

# DR4200 EV Field Calibration Procedure

## Input Calibration Minimum and Maximum Range Values

Minimum and maximum range values

You should calibrate the recorder for the minimum (0%) and maximum (100%) range values of your particular sensor.

- If your recorder has two (pens) inputs, calibrate each input separately. Make sure the correct input is on display INP1 or INP2 use **[FUNC]** key to select. Select the voltage or resistance equivalent for 0% and 100% range values from Table 6-1, use these values when calibrating your recorder.

Table 6-1 Voltage and Resistance Equivalents for 0% and 100% Range Values

Sensor Type	PV Input Range		Range Values *		
	°F	°C	0%	68°F/20°C	100%
<b>Thermocouples</b>					
<b>B</b>	105 to 3300	41 to 1816	0 mV	0.003 mV	13.763 mV
<b>E</b>	-454 to 1832	-270 to 1000	-9.835 mV	1.192 mV	76.358 mV
<b>E (low)</b>	-200 to 1100	-129 to 593	-6.471 mV		44.547 mV
<b>J</b>	0 to 1600	-18 to 871	-0.885 mV	1.019 mV	50.059 mV
<b>J (low)</b>	20 to 770	-7 to 410	-0.334 mV		22.397 mV
<b>K</b>	-320 to 2500	-196 to 1371	-5.822 mV	0.798 mV	54.845 mV
<b>K (low)</b>	-20 to 1000	-29 to 538	-1.114 mV		22.251 mV
<b>NINIMoly</b>	32 to 2500	0 to 1371	-0.001 mV	1.458 mV	71.330 mV
<b>NIC Nicrosil Nisil</b>	0 to 2372	-17.8 to 1300	-0.461 mV	0.525 mV	47.502 mV
<b>R</b>	0 to 3100	-18 to 1704	-0.089 mV	0.111 mV	20.275 mV
<b>S</b>	0 to 3100	-18 to 1704	-0.092 mV	0.113 mV	17.993 mV
<b>T</b>	-300 to 700	-184 to 371	-5.341 mV	0.789 mV	19.095 mV
<b>T (low)</b>	-200 to 600	-129 to 316	-4.149 mV		15.789 mV
<b>W5W26</b>	0 to 4200	-18 to 2315	-0.234 mV	0.062 mV	37.066 mV
<b>RTD (IEC=0.00385)</b>					
<b>100 Ω **</b>	-300 to 900	-184 to 482	25.18 Ω		274.96 Ω
<b>100 Ω (low)**</b>	-130 to 392	-90 to 200	64.30 Ω		175.84 Ω
<b>100 Ω (T)***</b>	-238 to 482	-150 to 250	38.79 Ω		195.57 Ω
<b>Milliamps</b>	4 to 20 mA		4 mA		20 mA
<b>Millivolts</b>	0 to 100 mV		0 mV		100 mV
	0 to 200 mV		0 mV		200 mV
<b>Volts</b>	0 to 1 Volt		0 Volt		1 Volts
	1 to 5 Volts		1 Volt		5 Volts
	0 to 5 Volts		0 Volt		5 Volts
	0 to 10 Volts **		0 Volts		10 Volts

\* Range values for thermocouples are based on a cold junction temperature of 32°F (0°C). These values must be adjusted for the actual cold junction temperature when using the ambient temperature method for calibrating thermocouple inputs.

