

# Manual

## SIM HYDROGEN SENSOR

Installation and Calibration of the External Device  
for Agilent 7890 GC



## Document History

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## 1 PRINCIPLE OF OPERATION

The hydrogen sensor constantly detects the hydrogen concentration in the GC oven. In case of a leakage, optical and acoustic alarm will be set off and the carrier gas will automatically be switched to inert gas.

One green LED shows the ready status of the hydrogen sensor with no hydrogen in the GC oven. As soon as hydrogen appears, several of the LEDs will light up depending on the gas concentration. If the concentration is above a threshold level of 10 % of the lower explosion limit (LEL), the first red LED will light up and an acoustic signal will be transmitted. At a detected hydrogen level of 25% LEL (equals 1 % by vol. H<sub>2</sub>), an alarm signal will sound and the carrier gas will automatically be switched to an inert gas. At the same time the GC gets a “not ready” signal so that the GC run will stop. This prevents chromatographic separations with the “wrong” carrier gas. When the hydrogen concentration level falls under the set limit of 1% H<sub>2</sub> by vol. (25% LEL) the red LEDs will start flashing (inert gas mode) and the remaining LEDs will show the actual hydrogen concentration.

After eliminating the leakage, pushing the “reset” key (on the left beside the LEDs) switches back automatically to carrier gas, the gas chromatograph gets a “ready” signal and the indicator bar light works normally again.

## 2 ACCESSORIES KIT

- sensor box with carrier gas switch
- gas sensor (for installation into GC) together with fastener, cable and plug connector, 2 tapping screws
- drilling template for gas detector head
- 4 drill bits (8 / 6 / 4.3 / 3.8 mm)
- power supply and power cable
- Start/Remote cable



sensor box

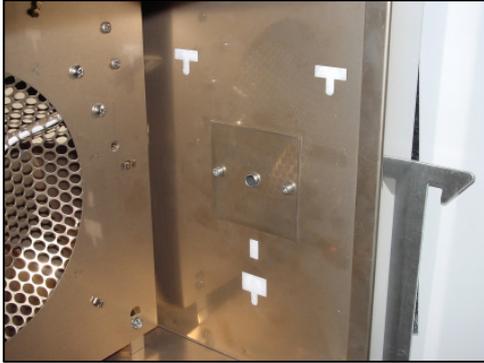


gas sensor

### 3 INSTALLATION OF THE HYDROGEN SENSOR

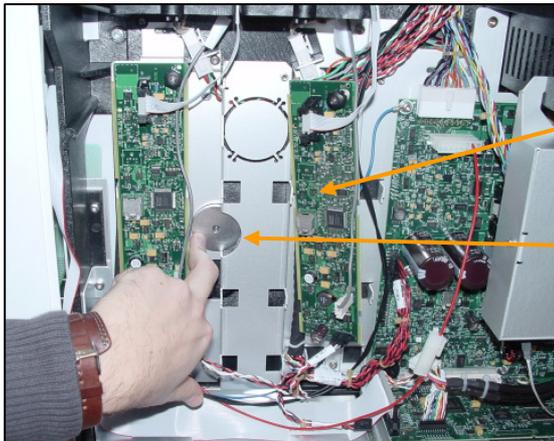
#### 3.1 Installation of the gas detector head

- Put off the right side cover of the GC.
- Detach the pre-cut sheet in the middle of the right side of the oven (see fig. below with the mounted gas detector head).



**Inside of the GC oven with mounting device and gas sensor head (left) and mounting device (above, longish installation sheet is situated in the oven side wall)**

- Prepare the hole for the detector head from outside the GC oven:  
 Carefully detach the back detector board and place the round drilling template onto the round blanking (see fig. below)



Detector board (detached)

Drilling template

**Right outside of the GC with the detached detector board and the drilling template onto the round blanking**

- Open up the hole by drilling with a 6 mm drill bit and take an 8 mm drill bit to bore through into the GC oven space.  
 Please note that there should not remain any isolation material in the hole (remove it by blowing or putting the sensor head in and out)!
- Inside the GC oven: Push the longish installation sheet of the mounting device through the created hole so that the square sheet of the mounting device can be mounted in front of it at the oven inside (see figures above).

- Push the gas detector head from outside through the isolation and the installation sheets as far as it will be possible.



