

Assets Planning and Delivery Group
Engineering

DESIGN STANDARD DS 70-30

Small Chlorination Systems (Wastewater) – Functional Control Description



VERSION 1
REVISION 3

MAY 2023

FOREWORD

The intent of Design Standards is to specify requirements that assure effective design and delivery of fit for purpose Water Corporation infrastructure assets for best whole-of-life value with least risk to Corporation service standards and safety. Design standards are also intended to promote uniformity of approach by asset designers, drafters and constructors to the design, construction, commissioning and delivery of water infrastructure and to the compatibility of new infrastructure with existing like infrastructure.

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Head of Engineering

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REVISION STATUS

The revision status of this standard is shown section by section below:

REVISION STATUS						
SECT.	VER./REV.	DATE	PAGES REVISED	REVISION DESCRIPTION (Section, Clause, Sub-Clause)	RVWD.	APRV.
1	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	New definitions added	NH	DH
All	1/3	26.05.23	All	Scheduled review, no change required	BM	BM

2	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	Minor text changes	NH	DH

3	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	Minor text changes	NH	DH

4	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	References to E-Net removed	NH	DH

5	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	References to Koyo PLC removed	NH	DH

6	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	Re-wording to ensure consistency between DS70-20 and DS70-30	NH	DH

7	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	Minor text changes	NH	DH

8	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	Minor text changes	NH	DH

9	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	Minor text changes	NH	DH

10	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	Minor text changes	NH	DH

11	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	Minor text changes	NH	DH

App A	1/1	27.02.13	All	New Version/Revision	NH	MH
	1/2		All	Table replaced so no longer	NH	DH

				Koyo specific		
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DESIGN STANDARD DS 70.30

Small Chlorination Systems (Wastewater – Control Function Description)

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1 Definitions

ESD	Emergency Shutdown Device
Modbus	Generic communications protocol
NTU	Nephelometric Turbidity Units
OIP	Operator Interface Panel
PID	Proportional, Integral and Derivative (controller)
PLC	Programmable Logic Controller
PPM	Parts per million
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition (system)

2 Introduction

The standard wastewater chlorination package has been developed to ensure legislative and business requirements are consistently met on future projects. The standard package enables the majority of small wastewater chlorination plants to use the same PLC hardware, program and OIP interface.

Configurable options that are set during commissioning or accessed using the OIP enable the standard wastewater chlorination package to be customized to individual situations by including or excluding equipment, indications, and control functionality.

3 Scope

The scope of this document is to outline the functionality of the standard wastewater chlorination package for medium, low and extra low risk applications

This standard wastewater chlorination package may also be specified by the Corporation for implementation at low risk secondary (drinking water) chlorination sites.

The Manager, Strategy and Risk Water Quality Business Unit should be contacted for more information on the risk classification and on chlorination functionalities for high risk applications.

This document is not intended as a user manual but describes how the control of each piece of equipment should operate. The document also indicates which parts of the package can be configured, enabled, and disabled from the OIP.

4 SCADA Interface

The standard wastewater chlorination package has a communications interface to provide indication and control to SCADA devices. For Ethernet connected devices Modbus protocol is used.

The SCADA interface provides a consecutive series of registers to facilitate block communications reads and writes.

All indications are always available at the communications interface but control of the wastewater chlorination package can either be from local or remote controlled. A selection on the OIP toggles between local and remote. When in local mode all setpoints and control operations are changed

or initiated from the OIP. In local mode the system will ignore commands from the communications interface. When in remote mode all setpoints and control operations are changed or initiated from the communications interface. In remote mode the system will ignore commands from the OIP.

5 Analogue Values

The following analogue inputs will be read from the PLC inputs and scaled internally. . Should the analogue signal drop below 3.5ma an analogue failure alarm is generated. The analogue input signal is also damped using a first order filter. The analogue ranges are also configured via the OIP. The scaled analogue values will be made available on the OIP, and SCADA interfaces.

- AT80101: Chlorine leak detector – Cell 1
- AT80101: Chlorine leak detector – Cell 2
- AT80101: Chlorine leak detector – Cell 3
- WI 80102A: Cylinder 1 weight
- WI 80102B: Cylinder 2 weight
- WI 80102C: Cylinder 3 weight (optional)
- WI 80102D: Cylinder 4 weight (optional)
- AT81202: Chlorine residual (Optional)
- MFT03005: Mains water flow rate
- Turbidity (Optional)

6 Chlorination Module

The chlorination module consists of a number of sub-modules that provide various functions in monitoring and controlling the chlorine levels in the water main that is being dosed. The chlorination module is normally enabled and the following sub-sections describe the functions of this mode.

When the chlorination module is disabled, the chlorinator will not be initiated under any conditions and all chlorination alarms will be deactivated with the exception of the following alarms which shall remain active:

- Power Failure
- 5ppm Chlorine Leak
- 20ppm Chlorine Leak
- Intruder Alarm
- Chlorine Leak Detector Cell Failure
- Tank Faults (Optional)

6.1 Communications Fail Chlorination Start / Stop

Chlorination is started once the mains wastewater flow rate is above the ‘Initiate chlorinators flow’ setpoint and ‘Flow Established’ is ‘ON’. ‘Flow Established’ signal could be from tank Call or pump station run (a flow switch is the last resort). Once started, an OIP adjustable minimum run duration (typically set at 2 minutes) is enforced by the PLC.

After water main flow ceases and the minimum run duration timer has expired, chlorination is stopped. Once stopped, an OIP adjustable minimum off duration (typically set at 2 minutes) is enforced by the PLC. These timers prevent flow instability from unnecessarily starting and stopping the chlorination system.

6.2 Mains Water Flow Verification

If a Mains flow established function is enabled (Default setting if a signal is available); a “mains flow discrepancy” can be flagged. The intent is to flag problems encountered with the flow meter.

- If the “Mains Flow Established” is on and the flow meter has not detected a flow greater than the “system on” setpoint for a period of two minutes a “mains flow discrepancy” alarm is set and annunciates on the OIP and on SCADA.
- If “Main Flow Established” is off (Flow Not Established”) and the flow meter has detected a flow greater than the “System On” set point for a configurable time, a “Mains Flow Discrepancy” alarm is set. The chlorinator will operate normally using the measured flow rate. If, however, the flow meter is not indicating correctly the chlorinator should fault out on “Dosing Fault” after a given time. The flow switch feature can be disabled from the OIP. This is to prevent chlorinator stopping from a faulty flow switch.

Note: Further action/automation may be necessary on a “Mains Flow Discrepancy” alarm to initiate shut down of the water supply. Inclusion of this action will depend on the risk level for the particular project. Please contact Manager, Strategy and Risk Water Quality Business Unit for

guidance.

6.3 Chlorine Dosing Rate Control

The chlorine flow rate shall be based on a user adjustable dose rate (in mg/L) with flow pacing. The dose required can be entered from the OIP.

For flow pacing the chlorine gas flow rate that is sent to the chlorinators is calculated using the formula:

$$\text{Gas Flow (g/h)} = \text{Mains Water Flow Rate (l/sec)} * \text{Dose Rate (mg/l)} * 3.6$$

If the calculated gas flow is above 100% of the chlorinator range then it is limited to 100%.

6.4 Duty/Standby Operation (Optional):

Note: Duty/Standby operation is an optional arrangement for wastewater chlorination modules and inclusion of it needs to be decided on a site by site basis. Factors and User Requirements such as end user risk levels, reserve storage availability and response time need to be considered during the design stage to determine the requirement for a standby chlorinator. Please contact Manager, Strategy and Risk Water Quality Business Unit for guidance.

Initially chlorinator 1 is the duty unit. The associated ejector pump starts running once chlorination is initiated. Duty can be set manually locally or remotely. The following modes of operation are possible:

- Auto alternating
- Chlorinator 1 on duty
- Chlorinator 2 on duty

When set to Auto alternating, the chlorinators toggle automatically each time the Chlorinator stops or when they reach the maximum run-time. The maximum run-time is configurable through the OIP (e.g. weekly or daily). Change over occurs at 8am daily or at 8am Tuesdays if weekly is selected.

If the running chlorinator or ejector pump faults out or is not selected to PLC control, the standby chlorinator and ejector pump starts automatically if selected to PLC control. The duty/standby changeover occurs in all three modes. For example, if “Chlorinator 2 on duty” is selected and chlorinator 2 faults, chlorinator 1 and the associated ejector pump will start automatically.

6.4.1 Duty/Standby Changeover Faults

The duty chlorinator is called to run when chlorination is initiated. This involves calling the chlorinator’s associated ejector pump and ejector valve to run and open respectively. If a fault condition occurs on the duty chlorinator, the fault is displayed on the OIP and sent to the SCADA and the standby chlorinator is called to run. The possible chlorinator fault conditions include:

- Ejector Pump Hydraulic Fault;
- Ejector Pump Incomplete Start;
- Dosing Fault (Chlorine Residual low or High)

- Ejector Pump Motor Overload;
- Ejector Isolation Valve Fault (Opening or Closing);
- Loss of Chlorine;
- Loss of Vacuum

Incomplete Start and Hydraulic Faults occur when the required system state is not achieved within a set time period. To allow time for the ejector pumps to start and the ejector isolation valves to open, the timers for Incomplete Start and Hydraulic Fault cannot start until 20 seconds after the chlorinator is called to run. These faults are flagged:

- If the ejector pump run contactor is not on following a chlorinator call to run and the incomplete start timer elapses, the Incomplete Start fault is activated. The incomplete start time delay is set by the PLC. If an ejector pump is employed the incomplete start delay is a further 10 seconds (30 seconds overall). If an ejector valve is employed the delay is a further 60 seconds (70 seconds overall).
- If the flow switch does not detect a flow following a chlorinator call to run and the hydraulic timer elapses, the Hydraulic Fault is activated. The Hydraulic fault time delay is settable from the OIP (default is 10 seconds).

If an opening or closing fault occurs on the duty ejector isolation valve the standby chlorinator will be called. An opening fault occurs when a valve open/vacuum not high signal is not received within 30 seconds from when the chlorinator is called to run. This fault is displayed on the OIP and SCADA interfaces. The same happens for a closing fault except this is when a valve close/vacuum not low signal is not received within 30 seconds from when the chlorinator run signal turns off.

If Chlorinator high vacuum (Loss of Chlorine) or Chlorinator low vacuum alarm is activated, it generates an alarm and causes the standby chlorination system to start automatically. Both the high and low alarm delays are configurable from the OIP (Default is 20 seconds).

6.5 Digital Leak Detection

There are four digital inputs for chlorine leak detection:

- 5ppm Chlorine room leak;
- 5ppm Chlorinator room leak;
- 1ppm Chlorine room leak;
- Chlorine leak detector cell fail.

