



# High Speed Flavor And Fragrance Injector

## LMHFI-A100

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## 1. Safety Measures

### Precautions for use:

- Before starting the injection, be sure to confirm the size of the cigarette adapter and whether the cigarette bracket is installed.
- Applicable diameter range of cigarette adapter and cigarette bracket:  $\Phi 4.5$ - $\Phi 5.5$  (red),  $\Phi 6.5$ - $\Phi 7.5$  (black),  $\Phi 7.5$ - $\Phi 8.2$  (blue).
- The spice bottle shall not be less than 0.5ml of spice (if rehydration is required).
- If the injection dose is less than 1ul, it is recommended to use a 25ul or 50ul injector.
- When the filter rod is injected, the insertion speed is recommended to be no more than 5mm/s.
- When injecting viscous spices into tobacco, it is recommended that the number of injections at one time should not be more than 200 (the outer wall of the needle and the residual spices in the guide hole need to be cleaned before the injection can be continued).
- When injecting viscous spices, the rehydration speed should be adjusted accordingly, and the rehydration delay should be increased.
- After each injection, the pilot hole, the injector, and the needle must be cleaned, and the injector cannot be soaked in alcohol when cleaning; It is recommended to use 50°C to 90°C alcohol suction for cleaning.
- Before using this instrument, please be sure to read this manual carefully; The function and precautions of each component can be used only after the operation is clarified.
- This instrument is a precision instrument, and it must be handled with care when handling and placing it.
- Microsyringes are fragile and should be handled gently to avoid injury to the needle tip.
- The injection needle is soft, and it must be confirmed that the injection needle is perpendicular to the worktable before use.
- When the instrument is installed and debugged, it must be carried out by the technical engineer of the product.
- The 220V AC power supply used by the instrument should be between 180-240V, and the power grounding wire must be grounded to prevent static electricity.
- Before turning on the power, the power switch of the host is in the "O" state.
- During the operation of the instrument, it is strictly forbidden to touch the horizontal turntable and injection needle, so as not to cause unnecessary injury.
- Without permission, it is strictly forbidden to open the back cover of the instrument, and it is strictly forbidden to repair it by non-certified personnel, so as not to cause unnecessary damage to the instrument.

## 2. Introduction

**High Speed Flavor And Fragrance Injector LMHFI-A100** facilitates up to 10 cigarettes per minute with automated functions. It features single and dual-channel modes, allowing seamless adaptation to different processing needs. Integrated with an advanced temperature system, it effectively measures a range from -20°C to 80°C. Built with a spacious bin, it holds over 600 samples, ensuring continuous workflow. Our High Speed Flavor And Fragrance Injector is designed for durability, offering reliable performance over extended periods.

## 3. Features

- Multiple Injection Modes
- Automated Flavor Dispensing
- Flexible Syringe Compatibility
- Rapid Sorting Speed
- Real-Time Monitoring System
- Compact And Lightweight
- Extensive Humidity Control
- Low Power Consumption

## 4. Specifications

| Model No.                      | LMHFI-A100                                                    |
|--------------------------------|---------------------------------------------------------------|
| Sample Length                  | 40 to 100mm                                                   |
| Sample Diameter                | Φ4.5 to Φ5.5, Φ6.5 to Φ7.5, Φ7.5 to Φ8.2                      |
| Injection Speed                | up to 10 cigarettes/min                                       |
| Sorting Speed                  | 12 pcs/min                                                    |
| Injection Volume               | 0.1μl to 25μl                                                 |
| Injection Depth                | 1 to 80mm adjustable                                          |
| Bin Capacity                   | 500 pcs (Φ8mm) / 900 pcs (Φ5.2mm)                             |
| Injection Modes                | Single-point, spiral, fixed length, and cigarette stick modes |
| Automated Flavor Filling       | 6 bottles (4000μl per bottle)                                 |
| Working Modes                  | Single-channel mode, dual-channel mode                        |
| Cigarette Loading Capacity     | Greater than 600 pcs                                          |
| Syringe Capacity               | 25μl, 50μl, 100μl, 250μl                                      |
| Injection Dose                 | 0.1μl to 25μl                                                 |
| Maximum Production Speed       | 12 pcs/min                                                    |
| Temperature Measuring Range    | -20°C to 80°C                                                 |
| Temperature Measuring Accuracy | ±0.3°C                                                        |
| Humidity Measuring Range       | 0 to 100% RH                                                  |
| Humidity Measuring Accuracy    | ±0.5%RH                                                       |
| Power Supply                   | 220V, 50Hz                                                    |
| Dimensions (L × W × H)         | 950mm × 500mm × 950mm                                         |
| Weight                         | 40kg                                                          |

