Waterfront Lagoon Pumps

Operations Manual

Installation Date:	20/02/2024
Commissioning Engineer:	Dylan Brooke

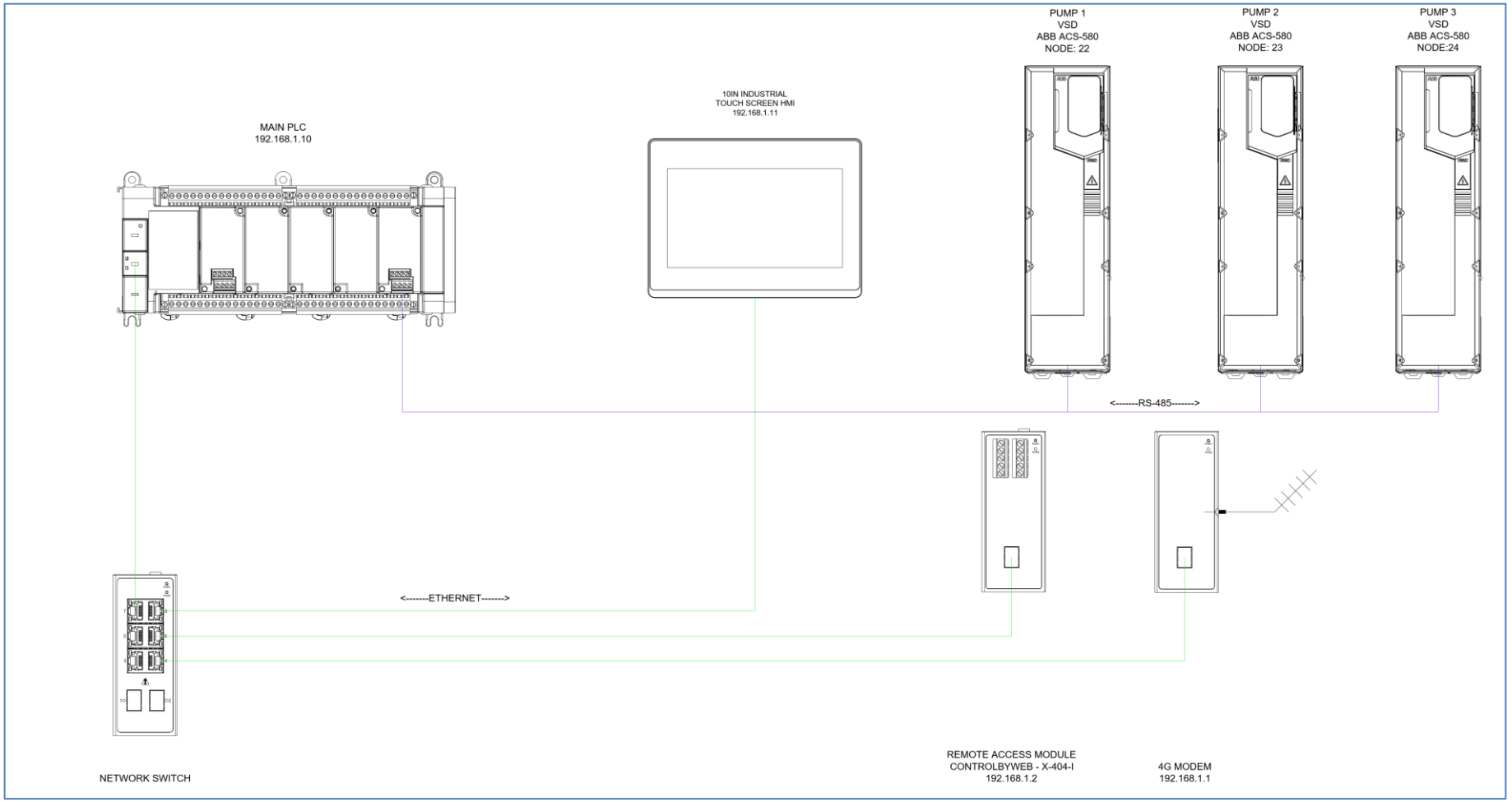
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2. Hardware Overview

2.1. Hardware Network Diagram



2.2. Main PLC

2.2.1. Functions

- System Control
- Modbus TCP interface to Remote Module

2.3. HMI

2.3.1. Functions

- Local Operator Interface – Refer ***Section 4*** for details.

2.4. VSDs

2.4.1. Functions

- Pump controllers * 3
- Set Pump Speeds
- Modbus Serial Interface (RS485) to PLC – Monitoring Only

2.5. Remote Module

2.5.1. Functions

- Modbus TCP Interface to PLC
- Remote access via ControlByWeb Cloud – Refer ***Section 5*** for details.

2.6. 4G Modem

2.6.1. Functions

- Internet Access for Remote Module

3. Control Overview

The Waterfront Control Panel has 2 main control components, these are **Local Pump Control**, **Automatic Pump Control**.

