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Terminator(R) Ultra-Violet Water System Model T1SR

To Assist in Controlling Bacteria and Algae Growth

This device will augment bactericidal and algicidal activity of primary disinfectants such as chlorine, bromine, etc. in swimming pools.

FOR DOMESTIC USE

A minimum of 0.6 ppm of available chlorine or equivalent bromine must be maintained. If this device is used in regulated pools, Provincial/municipal regulations governing minimum levels of chlorine/bromine must be followed.

READ THE LABEL AND USER'S GUIDE BEFORE
OPERATING THIS UNIT

REGISTRATION NO. 24366 PEST CONTROL PRODUCTS ACT

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TERMINATOR
TRADEMARK

BACTERIA

Terminator Water Products Inc.

USER'S GUIDE

Date Issued: JULY, 1995

Water Disinfecting System

Models #T1SR/T2SR

Unit 4, 11 Calkin Drive

Kentville, Nova Scotia
Canada B4N 3X7

IMPORTANT REMINDERS FOR OPTIMUM OPERATION

- Reminder #1: Ensure the Terminator(R) System is connected in accordance with section 4.1.1
- Reminder #2: Check the flow rate of your pump (see section 4.1.2). Flow rates are dependent on pump horsepower and distance between pool and pump system.
- Reminder #3: Should your pool water be dirty or contain a heavy mineral content (hard water), ensure you use a precipitator (See Section 5.2.6.1). This will reduce scaling on the quartz tubing and lengthen the time between system maintenance.
- Reminder #4: Clean and backwash your filters at least twice weekly. NOTE: A Properly working filter is essential for the Terminator(R) System to operate efficiently.

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1.2 INTRODUCTION

1.2.1 Thank you for choosing the Terminator(R) System. Our products are designed to deliver years of safe and reliable operation. Your Terminator(R) System comes assembled and ready for installation. Please complete and return your enclosed Warranty Registration Card ensuring first class postage is affixed. The serial number may be found on the identification sticker located on the front of the Terminator(R) System.

1.2.2 Bacteria and organic matter can be introduced into your pool at any time. The Terminator(R) system will augment bactericidal and algicidal activity of primary disinfectants such as chlorine, bromine, etc., in swimming pools. A minimum of 0.6 PPM of available chlorine or equivalent bromine must be maintained. In the case of regulated pools, Provincial/State/Municipal regulations must be followed.

1.2.3 Any form of chlorine will work to maintain the 0.6 PPM residual. For example: depending on conditions, you could add one Trichlor tablet to the floater every week, then check the floater and test the chlorine level in the swimming pool daily. In hot weather testing should be carried out more often. Always read the labeling instructions on chemical packaging prior to adding chemicals to pool water.

1.2.4 The Terminator(R) System is designed to meet recognized electrical and plumbing standards. The system is reliable, affordable and provides for ease of use.

2.0 CAUTION AND SAFETY

2.1 The following cautions are for the safety of the user:

- (1) Read all instructions in the User's Guide before operating the Terminator(R) System;
- (2) To protect against electrical hazards, do not immerse the electrical cord or the Terminator(R) System in pool water or other liquids;
- (3) Remove the electrical power from the Terminator(R) System when not in use for extended periods of time and prior to performing maintenance and cleaning operations;
- (4) Allow the Ultraviolet lamp to cool before handling.;

- (5) Do not operate the Terminator(R) System if the power cord is damaged. Contact your local Terminator Dealer for examination, repair and/or adjustment;
- (6) Do not use the Terminator(R) System for other than its intended purpose;
- (7) Do not puncture the PVC chamber or junction box of the Terminator(R) System;
- (8) The "magic" inspection eye is designed to be child-proof and should only be checked by an adult for proper operation;
- (9) In case of an electrical short, a Ground Fault Circuit Interrupter (GFCI) has been installed and will remove power from the Terminator(R) System in case of short circuit to ground.

3.0 Description and Operation

3.1 DESCRIPTION

3.1.2 The UV disinfecting process is based on the principal that varying UV wave lengths can produce different levels of intensity which are powerful enough to kill various strains of bacteria and algae. The UV light is able to penetrate the core of bacteria and algae cells and affect the DNA matter so that they are unable to reproduce. The actual UV dose received by the organism depends on a number of factors, such as: the intensity of the UV lamp, the flow rate of the water through the UV system, the transmission efficiency of the water and quartz glass sleeve and the geometry of the UV radiation chamber.:

3.1.3 Ultraviolet light does not affect the taste, odor or the pH balance of the water and does not add anything to the water.

