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Technical Note

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Subject: Withdrawal of EP 11 00 00 07 SP Design Technical Reviews for Electrical SCADA Equipment

This technical note is issued by the Asset Standards Authority as a notification to remove from use RailCorp document EP 11 00 00 07 SP *Design Technical Reviews for Electrical SCADA Equipment,* Version 1.1 and its associated form EP 11 00 00 07 SP FM 01.

EP 11 00 00 07 SP and EP 11 00 00 07 SP FM 01 are legacy documents and should be used for reference purposes only. ASA procedure T HR EL 11001 PR *Design Technical Reviews for Electrical SCADA Equipment,* Version 1.0 and its associated form T HR EL 11001 PR F1 replace these documents.

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Superseded by T HR EL 11001 PR

Engineering Procedure
Electrical

EP 11 00 00 07 SP

DESIGN TECHNICAL REVIEWS FOR ELECTRICAL SCADA EQUIPMENT

Version 1.1

Issued October 2012

Engineering Procedure

Owner:	Chief Engineer Electrical		
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Document control

Version	Date	Summary of change
1.0	March 2012	First Issue
1.1	October 2012	Modified Section 4.7.8 to correct drawing names and section 4.5.2 for excel version of IO schedule.

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1 Introduction

Technical reviews are essential to provide assurance that equipment being developed will meet specified requirements and that the requirements and design intent of the customer are understood by the development team. These reviews provide a major input to the verification and validation processes for projects.

The process for technical reviews is detailed in Engineering Procedure *EPD 0013 Technical Reviews*.

1.1 Purpose

The purpose of this procedure is to detail deliverable requirements for each stage of the design associated with the electrical SCADA system. It includes sub-components of wider scope design items where such sub-components are required as part of the SCADA design, but where the overall design item falls under a different responsibility (e.g. cable schedule).

1.2 Application

This document is initially only applicable to Electrical SCADA system Remote Terminal Units (RTUs) but will include additional SCADA equipment in subsequent updates. It applies to the design of new RailCorp Electrical SCADA System RTUs including those that are replacing existing RTUs due to plant expansion.

It is not applicable to RTU replacements completed as part of the RTU Replacement Project or replacements completed internally for maintenance reasons by the RailCorp SCADA section.

2 References

2.1 Australian and International Standards

AS/NZS 3000: 2007	*Electrical Installations (The Australian/New Zealand Wiring Rules)*

2.2 RailCorp Documents

EP 00 00 00 01 T1: Sep 2010	*RailCorp Electrical System General Description*
EP 11 03 00 02 SP: Jul 2011	*Electrical SCADA System Remote Terminal Unit Specification*
EP 11 00 00 07 SP FM 01	*I/O Schedule*
PR PSA EP 002: Jan 2011	*Design Submissions*
EPD 0001: May 2009	*Design Management Process*
EPD 0006: Feb 2010	*Design Standards*
EPD 0010: May 2009	*Design Approval and Acceptance*
EPD 0013: Jul 2009	*Technical Reviews*

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3 Definitions and Abbreviations

ADI Analogue and Digital Input

AI Analogue Input

DI Digital Input

DO Digital Output

I/O Input/ Output

4 Electrical SCADA Remote Terminal Unit Design Procedure

4.1 Concept Design

The Concept Design requires a SCADA design and site plan consisting of the following items.

4.1.1 Cabinet Sizing and Placement

Calculate the size of the RTU and then determine the size of the RTU cabinet and marshalling cabinet. This requires the operating diagram and a list of the equipment to be monitored and/or controlled, including hardwired and serially connected I/O. A suitable location for the RTU cabinet, marshalling cabinet and communication cabinet on the site plan can then be confirmed. The RTU and marshalling cabinets are joined to form one unit and the communications cabinet should be located nearby for ease of wiring. The sizing will also provide the RTU power requirements.

For larger substations, multiple marshalling panels may be required. Additional marshalling panels can be accommodated on the reverse side of cabinets as well as the front, but only where front and rear door access is possible. This is dependent on the panel's proposed location in the substation. However, the preference is for front and back access to the cabinet as this means the cabinets can be smaller and less congested.

4.1.2 SCADA Communication Design

Produce the communications design including schematics showing route diversity for the communication channel media and the arrangement of communications equipment including network switches. The design shall meet SCADA communications requirements. This is applicable to communications services providing access to the RTU, VoIP phones, corporate WAN and any future communication requirements.

4.2 Reference Design

The previous design submission should be adjusted if necessary.

4.3 System Definition Review (SDR)

The previous design submission should be adjusted if necessary.

4.4 Preliminary Design Review (PDR)

The Preliminary Design Review requires a SCADA design and implementation consisting of the following items.

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4.4.1 Cable Schedule

Produce a cable schedule that is in an editable MS Excel spreadsheet format. A subset of the cable schedule relates to the SCADA wiring of the substation. The SCADA cables are prefixed with:

Prefix	*Cable Use*
S	*Digital Inputs and Outputs*
IA	*Screened analogue signal cables used for analogue*
CM	*Communications cables (mostly RS485 serial cables)*
AC	*AC power cables for cubicle lighting*
DC	*DC power cables for DC supply to RTU*
E	*Earth cables for earthing the RTU cubicles*

Types S and IA specify the requirements for the direct (hardwired) RTU I/O.

Any minor modifications to the cable schedule should not affect other I/O, e.g. if a cable is deleted, all other cable numbering should remain the same.

4.4.2 SCADA Communication Design

The detailed design should show cable routing, including redundancy, any diversity, cores and edge node locations. This is applicable to the RTU, VoIP phones, corporate WAN access and any future communication requirements.

4.5 Critical Design Review (CDR)

The Critical Design Review requires a SCADA alarms and interface design consisting of the following items.

4.5.1 Confirm Cable Schedule is “For Construction”

The following design procedure relies on use of the cable schedule, operating diagram and protection concept document, all of which are required to be in a ‘for construction’ state of approval. Failing to ensure the documentation is approved for construction could result in design and manufacturing re-work for the RTU, potentially delaying the delivery of the RTU and final substation commissioning.

4.5.2 I/O Schedule

Produce an I/O Schedule that includes normal state (open/closed) of Digital Input alarm contacts, CT/VT ratios, transducer type & ratio, indication description. In addition to the I/O connected through wiring shown on the cable schedule, listing of serially communicated indications and virtual indications are also required. Serially communicated indications are those acquired via a software link (e.g. serial link to protection relays – an RS485 link using Modbus protocol) while virtual indications are those calculated internally to the RTU (e.g. staff alarm). The SCADA component of the cable schedule combined with the virtual indications specifies the SCADA I/O requirement for the substation and assigns each required I/O function to a cable and core. Appendix F provides a sample of an I/O Schedule.The I/O schedule shall be in an editable Excel format. Download form *EP 11 00 00 07 SP FM 01* for the excel version. See Appendix A for more information about substations with 2 battery systems.

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The SCADA alarms and controls to be provided for a location will largely conform to the standard I/O complement that has been provided at locations already in service in the RailCorp network. However, where a SCADA point is required for a new type of equipment or to alarm a condition not previously alarmed in the system, instructions detailing the meaning and use of the point will need to be provided to EOC. This document will give a description of the indication and instructions of required actions by the Electrical System Operators when the alarm occurs in service.

4.5.3 Confirm RTU Supplier

RailCorp has determined a number of RTUs from different suppliers that have been proven to work satisfactorily with the Master Station. The suppliers are Invensys, Logica and Kingfisher. As at October 2011 Railcorp has a supply agreement with Invensys for the supply of complete RTU assemblies (RTU, ancillary equipment, cabinets and cable marshalling area). The supply agreement is current to 12 June 2012, and thereafter, for an additional year if required. This supply agreement is entered in RailCorp's procurement system, Ariba, as a set of "Catalogue Items". See Appendix D for more information about procuring RTUs using Ariba. RailCorp will procure the RTU.

4.5.4 RTU Size

The RailCorp SCADA section will determine the number of racks, I/O cards and marshalling terminals from the I/O Schedule and Cable Schedule. Once the quantity and type of each module required has been determined, the number of racks required can be determined. Multiple racks are interconnected using optical links ('optonets') to form a single logical RTU. Physical I/O points in the RTU are then identified by specifying Rack, Slot and Channel numbers. See Appendix A for more information.

4.5.5 RTU and Marshalling Cabinet Layout

The RailCorp SCADA section will arrange the cabinet layout.

RTUs are assembled as RTU/marshalling panel assemblies with the marshalling cabinet housing terminations for the field cables. A dedicated terminal strip is provided for the termination of each field cable with a terminal provided and numbered in sequence for each core of the cable. The strip is labelled according to the cable number and its function. The terminals in these strips are 'disconnect' links, enabling complete isolation of the plant from the RTU.

Additionally, the marshalling cabinet houses another set of terminal strips, which relates to each I/O module in the RTU assembly and is in sequence e.g. R1S3DI1 down to R1S3DI32 for an Invensys DI module with 32 inputs. The terminals in these strips are through (not disconnect) links.

Physical assignment of an I/O field function to a particular I/O point in the RTU is completed by installing wiring (Cross Wiring) between the field wiring terminal strips and the RTU-centric terminal strips. From the cable schedule, the quantity and size of the field wiring terminal strips required is known and from the I/O specification of the RTU determined earlier, the number and quantity of RTU terminals is known. Using this information, the marshalling panel terminal layout can be performed. This arrangement of terminals facilitates changes if required on site, where cross wiring can be altered without changing either RTU or field cabling.

The marshalling panel is laid out with field cabling passing up large slotted cable ducts in the centre of the cabinet and terminated onto the field terminals laid out on either side of the ducts. The RTU module terminals are arranged outside the field terminals. See Appendix A for more information.

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4.5.6 Marshalling Cabinet Cross Wiring

The RailCorp SCADA section will produce the cross wiring schedule.

Cross wiring needs to be installed in the RTU between each non-spare field cable core on the field terminal strip and the assigned I/O channel on the RTU terminal strip for that I/O function to complete the factory built RTU to match the master station configuration. This cross wiring can be done so that consecutive field cable cores are where possible wired to consecutive RTU module channels minimising the length and complexity of wiring within the marshalling panel.

Each specified I/O is assigned to a particular RTU channel using the I/O Schedule. This is done using a dedicated master station configuration tool, the output of which is downloaded into the master station to modify the master station configuration to include the requirements for the new substation. This tool can also output an Excel report, which is used to specify the required cross wiring to the manufacturer. This is done using a previously completed substation as a template, which helps identify omitted or unnecessary I/O functions. Note that this assignment of I/O functions to channels is arbitrary although some consideration is given to different substation batteries and separating redundant feeder I/O onto different modules and/or racks to allow limited operation of the substation SCADA system in the case of individual, single module and/or rack failure. Where possible RTU channels should be allocated to functions in the same order as the functions appear in the cable schedule. This minimises wiring length, the possibility of wiring errors and the complexity of the documentation provided to the RTU manufacturer.

4.6 Approved for Construction

There should be only minor changes to the I/O Schedule and RTU design at this stage.

4.7 Construction

4.7.1 Order RTU

The order is placed with the RTU supplier by RailCorp. This includes cabinets, communications power supplies and all ancillary equipment. The RTU must be ordered 16 weeks before it is required to be installed. This provides 8 weeks for the order and fit out of the RTU and a further 8 weeks for cabinet fit out and wiring. The manufacturer is provided with the required RTU layout, the marshalling cabinet layout and the cross wiring schedule. RTU manufacture can commence with this information along with specification of some standard provisions such as communications power supplies, dummy circuit breaker and supply bus arrangements. See Appendix D for more information about procuring an RTU using Ariba.

The RTU will undergo Factory Acceptance Testing, which may be witnessed by RailCorp, at the manufacturer's premises before delivery to site. Under the supply agreement with RailCorp, a standard "Inspection and Test Plan" documents these procedures and an "RTU Release Certificate" is signed, permitting delivery to site.

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4.7.2 Prepare Master Station

RailCorp's SCADA section will modify the Master Station's configuration database for the new RTU.

The configuration produced by the Master Station SCADA Configuration Tool is used to add all the I/O for the new RTU into the Master Station's database. After this is done, SCADA operator screen layouts (schematics) can be completed ready for pre-commissioning.

4.7.3 RTU Installed

The RTU and marshalling cabinets will be delivered to site and installed (field wiring will be connected to the field terminals in the marshalling cabinet). Field cable terminations located within an RTU marshalling cubicle shall define the point of separation between the Electrical SCADA RTU and the substation electrical system.

4.7.4 Communications Installed

RailCorp's Communications and Control Section (C&CS) will arrange the installation of communications for the SCADA system. C&CS will then test and verify the links.

4.7.5 Configure RTU

RailCorp's SCADA Technicians will prepare the configuration required for the RTU from the detail provided to the manufacturer and the Master Station SCADA Configuration Tool. This is then loaded into a test RTU facility and checked against the master station configuration to ensure the master station can satisfactorily scan the test RTU.

The configuration of the test RTU is then transferred to the target RTU on site. The RTU can then be scanned by the Master Station to confirm the communication configuration is correct.

4.7.6 Pre-commissioning

Pre-commissioning is done to confirm the SCADA RTU is configured correctly by testing between the RTU and the Master Station. This is done in coordination with the SCADA section at EOC and verifies connection from field terminals to the master station. During this test, the disconnect links in the RTU remain open.

The SCADA RTU needs to be in service before any field testing is done. This prevents field equipment being checked twice.

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4.7.7 Commissioning

Commissioning is an end to end check, from field equipment to the Master Station. This confirms field equipment, field wiring and cross wiring are all correct. This is done by project staff in coordination with the SCADA section at EOC. Once the indication is operational the disconnect links are left closed.

Records need to be kept both in the field and at EOC of the progress of commissioning. A summary report should be completed after commissioning that lists all the indications that have not been tested or are faulty and give comments including expected date of completion and person responsible for rectification. See Appendix E for a sample commissioning sheet.

For a substation to be commissioned all high priority indications (circuit breaker status and control and protection monitoring alarms) must be in service.

4.7.8 'As Built' Drawings

After commissioning the 'as built' drawings should be supplied. These include cable schedule, I/O schedule and RTU drawings. The RTU drawings shall be corrected to "as built" status and include the following for each site:

- RTU & Marshalling Cabinet General Arrangement
- RTU & Marshalling Cabinet Details of Materials
- RTU & Marshalling Cabinet Diagram of Connections
- RTU & Marshalling Cabinet Terminal Arrangement

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Appendix A RTU Layout

I/O Arrangement at Dual Battery Substations

At bulk supply points and major substations there are two independent, isolated battery systems. At these locations the RTU will be supplied from Battery No.1. However, the indications may be supplied from either battery system. It is imperative that these two systems are not connected through the RTU

Battery No.1 will be the supply for most indications. The exception to this is for DCCBs, which will normally be split so that half are supplied from Battery No.1 and half are supplied from Battery No.2.

