MicroFab Technologies, Inc.

www.microfab.com

MJ-AB User's Manual

General Notice:

The information contained in this document is subject to change without notice.

MicroFab makes no warranty of any kind with regard to this material, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose. MicroFab shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Regarding Dispensing Device(s)

All dispensing devices are tested at MicroFab. Test waveforms are established for IPA and DI Water. If your dispenser does not function as expected, repeat these test conditions as described in the form included with each dispensing device. If the device does not dispense IPA or DI Water with the test waveforms, please contact MicroFab.

Cleaning procedures for MicroFab's dispensers can be found on the website at www.microfab.com

Warranty

The MJ-AB dispensing device is warranted against defects in material and workmanship for a period of thirty days from date of shipment. During the warranty period, MicroFab will, at its option, either repair or replace units which prove to be defective.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, or operation outside of the environmental specifications for the product. MicroFab makes no claim that the unit will operate with jetting devices, dispensing systems, or waveform generators from any other Manufacturer.

General Safety Considerations

Warning	The jetting device itself presents no general chemical hazard. However, when fluids are selected to be dispensed by the operator, appropriate safety measures should be followed as outlined in the selected material's MSDS.
Warning	If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

Introduction

MicroFab's MJ-AB low-temperature jetting device family has been developed to dispense single drops of solvents, water-based fluids, and inks. With proper fluid preparation and device maintenance, the jetting device will provide reliable delivery of fluid micro-drops. The jetting device can be provided with orifice sizes ranging from 20-80 (MJ-ABL-01; 20-120) microns. Depending on the operating parameters and the fluid, these devices can produce drops ranging from 20-300 picoliters in volume for standard orifice sizes (20-80 microns), and larger than 300 picoliters for MJ-ABL-01 with orifices ranging from 85-120 microns.

Technical Specification

Physical Dimensions

- Dimensions for the MJ-AB-01 device are shown in Figure 1.
- Tip Extensions: Up to 15mm

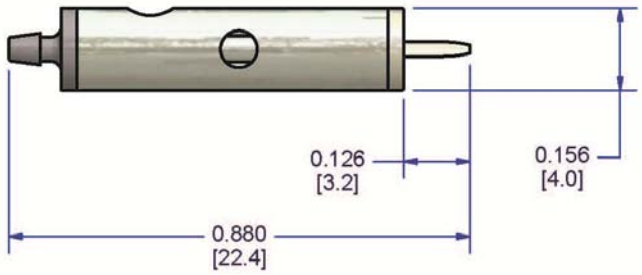

Figure 1 Physical Dimensions of MJ-AB-01 (in inches)

MJ-AB Device Family

- MJ-AB-01: Barb fitting low temperature microdispensing device; orifice diameters 20-80µm.
- MJ-AB-04: Barb fitting low temperature microdispensing device; orifice diameters 20-80µm. Tip extension 7.5 mm.
- MJ-AB-15: Barb fitting low temperature microdispensing device; orifice diameters 20-80µm. Tip extension 15 mm.
- MJ-ABP-01: Barb fitting low temperature microdispensing device. Protected tip. Orifice diameters 20-80µm.
- MJ-ABL-01: Large diameter barb fitting low temperature microdispensing device. Orifice diameters 20-120µm.

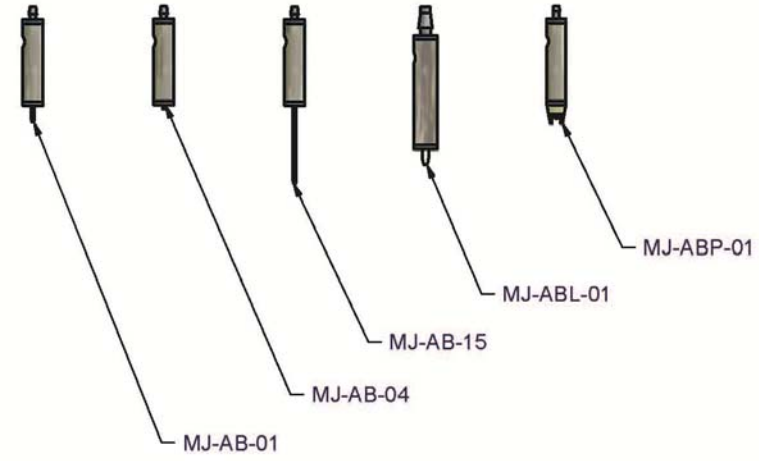

Figure 2 MJ-AB Device Family

Power Requirements

- Required power - 115VAC/2A max; 50/60 Hz (for CT-M3-02 JetDrive™III electronics; JetDrive™III can also be configured for 240V installation)

