Emriver Em2

Use and Care Manual

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emriver

YOU MUST READ AND UNDERSTAND THESE WARNINGS BEFORE USING THE EMRIVER MODEL

- The Emriver model is very heavy when filled with water and sediment. A collapse of the model's supports could severely injure or kill a person. Be absolutely sure you understand how to use the supports.
- Use only the supports provided with the Emriver model. Despite weight-bearing claims, no standard production sawhorse is strong enough to safely support the model. Sawhorses and folding tables can collapse under dynamic or side loading.
- Check all fittings on the aluminum supports before each use to be sure they are secure.
- When setting up the box, the supports must be laterally level and aligned. They must also be aligned with the proper support point underneath the box. Otherwise the box could warp or collapse when loaded. Make sure spreader bars are fully engaged.
- Never set the model up on a surface with a slope exceeding 8% (a 7-inch drop in 7 feet).
- Never use more than 22 gal (84 L) of water in the model. Using more than the maximum amount of water and sediment could cause the box or supports to collapse.
- Never use more than the provided 150 lb (68 kg) of sediment in the box, and do not place any heavy objects in the box.
- Never allow people to sit or stand on or in the box. Never get underneath the loaded box.
- Use only the pump and power supply provided with the Emriver Em2. Be certain to connect the power supply to a properly grounded outlet. Always use the Ground Fault Circuit Interrupter (GFCI) provided with the Emriver model (see Figure 20), and be sure to read the manual that accompanies the GFCI.
- When using a 12-volt battery to power the model, always use the Emriver Battery Adapter from Emriver, Inc. Never bypass the fuses.
- When powering the model with a 12-volt battery, be sure you understand the dangers associated with charging and using lead-acid batteries, and consider using safer spill-proof batteries.
- The box should only be used for its intended purpose as stated herein.
- If any part of the box or pumping system is damaged, if you have any doubts about the electrical or structural safety of the model, or if you do not understand these directions, do not use this model.

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Introduction

This manual describes the safe use and maintenance of your Emriver Em2 river process simulator. It is very heavy when filled with modeling media and water, and could be dangerous if not properly supported, assembled, and operated.

Read, understand, and abide by all the instructions and warnings in this manual to avoid damage to the model or personal injury. Updates to this manual and other support for the Emriver model may be found at www.emriver.com.

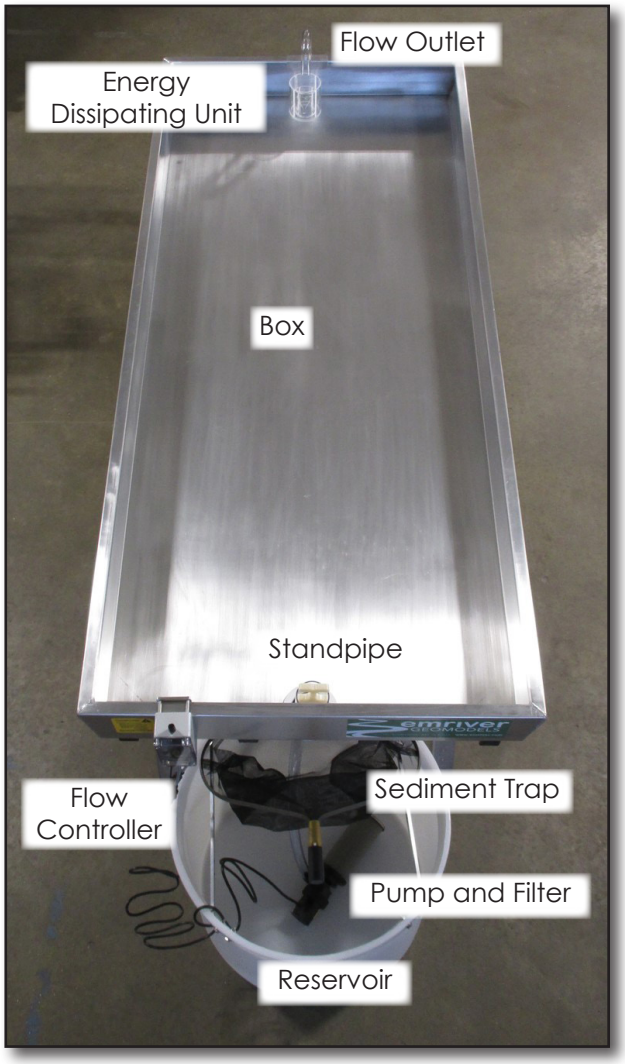

Figure 1 Parts of the Emriver Em2 river process simulator. Power supply is shown in Figure 2

Figure 2. Power supply shown attached to the downstream support.

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Parts and Accessories Checklist

Included with your model:

- Emriver Em2 Box
- Modeling media in 5 buckets
- Standpipe
- Emriver supports
- Reservoir
- Sediment trap
- Pump and filter
- ¾-inch-diameter tubing
- Tube Hanger Clips
- K28 Electronic Flow Controller
- Energy Dissipater Unit (EDU)
- Flow outlet
- Power supply
- GFCI adapter
- Culvert tubes
- Measuring tape
- Solid scoop
- Perforated Scoop
- Marble and plastic riprap
- Simulated riparian vegetation
- Scrapers for moving media
- Poly hand float
- Squeegee
- Blue and green dye
- Dye injector bottles

Other parts and supplies to have on hand:

- Water supply
- Electric outlet
- Tarp or groundcloth, 12 x 15 feet
- Paper towels and mop
- Shim materials
- Hand level
- Garden hose
- Notebook
- Household bleach
- Small towels for drying hands
- 1/2" mesh sieve

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Assembly and Operation

STEP 1 - Set up the supports

It is best to set up your Emriver model on smooth and level ground.