6.5.1 5ppm Chlorine Leak (Chlorine Room and Chlorinator Room)

If either the 5ppm chlorine room leak or the 5ppm chlorinator room leak inputs are activated the 5ppm flashing light is activated on the chlorine building. A separate alarm for the chlorine room and chlorinator room leak is displayed on the OIP and sent to the SCADA interface.

If either the 5ppm chlorine room leak or the 5ppm chlorinator room leak inputs are activated for at least one second the chlorine leak audible alarm siren is sounded. The siren sounds for 2 minutes continuously before silencing. It is also possible to silence the siren immediately by pressing an

alarm acknowledge button on the OIP. The alarm cannot be silenced from the SCADA interface.

6.5.2 1ppm Chlorine Leak

The 1ppm chlorine leak alarm is a local alarm only and provides indication on OIP immediately when the input is activated. The alarm activates the general audible alarm but does not sound the alarm siren or activate the flashing light.

6.5.3 Chlorine Leak Detector Cell Fail

The chlorine leak detector cell fail alarm provides immediate indication on the OIP. The alarm is common for all leak detectors. If the security system is on then the alarm is sent to the SCADA interface immediately. If the security system is off then the chlorine leak detector cell fail alarm is sent to the SCADA interface after fifteen minutes.

6.6 Analogue Leak Detection

The standard wastewater chlorination package supports up to three chlorine leak detector cells. Two leak detector cells are placed in the chlorine room, while one is placed in the chlorinator room.

If any of the leak detector cells detect a leak above twenty parts per million (20ppm) an alarm is displayed and sent to the SCADA interface separately for chlorine store and chlorinator rooms. Once the 20 ppm leak is activated it will latch and will remain latched until the chlorine has dissipated to below 5 ppm.

6.7 General Alarm

A general chlorination alarm is displayed on the OIP if any of the following alarms are activated:

- PLC/RTU communication fail;
- Chlorine cylinder no.1 low weight;
- Chlorine cylinder no.2 low weight;
- Chlorine cylinder no.1 empty;
- Chlorine cylinder no.2 empty;
- Chlorine cylinder change required;
- Turbidity high; (Optional)
- Turbidity transmitter fault; (Optional)
- Service tank level high;
- Service tank level low;
- Inlet chlorine residual high; (Optional)
- Inlet chlorine residual low; (Optional)

- Chlorine store 5ppm chlorine leak detected;
- Chlorination room 5ppm Chlorine leak detected;
- Chlorine leak detector cell no.1: 20ppm leak chlorine store;
- Chlorine leak detector cell no.2: 20ppm leak chlorine store;
- Chlorine leak detector cell no.3: 20ppm leak chlorinator room;
- Common 1ppm leak detected;
- Chlorine leak cell - cell fail;
- Security breached;
- Power fail;
- Fire alarm;
- Safety Shower Activated alarm;
- Ejector pump no.1 hydraulic fault;
- Ejector pump no.1 incomplete start;
- Ejector pump no.1 overload;
- Chlorinator no.1 loss of chlorine (high vacuum);
- Chlorinator no.1 loss of vacuum;
- Chlorinator no.1 dosing fault;
- Ejector pump no.2 hydraulic fault; (Optional)
- Ejector pump no.2 incomplete start; (Optional)
- Ejector pump no.2 overload; (Optional)
- Chlorinator no.2 loss of chlorine (high vacuum); (Optional)
- Chlorinator no.2 loss of vacuum; (Optional)
- Chlorinator no.2 dosing fault; (Optional)
- Analyser sample water flow low; (Optional)
- Chlorine store door open for 55 minutes;
- Chlorine store door open for 60 minutes;
- Chlorination system disabled
- ESD air supply low; (Optional)

- ESD battery volts low;
- ESD Activated;
- Ejector valve no.1 failed to open; (Optional)
- Ejector valve no.2 failed to open; (Optional)
- Ejector valve no.1 failed to close; (Optional)
- Ejector valve no.2 failed to close; (Optional)
- Chlorine leak cell no.1 transmitter fault;
- Chlorine leak cell no.2 transmitter fault;
- Chlorine leak cell no.3 transmitter fault;
- Chlorine cylinder no.1 transmitter fault;
- Chlorine cylinder no.2 transmitter fault;
- Chlorine residual analyser transmitter fault; (Optional)
- Inlet flow meter transmitter fault;
- Service tank level A transmitter fault; (Optional)
- Service tank level B transmitter fault; (Optional)
- Mains flow discrepancy
Turbidity transmitter fault (Optional);

6.8 Cylinder Empty Indication

When either of the two chlorine cylinders empties an offline indication is sent to the OIP and to the SCADA interface. There are separate indications for cylinder 1 and for cylinder 2.

6.9 Cylinder Weights

Each of the two cylinder weights provides a configurable low weight alarm. Both of the alarms are displayed on the OIP and sent to the SCADA interface.

6.10 Vacuum Alarms

Each chlorinator provides loss of chlorine (high vacuum) and loss of vacuum (low vacuum) alarms. If a high vacuum stays on for a configurable period (0-999 seconds), it will produce a high vacuum alarm on the OIP and to the SCADA interface.

A low vacuum for a configurable period (0-999 seconds), produces a loss of vacuum alarm on the OIP and to the SCADA interface. The low vacuum alarm is only activated when the process water flow switch indicates that sufficient process water is flowing past the ejectors.

6.11 Power Failure

Loss of power, indicated by the phase failure relay, produces a power failure alarm on the OIP and to the SCADA interface if the condition remains for a configurable time with a default setting of 60 seconds (Maximum 15 minutes). When the power is restored the chlorinator delays resumption of normal operation for a configurable time with a default setting of 60 seconds.

6.12 Security System

The security system provides a security system enabled (on) input and a security system alarm input. If the security system is armed then an Armed Status is displayed on the OIP & SCADA. If the security system alarm is active, a corresponding alarm is raised on the OIP and sent to the SCADA interface.

If the security system is not armed for 8 continuous hours, then a “Security System Disabled for 8 hours” warning is activated.

6.12.1 General Audible Alarm

The general audible alarm is separate from the chlorine leak audible alarm. The general audible alarm is sounded if the security system is off, and any of the general alarms above becomes active for at least 1 second.

The general audible alarm is automatically silenced after 5 minutes but can be silenced immediately from the OIP. The audible alarm cannot be silenced using the SCADA interface.

6.13 Chlorine Residual Monitoring (Optional)

Note: Chlorine Residual Monitoring is an optional feature. It has been observed that due to high fouling potential of the probe total chlorine residual monitoring often provides inaccurate results. The inclusion of chlorine residual monitoring will depend on the level of treatment of wastewater and fouling potential of treated wastewater. Please contact Manager, Strategy and Risk Water Quality Business Unit for further information guidance.

The chlorine residual monitoring is to be done post chlorination before the inlet (if applicable) of any storage. The inlet residual will be monitored for High and Low chlorine residual alarm. High and Low chlorine residual values will be entered as absolute values. The ‘High and Low Chlorine Residual’ will have a configurable delay time. All the chlorine residual alarms are displayed on the OIP and sent to the communications interface. The chlorine residual alarms are generated only when the chlorinator is running. High and Low Chlorine residual values can be entered from OIP and remotely.

If chlorine residual approaches High/Low chlorine residual limit and stays above/below for 15 (default) minutes, High/ Low chlorine residual alarm will set off.

Note: Further action in this situation will be to shut the system down. Inclusion of this action will depend on the risk level of the particular project. Please contact Manager, Strategy and Risk Water Quality Business Unit for further information guidance.

When analyser low flow is detected, all chlorine residual alarms are disabled. When flow is restored, a ten minute delay is required to enable chlorine residual alarms. If flow has not been restored after fifteen minutes - an “analyser sample water flow low” alarm is set and sent to the communications interface.

6.14 Total Chlorination Failure

Total Chlorination Failure' will be generated if any of the following alarm are raised:

- High/Low vacuum
- Ejector Pump Incomplete Start
- Ejector Pump Hydraulic Fault
- Flow Discrepancy
- High/Low Chlorine Residual (Optional See Section 6.13)

Total chlorination Failure will lead to shutdown of the flow and chlorination system.

7 Chlorine Risk Mitigation Measures (optional)

Risk mitigation measures need to be included at some chlorine facilities because of their offsite risk profile (Refer DS79- Design of Chemical Systems – Legislative Requirements and General Principles). Chlorine Store Risk Mitigation Options include:

- Containment
- Gas scrubber

7.1 Enabled Containment Operation

When the chlorine store door is open, after fifty five minutes a warning audible alarm is generated locally, and after sixty minutes a door open alarm is generated. Alarms are reset when the door is closed.

Under normal operation, the chlorine room fan will switch on when the security door is disarmed. This provides a safer environment for any personnel working in the chlorine store. In case of containment operation the fan is inhibited to contain any leaks 5ppm or above. The fan inhibit system can be overridden using the OIP by selecting the Fan Inhibit Override function on the OIP and then selecting use of this function. If the Fan Inhibit Override function is activated the fan will run for a set time (maximum 15 minutes) and then turn off. This fan run time is configurable through the OIP. During this period it can be turned off on the OIP if required.

7.2 Enabled Emergency Shutdown Device Operation (Mandatory)

The emergency shutdown device (ESD) consists of a control unit and a number of actuators which attach to the cylinder valves- these close the chlorine cylinder valves on detection of a five part per million chlorine gas concentration (hard wired to chlorine leak detector controller). There is an option in the PLC code to allow remote activation instead, but, this is non-standard and requires approval in order to be implemented.

The ESD if operated will send a digital signal to the PLC: ESD Activated. The ESD control units also monitor system air pressure and/or the battery voltage. Both of these are alarmed if low.

7.3 Disabled Operation

For disabled functions, alarms will remain off at all times. The disabled alarms will never activate on the OIP or the SCADA interface. (This feature is used where Containment and/or ESD are not provided at the chlorination site.)

8 Turbidity (optional)

Note: Turbidity monitoring and alarms are optional and the inclusion of it will depend on its need for the project. Please contact Manager, Water Quality Branch for guidance.

8.1 Enabled Operation

The turbidity meter provides an analogue indication and a local high turbidity alarm. It provides no input to the control of the chlorination system. It does, however, if configured, provide a high turbidity alarm.

The high turbidity setpoint and delay time is configurable from the OIP. The high alarm is displayed on the OIP when the alarm limit is exceeded. Soft alarms for high turbidity are no longer generated from the PLC for SCADA. Soft alarms should be configured using the “tune alarm limits” from SCADA.

8.2 Disabled Operation

The turbidity meter is not displayed on the OIP. The turbidity high alarm is disabled. (This is done only when there is no turbidity meter in the system).

9 pH Monitoring (Optional)

pH monitoring is optional and the inclusion of it will depend on its need for the project. Please contact Manager, Strategy and Risk Water Quality Business Unit for guidance.

9.1 Enabled Operation

The pH meter provides an analogue indication. pH alarms are not generated from PLC. Soft alarms should be configured using ‘Tune Alarm Limits’ from SCADA.

