



## MODEL TES18 & TES25 UV SYSTEMS

FOR RESIDENTIAL SPAS & SWIMMING POOLS



## INSTALLATION & OPERATING INSTRUCTIONS

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## ADVANTAGES OF UV OVER CHLORINE

The use of chlorine, in one form or another, has been the common method of swimming pool water disinfection for many years. While not perfect, it has done a reasonable job however various shortcomings of chlorine use have been, for the most part, accepted as normal by the pool owning public.

We all know that water, if left untreated, will stagnate and a variety of micro-organisms will flourish and cause health hazards. The same holds true if water is not properly treated or under dosed with a sanitising agent. Therefore, in our pools, we all strive for the best environment possible.

Are private pool owners successful in maintaining good quality pool water?

In general the answer has to be "no", however our UV systems offer excellent disinfection and protection. When one sees algae in pool water that is not clear and sparkling, etched or green plaster, or the smell of chlorine is present in the pool, it is easy to see that manual addition of chlorine is not necessarily the solution to a safe pool water environment.

Automatic feeders, which constantly add small doses of chemical are not the solution since fluctuations in bather loading, temperature changes, sunshine (which dissipates chlorine) etc. are not taken into consideration.

So how does one ensure the health of those using the pool, without having specific knowledge of chemistry or constantly tending to the pool water?

The answer is "Ultraviolet (UV) Sanitation". This is the same technology used worldwide in public swimming pools which see far higher bathing loads than the typical residential pool. The TES range of UV units now make this technology available at affordable prices for residential pools.

The units are easy to install, indoors or outdoors, and require only periodic thimble cleaning and a once per year lamp replacement.

What are the advantages of using UV for pool sanitation over chlorine.

### 1. Consistent Sanitation Level

The TES UV system is ON and doing its job whenever the pool circulation is operating. Thus, 100% of the pool water entering the UV reactor is sanitised before returning to the pool

By contrast, chlorine is dosed into the pool at various times, for example, once or twice a week. Thus, the pool is charged (when the chlorine is added) with a large dose of chemical which then dissipates until the next dose. As a result, there is no consistent level of chlorine. This can cause severe problems when the chemical level in the pool is either too high or too low.



## ADVANTAGES OF UV OVER CHLORINE

### 2. Elimination of "Chlorine Smell"

Chlorine exists in both a "Free state", and a combined state in pool water. The Free chlorine is the chlorine that is available to oxidise organics and kill bacteria. The Combined chlorine is chlorine that is combined, or "locked up", with nitrogen-ammonia compounds to allow the formation of Chloramines.

Chloramines are responsible for the chlorine odour that is normally present in a "chemical only" treated pool. These chloramines exit the pool water in the form of an off-gas that is not only unpleasant to the smell but has also been shown in tests to cause skin, eye and respiratory problems, especially to asthmatic persons or persons with other breathing difficulties.

Thus when Chloramines are eliminated the "chlorine smell" disappears. UV has the ability to produce a photo-oxidation effect that destroys chloramines and other toxic by-products of chlorine. This results in much lower chlorine requirement for bacterial control and greatly improves water and atmospheric conditions.

### 3. Hazardous Materials

When you add chlorine to a pool, extreme care must be taken not to overdose the pool water and cause harm to the bathers. UV has the advantage over Chlorine in that UV does not add any chemical to the pool water and cannot be overdosed.

### 4. Reduced Chlorine Levels

A reduced amount of chlorine (70% to 85% reduction on normal usage) is still necessary to oxidise the organics and for sanitising wetted areas such as in the pool piping or filter. This level of chlorine is harmless.

### 5. Immediate Killing of Micro-organisms

While chlorine requires a long retention time of 20-45 minutes to sanitise, UV sanitises the pool water in 1-3 seconds of exposure. This occurs during all operation time of the pool circulation system.

