



Tender Document

MR 193/2017 - Design, Supply & Commission
New Control Panel for Ruston 16RK270
Generator

Fiji Electricity Authority
Generation
17-Jul-17

Tender Submission - Instruction to bidders

It is mandatory for Bidders to upload a copy of their bid in the **TENDER LINK** Electronic Tender Box no later than **4:00pm, on Wednesday 30th August, 2017**.

To register your interest and tender a response, view 'Current Tenders' at:

<https://www.tenderlink.com/fea>

For further information contact The Secretary Tender Committee, by e-mail

TDelairewa@fea.com.fj

In addition, hard copies of the tender, one original and one copy must be deposited in the tender box located at the FEA Head Office, 2 Marlow Street, Suva, Fiji no later than **4:00pm, on Wednesday 30th August, 2017**- Addressed as

Tender – MR 193/2017 – Design, Supply & Commission of New Control Panel for Ruston 16RK270 Generator at the FEA's Labasa Power Station

**The Secretary Tender Committee
Fiji Electricity Authority
Head Office
Suva
Fiji**

- **Hard copies of the Tender bid will also be accepted after the closing date and time provided a soft copy is uploaded in the e-Tender Box and it is dispatched before the closing date and time.**

Tenders received after **4:00pm** on the closing date of **Wednesday 30th August, 2017**

- will not be considered.
- Lowest bid will not necessarily be accepted as successful bid
- **It is the responsibility of the bidder to pay courier chargers and all other cost associated with the delivery of the hard copy of the Tender submission including any Duties/Taxes. Hard copies of the Tender submission via Post Box will not be considered.**
- **Local Bidders are requested to submit a:**
 - **Valid Tax Compliance Certificate**
 - **FNPF Compliance Certificate**

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2 System Information

2.1 Generator Specification

2.1.1 Engine

Name: Ruston 16RK270

Engine Number: 1H10424

Continuous Service Output: 3590KW

2.1.2 Alternator

Name: Leroy Somer

Type: LSA 56 BZ11-8P

Serial Number: 600158-1

IP Number: 23

Output: 3600KW (4500KVA)

2.1.3 Current Control Panel Specification

Current Status – Offline

Items	Model	Components
PLC Unit	Allen-Bradley SLC 500 series	<ul style="list-style-type: none">• Modular Processors• Thermocouple/mV Input Module• RTD/ Resistance Input Module• High Speed Counter Module• Discrete I/O Modules
User Interface	Paneview 600	

Setup and Terminal arrangement is shown in the Appendix 1

3 Specification

3.1 General Information

The upgraded PLC should have the same capability and features of the existing PLC or have more advance Digital instrument that will maintain the safety of the Generator when in operation.

The PLC handles all control and alarm function. It also measures the Engine & Turbocharger speeds and operates a series of relays as a temperature scanner. It also incorporates the protection system for both the Engine and Alternator units.

The control panel must incorporate the following items to be mounted inside the panel are:

- PLC Unit (Modular system mounted in rack)
- Control fuses
- Temperature Scanner unit to read existing thermocouples and provide protection
- Control relays
- Speed signal convector
- Audible alarm
- Terminal Blocks

Items mounted on the panel door:

- PLC User Interface Panel
- Engine Hours runs Indicators
- Governor solenoid latched indicator lamp
- Panel ON lamp
- Air System Indicator
- Air System ON/OFF switch
- Metal Detector Indicator & Reset
- Engine Stop and Start buttons
- Engine Speed lower and raise buttons
- Reset Button
- Local-Remote control switch
- Hand-Auto control switch
- Emergency Stop Button

The emergency Stop button must be connected directly to the shutdown relay and cuts off the engine without requiring any action from the PLC.

3.2 User Interface Panel

The User Interface Panel should contain a colour touch screen together with a set of buttons for data entry and function keys. This unit should indicate all status and alarms conditions. It also should give limited access to system setup.

On Power Up, the unit should run a self-test routine and then display a default screen which shows current status of the system.

3.2.1 Default Screen

The screen should display;

- Set unavailable/ Hand/ Auto Status

- Engine Speed (When Running)
- Turbo Speed (When Running)
- Various Indicator and warning message prompt

This screen must carry the software version/revision number which would be used to track or enquire about the software or operation of the equipment.

