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## WHAT IS THE DUALPRO CALIBRATION PROCEDURE?

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### ANALOG INPUT CALIBRATION

There are three analog inputs and a cold junction compensation sensor on the DUALPRO. The input level and input features for each input are determined by changeable daughter boards that are mounted piggy back on the analog input board. There are several types of input daughter boards: thermocouple input, auxiliary input, 4 to 20 mA input, 0 to 10 V linear, RTD, and slide wire input.

The standard factory configuration is for input A to be a thermocouple input, input B to be an Oxygen probe input (auxiliary input) board, and input C to be another thermocouple input. If the instrument to be calibrated does not have the standard factory configuration, then identifying the configuration is necessary so that the proper procedure for each input board can be followed.

The input daughter boards can be identified by the part number located on the circuit board. Most part numbers appear on the back of the boards. The following table lists the board type and the part number.

Board Name	Part Number	Configuration #
Thermocouple	810077	1
Carbon Probe (mV)	810076	2
Slidewire feedback	810095	3
Linear input for 10V	810147	4
4-20mA	810168	5
RTD	810155	6
02 Probe (mV)	810190	7

### CALIBRATION DISPLAYS AND KEYBOARD

When operating in the calibration mode, the displays and front panel keys take on special assignments. The PROCESS display shows the value of the input being calibrated with a flashing digit. This flashing digit shows the relative sensitivity of the arrow keys, as described following the key descriptions. The SET display shows which input is being calibrated and whether the zero value or the span value is being modified.

The SET display messages are shown below:

Message	Description
Z-A	Zero input A
Z-B	Zero input B
Z-C	Zero input C
Z-SW	Zero slide wire (from input C)
S-A	Span input A
S-B	Span input B
S-C	Span input C
S-SW	Span slide wire (from input C)

**NOTE**

It is very important to be sure the SET display is showing the proper mode before making an adjustment or the wrong value will be changed.

**ADJUSTMENT SENSITIVITY**

The adjustment sensitivity works in the following manner. If the digit farthest right in the process display is flashing, then each press of the [Up Arrow] or [Down Arrow] key will change the calibration value shown by one unit. This is the least sensitive position. If the digit farthest left is flashing, then each press of the [Up Arrow] or [Down Arrow] key will change the calibration value by a thousand units. The middle digits will show sensitivities of a hundred and ten units respectively. It is not important to know the relative worth of one calibration unit. Understanding that the location of the flashing digit affects change that one key press will make on the calibration value is necessary. By observing the degree of sensitivity one key press makes at each flashing digit location, you can quickly see how to use this feature.

1. Calibration mode is turn on by using the 4 key sequence; **Shift, Enter, Setpt, and Page Disp**, or by putting a jumper across terminals TB. D 17 & 18.

## PREPARING FOR CALIBRATION

### THERMOCOUPLE DAUGHTER BOARD CALIBRATION

#### PARTS REQUIRED

1. 1 - 0-50 millivolt dc signal (for input voltage simulation).
2. 1 - set of twisted pair copper wire (for input voltage simulation).
3. 1 - jumper (to short out the input).
4. 1 - digital voltmeter (to determine the amount of input voltage).
5. 1 - piece of thermocouple extension wire same as being used on instrument (to calibrate the cold junction compensation).
6. 1 - thermocouple input simulator (to simulate the thermocouple input readings).

#### SETUP FOR LINEAR CALIBRATION

#### NOTE

For simplicity the following procedure will be referring to input 1, this may not apply to all instrument configuration. Please substitute the appropriate input for this procedure.

1. Determine which inputs are thermocouple inputs, the part number should let you know. For example an FDP121-4.0 has a thermocouple input on input 1 and input 3.
2. Set the thermocouple input type to linear for all thermocouple board(s).

#### LINEAR CALIBRATION PROCEDURE

2. Place the jumper from pins 1 and 2 of terminal block D. (shorting input 1)
3. Place the Dualpro in calibration mode, by using the following key sequence: **Shift, Enter, Setpt,** and **Page Disp.**
4. Verify **z-a** is displayed in the **Set Window**. If **a** is not displayed press the **Shift** key until it is displayed, if **z** is not displayed press the **Enter** key until it is displayed.
5. Adjust the value in the **Process Window** to read zero ( 0 ) by using the up, down, left, and right arrow keys. The flashing digit determines the amount of adjustment. The right most digit is the least coarse, and the farther left the digit is the more coarse the adjustment gets.
6. Once zero ( 0 ) is achieved press the **Enter** key once to store the value, and go to **s-a**.
7. Remove the jumper, connect the twisted pair copper wire to the voltage simulator and connect to the instrument where the jumper was.
8. Set the simulator to 50 millivolts.
9. Adjust the value in the **Process Window** to read 2500, by using the up, down, left, and right arrow keys. The flashing digit determines the amount of adjustment. The right most digit is the least coarse, and the farther left the digit is the more coarse the adjustment gets.
10. Once 2500 is achieved, press the **Enter** key once to store the value, and go to **z-a**.
11. Follow this procedure until the input reads correctly and for any other inputs.
12. Exit calibration mode by pressing the **Setup** key.