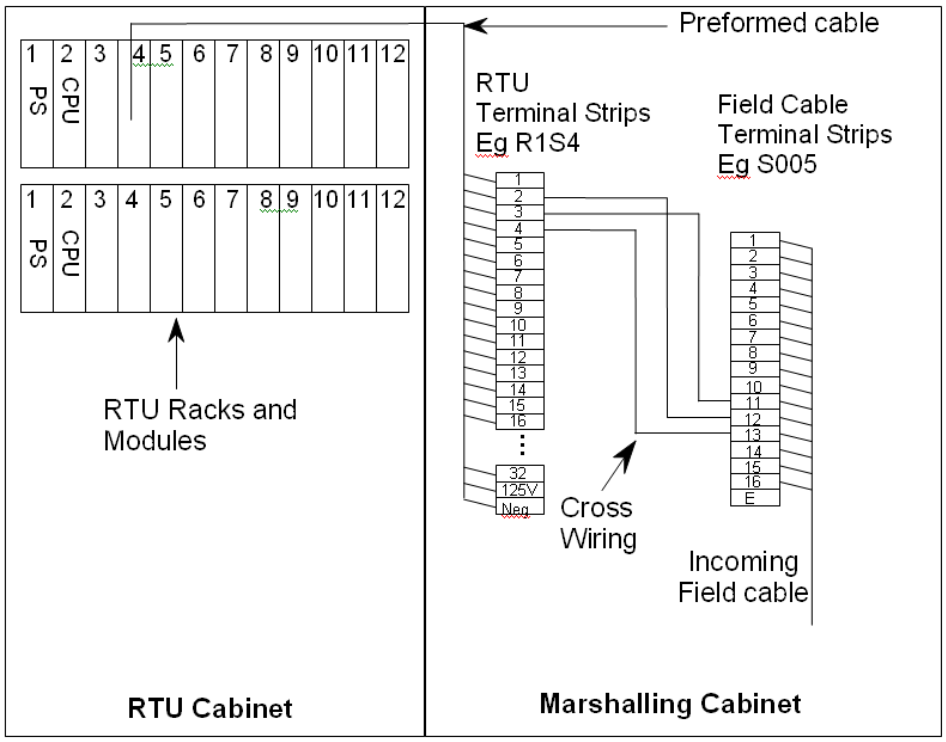
The marshalling terminals shall be arranged so there is clear definition between indications from Battery No.1 and those from Battery No.2, so as to avoid inadvertent cross connection in the field.

RTU and Marshalling Cabinet Layout

To summarise the terminal and wiring arrangement:

Terminals on the RTU terminal strip are arranged to suit the RTU hardware modules. The digital inputs on Invensys RTUs are arranged on modules with 32 DI channels. Therefore the terminals on the RTU terminal strips which relate to the digital inputs on the ADI module in slot 4 in the example have 32 terminals numbered sequentially with each terminal number corresponding to the RTU module input number. Two additional terminals are provided for 125V negative connection from the RTU module.

Terminals on the field terminal strip are arranged in blocks to suit the field cables. For each field cable block, a terminal is provided for each core of the cable, so for the example cable S005, which is a 16 core cable with earth, 17 terminals are provided, numbered in sequence 1 to 16 with each (numbered) core of the cable connected to the correspondingly numbered terminal of the block and earth connection.



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Appendix B Invensys RTUs

The supply agreement current at October 2011 for RTUs provides for the following modules:

- ADI modules: These provide 32 digital inputs and 4 analogue inputs on the module.
- DO modules: These provide 8 digital outputs (4 trip/close pairs) on the module.
- AI module: These provide 20 analogue inputs on the module. However they are normally not required, as the ADI cards provide digital and analogue inputs in the typically used ratio.
- Serial Input module: This provides 4 isolated channels of RS485 inputs, and 4 non-isolated channels.
- Multi I/O modules: These provide mixtures of AIs, DIs, and DOs.

The Invensys RTUs comprise of racks of 12 slots (although 1 and 5 slot racks are also available), 10 of which are available for I/O modules because slots 1 and 2 are reserved for power supply and CPU respectively.

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Appendix C General and Sample Drawings

There are a number of drawings that relate to the installation of RTUs in substations. Some of these are general drawings applicable to all locations and others are sample arrangements.

Drawing No.	***Title***	***Description***
EL0204559	*General - Substations Staff Access, Emergency Lighting, A/C & HWU Control Schematic*	*Staff switch, door reeds, control wiring*
EL0435527	*Toongabbie SS Electrical Communication Cabling Block Diagram*	*Communications cabling with C&CS fibre for protection pilots*
EL0476114	*Art Gallery SS Electrical Communication Cabling Block Diagram*	*Communications cabling using feeder fibre for protection pilots*
EL0360897	*Waverton SS Electrical Communication Cabling Block Diagram*	*Communications cabling using copper for protection pilots*
EL0493835	*Ashfield SS RTU and Marshalling cabinet General Arrangement*	*RTU General arrangement (single cubicle, front and rear access, terminals on back of RTU)*
EL0015242	*Strathfield SS RTU and Marshalling cabinet General Arrangement*	*RTU General arrangement (triple cubicle, front access only, terminals on back of RTU, RTU on swing frame)*
EL0493837 *EL0493838*	*Ashfield SS RTU & Marshalling Cabinet Detail of Materials (Two Sheets)*	*Bill of Materials*
EL0493839 *EL0493840* *EL0493841*	*Ashfield SS RTU & Marshalling Cabinet Diagram of Connections (Three sheets)*	*Typical connection diagram (Power supply, Dummy Circuit Breaker)*
EL0493836	*Ashfield SS RTU & Marshalling Cabinet Terminal Arrangement*	*Terminal arrangement*

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Appendix D Procurement of RTU/Marshalling Cubicles using Ariba

The supply agreement with Invensys is entered in RailCorp's procurement system, Ariba, as a set of "Catalogue Items". It can be accessed by locating the supplier "Invensys Process Systems." There are 81 items available to specify an RTU/marshalling cubicle combination.

The prices in the Supply Agreement are for ***complete RTU assemblies*** including the following:

- RTU compatible with RailCorp's master station, capable of being scanned using either DNP (on fibre) or pilot wire.
- Cubicles – standard size 1800mmW x 600mmD x 2100mmH front and back access, bottom entry, or 2400mmW x 500mmD x 2100mmH, front access only, bottom entry, or wall mount for smaller locations.
- Marshalling terminals using disconnect links where specified
- All power supplies, including 48V supplies for communications purposes
- Dummy circuit breaker
- Blanking panels to cover empty card slots to ensure EMC compliance
- AC connection for lights and GPO inside cubicles
- Provision of sequential termination of individual RTU and field cable cores.
- Testing at the nominated supply voltage
- Delivery to a nominated RailCorp location
- Supply of documentation and manuals for operation and maintenance of the equipment

Pricing is given for RTUs with several different I/O complements. Price modifiers are given to increment or decrement the I/O to suit the location. Noting that an ADI card (analogue digital card) has 32 digital inputs and 4 analogue inputs, a DO card contains 8 digital outputs with clean contacts for each output, a serial card is equipped with 4 x RS485 isolated channels, and there are 10 x I/O cards per file, the RTUs priced are:

- Item1.13/B2.2.1 – 6 x ADI, 3 x DO, 1 serial - 1 x card files
- Item 1.1/B2.2.1 – 8 x ADI, 4 x DO, 1 serial – 2 x card files
- Item 1.11/B2.2.1 – 10 ADI, 5 x DO, 1 serial – 2 x card files
- Item 1.8/B2.2.1 – 2 x ADI, 1 x DO – 1 x card files
- Item 1.14/B2.2.1 – 2 x ADI, 2 x DO – 1 x card files.

Thus the first item is equipped with 6 x 32 or 192 digital inputs, 24 analogue inputs, 24 control outputs, and 4 isolated serial RS485 ports. The most commonly used increments and decrements priced are:

- Item 2.1/B2.2.2 – Adds 1 x ADI card plus cabling and terminals
- Item 2.2/B2.2.2 – Subtracts 1 x ADI card plus cabling and terminals
- Item 2.5/B2.2.2 - Adds 1 x DO card plus cabling and terminals
- Item 2.6/B2.2.2 – Subtracts 1 x DO card plus cabling and terminals
- Item 2.7/B2.2.2 – Adds 1 serial card plus cabling and terminals
- Item 2.8/B2.2.2 – Subtracts 1 x serial card plus cabling and terminals
- Item 2.17/B2.2.2 – Adds 1 x 10 I/O slot chassis plus CPU and power supply cards
- Item 2.18/B2.2.2 – Subtracts 1 x 10 I/O slot chassis plus CPU and power.
- Item 2.23/B2.2.2 – Converts 1 x ADI card to a universal ADI card (new type)

Individual items are also priced as spare parts, which are delivered as separate items. They are numbered Item 5.1/B2.2.5 through to Item 5.20/B2.2.5, and are described in ARIBA.

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(The ARIBA price lists also include items mounted on an aluminium “gear plates”. These are RTU subassemblies made to replace an existing RTU leaving the cubicle intact, and are not applicable to new locations. These were included to facilitate the RTU upgrade program. Items range from item 3.1/B2.2.3 to item 3.30/B2.2.3 and item 4.1/B2.2.4 to item 4.14/B2.2.4. These items do not include cubicles, GPOs & lighting, and have different methods for inclusion of marshalling terminals)

Pricing in this Supply Agreement is subject to escalation in accordance with agreed indices.

- Pricing listed in ARIBA was applicable from 12 June 2009 to 11 June 2010.
- Pricing from 12 June 2010 to 11 June 2011 has escalation of 1.18% applied
- Pricing from 12 June 2011 to 11 June 2012 has escalation of 3.43% applied
- Pricing from 12 June 2012 to 11 June 2013 is yet to be advised.

When the subtotal of the order is determined, a new item is selected - *Miscellaneous parts & services* (set to $1.00) and an escalation quantity is entered to determine the current price.

Example A:

A new RTU requires 212 digital inputs, 33 analogue inputs, 35 digital outputs and 3 serial channels. The cubicle is a standard suite with back and front access, bottom entry. Power supply is a single 125VDC. Delivery is required on site by 1 September 2011. Spares are to be provided at 20%. The timing requires an order by 1 May 2011

No. of digital input points is (212+20%)/32 or 9.9375 cards – select 10 ADI cards. 10 x ADI cards provide 40 analogue inputs, which is adequate to handle 33 plus 7 spares. No. of digital output points is (35+20%) +2 for dummy CB, which is 44/8 which is 5.5 cards - select 6 cards. 1 x serial card is adequate. At 10 I/O cards per file, this will require 2 I/O files. Item 1.11 in list above contains 10 x ADI, 5 x DO and 1 x Serial. Therefore we need to add 1 x DO card to this RTU – select item 3 in the list of RTUs and 1 off item 3 in the list of increments and decrements. This gives:

Item1: Base RTU with 10 x ADI, 5 x DO and 1 serial card
Item2: Add 1 x DO card
Item 3: add 1 year escalation at 1.18%

Note: The RTU and field terminals need analysis to ensure that the layout fits adequately into the cubicle space. This will be done by the manufacturer in a set of drawings done to be “approved for manufacture” status, including GA, BOM and terminal layout.

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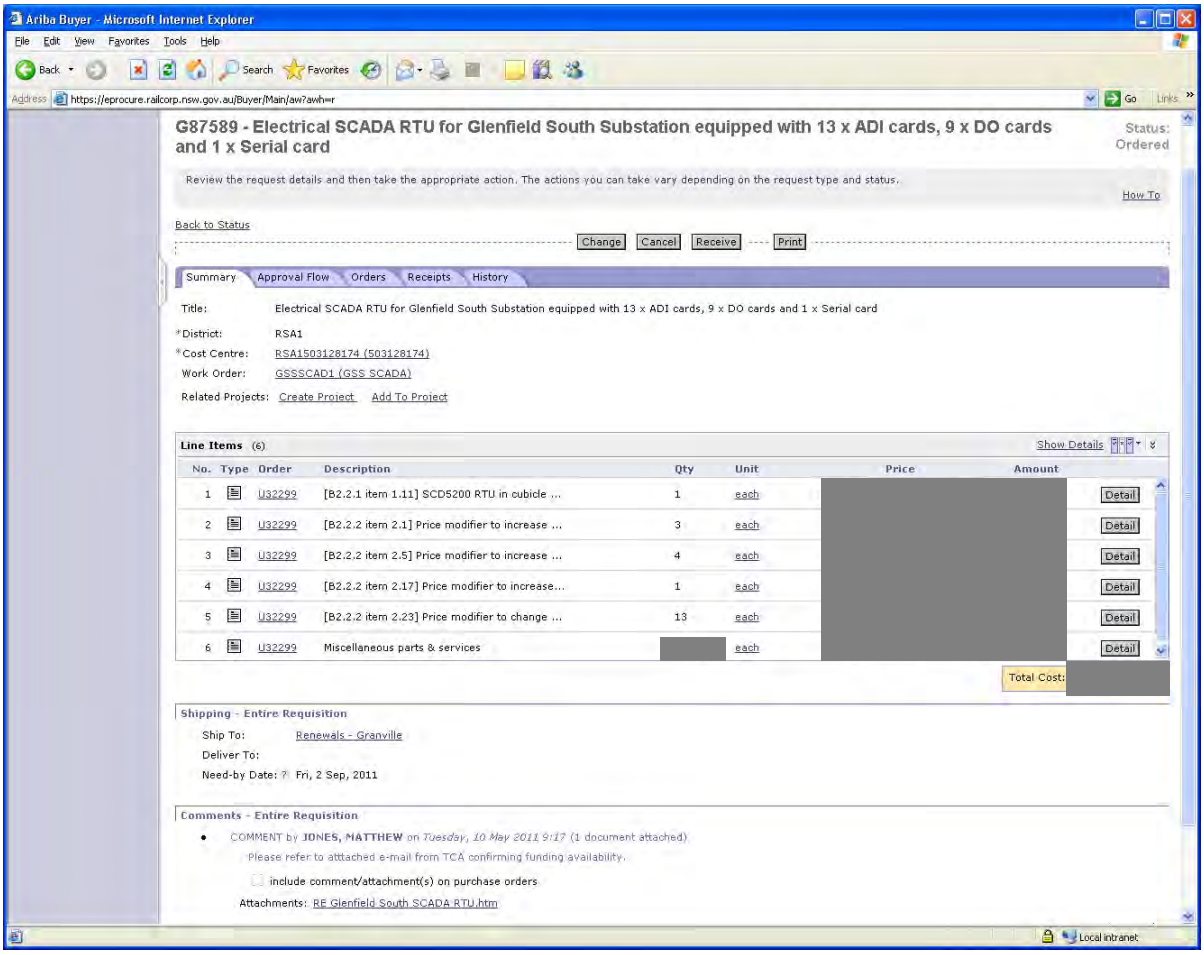
Example B:

Note the following order in ARIBA for Glenfield South RTU



There are 6 line items on this order:

- A complete RTU/marshalling cubicle, equipped with 10 x ADI cards, 5 x DO cards and 1 x serial card.
- Add 3 x ADI cards to make 13 total
- Add 4 x DO cards to make 9 total
- Add 1 x 10 I/O slot chassis – there are 13 + 9 + 1 =23 I/O cards requiring 3 I/O files
- Add cost to convert all 13 ADI cards to new universal type
- Add escalation of 1.18% of items 1 through 5

The result is an order for Glenfield South Substation RTU equipped with 13 x ADI cards, 9 x DO cards and 1 x serial card, in a standard cubicle suite.

