RK2

SYSTEMS

SAN DIEGO, CA

RK10AC-PF

PROTEIN FRACTIONATOR

Operations Manual

RK2 10 AC Protein Fractionator

I. Introduction

Congratulations on your purchase of the RK2 10 AC Protein Fractionator. This sophisticated filtration system is recommended for aquaria of up to 1000 gallons, and, when operated and maintained correctly, will provide many years of service, clean water, and health for aquatic life systems.

Should any technical issues arise during assembly or operation of this unit, please contact your RK2 Systems Distributor.

II. Tools, Parts and Hardware

The RK2 10 AC is simple to assemble, with only a few tools necessary and very few nuts, bolts and washers to keep track of.

Tools & Supplies Needed:

Flat head screwdriver
One 1/4 " open-end, crescent or socket wrench
Box-cutter or similar blade
One tube of Silicone Grease

NOTE: Pipe wrenches are not recommended for assembly of the 10 AC and typically result in damage to the unit.)

Hardware included:

(For top assembly)
Twelve 1/4" x 2" bolts
Twelve 1/4" x 5/8" standard flat washers

(For pump mount)
Two 1/4" x 1.5" bolts
Four 1/4" x 5/8" washers

(For Reaction Chamber base)
Four 1 1/4" x 1/4" bolts
Four washers (SIZE?)

III. Unpacking Procedures

1. Using the box cutter, remove plastic straps and plastic wrap from the RK2 10 AC box and pallet.

   HELPFUL HINT: The lid makes a useful tray to keep some of the hardware components together for assembly.

2. Using the flat head screwdriver, remove the staples from the bottom of the carton.

3. Lift the carton off the bottom of the box.

4. Remove the Top and Cone Assembly from the top of the unit and set aside.

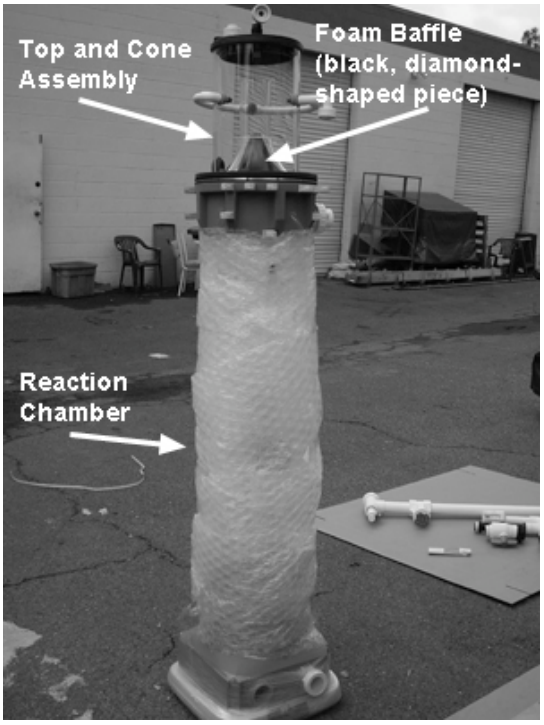


Fig. A

Fig. B

Fig. C

5. Remove the Foam Baffle from the top of the unit and set aside.

6. Remove all loose components from inside the clear reaction chamber (see Fig. B). Unwrap them and set them aside.

7. Remove plastic wrap from around the reaction chamber.

8. Remove the blue foam and plastic wrap from the bottom of the unit as shown in Fig. C.

IV. Assembly Procedures

Mounting the Pump

1. Using the bolts included (they are shipped threaded into their appropriate holes), secure the grey base of the reaction chamber to the grey rectangular platform. Bolts should be snug, and not excessively tight. See Fig. 1.

2. Attach the Venturi Ball Valve as shown in Fig. 2. Remove any tape found on the threads.

Fig. 1

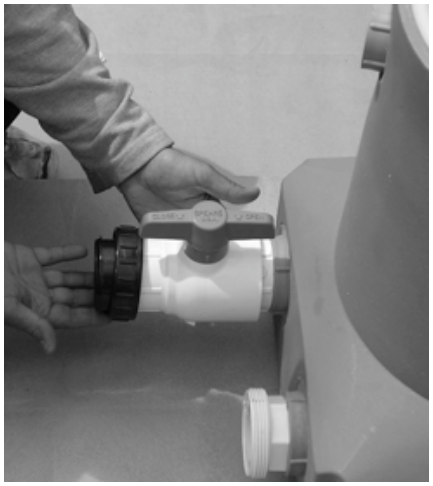


Fig. 2

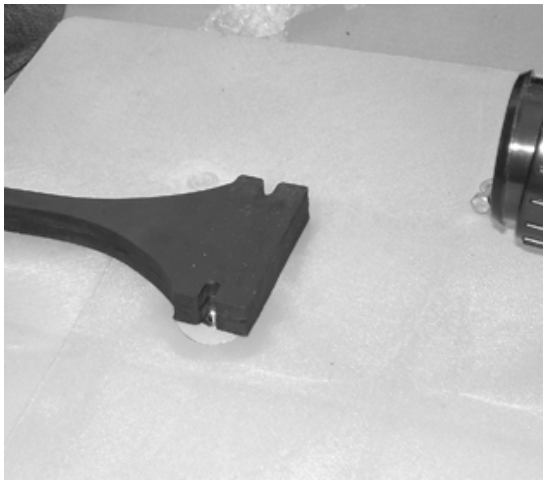


Fig. 4

3. Note the two bolts on the opposite side of the platform from the base of the reaction chamber. These bolts are for securing the pump. Remove bolts and washers and set aside.

4. Place the black rubber pump base so that its indentations line up over the holes for the pump. (See Fig. 4.)

5. Position the pump on the base, and hand-tighten the pump valve onto the 2" ball valve, as shown in Fig. 5, until the surfaces are flush. Use Figs. 5B and 5C to observe how a union looks when it is flush or not flush. (See WARNING, next page.)

Fig. 5A

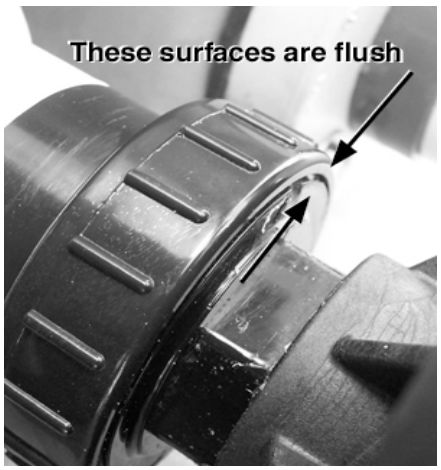


Fig. 5B

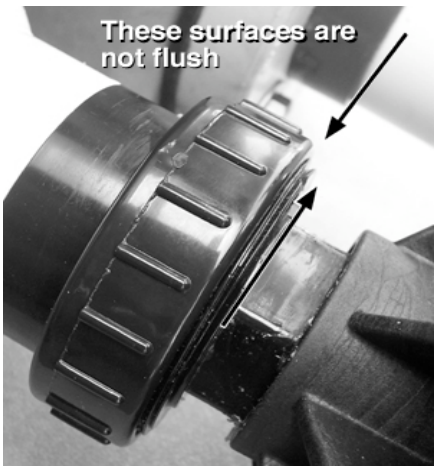


Fig 5C

WARNING: Do NOT USE A WRENCH to tighten this union, or a rupture will most likely result. Do not over-tighten this union!

