

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

The Emriver Em4 model is very heavy when filled with water and sediment. A collapse of the model could severely injure or kill a person. Be absolutely sure you understand how to use the model and its tilting base.

Use only the base provided with your model. Despite weight-bearing claims, no standard production sawhorse is strong enough to safely support the Em4 model. Sawhorses and folding tables can collapse under dynamic or side loading.

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 box. Be certain to connect it to a properly grounded outlet. Always use the Ground Fault Circuit Interrupter (GFCI) provided with your model.

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.

You must 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 Em4 can be found at <http://www.emriver.com>. Please contact us for additional support if your question cannot be answered online.

Assembly and Operation

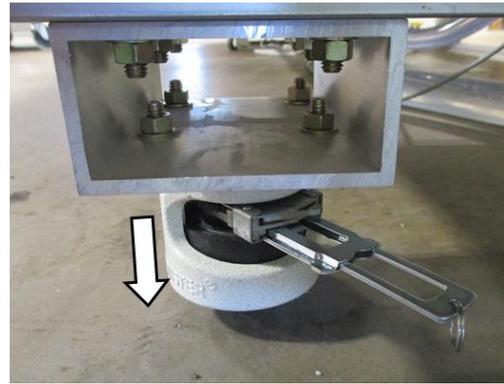
WARNING

When fully charged with water, the model can weigh in excess of 1,200 lbs. (544 kg). Dynamic loading during use, caused by someone leaning on the model, for example, can greatly increase this load. A collapse of the model's supports could be dangerous and seriously damage the model. You must be certain the model is adequately supported and that you have read and understand all warnings.

STEP 1 – Tilt base information and assembly/disassembly instructions

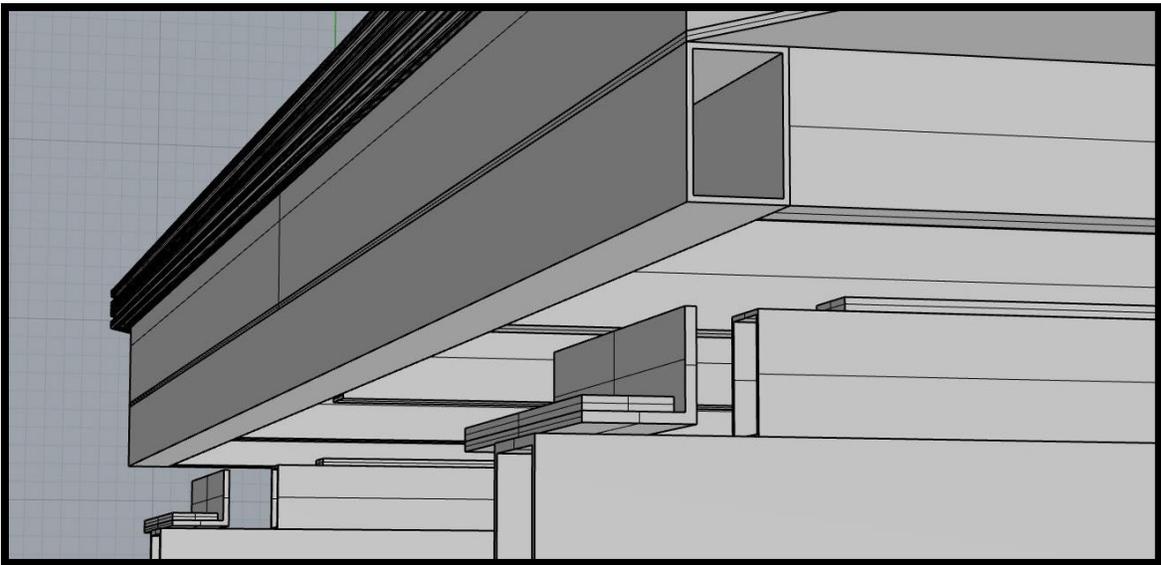
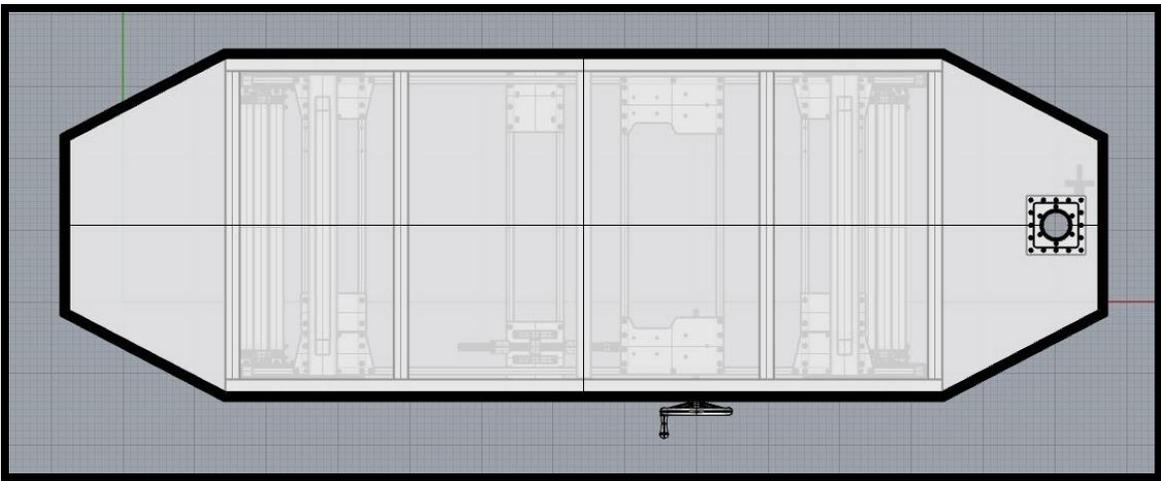
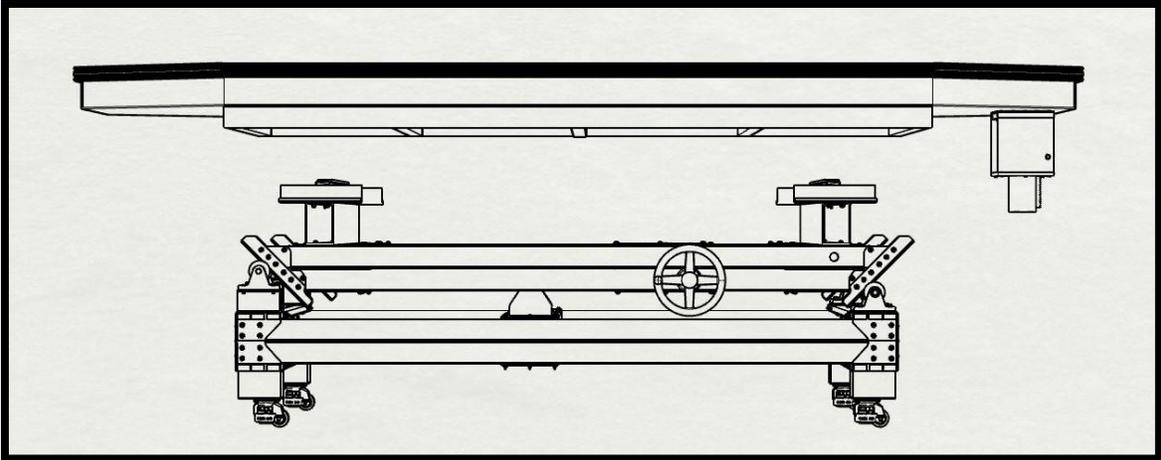
Your model will ship assembled, with the Em4 box on the tilt base. The system is modular and made to easily disassemble into components. Each component (box, tilt frame, base) weighs 225-250 lbs and will require at least 6 strong people to lift. If you need to disassemble the system in order to transport it, please watch the video at <https://vimeo.com/208926030>.