3.1. Local Pump Control

Local pump control uses the hard-wired pump circuitry and will operate independent of the PLC. This is active when the selector switch is no in Auto.

Note: ***This mode should only be used for testing or short-term purposes. This mode will not consider Sea Water and Lagoon Levels in the logic.***

	Function	Execution
1	Auto	Local Selector Switch
2	Manual	Local Selector Switch
3	Off	Local Selector Switch
4	Local Manual Start	Local Push Button
5	Local Manual Stop	Local Push Button
6	Reset Fault	Local Push Button

3.2. Automatic Pump Control

3.2.1. General Philosophy

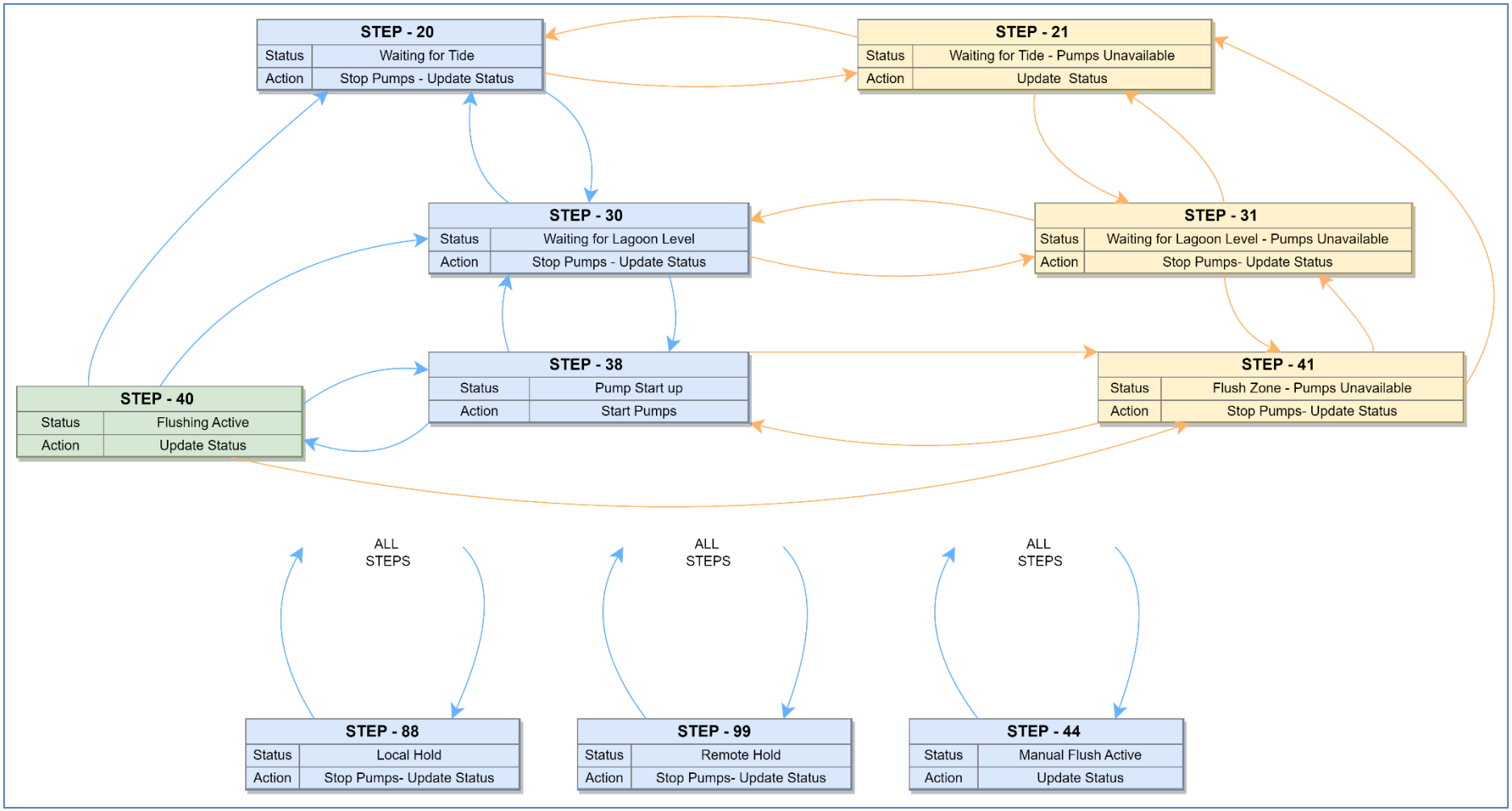
Automatic control relies on the level sensors in the lagoon and open water (Sea) to activate the pumps in a defined pumping window. This is active when the local Selector switch is in Auto.

