

Calibrating NH3CAN Sensors with the ECM Calibrator 5200

NH3CalibrationInstructions.pdf, September 15, 2022, © ECM, 2022

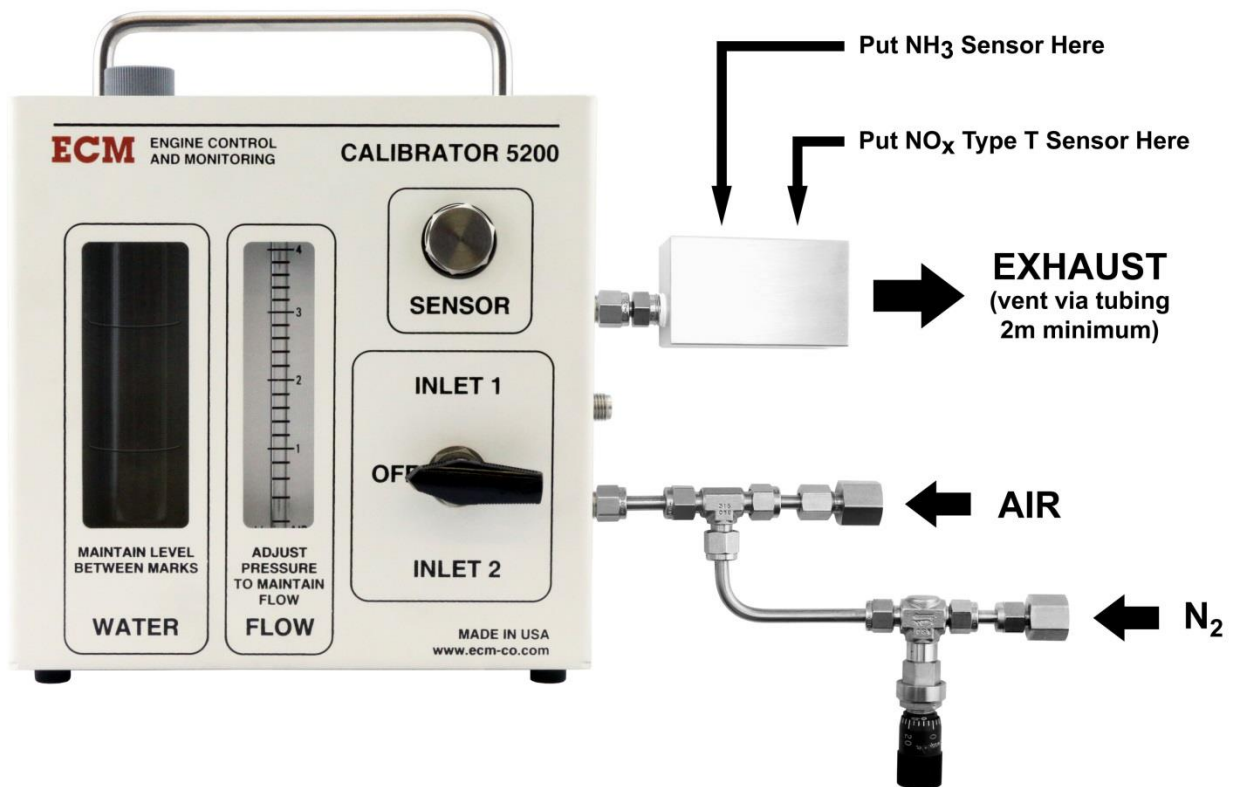
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Caution: You will be using ammonium hydroxide (NH₄OH) during the calibration. 5% to 10% (by volume) ammonium hydroxide diluted by water is commonly used as a cleaner and is easily acquired. Avoid body contact and smelling its fumes. It is best that you handle it in a fume hood. You will be further diluting it with water to approximately 0.3% before use. For example, if you get a bottle of 5% ammonium hydroxide, you will need to dilute it approximately 15:1 with water to get it to 0.3% (for 10% ammonium hydroxide dilute 30:1).

