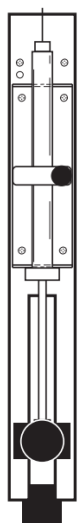


Bee Syringe Pumps

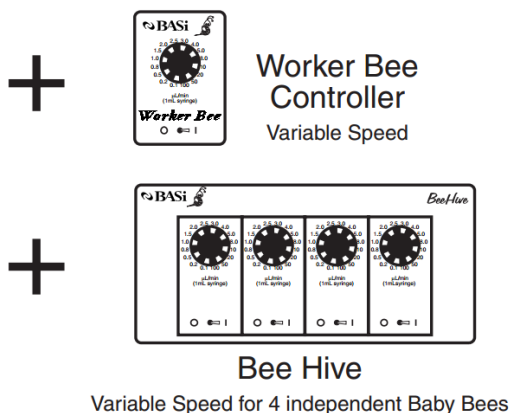
INSTRUCTION MANUAL

Thank you for purchasing the BASi Bee. Please take a moment to buzz through the instructions.



Baby Bee

Requires one of the controllers shown



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 m Teflon Tubing, 0.12mm 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 shown 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 column 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 required to achieve the flow rates in the second column.

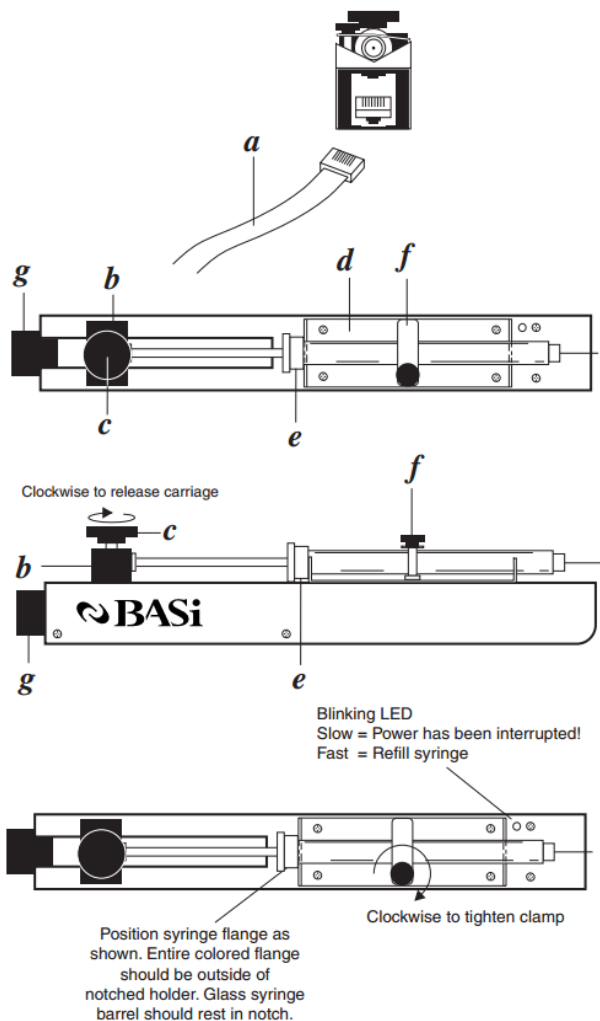
Syringe Volume	No. of Syringes	Maximum Recommended Flow Rate (each syringe) $\mu\text{L}/\text{min}$	Maximum Bee Controller Knob Setting
500 μL	1	50	100
	2	50	100
	3	50	100
1 mL	1	100	100
	2	100	100
	3	100	100
2.5 mL	1	250	100
	2	125	50
	3	125	50
5.0 mL	1	100	20
	2	50	10
	3	25	5

Pump carriage force: 20 lb minimum

Operating Instructions

1. Plug cable **a** into front of Bee Pump, with the other side plugged into the back of controller.
2. Plug the DC Adapter into the power jack. Attach the power cord to the DC Adapter and plug into an outlet.
FOR WORKER BEE CONTROLLER: The LED on the pump may flash slowly. To stop the LED from flashing, switch the controller 'On' (I) then 'Off' (O) or change the setting of the flow rate adjustment.
FOR BEEHIVE CONTROLLER: 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.
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** (turn knob clockwise to release the leadscrew threads) at the top of the carriage and slide the carriage to the desired position. LOOSEN the thumbscrew (turn knob counter clockwise) 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 expel air bubbles by hand, advance carriage **b** by turning end knob **g** counterclockwise. Turn the knob clockwise to retract the carriage.

- 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).
NOTE: There is still power to the controller even when the pump is switched 'Off' (O). To shut off power to the controller, the DC or outlet power cord must be unplugged.
- 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 **v** 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.
- 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

- Reverse the carriage by turning the end knob clockwise, or release the carriage by tightening the thumbscrew and sliding the carriage back.
- Unscrew the syringe clamp.
- 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:

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

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

A 500 μL 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: 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 3-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

- 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.
- 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.
- Screw the carriage extender bar to the front of the carriage block using the two screws supplied.

