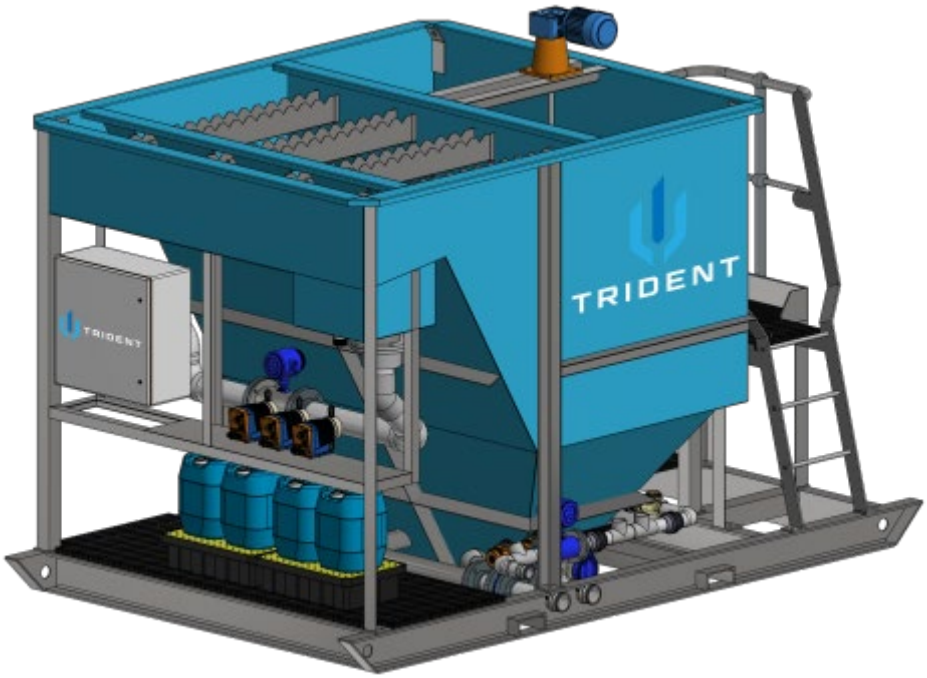
Trident T2R Lamella Separator



Operation and Maintenance Manual

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1 Confidentiality and Copyright

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Recipients must obtain written authority of the said company before wholly or partly duplicating the contents or disclosing it to others.

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 T2R, then please pay special attention to the Safety & Chemical Handling of those chemicals.

2.1 Specification

Maximum effective process flow rate	5 L/s
Power requirement	240 V, c/w 15A socket via appliance inlet
Power	2.6 kW
Apparent power	3.3 kVA
Max Current	13.6 A
External dimensions (L x W x H)	3650mm x 2200mm x 2520mm
Data available	Inlet pH Discharge flow rate and volume Processed water pH Processed water turbidity

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.**

3.2 Equipment Warnings

	**DANGER** Electrical Power Present
	**DANGER** Moving Parts Present
	**DANGER** Mandatory Electrical Lockout To Service
	**DANGER** Mandatory Eye Protection For Service

4 Transport and Installation

The dry weight of the unit is 2,300 kgs.

4.1 Lifting

The Trident T2R is manufactured with 4 lifting lugs on the skid 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 T2R 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 7.5 tonnes.

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

4.3 Connections

Process fluid connections to the T2R are:

- Inlet connection: 80mm Table D flange, with 75mm female camlock
- Discharge connection: 100mm Table D flange, with 100mm male Bauer
- Off spec connection: 100mm Table D flange, with 100mm male Bauer
- Sludge outlet: Two off 50m Table D flange, with 50mm male camlock
- Safety shower/eyewash: 25 mm BSP male (see section 4.4 for additional info)

The T2R requires a 240V 15A power supply, connected via an appliance inlet socket on the control panel.

4.4 Safety Shower/Eyewash

⚠	*This unit should be connected to an uninterrupted source of potable water, no less than 25mm with a minimum flowing pressure of 138KPa and a and a maximum static pressure of 860 KPa*

The Trident is fitted with a combination safety shower and eyewash unit.

For transport, the shower head is rotated 90 degrees. During set up, loosen the union nut (circled in red in the picture), rotate the shower head to line up with the basin and tighten the nut.

Connect water (see note above) and test operation.

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 T2R, this is 5 L/s.

A flow switch is installed on the feed pipe, to measure feed rate, feed volume and to control the proportional dosing.

