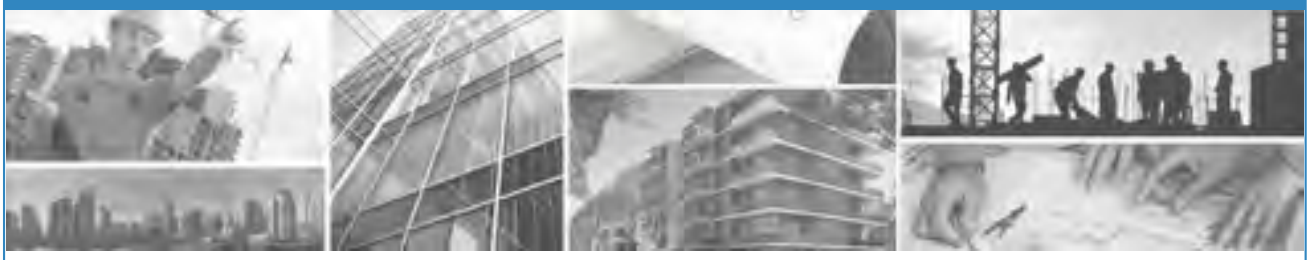

OPERATIONS AND MAINTENANCE MANUALS

Regional Lagoons Manuals > ST52 Forest Hill STP > Chemical dosing equipment

Builder
Thomas Coffey

Compiled
Feb 03, 2015

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Introduction

Forest Hill CO2 Gas Control - Introduction

This operation and maintenance manual presents information required for installation, operation, and maintenance of the CO2 Gas Control system supplied to Thomas & Coffey for the Forest Hill Regional Lagoon Upgrade Project.

The Grundfos CO2 Gas Control system is a low maintenance liquid feed dosing system, designed to provide continuous supply of chemical from the dosing skid to the dosing points.

This document is intended as a guide to assist Operators in understanding and operating the CO2 Gas Control system. This document contains information regarding the CO2 Gas Control system only within the scope of supply of Grundfos.

Maintenance

Forest Hill CO2

1 - Daily

SECTION 5: ROUTINE MAINTENANCE

5.1 Cleaning the Equipment

1. The pipe work and hardware on the skid should be cleaned only with mild detergent and damp cloth. No solvents or abrasive cleaners should be used.

5.3 Routine Maintenance Schedules

Equipment

Remove dirt and debris buildup - As required

All equipment - Visual inspection - Physically check for leaks - Daily

1 - Monthly

SECTION 5: ROUTINE MAINTENANCE

Routine Maintenance Schedules

pH Dosing Panel - Line strainers - these will require frequent cleaning during the first 3-4 months of operation due to contaminants in the tank and pipe work. Frequency during this period should be weekly. After this time, as required - approximately monthly.

Equipment

Physically check for vibration and security of mounting - Monthly

1 - Yearly

SECTION 5: ROUTINE MAINTENANCE

5.3 Routine Maintenance Schedules

Yearly

Equipment

Replace pump kit - Refer to Grundfos Installation & Maintenance Manual – Section 9 - Yearly

Suction and Discharge Valve Cleaning / Replacement -

1. Unscrew the valves.
2. Unscrew the screw parts and valve set using round nose pliers.
3. Dismantle the inner part (seat, O-ring, balls, ball cages and, if present, spring).
4. Clean all parts. Replace faulty parts by new ones.
5. Re-assemble the valve.
6. Replace the O-rings by new ones. Refit the valve.

Injection Quill Cleaning -

1. Remove the Injection Quill
2. Clean the submersed tip with mild detergent and damp cloth.
3. Reinstall.

CO2 Purifier Cartridge Replacement -

1. Unscrew every cylinder connection hose on the CO2 Gas manifold from the cylinder.
2. Bleed off the retained manifold pressure by loosening the hose to manifold fitting (verify pressure drop on regulator gauge) Caution: The system pressure has potential to reach approximately 75 Bar. Full PPE should be used.
3. Loosen M3 set screw on the filter assembly near the hose hand wheel.
4. Dismantle cartridge holder and replace with new CO2 Purifier Cartridge

Calibrate pH Sensor - Follow instructions in the Dia 2Q manual -

1. Isolate both valves on either side of the sensor.
2. Unscrew the sensor and insert into the Buffer calibration solution.
3. Calibrate the sensor using the lower pH buffer valve as per instructions for the DIA-2Q (Page 46) Rinse sensor in water before next step.
4. Calibrate the sensor using the upper pH buffer valve as per instructions for the DIA-2Q (Page 46)
5. Replace sensor.

Linked Documents

CO2 Dosing Equipment Photos .pdf

INJECTION QUILL

INJECTION QUILL PARTIALLY WITHDRAWN

INJECTION QUILL GAS ISOLATION

pH PROBE (BLACK UNIT)

pH PRE-AMPLIFIER

AREAS TO CLEAN (CO2 DOSING)

GAS FILTER

INJECTION QUILL

CO2 CONTROL PANEL

Operations & Tech Data

Carbon Dioxide Dosinf Functional Description

Service : (1.0) Site, Process or Subprocess

Subservice : (SP_) SEWER_PS

The Carbon Dioxide (CO2) system starts when it receives a signal from the Magflow meter (FIT-0108-001) via the DIA-2Q pH Meter (PHT-0740-001) to inputs 800 & 801. The control of the CO2 dosing is the DIA 2Q pH Meter which monitors the pH of the MF Filtrate water by the pH Probe. The feedback from the probe then regulates the proportional control valve on the CO2 Dosing Panel to open proportionally to the 4-20 mA signal. In order for the 4-20 mA signal to be sent from the DAI 2Q, it must meet certain conditions:

1. A run signal is received from plant control via volt free contact.
2. The sample water flow switch (FS-0740-001) is closed to indicate that there is water flowing over the pH sensor (AE-0740-001).
3. The flow meter is sending a 4-20 mA signal indicating that there is water flowing in the MF Filtrate line.

Once these conditions are met, the DAI 2Q pH Meter will send the 4-20 mA run signal to the CO2 Dosing Panel. For the Dosing panel to operate there are certain conditions that it needs to meet:

1. The high pressure switches (PSL-0740-001 & PSL-0740-002) must indicate that the duty bank pressure is closed to run.
2. The motorised Ball valve (MV-0740-001) is in the correct position for the duty bank to run.
3. The low pressure switch is not activated indicating the system is ready to run.

Once these conditions are meet, the signal from the pH meter will open the shut off solenoid valve (SV-0740-001) and control the proportional control solenoid valve SV-0740-002.

The maximum amount of CO2 gas is regulated via the manual flow meter (FL-0740-001) and set to the maximum usage as per specifications. Forest Hill peak usage is 0.6 Kg/h.

This given peak usage rates, translate to peak usage of 1.85 L/min at 3 bar back pressure for Forest Hill . The back pressure is factory set and do not need to be adjusted.

Factory tests prove that the 4-20 mA signal controlling the proportional control vale will give a lineal flow rate of CO2 gas into the injection quill.

The CO2 system is also a are flow paced system, which means that if the water flow rate is increased, the CO2 gas rate is increased proportionally, and then monitored and adjusted via the pH sensor probe feedback.

If the Injection Quill diffuser blocks, then the back pressure will increase and activate the alarm on the low pressure side resulting in shutting off the CO2 Gas dosing system. This meets the specifications and is designed to send fault signals to the plant control room.

The automatic CO2 cylinder bank changeover is controlled by the PLC within the CO2 control electrical panel. The conditions that are required to change form duty bank 1 to standby bank 2 are:

- The high pressure switch will close to activate a low gas pressure condition.
- The PLC sends the run signal to the L Port Motorised ball valve (MV-0740-001) to change to standby bank 2.
- Once the ball valve is in the correct position, the switch integral within the motorised ball valve will signal back to the PLC.
- The system will continue to dose CO2, but a Red light will remain on the CO2 panel to indicate that bank

1 is in a low pressure state and needs to be replenished.

- The duty 2 bank will show a Green light to indicate that it is in use.
- The Red light will remain illuminated until the pressure is restored within bank 1. Note: - There is no need to shut off system to replenish the empty gas bottles, as each flexible hose has a non-return valve fitted at each bottle connection, allowing a seamless change-over process.
- All bottles need to be replaced within each bank when the empty light is illuminated, as they are connected via each bank manifold. As soon as one cylinder is replaced, there is sufficient pressure to turn off the empty bank light, although the other bottles have not yet been replaced.

There is a fault light on the control panel that will illuminate if any of the below conditions are met:

- Low pressure switch activated on the high pressure supply side from switches (PSL-0740-001 and PSL-0740-002)
- The motorised ball valve (MV-0740-001) has reached the correct position in the allocated time.

There is a separate alarm light for the low pressure switch indicating a blocked injector.

Forest Hill CO2 Gas Control - OPERATING INSTRUCTIONS

Service : (8.0) Energy Transfer

Subservice : (BRN) WASTE_GAS_FLARE

Operational Procedures

DANGER!

- Moving Parts
- Potential Slip Hazard
- Chemical Contact

Prior to Start-up

- Prior to Start-up, the following items need to be checked:
- Ensure adequate supply of chemical is available to the dosing system.
- Isolation Valves are configured correctly as set out in tables below. (Refer to the P&IDs)
- Ensure that no alarms are activated.

Safety Aspects

- “Always” wear protective clothing when operating or undertaking any maintenance on the chemical systems. i.e. clothing, eye protection, gloves.
- “Always” ensure you isolate the power to the equipment you are about to work on, to avoid the risk of the equipment starting up without warning.
- “Always” ensure you isolate the suction and discharge of each pump before attempting to do any service work or repairs.
- “Always” relieve the back pressure in the discharge line between the isolation valve and the pump, prior to attempting to work on the pump, or remove any fittings, unions, or connections.
- Chemical dosing skids require established safety guidelines for plant operation and maintenance.
- Note: These procedures do not address all of the safety concerns associated with operating this system and do not replace a properly designed and implemented facility safety program. It is the responsibility of the user to establish appropriate safety and health practices and ensure that they are implemented.
- Operators should be familiar with chemicals being utilised (Refer to Material Data Sheets supplied by

Chemical Manufacturers/Suppliers) and all hazards associated with the equipment provided (Refer to the Manufacturers' Literature).

- Equipment warranty can be voided due to inappropriate operation - e.g.:

1. running the pump with the suction/isolation valve closed
2. perform routine maintenance – refer to individual manufacturer manuals
3. Keep strainer clear – failing to do so will destroy the diaphragm valves
4. Hand tighten PVC fittings only - do not over-tighten

The following safety pre-cautions should be followed during plant operation:

- DO NOT operate any rotating equipment without the protective guards in place.
- DO NOT attempt to dismantle any pipe work and fittings, prior to relieving the system pressure within all of the lines.
- Warning: All electrical work must be carried out by a qualified electrician.

Established facility safety procedures should be followed during maintenance:

Local isolators and motors should be properly locked and/or tagged out according to plant safety procedures. A facility policy should be in place and followed to prevent unauthorised maintenance on the skids, including pipe work dismantling and testing.

1. Maintenance may require use of multiple tools, disassembly of equipment, and/or removal of guards normally in place when equipment is operating.
2. Eye protection should be worn at all times when operating, or adjusting any equipment on the dosing skids, whilst systems are operational, or stationary, due to pressure and possible corrosive nature of fluids contained within the pipe work and fittings.
3. These measures should be outlined in facility manuals, and addressed in personnel training.
4. It is the responsibility of the end-user to establish safe work-practices for Plant operation.

INSTALLATION & COMMISSIONING

Standards and Procedures - Mechanical Equipment

AS2032: Installation for PVC Pipe Systems

AS1554.6: Welding Stainless Steel for structural purposes

AS1345: Identification of the contents of pipes, conduits and ducts

AS3780: The Storage and Handling of Corrosive Substances

AS1692: Steel Tanks for flammable and combustible liquids

AS1940: The Storage and handling of flammable and combustible liquids

AS1657: Fixed Platforms, walkways, stairways and ladders – Design, construction and installation

Standards and Procedures for Wiring the Equipment

AS3000: Electrical Installations (wiring rules)

AS3008: Electrical Installations – Selection of Cables

Standards and Procedures for Lubricating the Equipment

Please refer to Manufacturer's O&M Manuals

Installation and Commissioning Instructions

Installation Instructions

1. Ensure the site civil works have been completed and all services are available.
2. Identify any hazards or safety issues before installation proceeds by completing site relative workplace risk assessment and job safety analysis sheets.
3. Mark out site to ensure correct location and orientation as per site requirements and design.
4. Ensure all plant components have arrived to site ready for the installation.
5. Using a crane, lower the storage tanks into the final position.
6. Fix the tank to the footings with chemical anchors.
7. Cut, glue and fit the vent assembly, overflow/drain, and truck fill lines to the storage tank.
8. Carefully unpack all crates and lift the dosing skid and unloading panels into the correct position ensuring the inlet and outlet of the dosing skid are correct to the desired layout.
9. Fix the dosing skid and unloading panels into position using chemical anchors, making sure it is level and plumb before final lockdown.
10. Mark out the route for the suction line from the storage tank to the inlet of the dosing skid then cut, glue and fix the pipework into final position.
11. Mark out and fit pipework from service water line to the flush water circuit inlet.
12. Connect the outlet of the dosing skid to the dosing point carrier lines
13. Connect services and complete all wiring to the dosing system and conduct all testing before commissioning.

Commissioning Instructions

1. Ensure services are available.
2. Visually inspect all plumbing and Electrical Equipment.
3. Physically examine all valves, unions etc.
4. Proceed as per Commissioning Test Sheet.

Note: Operators should be aware of updated Site Dosing Specifications and adjust test procedures / values accordingly.

CO2 Troubleshooting Flow Chart

Linked Documents

Visio-Troubleshooting Flowchart - chemical systems - CO2 Gas system Rev 2 (3).pdf

Kelco P20 Flow Switch

Service : (6.0) Control and Instrumentation

Subservice : (FE_) FLOW SENSOR

Linked Documents

P20 Flow Switch Brochure (3).pdf

pH Probe Sensor

Service : (6.0) Control and Instrumentation

Subservice : (AE_) ANALYSER

Linked Documents

pH Probe OPF10TI (3).pdf

Dia 2Q Settings

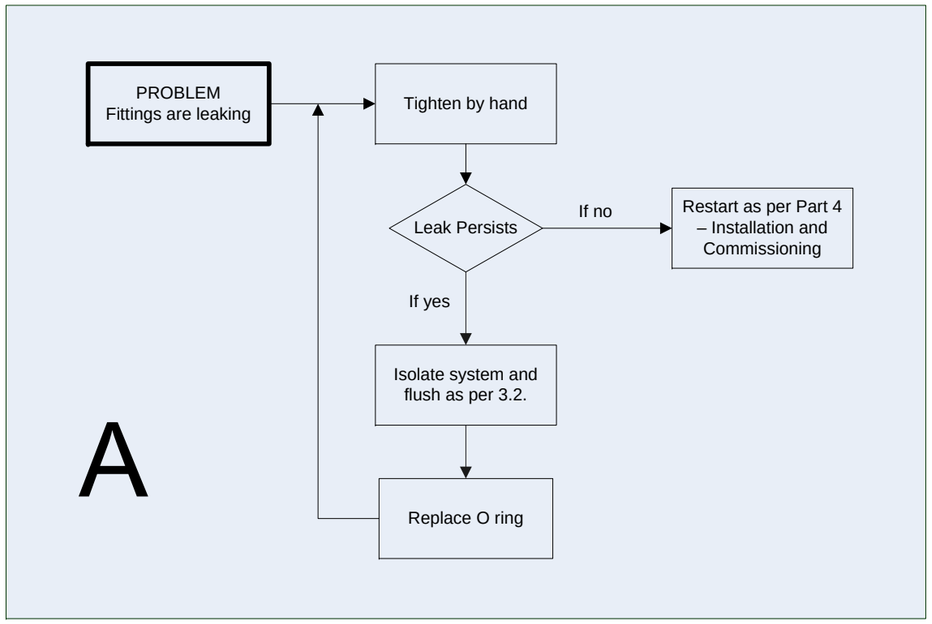
Service : (6.0) Control and Instrumentation

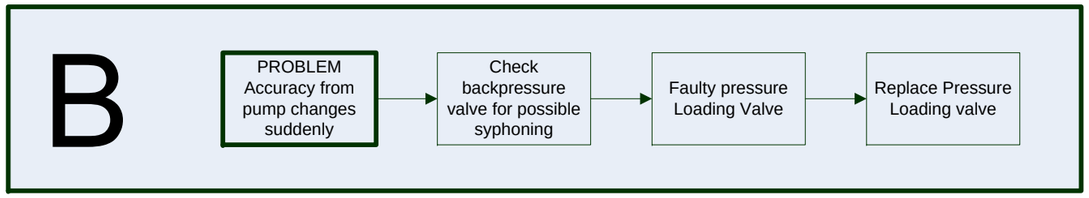
Subservice : (CTI) CONTROL_&_INSTR

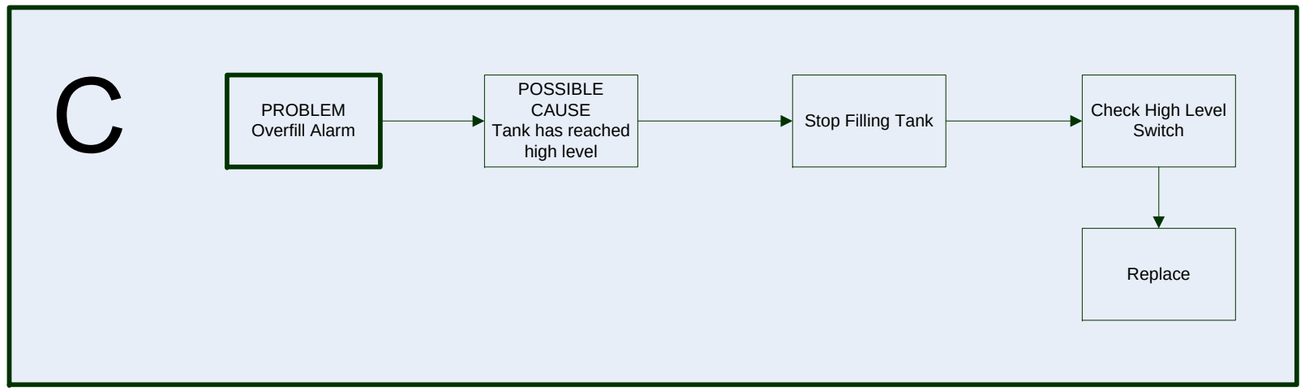
Linked Documents

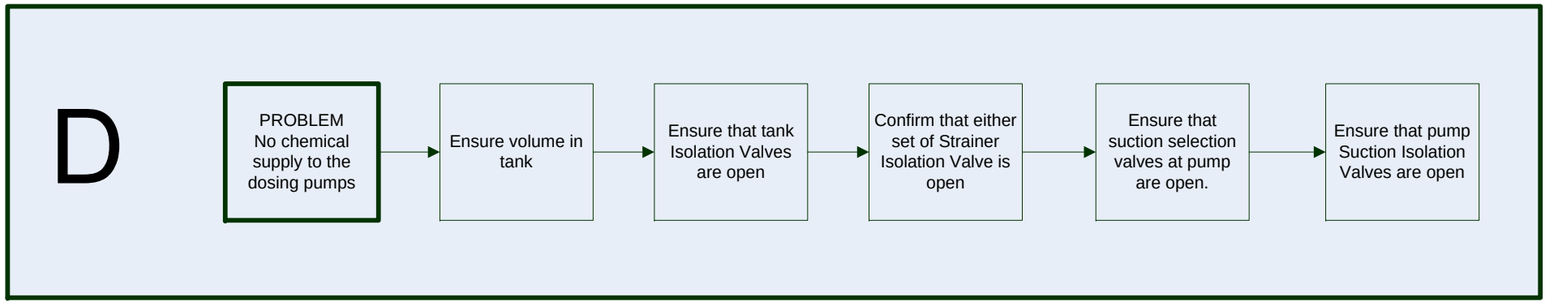
DIA 2Q Setings - Forest Hill.pdf

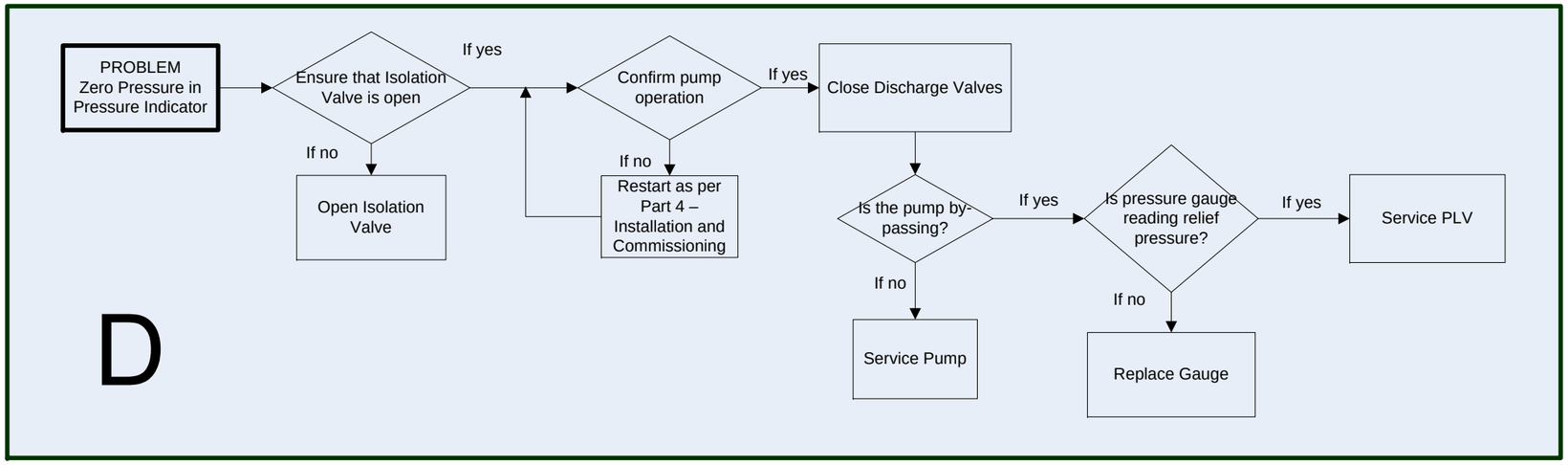
Troubleshooting Flowchart

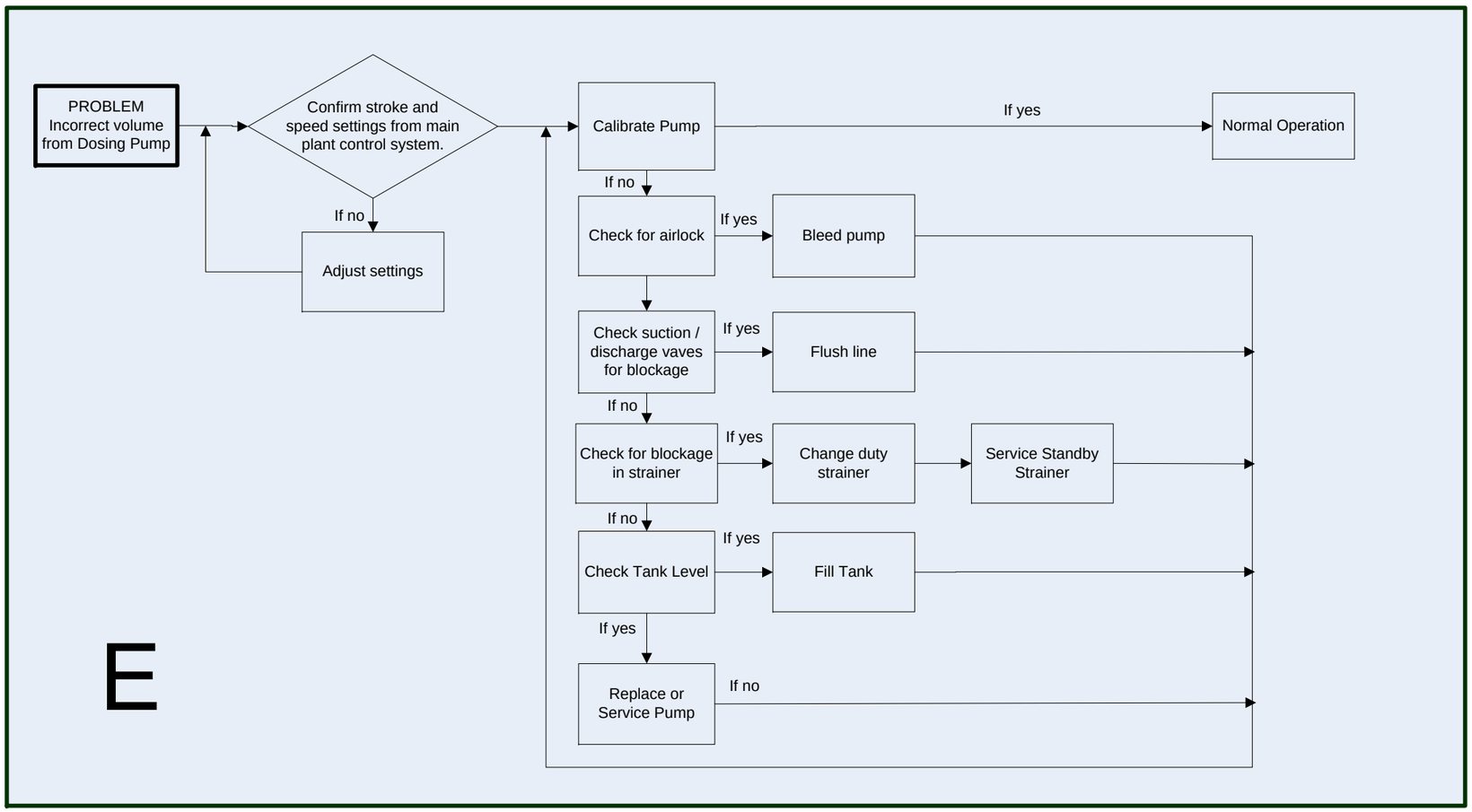




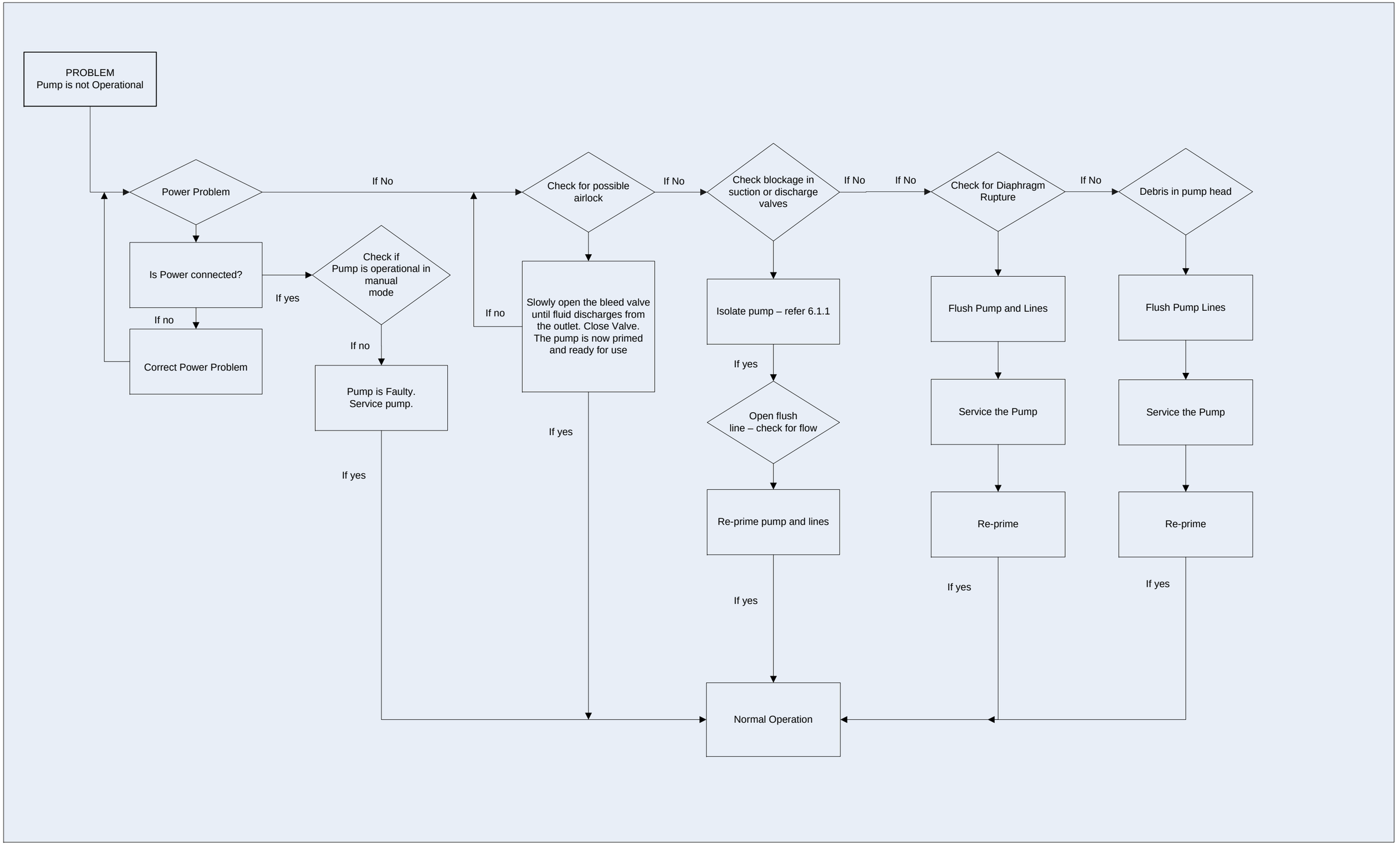





PROBLEM
Zero Pressure in Pressure Indicator
Ensure that Isolation Valve is open
If yes
If no
Open Isolation Valve
Confirm pump operation
If yes
If no
Restart as per Part 4 – Installation and Commissioning
Close Discharge Valves
Is the pump by-passing?
If yes
If no
Service Pump
Is pressure gauge reading relief pressure?
If yes
If no
Replace Gauge
Service PLV
D

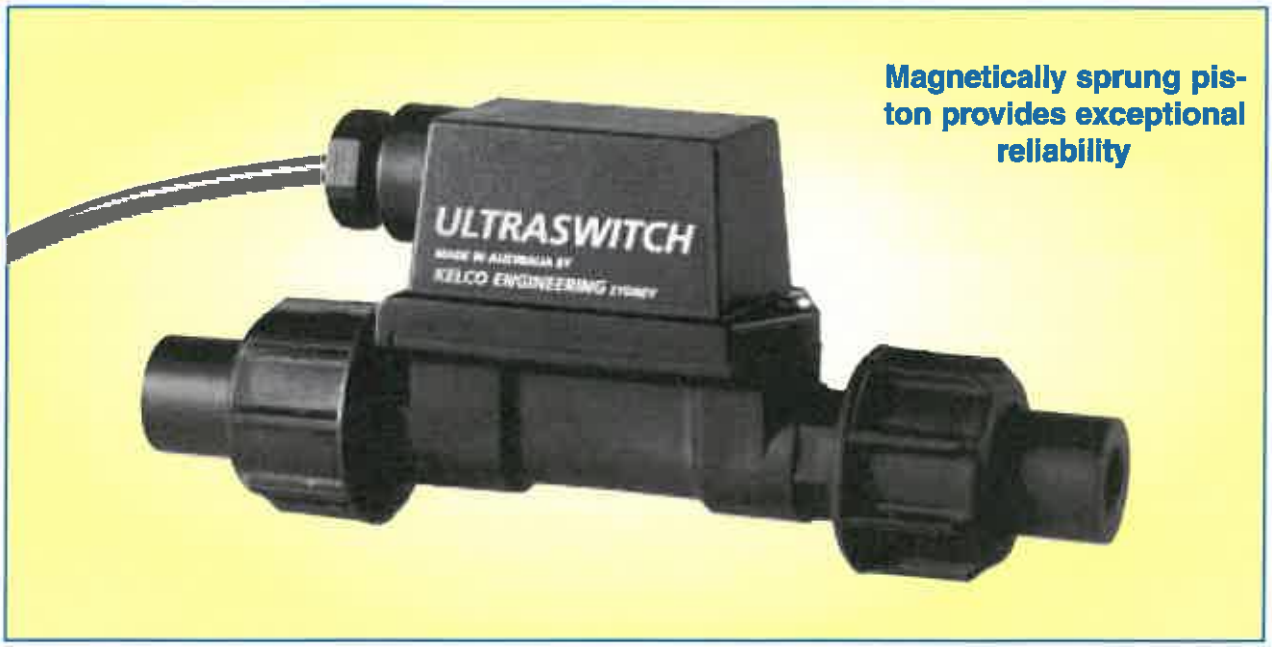

PROBLEM
Incorrect volume from Dosing Pump
Confirm stroke and speed settings from main plant control system.
If no
Adjust settings
Calibrate Pump
If yes
Normal Operation
If no
Check for airlock
If yes
Bleed pump
Check suction / discharge vaves for blockage
If yes
Flush line
If no
Check for blockage in strainer
If yes
Change duty strainer
Service Standby Strainer
If no
Check Tank Level
If yes
Fill Tank
If yes
Replace or Service Pump
If no
E

Common Faults and Symptoms



ULTRASWITCH P20 SERIES

CORROSION RESISTANT IN LINE FLOW SWITCHES



Magnetically sprung piston provides exceptional reliability

FEATURES

- SUITS TUBES & PIPES 6 TO 20 MM (¼" TO ¾") DIA.
- NO METAL PARTS IN CONTACT WITH LIQUIDS
- ALL POSITION MOUNTING
- CHOICE OF 3 SWITCHING FLOW RATES
- DETECTS VERY LOW FLOWS
- ROBUST RELIABLE SWITCH
- EASY TO INSTALL
- HIGH FLOW THROUGH
- 18 BAR (260 PSI) PRESSURE RATING
- VERY LOW HEAD LOSS
- MANY OPTIONS AVAILABLE

HORIZONTAL MOUNTING

VERTICAL MOUNTING

APPLICATIONS

- Liquid or gas flow detection
- Constant pressure pump control
- Loss of prime pump protection
- Water treatment contol
- Industrial process control
- Irrigation control
- Chemical dosing systems
- Chilled water control
- Vapour flow detection

AUSTRALIAN MADE

GENERAL INFORMATION

DESCRIPTION

The P20 In line Flow Switch is a simple and reliable flow switch that can detect the flow of liquids or gases in tubes and small diameter pipes. The P20 can detect either continuous or pulsed flows. Typical applications include monitoring flow in water treatment and irrigation systems, domestic constant pressure system control, gland cooling systems and a myriad of uses in industrial process control. The P20 flow switch gives a simple on or off response to liquid flow. There are no metal parts in contact with liquids within the switch, so the P20 is ideal for use in aggressive liquids such as seawater, groundwater, acids and many chemical solutions. The standard switch is supplied complete with pipe spigots and unions, for direct fitting into PVC or ABS pipe work. In addition 6 electrical modules are available that give a wide choice of control options. These include electrical modules with single and multiple reed switches, relays with various coil voltages, and solid-state switches. Each P20 flow switch is supplied complete with 3 pistons, to provide the user with a wide choice of flow switching points.

