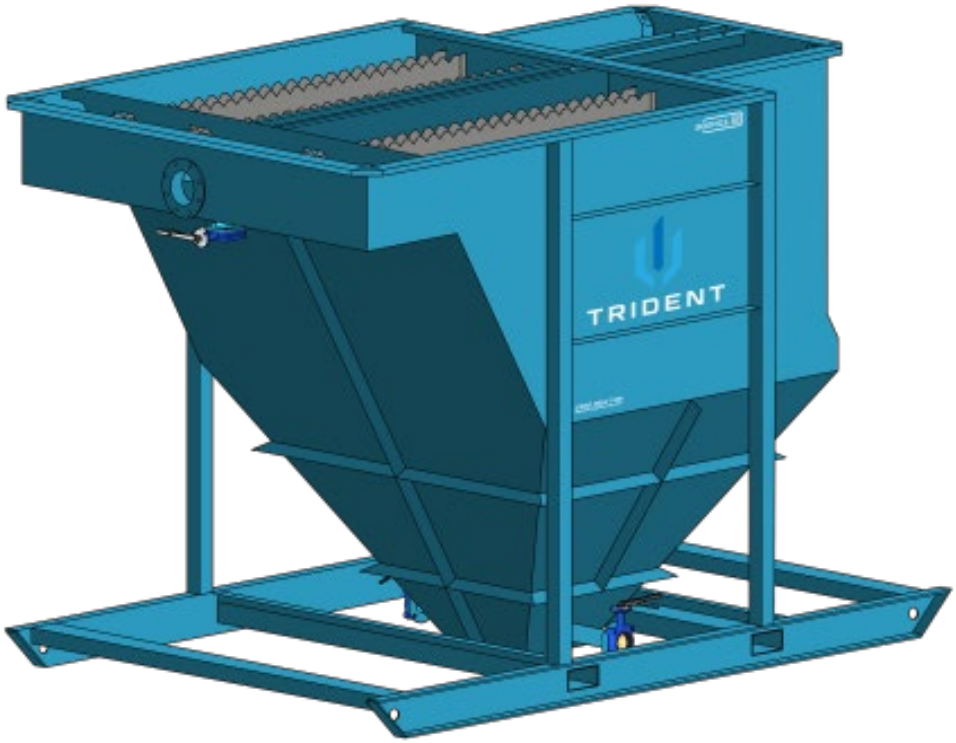
Aquatic ENGINEERING

Trident T4RL Lamella Separator



Operation and Maintenance Manual

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ISO 45001 ISO 14001 ISO 9001

trace. Carbon Neutral Organisation
Expires Jul 2025

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1 Confidentiality and Copyright

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2 Introduction & System Description

	*Read this manual before installing, operating or servicing this equipment* *Follow all site lockout procedures when servicing this equipment*

It is the user's responsibility to ensure before commencing any work or operating this equipment, the contents of this manual are read, clearly understood and fully complied with.

Where chemicals are used in the pre or post treatment of water passing through the Trident T4R, then please pay special attention to the Safety & Chemical Handling of those chemicals.

2.1 Specification

Maximum effective process flow rate	10 L/s
Power requirement	N/A
External dimensions (L x W x H)	3,825 x 2,450 x 2,700 mm

It is important not only to operate and maintain the equipment as detailed in this manual, but also to carefully monitor and control the chemical addition (if applicable) and sludge removal processes to achieve efficient operation.

If you have consulted this manual and you are unable to resolve any operational or maintenance difficulty, please contact:

Aquatic Engineering Australia Pty Limited

Level 2, Tower 1, 495 Victoria Ave

Chatswood NSW 2067

Telephone: 1300 364 749

Email: info@aquatic-engineering.com

Please retain this Manual for future reference.

3 Safety and Chemical Handling

3.1 General

- Do not operate the plant without the proper instructions given inside this manual.
- Always read and understand fully the Safety Data Sheets (SDS) before handling any chemical products.
- Always wear the correct personal protective equipment/clothing when handling any chemicals. Refer to the SDS.