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Appendix E Sample Commissioning Checklist

SCADA Plant	SCADA Desig	SCADA Point	DNP Index	Type	Rack No	Master Station Slot	Chan	Terminal	Field Cable	Checked From Equip	Checked From RTU	SCADA Page Lamp	SCADA Log	SCADA Wall Board Lamp	In Service
DigitalEquip	ALARM BUS SUPPLY	DigStatus	1024	DI	1	4	0	R1S4DI/1	S503.3						
DigitalEquip	CONTROLS DISABLED	DigStatus	1025	DI	1	4	1	R1S4DI/2	S503.4						
TestCB	CIRCUIT BREAKER	Status	1026	DI	1	4	2	R1S4DI/3	S503.5						

The commissioning checklist must include the location, any applicable comments, the date of test and the name of the person testing. The checklist is required to be signed by the person testing.

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Appendix F Sample I/O Schedule

= This I/O is conditionally required at some locations

SCADA Equipment Name	SCADA Plant	SCADA Design	From (Field Equip Name)	Batt	Cable No	Core No	Field Device Term.	Signal Type	Signal Description	Signal Status	CT or VT Ratio	RTU				Master Station						Hard wired	Comment
												Rack	Slot	Chan	Terminal	Mosaic Quantity (Point)	DNP Index	Type	Slot	Chan	Invert		
33kV Feeder			33kV Feeder Panel	1	S1000	1	X15:01		Control +ve						R1S10DO/CH2-a							Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1000	2	X15:03	PO	Remote Close Command			1	10	4	R1S10DO/CH2-b	Close	2561	PO	10	1			
33kV Feeder			33kV Feeder Panel	1	S1000	3	X15:02		Control +ve						R1S10DO/CH1-a							Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1000	4	X15:04	PO	Remote Open Command			1	10	3	R1S10DO/CH1-b	Open	2560	PO	10	0	Y	Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1001	1	X15:08	DI	ACCB Open	Energised = CB Open		1	5	1	R1S5DI/1	Status(1)	1280	DI	5	0			
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1001	2	X15:09	DI	ACCB Closed	Energised = CB Closed		1	5	2	R1S5DI/2	Status(0)	1281	DI	5	1		Y	
33kV Feeder	Switch	7XX ISOL	33kV Feeder Panel	1	S1001	3	X15:10	DI	Disconnector Open	Energised = Disc Open		1	5	3	R1S5DI/3	Status(1)	1282	DI	5	2	Y	Y	
33kV Feeder	Switch	7XX ISOL	33kV Feeder Panel	1	S1001	4	X15:11	DI	Disconnector Closed	Energised = Disc Closed		1	5	4	R1S5DI/4	Status(0)	1283	DI	5	3		Y	
33kV Feeder	Switch	7XX EARTH	33kV Feeder Panel	1	S1001	5	X15:12	DI	Earth Switch Open	Energised = ES Open		1	5	5	R1S5DI/5	Status(1)	1284	DI	5	4		Y	
33kV Feeder	Switch	7XX EARTH	33kV Feeder Panel	1	S1001	6	X15:13	DI	Earth Switch Closed	Energised = ES Closed		1	5	6	R1S5DI/6	Status(0)	1285	DI	5	5		Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1001	8	X15:15	DI	CB Motor Spring Charged	Energised = Charged		1	5	8	R1S5DI/8	SpringCharged	1287	DI	5	7		Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1001	9	X15:16	DI	ILIS Trip	Energised = Trip		1	5	9	R1S5DI/9	ILISTrip	1288	DI	5	8	Y	Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1001	10	X15:17	DI	ILIS Fault	Energised = Healthy		1	5	10	R1S5DI/10	ILISFault	1289	DI	5	9		Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel		IA001	W	X3:1	AI	B Phase AC Current +ve	0-10mA = 0 – 500 A	500/1A	1	5	33	R1S5AI/CH33+	Current	1312	AI	5	32		Y	Transducer is 1A/10mA
33kV Feeder	ACCB	7XX	33kV Feeder Panel		IA001	B	X3:4		B Phase AC Current -ve			1	5	33	R1S5AI/CH33-							Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel		IA001	S			Screen													Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	CM957	PR1	X15:32,33	PULSED	EDMI Mk6E kWh Meter (p10, output 1)	Energised = Pulse		1	5	10	R1S5DI/10	Energy	1290	DI	5	10		Y	Bulk supply feeders only.
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	IA160			AI	Power Factor	0-10mA = 0-1	1/10mA	1	5	34		PowerFactor	1313	AI	5	33		Y	Bulk supply feeders only.
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1002	2	X15:30	DI	VT MCB Closed (Dir Prot Voltage Fail)	Energised = MCB Closed		1	5	12	R1S5DI/12	DirProtVoltage	1291	DI	5	11		Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1004	1		DI	Low Gas	Energised = Gas Level OK		1	5	9	R1S5DI/9	Low Gas	1294	DI	5	14		Y	For outdoor SF6 switchgear
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1004	2		DI	Low Gas Lockout	Energised = Locked out		1	5	10	R1S5DI/10	Low Gas L/O	1295	DI	5	15	Y	Y	For outdoor SF6 switchgear
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1004	3		DI	Motor Trouble	Energised = Motor Healthy		1	5	11	R1S5DI/11	Motor Trouble	1296	DI	5	16		Y	Switchgear dependent
33kV Feeder	ACCB	7XX	33kV Feeder Panel							High = Comms Healthy						PWRelayCommsFail	37120	DI	145	0			Internal to RTU
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1002	1	X15:24	DI	PW Relay (P521) Watchdog	Energised = Relay Healthy		1	5	18	R1S5DI/18	PWRelayFail	1297	DI	5	17		Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1002	3		DI	Pilot Wire Trip (mhobo4)	Energised = Fault on feeder		1	5	19	R1S5DI/19	PilotWireTrip	1298	DI	5	18	Y	Y	Required for older relays
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 2	BIT 0	P521	Serial	Pilot Wire Trip Alarm (A-Phase)	High = PW Fault						PWTripA	37121	DI	145	1	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 2	BIT 1	P521	Serial	Pilot Wire Trip Alarm (B-Phase)	High = PW Fault						PWTripB	37122	DI	145	2	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 2	BIT 2	P521	Serial	Pilot Wire Trip Alarm (C-Phase)	High = PW Fault						PWTripC	37123	DI	145	3	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 2	BIT 3	P521	Serial	Pilot Wire Trip Alarm (AB-Phase)	High = PW Fault						PWTripAB	37124	DI	145	4	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 2	BIT 4	P521	Serial	Pilot Wire Trip Alarm (AC-Phase)	High = PW Fault						PWTripAC	37125	DI	145	5	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 2	BIT 5	P521	Serial	Pilot Wire Trip Alarm (BC-Phase)	High = PW Fault						PWTripBC	37126	DI	145	6	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 2	BIT 6	P521	Serial	Pilot Wire Trip Alarm (ABC-Phase)	High = PW Fault						PWTripABC	37127	DI	145	7	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 2	BIT 7	P521	Serial	Trip Circuit 1 Supervision Alarm	High = TC1 Healthy						TripCircuitSupervision1	37128	DI	145	8			
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 2	BIT 8	P521	Serial	CB Fail Alarm (TC1 – P521)	High = CB did not trip – TC1						BreakerFailPW	37129	DI	145	9	Y		
33kV Feeder	Feeder	7XX	33kV Feeder Panel		Word 2	BIT 9	P521	Serial	Pilot Communications Failed	High = Comms Failed						PilotWireFail	37130	DI	145	10	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel							High = Comms Healthy						OverCurrRelayCommFail	36864	DI	144	0			Internal to RTU
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1002	4	X15:26	DI	OC & EF Relay (P127) Watchdog	Energised = Relay Healthy		1	5	20	R1S5DI/20	OverCurrentRelay	1299	DI	5	19		Y	
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1002	5	X15:28	DI	DOC Trip	Energised = O/C Fault		1	5	21	R1S5DI/21	OverCurrent	1300	DI	5	20	Y	Y	Common alarm for older relays.
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 1	BIT 0	P127	Serial	DOC Trip Alarm (A-phase)	High = O/C Fault						OverCurrentA	36865	DI	144	1	Y		Could be OC or DOC
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 1	BIT 1	P127	Serial	DOC Trip Alarm (B-phase)	High = O/C Fault						OverCurrentB	36866	DI	144	2	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 1	BIT 2	P127	Serial	DOC Trip Alarm (C-phase)	High = O/C Fault						OverCurrentC	36867	DI	144	3	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 1	BIT 3	P127	Serial	DOC Trip Alarm (AB-phase)	High = O/C Fault						OverCurrentAB	36868	DI	144	4	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 1	BIT 4	P127	Serial	DOC Trip Alarm (AC-phase)	High = O/C Fault						OverCurrentAC	36869	DI	144	5	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 1	BIT 5	P127	Serial	DOC Trip Alarm (BC-phase)	High = O/C Fault						OverCurrentBC	36870	DI	144	6	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 1	BIT 6	P127	Serial	DOC Trip Alarm (ABC-phase)	High = O/C Fault						OverCurrentABC	36871	DI	144	7	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 1	BIT 7	P127	Serial	DEF Trip Alarm	High = Earth Fault						OverCurEarthLeakTrip	36872	DI	144	8	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 1	BIT 8	P127	Serial	Trip Circuit 2 Supervision Alarm	High = TC2 Healthy						TripCircuitSupervision2	36873	DI	144	9			Hardwired if from TC relay
33kV Feeder	ACCB	7XX	33kV Feeder Panel		Word 3	BIT 9	P127	Serial	CB Fail Alarm (TC2 – P127)	High = CB did not trip – TC2						BreakerFailOC	36874	DI	144	10	Y		
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1005	1	Intertrip relay	DI	Aux Supply Failed (mrtp03)	Energised = Failed		1	5	22		InterTripRelayFail	1301	DI	5	21		Y	Only for bulk supply points. From relay in pilot wire protection panel
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1005	2	Intertrip relay	DI	PW Intertrip Relay Failed	Energised = Failed		1	5	23		InterTripRelayFail	1302	DI	5	22		Y	Only for bulk supply points. From relay in pilot wire protection panel
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1005	3	Intertrip relay	DI	Intertrip Received (srr)	Energised = Received		1	5	24		InterTripReceive	1303	DI	5	23	Y	Y	Only for bulk supply points. From

