Scientific Instruments Manufacturer GmbH
D-46149 Oberhausen • +49(0)208-9410780 • www.sim-gmbh.de

Agilent Technologies
Premier Solution Partner

Manual

SIM Olfactory Detector (OFD)

Installation and Operation

Document History
Second Edition, October 2011

SAFETY

Before installation of the OFD, all parts of the GC should be cooled down to room temperature.
Only use **air** as **humidifier gas**!
The OFD should only be operated by qualified analysts because of the possible risk of smelling unknown compounds.

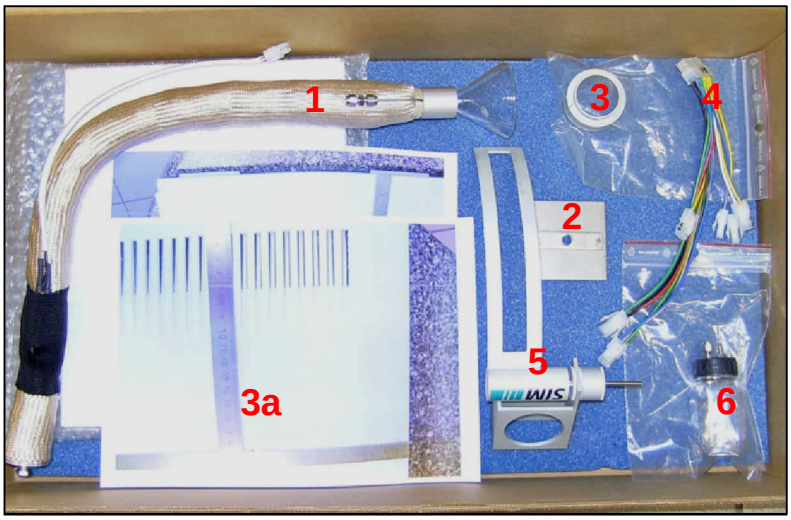
CONTENT

1 PRINCIPLE OF OPERATION

After GC separation, the SIM Olfactory Detector (OFD) is used to record odor associations of an eluted substance and its intensity in function of time. Therefore, a capillary transfers the eluate of the GC column from the oven to the “sniffing port”. This is a glass cone at the outside end of the capillary, where the tester can “sniff” the olfactory impressions of the compounds.
The OFD consists of a heatable transfer line without cold spots that is absolutely olfactory neutral, a humidifier that prevents the nasal mucosa from drying out, and a device for simultaneous detection with other GC detectors. The SIM Olfactometry Software together with different recording opportunities is used for data acquisition.

2 ACCESSORIES KIT

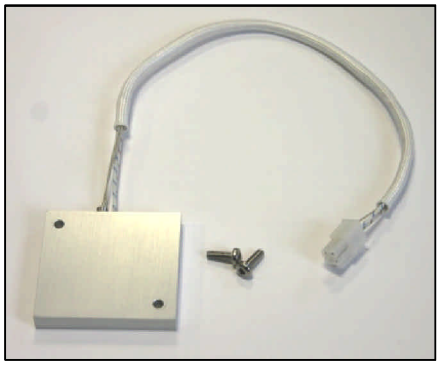
2.1 SIM Olfactory Detector (OD 1000 78 90)



1 - transfer line with funnel, heater cable and humidifier adapter
2- oven wall installation sheet (two parts) with 2 screws
3 – edging for transfer line hole with two set screws
4 – cable for transferline heater
5 - mounting assembly for sniffer funnel and water bottle
6 – humidifier-water bottle with frit and flexible tubing

NOTE:
Be careful when you install the **transfer line**: If you bend the transfer line in a bow with diameter lower than 20 cm you will damage the heater.

