PowerWizard 1.1, 1.1+ & & 2.1
Generating Set Control
Technical Manual

CONTENTS

IMPORTANT SAFETY INFORMATION

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly.

1. GENERAL INFORMATION

1.1 Introduction

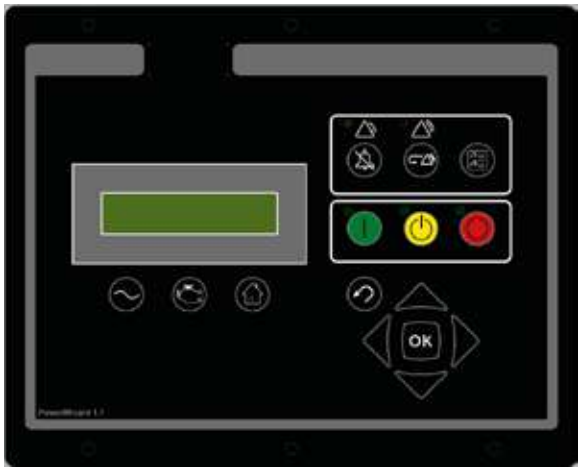


Figure 1: PowerWizard Control Panel

The controller is available in three versions, PowerWizard 1.1, PowerWizard 1.1+ and PowerWizard 2.1. These are based on different feature sets.

This Application and Installation Guide is intended to cover the PowerWizard Generating set Control and its application in generating set systems. The intended audience for this guide includes generating set system designers, service support personnel, dealers and service technicians, contractors and customers.

1.2 Applications

The PowerWizard product line of generating set controllers is designed for use in a wide range of applications. They can be used on standby and prime power diesel generating sets including FG Wilson and Olympian brands. The configurability of the controllers allows them to be used, in some cases, on other applications such as Marine auxiliary generating set, switchgear applications, industrial engines and generating sets as well as gas generating sets.

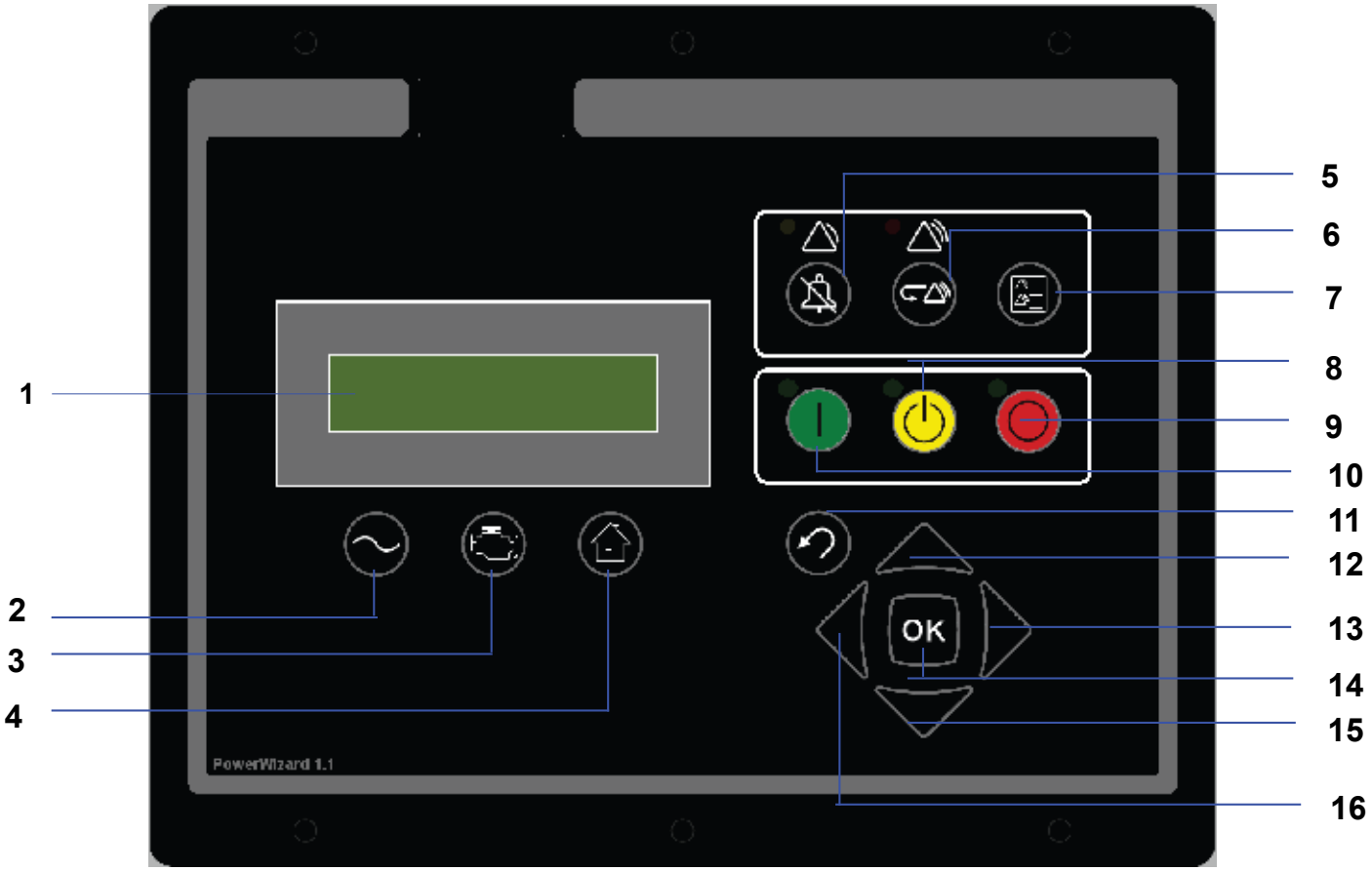
1.3 PowerWizard Variations

Some of the different features of the three versions, PowerWizard 1.1, PowerWiard 1.1+ and PowerWizard 2.1 are listed in Table 1.

Controllers Series Features	PowerWizard 1.1	PowerWizard 1.1+	PowerWizard 2.1
AC Volts, Current and Frequency metering	X	X	X
AC Power metering	-	-	X
DC metering – Batt Volts, Engine Hours Run, rpm, Engine Temperature and Oil Pressure	X	X	X
Analogue Inputs	2	3	3
Programmable Input Channels	4	6	6
Programmable Relay Outputs	6	6	8
Programmable Sink Output	0	0	2
Real Time Clock	-	-	X
40 Event Fault Log	X	X	X
2 Display Languages (customer language + Tech English)	X	X	X
Service Interval Counter	-	-	X
CAN1 J1939 Data Link	X	X	X
CAN2 J1939 Data Link	-	-	X
SCADA RS485 Modbus remote monitoring and control	-	-	X

Table 1: Features available on PowerWizard Modules

1.4 PowerWizard Control Module Description



1. Display screen
2. AC overview key
3. Engine overview key
4. Main menu or home key
5. Alarm acknowledge key
6. Event reset key
7. Event log key
8. Auto key
9. Stop key
10. Run key
11. Escape key
12. Up key
13. Right key
14. OK or Enter key
15. Down key
16. Left key

Figure 2: PowerWizard Control Module Description

2. USER INTERFACE OVERVIEW

2.1 Hot Keys

AC Overview key – The AC Overview key will navigate the display to the first screen of AC information. The AC Overview information contains various AC parameters that summarise the electrical operation of the generating set.
(Use the up / down keys to navigate within the AC parameters.)

Engine Overview key – The Engine Overview key will navigate the display to the first screen of engine information. The Engine Overview information contains various engine parameters that summarise the operation of the generating set.
(Use the up / down keys to navigate within the Engine parameters.)

Main Menu key – The Main Menu key will navigate the display to the main menu screen. Pressing the navigation keys will allow access to menus at all levels.

2.2 Control Keys

RUN – Pressing the Run key will cause the engine to enter the run mode.

AUTO – Pressing the Auto key will cause the engine to enter the auto mode.

STOP – Pressing the Stop key will cause the engine to enter stop mode.

2.3 Navigation Keys

Scroll Up – The Scroll Up key is used to navigate up through the various menus or monitoring screens. The Scroll Up key is also used during setpoint entry. During numeric data entry the Scroll Up key is used to increment the digits (0–9). If the setpoint requires selection from a list, the Scroll Up key is used to navigate through the list.

Escape – The Escape key is used during menu navigation in order to navigate up through the menu / sub-menu structure. Each key press causes the user to move backwards / upwards through the navigation menus. The Escape key is also used to exit / cancel out of data entry screens during setpoint programming. If the Escape key is pressed during setpoint programming, none of the changes made on screen will be saved to memory.

Scroll Right – The Scroll Right key is used during setpoint adjustment. During numeric data entry, the Scroll Right key is used to choose which digit is being edited. The Scroll Right key is also used during certain setpoint adjustments to select or deselect a check box. If a box has a check mark inside, pressing the Scroll Right key will cause the check mark to disappear, disabling the function. If the box does not have a check mark inside, pressing the Scroll Right key will cause a check mark to appear, enabling the function.

Enter / OK – The Enter key is used during menu navigation to select menu items in order to navigate forward / downward in the menu / sub–menu structure. The Enter key is also used during setpoint programming in order to save setpoint changes. Pressing the Enter key during setpoint programming causes setpoint changes to be saved to memory.

Scroll Down – The Scroll Down key is used to navigate down through the various menus or monitoring screens. The Scroll Down key is also used during setpoint entry. During numeric data entry the Scroll Down key is used in order to decrement the digits (0–9). If the setpoint requires selection from a list, the Scroll Down key is used to navigate down through the list.

Scroll Left – The Scroll Left key is used during setpoint adjustment. During numeric data entry, the Scroll Left key is used to choose which digit is being edited. The Scroll Left key is also used during certain setpoint adjustments to select or deselect a check box. If a box has a check mark inside, pressing the Scroll Left key will cause the check mark to disappear, disabling the function. If the box does not have a check mark inside, pressing the Scroll Left key will cause a check mark to appear, enabling the function.

2.4 Event Keys and Indicators

Yellow Warning Light – A flashing yellow light indicates that there are unacknowledged active warnings. A solid yellow light indicates that there are acknowledged warnings active. If there are any active warnings, the yellow light will change from flashing yellow to solid yellow after the Alarm Acknowledge key is pressed. If there are no longer any active warnings, the yellow light will turn off after the Alarm Acknowledge key is pressed.

Red Shutdown Light – A flashing red light indicates that there are unacknowledged active shutdown events. A solid red light indicates that there are acknowledged shutdown events active. If there are any active shutdown events the red light will change from flashing red to solid red after the Alarm Acknowledge key is pressed. Any condition that has caused a shutdown event must be manually reset. If there are no longer any active shutdown events, the red light will turn off.

Alarm Acknowledge – Pressing the Alarm Acknowledge will cause the horn relay output to turn off and silence the horn. Pressing the key will also cause any yellow or red flashing lights to turn off or to become solid depending on the active status of the alarms.

Event Reset Key – Pressing the Event Reset key will reset all events when the control is in the stopped position. However, "Reset All Events" will not reset "Present" events.

Event Log Key – Pressing the Event Log key will navigate to the "Active Events" menu. In order to scroll through the events, use the up and down keys. After highlighting an event, press the "OK" key to see information about the event such as the SPN and the FMI.

EMERGENCY STOP Push button – A red lock-down push button that immediately shuts down the generating set and will inhibit start until the push button has been released by turning it clockwise. Prior to restarting the set, this fault must be reset by pressing the "Stop" button on the module and resetting the fault in the "Event Log Menu".

3. DETAILED OPERATION

3.1 PowerWizard Menu Trees

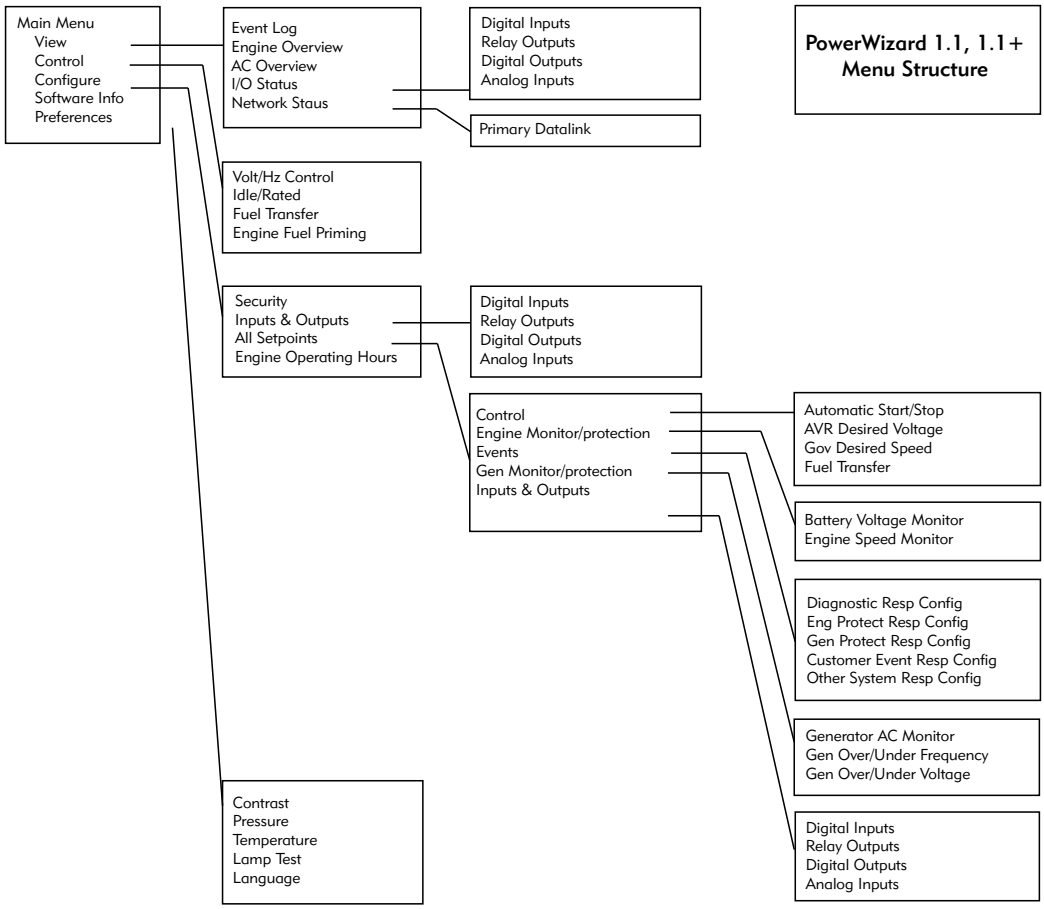


Figure 3: PowerWizard 1.1, 1.1+ Menu Tree

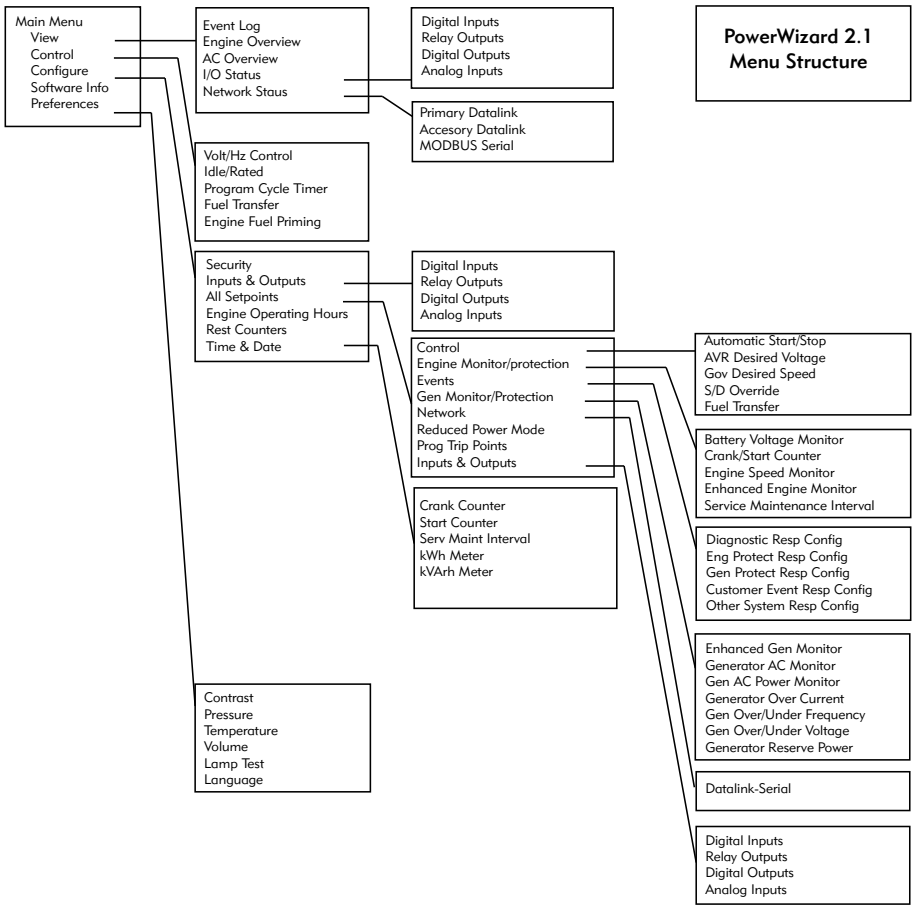


Figure 4: PowerWizard 2.1 Menu Tree

3.2 Technical Operation

3.2.1 Engine Starting Sequence

1. The PowerWizard receives an engine start signal. The signal will be one of three.
   - The operator presses the Run key
   - The control is in auto and the remote initiate digital input becomes active
   - The control receives a start command via the RS-485 SCADA Data Link (PowerWizard 2.1 only)
   - The control has a program cycle timer (PCT) configured that becomes active (PowerWizard 2.1 only).
2. The PowerWizard checks the system before beginning the cranking sequence. The PowerWizard checks that there are no shutdown events present and that all previous shutdown events have been reset.
3. If the engine is equipped with a form of start aid such as thermostart it will enter a prestart sequence.
4. The PowerWizard begins the crank sequence by activating the engine crank relay and the fuel control relay.
   - If the engine reaches the setpoint for crank terminate speed the engine is deemed running and the engine crank relay will be deactivated
   - If the engine fails to start within a preset duration (normally seven seconds) the PowerWizard will stop cranking and wait for a preset time (normally seven seconds) before attempting to start again
   - If the PowerWizard fails to start within a preset number of crank attempts (normally three) the PowerWizard will activate a "Fail to Start shutdown".

