

**RK2**

**SYSTEMS**  
**SAN DIEGO, CA**

**RK150PE**

**PROTEIN FRACTIONATOR**

**OPERATIONS MANUAL**

# RK150PE

PROTEIN FRACTIONATOR  
FLOW RATE 150GPM @ 2 MIN. DWELL  
HDPE Molded Tank

internal rinse system  
seawater - 1 nozzle jet  
retracting

riser configuration

external rinse system  
high pressure - freshwater  
4 nozzle jets.

**L** effluent drain union  
back-side of  
upper riser chamber  
(not shown)

**K** electronic interval timer  
3/4" fipt (rinse system) x2

venturi anti-siphon  
air/ozone intake

Kynar venturi  
220 cfh gas injection  
6230 clh. w/ ozone  
& anti-syphon connx.

**I** filter discharge  
return manifold

Dedicated venturi pump  
13.8/6.9 amp max.  
@110/220v 50/60Hz 1ph.

HDPE Pump pad  
18"x24"x3"

**O** ozone vent union

upper riser chamber  
clear acrylic

Clear Sight Gauge  
(Tank level monitor)

2" vent - (discharge manifold)

**M** 3" intake  
(standard locations  
@ 90° or 270°.)

107"

reaction chamber  
HDPE custom molded  
36" dia. (46cm dia.)

