

**PROJECT: LEE LANE, ROYSTON**

**FOUL & SURFACE WATER PUMPING STATION**

**CLIENT: BARRATT DWH YORKSHIRE WEST**

**PROJECT REFERENCE: PR10369**

<i>Issue</i>	<i>Revision Description</i>	<i>Date</i>	<i>Engineer</i>	<i>Approved</i>
A	Initial Submission for Yorkshire Water Approval	12.02.2018	I. Handem	P. Warner
B	Compound boundary treatment updated on drawing PR10369-009	16.02.2018	I. Handem	P. Warner



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## CONTENTS

- 1: Overview
- 2: Specification.
- 3: Peak Inflow, Discharge and Pump Regime.
- 4: Emergency Storage.
- 5: Rising Main and Surge Analysis.
- 6: Pump Duty Requirements and Selection.
- 7: Pump Station Layout.
- 8: Retention Time and Septicity.
- 9: Pump and Level Control Cabling.
- 10: Control Equipment.
- 11: Telemetry Equipment.
- 12: Access Covers.
- 13: Lifting Equipment.
- 14: Storage Kiosk
- 15 Inlet Penstock
- 16: Valve Chamber Access Ladder.
- 17: Services
- 18: Appendices
  - A. Summary
  - B. Hydraulic Calculations, System and Performance Curves and Pump Dimensions
  - C. Foul Water Storage Schedule
  - D. Pump Station Drawings
  - E. Wiring Diagrams
  - F. Lifting Equipment
  - G. Penstock drawing
  - G. Yorkshire Water Proforma

## 1: Overview

The site has a requirement for both foul and surface water pump Stations. Both are to be offered to Yorkshire Water for Adoption. The pump stations are in a combined compound in the location shown on the ARP Associates drawings submitted under separate cover by them.

## 2: Specification

Our proposal is based on equipment providing compliance with the Sewers for Adoption 7<sup>th</sup> Edition Specification as amended by the Yorkshire Water Addendum to this document as obtained from their Developer Services website at the time of the original application for this site.

However, the electrical equipment would be supplied in accordance with Yorkshire Water addendum of the Sewers for Adoption 6<sup>th</sup> Edition specification, since there is not amendment for this element within the latest SFA7.

## 3: Peak Inflow, Discharge and Pump Regime

### Foul Water

Our design for this station is based on a Dual Pump System operating on a Duty / Standby basis.

The pump station is designed to deal with the foul water inflow from 164 domestic dwellings. Based on the Sewers for Adoption 7<sup>th</sup> Edition criteria, we calculate the design flow to be 7.59L/sec.

Sewers for Adoption 7<sup>th</sup> Edition states the pump design flow rate should be half the peak inflow (3.80L/sec) or minimum required to provide self-cleansing velocity through the rising main.

Our duty calculations and pump selection are based on pumps designed to provide the specified foul water discharge rate of 5L/sec in the rising main detailed in Section 5.

### Surface Water

Our design for this station is again based on a Dual Pump System operating on a Duty / Standby basis

From the site plans provided, we understand that a Flow Control device will be installed upstream manhole S26 to limit the discharge into the pump station Wet Well to 21.8L/sec.

We have selected pumps to provide the required flow rate utilising FIXED SPEED motors.

### Common Items

We would refer you to Section 6 for details of the proposed pumps and actual discharge rates for each pumping station.

## 4: Emergency Storage

### Foul Water

The Sewers for Adoption 7<sup>th</sup> Edition document stipulates a requirement for 160 litres per dwelling which for the 164 dwellings this equates to a total requirement of 26.240m<sup>3</sup>.

It is proposed to use the wet well and incoming sewer network to provide the required storage above high level alarm and below the invert level of the lowest connected private foul water demarcation chamber. This manhole has been identified as Demarcation Chamber F10a located off the main adoptable manhole F10 which has an invert level of 68.710m. We will utilise this level as the Maximum Storage Level.

We calculate there is 8.672m<sup>3</sup> of storage available within the manholes and 1.231m<sup>3</sup> available within the pipe runs.

For the Inlet Manhole F22, we suggest a 1.5m internal diameter by 5.35m deep manhole where it would be necessary for the provision of an external inlet backdrop. The storage volume with the Inlet Manhole included with the above figures.

To accommodate the remaining 16.336m<sup>3</sup>, we propose a 2.7m internal diameter by 6.7m deep wet well sized which also allows for normal pump operation volume and benching.

The total available emergency storage equates to 26.279m<sup>3</sup> will be accommodated above the High Level Alarm and below the Maximum Storage Level.

Please refer to Appendix C for the storage schedule.

#### Surface Water

ARP Associates have designed the surface water storage system and will provide calculations for the attenuation system as part of their submission.

The Wet Well is sized for normal pump operation and we propose a 2.7m internal diameter by 7.20m deep chamber.

### **5: Rising Main and Surge Analysis**

#### Foul Water

We are proposing the use of a Black 110mm outside diameter PE100 SDR11 black/grey pipe with an 89.1mm Bore.

As specified by ARP Associates, to avoid the need to air valves and concrete protection within the site boundary the invert level of the Valve Chamber outlet pipe is 2.75m depth which makes the Valve Chamber depth 3.11m.

#### Surface Water

We are proposing the use of a Black 160mm outside diameter PE100 SDR11 black/grey pipe with a 129.7mm Bore.

As specified by ARP Associates, to avoid the need to air valves and concrete protection within the site boundary the invert level of the Valve Chamber outlet pipe is 1.80m depth which makes the Valve Chamber depth 2.16m.

#### Common Items

Both rising mains are less than 500m long and as such it is not intended to prepare a surge analysis report for either station. Long section drawings for the rising main to be provided by the Developer or their consulting engineer ARP Associates under a separate cover.

### **6: Pump Duty Requirements and Selection**

#### Foul Water

From the site data provided we calculate the pump duty from Mid Water Level to be a discharge rate of 5L/sec against a total head of 10.28m for which we have selected submersible sewage pumps from the Grundfos SE1.80.80.22.EX.4.50D range fitted with fitted with S-TUBE impellers and 2.2kW explosion proof motors.

Due to the relative low flow and head application, we have included for 4-pole pumps where the duty point falls outside 80-110% of the pump Best Efficiency Point (B.E.P.). For compliance with this requirement, YWS would need to relax the offsite foul water discharge rate restriction and accepted 2-pole pumps.

We have tabulated below the discharge rates from key operating levels.

Table 6.1 – Foul Water Pump Flow Rates

<b>Operating Level</b>	<b>Discharge (L/sec)</b>
Pump Stop	4.64
Mid Water Level	4.79
Duty Pump Start	4.91
Standby Pump Start	5.00
High Level Alarm	5.06
Wet Well Inlet	5.22
Maximum Storage Level	6.52

### Surface Water

From the site data provided we calculate the pump duty from Mid Water Level to be 23.8L/sec against a total head of 8.32m for which we have selected submersible pumps from the Grundfos SE1.80.100.30.EX.4.50D.B range fitted with fitted with S-STUBE impellers and 3.0kW explosion proof motors.

We have tabulated below the discharge rates from key operating levels. The system as designed and pumps selected provide the best match to the discharge restriction imposed on the pump station.

Table 6.2 – Surface Water Pump Flow Rates

<b>Operating Level</b>	<b>Discharge (L/sec)</b>
Pump Stop	22.8
Mid Water Level	23.3
Duty Pump Start	23.8
Standby Pump Start	24.1
High Level Alarm	24.3
Wet Well Inlet	24.9

### Common Items

One pump would be fitted with a hydraulic Autoflush device. All pumps would be fitted with stainless steel lifting chains.

As the pumps are less than 7.5kW as detailed within YWS SFA7 addendum, we do not propose to fit any of the pumps with a seal leakage detection system.

We have attached our hydraulic calculations, system curves and pump performance details in Appendix B.

### **7: Pump Station Layout**

The pumps, pipework and valves would be installed within concrete chambers constructed by the civil contractor to a layout as shown on PDAS drawings PR10369-001 to 010. Please refer to Appendix D for drawings.

For civil construction detail refer to ARP Associates drawings provided by them under a separate cover.

Our contract would terminate a short distance outside the valve chambers with a plain ended pipe from where provision of the rising mains and connecting them to the pump stations pipework would be the responsibility of others.

A 100mm valve chamber drain would be installed for each pump station with a P Trap gully in the valve chamber.

## 8: Retention Time and Septicity

### Foul Water

Based on a half developed site the retention time within the system is 1.26 hours and for the fully developed site 0.63 Hours.

Both of these are well below the 6 hour figure after which septicity is considered to be a problem and as such we do not propose to install any permanent or temporary septicity control equipment.

### Surface Water

Septicity is not applicable for the surface water system.

## 9: Pump and Level Control Cabling

For each pump station the pump cables would be wired directly back to the composite control panel without intermediate junction boxes or Icore connectors as detailed and generally preferred by Yorkshire Water. All cable ducts emanating from the wet well would be sealed with gas type sealant at the kiosk.

## 10: Control Equipment

Automatic level control for each station would be provided via Siemens Hydromanager Plus ultrasonic level control systems augmented by two separate float switches for high level and ultrasonic failure all wired back to a composite multi-compartment control panel in accordance with the Yorkshire Water SFA6 Addendum.

The control panel would be installed within a floor fixing GRP kiosk in accordance with the Yorkshire Water SFA6 Addendum. The size of the kiosk would be 2500mm Wide x 1750mm High x 750mm Deep.

Please refer to Appendix E for Wiring Diagrams and Kiosk Layout

## 11: Telemetry Equipment

Yorkshire Waters preferred Telemetry Outstation to monitor both pump stations would be supplied installed and commissioned on this site either by PDAS or as a direct transaction between Developer and Yorkshire Water Services.

## 12: Access Covers

Steelway Prolift FACTA B access covers and frames would be provided for the wet well and valve chamber of the following sizes. These are hinged and fabricated from galvanised steel chequer plate and are capable of being lifted with an effort not exceeding 25kg.

*Table 12.1 – Access Covers Clear Opening Dimensions*

<b>Chamber</b>	<b>Size</b>
Inlet Manhole FW & SW	750 x 750mm
Wet Well FW	1500 x 900mm
Wet Well SW	1800 x 900mm
Valve Chamber FW	2400 x 1800mm
Valve Chamber SW	2650 x 2250mm

The valve chamber cover has been sized on the basis of a full clear opening as specified with SFA7 and Yorkshire Water Services addendum of this specification.

## 13: Lifting Equipment

A Reid Type Davit Socket (with cover plate) would be installed adjacent to the Wet Well access opening and we have allowed for the supply of a dedicated Reid Lifting Davit arm.

The Davit socket drain-down hole should penetrate through the cover slab as required by YWS.

Please refer to Appendix F for details of lifting equipment.

**14: Storage Kiosk**

A dedicated GRP Storage Kiosk will be provided to house the lifting davit arm and access cover posts and barriers systems when not in use. Please refer to the PDAS layout drawings for further details and location.

**15: Inlet Penstock**

A Penstock valve would be mounted in the inlet manhole over the outgoing sewer to the wet well. The penstock valves would be manufactured from cast iron, wall mounting complete with non-rising spindles, support brackets, a single tee key and a top box for the inlet manhole unit.

For Penstock drawing see Appendix G.

**16: Valve Chamber Access Ladder**

A galvanised mild steel access ladder complete with a retractable handhold would be installed within each of the valve chambers.

**17: Services**

It would be the responsibility of the Developer and Main Contractor to provide a suitably rated 400 volt 3 Phase and neutral power supply to the control panel and a PSTN line for the telemetry outstation.

**18: Appendices**

## Technical Summary - Foul Water Pump Station

Liquid Handled	Foul Water
Number of Pumps	2
Control Philosophy	Duty / Standby
Capacity per Pump (L/sec)	5
Head Generated (m)	10.28
Pump Manufacturer	Grundfos
Pump Type	SE1.80.80.22.EX.4.50D
Impeller Type / Reference	SUPER-VORTEX
Solids Handling (mm)	80
Hazardous Area Rating of Pump	EXP
Motor Rating (kw)	2.2
Speed (rpm)	1455
Electric Supply	230/400V 50Hz, 3 Phase
Full Load Current (Amps)	6.0
Method of Starting	Direct On Line
Length of Cables	20
Level Controls	Siemens Hydromanager Plus Ultrasonic + high level and float switch back up
Wet Well Diameter (mm)	2700
Wet Well Depth (m)	6.7
Station Pipes and Valves (mm)	80
Station Final Discharge Pipe (mm)	80
Pump Station Pipe Material	Ductile Iron
Rising Main (By Civil contractor or Developer)	110mm OD PE100 SDR11 (89.1mm Bore)
Access Covers (Supply Only)	Manufacturer: Steelway Prolift Rating: FACTA B Inlet Manhole 750 x 750mm Wet Well 1500 x 900mm Valve Chamber 2400 x 1800mm
Inlet Diameter (mm)	150
Penstock (Supply Only)	150mm NB Cast Iron, wall fixing (EVS drawing D0666 issue 1) Isolation of incoming sewers by Developer / Contractor
General Arrangement Drawings	PR10369-001 to 010

### Technical Summary - Surface Water Pump Station

Liquid Handled	Surface Water
Number of Pumps	2
Control Philosophy	Duty / Standby
Capacity per Pump (L/sec)	23.8
Head Generated (m)	8.32
Pump Manufacturer	Grundfos
Pump Type	SE1.80.100.30.EX.50D.B
Impeller Type / Reference	S-TUBE
Solids Handling (mm)	80
Hazardous Area Rating of Pump	EXP
Motor Rating (kw)	3.0
Speed (rpm)	1460
Electric Supply	230/400V 50Hz, 3 Phase
Full Load Current (Amps)	8.0
Method of Starting	Direct On Line
Length of Cables	20
Level Controls	Siemens Hydromanager Plus Ultrasonic + high level and float switch back up
Wet Well Diameter (mm)	2700
Wet Well Depth (m)	7.2
Station Pipes and Valves (mm)	150
Station Final Discharge Pipe (mm)	150
Pump Station Pipe Material	Ductile Iron
Rising Main (By Civil contractor or developer)	160mm OD PE100 SDR11 (129.7mm Bore)
Access Covers (Supply Only)	Manufacturer: Steelway Prolift Rating: FACTA B Inlet Manhole 750 x 750mm Wet Well 1800 x 900mm Valve Chamber 2650 x 2250mm
Inlet Diameter (mm)	225
Penstock (Supply Only)	225mm NB Cast Iron, wall fixing (EVS drawing D0664 issue 1) Isolation of incoming sewers by Developer / Civil Contractor
General Arrangement Drawings	PR10448-001 to 010

**Materials Specification**

<b>Pump Station Type</b>	<b>Submersible – Guiderail Mounted Pumps</b>
<b>Base Specification</b>	<b>Sewers For Adoption 7<sup>th</sup> Edition</b>
<b>Addendum</b>	<b>As described in covering letter</b>

**PUMP:**

Single stage fully submersible pump with cast iron case and impeller which is securely locked to the fully protected motor shaft extension. Impeller as data section.

**SEAL CHAMBER:**

Buffer chamber between pump and motor, charged with oil retained by opposing seals.

**MOTOR:**

Squirrel cage induction motor of watertight IP68 enclosure suitable for continuous service and having Klixon lock out circuit for over-temperature protection on Explosion Proof motors.

**CABLE:**

Suitable length(s) of multi-core VRI PCP sheathed flexible cable connected through watertight gland(s) to the motor windings.

**DUCKFOOT:**

Cast iron floor fixing duckfoot bend (or pedestal with elbow) incorporating guiderail socket(s) and self-locating boltless pump quick release coupling.

**GUIDERAILS:**

Stainless Steel rail(s) for attachment to cover slab or ground level steelwork and extending to duckfoot sockets. Complete with necessary location brackets.

**LIFTING CHAINS:**

Stainless Steel Lifting chain, attached to pump and of length to reach and be hooked at floor level.

**REFLUX VALVE:**

Fullway pattern delivery non-return valve.

**SLUICE VALVE:**

Fullway pattern isolating sluice valve with non-rising spindle and Cap Top

**PIPES:**

From duckfoot through to defined point for rising main connection, incorporating the valves and, in case of multi-pump system, an appropriately sized manifold. All fitting connections appropriate to materials employed.

**LEVEL CONTROLS:**

Siemens Hydroranger Plus Ultrasonic level control unit as data sheet complete with submersible transducer, bracket and cable to control panel, with float switches for ultrasonic backup control and high level alarm functions.

**KIOSK:**

GRP, two-door, weatherproof lockable enclosure in deep green textured finish, provisional dimensions 2500mm Wide x 1750mm High x 750mm Deep containing a full sized backboard on which would be mounted / provided:-

- a) Composite Control panel in accordance with the Yorkshire WaterSFA6 Specification
- b) Anti-condensation heater and thermostat
- c) Interior light and switch
- d) Set of suitably rated double insulated cable tails for connection to Electricity Board meters
- e) Minimum 600 x 450 clear space for the mounting of Electricity Board meters
- f) Space for telemetry

***The whole of the above being suitably interconnected and earth bonded extended to all non-conductive steelwork within the pump station in 16mm<sup>2</sup> cable to provide a complete P.M.E system.***

**GENERATOR EARTH:**

Comprising a copper electrode to be driven into the ground adjacent to the control kiosk, a concrete inspection pit and interconnecting cable to the panel.

**STORAGE KIOSK:**

GRP, floor fixing, weatherproof lockable enclosure in deep green textured finish, dimensions 1350mm High x 2200mm Wide x 500mm Depth.

**ACCESS COVERS:**

Steelway Prolift FACTA B Access Covers and Frames complete with safety grids and demountable barrier system.

Inlet Manhole	750 x 750 mm clear opening
Wet Well	1500 x 900mm clear opening – Foul PS 1800 x 900mm clear opening – Surface PS
Valve Chamber	2400 x 1800mm clear opening – Foul PS 2650 x 2250mm clear opening – Surface PS

**LIFTING EQUIPMENT:**

- 2 – Cast in Type Davit Socket and cover plate to suit Reid Porta Davit for in situ casting by Contractor (1off per station)
- 1 – Reid Porta Davit 500kg SWL.

***NOTE: If lifting equipment is supplied site load testing of items cast into cover slab by ground-workers is excluded from our offer.***

**ANCILLARY EQUIPMENT:**

1. Lever arm and weights on non-return valves complete with guards
2. Extension spindle for gate valves
3. Pressure tappings on pump discharge leg non-return valves and on common manifold
4. 100mm female Bauer coupling on over pumping tee
5. 100mm auxiliary suction pipework
6. Cast iron penstock c/w extension spindle for installation within the inlet manhole
7. Stainless Steel Inlet Baffle plate
8. Rubber matting in control panel kiosk
9. Galvanised Steel Access Ladder C/w Retractable hand hold in valve chamber
10. Supply only of a 100mm nominal bore P Trap and valve chamber drain
11. 3 Operating and maintenance manuals plus drawings or 1 electronic copy prepared in PDAS format

**Appendix B**  
**Hydraulic Calculations, System Curves and**  
**Performance Curves and Dimensional Data**

*Foul Water Pump Station*

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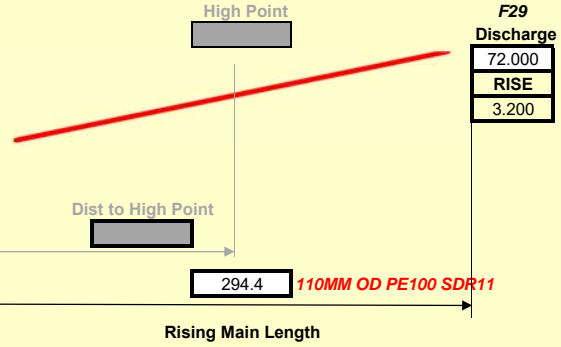
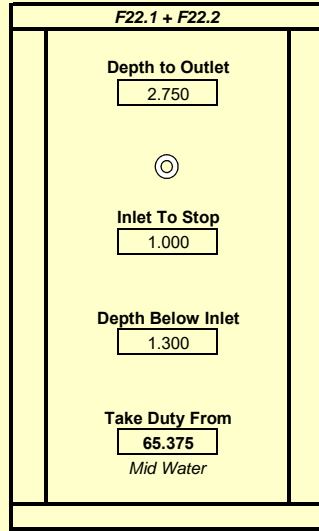
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Date	19/04/17
Project Reference	PR10369
Date	14/12/17

Clients Name	BDW HOMES YORKSHIRE WEST
Site Address	LEE LANE ROYSTON

Adopting Authority	YORKSHIRE WATER
Pump Station Type	FOUL
Number of Dwellings	164
Non Domestic Area (m <sup>2</sup> )	
Non Domestic Rate (L/s Hectare)	
Number of Pumps	2
Number of Duty Pumps	1

Design Flow / Rising Main	
Design Flow (& SFA 6 Discharge)	7.59 L/s
Pump Discharge Rate 7th Edition	3.80 L/s
Pump Discharge Rate	5 L/s
Rising Main I.D	89.1 mm
Velocity in Main	0.80 m/sec
Surge Analysis	NOT REQUIRED

Cover Level	71.550
VC Outlet	68.800
Max Storage	68.710
Inlet	66.150
HLA	65.850
P2 Start	65.750
P1 Start	65.600
Mid Water	65.375
Stop Level	65.150
Dead Area	300
Base Level	64.850



**Notes:**

- YWS imposed a max. 5L/sec foul discharge
- Valve chamber depth 3.11m as specified by ARP Associates
- Rising main long section to be provided by ARP Associates

Wet Well	
Wet Well Diameter	2700 mm
Calc Chamber Depth	6.302 m
Volume Per m	5,725.55 litres
Depth Between Starts	150 mm
Actual Chamber Depth	6.700 m
Theoretical Op Volume	300.00 litres
Actual Op Volume	781.07 litres
Max Theoretical Starts	15.00
Actual Starts	5.52

Retention Calculations	
Dwf Inflow Per Day	99,393.94 litres
Rising Main Volume	1,835.72 litres
Combined Main and Op Vol	2,616.79 litres
No. of Main Clears per Day	37.98
Retention Full Usage	0.63 Hours
Retention Half Usage	1.26 Hours

*Retention calcs assume ascending rising main*

Storage	
Domestic @ 160L / Dwelling	26.240 m <sup>3</sup>
Industrial 1 Hr @ Design Flow	0.000 m <sup>3</sup>
Total Required Storage	26.240 m <sup>3</sup>
Capacity in Gravity System	9.904 m <sup>3</sup>
Capacity between HLA & inlet	1,717.67 litres

	Rising Main	Common 3	Common 2	Common 1	Individual 3	Individual 2	Individual 1
Flow Rate (L/sec)	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Static Head (m)	6.63						
Pipe Diameter (mm)	89.10	80	80	80	80	80	80
Velocity (m/sec)	0.80	0.99	0.99	0.99	0.99	0.99	0.99
Roughness Factor	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Pipe length (m)	294.416					9.000	
Duckfoot Bend							1
Short Radius Bends	1					1	
Long Radius Bends	3					1	
Tee Straight through						2	
Tee through branch							
Radial Tee thro Branch							
Sluice Valve						1	
Non Return Valve						1	
Bellmouth inlet							
Sharp Taper							
Standard Taper							
Equivalent Pipe Length (m)	302.26	0.00	0.00	0.00	0.00	19.08	2.72
Reynolds Number	6.3E+04	7.0E+04	7.0E+04	7.0E+04	7.0E+04	7.0E+04	7.0E+04
Darcy-Weisbach Friction Factor	0.029	0.030	0.030	0.030	0.030	0.030	0.030
Velocity Head	0.033	0.050	0.050	0.050	0.050	0.050	0.050
Hydraulic (Piezometric) gradient	0.011	0.019	0.019	0.019	0.019	0.019	0.019
Friction Head Loss	3.217	0.000	0.000	0.000	0.000	0.355	0.051

Calc Duty Point	
Flow	5.00 L/s
Static Head	6.63 m
Total Head	10.28 m

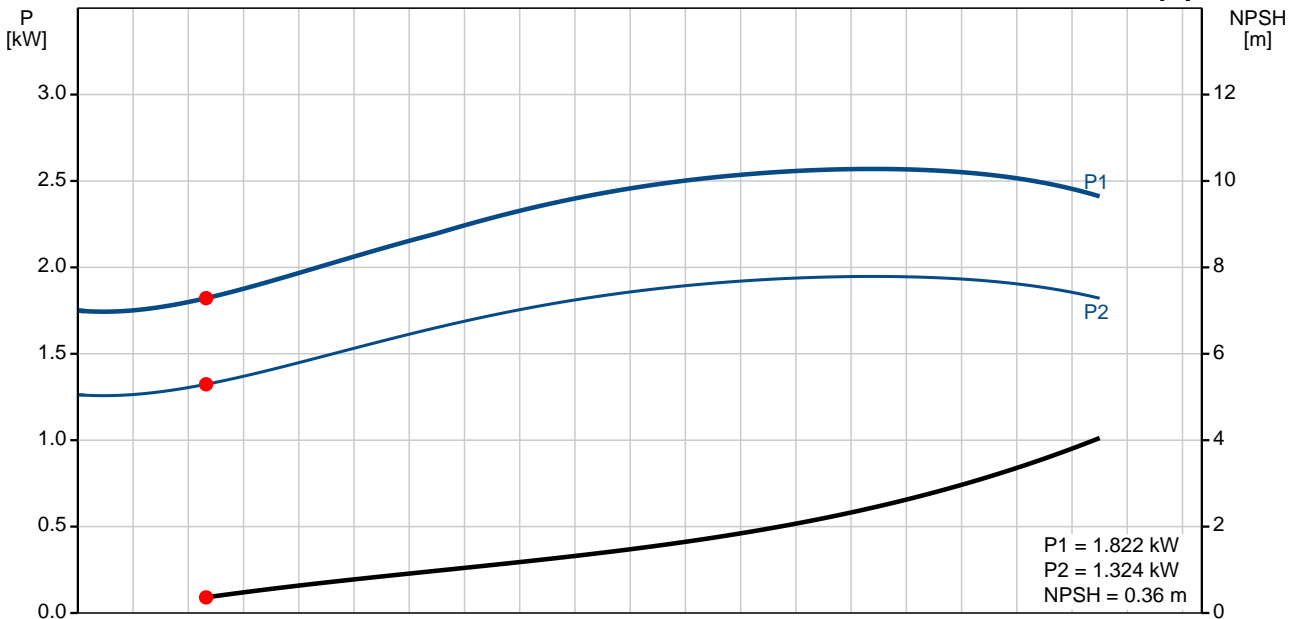
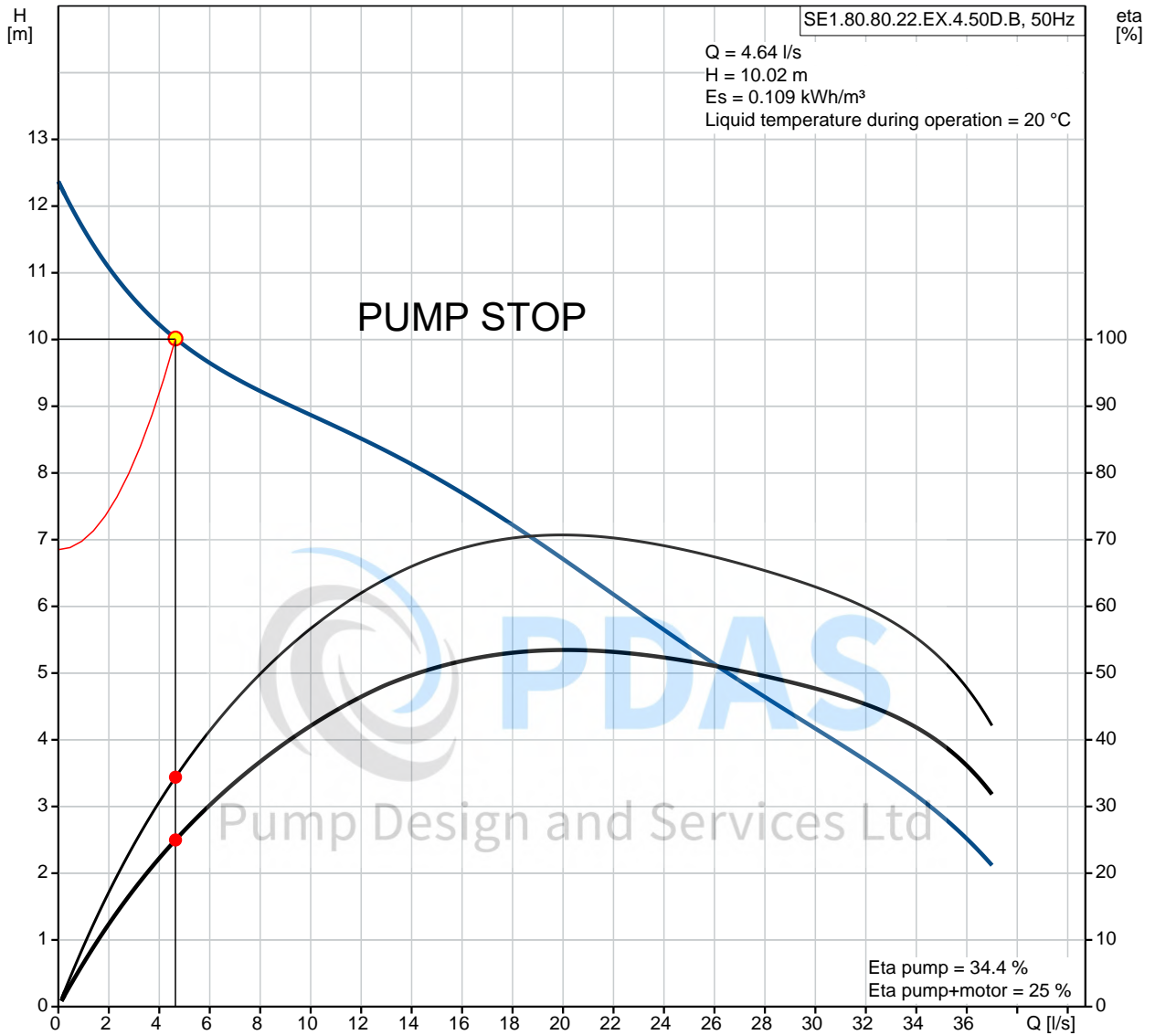
Pump Selection	
Pump Type	SE1.80.80.22.EX.4.50D
Impeller	SUPER-VORTEX
Kw Rating	2.2