6. Insert and tighten the bolts set aside in Step 3 to finish securing the pump.

Mounting the External Plumbing

7. Using a flat-head screwdriver, remove the pipe spacers from the pipe clicks throughout the unit. (Fig. 7.)

8. Attach the Venturi Intake Assembly as shown in Fig. 8.

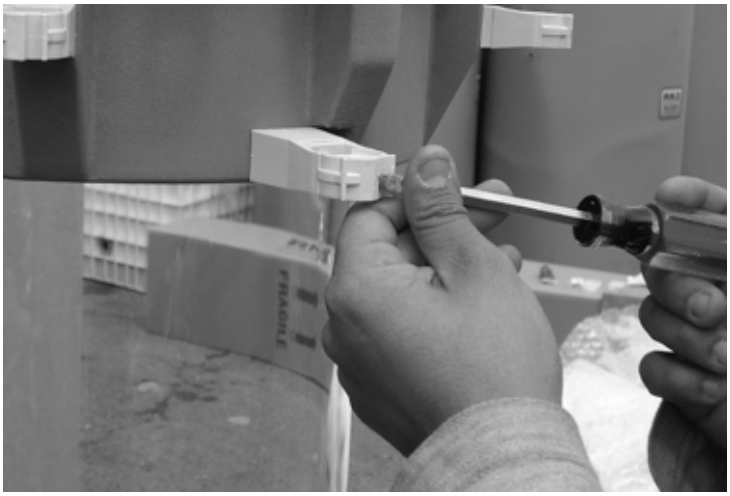


Fig. 7

Fig. 8

9. Fasten the Air Intake Assembly to the pipe clicks as shown in Fig. 9.

10. Tighten the bottom of the Air Intake assembly the Venturi Intake Valve (this valve comes off the black pipe), as shown in Fig. 10.

Fig. 9

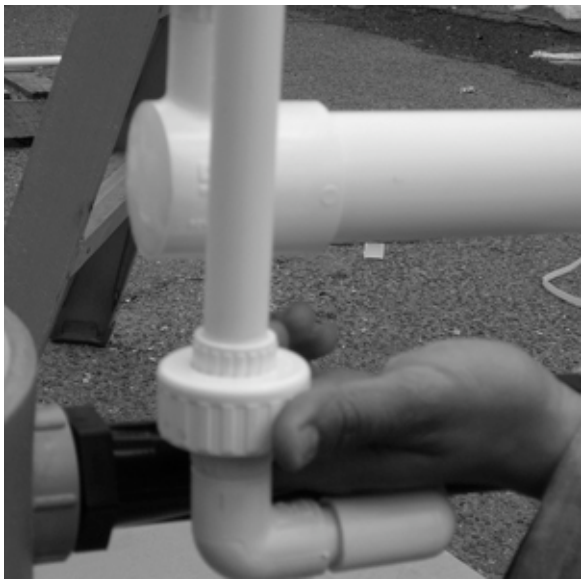


Fig. 10

11. Install the Discharge Plumbing as shown in Fig. 11, by affixing to the pipe click, and snugly tightening the lower union to the outlet from the bottom of the Reaction Chamber.

12. Attach the Discharge Air Vent to the top of the Discharge Plumbing as shown in Fig. 12.

Fig. 11

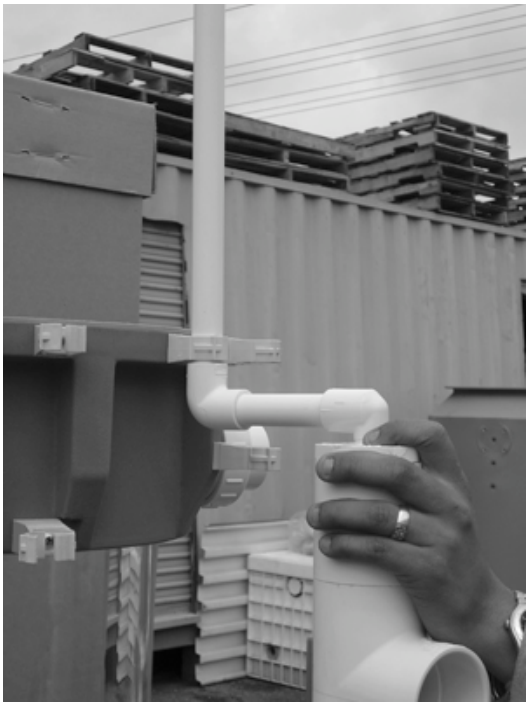


Fig. 12

13. Install the External Wash Timer Assembly by clipping the timer onto the bracket of the Discharge Plumbing and affixing the solenoid valve to the pipe clicks as shown in Fig 13A and 13B.

14. Place the Foam Baffle at the top of the Reaction Chamber, lining up its four sides with the notches as shown in Fig. 14.

Fig. 13A

Fig. 13B

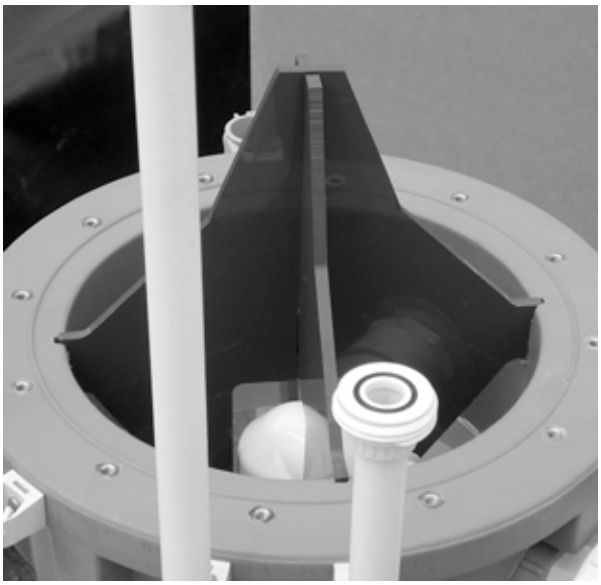


Fig. 14

15. Place the Top and Cone Assembly on top of the Reaction Chamber as shown in Fig. 15A, and tighten the 2" x 1/4" bolts in pairs of opposites as shown in Fig. 15B.

