



APLAB OLFACTOMETER

USER'S MANUAL

Version 2.0 - 2020





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Viale del Vignola 75, 00196 Roma (Italy)

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Author: Nunzio Lanotte



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1 INTRODUCTION

APLab Olfactometer is a device designed for smell research.

This manual provides a detailed description of the device and its software, and the instructions for use and maintenance of **APLab Olfactometer**. The Olfactometer was originally designed by Dr. Dwight Hector.



2 WARRANTY

The *device* is guaranteed for a period of *24 months* from the purchase date, certified by a receipt or invoice
Warranty doesn't cover normal wear and tear or defects caused by rough handling.



3 COMPLIANCE AND SAFETY

APLab Olfactometer is a laboratory device without medical approval according to 93/42/ECC directive.

It may only be used on healthy subjects.

APLab Olfactometer has been designed and built to meet the strictest standards for the safety of people and things. Every measure has been adopted to avoid risks to the users.



4 SYSTEM DESCRIPTION

APLab Olfactometer consists of 8 independent channels (OC) for delivering odorants to a subject and 2 Flow Channels (FC) delivering filtered clean air (Figure 1)

The main characteristics of the system are listed hereafter:

- computer-controlled delivering sequence;
- odorants contained in vials;
- technopolymer inserts and manifolds;
- flow meters with adjustable orifice to set the air flow and the odorant concentration;
- valved inlet and outlet manifolds;
- filtered air supplied by oilless compressor
- PC control interface via USB connection;
- Communication via Ethernet between control PC and external device for E-Prime synchronisation
- Electric parts protected by removable carter
- Mounted on inox steel trolley



Figure 1: Front panel with flow meters and channel numbers.



Figure 2: Rear view (carter removed). Valves and connections.



Figure 3: Power supply unit



Figure 4: Odorant vial holder with valved connections and outlet manifolds. Odorant subchannels are marked by a coloured ring

The main functional characteristics of the system are detailed hereafter:

- each Odorant Channel (OC) consists of 2 subchannels, one delivering the odorant and the other delivering clean air (ballast).
- each of the Flow Channels (FC) provides a constant flow of filtered clean air that acts as a carrier for the odorants
- the ballast subchannels are normally open, the odorant ones are closed. When a OC is activated by the computer generated sequence, the ballast subchannel is switched off and the odorant subchannel is switched on. When the OC is deactivated the opposite happens
- the two FC are always open and independent of each other. The first (FC1) provides clean air flow for odorant channels 1 to 4, the second (FC2) provides clean air flow for odorant channels 5 to 8.
- In the outlet manifolds, the odorant flow is mixed with the flow of clean air and delivered to the subject
- the flow is controlled by the opening time of the valves and regulated by the adjustable flowmeters
- working pressure < 0.7 bar
- check valves on odorant lines ensure that no odorant can flow into the clean air circuit

Figure 5 shows a schematic of the channel structure.

