



UltraPrecise Auto Top Off Liquid Level Controller (LM-UPLC-ATO-G7)



INSTALLATION MANUAL

SpectraPure®

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PACKING LIST FOR LLC-UPLC-ATO:

IF ANY OF THE ITEMS LISTED BELOW ARE MISSING PLEASE CONTACT SPECTRAPURE PRIOR TO INSTALLATION.

- Module w/ Sensor Tubes Attached
- 12' White Tubing
- Magnetic Sensor Holder Assembly
- Blue Warranty Card
- 12v /800mA Power Supply
- Operations Manual
- Allen Wrench

ALL RETURNS WITHOUT RMA# WILL BE REFUSED. CLAIMS MUST BE WITHIN 10 DAYS FROM RECEIPT.

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SYSTEM FEATURES

- Highest Quality and Accuracy – New and Improved “Gen 7” LiterMeter3 Pump machined to aerospace tolerances. Antiwear and anti-friction coated for exceptional pump life.
- Fully automatic operation - May be programmed to fill a vessel or to drain a sump (Fill Mode/Drain Mode).
- High reliability metal pump housing
- Virtually maintenance free
- No damage to the pump if run dry
- No check valves to clog or seals to leak
- Self-priming and anti-siphoning
- High limit Sensor Tube for fail-safe operation
- High delivery pressure - over 40 psi
- Compact size and cool operation
- Kalkwasser safe
- Quiet operation and low power consumption
- Complete system consumes less than 3 watts when pump is on
- **2-year Warranty**

SYSTEM SPECIFICATIONS:

Pump Flow Rate: Adjustable in 10 Steps up to 180 ml./min.

Dimensions: 5.35"L x 2.15"H x 2.2"W (13.6 cm. x 5.5 cm. x 5.6 cm.)

Maximum Daily Total (per Pump): 260 liters (68.5 gals.)

Draw Height: from maximum **25 feet** (7.6 meters) below

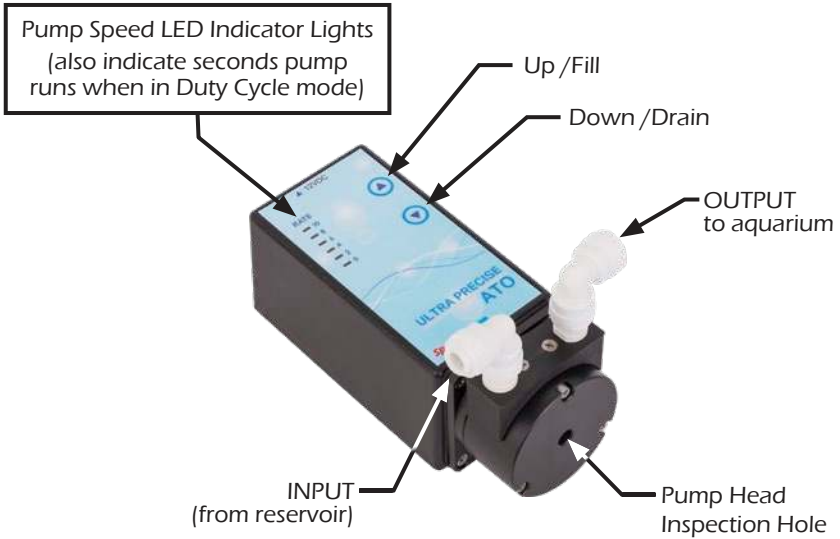
Delivery Height: to maximum **60 feet** (18.3 meters) above

Power Supply: 115VAC /12VDC wall-mounted power supply
(Can be powered by 12VDC battery)

SpectraPure® Inc. assumes no responsibility for water damage due to leaks or misapplications of our products. It is the user's responsibility to determine that the system is leak-free and properly installed.