OPERATING PRINCIPLE

The body of the P20 flow switch houses a fluted piston. Any flow, either pulsed or continuous, causes the piston to be pushed back within the switch body to a point where the liquid can pass over the piston and out of the switch. The piston contains a magnet that actuates a reed switch and this provides the switching output. When flow stops, the piston is pushed back to the off position by a second magnet built into the switch body. No metal parts are in contact with the process liquid, and the magnetically sprung piston provides an exceptionally reliable corrosion proof mechanism. The sensitivity of the flow switch and its switching point are determined by the viscosity of the fluid and by the clearance between the piston and the switch body. The P20 flow switch can be mounted in any orientation in pipe-work, including upside down, with no adverse effects.

CONSTRUCTION

The standard P20 flow switch is made from glass reinforced polypropylene and ABS, with neoprene o-ring seals. The piston return mechanism and the electrical switching action within the switch are achieved using high power magnets operating through the solid body of the switch. The electrical housing is hose-proof & weatherproof, and is supplied with a built in 20mm cable gland, for conduit or flexible cable entry. The electrical circuit boards used in the switch are interchangeable, and all of the parts of the P20 flow switch are available as spare parts.

OPTIONS

In addition to a choice of 6 standard circuit boards to suit the P20 flow switch; the user also has the following options.

Each P20 flow switch is supplied complete with 3 pistons. By simply changing pistons the user has the choice of 3 switching points, 140 millilitres per minute, 570 millilitres per minute or 1.70 Litres per minute. In addition, for OEM applications, switches can be ordered pre-set to any required switching point from one Litre per hour to 4 Litres per minute. Contact your supplier for details.

The standard P20 flow switch is supplied complete with inlet and outlet pipe connections with 20mm (3/4 BSP) male threads and unions. Pipe spigots in 15 nominal size are also included. In addition, the P20 flow switch can also be ordered with optional 25mm (1" BSP) unions and 20mm (3/4") nominal size spigots, in PVC or ABS.

MADE IN AUSTRALIA BY **KELCO ENGINEERING**
Manufacturing division of CYNCARD PTY LTD A.B.N. 20 002 834 844
Head Office and Factory: 2/9 Powells Road BROOKVALE 2100 AUSTRALIA
Postal Address: PO Box 496 BROOKVALE NSW 2100
Phone: 61 2 (02) 9905 6425 Fax: 61 2 (02) 9905 6420
Email: kelco@wr.com.au URL: http;//www.kelco.com.au

P20 SERIES IN LINE FLOW SWITCH TECHNICAL DATA

The P20 In Line Flow Switch is a versatile and adaptable flow switch that lends itself to a myriad of applications ranging from low flow detection in chemical metering systems through to domestic constant pressure pump control. The following technical data is principally intended to assist system designers and process engineers with details of the most common parameters of the product.

NOMENCLATURE

EXAMPLE: P20-B-A-20-PVC

P20 FLOW SWITCH WITH SINGLE REED SWITCH CIRCUIT BOARD, NORMALLY OFF, SWITCHES ON AT 0.14 LITRES PER MINUTE ON A RISING FLOW, 20mm (3/4BSP) UNIONS AT BOTH ENDS AND 15 N/B PVC SPIGOTS PROVIDED.

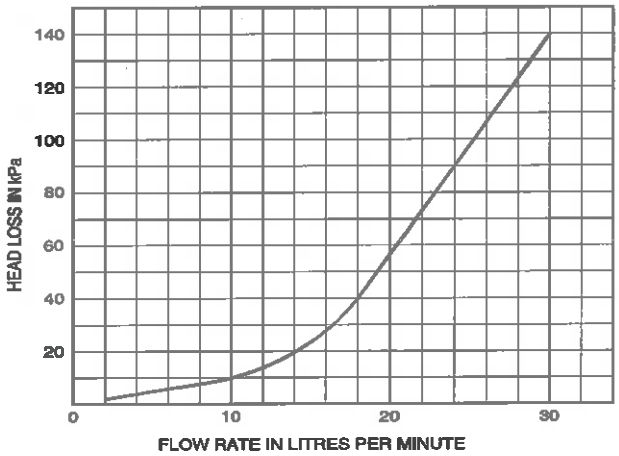
P20— □ — □ — □ — □

ELECTRICAL MODULE	PISTON	PIPE THREADS	SPIGOT MATERIAL
B C D R A-240 A-24	A B C	20 (SUPPLIED WITH 15 N/B SPIGOTS) 25 (SUPPLIED WITH 20 N/B SPIGOTS)	PVC ABS

CONSTRUCTION MATERIALS

The P20 In Line Flow Switch has no metal parts in contact with the process fluid. The only materials in contact with fluid passing through the switch are glass-reinforced polypropylene, and neoprene (O-rings). The working action of the switch is achieved using high power permanent magnets operating through the solid glass reinforced polypropylene body of the switch. The electrical housing is made from ABS, and the pipe spigots supplied with the switch are available in either PVC or ABS

The graph below sets out the dynamic head loss across the P20 flow switch. The graph data refers to water at 15°C as the test medium.

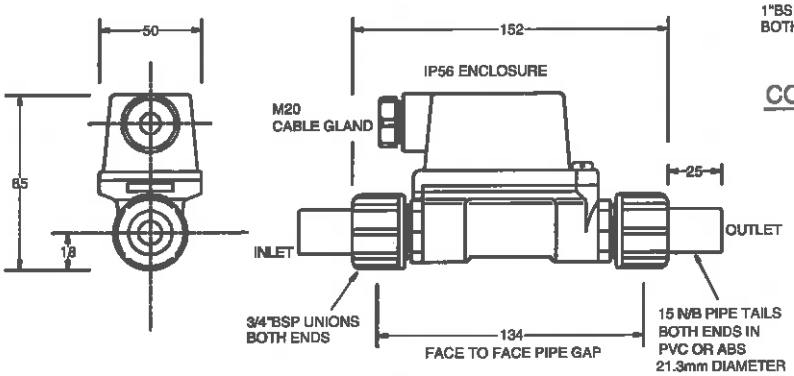


OPERATING ENVIRONMENT

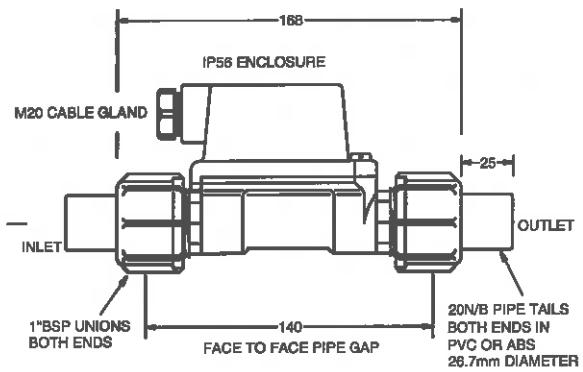
Maximum Operating Pressure (Static or Dynamic) at Ambient Temperature	1800 Kpa (260 P.S.I.)
Minimum Burst Pressure at Ambient Temperature	9700 Kpa (1400 P.S.I.)
Maximum Liquid Temperature (Standard P20 Switch)	80°C
Minimum Liquid Temperature (Standard P20 Switch)	-30°C
Maximum Recommended Continuous Flow Rate (Water)	25 Litres per Minute Dynamic head loss across the switch <100kPa)
Liquid Ph range	1 to14
Ingress Protection Rating (Weatherproof Rating)	IP56 (Hose proof & weather proof)

Important Note Maximum operating pressure must be de-rated, in proportion to temperature increase, and in consideration of any chemical solutions being processed.

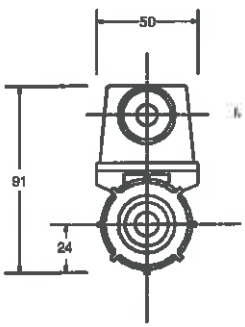
DIMENSIONS



CONFIGURED FOR 15mm NOMINAL BORE PIPE



CONFIGURED FOR 20mm NOMINAL BORE PIPE



FLOW SENSITIVITY & HYSTERESIS

Sensitivity to fluid flow is a direct function of liquid viscosity and piston clearance. There are 3 pistons available to suit the P20 flow switch. Each piston has a distinct switching point. The pistons are designated and marked A, B and C. The P20 Flow switch is supplied as standard with the "A " piston fitted. The optional "B" or "C" pistons are also supplied with each switch.

The following table sets out the performance parameters of the 3 pistons. The data is based on testing using water at 15˚C as the test medium, and is accurate to +/-10%. Changes in liquid viscosity will affect the switching point. Increases in viscosity will proportionally decrease the flow rate required to actuate the switch, and will proportionally increase the response time. Decreasing viscosity will proportionally increase the flow rate required to actuate the switch, and will proportionally decrease the response time.

Piston Markings and Designation	Switching Point on a Slowly Rising Flow in Litres per Minute	Switching Point on a Slowly Reducing Flow in Litres per Minute	Electrical Response Time in Seconds After Cessation of Flow
A	0.140	0.065	0.4
B	0.570	0.370	0.3
C	1.700	1.330	0.2

Please Note The type "A "piston is supplied as standard fitted to each switch, unless otherwise specified. The B & C pistons are included packed in with each switch.

ELECTRICAL DATA

The P20 In Line Flow Switch is available in a variety of electrical configurations, to suit specific applications. The model numbers and details of these options are outlined in the table below.

Switch Model	Module Type	Contact Configuration	Switched Power Maximum	Switched Voltage Maximum	Switched Current Resistive AC (rms) Maximum	Inductive Loads (Power Factor 0.4)	Typical Application
P20-B	Dry Reed Switch	S.P.S.T. N.O	40W	240V AC 200V DC	1A	Not Suitable	PLC and General Control Circuits
P20-C	Dry Reed Switch	S.P.D.T.	40W	240V AC 200V DC	1A	Not Suitable	PLC and General Control Circuits
P20-D	Dry Reed Switch	3 Pole Switch 3 by N.O	40W	240V AC 200V DC	1A	Not Suitable	Telemetry and local Control Circuits
P20-R	Solid State Relay (Triac)	S.P.S.T. N.O	750W	2 to 240V AC	4A Continuous (Spike to 16A)	4A at 240V AC	AC Control circuits and AC Motor Control to 1 HP
P20-A-240	Standard Relay 240V AC Coil	S.P.D.T.	2500VA at 250VAC 300VA at 30VDC	0 to 240 V AC	10A	7.5A at 240V AC 5A at 30V DC	General AC or DC Control
P20-A-24	Standard Relay 24V AC Coil	S.P.D.T.	2500VA at 250VAC 300VA at 30VDC	0 to 240V AC	10A	7.5A at 240V AC 5A at 30V DC	General AC or DC Control

Note The P20 In Line Flow Switch uses reed switches as the primary switching element. Reed switches are one of the most reliable mechanical switching devices ever devised. They offer an operating life in excess of 100 million cycles, however, care needs to be taken to ensure they are not electrically overloaded or if applied in questionable applications, suitable protection should be added to the control circuit.

COMPONENT PARTS

The P20 In Line Flow Switch is a fully serviceable device. All of the component parts of the switch are available as spare parts, and many of the parts are interchangeable, these include the circuit boards, the pistons and the inlet and outlet adaptors and unions.

The interchangeability of components allows custom configuration of the switch. For example it is entirely practical to configure the P20 flow switch with a 25mm inlet thread and a 20mm outlet thread, or to configure the switch with the reverse of this arrangement. This flexibility can be achieved using the standard component parts of the switch.

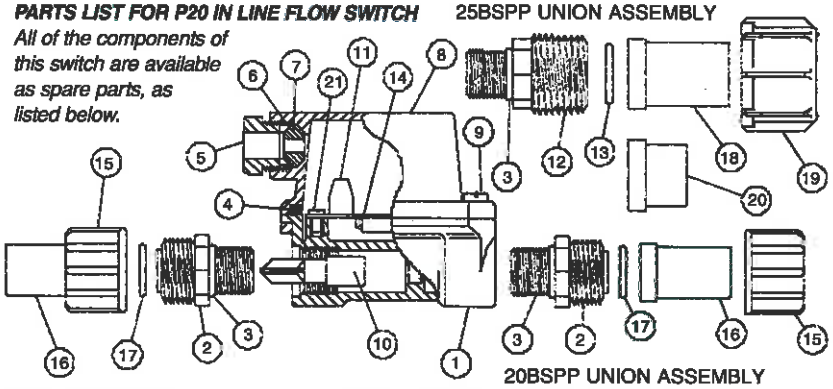
ADDITIONAL OPTIONS

The P20 flow switch can be supplied with 20 BSP (3/4" BSP) or 25 BSP (1" BSP) unions and 15mm or 20mm sockets or spigots in PVC or ABS. In addition, sets of tube flare fittings are available to suit the switch. These allow the switch to be installed in flexible poly tubing systems in 6 by 5mm, 8 by 4mm or 12 by 9mm sizes.

Switches are also available in materials of construction other than those outlined here. Contact your supplier with your specific requirements.

PARTS LIST FOR P20 IN LINE FLOW SWITCH

All of the components of this switch are available as spare parts, as listed below.



ITEM	DESCRIPTION	QTY	MATERIAL
1	SWITCH BODY	1	GLASS REINFORCED POLYPROPYLENE
2	M20 by 3/4BSPP ADAPTOR	2	GLASS REINFORCED POLYPROPYLENE
3	No 016 O-RING	2	NEOPRENE
4	MAIN LID GASKET	1	SANOPRENE
5	CABLE GLAND NUT	1	HIGH IMPACT ABS
6	CABLE GLAND THRUST RING	1	HIGH IMPACT ABS
7	CABLE GROMMET	1	SANOPRENE
8	LID	1	HIGH IMPACT ABS
9	LID FIXING SCREW	1	M5 BY 16 STAINLESS STEEL TYPE 304
10	PISTON,MODEL A, B or C	1	GLASS REINFORCED POLYPROPYLENE
11	TERMINAL BLOCK	1	ACETAL RESIN
12	M20 by 1" BSPP ADAPTOR	2	GLASS REINFORCED POLYPROPYLENE
13	No 117 O-RING SEAL	2	NEOPRENE
14	CIRCUIT BOARD ASSEMBLY	1	COMPLETE ELECTRICAL MODULE
15	20 mm BSPP UNION NUT	2	GLASS REINFORCED POLYPROPYLENE
16	15 mm (1/2") PIPE SPIGOT	2	PVC OR ABS
17	No 115 O-RING SEAL	2	NEOPRENE
18	20mm (3/4") PIPE SPIGOT	2	PVC OR ABS
19	25mm BSPP UNION NUT	2	GLASS REINFORCED POLYPROPYLENE
20	16mm (1/2") PIPE SOCKET	2	PVC OR ABS
21	CIRCUIT BOARD SCREW	2	M4 BY 6 STAINLESS TYPE 304

MADE IN AUSTRALIA BY ***KELCO ENGINEERING***
Manufacturing division of CYNCARD PTY LTD ABN 20 002 834 844
Head Office and Factory: 2/9 Powells Road BROOKVALE 2100 AUSTRALIA
Postal Address: PO Box 496 BROOKVALE NSW 2100 Phone: 61 2 (02) 9905 6425
Fax: 61 2 (02) 9905 6420 Email: kelco@wr.com.au

INSTALLATION AND OPERATING SHEET FOR P20 IN LINE FLOW SWITCH

PLEASE READ THIS INSTALLATION SHEET CAREFULLY AND FULLY BEFORE INSTALLING THIS FLOW SWITCH

INTRODUCTION

The P20 flow switch is an in line piston flow switch that is supplied preset to switch on or off at a specific flow rate. The body of the switch contains a piston that obstructs the line of flow. To pass through the switch, the process fluid must push the piston back and flow over the piston and out through the outlet fitting. When fluid pushes the piston back, a magnet inside the piston actuates a reed switch in the electrical enclosure; this provides a set of closed, (or open) electrical contacts, which can be used in control circuits to indicate flow. The body of the P20 contains a fixed magnet that opposes the magnet in the piston. The repulsive force generated between the piston and body magnets constantly pushes the piston back to the off position, against the incoming flow. This unique magnet system negates the need for metal springs and provides the switch with exceptional reliability.

OPERATING ENVIRONMENT

The P20 flow switch has no metal parts in contact with the process fluid. Inert thermoplastics are all that come in contact with the liquid passing through the switch. This means the P20 can be used in aggressive chemical solutions, seawater, and bore water and in many fluids that would attack metal parts. The P20 flow switch contains a close fitting piston, and should only be used in applications where the process fluid is reasonably clean and free of entrained or suspended material. Fluids containing large particulate matter, ferrous materials or fibrous matter should not be used in this switch. If the degree of contamination of the process fluid can't be guaranteed, then suitable line filtration should be fitted to the system upstream of the P20 flow switch.

The standard P20 flow switch is constructed from glass reinforced polypropylene, with neoprene o-rings, and an ABS electrical housing. The P20 flow switch is weatherproof to IP56, that is it is hose-proof and suitable for all outdoor exposed applications. The switch should be protected from freezing, or from exposure to fluid temperatures in excess of 80°C. The P20 flow switch should not be used in applications where the line pressure exceeds 18 bars, in the interest of safety, the switch has a burst pressure rating of >97 bars. Care should be taken not to expose the P20 switch to excess pressures such as may be generated by water hammer.

The environmental limitations of the standard P20 flow switch are set out in the following table.

Maximum Operating Pressure (Static or Dynamic) at Ambient Temperature	1800 Kpa (260 P.S.I.)
Minimum Burst Pressure at Ambient Temperature	9700 Kpa (1400 P.S.I.)
Maximum Liquid Temperature (Standard P20 Switch)	80°C
Minimum Liquid Temperature (Standard P20 Switch)	-30°C
Maximum Recommended Continuous Flow Rate (Water)	25 Litres per Minute
Liquid Ph range	1 to14

Important Note: Maximum operating pressure must be de-rated, in proportion to temperature increase, and in consideration of any chemical solutions being processed.

INSTALLATION

The P20 flow switch can be mounted in any orientation in the pipe-work, including upside down. There is a direction of flow arrow on the switch body. This directionality must be adhered to, as the switch will not operate against a reversed flow. Pipe-work can be used to support the switch, or the switch can be connected directly into valve manifolds or pump ports.

PIPE TERMINATION & SPIGOTS

There are a number of optional piping terminations available that may have been supplied with the P20 flow switch. These include tapered or parallel BSP male fittings, in ¾" or 1" sizes. The parallel thread fittings are supplied with suitable union nuts, O-rings and pipe sockets or spigots. The taper thread adaptors are not supplied with unions, as they are intended to be screwed directly into pipe-work. Where parallel thread fittings and unions are supplied, a set of tube flare fittings to suit standard flexible tubing may also be included. The tube flare fittings accept flexible poly tubing in sizes 12 by 9, 8 by 4 and 6 by 5mm.

FLOW SENSITIVITY & SWITCHING POINT

The P20 flow switch is supplied configured to switch at one of three possible flow rates. It is possible to alter the switching point of the flow switch, on site, simply by substituting one of the 2 alternate pistons. The piston fitted to a specific P20 flow switch can be identified by a letter, either A, B or C that is engraved on the conical nose of each piston. The "A" piston is supplied as standard fitted to the switch, and detects the lowest flow rate, 0.14 L/m, it is therefore the most sensitive. The "B" piston switches at 0.57 L/m, and the "C" piston is the least sensitive, and requires a flow of 1.70 L/m to actuate. Pistons are easily cleaned or replaced simply by unscrewing the inlet adaptor and removing the specific piston, a piston kit is included with each switch that contains the optional "B" and "C" pistons.

ELECTRICAL

The electrical enclosure on the P20 switch is accessible by removing one screw on the lid. The lid has an integral 20mm cable gland designed to accept flexible cable up to 10mm diameter. If the gland nut is removed the exposed female thread will then accept a 20mm conduit bush. Various electrical options are available for the P20 flow switch. Details of the specific circuit board module, including its model number are located inside the lid of the electrical housing of each switch. All the available electrical modules use a reed switch as the primary switching element. The contacts of the reed switch open and close in response to the position of the switch piston magnet. The reed switch may be the primary switch, or it may be used to drive a triac or a relay, that is included on the circuit board in the switch. Where the reed switch is used as the main switch, care should be taken to ensure it is not overloaded. Reed switches are very reliable devices but may be damaged easily if overloaded. Use interposing relays and avoid inductive loads, fit suitable protection such as diodes or rate effect suppression circuits. Avoid capacitive coupling effects associated with long cable runs, use shielded cable in such situations, and fit diode protection to the reed switches in DC applications.

The table below sets out details of the various electrical modules, their model numbers and their electrical specifications.

Switch Model	Module Type	Contact Configuration	Switched Power Maximum	Switched Voltage Maximum	Switched Current Resistive AC (rms) Maximum	Inductive Loads (Power Factor 0.4)	Typical Application
P20-B	Dry Reed Switch	S.P.S.T. N.O	40W	240V AC 200V DC	1A	Not Suitable	PLC and General Control Circuits
P20-C	Dry Reed Switch	S.P.D.T.	40W	240V AC 200V DC	1A	Not Suitable	PLC and General Control Circuits
P20-D	Dry Reed Switch	3 Pole Switch 3 by N.O	40W	240V AC 200V DC	1A	Not Suitable	Telemetry and local Control Circuits
P20-R	Solid State Relay (Triac)	S.P.S.T. N.O	750W	2 to 240V AC	4A Continuous (Spike to 16A)	4A at 240V AC	AC Control circuits and AC Motor Control to 1 HP
P20-A-240	Standard Relay 240V AC Coil	S.P.D.T.	2500VA at 250VAC 300VA at 30VDC	0 to 240 V AC	10A	7.5A at 240V AC 5A at 30V DC	General AC or DC Control
P20-A-24	Standard Relay 24V AC Coil	S.P.D.T.	2500VA at 250VAC 300VA at 30VDC	0 to 240V AC	10A	7.5A at 240V AC 5A at 30V DC	General AC or DC Control

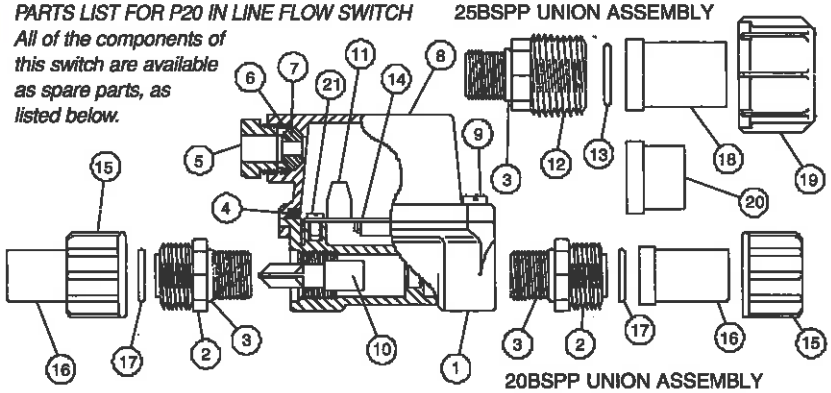
TESTING

The P20 switch can be tested for electrical function in the following way. With the switch isolated, place a continuity tester across terminals S1 and S2 or C and NO. (Do not use a lamp tester for this, due to the high inrush current.) Use a pencil or similar object to depress the piston. Each time the piston is depressed a closed circuit should appear across S1 and S2 or C and NO. The piston is accessed by pushing the pencil straight down the centre of the switch, through the inlet fitting. This test can be done dry, and without the switch in the pipe-work. Each time the piston is released it should return to the off position, due to the internal magnetic repulsion, and the switch should respond with an open circuit across its terminals.

MAINTENANCE

This flow switch is a very low maintenance device. If The P20 flow switch is correctly installed and if the process fluid is compatible with the materials of construction of this switch, then a very long service life can be expected. Factors that may contribute to early failure of this device include excess temperature, excess pressure or electrical loads in excess of the electrical modules ratings.

PARTS LIST FOR P20 IN LINE FLOW SWITCH
All of the components of this switch are available as spare parts, as listed below.



ITEM	DESCRIPTION	QTY	MATERIAL
1	SWITCH BODY	1	GLASS REINFORCED POLYPROPYLENE
2	M20 by 3/4BSPP ADAPTOR	2	GLASS REINFORCED POLYPROPYLENE
3	No 018 O-RING	2	NEOPRENE
4	MAIN LID GASKET	1	SANOPRENE
5	CABLE GLAND NUT	1	HIGH IMPACT ABS
6	CABLE GLAND THRUST RING	1	HIGH IMPACT ABS
7	CABLE GROMMET	1	SANOPRENE
8	LID	1	HIGH IMPACT ABS
9	LID FIXING SCREW	1	M5 BY 16 STAINLESS STEEL TYPE 304
10	PISTON,MODEL A, B or C	1	GLASS REINFORCED POLYPROPYLENE
11	TERMINAL BLOCK	1	ACETAL RESIN
12	M20 by 1" BSPP ADAPTOR	2	GLASS REINFORCED POLYPROPYLENE
13	No 117 O-RING SEAL	2	NEOPRENE
14	CIRCUIT BOARD ASSEMBLY	1	COMPLETE ELECTRICAL MODULE
15	20 mm BSPP UNION NUT	2	GLASS REINFORCED POLYPROPYLENE
16	15 mm (1/2") PIPE SPIGOT	2	PVC OR ABS
17	No 115 O-RING SEAL	2	NEOPRENE
18	20mm (3/4") PIPE SPIGOT	2	PVC OR ABS
19	25mm BSPP UNION NUT	2	GLASS REINFORCED POLYPROPYLENE
20	15mm (1/2") PIPE SOCKET	2	PVC OR ABS
21	CIRCUIT BOARD SCREW	2	M4 BY 6 STAINLESS TYPE 304

MADE IN AUSTRALIA BY

KELCO ENGINEERING

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Postal Address: PO Box 496 BROOKVALE NSW 2100
Phone: 61 2 (02) 9905 6425 Fax: 61 2 (02) 9905 6420
Email: kelco@wr.com.au

Model OPF 10 pH Electrode

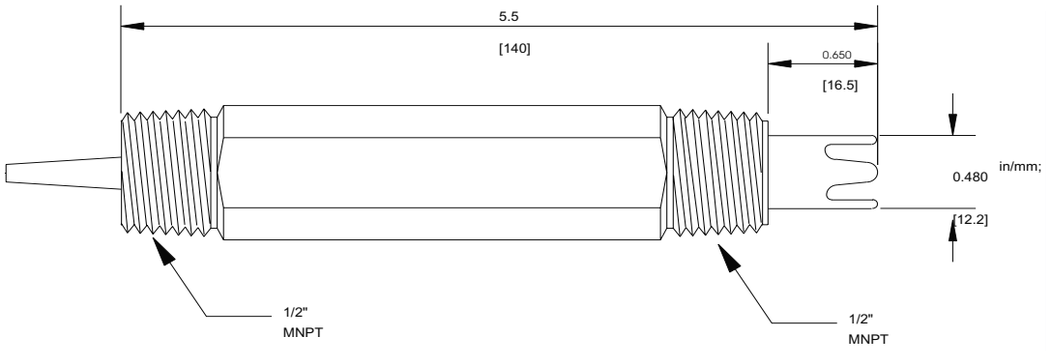
General purpose pH electrode with optional integral temperature sensor and ½" MNPT process connection

- Patented Teflon® junction and gelled electrolyte deliver high performance and low maintenance
- Single chamber reference system for clean water conditions
- ORP option available
- Standard and high temperature versions available
- Compact design for insertion or flow through installation

For use in general purpose applications such as potable water, surface water, aquariums, hydroponics and fish farming

OPF 10	Specifications
Measurement range	pH 0 - 14
Pressure range	0 to 6.9 bar (100 psig)
Temperature range	- 5 to 80°C (23 to 176°F Standard Version) 25 to 110°C (77 to 230°F High Temperature Version)
Temperature sensor	Pt 100, Pt 1000 RTD
Minimum conductivity	10 µS/cm
Electrolyte	KCl/AgCl gel
Response time (@ 25°C / 77°F)	95% of reading in 10 seconds
Materials of construction	Ryton® body with Viton® O-rings

Dimensions Diagram



Order Code

OPF10						
	Measuring Element					
	NN pH					
	PB Platinum ORP					
	LH High Temperature pH option (not ORP)					
		Probe				
		N No temperature element				
		C Pt100 Temperature Element (not ORP)				
		E Pt1000 Temperature Element (not ORP)				
			Cable			
			10 Integral 10 ft cable, BNC			
			25 Integral 25 ft cable, BNC			

Accessories

Calibration Solutions	
OPY 21	NIST Traceable pH Calibration Solution, pH 4.00, 1000ml
OPY 23	NIST Traceable pH Calibration Solution, pH 7.00, 1000ml
OPY 30	NIST Traceable ORP Calibration Solution, Value: +220mV @ pH 7.00, 1000ml
OPY 31	NIST Traceable ORP Calibration Solution, Value: +468 @ pH 7.00, 1000ml

Model 800/802

Wedgewood Analytical, Inc.
4123 East La Palma Avenue, Suite 200
Anaheim, CA 92807
Toll Free: 1-800-835-5474
Direct: 1-714-577-5600
Fax: 1-714-577-5688
www.WedgewoodAnalytical.com

Forest Hill - DIA 2Q settings

Main Menu	**Controller pH**	set point	7.5 pH					
		prop. band xp	XP = 156.4 %					
		reset time TN	TN = 113 sec					
		constant load	0%					
		max. dosing flow	100%					
		dosing coeffic.	7					
		Adaption	Start					
			Stop					
			Adapt.result	XP : 156.4 %				
				TN: 113 sec				
		Stop	N.O.					
			N.C.					
	Alarm pH	alarm values	alarm on					
			alarm off					
		dos.time monit.	on					
			off					
	Service	pH	CalData/LogBook					
			measured value	Current data values				
		controller pH	Summary of **Controller pH** settings					
		test current	N/a					
		test relay	N/a					
		test display	N/a					
	Setup	Language	English (Deutsch is default)					
		parameter 1	Turn off					
		parameter 2	select pH	select temp. meas. to off				
		measuring ranges	select pH	select 2.00-12.00 pH				
		controller pH	Select combined contrl	Select cont. controller	select downward control	select PI	Select others	Adjust to Low mA = 4mA
		wat. def. sensor	select on					Adjust to High mA = 9mA
		date/time	set correct date & time					
		code function	leave at full rights	Contact Grundfos for code if error message is displayed				
		display	set to suit operators - default is 50 %					
		factory setting	setup	save	Must do after every Conex adjustment			
				activate	Resets device to last saved settings			
			reset	Contact Grundfos for code as this will wipe all previous settings	Use only in an emergency			
		current output	select control 2	select 4-20 mA	Drives the CO2 proportional control valve			
		program version	Displays the model and software version					

Don't forget to save the latest settings every time before exiting - Setup - Factory settings - Setup -**Save**.