\*\* IEC = 0.00385

\*\*\* IEC = 0.00391

# Input Calibration Preliminary Information

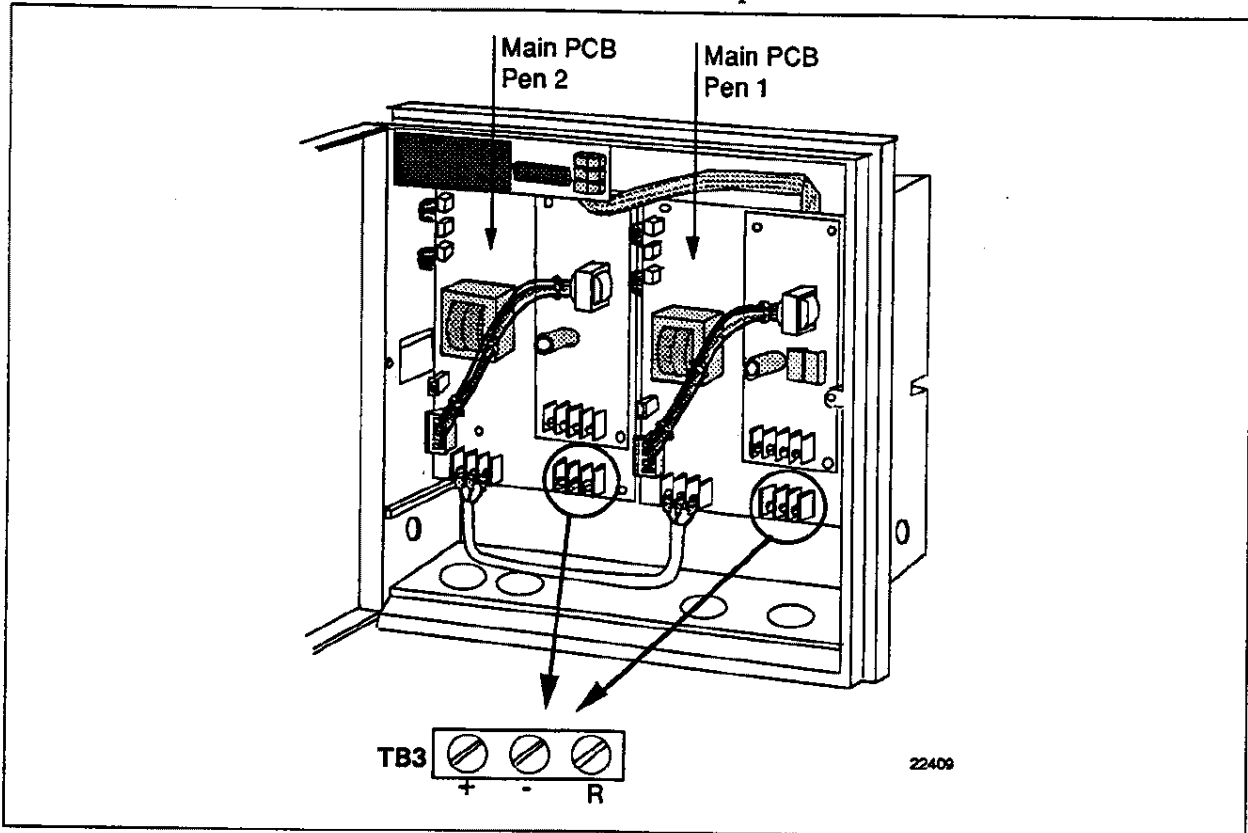
## Disconnect the field wiring

Depending on which input (#1 or #2) you are going to calibrate, tag and disconnect any field wiring connected to the input terminals on the input boards inside the recorder. Reference Figure 6-1 and follow the procedure in Table 6-2.

Table 6-2 Disconnect the Field Wiring

Step	Action
1	Remove the operating power from the recorder, open the door on the recorder, and swing the chart plate out.
2	Depending on the input (1 or 2) you are going to calibrate, disconnect the input connections from terminal block TB3 on the bottom edge of the applicable circuit board. See Figure 6-1 for the location of the circuit boards and input connectors.

Figure 6-1 Location of the Input Connections on the Input Boards



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# Input Calibration Preliminary Information, Continued

## Equipment needed

Table 6-3 lists the equipment required to calibrate the specific types of inputs listed in the table. You will need a medium size bladed screwdriver for general use and a small size bladed screwdriver for use with the screws on the connector plugs.