The downstream support is shorter than the upstream support and has one crossbrace mounted near the top to make room for the reservoir. Keep in mind how you would like the model oriented as you set them up.

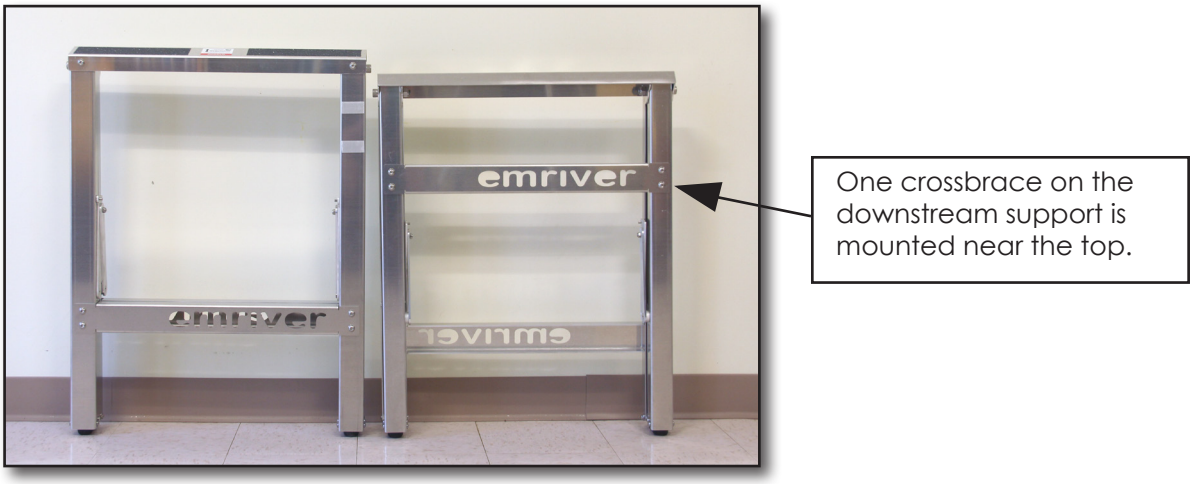

Figure 3. Upstream and downstream supports. The downstream suport, right, is shorter and has one crossbrace mounted near the top to make room for the reservoir.

The supports should be set up with the tops 45 in (1.14 m) apart and aligned as shown in Figure 4 to prevent damage to the box.

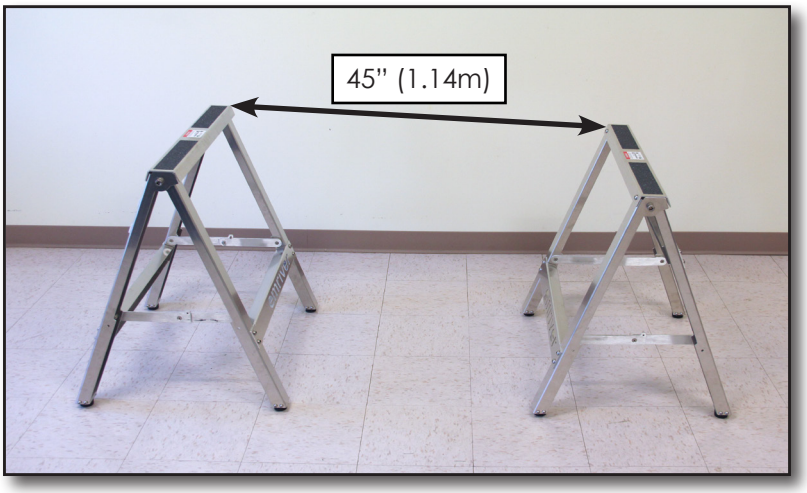

Figure 4. Place the supports 45" (1.14m) apart and square with each other.

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If the supports are not properly aligned, the box will twist when fully loaded, which may damage the box. To check alignment, look across the support crossbars as shown in Figure 5. The supports must be both level and parallel. On uneven ground, use shims under the support feet as necessary. Be sure all four feet of each support are in contact with the ground or a shim.

The Emriver supports have a difference in height of 2 in (50.8 mm), yielding a box slope of 4%, (40.8mm/m or 0.49"/ft).

The slope of channels in the box will be determined by the position of the standpipe, so the exact box slope is not necessarily important.

Figure 5. Look from the end to ensure the supports are level with each other.

Note: Labels on the supports have arrows that indicate proper placement and orientation, with the shorter support at the model's downstream end. See Figure 6.

Figure 6. Labels on the supports indicate proper orientation, with the shorter support at the downstream end.

STEP 2 - Place the box on the supports

The box MUST be supported at the two reinforced ribs, and nowhere else. See Figure 7.

