

This document describes the preferred calibration procedure of the WatchGas UNI product range. If you require any assistance, feel free to contact us at info@watchgas.eu

Calibration of standard gasses

Sensors measuring standard gasses can be easily calibrated using a fixed flow of 0.5 L/min, a piece of a WatchGas Last-O-More Gas Sampling Hose and the WatchGas UNI calibration adapter. See the table below for the preferred gas concentration.

Keep in mind that some of these gasses impose safety risks.

Gas	Range(s)	Calibration gas	Calibration time	Article number
O ₂	0-25 vol% 0-30 vol%	18 vol% O ₂ in N ₂	45-60s	CAL-C016171 (116L.)
CO	0-500 ppm 0-1000 ppm 0-2000 ppm	50 ppm CO in air	45-60s	CAL-C019449 (116L.)
		100 ppm CO in air		
H ₂ S	0-50 ppm 0-100 ppm 0-200 ppm	25 ppm H ₂ S in N ₂	45-60s	CAL-C006275 (116L.)
H ₂ S	0-1000 ppm	200 ppm H ₂ S in N ₂	60s	CAL-C006292 (116L.)
Mix	all ranges	18 vol%	60s	CAL-C009147 (34L.) CAL-C011916 (58L.) CAL-C017064 (116.)
		50% LEL		
		50 ppm		
		10 ppm		
Mix	all ranges	18 vol%	60s	CAL-C008905 (34L.) CAL-C011921 (58L.) CAL-C006853 (116.)
		50% LEL		
		100 ppm		
		25 ppm		

The WatchGas UNI Mono Docking Station can be used to perform the whole calibration procedure automatically.



Calibration of exotic gasses

Calibrating sensors that measure more exotic gasses require a different calibration procedure than standard gasses:

1. Perform a fresh air calibration
2. Set the correct span value
3. Exit the menu
4. Apply gas using a 1 L/min fixed flow, allow gas reading to stabilize before starting the calibration. This is also called soaking. Newer versions of the UNI, firmware version 3.9.1 and higher, do not require soaking.
5. Start span calibration via the user menu
6. Exit the menu. Allow some time for the gas reading to return to 0, wait at least 60 seconds.
7. Restart the WatchGas UNI
8. Verify a correct calibration by applying the same gas concentration again, preferably from another cylinder. Allow readings to stabilize.

Gas	Range(s)	Calibration gas	Calibration time	Remarks	Article number
H₂	0-1000 ppm 0-2000 ppm	200 ppm H ₂ in air	60s	A flow of 0.5 L/ min can be used	CAL-C017697 (116l.)
NH₃	0 - 100 ppm 0 - 500 ppm	50 ppm NH ₃ in N ₂	180s		CAL-C006549 (116l.)
Cl₂	0-50 ppm	10 ppm Cl ₂ in N ₂	180s		CAL-C018258 (116l.)
NO	0-250 ppm	25 ppm NO in N ₂	120s		CAL-C006664 (116l.)
NO₂	0-20 ppm	5 ppm NO ₂ in air*	120s		CAL-C006607 (116l.)
PH₃	0-20 ppm	5 ppm PH ₃ in N ₂ *	180s		CAL-C006838 (116l.)
SO₂	0-20 ppm 0-100 ppm	5 ppm SO ₂ in air* 10 ppm SO ₂ in air*	180s		CAL-C007106 (116l.) CAL-C017069 (116l.)
ETO / C₂H₄O	0-100 ppm 0-200 ppm	10 ppm ETO in N ₂	240s		CAL-C015090 (58l.)
THT	0-40 ppm	50 mg/m ³ THT in air* 10 ppm THT in N ₂ *	>240s	50 mg/m ³ = 13,6 ppm (T=293 K) 20 ppm = 73.5 mg/m ³ (T=293 K)	CAL-C017581(58l.) CAL- C012090 (58l.)
CH₃SH	0-10 ppm	5 ppm CH ₃ SH in air*	>240s		CAL-C019143 (58l.)
HCN	0-100 ppm	10 ppm HCN in air	120s		On request
COCl₂	0-1 ppm	1.0 ppm Cl ₂ in air* equals 0.5 ppm ClOCl ₂	120s	Surrogate gas	On request
AsH₃	0-1 ppm	5 ppm SO ₂ in air* equals 0.8 ppm AsH ₃	90s	Surrogate gas	CAL-C007106 (116L.)

*Nitrogen (N₂) balance can also be used if exposure is <5 minutes.

Special calibrations

This section describes the calibration procedures for highly reactive gasses such as O₃, ClO₂, HCl and HF. Due to their toxicity, adequate safety measures should be taken when working with these type of gasses. Avoid personal exposure at all times by working under a fume hood and/or wearing personal protective equipment.

Do not use the WatchGas UNI Mono Docking Station to calibrate these type of devices.