Chemical dosing points are into the feed pipe, prior to the inline mixer. Chemical dosing is controlled via a sensor in the flocculation tank, and operator inputs on the HMI.

Coagulant is added proportionally to the feed flow rate, at the operator adjustable setpoint.

pH correction is achieved by dosing either acid or caustic (depending on the feed water expected pH) via feedback from the floc tank pH sensor, and a PID loop.

5.2 Reaction Tank

The feed flow is dosed in the reaction tank to flocculate incoming solids so that they settle faster in the separator tank and leave a clearer final clarified water.

The tank is fitted with a slow speed agitator, for mixing in the dosed flocculant solution into the feed. The coagulant (added into the feed pipe) initially reacts with solid particles in the water.

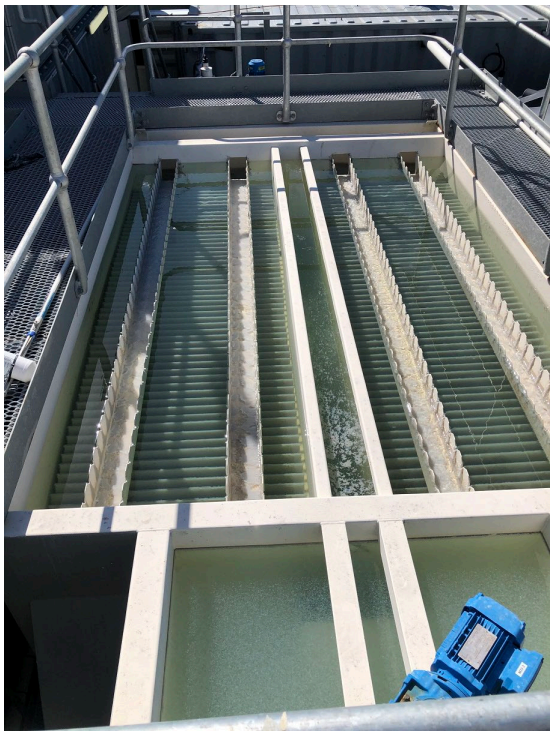
Flocculant is then added in the reaction tank, which causes the solid particles to clump together (to flocculate), increasing their mass, which allows them to settle out of the flow stream.

The floc dosing pump speed can be adjusted by the operator.

The pH sensor used to control the pH correction dose is installed in the reaction tank.

5.3 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.

5.4 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. Before entering the pipe, the water passes around a pH sensor and turbidity sensor.

These devices measure the water quality and are used to automatically control the discharge and off-spec valves.

If the water meets the discharge requirements of the system, the discharge valve is opened (and the off-spec valve closed.)

If the discharge water is out of specification – either the pH is too high or low, or the turbidity is too high – the discharge valve is closed, and the off-spec valve opened.

	*Discharge criteria are set by Aquatic Engineering, based on information provided and in consultation with the hirer.* *These criteria limits cannot be modified by site personnel.*

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

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

5.5 Sludge Removal

Sludge is removed from the base of the hopper via the drain outlets. The T2R has two camlock fittings to allow connection of a hose and pump to transfer the sludge to another container for processing or removal from site.

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 HMI

The Trident lamella system is controlled via the HMI, located on the control panel.