Remove all packing straps and padding, including the padding on the “rollers.” Roll the tilt base into place. It is very important to level the tilt base and lower the rubber shoes on the leveling casters with the built-in ratchets before placing the box onto the base.

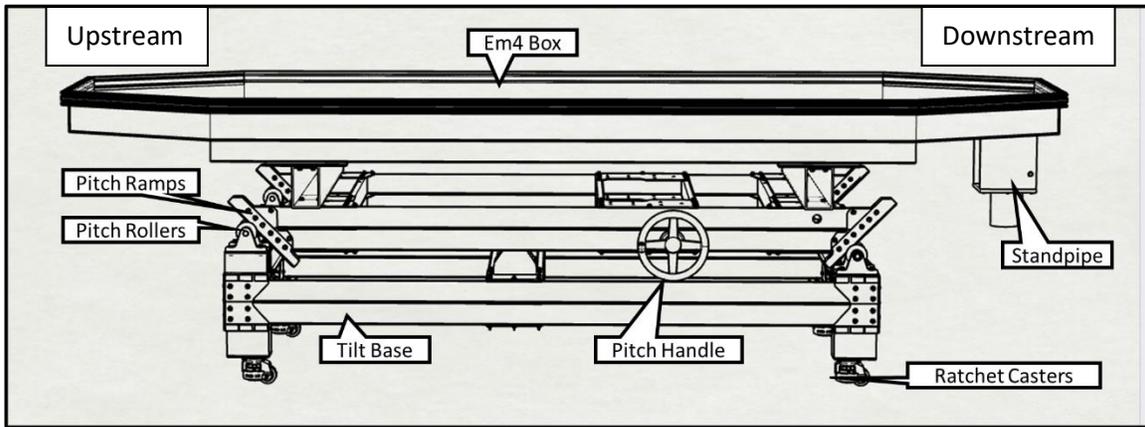


Remember that the box will extend farther than the tilt base on all sides. Once the box is loaded onto the base and filled with modeling media, and reservoirs are installed and filled with water, it will be much harder to move the base, so be sure to position it where you will use it before completing the setup.

Several people are needed to lift the box onto the tilt base. Be sure the box is centered on the base, with an equal amount of overhang on all sides.