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SCADA Equipment Name	SCADA Plant	SCADA Design	From (Field Equip Name)	Batt	Cable No	Core No	Field Device Term.	Signal Type	Signal Description	Signal Status	CT or VT Ratio	RTU Rack	RTU Slot	RTU Chan	Terminal	Master Station Mosaic Quantity (Point)	DNP Index	Type	Slot	Chan	Invert	Hard wired	Comment
																							relay in pilot wire protection panel
33kV Feeder	ACCB	7XX	33kV Feeder Panel	1	S1005	4	Intertrip relay	DI	Intertrip Send	Energised = Sent		1	5	25		InterTripSend	1304	DI	5	24	Y	Y	Only for bulk supply points. From relay in pilot wire protection panel
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1006	1	X15:1		Control +ve						R1S10DO/CH4-a							Y	
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1006	2	X15:3	PO	Remote Close Command			1	10	4	R1S10DO/CH4-b	Close	2563	PO	10	3		Y	
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1006	3	X15:2		Control +ve						R1S10DO/CH3-a							Y	
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1006	4	X15:4	PO	Remote Open Command			1	10	3	R1S10DO/CH3-b	Open	2562	PO	10	2		Y	
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1007	1	X15:8	DI	ACCB Open	Energised = CB Open		1	5	26	R1S5DI/26	Status(1)	1305	DI	5	25		Y	
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1007	2	X15:9	DI	ACCB Closed	Energised = CB Closed		1	5	27	R1S5DI/27	Status(0)	1306	DI	5	26		Y	
33kV Bus Section	Switch	33KV 1-2 BS ISOL	33kV Bus Section Panel	1	S1007	3	X15:10	DI	Disconnector Open	Energised = DISC Open		1	5	28	R1S5DI/28	Status(1)	1307	DI	5	27		Y	
33kV Bus Section	Switch	33KV 1-2 BS ISOL	33kV Bus Section Panel	1	S1007	4	X15:11	DI	Disconnector Closed	Energised = DISC Closed		1	5	29	R1S5DI/29	Status(0)	1308	DI	5	28		Y	
33kV Bus Section	Switch	33KV 1-2 BS EARTH	33kV Bus Section Panel	1	S1007	5	X15:12	DI	Earth Switch Open	Energised = ES Open		1	5	30	R1S5DI/30	Status(1)	1309	DI	5	29		Y	
33kV Bus Section	Switch	33KV 1-2 BS EARTH	33kV Bus Section Panel	1	S1007	6	X15:14	DI	Earth Switch Closed	Energised = ES Closed		1	5	31	R1S5DI/31	Status(0)	1310	DI	5	30		Y	
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1007	7	X15:16	DI	CB Motor Spring Charged	Energised = Charged		1	5	32	R1S5DI/32	SpringCharged	1311	DI	5	31		Y	
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1020	1		DI	Low Gas	Energised = Gas Level OK		1	6	3	R1S6DI/3	Low Gas	1538	DI	6	2		Y	For outdoor SF6 switchgear
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1020	2		DI	Low Gas Lockout	Energised = Locked out		1	6	4	R1S6DI/4	Low Gas L/O	1539	DI	6	3	Y	Y	For outdoor SF6 switchgear
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1020	3		DI	Motor Trouble	Energised = Motor Healthy		1	6	5	R1S6DI/5	Motor Trouble	1540	DI	6	4		Y	For outdoor SF6 switchgear. Switchgear dependent
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1008	9	X15:19	DI	ILIS Trip	Energised = Trip		1	6	7	R1S6DI/7	ILISTrip	1542	DI	6	6	Y	Y	
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1008	10	X15:20	DI	ILIS Fault	Energised = Healthy		1	6	8	R1S6DI/8	ILISFault	1543	DI	6	7		Y	
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		S1008	11		DI	Cable Diff Trip Alarm (A-Phase)	Energised = Diff Fault		1	6	9	R1S6DI/9	DifferentialTripA	1544	DI	6	8	Y	Y	Diff is usually MCAG34 relay + P127 for BSPs
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		S1008	12		DI	Cable Diff Trip Alarm (B-Phase)	Energised = Diff Fault		1	6	10	R1S6DI/10	DifferentialTripB	1545	DI	6	9	Y	Y	
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		S1008	13		DI	Cable Diff Trip Alarm (C-Phase)	Energised = Diff Fault		1	6	11	R1S6DI/11	DifferentialTripC	1546	DI	6	10	Y	Y	
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1008	14	X15:24	DI	Cable Diff Relay (P127) Watchdog	Energised = Relay Healthy		1	6	12	R1S6DI/12	DiffRelayFail	1547	DI	6	11		Y	Required for Bus Tie CBs
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel							High = Comms Healthy						DiffRelayCommFail	32768	DI	128	0			Internal to RTU
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 4	BIT 0	P127	Serial	Cable Diff Trip Alarm	High = Diff Fault						DifferentialTrip	32769	DI	128	1	Y		
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 4	BIT 1	P127	Serial	Trip Circuit 1 Supervision Alarm (TC1)	High = TC1 Healthy						TripCircuitSupervision1	32770	DI	128	2			Hardwired if from TC relay
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 4	BIT 2	P127	Serial	CB Fail Alarm (TC1 - P127)	High = CB did not trip						DiffBreakerFail	32771	DI	128	3	Y		
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S1020	1		DI	Over Current Relay	High = Relay Healthy		1	6	13	R1S6DI/13	OverCurrentRelay	1548	DI	6	12		Y	May exist for outdoor CBs
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel							High = Comms Healthy						OverCurrRelayCommFail	33024	DI	129	0			Internal to RTU
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 5	BIT 0		Serial	OC Trip Alarm (A-phase)	High = O/C Fault						OverCurrentA	33025	DI	129	1	Y		May exist for outdoor CBs
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 5	BIT 1		Serial	OC Trip Alarm (B-phase)	High = O/C Fault						OverCurrentB	33026	DI	129	2	Y		May exist for outdoor CBs
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 5	BIT 2		Serial	OC Trip Alarm (C-phase)	High = O/C Fault						OverCurrentC	33027	DI	129	3	Y		May exist for outdoor CBs
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 5	BIT 3		Serial	OC Trip Alarm (AB-phase)	High = O/C Fault						OverCurrentAB	33028	DI	129	4	Y		May exist for outdoor CBs
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 5	BIT 4		Serial	OC Trip Alarm (AC-phase)	High = O/C Fault						OverCurrentAC	33029	DI	129	5	Y		May exist for outdoor CBs
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 5	BIT 5		Serial	OC Trip Alarm (BC-phase)	High = O/C Fault						OverCurrentBC	33030	DI	129	6	Y		May exist for outdoor CBs
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 5	BIT 6		Serial	OC Trip Alarm (ABC-phase)	High = O/C Fault						OverCurrentABC	33031	DI	129	7	Y		May exist for outdoor CBs
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 5	BIT 7		Serial	Trip Circuit 2 Supervision Alarm (TC2)	High = TC2 Healthy						TripCircuitSupervision2	33032	DI	129	8			Hardwired if from TC relay
33kV Bus Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel		Word 5	BIT 8		Serial	CB Fail Alarm (TC2)	High = CB did not trip						BreakerFailOC	33033	DI	129	9	Y		May exist for outdoor CBs
Bus Zone/Section	DigitalEquip	BS1 IGIS ALARM	33kV Bus Section Panel	1	S1019	3	X15:28	DI	IGIS PRE-Warning Alarm – BUS 1 (P200)	Energised = Healthy		1	6	11	R1S6DI/11	DigStatus	1546	DI	6	10		Y	From Bus Section or Feeder
Bus Zone/Section	DigitalEquip	BS1 IGIS WARN	33kV Bus Section Panel	1	S1019	4	X15:30	DI	IGIS Warning Alarm – BUS 1 (P200)	Energised = Healthy		1	6	12	R1S6DI/12	DigStatus	1547	DI	6	11		Y	From Bus Section or Feeder
Bus Zone/Section	DigitalEquip	BS1 IGIS FAULT	33kV Bus Section Panel	1	S1019	5	X15:33	DI	IGIS Fault – BUS 1 (P200)	Energised = Fault		1	6	13	R1S6DI/13	DigStatus	1548	DI	6	12	Y	Y	From Bus Section or Feeder
Bus Zone/Section	DigitalEquip	BZ1 PROT SUPPLY	33kV Bus Section Panel	1	S1019	10	X15:27	DI	Busbar Protection Supply (k10)	Energised = Supply Healthy		1	6	14	R1S6DI/14	DigStatus	1549	DI	6	13		Y	From Bus Section or Feeder
Bus Zone/Section	DigitalEquip	NO1 33KV BS L/O	33kV Bus Section Panel	1	S1019	1	X15:26	DI	Busbar Protection MTM Trip (k86b)	Energised = Fault		1	6	15	R1S6DI/15	DigStatus	1550	DI	6	14	Y	Y	From Bus Section or Feeder
Bus Zone/Section	ACCB	33KV 1-2 BS	33kV Bus Section Panel	1	S4017	20		DI	Cable Differential Protection MTM	Energised = CB locked out		1	6	16	R1S6DI/16	Lockout	1551	DI	6	15	Y	Y	From Bus Section or Feeder
Rectifier ACCB			Rectifier ACCB Panel	1	S1010	1	X15:1		Control +ve						R1S10DO/CH6-a							Y	
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1010	2	X15:23	PO	Remote Close Command			1	10	6	R1S10DO/CH6-b	Close	2565	PO	10	5		Y	
Rectifier ACCB			Rectifier ACCB Panel	1	S1010	3	X15:2		Control +ve						R1S10DO/CH5-a							Y	
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1010	4	X15:24	PO	Remote Open Command			1	10	5	R1S10DO/CH5-b	Open	2564	PO	10	4		Y	
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1011	1	X15:56	DI	ACCB Open	Energised = CB Open		1	6	17	R1S6DI/17	Status(1)	1552	DI	6	16		Y	
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1011	2	X15:57	DI	ACCB Closed	Energised = CB Closed		1	6	18	R1S6DI/18	Status(0)	1553	DI	6	17		Y	
Rectifier ACCB	Switch	R1 ISOL	Rectifier ACCB Panel	1	S1011	3	X15:58	DI	Disconnector Open	Energised = DISC Open		1	6	19	R1S6DI/19	Status(1)	1554	DI	6	18		Y	
Rectifier ACCB	Switch	R1 ISOL	Rectifier ACCB Panel	1	S1011	4	X15:59	DI	Disconnector Closed	Energised = DISC Closed		1	6	20	R1S6DI/20	Status(0)	1555	DI	6	19		Y	
Rectifier ACCB	Switch	R1 EARTH	Rectifier ACCB Panel	1	S1011	5	X15:60	DI	Earth Switch Open	Energised = ES Open		1	6	21	R1S6DI/21	Status(1)	1556	DI	6	20		Y	
Rectifier ACCB	Switch	R1 EARTH	Rectifier ACCB Panel	1	S1011	6	X15:62	DI	Earth Switch Closed	Energised = ES Closed		1	6	22	R1S6DI/22	Status(0)	1557	DI	6	21		Y	
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1011	7	X15:64	DI	CB Motor Spring Charged	Energised = Charged		1	6	24	R1S6DI/24	SpringCharged	1559	DI	6	23		Y	

Specified Not Approved

SCADA Equipment Name	SCADA Plant	SCADA Design	From (Field Equip Name)	Batt	Cable No	Core No	Field Device Term.	Signal Type	Signal Description	Signal Status	CT or VT Ratio	RTU Rack	RTU Slot	RTU Chan	Terminal	Master Station Mosaic Quantity (Point)	DNP Index	Type	Slot	Chan	Invert	Hard wired	Comment
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1011	8	X15:66	DI	ILIS Trip	Energised = Trip		1	6	27	R1S6DI/27	ILISTrip	1562	DI	6	26	Y	Y	
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1011	9	X15:67	DI	ILIS Fault	Energised = Healthy		1	6	28	R1S6DI/28	ILISFault	1563	DI	6	27		Y	
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	IA030	W	X3:1	AI	B Phase AC Current +ve	0-10 mA = 0 – 300A	300/1A	1	5	35	R1S5AI/CH35 +	Current	1314	AI	5	34		Y	Transducer is 1A/10mA
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	IA030	B	X3:4		B Phase AC Current -ve			1	5	35	R1S5AI/CH35 -							Y	
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	IA030	S			Screen													Y	
Rectifier ACCB	ACCB	R1							Sum of all Rectifier currents	0 - 300A						ACCurrentSum	34048	AI	133	0			Internal RTU calculation
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1020	1		DI	Low Gas	Energised = Gas Level OK		1	6	29	R1S6DI/29	Low Gas	1564	DI	6	28		Y	For outdoor SF6 switchgear
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1020	2		DI	Low Gas Lockout	Energised = Locked out		1	6	30	R1S6DI/30	Low Gas L/O	1565	DI	6	29	Y	Y	For outdoor SF6 switchgear
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1020	3		DI	Motor Trouble	Energised = Motor Healthy		1	6	31	R1S6DI/31	Motor Trouble	1566	DI	6	30		Y	For outdoor SF6 switchgear. Switchgear dependent
Rectifier ACCB	DigitalEquip	R1 PROT AUX SUPPLY		1	S1015	6	X15:78	DI	Primary Protection (P124) Aux Supply Failed	Energised = MCB Closed		1	6	32	R1S6DI/32	DigStatus	1567	DI	6	31		Y	Required if supplied from AC Aux not if self powered
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1012	1	X15:26	DI	OC & EF Relay (P124) Watchdog (Primary)	Energised = Relay Healthy		1	7	1	R1S7DI/1	OverCurrentRelay	1792	DI	7	0		Y	
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel							High = Comms Healthy						OverCurrRelayCommFail	34304	DI	134	0			Internal to RTU
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-5	BIT 0	P124	Serial	Primary Prot Trip Alarm (A-Phase)	High = Fault						InstOverCurrentA	34305	DI	134	1	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-5	BIT 1	P124	Serial	Primary Prot Trip Alarm (B-Phase)	High = Fault						InstOverCurrentB	34306	DI	134	2	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-5	BIT 2	P124	Serial	Primary Prot Trip Alarm (C-Phase)	High = Fault						InstOverCurrentC	34307	DI	134	3	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-5	BIT 3	P124	Serial	Primary Prot Trip Alarm (AB-Phase)	High = Fault						InstOverCurrentAB	34308	DI	134	4	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-5	BIT 4	P124	Serial	Primary Prot Trip Alarm (AC-Phase)	High = Fault						InstOverCurrentAC	34309	DI	134	5	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-5	BIT 5	P124	Serial	Primary Prot Trip Alarm (BC-Phase)	High = Fault						InstOverCurrentBC	34310	DI	134	6	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-5	BIT 6	P124	Serial	Primary Prot Trip Alarm (ABC-Phase)	High = Fault						InstOverCurrentABC	34311	DI	134	7	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-5	BIT 7	P124	Serial	Primary Prot Trip Alarm (Earth fault)	High = Fault						InstEarthLeakage	34312	DI	134	8	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-5	BIT 8	P124	Serial	Trip Circuit 1 Supervision Alarm	High = TC1 Healthy						TripCircuitSupervision1	34313	DI	134	9			Hardwired if from TC relay
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-5	BIT 9	P124	Serial	CB Fail Alarm (TC1 – P124)	High = CB did not trip – TC1						BreakerFailOC	34314	DI	134	10	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel	1	S1005	2	X15:26	DI	Protection Relay (P127) Watchdog (Backup)	Energised = Relay Healthy		1	7	2	R1S7DI/2	InstOverCurrentRelay	1793	DI	7	1		Y	
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel							High = Comms Healthy						OverCurrRelayCommFail	33280	DI	130	0			Internal to RTU
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-6	BIT 0	P127	Serial	Backup Prot Trip Alarm (A-phase)	High = Fault						OverCurrentA	33281	DI	130	1	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-6	BIT 1	P127	Serial	Backup Prot Trip Alarm (B-phase)	High = Fault						OverCurrentB	33282	DI	130	2	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-6	BIT 2	P127	Serial	Backup Prot Trip Alarm (C-phase)	High = Fault						OverCurrentC	33283	DI	130	3	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-6	BIT 3	P127	Serial	Backup Prot Trip Alarm (AB-phase)	High = Fault						OverCurrentAB	33284	DI	130	4	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-6	BIT 4	P127	Serial	Backup Prot Trip Alarm (AC-phase)	High = Fault						OverCurrentAC	33285	DI	130	5	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-6	BIT 5	P127	Serial	Backup Prot Trip Alarm (BC-phase)	High = Fault						OverCurrentBC	33286	DI	130	6	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-6	BIT 6	P127	Serial	Backup Prot Trip Alarm (ABC-phase)	High = Fault						OverCurrentABC	33287	DI	130	7	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-6	BIT 7	P127	Serial	Backup Prot Trip Alarm (Earth fault)	High = Fault						EarthFault	33288	DI	130	8	Y		
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-6	BIT 8	P127	Serial	Trip Circuit 2 Supervision Alarm	High = TC2 Healthy						TripCircuitSupervision2	33289	DI	130	9			Hardwired if from TC relay
Rectifier ACCB	ACCB	R1	Rectifier ACCB Panel		WORD-6	BIT 8	P127	Serial	CB FAIL Alarm (TC2 – P127)	High = CB did not trip – TC2						BreakerFail	33290	DI	130	10	Y		
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA093	W		AI	Rectifier No.1 Top (Exit) Air Temp +ve	0-20 mA = 0 – 80°c		1	6	33	R1S6AI/CH33 +	RectTopTemp	1568	AI	6	32		Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA093	B			Rectifier No.1 Top (Exit) Air Temp -ve						R1S6AI/CH33 -							Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA093	S			Screen													Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA092	W		AI	Rectifier No.1 Bottom (Entry) Air Temp +ve	0-20 mA = 0 – 80°c		1	6	34	R1S6AI/CH34 +	RectBottomTemp	1569	AI	6	33		Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA092	B			Rectifier No.1 Bottom (Entry) Air Temp -ve						R1S6AI/CH34 -							Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA092	S			Screen													Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA091	W		AI	Transformer Winding Temp +ve	0-20 mA = 0 - 150°C		1	6	35	R1S6AI/CH35 +	TXHotSpotTemp	1570	AI	6	34		Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA091	B			Transformer Winding Temp -ve						R1S6AI/CH35 -							Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA091	S			Screen													Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA090	W		AI	Transformer Oil Temp +ve	0-20 mA = 0 - 150°C		1	6	36	R1S6AI/CH36 +	TXTopOilTemp	1571	AI	6	35		Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA090	B			Transformer Oil Temp -ve						R1S6AI/CH36 -							Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	IA090	S			Screen													Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	S1015	10		DI	Rectifier Tx Frame Leakage (k64fl)	Energised = Fault		1	7	3	R1S7DI/3		1794	DI	7	2	Y	Y	Only for Rect Tx with a roof
Rectifier	Rectifier	R1	Rectifier No. 1	1	S1034	9		DI	Winding Temp Critical Alarm	Energised = Passed Critical Temp		1	7	4	R1S7DI/4	TXWdgTempCritical	1795	DI	7	3	Y	Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	S1034	10		DI	Oil Temp Critical Alarm	Energised = Passed Critical Temp		1	7	5	R1S7DI/5	TXOilTempCritical	1796	DI	7	4	Y	Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	S1034	12		DI	Winding Temp Alarm	Energised = Passed Lower Temp		1	7	7	R1S7DI/7	TXWdgTempAlarm	1798	DI	7	6	Y	Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	S1034	13		DI	Oil Temp Alarm	Energised = Passed Lower Temp		1	7	8	R1S7DI/8	TXOilTempAlarm	1799	DI	7	7	Y	Y	
Rectifier	Rectifier	R1	Rectifier No. 1	1	S1034	14		DI	Main Tank High Oil	Energised = Oil Not High Level		1	7	9	R1S7DI/9	TXMainOilHigh	1800	DI	7	8		Y	