3.2.2 Engine Stopping Sequence

1. The PowerWizard receives an engine stop signal. The signal will be one of four.
   - The operator presses the stop Key
   - The control is in auto and the remote initiate digital input becomes inactive
   - The control receives a stop command via the RS-485 SCADA Data Link (PowerWizard 2.1)
   - The control has a program cycle timer (PCT) configured that becomes inactive (PowerWizard 2.1 only)
2. The PowerWizard begins the cooldown period. In order to bypass the cooldown hold down the Stop key for 3 seconds. The options "PRESS ENTER TO BYPASS" and "PRESS ESCAPE TO CONTINUE" will be shown on the display. Press the Enter key to bypass the cooldown sequence or press the Escape key to continue the cooldown sequence.
3. After the cooldown cycle, the PowerWizard stops the engine by turning off the fuel control relay.

3.2.3 Event System

The PowerWizard module uses the J1939 standard format for events, whereby an event is defined as a combination of a suspect parameter number (SPN) and a failure mode identifier (FMI). The SPN defines what is at fault and the FMI defines how it is at fault (e.g. SPN = 100 = Oil Pressure, FMI = 1 = Low Shutdown would mean the generating set has shutdown on a low oil pressure fault). A list of SPN / FMI combinations can be found in appendix A.

PowerWizard modules have separate event logs for events raised by the module itself and those raised by ancillaries such as the engine ECM.

3.2.4 Event State

Events in PowerWizard may exist in one of three states, present, active and inactive.

Present – The condition causing the event is ongoing and affecting system behavior. If an event is present it cannot be reset.

Active – The event is no longer present and can be reset by the user. However it has been latched by the event system and needs to be reset before the engine can be restarted.

Inactive – The event was active at some time but is no longer active and is not affecting system behaviour. Inactive events exist for historical purposes only.

3.2.5 Event Viewing

There are two ways to view events. Pressing the EVENT LOG key navigates directly to the ACTIVE EVENTS menu. The other way is to use the Main Menu:

1. From the MAIN MENU / VIEW, highlight "EVENT LOGS" and press the Enter key. The ACTIVE EVENTS menu will be displayed. In this menu, a list of all installed ECMs will also be displayed with the number of the total of present and active events.
2. Highlight an ECM and press the enter key to view that ECMs event log.
3. In order to scroll through the events use the Up and Down keys. Events are ordered with present events first, active events next and inactive events last. Within these classifications they are ordered by engine run hours (or real time clock on PowerWizard 2.1).
4. Press Enter after highlighting an event to see additional information such as SPN, FMI, time and date of first occurrence, time and date of last occurrence (PowerWizard 2.1 only), engine hours at first occurrence and engine hours at last occurrence.

3.2.6 Single Event Resetting

A flashing red shutdown light indicates there is an unacknowledged shutdown event. The red shutdown light will change from flashing red to solid red when the Alarm Acknowledged key is pressed. Once a fault has been checked and the cause rectified, use the following procedure in order to reset the event.

1. Press the Stop key.
2. Enter the "EVENT LOGS" option from the MAIN MENU / VIEW.
3. Select an ECM from the list.
4. Scroll through the events in order to highlight the event to be reset.
5. Make sure the event status is active (not present).
6. Press the Enter key.
7. "RESET" will be highlighted if the condition is no longer present and the control is in stop.
8. Press the Enter key again. The fault will clear.
9. Press the Escape or Main Menu key in order to get back to the main menu.

3.2.7 All Events Resetting

In addition to the above procedure there is also a simplified process for resetting all events for all modules. To reset all events,

1. Ensure that the control is in the stopped position.
2. Press the Reset Event key from any screen.
3. A confirmation prompt will appear.
4. Press the OK key to reset all events on all modules. Press the Escape key to cancel the reset operation.

Note:

- The PowerWizard must be in stop mode to reset events.
- Present events cannot be reset

3.3 Security

There are 3 levels of password protection on the PowerWizard control panel. All of the adjustable setpoints are associated with a specific level of security required to make an adjustment to the parameter. The passwords only affect changing setpoints within the control panel. Changing setpoints with the Service Tool does not require passwords.

The level of password protection that is required for each setpoint is identified on the parameter setpoint entry screen. A security level identification number "1", "2" or "3" next to a padlock symbol is displayed on the parameter setpoint entry screen. A Level 3 security is used for the most secure setpoints and Level 1 security is used for the least secure setpoints. If the PowerWizard is currently at the required level of protection when viewing a parameter, the padlock will not appear.

If a parameter is displayed with a padlock but no security level identification number next to it, the parameter cannot be changed from the PowerWizard display and the service tool must be used. Levels 1 and 2 passwords are disabled as shipped from the factory. Levels 1 Level 2 passwords are user level passwords and can be used if desired.

The PowerWizard 2.1 also has a SCADA password, which can be used to secure remote communications.

To view the security menu,

MAIN MENU > CONFIGURE > SECURITY

At the top of the security menu the current security level is displayed. Within the security menu are the following options.

DROP TO MIN LEVEL – used to return the current security level to the lowest level setup. Highlight and press OK to drop to minimum level security. If no Levels 1 or 2 passwords are setup the minimum level will be 2. If a Level 2 password is setup, the minimum level will be 1 and if a Level 1 password is setup the minimum level will be 0.

ENTER LEVEL 1 OR 2 – used to enter Level 1 or 2 passwords. Highlight and press OK to proceed to the password entry screen. Passwords can be entered using the cursor keys. In PowerWizard Level 1 and 2 passwords must be different. An entered password is compared against the stored Levels 1 and 2 passwords, if the password is correct the PowerWizard will go to the corresponding security level.

ENTER LEVEL 3 – used to obtain Level 3 access. The Level 3 security password is reserved for critical setpoints that should only be changed by a skilled operative. The Level 3 password is a prompt and response password.

Highlight and press OK to proceed to the phone in prompt display. The Level 3 password can be obtained by contacting the generating set manufacturer and providing the 16 digit phone in prompt. The manufacturer will then provide the relevant response. To enter the 16 digit response press OK again. Passwords can be entered using the cursor keys. The Level 3 password will expire 10 minutes after the last key pressed.

The Level 3 password can be obtained from the After Sales Helpdesk. Refer to the contact list at the back of the manual.

CHANGE LEVEL 1 PASSWORD – used to setup, change or disable a Level 1 password. In order to use this feature the control must be at current security Level 1 or higher. Highlight and press OK to proceed to the password entry screen. To setup or change the password, enter the new password using the cursor keys. Passwords may be 16 digits long. To disable the Level 1 security password, set the password to '0'. Press the OK key to save.

CHANGE LEVEL 2 PASSWORD – used to setup, change or disable a Level 2 password. In order to use this feature the control must be at current security Level 2 or higher. Highlight and press OK to proceed to the password entry screen. To setup or change the password, enter the new password using the cursor keys. Passwords may be 16 digits long. To disable the level 2 security password set, the password to '0'. Press the OK key to save.

CHANGE SCADA PASSWORD (PowerWizard 2.1 only) – used to setup, change or disable a SCADA password. Highlight and press OK to proceed to the password entry screen. To setup or change the password, enter the new password using the cursor keys. Passwords may be 16 digits long. To disable the SCADA security password, set the password to '0'. Press the OK key to save.

3.4 Real Time Clock Programming (PowerWizard 2.1)

The real time clock provides information for the time and date of an automatic time based start / stop control. It also provides a mechanism for time stamps in the event log. The real time clock is not calibrated and is for information only. The date and time are set by the user.

1. In order to set the time or date format:

   MAIN MENU > CONFIGURE > TIME/DATE
2. To set the time, highlight the time then press the OK key twice.
3. Use the cursor keys to set the time and press the OK key to save. Press the Escape key to return.
4. To set the date, highlight the date then press the OK key twice.
5. Use the cursor keys to set the date and press the OK key to save. Press the OK key to return.
6. To set the date format, highlight either the 'FORMAT DD/MM/YY' or 'FORMAT MM/DD/YY' and press the OK key.
7. Use the cursor keys to select the required date format and press the OK key to save.

3.5 Fuel Priming – Engines with Electronic Fuel Lift Pump

Certain engines fitted with an electronic fuel pump do not have a manual-priming feature on the engine. In these circumstances the PowerWizard can be used to energize the fuel lift pump in order to prime the engine.

1. In order to prime the generating set:

   MAIN MENU > CONTROL > ENGINE FUEL PRIMING
2. To prime the set press the right cursor key, this will initiate a 180 second priming cycle.
3. To exit the priming cycle press the left cursor key.

   Note:

   - The generating set may only be primed when stopped and there are no active or present shutdown conditions.

3.6 Fuel Transfer (PowerWizard 2.1)

Fuel pump in connection with fuel level measurement can be controlled to transfer diesel to the fuel tank.

1. In order to set the Fuel Transfer operation:

   MAIN MENU > CONTROL > FUEL TRANSFER
2. To start or stop fuel pump, highlight the PUMP CONTROL then press the OK key.
3. Use the cursor key to select START FUEL PUMP or STOP FUEL PUMP and press the OK key.
4. Auto Fuel Load Pump On and Off thresholds are set at 25% and 75% respectively.

3.7 Programmable Cycle Timer (PCT) (PowerWizard 2.1)

The Programmable Cycle Timer (PCT) feature allows the operator to program times when two independent tasks, called PCT outputs, will be activated or deactivated automatically during the week.

This is useful for cases where two or more generating sets are required to automatically share the duty of supplying a load throughout the week. Using a programmable cycle timer, each generating set can be programmed to start and stop at pre-set times. The cooperation of a transfer switch is required to ensure that the generating sets are not stopped on load.

Programmable Cycle Timer can also be used in cases where a standby generating set does not have access to a utility supply to power a trickle charger. The Programmable Cycle Timer can be used to run the generating set for an hour a week to keep the battery well charged.

The PCT feature consists of seven independent timers. Each timer has the following setpoints (setpoints shown are for PCT #1):

- Day of the Week – This permits independent selection of each day (0 = Sun, 6 = Sat) that the timer will activate
- Start Time – The time of day (in hours and minutes) that the timer will activate
- Run For - The duration (in hours and minutes) for which the timer will be active (up to 24 hours)
- Output #1 Active (or Inactive) – Determines the first output will be activated (or not) when this timer is active
- Output #2 Active (or Inactive) – Determines the second output will be activated (or not) when this timer is active.

Output #1 is used to run the generating set. Output #2 can be used to drive relay output 8. Please see the Relay Outputs section for more information.

3.7.1 PCT Status

The status of the PCTs can be found within the menu structure at:

MAIN MENU > CONTROL > PROG CYCLE TIMER:

- The top row displays the seven PCTs (#1 to #7)
- The middle row is for OUTPUT #1
- The bottom row is for OUTPUT #2

3.7.2 Controlling The Outputs

The status of each output is indicated by a 1, 0 or - in the "PROG CYCLE" column under #1 to #7"

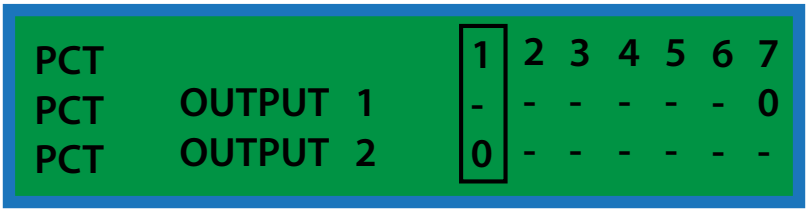
"1" The PCT is configured and currently driving the output.

"0" The PCT is configured but not currently driving the output.

"-" The PCT has not been configured:

3.7.3 PCT Example:

- PCT #1 is enabled - Output 1 is not selected. Output 2 is selected but is currently inactive.
- PCT #7 is enabled – Output 1 is selected but currently is inactive. Output 2 is not selected.
- PCT #2 to PCT#6 are disabled. They will not activate Output 1 or Output 2.



4. INSTALLATION

4.1 Power Requirements

The PowerWizard series of generating set controls require a nominal voltage of 12 Vdc or 24 Vdc. If batteries are used for operating power, a charging source such as an alternator or battery charger is necessary to maintain a stable supply voltage. Under steady state operation, the PowerWizard controllers on 12V sets have less than 1A current draw (not including any relay loads). This value will be lower for controllers on 24V sets.

This current drain can be reduced by approximately a factor of 7 by using the Reduced Power Mode option (RPM). However it is recommended that a generating set at rest or in storage for prolonged periods should have either the battery charger or isolator switch option fitted.

When connecting the PowerWizard generating set control to the DC power source, make sure that there is only one common connection to the negative potential of the power source. Make extra effort to avoid any ground loops in the DC electrical system. A single point common ground for electronics is recommended at the negative battery terminal or Power Distribution Box. Each electronics subsystem and major engine subsystem should have its own DC network so that they do not interfere with each other. An example is shown in Figure 5.

As shown in the figure all electronics are electrically isolated from higher current loads, such as the starter motor. All electronics have a common Power Bus and Single Point Reference. The chassis ground is a common Power and Transient Ground.

The electronics, such as sensors and control modules, have isolated power source paths. High current loads such as starters and solenoids can cause interference and possibly damage to low current loads, such as controllers and sensors. Extra effort must be made to keep the high current and low current loads electrically separated. The two types of loads may share common (+) and (-) battery connections, but they should not be electrically connected. This strategy ensures maximum isolation between high current and low current loads.

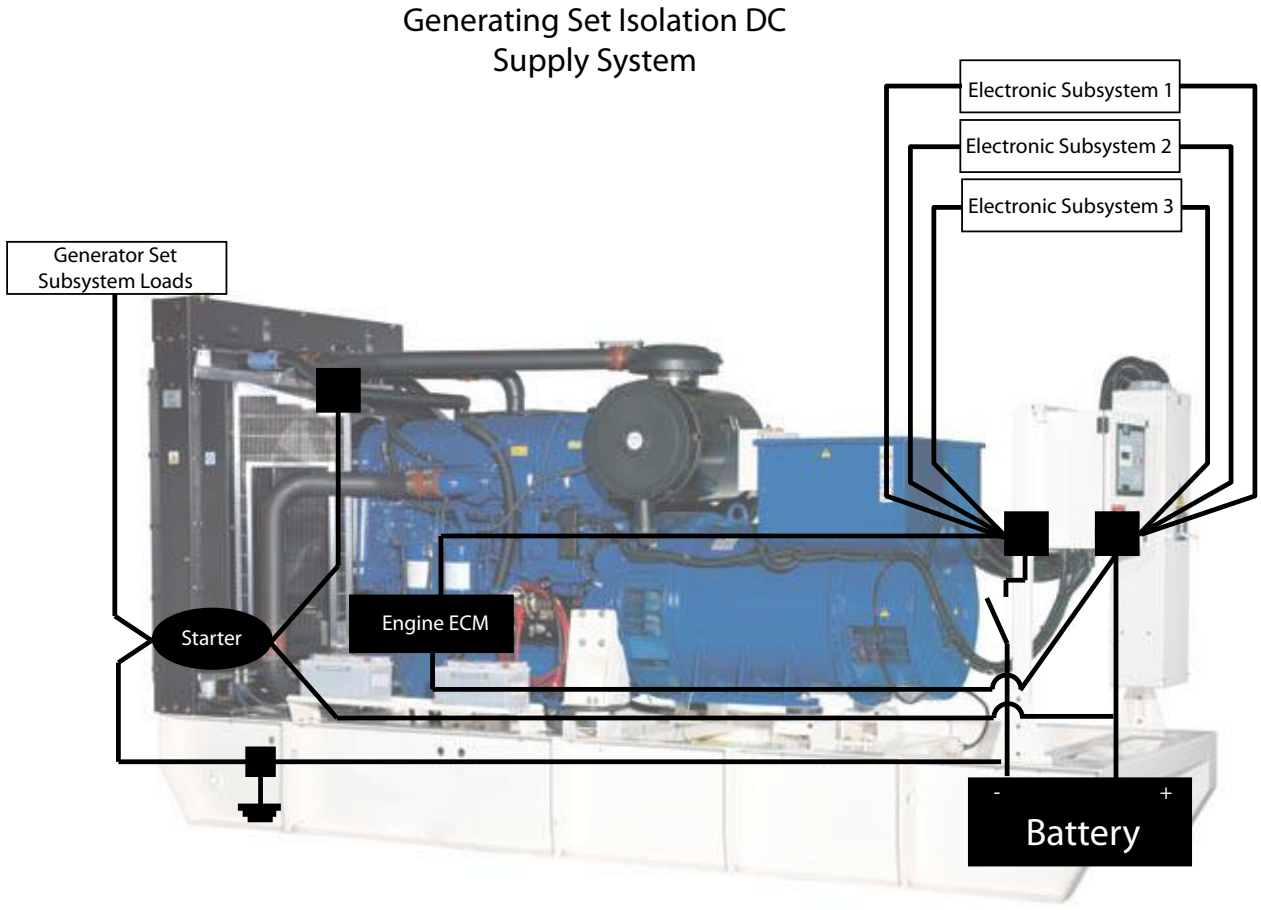


Figure 5: Generating Set Network Isolation

The battery disconnect switch is located on the negative leg of the battery supply. If a battery charger is to be used, it should be connected on the battery side of the disconnect switch, so as not to power the electronics. Most battery chargers are not to be used as power supplies. Proper battery charger operation requires that the actual battery load is present.