Table 6-3 Equipment Needed

Type of Input	Equipment Needed
<i>Thermocouple Inputs (Ice Bath)</i>	<ul style="list-style-type: none"><li>• A calibrating device with <math>\pm 0.02\%</math> accuracy for use as a signal source such as a millivolt source.</li><li>• Thermocouple extension wire that corresponds with the type of thermocouple that will be used with the recorder input.</li><li>• Two insulated copper leads for connecting the thermocouple extension wire from the ice baths to the precision calibrator.</li><li>• Two containers of crushed ice.</li></ul>
<i>RTD (Resistance Thermometer Device)</i>	<ul style="list-style-type: none"><li>• A resistance decade box, with <math>\pm 0.02\%</math> accuracy, capable of providing stepped resistance values over a minimum range of 0 to 1400 Ohms with a resolution of 0.01 ohm.</li><li>• Three insulated copper leads for connecting the decade box to the recorder.</li></ul>
<i>Milliampere, Millivolt, and Volts Inputs</i>	<ul style="list-style-type: none"><li>• A calibrating device with <math>\pm 0.02\%</math> accuracy for use as a signal source.</li><li>• Two insulated copper leads for connecting the calibrator to the recorder.</li></ul>

# Input Calibration Set Up and Wiring

## Jumper positions and DIP switch settings

Before starting the calibration activity, check that the jumpers and DIP switch settings on the applicable Main PCB (pen 1 or pen 2) are set in the proper positions for the particular sensor being calibrated.

## General set up procedure

Table 6-4 lists the general set up procedure for all methods of calibration. Do this procedure and then refer to the set up procedure and diagram for your specific input.

Table 6-4 General Set Up Procedure

Step	Action
1	Set-up and connect the calibrator to the input plug for the applicable input circuit board in your recorder according to the particular input sensor being used. Refer to the following figures for corresponding set-up diagrams: <ul style="list-style-type: none"><li>• Figure 6-2 Thermocouple inputs using an ice bath</li><li>• Figure 6-3 RTD (Resistance Thermometer Device) inputs.</li><li>• Figure 6-4 mA and Volts.</li></ul>
2	Route leads (for example: copper leads or thermocouple extension wires) through a conduit hole in the recorder case so that you will be able to close the chart plate.
3	Close the chart plate after you have completed the applicable calibration set up.

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## Input Calibration Set Up and Wiring, Continued

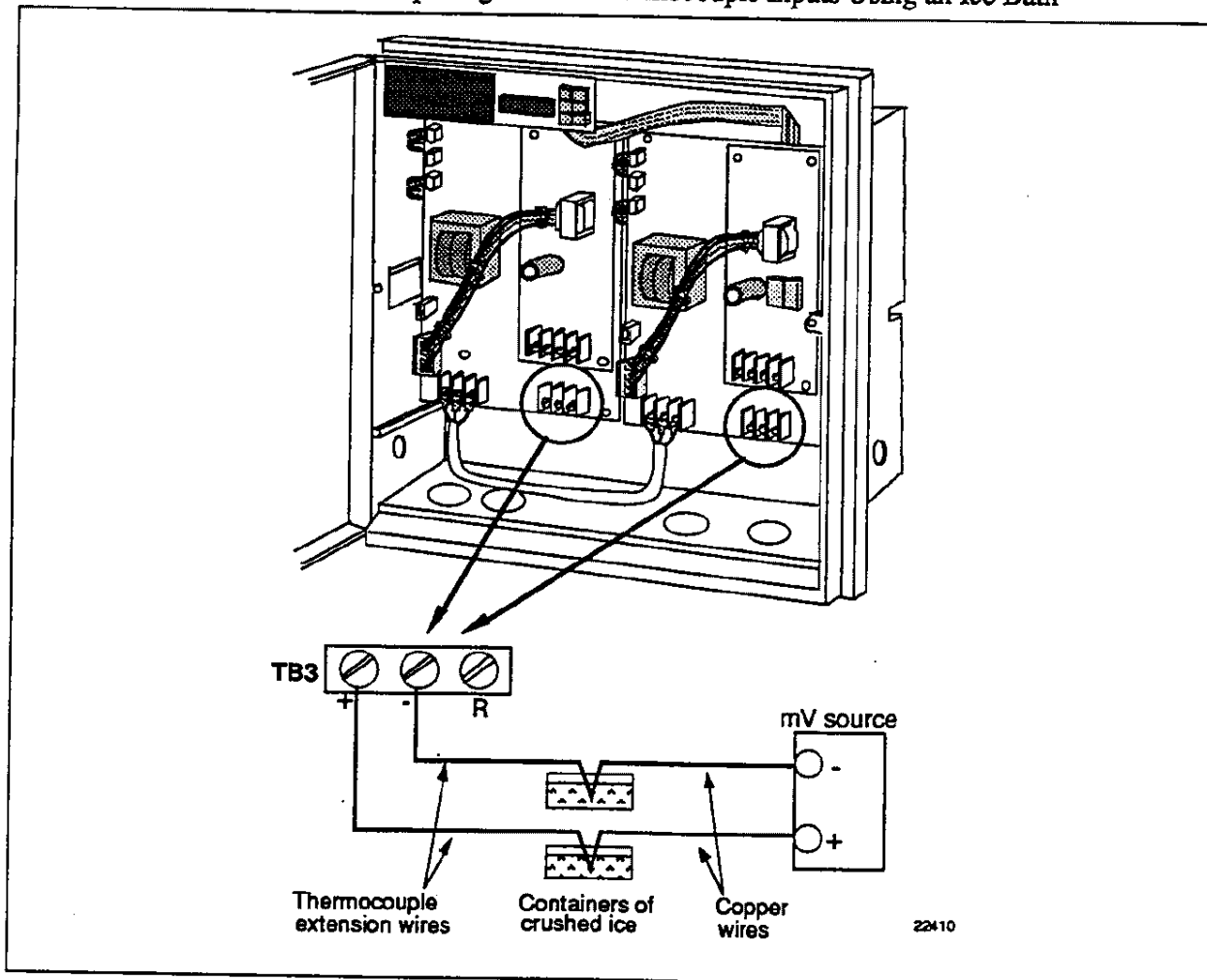
### Thermocouple Inputs using an Ice Bath

