

OPERATIONS AND MAINTENANCE MANUALS

Regional Lagoons Manuals > ST59 Kalbar > Chemical dosing equipment

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Introduction

Kalbar CO2 Gas Control

1.1 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 Kalbar 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

Kalbar CO2 Gas Control

1 - Daily

Cleaning the Equipment

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

Routine Maintenance Schedules

Equipment

Remove dirt and debris build up - As required

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

1 - Monthly

SECTION 5: ROUTINE MAINTENANCE

Routine Maintenance Schedule

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

Routine Maintenance Schedule

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 Dosing 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 DIA 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 DIA 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 met, 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. Peak usage is 0.6 Kg/h at Forest Hill.

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 valve will give a lineal flow rate of CO₂ gas into the injection quill.

The CO₂ system is also a 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 from 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.

Kalbar CO2 Gas Control

Service : (8.0) Energy Transfer

Subservice : (BRN) WASTE_GAS_FLARE

SECTION 3: OPERATING INSTRUCTIONS

3.1 Operational Procedures

DANGER! Moving Parts
Potential Slip Hazard
Chemical Contact

3.1.1 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.

3.2 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.

Kelco Flow Switch Data Sheet

Service : (6.0) Control and Instrumentation

Subservice : (FE_) FLOW SENSOR

Linked Documents

 [P20 Flow Switch Brochure \(2\).pdf](#)

pH Probe Data Sheet

Service : (6.0) Control and Instrumentation

Subservice : (CTI) CONTROL_&_INSTR

Linked Documents

 [pH Probe OPF10TI \(2\).pdf](#)

Dia 2Q Settings

Service : (6.0) Control and Instrumentation

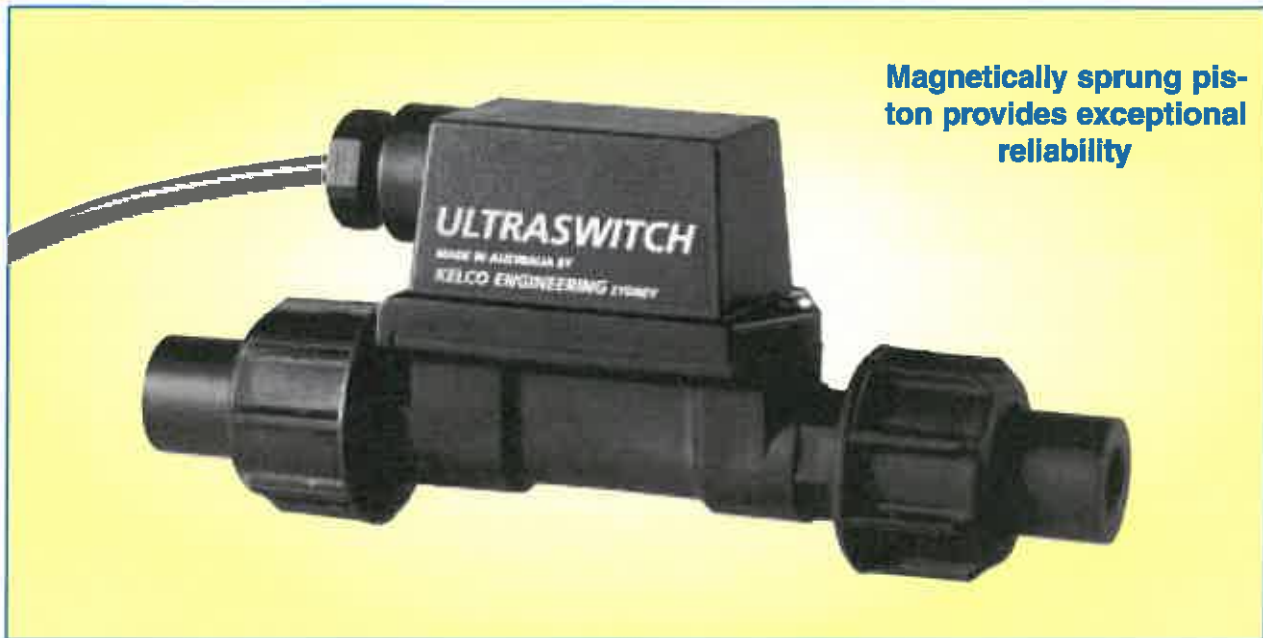
Subservice : (CTI) CONTROL_&_INSTR

Linked Documents

 [DIA 2Q Setings - Kalbar.pdf](#)

ULTRASWITCH P20 SERIES

CORROSION RESISTANT IN LINE FLOW SWITCHES



FEATURES

- SUITS TUBES & PIPES 6 TO 20 MM (1/4" TO 3/4") 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 control
- 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 electri-

cal 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.

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Please note the P20 flow switch is the subject of PCT International patent applications.

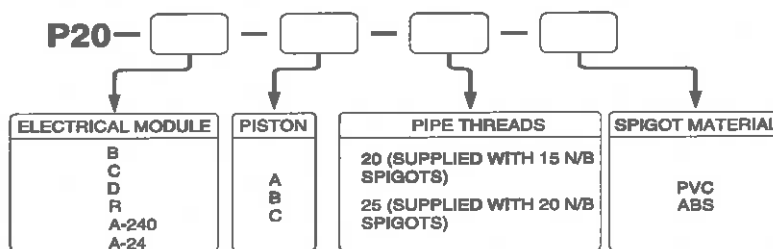
P20 SERIES IN LINE FLOW SWITCH TECHNICAL DATA

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

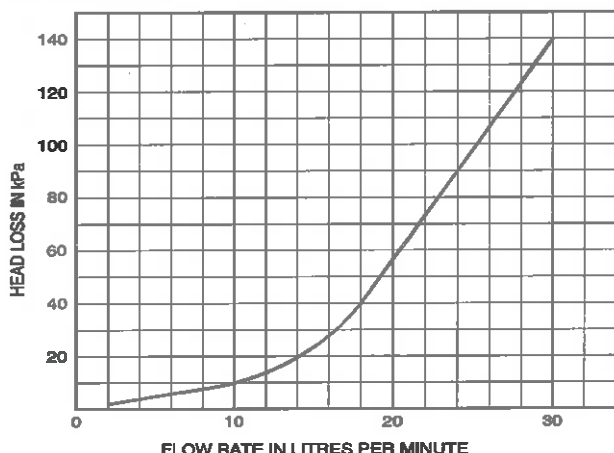
P20 FLOW SWITCH WITH SINGLE REED SWITCH CIRCUIT BOARD, NORMALLY OFF, SWITCHES ON AT 0.14 LITRES PER MINUTE ON A RISING FLOW, 20mm (3/4BSP) UNIONS AT BOTH ENDS AND 15 N/B PVC SPIGOTS PROVIDED.



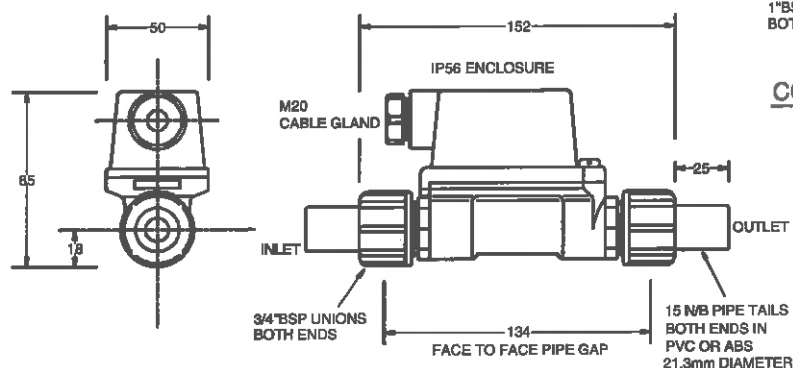
CONSTRUCTION MATERIALS

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.



DIMENSIONS

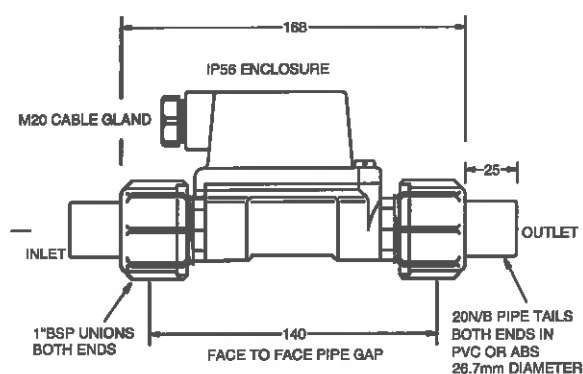


CONFIGURED FOR 15mm NOMINAL BORE PIPE

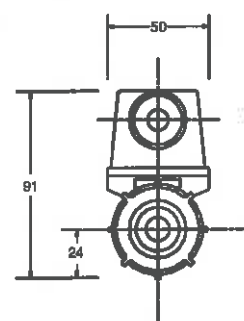
OPERATING ENVIRONMENT

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 to 14
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.



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	0.085	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.

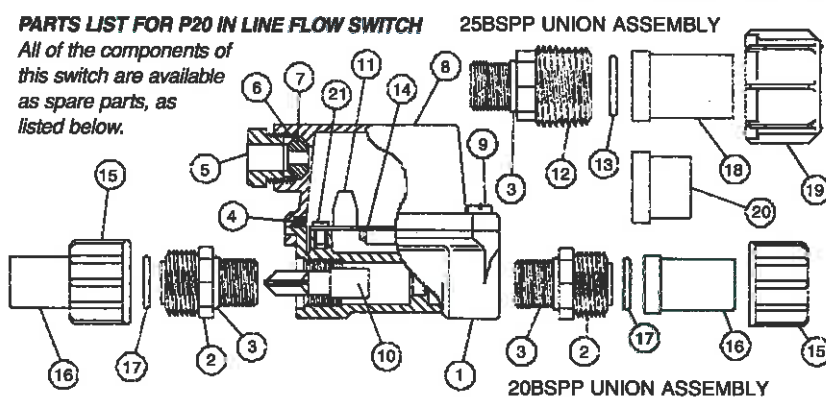
ADDITIONAL OPTIONS

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 3/4BSP 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 18 STAINLESS STEEL TYPE 304
10	PISTON MODEL A, B or C	1	GLASS REINFORCED POLYPROPYLENE
11	TERMINAL BLOCK	1	ACETAL REBIN
12	M20 by 1" BSP ADAPTOR	2	GLASS REINFORCED POLYPROPYLENE
13	No 117 O-RING SEAL	2	NEOPRENE
14	CIRCUIT BOARD ASSEMBLY	1	COMPLETE ELECTRICAL MODULE
15	20 mm BSP UNION NUT	2	GLASS REINFORCED POLYPROPYLENE
16	15 mm (1/2") PIPE SP/IGOT	2	PVC OR ABS
17	No 115 O-RING SEAL	2	NEOPRENE
18	20mm (3/4") PIPE SP/IGOT	2	PVC OR ABS
19	25mm BSP 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

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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 3/4" 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.

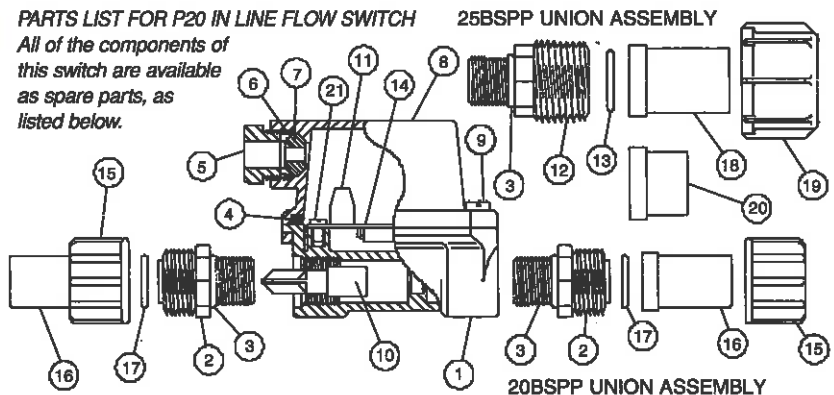
Switch Model	Module Type	Contact Configuration	Switched Power Maximum	Switched Voltage Maximum	Switched Current Resistive AC (rms) Maximum	Inductive Loads (Power Factor 0.4)	Typical Application
P20-B	Dry Reed Switch	S.P.S.T. N.O	40W	240V AC 200V DC	1A	Not Suitable	PLC and General Control Circuits
P20-C	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.

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 C18 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 18 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 C-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") P.P.E SP/GOT	2	PVC OR ABS
17	No 115 O-RING SEAL	2	NEOPRENE
18	20mm (3/4") PIPE SP/GOT	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

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

PLEASE NOTE: The "P20" Series In Line Float Switch is the subject of patent and trademark applications both in Australia and internationally. Cyncard Pty Ltd reserves the right to change the specifications of this product without notice. All rights reserved © 2001

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.

Model OPF 10 pH Electrode



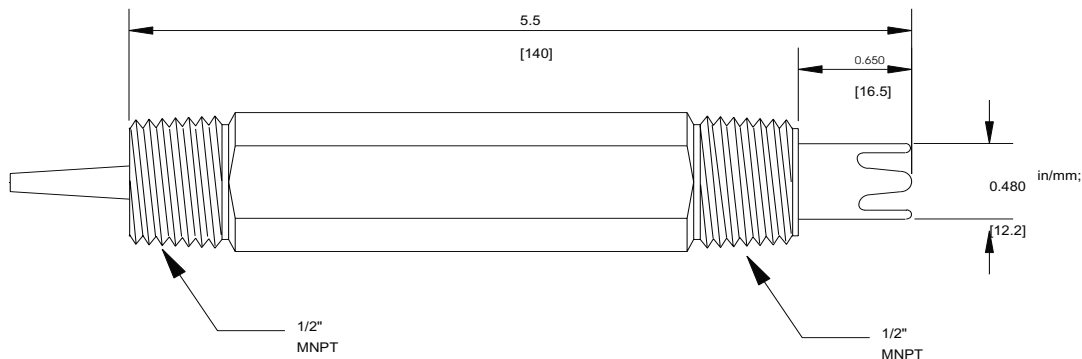
General purpose pH electrode with optional integral temperature sensor and ½" MNPT process connection

- 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

Kalbar - DIA 2Q settings												
Main Menu	Controller pH	set point	7.5 pH									
		prop. band xp	XP = 100.0 %									
		reset time TN	TN = 125 sec									
		constant load	0%									
		max. dosing flow	100%									
		dosing coeffic.	3									
		Adaption	Start									
			Stop									
			Adapt.result							XP : 100.0%		
										TN: 125 sec		
	Stop		N.O.									
	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 \(3\).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 CO2 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

Factory Acceptance Test (FAT)

Linked Documents

-  [98456866 FAT.pdf](#)
-  [98439300 FAT Kalbar pH Panel.pdf](#)

Site Acceptance Test (SAT)

Linked Documents

-  [98456866-SAT-KA.pdf](#)
-  [98439300 SPT Kalbar 4 Bar.pdf](#)
-  [98439300 SPT Kalbar 10 Bar.pdf](#)
-  [98439300 SAT Kalbar pH Panel.pdf](#)
-  [98437842-SAT-KA.pdf](#)

Commissioning Check Sheet

Linked Documents

-  [Grundfos-Comm-Chk-002KA.pdf](#)



Inspection and Test Plan (ITP)

Linked Documents

-  [98456866-ITP-KA.pdf](#)

Water pH Data Log

Linked Documents

-  [Kalbar Tank Discharge pH 31012014.pdf](#)
-  [Kalbar Filtrate Water pH 22012014.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 \(3\).pdf](#)


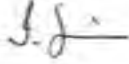

Form 15 & 16


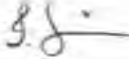
Linked Documents

-  [Kalbar Form 15.pdf](#)
-  [Kalbar Form 16.pdf](#)



Grundfos Pumps Pty Ltd FACTORY ACCEPTANCE TEST		SAT NO. :	98456866-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. :	486/5/5-0107-266 to 268 P&ID – 486/5/5-0107-251 to 252
SYSTEM DESCRIPTION:	Carbon Dioxide (CO2) Dosing System - Kalbar	EQUIPMENT/TAG NO. :	98456866-29042013

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
1	CO2 Gas Construction and Assembly (Manifold Assemblies)	As per approved P&ID 486/5/5-0107-251 to 252 As per approved GA 486/5/5-0107-253 to 259	 14/5/2013		<ul style="list-style-type: none"> PR-0740-001 Serial number: <u>N/A</u> PR-0740-002 Serial number: <u>N/A</u> 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 486/5/5-0107-251 to 252 As per approved GA 486/5/5-0107-266 to 268	 14/5/2013		<ul style="list-style-type: none"> 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.	 14/5/2013		Test Procedure <ol style="list-style-type: none"> Open and close all valves to ensure there is no binding. Close all drain/bleed isolation valves. Open / close all system isolation valves. Ensure all valves are open/closed as per the P&ID.

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
4	Pressure test – Pipework	As per test procedure. AS2032:2006 Cl. 7.2	To be completed at SAT		Test Procedure <ol style="list-style-type: none"> 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.	 14/5/2013		Test Procedure <ol style="list-style-type: none"> 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 1.7 Bar. Adjust the pressure switch until it operates the alarm.
6	Pressure Relief Valve	As per test procedure.	 14/5/2013		Test Procedure <ol style="list-style-type: none"> 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: <u>6 Bar</u>

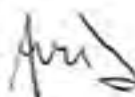
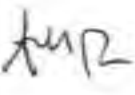
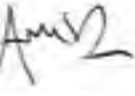

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
7	Panel Operation	As per test procedure	J S. 14/5/2013		Test Procedure <ol style="list-style-type: none"> 1. Close all isolation valves. 2. Set the supply pressure at 2 Bar 3. Check that the 0.8 Bar spring non return valve (P/n 95730920) 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. 6. Set the flow meter to 3.5 L/min at 0.8 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 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					



NOTES:	

	Name	Designation	Signature	Date
Grundfos Representative:	IAN GINN	PROJECT ENGINEER	<i>I. Ginn</i>	14/5/2013
Client Representative:				

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. :	486/5/5-0107-260 to 262 P&ID – 486/5/5-0107-251 to 252
SYSTEM DESCRIPTION:	pH Monitor Panel - Kalbar	EQUIPMENT/TAG NO.:	98439300-15042013

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
1	Panel Construction and Assembly (General)	As per approved P&ID 486/5/5-0107-251 to 252 As per approved GA 486/5/5-0107-260 to 262	 16.5.13		<ul style="list-style-type: none"> • 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.	 16.5.13		Test Procedure <ol style="list-style-type: none"> 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	 16.5.13	 16/5/13	Test Procedure <ol style="list-style-type: none"> 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.



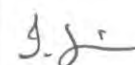
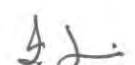
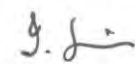
NOTES:	Note – The M10 Sensor is to be shipped with the pH Monitor Panel but is to only be installed at commissioning. The sensor must remain in the supplier's solution until just prior to calibration at commissioning.



	Name	Designation	Signature	Date
Grundfos Representative:	Andrew Dunnett	Fitter		16.5.13
Client Representative:	Tony Grish	Lead hand Kalbar-		16.5.13



Grundfos Pumps Pty Ltd SITE ACCEPTANCE TEST

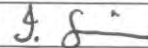

		SAT NO. :	98437842-SAT- KA
		DATE :	23/04/2013
		PREPARED BY :	I.Ginn
CLIENT :	Thomas & Coffey	CONTRACT NO. :	0060A
QUOTATION NO. :	20227-JKJ99	PROJECT :	Boonah Regional Lagoons
ORDER NO. :	6232240/003	DRAWING NO. :	486/5/5-0107-253 to 259 P&ID – 486/5/5-0107-251 to 252
SYSTEM DESCRIPTION:	Carbon Dioxide (CO2) Storage and Installation – Kalbar	EQUIPMENT/TAG NO. :	98437842-29042013

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
1	Dosing System Layout and Connections	As per approved P&ID 486/5/5-0107-251 to 252 As per approved GA 486/5/5-0107-253 to 259	 30/01/14	T-Z	<ul style="list-style-type: none"> 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 486/5/5-0107-251 to 252 As per approved GA 486/5/5-0107-253 to 259	 30/01/14	T-Z	<ul style="list-style-type: none"> 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.	 30/01/14	T-Z	Test Procedure <ol style="list-style-type: none"> Open and close all valves to ensure there is no binding. Close all drain/bleed isolation valves. Open / close all system isolation valves. Ensure all valves are open/closed as per the P&ID.

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
4	Safety inspection	As per inspection procedure.	 30/01/14		Inspection Procedure <ol style="list-style-type: none"> 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					



NOTES:	

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

System Pressure Test Sheet

Hydrostatic Test

PROJECT:	QUU Regional Lagoons WWTP - KALBAR	DOC ID: SPT-KAL 001	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			

Comments

GRUNDFOS REPRESENTATIVE

Signature Andrew Burnett
 Name Andrew Burnett
 Title Filter
 Date 16.5.13

THOMAS & COFFEY REPRESENTATIVE

Signature [Signature]
 Name Tony Lush
 Title Leaking pump
 Date 16.5.13

System Pressure Test Sheet

Hydrostatic Test

PROJECT:	QUU Regional Lagoons WWTP - KALBAR	DOC ID: SPT-KAL-002	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 Andrew Burnett
 Name Andrew Burnett
 Title Filter
 Date 16.5.13

THOMAS & COFFEY REPRESENTATIVE


Signature [Signature]
 Name Tony Gush
 Title Leading hand
 Date 16.5.13



Grundfos Pumps Pty Ltd SITE ACCEPTANCE TEST

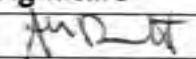

		SAT NO. :	98439300-SAT
		DATE :	05/04/2013
		PREPARED BY :	I.Ginn
CLIENT :	Thomas & Coffey	CONTRACT NO. :	0060A
QUOTATION NO. :	20227-JKJ99	PROJECT :	Boonah Regional Lagoons Upgrade
ORDER NO. :	6232240/003	DRAWING NO. :	486/5/5-0107-260 to 262 P&ID – 486/5/5-0107-251 to 252
SYSTEM DESCRIPTION:	pH Monitoring Panel – Kalbar	EQUIPMENT/TAG NO. :	98439300-15042013

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
1	Monitoring Panel Construction and Assembly	As per approved P&ID 486/5/5-0107-251 to 252 As per approved GA 486/5/5-0107-260 to 262	<i>Amr2</i> 16-5-13	<i>[Signature]</i> 16-5-13	<ul style="list-style-type: none"> • 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.	<i>Amr2</i> 16-5-13	<i>[Signature]</i> 16-5-13	Test Procedure <ol style="list-style-type: none"> 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	<i>Amr2</i> 16-5-13	<i>[Signature]</i> 16/5/13	Test Procedure <ol style="list-style-type: none"> 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.