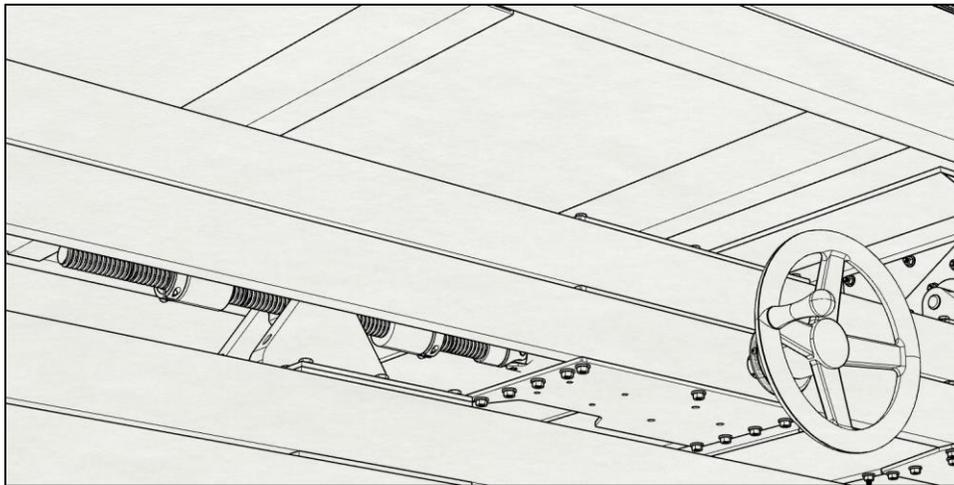


Note: Do not remove the box from the base while it is full of media. Only move the box while it is empty.



To operate the tilt base, turn the crank on the side. Pitch refers to slope along the length of the stream table, parallel to the stream.

When operating the system, be sure to keep hands away from any moving parts and pinch points, the aluminum ramps and rollers, and the acme screws.



Pitch acme screw.

STEP 2 – Position the reservoirs

The Em4 uses two reservoirs: an upstream reservoir and a downstream reservoir. The downstream reservoir will have two filters inside.



Place the upstream reservoir beneath the upstream end of the box (no standpipe) so that the hose connection and valve face downstream. Place the downstream reservoir beneath the downstream end of the box (with standpipe) so that the hose connection faces upstream. Be careful when tilting the Em4 that the standpipe does not hit the downstream reservoir or upright filter, which may cause damage.



STEP 3 – Connect reservoirs

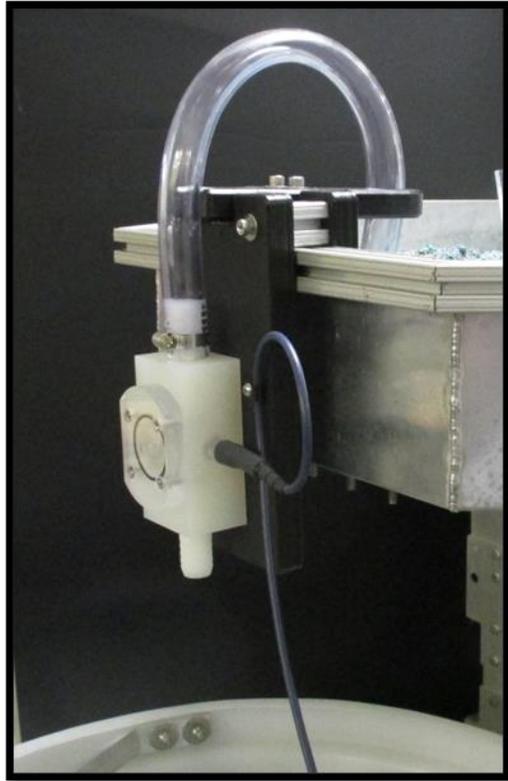
When fully assembled, the two-inch tubing will run between the two reservoirs. Place the tubing under the box in order to connect the reservoirs.

Attach the fitting on the tubing to the reservoir. Then snap down the metal clips toward the reservoir. See photos below.



STEP 4 – Attach K500 Paddlewheel

See the attached manual for instructions on setting up and using the K500 Digital Flow Controller.



STEP 5 – Fill the box with modeling media

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

Handling the media: During experiments and demonstrations, sediment leaving the box through the standpipe will accumulate in the sediment trap. The rate at which the trap fills is highly variable, depending on activity in the box. Use the perforated scoop included with the Emriver model to return sediment to the box.

Allowing sediment to accumulate in the reservoirs will **NOT** harm the system. The filters are sized to allow the system 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 the filters. Just give them a rinse now and then.

STEP 6 – Fill the reservoirs

Position the reservoirs before filling them with water. **Do not move the reservoirs after they have been filled, as this will cause damage to the reservoirs.**

Fill both reservoirs about 4/5 full, or to six inches (150 mm) below their rims; the exact amount of water isn't important. Wait for the water to equalize between the two reservoirs. This may take a few minutes. If water level is slow to equalize, make sure the filter in the downstream reservoir is clear and not full of air.

WARNING

Using excess water could damage the box or cause it to collapse. Do not exceed this volume and **do not start the pump** until you have filled the reservoirs.

STEP 7 – Setting up your instruments

See the instruction manual provided with each instrument or visit our website www.emriver.com for instructions or call our office at 618-529-7423.

STEP 8 – Power the pump

Use the appropriate provided power supply for your pump and controller.



Connect the power cord to the Ground Fault Circuit Interrupter (GFCI). If you are using an extension cord, connect the extension cord to the GFCI. Do not plug the model's power cord directly into an outlet unless you are sure the receptacle is GFCI protected.

Disassembly, Transport, and Storage

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

- The upstream reservoir is fitted with a drain valve and fitting for a garden hose for emptying the system into a floor drain.
- You may also use the pump and tubing to drain the reservoirs if you have a K28 controller.
- Remove the pump tubing from the outlet fitting at the upstream end of the box. Place the tubing into a media bucket (or any container that can be carried while full of water) or directly into a proper drainage area.
- Turn on the pump to move water from the reservoir to a smaller container or to a drain. Repeat until all of the water is removed from the reservoir.

As much as 20 gal (76 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 storage of the model, most of this remaining water must be drained from the sediment. This water can take several hours to drain.

