DEEP SEA ELECTRONICS

DSEA109 Configuration Suite
PC Software Manual

Document Number: 057-294

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057-294 ISSUE: 2

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DSEA109 Configuration Suite PC Software Manual

Amendments List

Issue	Comments
1	Initial release
2	Updated for new Idle Frequency Detection and De-Excite CAN message.

Typeface: The typeface used in this document is *Arial*. Care must be taken not to mistake the upper case letter I with the numeral 1. The numeral 1 has a top serif to avoid this confusion.

TABLE OF CONTENTS

SECTION **PAGE**

1 INTRODUCTION

WARNING!: LIVE PARTS exist within the AVR. To avoid damage to persons and/or property, only qualified personnel having full understanding of the application must install and configure the product.

This document details the use of the *DSE Configuration Suite PC Software* with the DSEA109 AVR, which is part of the DSEGenset® range of products.

The manual forms part of the product and should be kept for the entire life of the product. If the product is passed or supplied to another party, ensure that this document is passed to them for reference purposes.

This is not a *controlled document.* DSE do not automatically inform on updates. Any future updates of this document are included on the DSE website at www.deepseaelectronics.com

The *DSE Configuration Suite PC Software* allows the DSEA109 AVR to be connected to a PC via the DSE815 Configuration Interface. Once connected, the software allows easy, controlled access to various operating parameters within the AVR which can then be viewed and edited as required.

The *DSE Configuration Suite PC Software* must only be used by competent, qualified personnel, as changes to the operation of the module may have safety implications for the generating set to which it is fitted.

The information contained in this manual must be read in conjunction with the information contained in the appropriate module documentation. This manual only details which settings are available and how they may be used. Separate manuals deal with the operation of the individual module and its ancillaries, refer to section entitled *Bibliography* elsewhere in this document for further information.

1.1 CLARIFICATION OF NOTIFICATION

Clarification of notation used within this publication.

NOTE:	Highlights an essential element of a procedure to ensure correctness.
CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
WARNING!	Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

1.2 GLOSSARY OF TERMS

Term	Description
DSEA000 DSEAxxx	All AVRs in the DSEAxxx range.
DSEA109	DSEA109 AVR
AVR	Automatic Voltage Regulator An electronic device designed to automatically maintain a constant voltage output level of a generator.
CAN	Controller Area Network Vehicle standard to allow digital devices to communicate to one another.
CT	Current Transformer An electrical device that takes a large AC current and scales it down by a fixed ratio to a smaller current.
BMS	Building Management System A digital/computer based control system for a building's infrastructure.
DM1	Diagnostic Message 1 A DTC that is currently active on the engine ECU.
DTC	Diagnostic Trouble Code The name for the entire fault code sent by an engine ECU.
FMI	Failure Mode Indicator A part of DTC that indicates the type of failure, e.g. high, low, open circuit etc.
HMI	Human Machine Interface A device that provides a control and visualisation interface between a human and a process or machine.
IEEE	Institute of Electrical and Electronics Engineers
LED	Light Emitting Diode
OC	Occurrence Count A part of DTC that indicates the number of times that failure has occurred.
PGN	Parameter Group Number A CANbus address for a set of parameters that relate to the same topic and share the same transmission rate.
PMG	Permanent Magnet Generator A Generator that controls the alternator excitation voltage via a Permanent Magnet type alternator (typically attached the shaft of the main alternator).
SPN	Suspect Parameter Number A part of DTC that indicates what the failure is, e.g. oil pressure, coolant temperature, turbo pressure etc.

1.3 BIBLIOGRAPHY

This document refers to, and is referred by the following DSE publications which are obtained from the DSE website: www.deepseaelectronics.com or by contacting DSE technical support: support@deepseaelectronics.com.

1.3.1 INSTALLATION INSTRUCTIONS

Installation instructions are supplied with the product in the box and are intended as a 'quick start' guide only.

DSE Part	Description
053-245	DSEA109 Installation Instructions Sheet

1.3.2 MANUALS

Product manuals are obtained from the DSE website: www.deepseaelectronics.com or by contacting DSE technical support: support@deepseaelectronics.com.

DSE Part	Description
057-151	DSE Configuration Suite PC Software Installation & Operation Manual
057-295	DSEA109 Operator Manual

1.3.3 TRAINING GUIDES

Training guides are provided as 'hand-out' sheets on specific subjects during training sessions and contain specific information regarding to that subject.

DSE Part	Description
056-001	Four Steps To Synchronising
056-005	Using CTs With DSE Products
056-026	kVA, kW, kvar and Power Factor
056-069	Firmware Update

1.3.4 OTHER

The following third party documents are also referred to:

Reference	Description
ISBN 1-55937-879-4	IEEE Std C37.2-1996 IEEE Standard Electrical Power System Device Function Numbers and Contact Designations. Institute of Electrical and Electronics Engineers Inc
ISBN 0-7506-1147-2	Diesel generator handbook. L.L.J. Mahon
ISBN 0-9625949-3-8	On-Site Power Generation. EGSA Education Committee.