SUPPLY DOCUMENT

SCADA Equipment Name	SCADA Plant	SCADA Design	From (Field Equip Name)	Batt	Cable No	Core No	Field Device Term.	Signal Type	Signal Description	Signal Status	CT or VT Ratio	RTU			Terminal	Master Station						Hard wired	Comment
												Rack	Slot	Chan		Mosaic Quantity (Point)	DNP Index	Type	Slot	Chan	Invert		
Rectifier	Rectifier	R1	Rectifier No. 1	1	S1034	15		DI	Main Tank Low Oil	Energised = Oil Not Low Level		1	7	10	R1S7DI/10	TXMainOilLow	1801	DI	7	9		Y	
Rectifier	Rectifier	R1	Rectifier No. 1							High = Comms Healthy						PLCCommsFail	38144	DI	149	0			Internal to RTU
Rectifier	Rectifier	R1	Rectifier No. 1	1	S1015	7	X15:73	DI	PLC Fault (K97)	Energised = Fault		1	7	11	R1S7DI/11	PLCFault	1802	DI	7	10		Y	
Rectifier	Rectifier	R1	Rectifier No. 1		Modbus 10	BIT 0	PLC	Serial	Buchholz Oil Trip	High = Buchholz Oil Fault						BuchholzOil	38145	DI	149	1	Y		For oil filled transformers
Rectifier	Rectifier	R1	Rectifier No. 2		Word 7	BIT 1	PLC	Serial	Buchholz Gas Trip	High = Buchhoz Gas Fault						BuchholzGas	38146	DI	149	2	Y		For oil filled transformers
Rectifier	Rectifier	R1	Rectifier No. 1		Word 7	BIT 2	PLC	Serial	Rectifier Tx Over Pressure	High = Over Pressure Fault						Pressure	38147	DI	149	3	Y		
Rectifier	Rectifier	R1	Rectifier No. 1		Word 7	BIT 3	PLC	Serial	DC Reverse Current	High = Rev Curr Fault						ReverseCurrent	38148	DI	149	4	Y		
Rectifier	Rectifier	R1	Rectifier No. 1		Word 7	BIT 4	PLC	Serial	Rectifier frame leakage	High = Frame Leak Fault						FrameLeakage	38149	DI	149	5	Y		
Rectifier	Rectifier	R1	Rectifier No. 1		Word 7	BIT 5	PLC	Serial	Rectifier MTM Lockout (k86r)	High = CB locked out						Lockout	38150	DI	149	6			
Rectifier	Switch	R1 NEG ISOL	Rectifier No. 1		Word 7	BIT 6	PLC	Serial	Negative Isolator Closed	High = Neg Isol Closed						Status(0)	38151	DI	149	7			
Rectifier	Rectifier	R1	Rectifier No. 1		IA040	1W	X3:7	AI	DC Circuit Current +ve	0-20 mA = 0 – 13000A		1	7	33	R1S7AI/CH33 +	DCCurrent	1824	AI	7	32		Y	
Rectifier	Rectifier	R1	Rectifier No. 1		IA040	1B	X3:8		DC Circuit Current -ve			1	7	33	R1S7AI/CH33 -							Y	
Rectifier	Rectifier	R1	Rectifier No. 1		IA040	S			Screen													Y	
Rectifier	Rectifier	R1	Rectifier No. 1		IA050	1W	X3:11	AI	DC Voltage +ve	0-20 mA = 0 – 2200v		1	7	34	R1S7AI/CH34 +	DCVoltage	1825	AI	7	33		Y	
Rectifier	Rectifier	R1	Rectifier No. 1		IA050	1B	X3:12		DC Voltage -ve			1	7	34	R1S7AI/CH34 -							Y	
Rectifier	Rectifier	R1	Rectifier No. 1		IA050	S			Screen													Y	
Rect Tx Tap Chngr	AnalogEquip	R1 TC POSITION														AnaStatus	16896	AI	66	0			Internal to RTU. Analogue representing Tap position
Rect Tx Tap Chngr				1	S1008	1			Control +ve						R1S10DO/CH7-a							Y	
Rect Tx Tap Chngr	Switch	R1		1	S1008	2		PO	Remote Raise Command			1	10	7	R1S10DO/CH7-b	Raise	2566	PO	10	6		Y	
Rect Tx Tap Chngr	Switch	R1		1	S1008	3		PO	Remote Lower Command			1	10	8	R1S10DO/CH7-b	Lower	2567	PO	10	7		Y	
Rect Tx Tap Chngr	Rectifier	R1		1	S1034	16		DI	MCB Tripped Alarm (Circuit Fail)	Energised = MCB Closed		1	7	12	R1S7DI/12	TapChangerSupply	1803	DI	7	11		Y	
Rect Tx Tap Chngr	Rectifier	R1		1	S1034	1		DI	Tap Changer No.1 Motor O/L Trip	Energised = Tripped		1	7	13	R1S7DI/13	TapChangerOverload	1804	DI	7	12	Y	Y	
Rect Tx Tap Chngr	DigitalEquip	R1 TC POS1		1	S1034	2		DI	Tap Changer No.1 Tap 1	Energised = On Tap 1		1	7	14	R1S7DI/14	DigStatus	1805	DI	7	13		Y	
Rect Tx Tap Chngr	DigitalEquip	R1 TC POS2		1	S1034	3		DI	Tap Changer No.1 Tap 2	Energised = On Tap 2		1	7	15	R1S7DI/15	DigStatus	1806	DI	7	14		Y	
Rect Tx Tap Chngr	DigitalEquip	R1 TC POS3		1	S1034	4		DI	Tap Changer No.1 Tap 3	Energised = On Tap 3		1	7	16	R1S7DI/16	DigStatus	1807	DI	7	15		Y	
Rect Tx Tap Chngr	DigitalEquip	R1 TC POS4		1	S1034	5		DI	Tap Changer No.1 Tap 4	Energised = On Tap 4		1	7	17	R1S7DI/17	DigStatus	1808	DI	7	16		Y	
Rect Tx Tap Chngr	DigitalEquip	R1 TC POS5		1	S1034	6		DI	Tap Changer No.1 Tap 5	Energised = On Tap 5		1	7	18	R1S7DI/18	DigStatus	1809	DI	7	17		Y	
Rect Tx Tap Chngr	DigitalEquip	R1 TC POS6		1	S1034	7		DI	Tap Changer No.1 Tap 6	Energised = On Tap 6		1	7	19	R1S7DI/19	DigStatus	1810	DI	7	18		Y	
Rect Tx Tap Chngr	DigitalEquip	R1 TC POS7		1	S1034	8		DI	Tap Changer No.1 Tap 7	Energised = On Tap 7		1	7	20	R1S7DI/20	DigStatus	1811	DI	7	19		Y	
Rectifier DCCB	RDCCB	R1	Rectifier	1	S1015	8	x15:76	DI	DCCB Open	Energised = CB Open		1	7	21	R1S7DI/21	Status(1)	1812	DI	7	20		Y	
Rectifier DCCB	RDCCB	R1	Rectifier	1	S1015	9	x15:75	DI	DCCB Closed	Energised = CB Closed		1	7	22	R1S7DI/22	Status(0)	1813	DI	7	21		Y	
DC General			Common Equip Panel	2	S1108	1		+ve	125V dc common														
DC General	DigitalEquip	DC FRAME LEAKAGE	Common Equip Panel	2	S1108	2		DI	1500V DC Switchboard Frame Leakage Trip	Energised = F/L occurred		2	3	1	R2S3DI/1	DigStatus	3840	DI	15	0	Y	Y	
DC General	DigitalEquip	FRAME LEAKAGE FAULT	Common Equip Panel	2	S1108	3		DI	Frame Leakage Relay Failed	Energised = Healthy		2	3	2	R2S3DI/2	DigStatus	3841	DI	15	1		Y	
DC General	DigitalEquip	FRAME LEAKAGE SUPPLY	Common Equip Panel	2	S1108	4		DI	Frame Leakage Protection Supply Healthy	Energised = Volts Present		2	3	3	R2S3DI/3	DigStatus	3842	DI	15	2		Y	
DC General			Common Equip Panel						Frame Leakage Bypass													Y	
33/11 33kV ACCB			33kV Panel 3 33/11 Tx	1	S1005	1	X15:01		Control +ve						R1S11DO/CH2-a							Y	
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx	1	S1005	2	X15:03	PO	Remote Close Command			1	11	2	R1S11DO/CH2-b	Close	2817	PO	11	1		Y	
33/11 33kV ACCB			33kV Panel 3 33/11 Tx	1	S1005	3	X15:02		Control +ve						R1S11DO/CH2-a							Y	
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx	1	S1005	4	X15:04	PO	Remote Open Command			1	11	1	R1S11DO/CH2-b	Open	2816	PO	11	0		Y	
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx	1	S1040	1	X15:8	DI	ACCB Open	Energised = CB Open		1	7	23	R1S7DI/23	Status(1)	1814	DI	7	22		Y	
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx	1	S1040	2	X15:9	DI	ACCB Closed	Energised = CB Closed		1	7	24	R1S7DI/24	Status(0)	1815	DI	7	23		Y	
33/11 33kV ACCB	Switch	33/11 33KV ISOL	33kV Panel 3 33/11 Tx	1	S1040	3	X15:10	DI	Disconnector Open	Energised = DISC Open		1	7	25	R1S7DI/25	Status(1)	1816	DI	7	24		Y	
33/11 33kV ACCB	Switch	33/11 33KV ISOL	33kV Panel 3 33/11 Tx	1	S1040	4	X15:11	DI	Disconnector Closed	Energised = DISC Closed		1	7	26	R1S7DI/26	Status(0)	1817	DI	7	25		Y	
33/11 33kV ACCB	Switch	33/11 33KV EARTH	33kV Panel 3 33/11 Tx	1	S1040	5	X15:12	DI	Earth Switch Open	Energised = ES Open		1	7	27	R1S7DI/27	Status(1)	1818	DI	7	26		Y	
33/11 33kV ACCB	Switch	33/11 33KV EARTH	33kV Panel 3 33/11 Tx	1	S1040	6	X15:14	DI	Earth Switch Closed	Energised = ES Closed		1	7	28	R1S7DI/28	Status(0)	1819	DI	7	27		Y	
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx	1	S1040	7	X15:16	DI	CB Motor Spring Charged	Energised = Charged		1	7	29	R1S7DI/29	SpringCharged	1820	DI	7	28		Y	
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx	1	S1040	9	X15:19	DI	ILIS Trip	Energised = Trip		1	7	30	R1S7DI/30	ILISTrip	1821	DI	7	29	Y	Y	
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx	1	S1040	8	X15:20	DI	ILIS Fault	Energised = Healthy		1	7	31	R1S7DI/31	ILISFault	1822	DI	7	30		Y	
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		IA020	W	X3:1	AI	B Phase AC Current +ve	0-10 mA = 0 – 200 A	200/1A	1	7	35	R1S7AI/CH35+	Current	1826	AI	7	34		Y	Transducer is 1A/10mA
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		IA020	B	X3:4		B Phase AC Current -ve			1	7	35	R1S7AI/CH35-								
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		IA020	S			Screen													Y	
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx							High = Comms Healthy						DiffRelayCommsFail	37632	DI	147	0	Y		Internal to RTU