Pile the media at the upstream end of the box to aid drainage. Completely lower the standpipe to speed along the process.

Note: To prevent growth of mold and bacteria, add about 10 ml of household bleach to the media buckets if you plan to store them wet.

Maintenance and Care

Routinely inspect all nuts and bolts to ensure they are properly tightened, especially if the base is moved frequently.

Keep the Acme screw on the tilt base lubricated with general purpose grease. The Acme screw is a large screw, and its threads are exposed and easy to locate when the box is not installed on the tilt base. Rub grease along the acme screw where it meets the brass nut (visible from the underside of the tilt base). Then turn the hand crank that controls the pitch axis all the way to one side, and then all the way to the other side, to distribute the grease evenly.

Clean plastic parts with mild detergents. Do not use solvents, which may dissolve or weaken the plastic. If the tubing is left in the sun while wet, it may support algae growth and become cloudy. Removing all standing water in the lines will help as well.

If tubing becomes cloudy or damaged, contact us for replacement. Tubing from your local hardware store will work, but the tubing that is supplied with your model is a high-quality type and is longer lasting and more flexible.

Clean the filters periodically.

- To clean the pump filter, unscrew it from the pump and thoroughly rinse it inside and out with fresh water.
- To clean the reservoir filters, unscrew them from the inside of the reservoir and rinse inside and out with fresh water.

Demonstrations and Experiments

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.

Channel slope is controlled by the slope of the box and by the elevation of the standpipe. 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.

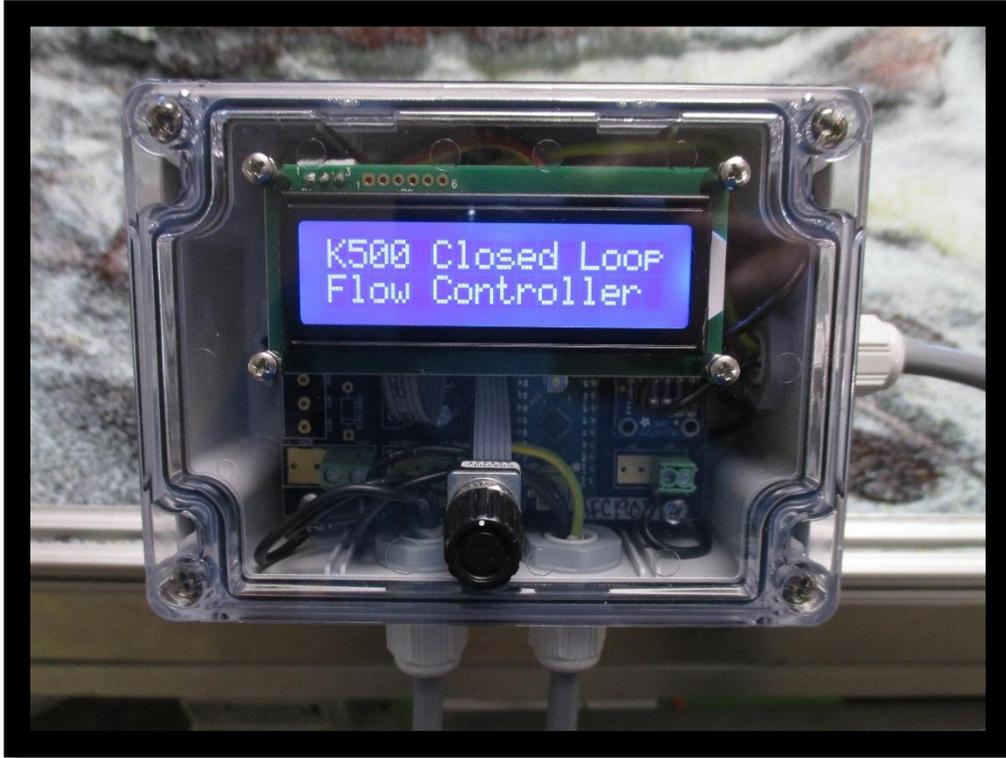
As you are learning to use the model, begin with low flows. These flows may seem too low at first glance, but low flows often give the most interesting results. Higher flows will mobilize all sediment in the channel, which, in many demonstrations and experiments, will make it difficult to see specific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

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) 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. The guidelines and videos at the following places will help you begin.

- www.emriver.com
- Emriver YouTube Channel
<https://www.youtube.com/channel/UCt2HD6vL70tc2eRLdvzQ-UQ>

You may want to add sediment to the small pool that usually forms just downstream of the energy dissipater. This prevents the upper ends of your channels from being sediment-starved.