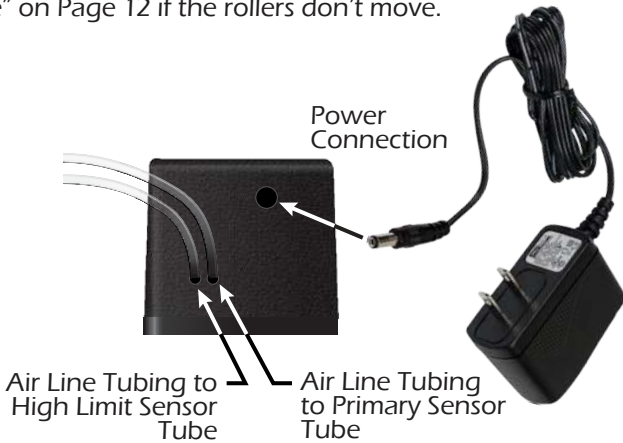
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PUMP CONNECTIONS AND CONTROLS:



This system is not waterproof. Saltwater damage is not covered in our five year warranty. Do not let the Pump Module fall into water!

Always run a new pump dry for 20 minutes before putting it into service. Be sure to observe the rollers revolving around the rotating motor shaft through the hole in the end of the pump head. See "Servicing The Pump Module" on Page 12 if the rollers don't move.



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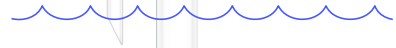
SETUP DIAGRAMS:

FRONT VIEW OF THE MAGNETIC PROBE HOLDER

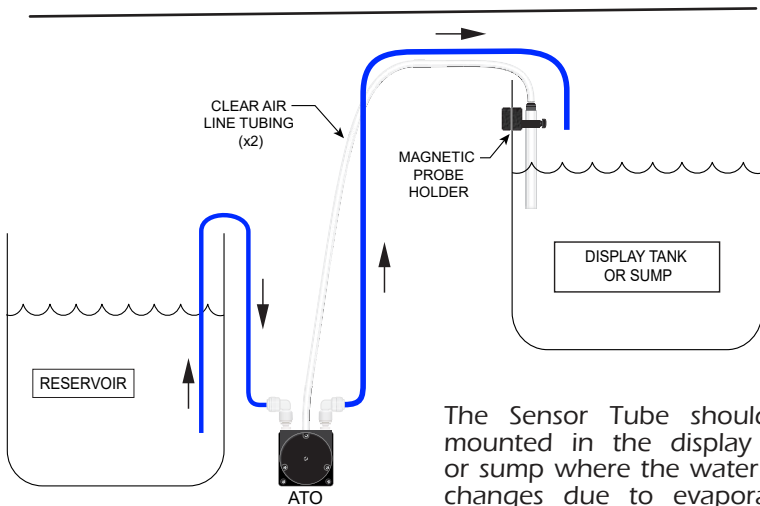
The high limit sensor will shut the pump off if the water level reaches the top of the level in the tube. Position the high limit sensor tube so any abnormal rise in the sump will deactivate the circuit and kill power to the ATO control module. See page 10 for instructions in setting the high and low water levels.



HIGH LIMIT WATER LEVEL



NORMAL WATER LEVEL



The Sensor Tube should be mounted in the display tank or sump where the water level changes due to evaporation. Pump operation is dependent upon the water level in relation to the Sensor Tube.

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INTRODUCTION:

The Ultra Precise ATO (Automatic Top Off) unit works as either an ATO (Fill mode) or as a sump pump (Drain mode). It has an integrated peristaltic pump that is capable of pumping approximately 180 ml/min when running at full speed. This may be regulated by changing the pump speed in 10 steps, from minimum to maximum. You may further alter the rate of flow by changing the Duty Cycle. The Duty Cycle consists of recurring 20-second cycles. The default setting is for the pump to run for the entire 20-second cycle. The user may change that setting to allow the pump to run for as few as 2 seconds during each cycle, in even increments (i.e. 2,4,6,8, etc.). This feature can be extremely useful to dial in exact dosages when using the ATO as a delivery pump for Kalkwasser, etc.

There are many advantages to the integrated peristaltic pump. The liquids themselves never come in contact with the internal workings of the pump. This contributes to the extremely long lifespan of the peristaltic pump. Also, since the pump does not rely on the liquid being pumped for lubrication, there are no deleterious effects if the pump is run dry. The LM-UPLC-ATO-G7 is also capable of pumping liquid to a level of 60 feet above the pump itself or 300 feet horizontally. This is very handy if your sump is located on a different floor or in a different room than your aquarium or if you can't mount the pump in close proximity.