9.2 Disabled Operation

The pH meter is not displayed on the OIP. (This is done when there is no pH meter in the system.)

10 Storage Tank (optional)

Storage tank level monitoring and alarms are optional. This feature will be enabled if there is any storage downstream of the chlorination.

The storage tank options include:

- Level indication
- Level control

- High level float switch
- Low level float switch

10.1 Level Indication Enable

Soft alarms for high tank level and an alarm for low tank level are no longer generated from the PLC. Soft alarms should be configured using the “tune alarm limits” from SCADA.

10.1.1 Tank Level Control

If the tank level indication is enabled, tank level control can also be enabled.

10.1.1.1 Tank Level Auto Control

‘Start Fill’ and ‘Stop Fill’ level setpoints can be set to either “request for water” or reset the “request for water”. When the service tank level reaches the stop fill setpoint (a high tank level), if the condition still exist after 30 seconds the “request for water” signal is reset and stops the flow of water into the tank. When the service tank level reaches the start fill setpoint (a low tank level), if the condition still exist after 30 seconds the “request for water” is active – allows water in to fill the tank. These settings can be set locally from the OIP or remotely via SCADA.

The operator can also locally “start fill” by pressing the call for water request “call” button on the OIP. This will set the “request for water” signal. The tank will fill automatically and reset the “request for water” signal when it reaches the stop fill setpoint. Should the tank level transmitter fail, the high and low alarm float switches, if fitted, will take interim control of the tank level control. The high and low level alarms will still occur with each operation.

10.1.1.2 Tank Level Manual Control

The “request for water” can be operated manually locally for OIP or remotely from SCADA.

The operator is required to put the level control in “manual” before he or she can operate the call for water “start/stop” button or the SCADA equivalent. When switching from auto to manual; the change of operation is bumpless, that is, the “request for water” signal, if set, remains set until the operator changes the state. When switching from manual to auto; the change of operation is also bumpless, however, if the tank level is above the “stop fill” setpoint and the “request for water” if set will reset, conversely if the tank level is below the “start fill” setpoint and the “request for water” if not set will set.

The “request for water” for a wastewater system will normally call a pump to start.

10.1.2 Level Float Switches

When using level switches, the service tank level alarm is generated based on the digital input into the PLC from these physical level switches. There is provision for a high level switch and a low level switch. Each of these switches can be enabled or disabled independently. They both have a debounce time of 10 seconds. The high and low level alarms are displayed on the OIP and are sent to the SCADA interface.

10.1.3 Disabled Operation

The level alarms will remain off at all times.

11 Configurable Set-points and Settings Default Values

11.1 Control Setpoints

Setpoint Group	Setpoint Item	Units	Range	Value (*)	Access Level
Chlorinator Duty (Optional)	System On Flow	%	0.0 – 100.0	10	Technician
	Max Gas Flow	g/hr	0 - 5000	500	Technician
	Auto Alternate Select	N/A	N/A	Y	Operator
	Weekly Select	N/A	N/A	Y	Operator
	Daily Select	N/A	N/A	N	Operator
	Chlorinator 1 Select	N/A	N/A	N	Operator
	Chlorinator 2 Select	N/A	N/A	N	Operator
	Minimum Run Time	min	0 - 15	2	Technician
Containment	Fan Runtime Setpoint	min	0 - 60	5	Technician
Power Relay	Power Fail Delay	sec	0 - 999	60	Technician
	Power Restored Delay	sec	0 - 999	60	Technician

(*): Values provided here are for guidance only and may change from site to site. Setpoint values for each sites needs to be documented during the commissioning phase.

Note: The inclusion of Access levels is optional and will be decided on project by project basis depending on the risk level associated with the recycled water use.

11.2 Alarm Set-points

Setpoint Group	Setpoint Item	Units	Range	Value	Access Level
Chlorine Inlet Residual (Total Chlorine)	High Setpoint	mg/l	0.00 – 10.00	5.00 (*)	Supervisor
	Low Setpoint	mg/l	0.00 – 5.00	0.2 (*)	Supervisor
	Alarms Timeout	min	0 - 60	15 min	Technician
Chlorine Cylinder Alarms	High/Low Vacuum Timeouts	Seconds	0 - 999	20 sec	Technician
Turbidity	High Setpoint	NTU	0.0 – 20.0	15(*)	Supervisor
	Turbidity Alarm Delay	min	0 - 60	15	Technician

Note: The inclusion of Access levels is optional and will be decided on project by project basis depending on the risk level associated with the recycled water use.

(*): Values provided here are for guidance only and may change from site to site. Setpoint values for each sites needs to be documented during the commissioning phase.

11.3 Module Enables and Disables

Module	1	0	Value
Containment	Enable	Disable	0
Tank Analogue	Enable	Disable	0
Tank Level High Switch	Enable	Disable	0
Tank Level Low Switch	Enable	Disable	0
Tank Level Control	Enable	Disable	0
Emergency Shutdown Device	Enable	Disable	0

11.4 Analogue Ranges

Analogue Input	Units	Range	Low	High
Leak Detector Cell 1	ppm	20	0	20
Leak Detector Cell 2	ppm	20-100	0	100
Leak Detector Cell 3	ppm	20	0	20
Cylinder Scale 1	kg	0 - 1000	0	70
Cylinder Scale 2	kg	0 - 1000	0	70
Chlorine Residual	mg/L	0 - 10	0	5
Flow Rate	m ³ /h	0 - 5000	0	100
Service Tank Level	m	0.00 – 50.00	0	5

12 Appendix A SCADA Map

Description	Input/Output Type	Tag	Unit	Address
Clear Water Tank Level Transmitter Selection	IED 1 Digital Input (TCPIP)	TA00010_SEL3E		42049.00
Chlorine ESD Shutdown Activated	IED 1 Digital Input (TCPIP)	PL00001_ACT1E		42049.01
Cl2 Cylinder Change Required	IED 1 Digital Input (TCPIP)	CD00104_REQ1AE		42049.02
Cl2 Store Door Open for 60 minutes	IED 1 Digital Input (TCPIP)	CL00002_CLS1AE		42049.03
Chlorine ESD Air Supply Low	IED 1 Digital Input (TCPIP)	AR00001_L1ALE		42049.04
Chlorine ESD Battery Voltage Low	IED 1 Digital Input (TCPIP)	BT00002_L1ALE		42049.05
Inlet Chlorine Residual High	IED 1 Digital Input (TCPIP)	AT00884_RES1AHE		42049.06
Inlet Chlorine Residual Low	IED 1 Digital Input (TCPIP)	AT00884_RES1ALE		42049.07
Chlorinator No.1 Loss of Vacuum	IED 1 Digital Input (TCPIP)	CL00809_P1ALE		42049.08
Chlorinator No.1 Loss of Chlorine	IED 1 Digital Input (TCPIP)	CL00809_P1AHE		42049.09
Chlorinator No.1 Dosing Fault	IED 1 Digital Input (TCPIP)	PU01201_FLT2AE		42049.10
Chlorinator No. 1 Flow Range	IED 1 Digital Input (TCPIP)	CL00809_RGE1E		42049.11
Chlorinator No.1 On	IED 1 Digital Input (TCPIP)	CL00809_RNG1E		42049.12
Chlorinator No.1 Hydraulic Fault	IED 1 Digital Input (TCPIP)	PU01201_FLT1AE		42049.13
Chlorinator No.1 Pump Overload	IED 1 Digital Input (TCPIP)	PU01201_OVL1AE		42049.14
Chlorinator No.1 Incomplete Start	IED 1 Digital Input (TCPIP)	PU01201_FLT3AE		42049.15
Chlorinator 1 On Normal (IED Control Enabled)	IED 1 Digital Input (TCPIP)	PU01201_ENA1E		42050.00
Chlorinator No.2 Loss of Vacuum	IED 1 Digital Input (TCPIP)	CL00809_P2ALE		42050.01
Chlorinator No.2 Loss of Chlorine	IED 1 Digital Input (TCPIP)	CL00809_P2AHE		42050.02
Chlorinator No.2 Dosing Fault	IED 1 Digital Input (TCPIP)	PU01202_FLT2AE		42050.03
Chlorinator No. 2 Flow Range	IED 1 Digital Input (TCPIP)	CL00809_RGE2E		42050.04
Chlorinator No.2 On	IED 1 Digital Input (TCPIP)	CL00809_RNG2E		42050.05
Chlorinator No.2 Hydraulic Fault	IED 1 Digital Input (TCPIP)	PU01202_FLT1AE		42050.06
Chlorinator No.2 Pump Overload	IED 1 Digital Input (TCPIP)	PU01202_OVL2AE		42050.07
Chlorinator No.2 Incomplete Start	IED 1 Digital Input (TCPIP)	PU01202_FLT3AE		42050.08
Chlorinator 2 On Normal (IED Control Enabled)	IED 1 Digital Input (TCPIP)	PU01202_ENA1E		42050.09
Analyser Sample Flow Low	IED 1 Digital Input (TCPIP)	AT00884_F1ALE		42050.10
Water Quality Poor	IED 1 Digital Input (TCPIP)	PL00001_FLT1AE		42050.11
Duty Chlorinator 1 Selected	IED 1 Digital Input (TCPIP)	PU01201_DTY1E		42050.12
Duty Chlorinator 2 Selected	IED 1 Digital Input (TCPIP)	PU01202_DTY1E		42050.13
Outlet Flow Rate Underrange	IED 1 Digital Input (TCPIP)	FT00002_F1AE		42050.14
Duty Daily Selected	IED 1 Digital Input (TCPIP)	PG00010_DTY2E		42050.15
Duty Auto Alternate Selected	IED 1 Digital Input (TCPIP)	PG00010_AUT1E		42051.00
Dose Rate High	IED 1 Digital Input (TCPIP)	CL00000_RTE1AHE		42051.01
PID in Auto	IED 1 Digital Input (TCPIP)	LP00001_AUT1E		42051.02
Dose Rate Low	IED 1 Digital Input (TCPIP)	CL00000_RTE1ALE		42051.03
Sample Water in Inlet Position	IED 1 Digital Input (TCPIP)	VA00003_INL1E		42051.04
Sample Water in Outlet Position	IED 1 Digital Input (TCPIP)	VA00003_OTL1E		42051.05
Sample Valve Failed to reach Inlet Position	IED 1 Digital Input (TCPIP)	VA00003_FLT1AE		42051.06
Sample Valve Failed to reach Outlet Position	IED 1 Digital Input (TCPIP)	VA00003_FLT2AE		42051.07
Zone Control Equipment Requested	IED 1 Digital Input (TCPIP)	ZM00010_RTR1E		42051.08
Flow Discrepancy	IED 1 Digital Input (TCPIP)	PL00001_DSC1AE		42051.09

