TECHNICAL NOTE TNPC03

TITLE: FIELD SCALING

PRODUCT(S): IRMA DC POWERED

(FOR LOOP POWERED SEE TECH NOTE TNPC04)

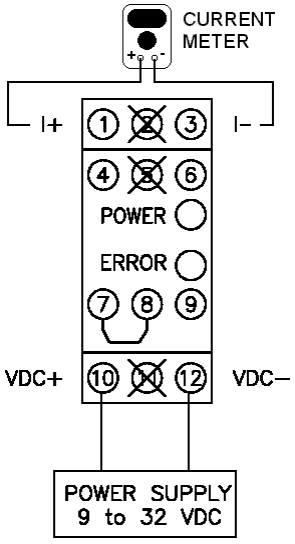
Problem Description: The expected operation of the IRMA is dependent upon completing the proper field calibration procedure. During certain steps of the calibration procedure, the input resistance must be adjusted so the output current is driven to the required 4mA or 20mA. The problem exhibited is the output stays at either 3.6mA (low end calibration) or 20.5mA (high end calibration) even as the input resistance is adjusted to fine-tune the output current for the 4mA or 20mA targets.

Cause of the Problem: It seems that too many users do not have the required adjustable resistance source to field scale the units for the required scaling points. The scaling problem arises when a potentiometer is used as a substitute for the adjustable resistance source. Obviously there is no indication of the resistance developed as the wiper is adjusted, thus an ohm meter is connected across the input and common terminals of the IRMA. Herein lies the problem. When the ohm meter is used to measure the resistance of the potentiometer as it is adjusted, it's excitation supply conflicts with the excitation supply of the IRMA. Because of this, the output rails at one end or the other and does not vary as the input potentiometer is adjusted.

Corrective Action: If an adjustable resistance source is not available and a potentiometer is substituted (which is acceptable), do not connect an ohm meter across the input and common of the IRMA. The resistance of the potentiometer's wiper must be measured and adjusted for the low end scaling point before it is connected to the IRMA. Once connected to the unit, the pot is used to fine-tune the low end scaling point. Then the potentiometer must be removed from the IRMA, readjusted for the high end scaling ohm value and then reconnected to the IRMA to complete the fine-tuning of high end scaling point.

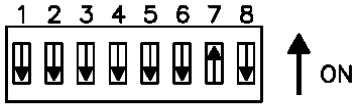
Corrective Action Implementation: The following procedure utilizes almost the entire Field Calibration procedure from the IRMA manual with only a few alterations *(italic steps)*.

For this procedure, we will use the following parameter points as an example. 4mA at 32°F and 20mA at 300°F. We require two fluke meters, one will measure the ohm value of the potentiometer and the other is connected to the 4-20mA output terminals of the IRMA. Utilizing RTD look-up tables for an RTD385, we have determined the resistance at 32°F (0°C) is 100Ω and 300°F (149°C) is 157Ω. A 1KΩ potentiometer can be used.



1.1 Connect a jumper wire between terminal #7 to terminal #8. (This connects the resistance source to the input terminals).

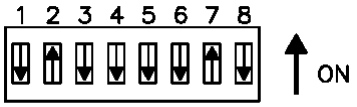
1.2 Set DIP switches #4-off, #6-off, #7-on & #8-off, which defines RTD alpha = 0.00385 and Range 2. Allow a 45-minute warm-up period.



Step 1.2

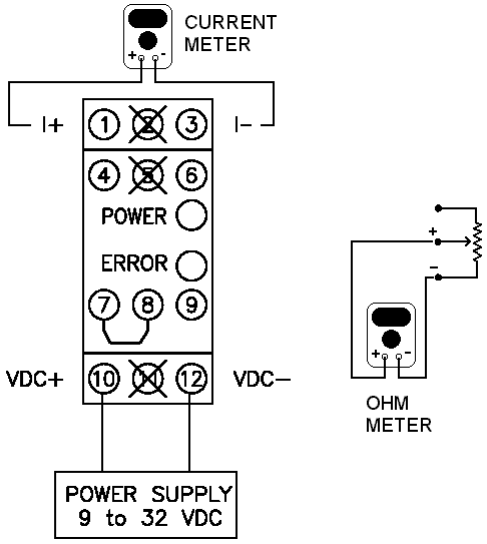
1.3 Wire *the current meter's positive lead to terminal 1 and the negative lead to terminal 3. (For loop powered IRMA, see tech note TNPC04)*