The sub displays of following variable must be inclusive but not limit to;

- Alternator
 - Temperature
 - Winding
 - Air
 - Terminal Output
 - Voltage
 - Current
 - Frequency
- Engine
 - Temperature
 - Cylinders
 - Exhaust
 - Turbine Inlet (Turbocharger)
 - Turbine Outlet (Turbocharger)
 - Charge Air
 - Bearing
 - Jack Water
 - Raw Water
 - Lube Oil
 - Pressure
 - Start Air
 - Fuel
 - Jacket Water
 - Crankcase
 - Lube Oil
 - Charge Air

3.3 The Alarm & Shutdown System – Protection System

Alarms & Shutdowns are to be indicate by a special alarm window which indicates the cause of the alarm with a fault code.

An Acknowledge/reset button is to be provided which removes the alarm window and if possible mute audible alarm. If several alarms are present, the alarm will not be muted.

All current alarms are to be automatically added to the fault list

3.3.1 The Fault List

Include a running log of all system faults & warning. In each case, the following data is to be stored and displayed;

- Alarm Date (DD/MM/YY)
- Alarm Time (HH:MM: SS)
- Fault Code & Description

- Engine Reading
- Alternator Reading

Include provisions for this data to be export via MODBUS or serial ports.

3.3.2 Alarms & Trip Setting

Independent relay OFF and ON points must be definable for the following analogue signals;

- High Charge Air Temperature – Shutdown
- High Charge Air Temperature – Alarm
- High Exhaust Temperature – Alarm
- High Jacket Water Temperature – Alarm
- High Jacket Water Temperature – Shutdown
- Low Lube Oil Pressure – Alarm
- Low Lube Oil Pressure – Shutdown
- High Crankcase Pressure – Alarm
- High Alternator Winding – Alarm
- High Alternator Bearing Temperature – Alarm
- High Alternator Air Temperature – Alarm

This allows fully variable hysteresis for every alarm channel.

3.4 System Diagnostic Tool – Built In

The user interface panel should support a System Diagnostics Screen. This may be accessible either in the setup menu or by a pre-defined button on the default screen.

This screen should contain many inputs, outputs and control flags used in the engine control system. These are generally labelled as on a (Ruston) standard engine control drawing and have similar functions:

- Main control relays
- Restart lockout from speed switch
- Air start lockout from speed switch
- Alarm On/ engine running from speed switch
- Secondary over speed protection from speed switch

3.5 Engine Speed

The engine speed is measured using a magnetic pickup. The signal from this is processed to produce a 24 VDC square wave. This should feed into a high speed counter on the PLC.

Independent relay OFF and ON points are definable for each of the following speed signals. This allows fully variable hysteresis for every speed channel.

- Restart Lockout
- Start Air Cut-off
- Running / Alarms On
- Overspeed

3.6 Communication

3.6.1 Communications protocol

Using MODBUS interface or similar product to connect to the PLC processor via D9 or similar upgraded connection. Note the inclusion of a RTS-CTS jumper at the PLC end of the cable for device to communicate.

The PLC must be a slave unit on the MODBUS

3.6.2 SCADA Integration

Ensure the PLC is capable of communicating to /able to be integrated in FEA internal SCADA system for remote Control and monitor of the generator unit.

3.6.3 SEL Integration

Ensure the PLC is capable of communicating to /able to be integrated in FEA protection system for the remote status of the generator unit at our control room HMI and National Control Centre. Currently SEL unit are used for CB control and protection.

4 Scope of Works

1. Evaluated the current system and design a Control system to governor Ruston 16RK270 generator set.
2. Supply and Install the control unit and integral with the Generator unit. The Controller/PLC should be an up to date or latest working version
3. Check, Calibrate & Test all sensors and cabling. Supply and replace if need be. All sensor must be tested before installation and must be to Engine/Alternator manufacture recommendation.
4. Extracting current PLC program and integral it into the new system. If the current PLC is un-extractable, re-coding/reprogramming of the upgraded PLC and HMI will be required.
5. Test and Commission the Control Panel.
6. Provide training in the operation and maintenance of the PLC and its control system.
7. Supply of a Laptop with loaded software which FEA can use to diagnose Faults in the event of failure of the PLC or HMI

5 Price Schedule

MR 193/2017 - Design, Supply & Commission New Control Panel for Ruston 16RK270 Generator