4.2 Location Considerations

When selecting a location for mounting the PowerWizard generating set control, consider the following:

- Protection from high-voltage and high-current devices
- Protection from devices which may produce electromagnetic interference
- Protection from excessive vibration. The controls are designed to withstand normal generating set vibrations. The controls should not be mounted directly to the engine block.
- Protection from direct exposure to water. Once installed, the Powerwizard controls are sealed to a level of IP Level 22 for resistance to moisture.
- The continuous operating range of the PowerWizard generating set controls is -20 to +70 °C ambient.

4.3 Electrical Connections

The PowerWizard control has one 70-pin connector on the back of the control. Not all 70 pins are used. The following diagrams show what pins are used and what each pin should be connected to for each version of the control.

Figures 6 and 7 are shown with all possible connections used. For Electronic Engines (EUI), the passive analogue input numbers 1 and 2 will not be used. These are for oil pressure and coolant temperature respectively. On EUI engines, those sensors will be wired to the engine ECM and the PowerWizard will get that information from the engine ECM via the Primary J1939 Data Link.

The method used for the analogue inputs is 1-wire sensors as shown in the diagram.

The discrete inputs are shown connected through normally open contacts to battery negative. These inputs can also be connected through normally closed contacts to battery negative. In order to do this the active state of the input will need to be set to active high.

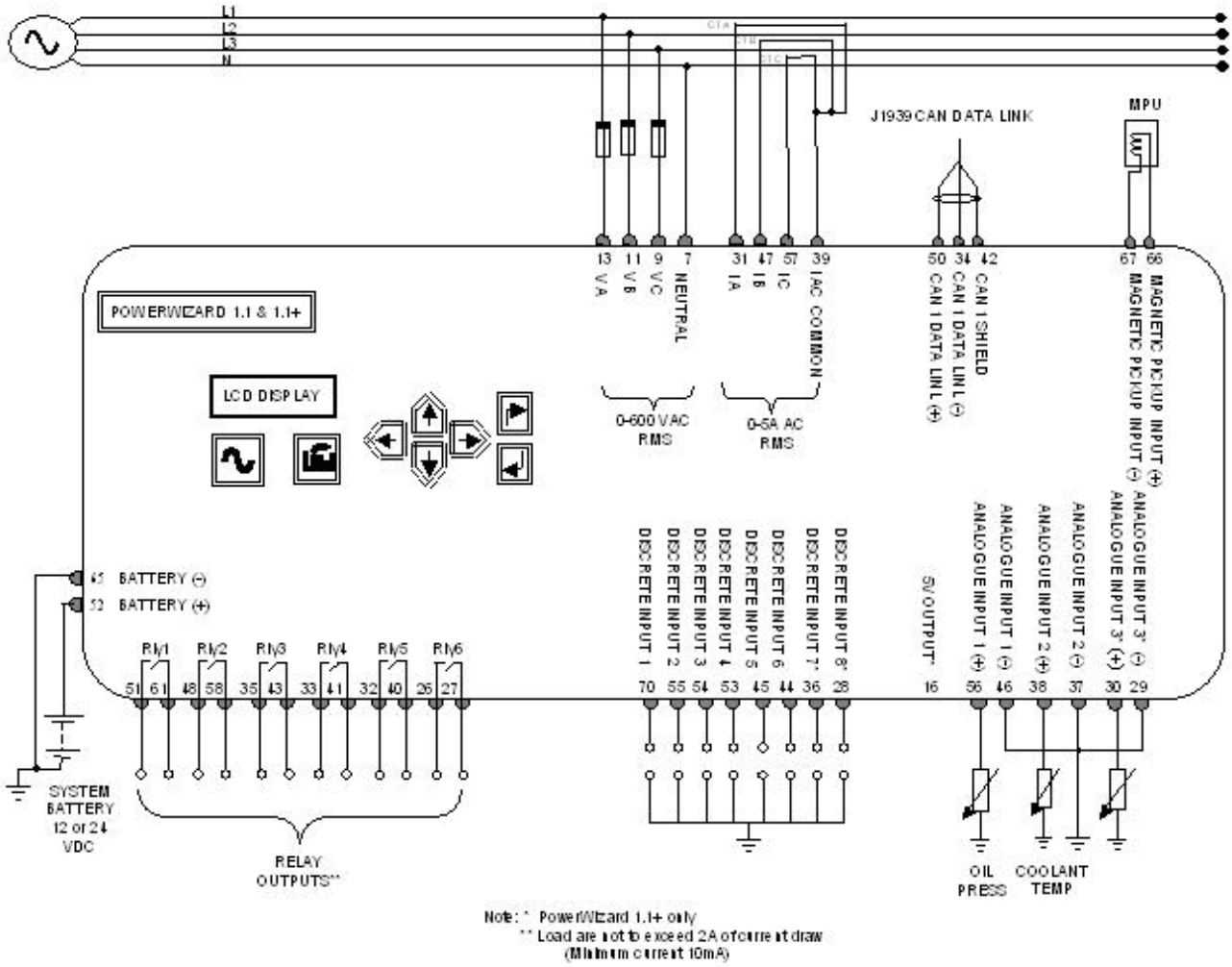


Figure 6: PowerWizard1.1 & 1.1+ Control Electrical Connections

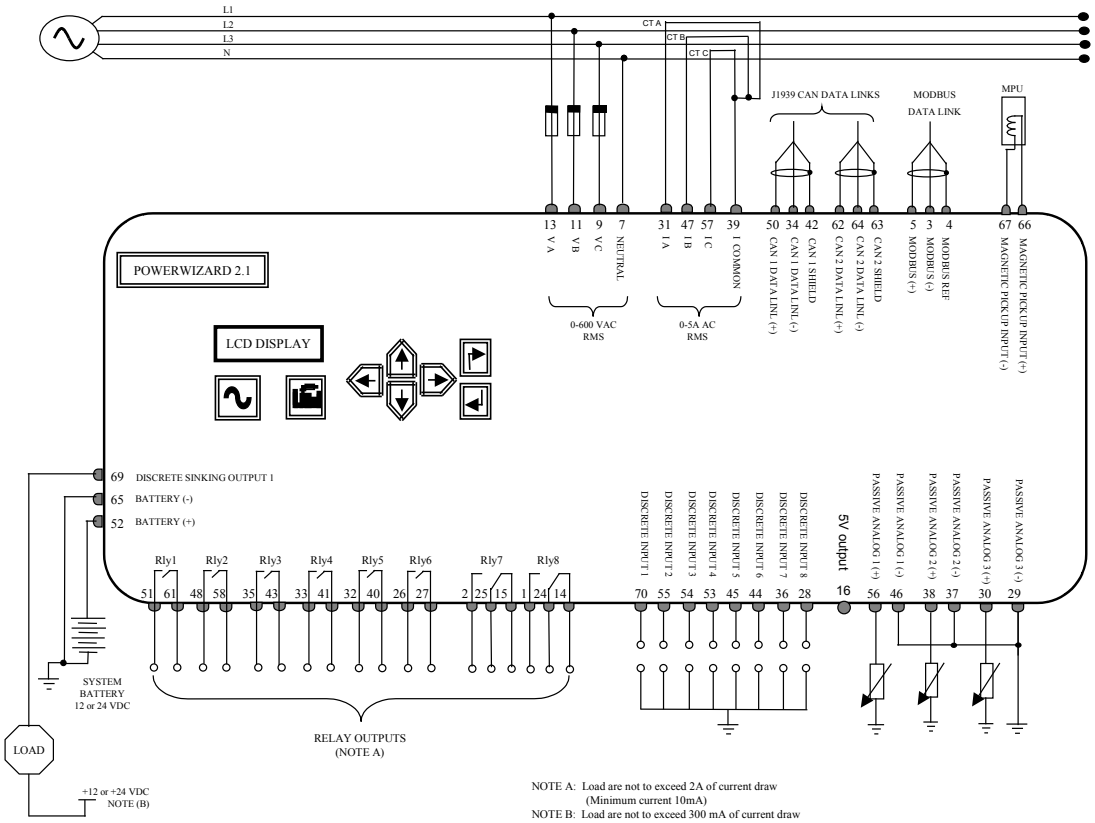


Figure 7 : PowerWizard 2.1 Control Electrical Connections

4.4 Winding Connections

The wiring connections between the generating set and PowerWizard depend on the winding configurations of the generator. Refer to the following connection diagarms.

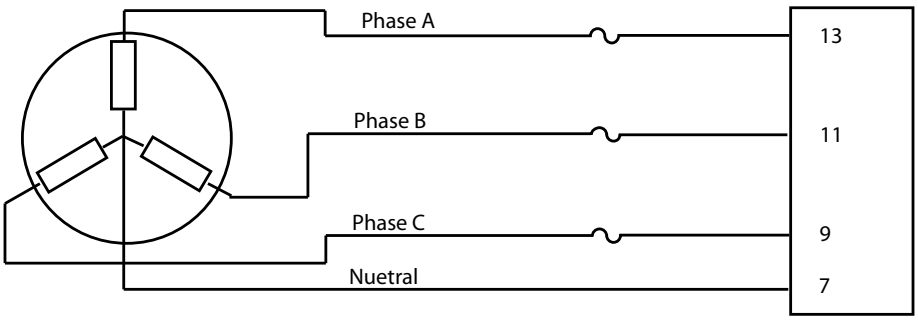


Figure 8: Three phase 4-wire (series or parallel) star

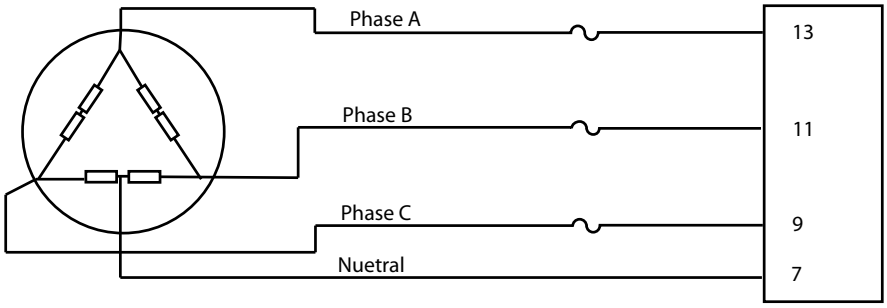


Figure 9: Three phase 4-wire Delta

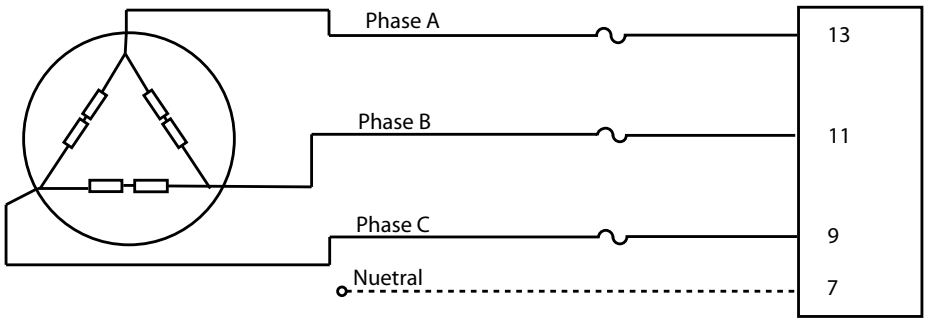


Figure 10: Three phase 3-wire Delta.

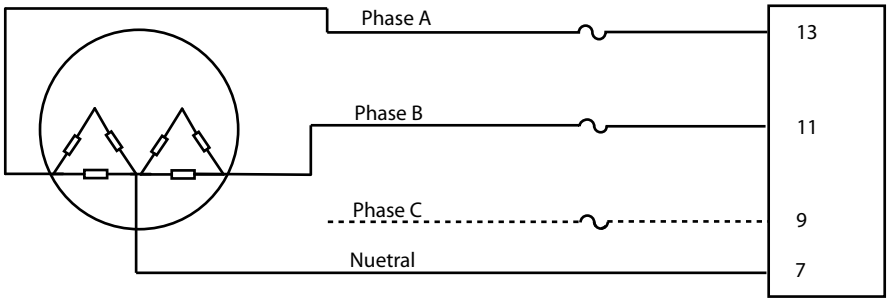


Figure 11: Single phase 3-wire (Double Delta)

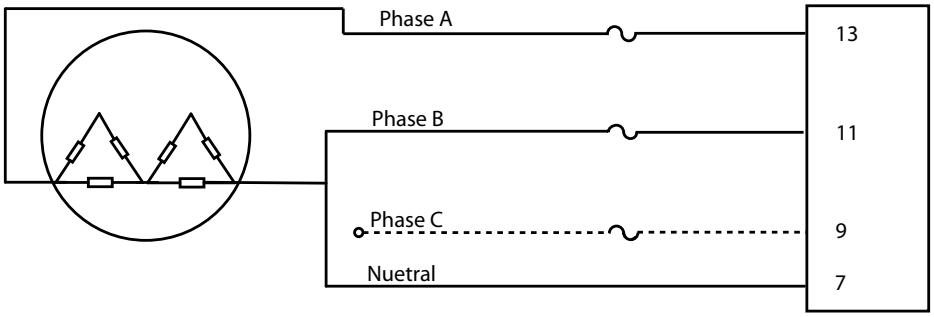


Figure 12: Single phase 2-wire (Double Delta)

4.5 Transformer Connections

The PowerWizard can monitor generator output voltages in the range of 80VAC to 600VAC. In order to monitor voltages greater than 600 Volts, external potential transformers must be used.

Note:

- The PowerWizard must be programmed for the correct winding ratios when connecting external potential transformers
- The wye configuration of external potential transformers is preferred for 4-wire wye generating set because of the greater accuracy when loads are unbalanced. With the open delta configuration, some power parameters cannot be determined. These parameters are real power phase A, B, C and power factor phase A, B, C. For maximum accuracy, the open delta configuration of external potential transformers should be used only for 3-wire delta generating sets.

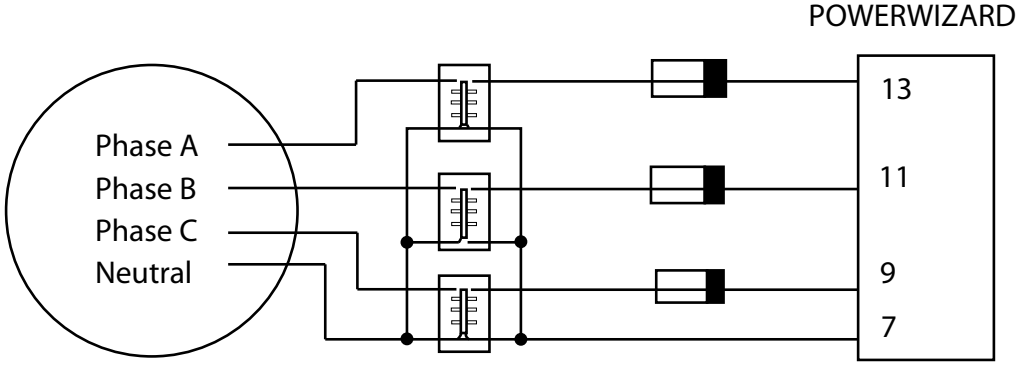


Figure 13: Wye Configuration of External Potential Transformers (PT) on the 4-wire Wye connected Generator

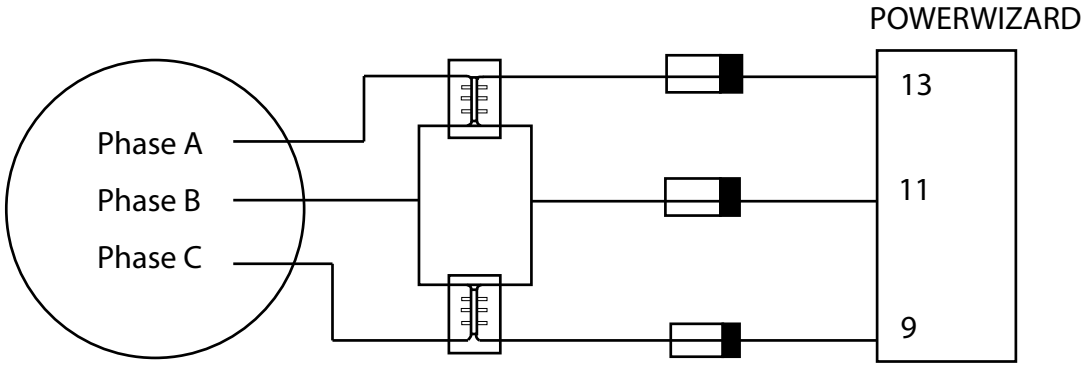


Figure 14: Open Delta Configuration of External Potential Transformers (PT) on the 3-wire Delta connected Generating Set

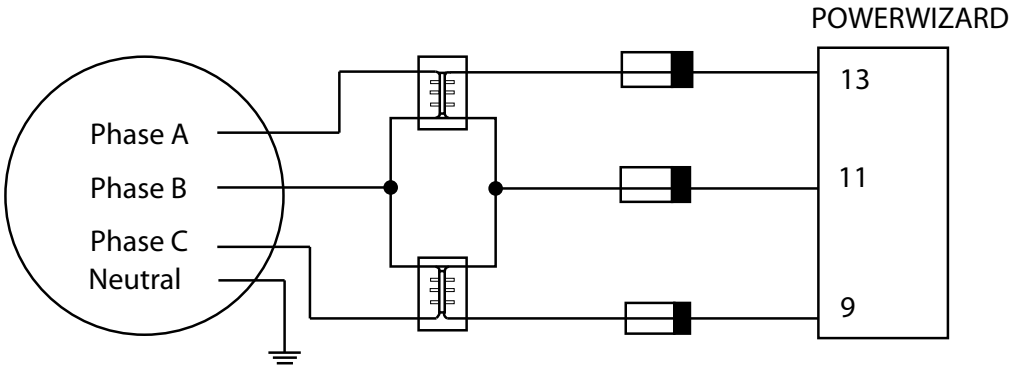


Figure 15: Open Delta Configuration Of External Potential Transformers (PT) on the 4-wire Wye connected Generating set

4.6 Data Links

The PowerWizard supports up to 3 different data links:

- One Primary J1939 Data Link
- One Accessory J1939 Data Link (PowerWizard 2.1 only)
- One System Control and Data Acquisition (SCADA) Data Link (PowerWizard 2.1 only).