1.4 Set the FIELD CAL switch (#2) ON. (Output goes to 3.5 mA nominal)

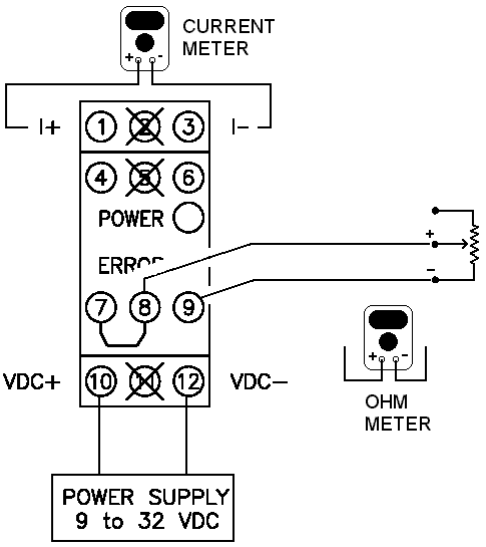


Step 1.4

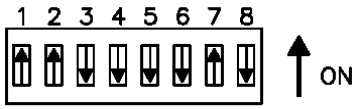
1.5 *Connect the negative probe of the ohm meter to one side of the potentiometer and the positive probe of the meter to the wiper of the pot. Adjust the pot until 100Ω is achieved (low end scaling point).*



1.6 *Carefully disconnect the pot from the ohm meter and connect to the IRMA. The wiper of the potentiometer connects to terminal 8 and the side of the pot that was connected to the negative probe of the ohm meter in Step 1.5 connects to terminal 9. (The ohm meter probes should not be connected to the IRMA).*



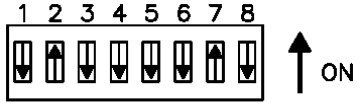
1.7 Set the OUTPUT CAL switch (#1) ON. (Output stays at 3.5 mA)



Step 1.7

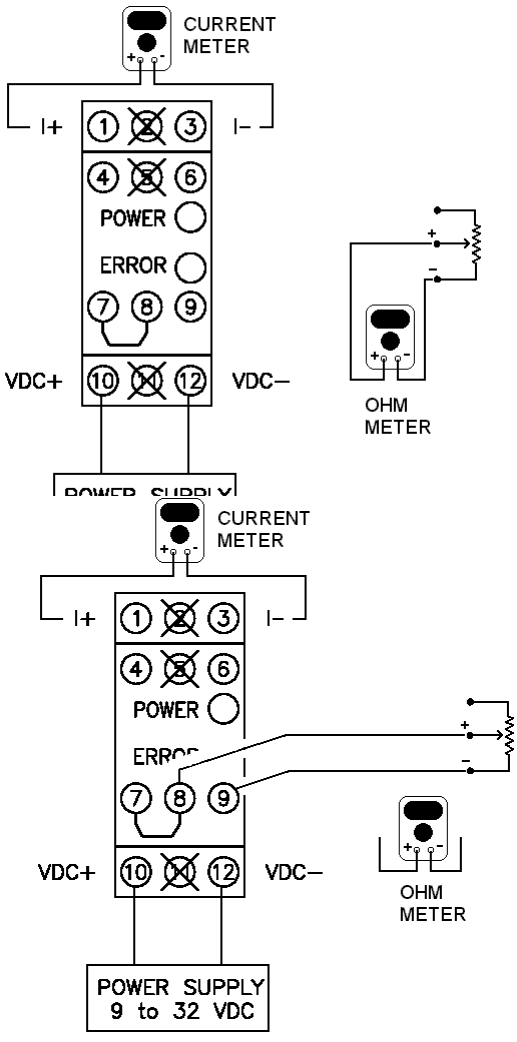
1.8 Adjust the potentiometer until the analog output equals 4 mA.

1.9 Set the OUTPUT CAL switch (#1) OFF. (Output increases to 22.5 mA).



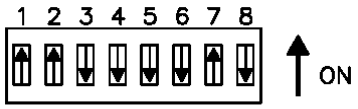
Step 1.9

1.10 *Remove the potentiometer from the IRMA and reconnect the ohm meter to the pot. Positive probe of the ohm meter to the wiper of the pot and the negative probe to the side of the pot used in Step 1.5. Adjust the potentiometer until 157Ω is displayed on the ohm meter (high end scaling point).*



1.11 *Carefully disconnect the pot from the ohm meter and reconnect to the IRMA. The wiper of the potentiometer connects to terminal 8 and the one side of the pot that was connected to the negative probe of the ohm meter in Step 1.5 connects to terminal 9. (The ohm meter probes should not be connected to the IRMA).*

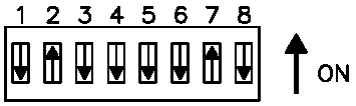
1.12 Set the OUTPUT CAL switch (#1) ON. (Output decreases to 20.7 mA).



Step 1.12

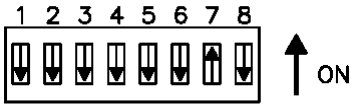
1.13 Adjust the potentiometer until the analog output equals 20 mA.

1.14 Set the OUTPUT CAL switch (#1) OFF.



Step 1.14

1.15 Set the FIELD CAL switch (#2) OFF.



Step 1.15

1.16 Disconnect the potentiometer from the IRMA and connect the actual sensor (RTD) to be used in the application. If using a 2-wire RTD, you may leave the jumper wire between terminals 7 & 8. If using a 3-wire or 4-wire RTD, the jumper wire between terminals 7 & 8 must be removed.