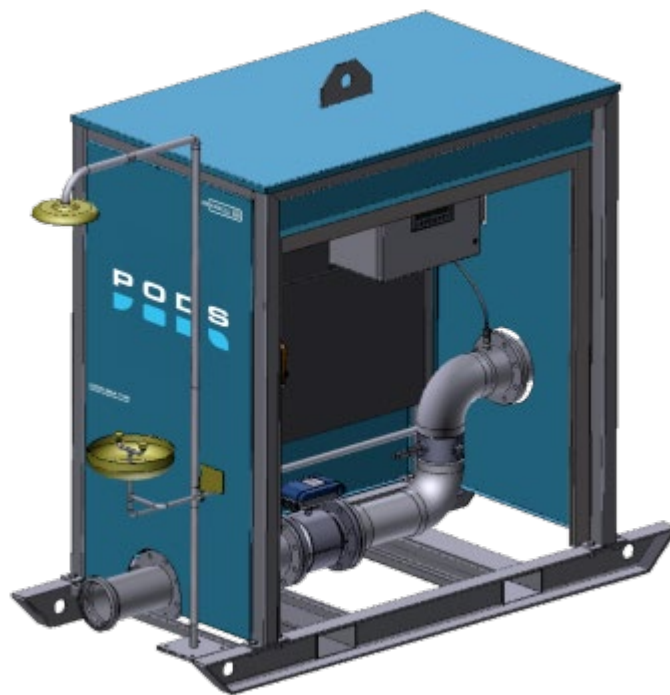




# DPOD150 – Chemical Dosing System



## Operation and Maintenance Manual



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Carbon  
Neutral  
Organisation

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## Table of Contents

1	Confidentiality and Copyright .....	3
2	Introduction & System Description .....	3
2.1	Specification .....	4
3	Safety and Chemical Handling .....	5
3.1	General.....	5
3.2	Equipment Warnings .....	6
4	Transport and Installation .....	7
4.1	Lifting 7 .....	
4.2	Installation.....	7
4.3	Connections.....	8
4.4	Safety Shower/Eyewash .....	8
5	Process Description .....	9
5.1	Feed 9 .....	
5.2	Reaction Tank.....	Error! Bookmark not defined.
5.3	Lamella Chamber.....	Error! Bookmark not defined.
5.4	Discharge.....	9
5.5	Sludge Removal .....	Error! Bookmark not defined.
6	Operation .....	10
6.1	HMI 10 .....	
6.1.1	Log In .....	10
6.1.2	Mimic Page .....	10
6.1.3	Manual Controls .....	11
6.1.4	Operator Settings .....	12
6.1.5	Admin Settings.....	Error! Bookmark not defined.
6.1.6	Alarms .....	13
6.1.7	Summary.....	13
6.2	Setup and Commissioning.....	14
6.3	Startup.....	14
6.4	Chemical adjustment .....	14
6.4.1	pH control.....	14
6.4.2	Coagulant dosing .....	Error! Bookmark not defined.
6.4.3	Flocculant dosing.....	Error! Bookmark not defined.
6.5	Lamella desludging and cleaning .....	Error! Bookmark not defined.
6.6	Flocculant Mixing .....	Error! Bookmark not defined.
6.7	Shutdown.....	15
6.8	Demobilisation .....	16
7	Maintenance .....	17
7.1	Daily Checks .....	17
8	Trouble Shooting .....	18
8.1	Common symptoms .....	Error! Bookmark not defined.
8.2	Possible Causes .....	Error! Bookmark not defined.

## 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 DPOD150, then please pay special attention to the Safety & Chemical Handling of those chemicals.

## 2.1 Specification

Hydraulic Capacity	20-60 L/s
Power requirement	240 V, c/w 10A socket via appliance inlet
Power	1.9 kW
Apparent power	2.4 kVA
Max Current	10 A
External dimensions (L x W x H)	2,400 x 1,100 x 2,150 mm
Data available	Inlet pH Discharge flow rate and volume Processed water pH

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](mailto: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

	<p><b>DANGER</b></p> <p>Electrical Power Present</p>
	<p><b>DANGER</b></p> <p>Mandatory Electrical Lockout To Service</p>
	<p><b>DANGER</b></p> <p>Mandatory Eye Protection For Service</p>

## 4 Transport and Installation

The dry weight of the unit is 700 kgs.

### 4.1 Lifting

The DPOD is designed to be lifted from the lifting lug located on the top of the unit.