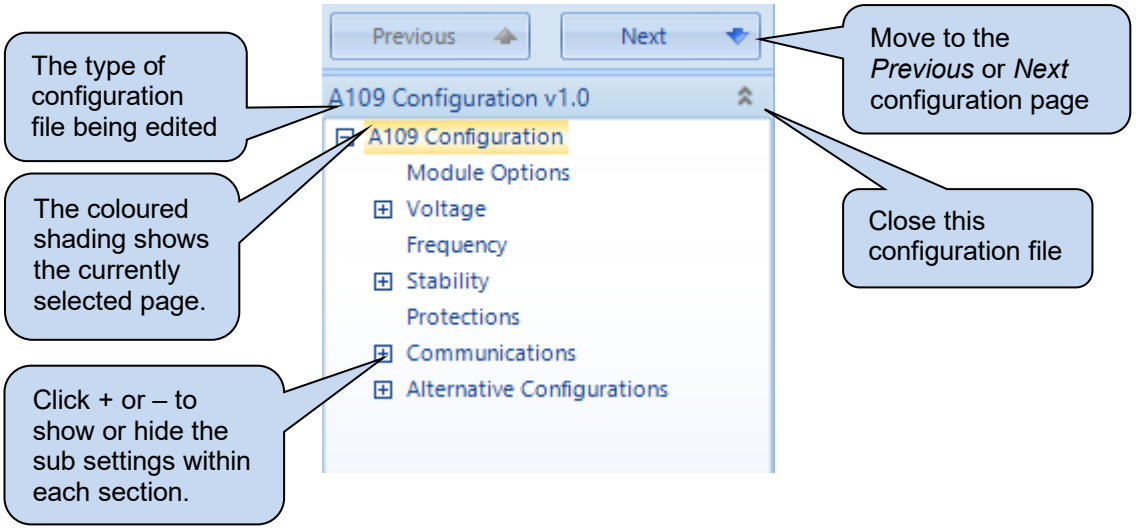
1.4 INSTALLATION AND USING THE DSE CONFIGURATION SUITE SOFTWARE

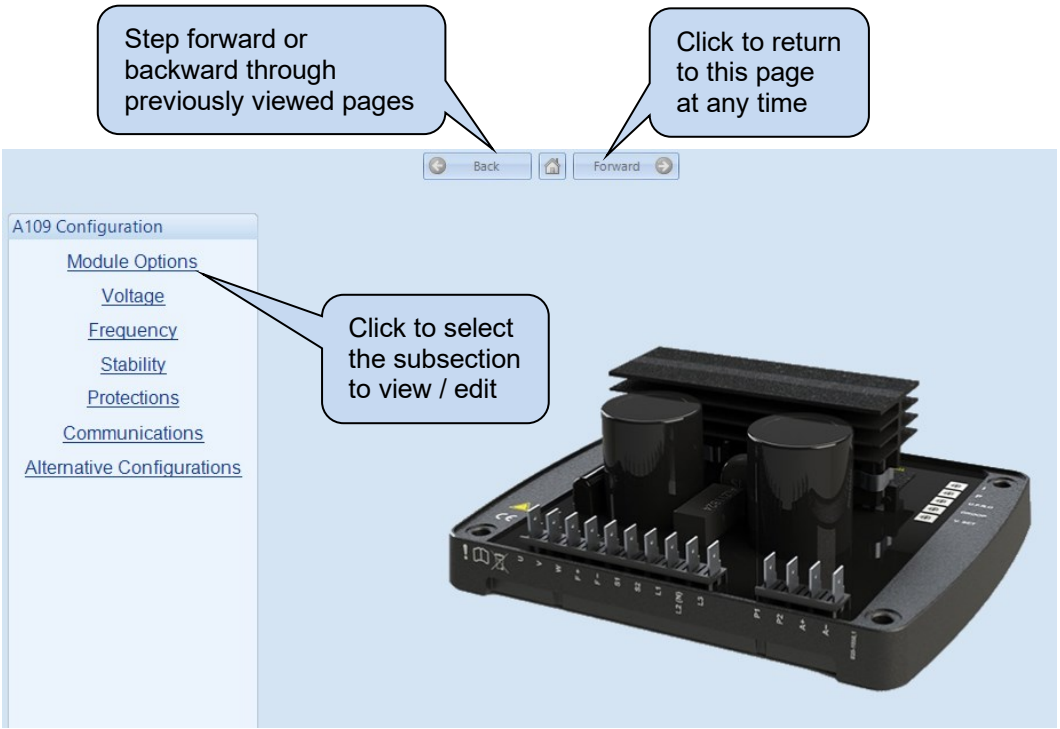
For information in regards to instating and using the DSE Configuration Suite Software please refer to DSE publication: ***057-151 DSE Configuration Suite PC Software Installation & Operation Manual*** which is found on our website: www.deepseaelectronics.com

2 EDITING THE CONFIGURATION

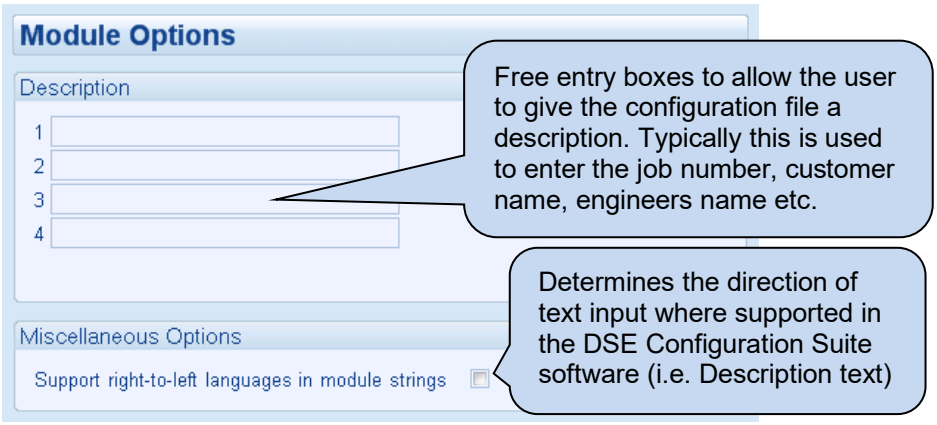
This menu allows module configuration, to change protection levels, system timers and parameter settings to suit a particular application.

2.1 SCREEN LAYOUT



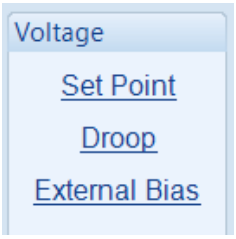


2.2 MODULE OPTIONS

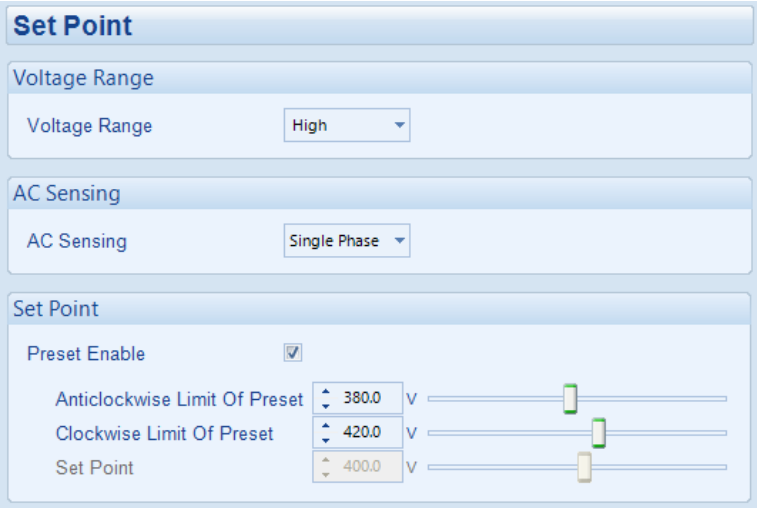


2.3 VOLTAGE

NOTE: It is possible to configure different voltage ranges in the *Alternative Configurations* section and use the DIP switches on the AVR to activate the relevant Alternative Configuration. For further details, refer to *Alternative Configurations* section elsewhere in this document and to DSE Publication: *057-295 DSEA109 Operators Manual.*



