



# STANDARD OPERATING PROCEDURE

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CALIBRATION OF THE EMTEK R2S/RCG SAMPLING ASSEMBLIES

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PURPOSE

To describe the calibration procedure of the EMTEK, LLC (EMTEK) Remote-Slit-Sampler (R2S) and Remote Compressed Air/Gas – Confined Space Sampling assemblies. This equipment collects viable airborne microorganisms.

SCOPE

This procedure applies to EMTEK R2SC.28 Air Sampler Controller, in conjunction with Air Sampler Model#’s R2SC.R2S.28, and R2SC.RCG.28.

RESPONSIBILITIES

It is the responsibility of all Calibration Personnel to adhere to the methods described in this procedure when performing the calibration of the EMTEK R2S or RCG Sampling Assemblies.

SAFETY

- All Standard Electrical Safety Procedures shall be followed.
- Observe all Manufacturer’s Safety recommendations.

GENERAL

- It is suggested that R2S and RCG Sampling Assemblies be calibrated a minimum of every six (6) months, but a twelve (12) month calibration cycle is acceptable.
- Coordinate the calibration of the R2S or RCG Sampling Assembly with the appropriate department before removing the instrument for calibration.

CALIBRATION EQUIPMENT

- Calibrated Mass Flow Meter:  
Manufacturer: Top Track                      Model: 822-13-OV1-PV1-V1  
Range: 0 to 40 SLPM                      Accuracy: ±1.5% of Full Scale
- Calibrated Timer or Stopwatch:  
Manufacturer: VWR                      Model: 62344-880  
Range: 0.01Sec to 99Hrs                      Accuracy: 0.001% @ 25°C
- Calibrated Thermometer (not required):  
Manufacturer: Extech                      Model: 421305  
Range: -50°C to 1300°C                      Accuracy: ±0.3% Reading ±1°C
- Turntable Rotation Distance Indicator:  
Manufacturer: EMTEK                      Model: TRDI.001  
Range: 0 to 360°                      Increments: 2.5°
- Sample Conduit Adapter: Stopper (e.g., rubber, silicon) and tubing assembly, or comparable.

Notes:

- Calibrated equipment of equivalent or greater accuracy may be used.
- Standards used shall have the necessary Accuracy, Range, Resolution and Test Ratio to transfer the measurement to the test instrument.
- Test Instruments shall be recalibrated/recertified within appropriate time periods, to NIST Traceable Standards, or other appropriate standards.



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## PROCEDURE

### 1. Calibration Set Up:

1.1 Using the Thermometer Standard, verify the temperature of the room in which calibration is to be performed. It is strongly suggested, but not required, that the calibration be performed in the temperature range of 15-to-25° C. If the temperature is monitored, document the test environment (room) temperature on the Calibration Report Form as “Testing Performed @ \_\_\_\_\_°C.”

1.2 Document the following applicable information on the Calibration Report Form, in the appropriate locations:

- Calibration Test Reference Code (as described in the example below):

-R2S.Date Tested(MMDDYY Format).Calibration Priority on that day.

Example: R2S.010198.5 = Fifth unit Calibrated on January 1, 1998

- Manufacturer
- R2SC Model No. (R2SC.28)
- R2S or RCG Model No. (R2SC.R2S.28, R2SC.RCG.28.)
- Reason for Calibration (Scheduled, New Equipment, etc.)
- R2SC (Sample Controller) Serial Number
- R2S or RCG Serial Number
- Recommended Calibration Interval (6 or 12 months)
- Date of Calibration
- Next Scheduled Calibration (date) (6 or 12 months from date calibrated)
- Standard Equipment Calibration Data (Timer, Flow Meter)
  - Manufacturer
  - Model Number
  - Serial Number
  - Last Calibration Date
  - Next Scheduled Calibration Date

1.3 Plug the mass flow meter in and allow it to equilibrate for approximately 15-minutes prior to testing.

## 2. Checking Sample Flow Rate:

- 2.1 Set up the R2S/RCG Sampling Assembly and perform the following calibration and documentation steps with the Standard 6 or 12 feet of vacuum tubing, or other desired length of tubing with which the R2S will be operated, to determine the rotometer flow rate settings required to achieve 60 SCFH (28.3 SLPM) at the R2S/RCG sample conduit.
  - 2.1.1 Connect the standard mass flow meter to the R2S/RCG sample conduit located at the top of the R2S/RCG dome using the sample conduit adapter (rubber stopper and tubing for R2S, Sanitary Fitting for RCG). Ensure the adapter is tightly seated in the sample conduit, or sanitary fitting.
  - 2.1.2 Turn the unit vacuum pump on and adjust the airflow by means of the R2SC rotometer control valve so the flow rate on the mass flow meter shows 28.3 SLPM.
  - 2.1.3 Document the flow in SLPM, as depicted on the standard flow meter display, on the Calibration Report Form under “AS FOUND”(SLPM).
  - 2.1.4 Multiply “AS FOUND” SLPM x 0.03531 x 60 to convert to SCFH and document on the Calibration Report Form under “AS FOUND” (SCFH).
  - 2.1.5 Document the flow rate indicated on the Rotometer in when the flow meter indicates 28.3 SLPM under “AS LEFT” (Required Flow to Achieve 60 SCFH).
  - 2.1.6 Record the result on the Calibration Report and the length of vacuum tubing tested.
- 2.2 If the unit has been previously calibrated, determine if the unit is operating within performance tolerance by comparing flow rate results for the specified tubing length to the previous calibration report.
  - 2.2.1 The performance tolerance for the flow rate is  $\pm 5$  SCFH.
    - 2.2.1.1 If the flow rate is within this range the unit passes the calibration.
    - 2.2.1.2 If the flow rate is outside of the this range the unit fails the calibration.
  - 2.2.5 Document the “Passing” or “Failing” status of the unit on the Calibration Report Form.