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
4	Calibrate the M10 Sensor	As per procedure	TO BE COMPLETED AT COMMISSIONING		Test Procedure <ol style="list-style-type: none"> 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.	AND 16-5-13	 16-5-13	Priming System <ol style="list-style-type: none"> 1. Purge water inlet and outlet connections. 2. Ensure 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	TO BE COMPLETED AT COMMISSIONING		Test Procedure <ol style="list-style-type: none"> 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)

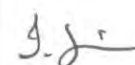
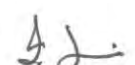
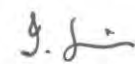




NOTES:	

	Name	Designation	Signature	Date
Grundfos Representative:	Andrew Bennett	Filter		16-5-13
Client Representative:	Tony Gresh	Leading hand		16-5-13



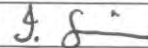

Grundfos Pumps Pty Ltd SITE ACCEPTANCE TEST		SAT NO. :	98437842-SAT- KA
		DATE :	23/04/2013
		PREPARED BY :	I.Ginn
CLIENT :	Thomas & Coffey	CONTRACT NO. :	0060A
QUOTATION NO. :	20227-JKJ99	PROJECT :	Boonah Regional Lagoons
ORDER NO. :	6232240/003	DRAWING NO. :	486/5/5-0107-253 to 259 P&ID – 486/5/5-0107-251 to 252
SYSTEM DESCRIPTION:	Carbon Dioxide (CO2) Storage and Installation – Kalbar	EQUIPMENT/TAG NO. :	98437842-29042013


NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
1	Dosing System Layout and Connections	As per approved P&ID 486/5/5-0107-251 to 252 As per approved GA 486/5/5-0107-253 to 259	 30/01/14	T-Z	<ul style="list-style-type: none"> 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 486/5/5-0107-251 to 252 As per approved GA 486/5/5-0107-253 to 259	 30/01/14	T-Z	<ul style="list-style-type: none"> 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.	 30/01/14	T-Z	Test Procedure <ol style="list-style-type: none"> Open and close all valves to ensure there is no binding. Close all drain/bleed isolation valves. Open / close all system isolation valves. Ensure all valves are open/closed as per the P&ID.

NO.	ACTIVITY	ACCEPTANCE CRITERIA	INSPECTION BY		NOTES / DOCUMENTS
			GRUNDFOS	CLIENT	
4	Safety inspection	As per inspection procedure.	 30/01/14		Inspection Procedure <ol style="list-style-type: none"> 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					



NOTES:	

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

GRUNDFOS 		PROJECT COMMISSIONING RECORD	
FORM TYPE:	PRE-COMMISSIONING CHECKSHEET		
FORM NAME:	DOSING SKID PRE-COMM	DOC ID:	GRUNDFOS-COMM-CHK-002KA
PROJECT:	0060A Boonah Regional Lagoon STP		
SYSTEM:	Carbon Dioxide Dosing System (CO2)- <i>KALBAR</i>		

1. PRE-COMMISSIONING INSPECTION AND CHECKS		
ITEM	PRE-COMMISSIONING 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 0.8 bar back pressure.	✓
12.	Check Dosing Pump 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:

G. Si

DATE: 30/01/2014



Grundfos Pumps Pty Ltd INSPECTION AND TEST PLAN

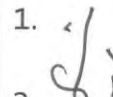
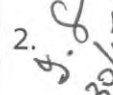
Grundfos Pumps Pty Ltd INSPECTION AND TEST PLAN		ITP NO. :	98456866-ITP- <i>KA</i>
		DATE :	27.03.2013
		PREPARED BY :	Ian Ginn
CLIENT :	Thomas & Coffey	CONTRACT NO. :	0060A
QUOTATION NO. :	20227-JKJ99	PROJECT :	Boonah Regional Lagoons
ORDER NO. :	6232240/003	DRAWING NO. :	P&ID – 486/5/5-0107-251 to 252 486/5/5-0107-260 to 262 – pH Monitor panel 486/5/5-0107-266 to 268 – CO2 Dosing Panel
SYSTEM DESCRIPTION:	Carbon Dioxide (CO2) Dosing System – Kalbar	EQUIPMENT/TAG NO.:	98456866-08042013

LEGEND

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

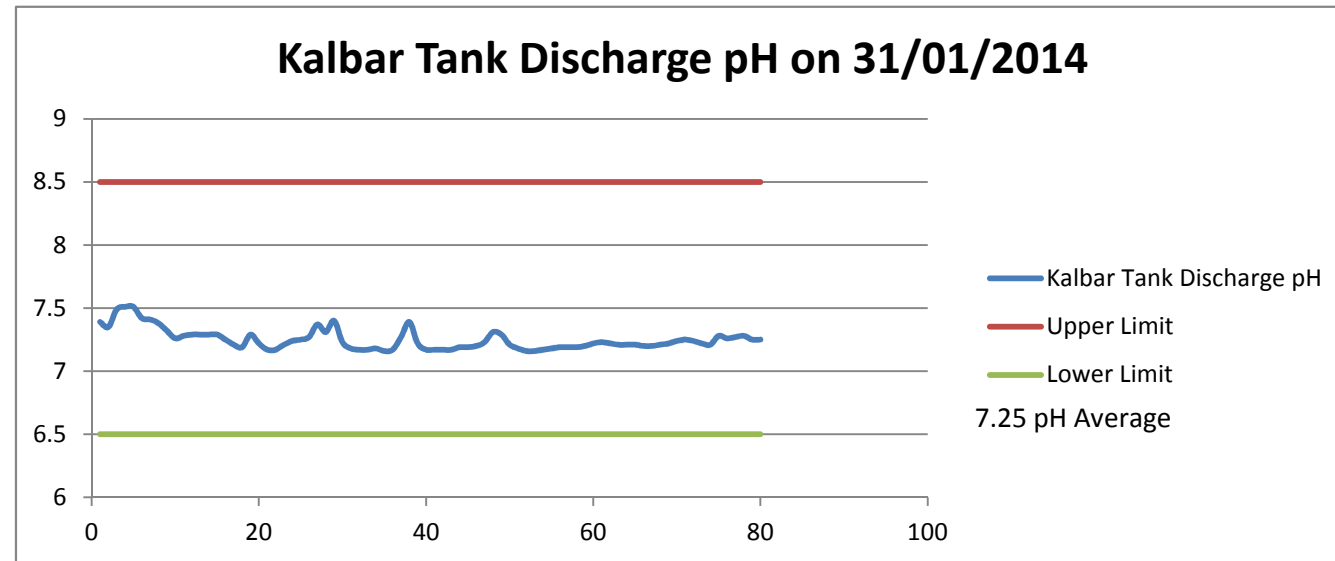


NO	ACTIVITY	CONTROLLING PROCEDURE	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTS	INSPECTION & VERIFICATION POINTS	INSPECTION BY (SIGN, DATE)	
						GRUNDFOS	CLIENT
1	Frame Fabrication	AS 1554.6	Construction Drawings Compliance to AS1554.6 486/5/5-0107-266 to 268	As built drawings Approved weld procedures Approved weld qualifications	M	1. <i>[Signature]</i> 30/01/14	T.Z
2	Panel Assembly	FAT	Approved P&ID- 486/5/5-0107-251 to 252 Construction Drawings 486/5/5-0107-260 to 262 486/5/5-0107-266 to 268	As built drawings Approved P&IDs Signed ITP	M	1. <i>[Signature]</i> 30/01/14 2. <i>[Signature]</i> 30/01/14 3. <i>[Signature]</i> 30/01/14	T.Z
3	Factory Acceptance Testing	Approval of Factory Acceptance Test sheet.	Approved Factory Acceptance Test sheets. 98456866-FAT 98439300-FAT	Signed Factory Acceptance Test sheet.	W	1. <i>[Signature]</i> 30/01/2014 2. <i>[Signature]</i> 30/01/2014	T.Z
4	Equipment Photographs	ITP	Photographs transferred to server.	Signed ITP	I	1. <i>[Signature]</i> 30/01/2014 2. <i>[Signature]</i> 30/01/2014	T.Z

NO	ACTIVITY	CONTROLLING PROCEDURE	ACCEPTANCE CRITERIA	VERIFYING DOCUMENTS	INSPECTION & VERIFICATION POINTS	INSPECTION BY (SIGN, DATE)	
						GRUNDFOS	CLIENT
5	Crating and Delivery	<p>Ensure skid is adequately packed and labelled for storage and transport.</p> <p>Ensure all loose items are adequately packaged and labelled for transport.</p> <p>Check items against BOM</p>	Checked by Project Engineer	Signed ITP	H	1.  2.  30/01/14	
6	Documentation	Compilation and delivery of documentation	T&C approved.	T&C Approval	M		

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. 98456866-SAT 98437842-SAT 98439300-SAT	Approved Site Acceptance Test sheet.	Signed Site Acceptance Test sheet.	H	1. 2. 3. <i>[Signature]</i> 30/01/2014	<i>T-Z</i>
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. 2. <i>[Signature]</i> 30/01/2014	<i>T-Z</i>

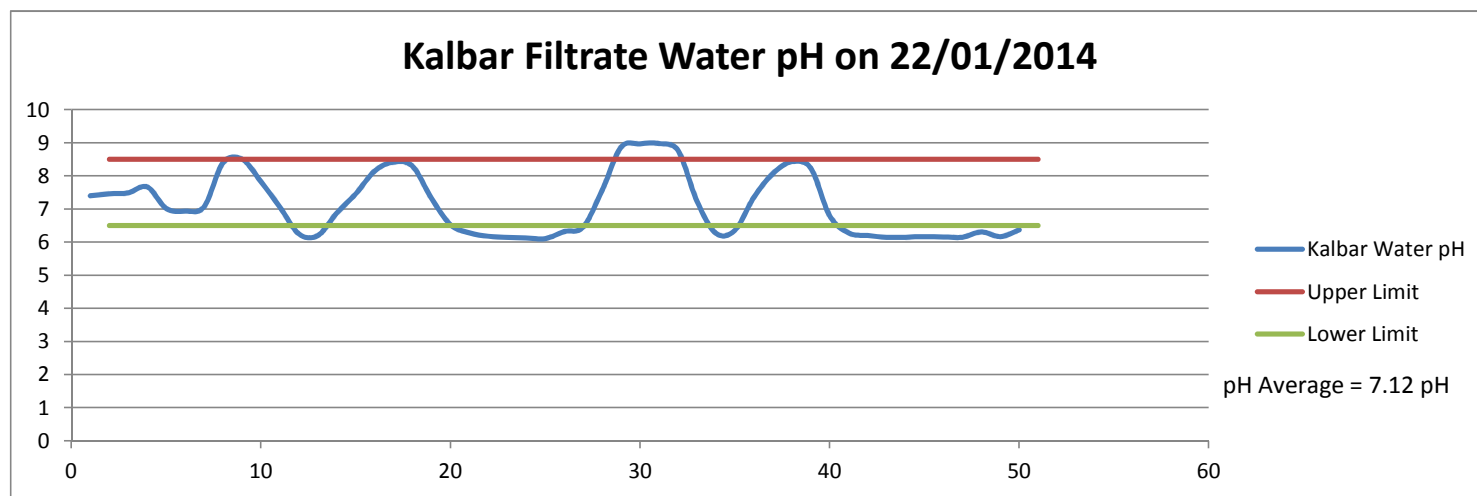
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31/01/2004	11:47	5	7.51
31/01/2004	11:48	6	7.42
31/01/2004	11:49	7	7.41
31/01/2004	11:50	8	7.38
31/01/2004	11:51	9	7.32
31/01/2004	11:52	10	7.26
31/01/2004	11:53	11	7.28
31/01/2004	11:54	12	7.29
31/01/2004	11:55	13	7.29
31/01/2004	11:56	14	7.29
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31/01/2004	11:58	16	7.25
31/01/2004	11:59	17	7.21
31/01/2004	12:00	18	7.19
31/01/2004	12:01	19	7.29
31/01/2004	12:02	20	7.22
31/01/2004	12:03	21	7.17
31/01/2004	12:04	22	7.17
31/01/2004	12:05	23	7.21
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31/01/2004	12:09	27	7.37
31/01/2004	12:10	28	7.31
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31/01/2004	12:12	30	7.23
31/01/2004	12:13	31	7.18
31/01/2004	12:14	32	7.17
31/01/2004	12:15	33	7.17



31/01/2004	12:16	34	7.18
31/01/2004	12:17	35	7.16
31/01/2004	12:18	36	7.17
31/01/2004	12:19	37	7.27
31/01/2004	12:20	38	7.39
31/01/2004	12:21	39	7.22
31/01/2004	12:22	40	7.17
31/01/2004	12:23	41	7.17
31/01/2004	12:24	42	7.17
31/01/2004	12:25	43	7.17
31/01/2004	12:26	44	7.19
31/01/2004	12:27	45	7.19
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31/01/2004	12:29	47	7.23
31/01/2004	12:30	48	7.31
31/01/2004	12:31	49	7.29
31/01/2004	12:32	50	7.21
31/01/2004	12:33	51	7.18
31/01/2004	12:34	52	7.16
31/01/2004	12:35	53	7.16
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31/01/2004	12:45	63	7.21
31/01/2004	12:46	64	7.21
31/01/2004	12:47	65	7.21
31/01/2004	12:48	66	7.2

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31/01/2004	12:51	69	7.22
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31/01/2004	12:54	72	7.24
31/01/2004	12:55	73	7.22
31/01/2004	12:56	74	7.21
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22/01/2004	9:58	13	6.2
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22/01/2004	10:01	16	8.15
22/01/2004	10:02	17	8.42
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22/01/2004	10:04	19	7.32
22/01/2004	10:05	20	6.53
22/01/2004	10:06	21	6.28
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22/01/2004	10:08	23	6.15
22/01/2004	10:09	24	6.13
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22/01/2004	10:19	34	6.27
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22/01/2004	10:21	36	7.35
22/01/2004	10:22	37	8.07



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22/01/2004	10:27	42	6.2
22/01/2004	10:28	43	6.15
22/01/2004	10:29	44	6.15
22/01/2004	10:30	45	6.17
22/01/2004	10:31	46	6.16
22/01/2004	10:32	47	6.15
22/01/2004	10:33	48	6.31
22/01/2004	10:34	49	6.17
22/01/2004	10:35	50	6.37



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 CO2 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

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)

Kalbar Water Treatment Facility

Heit Road, Kalbar, QLD

Postcode **4309**

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_5-0107-250, 486_5_5-0107-251, 486_5_5-0107-253 to 256, 486_5_5-0107-260 to 261, 486_5_5-0107-263 to 265 and 486_5_5-0107-266 to 267. In addition to the drawings there are documents referenced in the ITP 98456866-ITP-KA.

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 Pumps 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

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).

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*.

☒ Inspection Certificate for

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

☒ Aspect of building work
(indicate the aspect)

Completed installation of the 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)

Kalbar Water Treatment Facility

Heit Road, Kalbar, QLD

Postcode 4309

Lot & plan details (Attach list if necessary)

In which local government area is the land situated?

3. Building/structure description

Building/structure description

Existing industrial structure

Class of building / 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

REFERENCE NUMBER

Approved Form 16
1/1/11

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.

Technical Specification 20120801_AU1-706290-Construct Contract

7. Building certifier reference number and development approval number

Building certifier reference number

N/a

Development approval number

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

Grundfos Pumps 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 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

I. Ginn

Date

10/02/2014

Commissioning Information

Kalbar CO2 Gas Control

SECTION 4: INSTALLATION & COMMISSIONING

4.1 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

4.2 Standards and Procedures for Wiring the Equipment

AS3000: Electrical Installations (wiring rules)

AS3008: Electrical Installations – Selection of Cables

4.3 Standards and Procedures for Lubricating the Equipment

Please refer to Manufacturer's O&M Manuals – section 9.

4.4 Installation and Commissioning Instructions

4.4.1 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.

4.4.2 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.

Spares

Kalbar CO2 Gas Control

Service : (8.0) Energy Transfer

Subservice : (BRN) WASTE_GAS_FLARE

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

Supplier

Spare Parts

Description

Part No.

Quantity

Grundfos

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

Pressure Loading Valve - 96376567-1

Pressure Relief Valve - 96638469 - 1

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

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

Help & Contact

Kalbar CO2 Gas Control

Trade or Product:

Contact & Address Details:

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

MANUFACTURER/ SUPPLIER

ADDRESS

PHONE

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 Mechanical Drawings

Site: (ST059) Kalbar

Process: (1100.0) GENERAL

Sub: (1150) SEWERAGE

CO2 Mechanical Drawings

Linked Documents

 [486_5_5-0107-251.pdf](#)

 [486_5_5-0107-250.pdf](#)

 [486_5_5-0107-263 to 265.pdf](#)

 [486_5_5-0107-266 to 267.pdf](#)

 [486_5_5-0107-260 to 261.pdf](#)

 [486_5_5-0107-253 to 256.pdf](#)

CO2 Electrical Drawings

Site: (ST059) Kalbar

Process: (1100.0) GENERAL

Sub: (1150) SEWERAGE

CO2 Grundfos Standard Electrical Drawings

Linked Documents

 [CO2 Control Panel Kalbar Rev C AB.pdf](#)

As Constructed



QUEENSLAND

UrbanUtilities

KALBAR REGIONAL LAGOONS SEWAGE TREATMENT PLANTS ENHANCEMENT

DRAWING NUMBERS 486/5/5-0107-251 TO 486/5/5-0107-252 KALBAR CO2 PROCESS & INSTRUMENT DIAGRAM
DRAWING NUMBERS 486/5/5-0107-253 TO 486/5/5-0107-256 KALBAR CO2 INSTALLATION GA - STORAGE & DOSING
DRAWING NUMBERS 486/5/5-0107-260 TO 486/5/5-0107-262 KALBAR CO2 pH MONITOR PANEL GA
DRAWING NUMBERS 486/5/5-0107-263 TO 486/5/5-0107-265 KALBAR CO2 4" STATIC MIXER GA
DRAWING NUMBERS 486/5/5-0107-266 TO 486/5/5-0107-268 KALBAR CO2 GAS CONTROL GA

GRUNDFOS 

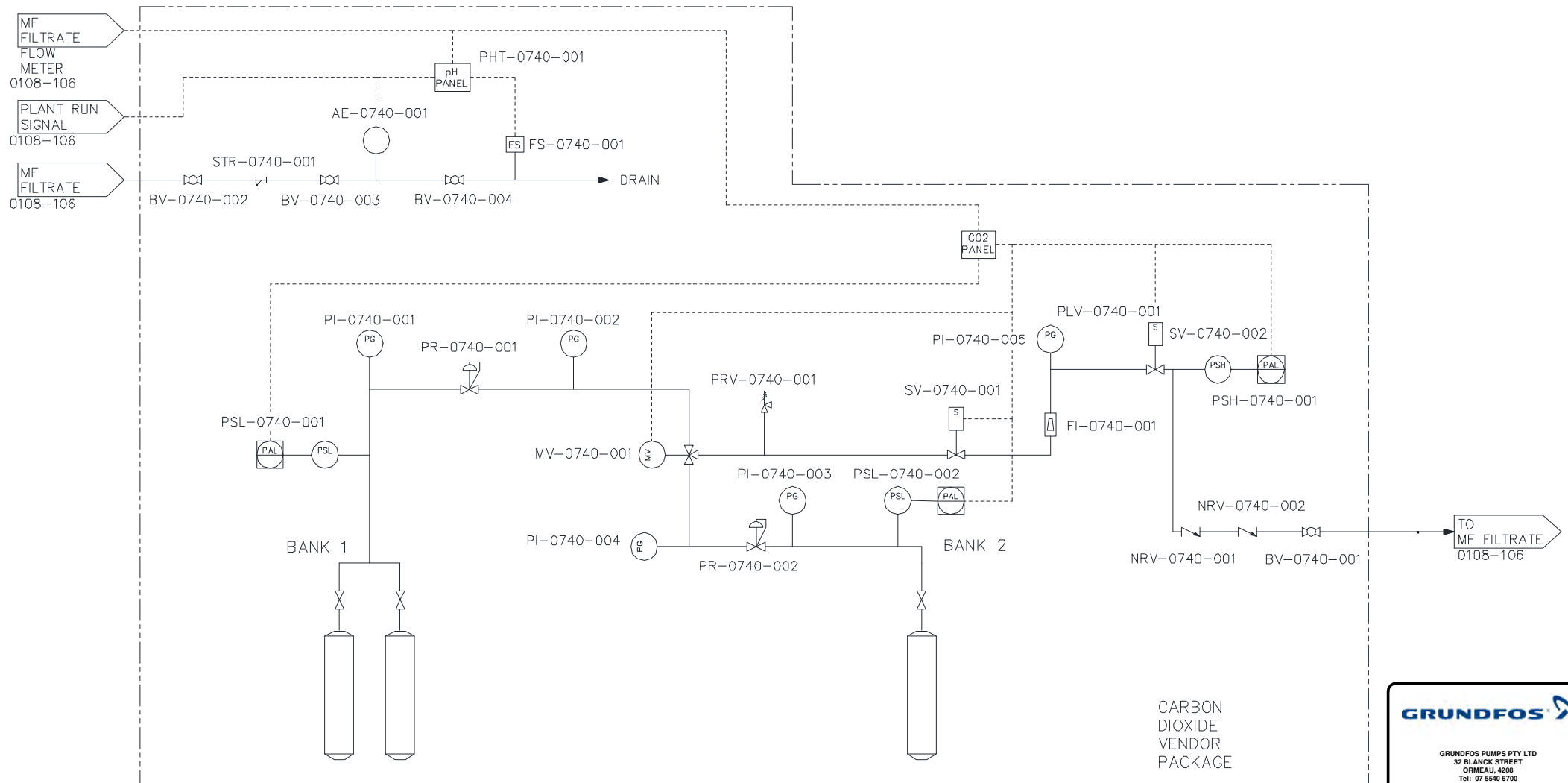
GRUNDFOS PUMPS PTY LTD
32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740

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



SHEET No. 1 OF 1	AMEND.
486/5/5-0107-250	A

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As Constructed**GRUNDFOS**

GRUNDFOS PUMPS PTY LTD
32 BLANK 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)

QUEENSLAND URBAN UTILITIES

SHEET No. 1 OF 1
QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.

