



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



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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SpectraPure® Inc. 480.894.5437 Call us toll-free 1.800.685.2783

2167 East Fifth St, Tempe, Arizona 85281

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SYSTEM FEATURES

- Highest Quality and Accuracy – New and Improved “Gen 6” 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
- Extended **5-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)

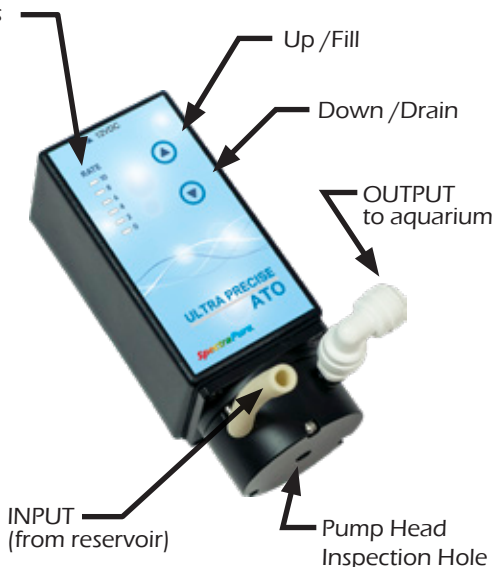
SpectraPure® Inc. assumes no responsibility for water damage due to leaks or misapplications of our products. It is the user's responsibility to determine that the system is leak-free and properly installed.

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PUMP CONNECTIONS AND CONTROLS:

Pump Speed LED Indicator Lights
(also indicate seconds pump runs when in Duty Cycle mode)

Press fit the end of a piece of 1/4" polyethylene tubing into the rubber inlet hose at least 3/4". This is connected to the supply reservoir. This reservoir needs to be vented to prevent collapse.



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.



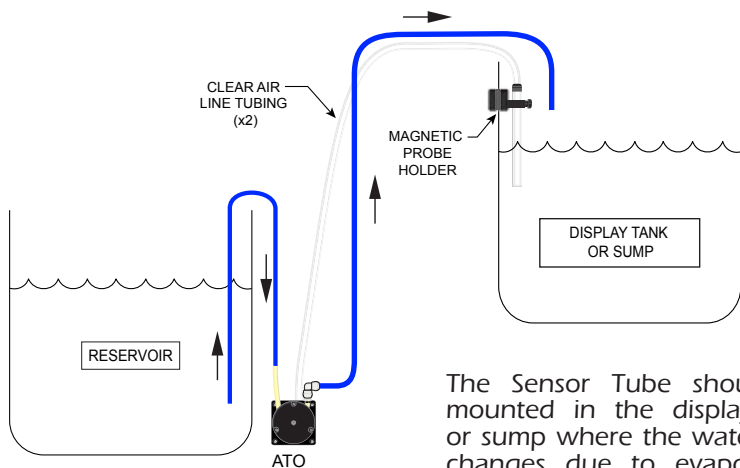
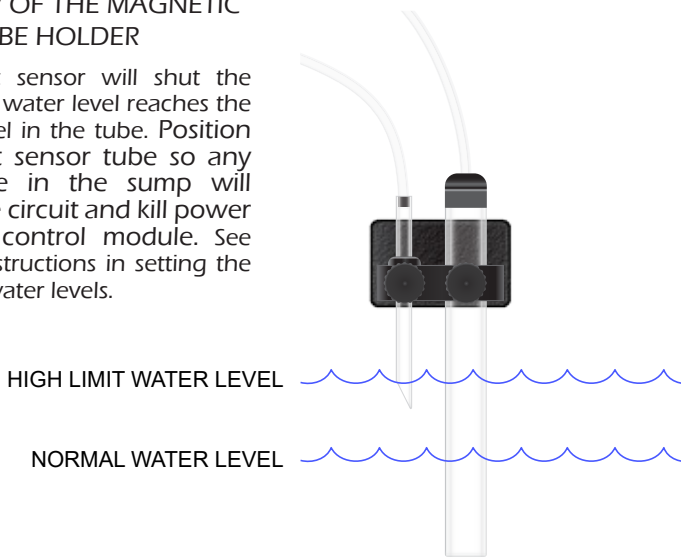
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SETUP DIAGRAMS:

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 bevel 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.



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.

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 LLC-UPLC-ATO 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 ($\pm 0.1"$) of this point.

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

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

SYSTEM STARTUP

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 Storage Reservoir to the rubber tube end of the ATO.