Superseded Document
UNCONTROLLED WHEN PRINTED

SCADA Equipment Name	SCADA Plant	SCADA Design	From (Field Equip Name)	Batt	Cable No	Core No	Field Device Term.	Signal Type	Signal Description	Signal Status	CT or VT Ratio	RTU				Master Station						Hard wired	Comment
												Rack	Slot	Chan	Terminal	Mosaic Quantity (Point)	DNP Index	Type	Slot	Chan	Invert		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx	1	S1041	1	X15:25	DI	Diff Relay (P632) Watchdog	Energised = Relay Healthy		1	8	1	R1S8DI/1	DiffRelayFail	2048	DI	8	0			
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		WORD-14	BIT 0	P632	Serial	Tx Diff Trip Alarm	High = Fault						DifferentialProtection	37633	DI	147	1	Y		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		WORD-14	BIT 1	P632	Serial	Trip Circuit 1 Supervision Alarm	High = TC1 Healthy						TripCircuitSupervision1	37634	DI	147	2			Hardwired if from TC relay.
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		WORD-14	BIT 2	P632	Serial	CB FAIL Alarm (TC1 – P632)	High = CB did not trip – TC1						DiffBreakerFail	37635	DI	147	3	Y		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		WORD-14	BIT 3	P632	Serial	Tap Changer Oil Pressure Switch	High = Pressure Activated						TCPressure	37639	DI	147	7	Y		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		WORD-14	BIT 4	P632	Serial	Tap Changer Alarm	High = TC Fault						TCFail	37640	DI	147	8			
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx							High = Comms Healthy						OverCurrRelayCommFail	37376	DI	146	0			Internal to RTU
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx	1	S1024	1	X15:32	DI	OC Relay (P127) Watchdog	Energised = Relay Healthy		1	8	2	R1S8DI/2	OverCurrentRelay	2049	DI	8	1		Y	
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		Word 8	BIT 0	P127	Serial	OC Trip Alarm (A-phase)	High = O/C Fault						OverCurrentA	37377	DI	146	1	Y		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		Word 8	BIT 1	P127	Serial	OC Trip Alarm (B-phase)	High = O/C Fault						OverCurrentB	37378	DI	146	2	Y		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		Word 8	BIT 2	P127	Serial	OC Trip Alarm (C-phase)	High = O/C Fault						OverCurrentC	37379	DI	146	3	Y		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		Word 8	BIT 3	P127	Serial	OC Trip Alarm (AB-phase)	High = O/C Fault						OverCurrentAB	37380	DI	146	4	Y		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		Word 8	BIT 4	P127	Serial	OC Trip Alarm (AC-phase)	High = O/C Fault						OverCurrentAC	37381	DI	146	5	Y		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		Word 8	BIT 5	P127	Serial	OC Trip Alarm (BC-phase)	High = O/C Fault						OverCurrentBC	37382	DI	146	6	Y		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		Word 8	BIT 6	P127	Serial	OC Trip Alarm (ABC-phase)	High = O/C Fault						OverCurrentABC	37383	DI	146	7	Y		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		Word 8	BIT 7	P127	Serial	Earth Fault Trip Alarm	High = Earth Fault						EarthFault	37384	DI	146	8	Y		
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		Word 8	BIT 8	P127	Serial	Trip Circuit 2 Supervision Alarm	High = TC2 Healthy						TripCircuitSupervision2	37385	DI	146	9			Hardwired if from TC relay.
33/11 33kV ACCB	ACCB	NO1 33/11 33KV	33kV Panel 3 33/11 Tx		Word 8	BIT 9	P127	Serial	CB Fail Alarm (TC2 – P127)	High = CB did not trip – TC2						BreakerFailOC	37386	DI	146	10	Y		
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	IA110	W		AI	Transformer Winding Temp +ve	0-20 mA = 0 - 150°C		1	8	33	R1S8AI/CH33 +	TXHotSpotTemp	2080	AI	8	32		Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	IA110	B			Transformer Winding Temp -ve						R1S8AI/CH33 -							Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	IA110	S			Screen													Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	IA111	W		AI	Transformer Oil Temp +ve	0-20 mA = 0 - 150°C		1	8	34	R1S8AI/CH34 +	TXTopOilTemp	2081	AI	8	33		Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	IA111	B			Transformer Oil Temp -ve						R1S8AI/CH34 -							Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	IA111	S			Screen													Y	
33 or 66/11 Tx	Tranformer	NO1 33/11kV 11kV	33/11kV Tx		IA012	W	X3:6	AI	11kV Voltage (A-C Phase) +ve	0-20 mA = 0 – 12.5 kV	11kV/110V	1	8	35	R1S8AI/CH35 +	Voltage	2082	AI	8	34		Y	Transducer is 125V/20mA
33 or 66/11 Tx			33/11kV Tx		IA012	B	X3:7		11kV Voltage (A-C Phase) -ve			1	8	35	R1S8AI/CH35 -							Y	
33 or 66/11 Tx			33/11kV Tx		IA012	S	X3:8		Screen													Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	S1035	1		DI	Winding Temp Critical Alarm	Energised = Passed Critical Temp		1	8	3	R1S8DI/3	TXWdgTempCritical	2050	DI	8	2	Y	Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	S1035	2		DI	Oil Temp Critical Alarm	Energised = Passed Critical Temp		1	8	4	R1S8DI/4	TXOilTempCritical	2051	DI	8	3	Y	Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	S1035	3		DI	Pressure	Energised = Over Pressure Fault		1	8	5	R1S8DI/5	Pressure	2052	DI	8	4	Y	Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	S1035	4		DI	Winding Temp Alarm	Energised = Passed Lower Temp		1	8	6	R1S8DI/6	TXWdgTempAlarm	2053	DI	8	5	Y	Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	S1035	5		DI	Oil Temp Alarm	Energised = Passed Lower Temp		1	8	7	R1S8DI/7	TXOilTempAlarm	2054	DI	8	6	Y	Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	S1035	6		DI	Main Tank High Oil	Energised = Oil Not High Level		1	8	8	R1S8DI/8	TXMainOilHigh	2055	DI	8	7		Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	S1035	7		DI	Main Tank Low Oil	Energised = Oil Not Low Level		1	8	9	R1S8DI/9	TXMainOilLow	2056	DI	8	8		Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx		S1035	8		DI	Buchholz Oil Trip	Energised = Buchholz Oil Fault		1	8	10	R1S8DI/10	BuchholzOil	2057	DI	8	9	Y	Y	For oil filled transformers
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx		S1035	9		DI	Buchholz Gas Trip	Energised = Buchholz Gas Fault		1	8	11	R1S8DI/11	BuchholzGas	2058	DI	8	10	Y	Y	For oil filled transformers
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	S1035	10	X15:34	DI	MTM Relay Lockout (k86t)	Energised = Locked out		1	8	12	R1S8DI/12	Lockout	2059	DI	8	11	Y	Y	
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	S1035	11		DI	Fan Motor Running	Energised = Fan Running		1	8	13	R1S8DI/13	FanRunning	2060	DI	8	12		Y	Required for Tx's with fans
33 or 66/11 Tx	Transformer	NO1 33/11KV TX	33/11kV Tx	1	S1035	12		DI	Fan Motor Fault	Energised = Fan Fault		1	8	14	R1S8DI/14	FanFail	2061	DI	8	13		Y	Required for Tx's with fans
33 or 66/11 Tx Tap changer	Transformer	NO1 33/11KV TX	Onload Tap Changer	1	S1030	1		DI	Tap Changer Faulty	Energised = Fault		1	8	15	R1S8DI/15	TCFail	6926	DI	8	14	Y	Y	
33 or 66/11 Tx Tap changer	Transformer	NO1 33/11KV TX	Onload Tap Changer	1	S1030	2		DI	Tap Changer Limit	Energised = Within Limits		1	8	16	R1S8DI/16	TCLimit	6927	DI	8	15		Y	
33 or 66/11 Tx Tap changer	Transformer	NO1 33/11KV TX	Onload Tap Changer	1	S1030	3		DI	Tap Changer Winding Temp Alarm	Energised = Passed alarm temp		1	8	17	R1S8DI/17	TCWdgTemp	6928	DI	8	16	Y	Y	Trip Temp Exceeded - Via ACCB
33 or 66/11 Tx Tap changer	Transformer	NO1 33/11KV TX	Onload Tap Changer	1	S1030	4		DI	Tap Changer Oil Temp Alarm	Energised = Passed alarm temp		1	8	18	R1S8DI/18	TCOilTemp	6929	DI	8	17	Y	Y	Trip Temp Exceeded - Via ACCB
33 or 66/11 Tx Tap changer	Transformer	NO1 33/11KV TX	Onload Tap Changer	1	S1030	5		DI	Motor Protection CB Trip Alarm	Energised = Closed (No Fault)		1	8	19	R1S8DI/19	TCMotorCB	6930	DI	8	18		Y	
33 or 66/11 Tx Tap changer	Transformer	NO1 33/11KV TX	Onload Tap Changer	1	S1030	6		DI	Buchholz Oil Trip	Energised = Buchholz Oil Fault		1	8	20	R1S8DI/20	TCBuchholzOil	37639	DI	8	19	Y	Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos1	Onload Tap Changer	1	S1031	1		DI	Tap Changer Position Tap 1	Energised = On Tap 1		2	4	1	R2S4DI/1	DigStatus	4096	DI	16	0		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos2	Onload Tap Changer	1	S1031	2		DI	Tap Changer Position Tap 2	Energised = On Tap 2		2	4	2	R2S4DI/2	DigStatus	4097	DI	16	1		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos3	Onload Tap Changer	1	S1031	3		DI	Tap Changer Position Tap 3	Energised = On Tap 3		2	4	3	R2S4DI/3	DigStatus	4098	DI	16	2		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos4	Onload Tap Changer	1	S1031	4		DI	Tap Changer Position Tap 4	Energised = On Tap 4		2	4	4	R2S4DI/4	DigStatus	4099	DI	16	3		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos5	Onload Tap Changer	1	S1031	5		DI	Tap Changer Position Tap 5	Energised = On Tap 5		2	4	5	R2S4DI/5	DigStatus	4100	DI	16	4		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos6	Onload Tap Changer	1	S1031	6		DI	Tap Changer Position Tap 6	Energised = On Tap 6		2	4	6	R2S4DI/6	DigStatus	4101	DI	16	5		Y	

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SCADA Equipment Name	SCADA Plant	SCADA Design	From (Field Equip Name)	Batt	Cable No	Core No	Field Device Term.	Signal Type	Signal Description	Signal Status	CT or VT Ratio	RTU				Master Station						Hard wired	Comment
												Rack	Slot	Chan	Terminal	Mosaic Quantity (Point)	DNP Index	Type	Slot	Chan	Invert		
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos7	Onload Tap Changer	1	S1031	7		DI	Tap Changer Position Tap 7	Energised = On Tap 7		2	4	7	R2S4DI/7	DigStatus	4102	DI	16	6		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos8	Onload Tap Changer	1	S1031	8		DI	Tap Changer Position Tap 8	Energised = On Tap 8		2	4	8	R2S4DI/8	DigStatus	4103	DI	16	7		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos9	Onload Tap Changer	1	S1031	9		DI	Tap Changer Position Tap 9	Energised = On Tap 9		2	4	9	R2S4DI/9	DigStatus	4104	DI	16	8		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos10	Onload Tap Changer	1	S1031	10		DI	Tap Changer Position Tap 10	Energised = On Tap 10		2	4	10	R2S4DI/10	DigStatus	4105	DI	16	9		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos11	Onload Tap Changer	1	S1032	1		DI	Tap Changer Position Tap 11	Energised = On Tap 11		2	4	11	R2S4DI/11	DigStatus	4106	DI	16	10		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos12	Onload Tap Changer	1	S1032	2		DI	Tap Changer Position Tap 12	Energised = On Tap 12		2	4	12	R2S4DI/12	DigStatus	4107	DI	16	11		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos13	Onload Tap Changer	1	S1032	3		DI	Tap Changer Position Tap 13	Energised = On Tap 13		2	4	13	R2S4DI/13	DigStatus	4108	DI	16	12		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos14	Onload Tap Changer	1	S1032	4		DI	Tap Changer Position Tap 14	Energised = On Tap 14		2	4	14	R2S4DI/14	DigStatus	4109	DI	16	13		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos15	Onload Tap Changer	1	S1032	5		DI	Tap Changer Position Tap 15	Energised = On Tap 15		2	4	15	R2S4DI/15	DigStatus	4110	DI	16	14		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos16	Onload Tap Changer	1	S1032	6		DI	Tap Changer Position Tap 16	Energised = On Tap 16		2	4	16	R2S4DI/16	DigStatus	4111	DI	16	15		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos17	Onload Tap Changer	1	S1032	7		DI	Tap Changer Position Tap 17	Energised = On Tap 17		2	4	17	R2S4DI/17	DigStatus	4112	DI	16	16		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos18	Onload Tap Changer	1	S1032	8		DI	Tap Changer Position Tap 18	Energised = On Tap 18		2	4	18	R2S4DI/18	DigStatus	4113	DI	16	17		Y	
33 or 66/11 Tx Tap changer	DigitalEquip	NO1 33/11 Tx TC Pos19	Onload Tap Changer	1	S1032	9		DI	Tap Changer Position Tap 19	Energised = On Tap 19		2	4	19	R2S4DI/19	DigStatus	4114	DI	16	18		Y	
VT (110V)			33kV Feeder Panel	1	S1063	1		+VE	125V dc common													Y	The VT may be in the feeder panel, but the master station associates it with the bus section.
VT (110V)	VT	NO1 33KV	33kV Feeder Panel	1	S1063	3	X15:29	DI	Phase Failure (K47)	Energised = Healthy		1	8	17	R1S8DI/17	PhaseFailure	2064	DI	8	16		Y	VT may be in feeder panel, but the master station associates it with the bus section.
VT (110V)	VT	NO1 33KV	33kV Feeder Panel		IA010	W	X3:6	AI	Busbar Voltage (A-C Phase) +ve	0-20 mA = 0 – 37.5 kV	33kV/110V	1	8	35	R1S8AI/CH35 +	Voltage	2082	AI	8	34		Y	Transducer is 125V/20mA
VT (110V)			33kV Feeder Panel		IA010	B	X3:7		Busbar Voltage (A-C Phase) -ve			1	8	35	R1S8AI/CH35 -							Y	
VT (110V)			33kV Feeder Panel		IA010	S	X3:8		Screen													Y	
11kV Feeder			11kV Feeder Panel	1	S1050	1	X15:01		Control +ve						R1S11DO/CH6-a							Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1050	2	X15:03	PO	Remote Close Command			1	11	6	R1S11DO/CH6-b	Close	2821	PO	11	5		Y	
11kV Feeder			11kV Feeder Panel	1	S1050	3	X15:02		Control +ve						R1S11DO/CH5-a							Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1050	4	X15:04	PO	Remote Open Command			1	11	5	R1S11DO/CH5-b	Open	2820	PO	11	4		Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1061	1	X15:08	DI	ACCB Open	Energised = CB Open		1	8	18	R1S8DI/18	Status(1)	2065	DI	8	17		Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1061	2	X15:09	DI	ACCB Closed	Energised = CB Closed		1	8	19	R1S8DI/19	Status(0)	2066	DI	8	18		Y	
11kV Feeder	Switch	6XX ISOL	11kV Feeder Panel	1	S1061	3	X15:10	DI	Disconnector Open	Energised = DISC Open		1	8	20	R1S8DI/20	Status(1)	2067	DI	8	19		Y	
11kV Feeder	Switch	6XX ISOL	11kV Feeder Panel	1	S1061	4	X15:11	DI	Disconnector Closed	Energised = DISC Closed		1	8	21	R1S8DI/21	Status(0)	2068	DI	8	20		Y	
11kV Feeder	Switch	6XX EARTH	11kV Feeder Panel	1	S1061	5	X15:12	DI	Earth Switch Open	Energised = ES Open		1	8	22	R1S8DI/22	Status(1)	2069	DI	8	21		Y	
11kV Feeder	Switch	6XX EARTH	11kV Feeder Panel	1	S1061	6	X15:13	DI	Earth Switch Closed	Energised = ES Closed		1	8	23	R1S8DI/23	Status(0)	2070	DI	8	22		Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1061	7	X15:14	DI	CB Motor Spring Charged	Energised = Charged		1	8	24	R1S8DI/24	SpringCharged	2071	DI	8	23		Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel		IA070	W	X3:1	AI	B Phase AC Current +ve	0-10 mA = 0 - 300 A	300/1A	1	8	36	R1S8AI/CH36+	Current	2083	AI	8	35		Y	Transducer is 1A/10mA
11kV Feeder	ACCB	6XX	11kV Feeder Panel		IA070	B	X3:4		B Phase AC Current -ve			1	8	36	R1S8AI/CH36-							Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel		IA070	S			Screen													Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1070	1		DI	Low Gas Alarm	Energised =		1	8	25	R1S8DI/25	LowGas	2072	DI	8	24		Y	Required for gas CBs
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1070	2		DI	Low Gas Lockout	Energised =		1	8	26	R1S8DI/26	LowGasLockout	2073	DI	8	25	Y	Y	Required for gas CBs
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1070	3		DI	Motor Fault	Energised = Motor Healthy		1	8	27	R1S8DI/27	MotorTrouble	2074	DI	8	26		Y	Required for gas CBs
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1070	4		DI	Motor Protection CB Trip Alarm	Energised =		1	8	28	R1S8DI/28	MotorSupply	2075	DI	8	27		Y	Required for gas CBs
11kV Feeder	Switch	6XX EARTH	11kV Feeder Panel	1	S1061	11	X15:18	DI	Disconnector Earthed	Energised = Disc Earthed		1	8	29	R1S8DI/29	Status (2)	2076	DI	8	28		Y	Only for 3 position switches
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1061	8	X15:15	DI	PW Relay (P521) Watchdog	Energised = Relay Healthy		1	8	30	R1S8DI/30		2077	DI	8	29		Y	Protection scheme may prescribe this
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1061	9	X15:16	DI	OC & EF Relay (P127) Watchdog	Energised = Relay Healthy		1	8	31	R1S8DI/31		2078	DI	8	30		Y	Protection scheme may prescribe this
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1061	10	X15:17	DI	DOC & DEF Voltage Healthy (CB Q2x closed)	Energised = Volts Present		1	8	32	R1S8DI/32	DirProtVolts	2079	DI	8	31		Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1065	1	X15:19	DI	Pilot Wire Trip	Energised = Fault on feeder		1	4	20	R1S4DI/20	PilotWireTrip	4115	DI	16	19	Y	Y	For 11kV hardwired summary alarms are normally required
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1065	2	X15:20	DI	DOC Trip	Energised = O/C Fault		1	4	21	R1S4DI/21	OverCurrent	4116	DI	16	20	Y	Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1065	3	X15:21	DI	Trip Circuit 1 Supervision Alarm	Energised = TC 1 Healthy		1	4	22	R1S4DI/22	TripCircuitSupervision1	4117	DI	16	21		Y	From TC relay
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1065	4	X15:22	DI	Trip Circuit 2 Supervision Alarm	Energised = TC 2 Healthy		1	4	23	R1S4DI/23	TripCircuitSupervision2	4118	DI	16	22		Y	From TC relay

