

APPLIED MEZO SYSTEMS

FIBER POLYIMIDE RECOATER

USER MANUAL

1. INTRODUCTION

Fiber Polyimide Recoater is designed to cover the fiber by PI2525 polyimide resin . The device allows covering the fiber section up to 0.5m and numbers of sections can be unlimited.

GENERAL FIBER POLYIMIDE RECOATER DATA:

Dimensions (L x W x H)	300 x 300 x 1035 mm
Weight	≤ 12 kg
Control Box (L x W x H)	300 X 120 X 200 mm
Power Consumption	≤ 300 W
AC Network Voltage	220 / 110 VAC
Diameter of the Optical Fiber	125 μm and more , see ^{*)}
Coating Length of One Fiber Section	Up to 0.5 m
Coating Speed	1 to 5 cm / min, with increments of 1 cm /min
Coating Thickness (Polyimide Film)	see ^{*)}
Number of Ovens (Zones)	3
Temperature Control	Separate for each oven
Maximum Heating	Up to 300 °C
Counter of Passed Section	Yes
Number of Optical Fiber Coating Layers	Not limited
The Total Length of the Optical Fiber , which can be covered	Not limited
Ambient Temperature Range	20 °C to 40 °C

*)

a. The diameter of the coated optical fiber is 125 μm

b. The diameter of the coating the origin optical fiber (cladding) is 3 types:

- 145 μm (polyimide)
- 155 μm (polyimide)
- 250 μm (acrylate)

c. After removing the cladding , the area (where a structural change in the fiber is made) is covered on the Recoater : for every pass up and down the fiber is covered with a layer of polyimide 2.5 μm - 3.0 μm thick.

For example, for 5 passes up and down (10 layers) the total diameter of the coating will reach 150 - 155 μm.