The pumping windows are defined as follows:

	Function	Description
1	Sea Level Flushing Window	The open water window is defined by a start and stop setpoint for pumping. This window is ranged between LAT and HAT (0.0m -> 8.1m.) These setpoints are operator configurable behind a password protected parameter page.
2	Sea Level lower Limit	The Lower limit is to be set as to not pumps silted water during low tide events.
3	Sea Level Upper limit	Set as to prevent overfilling of the logon at higher tides.
4	Lagoon Flushing Window	The Lagoon window is defined by a start and stop setpoint for pumping. This window is based upon AHD - Australia Height datum (-3.96m -> 4.41m) These setpoints are operator configurable behind a password protected setting page.
5	Lagoon lower Limit	The Lower limit is to be set for alarming purposes.
6	Lagoon Upper Limit	Set as to prevent overfilling of the lagoon at higher tides.

3.2.2. Auto Control Sequence Steps

The control Sequence is based off the following steps – The step number will indicate the status and execute pump control based on the following map.



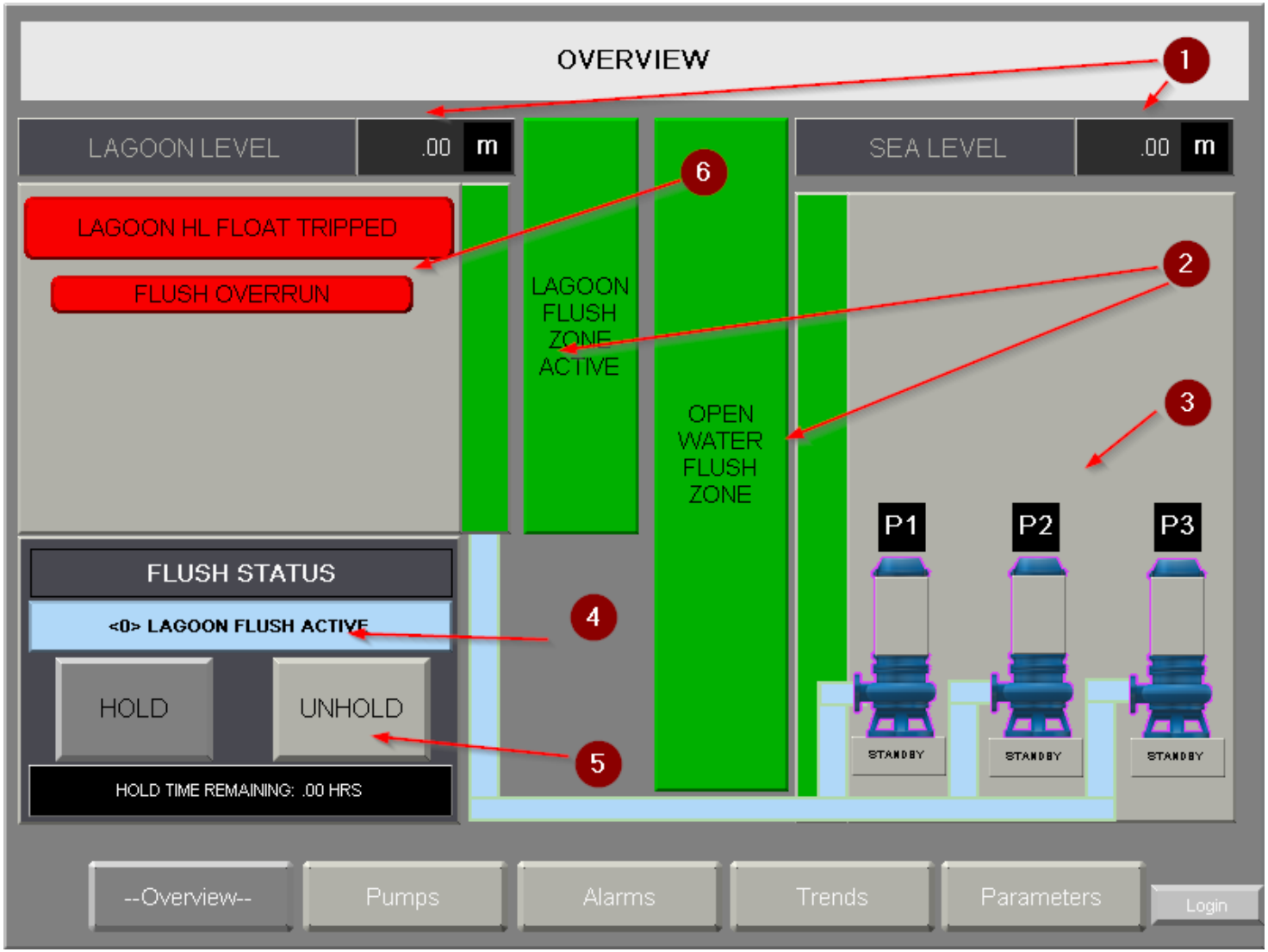
4. HMI

4.1. Overview

The HMI is used for local control and monitoring purposes. The table below summarises the Pages provided.