*The DPOD150 should only be lifted by the designed lift points*

### 4.2 Installation

The DPOD150 must be placed on a suitably engineered and level footing.

When operational, the DPOD150 unit has a mass of approximately 730 kg.

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

### 4.3 Connections

Process fluid connections to the DPOD150 are:

- Inlet connection: 150 mm c/w 150mm Female Bauer
- Discharge connection: 150 mm Table D flange, with 100mm male Bauer
- Safety shower/eyewash: 25 mm BSP male (see section 4.4 for additional info)

The DPOD150 requires a 240V 10A 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 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.

The eyewash basin is also removed and bolted inside the DPOD150. Using an allen key, bolt the basin to the safety shower assembly.

Connect water (see note above) and test operation.





## 5 Process Description

### 5.1 Feed

The DPOD is required to be fed from an upstream source (usually a feed tank), via a gravity feed, or more commonly. For the DPOD, this is typically 20-60 L/s.

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

pH correction is achieved by dosing either acid or caustic (depending on the feed water expected pH) via feedback pH sensor, and a PID loop. A second probe is installed downstream to control and monitor. Setpoints are entered on the HMI

### 5.2 Discharge


Discharge from the DPOD150 is typically directly to the discharge point. The DPOD150 has inputs to allow the installation of discharge/reject valves.

#### 5.2.1 Discharge Valves

The use of these valves is selected on the HMI Set up page

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.

	<p><i>Discharge criteria are set by Aquatic Engineering, based on information provided and in consultation with the hirer.</i></p> <p><i>These criteria limits cannot be modified by site personnel.</i></p>
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## 6 Operation

### 6.1 HMI

The DPOD 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.

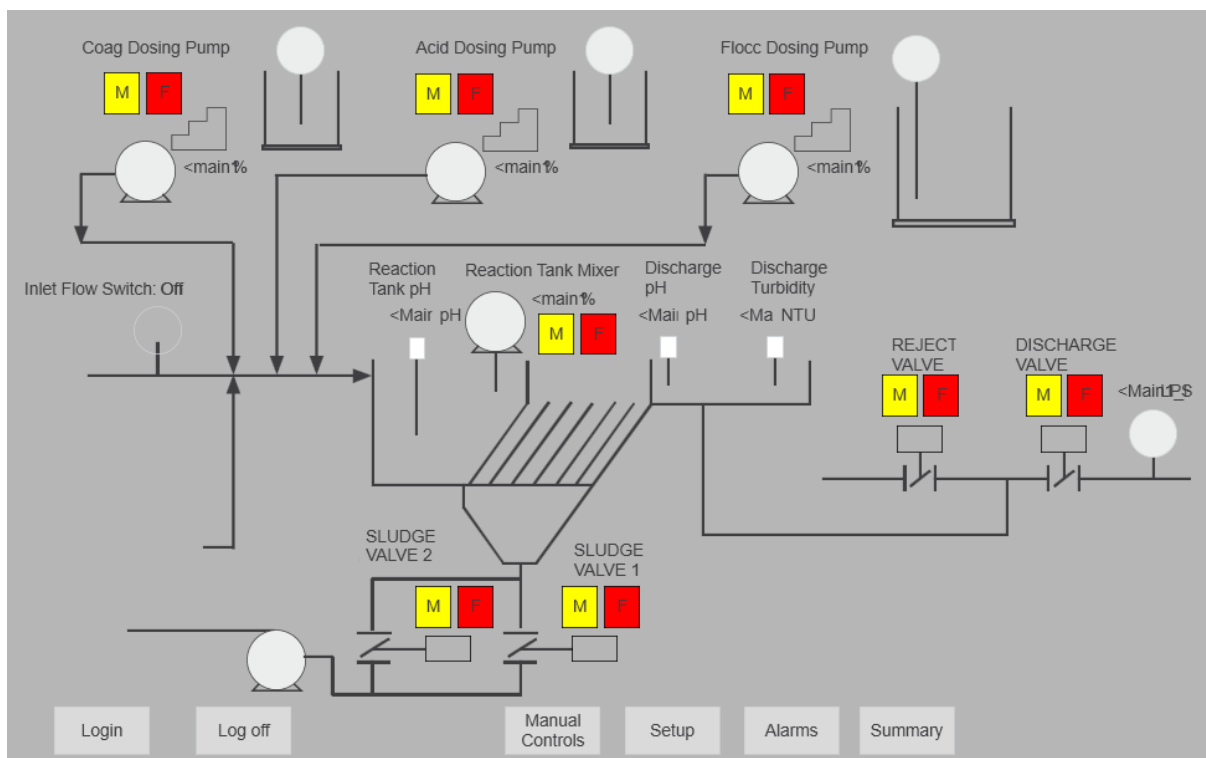
eg:

User: aea

Password: 300021

#### 6.1.2 Mimic Page

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

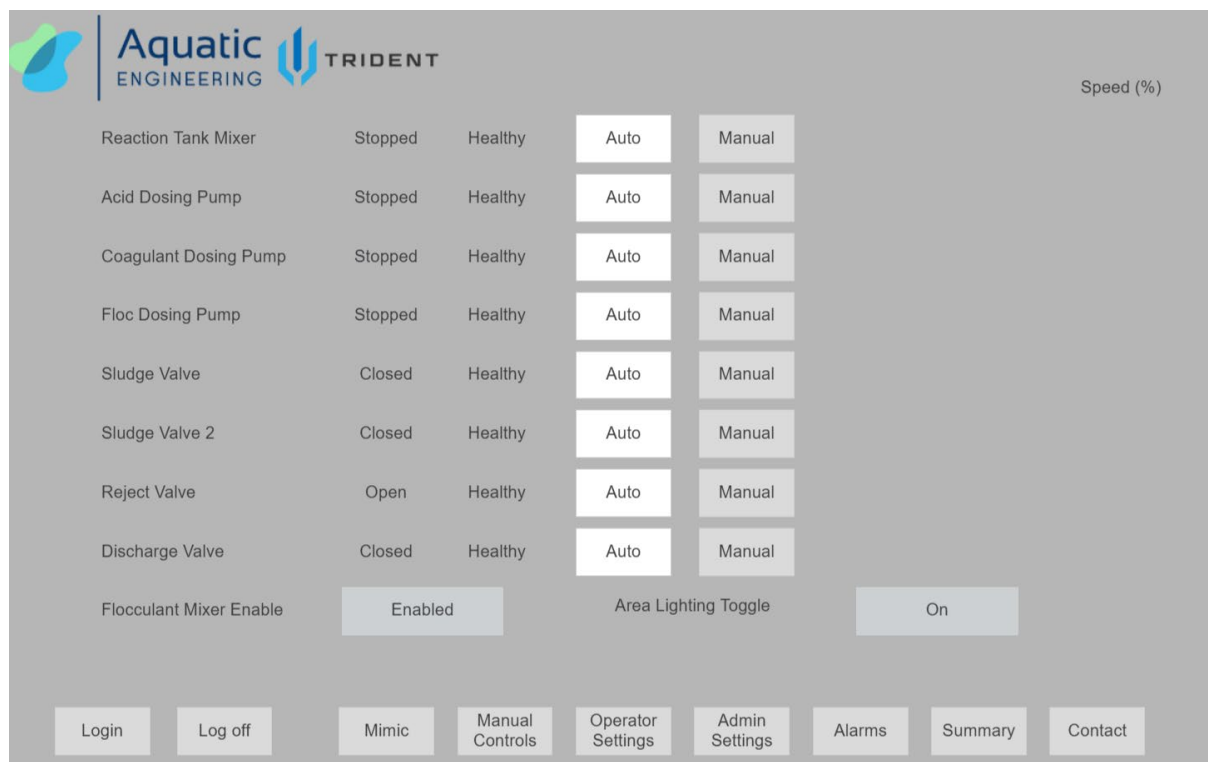


	Running/Stopped	Healthy/Faulted	Manual/Auto
Motor/ Pump	Stopped	Healthy	Manual
Tag & Description	Running	Faulted	Auto

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



**Aquatic ENGINEERING TRIDENT**

Speed (%)

Element	Status	Health	Auto	Manual
Reaction Tank Mixer	Stopped	Healthy	Auto	Manual
Acid Dosing Pump	Stopped	Healthy	Auto	Manual
Coagulant Dosing Pump	Stopped	Healthy	Auto	Manual
Floc Dosing Pump	Stopped	Healthy	Auto	Manual
Sludge Valve	Closed	Healthy	Auto	Manual
Sludge Valve 2	Closed	Healthy	Auto	Manual
Reject Valve	Open	Healthy	Auto	Manual
Discharge Valve	Closed	Healthy	Auto	Manual
Flocculant Mixer Enable	Enabled		Area Lighting Toggle	
			On	

