

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade	Contract No. C1011-045-087 Grit Washer System
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# **QUEENSLAND URBAN UTILITIES**

## **Wacol Sewage Treatment Plant, Wacol QLD**

### **Grit Washer Removal System GW80 Bilfinger**

### **Operation & Maintenance Manual**

**Meyjor Industries**

**Contract No. C1011-045-087**

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Grit Washer System

## Document History

### Revision history

Version	Author	Issue Purpose	Signature	Date
Draft	L. Arias	Review		10/03/15
A	L. Arias	Submission		14/05/15

### Approved By

Version	Name	Position	Signature	Date
Draft	M. Jacques	General Manager		10/03/15
A	M. Jacques	General Manager		14/05/15

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## 1. Volume 1 Introduction, System Overview, Functional Spec, Design

### 1.1 Introduction

This operation and maintenance manual presents information required for the operation and maintenance of the upgraded grit removal system at Wacol STP. The operators of this equipment should be generally familiar with the waste water treatment process.

This document can be used as a guide to assist operators in understanding and operating the grit removal system. This document contains information regarding only the grit removal system and associated equipment within the scope of supply by Meyjor Industries Pty Ltd.

Individual equipment manuals are also included to assist the operators. These are found in volume two of this document and should be used in conjunction with this operation and maintenance manual. It is recommended the operators familiarise themselves with the information contained within this document before operating the grit removal system.

Emphasis should be placed on the following:

- Plant and Equipment Operating Hazards.
- Operating Parameters/Limits.
- Operating Requirements.
- Maintenance Requirements.
- Location of Emergency Stops.
- Familiar with Plant Facilities Management Program.
- Plant Controls.
- Equipment operation, calibration, maintenance, cleaning etc.

### 1.2 System Overview

Grit removal from wastewater is considered critical in order to reduce operational problems for wastewater treatment plants and to reduce maintenance costs of the mechanical process of sewage treatment. Grit and other solids can increase wear of the mechanical equipment, cause pipe blockages, can settle and reduce the effective volume of the treatment basins. The implementation of a compatible grit classifier (GC) and grit washer (GW) are designed to separate grit from organics and wastewater.

The screened wastewater enters the grit tank and flows around the chamber. A specially designed rotating paddle (MX-101 or MX-201) creates a mechanically induced vortex that causes grit to settle.

The solids are collected in the bottom chamber. The grit free wastewater overflow from the grit tank for further treatment. A grit pump (PMP-101 or PMP-201) forward the collected grit from the bottom of the chamber, through a 100NB 316SS pipe to the GW for subsequent separation.

The Grit Washer shall consist of a conical hopper and a shaft-less spiral screw conveyor designed to further remove, wash and dewater grit and sand.

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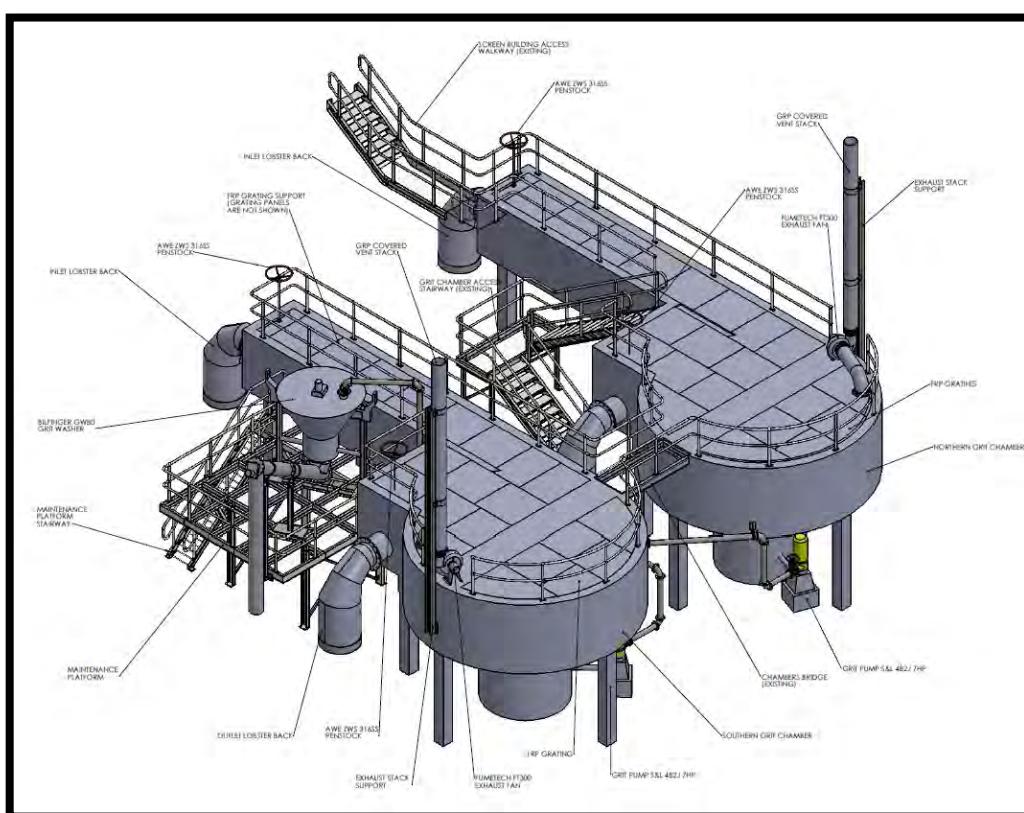
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Effluent contaminated with grit and organic matter shall discharge into the top of the hopper close to its periphery. The combination of a central agitator and periphery inlet cause the incoming effluent flow to maintain a slow rotational movement. The rotational movement, together with sufficient retention times for variations of particle densities and settling velocities, shall induce the grit and sand to spiral and settle towards the bottom of the hopper.

Wash water enters the bottom of the hopper via the pumps mentioned above. The central agitator, aided by the grit and sand particles abrading against each other scour any attached organic matter. Eventually, the grit shall be conveyed, washed, dewatered and discharged into a container to attain > 95 % removal of grit particles (min 0.2 mm [0.008inch] diameter) free of organic matter.

Suspended organic matter shall discharge from the conical hopper at intermittent frequencies and can either be returned to the forwarded flow of the grit chamber and onward to secondary treatment. Up to 97 % removal of organic matter is attainable. Figure 1 illustrates the general arrangement of the system and Figure 2 shows the standard Grit Washer unit.



*Figure 1 System GA*

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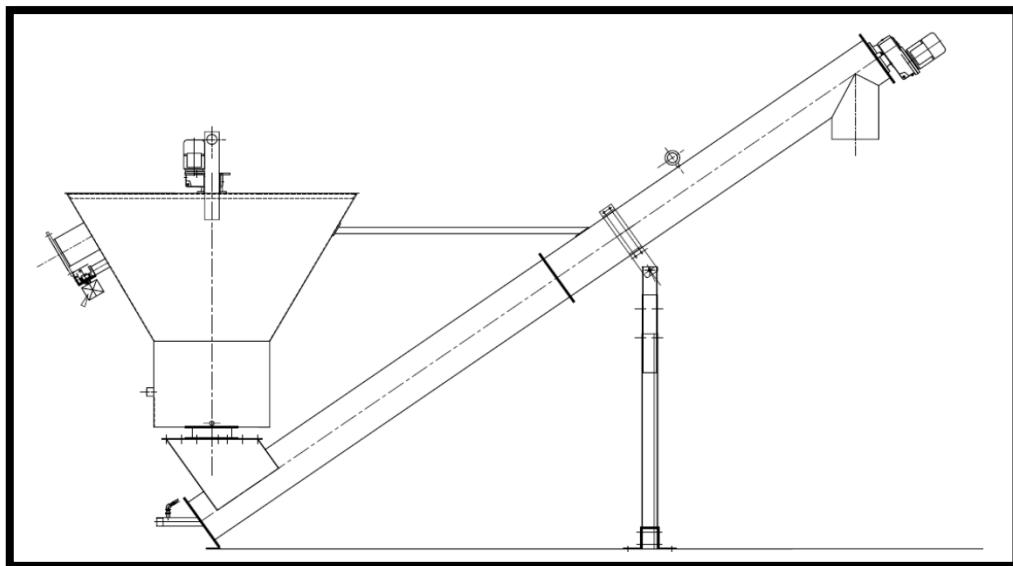


Figure 2 Grit Washer Unit

### 1.3 Location Details and Map

The system is installed in the QUU Wacol STP, Grindle Road, Wacol, QLD 4076. The figure 3 shows the site location.

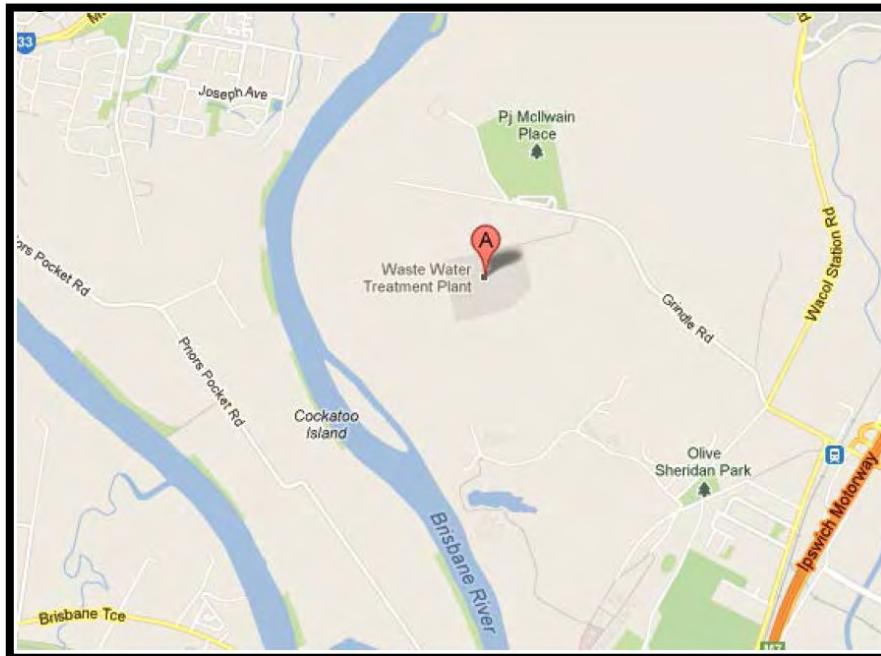


Figure 3 Site Location

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## 1.4 Description of Equipment and Process

The following are the major system components

Ref	Description	Service	Duty	Supplier
MX-101	Mixer Drive	3 Phase	1.5kW	S&L
MX-201	Mixer Drive	3 Phase	1.5kW	S&L
PMP-101	Grit Pump	3 Phase	15kW	S&L
PMP-201	Grit Pump	3 Phase	15kW	S&L
FS-101	Grit Line Flow Switch	Proximity Switch	24VDC	Omron
FS-201	Grit Line Flow Switch	Proximity Switch	24VDC	Omron
PS-101	600mm Penstock	Isolation		AWE
PS-201	600mm Penstock	Isolation		AWE
PV-101	100mm Pinch Valve	Isolation	10 bar	Flowrox
PV-102	100mm Pinch Valve	Isolation	10 bar	Flowrox
PV-201	100mm Pinch Valve	Isolation	10 bar	Flowrox
PV-202	100mm Pinch Valve	Isolation	10 bar	Flowrox
NRV- 101	100mm Non-Return Valve	Backflow prev	1,600kPa	HMA Valveco
NRV-201	100mm Non-Return Valve	Backflow prev	1,600kPa	HMA Valveco
MV-301	Motorised Valve			Bilfinger
MX-301	Grit Wash Paddle Drive	3 Phase	0.25kW	Bilfinger
EF-101	Exhaust Fan	4,300 M3/Hr	2.2Kw	Fumetech
EF-201	Exhaust Fan	4,300 M3/Hr	2.2Kw	Fumetech
SV-301	Wash Water Solenoid		24VDC	Bilfinger
FS-301	Wash Water Flow Switch		24VDC	Bilfinger
PT-301	Pressure Transmitter	0-1 Bar	Raw Screened Effluent	Bilfinger
GWC-301	Grit Wash Conveyor Drive	3 Phase	1.1kW	Bilfinger

## 1.5 Operational Modes

There are three modes of operation for these pumps – Local/Manual, Remote/Manual and Remote/Auto. Selection of the mode of control is performed using the Local/Remote selector mounted on the front of the system LCPs and through SCADA for Remote/Auto.

Local Mode enables operation of the system from within the LCP station. In local Mode, the SCADA has no control of the entire system. As long as the site has power and the emergency stops are not engaged, all the system components can be started and stopped from the panel Start/Stop controls.

Once in Local Mode, the operator cannot control through SCADA the pumps and will only monitor their status.

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## 2. Volume 2: Proprietary Equipment Manuals, Maintenance, Service, Data Sheets

### 2.1 Proprietary Equipment Manuals

[Bilfinger GW80 Order Specifications Manual](#)

[Bilfinger GW80 Installation, Operation and Maintenance Manual](#)

[NORD Drive Unit Manual](#)

[Penstock Slide Gate](#)

[Isolation Inch Valve](#)

[Check Valve](#)

### 2.2 Troubleshooting

#### 2.2.1. Penstock Slide Gate

The table below summarizes the common problems and possible solutions in the penstocks slice gate.

Indication	Probable cause	Rectification
Leakage between slide gate and concrete wall	Concrete wall does not meet the required std.	Un-install the slide gate and fix the wall.
	Not enough construction sealant.	Un-install the slide gate, clean the wall and apply a new layer of construction sealant.
	Loose anchor bolts.	Tighten anchor bolts.
	Incorrect anchor bolts.	Check the 'General Arrangement Drawing' and make sure the right anchor bolts have been installed.
Leakage through the seal	Damaged seal.	Replace seal.
Leakage through the bottom seal	Foreign material trapped between frame invert and slide.	Remove the foreign material. Check if there is any damage to the seal.
	Damaged seal.	Replace seal.
Excessive force required to operate the slide gate	Misaligned stem extension, stem guide, or floor stand.	Check and adjust alignment of stem extension, stem guide or floor stand.
	Dirty stem and/or stem nut.	Clean and lubricate stem and/or stem nut.

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## 2.2.2. Grit Washer Unit

The table below summarizes the common problems and possible solutions in the grit washer system

Problem			
MACHINE CANNOT START - ELECTRIC MOTOR IS NOT WORKING			
EXCESSIVE VIBRATIONS (EMPTY UNIT)			
HIGH ADSORBMENT (EMPTY UNIT)			
EXCESSIVE VIBRATIONS DURING NORMAL WORKLOAD			
MACHINE IS RUNNING, BUT AFTER FEW SECONDS THE MOTOR OVERLOAD PROTECTION ACTIVATES CAUSING THE AGITATOR MOTOR TO STOP.			
SAND IS TOO WET			
SCREW CONVEYOR CANNOT EXTRACT THE SAND			
SAND IS TOO DIRTY (I.E. TOO MUCH ORGANIC MATERIAL)			
Cause		Solution	
●		Electric power is not present.	Switch on electric power.
●	● ● ●	Electric connections are faulty.	Re-connect electric components.
●	●	Bad regulation of electric motor limit switch.	Regulate it.
●		Tension is very low, frequency very high.	Check tension condition.
●	●	Screw conveyor blocked/overloaded.	Start with reverse rotation to remove the blockage.
●		Screw conveyor is not perfectly centered.	Check fixing of the bolts in the flange.
●	●	Wearing bars not fixed correctly.	Adjust the wearing bar bolts.
●		Gearmotor could be damaged.	Check the correct connection of the electric motor and check that tension is the same as shown on the electric motor nameplate.
●	●	Screw conveyor rotation and direction could be opposite.	Reverse the polarity of the electric motor.
	●	Excessive activation times of the screw.	Reduce activation times.
	●	Pause times on the screw too short.	Augment pause times.
	●	Excessive feeding flow rate.	Reduce the feeding flow rate as scheduled.
	●	Clogging of the screw.	Clean it and remove foreign solids.
	●	Excessive opening times and frequencies on the organic outlet valve.	Reduce opening times and frequencies.
	● ●	Pressure gauge measuring the sand level defective or badly regulated.	Substitute the pressure gauge then setup and verify the maximum and minimum values for sand quantity.
	●	Shortage of washing water.	Verify the capacity and the pressure feeding the washing system.
	●	Agitator dirty or clogged.	Clean it.
	●	Opening time of the organic outlet too short or too much frequent.	Set up adequately the timers of the organic opening.
	●	Organic outlet clogged.	Clean it.
	●	Absence of clean sand at base in the starting phase.	Make sure that in the starting phase there is always some clean sand at the bottom of the hopper in the collection container.

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### 2.2.3. Swing Check Valve

The table below summarizes the common problems and possible solutions in the swing check valve.

Indication	Probable cause	Rectification
High operating force	Misalignment of gland-flange causing the gland-flange to contact the stem.	Re-align gland-flange and check stem for damage. In case the stem is damaged it should be replaced.
	Overstressed gland-bolting	Un-tighten the gland-bolting to reduce the packing-friction. Make sure no leakage occurs during operation.
	Foreign objects between stem and gland-flange	Unscrew gland-bolting and remove foreign objects. In case stems are severely damaged they should be replaced.
	Non-genuine stem-packing has been used increasing stemfriction.	Replace by genuine parts.
Valve will not close completely / passing valves	Foreign objects inside the valve prevent it from fully closing.	Open, as quickly as possible (to prevent erosion), the valve (acc. manufacturer's maintenance instructions) and remove foreign objects.
	Due to foreign objects the valve-stem and/or seating surfaces have been damaged.	Disassemble the valve and remove foreign objects, as quick as possible (to prevent erosion), and relap seating area's according the manufacturer's instructions.
	Limit switches on electric operated valves are malfunctioning or are incorrectly adjusted; preventing the valve from reaching its fully closed position.	Operate the valve manually and reset the limit switches. In case of malfunctioning limit switches these should be replaced.
	Torque switches on electric operated valves are malfunctioning or are incorrectly adjusted.	Reset the switches according the valve manufacturer's recommendation with respect to value and disconnection method.
	Adjustment of coupling on pneumatic operated valves is incorrectly preventing the valve from fully opening.	Re-adjust the coupling according to the manufacturer's instructions.
Leakage trough valve body or bonnet	Long-term leakage across seat has eroded through the valve body.	Replace valve. To prevent future problems, repair passing valves as quickly as possible
	Imperfection in casting.	Replace valve. To prevent future problems, review minimum NDE specifications.

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Corrosion on valve parts	This can be caused by incorrect selection of coating systems, incorrect application or due to damaging during transportation and installation.	Touch-up the damages immediately as per manufacturer's instructions. If result is insufficient contact the manufacturer.
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#### 2.2.4. Pinch Valve

The table below summarizes the common problems and possible solutions in the pinch valve.

Indication	Probable cause	Rectification
Valve is leaking (in flow direction).	Fluid pressure higher than rated.	Check fluid pressure. Valve type making indicates the max rated pressure.
	Pinch bars are not parallel or the distance between the bars is too long.	See maintenance instructions
	Sleeve is broken or worn out.	Measure the resistance of the sleeve. Change the sleeve.
	Sealing of the actuator piston is leaking	Change the sealing.
Flow fluid is leaking through the valve body bushings.	Sleeve is broken or worn out.	Change the sleeve.

## 2.3 Preventive Maintenance

#### 2.3.1. General Housekeeping

The maintenance checks in the table below must be performed in the indicated frequency to ensure reliability of the system.

No	Item	House Keeping Schedule		
		Daily	Weekly	Monthly
1	Check around machine for obvious signs of oil or water.	✓		
2	Check agitator is rotating freely in normal operation without any abnormal noises or squeaks.	✓		
3	Check sand is being transported effectively to the top of the screw conveyor.	✓		
4	Check that there is an adequate quantity of clean sand (0.4m <sup>3</sup> ) in the collection container at all times.	✓		
5	Check the wear bars are positioned correctly in the transport zone of the screw conveyor. Tighten bolts/screws if necessary.	✓		
6	Check motors are working at their respective correct loadings. Check for any abnormal noises and temperature rises.		✓	
7	Check for build-up of organic waste in screw conveyor inlet. Release drain valve if necessary			✓

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### 2.3.2. Grit Washer Unit

The table below presents the details of the recommended maintenance schedule for the Grit Washer unit and associated components.

<b>Maintenance Schedule</b>						
<b>No</b>	<b>Item</b>	<b>1 Wk</b>	<b>1 Mth</b>	<b>1 Yr</b>	<b>2.5 Yr</b>	<b>5 Yr</b>
1	Check hopper covers / parapets for signs of damage / deterioration. Replace immediately if required.	✓				
2	Visually inspect agitator for holes or excessive wear.	✓				
3	Check exterior of machine for signs of corrosion.	✓				
4	Check wash water system is efficiently working in unison with agitator.	✓				
5	Check the oil level and top up if appropriate.		✓			
6	Check the fixing nuts and bolts are in good condition and not loose.	✓				
7	Check for clogging in the effluent outlet zone	✓				
8	Check for clogging in the sand outlet zone	✓				
9	Check all wash water pipes for signs of wear or leaks. Replace if required.	✓				
10	Check for fibrous material on the agitator shaft		✓			
11	Check gear motor is working correctly			✓		
12	Check electrical condition of motor.			✓		
13	Inspect motor and gearbox mechanical condition.			✓		
14	Check structural integrity of all supports including corrosion			✓		
15	Replace wear liners in the screw conveyor.				✓	
16	Replace screw conveyor motor.					✓

### 2.3.3. Penstock Slide Gate

The table below presents the details of the recommended maintenance schedule for the penstock slide gates.

<b>Maintenance Schedule</b>						
<b>No</b>	<b>Item</b>	<b>1 Wk</b>	<b>1 Mth</b>	<b>6 Mth</b>	<b>2.5 Yr</b>	<b>5 Yr</b>
1	Stem and stem nut shall be cleaned and greased.			✓		
2	Clean the gate with clear water and remove any deposits, especially on the seals and in the guides.			✓		
3	Check the seals and make sure they are not damaged			✓		
4	Seals to be wet while operating.			✓		

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#### 2.3.4. Swing Check Valve

Val Matic Swing Check Valves require minimal maintenance. Under normal operating conditions, no periodic maintenance is necessary.

General Inspection and Repair can be carried out following the steps below;

- Body pressure MUST be relieved before any attempt is made to service internal parts of the swing check valve. Follow all safety procedures and appropriate regulations for handling the pipeline media.
- Remove the valve cover plate. Remove and inspect cover seal replacing if damaged or showing excessive set.
- Lift clapper assembly out of valve hanger section.
- Inspect clapper seal for damage. Replace if required. Inspect clapper for any imbedded foreign material. Remove as required. NOTE: Severely damaged clappers may require replacement.
- Clean and inspect clapper bushings.

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### 3. Volume 3: Drawings, Drawing Register, Underground Cable Routing Details

#### 3.1 Drawing Register

The drawings numbers allocated to this project are 486/5/5-0261-001 to 486/5/5-0261-060 for mechanical and structural components, and 486/5/5-0261-201 to 486/5/5-0261-207 for the electrical components of the system.

#### Mechanical drawings listing

DRAWING NO.	TITLE	SHEET	REV
486/5/5-0261-001	DRAWING INDEX	1 OF 1	A
486/5/5-0261-002	CONSTRUCTION NOTES	1 OF 1	A
486/5/5-0261-003	GRIT CHAMBERS GENERAL ARRANGEMENT	1 OF 1	A
486/5/5-0261-004	SOUTHERN CHAMBER WASHER MACHINE GENERAL ARRANGEMENT	1 OF 1	A
486/5/5-0261-010	MAINTENANCE PLATFORM	1 OF 1	A
486/5/5-0261-011	MAINTENANCE PLATFORM FRAME 1	1 OF 1	A
486/5/5-0261-012	MAINTENANCE PLATFORM FRAME 2	1 OF 1	A
486/5/5-0261-013	MAINTENANCE PLATFORM POSTS	1 OF 1	A
486/5/5-0261-014	MAINTENANCE STAIRWAY	1 OF 1	A
486/5/5-0261-020	NORTHERN CHAMBER EXHAUST FAN GENERAL ARRANGEMENT	1 OF 1	A
486/5/5-0261-021	SOUTHERN CHAMBER EXHAUST FAN GENERAL ARRANGEMENT	1 OF 1	A
486/5/5-0261-022	EXHAUST FAN ASSEMBLY	1 OF 1	A
486/5/5-0261-023	EXHAUST STACK SUPPORT	1 OF 1	A
486/5/5-0261-024	INTAKE PIPE FIXING	1 OF 1	A
486/5/5-0261-031	FRP GRATING SUPPORT GENERAL ARRANGEMENT	1 OF 1	A
486/5/5-0261-032	FRP GRATING SUPPORT DETAIL 1	1 OF 1	A
486/5/5-0261-033	FRP GRATING SUPPORT DETAIL 2	1 OF 1	A
486/5/5-0261-034	FRP GRATING SUPPORT DETAIL 3	1 OF 1	A
486/5/5-0261-035	FRP GRATING SUPPORT DETAIL 4	1 OF 1	A
486/5/5-0261-036	REBATE DETAIL FOR FRP GRATING	1 OF 1	A
486/5/5-0261-044	PIPEWORK	1 OF 1	A
486/5/5-0261-045	GRIT WASHER MACHINE RETURN PIPES	1 OF 1	A
486/5/5-0261-046	GRIT WASHER MACHINE FRONT SUPPORT	1 OF 1	A
486/5/5-0261-052	GRIT CHAMBER INLET PIPE GENERAL ARRANGEMENT	1 OF 1	A
486/5/5-0261-053	SPOOL SECTION A DETAILS	1 OF 1	A
486/5/5-0261-054	SPOOL SECTION B DETAILS	1 OF 1	A
486/5/5-0261-055	SPOOL SECTION C DETAILS	1 OF 1	A
486/5/5-0261-056	SPOOL SECTION D DETAILS	1 OF 1	A
486/5/5-0261-060	REPLACEMENT BAFFLE	1 OF 1	A

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## Electrical drawings listing

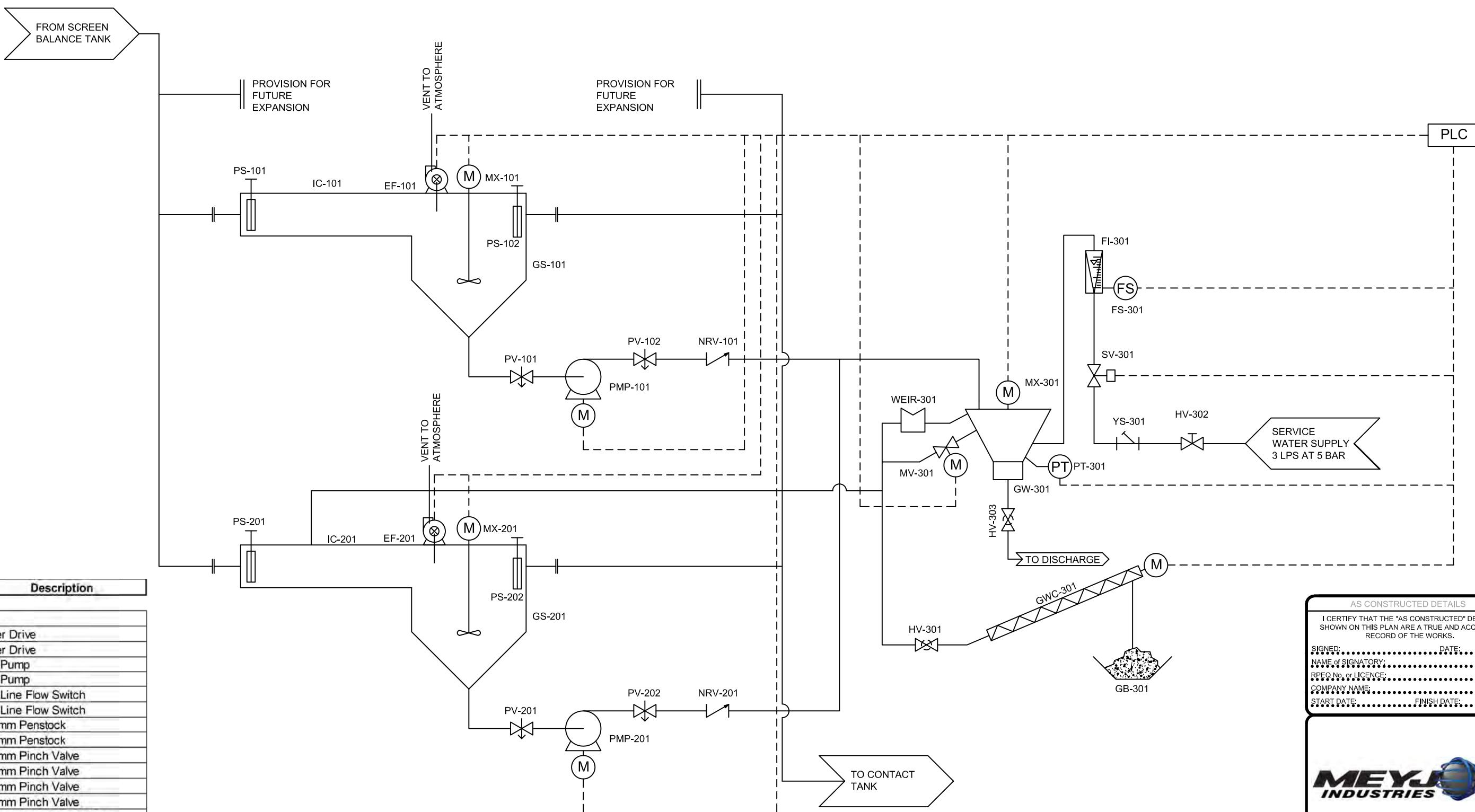
ELECTRICAL DRAWING INDEX		
DRAWING NUMBER	REV.	DRAWING TITLE
486/5/5-0261-201	A	NEW GRIT WASHER UNIT CONTROL PANEL DRAWING INDEX
486/5/5-0261-202	A	NEW GRIT WASHER UNIT CONTROL PANEL POWER CIRCUITS
486/5/5-0261-203	A	NEW GRIT WASHER UNIT CONTROL PANEL 24VDC COMMON CONTROLS
486/5/5-0261-204	A	NEW GRIT WASHER UNIT CONTROL PANEL 24VDC VALVE CIRCUITS
486/5/5-0261-205	A	NEW GRIT WASHER UNIT CONTROL PANEL PLC DIGITAL INPUTS
486/5/5-0261-206	A	NEW GRIT WASHER UNIT CONTROL PANEL PLC DIGITAL OUTPUTS
486/5/5-0261-207	A	NEW GRIT WASHER UNIT CONTROL PANEL PLC ANALOGUE INPUTS
486/5/5-0261-208	A	NEW GRIT WASHER UNIT CONTROL PANEL CABLE SCHEDULE
486/5/5-0261-209	A	NEW GRIT WASHER UNIT CONTROL PANEL PARTS LIST
486/5/5-0261-210	A	NEW GRIT WASHER UNIT CONTROL PANEL GENERAL ARRANGEMENT

### 3.2 'As Constructed' Drawings

Complete set of drawings can be accessed through the link below.

- [Mechanical and Structural Drawings.](#)

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**AS CONSTRUCTED**

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: ..... DATE: .....

NAME of SIGNATORY: .....

RPEQ No. or LICENCE: .....

COMPANY NAME: .....

START DATE: .....

FINISH DATE: .....



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



					FUNDING	DRAFTED	D.BLOCH	D.BLOCH	LARIAS	ASSET/PROJECT	DRAWING TITLE		SHEET No. 1 OF 1
B	24/03/15	AS CONSTRUCTED	MJF	DFB	DESIGN W.O. No. .	DRAFTING CHECK M.FREEMAN	CONSTRUCTION W.O. No. .	DESIGN R.P.E.Q. No. DATE	APPROVED BY N.JORGENSEN	WACOL WWTP	WACOL WWTP	QUEENSLAND URBAN UTILITIES DRAWING No. 486/S/5-0261-000	AMEND. B
No.	DATE	AMENDMENT	DRAFTED	DESIGNED	R.P.E.Q. NO. APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE No.	CONSTRUCTION MANAGER	GRIT HANDLING SYSTEM UPGRADE	INLET WORKS DISCHARGE PIPE ARRANGEMENT		



# WACOL GRIT REMOVAL SYSTEM UPGRADE

DRAWING NO.	TITLE	SHEET	REV
486/5/0261-001	DRAWING INDEX	1 OF 1	A
486/5/0261-002	CONSTRUCTION NOTES	1 OF 1	A
486/5/0261-003	GRIT CHAMBERS GENERAL ARRANGEMENT	1 OF 1	A
486/5/0261-004	SOUTHERN CHAMBER WASHER MACHINE GENERAL ARRANGEMENT	1 OF 1	A
486/5/0261-010	MAINTENANCE PLATFORM	1 OF 1	A
486/5/0261-011	MAINTENANCE PLATFORM FRAME 1	1 OF 1	A
486/5/0261-012	MAINTENANCE PLATFORM FRAME 2	1 OF 1	A
486/5/0261-013	MAINTENANCE PLATFORM POSTS	1 OF 1	A
486/5/0261-014	MAINTENANCE STAIRWAY	1 OF 1	A
486/5/0261-020	NORTHERN CHAMBER EXHAUST FAN GENERAL ARRANGEMENT	1 OF 1	A
486/5/0261-021	SOUTHERN CHAMBER EXHAUST FAN GENERAL ARRANGEMENT	1 OF 1	A
486/5/0261-022	EXHAUST FAN ASSEMBLY	1 OF 1	A
486/5/0261-023	EXHAUST STACK SUPPORT	1 OF 1	A
486/5/0261-024	INTAKE PIPE FIXING	1 OF 1	A
486/5/0261-031	FRP GRATING SUPPORT GENERAL ARRANGEMENT	1 OF 1	A
486/5/0261-032	FRP GRATING SUPPORT DETAIL 1	1 OF 1	A
486/5/0261-033	FRP GRATING SUPPORT DETAIL 2	1 OF 1	A
486/5/0261-034	FRP GRATING SUPPORT DETAIL 3	1 OF 1	A
486/5/0261-035	FRP GRATING SUPPORT DETAIL 4	1 OF 1	A
486/5/0261-036	REBATE DETAIL FOR FRP GRATING	1 OF 1	A
486/5/0261-044	PIPEWORK	1 OF 1	A
486/5/0261-045	GRIT WASHER MACHINE RETURN PIPES	1 OF 1	A
486/5/0261-046	GRIT WASHER MACHINE FRONT SUPPORT	1 OF 1	A
486/5/0261-052	GRIT CHAMBER INLET PIPE GENERAL ARRANGEMENT	1 OF 1	A
486/5/0261-053	SPOOL SECTION A DETAILS	1 OF 1	A
486/5/0261-054	SPOOL SECTION B DETAILS	1 OF 1	A
486/5/0261-055	SPOOL SECTION C DETAILS	1 OF 1	A
486/5/0261-056	SPOOL SECTION D DETAILS	1 OF 1	A
486/5/0261-060	REPLACEMENT BAFFLE	1 OF 1	A

**AS CONSTRUCTED**

**AS CONSTRUCTED DETAILS**

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: DATE:  
NAME of SIGNATORY:  
RPEQ No. or LICENCE:  
COMPANY NAME:  
START DATE: FINISH DATE:



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



					FUNDING	DRAFTED	A. MITRONKIN	L. ARIAS	ASSET/PROJECT	DRAWING TITLE	SHEET No.	QUEENSLAND URBAN UTILITIES DRAWING No.	AMEND.
					DESIGN W.O. No. C1011-045-87 CONSTRUCTION W.O. No. C1011-045-87	DRAFTING CHECK M.FREEMAN CAD FILE 550261001		APPROVED BY N.JORGENSEN CONSTRUCTION MANAGER	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	DRAWING INDEX DRAWING INDEX	1 OF 1	486/5/0261-001	A
A 12/2/15 No. DATE	AS BUILT AMENDMENT	MJF DRAFTED	LA DESIGNED	RPEQ NO. APPROVED FUNDING BY Q.U.U. ( ) EXTERNAL ( ) Q.U.U. FILE NO.		DESIGN CHECK R.P.E.Q. No. DATE Q.U.U. FILE NO.		SIGNATURE DATE SIGNATURE DATE					

**NOTES****GENERAL**

- These notes to be read with all project drawings and contract documents
- Dimensions in millimetres, levels in metres uno
- Dimensions not to be scaled from drawings
- Verify all dimensions on site prior to commencing work on site
- Materials and workmanship to comply with the current Standards Australia Codes, Building Code of Australia, By-laws and Ordinances of the relevant building authorities
- Structures to be maintained in a stable condition and no part to be overstressed during construction. Temporary bracing shall be provided by the contractor in order to keep the building works and excavations stable at all times
- Discrepancies to be referred to the superintendent before proceeding with work
- Obtain appropriate permits and approvals from relevant authorities before commencing work on site
- Notify relevant authorities before commencing work on site
- Substitute material not to be used without written approval from the Superintendent
- Locate and confirm all existing services and structures within and adjacent to the site

**STRUCTURAL STEEL**

- Structural steel workmanship and materials to comply with AS 4100
- Steel to comply with:
  - AS 1163 GR250 C250 for rectangular and hollow sections
  - AS 3678 for plates and floor plates
  - AS 3679.1 GR300 or BHP GR300 plus for parallel flange channels for plates and floor plates
  - AS 3679.2 GR300 for welded beams and columns
  - Other sections to comply with AS 3678 or AS 3679 GR250
- Weld to AS 1554
  - Weld category SP
  - Butt welds to be full penetration welds
  - Welds to be 6mm continuous fillet welds all round interfaces
  - Electrodes to AS 1554 classification E48XX
  - All welds to be free of slag
- Bolts to AS 1275. Commercial grade 4.6 to AS 1111 and AS 1112. High strength structural bolts to AS 1252
  - Bolts, nuts and washers M16 and larger to GR8.8
  - Structural connections to be 2 off M16 GR8.8 with 10mm thick cleat plate uno
  - Install washers under bolt head and nut. Install tapered washers as required
  - Bolt projection beyond but to be a minimum two threads and a maximum 10mm
  - All gussets to be 10mm unless noted otherwise
- Seal weld hollow sections with 3mm thick cap plate uno
- Grout base plates with high strength non-shrink pre-mixed grout before column are loaded
- Fabrication and erection of the steelwork shall be supervised by a qualified person experienced in such supervision, in order to ensure that all requirement of the design are met
- All members shall be supplied in single lengths. Splices shall only be permitted in locations shown on the drawings
- All steelwork shall be securely temporarily braced by the erector as necessary to stabilised the structure during erection
- The extent of non-destructive weld examination shall be noted as noted below:

Weld Type	Category	Examination	Extent %
Fillet	GP & SP	Visual	100
	GP	Visual	100
Butt	Visual	100	
	SP	RT or UT	10

**CONCRETE**

- Concrete workmanship and materials to comply with AS 3600, AS 3610. Liquid retaining structures to comply with AS 3735
- Concrete to comply with AS 1379, AS 1478.1, AS 1478.2, AS 3582.1, AS 3582.2, AS 3582.3 and AS 3972
- Slump to be required for placement, compaction and finishing to comply with AS 3735
- Water not to be added to concrete after each truck has left batching plant
- Test slump of each batch of concrete delivered
- Design, certification, construction, inspection and performance of formwork by contractor
- Formwork shall be designed to accommodate movements and load redistribution due to any post tensioning
- Formwork shall not be designed to rely on restraint or support from the permanent structure without prior approval from the structural engineer
- Formwork construction tolerances and stripping times shall comply with AS 3610 and AS 3600 unless otherwise approved by the structural engineer
- Before placing concrete, remove all water, dust and debris from formwork
- During construction, support propping will be required where loads from stacked materials, formwork and other supported slabs induced loads in a slab or beam which exceed the design capacity for strength or serviceability limit
- Do not place permanent loads on the concrete structure until after formwork and propping is removed
- Concrete construction tolerances to AS 3610
- Concrete sizes do not include finishes. Sizes not to be reduced or penetrations added without the Superintendent's approval
- Exposed edges and re-entrant corners to have 25mm chamfer or fillet uno
- Concrete surface finishes to AS 3610
  - Formed exposed surfaces - Class 1, 2, 3 or 4
  - Formed hidden surfaces - Class 5
  - Laid exposed surfaces - Steel trowel uno
  - Laid hidden surfaces - Wood float
- Concrete quality
- Concrete curing to AS 3600 as soon as possible after placing and finishing
- Concrete cover 50mm
- Fill all holes left by form tie bolts with mortar matching the surface colour of the finished surface

Concrete Structure	Strength Grade	Slump	Max agg. size (mm)	Cement Type	Max W/C ratio
Liquid retaining	S40	80	20	SR	0.45
Slabs, footings, non-water retaining pits and bunds	N32	80	20	GP	0.5

**REINFORCEMENT**

- Reinforcing to comply with AS 4671
- Reinforcement not to be welded unless approved by the Superintendent
- Reinforcement not to be bent, cut or heated on site unless approved by the Superintendent
- Reinforcement to be clean, free of mill scale, rust, oil, grease, etc
- Exposed reinforcement and mild steel anchors to be repaired as follows:
  - Chisel cut concrete, perpendicular to concrete surface, 10mm around reinforcement/anchor
  - Breakout concrete around reinforcement/anchor to a depth of 60mm
  - Cut exposed reinforcement/anchor at a minimum depth of 50mm from concrete surface
  - Clean concrete surface and remove loose material
  - Abrasive blast clean exposed reinforcement/anchor
  - Apply epoxy zinc primer "Nitoprime" or equivalent
  - Thoroughly soak substrate with clean water
  - Apply polymer emulsion bonding agent "Nitobond HAR" or equivalent
  - Apply concrete repair mortar "Renderoc HB40" or equivalent to fill opening

**PROTECTIVE COATING**

- Steelwork to be hot dip galvanised to AS 4680 system designation HDG600 and threaded fasteners to AS 1214
- Damaged galvanised coating repair:
  - Power clean to AS 1627.2. If inaccessible clean by hand to AS 1627.7
  - Solvent clean/degrease to AS 1627.1
  - Apply zinc overlapping the galvanising coating

**PIPELINES**

- PE pipes shall be series 1 PN16 PE100 complying with AS/NZS 4130. All fittings used with PE pipe shall comply with AS/NZS 4129 with a nominal working pressure of PN16
- Water supply mains conveying non-drinking water shall be constructed from pipes that are purple or purple striped in accordance with the pipe product standards
- Detectable marker tape shall be laid above non-metallic pipes along the top of the embedment zone or at 1m below the surface
- Marker tape for non-drinking water shall be coloured purple and shall include the words "Recycled water - Do not drink"
- Pipework shall be site tested to the satisfaction of the superintendent as follows:
  - All pressure mains greater than or equal to 100mm shall be tested to 1200kPa in accordance with WSA 03-2002
  - All non-pressure mains shall be low pressure air tested in accordance with WSA 03-2002
- Thrust blocks shall comply with WSA STD DWG's WAT-1205 Thrust Block Details and WAT-1207 Thrust and Anchor Blocks (Brisbane City Council/ Urban Management Division)
- Excavation of trenches shall be the minimum necessary to install the pipeline and associated structures

**SAFETY IN DESIGN AND CONSTRUCTION**

- Notice to all persons who commissioned the design work depicted in these documents and to all those involved in the construction of the works, it's operation and it's demolition.
- The construction of these works involves activities which involve some risk to the health and safety of those involved directly in the construction and any person entering the work site.
- All construction work must comply with the requirements of the Local Authority Workplace Health and Safety legislation.
- It is essential that prior to the commencement of the construction, an adequate safety plan is prepared by the Principal Contractor for the proposed work in accordance with statutory requirements. The safety plan shall include appropriate work method statements for all activities. A risk analysis is to be carried out by the Contractor of all work practices and where possible all risks eliminated. Where this is not possible, the safety plan must address these risk issues with appropriate documentation for strict adherence to during construction.
- The operation of these works involves activities that have some risk to the health and safety of those using the facility. The facility requires maintenance to maintain its initial level of safety at commencement of use. Note that maintenance activities also carry health and safety risks.
- The eventual demolition of these works will involve activities which have some risk to health and safety.
- Please contact Osborn Lane Consulting Engineers for information and assistance with minimising these risks.

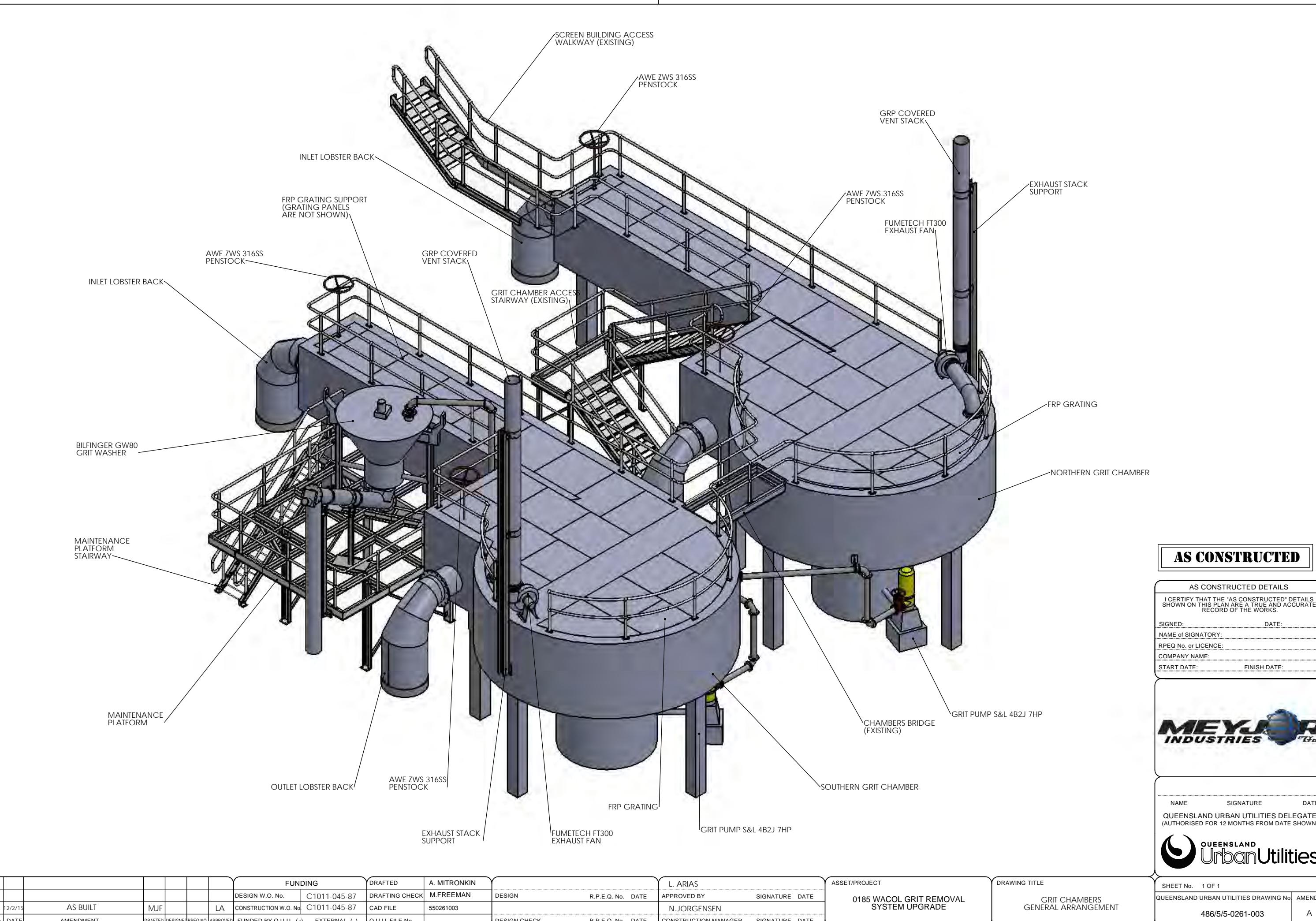
AS CONSTRUCTED DETAILS	
I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.	
SIGNED:	DATE:
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RPEQ No. or LICENCE:	
COMPANY NAME:	
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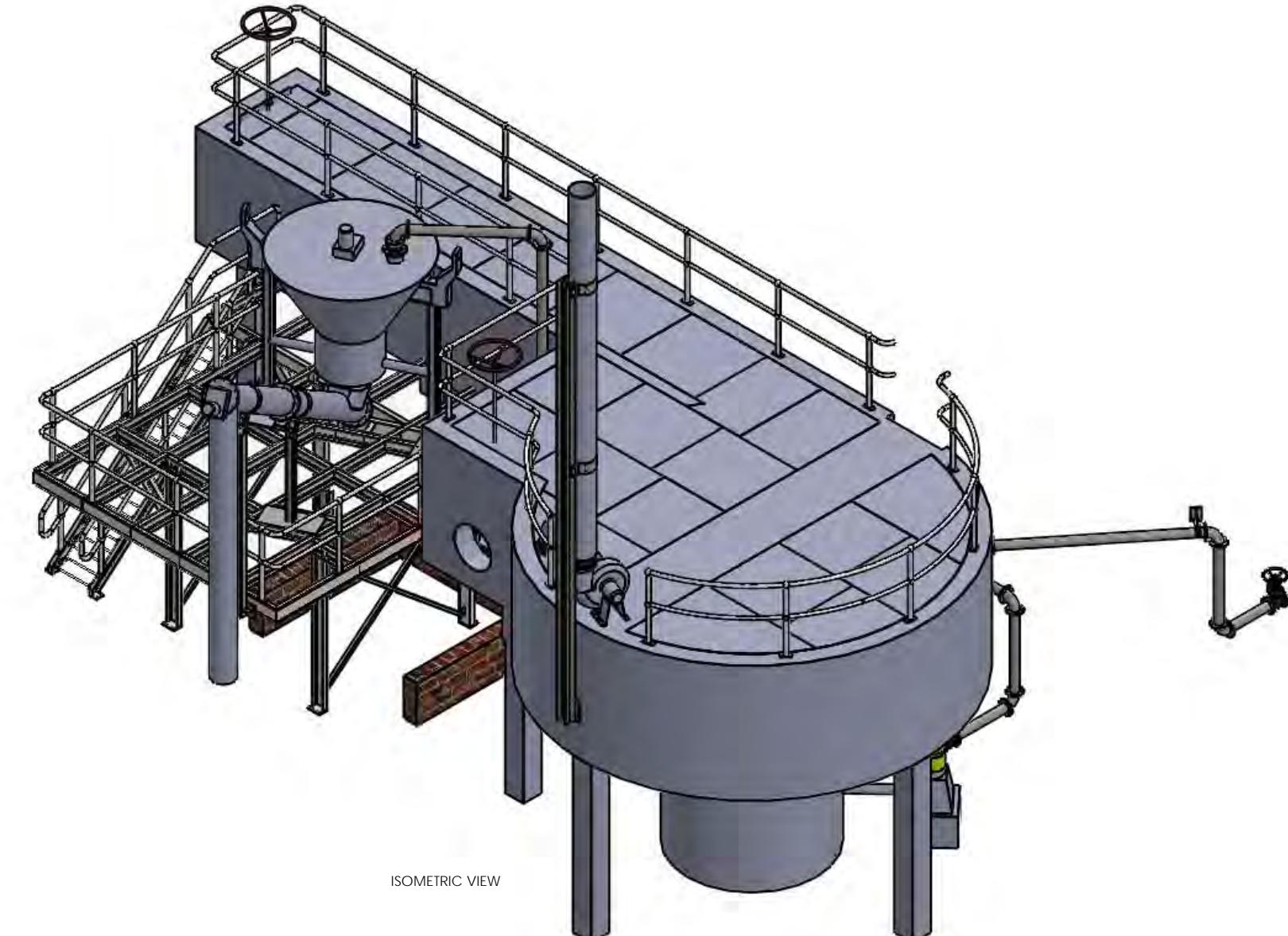
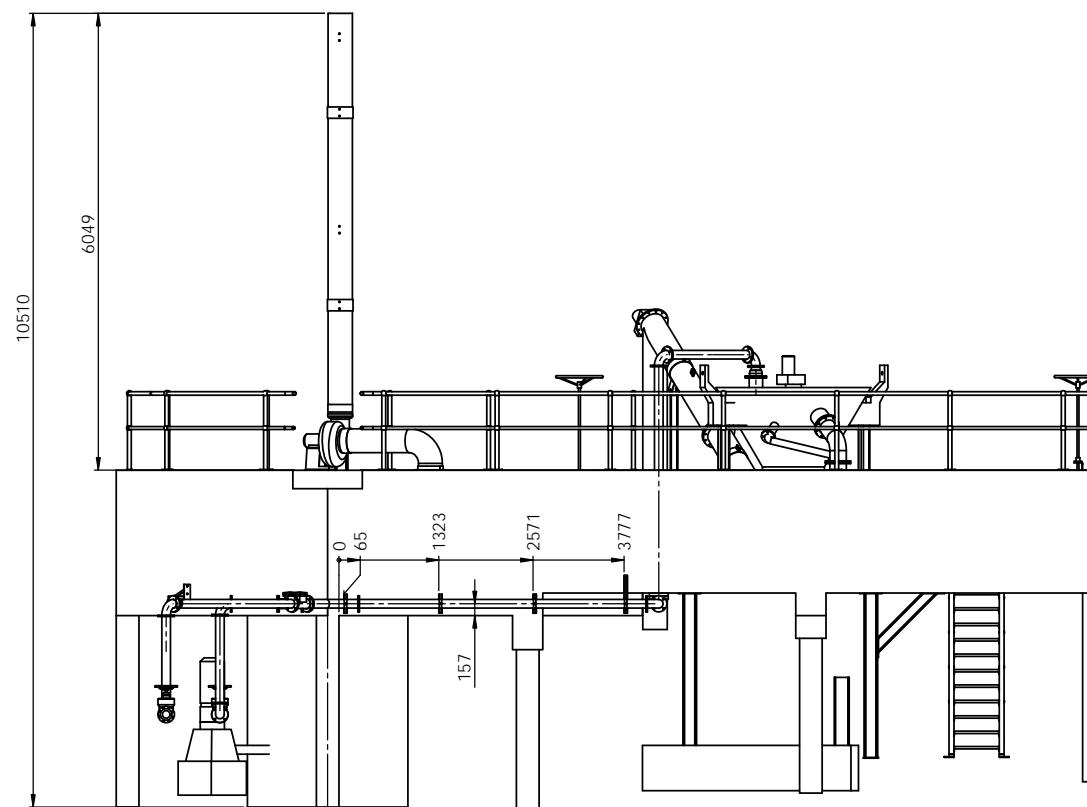
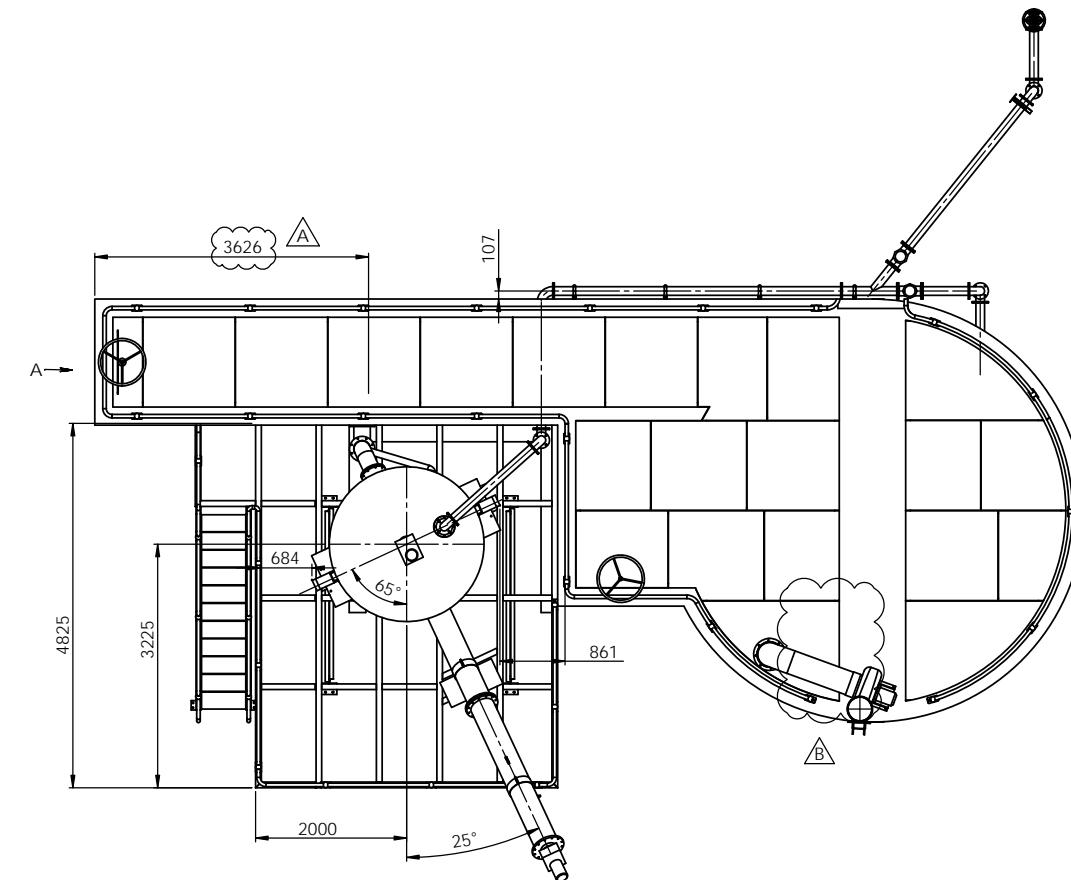


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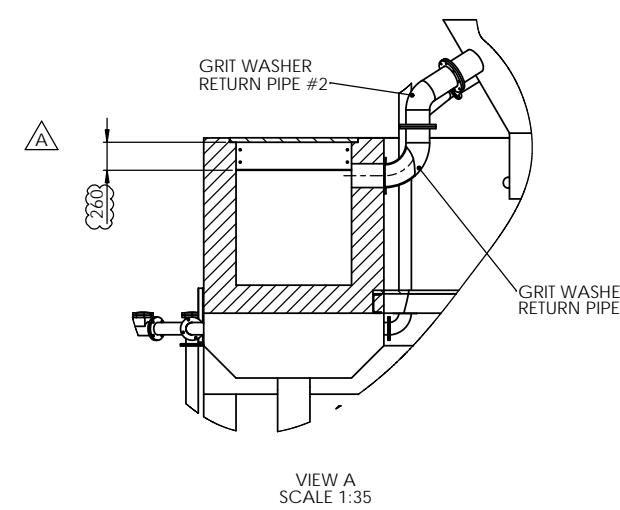
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QUEENSLAND Urban Utilities	
SHEET No. 1 OF 1	AMEND.
QUEENSLAND URBAN UTILITIES DRAWING No. 486/5-0261-002	A

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					DESIGN W.O. No.	C1011-045-87	DRAFTING CHECK	M.FREEMAN	DESIGN	R.P.E.Q. No.	DATE	APPROVED BY	SIGNATURE	DATE	
A 12/2/15	AS BUILT	MJF		LA	CONSTRUCTION W.O. No.	C1011-045-87	CAD FILE	550261002	N.JORGENSEN			CONSTRUCTION MANAGER	SIGNATURE	DATE	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE No.		DESIGN CHECK	R.P.E.Q. No.	DATE				CONSTRUCTION NOTES





ISOMETRIC VIEW

VIEW A  
SCALE 1:35**AS CONSTRUCTED**

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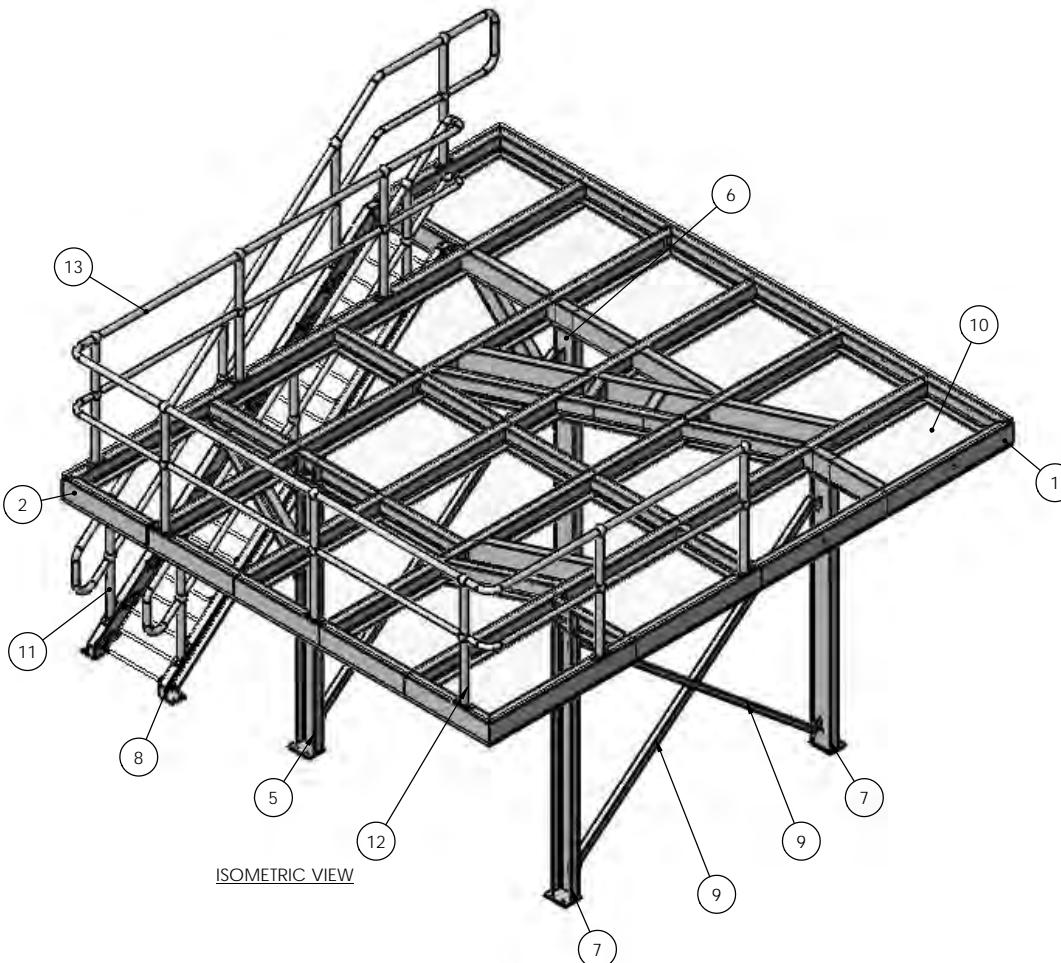
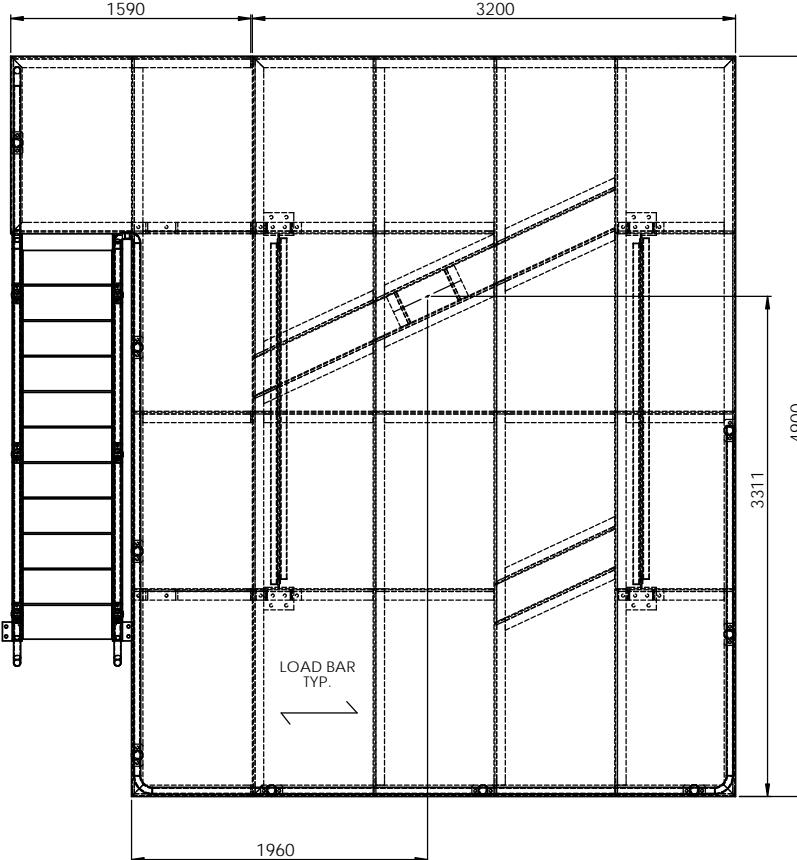
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 RPEQ No. or LICENCE: \_\_\_\_\_  
 COMPANY NAME: \_\_\_\_\_  
 START DATE: \_\_\_\_\_ FINISH DATE: \_\_\_\_\_



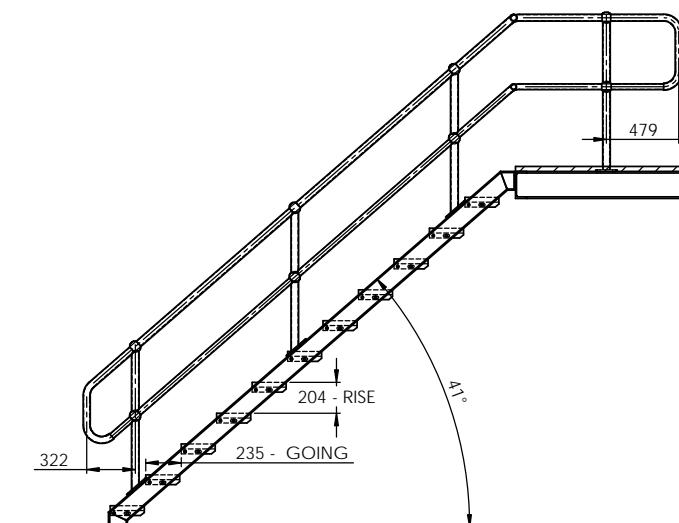
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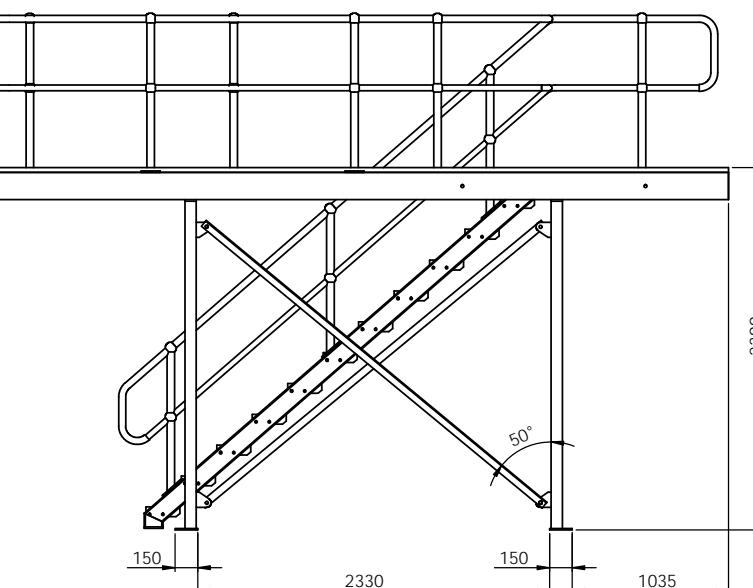
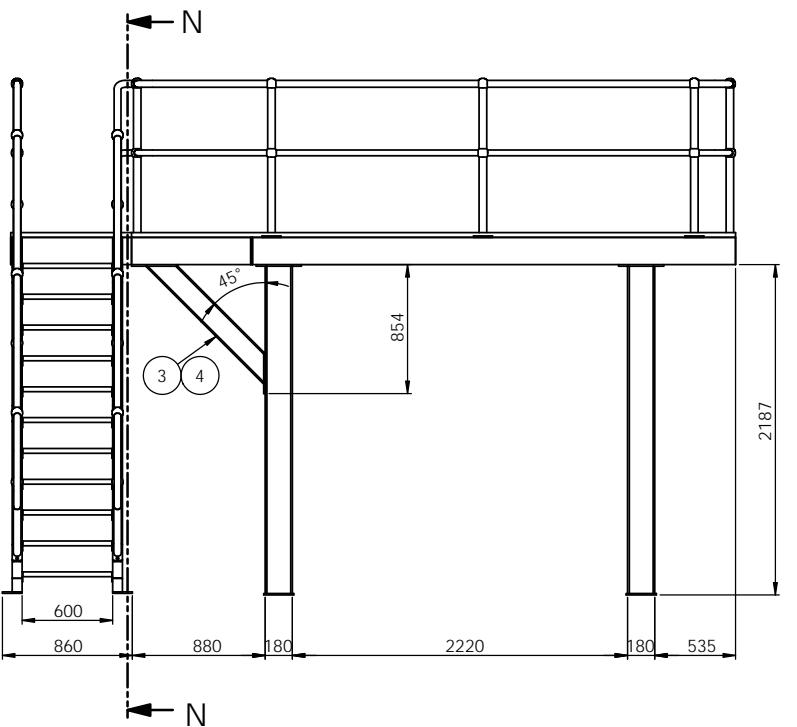
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A 12/2/15	AS BUILT	MJF	LA					CONSTRUCTION MANAGER		QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/0261-004	AMEND. A
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO APPROVED	FUNDED BY Q.U.U. ( ) EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK	R.P.E.Q. No. DATE			



Item	Part No	Description	Qty
1	0185-FRAME20	GRIT WASHER FRAME #1	1
2	0185-FRAME21	GRIT WASHER FRAME #2	1
3	0185-PLATFORM20-KB	GRIT WASHER FRAME #2 SUPPORT	1
4	Mirror0185-PLATFORM20-KB	GRIT WASHER FRAME #2 SUPPORT (OPP HAND)	1
5	0185-POST20-ASSY	PLATFORM POST #1	1
6	0185-POST21-ASSY	PLATFORM POST #1 (OPP HAND)	1
7	0185-POST22-ASSY	PLATFORM POST #2	2
8	0185-BTM-STAIRS	MAINTENANCE STAIRWAY	1
9	0185-PLATF20-BRACE01	PLATFORM BRACE EA 50x50x6.0 - 2927	4
10	0185-PLATFORM20-MESH	WELDLOK A30-325 MS GRATING	1
11	AM-41deg STD AL	ANGLE MOUNT STANCHION ALUM 41.90 deg	6
12	0185-P STD AL	PLATFORM STANCHION ALUMINIUM	9
13	0185-PLATF20-HRAIL	MAINTENANCE PLATFORM ALUMINIUM HANDBRAIL	1



SECTION N-N  
SCALE 1 : 25



### AS CONSTRUCTED

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NAME of SIGNATORY:

DATE:

RPEQ No. or LICENCE:

COMPANY NAME:

COMPANY NAME:

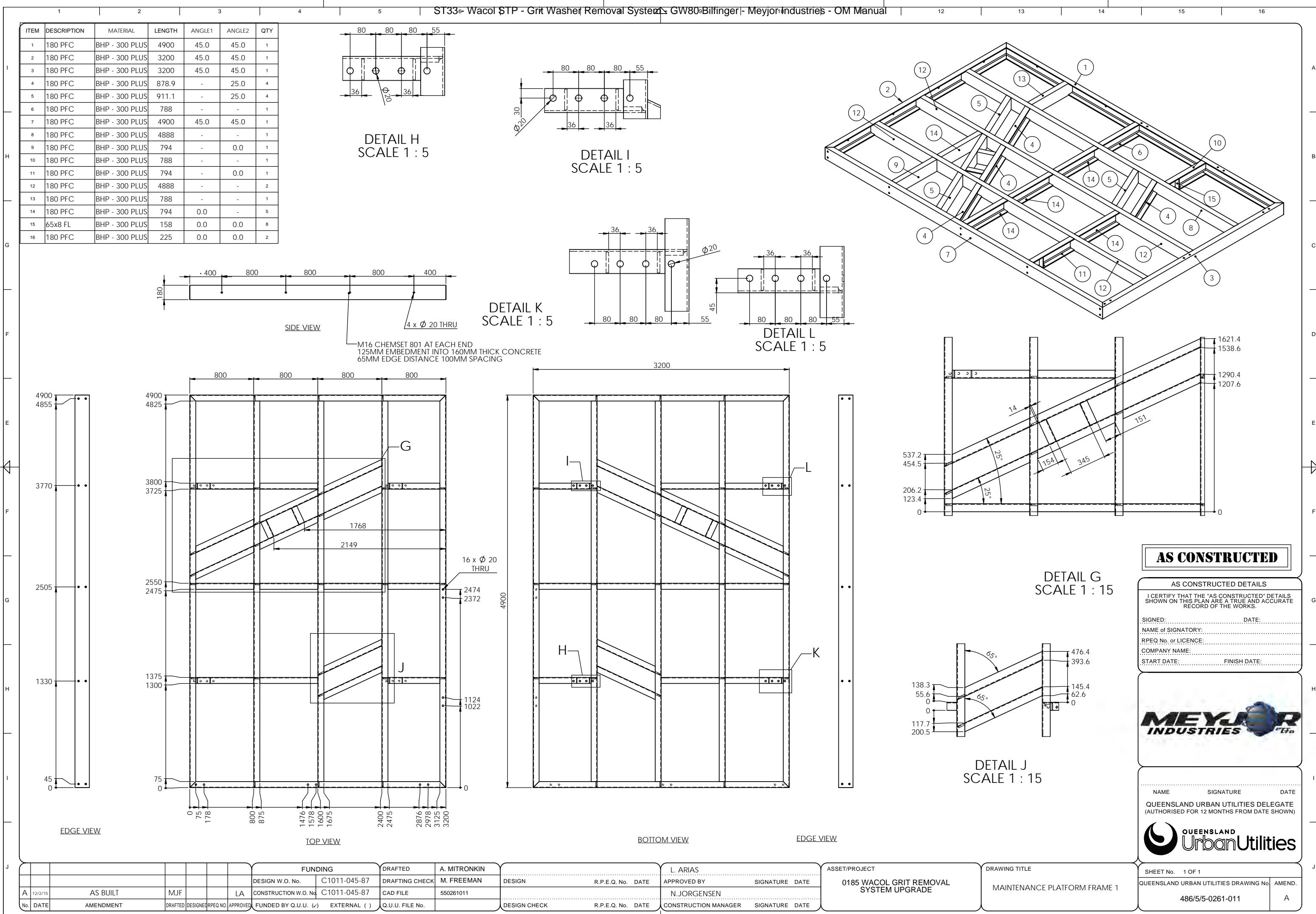
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QUEENSLAND URBAN UTILITIES DELEGATE  
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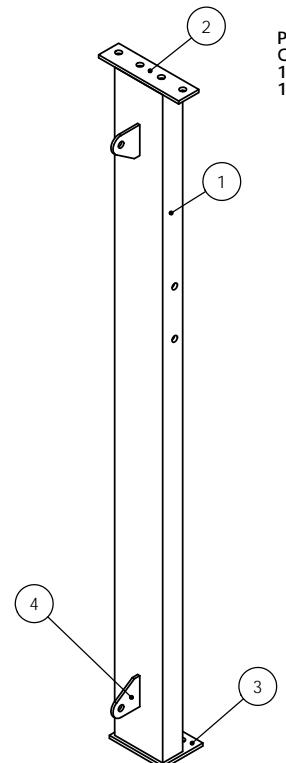
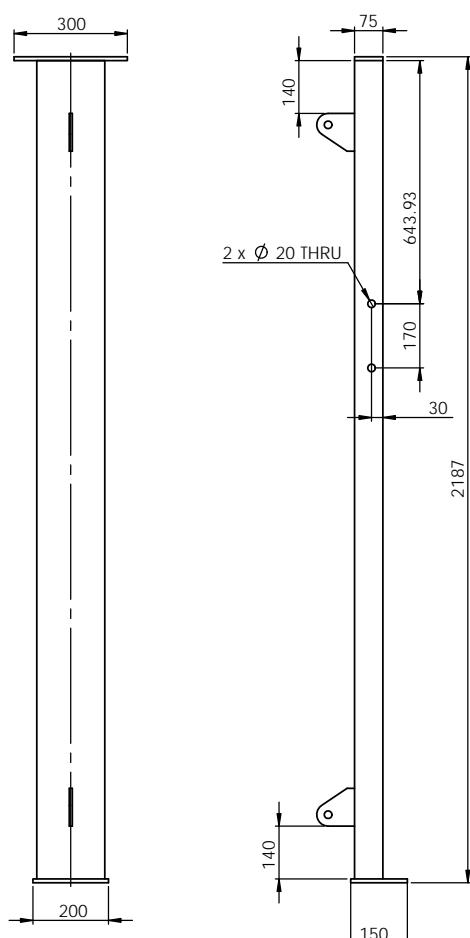
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A 12/02/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261010			CONSTRUCTION MANAGER			QUEENSLAND URBAN UTILITIES DRAWING No. 486/5-0261-010
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO APPROVED	FUNDED BY Q.U.U. ( ) EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK	R.P.E.Q. No. DATE	SIGNATURE DATE	AMEND.	A



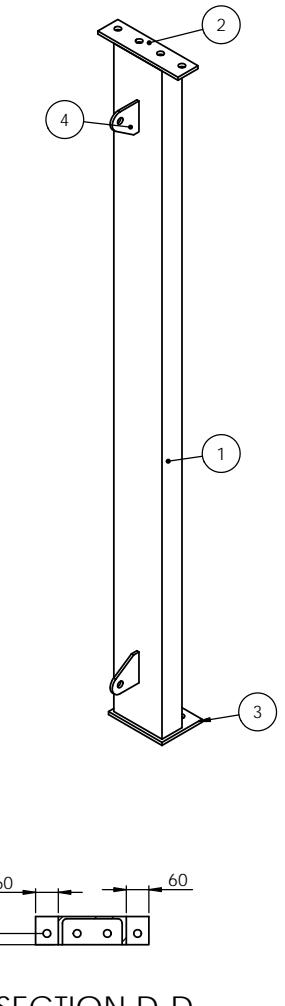
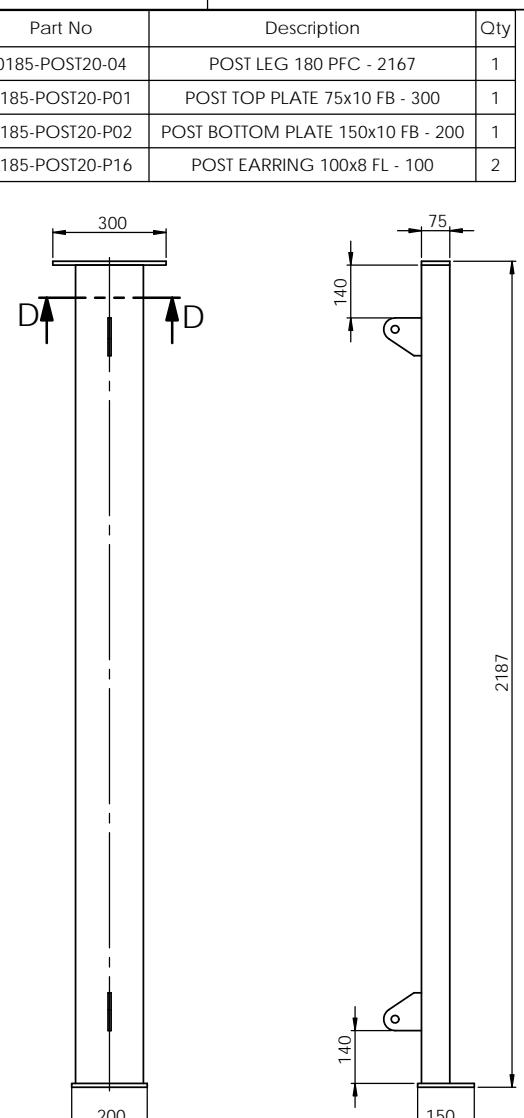
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A	12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261011		DESIGN CHECK R.P.E.Q. No. DATE	CONSTRUCTION MANAGER SIGNATURE DATE					
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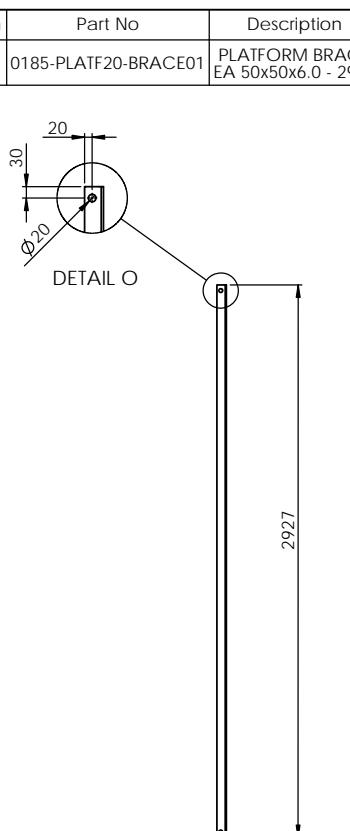
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1	0185-POST20-03	POST LEG 180 PFC - 2167	1
2	0185-POST20-P01	POST TOP PLATE 75x10 FB - 300	1
3	0185-POST20-P02	POST BOTTOM PLATE 150x10 FB - 200	1
4	0185-POST20-P16	POST EARRING 100x8 FL - 100	2



PLATFORM POST #1  
QTY : 2  
1 OFF AS DRAWN  
1 OFF AS OPP HAND



PLATFORM POST #2  
QTY : 2

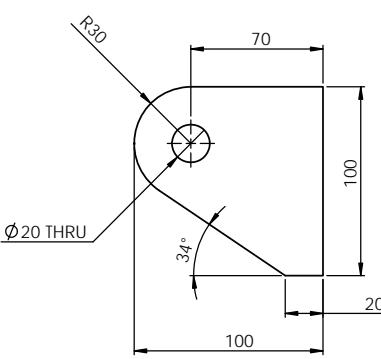
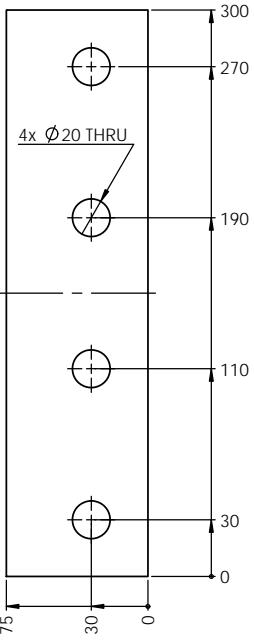
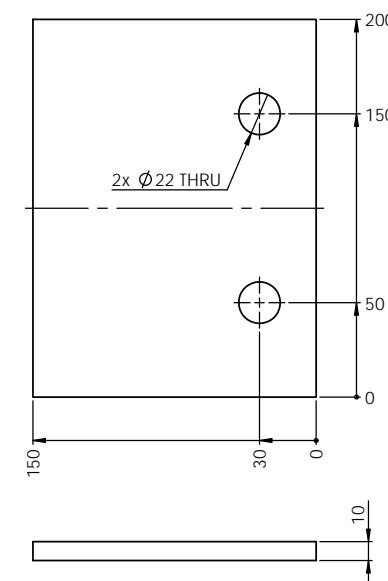


Item	Part No	Description	Qty
1	0185-POST20-P02	POST BOTTOM PLATE 150x10 FB - 200	4

Item	Part No	Description	Qty
1	0185-POST20-P01	POST TOP PLATE 75x10 FB - 300	4

Item	Part No	Description	Qty
1	0185-POST20-P16	POST EARRING 100x8 FL - 100	8

### AS CONSTRUCTED



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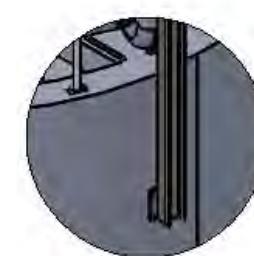
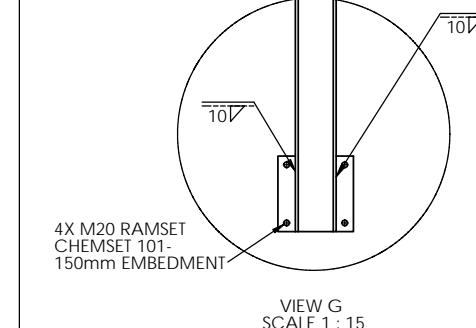
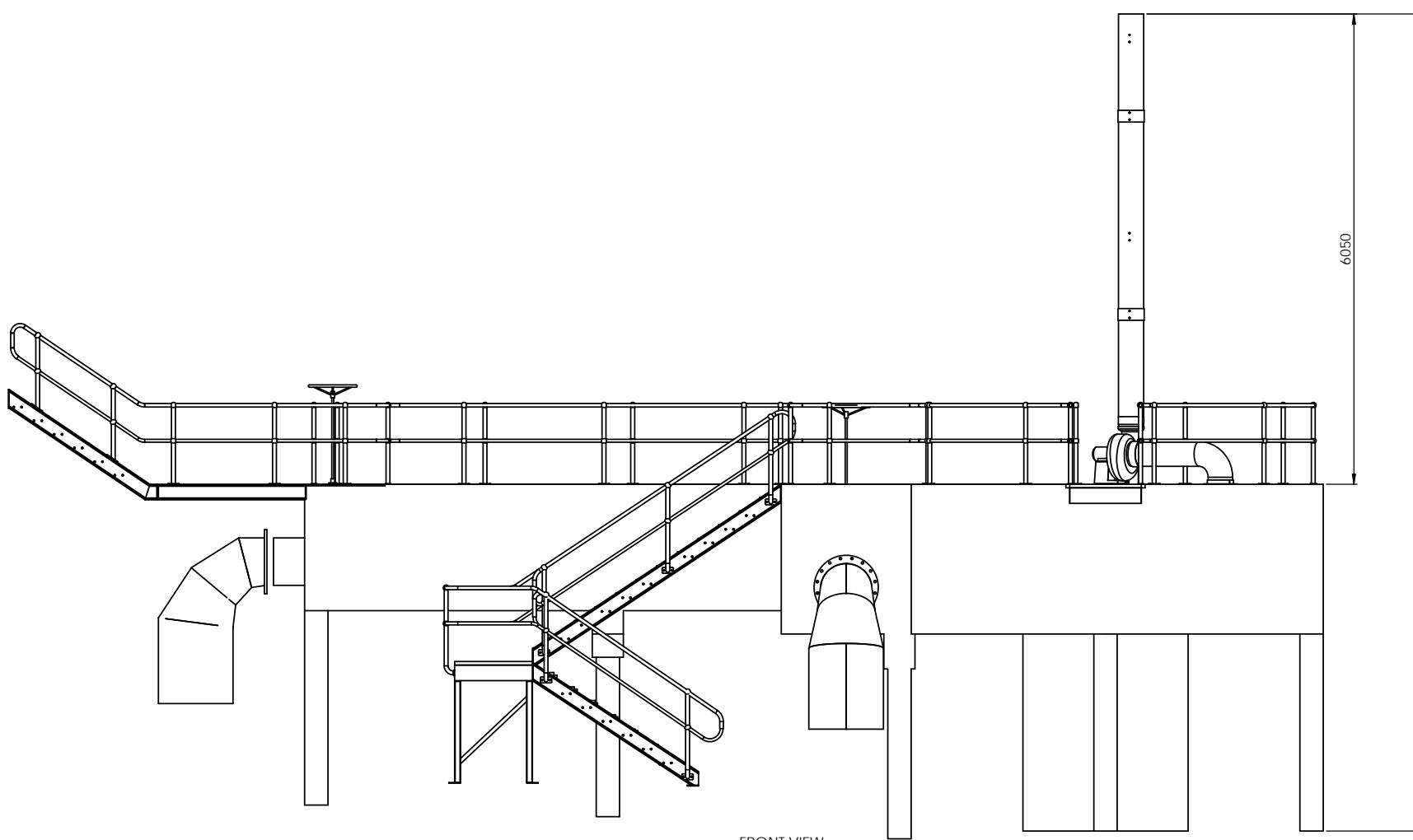
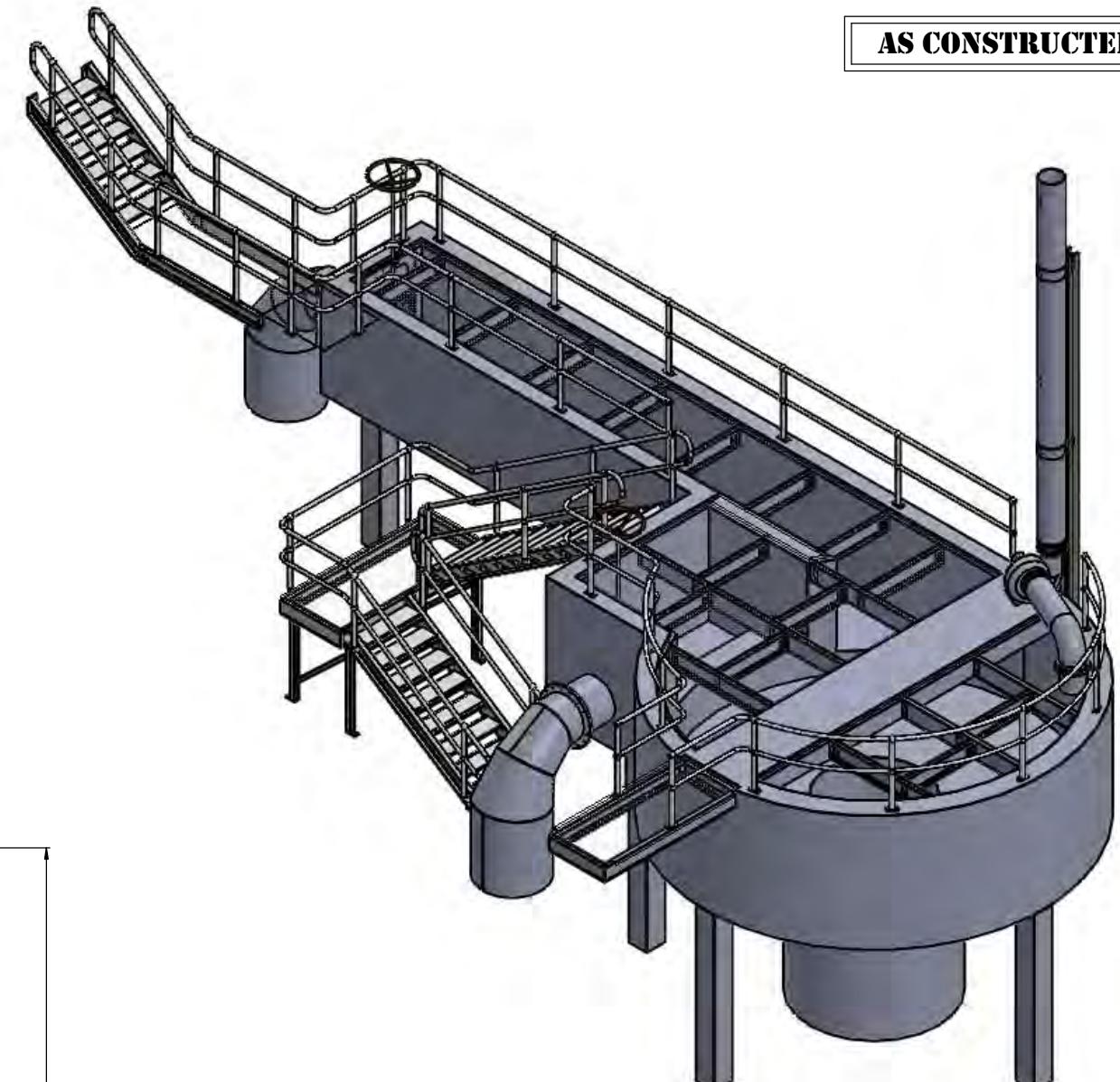
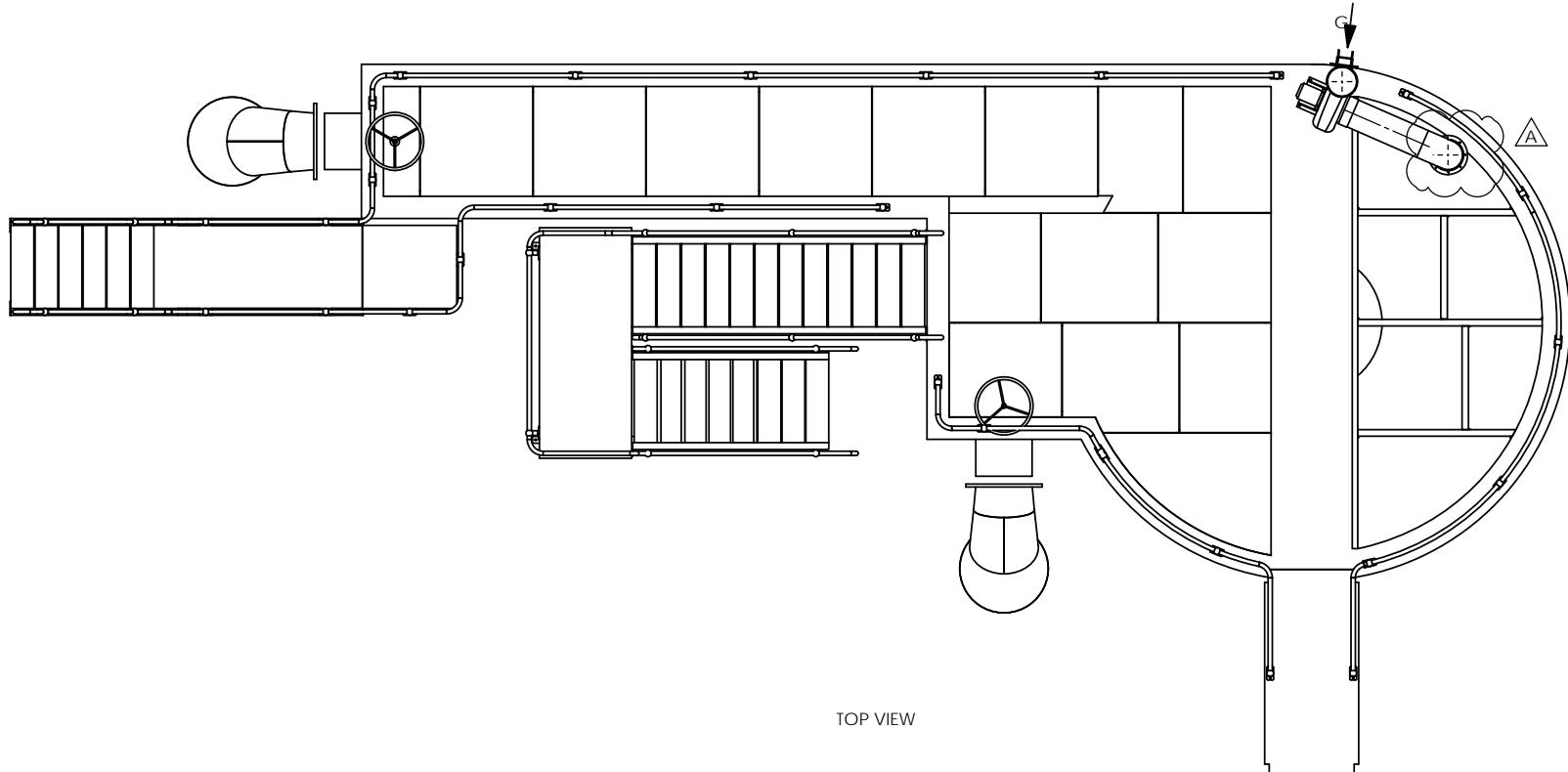


NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)



					FUNDING	DRAFTED	A. MITRONKIN		L. ARIAS		ASSET/PROJECT	DRAWING TITLE		
					DESIGN W.O. No. C1011-045-87	DRAFTING CHECK M. FREEMAN		DESIGN R.P.E.Q. No. DATE	APPROVED BY	SIGNATURE DATE	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	MAINTENANCE PLATFORM POSTS		
A	12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261013		DESIGN CHECK R.P.E.Q. No. DATE	N. JORGENSEN	CONSTRUCTION MANAGER	SIGNATURE DATE			
No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE NO.						



**AS CONSTRUCTED**

**AS CONSTRUCTED DETAILS**

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

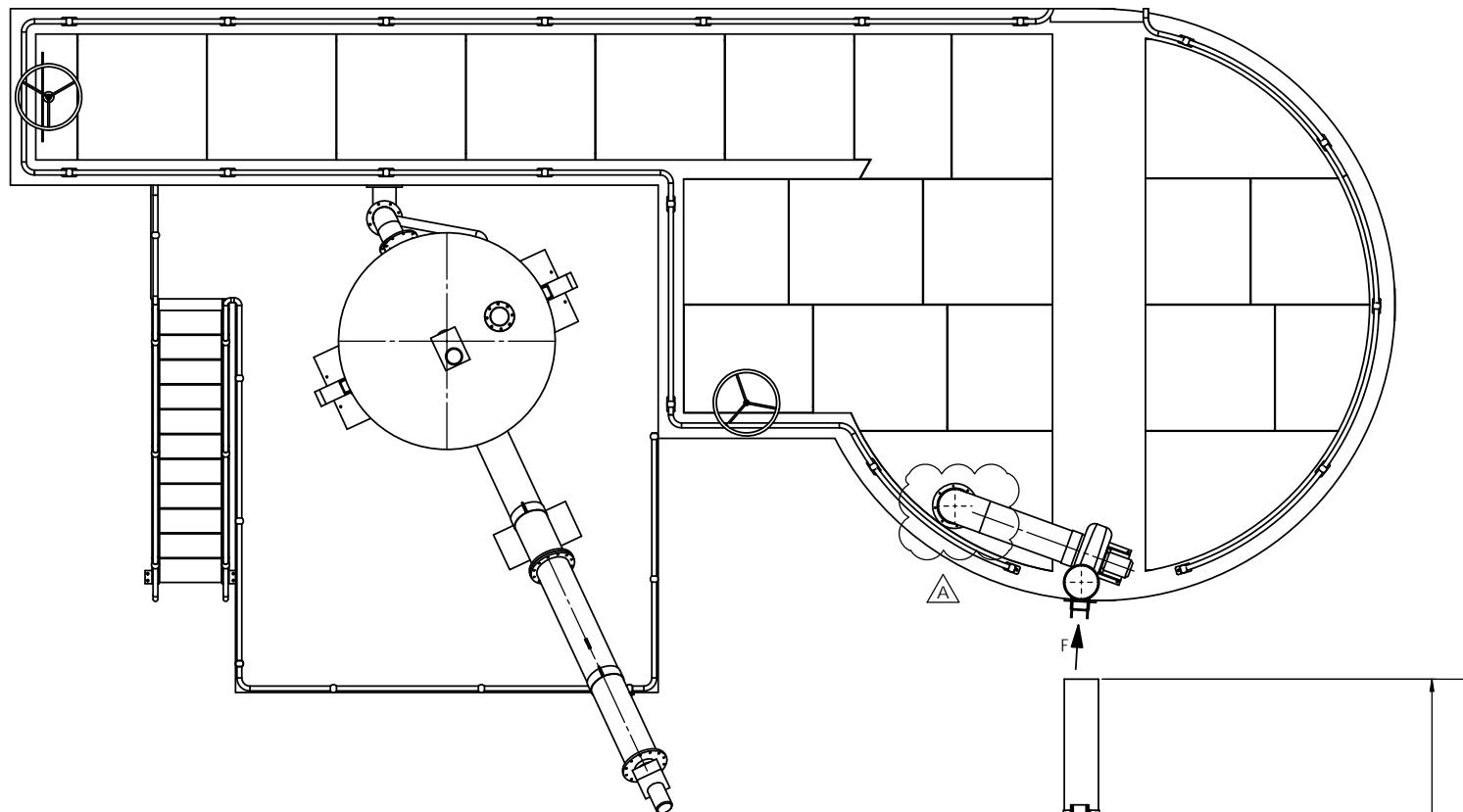
SIGNED: DATE:  
NAME of SIGNATORY:  
RPEQ No. or LICENCE:  
COMPANY NAME:  
START DATE: FINISH DATE:



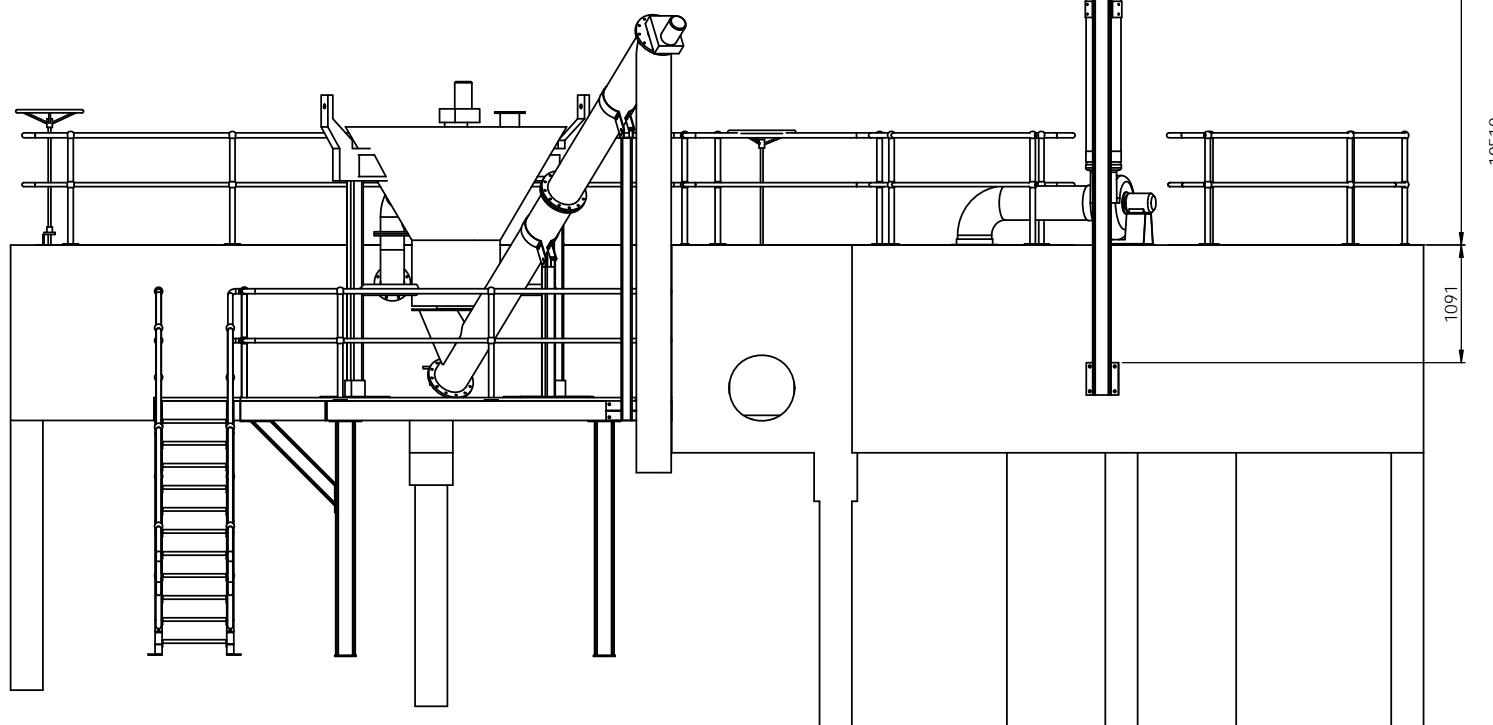
NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
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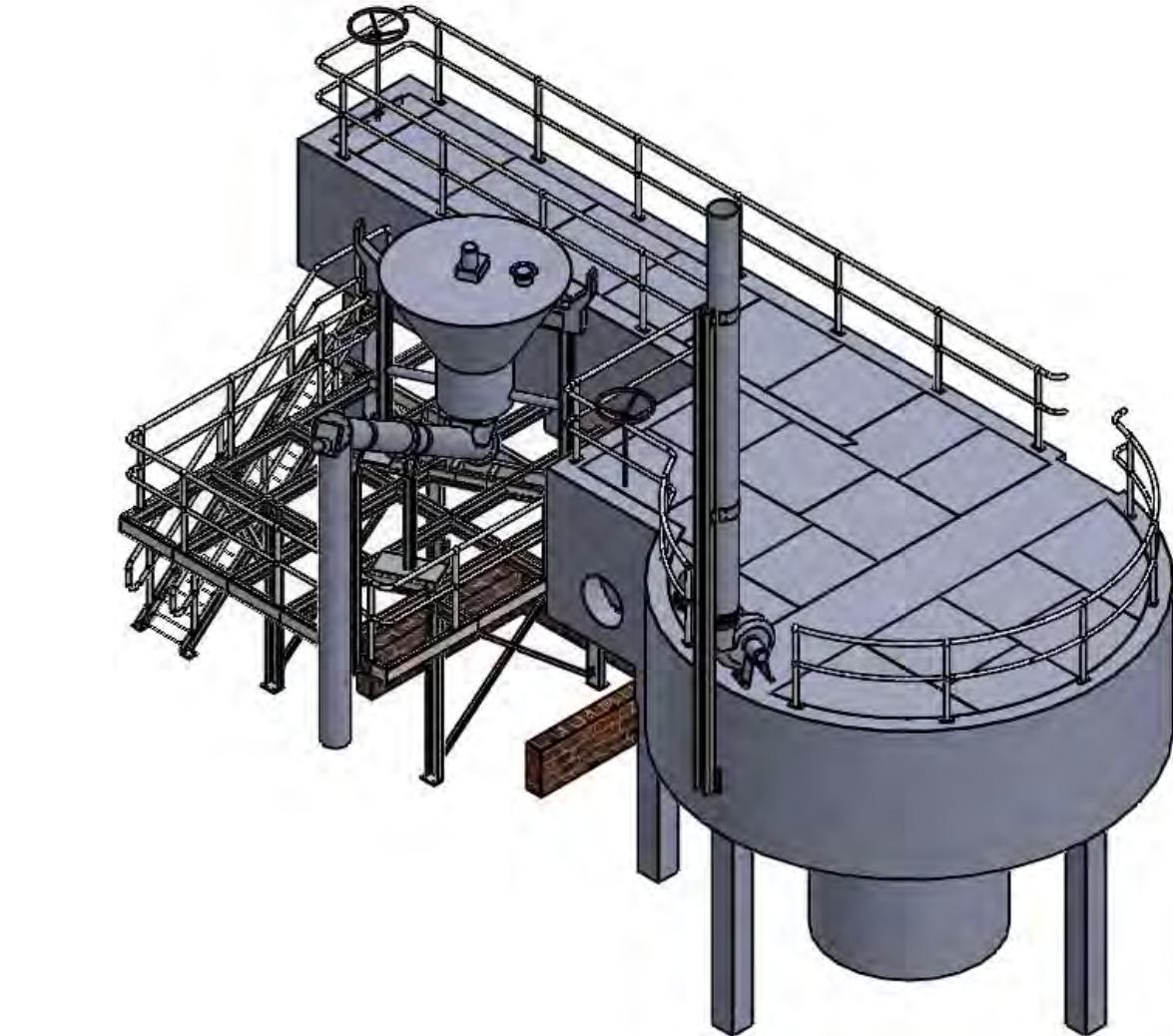
					FUNDING	DRAFTED	A. MITRONKIN	L. ARIAS	ASSET/PROJECT	DRAWING TITLE	SHEET No. 1 OF 1
A	12/2/15	AS BUILT	MJF	LA	DESIGN W.O. No. C1011-045-87 CONSTRUCTION W.O. No. C1011-045-87	DRAFTING CHECK M.FREEMAN CAD FILE 550261020	APPROVED BY N.JORGENSEN	CONSTRUCTION MANAGER	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	NORTHERN CHAMBER EXHAUST FAN GENERAL ARRANGEMENT	QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/0261-020 AMEND. A



TOP VIEW



FRONT VIEW



ISOMETRIC VIEW

**AS CONSTRUCTED****AS CONSTRUCTED DETAILS**

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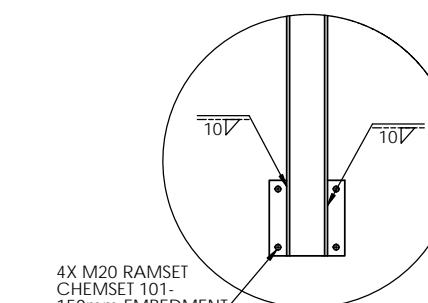
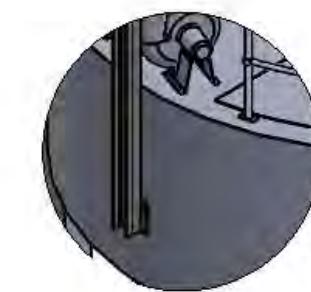
NAME of SIGNATORY:

DATE:

RPEQ No. or LICENCE:

COMPANY NAME:

COMPANY NAME: START DATE: FINISH DATE:

VIEW F  
SCALE 1 : 15

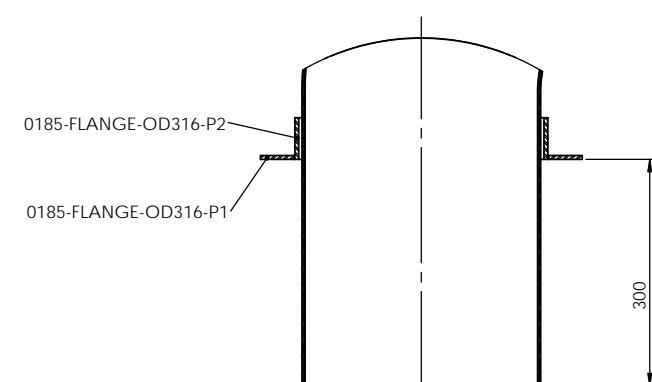
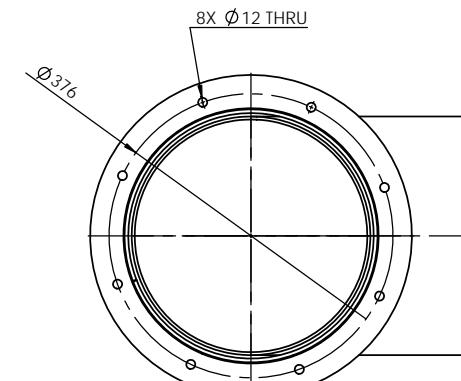
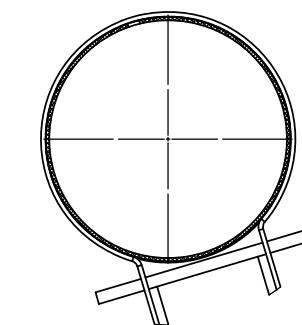
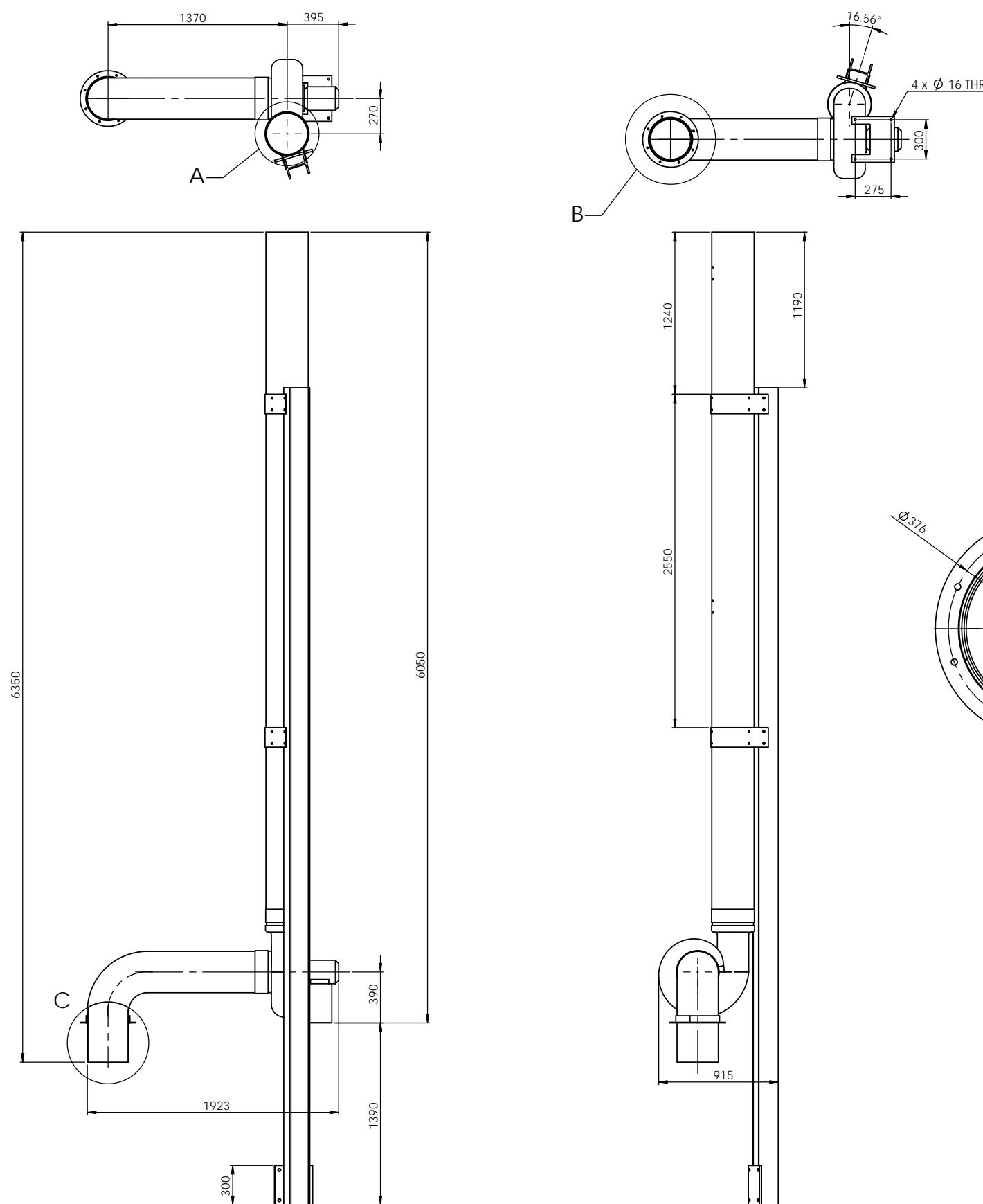
EXHAUST FAN INSTALLATION

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



					FUNDING	DRAFTED	A. MITRONKIN		L. ARIAS		ASSET/PROJECT	DRAWING TITLE		
					DESIGN W.O. No. C1011-045-87	DRAFTING CHECK M.FREEMAN		DESIGN R.P.E.Q. No. DATE	APPROVED BY SIGNATURE DATE		0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	SOUTHERN CHAMBER EXHAUST FAN GENERAL ARRANGEMENT		
A 12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261021		N.JORGENSEN	DESIGN CHECK R.P.E.Q. No. DATE	CONSTRUCTION MANAGER SIGNATURE DATE					
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE No.							

