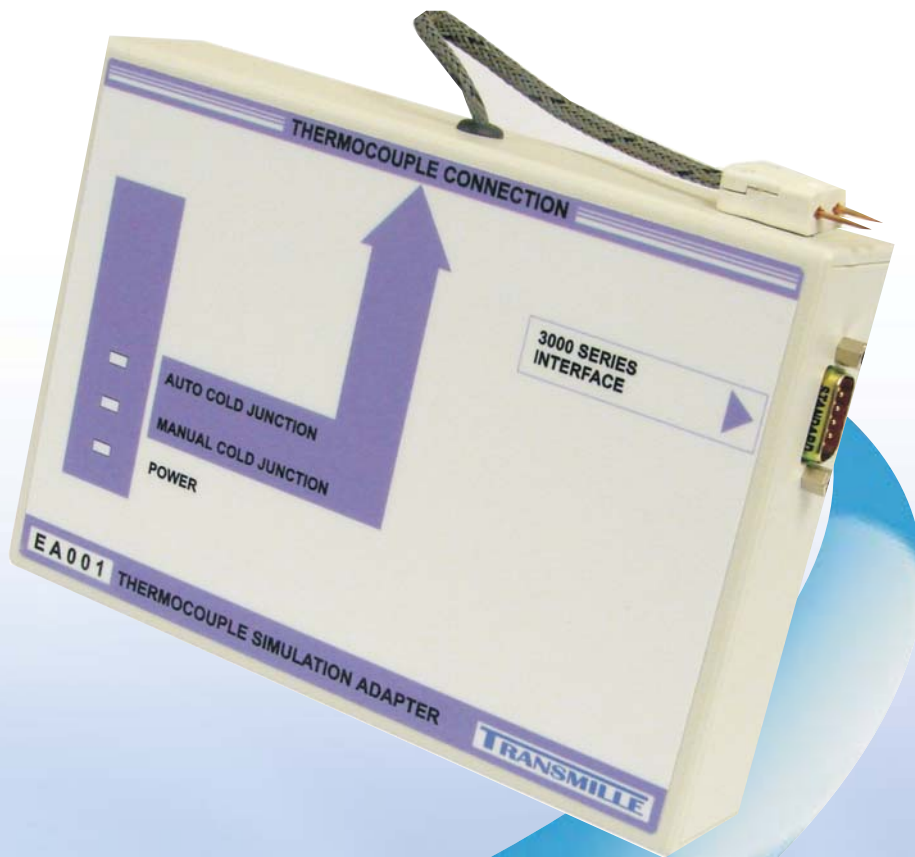


# EA001

THERMOCOUPLE SIMULATION ADAPTER



**OPERATION MANUAL**

# **EA001**

## **Thermocouple Simulation Adapter**

### **Operation Manual**

## **Guarantee and service**

---

Transmille Ltd. guarantees this instrument to be free from defects under normal use and service for a period of 1 years from purchase. This guarantee applies only to the original purchaser and does not cover fuses, or any instrument which, in Transmille's opinion, has been modified, misused or subjected to abnormal handling or operating conditions.

Transmille's obligation under this guarantee is limited to replacement or repair of an instrument which is returned to Transmille within the warranty period. If Transmille determines that the fault has been caused by the purchaser, Transmille will contact the purchaser before proceeding with any repair.

To obtain repair under this guarantee the purchaser must send the instrument in its original packaging (carriage prepaid) and a description of the fault to Transmille at the address shown below. The instrument will be repaired at the factory and returned to the purchaser, carriage prepaid.

Note :

**TRANSMILLE ASSUMES NO RESPONSIBILITY FOR DAMAGE IN TRANSIT**

**THIS GUARANTEE IS THE PURCHASER'S SOLE AND EXCLUSIVE GUARANTEE AND IS IN LEIU OF ANY OTHER GUARANTEE, EXPRESSED OR IMPLIED. TRANSMILLE SHALL NOT BE LIABLE FOR ANY INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OR LOSS.**