6.1.1 *Log In*

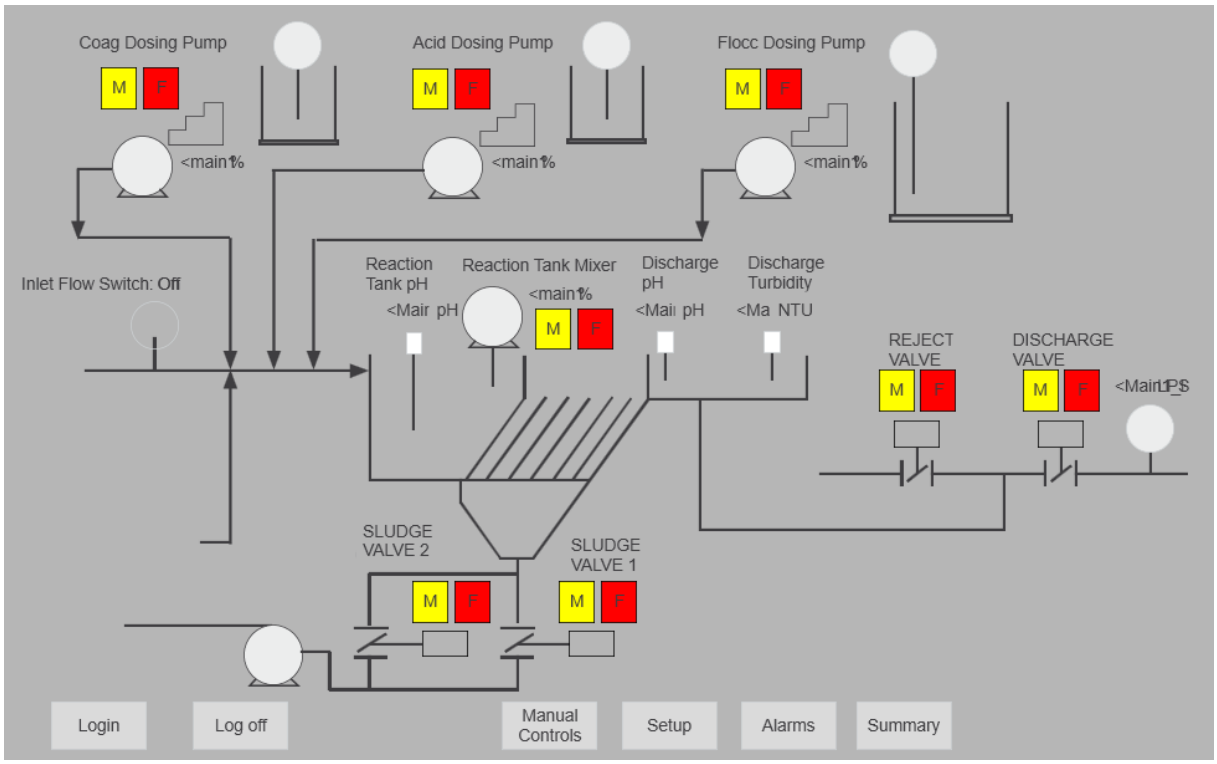
To log in, the username is ***aea*** (all lower case), and the password is the asset number of the unit.

eg:

User:	aea
Password:	300021

6.1.2 *Mimic Page*

Displays a graphical representation of the lamella system, including input and output values for the various elements in the system.