- Do not undertake any work without completing a risk assessment and preparing Safe Work Method Statements (SWMS). Many pipes and hoses contain chemicals or effluent under pressure even when the plant has been shut down for some time and most items are crucial to the effective treatment of the effluent and it is unlikely that the chemical separation will function without them.
- Do not ask maintenance staff to repair the plant when it is full of chemicals.
- **MAKE IT SAFE FIRST** by flushing out any chemical residues from the pumps and pipelines and isolating the equipment.
- When in doubt **ASK.** Consult this manual, a trained operator or Aquatic Engineering Australia Pty Limited.
- Always follow correct LOTO procedure **BEFORE** you dismantle any electrical equipment.
- The liquids in the plant are quite conductive, electrical work in the presence of spilled liquids is **DANGEROUS.**

4 Transport and Installation

- The dry weight of the unit is 2,000 kgs.
- Only use dedicated tie down point on the legs or base

4.1 Lifting

The Trident T4RL is manufactured with 4 lifting lugs on the of the unit. It is engineered and designed to be lifted only while empty and cleaned of any sludge, and by these lugs with a chain angle to vertical of not less than 55°.

	*The lamella should **never** be lifted or transported while it contains water or sludge. It must be cleaned and emptied before transport.*

	*The lamella should only be lifted by the designed lift points, and with a spreader bar to prevent lifting chains squeezing the plate pack tub.*

4.2 Installation

The Trident T4RL lamella must be placed on a suitably engineered and level footing.

The maximum allowable fall in any direction of the installed lamella is 1 in 100.

⚠	*The lamella must be levelled for operation. Failure to ensure a level installation will significantly impact the effectiveness of the lamella to remove solids via settling.*

When operational, the lamella unit has a mass of approximately 13.2 tonnes.

The control panel requires clear and safe access at all times.

4.3 Connections

Process fluid connections to the T4RL are:

- Inlet connection: 80mm Table D flange, with 75mm female camlock
- Discharge connection: 150mm Table D flange, with 150mm male Bauer
- Sludge outlet: 50mm male camlock

5 Process Description

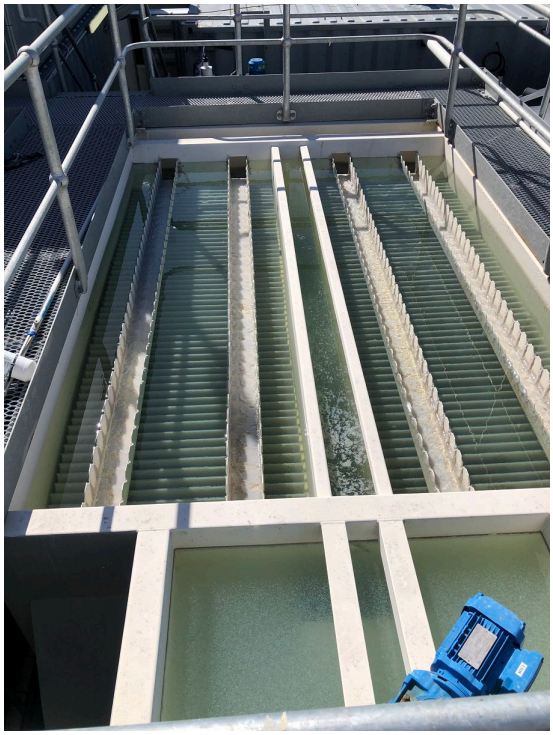
The pre & post treatment around the lamella will vary dependent on the overall process into which the lamella is placed, however the operation of the lamella settling system is described in the following.

5.1 Feed

The lamella is required to be fed from an upstream source (usually a feed tank), via a gravity feed, or more commonly, a pump. After the inlet connection, there is a throttling valve to allow the feed to be throttled to the maximum acceptable feed rate:

For the T4RL, this is 10 L/s.

5.2 Lamella Chamber



Waters exiting the reaction tank flow into the of the lamella chamber.

Heavy solids will sink directly to the Sludge Hopper section below, while finer and slower settling solids may entrain with the flow up through the plate pack.

The water then passes up through the lamella plate pack to the Discharge Weirs.

The laminar flow pattern up between the plates of the pack allows the finer and slower settling solids to settle onto the inclined plates, where they agglomerate and slide/settle down to the sludge hoppers.

⚠	*Level installation of the lamella is critical to allow the settling process to occur correctly. If the lamella is not installed level, the flow of water up through the plate packs will not be even across the full area of the lamella, and short circuiting of flow will occur. Short circuiting increases the velocity of the flow stream which prevents the solid particles from settling out of the process water.*

At the base of the hopper, two valves are installed to be used to remove the sludge. See *Sludge Removal*.