Item	Part No	Description	Qty
1	018X-EXHAUST-FAN-ASSY	EXHAUST FAN	1
2	018X-FANSTAND		1
3	018X-STACK-SUPP-BEAM	STACK SUPPORT BEAM 150-UC-37.2 - 6250	1
4	018X-STACK-SUPP-BEAM-PLATE	STACK SUPPORT PLATE 300x16 FL - 300	1
5	018X-EXHAUST-PIPE	EXHAUST STACK - GRP COVERED PVC	1
6	018X-STACKPIPE-CLAMP1	STACK SUPPORT CLAMP 150x6 FL - 1046	2
7	018X-GW-SP3-P1	INTAKE PIPE	1
8	018X-EXHAUST-RBBR-CPLNG	FAN RING COUPLING 100x1.5	2
9	0185-FLANGE-OD316	INATKE PIPE FLANGE	1



Detail C  
SCALE 1 : 5

**AS CONSTRUCTED**

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SIGNED: DATE:  
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R.P.E.Q. No. or LICENCE:  
COMPANY NAME:  
START DATE: FINISH DATE:

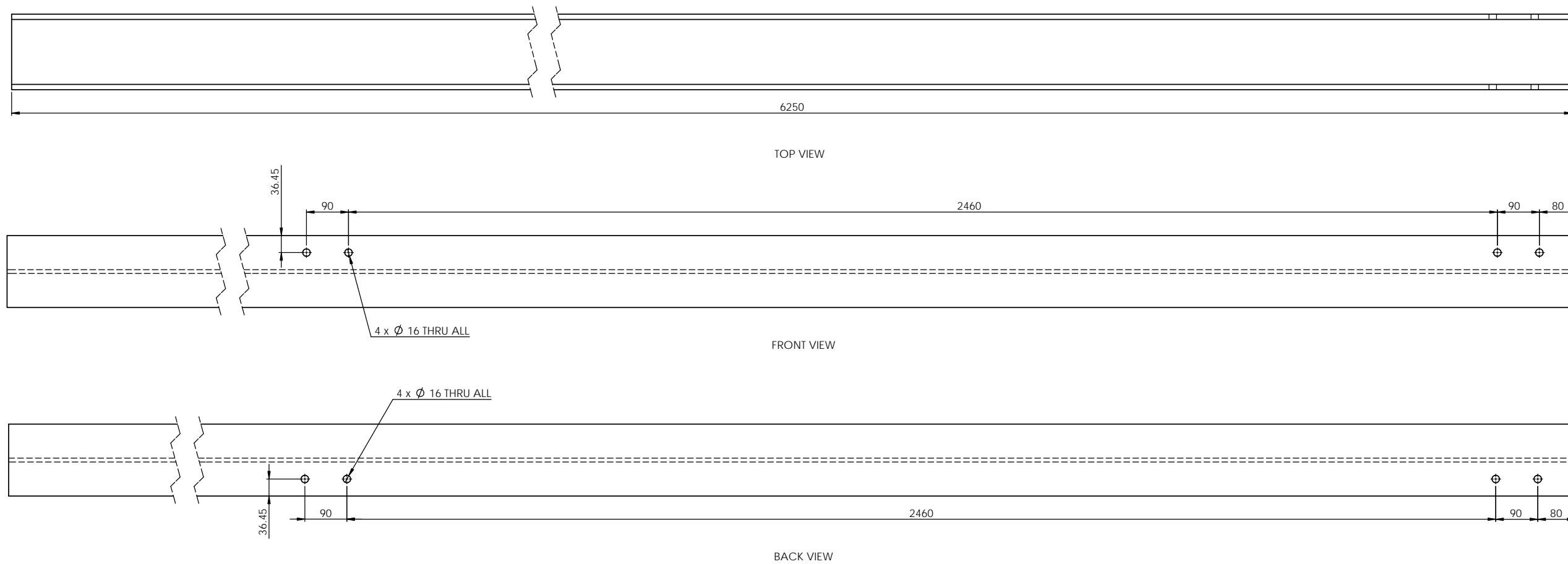
**MEYOR INDUSTRIES**

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

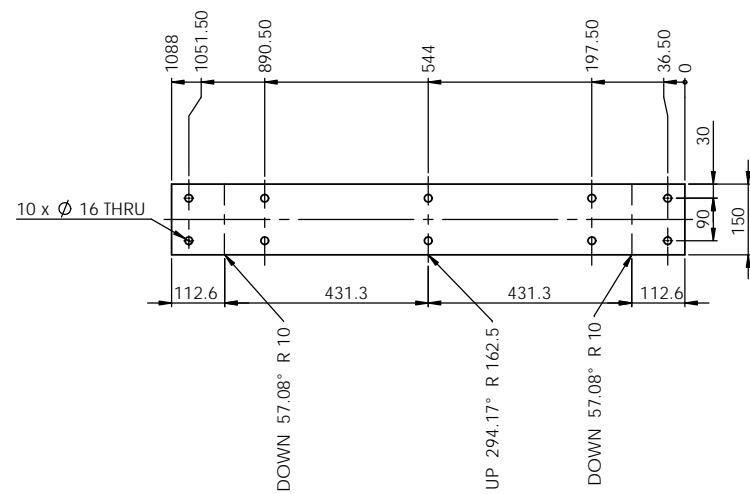
**QUEENSLAND Urban Utilities**

					FUNDING		DRAFTED	A. MITRONKIN	L. ARIAS			ASSET/PROJECT		DRAWING TITLE	SHEET No.	1 OF 1
					DESIGN W.O. No.	C1011-045-87	DRAFTING CHECK	M.FREEMAN	DESIGN	R.P.E.Q. No.	DATE	APPROVED BY	SIGNATURE	DATE	QUEENSLAND URBAN UTILITIES DRAWING No.	AMEND.
B	12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No.	C1011-045-87	CAD FILE	550261022	DESIGN CHECK	R.P.E.Q. No.	DATE	N.JORGENSEN	CONSTRUCTION MANAGER	SIGNATURE	486/5-0261-022	A
No. DATE	AMENDMENT	DRAFTED	DESIGNED	R.P.E.Q. NO.	APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE No.								

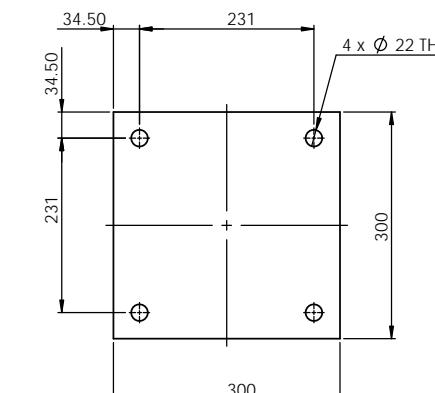
Part No	Description	Material	Qty
018X-STACK-SUPP-BEAM	STACK SUPPORT BEAM 150-UC-37.2 - 6250	BHP - 300 PLUS	2



Part No	Description	Material	Qty
018X-STACKPIPE-CLAMP1	STACK SUPPORT CLAMP 150x6 FL - 1088	AS3678-250	4



Part No	Description	Material	Qty
018X-STACK-SUPP-BEAM-PLATE	STACK SUPPORT PLATE 300x16 FL - 300	AS3678-250	2



AS CONSTRUCTED DETAILS  
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R.P.E.Q. No. or LICENCE:  
COMPANY NAME:  
START DATE: FINISH DATE:



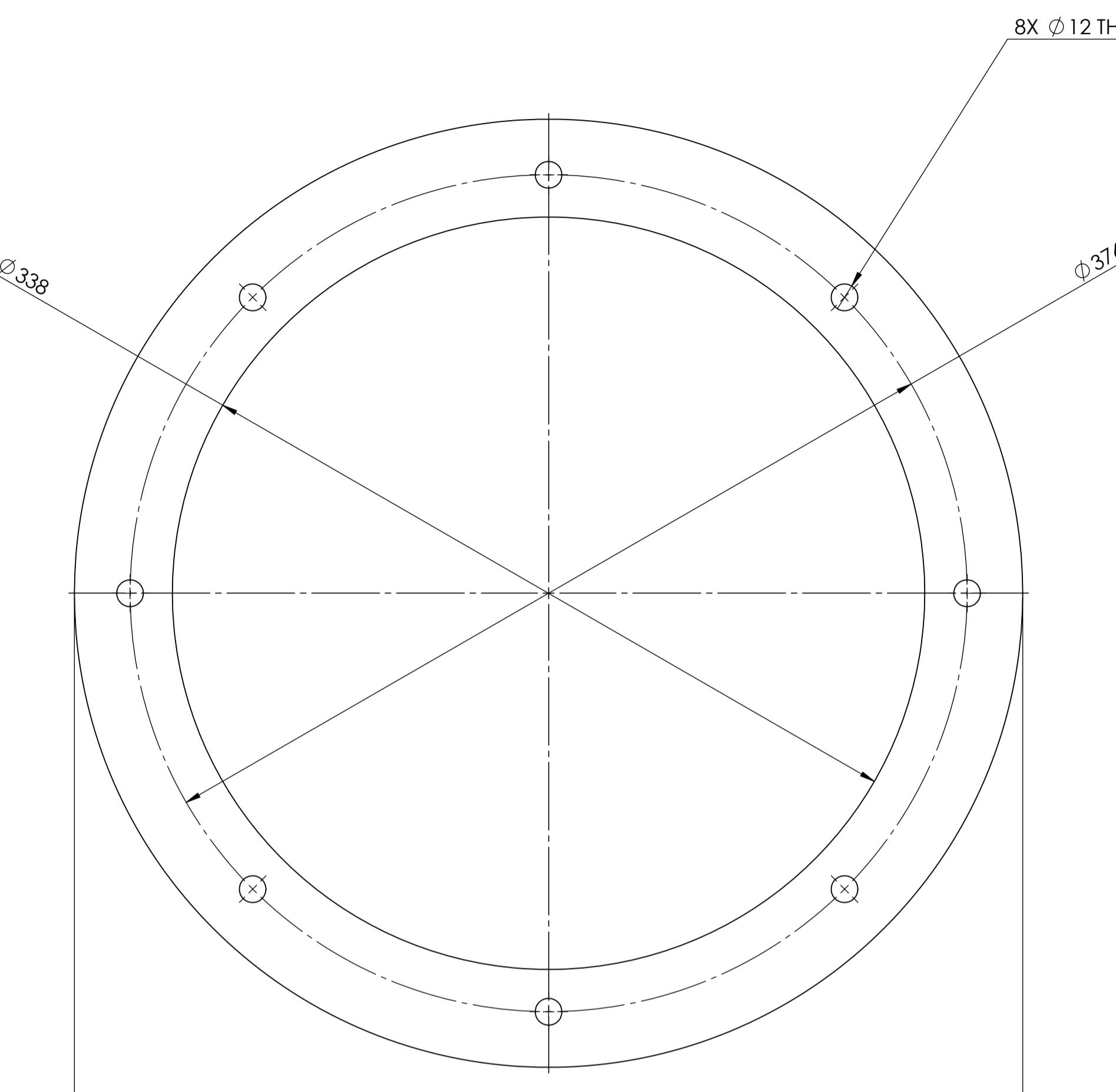
NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)



AS CONSTRUCTED

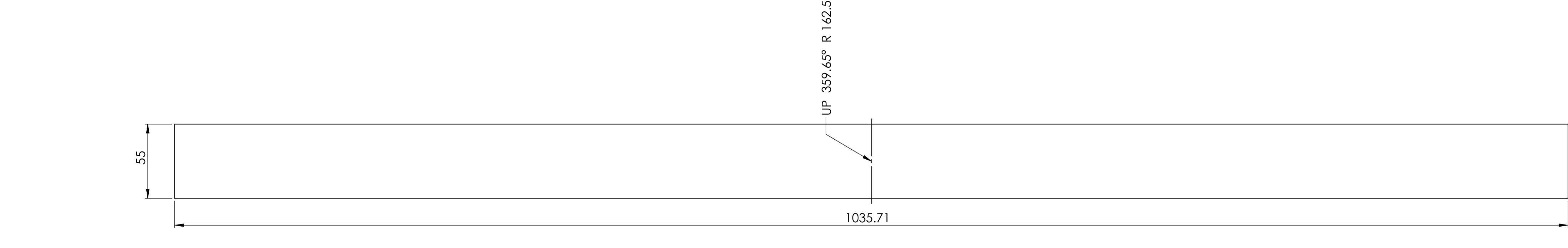
	FUNDING				DRAFTED	A. MITRONKIN	L. ARIAS	ASSET/PROJECT		DRAWING TITLE	SHEET No.
	DESIGN W.O. No.	C1011-045-87	DRAFTING CHECK	M.FREEMAN	DESIGN	R.P.E.Q. No. DATE	APPROVED BY	SIGNATURE	DATE	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	1 OF 1
A 12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No.	C1011-045-87	CAD FILE	550261023	N.JORGENSEN		EXHAUST STACK SUPPORT	QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.
No. DATE	AMENDMENT	DRAFTED	DESIGNED	R.P.E.Q. NO APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK	R.P.E.Q. No. DATE	CONSTRUCTION MANAGER	SIGNATURE DATE

ITEM NO.	PART NUMBER	Description	Material	QTY.
1	0185-FLANGE-OD316-P1	FLANGE PART #1 - 5mm	316 SS	2



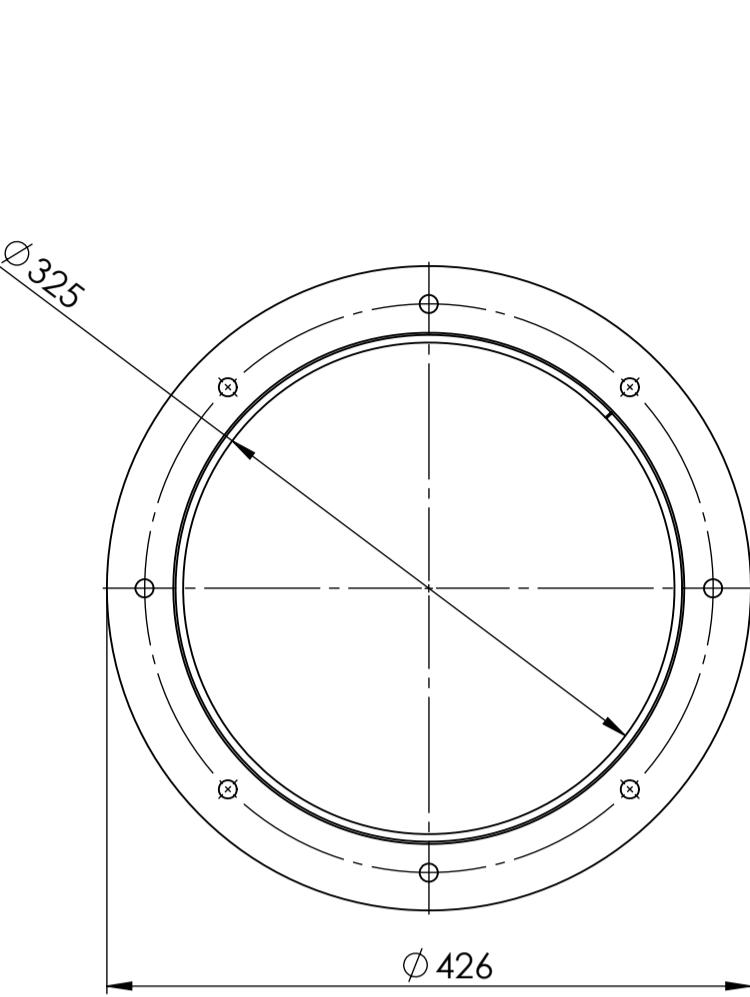
FLAT PATTERN

ITEM NO.	PART NUMBER	Description	Material	QTY.
1	0185-FLANGE-OD316-P2	FLANGE PART #2 - 5mm	316 SS	2

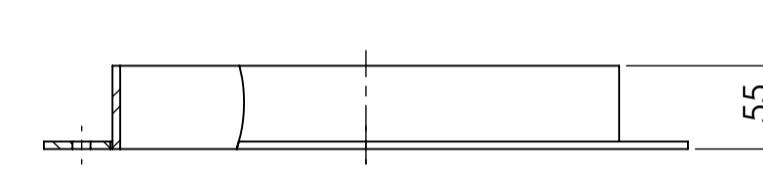


FLAT PATTERN

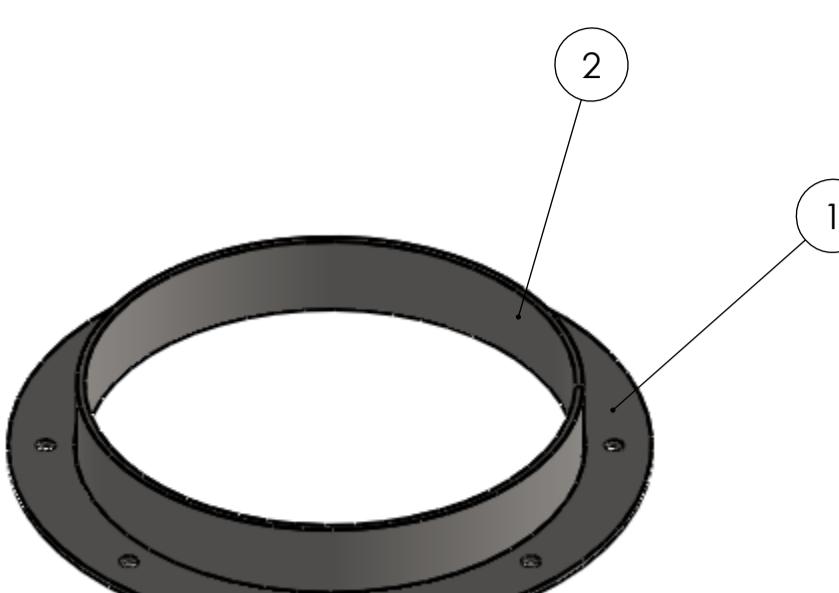
FUNDING					DRAFTED	A. MITRONKIN	L. ARIAS			ASSET/PROJECT		DRAWING TITLE	SHEET No.
A 04/12/2014	AS BUILT	AM		LA	DESIGN W.O. No.	C1011-045-87	DRAFTING CHECK	M.FREEMAN	APPROVED BY	SIGNATURE	DATE	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	1 OF 1
O 30/10/2014	ISSUED FOR CONSTRUCTION	AM		LA	CONSTRUCTION W.O. No.	C1011-045-87	CAD FILE	550261024	N.JORGENSEN			INTAKE PIPE FIXING	QUEENSLAND URBAN UTILITIES DRAWING No.
No. DATE	AMENDMENT	DRAFTED	DESIGNED	R.P.E.Q. NO.	APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE NO.	DESIGN CHECK	R.P.E.Q. NO.	DATE	CONSTRUCTION MANAGER	AMEND.



TOP VIEW



FRONT VIEW



ISOMETRIC VIEW

## NOTES:

- 1, 2 SHALL BE WELDED TO AS 1554
- BUTT WELDS SHALL BE FULL PENETRATION WELDS
- WELD TO BE 6mm CONTINUOUS FILLET WELDS ALL ROUND INTERFACES
- ALL WELDS TO BE FREE OF SLAG

0185-FLANGE-OD316  
INTAKE PIPE FLANGE  
SCALE 1:5

**AS CONSTRUCTED**

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NAME of SIGNATORY:

RPEQ No. or LICENCE:

COMPANY NAME:

START DATE:

FINISH DATE:

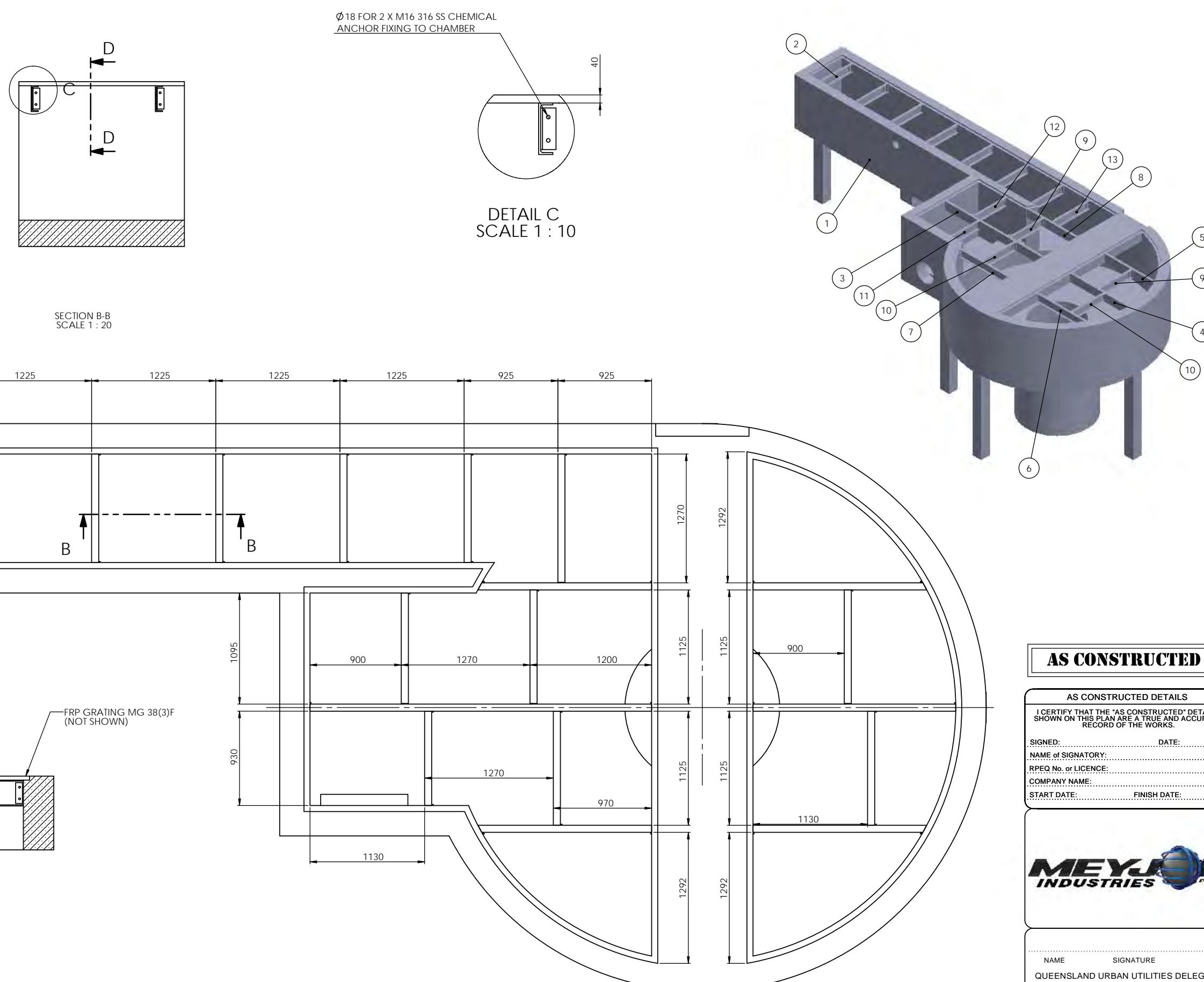


NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)



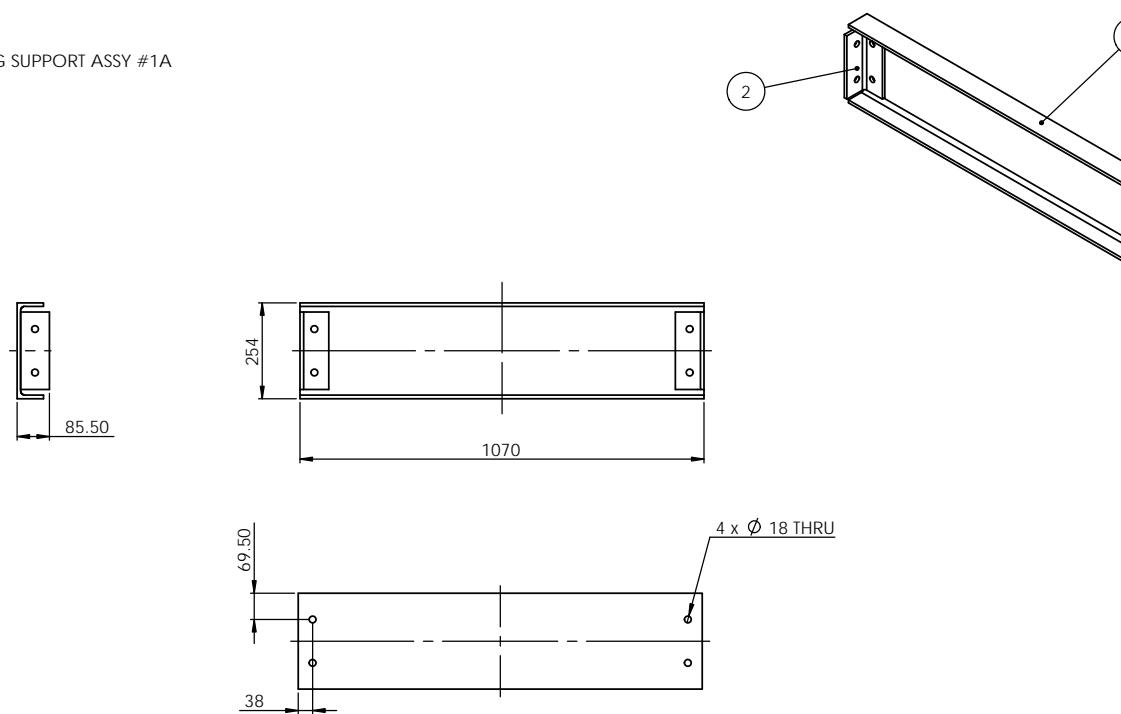
SHEET No. 1 OF 1  
QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.  
486/5/0261-024 A

Item	Part No	Description	Qty
1	0185 - GRITCHAMBER2	SOUTHERN GRIT CHAMBER	1
2	0185-GRTSUPPORT-SA1A-FRP	GRATING SUPPORT ASSY #1A	7
3	0185-GRTSUPPORT-SA2A-FRP	GRATING SUPPORT ASSY #2A	1
4	0185-GRTSUPPORT-SA3A-FRP	GRATING SUPPORT ASSY #3A	1
5	0185-GRTSUPPORT-SA4A-FRP	GRATING SUPPORT ASSY #4A	1
6	0185-GRTSUPPORT-SA4B-FRP	GRATING SUPPORT ASSY #4B	1
7	0185-GRTSUPPORT-SA4D-FRP	GRATING SUPPORT ASSY #4D	1
8	0185-GRTSUPPORT-SA4C-FRP	GRATING SUPPORT ASSY #4C	1
9	0185-GRTSUPPORT-SA1F-FRP	GRATING SUPPORT ASSY #1F	2
10	0185-GRTSUPPORT-SA1E-FRP	GRATING SUPPORT ASSY #1E	2
11	0185-GRTSUPPORT-SA1C-FRP	GRATING SUPPORT ASSY #1C	1
12	0185-GRTSUPPORT-SA1B-FRP	GRATING SUPPORT ASSY #1B	1
13	0185-GRTSUPPORT-SA1D-FRP	GRATING SUPPORT ASSY #1D	1
15	0185-GRATING-21	GRATING MG-38(3)F	1

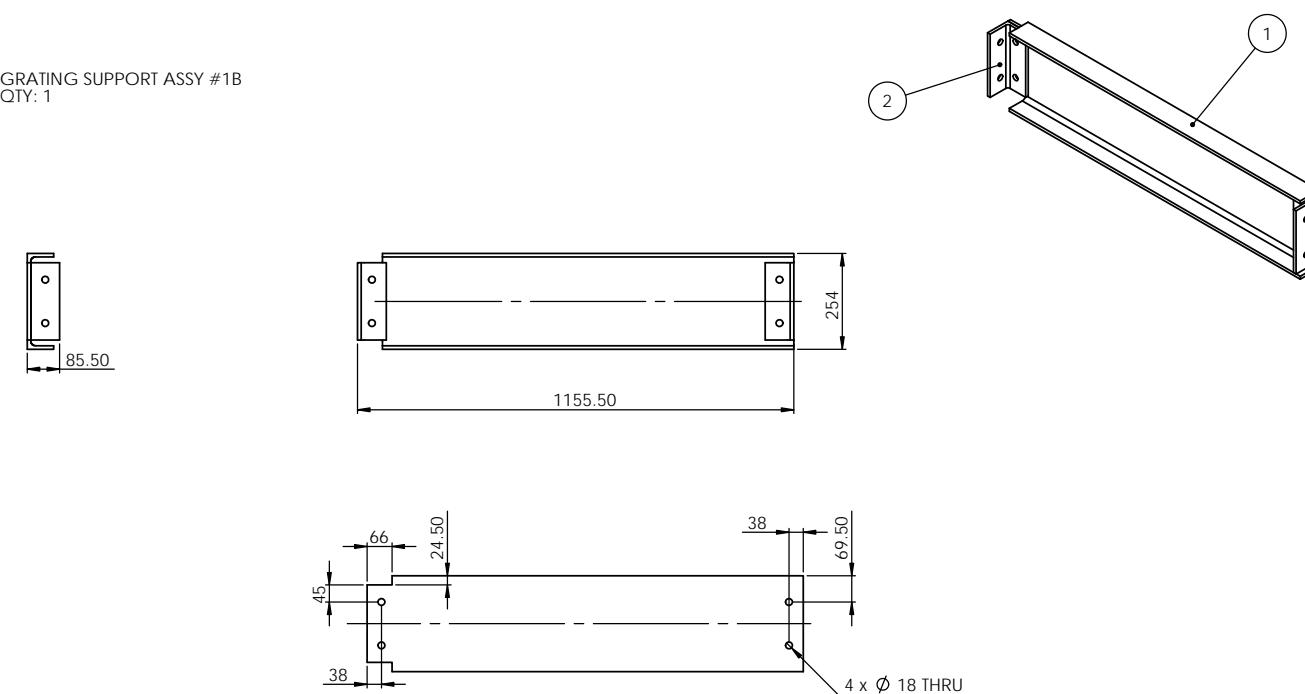


	FUNDING					DRAFTED	A. MITRONKIN	L. ARIAS	ASSET/PROJECT	DRAWING TITLE	SHEET No.		
	DESIGN W.O. No.	C1011-045-87	DRAFTING CHECK	M.FREEMAN	CONSTRUCTION W.O. No.	C1011-045-87	R.P.E.Q. No.	DATE	APPROVED BY	SIGNATURE	DATE		
A 12/2/15	AS BUILT	MJF	LA			CAD FILE	550261031		N.JORGENSEN				
No. DATE	AMENDMENT	DRAFTED	DESIGNED	R.P.E.Q. NO APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK	R.P.E.Q. No.	DATE	CONSTRUCTION MANAGER	SIGNATURE	DATE

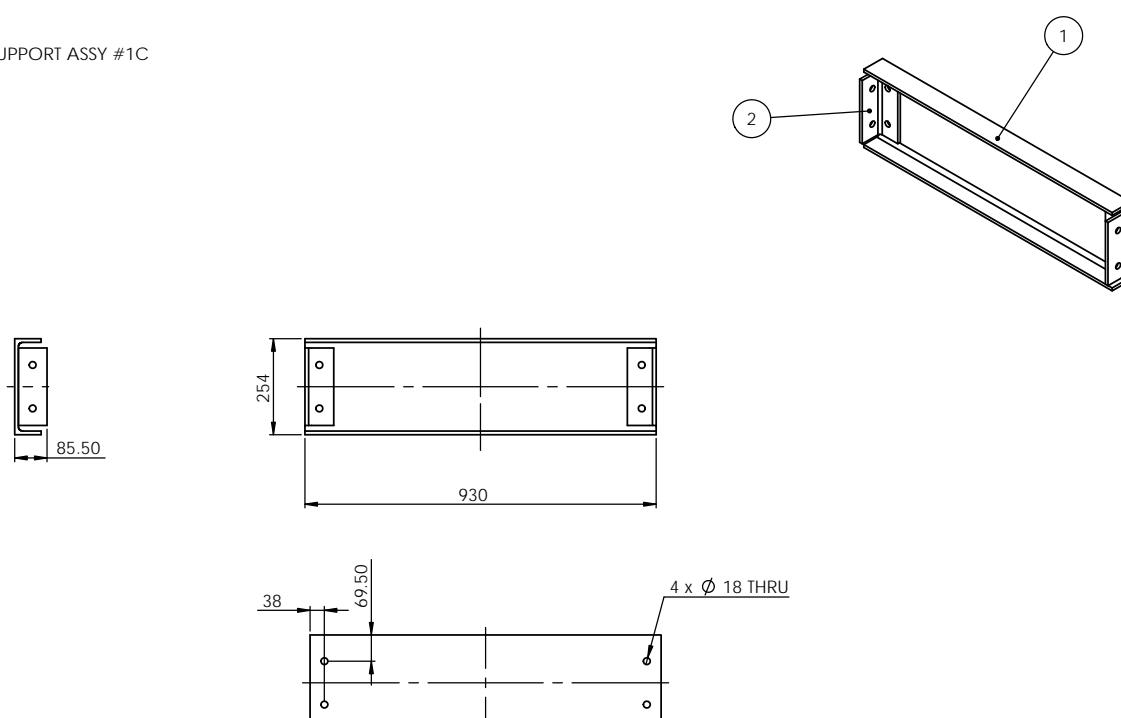
Item	Part No	Description	Qty
1	0185-GRTSUPP-P01-FRP	GRATING SUPPORT MEMBER #1A FRP CS 70x254x9.5 - 1070	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

GRATING SUPPORT ASSY #1A  
QTY: 7

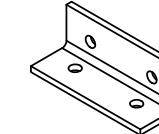
Item	Part No	Description	Qty
1	0185-GRTSUPP-P01B-FRP	GRATING SUPPORT MEMBER #1B FRP CS 9.5x254x70 - 1155.5	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

GRATING SUPPORT ASSY #1B  
QTY: 1

Item	Part No	Description	Qty
1	0185-GRTSUPP-P01C-FRP	GRATING SUPPORT MEMBER #1C FRP CS 70x254x9.5 - 930	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

GRATING SUPPORT ASSY #1C  
QTY: 1

Item	Part No	Description	Qty
1	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	20

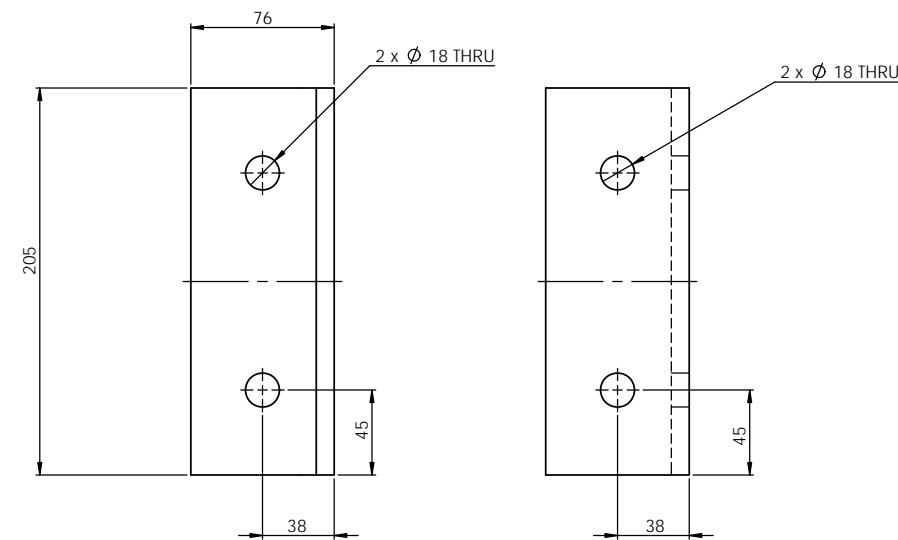
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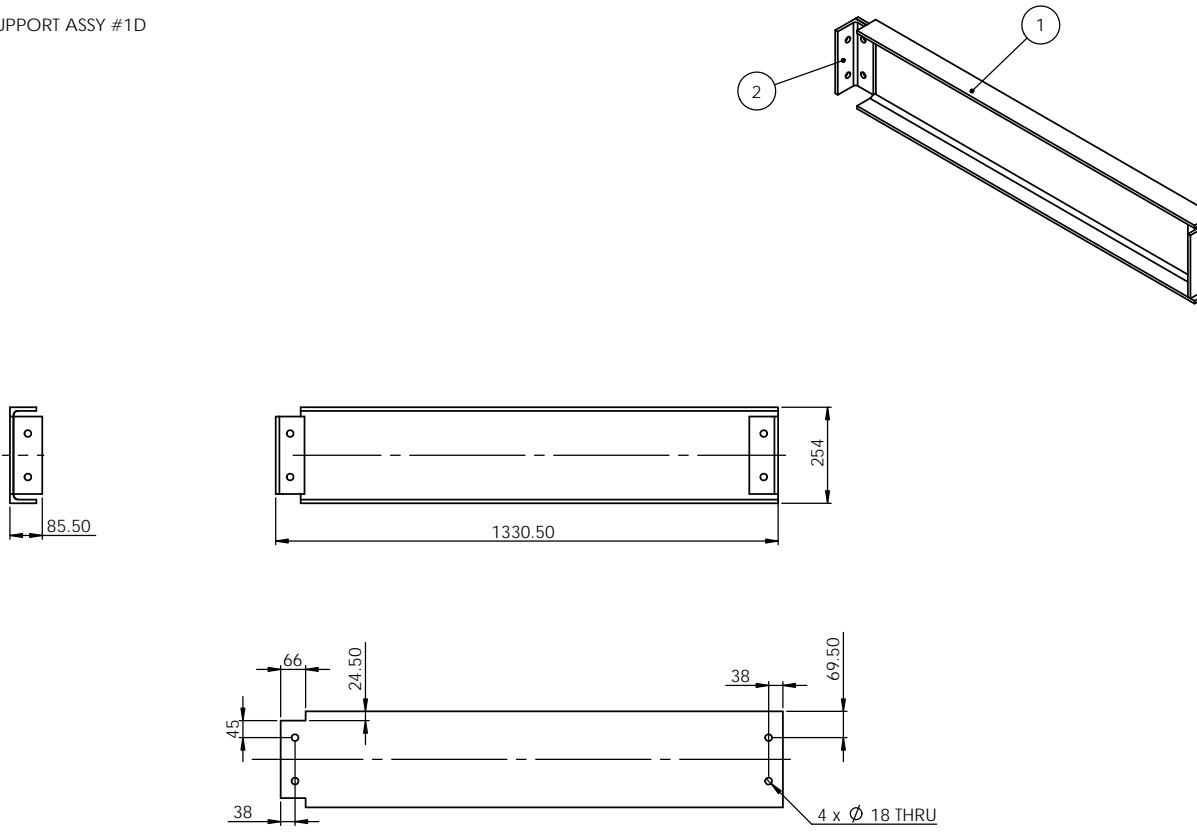
NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)



FUNDING				DRAFTED	A. MITRONKIN	L. ARIAS	ASSET/PROJECT			DRAWING TITLE	SHEET No. 1 OF 1			
				DESIGN W.O. No.	C1011-045-87	DRAFTING CHECK	M.FREEMAN	APPROVED BY	SIGNATURE	DATE	QUEENSLAND URBAN UTILITIES DRAWING No.	AMEND.		
A 12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No.	C1011-045-87	CAD FILE	550261032	N.JORGENSEN			486/5-0261-032	A		
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK	R.P.E.Q. No.	DATE	CONSTRUCTION MANAGER	SIGNATURE	DATE

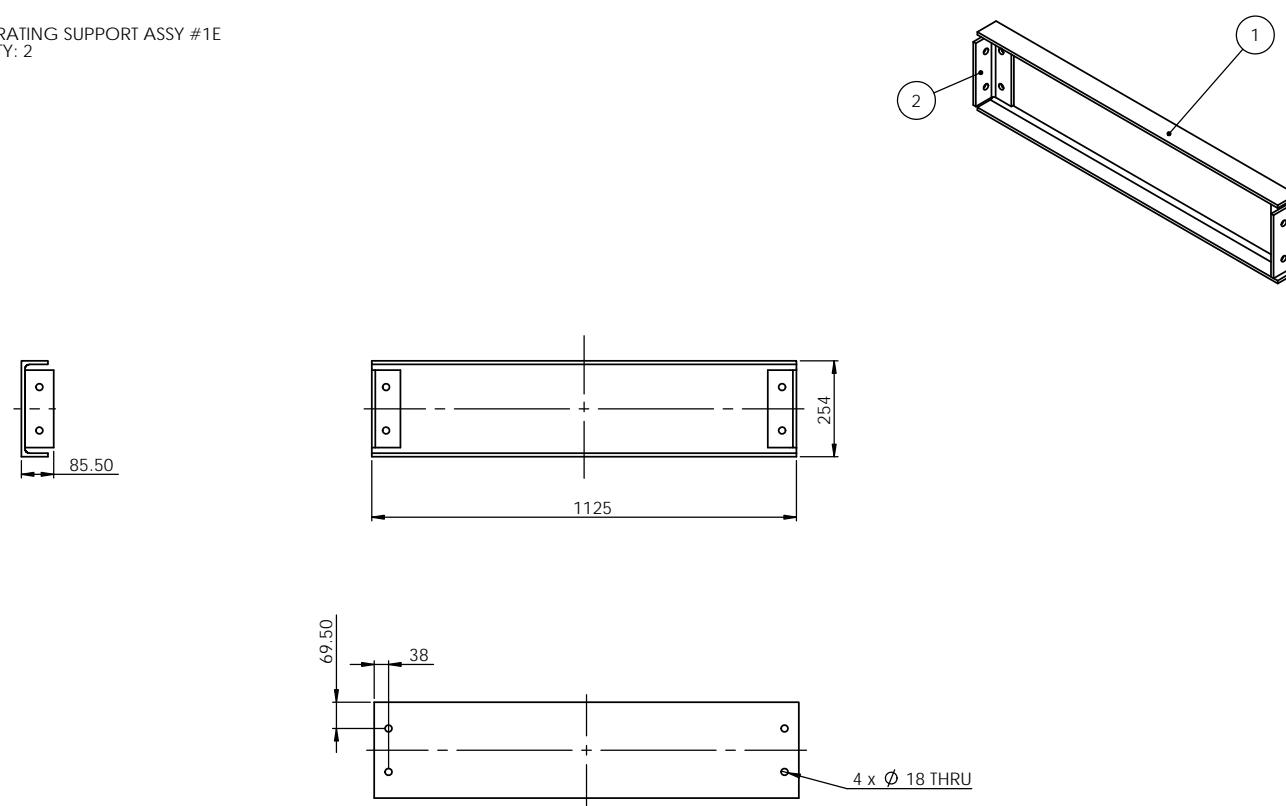
Item	Part No	Description	Qty
1	0185-GRTSUPP-P01D-FRP	GRATING SUPPORT MEMBER #1D FRP CS 70x254x9.5 - 1330.5	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

GRATING SUPPORT ASSY #1  
QTY: 1



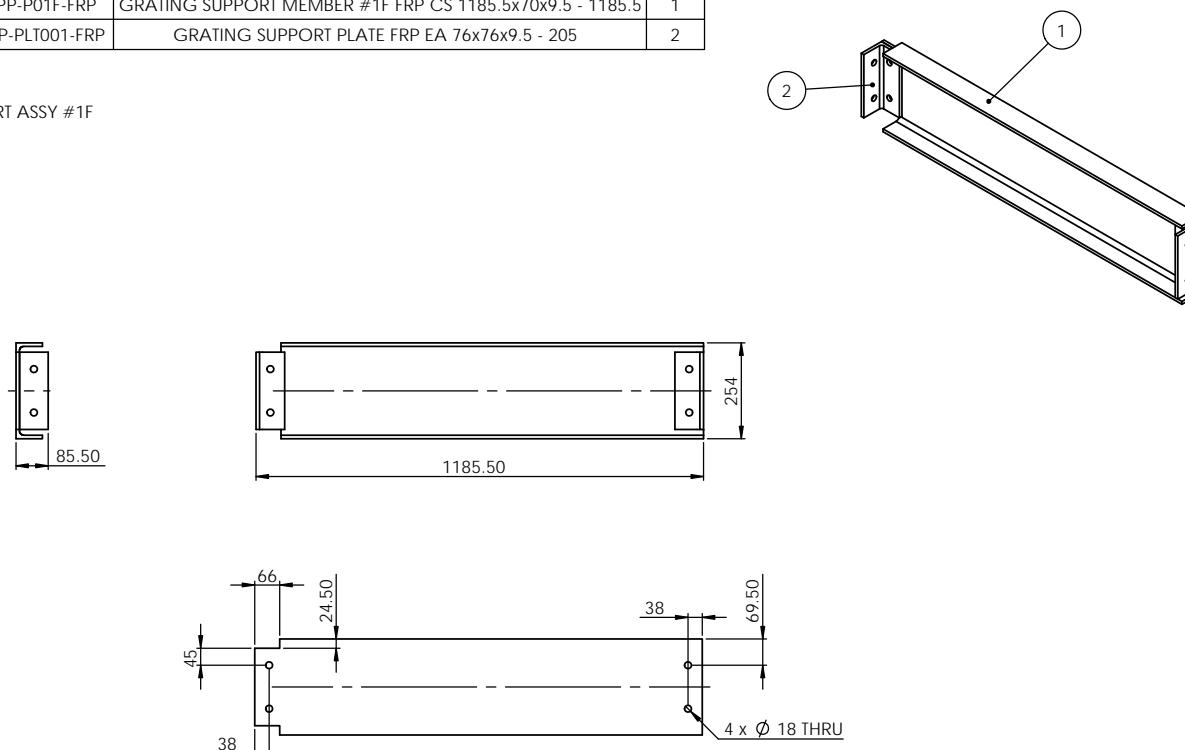
Item	Part No	Description	Qty
1	0185-GRTSUPP-P01E-FRP	GRATING SUPPORT MEMBER #1E FRP CS 254x70x9.5 - 1125	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

GRATING SUPPORT ASSY #1E  
QTY: 2



Item	Part No	Description	Qty
1	0185-GRTSUPP-P01F-FRP	GRATING SUPPORT MEMBER #1F FRP CS 1185.5x70x9.5 - 1185.5	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

GRATING SUPPORT ASSY #1F  
QTY: 2



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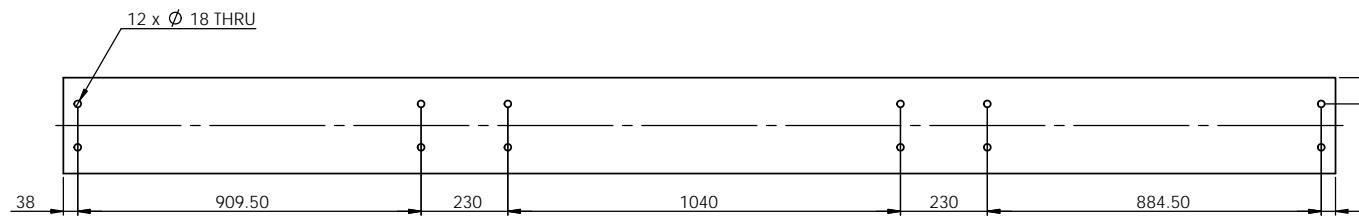
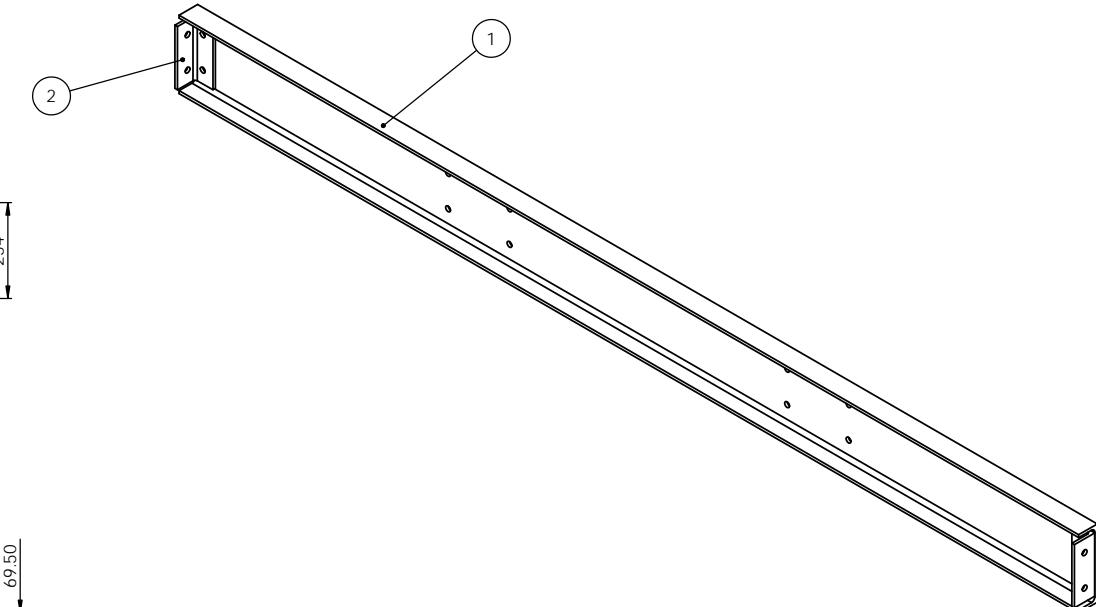
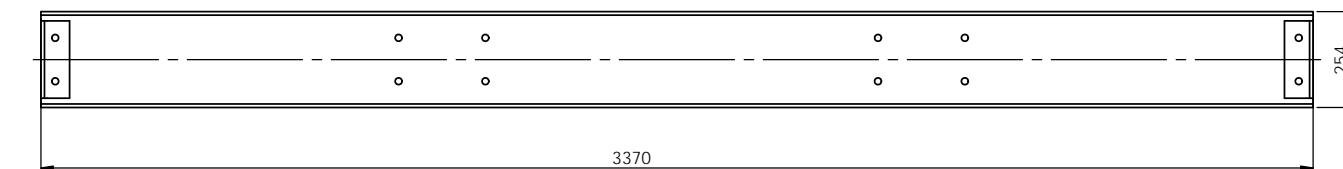
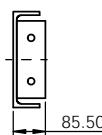


NAME SIGNATURE DATE  
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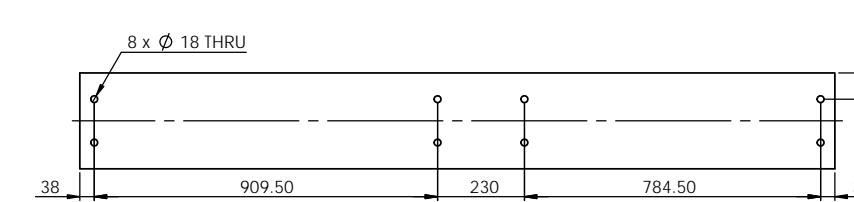
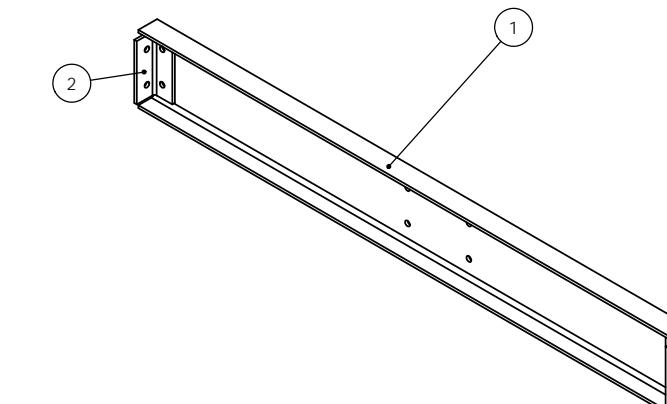
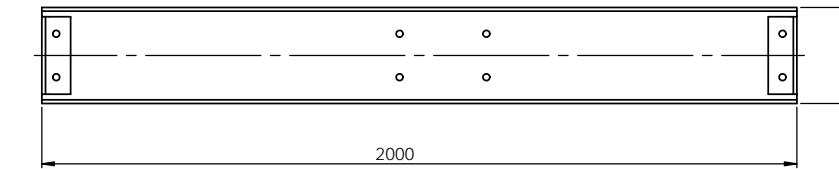
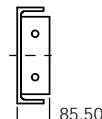


					FUNDING	DRAFTED	A. MITRONKIN	L. ARIAS	ASSET/PROJECT	DRAWING TITLE	SHEET No.
					DESIGN W.O. No. C1011-045-87	DRAFTING CHECK M.FREEMAN	DESIGN R.P.E.Q. No. DATE	APPROVED BY SIGNATURE DATE	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	FRP GRATING SUPPORT DETAIL 2	1 OF 1
A	12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261033	550261033	N.JORGENSEN	CONSTRUCTION MANAGER SIGNATURE DATE		QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO APPROVED	FUNDED BY Q.U.U. ( ) EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK R.P.E.Q. No. DATE				486/5-0261-033 A

Item	Part No	Description	Qty
1	0185-GRTSUPP-P02-FRP	GRATING SUPPORT MEMBER #2 FRP CS 70x254x9.5 - 3370	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

GRATING SUPPORT ASSY #2A  
QTY: 1

Item	Part No	Description	Qty
1	0185-GRTSUPP-P03-FRP	GRATING SUPPORT MEMBER #3 FRP CS 70x254x9.5 - 2000	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

GRATING SUPPORT ASSY #3A  
QTY: 1**AS CONSTRUCTED****AS CONSTRUCTED DETAILS**

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: DATE:

NAME of SIGNATORY:

RPEQ No. or LICENCE:

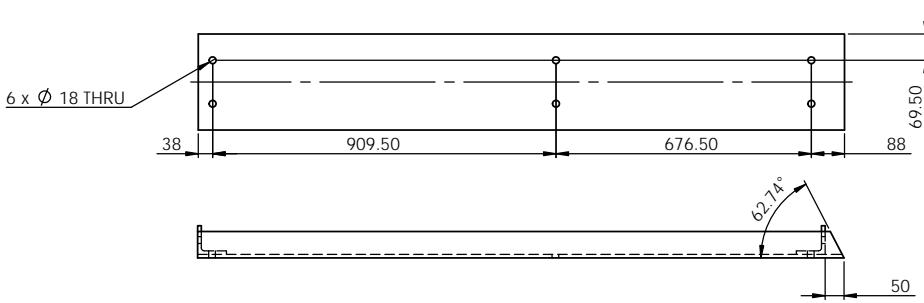
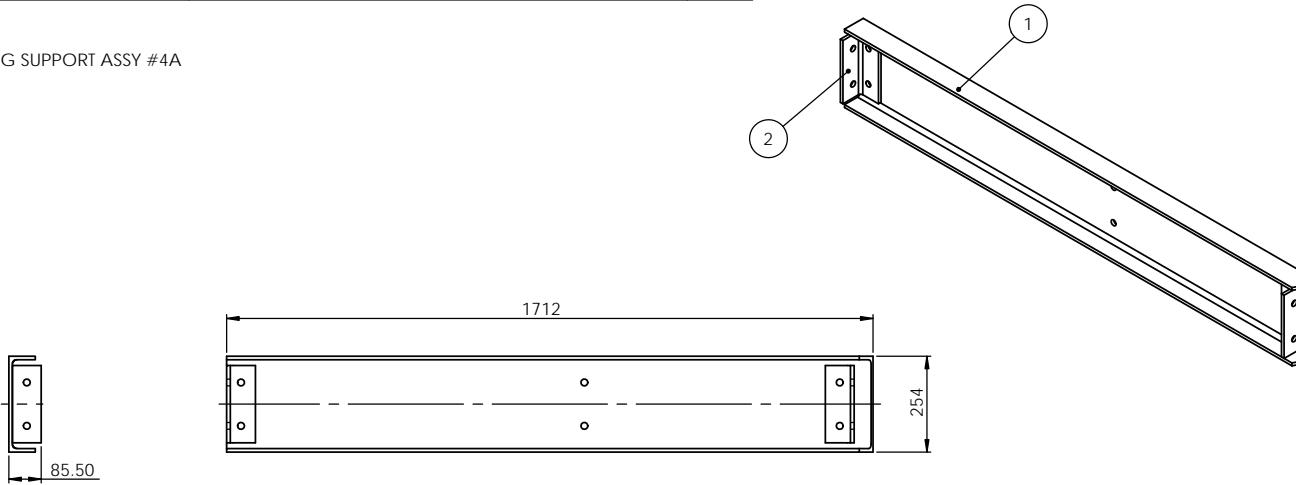
COMPANY NAME:

START DATE: FINISH DATE:

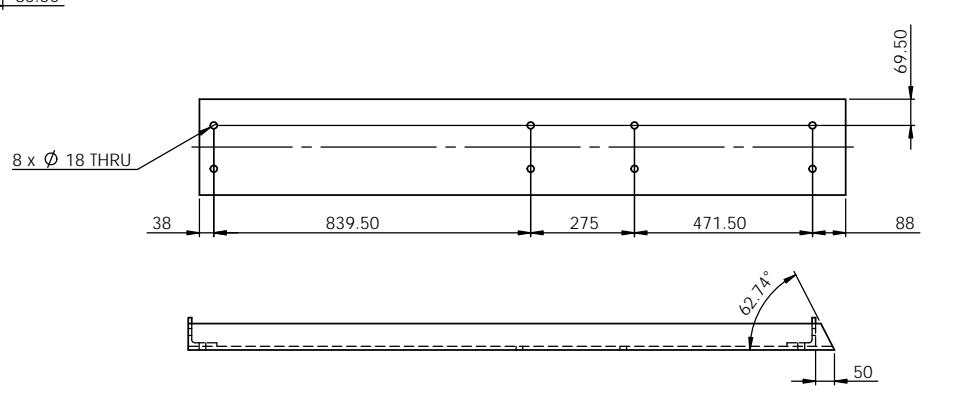
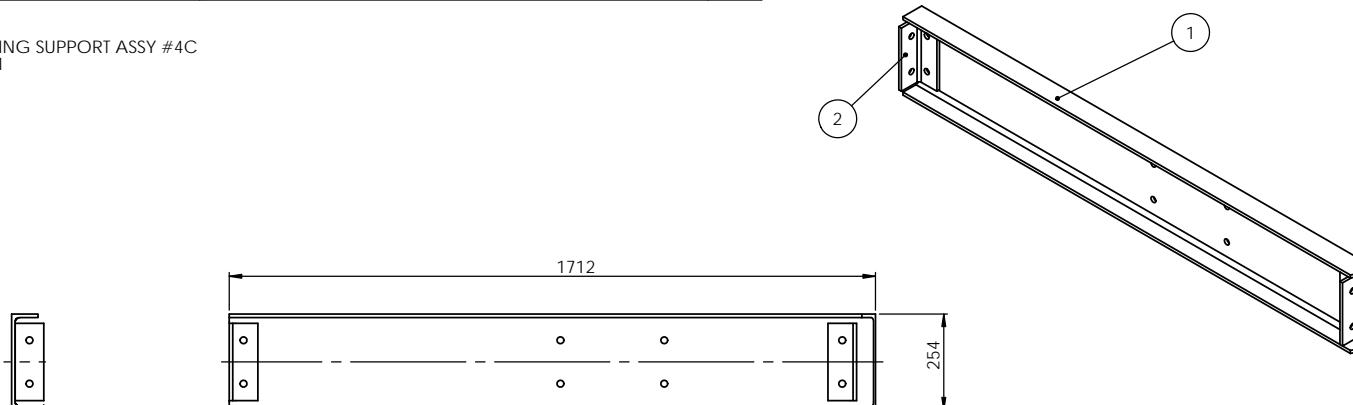
NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

					FUNDING	DRAFTED	A. MITRONKIN	L. ARIAS	ASSET/PROJECT	DRAWING TITLE	SHEET No.
					DESIGN W.O. No. C1011-045-87	DRAFTING CHECK M.FREEMAN		APPROVED BY	SIGNATURE DATE		1 OF 1
A	12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261034		N.JORGENSEN		FRP GRATING SUPPORT SYSTEM UPGRADE	QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO APPROVED	FUNDED BY Q.U.U. ( ) EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK	R.P.E.Q. No. DATE	CONSTRUCTION MANAGER	SIGNATURE DATE	486/5-0261-034 A

Item	Part No	Description	Qty
1	0185-GRTSUPP-P04A-FRP	GRATING SUPPORT MEMBER #4A FRP CS 70x254x9.5 - 1712	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

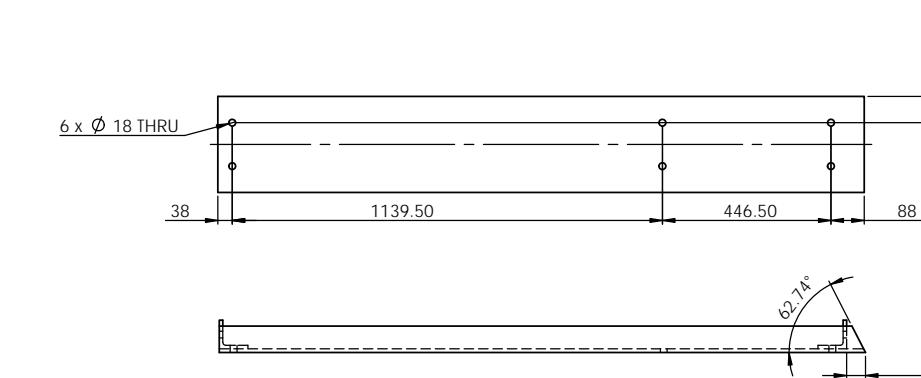
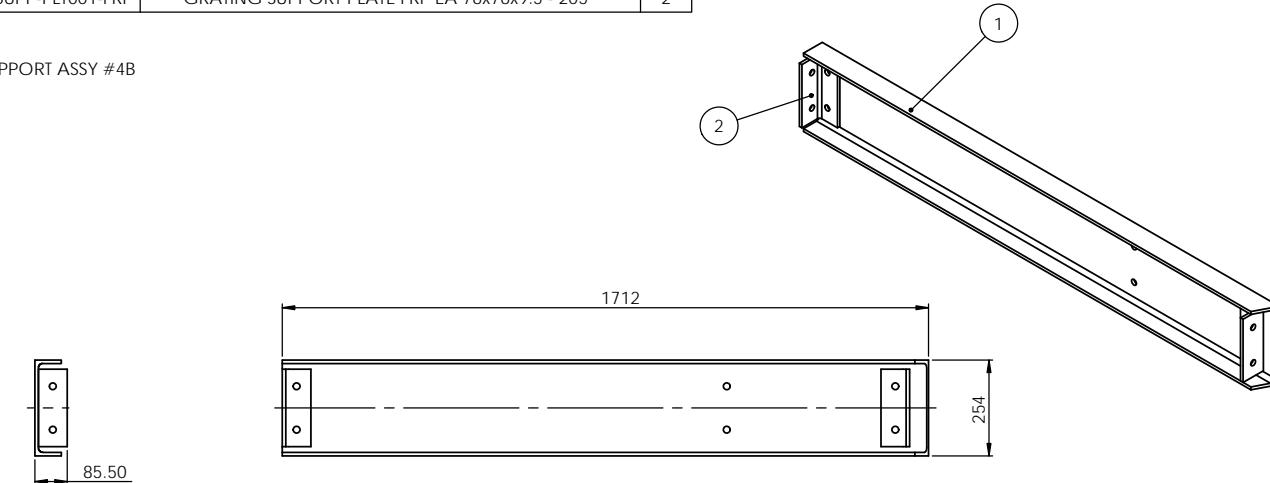
GRATING SUPPORT ASSY #4A  
QTY: 1

Item	Part No	Description	Qty
1	0185-GRTSUPP-P04C-FRP	GRATING SUPPORT MEMBER #4C FRP CS 70x254x9.5- 1712	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

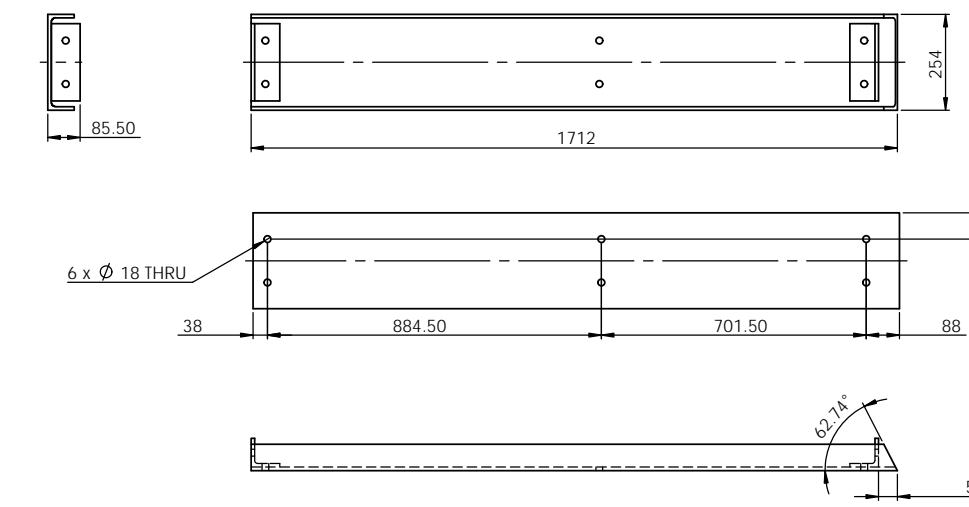
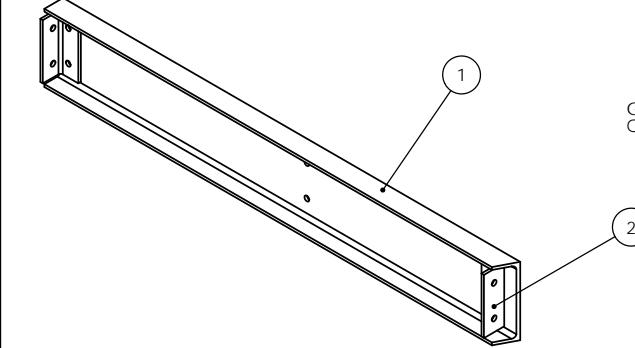
GRATING SUPPORT ASSY #4C  
QTY: 1

FUNDING						DRAFTED	A. MITRONKIN	L. ARIAS	ASSET/PROJECT			DRAWING TITLE	SHEET No. 1 OF 1
			DESIGN W.O. No.	C1011-045-87	DRAFTING CHECK	M.FREEMAN	DESIGN	R.P.E.Q. No.	DATE	APPROVED BY	SIGNATURE	DATE	QUEENSLAND URBAN UTILITIES DRAWING No.
A	12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No.	C1011-045-87	CAD FILE	550261035		N.JORGENSEN			AMEND.
No.	DATE	AMENDMENT	DRAFTED	DESIGNED	APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE No.		CONSTRUCTION MANAGER	SIGNATURE	DATE	486/5/0261-035

Item	Part No	Description	Qty
1	0185-GRTSUPP-P04B-FRP	GRATING SUPPORT MEMBER #4B FRP CS 70x254x9.5- 1712	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

GRATING SUPPORT ASSY #4B  
QTY: 1

Item	Part No	Description	Qty
1	0185-GRTSUPP-P04D-FRP	GRATING SUPPORT MEMBER #4D FRP CS 70x254x9.5- 1712	1
2	0185-GRTSUPP-PLT001-FRP	GRATING SUPPORT PLATE FRP EA 76x76x9.5 - 205	2

GRATING SUPPORT ASSY #4D  
QTY: 1**AS CONSTRUCTED****AS CONSTRUCTED DETAILS**

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: DATE:

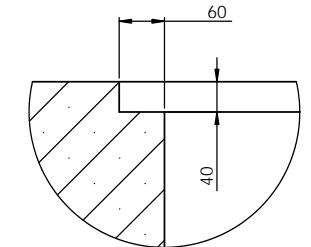
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RPEQ No. or LICENCE:

COMPANY NAME:

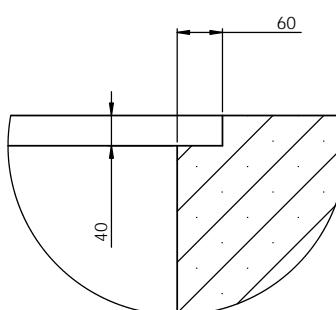
START DATE: FINISH DATE:

NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)SHEET No. 1 OF 1  
QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.  
486/5/0261-035 A



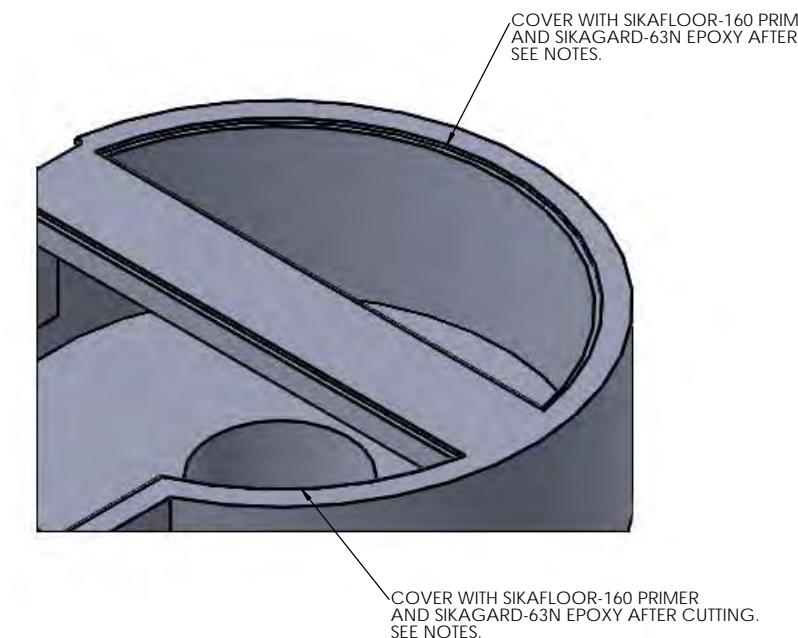
SECTION A-A

SCALE 1 : 5

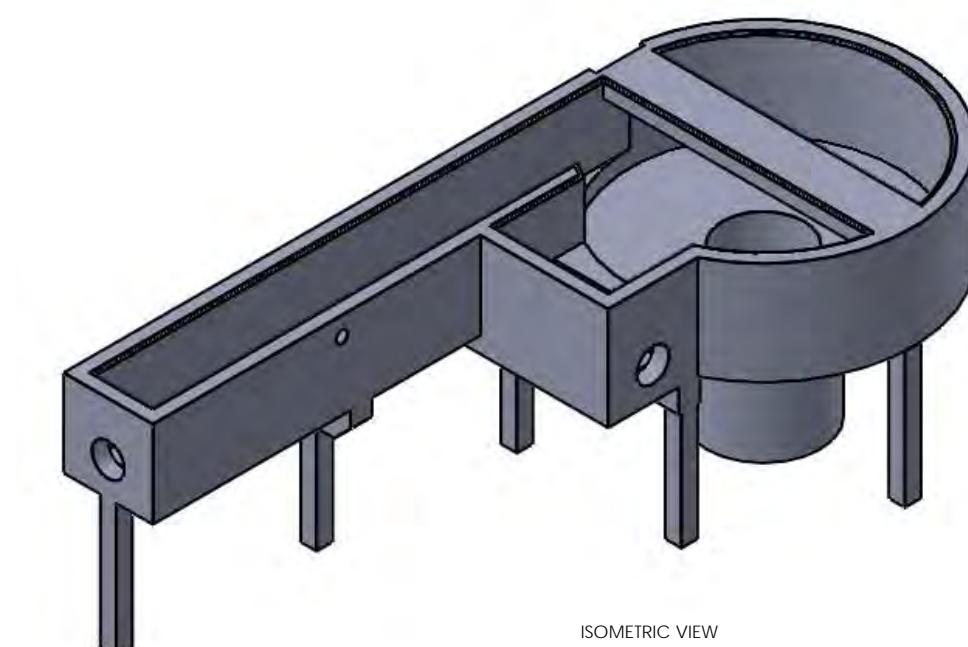


SECTION B-B

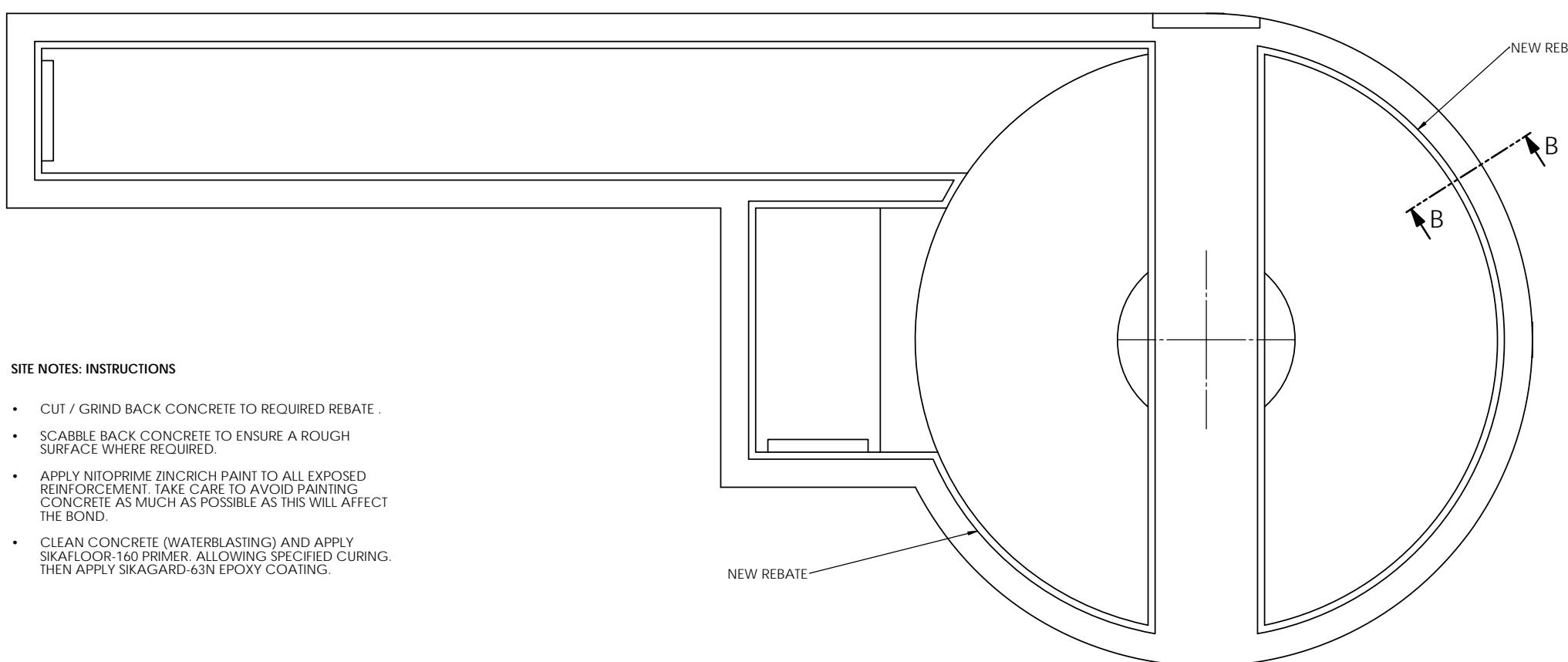
SCALE 1 : 5



DETAIL VIEW OF NEW REBATE



ISOMETRIC VIEW



TOP VIEW

**AS CONSTRUCTED****AS CONSTRUCTED DETAILS**

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: DATE:

NAME of SIGNATORY:

RPEQ No. or LICENCE:

COMPANY NAME:

START DATE:

FINISH DATE:

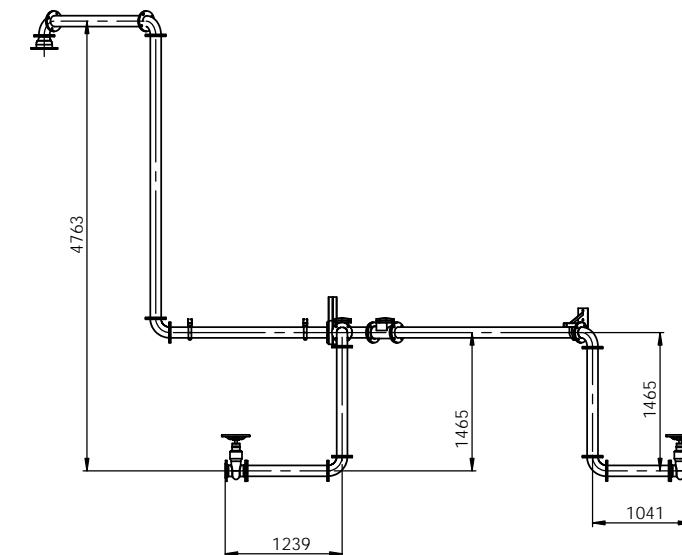
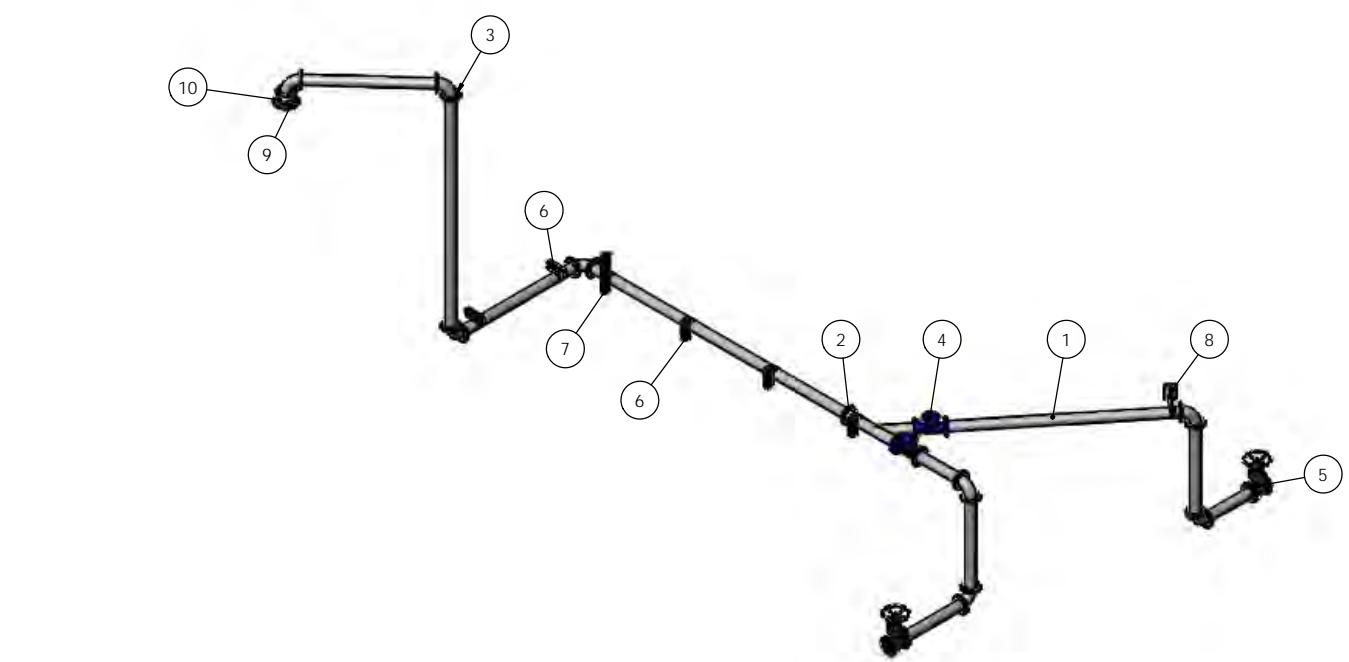
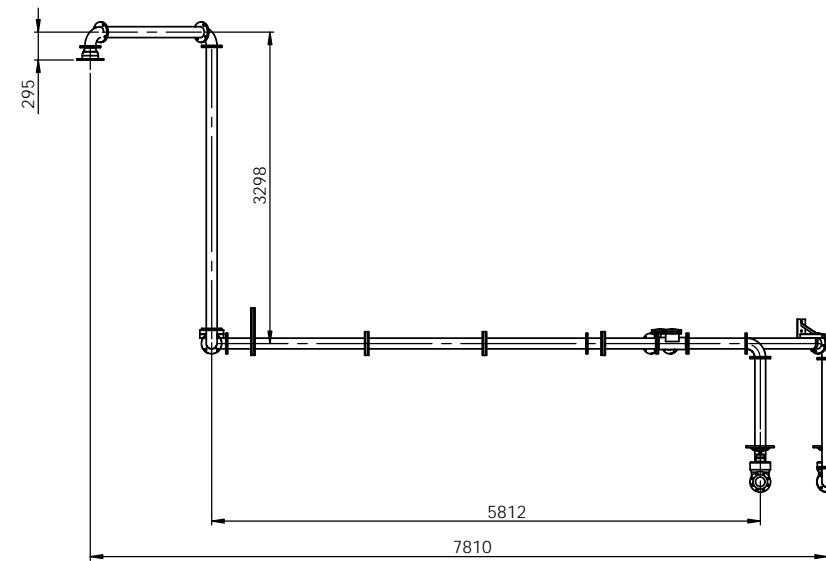
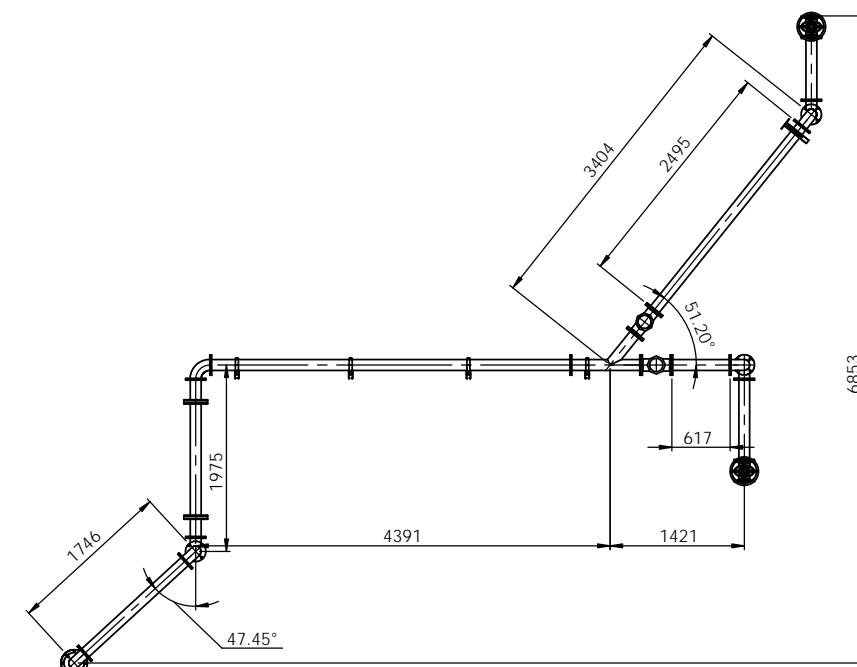


NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)



					FUNDING	DRAFTED	A. MITRONKIN	L.ARIAS	ASSET/PROJECT	DRAWING TITLE	SHEET No.
					DESIGN W.O. No. C1011-045-87	DRAFTING CHECK M. FREEMAN		APPROVED BY SIGNATURE DATE		REBATE DETAIL FOR FRP GRATING	1 OF 1
A 12/2/15	AS BUILT	MJF		LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261036		N.JORGENSEN	0185-WACOL Grit Removal System Upgrades		QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO. APPROVED	FUNDED BY Q.U.U. ( ) EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK R.P.E.Q. No. DATE	CONSTRUCTION MANAGER SIGNATURE DATE			486/5-0261-036 A

ITEM NO.	PART NUMBER	Description	QTY.
1	0185-GW-SP4-PIPE	PIPE SST 100NB SCHD10 - ASTM A312-94B	1
2	DN100	100NB TABLE D FLANGE	40
3	100NB SCHD40 90DEG LRAD ELBOW 316SS	LR ELBOW 90deg 100NB SCHD40 316SST	8
4	100NB NRV	NON RETURN VALVE 100NB	2
5	0185-GW-PINCH-VALVE	FLOWROX PINCH VALVE PVG100M10DIN	2
6	0185-GW-SP4-EZYSTRUT-E5	E5-114 CLIPS / E1001 - 250 CHANNEL EZYSTRUT PIPE SUPPORT	5
7	0185-GW-SP4-EZYSTRUT-E5L	E5-114 CLIPS / E1001 - 500 CHANNEL EZYSTRUT PIPE SUPPORT	1
8	0185-GW-SP4-EZYSTRUT-E5T	E5-114 CLIPS / E1001 - 250 CHANNEL/CB4-300 CANTILEVER BRACKET EZYSTRUT PIPE SUPPORT	1
9	150NB FLANGE ANSI SST	150NB PIPE FLANGE ANSI SST	1
10	CONC RED	150-100 CONC RED	1



**AS CONSTRUCTED**

**AS CONSTRUCTED DETAILS**

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SIGNED: DATE:

NAME of SIGNATORY:

R.P.E.Q. No. or LICENCE:

COMPANY NAME:

START DATE: FINISH DATE:



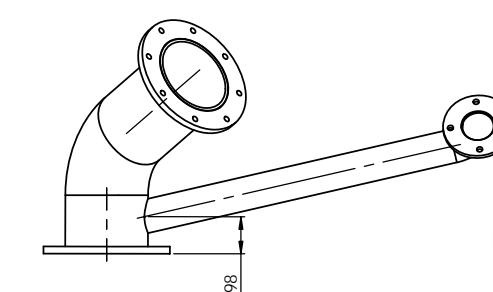
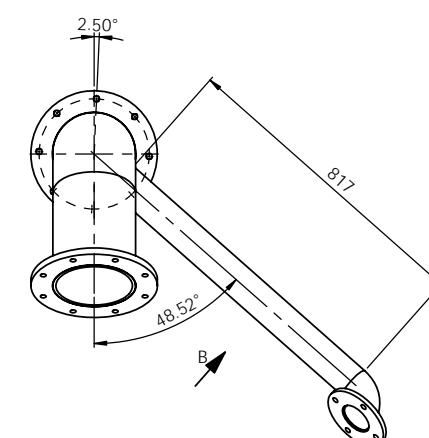
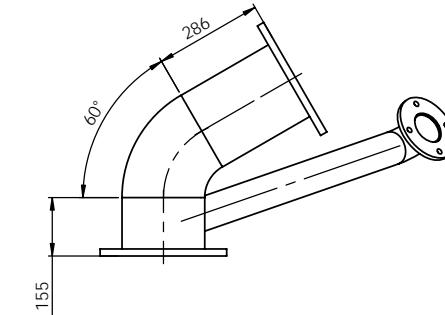
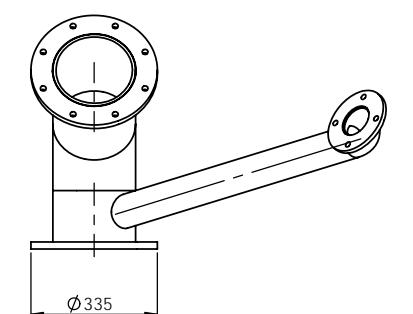
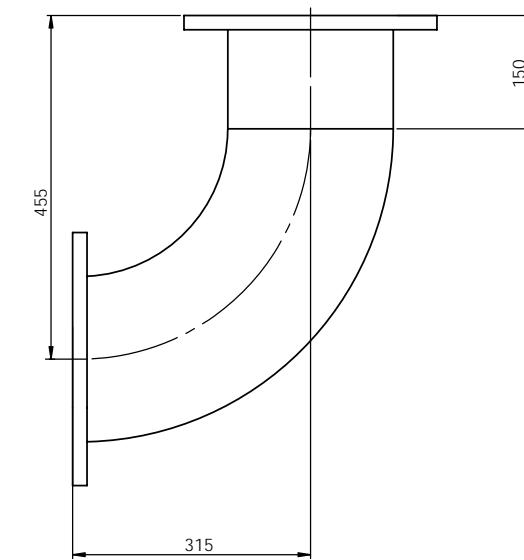
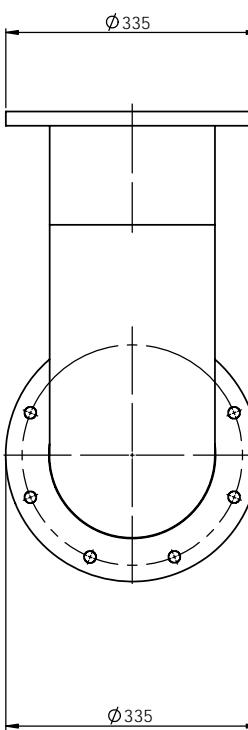
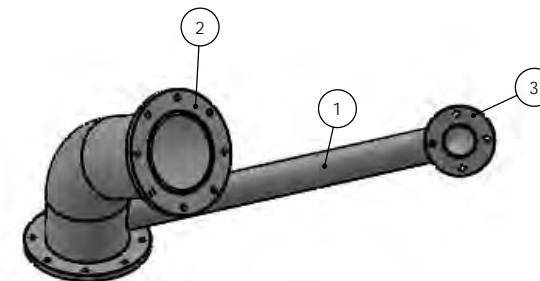
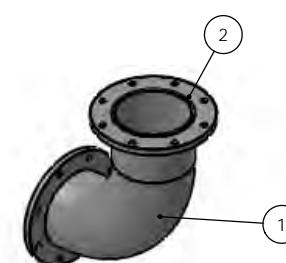
NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)



	FUNDING					DRAFTED	A.MITRONKIN	L. ARIAS			ASSET/PROJECT		DRAWING TITLE	SHEET No.	
	DESIGN W.O. No.	C1011-045-87	DRAFTING CHECK	M.FREEMAN		DESIGN	R.P.E.Q. No. DATE	APPROVED BY	SIGNATURE	DATE	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE		100NB 316 SS PIPEWORK FROM SLURRY PUMPS TO GRIT WASHER	1 OF 1	
A 12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No.	C1011-045-87	CAD FILE	550261001	N. JORGENSEN			QUEENSLAND URBAN UTILITIES DRAWING No.		AMEND.		
No. DATE	AMENDMENT	DRAFTED	DESIGNED	R.P.E.Q. NO.	APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK	R.P.E.Q. No. DATE	CONSTRUCTION MANAGER	SIGNATURE	DATE	486/5-0261-044	A

ITEM NO.	PART NUMBER	Description	QTY.
1	0185-GW-SP100-P01	ELBOW 200NB LR 90 SST + PIPE 200MB SST	1
2	0185-GWM-DN200	FLANGE DN200 AS4087	2

ITEM NO.	PART NUMBER	Description	QTY.
1	0185-GW-SP100-P02	ELBOW 200NB SR 60 + PIPE 200NB + PIPE 80NB + ELBOW 80 SR 90	1
2	0185-GWM-DN200	FLANGE DN200 AS4087	2
3	0185-GWM-DN80	FLANGE DN80 AS4087	1



VIEW B  
41.43°  
SCALE 1 : 10

### AS CONSTRUCTED

#### AS CONSTRUCTED DETAILS

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: DATE:

NAME of SIGNATORY:

RPEQ No. or LICENCE:

COMPANY NAME:

START DATE: FINISH DATE:



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



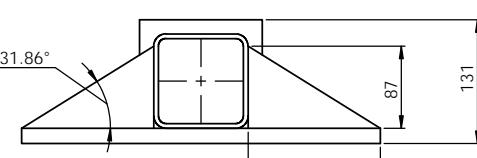
					FUNDING	DRAFTED	A.MITRONKIN	L. ARIAS	ASSET/PROJECT	DRAWING TITLE	SHEET No.
					DESIGN W.O. No. C1011-045-87	DRAFTING CHECK M. FREEMAN		APPROVED BY SIGNATURE DATE			1 OF 1
A 12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261045		N. JORGENSEN	CONSTRUCTION MANAGER SIGNATURE DATE	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	GRIT WASHER MACHINE RETURN PIPES TO CHAMBER	QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO. APPROVED	FUNDED BY Q.U.U. ( ) EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK R.P.E.Q. No. DATE				486/5/5-0261-045 A

ITEM NO.	DESCRIPTION	LENGTH	ANGLE1	ANGLE2	QTY.										
1	100x100x6 SHS	2615.9	0.0	0.0	1										
2	FB 75x6	164.83	31.9	58.1	2										
3	FB 180x16	380	0.0	0.0	1										
4	FB 130x6	130	0.0	0.0	1										
5	FB 75x6	90	0.0	0.0	2										

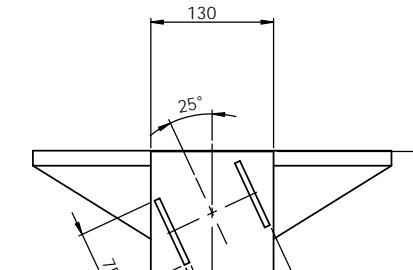
  

ITEM NO.	PART NUMBER	Description	QTY.
1	0185-GWM-CLAMP	CLAMP FB 100x6	2
2	0185-GWM-FRONT-POST-3	GWM FRONT LEG	1

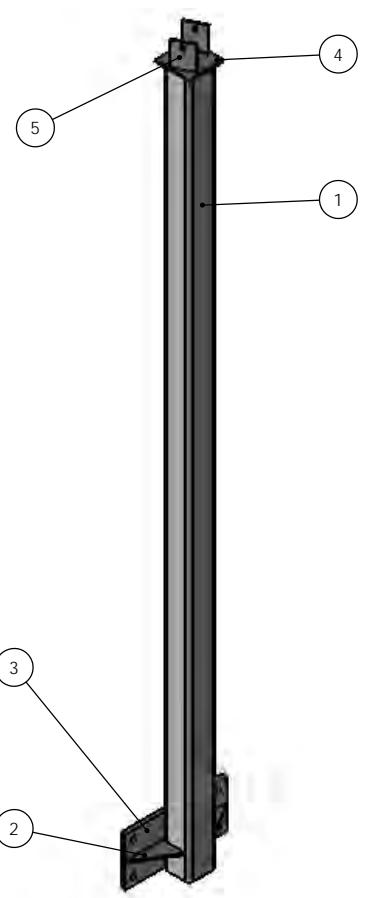
  



BOTTOM VIEW



TOP VIEW



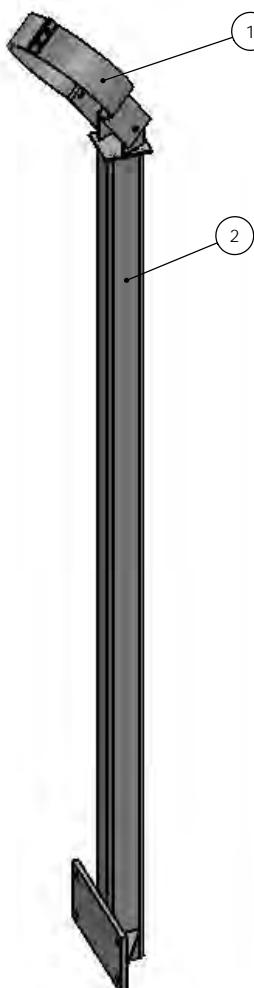
NOTES:  

- (1), (2), (3), (4), (5) SHALL BE WELDED TO AS 1554
- BUTT WELDS SHALL BE FULL PENETRATION WELDS
- WELD TO BE 6mm CONTINUOUS FILLET WELDS ALL ROUND INTERFACES
- ALL WELDS TO BE FREE OF SLAG



0185-GWM-CLAMP  
CLAMP FB 100x6  
SCALE 1:5



0185-GWM-FRONT-SUPPORT  
SCALE 1:10

**AS CONSTRUCTED DETAILS**

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: \_\_\_\_\_ DATE: \_\_\_\_\_  
 NAME of SIGNATORY: \_\_\_\_\_  
 RPEQ No. or LICENCE: \_\_\_\_\_  
 COMPANY NAME: \_\_\_\_\_  
 START DATE: \_\_\_\_\_ FINISH DATE: \_\_\_\_\_



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

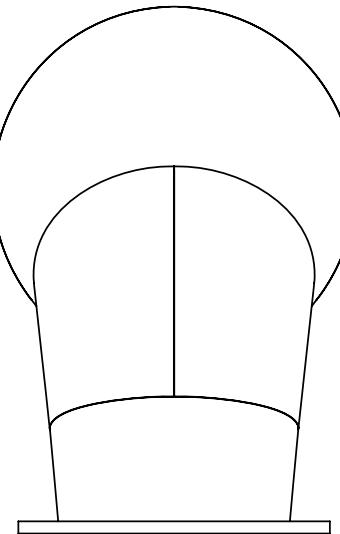


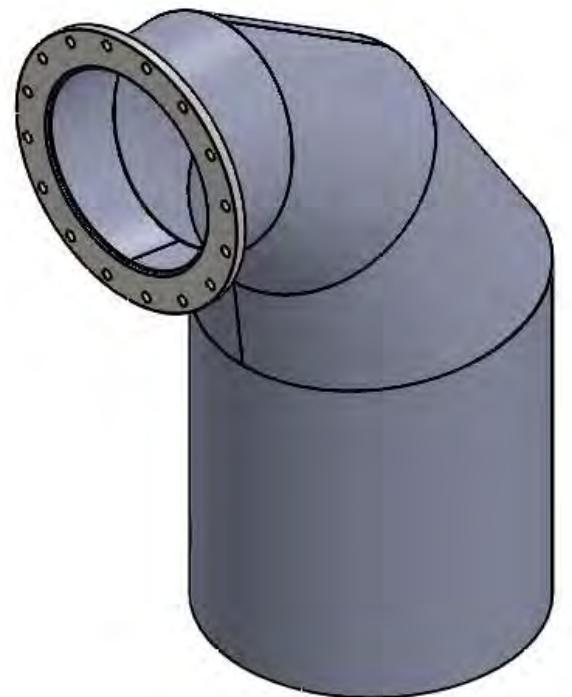
FUNDING	DRAFTED	A. MITRONKIN	4/11/2014	L. ARIAS	ASSET/PROJECT	DRAWING TITLE	SHEET No.							
DESIGN W.O. No.	DRAFTING CHECK	M. FREEMAN	4/11/2014	APPROVED BY	WACOL WWTP GRIT REMOVAL	GRIT WASHER MACHINE	1 OF 1							
CONSTRUCTION W.O. No.	CAD FILE		R.P.E.Q. No. DATE	SIGNATURE DATE	SYSTEM UPGRAGE	FRONT SUPPORT	QUEENSLAND URBAN UTILITIES DRAWING No.							
12/2/15	C1011-045-87		N. JORGENSEN				AMEND.							
AS BUILT	MJF	LA	CONSTRUCTION W.O. No.											
No. DATE	AMENDMENT	DRAFTED	DESIGNED	R.P.E.Q. NO.	APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE No.						