486/5/5-0107-251 A

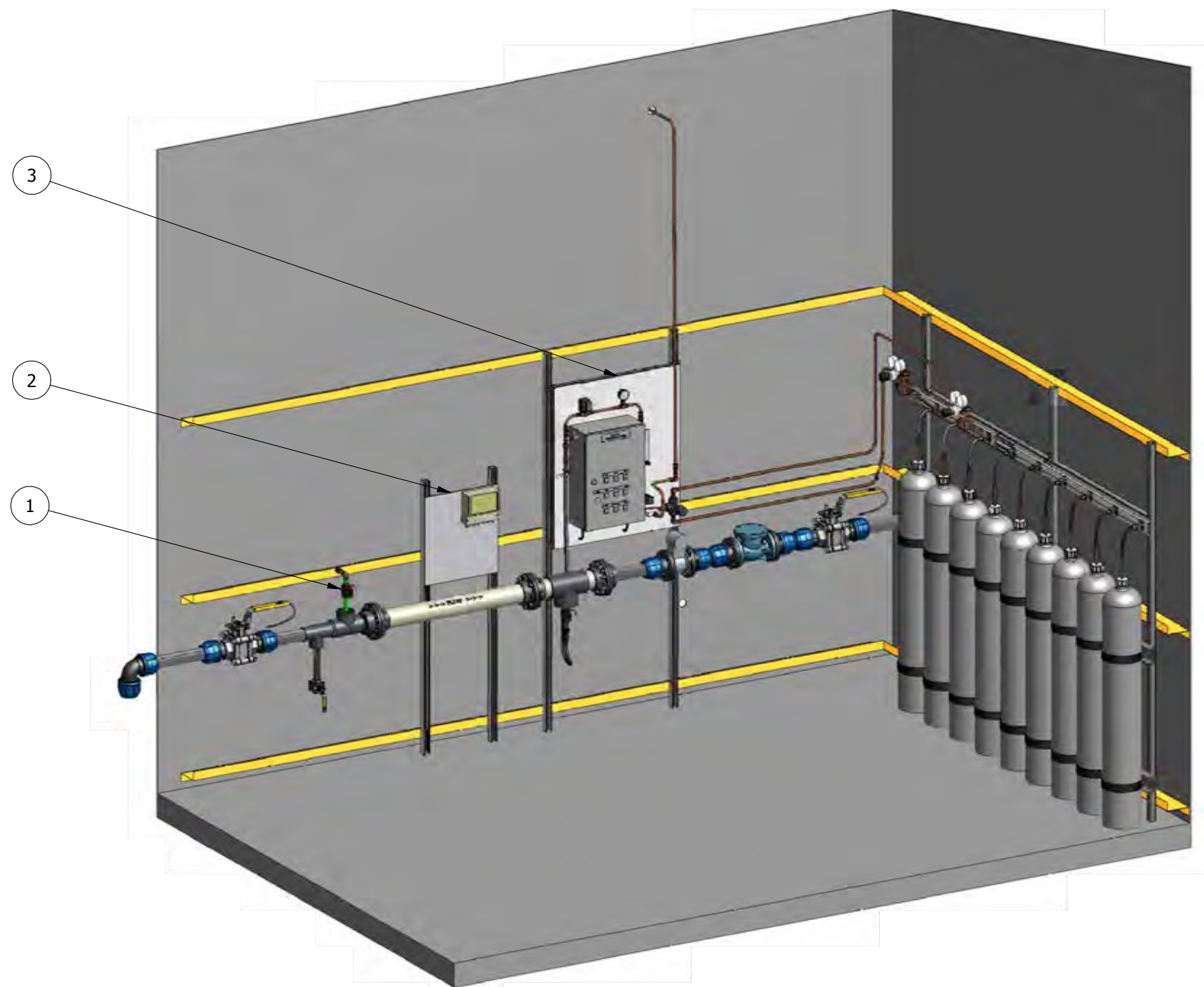
Page 75 of 116

FUNDING				DRAFTED		DS		DAN STENZEL		18/06/2013		ASSET/PROJECT		DRAWING TITLE	
DESIGN W.O. No.				DRAFTING CHECK		SB		DESIGN		DATE		REGIONAL LAGOONS		KALBAR CO2	
CONSTRUCTION W.O. No.				CAD FILE		550107251		SHAUN BELLAMY		18/06/2013		SEWAGE TREATMENT		PROCESS & INSTRUMENT	
FUNDED BY Q.U.U. (✓) EXTERNAL ()				Q.U.U. FILE No.				DESIGN CHECK		DATE		PLANTS ENHANCEMENT		DIAGRAM	
								JASON JOHNSON		18/06/2013					
								SIGNATURE							

PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	97759470	Valve Ball 546 1/2" BSPF PVC-U EPDM
2	1	96609140	Conex Measuring Unit DIA-2Q
3	1	2133-001	CO2 Enclosure

As Constructed



LEGEND

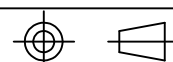
4.0" Pipe
3.0" Pipe
2.5" Pipe
2.0" Pipe
1.5" Pipe
1.25" Pipe
1.0" Pipe
0.75" Pipe
0.5" Pipe

*NOTE
LEFT HAND SIDE BUND WALL REMOVED FOR CLARITY

REVISION HISTORY

REV	DESCRIPTION	DATE	DR	CH	EN
AB	AS BUILT	28/01/2014	SB		IG

NOT TO SCALE



ALL DIMENSIONS IN MILLIMETRES

DESIGNED	DS	DATE	28/02/2013
CHECKED	SB	DATE	28/02/2013
APPROVED	IG	DATE	28/02/2013

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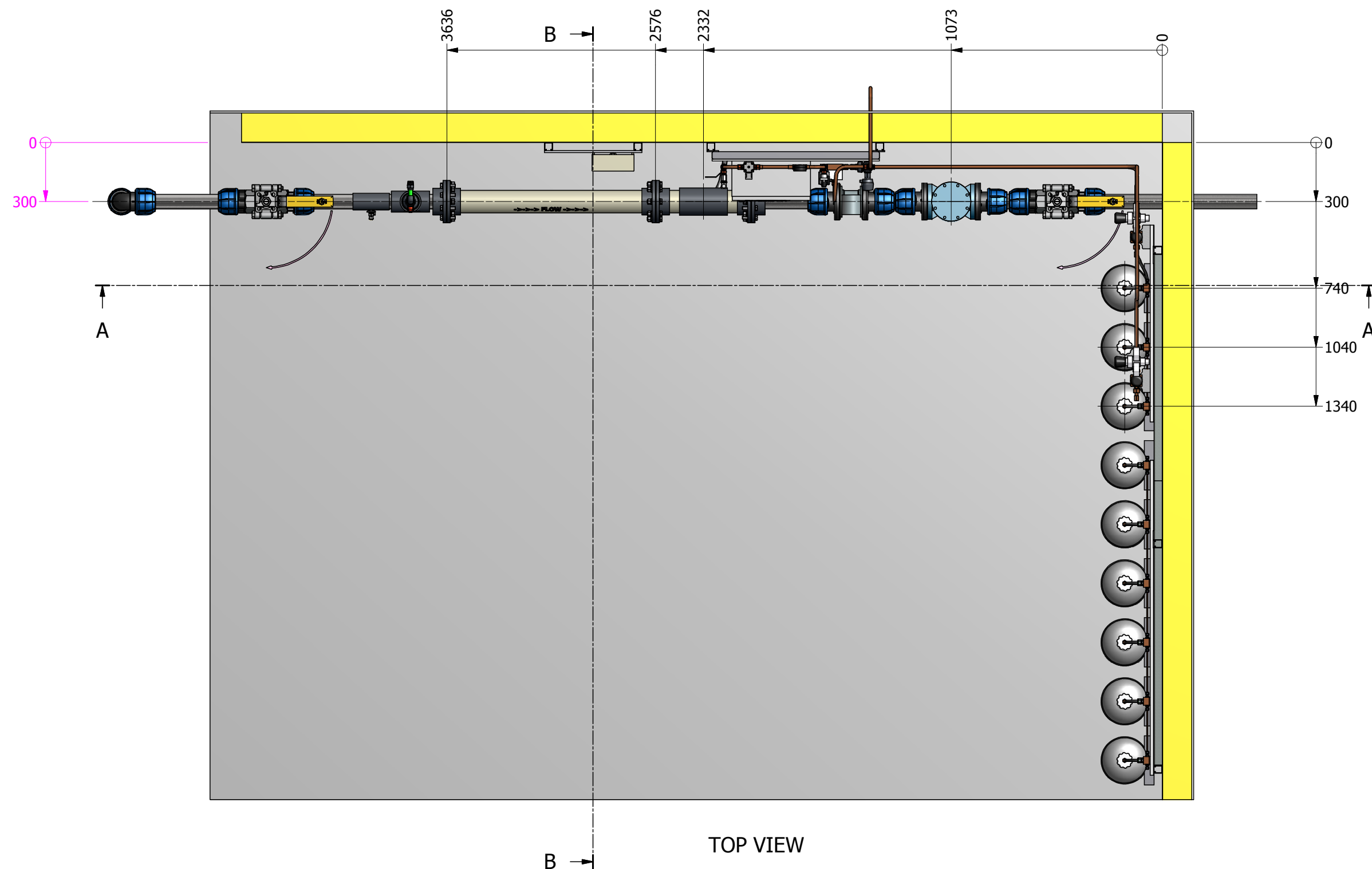
Grundfos Pumps Australia Pty. Ltd.
30 Blanck Street Ormeau, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740

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TITLE: **KALBAR REGIONAL LAGOON UPGRADES
CO2 DOSING INSTALLATION GA**

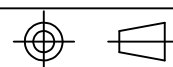
SIZE: **A3** DRG NO: **486_5_5-0107-253** SHEET: **1 / 4** REV: **AB**

As Constructed



UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE IN mm
X = +/- 1
X.X = +/- 0.1
X.XX = +/- 0.01
ANGLE = +/- 1°

NOT TO SCALE



ALL DIMENSIONS IN MILLIMETRES

DESIGNED	DS	DATE	28/02/2013
CHECKED	SB	DATE	28/02/2013
APPROVED	IG	DATE	28/02/2013

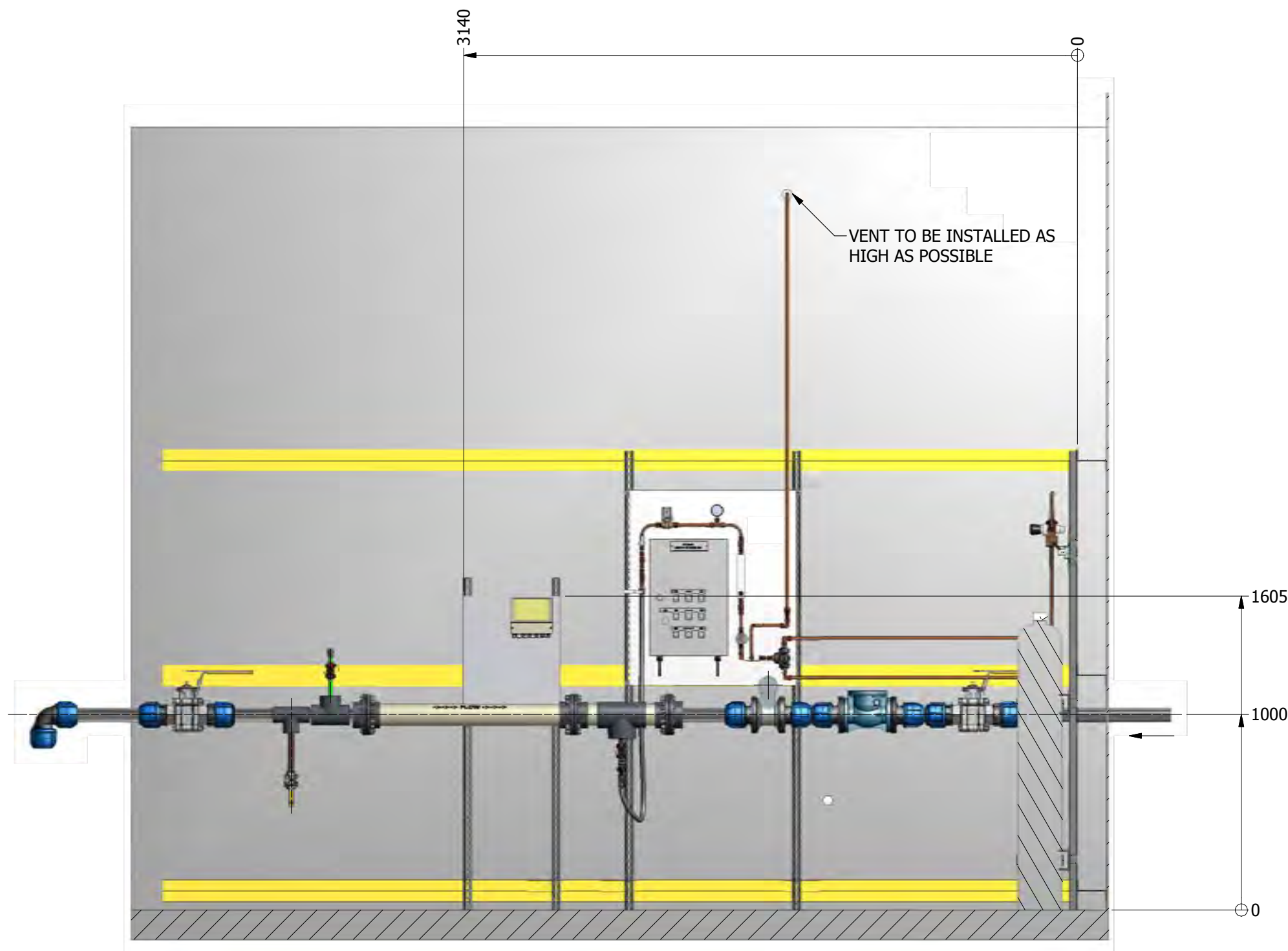
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TITLE: **KALBAR REGIONAL LAGOON UPGRADES
CO2 DOSING INSTALLATION GA**

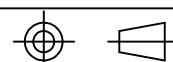
SIZE: **A3** DRG NO: **486_5_5-0107-254** SHEET: **2 / 4** REV: **AB**

As Constructed

SECTION A-A

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE IN mm
X = +/- 1
X.X = +/- 0.1
X.XX = +/- 0.01
ANGLE = +/- 1°

NOT TO SCALE



ALL DIMENSIONS IN MILLIMETRES

DESIGNED	DS	DATE	28/02/2013
CHECKED	SB	DATE	28/02/2013
APPROVED	IG	DATE	28/02/2013

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Tel: 07 5540 6700
Fax: 07 5540 6740

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TITLE: **KALBAR REGIONAL LAGOON UPGRADES
CO2 DOSING INSTALLATION GA**

SIZE: **A3** DRG NO: **486_5_5-0107-255** SHEET: **3 / 4** REV: **AB**

As Constructed

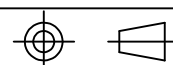
LEGEND

- 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

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE IN mm
X = +/- 1
X.X = +/- 0.1
X.XX = +/- 0.01
ANGLE = +/- 1°

SECTION B-B

NOT TO SCALE



ALL DIMENSIONS IN MILLIMETRES

DESIGNED	DS	DATE	28/02/2013
CHECKED	SB	DATE	28/02/2013
APPROVED	IG	DATE	28/02/2013

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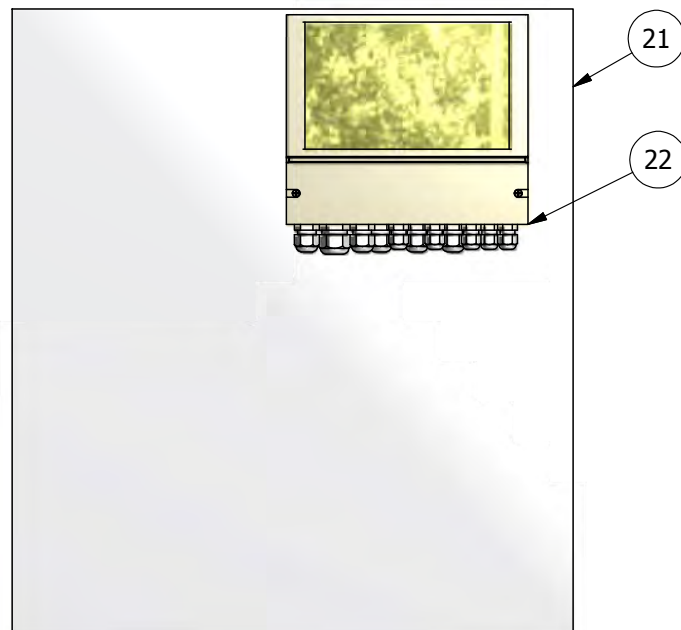
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TITLE: **KALBAR REGIONAL LAGOON UPGRADES
CO2 DOSING INSTALLATION GA**

SIZE: **A3** DRG NO: **486_5_5-0107-256** SHEET: **4 / 4** REV: **AB**

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 1/2" GF 305 Strainer SWJ EPDM + O-Ring Vit BS210V - 1/2"
5	4	97629528 + 95715032	Union 1/2" SWJ PVC-U VITON
6	4	97629003	Valve Ball 546 1/2" 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 3/4" - 1/2" 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

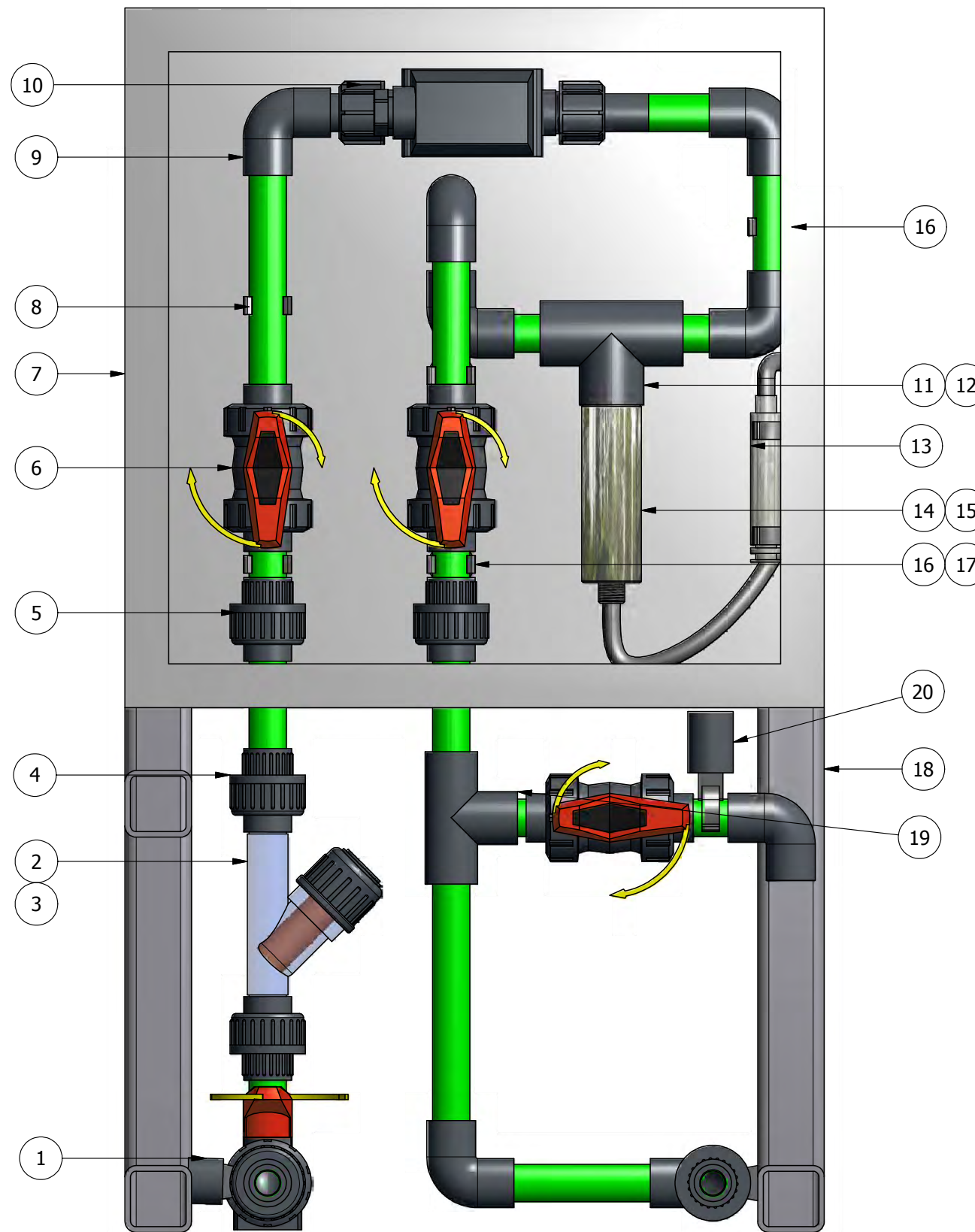


PARTS LIST

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

NOTES:

1. QUANTITY: 1 OFF REQUIRED.
2. FRAME MATERIAL: SHS 38x1.6 THK, SS316 (SHS 50x3 THK) (EA 50x5 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

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Fax: 07 5540 6740

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

UrbanUtilities

SHEET No. 1 OF 2

QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.

486/5/5-0107-260

A

DATE	AMENDMENT	DRAFTED	DESIGNED	REVIEWED	APPROVED	FUNDING	DESIGN W.O. No.	CONSTRUCTION W.O. No.	FUNDED BY Q.U.U. (✓)	EXTERNAL ()

DRAFTED	DS	DAN STENZEL
DRAFTING CHECK	SB	DESIGN
CAD FILE	550107260	SHAUN BELLAMY
Q.U.U. FILE No.		DESIGN CHECK

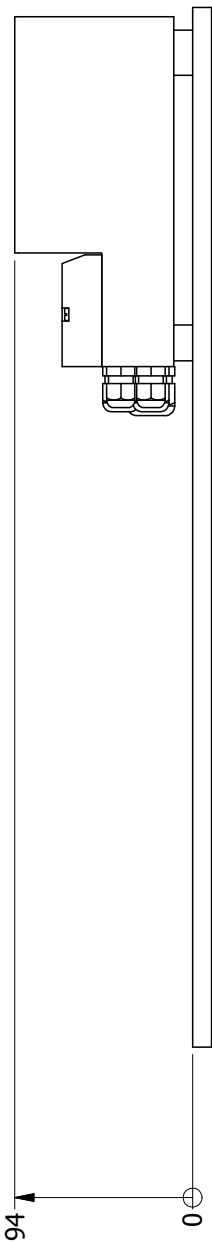
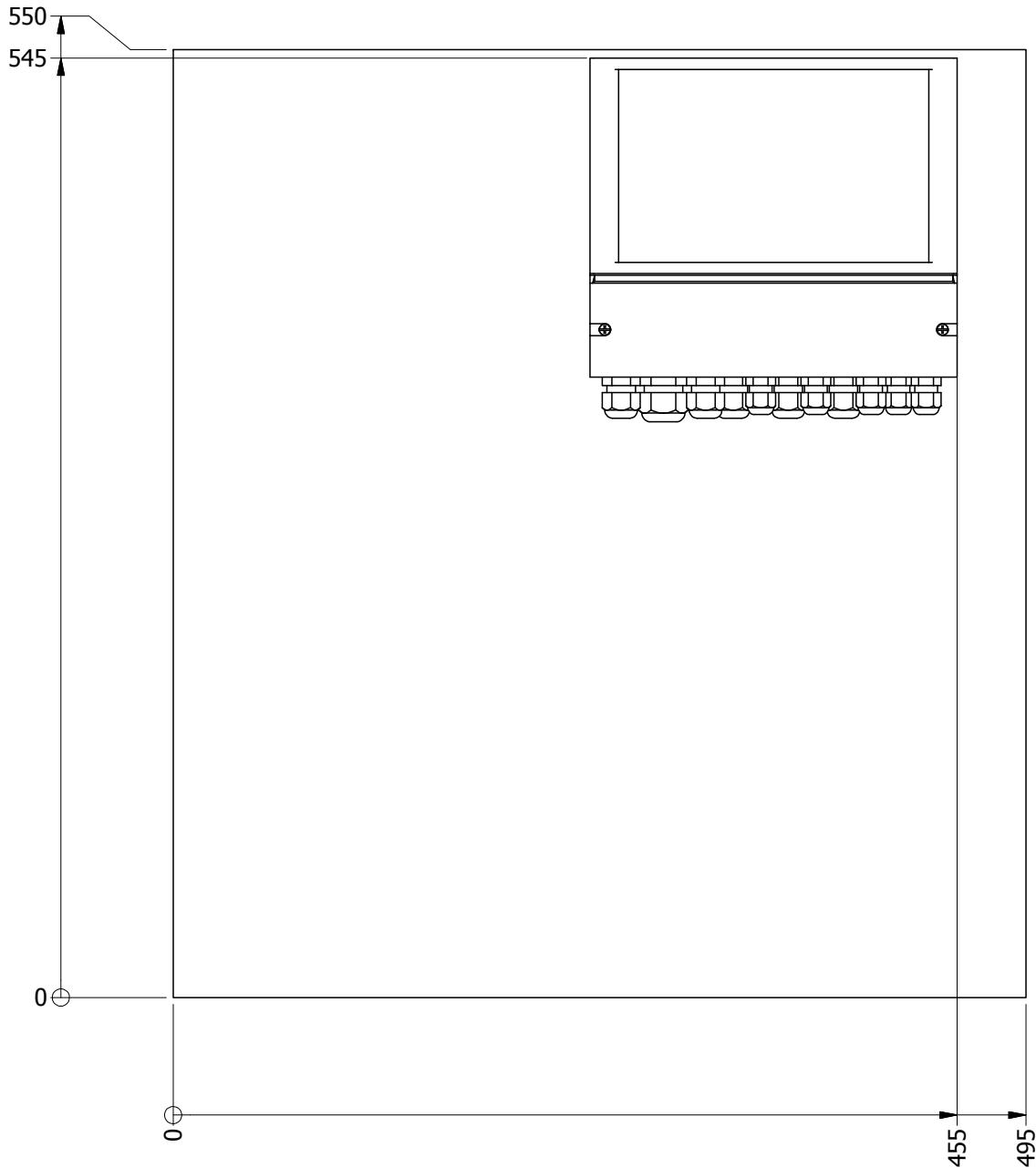
29/01/2014	DATE	ASSET/PROJECT
		REGIONAL LAGOONS
		SEWAGE TREATMENT
		PLANTS ENHANCEMENT
JASON JOHNSON	APPROVED BY	SIGNATURE

29/01/2014	DATE	ASSET/PROJECT
		REGIONAL LAGOONS
		SEWAGE TREATMENT
		PLANTS ENHANCEMENT
JASON JOHNSON	APPROVED BY	SIGNATURE

DRAWING TITLE	KALBAR CO2
	pH MONITOR PANEL GA

SHEET No. 1 OF 2	AMEND.
QUEENSLAND URBAN UTILITIES DRAWING No.	
486/5/5-0107-260	A

As Constructed



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



SHEET No. 2 OF 2
QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.
486/5/5-0107-261 A

FUNDING

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

DRAFTED

DRAFTING CHECK	SB
CAD FILE	550107261
Q.U.U. FILE No.	