**Mounting of the gas sensor head at the outside of the GC**

- Outside the GC oven: Drill mounting holes for the detector head (4.3 mm and then 3.8 mm drill bit) and screw the detector tightly with two screws (see fig above).
- Reassemble the back detector board.
- The gas sensor cable has to be connected to the circuit board of the hydrogen sensor at the end of the installation (see 3.6).
- Inside the GC oven: Fasten the detector head mounting device with the two screws of the accessory kit (see first fig of 3.1).
- Remount the side cover of the GC.

### 3.2 Carrier Gas Connection

#### NOTE:

The **pressure** of hydrogen and inert gas has to be **≤ 7 bar** each, otherwise the installed valve does not work correctly!

- Attach the hydrogen and inert gas pipe of the gas supply to the gas ports situated at the back side of the sensor box (see fig. on the left, hydrogen – H<sub>2</sub> in, inert gas – inert in).
- Connect the port in the middle (“out”) with the carrier gas port (EPC) of the GC.
- Put the gas sensor plug into the port “Sensor” (second row, left).
- Connect the Start/Remote-Cable with the “AUX” port of the sensor box and the “Remote” outlet of the GC (see fig. on the right)
- Connect the power supply (enclosed) with the port “24 V DC”.



**Sensor box connections (left) and back side of the GC with “remote” outlet (right)**

## 4 OPERATING MODE

After installing the gas sensor head and connecting carrier and inert gas as current supply, the Hydrogen Sensor is ready for use after pressing the “reset” key:

red LEDs are flashing: inert gas mode, not-ready signal for GC  
after first installation of the hydrogen sensor or switching-on the gas chromatograph or previous hydrogen alarm:  
pressing the “reset” key (on the left beside the LEDs) switches to carrier gas hydrogen and the “ready” signal for GC, so that the hydrogen sensor is in the ready mode (one green LED) or rather shows the actual hydrogen concentration in the GC oven

green LED on the left is lit: ready mode

green LED is flashing: zero point has to be recalibrated

red LEDs + acoustic alarm: hydrogen leak, carrier gas is switched to inert gas and “not ready” signal for GC:  
eliminate the hydrogen leak and return to the ready mode by pressing the reset key  
(automatic switch-over from inert gas to hydrogen and “ready” signal for GC)

## 5 CALIBRATION

### 5.1 Setting to zero point (after installation)

- run the system for 10 – 15 min
- press reset button until you can hear a beep (approx. 2 – 3 s): calibration mode is active
- shortly press the reset button 2 times: Setting to zero point begins, the green LEDs are flashing  
after ½ minute, zero point setting is done, a beep resounds automatically, and the sensor skips back to the measuring mode

### 5.2 Setting of the alarm value (25% of LEL) (factory-preset, annual recalibration by service engineer)

- attach calibration standard (air with 1% by vol. H<sub>2</sub>) to the gas sensor so that the standard mixture continuously flows through the sensor head (1-2 l/min)
- press reset button until you can hear a beep (approx. 2 – 3 s): calibration mode is active

- shortly press the reset button 3 times: Setting to alarm value begins, the yellow LEDs are flashing  
after ½ minute, alarm value setting is done, a beep resounds automatically, and the sensor skips back to the measuring mode
- detach calibration standard

### 5.3 Stop calibration mode

- If you want to drop out of calibration mode:  
shortly press the reset button once: sensor skips back to the measuring mode

## 6 OPTICAL ERROR MESSAGE

- Red LED on the right is flashing:  
oven deflector fails or oven is opened and the carrier gas has switched automatically to inert gas  
in case of operating deflector or closed oven, the sensor automatically skips back to the measuring mode

## 7 SPECIFICATIONS

detection range:	0 – 25 % LEL ( $\hat{=}$ 0 – 1.0 % by vol. H <sub>2</sub> )
0.4 % by vol. H <sub>2</sub> :	optical alarm: first red LED, acoustic alarm: starts with intermittent beep
1.0 % by vol. H <sub>2</sub> :	optical alarm: 4 red LEDs, acoustic alarm continues, carrier gas is switched to inert gas (N <sub>2</sub> , He)
size (control box):	13 cm (w) x 11,5 cm (d) x 4 cm (h)
electrical properties:	100-240 V, 50/60 Hz, 1.0 A