Item	Part No	Description	Qty
1	MJRIND-0185-PIPEA	SPOOL SECTION A - 10mm SS 316	1
2	MJRIND-0185-PIPEB	SPOOL SECTION B - 10mm SS 316	1
3	MJRIND-0185-PIPEC	SPOOL SECTION C - 10mm SS 316	1
4	MJRIND-0185-PIPED	SPOOL SECTION D - 10mm SS 316	1
5	DN600	TABLE D - DN 600 SS 316 FLANGE	1

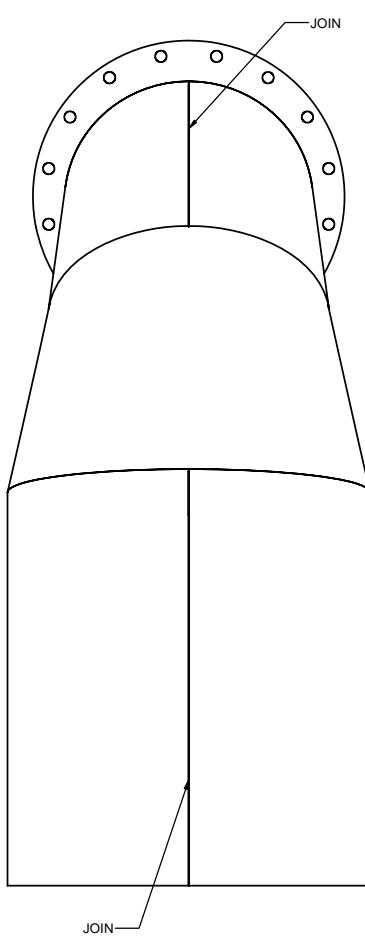
4 REQUIREMENTS



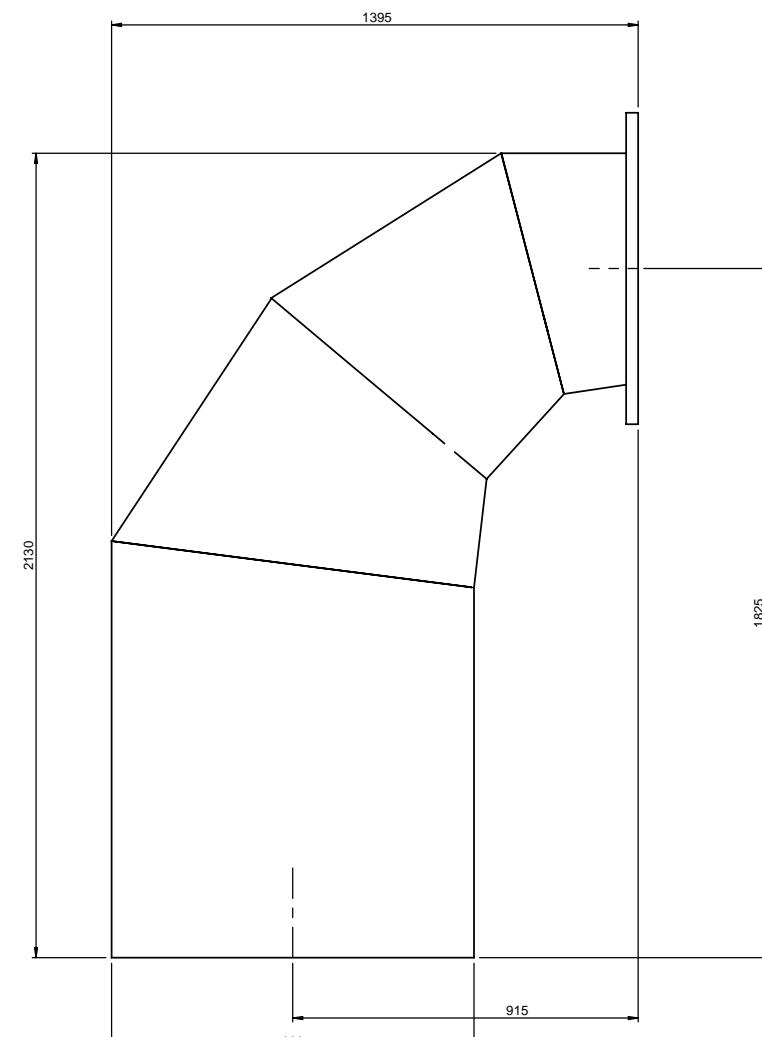
TOP VIEW



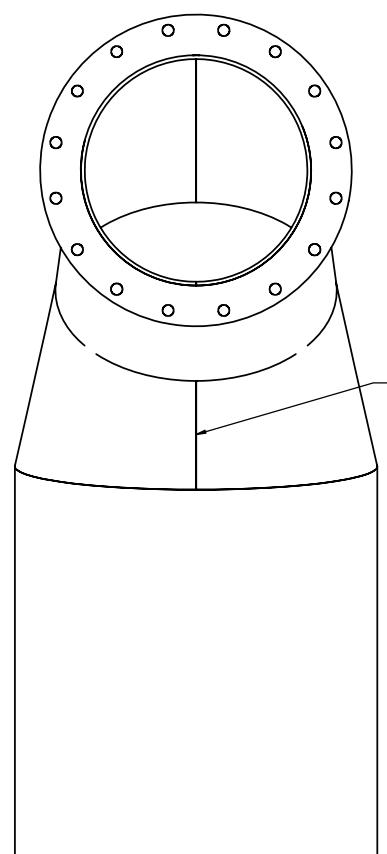
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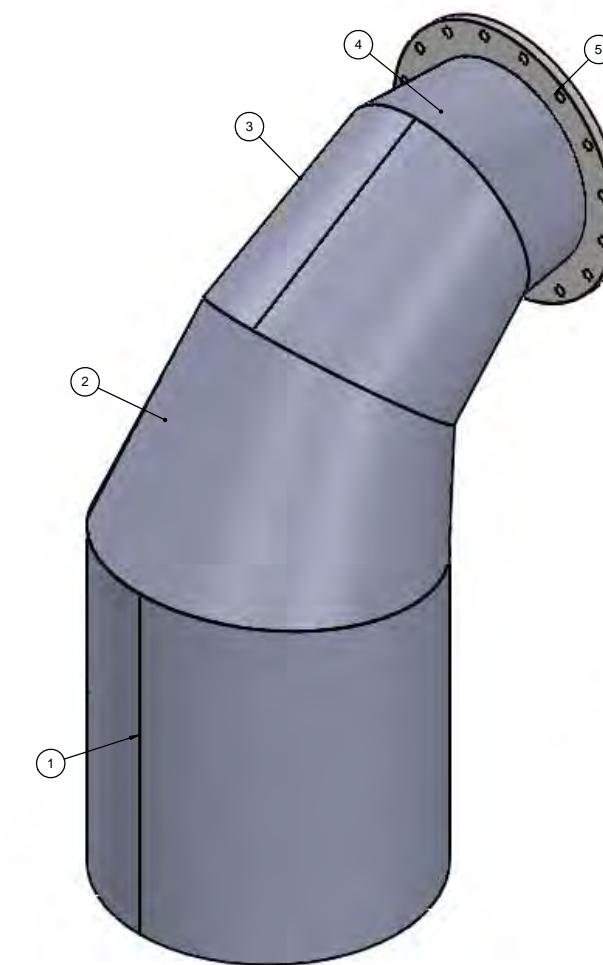
SIDE VIEW



**FRONT VIEW**



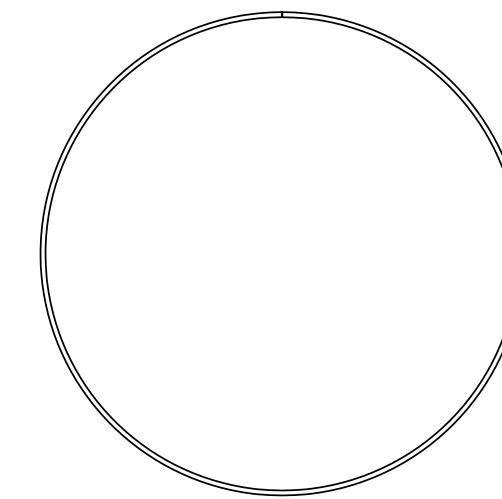
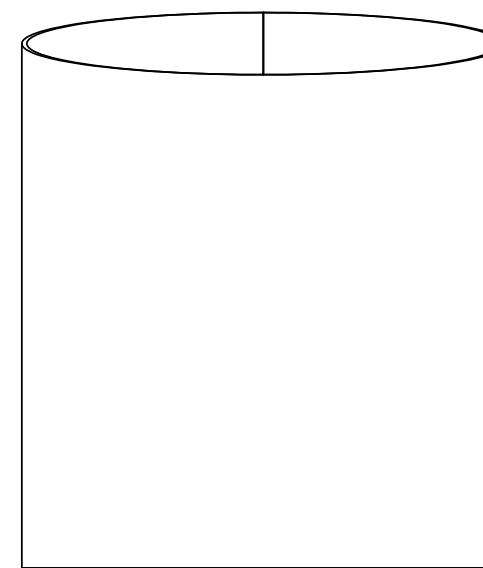
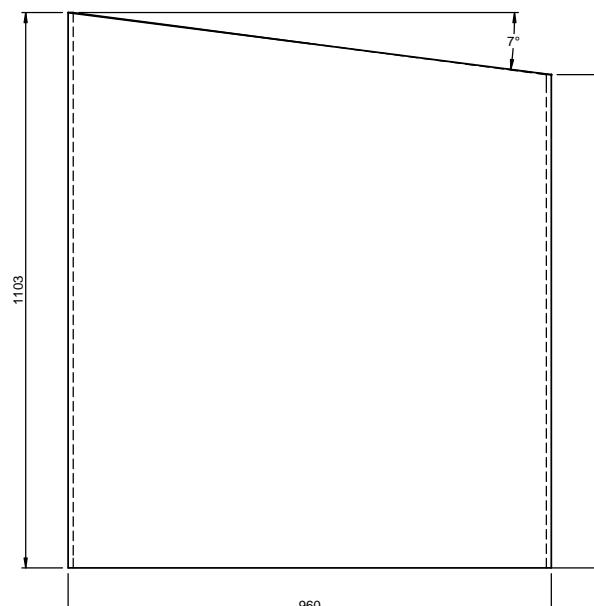
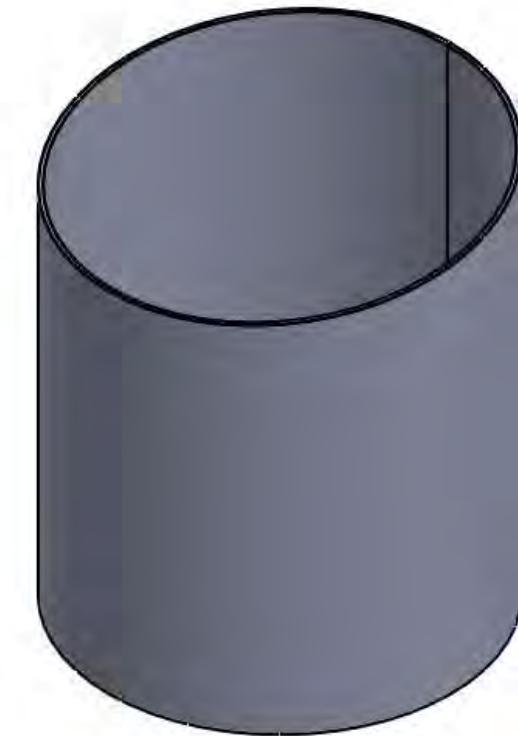
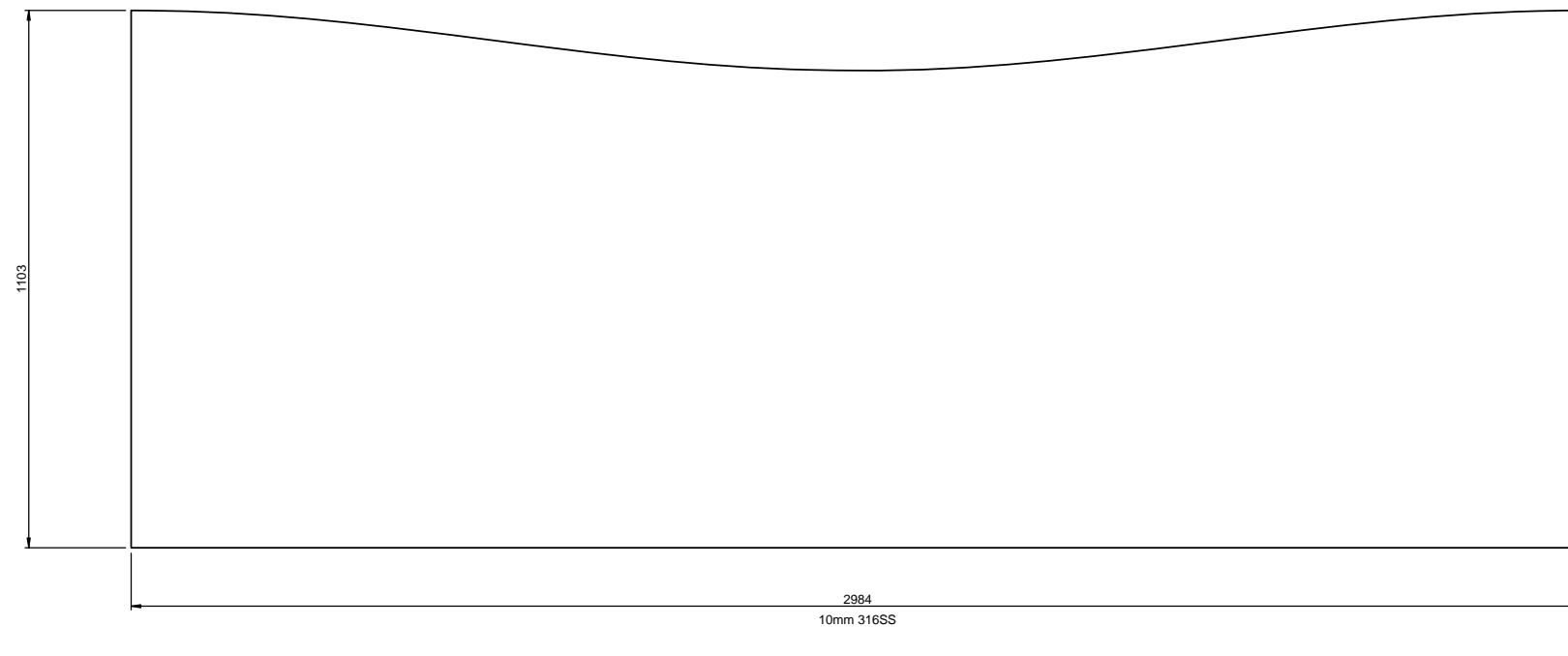
SIDE VIEW



#### REAR ISOMETRIC

AS CONSTRUCTED

						FUNDING	DRAFTED	A. MITRONKIN	L. ARIAS	ASSET/PROJECT	DRAWING TITLE	SHEET No. 1 OF 1
						DESIGN W.O. No. C1011-045-87	DRAFTING CHECK M. FREEMAN		APPROVED BY N. JORGENSEN	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	GRIT CHAMBER INLET PIPE GENERAL ARRANGEMENT	QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.
A 12/2/15	AS BUILT	MJF		LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261052.dwg						486/5/0261-052 A
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED	FUNDED BY Q.U.U. ( ) EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK R.P.E.Q. No. DATE	CONSTRUCTION MANAGER SIGNATURE DATE			



**AS CONSTRUCTED**

**AS CONSTRUCTED DETAILS**

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

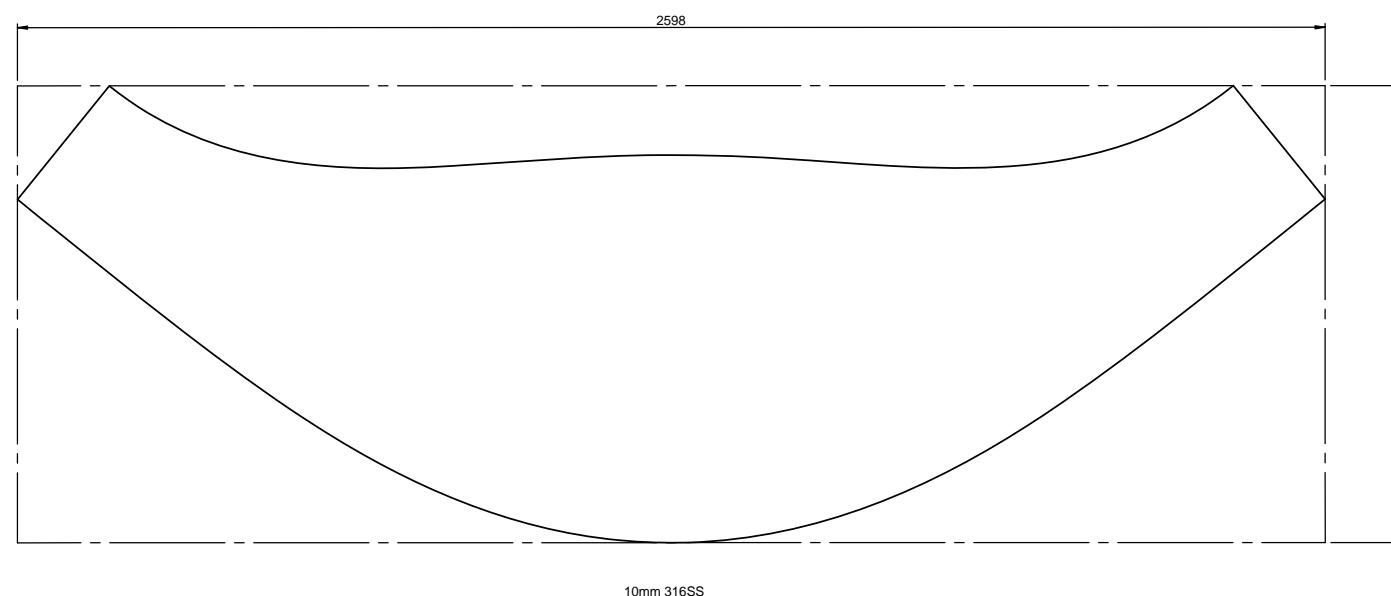
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NAME of SIGNATORY:  
RPEQ No. or LICENCE:  
COMPANY NAME:  
START DATE: FINISH DATE:

**MEYJOR INDUSTRIES**

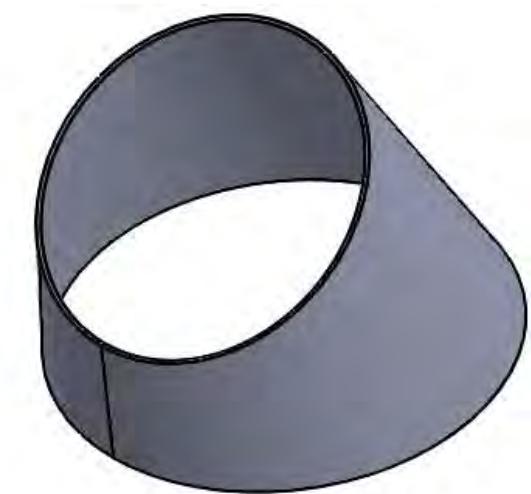
NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)



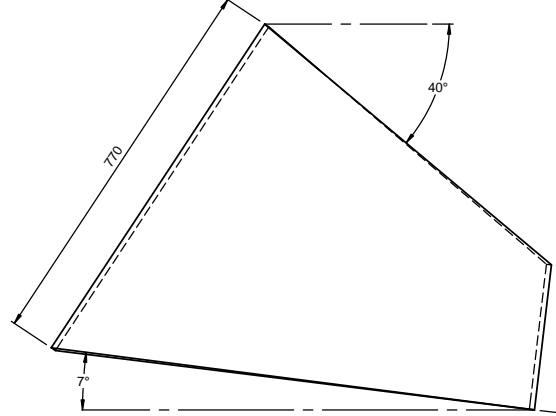
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					DESIGN W.O. No. C1011-045-87	DRAFTING CHECK M. FREEMAN			0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	SPOOL SECTION A DETAILS	QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.
A 12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261053.dwg	DESIGN R.P.E.Q. No. DATE	APPROVED BY SIGNATURE DATE	N. JORGENSEN	CONSTRUCTION MANAGER SIGNATURE DATE		486/5-0261-053 A
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO. APPROVED	FUNDED BY Q.U.U. ( ) EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK R.P.E.Q. No. DATE				



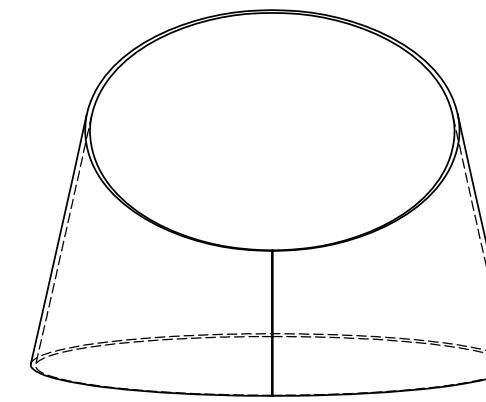
FLAT PATTERN VIEW



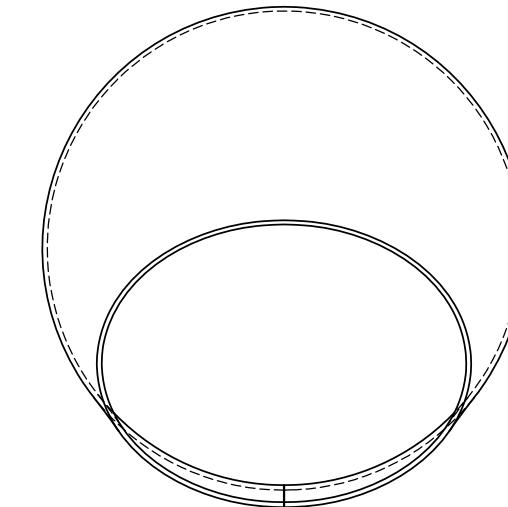
ISOMETRIC VIEW

**AS CONSTRUCTED**

FRONT VIEW



SIDE VIEW



TOP VIEW

**AS CONSTRUCTED DETAILS**  
I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

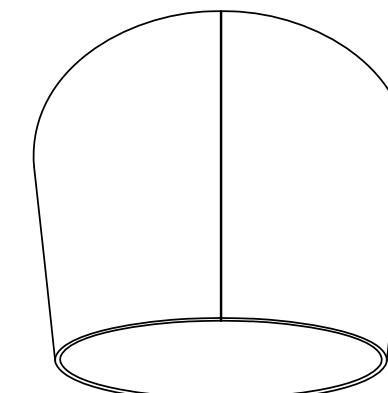
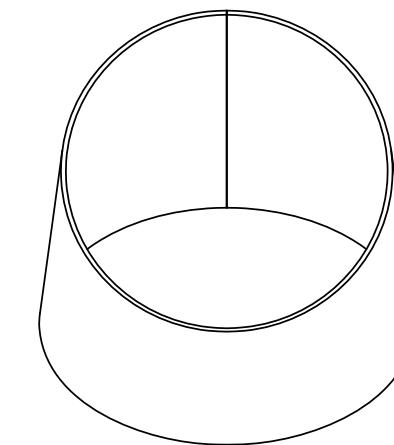
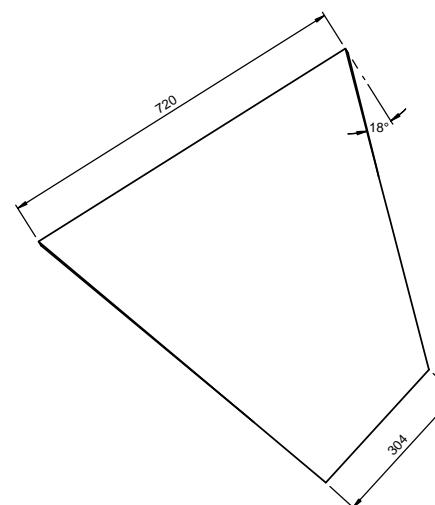
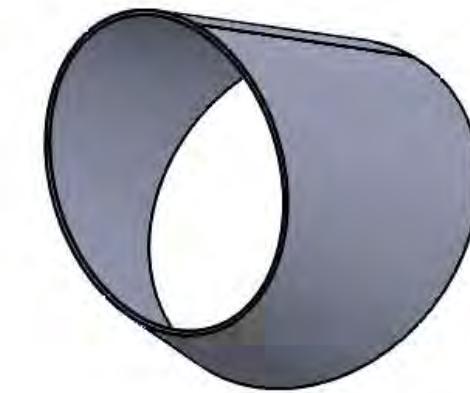
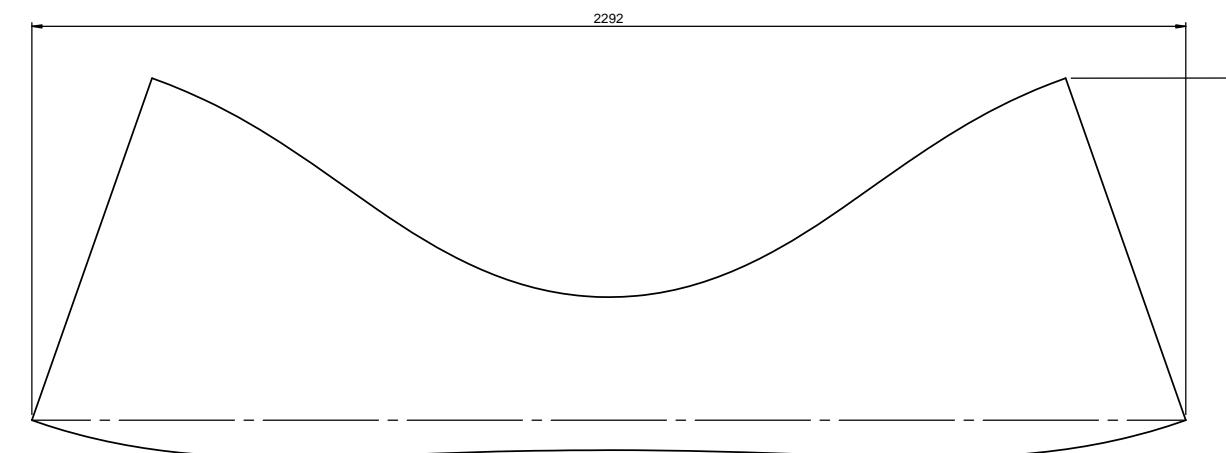
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NAME of SIGNATORY:  
RPEQ No. or LICENCE:  
COMPANY NAME:  
START DATE: FINISH DATE:

**MEYJOR INDUSTRIES**

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

**QUEENSLAND Urban Utilities**

					FUNDING	DRAFTED	A. MITRONKIN	L. ARIAS	ASSET/PROJECT	DRAWING TITLE	SHEET No.
					DESIGN W.O. No. C1011-045-87	DRAFTING CHECK M. FREEMAN		APPROVED BY SIGNATURE DATE	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	SPOOL SECTION B DETAILS	1 OF 1
A 12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261054.dwg		N. JORGENSEN	CONSTRUCTION MANAGER SIGNATURE DATE		QUEENSLAND URBAN UTILITIES DRAWING NO. AMEND.	QUEENSLAND URBAN UTILITIES DRAWING NO. AMEND.
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO. APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE NO.	DESIGN CHECK R.P.E.Q. No. DATE		486/5-0261-054	A



### AS CONSTRUCTED

#### AS CONSTRUCTED DETAILS

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

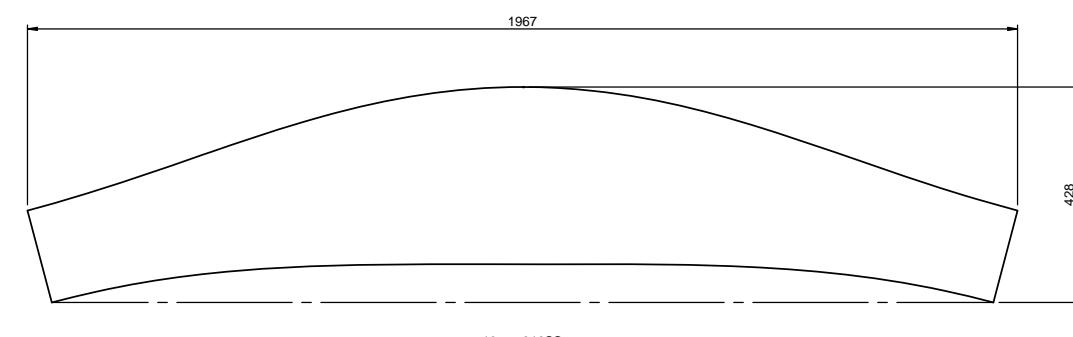
SIGNED: DATE:  
NAME of SIGNATORY:  
RPEQ No. or LICENCE:  
COMPANY NAME:  
START DATE: FINISH DATE:

**MEYJOR INDUSTRIES**

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

**QUEENSLAND Urban Utilities**

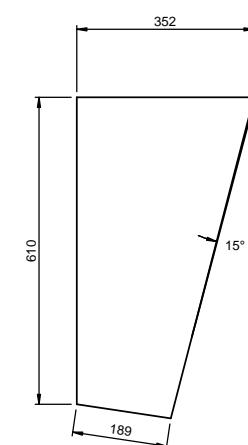
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					DESIGN W.O. No. C1011-045-87 CONSTRUCTION W.O. No. C1011-045-87	DRAFTING CHECK CAD FILE M. FREEMAN 550261055.dwg		R.P.E.Q. No. DATE N. JORGENSEN		SPOOL SECTION C DETAILS	1 OF 1
A No. DATE	AS BUILT AMENDMENT	MJF DRAFTED	LA DESIGNED	RPEQ NO. APPROVED	FUNDED BY Q.U.U. ( ) EXTERNAL ( ) Q.U.U. FILE No.			CONSTRUCTION MANAGER SIGNATURE DATE	0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	QUEENSLAND URBAN UTILITIES DRAWING No. AMEND. 486/5/0261-055 A	



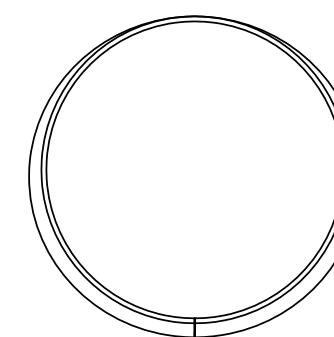
FLAT PATTERN VIEW



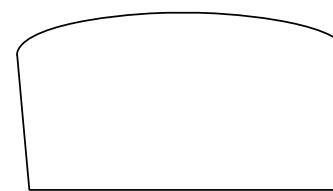
ISOMETRIC VIEW



FRONT VIEW



SIDE VIEW



TOP VIEW

**AS CONSTRUCTED****AS CONSTRUCTED DETAILS**

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: DATE:

NAME of SIGNATORY:

RPEQ No. or LICENCE:

COMPANY NAME:

START DATE: FINISH DATE:

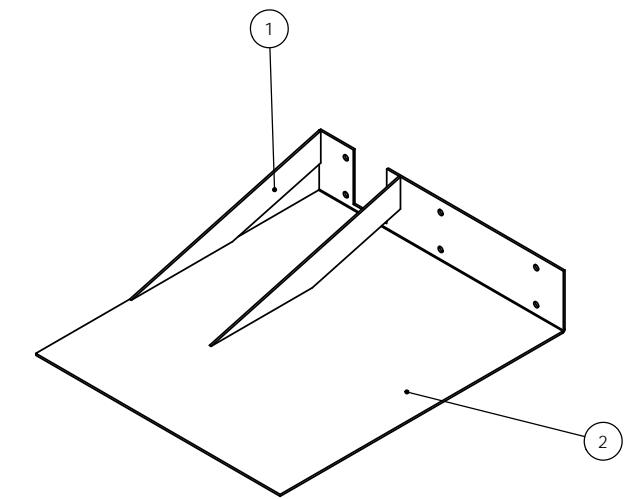
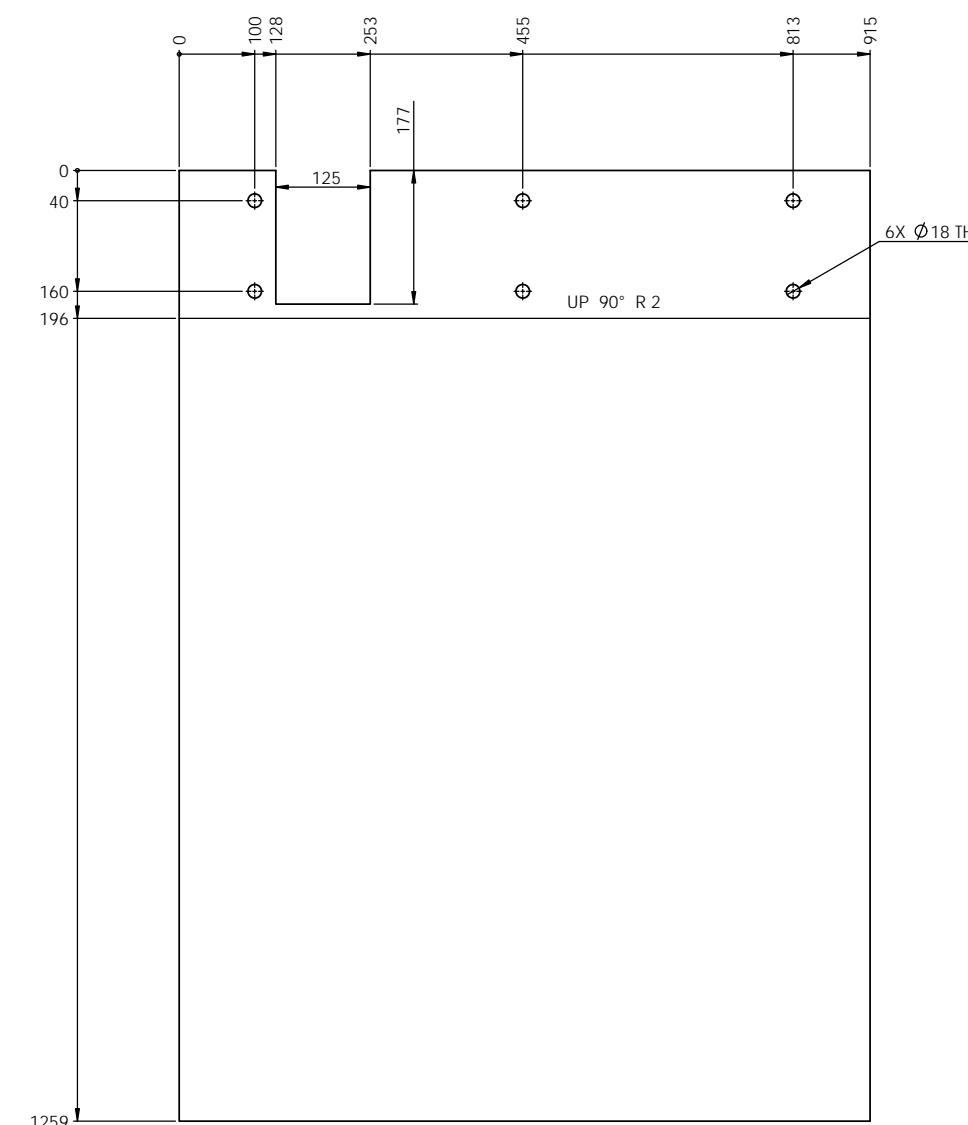
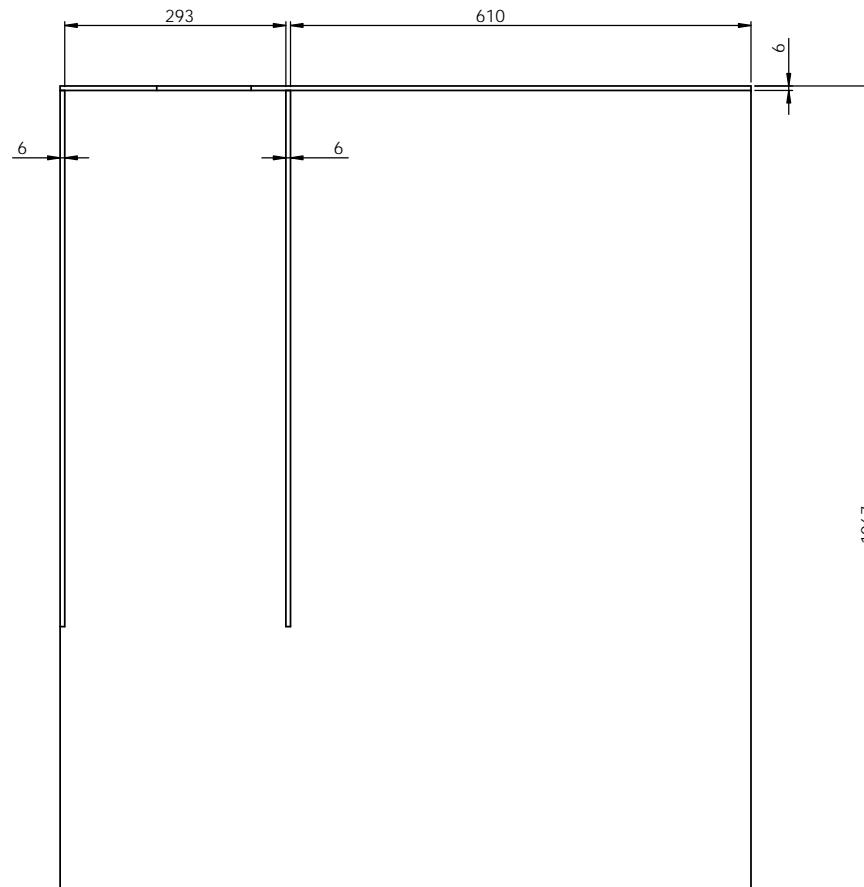


NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

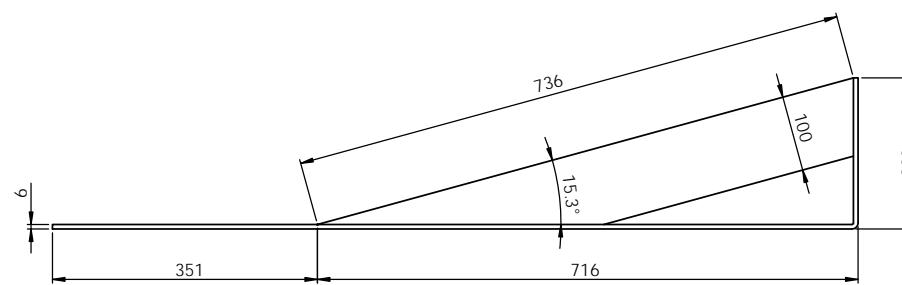
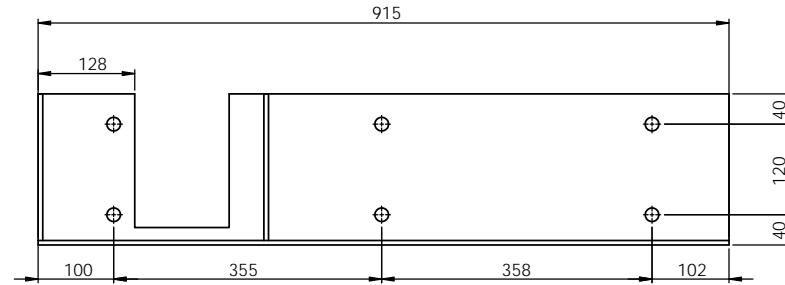


					FUNDING	DRAFTED	A. MITRONKIN	L. ARIAS	ASSET/PROJECT	DRAWING TITLE	SHEET No.
					DESIGN W.O. No. C1011-045-87	DRAFTING CHECK M. FREEMAN			0185 WACOL GRIT REMOVAL SYSTEM UPGRADE	SPOOL SECTION D DETAILS	1 OF 1
A 12/2/15	AS BUILT	MJF	LA	CONSTRUCTION W.O. No. C1011-045-87	CAD FILE 550261056.dwg	DESIGN R.P.E.Q. No. DATE	APPROVED BY SIGNATURE DATE	N. JORGENSEN	CONSTRUCTION MANAGER SIGNATURE DATE	QUEENSLAND URBAN UTILITIES DRAWING NO. AMEND.	QUEENSLAND URBAN UTILITIES DRAWING NO. AMEND.
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO. APPROVED FUNDING BY Q.U.U. ( ) EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK R.P.E.Q. No. DATE				486/5-0261-056	A

ITEM	DESCRIPTION	MATERIAL	LENGTH	ANGLE1	ANGLE2	QTY
1	100x6 FL	316 SS	736.027	74.7	15.3	2
2	6MM Sheet	316 SS				1



**AS CONSTRUCTED**



**AS CONSTRUCTED DETAILS**

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NAME of SIGNATORY:  
RPEQ No. or LICENCE:  
COMPANY NAME:  
START DATE: FINISH DATE:



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



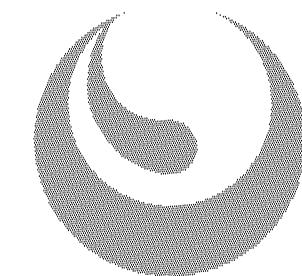
					FUNDING	DRAFTED	A.MITRONKIN		L. ARIAS		ASSET/PROJECT	DRAWING TITLE	SHEET No.	1 OF 1			
					DESIGN W.O. No.	DRAFTING CHECK	M.FREEMAN	DESIGN	R.P.E.Q. No.	DATE	APPROVED BY	SIGNATURE	DATE	QUEENSLAND URBAN UTILITIES DRAWING No.	AMEND.		
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No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED	FUNDED BY Q.U.U. ( )	EXTERNAL ( )	Q.U.U. FILE No.	DESIGN CHECK	R.P.E.Q. No.	DATE	CONSTRUCTION MANAGER	SIGNATURE	DATE		

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade	Contract No. C1011-045-087 Grit Washer System
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- [Electrical Drawings.](#)

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade		
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Version: A	10 May. 15	Page 17 of 27
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QUEENSLAND  
UrbanUtilities

# WACOL SEWAGE TREATMENT PLANT GRIT REMOVAL SYSTEM UPGRADE

## SITE COVER SHEET

### ELECTRICAL DRAWING INDEX

DRAWING NUMBER	REV.	DRAWING TITLE
486/5/5-0261-201	A	NEW GRIT WASHER UNIT CONTROL PANEL DRAWING INDEX
486/5/5-0261-202	A	NEW GRIT WASHER UNIT CONTROL PANEL POWER CIRCUITS
486/5/5-0261-203	A	NEW GRIT WASHER UNIT CONTROL PANEL 24VDC COMMON CONTROLS
486/5/5-0261-204	A	NEW GRIT WASHER UNIT CONTROL PANEL 24VDC VALVE CIRCUITS
486/5/5-0261-205	A	NEW GRIT WASHER UNIT CONTROL PANEL PLC DIGITAL INPUTS
486/5/5-0261-206	A	NEW GRIT WASHER UNIT CONTROL PANEL PLC DIGITAL OUTPUTS
486/5/5-0261-207	A	NEW GRIT WASHER UNIT CONTROL PANEL PLC ANALOGUE INPUTS
486/5/5-0261-208	A	NEW GRIT WASHER UNIT CONTROL PANEL CABLE SCHEDULE
486/5/5-0261-209	A	NEW GRIT WASHER UNIT CONTROL PANEL PARTS LIST
486/5/5-0261-210	A	NEW GRIT WASHER UNIT CONTROL PANEL GENERAL ARRANGEMENT

AS CONSTRUCTED DETAILS	
I CERTIFY THAT THE 'AS CONSTRUCTED' DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.	
SIGNED:	DATE: 21/01/2015
NAME of SIGNATORY: W. BUTTERWORTH	
RPEQ No. or LICENCE: 112080	
COMPANY NAME: LEND LEASE SERVICES	
START DATE: 10/09/2014 FINISH DATE: 21/01/2015	



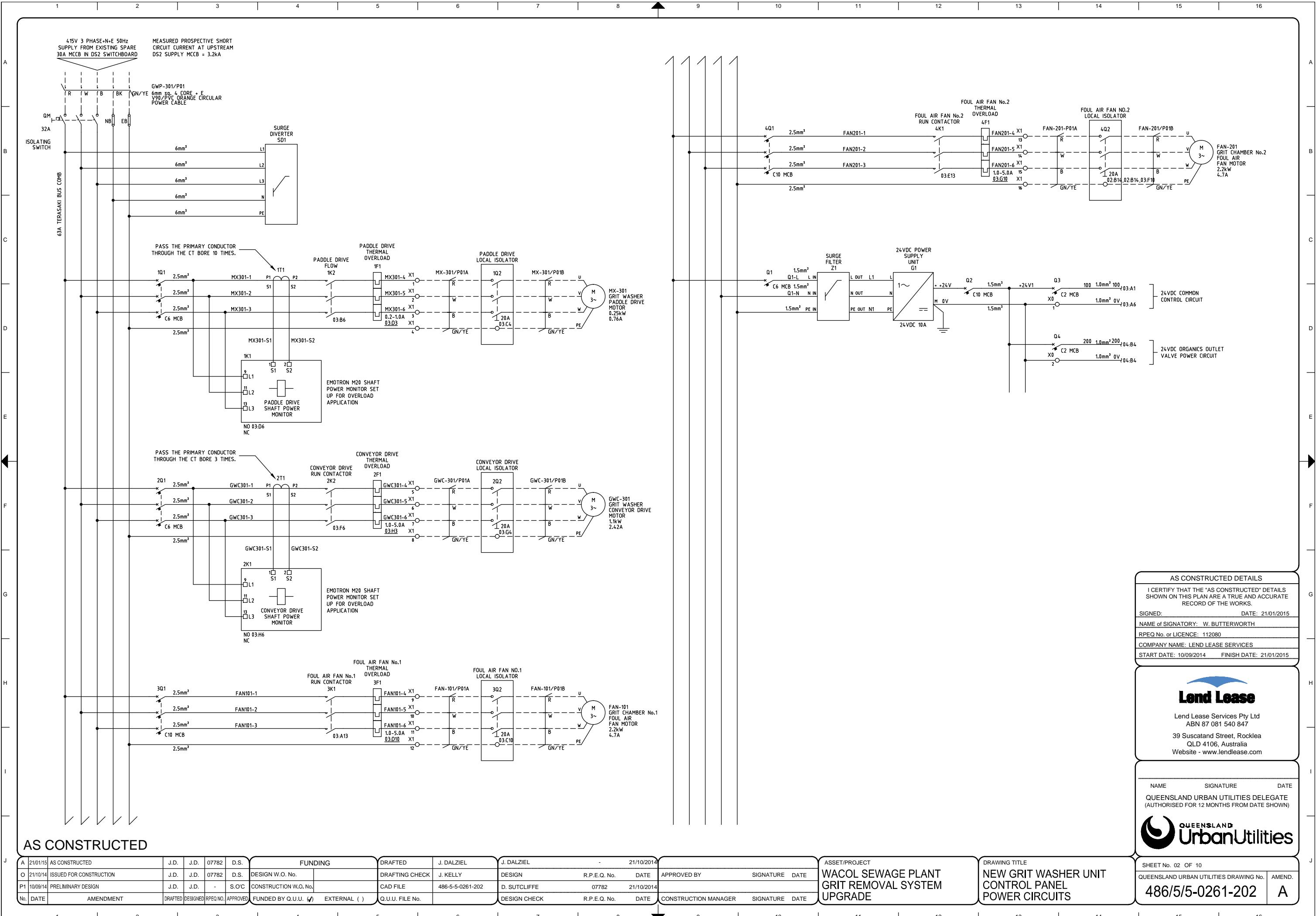
Lend Lease Services Pty Ltd  
ABN 87 081 540 847  
39 Suscatand Street, Rocklea  
QLD 4106, Australia  
Website - www.lendlease.com

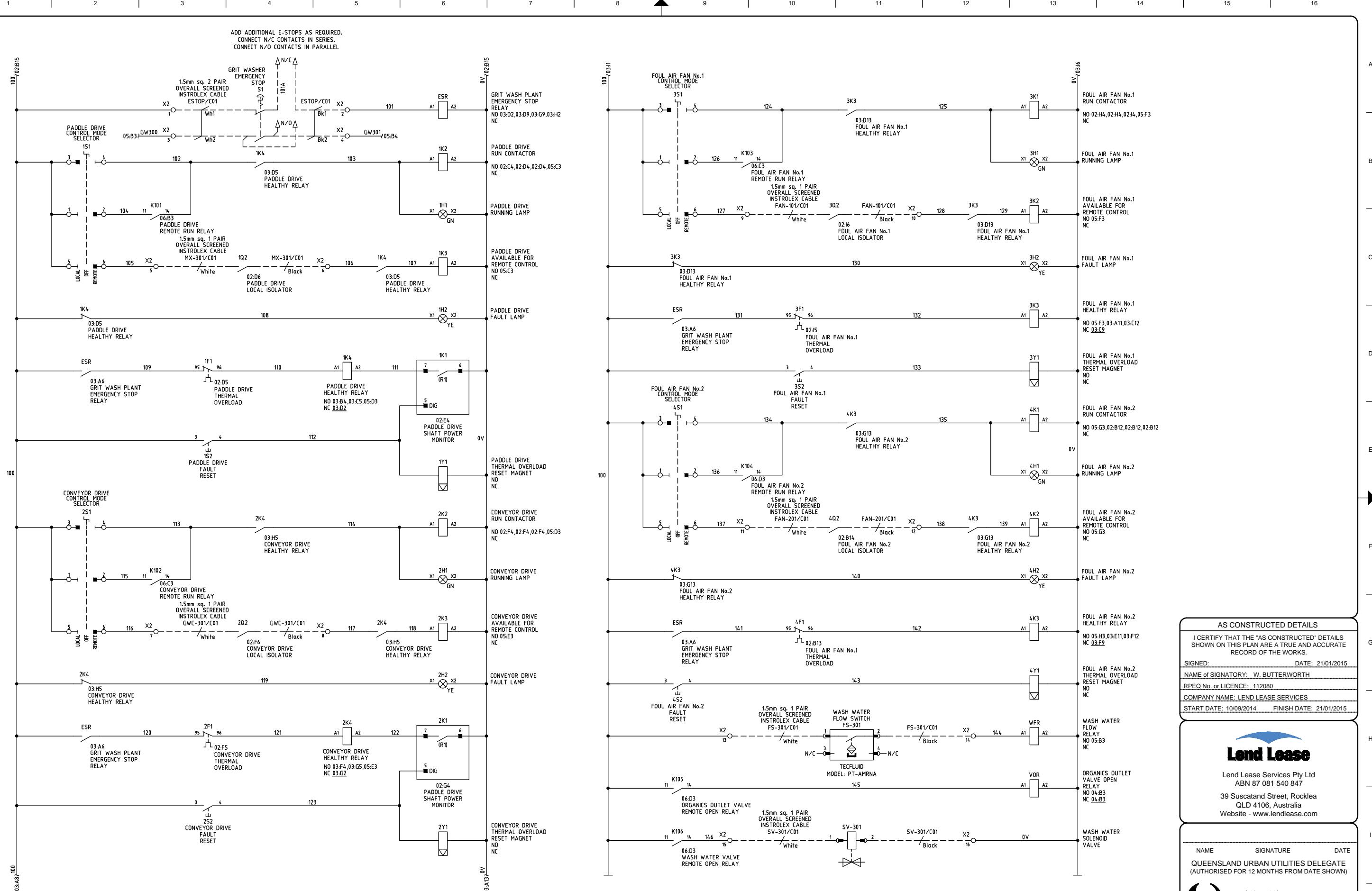
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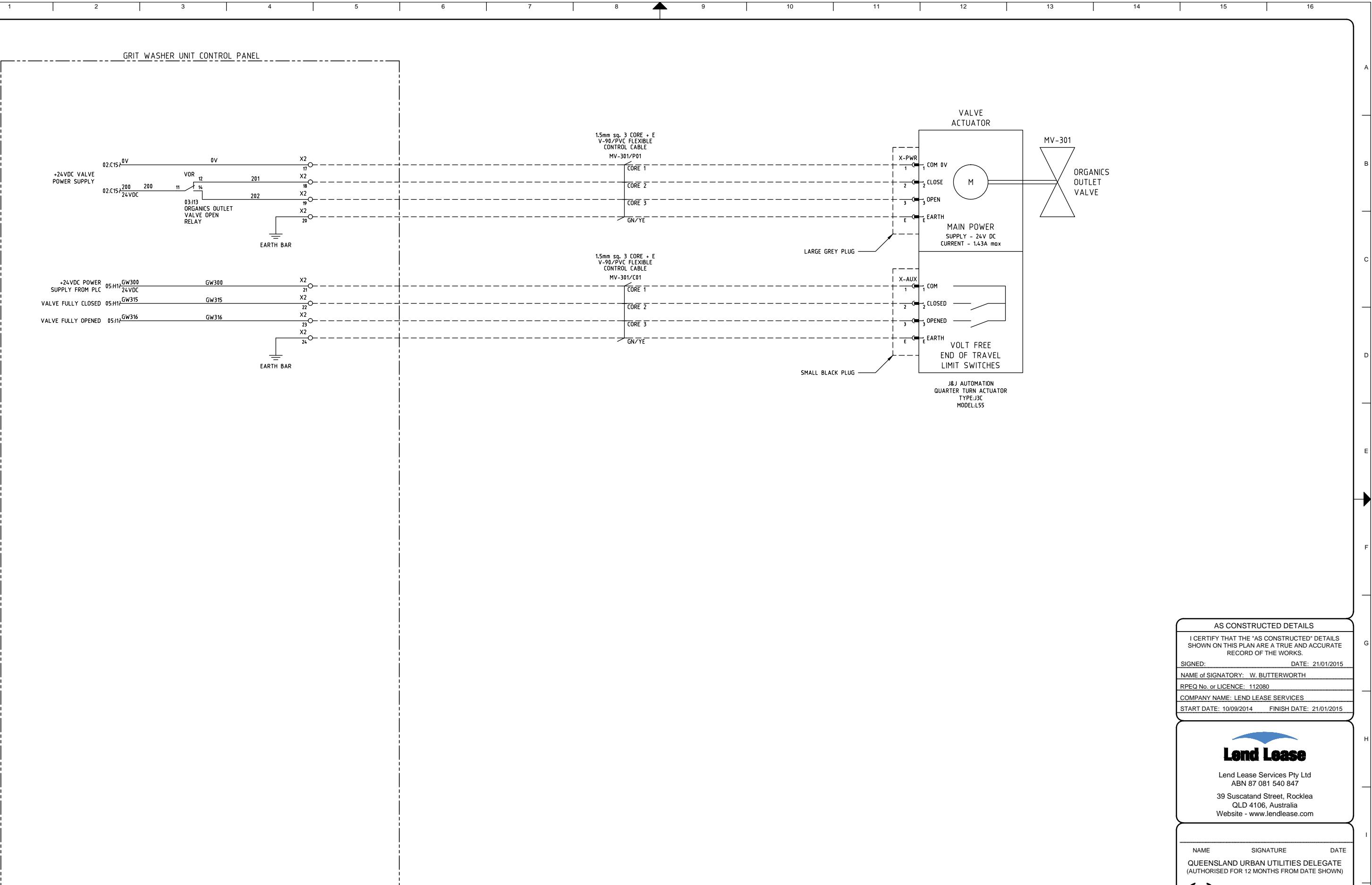
### AS CONSTRUCTED

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O	21/10/14	ISSUED FOR CONSTRUCTION	J.D.	J.D.	07782	D.S.	DESIGN W.O. No.			DRAFTING CHECK	J. KELLY	DESIGN	R.P.E.Q. No.	DATE	APPROVED BY	SIGNATURE	DATE
P1	10/09/14	PRELIMINARY DESIGN	J.D.	J.D.	-	S.O.C	CONSTRUCTION W.O. No.			CAD FILE	486-5-5-0261-201	D. SUTCLIFFE	07782	21/10/2014			
No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED	FUNDED BY Q.U.U. (✓)	EXTERNAL ( )	Q.U.U. FILE NO.	DESIGN CHECK	R.P.E.Q. No.	DATE		CONSTRUCTION MANAGER	SIGNATURE	DATE	





AS CONSTRUCTED		J.D.	J.D.	07782	D.S.	FUNDING		DRAFTED	J. DALZIEL	J. DALZIEL	-	21/10/2014	APPROVED BY		SIGNATURE DATE		ASSET/PROJECT		DRAWING TITLE		SHEET NO. 03 OF 10		
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P1	10/09/14	PRELIMINARY DESIGN	J.D.	J.D.	-	S.O.C	CONSTRUCTION W.O. No.		CAD FILE	486-5-5-0261-203	D. SUTCLIFFE	07782	21/10/2014	CONSTRUCTION MANAGER		SIGNATURE DATE		Grit Removal System Upgrade		NEW GRIT WASHER UNIT		AMEND.	
No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED	FUNDED BY Q.U.U. (Y)	EXTERNAL ( )	Q.U.U. FILE NO.	Q.U.U. FILE NO.	DESIGN CHECK	R.P.E.Q. NO.	DATE	CONSTRUCTION MANAGER		SIGNATURE DATE		UPGRADE		CONTROL PANEL		486/5/5-0261-203	



**AS CONSTRUCTED DETAILS**

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SIGNED: DATE: 21/01/2015  
NAME of SIGNATORY: W. BUTTERWORTH  
RPEQ No. or LICENCE: 112080  
COMPANY NAME: LEND LEASE SERVICES  
START DATE: 10/09/2014 FINISH DATE: 21/01/2015

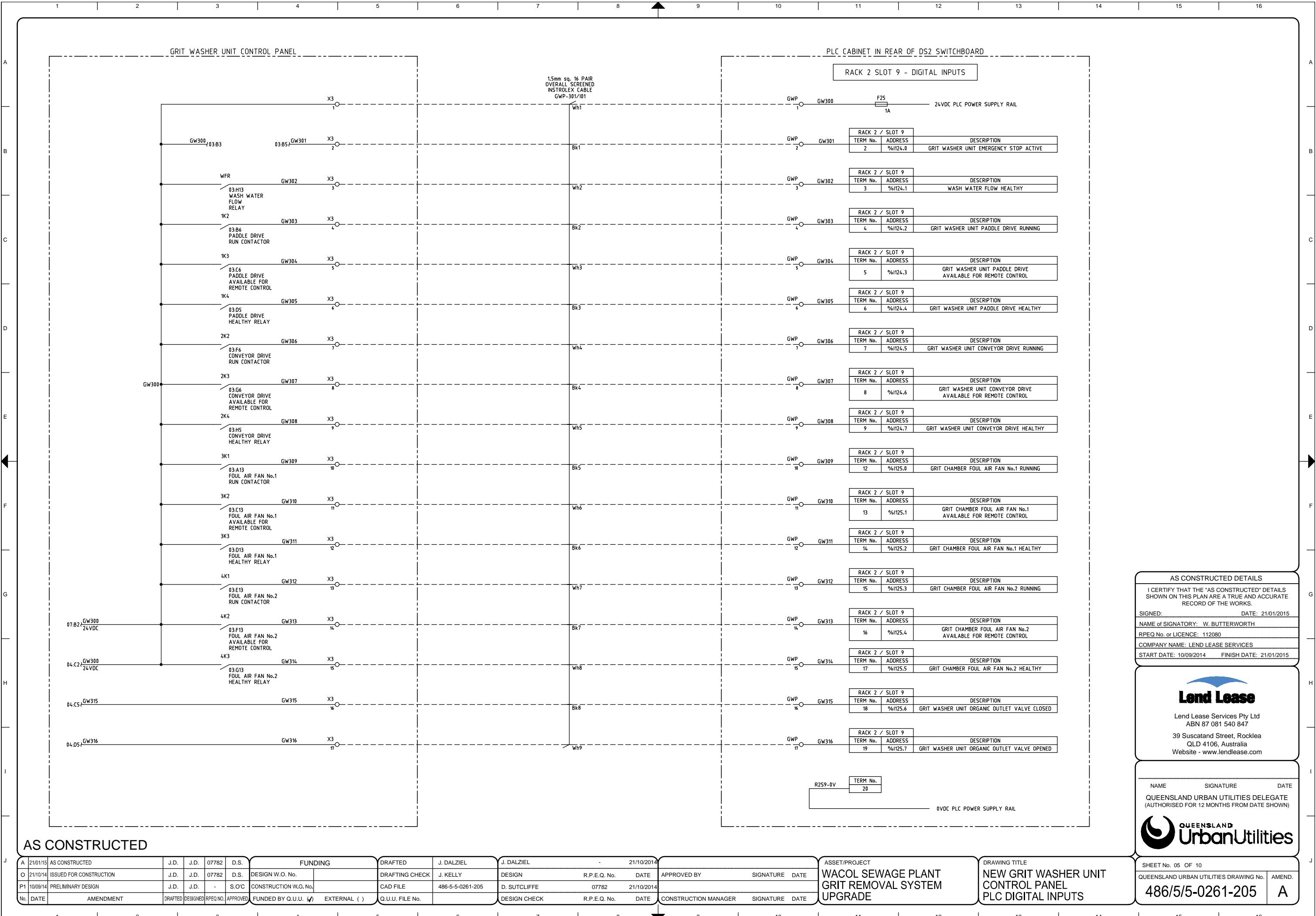


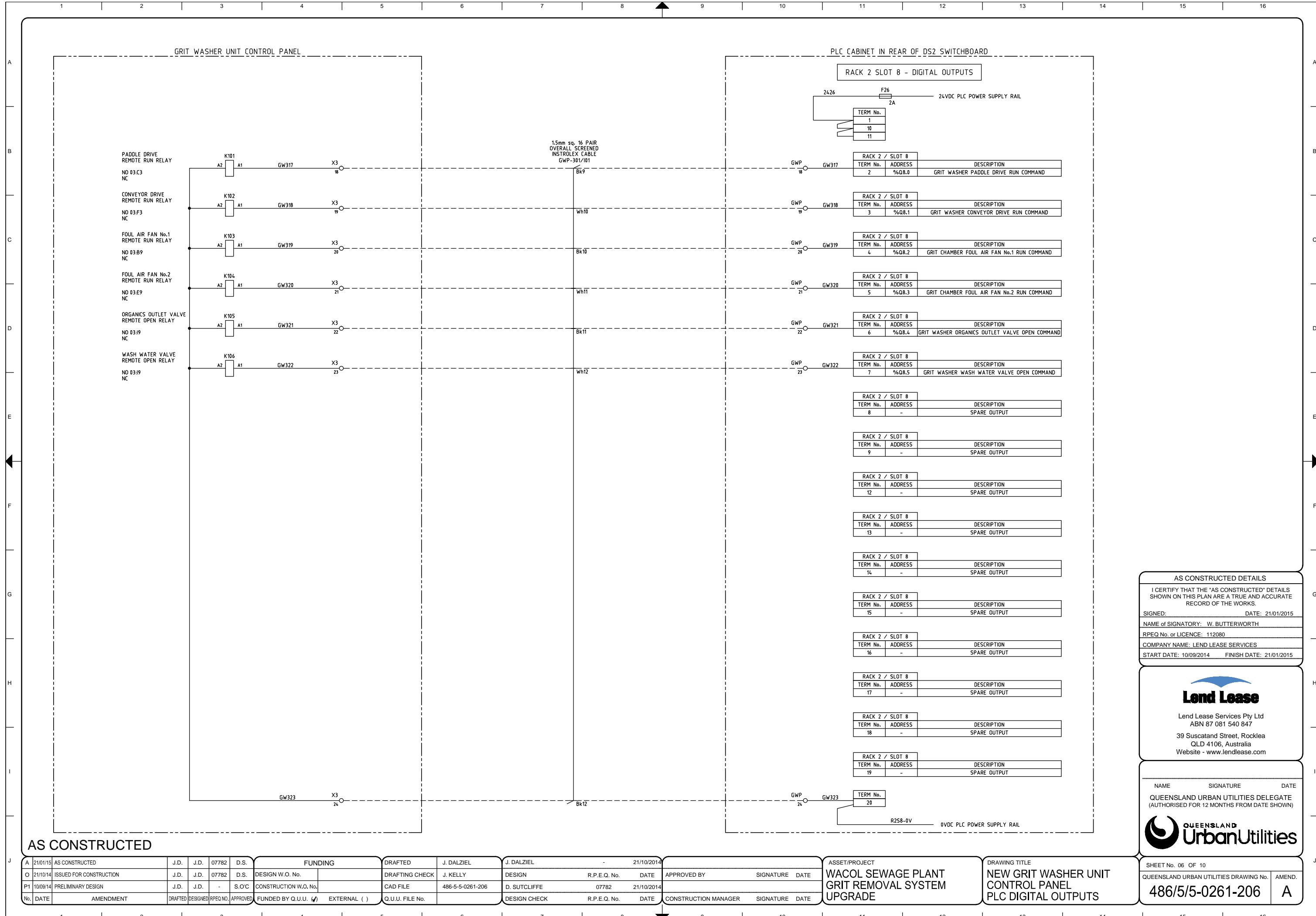
Lend Lease Services Pty Ltd  
ABN 87 081 540 847  
39 Suscatand Street, Rocklea  
QLD 4106, Australia  
Website - www.lendlease.com

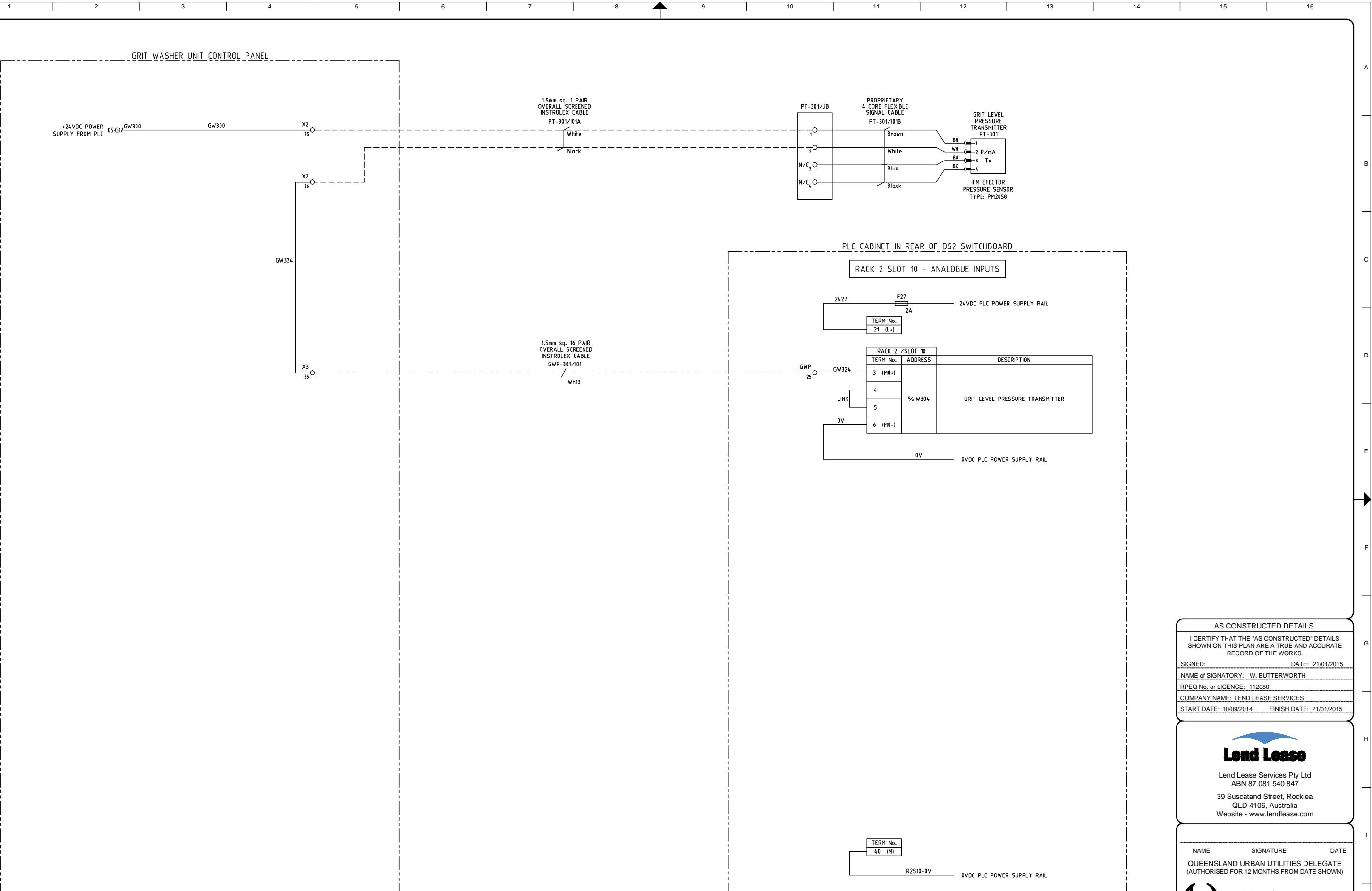
NAME SIGNATURE DATE  
QUEENSLAND URBAN UTILITIES DELEGATE  
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

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AS CONSTRUCTED				FUNDING			DRAFTED	J. DALZIEL	J. DALZIEL	-	21/10/2014	ASSET/PROJECT			DRAWING TITLE			SHEET NO. 04 OF 10	
O	21/10/14	ISSUED FOR CONSTRUCTION	J.D.	J.D.	07782	D.S.	DESIGN W.O. No.		DRAFTING CHECK	J. KELLY	DESIGN	R.P.E.Q. No.	DATE	APPROVED BY	SIGNATURE	DATE	QUEENSLAND URBAN UTILITIES DRAWING NO.	AMEND.	
P1	10/09/14	PRELIMINARY DESIGN	J.D.	J.D.	-	S.O.C	CONSTRUCTION W.O. No.		CAD FILE	486-5-5-0261-204	D. SUTCLIFFE	07782	21/10/2014				486/5/5-0261-204	A	
No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED	FUNDED BY Q.U.U. (✓)	EXTERNAL ( )	Q.U.U. FILE NO.	DESIGN CHECK	R.P.E.Q. NO.	DATE	CONSTRUCTION MANAGER	SIGNATURE	DATE				







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COMPANY NAME: LEND LEASE SERVICES  
START DATE: 10/09/2014 FINISH DATE: 21/01/2015



Lend Lease Services Pty Ltd  
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AS CONSTRUCTED				FUNDING			DRAFTED	J. DALZIEL	J. DALZIEL	-	21/10/2014	APPROVED BY	SIGNATURE	DATE	ASSET/PROJECT		DRAWING TITLE		SHEET NO. 07 OF 10		
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P1	10/09/14	PRELIMINARY DESIGN	J.D.	J.D.	-	S.O.C	CONSTRUCTION W.O. No.		CAD FILE	486-5-0261-207	D. SUTCLIFFE	07782	21/10/2014			GRIT REMOVAL SYSTEM	CONTROL PANEL				
No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED	FUNDED BY Q.U.U. (Y)	EXTERNAL ( )	Q.U.U. FILE NO.		DESIGN CHECK	R.P.E.Q. No.	DATE	CONSTRUCTION MANAGER	SIGNATURE	DATE	UPGRADE	PLC ANALOGUE INPUTS		486/5/5-0261-207	A

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16

GRIT WASHER UNIT CONTROL PANEL - CABLE SCHEDULE							
CABLE DESIGNATION	CONDUCTOR CROSS SECTION	NUMBER OF CORES	CABLE TYPE	CABLE LENGTH	CABLE SOURCE	CABLE DESTINATION	CABLE FUNCTION
GWP-301/P01	6.0mm <sup>2</sup>	4C + E	V90 PVC ORANGE CIRCULAR POWER CABLE	45m	SCREENS COMPLEX DISTRIBUTION SWITCHBOARD DS2	GRIT WASHER CONTROL PANEL	POWER SUPPLY TO GRIT WASHER CONTROL PANEL
MX-301/P01A	2.5mm <sup>2</sup>	3C + E	V90 PVC ORANGE CIRCULAR POWER CABLE	10m	GRIT WASHER CONTROL PANEL	PADDLE DRIVE LOCAL ISOLATOR	PADDLE DRIVE MOTOR POWER
MX-301/P01B	2.5mm <sup>2</sup>	3C + E	V90 PVC ORANGE CIRCULAR POWER CABLE	5m	PADDLE DRIVE LOCAL ISOLATOR	PADDLE DRIVE MOTOR	PADDLE DRIVE MOTOR POWER
GWC-301/P01A	2.5mm <sup>2</sup>	3C + E	V90 PVC ORANGE CIRCULAR POWER CABLE	10m	GRIT WASHER CONTROL PANEL	CONVEYOR DRIVE LOCAL ISOLATOR	CONVEYOR DRIVE MOTOR POWER
GWC-301/P01B	2.5mm <sup>2</sup>	3C + E	V90 PVC ORANGE CIRCULAR POWER CABLE	8m	CONVEYOR DRIVE LOCAL ISOLATOR	CONVEYOR DRIVE MOTOR	CONVEYOR DRIVE MOTOR POWER
FAN-101/P01A	2.5mm <sup>2</sup>	3C + E	V90 PVC ORANGE CIRCULAR POWER CABLE	14m	GRIT WASHER CONTROL PANEL	FOUL AIR FAN No.1 LOCAL ISOLATOR	FOUL AIR FAN No.1 MOTOR POWER
FAN-101/P01B	2.5mm <sup>2</sup>	3C + E	V90 PVC ORANGE CIRCULAR POWER CABLE	1m	FOUL AIR FAN No.1 LOCAL ISOLATOR	FOUL AIR FAN No.1 MOTOR	FOUL AIR FAN No.1 MOTOR POWER
FAN-201/P01A	2.5mm <sup>2</sup>	3C + E	V90 PVC ORANGE CIRCULAR POWER CABLE	17m	GRIT WASHER CONTROL PANEL	FOUL AIR FAN No.2 LOCAL ISOLATOR	FOUL AIR FAN No.2 MOTOR POWER
FAN-201/P01B	2.5mm <sup>2</sup>	3C + E	V90 PVC ORANGE CIRCULAR POWER CABLE	1m	FOUL AIR FAN No.2 LOCAL ISOLATOR	FOUL AIR FAN No.2 MOTOR	FOUL AIR FAN No.2 MOTOR POWER
MV-301/P01	1.5mm <sup>2</sup>	3C + E	V90 PVC FLEXIBLE CONTROL CABLE	13m	GRIT WASHER CONTROL PANEL	ORGANICS OUTLET VALVE POWER CONNECTOR	ORGANICS OUTLET VALVE MOTOR POWER
ESTOP/C01	1.5mm <sup>2</sup>	2 PAIR	INSTROLEX OVERALL SCREENED	10m	GRIT WASHER CONTROL PANEL	EMERGENCY STOP PUSHBUTTON STATION	EMERGENCY STOP
MX-301-C01	1.5mm <sup>2</sup>	1 PAIR	INSTROLEX OVERALL SCREENED	10m	GRIT WASHER CONTROL PANEL	PADDLE DRIVE ISOLATED SIGNAL	PADDLE DRIVE ISOLATED SIGNAL
GWC-301/C01	1.5mm <sup>2</sup>	1 PAIR	INSTROLEX OVERALL SCREENED	10m	GRIT WASHER CONTROL PANEL	CONVEYOR DRIVE ISOLATED SIGNAL	CONVEYOR DRIVE ISOLATED SIGNAL
FAN-101/C01	1.5mm <sup>2</sup>	1 PAIR	INSTROLEX OVERALL SCREENED	14m	GRIT WASHER CONTROL PANEL	FOUL AIR FAN No.1 LOCAL ISOLATOR	FOUL AIR FAN No.1 ISOLATED SIGNAL
FAN-201/C01	1.5mm <sup>2</sup>	1 PAIR	INSTROLEX OVERALL SCREENED	17m	GRIT WASHER CONTROL PANEL	FOUL AIR FAN No.2 LOCAL ISOLATOR	FOUL AIR FAN No.2 ISOLATED SIGNAL
FS-301/C01	1.5mm <sup>2</sup>	1 PAIR	INSTROLEX OVERALL SCREENED	12m	GRIT WASHER CONTROL PANEL	WASH WATER FLOW SWITCH ON ROTAMETER	WASH WATER FLOWING SIGNAL
SV-301/C01	1.5mm <sup>2</sup>	1 PAIR	INSTROLEX OVERALL SCREENED	11m	GRIT WASHER CONTROL PANEL	WASH WATER SOLENOID VALVE	WASH WATER SOLENOID ACTIVATION
MV-301/C01	1.5mm <sup>2</sup>	3C + E	V90 PVC FLEXIBLE CONTROL CABLE	13m	GRIT WASHER CONTROL PANEL	ORGANICS OUTLET VALVE AUX CONNECTOR	ORGANICS OUTLET VALVE POSITION INDICATION
GWP-301/I01	1.5mm <sup>2</sup>	16 PAIR	INSTROLEX OVERALL SCREENED	47m	SCREENS COMPLEX DS2 PLC CABINET	GRIT WASHER CONTROL PANEL	PLC DIGITAL AND ANALOGUE I/O SIGNALS
PT-301/I01A	1.5mm <sup>2</sup>	1 PAIR	INSTROLEX OVERALL SCREENED	10m	GRIT WASHER CONTROL PANEL	PRESSURE TRANSMITTER JUNCTION BOX PT-301/JB	ANALOGUE PRESSURE SIGNAL
PT-301/I01B	-	4 CORE	PROPRIETARY FLEXIBLE CABLE WITH PLUG	1m	PRESSURE TRANSMITTER JUNCTION BOX PT-301/JB	PRESSURE TRANSMITTER	ANALOGUE PRESSURE SIGNAL

AS CONSTRUCTED DETAILS  
I CERTIFY THAT THE 'AS CONSTRUCTED' DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.  
SIGNED: ..... DATE: 21/01/2015  
NAME of SIGNATORY: W. BUTTERWORTH  
RPEQ No. or LICENCE: 112080  
COMPANY NAME: LEND LEASE SERVICES  
START DATE: 10/09/2014 FINISH DATE: 21/01/2015



Lend Lease Services Pty Ltd  
ABN 87 081 540 847  
39 Suscatand Street, Rocklea  
QLD 4106, Australia  
Website - www.lendlease.com

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

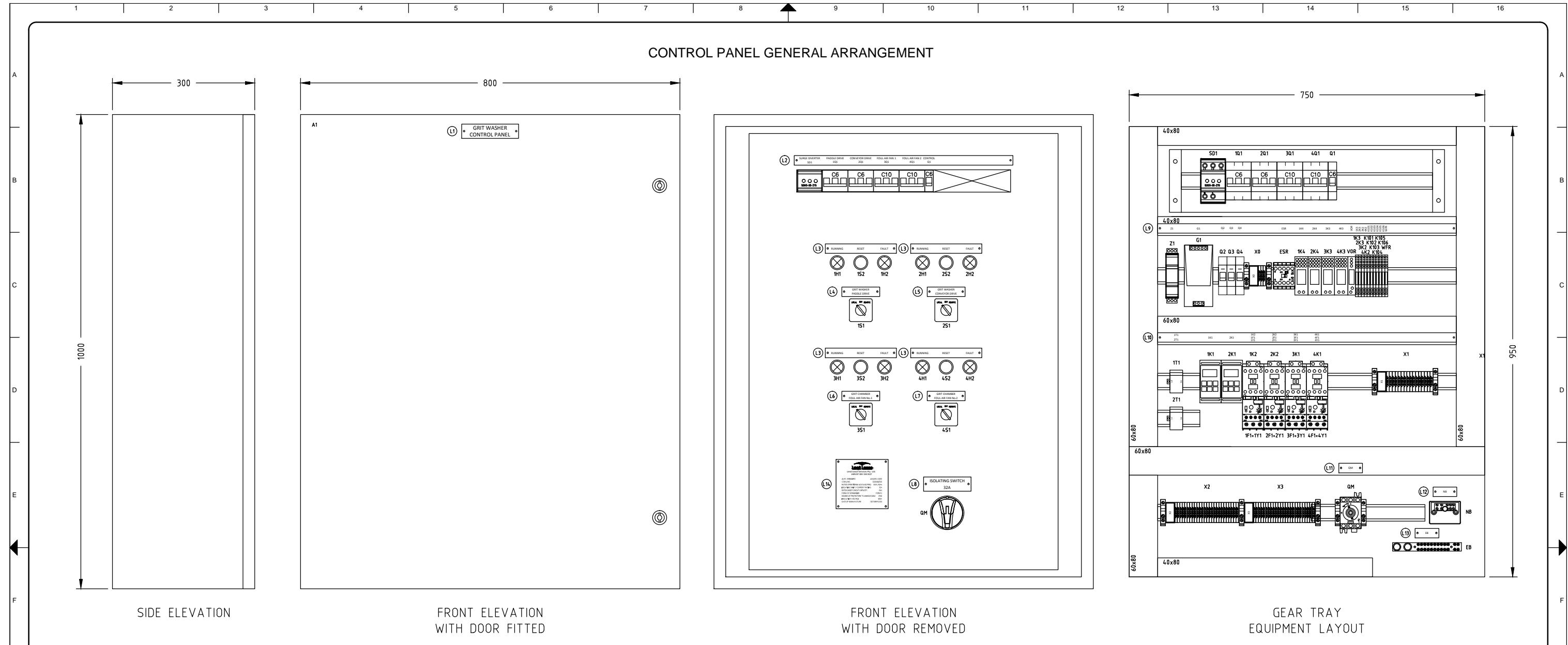


## AS CONSTRUCTED

A 21/01/15 AS CONSTRUCTED	J.D.	J.D.	07782	D.S.	FUNDING		DRAFTED	J. DALZIEL	J. DALZIEL	-	21/01/2014	APPROVED BY	SIGNATURE	DATE	ASSET/PROJECT	DRAWING TITLE	SHEET NO. 08 OF 10
O 21/10/14 ISSUED FOR CONSTRUCTION	J.D.	J.D.	07782	D.S.	DESIGN W.O. No.		DRAFTING CHECK	J. KELLY	DESIGN	R.P.E.Q. No.	DATE				WACOL SEWAGE PLANT	NEW GRIT WASHER UNIT	QUEENSLAND URBAN UTILITIES DRAWING NO. AMEND.
P1 10/09/14 PRELIMINARY DESIGN	J.D.	J.D.	-	S.O.C	CONSTRUCTION W.O. No.		CAD FILE	486-5-5-0261-208	D. SUTCLIFFE	07782	21/10/2014	APPROVED BY	SIGNATURE	DATE	GRIT REMOVAL SYSTEM	CONTROL PANEL	486/5/5-0261-208 A
No. DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED	FUNDED BY Q.U.U. (Y)	EXTERNAL ( )	Q.U.U. FILE NO.	DESIGN CHECK	R.P.E.Q. No.	DATE	CONSTRUCTION MANAGER	SIGNATURE	DATE	UPGRADE	CABLE SCHEDULE	

GRIT WASHER UNIT CONTROL PANEL - PARTS LIST					
DESIGNATION	QTY	DESCRIPTION	PART NUMBER	BRAND	SUPPLIER
1F1	1	ELECTRONIC OVERLOAD RELAY, 0.2A-1.0A	CEP7-ED1B8	SPRECHER & SCHUH	NHP
1H1	1	GREEN PILOT LAMP, 24VAC/DC	D7PP3PN3G	SPRECHER & SCHUH	NHP
1H2	1	YELLOW PILOT LAMP, 24VAC/DC	D7PP5PN3W	SPRECHER & SCHUH	NHP
1K1	1	SHAFT POWER MONITOR RELAY, M20, 3x380-500VAC	01-2520-45	EMOTRON	SIEMENS
1K2	1	CONTACTOR, 9A, 24VDC COIL	CA79E1024VDC	SPRECHER & SCHUH	NHP
1K3	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP
1K4	1	RELAY, 7A, 2C/O, 24VDC	5534007424VDC	FINDER	NHP
1Q1	1	RELAY BASE FOR 5534 RELAYS	9404	FINDER	NHP
1Q2	1	MCB, 6kA, C CURVE, 3 POLE, 6A	DTCB6306C	TERASAKI	NHP
1S1	1	LOAD BREAK SWITCH, 3 POLE, 20A WITH 1C/O AUX	565W320CXGY	CLIPSAL	LAWRENCE & HANSON
1S2	1	LOCAL/OFF/REMOTE SELECTOR SWITCH, CUSTOM	CA10	KRAUS & NAIMER	KRAUS & NAIMER
1T1	1	BLUE PUSH BUTTON, 1N/0	D7PF6PX10	SPRECHER & SCHUH	NHP
1Y1	1	CURRENT TRANSFORMER, 0.4A-10A	CTM010	EMOTRON	SIEMENS
2F1	1	REMOTE RESET MAGNET, 24VDC	CEP7EMRZ24	SPRECHER & SCHUH	NHP
2H1	1	ELECTRONIC OVERLOAD RELAY, 1.0A-5.0A	CEP7-ED1CB	SPRECHER & SCHUH	NHP
2H2	1	GREEN PILOT LAMP, 24VAC/DC	D7PP3PN3G	SPRECHER & SCHUH	NHP
2K1	1	YELLOW PILOT LAMP, 24VAC/DC	D7PP5PN3W	SPRECHER & SCHUH	NHP
2K2	1	CONTACTOR, 9A, 24VDC COIL	CA79E1024VDC	SPRECHER & SCHUH	NHP
2K3	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP
2K4	1	RELAY, 7A, 2C/O, 24VDC	5534007424VDC	FINDER	NHP
2Q1	1	RELAY BASE FOR 5534 RELAYS	9404	FINDER	NHP
2Q2	1	MCB, 6kA, C CURVE, 3 POLE, 6A	DTCB6306C	TERASAKI	NHP
2S1	1	LOAD BREAK SWITCH, 3 POLE, 20A WITH 1C/O AUX	565W320CXGY	CLIPSAL	LAWRENCE & HANSON
2S2	1	LOCAL/OFF/REMOTE SELECTOR SWITCH, CUSTOM	CA10	KRAUS & NAIMER	KRAUS & NAIMER
2S3	1	BLUE PUSH BUTTON, 1N/0	D7PF6PX10	SPRECHER & SCHUH	NHP
2T1	1	CURRENT TRANSFORMER, 0.4A-10A	CTM010	EMOTRON	SIEMENS
2Y1	1	REMOTE RESET MAGNET, 24VDC	CEP7EMRZ24	SPRECHER & SCHUH	NHP
3F1	1	ELECTRONIC OVERLOAD RELAY, 1.0A-5.0A	CEP7-ED1CB	SPRECHER & SCHUH	NHP
3H1	1	GREEN PILOT LAMP, 24VAC/DC	D7PP3PN3G	SPRECHER & SCHUH	NHP
3H2	1	YELLOW PILOT LAMP, 24VAC/DC	D7PP5PN3W	SPRECHER & SCHUH	NHP
3K1	1	CONTACTOR, 9A, 24VDC COIL	CA79E1024VDC	SPRECHER & SCHUH	NHP
3K2	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP
3K3	1	RELAY, 7A, 2C/O, 24VDC	5534007424VDC	FINDER	NHP
3Q1	1	RELAY BASE FOR 5534 RELAYS	9404	FINDER	NHP
3Q2	1	MCB, 6kA, C CURVE, 3 POLE, 10A	DTCB6310C	TERASAKI	NHP
3S1	1	LOAD BREAK SWITCH, 3 POLE, 20A WITH 1C/O AUX	565W320CXGY	CLIPSAL	LAWRENCE & HANSON
3S2	1	LOCAL/OFF/REMOTE SELECTOR SWITCH, CUSTOM	CA10-A71-F12-AUS002	KRAUS & NAIMER	KRAUS & NAIMER
3S3	1	BLUE PUSH BUTTON, 1N/0	D7PF6PX10	SPRECHER & SCHUH	NHP
3Y1	1	REMOTE RESET MAGNET, 24VDC	CEP7EMRZ24	SPRECHER & SCHUH	NHP
4F1	1	ELECTRONIC OVERLOAD RELAY, 1.0A-5.0A	CEP7-ED1CB	SPRECHER & SCHUH	NHP
4H1	1	GREEN PILOT LAMP, 24VAC/DC	D7PP3PN3G	SPRECHER & SCHUH	NHP
4H2	1	YELLOW PILOT LAMP, 24VAC/DC	D7PP5PN3W	SPRECHER & SCHUH	NHP
4K1	1	CONTACTOR, 9A, 24VDC COIL	CA79E1024VDC	SPRECHER & SCHUH	NHP
4K2	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP
4K3	1	RELAY, 7A, 2C/O, 24VDC	5534007424VDC	FINDER	NHP
4Q1	1	RELAY BASE FOR 5534 RELAYS	9404	FINDER	NHP
4Q2	1	MCB, 6kA, C CURVE, 3 POLE, 10A	DTCB6310C	TERASAKI	NHP
4S1	1	LOAD BREAK SWITCH, 3 POLE, 20A WITH 1C/O AUX	565W320CXGY	CLIPSAL	LAWRENCE & HANSON
4S2	1	LOCAL/OFF/REMOTE SELECTOR SWITCH, CUSTOM	CA10	KRAUS & NAIMER	KRAUS & NAIMER
4Y1	1	BLUE PUSH BUTTON, 1N/0	D7PF6PX10	SPRECHER & SCHUH	NHP
A1	1	REMOTE RESET MAGNET, 24VDC	CEP7EMRZ24	SPRECHER & SCHUH	NHP
E1	1	1000H X 800W X 300D STAINLESS STEEL ENCLOSURE	D1008030	ZANARDO	NHP
E2	1	INNER DOOR FOR ENCLOSURE	ID10080	ZANARDO	NHP
E3	1	SET OF 4 MOUNTING BRACKETS FOR ENCLOSURE	AG1A	ZANARDO	NHP
EB	1	EARTH BAR, 16SA, 12 WAY	16SE12	DORE	DORE ELECTRICS
ESR	1	EMERGENCY STOP RELAY 4 N/O 24VDC	C58C40E24VDC	SPRECHER & SCHUH	NHP
FS-301	1	MAGNETIC REED SWITCH N/O	PT-AMRNA	TECFUID	FREE ISSUED
G1	1	POWER SUPPLY UNIT 240VAC/24VDC 10A	8951360810	WEIDMULLER	RAMELEC
K101	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP
K102	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP
K103	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP
K104	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP
K105	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP
K106	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP
NB	1	NEUTRAL BAR ENCLOSED	100ASC	DORE	DORE ELECTRICS
PT-301	1	PRESSURE TRANSMITTER, 4-20mA	PN2058	IFM EFECTOR	FREE ISSUED
PT-301JB	1	JUNCTION BOX, IP66	56JB1	CLIPSAL	LAWRENCE & HANSON
Q1	1	MCB, 6kA, C CURVE, 1 POLE, 6A	DTCB6106C	TERASAKI	NHP
Q2	1	MCB, 6kA, C CURVE, 1 POLE, 10A	DTCB6110C	TERASAKI	NHP
Q3	1	MCB, 6kA, C CURVE, 1 POLE, 2A	DTCB6102C	TERASAKI	NHP
Q4	1	MCB, 6kA, C CURVE, 1 POLE, 2A	DTCB6102C	TERASAKI	NHP
QM	1	LOAD BREAK SWITCH, 3 POLE, 32A	SLBM32P	SOCOME	NHP
S1	1	ENCLOSED EMERGENCY STOP PUSH BUTTON	D71Y1M1	SPRECHER & SCHUH	NHP
SD1	1	LEGEND PLATE FOR ESTOP PUSHBUTTON	D715YE112	SPRECHER & SCHUH	NHP
SD2	1	EXTRA CONTACT BLOCK 1N/O	D7BX10	SPRECHER & SCHUH	NHP
SV-301	1	SURGE DIVERTER, 50kA, 3PHASE, ALL MODE	SD03-50-275	NOVARIS	POWERCOM SOLUTIONS
VOR	1	SOLENOID VALVE, N/C, 24VDC, 8W	5282A	BURKERT	FREE ISSUED
WFR	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	4661007424VDC	FINDER	NHP
Z1	1	RELAY BASE FOR 4661 RELAYS	9701	FINDER	NHP
WFR	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP
Z1	1	SURGE FILTER, 6.5KA, 1 PHASE	SD1-6-6.5-275	NOVARIS	POWERCOM SOLUTIONS

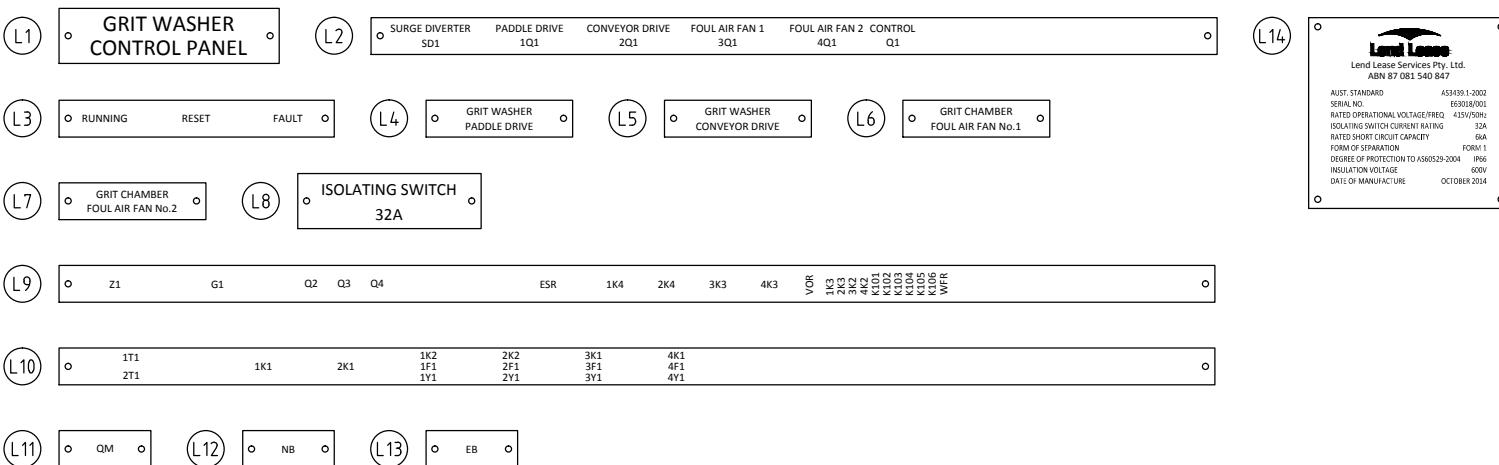
DESIGNATION	QTY	DESCRIPTION	TERMINALS		
			PART NUMBER	BRAND	SUPPLIER
X0	2	TERMINAL 2.5mm, UK3N	XPC3001501	PHOENIX CONTACT	PHOENIX CONTACT
	1	END COVER, D-UK4/10	XPC300320	PHOENIX CONTACT	PHOENIX CONTACT
	2	CLAMPS, E/UK1	XPC120143	PHOENIX CONTACT	PHOENIX CONTACT
	1	GROUP MARKER, UBE/D	XPC080307	PHOENIX CONTACT	PHOENIX CONTACT
X1	12	TERMINAL 4mm, UKSN	XPC3004362	PHOENIX CONTACT	PHOENIX CONTACT
	4	TERMINAL 2.5mm EARTH, USLKG3	XPC044504	PHOENIX CONTACT	PHOENIX CONTACT
	2	CLAMPS, E/UK1	XPC120143	PHOENIX CONTACT	PHOENIX CONTACT
	1	GROUP MARKER, UBE/D	XPC080307	PHOENIX CONTACT	PHOENIX CONTACT
X2	26	TERMINAL 2.5mm, UK3N	XPC3001501	PHOENIX CONTACT	PHOENIX CONTACT
	2	TERMINAL 2.5mm EARTH, USLKG3	XPC441083	PHOENIX CONTACT	PHOENIX CONTACT
	1	END COVER, D-UK4/10	XPC300320	PHOENIX CONTACT	PHOENIX CONTACT
	2	CLAMPS, E/UK1	XPC120143	PHOENIX CONTACT	PHOENIX CONTACT
X3	25	TERMINAL 2.5mm, UK3N	XPC3001501	PHOENIX CONTACT	PHOENIX CONTACT
	1	END COVER, D-UK4/10	XPC300320	PHOENIX CONTACT	PHOENIX CONTACT
	2	CLAMPS, E/UK1	XPC120143	PHOENIX CONTACT	PHOENIX CONTACT
	1	GROUP MARKER, UBE/D	XPC080307	PHOENIX CONTACT	PHOENIX CONTACT
GWP	25	TERMINAL 2.5mm, UK3N	XPC3001501	PHOENIX CONTACT	PHOENIX CONTACT
	1	END COVER, D-UK4/10	XPC300320	PHOENIX CONTACT	PHOENIX CONTACT
	2	CLAMPS, E/UK1	XPC120143	PHOENIX CONTACT	PHOENIX CONTACT
	1	GROUP MARKER, UBE/D	XPC080307	PHOENIX CONTACT	PH



SIDE ELEVATION

FRONT ELEVATION  
WITH DOOR FITTEDFRONT ELEVATION  
WITH DOOR REMOVEDGEAR TRAY  
EQUIPMENT LAYOUT

## CONTROL PANEL LABEL DETAILS



## AS CONSTRUCTED

A	21/01/15 AS CONSTRUCTED	J.D.	J.D.	07782	D.S.	FUNDING	DRAFTED	J. DALZIEL	J. DALZIEL	-	21/10/2014	ASSET/PROJECT	DRAWING TITLE	SHEET No. 10 OF 10	
O	21/10/14 ISSUED FOR CONSTRUCTION	J.D.	J.D.	07782	D.S.	DESIGN W.O. No.			DRAFTING CHECK	J. KELLY		WACOL SEWAGE PLANT	NEW GRIT WASHER UNIT	QUEENSLAND URBAN UTILITIES DRAWING No.	
P1	10/09/14 PRELIMINARY DESIGN	J.D.	J.D.	-	S.O.C	CONSTRUCTION W.O. No.			CAD FILE	486-5-0261-210	21/10/2014	GRIT REMOVAL SYSTEM	CONTROL PANEL	AMEND.	
No.	DATE	AMENDMENT	DRAFTED	DESIGNED	R.P.E.Q. NO.	APPROVED	FUNDED BY Q.U.U. (Y)	EXTERNAL ( )	Q.U.U. FILE NO.			UPGRADE	GENERAL ARRANGEMENT	486/5/5-0261-210	A

AS CONSTRUCTED DETAILS

I CERTIFY THAT THE 'AS CONSTRUCTED' DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: DATE: 21/01/2015  
NAME OF SIGNATORY: W. BUTTERWORTH  
R.P.E.Q. No. or LICENCE: 112080  
COMPANY NAME: LEND LEASE SERVICES  
START DATE: 10/09/2014 FINISH DATE: 21/01/2015

**Lend Lease**  
Lend Lease Services Pty Ltd  
ABN 87 081 540 847  
39 Suscatand Street, Rocklea  
QLD 4106, Australia  
Website - www.lendlease.com

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

**Queensland Urban Utilities**

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade
---

Contract No. C1011-045-087 Grit Washer System
--

## 4. Volume 4: Installation and Commissioning.

### 4.1 Commissioning Plan

The commissioning of the system was undertaken in two stages following [Meyor Industries Commissioning Plan](#). Firstly, the mechanical and electrical checks were carried out by the respective contractors in order to identify and rectify any defects. [Click to see check list](#).

The second stage included the final commissioning of the system in presence of QUU representatives. In addition, a training session was undertaken with the QUU operators.

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Queensland Urban Utilities Wacol STP Grit Removal System Upgrade	Contract No. C1011-045-087 Grit Washer System
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## Commissioning Plan

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade		
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GRIT WASHER SYSTEM  
COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
WACOL STP

Project:  
**Queensland Urban Utilities**  
**WACOL SEWAGE TREATMENT PLANT GRIT  
REMOVAL SYSTEM UPGRADE**

QUU Project Contract No. **C1011-045-087**

**Grit Washer  
Commissioning Plan**

Prepared by  
**Meyor Industries Pty Ltd**

**Meyor Industries Ref No: 0185**

**9 December, 2014**

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## GRIT WASHER SYSTEM COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
WACOL STP

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## GRIT WASHER SYSTEM COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
WACOL STP

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## GRIT WASHER SYSTEM COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
WACOL STP

### 1. Document History

#### Revision History

Version	Author	Issue Purpose	Signature	Date
A	A. Mofakhami	Review		14/11/14
A	L. Arias	Review		14/11/14

#### Approved By

Version	Name	Position	Signature	Date
A	N. Jorgensen	Manager		14/11/14

### 2. Commissioning Objectives

- Ensure the project will align with project objectives and technical specifications.
- Demonstrate Grit Washer Unit operates in accordance with manufacturer specifications.
- Verification the grit washer is operating within design parameters and in accordance with approved Process and Instrumentation Diagram.
- Ensure all motors are adequately electrically protected.
- Ensure motor protection against overload conditions in accordance with manufacturer procedure.

GRIT REMOVAL SYSTEM UPGRADE	GRIT WASHER COMMISSIONING PLAN	ISSUE DATE	9/12/14	VERSION A
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## GRIT WASHER SYSTEM COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
WACOL STP

### 3. Risk Assessment and Management

The purpose Workplace Risk Assessment (WRA) is to assist with the identification of hazards associated with the activities at a workplace. The hazards identified reflect a subjective assessment based upon the knowledge of the activities.

The WRA is carried out prior to works commencing at the workplace and should be reviewed at the agreed timeframes for the particular workplace. The WRA should be read in conjunction with relevant SWMS's or JSEA's.

#### **Warning to Subcontractors**

Subcontractors should not rely solely on the hazards identified by Meyjor Industries. Subcontractors must undertake their own assessment of the hazards and risks associated with their activities. Subcontractors WRA's and SWMS's must identify the hazards associated with their works and describe the hazard control measures.

Meyjor Industries Workplace Team members must consider the hazards identified when reviewing the adequacy of the Subcontractors Safe Work method Statements.

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## 4. Contingency Plan

The purpose of the contingency plan is to identify any risks that may delay or stop the commissioning process and establish safeguards or procedures to eliminate or minimise the impact on commissioning.

Identified Risk	Potential Outcome	Management / Controls	If Risk Can't be Controlled
Installation delayed or not complete.	Delays to commissioning.	Apply additional resources as required.	Reschedule commissioning if necessary.
Blockages in pipe systems.	Delays to commissioning.	Grit Washer Hopper Shall full clean prior to installation.	Do not start installation.
Available power insufficient for new motors	New motors inoperable.	Available power checked prior to works.	Do not start installation.
Leaks in pipe work during commissioning.	Delays to commissioning.	Follow correct installation and weld procedures during installation.	Fabrication staff to be available to perform any rectification works.
Commissioning equipment not available.	Delays to commissioning.	Ensure all required equipment is available.	Reschedule commissioning if necessary.
Monitoring equipment not available	Delays to commissioning.	Ensure all required equipment is available.	Reschedule commissioning if necessary.

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## 5. Roles and Responsibilities

### 5.1 Operation and Monitoring

Role	Responsibilities	Person/s Responsible
Plant operations.	Operate the plant during commissioning.	
Commissioning Supervisors.	Supervise all commissioning works.	
Plant monitoring during working hours (day time).	Monitor Grit Washer operation as per instruction and motors load, noises and temperature rises during working hours, notifying Control room of any problems.	
Plant monitoring during after-hours.	Monitor Grit Washer operation as per instruction and motors load, noises and temperature rises during after hours, notifying Control room of any problems and send a Fitter to the pump station.	

### 5.2 Commissioning Activities

Role	Responsibilities	Person/s Responsible
Grit Washer performance testing.	Carry out and record performance test data during commissioning.	
Motor Overload Protection	Configure motor protection according to procedure	

## 6. Preoperational Checks

Preoperational checks for Grit Washer include following activities (See Appendix A for vendor document):

- Obtain the completed checklists for the foundation, piping, grouting, and alignment activities for the particular equipment train to be started.
- Confirm Grit Washer is installed correctly using a spirit level. The hopper should be horizontally level and the screw conveyor should be at 35° from the horizontal. The platform surface should be horizontally level.
- Ensure all bolts are tightened; check the positioning and fixing of the machine.
- Check oil level in agitator and conveyor gearbox.

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## GRIT WASHER SYSTEM COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
WACOL STP

- All hydraulic connections shall be checked.
- Check the gear box is correctly sealed.
- Check that all covers/hatches are closed.
- Availability of all safety devices shall be checked on the machine.
- Check that all the warning notices are present on and around the machine.
- All blocking conditions removing should be checked before first start up.
- Ensure that piping is clean before start-up.
- Instrument loops shall be loop functional tested before start-up.
- Verify that all gauges have been calibrated either by the manufacturer when supplied new or by the installer if existing gauges are used.
- All lubrication and coolant shall be checked as per vendor document.
- All vendor and plant requirements read and understood.

Preoperational checks for Drivers include following activities (See Appendix B for vendor document):

- The oil level must be checked prior to commissioning.
- The vent plug activation or the pressure vent screwing in should be checked.
- Check conformity of the required configuration with the actual installation.
- Check the external gear shaft forces within permitted limits (chain tension).
- The torque support should be correctly fitted.
- Verify that contact guards are fitted to rotating components.
- Check the automatic lubricant dispenser is activated.
- Check the cooling cover is connected to the cooling circuit.

## 7. Performance Testing and Recording

Commissioning activities are to include testing and recording of control philosophy, emergency stop switch operation, hopper wash water system operation in conjunction with agitator, and screw conveyor operation alone and in conjunction with transport zone wash water system. Testing and recording of motor overload protection, measurement of motors loading, noises and temperature.

All commissioning test data is to be recorded on the relevant test sheet.

## 8. Electrical Installation Checks

### 8.1 Electrical Connections

Contractor Task	Lend Lease	QUU
Check all electrical connections including power supply and cable box as per vendor installation procedure.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check earthing correctly installed.	OK <input type="checkbox"/>	OK <input type="checkbox"/>

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## 8.2 Electrical Inspection

Electrical Inspector	Lend Lease	QUU
The following QUU site inspection tests have been completed and all defects have been rectified.	Reflux valve switch to be permanently wired.	Reflux valve switch to be permanently wired.
Site Inspection Checks - Cables	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Site Inspection Checks - Electric Motors	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Site Inspection Checks - Cable Ladder / Tray / Duct	OK <input type="checkbox"/>	OK <input type="checkbox"/>

## 9. Electrical, Mechanical & Hydraulic Commissioning

### 9.1 Mechanical & Hydraulic Commissioning

#### 9.1.1 Pre Start Tests

Prior commencing of the pre start tests, a shutdown of the equipment is to be done in order to plug in the new PLC I/O modules and load the PLC code. Time frame for this process is approx. one hour.

The following tests should be performed before running the Grit Washer for longer than a few agitator and screw conveyor revolutions.

#### *Initial Start-Up Checks for Grit Washer*

Contractor Task	Meyor	QUU
Fill the sand collection container with 0.4m <sup>3</sup> of clean sand.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Turn on main power supply to the Grit Washer.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Open effluent inlet valve and confirm effluent flow into hopper (may require turning on grit pump upstream).	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Commence Hopper and Screw Conveyor Running Cycles (or the equivalent).	OK <input type="checkbox"/>	OK <input type="checkbox"/>

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### 9.1.2 Commissioning Check list

The following checks should be done for Grit Washer commissioning.

*Commissioning Checks for Grit Washer*

Contractor Task	Meyor	QUU
Visual examination of the works for completeness and acceptable standard of workmanship and finish.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Inspect around machine for obvious signs of oil or water	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check agitator is rotating freely in normal operation without any abnormal noises or squeaks	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check sand is being transported effectively to the top of the screw conveyor	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check Grit Washer hopper cycle is implemented correctly. Start/Stop sequence must match control philosophy (see Appendix A).	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check Grit Washer screw conveyor cycle is implement correctly. Start/Stop sequence must match control philosophy (see Appendix A).	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check the rotation of the screw conveyor is as per the indication on the unit.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check the hopper wash water system and agitator are working together.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check screw conveyor is operating intermittently to ensure some quantity of sand is always in the sand collection container. Check that screw conveyor operates for 5 seconds every 90 minutes.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check the transport zone wash water system is only operating whilst the screw conveyor is in operation (if supplied).	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Set motor overload protection based on measured current.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
After 10 hours operation check that all bolts and nuts are still tightly secured and verify the electric motors are running at their rated capacities.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Operational testing of isolation valves.	OK <input type="checkbox"/>	OK <input type="checkbox"/>

### Electrical Commissioning of Drivers

Contractor Task	Lend Lease	QUU
Visually inspect the current readings for motors and compare with the relevant data sheet	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Locating the relevant control panel for both the agitator and screw motors.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check motors are working at their respective correct loadings.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check for any abnormal noises and temperature rises.	OK <input type="checkbox"/>	OK <input type="checkbox"/>

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# GRIT WASHER SYSTEM COMMISSIONING PLAN

# QUEENSLAND URBAN UTILITIES

## WACOL STP

## 10. Performance Checks

### **10.1 Grit Washer Performance Checks**

Customer	Queensland Urban Utilities		
	Wacol Sewage Treatment Plant Grit Removal System		
<b>Grit Washer</b>			
Maker	<b>Bilfinger</b>		
Model	<b>GW80</b>		
Serial Number	_____		
Control Philosophy	<input type="checkbox"/> checked	Emergency Stop Switch Operation	<input type="checkbox"/> checked

		Value	Spec Value
Max Flow Rate	L/s		22 (Slurry)
Max Capacity of Solids Extracted	M <sup>3</sup> /h		~ 1.1
Screw Inclination	Degree (°)		35°
Est. Hopper Capacity	M <sup>3</sup>		~ 1.9
Wash Water Requirements	L/s @ 500Kpa		3 L/s @ 500kPa

Tested by: \_\_\_\_\_ – Meyjor Industries Pty Ltd

Date: \_\_\_\_\_/11/2014

Witnessed by: \_\_\_\_\_

Date:       /11/2014

## Notes:



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## GRIT WASHER SYSTEM COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
WACOL STP

### 10.2 Drive System Performance Checks

#### 10.2.1 Motor Overload Protection

Motor protection must be configured to prevent the motor from damaging the machine caused by overload conditions. Motor overload protection is applicable to motors servicing both the central agitator and screw conveyor.

This may be achieved by using an Electronic Shear Pin or other equivalent method.

The following procedure must be used when configuring protection of this type:

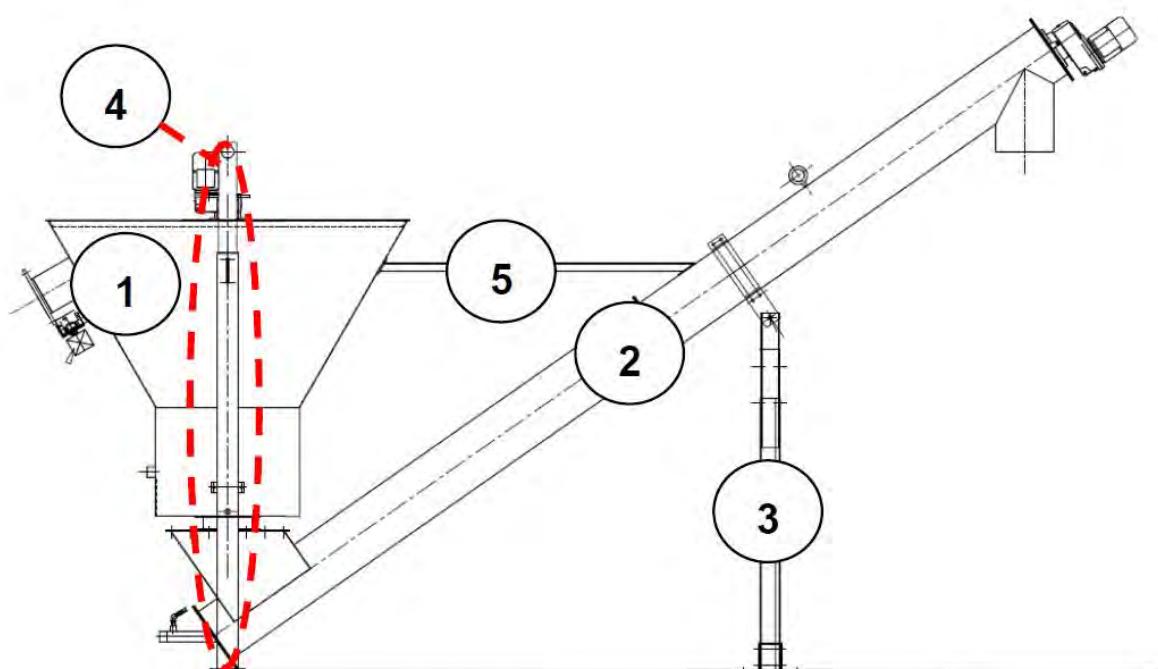
- Run Grit Washer under normal load conditions,
- Record the peak motor torque measured under these normal load conditions,
- Set the protection to trip at this normal load condition,
- Run Grit Washer and confirm the functionality of the device used to trigger the trip,
- Set the protection to trip at 10% above the measured peak torque value and
- Run the Grit Washer and monitor for nuisance tripping. If this occurs, increase the trip limit by another 10% and test run again.

Notes:

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The following lists all the major components of the Grit Washer, as shown in below Figure.

1. Hopper
2. Screw Conveyor
3. Screw Conveyor Support Strut
4. Hopper Support
5. Horizontal Hopper Screw Strut



*Grit Washer unit with major components numbered.*

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## GRIT WASHER SYSTEM COMMISSIONING PLAN

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## Appendix A- Process Control Philosophy

### 3.5 Process Control Philosophy

The Grit Washer requires a control system to be designed and installed for it to operate. The actual control methodology typically changes between installations to account for specific process and client requirements. If Johnson Screens has provided a specific Process and Instrumentation Diagram for this installation it will be supplied in Document 1 Section 5.

The following control philosophy is the recommended method for operating the Grit Washer; describing the automatic operation between the Stop and Running conditions only. It can be used to develop the process so suitable control equipment can be selected and configured prior to installation.

This control philosophy uses two independent cycles to control the operations in both the hopper and screw conveyor. Alternative trigger conditions could be used to accommodate specific installation requirements provided the main processes in each cycle are met. Manual control is not described.

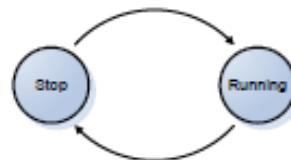


Figure 4: Automatic Control State Transition Diagram.

#### Stop State Condition (see Figure 4)

Grit Washer Central Agitator	= OFF	
Screw Conveyor	= OFF	(see Note 1)
Sand Washing System	= OFF	
Transport Zone Washing System	= OFF	(If Supplied)
Grit Pump / Air Lift Pump (upstream)	= OFF	(If Supplied)

*Note1: The Screw conveyor must operated for at least 5 seconds every 90 minutes when sand occupies the collection container.*

#### Running State Condition (see Figure 4)

Grit Washer Central Agitator	= CYCLE	(see Note 1)
Screw Conveyor	= CYCLE	(see Note 2)
Sand Washing System	= CYCLE	(see Note 1)
Transport Zone Washing System	= CYCLE	(If Supplied, see Note 3)
Grit Pump / Air Lift Pump (upstream)	= CYCLE	(see Note 1)

*Note 1: The agitator must always work together with the injection of the wash water. Wash water may be processed water filtered to at least 300 microns. The organic outlet valve must remain closed*

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## GRIT WASHER SYSTEM COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
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*while the effluent inflow (i.e. grit pump / air lift pump) is in operation. See Typical Hopper Running Cycle.*

**Note 2:** *The Screw Conveyor is operated intermittently to ensure some quantity of sand always remains in the sand collection container below the hopper. Sand quantities are measured via a pressure switch in the sand collection container. See Typical Screw Conveyor Running Cycle.*

**Note 3:** *Transport Zone washing system (if supplied) is only to operate whilst the Screw Conveyor is in operation. Wash water may be process water filtered to at least 300 microns.*

### *Typical Hopper Running Cycle:*

1. The base of hopper is flushed out before start up (user defined runtime),
2. Once the flushing is completed, the grit pump/air lift pump will commence filling the hopper with effluent (user defined speed and runtime),
3. Immediately after the grit pump/air lift pump stops, the sand washing system will start (user defined runtime),
4. Immediately after the sand washing system is activated, the agitator will start (user defined runtime),
5. After the grit pump/air lift pump has stopped the organics outlet valve will open after a short delay time (user set delay time and time valve remains open). The opening and shutting of organics outlet valve may not need to occur ever cycle (user defined opening cycle, e.g. 1 = every cycle, 2 = every second cycle, 3 = every third cycle.....),
6. Shut down the agitator at the end of the user defined runtime period. The agitator remains stopped until next cycle is initiated,
7. Shut down the sand washing system at the end of the user defined runtime period. The sand washing system remains stopped until next cycle is initiated.

*Note: "Immediately after" is referring to a short PLC delay of usually 1 - 3 sec.*

### *Typical Screw Conveyor Running Cycle:*

1. When the upper sand threshold is detected by the pressure switch continue on with the sequence (i.e. step 2),
2. Start the screw conveyor (user defined runtime ~ 30 sec),
3. The screw conveyor will stop when either the low sand threshold is detected by the pressure switch or the user runtime expires,
4. If the low sand threshold is reached then reset the sequence (i.e. step 1).
5. If the low sand threshold has not been reached but the expiry of the user timer has occurred then shut down the screw conveyor and start an operator adjustable off timer (user defined off timer ~ 60 sec). Once the off timer has expired immediately return to step 2 of the sequence.

*Note: Screw conveyor cycle is run independently to the hopper cycle and as such may start at any point in the hopper cycle. Step 5 is in place to avoid wet grit discharge resulting from the continuous operation of the screw.*

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## GRIT WASHER SYSTEM COMMISSIONING PLAN

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### ***Transition 1: Stop → Running***

Transition Trigger: Grit Pump/Air Lift Pump Activation or Sand Level above Threshold (or site specific trigger)

Running of the system may be achieved through the following transition triggers:

1. Manual request or,
2. Automatic request after the switching on of the plants upstream feeding the effluent (level sensors and/or timers), triggering the running cycle.
3. Automatic request from pressure sensor for the activation of the screw conveyor (pressure switch measure high quantity of sand in collection container).

*Note: When starting the machine, the hopper must be filled with 0.4m<sup>3</sup> of clean sand. Sand must not submerge the agitator before start up.*

### ***Transition 2: Running → Stop***

Transition Trigger: Grit Pump/Air Lift Pump Activation or Sand Level below Threshold (or site specific trigger)

Stopping of the system may be achieved through the following transition triggers:

1. Manual request,
2. Automatic request after the switching off of the plants upstream feeding the effluent (level sensor and/or timers),
3. Automatic request by motor overload protection,
4. Automatic request from pressure sensor for the de-activation of the screw conveyor (pressure switch measure low quantity of sand in collection container).
5. Manual request through emergency stop button

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## GRIT WASHER SYSTEM COMMISSIONING PLAN

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### Appendix B- Drive System Specification

#### Grit Washer Drive System Specifications

##### Agitator Motor

Make	NORD
Model	SK 1382NBAFH-71S4
Power	0.25 kW
Voltage	415 Volts
Frequency	50 Hz
Phase	3 ph
Agitator Speed	5.4 RPM
IP Rating	IP56

##### Screw Conveyor Motor

Make	NORD
Model	SK 4282AF-90S4
Power	1.1 kW
Voltage	415 Volts
Frequency	50 Hz
Phase	3 ph
Screw Speed	5.5 RPM
Grit Screw Capacity	1.1 m <sup>3</sup> / h
IP Rating	IP56

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## Electrical Checks

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade		
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Lend Lease's Services business

## IP-TS-3094 - Local Control Panel Test Sheet

3000 - Electrical Management

**Lend Lease**

Job No	E63018	Contract / PO Number	Meyor Industries 0185-012
Job Name	Wacol STP Grit Removal System Upgrade	Client Document Number	
ITP Description	Wacol STP Grit Removal System Upgrade FAT test sheet		
Component	Grit Washer Unit Control Panel	Item / Tag Number / Panel No	
Drawing Reference			

Section 1 EQUIPMENT RECORDING (Place a ✓ / N/A in the blocks)				
Equipment Item	Recorded Information	CHECKED BY		
		Operator	L/Hand	Tester
Record main switching device rating	32 Amps PANEL ISOLATOR	JK		
Record contactor 1 KW rating	4	JK		
Record contactor 2 KW rating	4	JK		
Record contactor 3 KW rating	4	JK		
Record contactor 4 KW rating	4	JK		
Record Mains Power Cable rating	6mm² mm²	JK		

Section 2 PANEL ASSEMBLY CHECKLIST (Place a ✓ / N/A in the blocks)				
GENERAL	CHECKED BY			
	Operator	L/Hand	Tester	
Check Panel is clean and free of loose objects	JK			
All Drilled Holes Deburred including Label screw holes	JK			
Rubber blanking gromets are fitted to all unused holes	JK			
Check Panel for correct IP Rating	JK			
Labels are fitted and correct	JK			
Door Locks correct and hinges tight	JK			
Shrouding fitted where applicable	JK			
Paint colour correct and acceptable	NOT PAINTED			
All wiring supports are suitable on doors and panels	JK			
All doors requiring earth have earth studs fitted and are terminated correctly	JK			
Door escutcheon and cutouts are correct	JK			
Overall dimensions are correct	JK			

Section 3 PANEL ASSEMBLY CHECKLIST (Place a ✓ / N/A in the blocks)				
WIRING & CABLING	CHECKED BY			
	Operator	L/Hand	Tester	
All Power Cable is Correct Current Rating	JK			
All Power Cable is free of sharp Bends (Minimum Bend Radius is 6 x Dia of cable)	JK			
All Power Cable is Coloured or Marked with a band of heat shrink	JK			
All Power and Control Looms are neat	JK			
All Terminations are Tight	JK			
All control Wiring is correct colour and size	JK			
All Terminal Bridge Links are fitted to terminal strips	JK			
All Wire Numbers are Fitted and correct	JK			
All terminals are numbered	JK			
Door Looms are secured at door and compartment	JK			
All Equipment is correctly earthed	JK			
All wiring access holes are bushed	JK			

Section 4 FUNCTIONAL TESTING (Place a pass/N/A in the blocks)				
EQUIPMENT ITEMS	CHECKED BY			
	Operator	L/Hand	Tester	
Main Switching Device Operation	Record Device Rating 32A		SI	
Paddle Drive Contactor Operation			SI	
Paddle Drive Push Button & Selector Switch Operation			-	
Paddle Drive Emergency Stop operation effective			SI	
Paddle Drive Indication Lamps			SI	
Paddle Drive Control Circuit Operation			SI	
Conveyor Drive Contactor Operation			SI	
Conveyor Drive Push Button & Selector Switch Operation			SI	
Conveyor Drive Emergency Stop operation effective			SI	
Conveyor Drive Indication Lamps			SI	
Conveyor Drive Control Circuit Operation			SI	
Foul Air Fan 1 Contactor Operation			SI	
Foul Air Fan 1 Push Button & Selector Switch Operation			-	
Foul Air Fan 1 Emergency Stop operation effective			SI	
Foul Air Fan 1 Indication Lamps			SI	
Foul Air Fan 1 Control Circuit Operation			SI	
Foul Air Fan 2 Contactor Operation			SI	
Foul Air Fan 2 Push Button & Selector Switch Operation			-	
Foul Air Fan 2 Emergency Stop operation effective			SI	
Foul Air Fan 2 Indication Lamps			SI	
Foul Air Fan 2 Control Circuit Operation			SI	
Auxiliary Devices Operation			SI	

OPERATOR (signing off for sections 1,2 & 3)	Date Comp	Print Name	Sign Name
LEADING HAND (signing off for sections 1,2 & 3)	Date Comp <u>11/11/14</u>	Print Name <u>JASON KELLY</u>	Sign Name <u>[Signature]</u>

**TEST EQUIPMENT**

- Multimeter

IPS Equip. No. \_\_\_\_\_

**Testing Officer Comments & Notes:**

Reset Modules have not arrived to be installed + tested onsite.