UNCONTROLLED WHEN PRINTED

SCADA Equipment Name	SCADA Plant	SCADA Design	From (Field Equip Name)	Batt	Cable No	Core No	Field Device Term.	Signal Type	Signal Description	Signal Status	CT or VT Ratio	RTU				Master Station						Hard wired	Comment
												Rack	Slot	Chan	Terminal	Mosaic Quantity (Point)	DNP Index	Type	Slot	Chan	Invert		
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1065	5	X15:23	DI	CB Fail Alarm (K187L CB)	Energised = CB did not trip – TC1		1	4	24	R1S4DI/24	BreakerFailPW	4119	DI	16	23	Y	Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel	1	S1065	6	X15:24	DI	CB Fail Alarm (K67 CB)	Energised = CB did not trip – TC2		1	4	25	R1S4DI/25	BreakerFailOC	4120	DI	16	24	Y	Y	
11kV Feeder	ACCB	6XX	11kV Feeder Panel							High = Comms Healthy						PWRelayCommsFail	37888	DI	148	0			Internal to RTU
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-16	BIT 0	P521	Serial	Pilot Wire Trip Alarm (A-Phase)	High = PW Fault						PWTripA	37889	DI	148	1	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-16	BIT 1	P521	Serial	Pilot Wire Trip Alarm (B-Phase)	High = PW Fault						PWTripB	37890	DI	148	2	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-16	BIT 2	P521	Serial	Pilot Wire Trip Alarm (C-Phase)	High = PW Fault						PWTripC	37891	DI	148	3	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-16	BIT 3	P521	Serial	Pilot Wire Trip Alarm (AB-Phase)	High = PW Fault						PWTripAB	37892	DI	148	4	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-16	BIT 4	P521	Serial	Pilot Wire Trip Alarm (AC-Phase)	High = PW Fault						PWTripAC	37893	DI	148	5	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-16	BIT 5	P521	Serial	Pilot Wire Trip Alarm (BC-Phase)	High = PW Fault						PWTripBC	37894	DI	148	6	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-16	BIT 6	P521	Serial	Pilot Wire Trip Alarm (ABC-Phase)	High = PW Fault						PWTripABC	37895	DI	148	7	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-16	BIT 7	P521	Serial	Trip Circuit 1 Supervision Alarm	High = TC1 Healthy						TripCircuitSupervision1	37896	DI	148	8			
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-16	BIT 8	P521	Serial	CB Fail Alarm (TC1 – P521)	High = CB did not trip – TC1						BreakerFailPW	37897	DI	148	9	Y		
11kV Feeder	Feeder	6XX	11kV Feeder Panel		WORD-16	BIT 9	P521	Serial	Pilot Communications Failed	High = Comms Failed						PilotWireFail	37898	DI	148	10	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel							High = Comms Healthy						OverCurrRelayCommFail	38144	DI	149	0			Internal to RTU
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-17	BIT 0	P127	Serial	OC Trip Alarm (A-phase)	High = O/C Fault						OverCurrentA	38145	DI	149	1	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-17	BIT 1	P127	Serial	OC Trip Alarm (B-phase)	High = O/C Fault						OverCurrentB	38146	DI	149	2	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-17	BIT 2	P127	Serial	OC Trip Alarm (C-phase)	High = O/C Fault						OverCurrentC	38147	DI	149	3	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-17	BIT 3	P127	Serial	OC Trip Alarm (AB-phase)	High = O/C Fault						OverCurrentAB	38148	DI	149	4	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-17	BIT 4	P127	Serial	OC Trip Alarm (AC-phase)	High = O/C Fault						OverCurrentAC	38149	DI	149	5	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-17	BIT 5	P127	Serial	OC Trip Alarm (BC-phase)	High = O/C Fault						OverCurrentBC	38150	DI	149	6	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-17	BIT 6	P127	Serial	OC Trip Alarm (ABC-phase)	High = O/C Fault						OverCurrentABC	38151	DI	149	7	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-17	BIT 7	P127	Serial	EF Trip Alarm	High = Earth Fault						OverCurEarthLeakTrip	38152	DI	149	8	Y		
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-17	BIT 8	P127	Serial	Trip Circuit 2 Supervision Alarm	High = TC2 Healthy						TripCircuitSupervision2	38153	DI	149	9			
11kV Feeder	ACCB	6XX	11kV Feeder Panel		WORD-17	BIT 9	P127	Serial	CB FAIL Alarm (TC2 – P127)	High = CB did not trip – TC2						BreakerFailOC	38154	DI	149	10	Y		
11kV Non feeder			33/11 11kV ACCB	1	S1055	1	X15:01		Control +ve						R1S11DO/CH8-a								
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB	1	S1055	2	X15:03	PO	Remote Close Command			1	11	8	R1S11DO/CH8-b	Close	2823	PO	11	7			
11kV Non feeder			33/11 11kV ACCB	1	S1055	3	X15:02		Control +ve						R1S11DO/CH7-a							Y	
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB	1	S1055	4	X15:04	PO	Remote Open Command			1	11	7	R1S11DO/CH7-b	Open	2822	PO	11	6		Y	
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB	1	S1070	1	X15:08	DI	ACCB Open	Energised = CB Open		2	4	26	R2S4DI/26	Status(1)	4121	DI	16	25		Y	
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB	1	S1070	2	X15:09	DI	ACCB Closed	Energised = CB Closed		2	4	27	R2S4DI/27	Status(0)	4122	DI	16	26		Y	
11kV Non feeder	Switch	33/11 11kV ISOL	33/11 11kV ACCB	1	S1070	3	X15:10	DI	Disconnector Open	Energised = Disc Open		2	4	28	R2S4DI/28	Status(1)	4123	DI	16	27		Y	
11kV Non feeder	Switch	33/11 11kV ISOL	33/11 11kV ACCB	1	S1070	4	X15:11	DI	Disconnector Closed	Energised = Disc Closed		2	4	29	R2S4DI/29	Status(0)	4124	DI	16	28		Y	
11kV Non feeder	Switch	33/11 11kV EARTH	33/11 11kV ACCB	1	S1070	5	X15:12	DI	Earth Switch Open	Energised = ES Open		2	4	30	R2S4DI/30	Status(1)	4125	DI	16	29		Y	
11kV Non feeder	Switch	33/11 11kV EARTH	33/11 11kV ACCB	1	S1070	6	X15:13	DI	Earth Switch Closed	Energised = ES Closed		2	4	31	R2S4DI/31	Status(0)	4126	DI	16	30		Y	
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB	1	S1070	7	X15:14	DI	CB Motor Spring Charged	Energised = Charged		2	4	32	R2S4DI/32	SpringCharged	4127	DI	16	31		Y	
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB	1	S1070	10	X15:17	DI	OC Relay (P127) Watchdog	Energised = Relay Healthy		2	5	1	R2S5DI/1	OverCurrentRelay	4352	DI	17	0			
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB	1	S1070	11	X15:18	DI	Trip Circuit 2 Supervision Alarm (TC2)	Energised = TC2 Healthy		2	5	2	R2S5DI/2	TripCircuitSupervision2	4353	DI	17	1			
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		IA080	W	X3:1	AI	B Phase AC Current +ve	0-10 mA = 0 - 300 A	300/1A	2	3	33	R2S3AI/CH33+	Current	3872	AI	15	32			Not for Bus Section ACCBs
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		IA080	B	X3:4		B Phase AC Current -ve			2	3	33	R2S3AI/CH33-								
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		IA080	S			Screen														
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB	1	S1067	1		DI	Neutral Leakage Trip	Energised = Neutral Fault		2	5	3	R2S5DI/3	NeutralLeakageProt		DI	17	2	Y		Only required for 33/11 11kV CB
11kV Non feeder	ACCB	11KV BUS SECTION	33/11 11kV ACCB	1	S1067	2		DI	Differential Prot Supply Healthy	Energised = Volts present		2	5	4	R2S5DI/4		4355	DI	17	3		Y	
11kV Non feeder	ACCB	11KV BUS SECTION	33/11 11kV ACCB	1	S1066	1		DI	Cable Diff MTM Trip	Energised = Diff Fault		2	5	5	R2S5DI/5		4356	DI	17	4	Y	Y	Bus section CBs
11kV Non feeder	ACCB	11KV BUS SECTION	33/11 11kV ACCB	1	S1066	2		DI	Busbar Protection MTM Trip	Energised = Busbar Fault		2	5	6	R2S5DI/6		4357	DI	17	5	Y	Y	Bus section CBs
11kV Non feeder	ACCB	6XX	33/11 11kV ACCB	1	S1065	2	X15:20	DI	DOC Trip	Energised = O/C Fault		2	5	7	R2S5DI/7	OverCurrent	4358	DI	17	6	Y	Y	For 11kV hardwired summary alarms are normally required
11kV Non feeder	ACCB	11KV BUS SECTION	33/11 11kV ACCB	1	S1066	6		DI	Trip Circuit 1 Supervision Alarm (TC1)	Energised = TC1 Healthy		2	5	8	R2S5DI/8	TripCircuitSupervision1	4359	DI	17	7		Y	
11kV Non feeder	ACCB	11KV BUS SECTION	33/11 11kV ACCB	1	S1066	7		DI	Trip Circuit 2 Supervision Alarm (TC2)	Energised = TC2 Healthy		2	5	9	R2S5DI/9	TripCircuitSupervision2	4360	DI	17	8		Y	
11kV Non feeder	ACCB	6XX	33/11 11kV ACCB	1	S1065	5	X15:23	DI	CB Fail Alarm (K187L CB)	Energised = CB did not trip – TC1		2	5	10	R2S5DI/10	BreakerFailPW	4361	DI	17	9	Y	Y	
11kV Non feeder	ACCB	6XX	33/11 11kV ACCB	1	S1065	6	X15:24	DI	CB Fail Alarm (K67 CB)	Energised = CB did not trip – TC2		2	5	11	R2S5DI/11	BreakerFailOC	4362	DI	17	10	Y	Y	
11kV Non feeder	ACCB	33KV 1-2 BS	33/11 11kV ACCB	1	S1066	8		DI	Diff Relay (P127) Watchdog	Energised = Relay Healthy		2	5	12	R2S5DI/12	DiffRelay	4363	DI	17	11		Y	Required for Bus Tie CBs
11kV Non feeder	ACCB	11KV BUS SECTION	33/11 11kV ACCB	1	S1066	10		DI	Differential Trip Alarm (A-Phase)	Energised = Diff Fault		2	5	13	R2S5DI/13	DifferentialTripA	4364	DI	17	12	Y		
11kV Non feeder	ACCB	11KV BUS SECTION	33/11 11kV ACCB	1	S1066	11		DI	Differential Trip Alarm (B-Phase)	Energised = Diff Fault		2	5	14	R2S5DI/14	DifferentialTripB	4365	DI	17	13	Y		
11kV Non feeder	ACCB	11KV BUS SECTION	33/11 11kV ACCB	1	S1066	12		DI	Differential Trip Alarm (C-Phase)	Energised = Diff Fault		2	5	15	R2S5DI/15	DifferentialTripC	4366	DI	17	14	Y		
11kV Non feeder	ACCB	33KV 1-2 BS	33/11 11kV ACCB							High = Comms Healthy						DiffRelayCommFail	38400	DI	150	0			Internal to RTU
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		WORD-20	BIT 0	P127	Serial	OC Trip Alarm (A-phase)	High = O/C Fault						OverCurrentA	38401	DI	150	1	Y		