3.1.4 The Terminator(R) System consists of a UV lamp which is enclosed in a quartz glass sleeve and housed in a PVC chamber with an opening at either end. The Terminator(R) System contains a ballast and ground fault circuit interrupter. Both are located in a metal junction box to power the UV lamp. UV light occurs naturally from sunlight but short wave UV light is filtered by the atmosphere. It is this short wave light that is produced by the System's UV lamp.

3.1.5 The Terminator(R) System is installed in the water circulation system, after the pump and filter and before the pool on the return line. This ensures the water is clear from debris and impurities that could refract the light rays and inhibit the disinfecting process. The water is treated as it passes through the length of the chamber at a relatively high flow rate. Depending on the flow rate, the contents of the swimming pool may be turned over several times during a 24-hour period. It is recommended the pump be

kept running to ensure a minimum of 4 turns overs per day.

3.1.6. The Terminator(R) System.

3.1.6.1 The Terminator(R) System is a water disinfecting device requiring 120 vac @ 60 Hz to operate. The specifications of both the T1SR and T2SR models are set out in section 7.0. As the water is pumped through the system and cleaned, it enters the UV chamber where it is exposed to UV energy from a high output lamp.

3.2 OPERATION

3.2.1 Principal of Germidical Action

3.2.1.1 Ultraviolet (UV) radiation in the 200-300 nanometer (NM) range and generated at sufficient dosage has proven to be effective in reducing micro-organisms such as bacteria and algae. Germicidal lamps are used in the ultraviolet radiation process for air and water purification, sewage treatment, food and beverage protection and other applications which may require disinfecting by ultra violet light.

3.2.2 UV Lamp - Germicidal

3.2.2.1 The Terminator(R) System incorporates within its chamber a high output, ozone-free type, germicidal lamp with a special quartz sleeve which absorbs the non-effective radiation. The rated useful life of the UV lamp is 5,000 hours The UV lamp operation should be checked daily using the filter end "magic" eye.

3.2.3 Magnetic Ballast

3.2.3.1 The UV lamp is powered by a high output, high power factor, indoor/outdoor, magnetic ballast to allow sure starts and reliable performance in the harshest of conditions.

3.2.4 Ground Fault Circuit Interrupter (GFCI)

3.2.4.1 The GFCI provides protection against ground fault leakage and shock for outlets and equipment in susceptible applications. Incorporated are two (2) available 110 Vac outlets to allow the user to operate other equipment, up to a maximum load of 10 Amps. Remember, never operate electrical equipment near water.

3.2.5 PVC Materials

3.2.5.1 Materials used in the Terminator(R) System are made of a rigid polyvinyl chloride (PVC) material, capable of withstanding pressures as indicated in section 7.1. PVC will not rust and is very tolerant to rough handling and high temperature variations.

3.2.6 Testing

3.2.6.1 Every Terminator(R) system undergoes a dielectric strength test and an air pressure leak test prior to packaging.

4.0 Installation and Removal

4.1 INSTALLATION

4.1.1 The Terminator(R) System is to be installed vertically and mounted to a solid, flat surface. Priority should be given to mounting the Terminator(R) System in a sheltered environment.

4.1.2 The location of the Terminator(R) System should be as close to the pump as possible and, for best results, the flow rate of the water should not exceed the rate indicated in section 7.1.

4.1.3 Should you have a flow rate exceeding the flow rate requirement for your particular model unit, you should install a reducer valve, available at most hardware stores, between the sand filter and the Terminator(R) system. This will allow you to regulate the flow rate. Many swimming pools have over powered pumps and it is important to check the flow rate on your pool.

4.1.4 Suggestions for above-ground pools

4.1.4.1 To reduce the build-up of algae on pools which have a straight jet on the water return into the swimming pool (either at the surface or just below) it is recommended that the user install an elbow to direct the water return towards the centre line of the water level.

4.1.5 Inlet/Outlet Connections

4.1.5.1 The output of the filter should be connected to the inlet female threaded adapter of the Terminator(R) System. The outlet female threaded adapter of the Terminator(R) System should be connected to the inlet of the swimming pool.

4.1.5.2 Plug in the Terminator(R) System, check the UV lamp operation, turn on the pump and enjoy your pool.

4.2 REMOVAL

4.2.1 To remove the Terminator(R) System (for maintenance or storage) turn off the pump, remove power from the Terminator(R) System, open the drain valve and drain the water. Remove the Terminator(R) System from its mounting support.

