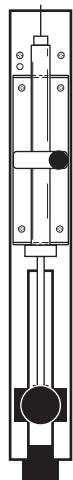


Bee Syringe Pump Instruction Manual

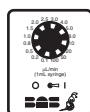
Revised 02-06

Thank you for purchasing the BASi Bee. Please take a moment to buzz through the instructions. Copyright December 1994, 2001, 2006 Bioanalytical Systems, Inc. All rights reserved.

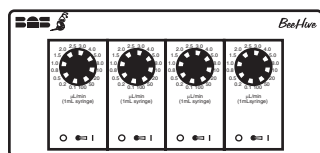


Baby Bee

Requires one of the 3 controllers shown



Worker Bee Controller
Variable Speed

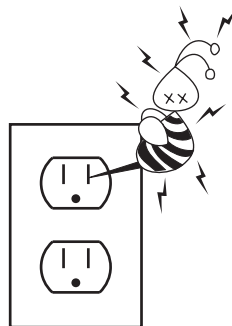


Bee Hive

Variable Speed for 4 independent Baby Bees

CAUTION! There are no user-serviceable parts inside the controllers. Attempts to service these products could result in personal injury and equipment damage. Controller switch (I/O) does not disconnect power.

MANUFACTURER'S NOTE: This instrument, either wholly or in part, is manufactured for research purposes only. Use for medical diagnosis in human subjects is not intended, implied, or recommended by the manufacturer. Use for this purpose and accountability for the same rests entirely with the user.



Maximum Recommended Flow Rates for Water through 1 meter Teflon Tubing, 0.12 mm i.d.

With the addition of the 3-syringe bracket, the Bee Pump can accommodate up to three 5 mL syringes. However, the maximum flow rate attainable with multiple syringes may be limited, depending on system back pressure.

The chart below gives examples of the maximum recommended flow rate from each syringe against back pressure created by dispensing water through 1 meter of 0.12 mm i.d. Teflon tubing.

The first column lists syringe size and number of syringes dispensing. The second lists the maximum recommended flow rate for the size and number of syringes dispensing through 1 meter of 0.12 mm i.d. Teflon tubing. The last column lists the Bee controller switch setting to achieve the flow rates in the second column.

Syringes Dispensing	Maximum Recommended Flow Rate (each syringe) $\mu\text{L}/\text{min}$	Maximum Bee Controller Knob Setting
1 500 μL	50	100
2 500 μL	50	100
3 500 μL	50	100
1 1 mL	100	100
2 1 mL	100	100
3 1 mL	100	100
1 2.5 mL	250	100
2 2.5 mL	125	50
3 2.5 mL	125	50
1 5.0 mL	100	20
2 5.0 mL	50	10
3 5.0 mL	25	5

Pump carriage force: 20 lb minimum

Operating Instructions

1. Plug cable **a** into front of Bee Pump.
2. FOR WORKER BEE CONTROLLER: Plug the power cord into an outlet. The LED on the pump will flash slowly (this indicates power-up of the controller). To stop the LED from flashing, switch the controller 'On' (I) then 'Off' (O) or change the setting of the flow rate adjustment knob.

FOR BEEHIVE CONTROLLER: Plug power cord into outlet. Turn power switch (located at rear) 'On' (I). The LED on the right front corner of the BeeHive will light. Plug the Bee Pump into one of the four sockets at the rear of the BeeHive.

FOR QUEEN BEE- see Queen Bee manual
3. Select a flow rate by turning the knob to the desired setting. Flow rates are calibrated to a 1 mL syringe with a 60 mm calibration length. (See next page for calculation of flow rates.)
4. To position carriage **b** quickly, TIGHTEN thumbscrew **c** at the top of the carriage and slide the carriage to the desired position. LOOSEN the thumbscrew to engage the carriage to the leadscrew.

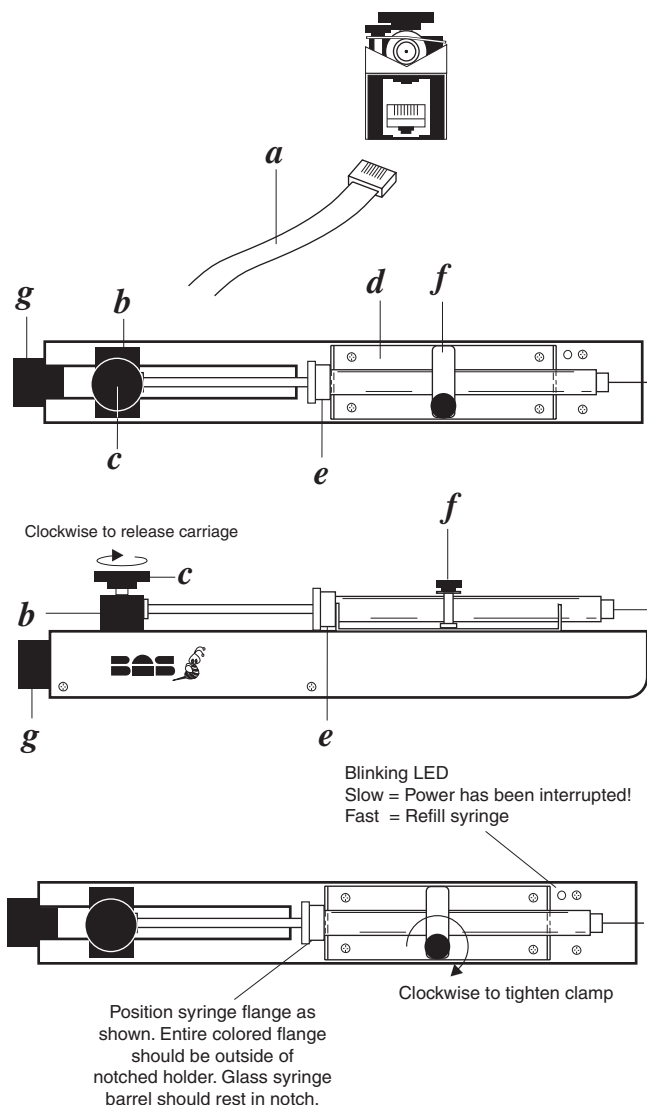
NOTE: Thumbscrew **c** must be loose for carriage **b** to advance during pump operation.
5. Place a syringe (5 mL maximum) on syringe holder **d** and push it as far forward as possible. The syringe flange **e** should be adjacent to the syringe holder. Secure the syringe by screwing down syringe clamp **f**.
6. For fine position adjustment or to dispel air bubbles by hand, advance carriage **b** by turning end knob **g** counterclockwise. Turn the knob clockwise to retract the carriage.