DS

SB

DAN STENZEL

DESIGN	
SHAUN BELLAMY	18/06/2013
DESIGN CHECK	DATE

JASON JOHNSON
APPROVED BY

29/01/2014

DATE
SIGNATURE

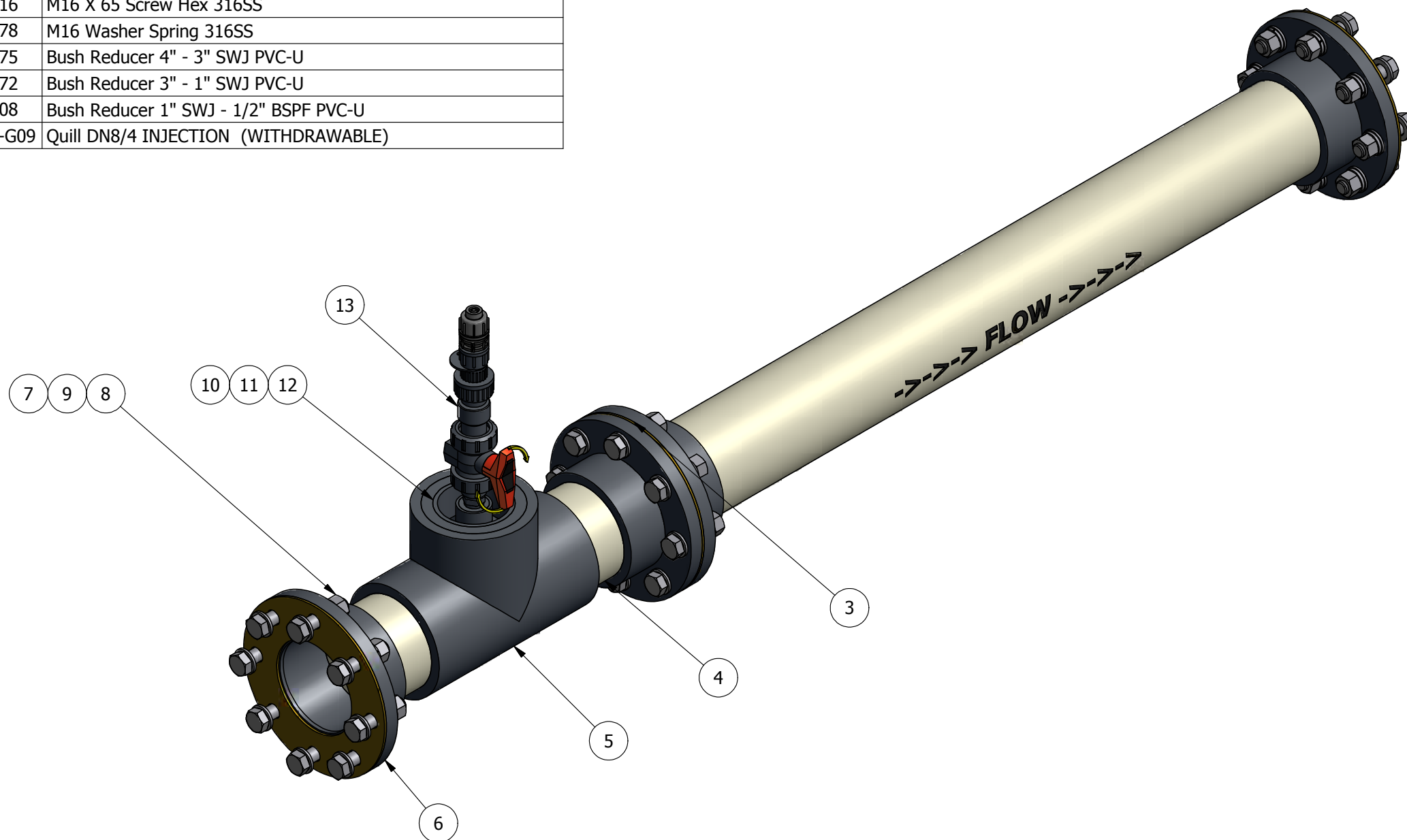
ASSET/PROJECT

REGIONAL LAGOONS
SEWAGE TREATMENT
PLANTS ENHANCEMENT

DRAWING TITLE

KALBAR CO2
pH MONITOR PANEL GA

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.

GRUNDFOS

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

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QUEENSLAND URBAN UTILITIES DELEGATE
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QUEENSLAND
UrbanUtilities

SHEET No. 1 OF 3

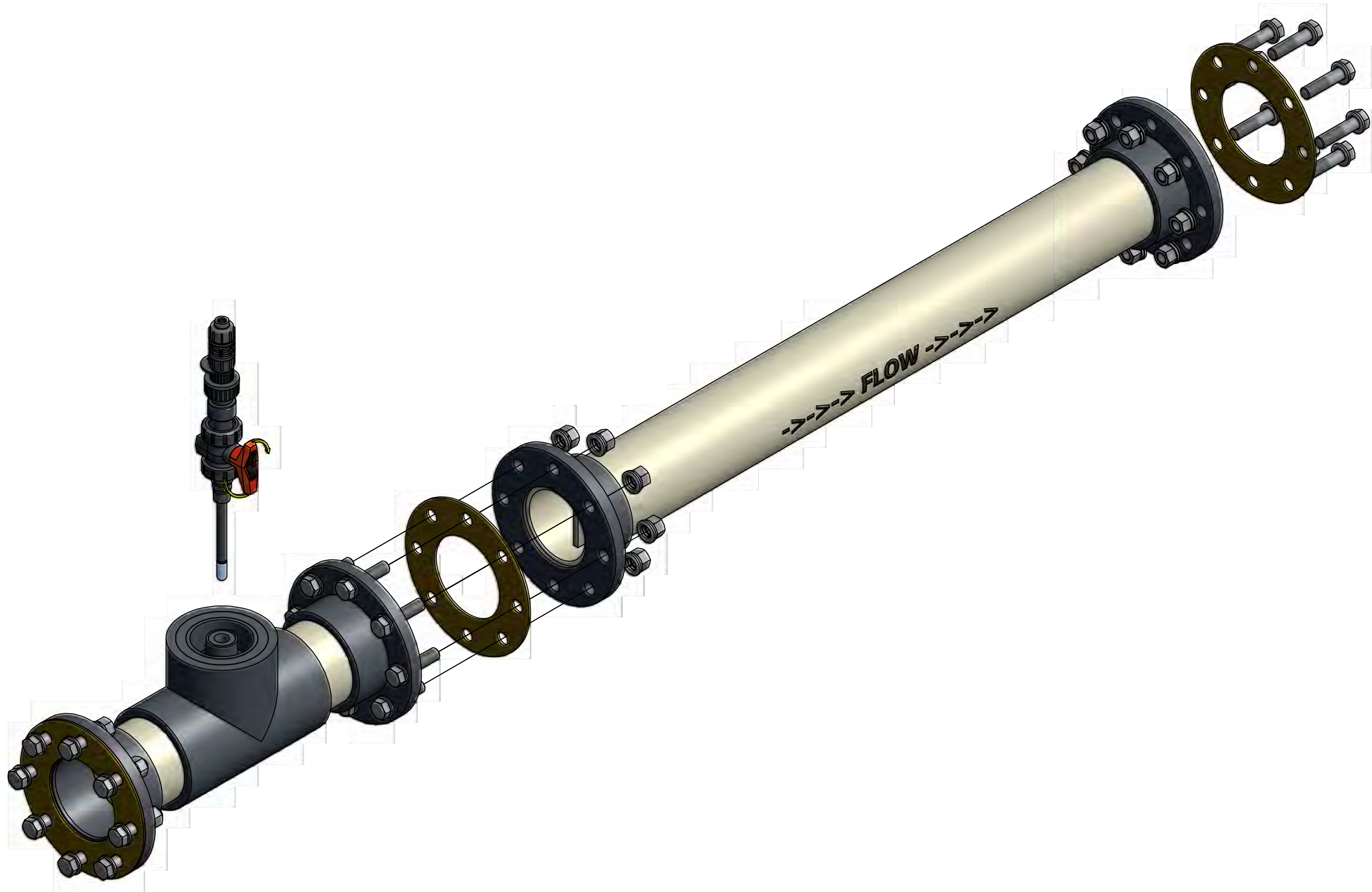
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486/5/5-0107-263

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DESIGN W.O. No.		DRAFTING CHECK	SB	DESIGN		DESIGN		DATE		REGIONAL LAGOONS		KALBAR CO2	
CONSTRUCTION W.O. No.		CAD FILE	550107263	SHAUN BELLAMY	18/06/2013	JASON JOHNSON		DATE		SEWAGE TREATMENT		4" STATIC MIXER GA	
FUNDED BY Q.U.U. (✓) EXTERNAL ()		Q.U.U. FILE No.		DESIGN CHECK		APPROVED BY		SIGNATURE		PLANTS ENHANCEMENT			

As Constructed



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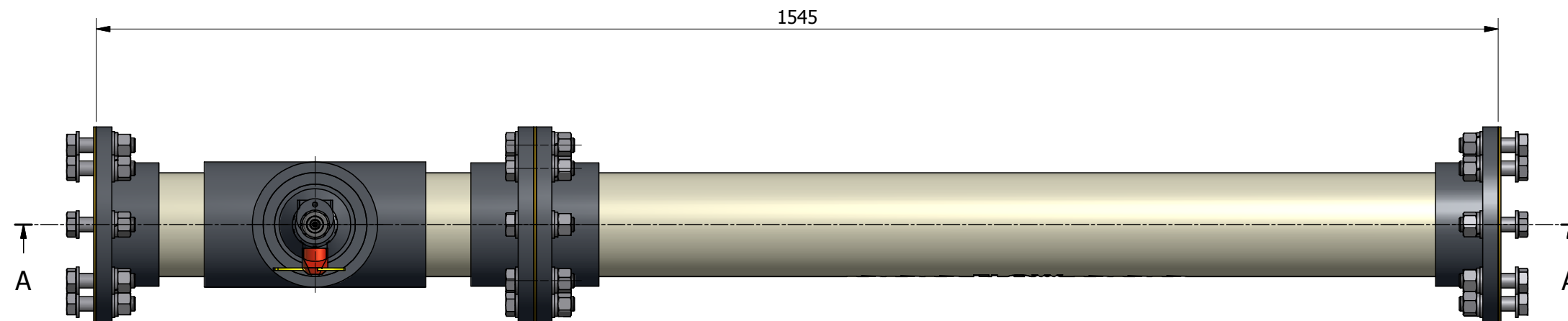
GRUNDFOS PUMPS PTY LTD
32 BLANCK STREET
ORMEAU, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740

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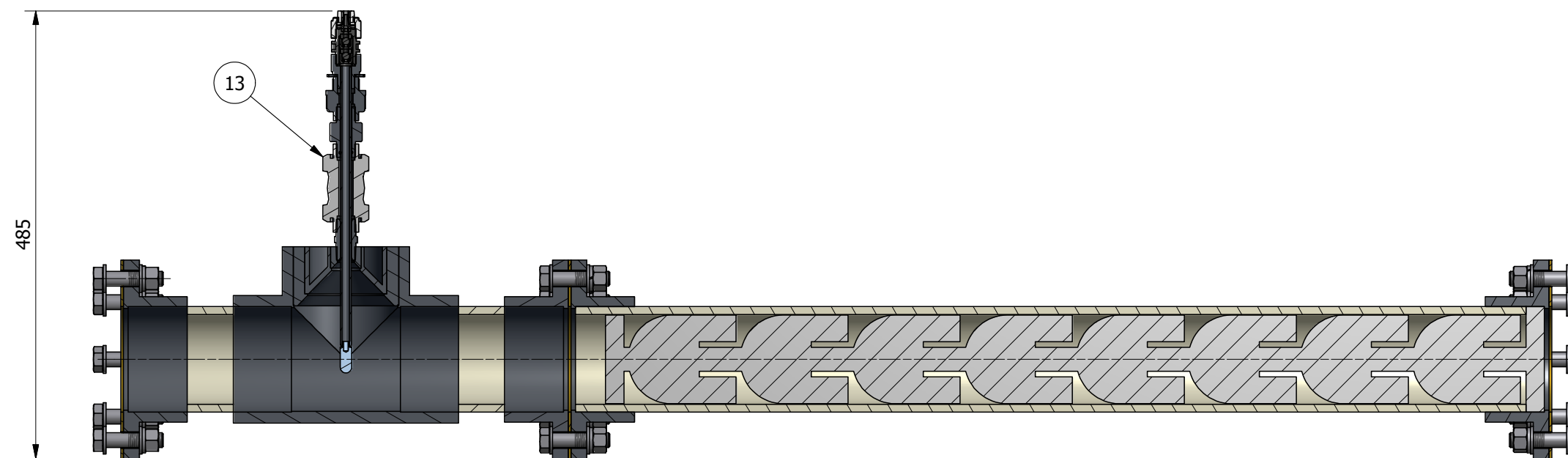


SHEET No. 2 OF 3
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486/5/5-0107-264 A

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				CONSTRUCTION W.O. No.		CAD FILE	550107264	SHAUN BELLAMY	18/06/2013	SEWAGE TREATMENT	4" STATIC MIXER GA
				FUNDED BY Q.U.U. (✓)	EXTERNAL ()	Q.U.U. FILE No.		DESIGN CHECK	DATE	PLANTS ENHANCEMENT	
No.	DATE	AMENDMENT		DRAFTED	DESIGNED	RPEQ NO.	APPROVED	APPROVED BY	SIGNATURE		

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TOP VIEW



SECTION A-A

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SHEET No. 3 OF 3

QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.

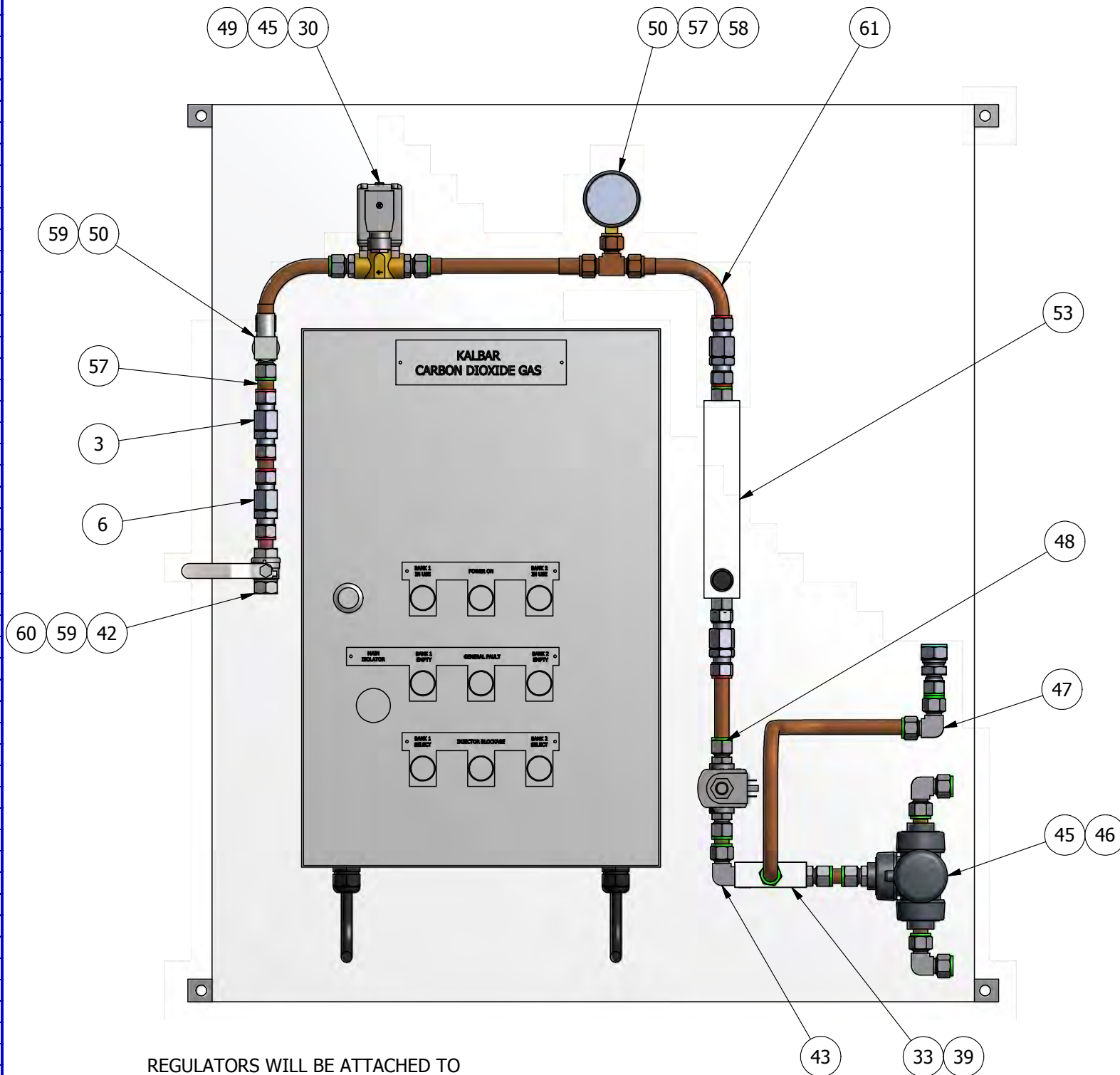
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				CONSTRUCTION W.O. No.		CAD FILE	550107265	SHAUN BELLAMY		18/06/2013					
No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED	FUNDED BY Q.U.U. (✓)	EXTERNAL ()	Q.U.U. FILE No.	DATE	APPROVED BY	SIGNATURE			

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

NOTES:

1. QUANTITY: 1 OFF REQUIRED.
2. FRAME MATERIAL: SHS 38x1.6 THK, SS316 U.N.O.
3. SEALS: VITON.



REGULATORS WILL BE ATTACHED TO THE WALL MOUNTED MANIFOLDS

As Constructed**GRUNDFOS**

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

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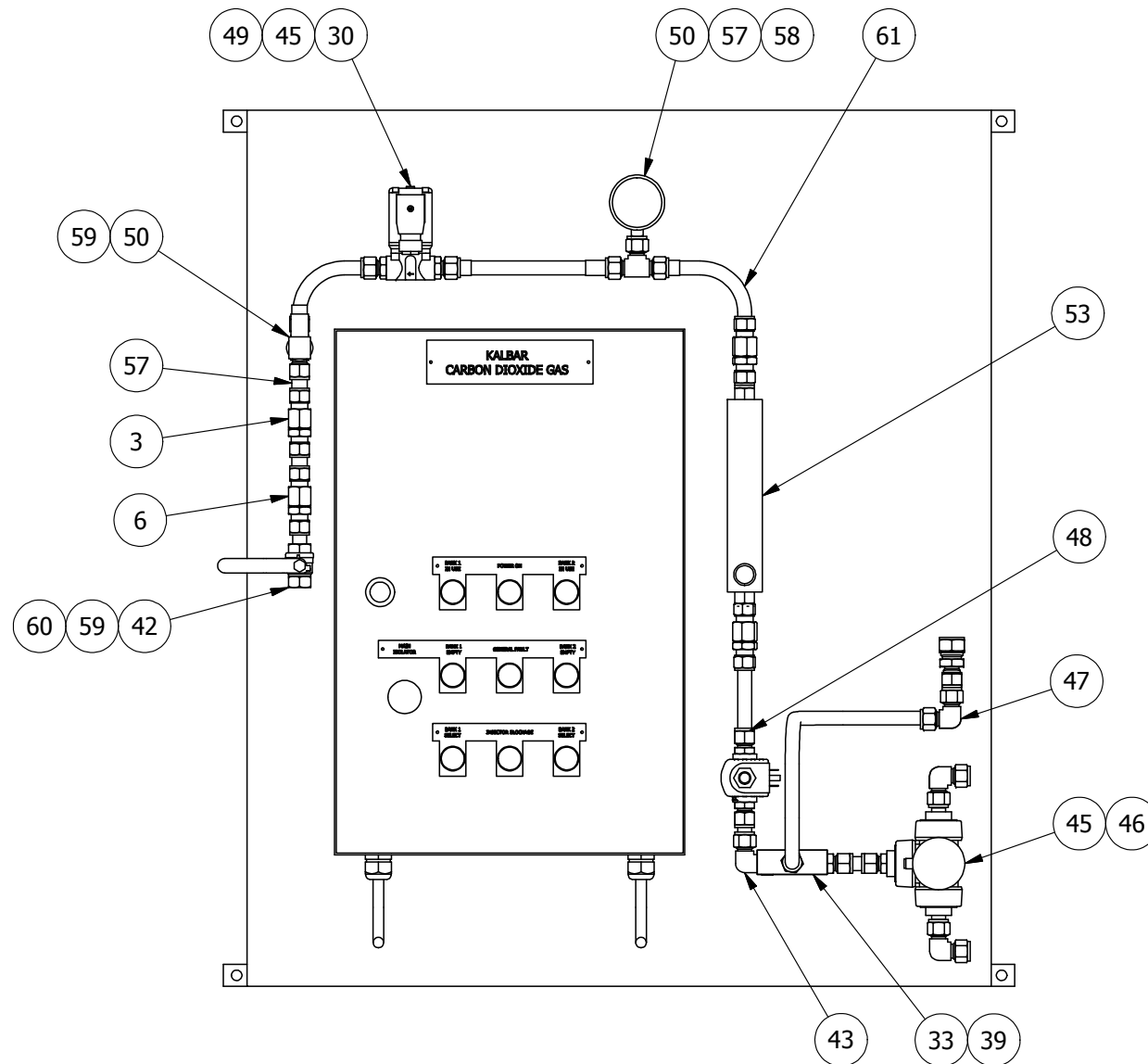
UrbanUtilities

SHEET No. 1 OF 2
QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.
486/5/5-0107-266 A

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DESIGN W.O. No.				DRAFTING CHECK	SB			DESIGN				REGIONAL LAGOONS		KALBAR CO2	
CONSTRUCTION W.O. No.				CAD FILE	550107266			SHAUN BELLAMY	18/06/2013	JASON JOHNSON		SEWAGE TREATMENT		GAS CONTROL PANEL GA	
FUNDED BY Q.U.U. (✓) EXTERNAL ()				Q.U.U. FILE No.				DESIGN CHECK				PLANTS ENHANCEMENT			
No.	DATE	AMENDMENT		DRAFTED	DESIGNED	REPO NO.	APPROVED								