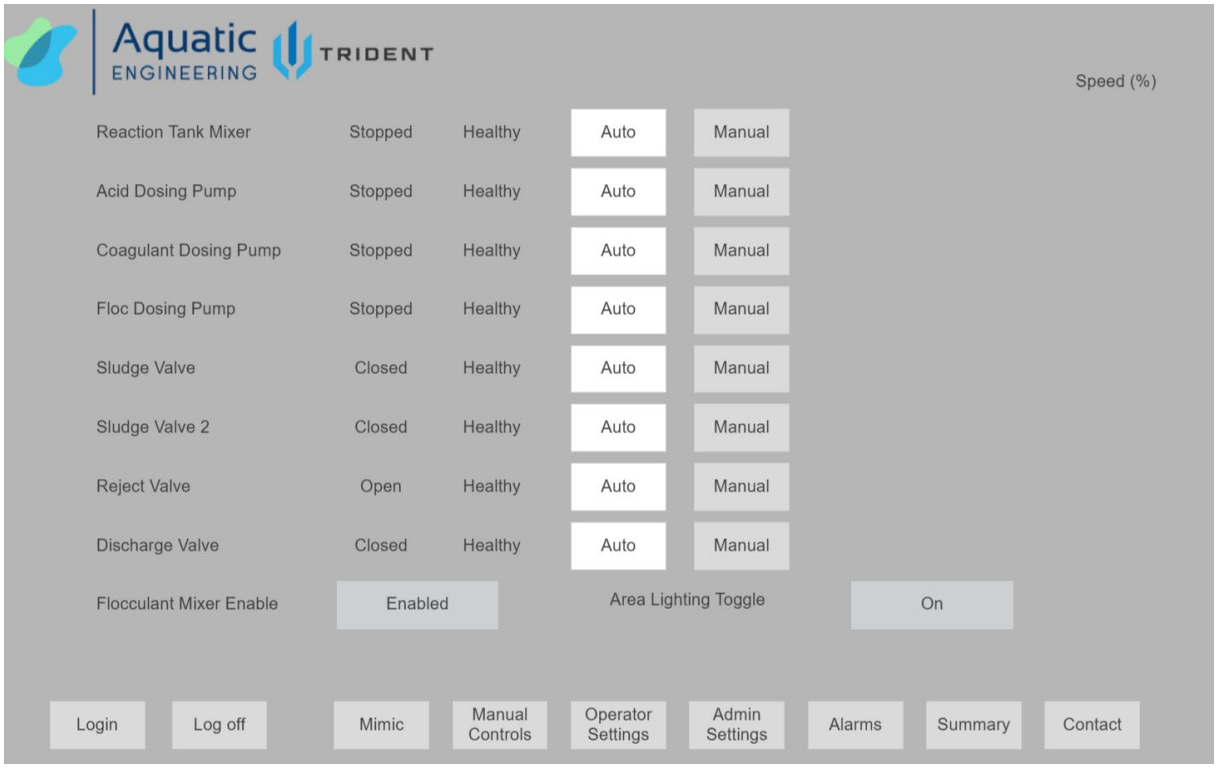


	Running/Stopped	Healthly/Faulted	Manual/Auto
Motor/ Pump Tag & Description	Stopped	Healthy	Manual
	Running	Faulted	Auto

	Running/Stopped	Manual/Auto
Valve Tag & Description	Closed	Manual
	Open	Auto

6.1.3 *Manual Controls*

The *Manual Controls* page allows the operator to set the plant elements to AUTO operation or manually turn on or off the elements in the plant.



	*Activating any element in the plant in MANUAL mode will override any other control or safety mechanism.*

The page displays

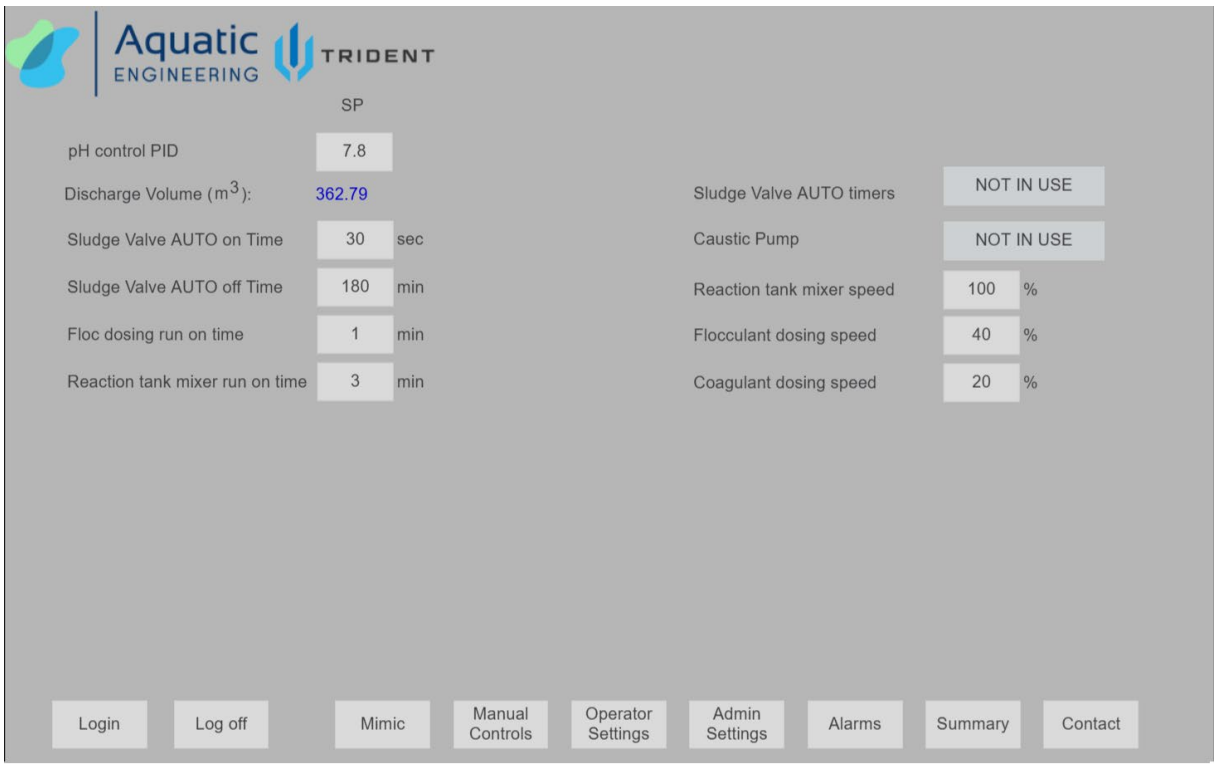
- Name of the element
- Operational status: Stopped, or Running
- Fault status: Healthy, or Fault
- Mode toggle: select either Auto or Manual
- Start/Stop or Open/Close button (when in Manual)
- Speed Input % (when in Manual)