Specification Tables

Compatible Materials	
Organic Solvents	alcohols, ketones, aliphatics, aromatics, dipolar solvents
Aqueous Biffers	nucleic acids, proteins, cells
Other Biologicals	amino acids, lipids, biodegradable polymers
Electronic Materials	fluxes, photoresists, epoxies, polyimides, electroactive polymers,
Particle Suspensions	pigments, latex spheres, metal particles, Teflon, phosphors, ferrites,
Other	sol-gels, thermoplastics, thermosets, acrylics, >1M salt solutions, photographic developer, fuels, aqueous adhesives, odorants
* compatibility excludes O-rings	

Specifications	
Standard orifice diameters	20-80µm, 5µm intervals, 80-120µm for MJ-ABL
Standard orifice diameter tolerance	±1µm
Printhead for MJ-AT, MJ-ATP	PH-46, PH-47
Printhead for MJ-AL	PH-41
Printhead for MJ-AB, MJ-ABP	PH-43
Fluid viscosity	3-20cPs
Fluid surface tension	20-70 dynes/cm
Fluid pH	2-11

Pneumatic Control

Depending upon the fluid characteristics and the position of the reservoir to the jetting device, positive or negative pressure control may be required. MicroFab's single channel CT-PT-21 pneumatics controller is designed to provide pressure control for one dispensing device. The CT-PT-24 controller requires a pressure source up to 3000mmHg (MAX) and vacuum source up to -300mmHg. The CT-PT4 can provide pneumatics control for up to 4 devices.

Pressure at the jetting device can also be regulated by raising or lowering the fluid reservoir relative to the device orifice.

Electrical

The CT-M3-02 JetDrive™III Controller is designed to provide a waveform pulse to the jetting device to generate droplets. This waveform is controlled via the JetServer™ or Jetlab™ software package. Instructions for using the JetServer™ or Jetlab™ program to create waveforms are included in their respective manuals. *To understand how inkjet dispensing works please refer to the Principles of Inkjet Tutorial.* An example of this waveform is shown in Figure 3 below.

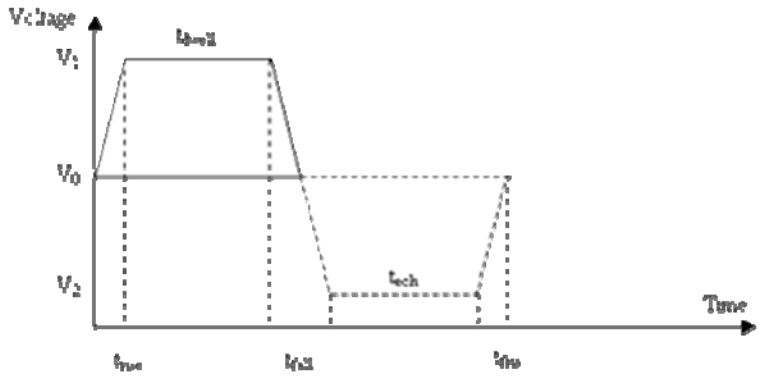

Figure 3 Example of dispensing waveform

Operational Voltage Limits

To prevent the depoling of the piezoelectric actuator, the low-temperature MJ-AT jetting device should be operated with *maximum positive voltage* of 70V at room temperature and drop generations frequencies under 1kHz. If no droplets are generated using unipolar waveform of positive 70V, then a bipolar waveform, as shown above in Figure 2, can be employed. The bipolar waveform can have positive and negative voltages and can be offset (negative V_0) such that the positive voltage is maintained *under* 70V.

Range of environmental conditions

The MJ-AB device has been successfully operated in the temperature range of 20° to 50° C. It is intended for use in a normal laboratory environment.