**Transmille Ltd.  
Unit 4, Select Business Centre  
Lodge Road  
Staplehurst  
Kent  
TN12 0QW  
United Kingdom**

**Tel : +44 0 1580 890700**

**Fax : +44 0 1580 890711**

**E Mail : [sales@transmille.com](mailto:sales@transmille.com)**

**Web : [www.transmille.com](http://www.transmille.com)**

**EA001 THERMOCOUPLE SIMULATION ADAPTER  
OPERATION MANUAL**

---

**TABLE OF CONTENTS**

---

**GUARANTEE AND SERVICE .....2**

**EA001 THERMOCOUPLE SIMULATION ADAPTER.....4**

**MAIN FEATURES .....4**

*Dedicated External Adapter For the Ultimate in Accuracy .....4*

*Direct Connection - No compensation cables required .....4*

**DESIGN NOTES.....5**

*Intuitive Operation & Control.....5*

*Supports any temperature standard using Virtual Front Panel software.....5*

**CONNECTIONS .....6**

**USING THE THERMOCOUPLE SIMULATION OPTION.....6**

*Manual Cold Junction Compensation .....8*

*Automatic Cold Junction Compensation.....8*

**CARE & MAINTENANCE .....10**

*Cleaning the Adapter .....10*

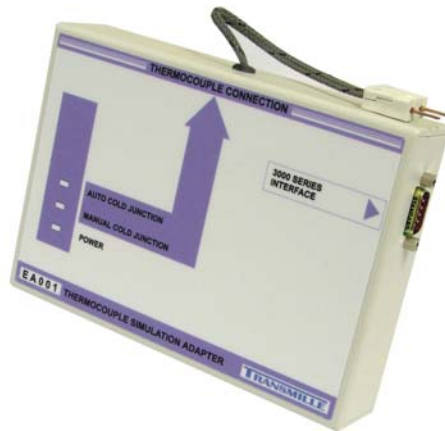
*Handling Precautions.....10*

*Servicing Information .....10*

**Appendix A : Specifications**

# **EA001 Thermocouple Simulation Adapter**

---



- **External Unit**
- **Low noise & Thermally stable**
- **Integrated temperature sensor for accurate cold junction compensation**
- **Supports types K • J • T • R • S • E • N • B**
- **Works with ProCal Calibration software and 3000 Series Virtual Front Panel.**

## **Main Features**

---

### **Dedicated External Adapter For the Ultimate in Accuracy**

---

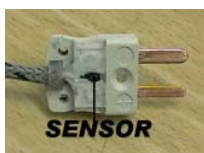
Temperature gradients / thermal EMFs which can be introduced by internally mounted thermocouple simulation methods are one of the greatest sources of error with thermocouple temperature calibration.

For the ultimate in accuracy, Transmille has designed a dedicated external unit. This keeps the electronics required to generate the low level signals used for thermocouple simulation as close as possible to the measuring input of the thermometer. This allows the signal to be as free from electrical noise as possible, and also eliminates errors caused by heat generated by surrounding electronics in the calibrator.

### **Direct Connection - No compensation cables required**

---

- **Uses neutral (copper) thermocouple plug -**  
For direct connection to any thermocouple type input without the need for compensation cables
- **CJC sensor built in to thermocouple plug**  
For automatic CJC compensation



## Design Notes

---

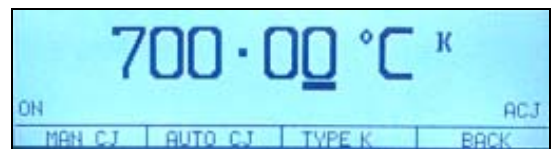
Special care has been taken over the cold junction compensation - a common source of errors in thermocouple calibration. The cold junction compensation (CJC) sensor is mounted in the thermocouple plug itself. By measuring the cold junction at the instruments input allows any type of thermocouple to be simulated without using compensation cables.

### Intuitive Operation & Control

---

- Easy selection of thermocouple type
- Auto / Manual Cold Junction compensation

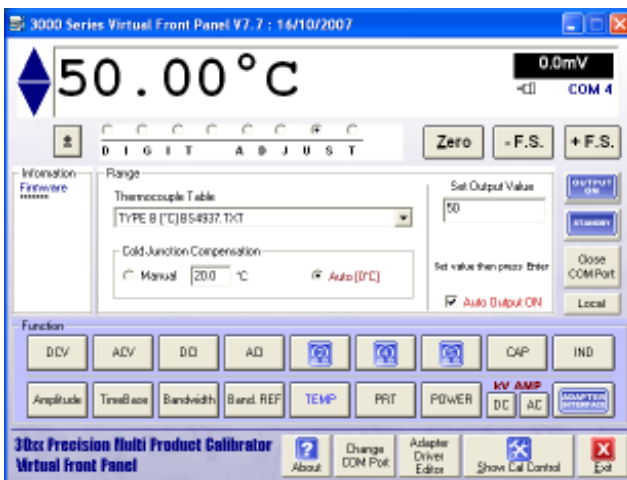
Quick and easy to use, simply plug in the temperature adapter into the 3000 Series calibrator, select thermocouple simulation mode and thermocouple type using the soft keys and enter the temperature required.