Item	Item Description	Unit Price	Total Price Currency: _____
1	Evaluated the current system and design a Control system for Ruston 16RK270		
2	Supply and Install the control unit and integral with the Generator		
3	Check & Test all sensors/thermocouples/protection switches and cabling. Supply and replace if need be		
4	Extracting current PLC program and integral it into the new system or reprogramming of program which had to be approved by the FEA		
5	Test and Commission the Control Panel		
6	Supply of 3 x of each; <ul style="list-style-type: none"> • O&M manual • Parts manual • Literature manual • Laptop Toolbox with installed required software 		
7	Accommodation & Mobilization to Site		
8	Transportation of Materials to Site		
	TOTAL (VEP)		
	VAT 9%		
	TOTAL (VIP)		

Notes:

1. Ensure site HSE rules are followed at all times.
2. Contractor to verify all drawing measurements onsite
3. All Sub-contractors to be used for any part of the works are to be declared.
4. Contractor shall provide all materials, tools equipment and labour necessary to perform works.
5. A detailed work plan to be provided with expected date for the works.
6. FEA financial terms are applicable for these works. Any advance payment will require a bank guarantee.

6 Appendix

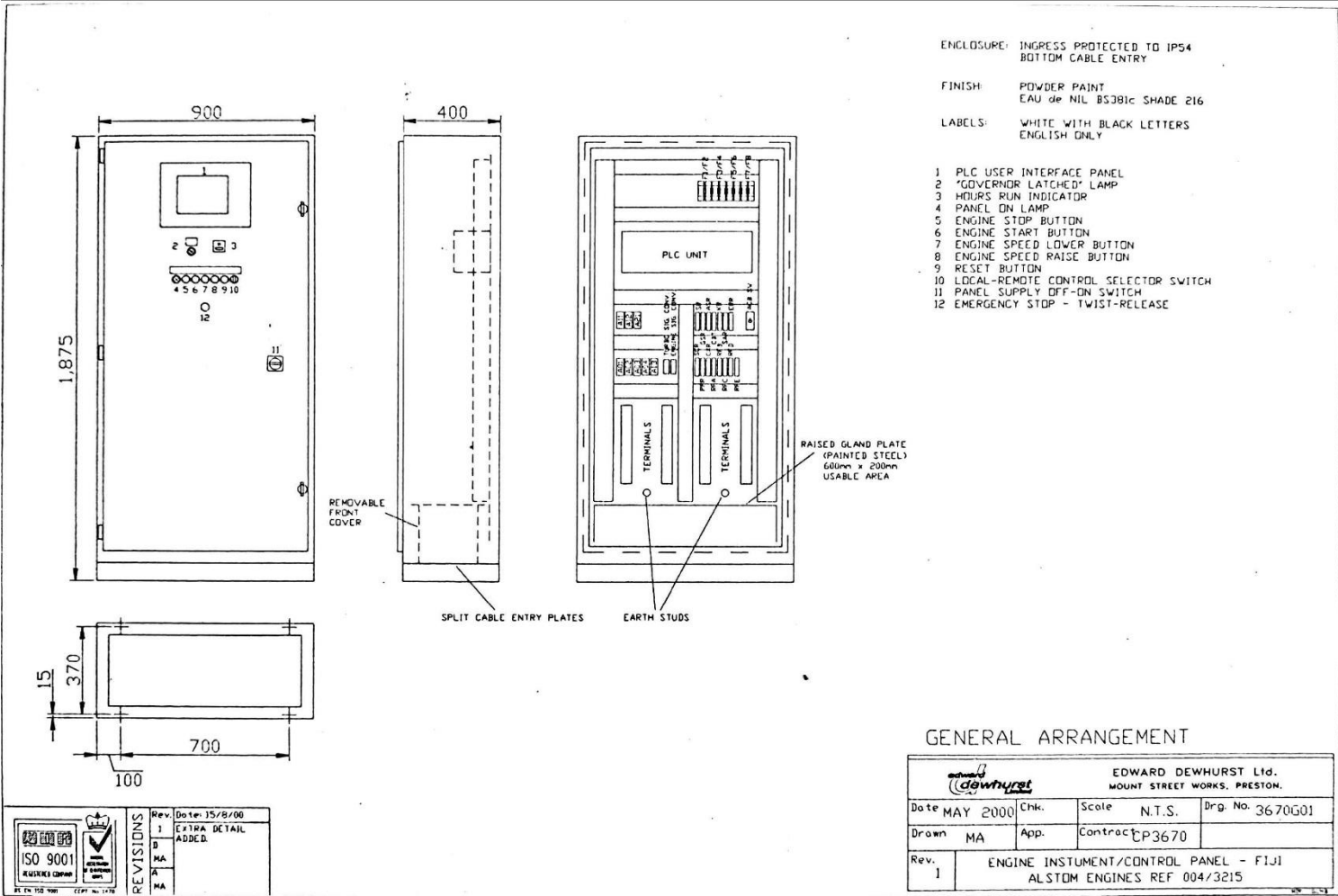


Figure 1 Current Setup - General Arrangement

6.1 Current Setup of the Control Panel

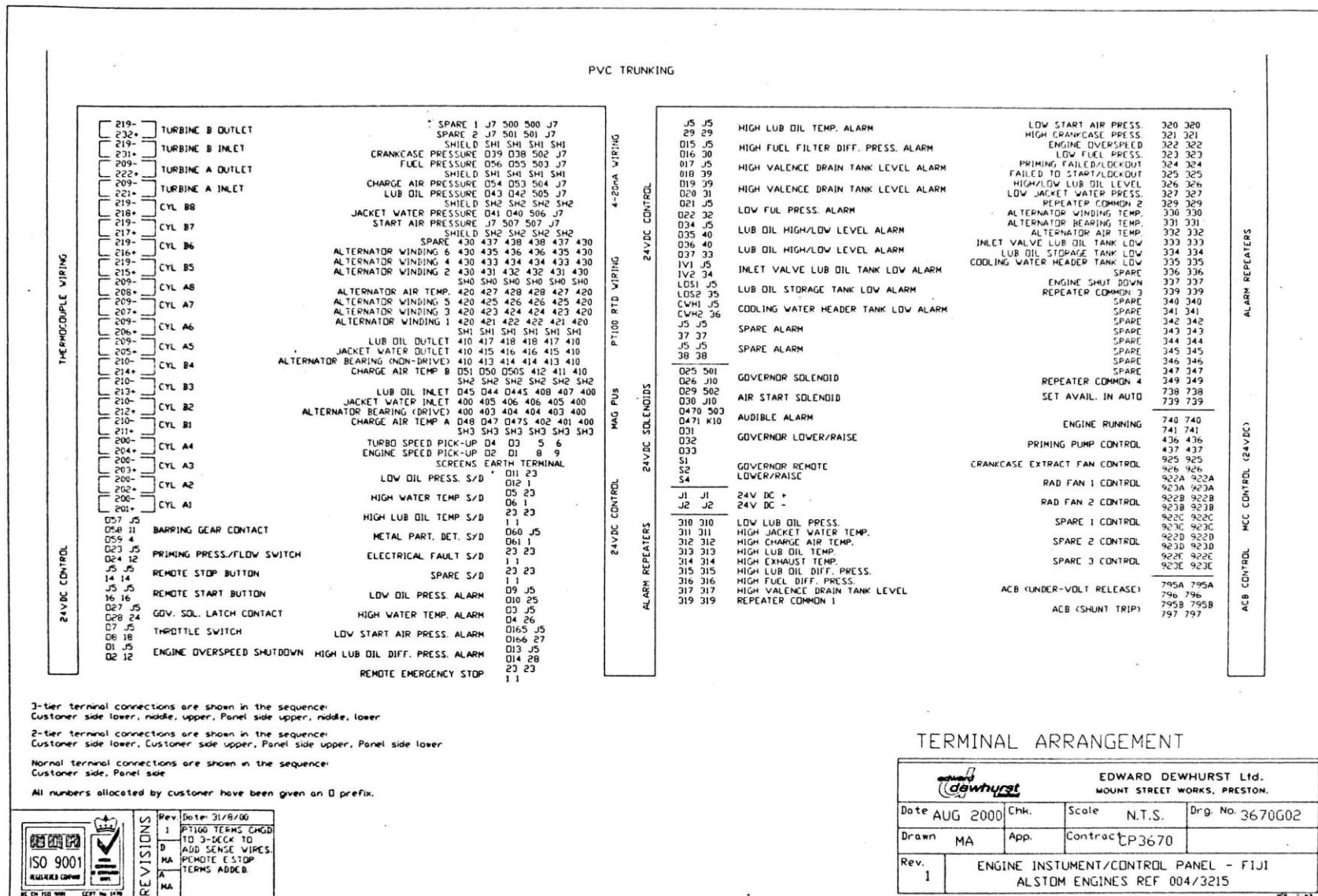


Figure 2 Current Setup - Terminal Arrangement