K500 & Paddle Wheel Setup and Use for Em4

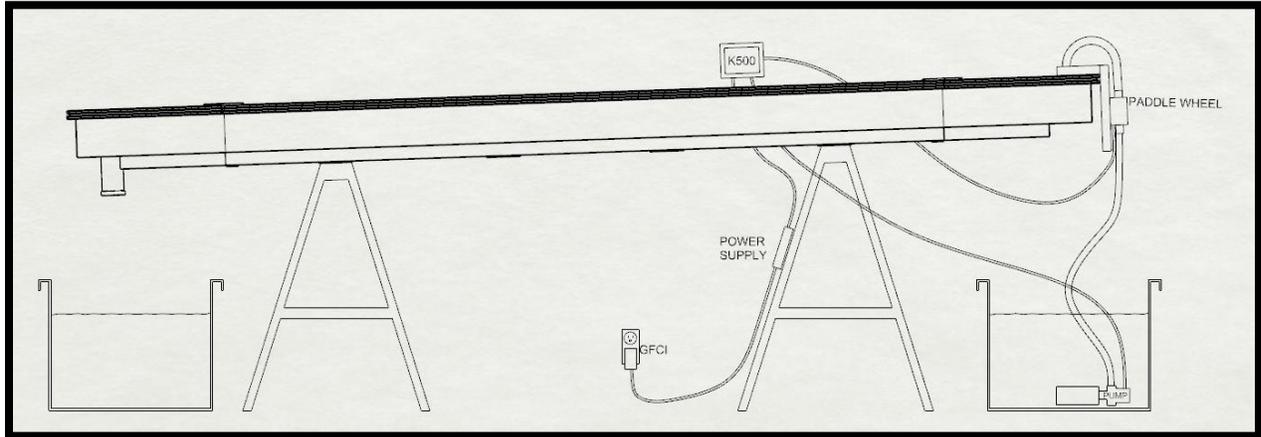


550 N. University Ave.
Carbondale, Illinois, USA
phone +1.618.529.7423
fax +1.618.529.0927
info@emriver.com
www.emriver.com



Introduction

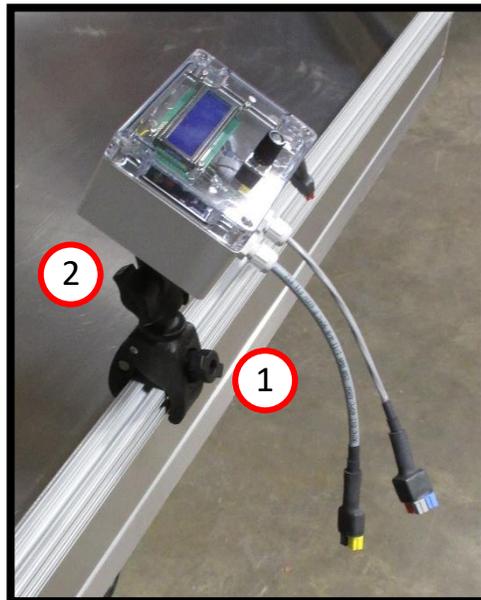
Your Emriver K500 digital flow controller can provide precise measurement of flow rates from 50 ml/sec to 400 ml/sec and automatically run hydrographs. Here are instructions for setup and use on an Emriver Em4.



Simplified diagram of K500 setup with Em4

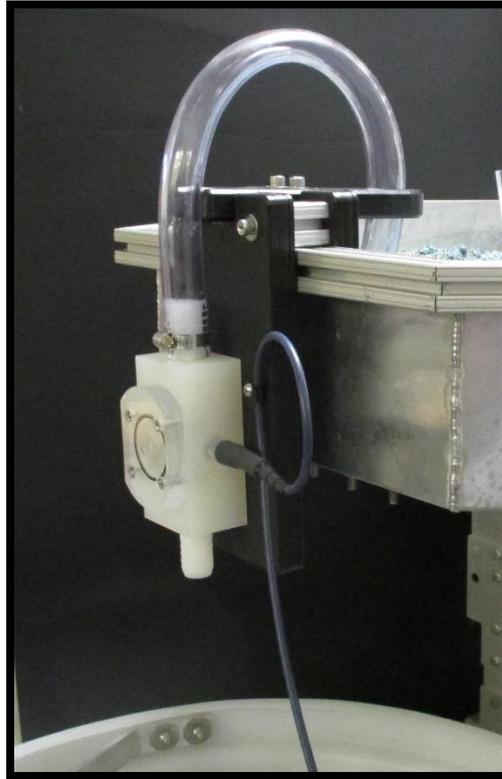
1. Mount K500 controller on Em4 box

Place the claw mount over the edge of the box and tighten Screw One so that the bracket is secure. An extension has been provided so the controller can be placed anywhere on the box. If you need to remove the K500 from the mounting bracket, just loosen Screw Two until the balls are removable from their sockets. Screw Two can be used to adjust the viewing angle of the K500.



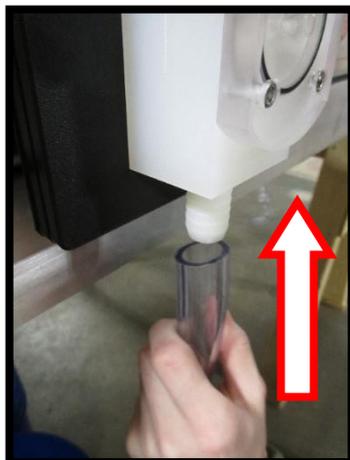
2. Mount the paddle wheel and outlet

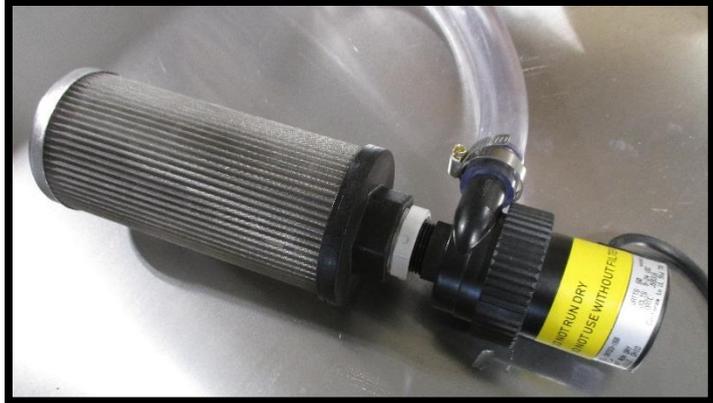
Hang the paddle wheel and outlet tubing in the center of the upstream end of the Em4 box.