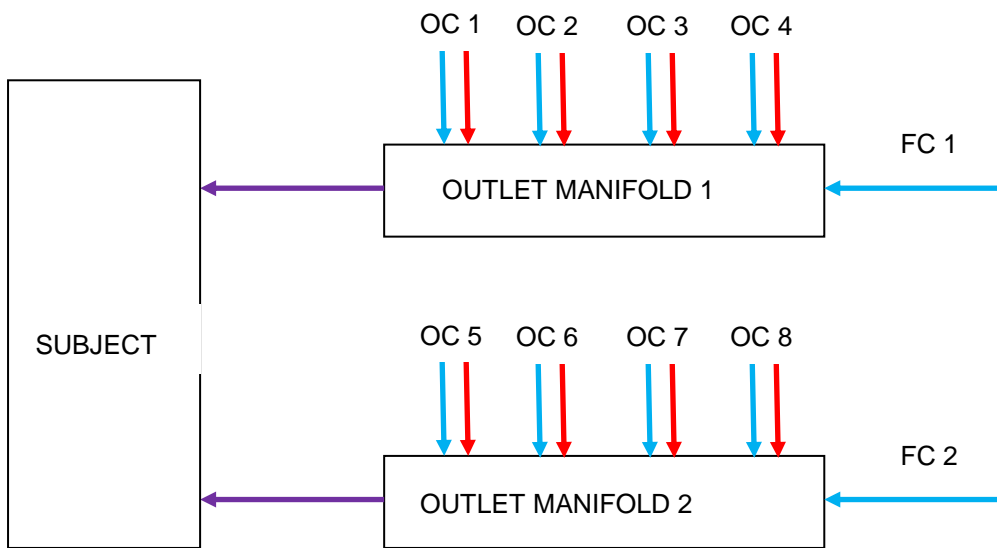


Figure 5: schematic of the air flow of the olfactometer. Blue arrows represent clean air, red arrows represent odorants, purple arrows represent clean air mixed with odorants.

5 USING THE SYSTEM

5.1 System requirements

- OS: Windows 7,8, 10
- Disk space > 500 MB
- 1 GB (32-bit) or 2 GB (64-bit) RAM
- Intel Pentium III class processor, 1.6 GHz or higher

5.2 Installing the software

Before installing, make sure that you have admin privileges.

Install the PC control interface software by clicking on the *setup.exe* file found in the accompanying CD.

5.3 Using the device

To start using the device:


- Fill in the vials with odorants
- Connect the power supply cable to the power unit (see Figure 6)
- Connect the USB cable to a USB port of the PC and to the USB port on the Olfactometer
- Press on the Power button. The green light switches on
- Turn the PC on. Click on the  icon to start the program. The window represented in Figure 7 will appear
- Refer to the user's manual of the PC control interface for the detailed description of the software