Standard operation of the system requires all elements to be set in AUTO mode.
The *Sludge Transfer Pump* and *Sludge Valve* may be set to Manual, if the automatic sludge transfer system is not set up for operation.

The *Discharge Valve* and *Reject Valve* are elements that cannot be manually operated by the operator user *aea*. These can only be operated in the Administrator user.

6.1.4 *Operator Settings*

Operator adjustable settings are displayed on the *Operator Settings* page.



	*Do not adjust operational settings without first consulting AEA, and understanding the potential impacts of the change to the operation of the system.*

6.1.5 *Admin Settings*

The Admin Settings are inputs that will be set during commissioning. These values will be determined in consultation with the site, to determine the correct setting.

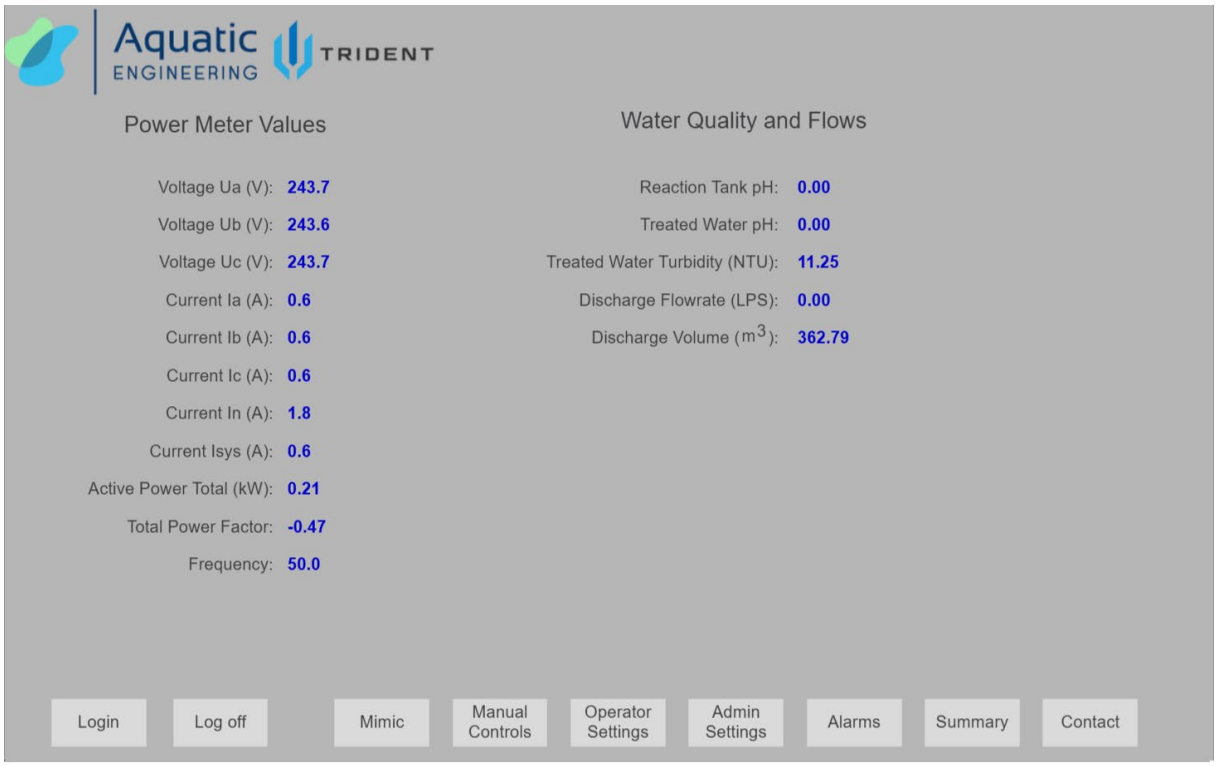
No elements on this page can be adjusted by the user *aea*.