## 5. Applications

High Speed Flavor And Fragrance Injector LMHFI-A100 aids tobacco research by refining flavor studies and enhancing filter aroma.

## 6. Instrument Introduction

### **Performance characteristics:**

#### **1) Precise injection:**

The transmission structure of the whole machine is made of mature and high-precision linear motion parts, which ensures the motion reliability and injection accuracy of the transmission unit. The problem is of low accuracy of similar foreign products. The injection accuracy is  $\pm 1\text{c/o}$ ; The positioning accuracy of the syringe platform reaches  $\pm 0.1\text{mm}$ , while the injection accuracy of similar foreign instruments is  $\pm 10\text{c/o}$ .

#### **2) Precise positioning:**

The high-precision platform and precision control ensure the accurate positioning of the injection position, and the positioning accuracy reaches  $\pm 0.1\text{mm}$ .

#### **3) Efficient production:**

The cigarette clamping and rotating module adopts a flexible cigarette loading structure, which works at the same time at multiple stations, which doubles the injection efficiency and solves the problem of low injection efficiency of similar foreign products. This instrument can complete three stations at the same time, and the production capacity is up to 12 pieces/minute, while similar foreign instruments can only be injected in a single station, and the production efficiency is only 1 piece/minute.

#### **4) Intelligent control:**

The design of the liquid injection module adopts the design ideas of low inertia, high speed and high acceleration, and innovatively realizes the automatic supply of spices through the strict selection and testing of the driving components, which solves the problems of low degree of automation, low efficiency and low precision caused by manual reclaiming of similar foreign products.

#### **5) Powerful:**

This product has a variety of injection modes, fully considering all the user's operational needs. The three specifications of microsyringes can be freely replaced to meet the requirements of different injection doses. At the same time, the instrument meets the length of 40mm to 100mm, diameter of 4.5 mm to 8.2 mm cigarettes, covering almost all types of cigarettes on the market, greatly meeting the user's requirements. In addition, an unlimited number of instrument protocols can be created, searched, and saved.

#### **6) Easy to operate:**

The highly intelligent product and superior man-machine interface make the user experience easy and pleasant to operate, and after selecting the experimental plan, the "**start**" button is easy and the whole experimental process is carried out automatically; Real-time prompts of running status, operation status, and error information.

7) **Easy maintenance:**

The moving parts of the instrument are magnetically fixed, which is extremely convenient and easy to replace and disassemble. The microsyringe can be installed and positioned with only a magnetic attachment. The microsyringe is equipped with a single needle that meets all injection requirements and is versatile, and does not require frequent replacement. Few parts need to be cleaned after the experiment, and the spice bottles, guide heads, microsyringes, etc., are easy to move and clean, and can be directly put into the ultrasonic device for cleaning and other disinfection methods for disinfection.

8) **Silent and environmentally friendly:**

The product enables quiet operation. It eliminates the trouble of high noise in the operation of similar foreign instruments.

9) **High experimental reliability:**

This instrument adopts automatic extraction of flavors and fragrances, and very small injections can be made with small-volume syringes, which reduces the volatilization of flavors and fragrances, improves the reliability of the experiment, and improves the injection accuracy. However, similar foreign instruments use large-capacity syringes to load many flavors and fragrances at one time in a manual way to complete multiple injections.