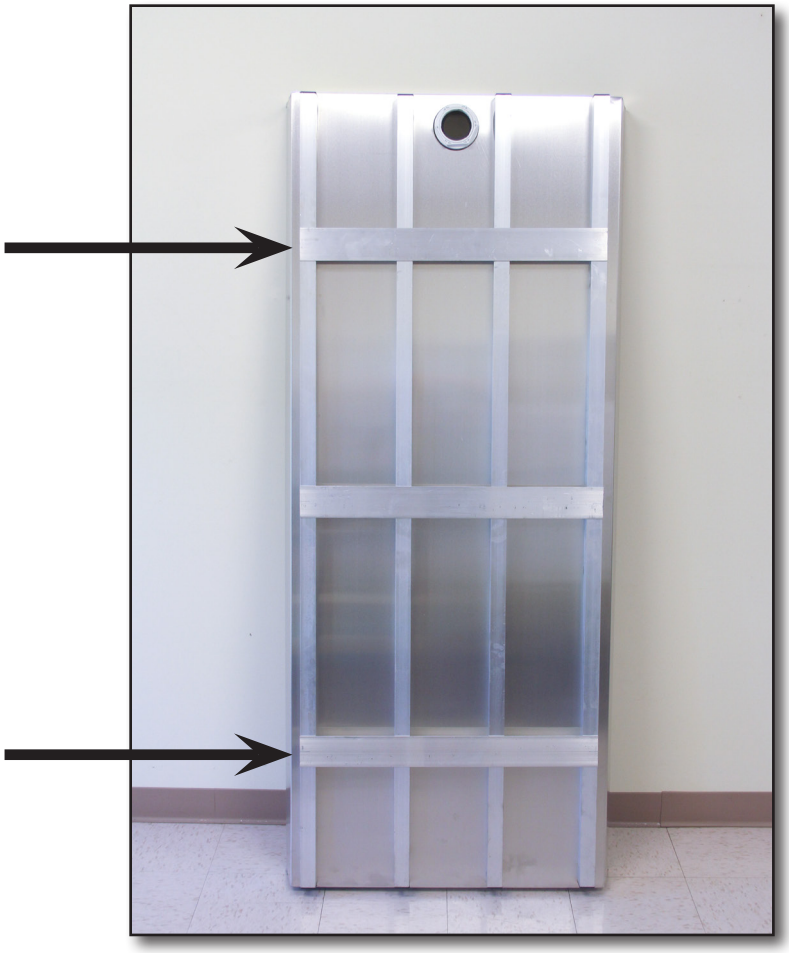

Figure 7. Reinforced ribs on the underside of the box (indicated with arrows) must rest on the two supports.

When the supports are level and aligned, place the box on them.

Note: Gaps of more than 0.25 in (6 mm) between the box's support ribs and the support crossbars indicate that the supports are **NOT** properly aligned.

CAUTION: The supports must be properly aligned with the reinforced ribs on the box before any weight is added to the box. See Figure 9.

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Figure 8. Place the box on the supports so the ribs rest on the support tops. It's easier with two people.

Figure 9. Check to ensure that the reinforced ribs rest on the supports properly.

STEP 3 - Install the standpipe in the drain assembly

The standpipe has been lubricated with a silicone grease to allow smooth action against the rubber seal. This lubricant is waterproof, nontoxic, and should last for many uses. Install the standpipe by sliding it into the drain assembly from the underside of the box. Insert the handle first. For initial setup, the standpipe should extend into the box approximately 2 inches (50 mm).

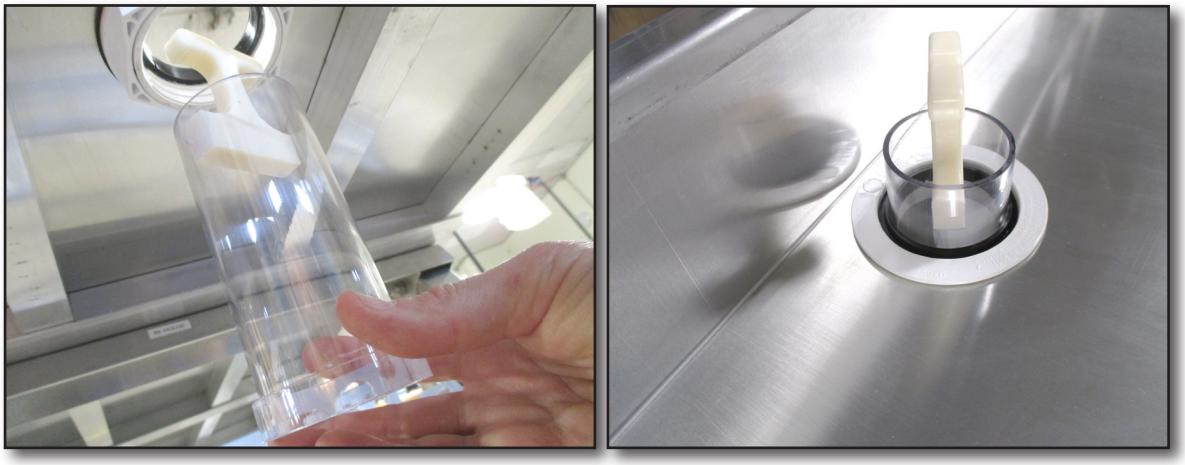

Figure 10. Insert the standpipe from the underside of the box. Never attempt to install the standpipe from the top of the box. The standpipe will move much easier when the seal is wet.