6.1.6 *Alarms*

System alarms are displayed in the Alarms List.

6.1.7 *Summary*

The *Summary* page shows various measured values of the system, including power data, and water volumes and real-time data.



6.2 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
- Priming dosing pumps
- Confirming setup of flow meters

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

6.3 Startup

When starting up the Trident T2R after an idle period, while it has remained full of process fluid:

1. Ensure the pH probes have remained immersed; if they have been exposed to the air and dried out, it is possible they will require recalibration, or replacement. Place probes in a calibrated pH solution to confirm the accuracy of the reading.
2. Check all pumps run in MANUAL, to confirm that they are operational.
3. Prime pumps using clean water and confirm that there are no leaks at the pump, along the lines, or at the injection point.
4. Ensure that chemical levels are sufficient.
5. Remove any sludge that may have accumulated in the reaction tank or settling chamber
6. Using clean water, run the feed through the lamella to confirm automation of dosing pumps and the reaction tank mixer

6.4 Chemical adjustment

The appropriate level of chemical dosing required to effectively settle the solids will vary as the quality of the feed water changes with site conditions, including the chemistry of the water that is fed to the lamella. Automating the chemical dosing setpoints is not possible due to the variability of water chemistry, solids particle chemistry, and the lack of effective real time measurement devices required to calculate such dosing.

Adjusting chemical usage is important to optimise the usage and reduce costs.

6.4.1 *pH control*

the pH setpoint that the lamella is dosing to achieve can be set by the operator. The dose rate is automatically varied to achieve the target setpoint in the reaction tank.

The pH correction dosing is controlled by a PID loop. The PID loop controls the pump so it doses proportionally to the variance between the measured pH value and the target pH value. The PID loop settings are set during commissioning and can only be adjusted during operation by an AEA representative.

6.4.2 *Coagulant dosing*

The coagulant dosing pump speed is set by the operator, and the pump speed is also run proportionally to the inflow rate.

6.4.3 *Flocculant dosing*

The flocculant dosing pump speed is set by the operator, and the pump speed is also run proportionally to the inflow rate.

6.5 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.

6.6 Flocculant Mixing

Flocculant is supplied as a concentrate and is required to be batched on site to create a suitable flocculant solution for dosing in the lamella.

This solution is mixed in the flocculant mixing tank.

	*Flocculant is extremely slippery.* *If required to clean a spill, use dry methods. Do not hose down flocculant.*

To mix manually, while adding potable water, slowly pour in the flocculant concentrate to the water stream. Use the hose to induce a swirl of the water in the IBC, to allow for adequate mixing.

To mix automatically using the floc mixer, fill the IBC with potable water. Turn the mixer on, and slowly add the flocculant concentrate. Once the flocculant has been added, allow the mixer to run for at least 30 minutes.

Batches can be topped up by adding the correct proportion of flocculant concentrate to additional water requirements.

6.7 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. It is imperative that the pH sensors remain immersed during standby periods.

	*Failure to ensure the pH probes remain immersed will likely lead to them requiring replacement.*

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

6.8 Demobilisation

When preparing to demobilise the lamella:

	*Take caution when handling chemicals, or any equipment that may have chemicals on or inside.* *Wear appropriate PPE when handling any equipment associated with acid or caustic.*

1. Remove chemical dosing pump suction lines from their respective chemical tanks and place them into a container filled with clean water.
2. Manually run dosing pumps for at least 15 minutes to ensure all dosing lines have been flushed. Top up the container with water as required.
3. Spool up and secure dosing lines below the dosing pumps.
4. Remove any sludge that may have accumulated in the reaction tank and settling tank
5. Using clean water, wash down all internal surfaces of the lamella
6. 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
7. Once the lamella has been drained, disconnect power to the lamella, and remove all external connections to the unit.
8. Rotate safety shower head 90 degrees to be within the envelope of the Trident. Ensure union nut connecting the two parts of the shower is tightened.