2. DESCRIPTION

2.1. General view of the device is shown in Fig.1

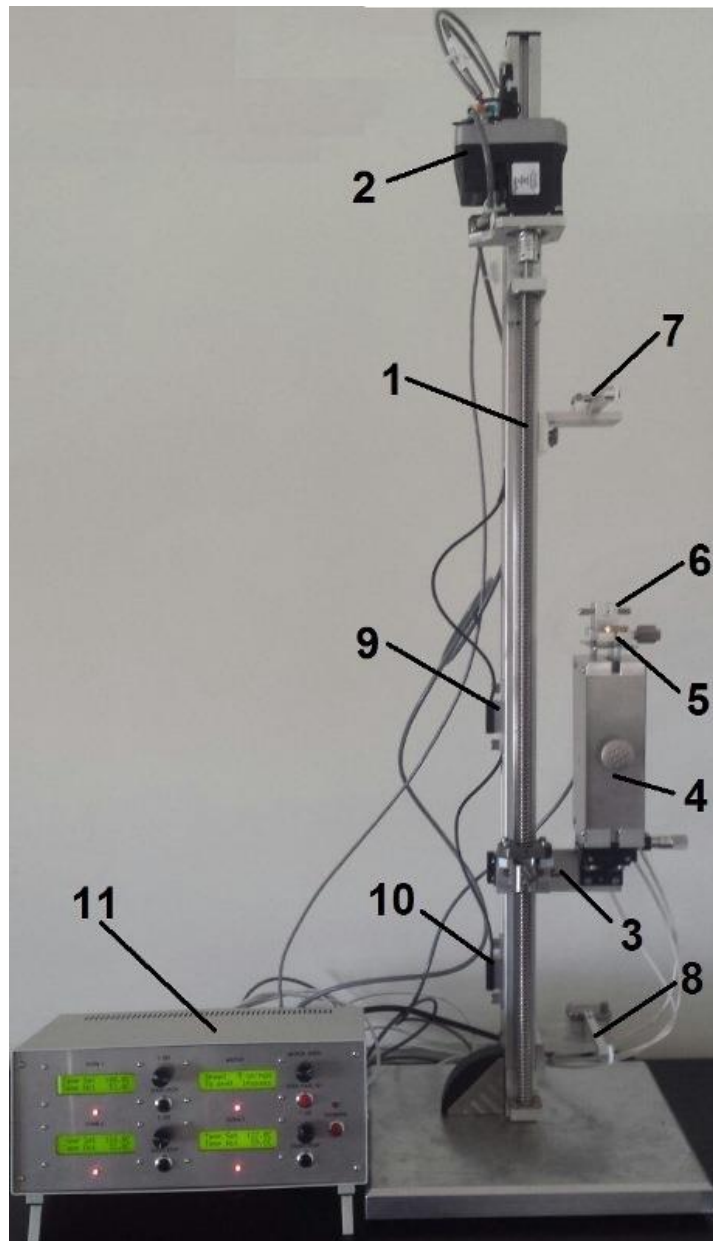


Fig.1 General view of the device

Fiber Polyimide Recoater consists of a vertical ball screw 1 driven by a motor 2. While rotating screw 1 moves the carriage 3, on which three-zone oven 4 and polyimide coating die 5 are mounted. Polyimide coating die 5 consists of two splitted part-moieties. (see Fig.2). It is also equipped with screw 5a and clamp screw 5b for coating die fixing. Above the coating die 5 there is a slot into which the tweezers 6 can be mounted. On the ends of tweezers 6 cotton tips are sometimes installed for ensuring the uniformity of the fiber coating and cleanup it (see Fig.3)

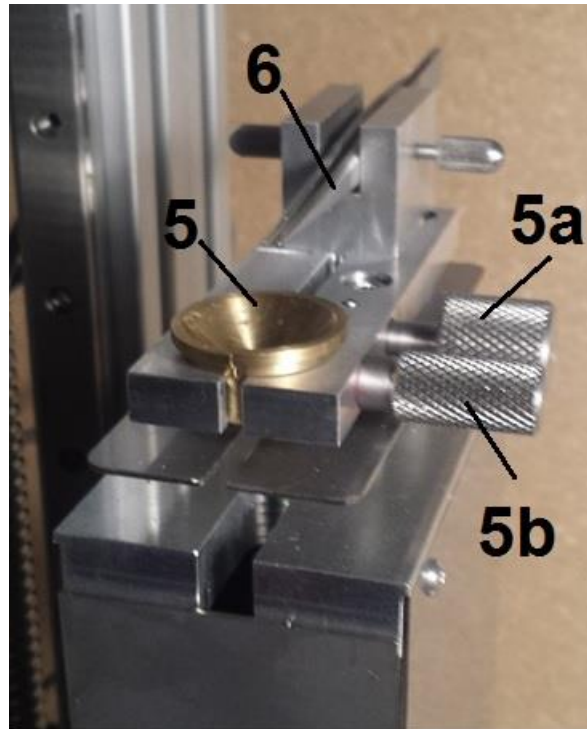


Fig.2 Polyimide coating die

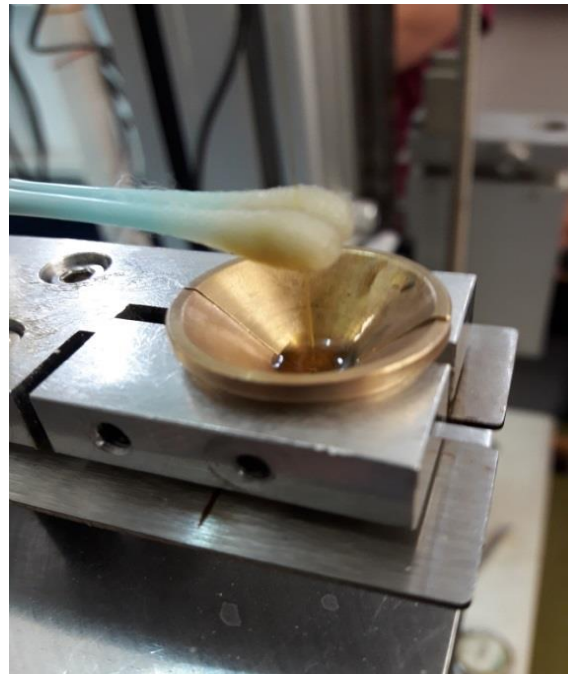


Fig.3 Cotton tips on the ends of tweezers

Fiber holders **7** and **8** are mounted on the upper and lower sides of the screw pillar.
Upper fiber holder is shown in more details in Fig.4. Lower fiber holder has the same construction.