	Page	Description
1	Overview	General Overview of the Lagoon Flushing system
2	Pumps	Pump specific status
3	Alarms	Alarms
4	Trends	Basic Trends
5	Parameters	System Parameter Settings – Password Protected – See ***Section 4.6.2*** for Login Details

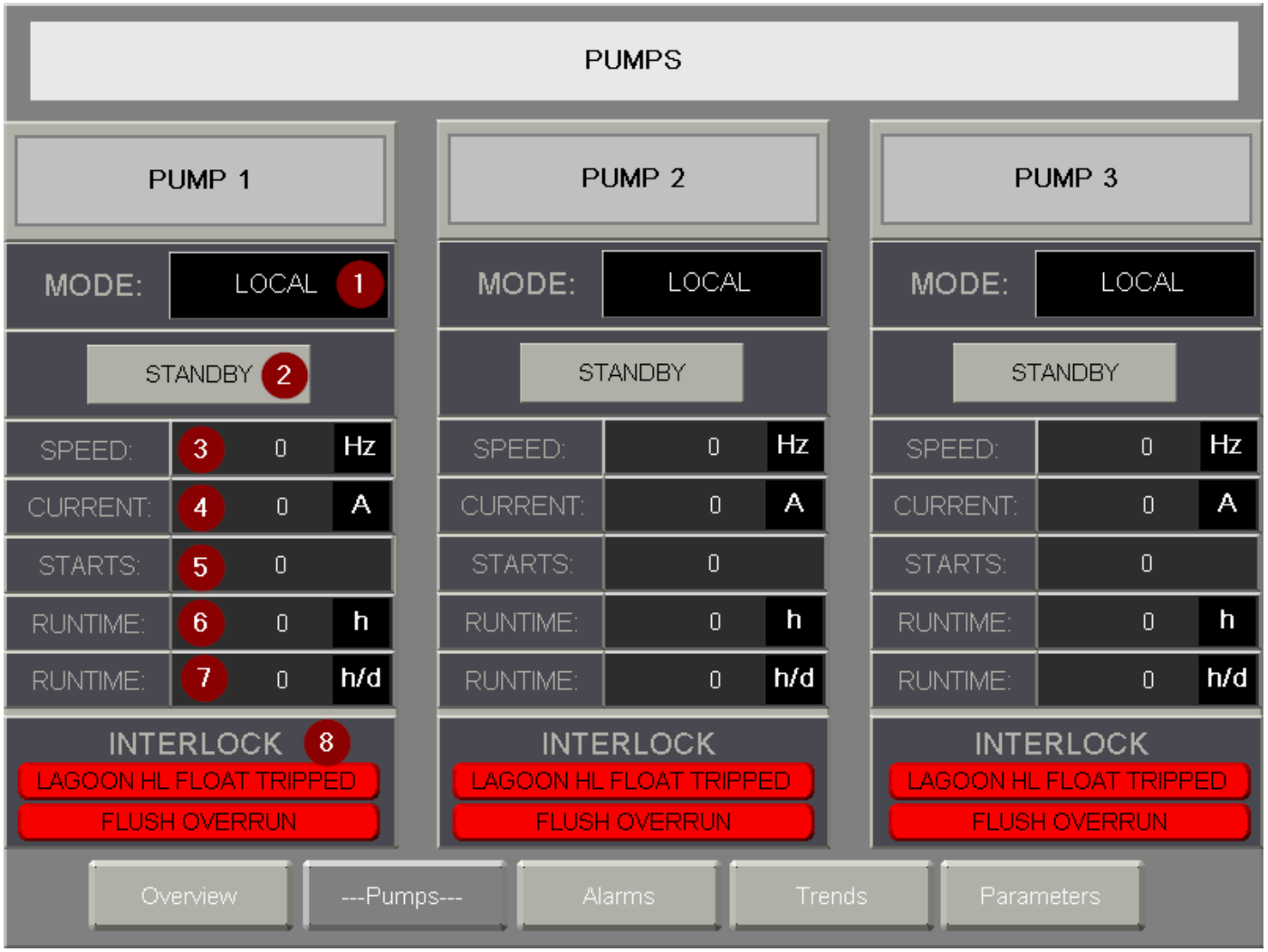
4.2. Overview Page



4.2.1. Overview Page Identifiers

ID	Name	Description
1	Levels	Level Feedback of the system
2	Level Status	Provides status of the level windows and the level as a bar graph
3	Pump Status	General Pump Status
4	Lagoon Flush Sequence	Lagoon Flushing System Status/Step • Refer Section *3.2.2 - Auto Control* Sequence for Lagoon Flush sequence details.
5	Lagoon Flush Sequence Control	Lagoon Flushing System Control • Hold/Stop Lagoon Flush for set time (3-24hrs) • Unhold/Restart Lagoon Flushing
6	Interlock Status	Lagoon High Level Float status and pump overrun status