Figure 6: power cable and switch

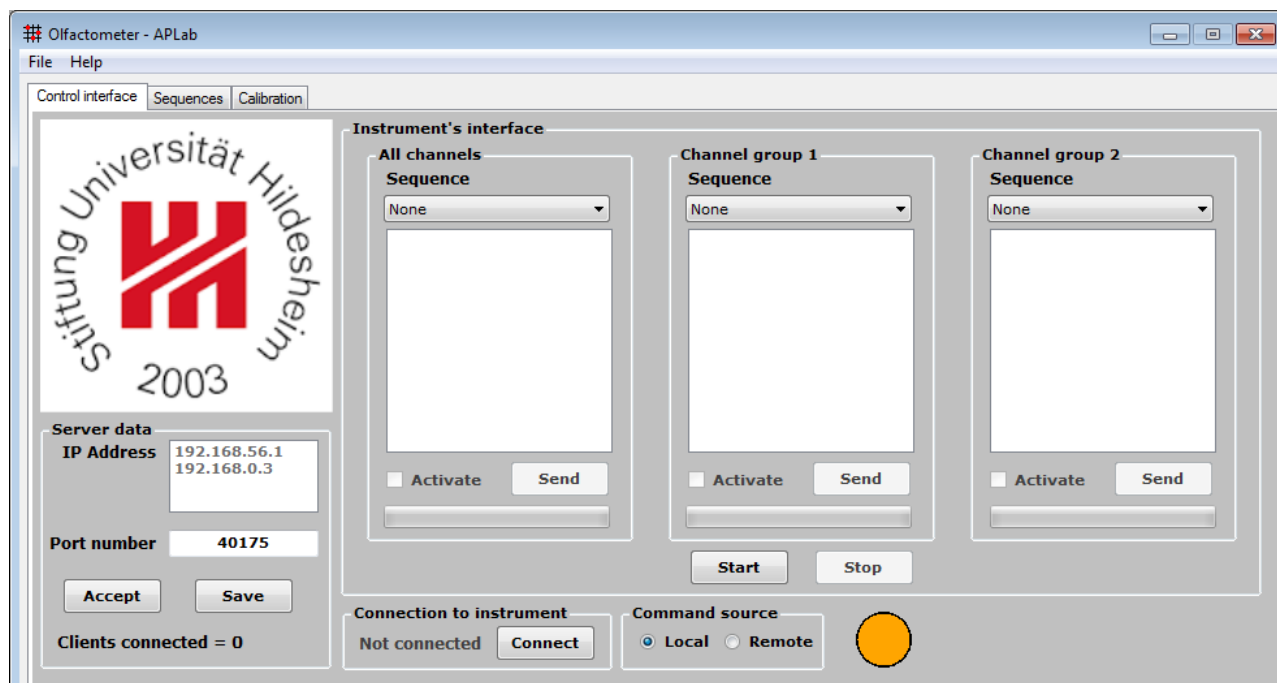


Figure 7: main window of the **APLab Olfactometer** PC control interface.

5.4 Channels calibration

The flow rate of each channel can be adjusted using the valves on the flowmeters. The ballast and odorant subchannels of a OC must have the same flow rate in order to avoid a variation of flow when the channel is activated. To calibrate the channels, click on the *Calibration* tab of the control interface. The following form will appear:

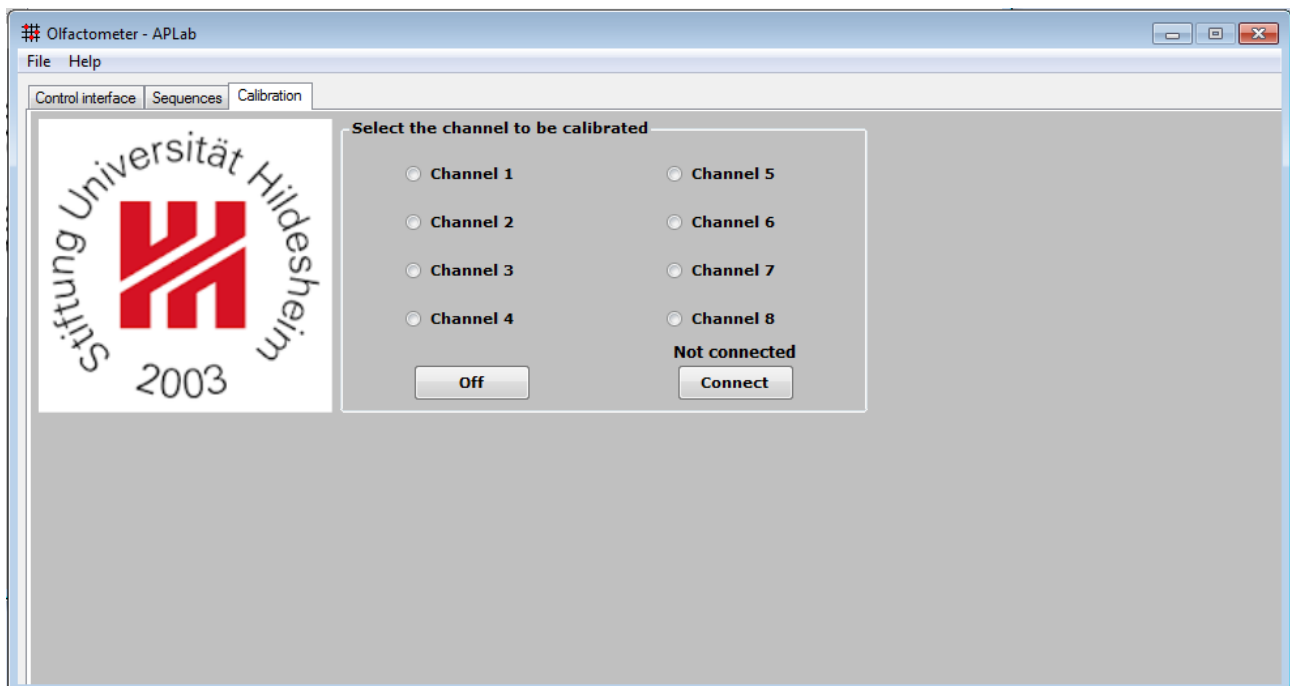


Figure 8: calibration window of the **APLab Olfactometer** PC control interface.