3. Connect tubing to pump and paddle wheel

Connect the GRI pump to the barb adapted at the bottom of the paddle wheel using the flexible PVC tubing and hose clamps.





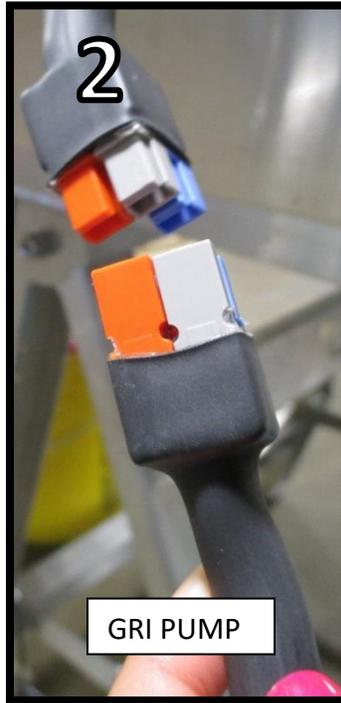
Attach the filter to the pump and be sure to fill the reservoir with water before powering up the K500 controller.

4. Make electrical connections

The K500 controller has three electrical pigtails.

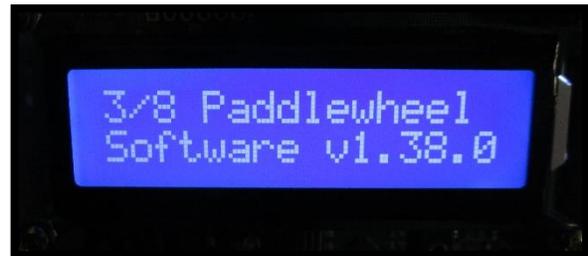
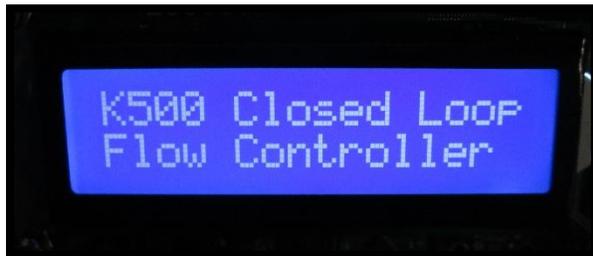


Make the power connection last, and make sure there is water in the reservoir before you start the pump using the controller.



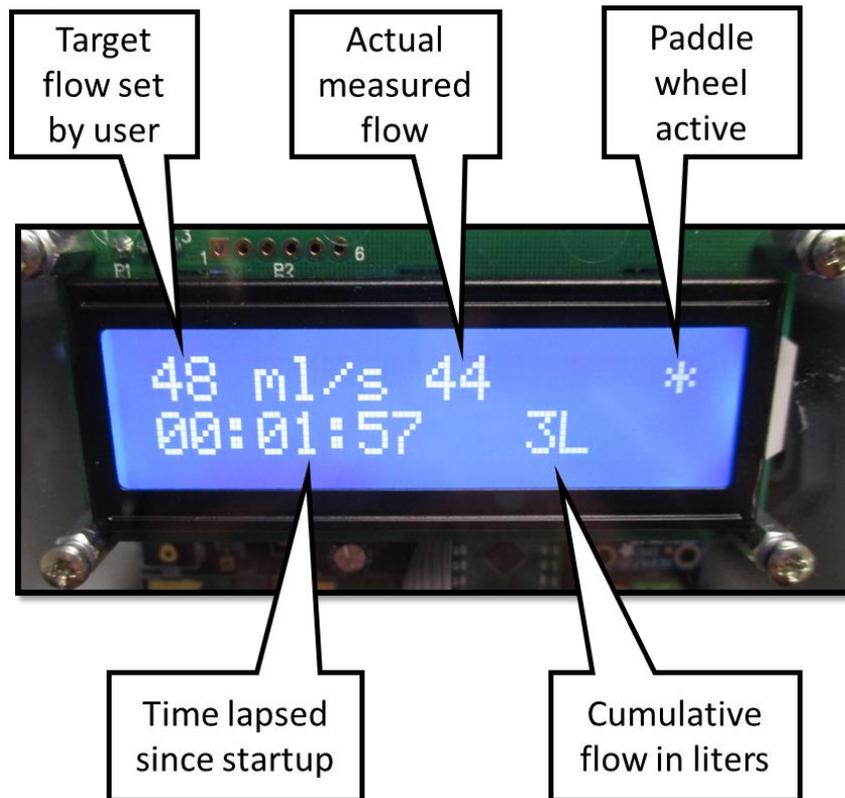
5. K500 Operation

Upon startup, the K500 will briefly display two splash screens and then go to the home display where the timer will immediately start.



Home Screen

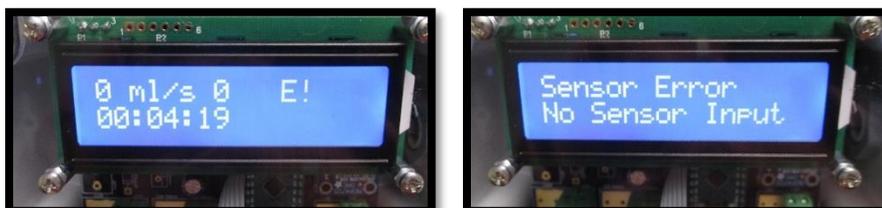
The home screen provides the user with five indicators.