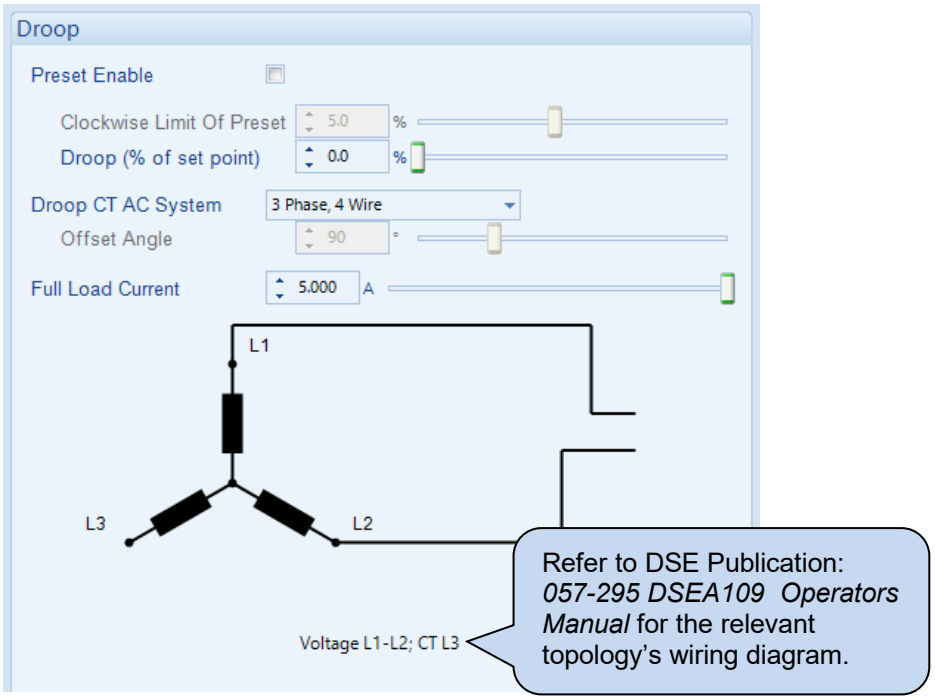
2.3.1 SET POINT



Parameter	Description
Voltage Range	Select the alternator's *Voltage Range* between the L1, L2 (N) L3 terminals. ***High:*** 180 V to 600 V range ***Low:*** for 90 V to 300 V range. The *Set Point* settings change when the *Voltage Range i*s changed.
AC Sensing	Select the AC sensing topology for the *L1, L2 (N) & L3* terminals. ***Single Phase*** ***Three Phase***
Preset Enable	☐ = The *Voltage Set Point* potentiometer is disabled and the voltage output of the alternator is determined by the *Set Point* parameter in the configuration. ☑ = The *Voltage Set Point* potentiometer is enabled and the voltage output of the alternator is determined by the *Voltage Set Point* potentiometer on the AVR.
Anticlockwise Limit Of Preset	Set the minimum voltage adjustment allowed by the *Voltage Set Point* potentiometer
Clockwise Limit Of Preset	Set the maximum voltage adjustment allowed by the *Voltage Set Point* potentiometer
Set Point	When the *Preset Enable* option is disabled, this determines the voltage output of the alternator.

2.3.2 DROOP

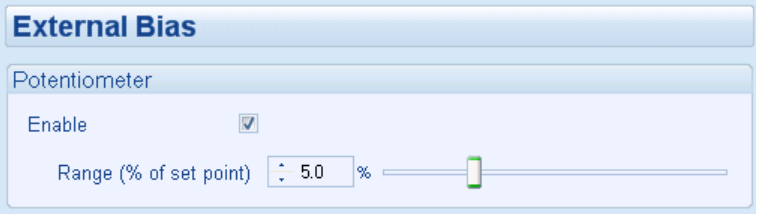
NOTE: For further details and examples on how to set the droop function, refer to DSE Publication: *057-295 DSEA109 Operators Manual*.



Parameter	Description
Preset Enable	☐ = The *Droop* potentiometer is disabled. The droop percentage is determined by the *Droop* parameter in the configuration. ☑ = The *Droop* potentiometer is enabled. The droop is determined by the *Droop* potentiometer on the AVR.
Clockwise Limit Of Preset	Set the maximum droop adjustment allowed by the *Droop* potentiometer
Droop (% of Set Point)	Set the droop amount as a percentage of the *Voltage Set Point*
Droop CT AC System	**NOTE: When User Configured is selected the Offset Angle must be configured. This enables the user to fit the droop CT to any phase regardless of the topology of the system. For further details on how to derive the correct offset angle please refer to the DSE Publication: 057-295 DSEA109 Operators Manual.** Select the correct AC wiring system of the voltage sensing, this provides the correct droop CT offset angle automatically. The options are: ***User Configured*** ***3 Phase, 3 Wire*** ***3 Phase, 4 Wire*** ***3 Phase, 4 Wire Delta L1-N-L2*** ***Single Phase, 2 Wire*** ***Single Phase, 3 Wire L1 – L2***
Offset Angle	Set the phase angle between the voltage sensing and droop CT reading
Full Load Current	Set the full load current of the Droop CT secondary

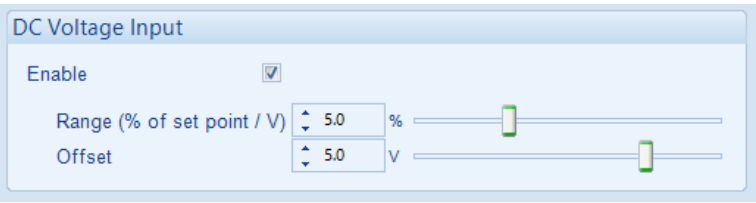
2.3.3 EXTERNAL BIAS

Potentiometer



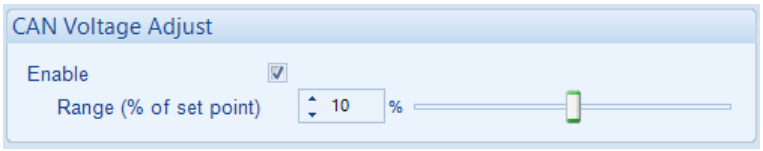
Parameter	Description
Enable	☐ = The *Remote Potentiometer* input is disabled ☑ = The *Remote Potentiometer* input is enabled, allowing the voltage biasing via a 5 kΩ potentiometer
Range (% of Set Point)	Set the range of voltage bias via the *Remote Potentiometer* as a percentage of the *Voltage Set Point* Example: When this is set to 5.0%, the maximum voltage adjustment via the potentiometer for a nominal voltage 230 V, has a range between 218.5 V and 241.5 V

DC Voltage Input



Parameter	Description
Enable	☐ = The *DC Voltage* input is disabled ☑ = The *DC Voltage* input is enabled, allowing the voltage biasing via a -10 V to 10 V DC Voltage signal
Range (% of Set Point / V)	Set the range of voltage bias via the *DC Voltage Input* as a percentage of the *Set Point per Voltage*. Example: When the *Range* is set to 5.0% and the *Offset* is set to 0.0 V, the AVR's adjustment range is ±50% (5% x ±10) of the Set Point. For a nominal voltage of 230 V, has a range between 115 V and 345 V
Offset	This is the DC Voltage to instruct running at the *Set Point*. It provides an offset to the voltage biasing input. Useful when the output voltage range of the external synchroniser/load matcher is smaller than the full voltage biasing range of the AVR.