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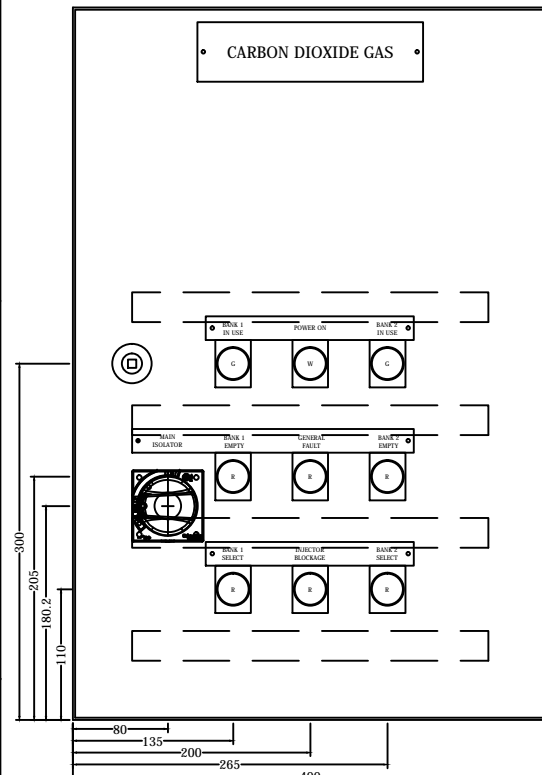
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5	4076263	CO2 SEAL RETAINER	1	18	18
6	WZ254	NRV SPRING	1	11	11
7	4TD.6	HP HOSE 600	1	9	9
8	D47IN2	CO2 INLET STEM	1	18	18
9	66592M0	CO2 NUT	1	18	18
10	T30HWP	CO2 PLASTIC H/W	1	9	9
11	235713-2	MOUNTING BLOCK	1	8	8
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**GRUNDFOS**GRUNDFOS PUMPS PTY LTD
32 BLANK STREET
ORMEAU, 4208
Tel: 07 5540 6700
Fax: 07 5540 6740NAME SIGNATURE DATE
QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

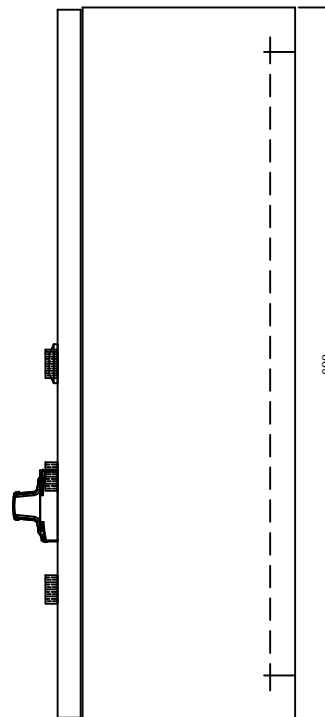
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SHEET No. 2 OF 2
QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.
486/5/5-0107-267 A

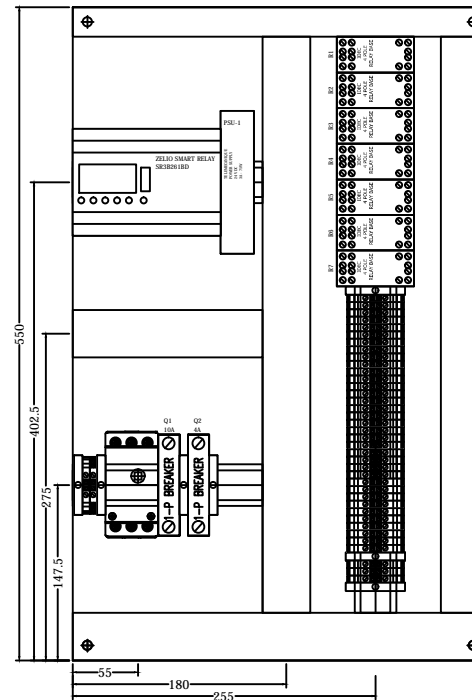
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FUNDED BY Q.U.U. (✓) EXTERNAL ()		CAD FILE		550107267		SHAUN BELLAMY		18/06/2013		SEWAGE TREATMENT		GAS CONTROL PANEL GA	
Q.U.U. FILE No.		DESIGN CHECK		DATE		JASON JOHNSON		APPROVED BY		SIGNATURE			



FRONT VIEW

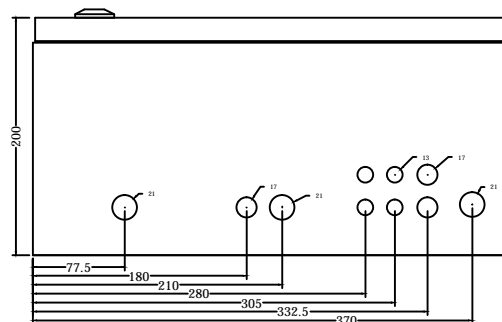


SIDE VIEW

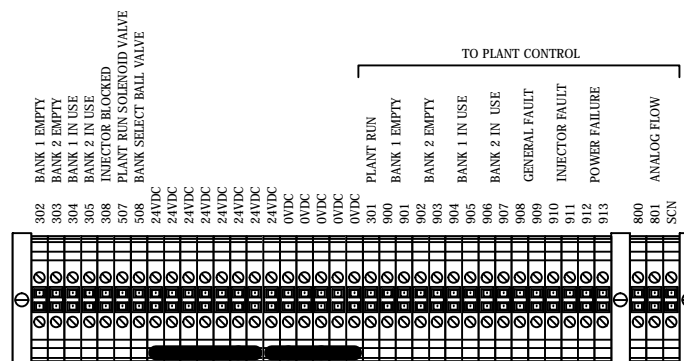


MOUNTING PAN

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
A. PHILPOTChecked by
T. HAEGENSProject Engineer
I. GINNProject Code
0060ADate
19.02.13

NTS

GRUNDFOS

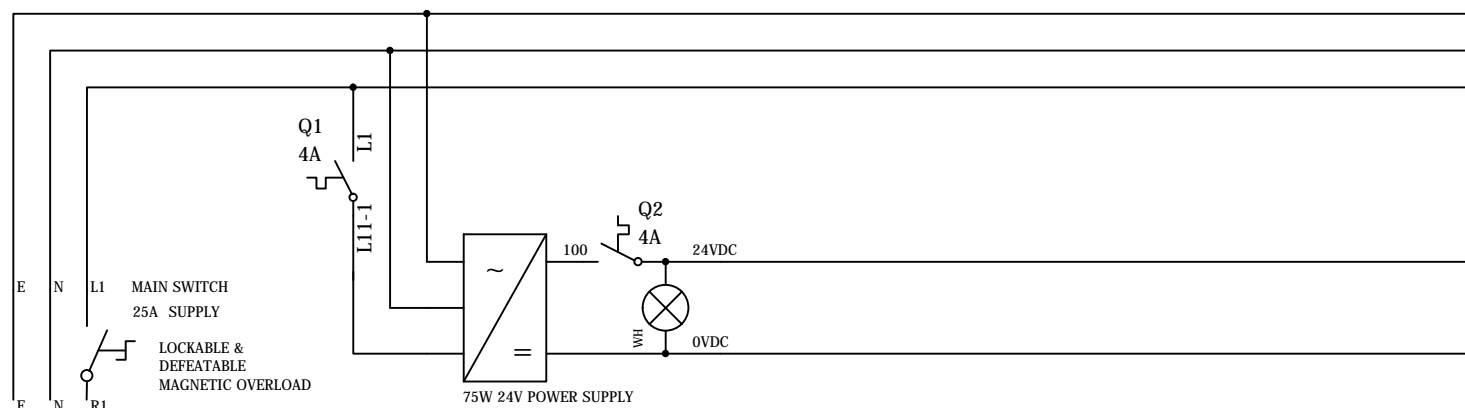
30 Blanck St Ormeau
QLD 4208
Ph: 07 5540 6700
Fax: 07 5540 6740

KALBAR
CARBON DIOXIDE GAS DOSING SYSTEM
GENERAL ARRANGEMENT

486/5/5-0108-150

Edition
C

Sheet
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
C	AS BUILT	20.05.13	AP	IG

 Designed by
A. PHILPOT

 Checked by
T. HAEGENS

 Project Engineer
I. GINN

 Project Code
0060A

 Date
19.02.13

NTS

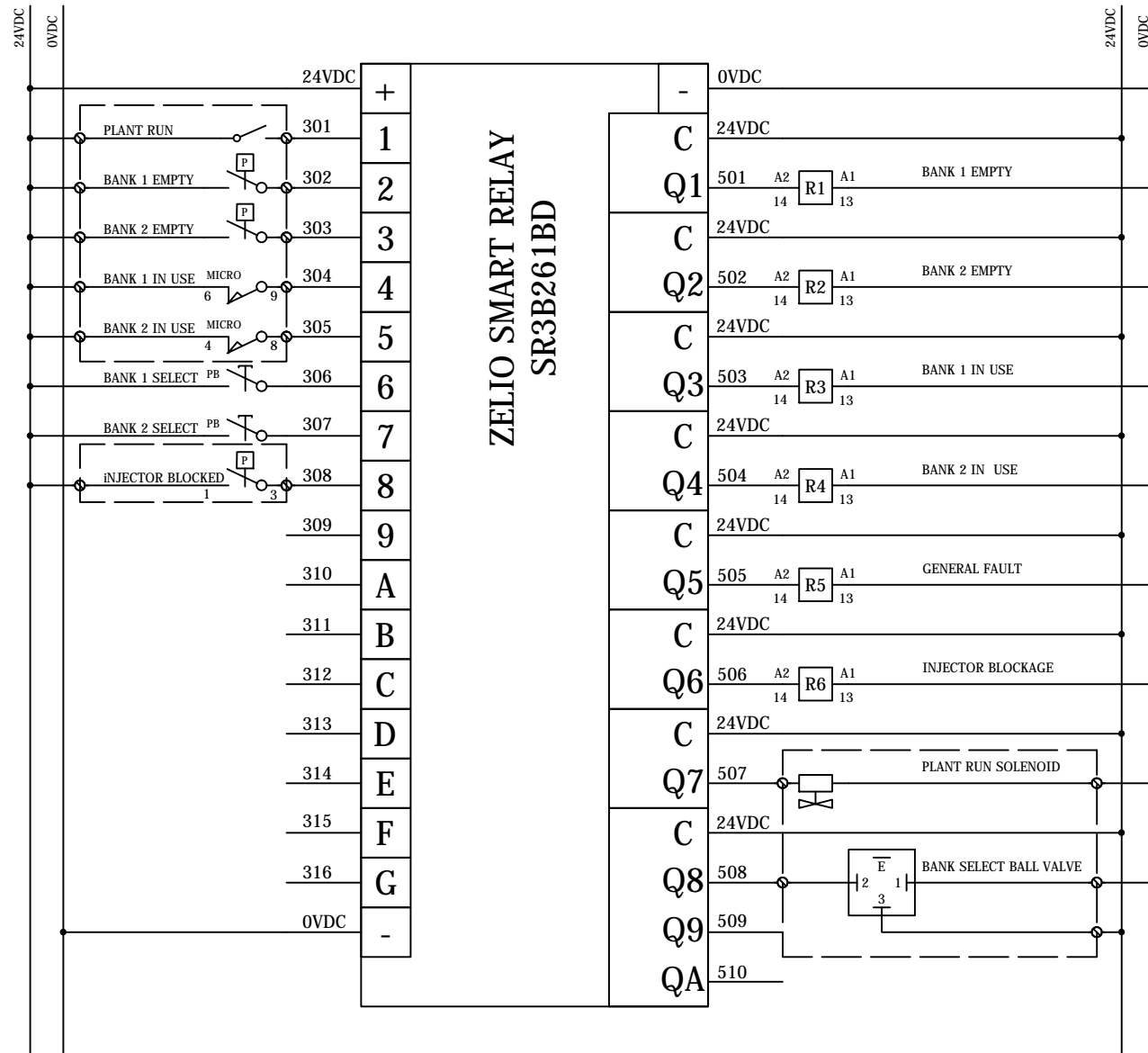
GRUNDFOS

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

**KALBAR
CARBON DIOXIDE GAS DOSING SYSTEM
ELECTRICAL SCHEMATIC**

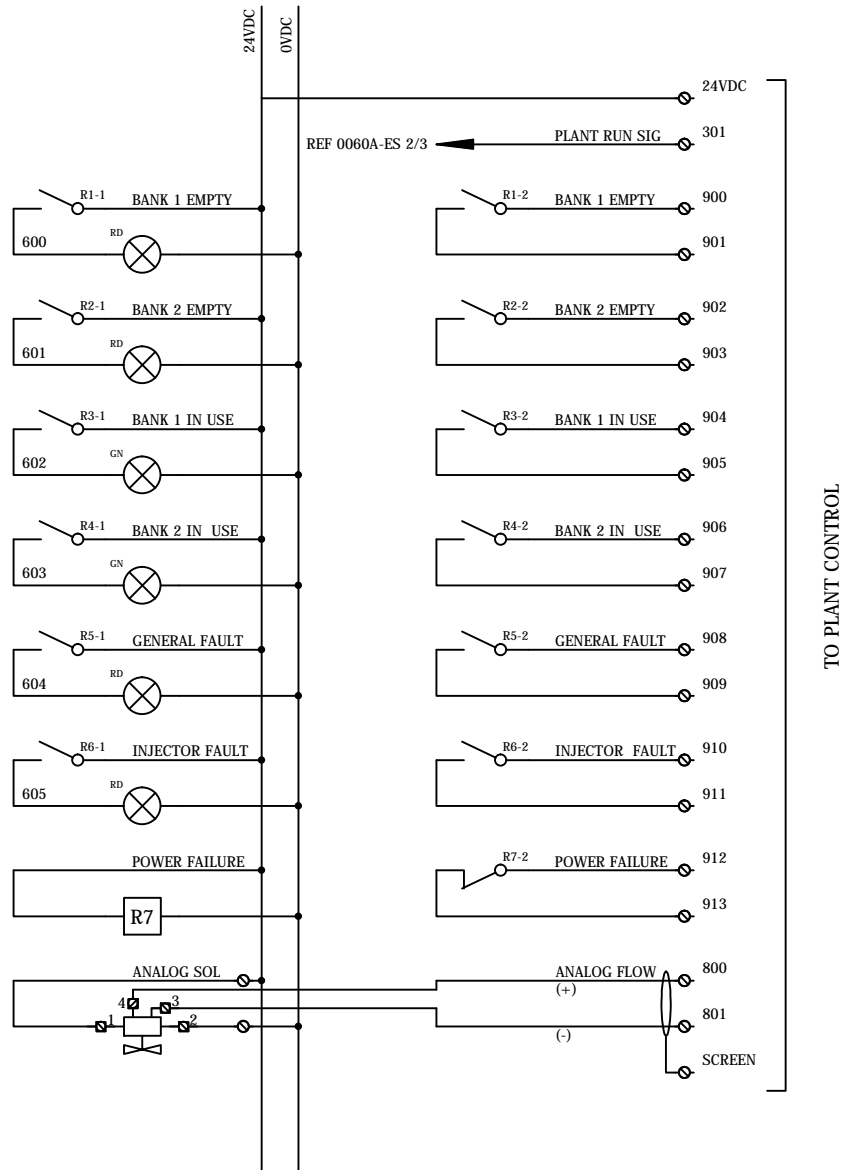
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**AS BUILT**

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B	ISSUE FOR CONSTRUCTION	12.03.13	AP	IG
C	AS BUILT	20.05.13	AP	IG

Designed by A. PHILPOT	Checked by T. HAEGENS	Project Engineer I. GINN	Project Code 0060A	Date 19.02.13	NTS
GRUNDFOS 30 Blanck St Ormeau QLD 4208 Ph: 07 5540 6700 Fax: 07 5540 6740			KALBAR CARBON DIOXIDE GAS DOSING SYSTEM ELECTRICAL SCHEMATIC 486/5/5-0108-152		
			Edition C	Sheet 2/3	


AS BUILT

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B	ISSUE FOR CONSTRUCTION	12.03.13	AP	IG
C	AS BUILT	20.05.13	AP	IG

Designed by A. PHILPOT	Checked by T. HAEGENS	Project Engineer I. GINN	Project Code 0060A	Date 19.02.13	NTS
GRUNDFOS 30 Blanck St Ormeau QLD 4208 Ph: 07 5540 6700 Fax: 07 5540 6740			KALBAR CARBON DIOXIDE GAS DOSING SYSTEM ELECTRICAL SCHEMATIC 486/5/5-0108-153		
			Edition C	Sheet 3/3	

Documents

Asset Register

Linked Documents

 [Grundfos Asset Rev 01 \(3\).xlsx](#)