Calibration Procedure:

1. To perform the calibration of NH₃ sensors, you will need:
 - i. Calibrator 5200 (ECM P/N 14-12T) with the sensor boss plugged
 - ii. NH₃ Sensor Calibrator Option (ECM P/N 14-13)
 - iii. NOxCANt Kit (ie. Type T, not Type G)
 - iv. NH₃CAN Kit
 - v. AC/DC Power Supply (ECM P/N 04-01) or 12 to 24 VDC (4A) supply
 - vi. USB-to-CAN adapter (ECM P/N 13-06)
 - vii. A PC running ECM's Configuration Software (latest version can be downloaded from www.ecm-co.com)
 - viii. A tank of compressed air with a regulator to adjust to 25 psig (1.7 bar) and lines and fittings to attach to the calibrator (user supplied)
 - ix. A tank of compressed N₂ with a regulator to adjust to 25 psig (1.7 bar) and lines and fittings to attach to the calibrator (user supplied)
 - x. A line (2m minimum) and fitting from the EXHAUST of the calibrator to a suitable vent (user supplied)
 - xi. Connections for viii, ix, and x on the calibrator are female ¼" NPT. Male ¼" NPT and ¼" ISO tapered will fit into them.
 - xii. A small volume (ex. 100 ml) of ammonium hydroxide diluted with water to 0.3% (user supplied)
 - xiii. An eye dropper (user supplied)
 - xiv. Water (user supplied)
2. You will be using the Type T NO_x sensor's 1:1 sensitivity to ammonia to calibrate the NH₃ sensor. Therefore, prior to calibrating the NH₃ sensor, you need to ZERO and SPAN the NO_x sensor using air and an NO + N₂ mixture according to the instructions on the back of the Calibrator 5200. Note that you must use a Type T NO_x sensor because a Type G NO_x sensor has a more complex and non-1:1 sensitivity to ammonia.
3. Install a NH₃ sensor, a calibrated NO_x (Type T) sensor, and lines as indicated in picture. Make sure air and N₂ tanks are closed, regulators are turned down, and the calibrator's valve is set to OFF.
4. Fill "Water" tank level in calibrator to half way between indicator marks. Let water reach room temperature by letting it sit overnight.

5. Complete connection of the NH₃ and NO_x sensors to their respective NH₃CAN and NO_xCANt kits, power, PC, and then power everything up. NH₃CAN and NO_xCANt modules should have the same baud rate but different node ids (NIDs). Set up the Configuration Tool to read NO_x and O₂ for the NO_x sensor and NH₃ for the NH₃ sensor. A minute after powering up, check to see that the green lights on the modules are solidly on and that there are no error codes shown for the NH₃CAN or NO_xCANt. If a sensor has an error code, it cannot be calibrated or used and must be replaced.
6. Wait until the NH₃ and NO_x sensors have been on for at least 30 minutes. The block that the sensors are mounted in will get very hot so don't burn yourself.
7. Adjust the air and N₂ cylinder supply regulators and micrometer adjustment valve on the N₂ line to obtain 1~1.2 lpm flowrate (shown on the calibrator) and 14% O₂ as measured by the NO_x sensor. The pressure regulators will be at approximately 25 psig (1.7 bar). Wait 5 minutes for the O₂ (for the NO_x sensor) and the NH₃ (for the NH₃ sensor) reading to stabilize and then ZERO the NH₃ sensor.
8. Unscrew the cap from the "Water" tank and using the eye dropper, add a few drops of the 0.3% ammonium hydroxide to the tank. Put the cap back on and wait 5 minutes for the NO_x and NH₃ readings to rise and stabilize. Check that the flowrate is still at 1~1.2 lpm. Repeat this process until the NO_x sensor reads a NO_x ppm level equivalent to the ppm level (of NH₃) that you want to SPAN the NH₃ sensor at. Then SPAN the NH₃ sensor. For example, if the NO_x sensor reads 200 ppm NO_x, SPAN the NH₃ sensor at 200 ppm NH₃.
9. After SPANing the NH₃ sensor, turn the valve to the OFF position and remove the NH₃ sensor.
10. When you are finished calibrating the NH₃ sensor, close the valves on the air and N₂ tanks, let the gases flow and pressures drop, turn the regulators down, disconnect the lines, and turn off and remove the sensors.
11. The last thing to do is to drain the ammonium hydroxide solution from the bubbler tank and rinse the tank out with clean water before storing the calibrator. You want to get all of the ammonium hydroxide out.



NH₃ Sensor Calibrator Option installed on Calibrator 5200 (P/N 14-12T)



NH₃ Sensor Calibrator Option (ECM P/N 14-13)