Tested By: (LL Authorised Officer)	Witnessed By: (Client if applicable)
(Name) <u>Scott Lanyon</u>	(Name) _____
(Sign) <u>[Signature]</u>	(Sign) _____
Date <u>11/11/14</u>	Date <u>1 / 1</u>

**NOTE:** Ensure relevant items or comments are recorded on the Hit List (IP-SF-2000A)

Lend Lease's Services business

**IP-TS-3097 - Insulation Resistance Test on Cable and Equipment**

3000 - Electrical Management



Job No	E63018	Contract / PO Number	Meyor 0185-012
Job Name	Wacol STP Grit Removal System Upgrade		
ITP Description	Insulation Resistance Test Sheet	Client Document Number	
Component	Grit Washer Control Panel	Item / Tag Number / Panel No	

Tests to be applied to transformer HV/LV cables, plugs and related equipment

Ensure that all VT's, VT primary fuses or links are disconnected and that all CT secondary and auxiliary wiring is shorted and earthed prior to test.

Test	Insulation Resistance @ <u>500</u> VDC	Test	Insulation Resistance @ _____ VDC
RWB-NE	<u>550</u> MΩ	RWB-NE	MΩ
WBE-NR	<u>550</u> MΩ	WBE-NR	MΩ
RBE-NW	<u>550</u> MΩ	RBE-NW	MΩ

Test	Insulation Resistance @ _____ VDC	Test	Insulation Resistance @ _____ VDC
	MΩ		MΩ
	MΩ		MΩ
	MΩ		MΩ

Test	Insulation Resistance @ _____ VDC	Test	Insulation Resistance @ _____ VDC
	MΩ		MΩ
	MΩ		MΩ
	MΩ		MΩ

Test	Insulation Resistance @ _____ VDC	Test	Insulation Resistance @ _____ VDC
	MΩ		MΩ
	MΩ		MΩ
	MΩ		MΩ

Lend Lease's Services business

IP-TS-3097 - Insulation Resistance Test on Cable and Equipment

3000 - Electrical Management



## INSULATION RESISTANCE TEST ON CABLES AND EQUIPMENT (cont.)

1369

Test	Insulation Resistance @ _____ VDC	Test	Insulation Resistance @ _____ VDC
	MΩ		MΩ
	MΩ		MΩ
	MΩ		MΩ

Test	Insulation Resistance @ _____ VDC	Test	Insulation Resistance @ _____ VDC
	MΩ		MΩ
	MΩ		MΩ
	MΩ		MΩ

Test	Insulation Resistance @ _____ VDC	Test	Insulation Resistance @ _____ VDC
	MΩ		MΩ
	MΩ		MΩ
	MΩ		MΩ

Insulation Tester	Equipment No	_____
<u>Fluke 1587</u>	Equipment No	_____
	<u>10126013</u>	_____
_____	Equipment No	_____
_____	_____	_____

Testing Officer Comments & Notes:

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Tested By: (LL Testing Officer)	Witnessed By: (Client if applicable)
(Name) <u>Jeff Lamm</u>	(Name) _____
(Sign) <u>LM</u>	(Sign) _____
Date <u>11/11/16</u>	Date <u>/ /</u>

NOTE: Ensure relevant items or comments are recorded on the Hit List (IP-SF-2000A)

Job No	E63018	Contract / PO Number	Meyor Industries 0185-012		
Job Name	Wacol STP Grit Removal System Upgrade	Client Document Number			
ITP Description	Adjustable Devices Recording Sheet				
Component	Grit Washer Control Panel	Item / Tag Number / Panel No			

ADJUSTABLE DEVICE (Thermal Overload, Timer, Protection Relay etc.)	CHECKED BY				
	Setting Description	Value	Operator	L/Hand	Tester
Designation : 1F1 PADLE DRIVE	Thermal Trip Setting				gpe
Type : Thermal Overload					lpm
Designation : 2F1 CONVEYOR DRIVE	Thermal Trip Setting	3.3		JK	gn
Type : Thermal Overload					
Designation : 3F1 FOUL AIR FAN 1	Thermal Trip Setting	4.5		JK	gn
Type : Thermal Overload					
Designation : 4F1 FOUL AIR FAN 2	Thermal Trip Setting	4.5		JK	gn
Type : Thermal Overload					
Designation :					
Type :					
Designation :					
Type :					
Designation :					
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Type :					
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Type :					
Designation :					
Type :					

## Comments &amp; Notes:

1F1 - Not able to set as no figures required

Tested By: (LL Testing Officer)	Witnessed By: (Client if applicable)
(Name) <u>SCOTT LARSON</u>	(Name) _____
(Sign) <u>SL</u>	(Sign) _____
Date <u>13/11/14</u>	Date <u>1/1</u>

NOTE: Ensure relevant items or comments are recorded on the Hit List (IP-SF-2000A)

Job No E63018 Contract / PO Number \_\_\_\_\_Job Name Wacol Grit Removal System Client Document Number \_\_\_\_\_PLC ID PLC01INL Site ID Wacol Treatment Plant

Site Drawing Reference \_\_\_\_\_ Site Item / Tag Number / Panel No \_\_\_\_\_

IO Type	TagName	Description	Rack	Slot	Terminal	PLC Address	Range Check %	SCADA Symbol	SCADA Alarm
AI	PT301	Grit Level Pressure Transmitter	2	10	1	%IW304	0,25,50,75,100	✓	✓
DI	ES301	Grit Washer Unit Emergency Stop	2	9	2	%I124.0	✓	✓	—
DI	FS301	Wash Water Flow Healthy	2	9	3	%I124.1	✓	✓	—
DI	MX301	Grit Washer Unit Paddle Drive Running	2	9	4	%I124.2	✓	✓	—
DI	MX301	Grit Washer Unit Paddle Drive Remote	2	9	5	%I124.3	✓	✓	—
DI	MX301	Grit Washer Unit Paddle Drive Healthy	2	9	6	%I124.4	✓	✓	—
DI	GWC301	Grit Washer Unit Conveyor Drive Running	2	9	7	%I124.5	✓	✓	—
DI	GWC301	Grit Washer Unit Conveyor Drive Remote	2	9	8	%I124.6	✓	✓	✓
DI	GWC301	Grit Washer Unit Conveyor Drive Healthy	2	9	9	%I124.7	✓	✓	—
DI	FAN101	Grit Chamber Foul Air Fan 1 Running	2	9	12	%I125.0	✓	✓	—
DI	FAN101	Grit Chamber Foul Air Fan 1 Remote	2	9	13	%I125.1	✓	✓	✓
DI	FAN101	Grit Chamber Foul Air Fan 1 Healthy	2	9	14	%I125.2	✓	✓	—
DI	FAN201	Grit Chamber Foul Air Fan 2 Running	2	9	15	%I125.3	✓	✓	—
DI	FAN201	Grit Chamber Foul Air Fan 2 Remote	2	9	16	%I125.4	✓	✓	✓
DI	FAN201	Grit Chamber Foul Air Fan 2 Healthy	2	9	17	%I125.5	✓	✓	—
DI	MV301	Grit Washer Unit Outlet Valve Closed	2	9	18	%I125.6	✓	✓	—
DI	MV301	Grit Washer Unit Outlet Valve Open	2	9	19	%I125.7	✓	✓	—
DO	MX301	Grit Washer Paddle Drive Run Command	2	8	2	%Q8.0	✓	✓	—
DO	GWC301	Grit Washer Conveyor Drive Run Command	2	8	3	%Q8.1	✓	✓	—
DO	FAN101	Grit Chamber Foul Air Fan 1 Run Command	2	8	4	%Q8.2	✓	✓	—
DO	FAN201	Grit Chamber Foul Air Fan 2 Run Command	2	8	5	%Q8.3	✓	✓	—



DO	MV301	Grit Washer Outlet Valve Open Command	2	8	6	%Q8.4		✓✓	-
DO	SV301	Grit Wash Water Valve Open Command	2	8	7	%Q8.5			-

**Testing Officer Comments and Notes:****Tested By:**

(Name) Michael Young  
 (Sign)   
 Date 16/12/2014

**Witnessed By:**

(Name) Tim Whage  
 (Sign)   
 Date 16/12/2014



Job No	E63018	Contract / PO Number	
Job Name	Wacol Grit Removal System	Client Document Number	
PLC ID	PLC01_INL	Site ID	Wacol Treatment Plant
Drawing Reference	<hr/>		

Tests							
No.	Functionality	Prerequisite	Action	Expected Results	FAT	SAT	Note
Pressure Sensor Operation [Note: Simulate level with current source at RTU physical input]							
1	Range Test Level Sensor 1	Level sensor 1 healthy and in normal range	Increase level above High High SP	Level data received at SCADA	<input checked="" type="checkbox"/>		
2				High and High High alarms at SCADA	<input checked="" type="checkbox"/>		
3			Increase level above sensor range (>20mA)	Level data received at SCADA to 100%	<input checked="" type="checkbox"/>		Q/N STD. Block
4				OVERRANGE alarm at SCADA	<input checked="" type="checkbox"/>		
5			Decrease level to normal range Duty 4 > Level > Duty 0	High and High High alarms clear at SCADA	<input checked="" type="checkbox"/>		
6				OVERRANGE alarm clears at SCADA	<input checked="" type="checkbox"/>		
7			Decrease level below Low Low SP	Level data received at SCADA	<input checked="" type="checkbox"/>		
8				LOW and LOW LOW alarms at SCADA	<input checked="" type="checkbox"/>		
9			Decrease level below range (<4mA)	Level data received at SCADA to 0%	<input checked="" type="checkbox"/>		
10				UNDERRANGE alarm at SCADA	<input checked="" type="checkbox"/>		
11			Increase level to normal range (within duty range)	Level data received at SCADA	<input checked="" type="checkbox"/>		
12				UNDERRANGE alarm clears at SCADA	<input checked="" type="checkbox"/>		
13				LOW and LOW LOW alarms clear at SCADA	<input checked="" type="checkbox"/>		
Grit Washer							
14	Start Grit Washer	All Devices Healthy and Remote Ready	FS-101 or FS-201 is Active	Grit Washer Paddle Drive Runs on 15 mins off 5 mins	<input checked="" type="checkbox"/>		
15				Wash Water Solenoid operates (opens for ?? Closes for ??)	<input checked="" type="checkbox"/>		
16			Level	Organic Discharge Valve operates (opens for ?? Closes for ??)	<input checked="" type="checkbox"/>		
17	Start Conveyor		Pressure Sensor reaches High SP	Grit Wash Conveyor Drive Runs	<input checked="" type="checkbox"/>		



Tests							
No.	Functionality	Prerequisite	Action [Level]	Expected Results	FAT	SAT	Note
18	Stop Conveyor		Pressure Sensor falls below Low SP	Grit Wash Conveyor Drive Stops	/		
19	Stop Grit Washer	Grit Washer is Running	FS-101 and FS-201 is not active	Grit Washer Paddle Drive Stops Wash Water Solenoid Closes	/		
20				Organic Discharge Valve Closes	/		
21							
<b>Other Functionality and Alarms</b>							
22	Low Flow Alarm	Grit Washer Running	Flow Switch not Active	Low Flow Alarm Active in SCADA	/		
23	Grit Washer Emergency Stop	Grit Washer Running	Emergency Stop Active	All Drives Stop	/		

## Testing Officer Comments and Notes:

FAT	Tested By: (Name) (Sign) Date	Michael Young  4/12/14	Witnessed By: (Name) (Sign) Date	Tim Whaggett  4/12/14
SAT	Tested By: (Name) (Sign) Date		Witnessed By: (Name) (Sign) Date	

Chek  
 - Box around Grit Washer - ok  
 - Flap gate on pages - fw  
 - Timer → FCSPI  
 - E/stop on page - ok fw

TESTING COPY

**QUEENSLAND  
Urban Utilities**

**WACOL SEWAGE TREATMENT PLANT  
GRIT REMOVAL SYSTEM UPGRADE  
SITE COVER SHEET**

ELECTRICAL DRAWING INDEX		
DRAWING NUMBER	REV.	DRAWING TITLE
486/5/5-0261-201	0	NEW GRIT WASHER UNIT CONTROL PANEL DRAWING INDEX
486/5/5-0261-202	0	NEW GRIT WASHER UNIT CONTROL PANEL POWER CIRCUITS
486/5/5-0261-203	0	NEW GRIT WASHER UNIT CONTROL PANEL 24VDC COMMON CONTROLS
486/5/5-0261-204	0	NEW GRIT WASHER UNIT CONTROL PANEL 24VDC VALVE CIRCUITS
486/5/5-0261-205	0	NEW GRIT WASHER UNIT CONTROL PANEL PLC DIGITAL INPUTS
486/5/5-0261-206	0	NEW GRIT WASHER UNIT CONTROL PANEL PLC DIGITAL OUTPUTS
486/5/5-0261-207	0	NEW GRIT WASHER UNIT CONTROL PANEL PLC ANALOGUE INPUTS
486/5/5-0261-208	0	NEW GRIT WASHER UNIT CONTROL PANEL CABLE SCHEDULE
486/5/5-0261-209	0	NEW GRIT WASHER UNIT CONTROL PANEL PARTS LIST
486/5/5-0261-210	0	NEW GRIT WASHER UNIT CONTROL PANEL GENERAL ARRANGEMENT

AS CONSTRUCTED DETAILS	
I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS	
SIGNED:	DATE:
NAME OF SIGNATORY:	
RPEQ No or LICENCE:	
COMPANY NAME:	
START DATE:	FINISH DATE:

**Lend Lease**

Lend Lease Services Pty Ltd  
ABN 87 081 540 847  
39 Suckland Street, Rocklea  
QLD 4106, Australia  
Website - [www.lendlease.com](http://www.lendlease.com)

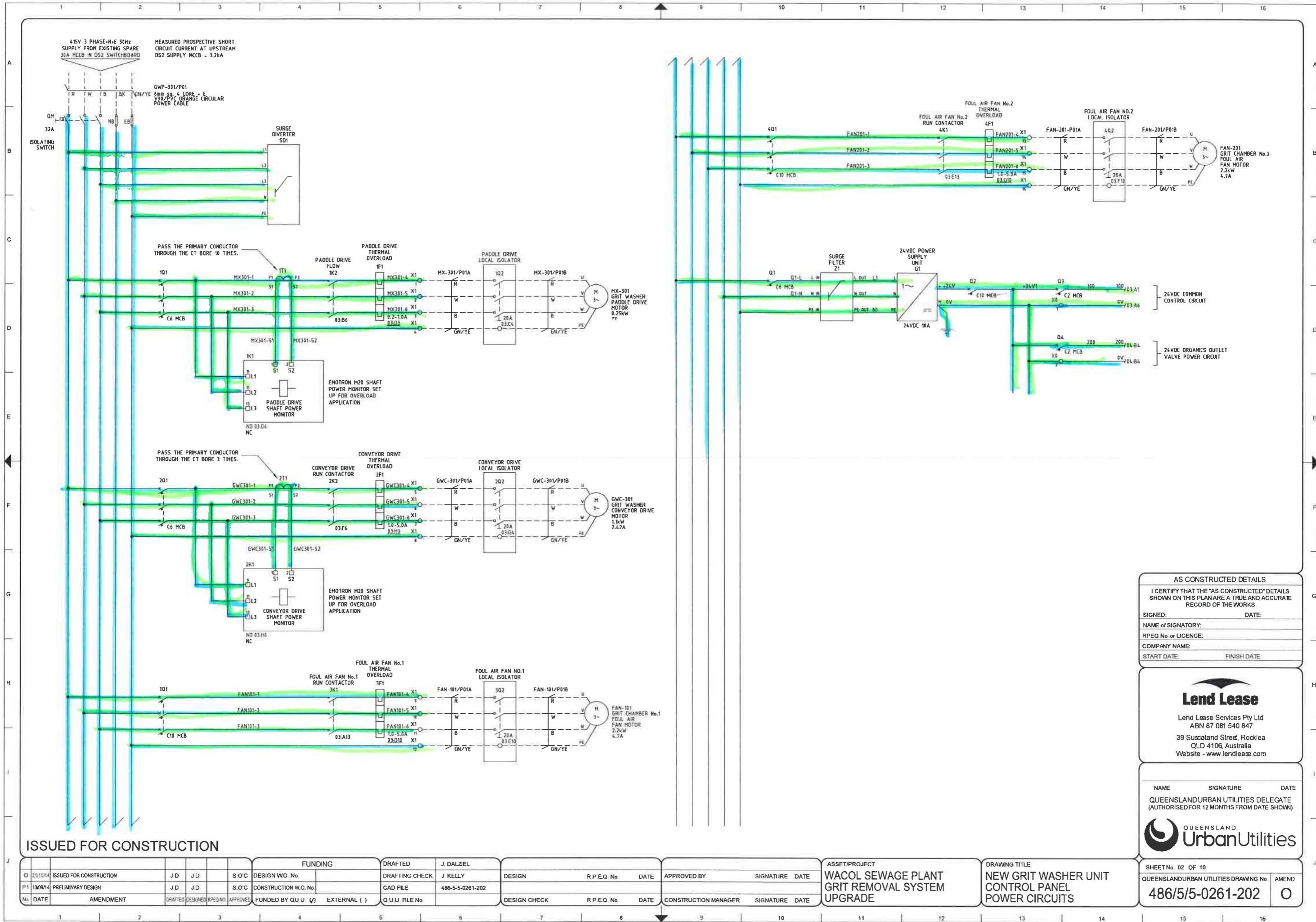
NAME	SIGNATURE	DATE
QUEENSLAND URBAN UTILITIES DELEGATE (AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)		

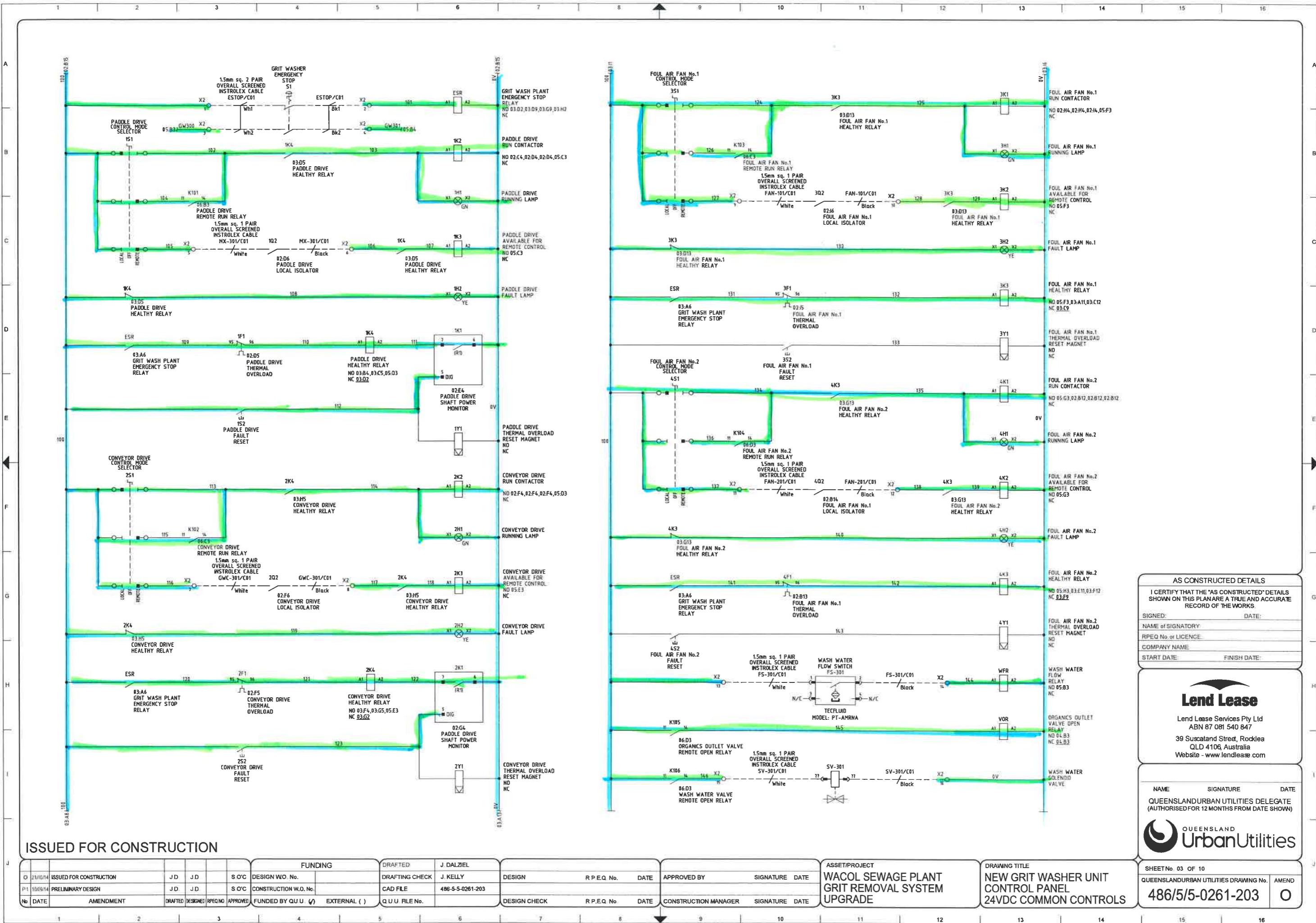
**QUEENSLAND Urban Utilities**

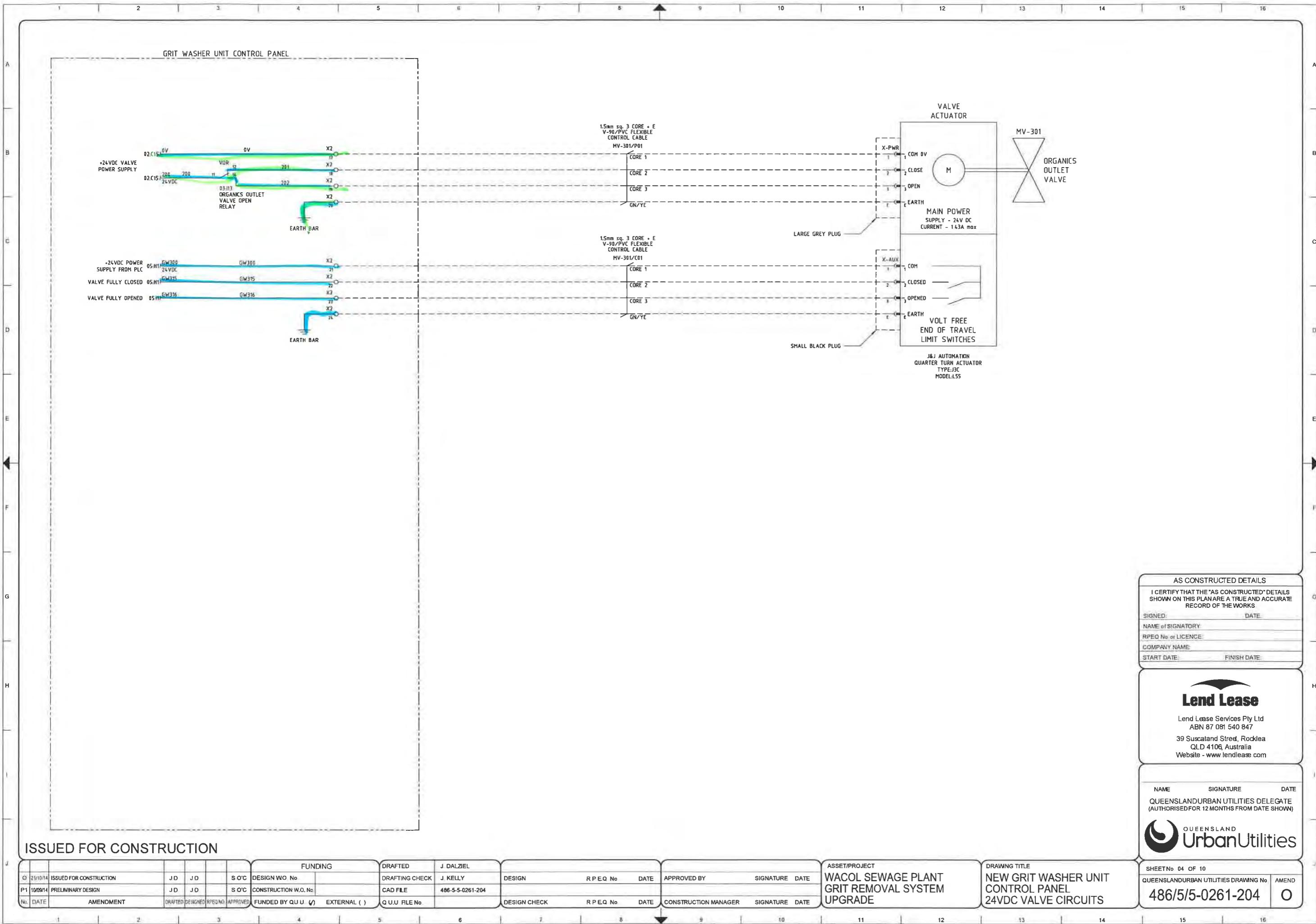
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QUEENSLAND URBAN UTILITIES DRAWING NO	O
486/5/5-0261-201	

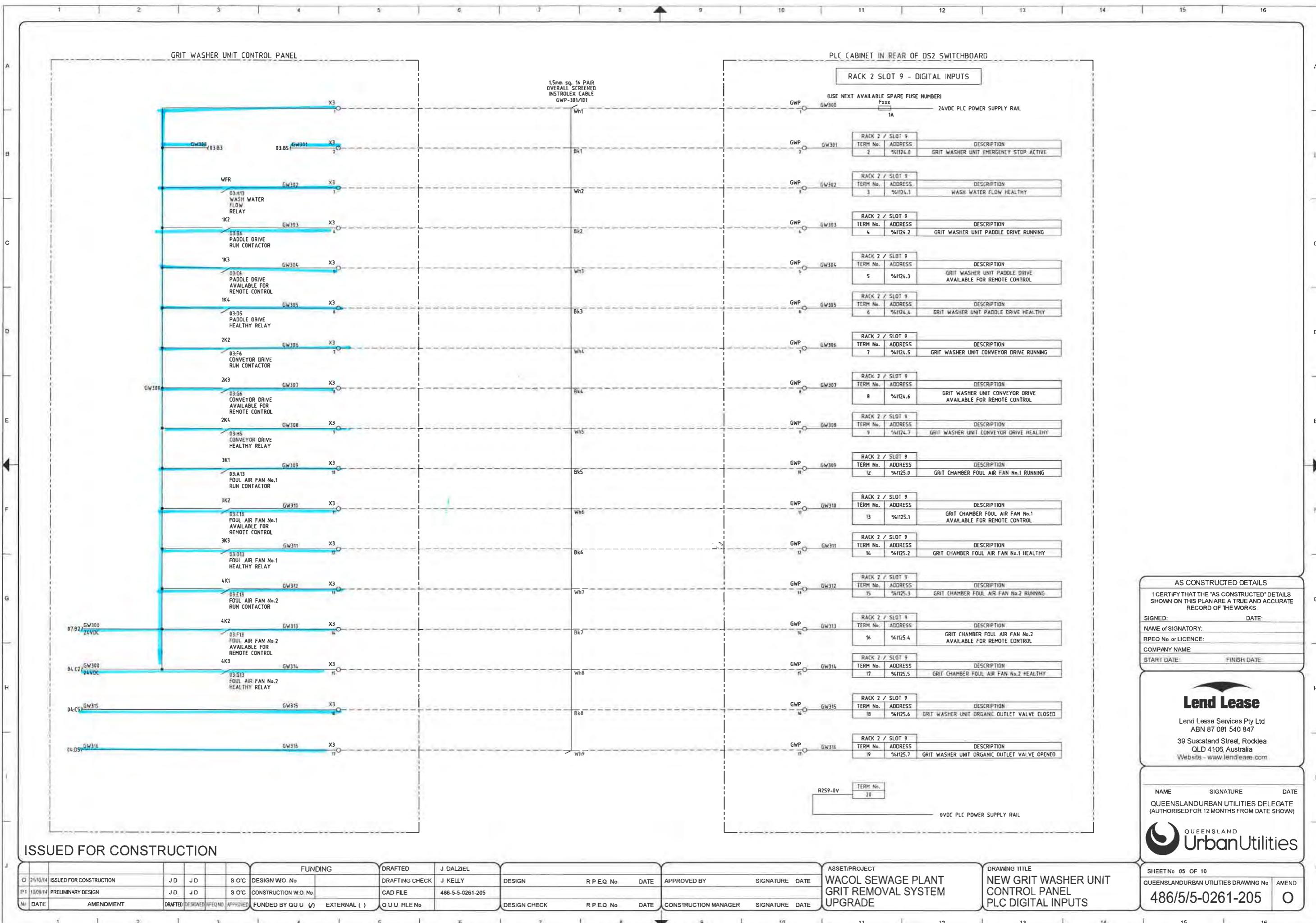
**ISSUED FOR CONSTRUCTION**

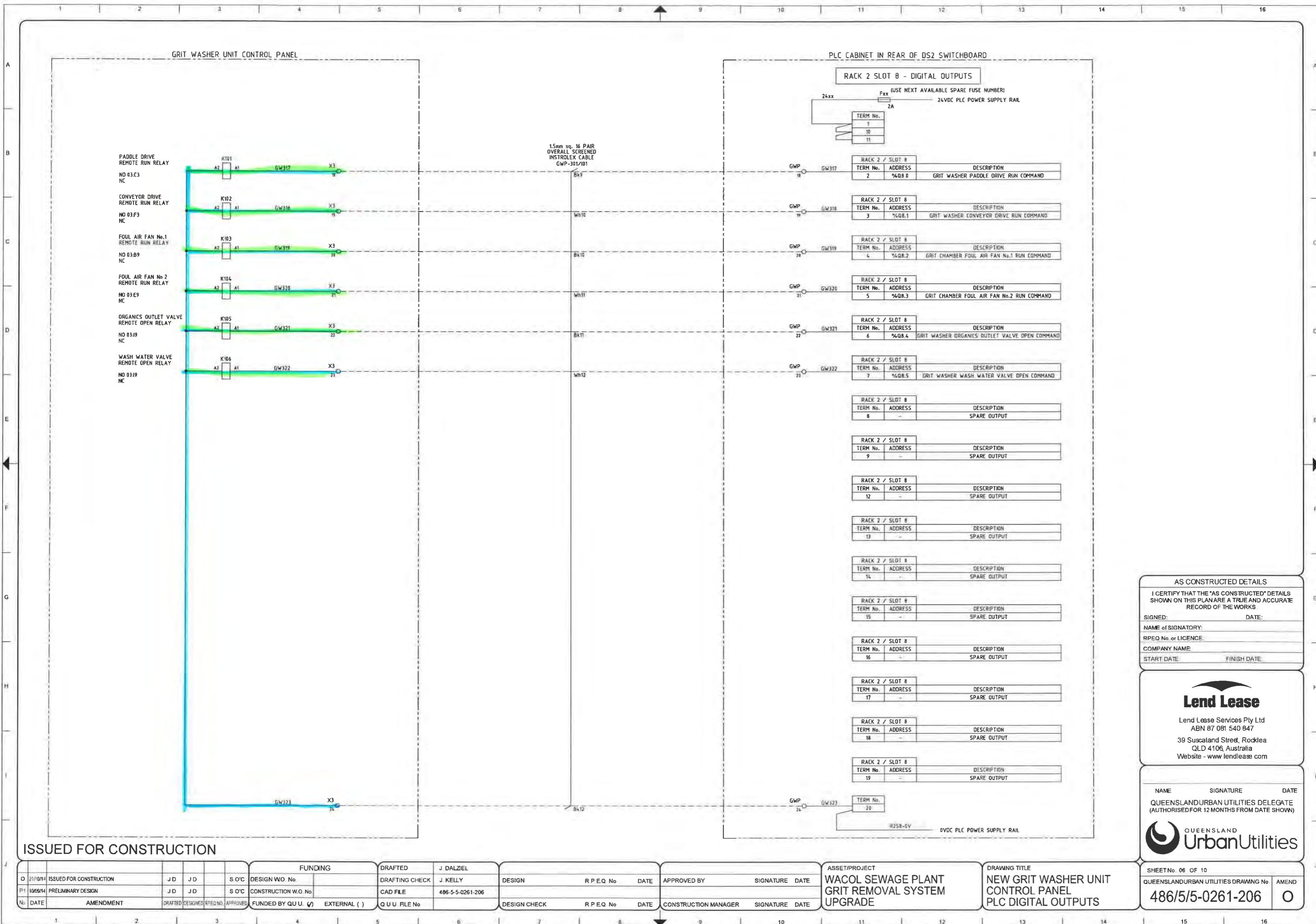
				FUNDING	DRAFTED	J DALZIEL	DESIGN	R P E Q N o	DATE	APPROVED BY	SIGNATURE	DATE	ASSET/PROJECT	DRAWING TITLE		
<input type="checkbox"/>	20/07/14	ISSUED FOR CONSTRUCTION		J D J D	S O/C	DESIGN WO No	DRAFTING CHECK	J KELLY					WACOL SEWAGE PLANT			
P1	10/09/14	PRELIMINARY DESIGN		J D J D	S O/C	CONSTRUCTION WO No	CAD FILE	486-5-5-0261-201					GRIT REMOVAL SYSTEM	NEW GRIT WASHER UNIT		
N1	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO	APPROVED	FUNDED BY QU U	(V)	EXTERNAL ( )	Q U U FILE No	DESIGN CHECK	R P E Q N o	DATE	UPGRADE	CONTROL PANEL	
														DRAWING INDEX		

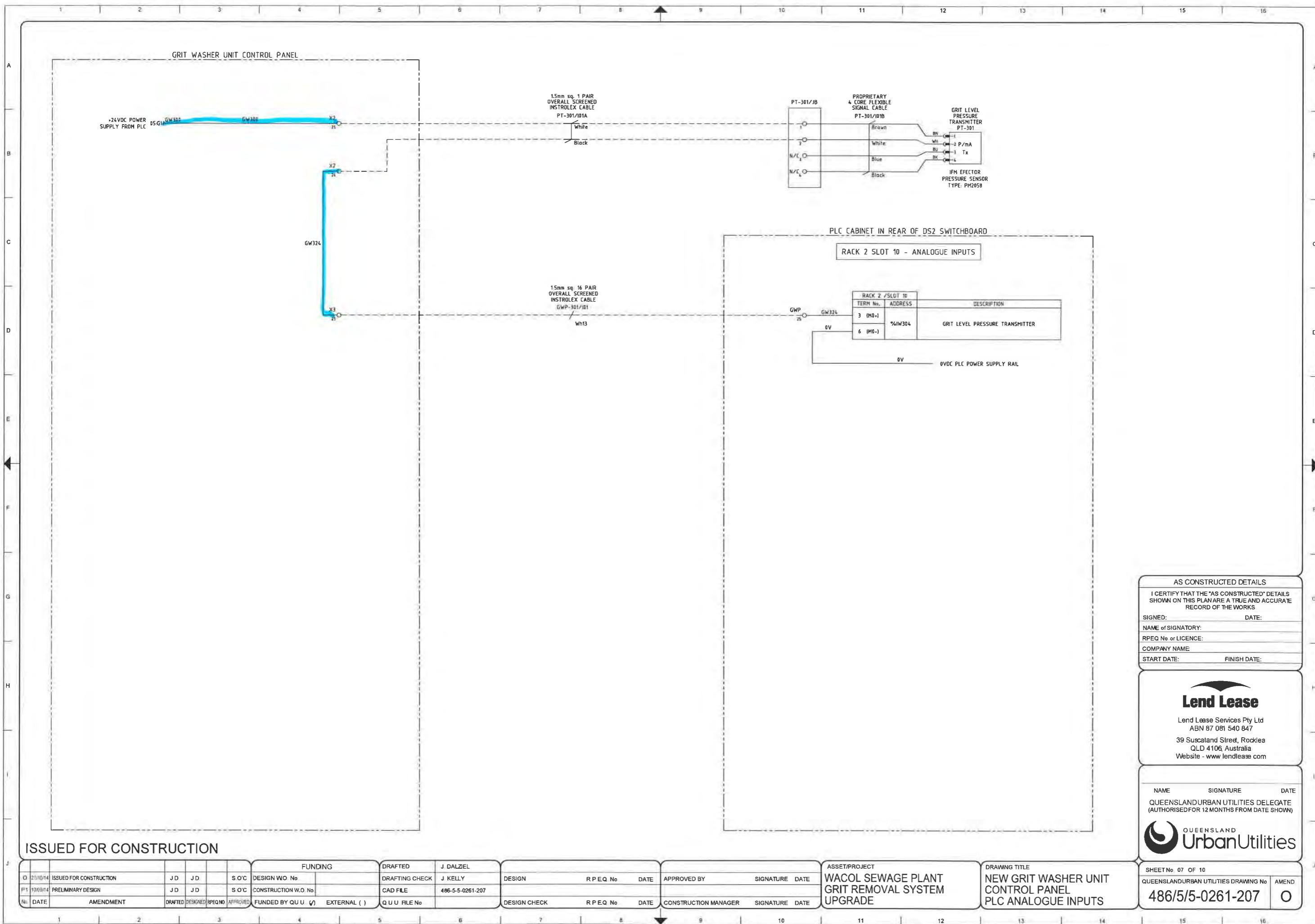






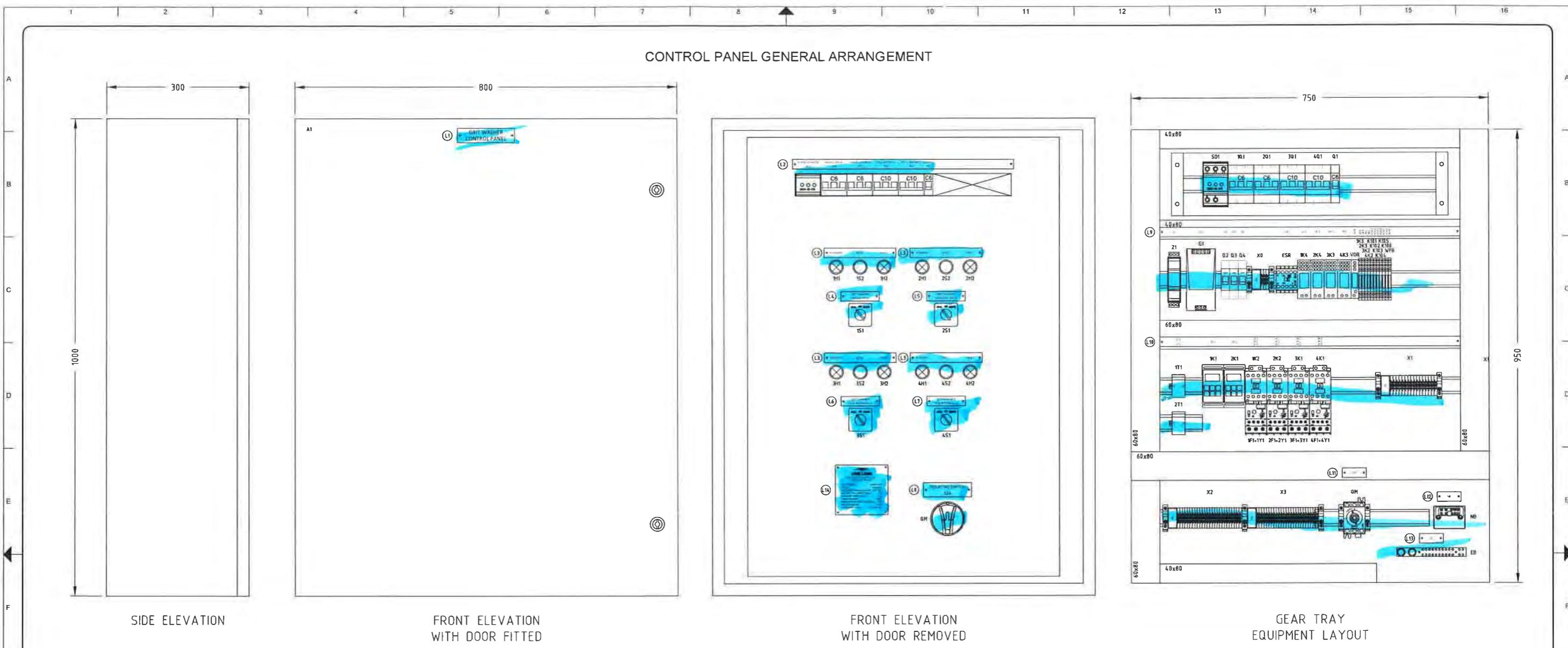




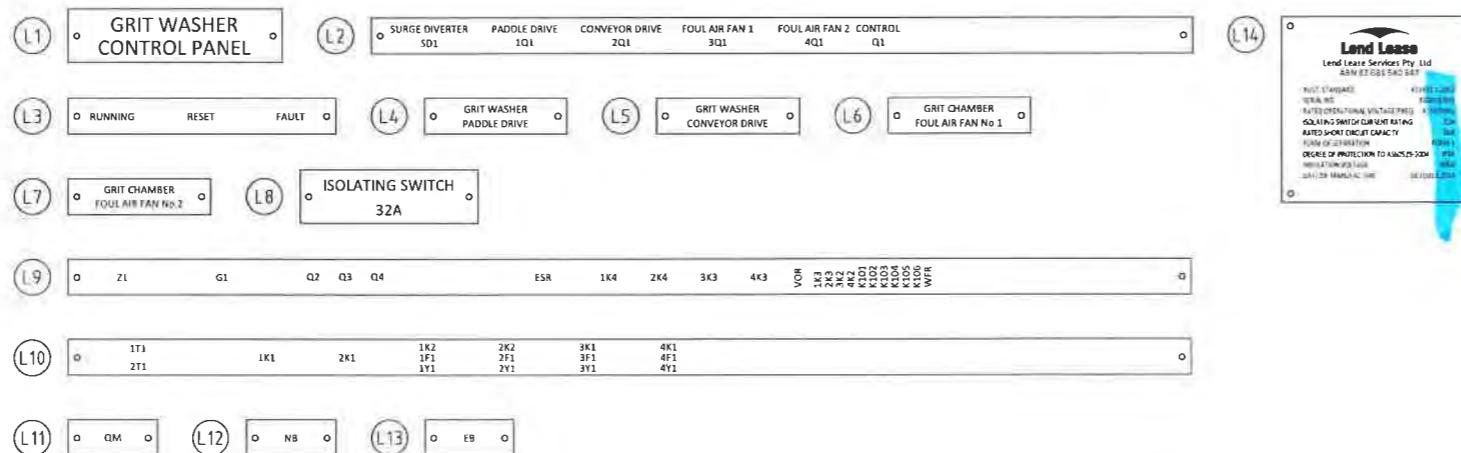




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A	<b>GRIT WASHER UNIT CONTROL PANEL - PARTS LIST</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>DESIGNATION</th><th>QTY</th><th>DESCRIPTION</th><th>PART NUMBER</th><th>BRAND</th><th>SUPPLIER</th></tr> </thead> <tbody> <tr><td>1F1</td><td>1</td><td>ELECTRONIC OVERLOAD RELAY, 0.2A-1.0A</td><td>CEP7-ED1BB</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>1H1</td><td>1</td><td>GREEN PILOT LAMP, 24VAC/DC</td><td>D7P3PN3G</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>1H2</td><td>1</td><td>YELLOW PILOT LAMP, 24VAC/DC</td><td>D7PP3PN3W</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>1K1</td><td>1</td><td>SHAFT POWER MONITOR RELAY, M20, 3x380-500VAC</td><td>D1-2520-4S</td><td>EMOTRON</td><td>SIEMENS</td></tr> <tr><td>1K2</td><td>1</td><td>CONTACTOR, 9A, 24VDC COIL</td><td>CA79E1024VDC</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>1K3</td><td>1</td><td>RELAY INTERFACE MODULE, 6A, 1C/O, 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24VDC</td><td>CEP7EMRZ24</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>2H1</td><td>1</td><td>ELECTRONIC OVERLOAD RELAY, 1.0A-5.0A</td><td>CEP7-ED1CB</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>2H2</td><td>1</td><td>GREEN PILOT LAMP, 24VAC/DC</td><td>D7PP3PN3G</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>2K1</td><td>1</td><td>YELLOW PILOT LAMP, 24VAC/DC</td><td>D7PP3PN3W</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>2K2</td><td>1</td><td>SHAFT POWER MONITOR RELAY, M20, 3x380-500VAC</td><td>D1-2520-4S</td><td>EMOTRON</td><td>SIEMENS</td></tr> <tr><td>2K3</td><td>1</td><td>CONTACTOR, 9A, 24VDC COIL</td><td>CA79E1024VDC</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>2K4</td><td>1</td><td>RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC</td><td>391124VACDC</td><td>FINDER</td><td>NHP</td></tr> <tr><td>201</td><td>1</td><td>RELAY, 7A, 2C/O, 24VDC</td><td>5534007424VDC</td><td>FINDER</td><td>NHP</td></tr> 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HANSON</td></tr> <tr><td>353</td><td>1</td><td>LOCAL/OFF/REMOTE SELECTOR SWITCH, CUSTOM</td><td>CA10-A711-FT2-AUS0022</td><td>KRAUS &amp; NAIMER</td><td>KRAUS &amp; NAIMER</td></tr> <tr><td>354</td><td>1</td><td>BLUE PUSH BUTTON, 1N/O</td><td>D7PF6PX10</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>3Y1</td><td>1</td><td>REMOTE RESET MAGNET, 24VDC</td><td>CEP7EMRZ24</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>4F1</td><td>1</td><td>ELECTRONIC OVERLOAD RELAY, 1.0A-5.0A</td><td>CEP7-ED1CB</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>4H1</td><td>1</td><td>GREEN PILOT LAMP, 24VAC/DC</td><td>D7PP3PN3G</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>4H2</td><td>1</td><td>YELLOW PILOT LAMP, 24VAC/DC</td><td>D7PP3PN3W</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>4K1</td><td>1</td><td>SHAFT POWER MONITOR RELAY, M20, 3x380-500VAC</td><td>D1-2520-4S</td><td>EMOTRON</td><td>SIEMENS</td></tr> <tr><td>4K2</td><td>1</td><td>CONTACTOR, 9A, 24VDC COIL</td><td>CA79E1024VDC</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>4K3</td><td>1</td><td>RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC</td><td>391124VACDC</td><td>FINDER</td><td>NHP</td></tr> <tr><td>401</td><td>1</td><td>RELAY, 7A, 2C/O, 24VDC</td><td>5534007424VDC</td><td>FINDER</td><td>NHP</td></tr> <tr><td>402</td><td>1</td><td>RELAY BASE FOR 5534 RELAYS</td><td>9404</td><td>FINDER</td><td>NHP</td></tr> <tr><td>451</td><td>1</td><td>MCB, 6kA, C CURVE, 3 POLE, 10A</td><td>DTCB6310C</td><td>TERASAKI</td><td>NHP</td></tr> <tr><td>452</td><td>1</td><td>LOAD BREAK SWITCH, 3 POLE, 20A WITH 1C/O AUX</td><td>565W320CXGY</td><td>CLIPSAL</td><td>LAWRENCE &amp; HANSON</td></tr> <tr><td>4Y1</td><td>1</td><td>LOCAL/OFF/REMOTE SELECTOR SWITCH, CUSTOM</td><td>CA10</td><td>KRAUS &amp; NAIMER</td><td>KRAUS &amp; NAIMER</td></tr> <tr><td>51</td><td>1</td><td>MCB, 6kA, C CURVE, 3 POLE, 10A</td><td>D7PF6PX10</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>A1</td><td>1</td><td>INNER DOOR FOR ENCLOSURE</td><td>ID10080</td><td>ZANARDO</td><td>NHP</td></tr> <tr><td>E1</td><td>1</td><td>SET OF 4 MOUNTING BRACKETS FOR ENCLOSURE</td><td>AG1A</td><td>ZANARDO</td><td>NHP</td></tr> <tr><td>E5R</td><td>1</td><td>EARTH BAR, 15A, 12 WAY</td><td>16SE12</td><td>DORE</td><td>DORE ELECTRICS</td></tr> <tr><td>FS-301</td><td>1</td><td>EMERGENCY STOP RELAY 4 N/O 24VDC</td><td>C5B40E24VOC</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>G1</td><td>1</td><td>MAGNETIC REED SWITCH N/O</td><td>PT-AHRA</td><td>TECFILUID</td><td>FREE ISSUED</td></tr> <tr><td>K101</td><td>1</td><td>POWER SUPPLY UNIT 240VAC/24VDC 10A</td><td>8951360010</td><td>WEIDMULLER</td><td>RAMELEC</td></tr> <tr><td>K102</td><td>1</td><td>RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC</td><td>391124VACDC</td><td>FINDER</td><td>NHP</td></tr> <tr><td>K103</td><td>1</td><td>RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC</td><td>391124VACDC</td><td>FINDER</td><td>NHP</td></tr> <tr><td>K104</td><td>1</td><td>RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC</td><td>391124VACDC</td><td>FINDER</td><td>NHP</td></tr> <tr><td>K105</td><td>1</td><td>RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC</td><td>391124VACDC</td><td>FINDER</td><td>NHP</td></tr> <tr><td>K106</td><td>1</td><td>RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC</td><td>391124VACDC</td><td>FINDER</td><td>NHP</td></tr> <tr><td>N3</td><td>1</td><td>NEUTRAL BAR ENCLOSED</td><td>10ASC</td><td>DORE</td><td>DORE ELECTRICS</td></tr> <tr><td>PT-301</td><td>1</td><td>PRESSURE TRANSMITTER, 4-20mA</td><td>PM2058</td><td>IFM EFECTOR</td><td>FREE ISSUED</td></tr> <tr><td>PT-301JB</td><td>1</td><td>JUNCTION BOX, IP66</td><td>56J01</td><td>CLIPSAL</td><td>LAWRENCE &amp; HANSON</td></tr> <tr><td>Q1</td><td>1</td><td>MCB, 6kA, C CURVE, 1 POLE, 6A</td><td>DTCB6106C</td><td>TERASAKI</td><td>NHP</td></tr> <tr><td>Q2</td><td>1</td><td>MCB, 6kA, C CURVE, 1 POLE, 10A</td><td>DTCB610C</td><td>TERASAKI</td><td>NHP</td></tr> <tr><td>Q3</td><td>1</td><td>MCB, 6kA, C CURVE, 1 POLE, 2A</td><td>DTCB6102C</td><td>TERASAKI</td><td>NHP</td></tr> <tr><td>Q4</td><td>1</td><td>MCB, 6kA, C CURVE, 1 POLE, 2A</td><td>DTCB6102C</td><td>TERASAKI</td><td>NHP</td></tr> <tr><td>QM</td><td>1</td><td>LOAD BREAK SWITCH, 3 POLE, 32A</td><td>SLB323P</td><td>SOCOME</td><td>NHP</td></tr> <tr><td>S1</td><td>1</td><td>ENCLOSED EMERGENCY STOP PUSH BUTTON</td><td>D71YM1</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>S1</td><td>1</td><td>LEGEND PLATE FOR ESTOP PUSHBUTTON</td><td>D75YE12</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>SD1</td><td>1</td><td>EXTRA CONTACT BLOCK 1N/0</td><td>D7BX10</td><td>SPRECHER &amp; SCHUH</td><td>NHP</td></tr> <tr><td>SV-301</td><td>1</td><td>SURGE DIVERTER, 50kA, 3PHASE, ALL MODE</td><td>S003-50-275</td><td>NOVARIS</td><td>POWERCOM SOLUTIONS</td></tr> <tr><td>VOR</td><td>1</td><td>RELAY, 16A, 1C/O, 24VDC</td><td>4661007424VDC</td><td>FINDER</td><td>NHP</td></tr> <tr><td>WFR</td><td>1</td><td>RELAY BASE FOR 4661 RELAYS</td><td>9701</td><td>FINDER</td><td>NHP</td></tr> <tr><td>Z1</td><td>1</td><td>SURGE FILTER, 6.5kA, 1 PHASE</td><td>SFD1-6.5-275</td><td>NOVARIS</td><td>POWERCOM SOLUTIONS</td></tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>DESIGNATION</th><th>QTY</th><th>DESCRIPTION</th><th>TERMINALS</th><th>PART NUMBER</th><th>BRAND</th><th>SUPPLIER</th></tr> </thead> <tbody> <tr><td>X0</td><td>2</td><td>TERMINAL 2.5mm, UK3N</td><td>2</td><td>XPC301501</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X0</td><td>1</td><td>END COVER, D-UK4/10</td><td>1</td><td>XPC303020</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X0</td><td>2</td><td>CLAMPS, E/UK1</td><td>2</td><td>XPC120143</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X1</td><td>1</td><td>GROUP MARKER, UBE/D</td><td>1</td><td>XPC0800307</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X1</td><td>12</td><td>TERMINAL 4mm, UKSN</td><td>12</td><td>XPC301501</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X1</td><td>4</td><td>TERMINAL 4mm, UKSN, USLKG5</td><td>4</td><td>XPC0441504</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X1</td><td>2</td><td>CLAMPS, E/UK1</td><td>2</td><td>XPC120143</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X1</td><td>1</td><td>GROUP MARKER, UBE/D</td><td>1</td><td>XPC0800307</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X2</td><td>26</td><td>TERMINAL 2.5mm, UK3N</td><td>26</td><td>XPC301501</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X2</td><td>2</td><td>TERMINAL 2.5mm EARTH, USLKG3</td><td>2</td><td>XPC441083</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X2</td><td>1</td><td>END COVER, D-UK4/10</td><td>1</td><td>XPC303020</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X2</td><td>2</td><td>CLAMPS, E/UK1</td><td>2</td><td>XPC120143</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X2</td><td>1</td><td>GROUP MARKER, UBE/D</td><td>1</td><td>XPC0800307</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X3</td><td>25</td><td>TERMINAL 2.5mm, UK3N</td><td>25</td><td>XPC301501</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X3</td><td>1</td><td>END COVER, D-UK4/10</td><td>1</td><td>XPC303020</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X3</td><td>2</td><td>CLAMPS, E/UK1</td><td>2</td><td>XPC120143</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>X3</td><td>1</td><td>GROUP MARKER, UBE/D</td><td>1</td><td>XPC0800307</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>GWP</td><td>1</td><td>TERMINAL 2.5mm, UK3N</td><td>1</td><td>XPC301501</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>GWP</td><td>2</td><td>CLAMPS, E/UK1</td><td>2</td><td>XPC120143</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>GWP</td><td>1</td><td>GROUP MARKER, UBE/D</td><td>1</td><td>XPC0800307</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>PT-301JB</td><td>4</td><td>TERMINAL 2.5mm, UK3N</td><td>4</td><td>XPC301501</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>PT-301JB</td><td>1</td><td>END COVER, D-UK4/10</td><td>1</td><td>XPC303020</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> <tr><td>PT-301JB</td><td>2</td><td>CLAMPS, E/UK1</td><td>2</td><td>XPC120143</td><td>PHOENIX CONTACT</td><td>PHOENIX CONTACT</td></tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">AS CONSTRUCTED DETAILS</th> </tr> </thead> <tbody> <tr> <td colspan="2">I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS</td> </tr> <tr> <td>SIGNED:</td> <td>DATE:</td> </tr> <tr> <td>NAME OF SIGNATORY:</td> <td></td> </tr> <tr> <td>RPEQ No or LICENCE:</td> <td></td> </tr> <tr> <td>COMPANY NAME:</td> <td></td> </tr> <tr> <td>START DATE:</td> <td>FINISH DATE:</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Lend Lease</th> </tr> </thead> <tbody> <tr> <td colspan="2">Lend Lease Services Pty Ltd ABN 80 081 540 847</td> </tr> <tr> <td colspan="2">39 Susticand Street, Rocklea QLD 4106 Australia</td> </tr> <tr> <td colspan="2">Website - www.lendlease.com</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">QUEENSLAND URBAN UTILITIES DELEGATE (AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)</th> </tr> </thead> <tbody> <tr> <td colspan="2"></td> </tr> <tr> <td>NAME</td> <td>SIGNATURE</td> </tr> <tr> <td colspan="2">DATE</td> </tr> </tbody> </table> <table border="															DESIGNATION	QTY	DESCRIPTION	PART NUMBER	BRAND	SUPPLIER	1F1	1	ELECTRONIC OVERLOAD RELAY, 0.2A-1.0A	CEP7-ED1BB	SPRECHER & SCHUH	NHP	1H1	1	GREEN PILOT LAMP, 24VAC/DC	D7P3PN3G	SPRECHER & SCHUH	NHP	1H2	1	YELLOW PILOT LAMP, 24VAC/DC	D7PP3PN3W	SPRECHER & SCHUH	NHP	1K1	1	SHAFT POWER MONITOR RELAY, M20, 3x380-500VAC	D1-2520-4S	EMOTRON	SIEMENS	1K2	1	CONTACTOR, 9A, 24VDC COIL	CA79E1024VDC	SPRECHER & SCHUH	NHP	1K3	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP	1K4	1	RELAY, 7A, 2C/O, 24VDC	5534007424VDC	FINDER	NHP	101	1	RELAY BASE FOR 5534 RELAYS	9404	FINDER	NHP	102	1	MCB, 6kA, C CURVE, 3 POLE, 6A	DTCB6306C	TERASAKI	NHP	1S1	1	LOAD BREAK SWITCH, 3 POLE, 20A WITH 1C/O AUX	565W320CXGY	CLIPSAL	LAWRENCE & HANSON	1S2	1	LOCAL/OFF/REMOTE SELECTOR SWITCH, CUSTOM	CA10	KRAUS & NAIMER	KRAUS & NAIMER	1T1	1	BLUE PUSH BUTTON, 1N/O	D7PF6PX10	SPRECHER & SCHUH	NHP	1Y1	1	CURRENT TRANSFORMER, 0.6A-10A	CTM010	EMOTRON	SIEMENS	2F1	1	REMOTE RESET MAGNET, 24VDC	CEP7EMRZ24	SPRECHER & SCHUH	NHP	2H1	1	ELECTRONIC OVERLOAD RELAY, 1.0A-5.0A	CEP7-ED1CB	SPRECHER & SCHUH	NHP	2H2	1	GREEN PILOT LAMP, 24VAC/DC	D7PP3PN3G	SPRECHER & SCHUH	NHP	2K1	1	YELLOW PILOT LAMP, 24VAC/DC	D7PP3PN3W	SPRECHER & SCHUH	NHP	2K2	1	SHAFT POWER MONITOR RELAY, M20, 3x380-500VAC	D1-2520-4S	EMOTRON	SIEMENS	2K3	1	CONTACTOR, 9A, 24VDC COIL	CA79E1024VDC	SPRECHER & SCHUH	NHP	2K4	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP	201	1	RELAY, 7A, 2C/O, 24VDC	5534007424VDC	FINDER	NHP	202	1	RELAY BASE FOR 5534 RELAYS	9404	FINDER	NHP	251	1	MCB, 6kA, C CURVE, 3 POLE, 6A	DTCB6306C	TERASAKI	NHP	252	1	LOCAL/OFF/REMOTE SELECTOR SWITCH, CUSTOM	CA10	KRAUS & NAIMER	KRAUS & NAIMER	2T1	1	BLUE PUSH BUTTON, 1N/O	D7PF6PX10	SPRECHER & SCHUH	NHP	2Y1	1	CURRENT TRANSFORMER, 0.6A-10A	CTM010	EMOTRON	SIEMENS	3F1	1	REMOTE RESET MAGNET, 24VDC	CEP7EMRZ24	SPRECHER & SCHUH	NHP	3H1	1	ELECTRONIC OVERLOAD RELAY, 1.0A-5.0A	CEP7-ED1CB	SPRECHER & SCHUH	NHP	3H2	1	GREEN PILOT LAMP, 24VAC/DC	D7PP3PN3G	SPRECHER & SCHUH	NHP	3K1	1	YELLOW PILOT LAMP, 24VAC/DC	D7PP3PN3W	SPRECHER & SCHUH	NHP	3K2	1	SHAFT POWER MONITOR RELAY, M20, 3x380-500VAC	D1-2520-4S	EMOTRON	SIEMENS	3K3	1	CONTACTOR, 9A, 24VDC COIL	CA79E1024VDC	SPRECHER & SCHUH	NHP	3K4	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP	301	1	RELAY, 7A, 2C/O, 24VDC	5534007424VDC	FINDER	NHP	302	1	RELAY BASE FOR 5534 RELAYS	9404	FINDER	NHP	351	1	MCB, 6kA, C CURVE, 3 POLE, 10A	DTCB6310C	TERASAKI	NHP	352	1	LOAD BREAK SWITCH, 3 POLE, 20A WITH 1C/O AUX	565W320CXGY	CLIPSAL	LAWRENCE & HANSON	353	1	LOCAL/OFF/REMOTE SELECTOR SWITCH, CUSTOM	CA10-A711-FT2-AUS0022	KRAUS & NAIMER	KRAUS & NAIMER	354	1	BLUE PUSH BUTTON, 1N/O	D7PF6PX10	SPRECHER & SCHUH	NHP	3Y1	1	REMOTE RESET MAGNET, 24VDC	CEP7EMRZ24	SPRECHER & SCHUH	NHP	4F1	1	ELECTRONIC OVERLOAD RELAY, 1.0A-5.0A	CEP7-ED1CB	SPRECHER & SCHUH	NHP	4H1	1	GREEN PILOT LAMP, 24VAC/DC	D7PP3PN3G	SPRECHER & SCHUH	NHP	4H2	1	YELLOW PILOT LAMP, 24VAC/DC	D7PP3PN3W	SPRECHER & SCHUH	NHP	4K1	1	SHAFT POWER MONITOR RELAY, M20, 3x380-500VAC	D1-2520-4S	EMOTRON	SIEMENS	4K2	1	CONTACTOR, 9A, 24VDC COIL	CA79E1024VDC	SPRECHER & SCHUH	NHP	4K3	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP	401	1	RELAY, 7A, 2C/O, 24VDC	5534007424VDC	FINDER	NHP	402	1	RELAY BASE FOR 5534 RELAYS	9404	FINDER	NHP	451	1	MCB, 6kA, C CURVE, 3 POLE, 10A	DTCB6310C	TERASAKI	NHP	452	1	LOAD BREAK SWITCH, 3 POLE, 20A WITH 1C/O AUX	565W320CXGY	CLIPSAL	LAWRENCE & HANSON	4Y1	1	LOCAL/OFF/REMOTE SELECTOR SWITCH, CUSTOM	CA10	KRAUS & NAIMER	KRAUS & NAIMER	51	1	MCB, 6kA, C CURVE, 3 POLE, 10A	D7PF6PX10	SPRECHER & SCHUH	NHP	A1	1	INNER DOOR FOR ENCLOSURE	ID10080	ZANARDO	NHP	E1	1	SET OF 4 MOUNTING BRACKETS FOR ENCLOSURE	AG1A	ZANARDO	NHP	E5R	1	EARTH BAR, 15A, 12 WAY	16SE12	DORE	DORE ELECTRICS	FS-301	1	EMERGENCY STOP RELAY 4 N/O 24VDC	C5B40E24VOC	SPRECHER & SCHUH	NHP	G1	1	MAGNETIC REED SWITCH N/O	PT-AHRA	TECFILUID	FREE ISSUED	K101	1	POWER SUPPLY UNIT 240VAC/24VDC 10A	8951360010	WEIDMULLER	RAMELEC	K102	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP	K103	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP	K104	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP	K105	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP	K106	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP	N3	1	NEUTRAL BAR ENCLOSED	10ASC	DORE	DORE ELECTRICS	PT-301	1	PRESSURE TRANSMITTER, 4-20mA	PM2058	IFM EFECTOR	FREE ISSUED	PT-301JB	1	JUNCTION BOX, IP66	56J01	CLIPSAL	LAWRENCE & HANSON	Q1	1	MCB, 6kA, C CURVE, 1 POLE, 6A	DTCB6106C	TERASAKI	NHP	Q2	1	MCB, 6kA, C CURVE, 1 POLE, 10A	DTCB610C	TERASAKI	NHP	Q3	1	MCB, 6kA, C CURVE, 1 POLE, 2A	DTCB6102C	TERASAKI	NHP	Q4	1	MCB, 6kA, C CURVE, 1 POLE, 2A	DTCB6102C	TERASAKI	NHP	QM	1	LOAD BREAK SWITCH, 3 POLE, 32A	SLB323P	SOCOME	NHP	S1	1	ENCLOSED EMERGENCY STOP PUSH BUTTON	D71YM1	SPRECHER & SCHUH	NHP	S1	1	LEGEND PLATE FOR ESTOP PUSHBUTTON	D75YE12	SPRECHER & SCHUH	NHP	SD1	1	EXTRA CONTACT BLOCK 1N/0	D7BX10	SPRECHER & SCHUH	NHP	SV-301	1	SURGE DIVERTER, 50kA, 3PHASE, ALL MODE	S003-50-275	NOVARIS	POWERCOM SOLUTIONS	VOR	1	RELAY, 16A, 1C/O, 24VDC	4661007424VDC	FINDER	NHP	WFR	1	RELAY BASE FOR 4661 RELAYS	9701	FINDER	NHP	Z1	1	SURGE FILTER, 6.5kA, 1 PHASE	SFD1-6.5-275	NOVARIS	POWERCOM SOLUTIONS	DESIGNATION	QTY	DESCRIPTION	TERMINALS	PART NUMBER	BRAND	SUPPLIER	X0	2	TERMINAL 2.5mm, UK3N	2	XPC301501	PHOENIX CONTACT	PHOENIX CONTACT	X0	1	END COVER, D-UK4/10	1	XPC303020	PHOENIX CONTACT	PHOENIX CONTACT	X0	2	CLAMPS, E/UK1	2	XPC120143	PHOENIX CONTACT	PHOENIX CONTACT	X1	1	GROUP MARKER, UBE/D	1	XPC0800307	PHOENIX CONTACT	PHOENIX CONTACT	X1	12	TERMINAL 4mm, UKSN	12	XPC301501	PHOENIX CONTACT	PHOENIX CONTACT	X1	4	TERMINAL 4mm, UKSN, USLKG5	4	XPC0441504	PHOENIX CONTACT	PHOENIX CONTACT	X1	2	CLAMPS, E/UK1	2	XPC120143	PHOENIX CONTACT	PHOENIX CONTACT	X1	1	GROUP MARKER, UBE/D	1	XPC0800307	PHOENIX CONTACT	PHOENIX CONTACT	X2	26	TERMINAL 2.5mm, UK3N	26	XPC301501	PHOENIX CONTACT	PHOENIX CONTACT	X2	2	TERMINAL 2.5mm EARTH, USLKG3	2	XPC441083	PHOENIX CONTACT	PHOENIX CONTACT	X2	1	END COVER, D-UK4/10	1	XPC303020	PHOENIX CONTACT	PHOENIX CONTACT	X2	2	CLAMPS, E/UK1	2	XPC120143	PHOENIX CONTACT	PHOENIX CONTACT	X2	1	GROUP MARKER, UBE/D	1	XPC0800307	PHOENIX CONTACT	PHOENIX CONTACT	X3	25	TERMINAL 2.5mm, UK3N	25	XPC301501	PHOENIX CONTACT	PHOENIX CONTACT	X3	1	END COVER, D-UK4/10	1	XPC303020	PHOENIX CONTACT	PHOENIX CONTACT	X3	2	CLAMPS, E/UK1	2	XPC120143	PHOENIX CONTACT	PHOENIX CONTACT	X3	1	GROUP MARKER, UBE/D	1	XPC0800307	PHOENIX CONTACT	PHOENIX CONTACT	GWP	1	TERMINAL 2.5mm, UK3N	1	XPC301501	PHOENIX CONTACT	PHOENIX CONTACT	GWP	2	CLAMPS, E/UK1	2	XPC120143	PHOENIX CONTACT	PHOENIX CONTACT	GWP	1	GROUP MARKER, UBE/D	1	XPC0800307	PHOENIX CONTACT	PHOENIX CONTACT	PT-301JB	4	TERMINAL 2.5mm, UK3N	4	XPC301501	PHOENIX CONTACT	PHOENIX CONTACT	PT-301JB	1	END COVER, D-UK4/10	1	XPC303020	PHOENIX CONTACT	PHOENIX CONTACT	PT-301JB	2	CLAMPS, E/UK1	2	XPC120143	PHOENIX CONTACT	PHOENIX CONTACT	AS CONSTRUCTED DETAILS		I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS		SIGNED:	DATE:	NAME OF SIGNATORY:		RPEQ No or LICENCE:		COMPANY NAME:		START DATE:	FINISH DATE:	Lend Lease		Lend Lease Services Pty Ltd ABN 80 081 540 847		39 Susticand Street, Rocklea QLD 4106 Australia		Website - www.lendlease.com		QUEENSLAND URBAN UTILITIES DELEGATE (AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)				NAME	SIGNATURE	DATE	
DESIGNATION	QTY	DESCRIPTION	PART NUMBER	BRAND	SUPPLIER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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4K3	1	RELAY INTERFACE MODULE, 6A, 1C/O, 24VAC/DC	391124VACDC	FINDER	NHP																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
401	1	RELAY, 7A, 2C/O, 24VDC	5534007424VDC	FINDER	NHP																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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452	1	LOAD BREAK SWITCH, 3 POLE, 20A WITH 1C/O AUX	565W320CXGY	CLIPSAL	LAWRENCE & HANSON																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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## CONTROL PANEL LABEL DETAILS



AS CONSTRUCTED DETAILS  
I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS  
SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE  
RECORD OF THE WORKS.

SIGNED:  
NAME of SIGNATORY:  
RPEQ No or LICENCE:  
COMPANY NAME:  
START DATE: FINISH DATE:

**Lend Lease**  
Lend Lease Services Pty Ltd  
ABN 87 081 540 847  
39 Suscaland Street, Rocklea  
QLD 4106, Australia  
Website - www.lendlease.com

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

**Queensland Urban Utilities**

## ISSUED FOR CONSTRUCTION

FUNDING				DRAFTED	J DALZEL	DESIGN	RPEQ No	DATE	APPROVED BY	SIGNATURE	DATE	ASSET/PROJECT	DRAWING TITLE	SHEET No
Q 2/10/14	ISSUED FOR CONSTRUCTION	JD	JD	S O/C	DESIGN WO No	DRAFTING CHECK	J KELLY	DATE	CONSTRUCTION MANAGER	SIGNATURE	DATE	WACOL SEWAGE PLANT GRIT REMOVAL SYSTEM UPGRADE	NEW GRIT WASHER UNIT GRIT REMOVAL SYSTEM GENERAL ARRANGEMENT	10 OF 10
P1	PRELIMINARY DESIGN	JD	JD	S O/C	CONSTRUCTION W.O. No	CAD FILE	486-5-0261-210	DATE	CONSTRUCTION MANAGER	SIGNATURE	DATE			QUEENSLAND URBAN UTILITIES DRAWING No
No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ No	APPROVED	FUNDED BY QU U	EXTERNAL ( )	Q U U FILE No	DESIGN CHECK	RPEQ No	DATE	CONSTRUCTION MANAGER	AMEND

**Lend Lease's infrastructure services business**  
**SF-3002-08 - Instrument Installation**  
**3000 - Electrical**


  
**Lend Lease**

PROJECT :

E6308 - WACOL STP Grit Removal System upgrade

CABLE No.

GWP-301 / 101

LOCATION:

Grit level pressure Tx (mounted on bottom of hopper)

DRAWING No:

4865/5-0261-207

EQUIPMENT No.

SERIAL No:

4311H2 224908-2

VERIFY CABLE IN CORRECT CABLE LADDER

**SATISFACTORY****COMMENTS**

VERIFY CABLE SIZE /TYPE



CABLE INSTALLED CORRECTLY



CABLE GLANDED CORRECTLY



CABLE IDENTIFICATION



CORE IDENTIFICATION



WIRE LUG / PIN TYPE



CORRECT TERMINATIONS



CERTIFIED, CURRENT, TEST EQUIPMENT



PRE-COMMISSIONED



POINT TO POINT



IR TEST



FINAL INSPECTION



COMMENTS: .....

**Tested by Lend Lease**(Name) Tim Brown

(Sign)

T Brown

Date: 27/11/2014

**Approved by (Client if Applicable)**

(Name) \_\_\_\_\_

(Sign)

\_\_\_\_\_

Date: / / 20

**Lend Lease's Services business**  
**SF-3101H -Switchboard Installation**  
**3000 - Electrical**



PROJECT: E63018-Wacol STP Grit Removal System Upgrade Record No: .....

Switchboard No: .....

Switchboard size: 18 Poles

Switchboard Main Switch Size: 32 Amps

Drawing No: 486/5/5-0261-2-1 → 210

**STATUS – De-energised**

## Comments

DB secured correctly / level



.....

Check for signs of damage



.....

Submain checklist complete



Sheet No: .....

Terminations secure / correct



.....

Check for debris / foreign objects



.....

All circuit breakers / switches off



.....

**Bus bar insulation Test**

Red-White ..... MΩ  
 Red-Blue ..... MΩ  
 Red-Neutral ..... MΩ  
 Red-Earth ..... MΩ

White-Blue ..... MΩ  
 White-Neutral ..... MΩ  
 White-Earth ..... MΩ

Blue-Neutral ..... MΩ  
 Blue-Earth ..... MΩ  
 Neutral-Earth ..... MΩ

## Test Voltage 1000V

Instrument Serial No. 2850019

Calibration No. New

All doors / covers installed

**Pre-commissioning complete**

Checked by: Tim Bowmer

Lend Lease: Tim Bowmer

Date: 27/11/14

CLIENT APPROVAL: \_\_\_\_\_

Date: ...../...../.....



Page



Version 00

Uncontrolled when printed

1 of 1

As at 24th October 2013



**Lend Lease's Services business**  
**SF-3101L - Motor Test Sheet**  
3000 - Electrical


**Lend Lease**

WACOL STP

Project : E63018-Wacol STP Grit Removal System Upgrade

Location : Grit Removal

TITLE : Grit Washer Module Drive EQUIPMENT NO : MX-301KW RATING : 0.25kW VOLTAGE : 400 VACSPEED : 1380 RPM F.L.C : 0.76 ASERIAL No. : 2012 862 85-500 / 19232545POWER /CONTROL TERMINATED MOTOR TERMINATED THERMISTER TERMINATED  NALOCAL ISOLATOR E-STOP FUSES / CIRCUIT BREAKER BASE: DIN T 6 RATING 6AOVERLOAD RELAY RANGE: 0.2-1 SETTING 0.7

MEGGER MOTOR WINDINGS MEGGER MOTOR CABLES

**TEST RESULTS****TEST RESULTS**

RED TO WHITE	<input type="checkbox"/>	<input type="checkbox"/>
WHITE TO RED	<input type="checkbox"/>	<input type="checkbox"/>
BLUE TO RED	<input type="checkbox"/>	<input type="checkbox"/>
RED TO EARTH	<input checked="" type="checkbox"/> >500 MΩ	<input type="checkbox"/>
WHITE TO EARTH	<input checked="" type="checkbox"/> >500 MΩ	<input type="checkbox"/>
BLUE TO EARTH	<input checked="" type="checkbox"/> >500 MΩ	<input type="checkbox"/>

INSTRUMENT SERIAL No: 2850019 CALIBRATION No: NEWMOTOR ROTATION CORRECT 

COMMENTS :

**Tested by Lend Lease**(Name) Tin Bowra(Sign) AB Date: 27/11/2014**Approved by (Client if Applicable)**

(Name) \_\_\_\_\_

(Sign) \_\_\_\_\_ Date: / / 20

**Lend Lease's Services business**  
**SF-3101L - Motor Test Sheet**  
 3000 - Electrical


**Lend Lease**

WACOL STP

Project : E63018-Wacol STP Grit Removal System Upgrade

Location : GRIT REMOVAL

TITLE : Grit Washer Conveyor Drive EQUIPMENT NO : GWC-301KW RATING : 1.1Kw VOLTAGE : 400SPEED : 1435 RPM F.L.C : 2.42ASERIAL No. : 201286285-600/1923254POWER /CONTROL TERMINATED MOTOR TERMINATED THERMISTER TERMINATED  NALOCAL ISOLATOR E-STOP FUSES / CIRCUIT BREAKER BASE: DIN 76 RATING 6AOVERLOAD RELAY RANGE: 1-5 SETTING 2-4

MEGGER MOTOR WINDINGS MEGGER MOTOR CABLES

## TEST RESULTS

## TEST RESULTS

RED TO WHITE	<input type="checkbox"/>	<input type="checkbox"/>
WHITE TO RED	<input type="checkbox"/>	<input type="checkbox"/>
BLUE TO RED	<input type="checkbox"/>	<input type="checkbox"/>
RED TO EARTH	<input checked="" type="checkbox"/> > 500mA	<input type="checkbox"/>
WHITE TO EARTH	<input checked="" type="checkbox"/> > 500mA	<input type="checkbox"/>
BLUE TO EARTH	<input checked="" type="checkbox"/> > 500mA	<input type="checkbox"/>

INSTRUMENT SERIAL No: 285 0019 CALIBRATION No: NewMOTOR ROTATION CORRECT 

COMMENTS :

**Tested by Lend Lease**(Name) Tim Brown (Sign) AB Date: 27/11/2014**Approved by (Client if Applicable)**

(Name) \_\_\_\_\_ (Sign) \_\_\_\_\_ Date: / / 20

**Lend Lease's Services business**  
**SF-3101L - Motor Test Sheet**  
**3000 - Electrical**


**Lend Lease**

WACOL STP

Project : E63018-Wacol STP Grit Removal System Upgrade

Location : GRIT REMOVAL

TITLE : GRIT CHAMBER NO. 1 FOUL AIR FAN EQUIPMENT NO : FAN - 101KW RATING : 2.2 KW VOLTAGE : 415VSPEED : 1455 RPM F.L.C : 4.7ASERIAL No. : 104291/006-014POWER /CONTROL TERMINATED MOTOR TERMINATED THERMISTER TERMINATED  N/ALOCAL ISOLATOR E-STOP  N/AFUSES / CIRCUIT BREAKER BASE: DINT 6 RATING 10AOVERLOAD RELAY RANGE: 1-5 SETTING 4-7

MEGGER MOTOR WINDINGS MEGGER MOTOR CABLES

## TEST RESULTS

- OK
- 
- 
- >500 mΩ
- >500 mΩ
- >500 mΩ

## TEST RESULTS

- 
- 
- 
- 
- 
- 

INSTRUMENT SERIAL No: 2850019 CALIBRATION No: NewMOTOR ROTATION CORRECT 

COMMENTS :

**Tested by Lend Lease**(Name) Tim Brown

(Sign)

OKDate: 27/11/2014**Approved by (Client if Applicable)**

(Name) \_\_\_\_\_

(Sign) \_\_\_\_\_

Date: / / 20

**Lend Lease's Services business**  
**SF-3101L - Motor Test Sheet**  
**3000 - Electrical**



**Lend Lease**

WACOL STP

GRIT REMOVAL

Project : E63018-Wacol STP Grit Removal System Upgrade

Location :

TITLE : GRIT CHAMBER NO.2 FOUL AIR EQUIPMENT NO : FAN 201

KW RATING : 2.2KW VOLTAGE : 415V

SPEED : 1455 RPM F.L.C : 4.7A

SERIAL No. : 112207/008-008

POWER / CONTROL TERMINATED MOTOR TERMINATED THERMISTER TERMINATED  NALOCAL ISOLATOR E-STOP  NA

FUSES / CIRCUIT BREAKER BASE: DIN T 6 RATING 10A

OVERLOAD RELAY RANGE: 1-5 SETTING 4.7

MEGGER MOTOR WINDINGS MEGGER MOTOR CABLES

## TEST RESULTS

- RED TO WHITE
- WHITE TO RED
- BLUE TO RED
- RED TO EARTH > 500 mΩ
- WHITE TO EARTH > 500 mΩ
- BLUE TO EARTH > 500 mΩ

## TEST RESULTS

- 
- 
- 
- 
- 
- 

INSTRUMENT SERIAL No: 2850019 CALIBRATION No: NEW

MOTOR ROTATION CORRECT 

COMMENTS :

Tested by Lend Lease

(Name) Tim Barrow

(Sign) 

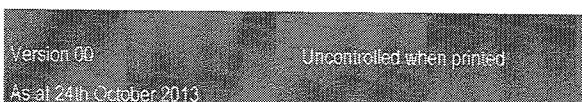
Date: 27/11/2014

Approved by (Client if Applicable)

(Name) \_\_\_\_\_

(Sign) \_\_\_\_\_

Date: / / 20



**Lend Lease's Services business**  
**SF-3101L - Motor Test Sheet**  
 3000 - Electrical



PROJECT : Wacol STP Grit Removal Upgrade

LOCATION : Wacol STP

TITLE : No 1 Grit Pump  
 KW RATING : 7½hp 55kw  
 SPEED : 1460

EQUIPMENT NO :

Pinnis MT 1451

VOLTAGE :

415V

F.L.C :

11A

SERIAL No. :

11-92579-11/27-02

POWER /CONTROL TERMINATED

 Existing

MOTOR TERMINATED

THERMISTER TERMINATED

 NA

LOCAL ISOLATOR

 Existing

E-STOP

 Existing

FUSES / CIRCUIT BREAKER

BASE: DIN-T

RATING

32A 9KA

OVERLOAD RELAY

RANGE: 9-13A

SETTING

9

MEGGER MOTOR WINDINGS

MEGGER MOTOR CABLES

TEST RESULTS

RED TO WHITE

WHITE TO RED

BLUE TO RED

RED TO EARTH

 @ 500V

WHITE TO EARTH

 @ 500V

BLUE TO EARTH

 @ 500V

INSTRUMENT SERIAL No.

16790098

CALIBRATION No.

LLW19

MOTOR ROTATION CORRECT

COMMENTS : Earth Resistance motor to switchboard 0.1Ω.

INSPECTED Lend Lease:

Tim BowmanDATE : 10.11.14

**Lend Lease's Services business**  
**SF-3101L - Motor Test Sheet**  
**3000 - Electrical**


  
**Lend Lease**
PROJECT : *Wacol STP Grit Removal Upgrade*LOCATION : *Wacol STP*

TITLE : *Paddle drive No 1* EQUIPMENT NO : *Pumas 1GB 474*  
 KW RATING : *1.5kW* VOLTAGE : *4.5*  
 SPEED : *1450* F.L.C : *3.16A*  
 SERIAL No. : *H3 45474*

POWER /CONTROL TERMINATED  *Existing*MOTOR TERMINATED THERMISTER TERMINATED  *N/A*LOCAL ISOLATOR  *existing*E-STOP  *Existing*FUSES / CIRCUIT BREAKER BASE: *DIN-T* RATING *20A 9mA*OVERLOAD RELAY RANGE: *2.5-4A* SETTING *2.9A*

MEGGER MOTOR WINDINGS MEGGER MOTOR CABLES TEST RESULTS TEST RESULTS

RED TO WHITE	<input type="checkbox"/>	<input type="checkbox"/>	
WHITE TO RED	<input type="checkbox"/>	<input type="checkbox"/>	
BLUE TO RED	<input type="checkbox"/>	<input type="checkbox"/>	
RED TO EARTH	<input checked="" type="checkbox"/> <i>@ 500V</i>	<input type="checkbox"/>	
WHITE TO EARTH	<input checked="" type="checkbox"/> <i>@ 500V</i>	<input type="checkbox"/>	
BLUE TO EARTH	<input checked="" type="checkbox"/> <i>@ 500V</i>	<input type="checkbox"/>	

INSTRUMENT SERIAL No. *1679.0098*CALIBRATION No. *LL W19*MOTOR ROTATION CORRECT 

COMMENTS :

INSPECTED Lend Lease: *Tim Downey* DATE: *10.11.14.*

**Lend Lease's Services business**  
**SF-3101L - Motor Test Sheet**  
**3000 - Electrical**


**Lend Lease**
PROJECT : *Wacol STP Grit Removal Upgrade*LOCATION : *Wacol STP*

TITLE :	<u>N02 GRIT Pump</u>	EQUIPMENT NO :	<u>Pimms MT 1452</u>
KW RATING :	<u>7 1/2 Hp 5.5kW</u>	VOLTAGE :	<u>415V</u>
SPEED :	<u>1460</u>	F.L.C :	<u>11A</u>
		SERIAL No.:	<u>11-92579-11/27-01</u>

POWER /CONTROL TERMINATED  *Existing*MOTOR TERMINATED THERMISTER TERMINATED  *N/A*LOCAL ISOLATOR  *Existing*E-STOP  *Existing*FUSES / CIRCUIT BREAKER BASE: DIN/T RATING 32A 9KA DIN/TOVERLOAD RELAY RANGE: 9-13A SETTING 9A

MEGGER MOTOR WINDINGS

MEGGER MOTOR CABLES

TEST RESULTS

RED TO WHITE  WHITE TO RED  BLUE TO RED  RED TO EARTH  *@ 500V* WHITE TO EARTH  *@ 500V* BLUE TO EARTH  *@ 500V* 

&gt; 500 MΩ

&gt; 500 MΩ

&gt; 500 MΩ

INSTRUMENT SERIAL No. 285 0019CALIBRATION No. New meterMOTOR ROTATION CORRECT 

COMMENTS :

INSPECTED Lend Lease: Tom BrownDATE: 22.9.14

**Lend Lease's Services business**  
**SF-3101L - Motor Test Sheet**  
 3000 - Electrical


  
**Lend Lease**

PROJECT : Wacol STP Grit Removal Upgrade

LOCATION : Wacol STP

TITLE :	Paddle Drive No.2	EQUIPMENT NO :	Pimms/GB 475
KW RATING :	1.5	VOLTAGE :	415V
SPEED :	1450	F.L.C :	3.16A
		SERIAL No.:	HB 45468

POWER /CONTROL TERMINATED MOTOR TERMINATED THERMISTER TERMINATED  N/ALOCAL ISOLATOR E-STOP 

FUSES / CIRCUIT BREAKER BASE: DIN T RATING 20A 9kA

OVERLOAD RELAY RANGE: 25-4A. SETTING 3.4A.

MEGGER MOTOR WINDINGS

MEGGER MOTOR CABLES

## TEST RESULTS

## TEST RESULTS

RED TO WHITE  WHITE TO RED  BLUE TO RED  RED TO EARTH  500V WHITE TO EARTH  500V BLUE TO EARTH  500V 

&gt; 500 MΩ

&gt; 500 MΩ

&gt; 500 MΩ

INSTRUMENT SERIAL No. 285001a

CALIBRATION No. New Meter

MOTOR ROTATION CORRECT 

COMMENTS :

INSPECTED Lend Lease:

W.Bittner

DATE : 23.9.15

**Lend Lease's Services business****SF-3111B - Multiple Power Cables Test Sheet**

3000 - Electrical

Project: E63018 – Wacol STP Grit Removal System UpgradeSheet No: 1 of 1

Cable Schedule: \_\_\_\_\_

Cable Type: \_\_\_\_\_

Origin: \_\_\_\_\_

Location: Grit RemovalDrawing Reference: 486/5/5-0261-208

ITP No. \_\_\_\_\_

**AS/NZ 3000, 8.3.3 Mandatory Tests:** The following tests shall be carried out on low voltage electrical installations:

- (a) Continuity of the earthing system (earth resistance to the main earthing conductor, protective earthing conductors and bonding conductors), in accordance with Clause 8.3.5.
- (b) Insulation resistance, in accordance with Clause 8.3.6.
- (c) Polarity, in accordance with Clause 8.3.7.
- (d) Correct circuit connections, in accordance with Clause 8.3.8.
- (e) Verification of impedance required for automatic disconnection of supply (earth fault-loop impedance), in accordance with Clause 8.3.9

**Cable Testing**Instrument Make/ Model: Fluke 1624B..... Instrument Serial No: 2850019..... Calibration No: New.....Cable Operational Voltage 230/400 Volts      Insulation Resistance Test Voltage 500-1000 Volts**Insulation Resistance**

Cable Number	Recorded Insulation Resistance Value MΩ								Earth Continuity	Loop Resistance	Point to Point	Complete	
	R-B	R-W	B-W	R-E	W-E	B-E	N-E	N-RWB				Correct	Pass
GWP-301/P01	>500	>500	>500	>500	>500	>500	>500	>500	0.3	RE 0.3 LE 0.46	✓	✓	
MX-301/P01A	>500	>500	>500	>500	>500	>500	N/A	N/A	0.06	—	✓	✓	
MX-301/P01B	>500	>500	>500	>500	>500	>500	N/A	N/A	0.01	—	✓	✓	
GWC-301/P01A	>500	>500	>500	>500	>500	>500	N/A	N/A	0.07	—	✓	✓	
GWC-301/P01B	>500	>500	>500	>500	>500	>500	N/A	N/A	0.08	—	✓	✓	
FAN-101/P01A	>500	>500	>500	>500	>500	>500	N/A	N/A	0.11	—	✓	✓	
FAN-101/P01B	>500	>500	>500	>500	>500	>500	N/A	N/A	0.03	—	✓	✓	
FAN-201/P01A	>500	>500	>500	>500	>500	>500	N/A	N/A	0.14	—	✓	✓	
FAN-201/P01B	>500	>500	>500	>500	>500	>500	N/A	N/A	0.04	—	✓	✓	
<del>MV-201A</del>							N/A	N/A					

Comments: .....

Cable Testing Complete

Y  N 

Tested by Lend Lease

(Name) Tim Bowman(Sign) Tim BowmanDate: 27/11/2014

Approved by (Client if Applicable)

(Name) \_\_\_\_\_

(Sign) \_\_\_\_\_

Date: / / 20

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade	Contract No. C1011-045-087 Grit Washer System
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## Mechanical Checks

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade		
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## GRIT WASHER SYSTEM COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
WACOL STP

- All hydraulic connections shall be checked.
- Check the gear box is correctly sealed.
- Check that all covers/hatches are closed.
- Availability of all safety devices shall be checked on the machine.
- Check that all the warning notices are present on and around the machine.
- All blocking conditions removing should be checked before first start up.
- Ensure that piping is clean before start-up.
- Instrument loops shall be loop functional tested before start-up.
- Verify that all gauges have been calibrated either by the manufacturer when supplied new or by the installer if existing gauges are used.
- All lubrication and coolant shall be checked as per vendor document.
- All vendor and plant requirements read and understood.

Preoperational checks for Drivers include following activities (See Appendix B for vendor document):

- The oil level must be checked prior to commissioning.
- The vent plug activation or the pressure vent screwing in should be checked.
- Check conformity of the required configuration with the actual installation.
- Check the external gear shaft forces within permitted limits (chain tension).
- The torque support should be correctly fitted.
- Verify that contact guards are fitted to rotating components.
- Check the automatic lubricant dispenser is activated.
- Check the cooling cover is connected to the cooling circuit.

## 7. Performance Testing and Recording

Commissioning activities are to include testing and recording of control philosophy, emergency stop switch operation, hopper wash water system operation in conjunction with agitator, and screw conveyor operation alone and in conjunction with transport zone wash water system. Testing and recording of motor overload protection, measurement of motors loading, noises and temperature.

All commissioning test data is to be recorded on the relevant test sheet.

## 8. Electrical Installation Checks

### 8.1 Electrical Connections

Contractor Task	Lend Lease	QUU
Check all electrical connections including power supply and cable box as per vendor installation procedure.	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Check earthing correctly installed.	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>

GRIT REMOVAL SYSTEM UPGRADE	GRIT WASHER COMMISSIONING PLAN	ISSUE DATE	20/01/15	VERSION A
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## GRIT WASHER SYSTEM COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
WACOL STP

### 8.2 Electrical Inspection

Electrical Inspector	Lend Lease	QUU
The following QUU site inspection tests have been completed and all defects have been rectified.	Reflux valve switch to be permanently wired.	Reflux valve switch to be permanently wired.
Site Inspection Checks - Cables	OK <input checked="" type="checkbox"/> TB	OK <input type="checkbox"/>
Site Inspection Checks - Electric Motors	OK <input checked="" type="checkbox"/> TB	OK <input type="checkbox"/>
Site Inspection Checks - Cable Ladder / Tray / Duct	OK <input checked="" type="checkbox"/> TB	OK <input type="checkbox"/>

## 9. Electrical, Mechanical & Hydraulic Commissioning

### 9.1 Mechanical & Hydraulic Commissioning

#### 9.1.1 Pre Start Tests

Prior commencing of the pre start tests, a shutdown of the equipment is to be done in order to plug in the new PLC I/O modules and load the PLC code. Time frame for this process is approx. one hour.

The following tests should be performed before running the Grit Washer for longer than a few agitator and screw conveyor revolutions.

#### *Initial Start-Up Checks for Grit Washer*

Contractor Task	Meyor	QUU
Fill the sand collection container with 0.4m <sup>3</sup> of clean sand.	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Turn on main power supply to the Grit Washer.	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Open effluent inlet valve and confirm effluent flow into hopper (may require turning on grit pump upstream).	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Commence Hopper and Screw Conveyor Running Cycles (or the equivalent).	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>

GRIT REMOVAL SYSTEM UPGRADE	GRIT WASHER COMMISSIONING PLAN	ISSUE DATE	20/01/15	VERSION A
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## GRIT WASHER SYSTEM COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
WACOL STP

### 9.1.2 Commissioning Check list

The following checks should be done for Grit Washer commissioning.

*Commissioning Checks for Grit Washer*

Contractor Task	Meyor	QUU
Visual examination of the works for completeness and acceptable standard of workmanship and finish.	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Inspect around machine for obvious signs of oil or water	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Check agitator is rotating freely in normal operation without any abnormal noises or squeaks	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Check sand is being transported effectively to the top of the screw conveyor	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Check Grit Washer hopper cycle is implemented correctly. Start/Stop sequence must match control philosophy (see Appendix A).	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Check Grit Washer screw conveyor cycle is implement correctly. Start/Stop sequence must match control philosophy (see Appendix A).	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Check the rotation of the screw conveyor is as per the indication on the unit.	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Check the hopper wash water system and agitator are working together.	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>
Check screw conveyor is operating intermittently to ensure some quantity of sand is always in the sand collection container. Check that screw conveyor operates for 5 seconds every 90 minutes.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Check the transport zone wash water system is only operating whilst the screw conveyor is in operation (if supplied).	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Set motor overload protection based on measured current.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
After 10 hours operation check that all bolts and nuts are still tightly secured and verify the electric motors are running at their rated capacities.	OK <input type="checkbox"/>	OK <input type="checkbox"/>
Operational testing of isolation valves.	OK <input checked="" type="checkbox"/>	OK <input type="checkbox"/>

### Electrical Commissioning of Drivers

Contractor Task	Lend Lease	QUU
Visually inspect the current readings for motors and compare with the relevant data sheet	OK <input checked="" type="checkbox"/> TB	OK <input type="checkbox"/>
Locating the relevant control panel for both the agitator and screw motors.	OK <input type="checkbox"/> TB	OK <input type="checkbox"/>
Check motors are working at their respective correct loadings.	OK <input checked="" type="checkbox"/> TB	OK <input type="checkbox"/>
Check for any abnormal noises and temperature rises.	OK <input checked="" type="checkbox"/> TB	OK <input type="checkbox"/>

GRIT REMOVAL SYSTEM UPGRADE	GRIT WASHER COMMISSIONING PLAN	ISSUE DATE	20/01/15	VERSION A
PAGE 10 OF 17				



## GRIT WASHER SYSTEM COMMISSIONING PLAN

QUEENSLAND URBAN UTILITIES  
WAGOL STP

## 10. Performance Checks

### 10.1 Grit Washer Performance Checks

Customer	Queensland Urban Utilities Wacol Sewage Treatment Plant Grit Removal System		
<b>Grit Washer</b>			
Maker	Bilfinger		
Model	GW80		
Serial Number	<u>077 059 14</u>		
Control Philosophy	<input checked="" type="checkbox"/> checked	Emergency Stop Switch Operation	<input checked="" type="checkbox"/> checked

		Value	Spec Value
Max Flow Rate	L/s		22 (Slurry)
Max Capacity of Solids Extracted	M <sup>3</sup> /h		~ 1.1
Screw Inclination	Degree (°)	35°	35°
Est. Hopper Capacity	M <sup>3</sup>		~ 1.9
Wash Water Requirements	L/s @ 500Kpa	3 L/s	3 L/s @ 500kPa

Tested by: Lewis Arjas - Meyjor Industries Pty Ltd

Date: 21 /01/2015

Witnessed by: Scott Whitting

Date: 21/01/2015

### Notes:

10. The following table summarizes the results of the study.

GRIT REMOVAL SYSTEM UPGRADE | GRIT WASHER COMMISSIONING PLAN | ISSUE DATE 20/01/15 | VERSION A  
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Queensland Urban Utilities Wacol STP Grit Removal System Upgrade	Contract No. C1011-045-087 Grit Washer System
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## Appendix A- Proprietary Manuals

### Bilfinger GW80 Order Specifications Manual

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade		
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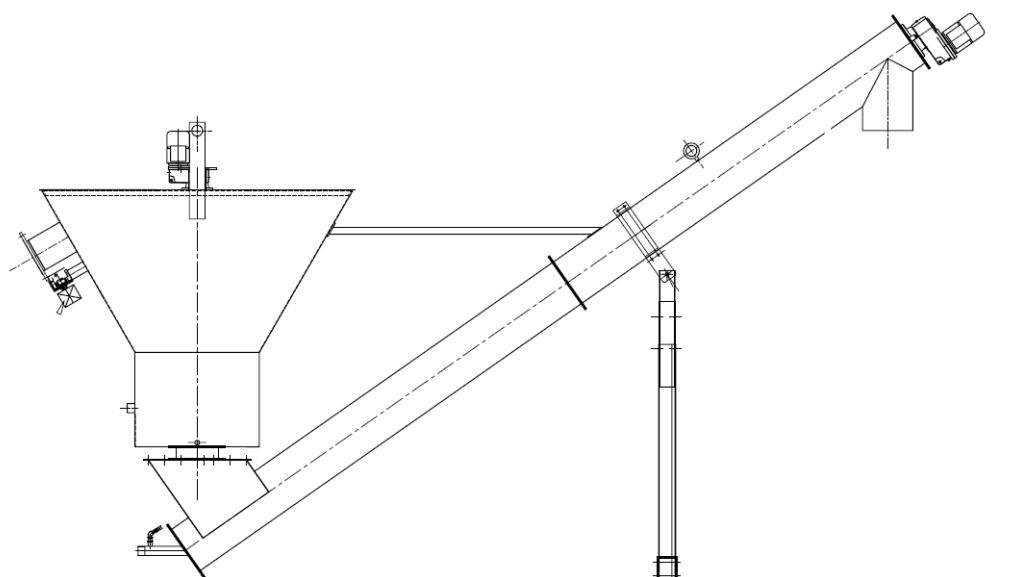


**BILFINGER**

# GRIT WASHER

## ORDER SPECIFICATIONS

(Document 1 of 2)



**CUSTOMER:** MEYJOR INDUSTRIES  
**PROJECT:** WACOL WWTP  
**MODEL TYPE:** GW80 GRIT WASHER  
**SERIAL No's:** 450004300  
**O. A. No.** 3706



This Order Specifications is the support document 2 of 2 for the installation, commissioning and operation of the Grit Washer.

*Revision 1.1*

*The details and drawings in this document were current as at 18 July 2014.*

**NOTICE**

Bilfinger Water Technologies Pty Ltd applies a policy of ongoing development and reserves the right to change product without notice. Bilfinger Water Technologies Pty Ltd does not accept any responsibility for loss or damage incurred as a result of acting or refraining from action based on information in this manual.

Grit Washer is a registered trademark of Bilfinger Water Technologies Pty Ltd.

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## Contents

### Contents

#### 1 Overview of Grit Washer GW80

#### 2 Specifications

##### 2.1 Washer Specifications

##### 2.2 Drive System Specifications

#### 3 Mechanical Drawings

#### 4 Electrical Drawings

#### 5 Process and Instrument Drawings

#### 6 Equipment Data

##### 6.1 Drive Unit

##### 6.2 Pressure Sensor

##### 6.3 Pressure Sensor Controller

##### 6.4 Solenoid valve

#### 7 Spares List

#### 8 Factory Test Certificate

#### 9 Installation and Commissioning Certificate

#### 10 Warranty



## 1 Overview of Grit Washer GW80

The following order specifications document, labelled document 1 of 2, contains all the technical engineering details and associated documentation specific to the Grit Washer model ordered. Data detailing the installation, operation and maintenance of the Grit Washer can be found in the manual labelled document 2 of 2.

Table 1 outlines the main order configurations, custom modifications and optional extras that are present.

*Table 1: Main Order Configurations*

<b>Grit Washer Order Configuration</b>		
O.A. Number	3706	
Model No.	GW80	
Grit Washer Configuration	Grit Washer Unit	
Standard Inclusions	<ul style="list-style-type: none"><li>• Screw Conveyor</li><li>• Screw Conveyor Motor</li><li>• Hopper</li><li>• Agitator</li><li>• Agitator Motor</li></ul>	N/A
Custom Modifications		
<b>Optional Extra</b>	<b>Included</b>	<b>Comments</b>
Bagging unit	NO	



## 2 Specifications

The Grit Washer is designed to wash and dewater extracted sand from screen sewage. Grit slurry flows into a conical hopper fitted with a rotating impeller. The stirring motion induces the grit to sink to the bottom where light organic matters is lifted up to the top and intermittently discharging back to the effluent. The washed grit is drawn intermittently from the hopper by the screw conveyor for discharge into the collection bin.

### 2.1 Washer Specifications

#### Grit Washer Specifications

**Max Flow Rate** 22 L/sec (Slurry)

**Max Capacity of Solids Extracted** ~ 1.1 m<sup>3</sup>/h

#### Extracted

**Total Screw Length** 6121 mm

**Screw Inclination** 35°

**Solids Discharge Height** 2895 mm

**Screw Diameter** 280 mm

**Screw Thickness** 20 mm

**Trough Diameter** 323 mm

**Effluent Inlet** DN150 PN16 AS4087

**Effluent Outlet** DN200 PN16 AS4087

**Est. Hopper Capacity** ~ 1.9 m<sup>3</sup>

**Wash Water** 3 L/sec @ 500kPa

#### Requirements

**Materials** All in SS 316, except spiral in high tensile micro alloy steel.

**Combined Weight of All Components** 1100 kg (Dry)

3500 kg (Wet)

## 2.2 Drive System Specifications

### Grit Washer Drive System Specifications

#### Agitator Motor

<b>Make</b>	NORD
<b>Model</b>	SK 1382NBAFH-71S4
<b>Power</b>	0.25 kW
<b>Voltage</b>	415 Volts
<b>Frequency</b>	50 Hz
<b>Phase</b>	3 ph
<b>Agitator Speed</b>	5.4 RPM
<b>IP Rating</b>	IP56

#### Screw Conveyor Motor

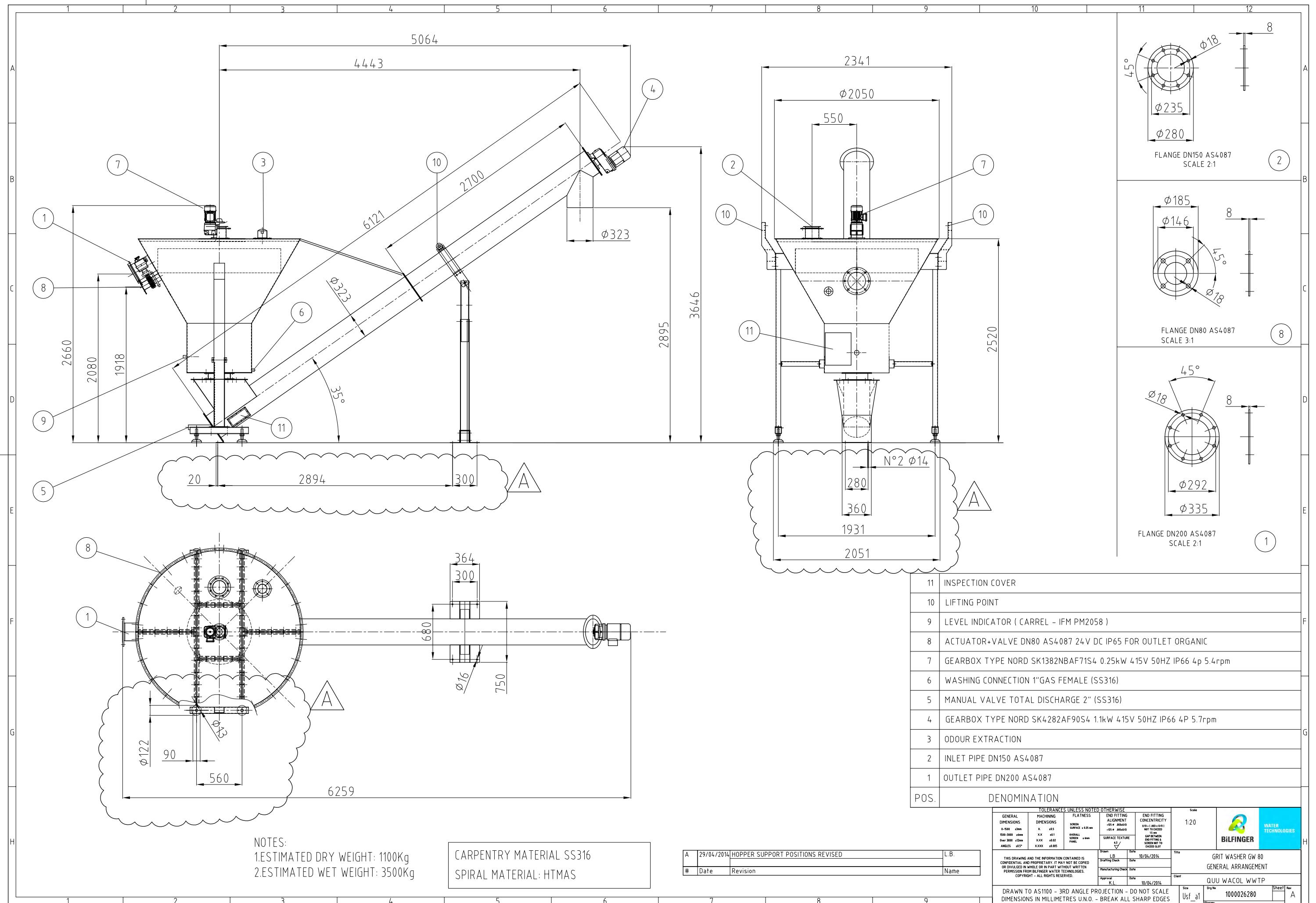
<b>Make</b>	NORD
<b>Model</b>	SK 4282AF-90S4
<b>Power</b>	1.1 kW
<b>Voltage</b>	415 Volts
<b>Frequency</b>	50 Hz
<b>Phase</b>	3 ph
<b>Screw Speed</b>	5.5 RPM
<b>Grit Screw Capacity</b>	1.1 m <sup>3</sup> / h
<b>IP Rating</b>	IP56

### 3 Mechanical Drawings

Table 2 lists the mechanical drawings that can be found in this document.

*Table 2: Mechanical drawing included in this document.*

Title	DWG No.	Revision
GA FOR GRIT WASHER GW80	1000026280	A





## 4 Electrical Drawings

Table 3 lists the electrical drawings that can be found in this document.

*Table 3: Electrical drawings included in this document.*

Title	DWG No.	Issue

**\*Note:** Electrical drawings have not been requested as part of the order.



## 5 Process and Instrument Drawings

Table 4 lists the process and instrument drawings that can be found in this document.

*Table 4: Process and instrument drawings included in this document.*

Title	DWG No.	Issue
PROCESS & INSTRUMENTATION DIAGRAM	1000026279	



## 6 Equipment Data

The following pages contain manufacturer data relevant to this Grit Washer order. Table 5 lists the equipment datasheets that have been referenced in Document 2 and are included in this document.

*Table 5: Lists the equipment data sheets that have been included in this document.*

Section Name/No.	Manufacturer	Component/Item	No. of pages
6.1 Drive Unit	NORD Drives	Operating and Maintenance Instructions for Gear Units and Geared Motors	48
6.2 Pressure Sensor	IFM Electronic	Efector 500 (PM2058)	14
6.3 Pressure Sensor Regulator	CAREL	Pressure sensor regulator	86
6.4 Solenoid valve	BURKERT	Solenoid valve	8

Table 6 lists the contact details for a select number of equipment data manufacturers.

*Table 6: Lists the contact details for selected equipment data manufactures.*

Manufacturer	Contact Details
NORD Drive Systems	NORD Drivesystems 18 Stoney Way Derrimut, VIC 3030 Tel.: 1300 00 NORD
IFM	IFM Efector Unit 5, 3366 Pacific Highway Springwood, QLD 4127 Tel.: 1300 365 088
CAREL	Carel Australia Unit 37, 11-21 Underwood Road Homebush, NSW 2140 Tel.: 02 8762 9200
BURKERT	Burkert Contromatic Australia Unit 1, 88 Brandl Street Eight Mile Plains, QLD 4113 Tel.: 1300 369 233



## **6.1 Drive Unit**



## **6.2 Pressure Sensor**



**Bedienungsanleitung  
Operating instructions  
Notice utilisateurs**

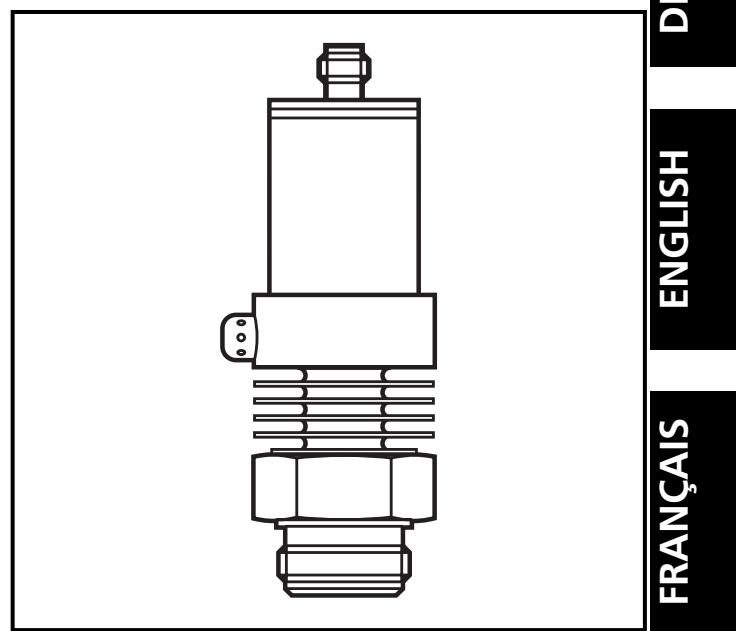
**efector<sup>500</sup>**

**Elektronischer  
Drucksensor  
Electronic pressure  
sensor**

**Capteur de pression  
électronique**

**PM2058**

Sachnr. 701959/00 04/05



**DEUTSCH**

**ENGLISH**

**FRANÇAIS**

# Inhalt

<b>1</b>	<b>Bestimmungsgemäße Verwendung . . . . .</b>	<b>Seite 3</b>
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<b>3</b>	<b>Sensor programmieren / Betrieb mit EPS-Interface . Seite 7</b>	
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	Maßzeichnung . . . . .	Seite 32

## Sicherheitshinweise

Lesen Sie vor der Inbetriebnahme des Gerätes die Produktbeschreibung. Vergewissern Sie sich, daß sich das Produkt uneingeschränkt für die betreffende Applikationen eignet.

Die Mißachtung von Anwendungshinweisen oder technischen Angaben kann zu Sach- und/oder Personenschäden führen.

Prüfen Sie in allen Applikationen die Verträglichkeit der Produktwerkstoffe (s. Technische Daten) mit den zu messenden Druckmedien.

# Bestimmungsgemäße Verwendung

Der Drucksensor erfaßt den Systemdruck und setzt ihn in ein analoges Ausgangssignal um (4 ... 20 mA). Der **Meßbereich ist skalierbar** bis auf 25% der Meßspanne (→ Seite 9, 11).

Weiter wird signalisiert:

- Systemdruck oberhalb des Meßbereichs: Ausgangssignal > 20 mA
- Systemdruck unterhalb des Meßbereichs: Ausgangssignal fällt maximal bis auf 3,2 mA (je nach Skalierung).

## Einsatzbereich

Druckart: Relativdruck

	<b>Meßbereich</b>	<b>Zulässiger Überlastdruck</b>	<b>Berstdruck</b>
mbar	-12,5 ... 250,0	10 000 (10 bar)	30 000 (30 bar)
kPa	-1,25 ... 25,00	1 000 (1 MPa)	3 000 (3 MPa)
inH <sub>2</sub> O	-5,0 ... 100,4	4 000	12 000
mmWS	-125 ... 2 550	102 000	306 000



Vermeiden Sie statische und dynamische Überdrücke, die den angegebenen Überlastdruck überschreiten.

Schon bei kurzzeitiger Überschreitung des Berstdrucks kann das Gerät zerstört werden (Verletzungsgefahr)!

Das Gerät wird **betriebsfertig** ausgeliefert.

Werkseinstellung: nicht skaliert (ASP = 0 mbar; AEP = 250 mbar).

