

ZE12A calibration process

1. Zero-point calibration process

- a. Zero-point calibration command: FF 01 87 00 00 00 00 78.
- b. Determine the current module environment: Zero calibration for each gas sensor module keeps same, if the module is not in clean air, you cannot send zero calibration command, otherwise the module will conduct failed calibration, and the module cannot be used for testing any longer.
- c. Calibration method: Make sure the module is in clean air environment, keep it powered for 15 minutes (If the module is powered on for first time, or the module has been powered off for over half an hour, it is necessary to power on the module for 24 hours and then conduct calibration), send zero calibration command via UART: FF 01 87 00 00 00 00 78.

Note: This operation is not recommended for customers to use.

2. Calibration steps for air concentration point:

- a. Low concentration point calibration command: FF 01 88 00 07 00 00 70. The 3rd and 4th bytes are calibration values, while the 8th byte is proof test value. Please refer to step 2 and step 3 if you want to change calibration value.
- b. Determine the current module environment:
Calibration range and concentration conversion factor of each gas module are shown in table 1.
- c. Calibration conditions and calibration methods for each gas:
 - ZE12A-CO low concentration point calibration:
Make sure the module output concentration is less than 2000ug/m³, and the true concentration around the module is (375ug/m³-2000ug / m³) that is (300ppb-1600ppb) range, if you need to change the output of current concentration value, you can send the value to be calibrated, which should be within (300ppb-1600ppb) range. Calibration value out of this range cannot be sent.
Take 1125ug/m³ for an example:
Convert 1125ug/m³ to ppb units (divided by 1.25), that is 900 ppb, converted to hexadecimal and then send command FF 01 88 03 84 00 00 70 (the 3rd and 4th bytes are calibration values).
 - ZE12A-SO₂ low concentration point calibration:
Make sure the current density and true concentration around the module is between (11.4ug/m³-314.3ug/m³), that is within the range of (4ppb-110ppb), then send the calibration value, and cannot send calibration value beyond this range.
Take 20ug/m³ for an example:
Convert 20ug/m³ to ppb units (divided by 2.857), that is 7 ppb, converted to hexadecimal and then send command FF 01 88 00 07 00 00 70 (the 3rd and 4th bytes are calibration values).
 - ZE12A-NO₂ low concentration point calibration:
Make sure the current density and true concentration around the module is between (18.5ug/m³-225.9ug/m³), that is within the range of (9ppb-110ppb), then send the

calibration value, and cannot send calibration value beyond this range.

Take 41ug/m³ for an example:

Convert 41ug/m³ to ppb units (divided by 2.054), that is 20 ppb, converted to hexadecimal and then send command FF 01 88 00 14 00 00 00 63 (the 3rd and 4th bytes are calibration values).

- ZE12A-O₃ low concentration point calibration:

Make sure the current density and true concentration around the module is between (17.1ug/m³-214.3ug/m³), that is within the range of (8ppb-100ppb), then send the calibration value, and cannot send calibration value beyond this range.

Take 161ug/m³ for an example:

Convert 161ug/m³ to ppb units (divided by 2.143), that is 75 ppb, converted to hexadecimal and then send command FF 01 88 00 4B 00 00 00 2C (the 3rd and 4th bytes are calibration values).

Table1:

Model	allowable concentration range	conversion coefficient between ug/m ³ & ppb
ZE12A-CO	375ug/m ³ -2000ug/m ³ (300ppb-1600ppb)	1.25
ZE12A-SO ₂	11.4ug/m ³ -314.3ug/m ³ (4ppb-110ppb)	2.857
ZE12A-NO ₂	18.5ug/m ³ -225.9ug/m ³ (9ppb-110ppb)	2.054
ZE12A-O ₃	17.1ug/m ³ -214.3ug/m ³ (8ppb-100ppb)	2.143

Note: We do not suggest calibration in high concentration, and do not explain more details here.

3. Cautions:

- a. If the sensor is stored for a long time without usage, aging is needed before calibration and usage, and aging time should be no less than 24 hours.
- b. The host serial port corresponds to only one module, and it is necessary to avoid a serial port corresponding to multiple modules.
- c. Each string of commands in the communication protocol needs to contain check digit, for details pls refer to ZE12A data sheet.