4.3. Pump Page


PUMPS
PUMP 1
PUMP 2
PUMP 3
MODE:
LOCAL
1
STANDBY
2
SPEED:
3
0
Hz
CURRENT:
4
0
A
STARTS:
5
0
RUNTIME:
6
0
h
RUNTIME:
7
0
h/d
INTERLOCK
8
LAGOON HL FLOAT TRIPPED
FLUSH OVERRUN
Overview
---Pumps---
Alarms
Trends
Parameters

4.3.1. Pump Page Identifiers

ID	Name	Description
1	Pump Mode	Pump Mode • Auto • Local (Man/Off)
2	Pump Status	Pump Status • Running • Stopped • Fault • Interlocked
3	Pump Speed	Pump Speed Feedback – (50Hz = 100%)
4	Pump Current	Pump Current Feedback
5	Pump Starts	Number Of Pump Starts
6	Pump Runtime	Pump Runtime Hours
7	Pump Runtime/Day	Pump Runtime Hours per day. This is the running average and will reset upon pump data reset.
8	Pump Interlocks	Pump Interlock status

4.4. Alarm Page

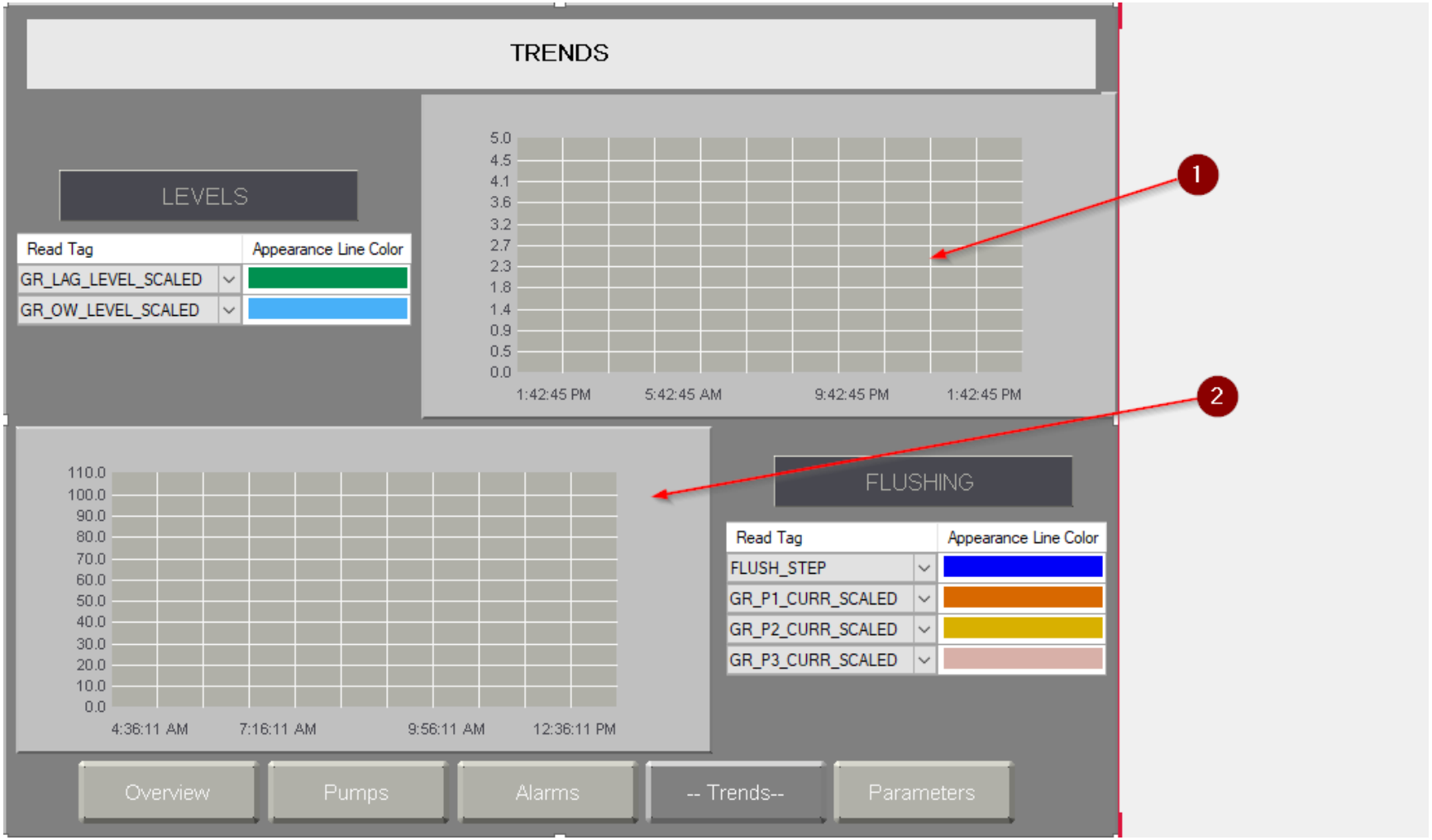
The alarm page shows the current alarms. The Following is the colour Keys:

Active Ack Req Not Rec BackColor		Inactive Ack Req Not Rec BackColo	
Active Ack Req Not Rec ForeColor		Inactive Ack Req Not Rec ForeColo	
Active Ack Req Rec BackColor		Inactive Ack Req Rec BackColor	
Active Ack Req Rec ForeColor		Inactive Ack Req Rec ForeColor	
Active No Ack Req BackColor		Inactive No Ack Req BackColor	
Active No Ack Req ForeColor		Inactive No Ack Req ForeColor	

* Ack Req = Acknowlegment Required

* Not Rec = Acknowlegment Not Received

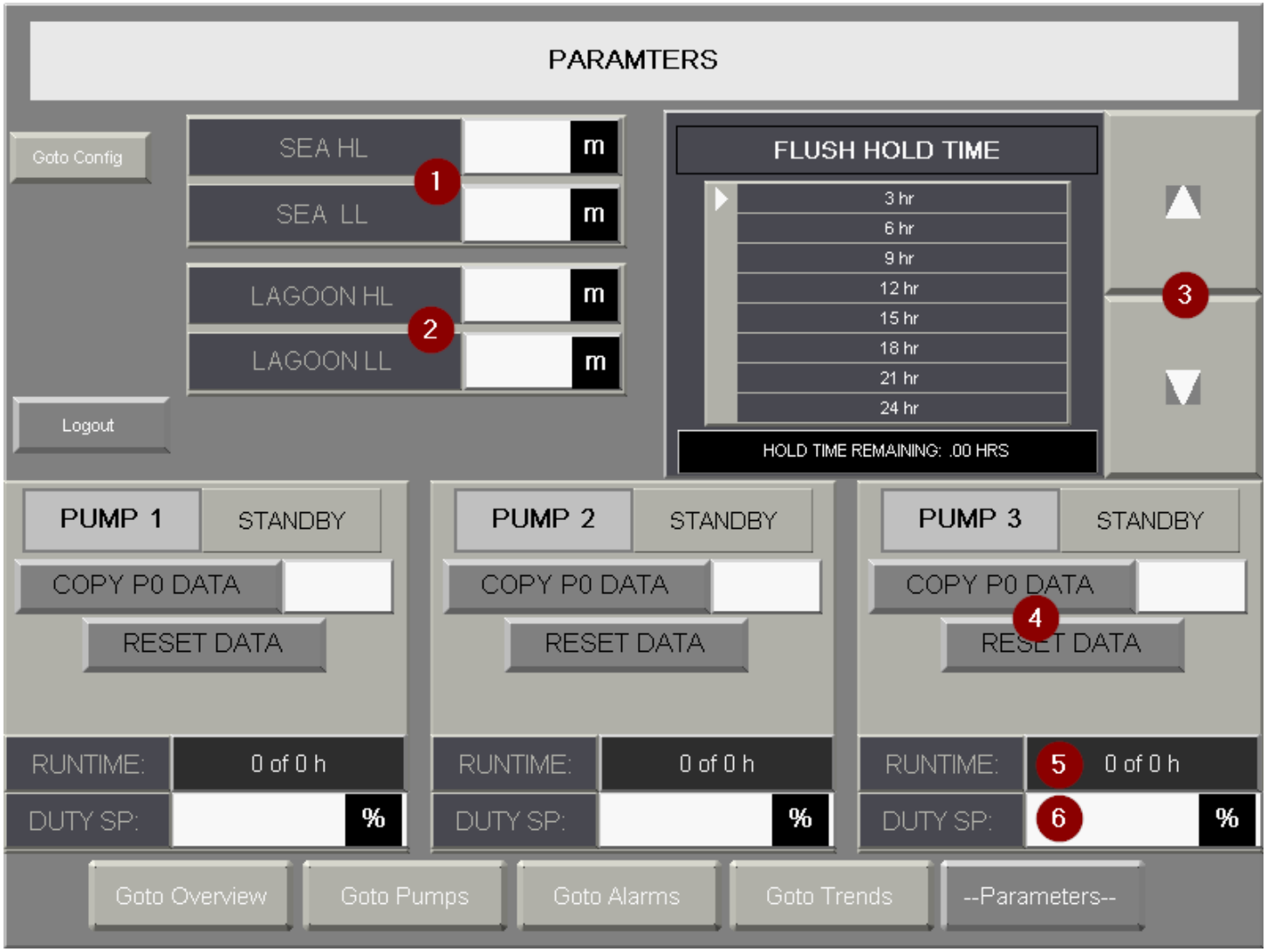
4.5. Trends Page



4.5.1. Trend Page Identifiers

ID	Name	Description
1	Trend 1	Lagoon and Sea Level Trends • Stores Trends Locally on USB • Trend for 2 days
2	Trend 2	Lagoon Flushing Trends • Lagoon Flush Step • Pumps Currents • Stores Trends Locally on USB • Trend for 2 days