7 Maintenance

The frequency of maintenance on the Trident T2R 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 T2R, 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
Confirm power supply to lamella
Confirm HMI is active
Confirm power to chemical dosing pumps and floc mixer
Feed
Check upstream source for debris and solids. Clean as required to prevent transfer to lamella
Check inlet flow switch is functional (powered)
Reaction Tank
Check mixer operation in AUTO
Check for solids build up in the floc tank
Check flocculation in the floc tank. Adjust chemical dosing if required.
Clean pH probe with soft cloth, taking care not to damage the sensor or lens
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.
Clean pH probe with soft cloth, taking care not to damage the sensor or lens
Clean turbidity probe with soft cloth, taking care not to damage the sensor or lens
Discharge
Check discharge flow meter is functional (powered)
Dosing
Visually inspect chemical containers for damage or leaks
Check chemical levels. Reorder as required, allowing for delivery time to site.
Batch flocculant as required.
Safety Shower/Eyewash
Activate eyewash unit and allow water to flow for 30 seconds to flush line. Ensure water flows evenly from both outlets. Ensure water is clean
Activate shower via the handle and allow water to for 30 seconds to flush line. Ensure water is clean

Routine Cleaning

Clean Mixer Tank pH probe

- With a soft cloth, wipe any residue off the probe tip. Take care not to apply pressure to the probe lense, only to remove any build up that may be on it.

Clean Discharge Tank pH probe

- With a soft cloth, wipe any residue off the probe tip. Take care not to apply pressure to the probe lense, only to remove any build up that may be on it.

Clean Discharge Tank Turbidity probe

- With a soft cloth, wipe any residue off the probe face. Take care not to apply pressure to the probe lense, only to remove any build up that may be on it.

Caution: if the lense is scratched, it will affect the reading.

Clean Mixing Tank

- Isolate the mixer motor.
- Connect a hose to the valve at the base of the discharge box. Direct this hose into the feed sump or tank, and open the valve. The water in the discharge box will drain out via this hose.
- Hose out any solids or debris in the corners of the mixing chamber, taking care not to hose the mixer motor.
- Close the valve and remove the hose.
- Reenergise the mixer motor.

Do not put arms or hands in positions that may be impacted by the mixer.

Clean Discharge Box

- Connect a hose to the valve at the base of the discharge box. Direct this hose into the feed sump or tank, and open the valve. The water in the discharge box will drain out via this hose.
- Hose out any solids or debris in the corners of the discharge box, taking care not to directly hose the sensors.
- Close the valve and remove the hose.

Desludge Lamella

- Connect discharge hose to sludge pump outlet flange. This hose is to direct the sludge to a holding tank.

- Run the sludge pump, until the discharge runs clear.
- For optimal use, this process should be run frequently. The required frequency will be determined by the volume of sludge generated by the system, which is affected by feed water quality and quantity.

8 Trouble Shooting

8.1 Common symptoms

Symptom	Possible Causes	Reference Section 8.2
Discharge valve not opening	Discharge pH out of specification	4, 5,13
	Discharge turbidity out of specification	6, 7, 13
Off-spec valve not closing	Discharge pH out of specification	4, 5,13
	Discharge turbidity out of specification	6, 7, 13
Lamella discharge water is dirty	Flocs not settling in lamella	8, 9
	Insufficient mixing	11, 16
	Insufficient settling time	10
	Carryover due to lamella being full of sludge	9
	Incorrect pH/Chemical dose rates	12, 19, 20, 21, 22, 23, 24,25, 26
Lamella overflowing	Inlet flow rate too high for lamella capacity	10
	Discharge line over capacity	13
	Off-spec line over capacity	14
	Discharge/Off spec valves closed	13, 14

8.2 Possible Causes

	Possible Cause	Solution
1	Inlet pH probe reading low number	• Feed water has low pH • Overdosed with acid – check dosing pump • Insufficient caustic being dosed – check dosing pump • Ensure dosing pumps are on and set in AUTO
2	Inlet pH probe reading high number	• Feed water has high pH • Overdosed with caustic – check dosing pump • Insufficient acid being dosed – check dosing pump • Ensure dosing pumps are on and set in AUTO
3	Inlet pH probe reading false number	• Check probe is submerged in mixing tank • Clean probe head • Check probe using pH buffers • Check condition of electrical connections
4	Discharge pH probe reading low number	• Feed water is low pH. Check inlet pH reading • Overdosing acid into the system • Adjust target pH setpoint up, to reduce acid dose into system • Check dosing pump operation, and chemical level is sufficient • Contact AEA to optimise PID loop
5	Discharge pH probe reading high number	• Underdosing acid into the system • Adjust target pH setpoint down, to increase acid dose into system • Check dosing pump operation, and chemical level is sufficient • Contact AEA to optimise PID loop
6	Discharge turbidity sensor reading false high number	• Clean probe head • Check condition of probe lens • Check probe is submerged in mixing tank • Check probe reading in potable water (0-10 NTU) • Check condition of electrical connections • Ensure no foaming in system
7	Discharge turbidity high number due to poor water quality	• Desludge lamella • Check chemical dose rates • Check dosing pump operation
8	Flocs not settling in lamella	• Check coagulant dosing is operational • Check flocculant dosing is operational • Adjust coagulant dosing rate • Adjust flocculant dosing rate • Ensure no air entrainment in feed to lamella • Ensure no foaming in lamella. Add antifoam if necessary
9	Lamella sludge capacity exceeded	• Drain sludge from the lamella hopper
10	Inlet flow rate too high	• Adjust feed flow throttling via inlet manual throttling valve
11	Inlet flow rate too low	• Check feed pump operation • Adjust feed flow throttling via inlet manual throttling valve