Warranties

Grundfos Sales and Warranty Statement

Linked Documents

Chemical Dosing Warranty.pdf

Harris Letter of Compliance

Linked Documents

Harris Letter of Compliance.docx

Terms & Conditions of Sale

1. Interpretation

(a) '**claim**' means any claim, action, proceeding, loss, damage, cost,expense or liability whatsoever incurred or suffered by or brought or made or recovered against any person and however arising (whether or not presently ascertained, immediate, future or contingent).

(b) '**customer**' means the person(s) or body(ies) corporate to whom these terms and conditions are directed.

(c) '**goods**' means all goods ordered from Grundfos by the customer.

(d) '**Grundfos**' means Grundfos Pumps Pty Ltd (ACN 007 920 765, ABN 90 007 920 765).

(e) '**GST Law**' means *A New Tax System (Goods & Services Tax) Act 1999* (Cth) and Regulations and any other similar or related Act or Regulation.

(f) '**Corporations Act**' means the *Corporations Act 2001* (Cth).

(g) '**PPSA**' means the *Personal Property Securities Act 2009* (Cth) and Regulations.

'**terms**' means these terms and conditions of sale. Nothing in these conditions shall be read or applied so as to exclude, restrict or modify or have the effect of excluding, restricting or modifying any condition, warranty, guarantee, right or remedy implied by law (including the *Australian Consumer Law*) and which by law cannot be excluded, restricted or modified.

2. Quotations

Unless previously withdrawn Grundfos' quotations are valid for a period of 30 days from the date of issuance.

3. Prices

All prices in the Price Book are current at the time of issue, however Grundfos reserves the right to vary these prices at any time with 7 days prior written notice.

An Order Processing charge of $15 per order applies. Orders received via the Grundfos Extranet are exempt of the Order Processing Fee.

A call out fee of $300 will apply for goods dispatched outside of normal working hours.

Customer changes to specifications, after acceptance of order may incur additional design costs.

Grundfos reserves the right to introduce other charges and fees and to vary these at any time with 7 days prior written notice.

4. Goods and services tax

All prices included in Price Books will include a 'GST' exclusive price and a 'GST' inclusive price (as defined in the GST Law). The customer must pay GST on all Grundfos' products and services in addition to any other amount that is required to be paid by the customer to Grundfos under these terms. The GST payable by the customer will appear as a separate line on the invoice.

5. Payment

The customer must make payment for goods by the last day of the month following the month in which the goods have been invoiced (due date).

A settlement discount as specified on the invoice is offered for payments which are received by the due date, provided that there are no overdue amounts owed. Payments for overdue amounts or payments received after the last day of the month are not eligible for settlement discount.

Grundfos reserves the right to commence recovery action on any overdue amount without notice to the customer. Any legal or collection costs incurred in the recovery of any overdue amounts will be recoverable from the customer.

If the customer fails to pay Grundfos any sum when due, Grundfos shall be entitled to charge interest at the rate of 1.5% per month on the overdue amount after the due date.

6. Delivery

The delivery date quoted is an estimate only based upon information available at the time of quoting and Grundfos shall not be liable for late delivery or non-delivery.

Delivery of goods will be to the customer's address or outlet identified by the customer and accepted by Grundfos.

Request for split deliveries may be accepted at Grundfos' discretion but may incur an extra fee.

If the customer fails to take delivery of goods supplied, unless there is agreement to the contrary the customer must make payment as if delivery has been made.

The customer shall at its expense be responsible for all costs associated with the unloading of goods.

Grundfos may refuse to deliver further product/s where the customer is in default of Grundfos' payment terms.

7. Acceptance

Upon delivery of the goods to the customer, the customer shall be deemed to have accepted the goods.

Immediately on receipt of the goods, the customer must make sure that all parts are intact and in compliance with their order.

8. Retention of Title

(a) Title in and to any goods will not pass to the customer until all amounts owed by the customer to Grundfos in respect of those goods have been paid in full.

(b) The customer acknowledges that until title in and to the goods passes to the customer in accordance with this clause 8:
  (i) the customer holds the goods as bailee for Grundfos;
  (ii) the customer must store the goods separately and in such a manner that they are clearly identified as the property of Grundfos;
  (iii) Grundfos is entitled at any time to demand the return of the goods and, except where the customer is an individual, Grundfos is entitled without notice to the customer and without liability to the customer to enter (or have its representatives enter) the customer's premises (or the premises of any 'related body corporate' (as defined in the Corporations Act) or agent) where the goods are located, without liability for trespass or any resulting damage in order to search for and retake possession of the goods; and
  (iv) to keep or re-sell any goods repossessed pursuant to paragraph 8(b)(iii) above.

(c) The customer acknowledges that if the goods or products incorporating the goods are sold, leased or otherwise dealt with before title in and to the goods passes to the customer in accordance with this clause 8, the customer must hold the proceeds of any such sale, lease or dealing on trust (as represents the invoice price of the goods sold, leased or dealt with) in a separate identifiable account as the beneficial property of Grundfos and must pay such amount to Grundfos upon request by Grundfos. Notwithstanding the provisions above, Grundfos is entitled to maintain an action against the customer for any amounts owing by the customer to Grundfos under these terms.

(d) Without limiting the generality of clause 10 of these terms, if title in and to the goods has not passed to the customer in accordance with this clause 8, the customer's implied right to sell, lease or deal with the goods will immediately terminate upon the happening of any of the following events in respect of the customer:
  (i) the customer makes default in any payment or is unable or states that it is unable to pay its debts as they fall due; or
  (ii) where a corporation, if under administration, provisional liquidation or liquidation as if a 'controller' (as defined in the Corporations Act) has been appointed; or
  (iii) if an individual, being an 'insolvent under administration' (as defined in the Corporations Act).

(e) The customer acknowledges that Grundfos has a security interest (for the purposes of the PPSA) in the goods and any proceeds described in sub-clause 8(c) until title passes to the customer in accordance with this clause 8.

(f) The customer acknowledges that each security interest over the goods (or their proceeds) arising under this clause 8 is a "purchase money security interest" under the PPSA to the extent that it secures payment of the amounts owing in relation to those particular goods. The security interests arising under this clause 8 attach to the goods when the customer obtains possession of the goods.

(g) The customer agrees, at its cost, to do anything (such as obtaining consents, signing and producing documents, getting documents completed and signed and supplying information) which Grundfos asks and considers required for the purposes of:
  (i) ensuring that the security interest is enforceable, perfected and otherwise effective, including, if applicable, as a purchase money security interest;
  (ii) enabling Grundfos to apply for any registration, complete any financing statement or give any notification, in connection with the security interest, so that Grundfos has the priority it requires; or
  (iii) enabling Grundfos to exercise rights in connection with the security interest. The customer agrees to pay or reimburse the reasonable costs of Grundfos in connection with anything required to be done under this clause 8.

(h) The customer agrees to pay or reimburse the reasonable costs of Grundfos in connection with anything required to be done under this clause 8.

(i) Grundfos does not need to give any notice under the PPSA (including notice of a verification statement) unless notice is required under the PPSA and cannot be excluded.

(j) The parties agree that they are not required to disclose any information of the kind referred to in section 275(1) of the PPSA.

(k) If there is any inconsistency between the rights of Grundfos under this clause 8 and Grundfos' rights under the PPSA, this clause prevails.

(l) Terms used in this clause 8 but not defined have the same meaning as in the PPSA.

9. Passing Risk

Risk in the goods shall pass to the customer upon delivery of the goods to the customer or collection of the goods by the customer's agent or courier. The customer shall insure the goods for their full replacement value from the time that risk in the goods passes to the customer until the time that title to the

Terms & Conditions of Sale

goods passes to the customer. The customer shall hold the goods as bailee but shall not be entitled to receive any remuneration in respect of that bailment.

Unloading of goods is the customer's, or the customer's agent's responsibility.

10. Default

If the customer makes default in payment or otherwise fails to carry out the terms or repudiates this or any other contract with Grundfos, or if the customer stops payment, calls a meeting of its creditors or becomes insolvent or subject to bankruptcy laws, or being a company calls a meeting for the purpose of or goes into liquidation or has a winding up summons presented against it or has a receiver, controller or administrator appointed, Grundfos at its option and notwithstanding the waiver of such default or failure (and without prejudice to its rights under the contract), may suspend or cancel any contract with the customer or require payment in cash before or on delivery. Grundfos may take possession of the goods and dispose of the same in its own interest, without prejudice to any claim it may have for any loss resulting from such re-sale and all credit facilities available to the customer may be withdrawn by Grundfos at any time thereafter.

11. Cancellation

No order of goods may be cancelled except with consent in writing and on terms which will indemnify Grundfos against all losses. Grundfos shall be entitled to cancel the order by notifying the customer in writing if fulfillment is impossible within a reasonable period of time because of war, strike, lockout, political conditions or other incidents of force majeure beyond Grundfos' control. The same applies in the case of delayed or faulty delivery from a sub-supplier, in the event of such incidents; Grundfos will not be liable to pay damages to the customer.

12. Privacy Act

The customer acknowledges that credit information may be given to a credit reporting agency, on the customer's understanding that the Privacy Act allows Grundfos to give a credit reporting agency certain information about the customer.

To enable Grundfos to assess the customer's application for commercial credit, the customer authorises Grundfos to obtain from a credit reporting agency a credit report containing personal and commercial credit information about the customer. In accordance with the Privacy Act, the customer authorises Grundfos to give and receive from any credit provider information in Grundfos' possession or the credit provider's possession about the customer's credit worthiness, credit standing, credit history and credit capacity. The customer understands that the information may be used to assess an application for credit by the customer and assess the customer's credit worthiness.

13. Returns

Unless there is a major failure to comply with a consumer guarantee:

(i) Grundfos will not be under any obligations to accept goods returned by a customer. Prior approval must be obtained before any goods will be accepted for return.

(ii) Grundfos will only consider the return of standard goods listed in Grundfos' current published Price Book and where those goods are in their original packaging, unsoiled, undamaged and in an immediate resalable condition. Standard goods returned will be accepted if returned within 60 days from date of delivery, and Grundfos will charge the customer $75 + 15% of invoice value for the goods.

(iii) If Grundfos accepts the return of goods, the goods returned must be accompanied by a Goods Return Advice (GRA) stating the original invoice number, date of purchase, customer order number and reason for return. Freight and insurance for goods to be returned to Grundfos must be pre-paid by the customer.

(iv) Goods not in the published Price Book are non standard and are non returnable.

(v) Requests for exemptions to the above must be agreed jointly with Grundfos' Market Segment Manager and Manufacturing Manager (or equivalent position from time to time).

14. Liability

To the extent that these terms and conditions provide for a supply of goods or services to a consumer (as defined in the *Australian Consumer Law*), that supply will be subject to consumer guarantees which are not excluded, restricted or modified. In all other respects and to the extent permitted by the law:

(a) all terms, conditions, warranties and representations, express or implied by statute or otherwise, as to the description, acceptable quality or fitness for any purpose of goods supplied under these terms are excluded (except such as may be provided for under these terms);

(b) Grundfos excludes all liability in statute, equity or common law (including, but not limited to, liability in negligence) and any loss and damage consequential or otherwise arising in any way from the supply of, delay in supplying or failure to supply goods or services under these terms;

(c) any liability of Grundfos which cannot be lawfully excluded in relation to the supply of goods is limited to;
  (i) the replacement of the goods or supply of equivalent goods to those that gave rise to the liability;
  (ii) the repair of the goods that gave rise to the liability; or
  (iii) the payment of the cost of replacing the goods that gave rise to the liability;

(d) Grundfos will not accept claims for liquidated damages; and

(e) Grundfos expressly disclaims responsibility for goods manufactured or supplied by it that:
  (i) are damaged by accident;
  (ii) are damaged by abnormal operating conditions, war, violence, storm, cataclysm or other acts of God;
  (iii) are damaged by equipment being used for any application for which the product is not manufactured or recommended;
  (iv) are damaged caused by sand, abrasive materials, corrosion due to saline water, hazardous liquid, electrolytic action, liquid temperature beyond the recommended range, cavitation, lightning strike, improper supply voltage or insufficient liquid to enable the product to perform;
  (v) are damaged by not being installed in accordance with Grundfos installation instructions and accepted codes of good practice; or
  (vi) are subject to incorrect maintenance or mishandling.

Any contaminated goods returned to Grundfos, must be sent in compliance with the Grundfos guidelines for handling grey contaminated waste. Goods not sent in accordance with these guidelines are considered possibly dangerous and will be returned to the sender.

If the customer re-sells the goods, the customer must limit its liability to end-user purchasers of commercial goods to the repair, replacement or payment of the cost of repairing or replacing the goods.

15. Warranty

Any warranty provided by Grundfos in respect of the goods is provided with the goods and detailed in the applicable Grundfos' Warranty Document. If no Grundfos Warranty Document is provided with the goods, no manufacturer's warranty applies to those goods.

The customer must provide the Grundfos Warranty Document to any purchaser or end-user for any Grundfos product sold or installed.

The customer acknowledges that any warranty given by the customer in relation to the goods (other than the warranty provided in Grundfos' Warranty Document) is not Grundfos' warranty. Grundfos will not accept claims under any such warranty.

The customer acknowledges that it understands what a 'duty point' is insofar as it relates to the goods. The customer must explain what a 'duty point' is to any end-user to whom it supplies goods.

16. Commissioning

Unless specifically included in the Grundfos offer, commissioning is not included. Commissioning can be requested from Grundfos and will be charged at a fee.

Any commissioning is to be done after installation is complete, power and water is available and the specified duty can be achieved

Commissioning test equipment (gauges, flow meters etc) is to be installed and operating by the customer before commissioning.

Commissioning will be to determine the correct operation of the Grundfos supplied equipment, not the whole system.

The customer's failure to meet these commissioning terms may incur an extra fee to the customer.

17. Freight charges

Standard domestic products and spares in the Price Book will be delivered Free in Store (FIS).

A freight charge of 0.5% of the product price will apply to the larger/ bulkier product covered under discount codes A0, A4, A8, D2, D3, D4, D5, E1, E3, H1, H3, H4, L1, S2 and Z2.

A freight charge of 1.0% of the price will apply to spare parts and service kits under the discount code M2.

For SQ Flex product freight charges also apply at rates designated in the Price Book based on product and destination zone (discount code A2 and A7).

18. Drawings

All drawings and descriptions supplied shall remain the property of Grundfos and may not be copied, reproduced, passed onto or in any other way communicated to a third party without permission from Grundfos. The ownership of descriptions necessary for the proper installation, starting, operation and maintenance of the supplied products shall pass to the customer upon payment. However, Grundfos may demand that this data is treated as confidential information.

19. Documentation

Unless otherwise agreed upon by Grundfos in writing, standard Grundfos operating documentation shall be provided in all cases. A variation to standard operating documentation requires prior written approval and may be subject to additional costs.

20. Applicable Law

Any agreement or contract made between Grundfos and the customer, including any contract made pursuant to these terms shall be deemed to have been made in South Australia and shall be governed by the laws of South Australia.

www.harrisproductsgroup.com.au July 2013

Co2 Grundfos Manifolds Compliance details

The manifolds are made using items of high quality and are backed by our US$ 20,000,000 products liability policy.

Max inlet pressure from a C02 cylinder that is sun affected would be 8000kpa, all items are rated in excess of this pressure.

Components:-

Hylok fittings Made in Sth Korea, rated to 3000psi/21,000kpa.

Cylinder fittings Made in Australia to AS 2473.2- 2007.

High pressure Hoses Made in USA rated to 20,000kpa with a 4x safety margin

Fittings Made in Australia rated to 24,000kpa+

Copper tube Made in Australia by Kembla.

High Purity Multi-Stage regulators Made by Harris USA compliance to CGA standard and exceeds requirements of AS 4267.

Please contact us if you have a query.

David Chadkirk MBA

Managing Director
HGE PTY LTD
www.harrisproductsgroup.com.au
T/A -Harris Products Group Australia & New Zealand
Ph: 61 7 3375 3670
Fax: 61 7 3375 3620
Mob: 0412 879 071

Certificates

Commissioning Check Sheets

Linked Documents

Grundfos-Comm-Chk-002FH.pdf

Factory Acceptance Tests (FAT)

Linked Documents

98456865 FAT Forest Hill CO2 System.pdf

98439300 FAT Forest Hill pH Panel.pdf

Site Acceptance Test (SAT)

Linked Documents

98439300 SPT Forest Hill 10 Bar.pdf

98439300 SPT Forest Hill 4 Bar.pdf

98456865-SAT-FH.pdf

98439300-SAT-FH.pdf

98437842-SAT-FH.pdf

Inspection and Test Plan (ITP)

Linked Documents

98456865-ITP-FH.pdf

Water pH Data Log

Linked Documents

Forest Hill Tank Discharge pH Log data 22012014 Tank.pdf

Forest Hill Filtrate Water pH Log data 17012014.pdf

Harris Products Group - Letter of Compliance for CO2 Gas Components

Harris Products Group - Letter of Compliance for CO2 Gas Components

Linked Documents

Harris Letter of Compliance (2).pdf

Form 15 & 16

Linked Documents

Forest Hill Form 15.pdf

Forest Hill Form 16.pdf

GRUNDFOS	PROJECT COMMISSIONING RECORD		
FORM TYPE:	**PRE-COMMISSIONING CHECKSHEET**		
FORM NAME:	DOSING SKID PRE-COMM	**DOC ID:**	GRUNDFOS-COMM-CHK-002FH
PROJECT:	0060A Boonah Regional Lagoon STP		
SYSTEM:	Carbon Dioxide Dosing System (CO2) - FOREST HILL		

1. PRE-COMMISSIONING INSPECTION AND CHECKS		
ITEM	**PRE-COMMSSIONING CHECK**	**COMPLETE**
1.	Check hardcopy of O&M Manual received	N/A
2.	Check electronic copy of O&M Manual received (format Word / PDF)	N/A
3.	Check all electrical items are installed above the bund wall height.	N/A
4.	Check overall installation	✓
5.	Installed as per drawings and vendor installation manual	✓
6.	Nuts and bolts secure to correct torque	✓
7.	Pipework, valve, instrumentation installation as per drawings and vendor installation manual	✓
8.	Flange gasket material of compatible type? Note: Co2 – use Viton.	✓
9.	Verify that ALL Pipework Pressure Testing has been completed for the system	✓
10.	Confirm electrical installation and testing is completed, including all safety switches and settings	✓
11.	Check Loading / Anti-syphon Valves set for 3 bar back pressure.	✓
12.	Check Dosing Pressure Relief Valves set for min. 6 bar.	✓
13.	P&ID labels in place on equipment	✓
14.	Pipe Marker Chemical labels install and flow direction is correct?	✓
15.		
16.	General Comment/Observations	

2. OUTSTANDING ITEMS		
ITEM	**DESCRIPTION**	

COMMISSIONING ENGINEER: J. S. DATE: 30/01/2014

GRUNDFOS

Grundfos Pumps Pty Ltd FACTORY ACCEPTANCE TEST			SAT NO. :	98456865-FAT
			DATE :	05/04/2013
			PREPARED BY :	I.Ginn
CLIENT :	Thomas & Coffey	CONTRACT NO. :	0060A	
QUOTATION NO. :	20227-JKJ99	PROJECT :	Boonah Regional Lagoons	
ORDER NO. :	6232240/003	DRAWING NO. :	486/5/5-0104-266 to 268 P&ID – 486/5/5-0104-251 to 252	
SYSTEM DESCRIPTION:	Carbon Dioxide (CO2) Dosing System – Forest Hill	EQUIPMENT/TAG NO. :	98456865-29042013	

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
1	CO2 Gas Construction and Assembly (Manifold Assemblies)	As per approved P&ID 486/5/5-0104-251 to 252 As per approved GA 486/5/5-0104-253 to 259			• PR-0740-001 Serial number: N/A • PR-0740-002 Serial number: N/A • Ensure process connections and orientations are as per P&ID and GA drawing.
2	Dosing Panel Construction and Assembly (General)	As per approved P&ID 486/5/5-0104-251 to 252 As per approved GA 486/5/5-0104-266 to 268	AMR 21.5.13		• Visual inspection of all components to check correct / satisfactory installation. • Ensure Pressure Regulating Valves, Solenoid Valves, Pressure Relief Valve are installed in the correct direction. • Check alignment of all equipment. • Check overall dimensions. • Check for correct nozzle locations.
3	Operational Check	All isolation valves are free in movement and in correct position.	AMR 21.5.13		**Test Procedure** 1. Open and close all valves to ensure there is no binding. 2. Close all drain/bleed isolation valves. 3. Open / close all system isolation valves. 4. Ensure all valves are open/closed as per the P&ID.

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
4	Pressure test – Pipework	As per test procedure. AS2032:2006 Cl. 7.2	AMD 21 5 13		**Test Procedure** 1. Connect the compressed air to a regulator and to the skid inlet. Ensure the compressed air supply is above 6 Bar. 2. Using the regulator, pressurise the low pressure side to 5 bar as per regulator pressure gauge, and hold for 15 minutes. 3. Apply soapy water to all connections using appropriate PPE for compressed air. 1. Visually inspect all pipework to ensure no leakage.
5	Check operation of Blocked Nozzle Pressure Switch	As per test procedure.	AMD 21-5-13		**Test Procedure** 1. While the electrical panel is live, isolate the outlet valve on the low Pressure side 4. Using the regulator pressure gauge set the downstream pressure to 4 Bar. Adjust the pressure switch until it operates the alarm.
6	Pressure Relief Valve	As per test procedure.	AMD 21-5-13		**Test Procedure** 1. Close the isolation solenoid valve. 2. Using the skid pressure indicator, check the pre-set PRV opens at 6 bar. 3. Visually / Audibly check PRV and system pressure spikes on the Regulating pressure gauge. 1. PRV-0740-001 Relief Pressure: 6 BAR

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
7	Panel Operation	As per test procedure	AMD 21-5-13		**Test Procedure** 1. Close all isolation valves. 2. Set the operating pressure at 4 Bar 3. Check that the 3 bar spring non return valve (P/n 95730332) is installed in the Dosing Quill. 4. Ensure all valves are open/closed as per the P&ID. 5. Calibrate the Proportional Control valve to operate at 900 Hz at 600 mA for the 20 mA setting and 800 Hz at 520 mA for the 4 mA setting. (Settings to be adjusted at commissioning) 6. Set the flow meter to 2 L/min and operate the proportional control valve through the full range of 4 – 20 mA to confirm a lineal response of the valve flow rate. 7. Run the system as per standard operation for approximately 30 minutes. 8. Visually and audibly check system. 9. Check the operation of the shut off and proportional control solenoid. 10. Check the operation of the L Port valve.
8			AMD 21-5-13		
9					

GRUNDFOS

NOTES:	Proportional valve setup
	VALV - FREE
	VAdj - 500L 900H Hz
	Adj - 420L 550H m/L.
	@ 4.5Bar inlet - 3Bar outlet.

	Name	Designation	Signature	Date
Grundfos Representative:	Andrew Bunnett	Fitter		21-5-13
Client Representative:				

GRUNDFOS

Grundfos Pumps Pty Ltd
FACTORY ACCEPTANCE TEST

		FAT NO. :	98439300-FAT
		DATE :	05.04.2013
		PREPARED BY :	I.Ginn
CLIENT :	Thomas & Coffey	CONTRACT NO. :	0060A
QUOTATION NO. :	20227-JKJ99	PROJECT :	Boonah Regional Lagoons
ORDER NO. :	6232240/003	DRAWING NO. :	486/5/5-0104-260 to 262 P&ID – 486/5/5-0104-260 to 262
SYSTEM DESCRIPTION:	pH Monitor Panel – Forest Hill	EQUIPMENT/TAG NO.:	98439300-15042013

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		
			GRUNDFOS	CLIENT	NOTES / DOCUMENTS
1	Panel Construction and Assembly (General)	As per approved P&ID 486/5/5-0104-251 to 252 As per approved GA 486/5/5-0104-260 to 262	24-5-2013		• Ensure components installed as per GA. • Ensure process connections and orientations are as per P&ID and GA drawing. • Visual inspection of all components to check correct / satisfactory installation. • Ensure Valves are installed in the correct direction. • Check overall dimensions.
2	Operational Check	All isolation valves are free in movement and in correct position.	24-5-13		**Test Procedure** 1. Open and close all valves to ensure there is no binding. 2. Isolate process drain valves. 3. Open all process valves.
3	Pressure test – Pipework	As per test procedure. AS2032:2006 Cl. 7.2	24-5-13 REFER TO PRESSURE TEST DOCUMENTION		**Test Procedure** 1. Ensure a minimum of 24h curing time for all solvent welded joints before test. Ambient temperatures. 2. Insert a plug where the M10 Sensor is located for pressure testing. 3. Hold 10 bar pressure for 15 minutes. 4. Visually monitor pipework and joints for leaks for 15 minutes to ensure there is no leakage. 5. Label both valves clearly with the above information until connected to the Filtrate Water Line onsite.

GRUNDFOS

NOTES:	Note – The M10 Sensor is to be shipped with the pH Monitor Panel but is to only be installed at commissioning. The sensor must remain in the supplier's solution until just prior to calibration at commissioning.

	Name	Designation	Signature	Date
Grundfos Representative:	IAN GINN	PROJECT ENGINEER		24-5-2013
Client Representative:				

System Pressure Test Sheet

Hydrostatic Test

PROJECT:	**QUU Regional Lagoons WWTP – Forest Hill**	**DOC ID: SPT-FH-02**	**98439300 - SPT**
SYSTEM:	**CARBON DIOXIDE**	**CLIENT:**	**Thomas & Coffey**
DATE:		**TESTED BY:**	**Grundfos Pumps Pty Ltd**
NOTE:	**AS2032:2006 Cl 7.2 Test procedure**		
	All piping and pressure pipelines installed shall hold water pressure of a minimum of 1.25 times the maximum normal operating pressure of the system with no visible leaks for 15 minutes. A pressure gauge shall be installed to show the pressure reading.		
SYSTEM PRESSURE:	**0.5 bar**		

DESCRIPTION	**PRESSURE (BAR)**	**TIME (MINUTES)**	**PASS**	**FAIL**
All pipe work from the Filtrate Line outlet to the pH Panel outlet valve	10	15	✓	
ADDITIONAL INFORMATION	**REFERENCE**			
RP-50 Bucket Pump used for testing	Serial No. 08011794			

Comments

GRUNDFOS REPRESENTATIVE

Signature.....

Name.....

Title.....

Date.....

THOMAS & COFFEY REPRESENTATIVE

Signature.....

Name.....

Title.....

Date.....

System Pressure Test Sheet

Hydrostatic Test

PROJECT:	**QUU Regional Lagoons WWTP – Forest Hill**	**DOC ID: SPT-FH-01**	**98439300 - SPT**
SYSTEM:	**CARBON DIOXIDE**	**CLIENT:**	**Thomas & Coffey**
DATE:		**TESTED BY:**	**Grundfos Pumps Pty Ltd**
NOTE:	**AS2032:2006 Cl 7.2 Test procedure**		
	All piping and pressure pipelines installed shall hold water pressure of a minimum of 1.25 times the maximum normal operating pressure of the system with no visible leaks for 15 minutes. A pressure gauge shall be installed to show the pressure reading.		
SYSTEM PRESSURE:	**0.5 bar**		

DESCRIPTION	**PRESSURE (BAR)**	**TIME (MINUTES)**	**PASS**	**FAIL**
All pipe work from the Filtrate Line outlet to the pH Panel outlet valve	4	15	✓	
ADDITIONAL INFORMATION	**REFERENCE**			
RP-50 Bucket Pump used for testing	Serial No. 08011794			

be think innovate GRUNDFOS

Comments

GRUNDFOS REPRESENTATIVE

Signature.....
Name Andrew Bunnett
Title Fitter
Date 24 · 5 · 13

THOMAS & COFFEY REPRESENTATIVE

Signature.....
Name NOAH HENISON
Title SITE FOREMAN
Date 24.5.13

GRUNDFOS

Grundfos Pumps Pty Ltd
SITE ACCEPTANCE TEST

		SAT NO. :	98456865-SAT-FH
		DATE :	05/04/2013
		PREPARED BY :	I.Ginn
CLIENT :	Thomas & Coffey	**CONTRACT NO. :**	0060A
QUOTATION NO. :	20227-JKJ99	**PROJECT :**	Boonah Regional Lagoons
ORDER NO. :	6232240/003	**DRAWING NO. :**	486/5/5-0104-266 to 268 P&ID – 486/5/5-0104-251 to 252
SYSTEM DESCRIPTION:	Carbon Dioxide (CO2) Dosing System – Forest Hill	**EQUIPMENT/TAG NO. :**	98456865-29042013

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
1	Dosing Panel Construction and Assembly (Regulator Assemblies)	As per approved P&ID 486/5/5-0104-251 to 252 As per approved GA 486/5/5-0104-253 to 259	22/01/2014	T.Z	• PR-0740-001 Serial number: N/A • PR-0740-002 Serial number: N/A • Ensure process connections and orientations are as per P&ID and GA drawing. If different mark up for As Built drawings
2	Dosing Panel Construction and Assembly (General)	As per approved P&ID 486/5/5-0104-251 to 252 As per approved GA 486/5/5-0104-266 to 268	22/01/14	T.Z	• Visual inspection of all components to check correct / satisfactory installation. • Ensure Pressure Regulating Valves, Solenoid Valves, Pressure Relief Valve are installed in the correct direction. • Check alignment of all equipment. • Check overall dimensions. • Check for correct nozzle locations.
3	Operational Check	All isolation valves are free in movement and in correct position.	22/01/14	T.Z	**Test Procedure** 1. Open and close all valves to ensure there is no binding. 2. Close all drain/bleed isolation valves. 3. Open / close all system isolation valves. 4. Ensure all valves are open/closed as per the P&ID.

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
4	Purge the System	Remove air from system.	22/01/14	T.Z	**Priming Pumps** 1. Purge the Gas inlet and outlet connections. 2. Close the isolation valves in the system. 3. Unsure there is no water/condensation left within the lines.
5	Pressure test – Pipework	As per test procedure. AS2032:2006 Cl. 7.2	22/01/14	T.Z	**Test Procedure** 1. Connect the CO2 Gas to the skid inlet. Close skid outlet. (Caution – High Pressure side of system can reach up to 70 Bar) 2. Using the regulator, pressurise the low pressure side to 5.5 bar as per regulator pressure gauge, and hold for 15 minutes. 3. Apply soapy water to all connections using appropriate PPE for CO2 Gas. 4. Visually inspect all pipework to ensure no leakage.
6	Check operation of Pressure Switches (High pressure)	As per test procedure.	22/01/14	T.Z	**Test Procedure** 1. While the electrical panel is live, bleed out the pressure on the High Pressure side 2. Using the regulator pressure gauge, ensure the regulator change over operates at approximately 5.0 bar by adjusting the switch setting to activate changeover. 3. Repeat for each Bank of CO2 cylinders.

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
7	Check operation of Blocked Nozzle Pressure Switch	As per test procedure.	22/01/14	T.Z	**Test Procedure** 1. While the electrical panel is live, isolate the outlet valve on the low Pressure side 2. Using the regulator pressure gauge set the downstream pressure to 2.5 Bar. Adjust the pressure switch until it operates the alarm.
8	Pressure Relief Valve	As per test procedure.	22/01/14	T.Z	**Test Procedure** 1. Close the isolation solenoid valve. 2. Using the skid pressure indicator, confirm factory setting of the PRV operates at 6 bar. 3. Visually / Audibly check PRV and system pressure spikes on the Regulating pressure gauge. 4. PRV-0740-001 Relief Pressure: .....
9	Dosing Quill Inspection	As per test procedure	22/01/14 REFER TO NOTES.	T.Z	**Test Procedure** 1. Isolate Dosing Line Valve. 2. Remove Quill to confirm Static Mixer Ball Valve seals under Filtrate Water Pressure 3. Check that the 3 bar spring non return valve (P/n 95730332) is installed in the Dosing Quill. 4. Confirm the diffuser **is** installed in the CO2 Quill 5. Reassemble and visually monitor pipework and joints to ensure there are no leaks.

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
10	Panel Operation	As per test procedure	22/01/14	T.Z	**Test Procedure** 1. Close all isolation valves. 2. Set the supply pressure at 4 Bar 3. Check that the 3 bar spring non return valve (P/n 95730332) is installed in the Dosing Quill. 4. Remove the quill from the static mixer and place into a bucket of water. 5. Calibrate the Proportional Control valve to operate at 900 Hz at 600 mA for the 20 mA setting and 800 Hz at 520 mA for the 4 mA setting. (Settings to be adjusted at commissioning) 6. Set the flow meter to 2 L/min at 3 Bar and operate the proportional control valve through the full range of 4 – 20 mA to confirm a lineal response of the valve flow rate. 7. Run the system as per standard operation for approximately 5 minutes. 8. Visually and audibly check system. 9. Check the operation of the shut off and proportional control solenoid. 10. Check the operation of the L Port valve. 11. Return the quill to the static mixer and run and observe system for 30 minutes.

GRUNDFOS

NOTES:	THE DIFFUSER HAS BEEN REMOVED + 1MM HOLES DRILLED IN QUILL.