### Supports any temperature standard using Virtual Front Panel software

---

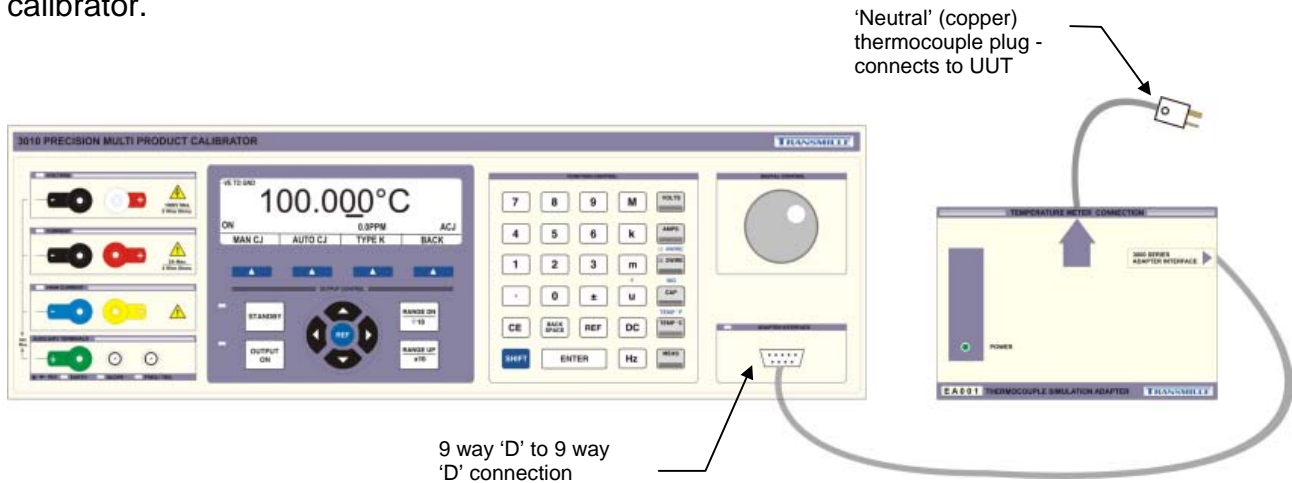
- Control directly from a PC
- Extend functionality
- Create custom conversion tables for any thermocouple standard



Using the Virtual Front Panel software from Transmille, custom configuration of temperature values can be achieved to any temperature standard providing the best flexibility.

## Connections

Using the supplied adapter connection lead (9 way 'D' type to 9 way 'D' type), connect the thermocouple adapter to the feature connection on the front panel of the 3000 series calibrator.



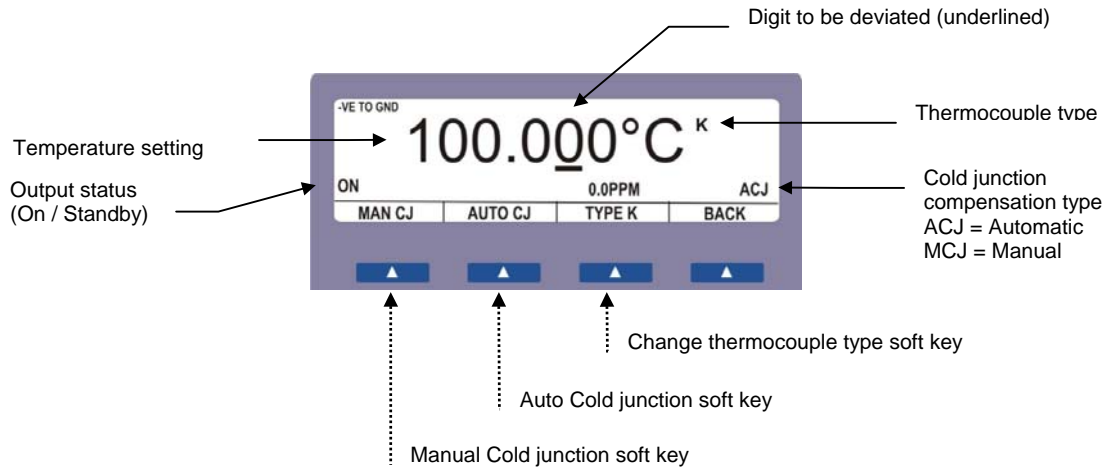
## Using The Thermocouple Simulation Option