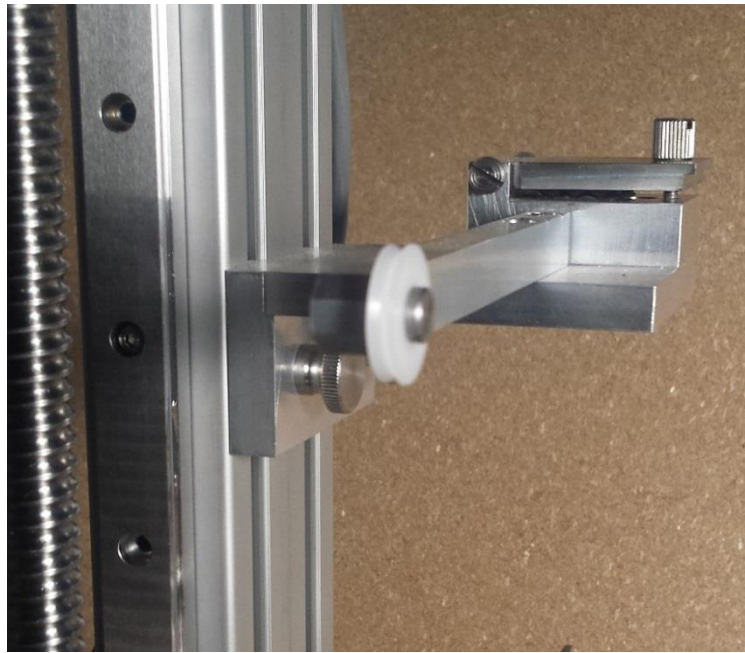


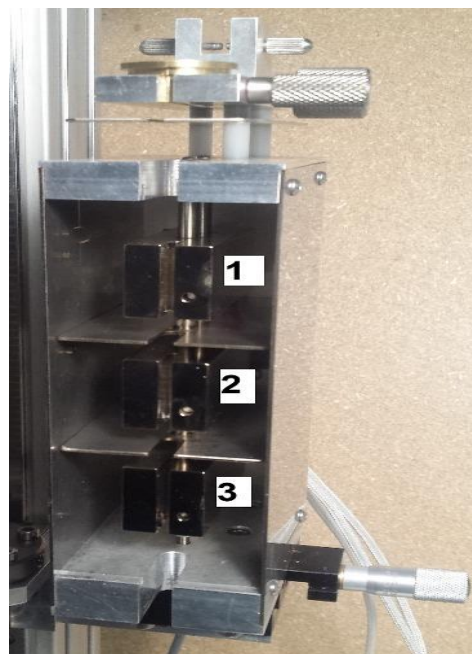
Fig.4 Upper fiber holder

Moving the carriage is limited by two limit switches **9** and **10**.
Heating control of the three-zone oven and carriage movement is carried out by control box **11**.

2.2. Three-zone oven is shown in Fig.5



Cover closed



Cover opened

Fig.5 Three-zone oven

Three-zone oven is equipped with three ovens, the numbering of which corresponds to the numbering of the ovens on the control box.