The ATO comes complete with a liquid level Sensor Tube which allows the user to set the levels of operation for the pump. In "Fill" mode, it turns on when the lower level is reached and turns off when the upper level is reached. It also includes a separate high limit Sensor Tube which works as a safety backup system. This sensor operates off of a separate circuit which will function even if the main processor and/or the pump switch were to fail. If the water level ever reaches the high limit sensor, the pump will be de-energized and will stay off until the water level drops below the low water level that has been set by the user.

The sensor tubes are held in place by a proprietary rustproof magnetic probe holder. This has been designed to hold the sensor tubes securely in place on tank walls up to 3/4" in thickness.

FAMILIARIZING YOURSELF WITH THE ATO:

The ATO comes "out of the box" ready to move water from your storage reservoir to your display tank. The Pump will be running at full speed (10) and will be constantly ON.

Before you connect the ATO to its Storage Reservoir and Display Tank, take a few minutes to familiarize yourself with the operation of the ATO.

It is most convenient to locate the ATO near the Display Tank, within the reach of the two airline tubes that are part of the Sensor Tube Assembly.

(continued on next page)

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FAMILIARIZING YOURSELF WITH THE ATO: (CONT.)

You can cut the tubes in two and extend them with 1/4" OD x 1/8" ID vinyl tubing to an additional distance of fifteen feet.

There are 6 lights, arranged vertically along the left side of the ATO. They are numbered 0, 2, 4, 6, 8 and 10. They are used in different modes to display various values and settings.

There are two buttons, UP (▲) and DOWN (▼). They are used to modify the runtime characteristics of the pump. Repeated presses of the UP button steps the indicator lights up to light 10. One more press of the UP button returns to light 0. Likewise, with the light 0 blinking, one press of the DOWN button will return the display to light 10. This is the most common way to quickly switch the pump from off to on and back to off.

During normal operation, the lights will indicate the SPEED at which the pump is running and the state of the pump – on or off. When the light(s) are solid on, the pump is on, when the light(s) are blinking, the pump is not running.

When the Primary Sensor Tube senses the water level dropping below the "lower limit" point, the pump will turn on and stay on until the Primary Sensor Tube senses the water level rising to the "upper limit" point. At that time, the pump will turn off and stay off until the level drops below the "lower limit" point again.

If the water level EVER reaches the high limit sensor tube, the pump will be stopped and all six lights will blink rapidly in unison until the water level is lowered.

When power is normally applied, the ATO will quickly go into its main mode of normal operation. During normal operation, the lights indicate the SPEED of the Pump in 10 steps, with 10 representing FULL SPEED and 0 representing OFF. Pressing the UP and DOWN buttons step the lights through the sequence from 0 to 10. There will be some maximum vertical distance where the pump may stall when it is set to a speed setting of 1. Increase the SPEED to 2 or even 3 for reliable operation.

During normal operation, the Primary Sensor Tube is positioned in the receiving vessel so that the expected high and low levels fall within the length of the Primary Sensor Tube.

QUICK SETUP

The Quick Setup should be performed with the High Limit Sensor Tube out of the water and the Primary Sensor Tube inserted into the water as shown on Page 5.

With the pump off, hold the DOWN arrow button and apply power. After 3 seconds, release the button. All 6 lights will blink three times in unison. The pump will then start to run in a normal mode with a pump speed of 10 and a duty cycle of 20 seconds. The water level will now be maintained to within one-tenth of an inch (± 0.1 ") of this point.

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SETUP:

SETTINGS

When the ATO is initially plugged in and powered up, the bottom light (0) will blink rapidly for three seconds before engaging the pump. At this time, the pump may be set for FILL or DRAIN mode.

NOTE: Setting the high and low levels may be performed at a table using a large glass of water. We recommend using a waterproof marker to indicate your set points on the Primary Sensor Tube. This will assist you when installing the Sensor Tube Assembly in your SUMP.

