TECHNICAL INSTRUCTIONS FOR DataTrace®
CALIBRATION PROCEDURES

TEMPERATURE CALIBRATION

The following procedures provide instructions for performing field calibrations on DataTrace equipment. There are two types of calibrations that are possible. The first is for temperature in the Micropack III version temperature-only Tracers, and the second is for humidity in all Humidity Tracer versions.

Both procedures depend on a set of instruction screens to guide the user through the process. These screens present simple instructions to enter information and then the program automatically generates new field calibration coefficients for the target Tracer. The instruction sets for both the temperature-only and the humidity calibration procedure are very similar in order to avoid user confusion.

Normally, if the instructions are followed and the calibration environment is stable and appropriate there is no problem with the successful completion of the calibration procedure. However, if problems are encountered, you can abort the field calibration procedure at any time by clicking on Cancel.

Should you complete the field calibration procedure, and, for some reason, you are not satisfied with it, you can revert to the last factory calibration by pressing the "Reset Factory Calibration" button on the first Calibration Utility screen. The Reset Factory Calibration button removes any field calibration data from a Tracer and returns the Tracer to the last factory calibration. The button is active only if the current Tracer has been calibrated in the field. Otherwise, the button is dimmed. This procedure applies to both Temperature and Humidity Tracer field calibrations.

It is important to note that field calibration will invalidate the factory calibration certification (Report of Calibration) that was originally shipped with the Tracer. The best calibration results will be provided from a factory calibration.

TEMPERATURE CALIBRATION

The following instructions allow you to perform a temperature sensor recalibration on the DataTrace® Micropack III (MPIII) Tracer.

We recommend that a field calibration be performed on a Tracer **only** when you detect and verify a drift in it's temperature accuracy. Furthermore, there are some considerations related to the reference environment that must be adhered to. If these requirements can not be met in the field, it is best to return the Tracers to the factory for calibration and certification.

    1) The minimum calibration dwell time in a **stable** environment is 20 minutes per point. This means that the bath or isothermal block must have attained the target temperature and stay at that temperature for at least 20 minutes at each point for an acceptable calibration to be performed.

    2) The stability of the reference environment is critical to a good calibration. The field calibration requires 0.05°C environmental stability for the calibration to be completed successfully. The factory calibration stability is 0.003°C.

The DataTrace® Calibration Utility allows the user great flexibility with respect to selecting the appropriate calibration points to match the requirements of the application and also accommodate changing needs and capabilities in the future. Once the procedure is initiated, instructions must be followed explicitly to complete the calibration process successfully. However, you can abort the field calibration procedure at any time with no ill affect on the Tracer by clicking on Cancel.

The temperature calibration procedure is initiated from the Program Tracer window under the MAIN Tab of the DataTrace Control Panel. Select Calibrate Mode by clicking on that option. Calibrate Mode installs a special temperature field calibration program that is used to create, verify, and install new calibration coefficients into a temperature Tracer in either a One Point or a Two Point Calibration cycle. The calibration process starts when the Program button is pressed. However, the field calibration procedure's operator screens will not appear until the Tracer is retrieved from the reference environment and then read in the Calibration Utility.

A One or Two Point Calibration optimizes a Tracer to a particular process or application. In most cases it is best to perform a two point field temperature calibration. In a two point calibration plan for the lower target calibration temperature to be 10°C below the lowest process temperature and the higher temperature should be 10°C above the highest process temperature. As a rule of thumb, do not use a two point calibration where the range of interest is less than 75°C. For this small of a range, use a one point calibration where the critical target temperature value is defined to "focus" the calibration on that critical temperature. If a two point calibration with a range less than 20°C is attempted a Range Error will be generated and the calibration will be aborted.

Procedure For a One or Two Point Temperature Calibration

The procedure for a One or Two Point Calibration is virtually the same. The primary difference is that for a two point calibration you must be prepared to expose the target Tracer to two temperature environments during the process, and the Calibration Utility will request information on two references rather than just one. The appropriate steps are listed in the following section of this document.