[Login](#)
[Log off](#)
[Mimic](#)
[Manual Controls](#)
[Operator Settings](#)
[Admin Settings](#)
[Alarms](#)
[Summary](#)
[Contact](#)



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

The page displays

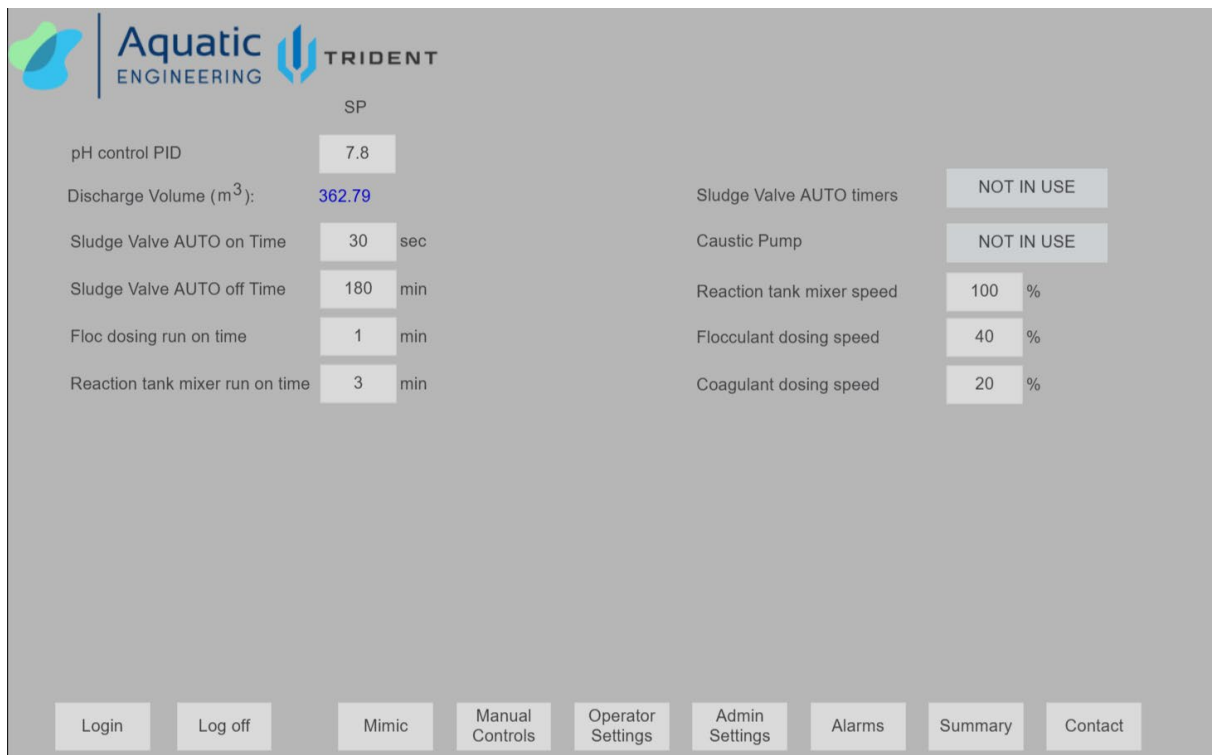
- Name of the element
- Operational status: Stopped, or Running
- Fault status: Healthy, or Fault
- Mode toggle: select either Auto or Manual
- Start/Stop or Open/Close button (when in Manual)
- Speed Input % (when in Manual)

Standard operation of the system requires all elements to be set in AUTO mode.


The *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 Settings

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



The screenshot shows the 'Operator Settings' page for the Aquatic Engineering Trident system. The page has a header with the Aquatic Engineering logo and the word 'TRIDENT'. Below the header, there is a 'SP' label. The main content area is divided into two columns. The left column contains settings for pH control PID (7.8), Discharge Volume (m³) (362.79), Sludge Valve AUTO on Time (30 sec), Sludge Valve AUTO off Time (180 min), Floc dosing run on time (1 min), and Reaction tank mixer run on time (3 min). The right column contains settings for Sludge Valve AUTO timers (NOT IN USE), Caustic Pump (NOT IN USE), Reaction tank mixer speed (100 %), Flocculant dosing speed (40 %), and Coagulant dosing speed (20 %). At the bottom of the page, there is a navigation bar with buttons for Login, Log off, Mimic, Manual Controls, Operator Settings (which is highlighted), Admin Settings, Alarms, Summary, and Contact.