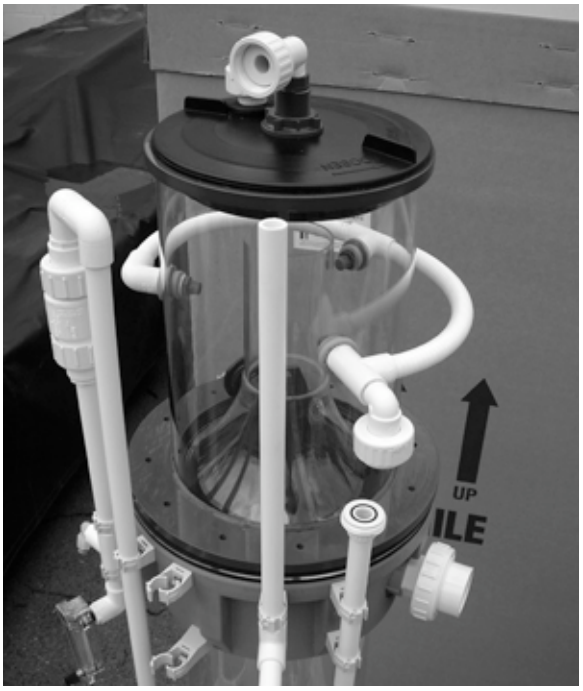


Fig. 15A

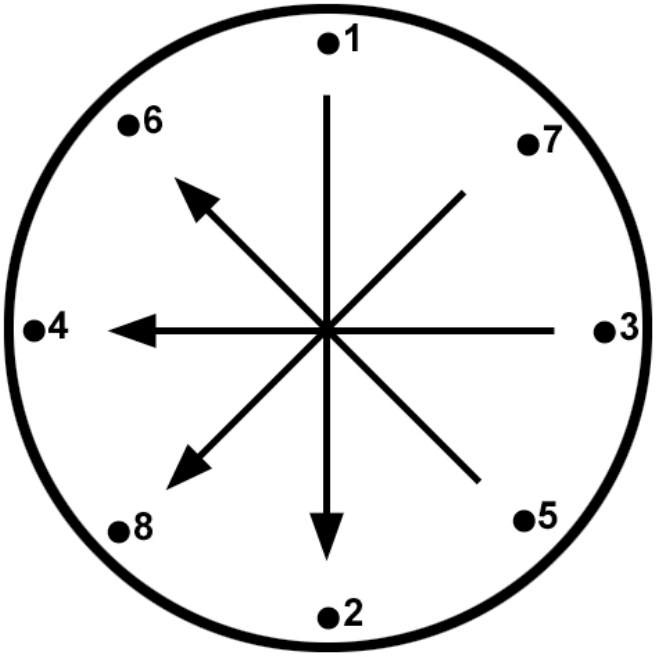


Fig. 15B

16. Apply silicon grease to lubricate and seal the 2" port near the top of the reaction chamber, as shown in Fig. 16.

Fig. 16

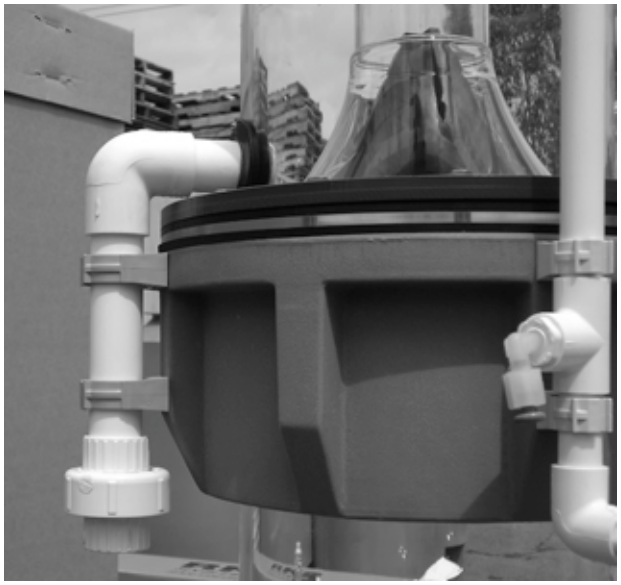


Fig. 17

17. Insert the Waste Drain into the port and attach to the pipe clicks as shown in Fig. 17.

NOTE: The PSI of the water running through this part of the 10 AC is extremely LOW. Because of that, you do not need to tighten the bolts beyond what is snug.

18. Attach the Internal Riser Rinse Assembly to the Venturi Intake Assembly at the bottom and the fitting at the top of the Top Assembly, as shown in Figs. 18A, B and C.

Fig. 18A

Fig. 18B

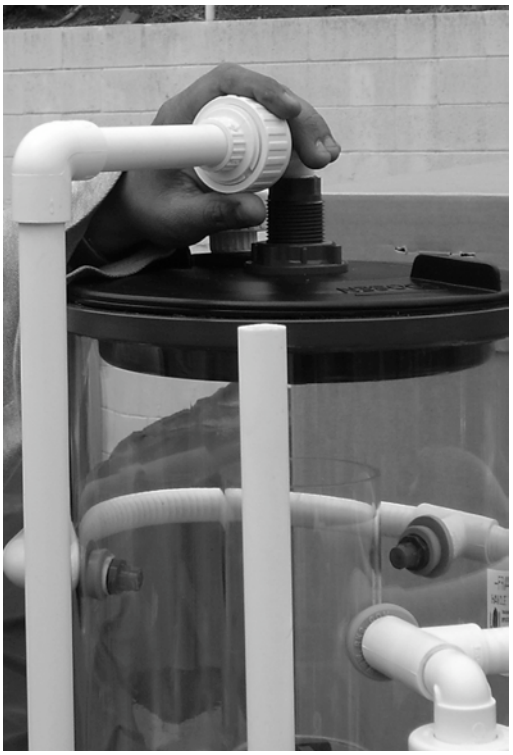


Fig. 18C

19. Attach the Solenoid Valve to the circular hose surrounding the Top Assembly, as shown in Fig. 19.

Fig. 19

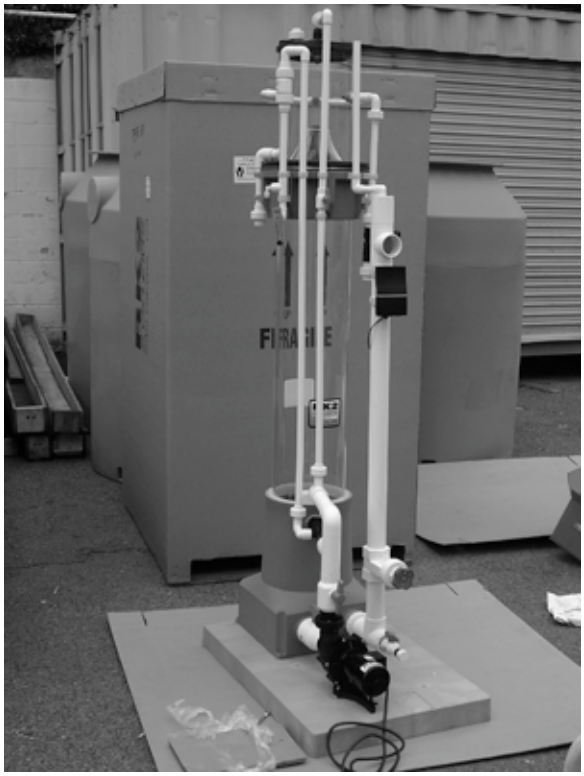


Fig. 20

Congratulations! You have successfully assembled the RK 10 AC! (See Fig. 20.) Now it's time to plumb the RK 10 AC to the outside world.

21. Plumb the Waste Drain to the sewage line.

22. Plumb the Intake Valve Assembly to the source of dirty water, such as an aquarium, etc.

23. Plum the 2" Discharge to reservoir.

WARNING: Immediately after the 2" Discharge, you must provide a minimum of 12" vertical drop. Do not install horizontal piping until you have provided 12" of vertical drop.

NOTE: The intake flow is designed to be 10 GPM.

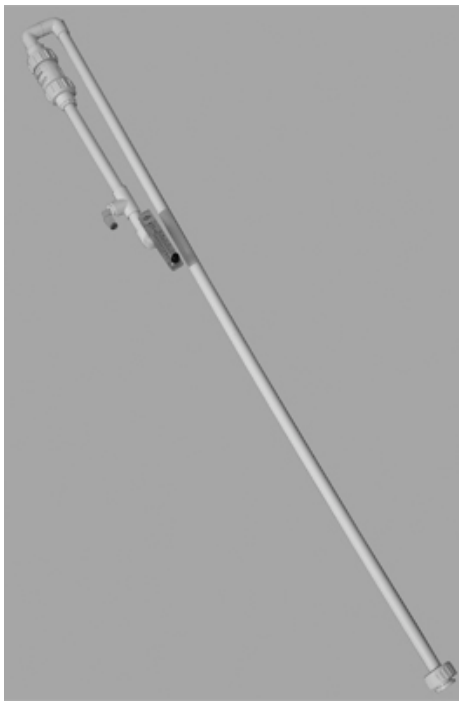
24. After you have completely connected the RK 10 AC, fire it up! Then inspect for any unions or nuts/bolts that leak, and hand tighten.

Appendix: Components

Included within the Reaction Chamber (main structural component of the RK 10 AC) and accompanying boxes there are some components wrapped in bubble-wrap that you will need to install. They are shown below for your reference:

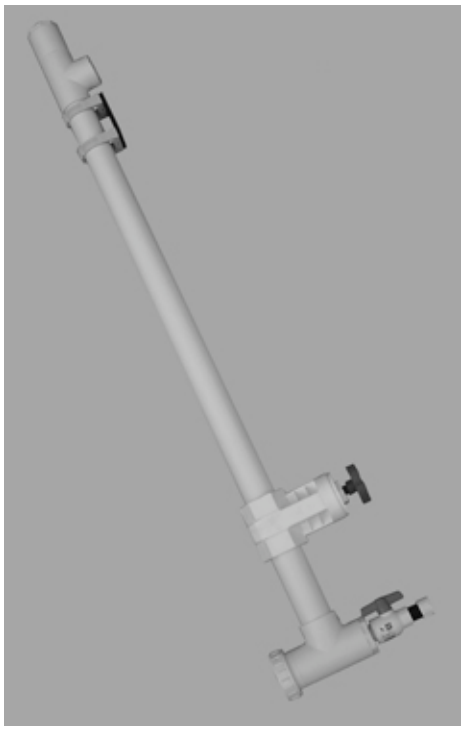
Venturi Intake Assembly

Venturi Pump Intake Ball Valve



Air Gauge Assembly

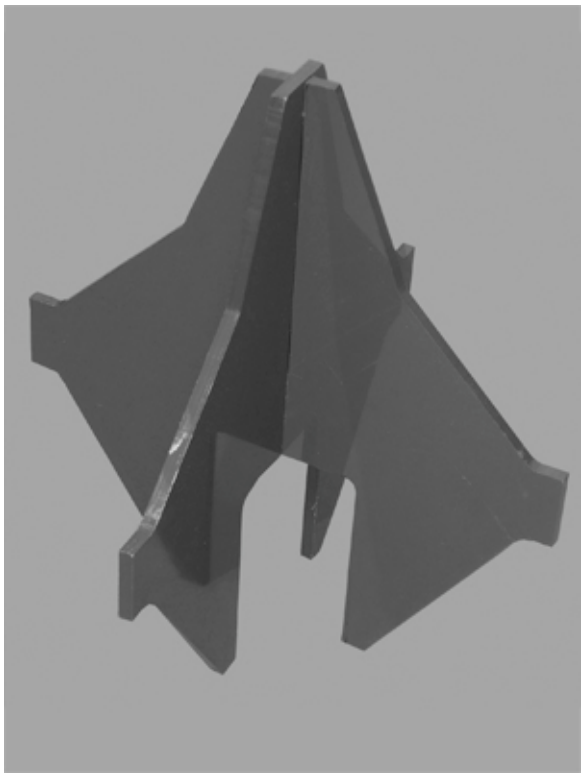
External Wash Timer Assembly



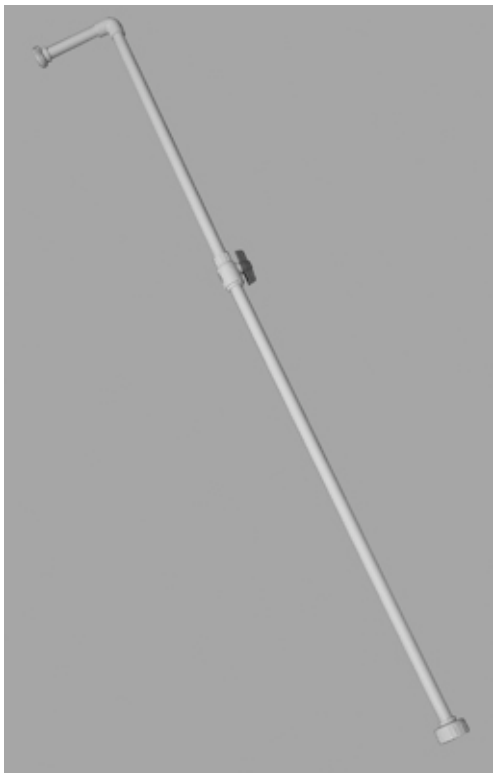
Discharge Plumbing

Discharge Air Vent

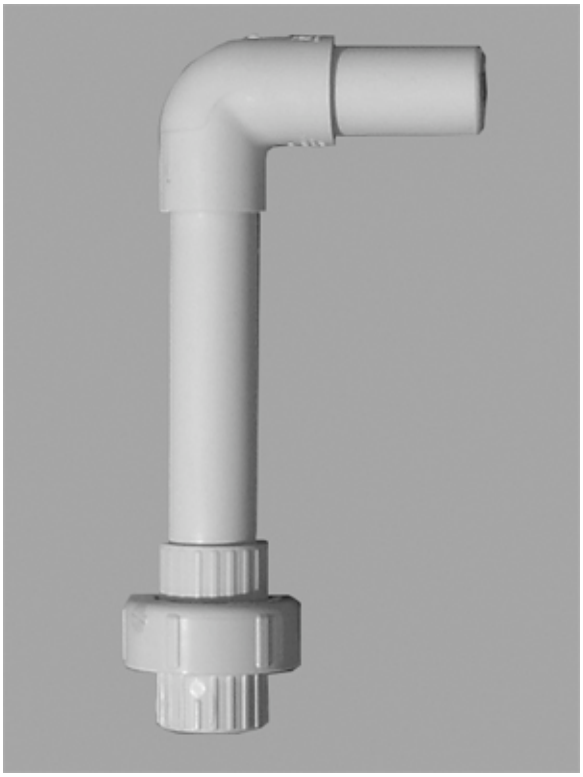
Appendix (continued)