Description	Input/Output Type	Tag	Unit	Address
Zone Control Equipment Mode in Manual	IED 1 Digital Input (TCPIP)	ZM00010_MAN1E		42051.10
1ppm Chlorine Leak Detected	IED 1 Digital Input (TCPIP)	CL00000_LDT3AE		42051.11
5ppm Chlorine Leak	IED 1 Digital Input (TCPIP)	CL00000_LDT1AE		42051.12
20ppm Chlorine Leak	IED 1 Digital Input (TCPIP)	CL00000_LDT2AE		42051.13
Chlorine leak detector cell failure	IED 1 Digital Input (TCPIP)	AT00140_FLT1AE		42051.14
Chlorinator manually disabled	IED 1 Digital Input (TCPIP)	CL00000_DIS1E		42051.15
Intruder alarm	IED 1 Digital Input (TCPIP)	PL00001_SEC2AE		42052.00
AC Power Failure	IED 1 Digital Input (TCPIP)	CC00010_E1AE		42052.01
Security System Armed	IED 1 Digital Input (TCPIP)	PL00001_SEC2E		42052.02
Fire Alarm	IED 1 Digital Input (TCPIP)	PL00001_WRN1AE		42052.03
Remote Selected	IED 1 Digital Input (TCPIP)	PL00001_REM1E		42052.04
CO2 Cylinder No.1 Empty	IED 1 Digital Input (TCPIP)	CD00104_L1ALE		42052.05
CO2 Cylinder No.2 Empty	IED 1 Digital Input (TCPIP)	CD00105_L1ALE		42052.06
Soda Ash batch Tank full	IED 1 Digital Input (TCPIP)	TA96001_L1HE		42052.07
Soda Ash batch Tank decanting/filling	IED 1 Digital Input (TCPIP)	TA96001_FLS1E		42052.08
Soda Ash batch Tank empty	IED 1 Digital Input (TCPIP)	TA96001_L1ALE		42052.09
Soda Ash Mixer on	IED 1 Digital Input (TCPIP)	MX96003_RNG1E		42052.10
Soda Ash Mixer Overload	IED 1 Digital Input (TCPIP)	MX96003_TOL1AE		42052.11
Soda Ash pH dosing Pump On	IED 1 Digital Input (TCPIP)	PU96002_RNG1E		42052.12
Soda Ash Storage Tank low	IED 1 Digital Input (TCPIP)	TA96002_L1LE		42052.13
Soda Ash Storage Tank < 40%	IED 1 Digital Input (TCPIP)	TA96002_L1LE		42052.14
Soda Ash Storage Tank > 40%	IED 1 Digital Input (TCPIP)	TA96002_L1HE		42052.15
Soda Ash Storage Tank high	IED 1 Digital Input (TCPIP)	TA96002_L1AHHE		42053.00
Soda Ash transfer Pump on	IED 1 Digital Input (TCPIP)	PU96001_RNG1E		42053.01
Soda Ash transfer Pump Fault	IED 1 Digital Input (TCPIP)	PU96001_FLT1AE		42053.02
Soda Ash transfer Pump Overload	IED 1 Digital Input (TCPIP)	PU96001_OVL1AE		42053.03
Inlet Turbidity High	IED 1 Digital Input (TCPIP)	AT00010_TUR1AHE		42053.04
Storage Tank Level High Alarm	IED 1 Digital Input (TCPIP)	TA00010_L1AHE		42053.05
Storage Tank Level Low Alarm	IED 1 Digital Input (TCPIP)	TA00010_L1ALE		42053.06
Storage Tank Level Discrepancy Alarm	IED 1 Digital Input (TCPIP)	TA00010_L1DSCAE		42053.07
Sodium Hypochlorite Bund -Tank Leak Alarm	IED 1 Digital Input (TCPIP)	TA81040_L1AHE		42053.08
Sodium Hypo Solution Tank Volume Low	IED 1 Digital Input (TCPIP)	TA81030_VOL1ALE		42053.09
Sample Water Reclaim Tank High	IED 1 Digital Input (TCPIP)	TA00020_L1AHE		42053.10
Sodium Hypo Dosing Pump No.1 Dosing Fault	IED 1 Digital Input (TCPIP)	PU81001_FLT2AE		42053.11
Sodium Hypo Dosing Pump No.1 On	IED 1 Digital Input (TCPIP)	PU81001_RNG1E		42053.12
Soda Ash batch Tank Feeder Incomplete Start	IED 1 Digital Input (TCPIP)	PU96010_STR1AE		42053.13
Soda Ash Hopper Level Low	IED 1 Digital Input (TCPIP)	TA96003_L1ALE		42053.14
Soda Ash Water Pressure Low	IED 1 Digital Input (TCPIP)	PT96003_P1ALE		42053.15
Sodium Hypo Dosing Pump No.1 On Normal (IED Control Enabled)	IED 1 Digital Input (TCPIP)	PU81001_ENA1E		42054.00
Sodium Hypo Dosing Pump No.2 Dosing Fault	IED 1 Digital Input (TCPIP)	PU81002_FLT2AE		42054.01
Sodium Hypo Dosing Pump No.2 On	IED 1 Digital Input (TCPIP)	PU81002_RNG1E		42054.02
Chlorine PID Manual Mode Selected	IED 1 Digital Input (TCPIP)	LP00001_MAN1E		42054.03
Ammonia PID Manual Mode Selected	IED 1 Digital Input (TCPIP)	LP88001_MAN1E		42054.04
Security System Arming Required	IED 1 Digital Input (TCPIP)	PL00001_SEC3AE		42054.05

Description	Input/Output Type	Tag	Unit	Address
Sodium Hypo Dosing Pump No.2 On Normal (IED Control Enabled)	IED 1 Digital Input (TCPIP)	PU81002_ENA1E		42054.06
Sodium Hypo Dosing Pump No.1 Flow Underrange	IED 1 Digital Input (TCPIP)	PU81001_F1AE		42054.07
Sodium Hypo Dosing Pump No.2 Flow Underrange	IED 1 Digital Input (TCPIP)	PU81002_F1AE		42054.08
Hypochlorite Storage Tank Volume Underrange	IED 1 Digital Input (TCPIP)	TA81030_VOL1AE		42054.09
Ammonia Analyser System Fault	IED 1 Digital Input (TCPIP)	AT00003_FLT1AE		42054.10
Total Ammonia Quality Poor	IED 1 Digital Input (TCPIP)	LP00001_FLT1AE		42054.11
Monochloramine Quality Poor	IED 1 Digital Input (TCPIP)	LP00001_FLT2AE		42054.12
Chlorine Cylinder No.1 Weight Underrange	IED 1 Digital Input (TCPIP)	CD00101_W1AE		42054.13
Chlorine Cylinder No.2 Weight Underrange	IED 1 Digital Input (TCPIP)	CD00102_W1AE		42054.14
Cell No.1 Chlorine Leak Underrange	IED 1 Digital Input (TCPIP)	AT00140_RES1AE		42054.15
Cell No.2 Chlorine Leak Underrange	IED 1 Digital Input (TCPIP)	AT00140_RES2AE		42055.00
Cell No.3 Chlorine Leak Underrange	IED 1 Digital Input (TCPIP)	AT00140_RES3AE		42055.01
Chlorine Residual Underrange	IED 1 Digital Input (TCPIP)	AT00884_RES1AE		42055.02
Turbidity Underrange	IED 1 Digital Input (TCPIP)	AT00010_TUR1AE		42055.03
Inflow Rate Underrange	IED 1 Digital Input (TCPIP)	FT00001_F1AE		42055.04
pH Underrange	IED 1 Digital Input (TCPIP)	AT00886_A1AE		42055.05
Storage Tank Level A Underrange	IED 1 Digital Input (TCPIP)	TA00010_L1AE		42055.06
Water Temperature Underrange	IED 1 Digital Input (TCPIP)	AT00002_T1AE		42055.07
Storage Tank Level B Underrange	IED 1 Digital Input (TCPIP)	TA00010_L2AE		42055.08
Total Ammonia Residual Underrange	IED 1 Digital Input (TCPIP)	AT00003_A1AE		42055.09
Monochloramine Residual Underrange	IED 1 Digital Input (TCPIP)	AT00003_A3AE		42055.10
Outlet Flow Comms Failed	IED 1 Digital Input (TCPIP)	FT00002_COM1AE		42055.11
Inlet Chlorine Residual High High	IED 1 Digital Input (TCPIP)	AT00884_RES1AHHE		42055.12
Inlet Chlorine Residual Low Low	IED 1 Digital Input (TCPIP)	AT00884_RES1ALLE		42055.13
Inlet Flow Comms Failed	IED 1 Digital Input (TCPIP)	FT00001_COM1AE		42055.14
100ppm Chlorine Leak	IED 1 Digital Input (TCPIP)	CL00000_LDT4AE		42055.15
Chlorine Cylinder No.5 Weight Underrange	IED 1 Digital Input (TCPIP)	CD00105_W1AE		42056.00
Chlorine Cylinder No.6 Weight Underrange	IED 1 Digital Input (TCPIP)	CD00106_W1AE		42056.01
Chlorine Cylinder No.7 Weight Underrange	IED 1 Digital Input (TCPIP)	CD00107_W1AE		42056.02
Chlorine Cylinder No.8 Weight Underrange	IED 1 Digital Input (TCPIP)	CD00108_W1AE		42056.03
Chlorinator 1 Vacuum Pressure Underrange	IED 1 Digital Input (TCPIP)	PT81101_P1AE		42056.04
Chlorinator 2 Vacuum Pressure Underrange	IED 1 Digital Input (TCPIP)	PT81101_P2AE		42056.05
Chlorinator 3 Vacuum Pressure Underrange	IED 1 Digital Input (TCPIP)	PT81201_P1AE		42056.06
Chlorinator 4 Vacuum Pressure Underrange	IED 1 Digital Input (TCPIP)	PT81201_P2AE		42056.07
Inlet pH High	IED 1 Digital Input (TCPIP)	AT00886_A1AHE		42057.00
Inlet pH Low	IED 1 Digital Input (TCPIP)	AT00886_A1ALE		42057.01
Ammonia Cylinder Change Required	IED 1 Digital Input (TCPIP)	CD88104_REQ1AE		42057.02
Ammonia Store Door Open for 60 minutes	IED 1 Digital Input (TCPIP)	PL88002_CLS1AE		42057.03
25ppm Ammonia Leak Detected	IED 1 Digital Input (TCPIP)	AT88000_LDT3AE		42057.04
35ppm Ammonia Leak Detected	IED 1 Digital Input (TCPIP)	AT88000_LDT1AE		42057.05
100ppm Ammonia Leak Detected	IED 1 Digital Input (TCPIP)	AT88000_LDT2AE		42057.06
Ammonia Leak Detector Cell Failure	IED 1 Digital Input (TCPIP)	AT88000_FLT1AE		42057.07
Ammoniator Manually Disabled	IED 1 Digital Input (TCPIP)	AT88000_DIS1E		42057.08
Ammonia Intruder alarm	IED 1 Digital Input (TCPIP)	PL88001_SEC2AE		42057.09