For information on the SCADA system refer to the following manuals:

- PowerWizard Monitoring Software (available with MCM7 and MCM8 options)
- PowerWizard Modbus Applications Guide (provided by the aftersales help desk, refer to the contacts list at the back of this manual.

4.6.1 Primary J1939 Data Link (CAN1)

The Primary J1939 Data Link is supported by all of the PowerWizard controls.

The Primary J1939 Data Link is used for local communication among modules associated with a single generating set. The PowerWizard can interface with both Electronic Engines (EUI) and Mechanical Engines (MUI). In MUI engines, the engine sensors are wired directly to the PowerWizard. The Primary J1939 Data Link utilizes the Society of Automotive Engineers (SAE) J1939 protocol and requires hardware compliant to the high-speed Controller Area Network (CAN) 2.0B protocol defined in the International Standards Organization (ISO) 11898-2 document, running at 250k bits per second.

The Primary J1939 Data Link supports appropriate SAE J1939 Broadcast Parameter Group Numbers (PGN) and Suspect Parameter Numbers (SPN) for engine and generating set data and diagnostics.

Wiring

The Primary J1939 communication wires are brought out of the PowerWizard as part of the 70-pin AMP connector. The pins, as designated on the AMP connector, are shown in Table 2.

Pin #	Name	Description
34	CAN1 -	Differential (-) for CAN
42	CAN1 SH	Shield for CAN
50	CAN1 +	Differential (+) for CAN

Table 2: Primary J1939 Data Link on 70-pin Connector

Network Topology

The physical topology of the CAN network used in the Primary J1939 Data Link is a bus topology, consisting of a main trunk and small drops. The maximum allowable trunk length is 130 ft (40 m) and the maximum drop length is 3 ft (1 m). The CAN network requires a termination resistor on the extreme ends of the main trunk. The topology for the PowerWizard 1.1 and 1.1+ is illustrated in Figure 11.

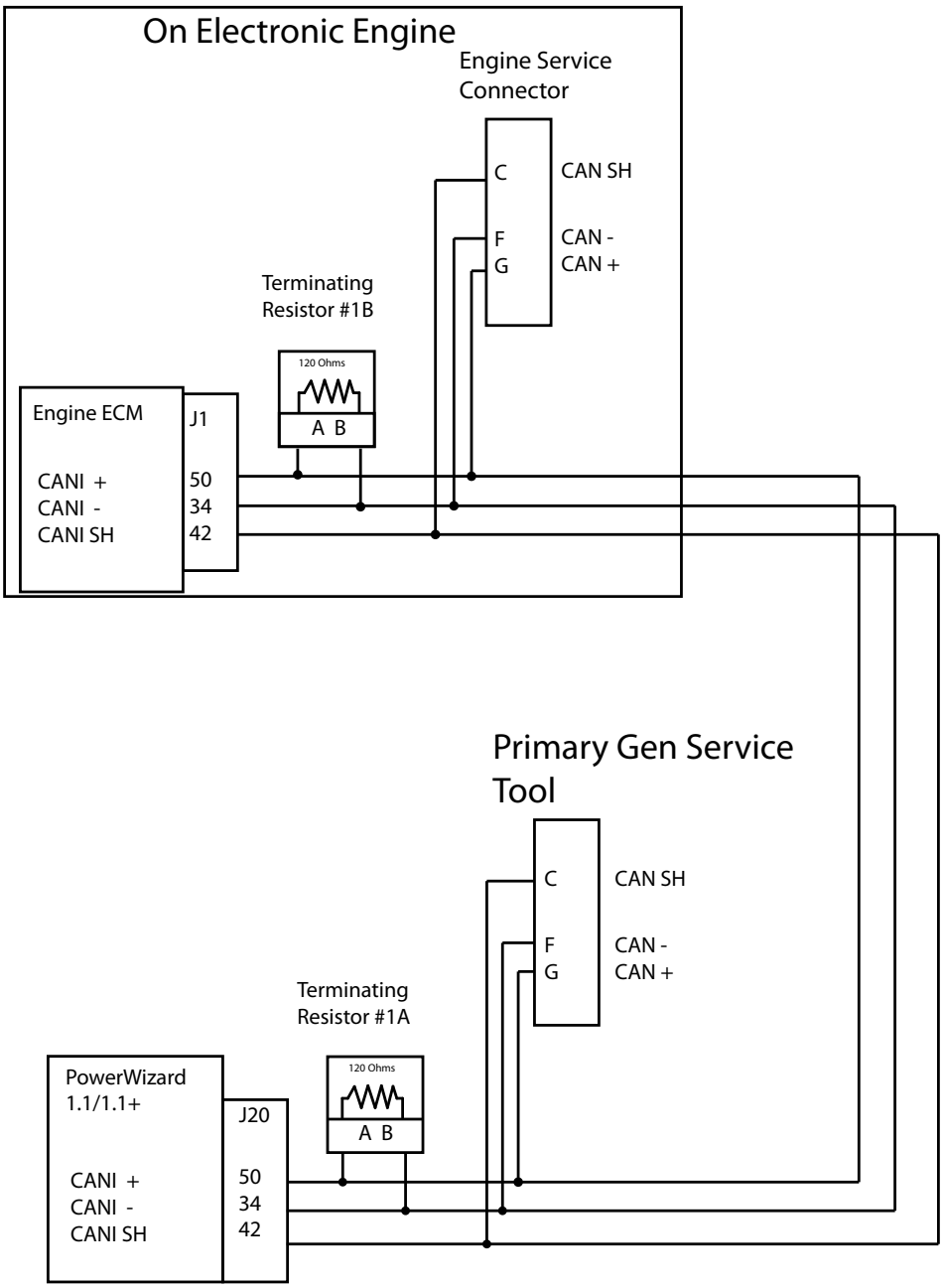


Figure 16: PowerWizard 1.1, 1.1+ CAN Wiring Diagram

4.6.2 Accessary J1939 Data Link

The Accessory J1939 Data Link is supported by the PowerWizard 2.1.

The Accessory Data Link is used for local or remote communication among modules associated with a single generating set. This includes annunciators and other expansion modules. The Accessory J1939 Data Link utilizes the same SAE standards as CAN1.

Wiring

Pin #	Name	Description
62	CAN2 -	Differential (-) for CAN
63	CAN2 SH	Shield for CAN
64	CAN2 +	Differential (+) for CAN

Table 3: Accessory J1939 Data Link on 70-pin Connector

Network Topology

The physical topology of the CAN network used in the Accessory J1939 Data Link is a bus topology, consisting of a main trunk and small drops. The maximum allowable trunk length is 800 ft (244 m) and the maximum drop length is 3 ft (1 m). The CAN network requires a termination resistor on the extreme ends of the main trunk. The topology for the PowerWizard 2.1 with some remote devices connected is illustrated in Figure 12. Note that more remote devices can be connected, as long as the proper lengths are maintained and the termination resistor is placed at the end of the trunk.

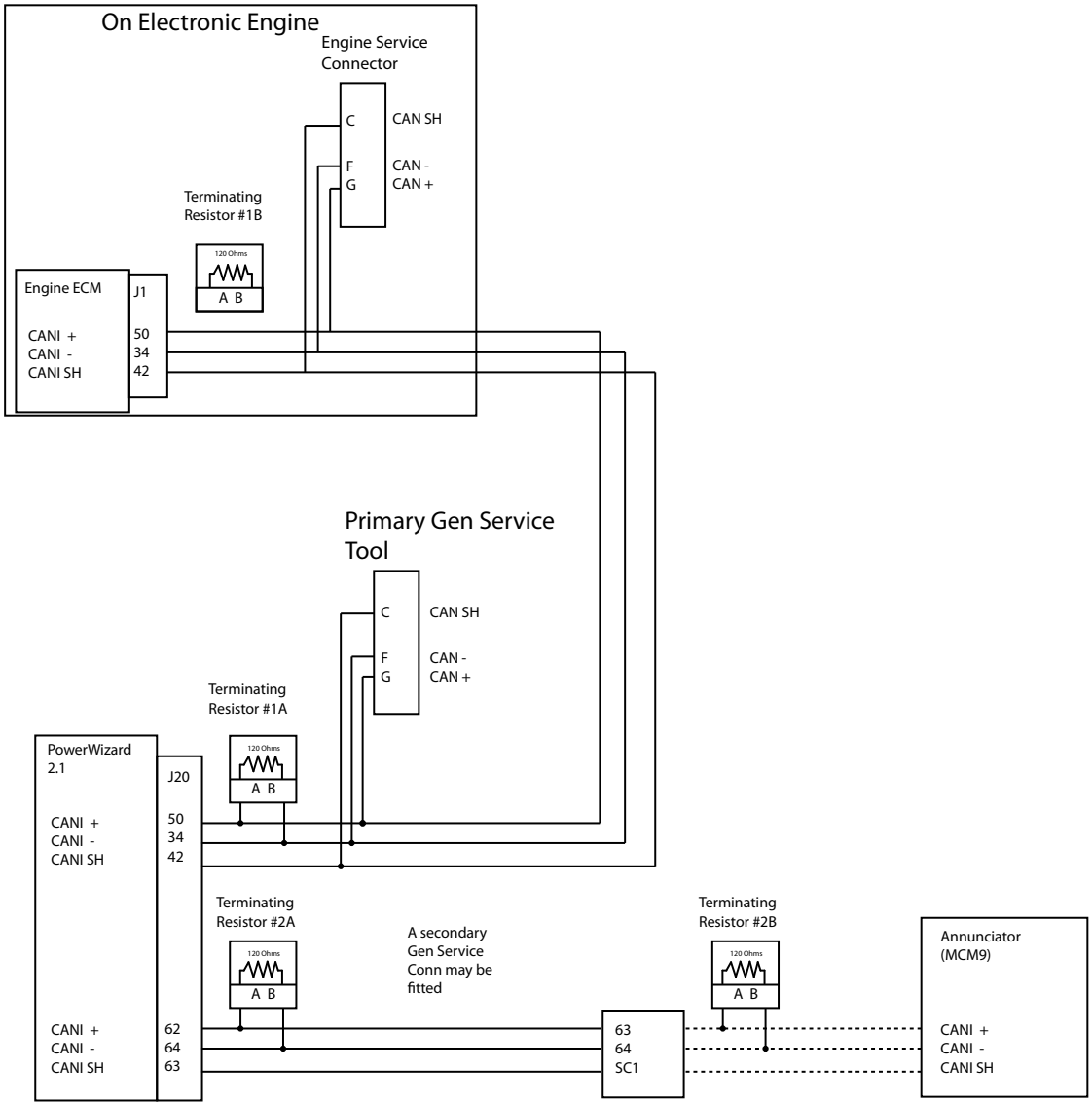


Figure 17: PowerWizard 2.1 CAN Wiring Diagram (with optional module)

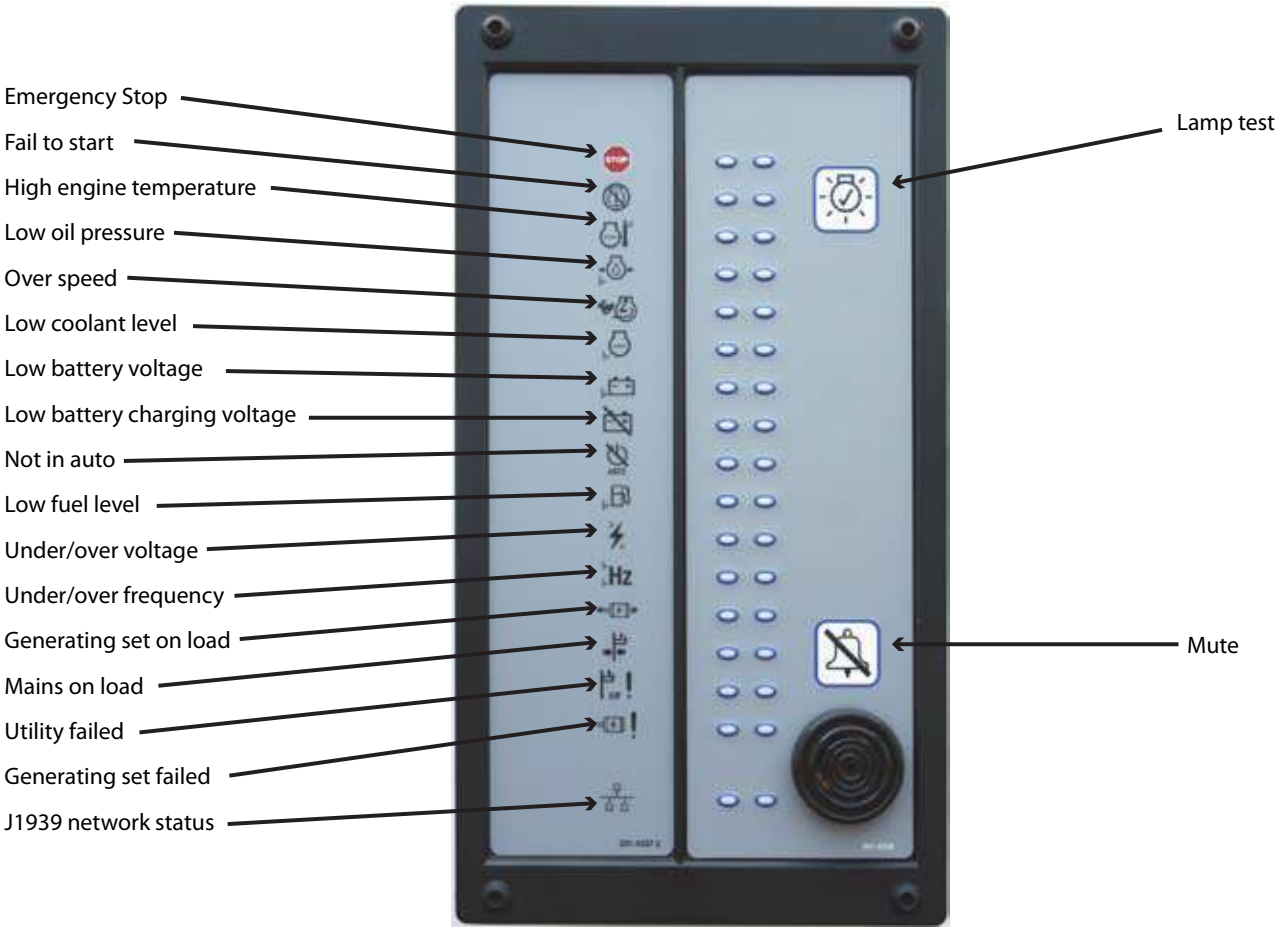
4.7 Optional Modules

4.7.1 CAN Annunciator (MCM9)

The PowerWizard Annunciator serves to display generating set system alarm conditions and status indications. The Annunciator has been designed for use on the PowerWizard J1939 Communication Network.

It is used in Remote applications being mounted separate from the generating set to provide remote indication of system operating and alarm conditions.

The PowerWizard Annunciator is configurable to the standards of NFPA 99/110



4.7.2 PowerWizard Support of the Annunciator

Note:

- CAN1 indicates the connection for the PowerWizard Primary J1939 data link and CAN2 indicates the connection for the PowerWizard Accessory J1939 data link. The PowerWizard 1.1 and 1.1+ only supports the Primary J1939 data link. For more information on the Primary and Accessory data links, refer to the Data Links section.

PowerWizard 1.1, 1.1+: Supports one Annunciator module using CAN1.