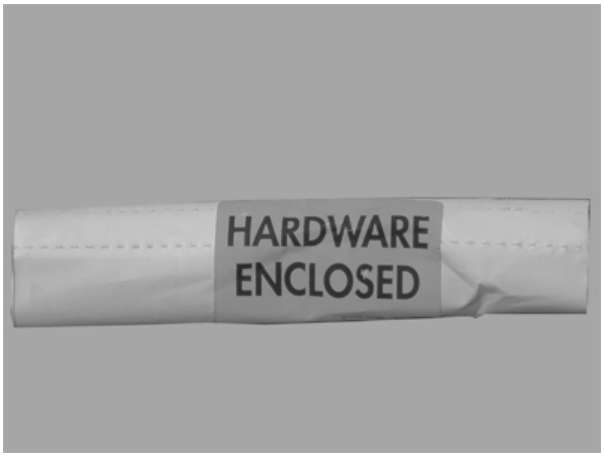
Foam Baffle



Internal Rinse Riser Assembly



Waste Drain



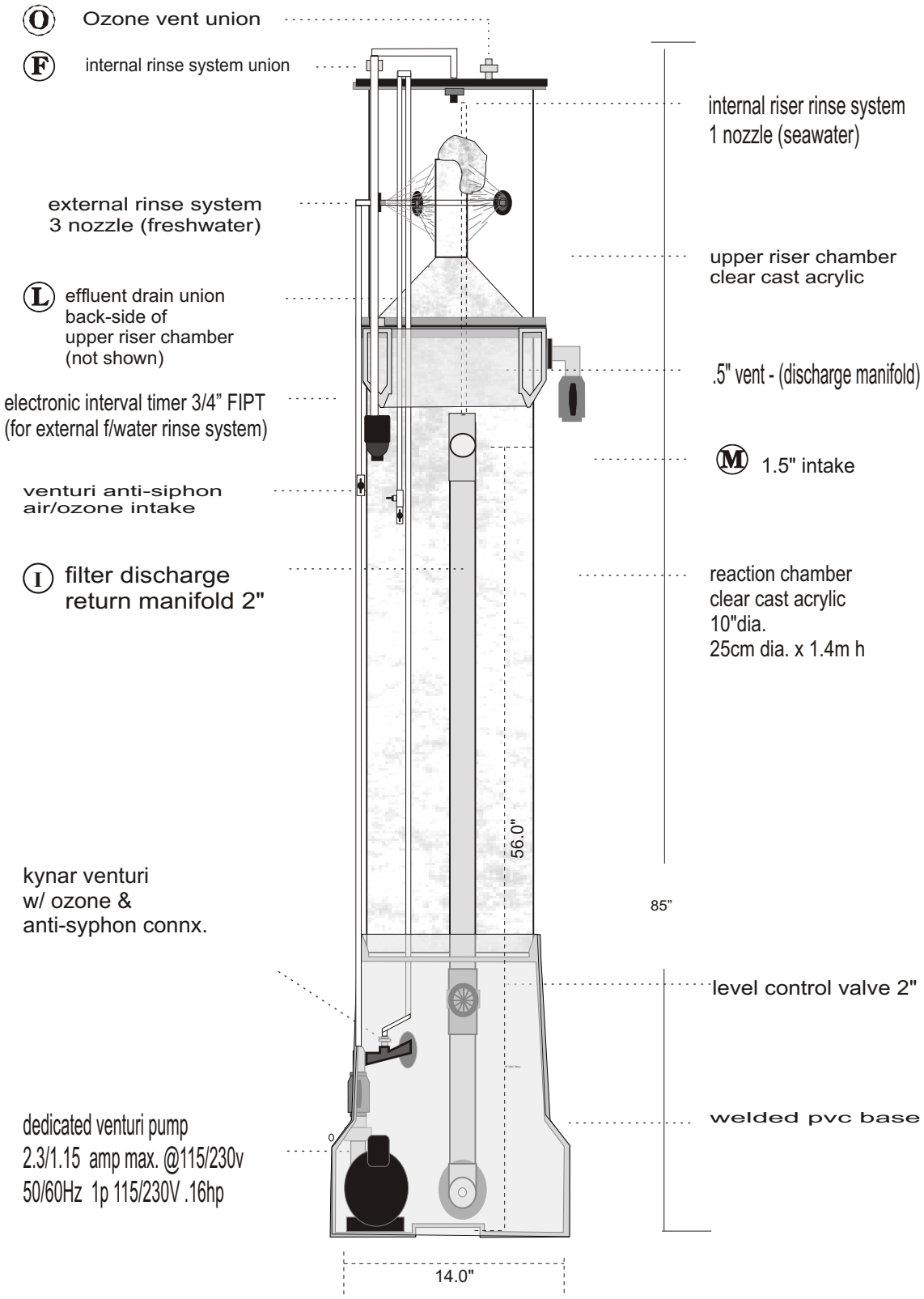
Hardware for Top/Cone Assembly

RK10AC-PF

PROTEIN FRACTIONATOR

13 GPM, 10"DIA x 85"HT
50 LPM, 25cm DIA x 2.07m HT

scale 1:10



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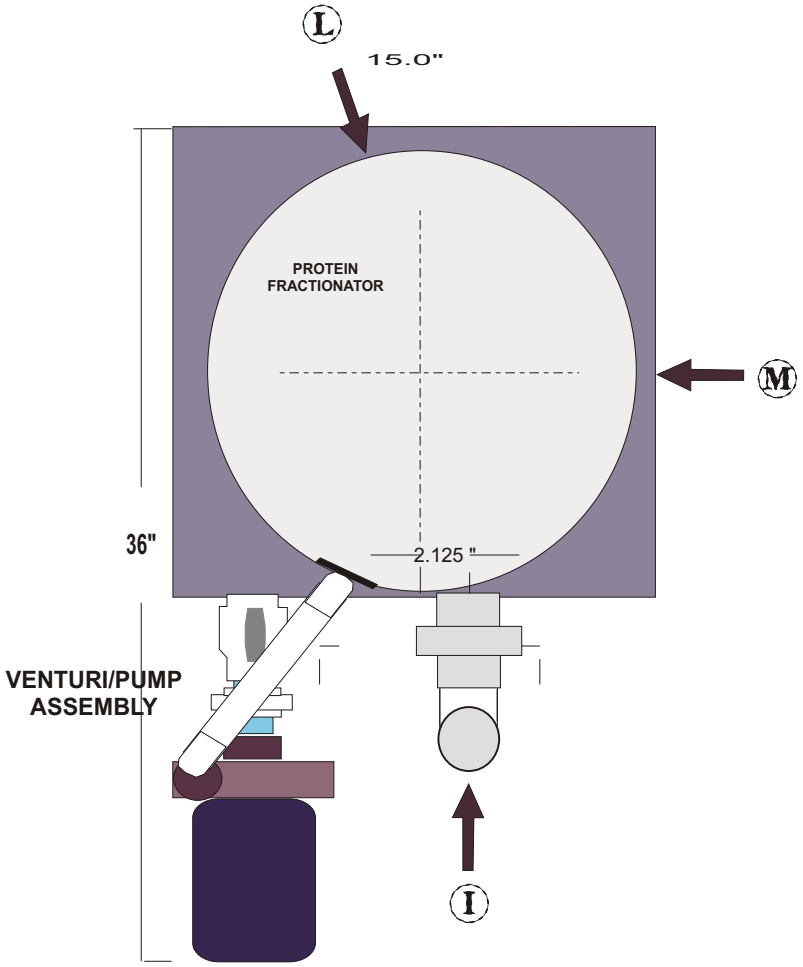
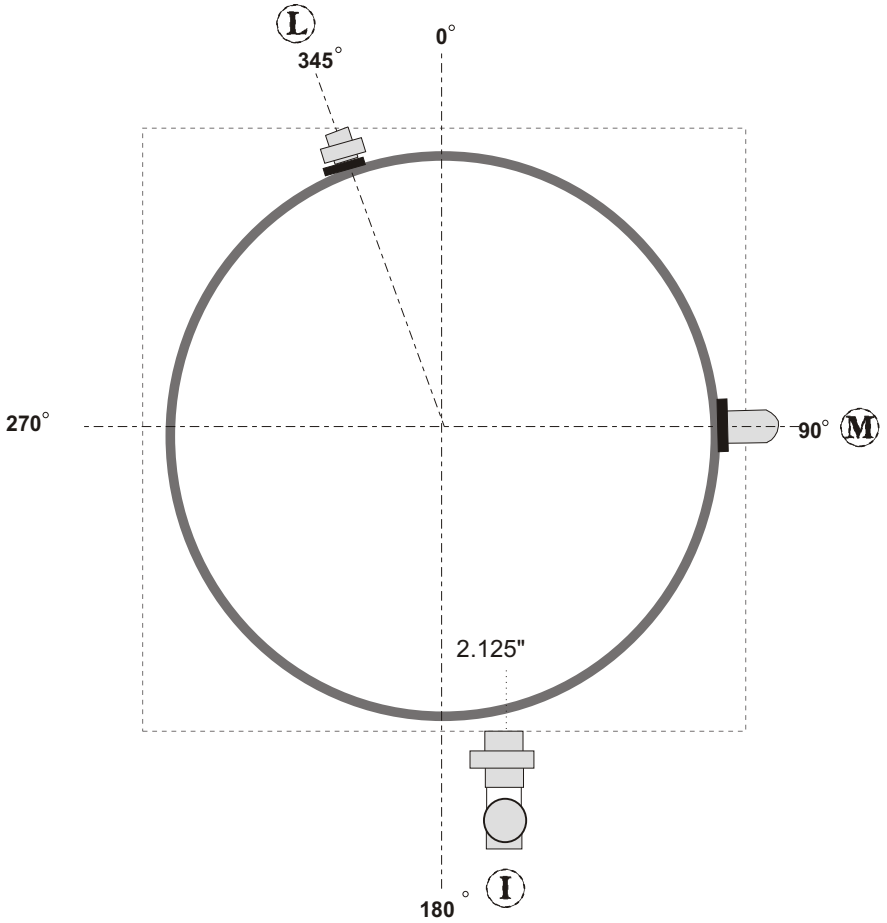
RK10AC PROTEIN FRACTIONATOR
PORT CONNECTION CONFIGURATIONS

TOP VIEW:



PORT ORIENTATION



M = FILTER INLET. 1.5" PVC SCH40 SLIP VALVE, VERTICAL POSITION. HEIGHT = 61.125”

L = EFFLUENT DRAIN. 1" PVC SCH40 SLIP UNION, HORIZONTAL POSITION. HEIGHT = 67.0".

I = FILTER DISCHARGE. 2" PVC SCH40 SLIP TEE, HORIZONTAL POSITION. HEIGHT = 56.0”
GRAVITY DRAIN, INITIAL 12" (MIN.) MUST DROP VERTICALLY , NO LATERAL PIPING.

O = OZONE VENT. 1" PVC SCH40 SLIP UNION. HEIGHT = 85.0"

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PROGRAMMING YOUR LCD WASHDOWN TIMER:

Follow Steps 8-14 to program you LCD Washdown timer for use with your RK2 Skimmer.

Under Step 12 – you will want to use the Cyclical Irrigation.

Step 13 – does not pertain to our use.

Following the shortened version of the manual with the pertinent information for use with your RK2 Skimmer is the full & complete manual for the LCD Washdown timer for your reference.

8. PROGRAMMING

This section explains the programming features, use of buttons and the steps necessary to assign irrigation schedules. To program the controller use the left button to select the desired programming mode, the right button to make the entry flash and the plus minus buttons to change the value.

Note: Only a flashing character can be changed.

DIG controllers are programmed with the aid of four buttons:

Use to select the desired programming mode

Use to lower the value of the selected parameter (e.g. deducts an hour)

Use to raise the value of the selected parameter (e.g. adds an hour)

Use to select the parameter to be changed (hour, minute, etc.). To implement the changes, the selected parameter must be flashing.

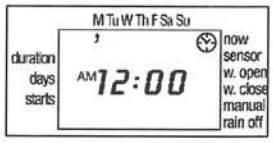
If no changes are implemented, the controller will always revert to the main screen.

9. PROGRAMMING CURRENT TIME AND DAY OF THE WEEK

To enable the controller to operate properly, the current time and current day of the week must first be set. Steps below explain how to set the day and time.