Ozone (O₃) and Chlorine Dioxide (ClO₂)

O₃ and ClO₂ are too unstable to be stored in a cylinder and must therefore be generated at the time of calibration. An generator for both O₃ and ClO₂ can be purchased from WatchGas. This generator generates a variable concentration of O₃, ranging from 0.1 to 1 ppm.

It is said that O₃/ ClO₂ sensors are cross sensitive to Cl₂, but this cross sensitivity is somewhat variable and should therefore not be used when calibrating. Cl₂ gas can be used to calibrate a ClO₂ sensor, but this still requires a gas generator. 1.0 ppm Cl₂ equals 0.6 ppm ClO₂.

Since the generator should be used, the calibration setup is somewhat different:

- Set up the gas generator and allow it to stabilize:
 - O₃: 0.5 ppm at 0.4 L/min. Although the O₃ concentration generated can be adjusted, the suggested 0.5 ppm gives a more reproducible and linear calibration result.
 - ClO₂: 0.5 ppm at 0.5 L/min.
 - Cl₂ as ClO₂: 1.0 ppm Cl₂ at 0.5 L/min, set span value to 0.6 ppm ClO₂.
- Connect a short (max 50 cm) low absorption gas hose and calibration adapter to the generator.

The WatchGas UNI O₃ and ClO₂ can be calibrated using the following procedure:

1. Take adequate safety measures when working with O₃/ClO₂ gas.
2. Turn on the device using the normal start-up procedure.
3. Perform a fresh air calibration using the user menu.
4. Set the span concentration to the correct value.
5. Exit the menu.
6. Start the ACD generator and set the gas concentration to the correct value. Allow generator to stabilize.
7. Connect the generator to the UNI device using the (short) gas hose and calibration adapter.
8. Allow some time for the gas reading to stabilize, at least 30 seconds for O₃ and 60s for ClO₂.
9. Start the span calibration via the menu.
10. Exit the menu.
11. Allow gas reading to return to 0.00 ppm.
12. Restart the device.
13. Verify a correct calibration by applying the same gas concentration again. Allow readings to stabilize.



Hydrochloric Acid (HCl)

Hydrochloric acid gas is highly corrosive. Take adequate safety measures. Only use a stainless steel regulator. 5 or 10 ppm HCl can be used at a flowrate of 0.3-0.5 L/min. Use very short inert tubing to connect the regulator to the calibration adapter, as shown in the photo below.

HCl calibration procedure:

1. Perform a fresh air calibration
2. Set the correct span concentration
3. Exit the menu
4. Connect the cylinder to the device and start the gas flow.
5. Allow the gas reading to stabilize, wait at least 90 seconds
6. Start the span calibration via the menu (also 90 seconds)
7. Exit the menu.
8. Verify gas reading is stable before the gas flow is turned off.
9. Allow the gas reading to return to 0.0 ppm. This may take several minutes.
10. Restart the device
11. Verify the calibration by applying the same concentration of gas, preferably from another cylinder, for at least 180 seconds.

Hydrofluoric Acid (HF)

Hydrofluoric acid can be bought in a cylinder, but this is very expensive and imposes great safety risks. HF sensors can be calibrated using HCl cross sensitivity, following the described calibration procedure described above. The use of (dry) 10.0 ppm HCl equals 16.0 ppm HF

After removing the dry calibration gas, the sensor may go into negative alarm while reequilibrating to ambient humidity over the course of several minutes. Do not re-zero unless the monitor is still reading negative after 15-20 minutes. The HCl cross sensitivity calibration can only be performed on newer versions on the UNI (version 3.9.0 and higher), since the range has been extended to 0-20 ppm. To calibrate an older version (0-10 ppm), please contact info@watchgas.eu.

NOTE: UNI HF may require a zero calibration once ambient conditions (temperature/humidity) have changed.



Phosgene (COCl₂)

For calibrating COCl₂ we recommend to calibrate it with Cl₂ gas. We recommend a 1 ppm Cl₂ from a generator.

In case you rather want to use a cylinder, 1 ppm has a very short shelf life in a cylinder, so we suggest using 2 ppm Cl₂ and setting the span value to 0.95 ppm, since 1.01 ppm will set off an over-range alarm."

Order Information for accessories

Description	Article Number
Regulator1/2	CAL-A0195339
Regulator 1	CAL-A0197371
Regulator Stainless Steel 1/2	SGT-FF100-0.5-SS
Regulator Stainless Steel 1	SGT-FF100-1.0-SS
Last-O-More Gas Sampling Hose	411-0018-038
Calibration adapter	M001-3003-W00
Generator O3	750-0200-02

WatchGas Application Note 6 Part1: WatchGas UNI Calibration v1.4 05-08-21 © 2021 WatchGas B.V.

WatchGas is dedicated to continuously improving its products. Therefore, the specifications and features mentioned in this datasheet are subject to change without prior notice.