Description	Input/Output Type	Tag	Unit	Address
Ammoniator No.1 Loss of Vacuum	IED 1 Digital Input (TCPIP)	AT88809_P1ALE		42057.10
Ammoniator No.1 Loss of Ammonia	IED 1 Digital Input (TCPIP)	AT88809_P1AHE		42057.11
Ammoniator No.1 Dosing Fault	IED 1 Digital Input (TCPIP)	PU88201_FLT2AE		42057.12
Ammoniator No. 1 Flow Range	IED 1 Digital Input (TCPIP)	AT88809_RGE1E		42057.13
Ammoniator No.1 On	IED 1 Digital Input (TCPIP)	AT88809_RNG1E		42057.14
Ammoniator No.1 Hydraulic Fault	IED 1 Digital Input (TCPIP)	PU88201_FLT1AE		42057.15
Ammoniator No.1 Pump Overload	IED 1 Digital Input (TCPIP)	PU88201_OVL1AE		42058.00
Ammoniator No.1 Incomplete Start	IED 1 Digital Input (TCPIP)	PU88201_FLT3AE		42058.01
Ammoniator No.1 On Normal (IED Control Enabled)	IED 1 Digital Input (TCPIP)	PU88201_ENA1E		42058.02
Ammoniator No.2 Loss of Vacuum	IED 1 Digital Input (TCPIP)	AT88809_P2ALE		42058.03
Ammoniator No.2 Loss of Ammonia	IED 1 Digital Input (TCPIP)	AT88809_P2AHE		42058.04
Ammoniator No.2 Dosing Fault	IED 1 Digital Input (TCPIP)	PU88202_FLT2AE		42058.05
Ammoniator No. 2 Flow Range	IED 1 Digital Input (TCPIP)	AT88809_RGE2E		42058.06
Ammoniator No.2 On	IED 1 Digital Input (TCPIP)	AT88809_RNG2E		42058.07
Ammoniator No.2 Hydraulic Fault	IED 1 Digital Input (TCPIP)	PU88202_FLT1AE		42058.08
Ammoniator No.2 Pump Overload	IED 1 Digital Input (TCPIP)	PU88202_OVL2AE		42058.09
Ammoniator No.2 Incomplete Start	IED 1 Digital Input (TCPIP)	PU88202_FLT3AE		42058.10
Ammoniator No.2 On Normal (IED Control Enabled)	IED 1 Digital Input (TCPIP)	PU88202_ENA1E		42058.11
Ammonia Dose Rate High	IED 1 Digital Input (TCPIP)	AT88000_RTE1AHE		42058.12
Ammonia PID in Auto	IED 1 Digital Input (TCPIP)	LP88001_AUT1E		42058.13
Ammonia Dose Rate Low	IED 1 Digital Input (TCPIP)	AT88000_RTE1ALE		42058.14
Duty Ammoniator 1 Selected	IED 1 Digital Input (TCPIP)	PU88201_DTY1E		42058.15
Duty Ammoniator 2 Selected	IED 1 Digital Input (TCPIP)	PU88202_DTY1E		42059.00
Content Control Mode Monochloramine Selected	IED 1 Digital Input (TCPIP)	LP00001_SEL3E		42059.01
Ammonia Duty Daily Selected	IED 1 Digital Input (TCPIP)	PG88010_DTY2E		42059.02
Ammonia Duty Auto Alternate Selected	IED 1 Digital Input (TCPIP)	PG88010_AUT1E		42059.03
Ammonia ESD Air Supply Low	IED 1 Digital Input (TCPIP)	AR88001_L1ALE		42059.04
Ammonia ESD Battery Voltage Low	IED 1 Digital Input (TCPIP)	BT88002_L1ALE		42059.05
Inlet Ammonia Residual Total High	IED 1 Digital Input (TCPIP)	AT00003_RES1AHE		42059.06
Inlet Ammonia Residual Total Low	IED 1 Digital Input (TCPIP)	AT00003_RES1ALE		42059.07
Ammonia Cylinder No.1 Weight Underrange	IED 1 Digital Input (TCPIP)	CD88101_W1AE		42059.08
Ammonia Cylinder No.2 Weight Underrange	IED 1 Digital Input (TCPIP)	CD88102_W1AE		42059.09
Cell No.1 Ammonia Leak Underrange	IED 1 Digital Input (TCPIP)	AT88000_RES1AE		42059.10
Cell No.2 Ammonia Leak Underrange	IED 1 Digital Input (TCPIP)	AT88000_RES2AE		42059.11
Inlet Ammonia Residual Total High High	IED 1 Digital Input (TCPIP)	AT88000_RES1AHHE		42059.12
Inlet Ammonia Residual Total Low Low	IED 1 Digital Input (TCPIP)	AT88000_RES1ALLE		42059.13
Safety Shower in Operation	IED 1 Digital Input (TCPIP)	PL00001_STA1AE		42059.14
Chlorine Cylinder Manifold Vacuum Pressure Underrange	IED 1 Digital Input (TCPIP)	PT80001_P1AE		42059.15
CO2 Dosing Pump Running	IED 1 Digital Input (TCPIP)	PU00104_RNG1E		42060.00
CO2 Dosing Pump Hydraulic Fault	IED 1 Digital Input (TCPIP)	PU00104_FLT1AE		42060.01
CO2 Dosing Pump Overload	IED 1 Digital Input (TCPIP)	PU00104_OVL1AE		42060.02
CO2 Dosing Pump Incomplete Start	IED 1 Digital Input (TCPIP)	PU00104_FLT3AE		42060.03
Chlorine Cylinder No.3 Weight Underrange	IED 1 Digital Input (TCPIP)	CD00103_W1AE		42060.04
Chlorine Cylinder No.4 Weight Underrange	IED 1 Digital Input (TCPIP)	CD00104_W1AE		42060.05

Description	Input/Output Type	Tag	Unit	Address
CO2 Dosing Pump On Normal (IED Control Enabled)	IED 1 Digital Input (TCPIP)	PU00104_ENA1E		42060.06
Zone Control Equipment 2 Start Requested	IED 1 Digital Input (TCPIP)	ZM00010_RTR2E		42060.07
Bank No.1 Valve Opened	IED 1 Digital Input (TCPIP)	VA80013_OPN1E		42060.08
Bank No.1 Valve Closed	IED 1 Digital Input (TCPIP)	VA80013_CLS1E		42060.09
Bank No.1 Valve Fault	IED 1 Digital Input (TCPIP)	VA80013_FLT1AE		42060.10
Bank No.2 Valve Opened	IED 1 Digital Input (TCPIP)	VA80014_OPN1E		42060.11
Bank No.2 Valve Closed	IED 1 Digital Input (TCPIP)	VA80014_CLS1E		42060.12
Bank No.2 Valve Fault	IED 1 Digital Input (TCPIP)	VA80014_FLT1AE		42060.13
PID Auto Setpoint Enabled	IED 1 Digital Input (TCPIP)	LP00001_ENA1E		42060.14
PID Setpoint Control Mode	IED 1 Digital Input (TCPIP)	LP00001_AUT2E		42060.15
Chlorinator No.1 Isolation Valve Opened	IED 1 Digital Input (TCPIP)	VA81111_OPN1E		42061.00
Chlorinator No.1 Isolation Valve Closed	IED 1 Digital Input (TCPIP)	VA81111_CLS1E		42061.01
Chlorinator No.1 Isolation Valve Fault	IED 1 Digital Input (TCPIP)	VA81111_FLT1AE		42061.02
Chlorinator No.2 Isolation Valve Opened	IED 1 Digital Input (TCPIP)	VA81106_OPN1E		42061.03
Chlorinator No.2 Isolation Valve Closed	IED 1 Digital Input (TCPIP)	VA81106_CLS1E		42061.04
Chlorinator No.2 Isolation Valve Fault	IED 1 Digital Input (TCPIP)	VA81106_FLT1AE		42061.05
Ammoniator No.1 Isolation Valve Opened	IED 1 Digital Input (TCPIP)	VA88111_OPN1E		42061.08
Ammoniator No.1 Isolation Valve Closed	IED 1 Digital Input (TCPIP)	VA88111_CLS1E		42061.09
Ammoniator No.1 Isolation Valve Fault	IED 1 Digital Input (TCPIP)	VA88111_FLT1AE		42061.10
Ammoniator No.2 Isolation Valve Opened	IED 1 Digital Input (TCPIP)	VA88106_OPN1E		42061.11
Ammoniator No.2 Isolation Valve Closed	IED 1 Digital Input (TCPIP)	VA88106_CLS1E		42061.12
Ammoniator No.2 Isolation Valve Fault	IED 1 Digital Input (TCPIP)	VA88106_FLT1AE		42061.13
Ammonia ESD Shutdown Activated	IED 1 Digital Input (TCPIP)	PL00001_ACT2E		42061.14
Storage Tank Zone Control Inhibit	IED 1 Digital Input (TCPIP)	ZM00010_INH1E		42061.15
Container No.1 Control Valve Open	IED 1 Digital Input (TCPIP)	VA80117_OPN1E		42062.00
Container No.1 Control Valve Closed	IED 1 Digital Input (TCPIP)	VA80117_CLS1E		42062.01
Container No.1 Control Valve Fault	IED 1 Digital Input (TCPIP)	VA80117_FLT1AE		42062.02
Container No.2 Control Valve Open	IED 1 Digital Input (TCPIP)	VA80118_OPN1E		42062.03
Container No.2 Control Valve Closed	IED 1 Digital Input (TCPIP)	VA80118_CLS1E		42062.04
Container No.2 Control Valve Fault	IED 1 Digital Input (TCPIP)	VA80118_FLT1AE		42062.05
Container No.3 Control Valve Open	IED 1 Digital Input (TCPIP)	VA80119_OPN1E		42062.06
Container No.3 Control Valve Closed	IED 1 Digital Input (TCPIP)	VA80119_CLS1E		42062.07
Container No.3 Control Valve Fault	IED 1 Digital Input (TCPIP)	VA80119_FLT1AE		42062.08
Container No.4 Control Valve Open	IED 1 Digital Input (TCPIP)	VA80120_OPN1E		42062.09
Container No.4 Control Valve Closed	IED 1 Digital Input (TCPIP)	VA80120_CLS1E		42062.10
Container No.4 Control Valve Fault	IED 1 Digital Input (TCPIP)	VA80120_FLT1AE		42062.11
Container No.5 Control Valve Open	IED 1 Digital Input (TCPIP)	VA80121_OPN1E		42062.12
Container No.5 Control Valve Closed	IED 1 Digital Input (TCPIP)	VA80121_CLS1E		42062.13
Container No.5 Control Valve Fault	IED 1 Digital Input (TCPIP)	VA80121_FLT1AE		42062.14
Container No.6 Control Valve Open	IED 1 Digital Input (TCPIP)	VA80122_OPN1E		42062.15
Container No.6 Control Valve Closed	IED 1 Digital Input (TCPIP)	VA80122_CLS1E		42063.00
Container No.6 Control Valve Fault	IED 1 Digital Input (TCPIP)	VA80122_FLT1AE		42063.01
Container No.7 Control Valve Open	IED 1 Digital Input (TCPIP)	VA80123_OPN1E		42063.02
Container No.7 Control Valve Closed	IED 1 Digital Input (TCPIP)	VA80123_CLS1E		42063.03