CAN Voltage Adjust



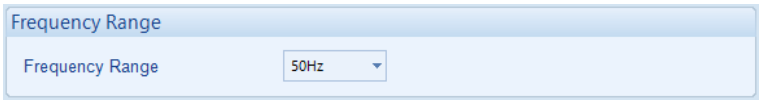
Parameter	Description
Enable	☐ = The *CAN Voltage Adjust* is disabled ☑ = The *CAN Voltage Adjust* is enabled, allowing the voltage biasing via the CAN Communication.
Range (% of Set Point)	Set the range of voltage bias via the CAN Communication port of the AVR as a percentage of the *Voltage Set Point* Example: When this is set to 10.0%, the maximum voltage adjustment via the CAN Communication for a nominal voltage 230 V, has a range between 207 V and 253 V

2.4 FREQUENCY

NOTE: Different frequency levels are configurable in the *Alternative Configurations* section. Use the DIP switches on the AVR to select the required configuration. For further details, refer to *Alternative Configurations* section elsewhere in this document to DSE Publication: *057-295 DSEA109 Operators Manual.*

NOTE: For further details of module operation, refer to DSE Publication: *057-295 DSEA109 Operators Manual*.

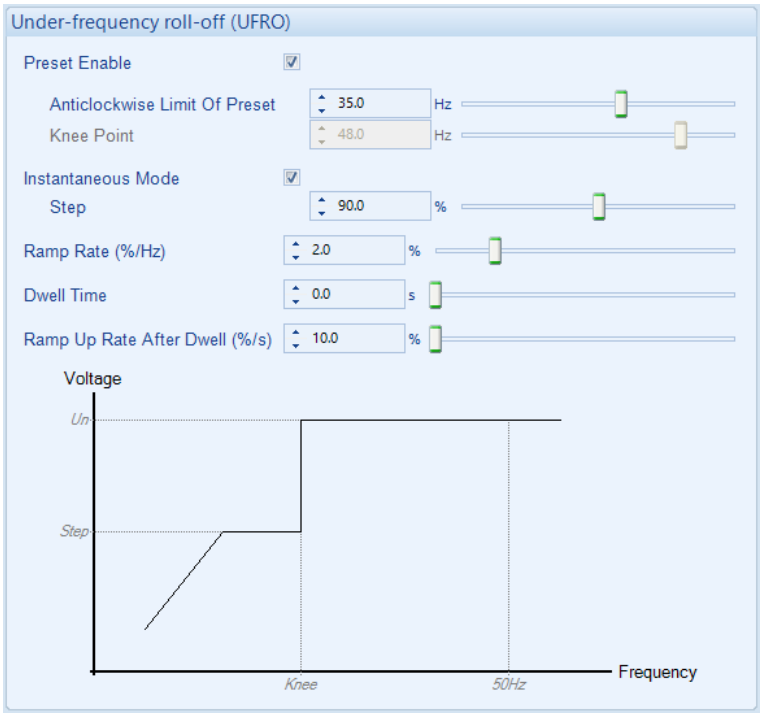
Frequency Range



Parameter	Description
Frequency Range	Select the alternator's *Frequency Range*: ***50 Hz*** ***60 Hz*** The UFRO setting limits are changed when the *Frequency Range* is changed.

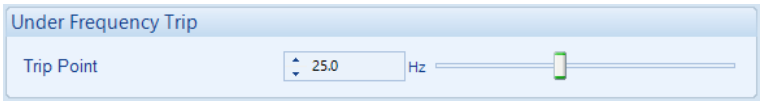
Under-Frequency Roll-Off (UFRO)

NOTE: For further details on the operation of UFRO, refer to DSE Publication: *057-295 DSEA109 Operators Manual*.



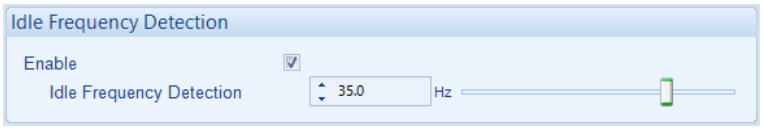
Parameter	Description
Preset Enable	☐ = The *UFRO Potentiometer* is disabled; the *Knee Point* setting in the configuration is enabled ☑ = The *UFRO Potentiometer* is enabled; the *Knee Point* setting in the configuration is disabled
Anticlockwise Limit of Preset	Set the low limit for the UFRO potentiometer on the module.
Knee Point	Set the *Knee Point* for the UFRO protection. This the frequency setpoint at which the UFRO protection starts.
Instantaneous Mode	☐ = The *UFRO Instantaneous Mode* is disabled; the *UFRO* ramping down protection starts at the knee point ☑ = When the frequency drops below the *Knee Point* setting, the voltage output is instantly dropped to the configured *Step* level. Any further drop in frequency would result in a decrease of voltage output based on the configured *Ramp Rate.*
Ramp Rate (%/Hz)	Set the *Ramp Rate* for the UFRO protection, this is the percentage of *Set Point Voltage* decreased with every 1 Hz drop when the frequency drops below the configured *Knee Point* or the setpoint determined by the UFRO potentiometer
Dwell Time	Set the time delay before the AVR excitation starts to ramp up when a UFRO protection has occurred.
Ramp Up Rate After Dwell (%/s)	Set the rate of voltage ramp up after the *Dwell Time* expires. This is the percentage of *Set Point Voltage* increased every 1 s.

Under Frequency Trip



Parameter	Description
Under Frequency Trip Point	Set the frequency setpoint at which the AVR excitation is disabled.

Idle Frequency Detection



Parameter	Description
Idle Frequency Detection	☐ = The *Idle Frequency Detection* is disabled; the *Soft Start Ramps* as soon as the AVR is powered. ☑ = The *Idle Frequency Detection* is enabled; the *Soft Start Ramp* begins once the generator's frequency exceeds the configured level.

2.5 STABILITY

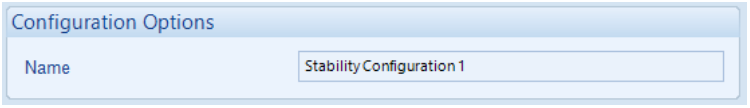
NOTE: The stability range is selected by the DIP switches on the AVR. For further details, refer to DSE Publication: *057-295 DSEA109 Operators Manual.*

The *Stability* section is subdivided into sub sections.
Select the required section with the mouse.
This allows the configuration of different stability settings for different sizes of alternators.

2.5.1 STABILITY CONFIGURATION 1 & 2

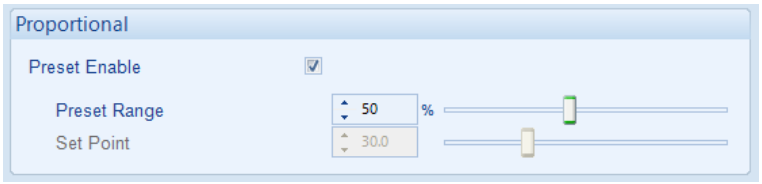
NOTE: For further details on stability settings, refer to DSE Publication: *057-295 DSEA109 Operators Manual*.