CO2 Troubleshooting Flow Chart

CO2 Troubleshooting Flow Chart

Linked Documents

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

Burkert Valves and Controller

Linked Documents

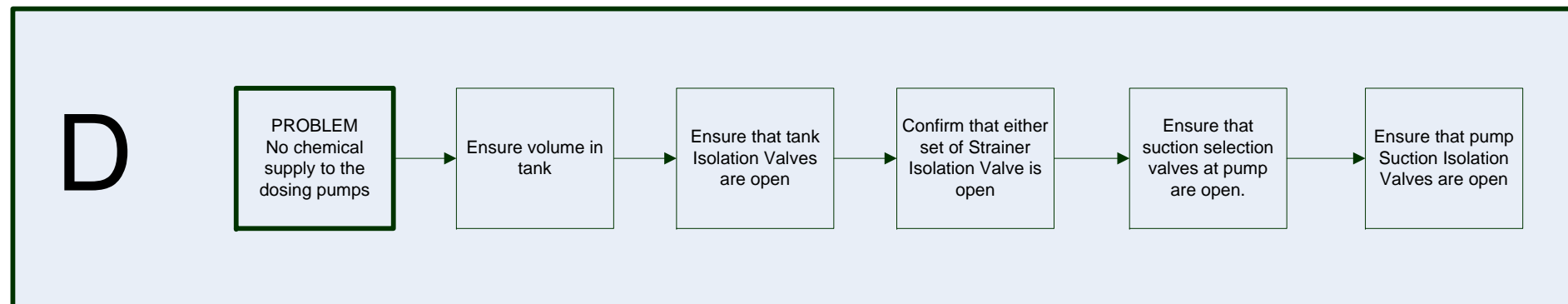
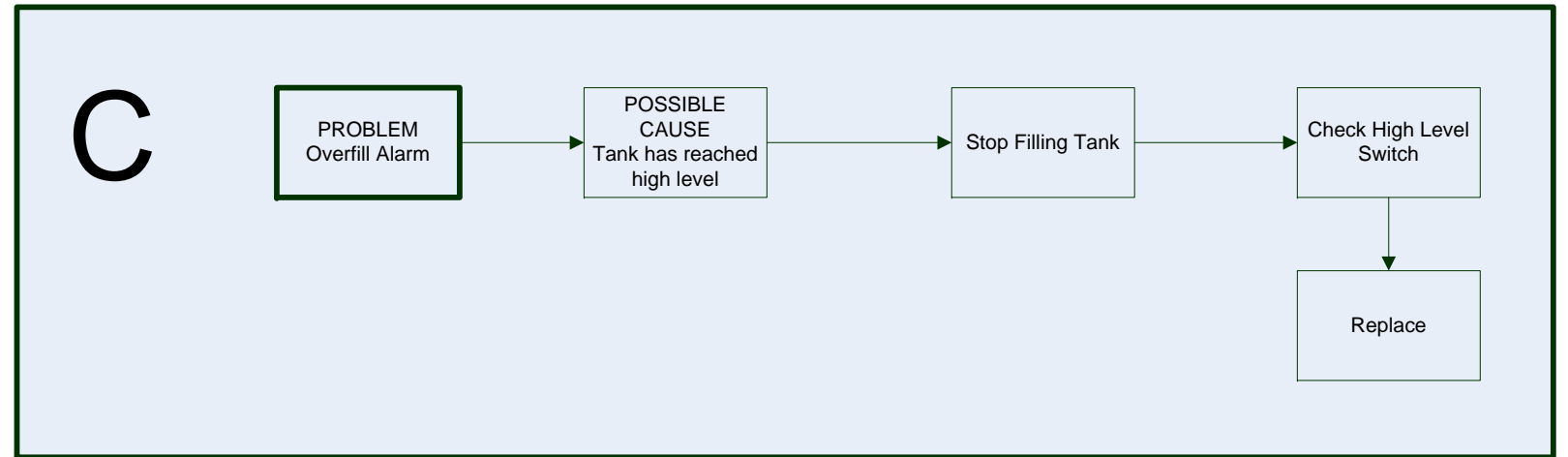
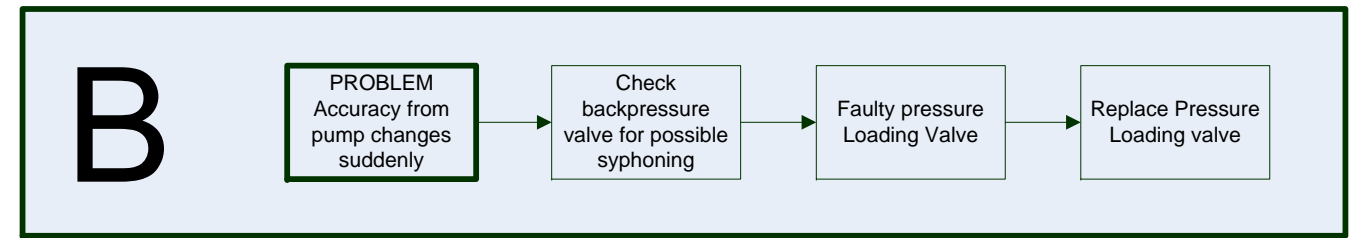
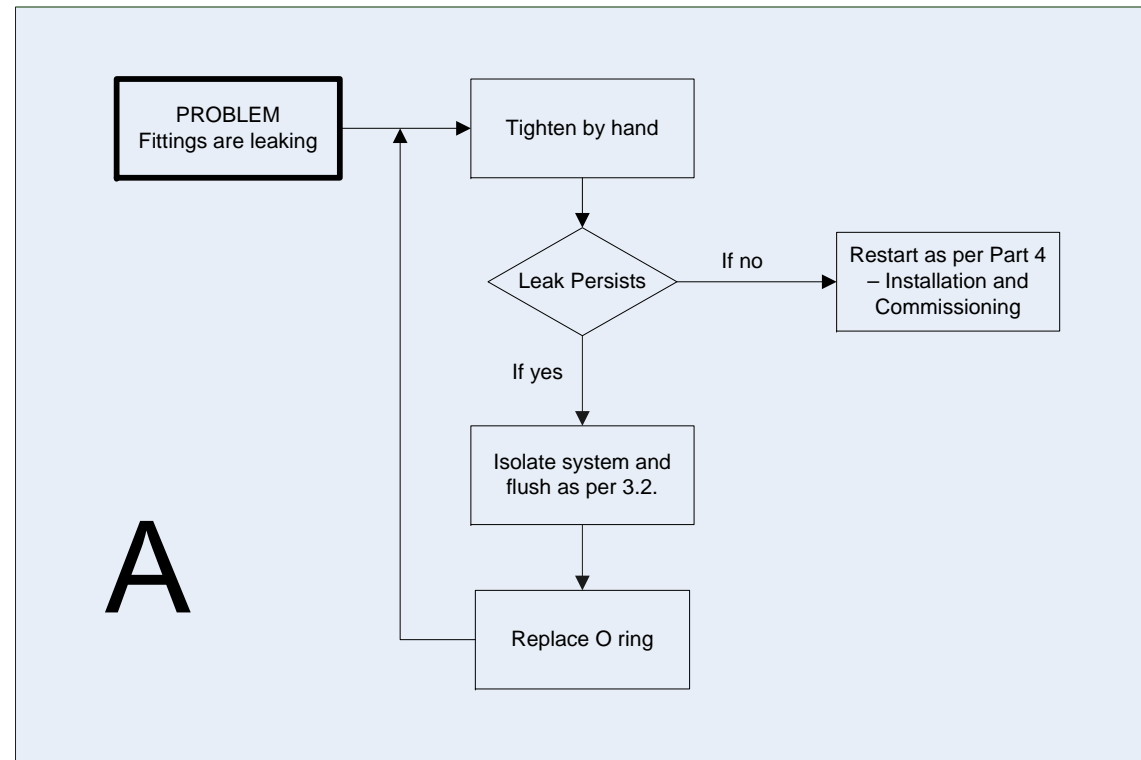
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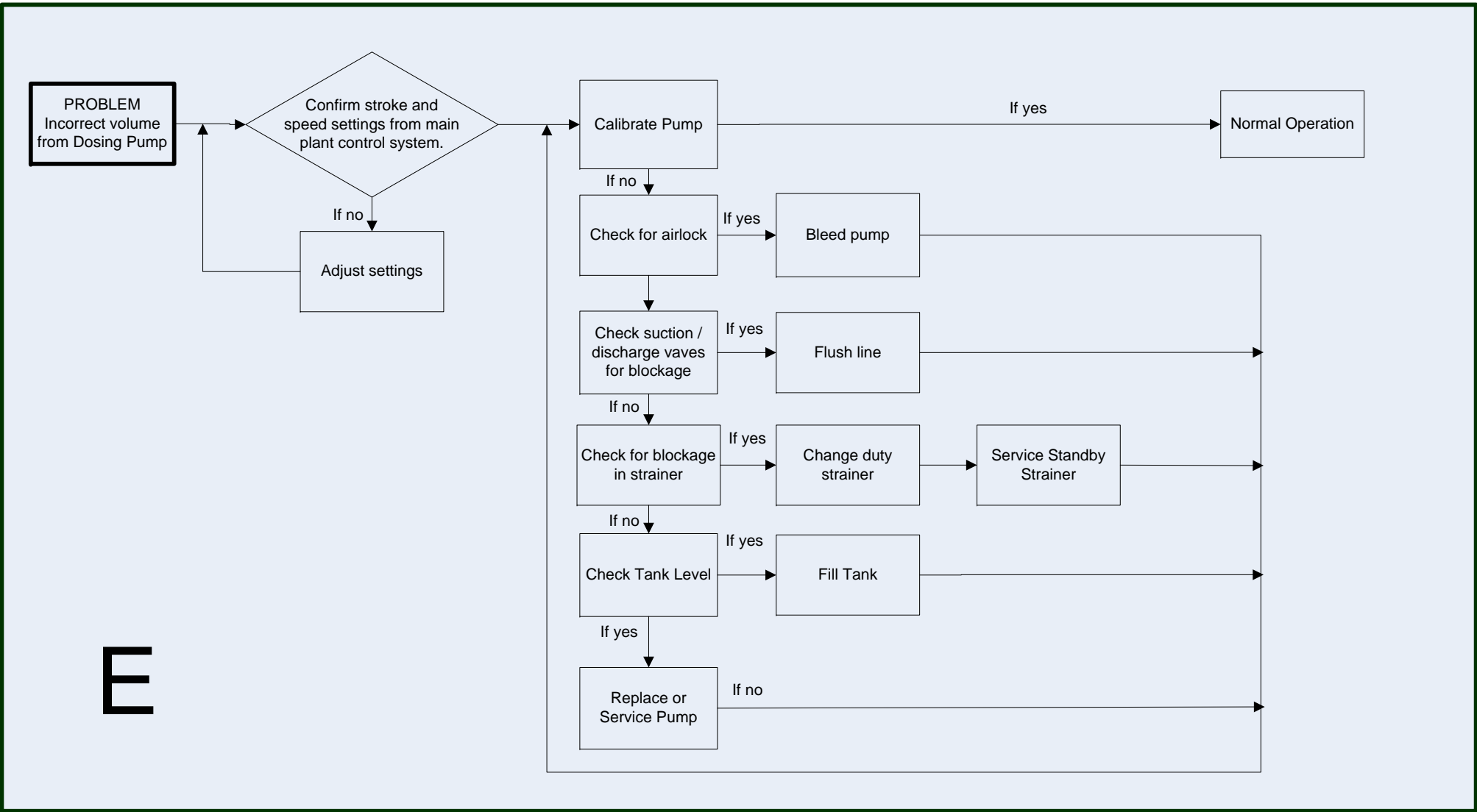
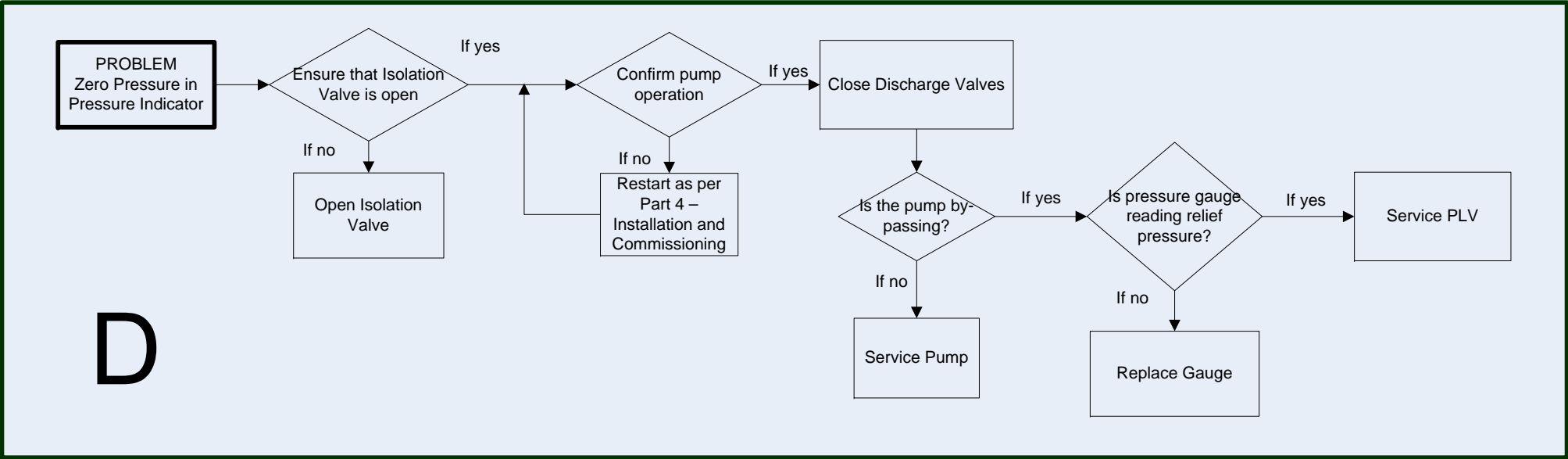
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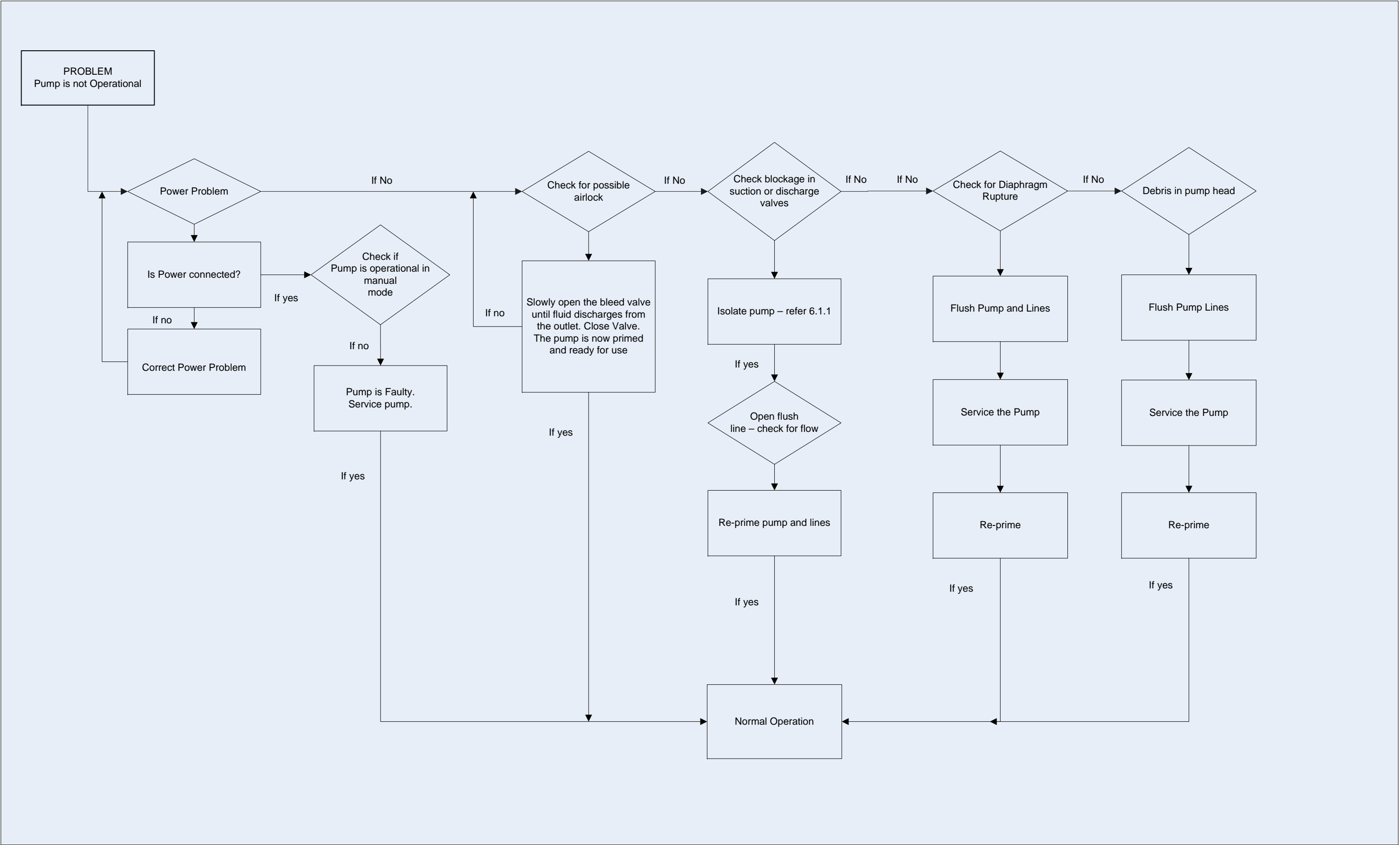
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Troubleshooting Flowchart





Common Faults and Symptoms



2656, 3-Way

3/2-way ball valve with electric quarter turn actuator, ball valve in stainless steel

- Suitable for aggressive media
- High flow rate value
- Actuator with adjustable limit switches
- Visual position indicator
- Multiport versions on request

Type 2656 can be combined with...



Type 2655

Pneumatically actuated ball valve



Type 8326

Pressure transmitter



Type 8644

AirLINE electro-pneumatic valve bank

The electric ball valve Type 2656 consists of an electrical quarter turn actuator and a 2/2-way or 3/2-way ball valve made of stainless steel. This datasheet refers to the 3/2 way version with threaded ports. Weld, flanged and other port types are also available.

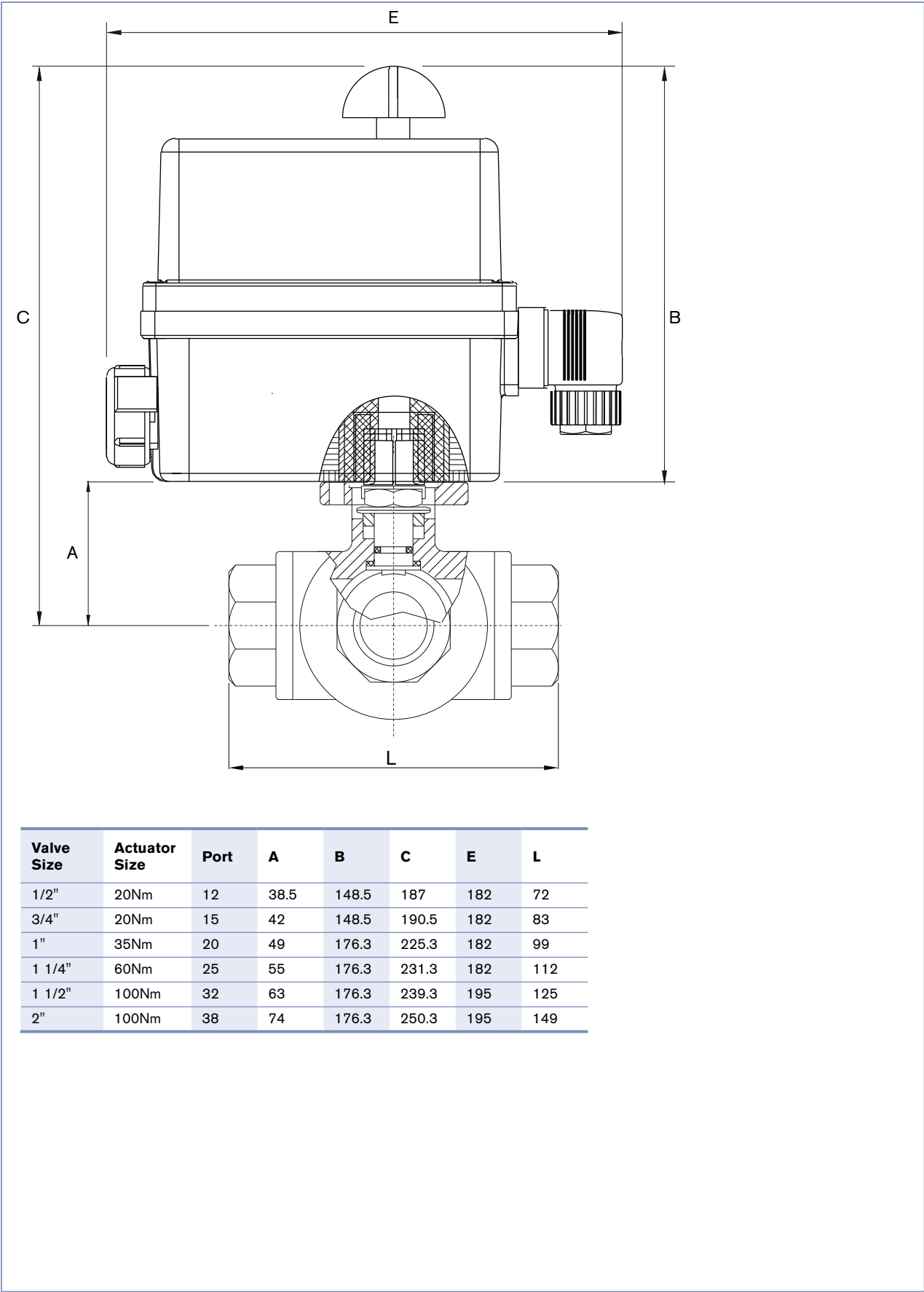
The quarter turn actuator is compactly built for various power options. One unit suits all quarter turn style valves. Alternatively the heavy duty Type 3005 electric actuator, for high torque and industrial applications, may be used. Contact Bürkert for more information.

Technical data	
Body material	Stainless steel 1.4408
Seal material	PTFE
Medium	Gaseous and liquid media, which do not attack the housing and sealing materials
Medium temperature	-10 to +180°C (see valve pressure chart)
Ambient temperature	-10 to +55°C
Port connection	Threaded ports BSP Weld and flanged ported versions available
Operating pressure	0-70 bar
Connection between actuator and ball valve	Flange acc. to ISO 5211
Operating voltage	24 V AC/DC, 100-240 V AC / 50-60 Hz (Other voltages on request)
Voltage tolerance	DC: +/-20%; AC: +/-10%
Duty rating	At max. torque: 50% of the time
Electrical connection	2 cable glands ISO M20 (cable plug EN175301-803 on request)
Protection class	IP65
Rotation angle	90° (+/-5°)
Limit switches	4 adjustable - (2 for motor and 2 additional for feedback) max. 230 V / 5A
Elec. actuator material	Cover: ABS Body: PA Axis/Screws: Stainless steel gearbox: Steel, PC
Installation	Don't mount the actuator upside down

Applications

- Universal application
- Water treatment
- Food & beverage
- General manufacturing

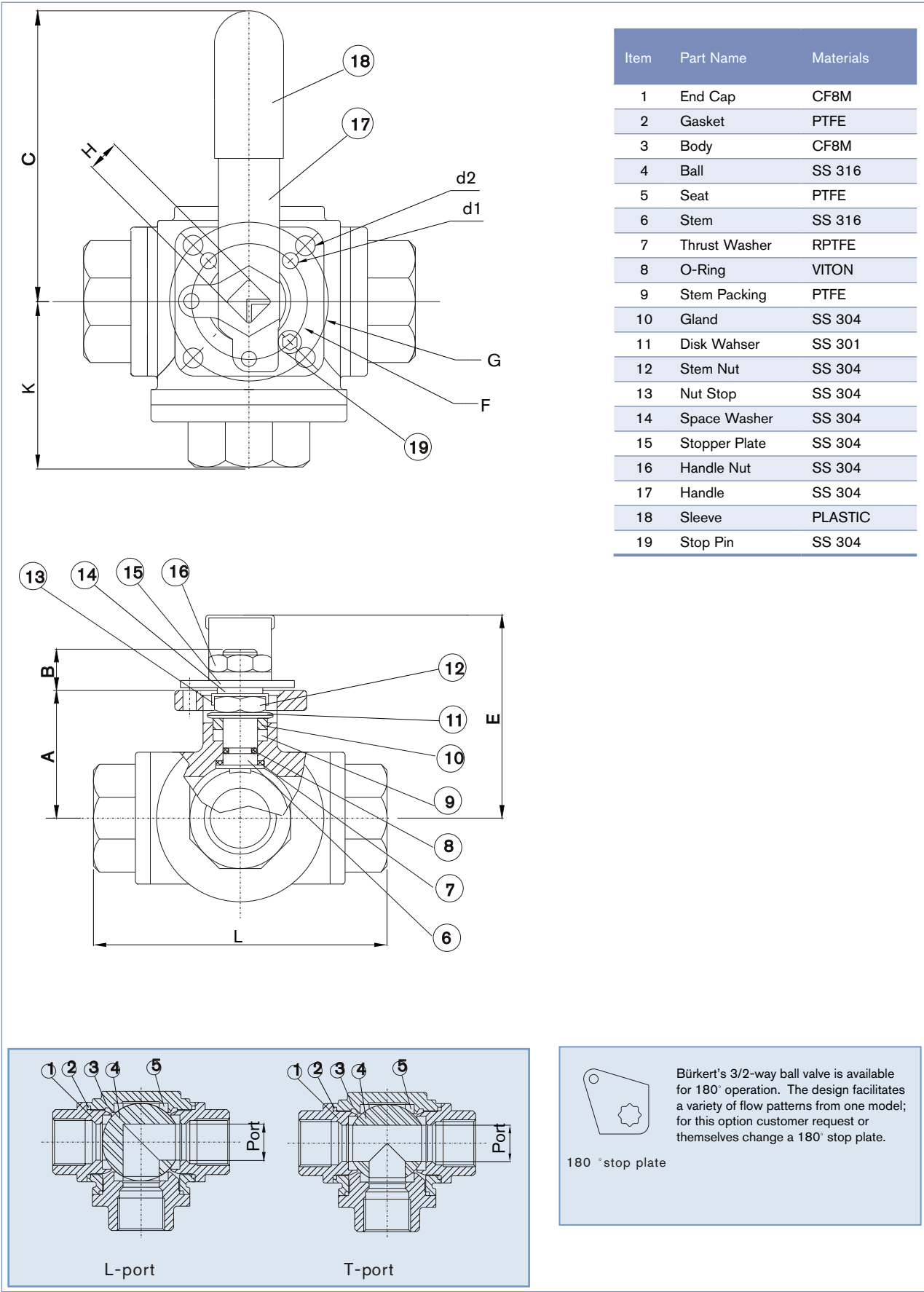
Valve dimensions [mm]



2656, 3-Way



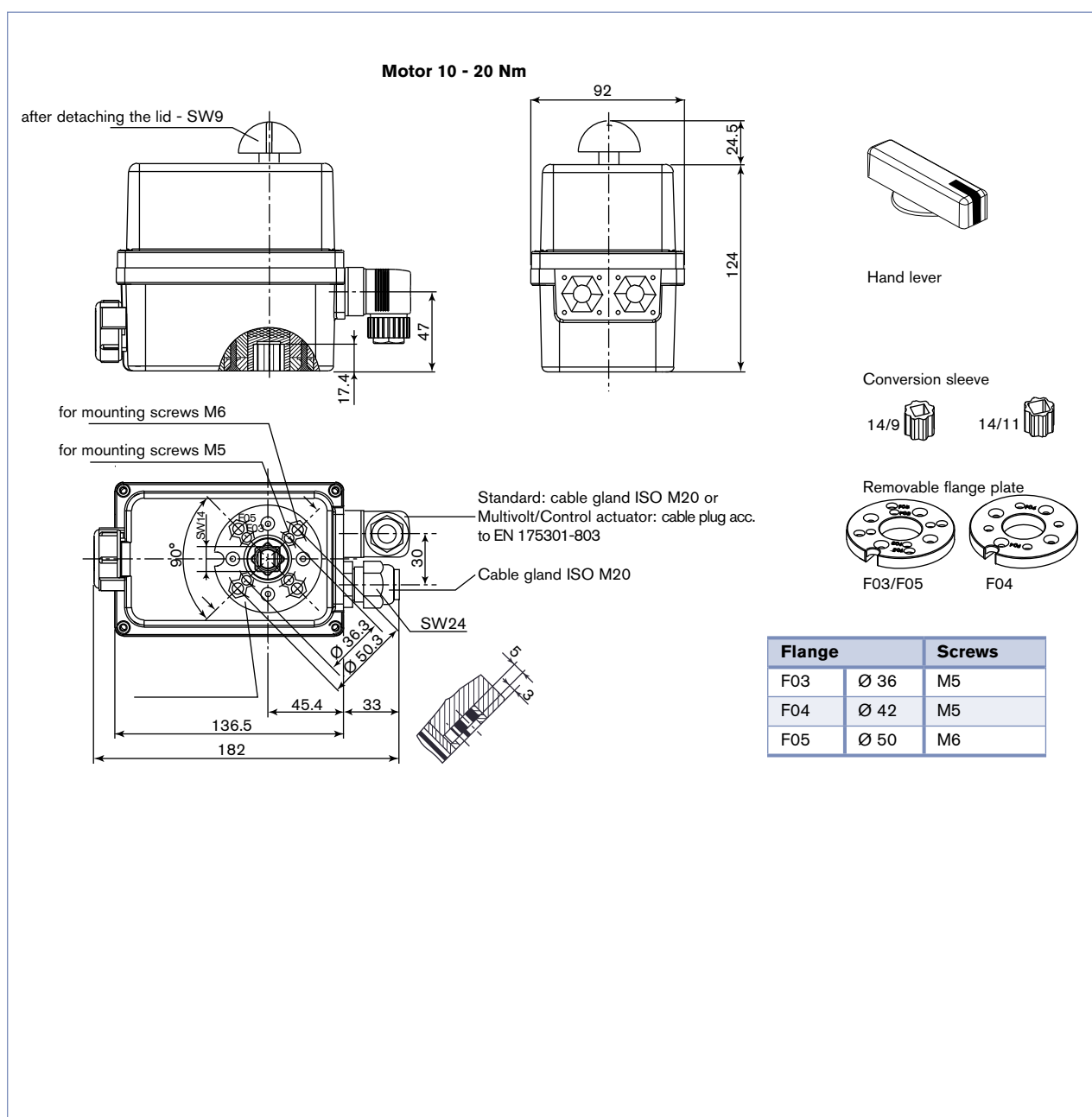
Valve dimensions [mm], continued (valve body detail)