The ballast subchannels of all channels are open. If we wish to regulate the flow of OC1 to, for example, 3 l/min, first we adjust the ballast channel (B in figure 9) to 3 l/min, then we click on the *Channel 1* radio button. The ballast subchannel will be switched off and the odorant (O in figure 9) on. We can now adjust O to the same flow rate.

The concentration of the odorant of OC 1 is given by the ratio of the flow rate of OC1 to the sum of the clean air flow rates of ballast subchannels #2, 3 and 4 and the FC1 flow rate. If for instance the flow rate of OC1 is 3 l/min, the flow rate of FC1 is 5 l/min, and ballast channels #2, 3 and 4 are set to 2 l/min, we have:

$$\text{Concentration} = 3 / (5 + 2 + 2 + 2) = 3 / 11$$

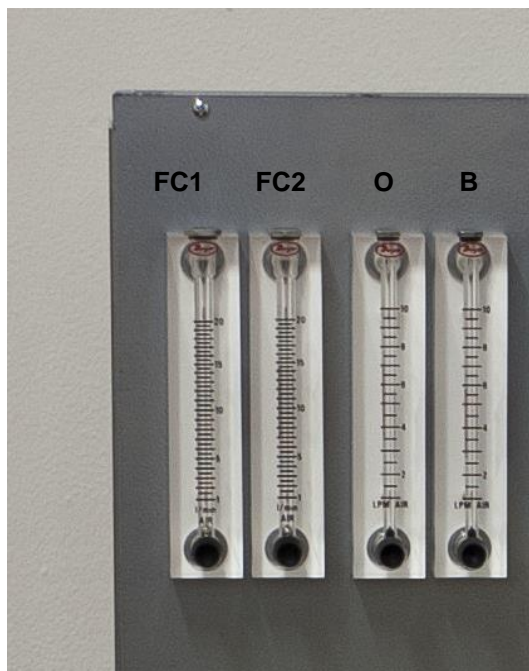


Figure 9: FC 1 and 2, and OC 1 with Odorant and Ballast subchannels

5.5 Synchronisation

Synchronisation to an external device is managed in the control PC. Please follow the instructions in the software user's manual.

6 FILTER REPLACEMENT

The air coming from the pump is filtered by a cartridge filter which also acts as a condensate collector (Figure 9).



Figure 8: Air filter

To replace the cartridge, unscrew the condensate tank then the cartridge and replace it with a new one.

Make sure that the cap at the bottom of the tank is closed to prevent air leaks. On some versions of the olfactometer the filter is placed inside the power unit.

7 TROUBLESHOOTING

1. The PC control interface can't be installed
 - check that the PC has the characteristics detailed in par. 5.1
 - check that .NET Framework 3.5 is installed
 - call APLab for support

2. the PC control interface it doesn't connect to the device
 - check that the device is switched on and the green light is on;
 - check that the USB cable is properly connected;
 - on the control panel-system-device manager window, verify that the device appears in the COM ports list (it is listed either as USB to Serial device or as Arduino)
 - call APLab for support.

3. The air pump doesn't start
 - check the integrity of the electrical connections to the compressor;
 - check the integrity of the fuse placed by the power button
 - call APLab for support.

4. one or more odorants are not dispensed
 - check the integrity of the pipes in the odorants line removing the carter on the back of the machine;
 - make sure that the odorant vial is properly closed
 - increase the flow rate using the potentiometer;
 - call APLab for support.



8 SUPPORT

For support contact:

APLab

Viale del Vignola 75

00196 ROMA

tel. +39 320 1456792

E-mail: info@aplab.it