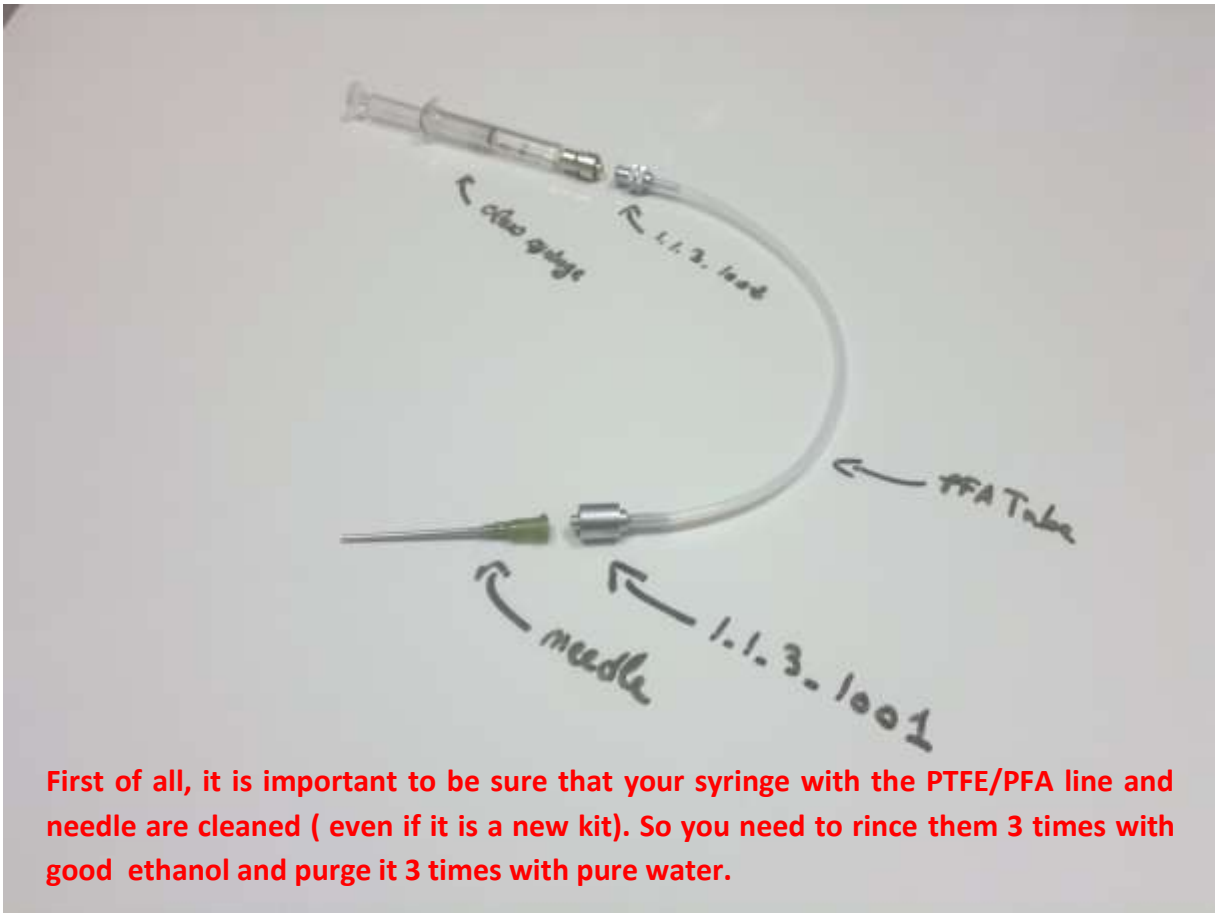
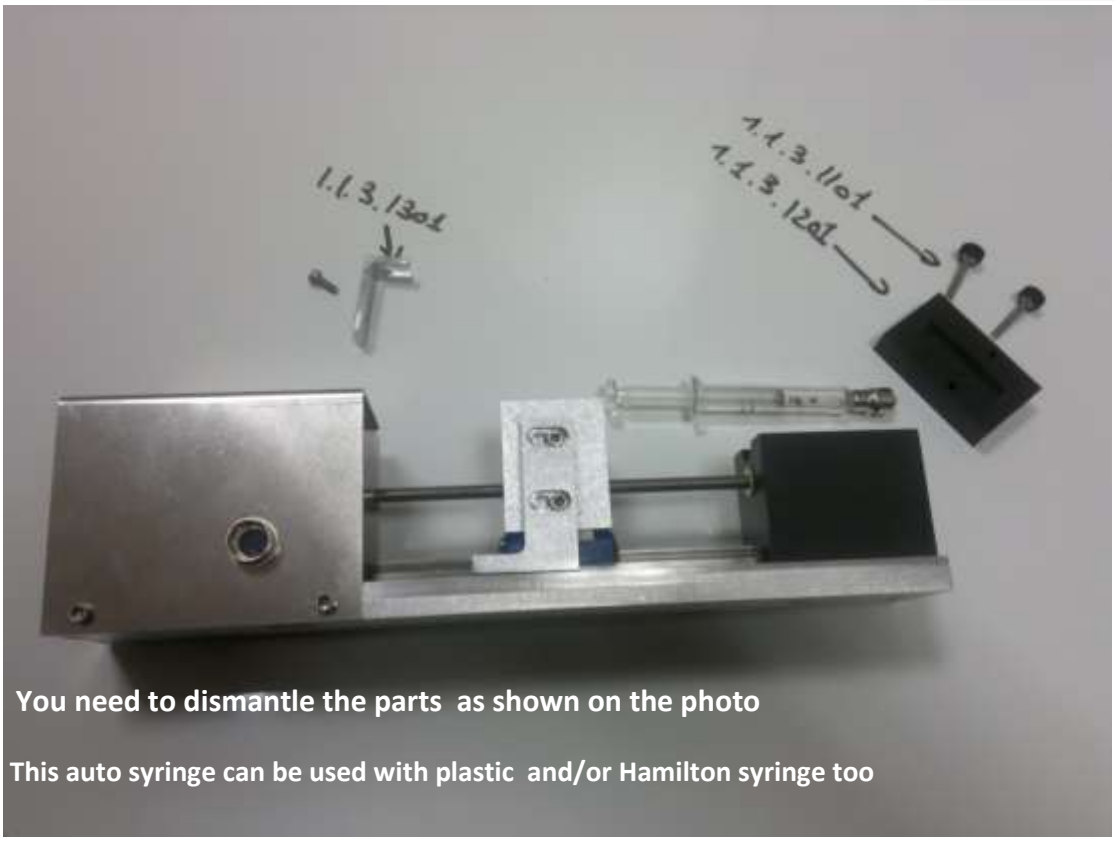
Procedure to use your automatic syringe v2 type