To start the oscilloscope calibration option, press the soft key below the **THERMO** menu item



**TIP** : If the **THERMO** menu item is not displayed, press the **NEXT** soft key to go to the next menu level.

The thermocouple simulation option allows the user to enter a temperature in °C and set the calibrator to the specific voltage output which corresponds to the thermocouple type selected. On entering thermocouple simulation mode, type K will be the default function. The display below will be shown indicating the currently selected range and output status :

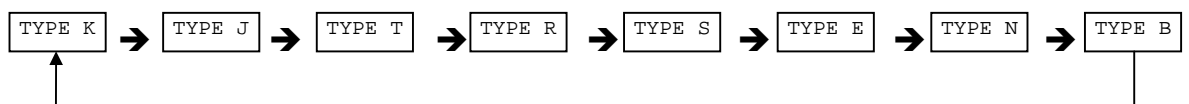


Once in thermocouple mode, the menus available at the bottom of the screen will change to reflect the thermocouple mode options - the available menu items are :

**MAN CJ** Selects the manual cold junction compensation mode  
This allows cold junction value to be set to zero.

**AUTO** Selects the automatic cold junction compensation mode  
This allows the calibrator to use the built in temperature sensor within the adapter's thermocouple plug to compensate for the cold junction measured between the adapter plug and the UUT socket.

**TYPE K** Selects the thermocouple type currently being simulated.  
Pressing this soft key allows the user to cycle through the available thermocouple types in the following order

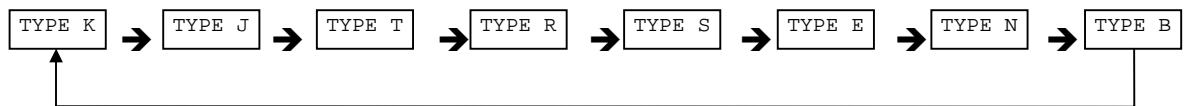




1. Connect the thermocouple simulation adapter to the 3000 Series calibrator via its feature connector using the supplied 9 way 'D' type to 9 way 'D' type lead. Connect the UUT to the thermocouple plug extending from the opposite end of the thermocouple simulation adapter.

Set the UUT to the required range.

2. Select the thermocouple type to be simulated using thermocouple type selection  soft key. Pressing this soft key allows the user to cycle through the available thermocouple types in the following order :



3. Select the cold junction setting using the soft keys :

#### **Manual Cold Junction Compensation**

**Manual Cold Junction Compensation**

Sets the cold junction to zero

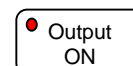
#### **Automatic Cold Junction Compensation**

**Automatic Cold Junction Compensation**

Activates the built in temperature sensor in the thermocouple plug to accurately compensate for the temperature at the point of connection.

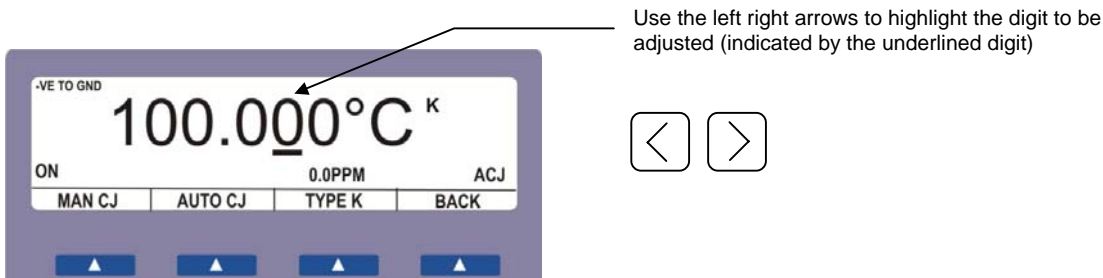
4. Use the calibrator keypad to key in the required temperature, for example 450.5° :

Ensure the calibrator output is turned ON by pressing

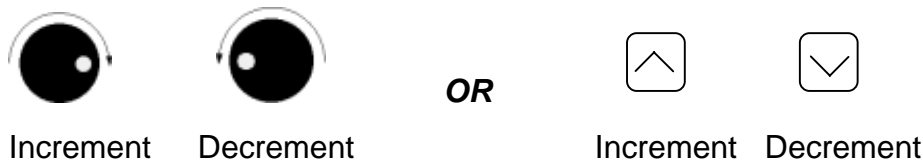


**Note** : The LED in the top left hand corner of the Output ON key will illuminate and the display will indicate ON in the left hand corner.