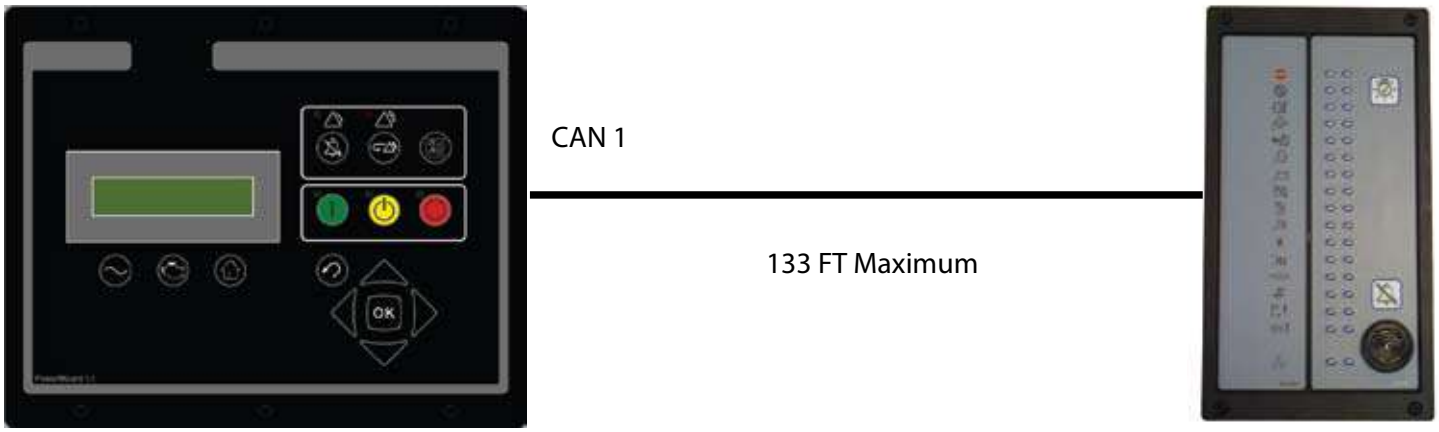


Figure 18: PowerWizard 1.1,1.1+ and Annunciator Connection

PowerWizard 2.1: Supports one Annunciator module using CAN1 and up to three Annunciators using CAN2

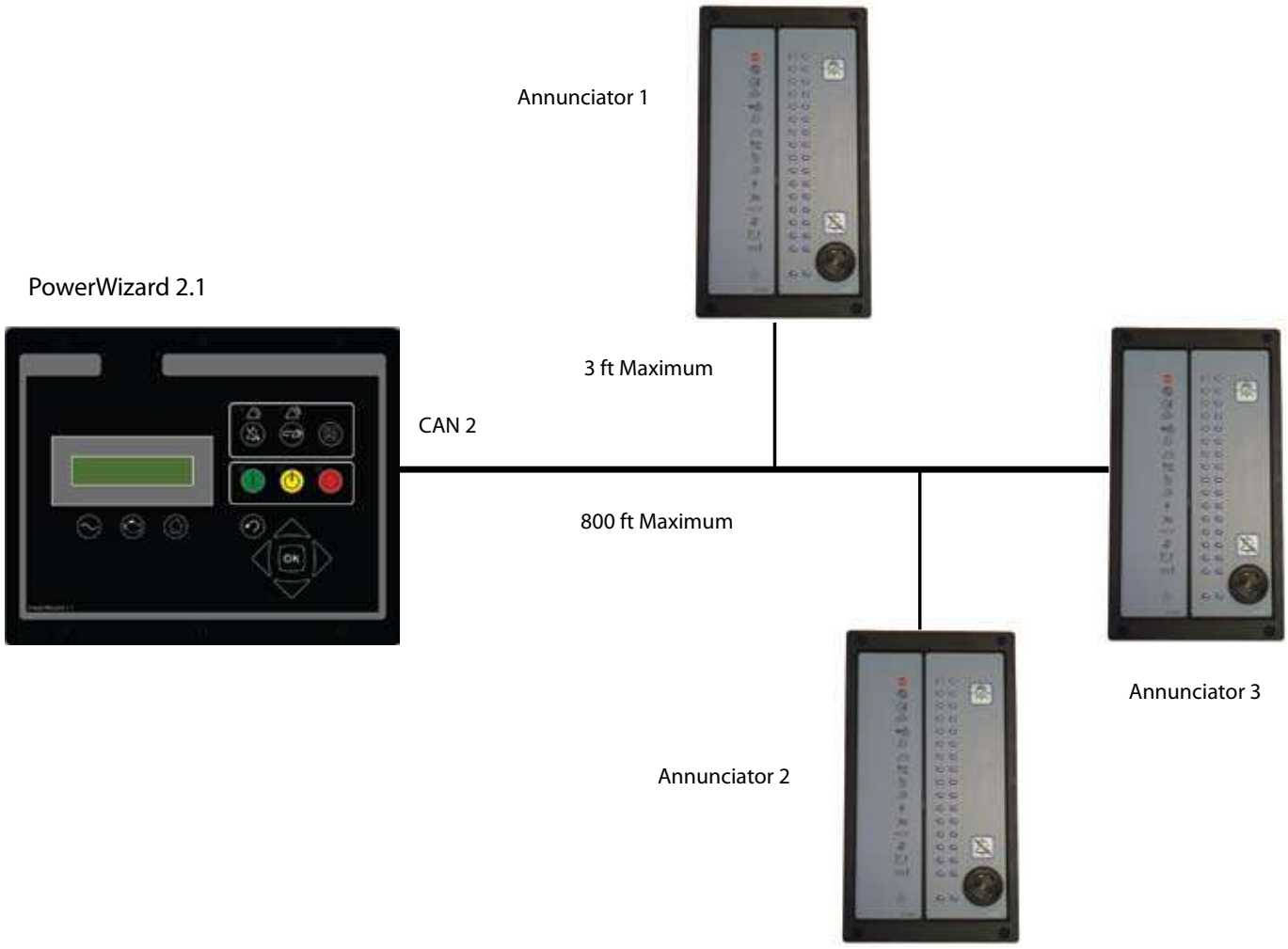


Figure 19: Example illustration of Accessory Data Link Modules and Wire Lengths

5. SETPOINT PROGRAMMING

The engine/generating setpoints affect the proper operation and serviceability of the engine and the accuracy of information shown on the display screen. The setpoints are programmed in the PowerWizard at the factory.

The setpoints may require changing when the PowerWizard is moved from one engine to another engine. The setpoints may also require changing in order to satisfy the requirements of the installation. The setpoints that are stored in the PowerWizard must match the specified setpoints of the particular generating set. For a list of all available setpoints see Appendix B.

5.1 Digital Input Programming

5.1.1 Digital Inputs

The main purpose for the digital inputs is to add additional monitoring capabilities for the engine or the generating set. The digital inputs are tied to an internal pull-up resistor inside the control. Therefore, if there is no connection to a digital input, then the digital input will read as a physical high. A ground or battery negative input should be wired, through a switch, to each digital input.

If an active high configuration is desired, then the battery negative input should be wired through a normally closed switch. If an active low configuration is desired, then the battery negative input should be wired through a normally open switch.

There are eight digital inputs on the PowerWizard. The first and second digital inputs are dedicated for the emergency stop and remote initiate function. The other 6 digital inputs on the PowerWizard 2.1 (4 digital inputs on PowerWizard 1.1) can be programmed for: Disabled, Command or Status, System Events and SCADA Datalink.

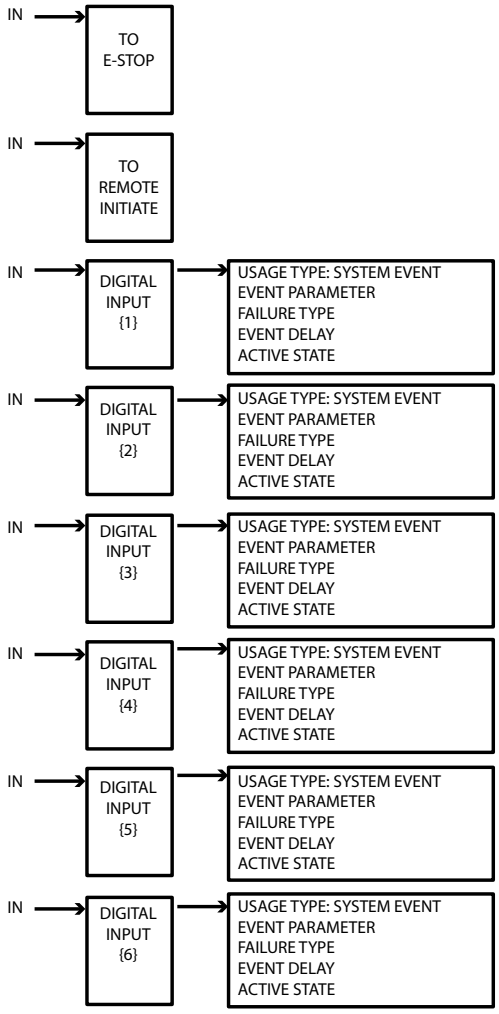


Figure 20: Digital inputs configuration

5.1.2 Dedicated Digital Inputs

Emergency Stop Input – This input should be wired to battery negative through an emergency stop switch. The input can be set to activate on an active high (normally closed contact) or an active low (normally open contact).

Remote Initiate Input – This input should be wired to battery negative through a "Remote Initiate" switch. The input can only be set to activate on an Active Low (normally open contact). If the input is active and the control is in the "AUTO" mode, then the engine will attempt to start and run. Once the input becomes inactive, the engine will enter into cooldown (If programmed to do so) and will then stop.

5.1.3 Programmable Digital Inputs

The inputs can be programmed through the following menu options:

MAIN MENU > CONFIGURE > INPUTS & OUTPUTS > DIGITAL INPUTS

The usage type can be selected from the following:

- **Disabled**
- Set to a **Command** or **Status**; refer to the "Command or Status" section below
- Set to **System Events** and can be configured to trigger warnings or shutdowns in the control. System event configurations determine the PowerWizard response to any supported event
- Set to SCADA datalink. In this case the state of the input will be placed into the appropriate MODBUS register. No alarms or warnings will be generated by the control.

1. Command or Status

Command/Status can be configured by selecting Parameters and Active State. The supported parameters or components are:

- ECS in Run
- ECS in Auto
- ECS in Stop
- Idle Mode Command
- Start Aid Timer Bypass
- Inhibit Cool Down
- Raise Voltage
- Lower Voltage
- Raise Speed
- Lower Speed
- Auto Load Fuel (PW1.1+ and PW2.1)

2. System Event

System Event can be configured by setting: Event Parameters, Failure Type, Event Delay and Active State. The event type is the selection of the Suspect Parameter Number (SPN) for the input. Table 4 gives a list of supported event parameters.

Event Parameter List
Pressures
Engine oil pressure
Gas Pressure
Temperatures
Engine coolant temperature
Engine oil temperature
Exhaust temperature
Generator Rear Bearing Temperature
Generator Winding #1 Temperature
Levels
Engine coolant level
Engine oil level
Fuel level
External fuel tank level
Other
Emergency Stop
EPS Supplying Load (PowerWizard 2.1)
Generator Circuit Breaker Closed
Generator Circuit Breaker Open
Battery Charging System Voltage
Custom Event
Fuel Leak Detected
Generator Current
Generator Power
Inlet Manifold Charge Combustion
Air Damper Closed
Battery Charger Failure
Earth Fault
Earth Leakage

Table 4

After the SPN is chosen, the Failure Mode Identifier (FMI) is the next setting. The following FMI's are available:

- High Warning (example: High Temperature Warning)
- Low Warning (example: Low Temperature Warning)
- High Shutdown (example: High Temperature Shutdown)
- Low Shutdown (example: High Temperature Shutdown)
- Status (example: Fuel tank Leak).

Status is used when an event is not essentially high or low but simply exists. An example of this is the Emergency Stop.

3. SCADA Datalink

When a digital input is configured as SCADA Data Link, the state of the input will be placed into the corresponding MODBUS register for remote monitoring. The Active State of the input can be selected as HIGH or LOW. The HIGH option should be used for a normally closed switch and the LOW option should be used for a normally open switch.

5.2 Relay and Digital Output Programming

The PowerWizard 1.1 and 1.1+ have six type-A relays. The PowerWizard 2.1 has eight relays. Six of these are type-A relays and the other two are type-C relays. Type-A is defined as one normally-open contact plus common. Type-C is defined as two contacts, normally-open and normally-closed plus common.

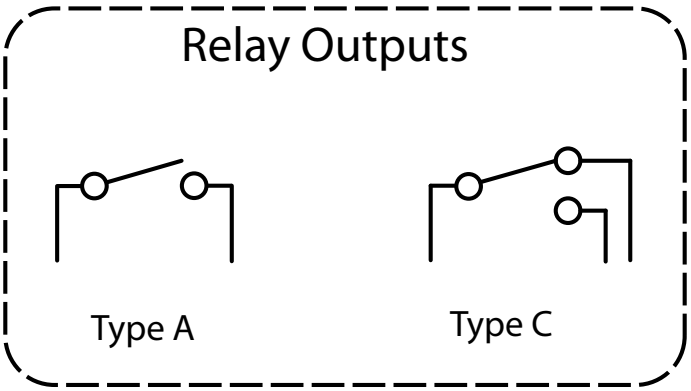


Figure 21: Relay Outputs

Each relay is capable of handling 2A @ 30 VDC. The relay contacts are not protected against shorts to battery or ground. Relay outputs 1 and 2 are typically used for Engine crank and fuel control.

PowerWizard 2.1 has also two current sink outputs, namely digital outputs. PowerWizard 1.1 and 1.1+ have no digital outputs. Each digital output is capable of sinking 300 mA. The outputs have diagnostics for a short to battery when the driver is on. If a short to battery persists for five seconds, then the driver will be disabled until the condition is no longer present.

Note:

The digital outputs are internally controlled and the active state should always be set to HIGH.

The relay and digital outputs can be configured to the following selections:

- Disabled
- Set to a status or command
- Set to a system event
- Set to a SCADA command

An output remains in the inactive state when the output is disabled. The control display and the SCADA shows the status of the output as "Disabled". An output is active based on the internal logic of the control when the output is set to a status or a command. An output is active based on the active status of an internal event or the active status of events that are communicated from other devices across the CAN data link when the output is set to a system event. An active state is sent over the Modbus when an output is configured for the SCADA data link.

The procedures that must be performed in order to program the outputs depend on the usage type for the output. Usage types are activated from the menu options below.

MAIN MENU > CONFIGURE > INPUTS & OUTPUTS > RELAY OUTPUTS

MAIN MENU > CONFIGURE > INPUTS & OUTPUTS > DIGITAL OUTPUTS

1. COMMAND / STATUS

Table 5 gives a list of available statuses and commands.

"COMMAND / STATUS"	
Status	**Command**
Run Mode	Air Shutoff
Auto Mode	Programmable Cycle Timer Output #2
Stop Mode	kW relay Trip #1
Package not in Auto	kW relay Trip #2
Fuel Control Relay	Common Alarm
Starter Motor Relay	Breaker #1 Trip
Start Aid	Breaker #2 Trip
Disable Aux AC Supply	Reduced Power Off
Crank Alert	Transfer Fuel In
Engine Start Initiated	Transfer Fuel Out(1)
Engine Started	Voltage Raise Command
Rated Speed	Voltage Lower Command
V/Hz within Limits	Speed Raise Command
Engine in Cooldown	Speed Lower Command
Package waiting on Delay on Stop	Nominal Frequency Selection Low / High(1)
Horn Control	Nominal Voltage Selection Low / High(1)
Common Warning	
Common Shutdown	
ECU Fault Reset	

Table 5

(1) Available with complex software

Auto Mode – Activated after the auto key has been pressed or a Modbus command is given to set engine operating mode to auto (register 302) and while the control remains in the auto mode.

Generator Breaker Trip 1 – Activated when any event occurs that has an event response configuration set for "Breaker Trip #1". This deactivates when the event is neither present nor active. This output does not control a circuit breaker unless the user makes the connections to do so. This output type should be viewed as having a generic name because the name does not necessarily imply the action that is performed.

Breaker Trip 2 – Activated when any event occurs that has an event response configuration set for "Breaker Trip #2". This deactivates when the event is neither present nor active. This output does not control a circuit breaker unless the user makes the connections to do so. This output type should be viewed as having a generic name because the name does not necessarily imply the action that is performed.

Common Alarm – Activated any time that the control initiates and/or detects either a shutdown event or a warning event. This deactivates when no warnings or shutdowns are present or active.

Disable Aux AC Supply – The "Disable Aux AC Supply" is intended to be used in order to disconnect the battery charger, heaters etc when the engine is running. It is activated when the engine start is initiated. This deactivates when the engine is stopped or the RPM is equal to zero.

Trip Point #1 – Activated when "Programmable Trip Point 1" is active. "Programmable Trip Point 1" is activated based on the high percent kW, according to the user configurable thresholds.

In Cooldown – Requires that the "Cooldown Duration" setpoint is set greater than zero. Activated when an engine stop has been initiated and the cooldown cycle begins. This deactivates when the cooldown timer has expired and remains deactivated any time the generating set is not in cooldown.

Run Mode – Activated after the run key (8) has been pressed or a Modbus command is given to set the "Engine Operating Mode" to "Run" (register 302) and while the PowerWizard remains in the "Run" mode.

Start Aid – Requires that the set point for "Start Aid Activation Time" is to be set greater than zero. It is activated when the engine start is initiated. The engine start also starts the timer. This deactivates after "Start Aid Activation Time" expires.

V&Hz Within Limits – The normal operating range is defined as being neither above the high warning or shutdown thresholds, nor below the low warning or shutdown thresholds. Activated when measured generator voltage and frequency (that is calculated as a percentage of rated voltage and frequency) are both within the normal operating range. This deactivates when either the measured generator voltage or the frequency are outside the normal operating range.