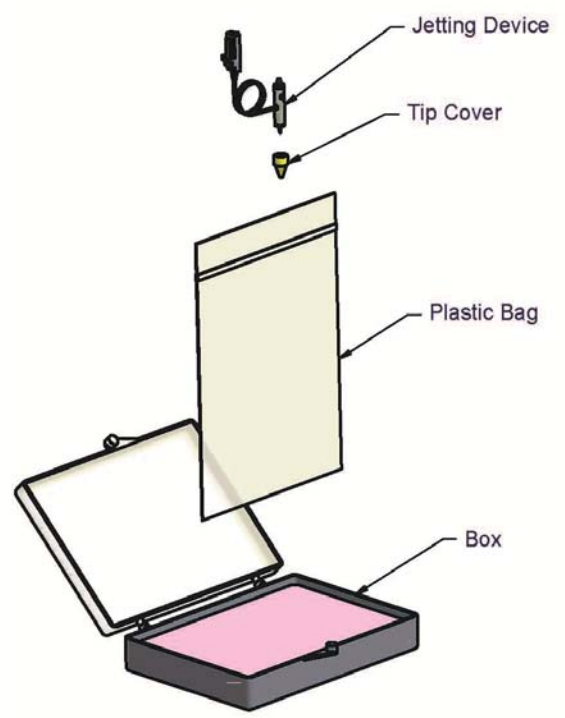

Figure 4 Shipping Contents

Shipment Contents (Figure 4 above)

- MJ-AB jetting device
- Tip Cover (installed)
- Plastic Bag (jetting device inside)

All MJ-AB devices are individually packaged in a bag inside a plastic box. The glass tip of the jetting device will be covered by a protective shell. After verifying the box label indicates the correct orifice diameter, remove the device and inspect it. To remove the protective cap, carefully pull the cap directly away from the device to prevent breaking the dispenser's glass tip.

Mounting

MicroFab's MJ-AB devices can be used in the PH-43 printhead or a user supplied mounting provided the tubing connection attaches to the barb fitting at the fluid inlet on the dispensing device. The barb fitting of MJ-AB devices can be attached directly to C-Flex tubing. Another option is to slip the PTFE microbore tubing, 0.022 x 0.042 in (0.55x1 mm) E-06417-21 into a small section (6.0mm) of C-Flex tubing, 0.031 x 0.094 in (0.7x2.3 mm) E-06422-01 that has been slipped over the barb fitting on the device, as shown in bottom device in the Figure 5. The C-Flex tubing or PTFE microbore tubing can then be connected to the syringe barrel adapter described below by inserting the metal needle end of a female luer fitted blunt needle into the C-Flex tubing (18 gauge needle part # 5118-B) or PTFE microbore tubing (22 gauge needle part # 5122-B) from EFD, Inc. (www.efd-inc.com). The tubing should be flushed thoroughly with filtered fluid to remove particulate material prior to connecting to the device.

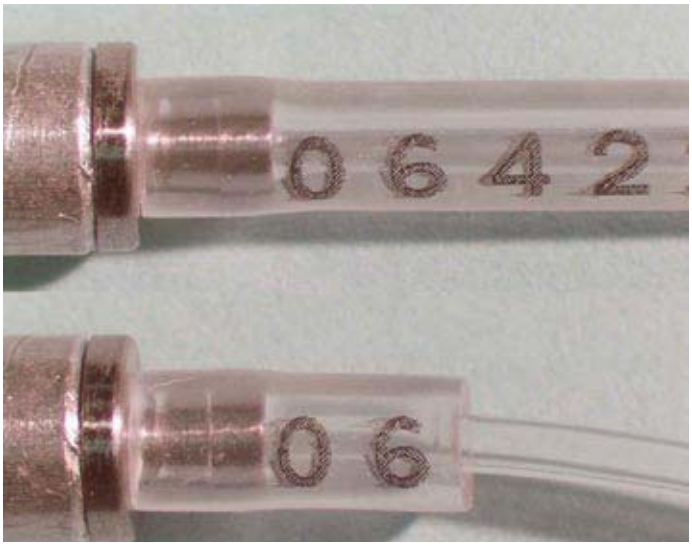

Figure 5 Connecting fluid tubing to the barb fitting

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Factory Support

For any questions regarding the MJ-AB jetting device family, or inkjet dispensing technology, contact

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