While at the home screen, turn the knob to start flow. The lowest setting is 25 ml/sec. You may need to set a higher flow rate when you are first starting up the system to flush air from the tubing or filter. Agitating the filter with the pump assembly under water can help remove air. Each 'click' of the knob is a one ml/sec change in the flow. After setting a target flow, it will take a little time for the pump to stabilize the flow around the target. The range of flow is from 50 ml/sec to 400 ml/sec.

Error Statement

If the K500 does not detect input from the paddle wheel, either because the sensor is disconnected or there is no flow from the pump, an error indicator will appear on the home screen.



If you receive an error statement, first check the electrical connection from the paddle wheel to the K500. If the connection is OK, check to see whether there is air in the filter or tubing that is preventing the pump from priming or getting flow to the paddle wheel. Reset the K500 by disconnecting the power supply and reconnecting.

Navigating the Menu Screens

Press the knob once to display the **Menu Selector** screen.



Turn the knob one 'click' to the right to get the **Zero Flow** screen. Here you can **press** the knob once to stop all flow.



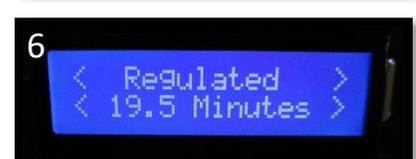
Turn the knob again to get the **Maximize Flow** screen. Here you can **press** the knob once to set the flow to the maximum level, 400 ml/sec.



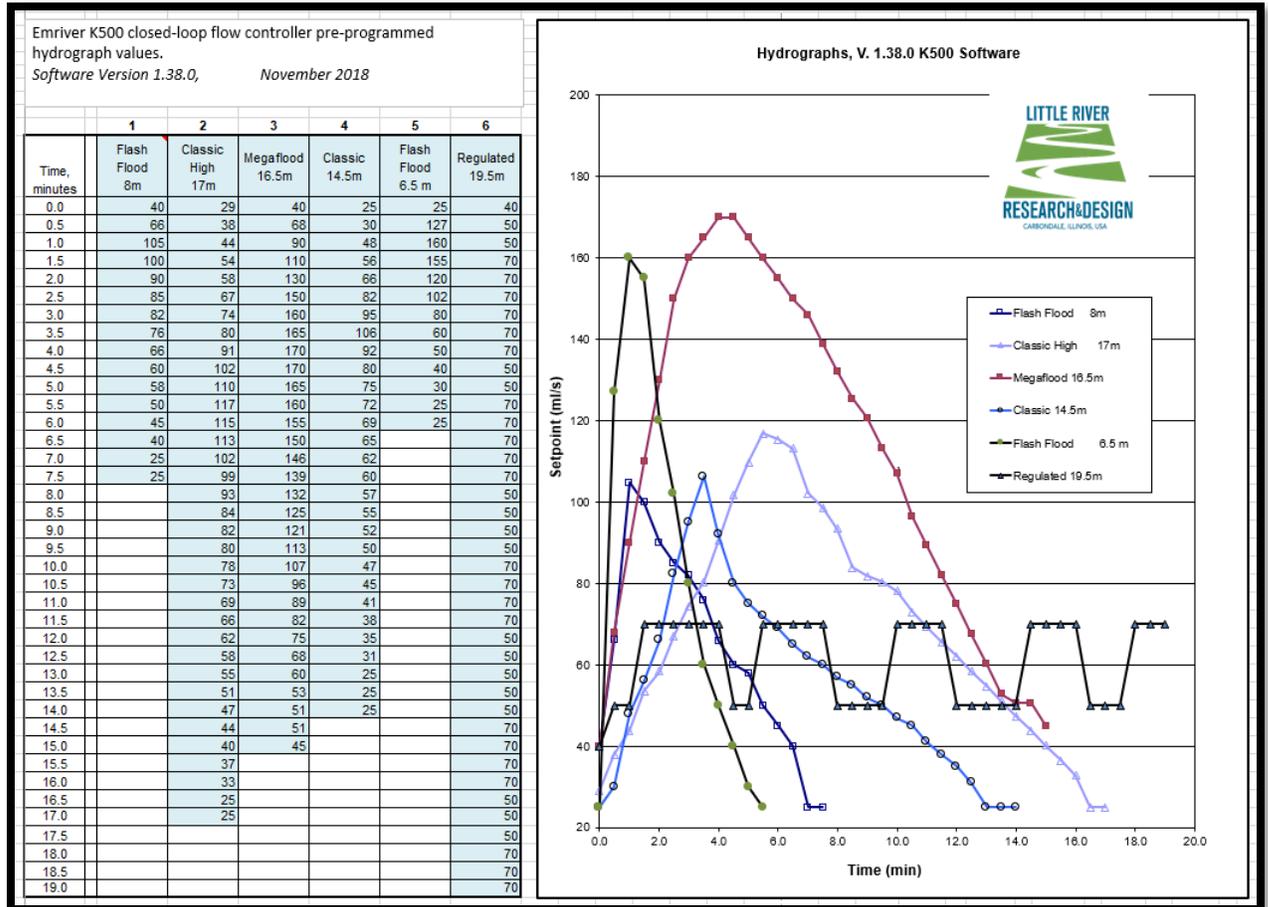
Turn the knob again to get the **Hydrograph Selector** screen.