FILL MODE SETUP

1. Power up the ATO unit
2. Within 3 seconds, while light 0 is blinking, press the UP button for two seconds, then release it. The three lower lights (4,2 and 0) will blink in a downward sequence.
3. Position the Primary Sensor Tube in the water at the point on the tube where you want to set the "lower limit". This will be the level where the pump will turn on. We recommend that you set this so that it is at least one inch from the open end of the tube.
4. Press the DOWN button to set the lower limit.
5. The three upper lights (6, 8 and 10) will now blink in an upward sequence.
6. Position the Primary Sensor Tube in the water at the point on the tube where you want to set the upper limit. This will be the water level where the pump will turn OFF. We recommend that you set this between 0.2 to 4 inches above the lower limit point.
7. Press the UP button to set the upper limit.
8. All six lights will turn on briefly to indicate success. These settings are remembered even after power is removed from the unit.

DRAIN MODE SETUP

1. Power up the ATO unit
2. Within 3 seconds, while light 0 is blinking, press the DOWN button for two seconds, then release it. The three lower lights (4,2 and 0) will blink in a downward sequence.

(continued on next page)

SETUP: (continued)

3. Position the Primary Sensor Tube in the water at the point on the tube where you want to set the “lower limit”. This will be the level where the pump will turn OFF. We recommend that you set this so that it is at least one inch from the open end of the tube.
4. Press the DOWN button to set the lower limit.
5. The three upper lights (6, 8 and 10) will now blink in an upward sequence.
6. Position the Primary Sensor Tube in the water at the point on the tube where you want to set the upper limit. This will be the water level where the pump will turn ON. We recommend that you set this between 0.2 to 4 inches above the lower limit point.
7. Press the UP button to set the upper limit.
8. All six lights will turn on briefly to indicate success. These settings are remembered even after power is removed from the unit.

DUTY CYCLE SETUP

1. Power down the ATO unit.
2. Press and hold the UP button
3. Power up the ATO unit
4. All six lights will flash twice to indicate that you are in Duty Cycle Mode, then one or two lights will blink rapidly, indicating the current setting for Duty Cycle Mode. (See Page 7 for explanation.)
5. Press the UP and DOWN buttons to adjust this setting.
6. To quit this setup mode, simply remove power from the ATO. This setting will be remembered.

SETTING PUMP SPEED




During normal operation, the lights will indicate the SPEED at which the pump is operating and the state of the pump — on or off. Solidly lit lights indicate that the pump is running; blinking lights indicate that the pump is not running. In both instances, the lights indicate the SPEED setting of the pump. Whenever the pump is running, you may use the UP and DOWN buttons to adjust the pump SPEED. (See Page 10 for further details.)

























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PUMP SPEED SETTINGS

The pump has been set at the factory to run at full speed when you first turn it on. At this setting, it will pump at the rate of about 180 ml./min. This may be adjusted in 10 steps. Step "1" is as slow as the pump can safely run. When set at Step "10", the pump is running at full speed. During normal operation, the lights will indicate the speed of the pump. You may use the UP and DOWN buttons to adjust the speed of the pump. When two adjacent lights are lit, it indicates that the step is the number between these two. (e.g. If the lights next to 6 and 4 are both lit, the pump is running at Step "5".)

LEGEND

-  On
-  Blinking
-  Off

Pump Off	Pump On Full	Pump On Step 5	Pump Off Step 4
 10	 10	 10	 10
 8	 8	 8	 8
 6	 6	 6	 6
 4	 4	 4	 4
 2	 2	 2	 2
 0	 0	 0	 0

NOTE: The High Limit Sensor Tube acts as a safety backup. It is on a separate circuit that will operate even if the main processor and/or the pump switch were to fail. If the water level reaches the High Limit Sensor tube, the pump will stop and all six lights will blink rapidly in unison until the water level drops back below the level of the High Limit Sensor tube. If the processor is disabled, the pump will still turn off but the lights will not blink.

-  10
-  8
-  6
-  4
-  2
-  0

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DUTY CYCLE SETTINGS

Duty Cycle is a function that will limit the time the pump is on in a 20-second recurring period. This function adds more precision when controlling the amount of liquid that is being pumped.


e.g. Typically, when the LLC-UPLC-ATO is running at full speed, it is pumping about 180 ml./min. (2.85 gallons per hour). If the Duty Cycle is set to "1" (2 seconds), the overall rate will be about 18 ml./min.


Duty Cycle Duration Times





























































These values represent the number of seconds the pump will run during a 20-second duty cycle. The number values are doubled since this is based on a 20-second duty cycle. When two adjacent lights are lit it represents the value between the two numbers.