### 6. Algae Control

Chlorine resistant algae, that normally require the addition of algae control chemicals, are eradicated as they pass through the UV system. The cost savings is obvious when these chemicals are no longer needed, but more importantly, your pool begins to approach a more "chemical free" state.

### 7. Lower Operating Costs

Your pool operating cost is greatly reduced through the installation of the TES UV system. Using less electricity than a 60 watt bulb, the system is one of the lowest operating cost method of achieving high water quality.



**DESCRIPTION OF EQUIPMENT**

The TES range of low pressure UV systems has been designed for use on private swimming pools and were developed to offer a cost effective disinfection system for improved water quality.

The range consists of two sizes of UV units with flowrates of 18 and 25 M3/hr.

The UV reactor bodies are made from PVC plastic with an internal 316 stainless steel reflector and a mirror polished stainless steel outer sleeve.

An electronic ballast with an operating indicator light powers the high output low pressure UV lamp which has 9,000 hour bulb life.

Both units have 2" PVC inlet & outlet unions for easy installation into existing or new PVC pipework with the addition of a pressure gauge on the top outlet connection.

**SIZING & SELECTION OF THE EQUIPMENT**

The correct selection of the unit is imperative if the water is to be correctly treated with a UV dose of 30mj/cm<sup>2</sup> which is the required dose rate for effective disinfection.

If the flowrates given below are exceeded then the contact time within the UV reactor body will be reduced. This will have the effect of lowering the dose rate.

MODEL REF	UV LAMP WATTS	FLOWRATE M <sup>3</sup> /HR	POOL VOLUME - M <sup>3</sup> 8 HOUR TURNOVER	POOL VOLUME - M <sup>3</sup> 6 HOUR TURNOVER	POOL VOLUME - M <sup>3</sup> 4 HOUR TURNOVER
TES18	58	18.0	144	108	72
TES25	80	25.0	200	150	100

**THE ABOVE FLOWRATES ARE BASED ON UV DOSE OF 30 mJ/cm<sup>2</sup> AT END OF LAMP LIFE**

*To calculate the pool volume that can be treated, multiply the flowrate per hour of the unit by the number of hours it takes to re-circulate the total pool contents.*

In instances where the flowrates exceed the maximum allowed for each unit, multiple units can be installed to satisfy higher flowrates.



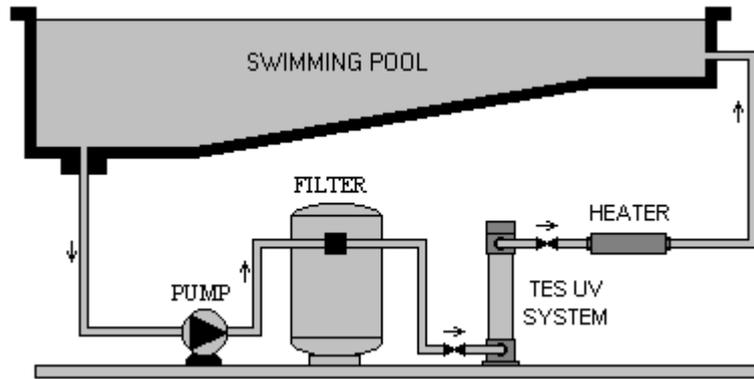
## INSTALLATION OF EQUIPMENT

The installation of the equipment should only be carried out by engineers who are trained in fitting standard pool filtration equipment.

## PRE-INSTALLATION CHECKS

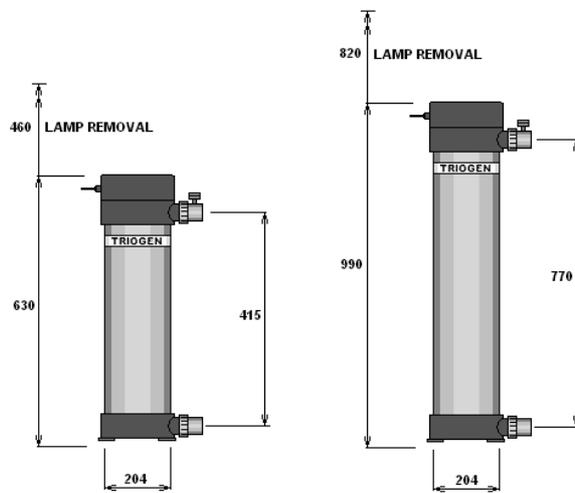
The UV system can be either installed indoors or outdoors, if installing outdoors protection from weather exposure should keep the unit in good condition.