Configuration Options



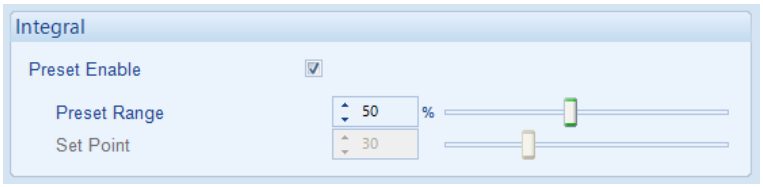
Parameter	Description
Name	Give a custom name to identify this stability configuration

Proportional



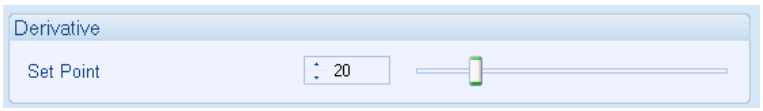
Parameter	Description
Preset Enable	☐ = The *Proportional Potentiometer* on the AVR is disabled; the *Set Point* setting in the configuration is enabled. The set point is also adjustable using the SCADA | Commissioning page whilst the generator is running. ☑ = The *Proportional Potentiometer* on the AVR is enabled; the *Set Point* setting in the configuration is disabled
Preset Range	Set the range of the *Proportional Gain* potentiometer on the module.
Set Point	When the potentiometer is disabled, this parameter fixes the *Proportional Gain* setting in the AVR

Integral



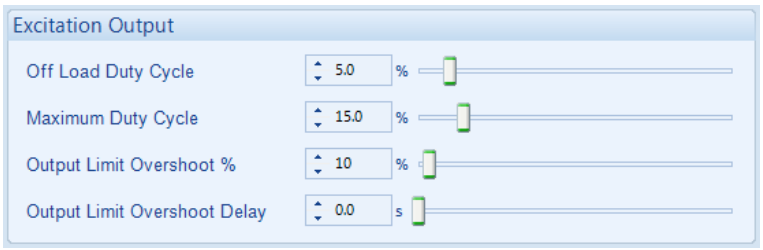
Parameter	Description
Preset Enable	☐ = The *Integral Potentiometer* on the AVR is disabled; the *Set Point* setting in the configuration is enabled. The set point is also adjustable whilst the generator is running using the SCADA | Commissioning page. ☑ = The *Integral Potentiometer* on the AVR is enabled; the *Set Point* setting in the configuration is disabled
Preset Range	Set the range of the *Integral Gain* potentiometer on the module.
Set Point	When the potentiometer is disabled, this parameter fixes the *Integral Gain* setting in the AVR

Derivative



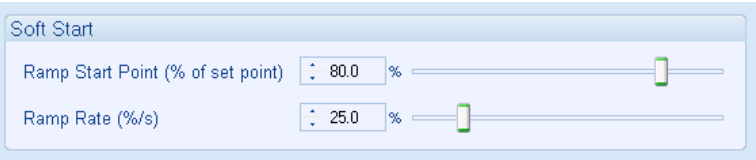
Parameter	Description
Set Point	**NOTE: For further details on the gain settings, refer to DSE Publication: *057-295 DSEA109 Operators Manual*.** Set the *Derivative Gain* parameter in the AVR. The set point is also adjustable whilst the generator is running using the SCADA | Commissioning page.

Excitation Output



Parameter	Description
Off Load Duty Cycle	Set the initial output duty cycle when starting. This is useful to ensure a fast voltage build-up upon starting.
Maximum Duty Cycle	Set the maximum output duty cycle. This is useful to limit the overall amount of excitation.
Output Limit Overshoot %	The Output Limit Overshoot allows the *Duty Cycle* to exceed the *Maximum Duty Cycle* setting by the *Output Limit Overshoot %* of the *Maximum Duty Cycle* level for the duration of *Output Limit Overshoot Delay*.

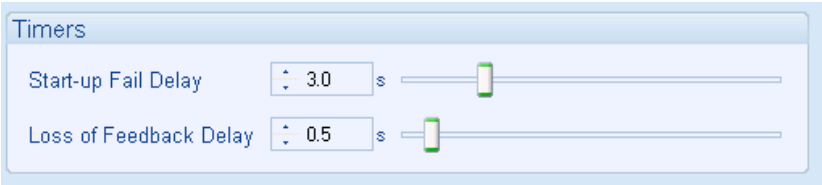
Soft Start



Parameter	Description
Ramp Start Point (% of Set Point)	Set the start point for the voltage build-up ramp. This is configured in percentage of the set point voltage. This is useful to allow a quick voltage build-up when starting the set.
Ramp Rate (%/s)	Set the rate for the voltage build-up ramp in percentage of set point voltage per second.

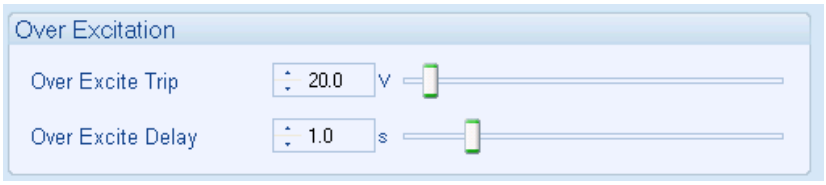
2.6 PROTECTIONS

Timers



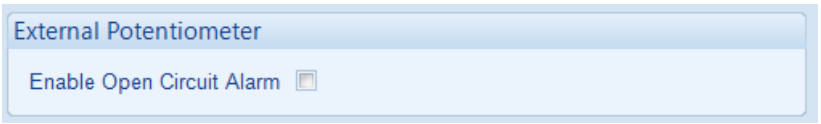
Parameter	Description
Start-up Fail Delay	Set the time delay for the *Start-up Fail* alarm when the module does not measure the auxiliary voltage upon starting.
Loss of Feedback Delay	Set the time delay for the *Loss Of Feedback Delay* alarm when the module sees a sudden loss of feedback voltage.

Over Excitation



Parameter	Description
Over Excite Trip	Set the *Over Excite Trip* level. The *Over Excite Trip* alarm activates when the excitation voltage exceeds the configured setting for longer than the *Over Excite Trip* delay.
Over Excite Delay	Set the time delay for the *Over Excite Trip* alarm.

External Potentiometer



Parameter	Description
Enable Open Circuit Alarm	☐ = The External Potentiometer Open Circuit Alarm is disabled. ☑ = The *External Potentiometer Open Circuit Alarm* is enabled. This allows detection of open circuit when the external potentiometer is disconnected.