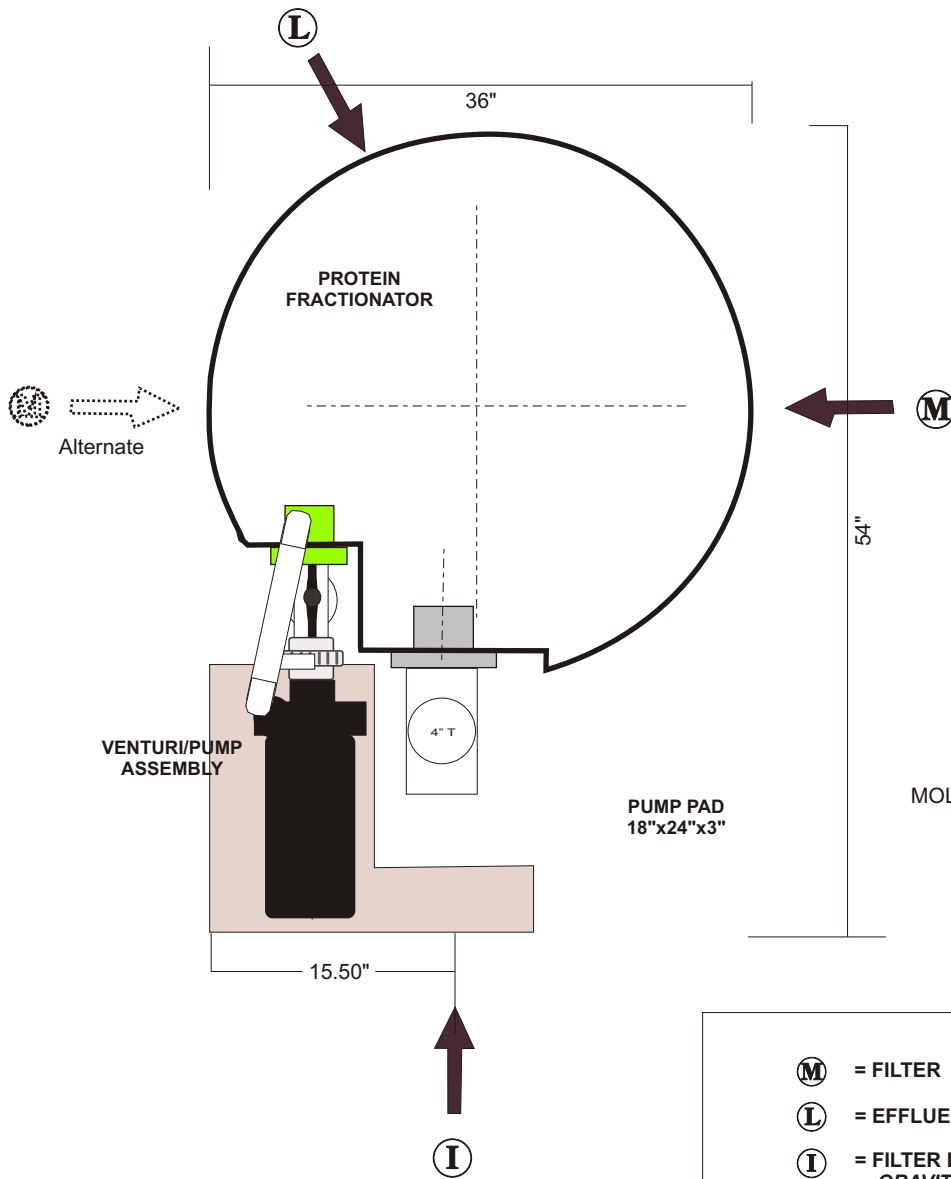
**N** level control valve

Floor

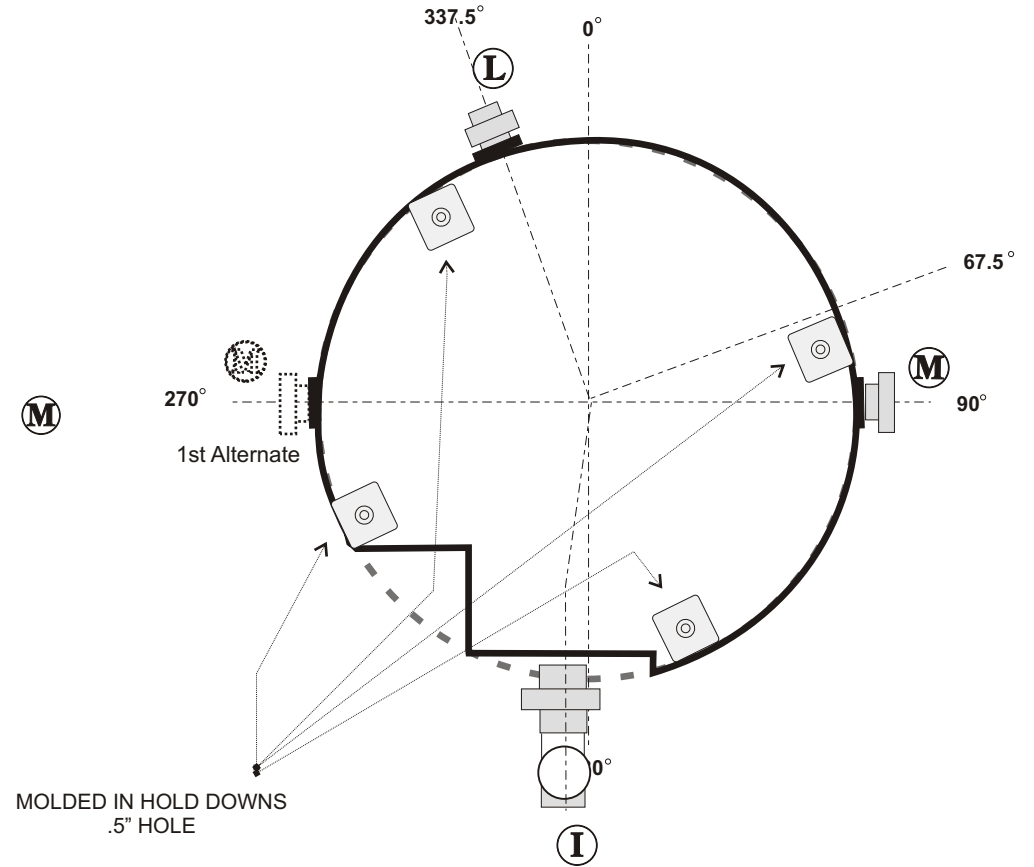
36.0"

# RK150PE PROTEIN FRACTIONATOR PORT CONNECTION CONFIGURATIONS

TOP VIEW:



## PORT ORIENTATION

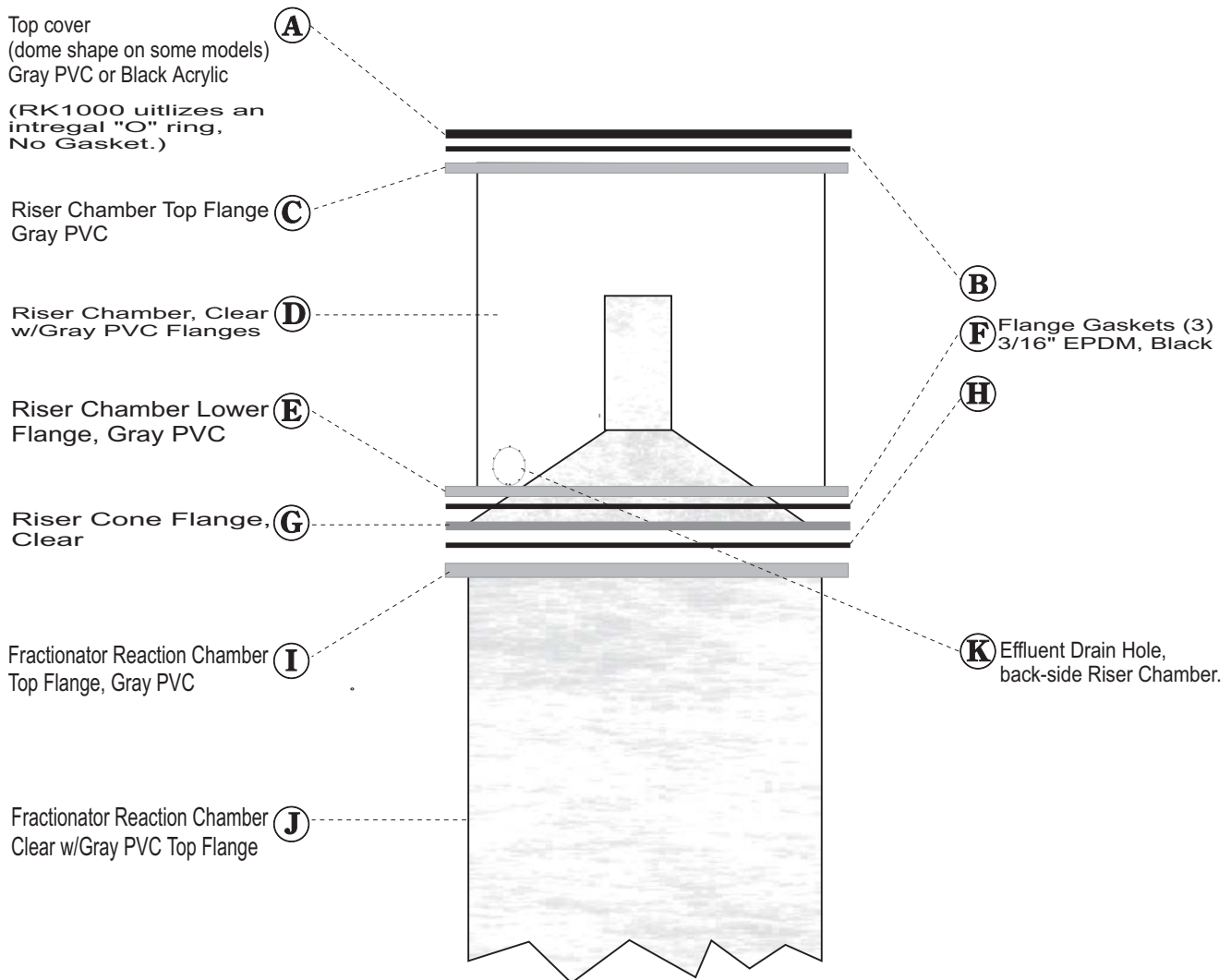


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- Ⓜ = FILTER INLET. 3" PVC STD. FLANGE, HORIZONTAL POSITION. HEIGHT = 62.50"
- Ⓛ = EFFLUENT DRAIN. 2" PVC SCH40 SLIP UNION, HORIZONTAL POSITION. HEIGHT = 64.0".
- Ⓢ = FILTER DISCHARGE. 4" PVC SCH40 SLIP TEE, HORIZONTAL POSITION. HEIGHT = 62.5"  
GRAVITY DRAIN, INITIAL 12" MUST DROP VERTICALLY, NO LATERAL PIPING.
- Ⓞ = OZONE VENT. 1" PVC SCH40 SLIP UNION. HEIGHT = 104"
- Ⓚ = RINSE SYSTEMS. ELECTRONIC CONTROL VALVES 3/4 MIPT. HEIGHT = 50.5"  
2 - 9V BATTERY PER VALVE.

# Riser Chamber/Gasket Sub-Assembly

NOTE:  
Letter designations are unique to this diagram



**ASSEMBLY SUGGESTIONS: ASSEMBLE COVER A , AND GASKET B , TO TOP FLANGE C WITH 316SS BOLTS, NUTS AND WASHERS, (SEE NOTE BELOW). MAKE SURE WASHER PLUMBING ASSEMBLY ALIGNS WITH CORRESPONDING PIPE CONNECTIONS, AND HOLD DOWN BRACKETS ATTACHED TO SIDE OF FLANGE C .**

**PLACE RISER CHAMBER D , ON RISER CONE FLANGE G , WITH GASKET F , BETWEEN. ALIGN BOLT HOLES BY SIGHT WITHOUT BOLTS. PLACE FINAL GASKET H , ON REACTION CHAMBER FLANGE I , ALIGN BOLT HOLES. LIFT AND PLACE RISER CHAMBER AND CONE ONTO FRACTIONATOR REACTON CHAMBER AND GASKET. MAKE SURE THAT UPPER RISER CHAMBER AND REACTION CHAMBER TUBE SEAMS ARE ALIGNED, AND THAT EFFLUENT DRAIN HOLE K , FACES TO THE REAR OF UNIT. AFTER ASSEMBLY, ALIGN BOLTS HOLES WITH A BLUNT TOOL, (EG: LARGE PHILLIPS SCREW DRIVER), DROP IN BOLTS & WASHERS AS HOLES COME INTO ALIGNMENT. FOR LARGER UNITS USE FORKLIFT WITH MELAMINE COVERED PALLET, LIFT TOP AND SLIDE INTO POSITION**

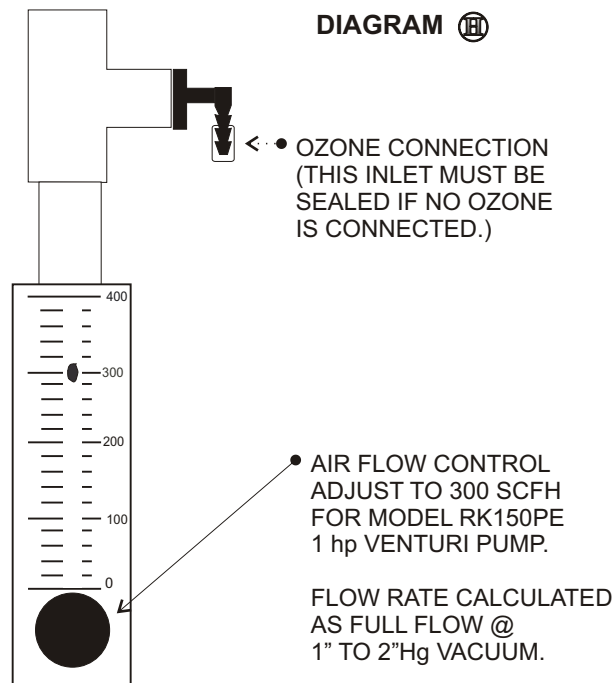
**\*\*IMPORTANT - TIGHTEN FLANGE BOLTS IN CRISS-CROSS PATTERN. FLANGE SEAL IS NOT UNDER PRESSURE, DO NOT OVERTIGHTEN! TIGHTEN SNUG ONLY. WITH UNIT OPERATING, TIGHTEN FURTHER AS NECESSARY, OVERTIGHTENING MAY CAUSE STRESS FRACTURES.**

MODEL RK150PE-PF  
(1 hp Venturi Pump)

FLOW CONTROL SETTINGS

**INITIAL START-UP**

- 1.) WITH THE VENTURI PUMP OFF, OPEN ALL WATER VALVES FULLY (EXCLUDING **M**). SLOWLY OPEN THE FRACTIONATOR INLET VALVE **M**. THIS VALVE WILL DIRECT FLOW INTO THE FRACTIONATOR. THE VALVE SHOULD BE ADJUSTED TO ALLOW A MAXIMUM FLOW RATE OF APPROXIMATELY 300 GPM.
  