2.2 Purge Vial Heating Device (OD 1000 78 90 OPT010)



2.3 Parallel Detection Kit (OD 1000 78 90 OPT020)

1 – external pneumatic box

2 – 4-way (quadruple) connector

3- connector holder with screw

2.4 SIM Olfactometry Software (OD 1000 78 90 OPT030)

The software package consists of

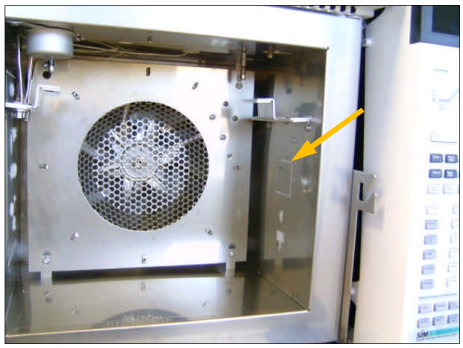
- CD with SIM Olfactometry Software and Agilent Effluent Splitter Calculator
- USB-Dongle for software protection
- BAMBOO pen tablet

3 INSTALLATION OF THE OLFACTORY DETECTOR

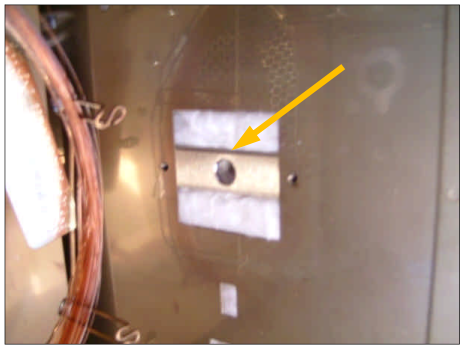
3.1 Preparing Operations

- Put off the right side cover of the Agilent 7890 GC.
- Open the GC oven.

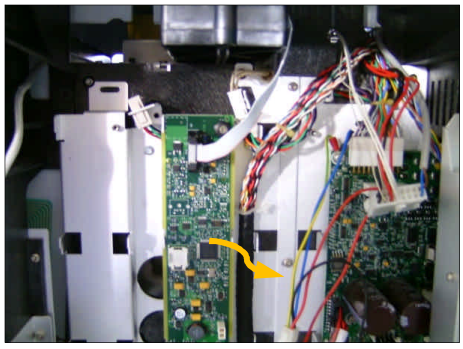
3.2 Modification of the Agilent 7890 GC



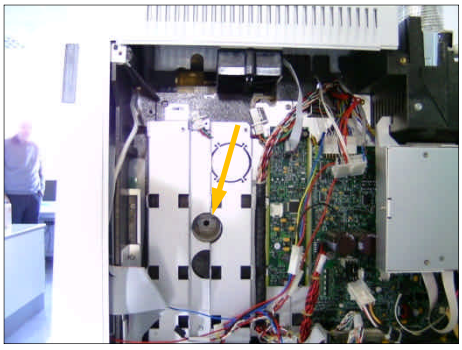
Detach the pre-cut sheet in the middle of the right side of the oven.



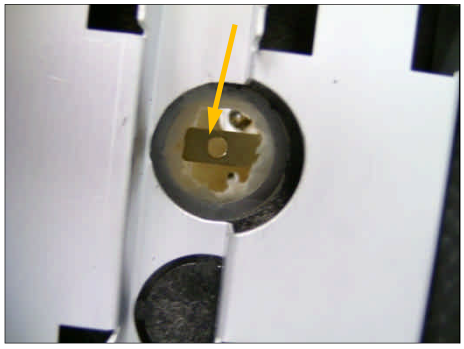
Push the longish installation sheet (see arrow) through the created hole and fix it with two screws (M 3).



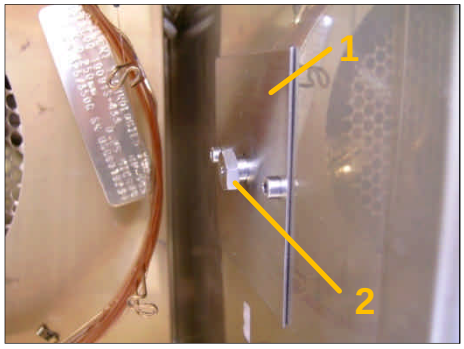
Move the left board into the middle position so that the boards are side by side (see photo below).