As needed, apply a small amount of silicone grease to restore smooth movement. An extra tube of silicone grease has been provided with your model and can be found inside the tool box. Extra silicone grease may be found at most hardware stores and is typically used for waterproofing electronics and O-rings. **Keep the standpipe coated with a thin film of silicone grease** to ensure years of trouble-free operation.

STEP 4 - Position the reservoir

Place the reservoir beneath the box at the downstream end. The reservoir should be located as shown in Figure 11 so that the standpipe will drain into the reservoir. Note that the support at the downstream end of the box has an opening for the reservoir. The aluminum struts in the reservoir should be parallel with the long edges of the box.

Figure 11. Place the reservoir beneath the support at the downstream end.

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STEP 5 - Position the pump

Attach one end of the tubing onto the outlet barb of the pump and secure it with a plastic hose clamp. Place the pump, lying on its side, in the bottom of the reservoir, keeping the wire connectors outside of the reservoir. Check that the filter is securely attached to the pump.

Figure 12. Place the pump with filter in the bottom of the reservoir, lying on its side.

STEP 6 - Fill the reservoir

Position the reservoir before filling it with water. Fill the reservoir with approximately 22 gallons (84 L) of water, using the graduations on the side as a guide. **Do not move the reservoir after it has been filled as this will cause damage to the reservoir.** **Do not fill the reservoir with more than 22 gallons (84 L) of water.**

WARNING: Using more than 22 gallons (84 L) of water could damage the box or cause it to collapse. Do not exceed this volume. When full of water, the reservoir weighs over 183 lb (84 kg). It may be damaged or destroyed if moved when full.

DO NOT START THE PUMP until you have filled the reservoir.

STEP 7 - Position the sediment trap

Place the sediment trap on the aluminum struts in the reservoir. Be sure the sediment trap sits directly below the standpipe. The white mesh filter bag should be in the sediment trap and secured around the rim with the lace.

Figure 13. Place the sediment trap with the filter bag insert on the reservoir bars.

STEP 8 - Attach and position the tubing and flow outlet

Route the flexible tubing through the box support legs from the reservoir to the upstream end of the model. Use the two tube hanger clips to hang the tubing from the box supports.

Figure 14. Hang the flexible tubing from the supports with the hanger clips.

Fit the end of the flexible tubing onto the bottom of the flow outlet and secure with the plastic hose clamp as shown in Figure 15. If necessary, turn the metal bracket so the word 'emriver' faces the pipe outlet, and place the bracket and outlet at the center of the upstream end of the box. If the flexible tubing is turning the outlet, loosen the plastic tubing clamp and twist it so the outlet sits perpendicular to the upstream end of the box.

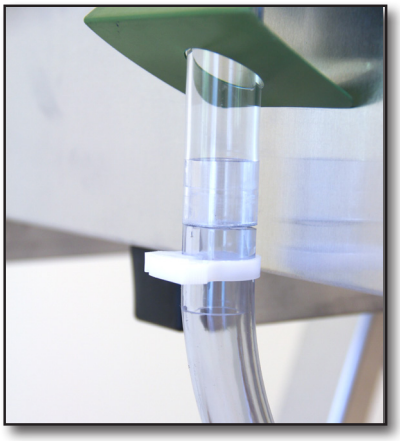

Figure 15. Attach the flexible tubing to the flow outlet and secure with the plastic hose clamp.

Figure 16. Hang the flow outlet in the center of the upstream end of the box.

STEP 9 - Position the Energy Dissipater Unit

Place the Energy Dissipater Unit (EDU) beneath the flow outlet. The flow outlet opening should line up with the innermost cylinder of the EDU. The EDU's Y-shaped opening should face downstream. Note the engraved flow rate scale on the EDU. The scale helps estimate flow rates and makes repeated experiments easier.

Figure 17. Place the EDU beneath the flow outlet.

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STEP 10 - Fill the box with modeling media (sediment)

Pour the media into the box one bucket at a time. Spread the media using the scraper or float included with your Emriver model to distribute it evenly throughout the box.

Figure 18. Pour the media into the box.

STEP 11 - Connect the power supply

Plug the power cord into the DC power supply. Attach the power supply to the leg of the upstream support using the snap-together mushroom fasteners on the support and the power supply. Wrap the Velcro® strap around the support leg and the power supply to fasten securely. See Figure 19.

Figure 19. Attach the DC power supply to the leg of the upstream support.

Plug the Ground Fault Circuit Interrupter (GFCI) into a wall outlet. If the green indicator light on the GFCI is on, it is ready for use. If the green light does not come on, press the top Reset button on the GFCI. If the reset button immediately pops back out, call an electrician to find the source of the ground fault in your electrical circuit.

Figure 20. The green light on the GFCI indicates the circuit is protected.

Connect the power cord to the GFCI (Figure 20, US outlet shown). If you are using an extension cord, connect the extension cord to the GFCI. Do not plug the model's power cord directly into a wall outlet. **Unless you have a GFCI-protected circuit, always use the GFCI.**

STEP 12 - Attach the K28 Flow Controller

If you purchased the K500 Digital Flow Controller, see the separate instructions. Attach the K28 flow controller to the downstream end of the box using the hook on the back of the controller. See Figure 21.