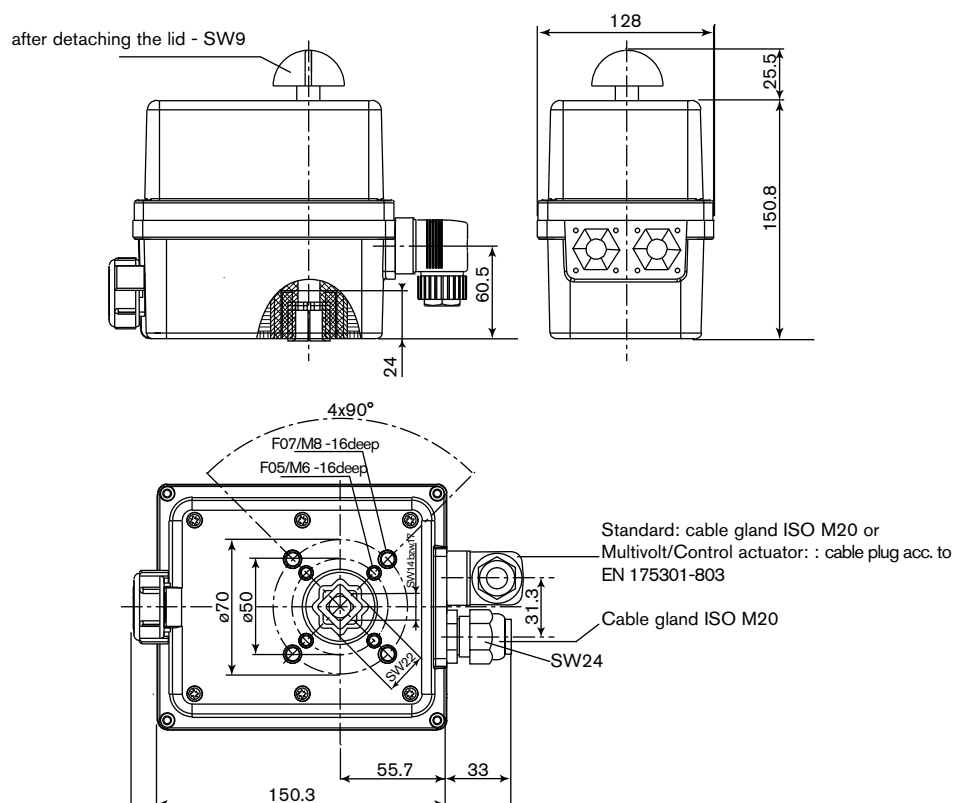


Valve dimensions [mm], continued (valve body detail)

Full Port	Std. Port	A	B	C	d1	d2	E	F	G	H	K	L	Port	Full Wt [Kg]	Std Wt [Kg]
1/4"	-	37.5	11	130	6	6	62	36	42	9	36	72	11	0.66	0.66
3/8"	1/2"	38.5	11	130	6	6	62	36	42	9	36	72	12	0.66	0.66
1/2"	3/4"	42	11	130	6	6	64	36	42	9	41.5	83	15	0.86	0.66
3/4"	1"	49	14	165	6	7.1	82	42	50	11	49.5	99	20	1.48	0.86
1"	1 1/4"	55	14	165	6	7.1	89	42	50	11	56	112	25	2.22	1.52
1 1/4"	1 1/2"	63	18	205	7.1	9.2	98	50	70	14	62.5	125	32	3.22	2.18
1 1/2"	2"	74	18	205	7.1	9.2	108	50	70	14	74.5	149	38	5.36	3.38
2"	-	93	22	325	9.2	11.4	140	70	102	17	87	174	50	9.7	5.26

Valve dimensions, continued (actuator detail)



2656, 3-Way**bürkert****Valve dimensions, continued (actuator detail)****Motor 35 - 60 - 100 Nm**

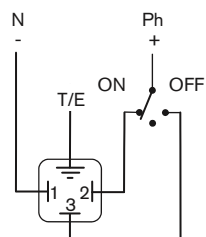
Electrical connection

Switch drawings

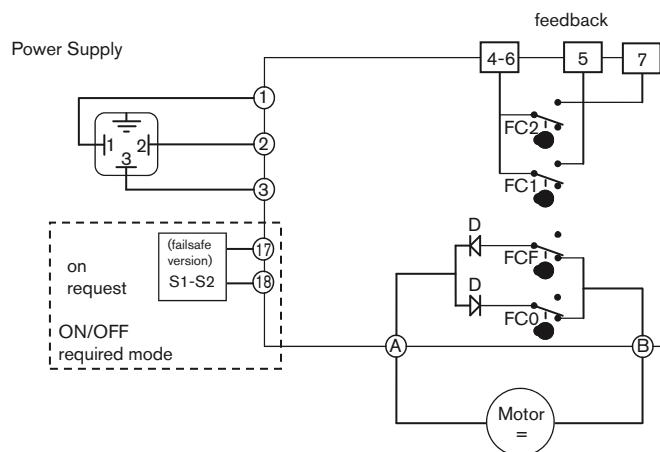
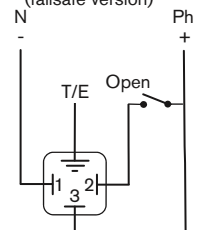
100-240 V AC/50-60 Hz multi-volt version

Recommended Wiring

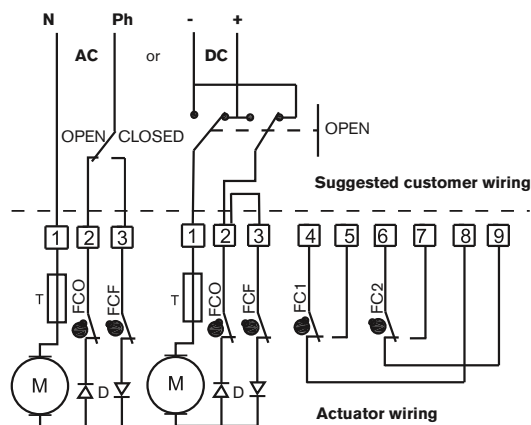
3- point mode



ON -OFF Mode (failsafe version)





24 V AC/DC standard version





Symbol	Description
FCO	Open limit switch
FCF	Close limit switch
FC1	Auxiliary 1 limit switch
FC2	Auxiliary 1 limit switch
M	Motor
T	Thermal fuse

Symbol	Description
D	Diode
C	Capacitor
P	Potentiometer
H	Heating resistor
J7	Heating resistor connection
J8	Potentiometer connector

2656, 3-Way**bürkert****Ordering chart****3/2-way stainless steel ball valve with on/off Type 3003 actuator & L port configuration**

	Valve function	Orifice Diameter [mm]	Port connection Ø	Pressure [bar]	Power supply	Body material	Seal material	ID No. [on/off control]
	3/2 Way L Port	12	1/2"	70 bar	24V DC	SS-316	PTFE	AU33046
		12	1/2"	70 bar	240V AC	SS-316	PTFE	AU33047
		15	3/4"	70 bar	24V DC	SS-316	PTFE	AU33051
		15	3/4"	70 bar	240V AC	SS-316	PTFE	AU33052
		20	1"	70 bar	24V DC	SS-316	PTFE	AU33055
		20	1"	70 bar	240V AC	SS-316	PTFE	AU33057
		25	1 1/4"	70 bar	24V DC	SS-316	PTFE	AU33060
		25	1 1/4"	70 bar	240V AC	SS-316	PTFE	AU33062
		32	1 1/2"	70 bar	24V DC	SS-316	PTFE	AU33065
		32	1 1/2"	70 bar	240V AC	SS-316	PTFE	AU33067
		40	2"	70 bar	240V AC	SS-316	PTFE	AU33070
		40	2"	70 bar	24V DC	SS-316	PTFE	AU33071

3/2-way stainless steel ball valve with on/off Type 3003 actuator & T port configuration

	Valve function	Orifice Diameter [mm]	Port connection Ø	Pressure [bar]	Power supply	Body material	Seal material	ID No. [on/off control]
	3/2 Way T Port	12	1/2"	70 bar	24V DC	SS-316	PTFE	AU33075
		12	1/2"	70 bar	240V AC	SS-316	PTFE	AU33076
		15	3/4"	70 bar	24V DC	SS-316	PTFE	AU33079
		15	3/4"	70 bar	240V AC	SS-316	PTFE	AU33080
		20	1"	70 bar	24V DC	SS-316	PTFE	AU33083
		20	1"	70 bar	240V AC	SS-316	PTFE	AU33085
		25	1 1/4"	70 bar	24V DC	SS-316	PTFE	AU33088
		25	1 1/4"	70 bar	240V AC	SS-316	PTFE	AU33090
		32	1 1/2"	70 bar	24V DC	SS-316	PTFE	AU33093
		32	1 1/2"	70 bar	240V AC	SS-316	PTFE	AU33095
		40	2"	70 bar	240V AC	SS-316	PTFE	AU33098
		40	2"	70 bar	24V DC	SS-316	PTFE	AU33099

i Further versions on request **Port Connection** **Approvals** **Temperature**

Alternative Electric Actuator, Types 3005 & 3004: Heavy Duty & High Torque



Bürkert's Type 3005 electrical actuator is for heavy duty industrial applications where a higher torque rating or a more rugged IP67 housing is required. The Type 3004 delivers the same heavy duty function, with ATEX and IECEx approvals. The Types 3005 and 3004 come in models with torques 25Nm, 45Nm, 75Nm, 100Nm, 150Nm, 300Nm (plus 600Nm & 1,000 Nm on request).

Similarly to the Type 3003 electrical actuators featured in this datasheet, these heavy duty models offer on/off and modulating control functions, prominent visual position indication and manual override standard. Note that models 25Nm – 75Nm have a gear disengage manual override, while larger torque models come with a hand wheel manual override.

Contact Bürkert on 1300 888 868 (Aust) or 0800 BURKERT (NZ) for more information on Type 3005 and 3004 heavy duty electrical actuators for quarter turn valves.

In case of special application conditions, please consult for advice.

We reserve the right to make technical changes without notice.
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201009_AU-en_2656_3way

2875

bürkert
 FLUID CONTROL SYSTEMS


2/2-Way Solenoid Control Valve

- Excellent range (1:200)
- Very good response
- Compact valve design
- Orifice sizes 2 ... 8 mm
- Port connection 3/8" and 1/2"

Type 2875 can be combined with...



Type 8605

Control Electronics,
Cable plug version



Type 8605

Digital control electronics
DIN-rail version



Type 2508

Cable plug

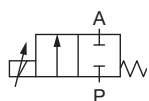


Type 8611

Universal controller

The direct-acting solenoid control valve Type 2875 is used as the regulating unit in control loops. Due to an elastomeric seat seal the valve closes tight (integrated shut-off function), up to the DN specific nominal pressure, see ordering chart on page 3. The plunger of the valve is assembled frictionless, which leads to an extraordinary adjustment characteristic. This valve is particularly suitable for demanding control tasks (high control range, dry gases, etc.).

Circuit function A



direct acting 2-way
solenoid control valve,
normally closed

Valve control takes place through a PWM signal¹⁾. The duty cycle of the PWM signal determines the coil current and hence the position of the plunger. Optionally the valve can also be driven with DC voltage.

Please note the sizing comments for such a control valve on page 2.

¹⁾ PWM pulse width modulation

²⁾ Pressure data [bar]: Measured as overpressure to the atmospheric pressure, orifice further depends on nominal pressure

³⁾ Maximum value, value depends on operating pressure

⁴⁾ Characteristic data of control behaviour depends on process conditions

⁵⁾ by flow measurement

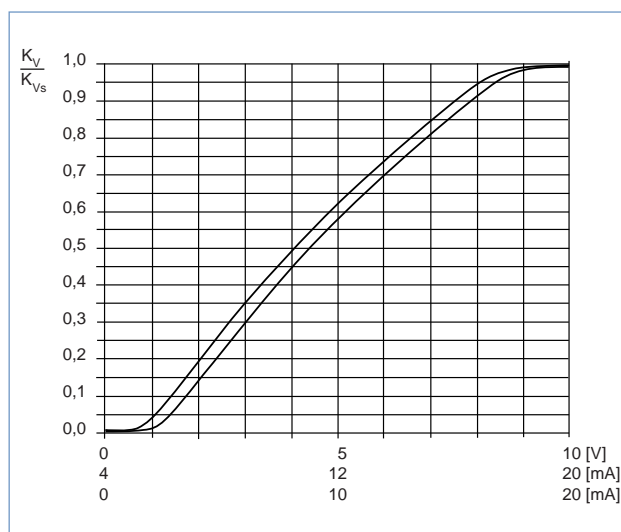
Technical Data - Valve	
Body material	Brass, stainless steel
Seal material	FKM, EPDM on request
Medium	Neutral gases, liquids on request
Pressure range	0 ... 25 bar ²⁾
Medium temperature	-10 ... +90 °C
Ambient temperature	max. +55 °C
Power supply	24 V DC
PWM frequency	900 Hz
Power consumption	16 W
Max. coil current ³⁾	750 mA
Duty cycle	100% continuously rated
Port connection	G 3/8, G 1/2, NPT 3/8, NPT 1/2
Electrical connection	Tag connector (DIN EN 175301-803 Form A)
Installation	As required, preferably with actuator in upright position
Typical control data ⁴⁾ at PWM-Control	
Hysteresis	< 5%
Repeatability	< 0.5% FS ⁵⁾
Sensitivity	< 0.25% FS ⁵⁾
Span	1:200
Response time (10 -90%)	25 ms
Protection class - valve	IP65

The valve control can take place through the control electronics of Type 8605, which converts an analogue input signal into a PWM signal.

Further functional features of the Type 8605 electronic control unit:

- Temperature compensation for coil heating by internal current regulation
- Simple adaptation of zero and span settings
- Ramp function to dampen fast set point changes

Characteristics of a solenoid control valve



Advice for valve sizing

In continuous flow applications, the choice of an appropriate valve size is much more important than with on/off valves. The optimum size should be selected such that the resulting flow in the system is not unnecessarily reduced by the valve. However, a sufficient part of the pressure drop should be taken across the valve even when it is fully opened.

Recommended value: $\Delta p_{\text{valve}} > 25\%$ of total pressure drop within the system

Otherwise, the ideal, linear valve curve characteristic is changed.

If the differential pressure (difference between inlet and outlet pressure) exceeds half the value of the nominal pressure, the characteristics may change.

For that reason take advantage of Bürkert competent engineering services during the planning phase!

Determination of the k_v value

Pressure drop	k_v value for liquids [m ³ /h]	k_v value for gases [m ³ /h]
Subcritical $p_2 > \frac{p_1}{2}$	$= Q \sqrt{\frac{\rho}{1000 \Delta p}}$	$= \frac{Q_N}{514} \sqrt{\frac{T_1 \rho_N}{p_2 \Delta p}}$
Supercritical $p_2 < \frac{p_1}{2}$	$= Q \sqrt{\frac{\rho}{1000 \Delta p}}$	$= \frac{Q_N}{257 p_1} \sqrt{T_1 \rho_N}$

k_v	Flow coefficient	[m ³ /h] ⁶⁾
Q_N	Standard flow rate	[m ³ /h] ⁷⁾
p_1	Inlet pressure	[bar] ⁸⁾
p_2	Outlet pressure	[bar] ⁸⁾
Δp	Differential pressure $p_1 - p_2$	[bar]
ρ	Density	[kg/m ³]
ρ_N	Standard density	[kg/m ³]
T_1	Medium temperature	[(273+t)K]

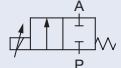
⁶⁾ measured for water, $\Delta p = 1$ bar, over the value

⁷⁾ At reference conditions
1.013 bar and 0°C (273K)

⁸⁾ Absolute pressure

Ordering chart

All valves with FKM seal

Circuit function	Orifice [mm]	Port connection	k_{vs} value water [m ³ /h] ⁹⁾	Q_{N_2} value [l/min] ¹⁰⁾	Nominal pressure ¹¹⁾ [bar]	Max. differential pressure [bar]	Item no. Brass	Item no. Stainless steel
A 2/2-way Normal closed (NC) 	2	G 3/8	0.12	129	25	12.5	236 897	236 899
		NPT 3/8	0.12	129	25	12.5	236 898	236 900
	3	G 3/8	0.25	270	10	5	236 901	263 903
		NPT 3/8	0.25	270	10	5	236 902	236 904
	4	G 3/8	0.45	485	8	4	236 905	236 910
		NPT 3/8	0.45	485	8	4	236 908	236 912
		G 1/2	0.45	485	8	4	236 906	236 911
		NPT 1/2	0.45	485	8	4	236 909	236 913
	6	G 1/2	0.80	862	4	2	236 915	236 919
		NPT 1/2	0.80	862	4	2	236 917	236 921
	8	G 1/2	1.10	1186	2	1	236 922	236 924
		NPT 1/2	1.10	1186	2	1	236 923	236 925

⁹⁾ k_{vs} value: Flow rate value for water, measured at +20 °C and 1 bar pressure differential over a fully opened valve.

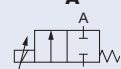
¹⁰⁾ Q_{N_2} value: Flow rate for air with inlet pressure of 6 bar, 1 bar pressure differential and +20 °C.

¹¹⁾ Pressure data [bar]: Overpressure with respect to atmospheric pressure, with a differential pressure (difference between inlet and outlet pressure) above half of the nominal pressure there are discontinuities in the valve's characteristics possible.

Note: Please note that the valves are delivered without control electronics and cable plug (see accessory ordering information).

Ordering chart - variants for higher differential pressure

All valves with FKM seal

Circuit function	Orifice [mm]	Port connection	k_{vs} value water [m ³ /h]	Q_{N_2} value [l/min]	Nominal pressure [bar]	Item no. Brass	Item no. Stainless steel
A 	2.0	G 3/8	0.12	129	25	239 040	239 085
	3.0	G 3/8	0.25	270	10	239 086	239 087
	4.0	G 3/8	0.45	485	8	239 088	239 089
	6.0	G 1/2	0.80	862	4	239 090	239 091
	8.0	G 1/2	1.10	1186	2	239 092	239 093

Note: The following technical data changes compared with the data on page 1:

- PWM frequency 500 Hz, span 1:100.
- Other connection variations (sub-base, NPT) on request<

Further versions on request



Material
EPDM



Analytical
Oxygen version Parts oil-, fat- and silicon free



Approvals
UL
CSA
DVGW/ Gas Appliances Directive (GAD)



Port connection
flange connections

Ordering chart for accessories

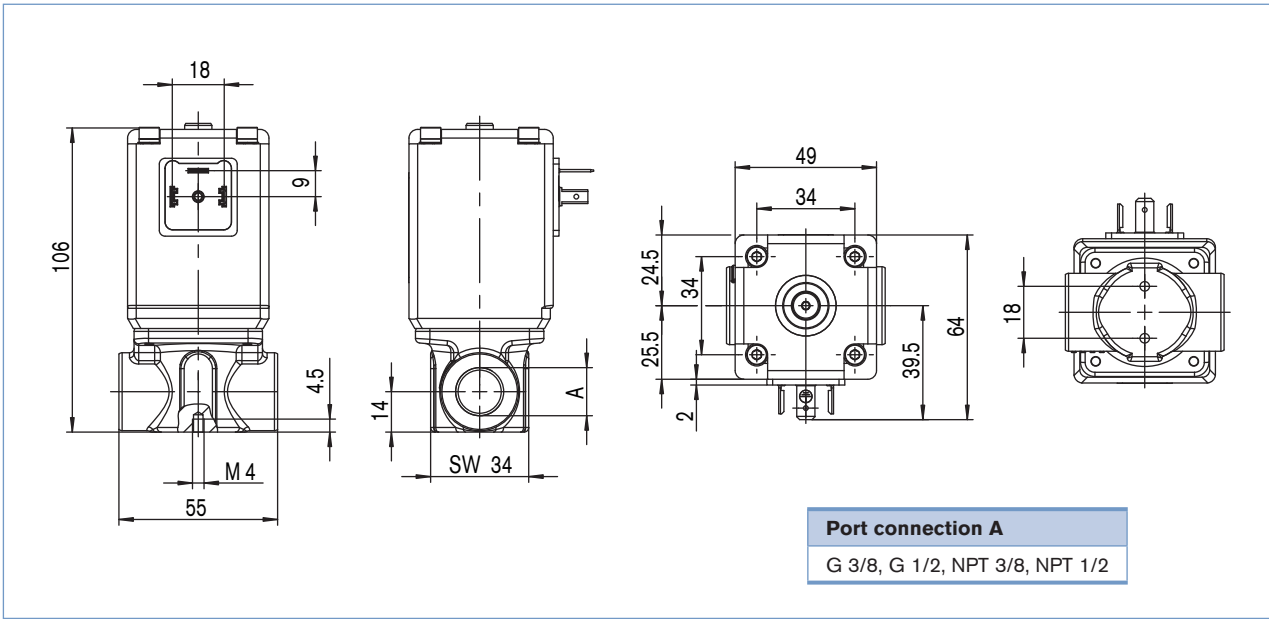
Cable plug 2508 acc. to DIN EN 175301-803 Form A

The delivery of a cable plug includes the flat seal and fixing screw

Circuitry	Voltage / frequency	Item no.
None	0 - 250 V AC/DC	008 376
None, with 3 m cable	0 - 250 V AC/DC	783 573

Control electronics, Type 8605 - please see datasheet

Dimensions [mm]



2875

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Note

You can fill out the fields directly in the PDF file before printing out the form.

Design data for solenoid control valves

► Please fill out this form and send to your local Bürkert Sales Centre* with your inquiry or order

Company	Contact person
Customer No	Department
Address	Tel./Fax
Postcode/Town	E-mail

☐ = Mandatory fields

Quantity

Requested delivery date

Process data

<input type="checkbox"/> Medium			
<input type="checkbox"/> State of medium	<input type="checkbox"/> liquid	<input type="checkbox"/> gaseous	
<input type="checkbox"/> Medium temperature		°C	
<input type="checkbox"/> Maximum flow rate	$Q_{nom} =$	Unit:	
<input type="checkbox"/> Minimum flow rate	$Q_{min} =$	Unit:	
<input type="checkbox"/> Inlet pressure at nominal operation	$p_1 =$	barg	
<input type="checkbox"/> Outlet pressure at nominal operation	$p_2 =$	barg	
<input type="checkbox"/> Max. inlet pressure (nominal pressure)	$p_{1max} =$	barg	
<input type="checkbox"/> Ambient temperature		°C	

Additional specifications

Body material

☐ Brass

☐ Stainless steel

Seal material

☐ FKM

☐ other

Note: Please state all pressure values as **overpressures with respect to atmospheric pressure** [barg].

Standard series of solenoid control valves



Type 2871

Orifice 0.8 to 2mm
20mm coil width



Type 2873

Orifice 0.8 to 4mm
32mm coil width



Type 2875

Orifice 2 to 8mm
49mm coil width

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Reset Form

In case of special application conditions, please consult for advice.

Subject to alteration.
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6027 Compact 2/2-way

Type 6027 Compact can be combined with...



Type 2508
Cable plug

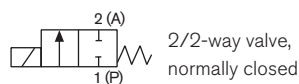
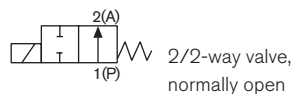


Type 1078
Timer unit



Type 2511
ASI cable plug

Type 6027 is a direct-acting solenoid valve used for shut-off, dosing, filling, and ventilation. The push-over solenoid system is of modular design and the coil can be rotated 360°.

