

9782 Conductivity / Resistivity Calibration

8.1 Overview

Introduction

Each type of cell has an associated cell constant entered during I/O setup (see Section 5 of manual). This number is part of the cell model number. However, for greater precision, every Honeywell cell is individually tested at the factory, and a calibration factor unique to that cell is determined. The cal factor for a cell can be found on the plastic tag hanging from the cell lead wires. Instructions for entering this cell cal factor are in 8.3.

For some conductivity applications even greater accuracy is required. For those applications it is possible to perform a calibration trim procedure. The Analyzer/Controller's reading can be adjusted while the associated cell is measuring a reference solution of known conductivity, as described in 8.4. The same procedure can be used to adjust the Analyzer/Controller's reading while the cell is in the process, if a reference instrument is used to determine the conductivity of the process. In this case the process fluid becomes the "reference solution".

Calibration trim can be removed as described in 8.5

ATTENTION

Any time a cold reset is performed, the calibration trim and TDS values will be removed. The cal factor will be reset to match the cell constant.

What's in this section?

The topics in this section are listed below.

| Topic | See Page |
|--|----------|
| 8.1 Overview | 8-1 |
| 8.2 Recommendations for Successful Measurement and Calibration | 3 |
| 8.3 Entering the Cal Factor for Each Cell | 4 |
| 8.4 Performing Calibration Trim | 5 |
| 8.5 Removing Calibration Trim Values | 7 |
| | |

Calibration menu customized for different configurations

The choices available on the menu displayed when CALIBRATION is selected from the main menu depend on the choices made for solution temperature compensation during I/O setup (see Step 13 in Table 5-1).

If neither cell's solution temperature setup uses total dissolved solids (TDS), then the calibration menu contains the following choices:

CELL CAL FACTOR
CAL TRIM C1
CAL TIRM C2
REMOVE CAL TRIM C1
REMOVE CAL TRIM C2

If the Cell 1 solution temperature compensation is set up without TDS, and Cell 2 with TDS, then the calibration menu will be:

CELL CAL FACTOR
CAL TRIM C1
TDS CVSN FACTOR C2
REMOVE CAL TRIM C1
REMOVE CAL TRIM C2

If both cells' solution temperature compensation is set up with TDS, then the calibration menu will be:

CELL CAL FACTOR
TDS CVSN FACTOR C1
TDS CVSN FACTOR C2
REMOVE CAL TRIM C1
REMOVE CAL TRIM C2

Therefore, the screens on your unit may not match exactly the calibration menus used in the procedure tables in this section.

8.2 Recommendations for Successful Measurement and Calibration

Selection and care of cell essential

Successful measurements and calibration depend upon selection and care of the cells. Always prepare cells and their mountings in accordance with the instructions supplied with them, observing temperature, pressure and flow limitations.

Recommendations

Note the following recommendations:

- For most accurate temperature measurement and compensation, insulate the outer body of the cell to minimize the effect of ambient conditions on process temperature measurement.
- Rinse the cells thoroughly with de-ionized water before immersing in a reference solution.
- Always deactivate control or alarm circuits before removing cells from the process.
- Do calibration trim with a reference solution which is at about the same temperature and conductivity as the process solution.
- Inspect and, if necessary, clean the cells periodically according to experience and conditions.

ATTENTION

For successful measurement in pure water applications where plastic piping is used, you may have to provide an earth ground for the cell. If the cell constant is 0.01, 0.1, or 1.0, run a wire from the black electrode terminal of the cell to the lower card retainer bracket screw. Do not ground cells having cell constants of 10, 25, or 50.

8.3 Entering the Cal Factor for Each Cell

Introduction

Each type of cell has an associated cell constant; this number is part of the cell model number. The constant for each cell is entered during I/O setup. However, for greater precision, every Honeywell cell is individually tested at the factory, and a calibration factor unique to that cell is determined. The cal factor for a cell can be found on the plastic tag hanging from the cell lead wires.

ATTENTION

Any time you replace a cell, even with another cell of the same type, enter the cal factor for the replacement cell.

Procedure

To enter the cal factor for each cell, follow the procedure in Table 8-1.

Table 0-1 Procedure for Entering Cal Factor

| Step | Screen | Action |
|------|---|---|
| 1 | <pre> MENU CONFIGURATION CALIBRATION MAINTENANCE I/O SETUP DIAGNOSTICS </pre> | <p>Go to CALIBRATION CELL CAL FACTOR.</p> <p>The cell constant entered for each cell during I/O setup will be displayed.</p> <p>To enter the unique cal factor for each cell, use the indicated function key to go into edit mode.</p> |
| | <pre> CALIBRATION CELL CAL FACTOR CAL TRIM 1 CAL TRIM 2 REMOVE CAL TRIM C1 REMOVE CAL TRIM C2 DIAGNOSTICS </pre> | |
| 2 | <pre> CELL CONSTANTS C1 10.0 C2 10.0 DIAGNOSTICS NEXT </pre> | <p>The current cell constant for each cell will be displayed. This information is read-only.</p> <p>To change the values, use the function key labeled "NEXT". To exit, use the MENU key.</p> |
| 3 | <pre> EDIT CELL CAL FACTOR C1 10.101 C2 09.955 DIAGNOSTICS DPP <-- --> </pre> | <p>For each cell, enter the cal factor found on the plastic tag hanging from the cell leads.</p> |

8.4 Performing Calibration Trim

Introduction

For most applications entering the cal factor for each cell will achieve satisfactory system performance. However, it is possible to perform a calibration trim procedure in which the Analyzer/Controller and cell combination are used to measure a reference solution of known conductivity; the reading of the Analyzer/Controller is adjusted to match.