Actual Duty	
Flow	4.79 L/s
Head	9.97 m



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**Date:** 09/02/2018

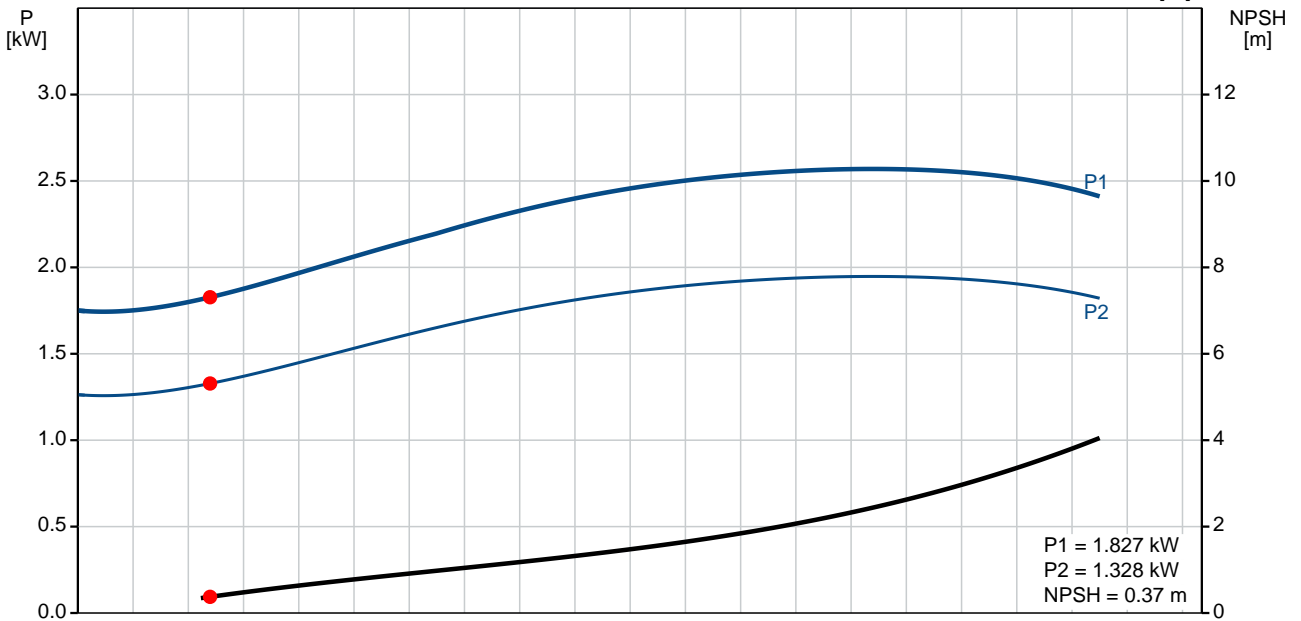
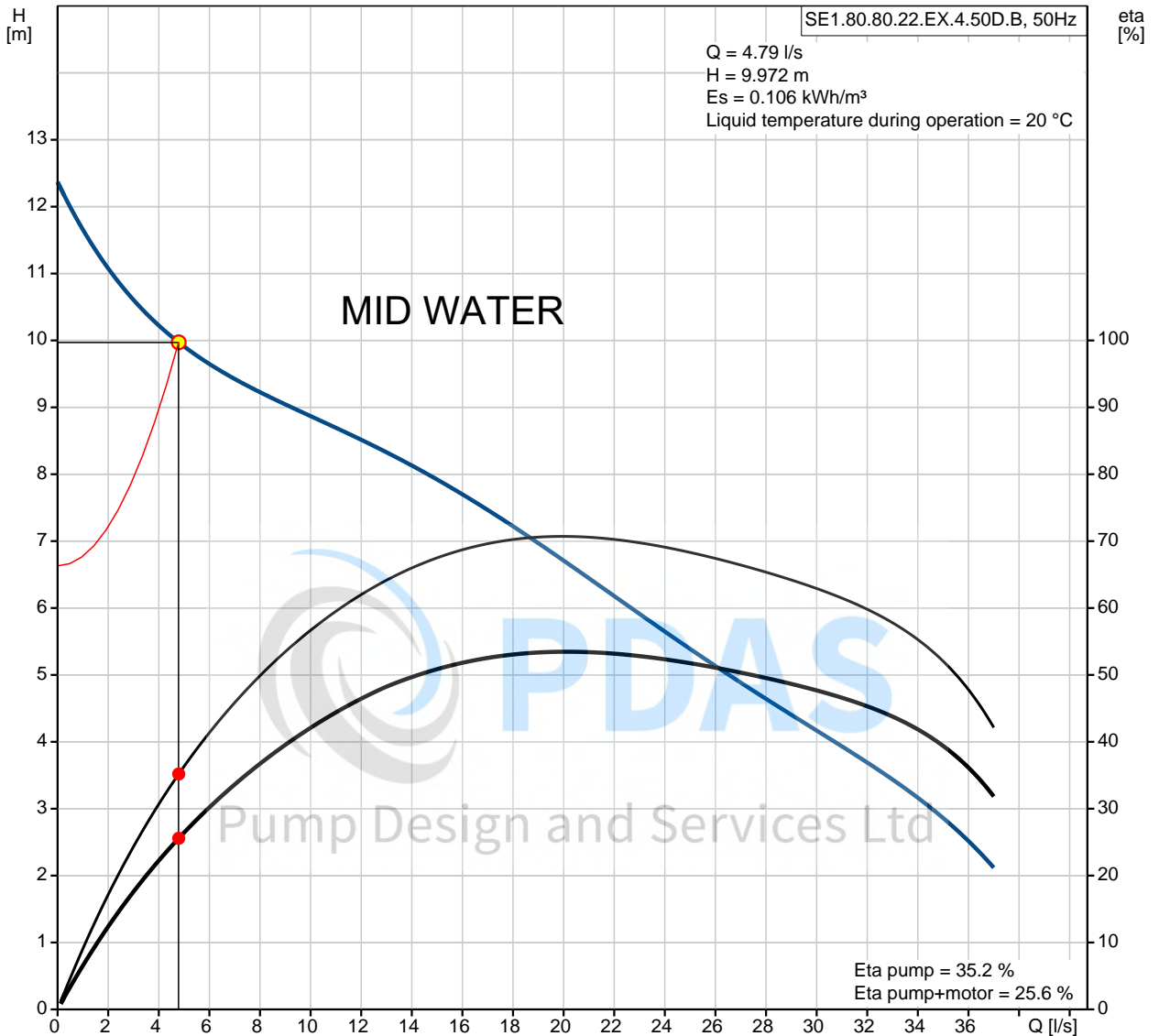
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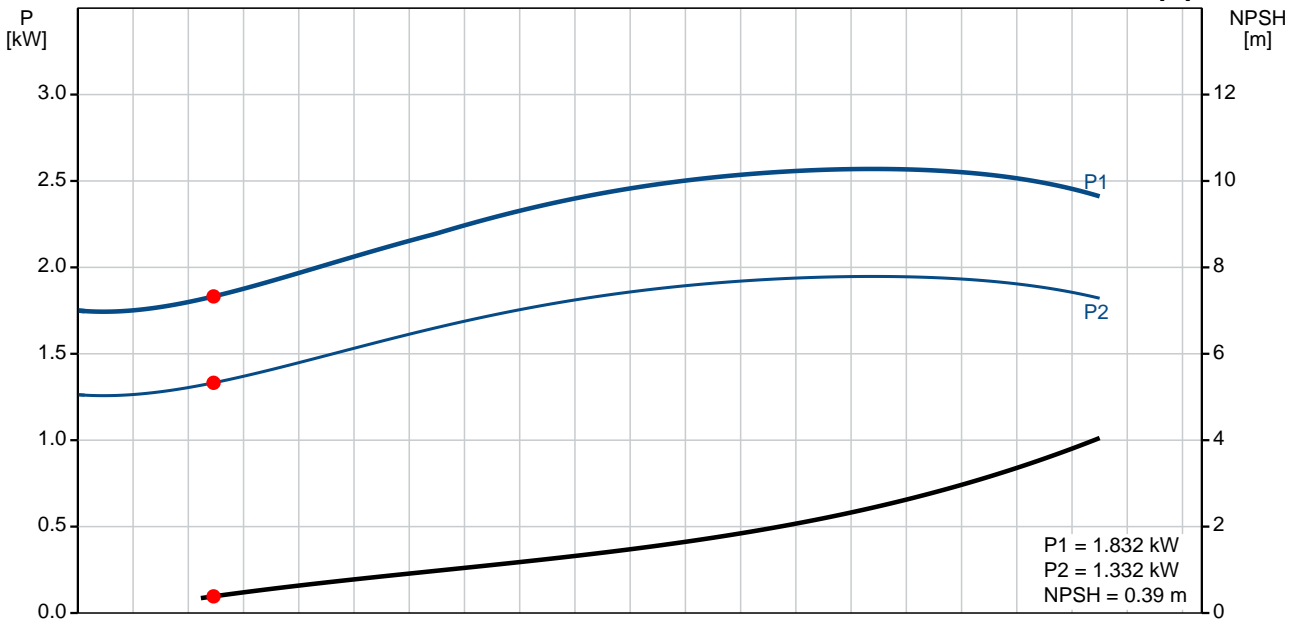
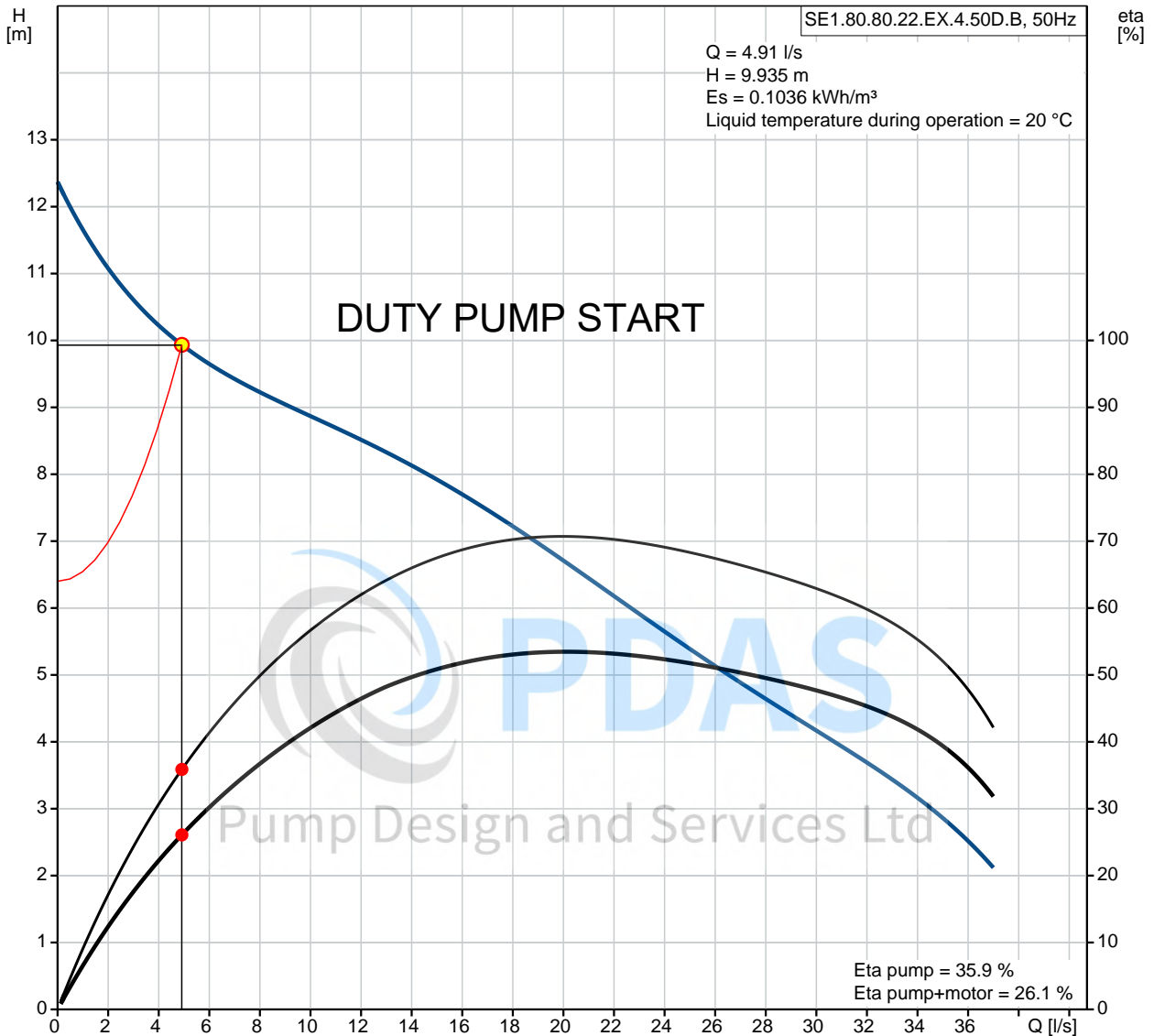
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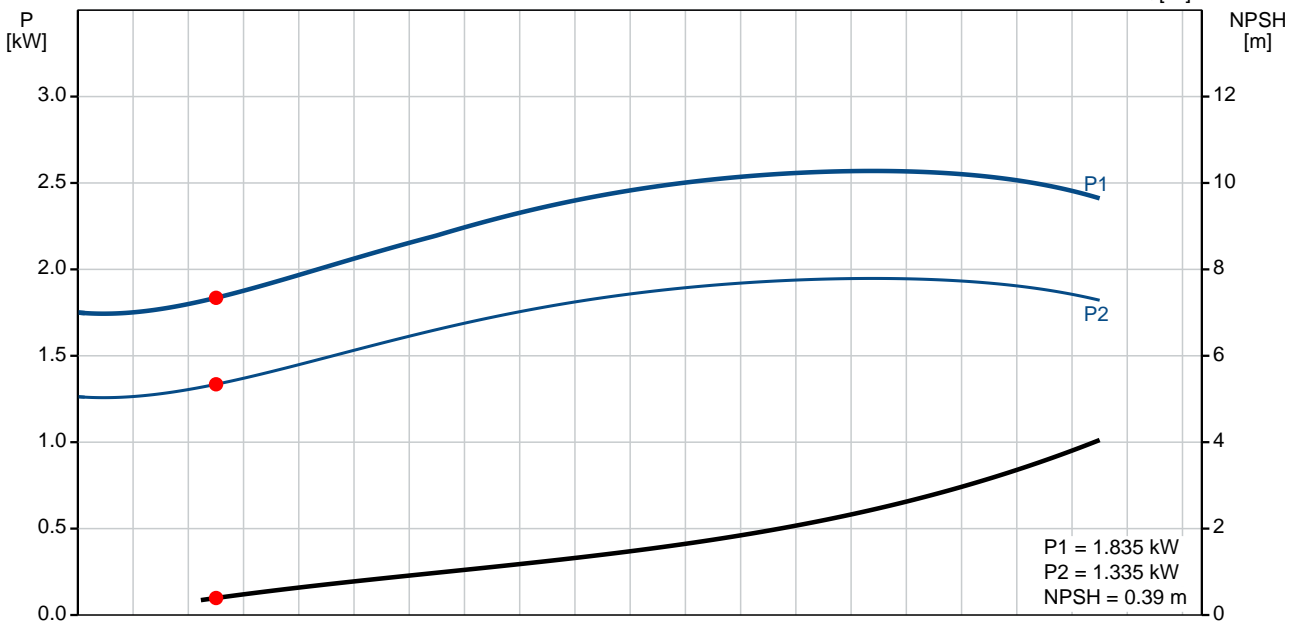
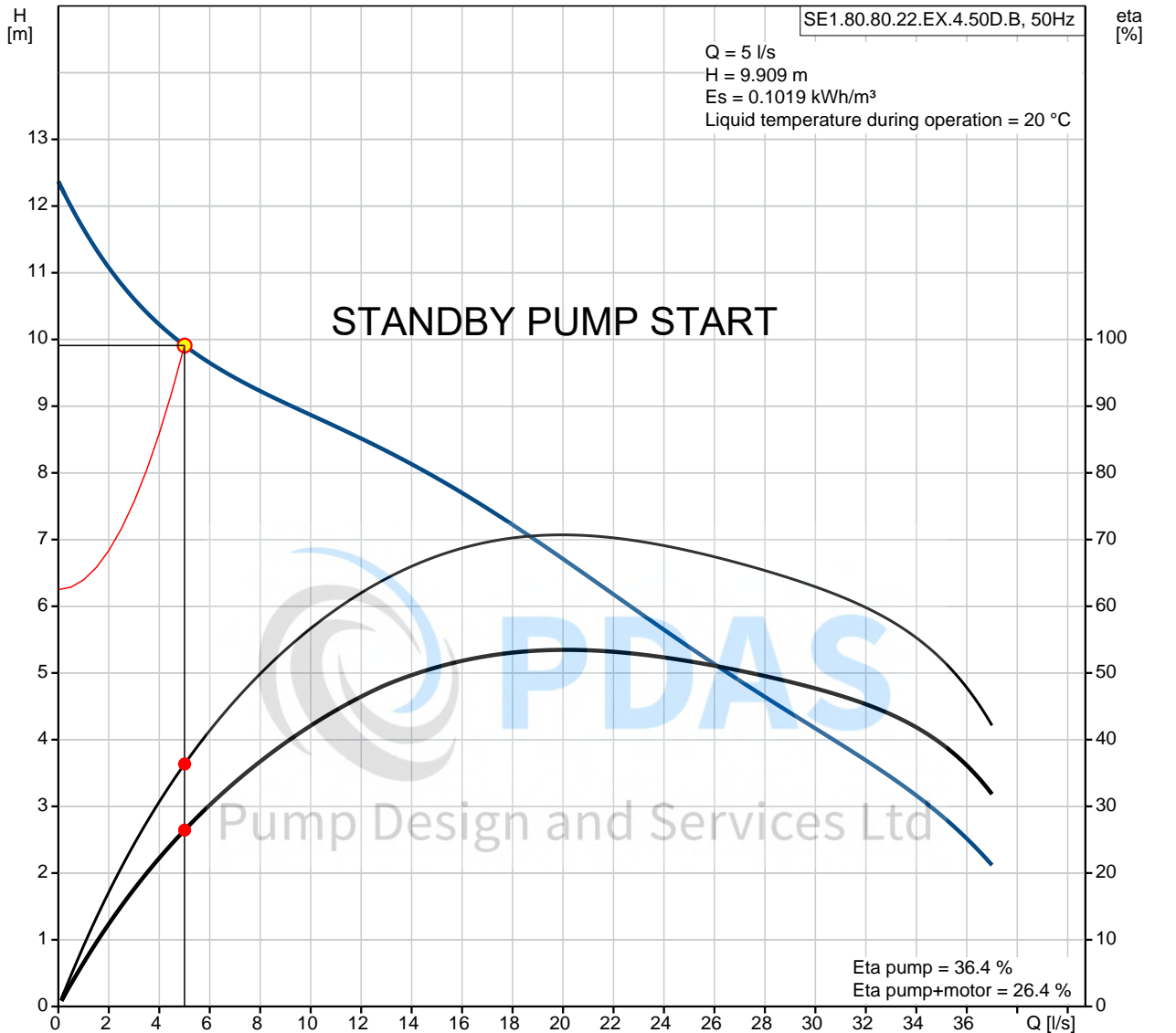
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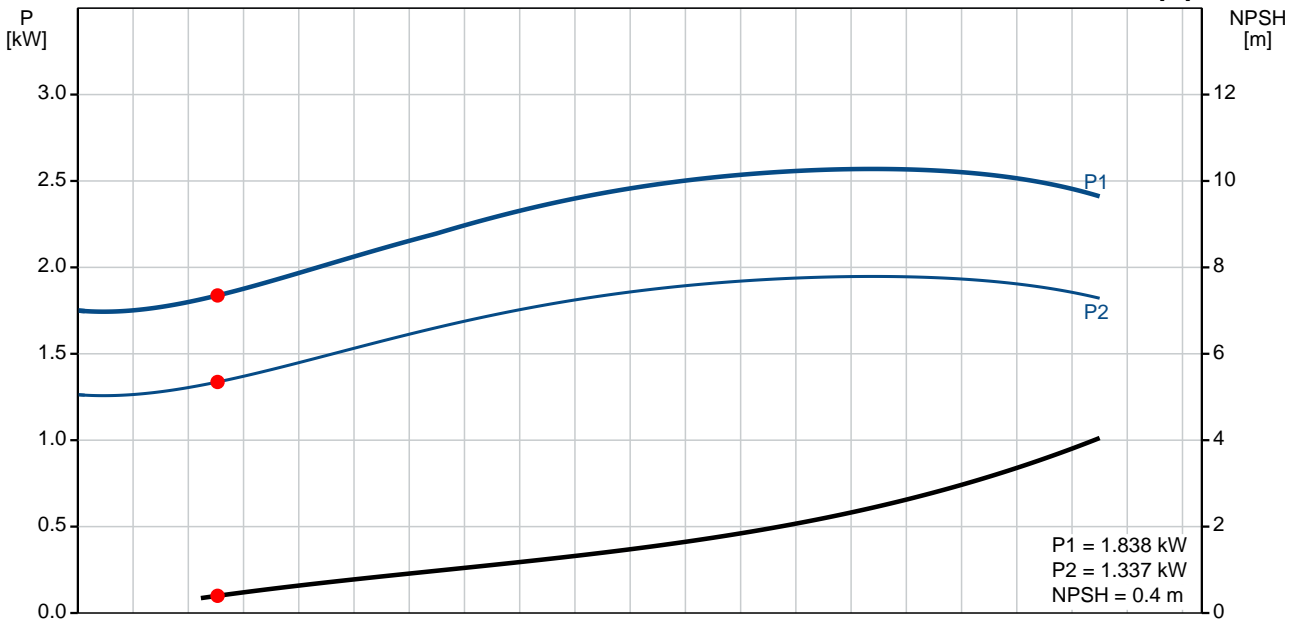
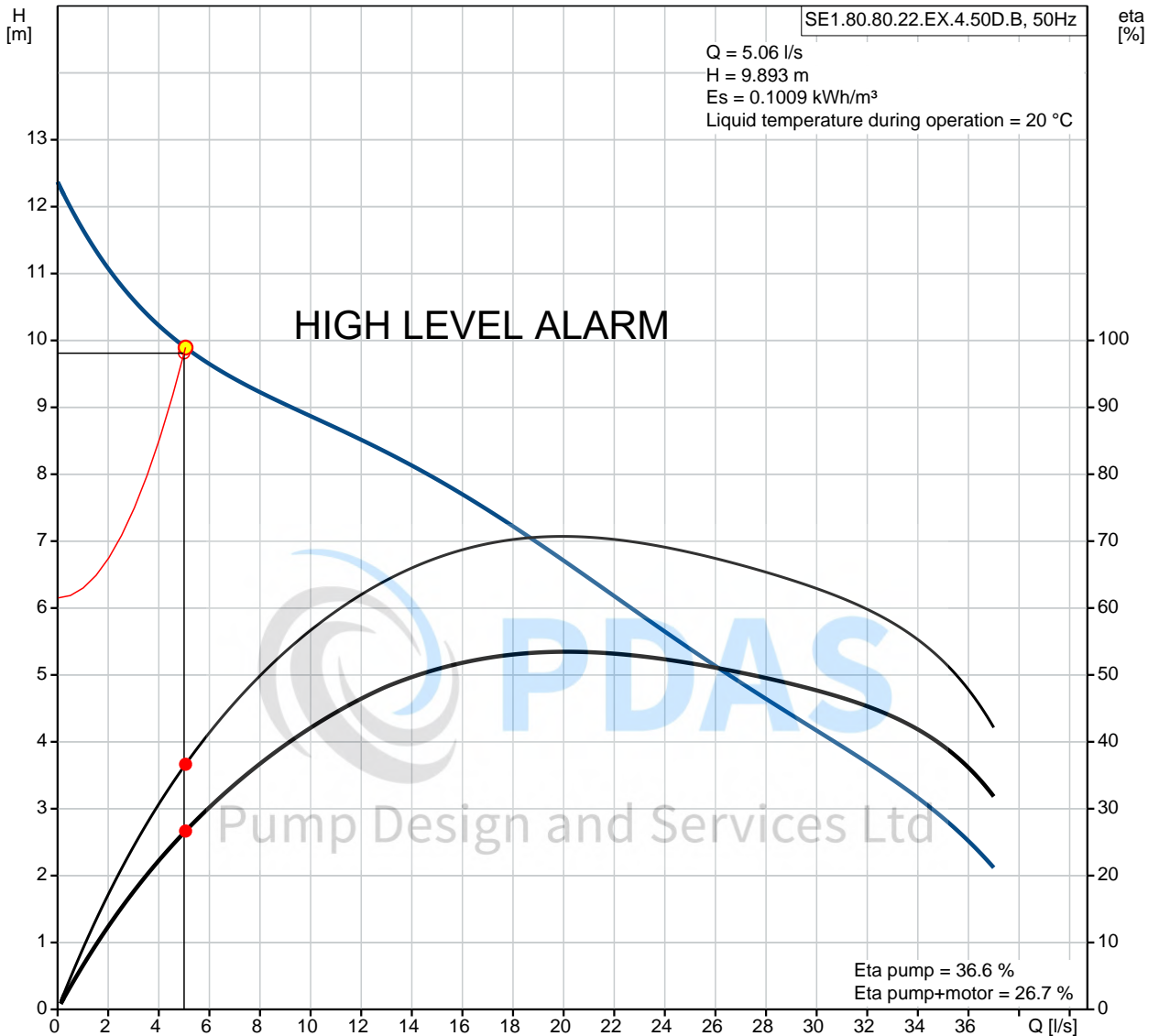
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**Phone:** 01256 638 024  
**Email:** idi.handem@pdasLtd.co.uk  
**Date:** 09/02/2018

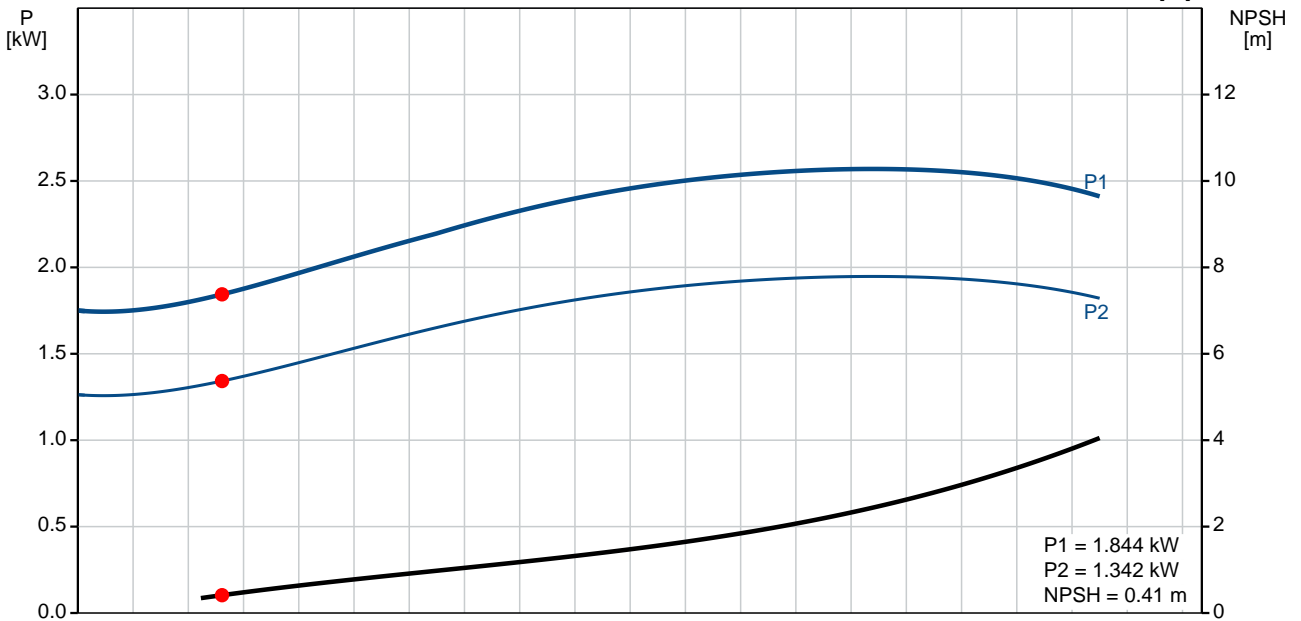
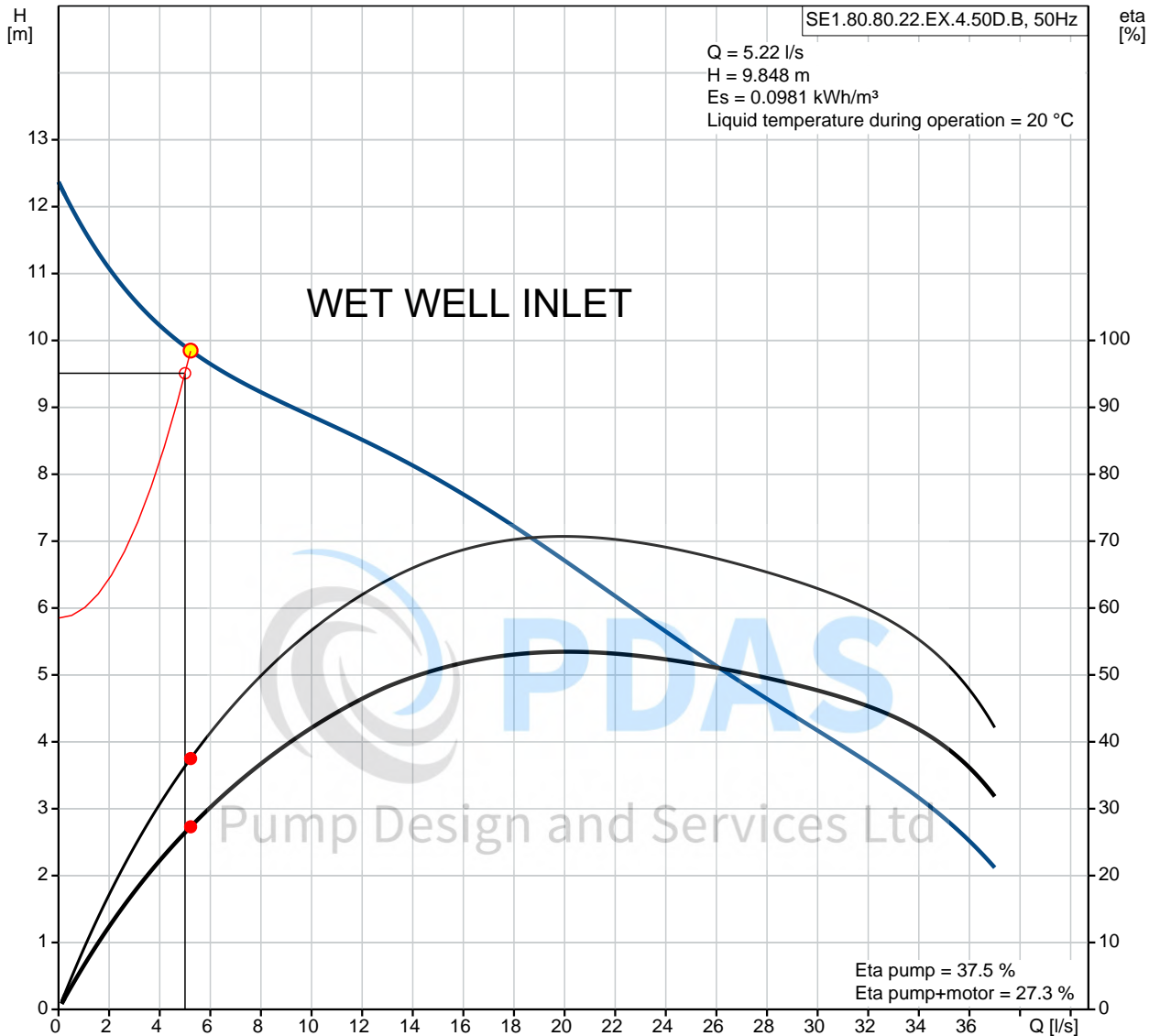
### 96047553 SE1.80.80.22.EX.4.50D.B 50 Hz





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**Created by:** Idi Handem  
**Phone:** 01256 638 024  
**Email:** idi.handem@pdaslt.co.uk  
**Date:** 09/02/2018

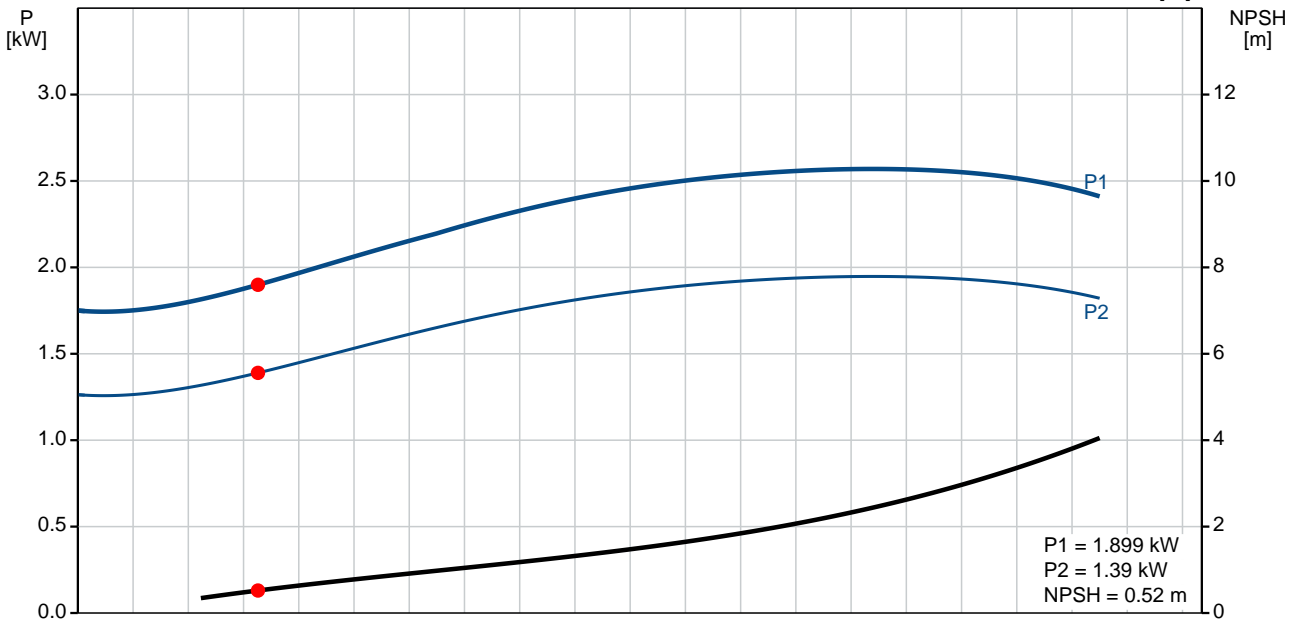
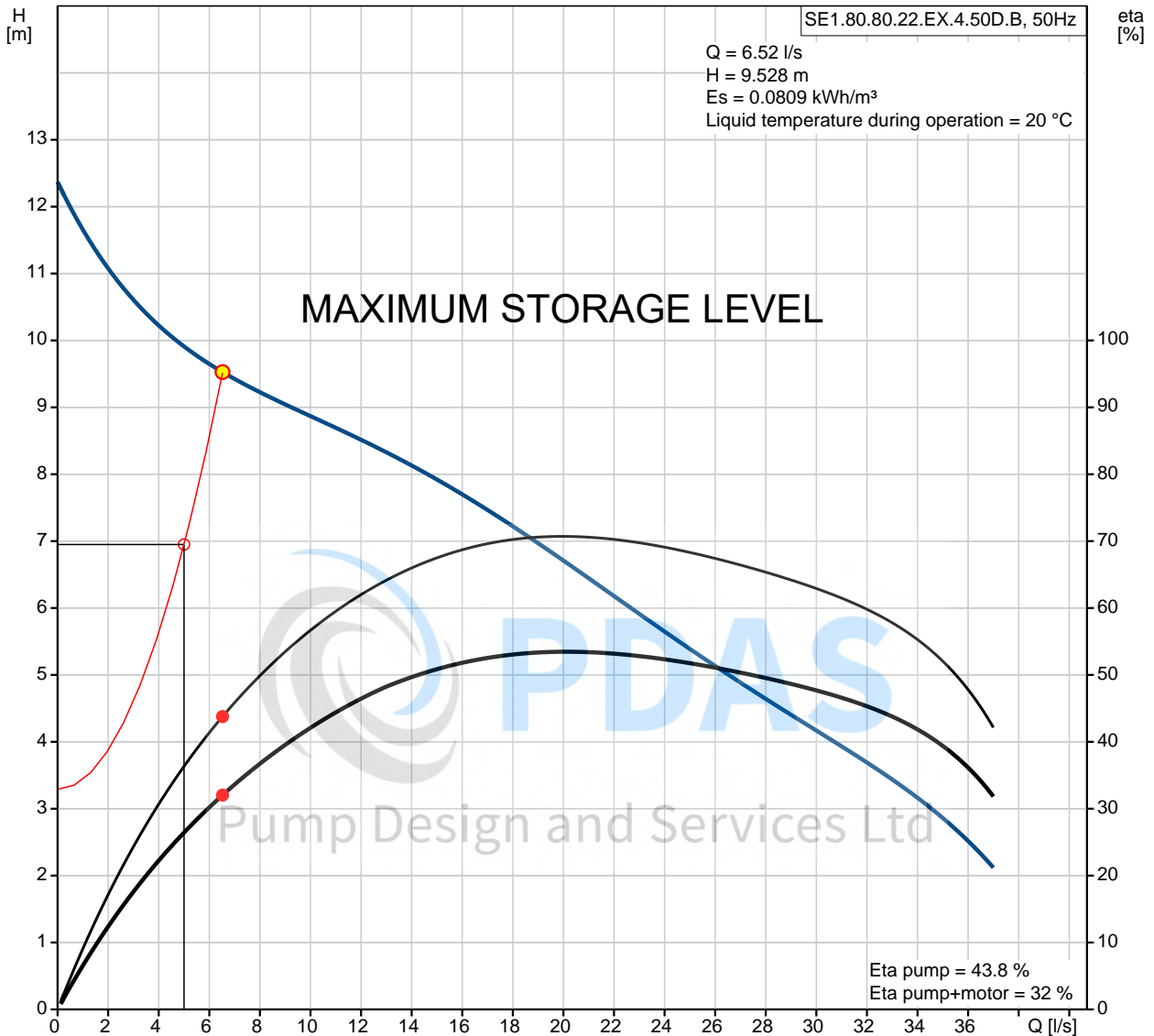
### 96047553 SE1.80.80.22.EX.4.50D.B 50 Hz





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### 96047553 SE1.80.80.22.EX.4.50D.B 50 Hz





Pump Design and Services Ltd

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Position	Qty.	Description																																												
	1	<p><b>SE1.80.80.22.EX.4.50D.B</b></p>  <p style="text-align: center;"><b>Note! Product picture may differ from actual product</b></p> <p>Product No.: <a href="#">96047553</a></p> <p>Non-self-priming, single-stage, centrifugal pump designed for handling wastewater, process water and unscreened raw sewage.</p> <p>The pump is designed for intermittent and continuous operation. The liquidless and maintenance free cooling system ensures that the pump can be used for submerged or dry installation. The revolutionary S-tube® impeller provides free spherical passage of solids up to 80 mm and is suitable for wastewater with a dry matter content of up to 3 %.</p> <p>A unique stainless-steel clamp assembling system enables quick and easy disassembly of the pump from the motor unit for service and inspection. No special tools are required. Pipework connection is via a DIN flange.</p> <p>The pump is explosion-proof.</p> <p><b>Controls:</b></p> <table> <tr> <td>Moisture sensor:</td> <td>without moisture sensors</td> </tr> <tr> <td>Water-in-oil sensor:</td> <td>without water-in-oil sensor</td> </tr> <tr> <td>Temp. sensor:</td> <td>N</td> </tr> </table> <p><b>Liquid:</b></p> <table> <tr> <td>Liquid temperature range:</td> <td>0 .. 40 °C</td> </tr> <tr> <td>Liquid temperature during operation:</td> <td>20 °C</td> </tr> <tr> <td>Density:</td> <td>998.2 kg/m³</td> </tr> </table> <p><b>Technical:</b></p> <table> <tr> <td>Actual calculated flow:</td> <td>4.79 l/s</td> </tr> <tr> <td>Resulting head of the pump:</td> <td>9.972 m</td> </tr> <tr> <td>Type of impeller:</td> <td>S-TUBE</td> </tr> <tr> <td>Maximum particle size:</td> <td>80 mm</td> </tr> <tr> <td>Primary shaft seal:</td> <td>SIC/SIC</td> </tr> <tr> <td>Secondary shaft seal:</td> <td>CARBON/CERAMICS</td> </tr> <tr> <td>Max. hydraulic efficiency:</td> <td>71 %</td> </tr> <tr> <td>Approvals on nameplate:</td> <td>EN12050-1</td> </tr> <tr> <td>Curve tolerance:</td> <td>ISO9906:2012 3B2</td> </tr> </table> <p><b>Materials:</b></p> <table> <tr> <td>Pump housing:</td> <td>EN 1561 EN-GJL-250</td> </tr> <tr> <td>Impeller:</td> <td>Cast iron</td> </tr> </table> <p><b>Installation:</b></p> <table> <tr> <td>Maximum operating pressure:</td> <td>6 bar</td> </tr> <tr> <td>Flange standard:</td> <td>DIN</td> </tr> <tr> <td>Pump outlet:</td> <td>DN 80</td> </tr> <tr> <td>Pressure rating:</td> <td>PN 10</td> </tr> <tr> <td>Maximum installation depth:</td> <td>20 m</td> </tr> </table>	Moisture sensor:	without moisture sensors	Water-in-oil sensor:	without water-in-oil sensor	Temp. sensor:	N	Liquid temperature range:	0 .. 40 °C	Liquid temperature during operation:	20 °C	Density:	998.2 kg/m³	Actual calculated flow:	4.79 l/s	Resulting head of the pump:	9.972 m	Type of impeller:	S-TUBE	Maximum particle size:	80 mm	Primary shaft seal:	SIC/SIC	Secondary shaft seal:	CARBON/CERAMICS	Max. hydraulic efficiency:	71 %	Approvals on nameplate:	EN12050-1	Curve tolerance:	ISO9906:2012 3B2	Pump housing:	EN 1561 EN-GJL-250	Impeller:	Cast iron	Maximum operating pressure:	6 bar	Flange standard:	DIN	Pump outlet:	DN 80	Pressure rating:	PN 10	Maximum installation depth:	20 m
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**Email:** idi.handem@pdasLtd.co.uk  
**Date:** 09/02/2018

Position	Qty.	Description
		<p><b>Electrical data:</b></p> <p>Power input - P1: 2.9 kW            Rated power - P2: 2.2 kW            Mains frequency: 50 Hz            Rated voltage: 3 x 380-415 V            Voltage tolerance: +6/-10 %            Max starts per. hour: 20            Rated current: 6,0-6,0 A            Rated current at 3/4 load: 4.8 A            Rated current at 1/2 load: 4.2 A            Starting current: 32 A            Rated current at no load: 3.6 A            Cos phi - power factor: 0,74            Cos phi - p.f. at no load: 0,13            Cos phi - p.f. at 3/4 load: 0,66            Cos phi - p.f. at 1/2 load: 0,53            Rated speed: 1445 rpm            Locked-rotor torque: 32 Nm            Breakdown torque: 45 Nm            Moment of inertia: 0.066 kg m<sup>2</sup>            Motor efficiency at full load: 76.3 %            Motor efficiency at 3/4 load: 75.2 %            Motor efficiency at 1/2 load: 70.9 %            Number of poles: 4            Start. method: direct-on-line            Enclosure class (IEC 34-5): IP68            Insulation class (IEC 85): F            Explosion proof: yes            Ex-protection standard: Ex cd IIB T4,T3            Length of cable: 10 m            Cable type: LYNIFLEX            Type of cable plug: NO PLUG</p> <p><b>Others:</b></p> <p>Net weight: 106 kg</p>



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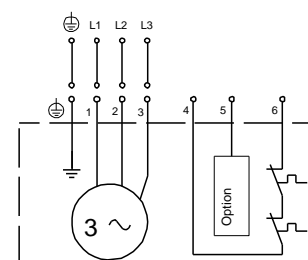
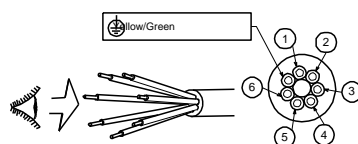
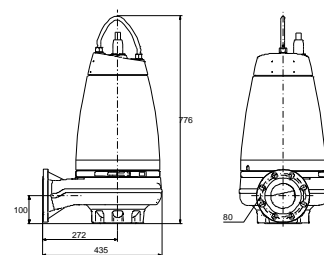
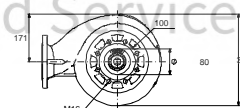
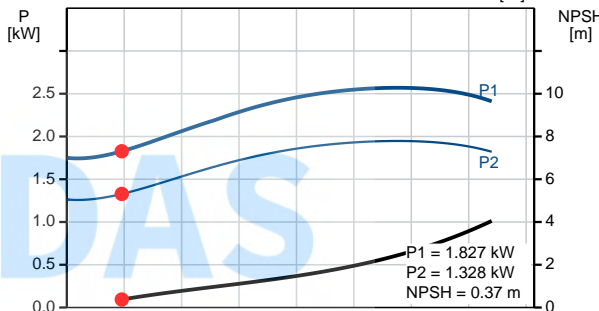
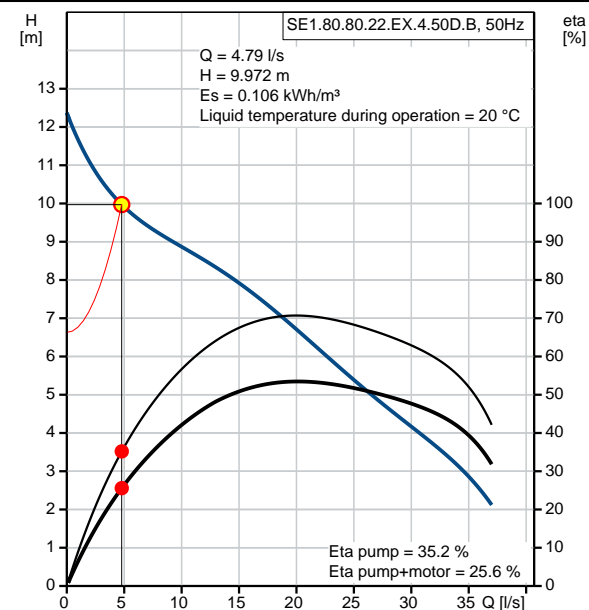
Description	Value
<b>General information:</b>	
Product name:	SE1.80.80.22.EX.4.50D.B
Product No:	96047553
EAN number:	5700395057713
<b>Technical:</b>	
Actual calculated flow:	4.79 l/s
Max flow:	36.9 l/s
Resulting head of the pump:	9.972 m
Head max:	11.6 m
Type of impeller:	S-TUBE
Maximum particle size:	80 mm
Primary shaft seal:	SIC/SIC
Secondary shaft seal:	CARBON/CERAMICS
Max. hydraulic efficiency:	71 %
Approvals on nameplate:	EN12050-1
Curve tolerance:	ISO9906:2012 3B2
Cooling jacket:	with cooling jacket