2. SYSTEM EVENT

EVENT PARAMETER and EVENT TRIGGER condition need to be selected for SYSTEM EVENT. Table 6 is a list of available system events.

SYSTEM EVENT	
Pressure	Gen Frequency
Engine Oil Pressure	Gen Real Power
Gas Pressure	Gen Voltage
Temperature	Primary Data Link
Engine Coolant Temperature	SCADA Data Link (PW2.1 Only)
Engine Oil Temperature	Service Interval Expired
Exhaust Temperature	Unexpected Eng S/D
Gen Rear Bearing Temp	Earth Fault
Gen Winding #1 Temp	Earth Leakage
Levels	Engine Controller
Engine Coolant Level	Fuel Leak
Engine Oil Level	Air Damper Closed
Fuel Level	Battery Charger Fail
External Tank Fuel Level	Gen Breaker Open
Others	Gen Breaker Closed
Any SPN	**Custom Events**
Accessory Data Link (PW2.1 Only)	Digital Input #1 Custom Event
Battery Charging Sys Volt	Digital Input #2 Custom Event
Battery Voltage	Digital Input #3 Custom Event
Emergency Stop Switch	Digital Input #4 Custom Event
Engine in Cooldown	Digital Input #5 Custom Event
Engine Fail to Start	Digital Input #6 Custom Event
Engine Speed	Analog Input #1 Custom Event
Control Not in Auto	Analog Input #2 Custom Event
Gen Current (Amp)	Analog Input #3 Custom Event
Generator Circuit Breaker Closed	Digital Input #5 Custom Event
Generator Circuit Breaker Locked Out	Digital Input #6 Custom Event
Generator Circuit Breaker Failure to Open	AnalogueInput #1 Custom Event
Generator Circuit Breaker Failure to Close	AnalogueInput #2 Custom Event
Utility to Generator Transfer Failure	AnalogueInput #3 Custom Event

Table 6

EVENT TRIGGER is used to select the desired condition in order to trigger the event. Table 7 is a list of the available trigger conditions.

Any Warning	FMI 02 Data Erratic: Intermittent or Incorrect
Any Shutdown	FMI 03 Voltage Above Normal or Shorted to High Source
Any Warning or Shutdown	
Low Warning	FMI 04 Voltage Below Normal or Shorted to Low Source
High Warning	FMI 05 Current Below Normal or Open Circuit
High / Low Warning	FMI 06 Current Above Normal or Grounded Circuit
Low Shutdown	FMI 07 Mechanical System Not Responding or Out of Adjustment
High Shutdown	FMI 08 Abnormal Frequency: Pulse Width or Period
High / Low Shutdown	FMI 09 Abnormal Update Rate
Low Warning or Shutdown	FMI 10 Abnormal Rate of Change
High Warning or Shutdown	FMI 11 Root Cause Not Known
High / Low Warning or High / Low Shutdown	FMI 12 Bad Intelligent Device or Component
High / Low Warning or High / Low Shutdown or Diagnostic	FMI 13 Out of Calibration
Any Diagnostic	
Condition Exists	FMI 14 Special Instruction

Table 7

3. SCADA DATALINK

When an output is configured for the SCADA data link, its active state can be sent over the Modbus.

5.3 Analogue Input Programming

PowerWizard 2.1 and 1.1+ have three analogue input channels and PowerWizard 1.1 has two. For a Mechanical Unit Injector Engine (MUI), two of the inputs are dedicated to monitor the engine coolant temperature and the engine oil pressure. The Analogue Input #3 has a default configuration to "disabled".

All three analogue inputs can be programmed to monitor any supported parameter in Table 8 for an Electronic Unit Injector Engine (EUI). In this case the engine oil pressure sensor and the engine coolant temperature sensor are wired to the Engine ECM and not to the PowerWizard.

Temperatures
Engine Coolant Temperature
Engine Oil Temperature
Pressures
Engine Oil Pressure
Levels
Engine Fuel Level
External Tank Fuel Level
Other
Customer Parameter #1
Customer Parameter #2
Customer Parameter #3
SCADA Data Link (PowerWizard 2.1 Only)
Desired Engine Speed Command
Urea Level

Table 8: List of supported parameters

Analogue inputs can be configured from menu options:

MAIN MENU > CONFIGURE > INPUTS & OUTPUTS > ANALOGUE INPUTS

There are three USAGE TYPES for an available input: DISABLED, RESISTIVE and VOLTAGE SENDER. Each of the inputs can be configured to have HIGH WARNING, LOW WARNING, HIGH SHUTDOWN or LOW SHUTDOWN with thresholds. Each event associated with the input also has a programmable time delay.

1. Resistive sender

DATA IDENTIFICATION for a resistive sender can be selected from the list in Table 8, e.g. temperature, pressure or level. The MAP SELECTION NUMBER is used to select a map in connection with the sender. PowerWizard has up to 25 maps available for resistive senders as shown in Table 9. Each map is defined in factory and contains up to 25 interpolation points.

Map	Description
Map 1	VDO Pressure Curve 4
Map 2	Pressure 246-8150
Map 3	VDO Temperature Curve 1
Map 4	Temp 191-6587
Map 5	VDO Temperature Curve 2
Map 6	Temp 349-2458
Map 7	Fozmula Level 1
Map 8	Linear 0 to 2000 ohm
Map 9	XQ Fuel 1
Map 10	XQ Fuel 2
Map 11-25	Future Use

Table 9

2. Voltage sender

For a voltage sender, the desired voltage range and corresponding data range need to be selected. The available voltage ranges are given in Table 10. The minimum and maximum data points can be set under the menu of DATA RANGE MIN and DATA RANGE MAX.

Available Voltage Range
0V to 5V
1V to 5V
0V to 10V

Table 10

6. RETROFITTING POWERWIZARDS

When replacing a PowerWizard or when fitting a new one, ensure that the correct controller type is selected i.e. PowerWizard 1.1 or PowerWizard 2.1. The differences between these are listed in the PowerWizard Variations section. The Electrical Connection drawings are shown in the Electrical Connections section.

6.1 EST Availability and Licensing

The Electronic Service Tool (EST) used with a laptop provides the mechanism for servicing the PowerWizard controller. It allows the user to display, view or change the current Configuration files (Field Replacement Files) or the base level flash files.

Therefore EST is an essential service tool for carrying out service operations on the PowerWizard.

Instructions on purchasing and licensing EST can be found on the FG Wilson Dealer website PowerUp2 or by contacting the EST Software License and Support Coordinator.

Tel: +44 (0) 28 2826 5228

email: support_tools@fgwilson.com

6.2 Flash Files and Field Replacement Files

PowerWizard's have two main types of files associated with them, the flash file (.fls file) that contains the base code and the Field Replacement File (.xml file) that contains the configuration information.

Flash Files:

To obtain a replacement flash file or the most recent version of a flash file contact the FG Wilson After Sales Helpdesk

Tel: +44 (0) 28 2826 5001

email afterSales@fgwilson.com.

When enquiring please supply the generating set Serial Number. The Helpdesk will send you the most recent version of the file associated with that generating set Serial Number. These files are backward compatible.

If you require the same file but in a different language inform the helpdesk and they will send the equivalent file in the required language.

Available languages are: English, French, German, Spanish, Italian, Portuguese, Dutch, Danish, Swedish, Finnish, Norwegian, Russian, Chinese, Japanese, Greek, Arabic, Icelandic, Hungarian, Turkish, Czech, Estonian, Latvian, Lithuanian, Polish, Slovak, Slovene.

If the file is for a new job not associated with a generating set Serial Number, then the following information is required in order to select the correct flash file for the controller.

1. Controller type (PowerWizard 1.1, 1.1+ or 2.1)
2. After Market ID (AMID) FG Wilson or Olympian.
3. Language

It is intended to have an online web based facility developed that will make these files available on line 24/7.

Note:

- When a new Flash Files is loaded the configuration file remains unchanged.

Field Replacement Files:

The Field Replacement Files only exist for controllers that have previously been programmed at the factory. FG Wilson cannot create Field Replacement Files for controllers that are in the field and that have not previously been programmed at the factory.

However Field Replacement Files can be used on more than one controller. So if the configuration you want is the same as a previous set, the same Field Replacement File can be used.

The same procedure is used again for obtaining this file. Contact the FG Wilson After Sales Helpdesk supplying the Generating set Serial Number and they will send you the required Field Replacement File.

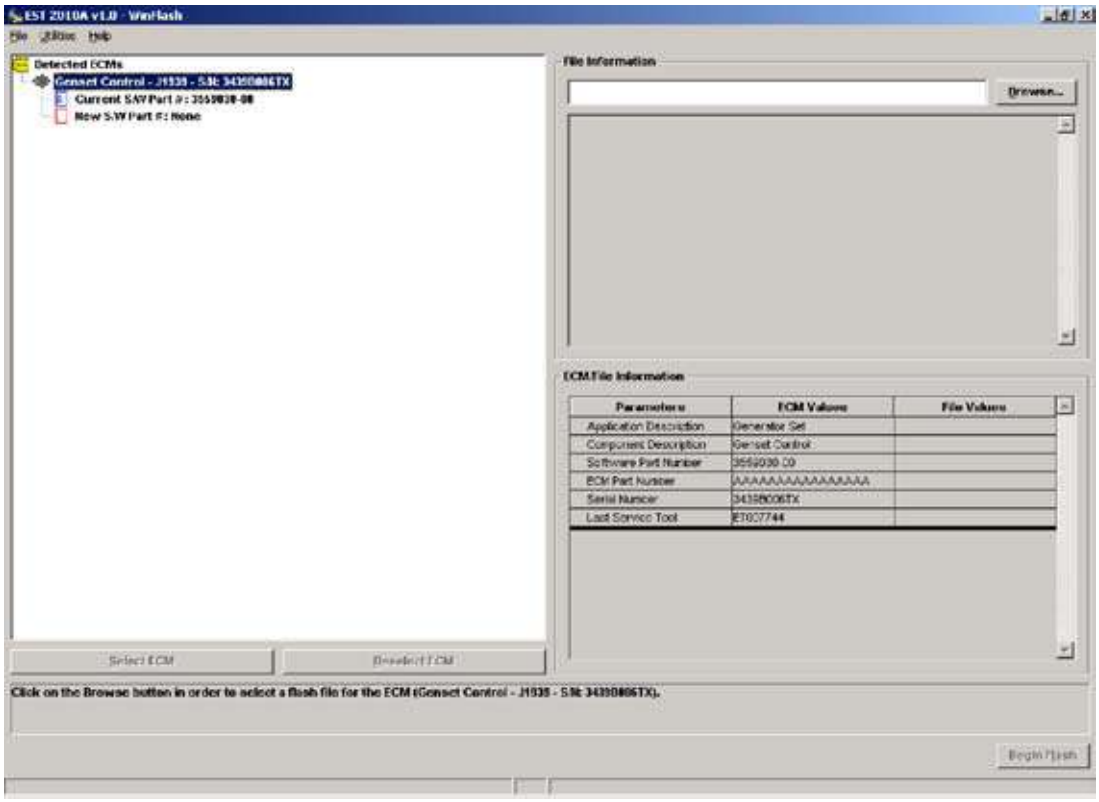
Note:

If a Field Replacement File that was created for a PowerWizard 1.1 is loaded onto a PowerWizard 2.1, some of the items on the PowerWizard 2.1 will not be configured. To configure these items open EST and select Configuration (SERVICE → CONFIGURATION).
Field replacement files from a PW X.0 cannot be used on PW X.1.

Using EST to load Flash Files

It is recommended to use the latest version of the service tool. While any version from 2004A onwards should work, it is easier to follow screen shots and menu navigation if the latest version is used.

1. Open EST Winflash (This should be a separate option to "Electronic Service Tool" from within the EST sub menu of Windows or it can be accessed from the Service Tool menu by selecting "Utilities" -> "Winflash"
2. Ensure that the service tool is using RP1210 (under "Utilities" -> "preferences" -> "communications")
3. Ensure that the communications adapter is connected to the correct port of the PC
4. You should have a screen similar to:



Press, "Browse" and select the desired flash file

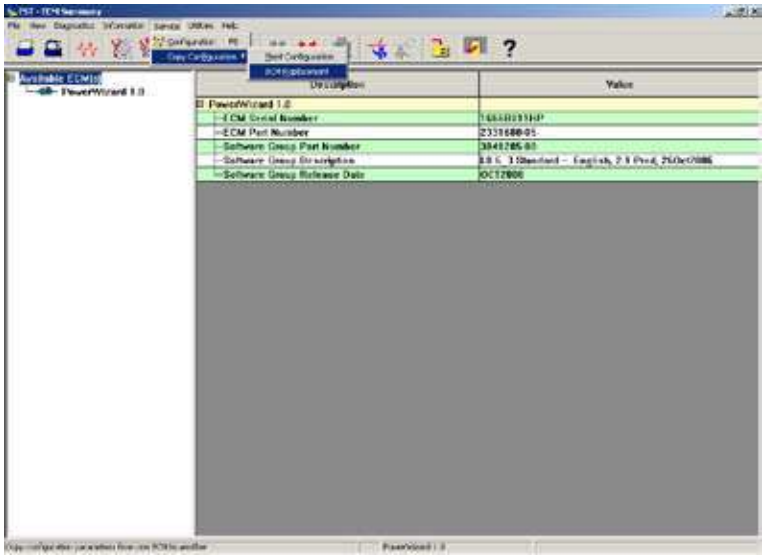
1. Press "Begin Flash"
2. When you see:

You're finished.

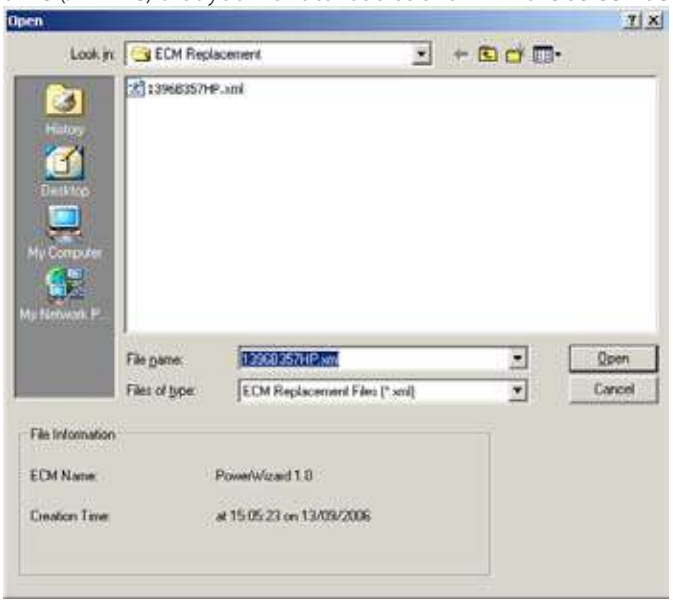
All the (old) setpoints are preserved when the PowerWizard control is re-flashed.

Using EST to load Field Replacement Files

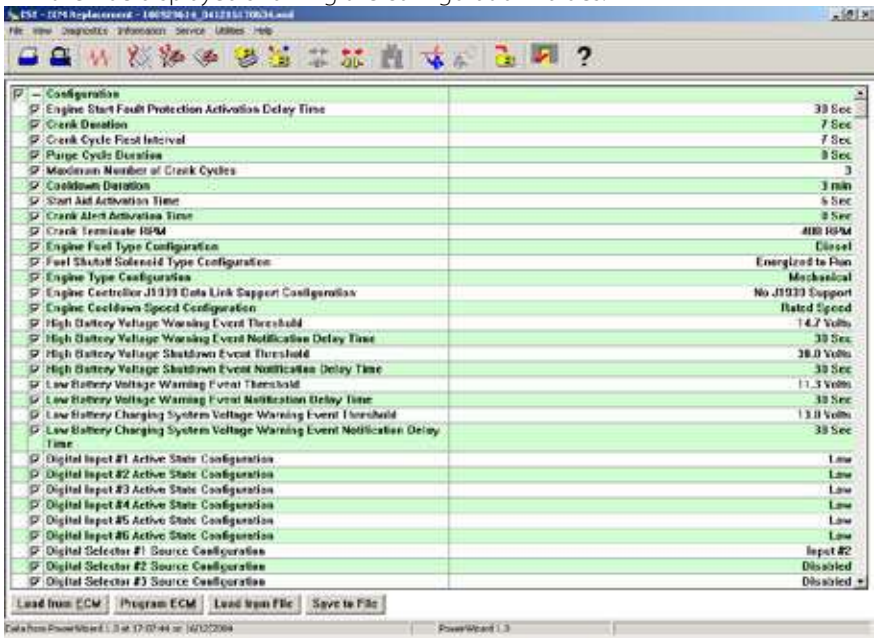
1. Open EST ECM Replacement by selecting the Service » Copy Configuration » ECM Replacement menu item, as shown in the figure below.



2. Select the Field replacement File (.xml file) that you want to load as shown in the screen below.



The following screen will then be displayed showing the configuration values.



3. Select Program ECM to load the configuration values onto the controller. Once the configuration values have been successfully loaded the message "Programming Complete" will be displayed.

6.3 Possible EST error messages, their cause and suggested action

"The communication adapter was unable to connect to the J1939 data link."