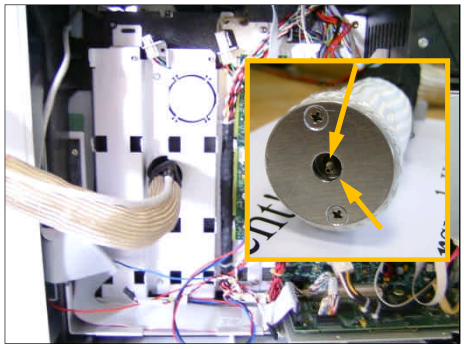
Use a rotary tool or a saw to remove the black plastic part (see arrow).



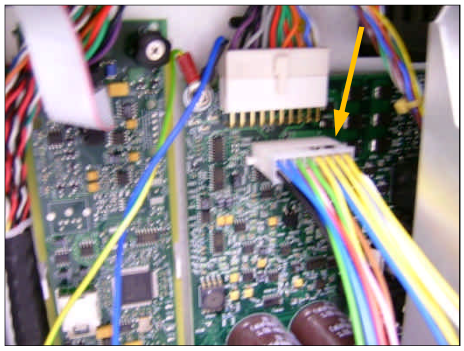
Remove the isolation material as well so that you can see the installation sheet (arrow).



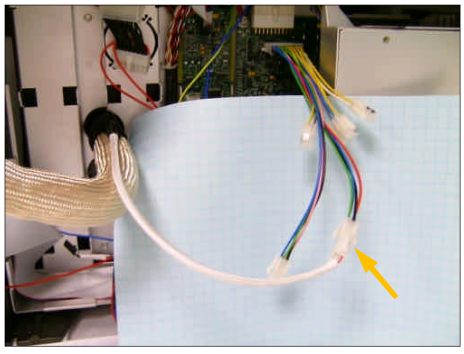
Fix the square installation sheet (1) with the M3 screws inside the oven and insert the capillary holder (2) through the hole in the middle.
Please note to that you fix the screws slightly so that the holder can rotate freely.



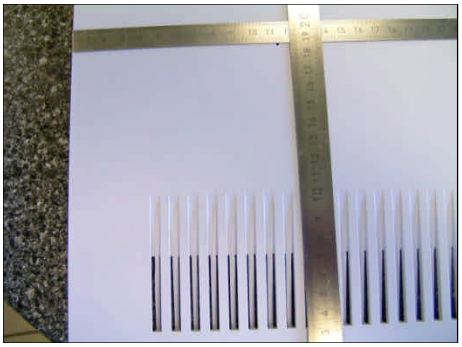
Take the transfer line and fix it at the capillary holder from outside the oven. Pay attention that internal and external thread of the transfer line (see small photo) are connected.



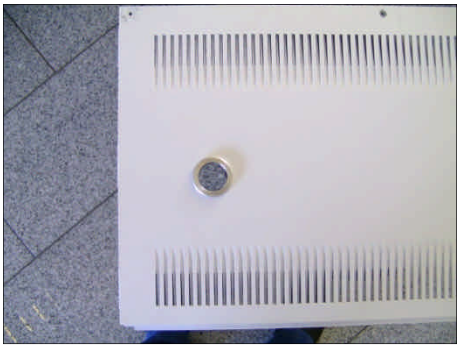
Fix the enclosed connector plug on the right board (see arrow).



Connect the heater cable of the sniffer transfer line to the A1/A2 contact of the connector plug (see arrow). The free contact can be used for the cable of the purge vial heating device (s. 2.3 and 3.3).
A1 and A2 equate AUX1 and AUX2 of the GC.

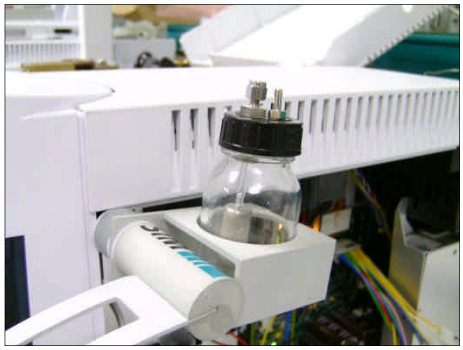


Take the side cover of the GC, mark the middle of the 40mm hole for the transfer line (11.5/18.5 cm, see photo), and cut out the circle (e.g. using a circle cutter).