<b>Materials:</b>	
Pump housing:	EN 1561 EN-GJL-250
Impeller:	Cast iron

<b>Installation:</b>	
Maximum operating pressure:	6 bar
Flange standard:	DIN
Pump outlet:	DN 80
Pressure rating:	PN 10
Maximum installation depth:	20 m
Inst dry/wet:	DRY/SUBMERGED
Installation:	horizontal or vertical

<b>Liquid:</b>	
Liquid temperature range:	0 .. 40 °C
Liquid temperature during operation:	20 °C
Density:	998.2 kg/m <sup>3</sup>

<b>Electrical data:</b>	
Power input - P1:	2.9 kW
Rated power - P2:	2.2 kW
Mains frequency:	50 Hz
Rated voltage:	3 x 380-415 V
Voltage tolerance:	+6/-10 %
Max starts per. hour:	20
Rated current:	6,0-6,0 A
Rated current at 3/4 load:	4.8 A
Rated current at 1/2 load:	4.2 A
Starting current:	32 A
Rated current at no load:	3.6 A
Cos phi - power factor:	0,74
Cos phi - p.f. at no load:	0,13
Cos phi - p.f. at 3/4 load:	0,66
Cos phi - p.f. at 1/2 load:	0,53
Rated speed:	1445 rpm
Locked-rotor torque:	32 Nm
Breakdown torque:	45 Nm
Moment of inertia:	0.066 kg m <sup>2</sup>
Motor efficiency at full load:	76.3 %
Motor efficiency at 3/4 load:	75.2 %





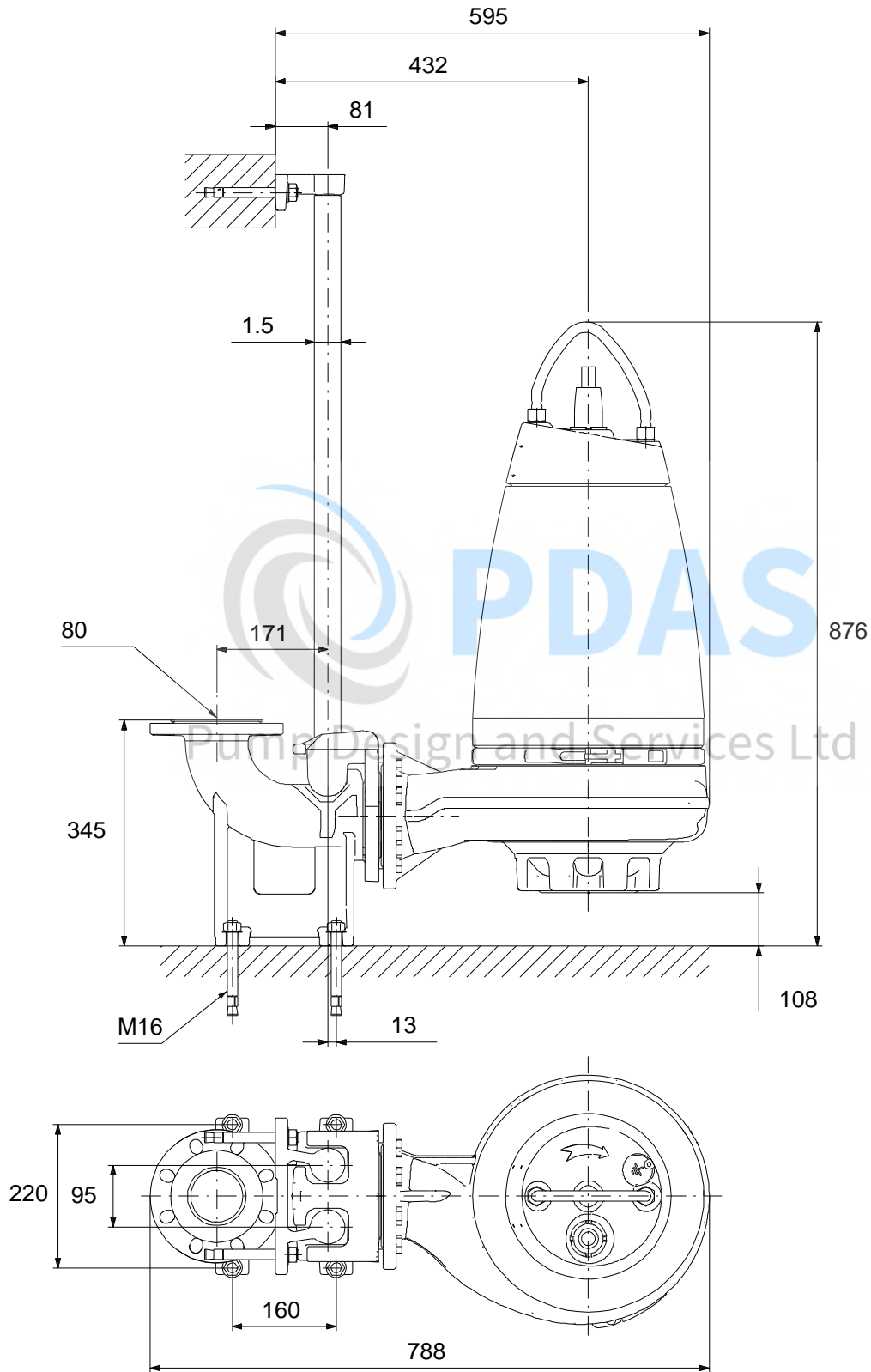
Pump Design and Services Ltd

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**Email:** idi.handem@pdasLtd.co.uk  
**Date:** 09/02/2018

Description	Value
Motor efficiency at 1/2 load:	70.9 %
Number of poles:	4
Start. method:	direct-on-line
Enclosure class (IEC 34-5):	IP68
Insulation class (IEC 85):	F
Explosion proof:	yes
Ex-protection standard:	Ex cd IIB T4,T3
Motor protec:	THERMAL SWITCH
Thermal protec:	internal
Length of cable:	10 m
Cable type:	LYNIFLEX
Type of cable plug:	NO PLUG
<b>Controls:</b>	
Control box:	not included
Moisture sensor:	without moisture sensors
Water-in-oil sensor:	without water-in-oil sensor
Temp. sensor:	N
<b>Others:</b>	
Net weight:	106 kg

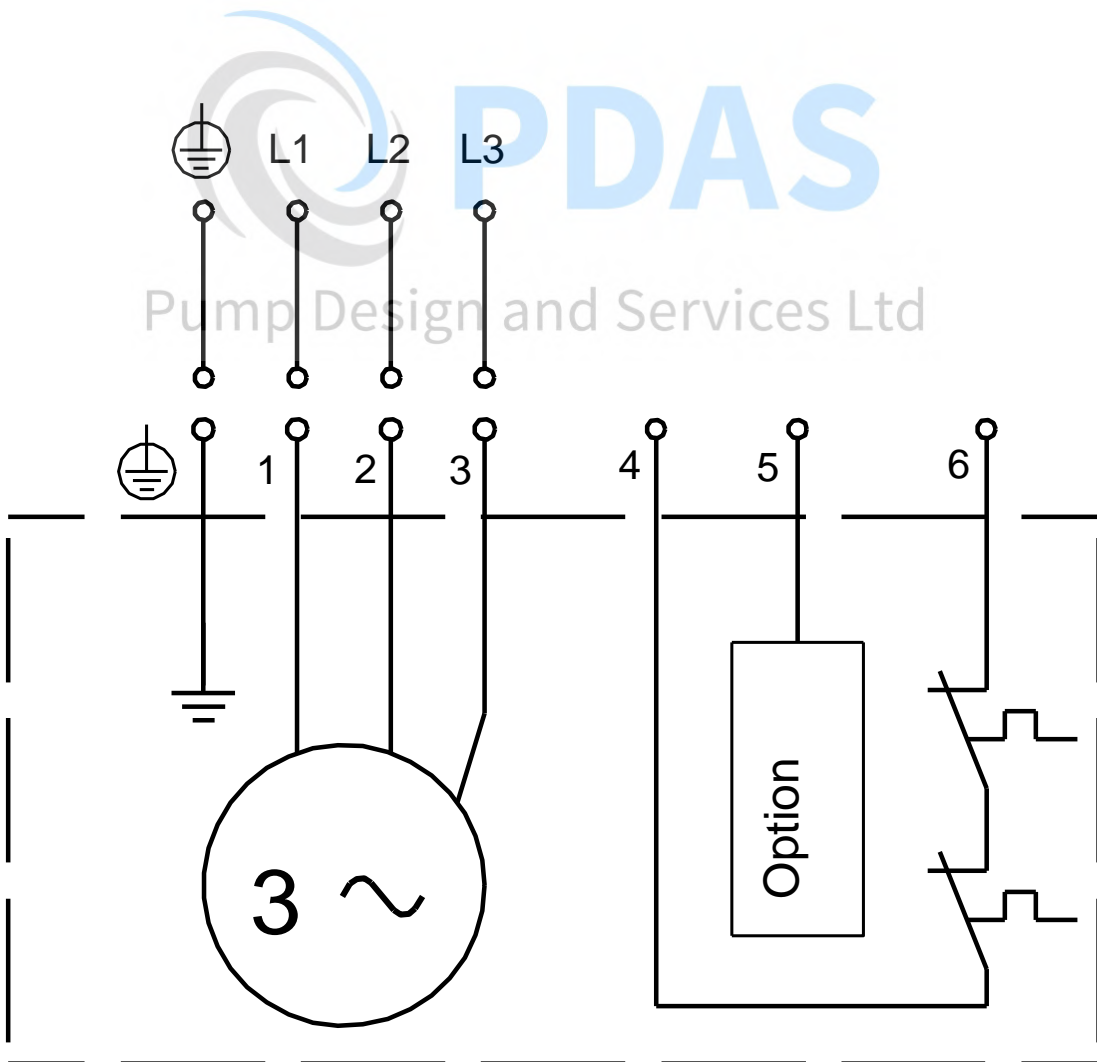
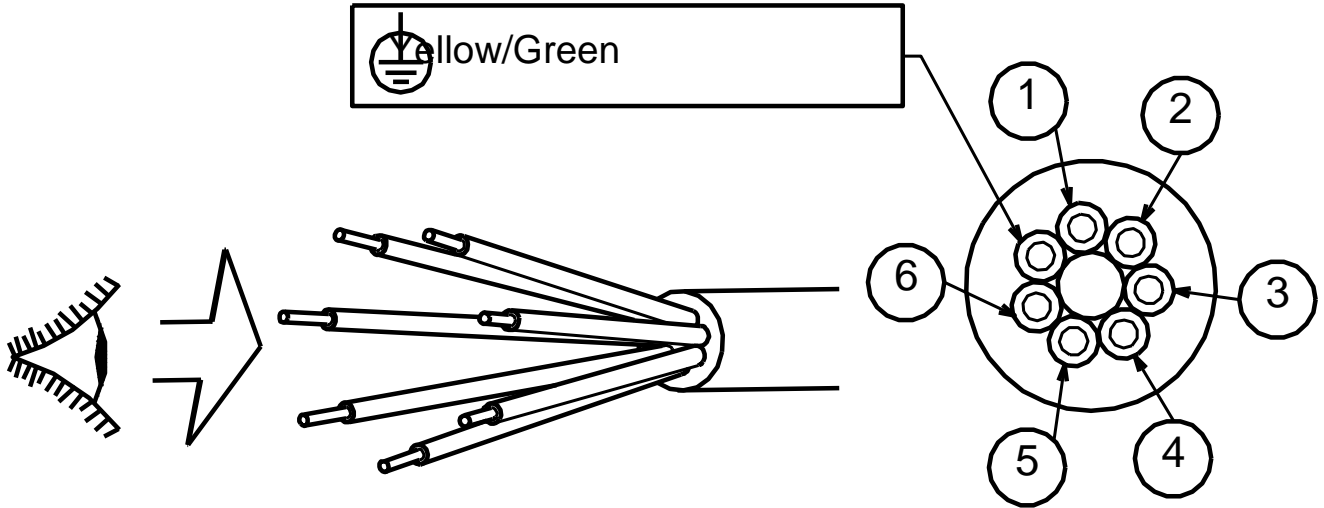


## 96047553 SE1.80.80.22.EX.4.50D.B 50 Hz



Note! All units are in [mm] unless others are stated.  
Disclaimer: This simplified dimensional drawing does not show all details.

### 96047553 SE1.80.80.22.EX.4.50D.B 50 Hz



Note! All units are in [mm] unless others are stated.

Surface Water Pump Station

Pump Design and Services Ltd  
 Abbey House  
 282 Farnborough Road  
 Farnborough  
 Hampshire GU14 7NA



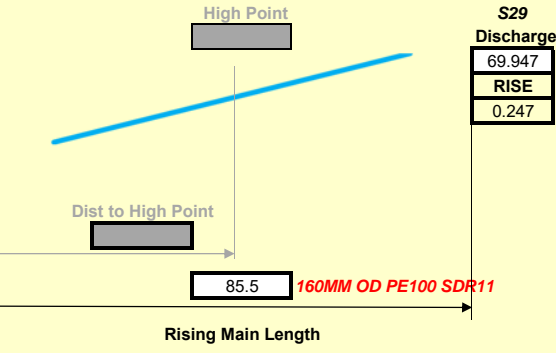
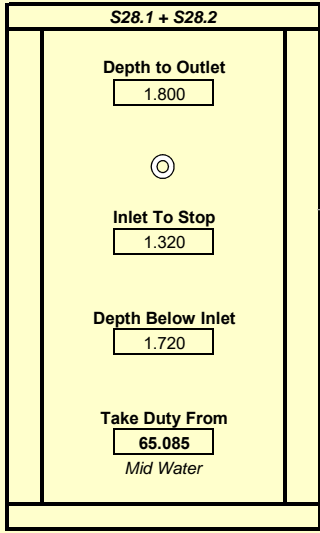
Quote Reference	Q10570
Date	19/04/17
Project Reference	PR10369
Date	14/12/17

Clients Name	BDW HOMES YORKSHIRE WEST
Site Address	LEE LANE ROYSTON

Adopting Authority	YORKSHIRE WATER
Pump Station Type	SURFACE
Number of Dwellings	
Non Domestic Area (m <sup>2</sup> )	
Non Domestic Rate (L/s Hectare)	
Number of Pumps	2
Number of Duty Pumps	1

Design Flow / Rising Main	
Design Flow (& SFA 6 Discharge)	0.00 L/s
Pump Discharge Rate 7th Edition	0.00 L/s
Pump Discharge Rate	23.8 L/s
Rising Main I.D	129.7 mm
Velocity in Main	1.80 m/sec
Surge Analysis	NOT REQUIRED

Cover Level	71.500
VC Outlet	69.700
Max Storage	66.020
Inlet	66.020
HLA	65.720
P2 Start	65.620
P1 Start	65.470
Mid Water	65.085
Stop Level	64.700
Dead Area	400
Base Level	64.300



**Notes:**  
 - Max. 23.8L/sec surface discharge  
 - Valve chamber max. depth 2.16 as specified by ARP Associates  
 - Rising main long section to be provided by ARP Associates

Wet Well	
Wet Well Diameter	2700 mm
Calc Chamber Depth	6.579 m
Volume Per m	5,725.55 litres
Depth Between Starts	150 mm
Actual Chamber Depth	7.200 m
Theoretical Op Volume	1,428.00 litres
Actual Op Volume	2,495.72 litres
Max Theoretical Starts	15.00
Actual Starts	8.58

Retention Calculations	
Dwf Inflow Per Day	0.00 litres
Rising Main Volume	1,129.14 litres
Combined Main and Op Vol	3,624.86 litres
No. of Main Clears per Day	0.00
Retention Full Usage	#DIV/0! Hours
Retention Half Usage	#DIV/0! Hours

*Retention calcs assume ascending rising main*

Storage	
Domestic @ 160L / Dwelling	0.000 m <sup>3</sup>
Industrial 1 Hr @ Design Flow	0.000 m <sup>3</sup>
Total Required Storage	0.000 m <sup>3</sup>
Capacity in Gravity System	0.000 m <sup>3</sup>
Capacity between HLA & inlet	1,717.67 litres

	Rising Main	Common 3	Common 2	Common 1	Individual 3	Individual 2	Individual 1
Flow Rate (L/sec)	23.80	23.80	23.80	23.80	23.80	23.80	23.80
Static Head (m)	4.86						
Pipe Diameter (mm)	129.70	150	150	150	150	150	100
Velocity (m/sec)	1.80	1.35	1.35	1.35	1.35	1.35	3.03
Roughness Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.06
Pipe length (m)	85.463					10.400	
Duckfoot Bend							1
Short Radius Bends						1	
Long Radius Bends	1					1	
Tee Straight through						2	
Tee through branch							
Radial Tee thro Branch							
Sluice Valve						1	
Non Return Valve						1	
Bellmouth inlet							
Sharp Taper							
Standard Taper							1
Equivalent Pipe Length (m)	87.80	0.00	0.00	0.00	0.00	29.30	5.60
Reynolds Number	2.0E+05	1.8E+05	1.8E+05	1.8E+05	1.8E+05	1.8E+05	2.7E+05
Darcy-Weisbach Friction Factor	0.022	0.021	0.021	0.021	0.021	0.021	0.019
Velocity Head	0.165	0.092	0.092	0.092	0.092	0.092	0.468
Hydraulic (Piezometric) gradient	0.028	0.013	0.013	0.013	0.013	0.013	0.088
Friction Head Loss	2.418	0.000	0.000	0.000	0.000	0.383	0.495

Calc Duty Point	
Flow	23.80 L/s
Static Head	4.86 m
Total Head	8.32 m

Pump Selection	
Pump Type	SE1.80.100.30.EX.4.50D.E
Impeller	S-TUBE
Kw Rating	3.0

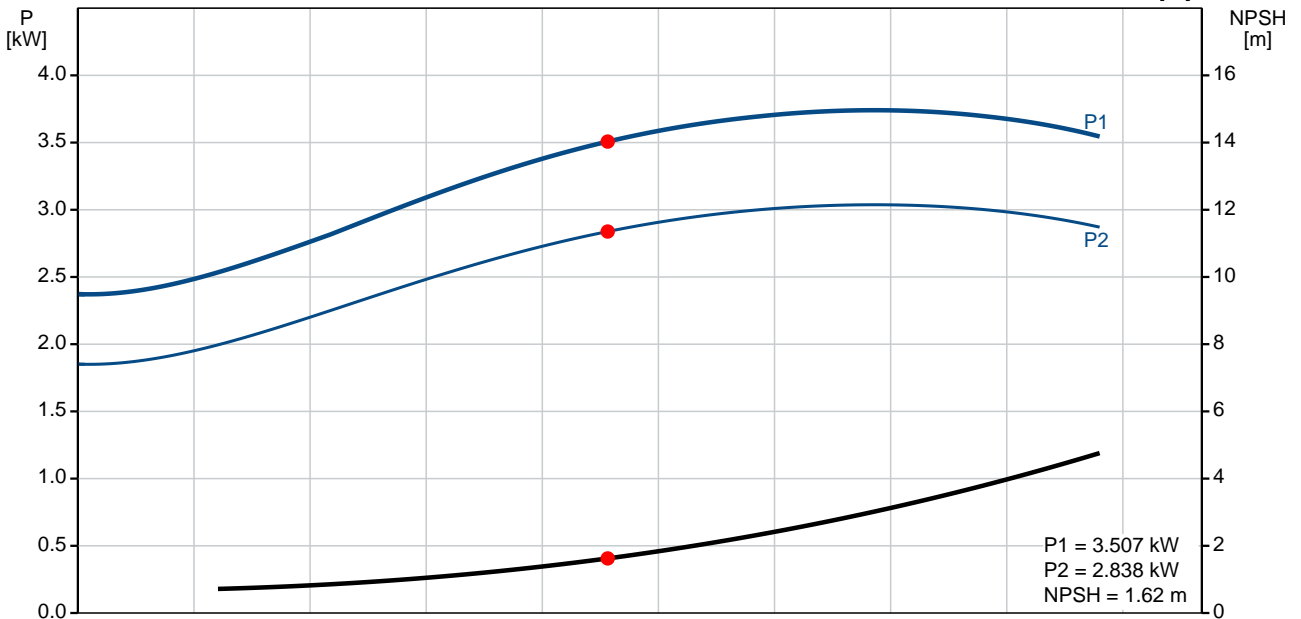
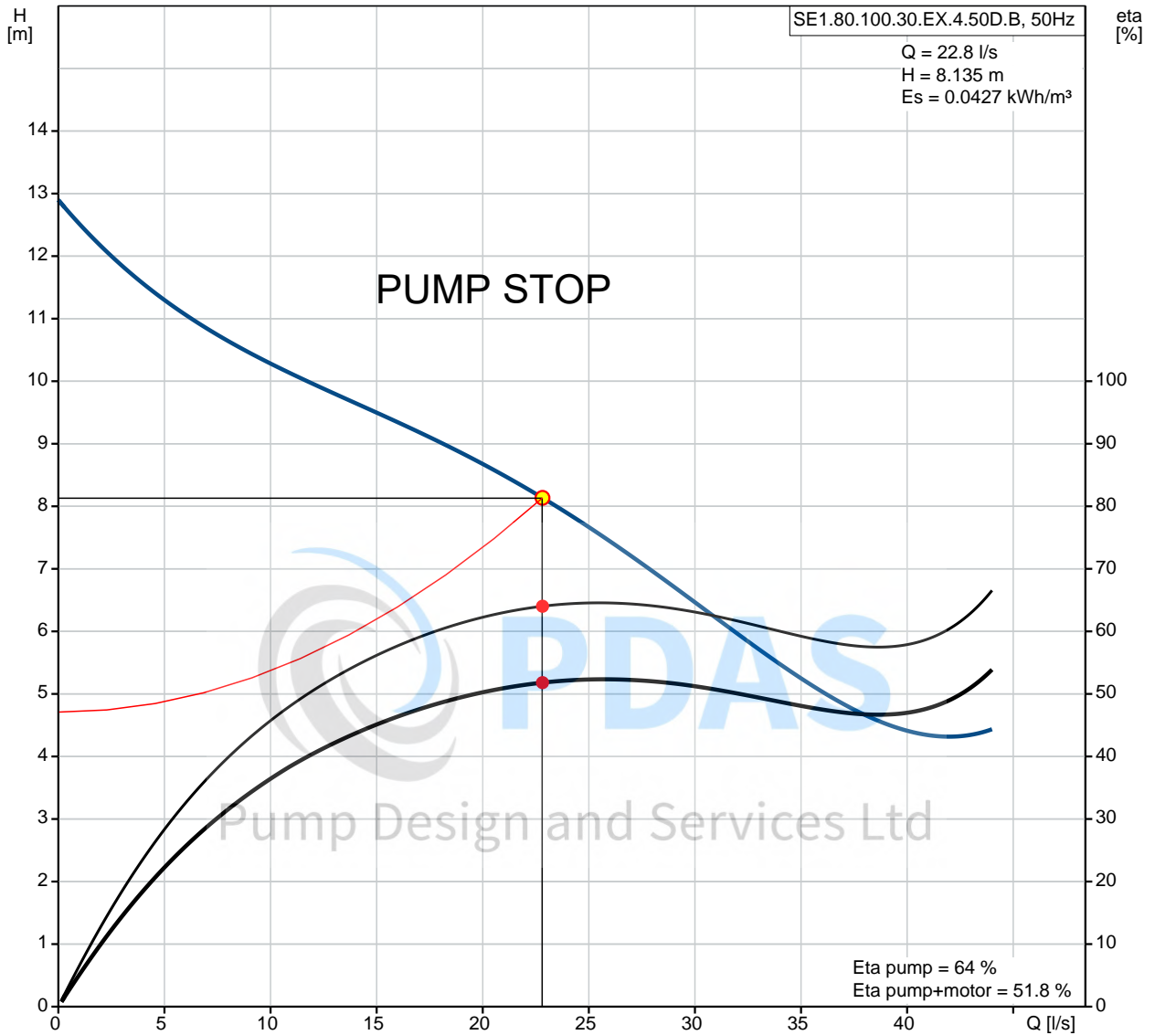
Actual Duty	
Flow	23.80 L/s
Head	7.93 m

@ Duty Pump Start



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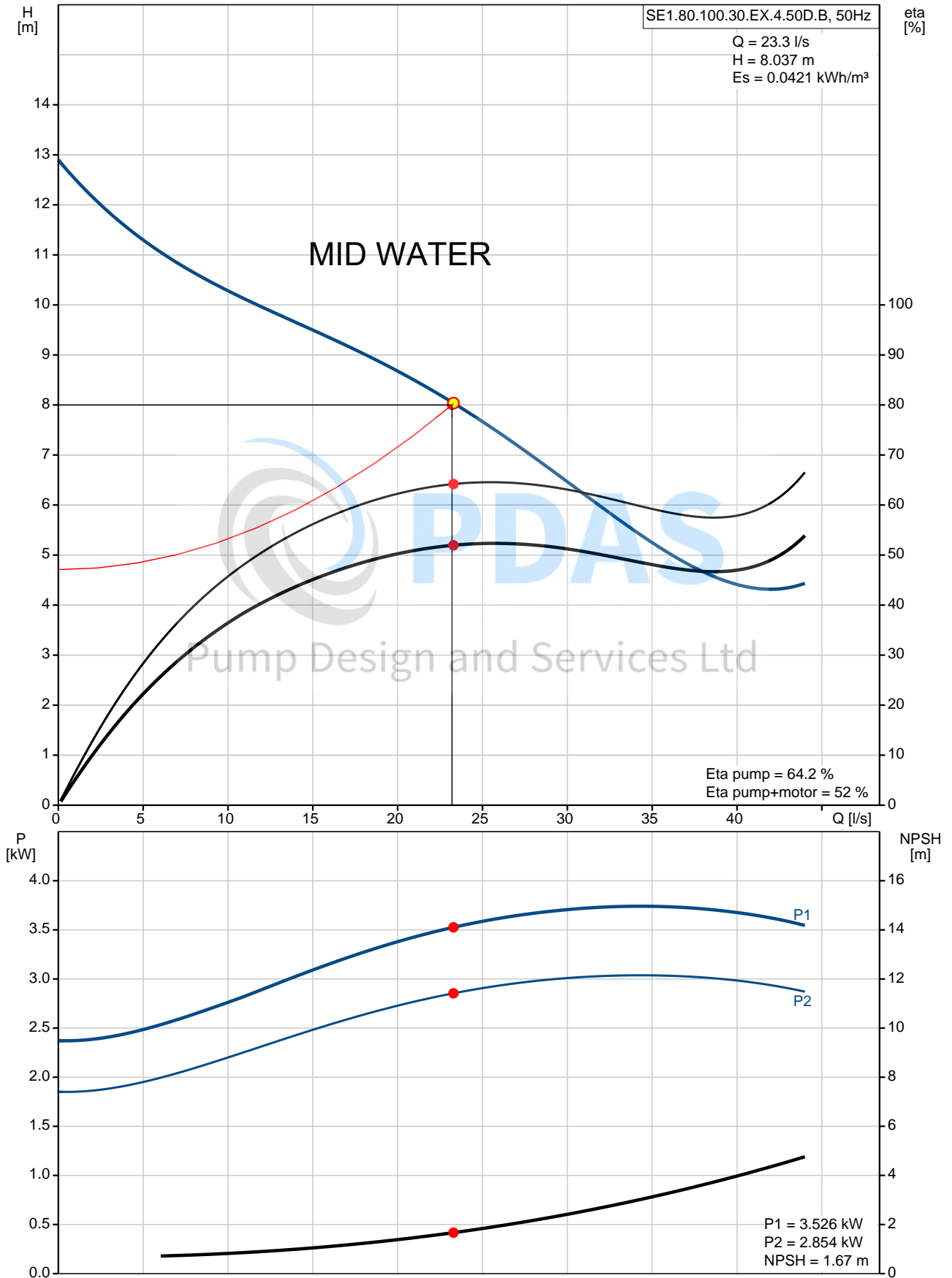
## 96048041 SE1.80.100.30.EX.4.50D.B 50 Hz





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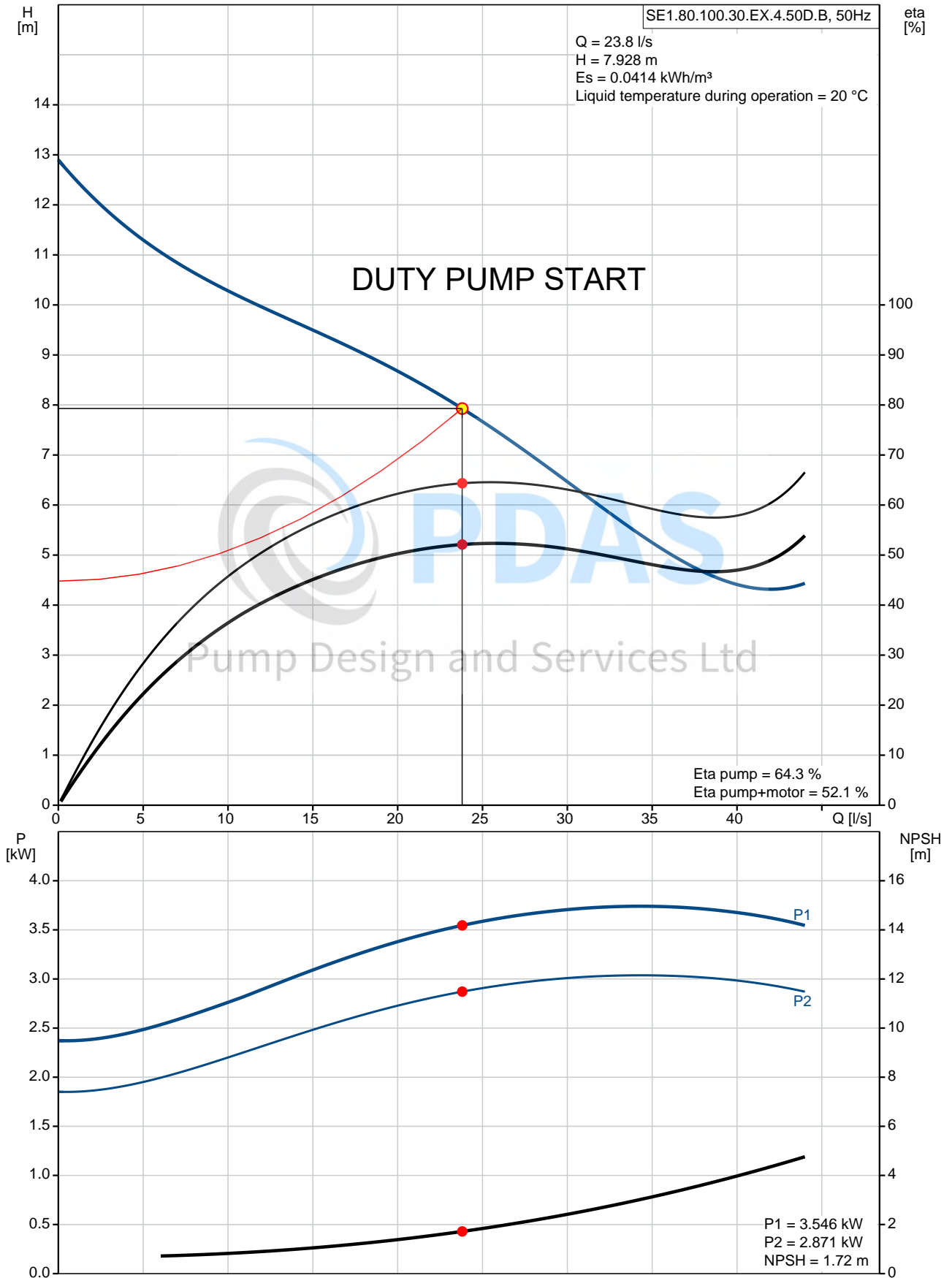
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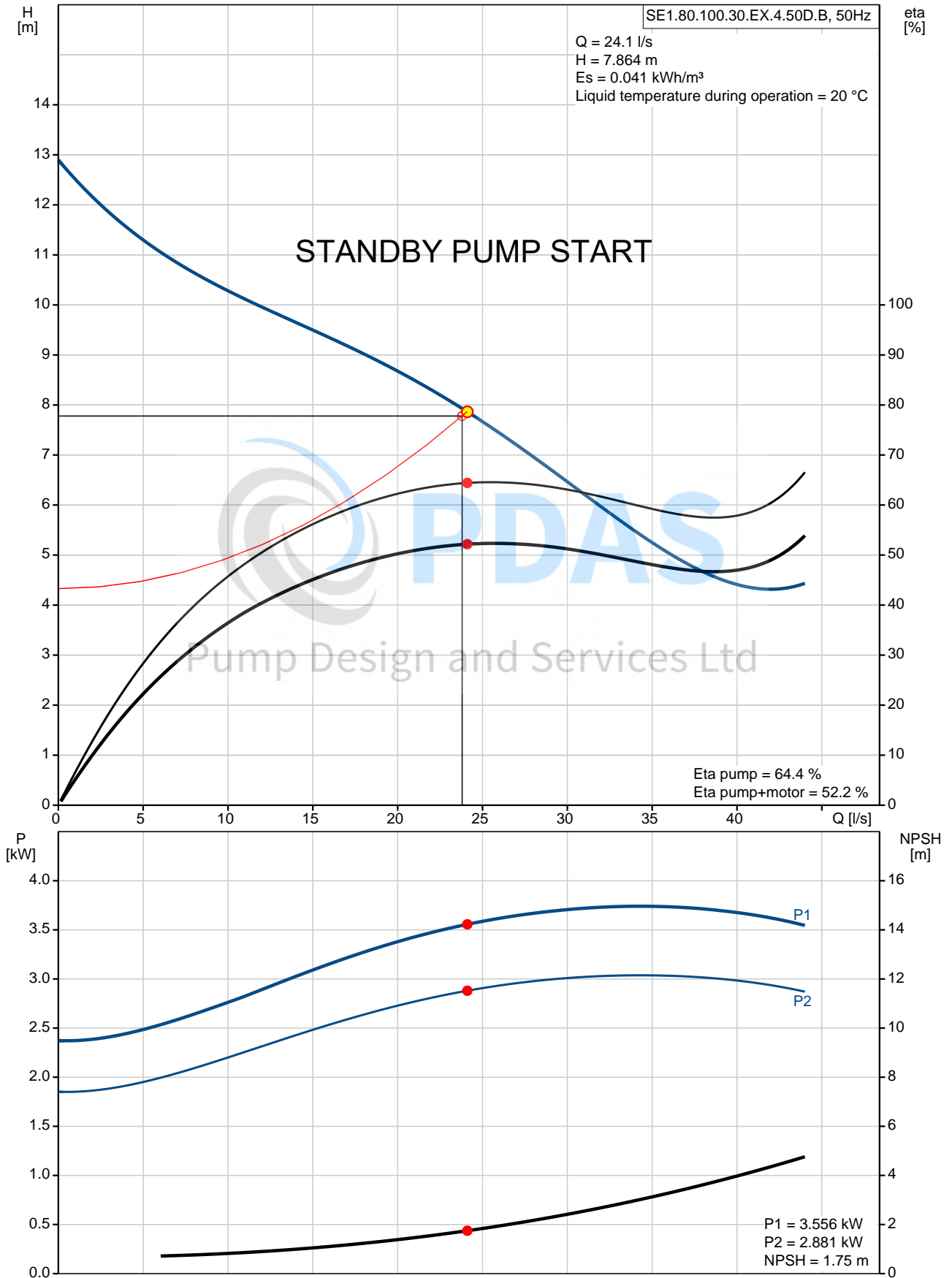
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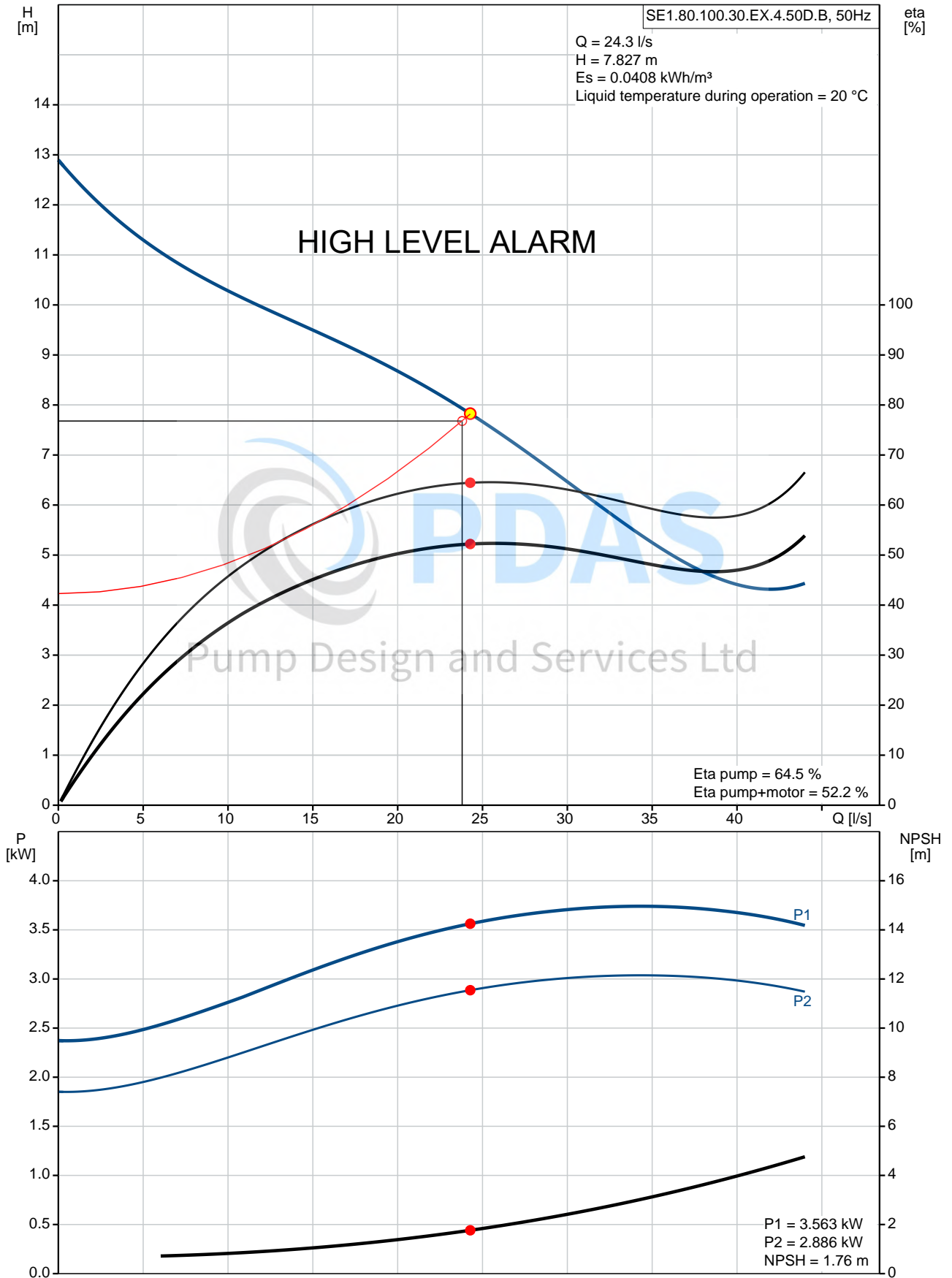
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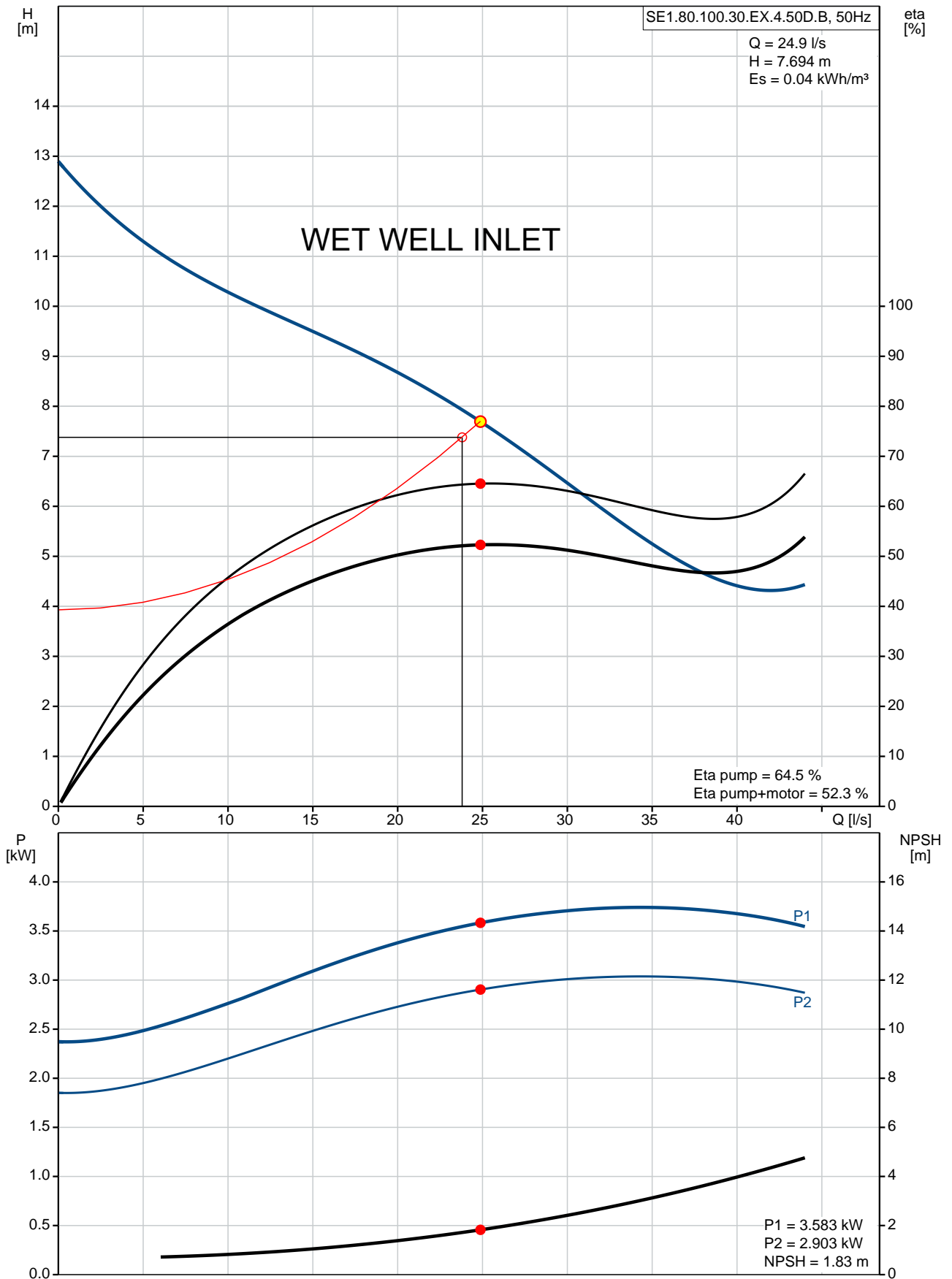