Description	Input/Output Type	Tag	Unit	Address
Container No.7 Control Valve Fault	IED 1 Digital Input (TCPIP)	VA80123_FLT1AE		42063.04
Container No.8 Control Valve Open	IED 1 Digital Input (TCPIP)	VA80124_OPN1E		42063.05
Container No.8 Control Valve Closed	IED 1 Digital Input (TCPIP)	VA80124_CLS1E		42063.06
Container No.8 Control Valve Fault	IED 1 Digital Input (TCPIP)	VA80124_FLT1AE		42063.07
Chlorinator No.3 Loss of Vacuum	IED 1 Digital Input (TCPIP)	CL81201_P1ALE		42064.00
Chlorinator No.3 Loss of Chlorine	IED 1 Digital Input (TCPIP)	CL81201_P1AHE		42064.01
Chlorinator No.3 Dosing Fault	IED 1 Digital Input (TCPIP)	PU01203_FLT2AE		42064.02
Chlorinator No. 3 Flow Range	IED 1 Digital Input (TCPIP)	CL81201_RGE1E		42064.03
Chlorinator No.3 On	IED 1 Digital Input (TCPIP)	CL81201_RNG1E		42064.04
Chlorinator No.3 Hydraulic Fault	IED 1 Digital Input (TCPIP)	PU01203_FLT1AE		42064.05
Chlorinator No.3 Pump Overload	IED 1 Digital Input (TCPIP)	PU01203_OVL1AE		42064.06
Chlorinator No.3 Incomplete Start	IED 1 Digital Input (TCPIP)	PU01203_FLT3AE		42064.07
Chlorinator 3 On Normal (IED Control Enabled)	IED 1 Digital Input (TCPIP)	PU01203_ENA1E		42064.08
Chlorinator No.3 Isolation Valve Opened	IED 1 Digital Input (TCPIP)	VA81211_OPN1E		42064.09
Chlorinator No.3 Isolation Valve Closed	IED 1 Digital Input (TCPIP)	VA81211_CLS1E		42064.10
Chlorinator No.3 Isolation Valve Fault	IED 1 Digital Input (TCPIP)	VA81211_FLT1AE		42064.11
Chlorinator No.4 Loss of Vacuum	IED 1 Digital Input (TCPIP)	CL81201_P2ALE		42064.12
Chlorinator No.4 Loss of Chlorine	IED 1 Digital Input (TCPIP)	CL81201_P2AHE		42064.13
Chlorinator No.4 Dosing Fault	IED 1 Digital Input (TCPIP)	PU01204_FLT2AE		42064.14
Chlorinator No. 4 Flow Range	IED 1 Digital Input (TCPIP)	CL81201_RGE2E		42064.15
Chlorinator No.4 On	IED 1 Digital Input (TCPIP)	CL81201_RNG2E		42065.00
Chlorinator No.4 Hydraulic Fault	IED 1 Digital Input (TCPIP)	PU01204_FLT1AE		42065.01
Chlorinator No.4 Pump Overload	IED 1 Digital Input (TCPIP)	PU01204_OVL1AE		42065.02
Chlorinator No.4 Incomplete Start	IED 1 Digital Input (TCPIP)	PU01204_FLT3AE		42065.03
Chlorinator 4 On Normal (IED Control Enabled)	IED 1 Digital Input (TCPIP)	PU01204_ENA1E		42065.04
Chlorinator No.4 Isolation Valve Opened	IED 1 Digital Input (TCPIP)	VA81206_OPN1E		42065.05
Chlorinator No.4 Isolation Valve Closed	IED 1 Digital Input (TCPIP)	VA81206_CLS1E		42065.06
Chlorinator No.4 Isolation Valve Fault	IED 1 Digital Input (TCPIP)	VA81206_FLT1AE		42065.07
Sample Pump Running	IED 1 Digital Input (TCPIP)	PU03003_RNG1E		42065.08
Sample Pump Overload	IED 1 Digital Input (TCPIP)	PU03003_OVL1AE		42065.09
Service Water Fault	IED 1 Digital Input (TCPIP)	PU03303_FLT1AE		42065.10
UPS Healthy	IED 1 Digital Input (TCPIP)	UP00001_E1AE		42065.11
Site Main Switchboard Security Breached	IED 1 Digital Input (TCPIP)	PL00001_SEC3E		42065.12
Service Tank Hatch	IED 1 Digital Input (TCPIP)	TA0010_SEC1AE		42065.13
Emergency Response Required	IED 1 Digital Input (TCPIP)	PL00001_ER1E		42065.14
Site Main Switchboard AC Failure	IED 1 Digital Input (TCPIP)	CC00001_E1AE		42065.15
Scrubber Blower Running	IED 1 Digital Input (TCPIP)	BL81201_RNG1AE		42066.00
Scrubber Blower Fault	IED 1 Digital Input (TCPIP)	BL81201_FLT1AE		42066.01
Extraction Damper Open	IED 1 Digital Input (TCPIP)	VA80110_OPN1E		42066.02
Extraction Damper Closed	IED 1 Digital Input (TCPIP)	VA80110_CLS1E		42066.03
Extraction Damper Fault	IED 1 Digital Input (TCPIP)	VA80110_FLT1AE		42066.04
Scrubber Differential Pressure Underrange	IED 1 Digital Input (TCPIP)	PT81221_P1AE		42066.05
Scrubber Chlorine Leak Underrange	IED 1 Digital Input (TCPIP)	AT00140_RES4AE		42066.06
Batch Tank Level Underrange	IED 1 Digital Input (TCPIP)	TA96001_L1AE		42066.07

Description	Input/Output Type	Tag	Unit	Address
CO2 Dosing Pump No.2 Running	IED 1 Digital Input (TCPIP)	PU00204_RNG1E		42066.10
CO2 Dosing Pump No.2 Hydraulic Fault	IED 1 Digital Input (TCPIP)	PU00204_FLT1AE		42066.11
CO2 Dosing Pump No.2 Pump Overload	IED 1 Digital Input (TCPIP)	PU00204_OVL1AE		42066.12
CO2 Dosing Pump No.2 Incomplete Start	IED 1 Digital Input (TCPIP)	PU00204_FLT3AE		42066.13
CO2 Dosing Pump No.2 On Normal (IED Control Enabled)	IED 1 Digital Input (TCPIP)	PU00204_ENA1E		42066.14
CO2 Cell CO2 Leak Underrange	IED 1 Digital Input (TCPIP)	AT89101_RES1AE		42066.15
Hypo Bund Valve On Normal (IED Control Enabled)	IED 1 Digital Input (TCPIP)	VA82106_ENA1E		42067.00
Hypo Bund Valve Open	IED 1 Digital Input (TCPIP)	VA82106_OPN1E		42067.01
Hypo Bund Valve Closed	IED 1 Digital Input (TCPIP)	VA82106_CLS1E		42067.02
Containment Tank Level High	IED 1 Digital Input (TCPIP)	TA82107_L1AHE		42067.03
Roller Door Open	IED 1 Digital Input (TCPIP)	PL00001_SEC4E		42067.04
Reticulation Tank High	IED 1 Digital Input (TCPIP)	TA00030_L1AHE		42067.05
Reticulation Tank Low	IED 1 Digital Input (TCPIP)	TA00030_L1ALE		42067.06
Load in Valve in Containment Position	IED 1 Digital Input (TCPIP)	VA82105_OPN1E		42067.07
Load in Valve in Drain Position	IED 1 Digital Input (TCPIP)	VA82105_CLS1E		42067.08
Scrubber Blower CSS Normal	IED 1 Digital Input (TCPIP)	BL81201_ENA1AE		42067.09
Scrubber Outlet Chlorine Measurement High	IED 1 Digital Input (TCPIP)	AT00140_FLT2AE		42067.10
Total Chlorine Underrange	IED 1 Digital Input (TCPIP)	AT00003_A2AE		42067.11
Free Ammonia Underrange	IED 1 Digital Input (TCPIP)	AT00003_A4AE		42067.12
Ammonia Analyser Sample Flow Low	IED 1 Digital Input (TCPIP)	AT00003_F1ALE		42067.13
Turbidity Analyser Sample Flow Low	IED 1 Digital Input (TCPIP)	AT00010_F1ALE		42067.14
RTU Midnight Pulse	IED 1 Digital Output (TCPIP)	RT00001_K1CE		42113.00
Chlorine Gas System Misc Fault Reset	IED 1 Digital Output (TCPIP)	CD00103_RST1CE		42113.02
System 1 Chlorinator Fault Reset	IED 1 Digital Output (TCPIP)	CL00809_RST1CE		42113.03
Chlorine System 1 Ejector Boost Fault Reset	IED 1 Digital Output (TCPIP)	PU01201_RST1CE		42113.04
Chlorine System 1 Ejector Boost Fault Reset	IED 1 Digital Output (TCPIP)	PU01201_RST1CE		42113.04
Chlorine System 1 Ejector Boost Fault Reset	IED 1 Digital Output (TCPIP)	PU01201_RST1CE		42113.04
System 2 Chlorinator Fault Reset	IED 1 Digital Output (TCPIP)	CL00809_RST2CE		42113.05
Chlorine System 2 Ejector Boost Fault Reset	IED 1 Digital Output (TCPIP)	PU01202_RST1CE		42113.06
Sodium Hypo Dosing Unit 1 Fault Reset	IED 1 Digital Output (TCPIP)	PU81001_RST1CE		42113.07
Sodium Hypo Dosing Unit 2 Fault Reset	IED 1 Digital Output (TCPIP)	PU81002_RST1CE		42113.08
Sodium Hypo Storage Fault Reset	IED 1 Digital Output (TCPIP)	TA81030_RST1CE		42113.09
Inlet Chlorine Residual Fault Reset	IED 1 Digital Output (TCPIP)	AT00884_RST1CE		42113.10
Auto Alternate Duty Select	IED 1 Digital Output (TCPIP)	PG00010_AUT1CE		42113.11
Auto Alternate Duty Select	IED 1 Digital Output (TCPIP)	PG00010_AUT1CE		42113.11
Chlorinator 1 Duty Select	IED 1 Digital Output (TCPIP)	PU01201_DTY1CE		42113.12
Chlorinator 2 Duty Select	IED 1 Digital Output (TCPIP)	PU01202_DTY1CE		42113.13
Daily or Weekly Duty Select	IED 1 Digital Output (TCPIP)	PG00010_AUT2CE		42113.14
Daily or Weekly Duty Select	IED 1 Digital Output (TCPIP)	PG00010_AUT2CE		42113.14
PID Remote Manual	IED 1 Digital Output (TCPIP)	LP00001_MAN1CE		42113.15
PID Remote Manual	IED 1 Digital Output (TCPIP)	LP00001_MAN1CE		42113.15
Dosing Room PID Fault Reset	IED 1 Digital Output (TCPIP)	CL00000_RST1CE		42114.00
Dosing Room PID Fault Reset	IED 1 Digital Output (TCPIP)	CL00000_RST1CE		42114.00
Dosing Room Sample Valve Fault Reset	IED 1 Digital Output (TCPIP)	VA00003_RST1CE		42114.01