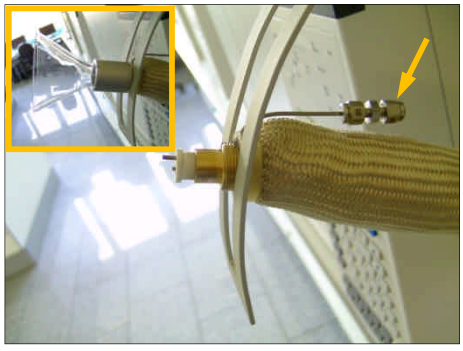


Put in the edging for the hole and fix it with two set screws on the back of the side cover.

Lead the transfer line and – where required - the cable of the purge vial heating device (see 3.3, note that the plug has to be connected before) through the hole, remount the side cover, and screw the mounting assembly for the sniffer funnel and water bottle in the position for the left screw (see arrow).If required follow the instructions of 3.3 to install the heating plate beneath the mounting assembly.

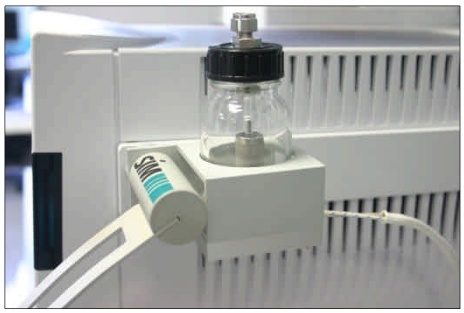


Put the water bottle for the sniffing gas humidification into the holder and connect the adapter of the frit with the humidification gas supply (e.g. humidifier out-port of the external pneumatic box, see 3.4). Put the flexible tube onto the second adapter. The other end is connected to the top of the transfer line (see next figure).



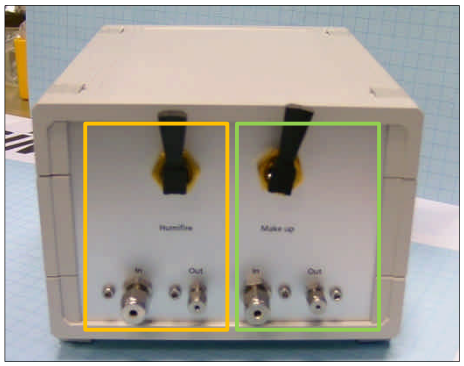
Put the other side of the transfer line into the guide plate and fix it in an adequate position by screwing on the funnel (small photo).
Then connect the flexible tubing of the water bottle with the top of the transfer line (see arrow).
Fix the serial number label on the side cover near the sniffer mounting assembly.

3.3 Installation of the Purge Vial Heating Device (OD 1000 78 90 OPT010)



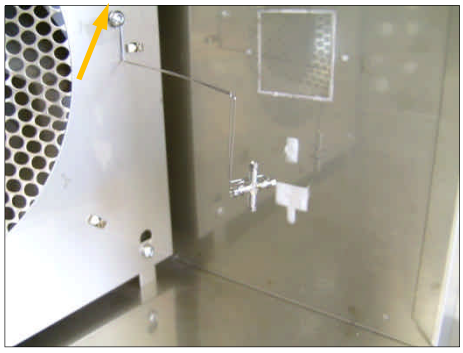
Use the two screws of the Heating Device Kit and fix the heating plate beneath the sniffer mounting assembly with the two screws (two arrows), so that the cable is directed towards the GC's rear side (the plug of this cable should have been connected to the A1/A2 contact of the connector plug before remounting the side wall – see 3.2., bottom of page 6).

3.4 Installation of the Parallel Detection Kit with external manual pneumatic box (OD 1000 78 90 OPT020)



Rear side of the pneumatic box:
On the left you find the toggle switch and in- and out-port for the humidifier gas (orange frame).
Note: Only use **air** as **humidifier gas**!
On the right there are the same elements for the sniffer make-up gas (green frame).
Connect the in-ports with the gas supply and the out ports with the GC system.

Front side of the pneumatic box:
On the left there is the control of the make-up gas for the sniffer with back-pressure regulator and manometer.
On the right you find the needle valve for the humidifier.