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**Date:** 09/02/2018

Position	Qty.	Description																																												
	1	<p><b>SE1.80.100.30.EX.4.50D.B</b></p>  <p style="text-align: center;"><b>Note! Product picture may differ from actual product</b></p> <p>Product No.: <a href="#">96048041</a></p> <p>Non-self-priming, single-stage, centrifugal pump designed for handling wastewater, process water and unscreened raw sewage.</p> <p>The pump is designed for intermittent and continuous operation. The liquidless and maintenance free cooling system ensures that the pump can be used for submerged or dry installation. The revolutionary S-tube® impeller provides free spherical passage of solids up to 80 mm and is suitable for wastewater with a dry matter content of up to 3 %.</p> <p>A unique stainless-steel clamp assembling system enables quick and easy disassembly of the pump from the motor unit for service and inspection. No special tools are required. Pipework connection is via a DIN flange.</p> <p>The pump is explosion-proof.</p> <p><b>Controls:</b></p> <table> <tr> <td>Moisture sensor:</td> <td>without moisture sensors</td> </tr> <tr> <td>Water-in-oil sensor:</td> <td>without water-in-oil sensor</td> </tr> <tr> <td>Temp. sensor:</td> <td>N</td> </tr> </table> <p><b>Liquid:</b></p> <table> <tr> <td>Liquid temperature range:</td> <td>0 .. 40 °C</td> </tr> <tr> <td>Liquid temperature during operation:</td> <td>20 °C</td> </tr> <tr> <td>Density:</td> <td>998.2 kg/m³</td> </tr> </table> <p><b>Technical:</b></p> <table> <tr> <td>Actual calculated flow:</td> <td>23.8 l/s</td> </tr> <tr> <td>Resulting head of the pump:</td> <td>7.928 m</td> </tr> <tr> <td>Type of impeller:</td> <td>S-TUBE</td> </tr> <tr> <td>Maximum particle size:</td> <td>80 mm</td> </tr> <tr> <td>Primary shaft seal:</td> <td>SIC/SIC</td> </tr> <tr> <td>Secondary shaft seal:</td> <td>CARBON/CERAMICS</td> </tr> <tr> <td>Max. hydraulic efficiency:</td> <td>65 %</td> </tr> <tr> <td>Approvals on nameplate:</td> <td>EN12050-1</td> </tr> <tr> <td>Curve tolerance:</td> <td>ISO9906:2012 3B2</td> </tr> </table> <p><b>Materials:</b></p> <table> <tr> <td>Pump housing:</td> <td>EN 1561 EN-GJL-250</td> </tr> <tr> <td>Impeller:</td> <td>Cast iron</td> </tr> </table> <p><b>Installation:</b></p> <table> <tr> <td>Maximum operating pressure:</td> <td>6 bar</td> </tr> <tr> <td>Flange standard:</td> <td>DIN</td> </tr> <tr> <td>Pump outlet:</td> <td>DN 100</td> </tr> <tr> <td>Pressure rating:</td> <td>PN 10</td> </tr> <tr> <td>Maximum installation depth:</td> <td>20 m</td> </tr> </table>	Moisture sensor:	without moisture sensors	Water-in-oil sensor:	without water-in-oil sensor	Temp. sensor:	N	Liquid temperature range:	0 .. 40 °C	Liquid temperature during operation:	20 °C	Density:	998.2 kg/m³	Actual calculated flow:	23.8 l/s	Resulting head of the pump:	7.928 m	Type of impeller:	S-TUBE	Maximum particle size:	80 mm	Primary shaft seal:	SIC/SIC	Secondary shaft seal:	CARBON/CERAMICS	Max. hydraulic efficiency:	65 %	Approvals on nameplate:	EN12050-1	Curve tolerance:	ISO9906:2012 3B2	Pump housing:	EN 1561 EN-GJL-250	Impeller:	Cast iron	Maximum operating pressure:	6 bar	Flange standard:	DIN	Pump outlet:	DN 100	Pressure rating:	PN 10	Maximum installation depth:	20 m
Moisture sensor:	without moisture sensors																																													
Water-in-oil sensor:	without water-in-oil sensor																																													
Temp. sensor:	N																																													
Liquid temperature range:	0 .. 40 °C																																													
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Density:	998.2 kg/m³																																													
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Resulting head of the pump:	7.928 m																																													
Type of impeller:	S-TUBE																																													
Maximum particle size:	80 mm																																													
Primary shaft seal:	SIC/SIC																																													
Secondary shaft seal:	CARBON/CERAMICS																																													
Max. hydraulic efficiency:	65 %																																													
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Pump housing:	EN 1561 EN-GJL-250																																													
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Pump outlet:	DN 100																																													
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Maximum installation depth:	20 m																																													



Pump Design and Services Ltd

**Company name:** Pump Design and Services Ltd t/a PDAS  
**Created by:** Idi Handem  
**Phone:** 01256 638 024  
**Email:** idi.handem@pdasLtd.co.uk  
**Date:** 09/02/2018

Position	Qty.	Description
		<p><b>Electrical data:</b></p> <p>Power input - P1: 3.7 kW            Rated power - P2: 3 kW            Mains frequency: 50 Hz            Rated voltage: 3 x 380-415 V            Voltage tolerance: +6/-10 %            Max starts per. hour: 20            Rated current: 7,8-8,0 A            Rated current at 3/4 load: 6.4 A            Rated current at 1/2 load: 5.6 A            Starting current: 43 A            Rated current at no load: 5.1 A            Cos phi - power factor: 0,73            Cos phi - p.f. at no load: 0,12            Cos phi - p.f. at 3/4 load: 0,64            Cos phi - p.f. at 1/2 load: 0,5            Rated speed: 1455 rpm            Locked-rotor torque: 53 Nm            Breakdown torque: 71 Nm            Moment of inertia: 0.11 kg m<sup>2</sup>            Motor efficiency at full load: 81.2 %            Motor efficiency at 3/4 load: 79.9 %            Motor efficiency at 1/2 load: 76.4 %            Number of poles: 4            Start. method: direct-on-line            Enclosure class (IEC 34-5): IP68            Insulation class (IEC 85): F            Explosion proof: yes            Ex-protection standard: Ex cd IIB T4,T3            Length of cable: 10 m            Cable type: LYNIFLEX            Type of cable plug: NO PLUG</p> <p><b>Others:</b></p> <p>Net weight: 151 kg</p>



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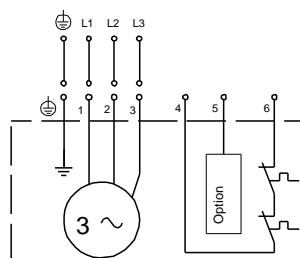
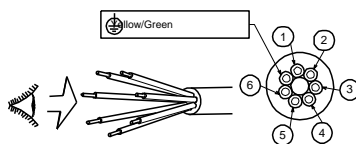
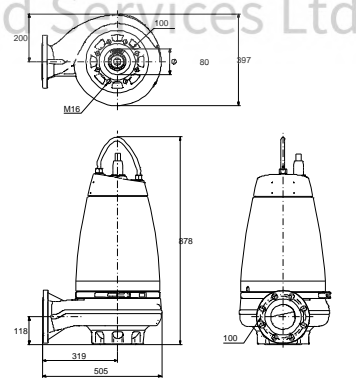
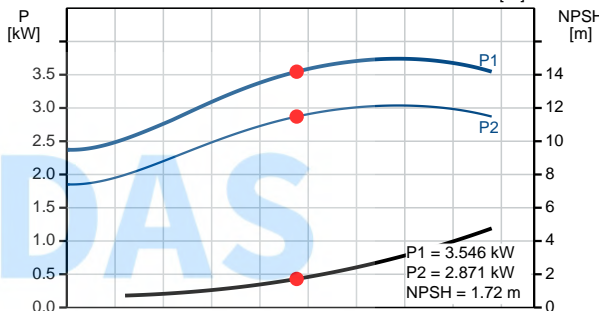
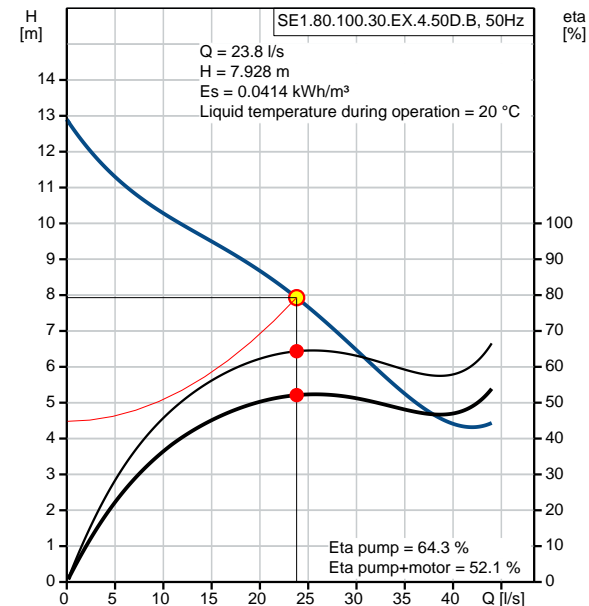
Description	Value
<b>General information:</b>	
Product name:	SE1.80.100.30.EX.4.50D.B
Product No:	96048041
EAN number:	5700395062793
<b>Technical:</b>	
Actual calculated flow:	23.8 l/s
Max flow:	43.9 l/s
Resulting head of the pump:	7.928 m
Head max:	12.9 m
Type of impeller:	S-TUBE
Maximum particle size:	80 mm
Primary shaft seal:	SIC/SIC
Secondary shaft seal:	CARBON/CERAMICS
Max. hydraulic efficiency:	65 %
Approvals on nameplate:	EN12050-1
Curve tolerance:	ISO9906:2012 3B2
Cooling jacket:	with cooling jacket

<b>Materials:</b>	
Pump housing:	EN 1561 EN-GJL-250
Impeller:	Cast iron

<b>Installation:</b>	
Maximum operating pressure:	6 bar
Flange standard:	DIN
Pump outlet:	DN 100
Pressure rating:	PN 10
Maximum installation depth:	20 m
Inst dry/wet:	DRY/SUBMERGED
Installation:	horizontal or vertical

<b>Liquid:</b>	
Liquid temperature range:	0 .. 40 °C
Liquid temperature during operation:	20 °C
Density:	998.2 kg/m <sup>3</sup>

<b>Electrical data:</b>	
Power input - P1:	3.7 kW
Rated power - P2:	3 kW
Mains frequency:	50 Hz
Rated voltage:	3 x 380-415 V
Voltage tolerance:	+6/-10 %
Max starts per. hour:	20
Rated current:	7,8-8,0 A
Rated current at 3/4 load:	6.4 A
Rated current at 1/2 load:	5.6 A
Starting current:	43 A
Rated current at no load:	5.1 A
Cos phi - power factor:	0,73
Cos phi - p.f. at no load:	0,12
Cos phi - p.f. at 3/4 load:	0,64
Cos phi - p.f. at 1/2 load:	0,5
Rated speed:	1455 rpm
Locked-rotor torque:	53 Nm
Breakdown torque:	71 Nm
Moment of inertia:	0.11 kg m <sup>2</sup>
Motor efficiency at full load:	81.2 %
Motor efficiency at 3/4 load:	79.9 %





Pump Design and Services Ltd

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**Phone:** 01256 638 024  
**Email:** idi.handem@pdasLtd.co.uk  
**Date:** 09/02/2018

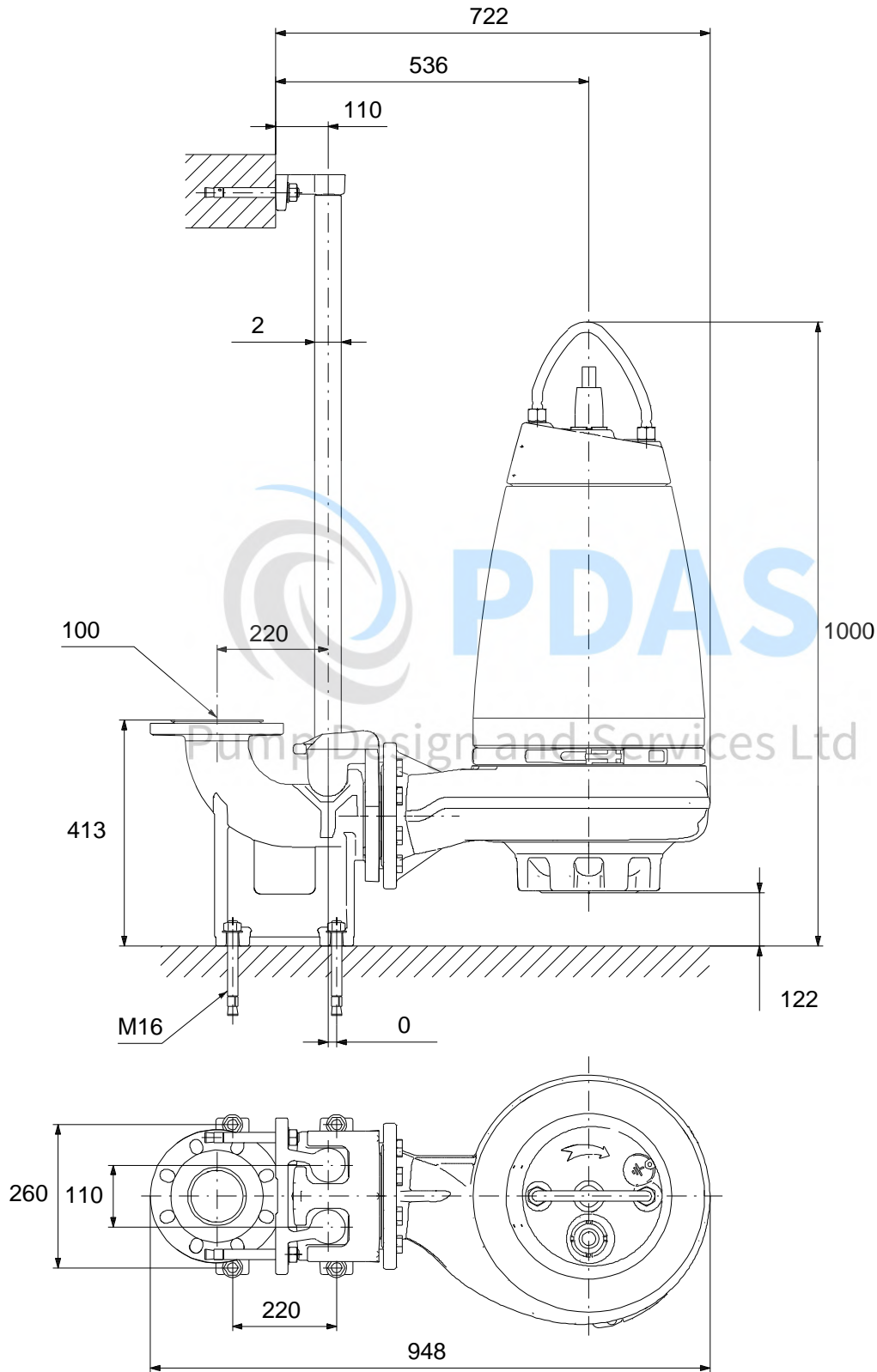
Description	Value
Motor efficiency at 1/2 load:	76.4 %
Number of poles:	4
Start. method:	direct-on-line
Enclosure class (IEC 34-5):	IP68
Insulation class (IEC 85):	F
Explosion proof:	yes
Ex-protection standard:	Ex cd IIB T4,T3
Motor protec:	THERMAL SWITCH
Thermal protec:	internal
Length of cable:	10 m
Cable type:	LYNIFLEX
Type of cable plug:	NO PLUG
<b>Controls:</b>	
Control box:	not included
Moisture sensor:	without moisture sensors
Water-in-oil sensor:	without water-in-oil sensor
Temp. sensor:	N
<b>Others:</b>	
Net weight:	151 kg





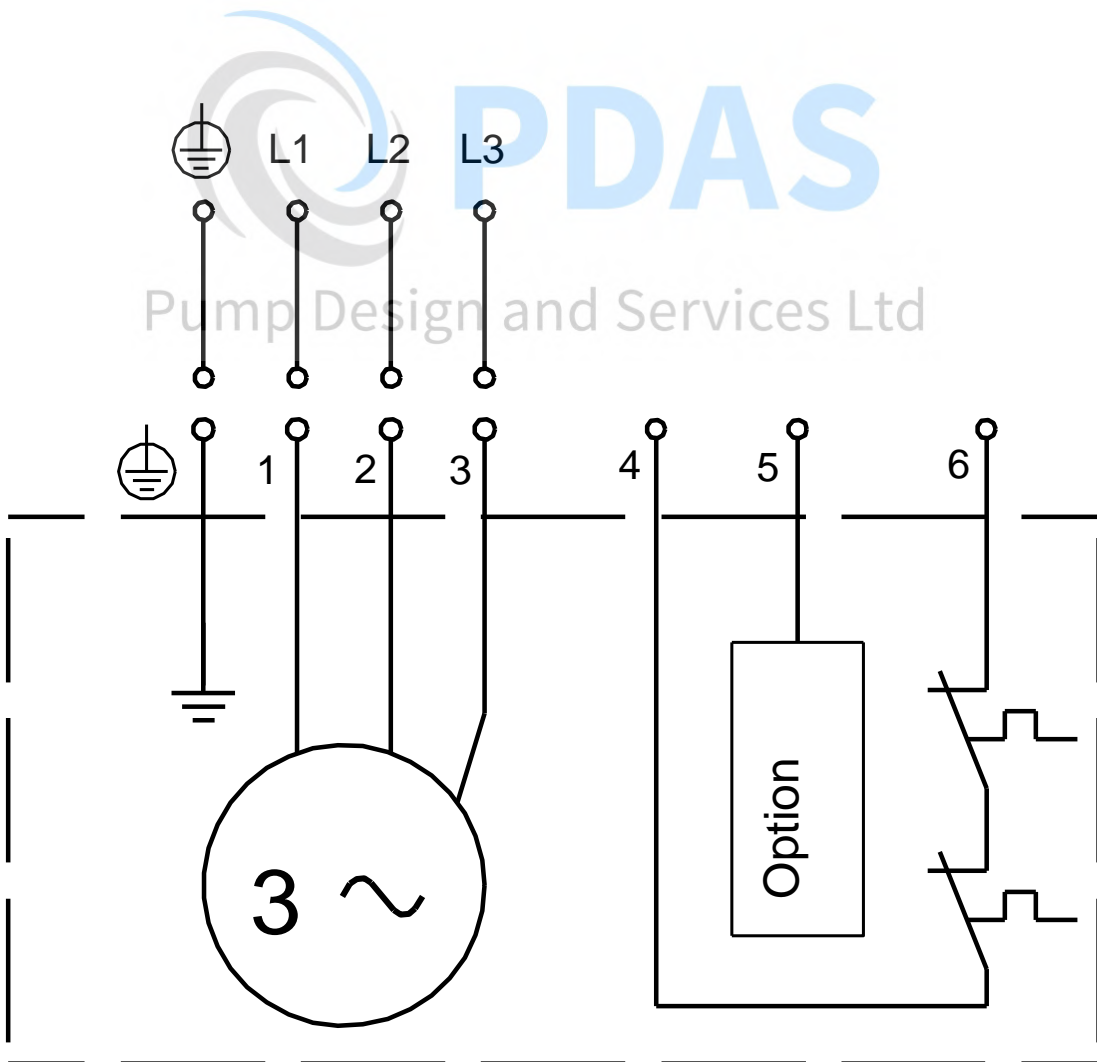
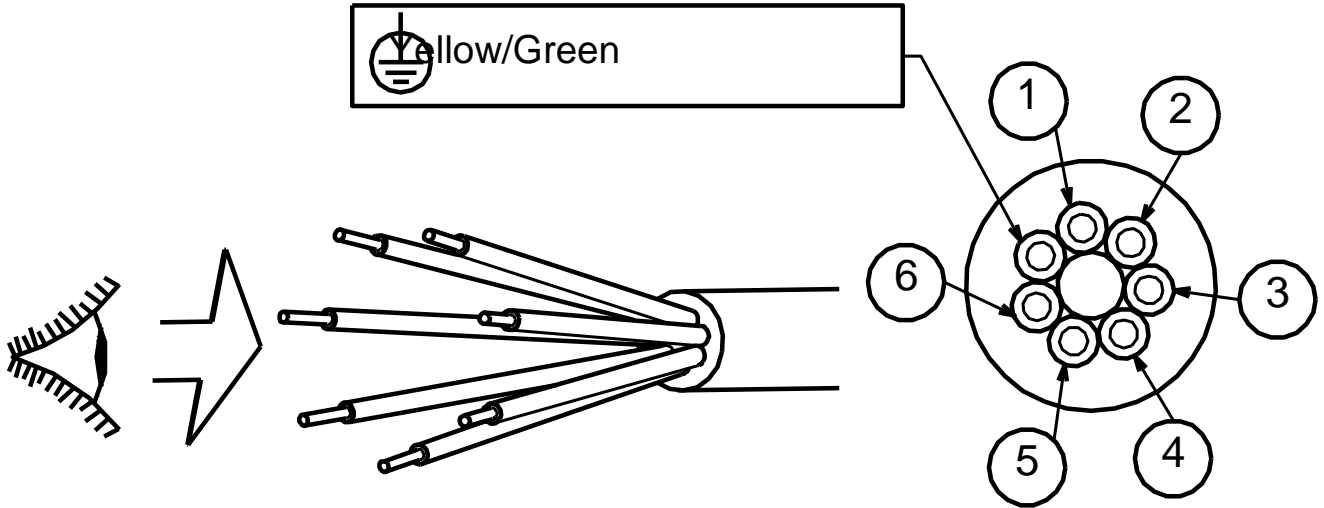
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**Date:** 09/02/2018

### 96048041 SE1.80.100.30.EX.4.50D.B 50 Hz



Note! All units are in [mm] unless others are stated.  
Disclaimer: This simplified dimensional drawing does not show all details.

### 96048041 SE1.80.100.30.EX.4.50D.B 50 Hz



Note! All units are in [mm] unless others are stated.

**Appendix C**  
**Foul Water Pump Station Storage Calculations**

Pump Design and Services Ltd  
Abbey House  
282 Farnborough Road  
Farnborough  
Hampshire GU14 7NA



Pump Design and Services Ltd  
Tel: 01256 638020  
Email: info@pdasltd.co.uk

Quote Reference	Q10570
Date	19/04/2017
Project Reference	PR10369
Date	14/12/2017

Clients Name	BDW HOMES YORKSHIRE WEST
Site Address	LEE LANE ROYSTON

Storage Requirement	
Number of Dwellings	164
Non Domestic Design Flow	0 L/s
Domestic @ 160L / Dwelling	26.240 m <sup>3</sup>
Industrial 1 Hr @ Design Flow	0.000 m <sup>3</sup>
Total Required Storage	26.240 m <sup>3</sup>
Location of Lowest Private Manhole	F10a
Invert Level of Lowest Private Manhole	68.710 m

Notes:

Storage in Gravity Manholes					
Manhole Reference	Manhole Diameter (mm)	Max Storage Level (m)	Cover Level (m)	Invert Level (m)	Storage Volume (m <sup>3</sup> )
		68.710			0.000
INLET MH F22	1500	68.710	71.550	66.200	4.436
		68.710			0.000
F21	1350	68.710	71.600	67.510	1.718
		68.710			0.000
F7	1200	68.710	71.056	67.830	0.995
F6	1350	68.710	71.332	68.230	0.687
		68.710			0.000
F3	1200	68.710	71.056	68.710	0.000
F2		68.710			0.000
F1	1200	68.710	71.476	69.570	0.000
		68.710			0.000
F5	1200	68.710	71.637	68.650	0.068
F4	1200	68.710	71.028	69.530	0.000
		68.710			0.000
F10	1200	68.710	71.327	68.670	0.045
F9	1200	68.710	71.468	69.830	0.000
F8	1200	68.710	72.068	70.400	0.000
		68.710			0.000
F20.1	1200	68.710	71.550	68.130	0.656
		68.710			0.000
F16	1200	68.710	71.550	68.650	0.068
F15	1200	68.710	72.209	68.930	0.000
F14	1200	68.710	71.536	69.500	0.000
		68.710			0.000
		68.710			0.000
F20	1200	68.710	71.580	68.733	0.000
F19	1200	68.710	70.870	68.973	0.000
F18	1350	68.710	71.197	69.292	0.000
		68.710			0.000
F12	1200	68.710	71.279	69.823	0.000
		68.710			0.000
		68.710			0.000
<b>Total storage in manholes below detailed maximum storage level</b>					<b>8.672</b>

BD 67.470

Private Manhole Invert (m)	
70.050	F7a
70.120	F6a
69.280	F3b
69.680	F1a
69.850	F5b
69.630	F4a
<b>68.710</b>	F10a
70.370	F9a
70.300	F8a
70.570	F16a
69.810	F14b
69.640	F14a
68.820	F20a
69.470	F19a
69.650	F18b
70.030	F12b

Pump Design and Services Ltd  
Abbey House  
282 Farnborough Road  
Farnborough  
Hampshire GU14 7NA



Pump Design and Services Ltd  
Tel: 01256 638020  
Email: info@pdasltd.co.uk

Quote Reference	Q10570
Date	19/04/2017
Project Reference	PR10369
Date	14/12/2017

#### Storage in Gravity Sewer Pipes

Sewer Pipe Run	Sewer Diameter (mm)	Max Storage Level (m)	Length (m)	Upper Invert (m)	Storage Volume (m <sup>3</sup> )
		68.710			0.000
4.001	150	68.710	42.520	69.823	0.000
4.002	150	68.710	25.529	69.292	0.000
4.004 F19-F20	150	68.710	19.207	68.973	0.000
4.003	150	68.710	46.158	68.733	0.000
4.004 F20.1-F21	150	68.710	10.099	68.130	0.178
		68.710			0.000
5.001	150	68.710	45.713	69.500	0.000
5.002	150	68.710	19.735	68.930	0.000
5.003	150	68.710	32.298	68.650	0.000
		68.710			0.000
3.000	150	68.710	44.931	70.400	0.000
3.001	150	68.710	85.849	69.830	0.000
3.002	150	68.710	20.004	68.670	0.000
		68.710			0.000
2.000	150	68.710	69.692	69.530	0.000
2.001	150	68.710	33.263	68.650	0.000
		68.710			0.000
1.001	150	68.710	68.038	69.570	0.000
1.002	150	68.710	25.215	68.710	0.000
		68.710			0.000
1.003	150	68.710	31.758	68.230	0.561
1.004	150	68.710	25.217	67.830	0.446
1.005	150	68.710	2.607	67.510	0.046
		68.710			0.000
<b>Total storage in sewers below detailed maximum storage level</b>					<b>1.231</b>

#### Storage in Wet Well

	Wet Well Diameter (mm)	Max Storage Level (m)		High Level Alarm (m)	Storage Volume (m <sup>3</sup> )
Pump Station	2700	68.710		65.850	16.375
<b>Total storage in wet well below detailed maximum storage level</b>					<b>16.375</b>

#### Summary

Manholes	8.672	m <sup>3</sup>
Sewers	1.231	m <sup>3</sup>
Pump Station	16.375	m <sup>3</sup>
Total Provided	26.279	m <sup>3</sup>
Total Required	26.240	m <sup>3</sup>

**Appendix D**  
**Pump Station M&E Drawings**

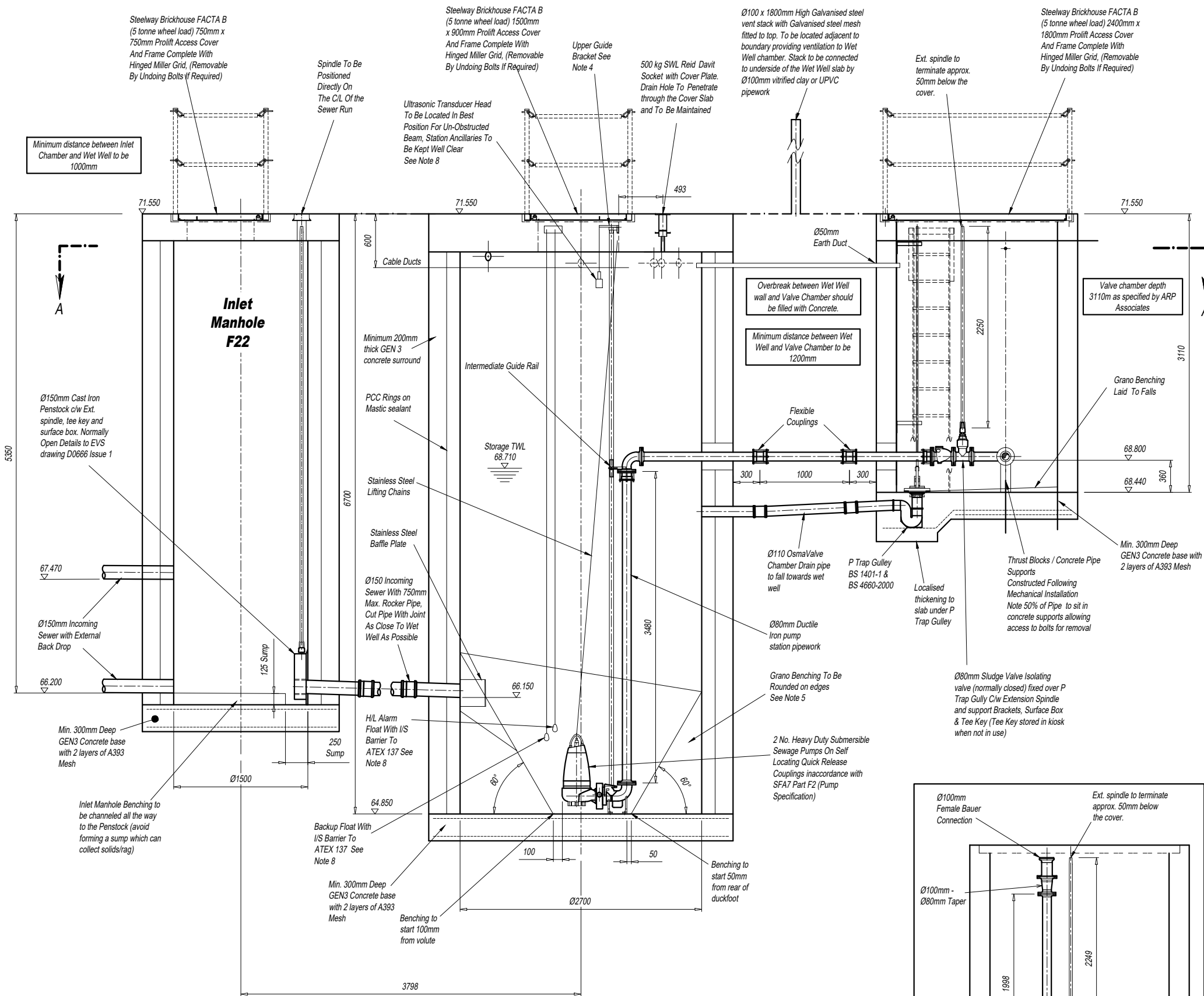
**STANDARD NOTES**

- DO NOT SCALE.
- UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
- ALL CIVIL WORKS ARE THE RESPONSIBILITY OF THE DEVELOPER / CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
- REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
- BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE SEWERS FOR ADOPTION AND ADOPTING AUTHORITY SPECIFICATION.
- UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE 100MM DIAMETER AND BE COMPLETE WITH DRAW ROPE. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIER'S SPECIFICATION.
- DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS TO BE LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
- LEVEL CONTROL POSITIONS ARE DIAGRAMMATIC ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

FOR CIVIL ENGINEERING DETAILS REFER TO ARP ASSOCIATES DRAWINGS

**YORKSHIRE WATER NOTES**

- COVER TO RE INFORCEMENT TO BE 40MM TO BOTH FACES.
- SPACERS TO BE 1200MM CENTRE TO CENTRE.
- CONCRETE TO BE 30 NMM AT 28 DAYS.
- GROUND BEARING PRESSURE TAKEN AS 50 KN/M.
- NO DAY WORK JOINTS PERMITTED IN SLABS.
- ALL SOFT SPOTS TO BE REMOVED AND REPLACED BY SUITABLE MATERIAL.
- PROVIDE 50MM BLINDING CONCRETE.
- ALL ADOPTABLE SEWER WORKS & MATERIALS TO BE IN ACCORDANCE WITH THE SEWER FOR ADOPTION 7TH EDITION, THE RELEVANT BRITISH, EUROPEAN & YORKSHIRE WATER STANDARDS, REQUIREMENTS & ADDENDUM TO THE MECHANICAL & ELECTRICAL SPECIFICATION AND KIT MARKED.
- MINIMUM BAR LAP LENGTH 800MM.
- WET WELL AND VALVE CHAMBER COVERS TO BE AS SUPPLIED BY PUMP SUPPLIER AND BE RATED FACTA B (5 TONNE WHEEL LOAD)
- TO BE READ IN CONJUNCTION WITH THE CIVILS DETAILS.
- ANY OVER BREAK BETWEEN WET WELL AND VALVE CHAMBER TO BE FILLED WITH LEAN MIX CONCRETE.
- WET WELL TO BE CLEAN AND DRY BEFORE INSTALLATION OF PUMPS COMMENCES.
- DEWATERING TO BE PROVIDED IF NECESSARY AS WORKS PROCEED.
- FOUL WATER RISING MAIN TO BE 110MM OD PE100 SDR11 (89.1 ID) X 294.4M LONG.
- SURFACE WATER RISING MAIN TO BE 160MM OD PE100 SDR11 (129.7MM ID) X 85.5M LONG.
- CUT OUT AND CUT IN LEVELS TO BE ESTABLISHED ON SITE BY PUMP SUPPLIER.
- THE BRACKET FOR HOLDING THE DAVIT EQUIPMENT SHOULD BE KEPT IN THE KIOSK.
- THRUST BLOCKS TO BE PROVIDED AT CHANGES IN DIRECTIONS.
- STATUTORY SERVICES TO PROVIDE ADEQUATE SERVICES TO PUMP STATION AND KIOSK AND TO ALLOW FOR ALL NECESSARY REQUIREMENTS.
- STAINLESS STEEL PUMP LIFTING CHAINS REQUIRED.
- ALL METAL FIXINGS TO BE STAINLESS STEEL.