Refer to Figure 6-2 and wire the recorder according to the procedure given in Table 6-5.

Table 6-5 Set Up Wiring Procedure for Thermocouple Inputs Using an Ice Bath

Step	Action
1	Connect the copper leads to the calibration source (see Figure 6-2).
2	Connect a length of thermocouple extension wire to the end of each copper lead and insert the junction points into the ice bath.
3	Connect the other end of the thermocouple extension wires to the terminals on the Main PCB for the applicable input connector (TB3).

Figure 6-2 Calibration Set Up Diagram for Thermocouple Inputs Using an Ice Bath



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# Input Calibration Set Up and Wiring, Continued

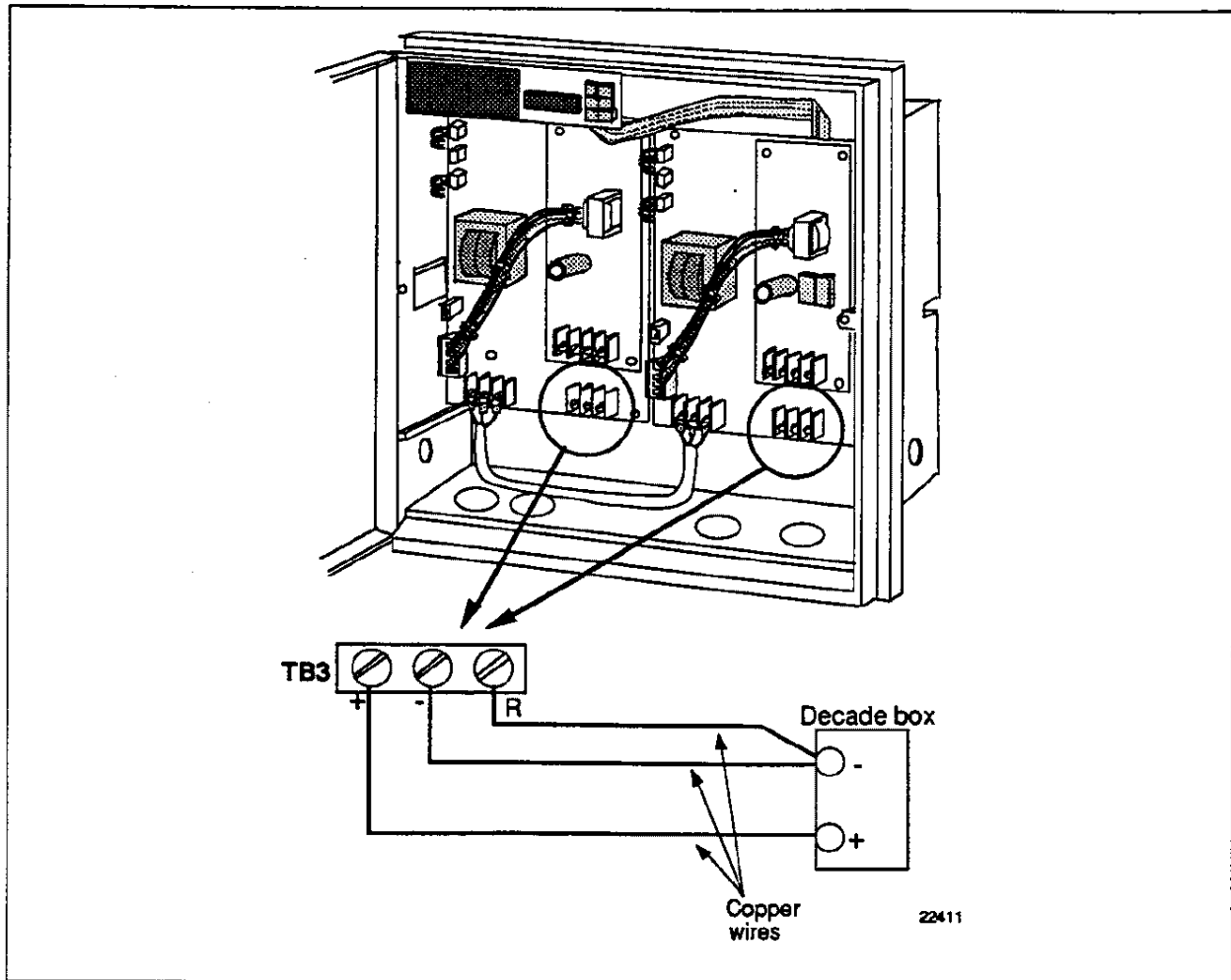
**RTD (Resistance Thermometer Device) Inputs**