4.6. Parameters Page



4.6.1. Parameters Page Identifiers

ID	Name	Description
1	Sea Level Settings	Sea Level Flushing Window settings • The System will flush when the relative Sea Level is between these numbers and the Lagoon window is active
2	Lagoon Level Settings	Lagoon Flushing Window settings • The System will flush when the relative Lagoon level is between these numbers and the Sea Level window is active
3	Flush Hold Time	Flush Hold Setting • When activating the 'Flush Hold' this parameter determines how long the flush will stay held before returning to auto mode. If the Lagoon and Sea Level windows are active then it will restart the flushing, if outside either window it will return to the step corresponding tot eh sequence status.
4	Reset Data/Copy Data	• Reset Data - Clears the Pump Runtime and Number of starts. • Copy Data – Copies the pump data entered as an integer into current pump.
5	Runtime	• Number of hours run in the run window total hours
6	Runtime % Setpoint	Target run percentage used to offset the pump run hours for maintenance purposes. When a pump is set to Auto, and a Flushing window is available, a timer will be accumulated. This is the theoretically maximum amount of time the pump would run. The setpoint is a percentage of that theoretical time. **Note: If pumps are to run all the time – Set all to 100%.** Example: P1 = 100% - P1 with run for 100% of the calculated theoretical maximum flushing time for P1. P2 = 80% - P2 with run for 80% of the calculated theoretical maximum flushing time for P2. P3 = 75% - P3 with run for 75% of the calculated theoretical maximum flushing time for P3. Note: Resetting the individual pump data, will reset the running theoretical maximum pump time for that pump, but will not affect the pump data of the other pumps.

4.6.2. Parameter Page Login

The Parameter is password protected with a timeout of 15 mins.