Connect the pump to the controller using the gray, blue, and orange connectors (note there is one red tab that is not a connector). Then, connect the controller to the power supply using the barrel jack with the red sleeve. See Figures 22-24. *Make sure the power brick is secured to the support so there is no weight pulling on the power connection at the controller*. See Figure 19.

Note that pre-2018 models of the pump and controller have different electrical connectors which are not compatable with current pumps and controllers.

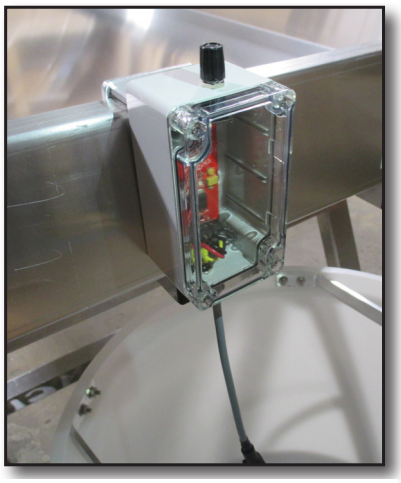
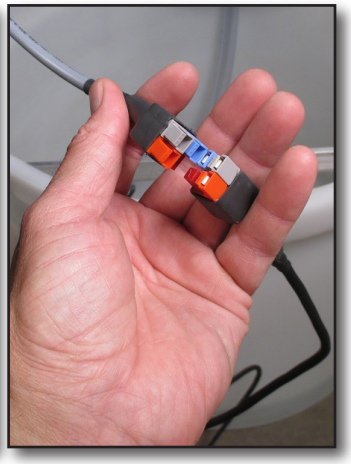


Figure 21. Attach the controller to the downstream end of the box.



Figures 22-24. The pump, above left, connects to the flow controller. The flow controller, right, connects to the power supply. The color-coded connectors on each component will match up.

A green LED in the controller glows when the power is on. Start water flow by turning the knob on the controller clockwise. It will take several turns to start the water flow when the tubing is full of air.

A blue LED will start to glow to indicate flow is not set to zero. Pressing the knob resets the flow to zero.

Note: The knob does not turn the pump off completely; it merely stops flow. The pump is on as long as the power is connected. To completely turn off the pump, the power must be disconnected.

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Setup Checklist

- Read and understand all warnings in this manual.
- Find a surface with a slope of less than 8%.
- Set up supports so the crossbars are 48 in (1.25 m) apart. Check that the supports are aligned properly to prevent twisting of the box. **Check the supports for damage and loose connectors before setting up the model.**
- One of the supports has an opening for the reservoir and is shorter than the other– be sure to place this support at the box's downstream end with the opening for the reservoir facing downstream. Labels on the supports have arrows that indicate correct placement and orientation. Use these arrows as a guide for proper support setup and reservoir placement.
- Place the box on the supports. Before adding any weight to the box, be sure that the support ribs on the box's underside rest directly on the supports, and that there are no gaps greater than 0.25 in (6 mm) between the support crossbars and the box support ribs.
- Insert the standpipe in the drain assembly from the underside of the box so that the standpipe extends at least 2 in (51 mm) inside the box.
- Place the reservoir under the standpipe and place the pump in the reservoir, lying on its side. Check the pump filter for fine debris.
- Fill the reservoir with 22 gal (84 L) of water using the graduations on the side of the reservoir. **Do not exceed 27 gal (84 L).**
- Place the sediment trap on the aluminum struts in the reservoir. Be sure the sediment trap sits directly beneath the standpipe.
- Connect the tubing and flow outlet. Attach the flow outlet to the box. Place the Energy Dissipater Unit under the outlet. The innermost cylinder of the EDU must align with the mouth of the flow outlet and the EDU's Y-shaped opening should face downstream.
- Fill the box with modeling media.
- Fasten the brick power supply to the leg of the downstream support. Plug the model's power cord into the GFCI provided with the model and plug the GFCI into a wall outlet. **Unless your circuit is GFCI protected, never plug the model's power cord directly into a wall outlet.**
- Attach the Electronic Flow Controller to the box.
- Connect the power supply to the flow controller. Connect the controller to the pump. Match the color-coded connectors. Adjust the knob on the controller to desired flow rate.
- Begin experiments and demonstrations.

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Troubleshooting the K28 Flow Controller

Problem	Possible Cause	Solution
Controller does not turn on.	If the LED on the circuit board in the controller is not illuminated there is no power to the controller.	Check that all connections are firm and the GFCI adapter is not tripped.
		Make sure correct power adapter (12V, 5A) is being used. There is a red band on the DC barrel jack to indicate correct size.
		Make sure the power supply is functioning properly. Some models have an LED that will be illuminated when in operation. If you suspect a malfunctioning power supply, contact Emriver.
		If none of these attempts work, call Emriver for assistance.
Controller is on but no water is moving or water starts to flow.	Poor electrical connections	Ensure the barrel connector from the power supply is securely inserted into the controller enclosure.
		Ensure the three-color connection between flow meter and controller is secure.
		Inspect metal tabs in the four-color connector for corrosion. If needed, apply contact cleaner.
	Air is trapped in the supply tubing	Air in the line is the most common reason for the delay in flow. Ensure pump and filter are fully submerged. Air trapped in the filter or pump can prevent the pump from priming. A clogged filter can trap air. If the water in the reservoir is clean, you can remove the filter while submerged to help purge air and prime the pump.

