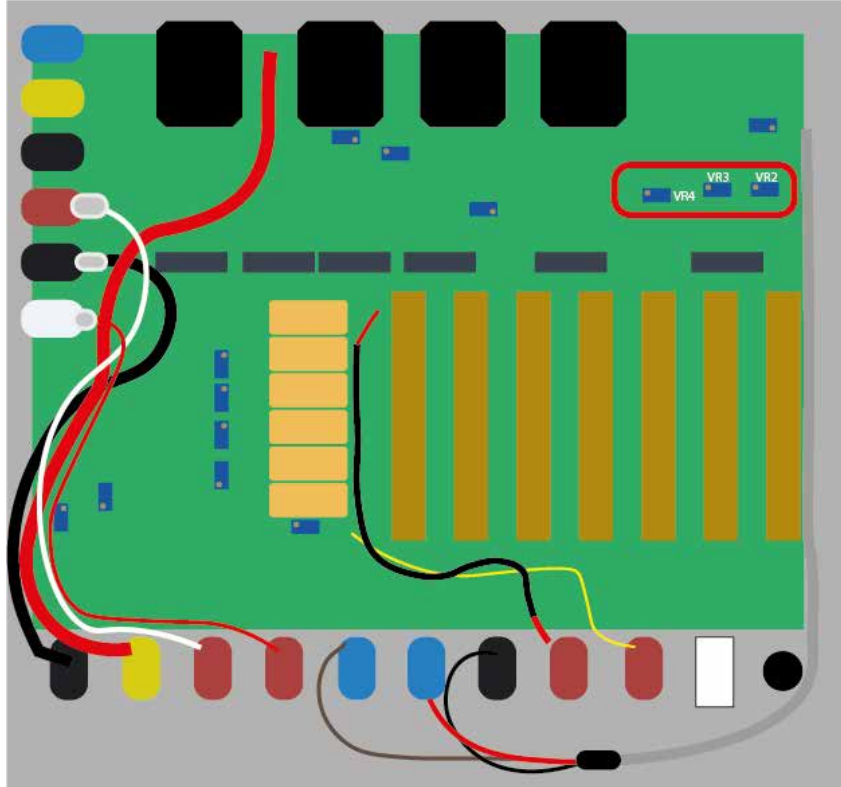


To adjust, apply 30mA to the current measurement input with the workstation in the Current Measurement mode and adjust for an in tolerance reading.



The voltage measurement function of the EA015 has 3 adjustments, one for the full scale of each Range.

The three adjustment points are in line as marked on the image below



VR4 is used for adjustment of the 30V Range, VR3 is used for the 1V range and VR2 is used for the 100mV Range.

For the range(s) that require adjustment, set the workstation to the appropriate range and apply positive Full Scale. Adjust the appropriate adjustment point for a within tolerance measurement

## ABOUT US

We truly believe in offering Solutions in Calibration, offering bespoke solutions for calibration laboratories and manufacturers across the globe. Our mission statement is not just a phrase, it is our design and support philosophy, offering support and advice that cannot be found elsewhere with a friendly atmosphere.

Transmille was founded in 1997 as a commercial calibration service, and soon after began to develop and manufacture a range of electrical calibration products and software to answer a growing requirement for solutions to common problems. Following this small beginning, Transmille has worked year on year to provide unique equipment and software to benefit calibration laboratories and manufacturers across the globe.

Ever since releasing the very first products Transmille have continued to innovate and develop new products for the metrology

community, from world first products such as the 2100 Electrical Test Equipment calibrator, through to the worlds lowest cost multi product calibrator the 1000 series.

Transmille now produce over 600+ calibration instruments per year, shipping instruments to customers ranging from National Standards Laboratories and manufacturers through to small calibration test houses around the world.

An unrivalled commitment to quality and innovation drives Transmille forwards, with a dedicated design and support team in house with a combined experience of over 60 years in manufacture and design of electrical calibration products and software.

With local distributors across the globe, we can offer one to one personalised support, no matter how large or small the customer.



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