Description	Input/Output Type	Tag	Unit	Address
Zone Control Equipment Manual Start/Open Request Select	IED 1 Digital Output (TCPIP)	ZM00010_RTR1CE		42114.02
Zone Control Equipment Manual Mode Select	IED 1 Digital Output (TCPIP)	ZM00010_MAN1CE		42114.03
Remote Select	IED 1 Digital Output (TCPIP)	PL00001_REM1CE		42114.04
Local Select	IED 1 Digital Output (TCPIP)	PL00001_LOC1CE		42114.05
Miscellaneous Fault Reset	IED 1 Digital Output (TCPIP)	PL00001_RST1CE		42114.06
Chlorine ESD Shutdown Activate Select	IED 1 Digital Output (TCPIP)	PL00001_ACT1CE		42114.07
Content Control Mode - Chlorine Select	IED 1 Digital Output (TCPIP)	LP00001_SEL1CE		42114.08
Water Treatment Inhibit (Optional)	IED 1 Digital Output (TCPIP)	PL00001_INH1CE		42114.09
Content Control Mode - Monochloramine Select	IED 1 Digital Output (TCPIP)	LP00001_SEL2CE		42114.10
PID Automatic Setpoint Enable Select	IED 1 Digital Output (TCPIP)	LP00001_ENA1CE		42114.11
PID Automatic Setpoint Disable Select	IED 1 Digital Output (TCPIP)	LP00001_NENA1CE		42114.12
Zone Control Equipment 2 Force Start	IED 1 Digital Output (TCPIP)	ZM00010_FRC2CE		42114.13
Temperature Underrange (Used when it connects to RTU)	IED 1 Digital Output (TCPIP)	AT00002_TIACE		42114.14
CO2 Dosing System 1 Fault Reset	IED 1 Digital Output (TCPIP)	PU00104_RST1CE		42114.15
CO2 Dosing System 2 Fault Reset	IED 1 Digital Output (TCPIP)	PU00204_RST1CE		42115.00
Chlorinator 3 Duty Select	IED 1 Digital Output (TCPIP)	PU01201_DTY1CE		42115.01
Chlorinator 4 Duty Select	IED 1 Digital Output (TCPIP)	PU01202_DTY1CE		42115.02
System 3 Chlorinator Fault Reset	IED 1 Digital Output (TCPIP)	CL81201_RST1CE		42115.03
System 4 Chlorinator Fault Reset	IED 1 Digital Output (TCPIP)	CL81201_RST2CE		42115.04
Storage Tank Level A Select	IED 1 Digital Output (TCPIP)	TA00010_SEL1CE		42121.00
Storage Tank Level B Select	IED 1 Digital Output (TCPIP)	TA00010_SEL2CE		42121.01
Ammonia Gas System Misc Fault Reset	IED 1 Digital Output (TCPIP)	CD88103_RST1CE		42121.02
System 1 Ammoniator Fault Reset	IED 1 Digital Output (TCPIP)	AT88809_RST1CE		42121.03
Ammonia System 1 Ejector Boost Fault Reset	IED 1 Digital Output (TCPIP)	PU88201_RST1CE		42121.04
System 2 Ammoniator Fault Reset	IED 1 Digital Output (TCPIP)	AT88809_RST2CE		42121.05
Ammonia System 2 Ejector Boost Fault Reset	IED 1 Digital Output (TCPIP)	PU88202_RST1CE		42121.06
Ammonia PID Remote Manual	IED 1 Digital Output (TCPIP)	LP88001_MAN1CE		42121.07
Ammonia PID Fault Reset	IED 1 Digital Output (TCPIP)	AT88000_RST1CE		42121.08
Ammonia Auto Alternate Duty Select	IED 1 Digital Output (TCPIP)	PG88010_AUT1CE		42121.09
Ammoniator 1 Duty Select	IED 1 Digital Output (TCPIP)	PU88201_DTY1CE		42121.10
Ammoniator 2 Duty Select	IED 1 Digital Output (TCPIP)	PU88202_DTY1CE		42121.11
Ammonia Daily or Weekly Duty Select	IED 1 Digital Output (TCPIP)	PG88010_AUT2CE		42121.12
Chlorine Cylinder No.1 Weight	IED 1 Analog Input (TCPIP)	CD00101_W1E	kg	42177
Chlorine Cylinder No.2 Weight	IED 1 Analog Input (TCPIP)	CD00102_W1E	kg	42178
Cell No.1 Chlorine Leak	IED 1 Analog Input (TCPIP)	AT00140_RES1E	ppm	42179
Cell No.2 Chlorine Leak	IED 1 Analog Input (TCPIP)	AT00140_RES2E	ppm	42180
Inlet Chlorine Residual High Deviation SP Feedback	IED 1 Analog Input (TCPIP)	AT00884_RES1SHE		42181
Inlet Chlorine Residual Low	IED 1 Analog Input (TCPIP)	AT00884_RES1SLE		42182
Inlet Chlorine Residual	IED 1 Analog Input (TCPIP)	AT00884_RES1E	mg/L	42183
Outlet Chlorine Residual	IED 1 Analog Input (TCPIP)	AT00884_RES2E	mg/L	42184
Cell No.3 Chlorine Leak	IED 1 Analog Input (TCPIP)	AT00140_RES3E	ppm	42185
Chlorine Residual SP	IED 1 Analog Input (TCPIP)	CL00809_RES1SE	mg/L	42186
Inlet Chlorine Residual High High SP Feedback	IED 1 Analog Input (TCPIP)	AT00884_RESSHHE		42187
Chlorine Remote Manual Dose Rate	IED 1 Analog Input (TCPIP)	CD00000_MAN1E		42188

Description	Input/Output Type	Tag	Unit	Address
Chlorine Gas Flow Rate	IED 1 Analog Input (TCPIP)	CL00809_F1E	g/h	42189
Chlorine PID Maximum Dose Rate Limit	IED 1 Analog Input (TCPIP)	LP00001_RTE1SXE		42190
Chlorine PID Minimum Dose Rate Limit	IED 1 Analog Input (TCPIP)	LP00001_RTE1SIE		42191
Chlorine Maximum Dose Rate	IED 1 Analog Input (TCPIP)	CD00000_RTE1SXE		42192
Inlet Turbidity	IED 1 Analog Input (TCPIP)	AT00010_TUR1E	NTU	42193
Inlet Chlorine Residual Low Low SP Feedback	IED 1 Analog Input (TCPIP)	AT00884_RESSLLE		42194
Zone Control Equipment Start Setpoint	IED 1 Analog Input (TCPIP)	ZM00010_STR1SE		42195
Zone Control Equipment Stop Setpoint	IED 1 Analog Input (TCPIP)	ZM00010_STP1SE		42196
pH Calibration factor	IED 1 Analog Input (TCPIP)	AT00886_PVL1SE		42197
Inlet pH	IED 1 Analog Input (TCPIP)	AT00886_A1E		42198
Storage Tank Level A	IED 1 Analog Input (TCPIP)	TA00010_L1E	m	42199
Inlet Water Temperature	IED 1 Analog Input (TCPIP)	AT00002_T1E	°C	42200
Inlet Total Ammonia Residual	IED 1 Analog Input (TCPIP)	AT00003_A1E	mg/L	42201
Chlorine Cylinder Manifold Vacuum Pressure	IED 1 Analog Input (TCPIP)	PT80001_P1E	kPa	42202
Inlet Flow Meter Oldest Error Pending	IED 1 Analog Input (TCPIP)	FT00001_STA1E		42203
Outlet Flow Meter Oldest Error Pending	IED 1 Analog Input (TCPIP)	FT00002_STA1E		42204
Dosing Unit 1 Hypochlorite Flow Rate	IED 1 Analog Input (TCPIP)	PU81001_F1E	mL/h	42205
Dosing Unit 2 Hypochlorite Flow Rate	IED 1 Analog Input (TCPIP)	PU81002_F1E	mL/h	42206
Hypochlorite Storage Tank Volume	IED 1 Analog Input (TCPIP)	TA81030_VOL1E	L	42208
Storage Tank Volume	IED 1 Analog Input (TCPIP)	TA00010_VOL1E	kL	42209
Storage Tank Level B	IED 1 Analog Input (TCPIP)	TA00010_L2E	m	42210
Chlorine PID Output	IED 1 Analog Input (TCPIP)	LP00001_RTE1E	%	42211
PLC to RTU Comms Check	IED 1 Analog Input (TCPIP)	PC00001_CNT1		42212
Outlet Turbidity	IED 1 Analog Input (TCPIP)	AT00010_TUR2E	NTU	42213
Outlet pH	IED 1 Analog Input (TCPIP)	AT00886_A2E		42214
Outlet Water Temperature	IED 1 Analog Input (TCPIP)	AT00002_T2E	°C	42215
Outlet Total Ammonia Residual	IED 1 Analog Input (TCPIP)	AT00003_A2E	mg/L	42216
Chlorine PID Process Variable	IED 1 Analog Input (TCPIP)	CL00809_PVL1E	mg/L	42218
Inlet Monochloramine as Nitrogen	IED 1 Analog Input (TCPIP)	AT00003_A3E	mg/L	42219
Outlet Monochloramine Residual	IED 1 Analog Input (TCPIP)	AT00003_A4E	mg/L	42220
Inlet Free Ammonia Residual	IED 1 Analog Input (TCPIP)	AT00003_A5E	mg/L	42221
Outlet Free Ammonia Residual	IED 1 Analog Input (TCPIP)	AT00003_A6E	mg/L	42222
Chlorine Cylinder No.3 Weight	IED 1 Analog Input (TCPIP)	CD00103_W1E	kg	42223
Chlorine Cylinder No.4 Weight	IED 1 Analog Input (TCPIP)	CD00104_W1E	kg	42224
Storage Tank Level High SP FB	IED 1 Analog Input (TCPIP)	TA00010_L1SHE		42225
Storage Tank Level Low SP FB	IED 1 Analog Input (TCPIP)	TA00010_L1SLE		42226
Zone Control Equipment 2 Start SP FB	IED 1 Analog Input (TCPIP)	ZM00010_STR2SE		42227
Zone Control Equipment 2 Stop SP FB	IED 1 Analog Input (TCPIP)	ZM00010_STP2SE		42228
Cell No.3 Ammonia Leak	IED 1 Analog Input (TCPIP)	AT88000_RES3E	ppm	42229
Ammonia Cylinder Manifold Vacuum Pressure	IED 1 Analog Input (TCPIP)	PT88001_P1E	kPa	42230
Pre-Chlorine Gas Flow Rate	IED 1 Analog Input (TCPIP)	CL81201_F1E	g/h	42233
Scrubber Differential Pressure	IED 1 Analog Input (TCPIP)	PT81221_P1E	kPa	42234
Scrubber Chlorine Leak	IED 1 Analog Input (TCPIP)	AT00140_RES4E	ppm	42235
CO2 Cell CO2 Leak	IED 1 Analog Input (TCPIP)	AT89101_RES1E	ppm	42236