The unit has to be fitted in the pool filtration pipework system and should be located after filtration as shown in the diagram below.



It is recommended that isolating valves are fitted within the inlet and outlet pipework when the unit is installed below pool water level to allow isolation of the unit for periodic thimble cleaning or general maintenance.

It is also important to install the unit in an area that allows adequate height for the removal of the reactor internal thimble or for UV lamp replacement. The drawings below show the clearances required.





## MECHANICAL INSTALLATION

The following installation guidelines should be read carefully and understood prior to fitting the system.

- 1 - The TES units are supplied ready assembled with exception of the two inlet and outlet half unions, union seals and pressure gauge.
- 2 - The bottom connection is the "INLET" connection and the top connection is the "OUTLET" connection. Never reverse these connections.
- 3 - The bottom connection should be fitted with the solid half union tailpiece and the top connection should be fitted with the clear tailpiece connection.
- 4 - Two white union gaskets are supplied with the units and care should be taken to ensure that the gasket is installed with the raised half round bead fitting into the tailpiece face which has a matching groove to correctly locate the gasket within the union.
- 5 - Place the gaskets onto the face of the union tailpieces and then secure in position by threading the half union nut on the TES unit onto the tailpiece.

*NOTE: DO NOT OVERTIGHTEN THE UNION NUT.  
HAND TIGHTENING SHOULD BE SUFFICIENT.  
OVERTIGHTENING WILL BREAK THE UNION NUT.*

- 6 - The TES unit is supplied with a pressure gauge which should be fitted into the top clear union tailpiece. When installing the pressure gauge into the fitting, only use the square brass boss on the back of the gauge when using a spanner but care should again be taken not to over-tighten the gauge.

*NOTE: DO NOT OVERTIGHTEN THE PRESSURE GAUGE.  
OVERTIGHTENING WILL STRIP THE PLASTIC THREAD.  
DO NOT USE THE GAUGE BODY TO TIGHTEN.*

The gauge should be fitted in a vertical position and never facing upwards as water could enter the gauge and destroy it.

The gauge is used to indicate the pressure the pool pump is operating at and to ensure that the maximum operating pressure of the TES unit of 40psi. is not exceeded.

*NOTE: DO NOT EXCEED THE MAXIMUM OPERATING PRESSURE*



## MECHANICAL INSTALLATION

7 - The TES unit should be mounted on a suitable concrete or wooden floor structure and bolted down utilising the four bolt holes located in the unit base. (Fixings not supplied)

*NOTE: THE UNIT MUST BE SECURELY FITTED TO A FLOOR SURFACE. FAILURE TO DO SO COULD RESULT IN VIBRATION IN OPERATION AND STRESSING OF THE CONNECTIONS.*

8 - The PVC pipework used for the installation should be glued into the union tailpieces using suitable PVC primer and cement as recommended by the pipework supplier.

9 - The connecting pipework adjacent to the TES unit should be adequately supported to ensure that no additional loadings are put on the reactor union connections.

10 - The installation of suitable isolating valves is recommended for isolation of the unit for maintenance and is mandatory if the unit is fitted below the pool water level.



## ELECTRICAL INSTALLATION

The electrical installation of the equipment should only be carried out by suitably qualified person.

The TES UV unit is supplied with a three core flying lead. This should be wired to a fused switched spur or fitted with an appropriate type plug for connection to a socket.

The colour code in the lead is:-

Brown	= 230V live line.
Blue	= 230V neutral line.
Green/Yellow	= Earth

This appliance must be earthed.