Minimum distance between Inlet Chamber and Wet Well to be 1000mm

Ø150mm Cast Iron Penstock c/w Ext. spindle, tee key and surface box. Normally Open Details to EVS drawing D0666 Issue 1

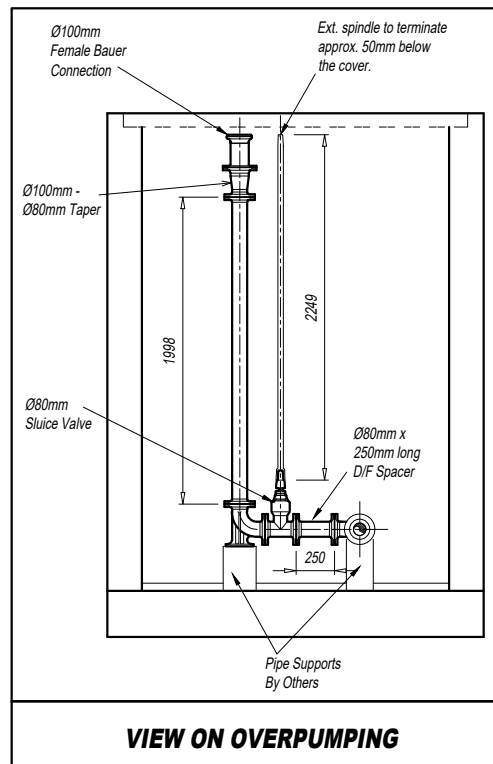
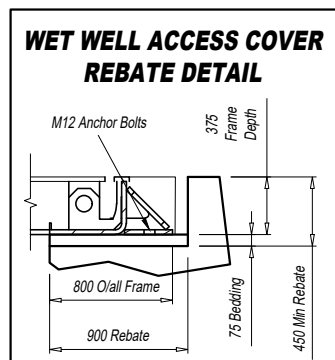
Min. 300mm Deep GEN3 Concrete base with 2 layers of A393 Mesh

Inlet Manhole Benching to be channelled all the way to the Penstock (avoid forming a sump which can collect solids/rag)

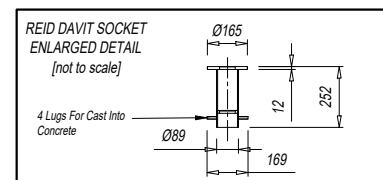
IF BOXOUT HOLES TO BE CORE DRILLED, Civil's To Ensure All Core Drillings Are Parallel To Centre Line / Perpendicular To Valve Chamber

All Cut Pipe Joints As Close To Structures As Possible Consistent With Making The Joint. The Rocker Pipes To Be 1m Or Equal To One Nominal Pipe Diameter Whichever Is The Larger

**VIEW ON SECTION B - B**



STATION INFORMATION		
PUMP TYPE	GRUNFOS	SEV.80.80.22.EX.4.50D
IMPELLER		SUPER VORTEX
MOTOR RATING		2.2 kW
FULL LOAD CURRENT		6.0 A FLC
ZONE RATING		EXP
DUTY FLOW		5 L/Sec
HEAD GENERATED		10.28m
LEVEL CONTROLS		HYDRORANGER ULTRASONIC C/W HIGH LEVEL ALARM AND BACK UP FLOAT SWITCHES
PIPE / VALVE SIZE		Ø80mm
FINAL DISCHARGE		
INTERNAL DIAMETER		Ø80mm
MATERIAL		DUCTILE IRON
TERMINATION		FLANGED
PIPE OD		Ø98MM
FLANGE DATA		Ø98MM OD DUCTILE
RISING MAIN		110MM OD PE100 SDR11 (89.1) BORE
RISING MAIN COUPLER		110MM OD PE CONVERTER
OPERATING LEVELS		
STORAGE LEVEL		68.710
INVERT OF INLET		66.150
INVERT OF H.L.A.		65.850
INVERT OF PUMP 2		65.750
INVERT OF PUMP 1		65.600
INVERT OF B.W.L.		64.150
INVERT OF WET WELL BASE		64.850
DEAD AREA		300mm
OPERATING DEPTH		450mm
OPERATING VOLUME		781 Litres
PUMP FLOW		4.79 Litres / Second
FROM THE ABOVE : (781 X 2) ÷ (4.79 ÷ 2) = 652 SECONDS		
652 SECONDS DIVIDED INTO 3600 = 5.52 STARTS PER HOUR		
Telemetry		
This Will Be Supplied And Fitted By Yorkshire Water I.C.A. Department And Will Be Their Metasphere MIM Telemetry Outstation.		



REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
A	15/02/18	Minor Drawing notes amended.	L.C.	-	I.H.

**FOR APPROVAL**



ABBEY HOUSE, 282 FARNBOROUGH ROAD, FARNBOROUGH, HAMPSHIRE, GU14 7NA OFFICE TEL No. (01256) 638020 WEBSITE WWW.PDASLTD.CO.UK

PROJECT	LEE LANE ROYSTON	
TITLE	FOUL WATER PUMP STATION ELEVATION VIEW	
CLIENT	BDW HOMES YORKSHIRE WEST	
SCALE AT A1	1:25	SCALE AT A3 1:50
QUOTE NUMBER	Q10570	APR'l I.H. DATE 19-01-2018
PROJECT REF.	PR10369	CHK'd L.C. DATE 09-01-2018
DRAWING NUMBER	PR10369 - 001	DR'n L.C. DATE 09-01-2018

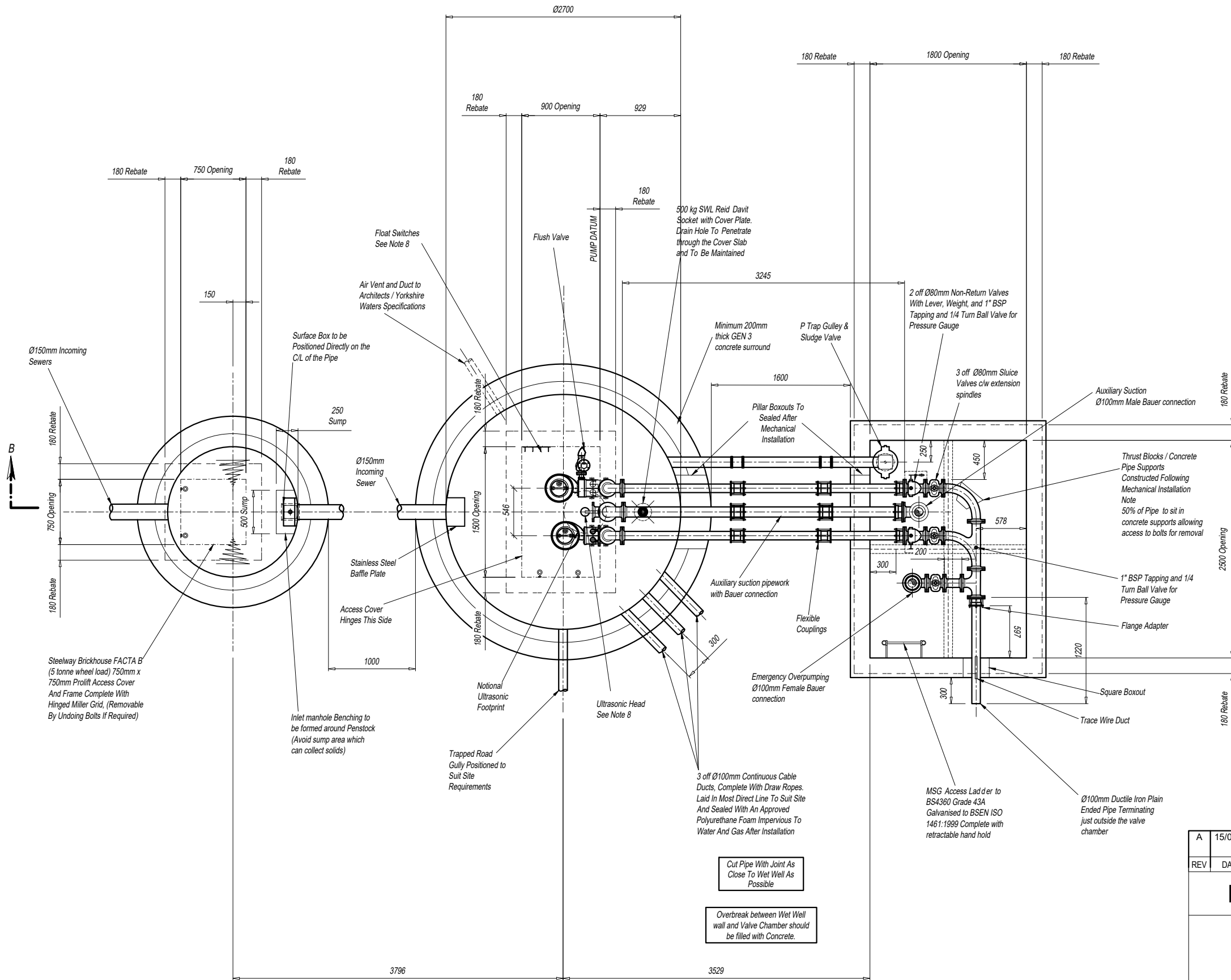
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DRAWINGS

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DRAWING NUMBER	PR10369 - 002	DR'n	L.C.	DATE	09-01-2018

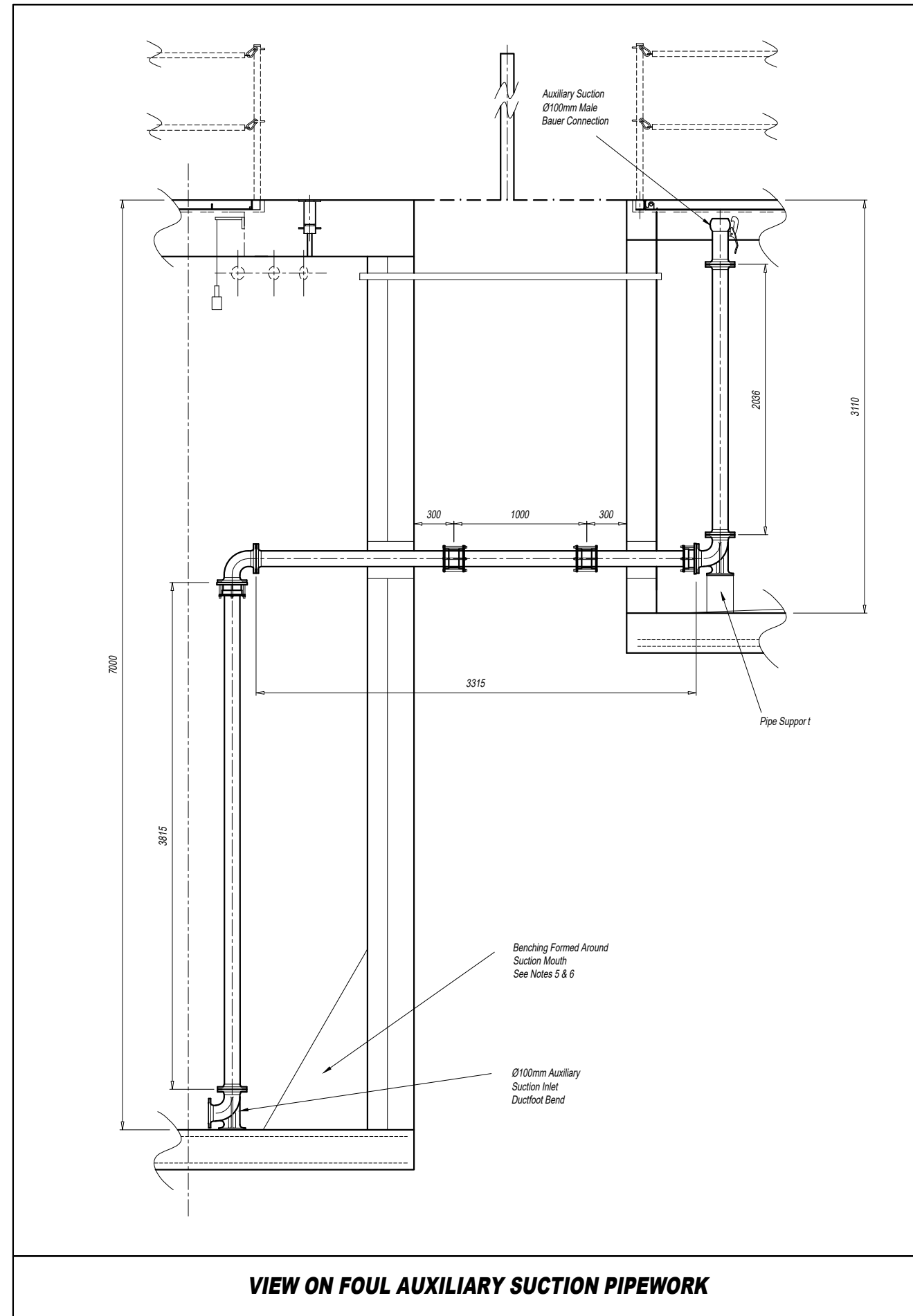
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PROJECT <b>LEE LANE ROYSTON</b>					
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CLIENT <b>BDW HOMES YORKSHIRE WEST</b>					
SCALE AT A1 <b>1:20</b>		SCALE AT A3 <b>1:40</b>			
QUOTE NUMBER	<b>Q10570</b>	APR'l	<b>I.H.</b>	DATE	<b>19-01-2018</b>
PROJECT REF.	<b>PR10369</b>	CHK'd	<b>L.C.</b>	DATE	<b>09-01-2018</b>
DRAWING NUMBER	<b>PR10369 - 003</b>	DR'n	<b>L.C.</b>	DATE	<b>09-01-2018</b>

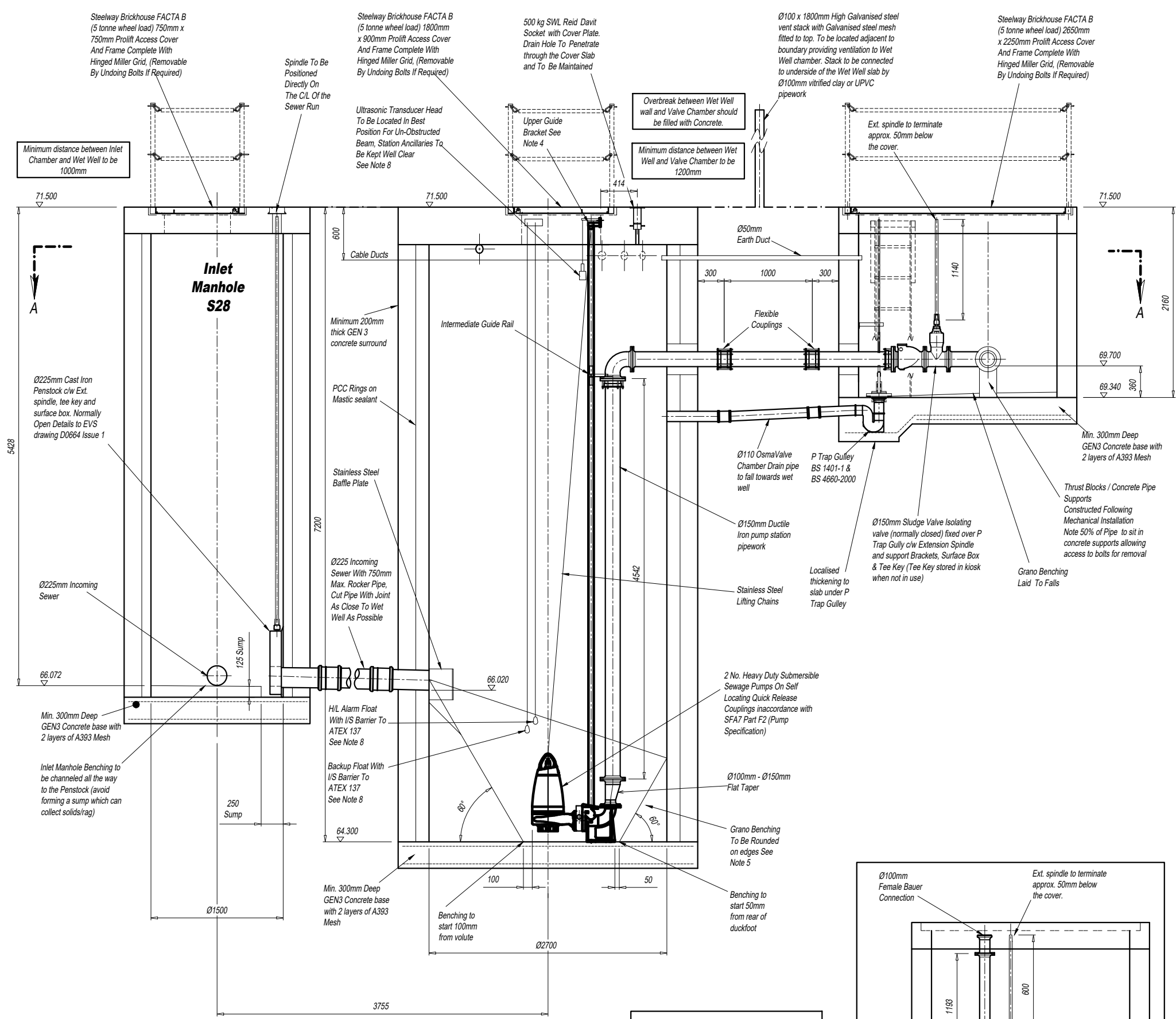
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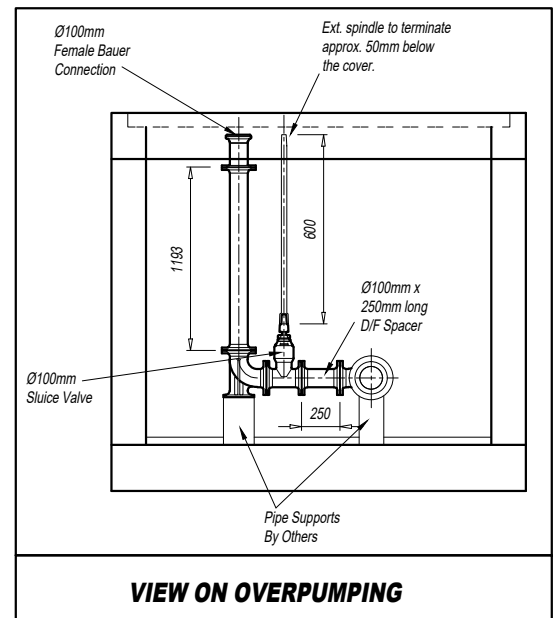
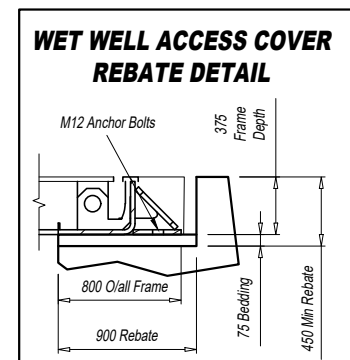
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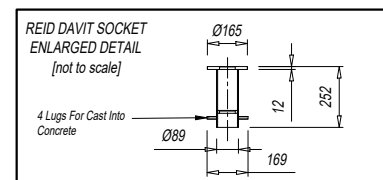
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**VIEW ON SECTION B - B**



STATION INFORMATION		
PUMP TYPE	GRUNDFOS	SE1.80.100.30.EX.4.50D.B
IMPELLER		S-TUBE
MOTOR RATING		3.0 kW
FULL LOAD CURRENT		8.0 A FLC
ZONE RATING		EXP
DUTY FLOW		23.8 L/Sec
HEAD GENERATED		8.32m
LEVEL CONTROLS		HYDRORANGER ULTRASONIC C/W HIGH LEVEL ALARM AND BACK UP FLOAT SWITCHES
PIPE / VALVE SIZE		Ø150mm
FINAL DISCHARGE		
INTERNAL DIAMETER		Ø150mm
MATERIAL		DUCTILE IRON
TERMINATION		FLANGED
PIPE OD		Ø170mm
FLANGE DATA		Ø170mm OD DUCTILE
RISING MAIN		160MM OD PE100 SDR11 (129.7MM) BORE
RISING MAIN COUPLER		160MM OD PE CONVERTER
OPERATING LEVELS		
STORAGE LEVEL		N/A
INVERT OF INLET		66.020
INVERT OF H.L.A.		65.720
INVERT OF PUMP 2		65.620
INVERT OF PUMP 1		65.470
INVERT OF B.W.L.		64.300
INVERT OF WET WELL BASE		64.300
DEAD AREA		400mm
OPERATING DEPTH		1114mm
OPERATING VOLUME		4,058 Litres
PUMP FLOW		26.6 Litres / Second
FROM THE ABOVE : (4.058 X 2) ÷ (26.6 ÷ 2) = 610 SECONDS		
610 SECONDS DIVIDED INTO 3600 = 5.90 STARTS PER HOUR		
Telemetry		
This Will Be Supplied And Fitted By Yorkshire Water I.C.A. Department And Will Be Their Metasphere MMIM Telemetry Outstation.		



REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
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PDAS

Pump Design and Services Ltd

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PROJECT **LEE LANE ROYSTON**

TITLE **SURFACE WATER PUMP STATION ELEVATION VIEW**

CLIENT **BDW HOMES YORKSHIRE WEST**

SCALE AT A1	1:25	SCALE AT A3	1:50
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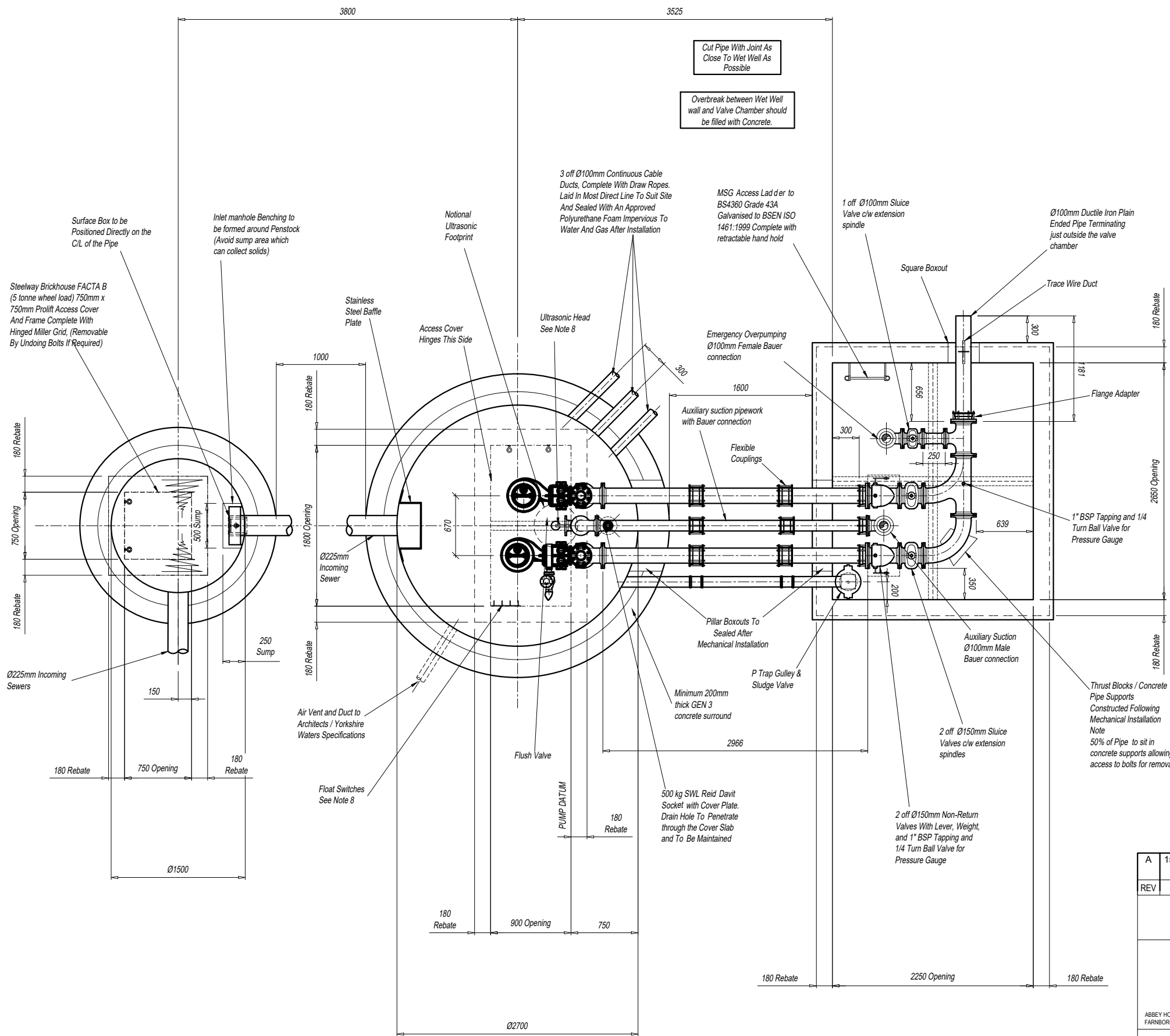
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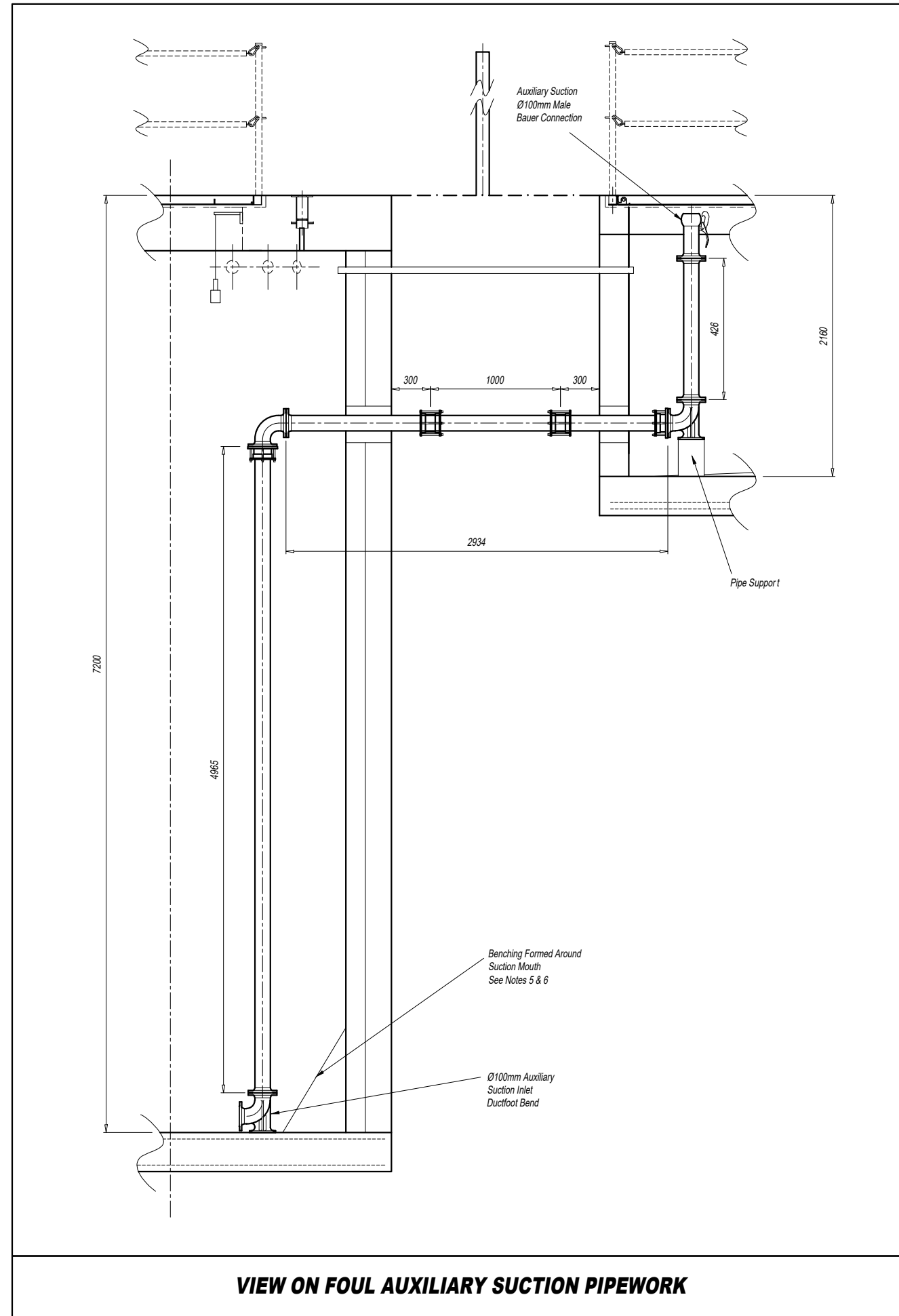
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- H. ALL ADOPTABLE SEWER WORKS & MATERIALS TO BE IN ACCORDANCE WITH THE SEWER FOR ADOPTION 7TH EDITION, THE RELEVANT BRITISH, EUROPEAN & YORKSHIRE WATER STANDARDS, REQUIREMENTS & ADDENDUM TO THE MECHANICAL & ELECTRICAL SPECIFICATION AND KIT MARKED.
- I. MINIMUM BAR LAP LENGTH 800MM.
- J. WET WELL AND VALVE CHAMBER COVERS TO BE AS SUPPLIED BY PUMP SUPPLIER AND BE RATED FACTA B (5 TONNE WHEEL LOAD)
- K. TO BE READ IN CONJUNCTION WITH THE CIVILS DETAILS.
- L. ANY OVER BREAK BETWEEN WET WELL AND VALVE CHAMBER TO BE FILLED WITH LEAN MIX CONCRETE.
- M. WET WELL TO BE CLEAN AND DRY BEFORE INSTALLATION OF PUMPS COMMENCES.
- N. DEWATERING TO BE PROVIDED IF NECESSARY AS WORKS PROCEED.
- O. FOUL WATER RISING MAIN TO BE 110MM OD PE100 SDR11 (89.1 ID) X 294.4M LONG.
- P. SURFACE WATER RISING MAIN TO BE 160MM OD PE100 SDR11 (129.7MM ID) X 85.5M LONG.
- Q. CUT OUT AND CUT IN LEVELS TO BE ESTABLISHED ON SITE BY PUMP SUPPLIER.
- R. THE BRACKET FOR HOLDING THE DAVIT EQUIPMENT SHOULD BE KEPT IN THE KIOSK.
- S. THRUST BLOCKS TO BE PROVIDED AT CHANGES IN DIRECTIONS.
- T. STATUTORY SERVICES TO PROVIDE ADEQUATE SERVICES TO PUMP STATION AND KIOSK AND TO ALLOW FOR ALL NECESSARY REQUIREMENTS.
- U. STAINLESS STEEL PUMP LIFTING CHAINS REQUIRED.
- V. ALL METAL FIXINGS TO BE STAINLESS STEEL.



REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
A	15/02/18	Minor Drawing notes amended.	L.C.	-	I.H.
<b>FOR APPROVAL</b>					
 <b>PDAS</b> Pump Design and Services Ltd <small>ABBAY HOUSE, 282 FARNBOROUGH ROAD, FARNBOROUGH, HAMPSHIRE, GU14 7NA OFFICE TEL No. (01256) 638020 WEBSITE WWW.PDASLTD.CO.UK</small>					
PROJECT <b>LEE LANE ROYSTON</b>					
TITLE <b>SURFACE WATER PUMP STATION AUXILIARY SUCTION PIPEWORK</b>					
CLIENT <b>BDW HOMES YORKSHIRE WEST</b>					
SCALE AT A1 <b>1:20</b>		SCALE AT A3 <b>1:40</b>			
QUOTE NUMBER	<b>Q10570</b>	APR'l	<b>I.H.</b>	DATE	<b>19-01-2018</b>
PROJECT REF.	<b>PR10369</b>	CHK'd	<b>L.C.</b>	DATE	<b>09-01-2018</b>
DRAWING NUMBER	<b>PR10369 - 006</b>	DR'n	<b>L.C.</b>	DATE	<b>09-01-2018</b>

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4. REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
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7. DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS TO BE LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
8. LEVEL CONTROL POSITIONS ARE DIAGRAMMATIC ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

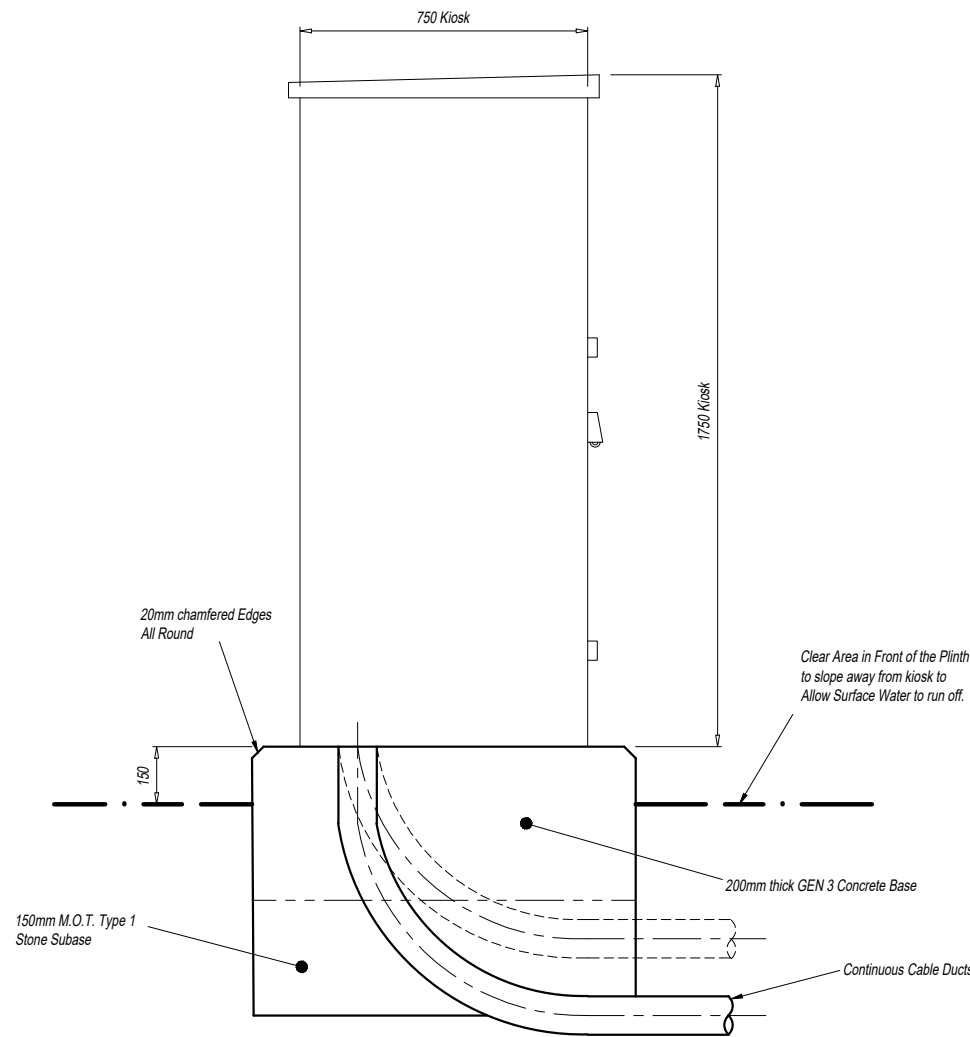
FOR CIVIL ENGINEERING DETAILS REFER TO  
ARP ASSOCIATES  
DRAWINGS

**YORKSHIRE WATER NOTES**

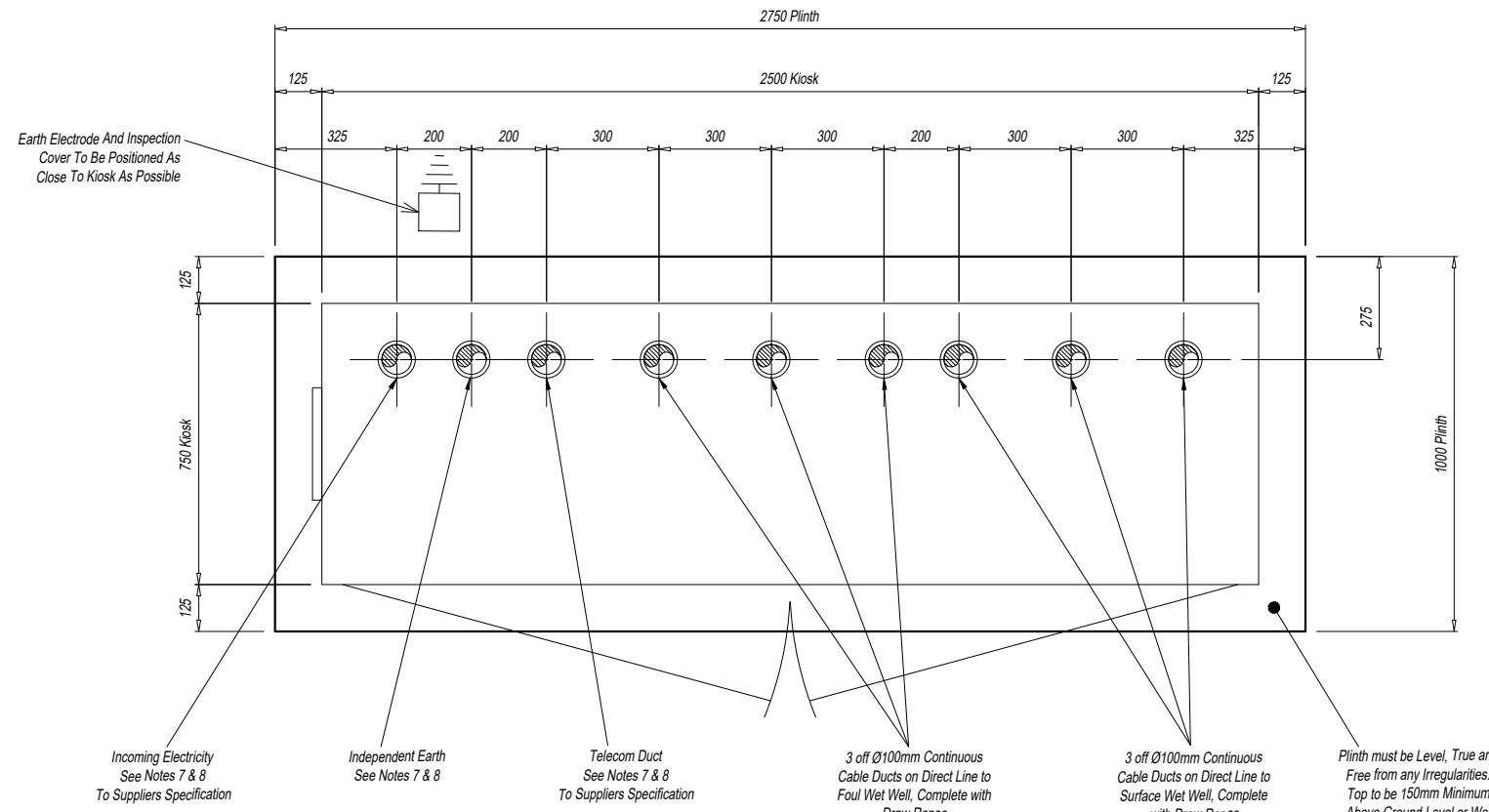
- A. COVER TO RE INFORCEMENT TO BE 40MM TO BOTH FACES.
- B. SPACERS TO BE 1200MM CENTRE TO CENTRE.
- C. CONCRETE TO BE 30 NMM AT 28 DAYS.
- D. GROUND BEARING PRESSURE TAKEN AS 50 KN/M.
- E. NO DAY WORK JOINTS PERMITTED IN SLABS.
- F. ALL SOFT SPOTS TO BE REMOVED AND REPLACED BY SUITABLE MATERIAL.
- G. PROVIDE 50MM BLINDING CONCRETE.
- H. ALL ADOPTABLE SEWER WORKS & MATERIALS TO BE IN ACCORDANCE WITH THE SEWER FOR ADOPTION 7TH EDITION, THE RELEVANT BRITISH, EUROPEAN & YORKSHIRE WATER STANDARDS, REQUIREMENTS & ADDENDUM TO THE MECHANICAL & ELECTRICAL SPECIFICATION AND KIT MARKED.
- I. MINIMUM BAR LAP LENGTH 800MM.
- J. WET WELL AND VALVE CHAMBER COVERS TO BE AS SUPPLIED BY PUMP SUPPLIER AND BE RATED FACTA B (5 TONNE WHEEL LOAD)
- K. TO BE READ IN CONJUNCTION WITH THE CIVILS DETAILS.
- L. ANY OVER BREAK BETWEEN WET WELL AND VALVE CHAMBER TO BE FILLED WITH LEAN MIX CONCRETE.
- M. WET WELL TO BE CLEAN AND DRY BEFORE INSTALLATION OF PUMPS COMMENCES.
- N. DEWATERING TO BE PROVIDED IF NECESSARY AS WORKS PROCEED.
- O. FOUL WATER RISING MAIN TO BE 110MM OD PE100 SDR11 (89.1 ID) X 294.4M LONG.
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- S. THRUST BLOCKS TO BE PROVIDED AT CHANGES IN DIRECTIONS.
- T. STATUTORY SERVICES TO PROVIDE ADEQUATE SERVICES TO PUMP STATION AND KIOSK AND TO ALLOW FOR ALL NECESSARY REQUIREMENTS.
- U. STAINLESS STEEL PUMP LIFTING CHAINS REQUIRED.
- V. ALL METAL FIXINGS TO BE STAINLESS STEEL.