Description	Input/Output Type	Tag	Unit	Address
Batch Tank Level	IED 1 Analog Input (TCPIP)	TA96001_L1E	m	42237
Chlorine Cylinder No.5 Weight	IED 1 Analog Input (TCPIP)	CD00105_W1E	kg	42238
Chlorine Cylinder No.6 Weight	IED 1 Analog Input (TCPIP)	CD00106_W1E	kg	42239
Chlorine Cylinder No.7 Weight	IED 1 Analog Input (TCPIP)	CD00107_W1E	kg	42240
Chlorine Cylinder No.8 Weight	IED 1 Analog Input (TCPIP)	CD00108_W1E	kg	42241
Chlorinator 1 Vacuum Pressure	IED 1 Analog Input (TCPIP)	PT81101_P1E	kPa	42242
Chlorinator 2 Vacuum Pressure	IED 1 Analog Input (TCPIP)	PT81101_P2E	kPa	42243
Chlorinator 3 Vacuum Pressure	IED 1 Analog Input (TCPIP)	PT81201_P1E	kPa	42244
Chlorinator 4 Vacuum Pressure	IED 1 Analog Input (TCPIP)	PT81201_P2E	kPa	42245
kW Instant	IED 1 Analog Input (TCPIP)	PL00001_J1QE	kWh	42246
kVA Instant	IED 1 Analog Input (TCPIP)	PL00001_J2QE	kVARh	42247
kW Total	IED 1 Analog Input (TCPIP)	PL00001_J9QE	Kwh	42248
kVA Total	IED 1 Analog Input (TCPIP)	PL00001_J6QE	kVARh	42249
Hypochlorite Storage Tank No.1 Level	IED 1 Analog Input (TCPIP)	TA82110_L1E	m	42250
Hypochlorite Storage Tank No.2 Level	IED 1 Analog Input (TCPIP)	TA82120_L1E	m	42251
Bund Conductivity	IED 1 Analog Input (TCPIP)	AT82153_C1E	mS/m	42252
Inlet Conductance	IED 1 Analog Input (TCPIP)	AT00004_C1E	mS/m	42253
Outlet Conductance	IED 1 Analog Input (TCPIP)	AT00004_C2E	mS/m	42254
Reticulation Tank Level	IED 1 Analog Input (TCPIP)	TA00030_L1E	m	42255
Inlet Total Chlorine	IED 1 Analog Input (TCPIP)	AT00003_A7E	mg/L	42256
Outlet Total Chlorine	IED 1 Analog Input (TCPIP)	AT00003_A8E	mg/L	42257
Ammonia Cylinder No.1 Weight	IED 1 Analog Input (TCPIP)	CD88101_W1E	kg	42305
Ammonia Cylinder No.2 Weight	IED 1 Analog Input (TCPIP)	CD88102_W1E	kg	42306
Cell No.1 Ammonia Leak	IED 1 Analog Input (TCPIP)	AT88000_RES1E	ppm	42307
Cell No.2 Ammonia Leak	IED 1 Analog Input (TCPIP)	AT88000_RES2E	ppm	42308
Inlet Ammonia Residual High High SP Feedback	IED 1 Analog Input (TCPIP)	AT88000_RESSHHE		42309
Ammonia PID Output	IED 1 Analog Input (TCPIP)	LP88001_RTE1E	%	42310
Ammonia Residual SP	IED 1 Analog Input (TCPIP)	AT88809_RES1SE	mg/L	42311
Inlet Ammonia Residual Low Low SP Feedback	IED 1 Analog Input (TCPIP)	AT88000_RESSLLE		42312
Ammonia Remote Manual Dose Rate	IED 1 Analog Input (TCPIP)	CD88000_MAN1E		42313
Ammonia Gas Flow Rate	IED 1 Analog Input (TCPIP)	AT88809_F1E	g/h	42314
Ammonia PID Process Variable	IED 1 Analog Input (TCPIP)	AT88809_PVL1E	mg/L	42315
Ammonia PID Upper Dose Rate Limit	IED 1 Analog Input (TCPIP)	LP88001_RTE1SXE		42316
Ammonia PID Lower Dose Rate Limit	IED 1 Analog Input (TCPIP)	LP88001_RTE1SIE		42317
Ammonia Maximum Dose Rate	IED 1 Analog Input (TCPIP)	CD88000_RTE1SXE		42318
Inlet Ammonia Residual Total High Deviation SP Feedback	IED 1 Analog Input (TCPIP)	AT88000_RES1SHE		42319
Inlet Ammonia Residual Total Low Deviation SP Feedback	IED 1 Analog Input (TCPIP)	AT88000_RES1SLE		42320
Inlet Forward Flow Rate	IED 1 Real Input (TCPIP)	FT00001_F1E	L/s	42465
Inlet Forward Flow Total	IED 1 Real Input (TCPIP)	FT00001_F1QE	kL	42467
Inlet Reverse Flow Rate	IED 1 Real Input (TCPIP)	FT00001_F2E	L/s	42469
Inlet Reverse Flow Total	IED 1 Real Input (TCPIP)	FT00001_F2QE	kL	42471
Outlet Forward Flow Rate	IED 1 Real Input (TCPIP)	FT00002_F1E	L/s	42473
Outlet Forward Flow Total	IED 1 Real Input (TCPIP)	FT00002_F1QE	kL	42475
Outlet Reverse Flow Rate	IED 1 Real Input (TCPIP)	FT00002_F2E	L/s	42477

Description	Input/Output Type	Tag	Unit	Address
Outlet Reverse Flow Total	IED 1 Real Input (TCPIP)	FT00002_F2QE	kL	42479
Inlet Chlorine Residual High Deviation Setpoint	IED 1 Analog Output (TCPIP)	AT00884_RES1SHCE	mg/L	42369
Inlet Chlorine Residual Low Deviation Setpoint	IED 1 Analog Output (TCPIP)	AT00884_RES1SLCE	mg/L	42370
Chlorine Remote Residual SP	IED 1 Analog Output (TCPIP)	CL00809_RES1SCE	mg/L	42371
Chlorine Remote Manual Dose Rate	IED 1 Analog Output (TCPIP)	CD00000_MAN1CE	mg/L	42372
Chlorine PID Maximum Dose Rate Limit	IED 1 Analog Output (TCPIP)	LP00001_RTE1SXCE	mg/L	42373
Chlorine PID Minimum Dose Rate Limit	IED 1 Analog Output (TCPIP)	LP00001_RTE1SICE	mg/L	42374
Chlorine Maximum Dose Rate	IED 1 Analog Output (TCPIP)	CD00000_RTE1SXCE	mg/L	42375
PH Calibration factor	IED 1 Analog Output (TCPIP)	AT00886_PVL1SCE		42376
Zone Control Equipment 1 Start SP	IED 1 Analog Output (TCPIP)	ZM00010_STR1SCE	m	42377
Zone Control Equipment 1 Stop SP	IED 1 Analog Output (TCPIP)	ZM00010_STP1SCE	m	42378
Zone Control Equipment 2 Start SP	IED 1 Analog Output (TCPIP)	ZM00010_STR2SCE	m	42379
Zone Control Equipment 2 Stop SP	IED 1 Analog Output (TCPIP)	ZM00010_STP2SCE	m	42380
	IED 1 Analog Output (TCPIP)			42381
	IED 1 Analog Output (TCPIP)			42382
RTU to PLC Comms Check	IED 1 Analog Output (TCPIP)	RT00001_CNT1		42383
Storage Tank Level High SP	IED 1 Analog Output (TCPIP)	TA00010_L1SHCE	m	42384
Ammonia Remote Residual SP	IED 1 Analog Output (TCPIP)	AT88809_RES1SCE	mg/L	42409
Ammonia Remote Manual Dose Rate	IED 1 Analog Output (TCPIP)	CD88000_MAN1CE	mg/L	42410
Ammonia PID Upper Dose Rate Limit	IED 1 Analog Output (TCPIP)	LP88001_RTE1SXCE	mg/L	42411
Ammonia PID Lower Dose Rate Limit	IED 1 Analog Output (TCPIP)	LP88001_RTE1SICE	mg/L	42412
Ammonia PID Lower Dose Rate Limit	IED 1 Analog Output (TCPIP)	CD88000_RTE1SXCE	mg/L	42413
Inlet Chlorine Residual High High SP	IED 1 Analog Output (TCPIP)	AT00884_RESSHCE	mg/L	42414
Inlet Chlorine Residual Low Low SP	IED 1 Analog Output (TCPIP)	AT00884_RESSLCE	mg/L	42415
Storage Tank Level Low SP	IED 1 Analog Output (TCPIP)	TA00010_L1SLCE	m	42416
Inlet Ammonia Residual High High SP	IED 1 Analog Output (TCPIP)	AT88000_RESSHCE	mg/L	42417
Inlet Ammonia Residual Low Low SP	IED 1 Analog Output (TCPIP)	AT88000_RESSLCE	mg/L	42418
Inlet Ammonia Residual Total High Deviation SP	IED 1 Analog Output (TCPIP)	AT88000_RES1SHCE	mg/L	42419
Inlet Ammonia Residual Total Low Deviation SP	IED 1 Analog Output (TCPIP)	AT88000_RES1SLCE	mg/L	42420
Temperature (Reserve - used when it connects to RTU)	IED 1 Analog Output (TCPIP)	AT00002_T1CE		42421
RTU Time - Date	IED 1 Analog Output (TCPIP)	RT00001_K2CE		42422
RTU Time - Month	IED 1 Analog Output (TCPIP)	RT00001_K3CE		42423
RTU Time - Year	IED 1 Analog Output (TCPIP)	RT00001_K4CE		42424
RTU Time - Day of Week	IED 1 Analog Output (TCPIP)	RT00001_K5CE		42425

Note: Register addresses shall be contiguous.

13 Appendix A Functional Description Overview

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