§1 - Installation of the syringe



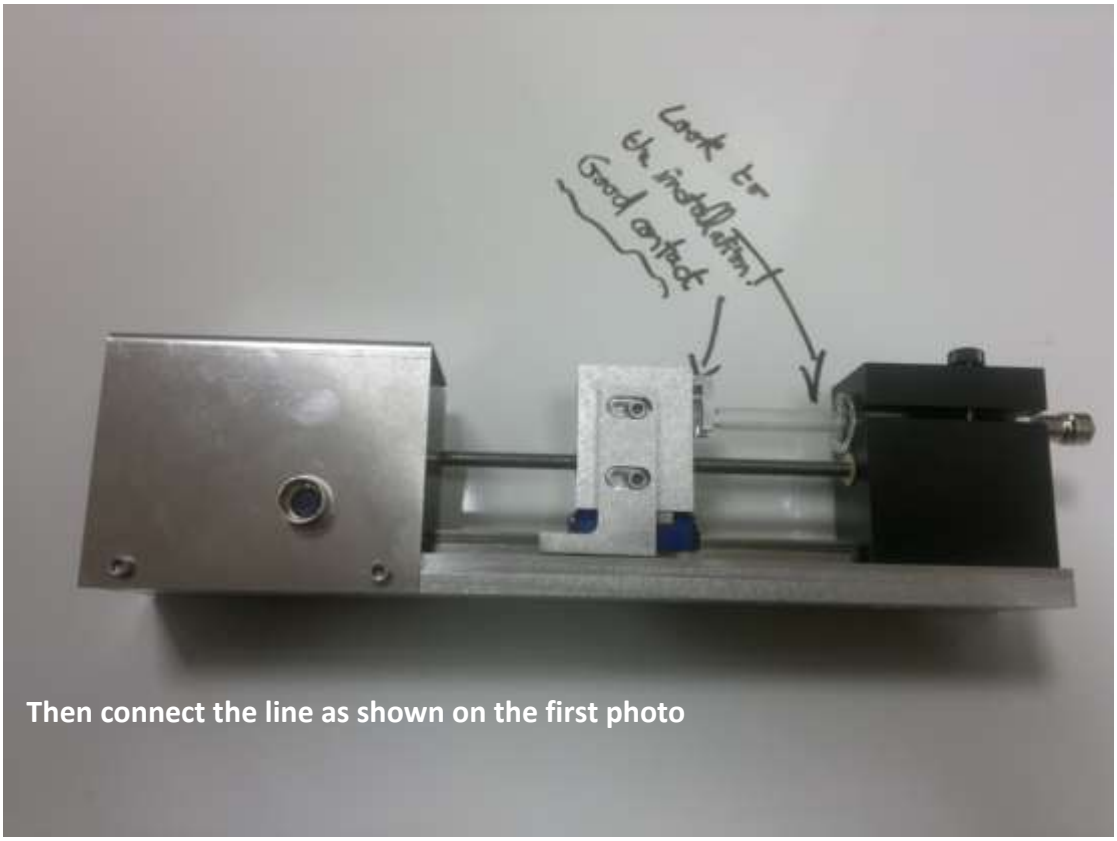
First of all, it is important to be sure that your syringe with the PTFE/PFA line and needle are cleaned (even if it is a new kit). So you need to rince them 3 times with good ethanol and purge it 3 times with pure water.