DEUTSCH

## 2 Verwendung im Auslieferungszustand

### Montage

Stellen Sie vor Ein- und Ausbau des Sensors sicher, daß die Anlage druckfrei ist.

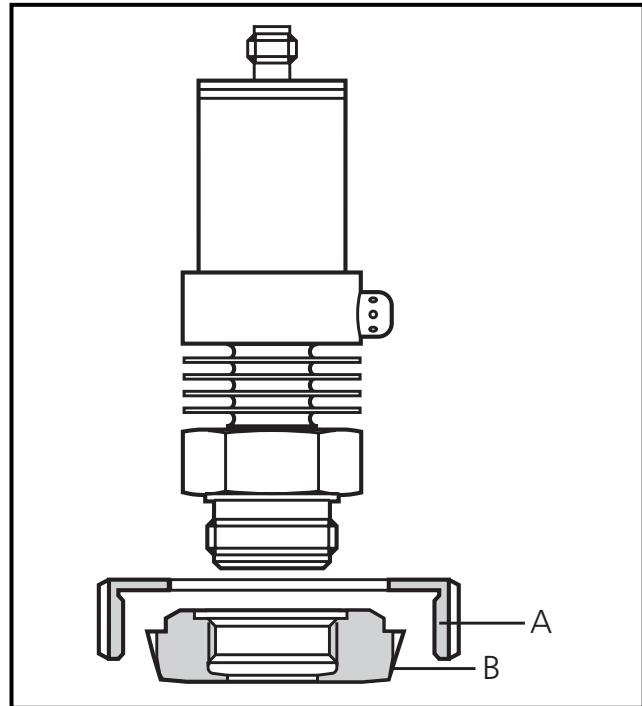
Durch Aseptoflex-Adapter ist der Sensor adaptierbar an unterschiedliche Prozeßanschlüsse.

(Adapter sind gesondert als Zubehör zu bestellen).

Montieren Sie zuerst den Adapter (B) an den Sensor, dann Sensor + Adapter mit Hilfe einer Überwurfmutter, eines Klemmflanschs o. ä. (A) an den Prozeßanschluß.

Falls das Befestigungselement (A) nicht von oben über den Sensor geschoben werden kann: schieben Sie es vor Montage des Adapters von unten auf den Sensor.

**ACHTUNG:** Eine Garantie für langzeitstabile und somit wartungsfreie, spaltfreie, hygienegerechte Dichtwirkung der metallischen Abdichtung (Aseptoflex-Verbindung) besteht nur für einmalige Montage.



### Montage des Aseptoflex-

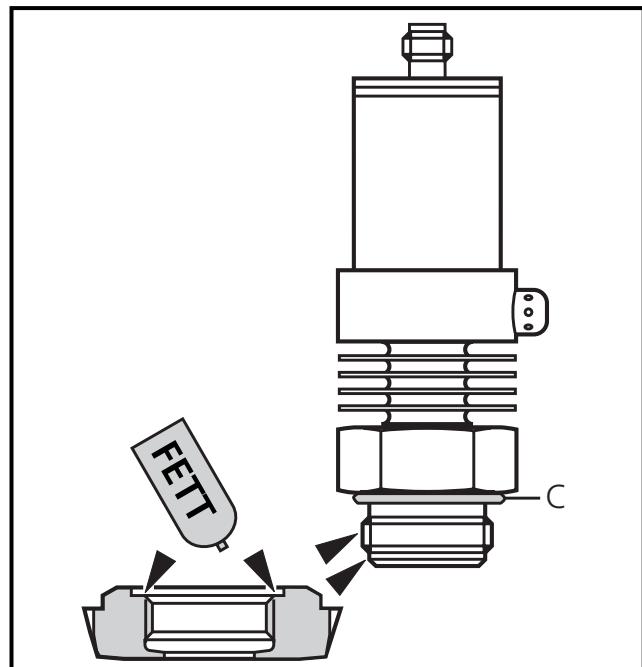
### Adapters

#### Schritt 1

Fetten Sie Gewinde und Dichtflächen von Sensor und Adapter mit der beiliegenden Schmierpaste ein.

Die Schmierpaste ist lebensmittelzugelassen (USDA-H1 84-201).

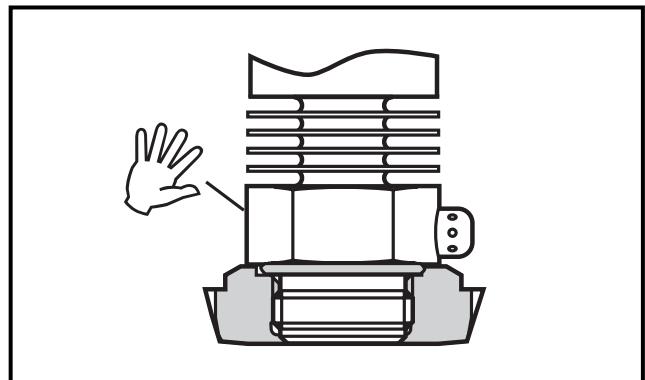
Achten Sie darauf, daß sich der O-Ring (C) an seinem Platz befindet.



## Verwendung im Auslieferungszustand

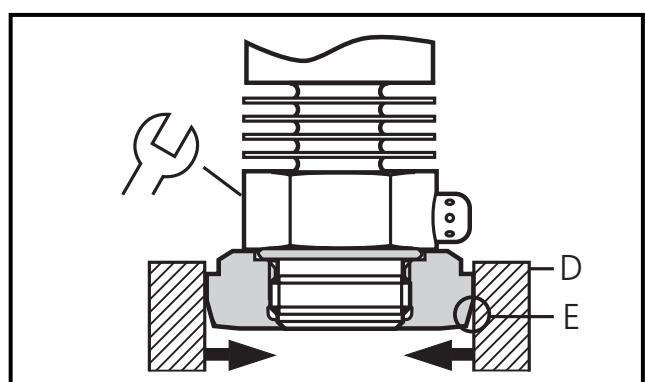
### Schritt 2

Schrauben Sie den Sensor in den Adapter ein. Vermeiden Sie dabei mechanische Einwirkungen auf die Dichtflächen.



### Schritt 3

Spannen Sie Sensor + Adapter in eine Klemmvorrichtung (D). Die Dichtflächen (E) dürfen dabei nicht beschädigt werden. Ziehen Sie den Sensor mit einem Schraubenschlüssel an, bis der Anschlag spürbar ist.



**Achtung:** Weiterdrehen kann die Dichtwirkung beeinträchtigen.

## Elektrischer Anschluß

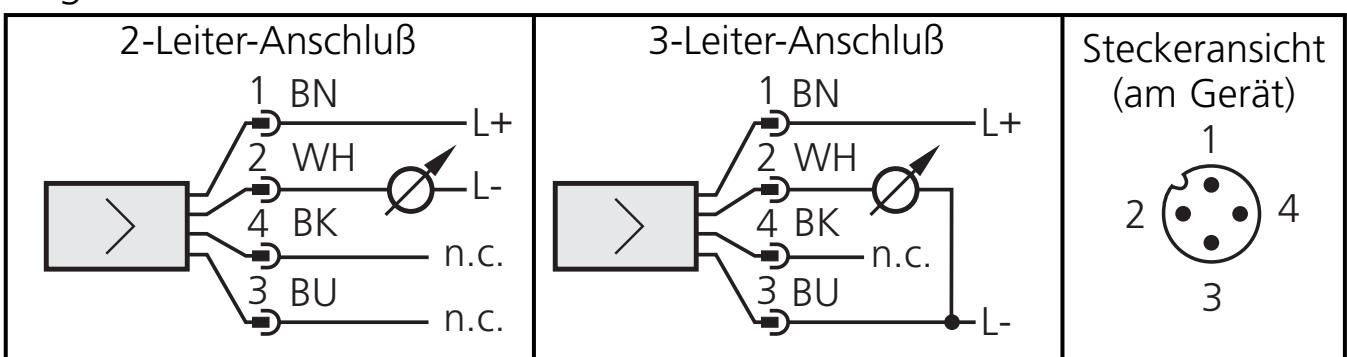


Das Gerät darf nur von einer Elektrofachkraft installiert werden.  
Befolgen Sie die nationalen und internationalen Vorschriften zur Errichtung elektrotechnischer Anlagen.

DEUTSCH

Spannungsversorgung nach EN50178, SELV, PELV.

Schalten Sie die Anlage spannungsfrei und schließen Sie das Gerät folgendermaßen an:



Adernfarben bei ifm-Kabeldosen: 1 = BN (braun), 2 = WH (weiß),  
3 = BU (blau), 4 = BK (schwarz); n.c. = nicht belegt.

## 2 Verwendung im Auslieferungszustand

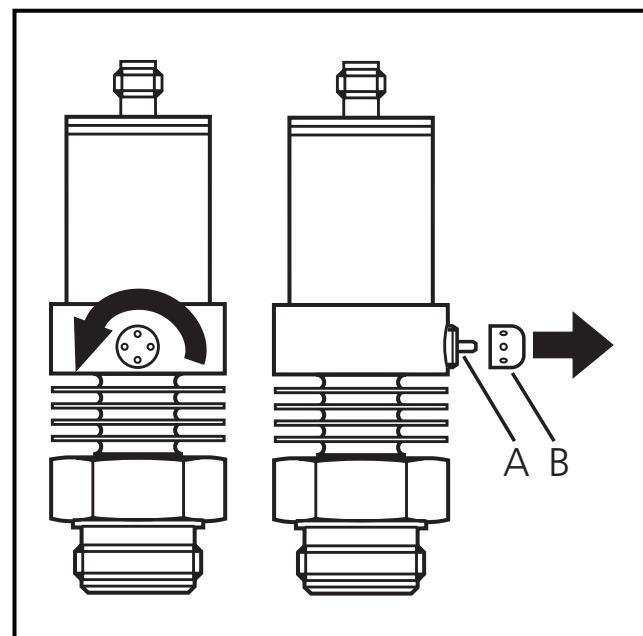
### Inbetriebnahme / Betrieb / Wartung

Prüfen Sie nach Montage, elektrischem Anschluß und Programmierung, ob das Gerät sicher funktioniert.

### Reinigen der Filterabdeckung

Sollten zähflüssige und rückstandsbildende Medien die Filterabdeckung des Sensors zusetzen (und damit die Meßgenauigkeit geringfügig beeinträchtigen), können Sie die Abdeckung reinigen.

Schrauben Sie die Filterabdeckung (B) ab (benutzen Sie dazu eine Zange mit kunststoffgeschützten Backen). Reinigen Sie die Kappe gründlich.

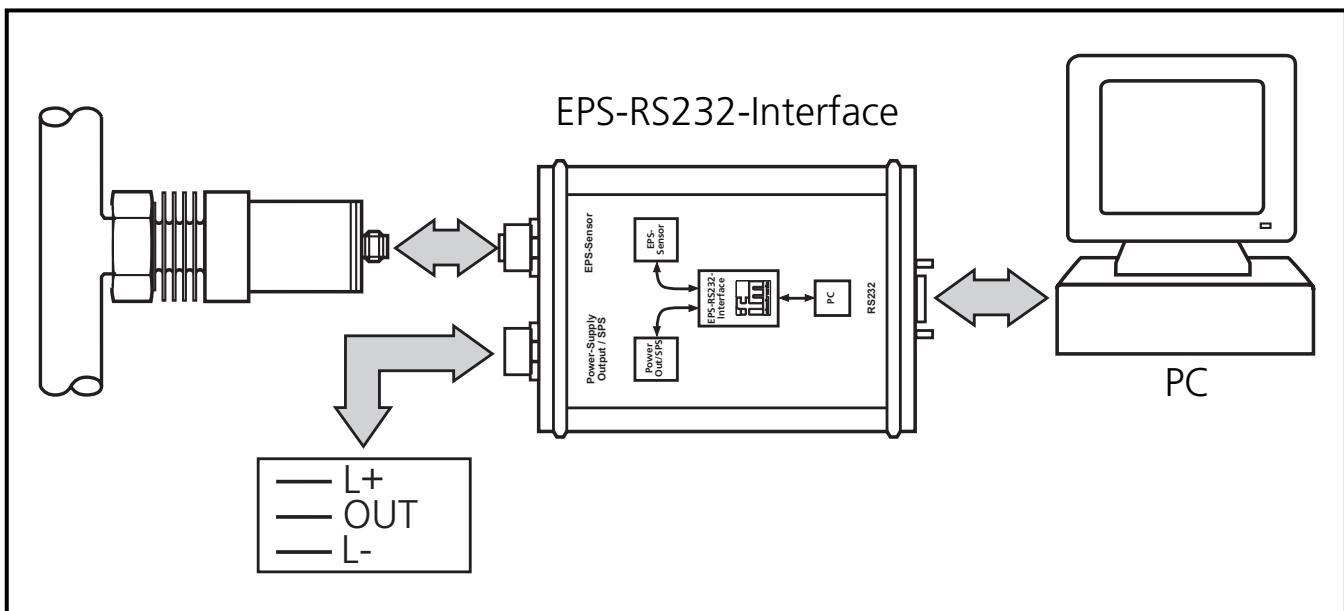


Der Stutzen (A) sollte nur von fachkundigem Personal und mit großer Sorgfalt gereinigt werden.

**⚠** Etwaige Mediumsrückstände dürfen nicht verdichtet und in den Stutzen gepreßt werden. Sie könnten das Filtersystem verstopfen und die Meßgenauigkeit des Sensors beeinträchtigen. Schrauben Sie die Filterabdeckung wieder fest auf.

Der Sensor ist ausreichend gegen rauhe Umgebungsbedingungen geschützt (Schutzart IP 67). Sie können die Schutzart durch spezielles Zubehör erhöhen (Bestell-Nr. E30043).

## Sensor programmieren / Betrieb mit EPS-Interface



Verbinden Sie den Sensor über das **EPS-RS232-Interface** (Bestell-Nr. E30066) mit einem PC.

- Der Sensor wird vom Interface mit Betriebsspannung versorgt,
- und überträgt über das Interface kontinuierlich seine Daten (Meßwerte, Analogsignal und Parameter-Einstellungen).

Es bieten sich damit folgende Möglichkeiten:

- **Fernanzeige**

Anzeige des aktuellen Systemdrucks durch PC oder eine Anzeigeeinrichtung.

- **Fernauswertung**

Ausgabe des aktuellen Analogwerts.

- **Fernprogrammierung**

Skalieren des Meßbereichs, Dämpfen des Analogsignals; Kalibrieren des Sensors.

Parameter können eingestellt werden vor Einbau und Inbetriebnahme des Sensors oder während des laufenden Betriebs.



Ändern Sie Parameter während des Betriebs, wird die Funktionsweise der Anlage beeinflußt. Stellen Sie sicher, daß es nicht zu Fehlfunktionen in der Anlage kommt.

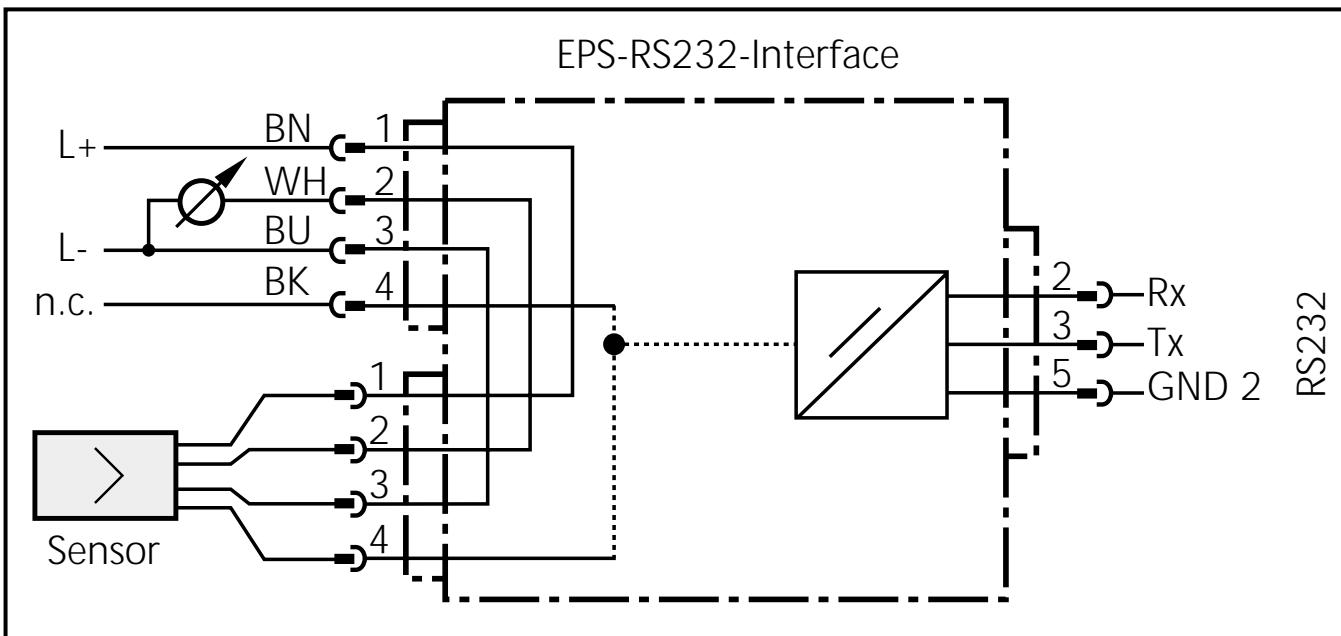
DEUTSCH

### 3 Sensor programmieren / Betrieb mit EPS-Interface

#### Elektrischer Anschluß von Sensor und EPS-RS232-Interface

Wenn Sie Sensor und Interface außerhalb der Anlage betreiben: Verwenden Sie zur Spannungsversorgung ein geeignetes Netzgerät (z. B. 24 V Power Supply, Bestell-Nr. E30080).

-  Wenn Sie das Interface in der laufenden Anlage verwenden:  
Schalten Sie die Anlage spannungsfrei bevor Sie das Gerät anschließen.  
Lösen Sie Steckverbindungen nicht, wenn sie unter Spannung stehen.



Adernfarben bei ifm-Kabeldosen:

1 = BN (braun), 2 = WH (weiß), 3 = BU (blau), 4 = BK (schwarz)

n.c. = nicht belegt

#### Programmieren

Zum Programmieren des Sensors nutzen Sie bitte das FDT-Service-Programm **ifm-container** (Bestell-Nr. E30110).

EPS-RS232-Interface, das Service-Programm ifm-container, Netzteil und Verbindungskabel sind als Set erhältlich (Bestell-Nr. ZZ0050).

# Technik-Information / Parameter / Funktionsweise

## Einstellbare Parameter

<b>ASP</b>	<b>Analogstartpunkt</b> Meßwert, bei dem 4mA ausgegeben werden.																				
<b>AEP</b>	<b>Analogendpunkt</b> Meßwert, bei dem 20mA ausgegeben werden. Mindestabstand zwischen ASP und AEP = 25% der Meßspanne.																				
	<b>Einstellbereiche:</b>																				
	<table border="1"> <thead> <tr> <th></th> <th>ASP</th> <th>AEP</th> <th>in Schritten von</th> </tr> </thead> <tbody> <tr> <td>mbar</td> <td>-12,5 ... 100,0</td> <td>50,0 ... 250,0</td> <td>0,5</td> </tr> <tr> <td>kPa</td> <td>-1,25 ... 10,00</td> <td>5,00 ... 25,00</td> <td>0,05</td> </tr> <tr> <td>inH<sub>2</sub>O</td> <td>-5,0 ... 40,2</td> <td>20,2 ... 100,4</td> <td>0,2</td> </tr> <tr> <td>mmWS</td> <td>-125 ... 1020</td> <td>515 ... 2550</td> <td>5</td> </tr> </tbody> </table>		ASP	AEP	in Schritten von	mbar	-12,5 ... 100,0	50,0 ... 250,0	0,5	kPa	-1,25 ... 10,00	5,00 ... 25,00	0,05	inH <sub>2</sub> O	-5,0 ... 40,2	20,2 ... 100,4	0,2	mmWS	-125 ... 1020	515 ... 2550	5
	ASP	AEP	in Schritten von																		
mbar	-12,5 ... 100,0	50,0 ... 250,0	0,5																		
kPa	-1,25 ... 10,00	5,00 ... 25,00	0,05																		
inH <sub>2</sub> O	-5,0 ... 40,2	20,2 ... 100,4	0,2																		
mmWS	-125 ... 1020	515 ... 2550	5																		
<b>HI</b>	<b>Min-Max-Speicher für Systemdruck</b>																				
<b>LO</b>	<ul style="list-style-type: none"> <li>• HI: Anzeige des höchsten gemessenen Drucks.</li> <li>• LO: Anzeige des niedrigsten gemessenen Drucks.</li> </ul>																				
<b>COF</b>	<b>Nullpunkt-Kalibrierung (Calibration offset)</b> Der interne Meßwert (Arbeitswert des Sensors) wird gegenüber dem realen Meßwert verschoben. <ul style="list-style-type: none"> <li>• Einstellbereich: -5 ... +5% der Meßspanne (bei Skalierung im Auslieferungszustand:(ASP = 0 mbar und AEP = 250 mbar),</li> <li>• in Schritten von 0,1% der Meßspanne.</li> </ul>																				
<b>Car</b>	<b>Zurücksetzen der Kalibrierdaten (Calibration reset)</b> Setzt die mit <b>COF</b> eingestellte Kalibrierung zurück.																				
<b>dAA</b>	<b>Dämpfung für den Analogausgang</b> Mit dieser Funktion lassen sich Druckspitzen von kurzer Dauer oder hoher Frequenz ausfiltern. dAA-Wert = Ansprechzeit zwischen Druckänderung und Änderung des Ausgangssignals in Millisekunden (ms). <ul style="list-style-type: none"> <li>• Einstellbereich: 0 (= dAA ist nicht aktiv) / 0,1 s / 0,5 s / 2 s.</li> </ul>																				
<b>Uni</b>	<b>Anzeigeeinheit</b> Meßwert und Werte für ASP / AEP können in folgenden Einheiten angezeigt werden: <b>mbar, kPA, inH<sub>2</sub>O, mmWS</b> . Stellen Sie die Anzeigeeinheit ein, <b>bevor</b> Sie die Grenzen für die Analogwerte (ASP, AEP) einstellen. Dadurch vermeiden Sie Rundungsfehler bei der internen Umrechnung auf andere Einheiten und erhalten exakt die gewünschten Werte.																				

## 4

**Technik-Information / Parameter / Funktionsweise****Einstellbare Parameter (Fortsetzung)****diS****Einstellung der Anzeige**

**d1 / d2 / d3** = Meßwertaktualisierung alle 50ms / 200ms / 600ms. Die Meßwertaktualisierung betrifft nur die Anzeige.

**Ph** = kurzzeitig festgehaltene Anzeige des Spitzen-Meßwerts (peak hold).

**rotated** = Anzeige um 180° gedreht.

**OFF** = Die Meßwertanzeige ist im Run-Modus ausgeschaltet.

**Technische Daten**

Betriebsspannung [V] . . . . .	14 ... 30 DC
Betriebsspannung für EPS-RS232-Interface mit Sensor [V] . . . . .	15,5 ... 30 DC
Analogausgang . . . . .	4 ... 20 mA Meßbereich skalierbar (Turn down:1:4 der Meßspanne)
Max. Bürde [ $\Omega$ ]: . . . . .	( $U_B - 13$ ) x 50; 550 bei $U_B = 24V$
Anstiegszeit (bei Dämpfung dAA = 0) [ms] . . . . .	3
Genauigkeit / Abweichungen (in% der Spanne) <sup>1)</sup>	
- Kennlinienabweichung (Linearität, einschließlich Hysterese und Wiederholgenauigkeit) <sup>2)</sup> . . . . .	< $\pm 0,6$
- Linearität . . . . .	< $\pm 0,5$
- Hysterese . . . . .	< $\pm 0,1$
- Wiederholgenauigkeit (bei Temperaturschwankungen < 10K) . . . . .	< $\pm 0,1$
- Langzeitstabilität (in% der Spanne pro Jahr) . . . . .	< $\pm 0,1$
- Temperaturkoeffizienten (TK) im kompensierten Temperaturbereich 0 ... 80°C (in % der Spanne pro 10 K)	
- Größter TK des Nullpunkts . . . . .	< $\pm 0,1$
- Größter TK der Spanne . . . . .	< $\pm 0,4$
Umgebungstemperatur [°C] . . . . .	-25 ... +80
Mediumtemperatur [°C] . . . . .	-25 ... +125 (+145 max. 1h)
Schutzart, Schutzklasse . . . . .	IP 67 III
Isolationswiderstand [ $M\Omega$ ] . . . . .	> 100 (500 V DC)
Schockfestigkeit [g] . . . . .	50 (DIN / IEC 68-2-27, 11ms)
Vibrationsfestigkeit [g] . . . . .	20 (DIN / IEC 68-2-6, 10 - 2000 Hz)
Gehäusewerkstoffe . . . . .	PEI; PBTP (Pocan); V4A (1.4404); FPM (Viton)
Werkstoffe in Kontakt mit Medium . . . . .	V4A (1.4404); Keramik (99,9 % Al <sub>2</sub> O <sub>3</sub> ); PTFE

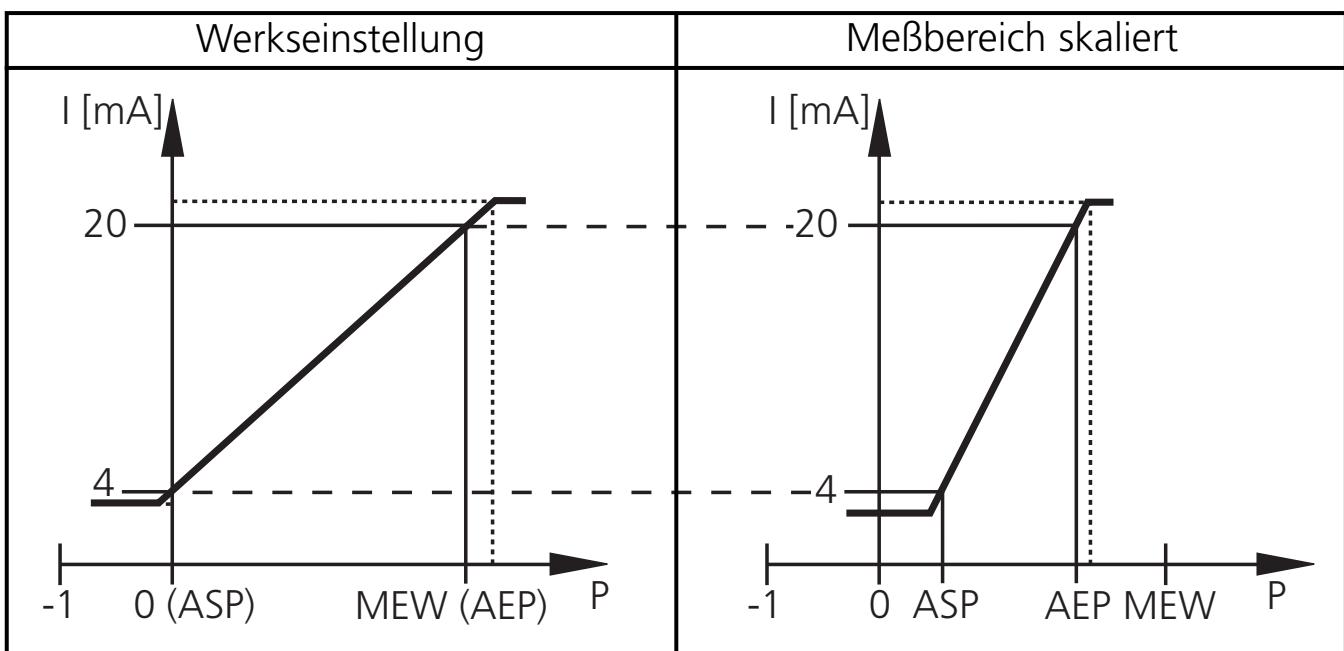
<sup>1)</sup> alle Angaben bezogen auf Turn down von 1:1

<sup>2)</sup> Grenzpunkteinstellung nach DIN 16086

## Technik-Information / Parameter / Funktionsweise

### Skalieren des Meßbereichs

- Mit dem Parameter Analogstartpunkt (**ASP**) legen Sie fest, bei welchem Meßwert das Ausgangssignal 4 mA beträgt.
- Mit dem Parameter Analogendpunkt (**AEP**) legen Sie fest, bei welchem Meßwert das Ausgangssignal 20 mA beträgt.
- Mindestabstand zwischen ASP und AEP = 25% der Meßspanne (Skalierfaktor 4).



MEW = Meßbereichsendwert

Im eingestellten Meßbereich liegt das Ausgangssignal zwischen 4 und 20 mA.

Weiter wird angezeigt:

- Systemdruck oberhalb des Meßbereichs: Ausgangssignal > 20 mA
- Systemdruck unterhalb des Meßbereichs: Ausgangssignal fällt maximal bis auf 3,2 mA (je nach Skalierung).

DEUTSCH

## Contents

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<b>3</b>	<b>Programming / Use with EPS interface</b>	<b>page 17</b>
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### Safety instructions

**Read the product description before installing the unit. Ensure that the product is suitable for your application without any restrictions.**

**Non-adherence to the operating instructions or technical data can lead to personal injury and/or damage to property.**

**In all applications check compliance of the product materials (see Technical data) with the media to be measured.**

## Function and features

The pressure sensor detects the system pressure and converts it into an analogue output signal (4 ... 20 mA). The measuring range can be scaled to up to 25% of the value of the span (→ page 19, 21).

It is also indicated:

- System pressure above the measuring range: output signal > 20 mA.
- System pressure below the measuring range: output signal drops to max. 3.2 mA (depending on the scaling).

## Applications

Type of pressure: relative pressure

	<b>Measuring range</b>	<b>Permissible overl. pressure</b>	<b>Bursting pressure</b>
mbar	-12.5 ... 250.0	10 000 (10 bar)	30 000 (30 bar)
kPa	-1.25 ... 25.00	1 000 (1 MPa)	3 000 (3 MPa)
inH <sub>2</sub> O	-5.0 ... 100.4	4 000	12 000
mmWS	-125 ... 2 550	102 000	306 000



Avoid static and dynamic overpressure exceeding the given overload pressure.

Even if the bursting pressure is exceeded only for a short time the unit can be destroyed (danger of injuries)!

The unit is **ready for operation** when delivered.

Factory preset: not scaled (ASP = 0 mbar; AEP = 250 mbar).

## 2 Use with factory setting

### Installation

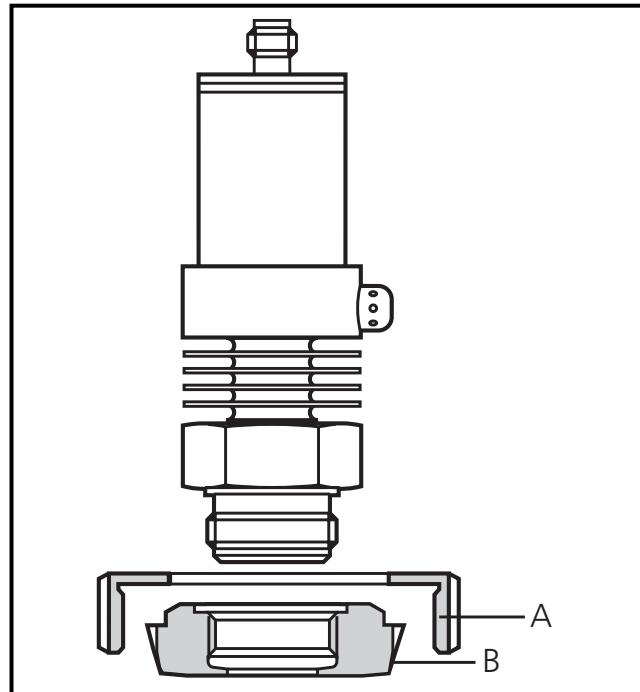
Before mounting and removing the sensor, make sure that no pressure is applied to the system.

The unit is adaptable for various process fittings by Aseptoflex adapters (to be ordered separately as accessories).

Mount adapter (B) to the sensor first, then sensor + adapter to the process connection by means of a nut, a clamping flange or similar (A).

If it is not possible to slide the fixing element (A) down over the top of the sensor: slide it up over the bottom of the sensor before the adapter is mounted.

**NOTE:** A guarantee for a long-term stable and maintenance-free fitting, with no bug traps in the hygienic sealing of the metal seal (Aseptoflex connection) is only valid for once-only mounting.



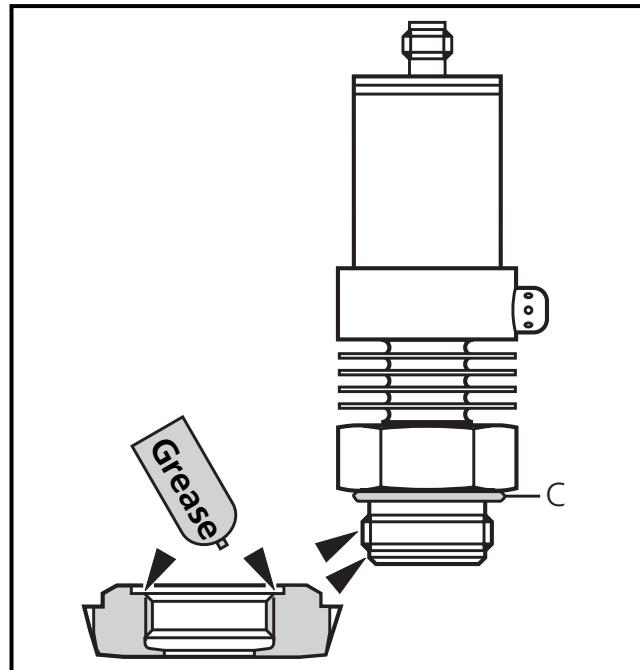
### Mounting of the Aseptoflex adapter

#### Step 1

Grease thread and sealing chamber of the sensor and of the adapter with the greasing paste supplied.

The greasing paste is food-grade (USDA-H1 84-201).

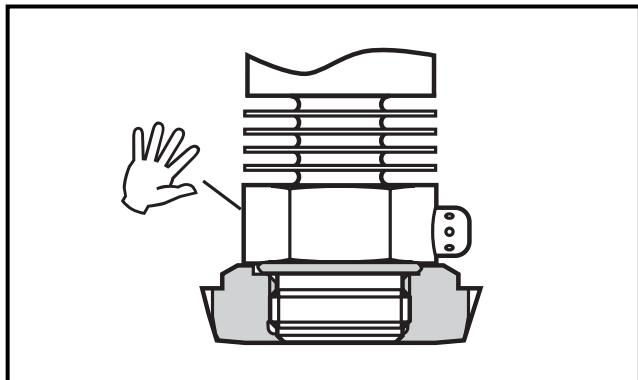
Make sure that the O-ring (C) is correctly positioned.



## Use with factory setting

### Step 2

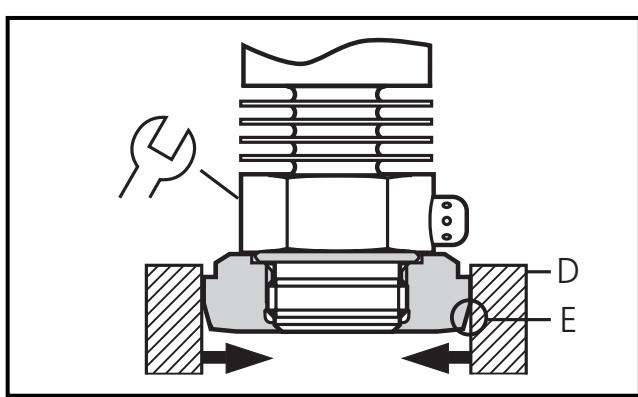
Screw the sensor into the adapter. Avoid mechanical influence on the sealing chamfers.



### Step 3

Clamp sensor and adapter into a clamping device (D). The sealing chamfers (E) must not be damaged. Tighten the sensor with a spanner until you can feel the end stop.

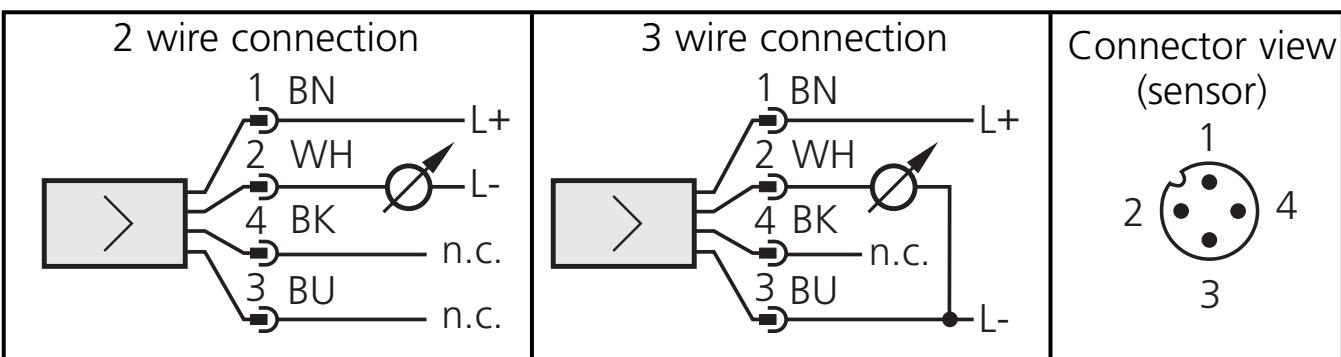
**Note:** If you continue to turn, this can have adverse effect on the sealing.



## Electrical connection

-  The unit must be connected by a suitably qualified electrician.
- The national and international regulations for the installation of electrical equipment must be observed.
- Voltage supply to EN50178, SELV, PELV.

Disconnect power before connecting the unit as follows:



ENGLISH

Core colours of ifm sockets:

1 = BN (brown), 2 = WH (white), 3 = BU (blue), 4 = BK (black);

n.c. = not connected.

## 2 Use with factory setting

### Installation and set-up / operation / maintenance

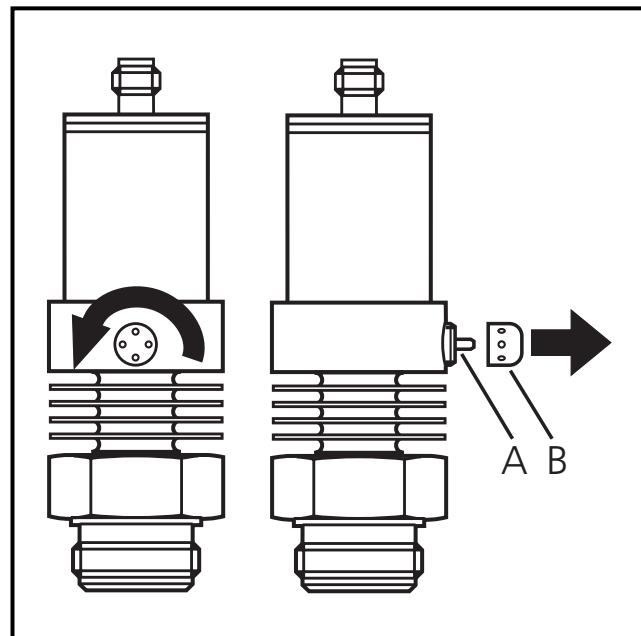
After mounting, wiring and setting check whether the unit operates correctly.

### Cleaning of the filter cover

If viscous and residues producing media clog the filter cover of the sensor (and thus reduce the measuring accuracy slightly), you can clean it.

Unscrew the filter cover (B) (use a pair of pliers with plastic-covered jaws for this). Clean the cover thoroughly.

The vent (A) should only be cleaned by skilled personnel and with utmost care.

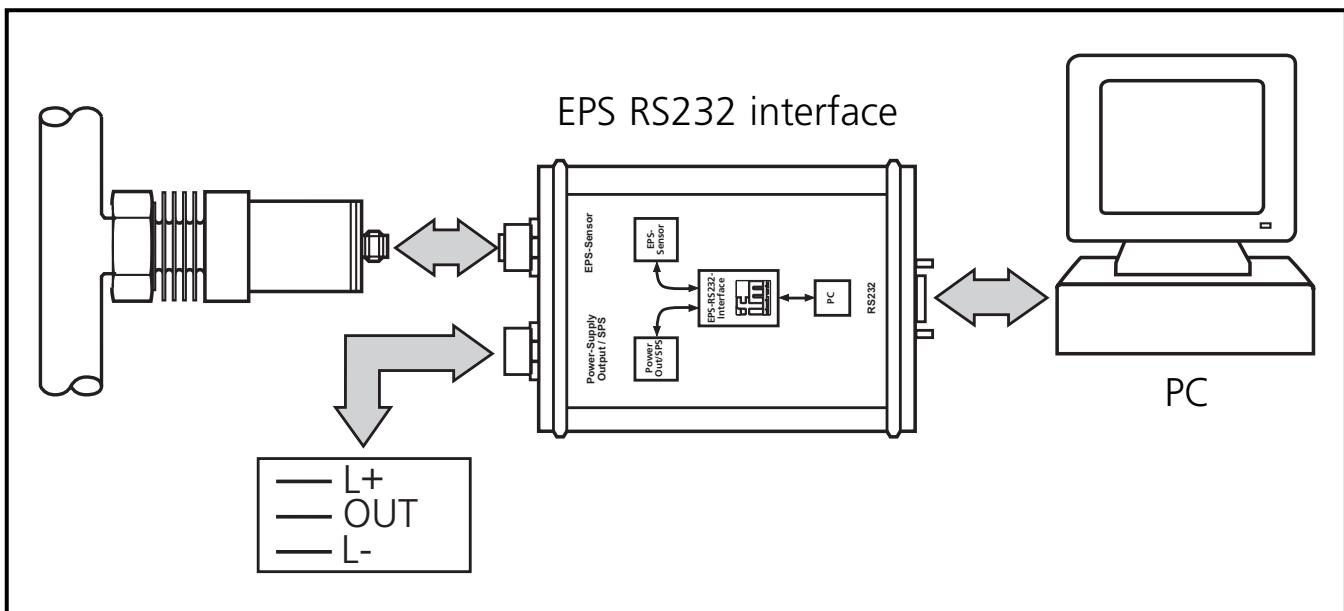


**!** Possible medium residues must not be compressed and pressed into the vent. This could clog the filter system and reduce the measuring accuracy of the sensor.

Screw the filter cover again tightly.

The sensor is sufficiently protected against harsh ambient conditions (protection IP 67). The protection rating can be increased by a special accessory (order no. E30043).

## Programming / Use with EPS RS232 interface



Connect the sensor to a PC via the EPS-RS232 interface (order no. E30066).

- The sensor is supplied with operating voltage by the interface,
- and transmits its data (measured values, analogue signal and parameter settings) continuously via the interface.

It provides the following options:

- **Remote display**

Indication of the current system pressure by PC or display.

- **Remote evaluation**

Output of the current analog value.

- **Programming / remote programming of the sensor**

Scaling the measuring range, damping for the analog output, calibration of the sensor.

Parameters can be set before the sensor is mounted and set up or during operation.



If you change the parameters during operation, the functioning of the plant will be affected. Ensure that plant malfunction is prevented.

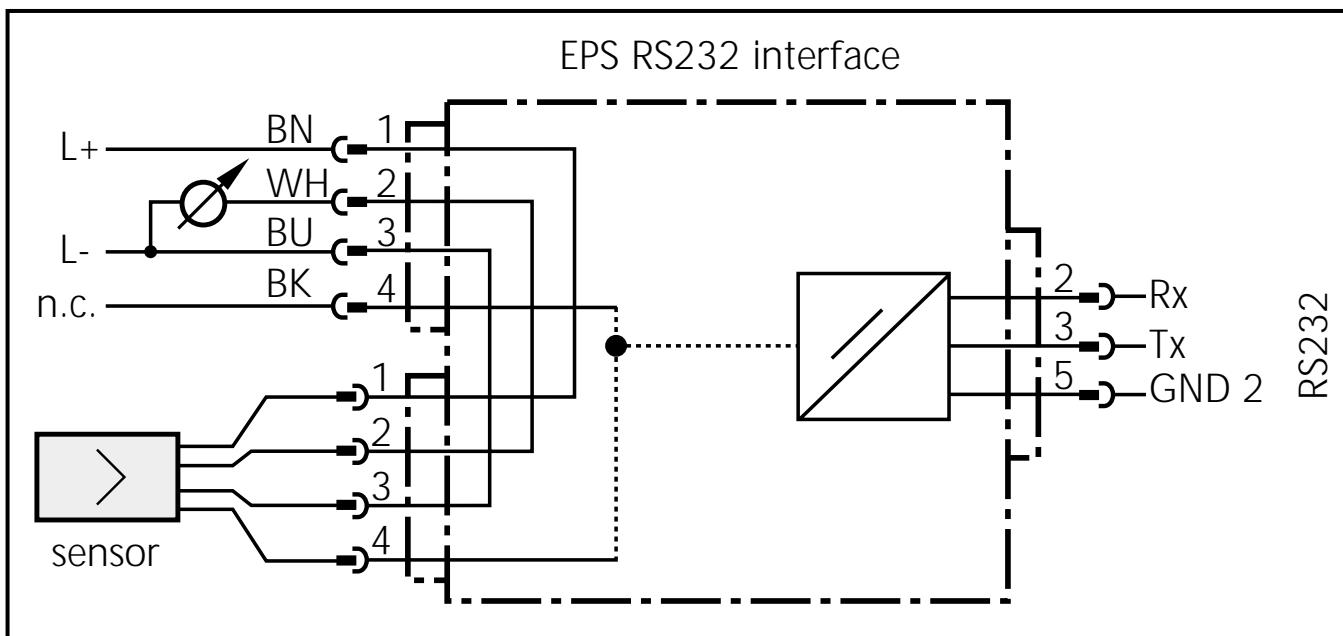
**ENGLISH**

### 3 Programming / Use with EPS RS232 interface

#### Wiring of sensor and EPS interface

For use of the sensor with EPS interface prior to installation of the sensor: Use a suitable power supply (24 V power supply; ifm order no. E30080).

-  For mobile use of the interface after installation of the sensor:  
Disconnect power before connecting the unit.  
Do not disconnect these connections while live.



Core colours of ifm sockets:

1 = BN (brown), 2 = WH (white), 3 = BU (blue), 4 = BK (black).

n.c. = not connected

#### Programming

For programming of the sensor please use the FDT service program **ifm container** (order no. E30110).

EPS RS-232 interface, FDT service program, power supply and connection cable available as a set (order no. ZZ0050).

# Technical information / Functioning / Parameters

## Adjustable parameters

<b>ASP</b>	<b>Analogue start point</b> Measured value at which 4mA is provided.																				
<b>AEP</b>	<b>Analogue end point</b> Measured value at which 20mA is provided. Minimum distance between ASP and AEP = 25% of the span.																				
	<b>Setting range:</b>																				
	<table border="1"> <thead> <tr> <th></th> <th>ASP</th> <th>AEP</th> <th>in steps of</th> </tr> </thead> <tbody> <tr> <td>mbar</td> <td>-12.5 ... 100.0</td> <td>50.0 ... 250.0</td> <td>0.5</td> </tr> <tr> <td>kPa</td> <td>-1.25 ... 10.00</td> <td>5.00 ... 25.00</td> <td>0.05</td> </tr> <tr> <td>inH<sub>2</sub>O</td> <td>-5.0 ... 40.2</td> <td>20.2 ... 100.4</td> <td>0.2</td> </tr> <tr> <td>mmWS</td> <td>-125 ... 1020</td> <td>515 ... 2550</td> <td>5</td> </tr> </tbody> </table>		ASP	AEP	in steps of	mbar	-12.5 ... 100.0	50.0 ... 250.0	0.5	kPa	-1.25 ... 10.00	5.00 ... 25.00	0.05	inH <sub>2</sub> O	-5.0 ... 40.2	20.2 ... 100.4	0.2	mmWS	-125 ... 1020	515 ... 2550	5
	ASP	AEP	in steps of																		
mbar	-12.5 ... 100.0	50.0 ... 250.0	0.5																		
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inH <sub>2</sub> O	-5.0 ... 40.2	20.2 ... 100.4	0.2																		
mmWS	-125 ... 1020	515 ... 2550	5																		
<b>HI</b>	<b>Min-Max memory for system pressure</b>																				
<b>LO</b>	<ul style="list-style-type: none"> <li>• HI: displays the highest measured pressure.</li> <li>• LO: displays the lowest measured pressure.</li> </ul>																				
<b>COF</b>	<b>Calibration offset</b> The internal measured value (operating value of the sensor) is offset against the real measured value. <ul style="list-style-type: none"> <li>• Setting range: -5 ... +5% of the value of the span (with scaling as factory setting (ASP = 0 mbar and AEP = 250mbar),</li> <li>• in steps of 0.1% of the value of the span.</li> </ul>																				
<b>Car</b>	<b>Calibration reset</b> Resets the calibration set by COF.																				
<b>dAA</b>	<b>Damping for the analog output</b> Pressure peaks of short duration or high frequency can be filtered out. dAA-value = response time between pressure change and change of the switching status in milliseconds (ms). <ul style="list-style-type: none"> <li>• setting range: 0 (= dAA is not active) / 0.1s / 0.5s / 2s.</li> </ul>																				
<b>Uni</b>	<b>Display unit</b> The measured values and values for ASP / AEP can be indicated in the following units: <b>mbar, kPa, inH<sub>2</sub>O, mmWS</b> . Select the <b>display unit before setting the</b> limits for the analog output signal (ASP, AEP). This avoids rounding errors generated internally during the conversion of the units and enables exact setting of the limits for the analog output signal.																				

ENGLISH

## 4

# Technical information / Functioning / Parameters

## Adjustable parameters (continuation)

diS

### Setting of the display

**d1 / d2 / d3** = update of the measured value every 50 ms / 200 ms / 600 ms. The update interval only refers to the display.

**ph** = display of the measured peak value remains for a short time (peak hold); **rotated** = display rotated 180°.

**OFF** = in the Run mode the display of the measured value is deactivated.

## Technical data

Operating voltage [V] . . . . .	14 ... 30 DC
Operating voltage for EPS interface with sensor [V] . . . . .	15.5 ... 30 DC
Analogue output . . . . .	4 ... 20 mA
	Measuring range scaleable (turn down 1:4 of the span)
Max. load [ $\Omega$ ]: . . . . .	( $U_B$ - 13) x 50; 550 at $U_B$ = 24V
Rise time (with damping dAA = 0) [ms] . . . . .	3
Accuracy / deviations (in% of the span) <sup>1)</sup>	
- Characteristics deviation (linearity, incl. hysteresis and repeatability <sup>2)</sup> . . . . .	< $\pm$ 0.6
- linearity . . . . .	< $\pm$ 0.5
- hysteresis . . . . .	< $\pm$ 0.1
- repeatability (with temperature fluctuations < 10K) . . . . .	< $\pm$ 0.1
- Long-time stability (in% of the span per year) . . . . .	< $\pm$ 0.1
- Temperature coefficients (TEMPCO) in the compensated temperature range 0 ... +80°C (in% of the span per 10 K)	
- greatest TEMPCO of the zero point . . . . .	< $\pm$ 0.1
- greatest TEMPCO of the span . . . . .	< $\pm$ 0.4
Operating temperature [°C] . . . . .	-25 ... +80
Medium temperature [°C] . . . . .	-25 ... +125 (+145 max. 1h)
Protection . . . . .	IP 67 III
Insulation resistance [ $M\Omega$ ] . . . . .	> 100 (500 V DC)
Shock resistance [g] . . . . .	50 (DIN / IEC 68-2-27, 11ms)
Vibration resistance [g] . . . . .	20 (DIN / IEC 68-2-6, 10 - 2000 Hz)
Housing material . . . . .	stainless steel (316S12); PEI; PBTP; FPM (Viton)
Materials (wetted parts) . . . . .	stainless steel (316S12); ceramics (99.9 % Al <sub>2</sub> O <sub>3</sub> ); PTFE

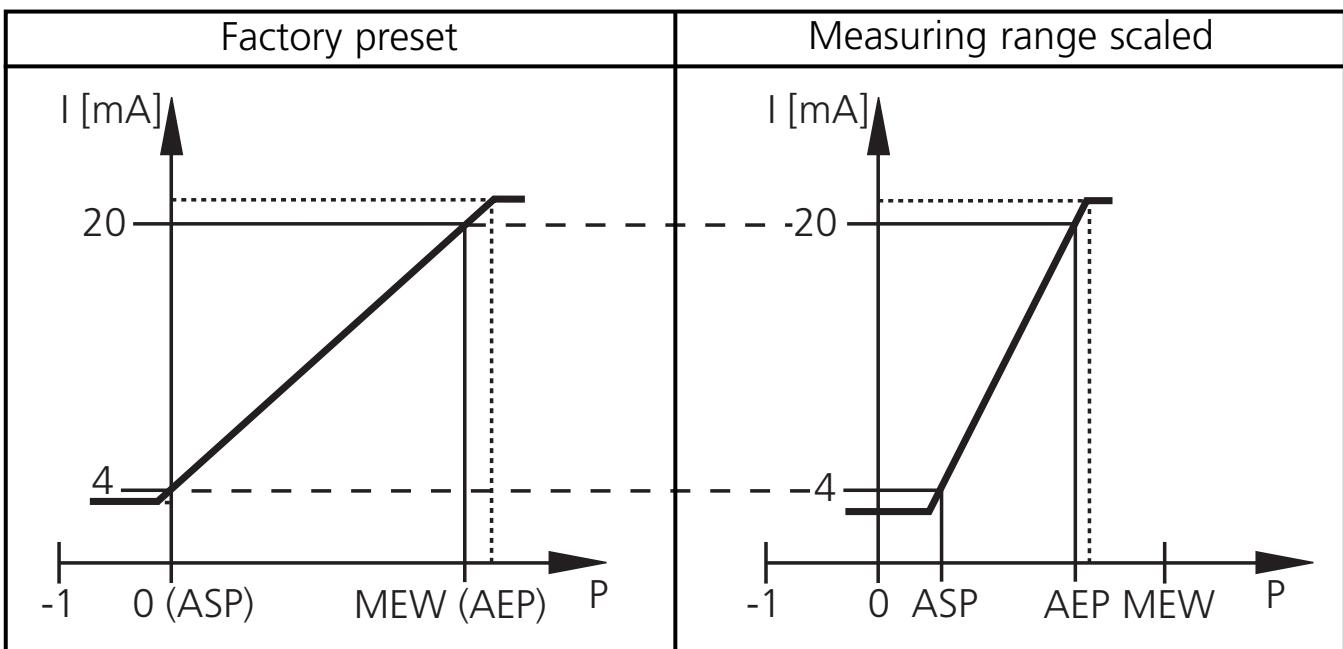
<sup>1)</sup> all indications are referred to a turn down of 1:1

<sup>2)</sup> limit value setting to DIN 16086

## Technical information / Functioning / Parameters

### Scaling the measuring range

- With the parameter "Analogue start point" (**ASP**) the measured value at which the output signal is 4mA is defined.
- With the parameter "Analogue end point" (**AEP**) the measured value at which the output signal is 20mA is defined.
- Minimum distance between ASP and AEP = 25 % of the span (scaling factor 4).



MEW = final value of measuring range

The output signal is between 4 and 20mA in the set measuring range.  
It is also indicated:

- System pressure above the measuring range: output signal > 20mA.
- System pressure below the measuring range: output signal drops to max. 3.2mA (depending on the scaling).

# Contenu

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<b>2</b>	<b>Utilisation avec réglage usine . . . . .</b>	<b>page 24</b>
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	Dimensions . . . . .	page 32

## Remarque sur la sécurité

**Avant la mise en service de l'appareil, veuillez lire la description du produit. Assurez-vous que le produit est approprié pour l'application concernée sans aucune restriction.**

**Le non-respect des remarques ou des données techniques peut provoquer des dommages matériels et/ou corporels.**

**Pour toutes les applications, veuillez vérifier la compatibilité des matières du produit (voir Données techniques) avec les fluides sous pression à mesurer.**

## Fonctionnement et caractéristiques

Le capteur de pression détecte la pression du circuit et la convertit en un signal de sortie analogique (4 ... 20mA). L'étendue de mesure peut être décalée jusqu'à 25% du gain (→ page 29, 31).

En plus, il est possible d'indiquer:

- Pression supérieur à l'étendue de mesure: signal de sortie > 20mA.
- Pression du système au-dessous de l'étendue de mesure: le signal de sortie tombe jusqu'à 3,2 mA maxi (selon la mise à l'échelle).

## Applications

Type de pression: pression relative

	<b>Etendue de mesure</b>	<b>Surpression admissible</b>	<b>Pression d'éclatement</b>
mbar	-12,5 ... 250,0	10 000 (10 bar)	30 000 (30 bar)
kPa	-1,25 ... 25,00	1 000 (1 MPa)	3 000 (3 MPa)
inH <sub>2</sub> O	-5,0 ... 100,4	4 000	12 000
mmWS	-125 ... 2 550	102 000	306 000



Eviter les pics de pression statiques et dynamiques qui dépassent la valeur de surpression indiquée. Même si la pression d'éclatement est dépassée brièvement l'appareil peut être détruit (danger de blessures)!

L'appareil est **livré en état de fonctionnement**.

Réglage usine: non décalé (ASP = 0mbar; AEP = 250mbar).

## 2

## Utilisation avec réglage usine

### Montage

Avant de monter / démonter le capteur, s'assurer que la pression n'est pas appliquée au circuit.

L'appareil est adaptable à différents types de raccords process par adaptateurs Aseptoflex (à commander séparément comme accessoires).

Monter d'abord l'adaptateur (B) sur le capteur, ensuite le capteur et l'adaptateur sur le raccord process à l'aide d'un écrou, d'une flasque de serrage ou similaire (A).

Si l'élément de fixation (A) ne peut pas être monté par le haut, il est possible de le monter par le bas avant de visser l'adaptateur.

**ATTENTION :** Une garantie pour un effet d'étanchéité stable à long terme et ainsi sans entretien, sans fentes, et aseptique du joint métallique (adaptation Aseptoflex) est seulement assumée pour l'appareil monté une seule fois.

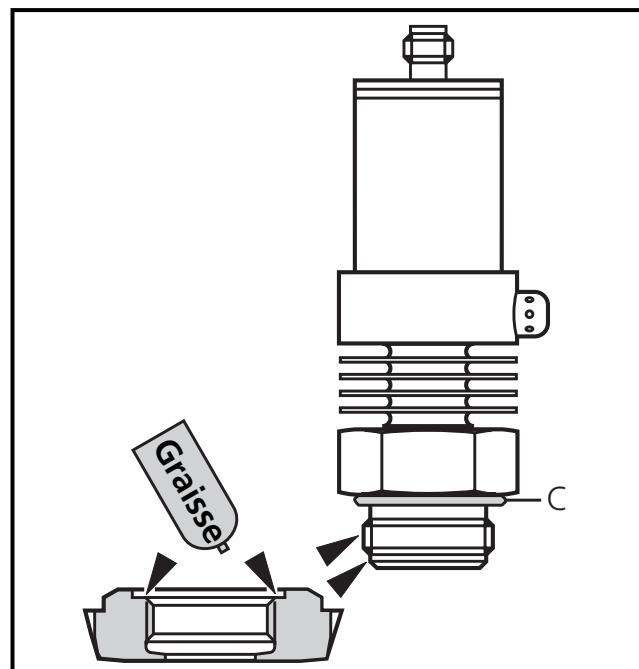
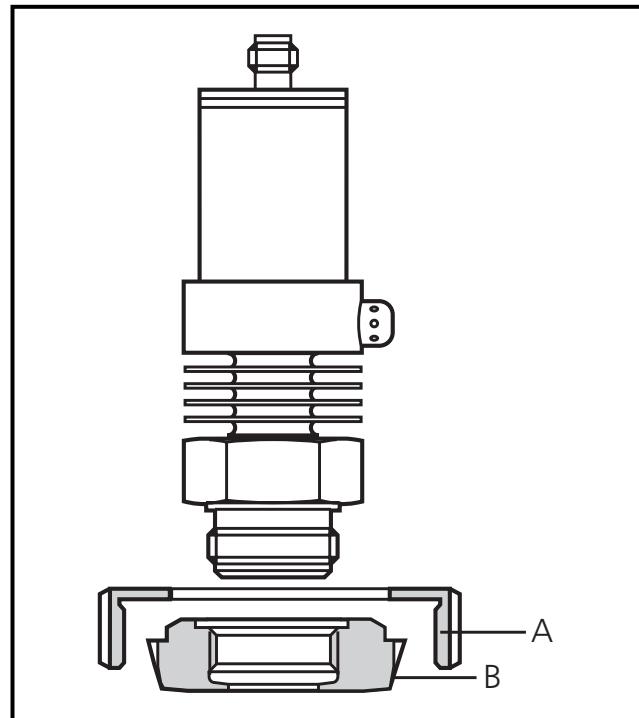
### Montage de l'adaptateur Aseptoflex

#### Pas 1

Avec la graisse jointe: Graisser les chanfreins d'étanchéité du capteur et de l'adaptateur.

La graisse peut être utilisée pour les denrées alimentaires.

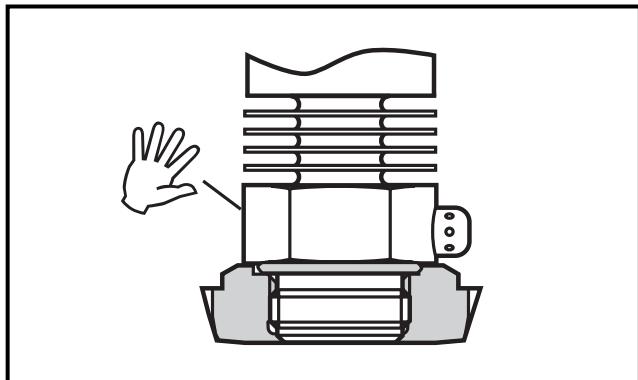
S'assurer que le joint torique (C) est bien positionné..



## Utilisation avec réglage usine

### Pas 2

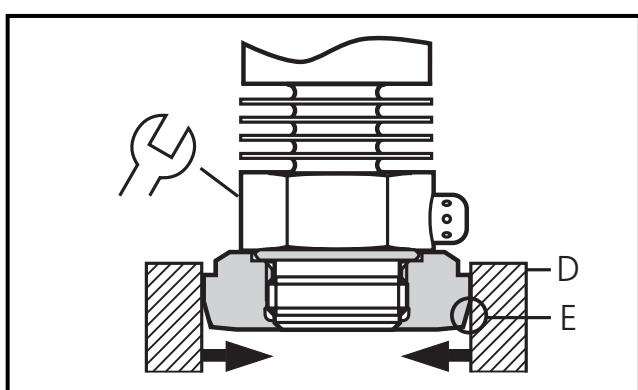
Visser le capteur dans l'adaptateur. Eviter des influences mécaniques sur les chanfreins d'étanchéité.



### Pas 3

Serrer le capteur et l'adaptateur dans un dispositif de serrage (D). Les chanfreins d'étanchéité (E) ne doivent pas être endommagés. Serrez le capteur jusqu'à ce que vous sentiez la butée.

**Attention:** L'étanchéité peut être affectée si vous serrez trop fort.



## Raccordement électrique



L'appareil doit être monté par un électricien.

Les règlements nationaux et internationaux relatifs à l'installation de matériel électrique doivent être respectés.

Alimentation selon EN50178, TBTS, TBTP.

Mettre l'installation hors tension avant de raccorder l'appareil comme suit:

raccordement 2 fils	raccordement 3 fils	branchement connecteur

Couleurs des fils conducteurs des connecteurs femelles ifm:

1 = BN (brun), 2 = WH (blanc), 3 = BU (bleu), 4 = BK (noir);  
n.c. = non raccordé.

## 2

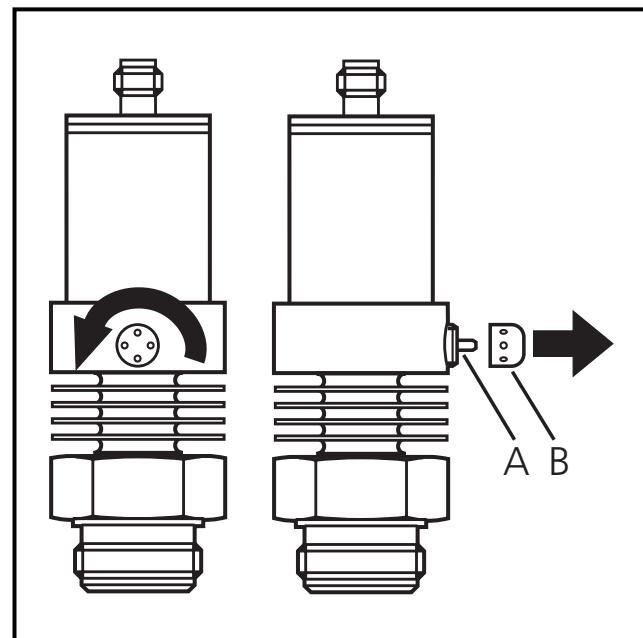
## Utilisation avec réglage usine

### Mise en service / Fonctionnement / Maintenance

Après le montage, le câblage et le réglage vérifier le bon fonctionnement de l'appareil.

### Nettoyage du couvercle du système de filtrage

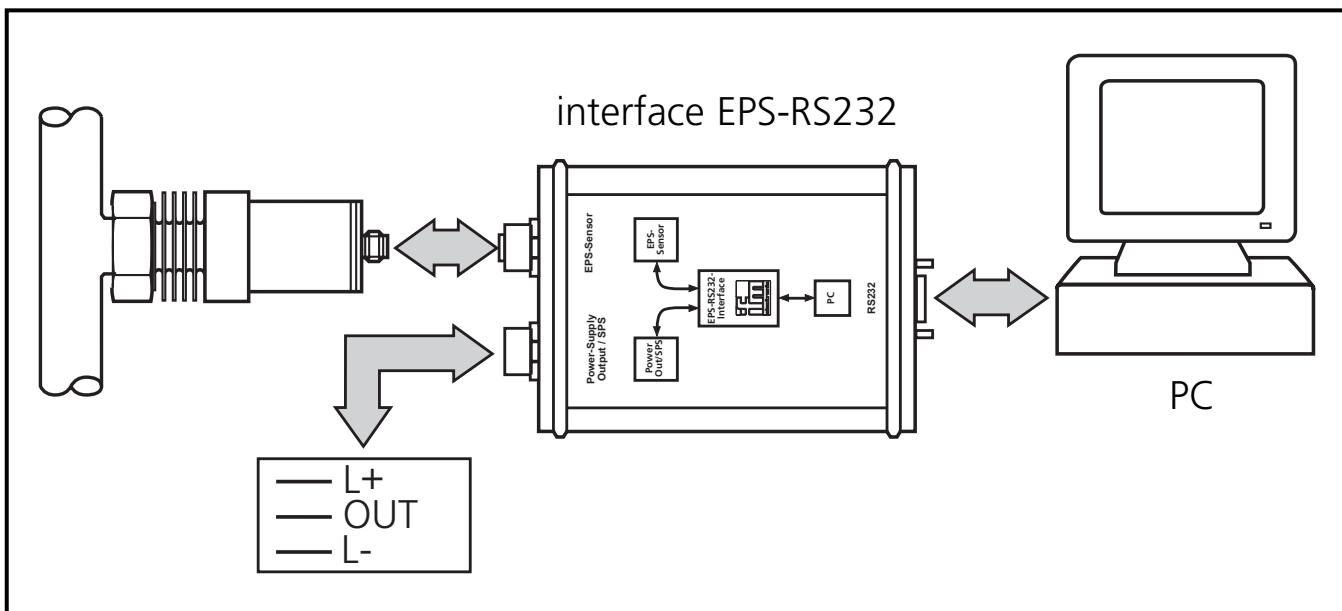
Si des fluides visqueux qui produisent des résidus bouchent le couvercle du système de filtrage du capteur (et donc réduisent l'exactitude de mesure faiblement), vous pouvez le nettoyer. Dévisser le couvercle du filtre (B) (utiliser une pince avec des becs couverts de plastique). Nettoyer le couvercle soigneusement. L'évent (A) ne devrait être nettoyé que par un personnel qualifié et avec grand soin.



**!** Des résidus éventuels du fluide ne doivent pas être comprimés et pressés dans l'évent. Cela pourrait boucher le système de filtrage et réduire l'exactitude de mesure du capteur.  
Visser le couvercle de filtrage de nouveau.

Le capteur est suffisamment protégé contre les conditions environnantes sévères (protection IP 67). La protection peut être augmentée par un accessoire spécial (n° de commande E30043).

## Programmation / Capteur avec interface EPS-RS232



Raccorder le capteur à un PC via l'interface EPS-RS232 (n° de commande E30066).

- Le capteur est alimenté en tension par l'interface
- et transmet ses données (valeurs mesurées, signal analogique et paramètres réglés) continuellement via l'interface.

Les options suivantes se présentent:

- **Indication à distance**

Indication de la pression actuelle du circuit sur PC ou afficheur.

- **Evaluation à distance**

Sortie de la valeur analogique actuelle.

- **Programmation / programmation à distance du capteur**

Réglage de l'étendue de mesure, amortissement pour la sortie analogique; calibrage du point zéro.

Les paramètres peuvent être réglés avant le montage et la mise en service du capteur ou pendant le fonctionnement.



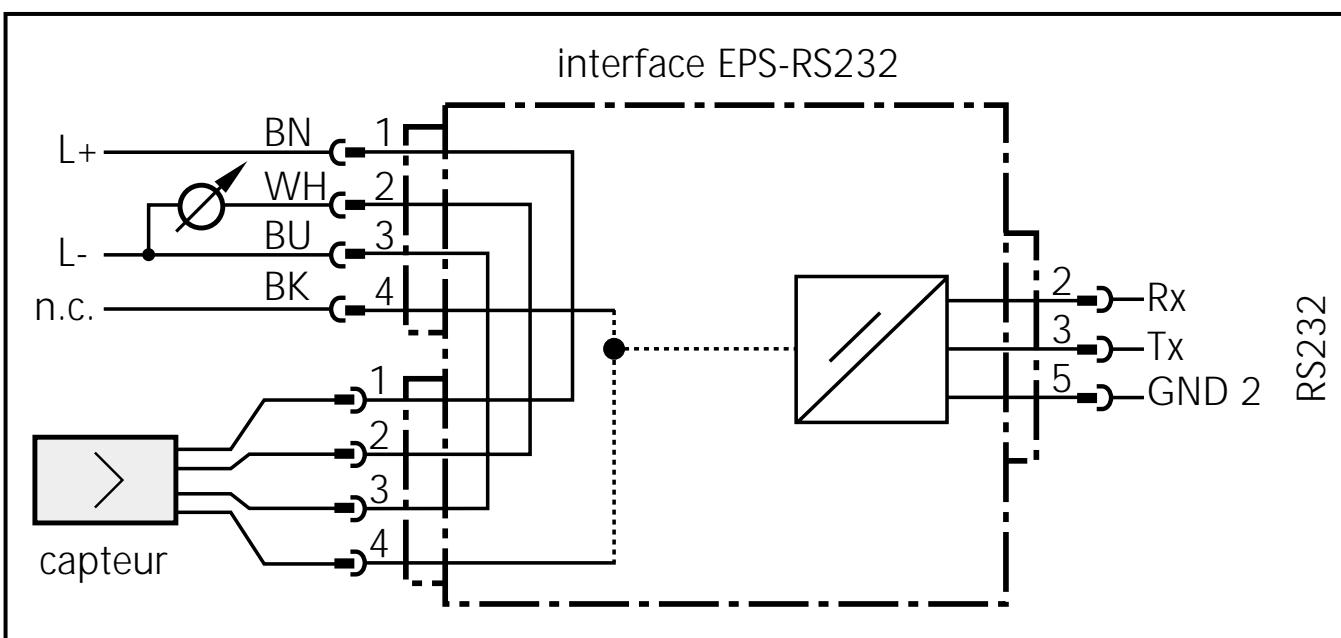
Si vous modifiez les paramètres avec l'installation en service, le fonctionnement de celle-ci est influencé. Vérifiez de ne pas créer un mauvais fonctionnement de l'installation.

### 3 Programmation / Capteur avec interface EPS-RS232

#### Raccordement électrique (capteur / interface EPS-RS232)

Pour l'emploi du capteur avec interface EPS-RS232 hors de l'installation: Utiliser une alimentation appropriée (alimentation 24 V; N° de commande E30080).

 Pour l'emploi mobile du interface EPS-RS232 sur une installation en service: Mettre l'installation hors tension avant de raccorder l'unité.  
Ne pas déconnecter les connecteurs quand ils sont sous tension!



Couleurs des fils conducteurs des connecteurs femelles ifm:  
1 = BN (brun), 2 = WH (blanc), 3 = BU (bleu), 4 = BK (noir).  
n.c. = non raccordé.

#### Programmation

Pour programmer le capteur, veuillez utiliser le programme de service FDT **ifm container** (référence E30110).

L'interface EPS-RS-232, le programme de service FDT, l'alimentation et le câble de raccordement sont disponibles dans un kit (référence ZZ0050).

# Informations techniques / Fonctions / Paramètres

## Paramètres réglables

ASP	<b>Valeur minimum de la sortie analogique</b> Valeur mesurée dont le signal de sortie est 4mA.		
AEP	<b>Valeur maximum de la sortie analogique</b> Valeur mesurée dont le signal de sortie est 20mA. Ecart minimum entre ASP et AEP = 25% du gain.		
<b>Plage de réglage:</b>			
mbar	ASP -12,5 ... 100,0	AEP 50,0 ... 250,0	en pas de 0,5
kPa	-1,25 ... 10,00	5,00 ... 25,00	0,05
inH <sub>2</sub> O	-5,0 ... 40,2	20,2 ... 100,4	0,2
mmWS	-125 ... 1020	515 ... 2550	5
HI	<b>Mémorisation pression maxi/mini</b>		
LO	<ul style="list-style-type: none"> <li>HI: affichage de la pression maxi mesurée.</li> <li>LO: affichage de la pression mini mesurée.</li> </ul>		
COF	<b>Calibrage du point zéro (Calibration offset)</b> La valeur de travail du capteur peut être décalée par rapport à la valeur réelle mesurée.		
	<ul style="list-style-type: none"> <li>• Plage de réglage: -5 ... +5% du gain (pour une échelle réglée en usine avec ASP = 0mbar et AEP = 250mbar),</li> <li>• en pas de 0,1% du gain.</li> </ul>		
Car	<b>Remise à 0 du calibrage (Calibration reset)</b> Remet le calibrage réglé par COF à 0 (réglage usine).		
dAA	<b>Amortissement pour la sortie analogique</b> Les pics de pression de courte durée ou de haute fréquence peuvent être filtrés. Valeur dAA = temps d' amortissement entre changement de la pression et changement du signal analogique en millisecondes (ms). • plage de réglage: 0 (= dAA n'est pas actif) / 0,1 s / 0,5 s / 2 s.		
Uni	<b>Unité d'affichage</b> La valeur mesurée et les valeurs pour ASP et AEP peuvent être affichées dans les unités suivantes: <b>mbar, kPA, inH<sub>2</sub>O, mmWS</b> . Choisir l'unité d'affichage <b>avant</b> de régler des valeurs de la sortie analogique (ASP, AEP). Cela évitera les erreurs d'arrondi générées en interne lors de la conversion des unités et permettra de régler des valeurs exacts.		

## 4

**Informations techniques / Fonctions / Paramètres****Paramètres réglables** (continuation)

diS

**Réglage de l'afficheur**

**d1 / d2 / d3** = actualisation de la valeur mesurée toutes les 50ms / 200ms / 600ms. L'actualisation ne change que l'intervalle d'actualisation de l'affichage.

**ph** = affichage de la valeur maxi mesurée pour un bref délai (peak hold); **rotated** = orientation de l'affichage à 180°.

**OFF** = En mode Run l'affichage de la valeur mesurée est désactivé.

**Données techniques**

Tension d'alimentation [V] . . . . .	14 ... 30 DC
Tension d'alimentation pour interface EPS-RS232 avec capteur [V] . . . . .	15,5 ... 30 DC
Sortie analogique . . . . .	4 ... 20 mA L'étendue de mesure peut être mise à l'échelle (turn down: 1:4 du gain)
Charge maxi [ $\Omega$ ]: . . . . .	( $U_B - 13$ ) x 50; 550 à $U_B = 24V$
Amortissement (avec valeur de damping dAA = 0) [ms]: . . . . .	3
Exactitude / dérives (en % du gain) <sup>1)</sup>	
- Exactitude type (linéarité, tenant compte de l'hystérésis et de la répétabilité) <sup>2)</sup> . . . . .	< $\pm 0,6$
- Linéarité . . . . .	< $\pm 0,5$
- Hystérésis . . . . .	< $\pm 0,1$
- Répétabilité (avec des fluctuations de température < 10K) . . . . .	< $\pm 0,1$
- Stabilité à long terme (en % du gain par an) . . . . .	< $\pm 0,1$
- Coefficients de température (CT) dans la plage de température compensée 0 ... +80°C (en % du gain par 10 K)	
- meilleur CT du point de zéro / du gain . . . . .	< $\pm 0,1$ / < $\pm 0,4$
Température ambiante [°C] . . . . .	-25 ... +80
Température du fluide [°C] . . . . .	-25 ... +125 (+145 max. 1h)
Protection . . . . .	IP 67 III
Résistance d'isolation [ $M\Omega$ ] . . . . .	> 100 (500 V DC)
Tenue aux chocs [g] . . . . .	50 (DIN / CEI 68-2-27, 11ms)
Tenue aux vibrations [g] . . . . .	20 (DIN / CEI 68-2-6, 10 - 2000 Hz)
Boîtier . . . . .	INOX 316L; PEI; PBTP; FPM (Viton)
Matières en contact avec le fluide . . . . .	INOX 316L; céramique (99,9 % Al2 O3); PTFE

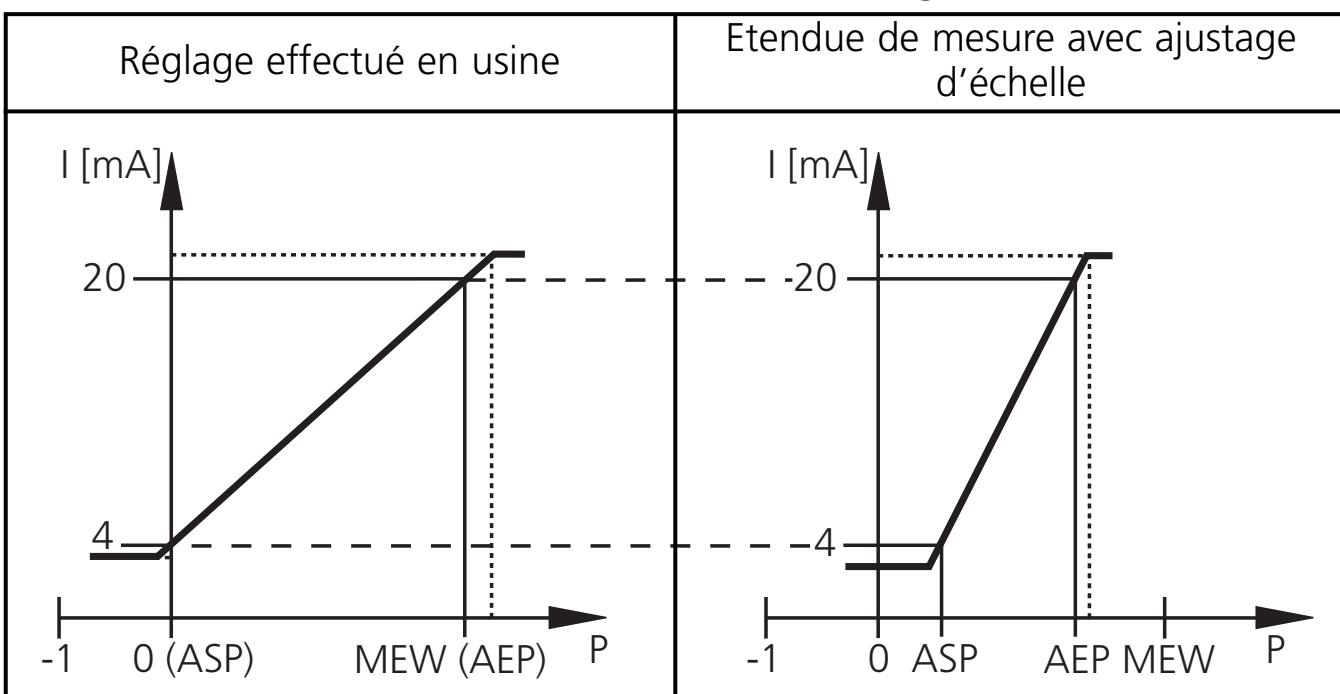
<sup>1)</sup> Toutes les indications se réfèrent à un turn down de 1:1

<sup>2)</sup> Réglage des valeurs limites selon DIN 16086

## Informations techniques / Fonctions / Paramètres

### Réglage de l'étendue de mesure

- Par le paramètre "Valeur minimum de la sortie analogique" (**ASP**) on peut sélectionner la valeur mesurée à laquelle le signal de sortie est 4 mA.
- Par le paramètre "Valeur maximum de la sortie analogique" (**AEP**) on peut sélectionner la valeur mesurée à laquelle le signal de sortie est 20 mA.
- Ecart minimum entre ASP et AEP = 25% du gain.



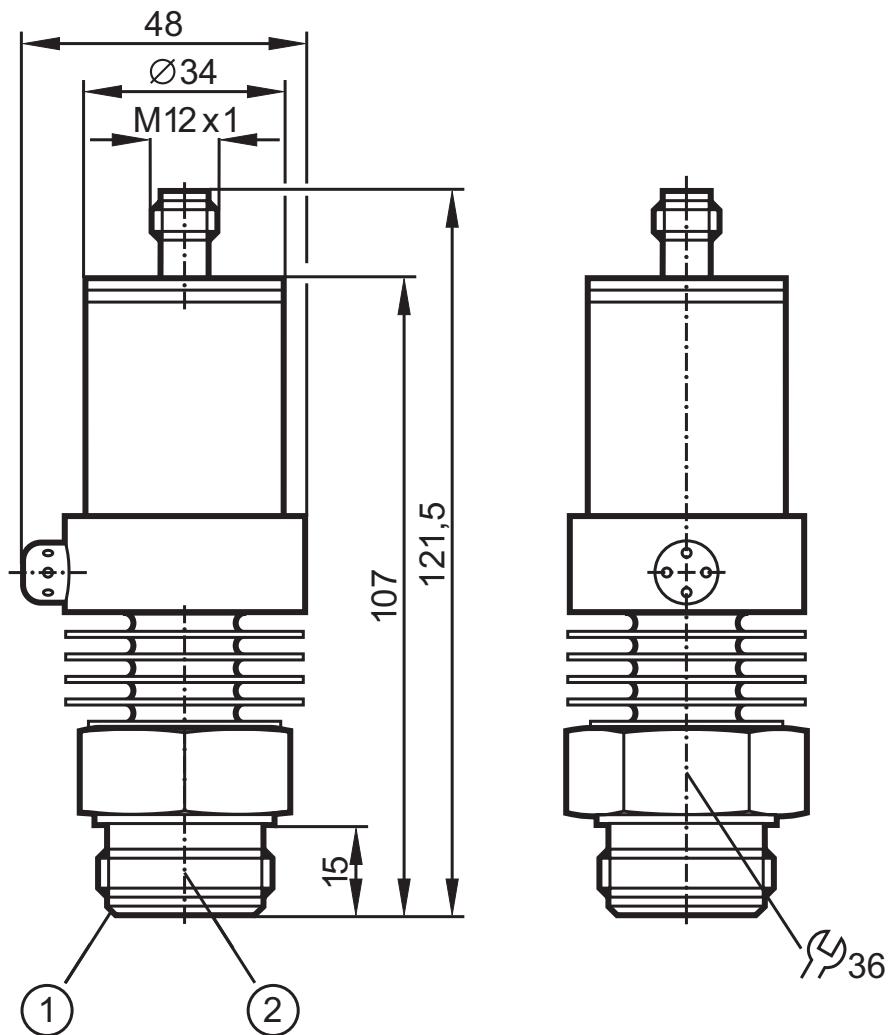
MEW = valeur final de l'étendue de mesure

Le signal de sortie entre 4 et 20 mA correspond à la nouvelle étendue de mesure.

En plus, il est possible d'indiquer:

- Pression supérieure à l'étendue de mesure: signal de sortie > 20 mA.
- Pression du système au-dessous de l'étendue de mesure: le signal de sortie tombe jusqu'à 3,2 mA maxi (selon la mise à l'échelle).

# Maßzeichnung Scale drawing Dimensions



- ① Aseptoflex-Dichtkante  
② Aseptoflex-Gewinde

- ① Aseptoflex sealing edge  
② Aseptoflex thread

- ① chanfrein pour l'étanchéité Aseptoflex  
② filtre Aseptoflex



### **6.3 Pressure Sensor Controller**



*manuale d'uso*

*user manual*

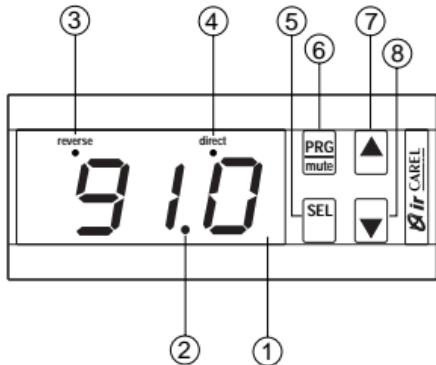
**CAREL**

Q-Pulse Active 022430450 of 383

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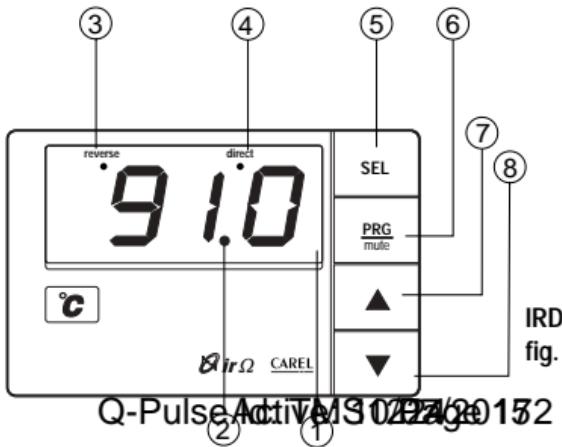
# Grit Washer Removal System - GW80 Bilfinger - Meyjor Ind

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IR32

fig. 1



IRDR

fig. 2

# - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

- 1 - Display**
- 2 - Led decimale**
- 3 - Led reverse**
- 4 - Led direct**
- 5 - Tasto SEL:** visualizza il Set Point. Se premuto insieme al tasto PRG-Mute per 5 s. permette di accedere ai parametri di configurazione (con codice tipo 'Cxx').
- 6 - Tasto PRG/Mute:** premuto per 5 secondi da' accesso al menu' dei parametri di utilizzo più frequente (codice tipo 'Pxx'). In caso di allarme tacita il buzzer. Resetta le altre segnalazioni d'allarme se premuto al cessare della causa.
- 7 - Tasto "Freccia Sù":** incrementa il valore del parametro selezionato.
- 8 - Tasto "Freccia Giù":** decrementa il valore del parametro selezionato. Nelle versioni NTC, se premuto quando sul display e' visualizzato il valore della sonda principale permette la visualizzazione della seconda sonda.

- 1 - Display**
- 2 - Decimal Point**
- 3 - Led reverse**
- 4 - Led direct**
- 5 - Key SEL:**

*displays the Set-point. Hold it down for more than 5 seconds together with the PRG-MUTE key to access the Configuration menu (code type 'Cxx').*

- 6 - Key PRG/MUTE:**

*Hold it down for 5 seconds to access the menu of the more frequently used parameters (code type 'Pxx'). In the event of alarm condition, press it to silence the buzzer.*

- 7 - Key UP:**
- 8 - Key DOWN:**

*increases the value of the selected parameter.  
decreases the value of the selected parameter. For NTC input versions, if pressed when the main probe value is displayed, it displays the second probe value.*

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- **Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie**  
Il regolatore acquistato appartiene alla SERIE INFRARED UNIVERSALE composta da oltre 40 modelli destinati al controllo delle principali grandezze fisiche (temperatura, pressione, umidità, ...) e sviluppati sfruttando la più che ventennale esperienza Carel nella regolazione di unità di Condizionamento, Refrigerazione e Riscaldamento. Per comodità riportiamo la struttura del codice della **Serie Infrared**. Si ricorda che tutti i modelli, tranne le eccezioni sotto indicate, vengono forniti con cicalina di allarme, predisposizione per il seriale e sensore I.R. per la programmaz. dei parametri da telecomando (fornito come accessorio).

**IR aa b c d**

solo per i modelli IR32V d è diverso da 0:

E, 12÷24 Vac-dc, priva di I.R. e buzzer

L, 12÷24 Vac-dc

U, 24÷240Vac-dc, priva di predisposizione seriale

H, 110÷240Vac-dc, priva di predisposizione seriale

0 per sonde tipo NTC

1 per sonde Pt100

2 per sonde a termocoppia tipo J o K

3 per sonde in corrente 0/20 mA o 4/20 mA

4 per sonde in tensione -0,4 / +1 Vdc

D nelle versioni ad 1 uscita per SSR

A nelle versioni a 4 uscite per SSR

V nelle versioni ad 1 relè

W nelle versioni a 2 relè

Z nelle versioni a 4 relè

32 nelle versioni da pannello

DR nelle versioni per montaggio su Guida DIN

È inoltre disponibile il modello **IRDRTE0000**, per guida DIN, alim. 230 Vac, 1 uscita a relè, ingresso per sonde NTC, privo di buzzer e di predisposizione seriale.

## Descrizione del frontale e degli strumenti

### - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

Si faccia riferimento alla Fig.1 per i modelli IR32 e alla Fig.2 per gli ITRDR:

- 1 Display:** visualizza il valore della sonda collegata. In caso di allarme il valore della sonda viene visualizzato alternativamente ai codici degli allarmi attivi. Durante la programmazione mostra i codici dei parametri ed il loro valore.
- 2 Led Decimale:** viene acceso quando la grandezza controllata è visualizzata con la precisione del decimo.
- 3 Led Reverse:** lampeggia quando è attivo almeno un relé con funzionamento "Reverse". Il numero di lampeggi indica i relé attivi in Reverse. Tra una fase di lampeggio e la successiva il led rimane spento per 2 sec.
- 4 Led Direct:** lampeggia quando è attivo almeno un relé in funzionamento 'Direct'. Valgono le altre considerazioni viste per la funzione reverse. Nota: per il significato di Reverse e Direct si rimanda al prossimo paragrafo.
- 5 Tasto SEL:** visualizza e/o imposta il set point. Se premuto insieme al tasto PRG-MUTE per 5 secondi permette di inserire la password e di accedere ai parametri di configurazione (parametri con codice tipo "Cxx").
- 6 Tasto PRG/Mute:** premuto per 5 secondi dà accesso al menù dei parametri di utilizzo più frequente (codice tipo "Pxx"). In caso di allarme tacita il buzzer. Resetta le altre segnalazioni d'allarme se premuto al cessare della causa.
- 7 Tasto FRECCIA SÙ:** incrementa il valore del set-point o di ogni altro parametro selezionato.
- 8 Tasto FRECCIA GIÙ:** decrementa il valore del set-point o di ogni altro parametro selezionato. Nelle versioni con ingresso NTC, se premuto quando sul display è visualizzato il valore della sonda principale, permette la visualizzazione della seconda sonda per il tempo in cui il tasto resta premuto (vedi NTC1, NTC2 nel paragrafo "Collegamenti").

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

Per la messa in servizio del regolatore seguire la seguenti fasi:

- 1) collegare sonde ed alimentazione seguendo le indicazioni contenute nel prossimo paragrafo "Consigli per una corretta installazione" e seguendo gli schemi di collegamento riportati alla fine del manuale. Si consiglia di collegare gli attuatori solo dopo aver programmato il controllo.
- 2) **programmare lo strumento.** I regolatori della Serie Infrared vengono forniti già programmati in modo da poter essere facilmente utilizzati nelle applicazioni più frequenti (vedi "Programmazione semplificata: funzionamento previsto in fabbrica"). È comunque possibile modificare in parte o completamente il funzionamento previsto in fabbrica per meglio adattare lo strumento alle proprie esigenze. Sono possibili 2 modalità di programmazione:
  - 2a) **programmazione semplificata.** In tutte le applicazioni già previste in fabbrica è sufficiente verificare ed eventualmente modificare pochi parametri (Set Point e differenziale, ad esempio). Eventualmente è possibile modificare anche altri parametri per ottenere prestazioni aggiuntive (si veda la "Descrizione dei Parametri utili").
  - 2b) **programmazione avanzata.** Permette di adattare lo strumento ad utilizzi diversi da quelli previsti in fabbrica. Come si vedrà anche in questo caso la programmazione è estremamente semplice grazie a tutta una serie di funzionamenti predefiniti (Modi), pronti per essere attivati.
- 3) per i modelli con ingresso in corrente, tensione o per termocoppia J si dovranno selezionare alcuni parametri speciali. Si veda il paragrafo "Parametri speciali per termocoppi, sonde in tensione e in corrente".
- 4) **collegare gli attuatori.** Al riguardo si raccomanda di valutare attentamente le portate massime dei relé indicate nelle "Caratteristiche Tecniche".

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

Per una corretta installazione si prega di seguire le note sottostanti.

- Si ricordi che l'utilizzo del regolatore elettronico non esime dal predisporre sull'unità tutte i dispositivi elettromeccanici necessarie per garantire la sicurezza dell'impianto.
- Evitare il montaggio dei controlli in ambienti con le seguenti caratteristiche:
  - Umidità relativa maggiore dell' 90% o condensante
  - Forti vibrazioni o urti
  - Esposizioni a continui getti d'acqua
  - Esposizione ad atmosfere aggressive ed inquinanti (es: gas solforici e ammoniacali, nebbie saline, fumi) per evitare corrosione e/o ossidazione.
  - Alte interferenze magnetiche e/o radiofrequenze (evitare quindi l'installazione delle macchine vicino ad antenne trasmittenti).
  - Esposizioni dei controlli all'irraggiamento solare diretto e agli agenti atmosferici in genere.
- Si ricordi che il non corretto allacciamento della tensione di alimentazione può danneggiare seriamente il sistema. Nel collegamento dei regolatori è necessario rispettare le seguenti avvertenze:
  - Utilizzare capicorda adatti per i morsetti in uso.
  - Allentare ciascuna vite ed inserirvi i capicorda, quindi serrare le viti. Ad operazione ultimata tirare leggermente i cavi per verificarne il corretto serraggio.
  - Separare quanto più possibile i cavi delle sonde e degli ingressi digitali dai cavi dei carichi indutttivi e di potenza per evitare possibili disturbi elettromagnetici.



- **Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie**
  - Non inserire mai nelle stesse canaline (comprese quelle dei quadri elettrici) cavi di potenza e cavi sonde.
  - Evitare inoltre che i cavi delle sonde siano installati nelle immediate vicinanze di dispositivi di potenza (contattori, interruttori magnetotermici, ecc.)
  - Le sonde possono essere remotate fino ad una **distanza massima** di 100 mt dal controllo purchè si usino cavi con sezione minima di 1mm<sup>2</sup>, e purchè si usino sonde con cavo schermato.
  - Per migliorare l'immunità ai disturbi ed avere la migliore precisione si consiglia di usare sonde con cavo schermato; in questo caso deve essere collegato **un solo estremo dello schermo alla terra del quadro elettrico**, l'altro estremo non deve essere connesso. Quando si utilizzano termocoppie è obbligatorio usare cavo schermato per avere una corretta immunità ai disturbi; inoltre le sonde possono essere prolungate solo usando gli appositi cavi e connettori compensati (per i codici vedi listino Carel).
  - Se è previsto l'allacciamento alla rete di supervisione tramite le apposite schede seriali (IR32SER per i modelli IR32 e IRDRSER per i modelli IRDR) è necessario curare la messa a terra del sistema. In particolare non dovrà essere collegato a terra il secondario dei trasformatori che alimentano gli strumenti. Nel caso sia necessario collegarsi ad un trasformatore con secondario a terra, dovrà essere interposto un trasformatore di isolamento. È possibile collegare più strumenti allo stesso trasformatore di isolamento, tuttavia è consigliabile utilizzare un trasformatore di isolamento diverso per ogni strumento (vedi listino Carel per codici e caratteristiche dei trasformatori di isolamento).

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

Prima di descrivere come programmare lo strumento è necessario riprendere alcuni concetti di base:

- **Azione Direct e azione Reverse:** un regolatore agisce in Direct quando opera un'azione di contenimento sulla grandezza che stà aumentando. Il funzionamento Direct è tipico, ad es., degli impianti di refrigerazione: all'aumentare della temperatura misurata aumenta la potenza frigorifera prodotta e ciò al fine di far diminuire la temperatura stessa. Si parla invece di funzionamento Reverse se l'azione tende a contrastare la diminuzione della grandezza regolata. Ciò avviene ad esempio negli impianti di riscaldamento dove si deve contrastare la diminuzione di temperatura attivando la produzione di calore.
- **Punto di lavoro o Set Point (o Set):** si tratta del valore che deve essere mantenuto dalla grandezza fisica controllata, ad esempio il valore della temperatura a cui si vuole far lavorare un forno. Quando la grandezza regolata arriva al valore di Set, tutte le uscite sono disattivate.
- **Differenziale o isteresi:** permette di regolare l'inserimento delle uscite quando la grandezza regolata si scosta dal set. Senza Differenziale si passerebbe repentinamente da uscite tutte OFF (grandezza uguale al SET) a uscite tutte ON (grandezza diversa dal SET). Con il differenziale maggiore di 0 l'inserimento delle uscite è invece graduale e il regolatore inserisce completamente tutte le uscite solo quando la differenza tra grandezza regolata e il Set supera il valore del Differenziale. Un differenziale "stretto" normalmente mantiene la grandezza regolata molto vicino al Set ma può provocare frequenti accensioni/spegnimenti dei dispositivi controllati e pendolazioni. Nel caso sia richiesta una regolazione molto precisa, invece di selezionare un differenziale stretto si può attivare la regolazione P+I descritta nel manuale "Installazione ed Uso".

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

Lo strumento viene fornito già programmato per le seguenti applicazioni:

**Modelli con sonde di temperatura (NTC, Pt100, Termocoppie):** controllo di forni, bruciatori, impianti di riscaldamento e in genere allarmi di bassa temperatura

**Modelli per sonde di umidità:** controllo di umidificatori e in genere allarmi di bassa umidità

**Modelli per sonde di pressione:** controllo evaporatori e in genere allarmi di bassa pressione.

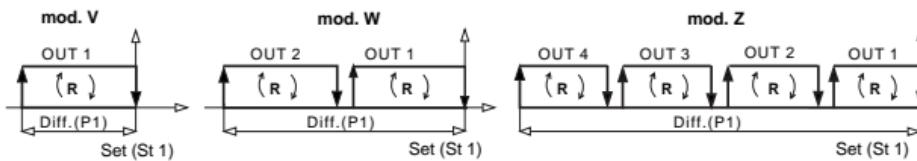


Fig. 4

Come evidenziato nella figura, i parametri fondamentali di questo tipo di funzionamento sono il set point (St1) e il differenziale (P1). Nel funzionamento standard, che corrisponde all'azione Reverse, il regolatore attiva le uscite solo se la grandezza regolata diminuisce sotto il valore di Set point. Fissato il punto di lavoro desiderato (St1), le uscite vengono attivate una alla volta man mano che la grandezza si scosta da St1. Come indicato in figura, nei modelli a più uscite l'attivazione dei relè è equamente distribuita all'interno del differenziale. Quando la grandezza controllata è uguale o inferiore a St1-P1 tutte le uscite sono attive. Viceversa, se la grandezza, partendo da valori inferiori a St1, inizia ad aumentare, eventuali relè attivi vengono spenti man mano che ci si avvicina a St1. Al valore St1 tutte le uscite sono spente. Il led REVERSE lampeggia con un numero di impulsi pari alle uscite attive.

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

Per adattare il funzionamento del regolatore alle proprie esigenze sarà necessario modificare il Set (valore previsto in fabbrica= 20) ed il differenziale (valore previsto in fabbrica= 2). Ci sono però altri parametri, non programmati nella selezione di fabbrica, che possono essere utilmente selezionati:

### Parametri utili

**Set allarme di alta e set allarme di bassa:** è possibile selezionare un valore massimo ed un valore minimo per la grandezza regolata. Quando lo strumento rileva un valore esterno ai limiti impostati visualizza un codice di allarme e genera un allarme sonoro (nei modelli provvisti di buzzer). I valori di alta e bassa sono considerati come valori assoluti e quindi, per evitare che i limiti di allarme intervengano durante il normale funzionamento dello strumento, essi devono essere esterni all'intervallo individuato dai due valori "Setpoint-differenziale" e "Set Point". Nel caso si vari il punto di lavoro è necessario verificare che il nuovo intervallo di funzionamento non giunga oltre i limiti di allarme.

**Differenziale allarme:** è l'isteresi prevista per gli allarmi. Un differenziale anche minimo è necessario per evitare pendolazioni, ovvero inserimenti e disinserimenti successivi degli allarmi dovuti a piccole variazioni della grandezza misurata. I regolatori della Serie Infrared escono di fabbrica con il differenziale allarmi impostato a "2". Gli allarmi di alta e bassa sono a reinserimento automatico, ovvero quando la grandezza misurata ritorna all'interno dei limiti massimi previsti, l'allarme viene automaticamente annullato.

È possibile impostare il set di allarme anche di tipo relativo assegnando valori con segno negativo al parametro P27). In questo caso, prestare attenzione ai segni di P25 e P26: infatti il segno negativo indica l'intervento del rispettivo allarme prima del Set Point, mentre il segno positivo indica l'intervento dopo il Set Point.

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Tempo di ritardo attuazione allarme: permette di ritardare la segnalazione dell'allarme.

Il regolatore attiva l'allarme solo se le condizioni di allarme permangono per il ritardo selezionato. Attenzione: se durante il ritardo la grandezza misurata rientra all'interno dei limiti previsti, il conteggio è annullato.

Calibrazione sonda: permette di variare l'indicazione visualizzata dallo strumento per compensare errori o differenze con altri strumenti.

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Per comodità si riportano i valori di fabbrica del Set e degli altri parametri utili:

Parametro	Codice	Valore di fabbrica	Campo
Set Point	St1	20	limiti sonda
Differenziale	P1	2,0	0.1 / 99.9
Calibrazione sonda	P14	0,0	-99 / 99
Allarme di Bassa	P25	limite inferiore sonda	-99 / P26
Allarme di Alta	P26	limite superiore sonda	P25 / 999
Differenz.Allarme	P27	2,0	0.1 / 99.9
Ritardo Allarme	P28	60 minuti	0 / 120 min.

Per modificare il Set point operare come di seguito indicato (Fig. 1 e 2):

- premere il tasto "5" per qualche secondo: a display compare St1;
- rilasciare il tasto "5": a display lampeggia il valore attuale del Set Point
- premere i tasti "7" o "8" fino a raggiungere il valore desiderato;
- premere "5" per confermare il nuovo valore di St1;

Per modificare il differenziale ed i param. utili operare nel seguente modo:

- premere il tasto "6" per 5 secondi: a display compare "P1";
- premere il tasto "7" o "8" fino a visualizzare il parametro da modificare;
- premere il tasto "5": a display compare il valore attuale del parametro da modificare;
- premere "7" o "8" fino a raggiungere il valore desiderato;
- premere "5" per confermare il dato;
- a display compare il codice identificatore del parametro modificato;
- ripetere le operazioni dal punto b) al punto f) se si vogliono modificare altri parametri, altrimenti passare al punto h);

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  - h) premere "6" per memorizzare i dati modificati e ritornare al funzionamento normale.
  - I modelli con ingresso in corrente hanno un parametro speciale, C13, che permette di scegliere il tipo di ingresso in corrente: C13=0 per sonde 4/20 mA, valore definito in fabbrica, e C13=1 per sonde 0/20 mA. Il valore è quindi da modificare solo se si usa una sonda in corrente con segnale 0/20 mA. Lo stesso parametro C13 è usato dagli strumenti con ingresso per termocoppia: il valore C13=0, predefinito in fabbrica, corrisponde alle termocoppie K, C13=1 alle termocoppia tipo J. Il valore di C13 è quindi da modificare solo se si usano termocoppie tipo J. Gli strumenti con ingresso in corrente o in tensione hanno due parametri speciali, C15 e C16, che permettono di definire l'intervallo di lavoro della sonda usata, ovvero i valori che corrispondono agli ingressi minimo (parametro C15) e massimo (parametro C16). I parametri C15 e/o C16 devono essere modificati solo se la sonda usata ha limiti diversi da quelli predefiniti in fabbrica: C15=0 e C16=100.

**Per modificare i parametri C13, C15 e C16 operare nel seguente modo:**

- a) premere i tasti "5" e "6" contemporaneamente per 5 secondi;
- b) a display compare 0;
- c) impostare la password, ovvero premendo il tasto "7" fino a visualizzare 22;
- d) premere il tasto "5" per confermare la password;
- e) se la password impostata e' corretta, a display compare il codice "C0", altrimenti bisogna ripetere le operazioni dal punto a);
- f) premere i tasti "7" e/o "8" fino a visualizzare il parametro desiderato (C13, C15 o C16): quando esso compare premere il tasto "5";
- g) a display appare il valore associato al parametro: premere i tasti "7" o "8" fino a visualizzare il valore desiderato; premere il tasto "5" per confermare;
- h) ripetere la procedura dal punto f) per modificare altri parametri oppure premere il tasto "6" per terminare la modifica memorizzando i nuovi valori.

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La programmazione avanzata permette di modificare il funzionamento dello strumento per adattarlo ad usi diversi da quelli previsti in fabbrica (pag. 8).

Si tratta di un'operazione molto semplice grazie ai **Modi di Funzionamento**. In ogni regolatore sono infatti memorizzati ben **9 diversi programmi** pensati per risolvere al meglio ogni problema di controllo. La procedura da seguire è:

- 1) scelto il Modo di funzionamento adeguato alla propria applicazione si dovrà attivarlo modificando un parametro (C0)
- 2) si potrà poi eventualmente adeguare il Set point, il differenziale o ogni altro parametro ritenuto utile con le stesse modalità viste in precedenza.

Prima di descrivere in dettaglio le caratteristiche dei 9 "Modi di funzionamento" è necessario introdurre altri due concetti base:

**Set Points multipli.** In precedenza si è descritto il funzionamento con Set unico. Esistono però applicazioni con 2 Set Point: è il caso, ad esempio, di un impianto di riscaldamento che lavori con due diversi Set point, uno per il funzionamento diurno ed uno per quello notturno, oppure un impianto di condizionamento con un Set estivo ed uno invernale. Come si vedrà nella descrizione dei Modi, i regolatori della serie Infrared possono gestire anche 2 Set point.

**Zona neutra o zona morta:** indica un intervallo di valori attorno al Set point in cui la grandezza regolata può oscillare senza che sia necessario inserire alcuna uscita. Il concetto sarà ripreso nella descrizione dei Modi 3, 4 e 5.

**Nota:** per seguire più facilmente la descrizione dei Modi si raccomanda di fare riferimento alle figure riportate alla fine del manuale. Nella descrizione si troverà sempre associato ai parametri il codice di programmazione corrispondente (ad es. al **Set** sarà associato il codice **S11**) e ciò per semplificare l'eventuale modifica dei parametri stessi.

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### Modo 1: funzionamento DIRECT (Fig. 5)

I parametri fondamentali di questo tipo di funzionamento sono il Set Point (St1) e il differenziale (P1). Nel funzionamento Direct il regolatore opera un'azione di contenimento solo se la grandezza regolata è superiore al valore di Set Point. Fissato il punto di lavoro desiderato (St1), le uscite sono attivate una alla volta man mano che la grandezza si scosta da St1. Come indicato in fig. 5 i relè presenti nei modelli con più uscite sono distribuiti equamente all'interno dell'unico differenziale impostato. Quando la grandezza controllata è uguale o superiore a St1+P1 tutte le uscite sono attive. Viceversa, se la grandezza, partendo da valori superiori a St1, inizia a diminuire, eventuali relè attivi vengono spenti man mano che ci si avvicina a St1. Al valore St1 tutte le uscite sono spente. Il led DIRECT lampeggia solo se ci sono uscite attive ed il numero di impulsi è pari ai relè inseriti.

### Modo 2: funzionamento REVERSE (Fig. 6)

È il modo predefinito in fabbrica e già descritto in precedenza (vedi pag. 8).

### Modo 3: funzionamento ZONA NEUTRA (Fig. 7)

I parametri fondamentali di questo tipo di funzionamento sono il Set Point (St1), il differenziale dell'azione Reverse (P1), il differenziale dell'azione Direct (P2) e la zona neutra (P3). Lo scopo del regolatore è portare la grandezza misurata all'interno di un intervallo, detto zona morta, posto attorno al Set Point (St1). Come indicato in Fig. 7 l'estensione della zona morta dipende dal valore del parametro P3. All'interno della zona morta lo strumento non richiede l'intervento di alcun dispositivo. Al di fuori della zona morta lo strumento lavora in **Modo DIRECT** quando la grandezza controllata aumenta e in **Modo REVERSE** quando diminuisce. A seconda del modello usato, possono esserci uno o più relè nei funzionamenti Direct e Reverse. Tali uscite sono attivate o spente una alla volta secondo le modalità già viste nei modi 1 e 2, in conformità ai valori assunti dalla grandezza controllata, dal valore St1, da P1 e da P2. Il LED DIRECT e il LED REVERSE lampeggiano

- Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie con le modalità già viste. Attenzione: quando lo strumento è fornito di un'unica uscita a relè, essa funziona solo in Modo REVERSE con zona neutra.

#### Modo 4: funzionamento PWM (Fig. 8)

I parametri fondamentali di questo tipo di funzionamento sono il Set Point (St1), il differenziale dell'azione Reverse (P1), il differenziale dell'azione Direct (P2) e la zona neutra (P3). La logica di regolazione di questo tipo di funzionamento è la stessa già vista per il **Modo 3**. Si tratta infatti di un funzionamento con zona neutra con la sola particolarità che i relè vengono attivati in modo impulsivo in base alla procedura PWM (dall'inglese Pulse Width Modulation, o modulazione della larghezza d'impulso). In termini pratici ogni singolo relè, anziché essere attivato al superamento del differenziale (o di parte di esso), è attivato periodicamente (con periodo pari a 20 secondi, eventualmente modificabile) per un tempo che va da 0,2 a 20 secondi. Il tempo di ON del relè è **proporzionale** alla posizione occupata dalla grandezza controllata all'interno del differenziale, così come indicato in fig. 8: per piccoli scostamenti il relè sarà inserito per un tempo "piccolo", al superamento del differenziale sarà attivo 20 secondi su 20, ovvero sarà sempre inserito. Il funzionamento PWM permette quindi di inserire in modo "proporzionale" attuatori con funzionamento tipicamente ON/OFF (ad esempio resistenze di riscaldamento) e ciò può migliorare il controllo della grandezza regolata. Da considerare però anche i limiti di questo funzionamento. Ad esempio è assolutamente sconsigliato l'utilizzo con compressori o altri attuatori la cui affidabilità può risentire di inserimenti/spegnimenti troppo ravvicinati. Si ricorda poi che l'attivazione troppo frequente dei relè può comprometterne la durata (calcolata in circa 1 milione di attivazioni). Nel funzionamento PWM i led DIRECT/ REVERSE lampeggiano con un numero di impulsi pari al numero di uscite (impulsive) attive. Quando lo strumento è fornito di un solo relè, essa funziona in modo Reverse con zona neutra.