**KIOSK NOTES**

- KIOSK DOORS FITTED WITH TRIANGULAR KEYED CAMLOCKS AT THE TOP AND BOTTOM OF EACH DOOR AND A SECURE HARDENED HASP AND STAPLE TO TAKE A YORKSHIRE WATER SIZED SERVICES PADLOCK
- WHEN INSTALLATION IS COMPLETE ALL CABLE DUCTS TO BE CUT LEVEL WITH TOP OF PLINTH. THE DUCTS WITHIN THE WET WELL SHOULD NOT BE SEALED WITH FOAM, THEY SHOULD BE SEALED WITHIN THE KIOSK. ALL DUCTS AT THE KIOSK SHOULD BE SEALED USING GAS TIGHT SEALING PUTTY TO 10ATEX 137 DIRECTIVE.
- THE KIOSK MUST BE LOCATED A MIN. 2M AWAY FROM THE WET WELL AND VALVE CHAMBER.



**VIEW ON ARROW Z**



Tolerance on Duct Centre Positions  $\pm 10\text{mm}$   
All Ducts To Be Cut Level With Top Of Plinth

A	15/02/18	Minor Drawing notes amended.	L.C.	-	I.H.
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
<b>FOR APPROVAL</b>					
 Pump Design and Services Ltd ABBEY HOUSE, 282 FARNBOROUGH ROAD, FARNBOROUGH, HAMPSHIRE, GU14 7NA OFFICE TEL No. (01256) 638020 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT <b>LEE LANE ROYSTON</b>					
TITLE <b>COMMON PUMP STATION KIOSK AND PLINTH DETAIL</b>					
CLIENT <b>BDW HOMES YORKSHIRE WEST</b>					
SCALE AT A1 <b>1:10</b>		SCALE AT A3 <b>1:20</b>			
QUOTE NUMBER <b>Q10570</b>	APR'l <b>I.H.</b>	DATE <b>19-01-2018</b>			
PROJECT REF. <b>PR10369</b>	CHK'd <b>L.C.</b>	DATE <b>09-01-2018</b>			
DRAWING NUMBER <b>PR10369 - 007</b>	DR'n <b>L.C.</b>	DATE <b>09-01-2018</b>			

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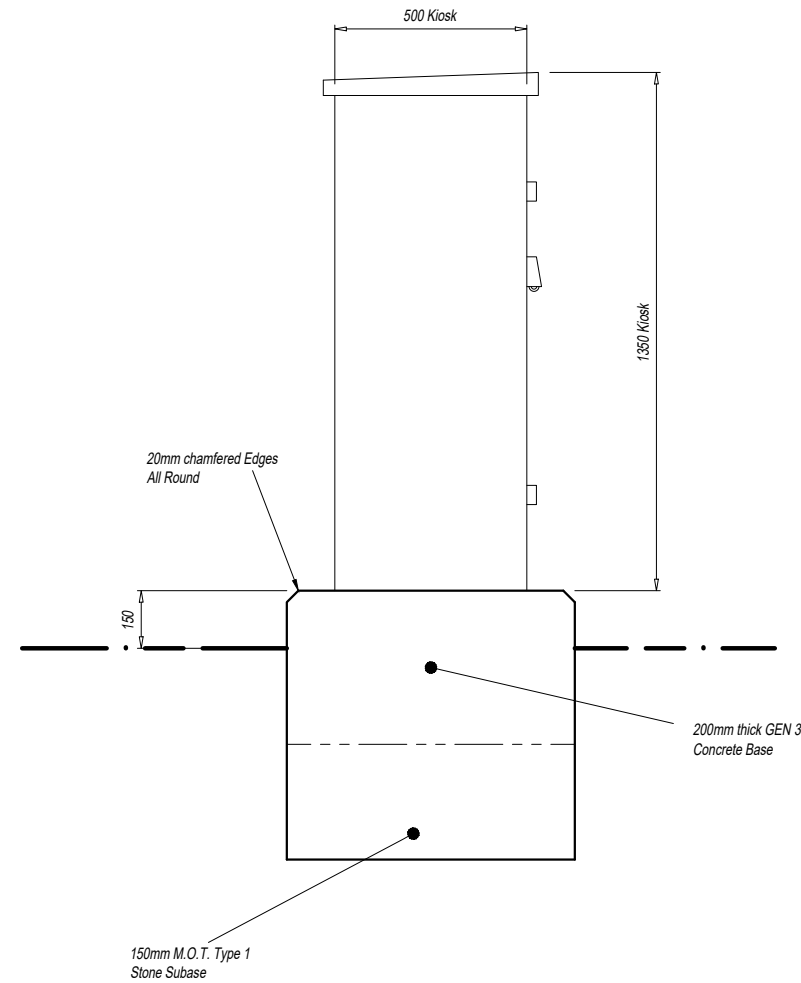
FOR CIVIL ENGINEERING DETAILS REFER TO  
ARP ASSOCIATES  
DRAWINGS

**YORKSHIRE WATER NOTES**

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- C. CONCRETE TO BE 30 NMM AT 28 DAYS.
- D. GROUND BEARING PRESSURE TAKEN AS 50 KN/M.
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- F. ALL SOFT SPOTS TO BE REMOVED AND REPLACED BY SUITABLE MATERIAL.
- G. PROVIDE 50MM BLINDING CONCRETE.
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- O. FOUL WATER RISING MAIN TO BE 110MM OD PE100 SDR11 (89.1 ID) X 294.4M LONG.
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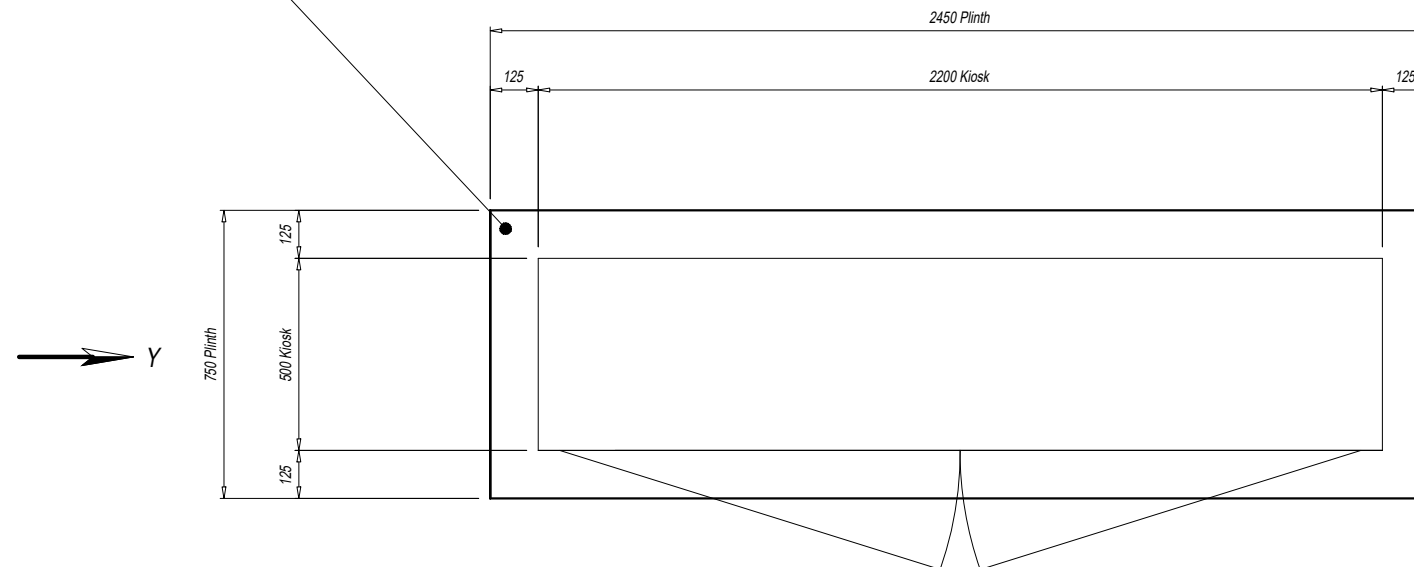
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- THE KIOSK MUST BE LOCATED A MIN. 2M AWAY FROM THE WET WELL AND VALVE CHAMBER.



**VIEW ON ARROW Y**

*Plinth must be Level, True and Free from any Irregularities. Top to be 150mm Minimum Above Ground Level or Wet Well Cover Slab Level (Whichever is higher).*



A	15/02/18	Minor Drawing notes amended.	L.C.	-	I.H.
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
<b>FOR APPROVAL</b>					
 <b>PDAS</b> Pump Design and Services Ltd <small>ABBEY HOUSE, 282 FARNBOROUGH ROAD, FARNBOROUGH, HAMPSHIRE, GU14 7NA OFFICE TEL No. (01256) 638020 WEBSITE WWW.PDASLTD.CO.UK</small>					
PROJECT <b>LEE LANE ROYSTON</b>					
TITLE <b>COMMON PUMP STATION STORAGE KIOSK AND PLINTH</b>					
CLIENT <b>BDW HOMES YORKSHIRE WEST</b>					
SCALE AT A1 <b>1:10</b>		SCALE AT A3 <b>1:20</b>			
QUOTE NUMBER	<b>Q10570</b>	APR'l	<b>I.H.</b>	DATE	<b>19-01-2018</b>
PROJECT REF.	<b>PR10369</b>	CHK'd	<b>L.C.</b>	DATE	<b>09-01-2018</b>
DRAWING NUMBER	<b>PR10369 - 008</b>	DR'n	<b>L.C.</b>	DATE	<b>09-01-2018</b>

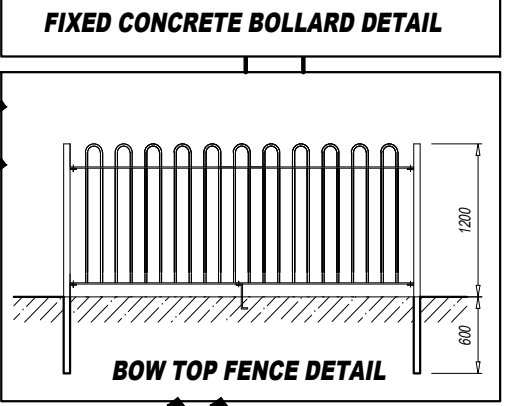
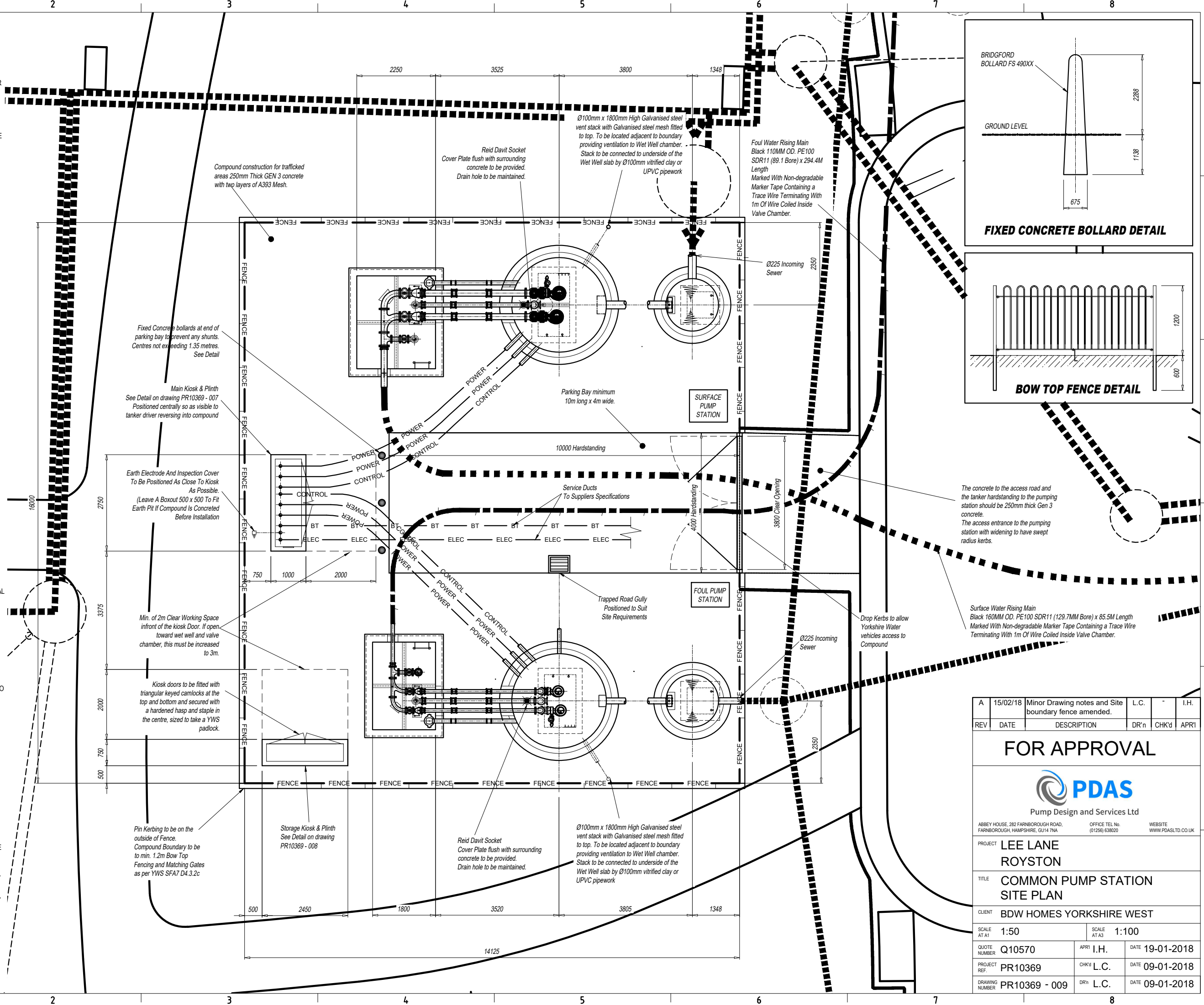
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FOR CIVIL ENGINEERING DETAILS REFER TO  
ARP ASSOCIATES  
DRAWINGS

**YORKSHIRE WATER NOTES**

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A	15/02/18	Minor Drawing notes and Site boundary fence amended.	L.C.	I.H.
REV	DATE	DESCRIPTION	DR'n	CHK'd
				APR1

FOR APPROVAL

PDAS

Pump Design and Services Ltd

ABBEY HOUSE, 282 FARNBOROUGH ROAD, FARNBOROUGH, HAMPSHIRE, GU14 7NA  
 OFFICE TEL No. (01256) 638020 WEBSITE WWW.PDASLTD.CO.UK

PROJECT **LEE LANE ROYSTON**

TITLE **COMMON PUMP STATION SITE PLAN**

CLIENT **BDW HOMES YORKSHIRE WEST**

SCALE AT A1: <b>1:50</b>	SCALE AT A3: <b>1:100</b>
QUOTE NUMBER: <b>Q10570</b>	APR1 I.H. DATE <b>19-01-2018</b>
PROJECT REF: <b>PR10369</b>	CHK'd L.C. DATE <b>09-01-2018</b>
DRAWING NUMBER: <b>PR10369 - 009</b>	DR'n L.C. DATE <b>09-01-2018</b>

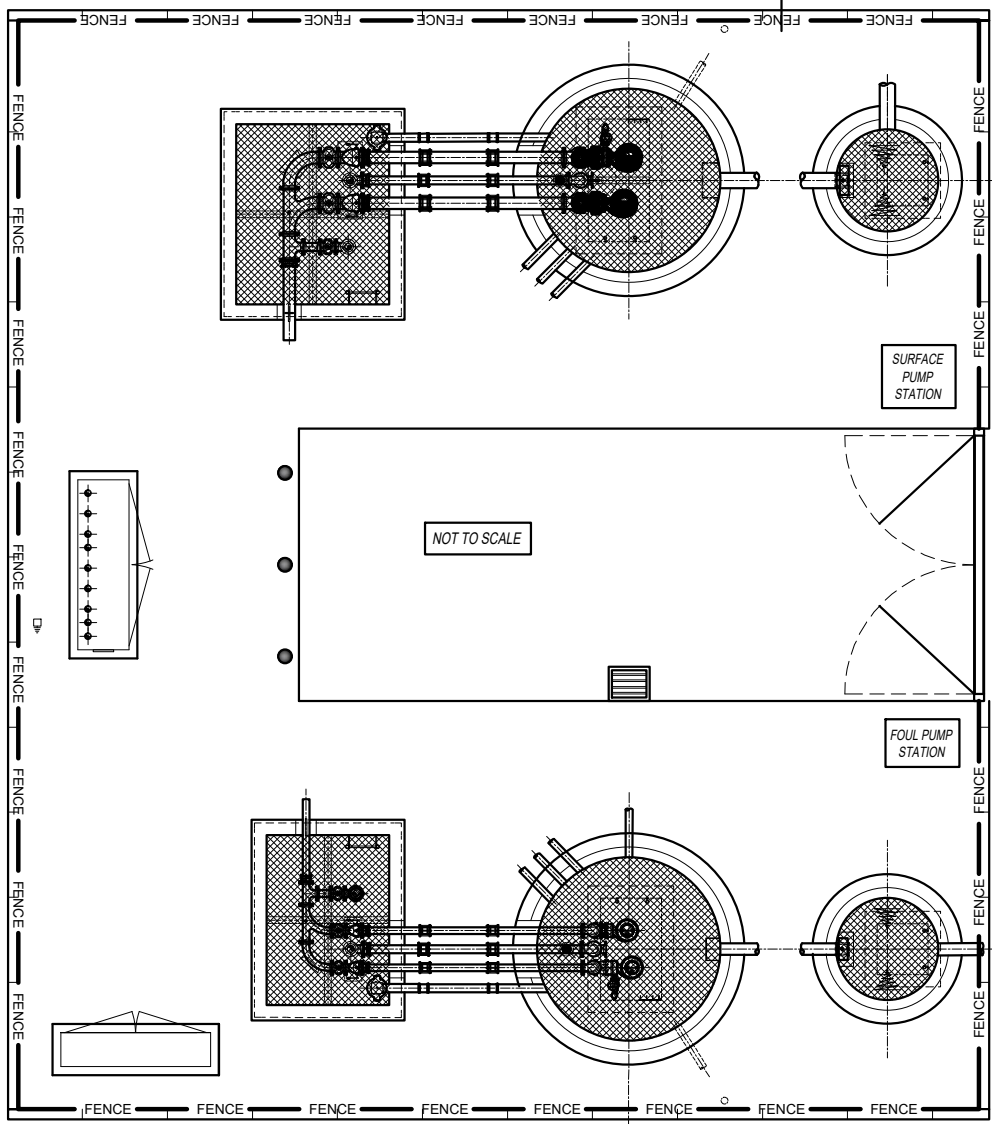
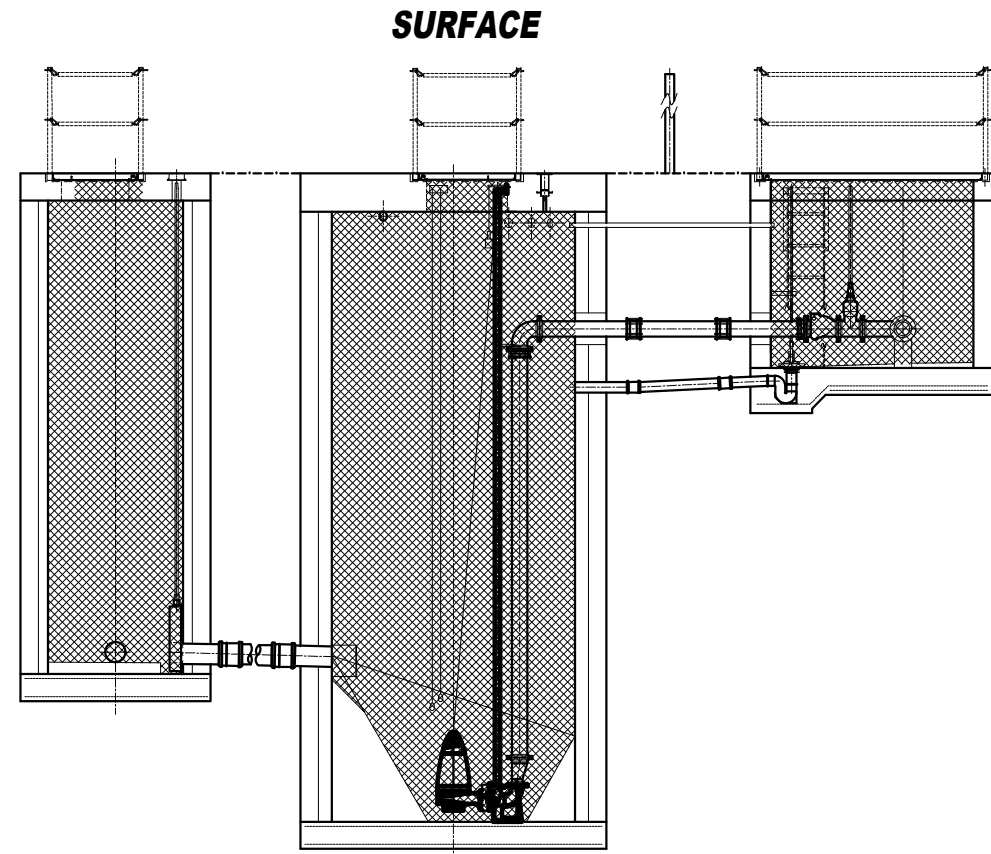
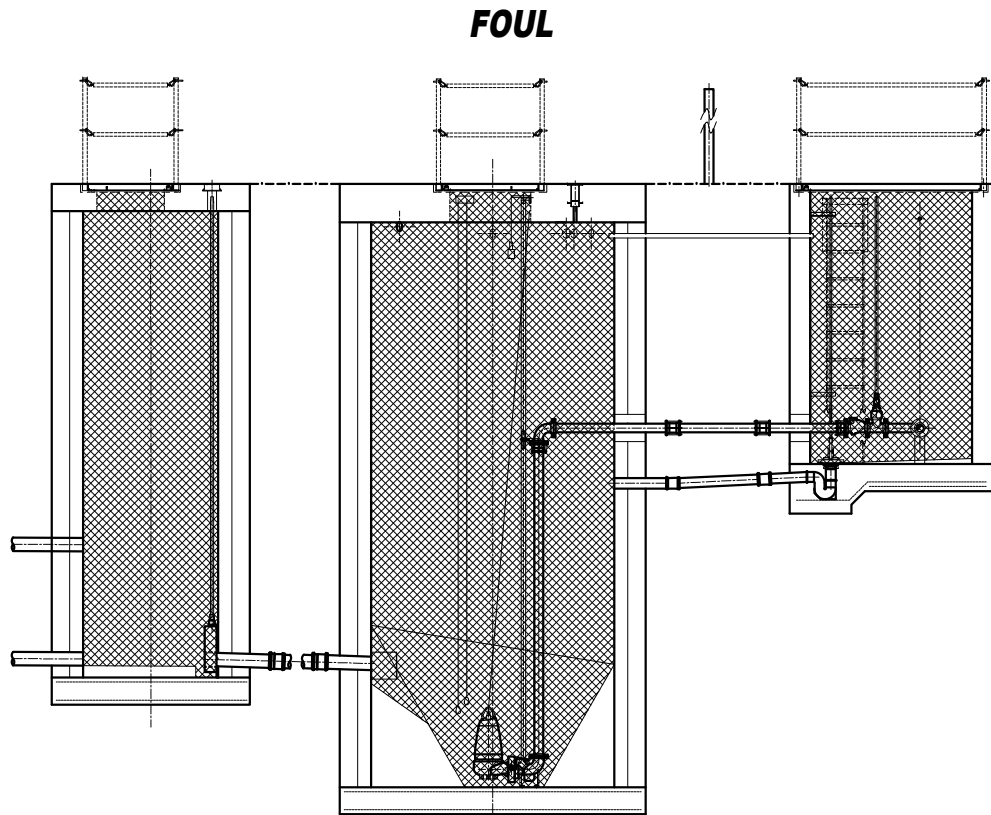
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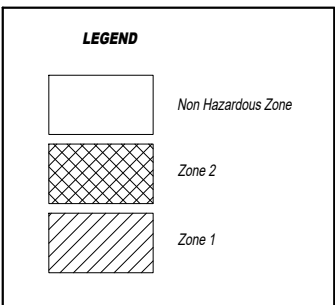
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**YORKSHIRE WATER NOTES**

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Cable Ducts in accordance with SFA7 F.3.4.4 and BS EN 1401-01 & BS 4660 sealed with rise sealant system Gas + waterproof sealant system



REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
A	15/02/18	Minor Drawing notes amended.	L.C.	-	I.H.

**FOR APPROVAL**



ABBAY HOUSE, 282 FARNBOROUGH ROAD, FARNBOROUGH, HAMPSHIRE, GU14 7NA OFFICE TEL No. (01256) 638020 WEBSITE WWW.PDASLTD.CO.UK

PROJECT **LEE LANE ROYSTON**

TITLE **COMMON PUMP STATION HAZARDOUS ZONING**

CLIENT **BDW HOMES YORKSHIRE WEST**

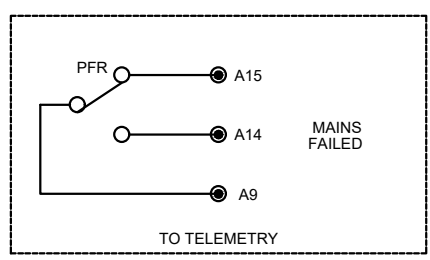
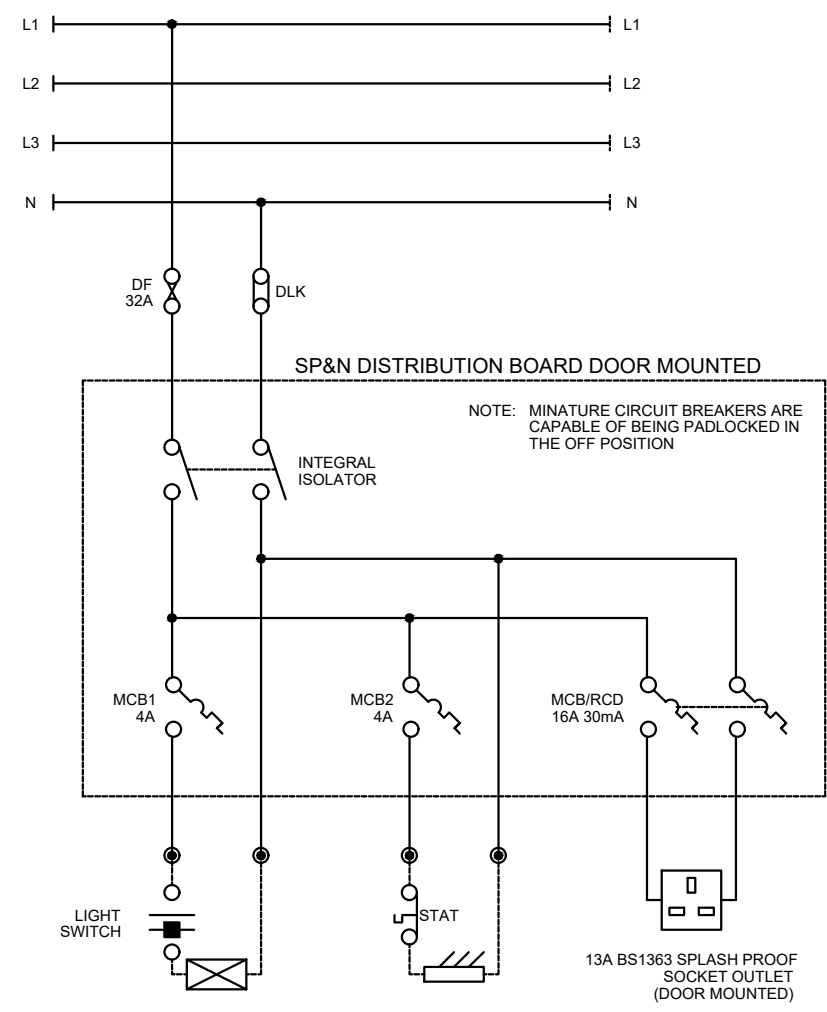
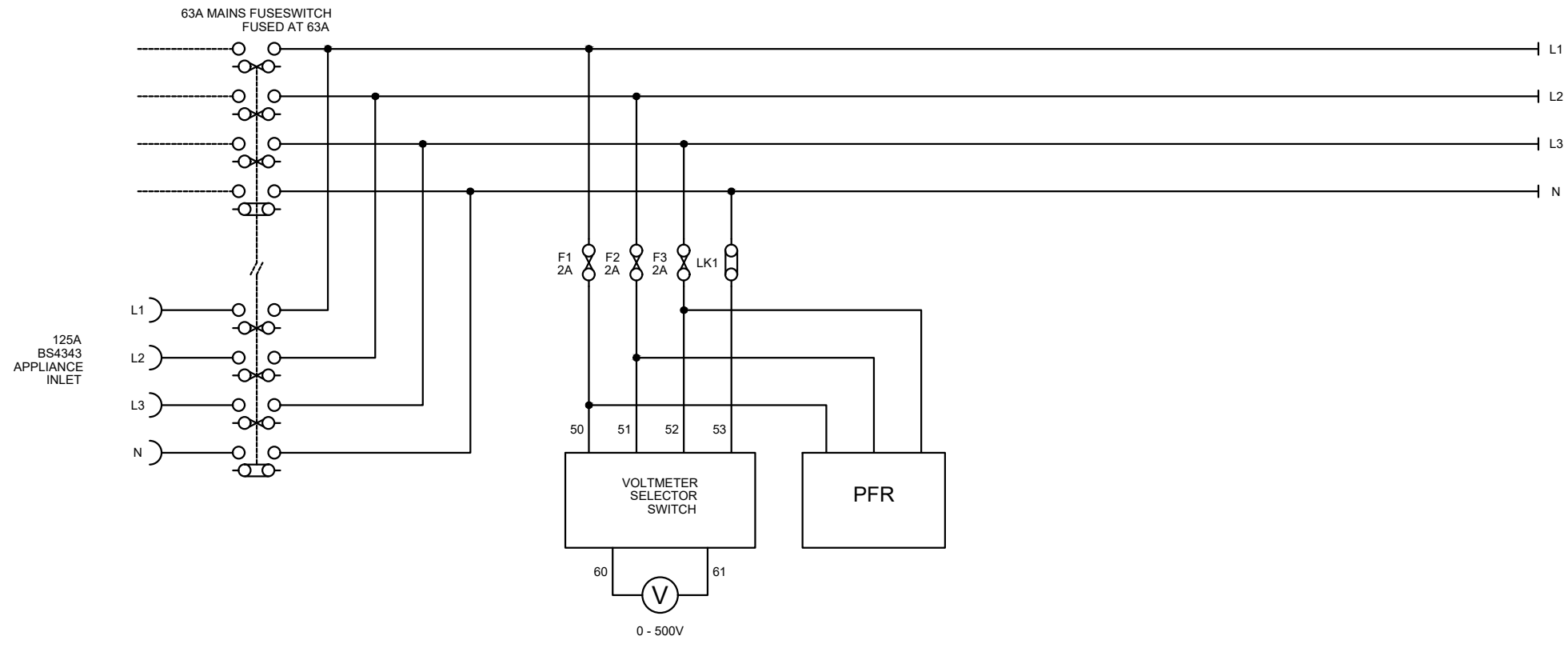
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QUOTE NUMBER **Q10570** APR'l **I.H.** DATE **19-01-2018**

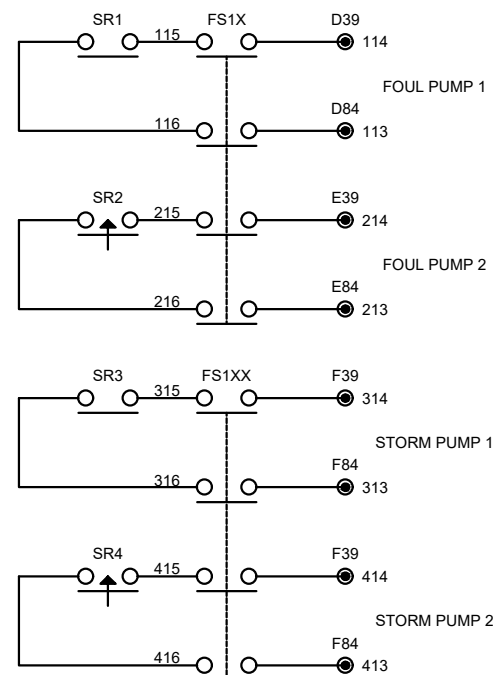
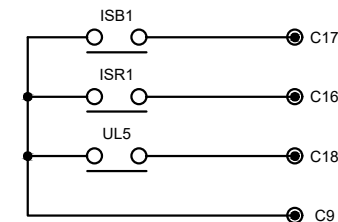
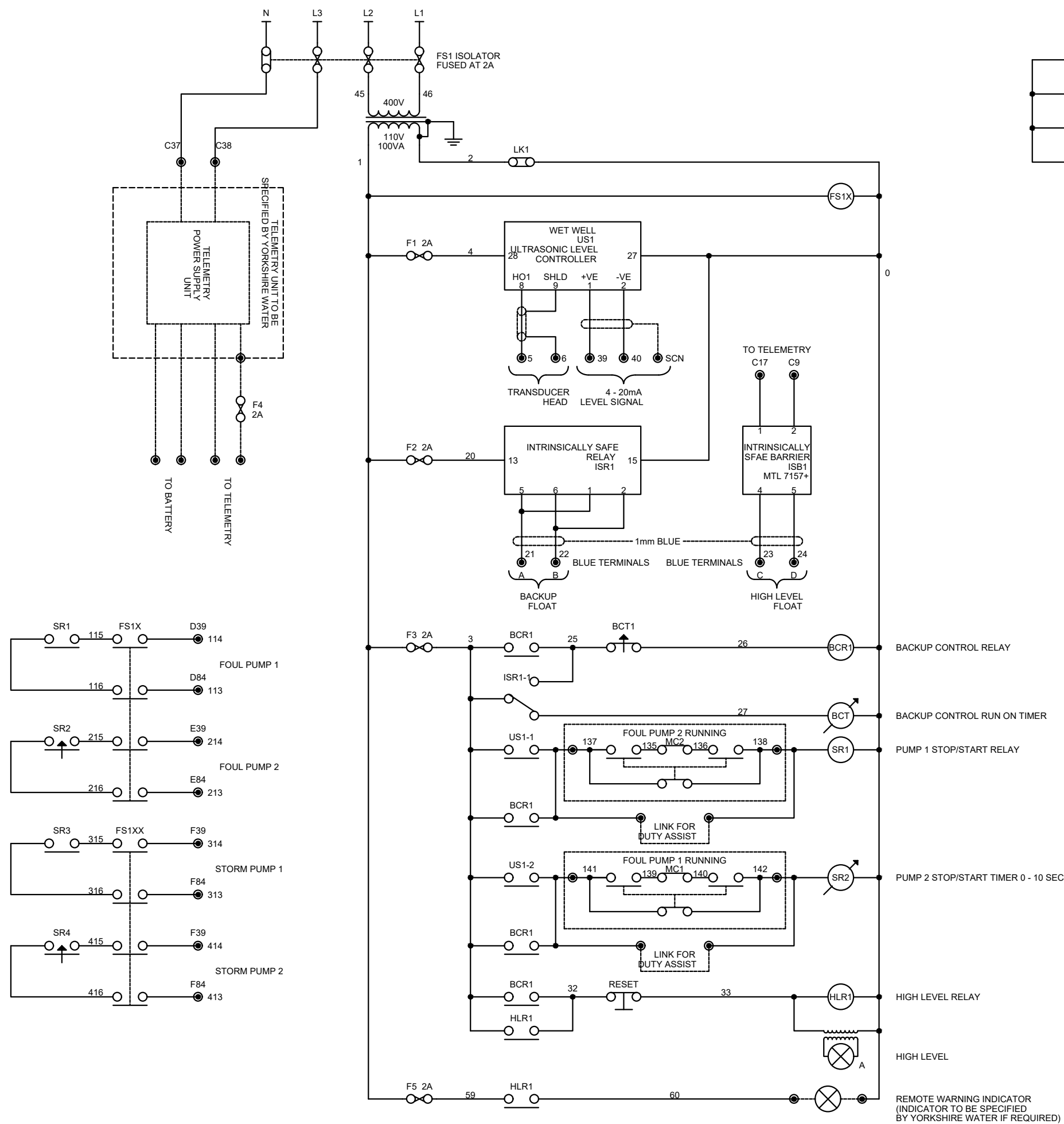
PROJECT REF. **PR10369** CHK'd **L.C.** DATE **09-01-2018**