#### SETUP FOR COLD JUNCTION COMPENSATION CALIBRATION

1. Determine which inputs are thermocouple inputs by checking the daughter board part

- numbers. For example, an FDP121-4.0 has a thermocouple input on input 1 and input 3. See table at the beginning of these procedure for configuration numbers and part numbers.
2. Set the input to the correct thermocouple type(s) for the specific board(s).
  3. Turn on the cold junction compensation for the input(s).

## COLD JUNCTION COMPENSATION CALIBRATION PROCEDURE

1. Connect the correct thermocouple extension wire to the thermocouple input simulator and the Dualpro. (terminal block D, pins 1 and 2)
2. Set the simulator for a zero value. See following table for thermocouple minimums.
3. Place the Dualpro in calibration mode, by using the following key sequence: **Shift, Enter, Setpt,** and **Page Disp.**
4. Verify **z-a** is displayed in the **Set Window**. If **a** is not displayed press the **Shift** key until it is displayed, if **z** is not displayed press the **Enter** key until it is displayed.
5. Adjust the value in the **Process Window** to read the zero value, by using the up and down, left and right arrow keys. The flashing digit determines the amount of adjustment. The right most digit is the least coarse, and the farther left the digit is the more coarse the adjustment will get.
6. Once the zero value is achieved press the **Enter** key once to store the value, and go to **s-z**.
7. Set the simulator for a span value. See table below for thermocouple maximums.
8. Adjust the value in the **Process Window** to read the span value selected, by using the up and down, left and right arrow keys. The flashing digit determines the amount of adjustment. The right most digit is the least coarse, and the farther left the digit is the more coarse the adjustment will get.
9. Once the span value is achieved press the **Enter** key once to store the value, and go to **z-a**.
10. Follow this procedure until the input reads correctly and for any other inputs.
11. Exit calibration mode by pressing the **setup** key.

### Thermocouple Calibration Chart

Thermocouple type	Zero °F	Span°F
B	200	3000
C	32	3000
E	32	1300
J	32	1300
K	32	2300
N	32	2300
NNM	32	2000
R	300	3000
S	300	3000
T	32	700

The usable ranges of the thermocouple types are shown in the table above. If having a high accuracy over a specific operating range is desirable then the input should be calibrated over that range. Follow the calibration procedure for normal calibration with the following changes. Use the low end of the desired range as the zero value and the high end as the span value.

There will be more interaction between zero and span with this method. The desired operating range must fit with the limits of the table.

## O2 AUXILIARY INPUT DAUGHTER BOARD CALIBRATION

### **PARTS REQUIRED**

1. 1 - 0-2volt dc power supply. (for input voltage simulation)
2. 1 - set of twisted pair copper wire. (for input voltage simulation)
3. 1 - jumper (to short out the input)
4. 1 - digital voltmeter. (to determine the amount of input voltage)

### **Setup For Calibration**

#### **NOTE**

For simplicity the following procedure will be referring to input 2, this may not apply to all instrument configuration. Please substitute the appropriate input for this procedure.

1. Determine which inputs are auxiliary inputs, the part number should let you know. For example, an FDP121-4.0 has an auxiliary input on input 2.
2. Set the input type to linear for the board(s).

### **CALIBRATION PROCEDURE**

1. Place the jumper from pins 4 and 5 on TB D. (shorting input 2)
2. Place the Dualpro in calibration mode, by using the following key sequence: **Shift, Enter, Setpt, and Page Disp.**
3. Verify **z-b** is displayed in the **Set Window**. If **b** is not displayed press the **shift** key until it is displayed, if **z** is not displayed press the **enter** key until it is displayed.
4. Adjust the value in the **Process Window** to read zero ( 0 ), by using the up and down, left and right arrow keys. The flashing digit determines the amount of adjustment. The right most digit is the least coarse, and the farther left the digit is the more coarse the adjustment will get.
5. Once zero ( 0 ) is achieved press the **Enter** key once to store the value, and go to **s-b**.
6. Remove the jumper, connect the twisted pair copper wire to the voltage simulator and connect to the instrument where the jumper was.
7. Set the simulator to 1.5volts dc.
8. Adjust the value in the **Process Window** to read 1500, by using the up and down, left and right arrow keys. The flashing digit determines the amount of adjustment. The right most digit is the least coarse, and the farther left the digit is the more coarse the adjustment gets.
9. Once 1500 is achieved press the **Enter** key once to store the value, and go to **z-a**.
10. Follow this procedure until the input reads correctly and for any other inputs.
11. Exit calibration mode by pressing the **Setup** key.