## 7. Installation

### 7.1 Working conditions

1) **Working environment**

Temperature: 0°C-50°C Humidity  
5%-95% (non-condensing)

2) **Storage environment**

Temperature: 0°C-70°C  
Humidity: 5%-95% (non-condensing)

### 7.2 Placement and installation of the instrument

The instrument should stand upright on a sturdy laboratory bench that can bear a weight of at least 100 kg and no vibration interference is allowed on the bench.

**Note:**

- The instrument can only be placed and operated horizontally, and no other items should be placed on it or placed anywhere on it.
- Plug the instrument power cord into the power socket in the laboratory, and the socket should meet the power supply requirements of 220V10A.

## 8. Operations

### 8.1 The start of the instrument

Power on the air pump and make sure the air pump valve is open. After the instrument is installed and connected, the "I/O" power switch on the right side of the instrument can be closed (as shown in **Figure 1** below).



**Figure-1 Instrument buttons and interfaces**

After the instrument is powered on, the computer automatically starts the Windows operating system and opens the instrument application to enter the login interface (as shown in **Figure 2**). If the user close the application halfway, find the "**Flavor and Fragrance Injection Instrument**" on the computer desktop, and open it to enter the program login interface. Enter the username and password to enter the main interface of the instrument control.



**Figure-2 The computer automatically enters the application login page**

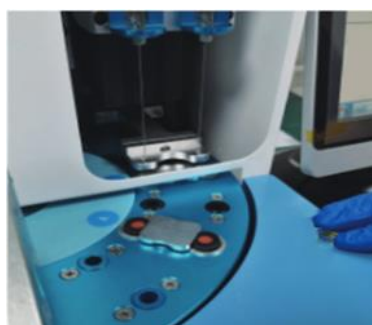
**Note:** Before the instrument leaves the factory, the username and password have been set, and the user should log in.

The user must start in the order required by this section, especially to connect the air source, and then log in to the "**flavor and fragrance injector**" instrument control program; Otherwise, errors will occur due to insufficient air pressure in the instrument, and the device will not work properly.

### 8.2 Loading of flavors and fragrances

As shown in **Figure 3**, first move the spice bottle fixing plate upward, then put the spice bottle containing the spice into the round hole, and finally close the fixed plate and press the spice bottle. (Magnetic attachment)

Place A, B, C, and D spice stations in the designated positions of the horizontal workbench, respectively, as needed.

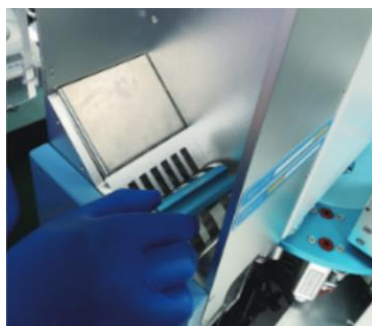


**Figure-3 Loading of flavors and fragrances**

**Note:** Users should load flavors and fragrances according to the dosage, just add flavors and fragrances in one or more of the corresponding A or B or C, or D, and tick the program interface. The minimum solution in the spice bottle is 0.5 mL.

### 8.3 The loading of cigarettes

As shown in **Figure 4**, firstly, the corresponding cigarette holder is installed on the lower cigarette roller according to the diameter of the experimental cigarette. There are three groups of cigarette holders, which are distinguished by red, blue, and black colors, as shown in **Figure 5**.



**Figure-4 Install the cigarette holder**



**Figure-5**

As shown in **Figure 6**, put the experimental cigarette into the cigarette box according to the specified direction. The cigarette should be kept horizontal, and one end of the cigarette should be close to the inner wall and should not be bent or deformed. After the cigarette is loaded, the length of the cigarette  $\leq 70\text{mm}$  needs to be installed with a length adjustment block (**Figure 7**).