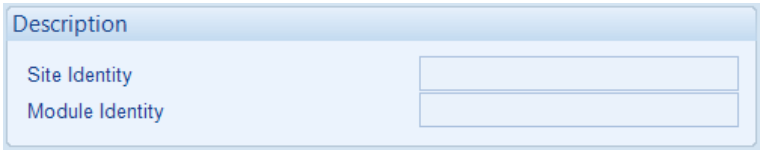
2.7 COMMUNICATIONS

The DSE815 Configuration Interface communication port is provided to give a simple means of connection between a PC and the controller.

The *Communications* page is subdivided into smaller sections.
Select the required section with the mouse.

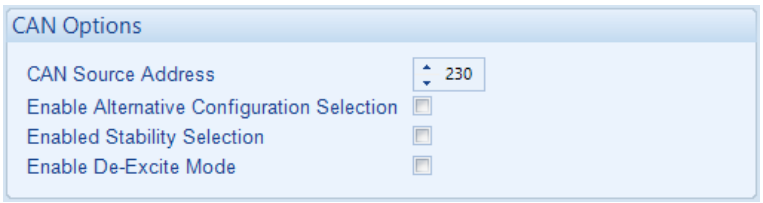
2.7.1 COMMUNICATIONS OPTIONS

Description



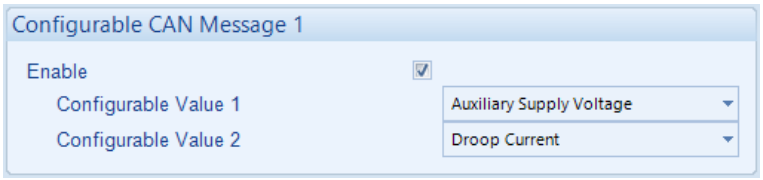
Parameter	Description
Site Identity / Module Identity	Free text entries to identify the module. These texts are displayed on the SCADA screen when the module is connected to the PC.

CAN Options



Parameter	Description
CAN Source Address	Configure the CAN Source address of the AVR's CAN port.
Enable Alternative Configuration Selection	☐ = The *Alternative Configuration Selection* through the CAN message is disabled. ☑ = The *Alternative Configuration Selection* through the CAN message is enabled.
Enabled Stability Selection	☐ = The *Stability Selection* through the CAN message is disabled. ☑ = The *Stability Selection* through the CAN message is enabled.
Enable De-Excite Mode	☐ = The *De-Excite* command via a CAN message is disabled. ☑ = The *De-Excite* command via a CAN message is enabled. The generator first starts up in a De-Excited state. Once the AVR is powered and confirms there is no *De-Excite* command via a CAN message is present, the generator excites. This feature is normally used for *Dead Bus Synchronising* or magnetisation of transformers / motors to limit inrush currents.

Configurable CAN Message 1 & 2

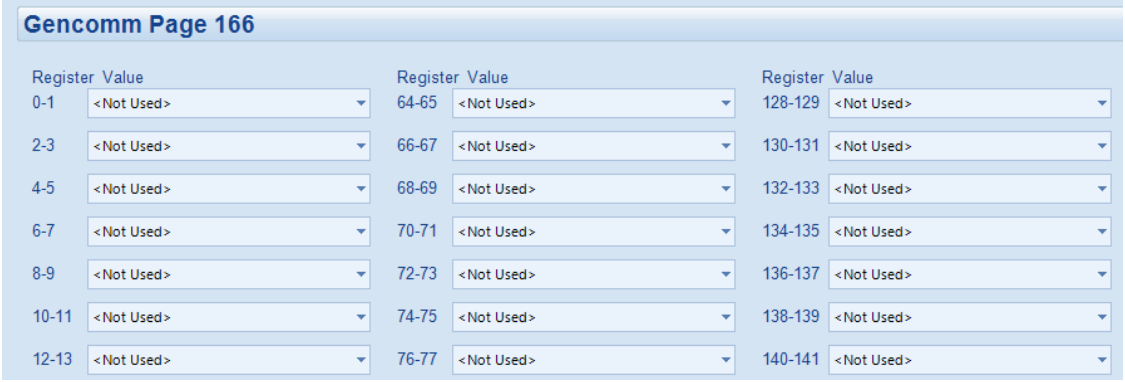


Parameter	Description
Configurable CAN Message 1 or 2	☐ = The relevant *Configurable CAN Message* is disabled. ☑ = The relevant *Configurable CAN Message* is enabled.
Configurable Value 1 or 2	**NOTE: For the Configurable CAN Instrumentation PGNs, refer to DSE Publication: *057-295 DSEA109 Operators Manual*.** Select the required Instrumentation or Status to read over the CAN.

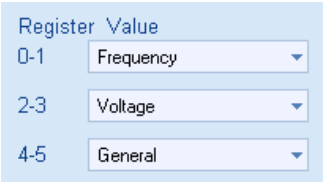
2.7.2 GENCOMM PAGE 166

Configurable Gencomm pages are available to allow the user to create personal collections of data in subsequent registers to minimise the number of modbus reads required by the master, and hence speed up data collection.

All configurable Gencomm registers are 32-bit unsigned format.



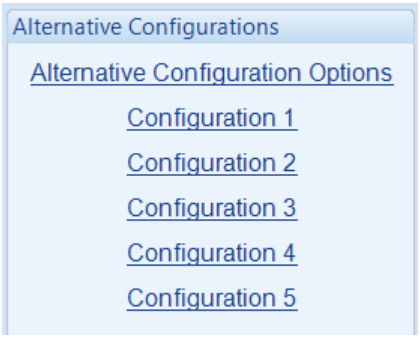
Example of Gencomm page configuration:



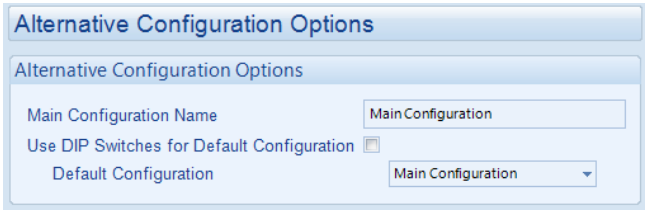
The register address is obtained from the formula: register address= page number*256+register offset.
To read the *Frequency* from the above register, the Modbus master device needs to read the data in two registers and then combine the data from the Most Signficant 16-Bit register and the Least Significant 16-Bit register.
MSB address in Decimal = (166 * 256) + 0 = 42496
LSB address in Decimal = (166 * 256) + 1 = 42497

2.8 ALTERNATIVE CONFIGURATIONS

The *Alternative Configurations* page is subdivided into smaller sections.
Select the required section with the mouse.