	Name	Designation	Signature	Date
Grundfos Representative:	IAN GINN	PROJECT ENGINEER		22/01/14
Client Representative:	TAKURA ZIYAMBE	PM		21/01/14

GRUNDFOS

Grundfos Pumps Pty Ltd SITE ACCEPTANCE TEST			SAT NO. :	98439300-SAT-FH
			DATE :	05/04/2013
			PREPARED BY :	I.Ginn
CLIENT :	Thomas & Coffey	CONTRACT NO. :	0060A	
QUOTATION NO. :	20227-JKJ99	PROJECT :	Boonah Regional Lagoons Upgrade	
ORDER NO. :	6232240/003	DRAWING NO. :	486/5/5-0104-260 to 262 P&ID – 486/5/5-0104-251 to 252	
SYSTEM DESCRIPTION:	pH Monitoring Panel – Forest Hill	EQUIPMENT/TAG NO. :	98439300-15042013	

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
1	Monitoring Panel Construction and Assembly	As per approved P&ID 486/5/5-0104-251 to 252 As per approved GA 486/5/5-0104-260 to 262	30/01/14	T.Z	• Ensure process connections and orientations are as per P&ID and GA drawing. • Visual inspection of all components to check correct / satisfactory installation. • Ensure valves are installed in the correct direction. • Check alignment of all equipment. • Check overall dimensions. • Check for correct nozzle locations.
2	Operational Check	All isolation valves are free in movement and in correct position.	30/01/14	T.Z	**Test Procedure** 1. Open and close all valves to ensure there is no binding. 2. Close all drain/flushing isolation valves. 3. Open inlet and discharge isolation valves. 4. Ensure all valves are open / closed as per the P&ID.
3	Pressure test – Pipework	As per test procedure. AS2032:2006 Cl. 7.2	30/01/14	T.Z	**Test Procedure** 1. Connect the test pump to the panel inlet. Close skid outlet. 2. Using the test pump, pressurise the pipes to 4 bar and hold for 15 minutes. 3. Visually inspect all pipework to ensure no leakage.

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
4	Calibrate the M10 Sensor	As per procedure	30/01/14	T.Z	**Test Procedure** 1. Isolate both valves on either side of the sensor. 2. Unscrew the sensor and insert into the Buffer calibration solution. 3. Calibrate the sensor using the lower pH buffer valve as per instructions for the DIA-2Q (Page 46) Rinse sensor in water before next step. 4. Calibrate the sensor using the upper pH buffer valve as per instructions for the DIA-2Q (Page 46) 5. Replace sensor.
5	Prime the System	Remove air from system.	30/01/14	T.Z	**Priming System** 1. Purge water inlet and outlet connections. 2. Unsure there is no trapped air left within the pipes. 3. Regulate the flow on the discharge ball valve to ensure the M10 Sensor is fully immersed in water at all times.
6	Panel Operation	As per test procedure	30/01/14	T.Z	**Test Procedure** 1. Ensure all valves are open/closed as per the P&ID. 2. Run the system as per standard operation for approximately 30 minutes. 3. Visually and audibly check system. 4. Check that the temperature of the water displayed on the panel is accurate using the handheld digital laser temperature gun. Adjust if required. (Page 47)

GRUNDFOS

NOTES:	

	Name	Designation	Signature	Date
Grundfos Representative:	IAN GINN	PROJECT ENGINEER		30/01/2014
Client Representative:	TAKUDZWA ZIYAMBE	PM		31/01/14

GRUNDFOS

Grundfos Pumps Pty Ltd
SITE ACCEPTANCE TEST

		SAT NO. :	98437842-SAT-FH
		DATE :	23/04/2013
		PREPARED BY :	I.Ginn
CLIENT :	Thomas & Coffey	CONTRACT NO. :	0060A
QUOTATION NO. :	20227-JKJ99	PROJECT :	Boonah Regional Lagoons
ORDER NO. :	6232240/003	DRAWING NO. :	486/5/5-0104-253 to 259 P&ID – 486/5/5-0104-251 to 252
SYSTEM DESCRIPTION:	Carbon Dioxide (CO2) Storage and Installation – Forest Hill	EQUIPMENT/TAG NO. :	98437842-29042013

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
1	Dosing System Layout and Connections	As per approved P&ID 486/5/5-0104-251 to 252 As per approved GA 486/5/5-0104-253 to 259	24.5.13	24.5.13	• Visual inspection of installed Bottle assemblies, panels and sundry for correct location to GA, conformance to P&ID and any damage. • Check hold down bolts - correct installation • Check installation of regulators and valves. • Check installation of pressure switches and manifold assemblies. • Check dosing line installation, pipe supports, valves and general alignment
2	Dosing Panel Construction and Assembly (General)	As per approved P&ID 486/5/5-0104-251 to 252 As per approved GA 486/5/5-0104-253 to 259	24.5.13	24.5.13	• Visual inspection of all components to check correct / satisfactory installation. • Ensure Pressure Regulating Valves, Solenoid Valves, Pressure Relief Valve are installed in the correct direction. • Check alignment of all equipment. • Check for correct nozzle locations.
3	Operational Check	All isolation valves are free in movement and in correct position.	24.5.13	24.5.13	**Test Procedure** 1. Open and close all valves to ensure there is no binding. 2. Close all drain/bleed isolation valves. 3. Open / close all system isolation valves. 4. Ensure all valves are open/closed as per the P&ID.

GRUNDFOS

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		
			GRUNDFOS	CLIENT	NOTES / DOCUMENTS
4	Safety inspection	As per inspection procedure.	24.5.13	24.5.13.	**Inspection Procedure** 1. Are cylinders stored and secured correctly? 2. Is the Pressure Relief vent line directed outside and in a safe position? 3. Is the Pressure Relief vent line fitted with an insect screen? 4. Are the PPE, Hazard signs installed? 5. Are the Pipe Marker signs installed?
5					

GRUNDFOS

NOTES:	Co2 Cylinder not yet in place

	Name	Designation	Signature	Date
Grundfos Representative:	Andrew Dunnett	Fitter		24.5.13
Client Representative:	NOAH HENDSON.	SITE FOREMAN.		24.5.13

GRUNDFOS

Grundfos Pumps Pty Ltd INSPECTION AND TEST PLAN			ITP NO. :	98456865-ITP-FH
			DATE :	27.03.2013
			PREPARED BY :	Ian Ginn
CLIENT :	Thomas & Coffey	CONTRACT NO. :	0060A	
QUOTATION NO. :	20227-JKJ99	PROJECT :	Boonah Regional Lagoons	
ORDER NO. :	6232240/003	DRAWING NO. :	P&ID – 486/5/5-0104-251 to 252 486/5/5-0104-260 to 262 – pH Monitor panel 486/5/5-0104-266 to 268 – CO2 Dosing Panel	
SYSTEM DESCRIPTION:	Carbon Dioxide (CO2) Dosing System – Forest Hill	EQUIPMENT/TAG NO.:	98456865-08042013	

LEGEND			
R	Review	H	Hold Point
I	Inspection Point	M	Monitor
W	Witness Point	S	Subcontractor
C	Certificate	V	Verified

GRUNDFOS

NO	ACTIVITY	CONTROLLING PROCEDURE	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTS	INSPECTION & VERIFICATION POINTS	INSPECTION BY (SIGN, DATE)	
						GRUNDFOS	CLIENT
1	Frame Fabrication	AS 1554.6	Construction Drawings Compliance to AS1554.6 486/5/5-0104-260 to 262 486/5/5-0104-266 to 268	As built drawings Approved weld procedures Approved weld qualifications	M	1. 24-5-13 2. 24-5-13	
2	Panel Assembly	FAT	Approved P&ID- 486/5/5-0104-251 to 252 Construction Drawings 486/5/5-0104-260 to 262 486/5/5-0104-266 to 268	As built drawings Approved P&IDs Signed ITP	M	1. 21-5-13 2. 21-5-13 3. 21-5-13	
3	Factory Acceptance Testing	Approval of Factory Acceptance Test sheet.	Approved Factory Acceptance Test sheets. 98456865-FAT 98439300-FAT	Signed Factory Acceptance Test sheet.	W	1. 21-5-13 2. 24-5-13	T.B
4	Equipment Photographs	ITP	Photographs transferred to server.	Signed ITP	I	1. 27-5-13 2. 27-5-13	

GRUNDFOS

NO	ACTIVITY	CONTROLLING PROCEDURE	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTS	INSPECTION & VERIFICATION POINTS	INSPECTION BY (SIGN, DATE)	
						GRUNDFOS	CLIENT
5	Crating and Delivery	Ensure skid is adequately packed and labelled for storage and transport. Ensure all loose items are adequately packaged and labelled for transport. Check items against BOM	Checked by Project Engineer	Signed ITP	H	1. 23-5-13 2. 23-5-13	
6	Documentation	Compilation and delivery of documentation	T&C approved.	T&C Approval	M	31/01/14	

GRUNDFOS

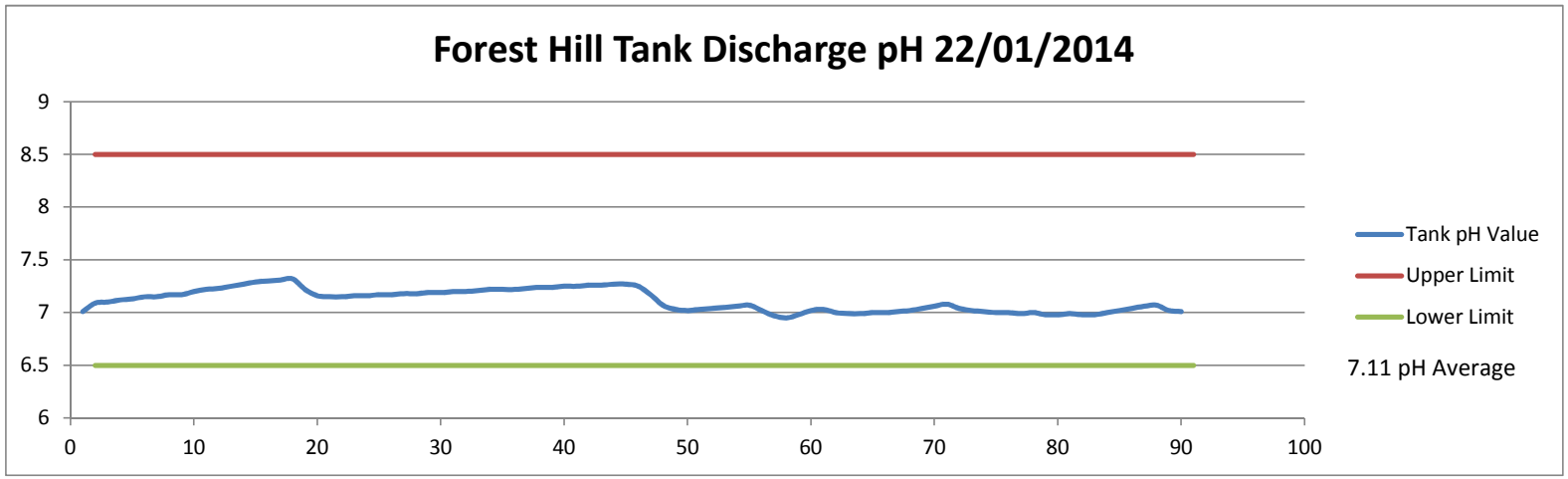
NO	ACTIVITY	CONTROLLING PROCEDURE	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTS	INSPECTION & VERIFICATION POINTS	INSPECTION BY (SIGN, DATE)	
						GRUNDFOS	CLIENT
7	Site Acceptance Testing	Approval of Site Acceptance Test sheet. 98456865-SAT ✓ 98437842-SAT ✓ 98439300-SAT ✓	Approved Site Acceptance Test sheet.	Signed Site Acceptance Test sheet.	H	1. 30/01/14 2. 24-5-13 3. 30/01/14	T.2
8	Commissioning Acceptance Documents	Approval of Commissioning Acceptance Test Documents- COMM-CHK-002 COMM-CHK-003	Approved Commissioning Acceptance Test sheet.	Signed Commissioning Acceptance Test sheet.	H	1. 30/01/14 2. 30/01/2014	T-2

GRUNDFOS

NOTES:	

	Name	Designation	Signature	Date
Prepared by:	Ian Ginn	Project Engineer	I. G	30/01/2014
Approved by:	Martin Simms	Projects Engineering Manager - Dosing		
Client Approval by:	Toby Grayson	Civil Project Manager	pp. T. Z M Amise	31/01/14

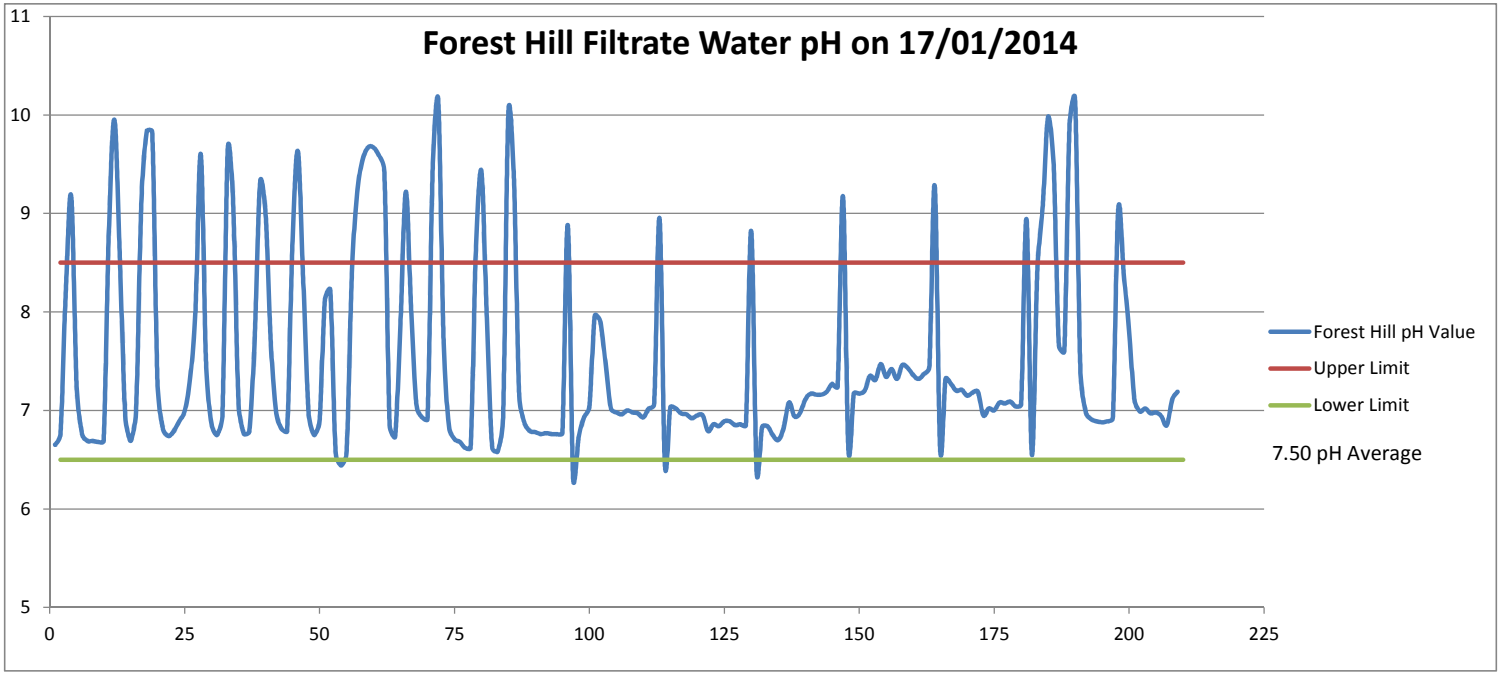
Date	Time	Log No.	pH Value
22/01/2004	13:40	1	7.01
22/01/2004	13:41	2	7.09
22/01/2004	13:42	3	7.1
22/01/2004	13:43	4	7.12
22/01/2004	13:44	5	7.13
22/01/2004	13:45	6	7.15
22/01/2004	13:46	7	7.15
22/01/2004	13:47	8	7.17
22/01/2004	13:48	9	7.17
22/01/2004	13:49	10	7.2
22/01/2004	13:50	11	7.22
22/01/2004	13:51	12	7.23
22/01/2004	13:52	13	7.25
22/01/2004	13:53	14	7.27
22/01/2004	13:54	15	7.29
22/01/2004	13:55	16	7.3
22/01/2004	13:56	17	7.31
22/01/2004	13:57	18	7.32
22/01/2004	13:58	19	7.22
22/01/2004	13:59	20	7.16
22/01/2004	14:00	21	7.15
22/01/2004	14:01	22	7.15
22/01/2004	14:02	23	7.16
22/01/2004	14:03	24	7.16
22/01/2004	14:04	25	7.17
22/01/2004	14:05	26	7.17
22/01/2004	14:06	27	7.18
22/01/2004	14:07	28	7.18
22/01/2004	14:08	29	7.19
22/01/2004	14:09	30	7.19
22/01/2004	14:10	31	7.2
22/01/2004	14:11	32	7.2
22/01/2004	14:12	33	7.21
22/01/2004	14:13	34	7.22
22/01/2004	14:14	35	7.22
22/01/2004	14:15	36	7.22
22/01/2004	14:16	37	7.23



22/01/2004	14:17	38	7.24
22/01/2004	14:18	39	7.24
22/01/2004	14:19	40	7.25
22/01/2004	14:20	41	7.25
22/01/2004	14:21	42	7.26
22/01/2004	14:22	43	7.26
22/01/2004	14:23	44	7.27
22/01/2004	14:24	45	7.27
22/01/2004	14:25	46	7.25
22/01/2004	14:26	47	7.17
22/01/2004	14:27	48	7.07
22/01/2004	14:28	49	7.03
22/01/2004	14:29	50	7.02
22/01/2004	14:30	51	7.03
22/01/2004	14:31	52	7.04
22/01/2004	14:32	53	7.05
22/01/2004	14:33	54	7.06
22/01/2004	14:34	55	7.07
22/01/2004	14:35	56	7.02
22/01/2004	14:36	57	6.97
22/01/2004	14:37	58	6.95
22/01/2004	14:38	59	6.98
22/01/2004	14:39	60	7.02
22/01/2004	14:40	61	7.03
22/01/2004	14:41	62	7
22/01/2004	14:42	63	6.99
22/01/2004	14:43	64	6.99
22/01/2004	14:44	65	7
22/01/2004	14:45	66	7
22/01/2004	14:46	67	7.01
22/01/2004	14:47	68	7.02
22/01/2004	14:48	69	7.04
22/01/2004	14:49	70	7.06
22/01/2004	14:50	71	7.08
22/01/2004	14:51	72	7.04
22/01/2004	14:52	73	7.02
22/01/2004	14:53	74	7.01
22/01/2004	14:54	75	7
22/01/2004	14:55	76	7

22/01/2004	14:56	77	6.99
22/01/2004	14:57	78	7
22/01/2004	14:58	79	6.98
22/01/2004	14:59	80	6.98
22/01/2004	15:00	81	6.99
22/01/2004	15:01	82	6.98
22/01/2004	15:02	83	6.98
22/01/2004	15:03	84	7
22/01/2004	15:04	85	7.02
22/01/2004	15:05	86	7.04
22/01/2004	15:06	87	7.06
22/01/2004	15:07	88	7.07
22/01/2004	15:08	89	7.02
22/01/2004	15:09	90	7.01

Date	Time	Log No.	pH Value
17/01/2004	13:19	1	6.65
17/01/2004	13:21	2	6.76
17/01/2004	13:22	3	8.23
17/01/2004	13:23	4	9.17
17/01/2004	13:24	5	7.25
17/01/2004	13:25	6	6.76
17/01/2004	13:26	7	6.69
17/01/2004	13:27	8	6.69
17/01/2004	13:28	9	6.68
17/01/2004	13:29	10	6.69
17/01/2004	13:30	11	8.88
17/01/2004	13:31	12	9.95
17/01/2004	13:32	13	8.56
17/01/2004	13:33	14	6.95
17/01/2004	13:34	15	6.69
17/01/2004	13:35	16	6.99
17/01/2004	13:36	17	9.14
17/01/2004	13:37	18	9.84
17/01/2004	13:38	19	9.83
17/01/2004	13:39	20	7.25
17/01/2004	13:40	21	6.81
17/01/2004	13:41	22	6.74
17/01/2004	13:42	23	6.79
17/01/2004	13:43	24	6.89
17/01/2004	13:44	25	6.99
17/01/2004	13:45	26	7.31
17/01/2004	13:46	27	7.99
17/01/2004	13:47	28	9.6
17/01/2004	13:48	29	7.44
17/01/2004	13:49	30	6.86
17/01/2004	13:50	31	6.75
17/01/2004	13:51	32	6.94
17/01/2004	13:52	33	9.65
17/01/2004	13:53	34	9.1
17/01/2004	13:54	35	7.07
17/01/2004	13:55	36	6.76
17/01/2004	13:56	37	6.79
17/01/2004	13:57	38	7.75
17/01/2004	13:58	39	9.32
17/01/2004	13:59	40	9
17/01/2004	14:00	41	7.66
17/01/2004	14:01	42	6.97



17/01/2004	14:02	43	6.81
17/01/2004	14:03	44	6.79
17/01/2004	14:04	45	8.72
17/01/2004	14:05	46	9.63
17/01/2004	14:06	47	8.3
17/01/2004	14:07	48	6.96
17/01/2004	14:08	49	6.75
17/01/2004	14:09	50	6.89
17/01/2004	14:10	51	8.12
17/01/2004	14:11	52	8.22
17/01/2004	14:12	53	6.56
17/01/2004	14:13	54	6.44
17/01/2004	14:14	55	6.56
17/01/2004	14:15	56	8.39
17/01/2004	14:16	57	9.22
17/01/2004	14:17	58	9.55
17/01/2004	14:18	59	9.67
17/01/2004	14:19	60	9.67
17/01/2004	14:20	61	9.59
17/01/2004	14:21	62	9.44
17/01/2004	14:22	63	6.85
17/01/2004	14:23	64	6.73
17/01/2004	14:24	65	7.88
17/01/2004	14:25	66	9.22
17/01/2004	14:26	67	7.99
17/01/2004	14:27	68	7.04
17/01/2004	14:28	69	6.93
17/01/2004	14:29	70	6.91
17/01/2004	14:30	71	9.51
17/01/2004	14:31	72	10.15
17/01/2004	14:32	73	7.69
17/01/2004	14:33	74	6.83
17/01/2004	14:34	75	6.71
17/01/2004	14:35	76	6.68
17/01/2004	14:36	77	6.62
17/01/2004	14:37	78	6.62
17/01/2004	14:38	79	8.67
17/01/2004	14:39	80	9.43
17/01/2004	14:40	81	7.94
17/01/2004	14:41	82	6.62
17/01/2004	14:42	83	6.58
17/01/2004	14:43	84	6.9
17/01/2004	14:44	85	10.03

17/01/2004	14:45	86	9.39
17/01/2004	14:46	87	7.15
17/01/2004	14:47	88	6.87
17/01/2004	14:48	89	6.79
17/01/2004	14:49	90	6.78
17/01/2004	14:50	91	6.76
17/01/2004	14:51	92	6.77
17/01/2004	14:52	93	6.76
17/01/2004	14:53	94	6.76
17/01/2004	14:54	95	6.77
17/01/2004	14:55	96	8.88
17/01/2004	14:56	97	6.31
17/01/2004	14:57	98	6.72
17/01/2004	14:58	99	6.93
17/01/2004	14:59	100	7.04
17/01/2004	15:00	101	7.96
17/01/2004	15:01	102	7.91
17/01/2004	15:02	103	7.48
17/01/2004	15:03	104	7.02
17/01/2004	15:04	105	6.98
17/01/2004	15:05	106	6.96
17/01/2004	15:06	107	7
17/01/2004	15:07	108	6.98
17/01/2004	15:08	109	6.97
17/01/2004	15:09	110	6.93
17/01/2004	15:10	111	7.02
17/01/2004	15:11	112	7.06
17/01/2004	15:12	113	8.95
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17/01/2004	15:14	115	7.03
17/01/2004	15:15	116	7.02
17/01/2004	15:16	117	6.97
17/01/2004	15:17	118	6.96
17/01/2004	15:18	119	6.92
17/01/2004	15:19	120	6.95
17/01/2004	15:20	121	6.95
17/01/2004	15:21	122	6.79
17/01/2004	15:22	123	6.86
17/01/2004	15:23	124	6.84
17/01/2004	15:24	125	6.89
17/01/2004	15:25	126	6.89
17/01/2004	15:26	127	6.85
17/01/2004	15:27	128	6.86

17/01/2004	15:28	129	6.85
17/01/2004	15:29	130	8.82
17/01/2004	15:30	131	6.37
17/01/2004	15:31	132	6.83
17/01/2004	15:32	133	6.84
17/01/2004	15:33	134	6.75
17/01/2004	15:34	135	6.7
17/01/2004	15:35	136	6.82
17/01/2004	15:36	137	7.08
17/01/2004	15:37	138	6.94
17/01/2004	15:38	139	6.97
17/01/2004	15:39	140	7.11
17/01/2004	15:40	141	7.17
17/01/2004	15:41	142	7.16
17/01/2004	15:42	143	7.16
17/01/2004	15:43	144	7.19
17/01/2004	15:44	145	7.27
17/01/2004	15:45	146	7.24
17/01/2004	15:46	147	9.17
17/01/2004	15:47	148	6.6
17/01/2004	15:48	149	7.17
17/01/2004	15:49	150	7.17
17/01/2004	15:50	151	7.2
17/01/2004	15:51	152	7.35
17/01/2004	15:52	153	7.31
17/01/2004	15:53	154	7.47
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17/01/2004	15:57	158	7.46
17/01/2004	15:58	159	7.43
17/01/2004	15:59	160	7.36
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17/01/2004	16:01	162	7.37
17/01/2004	16:02	163	7.44
17/01/2004	16:03	164	9.28
17/01/2004	16:04	165	6.61
17/01/2004	16:05	166	7.32
17/01/2004	16:06	167	7.27
17/01/2004	16:07	168	7.2
17/01/2004	16:08	169	7.21
17/01/2004	16:09	170	7.15
17/01/2004	16:10	171	7.18
17/01/2004	16:11	172	7.19

17/01/2004	16:12	173	6.95
17/01/2004	16:13	174	7.02
17/01/2004	16:14	175	7
17/01/2004	16:15	176	7.08
17/01/2004	16:16	177	7.07
17/01/2004	16:17	178	7.09
17/01/2004	16:18	179	7.04
17/01/2004	16:19	180	7.06
17/01/2004	16:20	181	8.94
17/01/2004	16:21	182	6.55
17/01/2004	16:22	183	8.4
17/01/2004	16:23	184	9.06
17/01/2004	16:24	185	9.98
17/01/2004	16:25	186	9.53
17/01/2004	16:26	187	7.66
17/01/2004	16:27	188	7.6
17/01/2004	16:28	189	9.91
17/01/2004	16:29	190	10.16
17/01/2004	16:30	191	7.38
17/01/2004	16:31	192	6.98
17/01/2004	16:32	193	6.91
17/01/2004	16:33	194	6.89
17/01/2004	16:34	195	6.88
17/01/2004	16:35	196	6.89
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17/01/2004	16:37	198	9.04
17/01/2004	16:38	199	8.4
17/01/2004	16:39	200	7.82
17/01/2004	16:40	201	7.11
17/01/2004	16:41	202	6.99
17/01/2004	16:42	203	7.02
17/01/2004	16:43	204	6.97
17/01/2004	16:44	205	6.98
17/01/2004	16:45	206	6.94
17/01/2004	16:46	207	6.85
17/01/2004	16:47	208	7.11
17/01/2004	16:48	209	7.19

Compliance Certificate for building Design or Specification

15

NOTE

This is to be used for the purposes of section 10 of the *Building Act 1975* and/or section 46 of the *Building Regulation 2006.*

RESTRICTION: A building certifier (class B) can only give a compliance certificate about whether building work complies with the BCA or a provision of the QDC. A building certifier (Class B) can not give a certificate regarding QDC boundary clearance and site cover provisions.

1. Property description

This section need only be completed if details of street address and property description are applicable.

EG. In the case of (standard/generic) pool design/shell manufacture and/or patio and carport systems this section may not be applicable.

The description must identify all land the subject of the application.

The lot & plan details (eg. SP / RP) are shown on title documents or a rates notice.

If the plan is not registered by title, provide previous lot and plan details.

Street address *(include no., street, suburb / locality & postcode)*

Forest Hill Water Treatment Facility		
Dodt Road, Forest Hill, QLD	Postcode	**4342**

Lot & plan details *(attach list if necessary)*

In which local government area is the land situated?

2. Description of component/s certified

Clearly describe the extent of work covered by this certificate, e.g. all structural aspects of the steel roof beams.

The Carbon Dioxide Dosing System consists of - CO2 Gas 2 off - CO2 Gas Manifolds, Wall Mounted CO2 Control Panel, Wall Mounted DIA 2Q CONEX Controller, Injection Quill, Static Mixer and pH Enclosure.

3. Basis of certification

Detail the basis for giving the certificate and the extent to which tests, specifications, rules, standards, codes of practice and other publications were relied upon.

The Carbon Dioxide system is covered under the Grundfos Warranty as free from defects in material and workmanship and is covered for 12 months from date of installation. All installations have been inspected and passed the Factory Acceptance Tests, Site Acceptance Tests and Commissioning Tests and have been approved by the principle Contractor.

LOCAL GOVERNMENT USE ONLY

Date received		Reference Number		Approved form 15 Version 2 11/11

Form 15 continued

4. Reference documentation

Clearly identify any relevant documentation, e.g. numbered structural engineering plans.

Drawing documents referenced are - 486_5_5-0104-250, 486_5_5-0104-251, 486_5_5-0104-253 to 256, 486_5_5-0104-260 to 261, 486_5_5-0104-263 to 265 and 486_5_5-0104-266 to 267. In addition to the drawings there are documents referenced in the ITP 98456865-ITP-FH.

5. Building certifier reference number

Building certifier reference number

N/a

6. Competent person details

A competent person for building work, means a person who is assessed by the building certifier for the work as competent to practise in an aspect of the building and specification design, of the building work because of the individual's skill, experience and qualifications in the aspect. The competent person must also be registered or licensed under a law applying in the State to practice the aspect.

If no relevant law requires the individual to be licensed or registered to be able to give the help, the certifier must assess the individual as having appropriate experience, qualifications or skills to be able to give the help.

If the chief executive issues any guidelines for assessing a competent person, the building certifier must use the guidelines when assessing the person.

Name (*in full*)

Ian John Ginn

Company name (*if applicable*)

Grundfos Pumnps Australia

Contact person

Ian Ginn

Phone no. *business hours*

07 5540 6743

Mobile no.

0400 799 138

Fax no.

07 5540 6740

Email address

iginn@grundfos.com

Postal address

30 Blanck Street, Ormeau, QLD. Australia

Postcode **4208**

Licence or registration number (*if applicable*)

7. Signature of competent person

This certificate must be signed by the individual assessed by the building certifier as competent.

Signature

I. Ginn

Date

10/02/2014

Inspection Certificate / Aspect Certificate / QBSA Licensee Aspect Certificate

16

NOTE

This form is to be used for the purposes of section 10(c) and 239 of the *Building Act 1975* and/or sections 32, 35B, 43, 44 and 47 of the *Building Regulation 2006*.

1. Indicate the type of certificate

The stages of assessable building work are listed in section 24 of the *Building Regulation 2006* or as conditioned by the building certifier.

An aspect of building work is part of a stage (e.g. waterproofing).

[X] Inspection Certificate for

[ ] Stage of building work (for single detached class 1a or class 10 building or structure)
(indicate the stage) _____

[X] Aspect of building work
(indicate the aspect) Completed installation of CO2 system

[ ] QBSA Licensee Aspect Certificate

Scope of the work

Scope of the work covered by the licence class under the *Queensland Building Services Authority Regulation 2003* for the aspect being certified, e.g. scope of work for a waterproofing licence is "installing waterproofing materials or systems for preventing moisture penetration". An aspect being certified may include "wet area sealing to showers".

N/a

2. Property description

The description must identify all land the subject of the application.

The lot & plan details (eg. SP / RP) are shown on title documents or a rates notice.

If the plan is not registered by title, provide previous lot and plan details.

Street address *(include no., street, suburb / locality & postcode)*

Forest Hill Water Treatment Facility

Dodt Road, Forest Hill, QLD Postcode **4342**

Lot & plan details *(Attach list if necessary)*

In which local government area is the land situated?

3. Building/structure description

Building/structure description	Class of building / structure
Existing industrial structure	

4. Description of component/s certified

Clearly describe the extent of work covered by this certificate, e.g. all structural aspects of the steel roof beams.

The Carbon Dioxide Dosing System consisting of - 2 off - CO2 Gas Manifolds, Wall Mounted CO2 Control Panel, Wall Mounted DIA 2Q CONEX Controller, Injection Quill, Static Mixer and pH Enclosure.

LOCAL GOVERNMENT USE ONLY

DATE RECEIVED		DIFFERENCE NUMBER		Approved Sept 10

Form 16 continued

5. Basis of certification

Detail the basis for giving the certificate and the extent to which tests, specifications, rules, standards, codes of practice and other publications, were relied upon.