Press the ➔ hour digit will blink. Use the ⊕ or ⊖, to set the current hour (note: use of AM and PM designations). Press ➔ the minutes digit blink, set the current minute using ⊕ or ⊖. Press ➔ A blinking arrow will appear under "M" for "Monday". Use the ⊕ or ⊖ to move the arrow to current day. Press ↻ to proceed to the next step.

Note: If the last data entered stops flashing, press the ➔ again to resume programming.



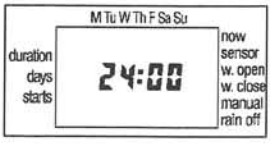
10. TIME FORMAT (SWTICHING BETWEEN AM/PM AND 24 HOUR)

The default time format is AM/PM. There is also a 24 hour time format option that can be switched between the two formats.

Press ↻ several times until ⏲ appears.

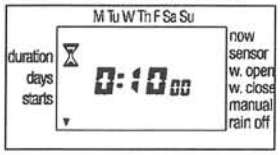
Press ➔ hour digit will blink. Press the ⊕ or ⊖ simultaneously. The clock reading switches from AM/PM to a 24 hour tiime display or vice versa.

Note: You can switch the time display format at any step in this section of the programming process.



11. SETTING WATERING 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. Press ⟲ to proceed to the next step.



12. PROGRAMMING WATERING SCHEDULE

This setting determines which days the controller will operate. Choose either "A. Watering According to the Days of the Week" or "B. One-time Irrigation or Cyclical Irrigation".

Press ⟲ until appears. Press ⟶. A blinking arrow appears at the top of the display, under Monday. At this stage you can set one of two options:

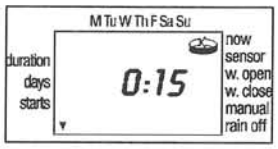
a) Watering according to the days of the week,

b) One time only watering, cyclical watering in minutes, hours or days.

CYCLICAL IRRIGATION

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 minues, every 15 minutes up to 1 hour, every 1 hour up to 24 hours, and every day up to 30 days.

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 15 minutes" is selected, your programmed watering duration will activate every 15 minutes during a 24-hour period. (see #19 for irrigation window). For example, if "every 30 days" appears, watering will take place once every thirty days, for the irrigation period as set in duration. To change the number of days press ⊕ or ⊖. Press ⟲ to proceed to the next step.

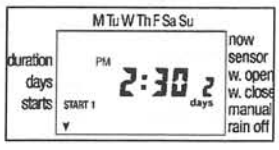


14. SETTING A CYCLICAL OR ONCE START TIME (WITH OPTION TO DELAY VALVE START TIME)

This program is used to pre-set the valve start time (only one start time available) and the number of days to delay the valve start time, the number of day(s) to delay option will appear on the display to the right of the irrigation start time above the word "days".

In this feature 0 days = program starts today; where 1 = program starts tomorrow, etc. (up to 30 days delay).

Press ⟲ until START I appears or the last opening time entered appears on the display. Press ⟶. The hours and the AM/PM digits blink. Set the desired opening hour by pressing the ⊕ or ⊖ (note: AM and PM designations appear to the left of the hour digits). Press ⟶. The minute digits blink. Repeat the same step for setting the minutes and then the number of days to delay between watering cycles. Start time must be later than the current time in order for the cycle to start today (day = 0).



RK2 PROTEIN FRACTIONATOR
FLOW CONTROL SETTINGS

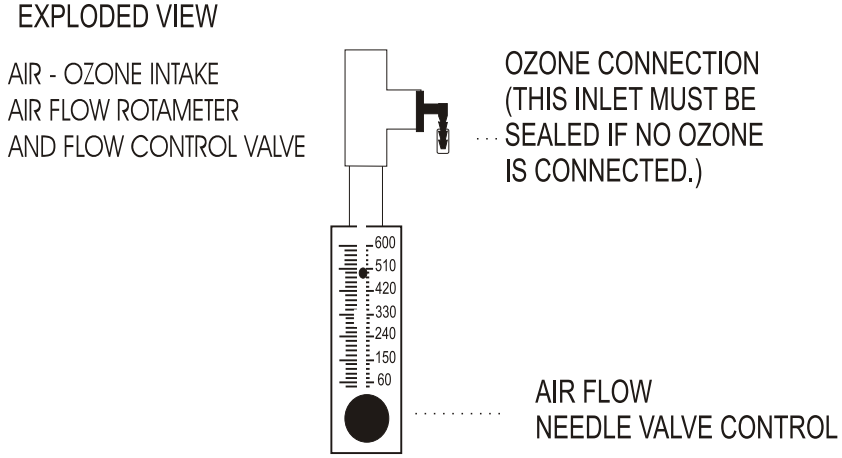
INITIAL START-UP

1.) WITH THE VENTURI PUMP(S) OFF, OPEN ALL WATER VALVES FULLY EXCLUDING INLET SUPPLY. OPEN THE FRACTIONATOR INLET VALVES, THE VALVES SHOULD BE ADJUSTED TO ALLOW A MAXIMUM FLOW RATE AT WHICH THE FILTER IS RATED.

CHECK FOR LEAKS. IF ANY UNIONS HAVE LEAKS HAND -TIGHTEN ONLY. IF THE UNION CONTINUES TO LEAK THE FITTING NEEDS TO EXAMINED FOR CRACKS AND CORRECT "O" RING SEATING.

LEAKS AT THE FLANGE AREA SHOULD BE ADDRESSED BY TIGHTENING THE FLANGE BOLTS IN A CRISS-CROSS PATTERN. THE SCH80 FLANGES WITH INSERTS IN THE TANK WALL SHOULD TORQUED TO A MAXIMUM OF 25LBS. THE FLANGE CONNECTING THE CLEAR CHAMBER TO THE TANK SHOULD TIGHTENED IN A CRISS-CROSS PATTERN ½ TURN PAST HAND TIGHT. INCORRECT TIGHTENING OF THIS FLANGE WILL FRACTURE THE UPPER CHAMBER.

2.) TURN ON THE VENTURI PUMP(S). ADJUST THE AIR/OZONE FLOW INTO THE FRACTIONATOR WITH THE NEEDLE CONTROL VALVE . DIFFERENT MODEL VENTURIS HAVE DIFFERENT FLOW RATES. CHECK THE GAUGE WITH THE NEEDLE VALVE SET TO FULL FLOW. THE TOTAL FLOW SHOULD THEN BE REDUCED BY 20%. THIS FLOW REDUCTION WILL CREATE A VACUUM OF 1" TO 2" IN THE VENTURI GAS INTAKE LINE. THIS IS THE CORRECT SETTING. IF OZONE IS APPLIED, THE AIR FLOW SHOULD BE REDUCED BY THE AMOUNT OF OZONE BEING INTRODUCED SO THAT THE TOTAL COMBINED FLOW REMAINS THE SAME.



3.) FINAL FOAM LEVEL ADJUSTMENT IS CONTROLLED WITH THE FILTER DISCHARGE VALVE. ALL OTHER VALVES SHOULD REMAIN IN THERE SET POSITIONS AND THE DISCHARGE VALVE ADJUSTED AS NECESSARY FOR CHANGING CONDITIONS AND TO ACHIEVE THE CORRECT FOAM CONSISTENCY.
(SEE "PROPER PROTEIN ADJUSTMENT")