The power consumption is:-

TES UV 18 - 58W (0.29A)
TES UV 25 – 80W (0.58A)

The plug or fused spur should be fitted with a 3A fuse.

The circuit for the socket / fused spur must be protected by an earth leakage device such as an RCD or ELCB unless a plug is used that incorporates an earth leakage device.

The power to the socket / fused spur must be interlocked with the supply to the main circulating pump so that the power to the TES UV unit is isolated when the pump is stopped and there is no water flow through the TES UV unit.

In the case of a filtration system incorporating a time clock. As this will shut down the main circulating pump the interlock on the power supply will ensure that the TES UV unit is also switched OFF.



## SYSTEM START-UP

The initial start-up of the UV system will depend mainly on how the system has been installed but the following checks should always be carried out.

- 1 - Check that all pipework connections appear tight.
- 2 - Open both isolating valves which should be installed in the supply and return pipe-work adjacent to the TES unit.
- 3 - This should flood the UV reactor body and then check for any water leakage.
- 4 - Start the main pool circulation pump and again check for any water leakage now that the system is at operating pressure.
- 5 - Check the pressure reading at the TES unit pressure gauge to ensure that the maximum pressure rating of 40 psi is not being exceeded.
- 6 - Check that the mains power supply to the unit is switched off and then remove the top cap of the unit to allow inspection of the UV reactor thimble and seal to ensure that there is no water leakage present.
- 7 - Re-instate the top cap.
- 8 - Switch on the mains power supply to the TES unit.
- 9 - The UV lamp should then be energised which will be indicated by a glow in the top clear connection.
- 10 - When the power supply to the TES unit is electrically interlocked with the main pool pump, stop the pool pump check that the lamp glow goes off. Re-start the pump and check that the lamp energises again.

*NOTE: IT IS ALWAYS PREFERABLE TO ELECTRICALLY INTERLOCK THE POWER SUPPLY TO THE TES UNIT WITH THE MAIN POOL CIRCULATION STARTER CIRCUIT AS A FURTHER SAFETY.*



## MAINTENANCE

The TES UV unit requires very little maintenance during the year, the required maintenance is as follows:

### UV LAMP THIMBLE CLEANING.

The UV lamp thimble which protects the lamp from direct contact with the pool water must be kept as clean and free from external deposits as possible as heavy contamination will effect the UV transmission through the quartz glass into the water.

It is recommended that the quartz thimble is inspected at least every six months.

To remove the UV lamp thimble, the following procedure should be adopted:

- 1 - Isolate the main power supply to the TES unit.
- 2 - Switch off the main pool recirculation pump.
- 3 - Close both the inlet and outlet isolating valves.
- 4 - Check that the pressure gauge reading has went to ZERO.
- 5 - If after a few minutes pressure still exists, release the top union nut which will allow a little water to escape and the pressure should drop to ZERO. Remember to re-tighten the nut.
- 6 - Remove the top electrical cover.

Depending on the time taken to reach this stage, the UV lamp may still be hot and therefore the system should be left to cool down for at least ten minutes.

- 7 - Remove the UV bulb by pulling the lamp wire in an upwards direction until the lamp plug and lamp end socket are visible.
- 8 - Hold the lamp only by the lamp end piece (not the glass) and remove the lamp connection plug.
- 9 - It is now possible to fully remove the UV lamp taking care not to touch the glass surface of the lamp as this could shorten the lamp-life if contaminated. Always use clean cotton gloves or a cloth if handling the glass surfaces of the lamp.
- 10 - Carefully store the lamp in a clean dry area while proceeding to the next step.
- 11 - Remove the back plastic nut using a suitable tool that does not mark or de-face the plastic material.