TYPICAL DIAGRAM OF A SWIMMING POOL SYSTEM
SHOWING THE TERMINATOR(R) SYSTEM

((DIAGRAM))

Terminator(R) System
Unit Diagram

((DIAGRAM))

Terminator(R) System
Internal Diagram

((DIAGRAM))

Terminator(R) System
Junction Box Diagram

((DIAGRAM))

Terminator(R) System
Electrical Diagram

((DIAGRAM))

Terminator(R) System

Please follow these five (5) simple steps when installing or maintaining your new Terminator(R) System and read the User's Guide for more information pertaining to your system.

Step #1: Ensure that your Terminator(R) System is installed vertically with the drain valve mispet cock) located at the bottom. (See figure #1)

FIGURE #1

((DIAGRAM))

FIGURE #2

((DIAGRAM))

- Step #2: Remove power from the pump and cut the line after the sand filter and before the pool. Figure #2 shows the adjustments required should your pipe size be larger than 1.25 inches for the Model T1SR unit, or 1.5 inches for the model T2SR unit. A reducer bushing should be installed to bring the pipe to the appropriate diameter. Install a 1.25 inches (model T1SR unit) or a 1.5 inches (model T2SR unit) male threaded hose adapter to each end of the cut pipe. Screw the adapter (attached to the output of the sand filter) into the female adapter located at the bottom of the Terminator(R) System (water inlet). Screw the adapter (attached to the pool line) into the female adapter located at the top of the Terminator(R) System (water outlet). (See figure #2.)
- Step #3: Plug your Terminator(R) System into a standard 115 Vac outlet and reset the GFCI. Ensure that the UV lamp is "on" by lifting the washer on the "Magic Eye".
- Step #4: Ensure that the drain valve (mispet cock) is closed. Turn on the pump and check the system for leaks. Should any leaks occur, turn off the pump and place an empty bucket (to catch water) below the Terminator(R) System prior to opening the drain valve.
- Step #5: Repair the leaks, close the drain valve, and restart the pump. Ensure that the UV lamp is "on" by checking the "Magic Eye".

5.0 MAINTENANCE OF SYSTEM AND POOL

5.1 MAINTENANCE OF THE TERMINATOR(R) SYSTEM

5.1.1 Exterior Cleaning

5.1.1.1 The Terminator(R) System should only be cleaned using a damp sponge and mild soap water. Never use a harsh detergent or try to remove the labels and decals because this would void the warranty.

5.1.2 UV Lamp Replacement

5.1.2.1 The UV lamp should be checked daily using the "magic" eye, however, the UV lamp will require replacement after 5,000 hours of use. To replace the UV lamp follow these steps:

- 1) Turn off the pump and remove power from the Terminator(R) System;
- 2) Open the drain valve until all of the water is removed:

- 3) Loosen the strain relief connector from the top end of the System;
- 4) Unscrew the PVC end connector completely and unplug the lamp holder;
- 5) Remove the white bushing and place aside (do not lose);
- 6) Gently slide out the UV lamp by pulling on the lamp terminals;
- 7) Slide the new UV lamp in place and push until it snaps into the lamp holder;
- 8) Reinstall the white bushing;
- 9) Snap on the lamp holder and reinstall the PVC end connector;
- 10) Tighten the strain relief;
- 11) Close the drain valve;
- 12) Apply power to the Terminator(R) System and check UV lamp operation,
- 13) Turn on the pump

5.1.3 Care of Quartz Glass Sleeve

5.1.3.1 The quartz glass sleeve should be cleaned every year using a damp sponge and a mild glass cleaning solution. Never use harsh chemicals or abrasive cleansers. The quartz glass sleeve should be handled with care because it can be damaged easily by dropping or banging it against hard surfaces.

Removing the Rubber Seal to Gain Access to Quartz Glass Sleeve

((DIAGRAM))

In order to remove the quartz glass sleeve the rubber seal must first be removed (carefully) from the PVC reduce coupling. This is easily done by using either a pair of pliers or other needle-nose device and gently pulling on the inside edge of the rubber seal. Be careful not to force against the quartz glass sleeve because chips or cracks may occur which may require replacement of the quartz sleeve.

5.1.4 Routine Inspections

5.1.4.1 It is important to inspect your Terminator(R) System thoroughly each week to ensure that there is no visible damage. Should there be visible

damage bring your Terminator(R) System to your local Terminator(R) Dealer for a thorough inspection. Never try to repair the Terminator(R) system yourself because extended ultraviolet exposure is dangerous.