Grundfos have issue this certificate of equipment compliance based upon the QUU Tender Document

6. Reference documentation

Clearly identify any relevant documentation, e.g. numbered structural engineering plans.

Technicial Specification 20120801_AU1-706290-Construct Contract

7. Building certifier reference number and development approval number

Building certifier reference number	Development approval number
N/a	**N/a**

8. Building Certifier, competent person or QBSA licensee details

A competent person must be assessed as competent before carrying out the inspection.

The builder for the work cannot give a stage certificate of inspection.

A competent person is assessed by the building certifier for the work as competent to practice in an aspect of the building and specification design, because of the individual's skill, experience and qualifications. The competent person must be registered or licensed under a law applying in the State to practice the aspect.

If no relevant law requires the individual to be licensed or registered, the certifier must assess the individual as having appropriate experience, qualifications or skills to be able to give the help.

If the chief executive issues any guidelines for assessing a competent person, the building certifier must use the guidelines when assessing the person.

Name (*in full*)

Ian John Ginn

Company name *if applicable*	Contact person
Grundfos Pumnps Australia	**Ian Ginn**

Phone no. *business hours*	Mobile no.	Fax no.
07 5540 6743	**0400 799 138**	**07 5540 6740**

Email address

iginn@grundfos.com

Postal address

30 Blanck Street, Ormeau, QLD. Australia

Postcode **4208**

Licence class	Licence number

Date approval to inspect received from building certifier

9. Signature of building certifier, competent person or QBSA licensee

Note: A building certifier must sign this form for temporary swimming pool fencing under section 4 of Schedule 1 of QDC MP 3.4.

Signature	Date
I. Ginn	**10/02/2014**

The *Building Act 1975* is administered by the Department of Local Government and Planning

Queensland Government

www.harrisproductsgroup.com.au July 2013

Co2 Grundfos Manifolds Compliance details

The manifolds are made using items of high quality and are backed by our US$ 20,000,000 products liability policy.

Max inlet pressure from a C02 cylinder that is sun affected would be 8000kpa, all items are rated in excess of this pressure.

Components:-

Hylok fittings Made in Sth Korea, rated to 3000psi/21,000kpa.

Cylinder fittings Made in Australia to AS 2473.2- 2007.

High pressure Hoses Made in USA rated to 20,000kpa with a 4x safety margin

Fittings Made in Australia rated to 24,000kpa+

Copper tube Made in Australia by Kembla.

High Purity Multi-Stage regulators Made by Harris USA compliance to CGA standard and exceeds requirements of AS 4267.

Please contact us if you have a query.

David Chadkirk MBA

Managing Director
HGE PTY LTD
www.harrisproductsgroup.com.au
T/A -Harris Products Group Australia & New Zealand
Ph: 61 7 3375 3670
Fax: 61 7 3375 3620
Mob: 0412 879 071

Spares

Forest Hill CO2 Gas Control

Service : (8.0) Energy Transfer

Subservice : (BRN) WASTE_GAS_FLARE

Parts Listing and Special Tools

Recommended Spare Parts and Special Tools

- The following Table contains a list of recommended spare parts that are to be kept onsite for the CO2 Dosing System.

Grundfos

DME 375/10 AR PVC/V/C Series Dosing Pumps - 96528887 - 1

Pressure Loading Valve - 96376567 - 1

Pressure Relief Valve - 96638469 -

For spare parts please contact Grundfos on (07) 5540 6700.

No special tools are required to be kept onsite for the CO2 Dosing System

Help & Contact

Forest Hill CO2 Gas Control

Trade or Product:

Contact & Address Details:

For spare parts please contact Grundfos on (07) 5540 6700.

The table below contains a list of Manufacturer and Supplier details for the CO2 Dosing System.

Grundfos Service Department

30 Blanck Street

Ormeau QLD 4208

07 5540 6710

Georg Fischer

7/30 Raubers Road
Banyo QLD 4014

07 3221 7503

Air & Hydraulics

3/7 Clearview Place

(PO Box 419)
Brookvale NSW 2100

02 9939 6199

Burkert

Unit 3/43 Sandgate Road

Albion Qld 4010

1300 888 868

As Built Drawings

CO2 Dosing Drawings

Site: (ST052) Forest Hill

Process: (0300) PRIMARY TREATMENT

Sub: (0390) PROCESS, CONTROL & ELECTRICAL POWER

CO2 Gas Mechanical Drawings

Linked Documents

- 486_5_5-0104-250.pdf
- 486_5_5-0104-251.pdf
- 486_5_5-0104-253 to 256.pdf
- 486_5_5-0104-260 to 261.pdf
- 486_5_5-0104-263 to 265.pdf
- 486_5_5-0104-266 to 267.pdf

CO2 Electrical Drawings

Site: (ST052) Forest Hill

Process: (2390) PROCESS, CONTROL & ELECTRICAL POWER

Sub: (2490) PROCESS, CONTROL & ELECTRICAL POWER

Our standard CO2 electrical drawings

Linked Documents

- CO2 Control Panel FH Rev C AB.pdf

As Constructed

QUEENSLAND Urban Utilities

FOREST HILL REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING NUMBERS 486/5/5-0104-251 TO 486/5/5-0104-252 FOREST HILL CO2 PROCESS & INSTRUMENT DIAGRAM
DRAWING NUMBERS 486/5/5-0104-253 TO 486/5/5-0104-256 FOREST HILL CO2 INSTALLATION GA - STORAGE & DOSING
DRAWING NUMBERS 486/5/5-0104-260 TO 486/5/5-0104-262 FOREST HILL CO2 pH MONITOR PANEL GA
DRAWING NUMBERS 486/5/5-0104-263 TO 486/5/5-0104-265 FOREST HILL CO2 4" STATIC MIXER GA
DRAWING NUMBERS 486/5/5-0104-266 TO 486/5/5-0104-268 FOREST HILL CO2 GAS CONTROL GA

GRUNDFOS

GRUNDFOS PUMPS PTY LTD
32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740

NAME SIGNATURE DATE
QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED

FUNDING
DESIGN W.O. No.
CONSTRUCTION W.O. No.
FUNDED BY Q.U.U. (✓) EXTERNAL ( )

DRAFTED	DS
DRAFTING CHECK	SB
CAD FILE	550104250
Q.U.U. FILE No.	

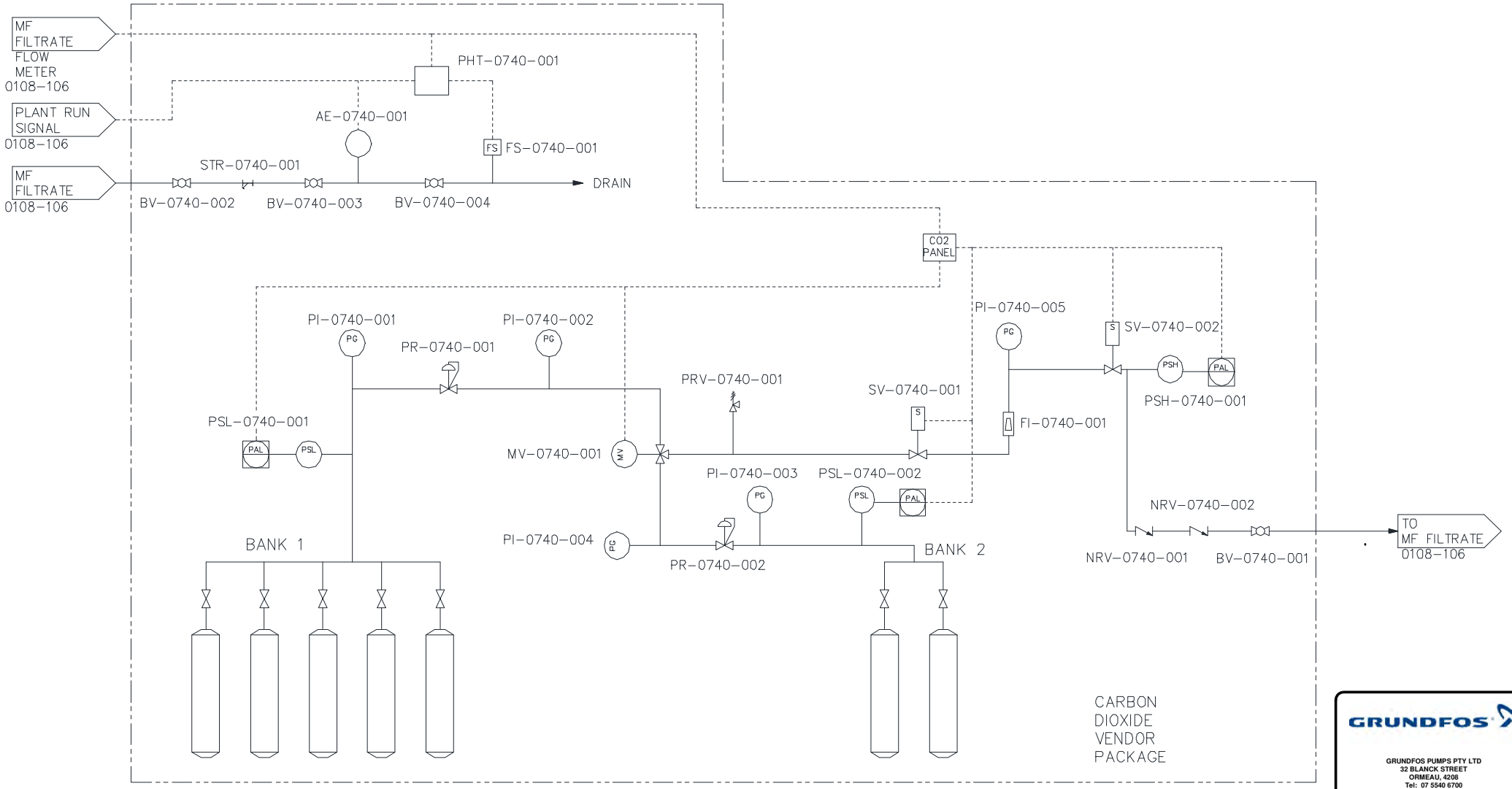
DAN STENZEL — DESIGN
SHAUN BELLAMY 18/06/2013 — DESIGN CHECK DATE
18/06/2013 DATE
JASON JOHNSON — APPROVED BY SIGNATURE

ASSET/PROJECT: REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING TITLE: FOREST HILL C02 TITLE PAGE

SHEET No. 1 OF 1
QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/5-0104-250
AMEND. A

As Constructed



GRUNDFOS

GRUNDFOS PUMPS PTY LTD
32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740

NAME SIGNATURE DATE

QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

Urban Utilities

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FUNDING	
DESIGN W.O. No.	
CONSTRUCTION W.O. No.	
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Q.U.U. FILE No.	

DAN STENZEL		18/06/2013	
DESIGN		DATE	
SHAUN BELLAMY	18/06/2013	JASON JOHNSON	
DESIGN CHECK	DATE	APPROVED BY	SIGNATURE

ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING TITLE
FOREST HILL C02 PROCESS & INSTRUMENT DIAGRAM

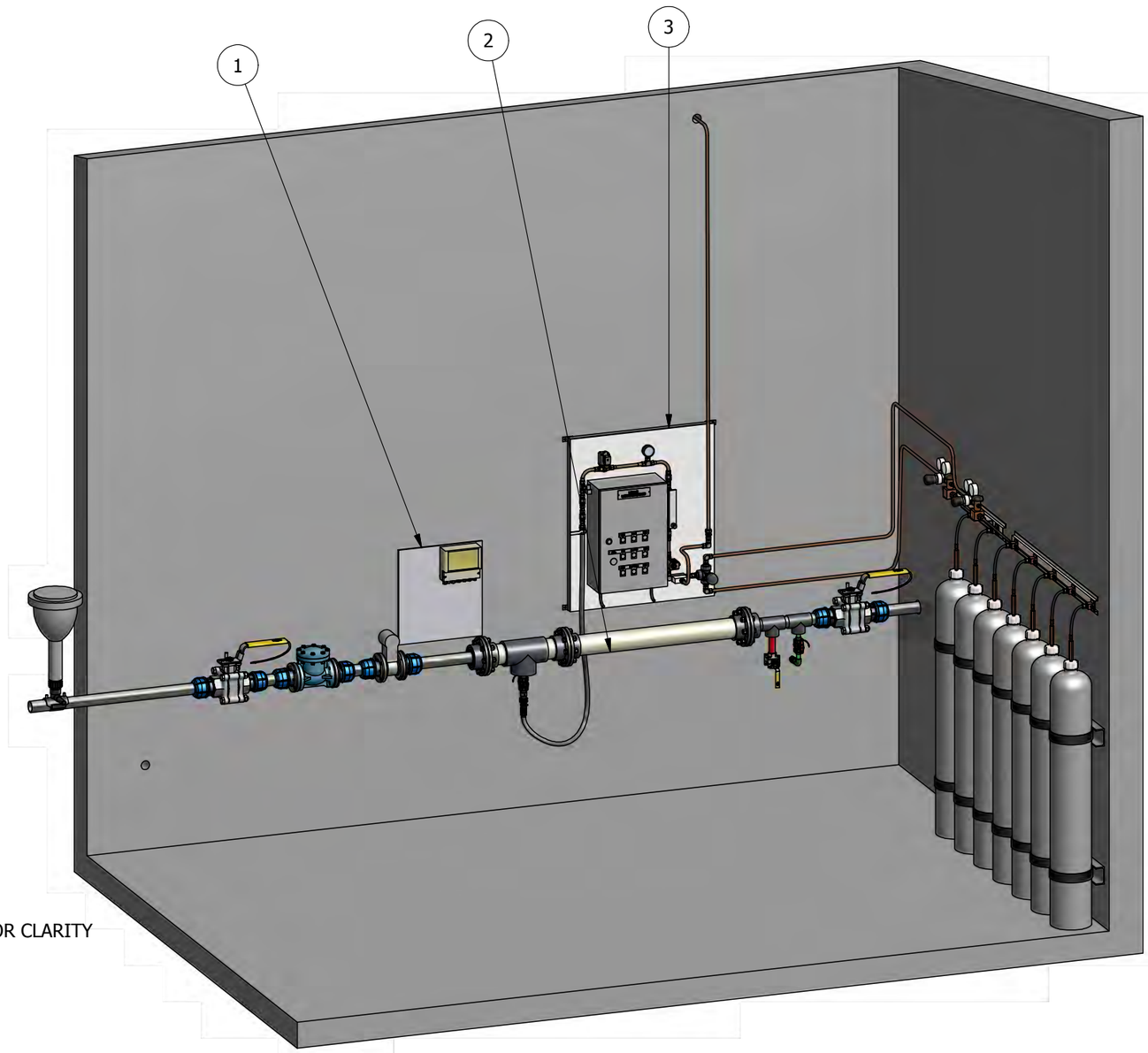
SHEET No. 1 OF 1

QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/5-0104-251

AMEND. A

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	95700782	Conex DIA-2Q
2	1	98437842	4" Static Mixer Table E & Injection Quill
3	1	98456865	CO2 Gas Control

As Constructed



* NOTE
LEFT HAND SIDE BUND WALL REMOVED FOR CLARITY

LEGEND
- 4.0" Pipe
- 3.0" Pipe
- 2.5" Pipe
- 2.0" Pipe
- 1.5" Pipe
- 1.25" Pipe
- 1.0" Pipe
- 0.75" Pipe
- 0.5" Pipe

GRUNDFOS

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32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740

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CONSTRUCTION W.O. No.
FUNDED BY Q.U.U. (✓) EXTERNAL ( )

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DRAFTING CHECK	SB
CAD FILE	550104253
Q.U.U. FILE No.	

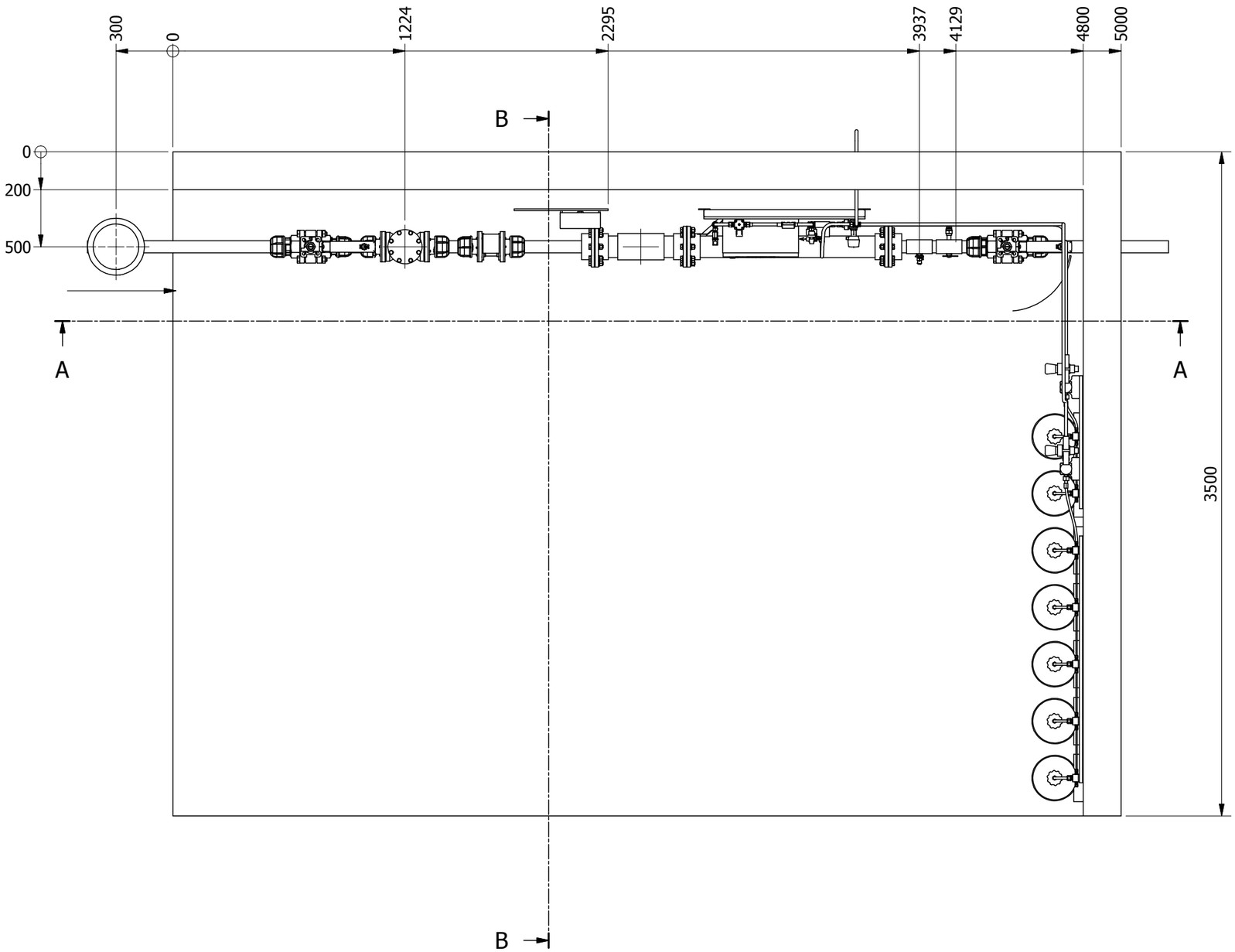
DAN STENZEL 18/06/2013
DESIGN DATE
SHAUN BELLAMY 29/01/2014
DESIGN CHECK DATE
JASON JOHNSON
APPROVED BY SIGNATURE

ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING TITLE
FOREST HILL CO2 INSTALLATION GA STORAGE & DOSING

SHEET No. 1 OF 4
QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/5-0104-253
AMEND. A

As Constructed



GRUNDFOS

GRUNDFOS PUMPS PTY LTD
32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740

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CONSTRUCTION W.O. No.
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DRAFTING CHECK	SB
CAD FILE	550104254
Q.U.U. FILE No.	

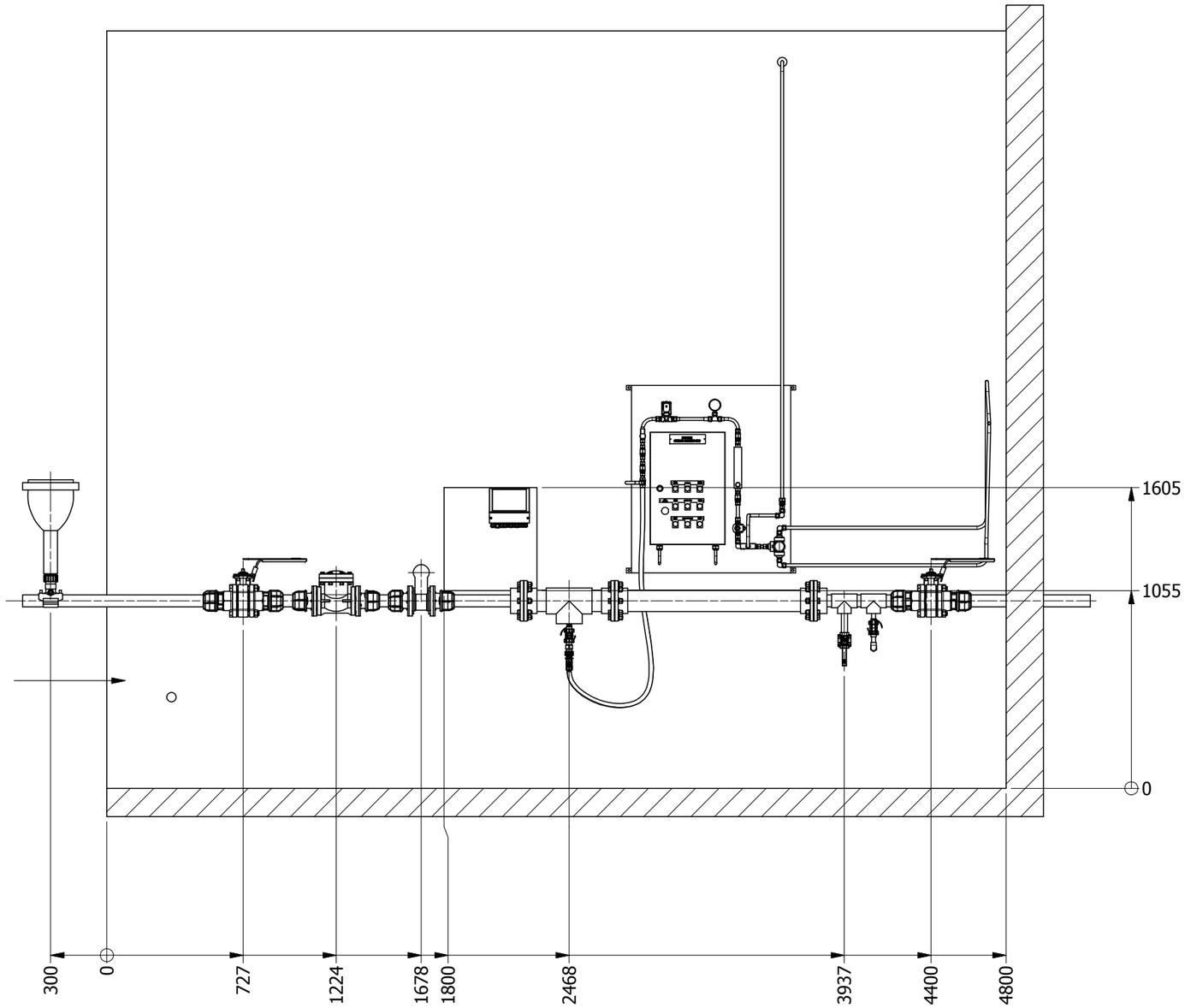
DAN STENZEL 18/06/2013
DESIGN DATE
SHAUN BELLAMY 29/01/2014
DESIGN CHECK DATE
JASON JOHNSON
APPROVED BY SIGNATURE

ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING TITLE
FOREST HILL CO2 INSTALLATION GA STORAGE & DOSING

SHEET No. 2 OF 4
QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/5-0104-254
AMEND. A

As Constructed



SECTION A-A

GRUNDFOS

GRUNDFOS PUMPS PTY LTD
32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740

NAME SIGNATURE DATE

QUEENSLAND URBAN UTILITIES DELEGATE
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Queensland Urban Utilities

No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED

FUNDING
DESIGN W.O. No.
CONSTRUCTION W.O. No.
FUNDED BY Q.U.U. (✓) EXTERNAL ( )

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DRAFTING CHECK	SB
CAD FILE	550104255
Q.U.U. FILE No.	

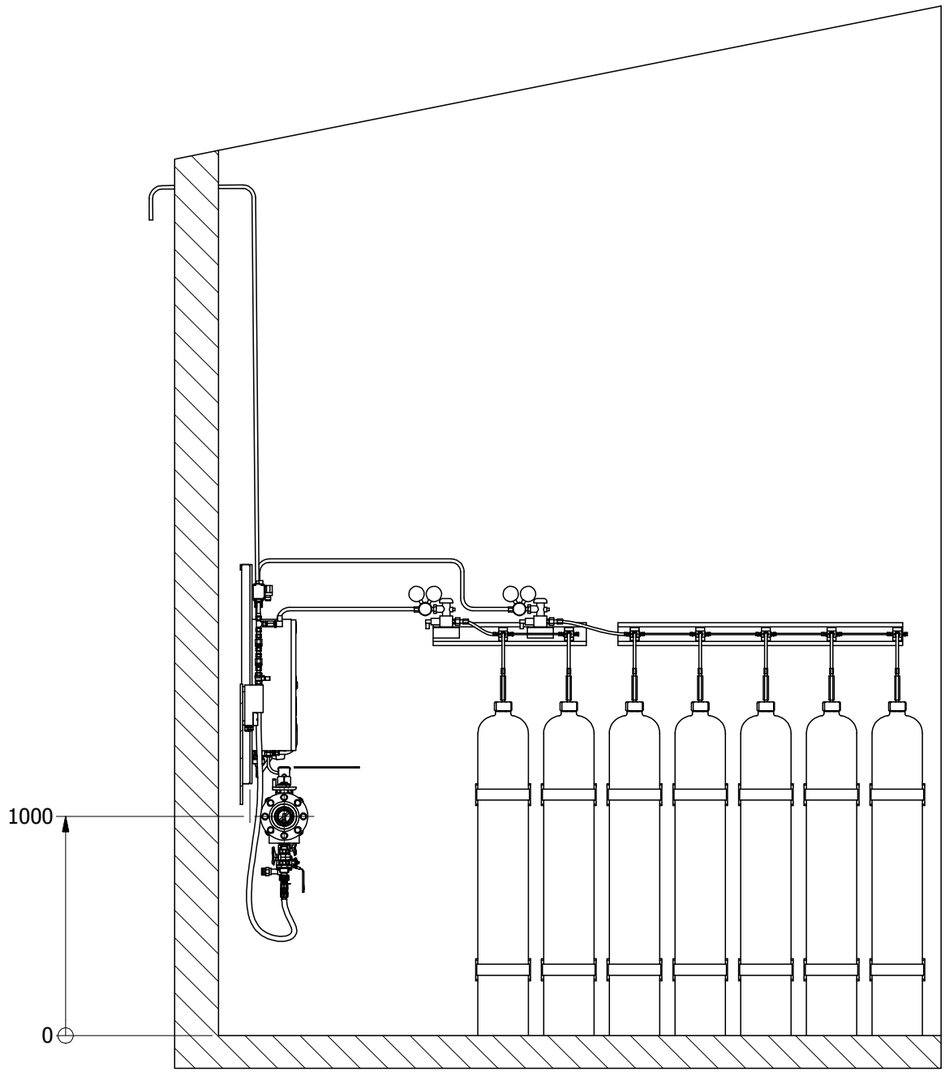
DAN STENZEL 18/06/2013
DESIGN DATE
SHAUN BELLAMY 29/01/2014
DESIGN CHECK DATE
JASON JOHNSON
APPROVED BY SIGNATURE

ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING TITLE
FOREST HILL CO2 INSTALLATION GA STORAGE & DOSING

SHEET No. 3 OF 4
QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/5-0104-255
AMEND. A

As Constructed



SECTION B-B

GRUNDFOS

GRUNDFOS PUMPS PTY LTD
32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740

NAME SIGNATURE DATE

QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

Urban Utilities

No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED

FUNDING
DESIGN W.O. No.
CONSTRUCTION W.O. No.
FUNDED BY Q.U.U. (✓) EXTERNAL ( )

DRAFTED	DS
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CAD FILE	550104256
Q.U.U. FILE No.	

DAN STENZEL 18/06/2013
DESIGN DATE
SHAUN BELLAMY 29/01/2014
DESIGN CHECK DATE
JASON JOHNSON
APPROVED BY SIGNATURE

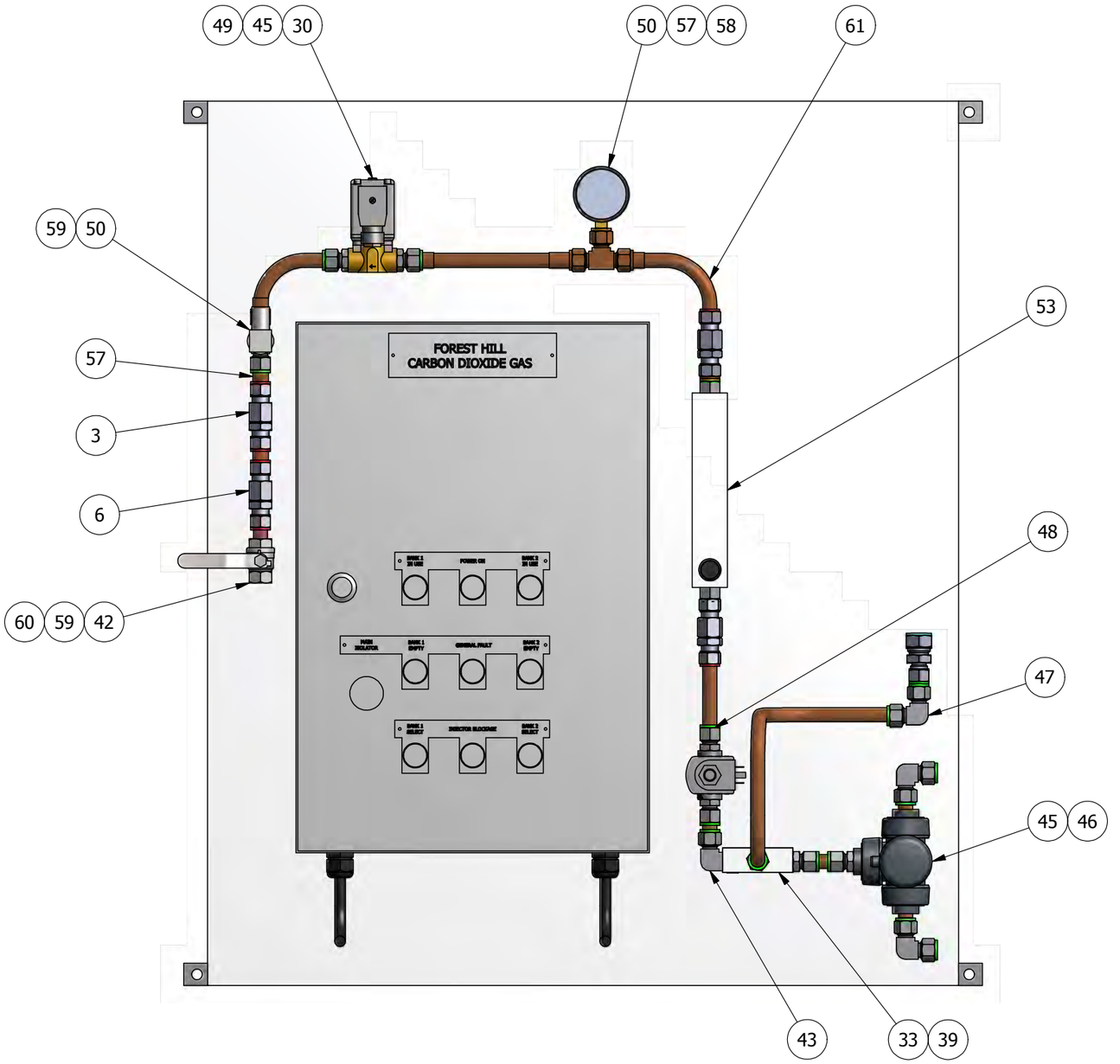
ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING TITLE
FOREST HILL CO2 INSTALLATION GA STORAGE & DOSING

SHEET No. 4 OF 4
QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/5-0104-256
AMEND. A

As Constructed

HARRIS CO2 GAS - SPECIAL CO2MB					
Item	Name	Description	Level	Assy Qty	Tot Qty
1	4302650	CYL BRKT	1	18	18
2	6639Y45MO	CO2 SEAL	1	18	18
3	4076262	NRV CAP	1	11	11
4	4076261	NRV PISTON	1	11	11
5	4076263	CO2 SEAL RETAINER	1	18	18
6	WZ254	NRV SPRING	1	11	11
7	4TD.6	HP HOSE 600	1	9	9
8	D47IN2	CO2 INLET STEM	1	18	18
9	66592M0	CO2 NUT	1	18	18
10	T30HWP	CO2 PLASTIC H/W	1	9	9
11	235713-2	MOUNTING BLOCK	1	8	8
12	235713	MOUNTING BLOCK	1	1	1
13	235711	CO2 - 3/8" ADAPTOR	1	10	10
14	235716	CO2 1/4" ADAPTOR	1	2	2
16	4TS.3	HP HOSE 300	1	1	1
17	103CMC6-4N	1/4" T 3/8" BSP	1	14	14
18	VB-BKT0204	VALVE BLOCK BRKT	1	2	2
19	235732	MANIFOLD BLOCK	1	2	2
20	451H0884	HP VALVE	1	2	2
21	HP702125000D	H. PURITY REG.	1	2	2
24	D47IN2	INLET STEM	1	1	1
25	235760	CAPSULE CAP	1	9	9
26	DF140-2	FILTER DISC	1	18	18
27	235761B	INTERNAL CAPSULE	1	9	9
29	235763	BODY	1	9	9
30	103CMC8-4N	1/2" T - 1/4" NPT	1	11	11
31	A472RO	INLET STEM	1	2	2
32	66592EO	T10 NUT	1	2	2
33	4076133	SRV BODY	1	1	1
34	4076134	SRV COVER	1	1	1
35	881782	STEM	1	2	2
36	881634	GASKET	1	2	2
37	881196	SRV NUT	1	2	2
38	WZ400	SRV SPRING	1	2	2
39	130#spacer	SPACER SHIM	1	2	2
42	235748	NRV BODY	1	2	2
43	103CLMA8-4N	ELBOW 1/4" - 1/2" T	1	1	1
44	103CMC6-4N	3/8" TUBE- 1/4"M	1	1	1
45	103CMC8-8R	1/2" TUBE - 1/2"T	1	3	3
46	B-8-SE	1/2" M-F TEE	1	1	1
47	B-4-E	1/4" ELBOW	1	1	1
48	103CMC8-6R	3/8"M - 1/2" TUBE	1	2	2
49	B-8-RB-4	1/2" - 1/4" RED. BUSH	1	2	2
52	HP703050000D	REG	1	1	1
53	RMB-50D-SSV	FLOW METER	1	1	1
54	BS011	PURIFIER 'O' RING	1	9	9
55	BS203	PURIFIER 'O' RING	1	9	9
56	S470-100-4F4F	BACK PRESSURE REG	1	1	1
57	106HSNA-4N	1/4" x 1/4" NIPPLE BRASS	1	1	1
58	8A8022	GAUGE	1	1	1
59	103HSTA-4N	1/4" TEE	1	2	2
60	23-FF08	1/2" BALL VALVE	1	1	1



*REGULATORS WILL BE ATTACHED TO THE WALL MOUNTED MANIFOLDS

NOTES:

1. QUANTITY: 1 OFF REQUIRED.
2. FRAME MATERIAL: SHS 38×1.6 THK, SS316 U.N.O.
3. SEALS: VITON.

GRUNDFOS

GRUNDFOS PUMPS PTY LTD
32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740

NAME SIGNATURE DATE

QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

Urban Utilities

No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED

FUNDING	
DESIGN W.O. No.	
CONSTRUCTION W.O. No.	
FUNDED BY Q.U.U. (✓)	EXTERNAL ( )

DRAFTED	DS
DRAFTING CHECK	SB
CAD FILE	550104266
Q.U.U. FILE No.	