Circuit function A**Circuit Function B****2/2-way Compact Solenoid Valve,
G 1/4 - G 1/2**

- Direct-acting, normally closed
- Brass and stainless steel body
- Electrical connection cable plug Form A
- High pressure version up to 100 bar
- High temperature version up to +180 °C

Technical data

Port connection	G 1/4, G 3/8, G 1/2 (NPT and RC on request)
Orifice	DN 2.0 - 12.0
Body material	Brass or stainless steel 1.4404 (316L)
Coil material	Epoxy
Coil insulation class	Epoxy class H
Seal material	FKM, PTFE/FKM and PTFE/PEEK for high temperature versions (EPDM on request)
Medium	Vacuum, neutral gases and liquids (e.g. compressed air, town gas, natural gas, water, hydraulic oil, petrol) and slightly aggressive medium (stainless steel version) Hot fluids and steam (only with stainless steel body)
High temperature version	
Medium temperature	
Seal material FKM, PTFE/FKM	-10 to +140°C
Seal material PTFE/PEEK	-40 to +180 °C
Ambient temperature	-10 to +55°C
Viscosity	max. 21 mm²/s
Voltages	24 V DC, 24 V/50 Hz, 230 V/50 Hz
Voltage tolerance	±10%
Duty cycle / single valve	100 % continuous operation
Electrical connection	According to DIN EN 175301-803 Form A for cable plug Type 2508 (see Ordering chart for accessories)
Protection class	IP65 with Cable Plug
Installation	As required, preferably with actuator in upright position

6027 Compact 2/2-way

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Technical data (cont.)

Power consumption				
Orifice [mm]	Power consumption		DC	
	Inrush AC [VA]	Hold AC (hot coil) [VA]	[W]	(hot/cold coil) [W]
2.0-12.0	105	37	16	16 / 21

Response times				
Orifice [mm]	Response times AC		Response times DC	
	Opening [ms]	Closing [ms]	Opening [ms]	Closing [ms]
2.0-12.0	10-20	20-30	20-80	20-30

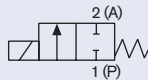



Response times [ms]:

Measured at valve outlet at 6 bar and +20°C.

Opening: pressure build-up 0 to 90% Closing: Pressure relief 100 to 10%

Ordering chart for valves with brass or stainless steel body, standard temperature version

Valves with AC19 coil (42 mm), seal material FKM, without cable plug

Circuit function	Port connection	Orifice [mm]	Kv value water [m³/h] 1)	Pressure range [bar] 2)		024/DC	Item no.				
				DC	AC		024/50	230/50			
A 2/2-way valve NC 	Seal material FKM, medium temperature -10 to +140°C										
	Brass body										
		Threaded port	G 1/4	3.0	0.28	0-30	0-25	178 295	178 296	178 297	
				4.0	0.54	0-12	0-16	178 299	178 300	178 301	
				5.0	0.73	0-6	0-10	178 303	178 304	178 305	
				6.0	0.95	0-3	0-6	178 307	178 308	178 309	
			G 3/8	3.0	0.28	0-30	0-25	178 311	178 312	178 313	
				4.0	0.54	0-12	0-16	178 315	178 316	178 317	
				5.0	0.73	0-6	0-10	178 319	178 320	178 321	
				6.0	0.95	0-3	0-6	178 323	178 324	178 325	
			G 1/2	8.0	1.6	0-1	0-3	178 327	178 328	178 329	
				6.0	0.95	0-3	0-6	178 331	178 332	178 333	
				8.0	1.6	0-1	0-3	178 335	178 336	178 337	
				10.0	1.8	0-0.4	0-2.0	178 339	178 340	178 341	
	Stainless steel 1.4404 (316L)										
		Threaded port	G 1/4	3.0	0.28	0-30	0-25	178 239	178 240	178 241	
				4.0	0.54	0-12	0-16	178 243	178 244	178 245	
				5.0	0.73	0-6	0-10	178 247	178 248	178 249	
				6.0	0.95	0-3	0-6	178 251	178 252	178 253	
			G 3/8	3.0	0.28	0-30	0-25	178 255	178 256	178 257	
				4.0	0.54	0-12	0-16	178 259	178 260	178 261	
				5.0	0.73	0-6	0-10	178 263	178 264	178 265	
				6.0	0.95	0-3	0-6	178 267	178 268	178 269	
			G 1/2	8.0	1.6	0-1	0-3	178 271	178 272	178 273	
				6.0	0.95	0-3	0-6	178 275	178 276	178 277	
				8.0	1.6	0-1	0-3	178 279	178 280	178 281	
				10.0	1.8	0-0.4	0-2.0	178 283	178 284	178 285	
			12.0	2.0	0-0.2	0-1.2	178 287	178 288	178 289		
			Brass body								
				G1/4	3	0.28	0-16		211 914	228 487	228 488
					4	0.54	0-10		208 623	228 489	228 490
	6	0.95			0-6		211 915	■	■		
		G1/2		8	1.6	0-3		211 916	228 503	228 504	
				10	1.8	0-2		210 436	219 530	210 438	
	Stainless steel										
		G1/4		3	0.28	0-16		230 243	230 244	230 245	
				4	0.54	0-10		230 246	230 247	230 248	
		G3/8		6	0.95	0-6		230 255	230 256	230 257	
		G1/2		8	1.6	0-3		230 261	230 262	230 263	
10	1.8			0-2		225 248	230 264	230 265			

¹⁾ Measured at +20 °C, 1 bar²⁾ pressure at valve inlet and free outlet²⁾ Measured as overpressure to the atmospheric pressure

■ on request

Please note that the cable plug has to be ordered separately, see accessories on page 5 and separate datasheet for Type 2508.

Further versions on request

**Materials**

Seal material EPDM, PTFE

**Voltage**

Non-standard voltages

**Pressure**

Higher pressures for gaseous medium

**Port connection**

NPT, RC

**Approvals**

ATEX

**Additional**

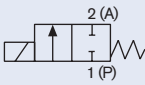

Oxygen versions

6027 Compact 2/2-way

bürkert

Ordering chart for valves with brass body, standard temperature and high pressure version

All valves with AC19 coil (42 mm), seal material PTFE/FKM, without Cable Plug

Circuit function	Port connection	Orifice [mm]	Kv value water [m3/h] ¹⁾	Pressure range [bar] ²⁾ for liquid and gaseous medium			Item no. per voltage/frequency [V/Hz]			
				DC for liquid and gaseous medium	AC		024/DC	024/50	230/50	
					Liquids	Gaseous medium				
<div>A 2/2-way valve NC</div> <div></div>	<div>42 mm</div> <div></div>	G 1/4	2.0	0.14	0-80	0-75	0-80	184 667	■	184 668
			4.0	0.54	0-20	0-30	0-50	184 670	■	184 671
			6.0	0.95	0-5	0-12		184 674	■	184 675
		G 3/8	6.0	0.95	0-5	0-12		184 677	■	184 678
			8.0	1.6	0-1	0-5		184 680	■	184 681
		G 1/2	8.0	1.6	0-1	0-5		184 683	■	184 684
			10.0	1.8	0-0.4	0-2	0-3	184 686	■	184 687

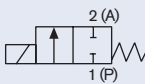

¹⁾ Measured at +20 °C, 1 bar²⁾ pressure at valve inlet and free outlet²⁾ Measured as overpressure to the atmospheric pressure

■ on request

Please note that the cable plug has to be ordered separately, see accessories on page 5 and separate datasheet for Type 2508.

Ordering chart valves with stainless steel body, also for high temperatures and high pressure

All valves with AC19 coil (42 mm), seal material PTFE/PEEK, without Cable Plug

Circuit function	Port connection	Orifice [mm]	Kv value water [m ³ /h] ¹⁾	Pressure range [bar] ²⁾ for liquid and gaseous medium			Item no. per voltage/frequency [V/Hz]			
				DC for liquid and gaseous medium	AC		024/DC	024/50	230/50	
					Liquids	Gaseous medium				
A 2/2-way valve NC  	Threaded port	G 1/4	2.0	0.14	0-100	0-75	0-100	184 689	■	184 690
			4.0	0.54	0-20	0-30	0-50	184 692	■	184 693
		G 3/8	6.0	0.95	0-5	0-12		184 695	■	184 696
			8.0	1.6	0-1	0-5		184 698	■	184 699
		G 1/2	10.0	1.8	0-0.4	0-2	0-3	184 701	■	184 702
			12.0	2.0	0-0.2	0-1.2	0-2	184 704	■	184 705

¹⁾ Measured at +20 °C, 1 bar²⁾ pressure at valve inlet and free outlet²⁾ Overpressure with respect to atmospheric pressure

■ on request

Please note that the cable plug has to be ordered separately, see accessories on page 5 and separate datasheet for Type 2508.

Further versions on request

**Materials**

Seal material EPDM, PTFE

**Port connection**

NPT, RC

**Voltage**

Non-standard voltages

**Approvals**

ATEX

**Pressure**

Higher pressures for gaseous medium

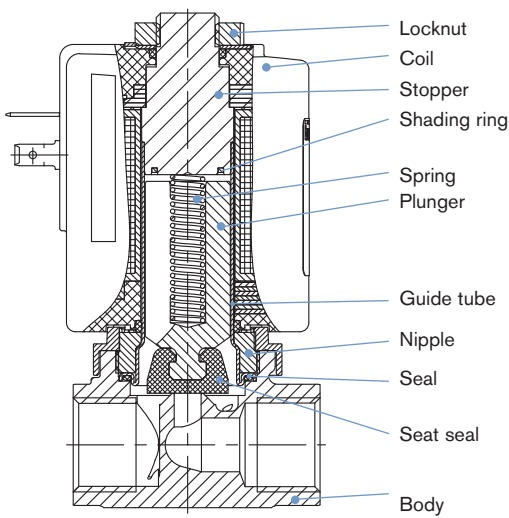
**Additional**

Oxygen versions

6027 Compact 2/2-way



Materials



Locknut
Coil
Stopper
Shading ring
Spring
Plunger
Guide tube
Nipple
Seal
Seat seal
Body

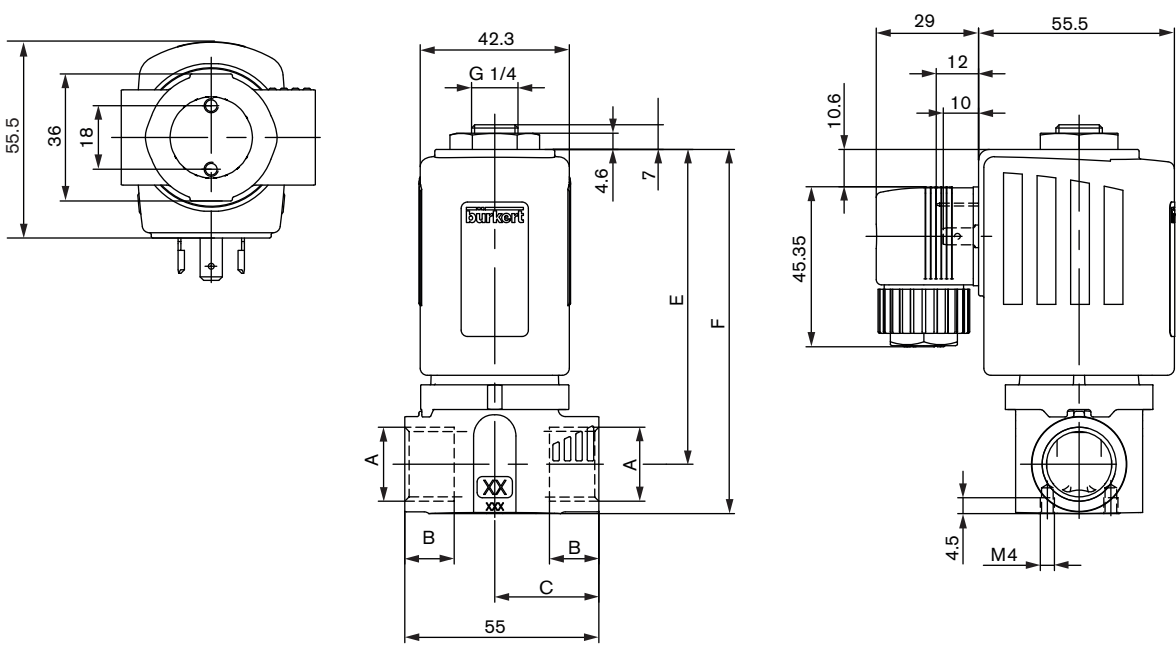
DIN 176 9Sn Pb 28K thick-film passivated or stainless steel
Epoxy
Stainless steel 1.4113
Copper (brass body), silver (stainless steel body)

Stainless steel 1.4310
Stainless steel 1.4113

Stainless steel 1.4303
Brass, stainless steel 1.4305
FKM, PEEK for high temperature versions
(EPDM on request)
FKM, PTFE (EPDM on request)


Brass, stainless steel 1.4404 /316L

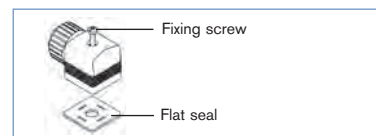
Dimensions [mm]



A Port connection	B [mm]	C [mm]	E [mm]	F [mm]	Weight [g]
G 1/4	12	27.5	88.2	98.2	793
G 3/8	12	27.5	89.2	101.2	816
G 1/2	14	29.5	89.2	103.2	840

6027 Compact 2/2-way**Ordering chart accessories****Cable plug Type 2508 according to DIN EN 175301-803 Form A**

	Circuit	Voltage/ Frequency	Item no.
	without (Standard)	0 - 250 V AC/DC	008 376
	with LED	12 - 24 V AC/DC	008 360
	with LED and varistor	12 - 24 V AC/DC	008 367
	with rectifier, LED and varistor	12 - 24 V AC/DC	008 363
	with LED	200- 240V	008 362
	with LED and varistor	200- 240V	008 369
	further versions see datasheet Type 2508		



Included in delivery is a connector with flat seal and fixing screw. For other cable plug versions according to DIN EN 175301-803 (previously DIN 43650) Form A, see separate datasheet for Type 2508. When you click on the orange box "More info." below, you will come to our website for the resp. product where you can download the datasheet.

**More
info.**

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In case of special application conditions,
please consult for advice.

Subject to alterations

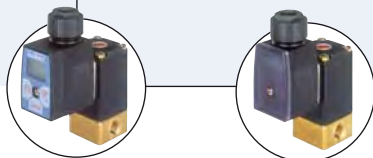
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8605
bürkert
 FLUID CONTROL SYSTEMS

Control Electronics for Solenoid Control Valves



Type 8605 can be combined with...



Type 8605

with operating unit combined with type 2873

Type 8605

without operating unit combined with type 2873

The digital control electronics, type 8605, serves to operate valves in the power range from 40 - 2000 mA.

The electronics converts an external standard signal into a pulse-width modulated (PWM) signal with which the opening of the valve and hence a fluidic output parameter (e.g. flow rate) can be infinitely varied. An internal current control with the duty cycle factor of the PWM signal as control variable ensures that every value of the input signal, irrespective of the thermal condition of the coil, is unambiguously assigned a given value of the effective coil current.

Compared to DC operation of solenoid control valves the PWM operation improves, among others, their sensitivity and hysteresis. A display and operating keys allow the electronics to be easily adapted to a particular solenoid control valve and to the concrete conditions of an application.

- Microprocessor-controlled electronics
- Selectable input signal
- Adjustable PWM frequency
- Optional RS232 or RS485 interface

Technical data	
Operating voltage	12 - 24 V DC
Voltage tolerance	±10 %
Residual ripple	<5 %
Power consumption	approx. 1 W (without valve)
Output current (valve)	max. 2A
Ambient temperature	-10 to 60°C
Input signal	0-20 mA, 4-20mA or 0-5V, 0-10 V (configurable)
Input impedance	<200 Ω (with current input) >20 kΩ (with voltage input)
Output signal for valve control	PWM signal – frequency adjustable from 80Hz to 6 kHz
Ramp function	Time variable from 0 to 10 s
Version	– Cable plug for direct installation (with PG- or M12 connection) – DIN-rail version (DIN EN 50022)
Protection class	Cable plug – IP65 DIN-rail – IP40
Housing material	Cable plug – Polyamide / PC DIN-rail – Polyamide / PBT

Functions of the controller Type 8605

- Microprocessor-controlled electronics
- Compensation of the solenoid coil heating by internal current control
- Configurable ramp function
- Adjustable zero point shutdown
- Display and buttons
- Selectable input signal
- RS232 or RS485 interface (with auxiliary module)
- Infinitely variable PWM frequency
- Simple adaptation of the minimum and maximum current (start of opening and full opening) to the actual pressure conditions

Ordering chart Control Electronics for Solenoid Control Valves

Version	Max. coil current [mA]	Item no.	2822 24 V DC	2822 12 V DC	2861, 2871 24 V DC	2861, 2871 12 V DC	2863, 2873 24 V DC	2863, 2873 12 V DC	2865, 2875 24 V DC	2865, 2875 12 V DC	2836 24 V DC	2853 24 V DC	2853 12 V DC	6024 24 V DC	6024 12 V DC	6223 24 V DC	6223 12 V DC
Cable plug with PG-connection	200 – 1000	178 354					x	x	x			x	x	x		x	
Cable plug with M12-connection	200 – 1000	178 355					x	x	x			x	x	x		x	
Cable plug with PG-connection	500 – 2000	178 356						x	x	x	x		x	x	x		x
Cable plug with M12-connection	500 – 2000	178 357						x	x	x	x		x	x	x		x
Cable plug with PG-connection without operating unit	200 – 1000	178 358					x	x	x			x	x	x		x	
Cable plug with M12-connection without operating unit	200 – 1000	178 359					x	x	x			x	x	x		x	
Cable plug with PG-connection without operating unit	500 – 2000	178 360						x	x	x	x		x	x	x		x
Cable plug with M12-connection without operating unit	500 – 2000	178 361						x	x	x	x		x	x	x		x
DIN-rail	40 – 220	178 362	x	x	x												
DIN-rail	200 – 1000	178 363			x	x	x	x	x			x	x	x		x	
DIN-rail	500 – 2000	178 364						x	x	x	x		x	x	x		x

Notes:

- With two current ranges possible please choose the lower one
 - Successor types:
 - 2861, 2871 with 2824
 - 2863, 2873 with 2833
 - 2865, 2875 with 2835
- When using the older type please choose the control electronics indicated for the adequate new type.

Ordering chart accessories

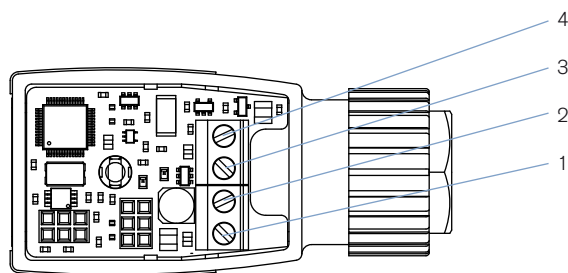
Version	Item no.
Control unit for plug-on module	667 839
RS232 module for plug-on	667 840
RS485 module for plug-on	667 841
RS232 module for DIN-rail	667 842
RS485 module for DIN-rail	667 843
Right-angle plug M12, 4 pins	784 301
M12 connector with 5m cable, 4 pins	918 038
M8 connector with 2m cable for RS232/ Rs485 plug-on module	918 718
Cover (for control unit without display)	670 549

8605

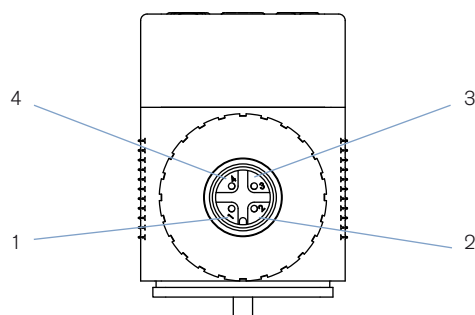
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Pin Assignment

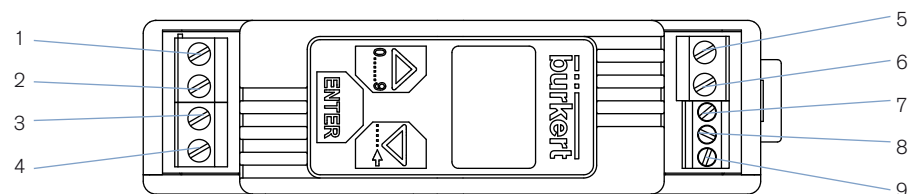
Cable plug PG



Cable plug M12



DIN-rail



- 1 : + 12-24 VDC
- 2 : GND
- 3 : Standard signal GND
- 4 : Standard signal +
- 5 : Valve
- 6 : Valve
- 7 : RS232 TxD/ RS485-B *)
- 8 : RS232 RxD/ RS485-A *)
- 9 : DGND *)

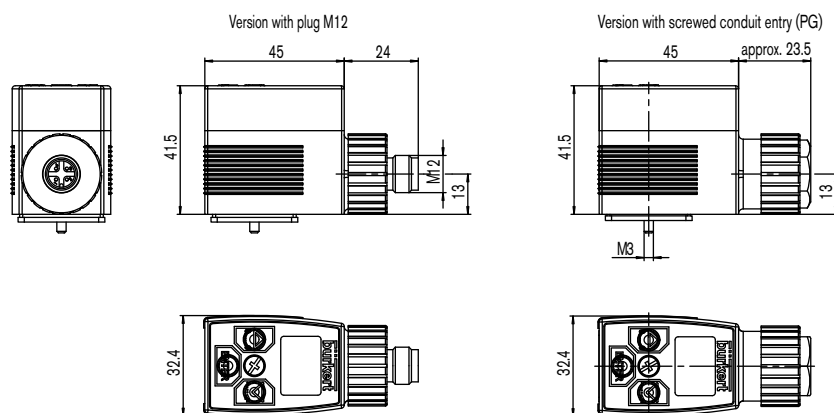
*) only with RS232 or RS485 auxiliary module

8605

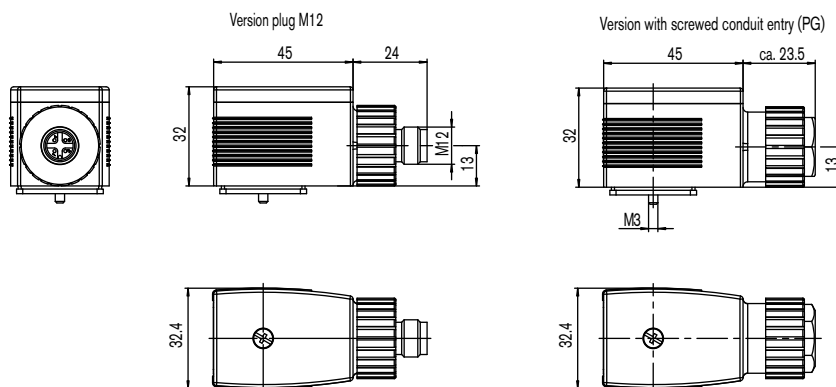
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Dimensions [mm]

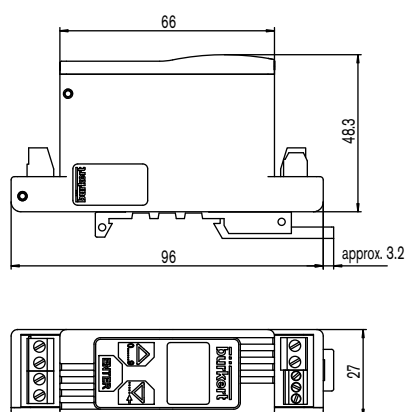
Cable plug with operating unit



Cable plug without operating unit



DIN-rail



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please consult for advice.We reserve the right to make technical
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