NOTE: The Duty Cycle will not allow a setting of 0 seconds.

LEGEND

 Blinking

 Off

20 secs	18 secs	16 secs	14 secs	12 secs
 10	 10	 10	 10	 10
 8	 8	 8	 8	 8
 6	 6	 6	 6	 6
 4	 4	 4	 4	 4
 2	 2	 2	 2	 2
 0	 0	 0	 0	 0
10 secs	8 secs	6 secs	4 secs	2 secs
 10	 10	 10	 10	 10
 8	 8	 8	 8	 8
 6	 6	 6	 6	 6
 4	 4	 4	 4	 4
 2	 2	 2	 2	 2
 0	 0	 0	 0	 0

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SYSTEM STARTUP

(See Pump Connections on Page 4.)

1. Before installing your ATO, turn the unit on and run it dry for 20 minutes in order to break the pump in.
2. Use 1/4" tubing to connect the right angle fitting on the ATO to the Storage Reservoir. Firmly push the tubing into the quick connect fitting until it hits the bottom of the fitting.

NOTE: Be sure the tubing cannot escape from the Storage Reservoir.

3. Push the tubing into the end of the rubber tubing on the pump.
4. Use 1/4" tubing to connect the right angle fitting on the ATO to the Display Tank. Firmly push the tubing into the quick connect fitting until it hits the bottom of the fitting.

NOTE: Be sure the tubing cannot escape from the Display Tank.

5. Mount the Sensor Tube Assembly to the side of your Display Tank or sump. (See diagrams on Page 5.)

SERVICING THE PUMP MODULE:

These instructions apply to ALL SpectraPure Pump Products. It is recommended that the pump head be inspected and cleaned, or the tubing replaced per the following procedure.

1. Disconnect the tubing from the pump.

NOTE: Make sure to keep track of which tube goes to which elbow. Getting these reversed will reverse the flow of the water.

2. Use the provided 3/32" Allen Hex Key to remove the three bolts in the pump head and lift the pump head away from the motor shaft. (Fig. 1)
3. Remove the three white rollers from the pump head. (Fig. 2)
4. If they are dirty, clean the three white rollers, tubing, head and base plate with a cloth soaked in De-Solv-it® (available in most grocery stores), acetone, or petroleum spirits. Common "lighter fluid" also works well. Make sure you remove all gummy deposits, then rinse parts with water and dry. Next, wipe the motor shaft clean. Be careful not to spill solvents on the plastic case or it will damage the finish. Keep cleaning fluids away from the bearing at the base of the motor shaft.

(continued on next page)

SERVICING THE PUMP MODULE: (continued)

5. If you are replacing the tubing assembly, unscrew the two phillips head screws on top of the yoke assembly. (Fig. 3) Pull the yoke and tubing away from the pump until the tubing is free of the slots that hold it in place. Slide the new yoke/tubing assembly (Fig. 4) into place and screw in the two phillips head screws which hold the yoke in place.
6. Place two of the three rollers into the pump body, pushing them down against the tubing. (Fig. 5) Hold them in position with your left thumb and then push the third roller into place. (Fig. 2)
7. Press the pump head firmly against the pump plate and check for proper alignment. Use the 3/32" Allen Hex Key to reinstall the three pump head bolts.
8. Reinsert the tubing into the push fittings on the two elbows.

NOTE: Make sure that you install the tubing into the same elbow that you disconnected them from so that the direction of flow remains the same.



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5

TROUBLESHOOTING:

Excessive Noise

1. Make sure that the Pump Module is not attached to or sitting atop a box or enclosure that will act as a “speaker” and amplify the vibration of the pump.
2. Secure the attached tubing so that it does not vibrate against nearby walls, cabinets, or other objects.

No LEDs are lit

1. Replace power supply

Lights are on but rollers are not turning

1. Look through the observation hole at the end of the pump head and see if the shaft is turning. If not, call SpectraPure Technical Support.
2. If the shaft is turning, follow the instructions on pages 12-13 for servicing the pump head.

Pump is running and rollers are turning but no fluid is being pumped.

1. Check the ends of the tubing for obstructions.
2. Check for a loose connection on the suction side which will cause the pump to lose its prime.