Inside the GC oven:
Mount the holder for the quadruple column connector in the oven (see arrow), so that you can connect the column, the OFD outlet, make-up gas and second detector.
For capillary length calculations use the Agilent Effluent Splitter Calculator (see file “G3180B_splitter_calc.xls” on the attached CD).
Set the OFD as detector 2 with an operating pressure of 14.696 psia.
Small retention time differences can be balanced with the **RT Shift** in the OFD software (see 5.1):
The values for “holdup time det 1/holdup time det 2” may be a rough estimate to balance the retention times between the two detectors.

3.5 Installation of the Parallel Detection KIT with electronically controlled Microfluidic Splitter (OD 1000 78 90 OPT021)

Installation and operation see manual and calculator enclosed to the Microfluidic Splitter.

3.6 Installation of the Detection Kit with electronically controlled Deans Switch (OD 1000 78 90 OPT022)

Installation and operation see manual and calculator enclosed to the Deans Switch.

4 OPERATING MODE

4.1 Configuration of the GC System

Note:
For detailed configuration information see the manual of the 7890 GC System.

- On the GC front panel press the key “CONFIG”, select “Oven” and go to “CONFIGURE AUX Heater 1 (or number 2, depending on the contact set between heating cable of the sniffer and GC board – see 3.2, page 6)
- Enter the following values for AUX1 (sniffer)
  (* correct values see information enclosed to the transfer line):

Auxiliary type:	User Config.
Proportional gain	* (e.g. 1.50)
Integral time	* (e.g. 45.0)
Derivative time	* (e.g. 0.0)
Mass (Watt-sec/deg)	105
Power (Watts)	26
Maximum setpoint	300
Sensor:	RTD
Zone control model:	SS

- If OPT10 (purge vial heating device)is installed, enter the following values for AUX2 (heating device)

Auxiliary type:	User Config.
Proportional gain	15.0
Integral time	48.8
Derivative time	3.52
Mass (Watt-sec/deg)	105
Power (Watts)	70
Maximum setpoint	100
Sensor:	RTD
Zone control model:	SS

4.2 OFD Settings

- Fill the humidifier bottle with water so that the frit is well covered.
- The transfer line temperature as well as the heating device temperature (if OPT010 is installed) have to be entered directly at the GC front panel (temperature of AUX1/AUX2 heater) or - using the (ChemStation) software - you can enter the values in the (ChemStation) method parameters. Prior to running a sample, wait until the operating temperature is reached.
  NOTE: The temperature of the heating device should not exceed 60 °C!.

- For OPT020 (manual pneumatic box):
  a) Turn on the humidifier flow with the toggle switch (back side) and regulate it with the needle valve on the front of the pneumatic box (s. 3.3) so that bubbles can be seen.
  b) Make-up gas avoids peak broadening. Turn on the make-up gas flow with the toggle switch (back side) and regulate it with back-pressure regulator and manometer on the front of the pneumatic box (s. 3.3) so that the detector flows match the results of the calculation (s. 3.3, on bottom).
- For OPT021/022 (microfluidic splitter/Deans Switch):
  Regulate all gas flows according to the enclosed manuals. The humidifier flow has to be adjusted using the EPC values in the software so that bubbles can be seen in the glas bottle and the humidity of the sniffer gas is pleasant to the tester's nose.
- Now OFD configuration is done and the system is ready for use.

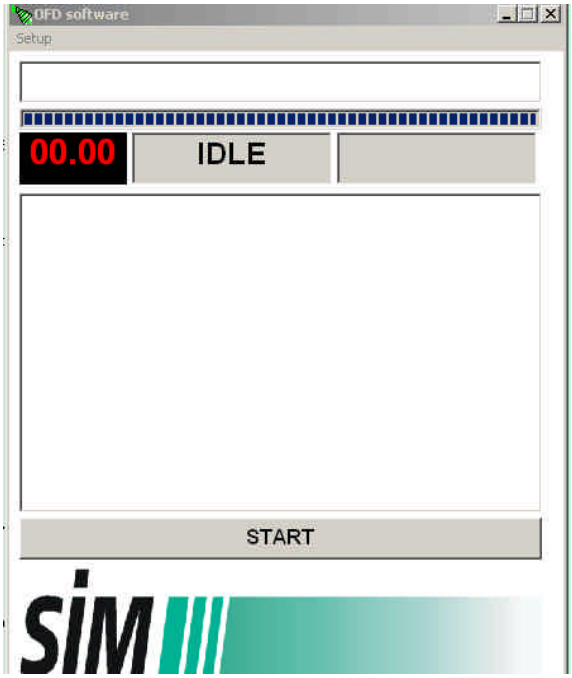
NOTE: The water in the humidifier water bottle has to be renewed every day to keep it fresh and prevent bacterial growth!