**Figure-6 Direction of cigarette placement**



**Figure-7 Length adjustment block installation**

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**Note:** When the length adjustment block is installed, it should not be in contact with the cigarette too tightly, and it should be kept at a distance of 1-3mm from the cigarette to prevent the cigarette from being stuck by the adjustment block during the test.

### 8.4 Injector loading

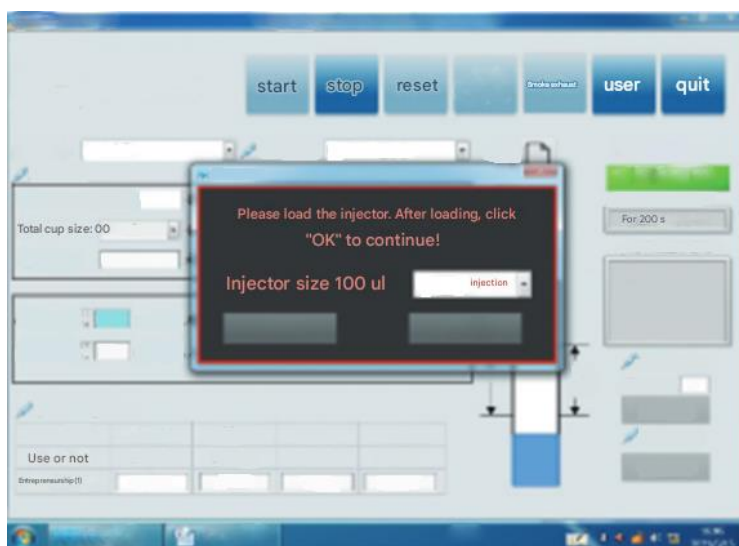
Select the appropriate size injector and install the needle as shown in **Figure 8**.



**Figure-8 Injector fitted needles**

Draw the incoming spices back and forth, manually empty the residual air in the injector, and extract a certain amount of spices; (Dual-channel injection, the amount of spice drawn from the two injectors must be the same)

Click the "**Load Injector**" button of the program to start the loading injector process, and the device will prompt you to select the size of the injector to be loaded and select single-channel injection or dual-channel injection (as shown in **Figure 9**).



**Figure-9 Selecting the injector size**

Manually load the injector (as shown in **Figure 10**); When loading the injector, the needle should be inserted into the pilot hole first (as shown in **Figure 11**).

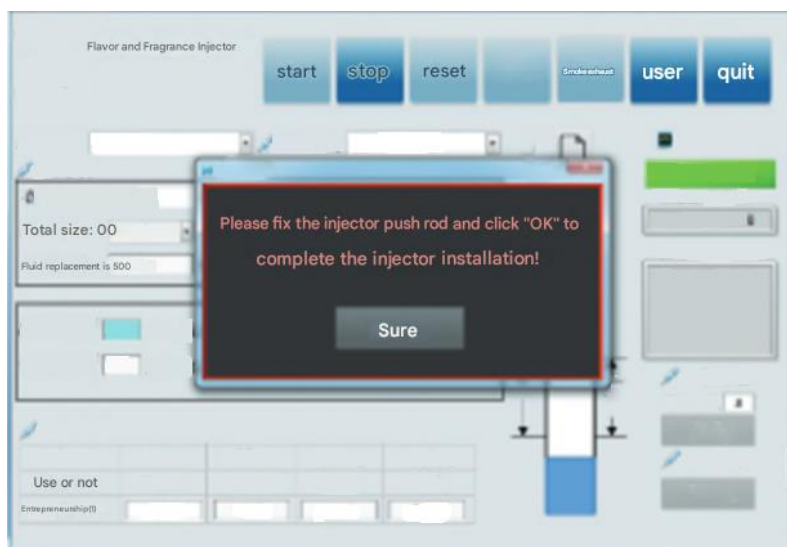


**Figure-10 Loading the injector**



**Figure-11 Inserting the needle into the positioning hole**

Click the **OK** button in **Figure 9**, and the instrument piston pusher will move forward until the program reminds the user to fix the injector pusher (**Figure 12**). At this time, the injector push rod is fixed with a fixer, and the push rod is fixed in **Figure 13**. Click **OK** in **Figure 12**, and at this point, the injector is loaded.