Superseded by RIV

SCADA Equipment Name	SCADA Plant	SCADA Design	From (Field Equip Name)	Batt	Cable No	Core No	Field Device Term.	Signal Type	Signal Description	Signal Status	CT or VT Ratio	RTU Rack	RTU Slot	RTU Chan	Terminal	Master Station Mosaic Quantity (Point)	Master Station DNP Index	Master Station Type	Master Station Slot	Master Station Chan	Master Station Invert	Hard wired	Comment
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		WORD-20	BIT 1	P127	Serial	OC Trip Alarm (B-phase)	High = O/C Fault						OverCurrentB	38402	DI	150	2	Y		
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		WORD-20	BIT 2	P127	Serial	OC Trip Alarm (C-phase)	High = O/C Fault						OverCurrentC	38403	DI	150	3	Y		
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		WORD-20	BIT 3	P127	Serial	OC Trip Alarm (AB-phase)	High = O/C Fault						OverCurrentAB	38404	DI	150	4	Y		
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		WORD-20	BIT 4	P127	Serial	OC Trip Alarm (AC-phase)	High = O/C Fault						OverCurrentAC	38405	DI	150	5	Y		
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		WORD-20	BIT 5	P127	Serial	OC Trip Alarm (BC-phase)	High = O/C Fault						OverCurrentBC	38406	DI	150	6	Y		
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		WORD-20	BIT 6	P127	Serial	OC Trip Alarm (ABC-phase)	High = O/C Fault						OverCurrentABC	38407	DI	150	7	Y		
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		WORD-20	BIT 7	P127	Serial	Earth Fault Trip Alarm	High = Earth Fault						EarthFault	38408	DI	150	8	Y		
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		WORD-20	BIT 8	P127	Serial	Trip Circuit 1 Supervision Alarm	High = TC1 Healthy						TripCircuitSupervision1	38409	DI	150	9			
11kV Non feeder	ACCB	33/11 11KV	33/11 11kV ACCB		WORD-20	BIT 9	P127	Serial	CB Fail Alarm (TC1 or TC2)	High = CB did not trip						BreakerFailOC	38410	DI	150	10			
DCCB BAR or FAR			DCCB	2			X15:01		Control +ve						R1S12DO/CH2-a							Y	
DCCB BAR or FAR	BARCB	481	DCCB	2	S1101	1	X15:03	PO	Remote Close Command			1	12	2	R1S12DO/CH2-b	Close	3073	PO	12	1		Y	
DCCB BAR or FAR			DCCB	2			X15:02		Control +ve						R1S12DO/CH1-a							Y	
DCCB BAR or FAR	BARCB	481	DCCB	2	S1101	2	X15:04	PO	Remote Open Command			1	12	1	R1S12DO/CH1-b	Open	3072	PO	12	0		Y	
DCCB BAR or FAR	BARCB	481	DCCB					PO	Raise Trip Setting			2	12	5	R2S12DO/CH5		3076	PO	12	4		Y	
DCCB BAR or FAR	BARCB	481	DCCB	2	S1105	1	D	DI	DCCB Open	Energised = Open		2	5	16	R2S5DI/16	Status(1)	3843	DI	15	3		Y	
DCCB BAR or FAR	BARCB	481	DCCB	2	S1105	2	C	DI	DCCB Closed	Energised = Closed		2	5	17	R2S5DI/17	Status(0)	3844	DI	15	4		Y	
DCCB BAR or FAR	BARCB	481	DCCB	2	S1105	3	P	DI	Delta-I Relay Operated	Energised = Delta I Operation		2	5	18	R2S5DI/18	Deltal_Trip	3845	DI	15	5	Y	Y	
DCCB BAR or FAR	BARCB	481	DCCB	2	S1105	4	T	DI	Low Trip Setting Indication	Energised = Low Trip Setting		2	5	19	R2S5DI/19		3846	DI	15	6		Y	
DCCB BAR or FAR	BARCB	481	DCCB	2	S1105	5	W	DI	High Trip Setting Indication	Energised = High Trip Setting		2	5	20	R2S5DI/20		3847	DI	15	7		Y	
DCCB BAR or FAR	BARCB	481	DCCB		IA140	W	G	AI	DC Feeder Current +ve	20mA = 10000A		2	3	34	R2S3AI/CH34+	Current	3873	AI	15	33		Y	
DCCB BAR or FAR	BARCB	481	DCCB		IA140	B	F		DC Feeder Current -ve			2	3	34	R2S3AI/CH34-							Y	
DCCB BAR or FAR	BARCB	481	DCCB		IA140	S	I		Screen													Y	
1500VDC BS Switch			1500V BS Switch	2	S1160	1		+ve	125V dc common														
1500VDC BS Switch	Switch	1500V BS	1500V BS Switch	2	S1160	2		DI	Switch Open	Energised = Open		2	3	9	R2S3DI/9	Status(0)	3848	DI	15	8			
1500VDC BS Switch	Switch	1500V BS	1500V BS Switch	2	S1160	3		DI	Switch Closed	Energised = Closed		2	3	10	R2S3DI/10	Status(1)	3849	DI	15	9			
1500VDC BS Switch	DigitalEquip	DC BUS 1 LIVE	1500V BS Switch	2	S1160	4		DI	1500V DC Bus 1 Live	Energised = Live		2	3	11	R2S3DI/11	DigStatus	3850	DI	15	10			
1500VDC BS Switch	DigitalEquip	DC BUS 2 LIVE	1500V BS Switch	2	S1160	5		DI	1500V DC Bus 2 Live	Energised = Live		2	3	12	R2S3DI/12	DigStatus	3851	DI	15	11			
1500VDC BS Switch	DigitalEquip	DC BUS LINK SVC POS	1500V BS Switch	2	S1160	6		DI	Link in Service Position	Energised = In Service		2	3	13	R2S3DI/13	DigStatus	3852	DI	15	12			
1500VDC BS Switch	Switch	DC BUS LINK AMPS	1500V BS Switch		IA150	W		AI	Link Switch DC Current +ve	20mA = 0-1000A		2	9	1	R2S9AI/CH1+	Current	3874	AI	15	34			
1500VDC BS Switch			1500V BS Switch		IA150	B			Link Switch DC Current +ve			2	9	1	R2S9AI/CH1-								
1500VDC BS Switch			1500V BS Switch		IA150	S			Screen														
Reactor			Common Equip Panel	1	S4005	1		+ve	125V dc common														No controls for reactor
Reactor	Reactor	REACTOR	Common Equip Panel	1	S4005	2		DI	Reactor Over Pressure Trip	Energised = Tripped		2	5	16	R2S5DI/16	OilOverPressure	4367	DI	17	15	Y	Y	
Reactor	Reactor	REACTOR	Common Equip Panel	1	S4005	3		DI	Reactor Protection Supply Healthy	Energised = Supply Healthy		2	5	17	R2S5DI/17	ACSupply	4368	DI	17	16		Y	
Reactor			Negative Reactor	1	S4006	1		+ve	125V dc Common													Y	
Reactor	Reactor	REACTOR	Negative Reactor	1	S4006	2		DI	Reactor Oil Overtemp Trip	Energised = Tripped		2	5	18	R2S5DI/18	OilOverTempTrip	4369	DI	17	17	Y	Y	
Reactor	Reactor	REACTOR	Negative Reactor	1	S4006	3		DI	Reactor Oil Overtemp Alarm	Energised = Healthy		2	5	19	R2S5DI/19	OilOverTemp	4370	DI	17	18		Y	
Reactor	Reactor	REACTOR	Negative Reactor		IA120	W		AI	Reactor Oil Temp +ve	20mA = 0-150C		2	4	33	R2S4AI/CH33+							Y	
Reactor	Reactor	REACTOR	Negative Reactor		IA120	B			Reactor Oil Temp -ve			2	4	33	R2S4AI/CH33-							Y	
Reactor	Reactor	REACTOR	Negative Reactor		IA120	S			Screen													Y	
Reactor	Reactor	REACTOR	Negative Reactor		IA121	W		AI	Reactor Winding Temp +ve	20mA = 0-150C		2	4	34	R2S4AI/CH34+							Y	
Reactor	Reactor	REACTOR	Negative Reactor		IA121	B			Reactor Winding Temp -ve			2	4	34	R2S4AI/CH34-							Y	
Reactor	Reactor	REACTOR	Negative Reactor		IA121	S			Screen													Y	
REC	REC	REC	Rail Earth Contactor		IA130	W		AI	Rail to Earth Volts +ve (Rail)	0-20ma = 0-800V		2	4	35	R2S4AI/CH35+	RailEarthVoltage	4130	AI	16	34		Y	
REC	REC	REC	Rail Earth Contactor		IA130	B			Rail to Earth Volts -ve (Earth)			2	4	35	R2S4AI/CH35-							Y	
REC	REC	REC	Rail Earth Contactor		IA130	S			Screen													Y	
REC			Rail Earth Contactor	1	S1109	1		+ve	125V DC Common													Y	
REC	REC	REC	Rail Earth Contactor	1	S1109	2		DI	Rail Earth Contactor Open	Energised = REC Open		2	5	20	R2S5DI/20	Status(1)	4371	DI	17	19		Y	Normal state is open
REC	REC	REC	Rail Earth Contactor	1	S1109	3		DI	Rail Earth Contactor Closed	Energised = REC Closed		2	5	21	R2S5DI/21	Status(0)	4372	DI	17	20		Y	
REC			Rail Earth Contactor	1	S1101	1			Control +ve						R1S12DO/CH4-a							Y	
REC	REC	REC	Rail Earth Contactor	1	S1101	2		PO	Remote Close Command			1	12	4	R1S12DO/CH4-b	Close	3075	PO	12	3		Y	
REC			Rail Earth Contactor	1	S1101	3			Control +ve						R1S12DO/CH3-a							Y	
REC	REC	REC	Rail Earth Contactor	1	S1101	4		PO	Remote Open Command			1	12	3	R1S12DO/CH3-b	Open	3074	PO	12	2		Y	
Battery Charger	BattCharger	BATTCHARGER1	125V DC Batt Charger	1	S1151	1		+ve	125V DC Common													Y	
Battery Charger	BattCharger	BATTCHARGER1	125V DC Batt Charger	1	S1151	2		DI	No1 Battery - Charger Fault	Energised = Charger Healthy		2	5	22	R2S5DI/22	Fail	4373	DI	17	21		Y	Combination of all 'other' alarms

SUPERSEDED

SCADA Equipment Name	SCADA Plant	SCADA Design	From (Field Equip Name)	Batt	Cable No	Core No	Field Device Term.	Signal Type	Signal Description	Signal Status	CT or VT Ratio	RTU				Master Station						Hard wired	Comment
												Rack	Slot	Chan	Terminal	Mosaic Quantity (Point)	DNP Index	Type	Slot	Chan	Invert		
Battery Charger	BattCharger	BATTCHARGER1	125V DC Batt Charger	1	S1151	3		DI	No1 Battery – O/P Volts Low	Energised = Volts OK (above limit)			5	23	R2S5DI/23	LowVolts	4374	DI	17	22		Y	
Battery Charger	BattCharger	BATTCHARGER1	125V DC Batt Charger	1	S1151	4		DI	No1 Battery – AC Failed	Energised = AC Healthy		2	5	24	R2S5DI/24	ACSupply	4375	DI	17	23		Y	Combination of 'AC Normal' & 'CB Open' indications
Battery Charger	BattCharger	BATTCHARGER1	125V DC Batt Charger		IA100	W		AI	No1 Battery - Voltage +ve	0-10mA = 0-150VDC	2	2	4	36	R2S4AI/CH36+	Voltage	4131	AI	16	35		Y	
Battery Charger	BattCharger	BATTCHARGER1	125V DC Batt Charger		IA100	B			No1 Battery - Voltage -ve			2	4	36	R2S4AI/CH36-							Y	
Battery Charger	BattCharger	BATTCHARGER1	125V DC Batt Charger		IA100	S			Screen													Y	
Battery Charger	BattCharger	BATTCHARGER1	125V DC Batt Charger	1	S1151	12			Battery Room Ventilation Fan Fail	Energised = Fan working		2	5	25	R2S5DI/25	VentFan	4376	DI	17	24		Y	For rooms with forced ventilation
Auxiliary Supply			415/240V AC Board	1	S1150	1		+ve	125V DC Common													Y	
Auxiliary Supply	Contactor	NO1 415V AUX	415/240V AC Board	1	S1150	2		DI	No.1 Aux Tx In Service	Energised = In Service		2	5	26	R2S5DI/26	Status	4377	DI	17	25		Y	Not required if from Rectifier Tx or 11kV Aux CB
Auxiliary Supply	Contactor	NO2 415V AUX	415/240V AC Board	1	S1150	3		DI	No.2 Aux Tx In Service	Energised = In Service		2	5	27	R2S5DI/27	Status	4378	DI	17	26		Y	Not required if from Rectifier Tx or 11kV Aux CB
Auxiliary Supply	DigitalEquip	AUX C/O MANUAL	415/240V AC Board	1	S1150	4		DI	Auto Selected	Energised = Auto		2	5	28	R2S5DI/28	DigStatus	4379	DI	17	27		Y	
Auxiliary Supply	DigitalEquip	NO1 AUX SUPPLY	415/240V AC Board	1	S1150	5		DI	No1 415V Healthy	Energised = Healthy		2	5	29	R2S5DI/29	DigStatus	4380	DI	17	28		Y	Not required if from Rectifier Tx or 11kV Aux CB
Auxiliary Supply	DigitalEquip	NO2 AUX SUPPLY	415/240V AC Board	1	S1150	6		DI	No2 415V Healthy	Energised = Healthy		2	5	30	R2S5DI/30	DigStatus	4381	DI	17	29		Y	Not required if from Rectifier Tx or 11kV Aux CB
Auxiliary Supply	DigitalEquip	ASV	415/240V AC Board	1	S1150	7		DI	Aux Supply Volts (C/O switch O/P) Phase Failure relay	Energised = Healthy		2	5	31	R2S5DI/31	DigStatus	4382	DI	17	30		Y	
Staff alarm			Staff Switch	1	S1170	1		+ve	125V dc common													Y	One input is required per area, see EL 0204559.
Staff alarm	Staff	STAFF	Staff Switch	1	S1170	2		DI	Staff access switch (Intruder Detection)	Energised = Staff present		1	4	9	R1S4DI/9	Switch	1032	DI	4	8		Y	
Staff alarm			Door Reeds	1	S1171	1		+ve	125V dc common													Y	
Staff alarm	Staff	STAFF	Door Reeds	1	S1171	2		DI	Door Reed Switches for HV Room	Energised = Doors Closed		1	4	10	R1S4DI/10	DoorReed	1033	DI	4	9		Y	One input is required per area, see EL 0204559.
Staff alarm	Staff	STAFF						DI	Staff status	High = Staff absent						Status	16640	DI	65	0			One per area. Internal to RTU.
Supy Phone			Bell Silence Button	1	S1178B	1		+ve	125V DC Common													Y	
Supy Phone	SupPhone	SUPY PHONE	Bell Silence Button	1	S1178B	2		DI	HV Equip Room VoIP Phone Buzzer Silence PB	Energised = Silence Alarm		1	4	13	R1S4DI/13	OffHook	1036	DI	4	12	Y	Y	One input is required per area, see EL 0204559.
Supy Phone	SupPhone	SUPY PHONE														Call	17152	PO	67	0			Goes to LCR to ring buzzer
Supy Phone			Piezo Buzzer	1	S1175	1		+ve	125V DC Common													Y	This output is for staff alarm and phone buzzer
Supy Phone			Piezo Buzzer	1	S1175	2		Latch	HV Equip Room Audible Alarm (Latched)	Energised = Sound Alarm		1	9	3	R1S9DO/CH3			PO				Y	Hard wired output to control staff/phone bell via local control programme
RTU alarms	DigitalEquip	RTU FAULT	RTU Cabinet					DI	Internal RTU Fault	High = Healthy						DigStatus	16641	DI	65	1			Internal to RTU
RTU alarms	DigitalEquip	ALARM BUS	RTU Cabinet	1	Internal	1		DI	Alarm Bus Fuse	Energised = Healthy		1	4	1	R1S4DI/1	DigStatus	1024	DI	4	0		Y	
RTU alarms	DigitalEquip	CONTROLS DISABLED	RTU Cabinet	1	Internal	1		DI	Remote Controls Disabled	Energised = Controls Disabled		1	4	2	R1S4DI/2	DigStatus	1025	DI	4	1		Y	Switch in RTU, will only affect some controls
RTU alarms	DigitalEquip	DCCB CTRL BAT1	RTU Cabinet	2	Internal	1		DI	DCCB Control Fuse	Energised = Healthy		1	4	3	R1S4DI/3	DigStatus	1026	DI	4	2		Y	
Comms			C&CS switch	1	S1181	1	K2:A1	+ve	48V DC Common													Y	
Comms	DigitalEquip	COMMS SWITCH A	C&CS switch	1	S1181	2	K2:A2	DI	Comms Panel - Switch A Fault	Energised = Healthy		1	4	4	R1S4DI/4	DigStatus	1027	DI	4	3		Y	
Comms			C&CS switch	1	S1181	3	K4:A1	+ve	48V DC Common													Y	
Comms	DigitalEquip	COMMS SWITCH B	C&CS switch	1	S1181	4	K4:A2	DI	Comms Panel - Switch B Fault	Energised = Healthy		1	4	5	R1S4DI/5	DigStatus	1028	DI	4	4		Y	
Comms	DigitalEquip	SWITCH A 48V SUPPLY	Power Supply in RTU	1	Internal	1		DI	125/48V DC Supply A Fail	Energised = Healthy		1	4	6	R1S4DI/6	DigStatus	1029	DI	4	5		Y	
Comms	DigitalEquip	SWITCH B 48V SUPPLY	Power Supply in RTU	1	Internal	1		DI	125/48V DC Supply B Fail	Energised = Healthy		1	4	7	R1S4DI/7	DigStatus	1030	DI	4	6		Y	
Dummy CB	TestCB	CIRCUIT BREAKER	RTU Cabinet	1	Internal	1		DI	CB Closed	Energised = Closed		1	4	8	R1S4DI/8	Status	1031	DI	4	7		Y	Normally open, relay latches closed when close control sent
Dummy CB			RTU Cabinet	1	Internal	2			Control +ve						R1S9DO/CH1-a							Y	
Dummy CB	TestCB	CIRCUIT BREAKER	RTU Cabinet	1	Internal	3		PO	Remote Open Command			1	9	1	R1S9DO/CH1-b	Open	2304	PO	9	0		Y	
Dummy CB			RTU Cabinet	1	Internal	4			Control +ve						R1S9DO/CH2-a							Y	
Dummy CB	TestCB	CIRCUIT BREAKER	RTU Cabinet	1	Internal	5		PO	Remote Close Command			1	9	2	R1S9DO/CH2-b	Close	2305	PO	9	1		Y	
Fire System			Fire Panel	1	S1182	1		+ve	125V DC Common													Y	From positive alarm bus
Fire System	DigitalEquip	FIRE ALARM FAULT	Fire Panel	1	S1182	2		DI	Fire Detection System Faulty	Energised = Healthy		2	6	1	R2S6DI/1	DigStatus	4608	DI	18	0		Y	Interposing relay may be required
Fire System	DigitalEquip	FIRE ALARM ISOLATED	Fire Panel	1	S1182	3		DI	Fire Detection System Isolated	Energised = Isolated		2	6	2	R2S6DI/2	DigStatus	4609	DI	18	1		Y	Interposing relay may be required
Fire System	DigitalEquip	FIRE ALARM	Fire Panel	1	S1182	4		DI	Fire alarm	Energised = Fire detected		2	6	3	R2S6DI/3	DigStatus	4610	DI	18	2		Y	Interposing relay may be required
Spares			Panel	1	S3000	15																	Spare field cable core
Spares			Panel	1	S3000	16																	Spare field cable core