The same procedure can be used to adjust the Analyzer/Controller's reading while the cell is in the process, if a reference instrument is used to determine the process conductivity. In this case, the process fluid becomes the "reference solution".

Materials and procedure

To perform calibration trim using a standard reference solution, follow the instructions in Table 8-3.

Materials required are:

- A reference solution of known conductivity near the point of interest, with the temperature controlled (or measured and compensated) to within ± 1 °C. Conductivities of potassium chloride solutions are provided in Table 8-2. Solutions must be prepared with high-purity de-ionized, CO₂-free water, and dried potassium chloride.
- A container for the reference solution, large enough to immerse the cell to measuring depth.
- De-ionized water to rinse the cell.

Table 0-2 Conductivity of Potassium Chloride Solutions at 25 °C

| Concentration M* | Conductivity (microsiemens per cm) |
|------------------|------------------------------------|
| 0.001 | 147.0 |
| 0.005 | 717.8 |
| 0.01 | 1,413 |
| 0.02 | 2,767 |
| 0.05 | 6,668 |

* M = Molarity; 1M = 74.555g potassium chloride per liter of solution

Table 0-3 Procedure for Performing Calibration Trim Using a Reference Solution

| Step | Screen | Action |
|------|--|--|
| 1 | <pre> MENU CONFIGURATION CALIBRATION MAINTENANCE I/O SETUP DIAGNOSTICS </pre> | Prepare container of the reference solution. |
| 2 | <pre> CALIBRATION CELL CAL FACTOR CAL TRIM 1 CAL TRIM 2 REMOVE CAL TRIM C1 REMOVE CAL TRIM C2 DIAGNOSTICS </pre> | Go to CALIBRATION CAL TRIM C 1 . |
| 3 | <pre> CAL TRIM PUT C1 IN REFERENCE SOLUTION ATTENTION WAIT FOR STABLE READING! DIAGNOSTICS PREV NEXT </pre> | <p>Remove the cell from the process.</p> <p>Rinse the cell thoroughly with de-ionized water.</p> <p>Immerse it in the reference solution.</p> <p>Go to the next screen.</p> |
| 4 | <pre> CAL TRIM C1 147.00 µS DIAGNOSTICS </pre> | <p>The display will show the conductivity of the reference solution as measured by the cell and Analyzer/Controller system.</p> <p>Once the reading is stable, change the value to match the actual conductivity of the reference solution at its current temperature.</p> <p>Press ENTER to save the calibration trim value. If the calibration trim adjustment is successful, the calibration menu will again be displayed.</p> <p>Return the cell to the process and go to Step 6.</p> |
| 5 | <pre> CAL TRIM C1 147.00 µS CAL ADJ FAILED </pre> | <p>If the attempted calibration trim is greater than the allowable adjustment limit, the operation will not be successful. The CAL TRIM display will remain on the screen and an error message will be displayed on the alarm stripe.</p> <p>Check the cell and replace if necessary.</p> |
| 6 | | After successful calibration, repeat the operation for the other cell. When calibration trim has been completed for both cells, return to the main menu. |

8.5 Removing Calibration Trim Values

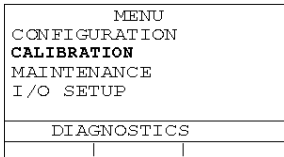
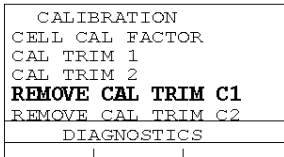
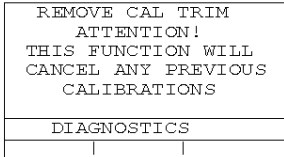
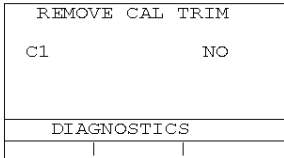
Introduction

If the calibration is suspect, or if the system operation is being checked using a reference resistor as described in Appendix D, remove the calibration trim. The Analyzer/Controller will go back to using the cal factors entered as described in 8.2.

Procedure

To remove the calibration trim value for each cell, follow the procedure in Table 8-4.

Table 0-4 Procedure for Removing Calibration Trim Values

| Step | Screen | Action |
|------|--|---|
| 1 |   | Go to CALIBRATION REMOVE CAL TRIM C1 . |
| 2 |  | A calibration trim message will be displayed. Go to the next screen. |
| 3 |  | To specify that you want to remove the trim for the cell, change the NO to YES. To execute the removal, press ENTER . To exit the screen without removing the calibration trim values, press the MENU key. Select "REMOVE CAL TRIM C2" from the Calibration Menu and repeat the procedure to remove the calibration trim for Cell 2. |