## MAINTENANCE

### UV LAMP THIMBLE CLEANING.

- 12 - After removing the plastic nut, the thimble water seal will be visible and should be removed and stored safely.
- 13 - Grip the visible end of the glass thimble and pull upwards until the thimble is fully removed from the reactor body.
- 14 - If staining or deposits are present on the outer surface of the thimble then these can be removed by mixing a mild solution of muriatic acid (normally available from pool stores) with water in a ratio of four parts water to one part acid.

*CAUTION: FOLLOW THE DIRECTIONS FOR USE AS STATED ON THE SUPPLIERS BOTTLE AND ALWAYS PROTECT YOUR EYES, WEAR RUBBER GLOVES AND AVOID BREATHING FUMES.*

- 15 - If lime or hard water calcium deposits are encountered, lime removal products that are available for household cleaning may be used.

*CAUTION: NEVER USE ABRASIVE PRODUCTS TO REMOVE DEPOSITS AS THEY WILL DAMAGE THE SURFACE OF THE THIMBLE AND DECREASE THE UV TRANSMISSION CHARACTERISTICS OF THE HIGH QUALITY QUARTZ FROM WHICH THE THIMBLE IS MANUFACTURED.*

- 16 - After cleaning the outer surface, ensure that the thimble is completely dry both externally and internally and also visually inspect the thimble for any signs of cracking that could lead to premature failure while in operation.
- 17 - Re-insert the glass thimble into the reactor housing. The bottom end of the thimble has to be located into a recess in the bottom cap. The thimble will not go all the way down if it is not located into the recess.
- 18 - Place the black rubber sealing ring all the way inside the black plastic sealing nut with the angled edge of the sealing ring facing downwards when the nut is installed on the sealing gland.

*CAUTION: DO NOT ATTEMPT TO FIT THE SEAL ONTO THE THIMBLE AS THIS WILL NOT EFFECT A PROPER SEAL.*

- 19 - Screw the plastic sealing nut onto the sealing gland taking care not to cross thread the parts. Tighten gently with a suitable tool taking care not to over-tighten.

*CAUTION: OVER TIGHTENING WILL CRACK THE PLASTIC SEALING NUT AND WATER LEAKAGE WILL THEN OCCUR.*



## MAINTENANCE

### UV LAMP THIMBLE CLEANING.

- 20 - Open the TES unit isolating valves which should flood the reactor body with water and check for any signs of water leakage around the thimble seal.
- 21 - Re-start the main pool circulating pump to pressurise the system and check that the pressure gauge returns to its normal reading. Re-check the thimble water seal for any signs of leakage.
- 22 - If water leakage occurs, gently tighten the nut another quarter turn to see if this cures the problem. If not, the water seal ring may be out of alignment or damaged and therefore the system will need to be isolated as previously explained and the seal examined and replaced if required.
- 23 - Once it has been established that the water seal is correct, the pool circulating pump should be stopped.
- 24 - Fit the lamp end cushion to the bottom end of the lamp and replace the top two o-rings around the top ceramic lamp end (the end with the power pins) Take care not to touch the glass surface with bare hands.
- 25 - Slide the lamp into the glass thimble taking care that the top two o-rings remain on the lamp ceramic end and go into the glass thimble. These o-rings are only to avoid vibration of the lamp and are not water seals.
- 26 - Re-connect the UV lamp power plug to the ceramic lamp end piece ensuring that the power plug is correctly orientated to the lamp pins as the plug will only fit in two out of four directions.
- 27 - Refit the reactor top cap by using the screws provided taking care not to over-tighten.
- 28 - Re-instate the mains power supply to the unit but the UV lamp should not light at this stage as the main pool circulating pump should still be stopped.
- 29 - Re-start the main pool circulation pump and the UV lamp should illuminate which will be indicated again by a glow at the top clear outlet connection.

The unit should now be fully operational again.