7. Turn the controller switch 'On' (I) to begin pump operation. The pump LED will light and remain lit while the unit is pumping. You can stop the pump at any time by switching the controller 'Off' (O). Turning the BeeHive power switch 'Off' (O) will stop all pumps.

NOTE: There is still power to the Worker controller even when the pump is switched 'Off' (O). To shut off power to the Worker controller, the power cord must be unplugged.

8. When carriage **b** reaches the end of travel, the pump automatically shuts off and the LED begins to blink rapidly. To reset the pump, move carriage **b** back away from the end of travel position. Switch the pump 'Off' (O), then 'On' (I), or change the flow rate setting to restart the pump.

9. If power is interrupted to the controller, the pump will stop operating and the LED will blink slowly. To restart the pump, switch the controller 'Off' (O) then 'On' (I).



Removing a Syringe

1. Reverse the carriage by turning the end knob clockwise, or release the carriage by tightening the thumbscrew and sliding the carriage back.
2. Unscrew the syringe clamp.
3. Remove the syringe.

Calculation of Flow Rates

For a syringe with a 60 mm calibrated stroke and other than 1 mL volume, the flow rate can be calculated by multiplying the syringe volume in mL by the flow rate setting.

Examples:

Use of a 2.5 mL syringe (MD-0250) at a setting of 4 $\mu\text{L}/\text{min}$ will provide a flow rate of 10 $\mu\text{L}/\text{min}$.

$$2.5 \times 4 \frac{\mu\text{L}}{\text{min}} = 10 \frac{\mu\text{L}}{\text{min}}$$

Use of a 500 mL syringe (MD-0050) at a setting of 5 $\mu\text{L}/\text{min}$ will provide a flow rate of 2.5 $\mu\text{L}/\text{min}$.

$$500 \mu\text{L} = 0.5 \text{ mL}$$

$$0.5 \times 5 \frac{\mu\text{L}}{\text{min}} = 2.5 \frac{\mu\text{L}}{\text{min}}$$

For syringes that do not have a 60 mm calibrated stroke, the flow rate can be calculated from the volume of the syringe and its stroke length. To calculate the flow rate, multiply the volume of the syringe in mL by the ratio of 60 mm to the syringe stroke length, then multiply by the flow rate setting.

Example: Use of a 10 μL syringe with a 54 mm stroke length at a setting of 0.5 $\mu\text{L}/\text{min}$ will provide a flow rate of 0.0056 $\mu\text{L}/\text{min}$.

$$10 \mu\text{L} = 0.01 \text{ mL}$$

$$0.01 \times \frac{60 \text{ mm}}{54 \text{ mm}} \times 0.5 \frac{\mu\text{L}}{\text{min}} = 0.0056 \frac{\mu\text{L}}{\text{min}} = 5.6 \frac{\text{nL}}{\text{min}}$$

Optional 3-Syringe Bracket

An optional three syringe bracket which permits simultaneously dispensing from three syringes (maximum syringe size is 2.5 mL) is available. Order part number MD-1002.

Syringe Part Numbers

- MD-0050 500 μL gas-tight syringe
- MD-0100 1 mL gas-tight syringe
- MD-0250 2.5 mL gas-tight syringe

Instructions for Assembly of 3-Syringe Bracket

1. Refer to the figure below. Unscrew the thumbscrew from the 1-syringe holder on the Baby Bee pump. Remove the spring and the 1-syringe clamp from the thumbscrew. Insert the thumbscrew through the hole in the 3-syringe clamp, then through the spring. Screw the thumbscrew into the thread on the 3-syringe holder.
2. Remove the 1-syringe holder from the Baby Bee pump by unscrewing the four screws that attach it to the pump cover. Place the 3-syringe mount on the pump cover with the thumbscrew aligned over the corresponding hole in the cover. Attach the 3-syringe mount to the pump cover using the four screws from the 1-syringe mount.
3. Screw the carriage extender bar to the front of the carriage block using the two screws supplied.