Once this has been done.



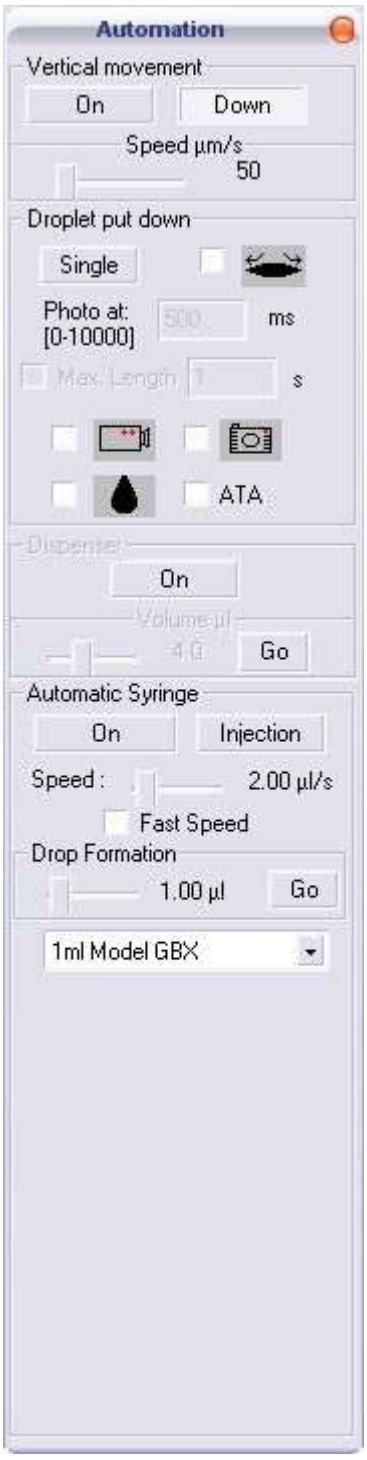
You need to dismantle the parts as shown on the photo

This auto syringe can be used with plastic and/or Hamilton syringe too



Then connect the line as shown on the first photo

§ 2-Automation Window / Version single automatic syringe (With Mobile syringe or Table /Without tilting table)



Vertical movement

➢ To move the syringe up and down manually

If the buttons display On- Down, by clicking On the syringe will move down. The button On will be changed in Off

The Speed µm/s will help the user to adapt the mobility depending on application.

Droplet put down

By clicking on **Single** the syringe

> Either will move down automatically if the syringe is mobile. Once the needle is visible in the screen, the needle stops automatically moving down.

> Or the table move up if the table is mobile.

By clicking this icon , you activate the automatic syringe to dispense the liquid during the process of automatic deposition of the droplet on the surface.