**Figure-12 Prompting the fixed actuator**



**Figure-13 Fixed injector pusher**

### 8.5 Initiation and execution of automatic injection

According to the needs of the experiment, fill in the corresponding parameters on the main interface of the program, click the **"Start"** button, and the program can control the instrument to automatically complete the spice injection; When the cigarette is injected, the finished product collection box is placed on the front side of the instrument to collect the finished cigarette that has completed the experiment. Refer to **Figure 14**. The finished collection box is a double-layer design, and the upper layer is removed when injecting in large quantities, so that more cigarettes can be accommodated.



**Figure-14 Collecting finished cigarettes**

When the set number of cigarettes is reached, the device will automatically stop, and the user will take out the injected cigarettes, reload the cigarettes, and click the **"Start"** button to complete the flavoring process of the same spice again. If you need to change the flavor or injector or cigarette size, you need to re-perform the above steps such as loading the cigarette and loading the injector.

**Note:** During the automatic operation of the instrument, it is strictly forbidden to touch the horizontal workbench and injection needle with your hands to avoid accidental injury.

### 8.6 Stop auto-injection

During the experiment, the user can click the **"Stop"** button to stop the experiment normally; During the experiment, if there is a lack of cigarettes in the cigarette container, the system will automatically pop up a dialog box to prompt the user, and the experiment will stop abnormally; At this time, you can add cigarettes to continue the injection, or you can abandon the experiment and stop the injection.

**Note:** After clicking the **"Stop"** button, you must click **"Device Reset"** to empty the cigarette in the adapter.

### 8.7 Cleaning up after the experiment

After the experiment is completed, the user should first click the **"Exit"** button of the program to exit the instrument control program, and then turn off the power switch on the right side of the instrument. After the experiment is completed, the spice bottle should be cleaned in time, and the equipment should be put back in its original place after drying. (Can be cleaned with an ultrasonic cleaner). Wash the injector on time and remove the pilot hole for cleaning (**Figure 15**).



**Figure-15 Remove the pilot hole**

## 9. Software Operations

### Introduction to the software interface:

The software "**Flavor and Fragrance Injection Instrument**" running on the host of this instrument integrates the functions of user management and program management, and is a complex main control software specially developed for this equipment, which is only allowed to run on this instrument.

**Note:** The path of the folder where the master software is stored and the file names of the internal files are not allowed to be modified by the user, otherwise the stability of the system operation will be affected.

### 9.1 User Login

Double-click the control software icon "**Flavor and Fragrance Injector**" on the computer desktop to enter the login interface shown in **Figure 16** below, enter the username and password, and click "**Login**" to enter the main interface of the device (**Figure 17**).

**Default user:** admin

**Password:** admin



Figure-16 Login screen



Figure-17 Main page

## 9.2 User management

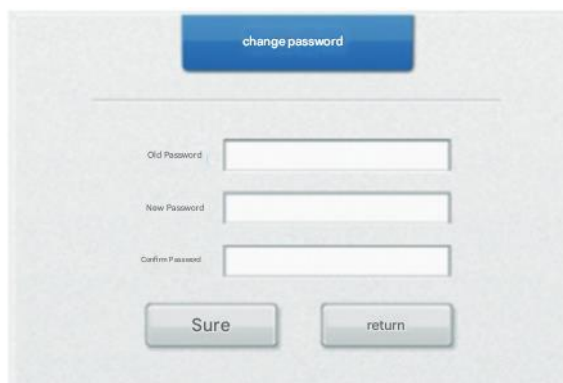
Click the **"User Management"** button in the upper left corner of the program to launch the user management dialog box, which mainly implements the management of users, including creating users, changing passwords and deleting users.