5.2 MAINTENANCE OF YOUR POOL

5.2.1 Vacuuming Your Pool

5.2.1.1 Any kind of material will accumulate at the bottom of a pool leaves, dead skin, hair, sand, dust, etc., and these materials harbor dangerous bacteria. Therefore, it is important to clean your pool and sand filter on a regular basis - at least twice a week.

5.2.1.2 Organic materials may build up faster in some pools than others. This depends on: (a) the area in which the pool is situated, and (b) the bather load.

5.2.1.3 It is up to the owner to ensure the bottom of the pool is always kept clean and free of debris. Vacuuming could be necessary up to once a day, however, in most cases, twice a week should be sufficient. Moreover, there are vacuums available which continuously clean the floor and walls of the swimming pool which may aid this routine task. However, they should only be operated at dusk so as not to interfere with the normal operation of the water circulation by way of the skimmer during daylight hours.

5.2.1.4 Back washing after vacuuming is highly recommended because it cleans out the sand filter from materials pulled in by the vacuuming process. This very important step is often forgotten.

5.2.2 Filters

5.2.2.1 There are three basic types of filters all designed to remove oils, grease and dirt from swimming pool water. These are sand, diatomaceous earth and cartridge. While sand and diatomaceous filters may be cleaned by backwashing, cartridge filters are cleaned by removing the cartridges, hosing them down and soaking them in a cleansing agent. Care should be taken to ensure filters operate effectively and, where necessary, the filtering agent should be replaced. Always follow manufacturer's directions for cleaning and/or replacement of filtering agents.

5.2.3 Shocking Your Pool

5.2.3.1 It is recommended that swimming pools be shock treated at the start-up of each pool season and when required. Shock treatment will disinfect all piping, inlets, outlets, filters and pool water. If the bather load is consistently high and/or the weather is consistently hot, the water may tend to become cloudy. It is recommended that you shock treat" your swimming pool to alleviate this condition.

5.2.4 pH

5.2 4.1 pH control is critical to maintaining water quality. Water that is too acidic is corrosive, irritating and staining. Water that is too alkaline is staining, irritating, cloudy and may cause scale to form. Ideally, your swimming pool's pH should be 7.5 However, a pH range of 7.2 to 7.8 is acceptable. To make the water more alkaline, add a pH increaser. To make the water more acidic, add a pH decreaser. It is suggested that you check your pH level on a daily basis. Your Terminator(R) System will work fine in both high and low pH water - as long as the water is clean on a daily basis.

5.2.5 Alkalinity

5.2.5.1 If total alkalinity is too high, water becomes cloudy and scale may form. If total alkalinity is too low, water is corrosive. With high and low alkalinity pH is difficult to control. To lower total alkalinity, add acid. To raise total alkalinity, add sodium bicarbonate. If you have a plaster pool, keep the total alkalinity between 80 PPM and 120 PPM. If you have a vinyl, painted or Fiberglass pool, keep the total alkalinity between 100 PPM and 140 PPM. This range will allow your pool to adjust itself to environmental factors (acid rain for example) without experiencing wild pH swings. It is suggested you check the alkalinity on a weekly basis.

5.2.6 Turbidity

5.2.6.1 Turbidity is a cloudy condition of the water. This is generally due to high alkalinity, pH or water hardness. A small amount of chemical additive (such as pH or water softener) will usually balance this off for a season. To avoid scaling of the quartz glass sleeve, due to high water hardness, it is suggested that the pool water be treated with a Chitosan-based precipitator (which is a natural polymer) and sells under various commercial trade names, such as Sequestrant.

5.2.7 Algae

5.2.7.1 Microscopic algae spores are consistently introduced into your pool by wind, rain, swimmers and water. Even before it becomes visible, your pool can have an algae infection. There are many types of algae and some can be very difficult to wipe out. When algae becomes visible there are already billions of microscopic algae spores in each litre of pool water.

5 2.7.2 These, difficult to control algae grow on the pool walls and floor. In order to combat-these algae, it is suggested to perform the following:

- (a) Adjust the pH between 7.2 and 7.4. Algae grows more slowly at low pH values;
- (b) Brush all surfaces which have a visible algae growth. Most algae grow a protective layer which must be removed before it can be killed. Use a stainless steel brush for gunite pools, and a stiff bristle brush for vinyl or Fiberglass pools;

- (c) Shock-treat the pool;
- (d) Using a high concentration Algaecide Shock spread this mixture evenly over the entire surface of the swimming pool. Be sure to vacuum the settled debris because it can become food for other algae;
- (e) Continue to keep the filtration system operating for 12 hours after treatment and then clean your filter cartridge, backwash your sand filter or clean and re-coat your D E filter;
- (f) Should the algae return, repeat the above-mentioned steps.