DRAWING NUMBER **PR10369 - 010** DR'n **L.C.** DATE **09-01-2018**

**Appendix E**  
**Wiring Diagrams**

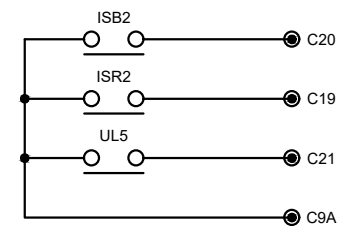
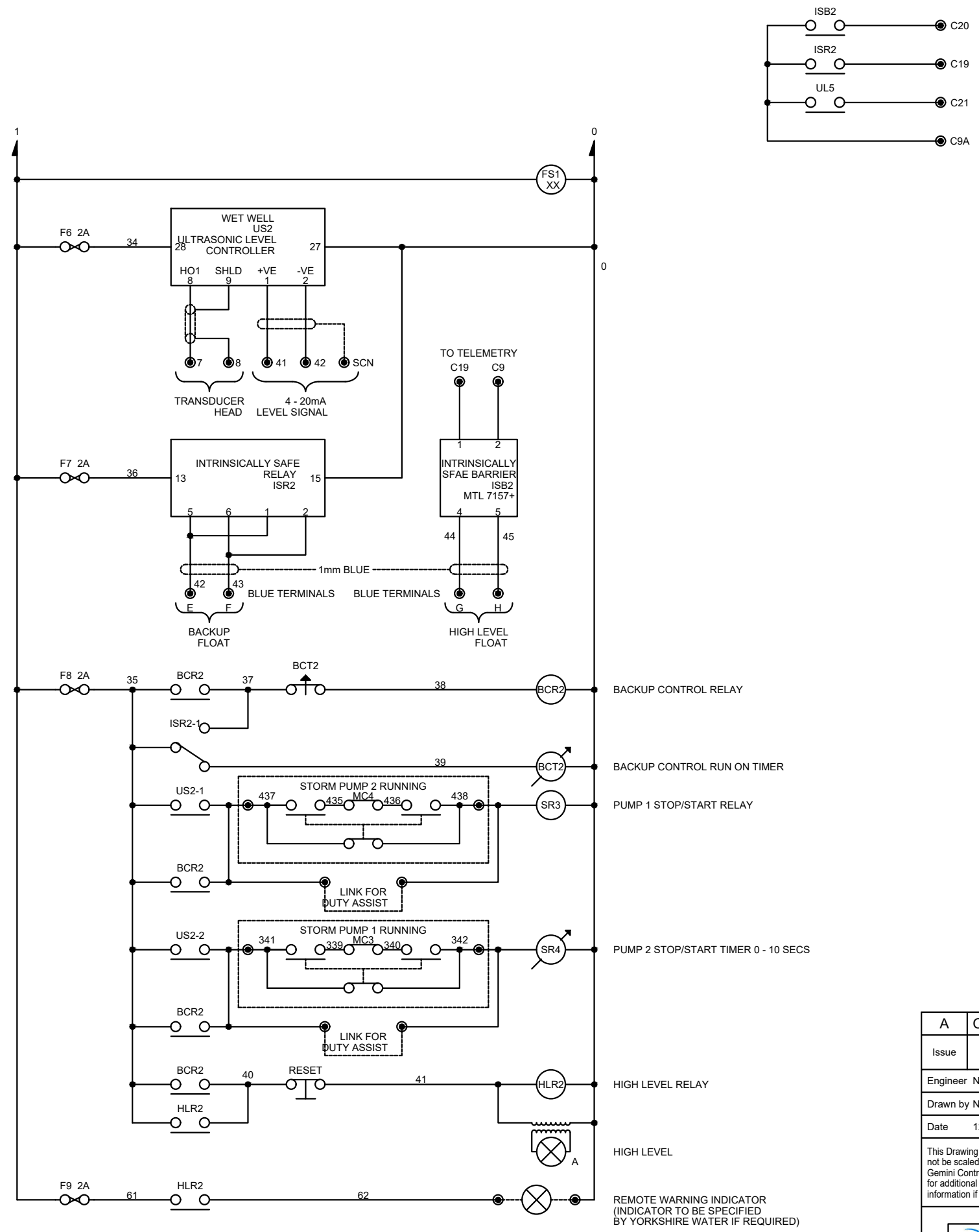




A	ORIGINAL ISSUE	I.Handem	N.Smith	12/02/18
Issue	Description	Request by	Insert by	Date
Engineer N. Smith	Customer name	 gemini control systems Ltd designers and manufacturers 0844 800 4250 www.gemini-controls.com		
Drawn by N. Smith	BDW Homes Yorkshire West			
Date 12/02/18	Lee Lane, Royston			
This Drawing should not be scaled. Refer to Gemini Control Systems Ltd for additional information if required.	Gemini ref: GC	This document may not, without our permission, be copied shown or handed out to competitors or any other unauthorized persons		
	Customer ref: PR10369	Title: INCOMER		
 Pump Design and Services Ltd	Pump Design and Services Ltd Abbey House 282 Farnborough Road Farnborough Hampshire GU14 7NA Tel: 01256 638020 Email: info@pdasitd.co.uk	Scale:	NTS	
		Drawing Number	WD10369-1	
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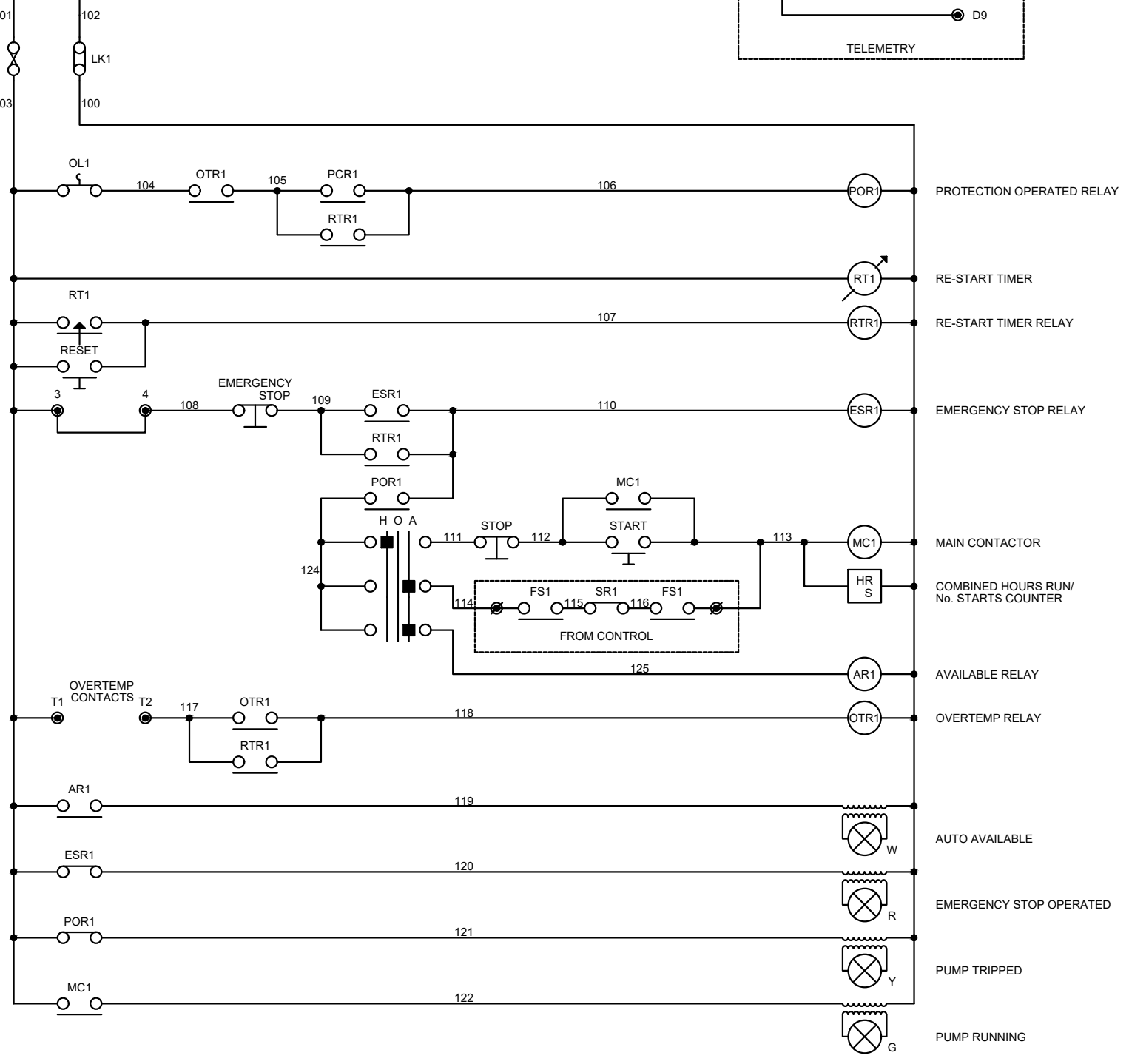
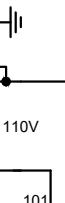
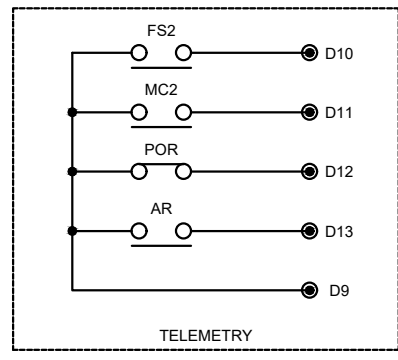
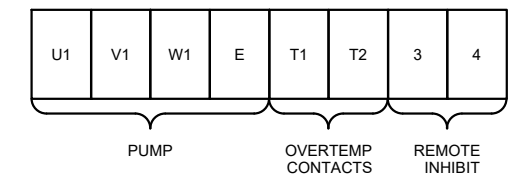
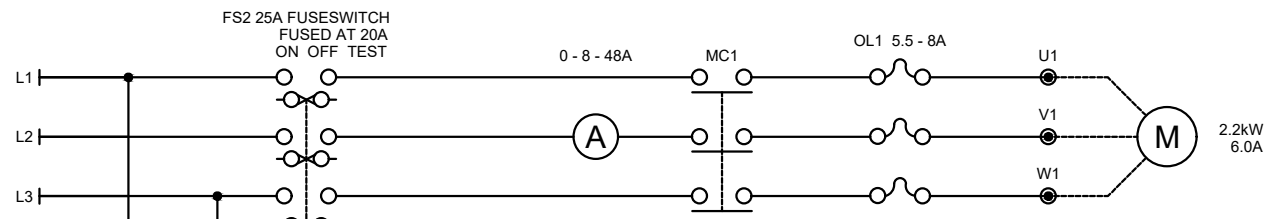
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A	ORIGINAL ISSUE	I.Handem	N.Smith	12/02/18
Engineer	N. Smith	Customer name	BDW Homes Yorkshire West Lee Lane, Royston	
Drawn by	N. Smith	Gemini ref:	GC	
Date	12/02/18	Customer ref:	PR10369	
This Drawing should not be scaled. Refer to Gemini Control Systems Ltd for additional information if required.		Title:		CONTROLS
Pump Design and Services Ltd Abbey House 282 Farnborough Road Farnborough Hampshire GU14 7NA Tel: 01256 638020 Email: info@pdasitd.co.uk		Scale:	NTS	
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		Issue	A	



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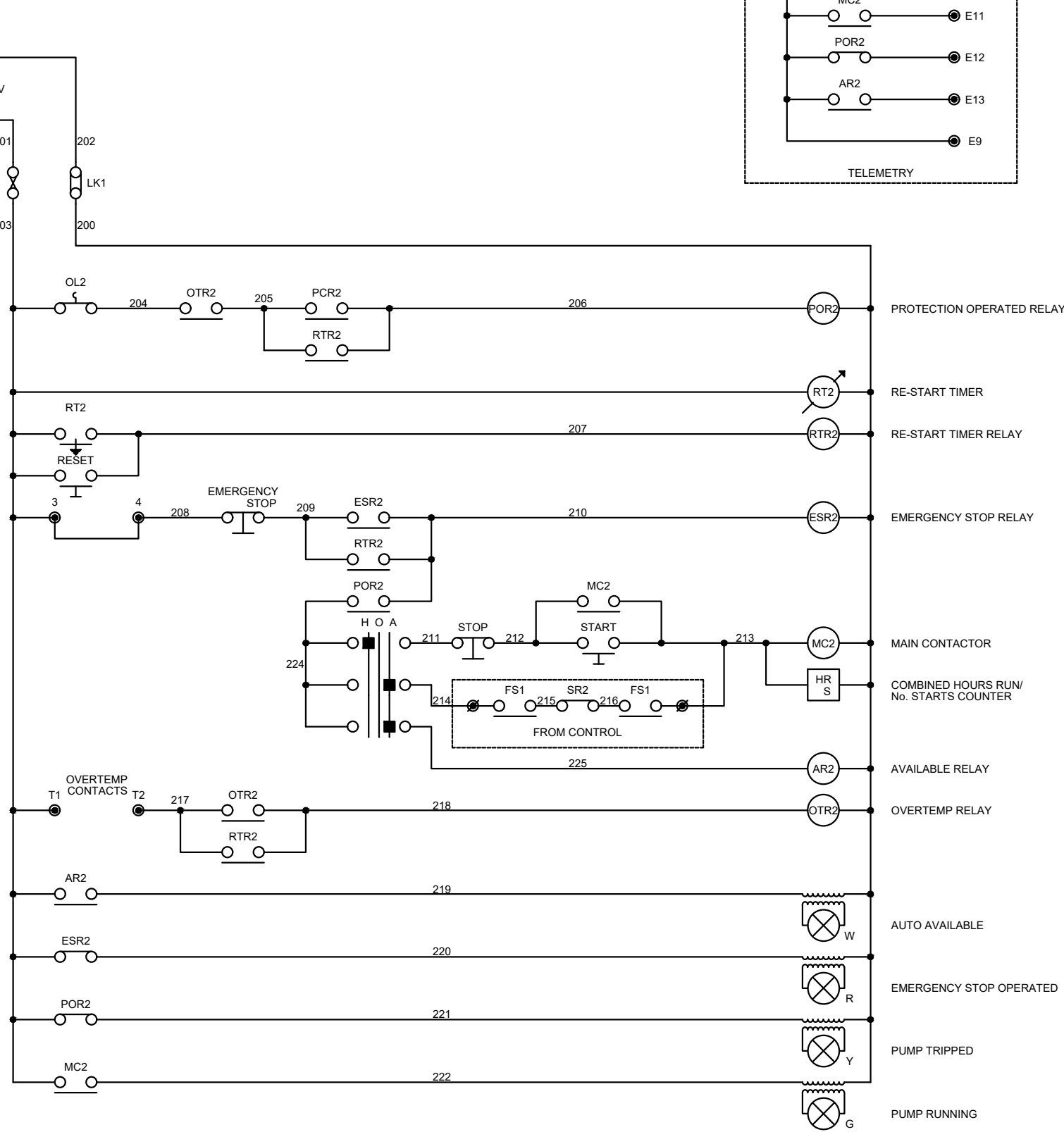
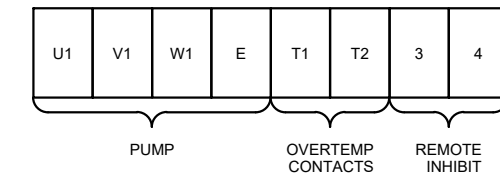
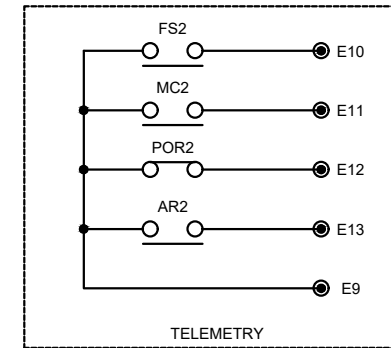
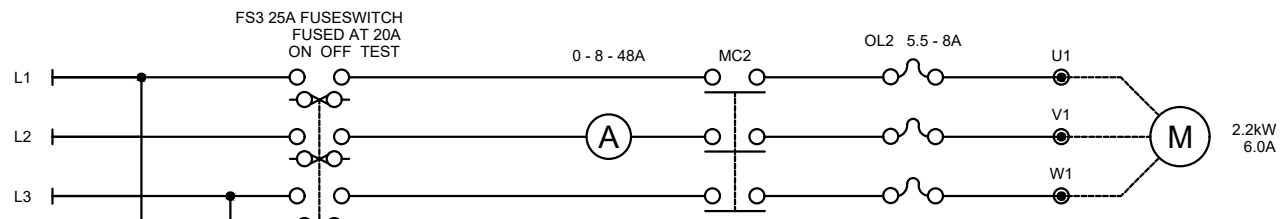


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Issue	Description	Request by	Insert by	Date
Engineer N. Smith	Customer name	 gemini control systems ltd designers and manufacturers 0844 800 4250 0844 800 4251 www.gemini-controls.com		
Drawn by N. Smith	BDW Homes Yorkshire West			
Date 12/02/18	Lee Lane, Royston			
This Drawing should not be scaled. Refer to Gemini Control Systems Ltd for additional information if required.	Gemini ref: GC	This document may not, without our permission, be copied shown or handed out to competitors or any other unauthorized persons		
	Customer ref: PR10369	Title: CONTROLS		
 Pump Design and Services Ltd Pump Design and Services Ltd Abbey House 282 Farnborough Road Farnborough Hampshire GU14 7NA Tel: 01256 638020 Email: info@pdasitd.co.uk		Scale:	NTS	
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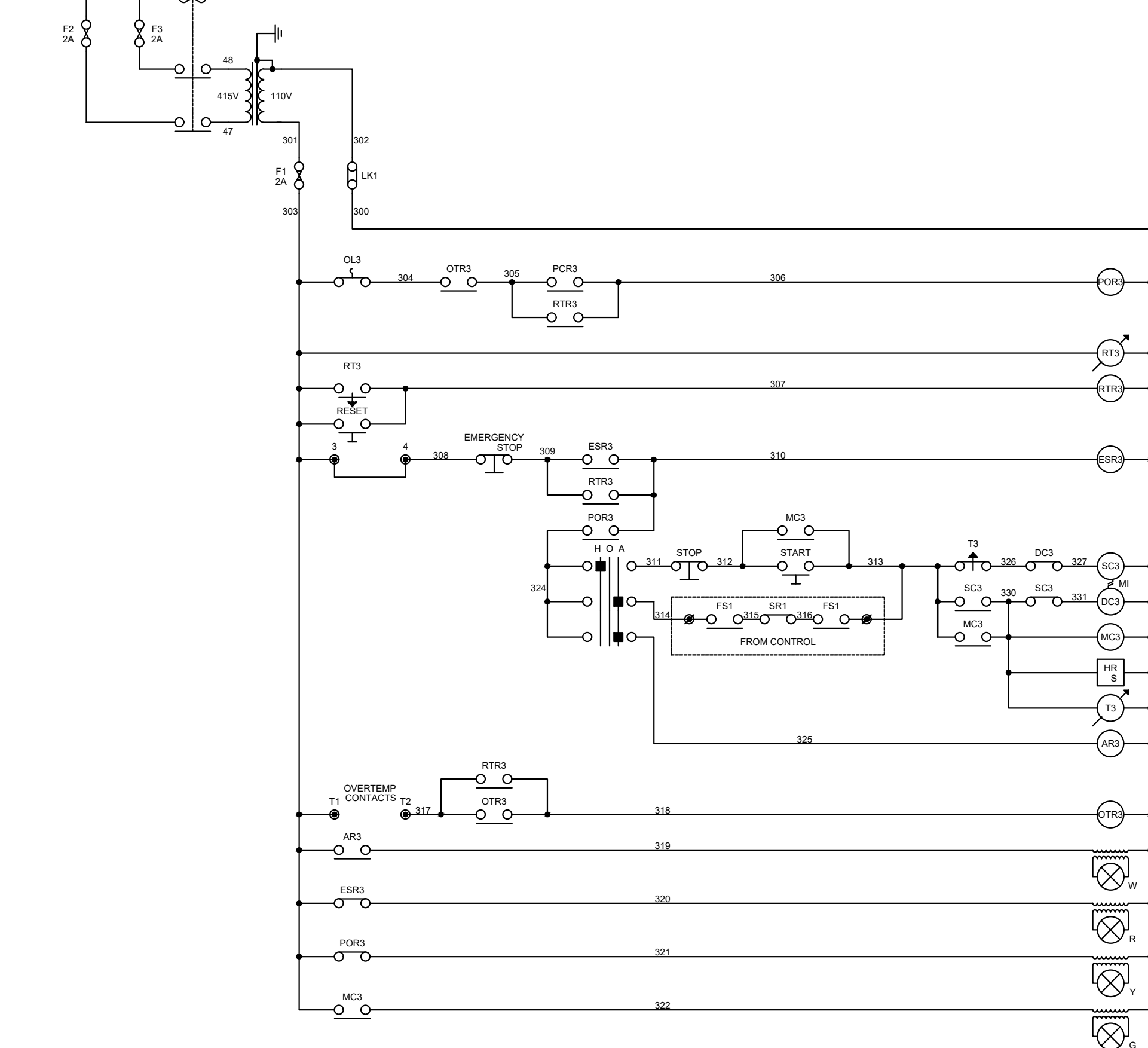
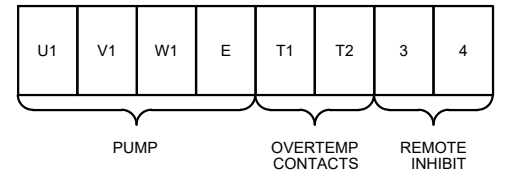
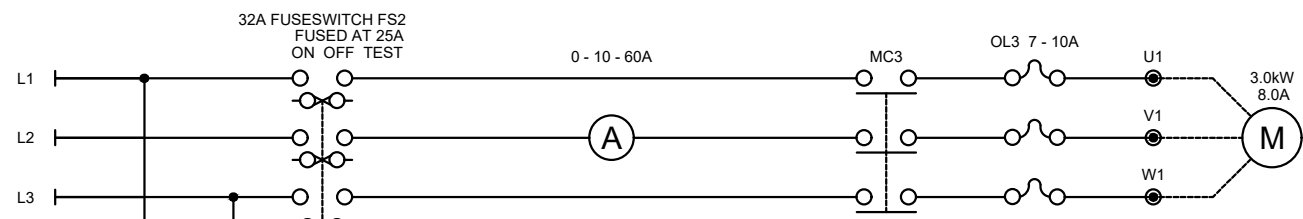
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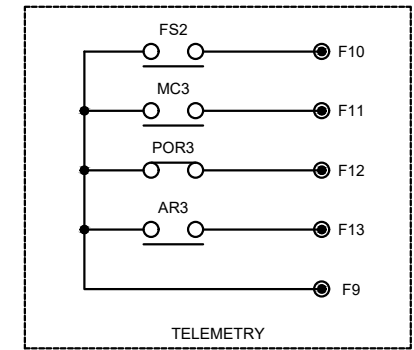
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Issue	Description	Request by	Insert by	Date
Engineer N. Smith	Customer name	 <b>gemini control systems ltd</b> designers and manufacturers 0844 800 4250 0844 800 4251 www.gemini-controls.com		
Drawn by N. Smith	BDW Homes Yorkshire West			
Date 12/02/18	Lee Lane, Royston			
This Drawing should not be scaled. Refer to Gemini Control Systems Ltd for additional information if required.	Gemini ref: GC	This document may not, without our permission, be copied shown or handed out to competitors or any other unauthorized persons		
	Customer ref: PR10369	Title: FOUL PUMP STARTER 1		
 Pump Design and Services Ltd Abbey House 282 Farnborough Road Farnborough Hampshire GU14 7NA Tel: 01256 638020 Email: info@pdasitd.co.uk		Scale:		
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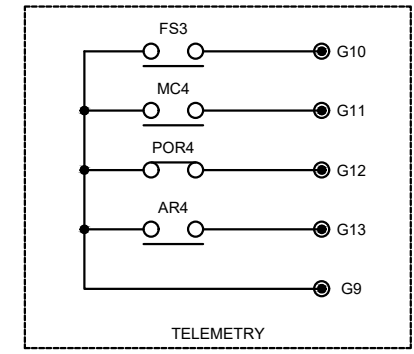
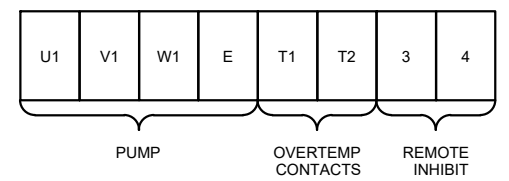
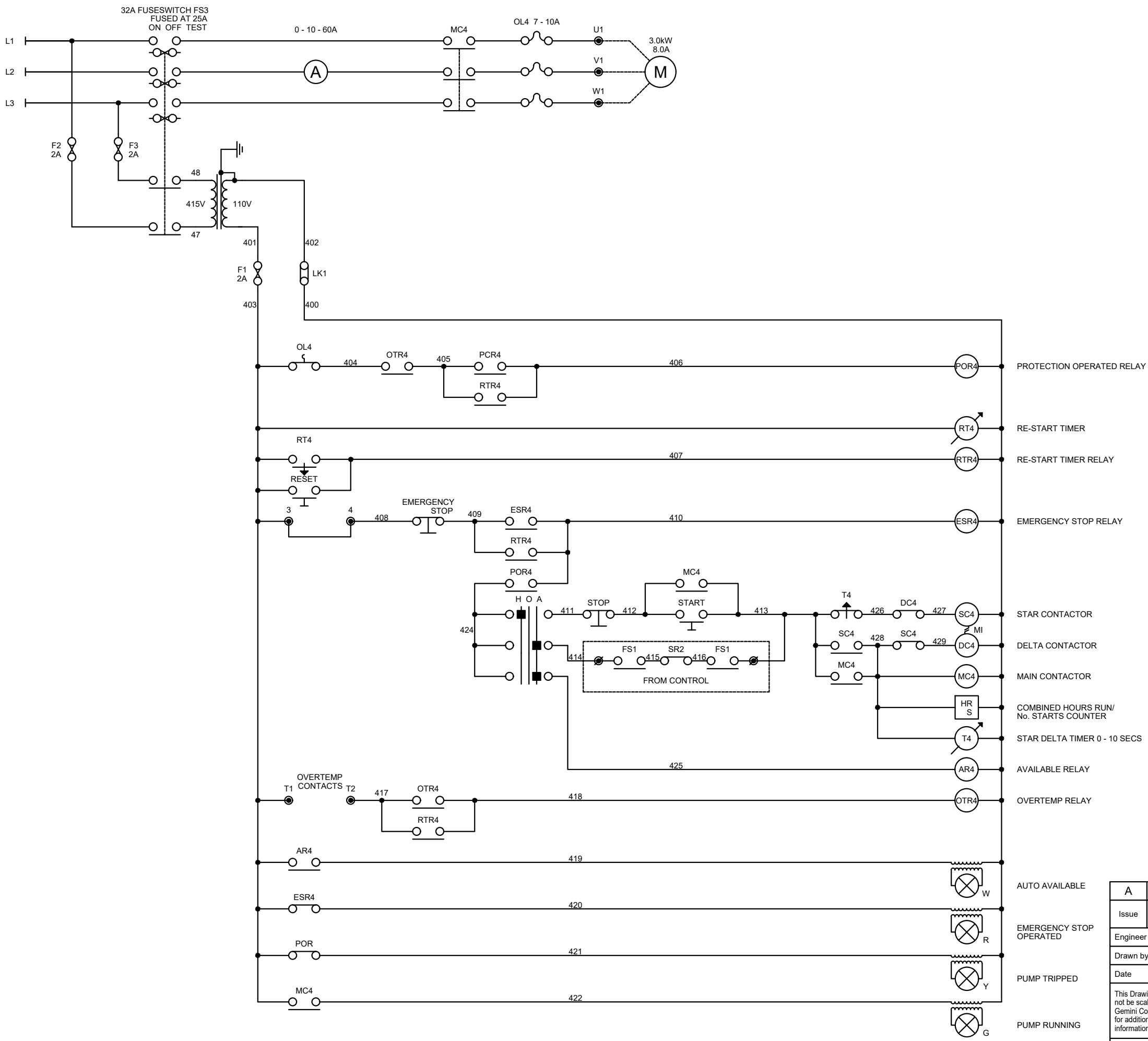
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Issue	Description	Request by	Insert by	Date
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Drawn by N. Smith	BDW Homes Yorkshire West			
Date 12/02/18	Lee Lane, Royston	Gemini ref: GC	This document may not, without our permission, be copied shown or handed out to competitors or any other unauthorized persons	
This Drawing should not be scaled. Refer to Gemini Control Systems Ltd for additional information if required.		Customer ref: PR10369	Title: FOUL PUMP STARTER 2	
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		Drawing Number	WD10369-5	
				Issue
				A



- POR3 PROTECTION OPERATED RELAY
- RT3 RE-START TIMER
- RTR3 RE-START TIMER RELAY
- ESR3 EMERGENCY STOP RELAY
- SC3 STAR CONTACTOR
- DC3 DELTA CONTACTOR
- MC3 MAIN CONTACTOR
- HR S COMBINED HOURS RUN/ No. STARTS COUNTER
- T3 STAR DELTA TIMER 0 - 10 SECS
- AR3 AVAILABLE RELAY
- OTR3 OVERTEMP RELAY
- W AUTO AVAILABLE
- R EMERGENCY STOP OPERATED
- Y PUMP TRIPPED
- G PUMP RUNNING

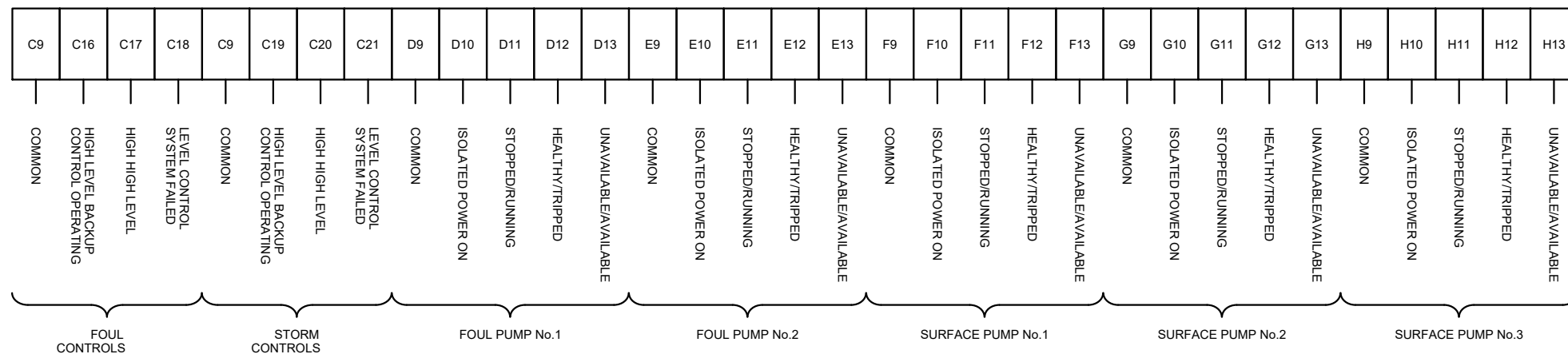
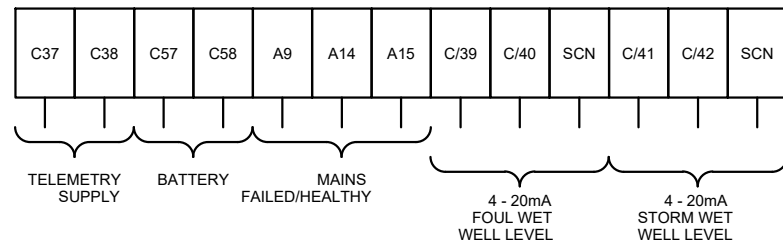




<b>A</b>	<b>ORIGINAL ISSUE</b>	I.Handem	N.Smith	12/02/18
Issue	Description	Request by	Insert by	Date
Engineer N. Smith	Customer name	<b>gemini control systems ltd</b> designers and manufacturers 0844 800 4250 0844 800 4251 www.gemini-controls.com		
Drawn by N. Smith	BDW Homes Yorkshire West			
Date 12/02/18	Lee Lane, Royston			
This Drawing should not be scaled. Refer to Gemini Control Systems Ltd for additional information if required.	Gemini ref: <b>GC</b>	This document may not, without our permission, be copied shown or handed out to competitors or any other unauthorized persons		
	Customer ref: <b>PR10369</b>	Title: <b>SURFACE PUMP STARTER 1</b>		
<b>PDAS</b> Pump Design and Services Ltd	Pump Design and Services Ltd Abbey House 282 Farnborough Road Farnborough Hampshire GU14 7NA Tel: 01256 638020 Email: info@pdasitd.co.uk	Scale:		
			<b>NTS</b>	Drawing Number
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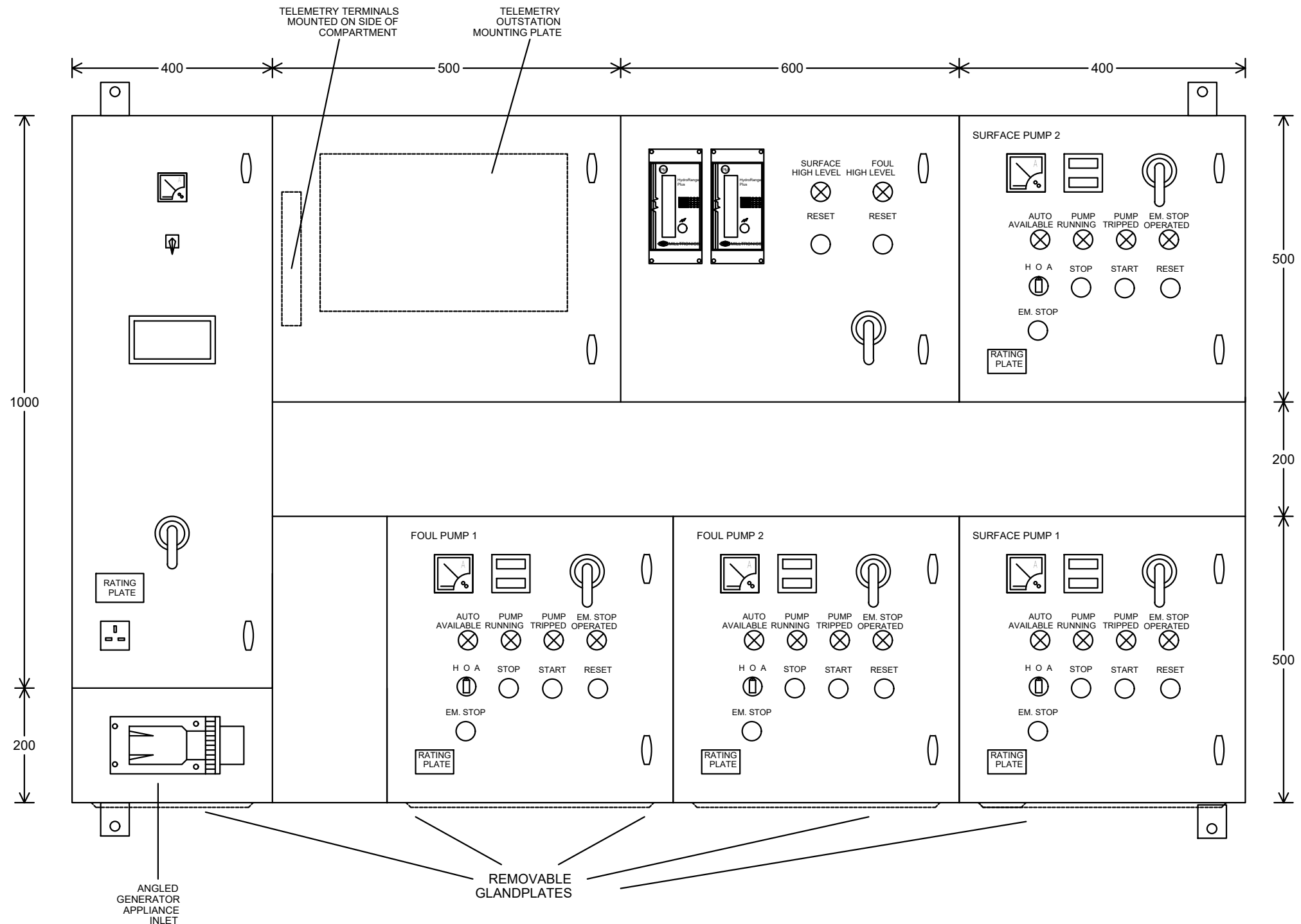


- POR4 PROTECTION OPERATED RELAY
- RT4 RE-START TIMER
- RTR4 RE-START TIMER RELAY
- ESR4 EMERGENCY STOP RELAY
- SC4 STAR CONTACTOR
- DC4 DELTA CONTACTOR
- MC4 MAIN CONTACTOR
- HR S COMBINED HOURS RUN/ No. STARTS COUNTER
- T4 STAR DELTA TIMER 0 - 10 SECS
- AR4 AVAILABLE RELAY
- OTR4 OVERTEMP RELAY
- W AUTO AVAILABLE
- R EMERGENCY STOP OPERATED
- Y PUMP TRIPPED
- G PUMP RUNNING