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Troubleshooting the K28 Flow Controller, Continued

Problem	Possible Cause	Solution
Controller is on but no water is moving or water starts to flow	Pump impeller is not spinning freely	If the pump is fully submerged, and there is a hum, but no flow, turn off the power and follow the steps in "Cleaning the GRI Pump" included in your manual. Grit in the impeller could prevent it from spinning properly.
		If none of these attempts work, call Emriver for assistance.
Pressing the knob does not stop flow	Loose set screw on knob	With a small flat-head screwdriver, loosen the brass set screw on the knob. Lift the knob approximately 4mm above the surface of the enclosure and tighten securely.

For questions or troubleshooting beyond this manual, please see our website, emriver.com, or call Emriver, Inc. at 618-529-7423.

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End Of The Day Procedure

When breaking down the model, remember that **the reservoir cannot be moved while full of water.**

After using the stream table, remove the standpipe and allow the water to drain from the box. Dump any media from the sediment trap back into the box.

As much as 10 gal (38 L) of "groundwater" will remain in the media and box after the pump has been turned off and flow from the standpipe has slowed to a deceptive trickle. Before storing the model, most of the remaining water must be drained from the sediment. This can take several hours.

Use the scoops to mound up the media in the upstream half of the box. This will encourage the bulk of the water to drain out of the sediment. It is ideal to let the media drain overnight.

If the stream table will not be used for a while, take the time to dry the media thoroughly before storing it. Choose whichever drying method is best for your setting:

> Spread the media out in the box to create more surface area exposure. Stir it occasionally to expose the wet media. A gentle fan can help speed up evaporation, but make sure you do not blow the drying particles out of the box.
>
> If you are in a dry, warm environment, you can dry the media outdoors in the sun. You will need to protect the media from being blown away by the wind, and from being contaminated by pollen or other organic material.
>
> A waterproof heating mat, like one used for seed starting, can be used under the media to speed the drying.
>
> If you have access to a soil oven, or any oven with low heat options, you can dry batches of media on trays. The melting point of melamine plastic is 345 C/653 F. Keep oven settings at or below 200 C/400 F.

Scoop as much media as you can into the buckets.

Remove the flow outlet from the tubing and use the pump to wash all remaining media out of the box and into the sediment trap. The included squeegee is ideal for coaxing the last bits of media to the hole.

Pump the water from the reservoir into media buckets, or directly into a drain. Once the water is low enough that the pump draws air, you may lift the reservoir to empty it. Unplug the power supply once the water is drained. Never run the pump 'dry.'

Note: To prevent growth of mold and bacteria, add about 6 ml of household bleach to the buckets if you must store them wet.

Figure 26. Use the pump and controller to drain the reservoir.

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Maintenance and Care

- Drain the model and reservoirs after each use; do NOT leave water in the Emriver model.
- To keep your model sanitary, change out the water every day and drain the table by lowering the standpipe all the way.
- Add bleach to the reservoir only as necessary. Add about 6 ml of household bleach to the reservoir, and run the pump to distribute it through the system. This will prevent algae and bacteria from colonizing the model. You may also use widely available home water filters to remove contaminants. Adding too much bleach or chlorine can damage the aluminum parts.
- Never use lithic materials (i.e., sand) in the Emriver tables.
- Do not use metallic objects in the model.
- Power down the pump and controller after each use by disconnecting the pump from the controller, and disconnecting the controller from the power supply.
- Do not use solvents, which may dissolve or weaken the plastic tubing. If the tubing is left in the sun while wet, it may support algae growth and become cloudy. Routing a mild bleach solution through the tubing after use will minimize this problem. Removing all standing water in the lines will help as well. If tubing becomes cloudy you may purchase a replacement from us, or buy from your local hardware store, but that which is supplied with your model is a high-quality type and is longer lasting and more flexible.
- All bolts on the supports should be periodically checked for tightness. Loose or missing bolts will affect the strength of the supports. The bolts should be as tight as possible while still allowing the supports to fold.
- Clean the filter on the pump periodically by unscrewing the filter from the pump and thoroughly rinsing it inside and out.

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Quick Start Guide for the Emriver Em2

Some basic guidelines for using the Emriver are included here. Further instructions and exercises can be found in the **Emriver Lab Manual**. In addition, the guidelines and videos at the following places will help you begin.

www.emriver.com

http://serc.carleton.edu/NAGTWorkshops/geomoph/emriver/index.html

Instructional videos are available as a Playlist on our YouTube channel. The link is also available from our website.

General Tips

The primary independent variables imposed on your experimental channels are channel slope and discharge. To gain familiarity with the capabilities of the model, it is best to begin by exploring both of these variables at relatively low values.

Slope is controlled by the slope of the box (which is 3.9% when you use the support horses on a level surface) and by the elevation of the standpipe. A 3% slope makes for a fast-moving stream when the standpipe is lowered. Raising the standpipe to 2 inches will reduce the effective slope to 2%, and raising it fully will reduce the slope to less than zero (-0.95%). This is the easiest way to control the slope of your model.

