

SOP Temperature Calibration of Halogen Moisture Analyzer

Applicable for HR / HG / HB / MJ Moisture Analyzers



General

For standardized and repeatable temperature calibration or adjustment of a Halogen Moisture Analyzer, the manufacturer's temperature calibration kit must be used (METTLER TOLEDO's Temperature Calibration Kit HA-TCC: Order No. 00214528). The kit contains a black disk which is used to simulate the surface of a sample. The black color provides a reference with maximum radiation absorption which hence has high sensitivity to changes in the system. This is best for achieving high repeatability and reproducibility of the calibration. The temperature of a sample during a measurement depends on its absorption characteristics and therefore may differ from the temperature measured on the black disk.

Influencing Factors to be considered for Temperature Calibration

The factors described below are potential sources of error which may influence the temperature calibration and could cause deviations in the accuracy, repeatability and reproducibility. It is recommended to avoid or minimize these influences. If they cannot be eliminated, make sure that they are at least the same or similar to those present during routine operation of the Moisture Analyzer.

Influences from HR/HG/HB/MJ Halogen Moisture Analyzer



	Impact
<ul style="list-style-type: none"> • The unit must be installed and ready for routine operation <ul style="list-style-type: none"> – Acclimatized to room temperature – Left on power for a sufficient period of time (minimum 1 hour) 	medium
<ul style="list-style-type: none"> • The heating compartment has cooled down (heating has not been used for 1 hour) 	big
<ul style="list-style-type: none"> • The heating system is clean and has no damage <ul style="list-style-type: none"> – The reflector is not damaged or dirty (small spots or damages below 2mm diameter are accepted) – The temperature sensor is clean – The protective glass is clean 	big
<ul style="list-style-type: none"> • The draft shield is installed 	medium

Influences from Temperature Calibration Kit



	Impact
<ul style="list-style-type: none"> • Always store Temperature Calibration Kit in its original box 	–
<ul style="list-style-type: none"> • Always use kit with handler 	medium
<ul style="list-style-type: none"> • Make sure that the temperature is read out correctly <ul style="list-style-type: none"> – 1 dash of the scale represents 2 °C – Make sure that the needle of the instrument has no hysteresis <ul style="list-style-type: none"> • To avoid, knock gently on the instrument before kit placing it into the instrument for adjustment – Make sure that no parallax error is made by placing the eye straight (90°) above the arrow. Reading from sideways may cause deviations in temperature reading 	medium
<ul style="list-style-type: none"> • Handle the Temperature Calibration Kit gently and put it back into storage box after cooling down completely 	–
<ul style="list-style-type: none"> • Use only a Temperature Calibration Kit with calibration certificate to improve accuracy and assure traceability. Re-calibrate it in regular intervals 	medium
<ul style="list-style-type: none"> • Any damage, which might have affected the Temperature Calibration Kit, should trigger an immediate re-calibration. METTLER TOLEDO's calibration services will give advice on this 	–
<ul style="list-style-type: none"> • Do not scratch the surface of the black disc or apply any sticker on the Temperature Calibration Kit 	–

Influences from Environment

	Impact
<ul style="list-style-type: none"> • Make sure the environmental temperature is within required range (5 °C – 40 °C) 	small
<ul style="list-style-type: none"> • Make sure the temperature calibration is performed at place of use under working conditions (e.g. if unit is running in a safety enclosure, the fan should be on same level and the door of the safety enclosure in the same position, as during routine operation) 	big

Influences from Procedure	Impact
<ul style="list-style-type: none"> Read out the temperature always after same heating time. Each test point should be read out after 15 minutes heating. That means 100 °C after 15 minutes and 160 °C after further 15 minutes 	small
<ul style="list-style-type: none"> Use corrected value of temperature reading only. Calculate the deviation from calibration kit certificate into the read out. Calculation scheme: $T^{\circ}_{\text{kit}} - T^{\circ}_{\text{dev.}} = T^{\circ}_{\text{actual}}$ <ul style="list-style-type: none"> T°_{kit} = Displayed value of temperature calibration kit $T^{\circ}_{\text{dev.}}$ = Kit deviation noted in certificate of temp. calibration kit $T^{\circ}_{\text{actual}}$ = Actual temperature 	medium
<ul style="list-style-type: none"> To assure traceability, report all calculation steps to the record <ul style="list-style-type: none"> Calculation Example: $T^{\circ}_{\text{kit}} - T^{\circ}_{\text{dev.}} = T^{\circ}_{\text{actual}}$ <ul style="list-style-type: none"> T°_{kit} = Displayed value of temperature calibration kit (e.g. 100 °C) $T^{\circ}_{\text{dev.}}$ = Kit deviation noted in certificate of temp. calibration kit (e.g. -2 °C) $T^{\circ}_{\text{actual}}$ = Actual temperature Example: $100\text{ °C} - [-2\text{ °C}] = 102\text{ °C}$ 	medium