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2.2.5.1 If the unit passes calibration proceed to Step 2.3.

2.2.5.2 If the unit failed the calibration proceed with step 2.4.

2.3 Apply appropriate calibration labeling to the R2SC as further described:

2.3.1 Document the R2S/RCG and R2SC Serial Numbers on the Calibration Sticker.

2.3.2 Document the rotometer setting required to achieve 60 SCFH at the sample conduit, as documented on the calibration report.

Example: Range: “Set @ 60.25 for 60 SCFH,” or “60 for 60 SCFH”

2.3.3 If an indicator flag is to be used, ensure that the indicator flag is set to the appropriate SCFH setting as specified by the calibration label and report. The indicator flag may be secured in place with glue in or a clear adhesive tape if desired.

2.3.4 Label the instrument with the date calibrated and initials of the technician who performed the calibration next to “BY/DATE”.

2.3.5 Document the calibration due date next to “DUE” which shall be 6-Months, or 12-Months from the date calibrated

2.3.6 Document labeling of the unit on the Calibration Report Form

2.4 If the unit was not found to be within the flow ranges documented on the previous Calibration Report Form:

2.4.1 Notify appropriate personnel of the failed status of the unit.

2.4.2 Corrective actions may include applying a correction factor to the results achieved by the unit during the previous six-months of use.

**EXAMPLE:**

If the results on the Calibration Report Form or Label from the previous calibration documented required flow rate for 60 SCFH was a setting of 60.25 on the Rotometer, and the current calibration shows a setting required on the rotometer of 65.25 to achieve 60 SCFH, the unit would be outside of the acceptable  $\pm 5$  SCFH Range. Results from the previous 6-months, or 12-months (which may have included this margin of error) should be adjusted to compensate for the loss in volume of air sampled.

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3. Checking Sample Timer Elapsed Time and Turntable (motor) Rotation:

- 3.1 Place rotation template on R2S/RCG.
- 3.2 Lower the turntable to its lowest position.
- 3.3 Rotate the turntable clockwise until snug and line the 0° Indicator of the rotation template with one edge of a finger relief well.
- 3.4 Set the Artisan Sample Timer to 59-min. 59-sec.
- 3.5 Start the sample timer and timer standard at the same time.
- 3.6 Using the timer standard, measure the time that has elapsed when the R2SC timer has counted down to zero (0) seconds using the timer standard.
- 3.7 Record the elapsed time on the Calibration Report under “As Found” readings.
- 3.8 Measure the turntable rotation at the end of the 59 min. 59 sec. test period.
- 3.9 Document the turntable rotation on the calibration report in the “As Found” section.
- 3.10 Ranges/Tolerances:

Equipment	Range	Useful Range	Resolution	Performance Tolerance
Sample Timer:	59' 59"	59' 59"	1 sec.	±1 minute
Turntable:	360°	360°	2.5°	±5 Degrees

- 3.11 If all readings are within performance tolerance, document the useful range for the turntable (e.g., 360°) and sample timer (e.g., 59'59"), under “AS LEFT” and apply the appropriate calibration labeling to the R2S-C as further described:

3.11.1 Document the R2S/RCG and R2SC Serial numbers on the calibration label.

3.11.2 On the Calibration Sticker document the Range of the Turntable/Timer as: 360°/59'59”.

3.11.3 Place this label near the R2SC sample timer

3.11.4 Label the instrument with the date calibrated and initials of the technician who performed the calibration next to “BY/DATE”.



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- 3.11.5 Document the calibration due date next to “DUE” which shall be 6-Months from the date calibrated
- 3.11.6 Document labeling of the unit on the Calibration Report Form.
- 3.12 If the sample timer or turntable (motor) are not within performance tolerance, perform maintenance as required and recalibrate the assembly per this procedure prior to returning to service.
- 4. Following Completion of all Testing:
  - 4.1 Ensure that all required, applicable, information is recorded on the Calibration Report Form.
  - 4.2 Sign and date the completed Calibration Report Form and have a second person review the report (if applicable).
  - 4.3 File the original report appropriately.