12	T2R not operating when water being pumped	• Check power is on • Check pumps and mixer are set to AUTO • Note - Very low flowrates may be lower than the flow switch's minimum setting
13	Discharge valve not operating	• Check water quality meets discharge parameters • Check valve has power • Ensure valve is in AUTO
14	Off-spec valve not operating	• Check water quality meets discharge parameters • Check valve has power • Verify valve operates by running in MANUAL mode
15	HMI not responding	• Check power supply to T2R • Cycle power to T2R
16	Mixer not running	• Verify mixer operates by running in MANUAL mode • Set mixer to AUTO mode • Observe mixer operation when inflow is being measured • Have electrician check for VSD fault • Cycle power to T2R • If not operating, contact AEA
17	Inlet flow switch not measuring	• Check feed pump operation and water is flowing • Check display has power • Check if display is showing an error icon. If so, use the arrow buttons to cycle screens to show error messages • Contact AEA
18	Discharge flow meter not measuring	• Ensure discharge valve is open. No flow is measured when system is in reject • Check display has power • Check if display is showing an error icon. If so, use the arrow buttons to cycle screens to show error messages • Contact AEA
19	Acid drum empty	• Replace/refill chemical drum. • **CAUTION – acid is extremely corrosive. Wear appropriate PPE (see SDS)** • Insert suction line into tank • Run pump to ensure pump primed and dosing operational
20	Caustic drum empty	• Replace/refill chemical drum. • **CAUTION – Caustic is extremely corrosive. Wear appropriate PPE (see SDS)** • Insert suction line into tank • Run pump to ensure pump primed and dosing operational
21	Coagulant drum empty	• Replace/refill coagulant tank • Insert suction line into tank • Run pump to ensure pump primed and dosing operational
22	Floc tank empty	• Refill tank and prepare flocculant batch • Run pump to ensure pump primed and dosing operational
23	Acid pump not primed	• **CAUTION – acid is extremely corrosive. Wear appropriate PPE (see SDS)** • Place suction foot valve in a bucket of clean water • Run pump in manual • While running, open bleed valve to bleed air from suction line

		• Direct bleed fluid into appropriate container. Wash down area after task completed • Once pump is primed, return suction foot valve into tank. Ensure is it fully submerged, and at the bottom of the vessel
24	Caustic pump not primed	• **CAUTION – caustic is extremely corrosive. Wear appropriate PPE (see SDS)** • Place suction foot valve in a bucket of clean water • Run pump in manual • While running, open bleed valve to bleed air from suction line • Direct bleed fluid into appropriate container. Wash down area after task completed • Once pump is primed, return suction foot valve into tank. Ensure is it fully submerged, and at the bottom of the vessel
25	Coagulant pump not primed	• **CAUTION – coagulants are typically corrosive and/or slippery. Wear appropriate PPE (see SDS)** • Place suction foot valve in a bucket of clean water. • Run pump in manual. • While running, open bleed valve to bleed air from suction line • Direct bleed fluid into appropriate container. Wash down area after task completed. • Once pump is primed, return suction foot valve into tank. Ensure is it fully submerged, and at the bottom of the vessel
26	Floc pump not primed	• **CAUTION – flocculants are typically slippery. Wear appropriate PPE (see SDS)** • Place suction foot valve in a bucket of clean water. • Run pump in manual • While running, open bleed valve to bleed air from suction line • Direct bleed fluid into appropriate container. Wash down area after task completed • Once pump is primed, return suction foot valve into tank. Ensure is it fully submerged, and at the bottom of the vessel