DAN STENZEL		18/06/2013
DESIGN		DATE
SHAUN BELLAMY	18/06/2013	JASON JOHNSON
DESIGN CHECK	DATE	APPROVED BY SIGNATURE

ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING TITLE
FOREST HILL
CO2 GAS CONTROL GA

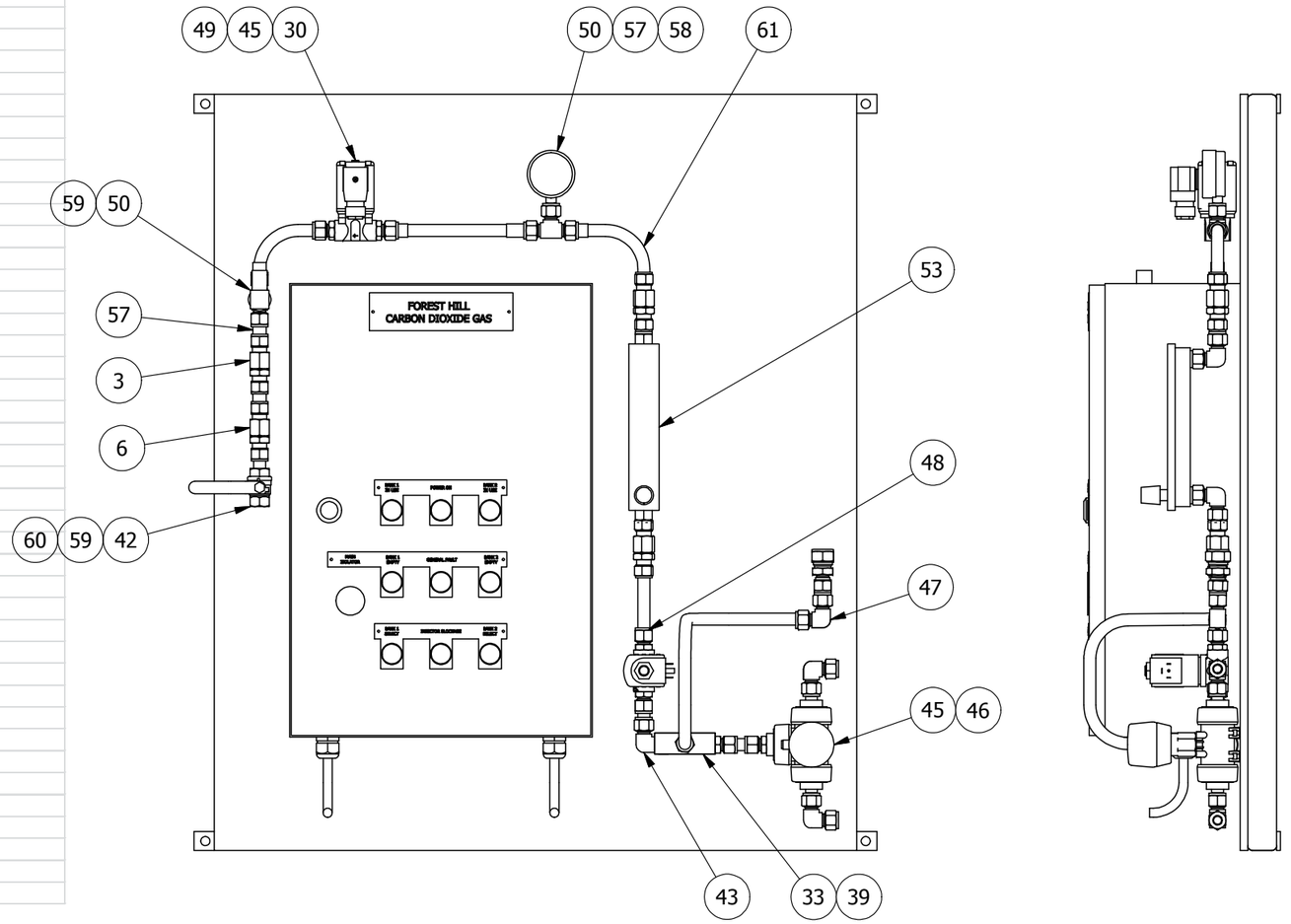
SHEET No. 1 OF 2

QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/5-0104-266

AMEND. A

As Constructed

HARRIS CO2 GAS - SPECIAL CO2MB					
Item	Name	Description	Level	Assy Qty	Tot Qty
1	4302650	CYL BRKT	1	18	18
2	6639Y45MO	CO2 SEAL	1	18	18
3	4076262	NRV CAP	1	11	11
4	4076261	NRV PISTON	1	11	11
5	4076263	CO2 SEAL RETAINER	1	18	18
6	WZ254	NRV SPRING	1	11	11
7	4TD.6	HP HOSE 600	1	9	9
8	D47IN2	CO2 INLET STEM	1	18	18
9	66592M0	CO2 NUT	1	18	18
10	T30HWP	CO2 PLASTIC H/W	1	9	9
11	235713-2	MOUNTING BLOCK	1	8	8
12	235713	MOUNTING BLOCK	1	1	1
13	235711	CO2 - 3/8" ADAPTOR	1	10	10
14	235716	CO2 1/4" ADAPTOR	1	2	2
16	4TS.3	HP HOSE 300	1	1	1
17	103CMC6-4N	1/4" T 3/8" BSP	1	14	14
18	VB-BKT0204	VALVE BLOCK BRKT	1	2	2
19	235732	MANIFOLD BLOCK	1	2	2
20	451H0884	HP VALVE	1	2	2
21	HP702125000D	H. PURITY REG.	1	2	2
24	D47IN2	INLET STEM	1	1	1
25	235760	CAPSULE CAP	1	9	9
26	DF140-2	FILTER DISC	1	18	18
27	235761B	INTERNAL CAPSULE	1	9	9
29	235763	BODY	1	9	9
30	103CMC8-4N	1/2" T - 1/4" NPT	1	11	11
31	A472RO	INLET STEM	1	2	2
32	66592EO	T10 NUT	1	2	2
33	4076133	SRV BODY	1	1	1
34	4076134	SRV COVER	1	1	1
35	881782	STEM	1	2	2
36	881634	GASKET	1	2	2
37	881196	SRV NUT	1	2	2
38	WZ400	SRV SPRING	1	2	2
39	130#spacer	SPACER SHIM	1	2	2
42	235748	NRV BODY	1	2	2
43	103CLMA8-4N	ELBOW 1/4" - 1/2" T	1	1	1
44	103CMC6-4N	3/8" TUBE- 1/4"M	1	1	1
45	103CMC8-8R	1/2" TUBE - 1/2"T	1	3	3
46	B-8-SE	1/2" M-F TEE	1	1	1
47	B-4-E	1/4" ELBOW	1	1	1
48	103CMC8-6R	3/8"M - 1/2" TUBE	1	2	2
49	B-8-RB-4	1/2" - 1/4" RED. BUSH	1	2	2
52	HP703050000D	REG	1	1	1
53	RMB-50D-SSV	FLOW METER	1	1	1
54	BS011	PURIFIER 'O' RING	1	9	9
55	BS203	PURIFIER 'O' RING	1	9	9
56	S470-100-4F4F	BACK PRESSURE REG	1	1	1
57	106HSNA-4N	1/4" x 1/4" NIPPLE BRASS	1	1	1
58	8A8022	GAUGE	1	1	1
59	103HSTA-4N	1/4" TEE	1	2	2
60	23-FF08	1/2" BALL VALVE	1	1	1



GRUNDFOS

GRUNDFOS PUMPS PTY LTD
32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740

NAME SIGNATURE DATE

QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

Urban Utilities

No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED

FUNDING		DRAFTED	DS
DESIGN W.O. No.		DRAFTING CHECK	SB
CONSTRUCTION W.O. No.		CAD FILE	550104267
FUNDED BY Q.U.U. (✓)	EXTERNAL ( )	Q.U.U. FILE No.	

DAN STENZEL		18/06/2013
DESIGN		DATE
SHAUN BELLAMY	18/06/2013	JASON JOHNSON
DESIGN CHECK	DATE	APPROVED BY SIGNATURE

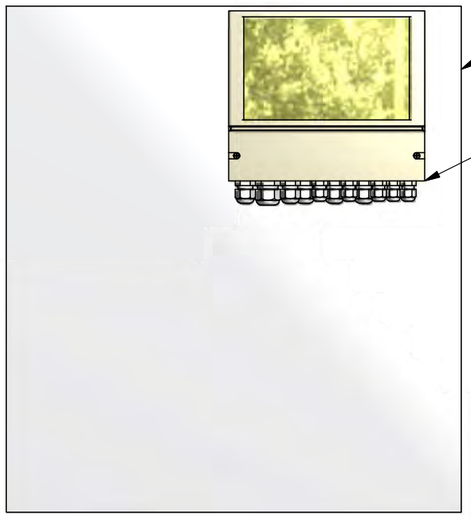
ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING TITLE
FOREST HILL
CO2 GAS CONTROL GA

SHEET No. 2 OF 2

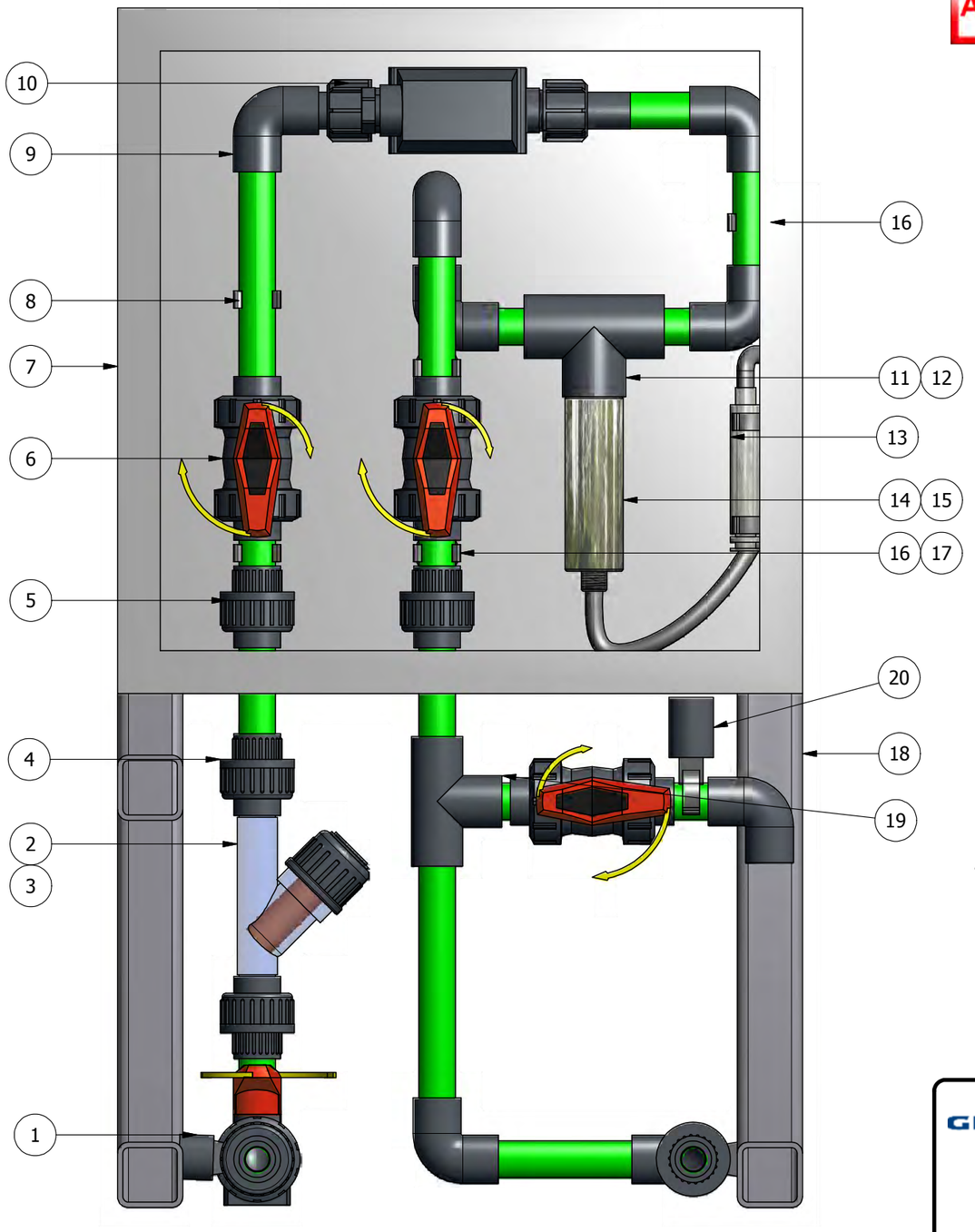
QUEENSLAND URBAN UTILITIES DRAWING No.	AMEND.
486/5/5-0104-267	A

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	N/A	Spacer 25mm x 20mm UPVC
2	1	97629851	Strainer 1/2" Typ305 Spig Clr UPVC Vit
3	1	97629387	Screen 1/2" GF 305 Strainer 0.8mm UPVC
4	2	97628950 + 95715032	Union Adapt ½" GF 305 Strainer SWJ EPDM + O-Ring Vit BS210V - ½"
5	4	97629528 + 95715032	Union ½" SWJ PVC-U VITON
6	4	97629003	Valve Ball 546 ½" SWJ PVC-U Viton
7	1		0060A-ENCLOSURE
8	1m	97629248	Pipe 1/2" Sched 80 PVC-U
9	10	97629696	Elbow 90DEG 1/2" SWJ SCH.80 UPVC
10	1	97629761	Flow switch (S.P.S.T.NO) P20-B-A-20
11	1	97629507	Tee 3/4" SWJ SCH.80 UPVC
12	2	95713897	Bush Reducer ¾" - ½" SWJ PVC-U
13	1	98606540	PHAMP-1 (pH Preamplifier)
14	1		ISI pH Electrode & Holder - M10
15	1	97629076	BUSH THREADED 1/2 BSPF-DN20 SOLV (GF)
16	11	97629270	Clip Pipe 1/2" GoemA
17	2	N/A	Spacer 25mm x 75mm UPVC
18	1		0060A-01-ENCLOSURE FRAME
19	1	97640403	Tee 1/2" SWJ SCH.80 UPVC
20	1	N/A	Spacer 25mm x 35mm UPVC



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
21	2.88m²	95716318	10mm Grey PVC sheet
22	1	95700782	Conex DIA-2Q

NOTES:
1. QUANTITY: 1 OFF REQUIRED.
2. FRAME MATERIAL: SHS 38×1.6 THK, SS316 (SHS 50×3 THK) (EA 50×5 THK) U.N.O.
3. SEALS: VITON.



As Constructed

LEGEND
- 4.0" Pipe
- 3.0" Pipe
- 2.5" Pipe
- 2.0" Pipe
- 1.5" Pipe
- 1.25" Pipe
- 1.0" Pipe
- 0.75" Pipe
- 0.5" Pipe

NOTE: MOUNTED REMOTELY
NEXT TO WATER TANK

GRUNDFOS

GRUNDFOS PUMPS PTY LTD
32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
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NAME SIGNATURE DATE
QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

Urban Utilities

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FUNDING		DRAFTED	DS
DESIGN W.O. No.		DRAFTING CHECK	SB
CONSTRUCTION W.O. No.		CAD FILE	550104260
FUNDED BY Q.U.U. (✓)	EXTERNAL ( )	Q.U.U. FILE No.	

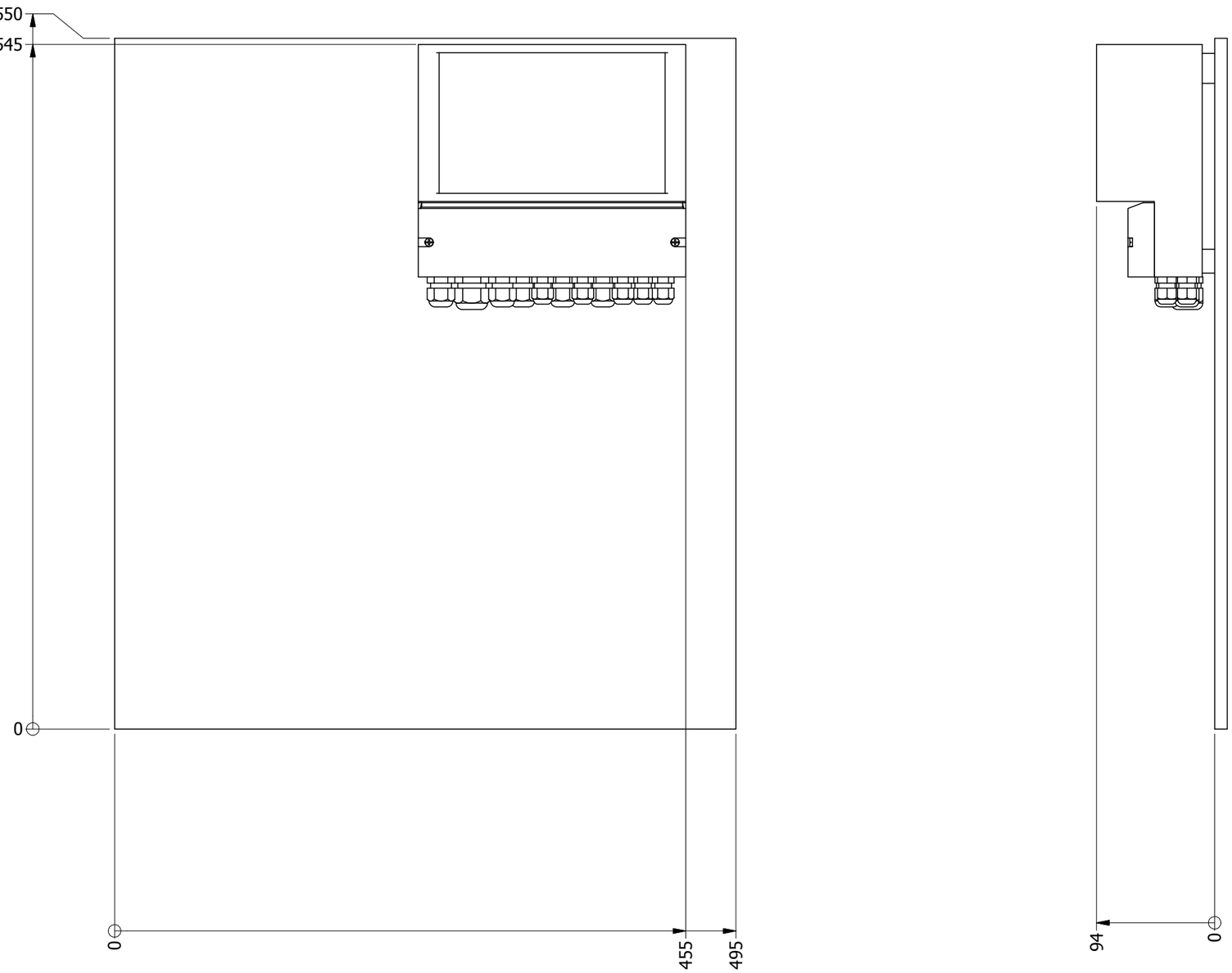
DAN STENZEL		29/01/2014	
DESIGN		DATE	
SHAUN BELLAMY	18/06/2013	JASON JOHNSON	
DESIGN CHECK	DATE	APPROVED BY	SIGNATURE

ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING TITLE
FOREST HILL CO2 pH MONITOR PANEL GA

SHEET No. 1 OF 2
QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/5-0104-260
AMEND. A

As Constructed



GRUNDFOS

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32 BLANCK STREET
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Tel: 07 5540 6700
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NAME SIGNATURE DATE

QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

Urban Utilities

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FUNDING

DESIGN W.O. No.

CONSTRUCTION W.O. No.

FUNDED BY Q.U.U. (✓) EXTERNAL ( )

DRAFTED	DS
DRAFTING CHECK	SB
CAD FILE	550104261
Q.U.U. FILE No.	

DAN STENZEL 29/01/2014
DESIGN DATE
SHAUN BELLAMY 18/06/2013
DESIGN CHECK DATE
JASON JOHNSON
APPROVED BY SIGNATURE

ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING TITLE
FOREST HILL CO2 pH MONITOR PANEL GA

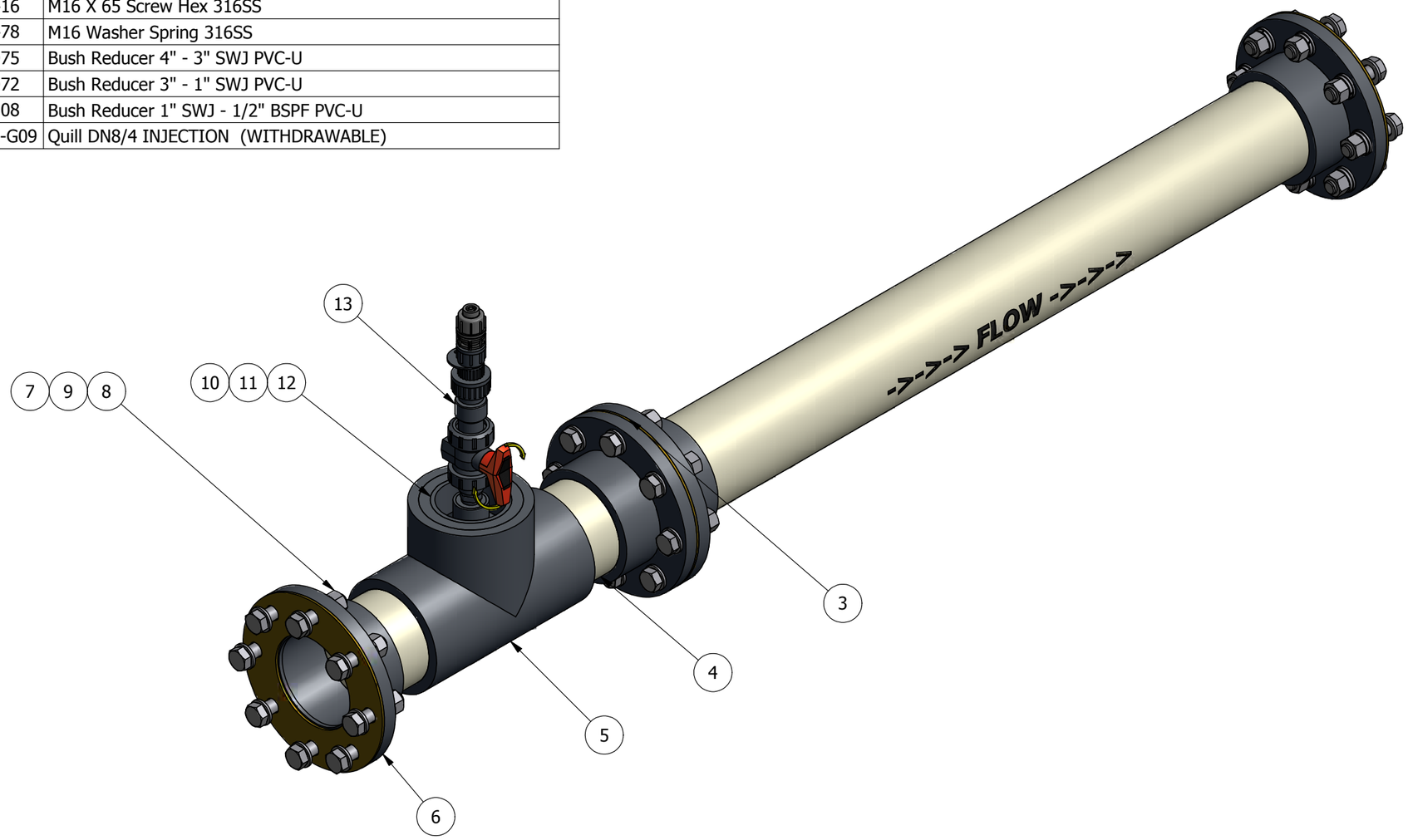
SHEET No. 2 OF 2

QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/5-0104-261

AMEND. A

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	48	97745507	M16 Washer Flat 316SS
2	1	0060A-01-G08	STATIC MIXER_400_TBL E_1060mm
3	3	97629779	Gasket 4" x 3.0mm Table E Viton
4	100mm	97639475	Pipe 4" Sched 80 PVC-U
5	1	97629510	Tee 4" SWJ PVC-U
6	2	97629748	Flange FF 4" SWJ TBL E UPVC
7	24	97745446	M16 Nut Std 316SS
8	24	97745416	M16 X 65 Screw Hex 316SS
9	24	97745478	M16 Washer Spring 316SS
10	1	97629075	Bush Reducer 4" - 3" SWJ PVC-U
11	1	97629072	Bush Reducer 3" - 1" SWJ PVC-U
12	1	97762908	Bush Reducer 1" SWJ - 1/2" BSPF PVC-U
13	1	0060A-01-G09	Quill DN8/4 INJECTION (WITHDRAWABLE)

As Constructed



NOTES:
1. QUANTITY: 1 OFF REQUIRED.
2. SEALS: VITON.

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FUNDING
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FUNDED BY Q.U.U. (✓) EXTERNAL ( )

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CAD FILE	550104263
Q.U.U. FILE No.	

DAN STENZEL		18/06/2013
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SHAUN BELLAMY	18/06/2013	JASON JOHNSON
DESIGN CHECK	DATE	APPROVED BY SIGNATURE

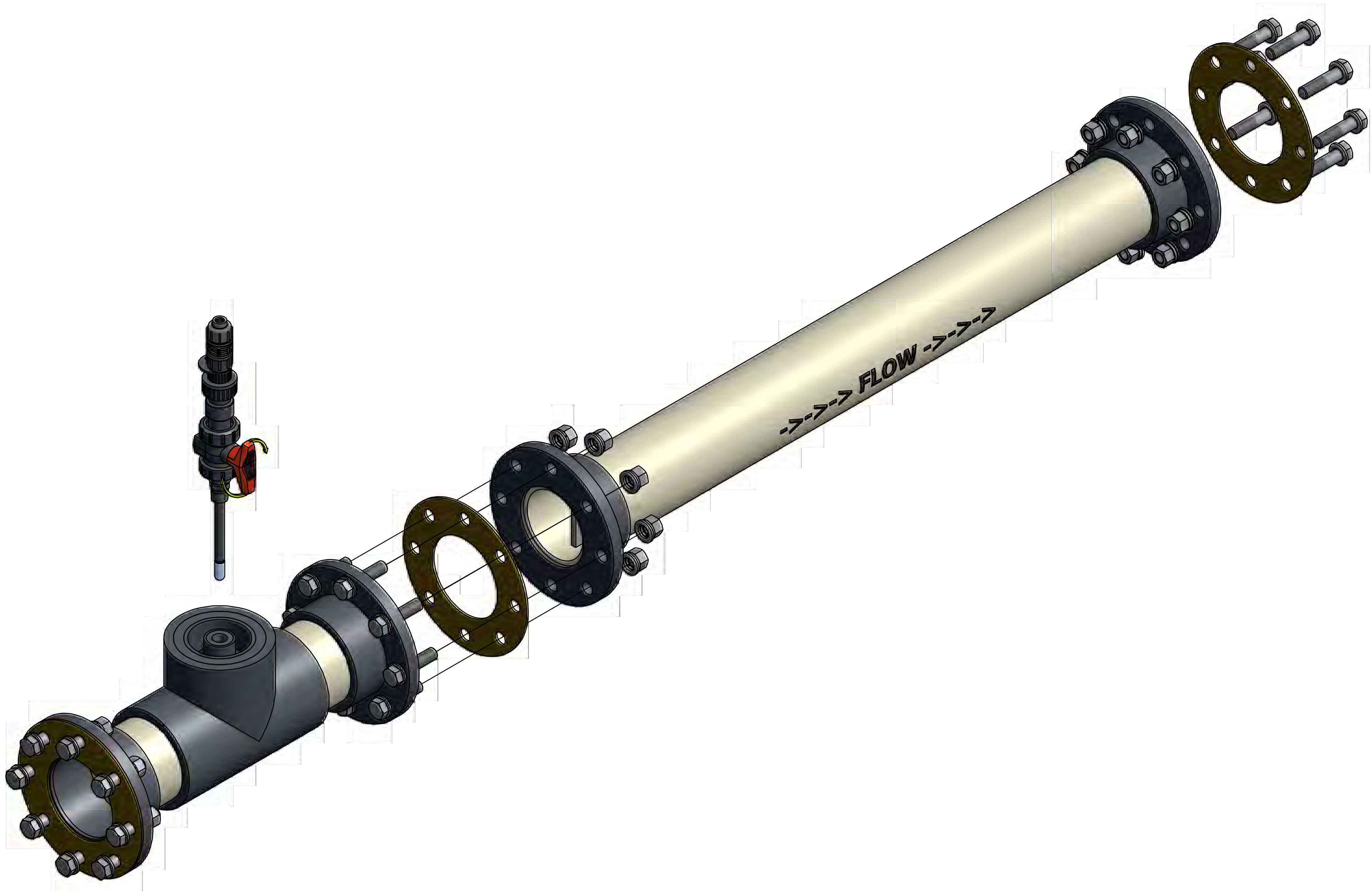
ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING TITLE
FOREST HILL CO2 4" STATIC MIXER GA

SHEET No. 1 OF 3

QUEENSLAND URBAN UTILITIES DRAWING No.	AMEND.
486/5/5-0104-263	A

As Constructed



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NAME SIGNATURE DATE
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Queensland Urban Utilities

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FUNDING	
DESIGN W.O. No.	
CONSTRUCTION W.O. No.	
FUNDED BY Q.U.U. (✓)	EXTERNAL ( )

DRAFTED	DS
DRAFTING CHECK	SB
CAD FILE	550104264
Q.U.U. FILE No.	