Series RM Rate-Master® Flowmeters

Specifications - Installation and Operating Instructions

Fig. 1

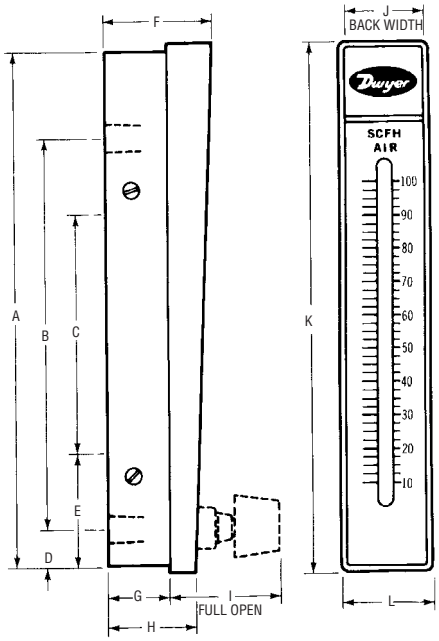


Fig. 2

Dimensions in Inches (Centimeters)			
	Model RMA	**Model RMB**	**Model RMC**
A	4 -9/16 (11.59)	8-1/2 (21.59)	15 -1/8 (38.42)
B	3 (7.62) 1/8 NPT CONN.	6-7/16 (16.35) 1/4 NPT CONN.	12 -1/4 (31.12) 1/2 NPT CONN.
C	1-5/8 (3.17) 10 - 32 Thds.	3-15/16 (8.56) 1/4 - 20 Thds.	8-3/4 (10.72) 10 - 32 Thds.
D	3/8 (.95)	5/8 (1.59)	1 (2.54)
E	1-1/16 (2.60)	1-7/8 (3.42)	2-3/4 (5.83)
F	1-3/16 (2.73)	1-3/4 (3.29)	2-1/4 (5.33)
G	3/4 (1.91)	1 (2.54)	1-7/16 (2.98)
H	1 (2.54)	1-7/16 (2.98)	1-31/32 (3.51)
I (OPEN)	1-3/8 (3.49)	1-13/16 (4.60)	2-1/2 (6.35)
J	3/4 (1.91)	1-1/4 (3.18)	2 (5.08)
K	4-13/16 (12.22)	8-3/4 (22.23)	15-3/8 (39.05)
L	1 (2.54)	1-1/2 (3.81)	2-1/4 (5.72)

PANEL CUTOUT FOR FLUSH MOUNTING			
HIGH	4-5/8 (11.75)	8-9/16 (21.75)	15 -3/16 (38.58)
WIDE	7/8 (2.22)	1-5/16 (3.33)	2-1/16 (5.24)
PANEL HOLE SIZES FOR SURFACE MOUNTING			
PIPE	7/16 (1.11)	5/8 (1.59)	15/16 (2.38)
BOLT	1/4 (0.64)	9/32 (0.71)	13/32 (1.03)

Dwyer Series RM Rate-Master® Flowmeters are furnished in three models (see Fig. 2), each available in a broad array of flow ranges with direct reading scales for air, gas or water. Installation, operation and maintenance are very simple. Only a few common-sense precautions must be observed to assure long, trouble-free service.

CAUTION: Dwyer Rate-Master® Flowmeters are designed to provide satisfactory long-term service when used with air, water or other compatible media. Refer to factory for information on questionable gases or liquids. Avoid solutions of acids, bases or salts having a pH below 5.0 or above 8.5. Caustic solutions, antifreeze (ethylene glycol) and aromatic solvents should definitely not be used.

Calibration
Each Rate-Master® Flowmeter is calibrated at the factory. If at any time during the meter's life, you wish to re-check its calibration, do so only with devices of certified accuracy. DO NOT attempt to check a Rate-Master® Flowmeter with a similar flowmeter, as seemingly unimportant variations in piping and back pressure may cause noticeable differences in the indicated reading. If in doubt, return your Dwyer Rate-Master® Flowmeter to the factory. Its calibration will be checked for you at no charge. Before proceeding with installation, check to be sure you have the Rate-Master model and flow range you require.

LOCATION: Temperature, Pressure, Atmosphere and Vibration: Dwyer Rate-Master® Flowmeters are exceptionally tough and strong. They are designed for use at pressures up to 100 psi (6.89 bar) and temperatures up to 130°F (54°C).

DO NOT EXCEED THESE LIMITS! The installation should not be exposed to strong chlorine atmospheres or solvents such as benzene, acetone, carbon tetrachloride, etc. The mounting panel should be free of excessive vibration, as it may prevent the unit from operating properly.

Inlet Piping Run: It is good practice to approach the flowmeter inlet with as few elbows and restrictions as possible. In every case, the inlet piping should be at least as large as the connection to the flowmeter; i.e.,1/8″ Iron Pipe Size for RMA models 1/4″ IPS for RMB models,1/2″ IPS for RMC models. Length of inlet piping makes little difference for normal pressure-fed flowmeters.

For flowmeters on vacuum air service, the inlet piping should be as short and open as possible. This will allow operation near atmospheric pressure and thereby insure the accuracy of the device. (**Note:** for vacuum air service, the flow control valve, if any, should be on the discharge side of the flowmeter. Either the TMV unit or a separate in-line valve may be applied.).

Discharge Piping: As on the inlet, discharge piping should be at least as large as the flowmeter connection. Also, for pressure-fed flowmeters on air or gas service, the discharge piping should be as short and open as possible. This will allow operation of the flow tube at near atmospheric pressure and insure the accuracy of the device. This is of less importance on water or liquid flowmeters, as the flowing medium is generally incompressible and moderate back pressure will not affect the accuracy of the instrument as calibrated.

POSITIONING AND MOUNTING
All Rate-Master® Flowmeters must be mounted in a vertical position with inlet connection at the bottom rear and outlet at the top rear.

Bezel or Through-Panel Mounting: Make panel cutout using appropriate dimensions from Fig. 2. Flowmeter must fit into panel freely without forcing or squeezing. Insert the flowmeter from the front of the panel and install the mounting clamps from the rear. Insert and tighten the clamp bolts in the locations shown in Fig. 3. Do not exceed 5 in./lbs. Make connections to inlet and outlet ports using small amount of RTV sealant or Teflon® thread tape to avoid leakage. Avoid excess torque, which may damage the flowmeter body.

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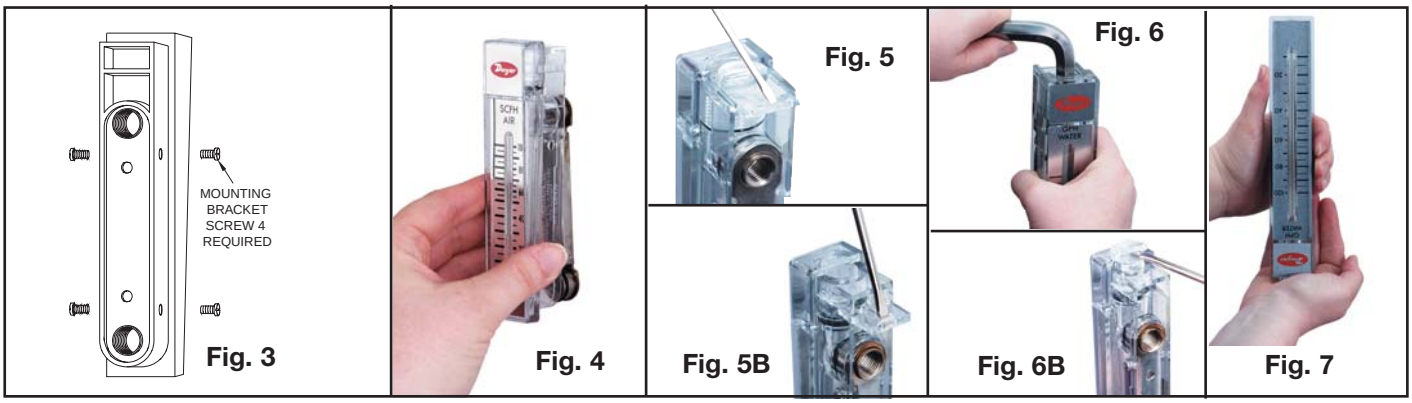


Surface Mounting: Drill appropriate holes in panel, using the dimensions shown in Fig. 2. Hold the flowmeter in position in front of the panel and install the clamp bolts from the rear. (The mounting clamps may be used as washers, if desired, by installing them backwards or straightening them out.) Pipe up inlet and discharge following the directions in the previous sections.

Surface Mounting on Piping Only: An alternate method of surface mounting, omitting the clamp bolts and supporting the flowmeter solely on the connecting piping, is possible. For this method, extra-long or straight pipe threads should be used so that nuts may be run onto the pipe and later tightened against the back of the panel to retain the unit in proper position. Use appropriate hole layout in formation from Fig. 2, but omit the small holes.

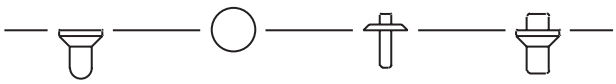
Surface Mounting on Piping Only Without Panel: For a temporary or laboratory type installation, the panel may be omitted altogether and the flowmeter installed directly in rigid piping. Its light weight permits this without difficulty.