Creating a user is mainly to add new users to the program. Among them, the super administrator can create administrators and experimenters; Administrators can create experimenters; Labers are not allowed to create new users. The function interface is shown in **Figure 18** below:



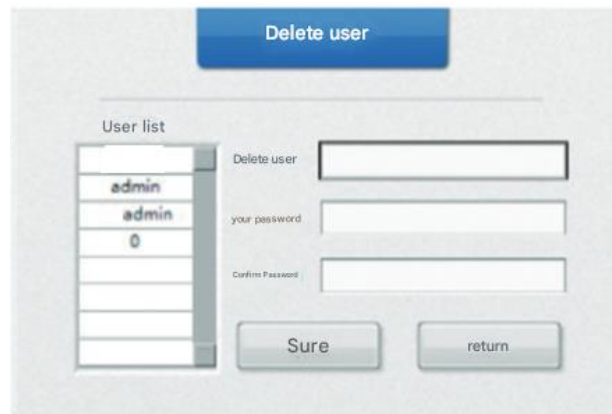
**Figure-18 Creating a user interface**

The password change function is mainly for the current user to change the login password. The function interface is shown in **Figure 19** below.



**Figure-19 The password changing page**

The delete user function is mainly for administrators to delete other users. Among them, the super administrator can delete the general administrator and experimenter; General administrators can delete experimenters; Experimenter is not allowed to delete other users. The function interface is shown in **Figure 20** below:

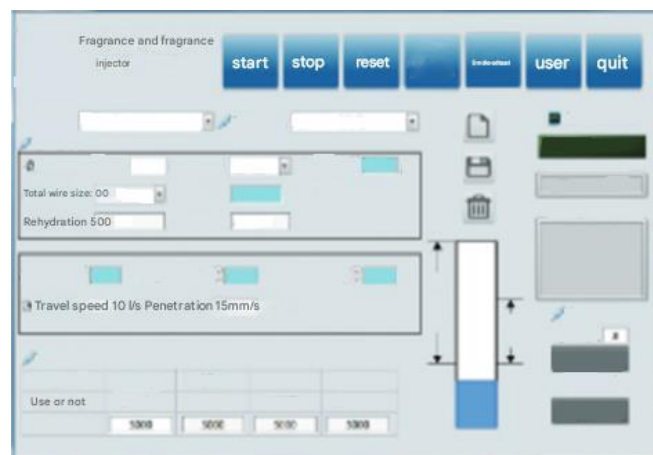


**Figure-20 Deleting the user interface**

### 9.3 Programme management

The program management function is located at the top left of the main interface of the program (the middle part of the program is the setting function area of the program details), and the program management function is mainly convenient for users to create, save, and delete the fragrance program. When the user creates a new plan, the program parameter details page is automatically cleared, and the user can enter the new plan information and save it. Program management is distinguished by program name, and program names are not allowed to be duplicated. The user can modify the existing plan information and save it, and the name of the plan is the same as the name of the existing plan when saving, and the program directly overwrites the plan with the same name. The delete function is mainly used to delete the selected scheme in the current scheme list.

### 9.4 The details of the program settings



**Figure-21 Main page**

The "**scheme name**" can be filled in freely, which is convenient for saving and calling later. The Injection Mode drop-down selects the mode required for the experiment.

Set Basic Parameters. Among them, the "**cigarette name**" does not affect the specific action of the fragrance program, and is only used for program data preservation records; "**Cigarette adapter**" according to the thickness of the cigarette, drop down to the corresponding option now; The Injector Size is determined when the injector is loaded, and is displayed here only and does not need to be changed again; "**Cigarette length**" is filled in truthfully according to the length of the experimental cigarette; "**Number of injections**" is the number of cigarettes that the user presets to be smoked, and the minimum number is 3.