- 2.) TURN ON THE VENTURI PUMP. ADJUST THE AIR/OZONE FLOW INTO THE FRACTIONATOR WITH THE NEEDLE CONTROL VALVE **H**. THE TOTAL FLOW SHOULD BE APPROXIMATELY 300 SCFH AS MEASURED ON THE INTAKE FLOW GAUGE. IF OZONE IS APPLIED THE TOTAL OF OZONE AND AIR COMBINED SHOULD EQUAL 300 SCFH.



- 3.) FINAL FOAM LEVEL ADJUSTMENT IS CONTROLLED WITH VALVE **N**. ALL OTHER VALVES SHOULD REMAIN IN THEIR SET POSITIONS AND VALVE **N** ADJUSTED AS NECESSARY FOR CHANGING CONDITIONS AND TO ACHIEVE THE CORRECT FOAM CONSISTENCY. ADJUSTMENTS TO THIS VALVE SHOULD BE SMALL, NOTE THAT FULL EFFECT FROM VALVE ADJUSTMENTS WILL TAKE 10 TO 20 MINUTES TO COMPLETELY MANIFEST THEMSELVES. (THE VENTURI PUMP VALVES ARE TO REMAIN IN THE FULLY OPEN POSITION.)

### INSTALLATION INSTRUCTIONS 6503 BATTERY OPERATED RINSE SYSTEM CONTROLLER

#### CONTROLLER MAIN FEATURES

- Operates on two 9-volt alkaline batteries
- Weekly or Cyclical program
- Station run time from 1 second to 12 hours in 1second increments
- Rinsing Schedule 7 day weekly program or cyclical from once a day to once every minute, hour, and day
- Simple, four button programming
- Semi-automatic or manual operation
- Completely waterproof
- Can be mounted on a valve or on the wall



#### SPECIFICATIONS

##### OPERATING SPECIFICATIONS

Rinse time: in 1-second increments up to 24 hours

Rinse Schedule: In 1-minute increments up to 5 minutes

In 5-minute increments up to 15 minutes

In 15-minute increments up to 45 minutes

In 1-hour increments up to 23 hours

In 1-day increments up to 30 days

7 days calendar

Start time in propagation mode: one start time every minute

Sensor: on and off

Open window: AM or PM

Close window: AM or PM

##### DIMENSIONS

Height: 6" (15cm)

Width: 4" (10cm)

Depth: 2" (5cm)

#### BATTERY INSTALLATION

Rotate the battery compartment cover handle to the 11 o'clock position to remove the cover (see drawing). Insert two 9-volt alkaline batteries. All controller display elements will briefly appear on the display, followed by the blinking time "12" – the controller is now ready to be programmed.

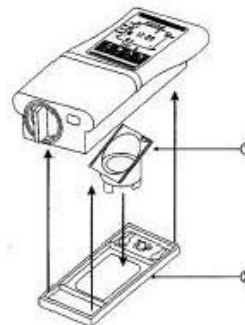


**IMPORTANT:** To replace the battery compartment cover, insert it with the handle in the "11" o'clock position to avoid possible cover guide pin breakage.

#### ASSEMBLY AND INSTALLATION OF CONTROLLER UNITS

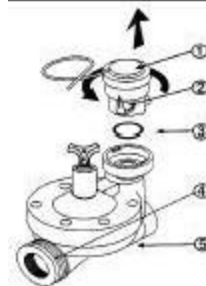
If the mounting plate [2] is attached to the controller, remove it.

1. Insert the mounting coupling [1] into the mounting plate, aligning the words "top", which are stamped on both the coupling and the plate.
2. Press the mounting plate, with the mounting coupling inserted, against the controller back.



#### ASSEMBLY AND INSTALLATION OF RINSE SYSTEM CONTROLLER

1. Shut the manual rinse system valve.
2. Before installing the hydraulic valve [5] in the rinse system, remove the solenoid [1] from the valve with a 90-degree counter-clockwise turn. Be careful not to lose the seal (O-Ring #2) [3].
3. Install the hydraulic valve in the rinse system, paying attention to the correct water flow direction, as indicated by the arrow [4].
4. After installing the hydraulic valve [5], assemble the solenoid with a 90-degree clockwise turn. Be sure to place the seal (O-Ring #1) [3] in its proper location.



#### MANUAL-MECHANICAL OPERATION

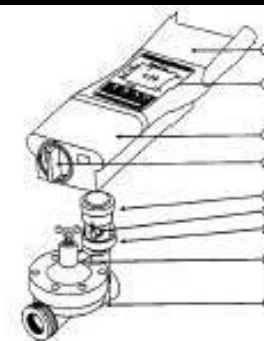
The valve can be opened and closed independent of controller operation. Manual operation is useful when



immediate rinsing is required, without the delay of controller programming. The 3-position valve handle [A] is located on the solenoid Manual valve, and functions as follows: Open [1], Automatic Operation [AUTO], Closed [2].