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. (Refer to images on pages 14-15)

1. If you are just inspecting the pump head, it is not absolutely necessary to disconnect the two tubings from the head, but it might make this task easier (Fig. B-1).
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. B-2)
3. Remove the three white rollers from the pump head. (Fig. B-3)
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. 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, remove the tubing from the pump head as shown in Fig. B-4. Replace the tubing assembly with a new tubing assembly. Reinstall by firmly inserting the tubing into the outlet port of the pump head as far as possible. (Fig. B-5)
6. Pinch the other end of the tubing and insert it through the slot at the inlet port of the pump body. Manipulate the tubing so that it conforms to the inside diameter of the pump body. Be sure that the tubing is completely pushed down into the output port so the tie-wrap is within 1/16" of the pump body and the plastic "wear strip" is positioned to the inside so the rollers will contact the wear strip evenly. (Fig. B-6)
7. Place two of the three rollers into the pump body, pushing them against the tubing. (Fig. B-7) Hold them in position with your left thumb and then push the third roller into place. (Fig. B-8)
8. Carefully line up the locator pin with the slot in the inlet port. (Fig. B-9)
9. Press the pump head firmly against the pump plate and check for proper alignment. (Figs. B-10 and B-11) Use the 3/32" Allen Hex Key to reinstall the three pump head bolts. (Fig. B-12)
10. Replace the union connector on the output port stud. The final assembly should look like Fig. B-1.
11. Run the pump dry for 20 minutes. Be sure to observe the rollers revolving around the rotating motor shaft through the hole in the end of the pump head.

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SERVICING THE PUMP MODULE: (continued)

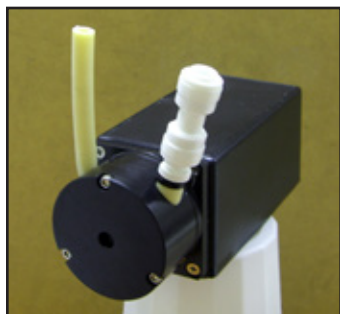


Fig. B-1

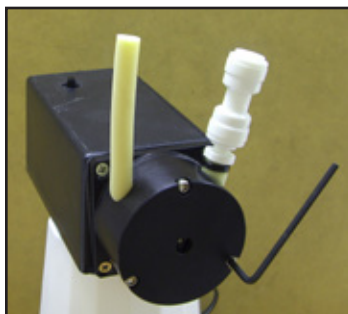


Fig. B-2



Fig. B-3

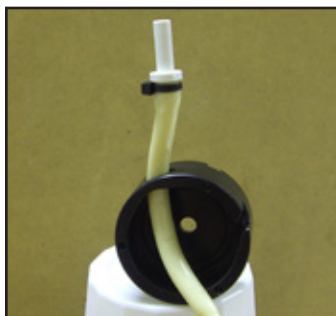


Fig. B-4



Fig. B-5

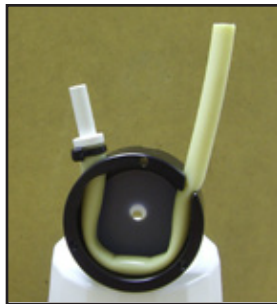


Fig. B-6

SERVICING THE PUMP MODULE: (continued)



Fig. B-7

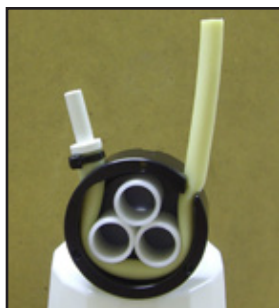


Fig. B-8



Fig. B-9

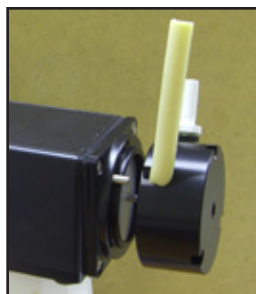


Fig. B-10

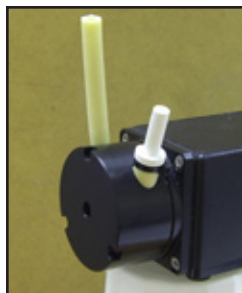


Fig. B-11

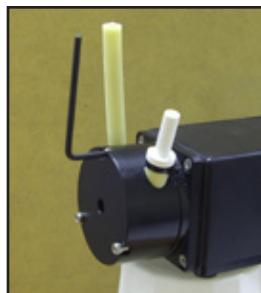


Fig. B-12

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.

FIVE-YEAR LIMITED WARRANTY:

SpectraPure, Inc. warrants each new Ultra Precise ATO to the original owner only to be free of defects in material and workmanship for a period of 5 years from the date of receipt.

SpectraPure’s liability under this warranty shall be limited to repairing or replacing on SpectraPure’s option, without charge, F.O.B. SpectraPure’s factory. 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.

SpectraPure will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, improper installation and operating conditions, power failures, freezing, flood, fire, or acts of God.

WARRANTY SUPPORT:

As confident as we are in our Pump Technology, we request that you fill out and return the Warranty Card in order to take full advantage of our FIVE YEAR WARRANTY.