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VIVERGO FUELS
SALT END TERMINAL
ETHANOL ROAD LOADING
CONTROL SYSTEM IMPROVEMENTS
DOCUMENTATION MANUAL

Rev	Date	By	Checked	Approved	Description	Client Ref.
A	05.09.16	D. Smith	PJP	PJP	Original Issue	
B	13.09.16	PJP	DRP	PJP	General Update	Document No. VI095001_MNL
						Page 1 of 4

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2. Reports
3. Specifications
4. Drawings and Schedules
5. Vendor Drawings
- 5.1 Flotech



Section 1
Register Control System



Register Control System

<u>Register No</u>	<u>Description</u>	<u>Issue</u>
VI095001_REG	Report Register	A
VI095002_REG	Drawing Register	B
VI095003_REG	Schedule Register	B
VI095004_REG	Specification Register	B



CLIENT:
Vivergo Fuels Ltd
Saltend Terminal

ISSUE	DATE	BY	CHKD	APPD
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VI095001_REG
SHT 1 OF 1

REPORT NO	REVISION	DATE	DESCRIPTION
	ISSUE 0 A B C D E		
VI095002_RPT	C	28.07.16	User Requirement Specification
J4253-ECA-001	B	04.09.16	415v Supplies Calculations
J4253-ECA-002	B	04.09.16	110v Supplies Calculations

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 Saltend Terminal

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REPORT NO	REVISION							DATE	DESCRIPTION
	ISSUE	0	A	B	C	D	E		
VI095001_DWG									Ethanol Loading Gantries Power Distrubution Board
VI095002_DWG									Ethanol Blending Gantry 1 Arm 1 Cable Overview
VI095003_DWG									Ethanol Blending Gantry 1 Arm 2 Cable Overview
VI095004_DWG									Ethanol Blending Gantry 1 Arm 3 Cable Overview
VI095005_DWG									Ethanol Blending Gantry 2 Arm 1 Cable Overview
VI095006_DWG									Ethanol Blending Gantry 2 Arm 2 Cable Overview
VI095007_DWG									Ethanol Blending Gantry 2 Arm 3 Cable Overview
VI095010_DWG									Gantry 1 Arm 1 AC/DC JB Connection Details
VI095011_DWG									Gantry 1 Arm 2 AC/DC JB Connection Details
VI095012_DWG									Gantry 1 Arm 3 AC/DC JB Connection Details
VI095013_DWG									Gantry 2 Arm 1 AC/DC JB Connection Details
VI095014_DWG									Gantry 2 Arm 2 AC/DC JB Connection Details
VI095015_DWG									Gantry 2 Arm 3 AC/DC JB Connection Details
VI095030_DWG									Gantry Control Building Proposed Layout
VI095031_DWG									Additive Pump Request Control Panel Logic Drawing
VI095032_DWG									Gantry 1 Scully Interface Control Panel Logic Drawing
VI095033_DWG									Gantry 2 Scully Interface Control Panel Logic Drawing
VI095034_DWG								A	DCS Interface JBD5117 Junction Box Termination Drawing
VI095040_DWG									Gantry Containment and equipment Layout

Distrubution Enclosure Drawings

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REPORT NO	REVISION							DATE	DESCRIPTION
	ISSUE	0	A	B	C	D	E		
VI095010_SCH				C					Power Distribution Cable Schedule
VI095011_SCH				C	D				Gantry 1 Arm 1 Cable Schedule
VI095012_SCH				A					Gantry 1 Arm 2 Cable Schedule
VI095013_SCH				A					Gantry 1 Arm 3 Cable Schedule
VI095014_SCH				A					Gantry 2 Arm 1 Cable Schedule
VI095015_SCH				A					Gantry 2 Arm 2 Cable Schedule
VI095016_SCH				A					Gantry 2 Arm 3 Cable Schedule

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REPORT NO	REVISION					DATE	DESCRIPTION
	ISSUE	0	A	B	C		
VI095001_SPC		A					Loading Bay Additive Junction Box
VI095002_SPC		B					Accuload III Batcher
VI095003_SPC		B					Ethanol Gantry PD Flowmeter
VI095004_SPC		A					Additive Injection Unit
VI095005_SPC		A					Ethanol Gantry DCV
VI095006_SPC		A					Denaturant Flow Unit
VI095007_SPC		A					Ethanol Gantry RTD
VI095008_SPC		A					9-JB-570104 Additive Pump Request Control Station
VI095009_SPC		A	B				Scully Interface Control Station
VI095010_SPC		A					Gantry AC Junction Box
VI095011_SPC		A					Gantry DC Junction Box
VI095012_SPC		A					9-JBX5116 (SIS) Gantries 1 &2 Junction Box
VI095013_SPC		A					9-JBD5112 (BPCS) Gantries 1 &2 Junction Box
VI095014_SPC			A				9-JBD5117 (Additive) DCS Junction Box

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VIVERGO FUELS ETHANOL ROAD LOADING IMPROVEMENTS

USER REQUIREMENT SPECIFICATION

Rev	Date	Description	Client Ref.
A	16.02.16	Original Issue	
B	22.04.16	Definitions Update	
C	28.07.16	Post Review meeting 12/7/16	
			Document No.
			VI095002_RPT

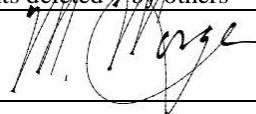


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1 REVISION HISTORY

Revision	A	
Description	Original Issue for Comments	
By	M. Morgan	
Checked	P. Parkin	
Approved	M. Morgan	
Revision	B	
Description	Definitions Update <ul style="list-style-type: none"> • Gantries renamed 1 & 2 (formerly A&B in this document) • Arms renamed 	
By	M. Morgan	
Checked	P. Parkin	
Approved	M. Morgan	
Revision	C	
Description	Updated post review meeting 12/07/2016 <ul style="list-style-type: none"> • SIS added as a system • Bill of Lading requirements deleted by others 	
By	M. Morgan	
Checked	P. Parkin	
Approved	M. Morgan	



2 ABBREVIATIONS & DEFINITIONS

2.1 Abbreviations

BOL	Bill of Lading
DCS	Distributed Control System
ERP	Vivergo Enterprise Resource Planning system, handling finance and logistics
TMS	Traffic Management System
URS	User Requirement Specification
VCU	Vapour Combustion Unit

2.2 Definitions

Gantry 1	Truck Loading Gantry 1
Gantry 2	Truck Loading Gantry 2
G1-A1	Gantry 1 Loading Arm 1
G1-A2	Gantry 1 Loading Arm 2
G1-A3	Gantry 1 Loading Arm 3
G2-A1	Gantry 2 Loading Arm 1
G2-A2	Gantry 2 Loading Arm 2
G2-A3	Gantry 2 Loading Arm 3
Additive 1	Additive 1 system – available to all arms
Additive 2	Additive 2 system – available to all arms
Additive 3	Additive 3 system – available to all arms
Additive 4	Additive 4 system – available to all arms
Additive 5	Additive 5 system – available to all arms
Load	Definition of what is to be loaded and for whom for a single visit of a vehicle to site
Batch	The portion of a load despatched in a single transaction by a single Accuload, usually equating to a single pot on a truck



3 REFERENCES

P&I Diagrams

Existing System

Bioethanol Bulk Storage	51203670-51-000-111-PID-5102	Rev.05
Bioethanol Truck Loading	51203670-51-000-111-PID-5105	Rev.05
Vapour Recovery Unit	51203670-51-000-111-PID-5106	Rev.05
Denaturant Unloading and Storage	51203670-51-000-111-PID-5108	Rev.05

Proposed System

Bioethanol Bulk Storage	51203670-51-000-111-PID-5102	Rev.05
Bioethanol Truck Loading Bay 1	51203670-51-000-111-PID-5105	Rev.07
Vapour Combustion Unit	51203670-51-000-111-PID-5106	Rev.05
Bioethanol Truck Loading Bay 2	51203670-51-000-111-PID-5107	Rev.00
Denaturant Unloading and Storage	51203670-51-000-111-PID-5108	Rev.08



4 INTRODUCTION

This User Requirement Specification (URS) has been produced by P&I Design Ltd. on behalf of Vivergo Fuels.

Vivergo Fuels operate a bio-refinery at Saltend Chemicals Park near Hull. The refinery is fully operational and produces approximately 420 million litres of bio-ethanol and 500,000 tonnes of animal feed per year using feed grade wheat. Ethanol is exported to ship and to road tankers. Ethanol exported to road tankers is currently de-natured with methanol/Bitrex. The use of methanol/Bitrex as a denaturant restricts potential customers who will purchase the Ethanol. This project has been instigated primarily to change the denaturant to use gasoline instead of methanol/Bitrex. As a result of the potentially extended customer base, the desire of those customers to have additives injected (corrosion inhibitors) is also being addressed. Furthermore the introduction of gasoline as the denaturant has led to the need for road tanker displaced vapours to be incinerated rather than recovered, as is currently the case, due to potential contamination of the process with gasoline.

4.1 Scope

This URS does not attempt to fully re-define the existing bioethanol road truck loading system. It has been produced to identify the process and structural changes to the system and identify key requirements to be incorporated. It is the responsibility of each vendor / responsible person to fully define how this will be achieved within the confines of their own system and via interfaces with the other systems involved. It should be clearly identified how the incorporation of these changes affects the existing functionality.

This URS is limited in scope to the following:

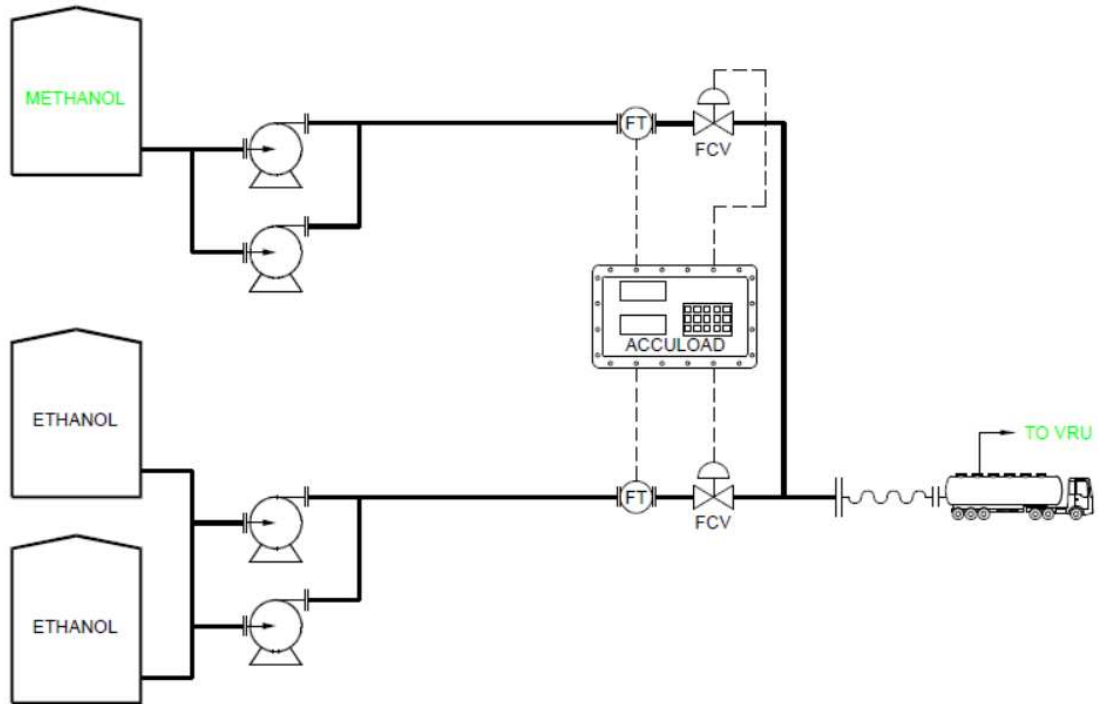
- ERP functional requirements but limited in scope to establishing the data transfer between ERP and TMS, all other logistics and finance implications will be dealt with elsewhere by Vivergo.
- TMS functional requirements
- Depot Visor functional requirements
- Accuload functional requirements
- DCS functional requirements



4.2 System Overview – Plant

4.2.1 System Overview – Existing

The existing facility is shown in a simplified schematic below, full details can be found on the referenced P&I Diagrams.



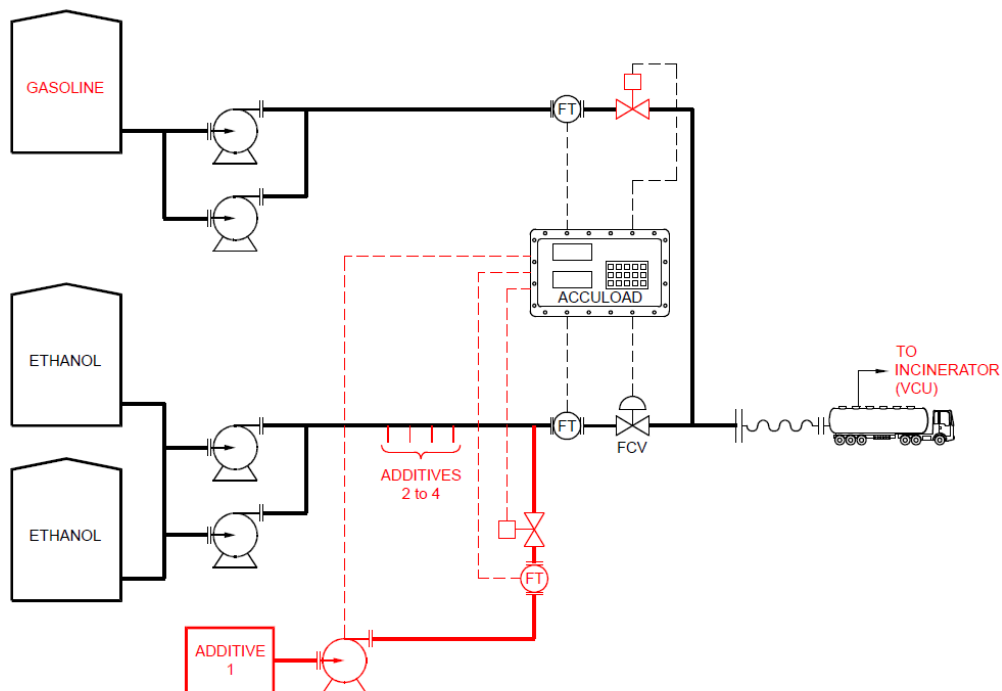
Notes

1. Only one loading gantry shown, ethanol and denaturant streams duplicated to second gantry
2. Denaturant offloading not shown

4.2.2 System Overview – Proposed

The modified facility is shown in a simplified schematic below, full details can be found on the referenced P&I Diagrams. The key differences are as follows:

- Bulk bioethanol storage remains fundamentally the same. There are some proposed changes to the control method of starting the delivery pumps only
- Denaturant changes to be gasoline, however is still stored in T-5105. Denaturant offloading stays essentially the same and has therefore not been shown for clarity.
- Additives are now available and injected directly into the bioethanol stream at the truck loading gantries. The system will be capable of five additives with all five available to both gantries.
- Increase from one loading arm per gantry to three loading arms per gantry. Although this would be a phased installation, the system needs to be capable of accommodating all arms.
- The system will now operate using single pot and multi-pot road tankers
- Truck displaced vapours will be incinerated by a vapour combustion unit rather than recovered by a vapour recovery unit
- There will be an extensive re-fit of the field equipment including flowmeters, valves etc. however so far as this URS is concerned this is incidental to the control scheme.



Notes

1. All five additives available to both gantries



4.3 System Overview – Control System

As noted in the introduction, systems are already operational for the existing road loading facility. The basic building blocks will remain the same in the modified system, therefore this description assumes some prior knowledge of the system, as documented elsewhere, and provides a simplified overview in order to identify the critical requirements for the proposed modifications.

The overall system can be broken into six modules

- ERP - Vivergo Enterprise Resource Planning system, handling finance and logistics
- DCS - Vivergo Distributed Control System
- TMS - Traffic Management System – By Avery Weightronix
- Depot Visor System – By FMA
- Field Equipment including tanks, pumps, Accuload batcher, flowmeters, control valves etc.
- Safety Instrumented System

In very simplistic terms the process operates as follows. More detailed information will be added in subsequent sections as necessary.

1. An order and traffic booking is created on the ERP
2. The ERP creates an order on the TMS
3. The TMS handles the vehicle entry to site and identifies the vehicle at the road loading gantry via a swipe card system
4. The TMS communicates with the Depot Visor system to transfer the order requirements for the specific vehicle and the specific gantry
5. The Depot Visor system communicates with the Accuload batcher to populate it with product requirements

On completion of the load, the process operates in reverse

6. The Depot Visor system communicates with the Accuload batcher to acquire actual delivered quantities
7. The Depot Visor system communicates with the TMS to update the database with the actual delivered quantities for the batch
8. The TMS handles the vehicle exit from the site including printing the Bill of Lading
9. The TMS communicates with the ERP and the ERP handles order closure and invoicing



5 KEY FUNCTIONAL REQUIREMENTS

The individual vendors will be expected to consider in detail the implications of the modifications to their system. It is required that each vendor will respond in the form of a functional specification, identifying in more detail how the requirements of this URS will be implemented. A clear audit trail should be established from the existing system to the modified system. Listed below are some of the key requirements and considerations.

5.1 General

The system shall be capable of delivering any permutation of bioethanol / denaturant / additive to any of Vivergo's customers.

5.2 Truck Loading Gantries

Each truck loading gantry shall be capable of running simultaneously delivering bioethanol or denatured bioethanol with any combination of additives

For multi-pot road tankers, the ability to load product on a single order into multiple pots shall be accommodated. Up to eight pots shall be available. The system will not know how many pots the road tanker barrel contains, therefore no restriction will be imposed on the quantity requested for each pot, within the constraints of the total quantity released for delivery on the order.

The implications of multi-pot loading will require further more detailed analysis by all sub-system vendors in collaboration. For example, the current single pot loading, completes a load when the Accuload indicates end of batch. An individual Accuload end of batch may now only indicate end of a single pot. The ability to communicate/establish end of total load will need to be established.

5.3 Interlocks

This URS does not consider interlocking. However there is a current anomaly that on loss of the Scully permissive to the Accuload during loading, the load is ended. This requires manual intervention by logistics to create a 'new' balancing order to permit the road tanker to receive the remainder of the load. This feature shall be removed and the Scully permissive will pause the load via action at the Accuload only. Once returned to a healthy state the load will be permitted to continue to completion.



5.4 DCS

The DCS operates the ethanol and denaturant delivery pumps. Currently manual intervention is required to start and stop the pumps. The system shall be modified so that the DCS receives a demand signal if any Accuload requires product and starts / stops the delivery pumps accordingly. Consideration shall be given to suitable run on times to prevent repeated multiple pump starts in quick succession. Consideration shall also be given to 'line pack' delay at the Accuload to ensure the delivery pumps are fully operational prior to commencing loading.

5.5 Vapour Combustion Unit

The VCU takes time to reach operational temperature from a cold start (in the order of 18 minutes). The exact functionality is to be determined, however the TMS shall provide a signal to the DCS as a vehicle arrives on site in order that the DCS can command the VCU to be brought online. It is thought that so long as any bio-ethanol truck is on site the signal should be held in an ON state. If there are no bio-ethanol trucks on site then the signal should be set OFF. This way the VCU can be brought online as the first vehicle arrives at the site gate and can be put into an idle or low fire state as the last vehicle leaves the site gate.

Note : It may be that a distinction is needed between a low fire mode for gaps in vehicles during normal operating hours and an idle or off state for periods of known inactivity e.g. overnight or Sunday. To be discussed further Vivergo / VCU vendor.

5.6 Throughput

There is the potential for increased vehicle throughput when 3 arms per gantry are installed. Throughput requirements have not been defined at this stage, however vendors shall consider any implications and advise of constraints.

6 RECIPE DATA

The following table summarises the various parameters to be passed through the system for a load. This table is not necessarily exhaustive and does not include data such as load reference etc. which is already incorporated in the existing functionality. The table is intended to summarise the product, denaturant and additive parameters and their variability.

		Desired	Actual
Quantity	Total quantity for load	0 – 40,000	Actual qty of ethanol loaded (measured litres - TBC)
Denaturant	Yes or No	Fixed at 1%	Actual qty of denaturant loaded (measured litres - TBC)
Additive 1	Set to 0 if not required	0 - ??? ppm	Actual qty of additive 1 loaded (measured litres - TBC)
Additive 2	Set to 0 if not required	0 - ??? ppm	Actual qty of additive 2 loaded (measured litres - TBC)



Additive 3	Set to 0 if not required	0 - ??? ppm	Actual qty of additive 3 loaded (measured litres - TBC)
Additive 4	Set to 0 if not required	0 - ??? ppm	Actual qty of additive 4 loaded (measured litres - TBC)
Additive 5	Set to 0 if not required	0 - ??? ppm	Actual qty of additive 5 loaded (measured litres - TBC)

6.1 Units

There appears to be a variety of units of measurement used throughout the system. This shall be discussed in more detail and a greater understanding of which units are required at the various stages and which system performs conversions if necessary.

For example, it is understood that order paperwork quantifies the load required in kg. When the load is entered at the Accuload the load will be quantified in litres. The process of conversion, the necessity for conversion and which system performs the conversion and on what data shall all be defined and understood for clarity and to ensure removal of any duplication.

For the purpose of safe loading, the Accuload will load in measured litres.



7 ASSUMPTIONS

Following initial meetings the following assumptions have been made. These shall be confirmed by Vivergo prior to proceeding.

- Multi-pot road tankers will receive the same specification product for all pots on a single order.
- In the initial phase of implementation it will only be physically possible, due to loading arm position, to load multi-pot vehicles on Gantry 1. It is assumed that no special software will be implemented in TMS to enforce this but rather it will become evident through experience and communicated through driver training / inductions.
- There will be no volume constraints on a pot batch size. This is in order to accommodate single and multi-pot trucks. Note : This is a significant deviation from the present single pot only loading and consideration should be given to pot overloading at HAZOP.
- Additive quantities injected will be recorded and communicated through the system to the same specification as ethanol and denaturant. Any HMRC duty calculation requirements have been excluded from this URS, however the following changes may need consideration by others.
 - Use of gasoline as a denaturant. Presumably duty already paid at dispatching depot prior to receipt at Vivergo.
 - Use of additives, although only in small ppm quantities, this is likely to be several litres over a full road tanker load
- A single load can only require a maximum of a single additive.
- There will be no provision for 'back loading' e.g. a gasoline denaturant delivery will not be followed by a back ordered ethanol collection. In this instance the road tanker would be required to leave site following the gasoline delivery and then re-enter site for the ethanol collection.
- Bio-ethanol loading to trucks at the loading gantries will under normal conditions require the driver only. Vivergo operations personnel will not be involved with a normal successful truck loading operation.
- Latest versions of environment software will be utilised e.g. Accuload firmware will be updated to latest version. Other suppliers to advise implications of this



8 DOCUMENTATION

8.1 Standardisation

It has been noted that there are multiple ways of referring to the same equipment / systems across various documents. The opportunity should be taken to standardise terminology and acronyms across documentation where they refer to the same item.

To aid this process it is suggested the abbreviations and definitions section of this document act as a reference point and be expanded as necessary.

9 TESTING

The existing system is to remain operational throughout the changeover, with a phased changeover being implemented to permit continued operation. An overall testing plan will be developed to define and control the overall testing programme.

The nature of the system with its component building blocks means that standalone testing will be performed on various systems prior to joining together in an integrated test. Interfaces between the various systems will require particular attention.

Vivergo propose to setup a virtual test network. Further details and diagrams will be supplied in due course.



Signature Certificate

 Document Reference: 4RHRNLJ8TLGFKEMC249ZZV

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Timestamp

2016-07-28 04:33:28 -0700
2016-07-28 04:33:28 -0700
2016-07-28 04:32:50 -0700
2016-07-28 04:04:25 -0700
2016-07-28 04:03:55 -0700
2016-07-28 03:56:03 -0700
2016-07-28 03:55:17 -0700
2016-07-28 03:54:49 -0700

Audit

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Cable Calculation Report

Project Reference: 110V Supplies Vivergo	Job Number: J4253	Rev Date : 04/09/2016
Document No: J4253-ECA-001	Created On : 19/07/2016	Rev No: B
Created By : D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-02-21-02 (Existing)	Name:
Connected From: SWB-62-21-02/1/L1	To: New Junction Box
Load Type: Junction Box	Design Current Ib (A): 63.0
Comments:	

Protective Device [a] = Auto, [f] = Fixed, [m] = Max.	
Overcurrent protection:	Schneider Compact NSX MCCB NSX100F TM-D
Rating In (A): 63 [f]	Overload Setting Ir (A): 63 [m]

Conductors [a] = Auto, [f] = Fixed, [d] = Double	
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 3c Size (mm²): 185 [f]
Neutral: 185 mm ² [a]	Length (m): 300
34 - On a ladder	Arrangement: Horizontal Touching

Rating Factors	
Air Temperature (°C) = 30.0	Ca = 1.00 [BS 7671, Table 4B1]
Circuits In Group = 5	Cg = .80 [BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of ladders = 1	No. of circuits per ladder = 5
3rd Harmonics (%) = .00	Ch = 1.00

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib = 63.0		
Device Rating In = 63	Overload Setting Ir = 63	[Ir ≥ Ib]
Min. Cable Capacity Iz = 78.8		[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It = 539.0		[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	63.0 / 0.95	0.0 / 0.00	0.0 / 0.00	63.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	4.98 / 4.52	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	4.98 / 4.52	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 185 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .02400	Z1 .04465	Z2 .04465	Zs .10728
Disconnection time (s)	From characteristic: .02			Max. Zs .21386
Circuit Protective Conductor (mm ²)				Maximum for circuit: 5.00
CPC Adiabatic check (mm ²)	CPC Section = Integral 185	Total = 185.0	Min. Section = .94	Integral 185 [a]
				Earth Fault Current (kA)
				0.97

Note: Earth Fault Current and Max Zs have been factored by Cmin

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 10.000 / 10.000	Load End: 1.316 / 1.131
Protective Device Breaking Capacity (kA)	Icu: 36	Ics: 36
Adiabatic Check:	CPD Energy Let-through (A ² s): 24.41 x 10 ³	Adiabatic Limit k ² S ² (A ² s): 699.87 x 10 ⁶

Cable Calculation Report

Project Reference: 110V Supplies Vivergo	Job Number: J4253	Rev Date: 04/09/2016
Document No: J4253-ECA-001	Created On: 19/07/2016	Rev No: B
Created By: D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-02-21-02 (New)	Name:
Connected From: New Junction Box	To: 9-JB62-21-02-51 / JUNCTION BOX
Load Type: Distribution Board	Design Current Ib (A): 63.0
Comments:	

Protective Device [a] = Auto, [f] = Fixed, [m] = Max.	
Overcurrent protection:	Schneider Compact NSX MCCB NSX100F TM-D
Rating In (A): 63 [f]	Overload Setting Ir (A): 63 [m]

Conductors [a] = Auto, [f] = Fixed, [d] = Double	
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 3c Size (mm²): 185 [f]
Neutral: 185 mm ² [a]	Length (m): 60
34 - On a ladder	Arrangement: Horizontal Touching

Rating Factors	
Air Temperature (°C) = 30.0	Ca = 1.00 [BS 7671, Table 4B1]
Circuits In Group = 5	Cg = .80 [BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of ladders = 1	No. of circuits per ladder = 5
3rd Harmonics (%) = .00	Ch = 1.00

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib = 63.0		
Device Rating In = 63	Overload Setting Ir = 63	[Ir ≥ Ib]
Min. Cable Capacity Iz = 78.8		[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It = 539.0		[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	63.0 / 0.95	0.0 / 0.00	0.0 / 0.00	63.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	1.00 / .90	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	5.97 / 5.43	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 185 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .10728	Z1 .00893	Z2 .00893	Zs .12494
Disconnection time (s)	From characteristic: .02			Max. Zs .21386
Circuit Protective Conductor (mm ²)				Maximum for circuit: 5.00
CPC Adiabatic check (mm ²)	CPC Section = Integral 185			Integral 185 [a]
	Total = 185.0			Min. Section = .81
Note: Earth Fault Current and Max Zs have been factored by Cmin				Earth Fault Current (kA) 0.84

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 1.316 / 1.131	Load End: 1.116 / 0.956
Protective Device Breaking Capacity (kA)	Icu: 36	Ics: 36
Adiabatic Check:	CPD Energy Let-through (A ² s): 17.46 x 10 ³	Adiabatic Limit k ² S ² (A ² s): 699.87 x 10 ⁶

Cable Calculation Report

Project Reference:	110V Supplies Vivergo	Job Number:	J4253	Rev Date :	04/09/2016
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Created By :	D Gibbs	Modified By:	D Gibbs		

Calculated in accordance with BS 7671

Active Source: Source

Circuit

Id No.: 9-SWB-62-21-02/P1	Name:
Connected From: 9-JB62-21-02-51/2/L1	To: 9-SWB-62-21-02-51-1 / GANTRY 1 AUX. D.B.
Load Type: Distribution Board	Design Current Ib (A): 14.5
Comments:	

Protective Device

[a] = Auto, [f] = Fixed, [m] = Max.

Overcurrent protection: Schneider Compact NSX MCCB NSX100F TM-D
 Rating In (A): 63 [f] Overload Setting Ir (A): 63 [m]

Conductors

[a] = Auto, [f] = Fixed, [d] = Double

Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4 **1 x 1 x 3c** **Size (mm²): 16 [f]**
 Neutral: 16 mm² [a] **Length (m): 2**
 34 - On a ladder Arrangement: Horizontal Touching

Rating Factors

Air Temperature (°C)	= 30.0	Ca	= 1.00	[BS 7671, Table 4B1]	
Circuits In Group	= 5	Cg	= .80	[BS 7671, Table 4C4]	Not Subject to Simultaneous Overload
No. of ladders = 1		No. of circuits per ladder = 5			
3rd Harmonics (%)	= .00	Ch	= 1.00		

Cable sizing (A)

Sized For: Phase Current Carrying Capacity

Auto-sized for current-carrying capacity and voltage drop limits.

Design Current Ib	= 14.5	Overload Setting Ir	= 63	[Ir ≥ Ib]
Device Rating In	= 63			[BS 7671, Appendix 4.5, Formula (3/4)]
Min. Cable Capacity Iz	= 63.4			[It ≥ Iz]
Actual Cable Rating It	= 115.0			

Load Current and Voltage Drop

	L1	L2	L3	Neutral
Design Current Ib (A/PF)	14.5 / 0.95	0.0 / 0.00	0.0 / 0.00	14.5
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	0.07 / .06	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	6.04 / 5.49	.00 / .00	.00 / .00	-----

Earth Fault

Circuit Protective Conductor (mm²)

Integral 16 [a]

[a] = Auto, [f] = Fixed

Earth Fault Loop Impedance (Ω)	Ze .12494	Z1 .00290	Z2 .00290	Zs .12961	Max. Zs .21386	Earth Fault Current (kA)	
Disconnection time (s)	From characteristic: .02						0.81
Circuit Protective Conductor (mm ²)	Integral 16 [a]						
CPC Adiabatic check (mm ²)	CPC Section = Integral 16		Total = 16.0	Min. Section = .78			

Note: Earth Fault Current and Max Zs have been factored by Cmin

Phase Fault

Phase Fault Current Max./Min. (kA)	Source End: 1.116 / 0.956	Load End: 1.078 / 0.917
Protective Device Breaking Capacity (kA)	Icu: 36	Ics: 36
Adiabatic Check:	CPD Energy Let-through (A ² s): 16.07 x 10 ³	Adiabatic Limit k ² S ² (A ² s): 5.23 x 10 ⁶

Cable Calculation Report

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Created By :	D Gibbs	Modified By:	D Gibbs		

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-21-02/P2	Name:
Connected From: 9-JB62-21-02-51/1/L1	To: 9-SWB-62-21-02-51-2 / GANTRY 2 AUX. D.B.
Load Type: Distribution Board	Design Current Ib (A): 13.5
Comments:	

Protective Device		[a] = Auto, [f] = Fixed, [m] = Max.
Overcurrent protection:	Schneider Compact NSX MCCB NSX100F TM-D	
Rating In (A): 63 [f]	Overload Setting Ir (A): 63	[m]

Conductors		[a] = Auto, [f] = Fixed, [d] = Double
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4		1 x 1 x 3c
Neutral: 16 mm ² [a]		Size (mm²): 16 [f]
34 - On a ladder	Arrangement: Horizontal Touching	Length (m): 2

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .80	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of ladders = 1	No. of circuits per ladder = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)		Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib	= 13.5		
Device Rating In	= 63	Overload Setting Ir = 63	[Ir ≥ Ib]
Min. Cable Capacity Iz	= 63.4		[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It	= 115.0		[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	13.5 / 0.95	0.0 / 0.00	0.0 / 0.00	13.5
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	0.07 / .06	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	6.04 / 5.49	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm ²)				Integral 16 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .12494	Z1 .00290	Z2 .00290	Zs .12961	Max. Zs .21386	Earth Fault Current (kA)	
Disconnection time (s)	From characteristic: .02				Maximum for circuit: 5.00		
Circuit Protective Conductor (mm ²)	CPC Section = Integral 16				Integral 16 [a]		
CPC Adiabatic check (mm ²)	CPC Section = Integral 16				Total = 16.0	Min. Section = .78	0.81

Note: Earth Fault Current and Max Zs have been factored by Cmin

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 1.116 / 0.956	Load End: 1.078 / 0.917
Protective Device Breaking Capacity (kA)	Icu: 36	Ics: 36
Adiabatic Check:	CPD Energy Let-through (A ² s): 16.07 x 10 ³	Adiabatic Limit k ² S ² (A ² s): 5.23 x 10 ⁶

Cable Calculation Report

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Created By :	D Gibbs	Modified By:	D Gibbs		

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-21-02-51-1/P1	Name:
Connected From: 9-SWB-62-21-02-51-1/1/L1	To: 9-XS-510210 / GANTRY 1 SCULLY SYSTEM SUPPLY
Load Type: Fixed equipment single phase and neutral	Design Current Ib (A): .5
Comments:	

Protective Device		[a] = Auto, [f] = Fixed, [m] = Max.
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898	
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A	

Conductors		[a] = Auto, [f] = Fixed, [d] = Double
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 3c	Size (mm²): 2.5 [f]
Neutral: 2.5 mm ² [a]		Length (m): 45
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching	

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib	= .5	Voltage drop limit = 9.35 V (BS 7671:2008 (2015) App. 4)
Device Rating In	= 6	Overload Setting Ir = N/A [Ir ≥ Ib]
Min. Cable Capacity Iz	= 6.0	[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It	= 39.0	[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	0.5 / 0.95	0.0 / 0.00	0.0 / 0.00	0.5
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	0.33 / .30	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	6.37 / 5.79	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .27492 #	Z1 .42750	Z2 .42750	Zs 1.12805
Disconnection time (s)	From characteristic: .02			
Circuit Protective Conductor (mm ²)	Maximum for circuit: 0.40			
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5	Total = 2.5	Min. Section = .05	Integral 2.5 [a]
				Earth Fault Current (kA)
				0.09

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault	
Phase Fault Current Max./Min. (kA)	Source End: 1.078 / 0.917
Protective Device Breaking Capacity (kA)	Icu: 10 Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 79.91
	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

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Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-21-02-51-1/P2	Name:
Connected From: 9-SWB-62-21-02-51-1/2/L1	To: 9-FIU-5115-G1 / GANTRY 1 CARD READER SYSTEM
Load Type: Fixed equipment single phase and neutral	Design Current Ib (A): 1.0
Comments:	

Protective Device [a] = Auto, [f] = Fixed, [m] = Max.	
Overcurrent protection: Schneider Multi9 MCB C60H Type C BS EN60898	Rating In (A): 6 [f] Overload Setting Ir (A): N/A

Conductors [a] = Auto, [f] = Fixed, [d] = Double	
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 3c Size (mm²): 2.5 [f]
Neutral: 2.5 mm ² [a]	Length (m): 45
31 - On horizontal/vertical perforated tray Arrangement: Horizontal Touching	

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)		Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib	= 1.0		Voltage drop limit = 9.35 V (BS 7671:2008 (2015) App. 4)
Device Rating In	= 6	Overload Setting Ir = N/A	[Ir ≥ Ib]
Min. Cable Capacity Iz	= 6.0		[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It	= 39.0		[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	1.0 / 0.95	0.0 / 0.00	0.0 / 0.00	1.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	0.73 / .66	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	6.77 / 6.15	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .27492 #	Z1 .42750	Z2 .42750	Zs 1.12805 Max. Zs 1.74161
Disconnection time (s)	From characteristic: .02 Maximum for circuit: 0.40			
Circuit Protective Conductor (mm ²)	Integral 2.5 [a]			
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5		Total = 2.5	Min. Section = .05
Earth Fault Current (kA)				
0.09				

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 1.078 / 0.917	Load End: 0.146 / 0.115
Protective Device Breaking Capacity (kA)	Icu: 10 Ics: 10	
Adiabatic Check:	CPD Energy Let-through (A ² s): 79.91	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

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Created By :	D Gibbs	Modified By:	D Gibbs		

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-21-02-51-1/P3	Name:
Connected From: 9-SWB-62-21-02-51-1/3/L1	To: 9-FQ-510201-G1 A1 / GANTRY 1, ARM 1, ACCULO A
Load Type: Fixed equipment single phase and neutral	Design Current Ib (A): 4.0
Comments:	

Protective Device		[a] = Auto, [f] = Fixed, [m] = Max.
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898	
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A	

Conductors		[a] = Auto, [f] = Fixed, [d] = Double
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4		1 x 1 x 3c
Neutral: 2.5 mm ² [a]		Size (mm²): 2.5 [f]
		Length (m): 20
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching	

Rating Factors			
Air Temperature (°C)	= 30.0	Ca	= 1.00 [BS 7671, Table 4B1]
Circuits In Group	= 5	Cg	= .75 [BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch	= 1.00

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for: current-carrying capacity and voltage drop limits.
Design Current Ib = 4.0	Voltage drop limit = 9.35 V (BS 7671:2008 (2015) App. 4)	
Device Rating In = 6	Overload Setting Ir = N/A	[Ir ≥ Ib]
Min. Cable Capacity Iz = 6.5	[BS 7671, Appendix 4.5, Formula (3/4)]	
Actual Cable Rating It = 39.0	[It ≥ Iz]	

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	4.0 / 0.95	0.0 / 0.00	0.0 / 0.00	4.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	1.29 / 1.18	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	7.34 / 6.67	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm²)				Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .27492 #	Z1 .19000	Z2 .19000	Zs .65348	Max. Zs 1.74161	Earth Fault Current (kA)	
Disconnection time (s)	From characteristic: .02				Maximum for circuit: 0.40		
Circuit Protective Conductor (mm²)					Integral 2.5 [a]	0.16	
CPC Adiabatic check (mm²)	CPC Section = Integral 2.5		Total = 2.5	Min. Section = .08			

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 1.078 / 0.917	Load End: 0.288 / 0.226
Protective Device Breaking Capacity (kA)	Icu: 10	Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 207.34	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

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Created By : D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-21-02-51-1/P4	Name:
Connected From: 9-SWB-62-21-02-51-1/4/L1	To: 9-FQ-510201-G1 A2 / GANTRY 1, ARM 2, ACCULO A
Load Type: Fixed equipment single phase and neutral	Design Current Ib (A): 4.0
Comments:	

Protective Device		[a] = Auto, [f] = Fixed, [m] = Max.
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898	
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A	

Conductors		[a] = Auto, [f] = Fixed, [d] = Double
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 3c	Size (mm²): 2.5 [f]
Neutral: 2.5 mm ² [a]		Length (m): 20
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching	

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib	= 4.0	Voltage drop limit = 9.35 V (BS 7671:2008 (2015) App. 4)
Device Rating In	= 6	Overload Setting Ir = N/A [Ir ≥ Ib]
Min. Cable Capacity Iz	= 6.5	[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It	= 39.0	[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	4.0 / 0.95	0.0 / 0.00	0.0 / 0.00	4.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	1.29 / 1.18	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	7.34 / 6.67	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .27492 #	Z1 .19000	Z2 .19000	Zs .65348
Disconnection time (s)	From characteristic: .02			
Circuit Protective Conductor (mm ²)	Maximum for circuit: 0.40			
CPC Adiabatic check (mm ²)	Integral 2.5 [a]			
	CPC Section = Integral 2.5	Total = 2.5	Min. Section = .08	Earth Fault Current (kA)
				0.16

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault	
Phase Fault Current Max./Min. (kA)	Source End: 1.078 / 0.917
Protective Device Breaking Capacity (kA)	Icu: 10 Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 207.34
	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

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Created By : D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit	Id No.: 9-SWB-62-21-02-51-1/P5	Name:
	Connected From: 9-SWB-62-21-02-51-1/5/L1	To: 9-FQ-510201-G1 A3 / GANTRY 1, ARM 3, ACCULO A
	Load Type: Fixed equipment single phase and neutral	Design Current Ib (A): 4.0
Comments:		

Protective Device	[a] = Auto, [f] = Fixed, [m] = Max.
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A

Conductors	[a] = Auto, [f] = Fixed, [d] = Double
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 3c Size (mm²): 2.5 [f]
Neutral: 2.5 mm ² [a]	Length (m): 20
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib = 4.0		Voltage drop limit = 9.35 V (BS 7671:2008 (2015) App. 4)
Device Rating In = 6	Overload Setting Ir = N/A	[Ir ≥ Ib]
Min. Cable Capacity Iz = 6.5		[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It = 39.0		[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	4.0 / 0.95	0.0 / 0.00	0.0 / 0.00	4.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	1.29 / 1.18	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	7.34 / 6.67	.00 / .00	.00 / .00	-----

Earth Fault	Circuit Protective Conductor (mm ²)				Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .27492 #	Z1 .19000	Z2 .19000	Zs .65348	Max. Zs 1.74161	Earth Fault Current (kA)
Disconnection time (s)	From characteristic: .02				Maximum for circuit: 0.40	
Circuit Protective Conductor (mm ²)	CPC Section = Integral 2.5				Integral 2.5 [a]	
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5				Total = 2.5	Min. Section = .08
Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board						

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 1.078 / 0.917	Load End: 0.288 / 0.226
Protective Device Breaking Capacity (kA)	Icu: 10	Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 207.34	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

Project Reference: 110V Supplies Vivergo	Job Number: J4253	Rev Date : 04/09/2016
Document No: J4253-ECA-001	Created On : 19/07/2016	Rev No: B
Created By : D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-21-02-51-1/P7	Name:
Connected From: 9-SWB-62-21-02-51-1/7/L1	To: / 110V PHONE SUPPLY
Load Type: Fixed equipment single phase and neutral	Design Current Ib (A): 1.0
Comments:	

Protective Device		[a] = Auto, [f] = Fixed, [m] = Max.
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898	
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A	

Conductors		[a] = Auto, [f] = Fixed, [d] = Double
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4		1 x 1 x 3c
Neutral: 2.5 mm ² [a]		Size (mm²): 2.5 [f]
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching	Length (m): 50

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib	= 1.0	Voltage drop limit = 9.35 V (BS 7671:2008 (2015) App. 4)
Device Rating In	= 6	Overload Setting Ir = N/A [Ir ≥ Ib]
Min. Cable Capacity Iz	= 6.0	[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It	= 39.0	[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	1.0 / 0.95	0.0 / 0.00	0.0 / 0.00	1.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	0.81 / .73	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	6.85 / 6.23	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .27492 #	Z1 .47500	Z2 .47500	Zs 1.22300
Disconnection time (s)	From characteristic: .02			
Circuit Protective Conductor (mm ²)	Maximum for circuit: 0.40			
CPC Adiabatic check (mm ²)	Integral 2.5 [a]			
	CPC Section = Integral 2.5	Total = 2.5	Min. Section = .05	Earth Fault Current (kA)
				0.09

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault	
Phase Fault Current Max./Min. (kA)	Source End: 1.078 / 0.917
Protective Device Breaking Capacity (kA)	Load End: 0.133 / 0.104
	Icu: 10 Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 69.94
	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

Project Reference: 110V Supplies Vivergo	Job Number: J4253	Rev Date : 04/09/2016
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Created By : D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-21-02-51-2/P1	Name:
Connected From: 9-SWB-62-21-02-51-2/1/L1	To: 9-XS-510234 / GANTRY 2 SCULLY SYSTEM SUPPLY
Load Type: Fixed equipment single phase and neutral	Design Current Ib (A): .5
Comments:	

Protective Device [a] = Auto, [f] = Fixed, [m] = Max.	
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A

Conductors [a] = Auto, [f] = Fixed, [d] = Double	
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 3c Size (mm²): 2.5 [f]
Neutral: 2.5 mm ² [a]	Length (m): 55
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching

Rating Factors	
Air Temperature (°C) = 30.0	Ca = 1.00 [BS 7671, Table 4B1]
Circuits In Group = 5	Cg = .75 [BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5
3rd Harmonics (%) = .00	Ch = 1.00

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib = .5		Voltage drop limit = 9.35 V (BS 7671:2008 (2015) App. 4)
Device Rating In = 6	Overload Setting Ir = N/A	[Ir ≥ Ib]
Min. Cable Capacity Iz = 6.0		[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It = 39.0		[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	0.5 / 0.95	0.0 / 0.00	0.0 / 0.00	0.5
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	0.40 / .36	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	6.44 / 5.85	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .27492 #	Z1 .52250	Z2 .52250	Zs 1.31796
Disconnection time (s)	From characteristic: .02			Max. Zs 1.74161
Circuit Protective Conductor (mm ²)				Maximum for circuit: 0.40
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5	Total = 2.5	Min. Section = .05	Integral 2.5 [a]
				Earth Fault Current (kA)
				0.08

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 1.078 / 0.917	Load End: 0.122 / 0.096
Protective Device Breaking Capacity (kA)	Icu: 10	Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 61.91	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

Project Reference:	110V Supplies Vivergo	Job Number:	J4253	Rev Date :	04/09/2016
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Created By :	D Gibbs	Modified By:	D Gibbs		

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-21-02-51-2/P2	Name:
Connected From: 9-SWB-62-21-02-51-2/2/L1	To: 9-FIU-5115-G2 / GANTRY 2 CARD READER SYSTEM
Load Type: Fixed equipment single phase and neutral	Design Current Ib (A): 1.0
Comments:	

Protective Device		[a] = Auto, [f] = Fixed, [m] = Max.
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898	
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A	

Conductors		[a] = Auto, [f] = Fixed, [d] = Double
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 3c	Size (mm²): 2.5 [f]
Neutral: 2.5 mm ² [a]		Length (m): 55
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching	

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib	= 1.0	Voltage drop limit = 9.35 V (BS 7671:2008 (2015) App. 4)
Device Rating In	= 6	Overload Setting Ir = N/A [Ir ≥ Ib]
Min. Cable Capacity Iz	= 6.0	[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It	= 39.0	[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	1.0 / 0.95	0.0 / 0.00	0.0 / 0.00	1.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	0.89 / .81	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	6.92 / 6.30	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .27492 #	Z1 .52250	Z2 .52250	Zs 1.31796
Disconnection time (s)	From characteristic: .02			
Circuit Protective Conductor (mm ²)	Integral 2.5 [a]			
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5	Total = 2.5	Min. Section = .05	Earth Fault Current (kA)
				0.08

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 1.078 / 0.917	Load End: 0.122 / 0.096
Protective Device Breaking Capacity (kA)	Icu: 10	Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 61.91	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

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Created By :	D Gibbs	Modified By:	D Gibbs		

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-21-02-51-2/P3	Name:
Connected From: 9-SWB-62-21-02-51-2/3/L1	To: 9-FQ-510225-G2 A1 / GANTRY 2, ARM 1, ACCULO A
Load Type: Fixed equipment single phase and neutral	Design Current Ib (A): 4.0
Comments:	

Protective Device		[a] = Auto, [f] = Fixed, [m] = Max.
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898	
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A	

Conductors		[a] = Auto, [f] = Fixed, [d] = Double
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4		1 x 1 x 3c
Neutral: 2.5 mm ² [a]		Size (mm²): 2.5 [f]
		Length (m): 30
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching	

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)		Sized For: Phase Current Carrying Capacity	Auto-sized for: current-carrying capacity and voltage drop limits.
Design Current Ib	= 4.0	Voltage drop limit = 9.35 V (BS 7671:2008 (2015) App. 4)	
Device Rating In	= 6	Overload Setting Ir = N/A	[Ir ≥ Ib]
Min. Cable Capacity Iz	= 6.5	[BS 7671, Appendix 4.5, Formula (3/4)]	
Actual Cable Rating It	= 39.0	[It ≥ Iz]	

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	4.0 / 0.95	0.0 / 0.00	0.0 / 0.00	4.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	1.94 / 1.77	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	7.98 / 7.25	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm²)				Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .27492 #	Z1 .28500	Z2 .28500	Zs .84325	Max. Zs 1.74161	Earth Fault Current (kA)	
Disconnection time (s)	From characteristic: .02				Maximum for circuit: 0.40		
Circuit Protective Conductor (mm²)					Integral 2.5 [a]	0.12	
CPC Adiabatic check (mm²)	CPC Section = Integral 2.5		Total = 2.5	Min. Section = .07			

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault	
Phase Fault Current Max./Min. (kA)	Source End: 1.078 / 0.917 Load End: 0.208 / 0.163
Protective Device Breaking Capacity (kA)	Icu: 10 Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 131.33 Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ⁻³

Cable Calculation Report

Project Reference: 110V Supplies Vivergo	Job Number: J4253	Rev Date : 04/09/2016
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Created By : D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit

Id No.: 9-SWB-62-21-02-51-2/P4 **Name:**
Connected From: 9-SWB-62-21-02-51-2/4/L1 **To:** 9-FQ-510225-G2 A2 / GANTRY 2, ARM 2, ACCULO A
Load Type: Fixed equipment single phase and neutral Design Current Ib (A): 4.0

Comments:

Protective Device

[a] = Auto, [f] = Fixed, [m] = Max.

Overcurrent protection: Schneider Multi9 MCB C60H Type C BS EN60898
 Rating In (A): 6 [f] Overload Setting Ir (A): N/A

Conductors

[a] = Auto, [f] = Fixed, [d] = Double

Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4 **1 x 1 x 3c** **Size (mm²):** 2.5 [f]
 Neutral: 2.5 mm² [a] **Length (m):** 30
 31 - On horizontal/vertical perforated tray Arrangement: Horizontal Touching

Rating Factors

Air Temperature (°C) = 30.0 Ca = 1.00 [BS 7671, Table 4B1]
 Circuits In Group = 5 Cg = .75 [BS 7671, Table 4C4] Not Subject to Simultaneous Overload
 No. of trays = 1 No. of circuits per tray = 5
 3rd Harmonics (%) = .00 Ch = 1.00

Cable sizing (A)

Sized For: Phase Current Carrying Capacity

Auto-sized for current-carrying capacity and voltage drop limits.

Design Current Ib = 4.0 Voltage drop limit = 9.35 V (BS 7671:2008 (2015) App. 4)
 Device Rating In = 6 Overload Setting Ir = N/A [Ir ≥ Ib]
 Min. Cable Capacity Iz = 6.5 [BS 7671, Appendix 4.5, Formula (3/4)]
 Actual Cable Rating It = 39.0 [It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	4.0 / 0.95	0.0 / 0.00	0.0 / 0.00	4.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	1.94 / 1.77	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	7.98 / 7.25	.00 / .00	.00 / .00	-----

Earth Fault

Circuit Protective Conductor (mm²)

Integral 2.5 [a]

[a] = Auto, [f] = Fixed

Earth Fault Loop Impedance (Ω)	Ze .27492 #	Z1 .28500	Z2 .28500	Zs .84325	Max. Zs 1.74161	Earth Fault Current (kA)
Disconnection time (s)	From characteristic: .02				Maximum for circuit: 0.40	
Circuit Protective Conductor (mm ²)	Integral 2.5 [a]					0.12
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5		Total = 2.5	Min. Section = .07		

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault

Phase Fault Current Max./Min. (kA)	Source End: 1.078 / 0.917	Load End: 0.208 / 0.163
Protective Device Breaking Capacity (kA)	Icu: 10 Ics: 10	
Adiabatic Check:	CPD Energy Let-through (A ² s): 131.33	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

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Created By :	D Gibbs	Modified By:	D Gibbs		

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-21-02-51-2/P5	Name:
Connected From: 9-SWB-62-21-02-51-2/5/L1	To: 9-FQ-510225-G2 A3 / GANTRY 2, ARM 3, ACCULO A
Load Type: Fixed equipment single phase and neutral	Design Current Ib (A): 4.0
Comments:	

Protective Device		[a] = Auto, [f] = Fixed, [m] = Max.
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898	
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A	

Conductors		[a] = Auto, [f] = Fixed, [d] = Double
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 3c	Size (mm²): 2.5 [f]
Neutral: 2.5 mm ² [a]		Length (m): 30
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching	

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib	= 4.0	Voltage drop limit = 9.35 V (BS 7671:2008 (2015) App. 4)
Device Rating In	= 6	Overload Setting Ir = N/A [Ir ≥ Ib]
Min. Cable Capacity Iz	= 6.5	[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It	= 39.0	[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	4.0 / 0.95	0.0 / 0.00	0.0 / 0.00	4.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	1.94 / 1.77	0.00 / 0.00	0.00 / 0.00	-----
Voltage Drop - From Source (V/%)	7.98 / 7.25	.00 / .00	.00 / .00	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .27492 #	Z1 .28500	Z2 .28500	Zs .84325
Disconnection time (s)	From characteristic: .02			
Circuit Protective Conductor (mm ²)	Integral 2.5 [a]			
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5	Total = 2.5	Min. Section = .07	Earth Fault Current (kA)
				0.12

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 1.078 / 0.917	Load End: 0.208 / 0.163
Protective Device Breaking Capacity (kA)	Icu: 10	Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 131.33	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

NOTES

1. Cable Type BSS467
2. All cables sizes and lengths to be checked by installation prior purchase and installation
3. Armour has not been used in cpc calculations. Integral core used as CPC
4. Source characteristics unknown. TORA assumed

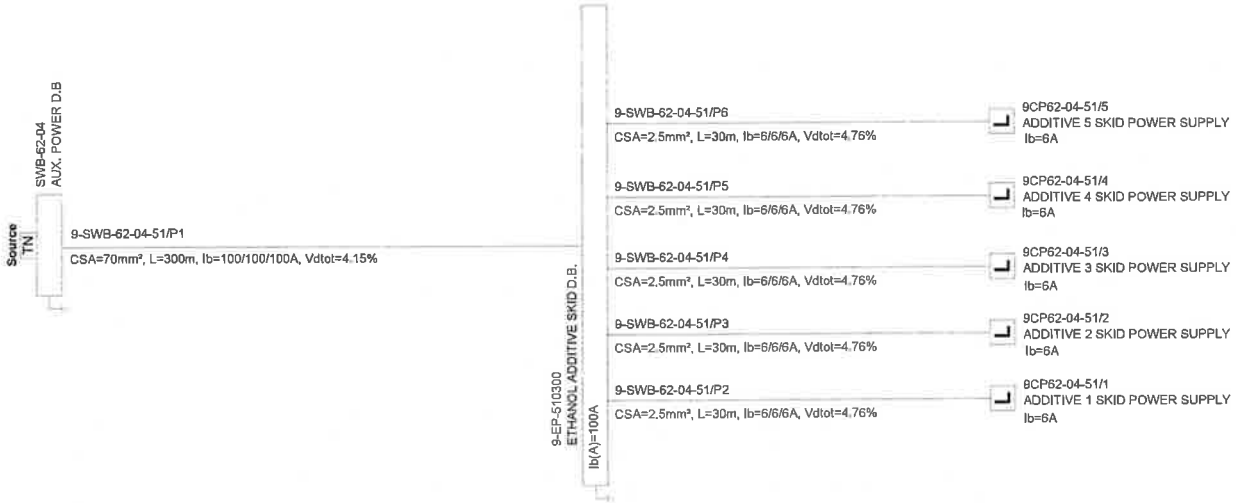
JDL Lonsdale
Premier Quality Electrical Engineering Company

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References:
415V Supplies Weirgo

Job No: J4253

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Cable Calculation Report

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Created By : D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit

Id No.: 9-SWB-62-04-51/P1 **Name:**
Connected From: SWB-62-04/1/L1,L2,L3 **To:** 9-EP-510300 / ETHANOL ADDITIVE SKID D.B.
Load Type: Distribution Board **Design Current Ib (A):** 100.0

Comments:

Protective Device

[a] = Auto, [f] = Fixed, [m] = Max.

Overcurrent protection: Schneider Compact NSX MCCB NSX100F Micrologic 2.2
 Rating In (A): 100 [f] Overload Setting Ir (A): 100 [m]

Conductors

[a] = Auto, [f] = Fixed, [d] = Double

Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4 **1 x 1 x 5c** **Size (mm²):** 70 [f]
 Neutral: 70 mm² [a] **Length (m):** 300
 34 - On a ladder Arrangement: Horizontal Touching

Rating Factors

Air Temperature (°C) = 30.0 Ca = 1.00 [BS 7671, Table 4B1]
 Circuits In Group = 5 Cg = .80 [BS 7671, Table 4C4] Not Subject to Simultaneous Overload
 No. of ladders = 1 No. of circuits per ladder = 5
 3rd Harmonics (%) = .00 Ch = 1.00

Cable sizing (A)

Sized For: Phase Current Carrying Capacity

Auto-sized for current-carrying capacity and voltage drop limits.

Design Current Ib = 100.0
 Device Rating In = 100 Overload Setting Ir = 100 [Ir ≥ Ib]
 Min. Cable Capacity Iz = 125.0 [BS 7671, Appendix 4.5, Formula (3/4)]
 Actual Cable Rating It = 251.0 [It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	100.0 / 0.95	100.0 / 0.95	100.0 / 0.95	0.0
3rd Harmonic Current (A)	0.0	0.0	0.0	0.0
Voltage Drop - This circuit (V/%)	9.54 / 4.15	9.54 / 4.15	9.54 / 4.15	-----
Voltage Drop - From Source (V/%)	9.54 / 4.15	9.54 / 4.15	9.54 / 4.15	-----

Earth Fault

Circuit Protective Conductor (mm²)

Conduit 0 [a]

[a] = Auto, [f] = Fixed

Earth Fault Loop Impedance (Ω)	Ze .02406 #	Z1 .10464	Z2 .10464	Zs .22122	Max. Zs .39727	Earth Fault Current (kA)
Disconnection time (s)	From characteristic: .08 Maximum for circuit: 5.00					
Circuit Protective Conductor (mm ²)	Conduit 0 [a]					0.99
CPC Adiabatic check (mm ²)	CPC Section = Conduit 0		Total = 70.0	Min. Section = 1.96		

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault

Phase Fault Current Max./Min. (kA)	Source End: 10.000 / 10.000	Load End: 2.389 / 1.046
Protective Device Breaking Capacity (kA)	Icu: 36 Ics: 36	
Adiabatic Check:	CPD Energy Let-through (A ² s): 87.08 x 10 ³	Adiabatic Limit k ² S ² (A ² s): 100.20 x 10 ⁶

Cable Calculation Report

Project Reference: 415V Supplies Vivergo	Job Number: J4253	Rev Date: 04/09/2016
Document No: J4253-ECA-001	Created On: 19/07/2016	Rev No: B
Created By: D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-04-51/P2	Name:
Connected From: 9-EP-510300/6/L1,L2,L3	To: 9CP62-04-51/1 / ADDITIVE 1 SKID POWER SUPPL'
Load Type: Fixed equipment three phase	Design Current Ib (A): 6.0
Comments:	

Protective Device [a] = Auto, [f] = Fixed, [m] = Max.	
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A

Conductors [a] = Auto, [f] = Fixed, [d] = Double	
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 4c Size (mm²): 2.5 [a]
	Length (m): 30
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib = 6.0		Voltage drop limit = 19.55 V (BS 7671:2008 (2015) App. 4)
Device Rating In = 6	Overload Setting Ir = N/A	[Ir ≥ Ib]
Min. Cable Capacity Iz = 8.0		[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It = 33.0		[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	6.0 / 0.95	6.0 / 0.95	6.0 / 0.95	N/A
3rd Harmonic Current (A)	0.0	0.0	0.0	N/A
Voltage Drop - This circuit (V/%)	1.42 / .62	1.42 / .62	1.42 / .62	-----
Voltage Drop - From Source (V/%)	10.96 / 4.76	10.96 / 4.76	10.96 / 4.76	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .33102 #	Z1 .27713	Z2 .27713	Zs .88336 Max. Zs 3.64168
Disconnection time (s)	From characteristic: .01 Maximum for circuit: 0.40			
Circuit Protective Conductor (mm ²)	Integral 2.5 [a]			Earth Fault Current (kA)
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5	Total = 2.5	Min. Section = .11	0.25

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault	
Phase Fault Current Max./Min. (kA)	Source End: 2.389 / 1.975 Load End: 0.756 / 0.596
Protective Device Breaking Capacity (kA)	Icu: 10 Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 794.82 Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

Project Reference: 415V Supplies Vivergo	Job Number: J4253	Rev Date : 04/09/2016
Document No: J4253-ECA-001	Created On : 19/07/2016	Rev No: B
Created By : D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-04-51/P3	Name:
Connected From: 9-EP-510300/1/L1,L2,L3	To: 9CP62-04-51/2 / ADDITIVE 2 SKID POWER SUPPL'
Load Type: Fixed equipment three phase	Design Current Ib (A): 6.0
Comments:	

Protective Device [a] = Auto, [f] = Fixed, [m] = Max.	
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A

Conductors [a] = Auto, [f] = Fixed, [d] = Double	
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 4c Size (mm²): 2.5 [a]
	Length (m): 30
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)	Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib = 6.0		Voltage drop limit = 19.55 V (BS 7671:2008 (2015) App. 4)
Device Rating In = 6	Overload Setting Ir = N/A	[Ir ≥ Ib]
Min. Cable Capacity Iz = 8.0		[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It = 33.0		[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	6.0 / 0.95	6.0 / 0.95	6.0 / 0.95	N/A
3rd Harmonic Current (A)	0.0	0.0	0.0	N/A
Voltage Drop - This circuit (V/%)	1.42 / .62	1.42 / .62	1.42 / .62	-----
Voltage Drop - From Source (V/%)	10.96 / 4.76	10.96 / 4.76	10.96 / 4.76	-----

Earth Fault					Circuit Protective Conductor (mm ²)	Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .33102 #	Z1 .27713	Z2 .27713	Zs .88336	Max. Zs 3.64168	Earth Fault Current (kA)	
Disconnection time (s)	From characteristic: .01						Maximum for circuit: 0.40
Circuit Protective Conductor (mm ²)						Integral 2.5 [a]	0.25
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5					Total = 2.5	

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 2.389 / 1.975	Load End: 0.756 / 0.596
Protective Device Breaking Capacity (kA)	Icu: 10	Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 794.82	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

Project Reference: 415V Supplies Vivergo	Job Number: J4253	Rev Date : 04/09/2016
Document No: J4253-ECA-001	Created On : 19/07/2016	Rev No: B
Created By : D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-04-51/P4	Name:
Connected From: 9-EP-510300/2/L1,L2,L3	To: 9CP62-04-51/3 / ADDITIVE 3 SKID POWER SUPPL
Load Type: Fixed equipment three phase	Design Current Ib (A): 6.0
Comments:	

Protective Device [a] = Auto, [f] = Fixed, [m] = Max.	
Overcurrent protection:	Schneider Multi9 MCB C60H Type C BS EN60898
Rating In (A): 6 [f]	Overload Setting Ir (A): N/A

Conductors [a] = Auto, [f] = Fixed, [d] = Double	
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 4c Size (mm²): 2.5 [a]
	Length (m): 30
31 - On horizontal/vertical perforated tray	Arrangement: Horizontal Touching

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)		Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib	= 6.0		Voltage drop limit = 19.55 V (BS 7671:2008 (2015) App. 4)
Device Rating In	= 6	Overload Setting Ir = N/A	[Ir ≥ Ib]
Min. Cable Capacity Iz	= 8.0		[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It	= 33.0		[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	6.0 / 0.95	6.0 / 0.95	6.0 / 0.95	N/A
3rd Harmonic Current (A)	0.0	0.0	0.0	N/A
Voltage Drop - This circuit (V/%)	1.42 / .62	1.42 / .62	1.42 / .62	-----
Voltage Drop - From Source (V/%)	10.96 / 4.76	10.96 / 4.76	10.96 / 4.76	-----

Earth Fault		Circuit Protective Conductor (mm ²)				Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .33102 #	Z1 .27713	Z2 .27713	Zs .88336	Max. Zs 3.64168	Earth Fault Current (kA)	
Disconnection time (s)	From characteristic: .01				Maximum for circuit: 0.40		
Circuit Protective Conductor (mm ²)					Integral 2.5 [a]	0.25	
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5				Total = 2.5 Min. Section = .11		

Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 2.389 / 1.975	Load End: 0.756 / 0.596
Protective Device Breaking Capacity (kA)	Icu: 10	Ics: 10
Adiabatic Check:	CPD Energy Let-through (A ² s): 794.82	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

Cable Calculation Report

Project Reference: 415V Supplies Vivergo	Job Number: J4253	Rev Date : 04/09/2016
Document No: J4253-ECA-001	Created On : 19/07/2016	Rev No: B
Created By : D Gibbs	Modified By: D Gibbs	

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-04-51/P5 Connected From: 9-EP-510300/3/L1,L2,L3 Load Type: Fixed equipment three phase	Name: To: 9CP62-04-51/4 / ADDITIVE 4 SKID POWER SUPPL' Design Current Ib (A): 6.0
Comments:	

Protective Device [a] = Auto, [f] = Fixed, [m] = Max.	
Overcurrent protection: Schneider Multi9 MCB C60H Type C BS EN60898 Rating In (A): 6 [f]	Overload Setting Ir (A): N/A

Conductors [a] = Auto, [f] = Fixed, [d] = Double	
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 4c Size (mm²): 2.5 [a] Length (m): 30
31 - On horizontal/vertical perforated tray Arrangement: Horizontal Touching	

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)		Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib	= 6.0	Voltage drop limit = 19.55 V (BS 7671:2008 (2015) App. 4)	
Device Rating In	= 6	Overload Setting Ir = N/A	[Ir ≥ Ib]
Min. Cable Capacity Iz	= 8.0		[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It	= 33.0		[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	6.0 / 0.95	6.0 / 0.95	6.0 / 0.95	N/A
3rd Harmonic Current (A)	0.0	0.0	0.0	N/A
Voltage Drop - This circuit (V/%)	1.42 / .62	1.42 / .62	1.42 / .62	-----
Voltage Drop - From Source (V/%)	10.96 / 4.76	10.96 / 4.76	10.96 / 4.76	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .33102 #	Z1 .27713	Z2 .27713	Zs .88336 Max. Zs 3.64168
Disconnection time (s)	From characteristic: .01 Maximum for circuit: 0.40			
Circuit Protective Conductor (mm ²)				Integral 2.5 [a]
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5		Total = 2.5	Min. Section = .11
Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board				

Phase Fault			
Phase Fault Current Max./Min. (kA)	Source End: 2.389 / 1.975	Load End: 0.756 / 0.596	
Protective Device Breaking Capacity (kA)	Icu: 10 Ics: 10		
Adiabatic Check:	CPD Energy Let-through (A ² s): 794.82	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³	

Cable Calculation Report

Project Reference: 415V Supplies Vivergo	Job Number: J4253	Created On: 19/07/2016	Rev Date: 04/09/2016
Document No: J4253-ECA-001	Modified By: D Gibbs	Rev No: B	

Calculated in accordance with BS 7671

Active Source: Source

Circuit	
Id No.: 9-SWB-62-04-51/P6 Connected From: 9-EP-510300/4/L1,L2,L3 Load Type: Fixed equipment three phase	Name: To: 9CP62-04-51/5 / ADDITIVE 5 SKID POWER SUPPL' Design Current Ib (A): 6.0
Comments:	

Protective Device [a] = Auto, [f] = Fixed, [m] = Max.	
Overcurrent protection: Schneider Multi9 MCB C60H Type C BS EN60898 Rating In (A): 6 [f]	Overload Setting Ir (A): N/A

Conductors [a] = Auto, [f] = Fixed, [d] = Double	
Multicore, 90°C thermosetting insulated, armoured Cu Table 4E4	1 x 1 x 4c Size (mm²): 2.5 [a] Length (m): 30
31 - On horizontal/vertical perforated tray Arrangement: Horizontal Touching	

Rating Factors			
Air Temperature (°C)	= 30.0	Ca = 1.00	[BS 7671, Table 4B1]
Circuits In Group	= 5	Cg = .75	[BS 7671, Table 4C4] Not Subject to Simultaneous Overload
No. of trays = 1	No. of circuits per tray = 5		
3rd Harmonics (%)	= .00	Ch = 1.00	

Cable sizing (A)		Sized For: Phase Current Carrying Capacity	Auto-sized for current-carrying capacity and voltage drop limits.
Design Current Ib	= 6.0	Overload Setting Ir = N/A	Voltage drop limit = 19.55 V (BS 7671:2008 (2015) App. 4)
Device Rating In	= 6		[Ir ≥ Ib]
Min. Cable Capacity Iz	= 8.0		[BS 7671, Appendix 4.5, Formula (3/4)]
Actual Cable Rating It	= 33.0		[It ≥ Iz]

Load Current and Voltage Drop	L1	L2	L3	Neutral
Design Current Ib (A/PF)	6.0 / 0.95	6.0 / 0.95	6.0 / 0.95	N/A
3rd Harmonic Current (A)	0.0	0.0	0.0	N/A
Voltage Drop - This circuit (V/%)	1.42 / .62	1.42 / .62	1.42 / .62	-----
Voltage Drop - From Source (V/%)	10.96 / 4.76	10.96 / 4.76	10.96 / 4.76	-----

Earth Fault		Circuit Protective Conductor (mm ²)	Integral 2.5 [a]	[a] = Auto, [f] = Fixed
Earth Fault Loop Impedance (Ω)	Ze .33102 #	Z1 .27713	Z2 .27713	Zs .88336 Max. Zs 3.64168
Disconnection time (s)	From characteristic: .01 Maximum for circuit: 0.40			
Circuit Protective Conductor (mm ²)	Integral 2.5 [a]			
CPC Adiabatic check (mm ²)	CPC Section = Integral 2.5		Total = 2.5	Min. Section = .11
Note: Earth Fault Current and Max Zs have been factored by Cmin # Local Earthing at Board				Earth Fault Current (kA) 0.25

Phase Fault		
Phase Fault Current Max./Min. (kA)	Source End: 2.389 / 1.975	Load End: 0.756 / 0.596
Protective Device Breaking Capacity (kA)	Icu: 10 Ics: 10	
Adiabatic Check:	CPD Energy Let-through (A ² s): 794.82	Adiabatic Limit k ² S ² (A ² s): 127.81 x 10 ³

CLIENT:
Vivergo Fuels

REV DATE BY CHKD APPD
A 08.04.16 AMS MM PJP

CLIENT REF.
Ethanol Additive
P & I REF.
VI095001_SPC
SHT 1 OF 6

ITEM: Electrical Component

GENERAL Tag Number See Sheet 3
Service Loading Bay Additive Junction Box
Area Classification Zone 1 IIB T4

UNIT Type Stainless Steel Enclosure
Dimensions 300mm x 300mm x 200mm
Supply 24VDC
Case Stainless Steel
Connections See OPTIONS
Mounting Surface
Enclosure Class IP66
Electrical Classification ATEX II 2G EExe
Certification Reference Baseefa06ATEX0011X

OPTIONS Enclosure to be fitted with the following:-

- 1 x Vertical row of 16 off WDU 2.5 EEx'e' and 1 x Vertical row of 31-off WDU 2.5 EEx'e'
- Blocks to be marked see sheet 2
- The terminals to be identified with dekafix markers.
- See sheet 2 for marking & linking details.

Enclosure to be drilled for the following entries:-

- 12 x 20mm glands. (12 bottom) 1 Plugged
 - 1 x 25mm glands Bottom
- NOTE : CLEARANCE HOLES ONLY

Labels:-

- Ident Label will be manufactured from 3 Ply Traffolyte with Tag Number and Service Details – See Sheet 3.
- ATEX Certification Label.

MANUFACTURERS DATA Supplier TBA
Model Number KTB MH 11

DOCUMENTATION See attached Documentation Specification

REVISION HISTORY	
Rev	Description
A	Issued for Procurement

ZZ#-ECA1.SPC

P & I Design Ltd.

Instrument Specification

CLIENT:
Vivergo Fuels

REV DATE BY CHKD APPD
A 08.04.16 AMS MM PJP

CLIENT REF.
Ethanol Additive
P & I REF.
VI095001_SPC
SHT 2 OF 6

DC	
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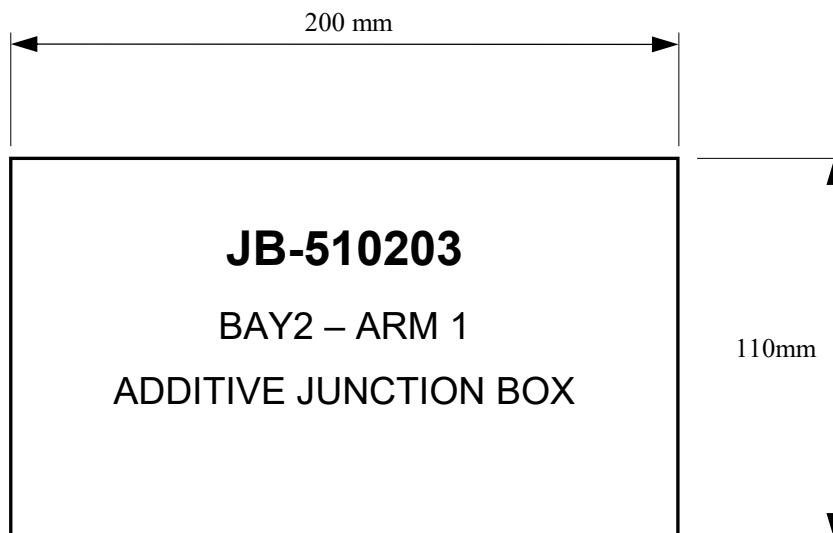
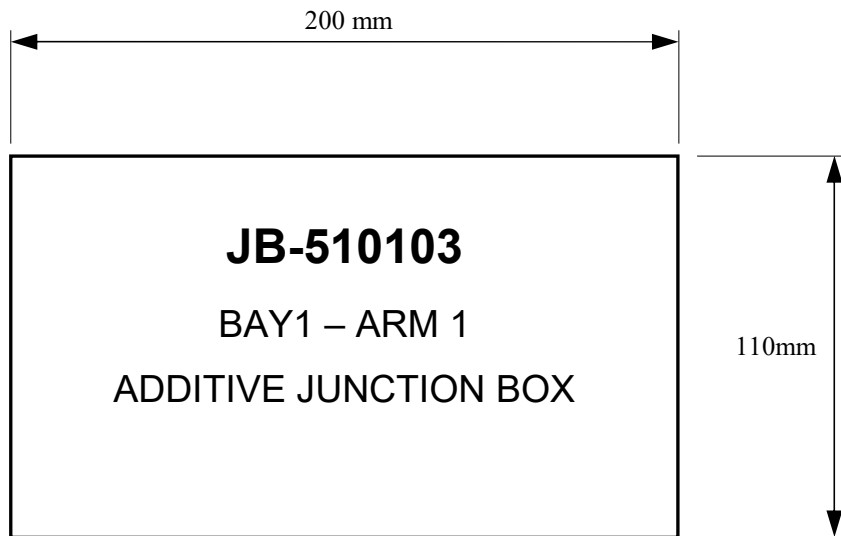
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CLIENT:
Vivergo Fuels

REV	DATE	BY	CHKD	APPD
A	08.04.16	AMS	MM	PJP

CLIENT REF.
Ethanol Additive
P & I REF.
VI095001_SPC
SHT 3 OF 6

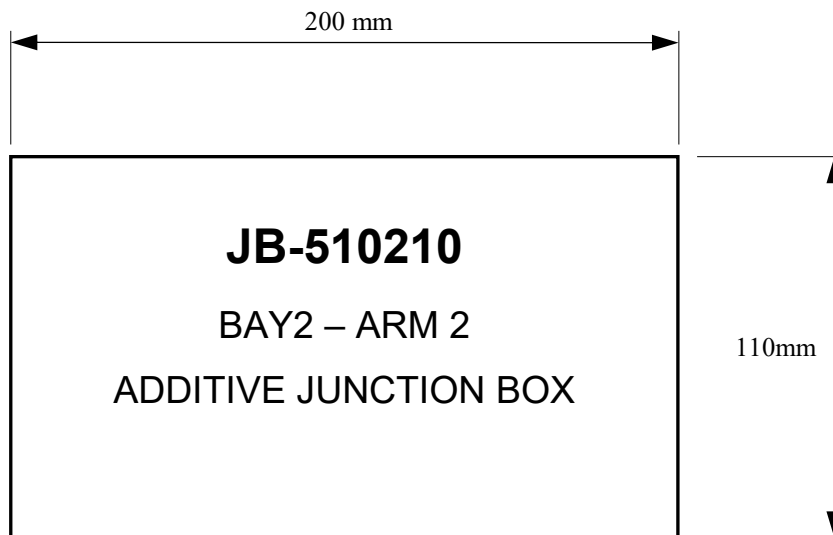
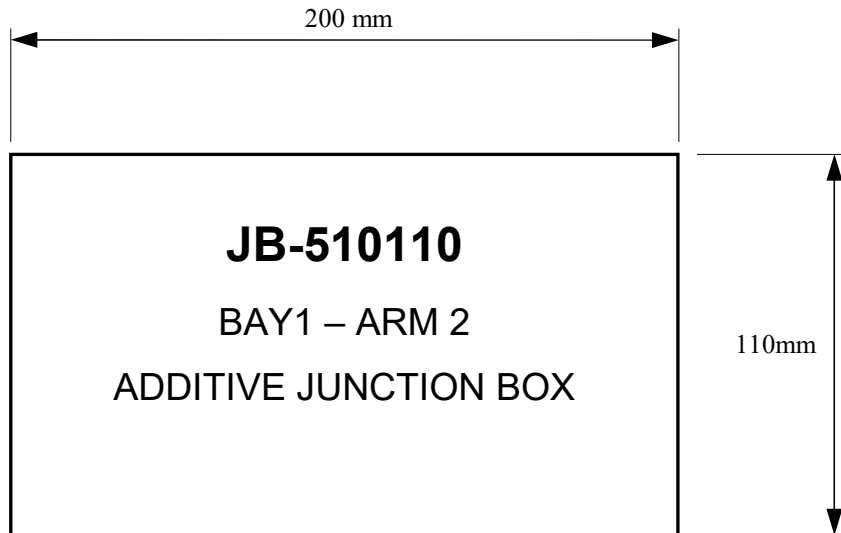
- 1) Labels to be manufactured from BlackWhite/Black traffolyte.
- 2) Engraved text to be best fit.
- 3) Text to be centered.



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REV	DATE	BY	CHKD	APPD
A	08.04.16	AMS	MM	PJP

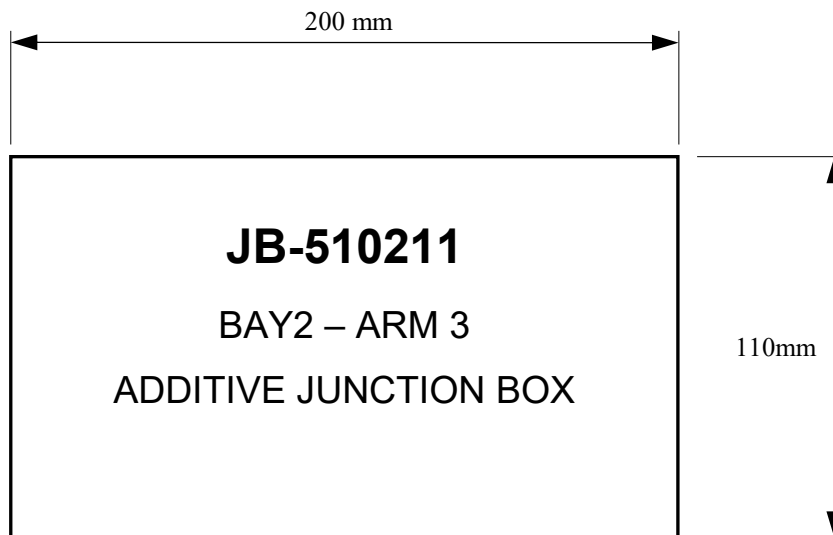
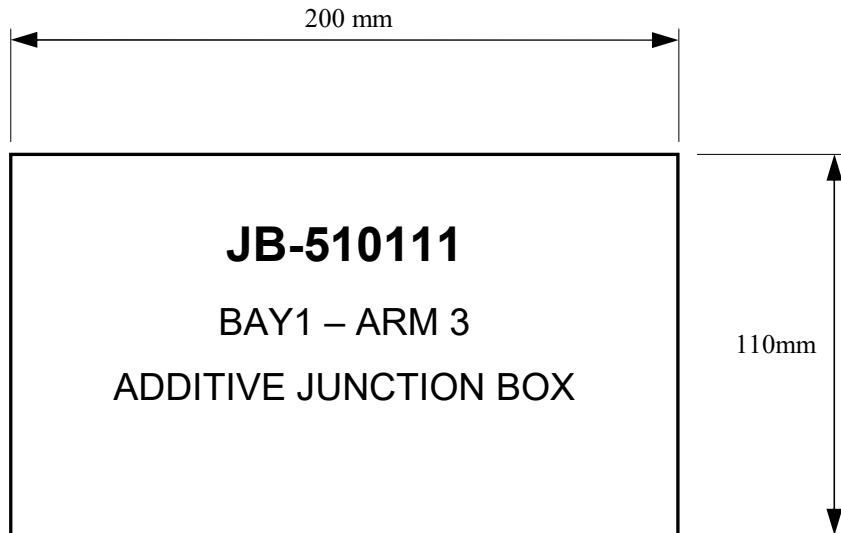
CLIENT REF.
Ethanol Additive
P & I REF.
VI095001_SPC
SHT 4 OF 6



CLIENT:
Vivergo Fuels

REV	DATE	BY	CHKD	APPD
A	08.04.16	AMS	MM	PJP

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A 08.04.16 AMS MM PJP

CLIENT REF.
Ethanol Additive
P & I REF.
VI095001_SPC
SHT 6 OF 6

Documentation Requirement

Item	Quantity	Description
1.	n/a	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	n/a	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	n/a n/a	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	n/a	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	n/a n/a	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	n/a n/a	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	n/a n/a	SOFTWARE a. Programming manual. b. Operating manual.
8.	n/a	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.	n/a 1 1	ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
10.	n/a n/a n/a	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	n/a	SPECIAL REQUIREMENTS

IMPORTANT NOTICE:

Vendors acceptance of this order is conditional on the provision of the Documentation.
Should the vendor not wish to supply the whole or part of the details herein requested, he shall state in writing any exceptions with the quotation or order acceptance.
P & I Design reserve the right to cancel any order where the documentation does not comply with P & I requirements. No item will be paid in full until documentation specified has been received.

###-FMB6.SPC

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD	CLIENT REF.
A	14.01.16	AMS	PJP	PJP	Denaturant Project
B	05.09.16	DRP	MM	MM	P & I REF. VI095002_SPC SHT 1 OF 3

ITEM: Batch
Controller
(Electronic)

GENERAL Tag Number 9-FQ-510201
Service Gantry 1 Loading Arm 1
Area Classification Zone 1 IIB T4

CONTROLLER Type Accuload III
INPUTS
Pulse / Frequency: Type Standard Programmable
6 off Pulse / Frequency Inputs:-

Analogue: Type 1 off RTD

Digital : Type 5 off ac Inputs (90 – 280Vac)
6 off dc Inputs (11 – 28Vdc):-

OUTPUTS
Pulse No. None Used
Type Passive

Analogue: Type None

Digital : Type Standard Programmable
3 off ac outputs (90 – 280Vac):-
11 off dc outputs (30Vdc max, 150mA max):-

FUNCTIONS
Communications Ethernet
Power Supply 240Vac
Case Cast Enclosure
Enclosure Class IP 65 (Nema 4x)
Connections Terminals
Mounting Base or Rear
Electrical Class ATEX II 2G Exd IIB T6
Certificate Reference DEMKO 11 ATEX 1103869X

Continued on Sheet 2

REVISION HISTORY	
Rev	Description
A	For Procurement
B	Specification number re-assigned

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	14.01.16	AMS	PJP	PJP
B	05.09.16	DRP	MM	MM

CLIENT REF.
Denaturant Project
P & I REF.
VI095002_SPC
SHT 2 OF 3

Continued from sheet 1

ITEM:	Batch Controller (Electronic)	
CONFIGURATION	Front Panel Remote Programmer PC software	Keypad No Yes –
DISPLAY	Type	Liquid Crystal Display 240 by 64 pixel graphic display with LED backlighting
OPTIONS		PC Programming Software

Engineering Notes

Operational requirements to be clarified

**MANUFACTURERS
DATA**

Supplier
Model Number

Artisan Measurement (FMC Technologies)
ALIII-S-XP-ALX1-A10000-0

DOCUMENTATION

See Attached Documentation Specification

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	14.01.16	AMS	PJP	PJP
B	05.09.16	DRP	MM	MM

CLIENT REF.
Denaturant Project
P & I REF.
VI095002_SPC
SHT 3 OF 3

Documentation Requirement

Item	Quantity	Description
1.		APPROVAL DOCUMENTATION
	n/a	To be supplied before manufacture commences
2.		GENERAL ARRANGEMENT DRAWING
	n/a	Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.		MATERIALS TEST CERTIFICATES
	n/a	a. Mechanical.
	n/a	b. Chemical analysis.
4.		ITEMISED PARTS LIST
	n/a	Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.		RECOMMEND SPARES QUOTATION
	n/a	a. Two years service.
	n/a	b. Commissioning only.
6.		INSTALLATION, OPERATING AND MAINTENANCE MANUALS
		To include calibration instructions where applicable.
	1	a. Paper Copy
	1	b. Electronic copy (Preferably Adobe Acrobat)
7.		SOFTWARE
	1	a. Programming manual.
	1	b. Operating manual.
8.		PRESSURE VESSELS
	n/a	Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.		ELECTRICAL
	n/a	a. Schematic and circuit diagrams.
	n/a	b. Certificates of conformity (to include EMC Directive 89/336/EEC).
	n/a	c. Hazardous area certification.
10.		INSTRUMENTATION
	1	a. Certificates of conformity (to include EMC Directive 89/336/EEC).
	n/a	b. Calibration certificates.
	1	c. Hazardous area certification.
11.		SPECIAL REQUIREMENTS

IMPORTANT NOTICE:

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CLIENT: Vivergo Fuels Ltd	REV	DATE	BY	CHKD	APPD	CLIENT REF. Ethanol Blending P & I REF. VI095003_SPC Page 1 of 3
	A	28/06/16	PP	MM	PJP	
	B	18/08/16	PP	MM	PJP	

ITEM:	Flowmeter Positive Displacement	
GENERAL	Tag Number	See Sheet 2
	Service	See Sheet 2
	Line Size/ Rating / Material	4"/ANSI 150/Carbon Steel
	Area Classification	Zone 1 IIB T4
BODY	Type	Bi Rotor Plus
	Size	4"
	Connections:	
	Size /Type/Rating	4"/ANSI 150/Carbon Steel
	Materials:	
	Body	Carbon Steel
	Rotating Element	ALCO 319 Cast Aluminium Hard Coat Anodized
	Shaft	17-4 Ph Stainless Steel
	Internal Strainer	None
	Bearings Type / Material	Ball / Ceramic
	Flow Rate Range	19 to 159 M ³ / Hr
INDICATION	Type	None
	Scale	
TRANSMISSION	Type	ATEX 7671 Pulse Transmitter
	Supply	9 to 28 VDC
	Output:	
	Pulse Type / Scaling	2 Pickoffs Dual Phase Shifted open Collector Passive
	Analogue	-
HOUSING	Material	A356 T6 Cast Aluminium
	Enclosure Class	IP67 / NEMA 4X
	Certificate Reference	ITS08ATEX15842X
	Electrical Classification	ATEX II 2G Exd IIB T6..T4
	Electrical Connection	2 off M20 x 1.5
OPTIONS		
PROCESS DATA	Fluid	Bio- Ethanol
	Flowrate Max./Min.	159 / 19 M ³ /Hr
	Temperature Max./Min.	40 / 10°C
	Temperature Operating	25°C
	Pressure Max./Min.	8 Barg/ 3Barg
	Pressure Operating	7 Barg
	S.G. Operating	789 / 792 kg / m ³ @ 20°C
	Viscosity Operating	1.1 cps at 20°C
MANUFACTURERS DATA	Supplier	Flotec Solutions
	Model Number	Brodie: B281CBDAACAGC1B
DOCUMENTATION	See Attached Documentation Specification	

P & I Design Ltd.

Instrument Specification

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	28/06/16	PP	MM	PJP
B	18/08/16	PP	MM	PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095003_SPC
Page 2 of 3

TAG No.	SERVICE
FT510201A	Gantry A Flowmeter Arm 1
FT510225A	Gantry B Flowmeter Arm 1

REVISION HISTORY	
Rev	Description
A	For Tender
B	Certificate Ref Added and Documentation Requirements updated.

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	28/06/16	PP	MM	PJP
B	18/08/16	PP	MM	PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095003_SPC
Page 3 of 3

Documentation Requirement

Item	Quantity	Description
1.	n/a	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	n/a	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	n/a	MATERIALS TEST CERTIFICATES a. Mechanical. n/a b. Chemical analysis.
4.	n/a	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	n/a	RECOMMEND SPARES QUOTATION n/a a. Two years service. n/a b. Commissioning only.
6.	1	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. 1 a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	n/a	SOFTWARE n/a a. Programming manual. n/a b. Operating manual.
8.	n/a	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.	1	ELECTRICAL n/a a. Schematic and circuit diagrams. n/a b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
10.	1	INSTRUMENTATION 1 a. Certificates of conformity (to include EMC Directive 89/336/EEC). 1 b. Calibration certificates. 1 c. Hazardous area certification.
11.	n/a	SPECIAL REQUIREMENTS

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CLIENT:
Vivergo Fuels Ltd

REV **DATE** **BY** **CHKD** **APPD**
A 28/06/16 PP MM PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095004_SPC
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ITEM:	Flowmeter Positive Displacement (Additive Unit)	
GENERAL	Tag Number Service Line Size/ Rating / Material Area Classification	See Sheet 2 See Sheet 2 Zone 1 IIB T4
BODY	Type Size Connections: Size /Type/Rating Materials: Body Rotating Element Shaft Internal Strainer Bearings Type / Material Flow Rate Range	Combined Solenoid , Meter & Pickup Sensor ½” ½” /Screwed/ 16 Barg 303 Stainless steel Ryton Gear Stainless steel Manufacturers standard Manufacturers standard 0 – 12 litres / Min
CONTROL	Type Supply	Solenoid 110 Vac
TRANSMISSION	Type Supply Output: Pulse Type / Scaling Analogue	Solid State, bi polar magnetic gated Open collector 5 -25 Vdc Open collector N/A
HOUSING	Material Enclosure Class Electrical Classification Electrical Connection	303 Stainless steel Manufacturers standard ATEX II 2G EExd IIB T6 Flying Leads
OPTIONS		
PROCESS DATA	Fluid Flowrate Max./Min. Temperature Max./Min. Temperature Operating Pressure Operating S.G. Operating Viscosity Operating Coefficient of Expansion	Additive TBA 30 Deg C to 5 Deg C Ambient 10 Barg TBA TBA TBA
MANUFACTURERS DATA	Supplier Model Number	Flotec Solutions Honeywell MonoBlock III
DOCUMENTATION	See Attached Documentation Specification	

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	28/06/16	PP	MM	PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095004_SPC
Page 2 of 3

TAG No.	SERVICE
FT511101	Gantry A Additive Stream 1
FT511102	Gantry A Additive Stream 2
FT512101	Gantry B Additive Stream 1
FT512102	Gantry B Additive Stream 2

REVISION HISTORY	
Rev	Description
A	For Tender

CLIENT:
Vivergo Fuels Ltd

REV **DATE** **BY** **CHKD** **APPD**
A 28/06/16 PP MM PJP

CLIENT REF.
Ethanol Blending
P & I REF.
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Page 3 of 3

Documentation Requirement

Item	Quantity	Description
1.	n/a	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	n/a	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	n/a n/a	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	n/a	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	n/a n/a	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	1 1	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	n/a n/a	SOFTWARE a. Programming manual. b. Operating manual.
8.	n/a	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.	n/a n/a n/a	ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
10.	1 n/a 1	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	n/a	SPECIAL REQUIREMENTS

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CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	28/06/16	PP	MM	PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095005_SPC
Page 1 of 3

ITEM: Control Valve
(Liquid)

GENERAL	Tag Number	See Sheet 2
	Service	See Sheet 2
	Line Size/Rating/Material	4"/ANSI 150/Carbon Steel
	Area Classification	Zone 1 IIB T4

BODY	Type	
	Size:	Body/Trim 4"
	Material:	Body Cast Steel
		Piston Stainless Steel
		Seals Buna Low Swell
	Connections:	Size/Type 4"
		Rating ANSI 150
		Type RF Flange
	Trim:	Form Mfr's std

ACTUATOR	Model & Size	Digital Control Valve
	Type	Hydraulically operated utilising flowing stream
	Action :	Open / Close
	Fail Position	Closed

SOLENOID VALVE	Model & Size	TBA by Mfr.
	Type	Direct Acting – 2 way
	Supply	110V ac
	Body/Trim Material	Stainless Steel
	Seals	Viton-F
	Electrical Classification	Exd to suit Zone (Full coding TBA by Mfr.)
	Certificate Reference	TBA by Mfr

OPTIONS

PROCESS DATA	Fluid	Bio - Ethanol
	Type	Liquid
	Flowrate Max.	159 M ³ /Hr
	Valve Pressure Drop	Manufacturer to advise
	Operating Pressure:	7 Barg
	Max. Shut Off Diff. Press.	8 Barg
	Temperature Max.	40°C
	Temperature Oper.	25°C
	S.G. Operating	789 / 792 kg / m ³ @ 20°C
	Viscosity Operating	1.1 cps at 20°C
	Valve Calculated C _v Max.	Manufacturer to advise
	Valve Rated C _v	Manufacturer to advise

MANUFACTURERS DATA	Supplier	Flotec Solutions
	Model Number	Brodie: BV 88 DCV

DOCUMENTATION See attached Documentation Schedule

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	28/06/16	PP	MM	PJP

CLIENT REF.
Ethanol Blending
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VI095005_SPC
Page 2 of 3

TAG No.	SERVICE
FV510201A	Gantry A Flow Control Valve Arm 1
FV510225A	Gantry B Flow Control Valve Arm 1

REVISION HISTORY	
Rev	Description
A	For Tender

CLIENT:
Vivergo Fuels Ltd

REV **DATE** **BY** **CHKD** **APPD**
A 28/06/16 PP MM PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095005_SPC
Page 3 of 3

Documentation Requirement

Item	Quantity	Description
1.	n/a	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	n/a	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	n/a n/a	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	n/a	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	n/a n/a	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	1 1	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	n/a n/a	SOFTWARE a. Programming manual. b. Operating manual.
8.	n/a	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.	n/a n/a n/a	ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
10.	1 n/a 1	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	n/a	SPECIAL REQUIREMENTS

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CLIENT:
Vivergo Fuels Ltd

REV **DATE** **BY** **CHKD** **APPD**
A 28/06/16 PP MM PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095006_SPC
Page 1 of 3

ITEM:	Flowmeter Positive Displacement (Pipe Injector)	
GENERAL	Tag Number Service Line Size/ Rating / Material Area Classification	See Sheet 2 See Sheet 2 Zone 1 IIB T4
BODY	Type Size Connections: Size /Type/Rating Materials: Body Rotating Element Shaft Internal Strainer Bearings Type / Material Flow Rate Range	Meter & Pickup Sensor (Trimec) ½” ½” /Screwed/ 16 Barg 303 Stainless steel PEEK Gear Stainless steel N/A Manufacturers standard 0 – 50 litres / Min
CONTROL	Type Supply	Solenoid (Alcon) 110 Vac
TRANSMISSION	Type Supply Output: Pulse Type / Scaling Analogue	Solid State, bi polar magnetic gated Open collector 5 -25 Vdc Open collector N/A
HOUSING	Material Enclosure Class Electrical Classification Electrical Connection	303 Stainless steel Manufacturers standard ATEX II 2G EExd IIB T6 Fling Leads
OPTIONS		
PROCESS DATA	Fluid Flowrate Max./Min. Temperature Max./Min. Temperature Operating Pressure Operating S.G. Operating Viscosity Operating Coefficient of Expansion	Gasoline 5/22 Litres/Min 30 Deg C to 5 Deg C Ambient 10 Barg TBA TBA TBA
MANUFACTURERS DATA	Supplier Model Number	Flotec Solutions Combined Pipe injector Model Number TBA
DOCUMENTATION	See Attached Documentation Specification	

P & I Design Ltd.

Instrument Specification

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	28/06/16	PP	MM	PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095006_SPC
Page 2 of 3

TAG No.	SERVICE
FT510101	Gantry A Denaturant Stream
FT510201	Gantry B Denaturant Stream

REVISION HISTORY	
Rev	Description
A	For Tender

CLIENT:
Vivergo Fuels Ltd

REV **DATE** **BY** **CHKD** **APPD**
A 28/06/16 PP MM PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095006_SPC
Page 3 of 3

Documentation Requirement

Item	Quantity	Description
1.	n/a	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	n/a	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	n/a n/a	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	n/a	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	n/a n/a	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	1 1	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	n/a n/a	SOFTWARE a. Programming manual. b. Operating manual.
8.	n/a	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.	n/a n/a n/a	ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
10.	1 n/a 1	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	n/a	SPECIAL REQUIREMENTS

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CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	28/06/16	PP	MM	PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095007_SPC
Page 1 of 4

ITEM: Thermowell

GENERAL

Tag Number	See Sheet 3
Service	See Sheet 3

WELL CONSTRUCTION

Type	Solid Drilled
Process Conn.Size/Type	2" / ANSI 150
Internal Conn.Size/Type	To suit thermocouple and head
Material	316L Stainless Steel
Insertion Length - U	185 mm
Extension Length - N	80 mm
Stem Diameter	12.7 mm
Tip Diameter	12.7 mm
Tip Length	N/A
Internal Bore	To suit thermocouple element
Element	See Sheet 2
Test Pressure	50 barg

OPTIONS

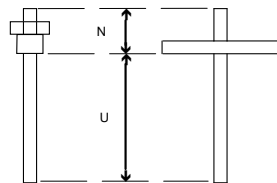
PROCESS DATA

Fluid	See Sheet 3
Max. Temperature	40°C
Max Pressure	14.5 barg

MANUFACTURERS DATA

Supplier	TBA
Model Number	TBA

DOCUMENTATION See attached Documentation Specification



REVISION HISTORY	
Rev	Description
A	For Tender

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	28/06/16	PP	MM	PJP

CLIENT REF.
Ethanol Blending
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VI095007_SPC
Page 2 of 4

ITEM:	Temperature Transmitter (RTD)	
GENERAL	Tag Number Service Area Classification	See Sheet 3 See Sheet 3 Zone 1 IIB T4
MEASURING ELEMENT	Type Standard Wiring Configuration Material Element Sheath Diameter Length Connections Process	Simplex RTD 4 Wire PT100 Stainless Steel Stainless Steel 6 mm To suit Thermowell and head see sheet 1 ¼" BSPT
TRANSMISSION	Type Supply Output Location Calibrated Range Electrical Classification Electrical Connection	None required None (see head) Terminals
HEAD	Material Enclosure Class Electrical Classification Electrical Connection	Die Cast alloy IP67 ATEX II 2G EExd IIC T6 20mm ET
OPTIONS	Well	See Sheet 1
PROCESS DATA	Fluid Temperature Max./Min	Bio-Ethanol 40°C / 5°C
MANUFACTURERS DATA	Supplier Model Number	TBA TBA
DOCUMENTATION	See Attached Document Specification	

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	28/06/16	PP	MM	PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095007_SPC
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TAG No.	SERVICE	PROBE LENGTH	CONNECTION	FLUID
9-TS-510214-G1-A1	Gantry 1 Arm 1 Temperature Probe	185 mm	2" ASA150	Bio-Ethanol
9-TS-510238-G2-A1	Gantry 2 Arm 1 Temperature Probe	185 mm	2" ASA150	Bio-Ethanol

TT#-RTA2.SPC

CLIENT:
Vivergo Fuels Ltd

REV **DATE** **BY** **CHKD** **APPD**
A 28/06/16 PP MM PJP

CLIENT REF.
Ethanol Blending
P & I REF.
VI095007_SPC
Page 4 of 4

Documentation Requirement

Item	Quantity	Description
1.	n/a	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	n/a	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	n/a n/a	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	n/a	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	n/a n/a	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	1 1	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	n/a n/a	SOFTWARE a. Programming manual. b. Operating manual.
8.	n/a	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.	n/a n/a n/a	ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
10.	1 n/a 1	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	n/a	SPECIAL REQUIREMENTS

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###-FMB6.SPC

CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 05.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095008_SPC
SHT 1 OF 3

ITEM: Electrical Component

GENERAL Tag Number See sheet 2
Service Additive Pump Request Control Station
Area Classification Zone 1 IIB T4

UNIT Type Cast Enclosure
Supply 110Vac
Case Aluminium
Connections 1 off gland Area
Mounting Surface
Enclosure Class IP66
Electrical Classification ATEX II 2 G EExd IIB

ADDITIONAL DETAILS

Enclosure to be supplied with:-
54 off SAKR 2.5 terminals.
30 off Omron relay MKS2PI AC110
30 off Omron relay base PF083A-E
Terminals to be identified with dekafix markers as per drawing.
Enclosure to be drilled for the following gland entries.
12 x 20mm (Bottom)

Internal wiring refer to Drawing VI095031_DWG

Labels:

1. Ident Label will be manufactured from 3 Ply Traffolyte with Tag Number and Service Details – See Sheet 2.
2. ATEX Certification Label.

MANUFACTURERS DATA Supplier TBA
Model Number TBA

DOCUMENTATION See attached Documentation Specification

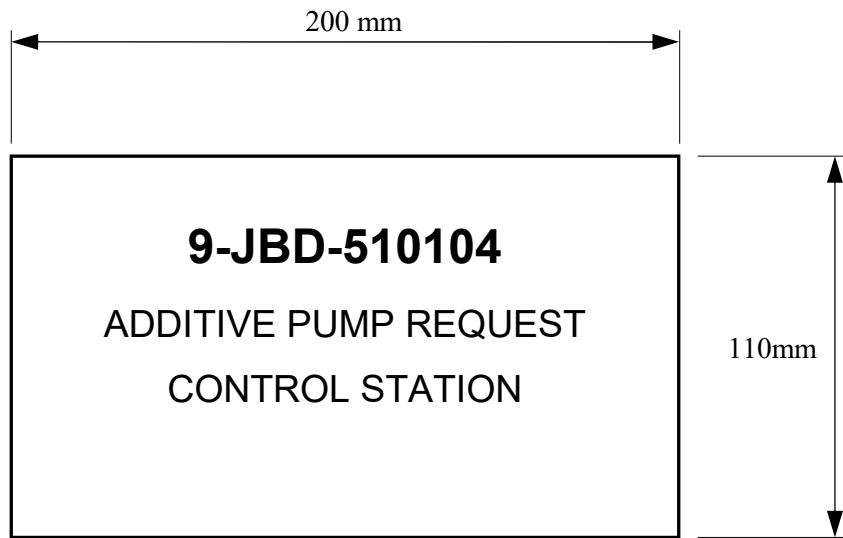
REVISION HISTORY	
Rev	Description
A	Issued for Procurement

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	05.09.16	DRP	MM	MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095008_SPC
SHT 2 OF 3

- 1) Labels to be manufactured from BlackWhite/Black traffolyte.
- 2) Engraved text to be best fit.
- 3) Text to be centered.



CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 05.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095008_SPC
SHT 3 OF 3

Documentation Requirement

Item	Quantity	Description
1.	-	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	-	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	-	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	-	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	-	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	-	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	-	SOFTWARE a. Programming manual. b. Operating manual.
8.	-	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.		ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
10.	1	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	-	SPECIAL REQUIREMENTS

IMPORTANT NOTICE:

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CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD	CLIENT REF.
A	05.09.16	DRP	MM	MM	Ethanol Road Loading
B	13.09.16	DRP	MM	MM	P & I REF. VI095009_SPC SHT 1 OF 3

ITEM: Electrical Component

GENERAL Tag Number See sheet 2
Service Scully Interface Control Station
Area Classification Zone 1 IIB T4

UNIT Type Cast Enclosure
Supply 110Vac
Case Aluminium
Connections 1 off gland Area
Mounting Surface
Enclosure Class IP66
Electrical Classification ATEX II 2 G EExd IIB

ADDITIONAL DETAILS

Enclosure to be supplied with:-
12 off SAKR 2.5 terminals.
2 off 2.5 Earth terminals.
1 off Omron relay MKS2PI AC110
1 off Omron relay base PF083A-E
Terminals to be identified with dekafix markers as per drawing.
Enclosure to be drilled for the following gland entries.
4 x 20mm (Bottom)

B Internal wiring refer to Drawing VI095032_DWG & VI095033_DWG

- Labels:
- Ident Label will be manufactured from 3 Ply Traffolyte with Tag Number and Service Details – See Sheet 2.
 - ATEX Certification Label.

MANUFACTURERS DATA B Supplier JCE
Model Number TBA

DOCUMENTATION See attached Documentation Specification

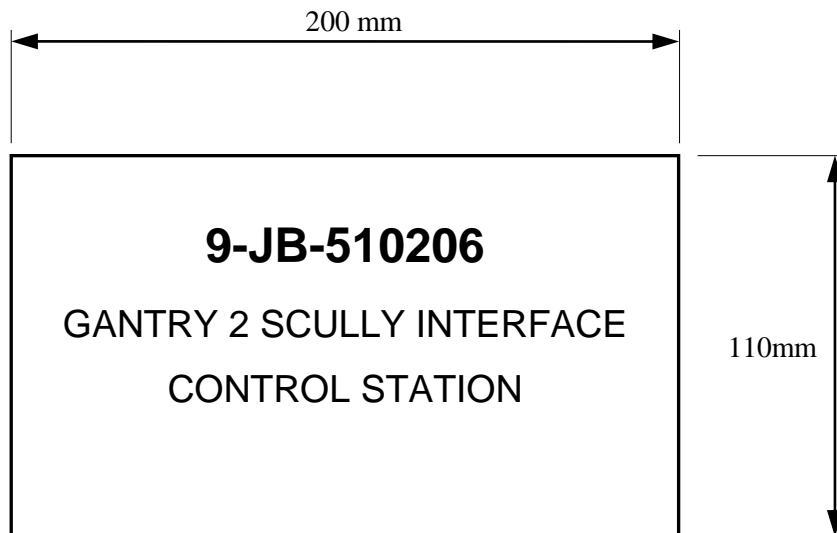
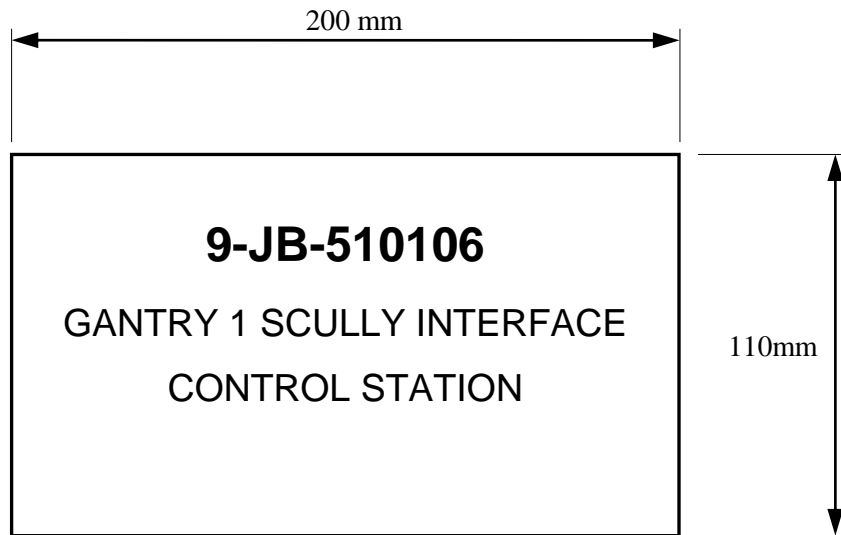
REVISION HISTORY	
Rev	Description
A	Issued for Procurement
B	Internal wiring referencing added

CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	05.09.16	DRP	MM	MM
B	13.09.16	DRP	MM	MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095009_SPC
SHT 2 OF 3

- 1) Labels to be manufactured from BlackWhite/Black traffolyte.
- 2) Engraved text to be best fit.
- 3) Text to be centered.



CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	05.09.16	DRP	MM	MM
B	13.09.16	DRP	MM	MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095009_SPC
SHT 3 OF 3

Documentation Requirement

<u>Item</u>	<u>Quantity</u>	<u>Description</u>
1.	-	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	-	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	-	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	-	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	-	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	-	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	-	SOFTWARE a. Programming manual. b. Operating manual.
8.	-	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.		ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
10.	1	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	-	SPECIAL REQUIREMENTS

IMPORTANT NOTICE:

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CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	05.09.16	DRP	MM	MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095010_SPC
SHT 1 OF 4

ITEM: Electrical Component

GENERAL Tag Number See sheet 3
Service Gantry AC Junction Box
Area Classification Zone 1 IIB T4

UNIT Type Stainless Steel Enclosure
Supply 110Vac
Case Stainless Steel
Connections 1 off gland Area
Mounting Surface
Enclosure Class IP66
Electrical Classification ATEX II 2 G EExe

ADDITIONAL DETAILS

Enclosure to be supplied with:- 102 off SAK 2.5 terminals.
12 off Earth Terminals
Terminals to be identified with dekafix markers as per drawing.
Enclosure to be drilled for the following gland entries.
20 x 20mm (Bottom) two blanked.
5 x 25mm (Bottom) two blanked.
Internal terminal layout refer to sheet 2.

- Labels:
- Ident Label will be manufactured from 3 Ply Traffolyte with Tag Number and Service Details – See Sheet 3.
 - ATEX Certification Label.

MANUFACTURERS DATA Supplier TBA
Model Number TBA

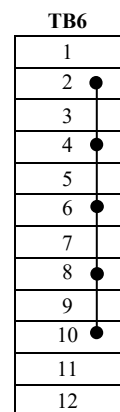
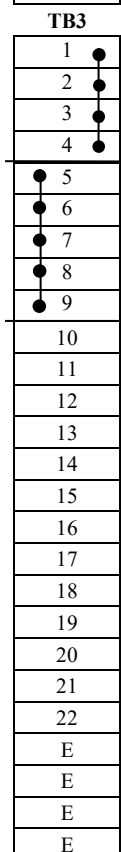
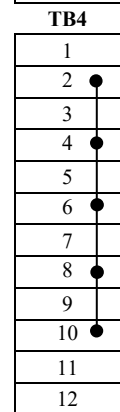
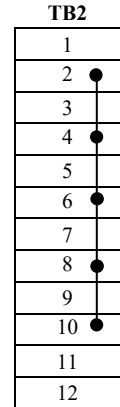
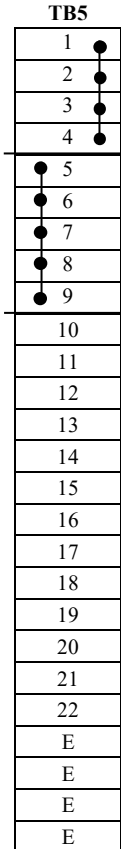
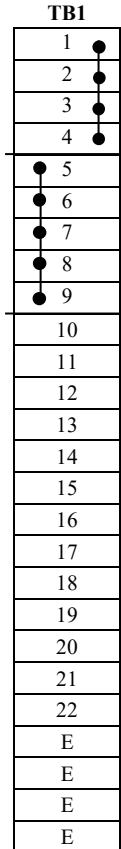
DOCUMENTATION See attached Documentation Specification

REVISION HISTORY	
Rev	Description
A	Issued for Procurement

CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 05.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095010_SPC
SHT 2 OF 4



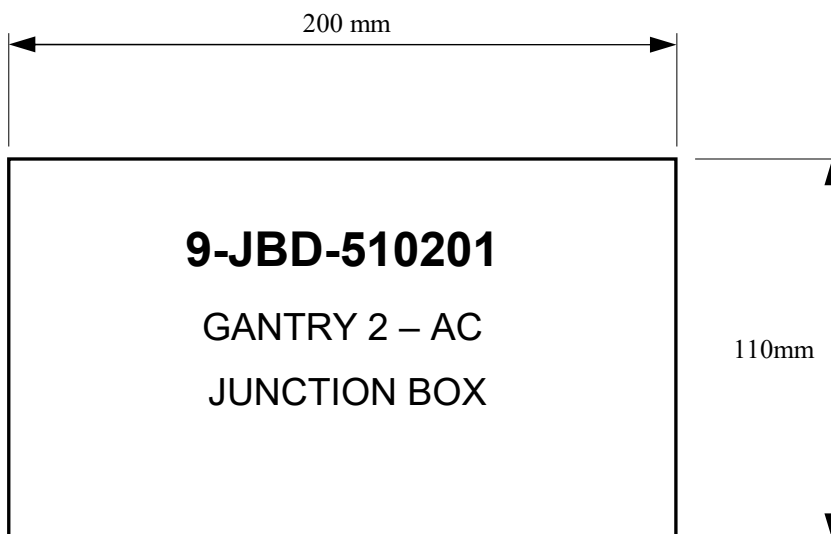
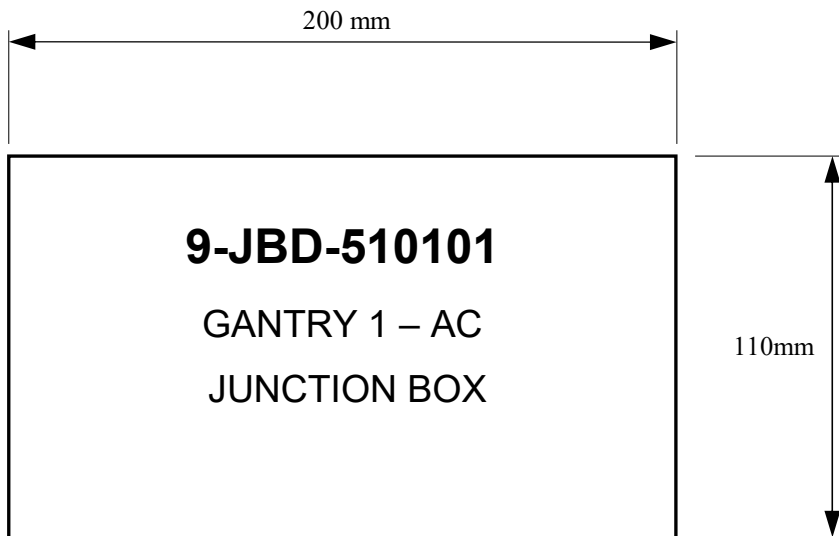
CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	05.09.16	DRP	MM	MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095010_SPC
SHT 3 OF 4

TAG No.	SERVICE
9-JBD-510101	Gantry 1 AC Junction Box
9-JBD-510201	Gantry 2 AC Junction Box

- 1) Labels to be manufactured from BlackWhite/Black traffolyte.
- 2) Engraved text to be best fit.
- 3) Text to be centered.



CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 05.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095010_SPC
SHT 4 OF 4

Documentation Requirement

Item	Quantity	Description
1.	-	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	-	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	-	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	-	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	-	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	-	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	-	SOFTWARE a. Programming manual. b. Operating manual.
8.	-	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.		ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
	1	
	1	
10.	1	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	-	SPECIAL REQUIREMENTS

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CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	06.09.16	DRP	MM	MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095011_SPC
SHT 1 OF 4

ITEM: Electrical Component

GENERAL Tag Number See sheet 3
Service Gantry DC Junction Box
Area Classification Zone 1 IIB T4

UNIT Type Stainless Steel Enclosure
Supply 110Vac
Case Stainless Steel
Connections 1 off gland Area
Mounting Surface
Enclosure Class IP66
Electrical Classification ATEX II 2 G EExe

ADDITIONAL DETAILS

Enclosure to be supplied with:- 112 off SAK 2.5 terminals.
12 off SAK 2.5 terminals linked for screens.
Terminals to be identified with dekafix markers as per sheet 2.
Enclosure to be drilled for the following gland entries.
5 x 32mm (Bottom) one blanked.
14 x 20mm (Bottom) three blanked.
Internal terminal layout refer to sheet 2.

- Labels:
- Ident Label will be manufactured from 3 Ply Traffolyte with Tag Number and Service Details – See Sheet 3.
 - ATEX Certification Label.

MANUFACTURERS DATA Supplier TBA
Model Number TBA

DOCUMENTATION See attached Documentation Specification

REVISION HISTORY	
Rev	Description
A	Issued for Procurement

CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 06.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095011_SPC
SHT 2 OF 4

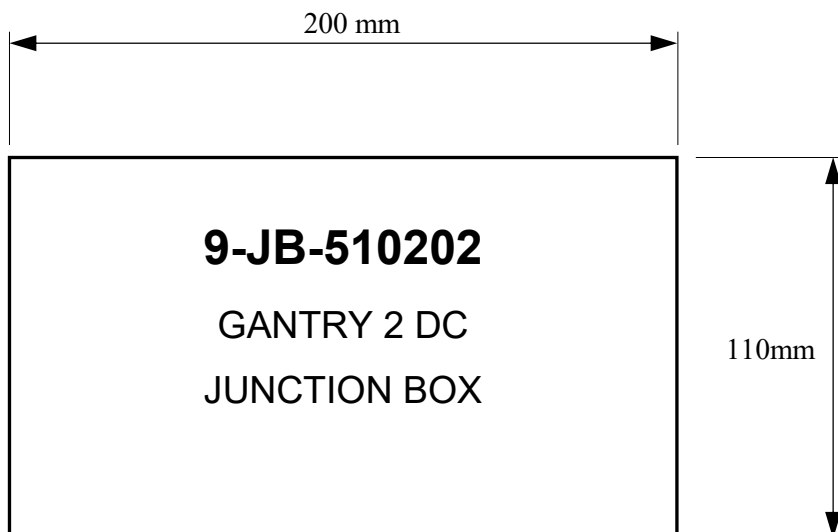
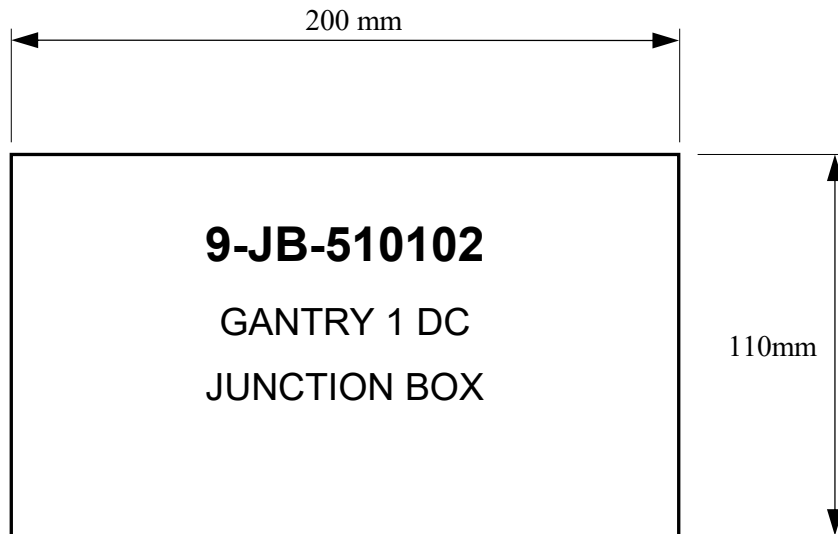
TB1	TB2	TB3	COMMS
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2	2	2	2 ●
3	3	3	3 ●
4	4	4	4 ●
5	5	5	5 ●
6	6	6	6 ●
7	7	7	7 ●
8	8	8	8 ●
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SCN ●	SCN ●	37	
SCN ●	SCN ●	38	
SCN ●	SCN ●	39	
SCN ●	SCN ●	40	
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CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	06.09.16	DRP	MM	MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095011_SPC
SHT 3 OF 4

- 1) Labels to be manufactured from BlackWhite/Black traffolyte.
- 2) Engraved text to be best fit.
- 3) Text to be centered.



CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 06.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095011_SPC
SHT 4 OF 4

Documentation Requirement

Item	Quantity	Description
1.	-	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	-	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	-	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	-	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	-	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	-	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	-	SOFTWARE a. Programming manual. b. Operating manual.
8.	-	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.		ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
10.	1	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	-	SPECIAL REQUIREMENTS

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CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 06.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095012_SPC
SHT 1 OF 4

ITEM: Electrical Component

GENERAL Tag Number 9-JBX5116
Service Gantries 1 & 2 DCS (SIS) Junction Box
Area Classification Zone 1 IIB T4

UNIT Type Stainless Steel Enclosure
Supply 110Vac
Case Stainless Steel
Connections 1 off gland Area
Mounting Surface
Enclosure Class IP66
Electrical Classification ATEX II 2 G EExe

ADDITIONAL DETAILS

Enclosure to be supplied with:- 24 off SAK 2.5 terminals.
1 off screen earth bar complete with 10 ZB4 terminals
Terminals 6 and 7 to be linked.
Terminals 14 and 15 to be linked.
Terminals to be identified with dekafix markers see sheet 2.
Enclosure to be drilled for the following gland entries.
2 x 32mm (Bottom) one blanked.
8 x 20mm (Bottom) two blanked.

Labels:
1. Ident Label will be manufactured from 3 Ply Traffolyte with Tag Number and Service Details
2. ATEX Certification Label.

MANUFACTURERS DATA Supplier TBA
Model Number TBA

DOCUMENTATION See attached Documentation Specification

REVISION HISTORY	
Rev	Description
A	Issued for Procurement

P & I Design Ltd.

Instrument Specification

CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 06.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095012_SPC
SHT 2 OF 4

TB1

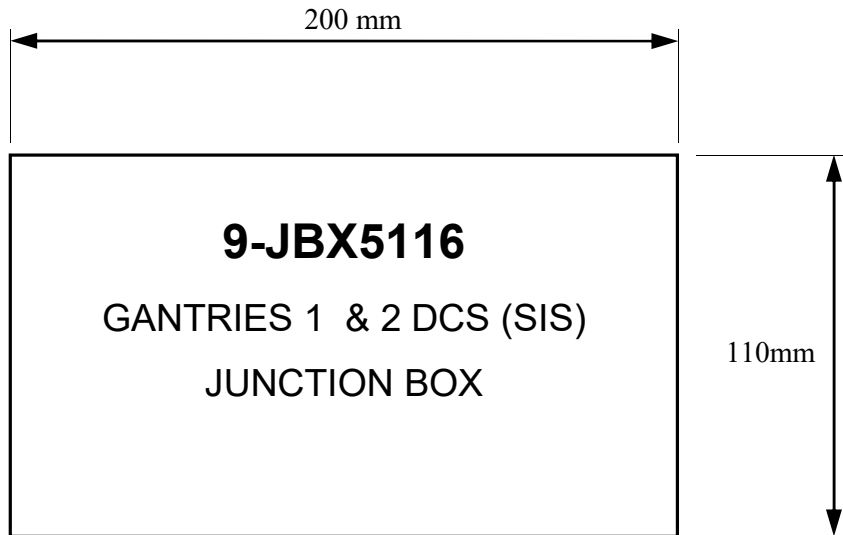
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CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	06.09.16	DRP	MM	MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095012_SPC
SHT 3 OF 4

- 1) Labels to be manufactured from BlackWhite/Black traffolyte.
- 2) Engraved text to be best fit.
- 3) Text to be centered.



CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 06.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095012_SPC
SHT 4 OF 4

Documentation Requirement

Item	Quantity	Description
1.	-	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	-	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	-	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	-	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	-	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	-	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	-	SOFTWARE a. Programming manual. b. Operating manual.
8.	-	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.		ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
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10.	1	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	-	SPECIAL REQUIREMENTS

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###-FMB6.SPC

CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 06.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095013_SPC
SHT 1 OF 4

ITEM: Electrical Component

GENERAL Tag Number See Sheet 3
Service Gantries 1 & 2 DCS (PAS) Junction Box
Area Classification Zone 1 IIB T4

UNIT Type Stainless Steel Enclosure
Supply 110Vac
Case Stainless Steel
Connections 1 off gland Area
Mounting Surface
Enclosure Class IP66
Electrical Classification ATEX II 2 G EExe

ADDITIONAL DETAILS

Enclosure to be supplied with:- Two rows containing 40 off SAK 2.5 terminals.
Row 1 tagged TB1 with terminals marked 1 to 40
Row 2 tagged TB2 with terminals marked 1 to 40
1 off screen earth bar complete with 20 ZB4 terminals.
Terminals to be identified with dekafix markers as per sheet 2.
Enclosure to be drilled for the following gland entries.
5 x 32mm (Bottom) one blanked.

- Labels:
1. Ident Label will be manufactured from 3 Ply Traffolyte with Tag Number and Service Details
 2. ATEX Certification Label.

MANUFACTURERS DATA Supplier TBA
Model Number TBA

DOCUMENTATION See attached Documentation Specification

REVISION HISTORY	
Rev	Description
A	Issued for Procurement

P & I Design Ltd.

Instrument Specification

CLIENT:
Vivergo Fuels Ltd

REV **DATE** **BY** **CHKD** **APPD**
A 06.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095013_SPC
SHT 2 OF 4

TB1

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TB2

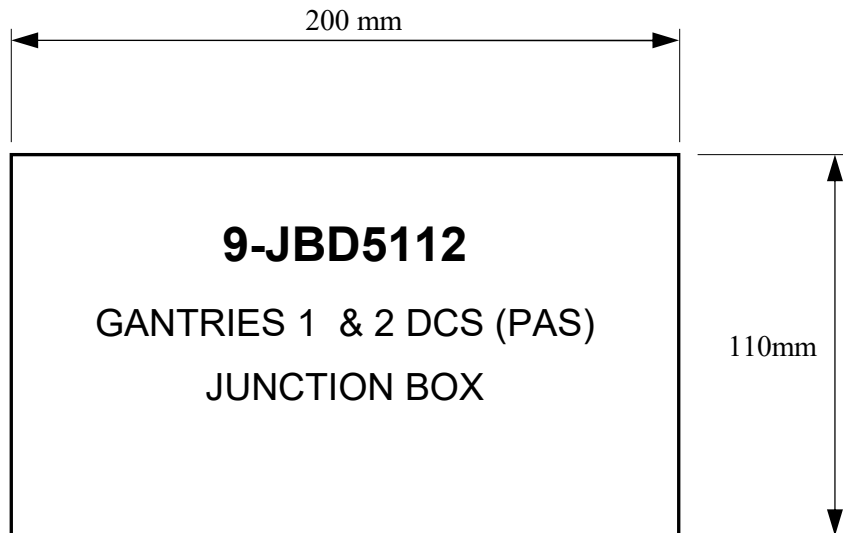
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CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	06.09.16	DRP	MM	MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095013_SPC
SHT 3 OF 4

- 1) Labels to be manufactured from BlackWhite/Black traffolyte.
- 2) Engraved text to be best fit.
- 3) Text to be centered.



CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 06.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095013_SPC
SHT 4 OF 4

Documentation Requirement

Item	Quantity	Description
1.	-	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	-	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	-	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	-	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	-	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	-	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	-	SOFTWARE a. Programming manual. b. Operating manual.
8.	-	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.		ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
10.	1	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	-	SPECIAL REQUIREMENTS

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CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	13.09.16	DRP	MM	MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095014_SPC
SHT 1 OF 4

ITEM: Electrical Component

GENERAL Tag Number 9-JBD-5117
Service Additive DCS Junction Box
Area Classification Zone 1 IIB T4

UNIT Type Stainless Steel Enclosure
Supply 110Vac
Case Stainless Steel
Connections 1 off gland Area
Mounting Surface
Enclosure Class IP66
Electrical Classification ATEX II 2 G EExe

ADDITIONAL DETAILS

Enclosure to be supplied with:- One row containing 50 off SAK 2.5 terminals.
Row 1 tagged TB2 with terminals marked 1 to 50
1 off screen earth bar complete with 6 ZB4 terminals.
Terminals to be identified with dekafix markers as per sheet 2.
Enclosure to be drilled for the following gland entries.
1 x 32mm (Bottom)
5 x 20mm (Bottom) 3x Blanked

- Labels:
- Ident Label will be manufactured from 3 Ply Traffolyte with Tag Number and Service Details
 - ATEX Certification Label.

MANUFACTURERS DATA Supplier TBA
Model Number TBA

DOCUMENTATION See attached Documentation Specification

REVISION HISTORY	
Rev	Description
A	Issued for Procurement

P & I Design Ltd.

Instrument Specification

CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 13.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095014_SPC
SHT 2 OF 4

TBI

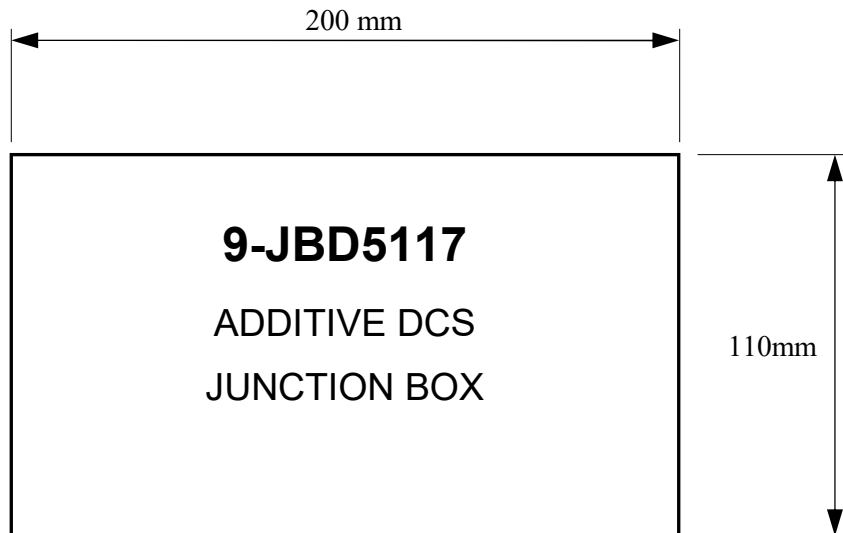
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CLIENT:
Vivergo Fuels Ltd

REV	DATE	BY	CHKD	APPD
A	13.09.16	DRP	MM	MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095014_SPC
SHT 3 OF 4

- 1) Labels to be manufactured from BlackWhite/Black traffolyte.
- 2) Engraved text to be best fit.
- 3) Text to be centered.



CLIENT:
Vivergo Fuels Ltd

REV DATE BY CHKD APPD
A 13.09.16 DRP MM MM

CLIENT REF.
Ethanol Road Loading
P & I REF.
VI095014_SPC
SHT 4 OF 4

Documentation Requirement

Item	Quantity	Description
1.	-	APPROVAL DOCUMENTATION To be supplied before manufacture commences
2.	-	GENERAL ARRANGEMENT DRAWING Cross-sectioned to show all details necessary for repair and maintenance purposes.
3.	-	MATERIALS TEST CERTIFICATES a. Mechanical. b. Chemical analysis.
4.	-	ITEMISED PARTS LIST Cross-referenced with G.A. drawing(s) and illustrating manufacturers references for all proprietary items such as bearings, oilseals, mechanical seals, etc.
5.	-	RECOMMEND SPARES QUOTATION a. Two years service. b. Commissioning only.
6.	-	INSTALLATION, OPERATING AND MAINTENANCE MANUALS To include calibration instructions where applicable. a. Paper Copy b. Electronic copy (Preferably Adobe Acrobat)
7.	-	SOFTWARE a. Programming manual. b. Operating manual.
8.	-	PRESSURE VESSELS Calculation sheets, spark test certificates (for lined vessels),hydraulic test certificates.
9.		ELECTRICAL a. Schematic and circuit diagrams. b. Certificates of conformity (to include EMC Directive 89/336/EEC). c. Hazardous area certification.
10.	1	INSTRUMENTATION a. Certificates of conformity (to include EMC Directive 89/336/EEC). b. Calibration certificates. c. Hazardous area certification.
11.	-	SPECIAL REQUIREMENTS

IMPORTANT NOTICE:

Vendors acceptance of this order is conditional on the provision of the Documentation.
Should the vendor not wish to supply the whole or part of the details herein requested, he shall state in writing any exceptions with the quotation or order acceptance.
We reserve the right to cancel any order where the documentation does not comply with the requirements. No item will be paid in full until documentation specified has been received.

SWB-62-04
415V
AUXILIARY POWER
DISTRIBUTION BOARD
BAY 3 BREAKER 3D
(63A)

SWB-62-21-02
110V
EXISTING

9-JB62-21-02-51
JUNCTION BOX

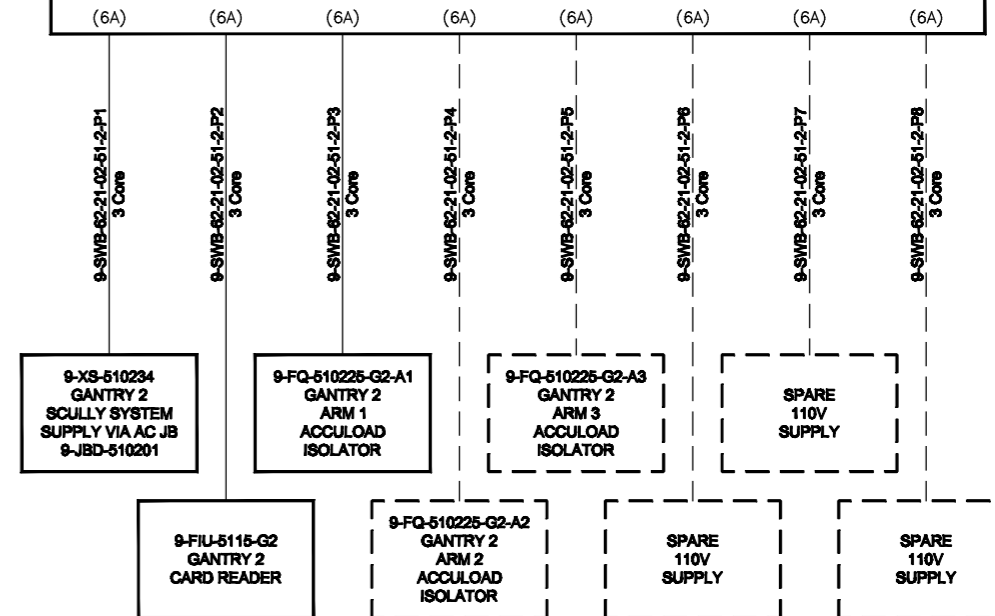
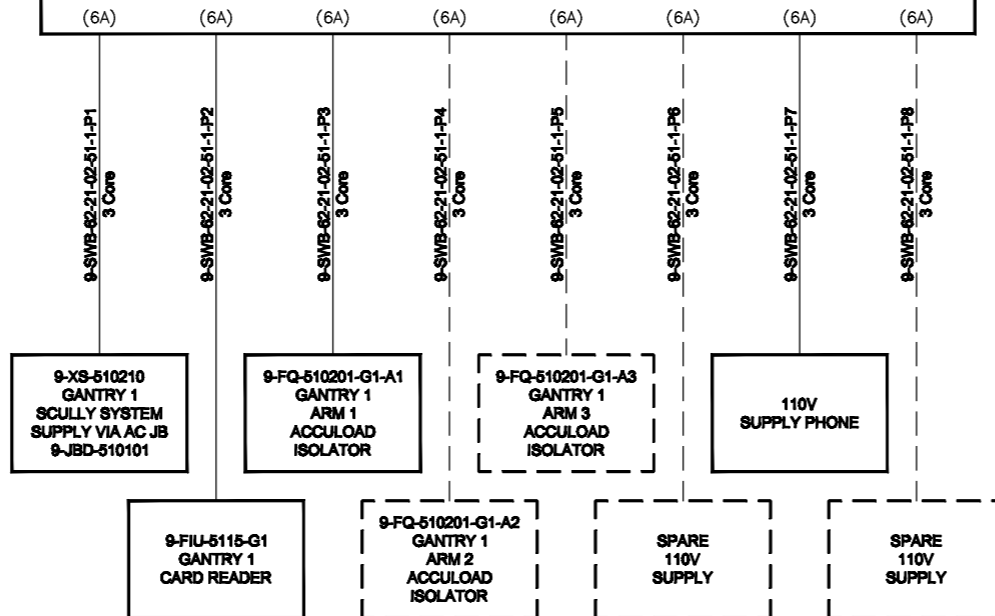
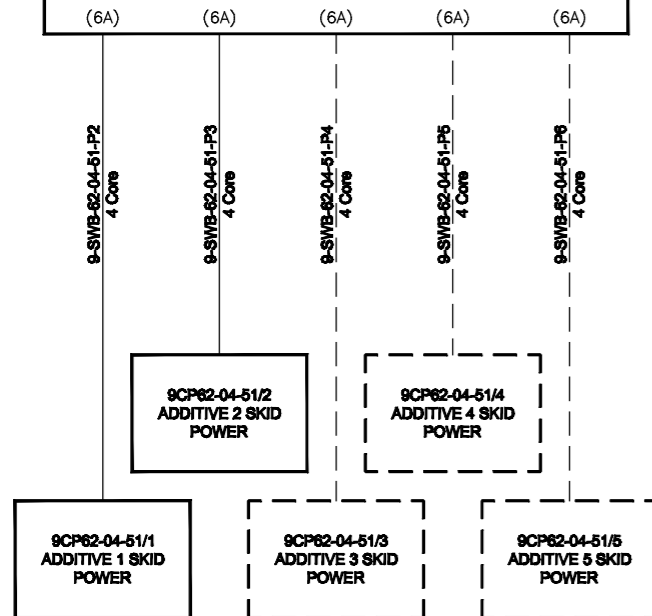
9-SWB-62-21-02-51-3
SPLITTER JUNCTION
BOX

TO BE SUPPLIED & FITTED BY THE
ELECTRICAL CONTRACTOR

(63A INCOMING)
9-EP-510300
ETHANOL ADDITIVE SKID
DISTRIBUTION BOARD
TYPE C (MCB)

9-SWB-62-21-02-51-1
GANTRY 1 AUXILLARY
DISTRIBUTION BOARD
TYPE C (MCB)

9-SWB-62-21-02-51-2
GANTRY 2 AUXILLARY
DISTRIBUTION BOARD
TYPE C (MCB)



NOTES

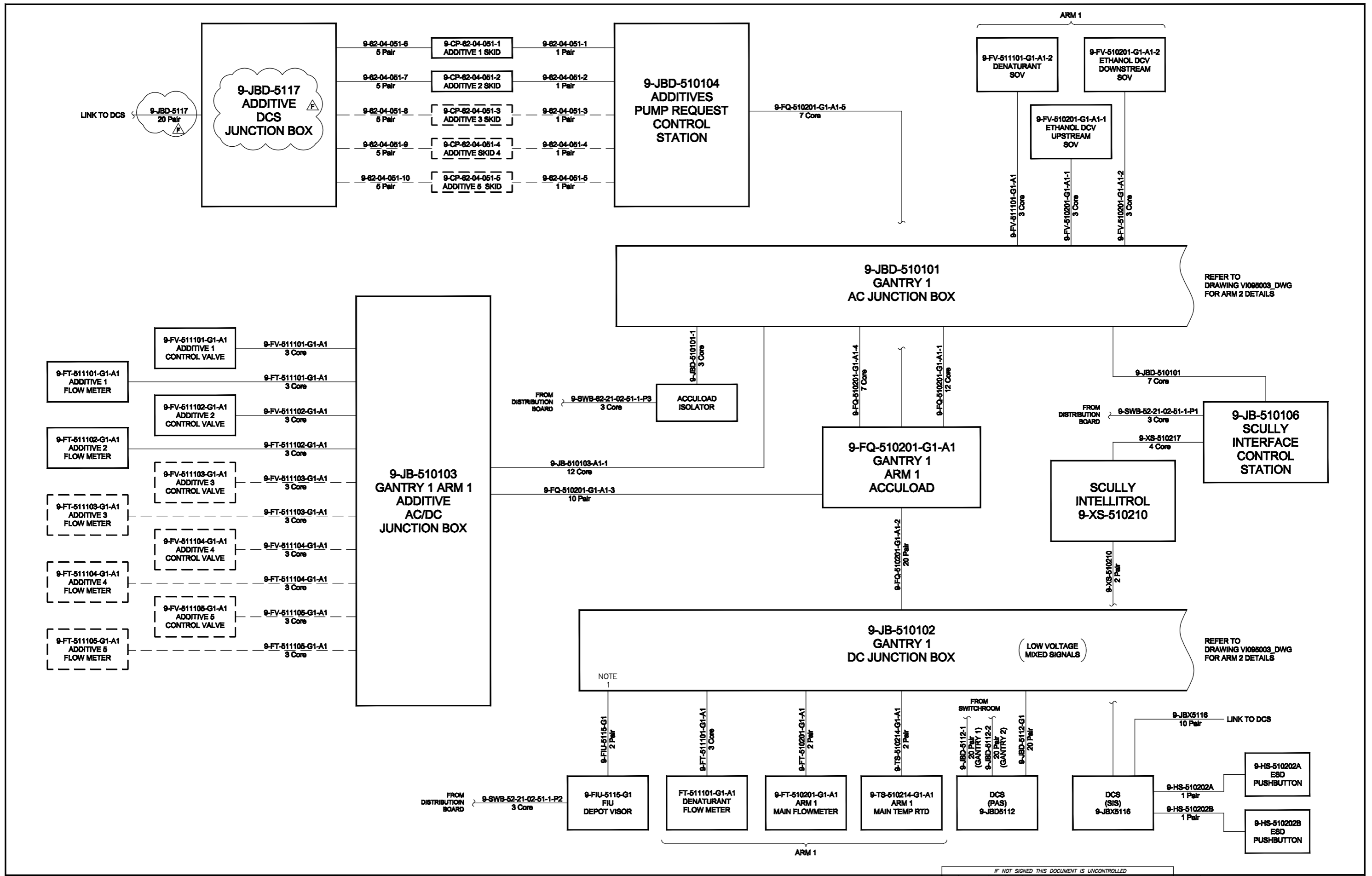
1) FUTURE EQUIPMENT & CABLES SHOWN : - - - - -

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED													
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION
H	05/09/16	M.M	D.A.Y	D.R.P	P.J.P	CONSTRUCTION ISSUE	A	15/02/16	P.J.P	D.A.Y	P.J.P	P.J.P	ISSUED FOR REVIEW
							B	16/03/16	P.J.P	D.A.Y	P.J.P	P.J.P	GENERAL UPDATE
							C	21/03/16	P.J.P	D.A.Y	P.J.P	P.J.P	110AC DISTRIBUTION
							D	06/04/16	P.J.P	D.A.Y	P.J.P	P.J.P	CLIENT COMMENTS ADDED
							E	22/04/16	P.P	P.P	P.J.P	P.J.P	POST CLIENT REVIEW
							F	27/04/16	P.P	P.P	P.J.P	P.J.P	TENDER ISSUE
							G	26/08/16	D.R.P	D.A.Y	D.R.P	P.J.P	CONSTRUCTION REVIEW

PLANT: VIVERO FUELS
TITLE: ETHANOL BLENDING GANTRIES POWER DISTRIBUTION BOARD

CLIENT DRG. No. ***
SHEET 1 OF 1
P&I DRG No. V1095001_DWG

P & I DESIGN
P & I Design Ltd
Tel: 01642 619444
www.pandesign.co.uk



NOTES
 1) EXISTING CABLE TO BE REPOSITIONED & TERMINATED IN NEW LOCATION TO BE AGREED WITH SITE ENGINEER.
 2) FUTURE EQUIPMENT & CABLES SHOWN :

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED										VIVERO FUELS	
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	ETHANOL BLENDING GANTRY 1 ARM 1 CABLE OVERVIEW			
A	22/02/16	P.J.P.	D.A.Y.	D.R.P.	D.R.P.	P.J.P.	P.J.P.	ISSUED FOR REVIEW			
B	22/04/16	P.P.	P.P.	D.R.P.	D.R.P.	P.J.P.	P.J.P.	POST CLIENT REVIEW			
C	27/04/16	P.P.	P.P.	P.J.P.	P.J.P.	P.J.P.	P.J.P.	TENDER ISSUE			
D	26/08/16	D.R.P.	D.A.Y.	P.J.P.	P.J.P.	P.J.P.	P.J.P.	FOR CONSTRUCTION REVIEW			
E	08/09/16	D.R.P.	D.A.Y.	P.J.P.	P.J.P.	P.J.P.	P.J.P.	FOR CONSTRUCTION			
F	13/09/16	D.R.P.	D.A.Y.	P.J.P.	P.J.P.	P.J.P.	P.J.P.	JB NUMBER AMENDED			

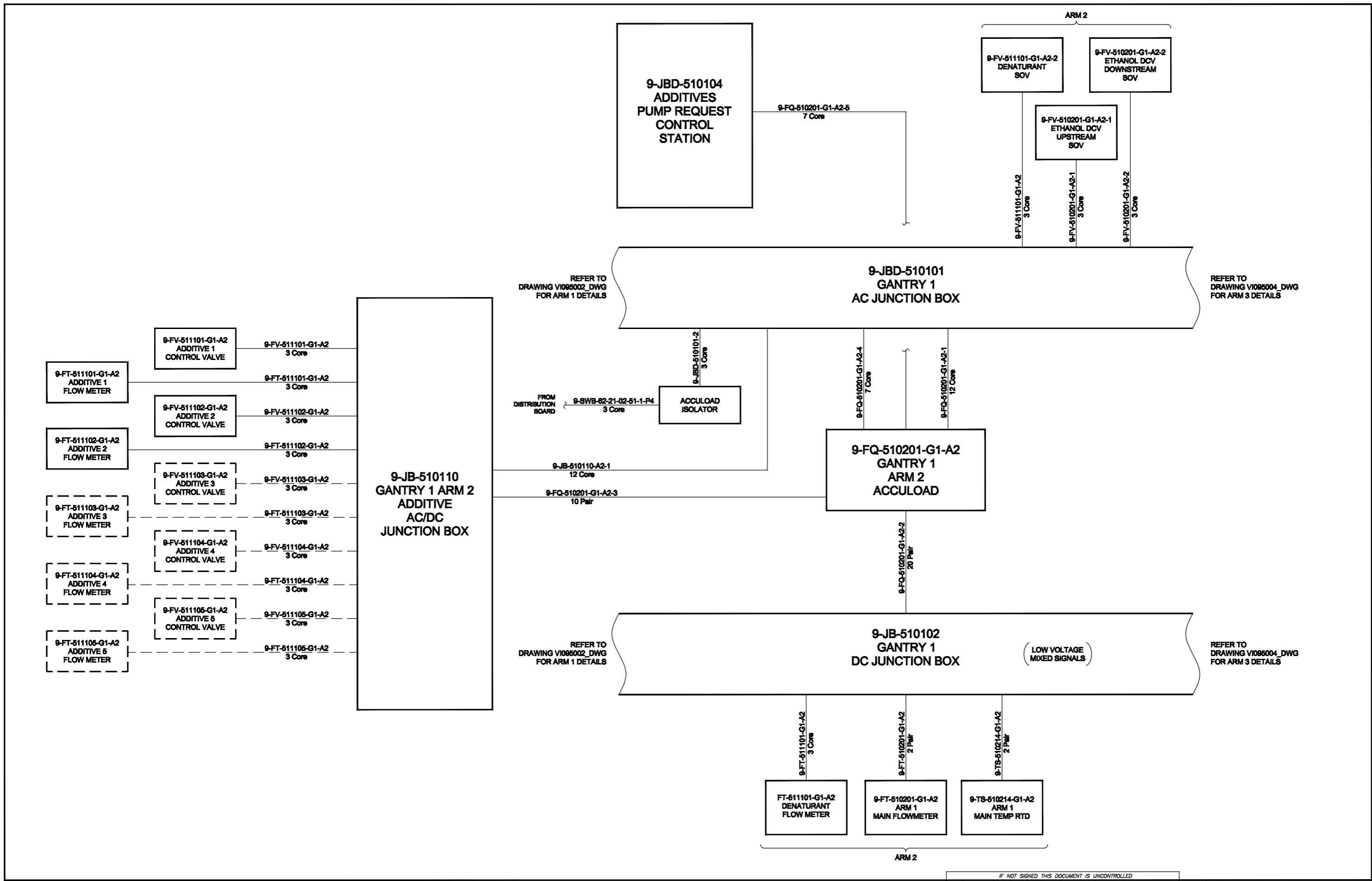
CLIENT DRG. No. ***

SHEET 1 OF 1

P&I DESIGN Ltd
 Tel. 01642 619444
 www.pandesign.co.uk

P&I DESIGN

P&I DRG No. V1095002_DWG

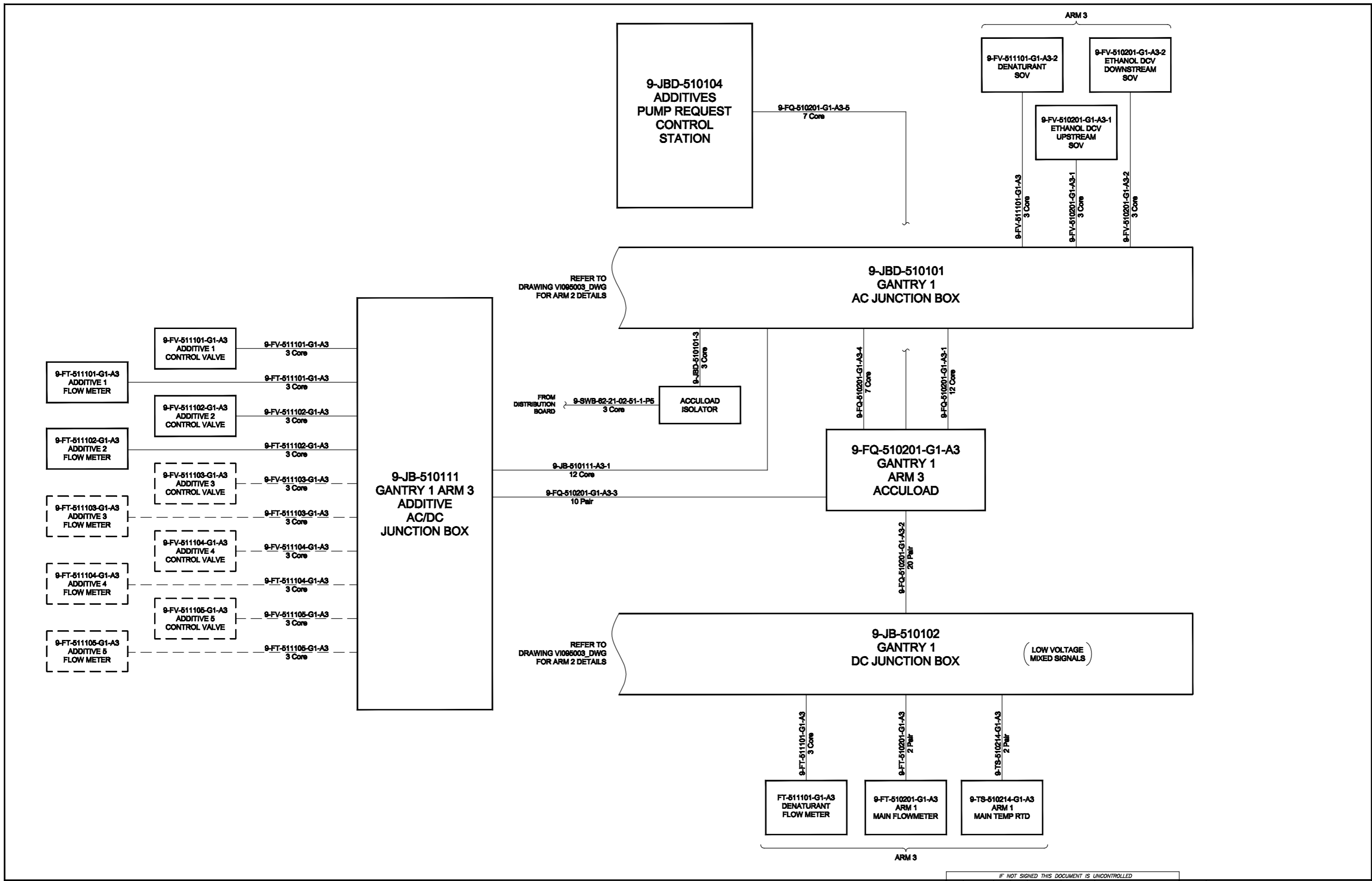


NOTES

1) FUTURE EQUIPMENT & CABLES SHOWN : - - - - -

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED								PLANT	VIVERO FUELS
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION		TITLE	
A	22/02/16	P.J.P	D.A.Y	P.J.P	D.R.P	P.J.P	P.J.P	ISSUED FOR REVIEW	
B	25/04/16	P.P.	P.P.	D.R.P	P.J.P	P.J.P	P.J.P	POST CLIENT REVIEW	
C	08/09/16	D.R.P	D.A.Y	D.R.P		P.J.P		FOR CONSTRUCTION	

CLIENT DRG. No.	***	SHEET 1 OF 1
P&I DESIGN		P & I Design Ltd Tel. 01642 619444 www.pandesign.co.uk
P&I DESIGN		SHEET 1 OF 1
P&I DESIGN		P&I DRG No. V1095003_DWG



NOTES
 1) FUTURE EQUIPMENT & CABLES SHOWN : - - - - -

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED							PLANT	VIVERO FUELS	
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	TITLE	ETHANOL BLENDING BAY 1 ARM 3 CABLE OVERVIEW	
A	22/02/16	P.J.P	D.A.Y	D.R.P	D.R.P	ISSUED FOR REVIEW			
B	25/04/16	P.P.	P.P.	D.R.P	D.R.P	POST CLIENT REVIEW			
C	08/09/16	D.R.P	D.A.Y	D.R.P	P.J.P	FOR CONSTRUCTION			

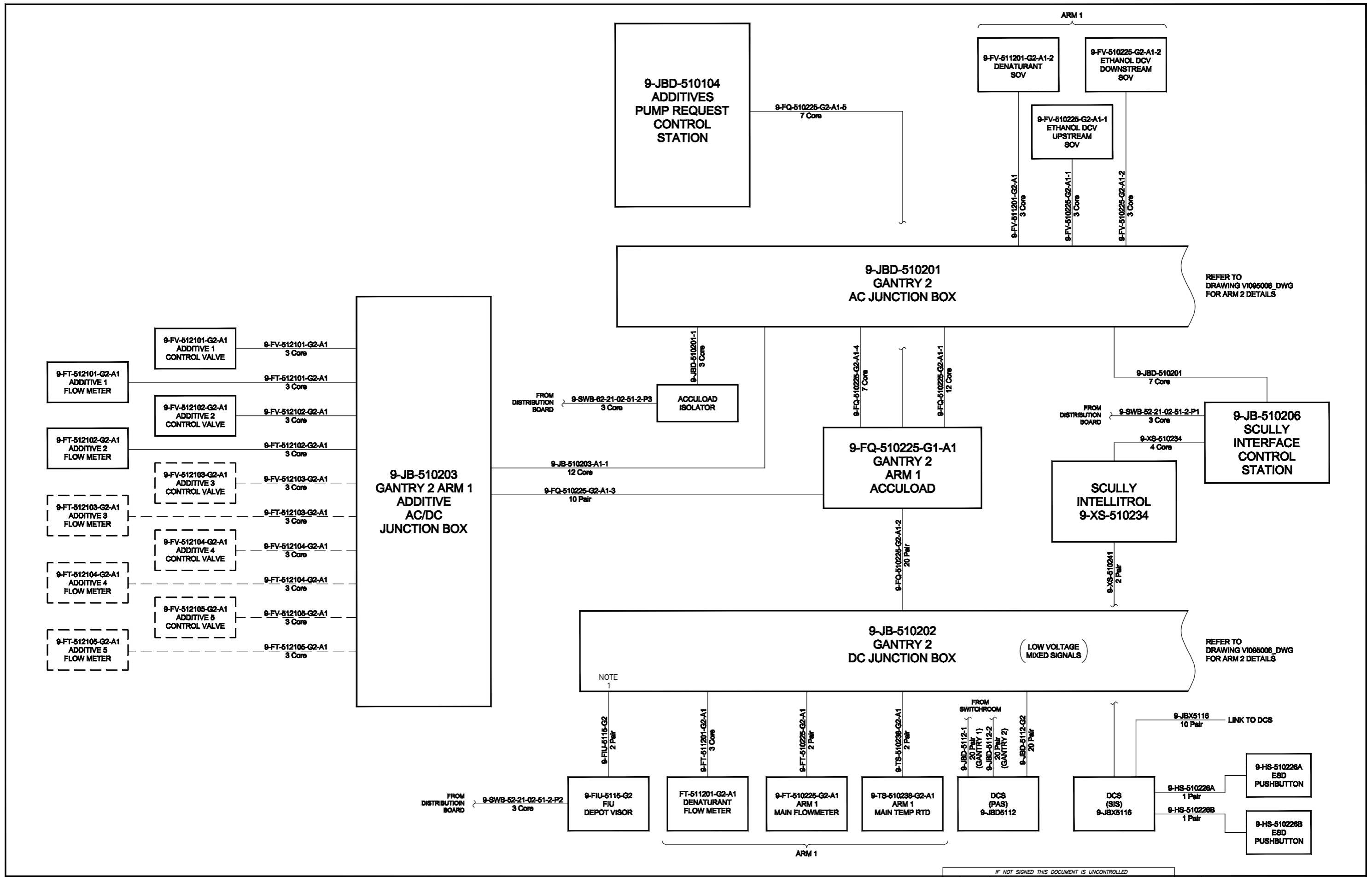
CLIENT DRG. No. ***

SHEET 1 OF 1

P&I DESIGN P & I Design Ltd
 Tel. 01642 619444
 www.pandesign.co.uk

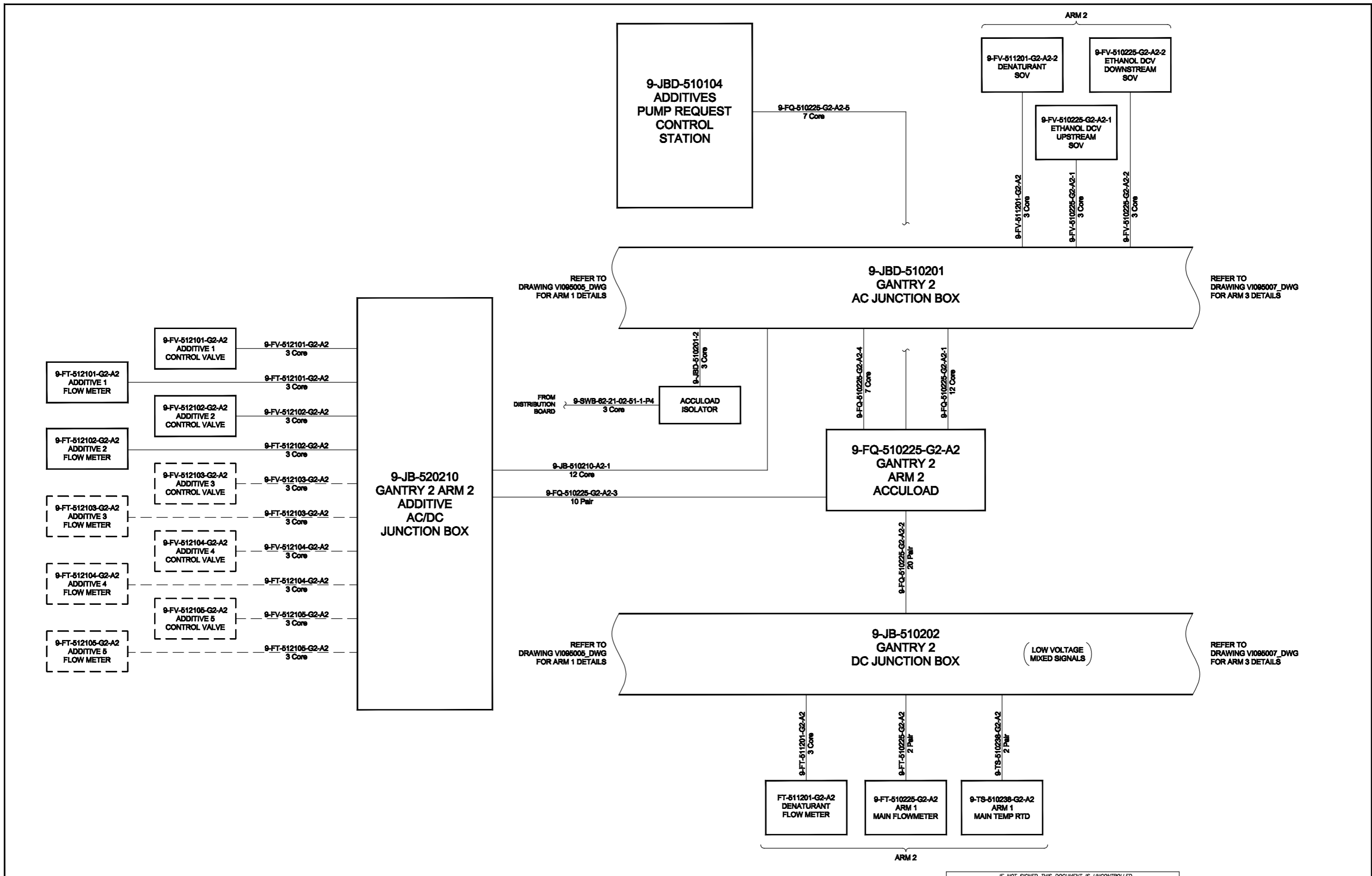
P&I DESIGN

P&I DRG No. V1095004_DWG



NOTES
 1) EXISTING CABLE TO BE REPOSITIONED & TERMINATED
 2) FUTURE EQUIPMENT & CABLES SHOWN :

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED										VIVERO FUELS	
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	ETHANOL BLENDING GANTRY 2 ARM 1 CABLE OVERVIEW			
A	22/02/16	P.J.P	D.A.Y	D.R.P	D.R.P	ISSUED FOR REVIEW					
B	22/04/16	P.P.	P.P.	D.R.P	D.R.P	POST CLIENT REVIEW					
C	27/04/16	P.P.	P.P.	P.J.P	P.J.P	TENDER ISSUE					
D	08/09/16	D.R.P	D.A.Y	P.J.P	P.J.P	FOR CONSTRUCTION					
							CLIENT DRG. No.	SHEET 1 OF 1			
							***	P&I DESIGN Ltd Tel: 01642 619444 www.pandesign.co.uk			
							P&I DESIGN Ltd Tel: 01642 619444 www.pandesign.co.uk				
							P&I DESIGN Ltd Tel: 01642 619444 www.pandesign.co.uk				



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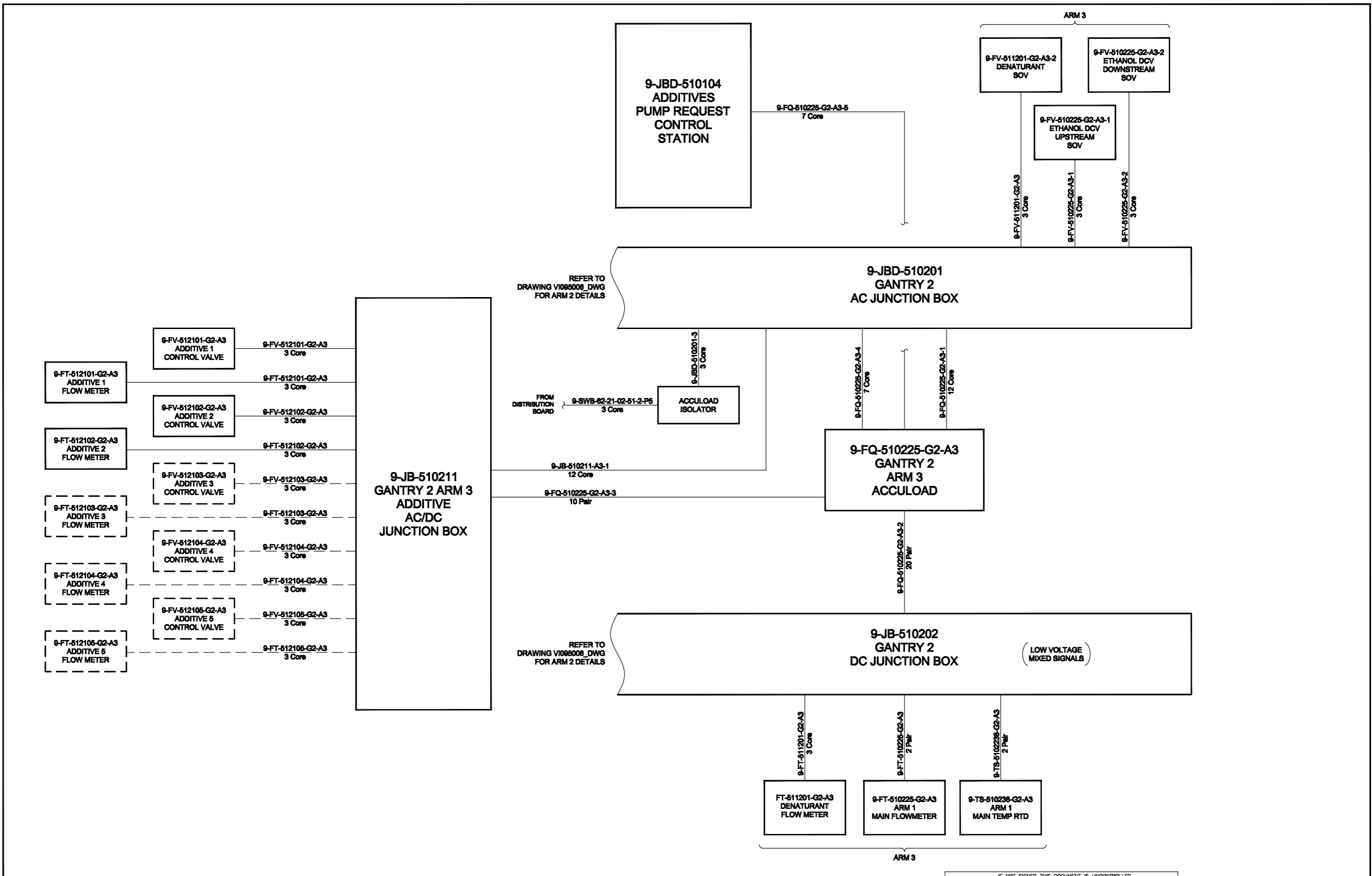
1) FUTURE EQUIPMENT & CABLES SHOWN : - - - - -

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION
A	22/02/16	P.J.P	D.A.Y	P.J.P	D.R.P	ISSUED FOR REVIEW
B	25/04/16	P.P.	P.P.	D.R.P	D.R.P	POST CLIENT REVIEW
C	08/09/16	D.R.P	D.A.Y	D.R.P	P.J.P	FOR CONSTRUCTION


PLANT	VIVERO FUELS
TITLE	ETHANOL BLENDING BAY 2 ARM 2 CABLE OVERVIEW
CLIENT DRG. No.	***
SHEET 1 OF 1	P&I DRG No. V1095006_DWG



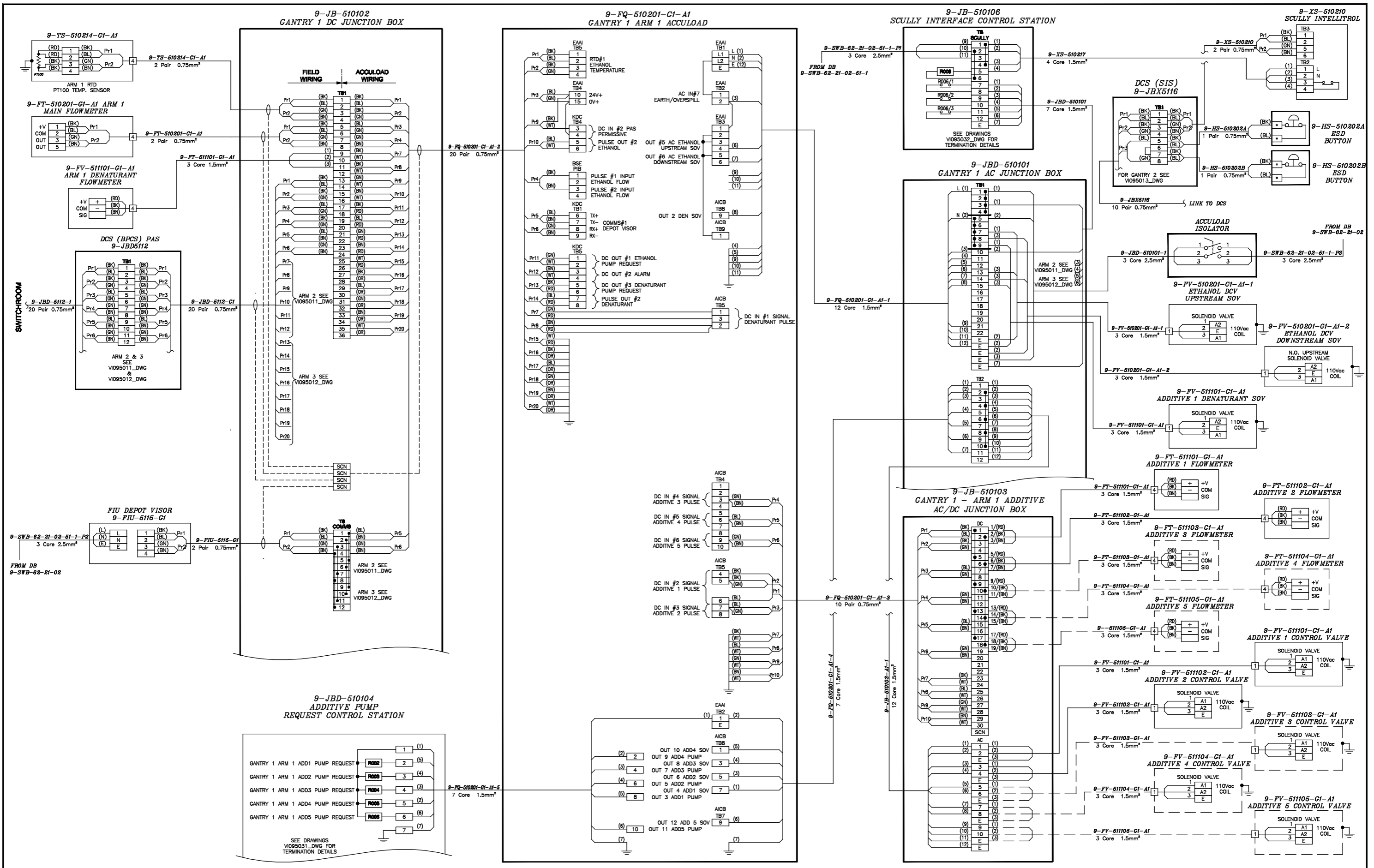


NOTES
 1) FUTURE EQUIPMENT & CABLES SHOWN : - - - - -

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED							PLANT	VIVERO FUELS	
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	TITLE	ETHANOL BLENDING BAY 2 ARM 3 CABLE OVERVIEW	
A	22/02/16	P.J.P	D.A.Y	D.R.P	P.J.P	ISSUED FOR REVIEW			
B	25/04/16	P.P.	P.P.	D.R.P	P.J.P	POST CLIENT REVIEW			
C	08/09/16	D.R.P	D.A.Y	D.R.P	P.J.P	FOR CONSTRUCTION			


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CLIENT DRG. No. *******
 SHEET 1 OF 1
 P&I DRG No. **V1095007_DWG**

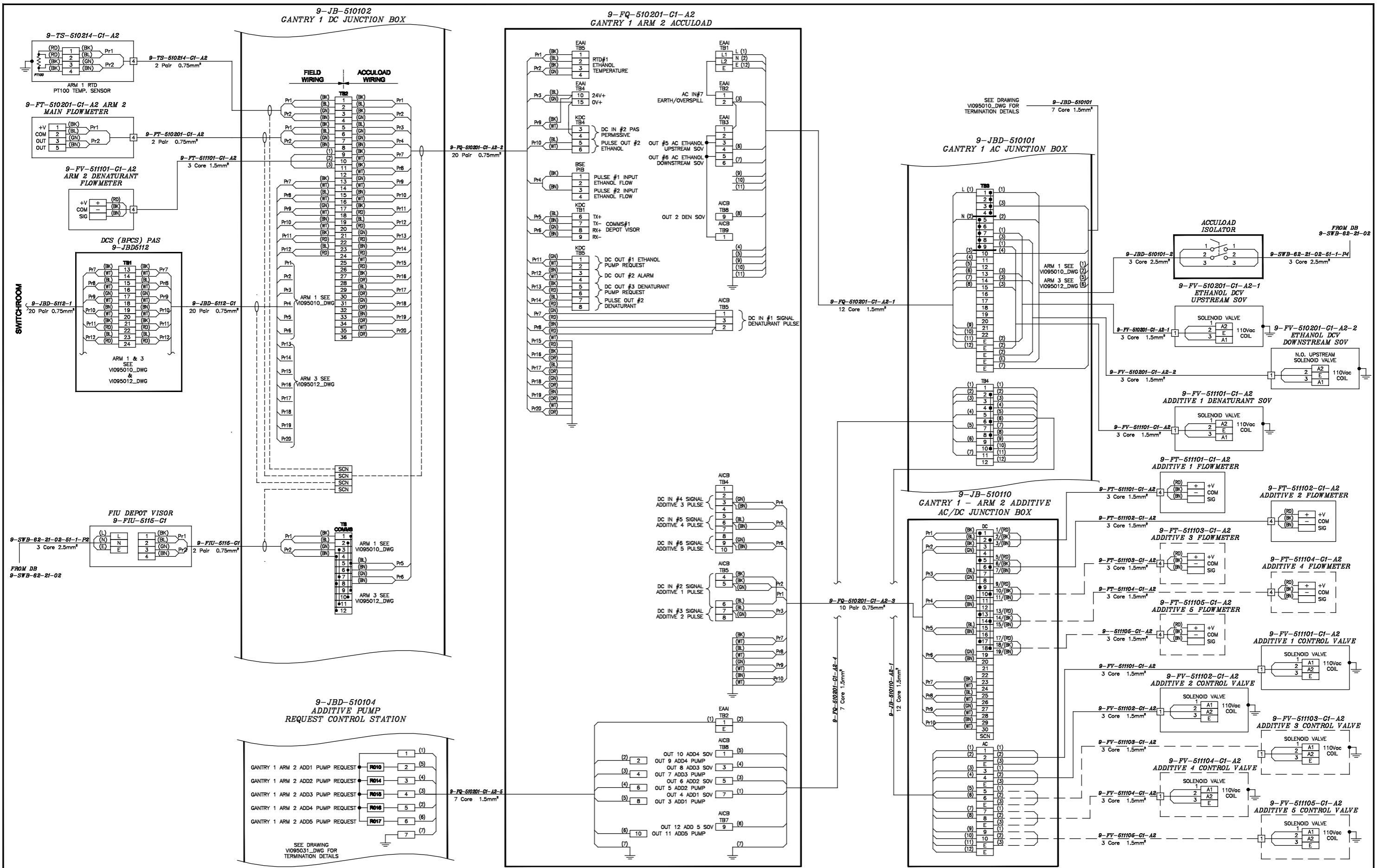


NOTES
 1. CORES TO BE TAPED UP.
 2. FUTURE CABLES SHOWN - - - - -
 3. FUNCTIONALITY AND OPERATION TO BE AGREED.

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	TITLE
A	08/04/16	P.J.P	D.A.Y	P.J.P	P.J.P	ISSUED FOR REVIEW	VIVERO FUELS	GANTRY 1 ARM 1
B	26/08/16	D.R.P	D.A.Y	D.R.P	P.J.P	CONSTRUCTION REVIEW	VIVERO FUELS	AC/DC JUNCTION BOX CONNECTION DETAILS
C	08/09/16	D.R.P	D.A.Y	D.R.P	P.J.P	FOR CONSTRUCTION	VIVERO FUELS	AC/DC JUNCTION BOX CONNECTION DETAILS

CLIENT DRG. No. *** SHEET 1 OF 1 P&I DRG No. VI095010_DWG

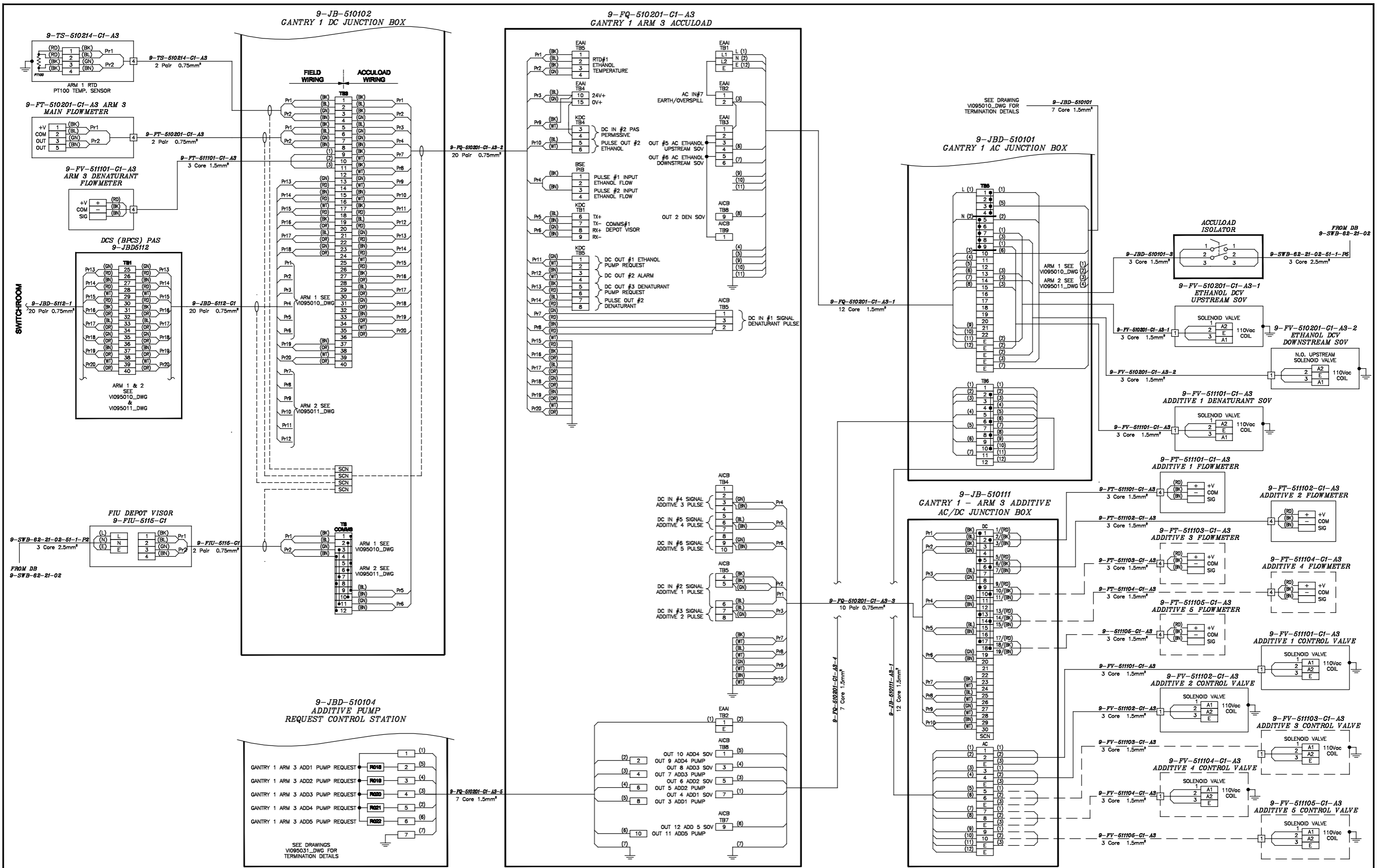


- NOTES**
1. CORES TO BE TAPED UP.
 2. FUTURE CABLES SHOWN - - - - -
 3. FUNCTIONALITY AND OPERATION TO BE AGREED.

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	TITLE
A	08/04/16	P.J.P	D.A.Y	P.J.P	P.J.P	ISSUED FOR REVIEW	VIVERO FUELS	GANTRY 1 ARM 2
B	26/08/16	D.R.P	D.A.Y	D.R.P	P.J.P	CONSTRUCTION REVIEW		AC/DC JUNCTION BOX CONNECTION DETAILS
C	08/09/16	D.R.P	D.A.Y	D.R.P	P.J.P	FOR CONSTRUCTION		

CLIENT DRG. No. *** SHEET 1 OF 1 P&I DRG No. VI095011_DWG



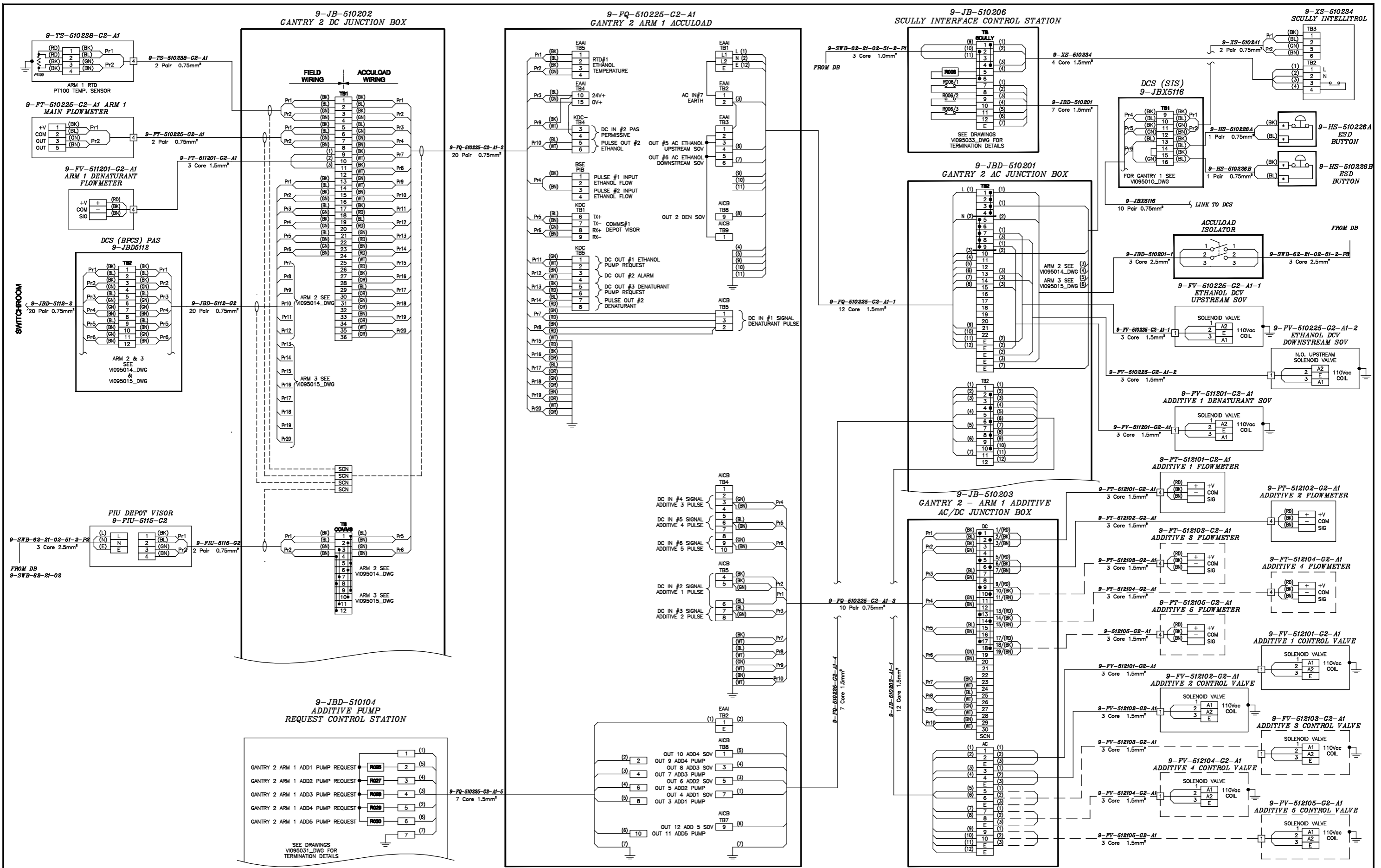
- NOTES**
1. CORES TO BE TAPED UP.
 2. FUTURE CABLES SHOWN - - - - -
 3. FUNCTIONALITY AND OPERATION TO BE AGREED.

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	TITLE
A	08/04/16	P.J.P	D.A.Y	P.J.P	P.J.P	ISSUED FOR REVIEW	VIVERO FUELS	GANTRY 1 ARM 3 AC/DC JUNCTION BOX CONNECTION DETAILS
B	26/08/16	D.R.P	D.A.Y	D.R.P	P.J.P	CONSTRUCTION REVIEW		
C	08/09/16	D.R.P	D.A.Y	D.R.P	P.J.P	FOR CONSTRUCTION		

CLIENT DRG. No. *** SHEET 1 OF 1 P&I DRG No. VIO95012_DWG

P & I Design Ltd
Tel. 02642 229444
www.pandesign.co.uk



NOTES

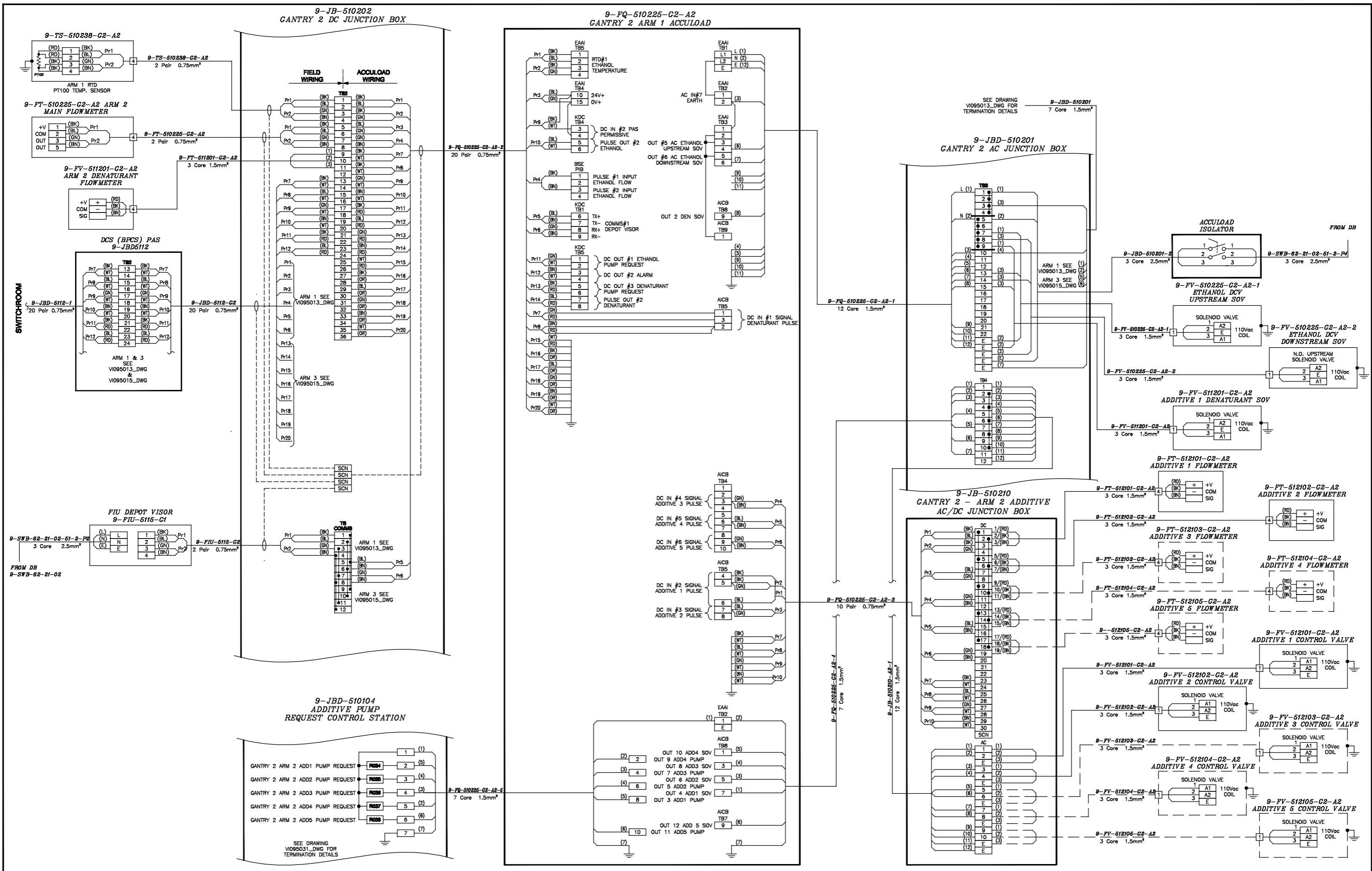
1. CORES TO BE TAPED UP.
2. FUTURE CABLES SHOWN - - - - -
3. FUNCTIONALITY AND OPERATION TO BE AGREED.

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	TITLE
A	08/09/18	D.R.P	D.A.Y	D.R.P	P.J.P	FOR CONSTRUCTION	VIVERO FUELS	GANTRY 2 ARM 1 AC/DC JUNCTION BOX CONNECTION DETAILS

CLIENT DRG. No. *** SHEET 1 OF 1 P&I DRG No. VI095013_DWG

P & I Design Ltd
Tel. 02642 229444
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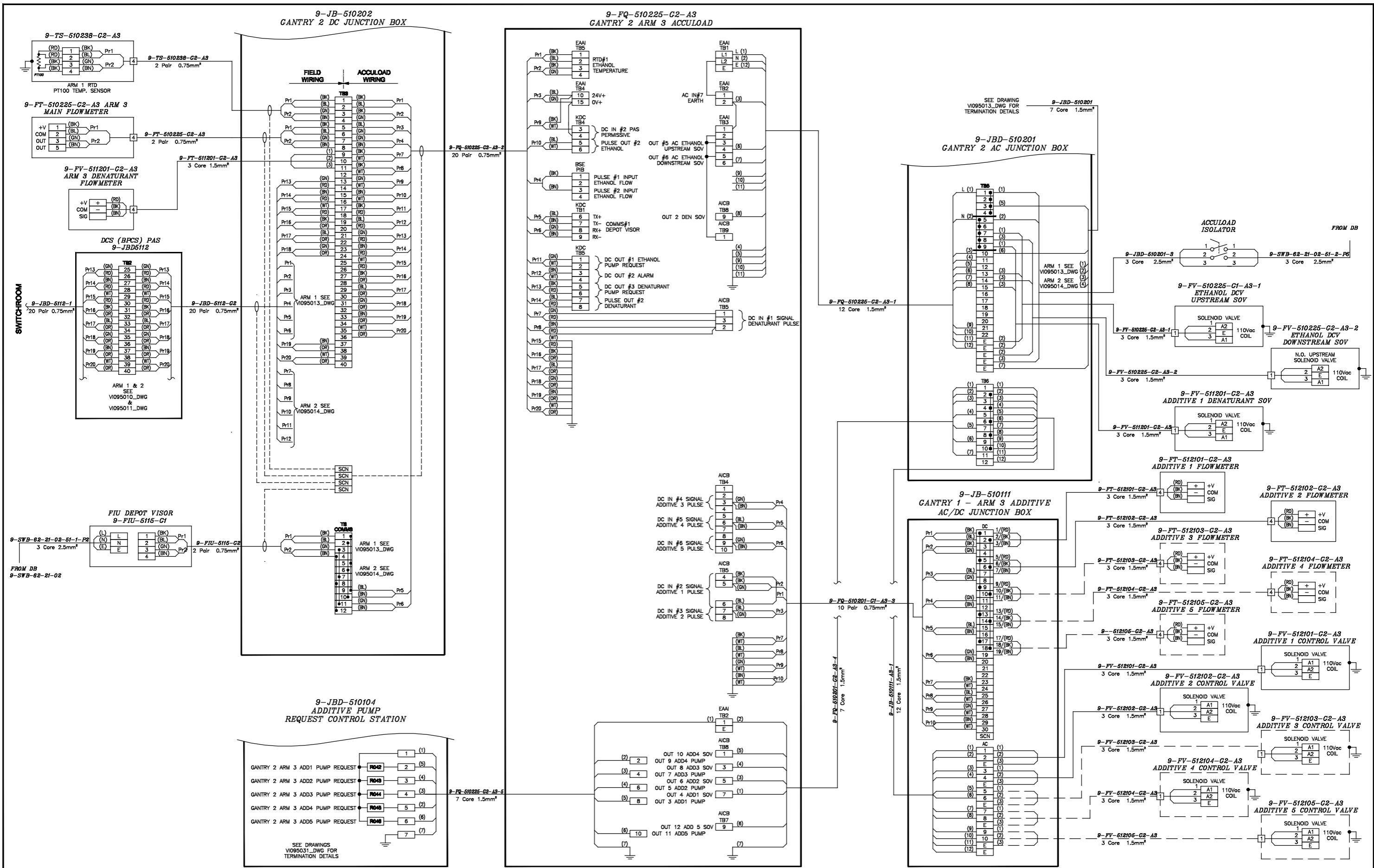


- NOTES**
1. CORES TO BE TAPED UP.
 2. FUTURE CABLES SHOWN - - - - -
 3. FUNCTIONALITY AND OPERATION TO BE AGREED.

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	TITLE
A	08/09/18	D.R.P	D.A.Y	D.R.P	P.J.P	FOR CONSTRUCTION	VIVERO FUELS	GANTRY 2 ARM 2 AC/DC JUNCTION BOX CONNECTION DETAILS

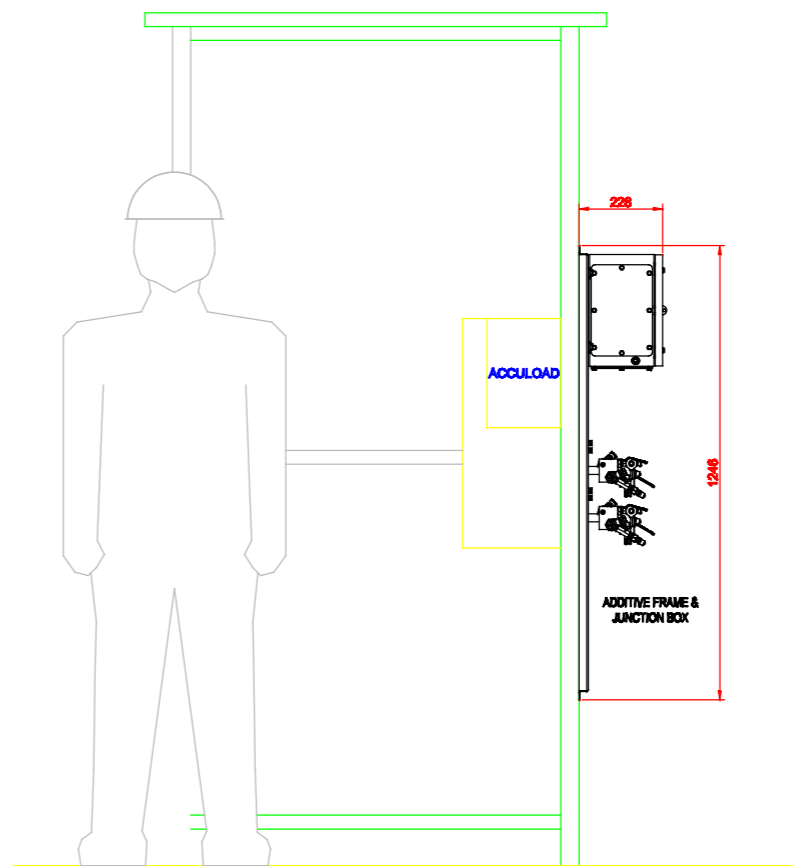
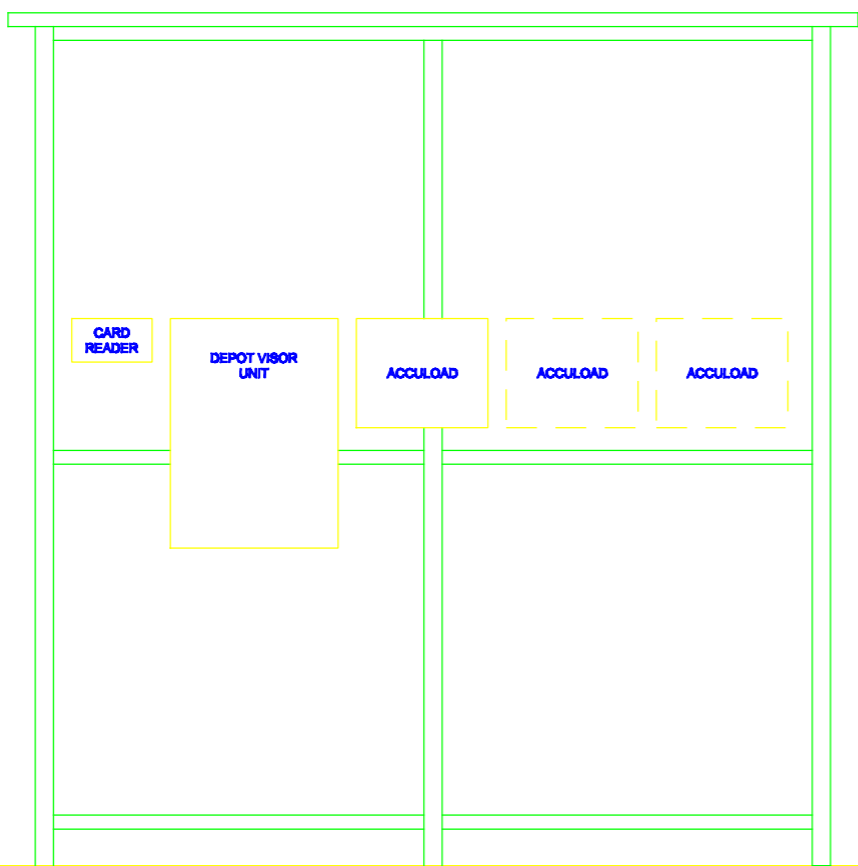
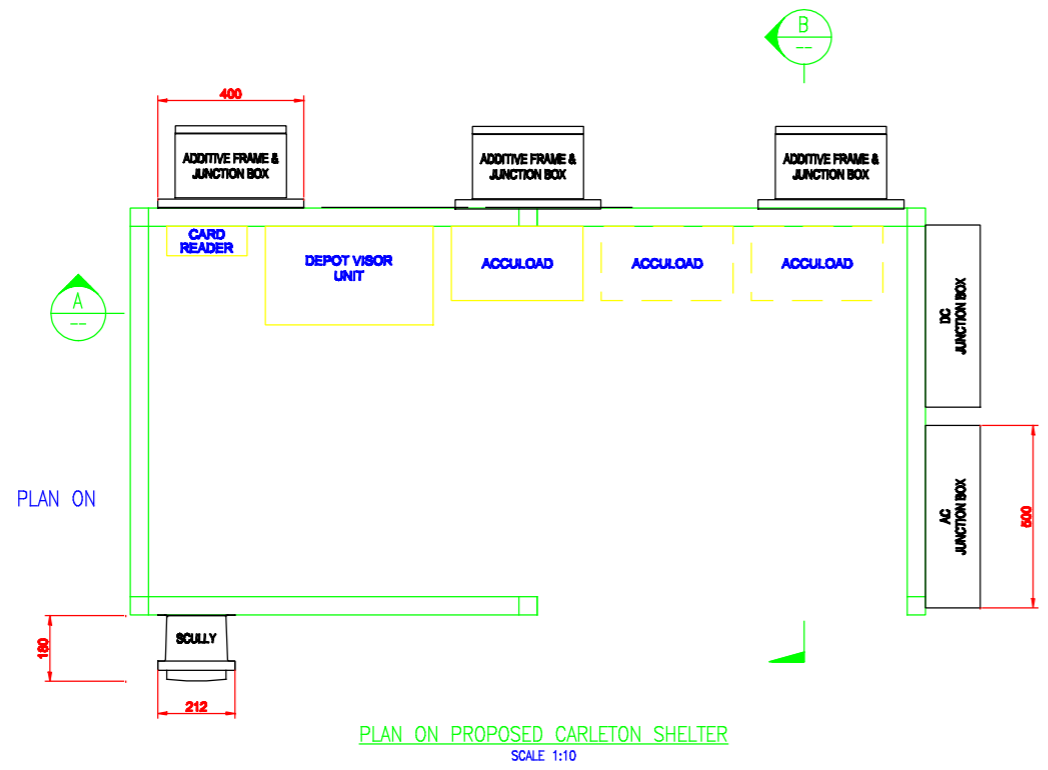
VIVERO FUELS
GANTRY 2 ARM 2
AC/DC JUNCTION BOX CONNECTION DETAILS
P & I Design Ltd
 Tel. 02642 229444
 www.pandesign.co.uk
 CLIENT DRG. No. *** SHEET 1 OF 1 P&I DRG No. VI095014_DWG



- NOTES**
1. CORES TO BE TAPED UP.
 2. FUTURE CABLES SHOWN - - - - -
 3. FUNCTIONALITY AND OPERATION TO BE AGREED.

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	VIVERO FUELS	
A	08/09/18	D.R.P	D.A.Y	D.R.P	P.J.P	FOR CONSTRUCTION		GANTRY 2 ARM 3 AC/DC JUNCTION BOX CONNECTION DETAILS	
								 P & I Design Ltd Tel. 02642 229444 www.pandesign.co.uk	
							CLIENT DRG. No.	***	SHEET 1 OF 1
									P&I DRG No. VI095015_DWG



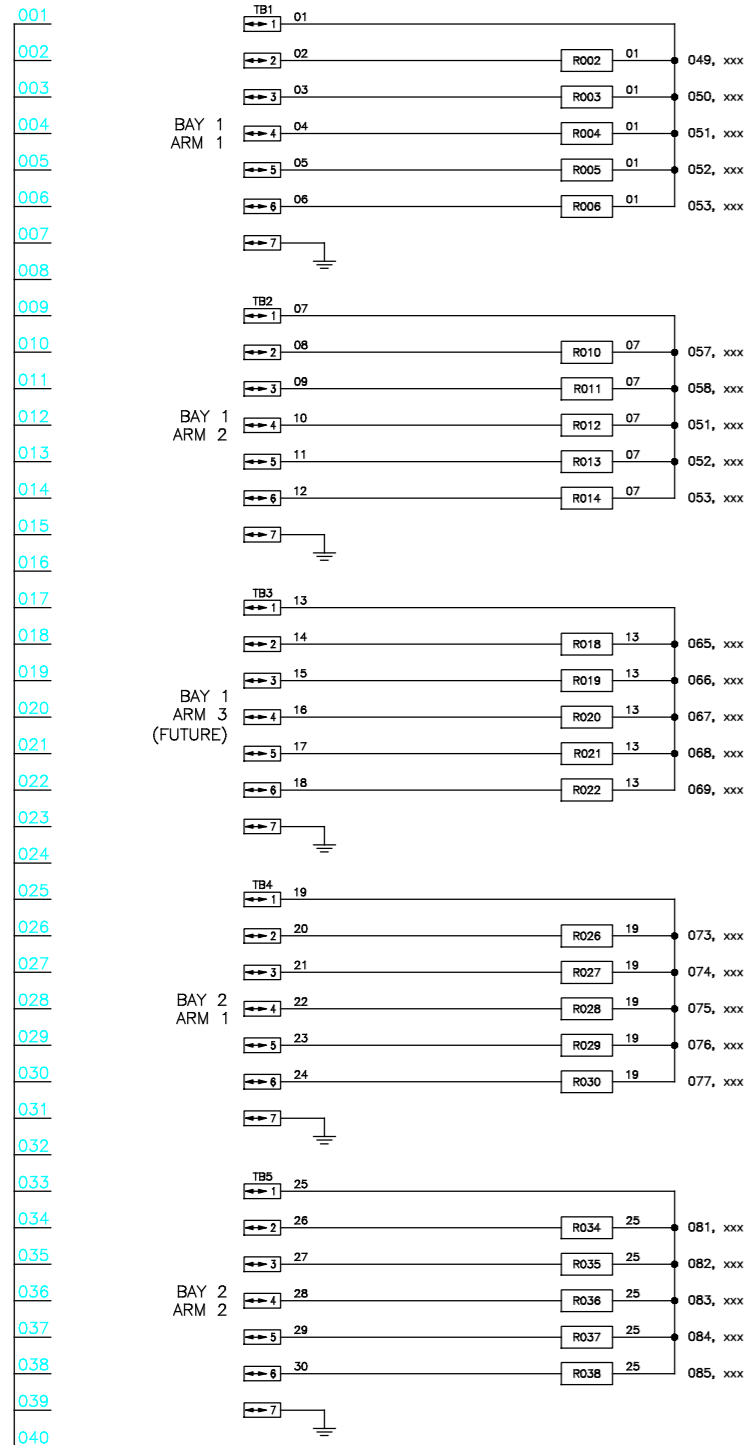
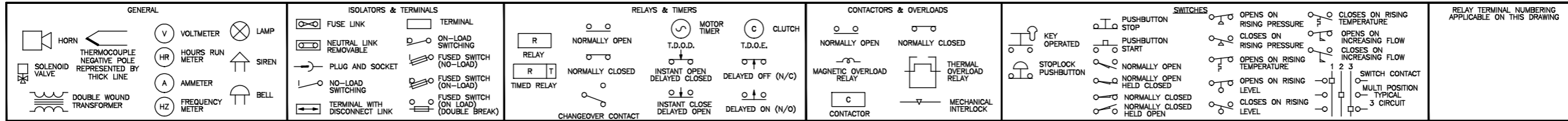
- GENERAL NOTES**
- CARLETON SHELTER IS A CARLETON 245 WITH RIGHT HAND FRONT ENTRY
 - EQUIPMENT PANELS ARE BASED ON THE FOLLOWING SIZES (mm) :-
 3 No. ACCULOAD 381x300x203 DEEP
 1 No. LARGE BOX CONNECTED TO THE CARD READER 630x460x270 DEEP
 1 No. SMALL SIZE CARD READER 220x120x80 DEEP.

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

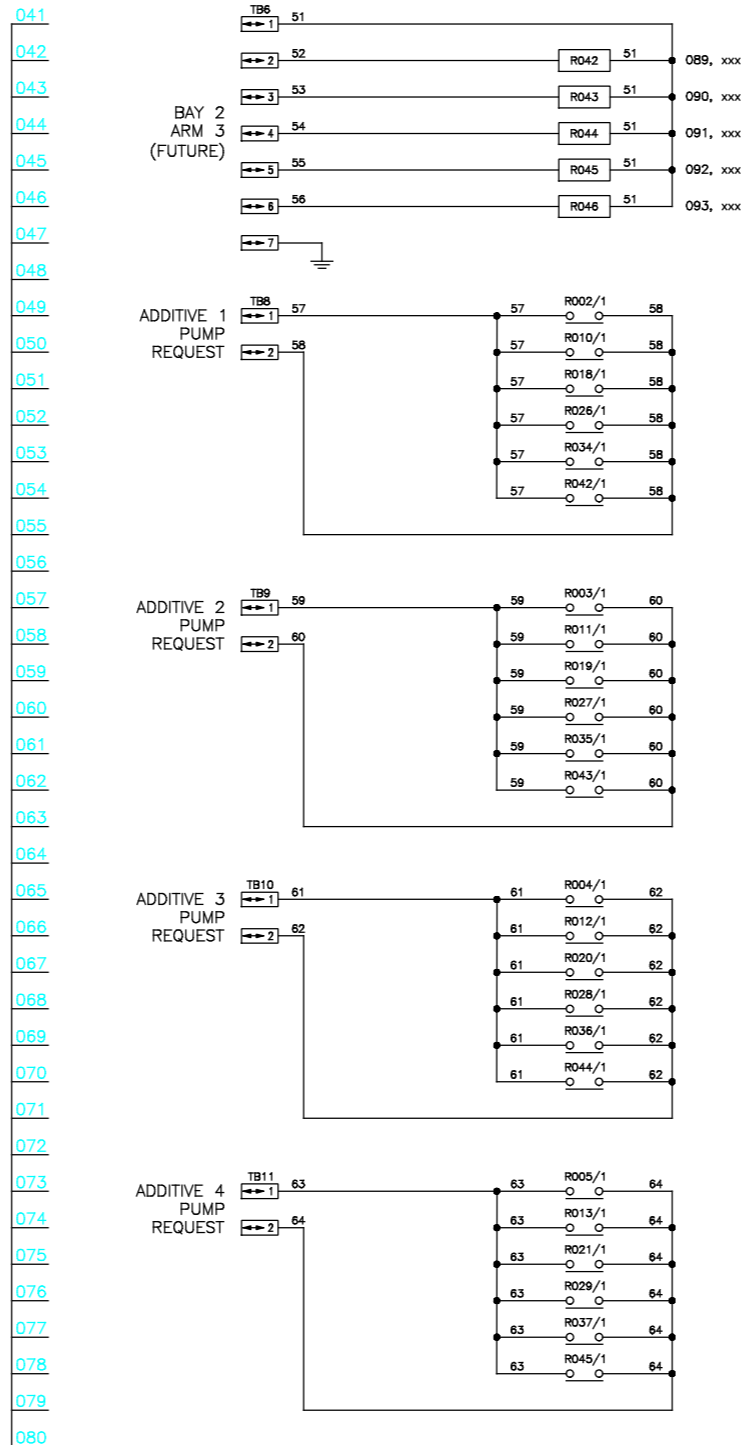
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION
A	25/04/16	P.P.	P.P.	P.J.P	P.J.P	ISSUED FOR REVIEW
B	27/04/16	P.P.	P.P.	P.J.P	P.J.P	TENDER ISSUE
C	08/08/16	P.J.P	D.A.Y	P.J.P	P.J.P	FOR CONSTRUCTION

PLANT	VIVERO FUELS
TITLE	GANTRY UPGRADE PROJECT CARLETON SHELTER LAYOUT
CLIENT DRG. No.	***
SHEET 1 OF 1	P&I DESIGN P & I Design Ltd Tel. 01642 619444 www.pandesign.co.uk
P&I DESIGN	V1096030_DWG

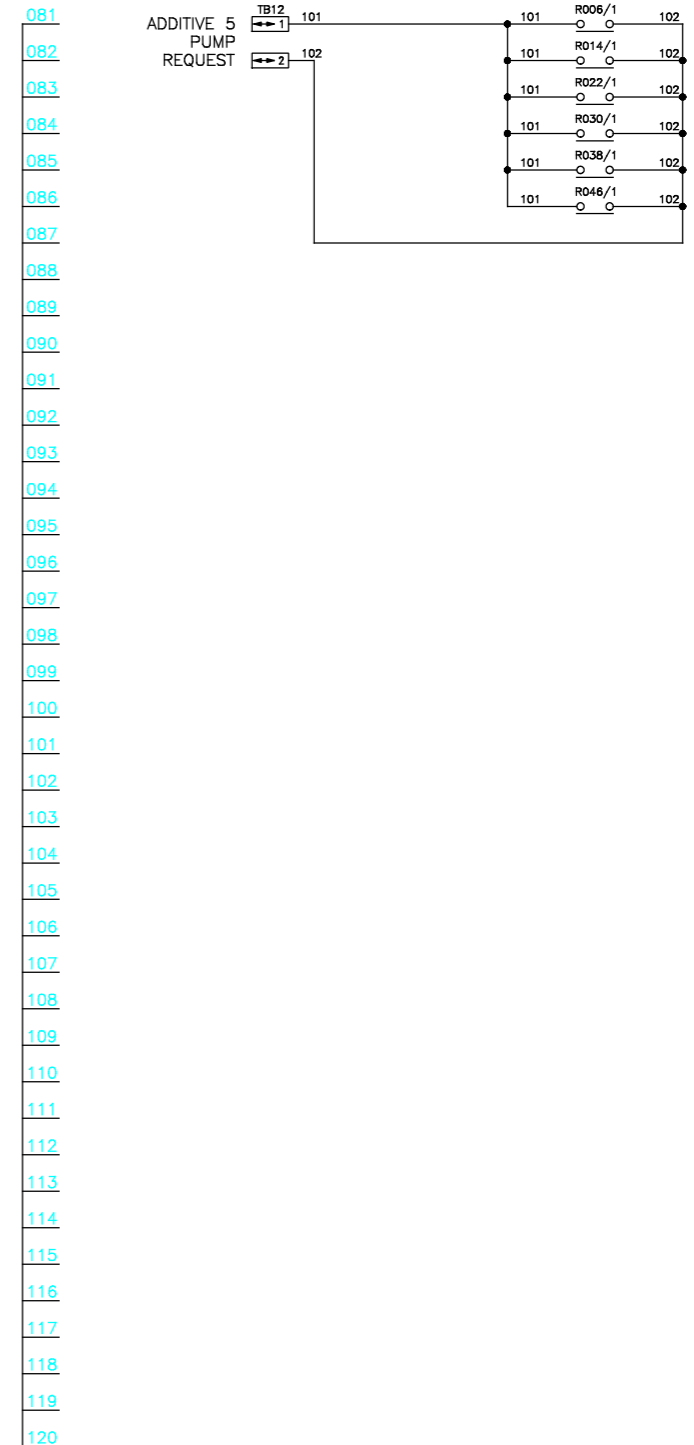
LEGEND OF GRAPHICAL SYMBOLS (ALL CONTACTS SHOWN IN THE DE-ENERGISED STATE)



LAST NUMBER USED : 30
 SPARE TO : 050



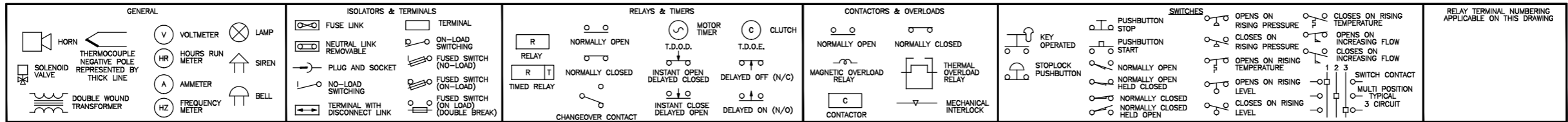
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 SPARE TO : 100



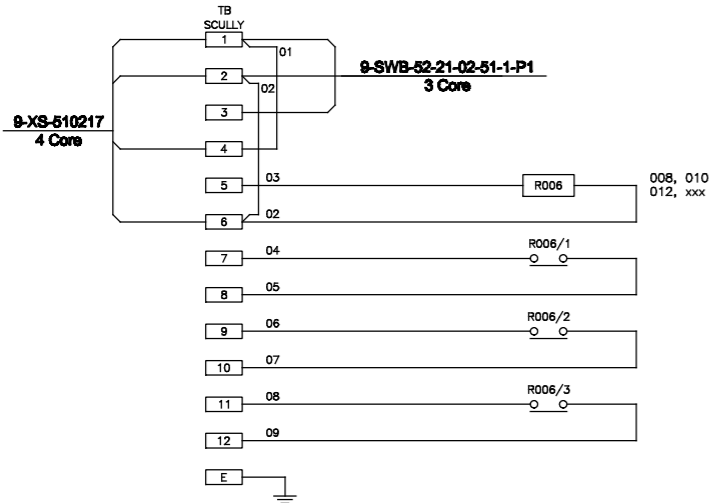
LAST NUMBER USED : 102
 SPARE TO : 150

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED							PLANT	VIVERO FUELS	
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	TITLE	ADDITIVE PUMP REQUEST CONTROL	
A	18/04/18	P.J.P	D.A.Y	D.R.P	P.J.P	ISSUED FOR REVIEW	STATION 0-JB-510104 LOGIC DRAWING 1		
							CLIENT DRG. No.	SHEET 1 OF 1	
							***	P&I DESIGN Ltd Tel: 25642 64344 www.pandesign.co.uk	
							P&I DESIGN V1096031_DWG		

LEGEND OF GRAPHICAL SYMBOLS (ALL CONTACTS SHOWN IN THE DE-ENERGISED STATE)



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LAST NUMBER USED : 30
SPARE TO : 050

LAST NUMBER USED : 64
SPARE TO : 100

LAST NUMBER USED : 102
SPARE TO : 150

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED							PLANT	VIVERO FUELS
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	TITLE	GANTRY 1 SCULLY INTERFACE CONTROL PANEL LOGIC DRAWING 1
A	18/04/16	P.J.P	D.A.Y	D.R.P	P.J.P	ISSUED FOR REVIEW		

CLIENT DRG. No. ***

SHEET 1 OF 1

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P&I DESIGN

P&I DESIGN Ltd. Tel. 25642 643444 www.pandesign.co.uk

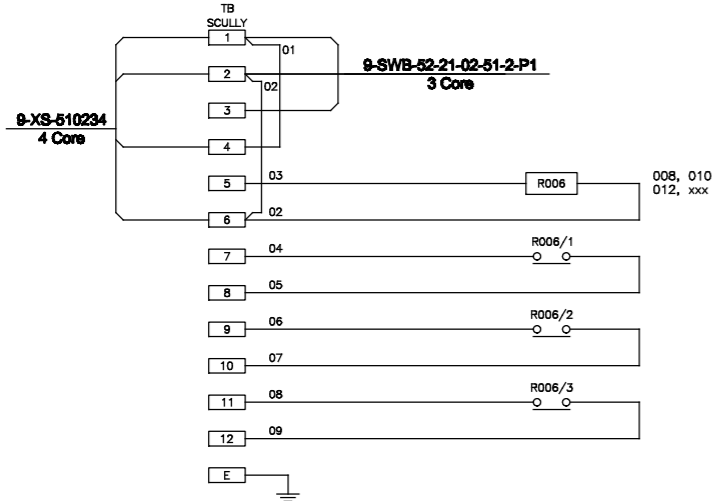
SHEET 1 OF 1

P&I DRG No. V1065032_DWG

LEGEND OF GRAPHICAL SYMBOLS (ALL CONTACTS SHOWN IN THE DE-ENERGISED STATE)

<p>GENERAL</p> <p>HORN</p> <p>THERMOCOUPLE NEGATIVE POLE REPRESENTED BY THICK LINE</p> <p>SOLENOID VALVE</p> <p>DOUBLE WOUND TRANSFORMER</p> <p>VOLTMETER</p> <p>HOURS RUN METER</p> <p>AMMETER</p> <p>FREQUENCY METER</p> <p>LAMP</p> <p>SIREN</p> <p>BELL</p>	<p>ISOLATORS & TERMINALS</p> <p>FUSE LINK</p> <p>NEUTRAL LINK REMOVABLE</p> <p>PLUG AND SOCKET</p> <p>NO-LOAD SWITCHING</p> <p>TERMINAL WITH DISCONNECT LINK</p> <p>TERMINAL</p> <p>ON-LOAD SWITCHING</p> <p>FUSED SWITCH (NO-LOAD)</p> <p>FUSED SWITCH (ON-LOAD)</p> <p>FUSED SWITCH (ON LOAD) (DOUBLE BREAK)</p>	<p>RELAYS & TIMERS</p> <p>RELAY</p> <p>TIMED RELAY</p> <p>NORMALLY OPEN</p> <p>NORMALLY CLOSED</p> <p>CHANGEOVER CONTACT</p> <p>MOTOR TIMER</p> <p>T.D.O.D.</p> <p>INSTANT OPEN DELAYED CLOSED</p> <p>INSTANT CLOSE DELAYED OPEN</p> <p>CLUTCH</p> <p>T.D.O.E.</p> <p>DELAYED OFF (N/O)</p> <p>DELAYED ON (N/O)</p>	<p>CONTACTORS & OVERLOADS</p> <p>RELAY</p> <p>NORMALLY OPEN</p> <p>NORMALLY CLOSED</p> <p>MAGNETIC OVERLOAD RELAY</p> <p>CONTACTOR</p> <p>THERMAL OVERLOAD RELAY</p> <p>MECHANICAL INTERLOCK</p>	<p>SWITCHES</p> <p>KEY OPERATED</p> <p>STOPLOCK PUSHBUTTON</p> <p>PUSHBUTTON STOP</p> <p>PUSHBUTTON START</p> <p>NORMALLY OPEN</p> <p>NORMALLY OPEN HELD CLOSED</p> <p>NORMALLY CLOSED</p> <p>NORMALLY CLOSED HELD OPEN</p> <p>OPENS ON RISING PRESSURE</p> <p>CLOSES ON RISING PRESSURE</p> <p>OPENS ON RISING TEMPERATURE</p> <p>CLOSES ON RISING TEMPERATURE</p> <p>OPENS ON INCREASING FLOW</p> <p>CLOSES ON INCREASING FLOW</p> <p>OPENS ON RISING TEMPERATURE</p> <p>CLOSES ON RISING LEVEL</p> <p>CLOSES ON RISING LEVEL</p> <p>SWITCH CONTACT</p> <p>MULTI POSITION</p> <p>TYPICAL</p> <p>3 CIRCUIT</p>	<p>RELAY TERMINAL NUMBERING APPLICABLE ON THIS DRAWING</p>
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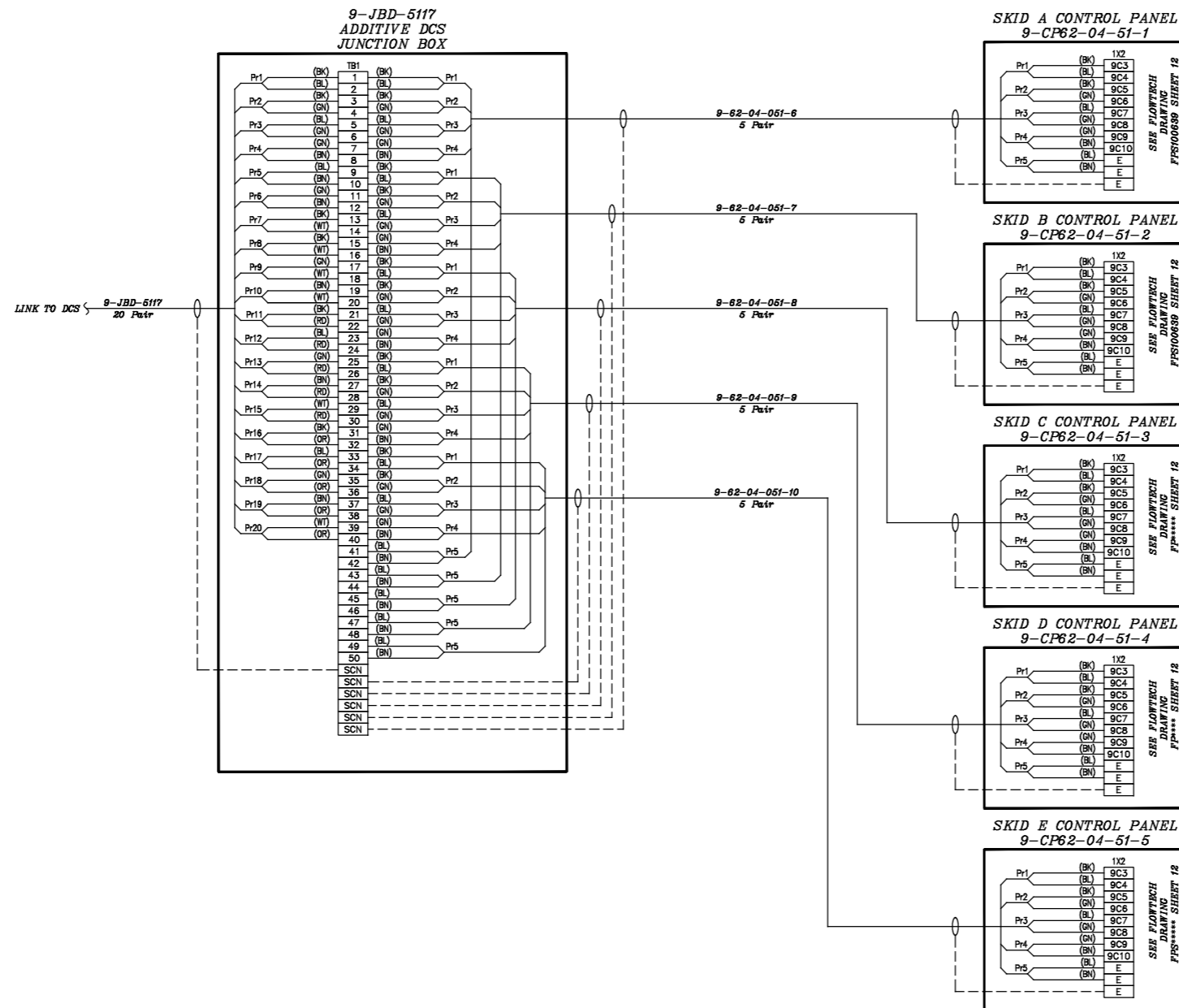
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LAST NUMBER USED : 30
SPARE TO : 050

LAST NUMBER USED : 64
SPARE TO : 100

LAST NUMBER USED : 102
SPARE TO : 150

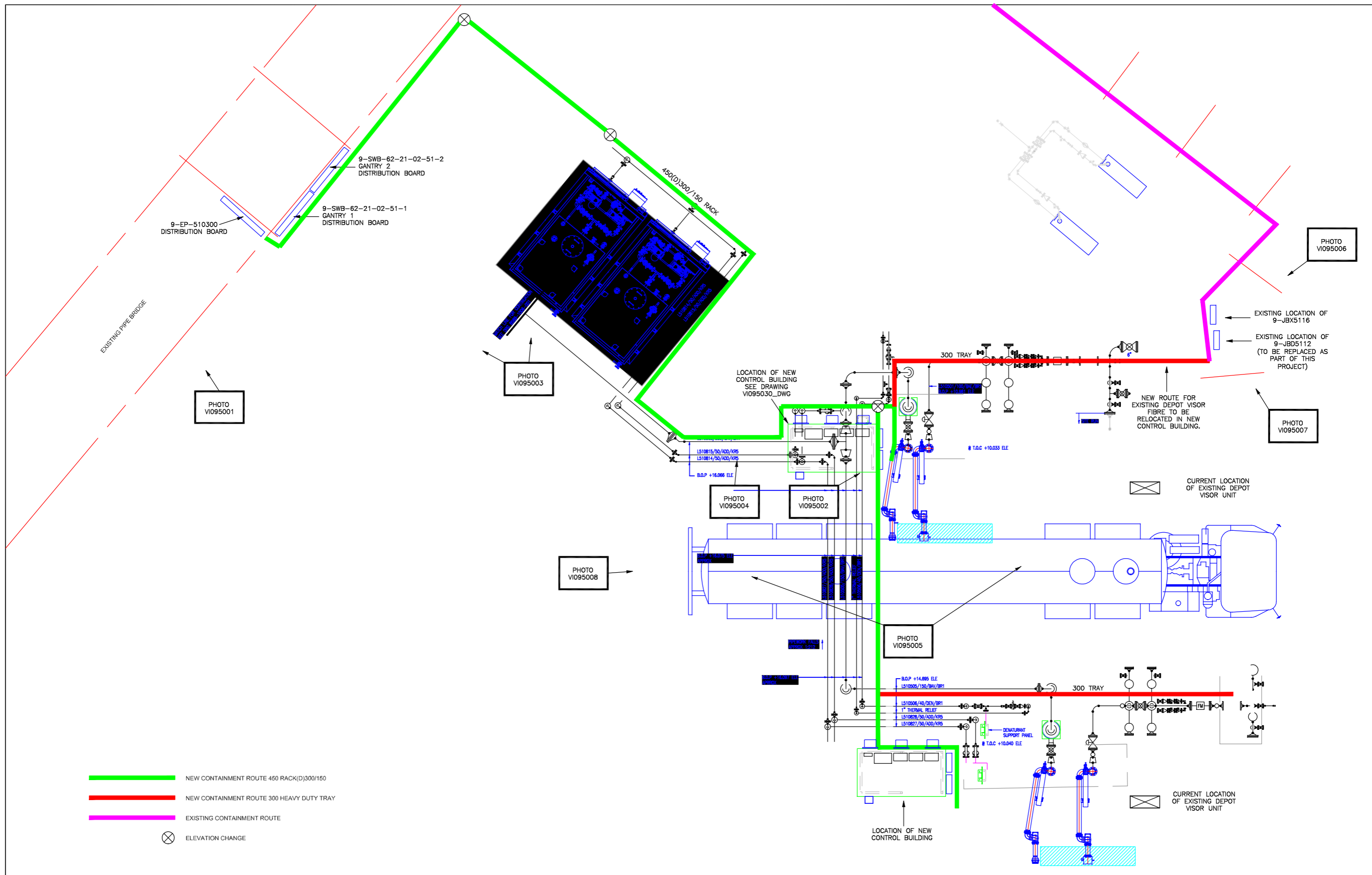
IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED						PLANT	VIVERO FUELS
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	TITLE
A	18/04/16	P.J.P	D.A.Y	D.R.P	P.J.P	ISSUED FOR REVIEW	GANTRY 2 SCULLY INTERFACE CONTROL PANEL LOGIC DRAWING 1
						CLIENT DRG. No.	SHEET 1 OF 1
						***	P&I Design Ltd Tel. 25642 643444 www.pandesign.co.uk
						P&I DRG No.	V1095033_DWG



IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED							PLANT	VIVERO FUELS	
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	TITLE	DCS ADDITIVE JUNCTION BOX 9-JBD-5117 TERMINATION DETAILS	
C	08/09/16	D.R.P	D.A.Y	D.R.P	P.J.P	FOR CONSTRUCTION			

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 Tel. 02642 229444
 www.pandesign.co.uk

CLIENT DRG. No. ******* SHEET 1 OF 1
 P&I DRG No. **V1096034_DWG**



- NEW CONTAINMENT ROUTE 450 RACK(D)300/150
- NEW CONTAINMENT ROUTE 300 HEAVY DUTY TRAY
- EXISTING CONTAINMENT ROUTE
- X ELEVATION CHANGE

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	TITLE
A	08/09/16	P.J.P	D.A.Y	D.R.P	P.J.P	ISSUED FOR REVIEW	VIVERGO FUELS	GANTRY CONTAINMENT AND EQUIPMENT LAYOUT DRAWING

CLIENT DRG. No. ***	<p style="font-size: small; margin: 0;">P & I Design Ltd Tel. 01642 619444 www.pldesig.co.uk</p> <p style="margin: 0;">SHEET 1 OF 1 P&I DRG No. V1095040_DWG</p>
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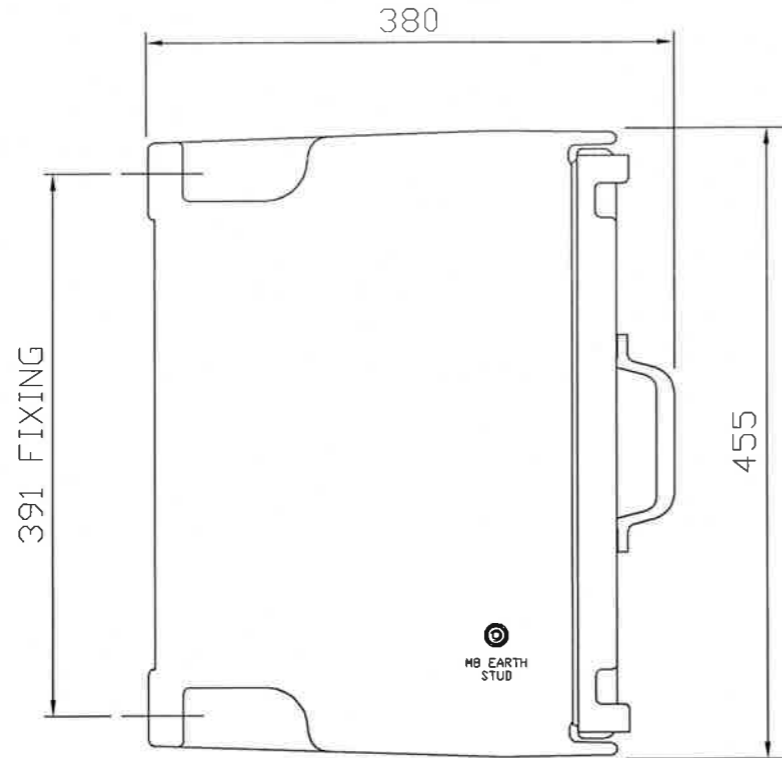
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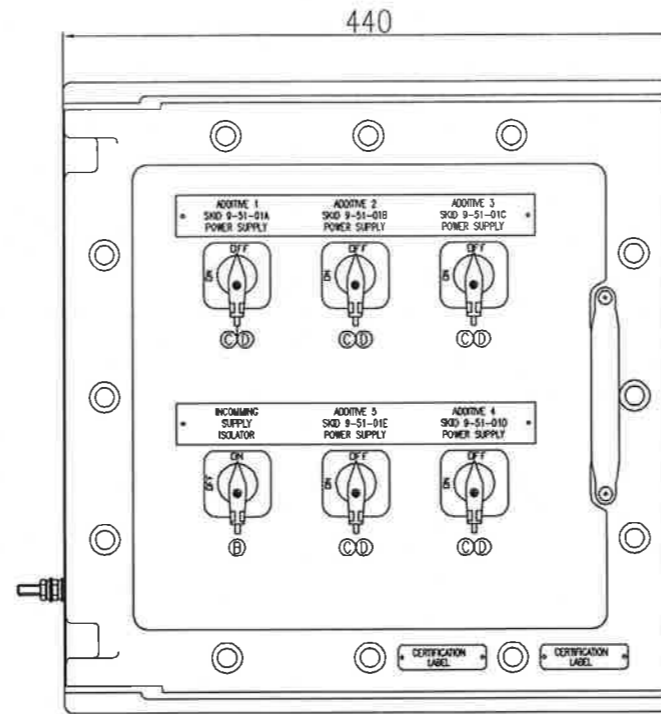
IF IN DOUBT ASK

3rd ANGLE PROJECTION

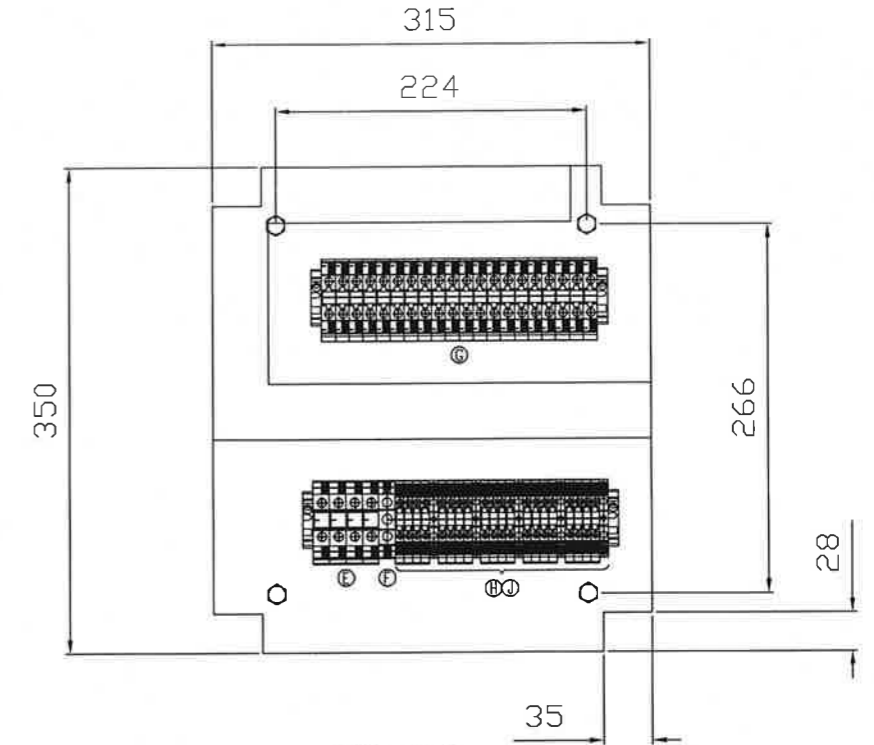
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A	1	ENCLOSURE	954 09	A.T.X.
B	1	ISOLATOR 63A	B263-41400-UK024	A.T.X.
C	5	MCB 4P 6A	24481	SCHNEIDER
D	5	MCB MECHANISMS	27046	SCHNEIDER
E	4	16MM TERMINALS	WDU16	WEIDMULLER
F	1	16MM EARTH TERMINALS	WPE16	WEIDMULLER
G	20	10MM TERMINALS	WDU10	WEIDMULLER
H	20	4MM TERMINALS	WDU4	WEIDMULLER
J	5	4MM EARTH TERMINALS	WPE4	WEIDMULLER
K	-	DUTY LABELS	-	JB SYSTEMS



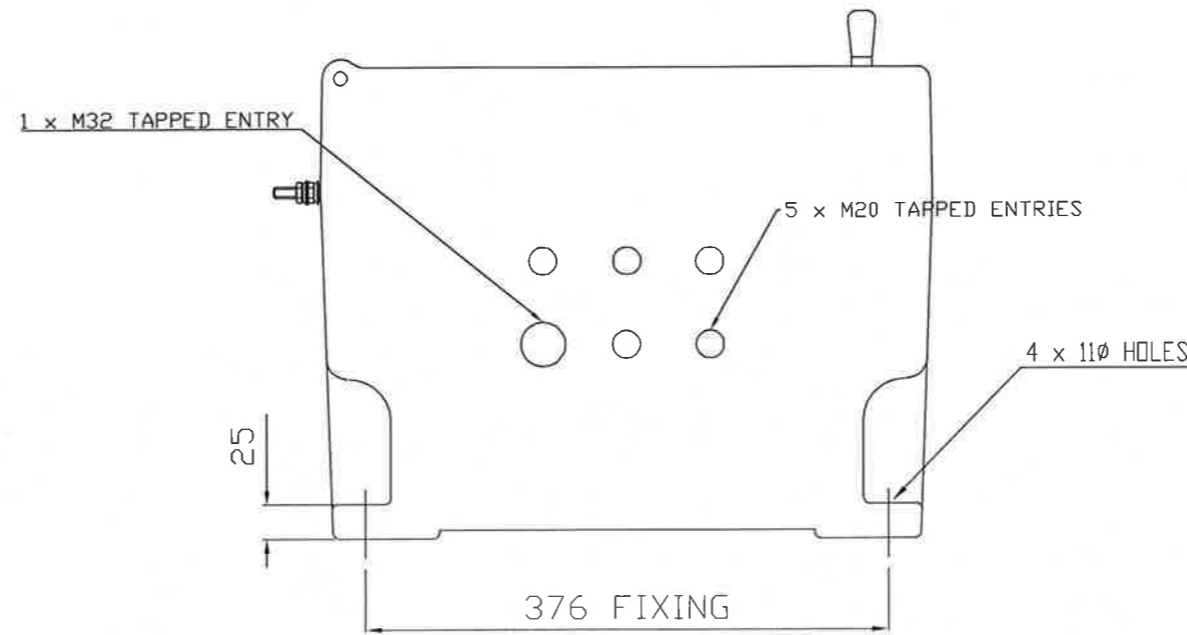
VIEW ON SIDE



FRONT VIEW



INNER PLATE



VIEW ON BOTTOM

ENCLOSURE TYPE CF50B REF: 954 09

1. All dimensions in millimeters
2. EEx"d" II-B T6 Certified to CENELEC EN 50 014/18 and EN 50281-1-1
3. LCIE Certificate: 02 ATEX 6057X and IECeX Certificate LCI 08.0023X
4. Protection index : IP66 according to EN 60529 and IEC 529
5. Material : Aluminium
6. Paint : Grey RAL 7038 suitable for a marine environment
7. Climatic protection : Suitable from -40°C to +55°C
8. Weight : 60 kg
9. Crossing earth terminal : M8
10. CAD Ref: Blank 09

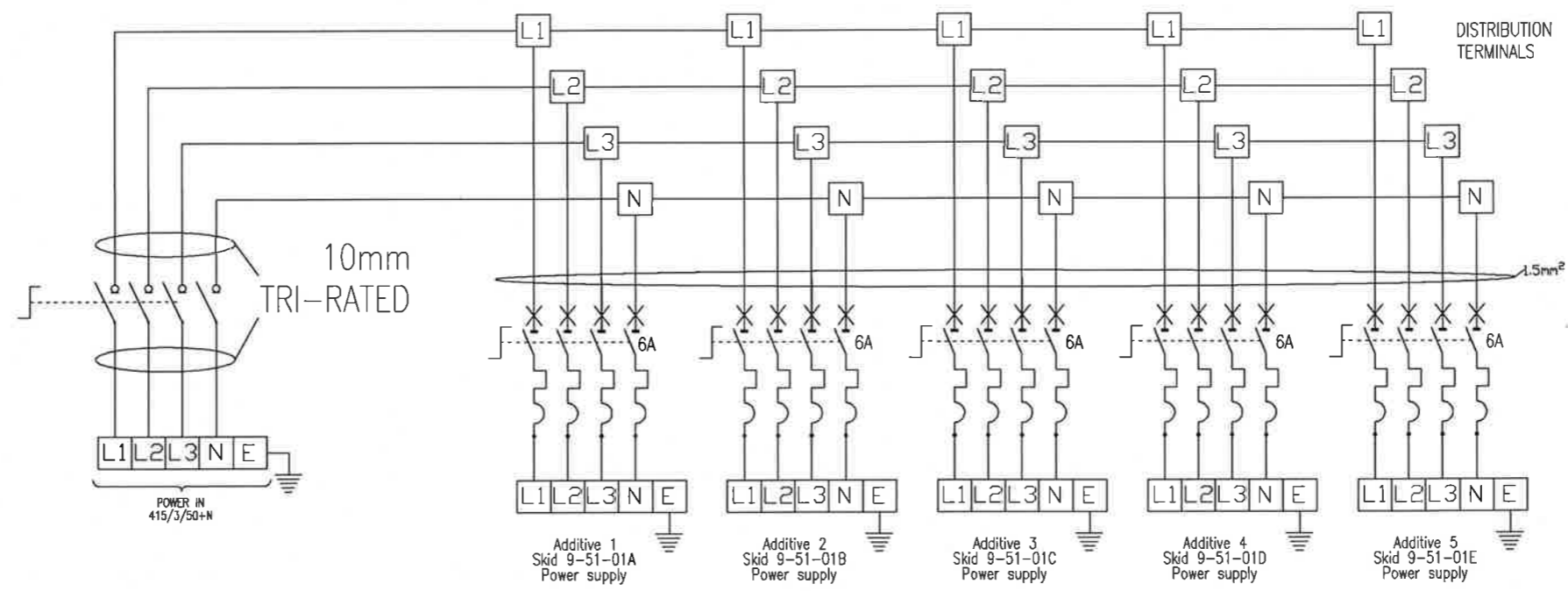
J.B. SYSTEMS LTD.

The Bridgegate Business Park
Gatehouse Way, Aylesbury
Bucks. HP19 8XN
E-mail: info@jbsystems.co.uk
Web Site: www.jbsystems.co.uk

TEL: (01296) 489967
FAX: (01296) 393515

IRIS FLAME MONITORING **Weidmüller** **Klippon** HAZARDOUS AREA **A.T.X.** ROSE **TESI** IGNITION EQUIPMENT

ISSUE	CHANGES	BY	DATE	CHK	DATE	TITLE	QTY:	SCALE:
2	REVISED AS PER COMMENTS	JM	06/04/16	PJ	06/04/16	415V DISTRIBUTION PANEL 954 09 ENCLOSURE	1	NTS
1	REVISED AS PER COMMENTS	JM	04/04/16	PJ	04/04/16	CLIENT 9-EP-510300 ETHANOL ADDITIVE SKID DISTRIBUTION BOARD		DATE: 01/04/16
0	FIRST ISSUE	JM	01/04/16	PJ	01/04/16	JOB NUMBER: 12749	CLIENT ORDER No: 124162	DRG No. 12749-A3-01



ALL MCBS ARE TYPE C

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 Bucks. HP19 8XN
 Tel: (01296) 489967



ISSUE	CHANGES	BY	DATE	CHK	DATE
2	REVISED AS PER COMMENTS	JM	06/04/16	PJ	06/04/16
1	REVISED AS PER COMMENTS	JM	04/04/16	PJ	04/04/16
0	FIRST ISSUE	JM	01/04/16	PJ	01/04/16

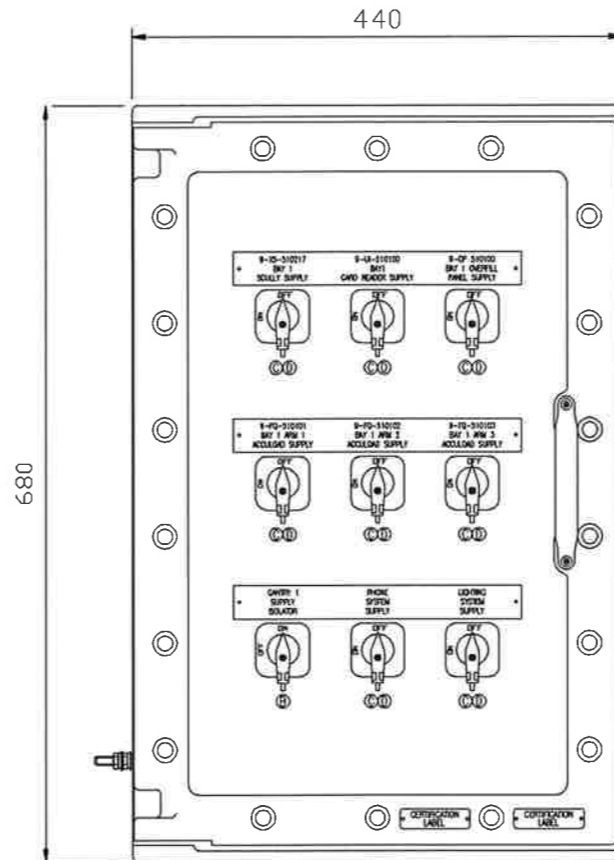
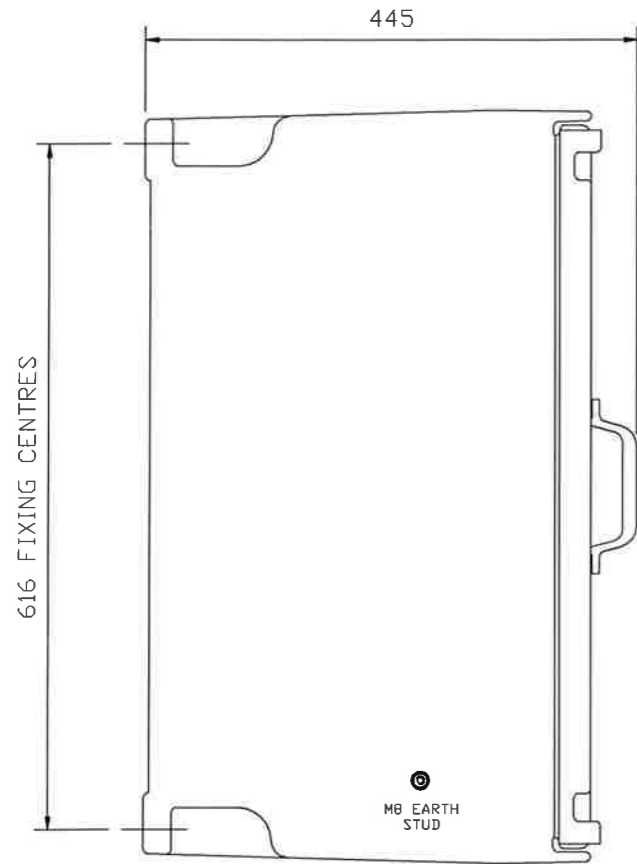
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CLIENT 9-EP-510300 ETHANOL ADDITIVE SKID DISTRIBUTION BOARD		DATE: 01/04/16	
JOB NUMBER: 12749	CLIENT ORDER No: 124162	DRG No. 12749-A4-02	

ALL DIMENSIONS IN mm

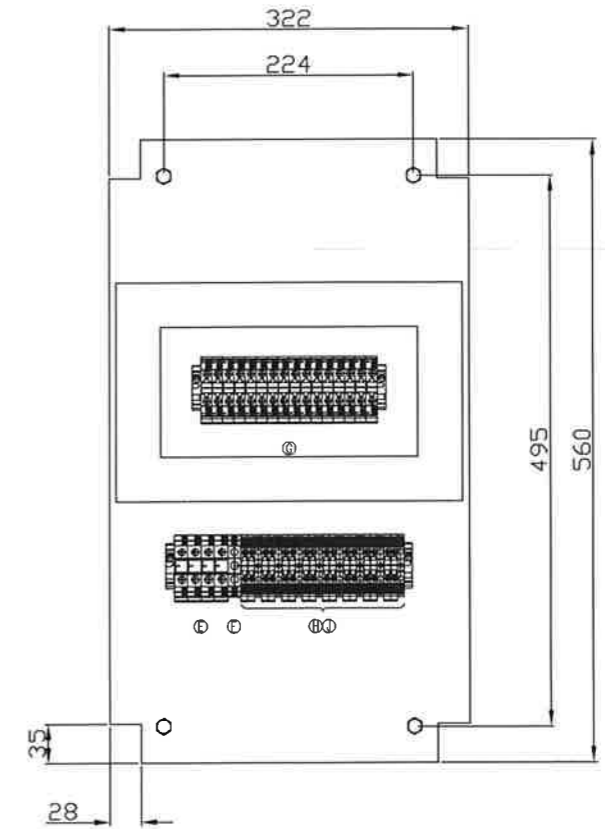
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IF IN DOUBT ASK

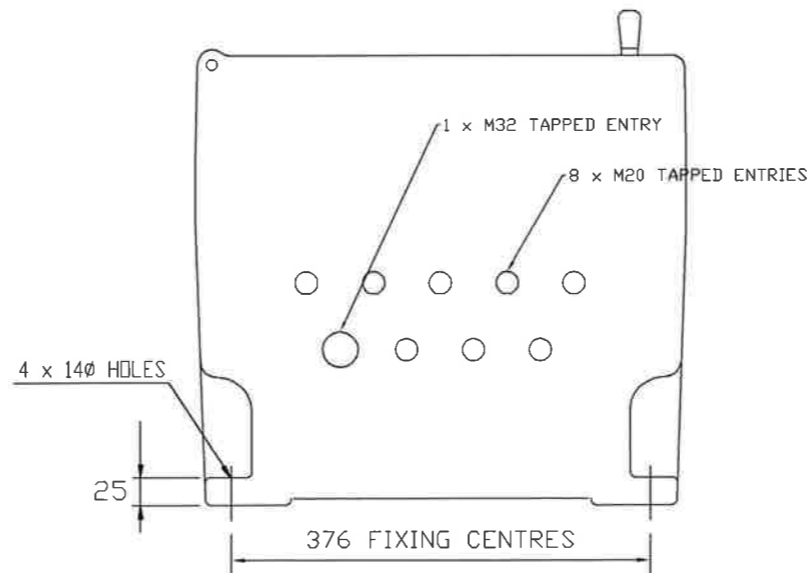
3rd ANGLE PROJECTION



ITEM	QTY	DESCRIPTION	PART No	SUPPLIER
A	1	ENCLOSURE	954 10	A.T.X.
B	1	ISOLATOR 63A	B263-41400-UK024	A.T.X.
C	8	MCB 2P 6A	24449	SCHNEIDER
D	8	MCB MECHANISMS	27046	SCHNEIDER
E	4	16MM TERMINALS	WDU16	WEIDMULLER
F	1	16MM EARTH TERMINALS	WPE16	WEIDMULLER
G	16	10MM TERMINALS	WDU10	WEIDMULLER
H	16	4MM TERMINALS	WDU4	WEIDMULLER
J	8	4MM EARTH TERMINALS	WPE4	WEIDMULLER
K	-	DUTY LABELS	-	JB SYSTEMS



INTERNAL LAYOUT PLATE



ENCLOSURE TYPE CF60B REF: 954 10

- 1. All dimensions in millimeters
- 2. II 2GD
- 3. Exd II-B T6 (EN/IEC 60079.0 60079.1)
- 4. LCIE Certificate: 02 ATEX 6057X and IECeX Certificate LCI 08.0023X
- 5. Protection index : IP66 according to IEC 60529
- 6. Material : Aluminium Alloy
- 7. Paint : Epoxy Powder Grey RAL 7038 suitable for a marine environment
- 8. Climatic protection : Suitable from -50°C to +55°C
- 9. Weight : 112 Kg
- 10. Crossing earth terminal : M8

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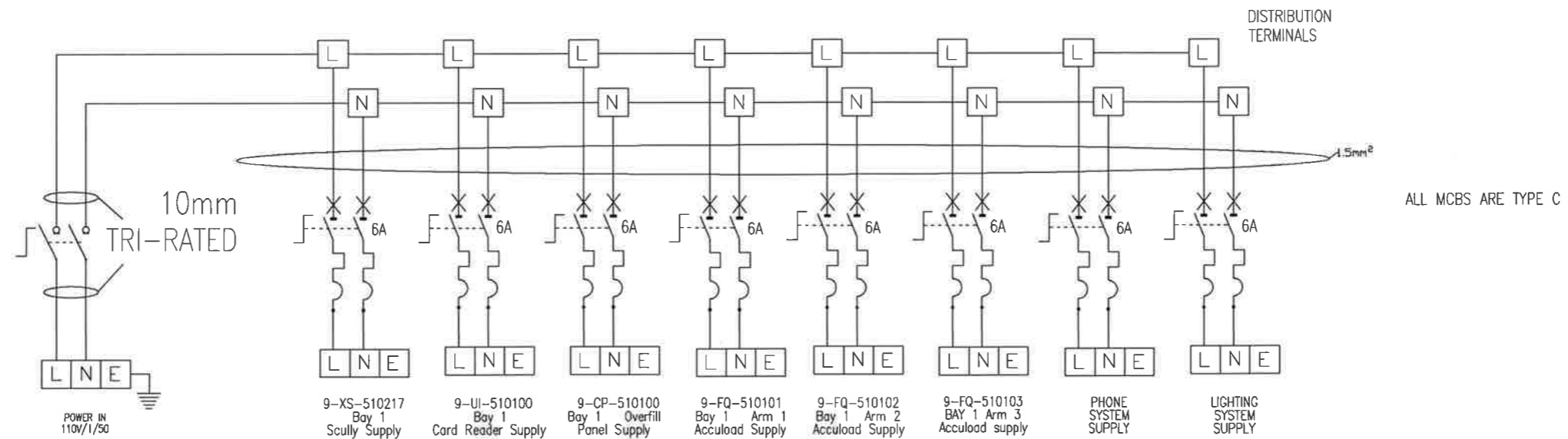
email: cad@jbsystems.co.uk
web: www.jbsystems.co.uk

The Bridgegate Business Park
Gatehouse Way, Aylesbury,
Bucks. HP19 8XN
Tel: (01296) 489967

IRIS FLAME MONITORING indEx ATEX AND IECEx EQUIPMENT A.T.X. ROSE TeSi IGNITION EQUIPMENT

ISSUE	CHANGES	BY	DATE	CHK	DATE
1	REVISED AS PER COMMENTS	JM	04/04/16	PJ	04/04/16
0	FIRST ISSUE	JM	01/04/16	PJ	01/04/16

TITLE	QTY:	SCALE:
110V DISTRIBUTION ENCLOSURE 954 10 - 1	1	NTS
CLIENT	DATE:	
9-EP-510301 GANTRY 1 AUX DISTRIBUTION BOARD	01/04/16	
JOB NUMBER:	CLIENT ORDER No:	DRG No.
12749	124162	12749-A3-03



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Tel: (01296) 489967

IRIS 
FLAME MONITORING

indEx
ATEX AND IECEX EQUIPMENT

A.T.X.

ROSE  **TeSi**
IGNITION EQUIPMENT

ISSUE	CHANGES	BY	DATE	CHK	DATE
1	REVISED AS PER COMMENTS	JM	04/04/16	PJ	04/04/16
0	FIRST ISSUE	JM	01/04/16	PJ	01/04/16

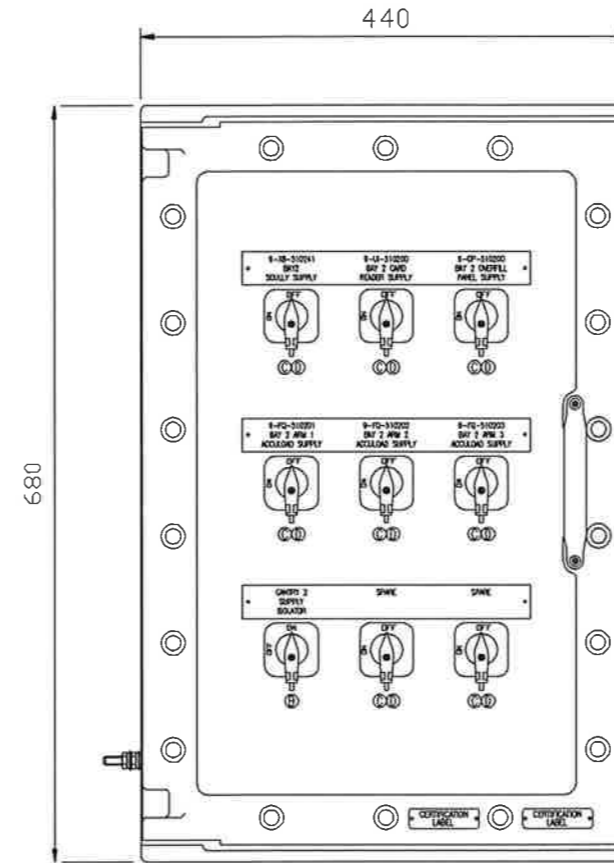
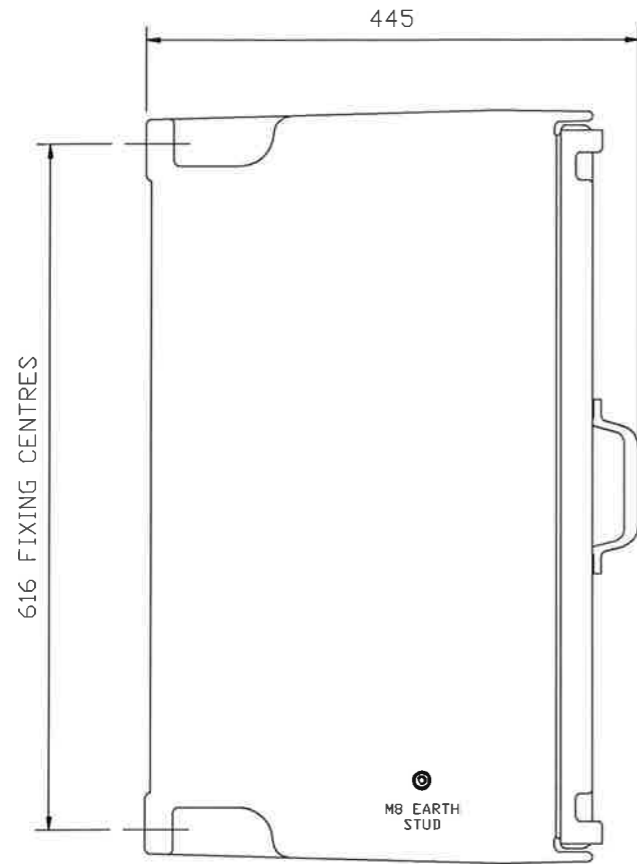
TITLE	QTY:	SCALE:
110V DISTRIBUTION BOARD WIRING - 1	1	NTS
CLIENT	DATE:	
9-EP-510301 GANTRY 1 AUX DISTRIBUTION	01/04/16	
JOB NUMBER:	CLIENT ORDER No:	DRG No.
12749	124162	12749-A4-04

ALL DIMENSIONS IN mm

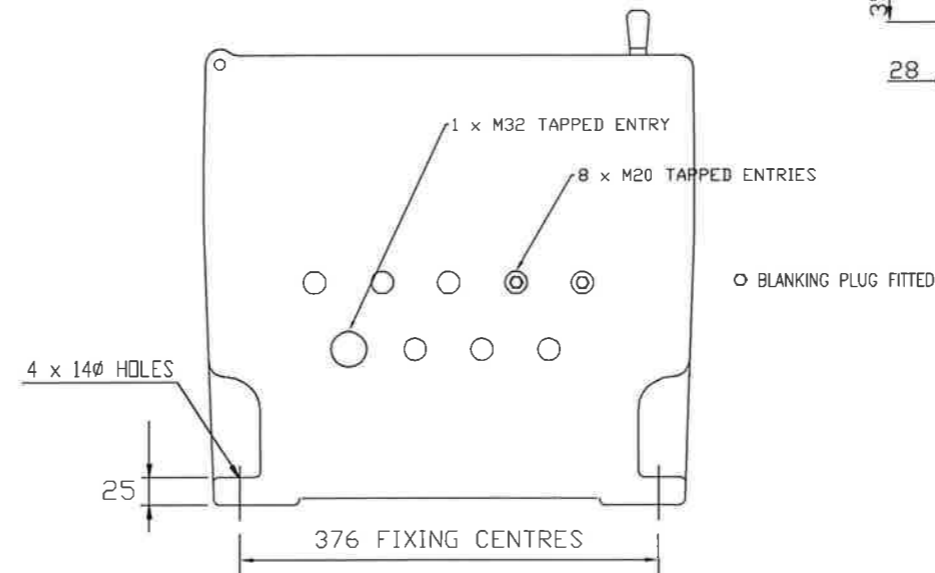
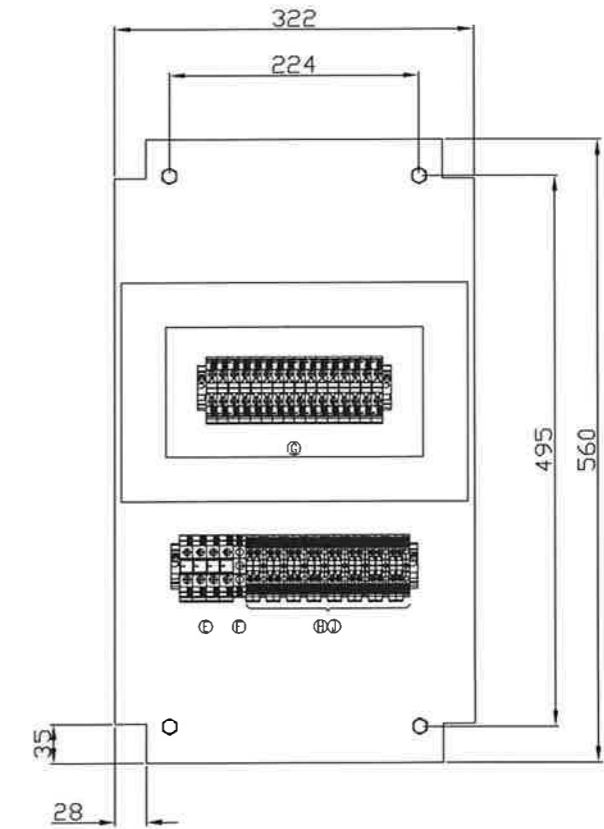
DO NOT SCALE

IF IN DOUBT ASK

3rd ANGLE PROJECTION



ITEM	QTY	DESCRIPTION	PART No	SUPPLIER
A	1	ENCLOSURE	954 10	A.T.X.
B	1	ISOLATOR 63A	B263-41400-UK024	A.T.X.
C	8	MCB 2P 6A	24449	SCHNEIDER
D	8	MCB MECHANISMS	27046	SCHNEIDER
E	4	16MM TERMINALS	WDU16	WEIDMULLER
F	1	16MM EARTH TERMINALS	WPE16	WEIDMULLER
G	16	10MM TERMINALS	WDU10	WEIDMULLER
H	16	4MM TERMINALS	WDU4	WEIDMULLER
J	8	4MM EARTH TERMINALS	WPE4	WEIDMULLER
K	-	DUTY LABELS	-	JB SYSTEMS



ENCLOSURE TYPE CF60B REF: 954 10

1. All dimensions in millimeters
2. II 2GD
3. Exd II-B T6 (EN/IEC 60079.0 60079.1)
4. LCIE Certificate: 02 ATEX 6057X and IECeX Certificate LCI 08.0023X
5. Protection index : IP66 according to IEC 60529
6. Material : Aluminium Alloy
7. Paint : Epoxy Powder Grey RAL 7038 suitable for a marine environment
8. Climatic protection : Suitable from -50°C to +55°C
9. Weight : 112 Kg
10. Crossing earth terminal : M8

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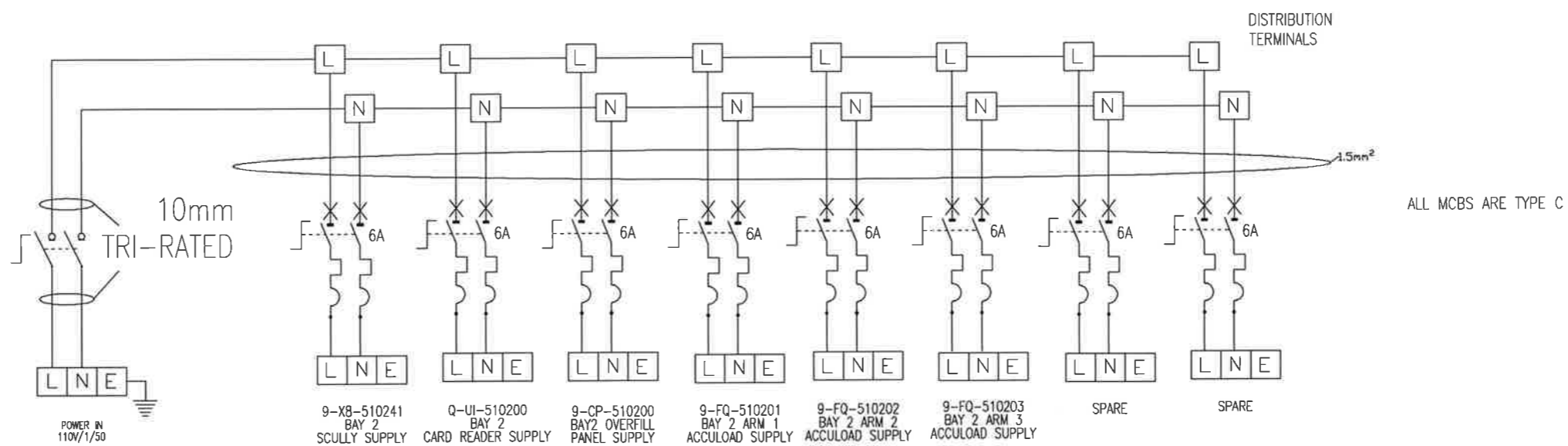
email: cad@jbsystems.co.uk
web: www.jbsystems.co.uk

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Gatehouse Way, Aylesbury,
Bucks. HP19 8XN
Tel: (01296) 489967



ISSUE	CHANGES	BY	DATE	CHK	DATE
1	REVISED AS PER COMMENTS	JM	04/04/16	PJ	04/04/16
0	FIRST ISSUE	JM	01/04/16	PJ	01/04/16

TITLE 110V DISTRIBUTION ENCLOSURE 954 10 - 2		QTY: 1	SCALE: NTS
CLIENT 9-EP-510302 GANTRY 2 AUX DISTRIBUTION BOARD		DATE: 01/04/16	
JOB NUMBER: 12749	CLIENT ORDER No: 124162	DRG No. 12749-A3-05	



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Tel: (01296) 489967



					TITLE		110V DISTRIBUTION BOARD WIRING - 2		QTY:	SCALE:
									1	NTS
					CLIENT		9-EP-510302 GANTRY 2 AUX DISTRIBUTION BOARD		DATE:	
									01/04/16	
1	REVISED AS PER COMMENTS				JM	04/04/16	PJ	04/04/16		
0	FIRST ISSUE				JM	01/04/16	PJ	01/04/16		
ISSUE	CHANGES				BY	DATE	CHK	DATE	JOB NUMBER:	CLIENT ORDER No:
									12749	124162
								DRG No.	12749-A4-06	

INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-SWB-62-04-51-P1	J05	70	5 Core	SWB-62-04 Auxiliary Power Distribution Board (63A)	ATEX II 2 G EExed	9-EP-510300 Ethanol Additive Skid Distribution Board	ATEX II 2 G EExed	300	MCCB overload to set at 63A
9-SWB-62-04-51-P2	J04	2.5	4 Core	9-EP-510300 Ethanol Additive Skid Distribution Board	ATEX II 2 G EExed	9CP62-04-51/1 Additive 1 Skid Power Supply	ATEX II 2 G EExed	30	
9-SWB-62-04-51-P3	J04	2.5	4 Core	9-EP-510300 Ethanol Additive Skid Distribution Board	ATEX II 2 G EExed	9CP62-04-51/2 Additive 2 Skid Power Supply	ATEX II 2 G EExed	30	
9-SWB-62-04-51-P4	J04	2.5	4 Core	9-EP-510300 Ethanol Additive Skid Distribution Board	ATEX II 2 G EExed	9CP62-04-51/3 Additive 3 Skid Power Supply	ATEX II 2 G EExed	30	Future
9-SWB-62-04-51-P5	J04	2.5	4 Core	9-EP-510300 Ethanol Additive Skid Distribution Board	ATEX II 2 G EExed	9CP62-04-51/4 Additive 4 Skid Power Supply	ATEX II 2 G EExed	30	Future
9-SWB-62-04-51-P6	J04	2.5	4 Core	9-EP-510300 Ethanol Additive Skid Distribution Board	ATEX II 2 G EExed	9CP62-04-51/5 Additive 5 Skid Power Supply	ATEX II 2 G EExed	30	Future
9-SWB-62-21-02		185	4 Core	SWB-62-21-02 110V distribution Board	ATEX II 2 G EExed	9-JB62-21-02-51 Junction Box	ATEX II 2 G EExed	300	Existing Cable - JB to replace
9-SWB-62-21-02-P1	J03	185	3 Core	9-JB62-21-02-51 Junction Box	ATEX II 2 G EExed	9-SWB-62-21-02-51-3 Splitter Junction Box	ATEX II 2 G EExed	60	
9-SWB-62-21-02-P2	J03	16	3 Core	9-SWB-62-21-02-51-3 Splitter Junction Box	ATEX II 2 G EExed	9-SWB-62-21-02-51-1 Gantry 1 Auxillary Distribution Board	ATEX II 2 G EExed	2	
9-SWB-62-21-02-P3	J03	16	3 Core	9-SWB-62-21-02-51-3 Splitter Junction Box	ATEX II 2 G EExed	9-SWB-62-21-02-51-1 Gantry 2 Auxillary Distribution Board	ATEX II 2 G EExed	2	
9-SWB-62-21-02-51-1-P1	J03	2.5	3 Core	9-SWB-62-21-02-51-1 Gantry 1 Auxillary Distribution Board	ATEX II 2 G EExed	9-XS-510210 Gantry 1 Scully System Supply	ATEX II 2 G EExed	45	Also detailed in VII095011_SCH
9-SWB-62-21-02-51-1-P2	J03	2.5	3 Core	9-SWB-62-21-02-51-1 Gantry 1 Auxillary Distribution Board	ATEX II 2 G EExed	9-FIU-5115-G1 Gantry 1 Card Reader System Supply	ATEX II 2 G EExed	45	Also detailed in VII095011_SCH
9-SWB-62-21-02-51-1-P3	J03	2.5	3 Core	9-SWB-62-21-02-51-1 Gantry 1 Auxillary Distribution Board	ATEX II 2 G EExed	9-FQ-510201-G1-A1 Gantry 1 Arm 1 Accuload Supply	ATEX II 2 G EExed	20	Also detailed in VII095011_SCH
9-SWB-62-21-02-51-1/P4	J03	2.5	3 Core	9-SWB-62-21-02-51-1 Gantry 1 Auxillary Distribution Board	ATEX II 2 G EExed	9-FQ-510201-G1-A2 Gantry 1 Arm 2 Accuload Supply	ATEX II 2 G EExed		Future
9-SWB-62-21-02-51-1/P5	J03	2.5	3 Core	9-SWB-62-21-02-51-1 Gantry 1 Auxillary Distribution Board	ATEX II 2 G EExed	9-FQ-510201-G1-A3 Gantry 1 Arm 3 Accuload Supply	ATEX II 2 G EExed		Future
9-SWB-62-21-02-51-1/P6	J03	TBC	3 Core	9-SWB-62-21-02-51-1 Gantry 1 Auxillary Distribution Board	ATEX II 2 G EExed	Spare Circuit	ATEX II 2 G EExed		
9-SWB-62-21-02-51-1/P7	J03	2.5	3 Core	9-SWB-62-21-02-51-1 Gantry 1 Auxillary Distribution Board	ATEX II 2 G EExed	110v Phone Supply	ATEX II 2 G EExed	50	
9-SWB-62-21-02-51-1/P8	J03	TBC	3 Core	9-SWB-62-21-02-51-1 Gantry 1 Auxillary Distribution Board	ATEX II 2 G EExed	Spare Circuit	ATEX II 2 G EExed		
9-SWB-62-21-02-51-2/P1	J03	2.5	3 Core	9-SWB-62-21-02-51-2 Gantry 2 Auxillary Distribution Board	ATEX II 2 G EExed	9-XS-510234 Gantry 2 Scully System Supply	ATEX II 2 G EExed	55	Also detailed in VII095014_SCH
9-SWB-62-21-02-51-2/P2	J03	2.5	3 Core	9-SWB-62-21-02-51-2 Gantry 2 Auxillary Distribution Board	ATEX II 2 G EExed	9-FIU-5115-G2 Gantry 2 Card Reader System Supply	ATEX II 2 G EExed	55	Also detailed in VII095014_SCH
9-SWB-62-21-02-51-2/P3	J03	2.5	3 Core	9-SWB-62-21-02-51-2 Gantry 2 Auxillary Distribution Board	ATEX II 2 G EExed	9-FQ-510225-G2-A1 Gantry 2 Arm 1 Accuload Supply	ATEX II 2 G EExed	30	Also detailed in VII095014_SCH
9-SWB-62-21-02-51-2/P4	J03	2.5	3 Core	9-SWB-62-21-02-51-2 Gantry 2 Auxillary Distribution Board	ATEX II 2 G EExed	9-FQ-510225-G2-A2 Gantry 2 Arm 2 Accuload Supply	ATEX II 2 G EExed		Future
9-SWB-62-21-02-51-2/P5	J03	2.5	3 Core	9-SWB-62-21-02-51-2 Gantry 2 Auxillary Distribution Board	ATEX II 2 G EExed	9-FQ-510225-G2-A3 Gantry 2 Arm 3 Accuload Supply	ATEX II 2 G EExed		Future
9-SWB-62-21-02-51-2/P6	J03	TBC	3 Core	9-SWB-62-21-02-51-2 Gantry 2 Auxillary Distribution Board	ATEX II 2 G EExed	Spare Circuit	ATEX II 2 G EExed		
9-SWB-62-21-02-51-2/P7	J03	TBC	3 Core	9-SWB-62-21-02-51-2 Gantry 2 Auxillary Distribution Board	ATEX II 2 G EExed	Spare Circuit	ATEX II 2 G EExed		
9-SWB-62-21-02-51-2/P8	J03	TBC	3 Core	9-SWB-62-21-02-51-2 Gantry 2 Auxillary Distribution Board	ATEX II 2 G EExed	Spare Circuit	ATEX II 2 G EExed		
							TOTAL	1114	

NOTES:

1) Refer to P&I Design Cable Specifications for details on Cable Type.

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Not part of this contract - cable numbers for future use
 Denotes Cable Deleted
 Denotes Cable Also on Loading Arm Schedule
 Denotes Existing Cable
 Future Cables

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	Vivergo Fuels -
A	13/04/16	DAY	DAY	PJP	PJP	Original Issue	TITLE	Ethanol Blending Power Distribution Cable Schedule
B	27/04/16	DAY	DAY	PJP	PJP	Tender Issue		
C	02/09/16	MM	MM	DRP	PJP	Construction Issue		



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-FQ-510201-G1-A1-1	J12	1.5	12 Core	9-FQ-510201-G1-A1 Gantry 1 Arm 1 Accuload	ATEX II 2 G EEExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EEExed	25	
9-FQ-510201-G1-A1-2	E20	0.75	20 Pair	9-FQ-510201-G1-A1 Gantry 1 Arm 1 Accuload	ATEX II 2 G EEExed	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EEExed	25	
9-FQ-510201-G1-A1-3	E10	0.75	10 Pair	9-FQ-510201-G1-A1 Gantry 1 Arm 1 Accuload	ATEX II 2 G EEExed	9-JB-510103 Gantry 1 Arm 1 Additive AC / DC Junction Box	ATEX II 2 G EEExed	25	
9-FQ-510201-G1-A1-4	J7	1.5	7 Core	9-FQ-510201-G1-A1 Gantry 1 Arm 1 Accuload	ATEX II 2 G EEExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EEExed	25	
9-FQ-510201-G1-A1-5	J7	1.5	7 Core	9-FQ-510201-G1-A1 Gantry 1 Arm 1 Accuload	ATEX II 2 G EEExed	9-JBD-510104 Additive Pump Request Control Station	ATEX II 2 G EEExed	25	
9-JB-510103-A1-1	J12	1.5	12 Core	9-JB-510103 Gantry 1 Arm 1 Additive AC / DC Junction Box	ATEX II 2 G EEExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EEExed	25	
9-FV-510201-G1-A1-1	J03	1.5	3 Core	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EEExed	9-FV-510201-G1-A1-1 Ethanol DCV Upstream Sov	ATEX II 2 G EEExed	35	
9-FV-510201-G1-A1-2	J03	1.5	3 Core	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EEExed	9-FV-510201-G1-A1-2 Ethanol DCV Downstream Sov	ATEX II 2 G EEExed	35	
9-FV-511101-G1-A1	J03	1.5	3 Core	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EEExed	9-FV-511101-G1-A1 Denaturant Sov	ATEX II 2 G EEExed	35	
9-FIU-5115-G1	E02	0.75	2 Pair	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EEExed	9-FIU-5115-G1 FIU Depot Visor Unit	ATEX II 2 G EEExed	25	Common to Gantry 1
9-XS-510217	J4	1.5	4 Core	9-JBD-510106 Gantry 1 Scully Interface Control Station	ATEX II 2 G EEExed	9-XS-510210 Scully Intellitrol Unit	ATEX II 2 G EEExed	25	
9-XS-510210	E02	0.75	2 Pair	9-XS-510201 Scully Intellitrol Unit	ATEX II 2 G EEExed	DCS (SIS) 9-JBX5116 Junction Box	ATEX II 2 G EEExed	35	
9-HS-510202A	E01	0.75	1 Pair	DCS (SIS) 9-JBX5116 Junction Box	ATEX II 2 G EEExed	9-HS-510202A ESD 1 Pushbutton	ATEX II 2 G EEExed	30	
9-HS-510202B	E01	0.75	1 Pair	DCS (SIS) 9-JBX5116 Junction Box	ATEX II 2 G EEExed	9-HS-510202B ESD 1 Pushbutton	ATEX II 2 G EEExed	30	
9-JBX-5116	E10	0.75	10 Pair	DCS (SIS) 9-JBX5116 Junction Box	ATEX II 2 G EEExed	DCS Link to Gantry 1 & 2	ATEX II 2 G EEExed	TBA	
9-JBD-510101	J7	1.5	7 Core	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EEExed	9-JBD-510106 Gantry 1 Scully Interface Control Station	ATEX II 2 G EEExed	30	
9-JBD-5112-G1	E20	0.75	20 Pair	DCS (BPCS) 9-JBD5112 Junction Box	ATEX II 2 G EEExed	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EEExed	35	
9-JBD-5112-1	E20	0.75	20 Pair	DCS (BPCS) 9-JBD5112 Junction Box	ATEX II 2 G EEExed	DCS Link to Gantry	ATEX II 2 G EEExed	TBA	
9-TS-510214-G1-A1	E02	0.75	2 Pair	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EEExed	9-TS-510214-G1-A1 Main Arm Temperature RTD	ATEX II 2 G EEExed	35	
9-FT-510201-G1-A1	E02	0.75	2 Pair	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EEExed	FT-510201-G1-A1 Main Arm Flowmeter	ATEX II 2 G EEExed	40	
9-FT-511101-G1-A1	J03	1.5	3 Core	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EEExed	FT-511101-G1-A1 Denaturant Flowmeter	ATEX II 2 G EEExed	40	
9-JBD-510101-1	J03	2.5	3 Core	Accuload Isolator	ATEX II 2 G EEExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EEExed	5	
9-SWB-62-21-02-51-1-P1	J03	2.5	3 Core	From Distribution Board 9-SWB-62-21-02-51-1	ATEX II 2 G EEExed	9-JBD-510106 Gantry 1 Scully Interface Control Station	ATEX II 2 G EEExed	45	
9-SWB-62-21-02-51-1-P2	J03	2.5	3 Core	From Distribution Board 9-SWB-62-21-02-51-1	ATEX II 2 G EEExed	9-FIU-5115-G1 FIU Depot Visor Unit	ATEX II 2 G EEExed	45	
9-SWB-62-21-02-51-1-P3	J03	2.5	3 Core	From Distribution Board 9-SWB-62-21-02-51-1	ATEX II 2 G EEExed	Arm 1 Accuload Isolator	ATEX II 2 G EEExed	20	
TOTAL								695	

NOTES:
1) Refer to P&I Design Cable Specifications for details on Cable Type.

	Not part of this contract
	Denotes Cable Deleted
	Denotes Cable Added
	Future Cables

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED										PLANT	Vivergo Fuels -
REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION	TITLE	Ethanol Blending Cable Schedule Gantry 1 Arm 1	
A	04/13/16	DAY	DAY	PJP	PJP	PJP	PJP	Original Issue			
B	27/04/16	DAY	DAY	PJP	PJP	PJP	PJP	Tender Issue			
C	02/09/16	PJP	PJP	DRP		MM		Construction Issue			
D	02/09/16	PJP	PJP	DRP		PJP		JBD 5117 Ammended			



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-62-04-051-1	E01	0.75	1 Pair	9-JBD-510104 Additive Pump Request Junction Box	ATEX II 2 G EExed	9-CP-62-04-051-1 Additive Skid Junction Box (Start)	ATEX II 2 G EExed	20	
9-62-04-051-2	E01	0.75	1 Pair	9-JBD-510104 Additive Pump Request Junction Box	ATEX II 2 G EExed	9-CP-62-04-051-2 Additive Skid Junction Box (Start)	ATEX II 2 G EExed	20	
9-62-04-051-3	E01	0.75	1 Pair	9-JBD-510104 Additive Pump Request Junction Box	ATEX II 2 G EExed	9-CP-62-04-051-3 Additive Skid Junction Box (Start)	ATEX II 2 G EExed		
9-62-04-051-4	E01	0.75	1 Pair	9-JBD-510104 Additive Pump Request Junction Box	ATEX II 2 G EExed	9-CP-62-04-051-4 Additive Skid Junction Box (Start)	ATEX II 2 G EExed		
9-62-04-051-5	E01	0.75	1 Pair	9-JBD-510104 Additive Pump Request Junction Box	ATEX II 2 G EExed	9-CP-62-04-051-5 Additive Skid Junction Box (Start)	ATEX II 2 G EExed		
9-62-04-051-6	E05	0.75	5 Pair	9-JBD-510105 Additive DCS Junction Box	ATEX II 2 G EExed	9-CP-62-04-051-1 Additive Skid Junction Box (Level)	ATEX II 2 G EExed	20	
9-62-04-051-7	E05	0.75	5 Pair	9-JBD-510105 Additive DCS Junction Box	ATEX II 2 G EExed	9-CP-62-04-051-2 Additive Skid Junction Box (Level)	ATEX II 2 G EExed	20	
9-62-04-051-8	E05	0.75	5 Pair	9-JBD-510105 Additive DCS Junction Box	ATEX II 2 G EExed	9-CP-62-04-051-3 Additive Skid Junction Box (Level)	ATEX II 2 G EExed		
9-62-04-051-9	E05	0.75	5 Pair	9-JBD-510105 Additive DCS Junction Box	ATEX II 2 G EExed	9-CP-62-04-051-4 Additive Skid Junction Box (Level)	ATEX II 2 G EExed		
9-62-04-051-10	E05	0.75	5 Pair	9-JBD-510105 Additive DCS Junction Box	ATEX II 2 G EExed	9-CP-62-04-051-5 Additive Skid Junction Box (Level)	ATEX II 2 G EExed		
9-FV-511101-G1-A1	J03	1.5	3 Core	9-JB-510103 Gantry 1 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511101-G1-A1 Additive 1 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-511101-G1-A1	J03	1.5	3 Core	9-JB-510103 Gantry 1 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511101-G1-A1 Additive 1 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-511102-G1-A1	J03	1.5	3 Core	9-JB-510103 Gantry 1 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511102-G1-A1 Additive 2 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-511102-G1-A1	J03	1.5	3 Core	9-JB-510103 Gantry 1 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511102-G1-A1 Additive 2 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-511103-G1-A1	J03	1.5	3 Core	9-JB-510103 Gantry 1 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511103-G1-A1 Additive 3 Control Valve	ATEX II 2 G EExed		
9-FT-511103-G1-A1	J03	1.5	3 Core	9-JB-510103 Gantry 1 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511103-G1-A1 Additive 3 Flowmeter	ATEX II 2 G EExed		
9-FV-511104-G1-A1	J03	1.5	3 Core	9-JB-510103 Gantry 1 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511104-G1-A1 Additive 4 Control Valve	ATEX II 2 G EExed		
9-FT-511104-G1-A1	J03	1.5	3 Core	9-JB-510103 Gantry 1 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511104-G1-A1 Additive 4 Flowmeter	ATEX II 2 G EExed		
9-FV-511105-G1-A1	J03	1.5	3 Core	9-JB-510103 Gantry 1 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511105-G1-A1 Additive 5 Control Valve	ATEX II 2 G EExed		
9-FT-511105-G1-A1	J03	1.5	3 Core	9-JB-510103 Gantry 1 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511105-G1-A1 Additive 5 Flowmeter	ATEX II 2 G EExed		
9-JBD-5117	E20	0.75	20 Pair	9-JBD-5117 Additive DCS Junction Box	ATEX II 2 G EExed	DCS Link to Additive Skids	ATEX II 2 G EExed	TBA	
TOTAL								120	

NOTES:

1) Refer to P&I Design Cable Specifications for details on Cable Type.

- Not part of this contract
- Denotes Cable Deleted
- Denotes Cable Added
- Future Cables

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION	PLANT	Vivergo Fuels -	
A	04/13/16	DAY	DAY	PJP	PJP	PJP	PJP	Original Issue	TITLE	Ethanol Blending Cable Schedule Gantry 1 Arm 1	
B	27/04/16	DAY	DAY	PJP	PJP	PJP	PJP	Tender Issue			
C	02/09/16	PJP	PJP	DRP	DRP	MM	MM	Construction Issue			
D	02/09/16	PJP	PJP	DRP		PJP		JBD 5117 Ammended			



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-FQ-510201-G1-A2-1	J12	1.5	12 Core	9-FQ-510201-G1-A2 Gantry 1 Arm 2 Accuload	ATEX II 2 G EExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510201-G1-A2-2	E20	0.75	20 Pair	9-FQ-510201-G1-A2 Gantry 1 Arm 2 Accuload	ATEX II 2 G EExed	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510201-G1-A2-3	E10	0.75	10 Pair	9-FQ-510201-G1-A2 Gantry 1 Arm 2 Accuload	ATEX II 2 G EExed	9-JB-510110 Gantry 1 Arm 2 Additive AC / DC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510201-G1-A2-4	J7	1.5	7 Core	9-FQ-510201-G1-A2 Gantry 1 Arm 2 Accuload	ATEX II 2 G EExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510201-G1-A2-5	J7	1.5	7 Core	9-FQ-510201-G1-A2 Gantry 1 Arm 2 Accuload	ATEX II 2 G EExed	9-JBD-510104 Additive Pump Request Control Station	ATEX II 2 G EExed	25	
9-JB-510110-A2-1	J12	1.5	12 Core	9-JB-510110 Gantry 1 Arm 2 Additive AC / DC Junction Box	ATEX II 2 G EExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	25	
9-FV-510201-G1-A2-1	J03	1.5	3 Core	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	9-FV-510201-G1-A2-1 Ethanol DCV Upstream Sov	ATEX II 2 G EExed	35	
9-FV-510201-G1-A2-2	J03	1.5	3 Core	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	9-FV-510201-G1-A2-2 Ethanol DCV Downstream Sov	ATEX II 2 G EExed	35	
9-FV-511101-G1-A2	J03	1.5	3 Core	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	9-FV-511101-G1-A2 Denaturant Sov	ATEX II 2 G EExed	35	
9-FIU-5115-G1	E02	0.75	2 Pair	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EExed	9-FIU-5115-G1 FIU Depot Visor Unit	ATEX II 2 G EExed	25	Common to Gantry 1
9-TS-510214-G1-A2	E02	0.75	2 Pair	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EExed	9-TS-510214-G1-A2 Main Arm Temperature RTD	ATEX II 2 G EExed	35	
9-FT-510201-G1-A2	E02	0.75	2 Pair	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EExed	FT-510201-G1-A2 Main Arm Flowmeter	ATEX II 2 G EExed	40	
9-FT-511101-G1-A2	J03	1.5	3 Core	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EExed	FT-511101-G1-A2 Denaturant Flowmeter	ATEX II 2 G EExed	40	
9-JBD-510101-2	J03	2.5	3 Core	Accuload Isolator	ATEX II 2 G EExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	5	
9-SWB-62-21-02-51-1-P4	J03	2.5	3 Core	From Distribution Board 9-SWB-62-21-02-51-1	ATEX II 2 G EExed	Arm 2 Accuload Isolator	ATEX II 2 G EExed	25	
TOTAL								425	

NOTES:
1) Refer to P&I Design Cable Specifications for details on Cable Type.

- Not part of this contract
- Denotes Cable Deleted
- Denotes Cable Added
- Future Cables

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	Vivergo Fuels -
A	02/09/16	PJP	PJP	DRP	MM	Construction Issue	TITLE	Ethanol Blending Cable Schedule Gantry 1 Arm 2



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-FV-511101-G1-A2	J03	1.5	3 Core	9-JB-510110 Gantry 1 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511101-G1-A2 Additive 1 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-511101-G1-A2	J03	1.5	3 Core	9-JB-510110 Gantry 1 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511101-G1-A2 Additive 1 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-511102-G1-A2	J03	1.5	3 Core	9-JB-510110 Gantry 1 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511102-G1-A2 Additive 2 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-511102-G1-A2	J03	1.5	3 Core	9-JB-510110 Gantry 1 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511102-G1-A2 Additive 2 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-511103-G1-A2	J03	1.5	3 Core	9-JB-510110 Gantry 1 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511103-G1-A2 Additive 3 Control Valve	ATEX II 2 G EExed		
9-FT-511103-G1-A2	J03	1.5	3 Core	9-JB-510110 Gantry 1 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511103-G1-A2 Additive 3 Flowmeter	ATEX II 2 G EExed		
9-FV-511104-G1-A2	J03	1.5	3 Core	9-JB-510110 Gantry 1 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511104-G1-A2 Additive 4 Control Valve	ATEX II 2 G EExed		
9-FT-511104-G1-A2	J03	1.5	3 Core	9-JB-510110 Gantry 1 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511104-G1-A2 Additive 4 Flowmeter	ATEX II 2 G EExed		
9-FV-511105-G1-A2	J03	1.5	3 Core	9-JB-510110 Gantry 1 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511105-G1-A2 Additive 5 Control Valve	ATEX II 2 G EExed		
9-FT-511105-G1-A2	J03	1.5	3 Core	9-JB-510110 Gantry 1 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511105-G1-A2 Additive 5 Flowmeter	ATEX II 2 G EExed		
							TOTAL	40	

NOTES:

1) Refer to P&I Design Cable Specifications for details on Cable Type.

- Not part of this contract
- Denotes Cable Deleted
- Denotes Cable Added
- Future Cables

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	Vivergo Fuels -
A	02/09/16	PJP	PJP	DRP	MM	Construction Issue	TITLE	Ethanol Blending Cable Schedule Gantry 1 Arm 2



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-FQ-510201-G1-A3-1	J12	1.5	12 Core	9-FQ-510201-G1-A3 Gantry 1 Arm 3 Accuload	ATEX II 2 G EExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510201-G1-A3-2	E20	0.75	20 Pair	9-FQ-510201-G1-A3 Gantry 1 Arm 3 Accuload	ATEX II 2 G EExed	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510201-G1-A3-3	E10	0.75	10 Pair	9-FQ-510201-G1-A3 Gantry 1 Arm 3 Accuload	ATEX II 2 G EExed	9-JB-510111 Gantry 1 Arm 3 Additive AC / DC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510201-G1-A3-4	J7	1.5	7 Core	9-FQ-510201-G1-A3 Gantry 1 Arm 3 Accuload	ATEX II 2 G EExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510201-G1-A3-5	J7	1.5	7 Core	9-FQ-510201-G1-A3 Gantry 1 Arm 3 Accuload	ATEX II 2 G EExed	9-JBD-510104 Additive Pump Request Control Station	ATEX II 2 G EExed	25	
9-JB-510111-A3-1	J12	1.5	12 Core	9-JB-510111 Gantry 1 Arm 3 Additive AC / DC Junction Box	ATEX II 2 G EExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	25	
9-FV-510201-G1-A3-1	J03	1.5	3 Core	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	9-FV-510201-G1-A3-1 Ethanol DCV Upstream Sov	ATEX II 2 G EExed	35	
9-FV-510201-G1-A3-2	J03	1.5	3 Core	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	9-FV-510201-G1-A3-2 Ethanol DCV Downstream Sov	ATEX II 2 G EExed	35	
9-FV-511101-G1-A3	J03	1.5	3 Core	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	9-FV-511101-G1-A3 Denaturant Sov	ATEX II 2 G EExed	35	
9-FIU-5115-G1	E02	0.75	2 Pair	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EExed	9-FIU-5115-G1 FIU Depot Visor Unit	ATEX II 2 G EExed	25	Common to Gantry 1
9-TS-510214-G1-A3	E02	0.75	2 Pair	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EExed	9-TS-510214-G1-A3 Main Arm Temperature RTD	ATEX II 2 G EExed	35	
9-FT-510201-G1-A3	E02	0.75	2 Pair	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EExed	FT-510201-G1-A3 Main Arm Flowmeter	ATEX II 2 G EExed	40	
9-FT-511101-G1-A3	J03	1.5	3 Core	9-JB-510102 Gantry 1 DC Junction Box	ATEX II 2 G EExed	FT-511101-G1-A3 Denaturant Flowmeter	ATEX II 2 G EExed	40	
9-JBD-510101-3	J03	2.5	3 Core	Accuload Isolator	ATEX II 2 G EExed	9-JBD-510101 Gantry 1 AC Junction Box	ATEX II 2 G EExed	5	
9-SWB-62-21-02-51-1-P5	J03	2.5	3 Core	From Distribution Board 9-SWB-62-21-02-51-1	ATEX II 2 G EExed	Arm 3 Accuload Isolator	ATEX II 2 G EExed	25	
TOTAL								425	

NOTES:
1) Refer to P&I Design Cable Specifications for details on Cable Type.

	Not part of this contract
	Denotes Cable Deleted
	Denotes Cable Added
	Future Cables

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED									
REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	Vivergo Fuels -	
A	02/09/16	PJP	PJP	DRP	MM	Construction Issue	TITLE	Ethanol Blending Cable Schedule Gantry 1 Arm 3	



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-FV-511101-G1-A3	J03	1.5	3 Core	9-JB-510111 Gantry 1 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511101-G1-A3 Additive 1 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-511101-G1-A3	J03	1.5	3 Core	9-JB-510111 Gantry 1 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511101-G1-A3 Additive 1 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-511102-G1-A3	J03	1.5	3 Core	9-JB-510111 Gantry 1 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511102-G1-A3 Additive 2 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-511102-G1-A3	J03	1.5	3 Core	9-JB-510111 Gantry 1 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511102-G1-A3 Additive 2 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-511103-G1-A3	J03	1.5	3 Core	9-JB-510111 Gantry 1 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511103-G1-A3 Additive 3 Control Valve	ATEX II 2 G EExed		
9-FT-511103-G1-A3	J03	1.5	3 Core	9-JB-510111 Gantry 1 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511103-G1-A3 Additive 3 Flowmeter	ATEX II 2 G EExed		
9-FV-511104-G1-A3	J03	1.5	3 Core	9-JB-510111 Gantry 1 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511104-G1-A3 Additive 4 Control Valve	ATEX II 2 G EExed		
9-FT-511104-G1-A3	J03	1.5	3 Core	9-JB-510111 Gantry 1 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511104-G1-A3 Additive 4 Flowmeter	ATEX II 2 G EExed		
9-FV-511105-G1-A3	J03	1.5	3 Core	9-JB-510111 Gantry 1 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-511105-G1-A3 Additive 5 Control Valve	ATEX II 2 G EExed		
9-FT-511105-G1-A3	J03	1.5	3 Core	9-JB-510111 Gantry 1 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-511105-G1-A3 Additive 5 Flowmeter	ATEX II 2 G EExed		
							TOTAL	40	

NOTES:
1) Refer to P&I Design Cable Specifications for details on Cable Type.

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REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	Vivergo Fuels -
A	02/09/16	PJP	PJP	DRP	MM	Construction Issue	TITLE	Ethanol Blending Cable Schedule Gantry 1 Arm 3

- Not part of this contract
- Denotes Cable Deleted
- Denotes Cable Added
- Future Cables



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-FQ-510225-G2-A1-1	J12	1.5	12 Core	9-FQ-510225-G2-A1 Gantry 2 Arm 1 Accuload	ATEX II 2 G EEExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EEExed	25	
9-FQ-510225-G2-A1-2	E20	0.75	20 Pair	9-FQ-510225-G2-A1 Gantry 2 Arm 1 Accuload	ATEX II 2 G EEExed	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EEExed	25	
9-FQ-510225-G2-A1-3	E10	0.75	10 Pair	9-FQ-510225-G2-A1 Gantry 2 Arm 1 Accuload	ATEX II 2 G EEExed	9-JB-510203 Gantry 2 Arm 1 Additive AC / DC Junction Box	ATEX II 2 G EEExed	25	
9-FQ-510225-G2-A1-4	J7	1.5	7 Core	9-FQ-510225-G2-A1 Gantry 2 Arm 1 Accuload	ATEX II 2 G EEExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EEExed	25	
9-FQ-510225-G2-A1-5	J7	1.5	7 Core	9-FQ-510225-G2-A1 Gantry 2 Arm 1 Accuload	ATEX II 2 G EEExed	9-JBD-510204 Additive Pump Request Control Station	ATEX II 2 G EEExed	25	
9-JB-510203-A1-1	J12	1.5	12 Core	9-JB-510203 Gantry 2 Arm 1 Additive AC / DC Junction Box	ATEX II 2 G EEExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EEExed	25	
9-FV-510225-G2-A1-1	J03	1.5	3 Core	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EEExed	9-FV-510225-G2-A1-1 Ethanol DCV Upstream Sov	ATEX II 2 G EEExed	35	
9-FV-510225-G2-A1-2	J03	1.5	3 Core	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EEExed	9-FV-510225-G2-A1-2 Ethanol DCV Downstream Sov	ATEX II 2 G EEExed	35	
9-FV-511201-G2-A1	J03	1.5	3 Core	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EEExed	9-FV-511201-G2-A1 Denaturant Sov	ATEX II 2 G EEExed	35	
9-FIU-5115-G2	E02	0.75	2 Pair	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EEExed	9-FIU-5115-G2 FIU Depot Visor Unit	ATEX II 2 G EEExed	25	Common to Gantry 2
9-XS-510234	J4	1.5	4 Core	9-JBD-510206 Gantry 2 Scully Interface Control Station	ATEX II 2 G EEExed	9-XS-510234 Scully Intellitrol Unit	ATEX II 2 G EEExed	25	
9-XS-510241	E02	0.75	2 Pair	9-XS-510234 Scully Intellitrol Unit	ATEX II 2 G EEExed	DCS (SIS) 9-JBX5116 Junction Box	ATEX II 2 G EEExed	35	
9-HS-510226A	E01	0.75	1 Pair	DCS (SIS) 9-JBX5116 Junction Box	ATEX II 2 G EEExed	9-HS-510226A ESD 1 Pushbutton	ATEX II 2 G EEExed	30	
9-HS-510226B	E01	0.75	1 Pair	DCS (SIS) 9-JBX5116 Junction Box	ATEX II 2 G EEExed	9-HS-510226B ESD 1 Pushbutton	ATEX II 2 G EEExed	30	
9-JBX-5116	E10	0.75	10 Pair	DCS (SIS) 9-JBX5116 Junction Box	ATEX II 2 G EEExed	DCS Link to Gantry 1 & 2	ATEX II 2 G EEExed	TBA	
9-JBD-510201	J7	1.5	7 Core	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EEExed	9-JBD-510206 Gantry 2 Scully Interface Control Station	ATEX II 2 G EEExed	30	
9-JBD-5112-G2	E20	0.75	20 Pair	DCS (BPCS) 9-JBD5112 Junction Box	ATEX II 2 G EEExed	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EEExed	35	
9-JBD-5112-2	E20	0.75	20 Pair	DCS (BPCS) 9-JBD5112 Junction Box	ATEX II 2 G EEExed	DCS Link to Gantry	ATEX II 2 G EEExed	TBA	
9-TS-510238-G2-A1	E02	0.75	2 Pair	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EEExed	9-TS-510238-G2-A1 Main Arm Temperature RTD	ATEX II 2 G EEExed	35	
9-FT-510225-G2-A1	E02	0.75	2 Pair	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EEExed	FT-510225-G2-A1 Main Arm Flowmeter	ATEX II 2 G EEExed	40	
9-FT-511201-G2-A1	J03	1.5	3 Core	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EEExed	FT-511201-G2-A1 Denaturant Flowmeter	ATEX II 2 G EEExed	40	
9-JBD-510201-1	J03	2.5	3 Core	Accuload Isolator	ATEX II 2 G EEExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EEExed	5	
9-SWB-62-21-02-51-2-P1	J03	2.5	3 Core	From Distribution Board 9-SWB-62-21-02-51-2	ATEX II 2 G EEExed	9-JBD-510206 Gantry 2 Scully Interface Control Station	ATEX II 2 G EEExed	55	
9-SWB-62-21-02-51-2-P2	J03	2.5	3 Core	From Distribution Board 9-SWB-62-21-02-51-2	ATEX II 2 G EEExed	9-FIU-5115-G2 FIU Depot Visor Unit	ATEX II 2 G EEExed	55	
9-SWB-62-21-02-51-2-P3	J03	2.5	3 Core	From Distribution Board 9-SWB-62-21-02-51-2	ATEX II 2 G EEExed	Arm 1 Accuload Isolator	ATEX II 2 G EEExed	30	
							TOTAL	725	

NOTES:

1) Refer to P&I Design Cable Specifications for details on Cable Type.

- Not part of this contract
- Denotes Cable Deleted
- Denotes Cable Added
- Future Cables

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	Vivergo Fuels -	
A	02/09/16	PJP	PJP	DRP	MM	Construction Issue	TITLE	Ethanol Blending Cable Schedule Gantry 2 Arm 1	



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-FV-512101-G2-A1	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512101-G2-A1 Additive 1 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-512101-G2-A1	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512101-G2-A1 Additive 1 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-512102-G2-A1	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512102-G2-A1 Additive 2 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-512102-G2-A1	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512102-G2-A1 Additive 2 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-512103-G2-A1	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512103-G2-A1 Additive 3 Control Valve	ATEX II 2 G EExed		
9-FT-512103-G2-A1	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512103-G2-A1 Additive 3 Flowmeter	ATEX II 2 G EExed		
9-FV-512104-G2-A1	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512104-G2-A1 Additive 4 Control Valve	ATEX II 2 G EExed		
9-FT-512104-G2-A1	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512104-G2-A1 Additive 4 Flowmeter	ATEX II 2 G EExed		
9-FV-512105-G2-A1	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512105-G2-A1 Additive 5 Control Valve	ATEX II 2 G EExed		
9-FT-512105-G2-A1	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 1 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512105-G2-A1 Additive 5 Flowmeter	ATEX II 2 G EExed		
							TOTAL	40	

NOTES:

1) Refer to P&I Design Cable Specifications for details on Cable Type.

- Not part of this contract
- Denotes Cable Deleted
- Denotes Cable Added
- Future Cables

IF NOT SIGNED THIS DOCUMENT IS UNCONTROLLED

REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	Vivergo Fuels -
A	02/09/16	PJP	PJP	DRP	MM	Construction Issue	TITLE	Ethanol Blending Cable Schedule Gantry 2 Arm 1



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-FQ-510225-G2-A2-1	J12	1.5	12 Core	9-FQ-510225-G2-A2 Gantry 2 Arm 2 Accuload	ATEX II 2 G EExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510225-G2-A2-2	E20	0.75	20 Pair	9-FQ-510225-G2-A2 Gantry 2 Arm 2 Accuload	ATEX II 2 G EExed	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510225-G2-A2-3	E10	0.75	10 Pair	9-FQ-510225-G2-A2 Gantry 2 Arm 2 Accuload	ATEX II 2 G EExed	9-JB-510203 Gantry 2 Arm 2 Additive AC / DC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510225-G2-A2-4	J7	1.5	7 Core	9-FQ-510225-G2-A2 Gantry 2 Arm 2 Accuload	ATEX II 2 G EExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510225-G2-A2-5	J7	1.5	7 Core	9-FQ-510225-G2-A2 Gantry 2 Arm 2 Accuload	ATEX II 2 G EExed	9-JBD-510204 Additive Pump Request Control Station	ATEX II 2 G EExed	25	
9-JB-510210-A2-1	J12	1.5	12 Core	9-JB-510203 Gantry 2 Arm 2 Additive AC / DC Junction Box	ATEX II 2 G EExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	25	
9-FV-510225-G2-A2-1	J03	1.5	3 Core	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	9-FV-510225-G2-A2-1 Ethanol DCV Upstream Sov	ATEX II 2 G EExed	35	
9-FV-510225-G2-A2-2	J03	1.5	3 Core	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	9-FV-510225-G2-A2-2 Ethanol DCV Downstream Sov	ATEX II 2 G EExed	35	
9-FV-511201-G2-A2	J03	1.5	3 Core	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	9-FV-511201-G2-A2 Denaturant Sov	ATEX II 2 G EExed	35	
9-FIU-5115-G2	E02	0.75	2 Pair	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EExed	9-FIU-5115-G2 FIU Depot Visor Unit	ATEX II 2 G EExed	25	Common to Gantry 2
9-TS-510238-G2-A2	E02	0.75	2 Pair	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EExed	9-TS-510238-G2-A2 Main Arm Temperature RTD	ATEX II 2 G EExed	35	
9-FT-510225-G2-A2	E02	0.75	2 Pair	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EExed	FT-510225-G2-A2 Main Arm Flowmeter	ATEX II 2 G EExed	40	
9-FT-511201-G2-A2	J03	1.5	3 Core	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EExed	FT-511201-G2-A2 Denaturant Flowmeter	ATEX II 2 G EExed	40	
9-JBD-510201-2	J03	2.5	3 Core	Accuload Isolator	ATEX II 2 G EExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	5	
9-SWB-62-21-02-51-2-P4	J03	2.5	3 Core	From Distribution Board 9-SWB-62-21-02-51-2	ATEX II 2 G EExed	Arm 2 Accuload Isolator	ATEX II 2 G EExed	30	
							TOTAL	430	

NOTES:

1) Refer to P&I Design Cable Specifications for details on Cable Type.

- Not part of this contract
- Denotes Cable Deleted
- Denotes Cable Added
- Future Cables

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REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	Vivergo Fuels -	
A	02/09/16	PJP	PJP	DRP	MM	Construction Issue	TITLE	Ethanol Blending Cable Schedule Gantry 2 Arm 2	



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-FV-512101-G2-A2	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512101-G2-A2 Additive 1 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-512101-G2-A2	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512101-G2-A2 Additive 1 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-512102-G2-A2	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512102-G2-A2 Additive 2 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-512102-G2-A2	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512102-G2-A2 Additive 2 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-512103-G2-A2	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512103-G2-A2 Additive 3 Control Valve	ATEX II 2 G EExed		
9-FT-512103-G2-A2	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512103-G2-A2 Additive 3 Flowmeter	ATEX II 2 G EExed		
9-FV-512104-G2-A2	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512104-G2-A2 Additive 4 Control Valve	ATEX II 2 G EExed		
9-FT-512104-G2-A2	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512104-G2-A2 Additive 4 Flowmeter	ATEX II 2 G EExed		
9-FV-512105-G2-A2	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512105-G2-A2 Additive 5 Control Valve	ATEX II 2 G EExed		
9-FT-512105-G2-A2	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 2 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512105-G2-A2 Additive 5 Flowmeter	ATEX II 2 G EExed		
							TOTAL	40	

NOTES:
1) Refer to P&I Design Cable Specifications for details on Cable Type.

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REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	Vivergo Fuels -
A	02/09/16	PJP	PJP	DRP	MM	Construction Issue	TITLE	Ethanol Blending Cable Schedule Gantry 2 Arm 2

- Not part of this contract
- Denotes Cable Deleted
- Denotes Cable Added
- Future Cables



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-FQ-510225-G2-A3-1	J12	1.5	12 Core	9-FQ-510225-G2-A3 Gantry 2 Arm 3 Accuload	ATEX II 2 G EExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510225-G2-A3-2	E20	0.75	20 Pair	9-FQ-510225-G2-A3 Gantry 2 Arm 3 Accuload	ATEX II 2 G EExed	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510225-G2-A3-3	E10	0.75	10 Pair	9-FQ-510225-G2-A3 Gantry 2 Arm 3 Accuload	ATEX II 2 G EExed	9-JB-510203 Gantry 2 Arm 3 Additive AC / DC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510225-G2-A3-4	J7	1.5	7 Core	9-FQ-510225-G2-A3 Gantry 2 Arm 3 Accuload	ATEX II 2 G EExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	25	
9-FQ-510225-G2-A3-5	J7	1.5	7 Core	9-FQ-510225-G2-A3 Gantry 2 Arm 3 Accuload	ATEX II 2 G EExed	9-JBD-510204 Additive Pump Request Control Station	ATEX II 2 G EExed	25	
9-JB-510210-A3-1	J12	1.5	12 Core	9-JB-510203 Gantry 2 Arm 3 Additive AC / DC Junction Box	ATEX II 2 G EExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	25	
9-FV-510225-G2-A3-1	J03	1.5	3 Core	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	9-FV-510225-G2-A3-1 Ethanol DCV Upstream Sov	ATEX II 2 G EExed	35	
9-FV-510225-G2-A3-2	J03	1.5	3 Core	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	9-FV-510225-G2-A3-2 Ethanol DCV Downstream Sov	ATEX II 2 G EExed	35	
9-FV-511201-G2-A3	J03	1.5	3 Core	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	9-FV-511201-G2-A3 Denaturant Sov	ATEX II 2 G EExed	35	
9-FIU-5115-G2	E02	0.75	2 Pair	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EExed	9-FIU-5115-G2 FIU Depot Visor Unit	ATEX II 2 G EExed	25	Common to Gantry 2
9-TS-510238-G2-A3	E02	0.75	2 Pair	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EExed	9-TS-510238-G2-A3 Main Arm Temperature RTD	ATEX II 2 G EExed	35	
9-FT-510225-G2-A3	E02	0.75	2 Pair	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EExed	FT-510225-G2-A3 Main Arm Flowmeter	ATEX II 2 G EExed	40	
9-FT-511201-G2-A3	J03	1.5	3 Core	9-JB-510202 Gantry 2 DC Junction Box	ATEX II 2 G EExed	FT-511201-G2-A3 Denaturant Flowmeter	ATEX II 2 G EExed	40	
9-JBD-510201-2	J03	2.5	3 Core	Accuload Isolator	ATEX II 2 G EExed	9-JBD-510201 Gantry 2 AC Junction Box	ATEX II 2 G EExed	5	
9-SWB-62-21-02-51-2-P4	J03	2.5	3 Core	From Distribution Board 9-SWB-62-21-02-51-2	ATEX II 2 G EExed	Arm 3 Accuload Isolator	ATEX II 2 G EExed	30	
TOTAL								430	

NOTES:
1) Refer to P&I Design Cable Specifications for details on Cable Type.

- Not part of this contract
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- Denotes Cable Added
- Future Cables

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REV	DATE	BY	DRN	CHK'D		APP'D		DESCRIPTION	PLANT
A	02/09/16	PJP	PJP	DRP		MM		Construction Issue	Vivergo Fuels -
									Ethanol Blending Cable Schedule Gantry 2 Arm 3



INSTRUMENT/ELECTRICAL CABLE SCHEDULE

CABLE		CONDUCTORS		CABLE ROUTE				APPROX. LENGTH METRES	REMARKS
REFERENCE	TYPE	AREA mm ²	No.	FROM	GLAND TYPE	TO	GLAND TYPE		
9-FV-512101-G2-A3	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512101-G2-A3 Additive 1 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-512101-G2-A3	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512101-G2-A3 Additive 1 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-512102-G2-A3	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512102-G2-A3 Additive 2 Control Valve	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FT-512102-G2-A3	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512102-G2-A3 Additive 2 Flowmeter	ATEX II 2 G EExed	10	Installed by Skid Manufacturer
9-FV-512103-G2-A3	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512103-G2-A3 Additive 3 Control Valve	ATEX II 2 G EExed		
9-FT-512103-G2-A3	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512103-G2-A3 Additive 3 Flowmeter	ATEX II 2 G EExed		
9-FV-512104-G2-A3	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512104-G2-A3 Additive 4 Control Valve	ATEX II 2 G EExed		
9-FT-512104-G2-A3	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512104-G2-A3 Additive 4 Flowmeter	ATEX II 2 G EExed		
9-FV-512105-G2-A3	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FV-512105-G2-A3 Additive 5 Control Valve	ATEX II 2 G EExed		
9-FT-512105-G2-A3	J03	1.5	3 Core	9-JB-510203 Gantry 2 Arm 3 Additive AC/DC Junction Box	ATEX II 2 G EExed	9-FT-512105-G2-A3 Additive 5 Flowmeter	ATEX II 2 G EExed		
TOTAL								40	

NOTES:

1) Refer to P&I Design Cable Specifications for details on Cable Type.

- Not part of this contract
- Denotes Cable Deleted
- Denotes Cable Added
- Future Cables

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REV	DATE	BY	DRN	CHK'D	APP'D	DESCRIPTION	PLANT	Vivergo Fuels -
A	02/09/16	PJP	PJP	DRP	MM	Construction Issue	TITLE	Ethanol Blending Cable Schedule Gantry 2 Arm 3



FPS100639 INJECTION, BLENDING & PUMPING SYSTEM SKID A

Electrical Project Drawings

NOTES

- ALL EQUIPMENT WITH A SEPARATE EXTERNAL EARTH CONNECTION SHOULD BE BONDED TO THE SKID.
- ALL SCREENS TO BE SLEEVED AND TERMINATED AT ONE END ONLY AS DETAILED IN THE ELECTRICAL SCHEMES. THE OTHER END TO BE ISOLATED, INSULATED AND TIED BACK. ENSURE EXPOSED WIRE LENGTH FROM SCREEN IS MINIMAL.
- WIRE NO. ARE AS SHOWN. PRINTER ON HEAT SHRINK WITH PERMANENT INK.
- CABLE IDENTIFIERS ARE SHOWN WITH CABLE PART NUMBER IN BRACKETS.
- CROSS REFERENCES BETWEEN SHEETS ARE SHOWN ON THE TOP LEFT HAND CORNER OF EACH SYMBOL.
- ON LINE DRAWINGS RED CABLES ARE AC AND BLUE CABLES ARE DC.

REV.	DATE	DESCRIPTION	BY.	CHKD.	APP.	NOTES	CUSTOMER DRAWING NUMBER
A	21/04/2016	Initial Design	K E	M D	R H		PROJECT #: SKID A Mivergo Fuels Project FPS100639
B	21/04/2016	Changed to 3Ph Power Supply	K E	M D	R H		DRAWING TITLE: INJECTION, BLENDING & PUMPING SYSTEM Cover page
C	06/05/2016	For Construction	K E	M D	R H		DRAWING #: FPS100639 01
D	14/07/2016	As Built	K E	M D	R H		ORDER #: DRAWN BY: K E
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Drawing	Revision	Date	Created by	Description	Titleblock
01	D	13/07/2016	K E	Cover page	Flotech Cover A2 2015
02	D	14/07/2016	K E	Drawing list	Flotech Drawing List A3 2015
03	D	13/07/2016	K E	Skid A Wiring line diagram AC	Flotech Line Diagram A2 2015
04	D	13/07/2016	K E	Skid A Wiring line diagram 24VDC	Flotech Line Diagram A2 2015
05	D	13/07/2016	K E	Skid A Electrical Scheme AC	Flotech Scheme Diagram A2 2015
06	D	13/07/2016	K E	Control Panel 1 Power Distribution	Flotech Scheme Diagram A2 2015
07	D	13/07/2016	K E	Skid A Electrical scheme 24VDC	Flotech Scheme Diagram A2 2015
08	D	13/07/2016	K E	CP1 Control Circuit	Flotech Scheme Diagram A2 2015
09	D	13/07/2016	K E	PLC drawing N1	Flotech Scheme Diagram A2 2015
10	D	13/07/2016	K E	PLC Drawing Extension N2 & N3	Flotech Scheme Diagram A2 2015
11	D	13/07/2016	K E	PLC Drawing Extension N4	Flotech Scheme Diagram A2 2015
12	D	13/07/2016	K E	External Signals to Site	Flotech Scheme Diagram A2 2015
13	D	14/07/2016	K E	PLC Inputs / Outputs list	Flotech Drawing List A3 2015
14	D	14/07/2016	K E	PLC Inputs / Outputs list	Flotech Drawing List A3 2015
15	D	14/07/2016	K E	List of the cables	Flotech Drawing List A3 2015
16	D	14/07/2016	K E	List of cable strands	Flotech Drawing List A3 2015
17	D	14/07/2016	K E	List of cable strands	Flotech Drawing List A3 2015

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	K.E	M.D	R.H	
B	21/04/2016	Changed to 3Ph Power Supply	K.E	M.D	R.H	
C	06/05/2016	For Construction	K.E	M.D	R.H	
D	14/07/2016	As Built	K.E	M.D	R.H	

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PROJECT NAME		SKID A Nivedra Fuels Project		CUSTOMER DRAWING NUMBER	
PROJECT #		FPS100639			
DRAWING TITLE		INJECTION, BLENDING & PUMPING SYSTEM			
DRAWING #		FPS100639			
ISSUED BY	DATE	ORDER #			
K.E	21/04/2016	02			
ISSUED BY	DATE	ORDER #			
N.T.S.					
ISSUED BY	DATE	ORDER #			
D					

SKID A


SITE SUPPLY 400VAC 3Ph + E

05-3-3
ISO-01 9-51-XSO1A
 Ex 20A Emergency Switch
 GHG 262 2301 R0007
 In = 20A

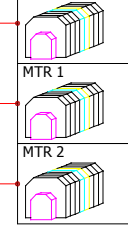


SKID A Control Panel 9-CP62-04-51-1

04-8-2
Control Panel
 Enclosure ECDAB684441
 QA6069A
 9-CP62-04-51-1



SUPPLY 1
 MTR 1
 MTR 2

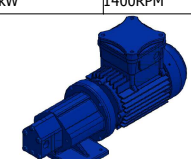


P01-A (55118)

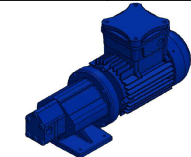
P02-A (55118)

P03-A (55118)

05-9-5
M51021A
 VIKING MAG DRIVE GEAR PUMP
 SG-80550 P510121A
 0.55kW 1400RPM



05-9-6
M51022A
 VIKING MAG DRIVE GEAR PUMP
 SG-80550 P510122A
 0.55kW 1400RPM



REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	KE	MD	RH	
B	21/04/2016	Changed to 3Ph Power Supply	KE	MD	RH	
C	06/05/2016	For Construction	KE	MD	RH	
D	14/07/2016	As Built	KE	MD	RH	

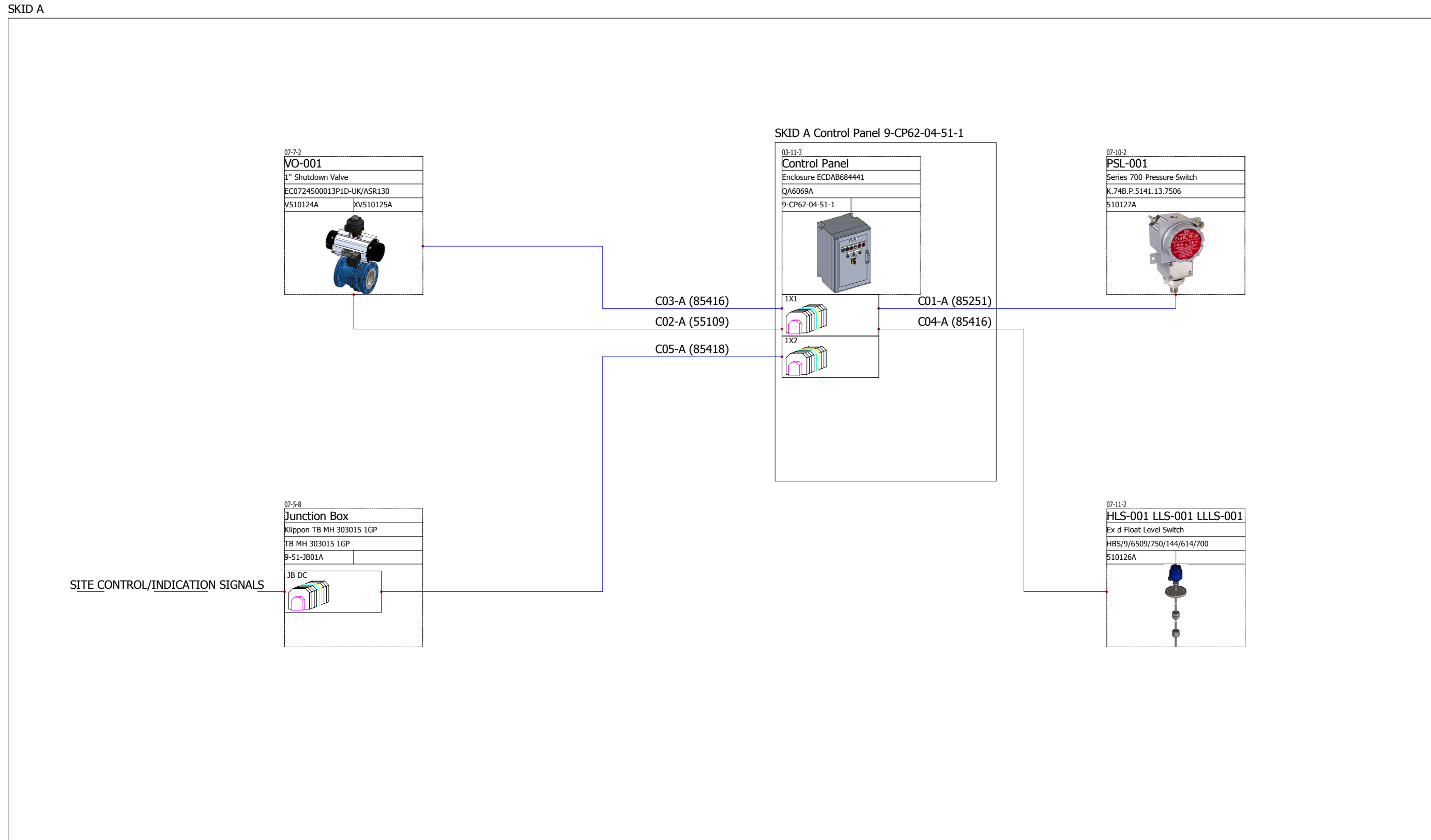
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 WEB: www.flotechps.com

PROJECT NAME	SKID A	PROJECT #	FPS100639
DRAWING TITLE	INJECTION, BLENDING & PUMPING SYSTEM Skid A Wiring line diagram AC		
DRAWING #	FPS100639	03	
DRAWN BY	KE	DATE	21/04/2016
CHECKED BY		SCALE	N.T.S.
CUSTOMER DRAWING NUMBER	D	3	of 17



07-7-2
VO-001
1" Shutdown Valve
EC0724500013P1D-UK/ASR130
V510124A XV510125A

03-11-3
Control Panel
Enclosure ECDAB684441
QA6069A
9-CP62-04-51-1

1X1
1X2

07-10-2
PSL-001
Series 700 Pressure Switch
K.74B.P.5141.13.7506
510127A

07-5-8
Junction Box
Klippon TB MH 303015 1GP
TB MH 303015 1GP
9-51-JB01A

JB DC

07-11-2
HLS-001 LLS-001 LLLS-001
Ex d Float Level Switch
HBS/9/6509/750/144/614/700
510126A

SITE CONTROL/INDICATION SIGNALS

C03-A (85416)
C02-A (55109)
C05-A (85418)

C01-A (85251)
C04-A (85416)

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	K E	M D	R H	
B	21/04/2016	Changed to 3Ph Power Supply	K E	M D	R H	
C	06/05/2016	For Construction	K E	M D	R H	
D	14/07/2016	As Built	K E	M D	R H	

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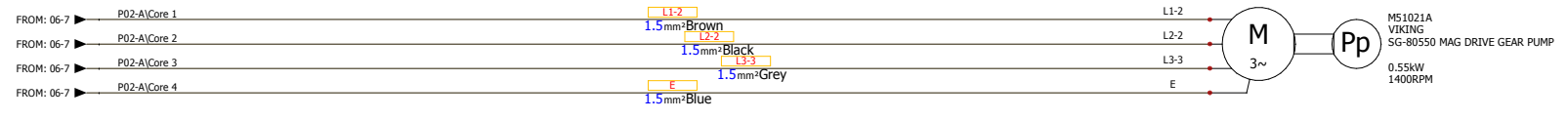
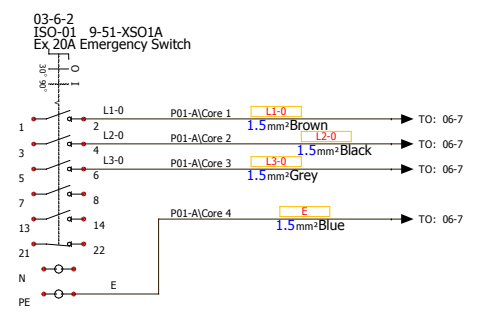
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PROJECT NAME SKID A Vivergo Fuels Project	PROJECT # FPS100639
DRAWING TITLE INJECTION, BLENDING & PUMPING SYSTEM Skid A Wiring line diagram 24VDC	ORDER #
DRAWING # FPS100639	04
DRAWN BY K E	CHECKED BY
DATE 21/04/2016	
SCALE N.T.S.	APPROVED BY
CUSTOMER D	CLIENT APPROVED BY
	SHEET 4 of 17

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

1
2
3
4
5
6
7
8
9

SITE SUPPLY 400VAC 3Ph + E



NOTE
For details of DC connections see DC Scheme
ALL EARTH CORES TO HAVE Gn/Ye SLEEVING AS REQUIRED

REV.	DATE	DESCRIPTION	BY:	CHKD:	APP:	NOTES
A	21/04/2016	Initial Design	KE	MD	RH	
B	21/04/2016	Changed to 3Ph Power Supply	KE	MD	RH	
C	06/05/2016	For Construction	KE	MD	RH	
D	14/07/2016	As Built	KE	MD	RH	

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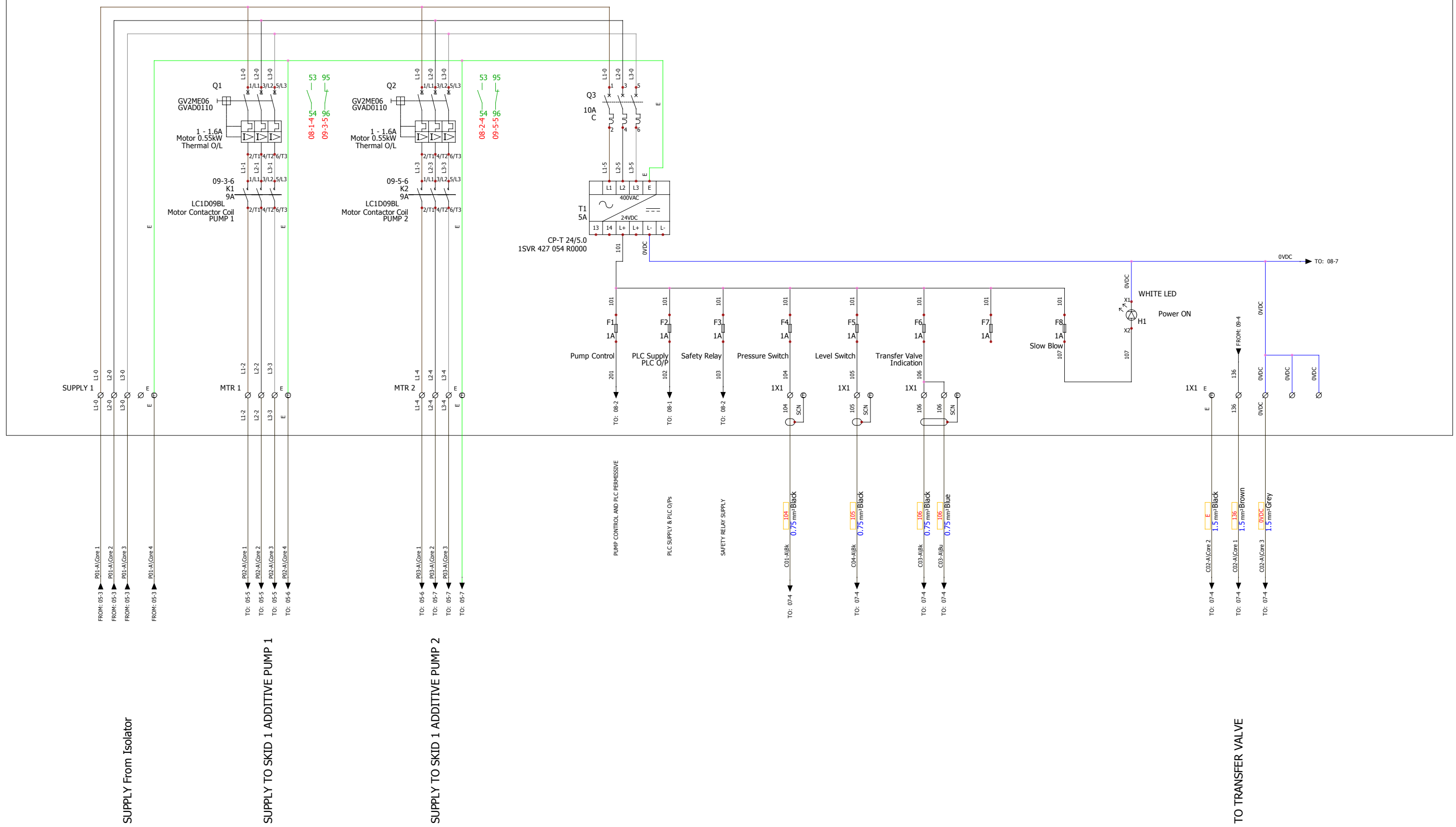
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PROJECT NAME: SKID A Vivergo Fuels Project
PROJECT #: FPS100639
DRAWING TITLE: INJECTION, BLENDING & PUMPING SYSTEM
DRAWING #: FPS100639 05
DATE: 21/04/2016
DRAWN BY: KE
CHECKED BY: N.T.S.
STATUS: D
5 of 17

SOLIDWORKS Electrical

SKID A Control Panel 9-CP62-04-51-1



SUPPLY From Isolator

SUPPLY TO SKID 1 ADDITIVE PUMP 1

SUPPLY TO SKID 1 ADDITIVE PUMP 2

TO TRANSFER VALVE

ALL EARTH CORES TO HAVE Gn/Ye SLEEVING AS REQUIRED
 SKID A AS MARKED
 SKID B/C/D/E AS MARKED WITH B/C/D/E
 SOME SCREENS ONLY SHOWN ON SINGLE CORES FOR CLARITY

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	K E	M D	R H	
B	21/04/2016	Changed to 3Ph Power Supply	K E	M D	R H	
C	06/05/2016	For Construction	K E	M D	R H	
D	14/07/2016	As Built	K E	M D	R H	

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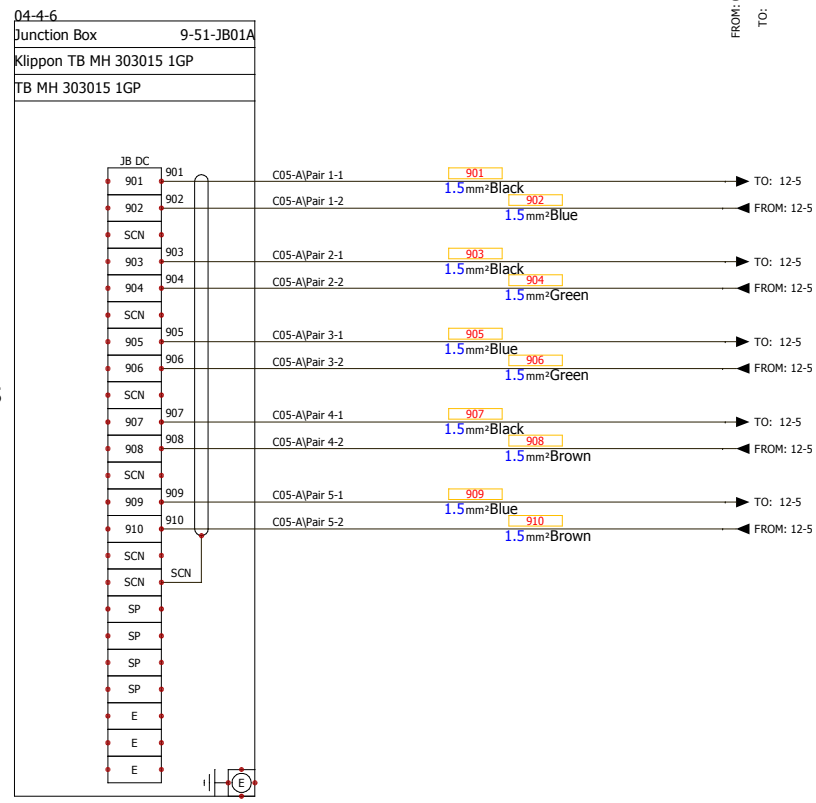
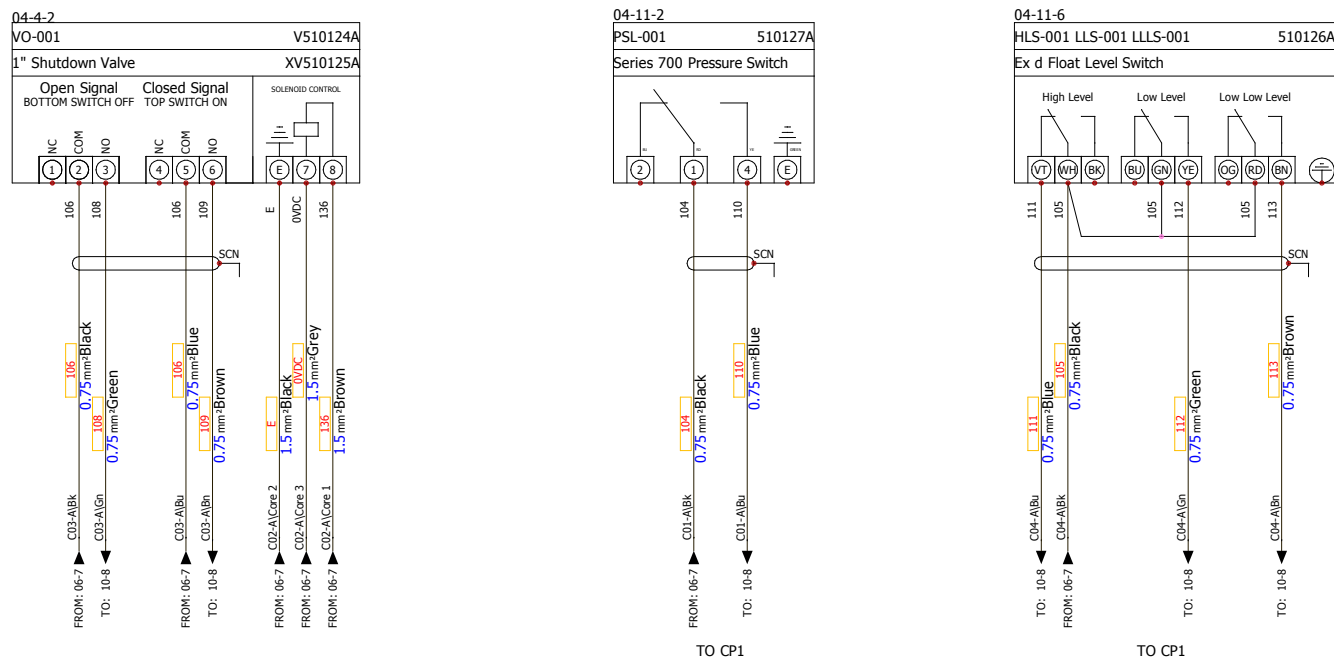
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PROJECT NAME: SKID A Vivergo Fuels Project
 DRAWING TITLE: INJECTION, BLENDING & PUMPING SYSTEM Control Panel 1 Power Distribution
 DRAWING NO: FPS100639
 DATE: 21/04/2016
 SCALE: N.T.S.
 SHEET: 6 of 17

SOLIDWORKS Electrical

SKID A



SITE CONTROL/INDICATION SIGNALS

- SITE PUMP START TO CONTROL PANEL
- PUMP 1 OR 2 RUNNING FROM CONTROL PANEL
- TANK LOW LEVEL FROM CONTROL PANEL
- TANK LOW LOW LEVEL FROM CONTROL PANEL
- TANK HIGH LEVEL FROM CONTROL PANEL

NOTE
For details of AC connections see AC Scheme

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	K E	M D	R H	
B	21/04/2016	Changed to 3Ph Power Supply	K E	M D	R H	
C	06/05/2016	For Construction	K E	M D	R H	
D	14/07/2016	As Built	K E	M D	R H	

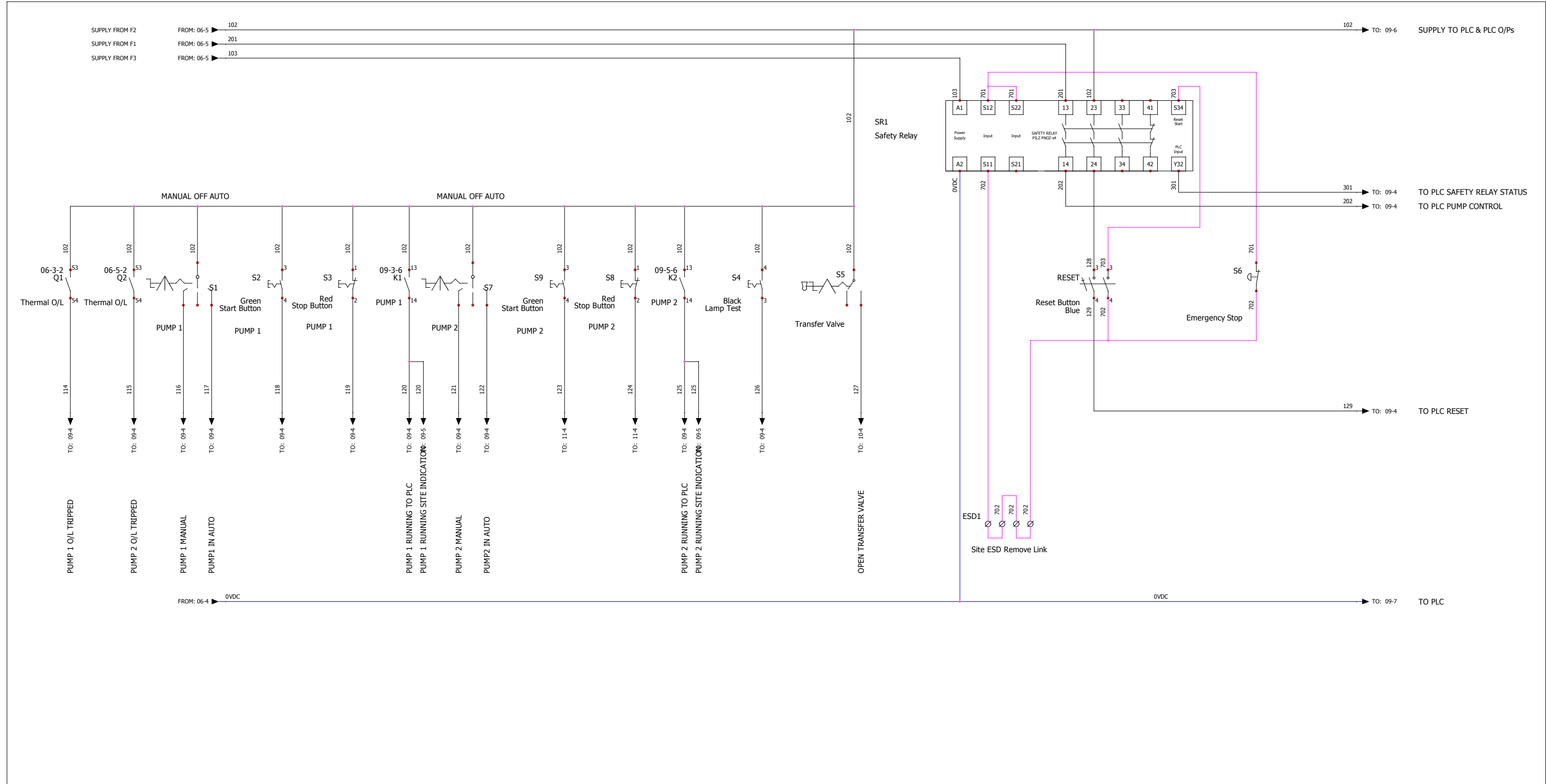
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PO16 0SU

PROJECT NAME: SKID A Vivergo Fuels Project
DRAWING TITLE: INJECTION, BLENDING & PUMPING SYSTEM Skid A Electrical scheme 24VDC
DRAWING #: FPS100639
DATE: 21/04/2016
SCALE: N.T.S.
SHEET: 7 of 17

SKID A Control Panel 9-CP62-04-51-1



REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	KE	MD	RH	
B	21/04/2016	Changed to 3Ph Power Supply	KE	MD	RH	
C	06/05/2016	For Construction	KE	MD	RH	
D	14/07/2016	As Built	KE	MD	RH	

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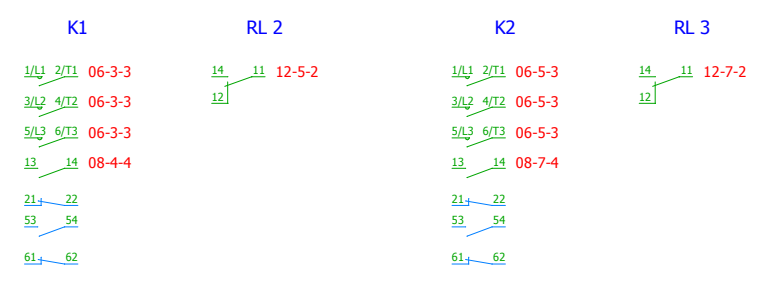
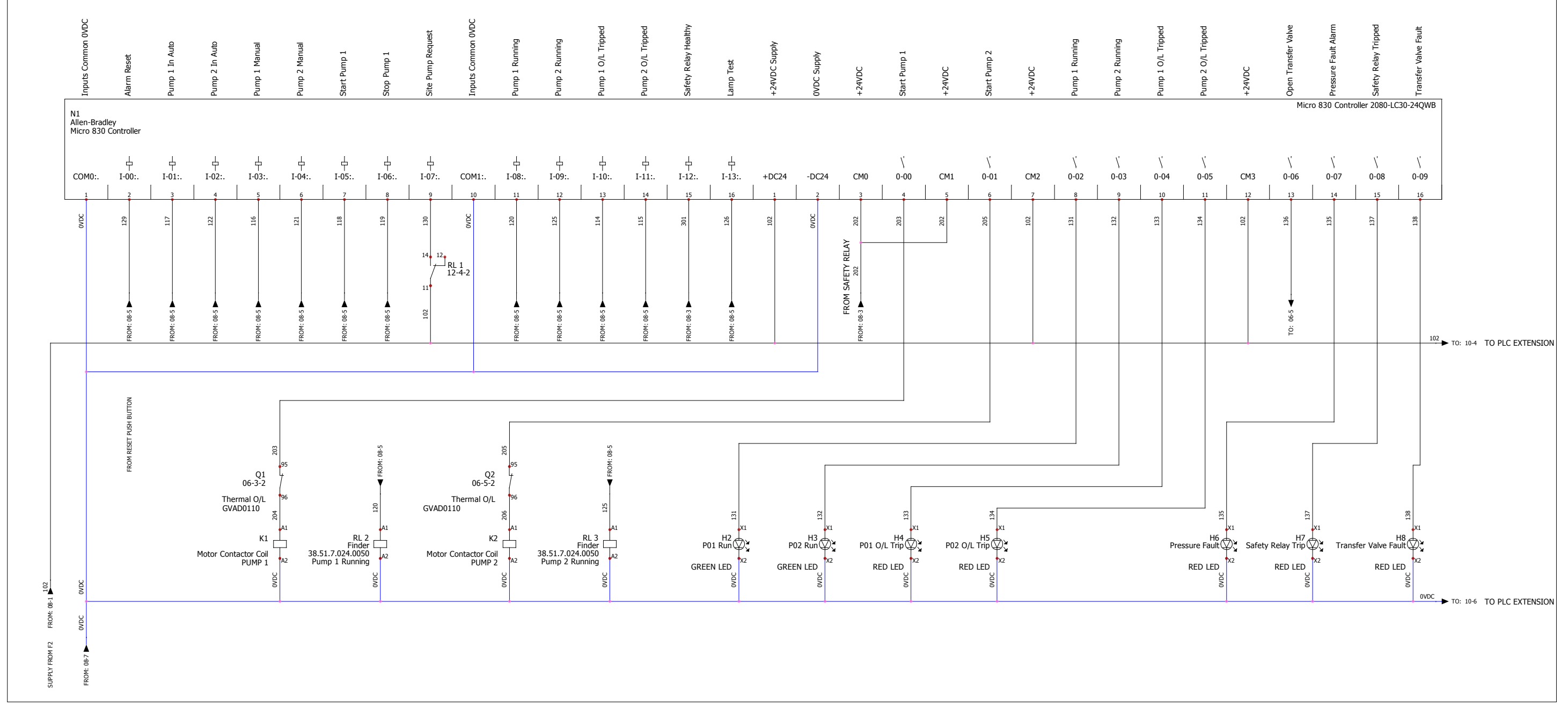
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 PO16 0SU

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 EMAIL: sales@flotechps.com
 WEB: www.flotechps.com

PROJECT NAME SKID A Vivergo Fuels Project	PROJECT # FPS100639
DRAWING TITLE INJECTION, BLENDING & PUMPING SYSTEM CP1 Control Circuit	
DRAWING # FPS100639	ORDER #
ISSUED BY KE	DATE 21/04/2016
SCALE N.T.S.	APPROVED BY
CHECKED BY D	CLIENT APPROVED BY
8 of 17	

SKID A Control Panel 9-CP62-04-51-1



NOT ALL SCREENS HAVE BEEN SHOWN FOR CLARITY

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	K E	M D	R H	
B	21/04/2016	Changed to 3Ph Power Supply	K E	M D	R H	
C	06/05/2016	For Construction	K E	M D	R H	
D	14/07/2016	As Built	K E	M D	R H	

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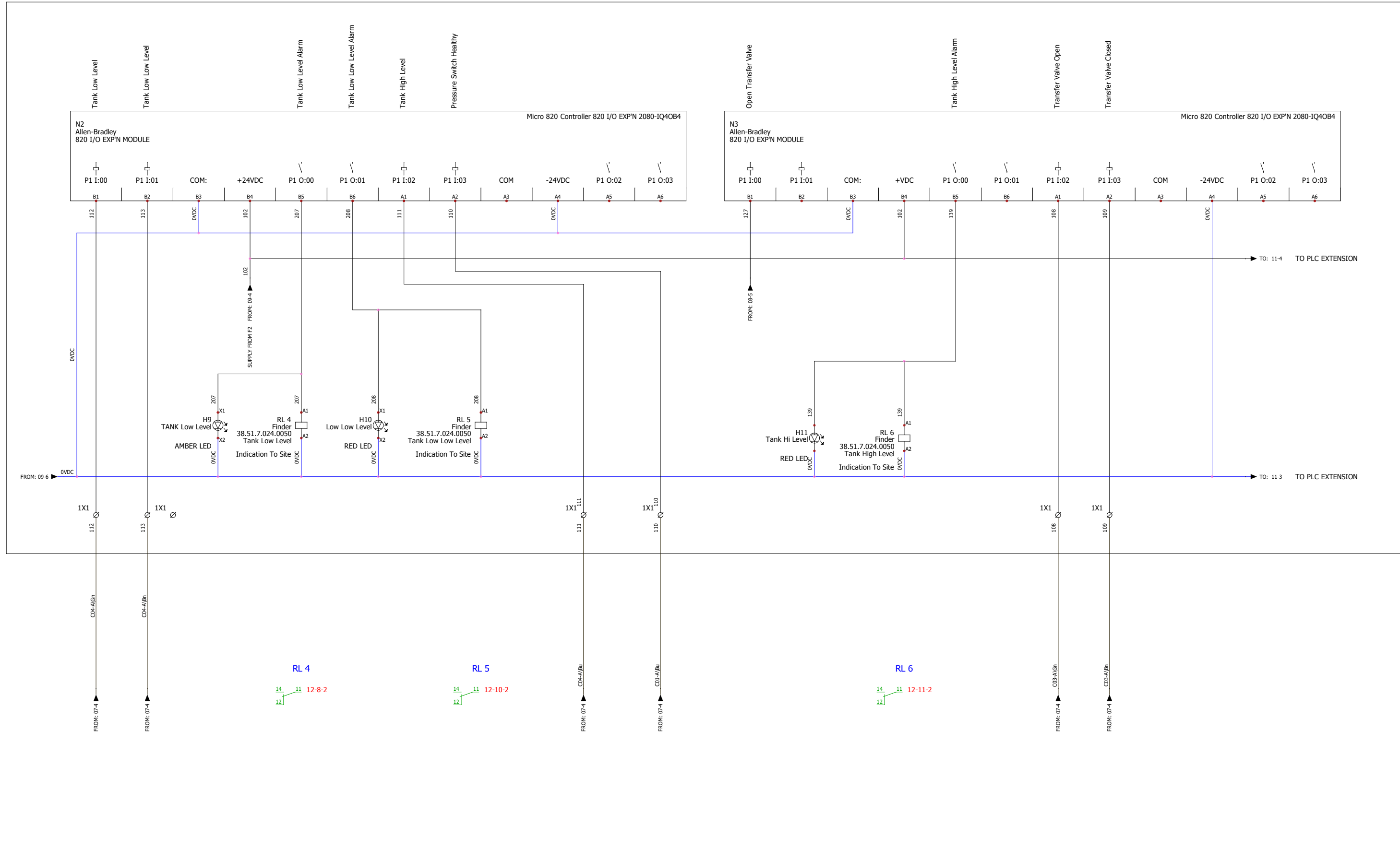
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Fareham, Hampshire
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EMAIL: sales@flotechps.com
WEB: www.flotechps.com

PROJECT NAME: SKID A Vivergo Fuels Project
DRAWING TITLE: INJECTION, BLENDING & PUMPING SYSTEM
PLC drawing N1
DRAWING #: FPS100639
DATE: 21/04/2016
SCALE: N.T.S.
PAGE: 9 of 17

SOLIDWORKS Electrical

SKID A Control Panel 9-CP62-04-51-1



REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	KE	MD	RH	
B	21/04/2016	Changed to 3Ph Power Supply	KE	MD	RH	
C	06/05/2016	For Construction	KE	MD	RH	
D	14/07/2016	As Built	KE	MD	RH	

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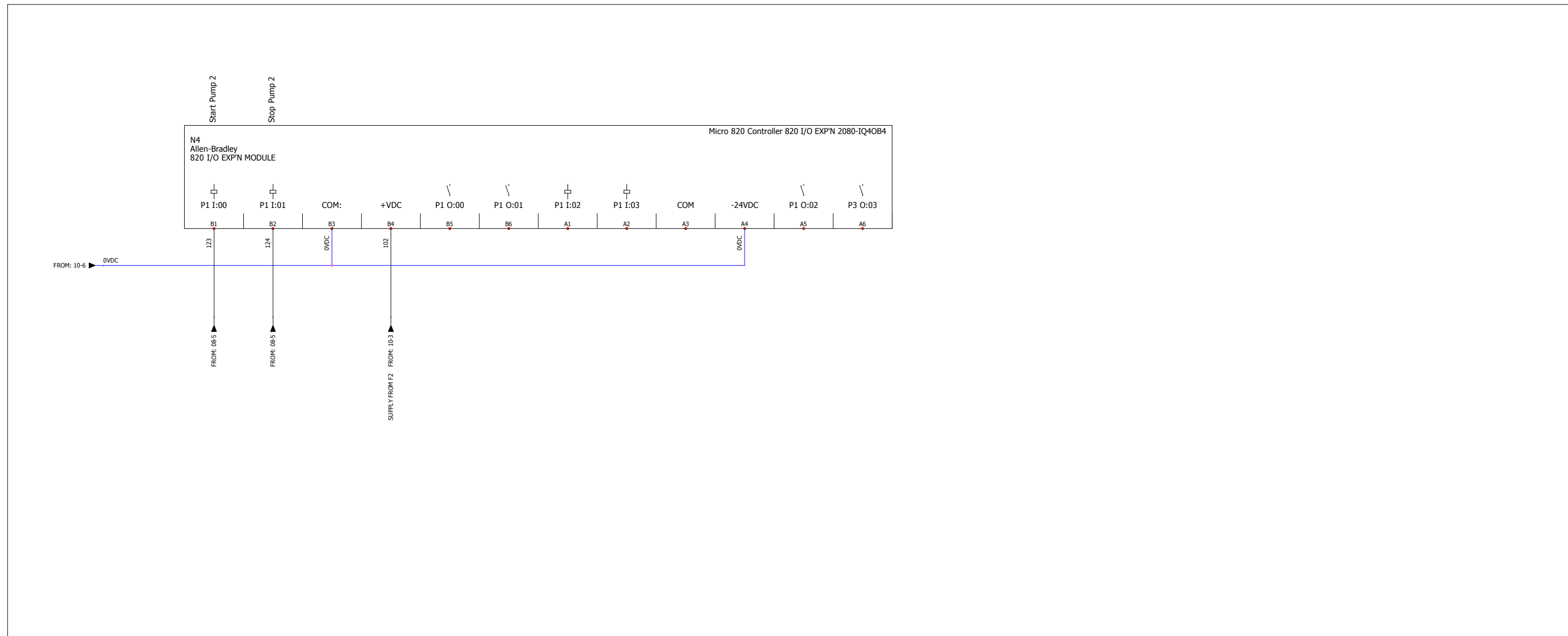
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 WEB: www.flotechps.com

PROJECT NAME SKID A Vivergo Fuels Project	PROJECT # FPS100639
DRAWING TITLE INJECTION, BLENDING & PUMPING SYSTEM PLC Drawing Extension N2 & N3	
DRAWING # FPS100639	10
DRAWN BY KE	CHECKED BY
DATE 21/04/2016	DATE
SCALE N.T.S.	SCALE
CUSTOMER APPROVED BY D	CUSTOMER APPROVED BY
	10 of 17

SKID A Control Panel 9-CP62-04-51-1



REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	KE	MD	RH	
B	21/04/2016	Changed to 3PH Power Supply	KE	MD	RH	
C	06/05/2016	For Construction	KE	MD	RH	
D	14/07/2016	As Built	KE	MD	RH	

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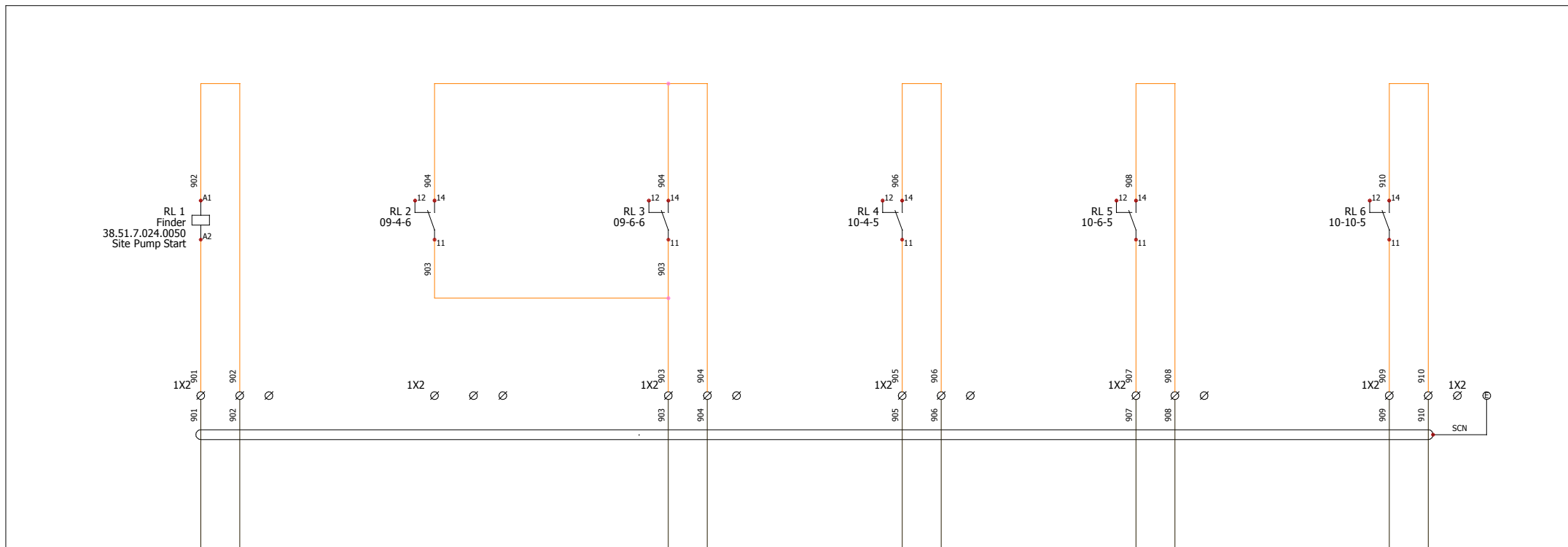
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PROJECT NAME	SKID A	PROJECT #	FPS100639
DRAWING TITLE	INJECTION, BLENDING & PUMPING SYSTEM PLC Drawing Extension N4		
DRAWING #	FPS100639	11	
DRAWN BY	KE	DATE	21/04/2016
CHECKED BY		SCALE	N.T.S.
CUSTOMER	D	CUSTOMER APPROVED BY	

SOLIDWORKS Electrical

SKID A Control Panel 9-CP62-04-51-1



SITE PUMP START FROM JBI

PUMP 1 OR 2 RUNNING TO JBI

TANK LOW LEVEL TO JBI

TANK LOW LOW LEVEL TO JBI

TANK HIGH LEVEL TO JBI

RL 1
14 11 09-5-3
12

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	KE	MD	RH	
B	21/04/2016	Changed to 3Ph Power Supply	KE	MD	RH	
C	06/05/2016	For Construction	KE	MD	RH	
D	14/07/2016	As Built	KE	MD	RH	

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PROJECT NAME SKID A Vivergo Fuels Project	PROJECT # FPS100639
DRAWING TITLE INJECTION, BLENDING & PUMPING SYSTEM External Signals to Site	
DRAWING # FPS100639	12
DRAWN BY KE	CHECKED BY
DATE 21/04/2016	
SCALE N.T.S.	APPROVED BY
CUSTOMER # D	CLIENT APPROVED BY
	PAGE # 12 of 17

N1

Address	Mnemonic	Function	Manufacturer	Reference	Mark	Description	Comments	Terminal Mark
I-03..			Allen-Bradley	Micro 830 Controller	N1	Pump 1 Manual		5
I-04..			Allen-Bradley	Micro 830 Controller	N1	Pump 2 Manual		6
I-05..			Allen-Bradley	Micro 830 Controller	N1	Start Pump 1		7
I-06..			Allen-Bradley	Micro 830 Controller	N1	Stop Pump 1		8
I-07..			Allen-Bradley	Micro 830 Controller	N1	Site Pump Request		9
COM1..			Allen-Bradley	Micro 830 Controller	N1	Inputs Common 0VDC		10
I-08..			Allen-Bradley	Micro 830 Controller	N1	Pump 1 Running		11
I-09..			Allen-Bradley	Micro 830 Controller	N1	Pump 2 Running		12
I-10..			Allen-Bradley	Micro 830 Controller	N1	Pump 1 O/L Tripped		13
I-11..			Allen-Bradley	Micro 830 Controller	N1	Pump 2 O/L Tripped		14
COM0..			Allen-Bradley	Micro 830 Controller	N1	Inputs Common 0VDC		1
I-00..			Allen-Bradley	Micro 830 Controller	N1	Alarm Reset		2
I-01..			Allen-Bradley	Micro 830 Controller	N1	Pump 1 In Auto		3
I-02..			Allen-Bradley	Micro 830 Controller	N1	Pump 2 In Auto		4
I-12..			Allen-Bradley	Micro 830 Controller	N1	Safety Relay Healthy		15
I-13..			Allen-Bradley	Micro 830 Controller	N1	Lamp Test		16
+DC24			Allen-Bradley	Micro 830 Controller	N1	+24VDC Supply		1
CM2			Allen-Bradley	Micro 830 Controller	N1	+24VDC		7
0-02			Allen-Bradley	Micro 830 Controller	N1	Pump 1 Running		8
0-03			Allen-Bradley	Micro 830 Controller	N1	Pump 2 Running		9
0-04			Allen-Bradley	Micro 830 Controller	N1	Pump 1 O/L Tripped		10
0-05			Allen-Bradley	Micro 830 Controller	N1	Pump 2 O/L Tripped		11
CM3			Allen-Bradley	Micro 830 Controller	N1	+24VDC		12
0-06			Allen-Bradley	Micro 830 Controller	N1	Open Transfer Valve		13
0-07			Allen-Bradley	Micro 830 Controller	N1	Pressure Fault Alarm		14
0-08			Allen-Bradley	Micro 830 Controller	N1	Safety Relay Tripped		15
0-09			Allen-Bradley	Micro 830 Controller	N1	Transfer Valve Fault		16
-DC24			Allen-Bradley	Micro 830 Controller	N1	0VDC Supply		2
CM0			Allen-Bradley	Micro 830 Controller	N1	+24VDC		3
0-00			Allen-Bradley	Micro 830 Controller	N1	Start Pump 1		4
CM1			Allen-Bradley	Micro 830 Controller	N1	+24VDC		5
0-01			Allen-Bradley	Micro 830 Controller	N1	Start Pump 2		6

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	K.E	M.D	R.H	
B	21/04/2016	Changed to 3Ph Power Supply	K.E	M.D	R.H	
C	06/05/2016	For Construction	K.E	M.D	R.H	
D	14/07/2016	As Built	K.E	M.D	R.H	

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PROJECT NAME		SKID A
PROJECT #		FPS100639
DRAWING TITLE		INJECTION, BLENDING & PUMPING SYSTEM
DRAWING #		FPS100639
DATE	21/04/2016	
BY	K.E	
CHKD.	N.T.S.	
APP.	D	

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N2

Address	Mnemonic	Function	Manufacturer	Reference	Mark	Description	Comments	Terminal Mark
+24VDC			Allen-Bradley	820 I/O EXP'N MODULE	N2			B4
P1 O:02			Allen-Bradley	820 I/O EXP'N MODULE	N2			A5
P1 I:03			Allen-Bradley	820 I/O EXP'N MODULE	N2	Pressure Switch Healthy		A2
P1 I:02			Allen-Bradley	820 I/O EXP'N MODULE	N2	Tank High Level		A1
P1 O:01			Allen-Bradley	820 I/O EXP'N MODULE	N2	Tank Low Low Level Alarm		B6
P1 O:00			Allen-Bradley	820 I/O EXP'N MODULE	N2	Tank Low Level Alarm		B5
P1 I:01			Allen-Bradley	820 I/O EXP'N MODULE	N2	Tank Low Low Level		B2
P1 I:00			Allen-Bradley	820 I/O EXP'N MODULE	N2	Tank Low Level		B1
COM:			Allen-Bradley	820 I/O EXP'N MODULE	N2			B3

N3

Address	Mnemonic	Function	Manufacturer	Reference	Mark	Description	Comments	Terminal Mark
P1 O:03			Allen-Bradley	820 I/O EXP'N MODULE	N3			A6
P1 O:02			Allen-Bradley	820 I/O EXP'N MODULE	N3			A5
P1 I:03			Allen-Bradley	820 I/O EXP'N MODULE	N3	Transfer Valve Closed		A2
P1 I:02			Allen-Bradley	820 I/O EXP'N MODULE	N3	Transfer Valve Open		A1
P1 O:01			Allen-Bradley	820 I/O EXP'N MODULE	N3			B6
P1 O:00			Allen-Bradley	820 I/O EXP'N MODULE	N3	Tank High Level Alarm		B5
P1 I:01			Allen-Bradley	820 I/O EXP'N MODULE	N3			B2
P1 I:00			Allen-Bradley	820 I/O EXP'N MODULE	N3	Open Transfer Valve		B1

N4

Address	Mnemonic	Function	Manufacturer	Reference	Mark	Description	Comments	Terminal Mark
P3 O:03			Allen-Bradley	820 I/O EXP'N MODULE	N4			A6
P1 O:00			Allen-Bradley	820 I/O EXP'N MODULE	N4			B5
P1 O:01			Allen-Bradley	820 I/O EXP'N MODULE	N4			B6
P1 I:00			Allen-Bradley	820 I/O EXP'N MODULE	N4	Start Pump 2		B1
P1 I:01			Allen-Bradley	820 I/O EXP'N MODULE	N4	Stop Pump 2		B2
P1 I:02			Allen-Bradley	820 I/O EXP'N MODULE	N4			A1
P1 I:03			Allen-Bradley	820 I/O EXP'N MODULE	N4			A2
P1 O:02			Allen-Bradley	820 I/O EXP'N MODULE	N4			A5

<table border="1"> <thead> <tr> <th>REV.</th> <th>DATE</th> <th>DESCRIPTION</th> <th>BY</th> <th>CHKD.</th> <th>APP.</th> <th>NOTES</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>21/04/2016</td> <td>Initial Design</td> <td>K.E</td> <td>M.D</td> <td>R.H</td> <td></td> </tr> <tr> <td>B</td> <td>21/04/2016</td> <td>Changed to 3Ph Power Supply</td> <td>K.E</td> <td>M.D</td> <td>R.H</td> <td></td> </tr> <tr> <td>C</td> <td>06/05/2016</td> <td>For Construction</td> <td>K.E</td> <td>M.D</td> <td>R.H</td> <td></td> </tr> <tr> <td>D</td> <td>14/07/2016</td> <td>As Built</td> <td>K.E</td> <td>M.D</td> <td>R.H</td> <td></td> </tr> </tbody> </table>					REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES	A	21/04/2016	Initial Design	K.E	M.D	R.H		B	21/04/2016	Changed to 3Ph Power Supply	K.E	M.D	R.H		C	06/05/2016	For Construction	K.E	M.D	R.H		D	14/07/2016	As Built	K.E	M.D	R.H		<p>Flotech PERFORMANCE SYSTEMS Specialist Multi-Discipline Engineering Services to the Petro-Chem, Process & Food Industries Across the UK. Electrical, Instrumentation & Mechanical Engineers.</p> <p>Flotech Performance Systems Ltd Unit 2, Salters Ind. Est. Salters Lane Fareham, Hampshire PO16 0SU</p> <p>TEL: +44 (0) 1329 284145 EMAIL: sales@flotechps.com WEB: www.flotechps.com</p>		<p>CUSTOMER DRAWING NUMBER</p> <p>PROJECT # FPS100639</p> <p>PROJECT NAME SKID A Nivedio Fuels Project</p> <p>DRAWING TITLE INJECTION, BLENDING & PUMPING SYSTEM PLC Inputs / Outputs list</p> <p>DRAWING # FPS100639 14</p> <p>DATE 21/04/2016</p> <p>BY K.E</p> <p>CHKD N.T.S.</p> <p>APP R.D</p>	
REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES																																					
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D	14/07/2016	As Built	K.E	M.D	R.H																																						
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Mark	Description	Article number	Path	Core Identification	Gland Size	Cable Rated Voltage
C01-A	BS5308 Cable Part 1 Type 2 CAM SWA 1 Pair 0.75mm	85251	Control Panel 9-CP62-04-51-1<>SKID A	Bu,Bk	20	300/500
C02-A	XLPE/PVC/SWA/PVC/Black 3 1.5mm	55109	Control Panel 9-CP62-04-51-1<>SKID A	Bk,Bn,Gy	20	600/1000v
C03-A	BS5308 Cable Part 1 Type 2 CAM SWA Quad 0.75mm	85416	Control Panel 9-CP62-04-51-1<>SKID A	Bk,Bu,Gn,Bn	20	300/500v
C04-A	BS5308 Cable Part 1 Type 2 CAM SWA Quad 0.75mm	85416	Control Panel 9-CP62-04-51-1<>SKID A	Bk,Bu,Gn,Bn	20	300/500v
C05-A	BS5308 Cable Part 1 Type 2 CAM SWA 5 Pair 0.75mm	85418	Control Panel 9-CP62-04-51-1<>SKID A	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	20/25	300/500
P01-A	XLPE/PVC/SWA/PVC/Black 4 1.5mm	55118	SKID A<>Control Panel 9-CP62-04-51-1	Bn,Bk,Gy,,Ye	20	600/1000v
P02-A	XLPE/PVC/SWA/PVC/Black 4 1.5mm	55118	Control Panel 9-CP62-04-51-1<>SKID A	Bn,Bk,Gy,,Ye	20	600/1000v
P03-A	XLPE/PVC/SWA/PVC/Black 4 1.5mm	55118	Control Panel 9-CP62-04-51-1<>SKID A	Bn,Bk,Gy,,Ye	20	600/1000v

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
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C	06/05/2016	For Construction	K.E	M.D	R.H	
D	14/07/2016	As Built	K.E	M.D	R.H	

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CUSTOMER DRAWING NUMBER		PROJECT #	
SKID A Nivedra Fuels Project		FPS100639	
DRAWING TITLE			
INJECTION, BLENDING & PUMPING SYSTEM			
List of the cables			
DRAWING #	ORDER #		
FPS100639	15		
ISSUED BY	DATE	CHECKED BY	
K.E	21/04/2016		
SCALE		APPROVED BY	
N.T.S.			
COMMENTS	STATUS	CLIENT APPROVED	
D			

C01-A

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
C01-A	85251	Bk	1X1-104	-PSL-001:1	104	Bu,Bk	BK
C01-A	85251	Bu	1X1-110	-PSL-001:4	110	Bu,Bk	BU
C01-A	85251	Shield				Bu,Bk	

C02-A

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
C02-A	55109	Core 1	1X1-136	-VO-001:8	136	Bk,Bn,Gy	BN
C02-A	55109	Core 2	1X1-E	-VO-001:E	E	Bk,Bn,Gy	BK
C02-A	55109	Core 3	1X1-0VDC	-VO-001:7	0VDC	Bk,Bn,Gy	GY

C03-A

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
C03-A	85416	Bk	1X1-106	-VO-001:2	106	Bk,Bu,Gn,Bn	BK
C03-A	85416	Bu	1X1-106	-VO-001:5	106	Bk,Bu,Gn,Bn	BU
C03-A	85416	Gn	1X1-108	-VO-001:3	108	Bk,Bu,Gn,Bn	GN
C03-A	85416	Bn	1X1-109	-VO-001:6	109	Bk,Bu,Gn,Bn	BN
C03-A	85416	Shield				Bk,Bu,Gn,Bn	

C04-A

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
C04-A	85416	Bk	1X1-105	-HLS-001 LLS-001 LLLS-001:WH	105	Bk,Bu,Gn,Bn	BK
C04-A	85416	Bu	1X1-111	-HLS-001 LLS-001 LLLS-001:VT	111	Bk,Bu,Gn,Bn	BU
C04-A	85416	Gn	1X1-112	-HLS-001 LLS-001 LLLS-001:YE	112	Bk,Bu,Gn,Bn	GN
C04-A	85416	Bn	1X1-113	-HLS-001 LLS-001 LLLS-001:BN	113	Bk,Bu,Gn,Bn	BN
C04-A	85416	Shield				Bk,Bu,Gn,Bn	

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
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C	06/05/2016	For Construction	K.E	M.D	R.H	
D	14/07/2016	As Built	K.E	M.D	R.H	

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PROJECT NAME		SKID A		CUSTOMER DRAWING NUMBER	
DRAWING TITLE		INJECTION, BLENDING & PUMPING SYSTEM		PROJECT #	
DRAWING #		FPS100639		ORDER #	
DATE	21/04/2016	ISSUED BY	N.T.S.	DATE	21/04/2016
DATE		ISSUED BY		DATE	
DATE		ISSUED BY		DATE	
DATE		ISSUED BY		DATE	

C05-A

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
C05-A	85418	Pair 1-1	1X2-901	JB DC-901	901	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BK
C05-A	85418	Pair 1-2	1X2-902	JB DC-902	902	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BU
C05-A	85418	Pair 2-1	1X2-903	JB DC-903	903	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BK
C05-A	85418	Pair 2-2	1X2-904	JB DC-904	904	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	GN
C05-A	85418	Pair 3-1	1X2-905	JB DC-905	905	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BU
C05-A	85418	Pair 3-2	1X2-906	JB DC-906	906	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	GN
C05-A	85418	Pair 4-1	1X2-907	JB DC-907	907	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BK
C05-A	85418	Pair 4-2	1X2-908	JB DC-908	908	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BN
C05-A	85418	Pair 5-1	1X2-909	JB DC-909	909	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BU
C05-A	85418	Pair 5-2	1X2-910	JB DC-910	910	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BN
C05-A	85418	Shield	SCN3	JB DC-SCN	SCN	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	

P01-A

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
P01-A	55118	Core 1	-ISO-01 9-51-XSO1A:2	SUPPLY 1-L1-0	L1-0	Bn,Bk,Gy,/Ye	BN
P01-A	55118	Core 2	-ISO-01 9-51-XSO1A:4	SUPPLY 1-L1-1	L2-0	Bn,Bk,Gy,/Ye	BK
P01-A	55118	Core 3	-ISO-01 9-51-XSO1A:6	SUPPLY 1-L1-3	L3-0	Bn,Bk,Gy,/Ye	GY
P01-A	55118	Core 4	ISO-01 9-51-XSO1A	SUPPLY 1-E	E	Bn,Bk,Gy,/Ye	BU

P02-A

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
P02-A	55118	Core 1	MTR 1-L1-2	M51021A	L1-2	Bn,Bk,Gy,/Ye	BN
P02-A	55118	Core 2	MTR 1-L2-2	M51021A	L2-2	Bn,Bk,Gy,/Ye	BK
P02-A	55118	Core 3	MTR 1-L3-2	M51021A	L3-3	Bn,Bk,Gy,/Ye	GY
P02-A	55118	Core 4	MTR 1-E	M51021A	E	Bn,Bk,Gy,/Ye	BU

P03-A

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
P03-A	55118	Core 1	MTR 2-L1-4	-M51022A:U1	L1-4	Bn,Bk,Gy,/Ye	BN
P03-A	55118	Core 2	MTR 2-L2-4	-M51022A:V1	L2-4	Bn,Bk,Gy,/Ye	BK
P03-A	55118	Core 3	MTR 2-L3-4	-M51022A:W1	L3-4	Bn,Bk,Gy,/Ye	GY
P03-A	55118	Core 4	MTR 2-E	-M51022A:E	E	Bn,Bk,Gy,/Ye	BU

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	21/04/2016	Initial Design	K.E	M.D	R.H	
B	21/04/2016	Changed to 3Ph Power Supply	K.E	M.D	R.H	
C	06/05/2016	For Construction	K.E	M.D	R.H	
D	14/07/2016	As Built	K.E	M.D	R.H	

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 EMAIL: sales@flotechps.com
 WEB: www.flotechps.com

PROJECT NAME		SKID A	
DRAWING TITLE		INJECTION, BLENDING & PUMPING SYSTEM	
DRAWING #		FPS100639	
PROJECT #		FPS100639	
DATE	21/04/2016	BY	
SCALE	N.T.S.	APPROVED BY	
DATE		CHECKED BY	
SCALE		DATE	
DATE		BY	

FPS100639 INJECTION, BLENDING & PUMPING SYSTEM SKID B

Electrical Project Drawings

NOTES

- ALL EQUIPMENT WITH A SEPARATE EXTERNAL EARTH CONNECTION SHOULD BE BONDED TO THE SKID.
- ALL SCREENS TO BE SLEEVED AND TERMINATED AT ONE END ONLY AS DETAILED IN THE ELECTRICAL SCHEMES. THE OTHER END TO BE ISOLATED, INSULATED AND TIED BACK. ENSURE EXPOSED WIRE LENGTH FROM SCREEN IS MINIMAL.
- WIRE NO. ARE AS SHOWN. PRINTER ON HEAT SHRINK WITH PERMANENT INK.
- CABLE IDENTIFIERS ARE SHOWN WITH CABLE PART NUMBER IN BRACKETS.
- CROSS REFERENCES BETWEEN SHEETS ARE SHOWN ON THE TOP LEFT HAND CORNER OF EACH SYMBOL.
- ON LINE DRAWINGS RED CABLES ARE AC AND BLUE CABLES ARE DC.

REV.	DATE	DESCRIPTION.	BY.	CHKD.	APP.	NOTES	CUSTOMER DRAWING NUMBER
A	15/07/2016	As Built	K E	M D	R H		PROJECT #: FPS100639
							DRAWING #: FPS100639 01
							ORDER #:
<small>We reserve all rights in this document and the information contained therein. Reproduction, use or disclosure to third parties without express authority is strictly forbidden.</small> ©FLOTECH PERFORMANCE SYSTEMS LTD 2015							PROJECT NAME: SKID B Mivergo Fuels Project
							DRAWING TITLE: INJECTION, BLENDING & PUMPING SYSTEM Cover page
			DRAWN BY: K E	DATE: 15/07/2016	CHECKED BY:		
			SCALE: N.T.S.	CLIENT:	APPROVED BY:		
			CURRENT REV: A	STATUS:	CLIENT APPROVED BY:	SHEETS:	1 of 17

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Drawing	Revision	Date	Created by	Description	Titleblock
01	A	15/07/2016	K E	Cover page	Flotech Cover A2 2015
02	A	15/07/2016	K E	Drawing list	Flotech Drawing List A3 2015
03	A	15/07/2016	K E	Skid B Wiring line diagram AC	Flotech Line Diagram A2 2015
04	A	15/07/2016	K E	Skid B Wiring line diagram 24VDC	Flotech Line Diagram A2 2015
05	A	15/07/2016	K E	Skid B Electrical Scheme AC	Flotech Scheme Diagram A2 2015
06	A	15/07/2016	K E	Control Panel Power Distribution	Flotech Scheme Diagram A2 2015
07	A	15/07/2016	K E	Skid B Electrical scheme 24VDC	Flotech Scheme Diagram A2 2015
08	A	15/07/2016	K E	CP1 Control Circuit	Flotech Scheme Diagram A2 2015
09	A	15/07/2016	K E	PLC drawing N1	Flotech Scheme Diagram A2 2015
10	A	15/07/2016	K E	PLC Drawing Extension N2 & N3	Flotech Scheme Diagram A2 2015
11	A	15/07/2016	K E	PLC Drawing Extension N4	Flotech Scheme Diagram A2 2015
12	A	15/07/2016	K E	External Signals to Site	Flotech Scheme Diagram A2 2015
13	A	15/07/2016	K E	PLC Inputs / Outputs list	Flotech Drawing List A3 2015
14	A	15/07/2016	K E	PLC Inputs / Outputs list	Flotech Drawing List A3 2015
15	A	15/07/2016	K E	List of the cables	Flotech Drawing List A3 2015
16	A	15/07/2016	K E	List of cable strands	Flotech Drawing List A3 2015
17	A	15/07/2016	K E	List of cable strands	Flotech Drawing List A3 2015

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	15/07/2016	As Built	K E	M D	R H	

We warrant as to the accuracy of the information contained herein.
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PROJECT NAME		SKID B Nivego Fuels Project	
DRAWING TITLE		INJECTION, BLENDING & PUMPING SYSTEM Drawing list	
DRAWING #	FPS100639	ORDER #	
DATE	15/07/2016	ISSUED BY	
DATE		APPROVED BY	
DATE		DATE	
DATE		DATE	

CUSTOMER DRAWING NUMBER: FPS100639

2 of 17

SKID B


SITE SUPPLY 400VAC 3Ph + E

05-3-3
ISO-01 9-51-XS01B
 Ex 20A Emergency Switch
 GHG 262 2301 R0007
 In = 20A

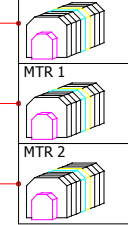


SKID B Control Panel 9-CP62-04-51-2

04-8-2
Control Panel
 Enclosure ECDAB684441
 QA6069A
 9-CP62-04-51-2



SUPPLY 1
 MTR 1
 MTR 2

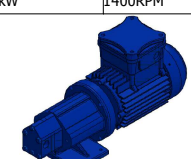


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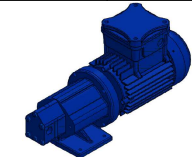
P02-B (55118)

P03-B (55118)

05-9-5
M51021B
 VIKING MAG DRIVE GEAR PUMP
 SG-80550 P510121A
 0.55kW 1400RPM



05-9-6
M51022B
 VIKING MAG DRIVE GEAR PUMP
 SG-80550 P510122A
 0.55kW 1400RPM



REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	15/07/2016	As Built	K E	M D	R H	

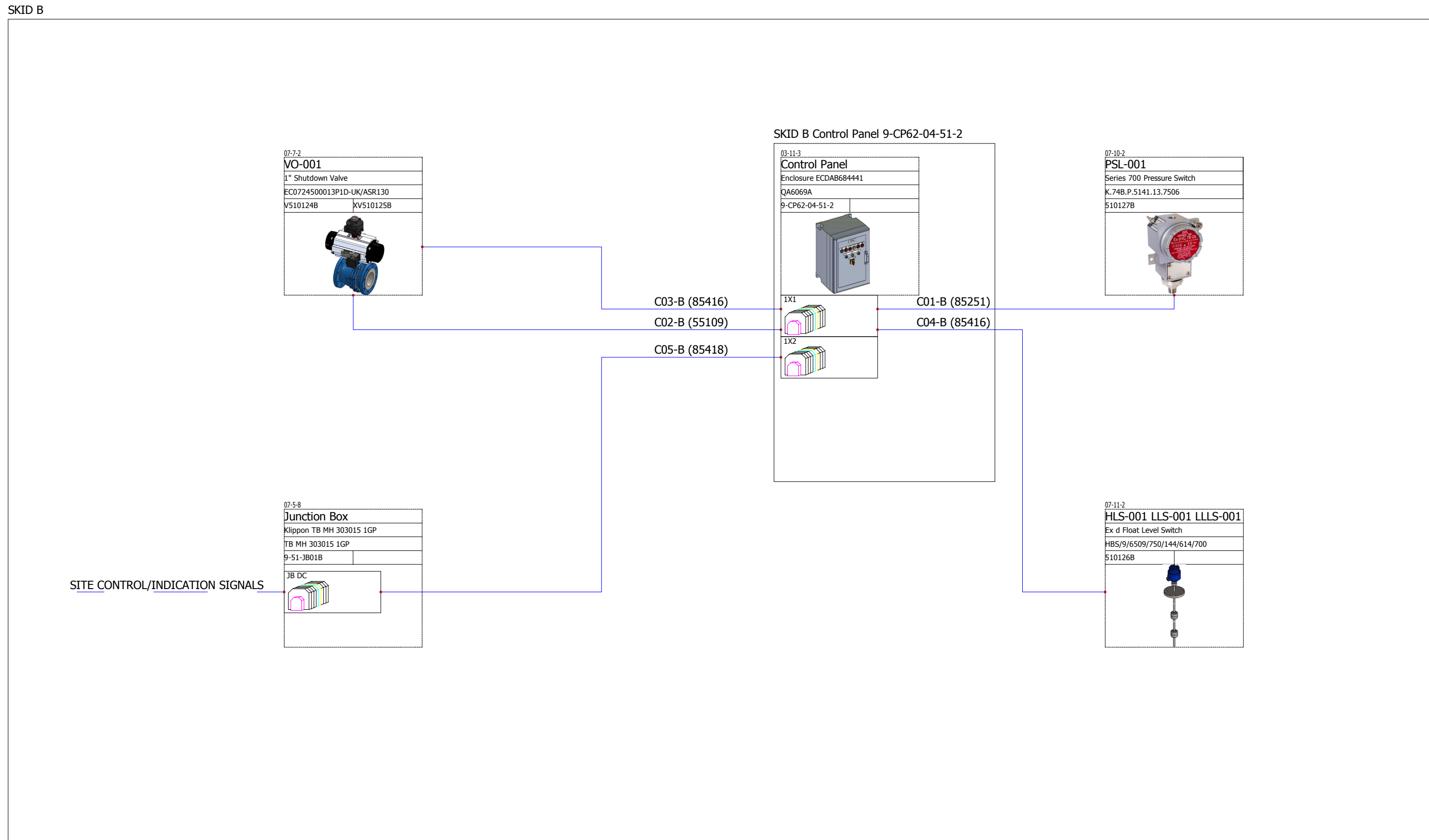
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PROJECT NAME	SKID B	PROJECT #	FPS100639
DRAWING TITLE	INJECTION, BLENDING & PUMPING SYSTEM Skid B Wiring line diagram AC		
DRAWING #	FPS100639	ISSUE	03
DRAWN BY	K E	DATE	15/07/2016
CHECKED BY	N.T.S.	SCALE	N.T.S.
CUSTOMER	A	CLIENT APPROVED BY	
SHEET			3 of 17



07-7-2
VO-001
1" Shutdown Valve
EC0724500013P1D-UK/ASR130
V510124B XV510125B

03-11-3
Control Panel
Enclosure ECDAB684441
QA6069A
9-CP62-04-51-2

1X1
1X2

07-10-2
PSL-001
Series 700 Pressure Switch
K.74B.P.5141.13.7506
510127B

07-5-8
Junction Box
Klippon TB MH 303015 1GP
TB MH 303015 1GP
9-51-JB01B

JB DC

07-11-2
HLS-001 LLS-001 LLLS-001
Ex d Float Level Switch
HBS/9/6509/750/144/614/700
510126B

SITE CONTROL/INDICATION SIGNALS

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	15/07/2016	As Built	KE	MD	RH	

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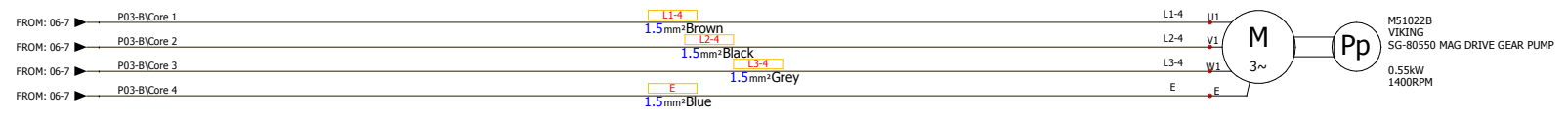
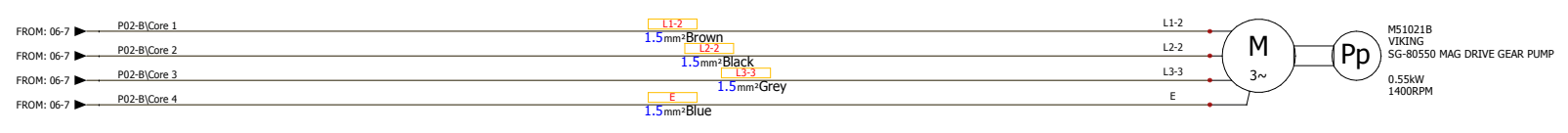
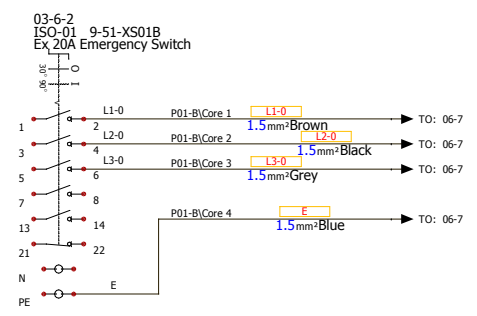
TEL: +44 (0) 1329 284145
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PROJECT NAME SKID B Vivergo Fuels Project	PROJECT # FPS100639
DRAWING TITLE INJECTION, BLENDING & PUMPING SYSTEM Skid B Wiring line diagram 24VDC	DRAWING # FPS100639
DRAWING # FPS100639	04
DRAWN BY KE	DATE 15/07/2016
CHECKED BY N.T.S.	APPROVED BY
CURRENT REV. A	4 of 17

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

1
2
3
4
5
6
7
8
9

SITE SUPPLY 400VAC 3Ph + E



NOTE
For details of DC connections see DC Scheme
ALL EARTH CORES TO HAVE Gn/Ye SLEEVING AS REQUIRED

REV.	DATE	DESCRIPTION	BY:	CHKD:	APP:	NOTES
A	15/07/2016	As Built	KE	MD	RH	

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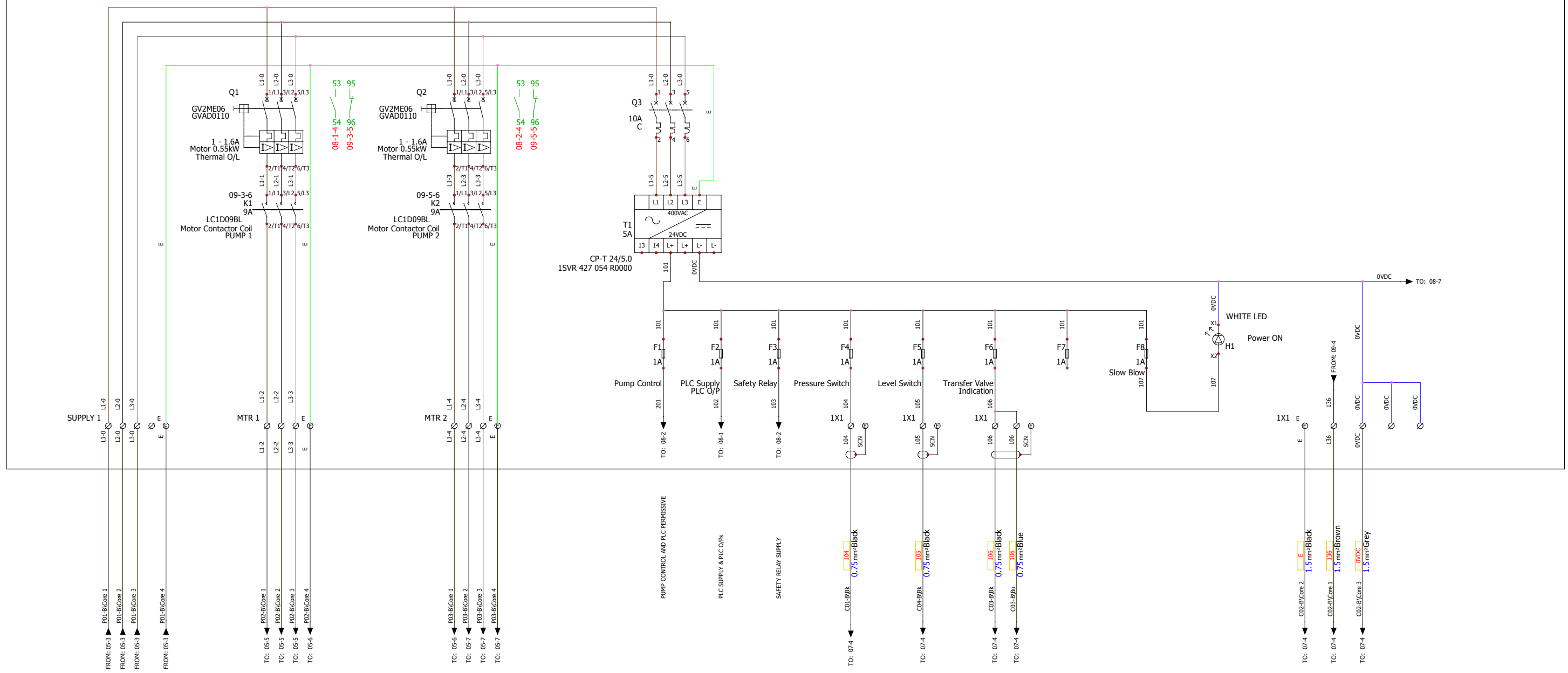
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PROJECT NAME SKID B Vivergo Fuels Project	PROJECT # FPS100639
DRAWING TITLE INJECTION, BLENDING & PUMPING SYSTEM Skid B Electrical Scheme AC	
DRAWING # FPS100639	ORDER #
DESIGNED BY KE	DATE 15/07/2016
STATUS N.T.S.	APPROVED BY
ORDER # A	5 of 17

SOLIDWORKS Electrical

SKID B Control Panel 9-CP62-04-51-2



SUPPLY From Isolator

SUPPLY TO SKID 1 ADDITIVE PUMP 1

SUPPLY TO SKID 1 ADDITIVE PUMP 2

TO TRANSFER VALVE

ALL EARTH CORES TO HAVE Gn/Ye SLEEVING AS REQUIRED
 SKID A AS MARKED
 SKID B/C/D/E AS MARKED WITH B/C/D/E
 SOME SCREENS ONLY SHOWN ON SINGLE CORES FOR CLARITY

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	15/07/2016	As Built	KE	MD	RH	

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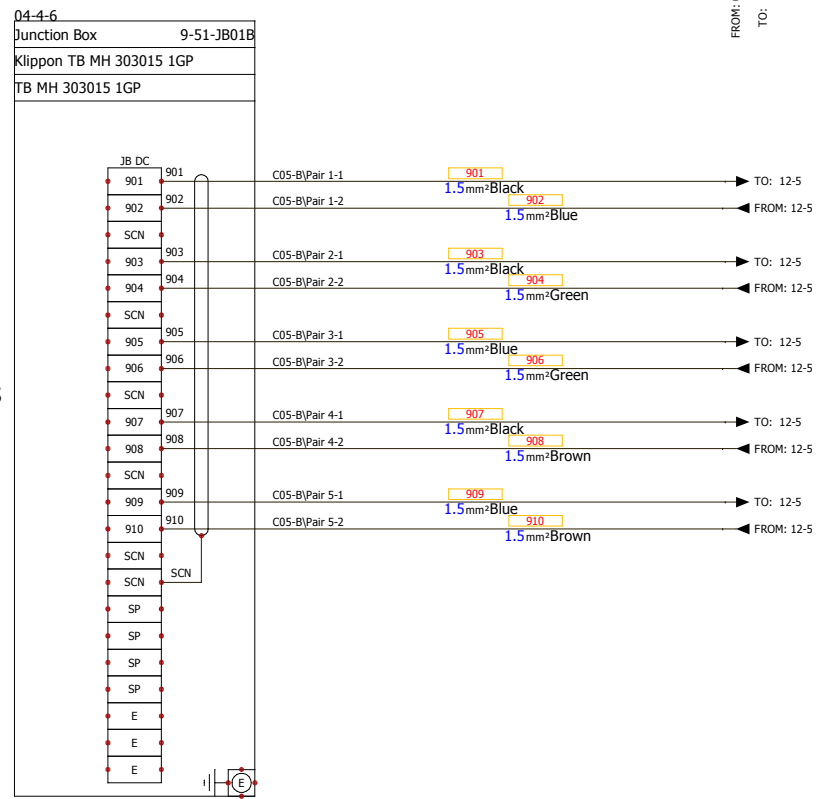
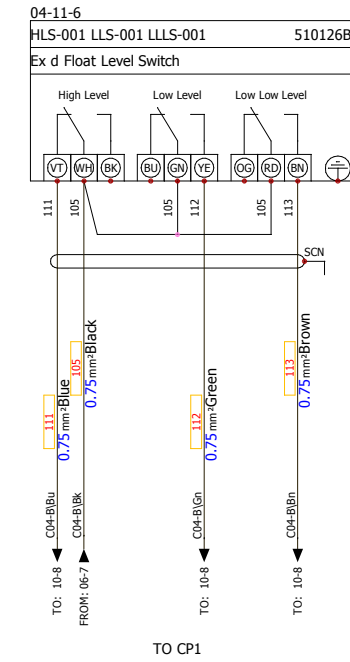
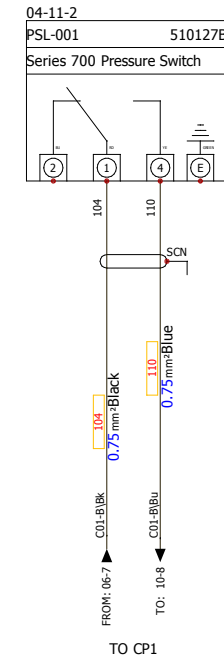
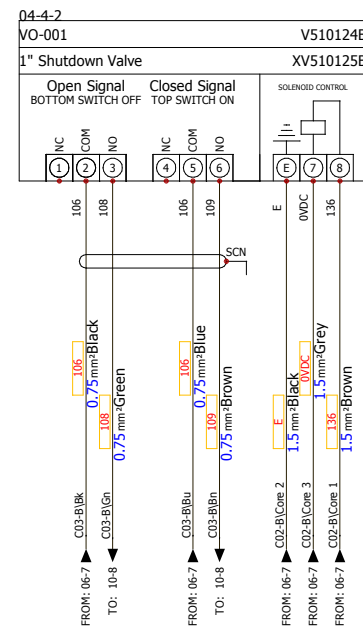
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PROJECT NAME SKID B Vivergo Fuels Project	PROJECT # FPS100639
DRAWING TITLE INJECTION, BLENDING & PUMPING SYSTEM Control Panel Power Distribution	DRAWING #
FPS100639	06
DRAWN BY KE	CHECKED BY
DATE 15/07/2016	DATE
SCALE N.T.S.	APPROVED BY
CUSTOMER NAME A	CUSTOMER APPROVED BY
	PAGE 6 of 17

SOLIDWORKS Electrical

SKID B



SITE CONTROL/INDICATION SIGNALS

- SITE PUMP START TO CONTROL PANEL
- PUMP 1 OR 2 RUNNING FROM CONTROL PANEL
- TANK LOW LEVEL FROM CONTROL PANEL
- TANK LOW LOW LEVEL FROM CONTROL PANEL
- TANK HIGH LEVEL FROM CONTROL PANEL

NOTE
For details of AC connections see AC Scheme

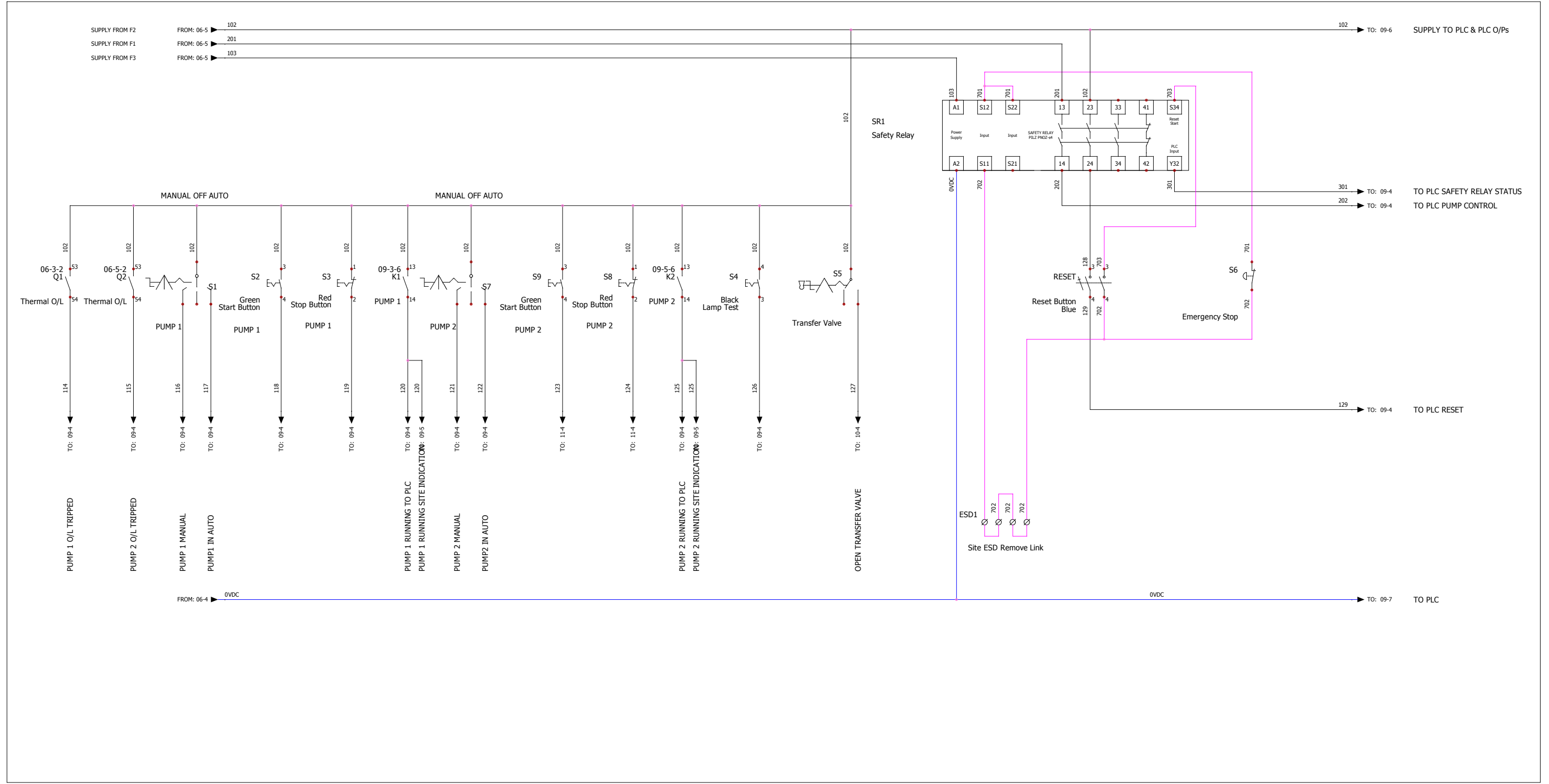
REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	15/07/2016	As Built	KE	MD	RH	

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PROJECT NAME SKID B Vivergo Fuels Project	PROJECT # FPS100639
DRAWING TITLE INJECTION, BLENDING & PUMPING SYSTEM Skid B Electrical scheme 24VDC	DRAWING # FPS100639
DRAWN BY KE	CHECKED BY KE
DATE 15/07/2016	SCALE N.T.S.
CUSTOMER DRAWING NUMBER	SHEET # 7 of 17

SKID B Control Panel 9-CP62-04-51-2



REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	15/07/2016	As Built	KE	MD	RH	

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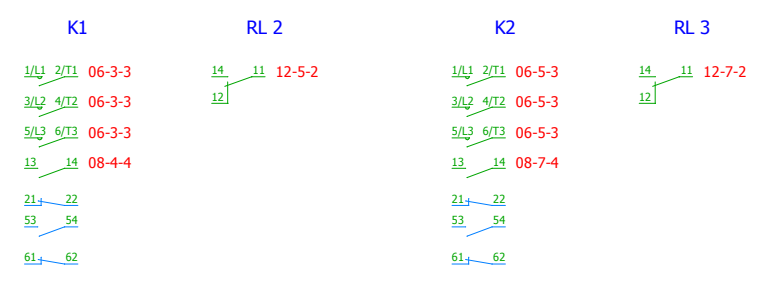
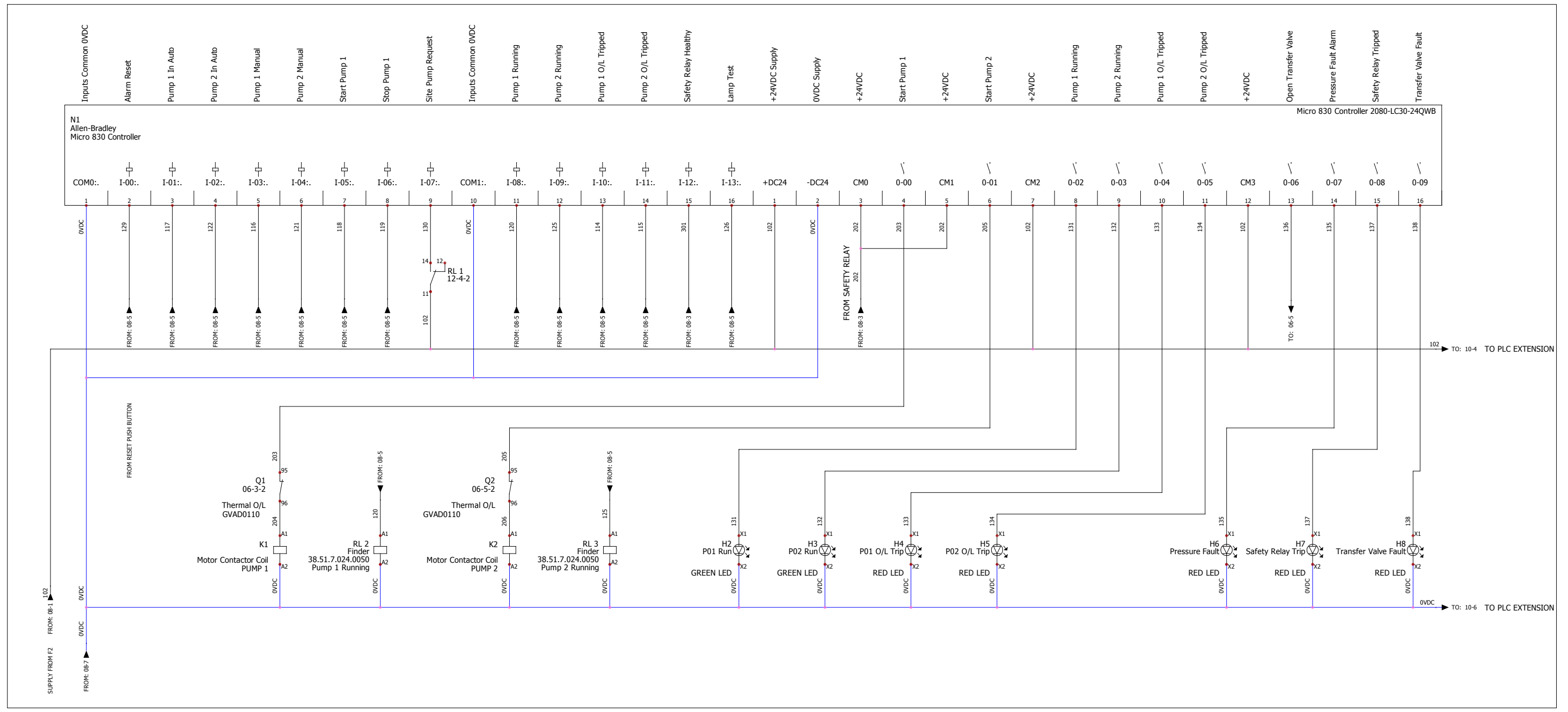
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PROJECT NAME	SKID B	PROJECT #	FPS100639
DRAWING TITLE	INJECTION, BLENDING & PUMPING SYSTEM CP1 Control Circuit		
DRAWING #	FPS100639	08	
DATE	15/07/2016	CHECKED BY	
SCALE	N.T.S.	APPROVED BY	
CURRENT FILE	A	CLIENT APPROVED BY	

SOLIDWORKS Electrical

SKID B Control Panel 9-CP62-04-51-2



NOT ALL SCREENS HAVE BEEN SHOWN FOR CLARITY

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	15/07/2016	As Built	KE	MD	RH	

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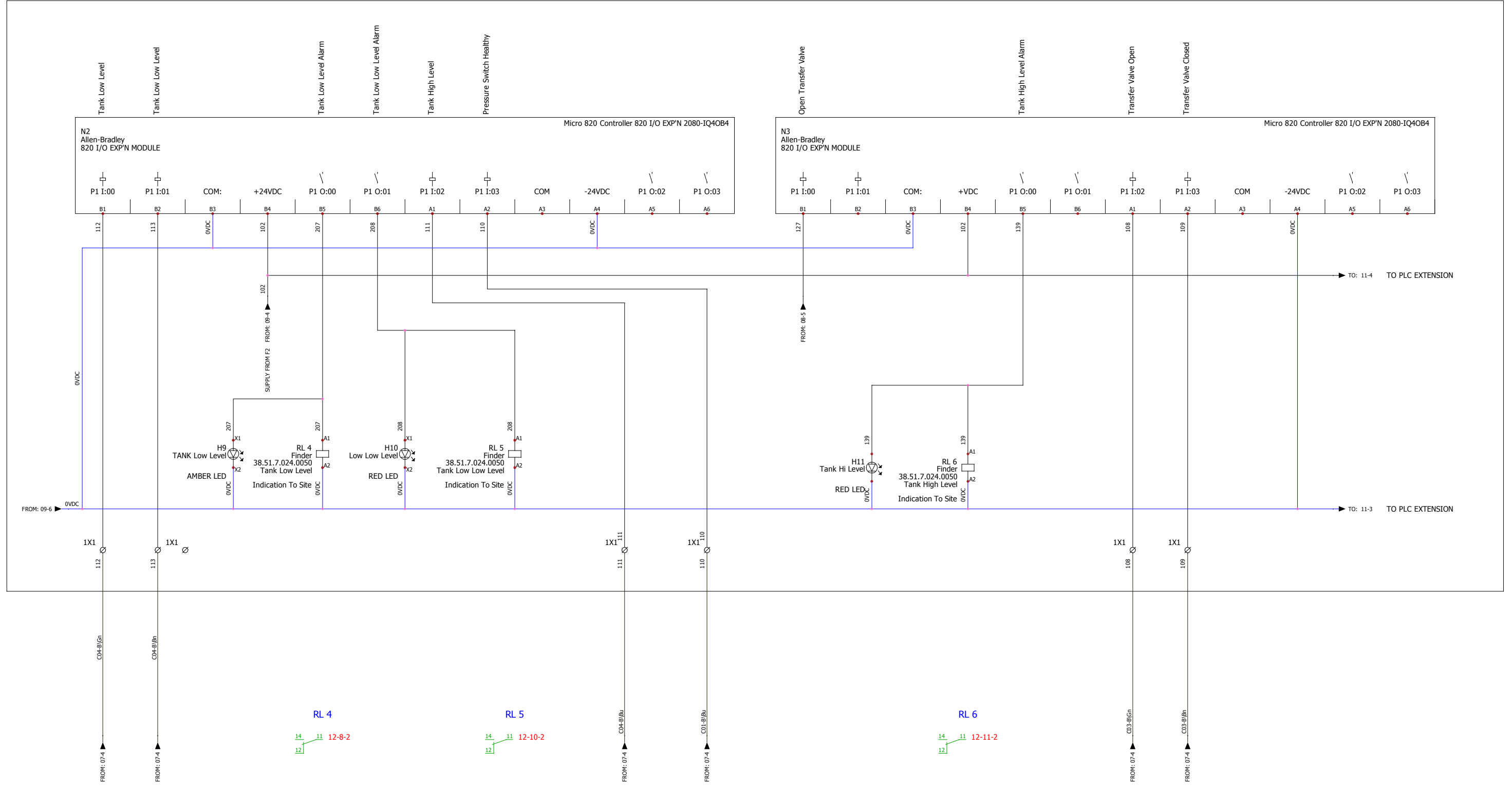
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EMAIL: sales@flotechps.com
WEB: www.flotechps.com

PROJECT NAME: SKID B Vivergo Fuels Project
DRAWING TITLE: INJECTION, BLENDING & PUMPING SYSTEM
PLC drawing N1
DRAWING #: FPS100639
SCALE: N.T.S.
DATE: 15/07/2016
DRAWN BY: KE
CHECKED BY: KE
APPROVED BY: KE

CUSTOMER DRAWING NUMBER: FPS100639

9 of 17

SKID B Control Panel 9-CP62-04-51-2



RL 4
14 11 12-8-2
12

RL 5
14 11 12-10-2
12

RL 6
14 11 12-11-2
12

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	15/07/2016	As Built	K E	M D	R H	

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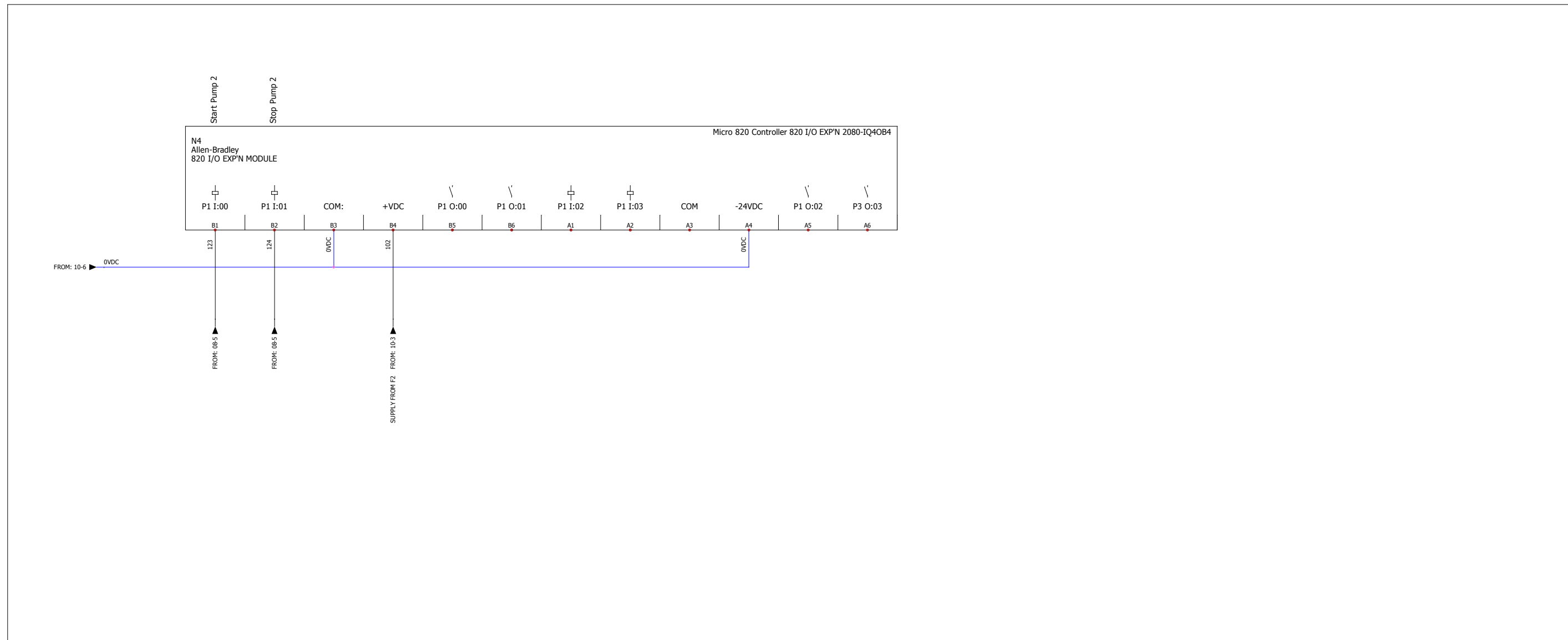
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PROJECT NAME SKID B Vivergo Fuels Project	PROJECT # FPS100639
DRAWING TITLE INJECTION, BLENDING & PUMPING SYSTEM PLC Drawing Extension N2 & N3	DRAWING # FPS100639
SCALE N.T.S.	CHECKED BY K E
CUSTOMER DRAWING NUMBER	DATE 15/07/2016
	APPROVED BY R H
	10 of 17

SOLIDWORKS Electrical

SKID B Control Panel 9-CP62-04-51-2



REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	15/07/2016	As Built	KE	MD	RH	

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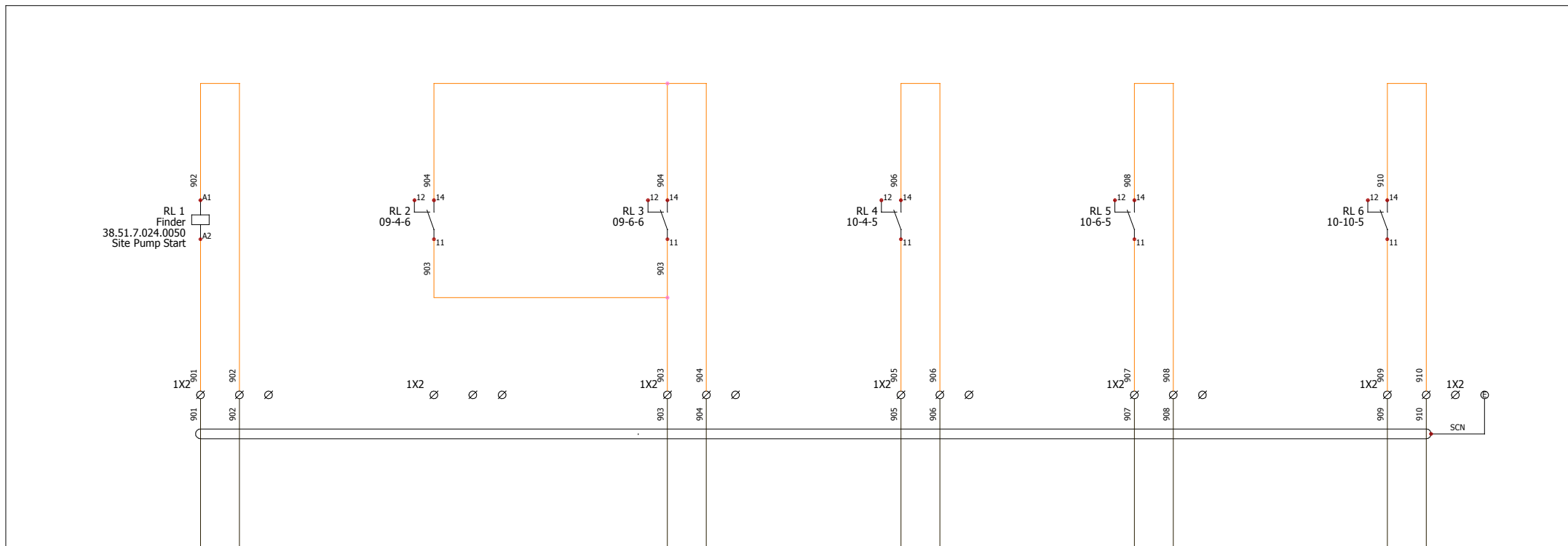
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PROJECT NAME	SKID B	PROJECT #	FPS100639
DRAWING TITLE	INJECTION, BLENDING & PUMPING SYSTEM PLC Drawing Extension N4		
DRAWING #	FPS100639	11	
DRAWN BY	KE	DATE	15/07/2016
CHECKED BY		SCALE	N.T.S.
CURRENT REV.	A	STATUS	

SOLIDWORKS Electrical

SKID B Control Panel 9-CP62-04-51-2



SITE PUMP START FROM JBI

PUMP 1 OR 2 RUNNING TO JBI

TANK LOW LEVEL TO JBI

TANK LOW LOW LEVEL TO JBI

TANK HIGH LEVEL TO JBI

RL 1
14 11 09-5-3
12

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	15/07/2016	As Built	KE	MD	RH	

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PROJECT NAME SKID B Vivergo Fuels Project	PROJECT # FPS100639
DRAWING TITLE INJECTION, BLENDING & PUMPING SYSTEM External Signals to Site	DRAWING # FPS100639
SCALE N.T.S.	CHECKED BY K E
DATE 15/07/2016	APPROVED BY
CUSTOMER DRAWING NUMBER	PAGE 12 of 17

N1

Address	Mnemonic	Function	Manufacturer	Reference	Mark	Description	Comments	Terminal Mark
I-03:.			Allen-Bradley	Micro 830 Controller	N1	Pump 1 Manual		5
I-04:.			Allen-Bradley	Micro 830 Controller	N1	Pump 2 Manual		6
I-05:.			Allen-Bradley	Micro 830 Controller	N1	Start Pump 1		7
I-06:.			Allen-Bradley	Micro 830 Controller	N1	Stop Pump 1		8
I-07:.			Allen-Bradley	Micro 830 Controller	N1	Site Pump Request		9
COM1:.			Allen-Bradley	Micro 830 Controller	N1	Inputs Common 0VDC		10
I-08:.			Allen-Bradley	Micro 830 Controller	N1	Pump 1 Running		11
I-09:.			Allen-Bradley	Micro 830 Controller	N1	Pump 2 Running		12
I-10:.			Allen-Bradley	Micro 830 Controller	N1	Pump 1 O/L Tripped		13
I-11:.			Allen-Bradley	Micro 830 Controller	N1	Pump 2 O/L Tripped		14
COM0:.			Allen-Bradley	Micro 830 Controller	N1	Inputs Common 0VDC		1
I-00:.			Allen-Bradley	Micro 830 Controller	N1	Alarm Reset		2
I-01:.			Allen-Bradley	Micro 830 Controller	N1	Pump 1 In Auto		3
I-02:.			Allen-Bradley	Micro 830 Controller	N1	Pump 2 In Auto		4
I-12:.			Allen-Bradley	Micro 830 Controller	N1	Safety Relay Healthy		15
I-13:.			Allen-Bradley	Micro 830 Controller	N1	Lamp Test		16
+DC24			Allen-Bradley	Micro 830 Controller	N1	+24VDC Supply		1
CM2			Allen-Bradley	Micro 830 Controller	N1	+24VDC		7
0-02			Allen-Bradley	Micro 830 Controller	N1	Pump 1 Running		8
0-03			Allen-Bradley	Micro 830 Controller	N1	Pump 2 Running		9
0-04			Allen-Bradley	Micro 830 Controller	N1	Pump 1 O/L Tripped		10
0-05			Allen-Bradley	Micro 830 Controller	N1	Pump 2 O/L Tripped		11
CM3			Allen-Bradley	Micro 830 Controller	N1	+24VDC		12
0-06			Allen-Bradley	Micro 830 Controller	N1	Open Transfer Valve		13
0-07			Allen-Bradley	Micro 830 Controller	N1	Pressure Fault Alarm		14
0-08			Allen-Bradley	Micro 830 Controller	N1	Safety Relay Tripped		15
0-09			Allen-Bradley	Micro 830 Controller	N1	Transfer Valve Fault		16
-DC24			Allen-Bradley	Micro 830 Controller	N1	0VDC Supply		2
CM0			Allen-Bradley	Micro 830 Controller	N1	+24VDC		3
0-00			Allen-Bradley	Micro 830 Controller	N1	Start Pump 1		4
CM1			Allen-Bradley	Micro 830 Controller	N1	+24VDC		5
0-01			Allen-Bradley	Micro 830 Controller	N1	Start Pump 2		6

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A	15/07/2016	As Built	K.E	M.D	R.H	

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CUSTOMER DRAWING NUMBER

PROJECT NAME: SKID B Nivedeo Fuels Project

PROJECT #: FPS100639

DRAWING TITLE: INJECTION, BLENDING & PUMPING SYSTEM

DRAWING #: FPS100639 13

DATE: 15/07/2016

BY: K.E

CHKD: N.T.S.

APP: A

ORDER #: 13 of 17

N2

Address	Mnemonic	Function	Manufacturer	Reference	Mark	Description	Comments	Terminal Mark
+24VDC			Allen-Bradley	820 I/O EXP'N MODULE	N2			B4
P1 O:02			Allen-Bradley	820 I/O EXP'N MODULE	N2			A5
P1 I:03			Allen-Bradley	820 I/O EXP'N MODULE	N2	Pressure Switch Healthy		A2
P1 I:02			Allen-Bradley	820 I/O EXP'N MODULE	N2	Tank High Level		A1
P1 O:01			Allen-Bradley	820 I/O EXP'N MODULE	N2	Tank Low Low Level Alarm		B6
P1 O:00			Allen-Bradley	820 I/O EXP'N MODULE	N2	Tank Low Level Alarm		B5
P1 I:01			Allen-Bradley	820 I/O EXP'N MODULE	N2	Tank Low Low Level		B2
P1 I:00			Allen-Bradley	820 I/O EXP'N MODULE	N2	Tank Low Level		B1
COM:			Allen-Bradley	820 I/O EXP'N MODULE	N2			B3


N3

Address	Mnemonic	Function	Manufacturer	Reference	Mark	Description	Comments	Terminal Mark
P1 O:03			Allen-Bradley	820 I/O EXP'N MODULE	N3			A6
P1 O:02			Allen-Bradley	820 I/O EXP'N MODULE	N3			A5
P1 I:03			Allen-Bradley	820 I/O EXP'N MODULE	N3	Transfer Valve Closed		A2
P1 I:02			Allen-Bradley	820 I/O EXP'N MODULE	N3	Transfer Valve Open		A1
P1 O:01			Allen-Bradley	820 I/O EXP'N MODULE	N3			B6
P1 O:00			Allen-Bradley	820 I/O EXP'N MODULE	N3	Tank High Level Alarm		B5
P1 I:01			Allen-Bradley	820 I/O EXP'N MODULE	N3			B2
P1 I:00			Allen-Bradley	820 I/O EXP'N MODULE	N3	Open Transfer Valve		B1

N4

Address	Mnemonic	Function	Manufacturer	Reference	Mark	Description	Comments	Terminal Mark
P3 O:03			Allen-Bradley	820 I/O EXP'N MODULE	N4			A6
P1 O:00			Allen-Bradley	820 I/O EXP'N MODULE	N4			B5
P1 O:01			Allen-Bradley	820 I/O EXP'N MODULE	N4			B6
P1 I:00			Allen-Bradley	820 I/O EXP'N MODULE	N4	Start Pump 2		B1
P1 I:01			Allen-Bradley	820 I/O EXP'N MODULE	N4	Stop Pump 2		B2
P1 I:02			Allen-Bradley	820 I/O EXP'N MODULE	N4			A1
P1 I:03			Allen-Bradley	820 I/O EXP'N MODULE	N4			A2
P1 O:02			Allen-Bradley	820 I/O EXP'N MODULE	N4			A5

REV.		DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
A		15/07/2016	As Built	K.E	M.D	R.H	
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CUSTOMER DRAWING NUMBER

PROJECT # FPS100639

DRAWING # FPS100639 14

DATE 15/07/2016

BY K.E

CHKD N.T.S.

APP

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Mark	Description	Article number	Path	Core Identification	Gland Size	Cable Rated Voltage
C01-B	BS5308 Cable Part 1 Type 2 CAM SWA 1 Pair 0.75mm	85251	Control Panel 9-CP62-04-51-2<>SKID B	Bu,Bk	20	300/500
C02-B	XLPE/PVC/SWA/PVC/Black 3 1.5mm	55109	Control Panel 9-CP62-04-51-2<>SKID B	Bk,Bn,Gy	20	600/1000v
C03-B	BS5308 Cable Part 1 Type 2 CAM SWA Quad 0.75mm	85416	Control Panel 9-CP62-04-51-2<>SKID B	Bk,Bu,Gn,Bn	20	300/500v
C04-B	BS5308 Cable Part 1 Type 2 CAM SWA Quad 0.75mm	85416	Control Panel 9-CP62-04-51-2<>SKID B	Bk,Bu,Gn,Bn	20	300/500v
C05-B	BS5308 Cable Part 1 Type 2 CAM SWA 5 Pair 0.75mm	85418	Control Panel 9-CP62-04-51-2<>SKID B	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	20/25	300/500
P01-B	XLPE/PVC/SWA/PVC/Black 4 1.5mm	55118	SKID B<>Control Panel 9-CP62-04-51-2	Bn,Bk,Gy,,Ye	20	600/1000v
P02-B	XLPE/PVC/SWA/PVC/Black 4 1.5mm	55118	Control Panel 9-CP62-04-51-2<>SKID B	Bn,Bk,Gy,,Ye	20	600/1000v
P03-B	XLPE/PVC/SWA/PVC/Black 4 1.5mm	55118	Control Panel 9-CP62-04-51-2<>SKID B	Bn,Bk,Gy,,Ye	20	600/1000v

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
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PROJECT NAME		SKID B		CUSTOMER DRAWING NUMBER
PROJECT #		FPS100639		
DRAWING TITLE		INJECTION, BLENDING & PUMPING SYSTEM		
DRAWING #		FPS100639		
DATE	15/07/2016	ORDER #	15	
BY	K.E	CHECKED BY		
DATE	N.T.S.	APPROVED BY		
DATE		DATE		
				15 of 17

C01-B

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
C01-B	85251	Bk	1X1-104	-PSL-001:1	104	Bu,Bk	BK
C01-B	85251	Bu	1X1-110	-PSL-001:4	110	Bu,Bk	BU
C01-B	85251	Shield				Bu,Bk	

C02-B

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
C02-B	55109	Core 1	1X1-136	-VO-001:8	136	Bk,Bn,Gy	BN
C02-B	55109	Core 2	1X1-E	-VO-001:E	E	Bk,Bn,Gy	BK
C02-B	55109	Core 3	1X1-0VDC	-VO-001:7	0VDC	Bk,Bn,Gy	GY

C03-B

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
C03-B	85416	Bk	1X1-106	-VO-001:2	106	Bk,Bu,Gn,Bn	BK
C03-B	85416	Bu	1X1-106	-VO-001:5	106	Bk,Bu,Gn,Bn	BU
C03-B	85416	Gn	1X1-108	-VO-001:3	108	Bk,Bu,Gn,Bn	GN
C03-B	85416	Bn	1X1-109	-VO-001:6	109	Bk,Bu,Gn,Bn	BN
C03-B	85416	Shield				Bk,Bu,Gn,Bn	

C04-B

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
C04-B	85416	Bk	1X1-105	-HLS-001 LLS-001 LLLS-001:WH	105	Bk,Bu,Gn,Bn	BK
C04-B	85416	Bu	1X1-111	-HLS-001 LLS-001 LLLS-001:VT	111	Bk,Bu,Gn,Bn	BU
C04-B	85416	Gn	1X1-112	-HLS-001 LLS-001 LLLS-001:YE	112	Bk,Bu,Gn,Bn	GN
C04-B	85416	Bn	1X1-113	-HLS-001 LLS-001 LLLS-001:BN	113	Bk,Bu,Gn,Bn	BN
C04-B	85416	Shield				Bk,Bu,Gn,Bn	

REV.	DATE	DESCRIPTION	BY	CHKD.	APP.	NOTES
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PROJECT NAME		SKID B		CUSTOMER DRAWING NUMBER	
PROJECT #		FPS100639			
DRAWING TITLE		INJECTION, BLENDING & PUMPING SYSTEM			
DRAWING #		FPS100639		ORDER #	
DATE		15/07/2016		CHECKED BY	
DRAWN BY		N.T.S.		APPROVED BY	
SCALE		A		DATE	
COURTESY				16 of 17	

C05-B

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
C05-B	85418	Pair 1-1	1X2-901	JB DC-901	901	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BK
C05-B	85418	Pair 1-2	1X2-902	JB DC-902	902	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BU
C05-B	85418	Pair 2-1	1X2-903	JB DC-903	903	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BK
C05-B	85418	Pair 2-2	1X2-904	JB DC-904	904	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	GN
C05-B	85418	Pair 3-1	1X2-905	JB DC-905	905	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BU
C05-B	85418	Pair 3-2	1X2-906	JB DC-906	906	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	GN
C05-B	85418	Pair 4-1	1X2-907	JB DC-907	907	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BK
C05-B	85418	Pair 4-2	1X2-908	JB DC-908	908	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BN
C05-B	85418	Pair 5-1	1X2-909	JB DC-909	909	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BU
C05-B	85418	Pair 5-2	1X2-910	JB DC-910	910	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	BN
C05-B	85418	Shield	SCN3	JB DC-SCN	SCN	Bk,Bu,Bk,Gn,Bu,GnBk,Bn,Bu,Bn	

P01-B


Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
P01-B	55118	Core 1	-ISO-01 9-51-XS01B:2	SUPPLY 1-L1-0	L1-0	Bn,Bk,Gy,/Ye	BN
P01-B	55118	Core 2	-ISO-01 9-51-XS01B:4	SUPPLY 1-L1-1	L2-0	Bn,Bk,Gy,/Ye	BK
P01-B	55118	Core 3	-ISO-01 9-51-XS01B:6	SUPPLY 1-L1-3	L3-0	Bn,Bk,Gy,/Ye	GY
P01-B	55118	Core 4	ISO-01 9-51-XS01B	SUPPLY 1-E	E	Bn,Bk,Gy,/Ye	BU

P02-B

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
P02-B	55118	Core 1	MTR 1-L1-2	M51021B	L1-2	Bn,Bk,Gy,/Ye	BN
P02-B	55118	Core 2	MTR 1-L2-2	M51021B	L2-2	Bn,Bk,Gy,/Ye	BK
P02-B	55118	Core 3	MTR 1-L3-2	M51021B	L3-3	Bn,Bk,Gy,/Ye	GY
P02-B	55118	Core 4	MTR 1-E	M51021B	E	Bn,Bk,Gy,/Ye	BU

P03-B

Cable Ident	Cable Part No	Core Ident	Origin	Destination	Wire number	Core Identification	Core colour code
P03-B	55118	Core 1	MTR 2-L1-4	-M51022B:U1	L1-4	Bn,Bk,Gy,/Ye	BN
P03-B	55118	Core 2	MTR 2-L2-4	-M51022B:V1	L2-4	Bn,Bk,Gy,/Ye	BK
P03-B	55118	Core 3	MTR 2-L3-4	-M51022B:W1	L3-4	Bn,Bk,Gy,/Ye	GY
P03-B	55118	Core 4	MTR 2-E	-M51022B:E	E	Bn,Bk,Gy,/Ye	BU

REV. DATE DESCRIPTION BY CHD APP				NOTES				CUSTOMER DRAWING NUMBER	
A	15/07/2016	As Built	K.E	M.D	R.H				
 Flotech PERFORMANCE SYSTEMS Specialist Multi-Discipline Engineering Services to the Petro-Chem, Process & Food Industries Across the UK. Electrical, Instrumentation & Mechanical Engineers.								PROJECT NAME: SKID B Nivedra Fuels Project PROJECT #: FPS100639 DRAWING TITLE: INJECTION, BLENDING & PUMPING SYSTEM DRAWING #: FPS100639 17 DATE: 15/07/2016 DRAWN BY: N.T.S. CHECKED BY: A PROJECT # 17 of 17	
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