*CAUTION: IT IS IMPERATIVE THAT THE MAIN POWER SUPPLY IS ISOLATED WHEN THE REACTOR TOP CAP IS REMOVED AS THIS ENSURES THAT EYE OR SKIN EXPOSURE TO UV IS NOT POSSIBLE.*

*CAUTION: UV LIGHT CAN SERIOUSLY DAMAGE EYESIGHT OR SKIN.*



## MAINTENANCE

### UV LAMP REPLACEMENT.

The TES UV lamps have a useful lamp life of 9000 hours of continual use. This equates to approx. one years continual operation. It is very important to note when the system was initially started up and how many hours per day the lamp is in operation as this can then be used to calculate when the 9,000 hours has expired and lamp replacement is necessary.

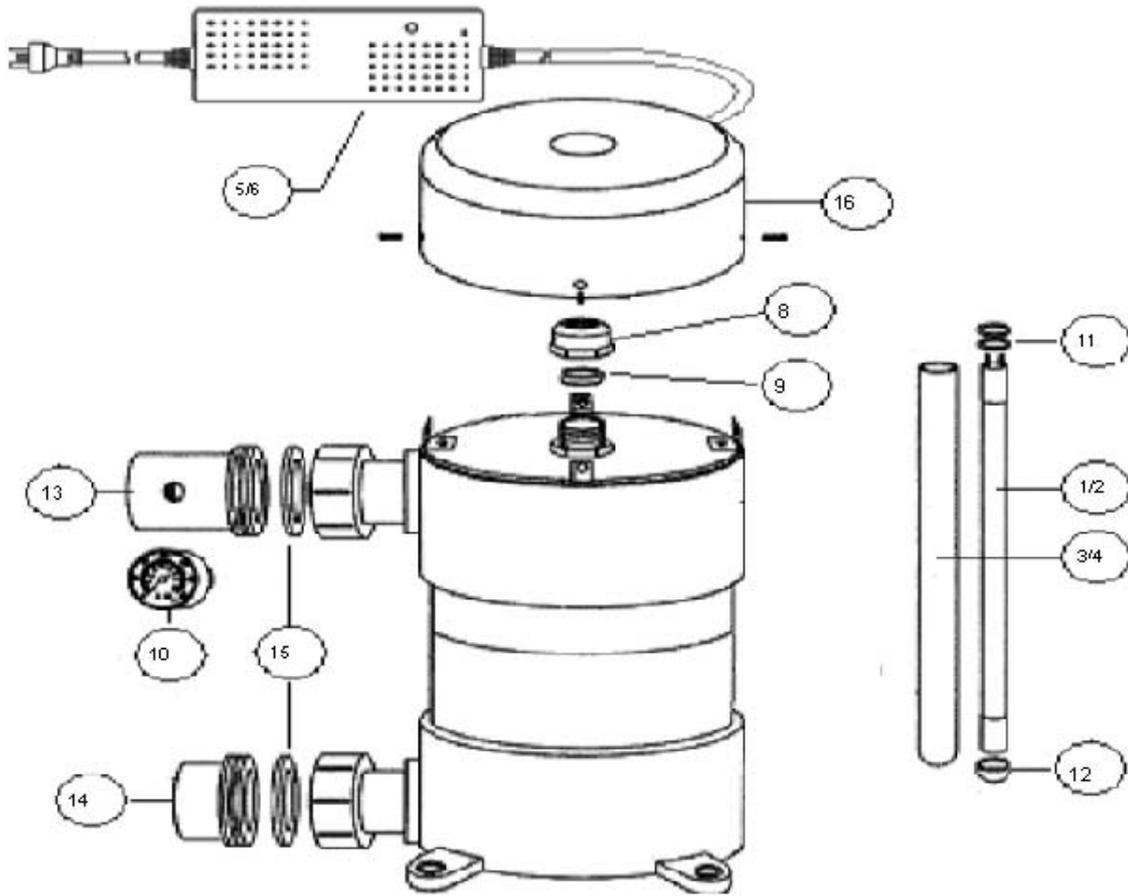
**CAUTION: DO NOT EXCEED THE 9000 HOUR LAMP LIFE AS THE LAMP REMAINING LIT IS NOT AN INDICATION THAT IT IS STILL CAPABLE OF DOSING THE NECESSARY LEVELS OF UV RADIATION.**

To remove the UV lamp, the following procedure should be adopted:

- 1 - Isolate the main power supply to the TES unit.
- 2 - Switch off the main pool recirculation pump.
- 3 - Close both the inlet and outlet isolating valves.
- 4 - Check that the pressure gauge reading has went to ZERO.
- 5 - Remove the top electrical cover.