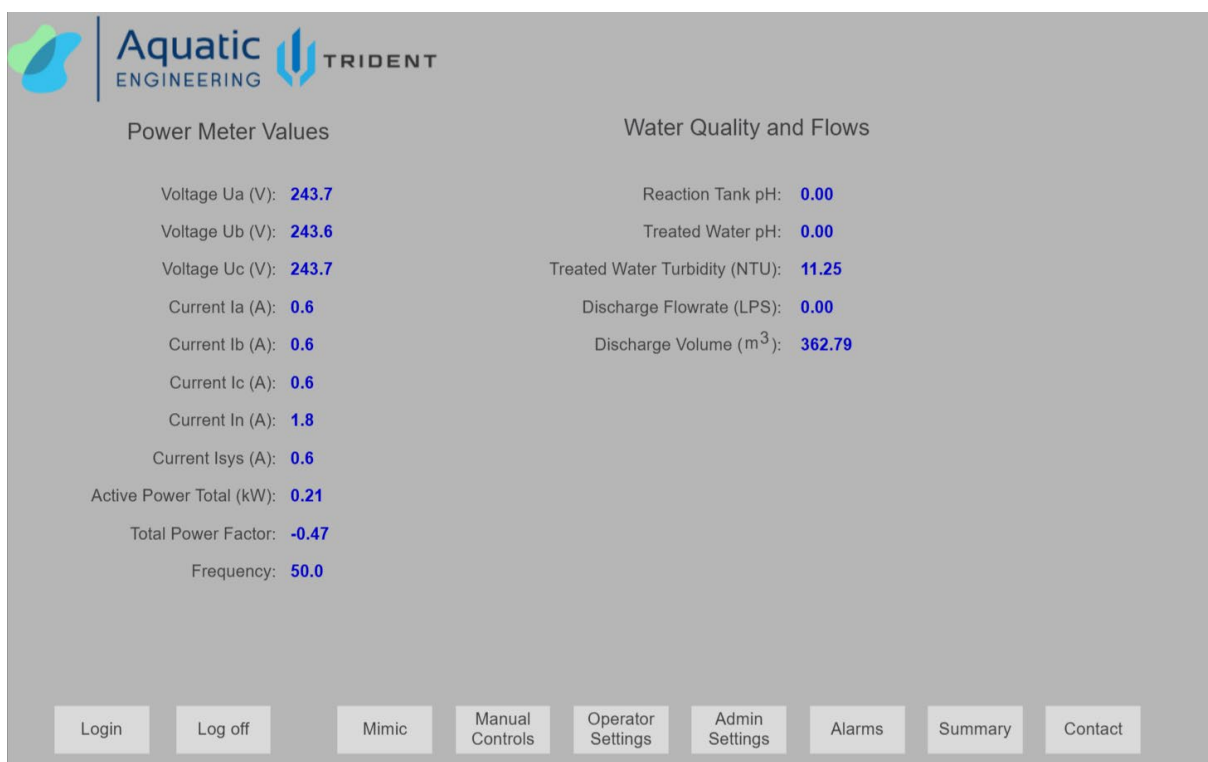
	<p><i>Do not adjust operational settings without first consulting AEA, and understanding the potential impacts of the change to the operation of the system.</i></p>
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### 6.1.5 Alarms

System alarms are displayed in the Alarms List.

### 6.1.6 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 DPOD 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. Using clean water, run the feed through the DPOD to confirm automation of dosing pump(s)

## 6.4 Chemical adjustment

### 6.4.1 pH control

the pH setpoint that the DPOD 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.

## 6.5 Shutdown

When placing the DPOD150 in standby, with intention to reactivate it:


1. Using clean water, run the feed through the DPOD150.
2. 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.*

## 6.6 Demobilisation

When preparing to demobilise the DPOD150:

	<p><i>Take caution when handling chemicals, or any equipment that may have chemicals on or inside.</i></p> <p><i>Wear appropriate PPE when handling any equipment associated with acid or caustic.</i></p>
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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. 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.
5. Remove eyewash basin and mount inside DPOD. Ensure it is secured.
6. Ensure roller shutter is done and locked



## 7 Maintenance

The frequency of maintenance on the DPOD will depend on the volume of water processed through the unit and, more importantly, the nature of the water that is being processed.