OPERATION

To start system, open valve slowly to avoid possible damage. Control valves on BV and SSV models are turned clockwise to reduce flow, counter-clockwise to increase flow. A nylon insert is provided in the threaded section of the valve stem to give a firm touch to valve and to prevent change of setting due to vibration.

The performance of low range units used in air or gas applications may be affected by static electricity. Excessive static charge may cause the ball float to behave erratically or provide a false reading. To ensure the proper function of the unit, the application should be designed to minimize or dispel static electricity.

The standard technique for reading a Variable Area Flowmeter is to locate the highest point of greatest diameter on the float, and then align that with the theoretical center of the scale graduation. In the event that the float is not aligned with a grad, an extrapolation of the float location must be made by the operator as to its location between the two closest grads. The following are some sample floats shown with reference to the proper location to read the float.



Variable Area Flowmeters used for gases are typically labeled with the prefix "S" or "N", which represents "Standard" for English units or "Normal" for metric units. Use of this prefix designates that the flowmeter is calibrated to operate at a specific set of conditions, and deviation from those standard conditions will require correction for the calibration to be valid. In practice, the reading taken from the flowmeter scale must be corrected back to standard conditions to be used with the scale units. The correct location to measure the actual pressure and temperature is at the exit of the flowmeter, except when using the Top Mounted Valve under vacuum applications, where they should be measured at the flowmeter inlet. The equation to correct for nonstandard operating conditions is as follows:

$$Q_2 = Q_1 \times \sqrt{\frac{P_1 \times T_2}{P_2 \times T_1}}$$

Where: Q_1 = Actual or Observed Flowmeter Reading
Q_2 = Standard Flow Corrected for Pressure and Temperature
P_1 = Actual Pressure (14.7 psia + Gage Pressure)
P_2 = Standard Pressure (14.7 psia, which is 0 psig)
T_1 = Actual Temperature (460 R + Temp °F)
T_2 = Standard Temperature (530 R, which is 70°F)

Example: A flowmeter with a scale of 10-100 SCFH Air. The float is sitting at the 60 grad on the flowmeter scale. Actual Pressure is measured at the exit of the meter as 5 psig. Actual Temperature is measured at the exit of the meter as 85°F.

$$Q_2 = 60.0 \times \sqrt{\frac{(14.7 + 5) \times 530}{14.7 \times (460 + 85)}}$$

Q_2 = 68.5 SCFH Air

CAUTION: Do not completely unscrew valve stem unless the flowmeter is unpressurized and drained of any liquid. Removal while in service will allow gas or liquid to flow out the front of the valve body and could result in serious personal injury. For applications involving high pressure and/or toxic gases or fluids, special non-removable valves are available on special order. Please contact factory for details.

MAINTENANCE

The only maintenance normally required is occasional cleaning to assure reliable operation and good float visibility.

Disassembly: The flowmeter can be disassembled for cleaning simply as follows:

1. Remove valve knob from RMB or RMC -BV or -SSV units by pulling the knob forward. It is retained by spring pressure on the stem half-shaft so that a gentle pull will remove it. On RMA-BV or -SSV models, turn the valve knob counter-clockwise until the threads are disengaged. Then withdraw the stem from the valve by gently pulling on the knob.

2. Remove the four mounting bracket screws located in the sides of the flowmeter. See Fig. 3. Pull the flowmeter body gently forward away from the back plate to avoid undue strain on the body. Leave the piping connections intact. There is no need to disturb them. See Fig. 4.

3. Threaded body style flowmeters - Remove the slip cap with a push on a screwdriver as shown in Fig. 5. Remove the plug ball stop as shown in Fig. 6 using allen wrench sizes as follows: Model RMA - 1/4″, Model RMB - 1/2″ and Model RMC - 3/4″ Threadless body style flowmeters - Release the plastic retaining clip with a screw driver (Figure 5B), it will unclip from the valve body (TMV Option) or the plug ball stop, slide the clip back until the valve body or ball stop can be removed. The clip will remain in the body for convenience. Using a screwdriver gently lift up on the plug in the groove as shown in Figure 6B until the o-ring seal is released and remove the plug. For the TMV option gently pull up on the valve knob to release the valve body seals and remove the valve.

4. Take out the ball or float by inverting the body and allowing the float to fall into your hand, as shown in Fig. 7. (Note: It is best to cover the discharge port to avoid losing the float through that opening.)

Cleaning: The flow tube and flowmeter body can best be cleaned with a little pure soap and water. Use of a bottle brush or other soft brush will aid the cleaning. Avoid benzene, acetone, carbon tetrachloride, alkaline detergents, caustic soda, liquid soaps (which may contain chlorinated solvents), etc. Also, avoid prolonged immersion, which may harm or loosen the scale.

Reassembly: Simply reverse steps 1 through 4 and place the flowmeter back in service. A little stopcock grease or petroleum jelly on the "O" rings will help maintain a good seal as well as facilitate assembly. No other special care is required.

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Proper Protein Fractionator Adjustment

A protein skimmer (actually a protein fractionator) is not a 'plug and play' piece of equipment. It requires close attention to achieve proper adjustment. This proper adjustment is critical to achieving the maximum performance from the unit.

The fractionator is adjusted by creating back pressure at the discharge by throttling the discharge valve. The gas intake and water inlet need to be set to their recommended flow rates. Throttling back the discharge valve increases the back pressure and raises the foam level in the upper chamber. This is basically a hydraulic balancing procedure. (Do not throttle water or air flow to and from the venturis to control foam height. Venturi water valves should run in the open position. Venturi air intakes should be adjusted to a 1" to 2" vacuum.)

The fractionator needs to be adjusted to a level that consistently produces an effluent the color of weak tea or ginger ale. Lowering the foam level to the point where it only produces dry foam and a dark effluent inhibits the removal of waste products. A new installation that has not had any fractionation for more than a few days will require 2 to 7 days for the system to achieve a level of stable organic removal.

Protein fractionators remove 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. As the organic laden foam rises into the upper chamber it overflows into the collection area.

The discharge valve adjustment combined with the Bio-load (and certain additives) will affect the foam level. If the foam level is set too low the protein fractionator 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 fractionator is not adjusted to remove them. The result of this level of adjustment is a very dark, concentrated waste extract from the protein fractionator. When this is occurring the aquarist has no way of determining how efficient the protein fractionator is working other than by observing the color of the water in the aquarium.

Adjusting the level too high creates a situation where the fractionator is removing a large amount of water that has very little dissolved organics.

To properly adjust a protein fractionator takes at least several days of observation and adjustments. You should allow a minimum of a half an hour between adjustments to allow the hydraulics to settle into balance. There are a couple things to remember to achieve proper adjustment. The first is the protein fractionator 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 fractionator properly the following must be done:

1. Make sure the venturi and inlet flows are set to the recommended rates.

2. Adjust the protein fractionator by throttling the discharge valve so that the extract is about the color of ginger ale or weak tea. Ideally you will produce a sudsy foam that is between the consistency of water and shaving cream.

3. Let it run, even though it may run wet 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 fractionator 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 number of adjustments and may take longer to slow down the first time. Keep the protein fractionator adjusted so that the extract does not become dark.

Adding feed, organic matter or animals to the water will cause the foam level to rise, sometimes substantially. Certain oils and other compounds will inhibit foam production. If the skimmer level "bounces" or changes radically over a short period, there may be hydraulic issues with the way the filter is plumbed and/or vented.

NEVER BLOCK THE DISCHARGE VENT UNION AT THE TOP OF THE FRACTIONATOR. This will pressurize the unit, and void all warranties. If you connect any filters or ozone destruct equipment to the top vent, the vent must remain free-flowing or at a slightly negative pressure.

To maintain an efficient fractionator the upper chamber must remain clean and the rinse system in the upper chamber needs to be working properly. The chamber should be accessed through the top cover and cleaned manually every 90 days or if the rinse system has been out of operation for more than 3 hours. With a properly adjusted protein fractionator the water will be noticeably cleaner. Ideally aquarium water should be clear and colorless. The closer to this goal the better.

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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