Depending on the time taken to reach this stage, the UV lamp may still be hot and therefore the system should be left to cool down for at least ten minutes.

- 6 - Remove the UV bulb by pulling the lamp wire in an upwards direction until the lamp plug and lamp end socket are visible.
- 7 - Hold the lamp only by the lamp end piece (not the glass) and remove the lamp connection plug.
- 8 - It is now possible to fully remove the UV lamp.
- 9 - Fit the lamp end cushion onto the bottom end of the new lamp and replace the top two o-rings around the top ceramic lamp end (the end with the power pins) Take care not to touch the glass surface with bear hands. Always use clean cotton gloves or a cloth if handling the glass surfaces of the lamp.
- 10 - Slide the lamp into the glass thimble taking care that the top two o-rings remain on the lamp ceramic end and go into the glass thimble. These o-rings are only to avoid vibration of the lamp and are not water seals.
- 11 - Re-connect the UV lamp power plug to the ceramic lamp end piece ensuring that the power plug is correctly orientated to the lamp pins as the plug will only fit in two out of four directions.
- 12 - Refit the reactor top cap by using the screws provided taking care not to over-tighten.
- 13 - Re-instate the mains power supply to the unit but the UV lamp should not light at this stage as the main pool circulating pump should still be stopped.
- 14 - Re-start the main pool circulation pump and the UV lamp should illuminate which will be indicated again by a glow at the top clear outlet connection.



ITEM	PART No.	UNIT TYPE	DESCRIPTION
1	TESP001	TES18	UV LAMP
2	TESP002	TES25	UV LAMP
3	TESP003	TES18	UV LAMP THIMBLE
4	TESP004	TES25	UV LAMP THIMBLE
5	TESP005	TES18	UV LAMP BALLAST
6	TESP006	TES25	UV LAMP BALLAST
8	TESP008	TES18-25	THIMBLE SEAL NUT
9	TESP009	TES18-25	THIMBLE SEAL
10	TESP010	TES18-25	PRESSURE GAUGE
11	TESP011	TES18-25	O-RING VITON (2)
12	TESP012	TES18-25	UV LAMP CUSHION
13	TESP013	TES18-25	UNION TAIL PIECE (CLEAR)
14	TESP014	TES18-25	UNION TAIL PIECE (WHITE)
15	TESP015	TES18-25	UNION FLAT SEAL
16	TESP016	TES18-25	ELECTRICAL TOP CAP



## WARRANTY

The UV systems (UV reactor and electrical control panel) are covered by a twelve month limited warranty period starting at the date of purchase, during which time any failure of the equipment due to defective workmanship or parts, will be rectified provided that:

1. Notice of the claimed defect is given to Triogen within twelve (12) months from the documented date of purchase.
2. Following notification, the parts or accessories are properly packaged and returned to the address so designated by Triogen, and that associated transportation and any other charges are prepaid.
3. Upon inspection, Triogen is satisfied that the claimed defects are traceable to the original parts or workmanship.

The warranty will be deemed void, if the equipment is serviced by other than a trained service engineer acknowledged by, or employed by, the supplier, or if the equipment has not been properly installed or operated according to the instructions in this manual.

In no event shall Triogen be liable for any consequential loss, damage or expense arising from the supply and use of the equipment, either separately or in combination with other equipment.

Triogen low pressure UV lamps are guaranteed for up to 1500 service hours full replacement. Lamps must be operated as specified, in a manner for which they were designed and must be returned, as noted above, for replacement lamp credit determination.