Slope of your channels is also dependent, of course, on their sinuosity. It is best to begin with lower slopes. A small laser level can be used to explore the relative elevations of the upper end of the channel and the standpipe.

As you are learning to use the model, begin with low flows of around 25 ml/s, as seen in Figure 27. These flows may seem too low at first glance, but low flows often give the most interesting results. Higher flows will mobilize all sediment in the channel, which, in many demonstrations and experiments, will make it difficult to see specific processes. Try forming a channel with moderate flows (less than 75 ml/s), and then lowering flow to find the point at which sediment transport in the channel ceases. Work up from this point.

Figure 27. The EDU showing about 25ml/sec flow rate.

When you notice media being scoured from in front of the EDU, you may replenish it by pushing the banks closer together adjacent to the scour or by sprinkling media directly into the stream. If you pile the media excavated from your initial channel near the EDU, you will have a ready supply. Placing 8-10 pieces of limestone riprap directly under the outlet of the EDU will further calm the stream and reduce scouring.

A straight channel from the EDU to the standpipe in your river model will eventually form meanders, point bars, cutbanks, and other river features just as in nature, but it

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may take a couple of hours for these features to fully develop. Below are a couple of initial conditions that can produce features more quickly for teaching and demonstrating.

Meandering Channels

When forming experimental channels, mimic what you see in the field. For example, meandering gravel-bed rivers will have low point bars that slope gradually up to a floodplain, and relatively steep banks on the outsides of bends. Routing brief flood pulses (high flows of about 190 ml/sec, as indicated on the EDU scale) through your channels will give them more realistic characteristics. Remember that your modeled channels should be in a near-equilibrium condition in order to show the effects of disturbances.

Delta Building

To explore delta building and alluvial fans, move most of the media to the upstream 2/3 of the box and distribute it evenly. The downstream third of the box can have the aluminum 'bedrock' exposed, or may have a thin layer of media in it. You may wish to remove one 5-gallon bucket of media from the model.

Cut a straight or meandering incision in the media from the EDU to the beach and sculpt a gentle slope in the media away from your initial channel with the poly hand float, plastic scraper, or the corner of a scoop. You may have media above the edge of the box at the upstream end of your model.

Raise the standpipe to 7cm (2.75") and start the pump, adjusting the flow to about 100 ml/s. The EDU will be about half-filled with water. Sediment will immediately begin moving downstream, and will be deposited in the forming lake at the downstream end of the model. As the lake fills, you will begin to see all the classic delta formation phenomena in the model. Periodically raising and lowering the standpipe will mimic rising and falling tides or sea level change and introduce layers of complexity to the delta. Raising and lowering the flow rate of the pump will further add to the dynamic qualities of the model.

Stratigraphy

If you have color-coded media in your model, examining its stratification can give fascinating insight into the depositional history of your experiments. As in nature, the most complex strata are often the result of long-term deposition under dynamic conditions. Flood sequences, meandering channels, delta building, and other fluvial and lacustrine processes all leave different marks on the stratigraphic record.

The best way to examine the stratifcation in your model is to drain it overnight so the media can pack down. (Saturated media has lower cohesion than damp media.) Use the corner of a large scoop to cut V-shaped incisions laterally across the media bed. Cutting into the media this way magnifies the thickness of the layers and keeps the cut wall from collapsing.

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Cleanup

When you are ready to put your Em2 away, dry the media as much as possible by fully draining the model and piling the media in the middle of the box for a day or so if possible. Scoop as much media as you can back into the buckets. If the reservoir is still full of water, remove the standpipe, pull the flow outlet tube from the end of the tube, and use the pump to wash all remaining media out of the box and into the sediment trap. The included squeegee is ideal for coaxing the last bits of media to the hole.

Handling the Media

During experiments and demonstrations, sediment leaving the box will accumulate in the sediment trap. The rate at which the sediment trap fills is highly variable, depending on activity in the box.

When the sediment trap becomes full, use the perforated scoop included with the Emriver model to return sediment to the box.

Allowing sediment to accumulate in the reservoir will **NOT** harm the pump. The filter is sized to allow the pump to function normally even when completely buried in sediment. However, fine debris such as dirt, lint and pollen can accumulate in the media over time and clog this filter. Just give it a rinse now and then.

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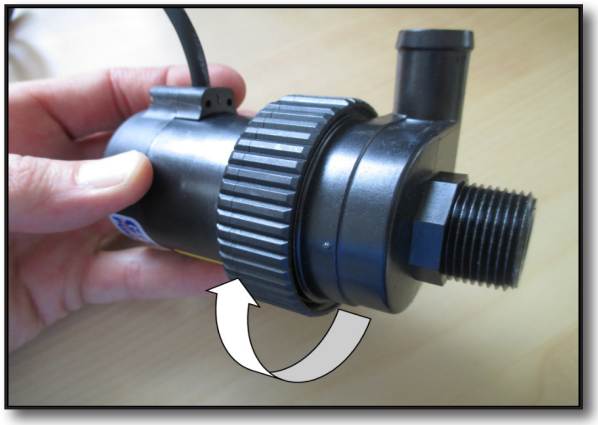
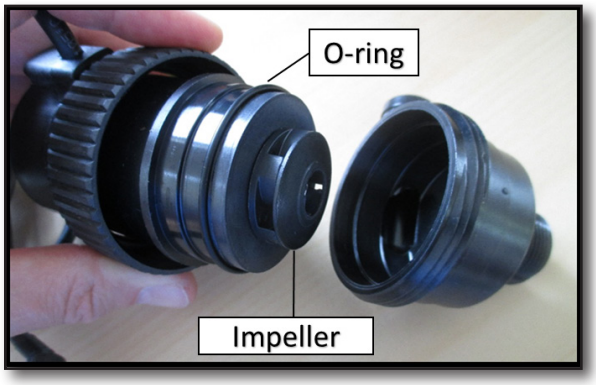
Instructions for Cleaning the GRI Pump