Here you can **press** the knob once to enter the submenu of Hydrograph options. **Turn** the knob to cycle through the options. **Press** the knob to select and start a hydrograph. The K500 will give an audible beep to indicate when the flow rate changes within a hydrograph. When the hydrograph is complete, flow will return to zero. **Press** the knob during a hydrograph to stop flow.



Press the knob on the **Back** screen to go back to the main **Hydrograph Selector**.



Preprogrammed hydrographs on K500. See image on our website, emriver.com

Turn the knob to view the **Controller Information** screen. Here you can **press** the knob to view information.



Turn the knob to return to the **Main Screen**.

6. Powering Down

To power down when finished, simply unplug the power cord on the K500. The controller should be powered down after each use.

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

The manual for the Omega FPR301 paddle wheel can be viewed at <https://www.omega.com/Manuals/manualpdf/M4172.pdf>

Instructions for cleaning the GRI pump

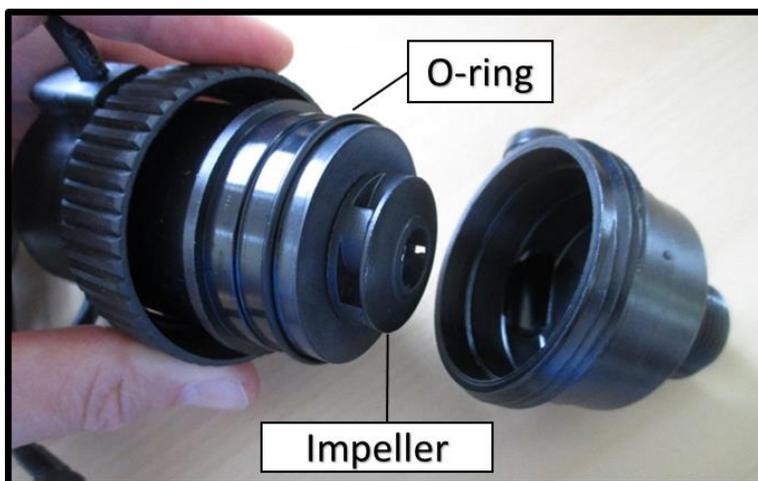


Your GRI pump should be checked monthly as part of routine maintenance. If you notice flow reduction or a complete cease in flow, disassemble and clean the pump following the instructions below. If you have questions about the process, please call Emriver at 618-529-7423.

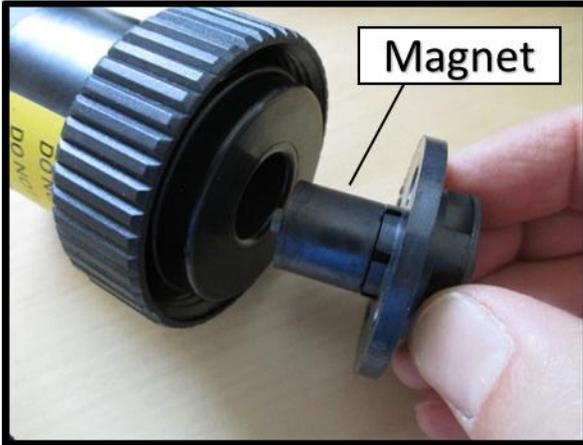
1. Disconnect GRI pump from controller and power supply.
2. Unscrew retaining ring.



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

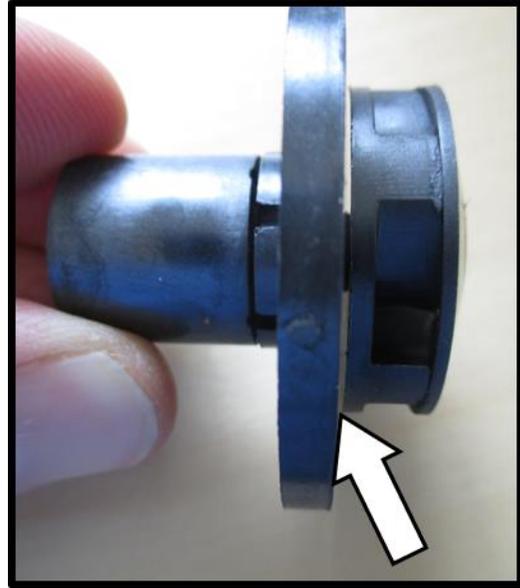
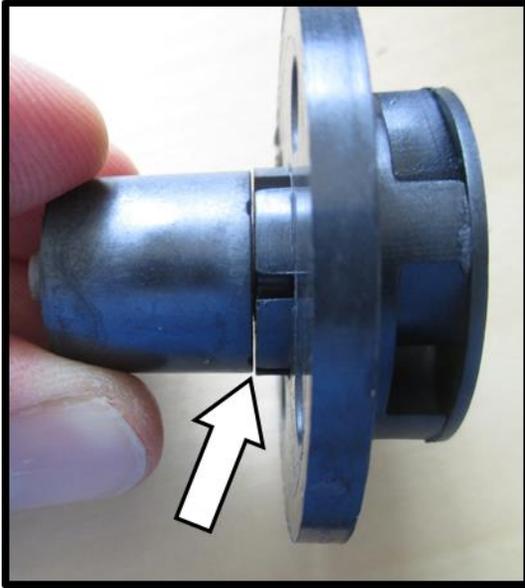


4. Remove the impeller by pulling it from the pump housing.



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.