DAN STENZEL
DESIGN
SHAUN BELLAMY 18/06/2013
DESIGN CHECK DATE

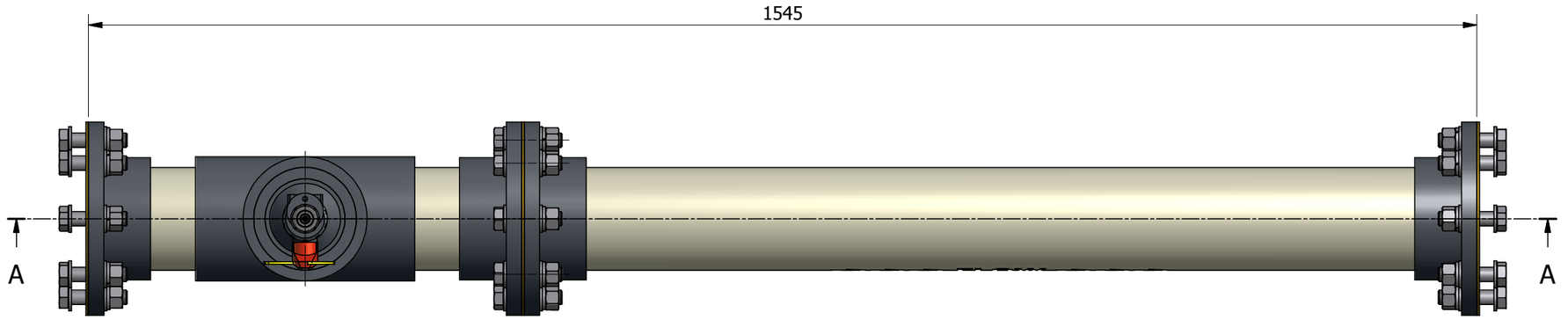
18/06/2013
DATE
JASON JONHSON
APPROVED BY SIGNATURE

ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

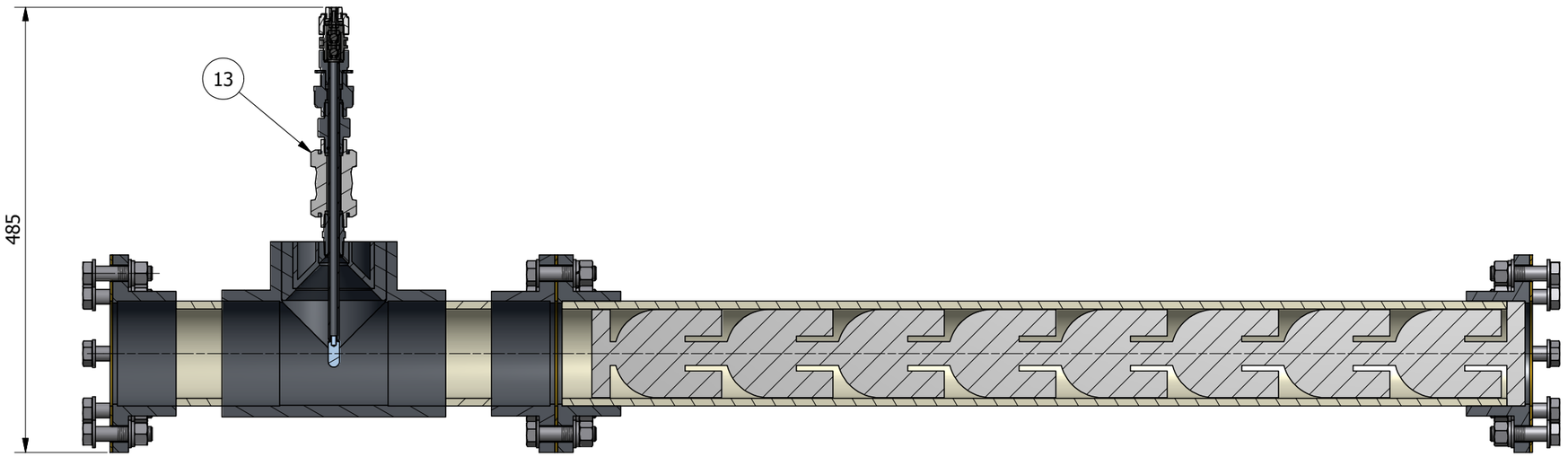
DRAWING TITLE
FOREST HILL CO2
4" STATIC MIXER GA

SHEET No. 2 OF 3
QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/5-0104-264
AMEND. A

As Constructed



TOP VIEW



SECTION A-A

GRUNDFOS

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32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
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CONSTRUCTION W.O. No.
FUNDED BY Q.U.U. (✓) EXTERNAL ( )

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DRAFTING CHECK	SB
CAD FILE	550104265
Q.U.U. FILE No.	

DAN STENZEL
DESIGN
SHAUN BELLAMY 18/06/2013
DESIGN CHECK DATE

18/06/2013
DATE
JASON JOHNSON
APPROVED BY SIGNATURE

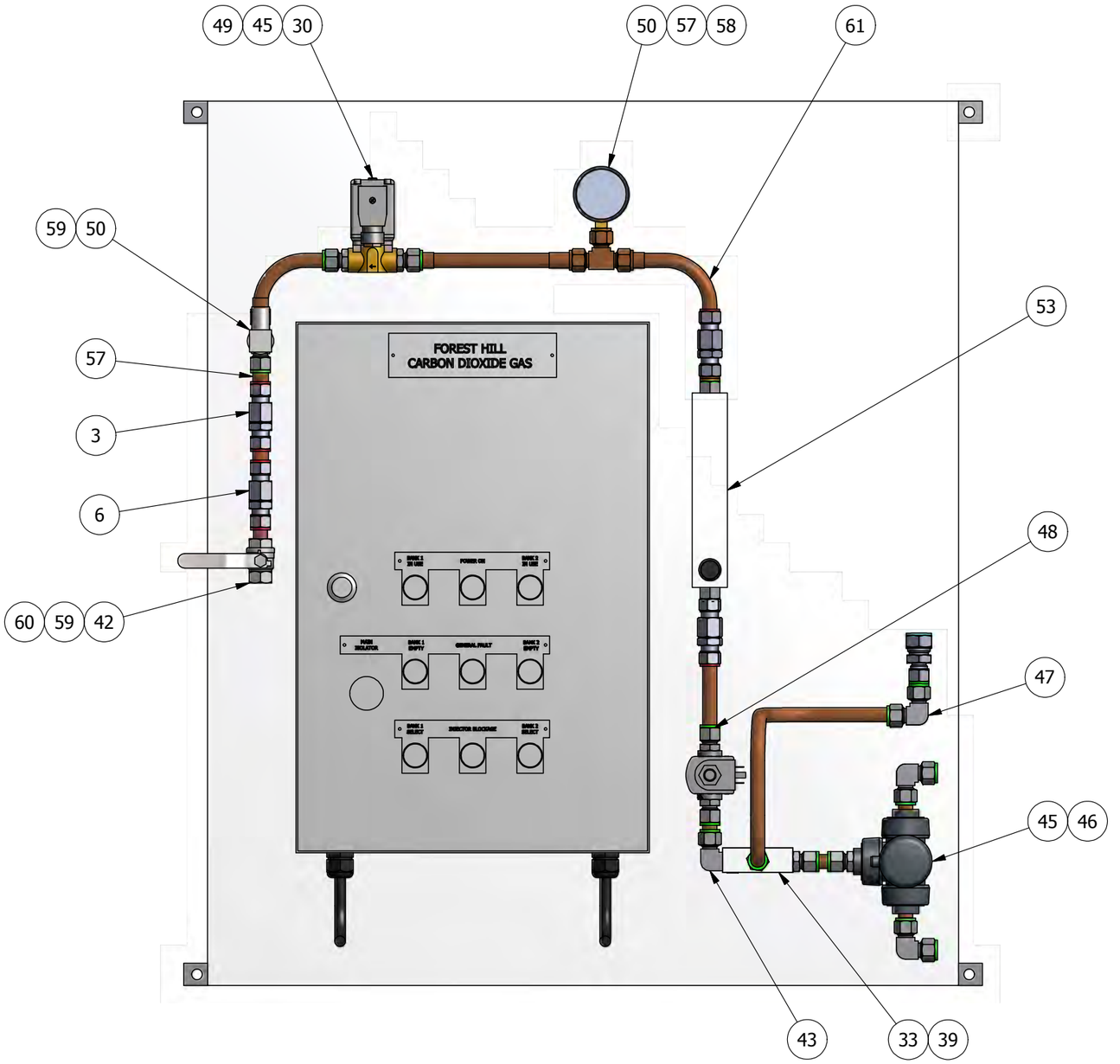
ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

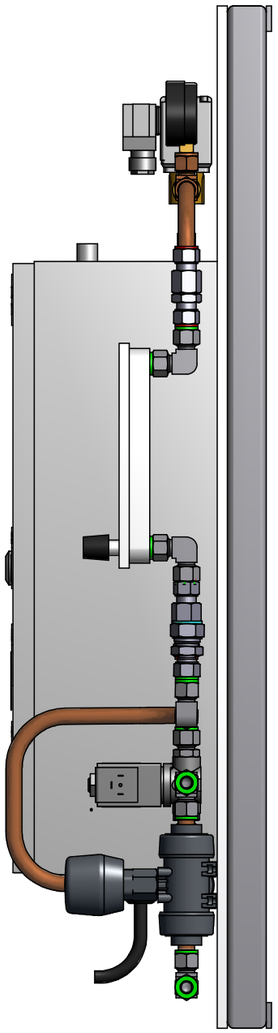
DRAWING TITLE
FOREST HILL CO2 4" STATIC MIXER GA

SHEET No. 3 OF 3
QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/5-0104-265
AMEND. A

As Constructed

HARRIS CO2 GAS - SPECIAL CO2MB					
Item	Name	Description	Level	Assy Qty	Tot Qty
1	4302650	CYL BRKT	1	18	18
2	6639Y45MO	CO2 SEAL	1	18	18
3	4076262	NRV CAP	1	11	11
4	4076261	NRV PISTON	1	11	11
5	4076263	CO2 SEAL RETAINER	1	18	18
6	WZ254	NRV SPRING	1	11	11
7	4TD.6	HP HOSE 600	1	9	9
8	D47IN2	CO2 INLET STEM	1	18	18
9	66592M0	CO2 NUT	1	18	18
10	T30HWP	CO2 PLASTIC H/W	1	9	9
11	235713-2	MOUNTING BLOCK	1	8	8
12	235713	MOUNTING BLOCK	1	1	1
13	235711	CO2 - 3/8" ADAPTOR	1	10	10
14	235716	CO2 1/4" ADAPTOR	1	2	2
16	4TS.3	HP HOSE 300	1	1	1
17	103CMC6-4N	1/4" T 3/8" BSP	1	14	14
18	VB-BKT0204	VALVE BLOCK BRKT	1	2	2
19	235732	MANIFOLD BLOCK	1	2	2
20	451H0884	HP VALVE	1	2	2
21	HP702125000D	H. PURITY REG.	1	2	2
24	D47IN2	INLET STEM	1	1	1
25	235760	CAPSULE CAP	1	9	9
26	DF140-2	FILTER DISC	1	18	18
27	235761B	INTERNAL CAPSULE	1	9	9
29	235763	BODY	1	9	9
30	103CMC8-4N	1/2" T - 1/4" NPT	1	11	11
31	A472RO	INLET STEM	1	2	2
32	66592EO	T10 NUT	1	2	2
33	4076133	SRV BODY	1	1	1
34	4076134	SRV COVER	1	1	1
35	881782	STEM	1	2	2
36	881634	GASKET	1	2	2
37	881196	SRV NUT	1	2	2
38	WZ400	SRV SPRING	1	2	2
39	130#spacer	SPACER SHIM	1	2	2
42	235748	NRV BODY	1	2	2
43	103CLMA8-4N	ELBOW 1/4" - 1/2" T	1	1	1
44	103CMC6-4N	3/8" TUBE- 1/4"M	1	1	1
45	103CMC8-8R	1/2" TUBE - 1/2"T	1	3	3
46	B-8-SE	1/2" M-F TEE	1	1	1
47	B-4-E	1/4" ELBOW	1	1	1
48	103CMC8-6R	3/8"M - 1/2" TUBE	1	2	2
49	B-8-RB-4	1/2" - 1/4" RED. BUSH	1	2	2
52	HP703050000D	REG	1	1	1
53	RMB-50D-SSV	FLOW METER	1	1	1
54	BS011	PURIFIER 'O' RING	1	9	9
55	BS203	PURIFIER 'O' RING	1	9	9
56	S470-100-4F4F	BACK PRESSURE REG	1	1	1
57	106HSNA-4N	1/4" x 1/4" NIPPLE BRASS	1	1	1
58	8A8022	GAUGE	1	1	1
59	103HSTA-4N	1/4" TEE	1	2	2
60	23-FF08	1/2" BALL VALVE	1	1	1





*REGULATORS WILL BE ATTACHED TO THE WALL MOUNTED MANIFOLDS

NOTES:

1. QUANTITY: 1 OFF REQUIRED.
2. FRAME MATERIAL: SHS 38×1.6 THK, SS316 U.N.O.
3. SEALS: VITON.

GRUNDFOS

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NAME SIGNATURE DATE

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(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

Urban Utilities

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FUNDING
DESIGN W.O. No.
CONSTRUCTION W.O. No.
FUNDED BY Q.U.U. (✓) EXTERNAL ( )

DRAFTED	DS
DRAFTING CHECK	SB
CAD FILE	550104266
Q.U.U. FILE No.	

DAN STENZEL		18/06/2013
DESIGN		DATE
SHAUN BELLAMY	18/06/2013	JASON JOHNSON
DESIGN CHECK	DATE	APPROVED BY SIGNATURE

ASSET/PROJECT
REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

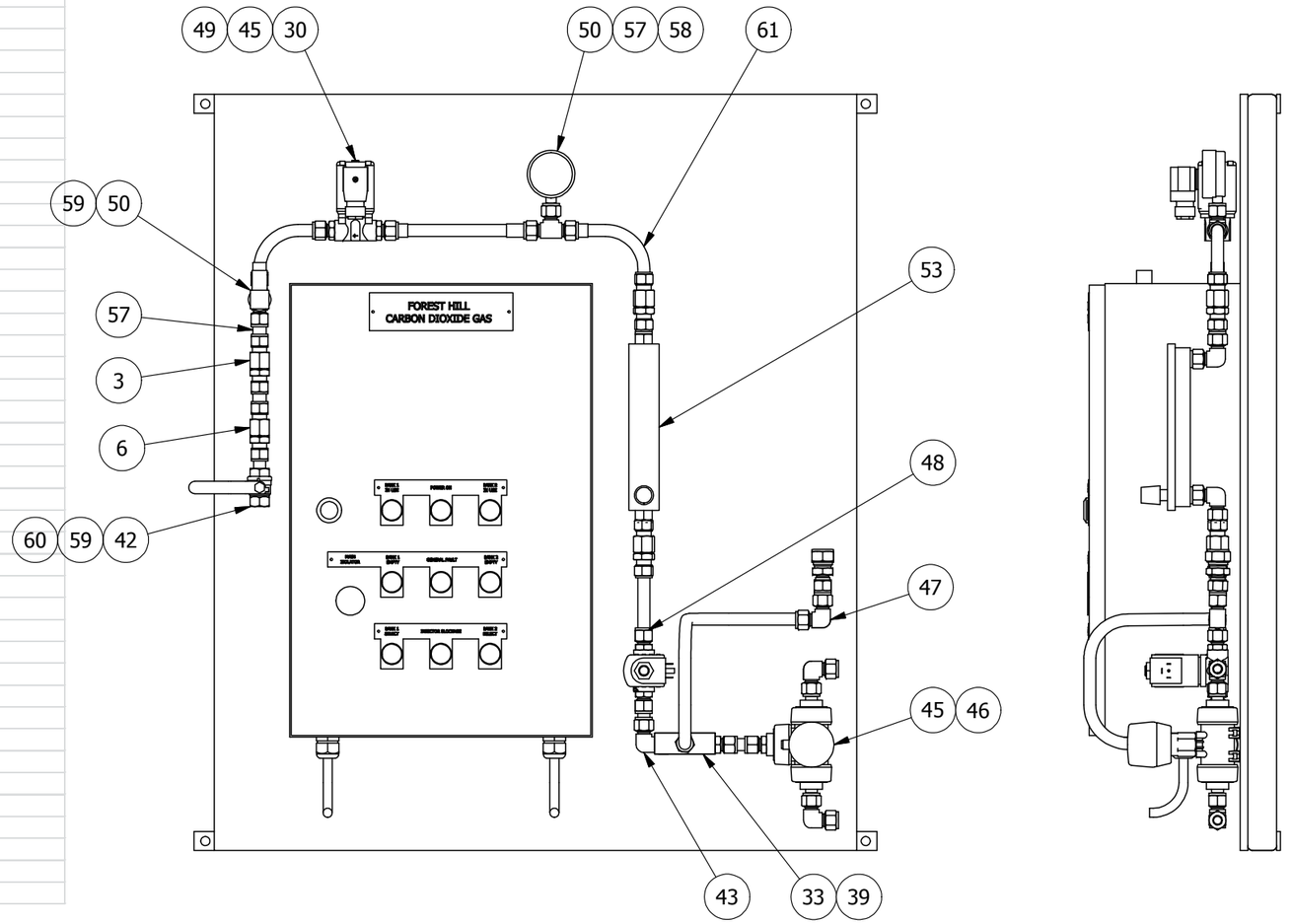
DRAWING TITLE
FOREST HILL
CO2 GAS CONTROL GA

SHEET No. 1 OF 2

QUEENSLAND URBAN UTILITIES DRAWING No.	AMEND.
486/5/5-0104-266	A

As Constructed

HARRIS CO2 GAS - SPECIAL CO2MB					
Item	Name	Description	Level	Assy Qty	Tot Qty
1	4302650	CYL BRKT	1	18	18
2	6639Y45MO	CO2 SEAL	1	18	18
3	4076262	NRV CAP	1	11	11
4	4076261	NRV PISTON	1	11	11
5	4076263	CO2 SEAL RETAINER	1	18	18
6	WZ254	NRV SPRING	1	11	11
7	4TD.6	HP HOSE 600	1	9	9
8	D47IN2	CO2 INLET STEM	1	18	18
9	66592M0	CO2 NUT	1	18	18
10	T30HWP	CO2 PLASTIC H/W	1	9	9
11	235713-2	MOUNTING BLOCK	1	8	8
12	235713	MOUNTING BLOCK	1	1	1
13	235711	CO2 - 3/8" ADAPTOR	1	10	10
14	235716	CO2 1/4" ADAPTOR	1	2	2
16	4TS.3	HP HOSE 300	1	1	1
17	103CMC6-4N	1/4" T 3/8" BSP	1	14	14
18	VB-BKT0204	VALVE BLOCK BRKT	1	2	2
19	235732	MANIFOLD BLOCK	1	2	2
20	451H0884	HP VALVE	1	2	2
21	HP702125000D	H. PURITY REG.	1	2	2
24	D47IN2	INLET STEM	1	1	1
25	235760	CAPSULE CAP	1	9	9
26	DF140-2	FILTER DISC	1	18	18
27	235761B	INTERNAL CAPSULE	1	9	9
29	235763	BODY	1	9	9
30	103CMC8-4N	1/2" T - 1/4" NPT	1	11	11
31	A472RO	INLET STEM	1	2	2
32	66592EO	T10 NUT	1	2	2
33	4076133	SRV BODY	1	1	1
34	4076134	SRV COVER	1	1	1
35	881782	STEM	1	2	2
36	881634	GASKET	1	2	2
37	881196	SRV NUT	1	2	2
38	WZ400	SRV SPRING	1	2	2
39	130#spacer	SPACER SHIM	1	2	2
42	235748	NRV BODY	1	2	2
43	103CLMA8-4N	ELBOW 1/4" - 1/2" T	1	1	1
44	103CMC6-4N	3/8" TUBE- 1/4"M	1	1	1
45	103CMC8-8R	1/2" TUBE - 1/2"T	1	3	3
46	B-8-SE	1/2" M-F TEE	1	1	1
47	B-4-E	1/4" ELBOW	1	1	1
48	103CMC8-6R	3/8"M - 1/2" TUBE	1	2	2
49	B-8-RB-4	1/2" - 1/4" RED. BUSH	1	2	2
52	HP703050000D	REG	1	1	1
53	RMB-50D-SSV	FLOW METER	1	1	1
54	BS011	PURIFIER 'O' RING	1	9	9
55	BS203	PURIFIER 'O' RING	1	9	9
56	S470-100-4F4F	BACK PRESSURE REG	1	1	1
57	106HSNA-4N	1/4" x 1/4" NIPPLE BRASS	1	1	1
58	8A8022	GAUGE	1	1	1
59	103HSTA-4N	1/4" TEE	1	2	2
60	23-FF08	1/2" BALL VALVE	1	1	1



GRUNDFOS

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32 BLANCK STREET
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Tel: 07 5540 6700
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NAME SIGNATURE DATE

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Urban Utilities

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DAN STENZEL		18/06/2013
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SHAUN BELLAMY	18/06/2013	JASON JOHNSON
DESIGN CHECK	DATE	APPROVED BY

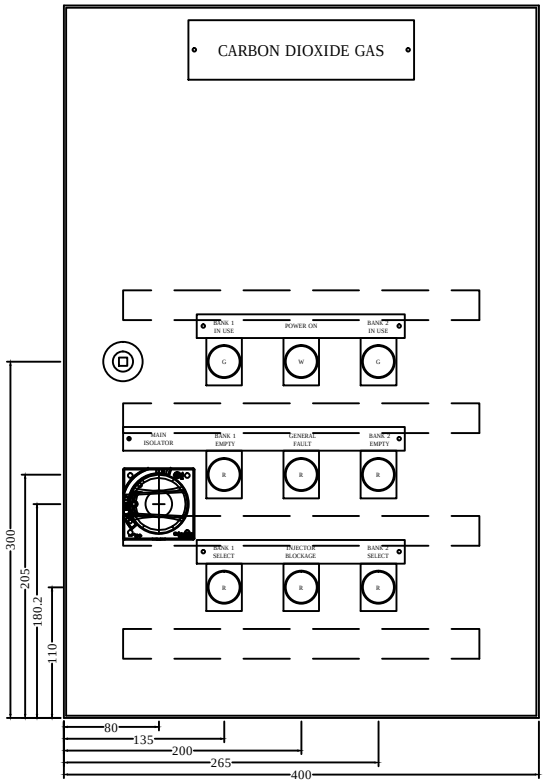
SIGNATURE

ASSET/PROJECT
REGIONAL LAGOONS
SEWAGE TREATMENT
PLANTS ENHANCEMENT

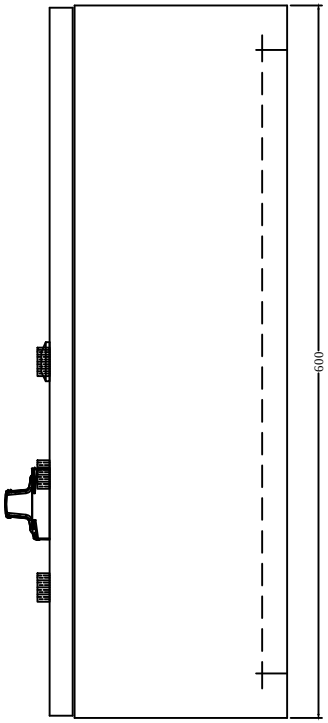
DRAWING TITLE
FOREST HILL
CO2 GAS CONTROL GA

SHEET No. 2 OF 2

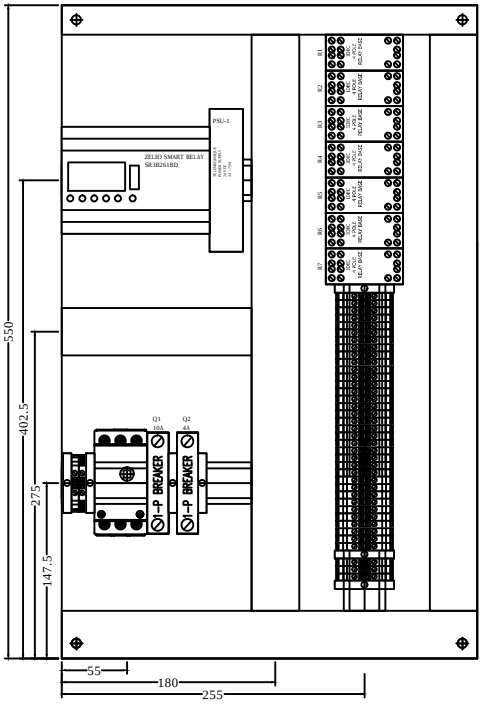
QUEENSLAND URBAN UTILITIES DRAWING No.	AMEND.
486/5/5-0104-267	A



FRONT VIEW

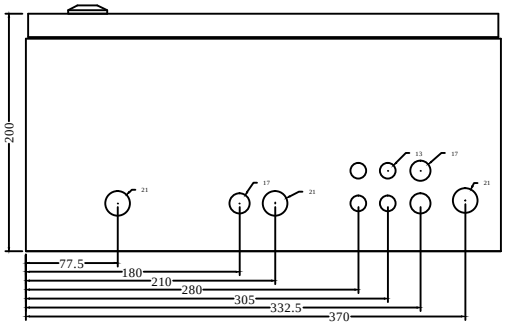


SIDE VIEW

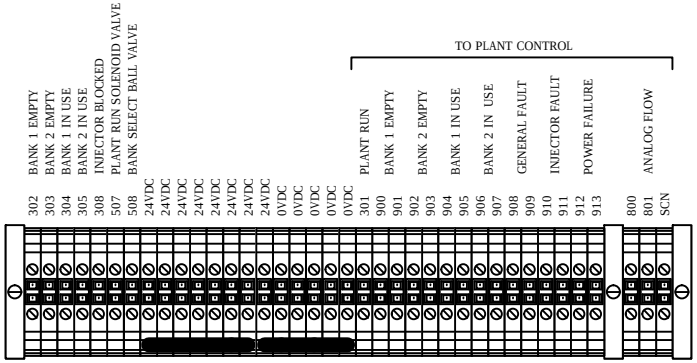


MOUNTING PAN

Item	Material / supplier
Cabinet	NI06042/S B&R
Smart Relay	Zelio SR3B261BD
Power supply	Telemecanique
MCBs	Merlin Gerin
Main Switch	Schneider
Push Buttons	Schneider
Lamps	Schneider
Relays	Idec
Terminals	Phoenix



BOTTOM VIEW



AS BUILT

REVISION HISTORY				
REV	DESCRIPTION	DATE	DRAWN	APPROVED
A	ORIGINAL ISSUE	19.02.13	AP	IG
B	ISSUE FOR CONSTRUCTION	12.03.13	AP	IG
C	AS BUILT	20.05.13	AP	IG

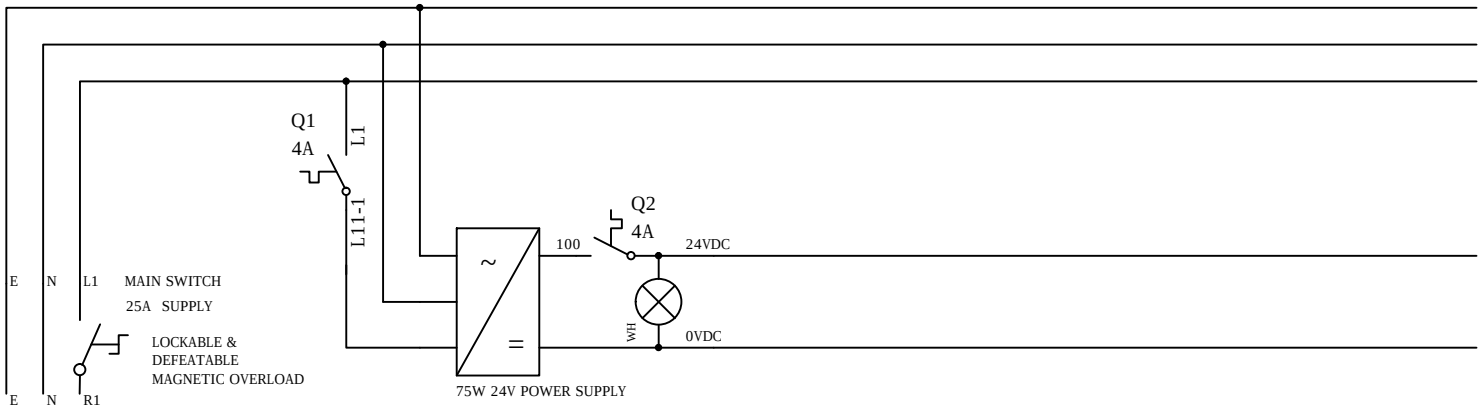
Designed by	Checked by	Project Engineer	Project Code	Date	
A. PHILPOT	T. HAEGENS	I. GINN	0060A	19.02.13	NTS

GRUNDFOS

30 Blanck St Ormeau
QLD 4208
Ph: 07 5540 6700
Fax: 07 5540 6740

FOREST HILL
CARBON DIOXIDE GAS DOSING SYSTEM
GENERAL ARRANGEMENT

486/5/5-0108-150	Edition	Sheet
	C	1/1



STD COLOUR CODE	
240-415 PHASE	RED -WHITE - BLUE
NEUTRAL	BLACK
24VDC	ORANGE
0VDC	PURPLE
INTERMEDIATE	GREY
ANALOG-	

AS BUILT

REVISION HISTORY				
REV	DESCRIPTION	DATE	DRAWN	APPROVED
A	ORIGINAL ISSUE	19.02.13	AP	IG
B	ISSUE FOR CONSTRUCTION	12.03.13	AP	IG
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GRUNDFOS

30 Blanck St Ormeau
QLD 4208
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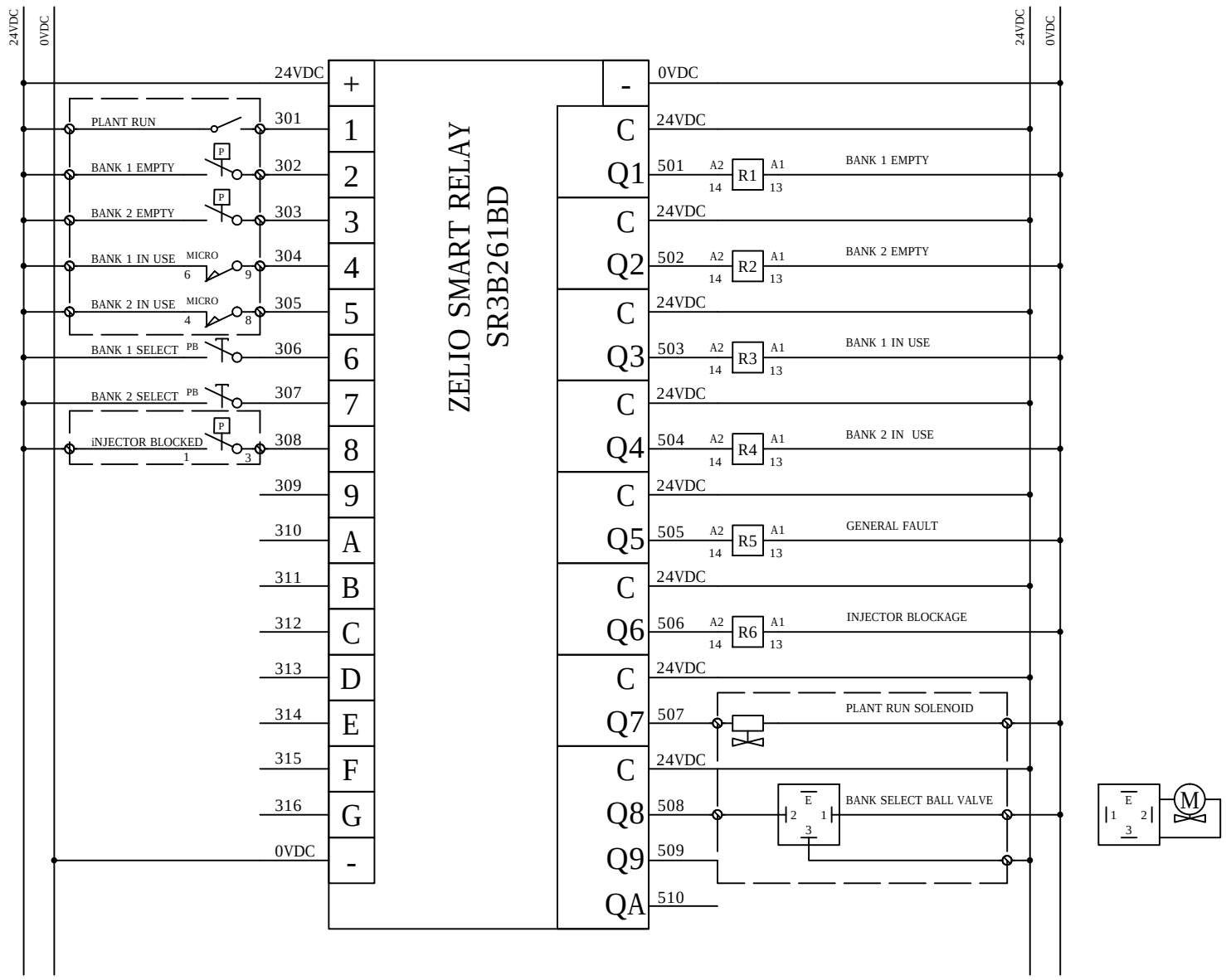
FOREST HILL
CARBON DIOXIDE GAS DOSING SYSTEM
ELECTRICAL SCHEMATIC