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TWO-YEAR LIMITED WARRANTY:

SpectraPure, Inc.® warrants the product to the original owner only to be free of defects in material and workmanship for a period of two years from the date of receipt. SpectraPure's liability under this warranty shall be limited to repairing or replacing at SpectraPure's option, without charge, F.O.B. SpectraPure's factory, any product of SpectraPure's manufacture. SpectraPure will not be liable for any cost of removal, installation, transportation or any other charges which may arise in connection with a warranty claim. Products which are sold but not manufactured by SpectraPure are subject to the warranty provided by the manufacturer of said products and not by SpectraPure's warranty. SpectraPure will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair or, if the product was not installed in accordance with SpectraPure's or other manufacturer's printed installation and operating conditions, or damage caused by hot water, freezing, flood, fire or acts of God.

SpectraPure will not be responsible for any consequential damages arising from installation or use of the product, including any water or mold damage due to flooding which may occur due to malfunction or faulty installation, including, but not limited to failure by installer to over- or under-tighten fittings, housings, and/or push-style fittings, or improper installation of push-style fittings. Consumable items such as prefilters and membranes are not covered under the two-year warranty.

To obtain service under this warranty, the defective system or components must be returned to SpectraPure with proof of purchase, installation date, failure date and supporting installation data. Any defective product to be returned to the factory must be sent freight prepaid. Documentation supporting the warranty claim and a Return Merchandise Authorization (RMA) number must be included. SpectraPure will not be liable for shipping damages due to the improper packaging of the returned equipment and all returned goods must also have adequate insurance coverage and a tracking number.

SpectraPure will not pay for loss or damage caused directly or indirectly by the presence, growth, proliferation, spread or any activity of "fungus", wet or dry rot or bacteria. Such loss or damage is excluded regardless of any other cause or event that contributes concurrently or in any sequence to the loss. We will not pay for loss or damage caused by or resulting from continuous or repeated seepage or leakage of water, or the presence or condensation of humidity, moisture or vapor, that occurs over a period of 14 days or more. "Fungus" and "fungi" mean any type or form of fungus or Mycota or any byproduct or type of infestation produced by such fungus or Mycota, including but not limited to, mold, mildew, mycotoxins, spores, scents or any biogenic aerosols.

SpectraPure will not be liable for any incidental or consequential damages, losses or expenses arising from installation, use, or any other causes. There are no expressed or implied warranties, including merchantability or fitness for a particular purpose, which extend beyond those warranties described or referred to above.

* **The two-year limited warranty does not apply to consumable items, including but not limited to, filters and cartridges unless specifically stated above.**

TERMS AND CONDITIONS:

1. Shipping charges on units or parts submitted to our facility for repair or replacement must be borne by the registered purchaser. After repair or replacement, the factory will return the unit or part freight prepaid to the customer.
2. We assume no warranty liability in connection with our equipment other than as herein specified.
3. This warranty is in lieu of all other warranties expressed or implied, including warranties of fitness for a particular purpose.
4. We do not authorize any person or representative to assume for us any other obligation on the sale of our equipment. This is the exclusive remedy and liability for consequential damages under any and all warranties which are excluded to the extent exclusion is permitted by law.
5. Proof of original purchase date must accompany all warranty claims.
6. SpectraPure, Inc. Reserves the right to change prices without notice when necessary. All prices in the catalog are quoted in US dollars.
7. Claims for error in quantity or condition must be made within 10 days of receipt of material. SpectraPure, Inc. will not be responsible for any claimed shortages not reported within 10 days. Returns other than warranty claims may be subject to 20% restocking fee.
8. SpectraPure, Inc. cannot be held liable for damage or loss to a shipment by a freight carrier. Check shipment for damage before acceptance or note on freight bill subject to inspection for concealed damage. Consignee must file claim. SpectraPure, Inc. will offer as much assistance as possible.
9. A complete credit check is required prior to shipping on a Net 30 basis. In the interim period during which credit references are being evaluated, all orders must be prepaid until approved.
10. All returned checks (due to insufficient funds or closed accounts) will be subjected to a **\$35 penalty charge**.
11. Invoices on Net 30 accounts not paid within 30 days of shipment will be considered delinquent and will accrue Finance charges at the rate of 1.5% per month (18% per annum).

NOTES: