all pump solutions LLP
Ennerdale Road
Shrewsbury
SY1 3LD
T: +44 (0) 1743 465 463
F: +44 (0) 1743 452 050
E: sales@allpumpsolutions.com
www.allpumpsolutions.com

HOLIDAY INN EXPRESS, BICESTER GATEWAY.

FOUL WATER PUMPING STATION DESIGN SPECIFICATION

SEWERS FOR ADOPTION 7TH EDITION, THAMES WATER ADDENDUM

ISSUE 1.0 –22ND OCTOBER 2019

APS INTERNAL REFERENCE: Q0000110935A

DOCUMENT HISTORY

Revision	Description	Originated	Authorised	Date
Issue 1.0	For Approval	MLKJ	DH	22/10/2019

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1. PROJECT DETAILS

1.1 INTRODUCTION

The proposed foul pumping station has been designed in accordance with Sewers for Adoption (SFA) 7th Edition, to Thames Water (TW) Standards, and includes for the installation of all stated components within the pumping chamber/wet well and valve chamber.

The pumping station is serving the Holiday Inn Express at Bicester Gateway. The estimated emergency storage requirement is based on 1 hour of peak flow, which equates to 81m^3. This volume will be achieved between the high level alarm and the network's lowest lateral drain, utilising a combination of the wet well, preceding manholes and a storage chamber. The design flow of 11.5l/s has been chosen to achieve the minimum 50% of the incoming flow, 22.5 l/s which has been supplied to us from Elliot group.

1.2 PUMP STATION DESIGN DATA

Liquid Handled:	Sewage	
Design Flow:	11.5	l/sec
Peak Incoming Flow:	22.5	l/sec
Total Storage Requirement:	81.0	m^3
Cover Level:	100.4000	m
Inlet Invert Level:	95.016	m
Chamber Base Level:	93.800	m
Top Storage Level:	98.336	m
Pump Outlet Invert Level:	99.200	m
Rising Main Discharge Invert:	121.300	m
Rising Main High Point:	121.300	m

1.3 PUMP CHAMBER DESIGN DETAIL

Chamber Construction:	PCC Rings	
Chamber Diameter:	3.000	m
Chamber Length/Depth:	6.600	m
Storage Available:	24.247	m^3
Inlet Diameter:	150	mm
Access Cover Size:	1500 x 900	mm
Pipework Size:	100	mm
Pipework Termination Size:	100	mm
Pipework Material:	Ductile Iron	

1.4 INLET CHAMBER DESIGN DETAIL

Cover Level:	100.400	m
Inlet Invert Level:	95.016	m
Chamber Base Level:	94.900	m
Outlet Invert Level:	94.900	m
Chamber Construction:	PCC Rings	
Chamber Diameter:	1200	mm
Chamber Depth:	5500	mm
Access Cover Size:	675x675	mm
Penstock Required:	Yes	
Over Pumping Required:	No	

1.5 VALVE CHAMBER DESIGN DETAIL

Cover Level:	104.000	m
Inlet Invert Level:	99.200	m
Chamber Base Level:	98.900	m
Outlet Invert Level:	99.200	m
Chamber Construction:	PCC Chamber	
Chamber Dimensions:	2400 x 1800	mm
Chamber Depth:	1500	mm
Access Cover Size:	2400 x 1800	mm
Gate Valve Size:	100	mm
Non Return Valve Size:	100	mm
Valve Material:	Cast Iron	
Over Pumping Required:	Yes	

1.6 PUMP DESIGN DETAIL

APS have endeavoured to select the most appropriate Pump set for this particular system by acknowledging both SFA & TW pump specification requirements. As a company, we are independent from pump manufacturers, and as a result, we can offer a non-bias approach to selection. We have attempted to select what we see as the most appropriate selection from 3 separate pump suppliers. In order to determine these selections, we have used the following criteria and our current understanding of TW's preferences.

Main Pump Selection Criteria in order of importance:

Thru Diameter of Pump – Must adhere to SFA Table F.1.
Rated Speed – Must have rated speed less than or equal to 1500rpm
Efficiency – Should have a duty flow rate between 80-105% of the pumps B.E.P. If unachievable, the best available efficiency is selected (after adhering to the criteria above).
Duty flow rate – Design rate has been set at 11.5l/s. The duty flow rate should be within 10% of this figure, within the rising main cleansing velocities, and approved by the water authority.
Rated Power – Generally speaking, a lower kW rating will mean lower running costs, and so long as the above criteria is met, then the lowest kw rated pump should be selected.

The below table summarises the pump details for the best selection from Xylem, Sulzer and Grundfos pump manufacturers. Full details of the selections can be found within Appendix A.

	Rated Speed (rpm)	Rated Power (Kw)	Through Diameter (mm)	Discharge Connection Diameter (mm)	Duty Flow (l/s)	Flow @ Pump B.E.P. (l/s)	Duty flow as a % of the flow rate at Pumps B.E.P.
Grundfos -	1463	5.5	100	100	11.5	20	57.50%
Sulzer -	1479	6	100	80	11.84	31.3	37.83%
Xylem -	1465	7.5	Ntech*	100	12.8	35.3	36.26%

**Maximum particle size is not available for Xylem N pumps. However, they are a widely accepted design due to the superior solids handling capabilities of the impeller design.*

From the 3 options in the above table, APS have selected the Grundfos pump to progress the pump station design. The pump meets all requirements within SFA 7th edition and is the most efficient selection.

Xylem NP 3151 SH 273

Pump Operation:	Duty/Standby	
Discharge Rate Per Pump:	11.5	l/sec
Static Head:	5.511	m
Total Head Generated:	15.27	m
Pump Type:	Grundfos	
Pump Model:	SLV.100.100.55.EX	
Impeller:	XXXX	
Impeller Type:	Super Vortex	
Motor Housing:	Cast Iron	
Motor Shaft:	Cast Iron	
Solids Handling:	100mm	
ATEX Rating:	EX Rated	
Motor Rating:	5.5	kW
Rated Current:	11.2	A
Starting Current:	81	A
Power Supply:	400	v
Phase:	Three	
Method of Starting:	Star Delta	
Cable Length:	20	m
Guide Rail Size:	2	"
Guide Rail Material:	Stainless Steel	
Discharge Connection Size:	100	mm

1.6.1 PUMP LEVEL DATA

Pump Stop Level:	94.150	m
Duty Pump Start Level:	94.550	m
Standby Pump Start Level:	94.700	m
High Level Alarm:	94.850	m
Duty Point Level:	94.350	m

1.7 CONTROL PANEL DESIGN DETAIL

Control Panel Type:	GD21250
Panel Form:	Form 4
Level Control:	Ultrasonic
Level Control Code:	DB10
Backup Level Control:	Floats

1.8 RISING MAIN DESIGN DETAIL

Length:	488	m
Outside Diameter:	125	mm
Inside Diameter:	109.5	mm
SDR Rating:	17	
Velocity:	1.221	m/sec
Highest Point on Rising Main:	99.861	m
Air Release Valves Required:	no	
Washout Chambers Required:	no	

For rising mains longer than 500m SFA advise that a Hydraulic Analysis is undertaken. As the rising main does not exceed 500m no Hydraulic Analysis has been undertaken.

2. PROJECT CALCULATIONS

2.1 RISING MAIN SEPTICITY CALCULATIONS

Sump Volume:	1.269	m^3
DWF @ Full Build & Occupancy:	3.75	l/s
Discharge flow:	11.5	l/s
Rising Main Volume:	4.6	m^3

Full Occupation:

Accumulating Time in Wet Well:	338.516	secs
Pumping Time:	110.386	secs
Volume of Sewage in one cycle:	1.683	m^3
No of cycles through Rising Main:	3	
Retention Time at Build DWF:	22.445	mins

Sewers for adoption guidelines suggest a retention time period of 6 hours maximum. Given our calculations suggest a smaller time period for a fully occupied build, the design will comply.

2.2 STORAGE CALCULATIONS

The following calculations have been carried out using the methodology set out in Sewers for Adoptions 7th Edition.

For foul pumping stations, as a minimum, the storage should equate to 160 litres per dwelling, and for commercial or industrial developments one hour of peak design flow.

Holiday Inn Express Bicester Gateway:	22.5	l/s
DWF:	3.750	l/s
Peak Flow (6*DWF):	22.50	l/s
Emergency Storage Requirement:	81.000	m^3
Lowest Lateral Drain (Top Storage Level):	98.336	m AOD
High Level Alarm:	94.850	m AOD
Wet Well Diameter:	3.0	m
Wet Well Storage:	24.247	m^3
Network Storage(inc inline chamber):	58.612	m^3
Total Storage Available:	82.859	m^3

2.3 HYDRAULIC DESIGN

The design flow rate for foul pumping stations should be at least the maximum of half the peak design flow rate and the flow rate required to achieve a minimum flow velocity in the rising main

Total Peak Flow Rate	22.5	l/sec
Minimum Design Flow Rate:	11.25	l/sec
Minimum Flow Rate to Achieve RM Cleansing:	7.1	l/sec
Design Flow:	11.5	l/sec

2.4 SUMP VOLUME CALCULATIONS

The pump operating volume (volume between pump stop and pump start) to be designed to allow minimum retention and limit the number of starts to 10 per hour. The maximum number of starts occurs when the incoming flow is half the pumped discharge rate.

Pumped Discharge Rate:	11.5	l/sec
Incoming Flow:	22.5	l/sec
Max Starts Per Hour:	10	/hour
Shortest Cycle Time:	7.35	mins

Using shortest cycle time = (sump volume/(outflow-0.5 outflow)+(sump volume/0.5 outflow)

Sump volume = shortest cycle time x (0.5outflow/2)

Using cycle time = (sump volume/(outflow-inflow))+(sump volume/inflow)

Sump Volume Required:	1269	litres
Pump Stop Level:	94.150	m
Duty Pump Start Level:	94.550	m
Distance Between:	400	mm
Sump Diameter:	3000	mm
Gross Sump Volume:	2827	litres
Volume taken by benching*:	1558	litres
Net Sump Volume:	1269	litres
Minimum Cycle Time:	7.35	mins
Max Starts:	10	/hr

*Benching Volume calculated using 3D modelling software.

APPENDIX A.

FRICTION LOSS CALCULATIONS AND PUMP CURVES

Company name:
Created by:
Phone:

Date: 17/10/2019

Qty.	Description
1	**SLV.100.100.55.EX.4.51D.C**

Product No.: 98626651

Non-self-priming, single-stage, centrifugal pump designed for handling wastewater, process water and unscreened raw sewage.

The pump is designed for intermittent and continous operations in submerged installation. The efficient SuperVortex impeller provides passage of long fibres and solids up to 100 mm and is suitable for wastewater with a dry matter content of up to 5 %.

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.

The pump is explosion-proof.

Controls:

Moisture sensor:	with moisture sensors
Water-in-oil sensor:	without water-in-oil sensor

Liquid:

Pumped liquid:	Any Newtonian liquid
Maximum liquid temperature:	40 °C
Density at selected liquid temperature:	998.2 kg/m³

Technical:

Actual calculated flow:	11.5 l/s
Resulting head of the pump:	15.27 m
Type of impeller:	SUPER VORTEX
Maximum particle size:	100 mm
Primary shaft seal:	SIC/SIC
Secondary shaft seal:	CARBON/CERAMICS
Approvals on nameplate:	CE, EN12050-1, ATEX
Curve tolerance:	ISO9906:2012 3B2

Materials:

Pump housing:	Cast iron EN 5.1301 EN-GJL-250
Impeller:	Cast iron EN 5.1301 EN-GJL-250
Motor:	EN-GJL-250

Installation:

Maximum ambient temperature:	40 °C
Flange standard:	DIN
Pump inlet:	100
Pump outlet:	100
Pressure rating:	PN 10
Maximum installation depth:	20 m
Frame range:	C

Electrical data:

Power input - P1:	6.3 kW
Rated power - P2:	5.5 kW

GRUNDFOS

Company name:
Created by:
Phone:

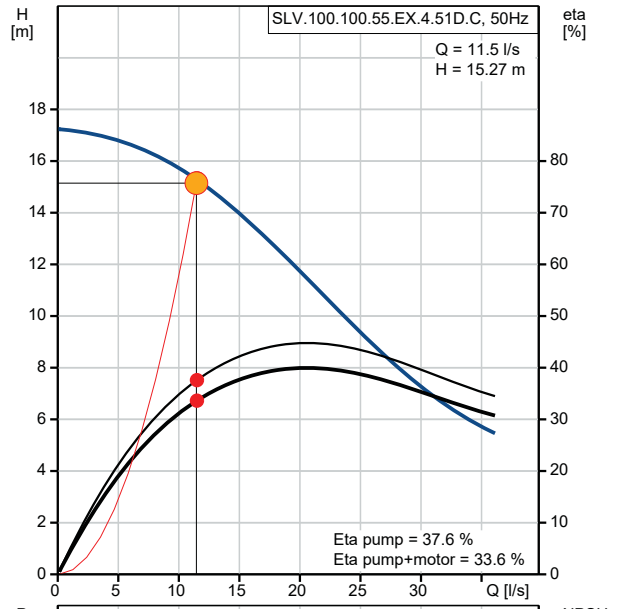
Date: 17/10/2019

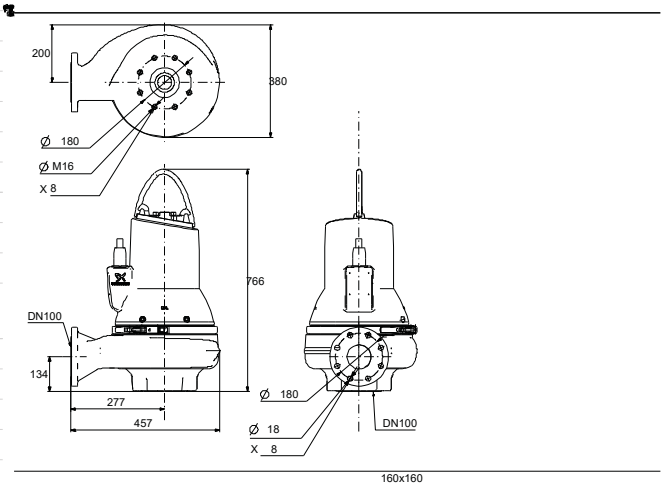
Qty.	Description	
	Mains frequency:	50 Hz
	Rated voltage:	3 x 380-415 V
	Voltage tolerance:	+10/-10 %
	Max starts per. hour:	20
	Rated current:	11.2-10.6 A
	Starting current:	81 A
	Cos phi - power factor:	0.85
	Cos phi - p.f. at 3/4 load:	0.80
	Cos phi - p.f. at 1/2 load:	0.70
	Rated speed:	1463 rpm
	Motor efficiency at full load:	89.1 %
	Motor efficiency at 3/4 load:	89.6 %
	Motor efficiency at 1/2 load:	89.0 %
	Number of poles:	4
	Start. method:	star/delta
	Enclosure class (IEC 34-5):	IP68
	Insulation class (IEC 85):	H
	Explosion proof:	yes
	Length of cable:	10 m
	Cable type:	LYNIFLEX
	Others:	
	Net weight:	139 kg
	Country of origin:	HU
	Custom tariff no.:	84137021

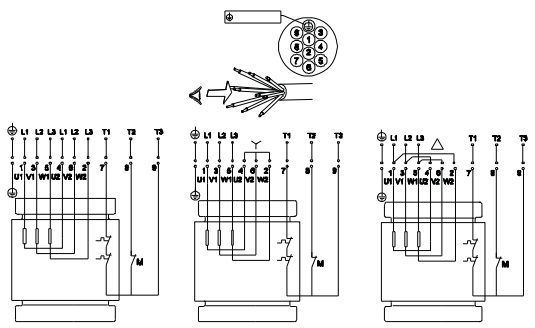
Company name:
Created by:
Phone:

Date: 17/10/2019

Description	Value
General information:	
Product name:	SLV.100.100.55.EX.4.51D.C
Product No:	98626651
EAN number:	5711498476837
	5711498476837
Price:	3.912,00 GBP
Technical:	
Actual calculated flow:	11.5 l/s
Max flow:	36.1 l/s
Resulting head of the pump:	15.27 m
Head max:	17.2 m
Type of impeller:	SUPER VORTEX
Maximum particle size:	100 mm
Primary shaft seal:	SIC/SIC
Secondary shaft seal:	CARBON/CERAMICS
Approvals on nameplate:	CE, EN12050-1, ATEX
Curve tolerance:	ISO9906:2012 3B2
Cooling jacket:	without cooling jacket
Materials:	
Pump housing:	Cast iron
	EN 5.1301 EN-GJL-250
Impeller:	Cast iron
	EN 5.1301 EN-GJL-250
Motor:	EN-GJL-250
Installation:	
Maximum ambient temperature:	40 °C
Flange standard:	DIN
Pump inlet:	100
Pump outlet:	100
Pressure rating:	PN 10
Maximum installation depth:	20 m
Inst dry/wet:	SUBMERGED
Installation:	Vertical
Frame range:	C
Liquid:	
Pumped liquid:	Any Newtonian liquid
Maximum liquid temperature:	40 °C
Density at selected liquid temperature:	998.2 kg/m³
Electrical data:	
Power input - P1:	6.3 kW
Rated power - P2:	5.5 kW
Mains frequency:	50 Hz
Rated voltage:	3 x 380-415 V
Voltage tolerance:	+10/-10 %
Max starts per. hour:	20
Rated current:	11.2-10.6 A
Starting current:	81 A
Cos phi - power factor:	0.85
Cos phi - p.f. at 3/4 load:	0.80
Cos phi - p.f. at 1/2 load:	0.70
Rated speed:	1463 rpm
Motor efficiency at full load:	89.1 %
Motor efficiency at 3/4 load:	89.6 %
Motor efficiency at 1/2 load:	89.0 %
Number of poles:	4
Start. method:	star/delta
Enclosure class (IEC 34-5):	IP68







GRUNDFOS

Company name:
Created by:
Phone:

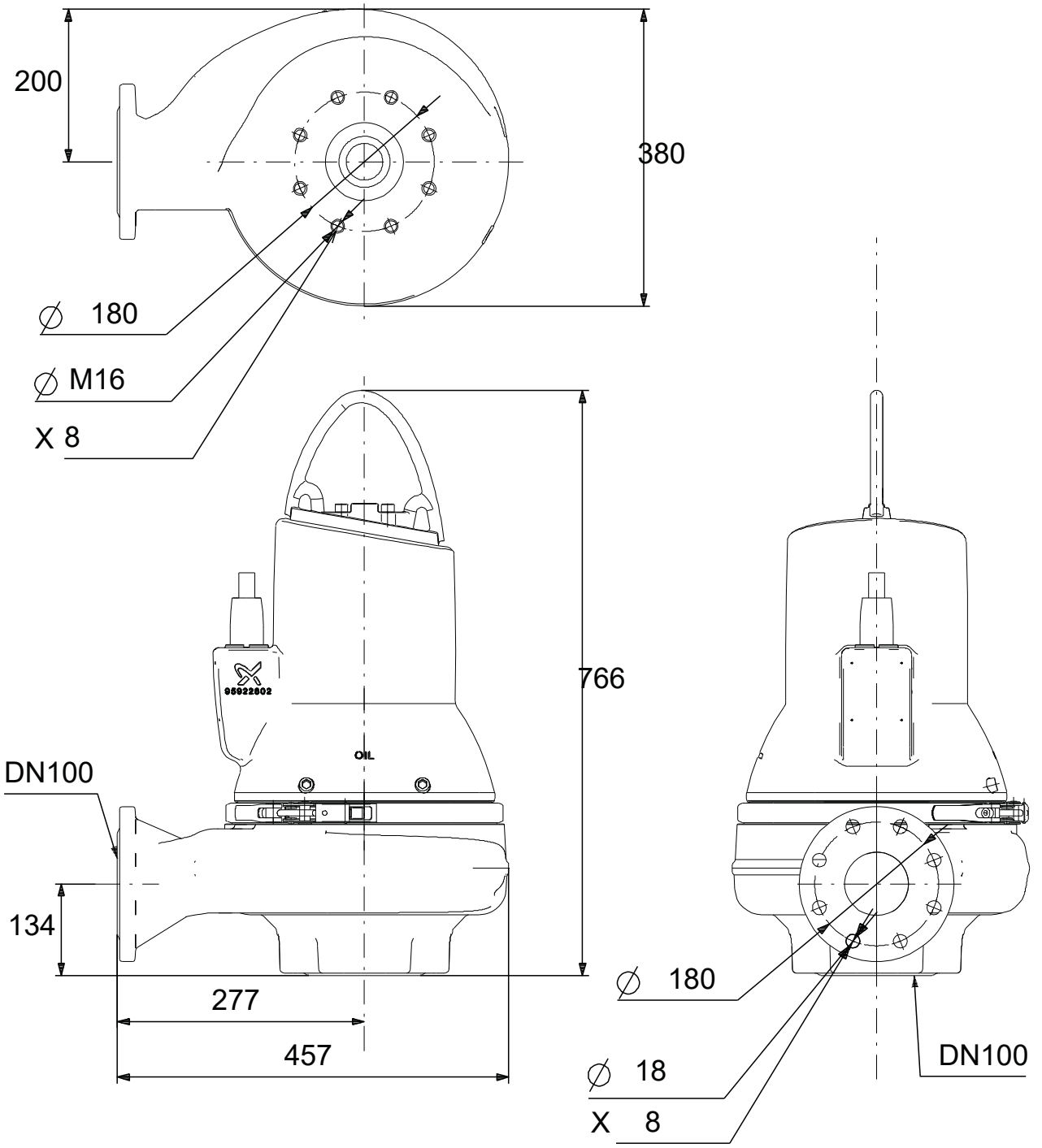
Date: 17/10/2019

Description	Value
Insulation class (IEC 85):	H
Explosion proof:	yes
Motor protec:	THERMAL SWITCH
Length of cable:	10 m
Cable type:	LYNIFLEX
Controls:	
Control box:	not included
Moisture sensor:	with moisture sensors
Water-in-oil sensor:	without water-in-oil sensor
Others:	
Net weight:	139 kg
Country of origin:	HU
Custom tariff no.:	84137021

Company name:
Created by:
Phone:

Date: 17/10/2019

98626651 SLV.100.100.55.EX.4.51D.C 50 Hz

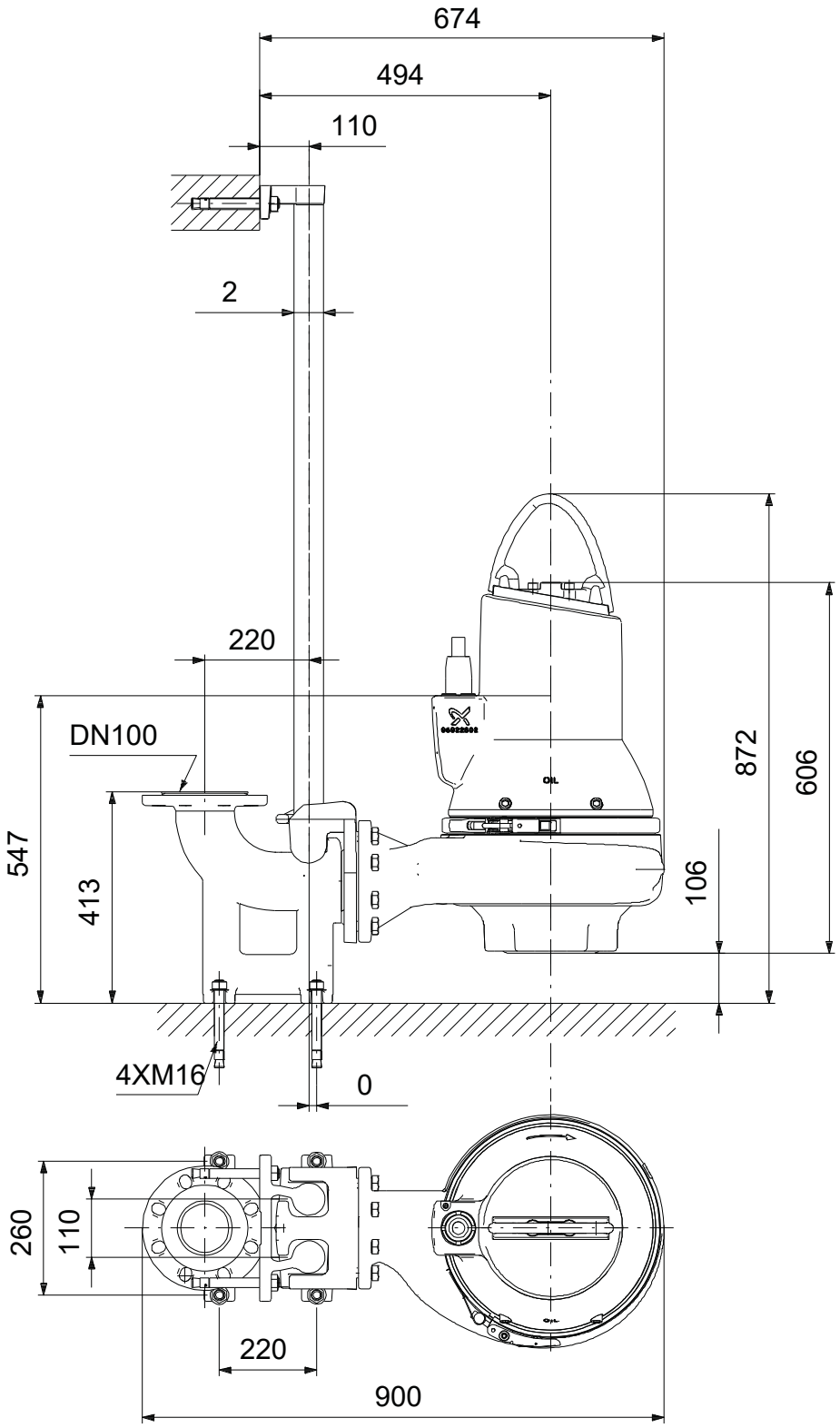


Note! All units are in [mm] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.

Company name:
Created by:
Phone:

Date: 17/10/2019

98626651 SLV.100.100.55.EX.4.51D.C 50 Hz

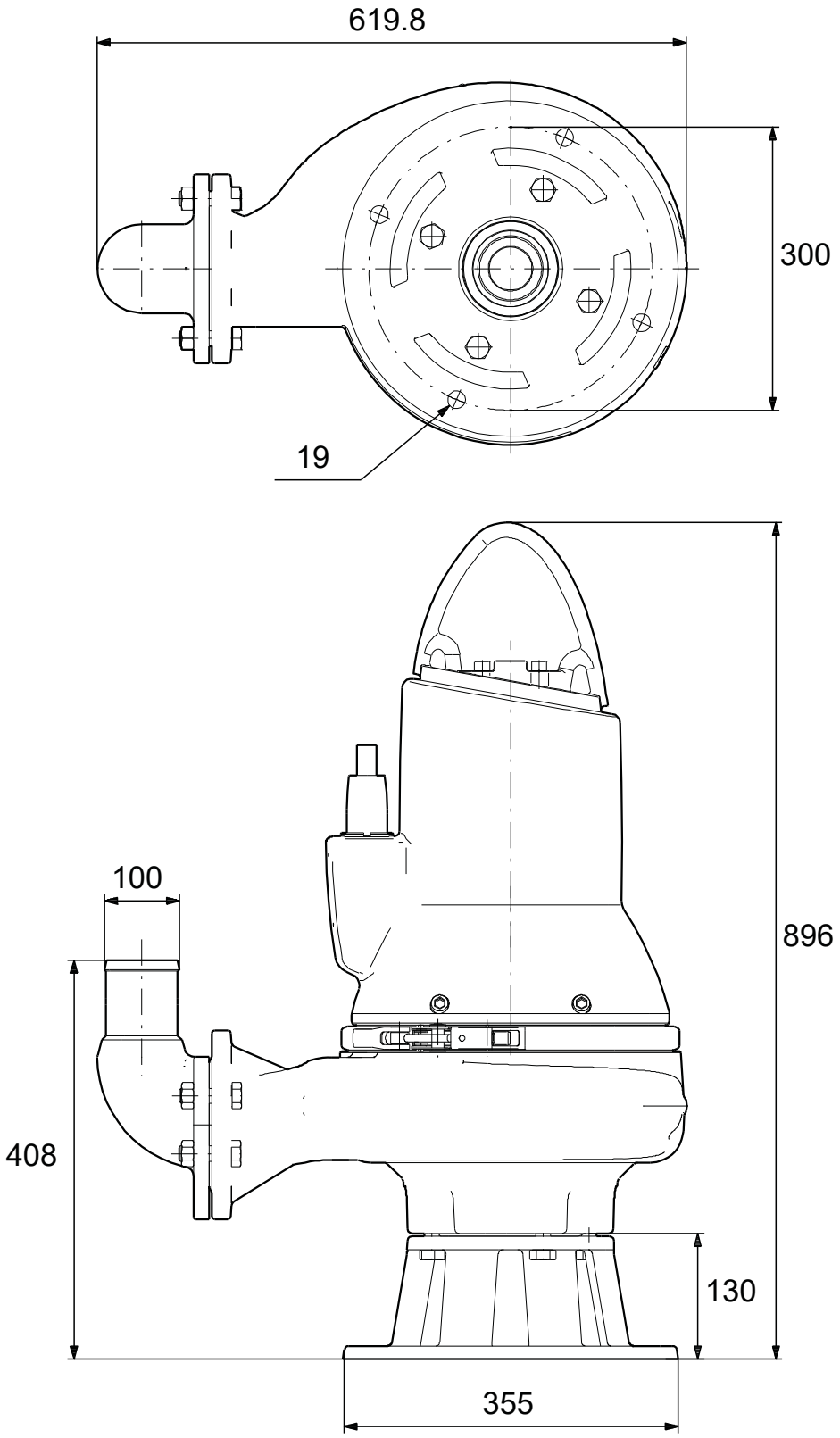


Note! All units are in [mm] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.

Company name:
Created by:
Phone:

Date: 17/10/2019

98626651 SLV.100.100.55.EX.4.51D.C 50 Hz



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

Product description

Pos.no	Description	Item no.	Quant.
	XFP100E CB1 50HZ		
	Centrifugal pump: XFP100E CB1		1

XFP

Submersible sewage pump type ABS XFP range of submersible pumps (PE1 to PE3) are supplied for reliable and economic pumping of clear water,
polluted water and most heavily polluted sewage containing solids, faecal slurry and sludge in commercial, industrial and municipal application. Driven by Premium Efficiency IE3 motor in according with IEC 60034-30,
exceeding CEMEP EFF 1. Motor insulation according to Class H, temperature rise according to Class A.
Explosion proof as standard, ATEX, FM and CSA.
Continuously rated motor suitable for wet and dry installation as standard.(PE1 and PE2)
PE3 has the option of internal closed loop cooling system for dry installation.
Equipped with temperature and moisture sensors as standard.
Standard sewage hydraulic with Contrablock plus gives enhanced levels of blockage resistance and excellent rag handling with large free solids passage of 75 mm minimum.

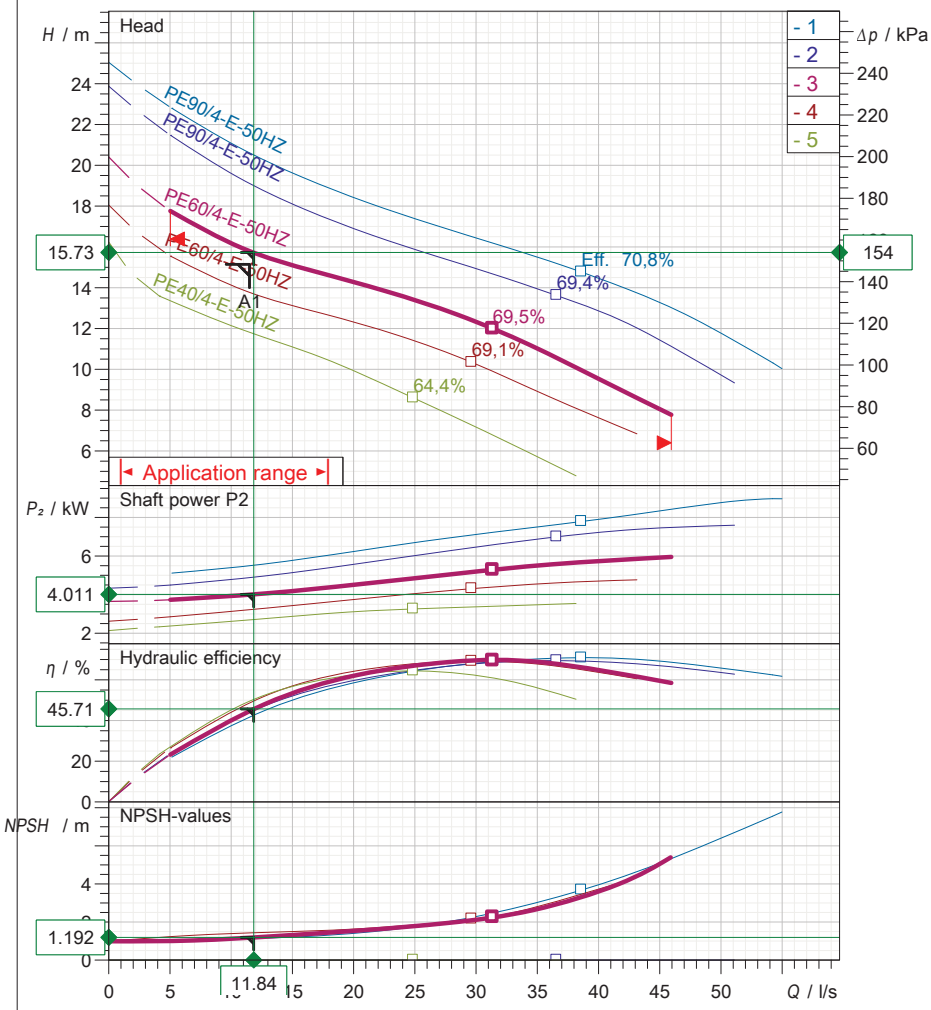
50Hz
Capacity up to 750 m3/h
Head, max. 74 m

60Hz
Capacity up to 3500 US g.p.m.
Head, max. 330ft

Type: XFP100E CB1
Technical data

Delivery rate	: 11,84 l/s
Delivery head	: 15,73 m
Hydr. Efficiency	: 45,71 %
Total efficiency	: 40,69 %
Shaft power	: 4,011 kW
Speed	: 1479 1/min
Impeller type	: Contrablock Plus impeller, 1 vane
Motor output	: 6 kW
Voltage	: 400 V
Frequency	: 50 Hz
Suction outlet	: DN100
Discharge outlet	: DN100

XFP100E CB1 50HZ



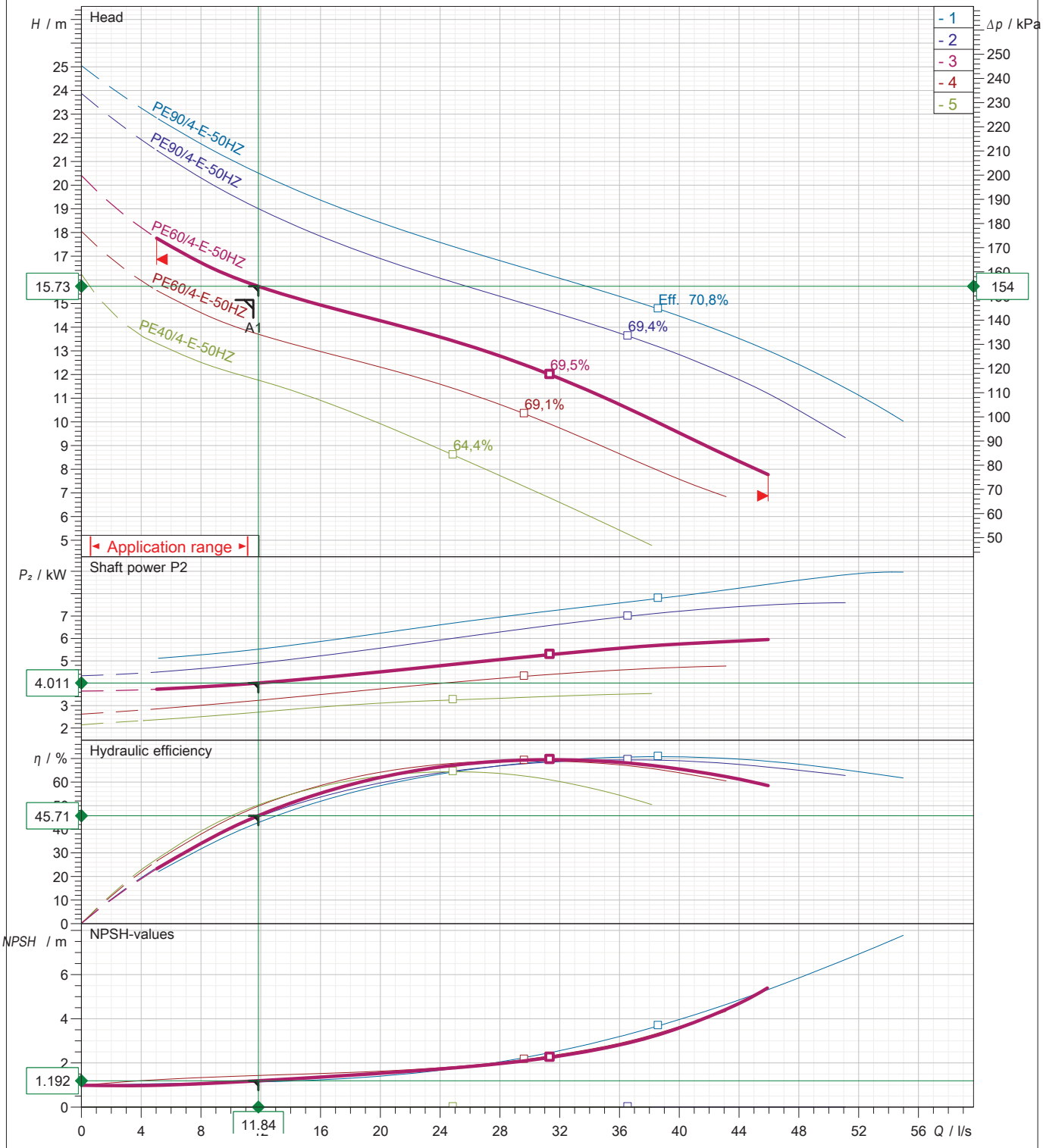
Testnorm
ISO 9906: 2012, HI 11.6/14.6 ≤10kW

2019-10-17

Operating data specification			
Flow	11,8 l/s	Head	15,7 m
Efficiency	45,7 %	Shaft power	4,01 kW
NPSH	1,19 m	Fluid	Wastewater
Temperature	20 °C	Nature of system	Single head pump
No. of pumps	1		
Pump data			
Type	XFP100E CB1 50HZ	Make	SULZER
Series	XFP PE1-PE3	Impeller	Contrablock Plus impeller, 1 vane
N° of vanes	1	Impeller size	225 mm
Free passage	80 mm	Suction flange	DN100
Discharge flange	DN100	Type of installation	Wet Well installation with pedestal
Motor data			
Rated voltage	400 V	Frequency	50,0 Hz
Rated power P2	6 kW	Nominal Speed	1470 1/min
Number of poles	4	Efficiency	89,8 %
Power factor	0,71	Rated current	13,6 A
Starting current	88,4 A	Rated torque	39 Nm
Starting torque	82 Nm	Degree of protection	IP 68
Insulation class	H	No. starts per hour	15

Curve number	Pump performance curves	
Reference curve XFP100E CB1 50HZ	**XFP100E CB1 50HZ**	SULZER

			Discharge	Frequency
			DN100	50 Hz
Density	Viscosity	Testnorm	Rated speed	Date
998,2 kg/m³	1 mm²/s	ISO 9906: 2012, HI 11.6/14.6 ≤10kW	1479 1/min	2019-10-17
Flow	Head	Rated power	Hydraulic efficiency	NPSH
11,8 l/s	15,7 m	4,01 kW	45,7 %	1,19 m

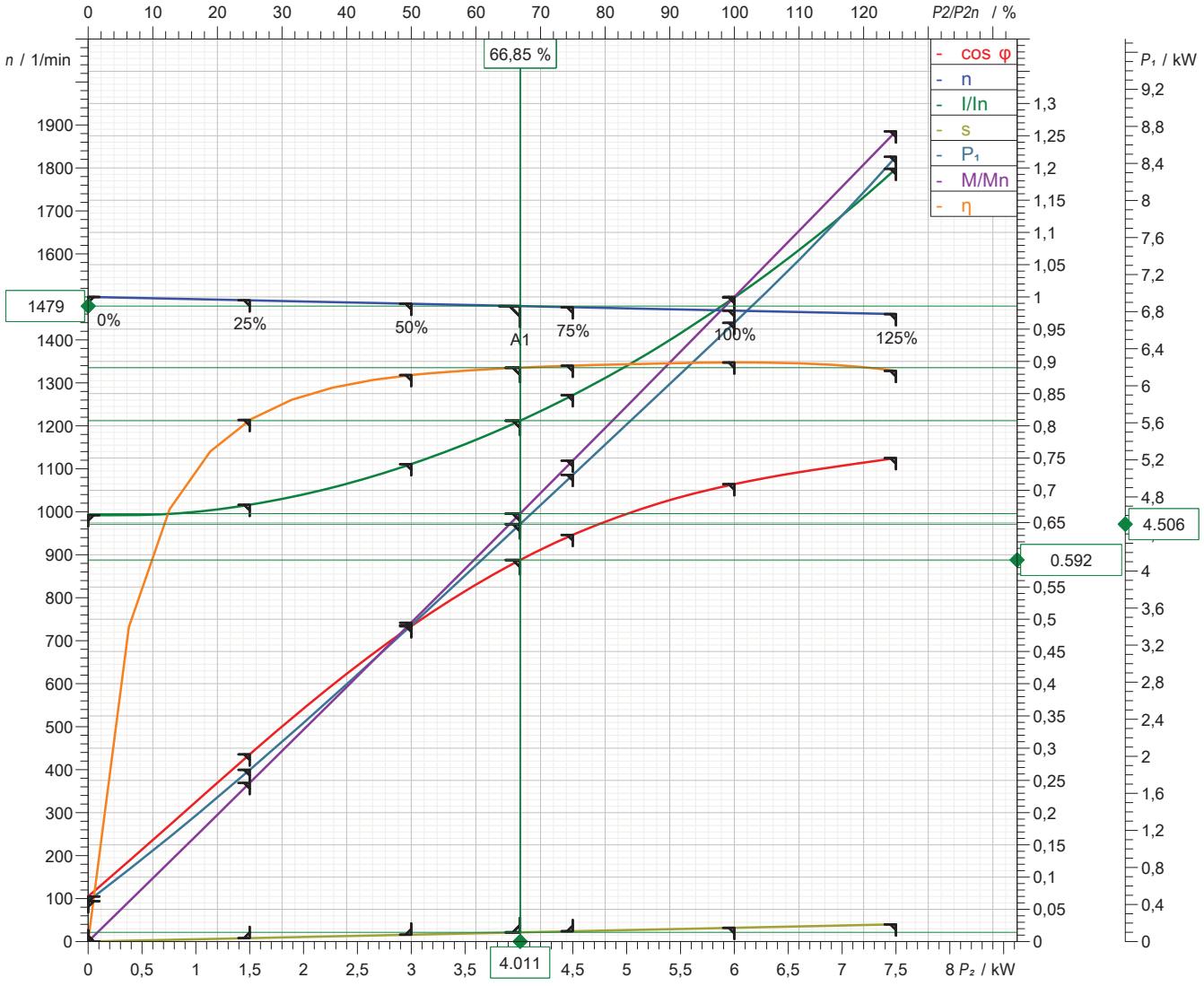


Impeller size	N° of vanes	Impeller	Solid size	Revision
225 mm	1	Contrablock Plus impeller, 1 vane	80 mm	

Version 2016/06/16
Data version Jun-2016

Frequency	Motor performance curve	SULZER
50 Hz	PE60/4-E-50HZ	

Rated power	Service factor	Nominal Speed	Number of poles	Rated voltage	Date
6 kW	1	1470 1/min	4	400 V	2019-10-17



Symbol	No load	25 %	50 %	75 %	100 %	125 %
P_2 / kW	0	1,5	3	4,5	6	7,5
P_1 / kW	0,4358	1,854	3,414	5,038	6,679	8,472
η / %	0	80,92	87,88	89,32	89,83	88,53
n / 1/min	1500	1492	1484	1476	1468	1460
cos φ	0,06992	0,2904	0,4892	0,6308	0,7096	0,7501
I / A	8,997	9,214	10,07	11,53	13,59	16,3
s / %	0	0,5333	1,067	1,6	2,133	2,667
M / Nm	0	9,6	19,3	29,11	39,03	49,05

Tolerance according to VDE 0530 T1 12.84 for rated power

Starting current	Starting torque	Moment of inertia	No. starts per hour
88,4 A	82 Nm	0,0317 kg m²	15

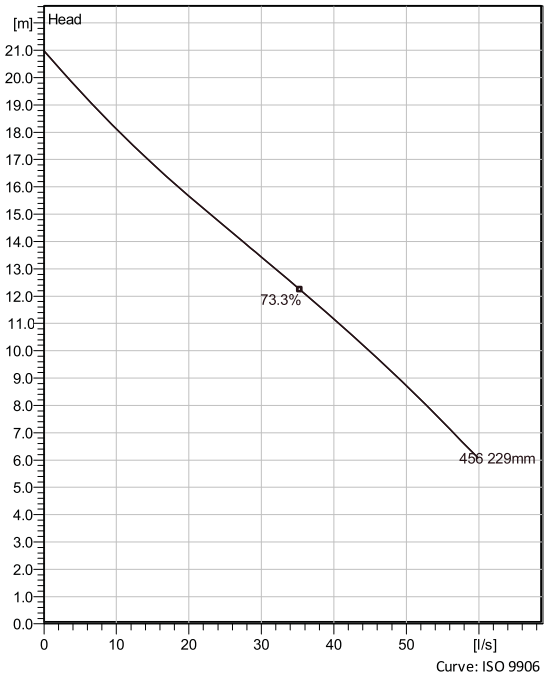
Version 2016/06/16
Data version Jun-2016

NP 3153 HT 3~ 456

Patented self cleaning semi-open channel impeller, ideal for pumping in most waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

Technical specification

Curves according to: Water, pure [100%],4 °C,1 kg/dm³,1.569 mm²/s



Curve: ISO 9906

Configuration

Motor number
N3153.091 21-15-4AA-W 7.5KW

Installation type
P - Semi permanent, Wet

Impeller diameter
229 mm

Discharge diameter
100 mm

Pump information

Impeller diameter
229 mm

Discharge diameter
100 mm

Inlet diameter
100 mm

Maximum operating speed
1465 1/min

Number of blades
2

Materials

Impeller
Grey cast iron

Project	**Created by**		**Last update**
Block	**Created on**	10/17/2019	

NP 3153 HT 3~ 456

Technical specification

Motor - General

Motor number N3153.091 21-15-4AA-W 7.5KW	**Phases** 3~	**Rated speed** 1465 1/min	**Rated power** 7.5 kW
Approval EN	**Number of poles** 4	**Rated current** 16 A	**Stator variant** 2
Frequency 50 Hz	**Rated voltage** 400 V	**Insulation class** H	**Type of Duty** S1

Motor - Technical

Power factor - 1/1 Load 0.77	**Motor efficiency - 1/1 Load** 87.0 %	**Total moment of inertia** 0.075 kg m²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.70	**Motor efficiency - 3/4 Load** 87.5 %	**Starting current, direct starting** 105 A	
Power factor - 1/2 Load 0.56	**Motor efficiency - 1/2 Load** 86.0 %	**Starting current, star-delta** 35 A	

Project	**Created by**		**Last update**
Block	**Created on**	10/17/2019	

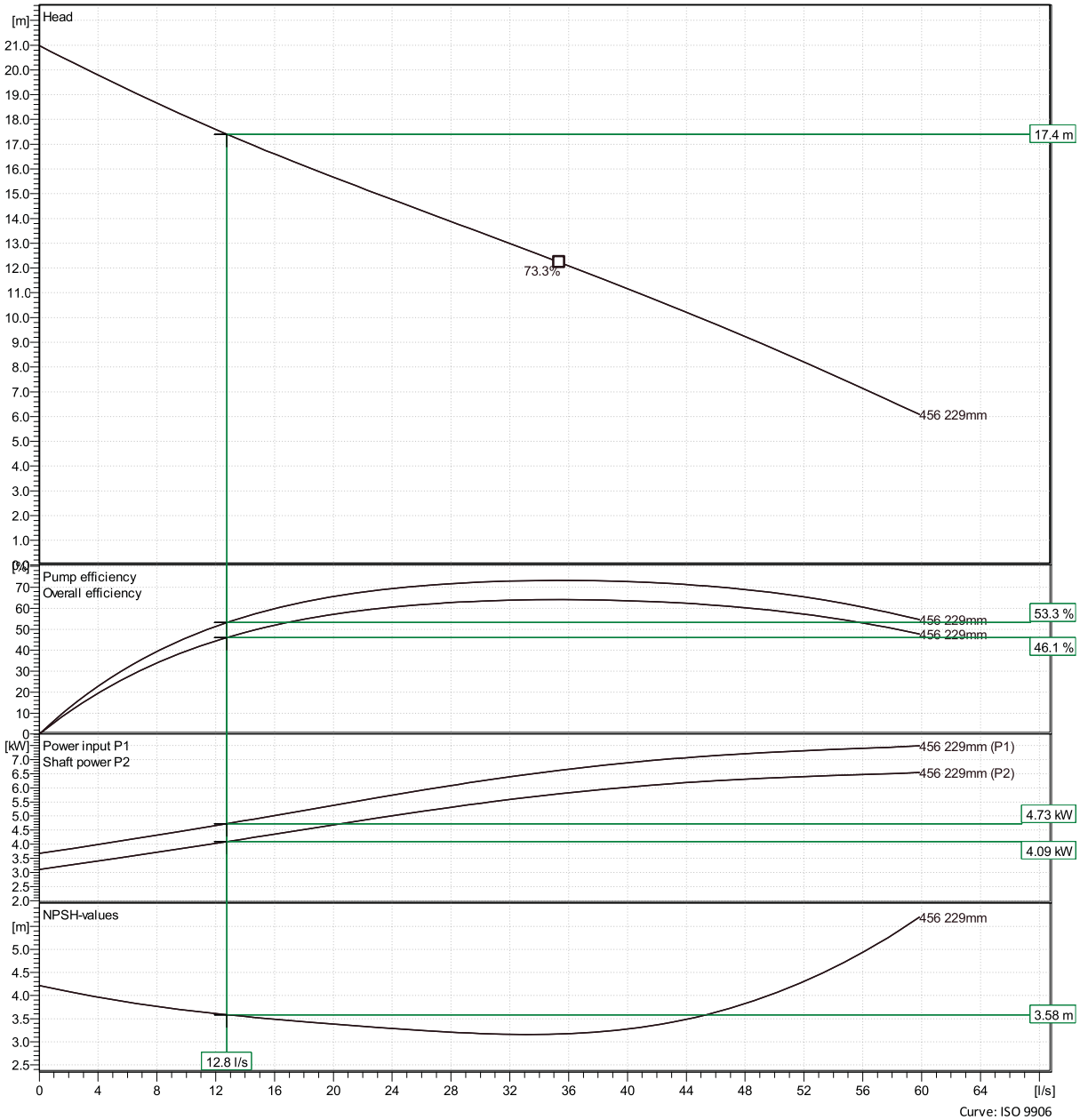
NP 3153 HT 3~ 456

Performance curve

Duty point

Flow	Head
12.8 l/s	17.4 m

Curves according to: Water, pure [100%],4 °C,1 kg/dm³,1.569 mm²/s



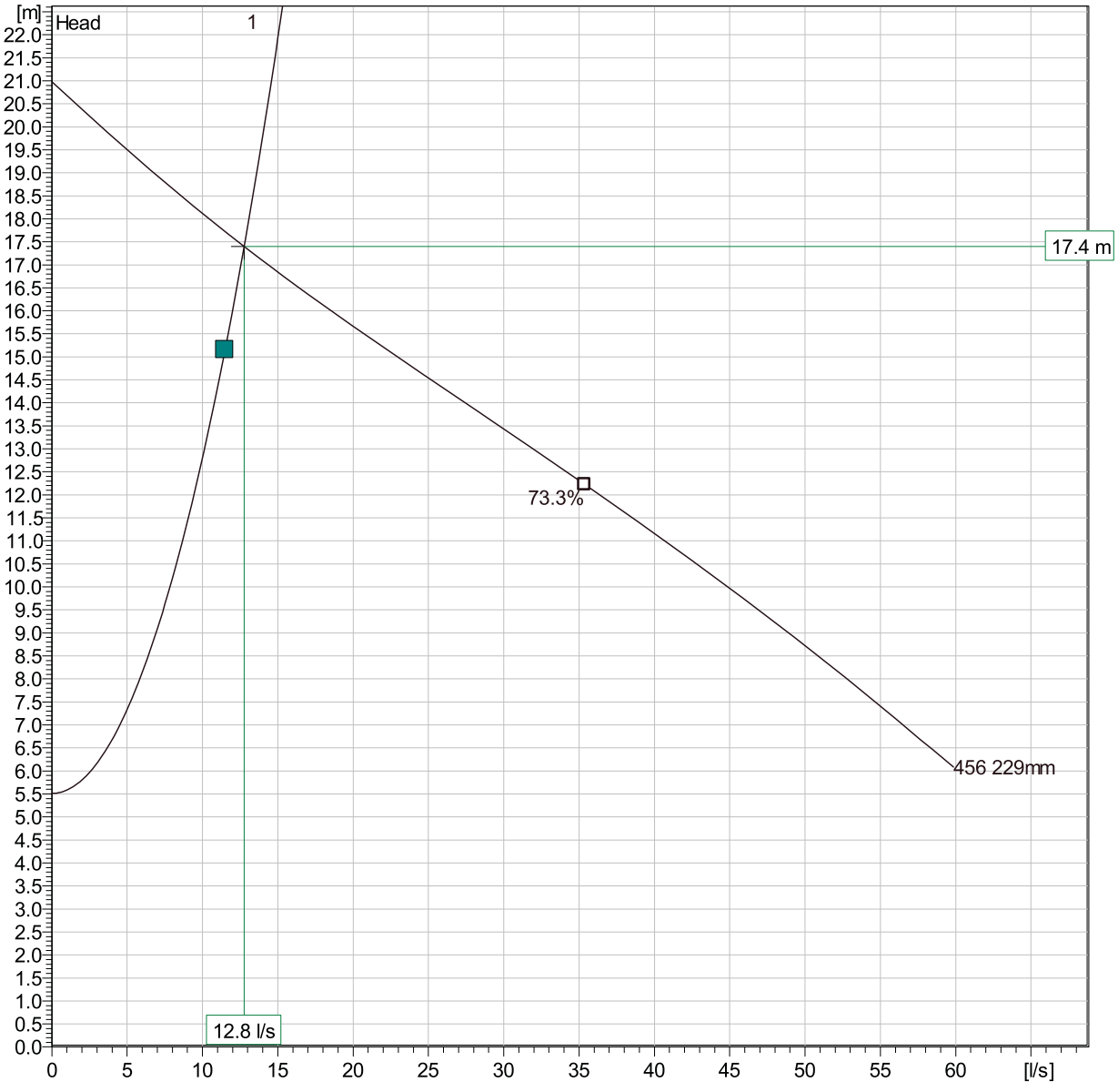
Curve: ISO 9906

Project	Created by	Last update
Block	Created on 10/17/2019	

NP 3153 HT 3~ 456

Duty Analysis

Curves according to: Water, pure [100%],4 °C,1 kg/dm³,1.569 mm²/s



Curve: ISO 9906

Operating characteristics

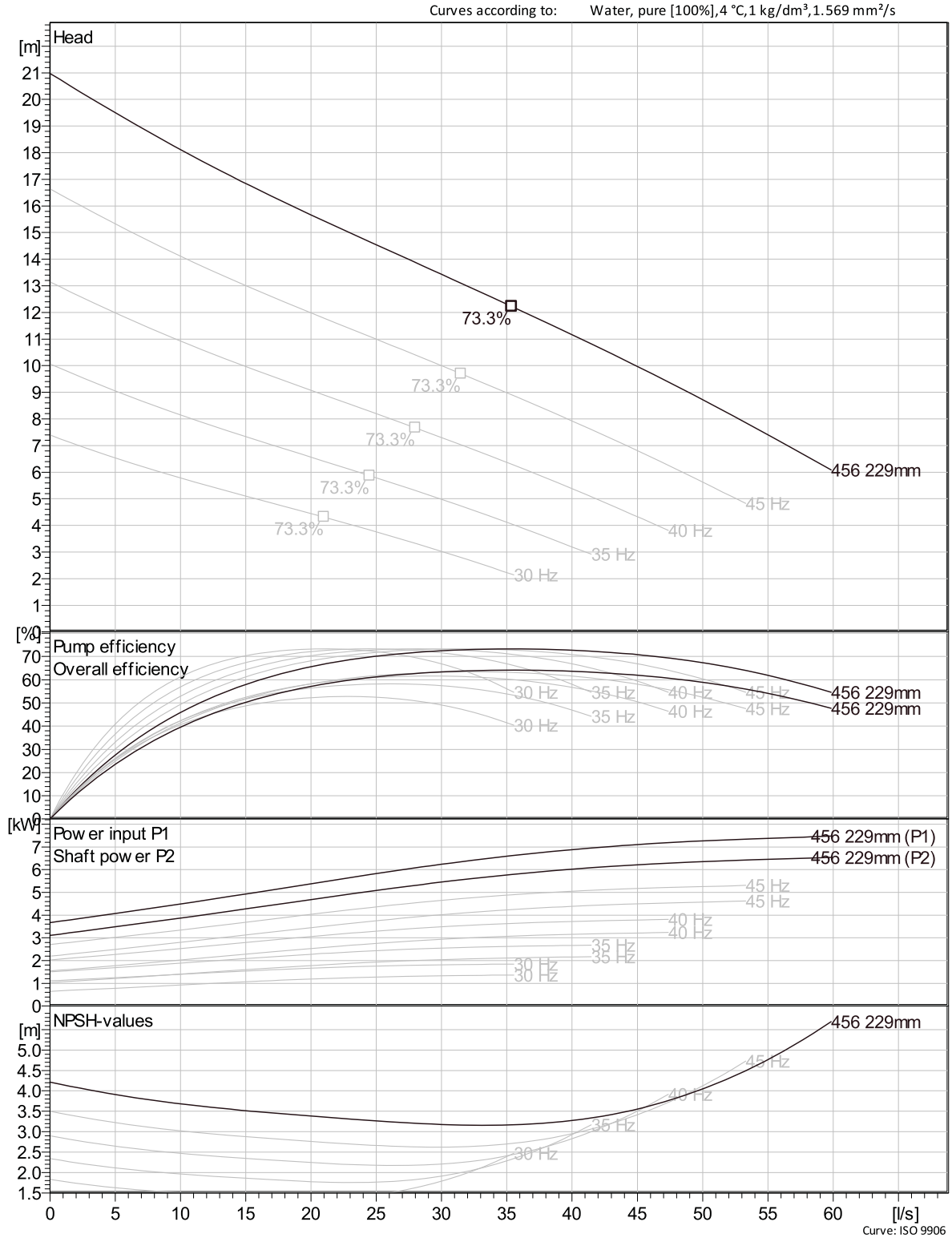
Pumps/Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHr
1	12.8 l/s	17.4 m	4.09 kW	12.8 l/s	17.4 m	4.09 kW	53.3 %	0.000103 kWh/	3.58 m

Project	**Created by**		**Last update**
Block	**Created on**	10/17/2019	

NP 3153 HT 3~ 456

VFD Curve

Curves according to: Water, pure [100%],4 °C,1 kg/dm³,1.569 mm²/s

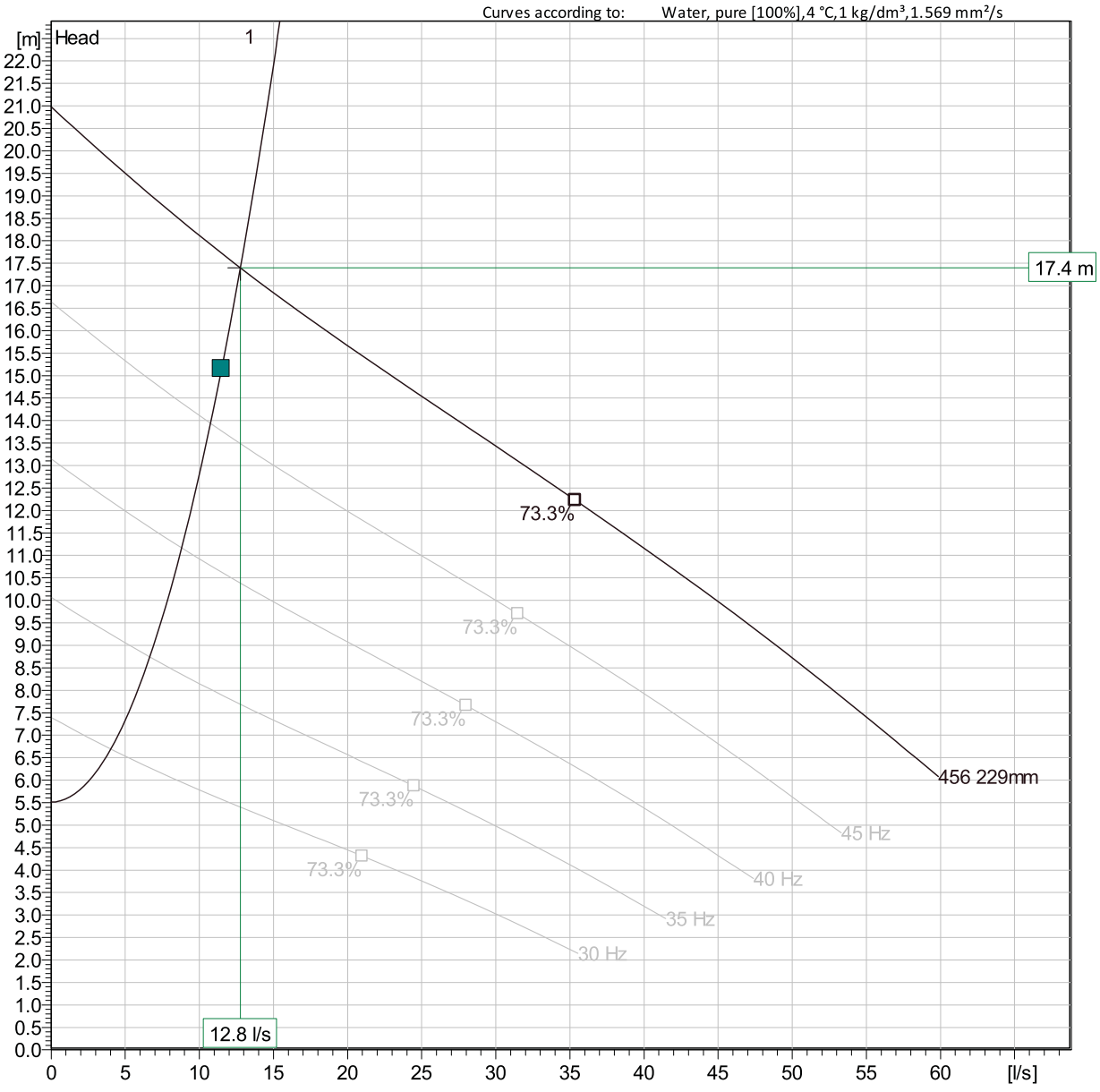


Curve: ISO 9906

Project	**Created by**		**Last update**
Block	**Created on**	10/17/2019	

NP 3153 HT 3~ 456

VFD Analysis



Curve: ISO 9906

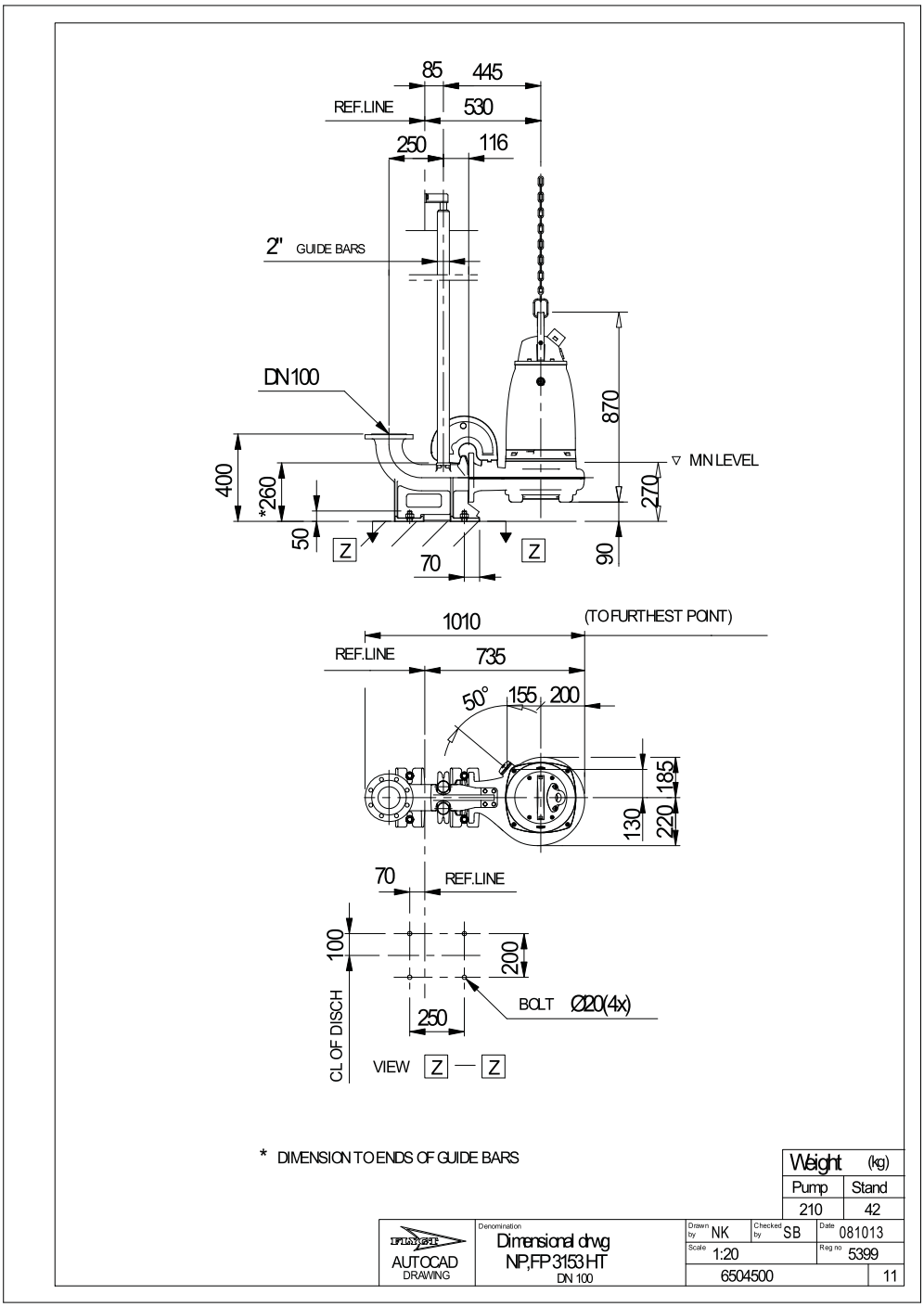
Operating Characteristics

Pumps/Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHr
1	50 Hz	12.8 l/s	17.4 m	4.09 kW	12.8 l/s	17.4 m	4.09 kW	53.3 %	0.000103 kWh	3.58 m
1	45 Hz	11 l/s	14.3 m	2.98 kW	11 l/s	14.3 m	2.98 kW	51.8 %	8.96E-5 kWh/	3.06 m
1	40 Hz	9.04 l/s	11.5 m	2.05 kW	9.04 l/s	11.5 m	2.05 kW	49.5 %	7.92E-5 kWh/	2.56 m
1	35 Hz	6.88 l/s	8.96 m	1.34 kW	6.88 l/s	8.96 m	1.34 kW	45.3 %	7.41E-5 kWh/	2.1 m
1	30 Hz	4.28 l/s	6.85 m	0.795 kW	4.28 l/s	6.85 m	0.795 kW	36.2 %	8.3E-5 kWh/l	1.69 m

Project	**Created by**		**Last update**
Block	**Created on**	10/17/2019	

NP 3153 HT 3~ 456

Dimensional drawing



Project	**Created by**	**Last update**
Block	**Created on** 10/17/2019	

APPENDIX B.

PRODUCT DATA SHEETS

Technical Specification

ENM-10 level regulator

FLYGT
a xylem brand

Density g/cm^3	Regulator length mm (in.)	Diameter mm (in.)
1.40 – 1.50	126 (5)	100 (4)

Weight

A regulator with standard density and 20 m cable weighs approximately 2 kg (4.5 lb).

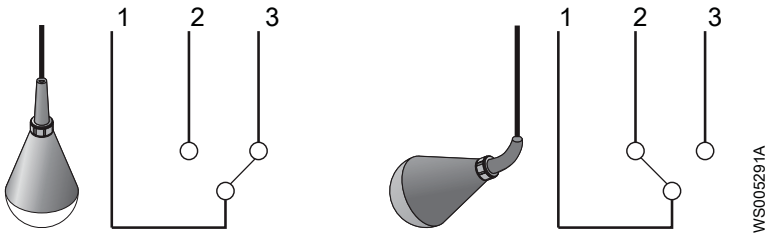
1.3 Cables

Lengths

For liquids with specific density between 0.95 and 1.10 g/cm^3, the following cables are available:

Version	Lengths m (ft)
Standard	• 6 m (20 ft) • 13 m (42 ft) • 20 m (65 ft) • 30 m (100 ft) • 50 m (167 ft)
Ex-version	• 6 m (20 ft) • 13 m (42 ft) • 20 m (65 ft)

Color codes



Cable	1	2	3
Color	EU: Grey US: Red	Black	EU: Brown US: White

1.4 Approvals and standards

Standard approvals

LVD approval according to EN61058
CSA approval: Certificate Number 1330172
Cl. I Zone 0, Gr. IIC
CL.I Div.1 Gr A, B, C and D
Cl.II Gr. E, F, and G

Ex approvals

IECEx ia IIC T4 Ga: -20°C≤Ta≤60°C
IECEx NEMKO 09.008
ATEX II 1G Ex ia IIC T4
NEMKO 10 ATEX 1082

Applied standards for ATEX and IEC

- EN 60079-0:2012/IEC 60079-0:2011
- EN 60079-11:2012/IEC 60079-11:2011

Intrinsically safe circuits are required for the automatic control system. Use a Zener barrier. For example, part number 84 01 07.

The electrical connections must comply with the Ex regulations of the national submitter.

2 References

2.1 Chemical resistance tables

The tables show the degree of resistance the level regulator has to different chemicals at two different temperatures. The density of the liquid determines the buoyancy of the regulator.

Acids

Acid	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetic acid 50%	1	2	0	0
Acetic acid 75%	2	2	0	0
Benzoic acid	2	2	0	0
Boric acid 5%	0	–	0	0
Butyric acid	2	2	2	2
Chromic acid 10%	0	2	2	2
Citric acid	0	1	0	0
Hydrobromic acid 5%	1	2	0	0
Hydrochloric acid 10%	0	1	0	1
Hydrochloric acid 37%	1	2	0	2
Hydrocyanic acid 10%	0	0	1	2
Hydrofluoric acid 5%	0	2	0	1
Hypochloric acid	1	2	2	2
Maleic acid	2	2	2	2
Nitric acid 5%	1	1	1	1
Nitric acid 65%	2	2	2	2
Oleic acid	1	2	2	2
Oxalic acid 50%	1	1	1	2
Phosphoric acid 25%	0	0	1	2
Phosphoric acid 85%	0	0	1	2
Sulphuric acid 10%	1	2	1	2
Sulphuric acid 78%	2	2	2	2
Tannic acid	0	0	0	0
Tartaric acid	1	1	1	1

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Alkalis

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Ammonium hydroxide	0	–	0	0
Calcium hydroxide	0	0	0	0

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Potassium hydroxide	1	2	0	0
Sodium hydroxide	1	2	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Salts

Salt	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Aluminum chloride	0	0	0	0
Calcium sulphate	0	0	0	0
Calcium chloride	0	0	0	0
Calcium nitrate	0	0	0	0
Copper chloride	0	0	0	0
Copper sulphate	0	0	0	0
Ferric chloride	0	0	0	0
Ferrous sulphate	0	0	0	0
Magnesium chloride	0	0	0	0
Potassium sulphate	0	0	0	0
Potassium nitrate	0	0	0	0
Potassium carbonate	1	1	1	1
Potassium bicarbonate	0	0	0	0
Sodium sulphate	0	0	0	0
Sodium chloride	0	0	0	0
Sodium nitrate	0	0	0	0
Sodium bicarbonate	0	0	0	0
Sodium carbonate	0	0	0	0
Tin chloride	1	1	1	1
Zinc sulphate	0	0	0	0
Zinc chloride	0	0	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Oils

Oil	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Castor oil	1	1	1	1
Coconut oil	0	–	0	2
Corn oil	2	2	2	2
Diesel oil	2	2	2	2
Linseed oil	2	2	2	2
Mineral oils	2	2	2	2
Olive oil	1	1	1	1
Silicone oils	0	0	0	0

Product Guide

Level and Flow Measurement

dB Series Transducers

pulsar®
PROCESS MEASUREMENT

pulsar Transducers

Standard Range

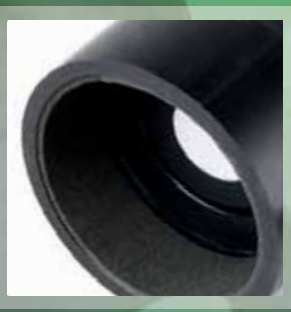
A range of compact high acoustic output, non contacting transducers designed for liquids or solids level measurement use. All have ATEX EEx m as standard for use in zone 1 flammable atmospheres.

Threaded Range

These incorporate the performance features of the standard products, but additionally offer a front thread mount option to suit threaded nozzles or flanged tank entries.

Accessories

Various transducer options can be provided to suit specific applications, such as submergence shields, foam faced transducers, sanitary flanges, blind flanges and a choice of transducer mounting brackets.



Transducers:
Standard Range

Features

- Encapsulated ATEX (EEx m II T6) for zones 1 and 2 as standard
- On NPT threaded versions, FM/FMC Class I, Div 1, Group A, B, C and D. Class II, Div 1, Group E, F and G. Class III.
- I.S. ATEX (EEx ia IIC T6) for zone 0 (option)
- Integral temperature compensation
- Narrow beam angles
- Robust IP 68/NEMA 6P
- PZT ceramic transducer element
- Standard 2 or 3 core screened cable extensions to 1000m
- High acoustic power output
- Patented

Pulsar's main dB series of non contact ultrasonic transducers offer compact, robust measurement and an innovative approach to transducer design.

Previously, users had a choice between high-voltage, frequency dependent transducers that were susceptible to electrical noise and needed special, protected interconnecting cables, and weak, low-power transducers that had good hazardous area performance but performed poorly in any but the simplest application.

The dB range has changed all that, creating a compact, low power transducer design that can be I.S. certified and uses standard interconnecting cables, yet produces extremely high acoustic power to give exceptional results in a wide variety of challenging situations.

Team a dB transducer with any of Pulsar's Ultra, FlowCERT, Zenith, Quantum or Blackbox control units to create the perfect solution for your application. All transducers have flammable atmosphere approval as standard.

Standard transducer bodies are made from Valox 357 PBT with a special foam radiating face. Some are available with both body and sealed front face in PVDF for corrosive applications.

(all beam angles defined as 3dB or half power inclusive)

dB3 – short range solids and liquids measurement
Range – 125mm – 3m (0.41ft-10ft), 125kHz, 19mm (0.75in) diameter radiating face, <10° beam angle. All dB3 versions are fitted with a shallow drip shield.

dBMACH3 – short range for accurate open channel flow measurement
Range – 0 - 2.425m (0-7.95ft), 125kHz fitted with cone and sun shield (see p8)

dB6 – short range solids and liquids measurement
Range – 300mm – 6m (0.98ft-20ft), 75kHz, 30mm (1.18in) diameter radiating face, <10° beam angle.

dBS6 – short deadband version, solids and liquids measurement
Range 200mm – 6m (0.66ft-20ft), at 50kHz, 45mm (1.78in) radiating face, <10° beam angle.

dB10 – solids, powders and liquids measurement
Range – 300mm – 10m (0.98ft-33ft), 50kHz, 45mm (1.78in) diameter radiating face, <10° beam angle.

dB15 – narrow beam transducer for solids, powders and liquids
Range – 500mm – 15m (1.64ft-50ft), 41kHz, 60mm (2.36in) diameter radiating face, <8° beam angle.

dB25 – narrow beam, mid-range transducer for solids, powders and liquids
Range – 600mm – 25m (1.97ft-82ft), 30kHz, 78mm (3.07in) diameter radiating face, <6° beam angle.

dB40 – narrow beam, long range transducer for solids, powders and liquids
Range – 1.2 – 40m (3.94ft-130ft), 20kHz, 160mm (6.30in) diameter radiating face, <5° beam angle.

dB50* – narrow beam, long range transducer for solids, powders and liquids
Range – 2m - 50m (6.56ft-164ft), 20kHz, 160mm (6.30in) diameter radiating face, <5° beam angle.

ALL BEAM ANGLES ARE INCLUSIVE, BUT GIVE AN EFFECTIVE BEAM ANGLE OF <3 DEGREES ON OUR CONTROLLERS. RANGE ON POWDERS AND SOLIDS DEPENDS ON APPLICATION.

* dB50 - not ATEX (flammable atmosphere) approved, and works with modified Ultra 3 and Ultra 5 controllers only

Metal Seat Wedge Gate Valve

FIGURE 3000

Metal seat wedge gate valve for pipeline isolation.

Suitable for water, wastewater and sewage duties.

Features

- Unique lightweight duticle iron design
- WRAS listed non-metallic components
- Durable fusion bonded epoxy coated
- Stem seals replaceable under pressure
- Clockwise closing spindle as standard, clockwise opening on request
- Corrosion resistant construction
- 100% full bore
- Drilling bosses and drain plug as standard
- Integral feet to facilitate safe storage
- Robust low maintenance design suitable for buried service

Options

- Handwheel or stem cap operation
- Actuation: electric or pneumatic
- Gearboxes: bevel or spur
- Position indicator
- Locking device
- By-pass
- Extension spindles and T-keys
- Alternative flange drillings

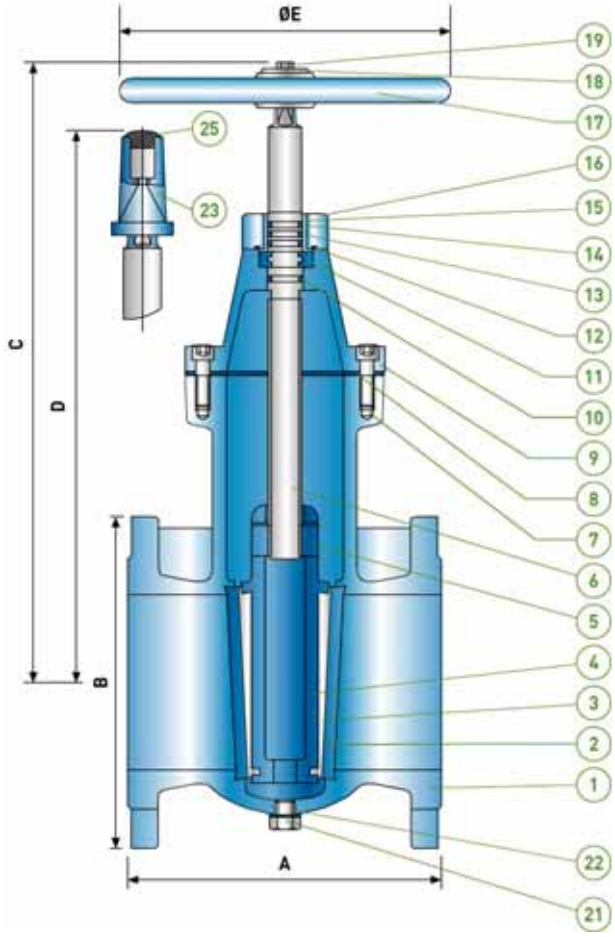
WRAS APPROVED PRODUCT CERTIFICATION MARK

Metal Seat Wedge Gate Valve

Material Specification

Item	Item Name	Material	Specification
1	Body	Ductile Iron	BS EN 1563 Gr 500/7
2	Body Seat Ring	Copper Alloy	BS EN 1982
3	Wedge Seat Ring	Copper Alloy	BS EN 1982
4	Wedge	Ductile Iron	BS EN 1563 Gr 500/7
5	Stem Nut	Copper Alloy	BS EN 1982
6	Stem	Stainless Steel	BS EN 10088Þ
7	Bolt	BZP Steel	BS 3692 Gr 8.8
8	Body Gasket	EPDM	WRAS Listed
9	Bonnet	Ductile Iron	BS EN 1563 Gr 500/7
10	'O' Ring	EPDM	WRAS Listed
11	Thrust Collar	Copper Alloy	BS EN 1982
12	'O' Ring	EPDM	WRAS Listed
13	'O' Ring	EPDM	WRAS Listed
14	Dust Seal	EPDM	WRAS Listed
15	Bush	Copper Alloy	BS EN 1982
16	Seal Housing	Ductile Iron	BS EN 1563 Gr 500/7
17	Handwheel	Ductile Iron	BS EN 1563 Gr 500/7
18	Washer	Stainless Steel	BS EN 10088
19	Bolt	Stainless Steel	BS EN 10088
20	Sealing Housing Bolt	BZP Steel	BS 3692 Gr 8.8
21	Drain Plug	Stainless Steel	BS EN 10088
22	Gasket	PTFE	WRAS Listed
23	Stem Cap	Ductile Iron	BS EN 1563 Gr 500/7
24	Stem Cap Bolt	Stainless Steel	BS EN 10088
25	Grommet	EPDM	-

Dimensions in mm. Weights are approximate.



Dimensions

DN	A	B	C	D	E	Handwheel KG	Stem Cap KG	WRAS Approved
50	178	165	282	312	180	23	21	X
65	190	185	313	343	180	24	22	
80	203	200	398	428	205	26	24	X
100	229	220	424	454	205	31	29	X
125	254	250	445	475	250	41	39	
150	267	285	525	556	280	58	55	X
200	292	340	638	668	320	87	82	
250	330	405	740	770	360	131	125	
300	356	460	840	870	450	186	177	

Dimensions in mm. Weights are approximate.

Technical Specification

Standard	BS5163 Pt. 1 & 2:2004 & EN1171:2002
Range	DN50 to DN300
Flanges & Drillings Alternatives	BS EN 1092-2:1987 Table 9 (PN16) BS EN 1092-2:1987 Table 8 (PN10) BS10 Table D or E
Maximum Working Pressure	16 Bar
Hydrostatic Pressure Tests	Seat: 1.1 x PN (17.6 Bar) Body: 1.5 x PN (24.0 Bar)
Temperature Range	-10°C to 70 °C (insulate at 0°C and below)
Coating	Blue fusion bonded epoxy (WRAS listed)
Face-to-Face Dimensions	BS EN 558-1:1986 Table 3, Basic Series 3

WRAS APPROVED PRODUCT
CERTIFICATION MARK

RECOIL CHECK VALVE

DN400 – RCV-PN16-NON SLAM

Single door non-slam recoil swing check valve suited to systems in which rapid flow reversal exists. The valve is suitable for potable and waste water applications.

Features

- Optimal design for rapid closure
- Robust compact ductile iron design
- Gunmetal seats
- Stainless steel shaft
- Inspection cover

Technical

Standard: EN12334
Range: DN80 - DN1000
Flange Drillings: BS EN 1092-2:1987
Table 9 (PN16)
Maximum Working Pressure: 16 Bar
Temperature Range: -10°C TO 70°c,
insulate at 0°C and below
Maximum temperature: 70°C
Coating: Blue fusion bonded epoxy (WRAS listed)

Hydrostatic Pressure Tests:

Seat: 1.1 x PN (17.6 Bar)
Seat: 1.5 x PN (24.0 Bar)

Options

- Larger Diameter
- Multi-Door Design
- PN25
- Bypass
- Flow sensing switches
- Alternative flange drillings

Dimensions

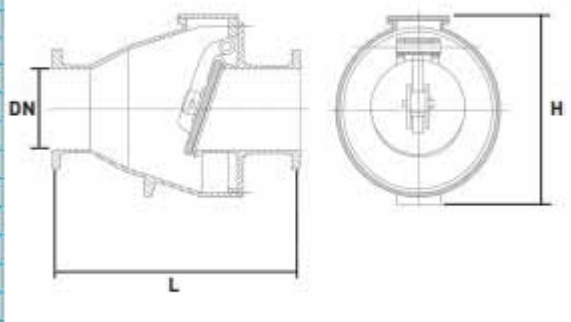
DN	L	H	Approx Weight(Kg)
80	380	300	40
100	460	350	50
150	610	440	115
200	762	520	135
250	965	610	230
300	1067	685	320
350	1143	770	420
400	1143	855	590
450	1219	940	800
500	1321	1040	1020
600	1450	1220	1270
700	1580	1315	1580
800	1700	1475	2130
900	1850	1750	3210
1000	2020	1820	4480

Horizontal installation, but can be manufactured to suit vertical pipe installation. Dimensions in mm

Material Specification

Description	Material
Body & Inlet	Ductile Iron EN1503
Disc	Ductile Iron EN1503
Shaft	Stainless Steel X20Cr13
Arm	Ductile Iron EN1503
Body Seat	Gunmetal BS1400 LG2
Disc Seat	Gunmetal BS1400 LG2
Bearing	Gunmetal BS1400 LG2
Cover	Ductile Iron EN1503
Hinge Pine	Stainless Steel X20cR13
O-Rings	EPDM
Retaining Pins	Stainless Steel 316
Air Release Plug*	Gunmetal BS1400 LG2
Drain Plug	Gunmetal BS1400 LG2
Seals	EPDM

* Not Shown



SPECIFICATION FOR CAST IRON WALL MOUNTED TYPE PENSTOCKS

SPECIFICATION No 0001-CIP

Frames shall be formed from ductile iron with a fixed yoke section. The minimum grade for the iron will be BS1452-BSEN 1561 GJL 250. The frame will incorporate stainless steel grade 316 BSEN 10088-2 (1.4401/1.4404) integral guides and ductile iron ISO 1083 BSEN 1563 adjustable wedges.

The frames will be suitable for grouting and bolting to vertical walls.

The seating side of the frame will have a mechanically fixed phosphor bronze seal. The phosphor bronze will be to BS1400 PB2 and be secured with on to a bed of high build adhesive, finally secured with a sufficient amount of special taper breakneck phosphor bronze screws. The seal is then to be machined and finished to the non-acceptance of 0.0025" (0.06mm) feeler gauge

Doors shall be formed from close grained cast iron with a fixed nut pocket. The door nut pocket shall enable the connection of the operating stem nut. The design shall allow the removal of the nut without disturbing the door. The minimum grade for the iron will be BS1452-BSEN 1561 GJL 250. The door will incorporate cast iron integral guides and taper wedge surfaces.

The seating side of the door will have a mechanically fixed phosphor bronze seal. The phosphor bronze will be to BS1400 PB2 and be secured with on to a bed of high build adhesive, finally secured with a sufficient amount of special taper breakneck screws. The un-seating side of the door will have a ground and scraped taper wedge surface. The seal is then to be machined and finished to the non-acceptance of 0.0025" (0.06mm) feeler gauge.

Wedges will be from ductile iron ISO 1083 BSEN 1563 be fully adjustable and be of the taper wedge design. They will be secured by means of stainless steel grade 316 securing pins and incorporate stainless steel grade 316 BSEN 10088-2 (1.4401/1.4404) adjusting pins for final commissioning.

The Penstocks shall be capable of both operating and withstanding the working heads (refer to particular specification).

Where necessary additional top wedging shall be provided by means of door wedges and a frame cross beam to ensure water tightness meets the required limits.

A renewable rubber EPDM face to BS681-1 shall be fitted to a machined face at the base of the Penstock door. The Flush invert face shall be retained in place by means of a stainless steel retainer and stainless steel retaining pins. The grade of stainless will be 316 BSEN 10088-2 (1.4401/1.4404). It shall be renewable in situ.

The Penstock operating stem will be of the rising or non-rising type and be manufactured from stainless steel grade 316 BSEN 10088-2 (1.4401/1.4404). The extension spindle will be mild steel grade 43A BSEN 10025:S275 JOH 1997/J2H 1994. The stem will work through a machine cut operating nut either housed in a thrust taking arrangement mounted direct to the top of the frame or remote on a pillar or housed in a nut located on a pocket at the top of the Penstock door. If actuated the stem will work through the drive sleeve of the actuator unit. (Actuator or gearbox operated Penstocks will utilise the drive sleeve supplied by the vendor)

For rising stems a cover tube shall be provided (indicating or non-indicating). Actuator cover tubes to be Manufacturers standard.

Headstocks shall be manufactured from heavy gauge mild steel and shall be heavy duty galvanised to BS729.

The Penstock will be clockwise closing at the hand wheel. This will be clearly marked on the hand wheel (integrally or mechanically fixed. the hand wheel will be no smaller than 300mm and geared that one operator can operate the Penstock using an effort of approximately 180N. This excluded electrically actuated Penstocks.

Installation of the Penstocks will be by electro zinc plated mild steel BS 7371-8:2011 or stainless steel grade A4 BSEN10088-2 (1.4401/1.4404) expanding/resin anchors. Following installation final adjustment and initial lubrication is to be undertaken and the door operated through one cycle (or as recommended by the manufacturer). If considered necessary by the client's representative a leakage test shall be undertaken at the maximum specified head.

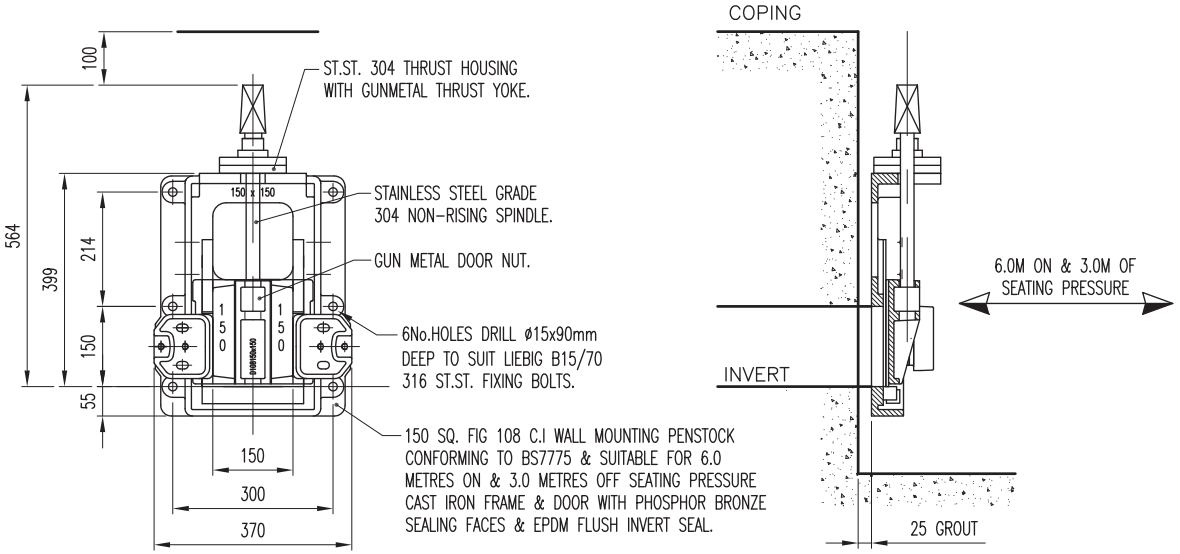
The maximum allowed leakage will be as BS7775:2005.

BS Specification BS7775:2005, including normative specifications references therein.

Cast Iron parts will be coated in-accordance with the following

Blast clean SA2½.
Two pack epoxy paint with a min of 250 microns DFT.

DO NOT SCALE – IF IN DOUBT ASK



FIRST ANGLE PROJECTION

GENERAL NOTES:

1. TOLERANCES UNLESS STATED OTHERWISE:

LINEAR DIMENSIONS <1000mm=	±0.25mm
LINEAR DIMENSIONS >1000mm=	±1.00mm
ANGULAR DIMENSIONS=	±0.5°
CONCENTRICITY=	0.10mm
HOLE POSITION=	0.25mm
PERPENDICITY=	0.10mm
FLATNESS=	0.10mm

2. REMOVE ALL BURRS & SHARP EDGES
3. MACHINE SURFACES $\overset{0.8}{\nabla}$ UNLESS NOTED OTHERWISE.

Rev	Date	Description	By

Amendments

Title
GENERAL ARRANGEMENT 150x150 SQ. CAST IRON WALL MOUNTING PENSTOCK. TEE KEY OPERATED.

Material: CAST IRON

Client:

industrial PENSTOCKS ltd
Penstocks Valves Fittings and Installation for fluid control
Unit 1&2 Washington Industrial Estate, Washington Street
Netherton, Dudley, DY2 9PH
Tel: 01384 458411 Fax: 01384 246950

Part/Drawing Number: 150-NR-CAP DIRECT

Revision:

Approved by	Checked by	Contract No
Drawn by AS	Date MAR'06	
Scales @ A3 work to figured dimensions only 1:10		Computer File No

DEFENDER
SOLID TOP HINGED - SEALED & ASSISTED

Tel: 0121 521 4500 Fax: 0121 521 4551 Email: sales@steelwaybrickhouse.co.uk www.steelway.co.uk

DEFENDER
SOLID TOP HINGED - SEALED & ASSISTED
Tel: 0121 521 4500 Fax: 0121 521 4551 Email: sales@steelwaybrickhouse.co.uk www.steelway.co.uk

Steelway Defender range of access covers and frames are designed for use on a variety of applications that require frequent opening and are subject to slow moving vehicular traffic. All of the products within the Defender range incorporate heavy guage torsion springs for ease of opening by one person. The ronge incorporates a deep channel frame which is sealed by EPDM or Nitrile and can be drained into the chamber or by weep pipes externally. Its frame design offers excellent stability under load. The Defender range is suitable for all applications especially on new builds where rebates are to be cast or where road conditions are being built up around the framing.

- Single skin flush fitting
- Torsion spring assisted for single person operation
- 106mm Deep frame for stability
- Internal fixings for increased security
- EPDM or Nitrile sealed
- Load tested to FACTA classification loadings A-D or to the requirements of BS9124
- Stamp-Lock™ locking for Utility padlocks
- Hidden tamperproof hinges
- Supplied as standard with single piece hinged safety grids
- Supplied as standard with cover safety stays to prevent accidental closure
- Galvanised to BSEN ISO1461

Additional Features

/M1 Open mesh walk on safety grid
/T1 Single pump pull through safety grid
/T2 Twin pump pull through safety grid
/CF Cable entry flaps
/PI Hinged peep in cover flap
/140G 140 micron galvanising
/RAL Powder coating over galvanising
/SRC Slip reducing coating
/FXK Fixing bolts
/PB Demountable posts and barriers

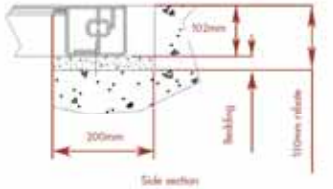
Size Range

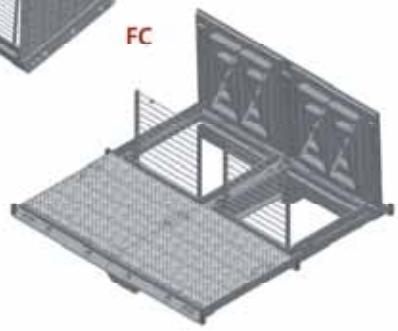
Available in a multitude of sizes from 500 x 500mm clear opening to suit any chamber opening dimensions

Cover configurations

FA - Single
FB - Twin In-Line
FC - Twin End Hinged
FD - Triple In-Line
FE - Triple 3 Side Hinged
FD - Single Span In-Line Duct
FC - Twin End Hinged Duct

AVAILABLE LOADINGS	A	B	C	D





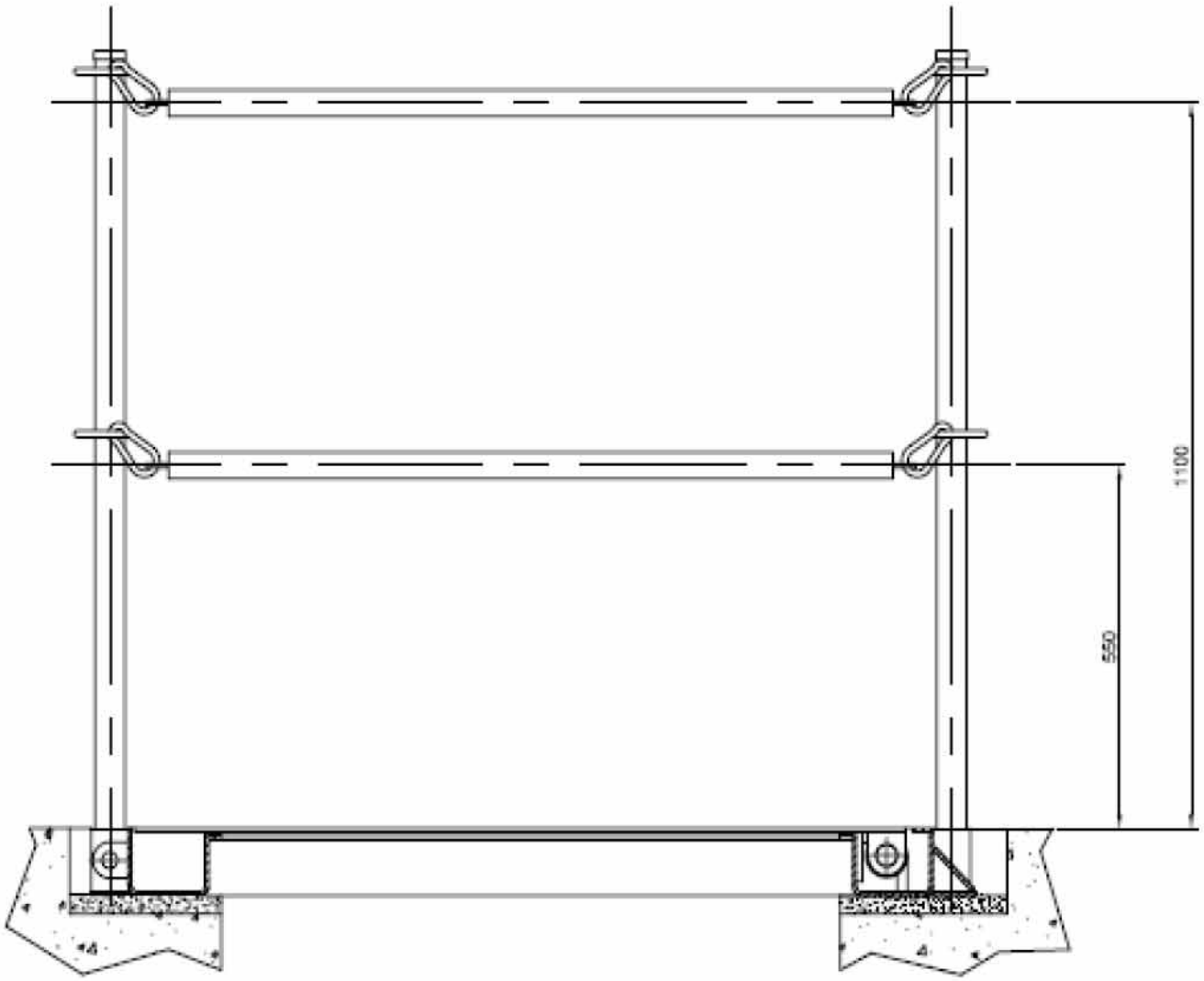
Stamp-Lock™

STAMPLOCK
LOCKING MECHANISM

- Facility to fit numerous utility padlocks
- Locks are fully replaceable
- Anti-theft built into the design
- Operator friendly

PRODUCT REFERENCES		
Fig FAA	Single Units	FACTA A
Fig FAB	Single Units	FACTA B
Fig FAC	Single Units	FACTA C
Fig FAD	Single Units	FACTA D
Fig FBA	Twin In-Line	FACTA A
Fig FBB	Twin In-Line	FACTA B
Fig FBC	Twin In-Line	FACTA C
Fig FBD	Twin In-Line	FACTA D
Fig FCA	Twin End Hinged	FACTA A
Fig FCB	Twin End Hinged	FACTA B
Fig FCC	Twin End Hinged	FACTA C
Fig FCD	Twin End Hinged	FACTA D
Fig FDA	Triple In-Line	FACTA A
Fig FDB	Triple In-Line	FACTA B
Fig FDC	Triple In-Line	FACTA C
Fig FDD	Triple In-Line	FACTA D
Fig FEA	Triple 3 side hinged	FACTA A
Fig FEB	Triple 3 side hinged	FACTA B
Fig FEC	Triple 3 side hinged	FACTA C
Fig FED	Triple 3 side hinged	FACTA D
Fig FDA	Single Span In-line Duct	FACTA A
Fig FDB	Single Span In-line Duct	FACTA B
Fig FDC	Single Span In-line Duct	FACTA C
Fig FDD	Single Span In-line Duct	FACTA D
Fig FCA	Twin End Hinged Duct	FACTA A
Fig FCB	Twin End Hinged Duct	FACTA B
Fig FCC	Twin End Hinged Duct	FACTA C
Fig FCD	Twin End Hinged Duct	FACTA D

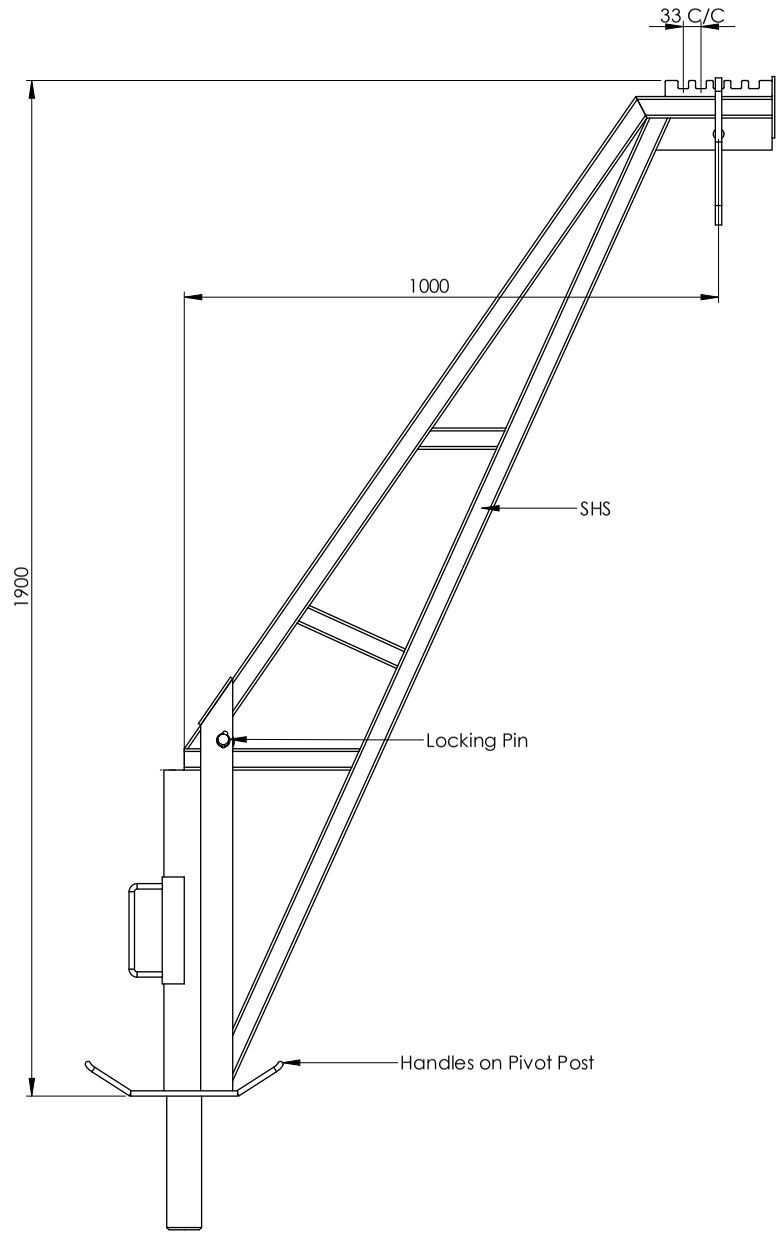
TYPICAL BARRIER DETAIL - DEFENDER FRAME SHOWN)



SECTION D-D

"500KG SWL 1000mm Reach Lean Over Davit"

Finish Ref; Galvanised



Front Elevation

Isometric View

General Notes / Revisions

Drawing No.	TAE-201-01.slddrw		
Description	500KG Davit		
Revision	A		
Drawn By	D.Johnson		
Scale	1:10 @ A3	Sheet	1 of 14
Date	13/03/2017		

Client Information

Core Product
T Allen Engineering
Stonebroom
DE55 6LQ

T Allen Engineering Services ltd
11 Stonebroom Industrial Estate
Stonebroom
Alfreton
DE55 6LQ

Approved by:	
Signed:	
Date:	

NOTE:

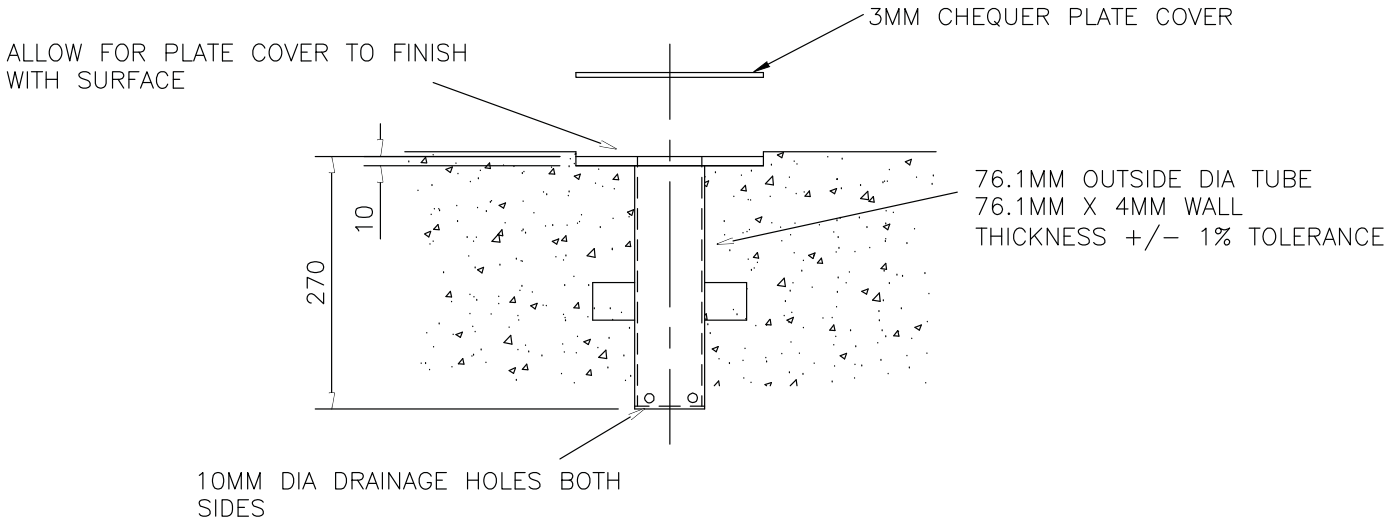
All Pump Solutions Pump Chambers can be customised to any site requirements. Typically this may include invert levels, pump configurations, pipework and more.

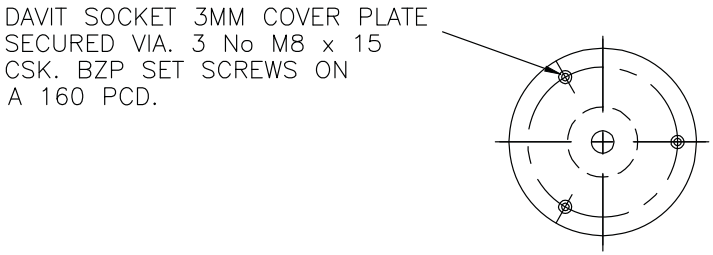
For specific requirements please ask our Technical Sales team for assistance.

Water Table & Burial Depth:

The customer must check tank specification is compatible with ground water table level (in winter) and burial depth. If in doubt contact All Pump Solutions sales or technical departments.

Check against drawing information By:	KQ	APS
Inlet Size		
Inlet Position		
Outlet Size / Position		
Access Shaft Size / Position		





NOTE
Socket to suit 65mm dia pin +/- 1mm tolerance
Material - Mild Steel
Finish - Galvanised BSEN ISO 1461 2009
Steel 3mm-6mm - local 55 micron - mean 70 micron
Steel 6mm+ - local 70 micron - mean 85 micron

Rev	Change	Date	Approved

DIMENSIONS ARE SUBJECT TO DIMENSIONAL TOLERANCES.
If critical, check physically prior to installation.

Title:

Tank Specification: NA

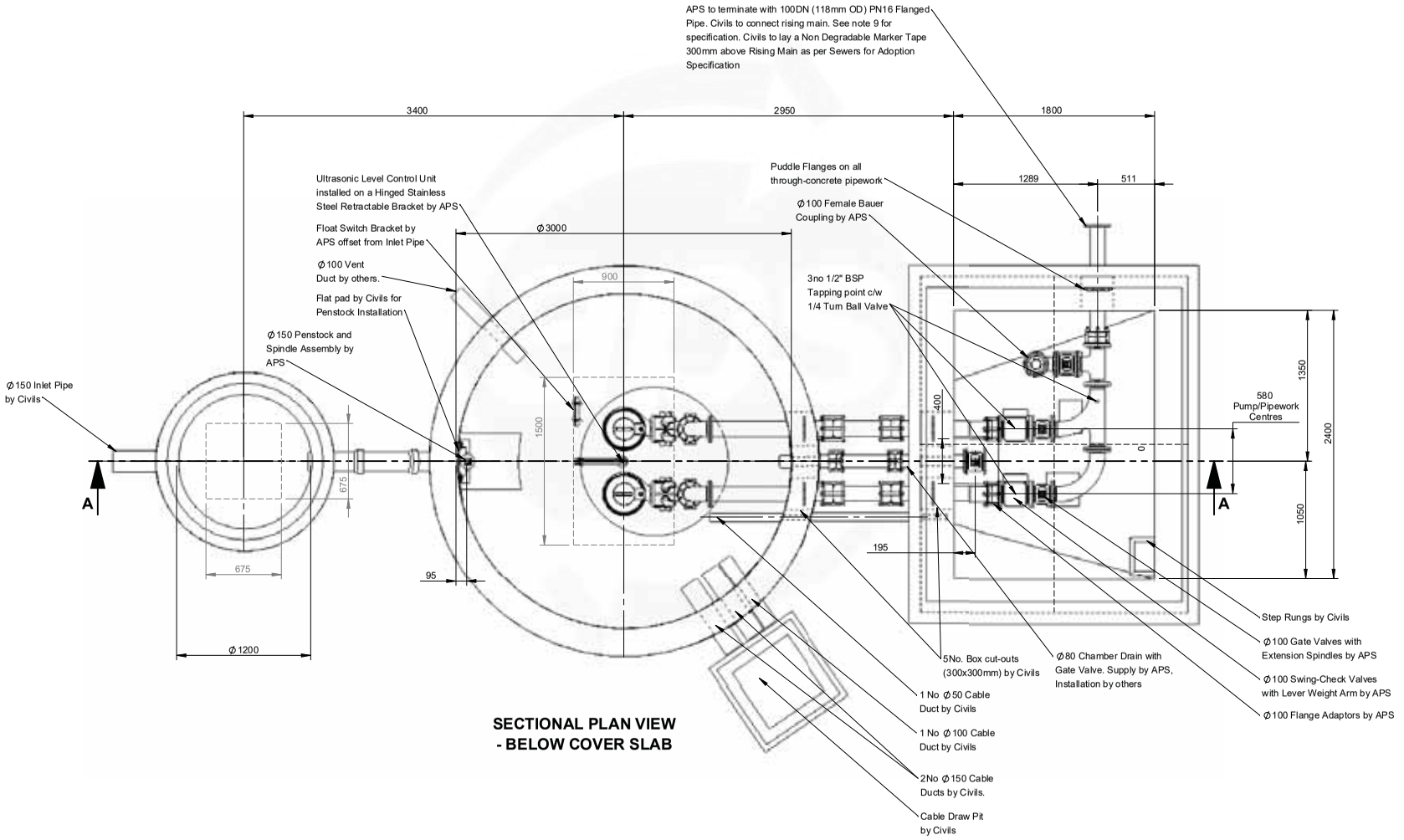
Laminate Specification: NA

Tel: 01743 465463
Fax: 01743 452050
Email: sales@allpumpsolutions.com
all pump solutions FLUID EXPERTISE

Drawn:	Checked:	Internal Reference:	
SUPPLIER	DH		
Date of issue: 27/10/2014		Drawing Number: V350/DP3068/WW	Rev:
Scale: NTS			

APPENDIX C.

PUMP STATION DRAWINGS



SECTIONAL PLAN VIEW - BELOW COVER SLAB

Approved by:

Date: Signed:

Notes

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2. All dimensions in mm unless otherwise stated.
3. All civils works to be completed by civil contractor.
4. Box outs to be filled and made good by civil contractor once pipework has been installed.
5. Benching to be completed by Civils after APS installation.
6. Cable ducts to be installed by civil contractor complete with draw-cords. Specific sizes shown within drawing detail.
7. Cable ducts to be sealed with 'Rise' sealant by APS.
8. All structural calculations to be completed by structural engineer. APS have no involvement with the design of wet well cover and base slab.
9. Flow calculations based on 125mm OD SDR17 Rising Main.
10. All metal fixings and fittings are to be stainless steel.
11. The pumps are to be labelled 'Pump1' & 'Pump2'.
12. The Davit Sockets will be fitted with a flush cover plate.
13. The bottom flange of the control kiosk will be sealed with a waterproof non setting mastic seal.
14. The rising main will be pressure tested by others prior to the formal adoption of the station.
15. All extraneous metal work is to be equipotentally bonded with safety electrical earth 'do not remove' labels fitted.
16. All drains/ducts will be cut back flush with chamber walls by Civils
17. All earthing cables will be installed with an 'Electrical earth – Do not remove' note.

Issue:	Description:	Date:	Auth:
A	Drawing for Approval	21/10/19	HD

Tel: 01743465463
Fax:01743452050
Email: sales@allpumpsolutions.com
all pump solutions
FLUID EXPERTISE

Title: **Installation detail of Foul Water Pumping Station to Sewers for Adoption 7th Edition, Thames Water Addendum** - *Sectional Plan View*

Contract: **Holiday Inn Express, Bicester**

Contractor: **Elliot Group**

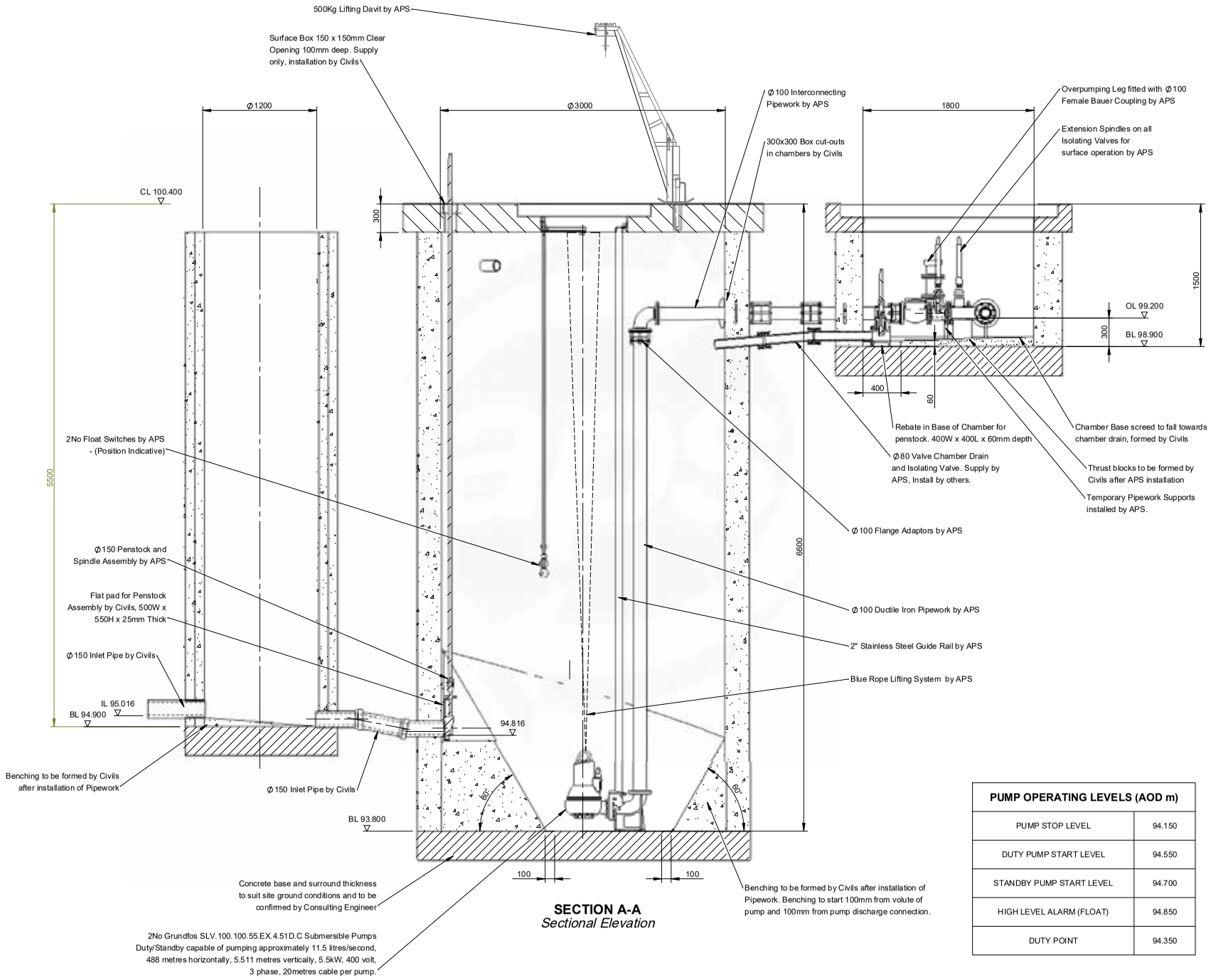
Consulting Engineer: **-**

Works Order Number: **WO5113**

Size:	Scale:	Drawn:	Checked:	Approved:
A3	**1:40**	**CW**	**DH**	**DH**

Drawing Number: **EQ1417-100-01** Date: **21/10/2019**

Internal Reference: **Q0000107894** Issue: **A**



SECTION A-A
Sectional Elevation

PUMP OPERATING LEVELS (AOD m)	
PUMP STOP LEVEL	94.150
DUTY PUMP START LEVEL	94.550
STANDBY PUMP START LEVEL	94.700
HIGH LEVEL ALARM (FLOAT)	94.850
DUTY POINT	94.350

Approved by:

Date: Signed:

Notes

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Issue:	Description:	Date:	Auth:
A	Drawing for Approval	21/10/19	HD

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Fax:01743452050
Email: sales@allpumpsolutions.com
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FLUID EXPERTISE

Title: **Installation detail of Foul Water Pumping Station to Sewers for Adoption 7th Edition, Thames Water Addendum** - *Sectional Elevation View*

Contract: **Holiday Inn Express, Bicester**

Contractor: **Elliot Group**

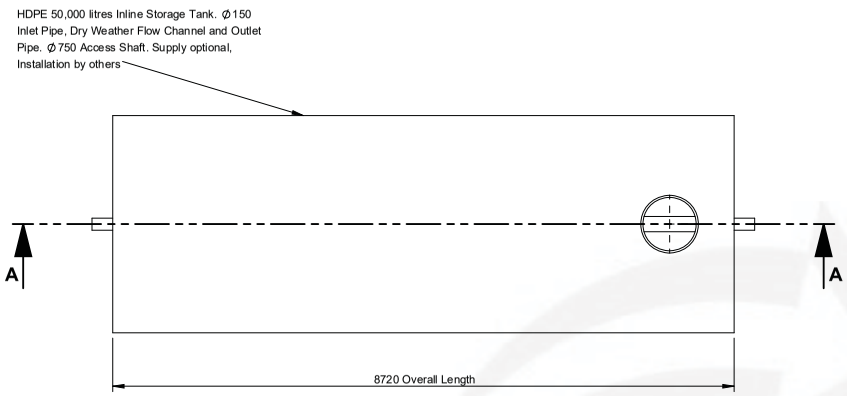
Consulting Engineer: **-**

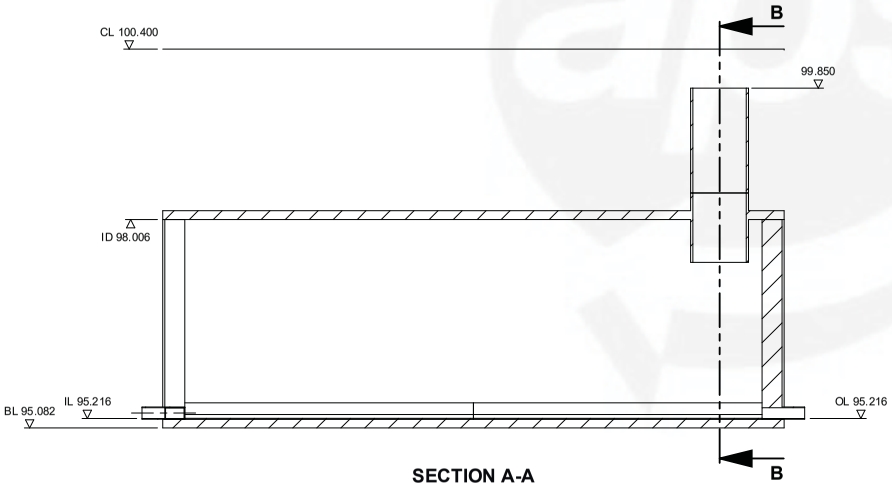
Works Order Number: **WO5113**

Size:	Scale:	Drawn:	Checked:	Approved:
A3	1:40	CW	DH	DH

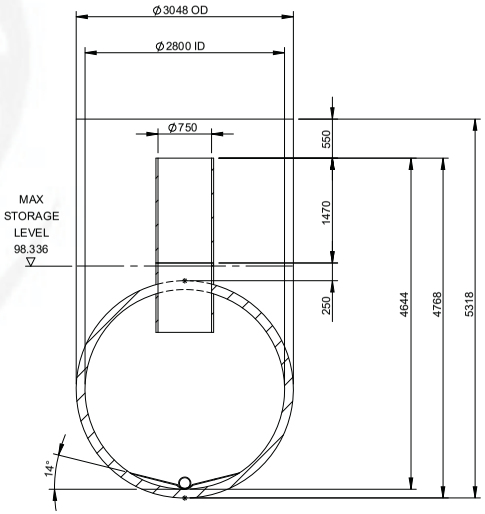
Drawing Number: **EQ1417-200-01** Date: **21/10/2019**

Internal Reference: **Q0000107894** Issue: **A**





SECTION A-A



SECTION B-B

Approved by:

Date: | Signed:

Notes

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17. All earthing cables will be installed with an 'Electrical earth – Do not remove' note.

Issue:	Description:	Date:	Auth:
A	Drawing for Approval	21/10/19	HD

Tel: 01743465463
Fax:01743452050
Email: sales@allpumpsolutions.com
all pump solutions
FLUID EXPERTISE

Title: **Installation detail of Foul Water Pumping Station to Sewers for Adoption 7th Edition, Thames Water Addendum** - *Inline Storage Vessel*

Contract: **Holiday Inn Express, Bicester**

Contractor: **Elliot Group**

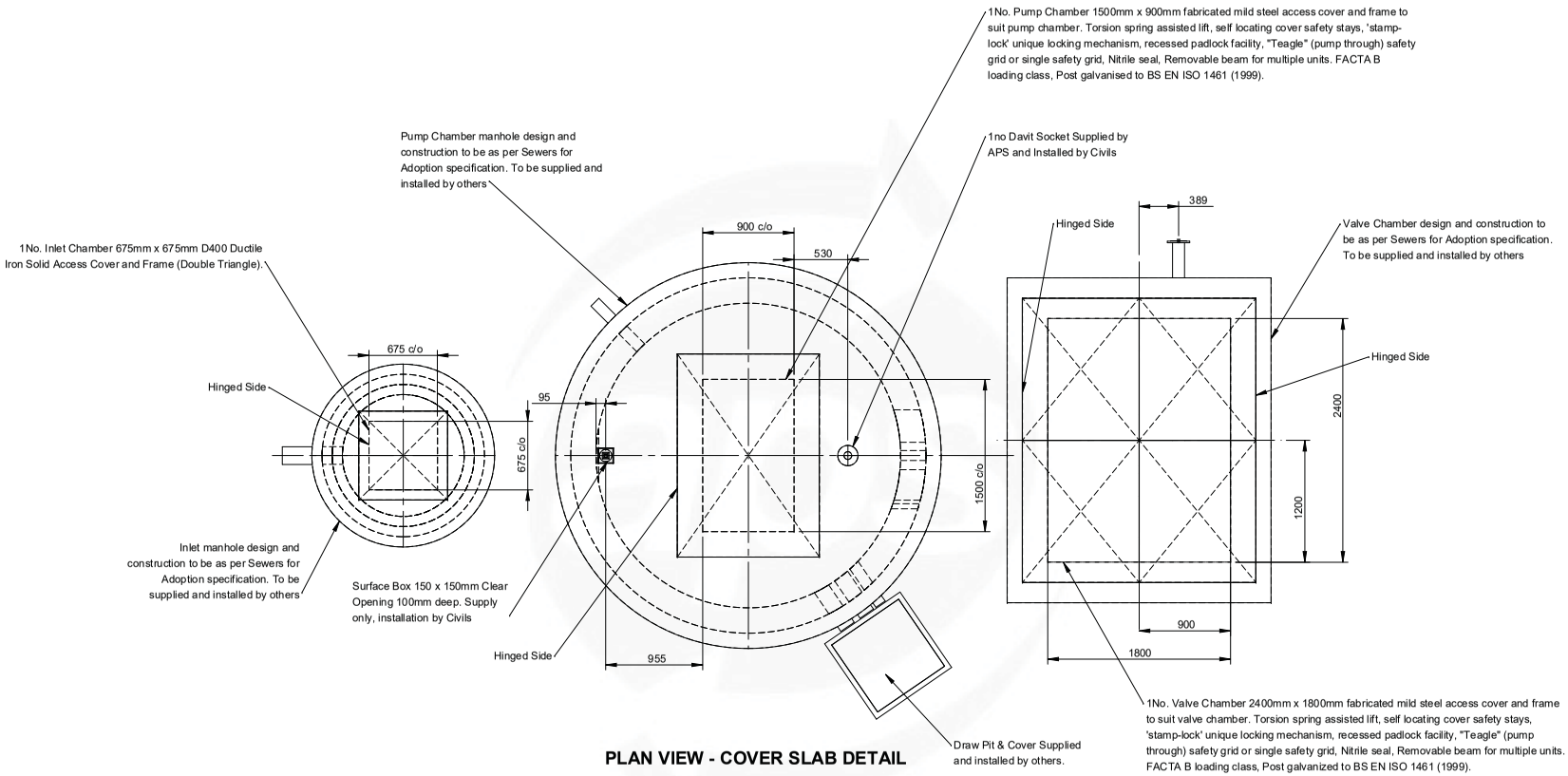
Consulting Engineer: **-**

Works Order Number: **WO5113**

Size:	Scale:	Drawn:	Checked:	Approved:
A3	**1:75**	**CW**	**DH**	**DH**

Drawing Number: **EQ1417-300-01** | Date: **21/10/2019**

Internal Reference: **Q0000107894** | Issue: **A**



PLAN VIEW - COVER SLAB DETAIL

Approved by:

Date: | Signed:

Notes

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Issue:	Description:	Date:	Auth:
A	Drawing for Approval	21/10/19	HD

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Fax:01743452050
Email: sales@allpumpsolutions.com
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FLUID EXPERTISE

Title: **Installation detail of Foul Water Pumping Station to Sewers for Adoption 7th Edition, Thames Water Addendum** - *Extra Detail Views*

Contract: **Holiday Inn Express, Bicester**

Contractor: **Elliot Group**

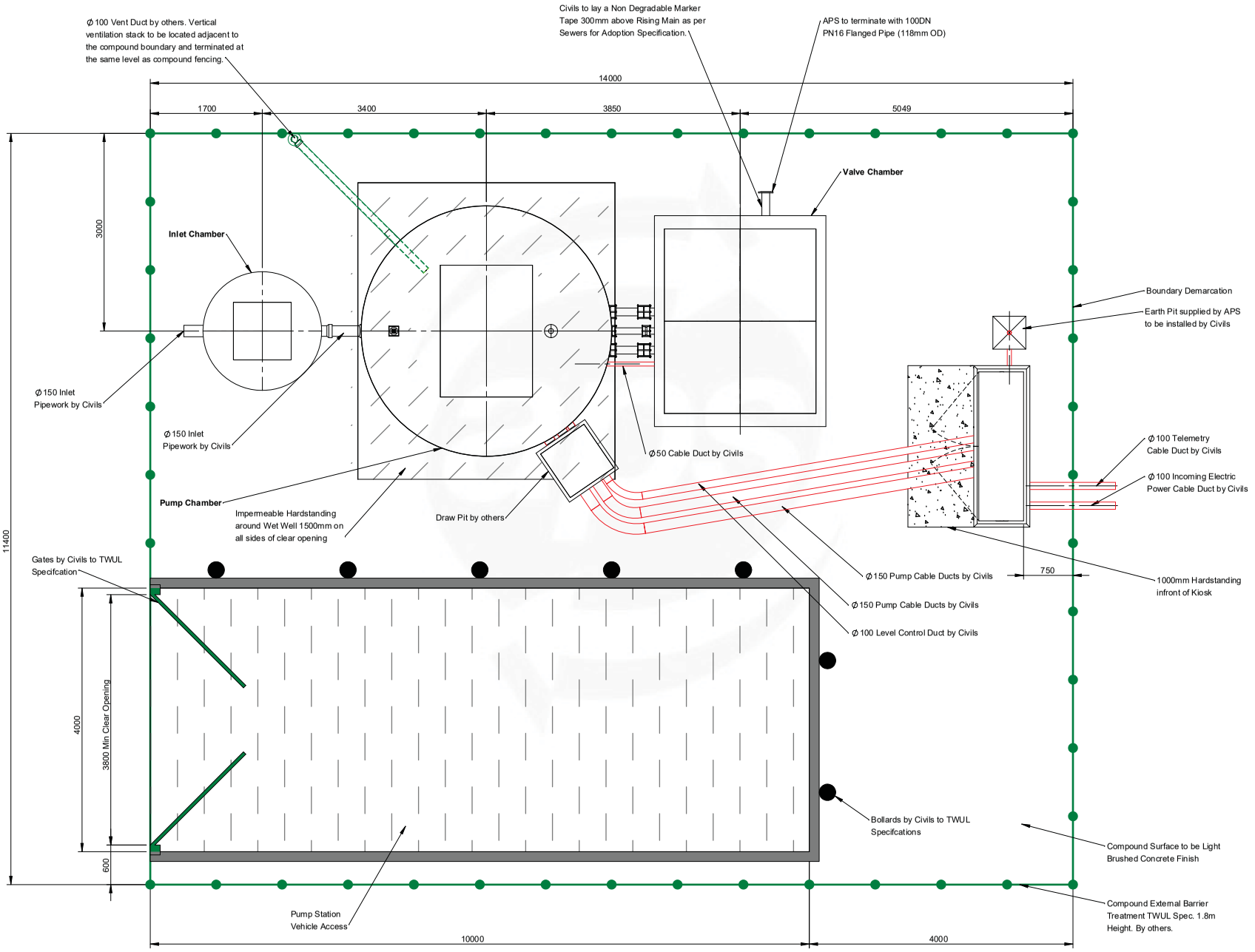
Consulting Engineer: **-**

Works Order Number: **WO5113**

Size:	Scale:	Drawn:	Checked:	Approved:
A3	**1:50**	**CW**	**DH**	**DH**

Drawing Number: **EQ1417-400-01** Date: **21/10/2019**

Internal Reference: **Q0000107894** Issue: **A**



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Date: Signed:

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Issue:	Description:	Date:	Auth:
A	Drawing for Approval	21/10/19	HD

Tel: 01743465463
Fax:01743452050
Email: sales@allpumpsolutions.com
all pump solutions
FLUID EXPERTISE

Title: **Installation detail of Foul Water Pumping Station to Sewers for Adoption 7th Edition, Thames Water Addendum** - *Compound Layout*

Contract: **Holiday Inn Express, Bicester**

Contractor: **Elliot Group**

Consulting Engineer: **-**

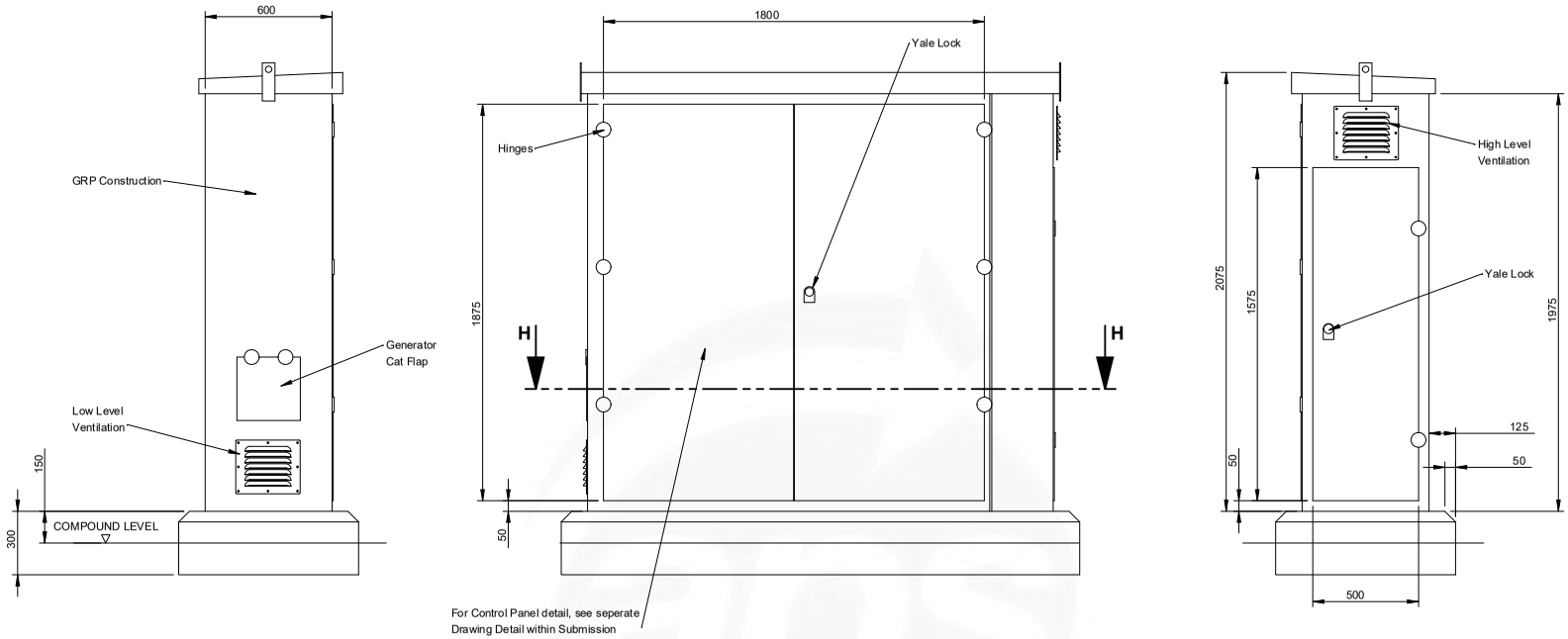
Works Order Number: **WO5113**

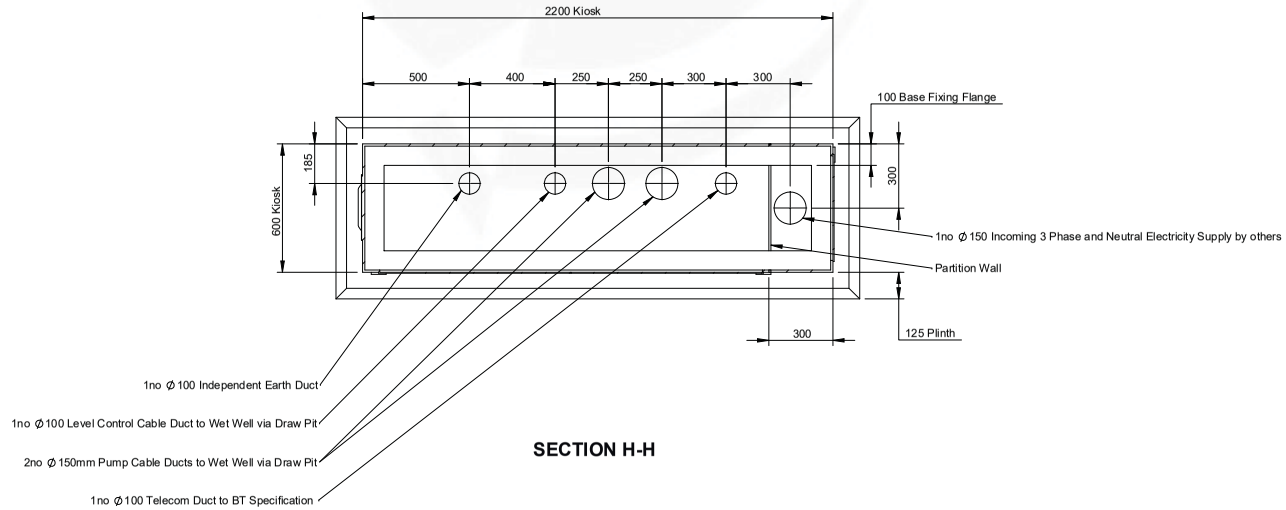
Size:	Scale:	Drawn:	Checked:	Approved:
A3	1:60	CW	DH	DH

Drawing Number: **EQ1417-500-01** Date: **21/10/2019**

Internal Reference: **Q0000107894** Issue: **A**

MCC KIOSK





SECTION H-H

Approved by:

Date: | Signed:

Notes

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2. All dimensions in mm unless otherwise stated.
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Issue:	Description:	Date:	Auth:
A	Drawing for Approval	21/10/19	HD

Tel: 01743465463
Fax:01743452050
Email: sales@allpumpsolutions.com
all pump solutions
FLUID EXPERTISE

Title: **Installation detail of Foul Water Pumping Station to Sewers for Adoption 7th Edition, Thames Water Addendum** - *Kiosk Detail*

Contract: **Holiday Inn Express, Bicester**

Contractor: **Elliot Group**

Consulting Engineer: **-**

Works Order Number: **WO5113**

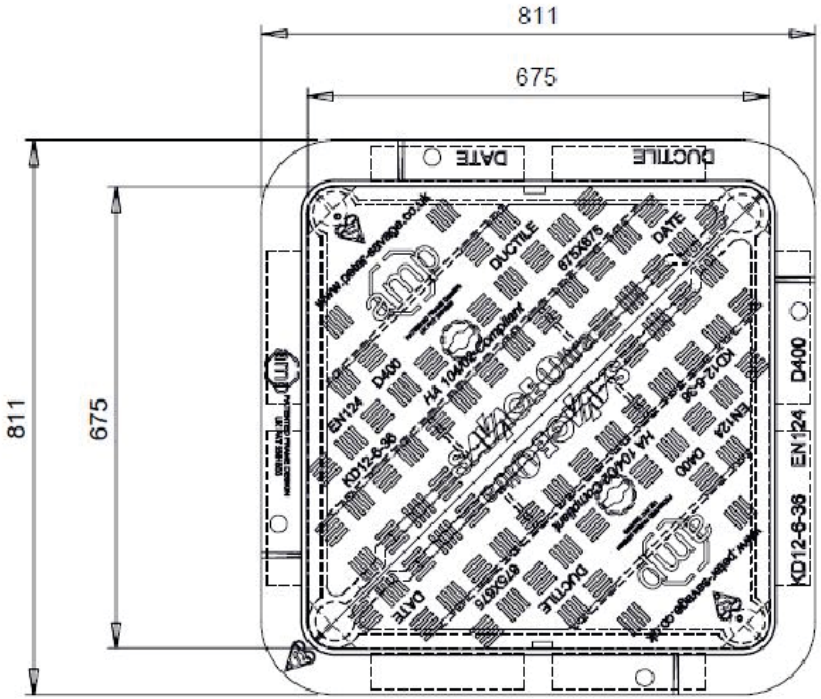
Size:	Scale:	Drawn:	Checked:	Approved:
A3	**1:25**	**CW**	**DH**	**DH**

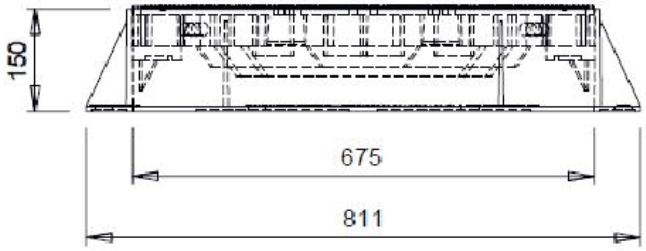
Drawing Number: **EQ1417-600-01** | Date: **21/10/2019**

Internal Reference: **Q0000107894** | Issue: **A**

INLET CHAMBER ACCESS COVER

- Ductile Iron
- D400





Approved by:

Date: | Signed:

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13. The bottom flange of the control kiosk will be sealed with a waterproof non setting mastic seal.
14. The rising main will be pressure tested by others prior to the formal adoption of the station.
15. All extraneous metal work is to be equipotentally bonded with safety electrical earth 'do not remove' labels fitted.
16. All drains/ducts will be cut back flush with chamber walls by Civils
17. All earthing cables will be installed with an 'Electrical earth – Do not remove' note.

Issue:	Description:	Date:	Auth:
A	Drawing for Approval	21/10/19	HD

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FLUID EXPERTISE

Title: **Installation detail of Foul Water Pumping Station to Sewers for Adoption 7th Edition, Thames Water Addendum** - *Inlet Chamber Access Cover*

Contract: **Holiday Inn Express, Bicester**

Contractor: **Elliot Group**

Consulting Engineer: **-**

Works Order Number: **WO5113**

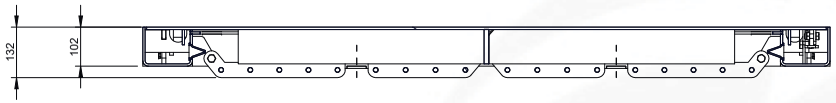
Size:	Scale:	Drawn:	Checked:	Approved:
A3	**1:15**	**CW**	**DH**	**DH**

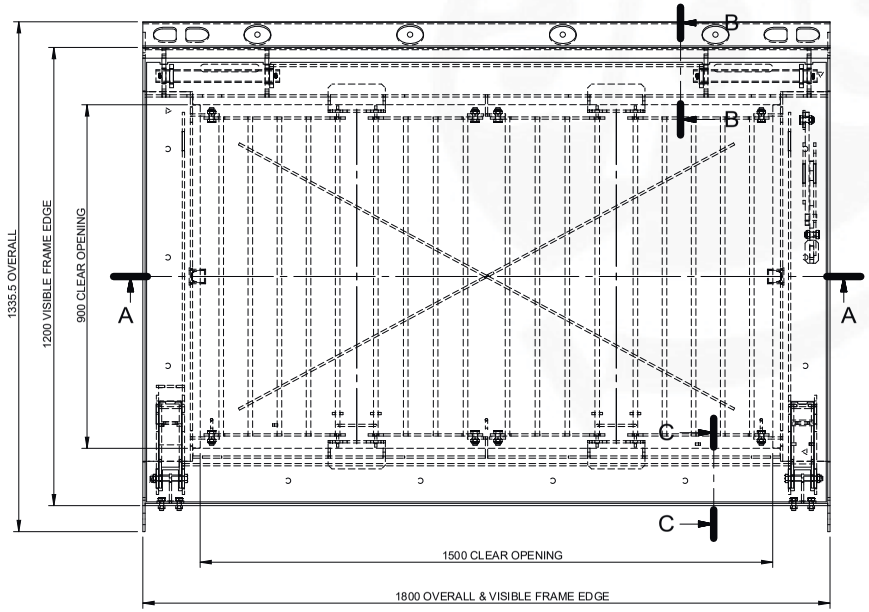
Drawing Number: **EQ1417-700-01** | Date: **21/10/2019**

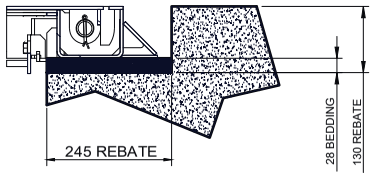
Internal Reference: **Q0000107894** | Issue: **A**

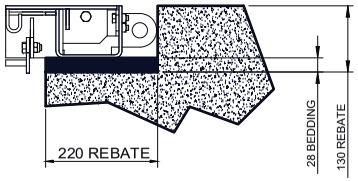
PUMP CHAMBER ACCESS COVER

-DEFENDER TYPE
- GALVANISED MILD STEEL
- FACTA B
-TEAGLE SAFTEY GRIDS









Approved by:

Date: | Signed:

Notes

1. All works to be carried out in accordance with Sewers for Adoption Seventh Edition.
2. All dimensions in mm unless otherwise stated.
3. All civils works to be completed by civil contractor.
4. Box outs to be filled and made good by civil contractor once pipework has been installed.
5. Benching to be completed by Civils after APS installation.
6. Cable ducts to be installed by civil contractor complete with draw-cords. Specific sizes shown within drawing detail.
7. Cable ducts to be sealed with 'Rise' sealant by APS.
8. All structural calculations to be completed by structural engineer. APS have no involvement with the design of wet well cover and base slab.
9. Flow calculations based on 125mm OD SDR17 Rising Main.
10. All metal fixings and fittings are to be stainless steel.
11. The pumps are to be labelled 'Pump1' & 'Pump2'.
12. The Davit Sockets will be fitted with a flush cover plate.
13. The bottom flange of the control kiosk will be sealed with a waterproof non setting mastic seal.
14. The rising main will be pressure tested by others prior to the formal adoption of the station.
15. All extraneous metal work is to be equipotentally bonded with safety electrical earth 'do not remove' labels fitted.
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17. All earthing cables will be installed with an 'Electrical earth – Do not remove' note.

Issue:	Description:	Date:	Auth:
A	Drawing for Approval	21/10/19	HD

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FLUID EXPERTISE

Title: **Installation detail of Foul Water Pumping Station to Sewers for Adoption 7th Edition, Thames Water Addendum** - *Pump Chamber Access Cover*

Contract: **Holiday Inn Express, Bicester**

Contractor: **Elliot Group**

Consulting Engineer: **-**

Works Order Number: **WO5113**

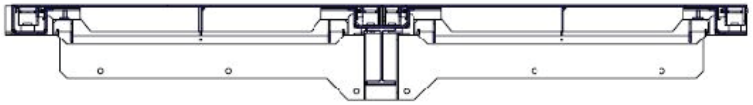
Size:	Scale:	Drawn:	Checked:	Approved:
A3	**1:40**	**CW**	**DH**	**DH**

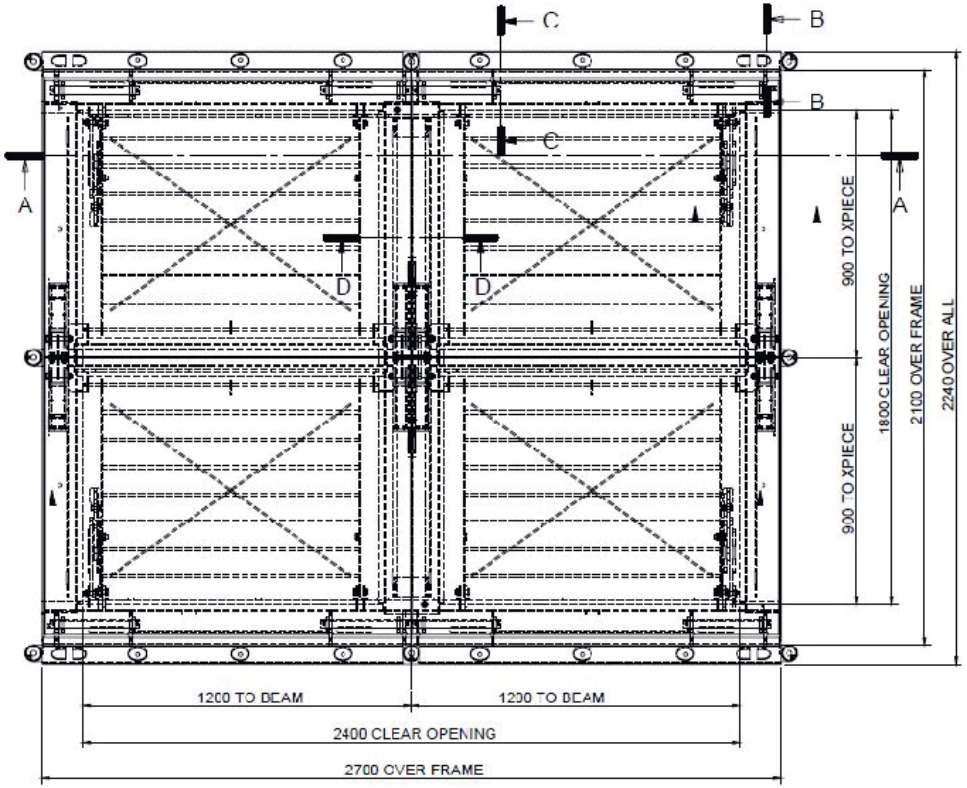
Drawing Number: **EQ1417-800-01** | Date: **21/10/2019**

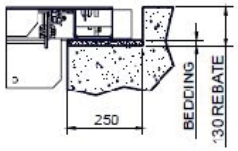
Internal Reference: **Q0000107894** | Issue: **A**

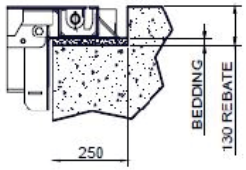
VALVE CHAMBER ACCESS COVER

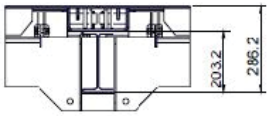
Steelway Defender:
- Galvanised Mild Steel
- FACTA B
- Safety Grids
- Removable Posts & Barriers
- MAX 25kg Lift Effort











Approved by:

Date: | Signed:

Notes

1. All works to be carried out in accordance with Sewers for Adoption Seventh Edition.
2. All dimensions in mm unless otherwise stated.
3. All civils works to be completed by civil contractor.
4. Box outs to be filled and made good by civil contractor once pipework has been installed.
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17. All earthing cables will be installed with an 'Electrical earth – Do not remove' note.

Issue:	Description:	Date:	Auth:
A	Drawing for Approval	21/10/19	HD

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Fax:01743452050
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FLUID EXPERTISE

Title: **Installation detail of Foul Water Pumping Station to Sewers for Adoption 7th Edition, Thames Water Addendum** - *Valve Chamber Access Cover*

Contract: **Holiday Inn Express, Bicester**

Contractor: **Elliot Group**

Consulting Engineer: **-**

Works Order Number: **WO5113**

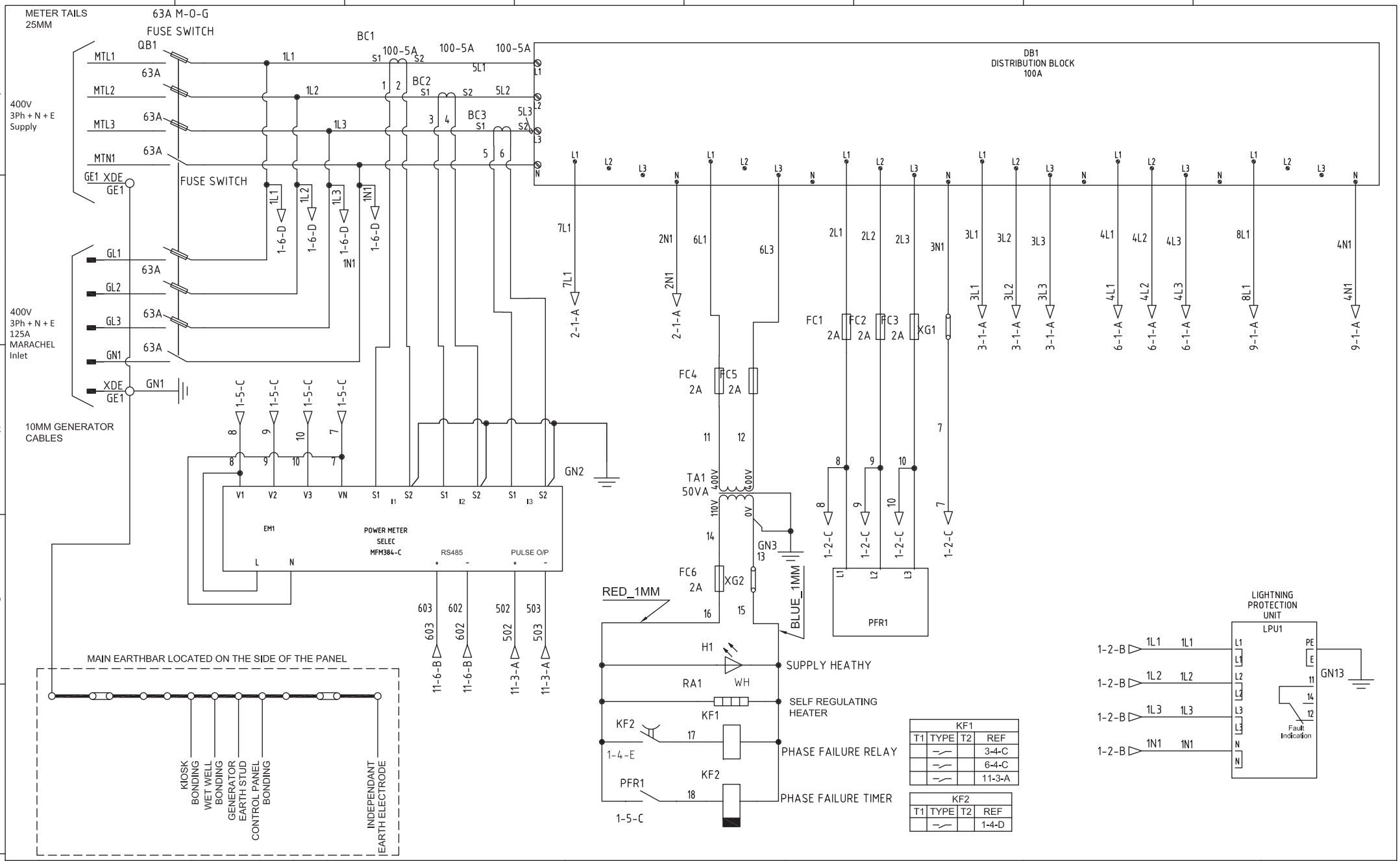
Size:	Scale:	Drawn:	Checked:	Approved:
A3	1:40	CW	DH	DH

Drawing Number: **EQ1417-900-01** Date: **21/10/2019**

Internal Reference: **Q0000107894** Issue: **A**

APPENDIX D.

WIRING DIAGRAMS



					Client Name: APS
					Title: SFA7 & THAMES WATER SPEC DUAL ASD CONTROL PANEL INCOMER SECTION
					Drawn By: JH; Project Code: PO0000013349
A	FIRST ISSUE	08/05/19	JH	JH	
Rev	Description	Date	Drn	Apprv	Drawing No GC21250

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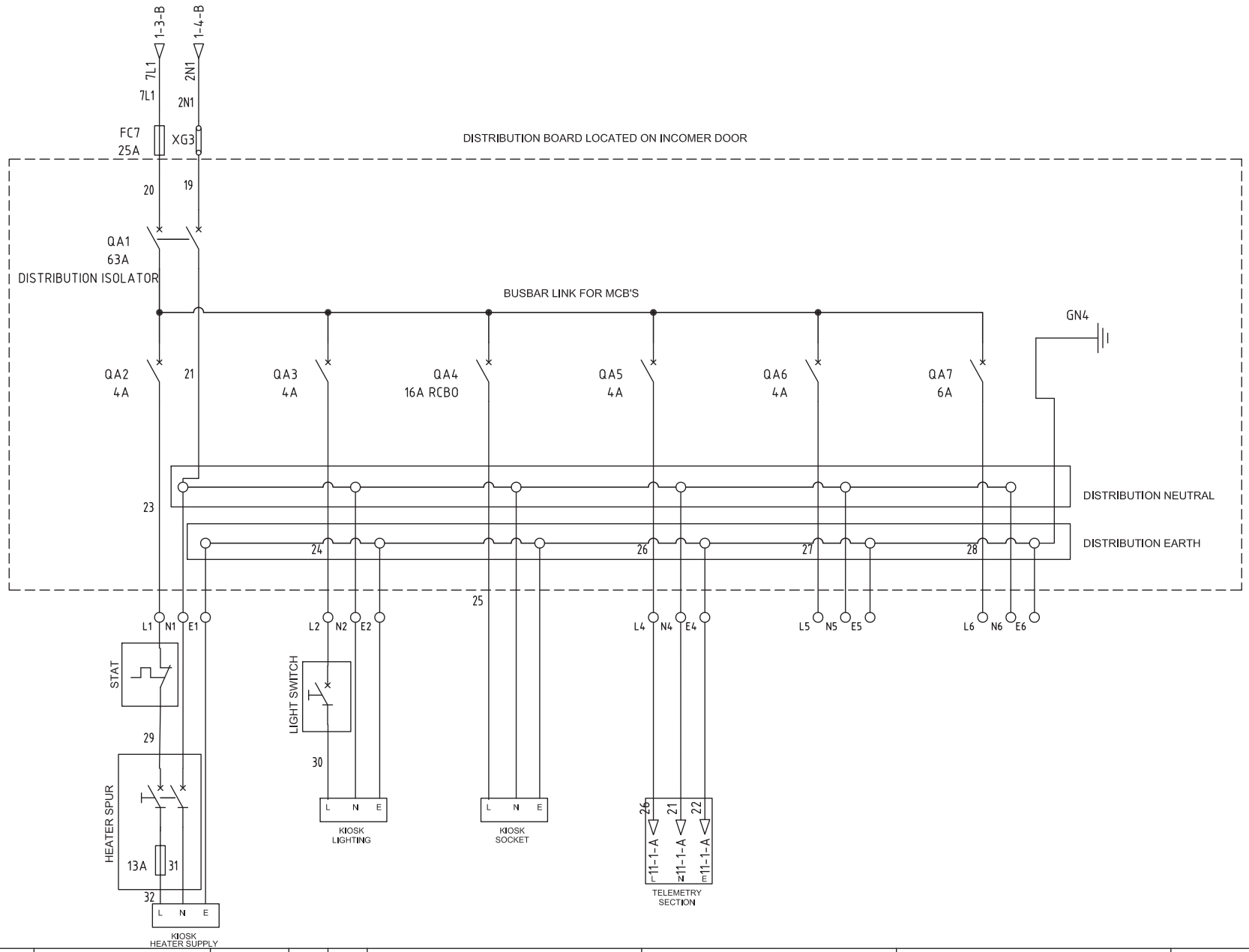

Rev	Description	Date	Drn	Apprv
A	FIRST ISSUE	08/05/19	JH	JH

Client Name
APS

Title SFA7 & THAMES WATER SPEC
DUAL ASD CONTROL PANEL
DISTRIBUTION SECTION

Drawn By
JH

Project Code
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Drawing No GC21250

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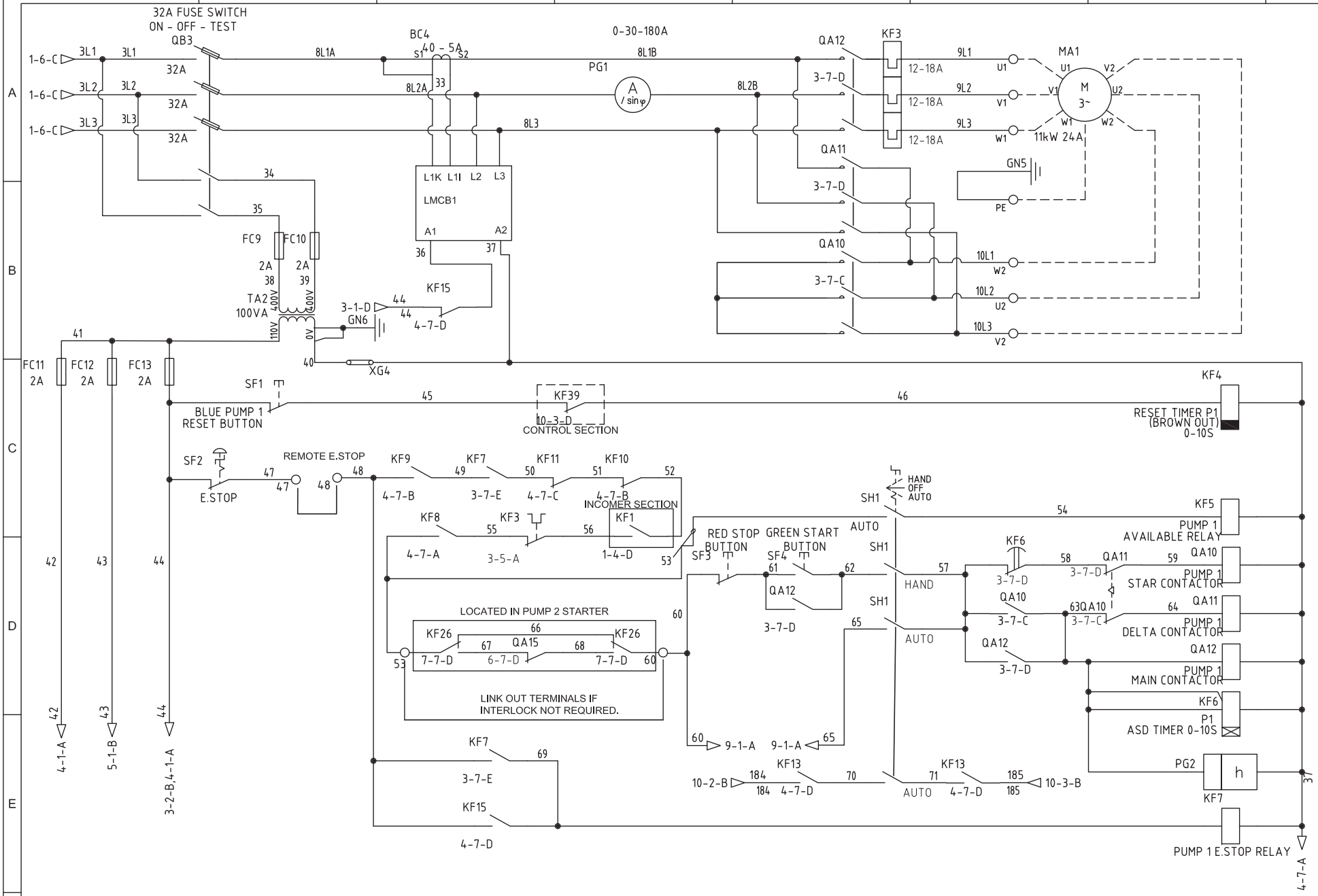

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Rev	Description	Date	Drn	Apprv
A	FIRST ISSUE	08/05/19	JH	JH

Client Name: APS

Title: SFA7 & THAMES WATER SPEC DUAL ASD CONTROL PANEL PUMP 1 STARTER

Drawn By: JH

Project Code: PO0000013349

Drawing No GC21250

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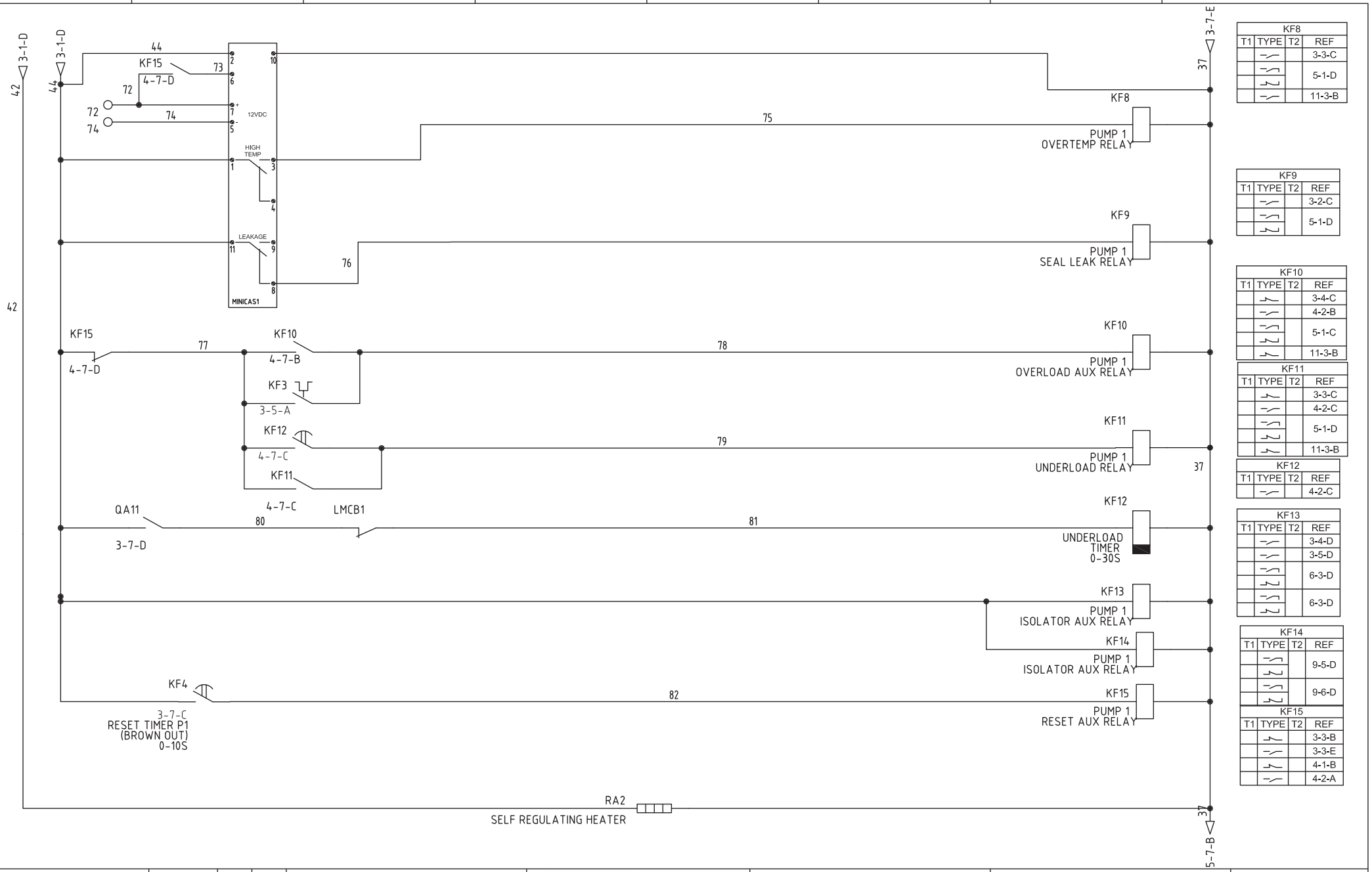

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Rev	Description	Date	Drn	Apprv
A	FIRST ISSUE	08/05/19	JH	JH

Client Name
APS

Title SFA7 & THAMES WATER SPEC
DUAL ASD CONTROL PANEL
PUMP 1 STARTER

Drawn By
JH

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Drawing No GC21250

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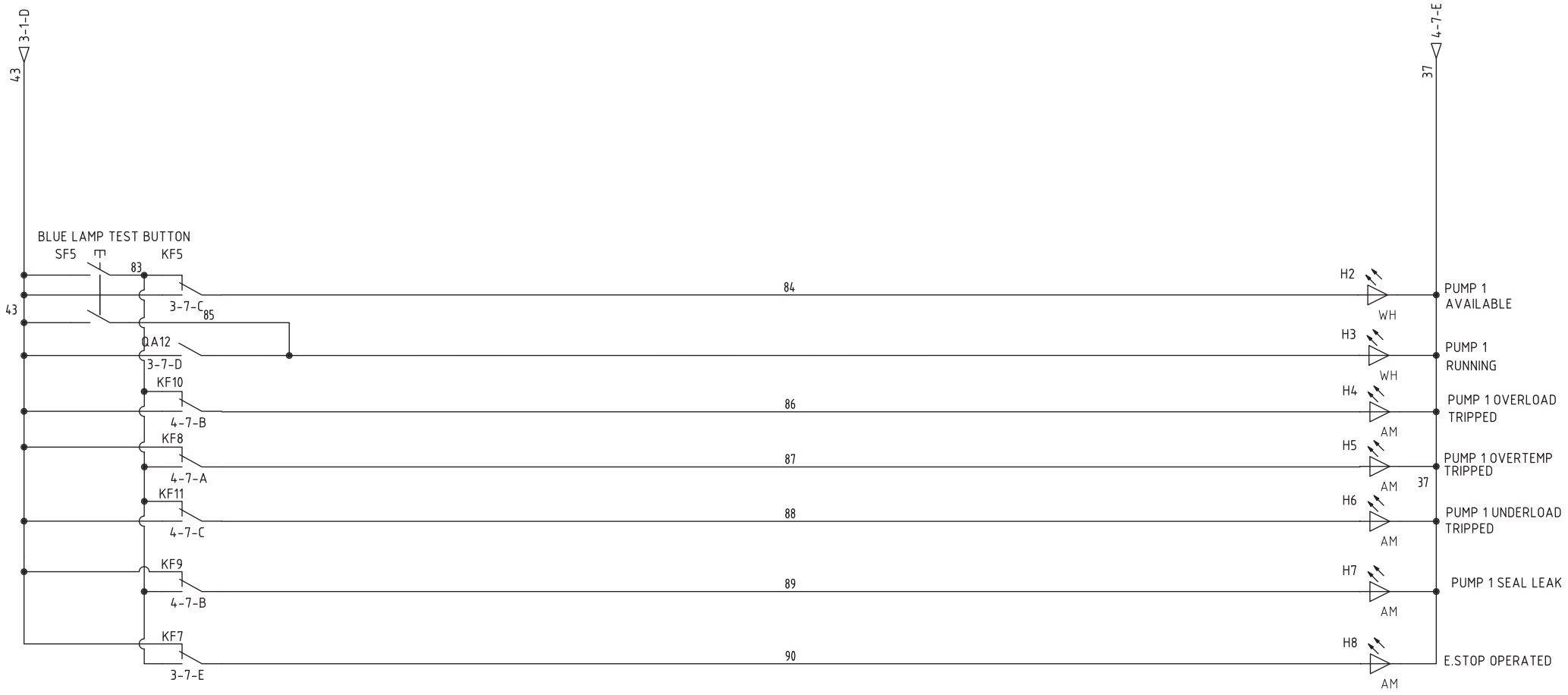

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A	FIRST ISSUE	08/05/19	JH	JH

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APS

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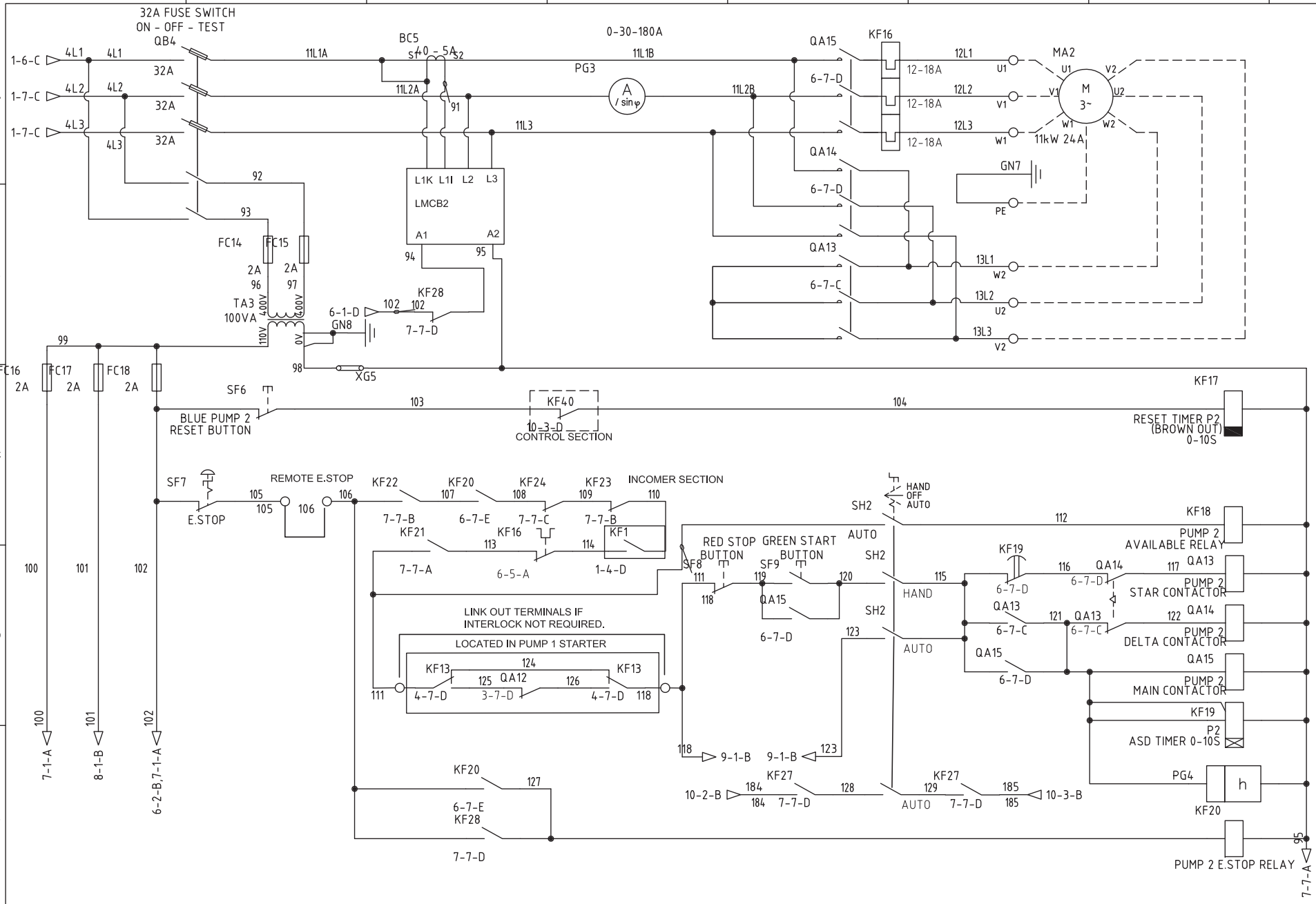

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Rev	Description	Date	Drn	Apprv
A	FIRST ISSUE	08/05/19	JH	JH

Client Name
APS

Title SFA7 & THAMES WATER SPEC
DUAL ASD CONTROL PANEL
PUMP 2 STARTER

Drawn By
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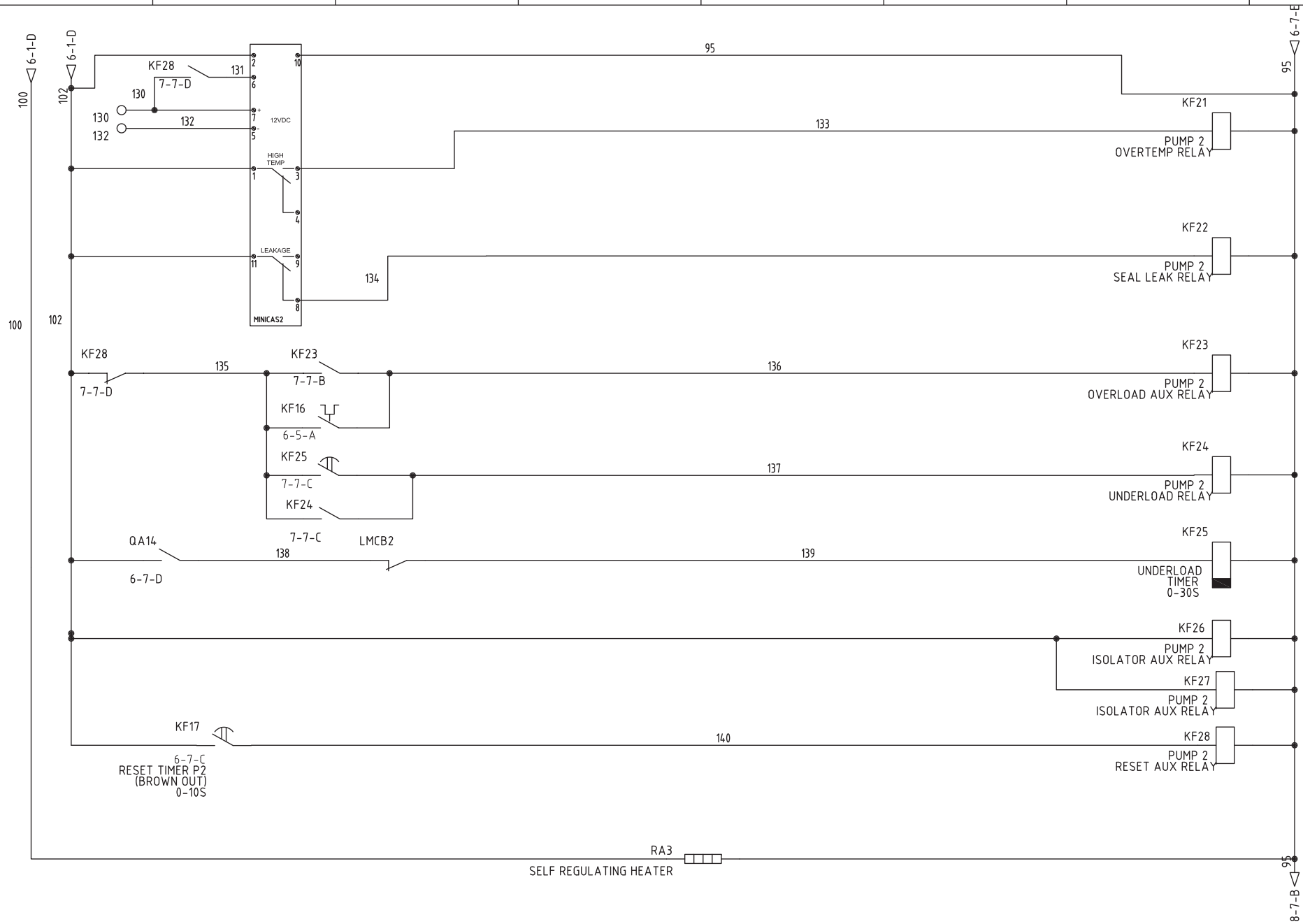

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Rev	Description	Date	Drn	Apprv
A	FIRST ISSUE	08/05/19	JH	JH

Client Name: APS

Title: SFA7 & THAMES WATER SPEC DUAL ASD CONTROL PANEL PUMP 2 STARTER

Drawn By: JH

Project Code: PO0000013349

Drawing No GC21250

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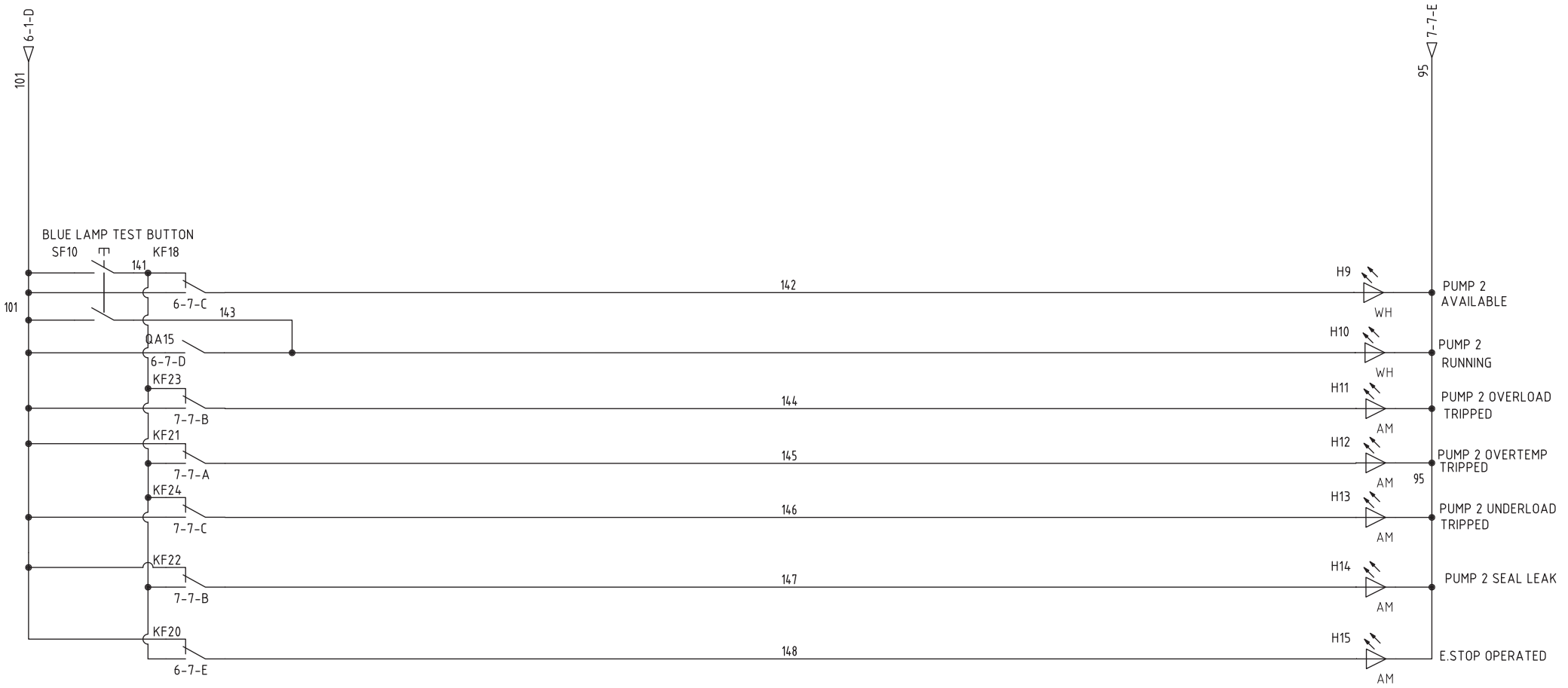

Rev	Description	Date	Drn	Apprv
A	FIRST ISSUE	08/05/19	JH	JH

Client Name: APS

Title: SFA7 & THAMES WATER SPEC DUAL ASD CONTROL PANEL PUMP 2 STARTER

Drawn By: JH

Project Code: PO0000013349

Drawing No: GC21250

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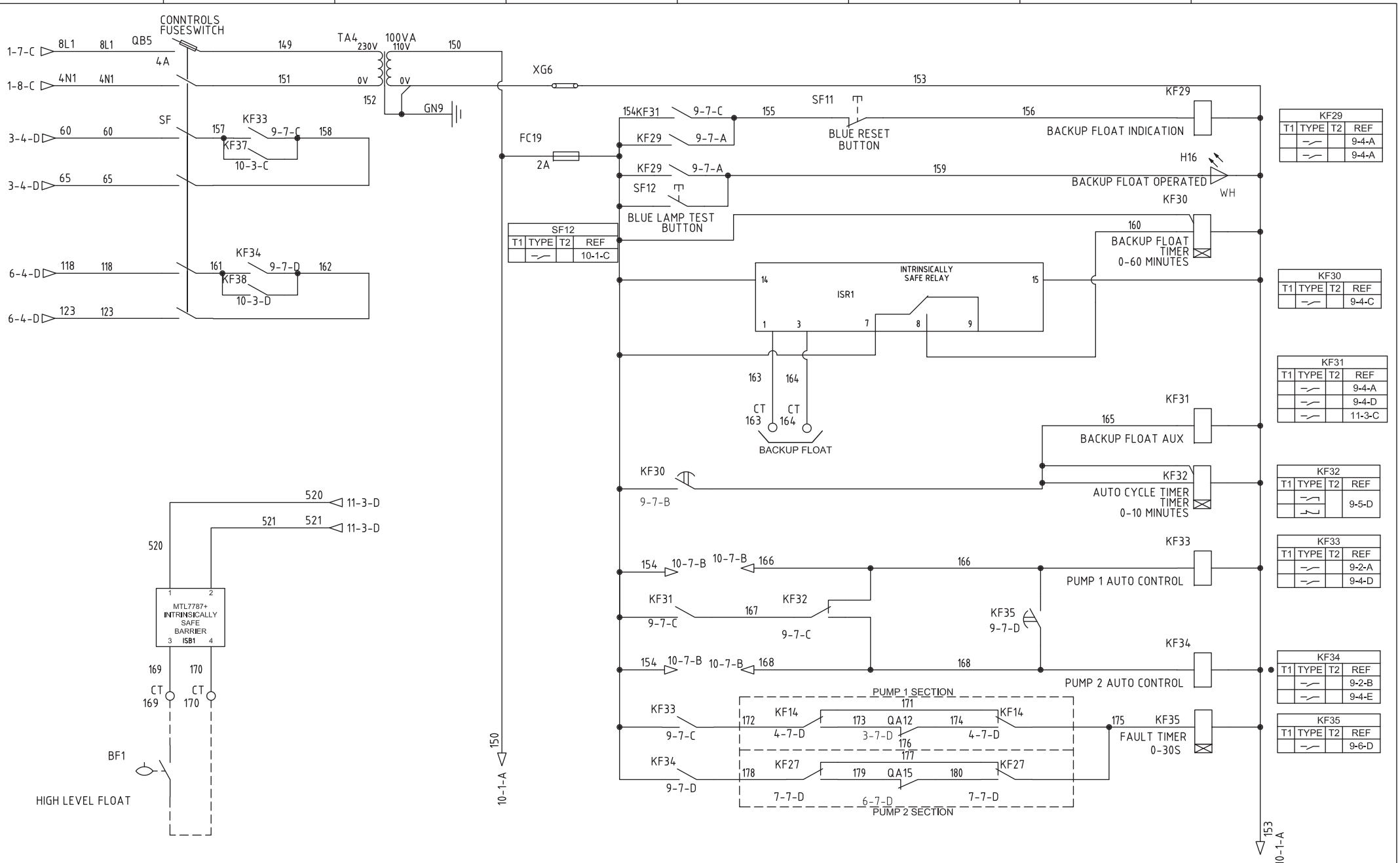

Rev	Description	Date	Drn	Apprv
A	FIRST ISSUE	08/05/19	JH	JH

Client Name: APS

Title: SFA7 & THAMES WATER SPEC DUAL ASD CONTROL PANEL COMMON CONTROLS

Drawn By: JH

Project Code: PO0000013349

Drawing No: GC21250

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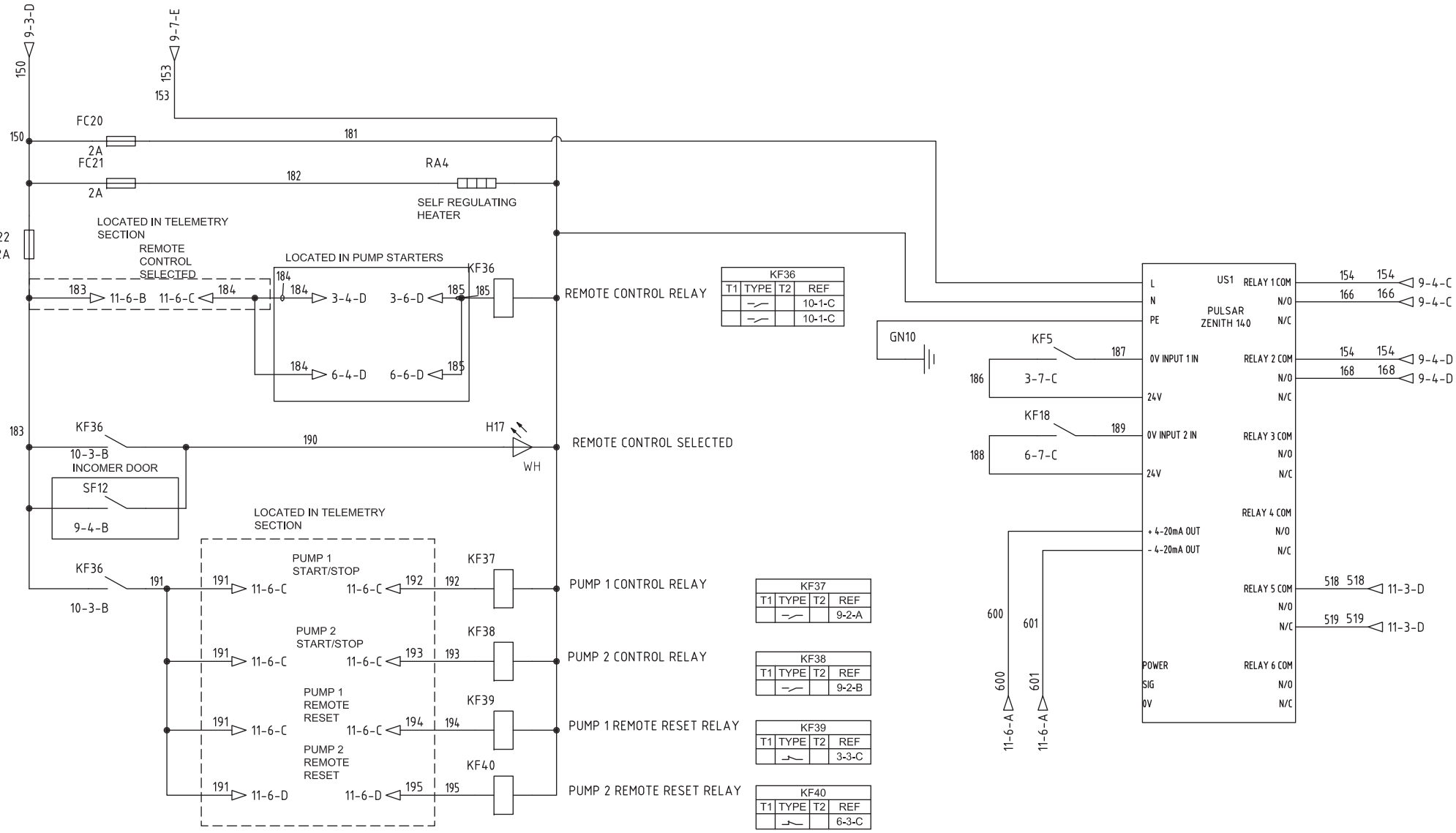

Rev	Description	Date	Drn	Apprv
A	FIRST ISSUE	08/05/19	JH	JH

Client Name: APS

Title: SFA7 & THAMES WATER SPEC DUAL ASD CONTROL PANEL COMMON CONTROLS

Drawn By: JH

Project Code: PO0000013349

Drawing No: GC21250

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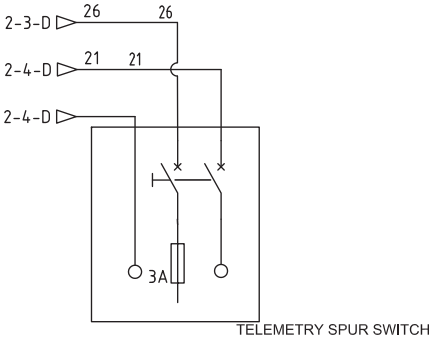
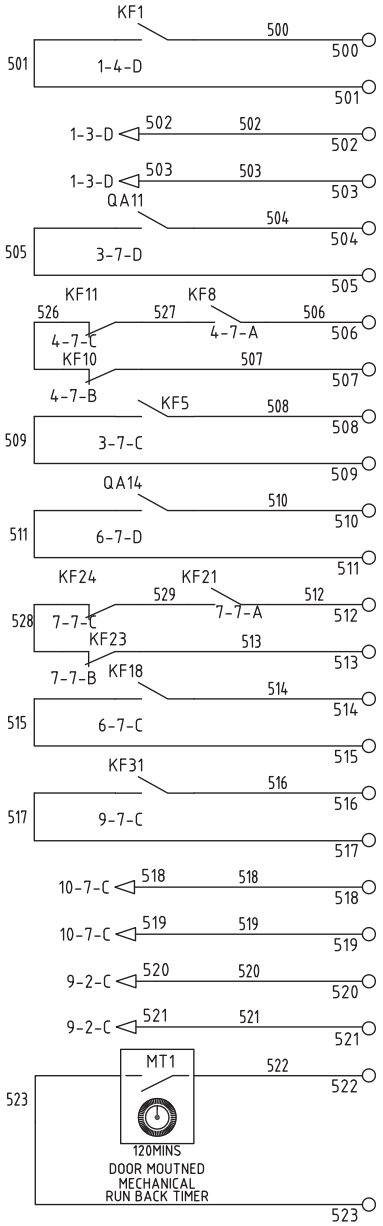


TELEMETRY SPUR SWITCH



COMMON

PHASE FAILURE

KWH PULSE

PUMP 1 RUNNING

PUMP 1 TRIPPED

PUMP 1 AVAILABLE

PUMP 2 RUNNING

PUMP 2 TRIPPED

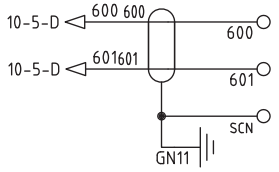
PUMP 2 AVAILABLE

BACKUP OPERATED

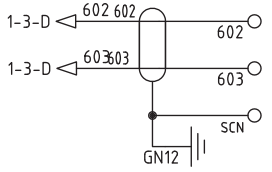
ULTRASONIC FAILED

WET WELL HIGH LEVEL FLOAT

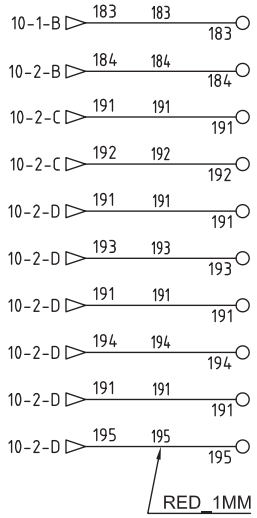
MAINTENANCE ON SITE



4-20mA LEVEL SIGNAL



DYNAMIC MODBUS 485 SIGNAL FROM POWER METER



					Client Name: APS
					Title: SFA7 & THAMES WATER SPEC DUAL ASD CONTROL PANEL TELEMETRY MARSHALLING
					Drawn By: JH; Project Code: PO0000013349
A	FIRST ISSUE	08/05/19	JH	JH	Drawing No GC21250
Rev	Description	Date	Drn	Apprv	

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SPARE SHEET

Rev	Description	Date	Drn	Apprv
A	FIRST ISSUE	08/05/19	JH	JH

Client Name
APS

Title SFA7 & THAMES WATER SPEC
DUAL ASD CONTROL PANEL
TELEMETRY MARSHALLING

Drawn By
JH

Project Code
PO0000013349

Drawing No GC21250

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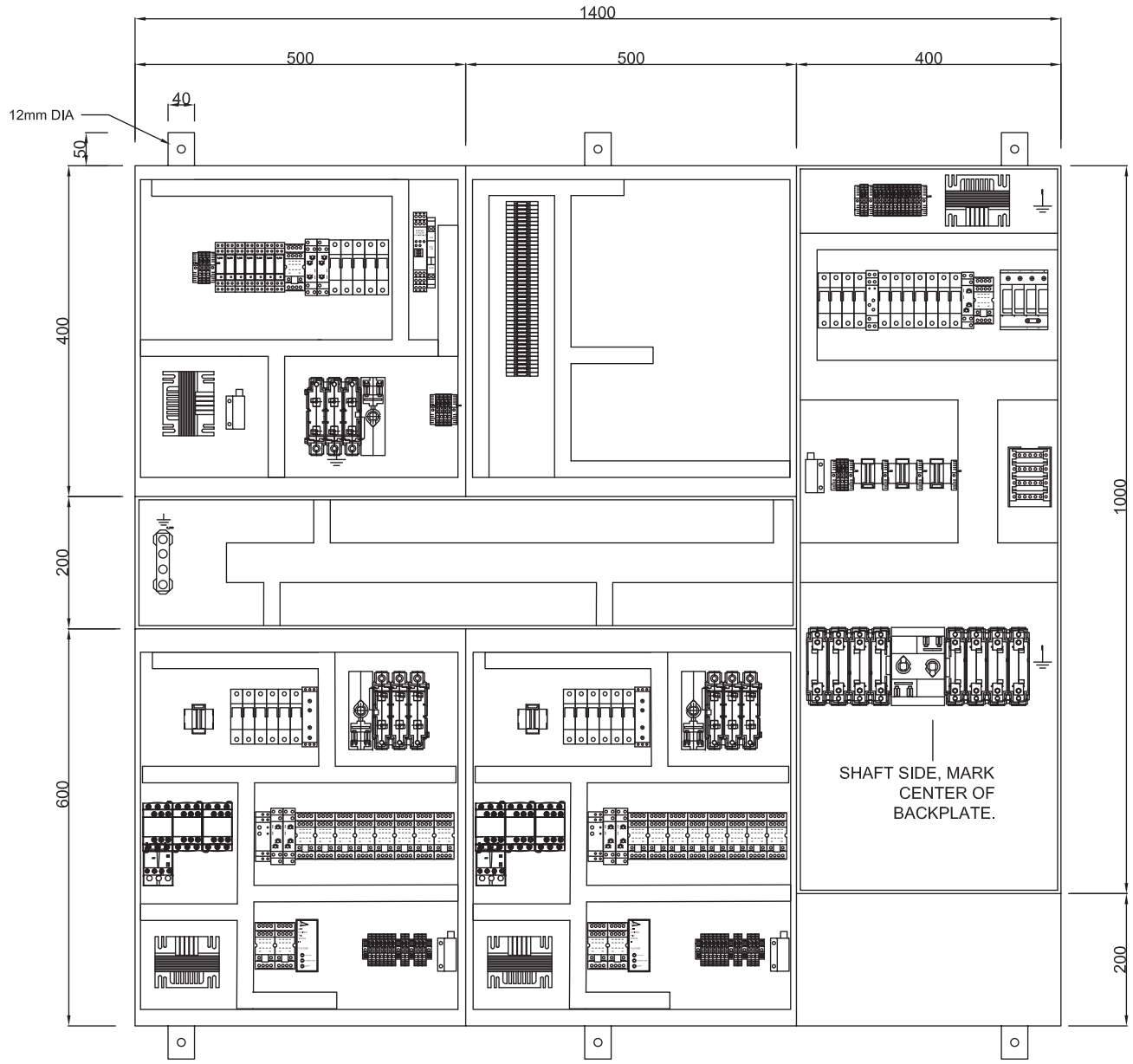

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A	FIRST ISSUE	08/05/19	JH	JH

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APS

Title SFA7 & THAMES WATER SPEC
DUAL ASD CONTROL PANEL
BACKPLATE GA

Drawn By
JH

Project Code
PO0000013349

Drawing No GC21250

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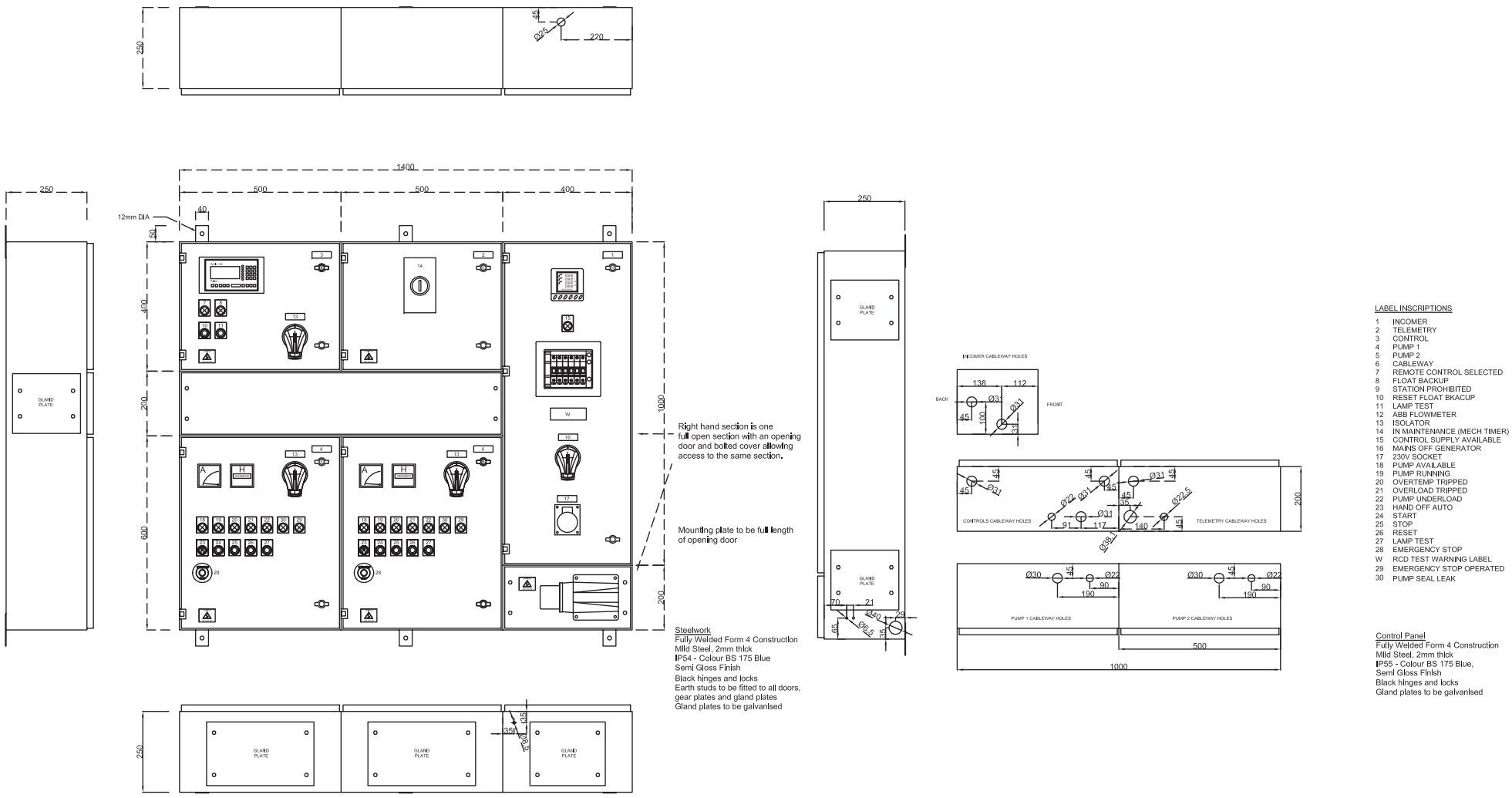

Steelwork
Fully Welded Form 4 Construction
Mild Steel, 2mm thick
IP54 - Colour BS 175 Blue
Semi Gloss Finish
Black hinges and locks
Earth studs to be fitted to all doors, gear plates and gland plates
Gland plates to be galvanised

LABEL INSCRIPTIONS

1	INCOMER
2	TELEMETRY
3	CONTROL
4	PUMP 1
5	PUMP 2
6	CABLEWAY
7	REMOTE CONTROL SELECTED
8	FLOAT BACKUP
9	STATION PROHIBITED
10	RESET FLOAT BKACUP
11	LAMP TEST
12	ABB FLOWMETER
13	ISOLATOR
14	IN MAINTENANCE (MECH TIMER)
15	CONTROL SUPPLY AVAILABLE
16	MAINS OFF GENERATOR
17	230V SOCKET
18	PUMP AVAILABLE
19	PUMP RUNNING
20	OVERTEMP TRIPPED
21	OVERLOAD TRIPPED
22	PUMP UNDERLOAD
23	HAND OFF AUTO
24	START
25	STOP
26	RESET
27	LAMP TEST
28	EMERGENCY STOP
W	RCD TEST WARNING LABEL
29	EMERGENCY STOP OPERATED
30	PUMP SEAL LEAK

Control Panel
Fully Welded Form 4 Construction
Mild Steel, 2mm thick
IP55 - Colour BS 175 Blue,
Semi Gloss Finish
Black hinges and locks
Gland plates to be galvanised

Rev	Description	Date	Drn	Apprv
A	FIRST ISSUE	08/05/19	JH	JH

Client Name: APS

Title: SFA7 & THAMES WATER SPEC DUAL ASD CONTROL PANEL PANEL GA

Drawn By: JH

Project Code: PO0000013349

Drawing No: GC21250

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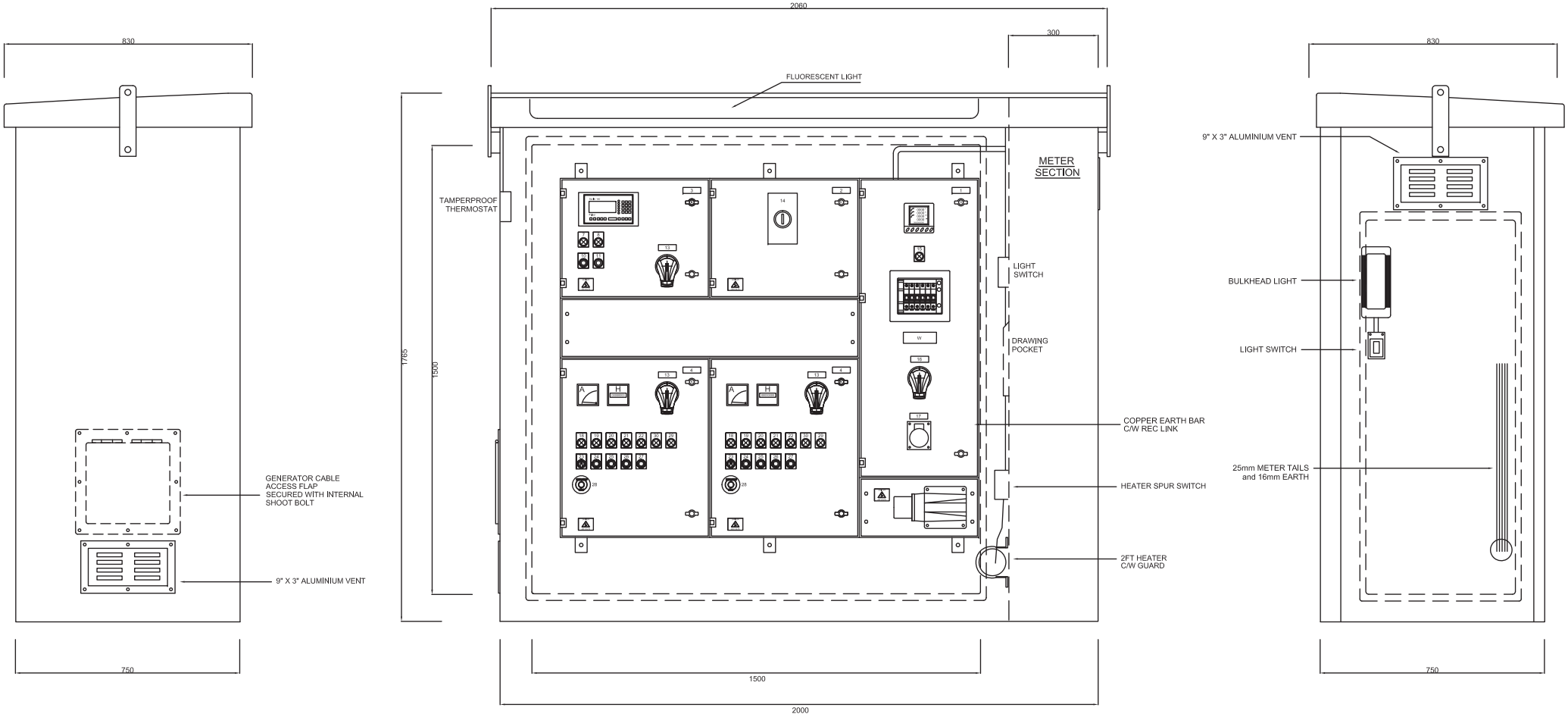
FRONT VIEW SHOWN WITH DOORS REMOVED



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A	FIRST ISSUE	08/05/19	JH	JH

Client Name
APS

Title SFA7 & THAMES WATER SPEC
DUAL ASD CONTROL PANEL
KIOSK GA

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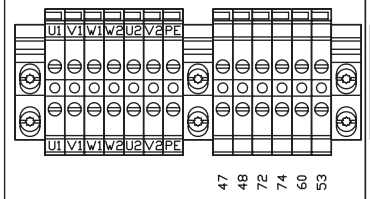
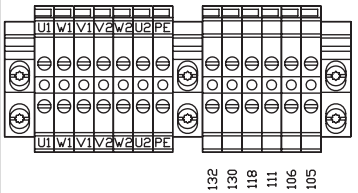
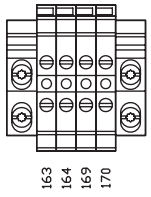
PUMP 1 STARTER



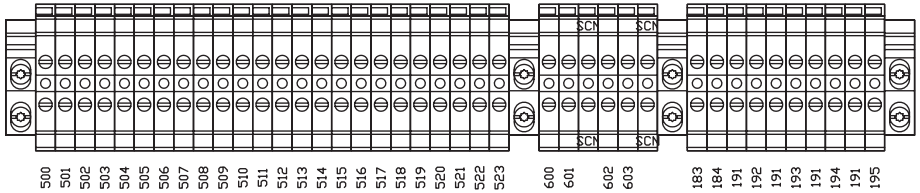
PUMP 2 STARTER



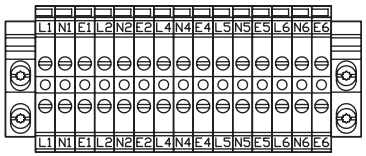
FLOAT TERMINALS



TELEMETRY TERMINALS



FEEDS FROM DIST BOARD



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DUAL ASD CONTROL PANEL
TERMINAL FOOTPRINTS

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