Before starting your deposition, you need to set your software to:

Get a **Speed** of dispense

Volume of **Drop Formation**

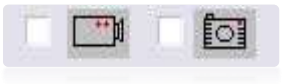
Select the type of syringe used

The **Fast Speed** selector is only **to** refill the syringe quickly.

Explanations of other buttons

By deselecting this icon, you can record a sequence or a photo once the droplet has touched the surface

If it is selected, the software starts recording of a sequence as soon as the **Single** button has been activated.



Click on the Camera if you want to record a sequence and on photo if you want to take a photo

Once you have selected photo, you can input the value in ms. This The photo will be grabbed at this time once the droplet has been in contact with the surface if the icon  has been deselected.

Information very important

Case of wrong dispensed liquid volume

Case 1 : You have dispensed volume of droplets with a good accuracy and complete good measurement of contact angles. Then you stop using the instrument for 5 minutes

You want to dispense a droplet of 2 µL and the volume dispensed (and/or displayed with Volume Estimation) is only 0.1 µL or you see nothing or a a wrong volume is displayed.

Why ?

The rate of evaporation of the molecules of water is approximatively (only for rough idea) is about 0,1µL- 0.3µL /15 s (or more) so after 5 min the needle of is empty of liquid.

If you are using a needle of 25 mm length and 0,81 mm of outside diameter, the volume is approximatively is 12 µL. So you might be obliged to clicked 6 times on liquid dispense before a droplet is dispensed.

Other explanation: You have some liquids in the line and after one night due to the fact that all walls are porous, some very small bubbles are available in the line. So because the air is compressible, when you ask for a volume the volume dispensed is not the good one. And this is very obvious for some small volume of liquids (below 2µL). Because your line has a dead volume of 200 µL -300 µl around so the sum of quantity of bubbles available is very near 1 or 2 µL or more.

Case 2 : You have dispensed a volume of 2 µL and the volume displayed with Volume estimation is wrong.

The value in µm of Pixel is wrong. You need to calibrate it. Go to Measure > Calibration > Enter the value of the outside diameter of the needle.

What volume to dispense?

When a droplet is put on a surface, the diameter of the droplet reaches a particular value named capillary length. At this value the forces due to the gravity equals the forces due to the surface tension. So that, above this value, the hydrodynamic forces play an unwanted role in the shape of the droplet. When we apply a droplet at a certain volume, we measure the diameter of the droplet. If it is below the value of the capillary length, the value of volume is good. If the diameter is above, the volume must be decreased.

Calculation of the capillary length of a liquid

By definition

$$L_c = \sqrt{\frac{\gamma}{gd}}$$

Where :

γ is the surface tension of the liquid in mN/m

g is the value of the gravity ($m.s^{-2}$)

d density of the liquid (no unit)

A.N. : γ_{Eau} = 72,8 mN/m / 20°C

Earth gravity : 9,81 m.s-2

Density of water = 1 / 20°C

Capillary length = 2,73 mm

§ 3 How to fill up your glass syringe with highly viscous liquid (Glycerol for exemple)

Prepare a clean beaker with glycerol and fill it with a volume of 1 mL

Use a disposable syringe to fill up the glass syringe from the top

And a non contaminated glass syringe with spring (for manual syringe only)

Suck the glycerol inside the disposable (plastic) syringe and clean it at the top with paper.

Put the Glycerol from the top of the glass syringe carefully

Insure no bubble is visible.

You are ready to work without any leak

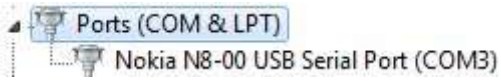
§ 4 Resolution of connections problem

If you need to connect your Digidrop with a RS232-USB Converter, it might be happen that the instrument fails to start automatically once this 

icon is activated. The following box is displayed.

To solve this communication problem click on 

Go to Control Panel > System > Hardware Settings > Device Manager > Search for COM Port – LPT > Prolific USB Serial and read the value of the port. Here it is COM 3



Put this value in the below windows box after clicking on 

If this window doesn't appear, you need to rename your exe file. Go to C:/Digidrop and search for Windrop ++ or Visiodrop . Rename it for a while (for exemple Visiodroptest.exe). Click on it. The software restarts and by clickin g on 

The Serial Communication Window is displayed again. Enter the Port number and press Ok. Your instrument is connected. The automation is ready to work.