Refer to Figure 6-3 and wire the recorder according to the procedure given in Table 6-6.

**Table 6-6 Set Up Wiring Procedure for RTD Inputs**

Step	Action
1	Connect the copper wire to the calibration source (see Figure 6-3).
2	Connect the other end of the copper wire to the terminals on the Main PCB for the applicable input connector (TB3).

**Figure 6-3 Calibration Set Up Diagram for RTD Inputs**



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# Input Calibration Set Up and Wiring, *Continued*

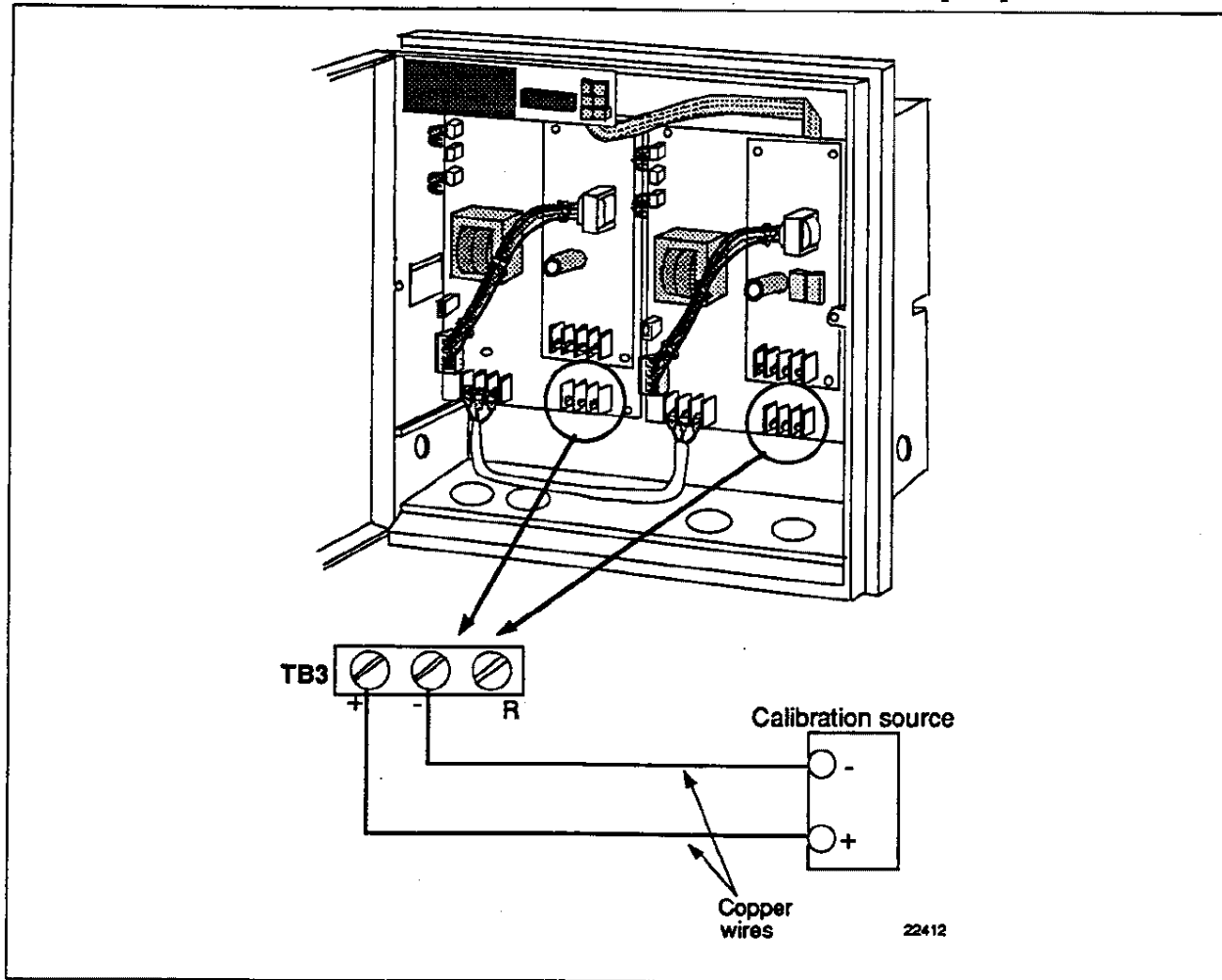
**Millivolts, Volts and Milliamp Inputs**

Refer to Figure 6-4 and wire the recorder according to the procedure given in Table 6-7.

**Table 6-7 Set Up Wiring Procedure for Millivolts, Volts, and Milliamps Inputs**

Step	Action
1	Connect the copper wire to the calibration source (see Figure 6-4).
2	Connect the other end of the copper wire to the terminals on the Main PCB for the applicable input connector (TB3).

**Figure 6-4 Calibration Set Up Diagram for Millivolts, Volts, and Milliamps Inputs**



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# Input Calibration Procedure

## Introduction

Apply power and allow the recorder to warm up for 30 minutes before you calibrate.

- Please read “*Set Up and Wiring*” before beginning the procedure.
- Make sure you have “LOCK” set to “NONE” (see *Section 4–Configuration*).
- The calibration procedure for inputs #1 and #2 are identical. The displays indicate the input number. Press **FUNC** key to change display as required (INP1 or INP2).

**CAUTION** For Milliamper inputs, be sure the current source is at zero before switching on the calibrator. Do not switch the calibrator on/off while it is connected to the recorder’s input.

## Calibration procedure sequence

The calibration procedure sequence for all inputs is listed in Table 6-8.

Table 6-8 Input Calibration Procedure Sequence


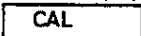


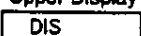




Step	Description	Press	Action/Result
1	Enter Calibration Mode	 until you see	Upper Display   Lower Display   <b>ATTENTION</b> If “CAL” doesn’t appear or prompt access is declined, check “LOCK” configuration.
			You will see: Upper Display   Lower Display 
			The calibration sequence is enabled and you will see: Upper Display   Lower Display 

Table 6-8 is continued on next page

# Input Calibration Procedure, Continued

Table 6-8 Input Calibration Procedure Sequence, continued

Step	Description	Press	Action/Result
2	Calibrate 0%	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">FUNC</div>	<p>You will see:</p> <p>Upper Display  <div style="border: 1px solid black; padding: 2px; display: inline-block; margin: 2px;">APLY</div></p>