2.3. Limit Switches is shown in Fig.6

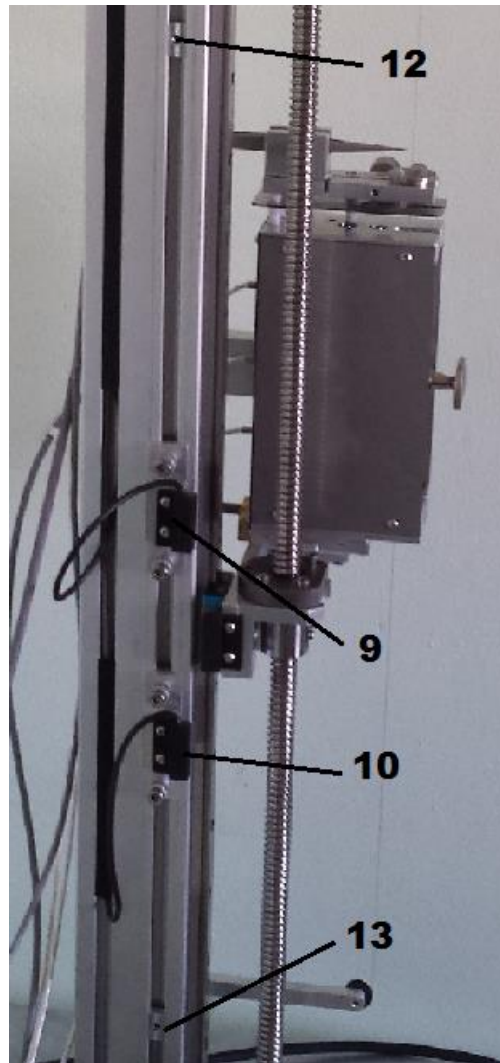


Fig.6 Limit Switches

The upper **9** and lower **10** limit switches determine the fiber length of coating. These switches can be moved along the pillar and secured with their knob screws. Inside the pillar upper **12** and lower **13** set screw limiters are mounted. These limiters determine the lowest and the highest position of the oven carriage, in which the carriage can damage the upper and lower fiber holders.

Pay attention. The upper and lower limit switches should always be positioned between upper and lower limiters.

2.4. Control Box is shown in Fig.7, Fig.8



Fig.7 Control Box _Front Panel



Fig.8 Control Box _Back Panel

The control box has 4 control regions: **OVEN 1**, **OVEN 2**, **OVEN 3** and **MOTOR**.

Each **OVEN 1**, **OVEN 2** and **OVEN 3** region is equipped with display, encoder **T_SET**, push-button **OVEN START/STOP** and red LED which lights when the OVEN is on. The desired temperature is set by encoder **T_SET** and displayed as **Temp Set** .By pressing **START/STOP** push-button the corresponding oven is turned on and the oven LED is lightened. Actual (measured) temperature of the OVEN is displayed as **Temp Act**.

MOTOR region is equipped with display, encoder **MOTOR SPEED/PUSH_PASS_SET**, push-button **START/STOP** located below the encoder, push-button **HOMING**, red and green LEDs. The desired speed (1 - 5 cm/min) is set by encoder and displayed as **Speed**. To set the desired number of passes (equivalent to fiber coating layers) it's necessary to press on the encoder knob, to set number of passes and then to press encoder knob again that displayed as **To end: N passes**. By pressing **START/STOP** push-button motor is turned on, red LED is lightened and the carriage starts to move up and down at a predetermined speed.

To quickly move the carriage to start position must be pressed the **HOMING** push-button, green LED is lightened and the carriage starts to move to homing position (position defined by lower limit switch). This function is performed only when the main processing is not performed.

3. Device operation

3.1. Preparing device

- Open screw **5a** for coating die fixing (Fig.2);
- Insert first die moiety and fix it with die fixing screw **5a** (Fig.2);
- Insert fiber into the slot between two fiber holders **7** and **8** (Fig.1);
- Insert second die moiety and fix it with clamp screw **5b** (Fig.2), at that fiber should be within the die hole;
- Fill the die with small amount of polyimide resin;
- Set the desired range of fiber coating using the upper **9** and lower **10** limit switches (Fig.6);
- If the carriage is not in the home position, turn on **HOMING** operation (as specified in section 2.4.). At the homing position control box will give a short “beep” signal, so you can begin the coating process of coating according to the operation instructions.

3.2. Operation

- Set the desired temperature for each oven and turn on them (as specified in section 2.4.). The process of heating up to set temperatures takes usually 20 to 30 minutes.
If PI2525 polyimide resin is used and depending on the fiber type, the oven temperature is usually set within (adjust by experiment) :
 - Lower oven (**OVEN 3**) - 270 °C to 300 °C;
 - Middle oven (**OVEN 2**) - 190 °C to 210 °C;
 - Upper oven (**OVEN 1**) - 100 °C to 120 °C.

Pay attention. During the heating process, the temperature of the upper oven (**OVEN 1**) can exceed the set temperature by 10 °C to 20 °C. However, this doesn't affect the coating quality.

- Set the desired speed and number of passes (as specified in section 2.4.).
- Turn on motor (as specified in section 2.4.).
- At the end of each pass control box will give a short beep.
- At the end of all passes (end of coating process) control box will give “double beep” signal.

Pay attention. When the motor is stopped by pressing the **START/STOP** button the set number of passes (layers) resets . To continue the operation of the Recoater, it is necessary to set again desired number of passes.