5. To deviate the temperature output from the nominal value, use the deviation function. This is controlled by using the left and right arrow keys to select the digit to be increased or decreased



To increase or decrease the digit, simply use the up down keys on the calibrator's keyboard or use the digital potentiometer



**Note :** The thermocouple type, temperature and cold junction compensation settings can be changed at any time by re-entered / selecting the setting required



**Tip**

Automatic or manual cold junction value is only updated when a temperature is entered or the output is set to standby, then on (i.e. to apply the change from automatic to manual cold junction, the output must be re-entered or the output set to *standby*, then to *output on*).

Calibration times using the thermocouple simulation option to calibrate temperature instrumentation can be significantly reduced by using the ProCal calibration software available from Transmille which allows a pre-defined sequence of tests (known as a procedure) to be set up. This allows the computer to automatically step through these tests, control the calibrator, set the correct outputs and record the amount of deviation in relation to the instrument's specifications.

## **Care & Maintenance**

---

The only maintenance instructions for the adapter is periodic cleaning.  
See below for details on the cleaning procedure and precautions for handling.

### **Cleaning the Adapter**

---

To keep the external enclosure of the adapter in good condition, clean the outer case with a soft cloth. Do not use any liquids in cleaning the enclosure – removal of surface dust is all that is recommended.



#### **CAUTION**

Do not use cleaning fluids or solvents for cleaning as these may damage the enclosure and affect the plastic materials used in the adapter.

### **Handling Precautions**

---

The adapter is designed for mechanical stability, but should not be subjected to excessive shock or be dropped. Transportation is recommended using the original packaging with avoidance of extreme changes of temperature.

### **Servicing Information**

---

The adapter is provided certified from the factory, and uses precision components and are not user repairable. If the adapter is damaged it should be returned to the factory for repair and recalibration.

# EA001

## Thermocouple Simulation Adapter

### Appendix A

#### Specifications

General Specifications	
Adaptor connection	Connects to male 'D' type adapter interface connector on 3000 Series front panel
Indicators	Incorporates an 'Active' LED mounted in the adaptor case
Adaptor Dimensions	12.5cm x 6.5cm x 2.5cm
Connections	1 x 9 way male 'D' type connector
	1 x Neutral (copper) industry standard thermocouple plug with <b>integral temperature sensor</b>
Connection to Calibrator	Via supplied 9 Way male to female serial lead (straight through connection)
Sensor Type	Thermistor Sensor incorporated into thermocouple plug to eliminate any lead effects
Output impedance	10 Ohms

Thermocouple Type	Range	90 Day <sup>1</sup> Rel. (°C)	180 Year <sup>1</sup> Rel. (°C)	1 Year <sup>1</sup> Rel. (°C)	2 Year <sup>1</sup> Rel. (°C)
<b>J</b>	-180°C to 150°C	0.04	0.05	0.05	0.07
	150°C to 750°C	0.24	0.27	0.30	0.42
<b>K</b>	-140°C to 200°C	0.08	0.09	0.10	0.14
	200°C to 1340°C	0.28	0.32	0.35	0.49
<b>T</b>	-250°C to 400°C	0.16	0.18	0.20	0.28
<b>R</b>	-50°C to 500°C	0.16	0.18	0.20	0.28
	500°C to 1700°C	0.80	0.90	1.00	1.40
<b>S</b>	-50°C to 1200°C	0.48	0.54	0.60	0.84
	1200°C to 1700°C	1.28	1.44	1.60	2.24
<b>B</b>	0°C to 1200°C	0.08	0.09	0.10	0.14
	1200°C to 1820°C	1.04	1.17	1.30	1.82
<b>N</b>	-270°C to 260°C	0.08	0.09	0.10	0.14
	260°C to 1300°C	0.32	0.36	0.40	0.56
<b>E</b>	0°C to 800°C	0.08	0.09	0.10	0.14

Note 1 : Does not include cold junction compensation errors

Specifications apply between 17°C and 27°C.

Outside this range an allowance of 0.18 x 1 Year Spec. per °C should be added.

Due to continuous development specifications may be subject to change.