Calibration Procedure

Preparation

- Make sure that conditions listed under "Influencing Factors to be Considered for Temperature Calibration" are respected
- Make sure that the sensitivity test (if applicable) is performed before the temperature test to avoid long cooling down time

Test Procedure

- Start the test of the heating module according to the description in the operating instructions.
 - HB43/HB43-S, (MJ33, HR73) and HG53 Moisture Analyzers do not have a calibration (test) function – only adjustment. To be able to perform a calibration, start an adjustment, note the values and after the last calibration point at 160 °C do not confirm the values but abort the adjustment. For HB & MJ simply open the lid, for HR73 & HG53 cancel the adjustment
- Remove the sample pan and the sample pan holder
- Place the Temperature Calibration Kit together with the handler
- Start the temperature calibration / adjustment
- Wait 15 minutes until the moisture analyzer gives a signal (beep) to read out
- Read stable value 1
 - Read value from the temperature gauge at the kit
 - Record value and mark it as "displayed value from temp. cal. kit"

- Calculate correct value by adding or reducing deviation reported in HA-TCC Calibration Certificate (follow calculation scheme noted above)
- Record the corrected value and mark it as “corrected value”
- Key in the “corrected value” into instrument memory
- Start next cycle for temp 2
- Wait 15 minutes until moisture analyzer gives a signal (beep) to read out
 - Read value from the temperature gauge at the kit
 - Record value and mark it as “displayed value from temp. cal. kit”
 - Calculate correct value by adding or reducing deviation reported in HA-TCC Calibration Certificate
 - Record the corrected value and mark it as “corrected value”
 - Key in the “corrected value” into instrument memory
- **HB, MJ, HR73 & HG53** proceed as follows
 - If values are within tolerance cancel adjustment
 - If Values are out of tolerance, proceed adjustment

Note:

Every adjustment requires a calibration (after let cooling down the unit) to assure the adjustment was successful.

- **HR83 & HG63** proceed as follows
 - If values are within tolerance, finish calibration
 - If values are out of tolerance, finish calibration and proceed adjustment
 - Repeat calibration after cooling down the system

Evaluation

- Evaluate whether “corrected values” exceed the defined “Warning Limits”¹⁾
- Evaluate whether the “corrected values” exceed the defined “Control Limits”²⁾

Deviation

Warning Limit¹⁾ (where defined)

- If a warning limit is exceeded, communicate this to the laboratory supervisor or the person responsible for the moisture analyzer
 - **HR83 & HG63**
Let the moisture analyzer cool down, perform the temperature adjustment, let the moisture analyzer cool down and repeat the calibration
 - **HB, MJ, HR73 & HG53**
Turn calibration into adjustment by not aborting the adjustment. Let the moisture analyzer cool down and repeat the calibration
- If a warning limit is still exceeded, report this to the laboratory supervisor or the person responsible for the moisture analyzer. Optionally, contact METTLER TOLEDO’s service organization for advice

Control Limit²⁾

- If a control limit is exceeded, communicate this to the laboratory supervisor or the person responsible of the moisture analyzer
- Label the moisture analyzer as “out of control limits”
- Contact METTLER TOLEDO service organization for support

¹⁾ – Values within the warning limit require no action.
– Values between the warning and control limit are within the tolerance but must be kept under surveillance.

²⁾ – Values within the control limit, see ¹⁾
– Values beyond the control limit show that moisture determination process is no longer under control and immediate action is therefore required.

Recommended Warning and Control Limits for Temperature Calibration

Moisture Analyzer	HR/HG	HB/MJ
Warning Limit	$\pm 3\text{ }^{\circ}\text{C}$	$\pm 3\text{ }^{\circ}\text{C}$
Control Limit	$\pm 5\text{ }^{\circ}\text{C}$	$\pm 5\text{ }^{\circ}\text{C}$

Required Temperature Calibration Kit:

HR/HG/HB/MJ: certified Temperature Calibration Kit (HA-TCC), Part No.: 00214528

www.mt.com/moisture

For more information

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Subject to technical changes

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