The surfaces of the lamella chamber (plates & walls) are inclined at 60° so that solids will slide down into the hoppers. This angle is a suitable incline for most solids to slide down.

However fine, sticky and clumped solids may not always follow this rule, and some hold-up can be expected over time.

For this reason, dependent on the solids type and characteristics, routine cleaning will be required to prevent clogging and solids carry over.

The centre chamber is also wide enough to allow a 4" suction hose to access the base of the sludge hoppers should the lamella ever need suctioning out.

5.3 Discharge

Discharge of clarified water is from the four V-notched weirs at the top of the lamella plate pack.

For effective settling of solids, the weir troughs should take an even flow along their length and between each weir, so that the flow of water through the lamella plate pack is evenly distributed and consistent.

The water flowing out of the weirs enters the discharge trough, which directs the water to the discharge pipe.

The discharge line is to be connected to the site discharge point.

The off-spec line is to divert the water to a location upstream of the lamella, to allow for retreatment.

5.4 Sludge Removal

Sludge is removed from the base of the hopper via either:

- the drain outlets, or
- the sludge transfer

The amount of sludge generated, and the required sludge draw-off frequency will be dependent on the quality of the feed water and any pre-treatment settling processes.

	*Failure to remove sludge from the lamella will impact the effectiveness of the lamella to settle solids from the stream*

As with the incline on the plates, the incline of the hoppers is 55-60°, which will allow most solids to slide down, however a sticky build-up can accumulate dependent on the sludge type, and so routine drain & clean practices may be required.

6 Operation

6.1 Setup and Commissioning

Setup and commissioning on site will be completed by an AEA representative. This will include

- Updating initial plant operational settings
- Confirming operation of all system elements
- Confirming setup of flow meters

If feed water is available, wet testing will also be completed at the time.

6.2 Lamella desludging and cleaning

As solids settle out of the flow stream, they will build up in the cone of the lamella. There is a maximum amount of sludge that can be stored in the cone; once this volume is reached, solids will remain in the flow, and be discharged into the trough, increasing the turbidity at the outlet of the lamella.

To desludge and clean the lamella:

- Isolate the upstream pump/feed, so that no additional water enters the lamella – this is to allow the plates to be exposed for cleaning.
- Use a pump and hose, connected to either of the outlets at the base of the cone, to pump the sludge and water out of the lamella.
- While pumping out the sludge, use a hose to wash the lamella plates and walls. Ensure the reaction tank also is rinsed to remove any sludge build up.

6.3 Shutdown

When placing the lamella in standby, with intention to reactivate it:

1. Remove any sludge that may have accumulated in the reaction tank and settling tank
2. Using clean water, run the feed through the lamella to replace process water lost during desludging.

3. Close the manual feed control valve, to ensure that water does not drain out of the lamella.

6.4 Demobilisation

When preparing to demobilise the lamella:

1. Remove any sludge that may have accumulated in the reaction tank and settling tank
2. Using clean water, wash down all internal surfaces of the lamella
3. Drain the lamella, including the feed pipe. Open any manual drain valves on the lamella unit, including reaction tank drain valve and the discharge box drain valve
4. Once the lamella has been drained, and remove all external connections to the unit.

7 Maintenance

The frequency of maintenance on the Trident T4RL Lamella will depend on the volume of water processed through the unit and, more importantly, the nature of the sludge/water that is being processed.

The heavier and “stickier” the sludge load on the T4RL, the more frequent cleaning will be required to prevent solids build-up on the inclined surfaces in the plates and hoppers.

	*Cleaning frequencies nominated are purely indicative and will need to be varied on observation of system characteristics and requirements.*

	*Aggressive cleaning of the tank and plates can cause damage to the protective coating/paint of the tank resulting in corrosion. It can also cause damage to the plate pack material resulting in de-lamination of the plates. It is recommended that cleaning down through the plate pack be done with a plastic or rubber ended pipe lance (typically 12 to 15mm) connected to water supply, or using a nozzle jet.*

7.1 Daily Checks

Operator checks should be made at regular intervals during the day covering the following:

Lamella and system
Visually inspect lamella for damage
Feed
Check upstream source for debris and solids. Clean as required to prevent transfer to lamella
Settling Chamber
Check build-up of solids on plates and other surfaces. If required, clean plates
Draw off sludge, as required
Clean discharge weirs, as required
Discharge Trough
Check for any solids in the discharge trough. Clean as required.