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### Modo 5: funzionamento allarme (Fig. 9)

I parametri fondamentali di questo tipo di funzionamento sono il Set point (St1), il differenziale dell'azione Reverse (P1), il differenziale dell'azione Direct (P2), la zona neutra (P3), il Set dell'allarme di bassa (P25), il Set dell'allarme di alta (P26), il differenziale dell'allarme (P27) e il tempo di ritardo dell'attuazione dell'allarme (P28). Con questo **Modo di Funzionamento** viene dedicato 1 relè (versioni V e W) o 2 relè (versione Z) per segnalare la presenza di un allarme generico (sonda scollegata o in corto, funzionamento anomalo dell'elettronica) o un allarme di alta o bassa. Nel caso delle versioni V e W il relè attivato è unico. Nel caso della versione Z viene attivato il relè 3 per gli allarmi generici e per l'allarme di bassa, mentre il relè 4 viene attivato per gli allarmi generici e per l'allarme di alta. L'attivazione del relè di allarme si somma alle usuali segnalazioni attive con gli altri modi di funzionamento ovvero **codice di allarme** sul display e **segnale acustico** (nelle versioni provviste di buzzer). Nel caso delle versioni W e Z, i relè non utilizzati per la segnalazione degli allarmi possono essere utilizzati con modalità analoghe a quelle viste nel **Modo 3**. L'uscita di allarme, una volta attivata per un allarme di alta o bassa, ritorna nello stato OFF quando la causa di allarme cessa (funzionamento a "riarmo automatico", ottenuto selezionando un valore "basso" per il differenziale di allarme P27) oppure quando viene premuto il tasto MUTE (funzionamento con riarmo manuale ottenuto selezionando valori alti per P27). Da evidenziare che, se si preme il tasto MUTE quando la causa di allarme è ancora persistente, viene tacitata la sirena ma il codice ed il relè di allarme resteranno attivi finché la causa sarà attiva.

### Modo 6: commutazione direct / reverse da ingresso digitale (Fig. 10)

I parametri fondamentali di questo tipo di funzionamento sono il Set point (St1), il differenziale (P1) dell'azione Direct, il Set Point (St2) ed il differenziale (P2) dell'azione Reverse. Lo strumento commuta dal funzionamento Direct a quello Reverse (vedi **Modo 1** e **Modo 2**) in funzione dello stato dell'ingresso digitale 1.

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Più precisamente si ha: funzionamento Direct quando l'ingresso digitale è aperto, funzionamento Reverse quando è chiuso.

### Modo 7: funzionamento Direct con commutazione di Set e differenziale da ingresso digitale (Fig. 11)

Con questo **Modo** la variazione di stato dell'ingresso digitale 1 (aperto/chiuso) non cambia il tipo di azione (sempre Direct) ma cambia il Set Point ed il Differenziale. I parametri fondamentali di questo tipo di funzionamento sono il Set (St1) e il differenziale (P1) attivi quando l'ingresso digitale è aperto ed il Set (St2) e il differenziale (P2) attivi quando l'ingresso digitale è chiuso.

### Modo 8: funzionamento Reverse con commutazione di Set e differenziale da ingresso digitale (Fig. 12)

Con questo **Modo di Funzionamento** la variazione di stato dell'ingresso digitale 1 (aperto/chiuso) non cambia il tipo di azione (sempre Reverse) ma cambia il Set ed il Differenziale. I parametri fondamentali di questo tipo di funzionamento sono il Set (St1) e il differenziale (P1) attivi quando l'ingresso digitale è aperto ed il Set (St2) e il differenziale (P2) attivi quando l'ingresso digitale è chiuso.

### Modo 9: funzionamento con 2 Set Point, uno in Direct e uno in Reverse (Fig. 13)

I parametri fondamentali di questo tipo di funzionamento sono il Set Point (St1), il differenziale (P1) dell'azione Reverse, il Set Point (St2) ed il differenziale (P2) dell'azione Direct. Questo **Modo di Funzionamento** è operativo solo nelle versioni W e Z. È un **Modo di Funzionamento** simile al **Modo 3** (funzionamento con zona neutra) in quanto metà uscite sono attive in Direct e metà in Reverse. La diversità è che non esiste nessun vincolo nel posizionamento dei Set point delle due azioni per cui si può operare come se si avessero due strumenti indipendenti che lavorano con la stessa sonda.

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie Funzionamento Speciale

È un modo speciale che non pone alcun limite alla gestione delle uscite. In realtà non è un ulteriore **Modo di Funzionamento** bensì è una procedura speciale che permette, partendo da uno degli altri 9 modi, di modificare a piacere un gran numero di parametri. Per ogni uscita è possibile selezionare: il Set di riferimento, l'isteresi, il tipo di azione (Direct o Reverse, con azione ON/OFF o PWM), l'isteresi rispetto alle uscite contigue, ecc. Inoltre è possibile programmare il funzionamento degli ingressi digitali, definire tempistiche sui tempi di attivazione delle uscite, e selezionare molte altre funzioni. Per i modelli con ingresso NTC è possibile utilizzare la seconda sonda per far funzionare lo strum. in differenz. o per modificare il Set Point in funzione della temperatura rilevata dalla seconda sonda (compensazione). L'utilizzo di questo **Modo** richiede una certa competenza oltre ad informazioni approfondite che sono fuori dalle finalità di questa guida. Per avere maggiori informazioni si richieda il Manuale Tecnico (cod. +030220160).

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Modifica automatica dei parametri al variare del Modo di Funzionamento

Ad ogni **Modo di Funzionamento** corrisponde un insieme predefinito di valori per i Set Points e i principali parametri. Questo significa che quando si modifica il **Modo di Funzionamento** lo strumento carica automaticamente in memoria l'insieme di valori associati al **Modo** scelto (vedi tabella successiva). I valori associati al Modo 2 sono in evidenza perché sono i valori di fabbrica o valori di Default. Questi possono essere ripristinati automaticamente spegnendo lo strumento e poi riaccendendolo con il tasto '6' premuto (Reset del controllo, vedi pag. 26).

Par.	Descriz.	Modo 1	Modo 2	Modo 3	Modo 4	Modo 5	Modo 6	Modo 7	Modo 8	Modo 9
St1	Set Point	20	20	20	20	20	20	20	20	20
St2	Set Point 2	assente	assente	assente	assente	assente	40	40	40	40
P1	Differenziale	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
P2	Differenziale	assente	assente	2.0	2.0	2.0	2.0	2.0	2.0	2.0
P3	Zona neutra	assente	assente	2.0	2.0	2.0	assente	assente	assente	assente
P14	Cal.sonda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P25	All. bassa (1)	100	-100	-100	-100	-100	-100	-100	-100	-100
P26	All. alta (2)	999	999	999	999	999	999	999	999	999
P27	Diff. allarme	2	2	2	2	2	2	2	2	2
P28	Ritardo all. (3)	60	60	60	60	60	60	60	60	60

(1): -50 per ingresso NTC

(2): 90 per ingresso NTC, +600 per ingresso Pt100.

(3): minuti

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- Come anticipato gli strumenti della serie Infrared vengono forniti già programmati, con impostato il **Modo 2**, ovvero funzionamento Reverse.

Se tale **Modo di Funzionamento** non è compatibile con l'utilizzo richiesto, lo si può facilmente modificare seguendo le seguenti istruzioni (vedi Fig.1 e 2):

- premere i tasti "5" e "6" contemporaneamente per 5 secondi;
- a display compare '0';
- impostare la password, ovvero premere il tasto "7" fino a visualizzare '22';
- premere il tasto "5" per confermare la password;
- se la procedura è stata eseguita in modo corretto, a display compare il codice "C0"; altrimenti bisogna ripetere le operazioni dal punto a).

C0 è il parametro corrispondente al **Modo di Funzionamento**. Per caricare sullo strumento uno dei 9 modi descritti è sufficiente assegnare a C0 il numero del **Modo scelto**, seguendo le seguenti modalità:

- quando C0 compare sul display, premere il tasto "5";
- a display appare un numero tra 1 e 9 che identifica il **Modo di Funzionamento** operativo sul regolatore fino a quel momento;
- per selezionare un diverso **Modo di Funzionamento** premere i tasti "7" o "8" fino a visualizzare il valore numerico associato al **Modo di Funzionamento** scelto; premere "5" per confermare il dato;
- premere il tasto "6" per concludere l'operazione e memorizzare definitivamente il nuovo **Modo di Funzionamento**.

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Nei Modo di Funzionamento 1,2,3,4 e 5 si ha la presenza di un unico Set Point e la procedura da seguire per la sua modifica è già stata descritta a pag. 6.

Nei modi di funzionamento 6, 7, 8 e 9 lo strumento lavora invece con 2 Set Points.

Per modificare entrambi i Set points operare come di seguito indicato (vedi Figg. 1 e 2):

- a) premere il tasto "5" per qualche secondo: a display compare St1
- b) rilasciare il tasto "5": a display lampeggia il valore attuale del Set Point 1
- c) premere i tasti "7" o "8" fino a raggiungere il valore desiderato;
- d) premere "5" per confermare il nuovo valore di St1;
- e) dopo aver confermato St1 lo strumento visualizza a display il codice St2 per qualche secondo, dopodichè compare lampeggiante il valore attuale del Set Point 2;
- f) premere i tasti "7" o "8" fino a raggiungere il valore desiderato;
- g) premere il tasto "5" per confermare il dato St2;
- h) a display riappare il valore rilevato dalla sonda principale.

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Le possibilità della serie Infrared Universale non si esauriscono con le funzionalità descritte nel capitolo "Programmazione Avanzata". Ci sono altri parametri speciali (tipo Cxx) che permettono di ottenere prestazioni ancora superiori a quelle sin qui viste. Per utilizzare in modo corretto queste funzioni è però necessaria una certa competenza e soprattutto la lettura attenta del Manuale Tecnico della Serie Infrared Universale da richiedere alla Carel o al suo distributore.

Per comodità si riporta di seguito la lista completa di tutti i parametri disponibili sulla serie Infrared (tipo Pxx e Cxx), esclusi quelli relativi al Modo Speciale (vedi pag. 20); il commento ai parametri è limitato all'essenziale visto che lo scopo dichiarato è fornire una comoda tabella riassuntiva a chi già conosce significato e modalità di funzionamento dei parametri riportati.

Per accedere alla lista completa dei parametri seguire la procedura indicata a pag. 20, utilizzando come **password** il numero '77'. Se la procedura è stata eseguita correttamente a display comparirà il primo parametro della lista, ovvero C0.

Per la visualizzazione del valore dei parametri e la sua eventuale modifica seguire le modalità già viste in precedenza. Analogamente per confermare le modifiche fatte, sarà necessario terminare la procedura premendo il tasto "6".

Par.	Descrizione	Min.	Max	Default
St1	Set Point 1	min. sonda	max. sonda	20
St2	Set Point 2 (Modi di Funzionam. 6,7,8,9)	min. sonda	max. sonda	40
C0	Modo di Funzionamento (vedi pag. 12)	1	9	2

#### Selezione dei Differenziali (vedi pagg. 7 e 12)

P1	Differenziale Set Point 1	0.1	99.9	2.0
P2	Differenziale Set Point 2 (Modi 3,4,5,7,8,9)	0.1	99.9	2.0
P3	Differenziale zona neutra (Modi 3, 4, 5)	0.0	99.9	2.0

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Par.	Descrizione	Min.	Max	Default
C4	Autorità. Attiva solo nei modelli NTC, con Modo 1 o 2 e C19 = 2, 3 o 4. Posto D=NTC2 - SET2, si ha: se C19= 2 per D<=0 SET1=SET1 per D>0 SET1=SET1+D*C4 se C19= 3 per D>=0 SET1=SET1 per D<0 SET1=SET1+D*C4 se C19= 4 per NTC2 > SET2+P2, SET1=SET1+(D-P2)*C4 per NTC2 < SET2- P2, SET1=SET1+(D+P2)*C4	-2.0	2.0	0.5

C5	Tipo di regolaz.: 0=Proporzionale, 1= P+I	0	1	0
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Parametri relativi alle uscite

C6	Ritardo tra gli inserimenti di 2 relè diversi	0	999"	5"
C7	Tempo minimo tra le accensioni dello stesso relè	0	15'	0
C8	Tempo minimo di spegnimenti dello stesso relè	0	15'	0
C9	Tempo minimo di accensione dello stesso relè	0	15'	0
C10	Stato relé in caso di allarme sonda: 0= tutti i relè spenti 1= tutti i relè accesi 2= Accesi i relè in Direct, spenti gli altri 3= Accesi i relè in Reverse, spenti gli altri	0	3	0

C11	Rotazione uscite (solo Modi 1, 2, 6, 7 e 8) 0 = rotazione non attiva 1 = rotazione standard 2 = rotazione 2+2 (compressori su relé 1 e 3) 3 = rotazione 2+2 per valvole norm.aperte 4÷7= vedere il manuale tecnico	0	7	0
-----	---	---	---	---

- Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

Par.	Descrizione	Min.	Max	Default
C12	Tempo di ciclo funzionamento PWM	0,2"	999"	20"

Parametri sonda (vedi anche pag. 9)

C13	Tipo sonda: 0=4-20, 1=0-20; 0=tc K, 1=tc J NTC: se C13=1 viene visualizzato NTC2 con regolazione su NTC1	0	1	0
P14	Calibrazione sonda o Offset	-99	+99.9	0.0
C15	Valore minimo per ingresso I e V	-99	C16	0.0
C16	Valore massimo per ingresso I e V	C15	999	100
C17	Velocità risposta sonda (filtro antidisturbi)	1	14	5
C18	Selezione unità temperatura: 0=°C, 1=°F	0	1	0
C19	Funz. 2° sonda: solo vers.NTC, Modo 1 o 2 0 = nessuna modifica al funz. Standard 1 = funzionamento differenziale NTC1 - NTC2 2 = compensazione estiva 3 = compensazione invernale 4 = compensazione sempre attiva con zona morta	0	4	0

Parametri Set

C21	Valore minimo Set Point 1	-99	C22	min.sonda
C22	Valore massimo Set Point 1	C21	999	max.sonda
C23	Valore minimo Set Point 2	-99	C24	min.sonda
C24	Valore massimo Set Point 2	C23	999	max.sonda

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

Par.	Descrizione	Min.	Max	Default
Parametri di allarme (vedi anche pagg. 9 e 10)				
P25	Set allarme di bassa (assoluto)	-99	P26	min.sonda
P26	Set allarme di alta (assoluto)	P25	999	max.sonda
P27	Differenziale allarme	0.1	99.0	2.0
P28	Tempo ritardo attuazione allarme	0	120'	60'
C29	Ingresso dig.1 (attivo se C0 è diverso da 6, 7 e 8) In caso di allarme, lo stato dei Relè dipende da C31 0= ingresso non attivo 1= allarme esterno immediato, reset automatico 2= allarme esterno immediato, reset manuale 3= allarme esterno con ritardo (P28), reset manuale 4= ON/OFF regolazione in relazione stato ingr.dig.	0	4	0
C30	Gestione ingresso digitale 2 (solo IRDR) Per le opzioni vedi C29	0	4	0
C31	Stato uscite in caso di allarme da ingresso digitale: stesse opzioni del parametro C10	0	3	0
Altre predisposizioni				
C32	Indirizzo per connessione seriale	1	16	1
C33	Non modificare questo Parametro	0	1	0
C50	abilitazione tastiera (TS) e telecomando (TC) 0= TS off, TC on (solo parametri Tipo P) 1= TS on, TC on (solo parametri Tipo P) 2= TS off, TC off 3= TS on, TC off 4= TS on, TC on (tutti i parametri)	0	4	4 (Def.=1 per strumenti con serial number <10.000)
C51	Codice per l'abilitazione del telecomando	0	120	0

- **Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie**
- **Problema:** la tastiera e/o il telecomando non funzionano  
Verifica: si veda parametro C50.
- **Problema:** la misura oscilla continuamente  
Verifica: - la misura può essere influenzata da disturbi elettromagnetici. Si veda il Paragrafo " Consigli per un'installazione ottimale"  
- modificare il parametro C17 inserendo un valore minore.
- **Problema:** gli allarmi di alta e/o bassa non sono segnalati  
Verifica: il ritardo allarme può essere eccessivo. Vedi param. P25, P26 e P27
- **Problema:** le uscite non vengono attivate  
Verifica: verificare le tempistiche di protezione delle uscite, par. C6, C7, C8.
- **Problema:** le uscite vengono attivate troppo frequentemente  
Verifica: il differenziale è troppo stretto. Aumentarlo e/o modificare le tempistiche di protezione sulle uscite, parametri C6, C7 e C8.
- **Problema:** la misura non raggiunge mai il valore di Set Point  
Verifica: escludendo problemi di dimensionamento dell'impianto, il differenziale, P1 o P2, è troppo largo o la zona neutra P3 è eccessiva
- **Problema:** la misura visualizzata a display non corrisponde al valore reale  
Verifica: Può essere un problema di installazione del sensore (vedi pag. 7). Nelle versioni con ingresso in corrente, in tensione o J/K Tc si veda il paragrafo "Parametri speciali per termocoppe, ..." a pag. 12.

### Reset del controllo

**Avvertenza:** può essere utile riportare lo strumento alla configurazione di fabbrica. Ciò può essere fatto con la seguente procedura di Reset:

- 1 - togliere tensione allo strumento
- 2 - ridare tensione tenendo premuto il tasto '6'

- Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

Messaggio	Descrizione	Causa	Verifiche	Rimedi
Er0	errore sonda	cavo sonda interrotto	verifica dei collegamenti tra strumento e sonda	
		o in corto circuito		
		errore collegamento		
		sonda guasta	(es.: NTC=10KΩ@ 25°C)	
Er1(solo vers.NTC)	errore sonda NTC2	come sopra, ma per sonda NTC2	come sopra, ma per sonda NTC2	
Er2	errore memoria	caduta di tensione durante la programmazione interferenze elettriche	ripristinare i valori di fabbrica: spegnere lo strumento e quindi accenderlo con '6' premuto. Se Er2 persiste sostituire lo strum	
Er3	allarme esterno attivo	è aperto il contatto collegato all'ingresso digitale	funzionamento speciale (vedi param. C29 a pag. 24)	verificare contatto esterno
Er4	allarme di ALTA	l'ingresso ha superato P26 per un tempo>P28	verifica dei parametri P26, P28	
Er5	allarme di BASSA	l'ingresso è sceso sotto P25 per un tempo >P28	verifica dei parametri P25, 28	

### Note importanti:

- In caso di allarme, il buzzer e l'indicazione sul display devono essere resettati manualmente premendo il tasto '6' (vedi fig. 1 e 2). Per il codice di allarme il reset è attivo solo se la causa di allarme è scomparsa. Il relé di allarme (Modo 5) ha reset automatico, tranne che per valori particolari di P27 (Er4 e Er5) e C29 (Er3). Si veda il Manuale Tecnico.
  - Per **Er0, Er1 e Er2** il ripristino del funzionamento del regolatore è automatico al cessare della causa di allarme; **Er4 e Er5** non influenzano il funzionamento.
  - Per **Er3** il ripristino del funzionamento può essere manuale o automatico (vedi **C29**).

- Grit Washer Removal System - GW80 Bilfinger - Meyor Indus	
Ingressi	
a seconda del mod.(vedi pag.2):	<u>Temperatura</u> : NTC, Pt100, Termoc.K / J <u>In corrente</u> 4/20 mA o 0/20 mA <u>In tensione</u> -0,4/+1 Vdc <u>NTC</u> : -50/90 °C, Pt100: -100/600 °C, <u>TcK</u> : -100/999 °C, J/K <u>Tc</u> : -100/800 °C
Campo di funzionamento:	<u>Corrente e tensione</u> : vedi parametri C15 e C16 0.1 da -9.9 a 99.9, 1 nel campo restante ± 0.5 % del fondo scala
Risoluzione:	
Precisione controllo	
<b>Alimentazione</b>	
Tensione	<u>IR32D, W e Z</u> : da 12 a 24 Vac/Vdc ±10% <u>IR32V</u> : vedi pag. 2, campo 'd': tolleranza ±10% <u>IRDRV e W</u> : 24 Vac± 10% e 230 Vac± 10% <u>IRDRTE</u> : 230 Vac ± 10% <u>IRDRA e Z</u> : da 12 a 24 Vac/Vdc, ± 10%
Assorbimento	<u>IR32A, D e V</u> : 2VA; <u>IR32W</u> e <u>IR32Z</u> : 3 VA <u>IRDRTE</u> , <u>IRDRV</u> , <u>IRDRW</u> e <u>IRDRA</u> : 3 VA <u>IRDRZ</u> : 4 VA
Uscita alimentazione sonda	10 Vdc, @ max 30mA (8 Vdc per IRDRW)
<b>Condizioni di utilizzo</b>	
Temperatura di lavoro	0 ÷ 50 °C
Temperatura di immagazz.to	-10 ÷ 70 °C
Umidità relativa ambientale	inferiore al 90%rH, non condensante
Polluzione ambientale	normale

## Caratteristiche tecniche

# - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industri

### Isolamenti

Le parti in bassa tensione presentano un isolamento principale rispetto alle parti in bassissima tensione e un doppio isolamento rispetto al frontale.

### Uscite

Numero relè(a seconda del mod.)

IR32 per NTC: 1, 2 o 4 relè SPDT

altri IR32V: 1 relè SPST

IR32W: 1 relè SPST + 1 SPDT

IR32Z: 1 relè SPST + 3 SPDT

IRDRTE, IRDRV e W: 1o 2 relè SPDT

IRDRZ: 1° e 2° relè SPDT, 3° e 4° relè SPST

IR32D: 1 uscita per SSR (relè stato solido);

IR32A e IRDRA: 4 uscite per SSR (relè stato solido)

max. tensione 250 Vac, max. potenza 2000 VA,

max. corrente spunto 10A. Disconnessione di

tipo 1C secondo norme ECC EN 60730-1

tensione uscita: 10 Vdc; resistenza uscita: 660 Ω

max. corrente uscita: 15 mA

Caratteristiche relè (tutti i mod.)

Caratteristiche segnale per SSR  
(relè stato solido)

### Caratteristiche meccaniche

Connessioni strumento

IR32: montaggio a pannello con staffa

IRDR: montaggio su guida DIN

Contenitori

plastici, autoestinguenza IR32 secondo UL94 - VO

Grado di protezione

IR32: IP 65 con strum. montato a pannello

Collegamenti

IRDR: IP 40 con strum.montato a quadro

tramite morsetti a vite sez.max.1.5 mm<sup>2</sup>



## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

Collegamento seriale

(modelli indicati a pag.1)

IR32: tramite accessorio IR32SER

IRDR: tramite accessorio IRDRSER

Modifica parametri

da tastiera, da seriale e da telecomando  
(per l'accessorio telecomando vedi listino)

**Nota importante:** i cavi usati devono resistere alla massima temperatura d'esercizio,  
ovvero alla massima temperatura ambiente prevista + l'autorisaldamento del  
controllo pari a 20 °C con le uscite tutte alla max.portata.

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

La serie Universale Infrared Carel ha funzionalità sofisticate e caratteristiche innovative, assolutamente superiori ad altri strumenti simili proposti dai concorrenti in questa classe di prezzo. Ma non è tutto!

Carel propone per la serie Infrared una gamma di accessori in grado di permettere prestazioni ancora superiori. In particolare ricordiamo:

### **- Telecomando per la programmazione dei parametri di funzionamento**

Il telecomando Carel per la serie Universale è disponibile nelle principali lingue. Con questo accessorio modificare i parametri di funzionamento è semplice come cambiare il volume del vostro televisore! Contattate il vostro distributore per maggiori informazioni.

### **- Kit Modì per la modifica dei parametri di funzionamento da PC**

Il kit Modì per Personal Computer è la soluzione ideale per produzioni in piccola/media serie. Permette infatti di memorizzare su files eventuali configurazioni 'standard' che possono essere semplicemente e velocemente trasferite agli strumenti tramite un collegamento seriale. In questo modo si evita ogni possibile errore legato alla programmazione manuale dei controlli da parte di personale non esperto.

### **- Collegamento seriale**

Tutti i controlli sono predisposti al collegamento in rete per la realizzazione di sistemi di supervisione e teleassistenza.

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

- Sistema di supervisione e teleassistenza

Carel ha una vasta gamma di programmi software che consentono di risolvere ogni problema di supervisione e teleassistenza.

Tra le principali prestazioni:

- monitoraggio di tutte le variabili con memorizzazione dei dati su hard-disk. È possibile visualizzare l'andamento degli ingressi con grafici su base oraria, giornaliera o mensile. I dati memorizzati ed i grafici possono essere stampati.
- rilevazione e registrazione di eventuali allarmi, con data e ora
- modifica dei principali parametri direttamente da PC.

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## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

Your regulator belongs to the UNIVERSAL INFRARED SERIES comprising over 40 models

designed to control Pressure, Humidity and Temperature and developed according to the experience Carel has acquired for more than 20 years in the regulation of Conditioning, Refrigeration and Heating units. For your convenience we are illustrating below the code structure of the **Infrared Series**. Remember that all models, except those indicated below, are equipped with alarm buzzer, serial output and I.R. receiver for parameters programming through remote keypad (supplied as an accessory).

**IR aa b c d**

only for IR32V versions **d** can be different from 0:

**E**, 12÷24 Vac-dc, no I.R. receiver and no buzzer

**L**, 12÷24 Vac-dc

**U**, 24÷240Vac-dc, no supplied with serial card

**H**, 110÷240Vac-dc, no supplied with serial card

**0** for NTC probe

**1** for Pt100 probe

**2** for thermocouple probes, type J or K

**3** for current 0/20 mA or 4/20 mA

**4** for voltage input -0,4 / +1 Vdc

**D** in the versions with 1 output for SSR

**A** in the versions with 4 outputs for SSR

**V** for 1 relay output versions

**W** for 2-relay output versions

**Z** for 4-relay output versions

**32** for panel mounting version

**DR** for DIN rail mounting version

In addition, the model **IRDRTE0000** is available for DIN rail mounting, with 230 Vac power supply, 1 relay, NTC probe, no buzzer and no serial output.

## *Key features*

- Grit Washer Removal System - GW80 Bilfinger - Meyjor Industries

**1 - Display:** shows the value measured by the connected probe. In the event of alarm condition the probe value will be shown alternately with the codes of activated alarms. During programming it shows the parameter codes and their values.

**2 - Decimal Point:** shows the number of decimal points in the controlled parameter.

**3 - Led reverse:** flashes when at least one device with "Reverse" function is activated. The number of flashes indicates the Reverse activated relays. A 2-second-pause occurs, between flashes.

**4 - Led direct:** flashes when at least one device with "Direct" function is activated. The other indications are the same as in "Led reverse".

**5 - Key SEL:** Note: for the meaning of **Reverse** and **Direct** see next paragraph.  
displays and/or selects the Set-point. If pressed for more than  
5 seconds together with PRG-MUTE, it allows you to enter the  
password and the configuration parameters (code type 'Cxx').

**6 - Key PRG/Mute:** If pressed for 5 seconds it allows you to access the menu of the more frequently used parameters (code type 'Pxx'). In the event of alarm condition, it silences the buzzer and it also resets any other alarm signal, if pressed after the event that caused the alarm has disappeared.

**7 - Key Up:** increases the value of the Set-point or of any other selected parameter.

**8 - Key Down:** decreases the value of the Set-point or of any other selected parameter. For NTC input versions, if pressed when the main probe value is shown, it displays the value of the second probe as long as the key is being pressed (see NTC1, NTC2, paragraph "Connections").



## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

To install the regulator follow these instructions:

- 1) **connect probes and power supply** following the instructions in the paragraphs below "Hints for Installation" and "Connections". It is advisable to connect actuators only after having programmed the controller.
- 2) **setting the instrument.** The Infrared Series regulators are supplied preprogrammed so as to be used in the more frequent applications (see page 38). However, it is always possible to modify in part or completely the factory-set function so as to customize the instrument to your requirements. There are two programming procedures:
  - 2a) **simplified programming.** In all factory-set applications, you only have to check and if necessary to modify a few parameters (Set-point and differential for example). It is also possible to modify other parameters to obtain better performance (see "Description of useful Parameters").
  - 2b) **advanced programming.** It allows the instrument to be tailored to uses different from the factory-set ones. As you will see, programming is extremely simple thanks to a series of prearranged functions (Modes), which are ready to be activated.
- 3) **for models with current, voltage or J thermocouple inputs,** some special parameters should be selected. See paragraph "Special parameters for thermocouples and voltage/current probes".
- 4) **connecting the actuators.** It is recommended to carefully evaluate the maximum switching power of relays (see "Technical specifications").

## Hints for optimum installation

### - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus For optimun performance please follow the notes below.

- Remember that it is necessary to install all the electromechanical devices required to ensure a safety operation of the plant.
- Avoid installation in places with the following features:
  - Relative humidity higher than 90% or condensing
  - Heavy vibrations or shocks
  - Exposures to continuous jets of water
  - Exposure to aggressive and polluting environment (eg: sulphurous and ammoniacal gases, saline mist, smoke) to avoid corrosion and/or oxidation
  - High magnetic and/or radio interferences (avoid therefore machine installation near transmitter aerials)
  - Exposure of controllers to direct solar radiation and to atmospheric agents in general.
- It should be remembered that incorrect connection of power supply voltage can seriously damage the system. When connecting the regulators it is necessary to follow these instructions:
  - Use wire suitable for the used terminals
  - Slacken each termination screw and insert the wire terminals, then tighten the screws
  - When the procedure has ended, pull the cables slightly to check the correct tightening
  - Separate as much as possible the probes and digital input cables from those of inductive and power loads, to avoid any electromagnetic interferences.
- Never insert in the same channels power cables and probe cables.



## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

- Avoid installing probe cables near power devices (Magnethermic contactors or others).

- Probes can be positioned up to a **maximum distance** of 100 meters from the controller, provided that their cables have a minimum section of 1mm<sup>2</sup> and are shielded.
- To improve immunity against noise and to get a better precision, we advise using shielded cables; in this case, connect **just one end of the shielding to the electrical panel ground**; do not connect the other end of the cable.

When using thermocouples, it is necessary to use shielded cables to ensure protection against noise; moreover, the probes can be lengthened only by using the suitable compensated cables and connectors. (As for codes see Carel price-list).

- If a supervisory network connection is provided through suitable serial boards (IR32SER for IR32 models and IRDRSER for IRDR models), it is necessary to pay attention to the earthing of the system. In particular: the secondary of the transformers which feed the instruments should not be earthed. If it is necessary to connect to a transformer with a earthed secondary, an isolating transformer should be used. Even if it is possible to connect more instruments to the same insulation transformer, we suggest you to use a different insulation transformer for each instrument (see Carel price list for the codes and specifications of the insulation transformers).

## Easy set-up: basic concepts

### - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

Before describing how to program the instrument, it is necessary to review some basic concepts:

- **Direct Mode and Reverse Mode:** a regulator works in Direct mode, when it tends to operate against the rise of the controlled variable. Direct function is typical, for example, of refrigeration: the more the measured temperature increases the more the capacity of the refrigeration circuit increases, so as to make temperature itself fall. We use the term Reverse if the regulation tends to operate against the decreasing of the controlled variable. This is used, for example, in heating systems where you have to oppose the decreasing temperature by increasing the heat production.
- **Set-point (or Set):** this is the value that the controlled parameter has to maintain, for example the value of the temperature at which an oven is to work. When the controlled parameter is at the Set-point value, all outputs are de-activated.
- **Differential or hysteresis:** regulates the outputs when the controlled parameter deviates from the Set. Without Differential the instrument could pass suddenly from all outputs OFF (parameter equal to SET) to all outputs ON (parameter different from SET). Instead, when differential  $> 0$ , the outputs insertion is gradual and the regulator will activate all outputs only when the difference between the controlled parameter and the Set Point exceeds the value of the Differential. A 'narrow' differential usually maintains the controlled parameter very near to the Set, but it can provoke frequent turning ON and OFF of the controlled devices i.e. hunting problems. If a very precise regulation is required, instead of selecting a narrow differential, the P+I regulation (described in the "Technial Manual") can be activated.

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

The instrument is supplied ready for the following applications:

**Models with temperature probes (NTC, Pt100, Thermocouples):** control of ovens, burners, heating systems and in general low temperature alarms.

**Models for humidity probes:** control of humidifiers and in general low humidity alarms.

**Models for pressure probes:** control of evaporators and in general low pressure alarms.

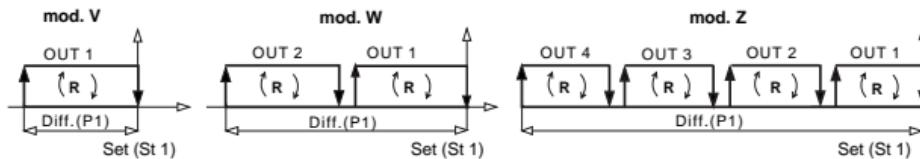


Fig. 4

As shown in the picture, the main parameters in this function mode are Set Point (St1) and differential (P1). For the standard function, which corresponds to Reverse action, the regulator energizes the outputs only if the controlled parameter decreases from the Set-point value. Once fixed at the desired Set Point (St1), the outputs will be energized one by one as the parameter deviates from St1. As shown in the picture, in models with more outputs, the activation of relays is equally distributed within the differential. When the controlled parameter is equal to/lower than St1-P1, all outputs will energize. Viceversa, starting from values lower than St1, if the parameter starts to increase any active relay will be de-activated as approaching St1. When the St1 value is reached, all outputs will be disenergized.

The REVERSE led will flash with a number of pulses equal to the activated outputs.

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

To customize the regulator's function to your requirements it will be necessary to modify the Set (factory-set value= 20) and the differential (factory-set value= 2). However, there are other parameters, not previously programmed, which can be usefully selected:

### **Useful Parameters**

**Higher/Lower limit alarm set:** allows you to select a maximum and a minimum value for the controlled param. When the instrument detects a value which is beyond the set thresholds, it displays an alarm code and gives off an acoustic signal (in models with buzzer). High and low thresholds are absolute values and so, to avoid alarm intervention during normal function, they have to be beyond the "Set Point-differential" plus "Set Point". If the Set Point has been modified, it is necessary to check that the new combined values do not exceed alarm limits.

**Alarm differential:** the hysteresis of the alarms. A minimum differential is necessary to avoid consecutive activating/deactivating of alarms due to small variations in the controlled parameter. Infrared Series regulators have a factory-set alarm differential value of "2".

Higher/lower limit alarms have an automatic reset, in fact when the controlled parameter returns within the maximum allowed limits, the alarm is automatically deactivated.

It is possible to set the alarm set, even if a relative alarm, assigning the values with a negative sign to the parameter P27). In this case, pay attention to the signs of P25 and P26: as a matter of fact the negative sign shows the event of its respective alarm before the Point, whereas the positive sign shows the event after the Set Point.

**Alarm delay:** allows you to set a time-delay in the alarm signal. The regulator activates the alarm only after the selected time delay has elapsed. If during a delay the controlled parameter returns within the allowed limits, the timer will be zeroed.

**Calibration offset:** allows you to modify the value displayed by the instrument. This compensates for any errors or differences with other instruments.

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

For your convenience we have listed the factory-set values of the Set Point and of the other useful parameters as follows.

Parameter	Code	Factory-set value	Range
Set Point	St1	20	probe limits
Differential	P1	2,0	0.1 / 99.9
Calibration offset	P14	0,0	-99 / 99
Lower limit alarm	P25	depending on the probe	-99 / P26
Higher limit alarm	P26	depending on the probe	P25 / 999
Alarm Differential	P27	2,0	0.1 / 99.9
Alarm Delay	P28	60 minutes	0 / 120 min.

**The Set-point can be modified as follows (pictures 1 and 2):**

- press the "5" key for some seconds: the display shows St1;
- release the "5" key: the actual value of the Set-point will flash;
- press either "7" or "8" keys until you reach the desired value;
- press "5" to confirm the new St1 value;

**The Differential and the Useful Parameters can be modified as follows:**

- press the "6" key for 5 seconds: "P1" is displayed;
- press either "7" or "8" keys until the parameter to be modified is shown;
- press the "5" key: the present value of the parameter to be modified is displayed;
- press either "7" or "8" keys until you reach the desired value;
- press "5" to confirm;
- the code identifying the modified parameter is displayed;
- repeat instructions from point b) to point f) if you want to modify other parameters, otherwise go to point h);
- press the "6" key to store the modified data and go back to normal operation.

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

*Current input models have a special parameter, C13, which allows you to choose the type of current input: C13=0 for 4/20 mA probes, factory-set value, and C13=1 for 0/20 mA probes. The value is therefore to be modified only if a 0/20 mA probe is being used.*

*The same C13 parameter is used by thermocouple input instruments: The value C13=0, factory-set, corresponds to thermocouples type K, C13=1 to thermocouples type J. The value of C13 is therefore to be modified only if you require thermocouples type J.*

*Current/voltage inputs instruments have two special parameters, C15 and C16, which allow the user to define the working range of the actual probe, and which are the values corresponding to minimum (C15 parameter) and maximum (C16 parameter) input. C15 and/or C16 parameters must be modified only if the probe limits are different from the factory-set ones: C15=0 and C16=100.*

***C13, C15 and C16 parameters can be modified as follows:***

- a) press the "5" and "6" keys simultaneously for 5 seconds;
- b) the display shows 0;
- c) select the password, by pressing the "7" key until 22 is displayed;
- d) press the "5" key to confirm the password;
- e) if the selected password is correct, code "C0" will be displayed, otherwise you will have to repeat procedures from point a);
- f) press the "7" and/or "8" keys until the desired parameter is displayed (C13, C15 or C16); then press the "5" key;
- g) the value associated to the parameter is displayed: press either "7" or "8" keys until the desired value is displayed; press "5" to confirm;
- h) repeat procedures from point f) to modify other parameters or press the "6" key to exit the procedure.

- **Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie**  
*Advanced programming allows you to modify the functions of the instrument to adapt it to uses different from the factory-set ones (pag. 38).*

This is an extremely simple procedure thanks to the **Function Modes**. In each regulator, in fact, have been memorized as many as **9 different programs** designed to optimally provide the best solution to any control problems. The procedure is as follows:

- 1) having chosen the Function Mode suitable to your application, you will have to activate it by modifying a parameter (C0)
- 2) then you will be able to modify Set-point, differential and any other parameter you consider useful by following the same procedures described above.

Before describing in detail the features of the 9 "Function Modes" it is necessary to introduce two other basic concepts:

**Multiple Set-Points.** We have previously described the function with only one Set. There are, however, applications with 2 Sets: this is the case, for example, of a heating system working with two different Sets, one for functioning by day and the other by night, or of a conditioning system with a winter Set and a summer Set. As you will see in the description of Modes, the Infrared series regulators can also manage two set-points.

**Neutral Zone or Dead Band:** indicates an interval in the values around the Set Point where the controlled parameter can fluctuate without having to activate any outputs. The concept will be resumed in the description of Modes 3, 4 and 5.

**Note:** to follow the description of Modes more easily it is advisable to refer to the pictures at the end of the manual. In the description below, associated to parameters, you will always find the corresponding programming code (eg. **Set** will be associated with code **St1**) so as to simplify any modification of these parameters.

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### Mode 1: DIRECT function (pict. 5).

The main parameters in this kind of function are Set Point (St1) and differential (P1). In the Direct function mode the regulator opposes the controlled parameter only if it exceeds the Set Point value. Having once fixed the desired Set Point (St1), the outputs will be energized one by one as the parameter deviates from St1. As shown in the picture, the relays in the models with more outputs are equally distributed within each single set differential. When the controlled parameter is equal to/higher than St1+P1, all outputs energize. Viceversa, if the parameter, starting from values higher than St1, starts to decrease, any active relay will be deactivated as approaching St1. When the St1 value is reached, all outputs will be disenergized. The DIRECT led will flash periodically, once for each activated output.

### Mode 2: REVERSE function mode (pict. 6).

This is the previously described factory-set mode.

### Mode 3: Dead-Band function mode (pict. 7).

The main parameters in this kind of function mode are Set Point (St1), Reverse mode differential (P1), Direct mode differential (P2) and Dead-Band (P3). The aim of the regulator is to bring the controlled parameter within a limited range, called dead zone, set around the Set Point (St1). As shown in the picture, the dead zone value depends on the P3 parameter value. Within the dead zone the instrument does not require the intervention of any device. Outside the dead zone the instrument will work in DIRECT mode, when the controlled parameter increases and, in REVERSE mode, when it decreases. According to the used model, there can be one or more relays in Direct and Reverse function. Said outputs are activated/deactivated according to the procedures already shown in modes 1 and 2, according to the values of the controlled parameter, of St1 value, of P1 and of P2. The DIRECT led and REVERSE led indicators will flash as already described. **Warning:** when the instrument has only one relay output, it will work in REVERSE mode with Dead-Band.

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### Mode 4: PWM function mode (pict. 8).

The main parameters in this kind of function mode are Set Point (St1), Reverse mode differential (P1), Direct mode differential (P2) and dead zone (P3). The logic of regulation in this kind of function is the same as in Mode 3. It is, in fact, a function with Dead-Band with the extra feature that relays are activated in an impulsive way according to the PWM procedure (Pulse Width Modulation). In practice, each single relay, instead of being activated when exceeding the differential (or part of it), is periodically activated (with a period of 20 seconds, modifiable if needed) for a time from 0,2 to 20 seconds, according to the amount of power. The relay ON period is **proportional** to the position of the controlled parameter within the differential, as shown in the picture. The PWM functioning therefore provides a proportional control which can improve the regulation of the controlled parameter. However, the limits of this kind of functioning should be considered. For example, it is not advisable to use it with compressors or other actuators whose reliability can suffer the effects of rapid switching. It should be remembered, then, that too rapid on/off routines of the relays can compromise their life (calculated in about 1 million activations). In **PWM** function DIRECT/ REVERSE leds will flash with a number of flashes equal to the number of active outputs. When the instrument is equipped with only one relay, it will function in REVERSE mode with Dead-Band.

### Mode 5: alarm function mode (pict. 9).

The main parameters in this kind of function mode are Set Point (St1), Reverse mode differential (P1), Direct mode differential (P2), Dead-Band (P3), lower limit alarm Set (P25), higher limit alarm Set (P26), alarm differential (P27) and alarm time delays (P28). With this kind of function 1 relay (V and W versions) or 2 relays (Z version) have been set to signal the presence of a general alarm (disconnected or short circuit probe, anomalous function in electronics) or a higher/lower limit alarm. In V and W versions the activated relay is always

- **Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus**  
the same. In Z version relay 3 is activated for general alarms and for lower limit alarm, whereas relay 4 is activated for general alarms and for higher limit alarm. The alarm relay activation is added to the other alarm signals, active with other function modes that are **alarm code on display and acoustic warning** (in buzzer equipped versions). In W and Z versions, the relays which are not used for the alarm signal can be used as in Mode 3. Once activated, the alarm output will go back to the OFF position when the cause of the alarm ends ("automatic resetting", is obtained with a "low" value selected for the alarm differential P27) or when the PRG-MUTE key is being pressed (with manual resetting, is obtained by selecting "high" values for P27). It is important to point out that if the MUTE key is pressed when the cause of the alarm is still present, the buzzer will be silenced but the alarm code and the alarm relay will remain active.

**Mode 6: Direct / Reverse selection from digital input (pict. 10).**

The main parameters in this kind of function are Set Point (St1), Direct mode differential (P1), Set Point (St2) and Reverse mode differential (P2). The instrument selects Direct or Reverse function (see Mode 1 and Mode 2) according to the condition of the digital input 1. More precisely you will have: Direct function when digital input 1 is open and Reverse function when digital input 1 is closed.

**Mode 7: Direct function mode with selection of Set and differential from digital input (pict. 11).**

With this kind of function the condition of the digital input (open/closed) does not change the kind of action (always Direct), but changes Set Point and differential. The main parameters in this kind of function are active Set (St1) and differential (P1) with open digital input and active Set (St2) and differential (P2) with closed digital input.

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*Mode 8: Reverse function mode with selection of Set and differential from digital input (pict. 12).*

With this **kind of function** the variation of digital input (open/closed) does not change the kind of action (always Reverse), but changes Set Point and differential. The main parameters in this kind of function are active Set (St1) and differential (P1) with open digital input and active Set (St2) and differential (P2) with closed digital input.

#### **Mode 9: function with 2 Set Points, one in Direct and one in Reverse (pict. 13).**

The main parameters in this kind of function are Set-point (St1), Direct mode differential (P1), Set Point (St2) and Reverse mode differential (P2). This function is present in W and Z versions, and is similar to mode 3 (function with Dead-Band) since half of the outputs are active in Direct and half in Reverse. The difference is that there is no single fixed Set Point, so you can work as if you had two independent instruments working with the same probe.

#### **Special function.**

This **special mode** gives no limits to the outputs management. This procedure allows you, starting from one of the other 9 modes, to modify a great number of parameters. For each output it is possible to select: reference Set, hysteresis, kind of action (Direct or Reverse, with On/Off or PWM action), hysteresis between two adjacent outputs, etc. Moreover, it is possible to select the digital input function, to define timings on outputs, activating times and to select many other functions. For NTC input models, a second probe can be used to make the instrument work in differential mode or to modify the Set Point according to the temperature read by the second probe (compensation). The use of this mode requires a certain experience as well as detailed information which cannot be found in this guide. To get further information please ask for the Universal Infrared Series **technical manual** (code +030220160).

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*Value of the main parameters with the different Function Modes.*

Each Function Mode has a defined set of values for Set-points and main parameters. This means that, when the Function Mode is modified, the instrument will automatically store the set of values associated to the selected Mode.

The table below shows the values associated with the first 9 Modes. Mode 2 has been highlighted because it is the factory-set one (Default value). In any moment it is possible to reset the Default value using the 'Reset procedure' (see pag. 57).

Par.	Descript.	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7	Mode 8	Mode 9
St1	Set-point 1	20	20	20	20	20	20	20	20	20
St2	Set-point 2	absent	absent	absent	absent	absent	40	40	40	40
P1	Hysteresis	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
P2	Hysteresis	absent	absent	2.0	2.0	2.0	2.0	2.0	2.0	2.0
P3	Dead-Band	absent	absent	2.0	2.0	2.0	absent	absent	absent	absent
P14	Probe Calibr.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P25	Lower al. (1)	-100	-100	-100	-100	-100	-100	-100	-100	-100
P26	Higher al. (2)	999	999	999	999	999	999	999	999	999
P27	Alarm Hyster.	2	2	2	2	2	2	2	2	2
P28	Alarm del. (3)	60	60	60	60	60	60	60	60	60

(1): -50 NTC input

(2): 90 for NTC input, +600 for Pt100 input.

(3): minutes

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As previously explained, the Infrared series instruments are supplied ready to use, with pre-selected Mode 2 (Reverse function).

If this kind of function is not compatible with the required use, it can be easily modified by following these instructions (see pict. 1 and 2):

- a) press the "5" and "6" keys **simultaneously** for 5 seconds;
- b) the display shows 0;
- c) select the password by pressing the "7" key up to 22;
- d) press the "5" key to confirm the password;
- e) if the selected password is correct, the display will show the code "C0", otherwise you will have to repeat the instructions from point a).

C0 is the parameter corresponding to the "Function Mode". To load one of the 9 described Modes it is sufficient to give C0 the chosen Mode number, according to the following instructions:

- f) when C0 is displayed, press the "5" key;
- g) the display shows the present Function Mode;
- h) press either "7" or "8" keys until you reach the desired Function Mode; press "5" to confirm;
- i) press the "6" key to end procedure and memorise the new function mode.

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In Function Modes 1, 2, 3, 4 and 5 there is only one Set Point, the procedure to modify it has already been described on page 40.

In Function Modes 6, 7, 8 and 9 the instrument works with 2 Set Points. To modify both Set Points follow these instructions (see pictures 1 and 2):

- a) press the "5" key for some seconds: the display will show St1;
- b) release "5": the present value of St1 begins to flash;
- c) press either "7" or "8" keys until you reach the desired value;
- d) press "5" to confirm the newly set value of St1;
- e) after having confirmed St1, the display shows the St2 code for some seconds, and then the present value of Set point 2 begins to flash;
- f) press either "7" or "8" until you reach the desired value;
- g) press "5" to confirm St2;
- h) the display shows again the value read by the main probe.

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The Universal Infrared instruments are capable of performing a lot of extra functions besides those described in the Advanced Programming Procedure section, thanks to some **special parameters** (Cxx type).

For your convenience the table below lists all the standard parameters of the Infrared regulators (Pxx and Cxx types) **except those regarding the Special Mode**. Each parameter will be accompanied by just a **brief** description because we assume you already know the meaning and function mode of each single parameter. We strongly recommend reading carefully the Technical Manual of the Universal Infrared Range before using the **special parameters**.

To access the full parameter list, follow the procedure indicated on page 49 but replace the password "22" with "77". If you enter the right password, the display will show the first parameter of the list, that is C0. To display and modify the value of the parameter follow the procedure described above. Similarly, in order to confirm any modification, press "6".

Par.	Description	Min.	Max	Default
SI1	Set Point 1	min. probe	max. probe	20
SI2	Set Point 2 (Function Modes 6, 7, 8, 9)	min. probe	max. probe	40
C0	Function Mode (see page 42)	1	9	2

Setting the Hysteresis (see pages 37 and 42)

P1	Hysteresis of Set Point 1	0.1	99.9	2.0
P2	Hysteresis of SP 2 (F. Modes 3,4,5,7,8,9)	0.1	99.9	2.0
P3	Dead-Band (Function Modes 3,4,5)	0	99.9	2.0

Par.	Description	Min.	Max	Default
C4	Compensation Coefficient. NTC only and with Mode 1 or 2 & C19 = 2, 3 or 4. Consider $D=NTC2 - SET2$ : <b>if C19 = 2</b> when $D \leq 0$ $SET1=SET1$ when $D > 0$ $SET1=SET1+D*C4$ <b>if C19 = 3</b> when $D \geq 0$ $SET1=SET1$ when $D < 0$ $SET1=SET1+D*C4$ <b>if C19 = 4</b> when $NTC2 > SET2+P2$ , $SET1=SET1+(D-P2)*C4$ when $NTC2 < SET2- P2$ , $SET1=SET1+(D+P2)*C4$	-2.0	2.0	0.5
C5	Control action: 0=Prop(P), 1=Prop+Integ(P+I)	0	1	0
<i>Parameters of the outputs</i>				
C6	Delay between on routines of 2 different outs	0	999"	5"
C7	Minimum time between on routines of the same output	0	5'	0
C8	Minimum off time of the same output	0	5'	0
C9	Minimum on time of the same output	0	15'	0
C10	Status of the outputs with probe alarm: 0 = All relay de-energized 1 = All relays energized 2 = Direct action relays energised, all others de-energised 3 = Reverse action relays energised, all others de-energ.	0	3	0

- Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie				
Par.	Description	Min.	Max	Default
C11	Output rotation: Modes 1, 2, 6,7,8 & models W&Z 0: no rotation 1: standard rotation 2: 2+2 rotation (compressor on outs 1 & 3) 3: 2+2 rotation (valve normal open) 4÷7: see technical manual	0	7	0
C12	time of PWM cycle	0,2"	999"	20"
<i>Probe parameters (see page 41)</i>				
C13	Probe type: 0=4-20, 1=0-20; 0=K T/c, 1= J T/c NTC input: if C13=1 the instruments displays NTC2 and controls on NTC1	0	1	0
P14	Probe calibration or offset	-99	+99.9	0.0
C15	Min.value for scaling of analogue inputs	-99	C16	0.0
C16	Max.value for scaling of analogue inputs	C15	999	100
C17	Probe response time (noise filter)	1	14	5
C18	Temperature units: 0=°C, 1=°F	0	1	0
C19	2nd probe: NTC only, Mode 1 or 2 0 = no modification of the Standard Mode 1 = differential mode NTC1 - NTC2 2 = summer compensation 3 = winter compensation 4 = active compensation with Dead-Band	0	4	0

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Par.	Description	Min.	Max	Default
<u>Set-Point</u>				
C21	Minimum Set-point 1 limit	-99	C22	min. probe
C22	Maximum Set-point 1 limit	C21	999	max.probe
C23	Minimum Set-point 2 limit	-99	C24	min. probe
C24	Maximum Set-point 2 limit	C23	999	max.probe
<u>Alarm Parameters (see pages 37 and 38)</u>				
P25	Low absolute alarm Set-Point	-99	P26	min.probe
P26	High absolute alarm Set-Point	P25	999	max.probe
P27	Alarm hysteresis	0.1	99.0	2.0
P28	Alarm Delay	0	120'	0'
C29	Config. of dig. input 1 (C0 must be different from 6,7,8) 0 In case of alarm the status of relays depends on C31) 0 = non active input 1 = immediate alarm with automatic reset 2 = immediate alarm with manual reset 3 = delayed alarm (P28) with manual reset 4 = on/off of the control	0	4	0
C30	Digital Input 2 (IRDR only) Options as for C29	0	4	0
C31	Status of the outputs in case of alarm condition detected via digital input. Options as for C10			

- Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie		Min.	Max	Default
Par.	Description			
<i>Other:</i>				
C32	Address of unit for serial connection	1	16	
C33	Do NOT modify this parameter	0	1	0
C50	Activation of Keypad (KP) and Remote Control(RC)	0	4	4
	0 = KP off, RC ON (only type P parameters)			(Def.=1 for
	1 = KP on, RC ON (only type P parameters)			instr.with
	2 = KP off, RC OFF			serial num.
	3 = KP on, RC OFF			< 10.000)
	4 = KP on, RC ON (all parameters)			
C51	Code to activate the IR remote control	0	120	0

## *Troubleshooting and Reset of the control*

- Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus
  - **Problem:** keypad/remote control unit does not work  
Check: see parameter C50.
  - **Problem:** value changes repeatedly  
Check: - possible noise. See 'Hints for Installation' above.  
- modify parameter C17 (decrease its value).
  - **Problem:** high/low alarms are not detected  
Check: decrease alarm time delays. See parameters P25, P26 and P27
  - **Problem:** outputs not activated  
Check: check time delays of the outputs; par. C6, C7, C8.
  - **Problem:** outputs are activated too often  
Check: increase the value of the differential. See par. C6, C7 and C8.
  - **Problem:** the variable never reaches the set-point  
Check: if the size of the entire system has been correctly calculated, the differential P1 or P2 should be decreased as well as the Dead-Band P3
  - **Problem:** the value displayed does not correspond to the actual value  
Check: the position of the sensor (see page 35&36). For models with current, voltage or J/K Tc input see the section "Special Parameters for Thermocouples" (see page 43).

### *Reset of the control*

**Important:** sometimes you may need to restore the factory-set configuration. To do so, follow these guidelines (Reset procedure):

- 1 - cut off power
- 2 - supply the instrument while holding down '6'

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

Messages	Description	Cause	Solution
Er0	probe error	probe cable interrupted or short-circuited	check connections between instrum.&probe
		connection error	check probe signal (eg. NTC=10KΩ @25°C)
		faulty probe	
Er1 (NTC only)	probe error NTC2	see above but for probe NTC2	see above but for NTC2 probe
Er2	memory error	supply cut off during programming step	turn off then turn on the instrument again holding down key "6"
		electrical noise	if persists, replace the unit
Er3	external alarm	digital input contact open	special function: see parameter C29
			check external contact
Er4	HIGH alarm	input has exceeded P26 for more than P28	check parameters P26 and P28
Er5	LOW alarm	input is below P25 for more than P28	check parameters P25 & P28

**Warning:** In case of alarm condition, the buzzer and the alarm code must be manually reset pressing the key '6' (note: the alarm code will disappear only if the alarm is not still pending). The alarm relay (Mode 5 only) is automatically reset when the alarm disappears; it can need a manual reset only for special value of P27 (Er4 & Er5) and of C29 (Er3) (see the technical manual for details). In case of alarm type Er0, Er1, Er2 the normal function of the unit restarts automatically when the alarm disappears; after a Er3 alarm the unit restarts automatically or manually according to C29; Er4 & Er5 alarms do not affect the normal function of the unit.

## Technical specifications

# - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

### Inputs

according to model (see pag 32):

Temperature: NTC, Pt100, K/J Thermoc.

Current 4/20 mA or 0/20 mA

Voltage -0,4/+1 Vdc

NTC: -50/90 °C, Pt100: -100/600 °C,

ThcK: -100/999 °C, ThcJ: -100/800 °C

Current/Voltage: see parameters C15 and C16

0.1or 1, according to decimal point selection

± 0.5 % of maximum range

Operating range:

Resolution:

Controler accuracy:

### Power supply

Voltage

IR32D, W and Z: from 12 to 24 Vac-dc ±10%

IR32V: see pag.1 field 'd', tolerance ±10%

IRDRV and W: 24 Vac ± 10% and 230 Vac ± 15%

IRDRT: 230 Vac ± 15%

IRDRA and Z: from 12 to 24 Vac-dc, ± 10%

IR32A, D and V: 2VA; IR32W and IR32Z: 3VA

IRDRT, IRDRV, IRDRW and IRDRA: 3VA

IRDRZ: 4VA

10 Vdc, @ max 30mA (8Vdc for IRDRW)

Power consumption:

Probe power supply output:

### Conditions of use

Working temperature:

0 ÷ 50 °C

Storage temperature:

-10 ÷ 70 °C

Relative ambient humidity:

lower than 90%rH, not condensing

Ambient pollution:

normal

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie *Insulation*

*There is a basic insulation between the low voltage section and the very low voltage section and a double insulation between the low voltage section and the front panel.*

### **Outputs**

Number of relays:  
(according to the mod.)

IR32 for NTC: 1, 2 or 4 SPDT relays  
others IR32V: 1 SPST relay;  
IR32W: 1 SPST relay + 1 SPDT;  
IR32Z: 1 SPST relay+ 3 SPDT  
IRDRTE, IRDRV & W: 1 or 2 SPDT relays  
IRDRZ: 1st and 2nd relays SPDT, 3rd & 4th SPST  
IR32D: 1 output for SSR (solid status relay)  
IR32A and IRDRA: 4 outputs for SSR  
(solid status relay)

Relay features (all models):

max.sw.voltage 250 Vac, max. sw.power 2000VA,  
max.inrush curr. 10A. Disconnection of  
type 1C according to ECC EN 60730-1  
output voltage: 10 Vdc; output resistance: 660 Ω  
max. outputs voltage: 15 mA

Signal characteristics for SSR  
(solid status relay)

### **Mechanical features**

Connections:

IR32: panel mounting with hanger

Cases:

IRDR: DIN rail mounting

Protection index:

plastic; IR32 autoextinguishing according to UL94-40

Connections:

IR32: IP 65 with panel mounted instrument

IRDR: IP 40

through screw terminals max. sect. 1.5 mm<sup>2</sup>

## Technical specifications

- Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus	
Serial connection (models indicated on pag.1)	<u>IR32</u> : through accessory <b>IR32SER</b> <u>IRDR</u> : through accessory <b>IRDRSER</b>
Parameters modification	from keyboard, from serial and from remote control (for remote control accessory see price-list)

**Important:** cables should resist to maximum temperature, that is the maximum ambient temper. allowed for the unit + controller (self heating is 20 °C max., with all outputs ON).

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus

The range of the *Carel Universal Infrared Instruments* features absolutely innovative specifications and is certainly extremely competitive with any other regulator on the market in this price bracket. And what's more, the *Infrared Series* can be further enhanced with a complete range of accessories capable of making your instrument perform superbly. Here are some examples:

### - *Remote Control, for an easy programming procedure*

The remote control unit for the *Carel Universal Infrared regulators* is available in the main languages. Modifying the working parameters is now as easy as to turn up or down the volume of your TV set. For more information, contact your nearest dealer.

### - *Modi Kit for parameters modification via PC*

The *Modi Kit for Personal Computer* is the best solution to the problem of centralized programming procedure. The *Modi Kit* allows you to store your standard configuration so as to transfer it easily and quickly to all the *Infrared instruments* via serial connection.

The *Modi Kit* makes your job easier since it prevents any error that may occur during the manual programming procedure by non-qualified personnel.

### - *Serial connection*

All IR instruments can be network connected to supervisory and telemaintenance systems.

### - *Package for Supervisory and Telemaintenance Systems*

*Carel* has a wide range of software programmes available for any type of supervisory and telemaintenance requirement.

Functions performed:

- variables monitoring and data storage on hard-disk (the trend of the variables can be displayed in a graph on a hourly, daily or monthly basis and printed whenever necessary);
- detection and storage of any off-normal condition (together with date and time of the alarm);
- modification of the main parameters directly via PC.

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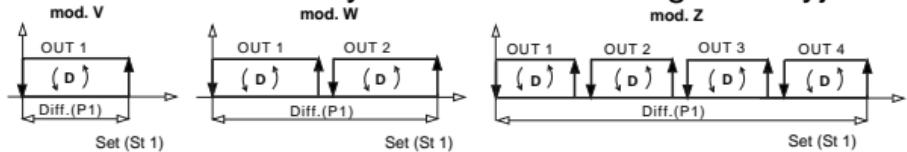


fig. 5: Mode 1

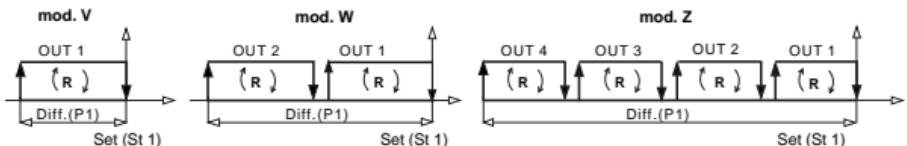


fig. 6: Mode 2

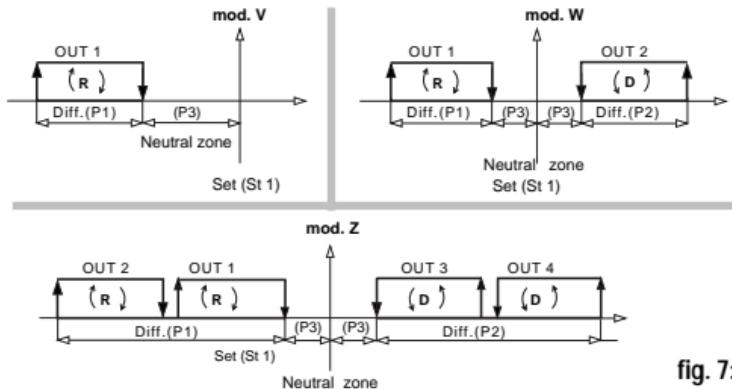


fig. 7: Mode 3

# - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

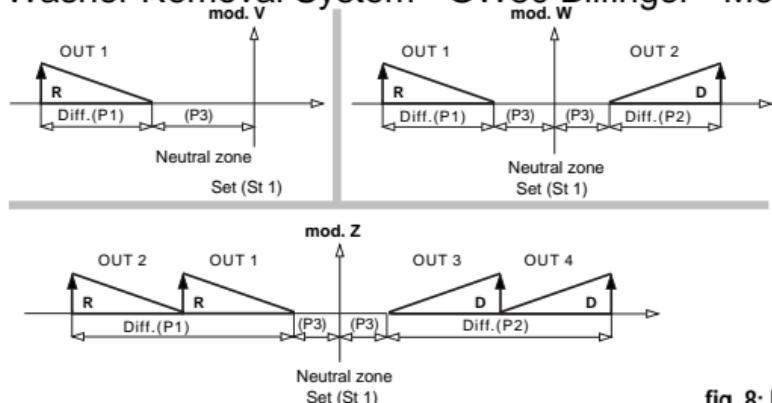


fig. 8: Mode 4

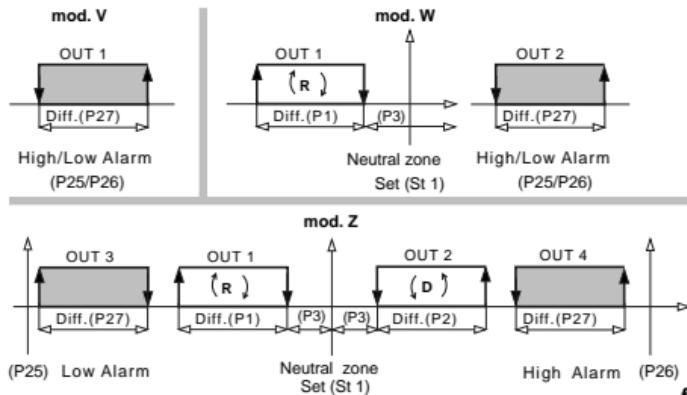
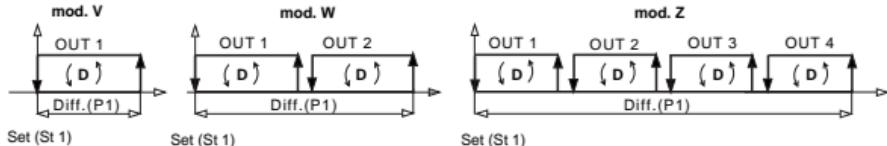
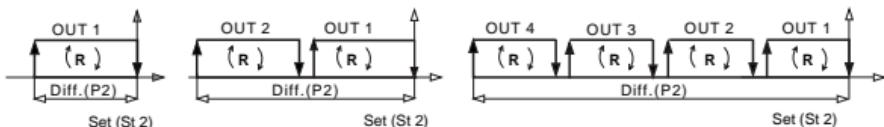


fig. 9: Mode 5

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

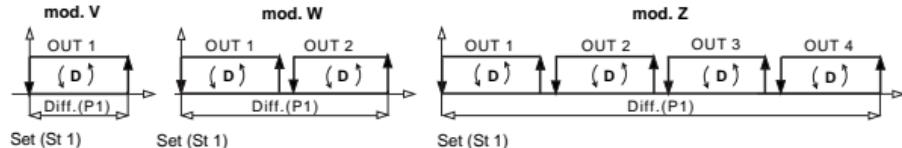


INGRESSO DIGITALE APERTO/ DIGITAL INPUT OPEN

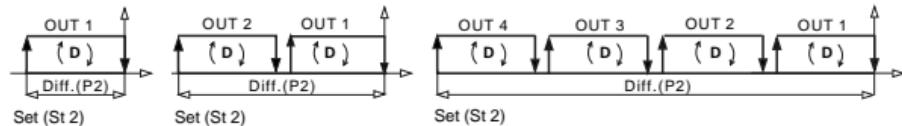


INGRESSO DIGITALE CHIUSO/ DIGITAL INPUT CLOSED

fig. 10: Mode 6



INGRESSO DIGITALE APERTO/ DIGITAL INPUT OPEN

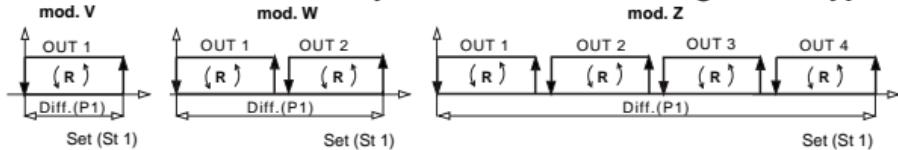


INGRESSO DIGITALE CHIUSO/ DIGITAL INPUT CLOSED

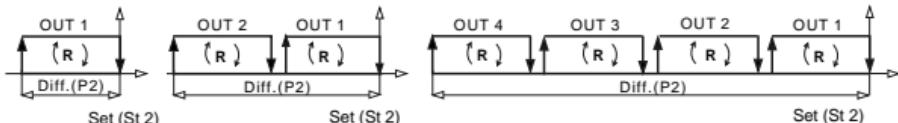
fig. 11: Mode 7



## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Indust



INGRESSO DIGITALE APERTO/ DIGITAL INPUT OPEN



INGRESSO DIGITALE CHIUSO/ DIGITAL INPUT CLOSED

fig. 12: Mode 8

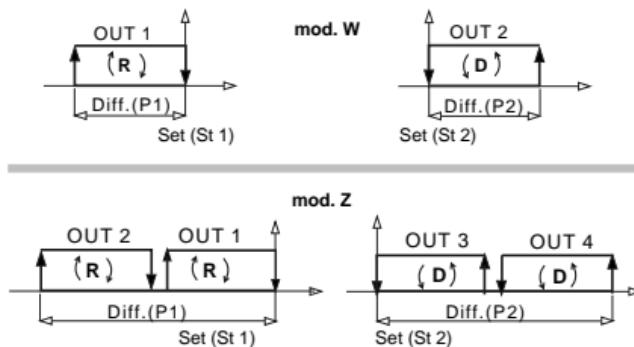


fig. 13: Mode 9

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

**Versione V**, alimentazione

24÷240 o 110÷240

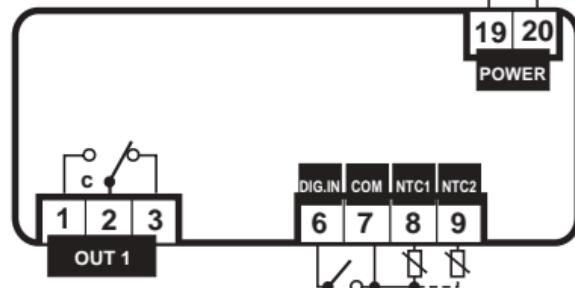
Vac/Vdc, ingresso NTC

mod. U 24÷240  $\sim$ mod. H 110÷240  $\sim$ **Version V**, power supply

24÷240 o

110÷240 Vac/Vdc, NTC

input

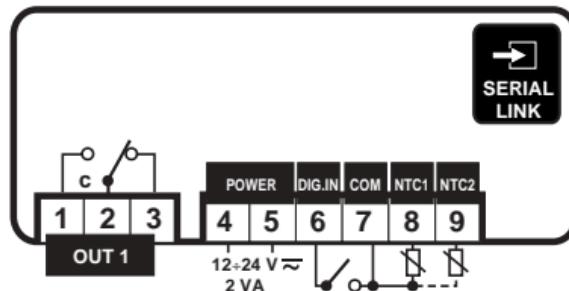
**Versione V**, alimentazione

12÷24Va/Vdc e ingresso

NTC

**Version V**, power supply

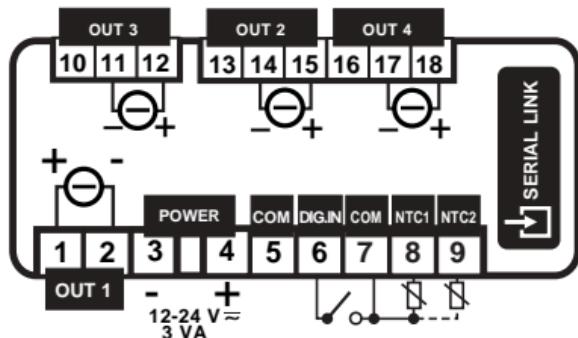
12÷24 Vac/Vdc, NTC input



## - Grit Washer Removal System - GW80 Bilfinger - Mejor Industria

**Versione A, alimentazione**  
12÷24 Vac/Vdc, ingresso  
NTC

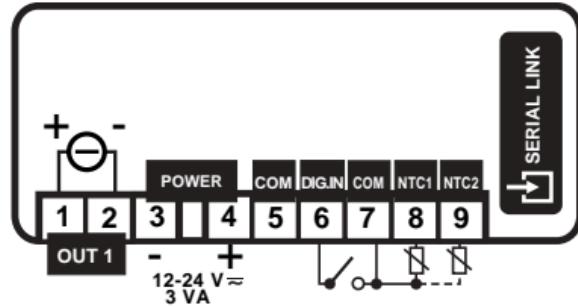
**Version A, power supply**  
12÷24Vac/Vdc, NTC input



---

**Versione D, alimentazione**  
12÷24 Vac/Vdc, ingresso  
NTC

**Version D, power supply**  
12÷24Vac/Vdc, NTC input



## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

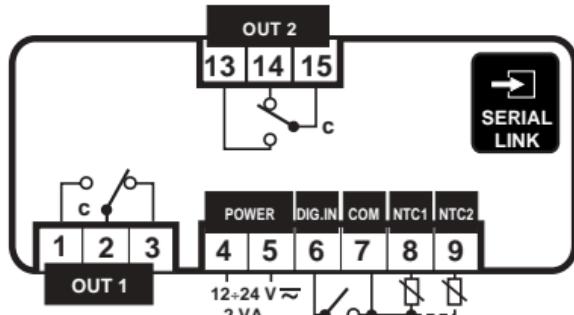
**Versione W, alimentazione**

12÷24 Vac/Vdc, ingresso

NTC

**Version W, power supply**

12÷24Vac/Vdc, NTC input



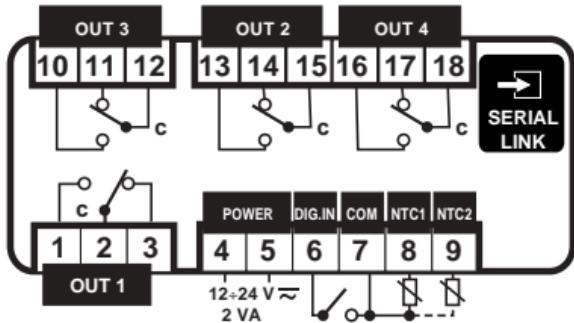
**Versione Z, alimentazione**

12÷24Va/Vdc e ingresso

NTC

**Version Z, power supply**

12÷24 Vac/Vdc, NTC input



## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

**Versione V, alimentazione**

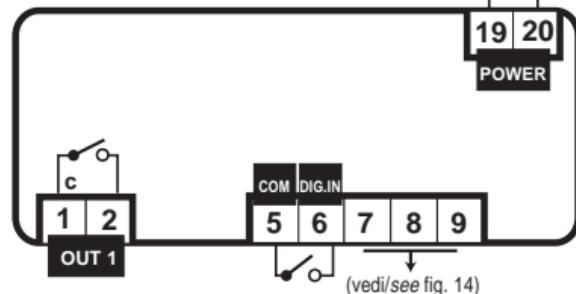
24÷240 o 110÷240

Vac/Vdc e ingresso Pt100

o Tc J/K o V/I

mod. U 24÷240  $\sim$

mod. H 110÷240  $\sim$



**Version V, power supply**

24÷240 o

110÷240Vac/Vdc and

Pt100 or J/K Tc or V/I

input

**Versione V, alimentazione**

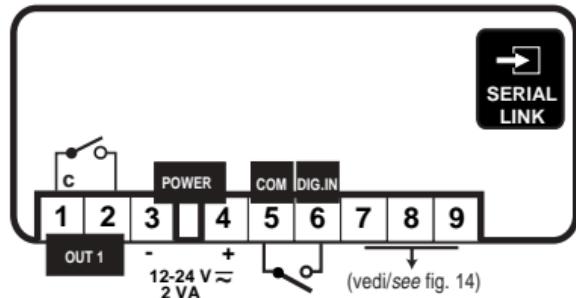
12÷24 Vac/Vdc e ingresso

Pt100 o Tc J/K o V/I

**Version V, power supply**

12÷24Vac/Vdc and Pt100

or J/K Tc or V/I input



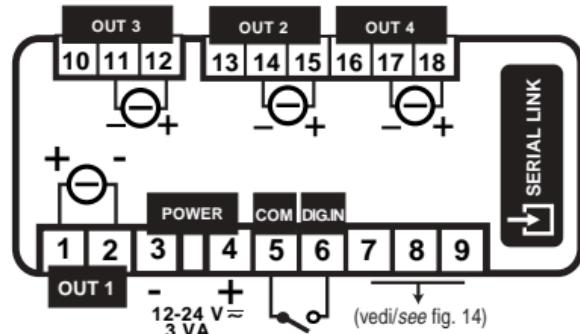
- Grit Washer Removal System - GW80 Bilfinger - Meyjor Indust

## **Versione A, alimentazione**

12÷24 Vac/Vdc

### **Version A, power supply**

12÷24 Vac/Vdc

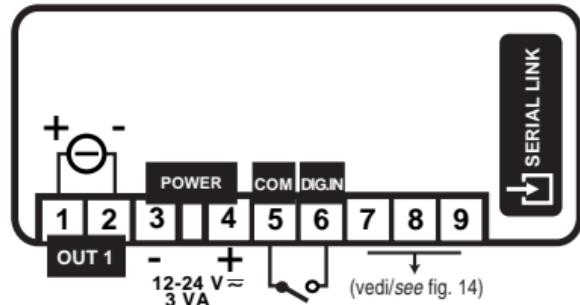


## **Versione D, alimentazione**

12÷24 Vac/Vdc

### **Version D, power supply**

12÷24Vac/Vdc



## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

**Versione W**, alimentazione

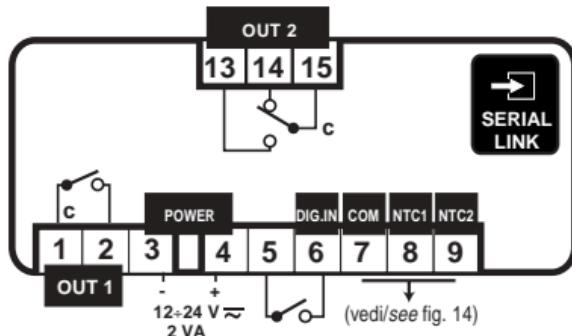
12÷24 Vac/Vdc e ingresso

Pt100 o Tc J/K o V/I

**Version W**, power supply

12÷24Vac/Vdc and Pt100

or J/K Tc or V/I input



**Versione Z**, alimentazione

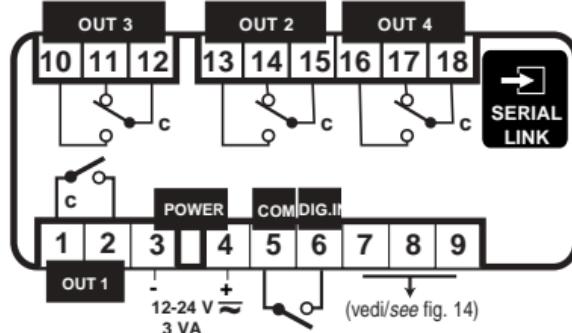
12÷24 Vac/Vdc e ingresso

Pt100 o Tc J/K o V/I

**Version Z**, power supply

12÷24Vac/Vdc and Pt100 or

J/K Tc or V/I input



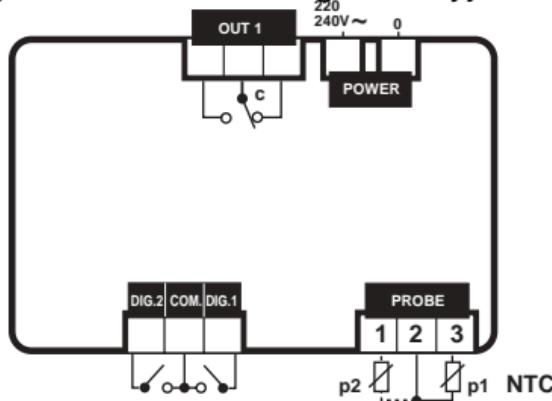
## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

**Versione TE**, alimentazione

220÷240 Vac/Vdc, ingresso  
NTC

**Version W**, power supply

220÷240Vac/Vdc, NTC input

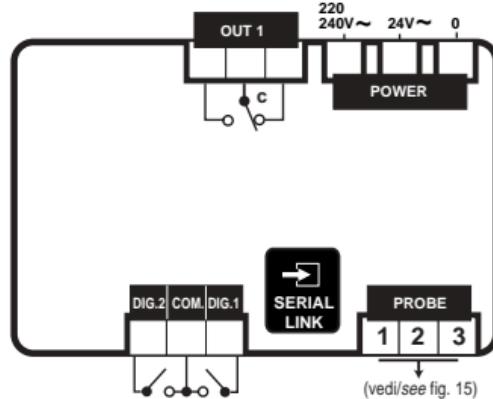


**Versione V**, alimentazione

24÷240 Vac/Vdc, ingresso  
NTC o Pt100 o Tc J/K o V/I

**Version V**, power supply

24÷240Vac/Vdc, NTC or  
Pt100 or J/K Tc or V/I input

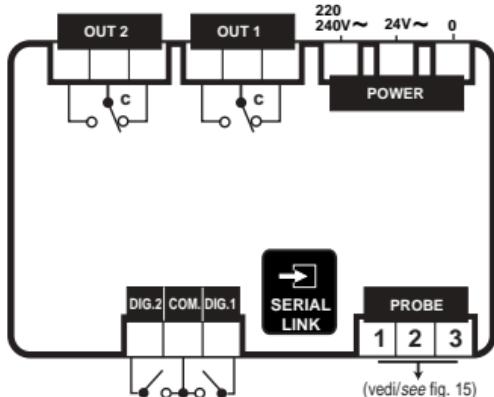


(vedi/see fig. 15)

## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

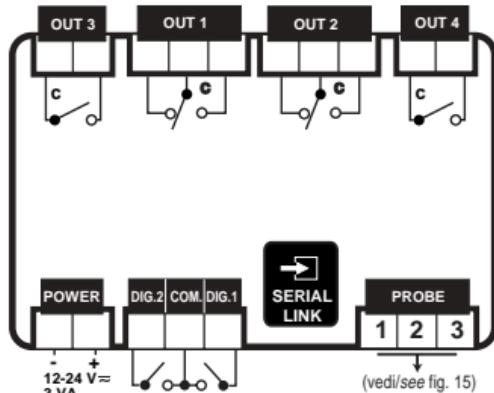
**Versione W**, alimentazione  
24÷230 Vac/Vdc, ingresso  
NTC o Pt100 o Tc J/K o V/I

**Version W**, power supply  
24÷230Vac/Vdc, NTC or  
Pt100 or J/K Tc or V/I input



**Versione Z**, alimentazione  
12÷24 Vac/Vdc, ingresso  
NTC o Pt100 o Tc J/K o  
V/I

**Version Z**, power supply  
12÷24Vac/Vdc, NTC or  
Pt100 or J/K Tc or V/I  
input



IRDR A: Collegamenti / *Connections*

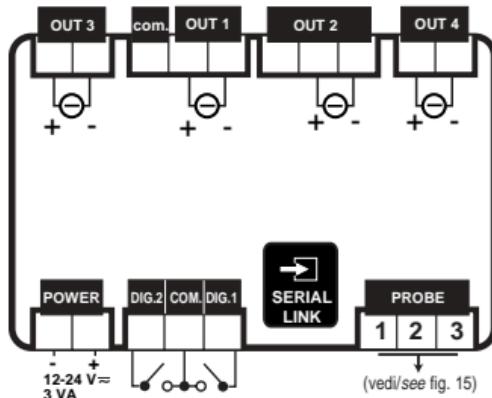
## - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie

**Versione A, alimentazione**

12÷24 Vac/Vdc, ingresso  
NTC o Pt100 o Tc J/K o V/I

**Version A, power supply**

12÷24Vac/Vdc, NTC or  
Pt100 or J/K Tc or V/I input



# - Grit Washer Removal System - GW80 Bilfinger - Meyjor Industrie IR32

(\*) Probe Connections/ Connessione Sonde

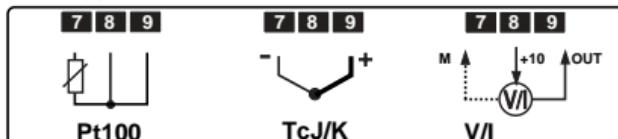


fig. 14

**IRDR**

(\*) Probe Connections/ Connessione Sonde

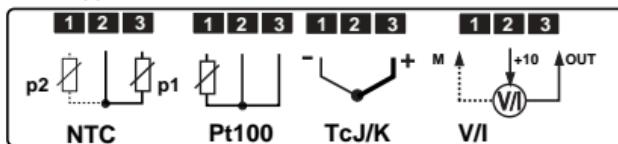


fig. 15

(\*) ad ogni tipo di sonda corrisponde uno specifico modello  
each probe type requires its specific model

**Note**

- Nel caso di sonde Pt100 a 2 fili cortocircuittare i morsetti 8 e 9 (IR32) o 2 e 3 (IRDR)
- Collegare l'eventuale schermatura della sonda alla terra del quadro elettrico. **Nel caso di termocoppie, è necessario usare sonde con cavo schermato per avere una corretta immunità ai disturbi**
- Per le sonde in tensione e/o corrente considerare che la massima tensione fornita è 10 Vdc @ 30 mA (max 8Vdc per IRDRW).

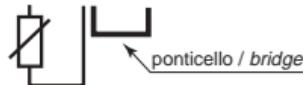
**Notes**

- The use of Pt100 2 Wires requires you to short circuit connectors 8 and 9 (IR32) or 2 and 3 (IRDR)*
- Connect the probe braiding to the electrical panel ground. When using thermocouples, use screened probes to avoid noises.*
- When using voltage or current probes consider that the maximum voltage output is 10 V dc @ 30mA (max 8 Vdc for IRDRW).*

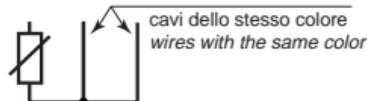
IR32 7 | 8 | 9

IRDR 1 | 2 | 3

Pt100E



Pt100A1/A2



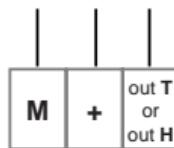
TcJ



TcK



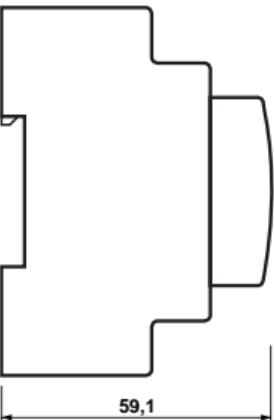
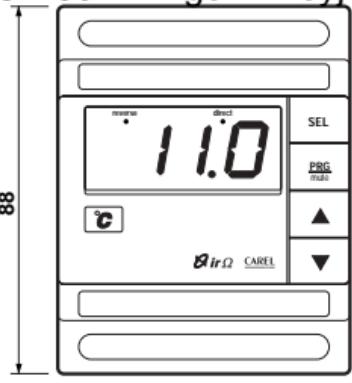
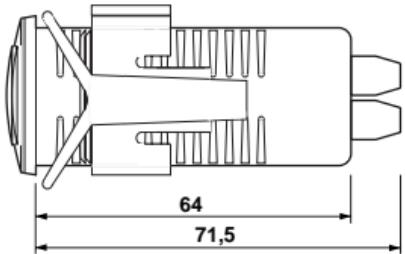
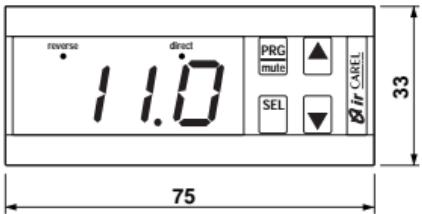
SpK

Sonde attive  
Active probe



Dimensioni / Dimensions

# - Grit Washer Removal System - GW80 Bilfinger - Meyor Indus



**Note:**



- Grit Washer Removal System - GW80 Bilfinger - Meyjor Indus



**Note:**

- Grit Washer Removal System - GW80 Bilfinger - Meyjor Indust

# Grit Washer Removal System - GW80 Bilfinger - Meyjor Ind

# CAREL

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Technology & Evolution

CAREL S.p.A.

Via dell'Industria, 11 - 35020 Brugine - Padova (Italy)

Tel. (+39) 049.9716611 Fax (+39) 049.9716600

<http://www.carel.com> - e-mail: [carel@carel.com](mailto:carel@carel.com)

## **6.4 Solenoid valve**



## 7 Spares List

The following table contains the spare parts list relevant to this Grit Washer order. The table specifies how many of each spare should be stored and the part number to quote when ordering new spares of that part. The table is not an exhausted list and Johnson Screens can support clients with any component on the unit. Your Bilfinger Water Technologies distributor can arrange for supply of Bilfinger Water Technologies manufactured items.

Table 7: Spare Parts List

<b>Grit Washer GW80</b>					<b>Page 1 of 1</b>
<b>Item Reference No.</b>	<b>Part No.</b>	<b>Item</b>	<b>Description</b>	<b>Material Spec</b>	<b>Recommended Holding Quantity</b>
1	1846665	Kitset Liners	Screw conveyor lining	SS 316	1 set
2	PM2058	Pressure sensor	Grit Hopper Level		1 off
3	138129	Coil, 24 VDC (solenoid valve)			1 off

## **8 Factory Test Certificate**

This is to certify that the following machine has been manufactured in compliance with the requirements of Bilfinger Water Technologies Pty Ltd's Quality Management System, ISO 9001, and the customer's order specifications.

Client Name: MEYJOR INDUSTRIES

Model Type: GRIT WASHER

Model Number: GW80

Serial number(s): 450004300

SEE ATTACHED FACTORY TEST FROM BILFINGER JOHNSON WT



## **9 Installation and Commissioning Certificate**

Client Name: MEYJOR INDUSTRIES

Model Type: GRIT WASHER

Model Number: GW80

Serial number(s): 450004300

SEE ATTACHED CHECKSHEETS



## 10 Warranty

With respect to the terms of equipment listed below, Bilfinger Water Technologies Pty. Ltd. warrants to the buyer that *under normal conditions of usage* faults or defects due to material or manufacture that are notified in writing to and accepted by Bilfinger Water Technologies Pty. Ltd. within 12 months from the date of *shipment* shall be remedied free of charge.

**THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

Bilfinger Water Technologies Pty. Ltd. Reserves the right to inspect any defective party to verify the defect and assess the cause.

The liability of Bilfinger Water Technologies Pty. Ltd. under this warranty is limited to *and will be fully discharged by repairing or replacing any defective part* as agreed in writing. The purchaser shall bear the expense of installation of replacement parts.

The warranty does not include remedial work or replacement necessary due to the following:

- a) normal wear and tear of components
- b) incorrect installation \*(unless installed by Bilfinger Water Technologies Pty. Ltd.)
- c) incorrect operation, *modification, handling, storage* or inadequate maintenance *including use of unauthorized replacement part\**
- d) abuse, misuse or neglect of the equipment supplied

\* Installation, operation and maintenance requirements are defined in the Bilfinger Water Technologies Pty. Ltd., Installation, Operation and Maintenance Manual provided with the equipment supplied.

*Any and all deviations to the terms of this Warranty shall be null and void until confirmed in writing by Bilfinger Water Technologies Pty. Ltd.*

### DETAILS OF EQUIPMENT SUPPLIED:

Model Type: GRIT WASHER

Model Number: GW80

Serial number(s): 450004300

Managing Director, Bilfinger Water Technologies Pty Ltd

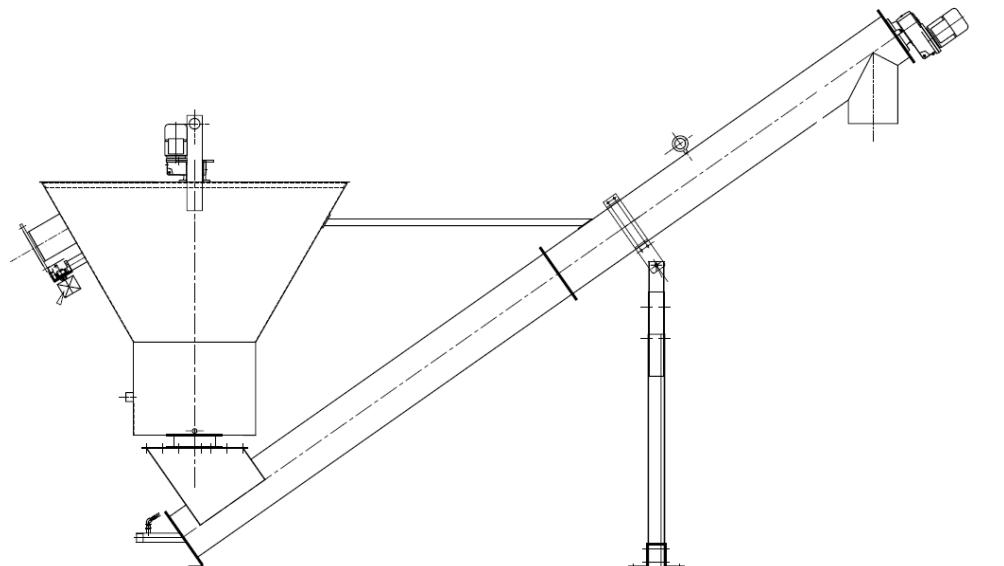
Date: 18/07/2014



**BILFINGER**

# GRIT WASHER

## INSTALLATION, OPERATION and MAINTENANCE MANUAL (Document 2 of 2)



**CUSTOMER:** MEYJOR INDUSTRIES  
**PROJECT:** WACOL WWTP  
**MODEL No:** GW80  
**SERIAL No's:** 450004300  
**O. A. No.** 3706



This Manual is the support document 2 of 2 for the installation,  
commissioning and operation of the Grit Washer.

*Revision 1.2*

*05 AUGUST 2010*

#### NOTICE

Bilfinger Water Technologies Pty Ltd applies a policy of ongoing development and reserves the right to change product without notice. Bilfinger Water Technologies Pty Ltd does not accept any responsibility for loss or damage incurred as a result of acting or refraining from action based on information in this manual.

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## Glossary of Terms

- P&ID                      Process and Instrumentation Drawing
- PPE                        Personal Protective Equipment



## Contents

### Glossary of Terms

i

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## 1 Warnings & Cautions

### 1.1 General Information

The following manual is labelled document 2 of 2 and represents the installation, operation and maintenance procedures that are standard across all Grit Washer models. The manual serves to provide the reader with a good working knowledge of the product. Read through this manual in order to get maximum performance from the product for your application.

In order to understand the product for your application, this manual needs to be read in conjunction with the supplied Order Specifications document. The Order Specifications is labelled document 1 of 2 and contains all the details and associated documentation specific to the Grit Washer model ordered. Failure to read, understand and implement the manual, particularly following correct maintenance schedules and procedures, may result in reduced overall life and performance from the product.

After reading, put both the manual and order specifications away together in a safe place for future reference.

### 1.2 Documentation Standards

**NOTE:**

THIS SYMBOL IS USED TO HIGHLIGHT AN ISSUE OR SPECIAL CASE WITHIN THE BODY OF THE MANUAL.

**WARNING:**

THIS SYMBOL IS USED WHERE NON-COMPLIANCE COULD RESULT IN INCORRECT OPERATION, DAMAGE TO OR FAILURE OF THE EQUIPMENT.

**DANGER:**

THIS SYMBOL IS USED TO WARN OF POTENTIAL INJURY IF INSTRUCTIONS ARE NOT FOLLOWED.

### 1.3 Installation Notes

**WARNING:**

CONNECTION OF ELECTRICAL EQUIPMENT MUST BE PERFORMED BY A QUALIFIED ELECTRICAL CONTRACTOR.

**DANGER:**

THE GRIT WASHER CONTAINS MOVING PARTS. FOLLOW SAFE ISOLATION AND LOCKOUT PROCEDURES BEFORE COMMENCING ANY MAINTENANCE.

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## 2 Overview of Grit Washer

### 2.1 Introduction

The Grit Washer shall consist of a conical hopper and a shaft-less spiral screw conveyor designed to further remove, wash and dewater grit and sand.

Effluent contaminated with grit and organic matter shall discharge into the top of the hopper close to its periphery. The combination of a central agitator and periphery inlet cause the incoming effluent flow to maintain a slow rotational movement. The rotational movement, together with sufficient retention times for variations of particle densities and settling velocities, shall induce the grit and sand to spiral and settle towards the bottom of the hopper.

Wash water shall enter into the bottom of the hopper and, aided by the central agitator, the grit and sand particles abrade against each other scouring any attached organic matter from their surface. Eventually, the grit shall be conveyed, washed, dewatered and discharged into a container to attain > 95 % removal of grit particles (min 0.2 mm [0.008inch] diameter) free of organic mater.

Suspended organic matter shall discharge from the conical hopper at intermittent frequencies and can either be returned to the flow and onward to secondary treatment or back to the works inlet. Up to 97 % removal of organic matter is attainable. Figure 1 shows the standard Grit Washer unit.

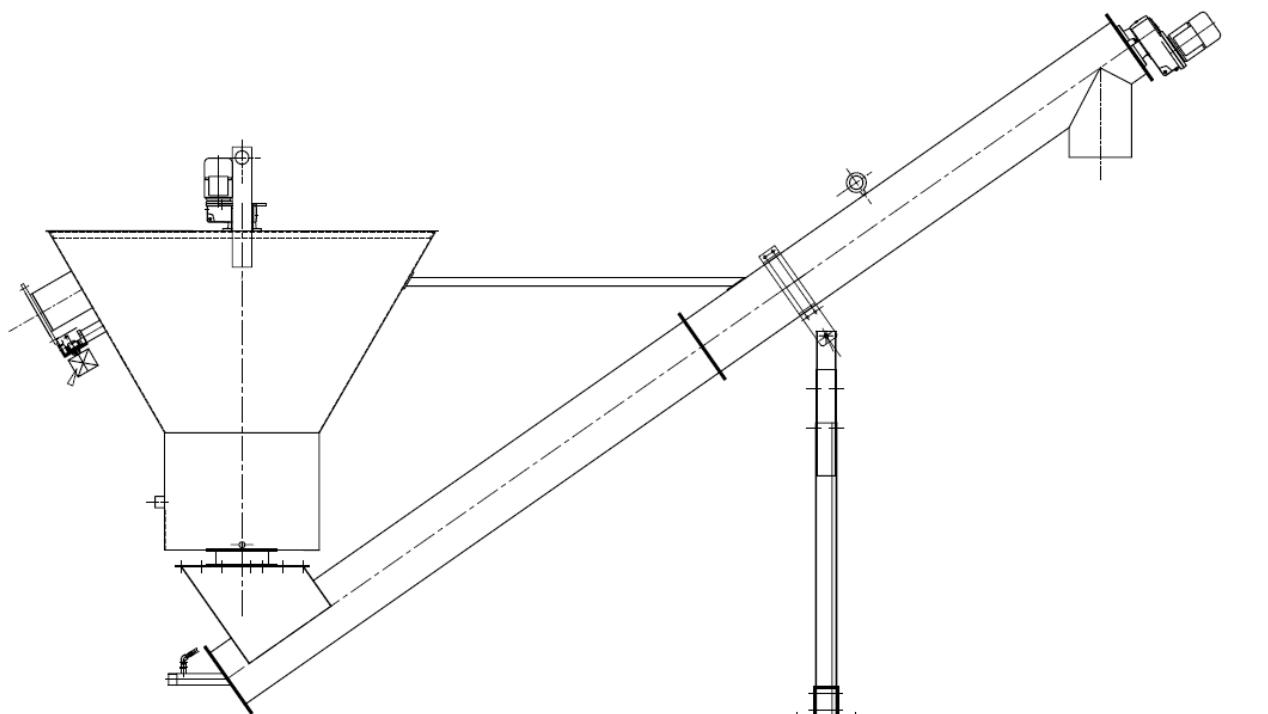


Figure 1: Standard Grit Washer.

### 2.2 Configuration Options

The Grit Washer comes as standard with conical hopper and screw conveyor. Continuous automated bagging systems are available if requested. A continuous bagging system shall abate odours and seal screenings without any direct contact. An additional wash water system can also be included in the screw conveyor transport zone upon request.

The Grit Washer may also have custom modifications, listed in Document 1 Section 1, to cater for a customer's specific requirements. Check the mechanical drawings supplied in Document 1 Section 3 for detail on custom modifications.

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## 3 Installation

### 3.1 Overview of Installation Process

The Grit Washer is designed to sit on a level concrete surface. The installation process involves:

- Site Preparation,
- Unpacking and Inspection,
- Pre-assembly of unit from separate components,
- Lifting into place,
- Assembly of remaining unit components,
- Bolting securely into position,
- Connection of electrical and mechanical services,
- Alignment check and
- Pre-commissioning checks and tests.

### 3.2 Site Preparation

The site must be checked before attempting to install the Grit Washer and its components.

Check that the concrete surface where the Grit Washer is to be installed is level and any civil mounting points are correctly located. Refer to the mechanical drawings in Document 1 Section 3 for dimensions and detail. The concrete surface must be suitable for the dimension and weight of the machine.

The concrete surface must be designed to allow for the unit to remain horizontal so a uniform distribution of effluent into the hopper can be achieved. Appropriate hold down bolts and a chemical setting compound must be provided to allow adjustment of the unit whilst preventing it from moving once fixed. Hold down bolts should be stainless steel grade 316, diameters one size below the hole diameters shown on the supports and cut to a sufficient length for levelling adjustment during installation.

The area designated for the positioning of the machine must be provided by the user with all the connections (electric power, air, etc...) for the operation of the machine, in conformity with the information of the present manual, and in conformity with the characteristics of the mechanical and electronic components.

Make sure there is room to manoeuvre the Grit Washer safely when lifting into place and that all applicable Workplace Health and Safety requirements are prepared before commencing installation.

### 3.3 Unpacking and Inspection

The Grit Washer is delivered to site inside a crate or on a pallet. Before unpacking, inspect the crate/pallet for any noticeable signs of transit damage.

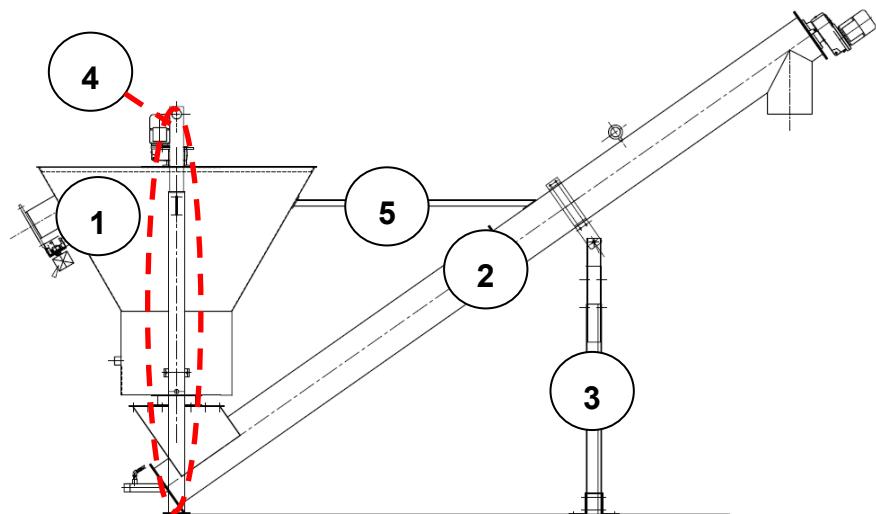
The following lists all the major components of the Grit Washer, as shown in Figure 3.

1. Hopper
2. Screw Conveyor
3. Screw Conveyor Support Strut
4. Hopper Support
5. Horizontal Hopper Screw Strut

Inspect each component of the Grit Washer for transit damage.

Unpack the Grit Washer and check all items on the packing slip have been supplied.

If there are any signs of damage, or items on the packing slip are missing contact Bilfinger Water Technologies Pty Ltd.



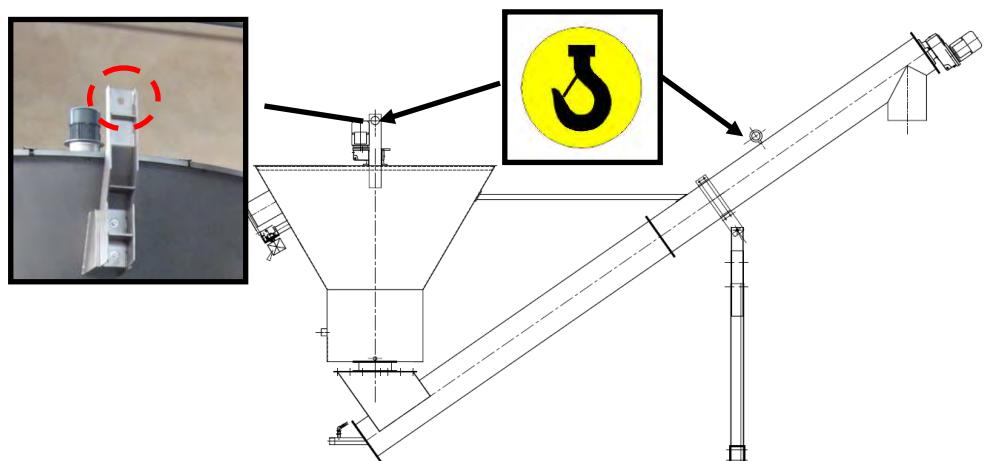
*Figure 2: Grit Washer unit with major components numbered.*

### 3.4 Lifting and Safe Handling

Take care when lifting the Grit Washer into place. Appropriate Personal Protective Equipment (PPE) must be worn by all personnel including steel cap boots, gloves and a hard hat. Take precautions to ensure adequate clearance is provided when lifting into place.

The machine is to be lifted and positioned only by means of a lifting system suitable for the weight and dimensions of the machine. The lifting system must only utilise the two support holes on the hopper and the fixed eyebolt on the screw housing when lifting the machine. The machine may only be lifted by using hooks and safety fasteners. The use of clamps, rings, open hooks or other systems that do not assure the safety during the lifting operation are prohibited.

Figure 3 shows the location of the two support holes on the hopper and the eyebolt fixed on the screw housing. Please check Document 1 Section 2.1 for the correct weight of your unit before attempting any lift procedure. If there are any discrepancies between the weight listed in Document 1 Section 2.1 and the weight printed on the machine, always assume the larger weight.



*Figure 3: Grit Washer unit with lifting points indicated.*

**NOTE:**

THE PROVIDED LIFTING LUGS MUST BE USED TO LIFT THE GRIT WASHER TO PREVENT DAMAGE DURING LIFTING.

**NOTE:**

LOCAL REGULATIONS FOR LIFTING AND HANDLING MUST BE FOLLOWED WHEN LIFTING THE GRIT WASHER.

### 3.5 Process Control Philosophy

The Grit Washer requires a control system to be designed and installed for it to operate. The actual control methodology typically changes between installations to account for specific process and client requirements. If Johnson Screens has provided a specific Process and Instrumentation Diagram for this installation it will be supplied in Document 1 Section 5.

The following control philosophy is the recommended method for operating the Grit Washer; describing the automatic operation between the Stop and Running conditions only. It can be used to develop the process so suitable control equipment can be selected and configured prior to installation.

This control philosophy uses two independent cycles to control the operations in both the hopper and screw conveyor. Alternative trigger conditions could be used to accommodate specific installation requirements provided the main processes in each cycle are met. Manual control is not described.

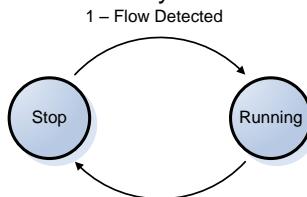


Figure 4: Automatic Control State Transition Diagram.

#### Stop State Condition (see Figure 4)

Grit Washer Central Agitator	= OFF	
Screw Conveyor	= OFF	(see Note 1)
Sand Washing System	= OFF	
Transport Zone Washing System	= OFF	(If Supplied)
Grit Pump / Air Lift Pump (upstream)	= OFF	(If Supplied)

**Note1:** The Screw conveyor must operated for at least 5 seconds every 90 minutes when sand occupies the collection container.

#### Running State Condition (see Figure 4)

Grit Washer Central Agitator	= CYCLE	(see Note 1)
Screw Conveyor	= CYCLE	(see Note 2)
Sand Washing System	= CYCLE	(see Note 1)
Transport Zone Washing System	= CYCLE	(If Supplied, see Note 3)
Grit Pump / Air Lift Pump (upstream)	= CYCLE	(see Note 1)

**Note 1:** The agitator must always work together with the injection of the wash water. Wash water may be processed water filtered to at least 300 microns. The organic outlet valve must remain closed

*while the effluent inflow (i.e. grit pump / air lift pump) is in operation. See Typical Hopper Running Cycle.*

**Note 2:** *The Screw Conveyor is operated intermittently to ensure some quantity of sand always remains in the sand collection container below the hopper. Sand quantities are measured via a pressure switch in the sand collection container. See Typical Screw Conveyor Running Cycle.*

**Note 3:** *Transport Zone washing system (if supplied) is only to operate whilst the Screw Conveyor is in operation. Wash water may be process water filtered to at least 300 microns.*

#### **Typical Hopper Running Cycle:**

1. The base of hopper is flushed out before start up (user defined runtime),
2. Once the flushing is completed, the grit pump/air lift pump will commence filling the hopper with effluent (user defined speed and runtime),
3. Immediately after the grit pump/air lift pump stops, the sand washing system will start (user defined runtime),
4. Immediately after the sand washing system is activated, the agitator will start (user defined runtime),
5. After the grit pump/air lift pump has stopped the organics outlet valve will open after a short delay time (user set delay time and time valve remains open). The opening and shutting of organics outlet valve may not need to occur ever cycle (user defined opening cycle, e.g. 1 = every cycle, 2 = every second cycle, 3 = every third cycle.....),
6. Shut down the agitator at the end of the user defined runtime period. The agitator remains stopped until next cycle is initiated,
7. Shut down the sand washing system at the end of the user defined runtime period. The sand washing system remains stopped until next cycle is initiated.

**Note:** "Immediately after" is referring to a short PLC delay of usually 1 - 3 sec.

#### **Typical Screw Conveyor Running Cycle:**

1. When the upper sand threshold is detected by the pressure switch continue on with the sequence (i.e. step 2),
2. Start the screw conveyor (user defined runtime ~ 30 sec),
3. The screw conveyor will stop when either the low sand threshold is detected by the pressure switch or the user runtime expires,
4. If the low sand threshold is reached then reset the sequence (i.e. step 1).
5. If the low sand threshold has not been reached but the expiry of the user timer has occurred then shut down the screw conveyor and start an operator adjustable off timer (user defined off timer ~ 60 sec). Once the off timer has expired immediately return to step 2 of the sequence.

**Note:** *Screw conveyor cycle is run independently to the hopper cycle and as such may start at any point in the hopper cycle. Step 5 is in place to avoid wet grit discharge resulting from the continuous operation of the screw.*

**Transition 1: Stop → Running**

Transition Trigger: Grit Pump/Air Lift Pump Activation or Sand Level above Threshold (or site specific trigger)

Running of the system may be achieved through the following transition triggers:

1. Manual request or,
2. Automatic request after the switching on of the plants upstream feeding the effluent (level sensors and/or timers), triggering the running cycle.
3. Automatic request from pressure sensor for the activation of the screw conveyor (pressure switch measure high quantity of sand in collection container).

**Note:** When starting the machine, the hopper must be filled with 0.4m<sup>3</sup> of clean sand. Sand must not submerge the agitator before start up.

**Transition 2: Running → Stop**

Transition Trigger: Grit Pump/Air Lift Pump Activation or Sand Level below Threshold (or site specific trigger)

Stopping of the system may be achieved through the following transition triggers:

1. Manual request,
2. Automatic request after the switching off of the plants upstream feeding the effluent (level sensor and/or timers),
3. Automatic request by motor overload protection,
4. Automatic request from pressure sensor for the de-activation of the screw conveyor (pressure switch measure low quantity of sand in collection container).
5. Manual request through emergency stop button

**3.5.1 Motor Overload Protection**

Motor protection must be configured to prevent the motor from damaging the machine caused by overload conditions. Motor overload protection is applicable to motors servicing both the central agitator and screw conveyor.

This may be achieved by using an Electronic Shear Pin or other equivalent method.

The following procedure must be used when configuring protection of this type:

- Run Grit Washer under normal load conditions,
- Record the peak motor torque measured under these normal load conditions,
- Set the protection to trip at this normal load condition,
- Run Grit Washer and confirm the functionality of the device used to trigger the trip,
- Set the protection to trip at 10% above the measured peak torque value and
- Run the Grit Washer and monitor for nuisance tripping. If this occurs, increase the trip limit by another 10% and test run again.

**Note:** Due to the differences in load conditions across installations, this setting must be set by measuring actual site values as described above.

### 3.6 Mechanical Installation

Mechanical installation of the Grit Washer must be performed by competent engineers or trade qualified fitter and turners.

The Grit Washer is installed on a level concrete surface, and fixed down using bolts chemically set in the concrete.

#### 3.6.1 Standards and Safety

The mechanical installation of the Grit Washer must be in accordance with all relevant standards and local regulations. Appropriate PPE must be worn at all times. The installer must ensure all necessary safety precautions are taken during installation.

#### 3.6.2 Precautions

Before positioning the unit on the concrete surface, verify the location of the hold down bolts and confirm the surface will take the wet weight of the unit.

Before moving the unit into its final position, check that the concrete surface is level and clean.

Check there are no obstructions such as pipe work that will prevent the Grit Washer from being lifted onto its final position.

#### 3.6.3 Mechanical Drawing

Details of the hold down bolt diameters and centres are shown on the mechanical drawing(s) located in Document 1 Section 3.

#### 3.6.4 Installation Procedure

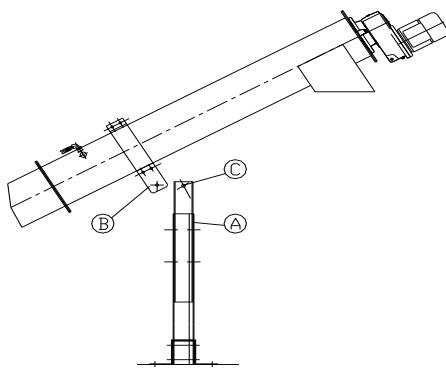
##### Assembling and Fixing the Machine

The Grit Washer is designed to be installed on a levelled concrete surface, the dimensions of which are shown in Document 1 Section 3. The Grit Washer is held in place via three fixing points; the screw conveyor support strut, the hopper support legs and the screw conveyor floor support. All fixing points should use suitable hold down bolts chemically set into the concrete surface. Hold down bolts for the screw conveyor floor support should be in place prior to conducting the assembling sequence.

The sequence that should be taken when assembling and fixing the Grit Washer into place is described below.