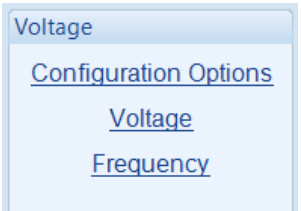
2.8.1 ALTERNATIVE CONFIGURATION OPTIONS



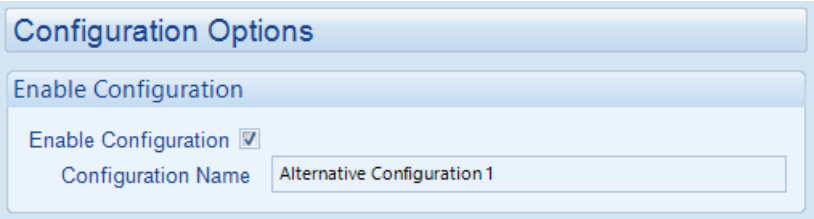
Parameter	Description
Main Configuration Name	Change the *Main Configuration* name as required.
Use DIP Switches for Default Configuration	☐ = The *Alternative Configuration* selection by the DIP Switches is disabled. The AVR operates according to the *Default Configuration*'s selection. ☑ = The *Alternative Configuration* is selected by the DIP Switches on the AVR.
Default Configuration	Select the required Configuration from the list: ***Main Configuration*** ***Alternative Configuration 1*** ***Alternative Configuration 2*** ***Alternative Configuration 3*** ***Alternative Configuration 4*** ***Alternative Configuration 5***

2.8.2 ALTERNATIVE CONFIGURATION 1 TO 5

The *Configuration x* page is subdivided into smaller sections.
Select the required section with the mouse.



2.8.2.1 CONFIGURATION OPTIONS



Parameter	Description
Enable Configuration	☐ = The *Alternative Configuration* is disabled from the configuration. ☑ = The relevant *Alternative Configuration* is enabled to be configured.
Configuration Name	Change the relevant *Alternative Configuration*'s name as required

2.8.2.2 VOLTAGE

Refer to the section entitled *Voltage* elsewhere in this document for the Voltage settings.

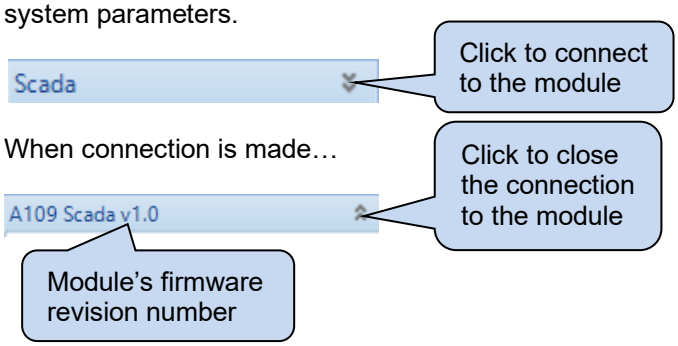
2.8.2.3 FREQUENCY

Refer to the section entitled *Frequency* elsewhere in this document for the Frequency settings.

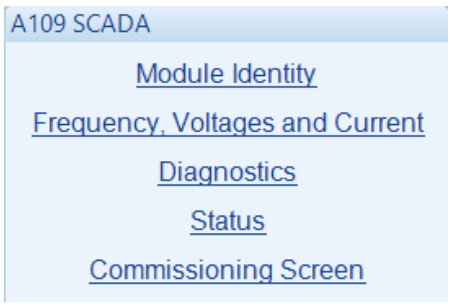
3 SCADA

NOTE: The DSE815 RS485 Configuration Interface and the configuration port on the module are designed to be used for configuration and diagnostics, not for monitoring.

SCADA stands for **S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition and is provided both as a service tool and also as a means of monitoring and control.
As a service tool, the SCADA pages is to check the operation of the module as well as checking the system parameters.



The *SCADA* page is subdivided into smaller sections.
Select the required section with the mouse.

