Verifying the Calibrators Conductivity Calibration Module

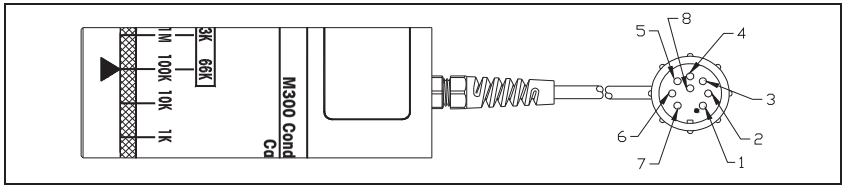
The M300 Conductivity Calibration Module should be returned to Mettler Toledo Thornton periodically for “NIST Traceable” re-calibration. If desired it can be checked on site. A precision "NIST Traceable" resistance meter is needed to perform the verification. Each calibrator consists of nine precision resistors: six for the resistivity signal and three for the temperature signal.

Verify the Resistance Signal:

1. Connect one lead of the ohmmeter to pin #1 of the calibrator.
2. Connect the other lead of the ohmmeter to pin #6 of the calibrator.
3. Set the knob to a specific resistance value and measure the resistance. Compare the ohm meter reading to the actual value printed on the calibrator label.
4. Repeat for the other resistance ranges.

Verify the Temperature:

1. Connect one lead of the ohmmeter to pin #4 of the calibrator.
2. Connect the other lead of the ohmmeter to pin #6 of the calibrator.
3. Set the knob to a specific temperature value and measure the resistance. Compare the ohmmeter reading to the actual value printed on the calibrator label.



If the calibrator is within performance limits (±0.1% for conductivity, ±0.5 ohms for 1K temperature, +/- 1.5 ohms for 3K temperature and +/- 0.325% for 66K temperature), a verification label can be applied to the calibrator to show the last verification date.

Limited Warranty

Mettler-Toledo Thornton, Inc. warrants products it manufactures against defects in materials and workmanship for 12 months from the date of shipment from Thornton. Items returned for warranty must be properly packaged, shipped prepaid and insured, and be accompanied by a Return Materials Authorization Number assigned by Thornton Customer Service.

Mettler-Toledo Thornton, Inc.
900 Middlesex Turnpike, Billerica, MA 01821 USA
Tel. +1-781-301-8600, Fax +1-781-271-0214
Toll Free +1-800-510-PURE (US and Canada only)
thornton.info@mt.com

OM84495 Rev.D 05/14

www.mt.com/thornton

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INSTRUCTION MANUAL
M300 Conductivity Calibration Module used with M300 Conductivity/Resistivity Measuring Systems

PN 58 082 300

The Mettler Toledo Thornton M300 calibration module performs a meter calibration without removing the instrument from the installation and without any additional equipment. The complete calibration process takes only a few minutes with minimal operator involvement. The accuracy of the Mettler Toledo Thornton calibration module can be traced to NIST (National Institute of Standards and Technology) standards. A simple test and verification procedure can be performed periodically to verify that each resistance value has maintained its accuracy.

M300 Conductivity Calibration Module Structure

The M300 Conductivity/Resistivity instruments have 5 resistance range circuits and 1 temperature circuit that require individual calibrations. Each resistance range circuit requires a 2-point calibration; the temperature range requires a 3-point calibration. The M300 Conductivity Calibration Module is designed to fully calibrate all resistance and temperature circuits. See the table on page 2 for the resistance and temperature ranges.

Verification/Calibration

NOTE: the M300 will not give direct readings of calibrator values in the normal measuring mode.* The Verify mode should be used for accuracy verification.

The M300 instruments provide one or two independent measurement channels which must be calibrated separately. To assure that the electronic circuitry has reached a stable operating temperature, power the instrument at least two hours prior to calibration. The procedure is initiated by disconnecting the cell on one channel and installing a calibrator.

Verification

1. Press the Cal key. The meter will read "Calibrate Sensor".
2. If using a single channel model, skip steps 3 and 4.
3. If using a multi channel model, press the right arrow key until the “Channel A” field flashes.
4. Press the up arrow to select desired channel.
5. Press the right arrow key until “Conductivity” flashes.

6. Press the down key until “Verify” flashes.
7. Press the ENTER key.
8. Compare the readings on the display to the values on the M300 Calibrator label. Verify all ranges. If measurements are noisy, take the average of several readings for comparison.
9. If the instrument reading is within ±0.5% of the values for the resistance and temperature listed on the calibrator, the instrument is within proper calibration. However, a calibration may be performed to "fine tune" the instrument.
10. Repeat this procedure for the other channel if available.

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* If you wish to obtain direct readings with calibrators in the normal measuring mode, it is necessary to select "None" for (temperature) Compensation and set the cell constants and temperature factors to “M” = 1.0000 and “A” = 0.0000 for the channel to be verified. After verification, set the Compensation and cell constant and temperature factors back to the settings for the particular sensor connected.

Instrument Calibration

Complete calibration covers the following ranges and resistance points.

Range:	Point 1	Point 2	Point 3
Resistance 1	1.0 Mohms	10.0 Mohms	–
Resistance 2	100.0 kohms	1.0 Mohms	–
Resistance 3	10.0 kohms	100.0 kohms	–
Resistance 4	1.0 kohms	10.0 kohms	–
Resistance 5	100 Ohms	1.0 kohms	–
Temperature	1000 Ohms	3.0 kohms*	66 kohms*

* Not used for conductivity sensor Pt1000 RTDs

To perform a calibration, press the *Cal* key on the M300. The display will show the following:

Calibrate ***Sensor***
Channel A Conductivity ↑

Use the up arrow key to toggle to:

Calibrate ***Meter***
Channel A Resistance 1 ↑

You may now choose which channel of the meter to calibrate by pressing the right arrow key until “Channel A” flashes. Press the up arrow key to select the desired channel. Mettler-Toledo Thornton recommends that both channels be calibrated unless verification shows the channels to be within specification.

Press the ENTER key.

Point1 = **1**.0000 MΩ
R1 = X.XXXX MΩ ↑

Set the dial on the M300 Calibrator to the 1M Resistance position and using the arrow keys, edit the Point1 value to equal the actual resistance value on the label of the M300 Calibrator.

Wait for the R1 value to stabilize and press the Enter key.

Point2 = **1**0.000 MΩ
R2 = X.XXXX MΩ ↑

You are now ready to calibrate the second point of Resisistance1. Set the dial on the M300 Calibrator to the 10M Resistance position and using the arrow keys, edit Point2 value to equal the actual resistance value on the label of the M300 Calibrator.

Wait for the R2 value to stabilize and press the Enter key.

Save Calibration **Yes**
Press ENTER to Exit ↑

Press the ENTER key.

You have now successfully completed calibration of the resistance1 range

Repeat the above procedure for resistance ranges 2, 3, 4, 5 and Temperature range.