6.0 WARRANTY

6.1 PRODUCT WARRANTY

6.1.1 We take pride in the quality of our products at Terminator(R) Water Products Inc. and have manufactured your Terminator(R) System to exacting quality standards. Please complete and return your enclosed Warranty Registration Card ensuring first class postage is affixed.

6.1.2 Terminator Water Products Inc. offers a "Lifetime Warranty" (10 years) on all PVC materials and a full one-year warranty on all other components (except for the UV lamp) from the date of purchase by the original retail purchaser. This warranty is conditional on the Terminator(R) System being installed and operated as directed in the User's Guide. This warranty becomes void in the event of rental use. Transportation to and from the authorized Terminator(R) dealer is the responsibility of the purchaser.

6.1.3 Terminator Water Products Inc.'s obligation under this warranty is limited to the repair or, at the Company's option, the exchange of any Terminator(R) System which shows evidence of a manufacturing defect within the warranty period. Replacement parts furnished in connection with this warranty shall be warranted for a period equal to the unexpired portion of the original warranty.

6.2 WARRANTY EXCLUSIONS

6.2.1 This warranty does not apply to appearance or accessory items including, but not limited to, damages due to handling, transportation, unpacking, set-up, installation, repair or replacement of parts supplied by other than an authorized Terminator(R) dealer, improper maintenance, incorrect line voltage, modifications or repair by the purchaser, abuse, misuse, neglect, accident, fire, flood, or other Acts of God.

6.2.2 This warranty becomes void in the event serial numbers are adhered, defaced or removed.

6.2.3 Terminator Water Products Inc. reserves the right to make changes

in design or to make additions or improvements to Terminator(R) Products without incurring any obligation to install the same on products previously manufactured or sold. The foregoing is in lieu of all other warranties expressed or implied. In no event shall Terminator Water Products Inc. be liable for special or consequential damage arising from the use of this product, or for any delay in the performance of this warranty due to causes beyond the company's control.

7.0 PRODUCT SPECIFICATIONS

7.1 The following specifications apply to your Terminator(R) System, Models T1SR and T2SR:

SPECIFICATIONS

DESCRIPTION	T1SR	T2SR
Maximum flow rate	273 litres/minute	341 litres/minute
Ultraviolet dosage	20,000 uW-sec/cm2 minimum	20,000 uW-sec/cm2 minimum
Electrical requirements	120 Vac @ 60 Hz, 13 Amps maximum	120 Vac @ 60 Hz, 13 Amps maximum
Number of germicidal lamps	1 @ 55 Watts, high-output	1 @ 75 Watts, high-output
Number of ballasts	1 @ 1.65 Amps, typical	1 @ 1.65 Amps, typical
Water temperature	2°C min., 40°C max	2°C min., 40°C max.
Operating temperature range	2°C min., 40°C max.	2°C min., 40°C max.
Water pressure	414 Kpa maximum	414 Kpa maximum
Materials, UV chamber	PVC Schedule 40	PVC Schedule 40
Rated UV lamp life	5,000 hours maximum	5,000 hours maximum
Overall weight	16 kg without water	17 kg without water
Inlet & outlet female adapters	31.75 mm threaded	38.10 mm threaded
Length of UV chamber	109 cm long, typical	145 cm long, typical
Power cable length	1.83 m minimum	1.83 m minimum minimum
Controls on GFCI	Reset=On; Test=Off	Reset=On; Test=Off

8.0 TROUBLESHOOTING AND SERVICE DIRECTORY

8.1 TROUBLESHOOTING

8.1.1 Every Terminator(R) System has been fully tested and inspected before leaving the factory, however, should you encounter problems with your Terminator(R) System, after installation in accordance with Section 4.0 of the User's Guide, please return your Terminator(R) System along with your bill-of-sale to your local authorized Terminator(R) Dealer (or contact the Company directly) for prompt service.

8.2 SERVICE DIRECTORY

8.2.1 For qualified service please contact either your authorized Terminator(R) Dealer or our plant office located at:

CORRESPONDENCE

Terminator Water Products Inc.
Unit #4,11 Calkin Drive, PO Box 606
Kentville, NS Canada B4N 3X7

Toll Free: 1 -800-425-POOL (7665)

Facsimile: 1-902-678-0445

Attention: Customer Service Department

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