



## Service life of Ammonia(NH<sub>3</sub>) electrochemical sensor under different application environment

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### 1. In the environment with constant presence of ammonia gas

Detection principle of NH<sub>3</sub> electrochemical sensor: During use, the active substances in the sensing electrode will be consumed, resulting in the signal drop of the sensor and the shortened service life, which is called a consumable electrochemical sensor. Long-term exposure to the ammonia atmosphere will greatly affect the service life. To maintain normal service life, only short-term exposure to measure ammonia gas concentration is allowed, and the sensor shall remain in fresh air environment once the measurement is completed.

For example, the sensitivity of NH<sub>3</sub> sensor from a manufacturer in the market is 0.135 $\mu$ A/ppm, and its theoretical detection life is 12000ppm•h. According to the environmental concentration and detection time, the calculated life is as follows. It should be noted that the service time here is h/day, which belongs to intermittent contact (electrochemical gas sensors are generally designed for intermittent detection of target gases and are not suitable for continuous detection applications, especially for those applications involving high gas concentration or extreme humidity and temperature).

Environment Ammonia Concentration	Sensor Expose Duration (h/day)	Sensor Life (day)
100ppm	2	60
50ppm	2	120
20ppm	24	25
10ppm	24	50
10ppm	8	150

## 2. In normal air environment

When the ammonia sensor is placed in the normal air environment that without  $\text{NH}_3$  presence for long time, theoretically there shall be no consume of the active substances in the working electrode. However, the sensing electrode of the sensor needs to go through an activation process and gas adsorption process. Therefore, in the first measurement T90 increases, and it looks like the sensitivity level decreases. In the second and third measurement, T90 gradually decreases, and the reading of the sensor stabilized. It is recommended that if the ammonia sensor has been in the normal air for a long time, then the second and third measurement value shall be used as actual value.

Note: The actual service life of the sensor is also closely related to the application environment. Ammonia sensor contains aqueous solution system, the environmental temperature and humidity will largely impact the sensor, so it is not recommended to use electrochemical sensors for testing in extremely dry environment for a long time. When not in use, the sensor or the instrument equipped with the sensor shall be placed in the fresh air environment.