Cause: EST was unable to see the Communication adaptor on the port it is expecting it to be connected to

- Ensure that Communication adapter is connected to the PowerWizard panel and has power
- Ensure that the communication adapter is connected to the PC
- Ensure that the settings on the service tool are set for the correct port
- Ensure that the communication adapter is using RP1210 (under utilities -> preferences -> communications)

"No ECMs detected"

Cause: EST was unable to detect any PowerWizard modules on the J1939 network.

- Ensure the PowerWizard module is powered up and is not in Reduced Power Mode
- Check the J1939 wiring between the PowerWizard and the communications adapter, particularly the termination resistor(s).

"The ECM software file and the ECM are not compatible. Process aborted. - Error Code: 163840"

Cause: The flash file is not compatible with the PowerWizard. This is usually seen when trying to flash a module with software for a different module, such as trying to flash a PW1.1 with a flash file for a PW1.1+ or 2.1.

- Use a flash file that is compatible with the level of PowerWizard control you are trying to flash.

"No flash file selected for the ECM"

Cause: This error message is seen when trying to use a flash file that is not suitable for any level of PowerWizard control.

- Use a flash file that is compatible with the level of PowerWizard control you are trying to flash.

7. STEP THROUGH GUIDES

7.1 Reduced Power Mode (RPM)

Under steady state operation, the PowerWizard controllers on 12V generating sets have less than 1A current draw (not including any relay loads). This value will be lower for controllers on 24V generating sets.

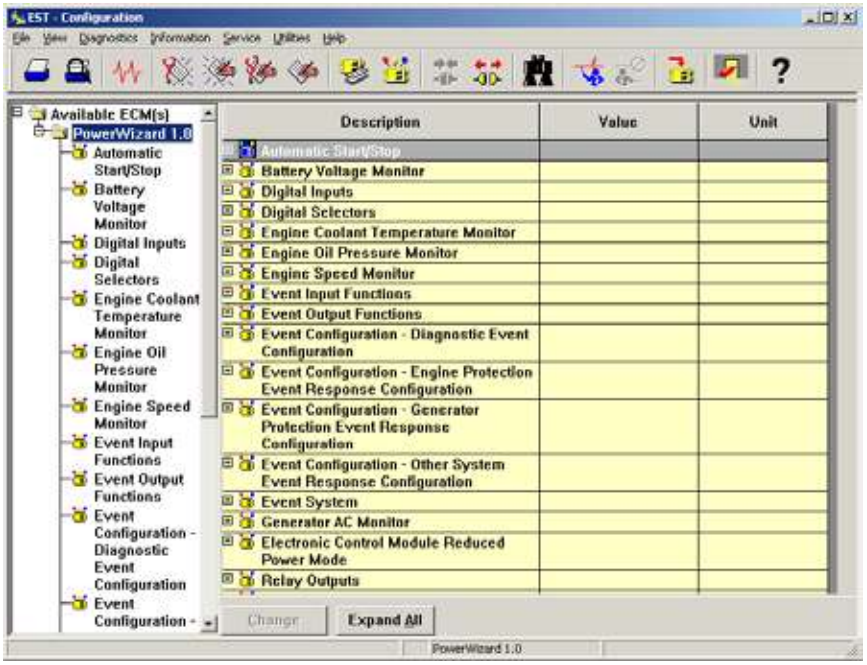
This can be reduced by approximately a factor of 7 by using the Reduced Power Mode (RPM). However it is recommended that generating sets at rest or in storage for prolonged periods should either have the battery charger or isolator switch option fitted.

When in reduced power mode the generating set control will appear powered down. It will also systematically pulse the control panel lamps. In Reduced Power Mode the control disables all communications.

If Reduced Power Mode is enabled and the generating set is stopped the control will enter reduced power mode a preset time (normally 30 minutes) after the last key press. The Control will awaken from Reduced Power Mode upon a key press, an Emergency-Stop or a remote start signal.

Enabling Reduced Power Mode on Using EST

1. Open EST
2. Ensure that the service tool is using RP1210 (under "Utilities" -> "preferences" -> "communications")
3. Ensure that the communications adapter is connected to the correct port of the PC.
4. Connect to the PowerWizard control (Press F8).
5. Select Configuration (Service -> Configuration) or (press F5).
6. It will take some tome for the service tool to check which blocks are installed. After about 30 seconds the screen will look like this:



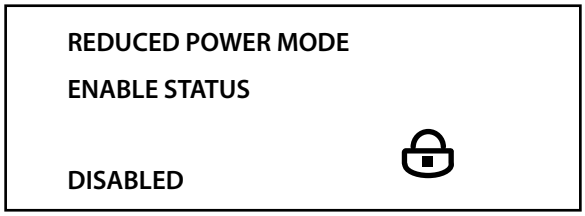
7. Select "Electronic Control Module Reduced Power Mode".
8. At the setpoint "Electronic Control Module Reduced Power Mode Enable Status" Click on "Disabled" and change it to "Enabled".
9. Ensure the "Electronic Control Module Reduced Power Mode delay time" is set to an appropriate time (such as 30 minutes).
10. You're finished. Disconnect EST from the PowerWizard.

Enabling Reduced Power Mode Using Keypad

To enable the Reduced Power Mode on the PowerWizard by using the keypad go to the Reduced Power Mode screen as shown below.

MAIN MENU > CONFIGURE > SETPOINTS > REDUCED POWER MODE

Enter the following screen:



A Level 3 password is required to allow the user to enter this screen and to enable the Reduced Power Mode.

The user may also change the time delay before the Reduced Power Mode is activated by entering the screen shown below.

REDUCED POWER MODE

DELAY TIME

30 MINS

Note:

- The remote communications (RS485) and the J1939 communications will not operate when the controller is in Reduced Power Mode. Therefore if using remote communications ensure RPM is disabled.

Since the remote communications options (MCM7/MCM8) uses a RS485/RS232 converter that is powered via a mains powered charger, we assume that if using remote communications mains power is available and the controller has a charger and RPM is disabled.

7.2 Service Maintenance Interval

The Service Maintenance Interval is available on PowerWizard 2.1 and has a flash file default of 500 engine hours or 180 days.

7.2.1 Reset Service Interval

To clear a Service Maintenance Interval Warning, the timer must be reset, rather than the event, because the countdown timer has reached zero. This timer can be reset from the display to return to the programmed interval. You may require a level 3 password to do this or use the service tool to change this password level from 3 to 2.

MAIN MENU > CONFIGURE > RESET COUNTERS > SERVICE MAINTENANCE INTERVAL

7.2.2 Change Duration of Service Interval Alarm

The duration of the Service Interval can only be changed using the service tool and not from the keypad. If the interval in days causes the alarm to be raised before the interval hours run is reached we suggest that you set the interval in days high (example: set to the maximum of 365 DAYS). The DAYS cannot be disabled.

7.2.3 Disable Service Interval Alarm

This warning can only be disabled by using the Event Response Configuration. Deselecting the Warning and Audible Alert under EDIT will stop the event from occurring.

MAIN MENU > CONFIGURE > ALL SETPOINTS > EVENTS > EVENT RESPONSE CONFIG > ENG PROTECT CONFIG > OTHERS > SERV MAINT INTERVAL WARNING CONFIG > EDIT

7.3 Setting Language

The PowerWizard module gives the operator the choice of using one of two available languages.

1. Technical English
2. Customer Language

To select your preferred language scroll to the LANGUAGE menu as shown below.

MAIN MENU → PREFERENCES → LANGUAGE

Use the curser to highlight the preferred language and press the OK key to select it.

Note:

- Preferences is the last option on the main menu and Language is the last option in Preferences.

7.4 Disabling NOT IN AUTO

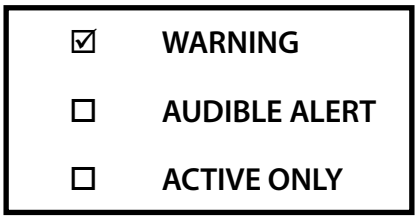
By default PowerWizard control panels have a generating set "not in auto" warning. This warning will be active when the control is in 'STOP' or 'RUN' mode. For certain applications it may be suitable to disable this warning. To disable "Not In Auto" perform the following.

MAIN MENU > CONFIGURE > SETPOINTS > EVENTS > EVENT RESPONSE CONFIGure → OTHER SYSTEM CONFIG

Scroll to "Gen Control Not in Auto Warning Config"

Select edit by using left cursor key and then press Enter

This takes you to the screen that is used to configure the desired response for the "Not In Auto" alarm. The options available can be viewed or edited.



A ☑ indicates which options are selected. The user may select or remove ☑ by using the left cursor key. If unable to EDIT check that the generating set is in STOP position and that the required password level is used.

7.5 Disabling Thermo Start (Start Aid Activation)

To disable the Thermo Start go to the "START AID ACTIVATION TIME" screen as shown below:

MAIN MENU > CONFIGURE > SETPOINTS > CONTROL > AUTO START/STOP

Press enter and then scroll down till you come to the "START AID ACTIVATION TIME" screen.

Once at this screen, set the time to 0 seconds.

APPENDIX A –

1.1 SPN/FMI List

Event Name	SPN	FMI
External Tank High Fuel Level Shutdown	38	0
External Tank Low Fuel Level Shutdown	38	1
External Tank Fuel Level Sensor Short High	38	3
External Tank Fuel Level Sensor Short Low	38	4
External Tank High Fuel Level Warning	38	15
External Tank Low Fuel Level Warning	38	17
High Starting Air Pressure Shutdown	82	0
Low Starting Air Pressure Shutdown	82	1
Starting Air Pressure Sensor Short High	82	3
Starting Air Pressure Sensor Short Low	82	4
High Starting Air Pressure Warning	82	15
Low Starting Air Pressure Warning	82	17
High Fuel Filter Differential Pressure Shutdown	95	0
Low Fuel Filter Differential Pressure Shutdown	95	1
Fuel Filter Differential Pressure Sensor Short High	95	3
Fuel Filter Differential Pressure Sensor Short Low	95	4
High Fuel Filter Differential Pressure Warning	95	15
Low Fuel Filter Differential Pressure Warning	95	17
High Fuel Level Shutdown	96	0
Low Fuel Level Shutdown	96	1
Fuel Level Sensor Short High	96	3
Fuel Level Sensor Short Low	96	4
High Fuel Level Warning	96	15
Low Fuel Level Warning	96	17
High Engine Oil Level Shutdown	98	0
Low Engine Oil Level Shutdown	98	1
Engine Oil Level Sensor Short High	98	3
Engine Oil Level Sensor Short Low	98	4
High Engine Oil Level Warning	98	15
Low Engine Oil Level Warning	98	17
High Engine Oil Filter Differential Pressure Shutdown	99	0
Low Engine Oil Filter Differential Pressure Shutdown	99	1
Engine Oil Filter Differential Pressure Sensor Short High	99	3
Engine Oil Filter Differential Pressure Sensor Short Low	99	4
High Engine Oil Filter Differential Pressure Warning	99	15
Low Engine Oil Filter Differential Pressure Warning	99	17
Low Engine Oil Pressure Shutdown	100	1
Engine Oil Pressure Sensor Short High	100	3
Engine Oil Pressure Sensor Short Low	100	4
Low Engine Oil Pressure Warning	100	17
High Air Filter Differential Pressure Shutdown	107	0
Low Air Filter Differential Pressure Shutdown	107	1
Air Filter Differential Pressure Sensor Short High	107	3
Air Filter Differential Pressure Sensor Short Low	107	4
High Air Filter Differential Pressure Warning	107	15
Low Air Filter Differential Pressure Warning	107	17
High Engine Coolant Temperature Shutdown	110	0
Engine Coolant Temperature Sensor Short High	110	3
Engine Coolant Temperature Sensor Short Low	110	4
High Engine Coolant Temperature Warning	110	15
Low Engine Coolant Temperature Warning	110	17
High Engine Coolant Level Shutdown	111	0
Low Engine Coolant Level Shutdown	111	1

Event Name	SPN	FMI
Engine Coolant Level Sensor Short High	111	3
Engine Coolant Level Sensor Short Low	111	4
High Engine Coolant Level Warning	111	15
Low Engine Coolant Level Warning	111	17
High Fire Extinguisher Pressure Shutdown	137	0
Low Fire Extinguisher Pressure Shutdown	137	1
Fire Extinguisher Pressure Sensor Short High	137	3
Fire Extinguisher Pressure Sensor Short Low	137	4
High Fire Extinguisher Pressure Warning	137	15
Low Fire Extinguisher Pressure Warning	137	17
Low Battery Charging System Voltage Warning	167	17
High Battery Voltage Shutdown	168	0
High Battery Voltage Warning	168	15
Low Battery Voltage Warning	168	17
High Ambient Air Temperature Shutdown	171	0
Low Ambient Air Temperature Shutdown	171	1
Ambient Air Temperature Sensor Short High	171	3
Ambient Air Temperature Sensor Short Low	171	4
High Ambient Air Temperature Warning	171	15
Low Ambient Air Temperature Warning	171	17
High Exhaust Temperature Shutdown	173	0
Low Exhaust Temperature Shutdown	173	1
Exhaust Temperature Sensor Short High	173	3
Exhaust Temperature Sensor Short Low	173	4
Exhaust Temperature Signal Abnormal	173	8
High Exhaust Temperature Warning	173	15
Low Exhaust Temperature Warning	173	17
High Engine Oil Temperature Shutdown	175	0
Low Engine Oil Temperature Shutdown	175	1
Engine Oil Temperature Sensor Short High	175	3
Engine Oil Temperature Sensor Short Low	175	4
High Engine Oil Temperature Warning	175	15
Low Engine Oil Temperature Warning	175	17
Engine Over Speed Shutdown	190	0
Engine Under Speed Shutdown	190	1
Engine Speed Sensor Erratic or Not Present	190	2
Engine Speed Sensor Open	190	5
Engine Under Speed Warning	190	17
Software Version Mismatch	234	31
SCADA Data Link Fault	625	11
Primary Data Link Fault	639	11
Custom Event #1 High Shutdown	701	0
Custom Event #1 Low Shutdown	701	1
Custom Event #1 High Warning	701	15
Custom Event #1 Low Warning	701	17
Custom Event #1 Status	701	31
Custom Event #2 High Shutdown	702	0
Custom Event #2 Low Shutdown	702	1
Custom Event #2 High Warning	702	15
Custom Event #2 Low Warning	702	17
Custom Event #2 Status	702	31
Custom Event #3 High Shutdown	703	0
Custom Event #3 Low Shutdown	703	1
Custom Event #3 High Warning	703	15
Custom Event #3 Low Warning	703	17
Custom Event #3 Status	703	31
Custom Event #4 High Shutdown	704	0
Custom Event #4 Low Shutdown	704	1

Event Name	SPN	FMI
Custom Event #4 High Warning	704	15
Custom Event #4 Low Warning	704	17
Custom Event #4 Status	704	31
Custom Event #5 High Shutdown	705	0
Custom Event #5 Low Shutdown	705	1
Custom Event #5 High Warning	705	15
Custom Event #5 Low Warning	705	17
Custom Event #5 Status	705	31
Custom Event #6 High Shutdown	706	0
Custom Event #6 Low Shutdown	706	1
Custom Event #6 High Warning	706	15
Custom Event #6 Low Warning	706	17
Custom Event #6 Status	706	31
Custom Event #7 High Shutdown	707	0
Custom Event #7 Low Shutdown	707	1
Custom Event #7 High Warning	707	15
Custom Event #7 Low Warning	707	17
Custom Event #7 Status	707	31
Custom Event #8 High Shutdown	708	0
Custom Event #8 Low Shutdown	708	1
Custom Event #8 High Warning	708	15
Custom Event #8 Low Warning	708	17
Custom Event #8 Status	708	31
Custom Event #9 Status	709	31
Custom Event #10 Status	710	31
Custom Event #11 Status	711	31
Custom Event #12 Status	712	31
Custom Event #13 Status	713	31
Custom Event #14 Status	714	31
Custom Event #15 Status	715	31
Custom Event #16 Status	716	31
Digital Output #1 Short High	924	3
Digital Output #2 Short High	925	3
Emergency Stop Switch Activated	970	31
High Generator Rear Bearing Temperature Shutdown	1122	0
Low Generator Rear Bearing Temperature Shutdown	1122	1
Generator Rear Bearing Temperature Sensor Short High	1122	3
Generator Rear Bearing Temperature Sensor Short Low	1122	4
High Generator Rear Bearing Temperature Warning	1122	15
Low Generator Rear Bearing Temperature Warning	1122	17
High Generator Winding #1 Temperature Shutdown	1124	0
High Generator Winding #1 Temperature Warning	1124	15
High Generator Winding #2 Temperature Shutdown	1125	0
High Generator Winding #2 Temperature Warning	1125	15
High Generator Winding #3 Temperature Shutdown	1126	0
High Generator Winding #3 Temperature Warning	1126	15
Accessory Data Link Fault	1231	11
Fuel Tank Leak	1239	31
Unexpected Engine Shutdown	1383	11
High Gas Pressure Shutdown	1390	0
Low Gas Pressure Shutdown	1390	1
High Gas Pressure Warning	1390	15
Low Gas Pressure Warning	1390	17
Engine Failure to Start	1664	31
High Right Exhaust Temperature Shutdown	2433	0
Low Right Exhaust Temperature Shutdown	2433	1
Right Exhaust Temperature Sensor Short High	2433	3
Right Exhaust Temperature Sensor Short Low	2433	4