5 OFD Software

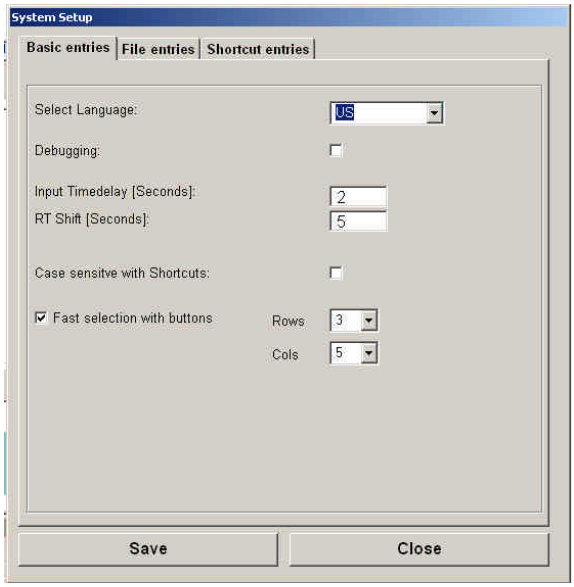
NOTE: The software license is authorized via the **USB dongle** which has to be inserted into a free USB port of the PC.

5.1 Installation and general settings

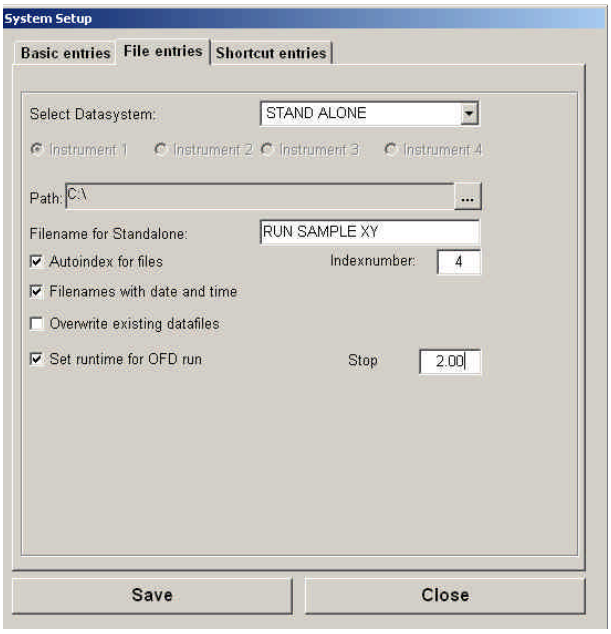
1. Insert the CD in the PC drive and start **Install.exe**.
Click the **Install** button on the bottom of the opened window.
The installation program creates a new directory
C:\SIM OLFACT\
and copies all program files into this directory.



2. Open the Explorer and go to directory C:\SIM OLFACT\.
Start the program “SIM Olfact.exe”. The OFD Software will appear on the desktop:
In the upper left corner you can find the menu **Setup,**
the line beneath is the “status line” followed by run time and system status in the next line and a field for the report of the sniffing impressions during the chromatographic run.



3. Click on **Setup** in OFD Software (see fig. 2) and make the software settings on the tab **Basic Entries**:
(**Debugging**: debug info for service only)
Input Time Delay: a value for the period of time in which you can enter all information for one odor impression
RT Shift: value (pos. or neg.) added to the absolute retention time to compensate the RT difference between OFD outlet and a second detector (see 3.3)
Here you can also select if you want to use shortcuts to characterize the odor impressions (select **Case sensitive with Shortcuts**) or the shortcut button list (select **Fast selection with buttons** and configure the appearance of the list).
Store all entries with a click on the button **Save**.