User	eng
Password	eng

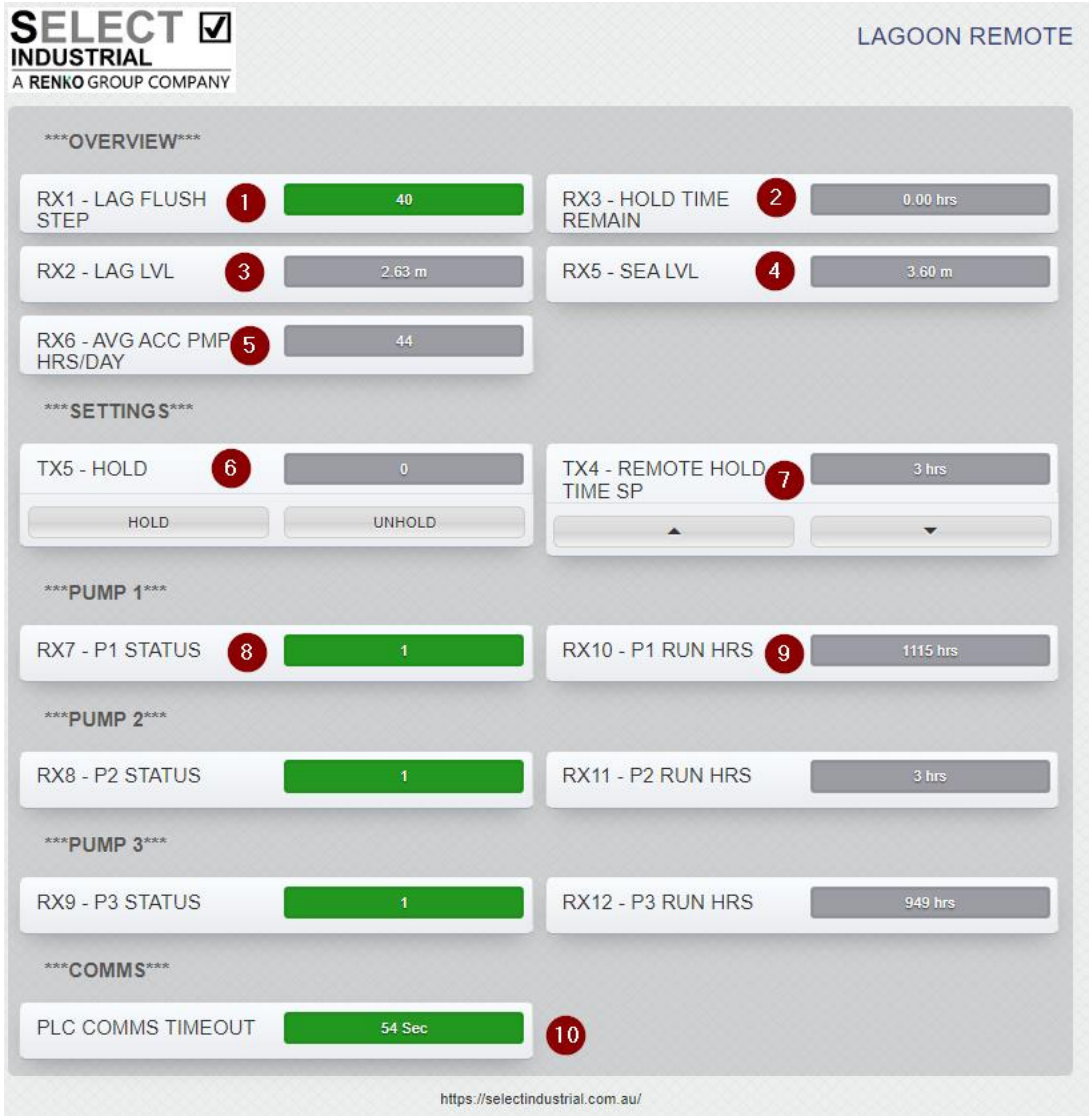
5. Remote Control and monitoring

5.1. Functions

The Remote monitoring system allows the following:

- Sea Relative Level
- Lagoon Relative Level
- Pumps Status
- Pump Run Hour Data
- Flush Sequence Status
- Flush Sequence Hold/Un-hold Controls
- Flush Hold Time Setting
- Cloud Data logging – 30 Days
- Email Alerts – Client to Setup with internal email client.

5.2. Control and Monitoring Page - Web Client



5.2.1. Control and Monitoring Page - Identifiers

ID	Name	Description
1	FLUSH STEP	Flushing System Status/Step Refer ***Section 3.2.2 - Auto Control Sequence*** for flush sequence details. Summary • 20 – Waiting for tides • 21 - Waiting for tides – No Pumps Available • 30 – Waiting for Lagoon Level • 31 - Waiting for Lagoon Level – No Pumps Available • 38 – Pumps Starting • 40 – Flushing Active • 41 – In Flush Zone – No Pumps Available • 99 – Remote System Hold Active • 88 – Local System Hold Active • 44 – Manual Flush/Pumping Active
2	HOLD TIME REMIANING	The remaining time the flushing sequence is held
3	LAG LVL	Lagoon Relative Level
4	OW LVL	Sea Relative Level
5	AVG RUN HOURS/DAY	Average aggregate Run hours per day. (*P1 Avg/Day + P2 Avg/Day + P3 Avg/Day*)
6	HOLD	Flush Hold/Un-Hold Commands
7	REMOTE HOLD TIME SP	This setting determines how long the system will be stopped (Held) when the hold command is executed
8	P1-2-3 STATUS	Pump Status • 0-Stopped • 1-Running

		• 2-Interlocked • 3-Faulted • 4-Standby (Runtime % above SP %)
9	P1/2/3 Run Hours	Pump Run hours
10	PLC COMMS TIMEOUT	Indicator for the Remote communications status to the PLC • Red - Comm Fault – PLC data not updating. • Green - Comms Healthy and reading PLC data

6. Alarms

6.1. Alarm Table

	Alarm Name	HMI	Remote	Other Alarm	Comment
1	24V DC POWER SUPPLY FAULT	X			
2	FLUSH ACTIVE FOR ABNORMAL TIME	X			
3	LAGOON HIGH LEVEL ALARM	X			
4	LAGOON HIGH LEVEL SWITCH ACTIVE	X			
5	LAGOON LOW LEVEL ALARM	X			
6	SEA HIGH LEVEL ALARM	X			
7	SEA LOW LEVEL ALARM	X			
8	PUMP 1 FAILED TO STOP	X			
9	PUMP 1 FAILED TO START	X			
10	PUMP 1 LEAKAGE ALARM	X			
11	PUMP 1 TEMPERATURE ALARM	X			
12	PUMP 1 VSD FAULT	X			
13	PUMP 2 FAILED TO STOP	X			
14	PUMP 2 FAILED TO START	X			
15	PUMP 2 LEAKAGE ALARM	X			
16	PUMP 2 TEMPERATURE ALARM	X			
17	PUMP 2 VSD FAULT	X			
18	PUMP 3 FAILED TO STOP	X			
19	PUMP 3 FAILED TO START	X			
20	PUMP 3 LEAKAGE ALARM	X			
21	PUMP 3 TEMPERATURE ALARM	X			
22	PUMP 3 VSD FAULT	X			
23	UPS/BATTERY FAULT	X			
24	PUMP 1 VSD COMMUNICATION FAULT	X			

	Alarm Name	HMI	Remote	Other Alarm	Comment
25	PUMP 2 VSD COMMUNICATION FAULT	X			
26	PUMP 3 VSD COMMUNICATION FAULT	X			

7. 4G Modem Network Configuration

7.1. Wifi Settings

WIFI SSID:	Dg1jzT8tgk_AP
PASSWORD:	1$Albatross$1

7.2. Settings Page

http://192.168.1.1/setup.html#

USER	admin
PASSWORD:	1$Albatross$1

8. Remote Module Network Configuration

8.1. Settings Page

http://192.168.1.2/setup.html#

USER	admin
PASSWORD:	1$Albatross$1