486/5/5-0108-151	Edition	Sheet
	C	1/3



AS BUILT

REVISION HISTORY				
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FOREST HILL
CARBON DIOXIDE GAS DOSING SYSTEM
ELECTRICAL SCHEMATIC

486/5/5-0108-152	Edition	Sheet
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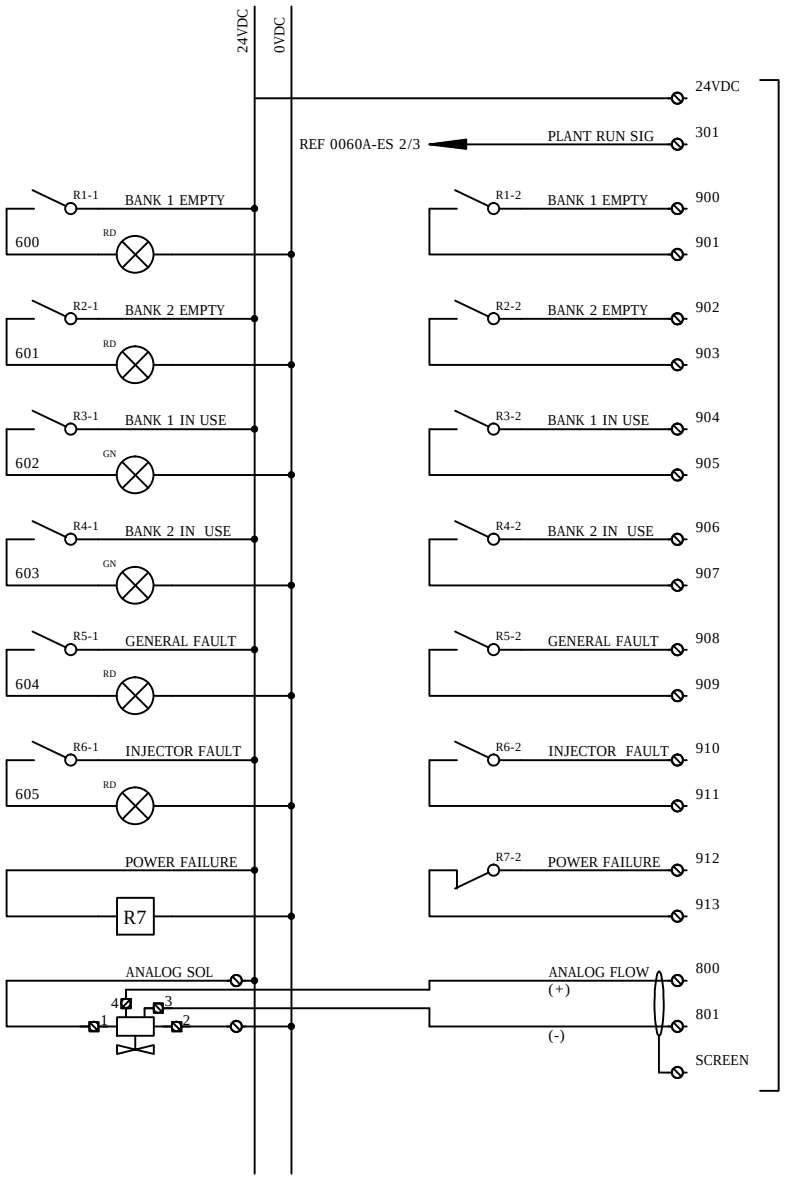

AS BUILT

REVISION HISTORY				
REV	DESCRIPTION	DATE	DRAWN	APPROVED
A	ORIGINAL ISSUE	19.02.13	AP	IG
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A. PHILPOT	T. HAEGENS	I. GINN	0060A	19.02.13	NTS

GRUNDFOS

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FOREST HILL
CARBON DIOXIDE GAS DOSING SYSTEM
ELECTRICAL SCHEMATIC

486/5/5-0108-153	Edition	Sheet
	C	3/3

Documents

CO2 Troubleshooting Flowchart

Linked Documents

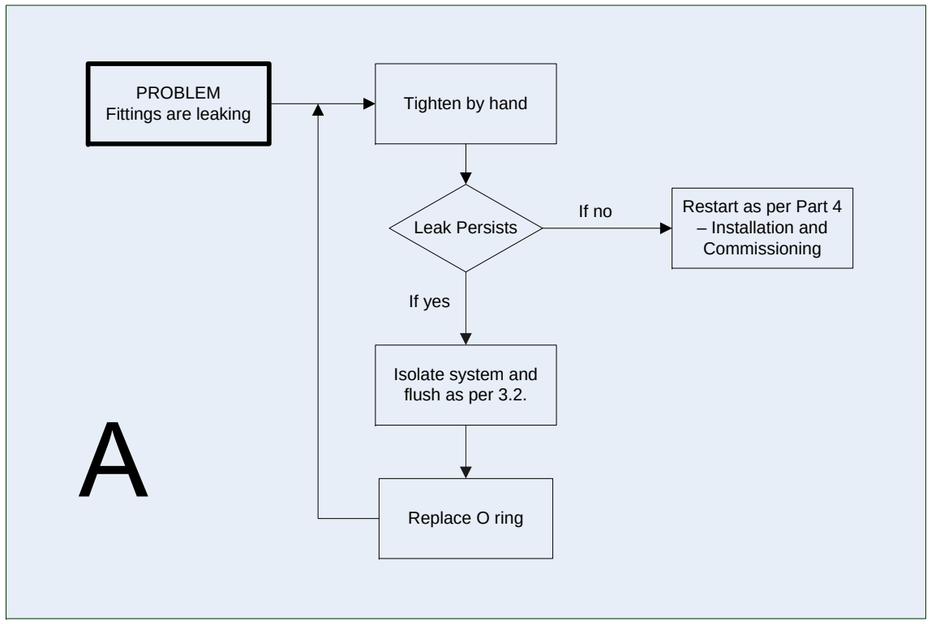
Visio-Troubleshooting Flowchart - chemical systems - CO2 Gas system Rev 2.pdf

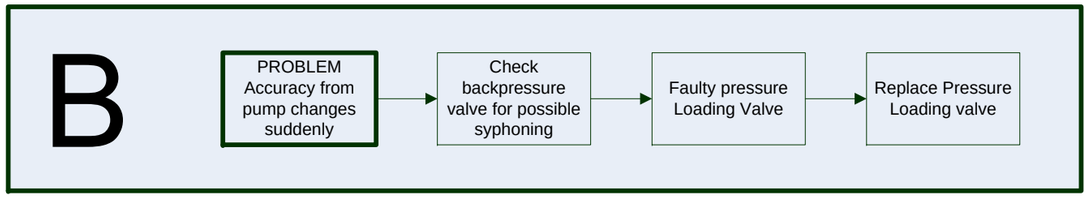
Asset Register

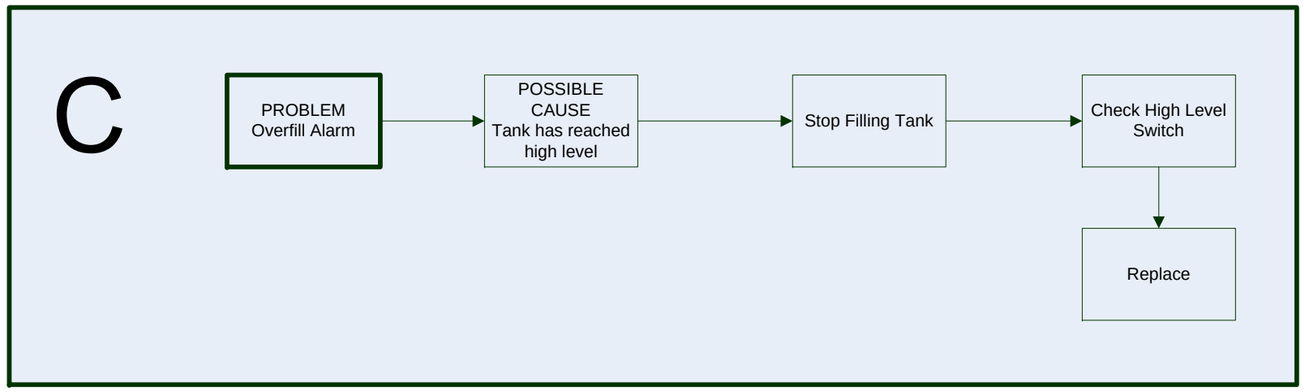
Linked Documents

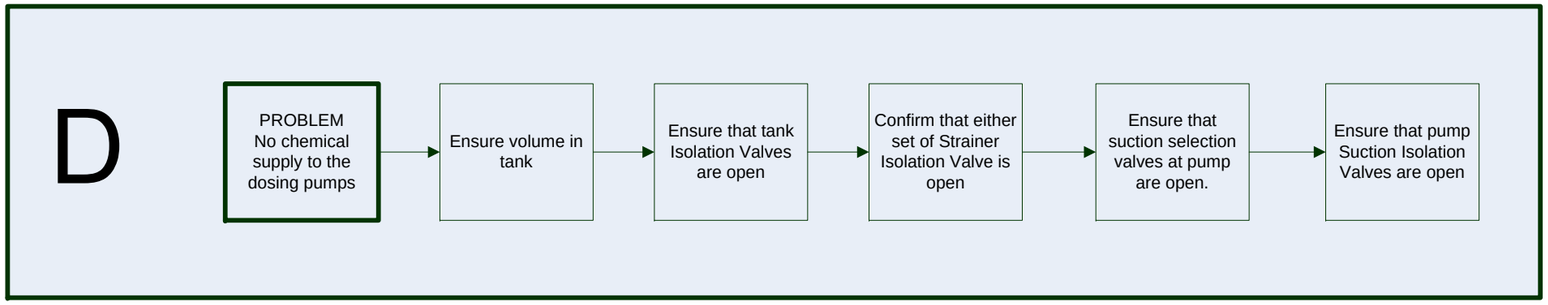
Grundfos Asset Rev 01 (2).xlsx

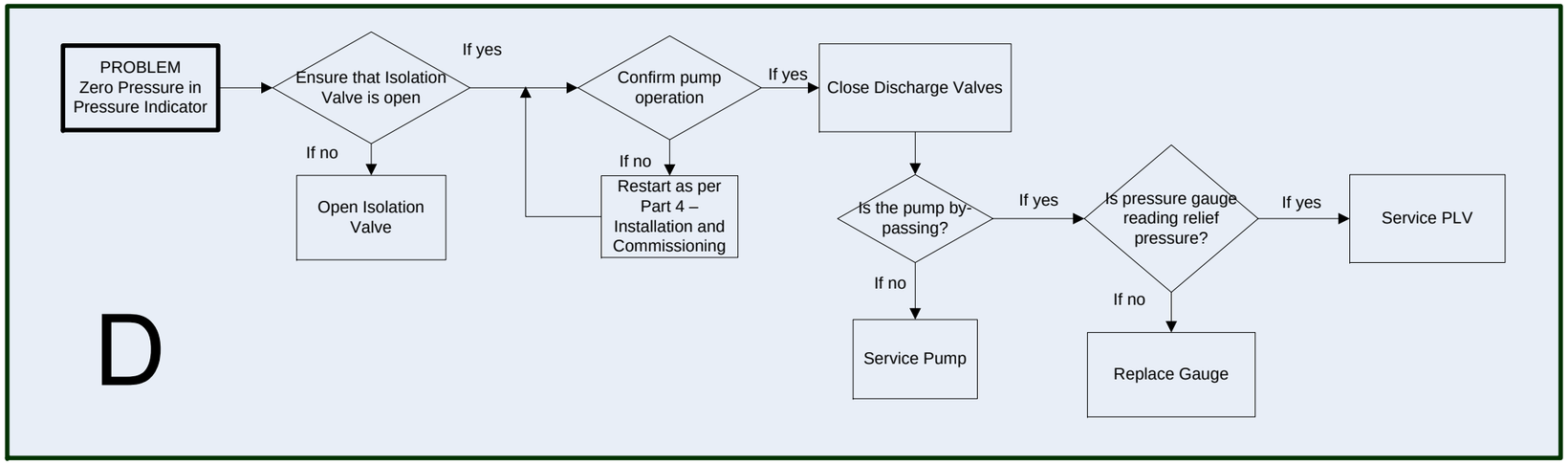
Troubleshooting Flowchart

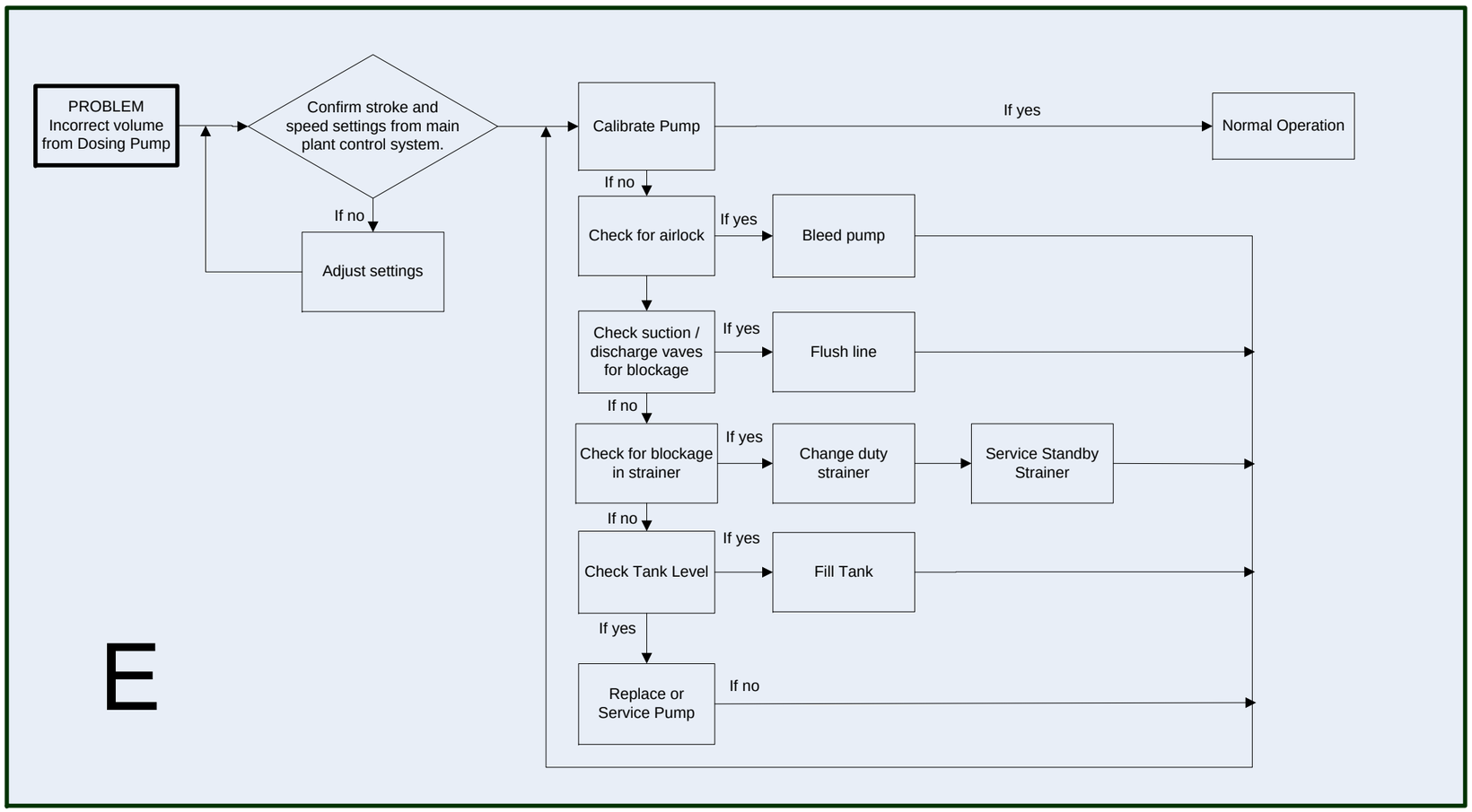




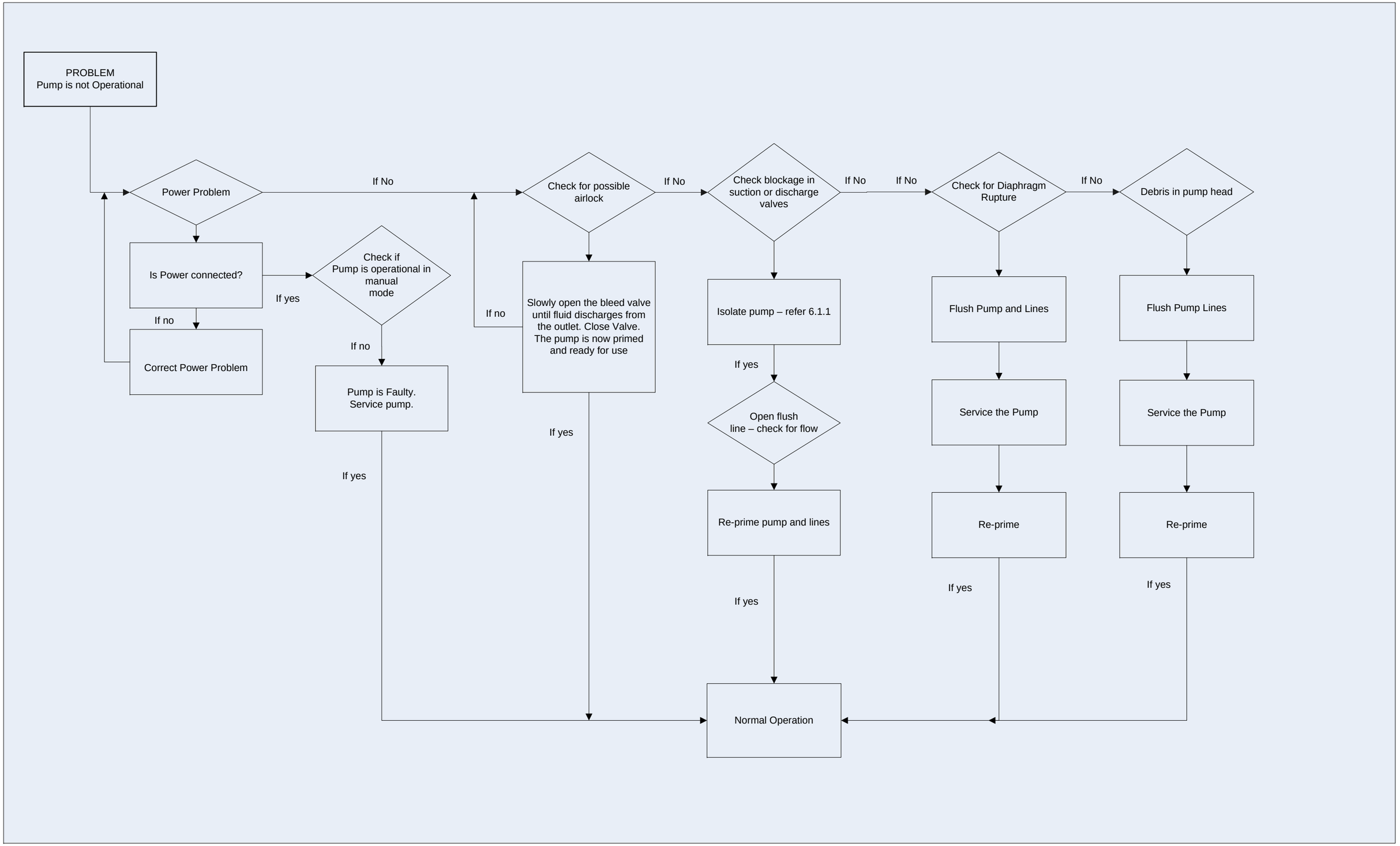





PROBLEM
Zero Pressure in Pressure Indicator
Ensure that Isolation Valve is open
If yes
If no
Open Isolation Valve
Confirm pump operation
If yes
If no
Restart as per Part 4 – Installation and Commissioning
Close Discharge Valves
Is the pump by-passing?
If yes
If no
Service Pump
Is pressure gauge reading relief pressure?
If yes
If no
Replace Gauge
Service PLV
D


PROBLEM
Incorrect volume from Dosing Pump
Confirm stroke and speed settings from main plant control system.
If no
Adjust settings
Calibrate Pump
If yes
Normal Operation
If no
Check for airlock
If yes
Bleed pump
Check suction / discharge vaves for blockage
If yes
Flush line
If no
Check for blockage in strainer
If yes
Change duty strainer
Service Standby Strainer
If no
Check Tank Level
If yes
Fill Tank
If yes
Replace or Service Pump
If no
E

Common Faults and Symptoms



Validation	Asset ID	Description	Service
	2I	Pump	(2.0) Material Displacement and D
	2I	Pump	(2.0) Material Displacement and D
	2I	Pump	(2.0) Material Displacement and D
	7E	Tank	(7.0) Civil and Storage
	2N	VALVES	(2.0) Material Displacement and D
	2N	VALVES	(2.0) Material Displacement and D
	2N	VALVES	(2.0) Material Displacement and D
	2G	PRESSURE_VALVE	(2.0) Material Displacement and D
	2G	PRESSURE_VALVE	(2.0) Material Displacement and D
	6S	FLOW DISPLAY	(6.0) Control and Instrumentation
	5F	SWITCHBOARD	(5.0) Electrical Distribution
	6K	LEVEL TRANSMITTER	(6.0) Control and Instrumentation
	6J	LEVEL ELEMENT	(6.0) Control and Instrumentation
	6A	ANALYSER SENSOR	(6.0) Control and Instrumentation
	6B	CONTROL_&_INSTR	(6.0) Control and Instrumentation
	6F	FLOW SENSOR	(6.0) Control and Instrumentation
	6J	LEVEL ELEMENT	(6.0) Control and Instrumentation
	6A	ANALYSER SENSOR	(6.0) Control and Instrumentation
	6B	CONTROL_&_INSTR	(6.0) Control and Instrumentation
	6F	FLOW SENSOR	(6.0) Control and Instrumentation
	6J	LEVEL ELEMENT	(6.0) Control and Instrumentation
	6A	ANALYSER SENSOR	(6.0) Control and Instrumentation
	6B	CONTROL_&_INSTR	(6.0) Control and Instrumentation
	6F	FLOW SENSOR	(6.0) Control and Instrumentation

Subservice	Site	Process
(PU_) PUMP	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(PU_) PUMP	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(PU_) PUMP	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(TK_) TANK	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(VV_) VALVES	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(VV_) VALVES	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(VV_) VALVES	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(PRV) PRESSURE_VALVE	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(PRV) PRESSURE_VALVE	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(FI) FLOW DISPLAY	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(SWB) SWITCHBOARD_MCC	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(LT_) LEVEL TRANSMITTER	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(LE_) LEVEL ELEMENT	(ST056) Boonah	(0700) DISINFECTION AND OUTFALL
(AE_) ANALYSER	(ST056) Boonah	(2390) PROCESS, CONTROL & ELECTRICAI
(CTI) CONTROL_&_INSTR	(ST056) Boonah	(2390) PROCESS, CONTROL & ELECTRICAI
(FE_) FLOW SENSOR	(ST056) Boonah	(2390) PROCESS, CONTROL & ELECTRICAI
(LE_) LEVEL ELEMENT	(ST052) Forest Hill	(0700) DISINFECTION AND OUTFALL
(AE_) ANALYSER	(ST052) Forest Hill	(2390) PROCESS, CONTROL & ELECTRICAI
(CTI) CONTROL_&_INSTR	(ST052) Forest Hill	(2390) PROCESS, CONTROL & ELECTRICAI
(FE_) FLOW SENSOR	(ST052) Forest Hill	(2390) PROCESS, CONTROL & ELECTRICAI
(LE_) LEVEL ELEMENT	(ST059) Kalbar	(0700) DISINFECTION AND OUTFALL
(AE_) ANALYSER	(ST059) Kalbar	(2390) PROCESS, CONTROL & ELECTRICAI
(CTI) CONTROL_&_INSTR	(ST059) Kalbar	(2390) PROCESS, CONTROL & ELECTRICAI
(FE_) FLOW SENSOR	(ST059) Kalbar	(2390) PROCESS, CONTROL & ELECTRICAI

Sub	Location Description	*DATE INSTALLED	*MODEL
(0710) CHLORINE	Boonah	27/05/2013	DDA 7.5-16
(0710) CHLORINE	Boonah	27/05/2013	DDA 7.5-16
(0710) CHLORINE	Boonah	27/05/2013	MA113
(0710) CHLORINE	Boonah	27/05/2013	98418722
(0710) CHLORINE	Boonah	27/05/2013	546
(0710) CHLORINE	Boonah	27/05/2013	546
(0710) CHLORINE	Boonah	27/05/2013	514
(0710) CHLORINE	Boonah	27/05/2013	PLV-G5/8-3 PV/T U2
(0710) CHLORINE	Boonah	27/05/2013	PRV-G5/8-3 PV/T U2
(0710) CHLORINE	Boonah	27/05/2013	200 ml Cal Cyl
(0710) CHLORINE	Boonah	27/05/2013	J-BOX 300X300 E-STOP
(0710) CHLORINE	Boonah	27/05/2013	Vegadis 61 - SN61XXAGHKMAX
(0710) CHLORINE	Boonah	27/05/2013	KQ6004
(2490) PROCESS, CON	Boonah	27/05/2013	OPF10-NN-N-10
(2490) PROCESS, CON	Boonah	27/05/2013	DIA-2Q-A, D12-P-AU-PCX-QS-T, W-G
(2490) PROCESS, CON	Boonah	27/05/2013	P20-C-A-20-PVC
(0710) CHLORINE	Forest Hill	27/05/2013	KQ6004
(2490) PROCESS, CON	Forest Hill	27/05/2013	OPF10-NN-N-10
(2490) PROCESS, CON	Forest Hill	27/05/2013	DIA-2Q-A, D12-P-AU-PCX-QS-T, W-G
(2490) PROCESS, CON	Boonah	27/05/2013	P20-C-A-20-PVC
(0710) CHLORINE	Kalbar	27/05/2013	KQ6004
(2490) PROCESS, CON	Kalbar	27/05/2013	OPF10-NN-N-10
(2490) PROCESS, CON	Kalbar	27/05/2013	DIA-2Q-A, D12-P-AU-PCX-QS-T, W-G
(2490) PROCESS, CON	Boonah	27/05/2013	P20-C-A-20-PVC

*SERIAL NO	*REGISTRATION	*TYPE	*PUMP TYPE
10000751		DDA 7.5-16 FCM-PV/T/T/C-F-31U2U2IG	PT02
10000638		DDA 7.5-16 FCM-PV/T/T/C-F-31U2U2IG	PT02
		MA113-PVDF-41-R-SL-HC-1000mm	PT02
135252		LLDPE	
		Ball Valve PVC-U	
		Ball Valve PVC-U	
		Diaphragm Valve PVC-U	
		PRESSURE LOADING VALVE	
		PRESSURE RELIEF VALVE	
		Calibration Cylinder	
		Junction box 300x300 SS316 E-Stop	
		ULTRASONIC	
		Capacitive sensor	
		pH Sensor	
		Measurement amplifier and controller	
		P20 Ultraswitch Magnetic In Line Flow Switch	
		Capacitive sensor	
		pH Sensor	
		Measurement amplifier and controller	
		P20 Ultraswitch Magnetic In Line Flow Switch	
		Capacitive sensor	
		pH Sensor	
		Measurement amplifier and controller	
		P20 Ultraswitch Magnetic In Line Flow Switch	

*MEDIUM	*IMPELLOR TYPE	*IMPELLOR REFERENCE	*MAKE
ME55	PT02		Grundfos
ME55	PT02		Grundfos
ME55	PT04	R	Lutz
ME55			Strongform Tanks
ME55			Georg Fischer
ME55			Georg Fischer
ME55			Georg Fischer
ME55			GRUNDFOS
ME55			GRUNDFOS
ME55			GRUNDFOS
ME55			GRUNDFOS
ME55			VEGA
ME55			IFM Efector
ME33			Wedgewood Analytical
ME33			GRUNDFOS
ME33			KELCO ENGINEERING
ME55			IFM Efector
ME33			Wedgewood Analytical
ME33			GRUNDFOS
ME33			KELCO ENGINEERING
ME55			IFM Efector
ME33			Wedgewood Analytical
ME33			GRUNDFOS
ME33			KELCO ENGINEERING

*BASE PLATE TAG	**EQUIP SPEC	*PHASES	*VOLTAGE	*FREQUENCY	*CURRENT	*SPEED
		1	240	50/60 Hz	25 amp	190 Stroke
		1	240	50/60 Hz	25 amp	190 Stroke
		1	240	50/60 Hz	460 W	
			24 VDC			
			24 VDC		< 17 Ma	
		1	240	50/60 Hz	15 VA	
			24 VDC		1 A	
			24 VDC		< 17 Ma	
		1	240	50/60 Hz	15 VA	
			24 VDC		1 A	
			24 VDC		< 17 Ma	
		1	240	50/60 Hz	15 VA	
			24 VDC		1 A	

*DRIVE	*POWER RATING	*POWER OUTPUT	*FRAME SIZE	*FRAME TYPE	*OIL FILLED	*RCD COUNT	***DIMENSIONS**
Stepper Motor	IP65	30 VDC/VAC			OF02		
Stepper Motor	IP65	30 VDC/VAC			OF02		
	IP54						
	IP66	4-20 mA					
	IP65	4-20 mA					
	10 uS/cm						
	IP65						
	IP56						
	IP65	4-20 mA					
	10 uS/cm						
	IP65						
	IP56						
	IP65	4-20 mA					
	10 uS/cm						
	IP65						
	IP56						

*DIAMETER	*VOLUME	*WIDTH	*HEIGHT	*LENGTH	*INLET DIAM	*OUTLET DIAM	*WEIGHT	*IMPELLOR DIA
N/a	7.5 l/h	168 mm	201 mm	280 mm	G 5/8"	G 5/8"	2.4 Kg	44 mm
N/a	7.5 l/h	168 mm	201 mm	280 mm	G 5/8"	G 5/8"	2.4 Kg	44 mm
		250 mm	1300 mm		41 mm Dia	G 1-1/4"	6.4	
1410 mm	2000 Ltrs		2425 mm		DN50	DN50		
					1/2"	1/2"		
					2"	2"		
					1/2"	1/2"		
					1/2"	1/2"		
					1/2"	1/2"		
					1"	1"		
		110 mm		270 mm	G 1-1/2"		2.5 Kg	
		36 mm	16 mm	80 mm			0.1 Kg	
25 mm				140 mm	1/2"	1/2"	0.2 Kg	
		94 mm	185 mm	212 mm			1.5 Kg	
DN15		50 mm	85 mm	202 mm	DN15	DN15	0.5 Kg	
		36 mm	16 mm	80 mm			0.1 Kg	
25 mm				140 mm	1/2"	1/2"	0.2 Kg	
		94 mm	185 mm	212 mm			1.5 Kg	
DN15		50 mm	85 mm	202 mm	DN15	DN15	0.5 Kg	
		36 mm	16 mm	80 mm			0.1 Kg	
25 mm				140 mm	1/2"	1/2"	0.2 Kg	
		94 mm	185 mm	212 mm			1.5 Kg	
DN15		50 mm	85 mm	202 mm	DN15	DN15	0.5 Kg	

*CAPAC PERF	*FLOW CURVE	*DESIGN FLOW	*DESIGN HEAD	*INLET PRESS	*OUTLET PRES	*MAX PRESS	*CAPACITYSWL	*OPERATIONAL
	7.5 l/h		6 Mtrs	2 bar max.	16 Bar	16 Bar		
	7.5 l/h		6 Mtrs	2 bar max.	16 Bar	16 Bar		
	130 l/min		7.5 Mtrs					

		6.9 Bar
	Max. 25 L/min	18 Bar
		6.9 Bar
	Max. 25 L/min	18 Bar
		6.9 Bar
	Max. 25 L/min	18 Bar

*ROTATION	**OTHER	*MATERIAL
		PVDF/PTFE/Ceramic Ball
		PVDF/PTFE/Ceramic Ball
		PVDF/ETFE
		LLDPE
	Viton Seal	PVC-U
	Viton Seal	PVC-U
	Viton Seal	PVC-U
	Viton Seal	PVC-U
	Viton Seal	PVC-U
		PVC-U
		Plastic
		PBT/TPE-U/PC
		Ryton body/Viton O-Ring
		Plastic
		Glass Reinforced Polypropylene
		PBT/TPE-U/PC
		Ryton body/Viton O-Ring
		Plastic
		Glass Reinforced Polypropylene
		PBT/TPE-U/PC
		Ryton body/Viton O-Ring
		Plastic
		Glass Reinforced Polypropylene