#### PARTS IDENTIFICATION

1. Top Cover
2. Controller Display
3. Bottom Cover
4. Battery Compartment Cover
5. Solenoid
6. Valve Handle
7. Bayonet
8. Manual Flow control
9. Hydraulic Valve



#### INSTALLING THE RINSE CONTROLLER


Your controller can be installed in line directly to PVC pipe fittings, (inlet female pipe thread, outlet female pipe thread)


**NOTE:** Wrap all fittings with Teflon tape. Do not use thread paste on valve as this will damage the valve and void your warranty.


**IMPORTANT:** Make sure flow direction arrow is pointed away from water source. Never use the controller unit as a handle for tightening the valve to the pipe.


## PROGRAMMING THE CONTROLLER

Controllers are programmed with the aid of four buttons:

 Programming step selector – used to select the desired programming mode (includes clock setting mode)









 Next step button – used to select the parameter to be changed (hour, minute, etc). Only a blinking parameter can be changed.

 Data increment button (increase) – Raises the value of the selected parameter (e.g., when time selected from 06:00 to 07:00).





 Data decrement button (decrease) – Lowers the value of the selected parameter (e.g., when time selected from 06:00 to 05:00).




## PROGRAMMING CURRENT TIME AND DAY OF THE WEEK

Press  a number of times until  icon appears. Press . The hour digit will flash. Use the  or  buttons, to set the current time (note: use of AM and PM). A further press of  will make the minutes digit flash. Use the  or  to set the current time.












Press . A flashing arrow will appear in the upper portion of the display. Use the  or  to set the current day. Press  to move to the next step.

*If the last data entered stops flashing, press the  again to resume programming.*

## PROGRAMMING WASH/RINSE TIME (DURATION)



This setting determines the length of time that the valve will remain open.

Press  until  appears. Press , the hour/minute digits blink. Set the desired number of hours by pressing  or . Press  again, the minute digits blink.

Set the desired number of minutes by pressing  or . Repeat the same steps for seconds. (10 seconds is recommended) Press  to proceed to the next step.



## PROGRAMMING RINSING SCHEDULE





Press  until  icon appears. At this stage you can select one of two program options:

**A. Cyclical Schedule Rinsing** – once, minutes, hours, and days. Recommended.

**B. Rinse Schedule according to the days of the week.**







**A. Cyclical Schedule Rinsing**

This option is used to program the controller to operate the rinse system one time only, for the rinse period as set in watering time (durations).

Press  until  appears. Press  several times (for all the days of the week) until  appears, and ONCE blinks on the display.

Note: In cyclical mode only 1 start time per day is available. **CYCLICAL RINSING**




This option is used to program the controller to operate the system in a cyclical manner. Once every 1 minute up to 5 minutes, every 5 minutes up to 15 minutes, every 15 minutes up to 1 hour, every 1 hour up to 12 hours, and every day up to 30 days. Recommended is every 10 minutes.

Press  until  appears. Press  several times (to advance all the days of the week) until  appears, and ONCE blinks on the display. With the display blinking, press  or . The number of minutes, hours or days between watering cycles appears on the display. For example if “every 10 minutes” is selected, your programmed rinsing duration will activate every 10 minutes during a 24-hour period.


Press  to proceed to the next step.

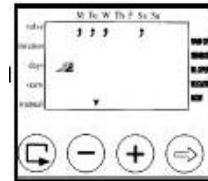


**B. Rinsing Schedule** according to the days of the week.

Press , a flashing arrow appears opposite the days of the week. Use the  or  buttons for the desired day.

A non-flashing arrow shows the Rinsing Day Selected. In this way, move along the days of the week and set any day of the week required.


To cancel a Rinsing Schedule: Press  when the arrow is flashing beside that day.










## PROGRAMMING A WEEKLY START TIME

(For watering according to the days of the week.)

Programming the controller by the day of the week allows 4 start times per day.




Press  for start no.1. The word OFF will appear (or the last start time entered).

Press  the word OFF flashes. Use the  or  to set the desired start time (note AM and PM). Press  to program start no. 2 and repeat the same steps for starts no. 3 and 4. To cancel one of the start times, press . The hour digit flashes. Use the  or  to display OFF.







## PROGRAMMING A CYCLICAL OR ONCE START TIME WITH START TIME DELAY

Programming a start time with these programs will allow the use of an additional function defined as “number of days”. You will be able to set the first start time today (day 0), tomorrow (day 1) or any number of days required (up to 30 days).

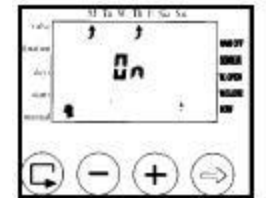
Press . Use  or  to set the desired start time, and day. (Only one start time in this mode).



## MANUAL OPERATION

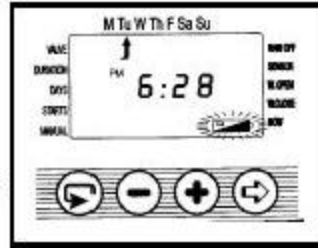
Press the . The  icon appears. Use the  or  to open or close the valves.