- **Phase 1 (see Figure 5)**

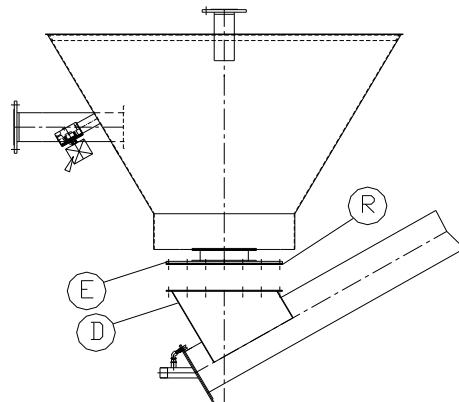
Place the screw conveyor in position using the appropriate lifting system. Sit the screw conveyor in the floor support hold down bolts so that it creates an angle of  $35^{\circ}$  with the (level) concrete surface. Place the screw conveyor support strut in position so that the bolt hole on the strut C corresponds with the bolt hole on the transport zone eyelet clamp B. Check to make sure adjusting bolts A on the strut support are adequately tightened. Insert a bolt through holes B & C and secure it. The strut support must be fixed on the concrete surface using chemically set hold down bolts.



*Figure 5: Installation Phase 1 reference diagram showing support strut and eyelet clamp.*

- **Phase 2 (see Figure 6)**

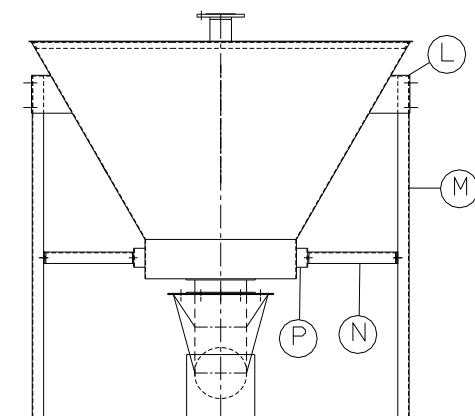
Place the sand outlet flange of the hopper E over the sand inlet flange end of the screw conveyor D using the appropriate lifting system. Check the integrity of the gasket supplied before inserting it between the two flanges. Fix the two flanges together using the appropriate supplied nuts and bolts.



*Figure 6: Installation Phase 2 reference diagram showing hopper and screw conveyor flange connection.*

- **Phase 3 (see Figure 7)**

Assemble the hopper supports M & N and fix, using the supplied bolts and nuts to points L & P respectively. Repeat for the opposite side. The hopper support M on each side must be fixed to the concrete surface using chemically set hold down bolts. Make sure the structure remains horizontal throughout the processes.



*Figure 7: Installation Phase 3 reference diagram showing the hopper support connections.*

- **Phase 4 (see Figure 8)**

Fix the screw conveyor floor support H to the concrete surface using chemically set hold down bolts. Place the horizontal hopper screw strut in position and fix using the appropriate supplied bolts and nuts.

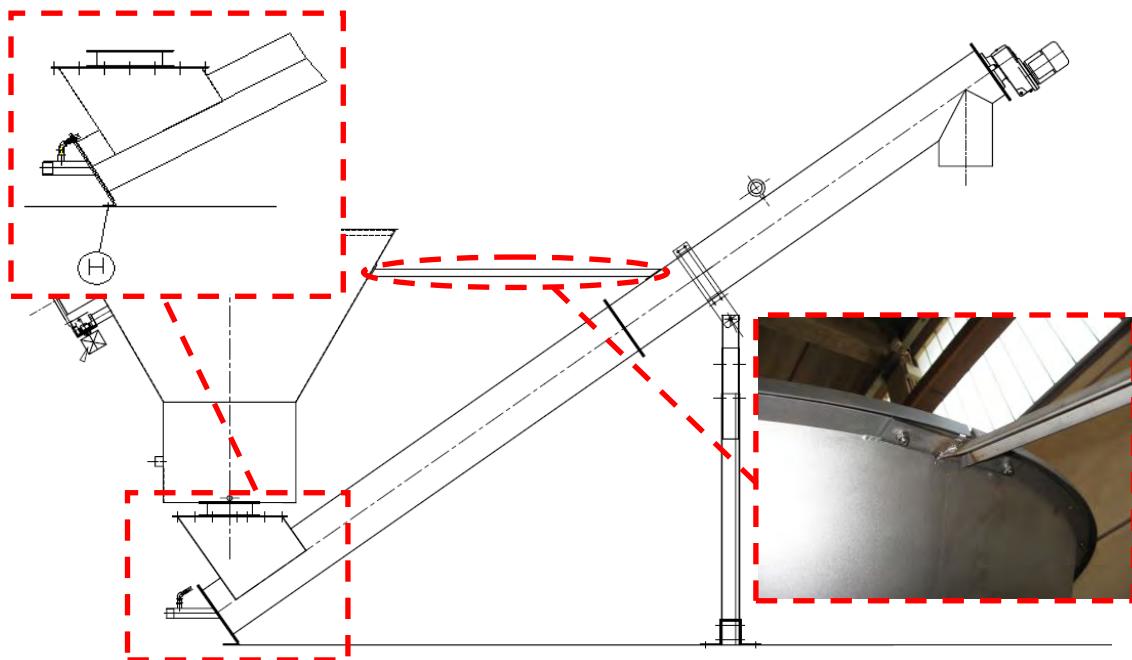


Figure 8: Installation Phase 4 reference diagram showing the screw floor and horizontal strut connections.

**WARNING:**

THE GRIT WASHER MUST BE INSTALLED ON A LEVEL ( $\pm 10$  MM [ $\pm 0.4$  INCH]) CONCRETE SURFACE CAPABLE OF HANDLING THE UNITS WET WEIGHT.



INADEQUATE FIXING MAY CAUSE DAMAGE TO PERSONS AND OBJECT(S), PLEASE VERIFY CORRECT INSTALLATION BEFORE START UP.

### Connecting Pipe Work

The Grit Washer has a water inlet connection for the washing of sand particles. As an optional extra, two water inlets at the screw conveyor transport zone can be included for further washing of the sand particles. These must have water supplied to them at the pressure specified in the mechanical drawing(s) in Document 1 Section 3. The water supply lines are not supplied by Johnson Screens and must be compatible with the fittings shown in the drawing.

The following lists all pipe work connections on the Grit Washer, as shown in Figure 9.

1. Hopper Wash Water Inlet
2. Transport Zone Wash Water Inlets (optional)
3. Organic Outlet
4. Effluent Outlet
5. Effluent Inlet
6. Sand Outlet
7. Drain Valve

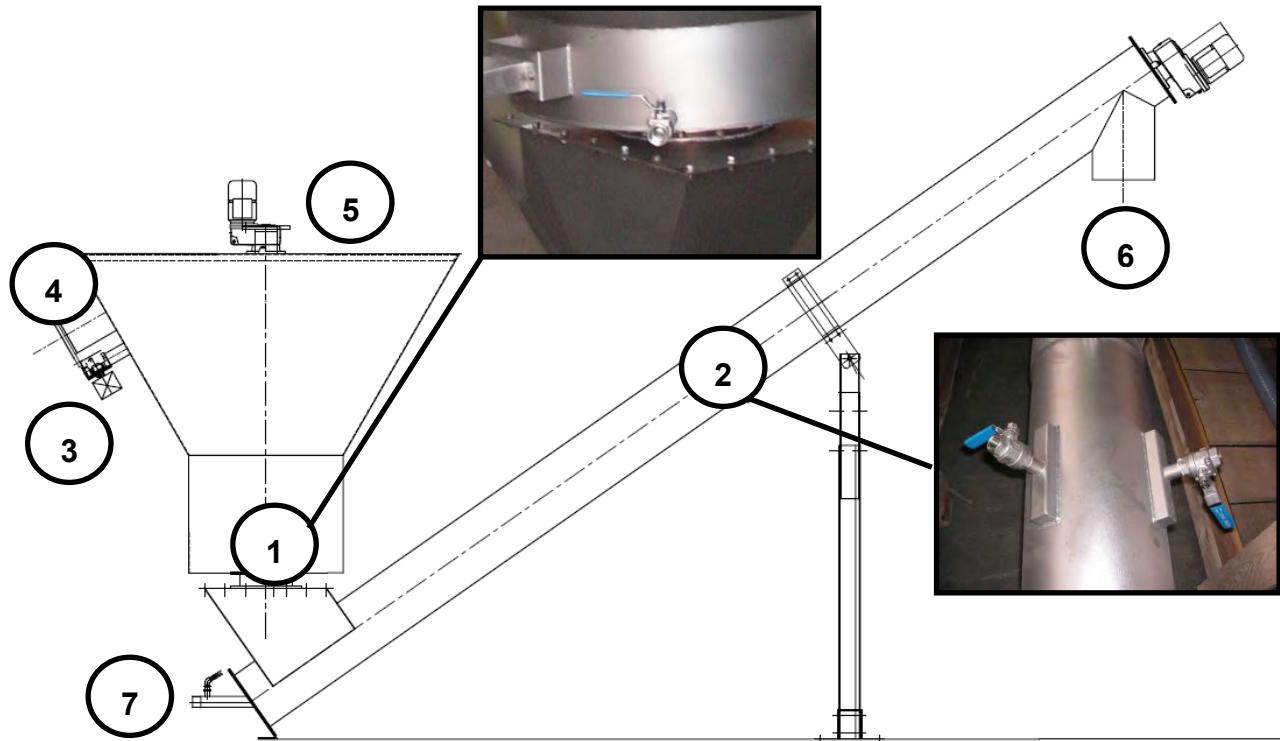


Figure 9: Grit Washer showing all hydraulic connections.



**NOTE:**

THE WASH WATER SUPPLY MUST BE FILTERED TO AT LEAST 300 MICRONS TO PREVENT DAMAGE TO THE SPARGE NOZZLES.



**WARNING:**

WATER SUPPLY PRESSURE MUST NOT EXCEED 2MPA (300 PSI) UNDER ANY CIRCUMSTANCES OR DAMAGE WILL RESULT.

### 3.7 Electrical Installation

The basic Grit Washer may include the following electrical components:

- Three phase electric motor for driving the screw conveyor,
- Three phase electric motor for driving the agitator,
- Heating system with temperature regulator for the transport zone (optional),
- Solenoid valves for the washing system (optional),
- Pressure switch for measuring the sand level, necessary for the functioning of the machine,
- Electronic torque limit switch (optional),
- Motor actuated organic outlet valve,
- Control Panel (optional).

For further information on any of the supplied components listed above please refer to the relevant data sheets included in Document 1 Section 6. Control circuitry is required to automatically operate the Grit Washer. The actual control system will differ between installations due to unique requirements. An electrical engineer will be required to design the control system. See Section 3.5 for more information on the recommended Control Philosophy for the Grit Washer.

An emergency stop switch must be included in the design.

It is recommended that any control panel be located in a position which allows perfect visibility to the unit for Workplace Health and Safety purposes. The system must be provided with a lockable isolation switch so the machine can be isolated and locked out when conducting maintenance.

### **3.7.1 Standards and Safety**

Relevant electrical installation standards must be followed when installing the Grit Washer. In Australia this includes, but is not limited to, AS3000 electrical wiring regulations.

All wiring and installation testing MUST be performed by an appropriately qualified and licensed electrical contractor.

The Grit Washer is designed to work in a wet environment. All wiring must be protected from water ingress and all metal equipment must be correctly bonded to earth.

### **3.7.2 Installation Procedure**

Refer to the Equipment Data in Document 1 Section 6 for installation details regarding the supplied motor.

Refer to the electrical installation drawings for the installation. These are not supplied by Bilfinger Water Technologies Pty Ltd.

### **3.7.3 Testing**

Before powering the circuit the installation must be tested as required by the local electrical installation standards. A test certificate should be obtained from the electrical contractor.

## **4 Commissioning Guide**

### **4.1 Safety Precautions**

Before commencing commissioning ensure the following:

- Make sure the electrical installation is complete and safe to power up and
- Inform all personnel that the Grit Washer will be started as part of the commissioning process.

### **4.2 Pre Start Tests and Checks**

The following tests, shown below in Table 1, should be performed before running the Grit Washer for longer than a few agitator and screw conveyor revolutions.

*Table 1: Commissioning Pre-Start Tests.*

<b>Pre Start Tests</b>		
<b>Check No</b>	<b>Check Item</b>	<b>Pass/Fail</b>
1	Confirm Grit Washer is installed correctly using a spirit level. The hopper should be horizontally level and the screw conveyor should be at 35° from the horizontal. The concrete surface should be horizontally level.	
2	Check the positioning and fixing of the machine, ensure all bolts are tightened.	
3	Check oil level in agitator gearbox.	
4	Check oil level in conveyor gearbox.	
5	Check the rotation of the screw conveyor is as per the indication on the unit.	
6	Check all hydraulic connections.	
7	Check all electrical connections including power supply and cable box.	
8	Check the gear box is correctly sealed.	
9	Check that all covers/hatches are closed.	
10	Check that all safety devices are present on the machine.	
11	Check that all the warning notices are present on and around the machine.	

**NOTE:**

PLEASE CHECK THAT ALL BLOCKING CONDITIONS BEFORE FIRST START UP HAVE BEEN REMOVED.



**NOTE:**

PLEASE CHECK THAT ALL SAFETY DEVICES (I.E. HATCHES, EMERGENCY STOPS) ARE PRESENT AND WORKING EFFECTIVELY.

### **4.3 Initial Start Up Procedure and Checks**

The following start up procedure, shown below in Table 2, should be performed on the Grit Washer after completing the pre start tests. The initial start up procedure must be repeated if the machine is to be started having been stopped for a long period of time.

*Table 2: Commissioning Initial Start-Up Checks.*

<b>Initial Start Up</b>		
<b>Check No</b>	<b>Check Item</b>	<b>Pass/Fail</b>
1	Fill the sand collection container with 0.4m <sup>3</sup> of clean sand.	
2	Turn on main power supply to the Grit Washer.	
3	Open effluent inlet valve and confirm effluent flow into hopper (may require turning on grit pump/air lift pump upstream).	
4	Commence Hopper and Screw Conveyor Running Cycles (or the equivalent).	
5	Run motors and check motor current draw is within expected range. (Note: actual current depends on size and type of motor installed)	
6	Check emergency stop switch operation.	
7	Check Grit Washer hopper cycle is implemented correctly. Start/Stop sequence must match control philosophy (see Section 3.5).	
8	Check Grit Washer screw conveyor cycle is implemented correctly. Start/Stop sequence must match control philosophy (see Section 3.5).	
9	Check the hopper wash water system and agitator are working together.	
10	Check screw conveyor is operating intermittently to ensure some quantity of sand is always in the sand collection container. Check that screw conveyor operates for 5 seconds every 90 minutes.	
11	Check the transport zone wash water system is only operating whilst the screw conveyor is in operation (if supplied).	
12	Set motor overload protection based on measured current. Refer to Section 3.5.1	
13	After 10 hours operation check that all bolts and nuts are still tightly secured and verify the electric motors are running at their rated capacities.	

**NOTE:**

AT FIRST START UP PAY ATTENTION TO IRREGULAR VIBRATION, NOISES, ROTATION ETC... THAT COULD POSSIBLY IMPLY OR LEAD TO A FUNCTIONING DEFECT.



THE UNIT MUST BE FILLED WITH 0.4M<sup>3</sup> OF CLEAN SAND BEFORE STARTING UP. THE SCREW IS OPERATED INTERMITTENTLY TO ENSURE SOME QUANTITY OF SAND IS ALWAYS IN THE SAND COLLECTION CONTAINER.

## 5 Operation

The Grit Washer is driven by two electrical motors and automatically controlled by a programmed control panel. In normal operation it starts and stops as required in response to effluent flow into the hopper and sand levels in the collection container.

An operator may need to start and stop the system manually in response to operational issues, or to conduct regular maintenance. These procedures are described below.

### 5.1 Operator Safety

The Grit Washer has moving parts. Care must be taken by operators and maintenance staff to ensure the machine is isolated and locked out before reaching into the machine.

Appropriate PPE must be worn when conducting housekeeping and maintenance tasks on the Grit Washer.

**DANGER:**

THE GRIT WASHER CONTAINS MOVING PARTS.



THE GRIT WASHER IS AUTOMATICALLY CONTROLLED AND MAY START AT ANY TIME.

FOLLOW SAFE ISOLATION AND LOCKOUT PROCEDURES BEFORE ACCESSING THE INTERNAL COMPONENTS OF THE MACHINE.

SUITABLE COVERS MUST BE SUPPLIED OVER THE TOP OF THE HOPPER TO PREVENT OBJECTS FALLING IN.

### 5.2 Start Up Procedure

The following procedure should be implemented when starting up the Grit Washer:

1. Check all inspection hatches have been closed,
2. Ensure there is adequate clean sand (0.4m<sup>3</sup>) in the collection container,
3. If the Grit Washer has been shutdown, restore power to the system,
4. Ensure the organic outlet has an appropriate connection,
5. Ensure the discharge chute is connected to some form of appropriate catchment,
6. Start the grit pump/air lift pump or equivalent to deliver effluent flow to the Grit Washer. If a control system is present, it will detect effluent flow and automatically start the Grit Washer when required.

### 5.3 Shutdown Procedure

The following procedure should be implemented when shutting down the Grit Washer:

1. Shut off the inlet flow valves before shutting down the Grit Washer,
2. Turn the main power switch OFF. If necessary shut off all valves,
3. Tag out the machine to ensure it will not start during any inspection or maintenance procedures.
- 4.

## 5.4 House Keeping Schedule

The following tasks must be performed to the schedule shown in Table 3 to ensure the Grit Washer operates reliably. They consist of daily machine checks and weekly cleaning tasks. Housekeeping procedures are detailed in Section 5.5.

*Table 3: Operation House Keeping Schedule.*

<b>House Keeping Schedule</b>				
No	Item	Daily	Weekly	Monthly
1	Check around machine for obvious signs of oil or water.	✓		
2	Check agitator is rotating freely in normal operation without any abnormal noises or squeaks.	✓		
3	Check sand is being transported effectively to the top of the screw conveyor.	✓		
4	Check that there is an adequate quantity of clean sand (0.4m <sup>3</sup> ) in the collection container at all times.	✓		
5	Check the wear bars are positioned correctly in the transport zone of the screw conveyor. Tighten bolts/screws if necessary.	✓		
6	Check motors are working at their respective correct loadings. Check for any abnormal noises and temperature rises.		✓	
7	Check for build-up of organic waste in screw conveyor inlet. Release drain valve if necessary			✓

## 5.5 House Keeping Procedures

The following house keeping procedures are in accordance with the house keeping schedule detailed in Section 5.4.



### WARNING:

ALWAYS WEAR APPROPRIATE PPE WHEN USING HIGH PRESSURE WATER CLEANERS. AS A MINIMUM, GLOVES AND FULL FACE SHIELD PROTECTION MUST BE WORN.

### 5.5.1 Check Motor Loadings

The procedure below details steps for checking the motor loadings on the Grit Washer.

- 
- 1 Locate the relevant control panel for both the agitator and screw motors.

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  - 2 Visually inspect the current readings for both the motor and air compressor.

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  - 3 Compare the readings with the optimum values specified in the relevant data sheet located in Document 1 Section 6.

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  - 4 If there is a discrepancy between the two values consult the troubleshooting table in Section 6.5.
-

## 6 Maintenance

### 6.1 Overview

Regular maintenance and inspection of the Grit Washer is necessary to prevent damage and extend the lifetime of the equipment.

### 6.2 Safety

The Grit Washer has moving parts. Care must be taken by operators and maintenance staff to ensure the machine is isolated and locked out before reaching into the machine.

Appropriate PPE must be worn when conducting housekeeping and maintenance tasks on the Grit Washer.



**DANGER:**

THE GRIT WASHER CONTAINS MOVING PARTS.

THE GRIT WASHER IS AUTOMATICALLY CONTROLLED AND MAY START AT ANY TIME.

FOLLOW SAFE ISOLATION AND LOCKOUT PROCEDURES BEFORE ACCESSING THE INTERNAL COMPONENTS OF THE MACHINE.

### 6.3 Maintenance Schedule

Table 4 details the recommended inspection and maintenance schedule for the Grit Washer.

*Table 4: Maintenance Schedule for Grit Washer.*

Maintenance Schedule						
No	Item	1 Wk	1 Mth	1 Yr	2.5 Yr	5 Yr
1	Check hopper covers / parapets for signs of damage / deterioration. Replace immediately if required.	✓				
2	Visually inspect agitator for holes or excessive wear.	✓				
3	Check exterior of machine for signs of corrosion.	✓				
4	Check wash water system is efficiently working in unison with agitator.	✓				
5	Check the oil level and top up if appropriate.	✓				
6	Check the fixing nuts and bolts are in good condition and not loose.	✓				
7	Check for clogging in the effluent outlet zone	✓				
8	Check for clogging in the sand outlet zone	✓				
9	Check all wash water pipes for signs of wear or leaks. Replace if required.	✓				
10	Check for fibrous material on the agitator shaft		✓			
11	Check gear motor is working correctly		✓			
12	Check electrical condition of motor.		✓			
13	Inspect motor and gearbox mechanical condition.			✓		

Maintenance Schedule						
No	Item	1 Wk	1 Mth	1 Yr	2.5 Yr	5 Yr
14	Check structural integrity of all supports including corrosion.			✓		
15	Replace wear liners in the screw conveyor.				✓	
16	Replace screw conveyor motor.					✓

## 6.4 Maintenance Procedures

The following maintenance procedures are in accordance with the maintenance schedule detailed in Section 6.3.

### 6.4.1 Inspections

#### *Unit Inspection*

Visual inspection of the unit is performed on a weekly basis to check for damage/wear to the hopper walls.

- 1 Shut off the inlet flow valves.
- 2 Turn the Grit Washer main power supply switch OFF.
- 3 Tag out the machine and verify it will not start while cleaning.
- 4 Completely drain the hopper and screw conveyor.
- 5 Inspect the walls of the hopper and verify no excessive wear or corrosion has occurred.
- 6 Close the access hatches, turn the power back on and reopen the inlet flow valves.



#### **WARNING:**

THE HOPPER IS A CONFINED SPACE.

FOLLOW ALL CONFINED SPACE WORK PROCEDURES AND REGULATIONS FOR THE SITE.

### 6.4.2 Screw Conveyor Wear Liner Replacement

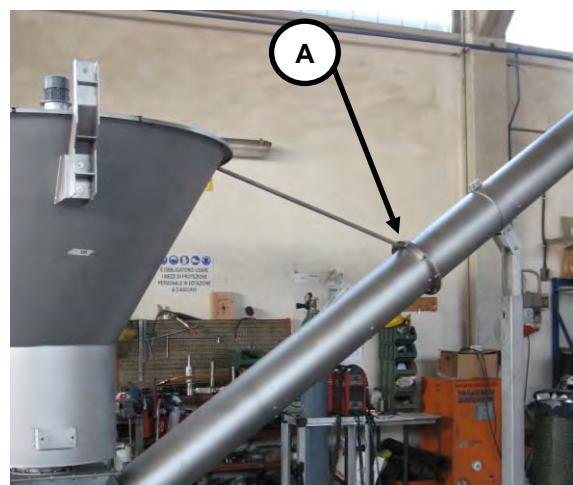
The procedure below details steps for replacing the wear liner in the screw conveyor as per the maintenance schedule in Section 6.3.

- 1 Shut off the inlet flow valves.
- 2 Turn the Grit Washer main power supply switch OFF.
- 3 Tag out the machine and verify it will not start while replacing the wear liner.
- 4 Use a suitable lifting system, fixed about the eyebolt, to hold the screw conveyor whilst the horizontal screw strut is removed.

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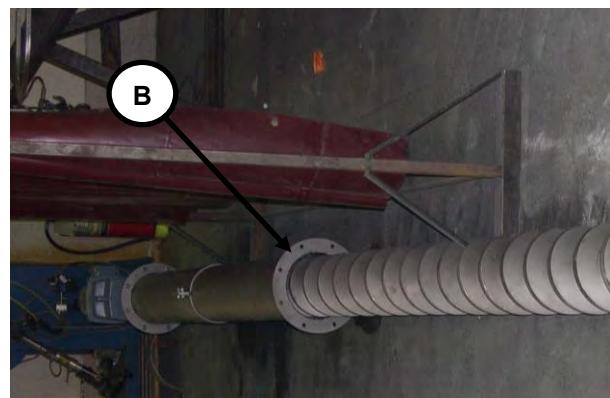
5 Remove the horizontal screw conveyor strut.

6 Unscrew the bolt of the intermediate flange A at the screw conveyor transport zone.



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7 Using the lifting system, remove the gearmotor side of the transport zone housing B.



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8 Unscrew the bolts fixing the wear liners to the transport zone housing (found on outside). Do for both the hopper and gearmotor sections.

9 Remove the wear liners for the transport zone housing.

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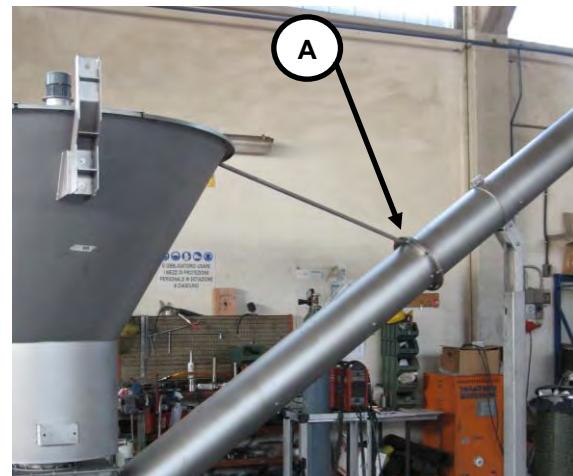
10 Install the new wear liners C by repeating steps 4 to 9 in the opposite sequence. When connecting the intermediate flange remember to apply silicon sealant to the two flange faces before fixing. Ensure the transport zone is capable of holding its weight before releasing the lifting system.



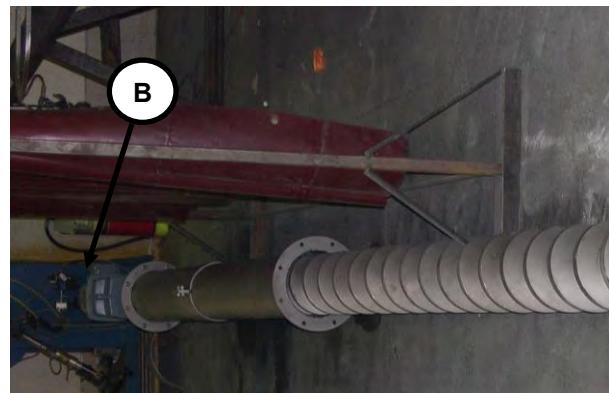
### 6.4.3 Screw Conveyor Motor Replacement

The procedure below details steps for replacing the screw conveyor motor as per the maintenance schedule in Section 6.3.

- 1 Shut off the inlet flow valves.
- 2 Turn the Grit Washer main power supply switch OFF.
- 3 Tag out the machine and verify it is not live.
- 4 Use a suitable lifting system, fixed about the eyebolt, to hold the screw conveyor whilst the horizontal screw strut is removed.
- 5 Remove the horizontal hopper screw strut.
- 6 Unscrew the bolt of the intermediate flange A at the screw conveyor transport zone.



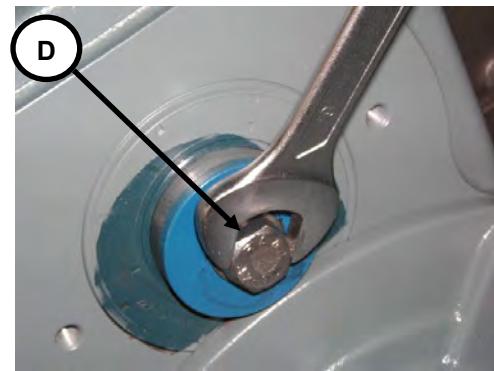
- 7 Using the lifting system, remove the gearmotor side of the transport zone housing B.



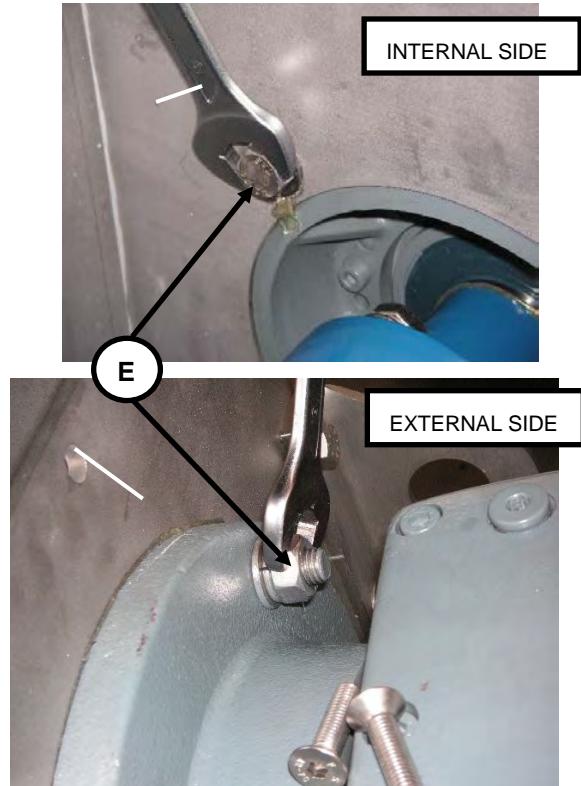
- 8 Remove the shaft protection cap C so that the motor shaft can be accessed.



- 
- 9 Unscrew bolt D fixing the motor shaft.



- 10 Unscrew bolt E fixing the gearmotor to the screw conveyor frame. This will require accessing the bolt head inside the screw conveyor frame.



- 11 Install the new gearmotor by repeating steps 4 to 10 in the opposite sequence. When connecting the intermediate flange remember to apply silicon sealant to the two flange faces before fixing. Ensure the transport zone is capable of holding its weight before releasing the lifting system.
- 

## 6.5 Trouble Shooting

Performing regular maintenance and housekeeping as described in this manual is the best way to ensure the Grit Washer enjoys maximum reliability.

If a fault does occur, check Table 5 for potential causes and solutions. If there is any doubt whatsoever, ring Bilfinger Water Technologies for advice before conducting any repairs.

Troubleshooting of mechanical and electrical faults must be performed by qualified personnel.



## **WARNING:**

**THE GRIT WASHER CONTAINS MOVING PARTS. FOLLOW SAFE ISOLATION AND LOCKOUT PROCEDURES BEFORE ACCESSING THE INTERNAL COMPONENTS OF THE MACHINE.**

**Table 5: Problem-Cause-Solution table for the Grit Washer.**

Problem		MACHINE CANNOT START - ELECTRIC MOTOR IS NOT WORKING	
EXCESSIVE VIBRATIONS (EMPTY UNIT)		HIGH ADSORBMENT (EMPTY UNIT)	
EXCESSIVE VIBRATIONS DURING NORMAL WORKLOAD		MACHINE IS RUNNING, BUT AFTER FEW SECONDS THE MOTOR OVERLOAD PROTECTION ACTIVATES CAUSING THE AGITATOR MOTOR TO STOP.	
SAND IS TOO WET		SCREW CONVEYOR CANNOT EXTRACT THE SAND	
SAND IS TOO DIRTY (I.E. TOO MUCH ORGANIC MATERIAL)			
		Cause	
●		Electric power is not present.	Switch on electric power.
● ● ● ●		Electric connections are faulty.	Re-connect electric components.
● ● ● ●		Bad regulation of electric motor limit switch.	Regulate it.
● ● ● ●		Tension is very low, frequency very high.	Check tension condition.
● ● ● ●		Screw conveyor blocked/overloaded.	Start with reverse rotation to remove the blockage.
● ● ● ●		Screw conveyor is not perfectly centered.	Check fixing of the blots in the flange.
● ● ● ●		Wearing bars not fixed correctly.	Adjust the wearing bar bolts.
● ● ● ●		Gearmotor could be damaged.	Check the correct connection of the electric motor and check that tension is the same as shown on the electric motor nameplate.
● ● ● ●		Screw conveyor rotation and direction could be opposite.	Reverse the polarity of the electric motor.
● ● ● ●		Excessive activation times of the screw.	Reduce activation times.
● ● ● ●		Pause times on the screw too short.	Augment pause times.
● ● ● ●		Excessive feeding flow rate.	Reduce the feeding flow rate as scheduled.
● ● ● ●		Clogging of the screw.	Clean it and remove foreign solids.
● ● ● ●		Excessive opening times and frequencies on the organic outlet valve.	Reduce opening times and frequencies.
● ● ● ●		Pressure gauge measuring the sand level defective or badly regulated.	Substitute the pressure gauge then setup and verify the maximum and minimum values for sand quantity.
● ● ● ●		Shortage of washing water.	Verify the capacity and the pressure feeding the washing system.
● ● ● ●		Agitator dirty or clogged.	Clean it.
● ● ● ●		Opening time of the organic outlet too short or too much frequent.	Set up adequately the timers of the organic opening.
● ● ● ●		Organic outlet clogged.	Clean it.
● ● ● ●		Absence of clean sand at base in the starting phase.	Make sure that in the starting phase there is always some clean sand at the bottom of the hopper in the collection container.

## **7 Spare Parts**

The unit is supplied with a number of spare parts as listed in Document 1 Section 7. The spares list outlines the recommended holding numbers for each part as well as a description of the part and its part number. The spare parts are referenced to an exploded drawing of the unit also found in Document 1 Section 7. If there is any doubt regarding number of spare parts supplied, or if new spares need to be ordered, ring Bilfinger Water Technologies for advice.

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## **8 Storage**

If the unit is to be stored for any length of time prior to initial service, it must be stored in a dry, secure, dust free environment out of direct sunlight.

If the unit has been in service prior to storage it is recommended that all solid particles are removed from all components using high pressure water. It's also recommended the unit be placed on a wooden pallet and stored in a dry, secure, dust free environment out of direct sunlight.

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## 9    **Warranty**

The following warranty statement is standard and may vary from the actual warranty issued. Please read over the warranty specific to this order in Document 1 Section 10.

*Bilfinger Water Technologies warrants the supplied equipment against defective parts and workmanship for a period of eighteen months from date of shipment or twelve months from date of installation, whichever is the shorter period. Bought out components, such as motors, valves, instruments etc, are supplied under the manufacturer's standard warranty.*

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade	Contract No. C1011-045-087 Grit Washer System
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## Bilfinger GW80 Installation, Operation and Maintenance Manual

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade		
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Queensland Urban Utilities Wacol STP Grit Removal System Upgrade	Contract No. C1011-045-087 Grit Washer System
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## NORD Drive Unit Manual

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade		
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Version: A	10 May. 15	Page 24 of 27
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## Intelligent Drivesystems, Worldwide Services



# B1000

Operating and Assembly Instructions for  
Gear Units and Geared Motors

Q-Pulse Id: TMS1224

Active: 10/07/2015

**NORD**  
DRIVESYSTEMS  
Page 304 of 383





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## 1. Notes

### 1. Notes

#### 1.1 General information

Read the Operating Manual carefully prior to performing any work on or putting the gear unit into operation. Strict compliance with the instructions in this Operating Manual is essential. Getriebbau NORD accepts no liability for damage to persons, materials or assets as a result of the non-observance of this Operating Manual, operating errors or incorrect use. General wearing parts, e.g. radial seals are excluded from the warranty.

**If additional components are attached to or installed in the gear unit (e.g. motor, cooling system, pressure sensor etc.) or components (e.g. cooling system) are supplied with the order, the operating instructions for these components must be observed.**

**If geared motors are used, compliance with the Motor Operating Manual is also necessary.**

If you do not understand the contents of this Operating Manual or additional operating instructions, please consult Getriebbau NORD!

#### 1.2 Safety and information symbols

Please always observe the following safety and information symbols!

	<b>Danger!</b>
	Risk of fatalities and injury
	<b>Attention!</b>
	Machine may be damaged
	<b>Note!</b>
	Useful information

#### 1.3 Correct use

These gear units generate a rotational movement and are intended for use in commercial systems. The gear unit must only be used according to the information in the technical documentation from Getriebbau NORD.

	<b>Danger!</b>
	Use in explosion hazard areas is prohibited.

Strict compliance with the technical data on the rating plate is essential.

**The documentation must be observed.**

Appropriate safety measures must be taken for applications where failure of a gear unit or geared motor may result in injury.



## 1. Notes

### 1.4 Safety information

**All work** including transportation, storage, installation, electrical connection, commissioning, servicing, maintenance and repair must be performed **only by qualified specialist personnel**. It is recommended that repairs to NORD Products are carried out by the NORD Service department.

	<b>Danger!</b>
	<p>Installation and maintenance work must only be performed when gear units are at a standstill and have cooled down. The drive must be isolated and secured to prevent accidental start-up.</p> <p>Tighten the drive elements or secure the parallel key before switching on.</p>

	<b>Danger!</b>
	<p>Only transport use the eyebolts attached to the gear unit. No additional loads may be attached. Transportation aids and lifting gear must have an adequate load-bearing capacity.</p>

If geared motors have an additional eyebolt attached to the motor, this must also be used. Avoid pulling the eyebolts at an angle. The thread of the eyebolt must be fully screwed in.

**Observe all safety information**, including that provided in the individual sections of this Operating Manual. All national and other regulations on safety and accident prevention must also be observed.

	<b>Danger!</b>
	<p><b>Serious physical and property damage</b> may result from inappropriate installation, non-designated use, incorrect operation, non-compliance with safety information, unauthorised removal of housing components or safety covers and structural modifications to the gear unit.</p>



## 1. Notes

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### 1.5 Other documents

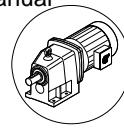
Further information may be obtained from the following documents:

- Gear unit catalogues (G1000, G2000, G1011, G1012, G1034, G1035)
- Operating and maintenance instructions for the electric motor
- if applicable, operating instructions for attached or supplied options

### 1.6 Disposal

Observe the current local regulations. In particular, lubricants must be collected and disposed of correctly.

<b>Gear unit components:</b>	<b>Material:</b>
Toothed wheels, shafts, rolling bearings, parallel keys, locking rings, ...	Steel
Gear unit housing, housing components, ...	Grey cast iron
Light alloy gear unit housing, light alloy gear unit housing components, ...	Aluminium
Worm gears, bushes, ...	Bronze
Radial seals, sealing caps, rubber components,...	Elastomers with steel
Coupling components	Plastic with steel
Flat seals	Asbestos-free sealing material
Gear oil	Additive mineral oil
Synthetic gear oil (rating plate code: CLP PG)	Polyglycol-based lubricants
Cooling spiral, embedding material of the cooling spiral, screw fittings	Copper, epoxy, yellow brass



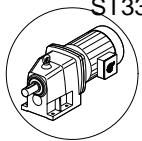
## 2. Description of Gear Units

### 2. Description of gear units

#### 2.1 Type designations and gear unit types

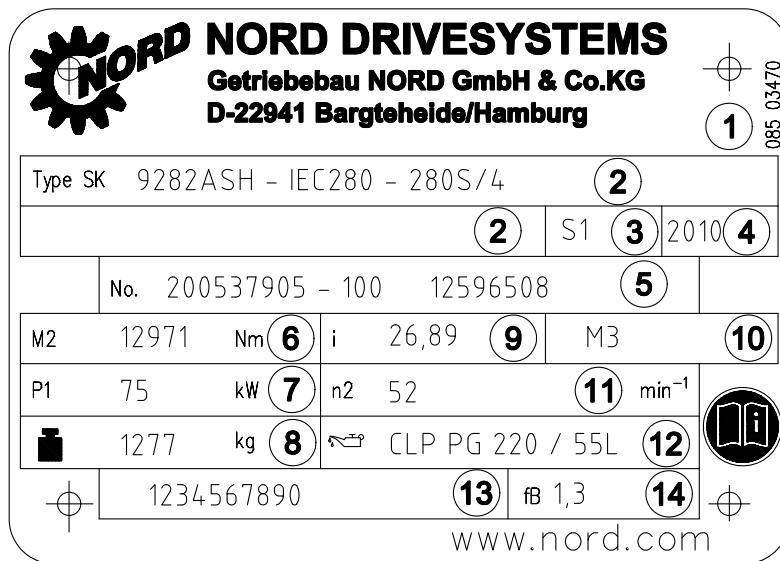
		Versions / Options
<b>Helical gear units</b>		- Foot mounting with solid shaft
SK 11E, SK 21E, SK 31E, SK 41E, SK 51E (single-stage)		A Hollow shaft version
SK 02, SK 12, SK 22, SK 32, SK 42, SK 52, SK 62N (2-stage)		V Solid shaft version
SK 03, SK 13, SK 23, SK 33N, SK 43, SK 53 (3-stage)		L Solid shaft both sides
SK 62, SK 72, SK 82, SK 92, SK 102 (2-stage)		Z Drive flange B14
SK 63, SK 73, SK 83, SK 93, SK 103 (3-stage)		F Output flange B5
<b>NORDBLOC helical gear units</b>		X Foot mounting
SK 320, SK 172, SK 272, SK 372, SK 472, SK 572, SK 672, SK 772, SK 872, SK 972 (2-stage)		XZ Base and output flange B14
SK 273, SK 373, SK 473, SK 573, SK 673, SK 773, SK 873, SK 973 (3-stage)		XF Base and output flange B5
SK 072.1, SK 172.1, SK 372.1, SK 572.1, SK 672.1, SK 772.1 SK 872.1, SK 972.1 (2-stage)		AL Reinforced axial drive bearings
SK 373.1, SK 573.1, SK 673.1, SK 773.1, SK 873.1, SK 973.1 (3-stage)		5 Reinforced output shaft (Standard helical gear unit)
<b>Standard helical gear units</b>		V Reinforced drive shaft (Standard helical gear unit)
SK 0, SK 01, SK 20, SK 25, SK 30, SK 33 (2-stage)		D Torque support
SK 010, SK 200, SK 250, SK 300, SK 330 (3-stage)		K Torque console
<b>Parallel shaft gear units</b>		S Shrink disc
SK 0182NB, SK 0282NB, SK 1282, SK 2282, SK 3282, SK 4282, SK 5282, SK 6282, SK 7282, SK 8282, SK 9282, SK 10282, SK 11282 (2-stage)		VS Reinforced shrink disc
SK 1382NB, SK 2382, SK 3382, SK 4382, SK 5382, SK 6382, SK 7382, SK 8382, SK 9382, SK 10382, SK 11382, SK 12382 (3-stage)		EA Hollow shaft with internal spline
<b>Bevel gear units</b>		G Rubber buffer
SK 92072, SK 92172, SK 92372, SK 92672, SK 92772 (2-stage)		VG Reinforced rubber buffer
SK 9012.1, SK 9016.1, SK 9022.1, SK 9032.1, SK 9042.1, SK 9052.1, SK 9062.1, SK 9072.1,		R Back stop
SK 9082.1, SK 9086.1, SK 9092.1, SK 9096.1 (3-stage)		B Fixing element
SK 9013.1, SK 9017.1, SK 9023.1, SK 9033.1, SK 9043.1, SK 9053.1 (4-stage)		H Covering cap as contact guard
<b>Contrate worm gear unit</b>		H66 Covering cap IP66
SK 02040, SK 02050, SK 12063, SK 12080, SK 32100, SK 42125 (2-stage)		VL Reinforced bearings
SK 13050, SK 13063, SK 13080, SK 33100, SK 43125 (3-stage)		VL2 Agitator design
<b>MINIBLOC worm gear units</b>		VL3 Drywell agitator design
SK1 S32, SK1 S40, SK 1S50, SK 1S63, SK 1SU...		IEC Standard motor mounting
SK 1SM31, SK 1SM40, SK 1SM50, SK 1SM63 (single-stage)		NEMA Standard motor mounting
SK 2S32NB, SK 2S40NB, SK 2S50NB, SK 2S63NB, SK 2SU..., SK 2SM40, SK 2SM50, SK 2SM63 (2-stage)		W With free drive shaft
<b>UNIVERSAL worm gear units</b>		VI Viton radial seals
SK 1SI31, SK 1SI40, SK 1SI50, SK 1SI63, SK 1SI75, SK 1SIS31, ..., SK 1SIS75, SK 1SD31, SK 1SD40, SK 1SD50, SK 1SD63, SK 1SIS-D31, ..., SK 1SIS-D63 (single-stage)		OA Oil expansion vessel
SK 2SD40, SK 2SD50, SK 2SD63, SK 1SI.../31, SK 1SI.../H10, SK 2SIS-D40, ..., SK 2SIS-D63 (2-stage)		OT Oil level tank
		SO1 Synthetic oil ISO VG 220
		CC Casing cover with cooling spiral
		DR Spring Loaded Breather
		H10 Modular contrate pre-stage
		/31 Worm pre-stage
		/40 Worm pre-stage

Double gear units consist of two single gear units. They are to be treated as per the instructions in this Manual, i.e. as two individual gear units. Type designation of double gear units: e.g. SK 73/22 (consisting of single gears SK 73 and SK 22)



## 2. Description of Gear Units

### 2.2 Name plate



### Explanation of the Name Plate

- 1 Matrix – Barcode
- 2 NORD gear unit type
- 3 Operating mode
- 4 Year of manufacture
- 5 Serial number
- 6 Rated torque of gear unit output shaft
- 7 Drive power
- 8 Weight according to ordered version
- 9 Overall gear unit ratio
- 10 Installation orientation
- 11 Rated speed of gear unit output shaft
- 12 Lubricant type, viscosity and quantity
- 13 Customer's part number
- 14 Operating factor



### 3. Assembly instructions, storage, preparation, installation



#### 3. Assembly instructions, storage, preparation, installation

Please observe all of the general safety information in Section 1.4, 1.3 and in the individual sections.

##### 3.1 Storing the gear unit

**For short-term storage before commissioning, please observe the following:**

- Store in the fitting position (see Section 6.1) and secure gear units against falling
- Lightly grease bare metal housing surfaces and shafts
- Store in dry rooms
- Temperature must not fluctuate beyond the range of  $-5^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$
- Relative humidity less than 60%
- No direct exposure to sunlight or UV light
- No aggressive, corrosive substances (contaminated air, ozone, gases, solvents, acids, alkalis, salts, radioactivity etc.) in the immediate vicinity
- No vibration or oscillation

##### 3.2 Long-term storage

	<b>Note!</b> <p>For storage or standstill periods in excess of 9 months, Getriebbau NORD recommends the long-term storage option. With the long-term storage option and the use of the measures listed below, storage for up to 2 years is possible. As the actual influences on the unit greatly depend on the local conditions, these times should only be regarded as guide values.</p>
--	--

##### **Conditions of the gear unit and storage area for long-term storage prior to commissioning:**

- Store in the fitting position (see Section 6.1) and secure gear units against falling
- Transportation damage to the external paint must be repaired. Check that a suitable rust inhibitor is applied to the flange bearing surfaces. If necessary apply a suitable rust inhibitor to the surfaces.
- Gear units with the long-term storage option are completely filled with lubricant or have VCI corrosion protection agents added to the gear oil. (See label on gear unit)
- The sealing band in the vent plug must not be removed during storage. The gear unit must remain sealed tight.
- Store in a dry place.
- In tropical regions, the drive unit must be protected against damage by insects
- Temperature must not fluctuate beyond the range of  $-5^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$
- Relative humidity less than 60%
- No direct exposure to sunlight or UV light
- No aggressive, corrosive substances (contaminated air, ozone, gases, solvents, acids, alkalis, salts, radioactivity etc.) in the immediate vicinity
- No vibration or oscillation

##### **Measures during storage or standstill periods**

- If the relative humidity is <50% the gear unit can be stored for up to 3 years.

##### **Measures before commissioning**

- If the storage or standstill period exceeds 2 years or the temperature during short-term storage greatly deviates from the standard range, the lubricant in the gear unit must be replaced before commissioning.
- If the gear unit is completely filled, the oil level must be reduced before commissioning.



### 3. Assembly instructions, storage, preparation, installation

#### 3.3 Transporting the gear unit

	<b>Danger!</b>
To prevent injury, <b>the danger area must be generously cordoned off</b> . Standing under the gear unit during transport is <b>extremely dangerous</b> .	

	<b>Attention!</b>
<p>Avoid damage to the gear unit. Impacts to the free ends of the shafts may cause internal damage to the gear unit.</p> <p>Use adequately dimensioned and <b>suitable means of transportation</b>. Lifting tackle must be designed for the weight of the gear unit. The weight of the gear unit can be obtained from the dispatch documents.</p>	

#### 3.4 Preparing for installation

The drive unit must be inspected and may only be installed if no transportation damage or leaks are visible. In particular the radial seals and the sealing caps must be inspected for damage.

All bare metal surfaces and shafts of the gear unit are protected against corrosion with oil, grease or corrosion protection agents before shipping.

Thoroughly remove all oil, grease or corrosion protection agents and any dirt from the shafts and flange surfaces before assembly.

In applications where an incorrect rotational direction may result in damage or potential risk, the correct rotational direction of the drive shaft is to be established by test running the drive when uncoupled and guaranteeing such for subsequent operation.

Gears with integrated return stops are marked with arrows on the driven/driving sides. The arrows point in the rotation direction of the gear unit. It must be ensured, when connecting the motor and during motor control, that the gear unit can only operate in the rotation direction, e.g. by means of a rotary field test. (For further details, please refer to Catalogue G1000 and WN 0-000 40)

	<b>Attention!</b>
With gear units with an integrated back stop, switching the drive motor to the blocked rotation direction, i.e. incorrect rotation direction, can lead to gear damage.	

Ensure that no aggressive or corrosive substances are present in the area surrounding the installation site or are subsequently expected during operation, which attack metal, lubricants or elastomers. In case of doubt, please contact Getriebbau NORD and take the recommended action.

Oil expansion tanks (Option OA) must be fitted in accordance with the attached works standard WN 0-530 04. For gear units with an M10x1 vent plug, works standard WN 0-52135 must be observed.

Oil storage tanks (Option OT) must be fitted in accordance with the attached works standard WN 0-521 30.

If venting of the gear unit is provided, the vent or the pressure vent must be activated before commissioning. To activate, remove the transport securing devices (sealing cord). Position of the vent plug: see Section 6.1.



### 3. Assembly instructions, storage, preparation, installation

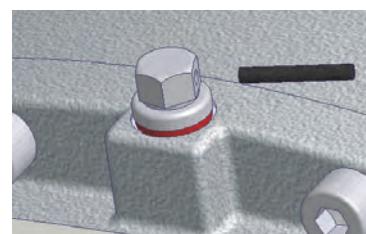
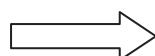
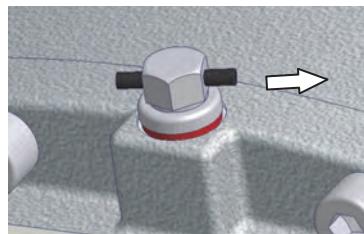


Figure 3-1: Activating the vent plug

Special pressure vents are supplied as loose parts. Before commissioning, the vent plug must be replaced with the pressure vent which is supplied as a loose part. This is achieved by screwing out the vent fitting and replacing it with the pressure vent and seal (refer to Section 6.2 for torque values). Double gear units consist of two single units and are equipped with 2 oil chambers and 2 pressure vents.

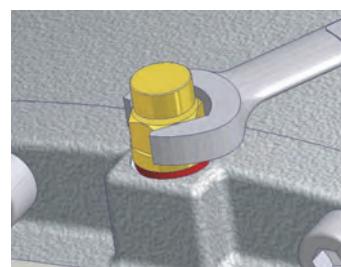
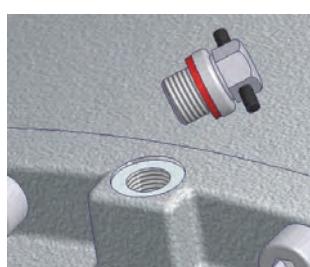
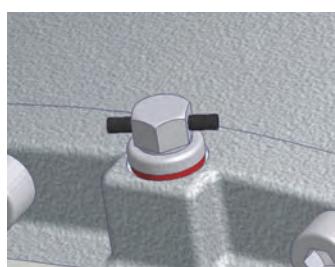


Figure 3-2: Removing vent plug and fitting the pressure vent

#### 3.5 Installing the gear unit

The eyebolts screwed into the gear units must be used during installation. The safety notes in Section 1.4 must be observed.

The base and/or flange to which the gear unit is fitted should be vibration-free, torsionally strong and flat. The smoothness of the mating surface on the base or flange must be according to tolerance class K of DIN ISO 2768-2. All contamination to the bolting surfaces of gear unit and base and/or flange must be thoroughly removed.

The gear unit must be precisely aligned with the drive shaft of the machine in order to prevent additional forces from being imposed on the gear unit due to tension.

Welding of the gear unit is prohibited. The gear unit must not be used as the earth connection for welding work, as this may cause damage to the bearings and gear wheels.



### 3. Assembly instructions, storage, preparation, installation



**The gear unit must be installed in the correct configuration (see Section 6.1) (UNIVERSAL gear unit types SI and SIS are independent of the configuration). Changes to the installation position after delivery require adjustment of the quantity of oil, and often other measures such as e.g. the installation of encapsulated roller bearings. Damage may result if the stated installation position is not observed.**

All gear unit feet and/or all flange bolts on each side must be used. Bolts must have a minimum quality of 8.8. The bolts must be tightened to the correct torques (refer to Section 6.2 for torque values). Tension-free bolting must be ensured, particularly for gear units with a foot and flange.

	<b>Danger!</b>
	<p><b>To ensure that the gearbox does not get too warm and to avoid injury to persons, observe the following during installation:</b></p> <ul style="list-style-type: none"> <li>• The surfaces of gear units or geared motors may become hot during or shortly after operation. <b>Attention: danger of burns!!</b> Protection against accidental contact may need to be installed.</li> <li>• With geared motors, the <b>cooling air of the motor fan</b> must be able to flow <b>unobstructed</b> onto the gear unit.</li> </ul>

#### 3.6 Fitting hubs on the gear shafts

	<b>Attention!</b>
	<p>Do not subject the gear unit to harmful axial forces when fitting the hubs.</p>

Drive and driven elements, e.g. coupling and chain-wheel hubs must be mounted onto the drive and driven shaft of the gear unit using suitable pullers that will not apply damaging axial forces onto the gear unit. In particular, do not hit the hubs with a hammer.

Use the end thread of the shafts for pulling. Fitting can be aided by coating the hub with lubricant or heating it up to approx. 100°C beforehand.

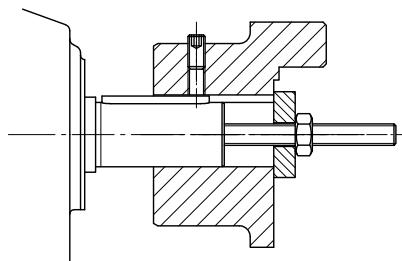


Figure 3-3: Example of a simple pulling device

	<b>Danger!</b>
	<p>Drive and driven elements, such as belt drives, chain drives and couplings <b>must be fitted with contact protection</b>.</p>

**Driven elements may only subject the drive units to the maximum radial force  $F_R$  and axial force  $F_A$  as specified in the catalogue.** Observe the correct tension, particularly on belts and chains. Additional loads due to unbalanced hubs are not permitted. The radial force must be applied to the gear unit as closely as possible.



### 3. Assembly instructions, storage, preparation, installation

#### 3.7 Fitting push-on gear units

	<b>Attention!</b>
The bearings, gear wheels, shafts and housing may be damaged by incorrect fitting.	

The push-on gear unit must be fitted onto the shaft using a suitable puller, which will not exert damaging axial forces on the gear unit. In particular, do not hit the gear unit with a hammer.

Assembly and subsequent dismantling is aided by applying an anti-corrosive lubricant to the shaft before fitting.

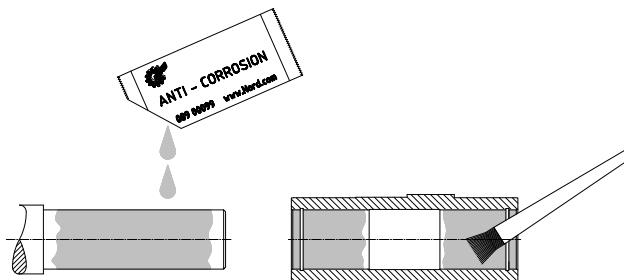


Figure 3-4: Applying lubricant to the shaft and the hub

	<b>Note!</b>
The gear unit can be fitted to shafts with and without a shoulder using the fastening element (Option B). Tighten the bolt of the fastening element to the correct torque. (See Chapter 6.2 for torque values) For gear units with option H66, the factory-fitted closing cap must be removed before assembly.	

For shaft mounted gear units with option H66 and fastening element (Option B) the pressed-in closing cap must be pushed out before fitting the gear unit. The pressed-in closing cap may be destroyed during dismantling. As standard a second closing cap is supplied as a loose spare part. After fitting the gear unit, fit the new / new condition closing cap as described in Section 3.11.

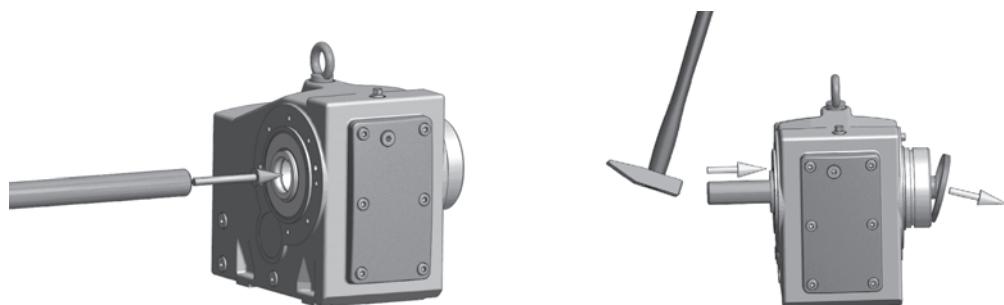


Figure 3-5: Removing the factory-fitted closing cap



### 3. Assembly instructions, storage, preparation, installation

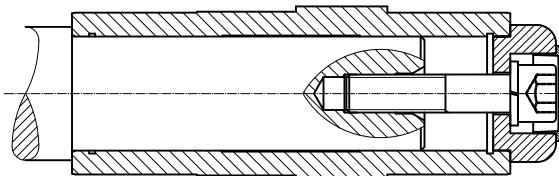


Figure 3-6: Gear unit mounted to shaft with a shoulder using the fastening element

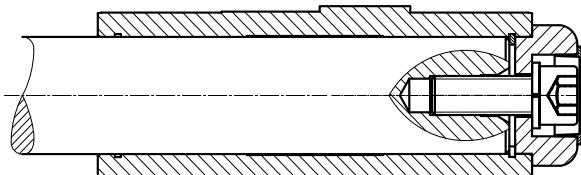


Figure 3-7: Gear unit mounted to shaft without a shoulder using the fastening element

A gear unit can be dismantled from a shaft with shoulder using the following device, for example.

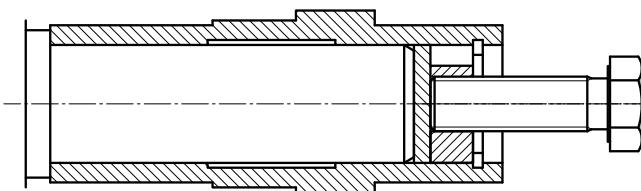


Figure 3-8: Dismantling using dismantling device

When mounting push-on gears with torque supports, the support must not be distorted. Tension-free mounting is aided by the rubber buffer (Option G and/or VG).

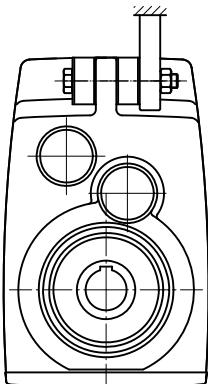


Figure 3-9: Mounting the rubber buffer (Option G and/or VG) on parallel shaft gear units

To fit the rubber buffer, tighten the screw fastening until there is no play between the contact surfaces when there is no load. Then turn the fastening nut (only applies for screw fastenings with adjusting threads) half a turn in order to pre-tension the rubber buffer. Greater pre-tension is not permissible. Secure the screw fastening from coming loose, e.g. with Loctite 242 or a second nut.



### 3. Assembly instructions, storage, preparation, installation

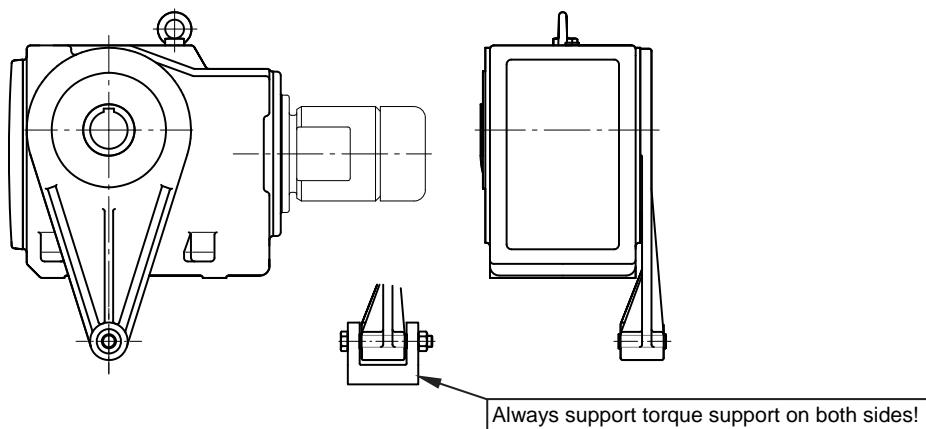


Figure 3-10: Attaching the torque support on bevel gear and worm gear units

Tighten the bolts on the torque support to the correct torque (see Section 6.2 for torque values) and secure to prevent loosening (e.g. Loctite 242, Loxeal 54-03).

#### 3.8 Fitting shrink discs

Shrink disc type, Mat. No.  
and torque details for tensioning screws

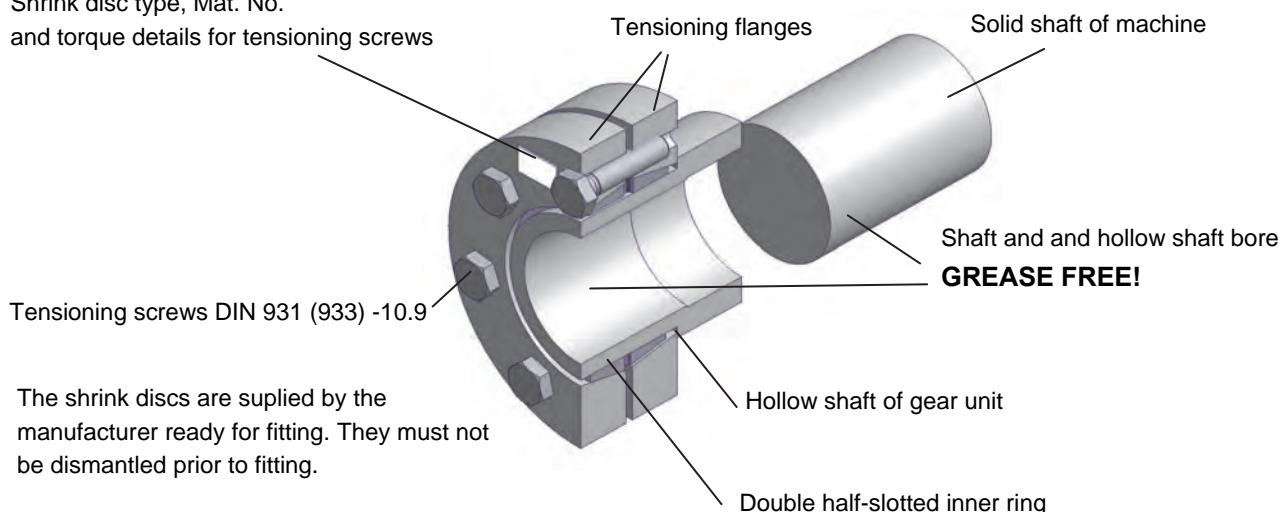


Figure 3-11: Hollow shaft with shrink disc

	<b>Attention!</b>
<b>Do not tighten bolts if the solid shaft is not inserted!</b>	

##### Assembly sequence:

1. Remove any transport securing devices.
2. Loosen but do not remove tightening bolt and tighten gently by hand until there is no play between the flanges and the inner ring.



### 3. Assembly instructions, storage, preparation, installation

3. Slide the shrink disc onto the hollow shaft until the outer clamping flange is flush with the hollow shaft. The shrink disc is easier to slide on if the bore of the inner ring is lightly greased.
4. Prior to mounting, grease the solid shaft only in the area which will later come into contact with the bronze bush in the hollow shaft of the gear unit. Do not grease the bronze bush, in order to prevent grease penetrating the area around the shrink connection.
5. The hollow shaft of the gear unit must be completely de-greased and **completely free of grease**.
6. In the area of the shrink connection the solid shaft of the machine must be degreased and **completely free of grease**.
7. Insert the solid shaft of the machine into the hollow shaft so as to completely fill the area around the shrink connection.
8. Position the clamping flange by gently tightening the bolts.
9. Tighten the bolts successively in a clockwise direction by several turns – not crosswise – with approx.  $\frac{1}{4}$  rotation per turn. Tighten the bolts with a torque wrench to the torque indicated on the shrink disc.
10. When the tensioning bolts have been tightened, there must be an even gap between the clamping flanges. If this is not the case, the gear unit must be dismantled and the shrink disc connection checked for correct fit.

	<b>Danger!</b>
<b>Risk of injury from incorrect mounting and dismantling of the shrink disc.</b>	

#### Dismantling sequence:

1. Loosen the bolts successively in a clockwise direction by several turns with approx.  $\frac{1}{4}$  rotation per turn. Do not remove the bolts from their thread.
2. Loosen the clamping flanges from the cone of the inner ring.
3. Remove the gear unit from the solid shaft of the machine.

### 3.9 Fitting the covers

	<b>Danger!</b>
<b>Shrink discs and exposed rotating shaft ends require contact guards in order to prevent injuries.</b> A cover (Option H and Option H66) can be used as a guard. If this does not achieve sufficient protection against contact according to the required protection type, the machinery and plant constructor must ensure this be means of special attached components.	

All fixing screws must be used and tightened to the correct torque. (See Section 6.2 for torque values) For covers with option H66, press in the new / new condition closing cap by tapping it lightly with a hammer.



### 3. Assembly instructions, storage, preparation, installation



Figure 3-12: Fitting the covers, Option SH, Option H, and Option H66

#### 3.10 Fitting a standard motor

The maximum permitted motor weights indicated in the table below must not be exceeded when attaching the motor to an IEC- / NEMA adapter

Maximum permitted motor weights														
IEC motor size	63	71	80	90	100	112	132	160	180	200	225	250	280	315
NEMA Motor size		56C	143T	145T	182T	184T	210T	250T	280T	324T	326T	365T		
Max. motor weight [kg]	25	30	40	50	60	80	100	200	250	350	500	700	1000	1500

#### Assembly procedure to attach a standard motor to the IEC adapter (Option IEC)/NEMA adapter

1. Clean motor shaft and flange surfaces of motor and IEC /NEMA adapter and check for damage. Mounting dimensions and tolerances of the motor must conform to DIN EN 50347/NEMA MG1 Part 4.
2. Push the coupling sleeve onto the motor shaft so that the motor parallel key engages into the groove in the sleeve on tightening.
3. Tighten the coupling sleeve on the motor shaft in accordance with the motor manufacturer's instructions until it touches the collar. With motor sizes 160, 180 and 225, any spacer bushes must be positioned between the coupling sleeve and the collar. With standard helical gear units, dimension B between the coupling sleeve and the collar must be observed (see Figure 3-13). Certain **NEMA adapters** require the adjustment of the coupling in accordance with the specifications indicated on the adhesive plate.
4. Secure the coupling half with the threaded pin. The threaded pin must be coated prior to use with a securing lubricant e.g. Loctite 242, Loxeal 54-03 and tightened to the correct torque. (See Chapter 6.2 for torque values)
5. Sealing of the flange surfaces of the motor and the IEC /NEMA adapter is recommended if the motor is installed outdoors or in a humid environment. **The flange surfaces** of motor and adapter must be completely coated with **surface sealant** Loctite 574 or Loxeal 58-14 prior to mounting so that the flange seals after mounting.
6. Mount the motor to the IEC /NEMA adapter, do not forget to fit the gear rim or the sleeve. (See Figure 3-13)
7. Tighten the IEC /NEMA adapter bolts to the correct torque. (See Chapter 6.2 for torque values)



### 3. Assembly instructions, storage, preparation, installation

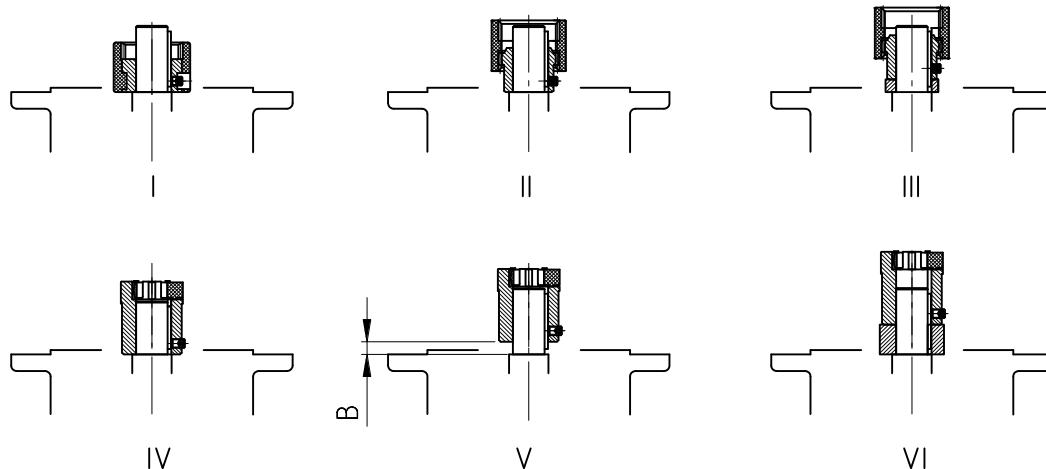


Figure 3-13: Fitting the coupling onto the motor shaft - various types of coupling

- I      Gear coupling, one-part
- II     Gear coupling, two-part
- III    Gear coupling, two-part with spacer bush
- IV    Claw coupling, two-part
- V     Claw coupling, two-part, observe dimension B:

<b>Standard helical gear unit:</b> SK0, SK01, SK20, SK25, SK30, SK33 (2-stage) SK010, SK200, SK250, SK300, SK330 (3-stage)		
	IEC size 63	IEC size 71

Dimension B (Fig. 3-13V)	B = 4.5mm	B = 11.5 mm
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- VI    Claw coupling, two-part with spacer bush

#### 3.11 Retrospective paintwork

	<b>Attention!</b> For retrospective painting of the gear unit, the radial seals, rubber elements, pressure venting valves, hoses, type plates, adhesive labels and motor coupling components must not come into contact with paints, lacquers or solvents, as otherwise components may be damaged or made illegible.
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### 3. Assembly instructions, storage, preparation, installation

#### 3.12 Fitting the cooling coil to the cooling system

Cutting ring screw threads (see Item 1, Figs. 3-14) are located at the casing cover for the connection of a pipe with an external diameter of 10 mm according to DIN 2353. **Remove the drain plug from the screw neck prior to assembly to avoid any contamination of the cooling system.** The screw necks should be connected with the coolant circuit, which must be provided by the operator. The flow direction of the coolant is irrelevant.

**Make sure not to twist the screw necks during or after assembly** as the cooling coil may be damaged (see Item 3, Fig. 3-14). You must ensure that no external forces act on the cooling coil.

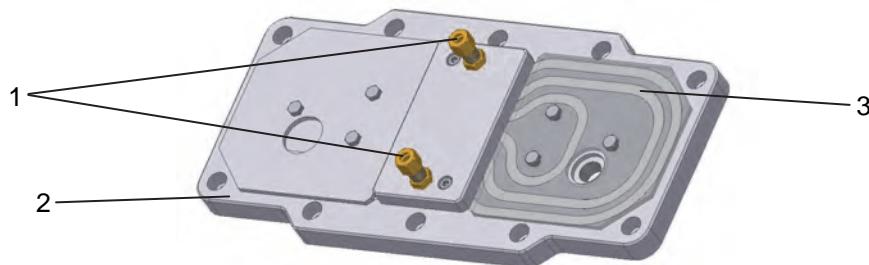


Figure 3-14: Cooling cover

	<b>Danger!</b>
<b>The pressure released from the cooling circuit before carrying out any work on the gear unit.</b>	



## 4. Commissioning

### 4.1 Checking the oil level

The oil level must be checked prior to commissioning. See Section 5.2.

### 4.2 Activating the automatic lubricant dispenser

Some gear unit types with standard motor (Option IEC/NEMA) have an automatic lubricant dispenser for the rolling bearings. This dispenser must be activated prior to commissioning. The cartridge case cover has a red information sign for the activation of the lubricant dispenser.

#### Activating the Automatic Lubricant Dispenser:

1. Loosen and remove cylinder bolts M8x16 (1)
2. Lift off cartridge case cover (2)
3. Insert activation screw (3) into the lubricant dispenser (5) until the lug (4) breaks off at the defined fracture point
4. Refit cartridge case cover (2) and fasten using cylinder bolt (1). (See Chapter 6.2 for torque values)
5. Mark activation date on the adhesive plate (6) indicating month/year

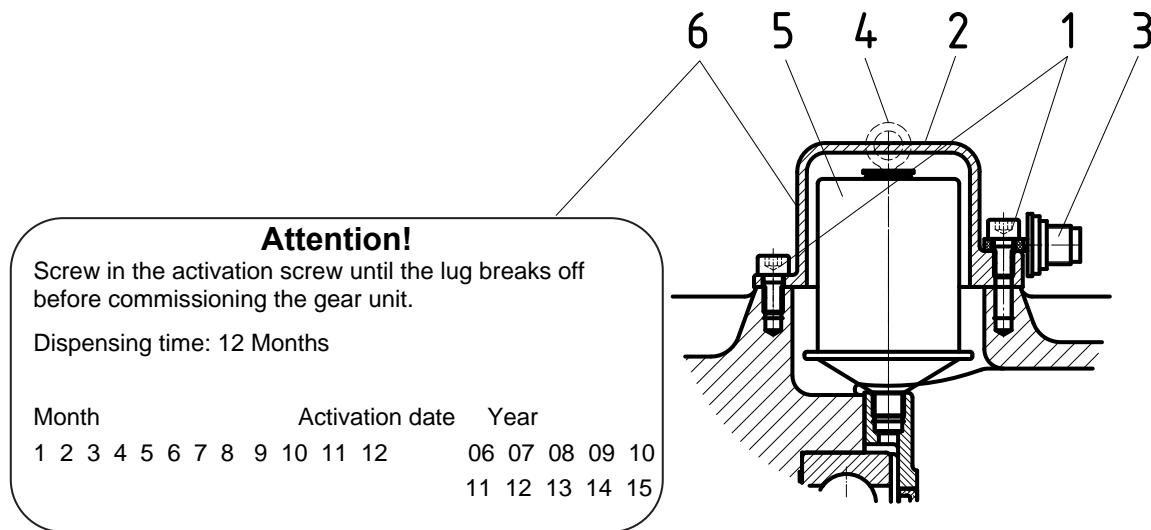


Figure 4-1: Activating the automatic lubricant dispenser with standard motor mounting



## 4. Commissioning

### 4.3 Operation with lubricant cooling

#### Water cooling

	<b>Caution!</b>
The drive may only be commissioned after the cooling spiral has been connected to the cooling circuit, and the cooling circuit has been put into operation.	

The coolant must have a similar thermal capacity as water (specific thermal capacity at 20°C  $c=4.18 \text{ kJ/kgK}$ ). Industrial water without any air bubbles or sediments is recommended as a coolant. The water hardness must be between 1° dH and 15° dH, and the pH value must be between pH 7.4 and pH 9.5. No aggressive liquids should be added to the coolant!

The **coolant pressure** must not exceed **8 bar**. The required **quantity of coolant** is **10 litres/minute**, and the **coolant inlet temperature** should not exceed 40°C; we recommend **10°C**.

We also recommend fitting a pressure reducer at the coolant inlet to avoid any damage due to excessive pressure.

If there is a danger of frost the operator should add a suitable anti-freeze solution to the cooling water.

The **temperature of the cooling water** and the **cooling water flow rate** must be **supervised** and **ensured** by the operator.

#### Air/Oil cooler

This version and all important data concerning the air/oil cooler can be obtained from Catalogue G1000, or contact the manufacturer of the cooling unit.

### 4.4 Running-in time for the worm gear unit

	<b>Note!</b>
In order to achieve maximum efficiency of the worm gear unit, the gear unit must be subjected to a running-in period of approx. 25 h – 48 h under maximum load. There may be a reduction in efficiency before the running-in period is complete.	

### 4.5 Checklist

<b>Checklist</b>		<b>Information – see Section</b>
<b>Object of the check</b>	<b>Checked on:</b>	
Is the vent plug activated or the pressure vent screwed in?		Sec. 3.4
Does the required configuration conform with the actual installation?		Sec. 6.1
Are the external gear shaft forces within permitted limits (chain tension)?		Sec. 3.6
Is the torque support correctly fitted?		Sec. 3.7
Are contact guards fitted to rotating components?		Sec. 3.9
Is the automatic lubricant dispenser activated?		Sec. 4.2
Is the cooling cover connected to the cooling circuit?		Sec. 3.12/4.3



## 5. Service and Maintenance

### 5. Service and maintenance

#### 5.1 Service and maintenance intervals

Service and Maintenance Intervals	Service and Maintenance Work	Information – see Section
At least every six months	<ul style="list-style-type: none"> <li>- Visual inspection</li> <li>- Check for running noises</li> <li>- Check oil level</li> <li>- Re-grease (applicable only to free drive shaft / Option W and on agitator bearings / Option VL2 / VL3)</li> <li>- Replace automatic lubricator (for operating times &lt; 8 h/day: a replacement interval for the lubricant dispenser of 1 year is permissible) (only with IEC/NEMA standard motors)</li> </ul>	5.2
For operating temperatures up to 80°C Every 10000 operating hours at least every 2 years (The interval is double this if the unit is filled with synthetic products)  For higher temperatures or extreme operating conditions (high humidity, aggressive environments and large temperature fluctuations) the oil change intervals must be halved.	<ul style="list-style-type: none"> <li>- Change the oil</li> <li>- Clean or replace the vent plug.</li> </ul>	5.2
At least every 10 years	<ul style="list-style-type: none"> <li>- General overhaul</li> </ul>	5.2

#### 5.2 Service and maintenance work

Servicing and maintenance work must only be performed by qualified specialist personnel.

Installation and maintenance work must only be performed when gear units are at a standstill. The drive must be isolated and secured to prevent accidental start-up.

##### Visual inspection

The gear unit must be checked for leaks. In addition, the gear unit must be inspected for external damage and cracks in the hoses, hose connections and rubber buffers. Have the gear unit repaired in case of leaks, e.g. dripping gear oil or cooling water, damage or cracks. Please contact the NORD service department.

##### Note:

SI type universal worm gear drives, IEC/NEMA adapters for NORDBLOC.1 up to size 673.1 and SEP/SEK servo motor adapters are sealed on the drive side by means of a shaft sealing ring which is located directly in the oil space. **This ensures that the shaft sealing ring is especially well supplied with lubricating oil, and has low friction and a long service life.**

The drive shaft bearing has two cover discs, which form a non-contact seal (See Fig. 5-1). These form a long sealing gap between the shoulder of the inner ring. Because of this, the bearing is almost frictionless, friction losses are minimal and there is no temperature increase in the drive shaft bearing.



## 5. Service and Maintenance

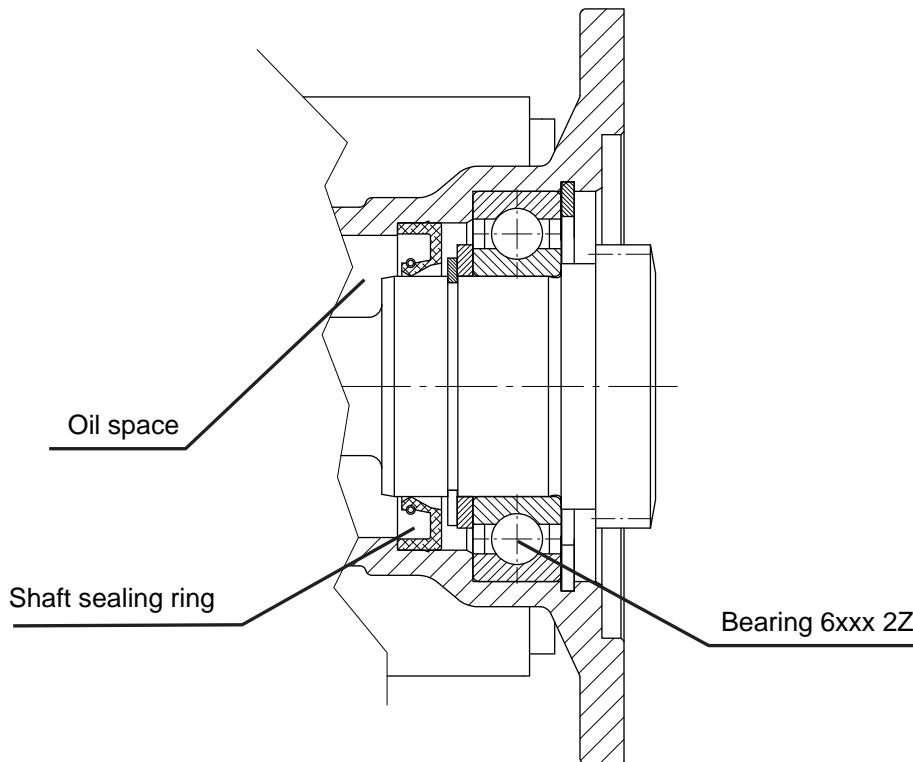


Fig. 5-1: Drive shaft bearing and seal on the coupling side of universal worm gear units

Due to the internal construction of the bearing, there may initially be a very slight apparent leakage on the drive shaft, which is caused by transport or storage. I.e. there may be a slight escape of oil from the bearing grease before commissioning and in the initial phase of operation.

**We hereby explicitly point out that any slight escape of oil does not constitute technical faults and does not impair the reliability of the gear unit and the bearing.**

### Check for running noises

If the gear unit produces unusual running noises and/or vibrations, this could indicate damage to the gear unit. In this case the gear should be shut down and a general overhaul carried out.

### Check the oil level

Section 6.1 describes the versions and the corresponding oil level screws. With double gear units, the oil level must be checked on both units. The pressure vent must be at the position marked in Section 6.1.

The oil level does not need to be checked on gear units without oil level screw (see Section 6.1).

Gear unit types that are not supplied full of oil must be filled before the oil level is checked. (see "Changing the oil")

#### Checking the oil level:

1. The oil level may only be checked when the gear unit is **at a standstill and has cooled down**. The gear unit must be secured to prevent accidental switch-on.
2. The oil level screw corresponding to the version must be screwed out. (See Section 6.1)



## 5. Service and Maintenance

	<b>Note!</b>
<p>At the first oil level check a small amount of oil may escape, as the oil level may be below the lower edge of the oil level hole.</p>	

3. **Gear units with oil level screw:** The maximum oil level is the lower edge of the oil level hole. The minimum oil level is 4 mm below the oil level hole. If the oil level is too low, this must be corrected using the correct type of oil. An oil level glass is available instead of the oil level screw
4. **Gear units with an oil level vessel:** The oil level must be checked **in the oil level vessel** with the aid of the dipstick plug (thread G1 1/4). The oil level must be between the upper and lower mark when the dipstick is completely screwed in (see Fig. 5-2). The oil level must be corrected with the correct type of oil if necessary. These gearboxes may only be operated in the configuration stated in Section 6.1.
5. The oil level screw or the cap screw with dipstick and all other loosened screws must be correctly re-tightened.

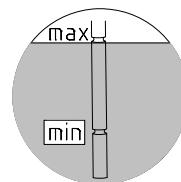


Figure 5-2: Check the oil level with a dipstick

### Regreasing

Some gear unit designs (free drive shaft, Option W, agitator designs VL2 and VL3) are equipped with a regreasing device.

For agitator versions VL2 and VL3, the vent screw located opposite to the grease nipple must be unscrewed before regreasing. Grease should be injected until a quantity of 20-25g escapes from the vent hole. After this, the vent plug must be reinserted and tightened.

For Option W and some IEC adapters, the outer roller bearing must be regreased with approx. 20-25g of grease via the grease nipple provided

Recommended grease: Petamo GHY 133N (see Section 6.4: Klüber Lubrication).

### Replacing the automatic lubricant dispenser

Screw-off the cartridge case cover (2), (see Fig. 4-1). The lubrication dispenser (5) is screwed out and replaced with a new component (Part No. 283 0100). Then activate (see Chapter 4.2)!

### Changing the oil

The figures in Section 6.1 show the oil drain screw, the oil level screw and the pressure vent screw for various designs.

Sequence:

1. Place the drip tray below the oil drain screw or the oil drain cock
2. Completely remove oil level screw, screwed sealing plug with dipstick if an oil level tank is being used and oil drain screw.

	<b>Danger!</b>
<b>Warning: Hot oil!</b>	



## 5. Service and Maintenance

3. Drain all the oil from the gear unit.
4. If the screw lock coating of the oil drain screw or oil level screw is damaged in the thread, a new oil level screw must be used or the thread cleaned and coated with securing lubricant, e.g. Loctite 242, Loxeal 54-03 prior to inserting. The seal ring must be replaced if damaged.
5. Support the seal ring, insert the oil drain screw into the hole and tighten to the correct torque! (See Section 6.2 for torque values)
6. Using a suitable filling device, refill with oil of the same type through the oil level hole until oil emerges from the oil level hole. (The oil can also be filled through the pressure vent screw or a sealing plug located higher than the oil level). If an oil level vessel is used, fill the oil through the upper inlet (thread G1½) until the oil level is set as described in Section 5.2.
7. Wait at least 15 minutes, or at least 30 minutes if an oil level tank is used, and then check the oil level. Proceed as described in Section 5.2.

	<p><b>Note!</b></p> <p>The oil does not need to be changed on gear units without oil level screw (see Section 6.1). These gear units are lubricated for life.</p> <p>Standard helical gear units have no oil level screw. Here, the oil is topped up through the pressure vent bolt using the quantities listed in the table in Section 6.5.</p>
--	--

### Cleaning or replacing the vent plug

In case of severe dirt, unscrew the vent plug and clean it thoroughly. If necessary screw in a new vent plug with a new sealing ring.

### General overhaul

The gear units must be completely dismantled. The following work must be carried out:

- Clean all gear unit components
- Examine all gear unit components for damage
- All damaged components must be replaced
- All roller bearings must be replaced
- Replace back stops if fitted
- Replace all seals, radial seals and Nilos rings
- Replace plastic and elastomer components of the motor coupling

The general overhaul must be carried out by qualified personnel in a specialist workshop with appropriate equipment in observance of national regulations and laws. We recommend that the general overhaul is carried out by the NORD service department.

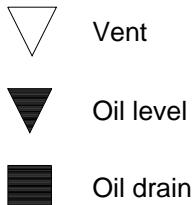


## 6. Appendix

### 6. Appendix

#### 6.1 Versions and maintenance

Explanation of symbols for the following version illustrations:



<b>Note!</b>	
	SK 320, SK 172, SK 272, SK 372K, SK 273 and SK373 as well as SK 01282 NB, SK 0282 NB, SK 1382 NB and UNIVERSAL / Minibloc gear units are lubricated for life. These gear units do not have an oil filler screw.

#### Parallel shaft gear units with oil level vessel

The following applies for SK 9282, SK 9382, SK 10282, SK 10382, SK 11282, SK 11382 parallel gear units and SK 12382 in the M4 configuration with oil level vessels:

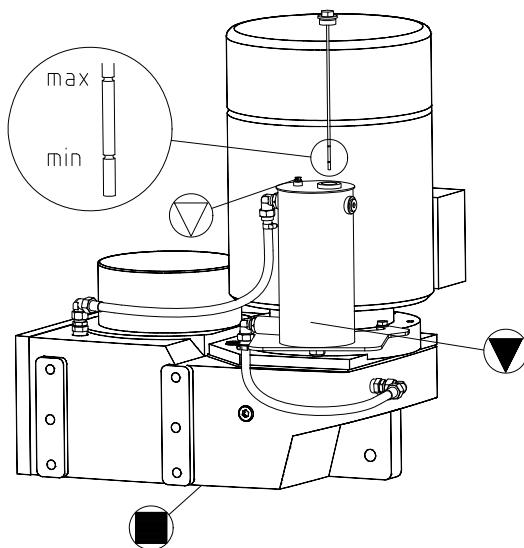
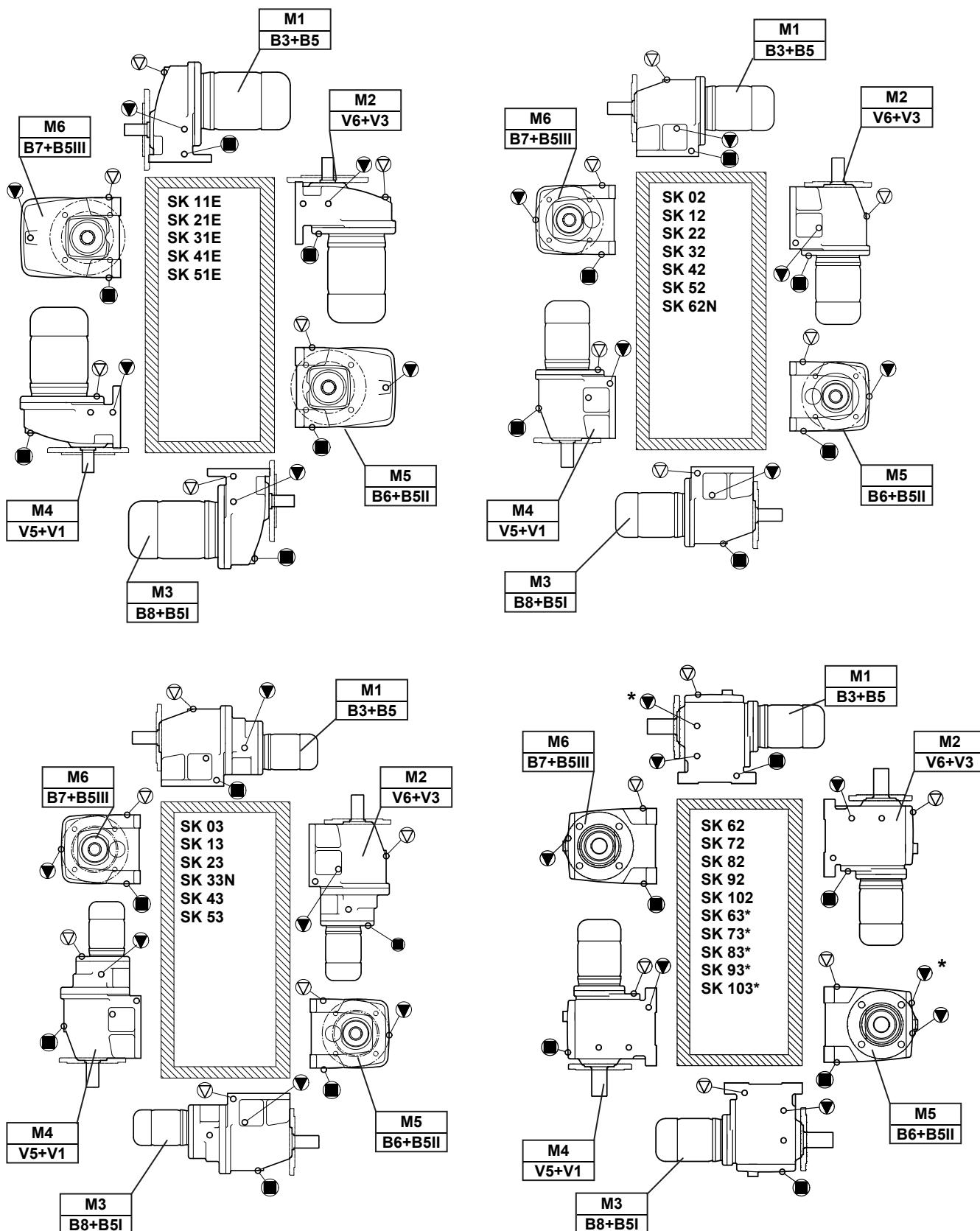
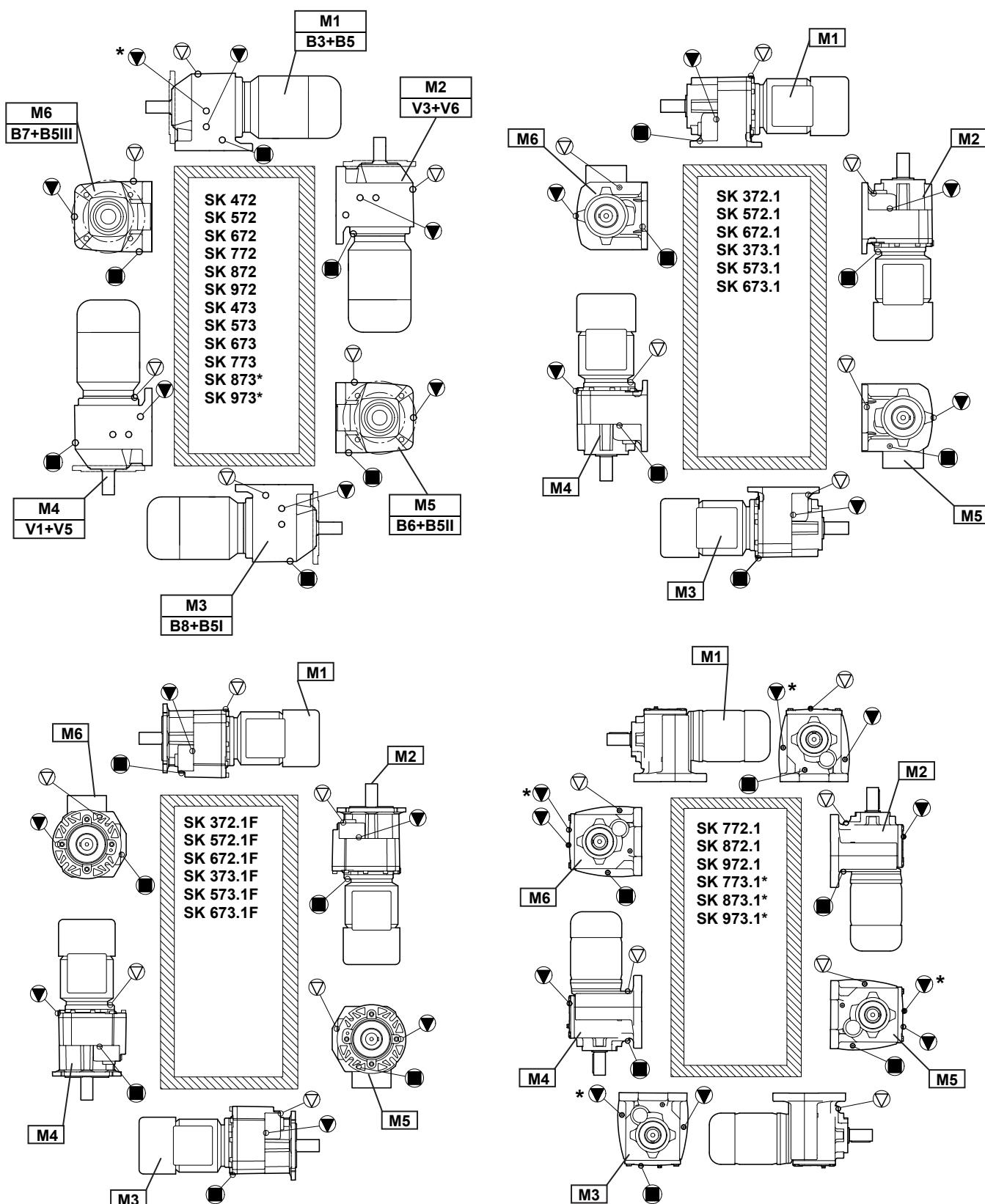
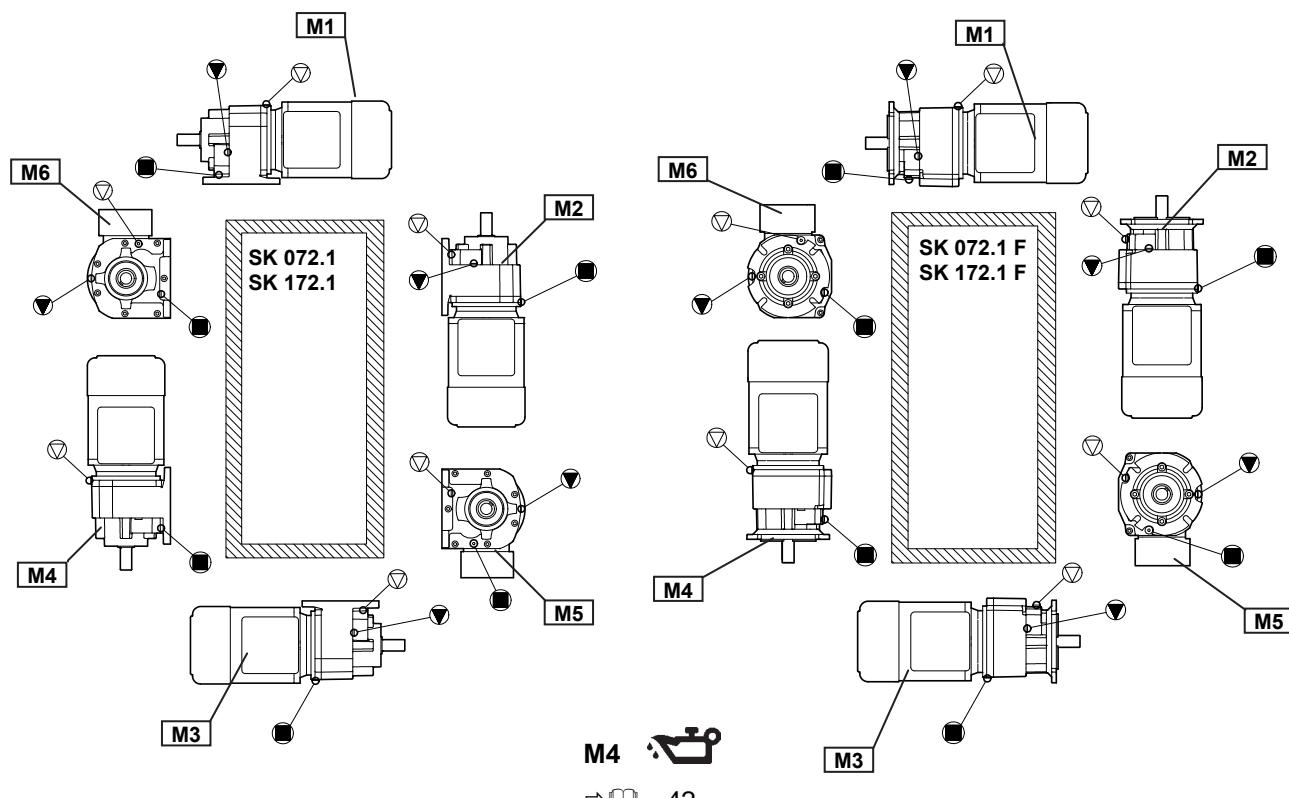
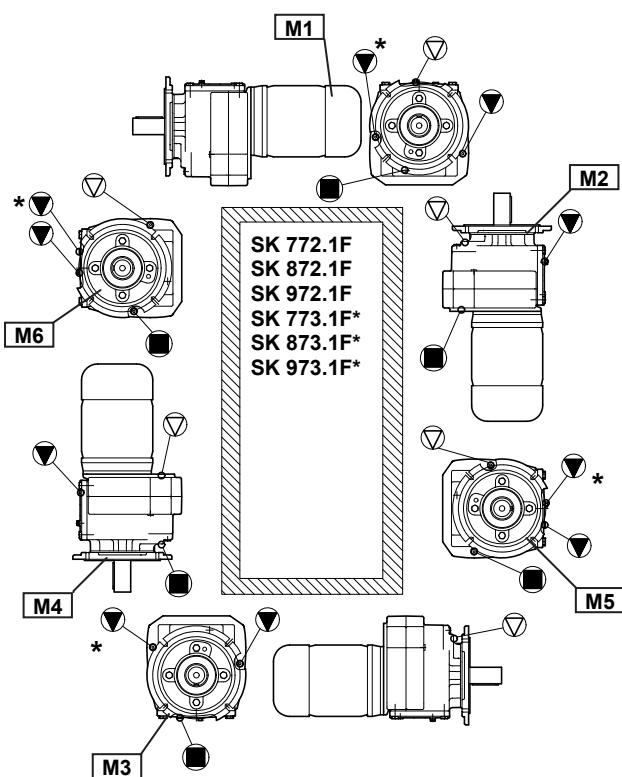
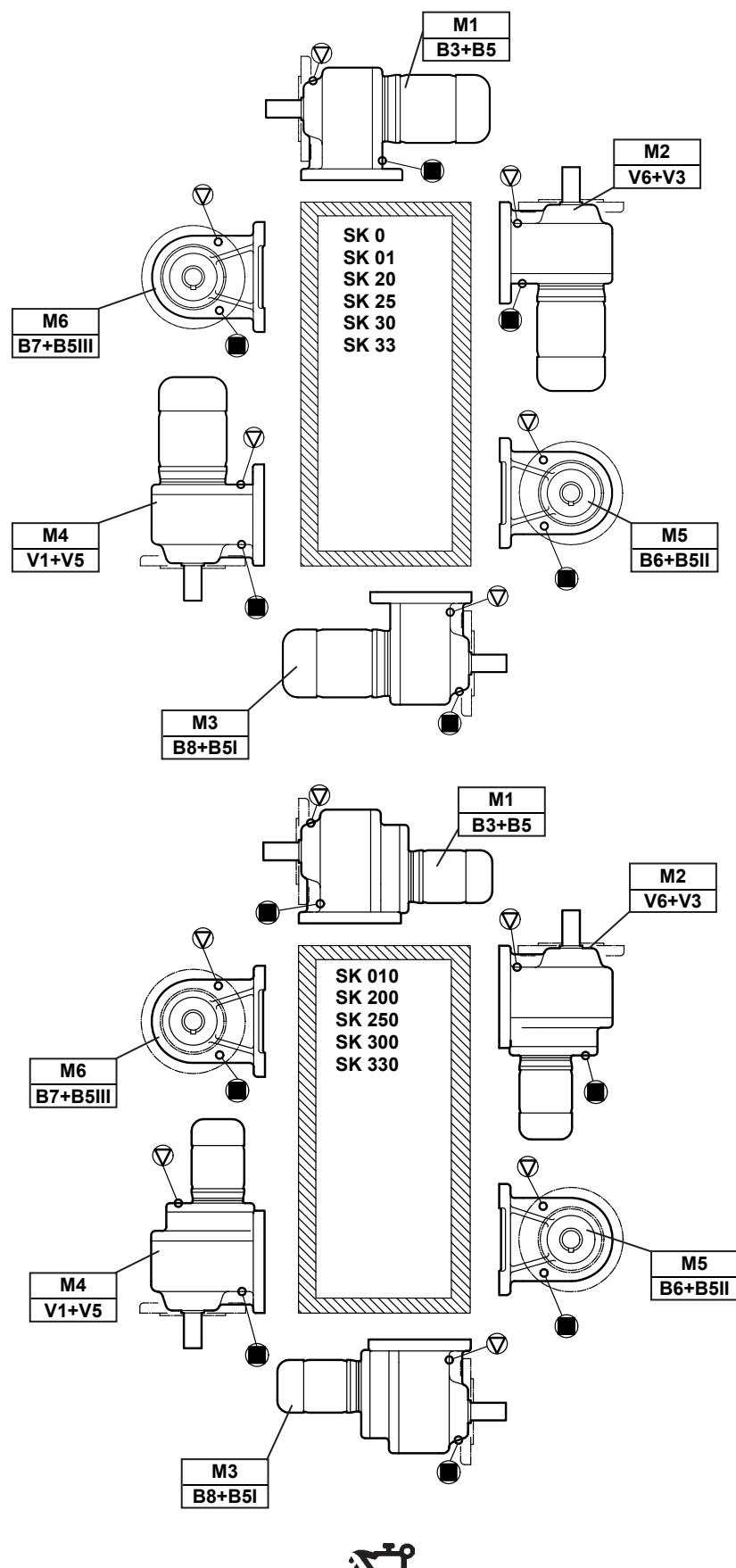


Figure 6-1: Oil level check with oil level tank

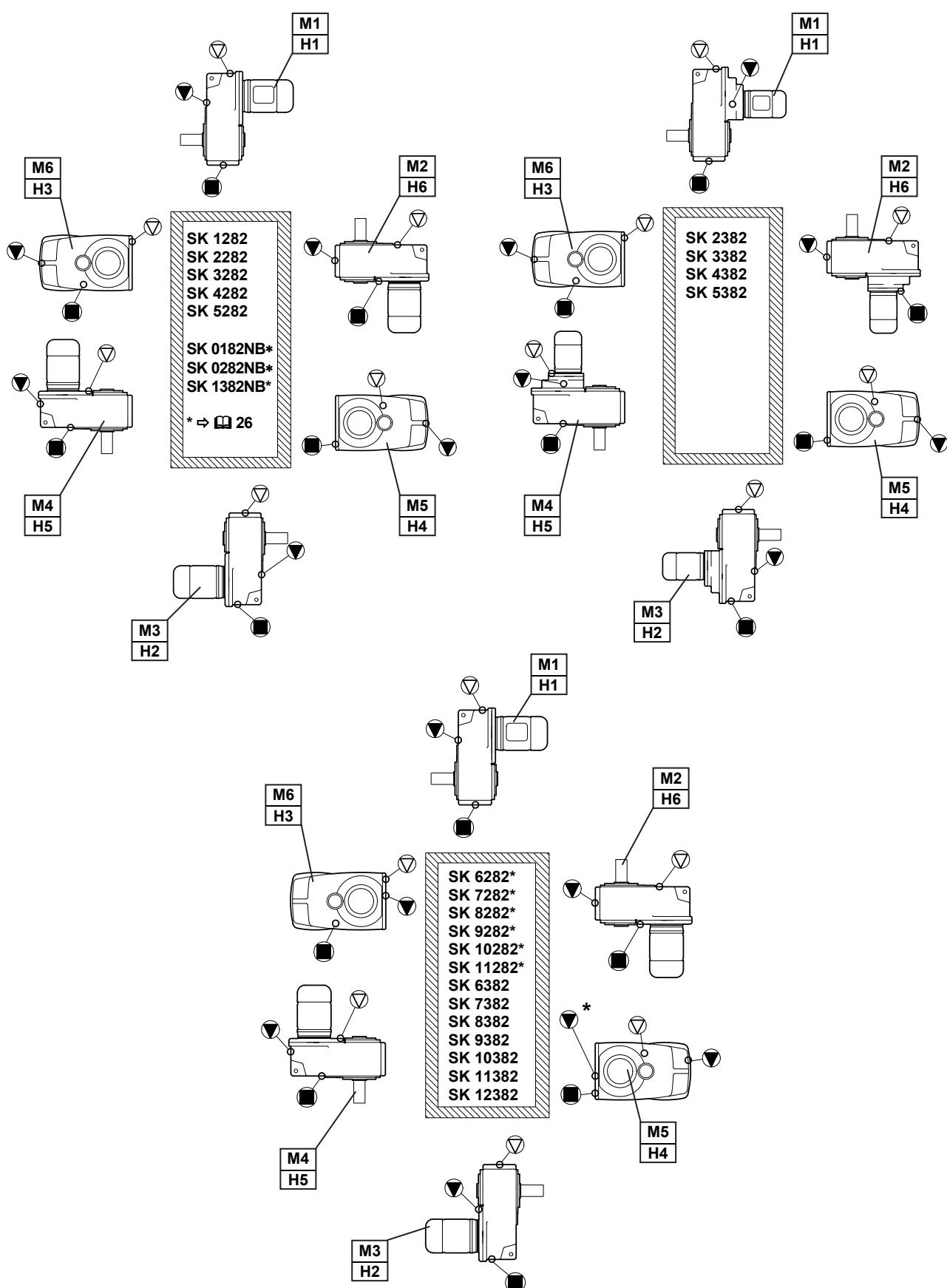


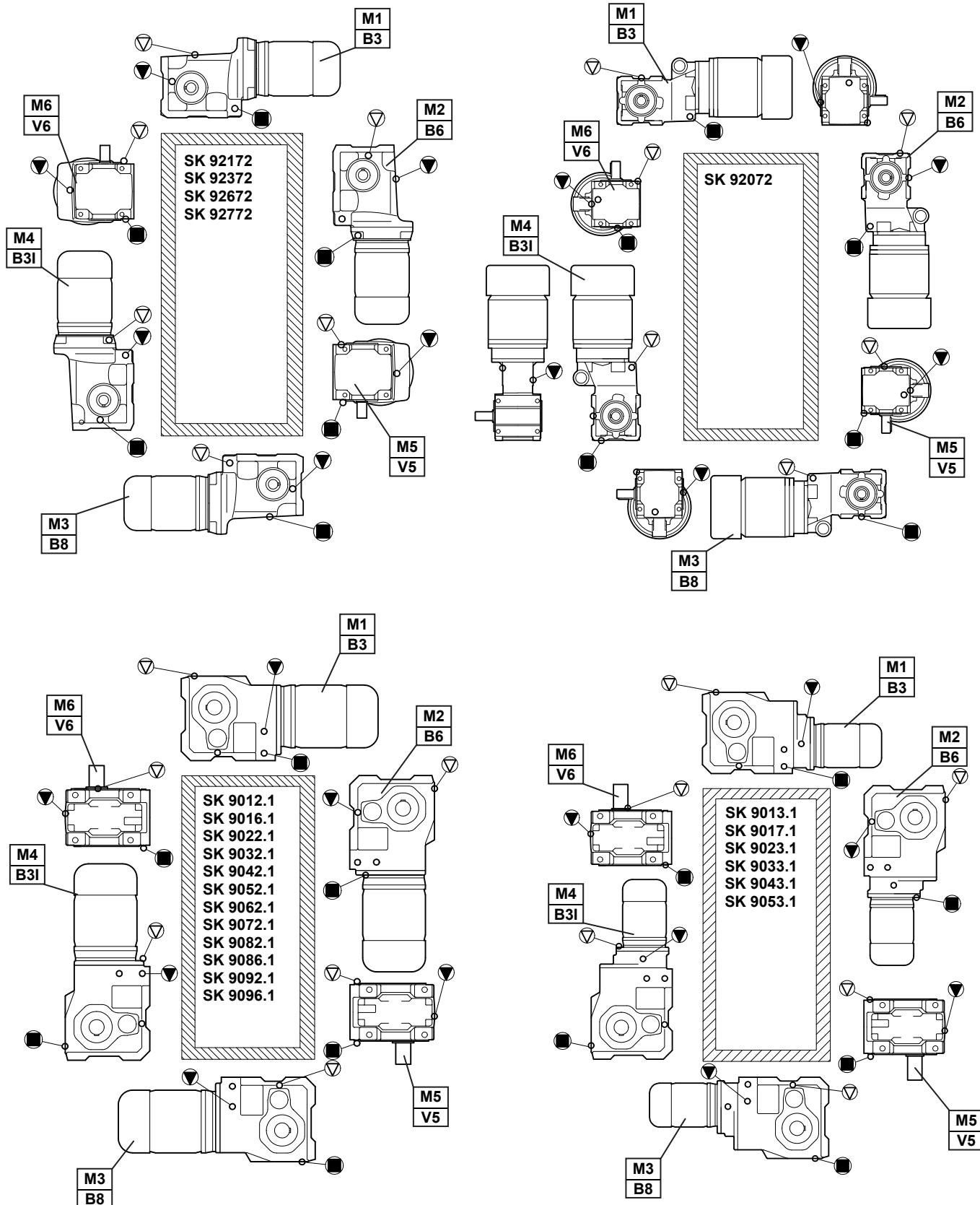


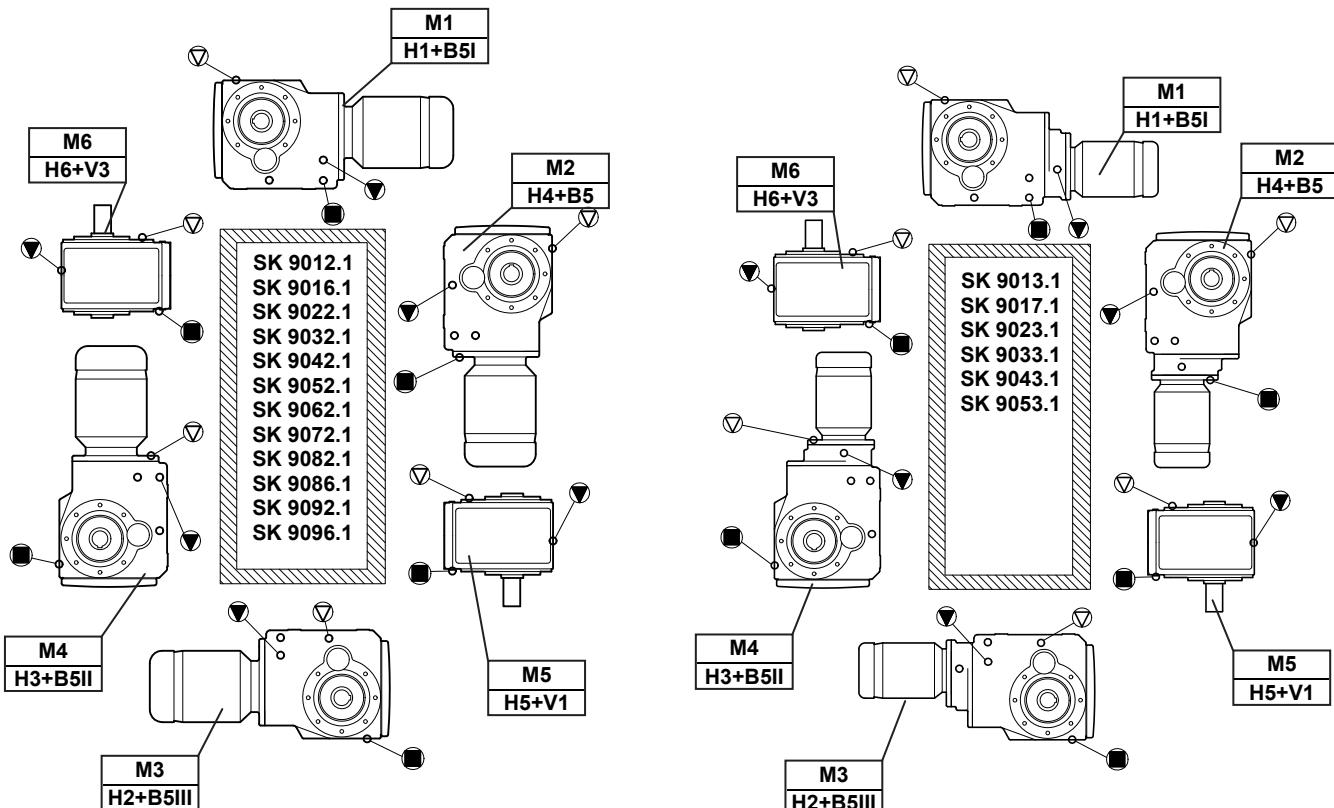
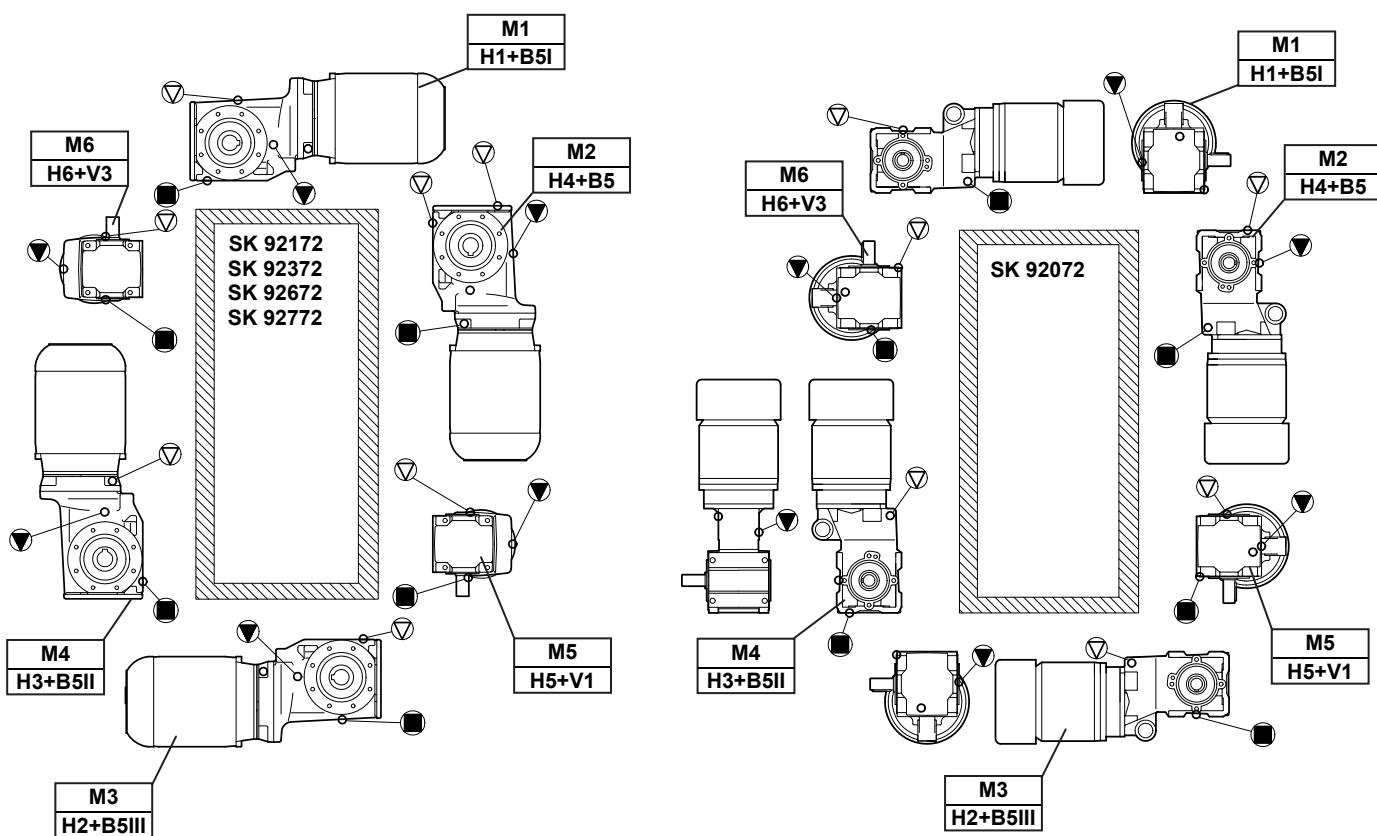