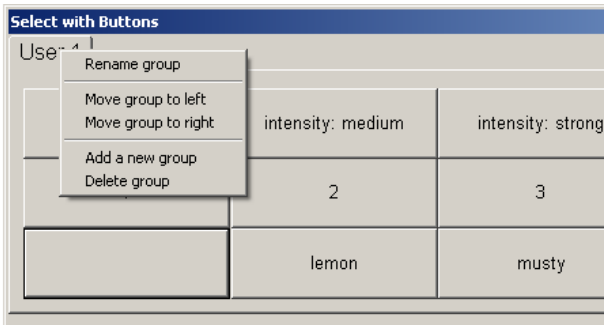


4. Go to **File entries** in the **System Setup**:
To run the software together with ChemStation software, select **GC or MSD ChemStation** in the first line (Select Datasystem) and click on the associated instrument (**#1 to #4**) in the second line. The OFD data are stored in the corresponding ChemStation file.
If you want to run the software without connection to the ChemStation, please select **STAND ALONE** in the first line and set the entries for the OFD data files:
Select the data path and a file name. The OFD file name can be set together with an automatic index number as well as date/time. You can also select an automatic stop time for each run (in minutes, e.g. 2.00) which follows the manual start. Store all entries with a click on the button **Save**.

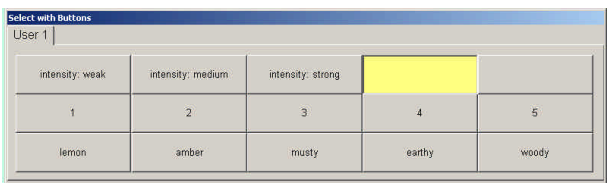
5.2 Shortcut button list

With the Shortcut Button list you can directly enter the odor impression of a component by clicking on the matching button. With the OFD Software you can store a number of different shortcut button lists with odor impression profiles for different users or different types of samples.

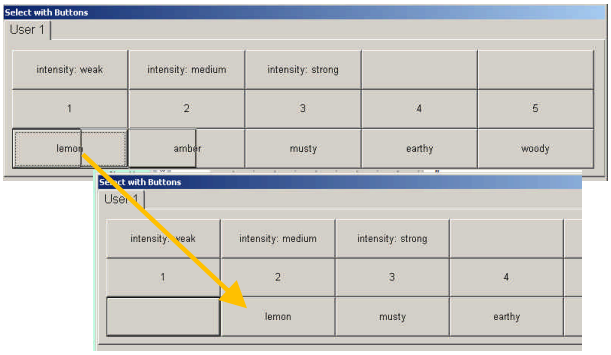
If you select **Fast selection with buttons** in the System Setup (see 5.1) the **shortcut buotton list** will open up**.**



1. Configure the group buttons by a right mouse click on the correspondent tab (e.g. USER1).



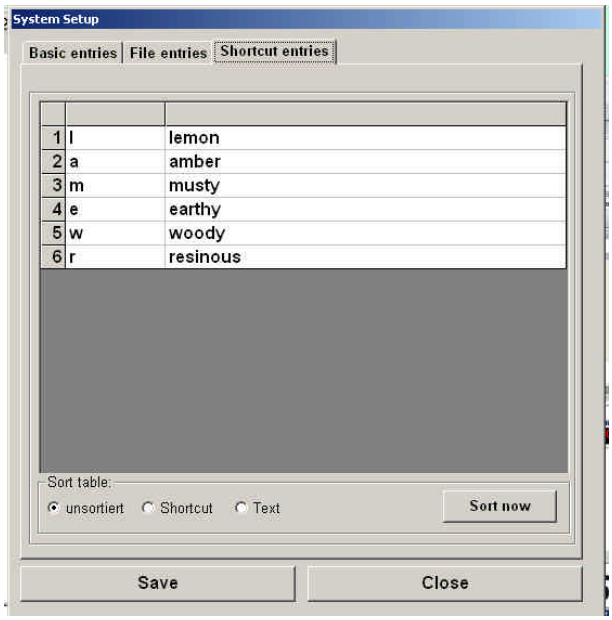
2. You can enter the odor impressions on the shortcut buttons with a right mouse click: The background color of the button will change to yellow and you can enter the new button name.