Event Name	SPN	FMI
Right Exhaust Temperature Signal Abnormal	2433	8
High Right Exhaust Temperature Warning	2433	15
Low Right Exhaust Temperature Warning	2433	17
High Left Exhaust Temperature Shutdown	2434	0
Low Left Exhaust Temperature Shutdown	2434	1
Left Exhaust Temperature Sensor Short High	2434	3
Left Exhaust Temperature Signal Abnormal	2434	8
Left Exhaust Temperature Sensor Short Low	2434	4
High Left Exhaust Temperature Warning	2434	15
Low Left Exhaust Temperature Warning	2434	17
Generator Over Frequency Shutdown	2436	0
Generator Under Frequency Shutdown	2436	1
Engine Speed-Generator Output Frequency Mismatch Warning	2436	2
Generator Output Sensing System Failure	2436	12
Generator Over Frequency Warning	2436	15
Generator Under Frequency Warning	2436	17
Generator Over Voltage Shutdown	2440	0
Generator Under Voltage Shutdown	2440	1
Generator Over Voltage Warning	2440	15
Generator Under Voltage Warning	2440	17
Generator Over Current Shutdown	2448	0
Generator Over Current Warning	2448	15
Generator Reverse Power Shutdown	2452	1
Generator High Power Warning	2452	15
Generator Reverse Power Warning	2452	17
Service Maintenance Interval Warning	2648	31
Engine Controller Not Responding	3543	9
Utility Breaker System Fault	3546	11
Engine Inlet Manifold Charge Combustion	3783	31
EPS Supplying Load	3829	31
Custom Event #17 Status	3880	31
Custom Event #18 Status	3881	31
Custom Event #19 Status	3882	31
Custom Event #20 Status	3883	31
Custom Event #21 Status	3888	31
Custom Event #22 Status	3889	31
Custom Event #23 Status	3890	31
Custom Event #24 Status	3891	31
Custom Event #25 Status	3892	31
Custom Event #26 Status	3893	31
Custom Event #27 Status	3894	31
Custom Event #28 Status	3895	31
Custom Event #29 Status	3896	31
Custom Event #30 Status	3897	31
Custom Event #31 Status	3898	31
Custom Event #32 Status	3899	31
Custom Event #33 Status	3904	31
Custom Event #34 Status	3905	31
Custom Event #35 Status	3906	31
Custom Event #36 Status	3907	31
Custom Event #37 Status	3908	31
Custom Event #38 Status	3909	31
Custom Event #39 Status	3910	31
Custom Event #40 Status	3911	31
Custom Event #41 Status	3912	31
Custom Event #42 Status	3913	31
Custom Event #43 Status	3914	31
Custom Event #44 Status	3915	31

Event Name	SPN	FMI
Custom Event #45 Status	3920	31
Custom Event #46 Status	3921	31
Custom Event #47 Status	3922	31
Custom Event #48 Status	3923	31
Custom Event #49 Status	3924	31
Custom Event #50 Status	3925	31
Custom Event #51 Status	3926	31
Custom Event #52 Status	3927	31
Custom Event #53 Status	3928	31
Custom Event #54 Status	3929	31
Custom Event #55 Status	3930	31
Custom Event #56 Status	3931	31
Air Damper Closed	4000	31
ATS in Normal Position	4001	31
ATS in Emergency Position	4002	31
Battery Charger Failure	4003	31
Generator Breaker Closed	4004	31
Utility Breaker Closed	4005	31
Engine in Cooldown	4006	31
Generator Control Not in Automatic Warning	4007	31
Generator Breaker Failure to Open	4009	31
Utility Breaker Failure to Open	4010	31
Generator Breaker Failure to Close	4011	31
Utility Breaker Failure to Close	4012	31
Generator Circuit Breaker Open	4013	31
Utility Breaker Open	4014	31
Utility to Generator Transfer Failure Shutdown	4015	0
Utility to Generator Transfer Failure Warning	4015	15
Generator to Utility Transfer Failure Warning	4016	15
Loss of Utility	4017	31
Generator Breaker Locked Out	4018	31
Utility Breaker Locked Out	4019	31
Earth Fault	4028	31
Earth Leakage	4029	31
Low Battery Cranking Voltage Warning	4256	17

1.2 Control

1.2.1 Automatic Start/Stop

Setpoints > Control > Automatic Start/Stop				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Description**
Engine start fault protection activation delay time	0	300	Sec	Time delay to prevent shut down during start up from low oil pressure etc.
Crank Duration	5	300	Sec	Amount of time the control energizes (cranks) the starting motor
Crank Cycle Rest Interval	5	300	Sec	Time the control de-energizes the starting motor between crank cycles
Engine Purge Cycle Time	0	20	Sec	
Maximum Number of Crank Cycles	1	20	N/a	Number of crank/rest cycles that the control will try.
Cooldown Duration	0	30	Min	The time allowing the engine to run after a normal shutdown is initiated
Start Aid Activation Time	0	240	Sec	Amount of time the control activates start aid control output. Set to 10 seconds for a EUI with prelube option.
Crank Alert Activation Time	0	60	Sec	Amount of time the control activates crank alert output.
Crank Terminate RPM	100	1000	RPM	Engine speed setting used in order to disengage the starting motor during engine cranking
Engine Fuel Type Configuration	List			Setpoint allows for selection of "Diesel" or "Natural Gas"
Fuel Shutoff Solenoid Type Configuration	List			Type of fuel system solenoid used on the generating set. Select "Energized to run" (ETR) or "Energized to Shut Off" (ETS).
Engine Cooldown Speed Configuration	List			Select engine speed during cooldown - rated or idle.
Engine Operating State Input Configuration	List			Set to "CAN Input" for common engine interface engines and set to "Hard Wired "for non-common engine interface EUI engines and non-EUI engines.
Engine Idle Operation Enable Status Engine	List			
Fuel Priming Feature Enable Status	List			
Engine Coolant Temperature Sensor Configuration	List			Set to "Sensor" for MUI Engines and set to "Data Link" for EUI Engines.
Engine Oil Pressure Sensor Configuration	List			Set to "Sensor" for MUI Engines and set to "Data Link" for EUI Engines.
Low Idle Low Engine Oil Pressure Warning Event Threshold	34	690	Kpa	
Low Idle Low Engine Oil Pressure Shutdown Event Threshold	34	690	Kpa	
Low Engine Oil Pressure Step Speed	400	1800	RPM	When the engine speed below this, the Low Idle setpoint is used. Set to 800 RPM for engines rated at 1000 or 1200 RPM. Set to 1200 RPM for engines rated at 1500 or 1800 RPM.
Emergency Stop Input Active State Configuration				

1.2.2 AVR Desired Voltage

Setpoints > Control > AVR Desired Voltage				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Description**
Maximum Generator Voltage Output Bias Percentage	0	100	%	The Maximum Generator Output voltage Bias Percent is the maximum value above and below the Nominal Voltage that the control will send a request for when adjusting the voltage from the control screen
Generator Nominal Output Voltage	100	50000	V	The Generator Nominal Output Voltage is the desired output voltage of the generating set. This value is set to match the generator rated voltage.

1.2.3 Governor Desired Engine Speed

Setpoints > Control > Governor Desired Engine Speed				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Description**
Maximum Engine Speed Range	0	2000	rpm	The Maximum Engine Speed Range is the maximum value above and below the Nominal Engine Speed that PowerWizard will send a request for when adjusting the speed from the control screen
Generator Nominal Output Frequency	40	500	Hz	This value is set to match the generator rated frequency

1.3 Engine Monitor / Protect

1.3.1 Battery Voltage Monitor

Setpoints > Engine Monitor / Protect > Battery Voltage Monitor			
Setpoint Name	**Min Value**	**Max Value**	**Units**
High Battery Voltage Warning Event Threshold	12	50	VDC
High Battery Voltage Warning Event Notification Delay Time	0.0	240	sec
High Battery Voltage Shutdown Event Threshold	12	50	VDC
High Battery Voltage Shutdown Event Notification Delay Time	0.0	240	sec
Low Battery Voltage Warning Event Threshold	0.0	25.0	VDC
Low Battery Voltage Warning Event Notification Delay Time	0.0	240	sec
Low Battery Charging System Voltage Warning Event Threshold	0.0	30	VDC
Low Battery Charging System Voltage Warning Event Notification Delay Time	0.0	240	sec
Low Cranking Voltage Warning Event Threshold	0.0	30.0	VDC
Low Cranking Voltage Warning Event Notification Delay Time	0.0	240	sec

1.3.2 Crank / Start Counter

Setpoints > Engine Monitor / Protect > Crank / Start Counter					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Customer Security Password Level to Reset Crank / Start Counters	0	4	n/a	3	Password level required in order to reset the Crank / Start Counters

1.3.3 Engine Speed Monitor

Setpoints > Engine Monitor / Protect > Engine Speed Monitor				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Description**
Flywheel Teeth	95	350	N/A	
Engine Over Speed Shutdown Threshold	400	4330	rpm	Set to 118% of rated speed
Engine Under Speed Warning Event Threshold	400	4330	rpm	Set to 86% of rated speed
Engine Under Speed Warning Event Notification Delay Time	0.0	20.0	sec.	
Engine Under Speed Shutdown Event Threshold	400	4330	rpm	Set to 82% of rated speed
Engine Under Speed Shutdown Event Notification Delay Time	0.0	20.0	sec.	
Engine Speed Sensor Configuration	Value List			

1.3.4 Enhanced Engine Monitor

Setpoints > Engine Monitor/Protect > Enhanced Engine Monitor				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Description**
Engine Cylinder Temperature Sensor Installation Status	Value List			Select "Installed" or "Not installed"
Number of Engine Cylinders	1	20	n/a	

1.3.5 Service Maintenance Interval

Setpoints > Eng Monitor/Protect > Service Maintenance Interval				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**
Service Maintenance Interval Hours	0.0	2000	hours	500
Service Maintenance Interval Days	0.0	365	days	180
Customer Password Security Level to Reset Service Maintenance Interval	0.0	4	N/A	3

1.4 Events

Description of Event Response Selection	
Active Only	Only displays event in the event log (no history on the event)
Warning	Event logged, amber warning status LED
Audible Alert	Activates relay output configured as "horn control"
Soft Shutdown	Shutdown event allows cooldown cycle
Hard Shutdown	Shutdown event skips cooldown cycle for fast engine shutdown
Breaker 1 Trip	Activates relay output configured as "breaker 1 trip"
Breaker 2 Trip	Activates relay output configured as "breaker 2 trip"
FTP	Suppress the event until the engine is running and the fault protection timer has expired

1.5 Generator Monitor / Protect

1.5.1 Enhanced generator monitor

Setpoints > Generator Monitor / Protect > Enhanced Generator Monitor					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Generator Winding Temperature Sensor Installation Status	Value List				Set to "Installed" when a temperature module is installed on the accessory data link
Number of Generator Bearing Temperature Sensors	Value List				

1.5.2 Generator AC monitor

Setpoints > Generator Monitor/Protect > Generator AC Monitor				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Description**
Generator Connection Configuration	Value List			Configurations can be: "Star/Wye" "Delta/3 Wire" "Delta/4 Wire" "Single Phase 2 Wire""Single Phase 3 Wire"
Generator Potential Transformer Primary Winding Rating	1	50000	V	For direct sensing leave at default value. For an application requiring a potential transformer set to transformer primary winding value.
Generator Potential Transformer Secondary Winding Rating	1	240	V	For direct sensing leave at default value. For an application requiring a potential transformer set to transformer secondary winding value
Generator Current Transformer Primary Winding Rating	1	7000	A	Set to current transformer primary winding value
Generator Current Transformer Secondary Winding Rating	1	5	A	Can only be set to 1 or 5
Number of Generator Poles	0	200	N/A	
Generator Rated Frequency	Value List			
Generator Rated Voltage	100	50000	V	
Generator Rated Power	1	50000	kW	
Generator Rated Apparent Power	1	50000	kVA	

1.5.3 Generator AC power monitor

The generator AC power monitor measures all generator power quantities, such as kW, kWh, kVAr, kVArh, kVA etc.

Setpoints > Gen Monitor/Protect > Gen AC Power Mon				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**
Customer Password Security Level to Reset Generator Energy Meters	0	3	N/A	3

1.5.4 Generator over current

Setpoints > Generator Monitor/Protect > Generator Over Current					
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**	**Description**
Generator Definite Time Over Current (Amp) Warning Event Percentage Threshold	80	130	%	100	Threshold for the Over Current Warning
Generator Inverse Time Over Current (Amp) Shutdown Event Time Multiplier	0.05	10.00	N/A	0.27	Time multiplier setpoint (TM) used in equation: t = (TMx0.14)/[(I/Is)0.02-1]
Generator Definite Time Over Current (Amp) Shutdown Event Percentage Threshold	100	300	%	125	If current is above this setpoint value for the specified time (setpoint #4) there will be an overcurrent shutdown.
Generator Definite Time Over Current (Amp) Shutdown Event Notification Delay Time	0.1	20.0	sec.	10	Time delay for setpoint #3

1.5.5 Generator Over / Under Frequency

Setpoints > Generator Monitor/Protect > Generator Over/Under Freq				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**
Generator Over Frequency Warning Event Percentage Threshold	80	120	%	105
Generator Over Frequency Warning Event Notification Delay Time	0.0	120	sec.	10
Generator Over Frequency Shutdown Event Percentage Threshold	80.0	120	%	110
Generator Over Frequency Shutdown Event Notification Delay Time	0.0	120	sec.	2
Generator Under Frequency Warning Event Percentage Threshold	80.0	120.0	%	95.0
Generator Under Frequency Warning Event Notification Delay Time	0.0	120	sec.	10
Generator Under Frequency Shutdown Event Percentage Threshold	80.0	120.0	%	90.0
Generator Under Frequency Shutdown Event Notification Delay Time	0.0	120	sec.	4

1.5.6 Generator Over / Under Voltage

Setpoints > Generator Monitor / Protect > Generator Over / Under Volt				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Factory Default**
Generator Over Voltage Warning Event Percentage Threshold	100	125	%	105
Generator Over Voltage Warning Event Notification Delay Time	0.0	120	sec.	10
Generator Over Voltage Shutdown Event Percentage Threshold	100	125	%	110
Generator Over Voltage Shutdown Event Notification Delay Time	0.0	120	sec.	2
Generator Under Voltage Warning Event Percentage Threshold	60	100	%	95
Generator Under Voltage Warning Event Notification Delay Time	0.0	120	sec.	10
Generator Under Voltage Shutdown Event Threshold	60	100	%	90
Generator Under Voltage Shutdown Event Notification Delay Time	0.0	120	sec.	4

1.5.7 Generator Reverse Power

Setpoints > Generator Monitor/Protect > Generator Reverse Power			
Setpoint Name	**Min Value**	**Max Value**	**Units**
Generator Reverse Power Warning Event Percentage Threshold	1	20	%
Generator Reverse Power Warning Event Notification Delay Time	0	30	sec.
Generator Reverse Power Shutdown Event Percentage Threshold	1	20	%
Generator Reverse Power Shutdown Event Notification Delay Time	0	30	sec.

1.6 Network

Setpoints > Network > Data Link - SCADA				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Description**
SCADA Data Link Baud Rate	2400	57600	N/A	
SCADA Data Link Parity	N/A	N/A	N/A	Select "None""Odd" or "Even"
SCADA Data Link Slave Address	1	247	N/A	
SCADA Data Link Access Password	0.0	0xfffff	N/A	
SCADA Data Link Connection Timeout Interval	0.1	3600.0	sec.	
RS-485 Bias Resistor Enable Status	Disabled	Enabled	N/A	

1.7 Reduced Power Mode

Setpoints > Reduced POWER Mode > Delay Time				
Setpoint Name	**Min Value**	**Max Value**	**Units**	**Description**
Reduced power mode delay time	1	100	min	The control will run at reduced power mode after delay. This mode can be disabled using Level 3 password.

1.8 Inputs & Outputs

1.8.1 Digital Inputs

Refer to the Digital Inputs section.

1.8.2 Digital Outputs

Refer to the Relay and Digital Outputs section.

1.8.3 Relay Outputs

Refer to the Relay and Digital Outputs section.

1.8.4 Analogue Inputs

The Analogue input coverts a resistive or Analogue voltage sender value to units and detects a high or low condition on the sender input. An input can be selected for temperature, pressure and levels. Only the options associated with the selection will appear on the menu. For example, if temperature is selected, some options related to pressure or level may not appear in the menu.

Setpoints > Inputs & Outputs > Analogue Input (#1 to #3)					
Setpoint Name	**Min Value**	**Max Value**	**Resolution**	**Units**	**Factory Default**
Analogue Input Type	Value list				0
Analogue Input Range	Value list				0
Analogue Input Data Identification	Value list				0
Analogue Input Configuration Code	1	25	1	N/A	1
Analogue Input Data Range Min	-1	50000	0.01	N/A	0
Analogue Input Data Range Max	-1	50000	0.01	N/A	100
Analogue Input High Warning Event Threshold	0	50000	1	N/A	100
Analogue Input High Warning Event Delay	0	240	0.10	sec	0
Analogue Input Low Warning Event Threshold	0	50000	1	N/A	0
Analogue Input Low Warning Event Delay	0	240	0.10	sec	0
Analogue Input High Shutdown Event Threshold	0	50000	1	N/A	100
Analogue Input High Shutdown Event Delay	0	240	0.10	sec	0
Analogue Input Low Shutdown Event Threshold	0	50000	1	N/A	0
Analogue Input Low Shutdown Event Delay	0	240	0.10	sec	0
Analogue Input Isolated Supply Voltage	Value list				0
Analogue Input Common Supply Voltage	Value list				0