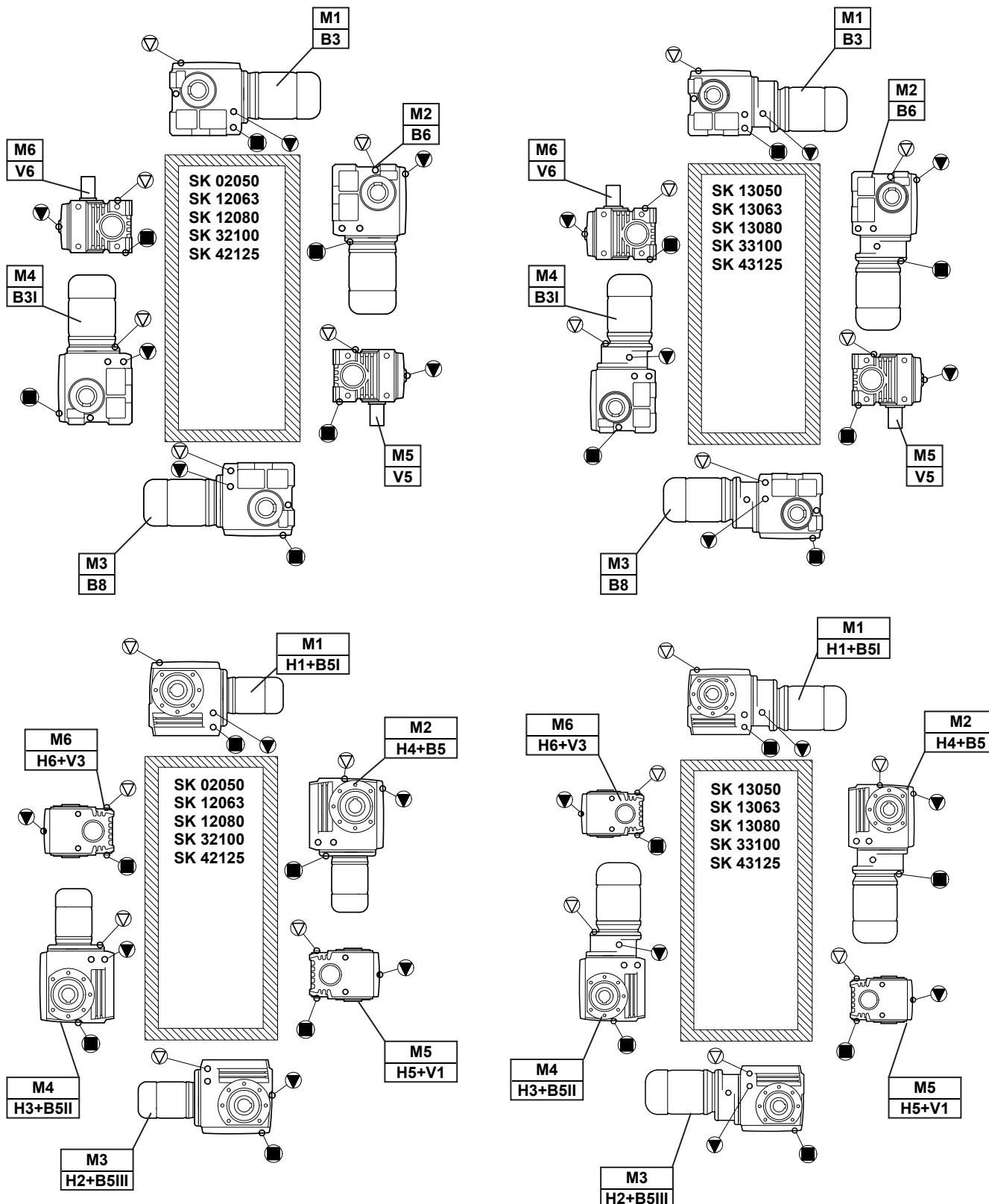


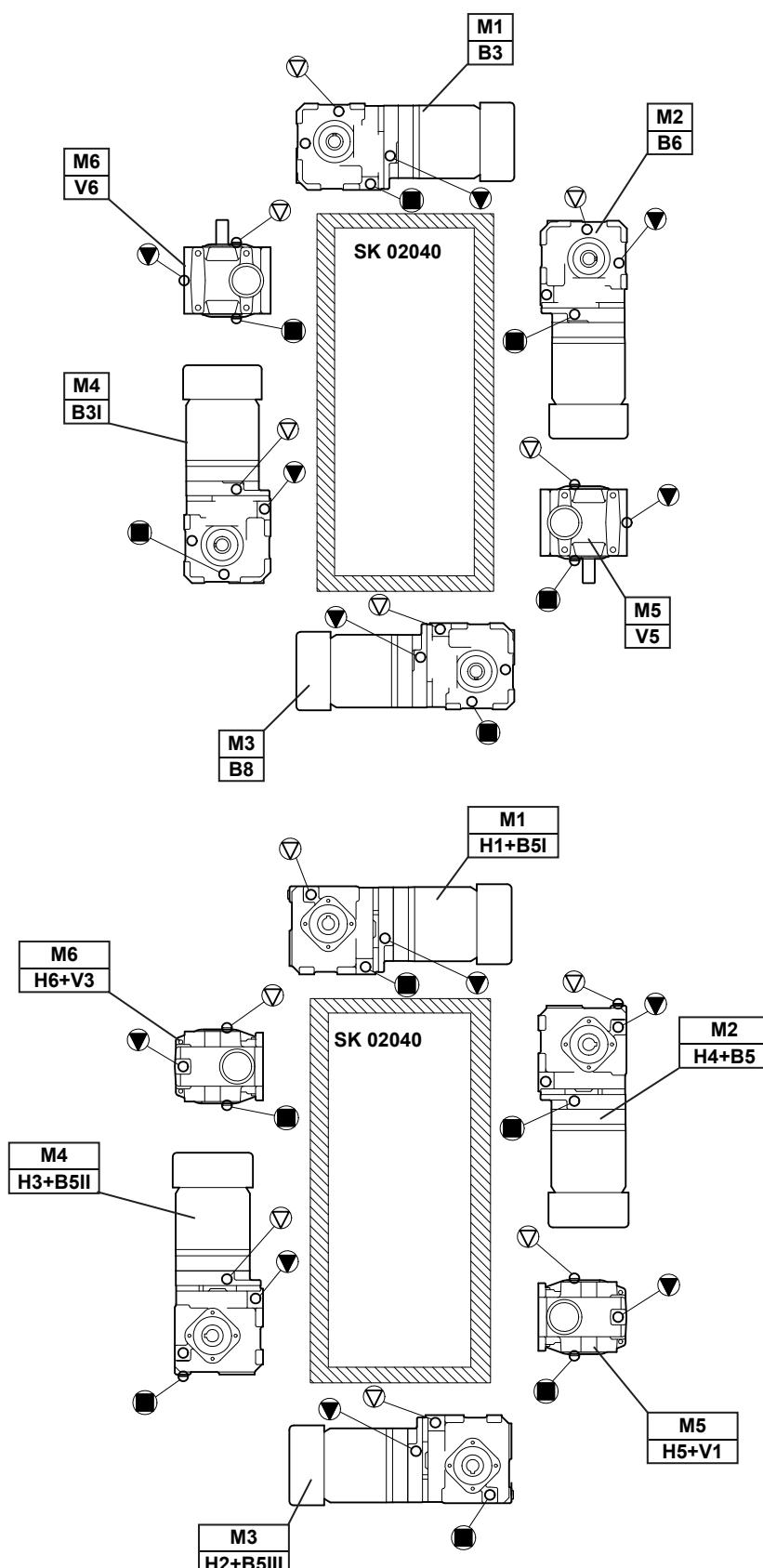
⇒ 43

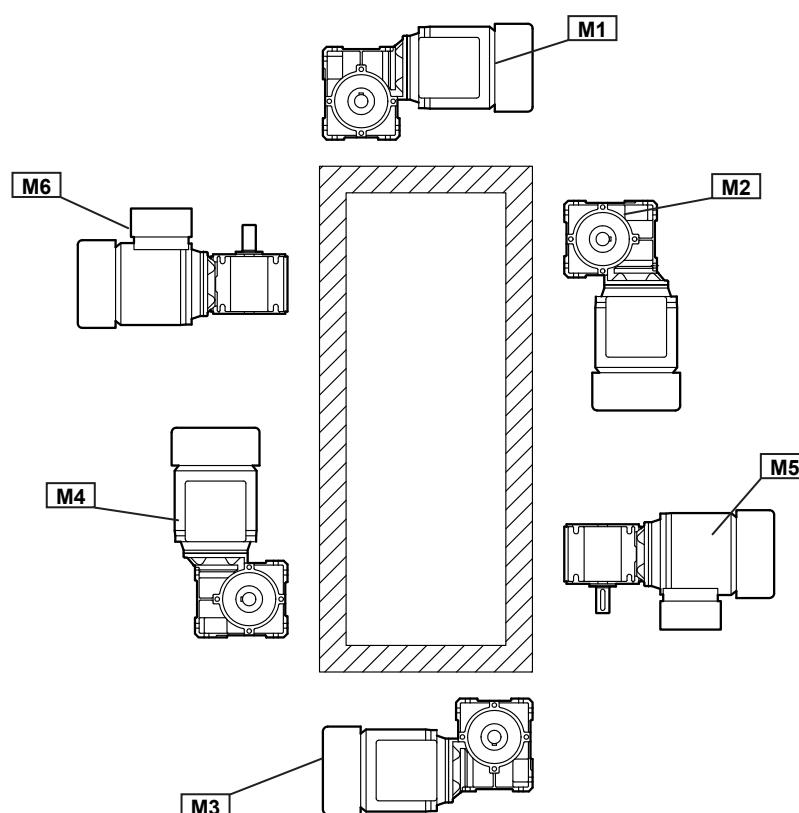










**SK 1SI31 – SK 1SI75****SK 1SIS31 – SK 1SIS75****SK 1SIS-D31 – SK 1SIS-D63****SK 2SIS-D40 – SK 2SIS-D63****SK 1S32 - SK 1S63****SK 2S32NB – SK 2S63NB****SK 1SU32 – SK 1SU63****SK 2SU32NB- SK 2SU63NB****SK 1SM31 – SK 1SM63****SK 2SM40 – SK 2SM63**

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## 6. Appendix

### 6.2 Torque values

Size	Screw connections in the strength classes			Sealing screws	Threaded pin on coupling	Screw connections on protective covers
	8.8	10.9	12.9			
M4	3.2	5	6	-	-	
M5	6.4	9	11	-	2	
M6	11	16	19	-	-	6.4
M8	27	39	46	5	10	11
M10	53	78	91	8	17	27
M12	92	135	155	27	40	53
M16	230	335	390	-	-	92
M20	460	660	770	-	-	230
M24	790	1150	1300	80	-	460
M30	1600	2250	2650	170	-	
M36	2780	3910	4710	-	-	
M42	4470	6290	7540	-	-	
G1½	-	-	-	20	-	

### 6.3 Troubleshooting

Gear unit malfunctions		
Fault	Possible cause	Remedy
Unusual running noises, vibrations	Oil too low or bearing damage or toothed wheel damage	Consult NORD Service
Oil escaping from gear unit or motor	Defective seal	Consult NORD Service
Oil escaping from pressure vent	Incorrect oil level or incorrect, contaminated oil or unfavourable operating conditions	Oil change Use oil expansion tank (Option OA)
Gear unit becomes too hot	Unfavourable installation conditions or gear unit damage	Consult NORD Service
Shock when switched on, vibrations	Defective motor coupling or loose gear unit mounting or defective rubber element	Replace elastomer gear rim, tighten motor and gear unit fastening bolts, replace rubber element
Drive shaft does not rotate although motor is running	Fracture in gear unit or defective motor coupling or shrink disc slippage	Consult NORD Service

	Attention!
	Warning: shut down the gear unit immediately should any of the above faults occur!



## 6. Appendix

### 6.4 Lubricants

With the exception of type SK 11282, SK 11382 and SK 12382 gear units, all gear units are filled with lubricant ready for operation in the required installation position when delivered. This initial filling corresponds to a lubricant from the column for the ambient temperatures (normal version) in the lubricant table.

#### Roller bearing greases

This table shows comparable roller bearing greases from various manufacturers. The manufacturer can be changed for a given grease type. Getriebebau NORD must be contacted in case of change of grease type or ambient temperature range, as otherwise no warranty for the functionality of our gear units can be accepted.

Lubricant type	Ambient temperature						
<b>Mineral oil-based grease</b>	-30 ... 60°C	Energrease LS 2 Energrease LS-EP 2	Longtime PD 2	RENOLIT GP 2 RENOLIT LZR 2 H	-	Mobilux EP 2	Gadus S2 V100 2
	-50 ... 40°C	-	Optitemp LG 2	RENOLIT JP 1619	-	-	-
<b>Synthetic grease</b>	-25 ... 80°C	Energrease SY 2202	Tribol 4747	RENOLIT HLT 2 RENOLIT LST 2	PETAMO GHY 133 N Klüüberplex BEM 41-132	Mobiltemp SHC 32	Cassida EPS2
<b>Biodegradable grease</b>	-25 ... 40°C	Biogrease EP 2	-	PLANTOGEL 2 S	Klüüberbio M 72-82	Mobil SHC Grease 102 EAL	Naturelle Grease EP2
<b>Foodstuff-compatible grease</b>	-25 ... 40°C	-	Obeen UF 2	RENOLIT G 7 FG 1	Klübersynth UH1 14-151	Mobilgrease FM 222	Cassida RLS2



## 6. Appendix

### Lubricant table

This table shows comparable lubricants from various manufacturers. The manufacturer can be changed within a particular viscosity or lubricant type. Getriebbau NORD must be contacted in case of change of viscosity or lubricant type, as otherwise no warranty for the functionality of our gearboxes can be accepted.

Lubricant type	Details on type plate	DIN (ISO) / Ambient temperature						
Mineral oil	CLP 680	ISO VG 680 0...40°C	Energol GR-XP 680	Alpha EP 680 Alpha SP 680 Optigear BM 680 Tribol 1100/680	RENOLIN CLP 680 RENOLIN CLP 680 Plus	Klüberoil GEM 1-680 N	Mobilgear 600 XP 680	Omala S2 G 680
	CLP 220	ISO VG 220 -10...40°C	Energol GR-XP 220	Alpha EP 220 Alpha SP 220 Optigear BM 220 Tribol 1100/220	RENOLIN CLP 220 RENOLIN CLP 220 Plus	Klüberoil GEM 1-220 N	Mobilgear 600 XP 220	Omala S2 G 220
	CLP 100	ISO VG 100 -15...25°C	Energol GR-XP 100	Alpha EP 100 Alpha SP 100 Optigear BM 100 Tribol 1100/100	RENOLIN CLP 100 RENOLIN CLP 100 Plus	Klüberoil GEM 1-100 N	Mobilgear 600 XP 100	Omala S2 G 100
Synthetic oil (Polyglycol)	CLP PG 680	ISO VG 680 -20...40°C	-	Alphasyn GS 680 Tribol 800/680	RENOLIN PG 680	Klübersynth GH 6-680	Mobil Glygoyle 680	Omala S4 WE 680
	CLP PG 220	ISO VG 220 -25...80°C	Enersyn SG-XP 220	Alphasyn GS 220 Alphasyn PG 220 Tribol 800/220	RENOLIN PG 220	Klübersynth GH 6-220	Mobil Glygoyle 220	Omala S4 WE 220
Synthetic oil (hydrocarbon)	CLP HC 460	ISO VG 460 -30...80°C	-	Alphasyn EP 460 Tribol 1510/460 Optigear Synthetic X 460	RENOLIN Unisyn CLP 460	Klübersynth GEM 4-460 N	Mobil SHC 634	Omala S4 GX 460
	CLP HC 220	ISO VG 220 -40...80°C	-	Alphasyn EP 220 Tribol 1510/220 Optigear Synthetic X 220	RENOLIN Unisyn CLP 220	Klübersynth GEM 4-220 N	Mobil SHC 630	Omala S4 GX 220
Bio-degradable oil	CLP E 680	ISO VG 680 -5...40°C	-	-	PLANTOGEAR 680 S	-	-	-
	CLP E 220	ISO VG 220 -5...40°C	-	Tribol BioTop 1418/220	PLANTOGEAR 220 S	Klübersynth GEM 2-220	-	Naturelle Gear Fluid EP 220
Food grade oil	CLP PG H1 680	ISO VG 680 -5...40°C	-	Tribol FoodProof 1800/680	-	Klübersynth UH1 6-680	Mobil Glygoyle 680	Cassida Fluid WG 680
	CLP PG H1 220	ISO VG 220 -25...40°C	-	Tribol FoodProof 1800/220	-	Klübersynth UH1 6-220	Mobil Glygoyle 220	Cassida Fluid WG 220
	CLP HC H1 680	ISO VG 680 -5...40°C	-	Optileb GT 680	GERALYN SF 680	Klüberoil 4 UH1-680 N	-	Cassida Fluid GL 680
	CLP HC H1 220	ISO VG 220 -25...40°C	-	Optileb GT 220	GERALYN SF 220	Klüberoil 4 UH1-220 N	Mobil SHC Cibus 220	Cassida Fluid GL 220
Gear unit liquid grease		-25 ... 60°C	Energrease LS-EP 00	Longtime PD 00 Tribol 3020/1000-00	RENOLIT DURAPLEX EP 00 RENOLIT LST 00	MICROLUBE GB 00 Klübersynth GE 46-1200	Mobil Chassis Grease LBZ Mobil Glygoyle Grease 00	Alvania EP(LF)2 Tivela GL00



## 6. Appendix

### 6.5 Lubricant quantities

	<b>Note!</b>
	<p>After changing the lubricant, and in particular after the initial filling, the oil level may change during the first few hours of operation, as the oil galleries and hollow spaces only fill gradually during operation. The oil level is still within the permissible tolerance.</p> <p>If at the express request of the customer, an oil inspection glass is installed at an additional charge, we recommend that the customer corrects the oil level after an operating period of approx. 2 hours, so that when the gear unit is at a standstill and has cooled down, the oil level is visible in the inspection glass. Only then, is it possible to check the oil level by means of the inspection glass.</p> <p>The filling quantities stated in the following tables are for guidance only. The precise quantities vary depending on the exact gear ratio. When filling, always observe the oil level screw hole as an indicator of the precise quantity of oil.</p>

\*Type SK11282, SK11382 and SK12382 gear units are normally supplied without oil.



[L]												
	M1	M2	M3	M4	M5	M6	M1	M2	M3	M4	M5	M6
⇒ 6.1	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>	<b>M5</b>	<b>M6</b>	<b>B5I</b>	<b>V1</b>	<b>B5II</b>	<b>B5III</b>		
⇒ 6.1	<b>B3</b>	<b>V6</b>	<b>B8</b>	<b>V5</b>	<b>B6</b>	<b>B7</b>	<b>B5</b>	<b>V3</b>				
<b>SK11E</b>	0,25	0,50	0,55	0,40	0,35	0,35	0,30	0,35	0,50	0,30	0,40	0,40
<b>SK21E</b>	0,60	1,20	1,20	1,00	1,00	1,00	0,50	1,40	1,10	0,70	0,90	0,90
<b>SK31E</b>	1,10	2,70	2,20	2,30	1,70	1,70	0,80	1,30	1,65	1,10	2,00	2,00
<b>SK41E</b>	1,70	2,60	3,30	2,50	2,60	2,60	1,00	2,60	2,80	1,60	3,30	3,30
<b>SK51E</b>	2,20	4,40	4,70	4,00	3,40	3,40	1,80	3,50	4,10	3,00	3,80	3,80
[L]												
<b>SK02</b>	0,15	0,60	0,70	0,60	0,40	0,40	0,25	0,60	0,60	0,60	0,50	0,50
<b>SK12</b>	0,25	0,75	0,85	0,75	0,50	0,50	0,35	0,85	0,90	0,90	0,60	0,60
<b>SK22</b>	0,50	1,80	1,80	1,80	1,35	1,35	0,70	2,00	2,00	1,80	1,55	1,55
<b>SK32</b>	0,90	2,50	2,50	2,90	2,00	2,00	1,30	2,90	3,30	3,10	2,40	2,40
<b>SK42</b>	1,30	4,50	4,50	4,30	3,20	3,20	1,80	4,40	4,50	4,00	3,70	3,70
<b>SK52</b>	2,50	7,00	6,80	6,80	5,10	5,10	3,00	6,80	6,20	7,40	5,60	5,60
[L]												
<b>SK62</b>	6,50	15,00	13,00	16,00	15,00	15,00	7,00	15,00	14,00	18,50	16,00	16,00
<b>SK72</b>	10,00	23,00	18,00	26,00	23,00	23,00	10,00	23,00	18,50	28,00	23,00	23,00
<b>SK82</b>	14,00	35,00	27,00	44,00	32,00	32,00	15,00	37,00	29,00	45,00	34,50	34,50
<b>SK92</b>	25,00	73,00	47,00	76,00	52,00	52,00	26,00	73,00	47,00	78,00	52,00	52,00
<b>SK102</b>	36,00	79,00	66,00	102,00	71,00	71,00	40,00	81,00	66,00	104,00	72,00	72,00
[L]												
<b>SK03</b>	0,30	1,00	0,80	0,90	0,60	0,60	0,50	0,80	0,90	1,10	0,80	0,80
<b>SK13</b>	0,60	1,25	1,10	1,20	0,70	0,70	0,85	1,20	1,20	1,20	0,95	0,95
<b>SK23</b>	1,30	2,40	2,30	2,35	1,60	1,60	1,50	2,60	2,50	2,80	2,80	2,80
<b>SK33N</b>	1,60	2,90	3,20	3,70	2,30	2,30	2,50	3,40	3,50	4,40	2,60	2,60
<b>SK43</b>	3,00	5,60	5,20	6,60	3,60	3,60	3,50	5,70	5,00	6,10	4,10	4,10
<b>SK53</b>	4,50	8,70	7,70	8,70	6,00	6,00	5,20	8,40	7,00	8,90	6,70	6,70
[L]												
<b>SK63</b>	13,00	14,50	14,50	16,00	13,00	13,00	13,50	14,00	15,50	18,00	14,00	14,00
<b>SK73</b>	20,50	20,00	22,50	27,00	20,00	20,00	22,00	22,50	23,00	27,50	20,00	20,00
<b>SK83</b>	30,00	31,00	34,00	37,00	33,00	33,00	31,00	34,00	35,00	40,00	34,00	34,00
<b>SK93</b>	53,00	70,00	59,00	72,00	49,00	49,00	53,00	70,00	59,00	74,00	49,00	49,00
<b>SK103</b>	74,00	71,00	74,00	97,00	67,00	67,00	69,00	78,00	78,00	99,00	67,00	67,00



[L]							[L]						
⇒ 6.1	M1	M2	M3	M4	M5	M6	⇒ 6.1	M1	M2	M3	M4	M5	M6
<b>SK072.1</b>	0,16	0,32	0,21	0,23	0,18	0,20	<b>SK072.1 F</b>	0,16	0,32	0,21	0,23	0,18	0,20
<b>SK172.1</b>	0,27	0,59	0,42	0,45	0,32	0,39	<b>SK172.1 F</b>	0,27	0,59	0,42	0,45	0,32	0,39
<b>SK372.1</b>	0,45	1,05	0,75	1,00	0,60	0,65	<b>SK372.1 F</b>	0,45	1,05	0,75	1,00	0,60	0,65
<b>SK572.1</b>	0,75	1,90	1,50	2,00	1,10	1,15	<b>SK572.1 F</b>	0,75	1,90	1,50	2,00	1,10	1,15
<b>SK672.1</b>	1,10	2,60	2,15	2,70	1,55	1,65	<b>SK672.1 F</b>	1,10	2,60	2,15	2,70	1,55	1,65
<b>SK772.1</b>	1,15	3,65	2,25	3,15	1,35	2,15	<b>SK772.1 F</b>	1,15	3,65	2,25	3,15	1,35	2,15
<b>SK872.1</b>	3,20	8,00	5,30	7,00	2,80	4,60	<b>SK872.1 F</b>	2,60	8,00	5,30	7,00	2,80	4,60
<b>SK972.1</b>	4,50	12,90	8,10	12,70	4,60	7,80	<b>SK972.1 F</b>	4,50	12,90	8,10	12,70	4,60	7,80

[L]							[L]						
⇒ 6.1	M1	M2	M3	M4	M5	M6	⇒ 6.1	M1	M2	M3	M4	M5	M6
<b>SK373.1</b>	0,45	1,05	0,75	1,00	0,60	0,65	<b>SK373.1 F</b>	0,45	1,05	0,75	1,00	0,60	0,65
<b>SK573.1</b>	0,75	1,90	1,50	2,00	1,10	1,15	<b>SK573.1 F</b>	0,75	1,90	1,50	2,00	1,10	1,15
<b>SK673.1</b>	1,10	2,60	2,15	2,70	1,55	1,65	<b>SK673.1 F</b>	1,10	2,60	2,15	2,70	1,55	1,65
<b>SK773.1</b>	1,95	3,50	3,20	2,90	2,25	2,95	<b>SK773.1 F</b>	1,95	3,50	3,20	2,90	2,25	2,95
<b>SK873.1</b>	4,05	7,60	6,85	6,55	5,00	6,55	<b>SK873.1 F</b>	4,05	7,60	6,85	6,55	5,00	6,55
<b>SK973.1</b>	7,40	12,20	11,10	11,60	8,00	10,90	<b>SK973.1 F</b>	7,40	12,20	11,10	11,60	8,00	10,90

[L]														
⇒ 6.1	M1	M2	M3	M4	M5	M6	M1	M2	M3	M4	M5	M6		
⇒ 6.1	B3	V6	B8	V5	B6	B7	B5	V3	B5I	V1	B5II	B5III		
<b>SK172</b>	0,35	0,50	0,50	0,50	0,50	0,50	0,35	0,50	0,50	0,50	0,50	0,50	0,50	0,50
<b>SK272</b>	0,60	1,00	1,00	1,00	1,00	1,00	0,60	1,00	1,00	1,00	1,00	1,00	1,00	1,00
<b>SK372</b>	0,60	1,00	1,00	1,00	1,00	1,00	0,60	1,00	1,00	1,00	1,00	1,00	1,00	1,00
<b>SK472</b>	1,00	1,90	1,90	2,00	1,80	1,80	1,00	1,90	1,90	1,90	1,90	1,90	1,90	1,50
<b>SK572</b>	1,00	1,90	1,90	2,00	1,80	1,80	1,00	1,90	1,90	1,90	1,90	1,90	1,90	1,50
<b>SK672</b>	1,40	3,40	3,10	3,15	1,45	3,15	1,15	3,40	2,70	2,80	1,25	2,70		
<b>SK772</b>	2,00	3,30	3,50	4,20	2,70	3,30	1,60	3,30	3,50	3,30	3,10	3,10	3,10	3,10
<b>SK872</b>	3,70	9,60	9,10	7,30	4,70	8,00	3,50	9,00	7,90	7,70	3,90	7,20		
<b>SK972</b>	6,50	16,00	15,70	14,70	8,50	14,00	6,50	15,00	13,00	13,50	6,50	12,00		
[L]														
<b>SK273</b>	0,62	1,10	1,10	1,10	1,10	1,10	0,62	1,10	1,10	1,10	1,10	1,10	1,10	1,10
<b>SK373</b>	0,55	1,10	1,10	1,10	1,10	1,10	0,55	1,10	1,10	1,10	1,10	1,10	1,10	1,10
<b>SK473</b>	1,30	2,50	2,10	2,40	2,10	2,10	1,25	2,40	2,10	2,50	2,10	2,10	2,10	2,10
<b>SK573</b>	1,30	2,50	2,10	2,40	2,10	2,10	1,25	2,40	2,10	2,50	2,10	2,10	2,10	2,10
<b>SK673</b>	1,80	3,80	3,20	3,40	2,90	3,00	1,70	3,80	3,00	3,20	3,00	3,00	3,00	3,00
<b>SK773</b>	2,50	4,50	3,70	4,60	3,30	3,30	2,30	5,00	3,60	4,50	3,90	3,90		
<b>SK873</b>	6,20	8,40	7,50	9,10	7,50	7,50	5,00	8,80	7,60	8,00	8,00	8,00	8,00	
<b>SK973</b>	11,00	15,80	13,00	16,00	13,30	13,00	10,30	16,50	13,00	16,00	14,00	14,00	14,00	



[L]							[L]						
⇒ 6.1	M1	M2	M3	M4	M5	M6	⇒ 6.1	M1	M2	M3	M4	M5	M6
<b>SK0</b>	0,13	0,22	0,13	0,22	0,13	0,13	<b>SK0 F</b>	0,13	0,22	0,13	0,22	0,13	0,13
<b>SK01</b>	0,22	0,38	0,22	0,38	0,22	0,22	<b>SK01 F</b>	0,22	0,38	0,22	0,38	0,22	0,22
<b>SK20</b>	0,55	1,00	0,55	1,00	0,55	0,55	<b>SK20 F</b>	0,35	0,60	0,35	0,60	0,35	0,35
<b>SK25</b>	0,50	0,90	0,50	0,90	0,50	0,50	<b>SK25 F</b>	0,50	0,90	0,50	0,90	0,50	0,50
<b>SK30</b>	0,80	1,40	0,70	1,40	0,70	0,70	<b>SK30 F</b>	0,80	1,40	0,70	1,10	0,70	0,70
<b>SK33</b>	0,80	1,60	1,00	1,60	0,80	1,00	<b>SK33 F</b>	1,00	1,60	1,00	1,60	0,80	1,00
<b>SK000</b>	0,24	0,41	0,24	0,41	0,24	0,24	<b>SK000 F</b>	0,24	0,41	0,24	0,41	0,24	0,24
<b>SK010</b>	0,38	0,60	0,38	0,60	0,38	0,38	<b>SK010 F</b>	0,38	0,60	0,38	0,60	0,38	0,38
<b>SK200</b>	0,80	1,30	0,80	1,30	0,80	0,80	<b>SK200 F</b>	0,60	1,04	0,60	1,04	0,60	0,60
<b>SK250</b>	1,40	1,50	1,40	1,50	1,40	1,40	<b>SK250 F</b>	1,40	1,50	1,40	1,50	1,40	1,40
<b>SK300</b>	1,40	1,50	1,40	1,50	1,40	1,40	<b>SK300 F</b>	1,40	1,50	1,40	1,50	1,40	1,40
<b>SK330</b>	1,50	1,58	1,50	1,58	1,50	1,50	<b>SK330 F</b>	2,00	1,58	1,50	2,80	1,50	1,50

[L]							[L]						
⇒ 6.1	M1	M2	M3	M4	M5	M6	⇒ 6.1	H1	H6	H2	H5	H4	H3
<b>SK0182NB A</b>	0,40	0,55	0,60	0,55	0,35	0,35							
<b>SK0282NB A</b>	0,70	1,00	0,80	1,10	0,90	0,90							
							<b>SK1382NB A</b>	1,30	2,30	1,40	2,10	2,00	1,90
[L]							[L]						
<b>SK1282 A</b>	0,90	1,30	0,90	1,20	0,95	0,95							
<b>SK2282 A</b>	1,65	2,40	1,90	2,00	1,80	1,80	<b>SK2382 A</b>	1,70	2,60	1,90	3,10	1,50	1,50
<b>SK3282 A</b>	3,15	4,10	3,25	4,10	3,15	3,15	<b>SK3382 A</b>	4,10	4,90	3,30	5,60	3,30	3,30
<b>SK4282 A</b>	4,70	6,10	4,75	5,40	4,70	4,70	<b>SK4382 A</b>	5,90	6,80	4,90	8,30	4,90	4,90
<b>SK5282 A</b>	7,50	8,80	7,50	8,80	7,20	7,20	<b>SK5382 A</b>	12,50	12,00	6,70	14,00	8,30	8,30
[L]							[L]						
<b>SK6282 A</b>	17,00	14,00	12,00	17,50	10,00	14,00	<b>SK6382 A</b>	16,50	13,00	9,60	18,00	14,00	12,50
<b>SK7282 A</b>	25,00	21,00	20,00	27,00	16,00	21,00	<b>SK7382 A</b>	22,00	20,00	16,00	25,00	23,00	19,00
<b>SK8282 A</b>	37,00	33,00	30,00	41,00	31,00	31,00	<b>SK8382 A</b>	34,00	32,00	25,00	38,00	35,00	30,00
<b>SK9282 A</b>	74,00	70,00	55,00	72,00	60,00	59,00	<b>SK9382 A</b>	73,00	70,00	45,00	74,00	65,00	60,00
[L]							[L]						
<b>SK10282 A</b>	90	90	40	90	60	82	<b>SK10382 A</b>	85	100	73	100	80	80
<b>SK11282 A</b>	165	160	145	195	100	140	<b>SK11382 A</b>	160	155	140	210	155	135
							<b>SK12382 A</b>	160	155	140	210	155	135

\* ⇒ 38



[L]												
→ 6.1	M1	M2	M3	M4	M5	M6	M1	M2	M3	M4	M5	M6
→ 6.1	B3	B6	B8	B3I	V5	V6	B5I	B5	B5III	B5II	V1	V3
<b>SK92072</b>	0,40	0,60	0,50	0,50	0,40	0,40	0,40	0,60	0,50	0,50	0,40	0,40
<b>SK92172</b>	0,55	0,90	0,95	1,10	0,75	0,62	0,50	0,92	0,87	1,05	0,75	0,65
<b>SK92372</b>	0,90	1,30	1,45	1,60	1,20	1,20	1,15	1,50	1,20	1,70	1,15	1,15
<b>SK92672</b>	1,80	3,50	3,20	3,40	2,60	2,60	1,55	2,80	2,50	3,30	2,40	2,40
<b>SK92772</b>	2,30	4,50	4,60	5,30	4,10	4,10	2,75	4,40	4,50	5,50	3,50	3,50
[L]												
<b>SK9012.1</b>	0,70	1,60	1,90	2,40	1,20	1,70	0,70	1,90	1,90	2,10	1,20	1,70
<b>SK9016.1</b>	0,70	1,60	1,90	2,40	1,20	1,70	0,70	1,90	1,90	2,10	1,20	1,70
<b>SK9022.1</b>	1,30	2,60	3,50	4,20	2,00	2,80	1,30	2,60	3,50	4,20	2,00	2,80
<b>SK9032.1</b>	1,70	4,80	6,40	6,70	4,10	5,10	1,90	5,20	6,40	7,30	3,30	5,10
<b>SK9042.1</b>	4,40	8,70	10,00	9,80	6,80	7,50	3,60	9,70	11,40	11,50	6,50	8,20
<b>SK9052.1</b>	6,50	16,00	19,00	21,50	11,00	15,50	7,50	16,50	20,00	22,50	11,50	18,00
<b>SK9062.1</b>	10,00	27,50	32,00	36,00	18,00	24,00	12,00	27,50	33,00	38,50	19,00	26,00
<b>SK9072.1</b>	10,00	27,50	32,00	36,00	18,00	24,00	12,00	27,50	33,00	38,50	19,00	26,00
<b>SK9082.1</b>	17,00	51,50	62,50	71,50	33,00	46,50	21,00	54,00	66,00	80,00	38,00	52,00
<b>SK9086.1</b>	29,00	73,00	85,00	102,00	48,00	62,00	36,00	78,00	91,00	107,00	53,00	76,00
<b>SK9092.1</b>	41,00	157,00	170,00	172,00	80,00	90,00	40,00	130,00	154,00	175,00	82,00	91,00
<b>SK9096.1</b>	70,00	187,00	194,00	254,00	109,00	152,00	80,00	187,00	193,00	257,00	113,00	156,00
[L]												
<b>SK9013.1</b>	1,20	2,00	2,20	3,00	1,40	1,90	1,20	2,30	2,20	3,00	1,40	1,90
<b>SK9017.1</b>	1,20	2,00	2,20	3,00	1,40	1,90	1,20	2,30	2,20	3,00	1,40	1,90
<b>SK9023.1</b>	2,40	3,00	3,80	5,30	2,20	3,10	2,40	3,00	3,80	5,30	2,20	3,10
<b>SK9033.1</b>	3,30	6,60	7,00	7,80	4,30	5,10	3,80	5,70	6,90	8,50	3,60	5,60
<b>SK9043.1</b>	4,60	10,20	10,70	12,80	5,20	6,70	5,70	10,20	14,70	14,70	6,60	9,60
<b>SK9053.1</b>	10,00	17,00	20,00	24,20	11,50	16,50	12,50	18,00	21,50	26,50	13,00	17,00



[L]							[L]						
⇒  6.1	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>	<b>M5</b>	<b>M6</b>		<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>	<b>M5</b>	<b>M6</b>
⇒  6.1	<b>B3</b>	<b>B6</b>	<b>B8</b>	<b>B3I</b>	<b>V5</b>	<b>V6</b>		<b>B5I</b>	<b>B5</b>	<b>B5III</b>	<b>B5II</b>	<b>V1</b>	<b>V3</b>
⇒  6.1								<b>H1</b>	<b>H4</b>	<b>H2</b>	<b>H3</b>	<b>H5</b>	<b>H6</b>
<b>SK02040</b>	0,45	0,60	0,60	0,60	0,50	0,50	<b>SK02040 A</b>	0,40	0,80	0,65	0,60	0,50	0,50
<b>SK02050</b>	0,40	1,20	0,70	1,15	0,70	0,70	<b>SK02050 A</b>	0,45	1,10	0,90	1,10	0,80	0,80
<b>SK12063</b>	0,60	1,70	1,20	1,55	1,00	1,00	<b>SK12063 A</b>	0,50	1,45	1,20	1,40	1,10	1,10
<b>SK12080</b>	0,80	2,60	1,70	2,70	1,70	1,70	<b>SK12080 A</b>	0,90	3,10	3,00	3,00	2,20	2,20
<b>SK32100</b>	1,60	5,50	3,40	5,40	3,20	3,20	<b>SK32100 A</b>	1,50	5,20	3,80	5,30	3,80	3,80
<b>SK42125</b>	2,80	11,00	6,20	10,30	5,80	5,80	<b>SK42125 A</b>	3,20	12,90	6,10	10,50	6,30	6,30
[L]							[L]						
<b>SK13050</b>	0,95	1,55	1,10	1,45	0,95	0,95	<b>SK13050 A</b>	0,85	1,75	1,25	1,35	1,15	1,15
<b>SK13063</b>	0,85	2,30	1,60	2,00	1,25	1,25	<b>SK13063 A</b>	0,90	2,10	1,55	2,10	1,45	1,45
<b>SK13080</b>	1,70	3,20	2,10	3,40	1,95	1,95	<b>SK13080 A</b>	1,70	3,75	3,60	3,60	2,55	2,55
<b>SK33100</b>	2,10	7,60	4,00	6,80	3,70	3,70	<b>SK33100 A</b>	2,10	6,10	4,80	6,60	4,20	4,20
<b>SK43125</b>	7,80	14,00	7,20	13,50	6,70	6,70	<b>SK43125 A</b>	4,80	13,50	7,40	14,50	8,00	8,00
[L]							[L]						
<b>SK02040 F</b>	0,50	0,80	0,75	0,60	0,50	0,50							
<b>SK02050 F</b>	0,45	1,40	0,90	1,25	1,00	1,00	<b>SK13050 F</b>	0,90	1,80	1,15	1,75	1,25	1,25
<b>SK12063 F</b>	0,50	1,60	1,40	1,80	1,50	1,50	<b>SK13063 F</b>	0,95	2,10	1,65	2,15	1,75	1,75
<b>SK12080 F</b>	0,95	3,20	3,10	3,70	2,50	2,50	<b>SK13080 F</b>	1,40	4,20	3,35	4,20	2,75	2,75
<b>SK32100 F</b>	1,50	7,10	4,90	7,10	4,40	4,40	<b>SK33100 F</b>	2,30	7,60	5,50	7,80	4,85	4,85
<b>SK42125 F</b>	3,30	11,20	6,10	10,40	6,80	6,80	<b>SK43125 F</b>	4,30	14,50	7,10	12,10	7,70	7,70





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**[www.nord.com/locator](http://www.nord.com/locator)**

#### Headquarters:

**Getriebbau NORD GmbH & Co. KG**

Rudolf-Diesel-Straße 1

D - 22941 Bargteheide

Fon +49 (0) 4532 / 401 - 0

Fax +49 (0) 4532 / 401 - 253

[info@nord.com](mailto:info@nord.com)

[www.nord.com](http://www.nord.com)

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Queensland Urban Utilities Wacol STP Grit Removal System Upgrade	Contract No. C1011-045-087 Grit Washer System
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## Penstock Slide Gate

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade		
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# Installation, Operation and Maintenance Manual

## Penstock Slide Gate

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<b>MODEL</b>	<b>SLIDE GATES</b>	

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## INTRODUCTION

This manual describes the recommended procedures for installation, operation, maintenance and safety precautions for Orbinox MU model slide gates. Please read thoroughly all the instructions in the manual prior to installation, and contact an Orbinox representative in case of any questions. The manual makes reference to the "General Arrangement Drawing" (GAD). The GAD is the drawing that is sent to and approved by the customer prior to the production of the slide gate. **Orbinox assumes no responsibility or liability if the slide gate is not installed, operated and maintained in strict accordance to the procedures described in this manual.**

## HANDLING AND STORAGE

Standard safety procedures should be followed to prevent personal injury or equipment damage. Additionally, the following instructions shall be followed during handling and storage to prevent any damage of the product:

- Stems have precision surfaces and should never be used as a mean to lift the slide gate.
- Special care shall be taken on any machined surface when lifting the gate.
- Equipment shall be stored in a dry, clean and even area on a raised even wood surface to prevent distortion of the frame. Do not stack slide gates.
- Stems and extensions that are shipped separately shall be supported over their entire length to prevent any bending or distortion while in storage.

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## INSTALLATION: CONCRETE WALL MOUNTED

### Required Materials:

Orbinox MU Slide Gates are installed by means of Anchor Bolts. Depending on the size and working conditions they shall be either of the mechanical or chemical type. Note that as standard, anchor bolts and construction sealant are not supplied with the slide gate.

**Note: for gates larger than 80"x80" and un-seating water head conditions, anchor bolts are not sufficient to hold the gate in place. A second phase of concrete will be required around the gate frame, and will be indicated on the GAD.**

In order to get the expected performance of the anchor bolts, the minimum concrete strength shall be 3,000 PSI (20.7 MPa).

In order to avoid leakage between the concrete wall and the frame construction sealant shall be used. (Sikabond Construction Sealant or equivalent, 200ml per meter of opening perimeter).

The following table gives a general description of the required anchor bolt types for the different gate sizes and pressure conditions. For detailed information about the type, size and quantity of the required anchor bolts, or any other specific installation notes or materials, please refer to the notes on the 'General Arrangement Drawing'.

MU Size	Water Pressure	Anchor Bolt Type	Recommended (Hilti or equivalent)
<b>MU BI-DIRECTIONAL</b> 6" x 6" - 48" x 48" (150mm x 150mm - 1000mm x 1000mm)	Seating and Un-Seating (Bi-Directional)	Stud Type Mechanical Anchor Bolts and Bolt Type Mechanical Anchor Bolts	Hilti 'Kwik 3' and Hilti 'HSL'
<b>MU BI-DIRECTIONAL</b> 52" x 52" - 80" x 80" (1100mm x 1100mm - 2000mm x 2000mm)	Seating and Un-Seating (Bi-Directional)	Chemical Anchor Bolts	Hilti 'HVU'
<b>MU UNI-DIRECTIONAL</b> 52" x 52" - 80" x 80" (1300mm x 1300mm - 2000mm x 2000mm)	Seating (Uni-Directional)	Stud Type Mechanical Anchor Bolts	Hilti 'Kwik 3'

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## INSTALLATION: CONCRETE WALL MOUNTED

continued

### Step 1: Concrete wall surface check:

Concrete wall surface shall be inspected before starting the installation of the slide gate:

- The concrete construction shall be flat, level and plumb, and shall be in accordance to ACI 117-06 standard. If necessary, use non-shrink grout in order to meet the specified standard.
- Concrete wall surface shall be dry (so the construction sealant sets effectively). If it is necessary, the wall can be dried with the help of a blowtorch or a hot air fan.

### Step 2: Reference lines:

Reference lines shall be marked on the wall in order to assure a proper alignment between the slide gate and the opening during the installation:

- Measure the top width of the frame ("d") and mark a horizontal line on the wall (RL-1), parallel to the opening and to the measured distance.
- Mark a vertical line on the vertical symmetry axis of the opening (RL-2).

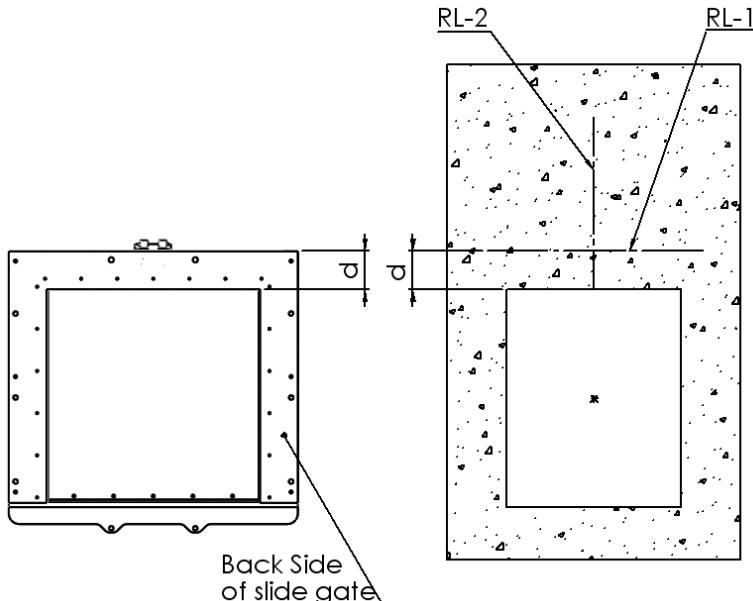


Figure 1

<b>INSTALLATION, OPERATION AND MAINTENANCE MANUAL</b>		02-2010 Edition Revision- A
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## INSTALLATION: CONCRETE WALL MOUNTED

continued

### Step 3: Pre-installation of the slide gate

- Place the slide gate against the wall and line up with the opening. Use previously marked reference lines for proper alignment. The gate shall be in the closed position.
- Drill and install an anchor bolt on each side of the gate. After installing the first anchor bolt, and prior to drilling the hole on the other side, make sure the frame is perfectly leveled.

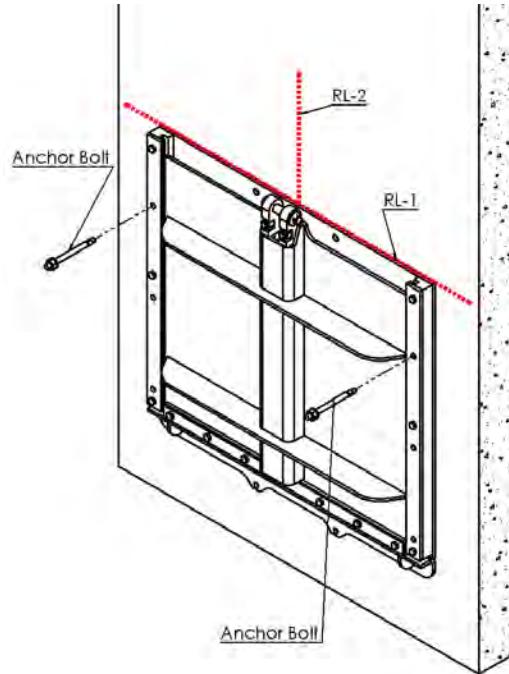


Figure 2

### Step 4: Construction sealant application (Sikabond or equivalent)

In order to avoid leakage between the frame and the wall, construction sealant shall be applied on the frame:

- Remove the slide gate from the wall (first remove the nuts of the anchor bolts).
- Apply construction sealant all around the perimeter of the frame. Sikabond (200 ml/m) or equivalent construction sealant shall be used. Be sure not to get sealant on the gate's seals, guides, and/or stem, as this may cause leakage or damage.
- Re-install the slide gate on the wall and tighten both anchor bolts.

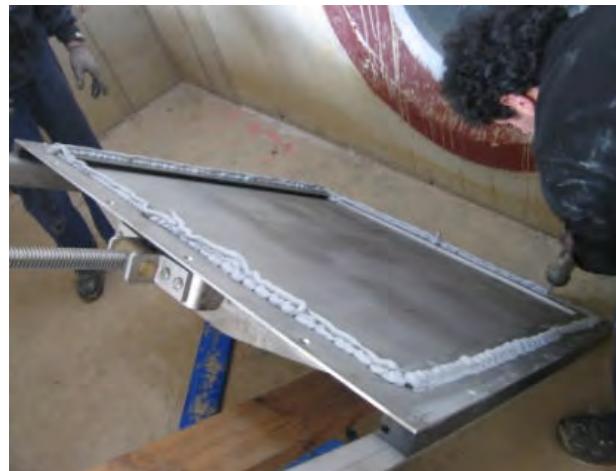


Figure 3

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**INSTALLATION: CONCRETE WALL MOUNTED**

continued

**Step 5: Final installation of the slide gate**

- Drill and install the rest of the anchor bolts (see Figure 4).

**CAUTION!**: If the slide gate is not completely in contact with the wall, do not over-tighten the anchor bolts. Over tightening may bend or distort the frame. If the wall flatness and levelness is according to the specified standards, the construction sealant will fill in the remaining void (see Figure 5).

- Apply construction sealant around the frame in order to fill in any existing gap between the wall and the frame (this step is only for esthetics). Wipe away the excess sealant to leave a smooth finish.

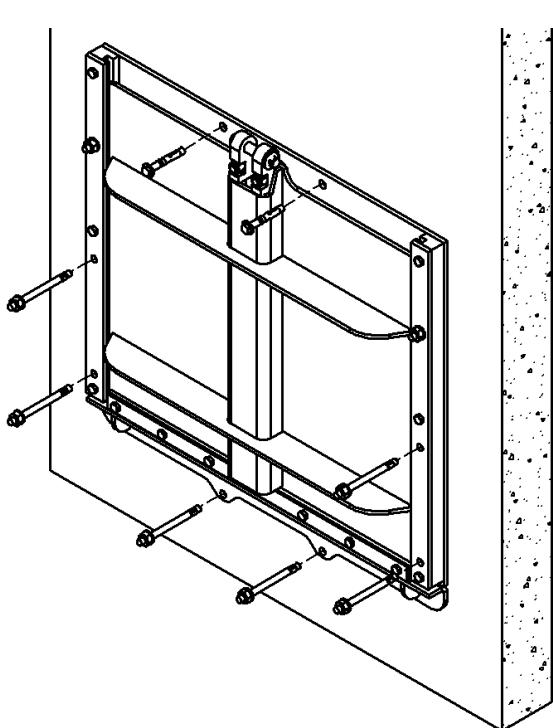


Figure 4

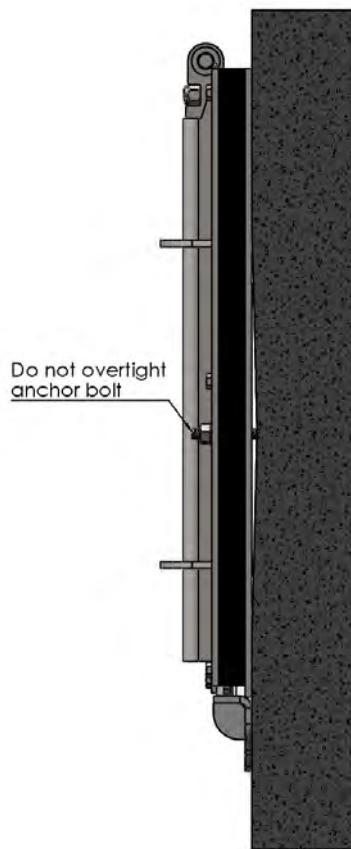


Figure 5

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## INSTALLATION: ROUND MANHOLE MOUNTED

Follow the instructions of "Concrete Wall Mounted" installation. Anchor bolts shall be installed perpendicular to the surface.

## INSTALLATION: WALL THIMBLE MOUNTED

### Required Materials:

Orbinox Wall Thimble Mounted MU Slide Gates are installed by means of Hex Bolts. In order to avoid leakage between the wall thimble and the frame, construction sealant shall be used. (Sikabond Construction Sealant or equivalent, 200ml per meter of opening perimeter). For detailed information about the size and quantity of the required bolts, or any other specific installation notes or materials, please refer to the notes on the 'General Arrangement Drawing'. Note that as standard, bolts and construction sealant are not supplied with the slide gate.

### Installation:

- The concrete construction shall be flat, level and plumb, and shall be in accordance to ACI 117-06 standard. If necessary, use non-shrink grout in order to meet the specified standard.
- Apply construction sealant all around the perimeter of the frame. Sikabond (200 ml/m) or equivalent construction sealant shall be used.
- Partially tighten the four corner bolts, and check that the slide gate is perfectly lined up with the wall thimble opening.
- Install the rest of the bolts, and evenly tighten all of them.

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## INSTALLATION: STEM EXTENSION, STEM GUIDES AND FLOOR STAND

### Procedure for open-frame and rising-stem configurations:

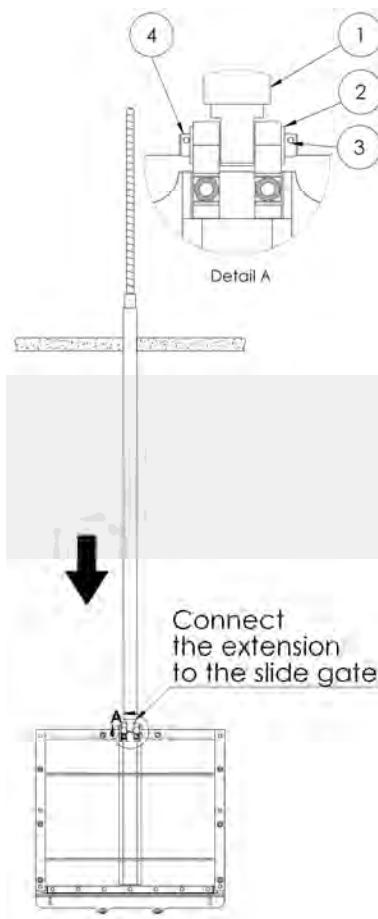
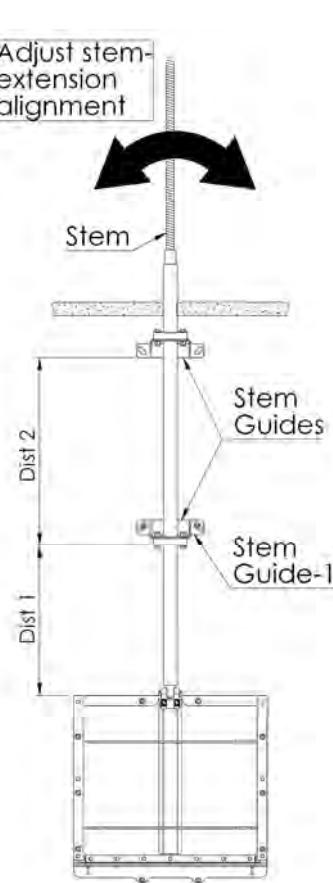
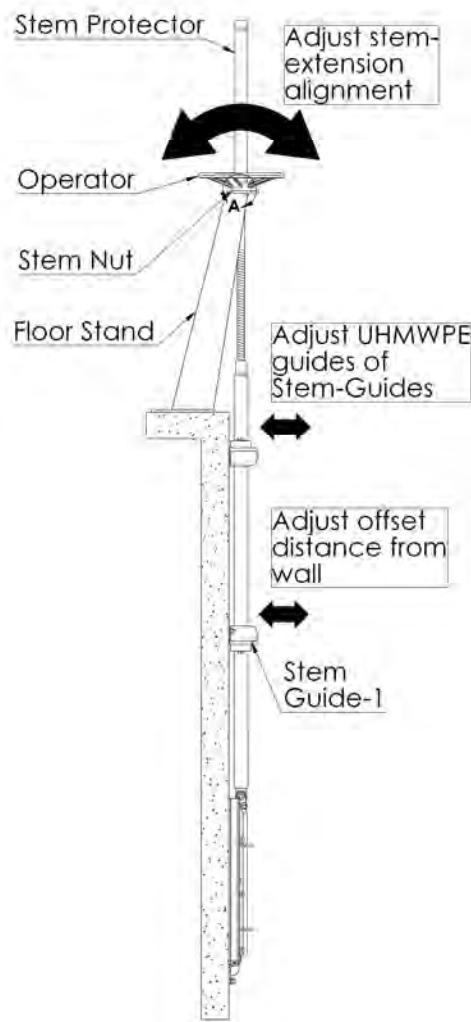
Once the slide gate has been installed, the stem extension, stem guide(s) and the floor stand shall be installed (when applicable). The following procedure shall be followed:

1. Connect the stem extension to the slide gate (Figure 6 and Detail A). Connect the stem extension (item 1) using the pin (item 4). In order to be able to do so, the washer (item 2) and the cotter-pin (item 3) shall be removed and re-installed.
2. Insert all stem guides from the top of the stem extension. Align stem extension, and especially make sure it is aligned with the vertical axis of the opening (see Figure 7). The maximum misalignment shall be 1/8" (3mm).
3. Next, install (drill and tighten anchor bolts) all stem guides except the first one (See Figure 7 and 8, "Stem Guide-1") . Refer to General Arrangement Drawing for dimensions ("Dist 1", "Dist 2", in Figure 7).
4. Thoroughly clean and grease the threaded part of the stem and the nut in the operator.
5. Position the floor stand and the operator. Engage the stem in the stem nut and turn the pedestal and the operator to bring it to the operating floor level. Make sure that the stem extension is perfectly aligned and parallel to the wall surface, adjusting the offset if necessary of the Stem-Guides' UHMWPE inserts (see Figure 8). Once the stem extension is perfectly aligned, install the floor stand (drill and tighten anchor bolts) .
6. Operate the slide gate and bring it to the open position. Install "Stem Guide-1", so the top of the slide hits on the stem guide. Note that "Stem Guide-1" is installed in the orientation shown in Figures 7 and 8 (UHMWPE insert down).
7. Install the stem protector and the position indication label (if applicable).

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**INSTALLATION: STEM EXTENSION, STEM GUIDES AND FLOOR STAND**

continued

**Figure 6****Figure 7****Figure 8**

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## INSTALLATION: STEM EXTENSION, STEM GUIDES AND FLOOR STAND

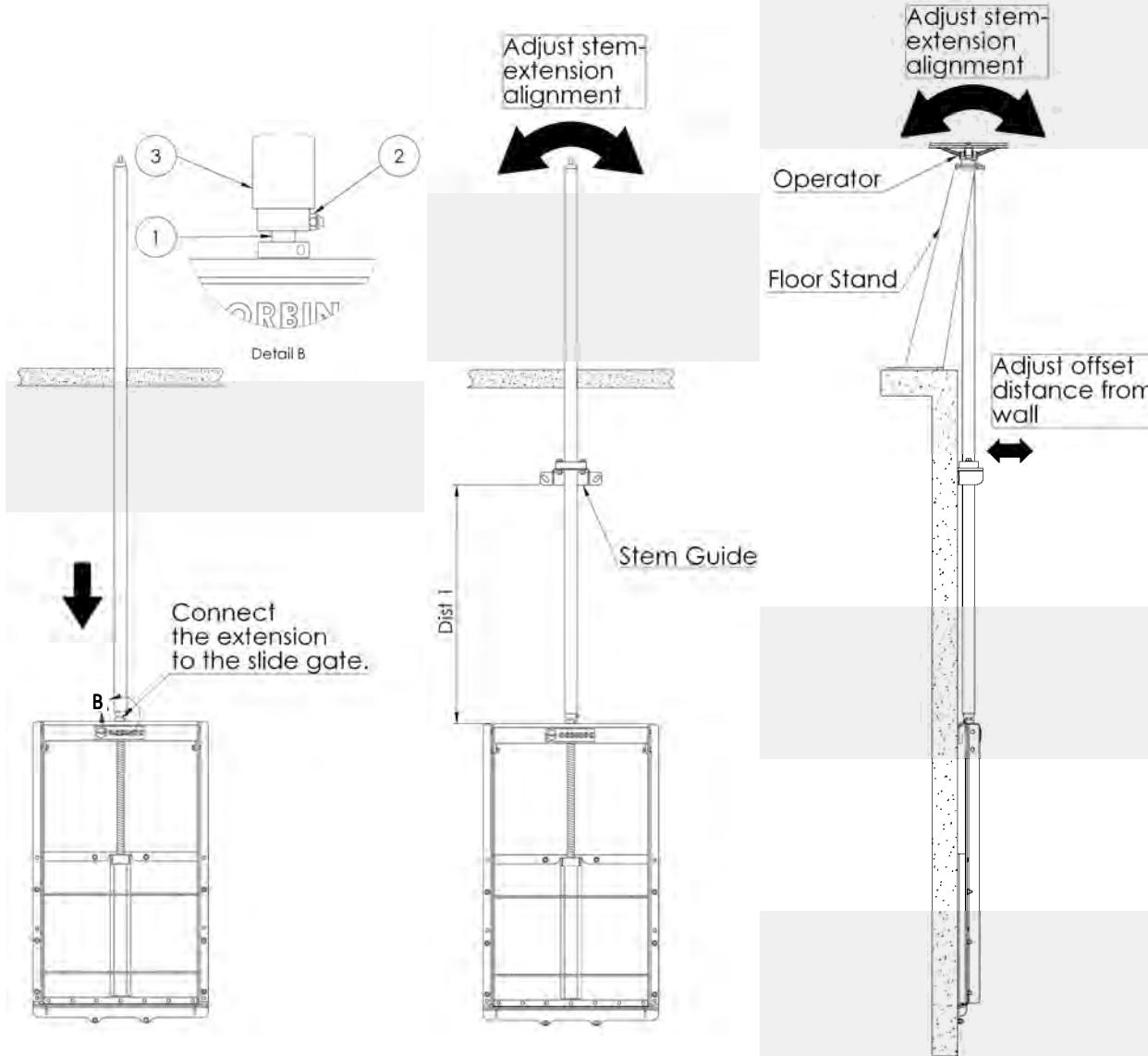
### Procedure for self-contained-frame and non-rising-stem configurations:

Once the slide gate has been installed, the stem extension, stem guide(s) and the floor stand shall be installed (when applicable). The following procedure shall be followed:

1. Connect the stem extension (item 3) to the shaft (item 1) on top of the yoke (see Figure 9 and Detail B).
2. Insert all stem guides from the top of the stem extension. Align stem extension, and especially make sure that it is aligned with the vertical axis of the opening (see Figure 10). For 2" Sqr. Nut operated gates, the stem guides shall be inserted onto the stem extension from the bottom.
3. Next, install all stem guides (drill and tighten anchor bolts). Refer to General Arrangement Drawing for dimensions ("Dist 1" in Figure 10).
4. Position the floor stand and the operator. Engage the shaft of the stem extension with the operator. Make sure that the stem extension is perfectly aligned and parallel to the wall surface, adjusting the offset if necessary of the Stem-Guides' UHMWPE inserts (see Figure 11). Once, the stem extension is perfectly aligned, install the floor stand (drill and tighten anchor bolts).

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Revision- A**MODEL****SLIDE GATES****INSTALLATION: STEM EXTENSION, STEM GUIDES AND FLOOR STAND**

continued

**Figure 9****Figure 10****Figure 11**

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## OPERATION

### Initial Operation:

- Before cycling the slide gate, make sure there are no foreign deposits or materials on the seals, guides or sealing area. Gate seals could be damaged if the area is not cleaned and coated with a light grease. Please refer to section "Materials needed for maintenance and seal replacement" on page 14 for detailed information about the grease type.
- **Manual:**
  - Apply a light grease on the stem before initial operation after the installation. If the operation is difficult due to high torque, stop operation of the gate and check stem alignment.
- **Electric Motor:**
  - Refer to the Electric Motor Instruction Manual section before cycling the slide gate. Manually open the gate approximately 5" before the initial electric motor operation. Check the motor rotation to assure proper direction of the slide travel according to the motor operation switch (open/close).
  - Special attention should be taken when the gate is almost fully open or fully closed. If the gate does not stop once the fully open or fully closed position is reached, stop immediately and adjust the limit and torque switches (Refer to motor manual).

### Operation:

- **CAUTION! Do not force the operator to close the gate, as it may cause damage to the stem and it does not improve the sealing system.**
- The MU Slide Gate is closed by a clockwise rotation, and opened by a counter-clockwise rotation of the operator.
- For self-contained frame configurations, the slide is stopped by the yoke when it is fully opened. For open frame configurations, the stem guide (wall bracket) stops the slide.
- The MU Slide Gate is designed to be self-locking, so that the slide maintains its position in open, close or intermediate positions.

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## MAINTENANCE: CLEANING AND LUBRICATION

Orbinox model MU slide gates need practically no maintenance. In order to assure maximum performance of the slide gate, the following maintenance inspections shall be carried out periodically every 6 months:

- Stem and stem nut shall be cleaned and greased. For non-rising stem configurations, the stem may be in contact with water and dirt. Under these conditions, the threads of the stem and/or stem nut may wear, and they shall be checked every 3 months.
- Clean the gate with clear water and remove any deposits, especially on the seals and in the guides.
- Check the seals and make sure they are not damaged. Seals shall be replaced if damaged. See section 'Maintenance: Seal Replacement' for detailed procedures about seal replacement.
- **Seals shall be wet while operating.** If the slide gate has not been used for a long period of time under dry conditions, the seals shall be wetted with clear water before operating the slide gate. Operating the gate with dry seals may damage the seals. Additionally, more torque may be required to operate the slide gate.

### Spare parts:

Orbinox does not recommend stocking any spare parts by the owner of the equipment as the slide gates are designed for a very long life cycle. If a repair part is required, please contact an Orbinox representative and provide the following information:

- Orbinox S/O number.
- "Orbinox General Arrangement Drawing" number.
- Project name (if applicable).
- Vendor's company name.

### Materials needed for maintenance and seal replacement:

Material	Type	Recommended or equivalent
Silicone	Silicone Rubber	Dow Corning RTV 732
Grease	Silica-Gel Silicone Grease	Verkosil G-2
Glue	Instant adhesive	Loctite 495

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## MAINTENANCE: SEAL REPLACEMENT (MU 8"X8" TO 48"X48")

Seal replacement procedure for Open-Frame and Rising-Stem configuration slide gates (up to 48"x48").

- **Step 1:** From the closed position, raise the slide around 1/2".
- **Step 2:** Unscrew the nuts of the lateral anchor bolts (item 10).
- **Step 3:** Remove stem extension coupling pin (item 1).

NOTE: the stem extension will not fall down as it is a rising-stem configuration slide gate.

- **Step 4:** Unscrew bolts (item 2) with caution, as major components of the gate are no longer secured.
- **Step 5:** Remove frame guides (item 3), UHMWPE guides (item 4) and slide (item 5).
- **Step 6:** Unscrew bolts (items 6) and remove retainers (items 7 and 8).
- **Step 7:** Remove seal (item 9) and replace it by the new seal.

Note 1: Before installing the new seal, apply silicone on the frame invert, where the seal will be in contact with it (see detail A).

Note 2: After installing the new seal, apply grease on it to ease operation.

### Reassembly:

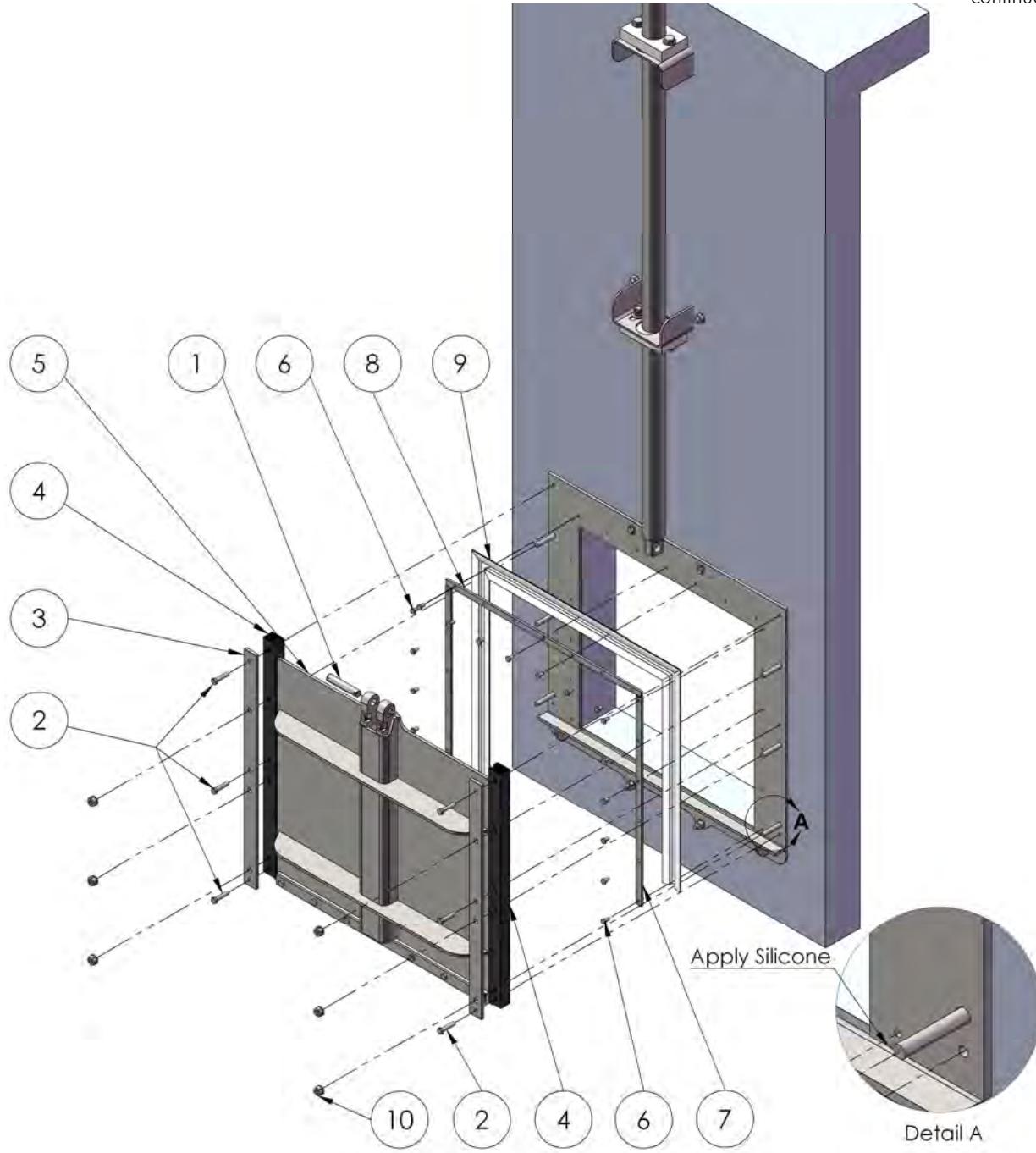
- **Follow Steps 6 to 1.**

Note: To reassemble in Step 5, first place one of the UHMWPE guides (item 6) on the anchor bolt rods. Next, take the slide (item 5) and attach the other UHMWPE guide onto it. Finally, mate the whole unit to the previously positioned UHMWPE guide.

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**MAINTENANCE: SEAL REPLACEMENT (MU 8"X8" TO 48"X48")**

continued



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## MAINTENANCE: SEAL REPLACEMENT (MU 8"X8" TO 48"X48")

Seal replacement procedure for Self-Contained and Non-Rising-Stem configuration slide gates (up to 48"x48").

- **Step 1:** From the closed position, raise the slide around 1/2".
- **Step 2:** Detach the stem extension (if applicable).

NOTE: The stem extension needs to be held in place, otherwise it will fall. Clamp the extension and lean it on the stem guide (if applicable) or on the operating floor.

- **Step 3:** Unscrew nuts and washers of lateral anchor bolts (items 1 and 2).
- **Step 4:** Unscrew bolts (item 3) with caution, as major components of the gate are no longer secured.
- **Step 5:** Remove the 'yoke (item 7), stem (item 9), slide (item 8), and frame guides (item 5) as one unit.
- **Step 6:** Unscrew bolts (item 10) and remove the seal retainer (items 11 and 12).
- **Step 7:** Remove seal (item 13) and replace it by the new seal.

Note 1: Before installing the new seal, apply silicone on the frame invert, where the seal is in contact with it (see detail A).

Note 2: After installing the new seal, apply grease on it to ease operation.

### Reassembly:

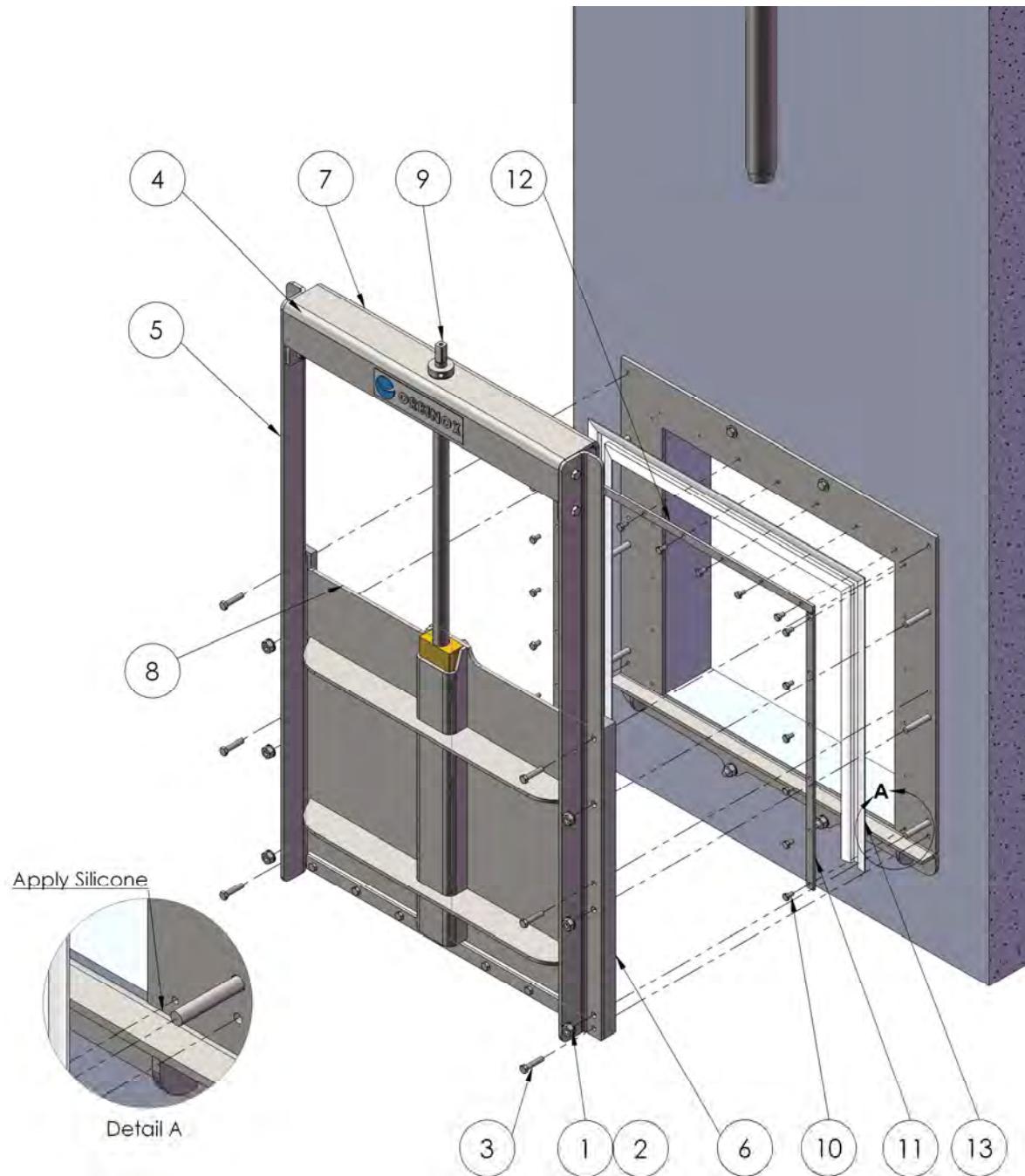
- **Follow Steps 6 to 1.**

Note: To reassemble Step 5, first place one of the UHWMPE guides (item 6) on the anchor bolt rods. Next, take the yoke, stem, slide, and frame-guides as one unit, and attach the other UHWMPE guide onto it. Finally, mate the whole unit to the previously positioned UHWMPE guide.

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**MAINTENANCE: SEAL REPLACEMENT (MU 8"X8" TO 48"X48")**

continued



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## MAINTENANCE: SEAL REPLACEMENT (MU 49"X49" TO 80"X80")

Seal replacement procedure for Open-Frame and Rising-Stem configuration slide gates (from 49"x49" to 80x80").

- **Step 1:** Start from closed position.
- **Step 2:** Remove the stem extension pin (item 2) and uncouple the stem extension (item 3) from the slide (item 1). See "Detail A".

NOTE: the stem extension will not fall down as it is a rising-stem configuration slide gate.

- **Step 3:** Unscrew the nuts and washers (items 8 and 9) of stem guide (item 7).
- **Step 4:** Unscrew the nuts and washers (item 5 and 6) of floor stand (item 4).
- **Step 5:** Move the set Floor Stand and Stem Extension (items 3 and 4) in order to be able to remove the slide (item 1).
- **Step 6:** Remove the slide (item 1) from the frame.
- **Step 7:** Unscrew bolts and nuts (items 12 and 13) from the retainers (items 10 and 11).
- **Step 8:** Remove seal (item 14) and replace it by the new seal.

Note 1: Apply glue where the bottom seal and side seals join.

Note 2: After installing the new seal, apply grease on it to ease operation.

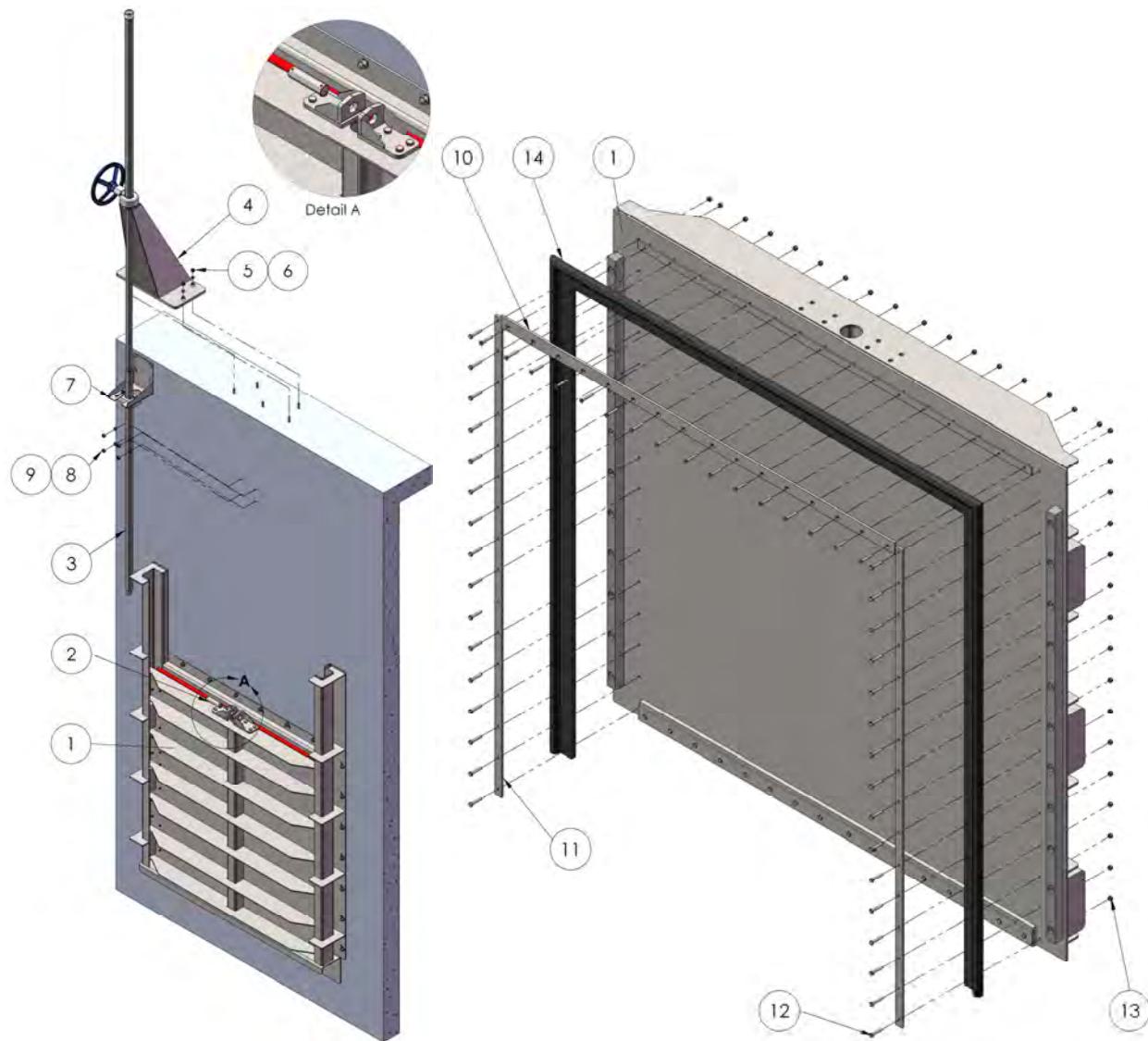
### Reassembly:

- Follow Steps 8 to 1.

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**MAINTENANCE: SEAL REPLACEMENT (MU 49"X49" TO 80"X80")**

continued



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## MAINTENANCE: SEAL REPLACEMENT (MU 49"X49" TO 80"X80")

Seal replacement procedure for Self-Contained and Non-Rising-Stem configuration slide gates (from 49"x49" to 80x80").

- **Step 1:** Start from closed position.
- **Step 2:** Unscrew bolts and nuts (items 3 and 4) that hold the couplings (item 2) in place. See "Detail A".
- **Step 3:** Unscrew the bolts and nuts (items 6 and 7) from the yoke (item 5).
- **Step 4:** Remove the Yoke and Stem (items 5 and 8) as one unit.
- **Step 5:** Remove the stem extension (item 9).
- **Step 6:** Remove the slide (item 1) from the frame.
- **Step 7:** Unscrew bolts and nuts (items 12 and 13) from the retainers (items 10 and 11).
- **Step 8:** Remove seal (item 14) and replace it by the new seal.

Note 1: Apply glue where the bottom seal and side seals join.

Note 2: After installing the new seal, apply grease on it to ease operation.

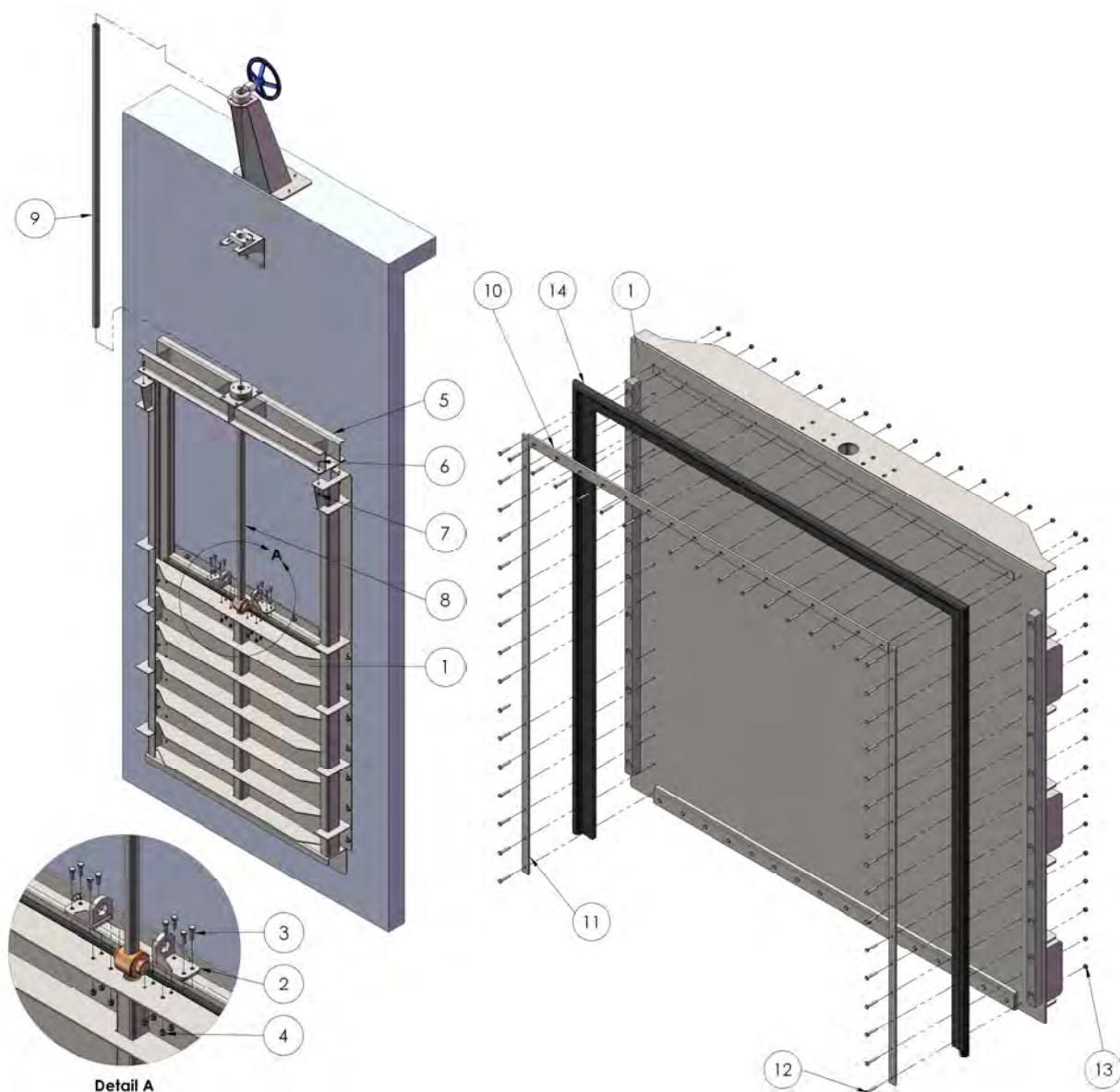
### Reassembly:

- Follow Steps 8 to 1.

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**MAINTENANCE: SEAL REPLACEMENT (MU 49"X49" TO 80"X80")**

continued



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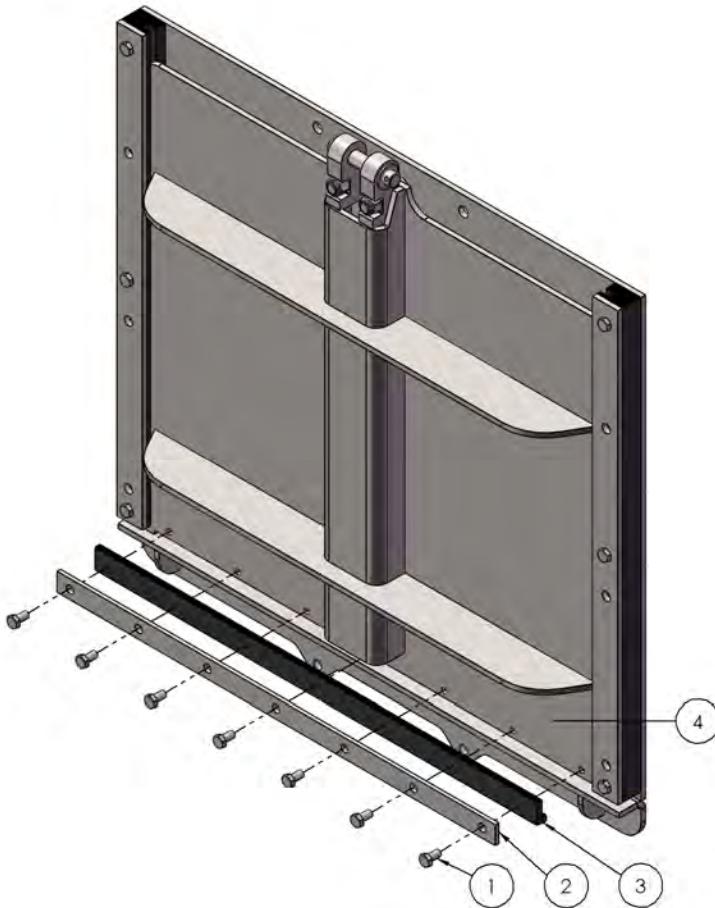
## MAINTENANCE: BOTTOM SEAL REPLACEMENT (MU 8"X8" TO 48"X48")

### Bottom seal replacement procedure\*:

- **Step 1:** From the closed position, raise the slide (item 4), around 2".
- **Step 2:** Unscrew bolts (item 1) and remove the bottom retainer (item 2).
- **Step 3:** Replace the bottom seal (item 3).

### Reassembly:

- Follow Steps 3 to 1.



\* The figure shows the slide gate removed from the wall in order to ease the identification of the different parts. However, there is no need to remove the frame or the slide from the wall to replace the bottom seal.

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## MAINTENANCE: BOTTOM SEAL REPLACEMENT (MU 49"X49" TO 80"X80")

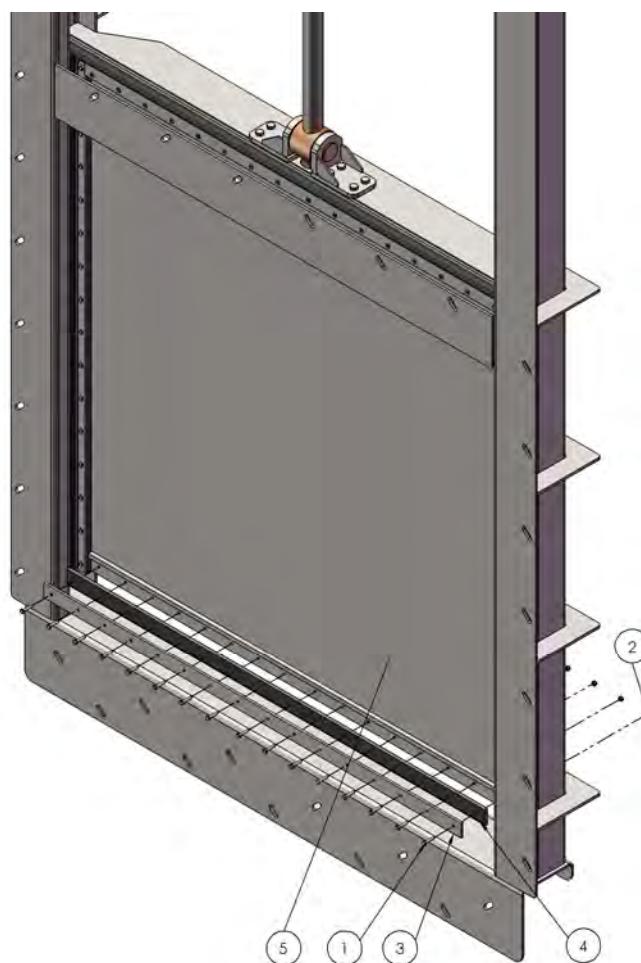
### Bottom seal replacement procedure\*:

- **Step 1:** From the closed position, raise the slide (item 5), around 2".
- **Step 2:** Unscrew bolts and nuts (item 1 and 2) and remove the bottom retainer (item 3).
- **Step 3:** Replace the bottom seal (item 4).

Note: Apply glue where the bottom seal and side seals join.

### Reassembly:

- Follow Steps 3 to 1.



\* The figure shows the slide gate removed from the wall in order to ease the identification of the different parts. However, there is no need to remove the frame or the slide from the wall to replace the bottom seal.

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## TROUBLE SHOOTING

SYMPTOM	CAUSE	SOLUTION
• Leakage between slide gate and concrete wall	<ul style="list-style-type: none"> <li>Concrete wall does not meet the required std.</li> </ul>	<ul style="list-style-type: none"> <li>Un-install the slide gate and fix the wall.</li> </ul>
	<ul style="list-style-type: none"> <li>Not enough construction sealant.</li> </ul>	<ul style="list-style-type: none"> <li>Un-install the slide gate, clean the wall and apply a new layer of construction sealant.</li> </ul>
	<ul style="list-style-type: none"> <li>Loose anchor bolts.</li> </ul>	<ul style="list-style-type: none"> <li>Tighten anchor bolts.</li> </ul>
	<ul style="list-style-type: none"> <li>Incorrect anchor bolts.</li> </ul>	<ul style="list-style-type: none"> <li>Check the 'General Arrangement Drawing' and make sure the right anchor bolts have been installed.</li> </ul>
• Leakage through the seal	<ul style="list-style-type: none"> <li>Damaged seal.</li> </ul>	<ul style="list-style-type: none"> <li>Replace seal.</li> </ul>
• Leakage through the bottom seal	<ul style="list-style-type: none"> <li>Foreign material trapped between frame invert and slide.</li> </ul>	<ul style="list-style-type: none"> <li>Remove the foreign material. Check if there is any damage to the seal.</li> </ul>
	<ul style="list-style-type: none"> <li>Damaged seal.</li> </ul>	<ul style="list-style-type: none"> <li>Replace seal.</li> </ul>
• Excessive force required to operate the slide gate	<ul style="list-style-type: none"> <li>Misaligned stem extension, stem guide, or floor stand.</li> </ul>	<ul style="list-style-type: none"> <li>Check and adjust alignment of stem extension, stem guide or floor stand.</li> </ul>
	<ul style="list-style-type: none"> <li>Dirty stem and/or stem nut.</li> </ul>	<ul style="list-style-type: none"> <li>Clean and lubricate stem and/or stem nut.</li> </ul>

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade	Contract No. C1011-045-087 Grit Washer System
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### Isolation Inch Valve

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade		
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# FLOWROX

Proven Performance

## Flowrox PVG Valves



### Features

- 100% tight
- Full bore
- Only rubber sleeve in contact with the medium
- Flexible sleeve
- Field replaceable
- Long lifetime
- Opening tags

### Process benefits

- No jamming or clogging
- Low maintenance
- Trouble-free operation
- Long service intervals
- Reduced cost of ownership

**Flowrox PVG** is a robust yet compact pinch valve engineered with the highest quality standards. It is made for processes involving pressure resistance, abrasion, corrosion and aggressive slurries. PVG offers substantial savings through improved performance, long service lifetime and low maintenance costs with pressure capabilities up to 10 bar.

### COMPACT SOLUTION

In the open position, the PVG valve is at full bore with no flow restrictions. Therefore it is an integral part of the pipeline and anything running through the pipeline can also pass through the valve.

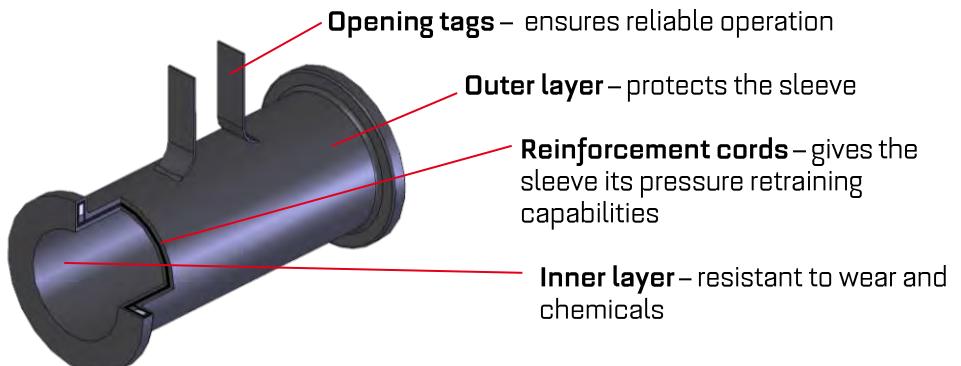
PVG is designed to be reliable and compact solution for flow control. Being a full port design the valves require the least pumping energy and do not reduce system head pressure. Installation is trouble free and valve includes pre-installed rubber sleeves with opening tags, which withstand tough process conditions. This ensures long valve lifetime and minimal maintenance costs.

All these features add up to lowest total cost of ownership (TCO).



### CORE OF THE VALVE

The core of the PVG valve is its elastic sleeve, which is the only part in contact with the medium. Designed to withstand wear, corrosion and chemicals, Flowrox sleeves guarantee non-clogging, trouble free operation and extended lifetime. The sleeves are bubble tight and easily replicable if necessary.



## Product Specification

## DIMENSIONS AND WEIGHTS

### Materials:

Body - Cast iron  
Pusher - Cast iron  
stem black nitrated CS

### Sleeve:

SBRT  
EPDM

### Size:

50- 250 mm

### Pressure:

10 bar (50-150mm)  
6 bar (200-250mm)

### Length:

Face to face according to  
EN558 ser 7.

### Standard flange drillings:

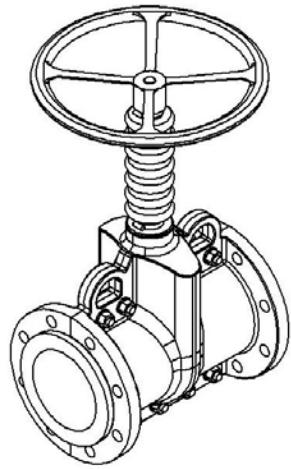
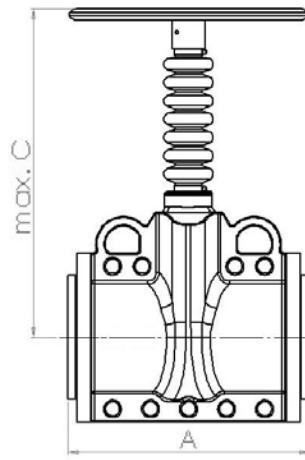
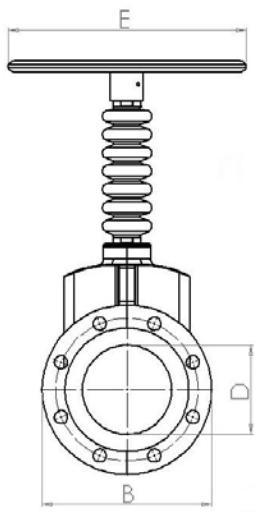
DIN 10  
ANSI 150

### Actuators

- Manual

### Applications

- Water and Wastewater treatment
- Mining and metal industries
- Mineral processing
- Power generation
- Sand and gravel
- Chemical
- Pulp and paper



Valve size	50 mm	80 mm	100 mm	150mm	200 mm	250mm
A	190	254	305	406	521	635
B	165	200	228	285	343	406
C	280	344	394	553	645	785
D	50	80	100	150	200	250
E	150	200	250	400	600	800
Weight KG	14	21	30	49	96	140
Maximum pressure BAR	10	10	10	10	6	6

Valve type marking e.g. PVC100M10 DIN

Dimensions are for guidance only – detailed dimensions drawings available on request. All dimensions are in millimeters, unless stated.

### FLOWROX PTY LTD

36 Sydenham Road, PO Box 980, Brookvale NSW 2100, Australia  
Tel. +61 2 9114 9715 Fax +61 2 9114 9725  
sales-au@flowrox.com, www.flowrox.com.au



Queensland Urban Utilities Wacol STP Grit Removal System Upgrade	Contract No. C1011-045-087 Grit Washer System
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## Check Valve

Queensland Urban Utilities Wacol STP Grit Removal System Upgrade		
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VAL'MATIC

# Swing Flex Check Valves

## Features:

- 100% unrestricted flow area for improved flow characteristics and lower head loss
- One piece precision molded steel disc reinforced with nylon and backed by a 25 year warranty
- Memory-flex disc is the only moving part for long life and minimal maintenance
- Full sized top access port allows disc removal without removing valve from line
- Integral O-ring on disc assures positive seating at high and low pressures
- "Short Disc Stroke" combined with memory flex disc action reduces potentially destructive water hammer
- Backflow capabilities are available by means of an optional screw type backflow actuator
- Every Swing-Flex® Check Valve is 100% tested including a seat test to assure drop tight sealing and hydrostatic testing to assure the integrity of the casting

## Technical Data:

- Sizes: DN50-1200 (2"- 48")
- Max. Working Pressure: 1,600kPa
- Ductile Iron Body
- Fusion Bonded Epoxy Coated to AS4158
- Buna-N Encapsulated Disc
- Flanges Drilled AS4087 Class 16
- 316 Stainless Steel Fasteners and Plugs
- Lay Length to AS3578 & AS4794
- WA Watercorp approval SPS223 coating



## Options

### Disc Accelerator (SURGEBUSTER)

The Disc Accelerator is a precision formed stainless steel mechanism that closes the valve disc rapidly thus avoiding slamming by flow reversal and yet allowing the disc to be stabilised under flow conditions. The accelerator is fully enclosed within the valve and completely out of the flow path.

### Disc Position Indicator

The cover mounted disc position indicator provides clear indication of the valve's disc position. A proximity limit switch can also be provided to indicate open/closed position to remote location.



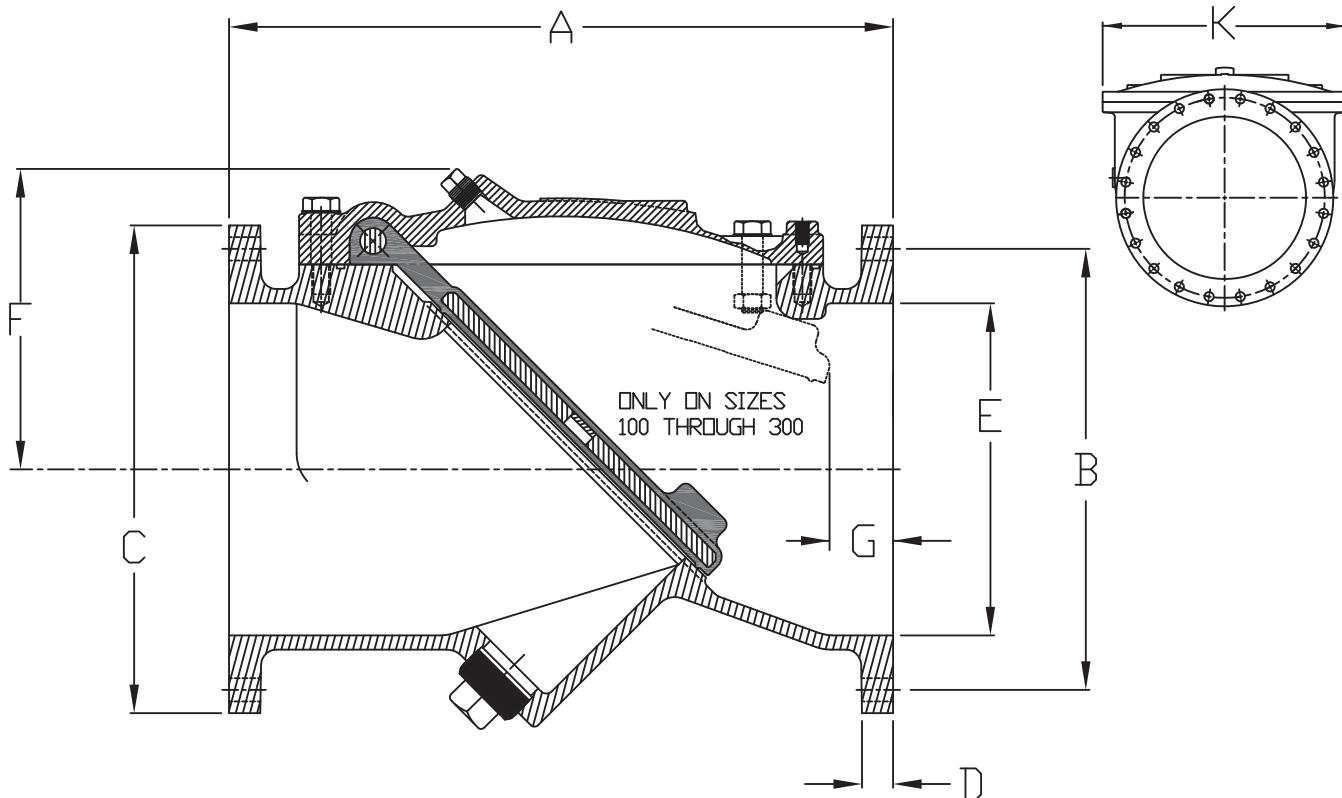
### Backflow Actuator

Available for use when manual backflow operation is required. Most commonly used for priming pumps, back flushing, draining lines, and system testing.



### Rubber Lining

Unlike conventional swing check valves, the Swing Flex Check Valves is designed to accept synthetic or natural rubber lining. Body lining coupled with synthetic Memory-Flex discs makes the Swingflex ideally suited for systems containing abrasive or corrosive fluids.



Hydro test Pressure  
1.5 Times Cold Working Pressure - CWP

AS4087 Class 16, Millimeters													
Valve Size	Model No.	CWP BAR	A	B	C	D	E	F	G	K	Bolt Size	No. of Bolts	WT-Kg
50*	502A	16	203	114	152	16	50	86	41	132	M16	4	11
80	503AU	16	260	146	185	19	76	130	41	190	M16	4	20
100	504AU	16	330	178	215	19	102	146	54	210	M16	4	32
150	506AU	16	410	235	280	21	152	173	54	284	M16	8	57
200	508AU	16	540	292	335	22	203	213	73	406	M16	8	109
225*	510X005	16	622	324	405	30	254	273	80	533	M16	8	190
250	510AU	16	640	356	405	24	254	273	80	533	M20	8	190
300	512AU	16	700	406	455	30	305	317	88	610	M20	12	290
375	515AU	16	820	495	550	30	375	330	92	591	M24	12	330
450	518AU	16	970	584	640	32	457	388	80	718	M24	12	546
500	520AU	16	1070	641	705	35	508	429	89	778	M24	16	771
600	524AU	16	1220	756	813	48	610	489	127	914	M27	16	998

\*NOTES:

Flange holes are slotted for ANSI 150 and AS4087 Class 16 on 50mm valve

Flange holes are drilled and tapped to AS4087 Class 16 on 225mm valve.

50mm and 225mm sizes are not to AS lay length.

The designs, materials, dimensions and specifications shown are subject to change without notice due to our continuing program of product development.