<b>A</b>	<b>ORIGINAL ISSUE</b>	I.Handem	N.Smith	12/02/18
Issue	Description	Request by	Insert by	Date
Engineer N. Smith	Customer name	<b>gemini control systems Ltd</b> designers and manufacturers 0844 800 4250 0844 800 4251 www.gemini-controls.com		
Drawn by N. Smith	BDW Homes Yorkshire West			
Date 12/02/18	Lee Lane, Royston			
This Drawing should not be scaled. Refer to Gemini Control Systems Ltd for additional information if required.	Gemini ref: <b>GC</b>	This document may not, without our permission, be copied shown or handed out to competitors or any other unauthorized persons		
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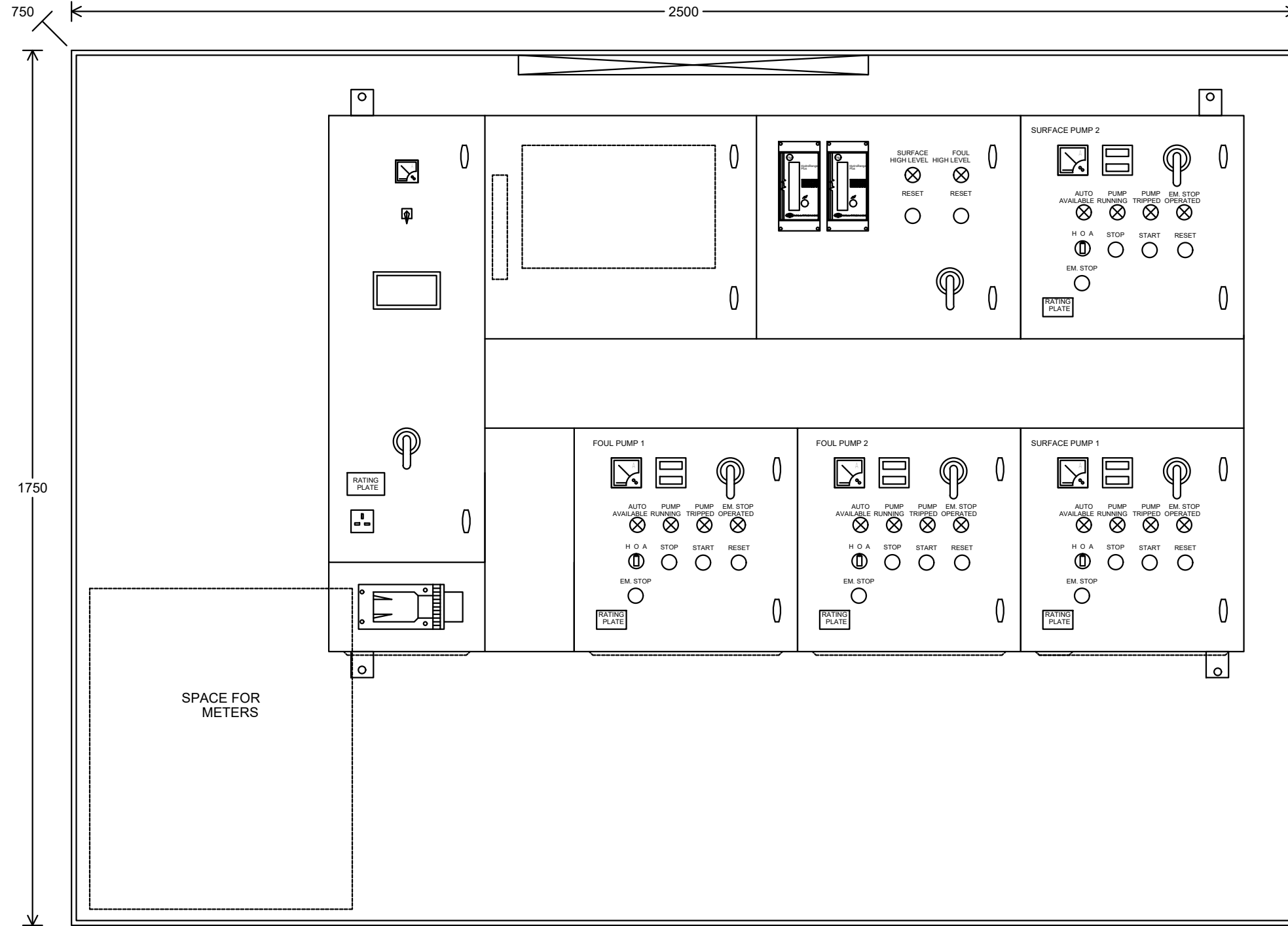




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Issue	Description	Request by	Insert by	Date
Engineer N. Smith	Customer name	 gemini control systems ltd designers and manufacturers 0844 800 4250 0844 800 4251 www.gemini-controls.com		
Drawn by N. Smith	BDW Homes Yorkshire West			
Date 12/02/18	Lee Lane, Royston			
This Drawing should not be scaled. Refer to Gemini Control Systems Ltd for additional information if required.	Gemini ref: GC	This document may not, without our permission, be copied shown or handed out to competitors or any other unauthorized persons		
	Customer ref: PR10369	Title: TELEMETRY		
 Pump Design and Services Ltd	Pump Design and Services Ltd Abbey House 282 Farnborough Road Farnborough Hampshire GU14 7NA Tel: 01256 638020 Email: info@pdasitd.co.uk	Scale:	NTS	
		Drawing Number	WD10369-8	
				A



- NOTES: □
- 1) CONTROL PANEL TO BE PRESSFORMED AND WELDED CONSTRUCTION TO IP54
  - 2) CONTROL PANEL HAS FRONT ACCESS ONLY
  - 3) INCOMING CABLES BOTTOM ENTRY
  - 4) CONTROL PANEL COLOUR BS4800 EXTERNAL SHADE 00 - A - 05 GEARPLATES WHITE

A	ORIGINAL ISSUE	I.Handem	N.Smith	12/02/18
Issue	Description	Request by	Insert by	Date
Engineer N. Smith	Customer name	 <b>gemini control systems ltd</b> designers and manufacturers 0844 800 4250 0844 800 4251 www.gemini-controls.com		
Drawn by N. Smith	BDW Homes Yorkshire West			
Date 12/02/18	Lee Lane, Royston			
This Drawing should not be scaled. Refer to Gemini Control Systems Ltd for additional information if required.	Gemini ref: GC	This document may not, without our permission, be copied shown or handed out to competitors or any other unauthorized persons		
	Customer ref: PR10369	Title: PANEL GA		
 <b>PDAS</b> Pump Design and Services Ltd	Pump Design and Services Ltd Abbey House 282 Farnborough Road Farnborough Hampshire GU14 7NA Tel: 01256 638020 Email: info@pdasitd.co.uk	Scale: NTS	Drawing Number	
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Issue	Description		Request by	Insert by	Date
Engineer N. Smith	Customer name	 <b>gemini control systems ltd</b> designers and manufacturers 0844 800 4250 0844 800 4251 www.gemini-controls.com			
Drawn by N. Smith	BDW Homes Yorkshire West				
Date 12/02/18	Lee Lane, Royston				
This Drawing should not be scaled. Refer to Gemini Control Systems Ltd for additional information if required.	Gemini ref: GC	This document may not, without our permission, be copied shown or handed out to competitors or any other unauthorized persons			
	Customer ref: PR10369	Title: KIOSK GA			
 <b>PDAS</b> Pump Design and Services Ltd	Pump Design and Services Ltd Abbey House 282 Farnborough Road Farnborough Hampshire GU14 7NA Tel: 01256 638020 Email: info@pdasitd.co.uk	Scale: NTS			
	Drawing Number: WD10369-10		Issue: A		

**Appendix F**  
**Lifting Equipment**



LIGHTWEIGHT ■ PORTABLE ■ SAFE



# PORTA-DAVIT®

No. 1 in lightweight, portable, safe lifting solutions



PORTA-GANTRY®



PORTA-DAVIT®



T-DAVIT®



PORTA-QUAD®



PORTA-LIFTER®

Lightweight, 2 piece, bagged davit system with WLL to 500kg, yet only 24kg fully assembled



500Kg  
WLL



1  
person



25Kg  
bagged

## Lightweight, 2 piece, bagged davit system with WLL to 500kg, yet only 24kg fully assembled

With a safe lifting capacity to 500kg, yet made of lightweight aluminium weighing just 24kg fully assembled (standard product), the PORTA-DAVIT system is literally a one person "pick up and go" lifting solution. Manufactured using REID Lifting's innovative design, the PORTA-DAVIT bagged system can be easily transported by hand to any site that a single person can access.

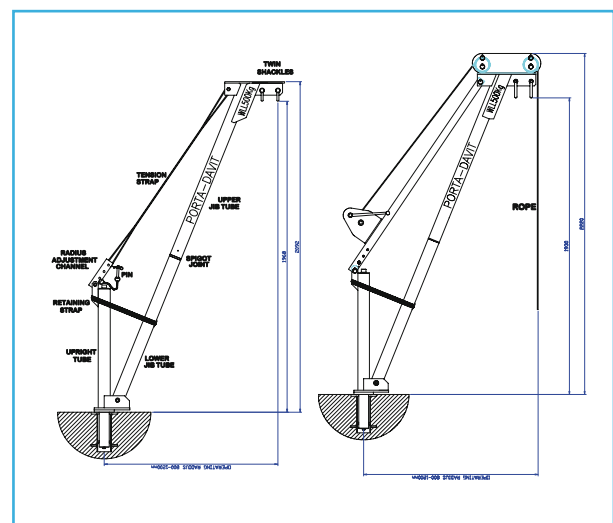
Make lifting challenges safer and more cost effective with a REID PORTA-DAVIT:

- Less is more – 1 davit serves many locations
- Low maintenance costs – protective heavy duty bag, only exposed to environment when needed
- Centralised inspections and testing - reducing costs
- Safer to use – Manual handling compliant & clean to use – easily cleaned
- Better for environment – less materials, easily recycled, with high residual value and quality regional supply chain – lower carbon footprint
- All systems factory tested to 150% WLL prior to shipment



### The Facts:

- Lightweight & portable - standard unit just 24kg assembled
- Strong yet light - High tensile Al alloy
- Simple assembly, 2 piece design, no tools needed
- WLL 500kg Goods and WLL 120kg Man-ride approved (EN795 Class B)
- Internal Bearing System - 360° rotation under finger tip control
- Radius adjustment (800-1200mm as standard) with shock load strap
- Corrosion resistant, high tensile aluminium alloy (powder coated finish) with low maintenance
- Manual handling compliance without mechanical aids - no tools required
- CE & EN795 Class B approved by Notified Body
- Goods & Manride approved
- Store and transport in heavy duty bag for easy handling and segregation
- Universal Kingpin – mates with wide range of REID sockets (or sleeves for existing sockets) as well as REID's new PORTA-BASE – the ultimately flexible system for use where no sockets are installed or possible



**ASSEMBLY**

**ASSEMBLY WINCH OPTION**

The PORTA-DAVIT is available in several variations to the base unit including standard winched versions, extended radius (e.g. WLL350, 1500mm radius), socket extensions, man-ride and PORTA-BASE & Counterbalanced versions.

Customised versions & bespoke specialised developments are always considered.

## PORTA-DAVIT- man-rated options

The PORTA-DAVIT is available in three forms rated for man-ride:

- standard davit with a fall arrest unit fitted to a shackle (fall protection)
- with a man rated winch to lower and raise personnel and separate fall arrest unit with or without integral retrieval winch
- with a fall arrest with integral retrieval winch where the man moves on a ladder or climbing.

The PORTA-DAVIT system (using Reid mounting sockets) is approved to EN 795 Class B Anchor Devices, giving protection against falls from a height. The fall-arrest unit is compliant with EN 360.

We recommend that the PORTA-DAVIT unit has a dedicated man-ride rating only and is set at the minimum possible operating radius; however, it is possible to have the davit dual rated at 120kg for man ride and 500kg goods lifting. When used for man-ride applications the PORTA-DAVIT unit MUST be dedicated to the man-ride application only and there should be no goods load attached to the davit. Suitably rated Chain Block, winch and man-ride options and accessories are all available from REID Lifting:

### PORTA-DAVIT – Customised & Bespoke:

Continuous development means REID has the capability to develop customised and bespoke davit solutions for those difficult and challenging lifting environments and applications, resulting in the REID T-Davit customised solutions as well as:

- Customised product developments
- Full “Design in” planning support
- Bespoke solutions development & consultancy
- Safe assembly, operation and maintenance training

### PORTA-DAVIT variations:

- Standard winched versions
- Extended radius (e.g.WLL350, 1500mm radius)
- Manride EN 795 Class B Approved options

Wide range of options & accessories available:

- Chain hoists
- Winches – manual & electric
- Sockets
- Socket Extensions
- Extended radius option
- PORTA-BASE for ultimate flexible use



PORTA-DAVIT range			
	Winch	WLL (kg)	Radius range (mm)
PORTA-DAVIT Standard Systems:			
PD500		500	800-1200
PD500W	W	500	800-1200
Extended Radius Systems:			
PD350EX		350	800-1500
PD350EXW	W	350	800-1500
For use with PORTA-BASE System			
PD500R		500	800-1000
PD500RW	W	500	800-1000
Man Ride PORTA-DAVIT System			
PD120MRW	W	120	800-1200

## DISCLAIMER

All Reid sockets & extensions have been designed, developed and tested for safe use with Reid's equipment and form a key part of the integrity of the total system.

- All Sockets have a WLL of 500KG
- All sockets are supplied in Galvanised Mild Steel or Stainless Steel (316L grade, passivated)
- Sockets can be powder coated upon request .e.g. Yellow for trip hazard warning.

Should non standard third party sockets be used the CE requirement for Declaration of Conformity & Incorporation on the products is negated.



Flush Mount

Top Mount

Side Mount

Bridge Mount

Bespoke

Socket Extensions



LIGHTWEIGHT PORTABLE SAFE



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info@bpf-ltd.com & www.bpf-ltd.com



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Fax: +46 (0)8540 60566  
www.kamab.nu



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PO Box 347  
Winona, MN 55987  
USA  
Phone: 507.454.2996  
Toll Free: 800.843.7648  
Fax: 507.454.5282  
info@thern.com

## REID Lifting – the best night’s sleep in the lifting industry

- Systems are type tested at NAMAS accredited laboratories
- Every individual system is tested to 150% of WLL rating prior to shipment
- Full product design & development Technical Files are available for inspection
- Lifting Equipment Engineers Association (LEEA) full membership
- ISO9001 Quality Management Systems accreditation
- ISO14001 accreditation environment management systems and standards
- OHSAS18001 Occupational Health and Safety Management accreditation
- Certification of products by relevant recognised bodies from sockets to systems
- Safe assembly, use and maintenance manuals and training are available for all systems

## WHAT’S NEXT

Further information and support can be found on our website [www.reidlifting.com](http://www.reidlifting.com)



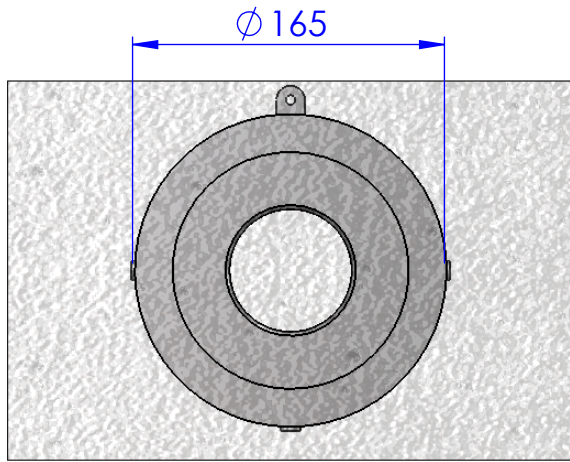
**CALL US**  
+44 (0)1291 620796



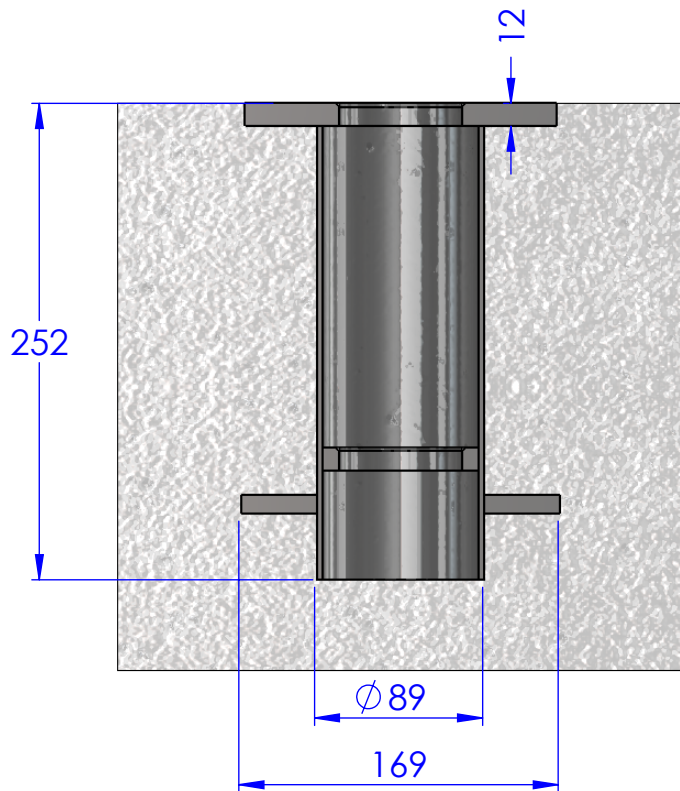
**EMAIL US**  
[enquiries@reidlifting.com](mailto:enquiries@reidlifting.com)



**WEB**  
[www.reidlifting.com](http://www.reidlifting.com)

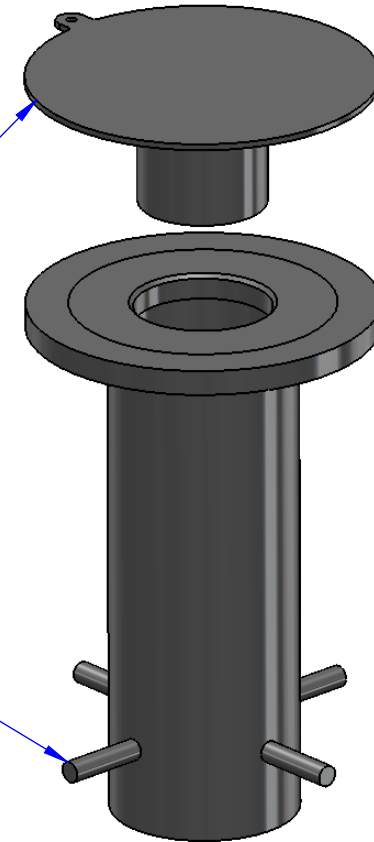


## SFMG0500 - Flush Mount Socket (Cast Into Concrete)



Supplied With Lid/Cover

4 Lugs For Casting  
Into Concrete



**Appendix G**  
**Penstock Drawing**

*Foul Water Pump Station*

REMOVE SHARP EDGES.

DO NOT SCALE – IF IN DOUBT, ASK.

1 2 3 4 5 6 7 8

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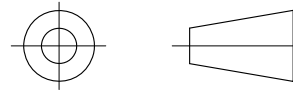
**GENERAL MACHINING TOLERANCES**

± 0.3mm UP TO 250mm  
± 0.5mm OVER 250mm TO 500mm  
± 1.2mm OVER 500mm  
(OR THEIR IMPERIAL EQUIVALENTS)

**SURFACE FINISHES: -**

ROUGH MACHINE  
6.3 µm ∇  
FINISH MACHINE  
3.2 µm ∇

**THIRD ANGLE PROJECTION**



DRAWING NUMBER

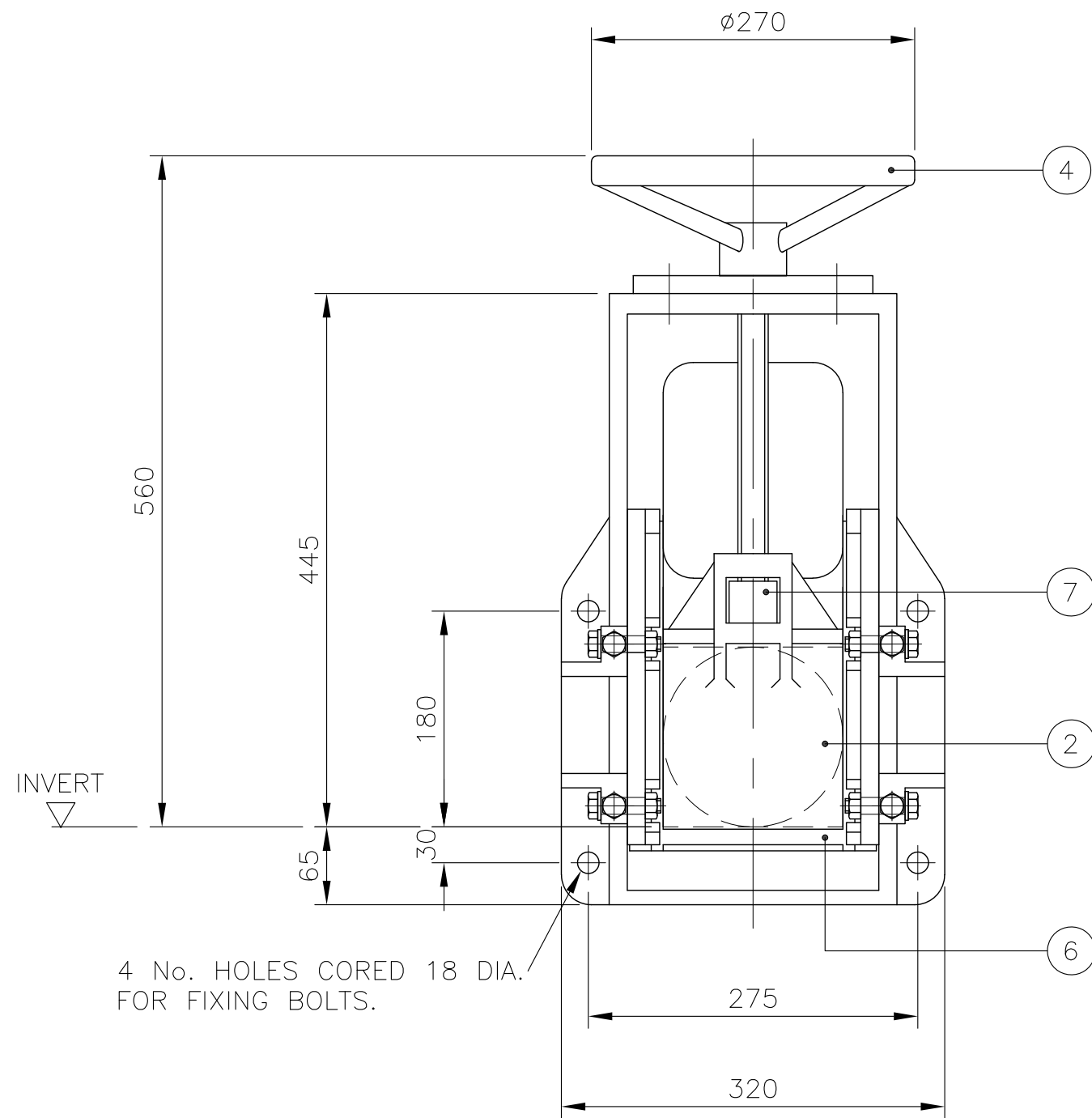
D0666

ISSUE

1

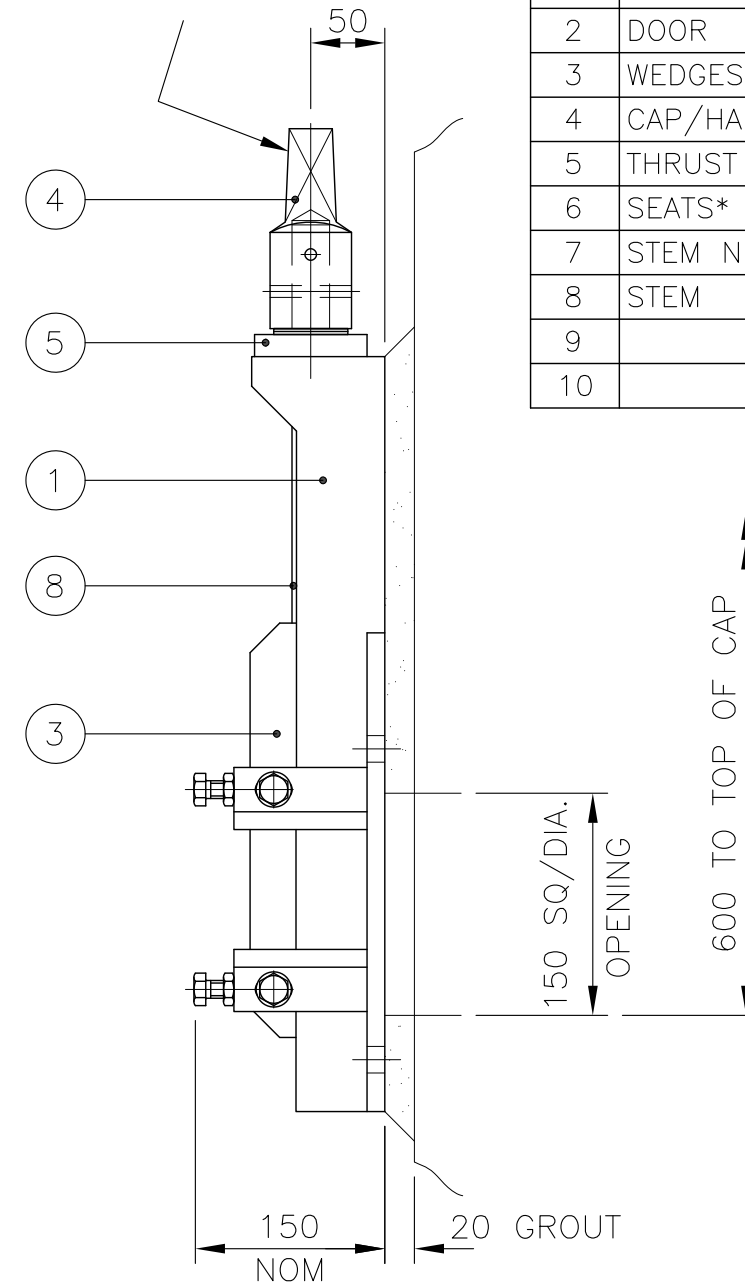
ITEM	PART	SPECIFICATION
1	FRAME	BS 1452, 220
2	DOOR	BS 1452, 220
3	WEDGES	BS 1452, 220
4	CAP/HANDWHEEL	BS 1452, 220
5	THRUST PLATE	BS 1452, 220
6	SEATS*	BS 2874, CZ121
7	STEM NUT	BS 1400, LG2
8	STEM	BS 970, 303S21
9		
10		

CAP FIT BS 5163 TEE  
KEY FOR ≤ DN300.



FRONT ELEVATION

4 No. HOLES CORED 18 DIA.  
FOR FIXING BOLTS.



SIDE ELEVATION

**NOTES:**

\* FOR CIRCULAR OPENINGS ITEM 6  
MATERIAL IS BS 1400 LG2.

ISSUE	NAME	DATE	CHECKED	REVISION
1	JMW	26/03/04	VC	MODIFIED CAP ADDED.
0				ORIGINAL ISSUE

DRAWN BY JMW	DATE 07/11/02	CHECKED BY RC	DATE 07/11/02	CONSULTING ENGINEERS:
SCALE 1:5	DRAWING NUMBER D0666	ISSUE 1	CUSTOMER:	
JOB No.	PART No.	TITLE: ARRANGEMENT DRAWING FOR 150MM PENSTOCK WITH HANDWHEEL/CAP. REBATE INVERT.		
MATERIAL SPECIFICATION: AS LISTED ON DRAWING				

**EXPRESS VALVE SERVICES LIMITED**

UNITS 18/19  
THE WALLOWES INDUSTRIAL ESTATE  
DUDLEY ROAD  
BRIERLEY HILL  
WEST MIDLANDS  
DY5 1HR

Telephone: 01384 263872  
Facsimile: 01384 480148

SCALE 1:5  
ORIGINAL SHEET SIZE A3

ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED

Surface Water Pump Station

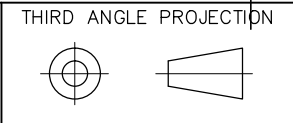
REMOVE SHARP EDGES.

DO NOT SCALE - IF IN DOUBT, ASK.

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**GENERAL MACHINING TOLERANCES**  
± 0.3mm UP TO 250mm  
± 0.5mm OVER 250mm TO 500mm  
± 1.2mm OVER 500mm  
(OR THEIR IMPERIAL EQUIVALENTS)

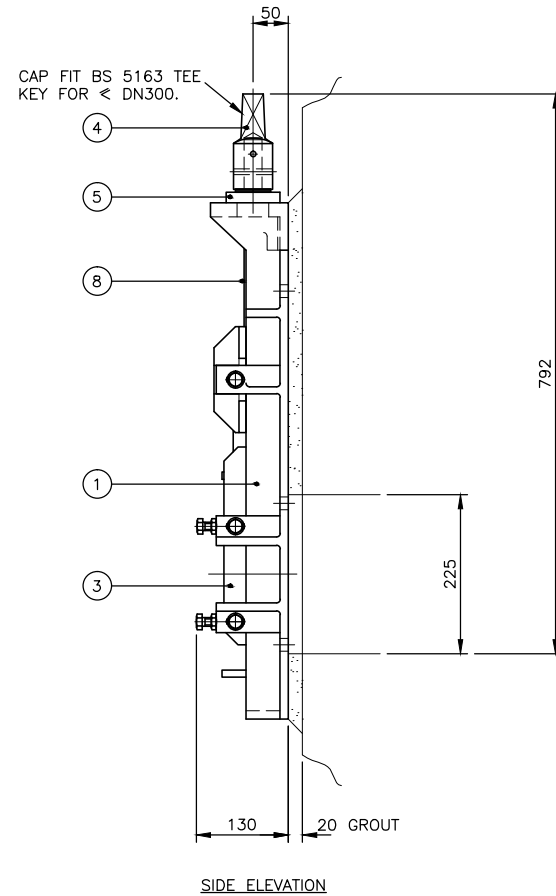
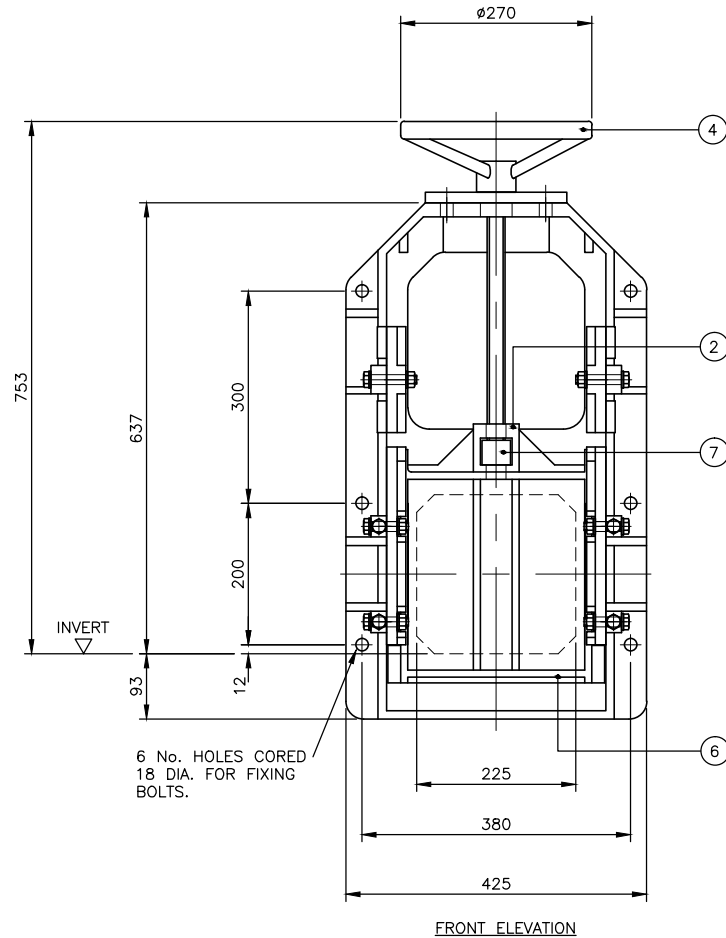
**SURFACE FINISHES: -**  
ROUGH MACHINE  
6.3 µm ∇  
FINISH MACHINE  
3.2 µm ∇



**DRAWING NUMBER**  
D0664

**ISSUE**  
1

ITEM	PART	SPECIFICATION
1	FRAME	BS 1452, 220
2	DOOR	BS 1452, 220
3	WEDGES	BS 1452, 220
4	CAP/HANDWHEEL	BS 1452, 220
5	THRUST PLATE	BS 1452, 220
6	SEATS	BS 2874, CZ121
7	STEM NUT	BS 1400, LG2
8	STEM	BS 970, 303S21
9		
10		



ISSUE	NAME	DATE	CHECKED	REVISION
1	JMW	26/05/04	VC	MODIFIED CAP ADDED.
0				ORIGINAL ISSUE

<b>DRAWN BY</b> JMW	<b>DATE</b> 15/10/03	<b>CHECKED BY</b> CQ	<b>DATE</b> 15/10/03	<b>CONSULTING ENGINEERS:</b>
<b>SCALE</b> 1:7.5	<b>DRAWING NUMBER</b> D0664	<b>ISSUE</b> 1	<b>CUSTOMER:</b>	
<b>JOB No.</b>	<b>PART No.</b>	<b>TITLE:</b> ARRANGEMENT OF 225MM SQUARE CAST IRON PENSTOCK WITH HANDWHEEL/CAP. REBATE INVERT.		
<b>MATERIAL SPECIFICATION:</b> AS LISTED ON DRAWING				

**EXPRESS VALVE SERVICES LIMITED**

UNITS 18/19  
THE WALLOWS INDUSTRIAL ESTATE  
DUDLEY ROAD  
BRIERLEY HILL  
WEST MIDLANDS  
DY5 1HR

**Telephone: 01384 263872**  
**Facsimile: 01384 480148**

SCALE 1:7.5  
ORIGINAL SHEET SIZE A3

ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED

**Appendix H**  
**Yorkshire Water Proforma**

*Foul Water Pump Station*

TO BE COMPLETED FOR ALL <u>NEW &amp; REPLACED</u> MECHANICAL & ELECTRICAL ASSETS															
YORKSHIRE WATER SERVICES LTD- ASSET INVENTORY (AI) - ASSET DESCRIPTION															
1.	Installation	BDW HOMES YORKSHIRE WEST						2.	Type of Installation	Foul Water PS					
3.	Process group			4.	Process										
5.	Asset Name							6.	Scheme code						
7.	Location ON SITE	ARP dwg 1048-88/03			8.	New	X	Replacement			Amendment				
							9.	Existing AI Ref. No							
		A	Mechanical Details		B	Other Mech. details		C	Electrical Motor details		D	Other Elec. details			
10.	Equipment Description	Two Submersible Pumps						SQ CAGE		M.C.C.					
11.	Manufacturer name	Grundfos						Grundfos		GEMINI					
12.	Model/Frame size	SE1.80.80.22.EX.4.50D						SE1.80.80.22.EX.4.50D		YW SPEC					
13.	P&I Tag No														
14.	Serial No	T B C						T B C		T B C					
15.	Asset Value	£5,698						INCL. IN PUMP COST		£16,000					
16.	Criticality Indicator														
17.	Manufactured Year	2018						2018		2018					
18.	Installed From Date	Provisionally 2018						Provisionally 2018		Provisionally 2018					
NOTES		19	Speed	1445	RPM	Speed		RPM	Speed	1445	RPM	Speed		RPM	
		20	Lubricant type	N/A		Lubricant type			Lubricant type	N/A		Lubricant type			
		21	Rating	2.2	kW	Rating			31	Haz Equip Class	EXP	Haz Equip Class			
		22	Size			Size			32	IP Rating	68	IP Rating			
		22	Size			Size			33	Power	2.2	kW	Power		kW
		23	Head	10.28	Metres	Head		Metres	34	Voltage In	400	AC/DC	Voltage In		AC/DC
		24	Flow	5.00	L/sec	Flow			35	Voltage Out	400		Voltage Out		AC/DC
		25	Pressure		bar				36	Current In	6	AMP	Current In		AMP
		26	Impeller Type	S-TUBE		30	Ratio		37	Current Out	6	AMP	Current Out		AMP
		27	No of Stages	Single					38	Insulation Class	F		Insulation Class		
		28	Const Material	CAST IRON		Const Material									
		29	Weight	106	Kg	Weight		Kg	Weight	AS PUMP	kg	Weight	300	Kg	
39.	Name of person filling in sheet	Idi Handem													
40.	Company name & contact Tel No	PDAS Ltd 01256 638 020						41.	Date filled in	14/12/2017					

Surface Water Pump Station

TO BE COMPLETED FOR ALL <u>NEW &amp; REPLACED</u> MECHANICAL & ELECTRICAL ASSETS																
YORKSHIRE WATER SERVICES LTD- ASSET INVENTORY (AI) - ASSET DESCRIPTION																
1.	Installation	BDW HOMES YORKSHIRE WEST						2.	Type of Installation	Storm Water PS						
3.	Process group			4.	Process											
5.	Asset Name							6.	Scheme code							
7.	Location ON SITE	ARP dwg 1048-88/03			8.	New	X	Replacement			Amendment					
							9.	Existing AI Ref. No								
		A	Mechanical Details		B	Other Mech. details		C	Electrical Motor details		D	Other Elec. details				
10.	Equipment Description	Two Submersible Pumps						SQ CAGE		M.C.C.						
11.	Manufacturer name	Grundfos						Grundfos		GEMINI						
12.	Model/Frame size	SE1.80.100.30.EX.4.50D.B						SE1.80.100.30.EX.4.50D.B		YW SPEC						
13.	P&I Tag No															
14.	Serial No	T B C						T B C		T B C						
15.	Asset Value	£7,020						INCL. IN PUMP COST		£16,000						
16.	Criticality Indicator															
17.	Manufactured Year	2018						2018		2018						
18.	Installed From Date	Provisionally 2018						Provisionally 2018		Provisionally 2018						
NOTES		19	Speed	1455	RPM	Speed		RPM	Speed	1455	RPM	Speed		RPM		
		20	Lubricant type	N/A		Lubricant type			Lubricant type	N/A		Lubricant type				
		21	Rating	3	kW	Rating			31	Haz Equip Class		EXP	Haz Equip Class			
		22	Size			Size			32	IP Rating	68		IP Rating			
		22	Size			Size			33	Power	3	kW	Power		kW	
		23	Head	8.32	Metres	Head		Metres	34	Voltage In	400	AC/DC	Voltage In		AC/DC	
		24	Flow	23.80	L/sec	Flow			35	Voltage Out	400		Voltage Out		AC/DC	
		25	Pressure			Pressure			36	Current In	8	AMP	Current In		AMP	
		26	Impeller Type	S-TUBE		30	Ratio			37	Current Out	8	AMP	Current Out		AMP
		27	No of Stages	Single					38	Insulation Class		F	Insulation Class			
		28	Const Material	CAST IRON		Const Material										
		29	Weight	151	Kg	Weight		Kg	Weight	AS PUMP	kg	Weight	300	Kg		
39.	Name of person filling in sheet	Idi Handem														
40.	Company name & contact Tel No	PDAS Ltd 01256 638 020						41.	Date filled in	14/12/2017						