- In manual operation, the valve will close automatically after the programmed watering time.



## BLINKING LOW BATTERY WARNING

A blinking battery icon appears on the display when the batteries are weak. In this state, a limited amount of energy still remains in the batteries for valve operation, and they should be promptly replaced. Press any button after replacing



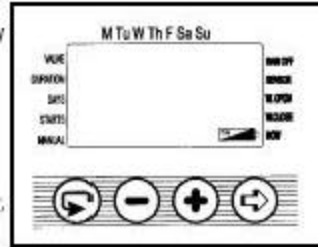
the batteries to resume rinsing controller activity. Program data will be retained for approximately 20 seconds during battery changing.

## CONSTANT LOW BATTERY WARNING

When weakened batteries are not replaced in a timely manner, the battery icon appears constantly. All other display elements disappear and all valves are closed.

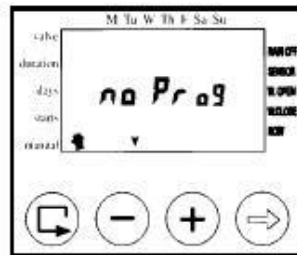
Replace batteries promptly, then press any button to resume rinsing controller activity.

Program data will be retained for approximately 20 seconds during battery changing.



## NO PROGRAM

During "manual" rinsing system operation via the rinsing controller, "no prog" appears on the display, meaning that no irrigation period has been set for the valve. In this case, the rinsing controller "does not know" when to close the valve. In this situation, valve opening is disabled.



## MAINTENANCE AND TROUBLESHOOTING

**PROBLEM:** Valve does not open.

**CAUSE:** One of the following not entered: Rinsing Time, Rinsing Days, Start Time.

**SOLUTION:** Check and program as required.

**CAUSE:** Valve or connection faulty.

**SOLUTION:** Check the valve or replace it.

**PROBLEM:** Valve does not close, despite click heard during activation.

**CAUSE:** Dirt or stones in the valve.

**SOLUTION:** Clean the valve.

**CAUSE:** Valve was opened manually.

**SOLUTION:** Move the handle to automatic position.

**CAUSE:** Valve faulty (torn diaphragm)

**SOLUTION:** Replace valve or part.

**CAUSE:** 5mm seal (O-ring) is missing between the valve and the valve coupling.

**SOLUTION:** Install a new seal (O-ring)

**PROBLEM:** Display "disappears"

**CAUSE:** Batteries are weak.

**SOLUTION:** Replace the batteries.

**PROBLEM:** Water leak from solenoid-valve adapter

**CAUSE:** O-ring is missing.

**SOLUTION:** Replace O-ring (See assembly and installation)

## MANUFACTURE 1 YEAR WARRANTY

Manufacturer warrants these products to be free from defects in material and workmanship for a period of one year from date purchased. This warranty does not cover damage resulting from accident, misuse, neglect, modification, improper installation or subsection to line pressure in excess of 150 lbs. per square inch. This warranty shall extend only to the original purchaser of the product for use by the purchaser. This warranty shall not cover batteries or any malfunction of the product due to battery failure. The obligation of manufacturer under this warranty is limited to repairing or replacing at its factory within one year after the original purchase and which on examination is found to contain defects in material and workmanship.

MANUFACTURER SHALL IN NO EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND; THE SOLE OBLIGATION OF THE MANUFACTURER BEING LIMITED TO REPAIR OR REPLACEMENT OF DEFECTIVE PRODUCTS. SOME STATES DO NOT ALLOW THE EXCLUSION OF LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

Manufacturer hereby disclaims any implied warranties including any warranties of merchantability and fitness for a particular purpose. In the case of the purchase of the product for personal, family or household purposes, manufacture disclaims any such warranties to the extent permitted by law. To the extent that any such disclaimer or implied warranties shall be ineffectual, then any implied warranties shall be limited in duration to a period of one year from the date of the original purchase for use by the purchaser. Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you.

In order to obtain performance under this warranty, the unit must be returned to the factory, along with proof of purchase indicating original date of purchase, shipping prepaid. You may also have other rights that vary from state to state.





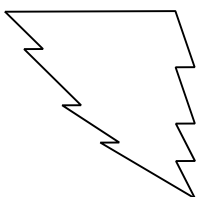
# *Owners Manual*

Professional Quality  
Corrosion Resistant  
Energy-Efficient

## Centrifugal Pumps



**RK2 Pumps are end suction centrifugal units that are close coupled to 56J motors. They feature excellent corrosion resistance with molded Noryl pump housings, 316 ss hardware, pump seals of Monel ceramic and buna, and motors with PVC encapsulated stainless steel motor shafts. Numerous electrical motor configurations are available.**



**WARNING: PLEASE READ COMPLETELY BEFORE YOU INSTALL OR OPERATE YOUR NEW PUMP! NEVER RUN PUMP DRY! NEVER REVERSE ROTATION! NEVER EXCEED AN INTERNAL CASE PRESSURE OF: 100 PSI MAX**

**Thank you for choosing an RK2 System pump. It has been designed and built to provide you with years of dependable service. To insure maximum performance, we urge you to carefully follow the instructions in this manual. If you have any questions, call your nearest distributor or (760) 746-7400 for assistance.**

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### Installation

Proper installation of your pump will help it to provide you with dependable, trouble free service. Please follow the general guidelines listed below to help insure maximum performance.