1) Select the Calibrate Mode option on the Program Tracer screen. The temperature calibration procedure starts by automatically programming the Tracer with a special program called "CALBRATE". (Note the missing "i" in calibrate.) Press the Program button.

   When initiated, a dialog box appears, stating that the calibration program has been loaded into the Tracer and that the Tracer must be placed into the appropriate reference environment(s). Do this as soon as possible as the Tracer starts taking readings once each minute beginning at the time it was programmed.

   If a two point calibration is being performed, allow sufficient time to transfer the target Tracer between the two reference environments and/or to allow the first bath to stabilize at the second point.

   Note that a calibration requires at least 20 minutes in a stable environment for each point. It is always best to error on the side of allowing too much time rather than too little.

2) Place the target Tracer into the selected calibration reference environment for the specified amount of time.

   Please note the reference temperature value(s) used and the time when each target reference temperature is attained and is stable. It is a good idea to write these values down so they are not forgotten.

   Retrieve the target Tracer from the reference environment after the required minimum stabilization time. Prepare to read the Tracer.

3) Go to the UTILITIES Tab of the DataTrace Control Panel, then click the Calibration Utility button. Place the Tracer in the PC Interface and press the Read Tracer button.

4) On the Calibration Information screen, select the type of field calibration, either a One Point or a Two Point. Select either the One Point or the Two Point option.

5) You will note two text boxes titled "When the Tracer's X reading was:" which include a listing of the data collected during the field calibration run. Depending on your previous entry defining the number of points, either the first or both text boxes will contain entries.

Skip down to the next text box(es) titled "It should have read:" and enter the reference value(s) from the environment(s) that you placed the Tracer into.

6) Now select from the data listing in the first text box the temperature value that is closest to the time that the Reference value(s) entered above were determined. Click on that value to highlight it. If this is a two point field calibration, do the same for the second point.

7) Drop down to the last text box(es) and enter the references' identifying Lot # or Certification #. This data is used to document the calibration and will be stored in the Calibration History log located under the REPORTS Tab of the DataTrace Control Panel. Click Next.

8) On the second screen a summary appears that displays the results of the field calibration procedure. The first value is the reference that the field calibration was performed in. The second item in the list is the value that you selected as the most appropriate value from the Tracer's collected data. Next, the difference between the first two values is calculated and displayed. The Corrected Value is the new value following the field calibration. Lastly, the value that the last factory calibration would have reported is displayed. All of this information is also logged into the Calibration History log under the REPORTS Tab.

Calibration

Reading 1

Rerference Value
-20.000

As Found
-19.9813

Difference
0.01870918273

Corrected Value
-20.000000000

Factory Reading
-19.9812908

Reading 2

Rerference Value
140.000

As Found
139.8664

Difference
-0.1335754394

Corrected Value
140.000000000

Factory Reading
139.8664246

Previous | Next | Finish | Cancel

M3T11885

9) On the Finish screen of the field calibration procedure, you may enter any comments you would like in the space provided. The program enters the Operator's Name automatically for documentation purposes. You may edit this if you wish.

You can also elect to have a calibration report generated for this Tracer. This report displays a summary of this Tracer's field calibration procedure; it is not the same as the Report of Calibration supplied following a factory calibration.

Calibration

Finish!

Do not remove Tracer from PC Interface until after you press the Finish button.

Comments

Operator Name

Dave Price

☐ **Print Report of Calibration**

Previous | Next | Finish | Cancel

M3T11885

10) The temperature field calibration procedure is now complete. Press Finish. A calibration complete message will appear, press OK. Please note the warning about removing the Tracer from the PC Interface before pressing the Finish button. The field calibration procedure is not complete until the Finish button is pressed and the Calibration Complete message appears.

If, for some reason the completed field calibration needs to be removed, you can restore the last factory calibration by placing the Tracer in the PC Interface and then start the Calibration Utility. At the bottom of the first calibration screen there is a Restore Factory Calibration button. When this button is clicked, the field calibration is removed and the last factory calibration is restored.