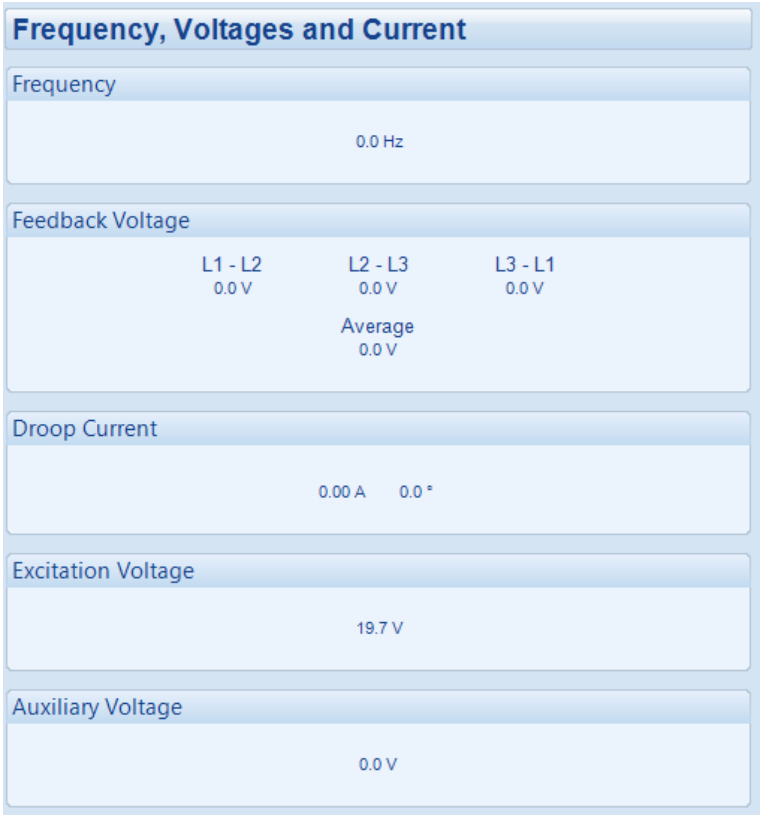


3.1 MODULE IDENTITY

Shows the module's current settings for *Site Identity* and *Module Identity.*

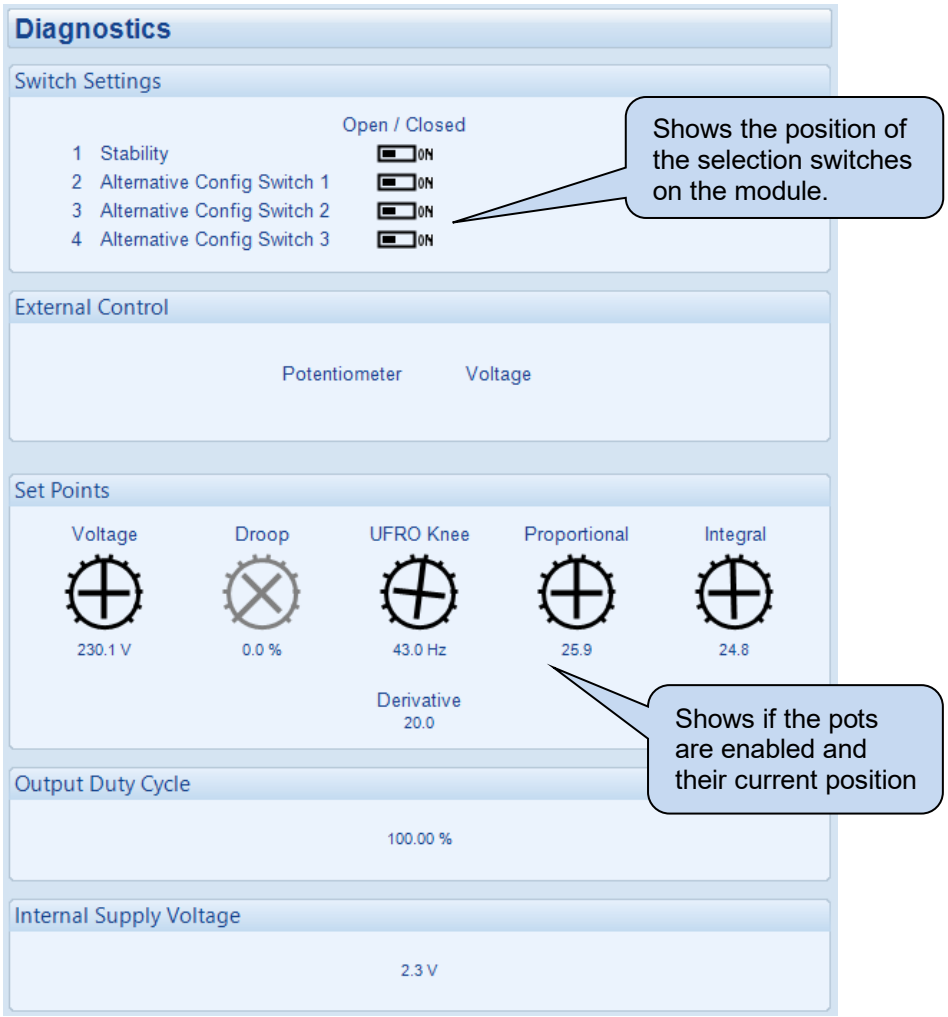
3.2 FREQUENCY, VOLTAGES AND CURRENT

Shows the modules measurements of the frequency, voltages and current.



3.3 DIAGNOSTICS

NOTE: For further details on Dip Switch Adjustment, refer to DSE Publication: 057-295 DSEA109 Operators Manual.



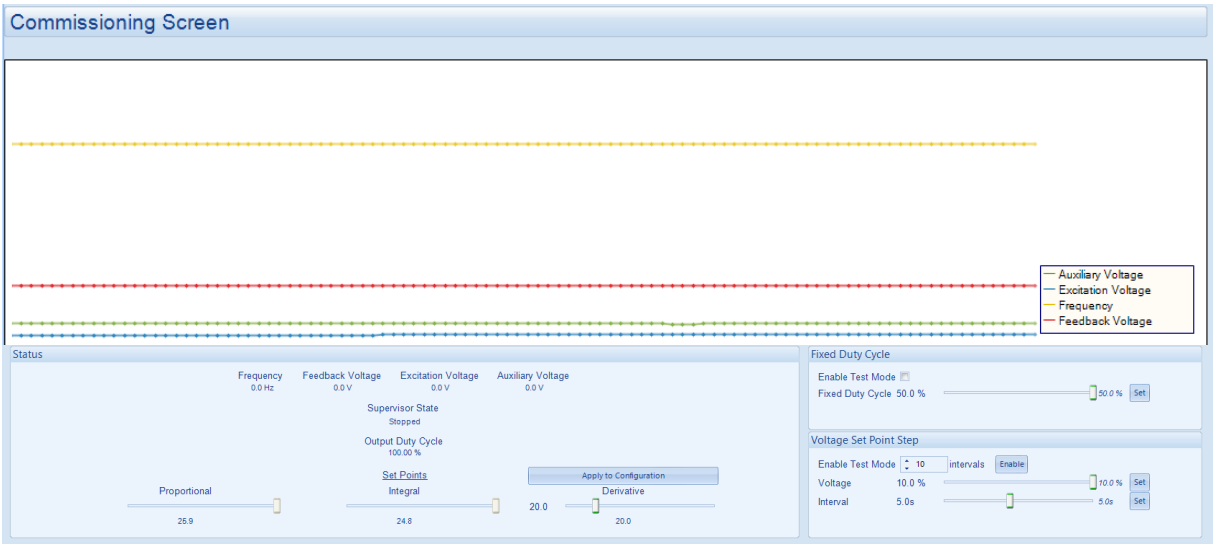
3.4 STATUS

Shows the module's current status.

3.5 COMMISSIONING SCREENS

NOTE: For further details on the setup procedure, refer to *DSE Publication: 057-295 DSEA109 Operators Manual.*

Shows a trace of the module's parameters to help with commissioning and adjusting the signal response.



Parameter	Description
Gain (P) Stability (I) Derivative (D)	**NOTE: Only enabled when *Preset Enabled* is unticked. For further details see section entitled *Stability* defined elsewhere in this manual.**
	The setting for the Gain (P), Stability (I) and Derivative (D) of the control loop for the AVR.
Apply to Configuration	Writes the Gain (P), Stability (I) and Derivative (D) of the control loop to the modules configuration file.

3.5.1 STATUS

Parameter	Description
Frequency	The generator frequency.
Feedback Voltage	The generator voltage.
Excitation Voltage	The alternator exciter voltage.
Auxiliary Voltage	The Auxiliary winding voltage.
Supervisor State	The state of the generator (Running, Idle or Stopped)
Output Duty Cycle	This value indicates the *Off Load Duty Cycle* it must be configured to when the generator is running with no load.
Proportional	Indicates the *Proportional* Set Point.
Integral	Indicates the *Integral* Set Point.
Derivative	Indicates the *Derivative* Set Point.

3.5.2 FIXED DUTY CYCLE

Parameter	Description
Enable Test Mode	☐ = The Test mode is disabled, the AVR operates according to the preset values. ☑ = The Test mode is enabled. With this mode the AVR no longer tries to adjust to the *Set Point*. The AVR changes the *Output Duty Cycle* to the *Fixed Duty Cycle* percentage. This causes the excitation to increase or decrease depending if the *Fixed Duty Cycle %* level Is greater or smaller than the *Off Load Duty Cycle*. This provides a load bank simulation to calibrate the *Set Points*.
Fixed Duty Cycle %	The percentage the excitation output's *Duty Cycle* is forced to when *Test Mode* is enabled. The higher the *Fixed Duty Cycle %* the great the excitation, the lower the *Fixed Duty Cycle %* the lower the excitation.

3.5.3 VOLTAGE SET POINT STEP

This feature allows the user to simulate a load being applied to the generator. It changes the target of the generator voltage adjustment to check the overshoot and time response.

Parameter	Description
Voltage Set Point Step Enable Test Mode intervals	This interval is the repetition number to vary the generator's output voltage up and down between the *Set Point* and the increased *Voltage %* levels.
Voltage %	The amount of Voltage to be changed in percentage during the *Test Mode*.
Interval	The delay time to increase the excitation output after each interval.

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