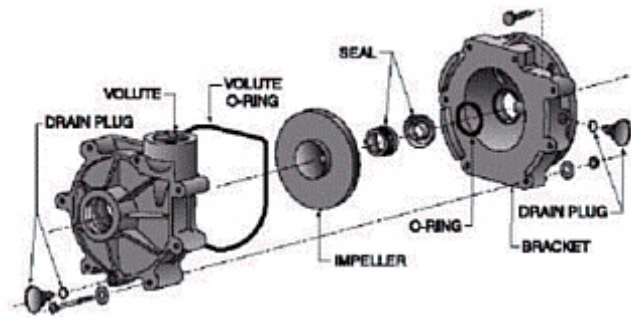
1. Position the pump as near the source and as low as is practical. This will help avoid cavitation and maximize your pumps output.
  2. Protect the motor from excessive heat and moisture. It is best to provide shade from direct sun, and insure that it has proper ventilation. Excessive heat will shorten the motor life and void the warranty.
  3. Protect the motor against dirt, water and all foreign matter. If the motor has been flooded, shut off power and do not operate it until it has been checked by an authorized motor technician, and it has been certified safe to operate. If the motor is damaged by dirt or moisture it voids the warranty.
  4. Mount the motor to a stable base where it won't get submerged.
  5. The pump ports are 1 1/2" NPT female on both the suction and discharge ports. The fittings used to connect to the housing should be plastic. All plumbing lines should be self supported and properly aligned. This will prevent undue stress to the housing. We recommend sealing the pipe threads with TFE (Teflon) paste.
  6. The intake to the pump should never be restricted. Keep your suction lines as free of elbows, fittings and valves as possible. The use of large diameter pipe will help provide adequate flow, as it reduces friction loss.
  7. This is a non self priming pump and is best suited with a flooded suction. The pump housing, and the entire suction line must be filled with fluid for it to operate properly.
- 

### Electrical

1. Make sure the power is disconnected at the breaker before wiring the motor.
2. Make sure that the motor is wired so that it matches the supply voltage (115, 208, 230 or 460 volt). If they do not match it will damage your motor and void the warranty.
3. Use a wire of adequate gauge and length to prevent electrical line losses. The use of heavier gauge wire will allow the motor to run cooler and more efficiently.
4. Make sure all connections are clean and tight. Properly ground the motor. (There is normally a green ground terminal located on the inside of the motor connection box.) Make sure the ground wire is properly connected to an electrical service ground. Connect the pump permanently to an adequately sized circuit. It is best to have a dedicated circuit that won't suffer voltage drop from other loads.
5. Insure proper motor *rotation*. When viewed from the shaft end, the motor must rotate counterclockwise. Incorrect rotation will destroy the pump and motor.  
Note: The motor leads must be energized in the order of #1 then #2 then #3. If you are not sure of the sequence of your incoming supply line, remove the volute from the pump, the connect power and check rotation. If it is incorrect, exchange any two of the connected leads and retest. When the rotation is correct, reinstall the volute.  
**Never test rotation by bumping a switch!!! This will destroy the pump and void the warranty!!!!**

## Disassembly

1. Shut off the power to the motor before disconnecting any electrical wiring from the back of the motor.
2. Disassemble the volute from the bracket motor assembly by removing the seven  $\frac{1}{4}$  20 x 2  $\frac{3}{4}$  cap screws. (The volute may be left in-line if you wish.)
3. Remove the cap covering the back end of the motor shaft and with a large screwdriver or wrench, prevent shaft rotation while unscrewing the impeller counterclockwise.
4. Remove the ceramic piece from the impeller hub.
5. Detach the bracket from the motor by removing the four  $\frac{3}{8}$ " cap screws, and slide it forward, away from the motor.
6. Remove the carbon-graphite seal from the bracket by pressing it out from the back. Do not dig it out from the front!



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## Pump End Assembly

1. Check all pump parts and clean as needed.
2. If the motor shaft has corrosion build up, use emery cloth to clean it.
3. Install the O-ring into the O-ring gland in the bracket bore.
4. Press the carbon seal head into the bracket bore. CAUTION! Press only on the stainless steel or polypropylene shell, NOT ON THE DELICATE CARBON FACE! DO NOT TOUCH THE CARBON SEAL FACE!
5. Insert the slinger onto the motor shaft. Note: It is not recommended to use a slinger in conjunction with a PVC shaft sleeve.
6. Mount the bracket onto the motor C-face using four  $\frac{3}{8}$ " cap screws and tighten them snugly.
7. Press the ceramic into the impeller hub. It helps to moisten the rubber boot with water first. The ceramic MUST SIT FLAT. If one side is higher than the other, the seal will leak! The smooth face must be up and exposed.
8. Screw the impeller clockwise onto the motor shaft and tighten. You can hold the shaft stationary at the opposite end of the motor with a large screwdriver or wrench..
9. Place the large O-ring in the groove in the volute. Note: It is easiest to lay the volute, suction side down, place the **O-ring in the groove**, and lower the bracket/motor assembly down onto the volute. (So the O-ring doesn't pop out.)
10. Install the seven  $\frac{1}{4}$ " x 2  $\frac{3}{4}$ " cap screws with washers and tighten in a cross pattern until they are reasonably snug. (No need to overtighten).
11. Place the small O-rings onto both drain plugs, and screw them into the  $\frac{1}{4}$ " holes in the volute and bracket.