### 7.1 Daily Checks

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

<b>DPOD and system</b>
Visually inspect DPOD150 for damage
Confirm power supply
Confirm HMI is active
Confirm power to chemical dosing pumps
<b>Feed</b>
Check upstream source for debris and solids
Check inlet flowmeter is functional (powered)
<b>pH</b>
Ensure probes are in water and clean. 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.
<b>Dosing</b>
Visually inspect chemical containers for damage or leaks
Check chemical levels. Reorder as required, allowing for delivery time to site.
<b>Safety Shower/Eyewash</b>
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

## 8 Trouble Shooting

	Issue	Solution
1	Inlet pH probe reading low number	<ul style="list-style-type: none"> <li>• Feed water has low pH</li> <li>• Overdosed with acid – check dosing pump</li> <li>• Insufficient caustic being dosed – check dosing pump</li> <li>• Ensure dosing pumps are on and set in AUTO</li> </ul>
2	Inlet pH probe reading high number	<ul style="list-style-type: none"> <li>• Feed water has high pH</li> <li>• Overdosed with caustic – check dosing pump</li> <li>• Insufficient acid being dosed – check dosing pump</li> <li>• Ensure dosing pumps are on and set in AUTO</li> </ul>
3	Inlet pH probe reading false number	<ul style="list-style-type: none"> <li>• Check probe is submerged in mixing tank</li> <li>• Clean probe head</li> <li>• Check probe using pH buffers</li> <li>• Check condition of electrical connections</li> </ul>
4	Discharge pH probe reading low number	<ul style="list-style-type: none"> <li>• Feed water is low pH. Check inlet pH reading</li> <li>• Overdosing acid into the system</li> <li>• Adjust target pH setpoint up, to reduce acid dose into system</li> <li>• Check dosing pump operation, and chemical level is sufficient</li> <li>• Contact AEA to optimise PID loop</li> </ul>
5	Discharge pH probe reading high number	<ul style="list-style-type: none"> <li>• Underdosing acid into the system</li> <li>• Adjust target pH setpoint down, to increase acid dose into system</li> <li>• Check dosing pump operation, and chemical level is sufficient</li> <li>• Contact AEA to optimise PID loop</li> </ul>
10	Inlet flow rate too high	<ul style="list-style-type: none"> <li>• Adjust feed flow throttling via inlet manual throttling valve</li> </ul>
11	Inlet flow rate too low	<ul style="list-style-type: none"> <li>• Check feed pump operation</li> <li>• Adjust feed flow throttling via inlet manual throttling valve</li> </ul>
12	DPOD not operating when water being pumped	<ul style="list-style-type: none"> <li>• Check power is on</li> <li>• Check pumps and mixer are set to AUTO</li> <li>• Note - Very low flowrates may be lower than the flow switch's minimum setting</li> </ul>
13	Discharge valve not operating (when selected)	<ul style="list-style-type: none"> <li>• Ensure discharge valves "IN USE" has been selected on the HMI</li> <li>• Ensure valve is in AUTO Check water quality meets discharge parameters</li> <li>• Check valve has power</li> </ul>
14	Off-spec valve not operating (when selected)	<ul style="list-style-type: none"> <li>• Ensure discharge valves "IN USE" has been selected on the HMI</li> <li>• Check water quality meets discharge parameters</li> <li>• Check valve has power</li> <li>• Verify valve operates by running in MANUAL mode</li> </ul>
15	HMI not responding	<ul style="list-style-type: none"> <li>• Check power supply</li> <li>• Cycle power</li> </ul>

18	Flow meter not measuring	<ul style="list-style-type: none"> <li>• Ensure there is flow &amp; no valves upstream or downstream are closed</li> <li>• Check display has power</li> <li>• Check if display is showing an error icon. If so, use the arrow buttons to cycle screens to show error messages</li> <li>• Contact AEA</li> </ul>
19	Chemical drum empty	<ul style="list-style-type: none"> <li>• Replace/refill chemical drum.</li> <li>• <b>CAUTION – Wear appropriate PPE (see SDS)</b></li> <li>• Insert suction line into tank</li> <li>• Run pump to ensure pump primed and dosing operational</li> </ul>
23	Dosing pump not primed	<ul style="list-style-type: none"> <li>• <b>CAUTION –. Wear appropriate PPE (see SDS)</b></li> <li>• Place suction foot valve in a bucket of clean water</li> <li>• Run pump in manual</li> <li>• While running, open bleed valve to bleed air from suction line</li> <li>• Direct bleed fluid into appropriate container. Wash down area after task completed</li> <li>• Once pump is primed, return suction foot valve into tank. Ensure is it fully submerged, and at the bottom of the vessel</li> </ul>