Your GRI pump should be checked monthly as part of routine maintenance. If you notice flow reduction or a complete cease in flow, disassemble and clean the pump following the instructions below. If you have questions in the process, please call Emriver at 618-529-7423.

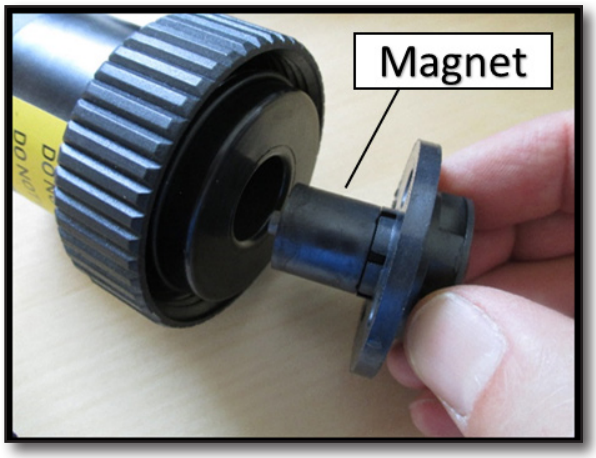
1. Disconnect GRI pump from controller and power supply.



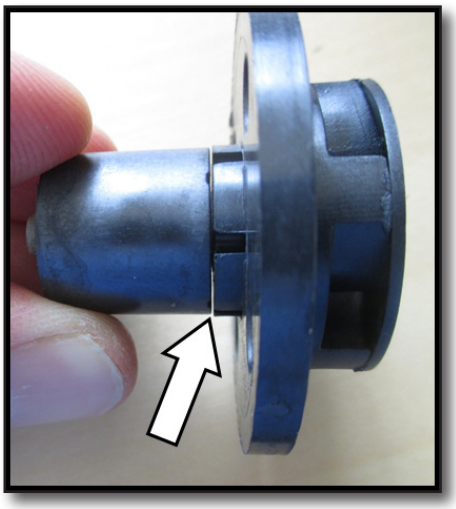
2. Unscrew the retaining ring.

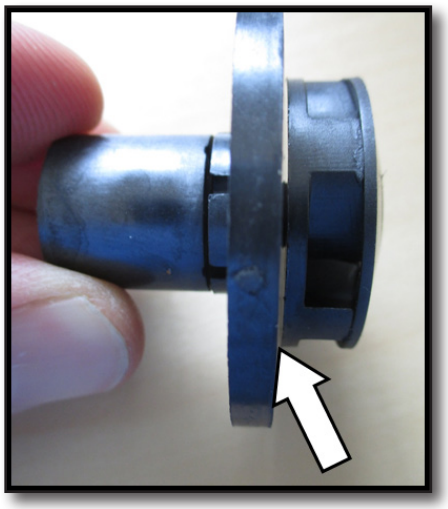


3. Pull threaded portion of pump housing to remove. Be careful not to remove the O-ring.



4. Remove the impeller by pulling it from the pump housing.





5.Clean all parts by rinsing with water. Make sure the narrow gaps around the impeller are clear of debris.

6. Moisten the whole unit to lubricate the O-ring and reassemble the pump by inserting the magnet and impeller into the housing. Make sure O-ring is in place and then press the threaded portion of the housing firmly onto the pump body. Tighten the retaining ring. When properly tightened, there should be no thread showing past the edge of the ring.

7. Attach filter and tubing. Submerge pump fully before restarting. Agitating the assembly lightly in the water will help clear air from the filter and pump.

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Specifications

Emriver Item		Specifications
Modeling Media	Composition	Thermoset melamine plastic
	Weight	150 lb. (68.2 kg)
	Specific gravity	1.55
	Particle size	0.02 - 0.09 in. (0.5 - 2.1 mm) Alpha & Carbondale Mix 0.01 - 0.05 in. (0.25 - 1.2 mm) Memphis Mix
Box	Weight	37.4 lb. (17kg)
	Dimensions	77 x 33 x 5 in. (1.95 x 0.83 x 0.13 M)
Reservoir	Water Capacity	22 gal. (84 L)
Pump	Capacity	120 gph (450 Lph) maximum Output range 0 - 250 mL/sec
Entire System	Dry weight	approx. 260 lbs (118.2 kg)
	Wet weight	approx. 460 lbs. (209.1 kg)
	Floor space required for demonstration with 12 people	12 x 15 ft. (2.5 x 4.6 m)

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