## Trouble Shooting Aid

### ***Motor Will Not Start***

1. Check for voltage present at connection box.
2. Check that the supply voltage matches the motor voltage connections.
3. Check that you have proper line voltage.
4. Check that all connections are sound.
5. Check that the motor shaft rotates easily by hand. (This can be checked at the rear of motor by turning with screwdriver or wrench.)

### ***Motor Won't Start, But It Hums.***

1. Check items 2-5 above.
2. Check that there is no foreign matter lodged between the contacts on the start switch.
3. Check to insure the capacitor is functioning properly.

### ***Motor Gets Hot And Shuts Down.***

1. Check for proper wiring in the motor box. The supply voltage must match the motor voltage connections.
2. Check the voltage at the motor box, with the motor and all other loads normally on the circuit running. It must not be significantly below the nominal voltage.
3. Check to see if the motor shaft turns without excessive resistance. Bad bearings, or a clogged impeller can cause excessive resistance.
4. Make sure any check valves are installed in the correct direction.
5. Check that the pump impeller and the housing are not clogged or blocked.

### ***Pump Will Not Hold A Prime.***

1. Check for defective joints at all pipe fittings. They must be air tight.
2. Check for a defective check valve or foot valve.
3. Check for a leaking seal.

# **RK2**

## *SYSTEMS*

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## **Proper Protein Skimmer Adjustment**

Many saltwater aquarists believe that a protein skimmer (actually a protein fractionator) is a 'plug and play' piece of equipment. In fact it requires close attention to achieve proper adjustment. This proper adjustment is critical to success in a miniature reef system including the survival of many types of corals.

First, there are two misconceptions which need to be addressed. The first one is that if the waste that the skimmer extracts from the water is dark, the skimmer is working well. The other is that a skimmer will just keep on working until the water is clean. These are both very wrong which you will understand from the explanations ahead.

Protein skimmers remove foaming compounds from the water by injecting fine bubbles into the water. Organic compounds 'stick' to the surface tension of the water which includes the surface of the bubbles. If there is nothing in the water that prevents foaming then a foam of dirty bubbles will accumulate at the top of the bubble column. Protein skimmers are designed that as this foam accumulates it will begin to overflow into a waste collection area which prevents it from returning to the water. The height of the water column, amount of air injected, and other factors create a threshold which determines how much waste is extracted.

This is the problem for those who do not understand how the protein skimmer is designed to operate. If the threshold is set too low the protein skimmer will only remove a small amount of waste even from very dirty water. Waste levels which are below this threshold remain in the water since the protein skimmer is not adjusted to remove them. The result of this level of adjustment is a very dark, concentrated waste extract from the protein skimmer. When this is occurring the aquarist has no way of determining how efficient the protein skimmer is working other than by observing the color of the water in the aquarium.

To properly adjust a protein skimmer takes at least several days of observation and adjustments. There are a couple things to remember to achieve proper adjustment. The first is the protein skimmer only removes waste to the threshold you have set. As it approaches this threshold it removes less and less resulting in a concentrated extract. The other is that the extract should be roughly the color of ginger ale or weak tea. If it is darker, the threshold is set too low.

To adjust the skimmer properly the following must be done:

1. Adjust the protein skimmer so that the extract is about the color of ginger ale or weak tea.
2. Let it run even though it may mean emptying it several times per day for a while. As it approaches the new threshold level for waste extraction it will begin to slow down and the extract will become darker and more concentrated. When this happens repeat step 1 and step 2.
3. When the point is reached that the protein skimmer does not slow down after a few days then it can be assumed that the protein skimmer is properly adjusted. In the case of very dirty water this process may take quite a few adjustments and may take longer to slow down the first time. Keep the protein skimmer adjusted so that the extract does not become dark.

With a properly adjusted protein skimmer the water will be noticeably cleaner. Ideally aquarium water should be clear and colorless. The closer to this goal the better. A couple other tips to remember are do not neglect water changes of at least 1/3 of the aquarium water once per month and be sure to change air stones whenever bubble output decreases.

# **RK2**

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### **PRODUCT WARRANTY TERMS**

RK2 Systems, Inc. (The Seller) warrants to the original purchaser, that products of its own manufacture will be free from defects in materials or workmanship, under normal use and service, for a period of one year from the date of purchase (with the exception of a vessel, which is warranted for three years). The Seller's obligations under this Warranty are limited to replacing or repairing or giving credit for, at its option, any of its said products which shall, within one year after purchase, be returned to the Seller's place of origin, transportation charges prepaid, and which are, after products examined, disclosed to the Seller's satisfaction to be thus defective. This Warranty does not apply to defects caused by shipping damages, or to any products manufactured by Seller which have been subject to improper installation, misuse, neglect, accident, ordinary wear and tear, or Buyer's attempts to use any products beyond its mechanical, thermal, or electrical capacity. Notice of a defective product must be given to Seller in writing within 48 hours of discovery and be free, without limitation of labor charges, lost profits, expenses of repair or other costs incidental to replacement. All transportation costs incurred in shipping product to or from Seller's plant shall be at the Buyer's expense. The aforementioned provisions do not extend the original Warranty period of any product which has either been partially repaired or replaced by the Seller.

### **FOR FURTHER TECHNICAL ASSISTANCE**

**Contact your RK2 distributor or call:**

**RK2 Systems, Inc.  
(760) 746-7400**