"**Injection Dose**" means the amount of incense added to each cigarette, which shall not be greater than the capacity of the syringe selected by the user. "**Injection length**" refers to the length of the fragrance section in each cigarette, and the "injection length" shall not be greater than the "**insertion depth**"; otherwise, the program will prompt an error. "Injection speed" refers to the speed at which the needle injects the fragrance into the cigarette (this value is usually generated automatically and does not need to be changed). The "use or not" and "remaining amount" of the spice bottle can be set by the user according to the number of injected cigarettes and the injection dose.

The "**Insertion Depth**" is the depth at which the tip of the needle is inserted into the cigarette, and this value must be greater than the "**Injection Length**"; otherwise, the program will prompt an error. The "insertion speed" is the speed at which the tip of the needle is inserted into the cigarette, and the user can set it according to the user's needs. The "**Refill Speed**" user sets the speed at which the piston is lifted when the injector is replenished with spices; Users can set the viscosity according to different flavors and fragrances. "**Rehydration Delay**" is used to set the time for the needle to be pulled out to the maximum range position of the injector and wait for the subsequent action to be executed when the injector is refilled. Users can set the viscosity according to different flavors and fragrances.

"**Real-time status prompt**" is used to display the current working status of the instrument, alarm information and other content.

### 10. Troubleshooting

#### **Emergency stop treatment:**

If an accident occurs during the work of the instrument and needs to be stopped **"Stop"** pressed urgently, press the emergency stop as soon as possible, or click on the software interface. **"Stop"** pressed the button, or the power switch on the right side of the instrument.

**Power failure handling:** After powering on, the right **"I/O"** button light is not on, first check whether the power supply is normal and whether the voltage is between 180V-240V. If it is normal, check whether the power cord and each connecting cable of the instrument are connected, and whether the safety of the power terminal of the instrument is fused.

**Air source troubleshooting:** Check whether the air pump is connected to the power supply, whether the air pump outlet valve is open, and whether the pressure gauge of the outlet air pressure regulating valve points to 4 bar.

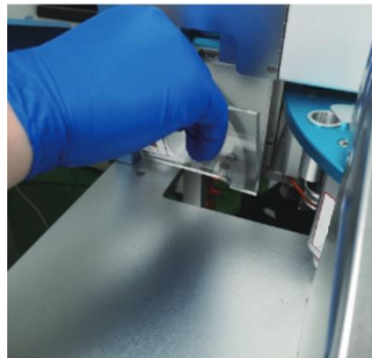
**Note:** The instrument uses an air pressure of 4 bar, and too much or too little air pressure will cause the instrument to malfunction.

**Cigarette sorting fault handling:** Turn the sorting wheel to take out the stuck cigarettes.

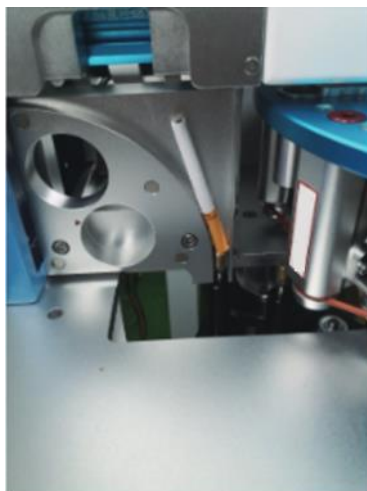
To clean up the cigarettes on the chimney, the user must click the **"Cylinder Push"** button in the main interface to eject the cigarette. Refer to **Figure 24**.



**Figure-22 Opening the protective cover**



**Figure-23 Remove the plexiglass cover**



**Figure-24 Ejecting the upper chimney cigarette**

### 11. Accessories

#### Standard Accessories

| Accessory      | Unit | Quantity |
|----------------|------|----------|
| Syringe        | Each | 1        |
| Flavor Bottles | Each | 6        |
| Spare Needles  | Pack | 1        |
| Cleaning Kit   | Set  | 1        |
| Power Cable    | Each | 1        |
| Software CD    | Each | 1        |



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