3. To reorganize the buttons of the shortcut list you can use “drag & drop”.

5.3 Keyboard Shortcut List

When you want to use the keyboard for entries of the odor impressions you can set up tokens that will be translated from the OFD Software to the words. To configure this token list go to **Shortcut entries** in the System Setup (see 5.1).



1. Enter the shortcut in the left and the description in the right column.
2. On the bottom of the window you can find the commands to sort the list.
3. At the end store all entries with a click on the button **Save.**

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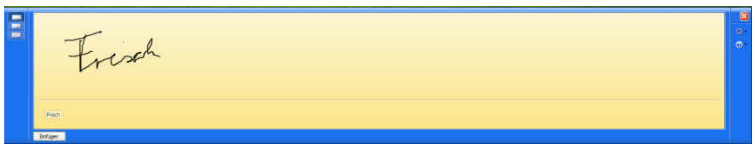
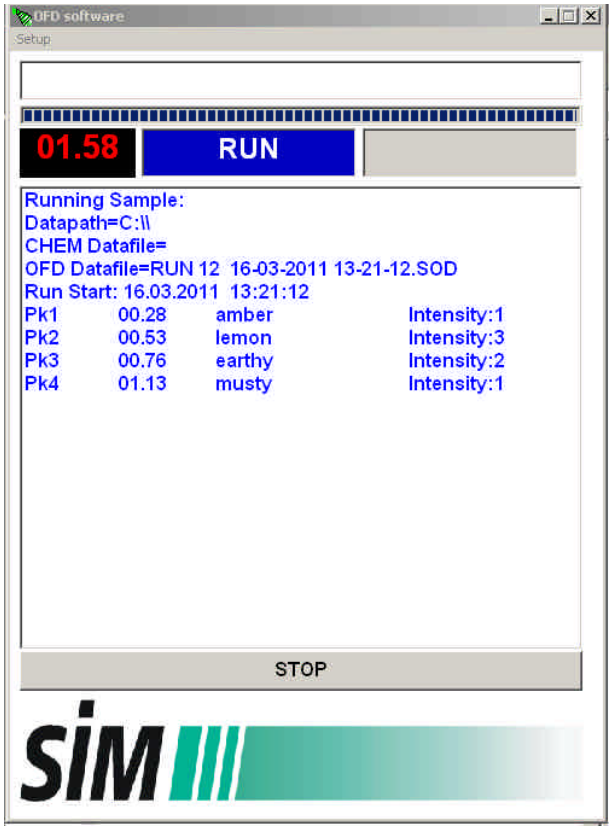
5.4 Pen tablet

Install the pen tablet in accordance with the operating instructions provided with the product:



1. Attach the pen tablet to a standard USB port and set it comfortably by your keyboard. An input field will appear on the computer monitor.
2. Start using the pen to edit your odor impressions or shortcuts (defined in the “shortcut entries” list).

5.5 Data Acquisition of Odor Impressions



1. Start the OFD software.
2. If you use ChemStation software recording of the data starts automatically with the GC run (see run time field on the left of the OFD software window).
3. Using the mode “standalone” (see 5.1) you have to click on the **START** button in the OFD software window to start data recording.
4. You have different possibilities to record your odor impressions:
   • keyboard only by typing the word or the shortcut (defined in the keyboard shortcut list, see 5.3)
   • “Shortcut Button List”(see 5.2) and the mouse
   • pen tablet (see 5.4) by writing the word or the shortcut
5. Besides the odor impression you can enter a number to describe the odor intensity.
6. During the preset time for one odor impression (e.g. input time delay 2 seconds, see 5.1.3) all entries are recorded in the status line.
7. At the end of the preset time all shortcut entries are converted into the long form and to all numbers “intensity” is added. These entries together with the retention time are recorded in the data file (see main field of the OFD software, figure above).

6 TECHNICAL DATA

Power	40 V, max. 30 W
Transferline Temp.	up to 300 °C
Humidifier Gas	air
Make-Up Gas	N_2, He