



Owner's Manual

Diesel Generator Set — Model RGS35Y

35 kW Continuous | 38 kW Emergency | 120/240V | 60 Hz

Yanmar 4TNV98-ZGGE Diesel Engine

Stamford S1L2-K1 Alternator

Deep Sea Electronics DSE4520 MKII Controller



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Section 2: Introduction

Thank you for choosing the RoyalGen RGS35Y generator set. You have acquired a superior quality product, designed and assembled to deliver reliable and high-performance emergency electrical power. RoyalGen is proud to support you with equipment that combines power, durability, and ease of use.

The RGS35Y is a diesel generator set providing 32 kW continuous power and 35 kW emergency power. It is powered by a Yanmar 4TNV98-ZGGES diesel engine renowned for its reliability and fuel efficiency, coupled with a Stamford S1L2-K1 alternator, a world leader in power generation technology. The system is managed by a Deep Sea Electronics DSE4520-MKII controller, offering complete automated management of the generator set. The unit is EPA Tier 3 certified for stationary emergency use. This manual covers all the information required for the installation, operation, and maintenance of your generator set. It is essential to read this document in its entirety before putting the unit into service. A thorough understanding of operation and maintenance procedures will help maximize the lifespan of your equipment and ensure safe and optimal operation.

ⓘ NOTICE This generator set is designed exclusively for stationary emergency or prime power supply. Any use outside of this application will void the warranty and could pose safety risks.

Section 3: Safety and Precautions

Safety is the absolute priority when using your generator set. This section presents the safety pictograms used in this manual as well as the essential precautions to be observed at all times.

3.1 Safety Pictograms

The following pictograms are used throughout this manual to draw your attention to important safety-related information:

Pictogram	Meaning	Description
 DANGER	Danger (red)	Indicates an imminent hazard that, if not avoided, will result in serious injury or death.
 WARNING	Warning (orange)	Indicates a potentially hazardous situation that could result in serious injury or death.
 CAUTION	Caution (yellow)	Indicates a potentially hazardous situation that could result in minor or moderate injuries.
 NOTICE	Notice (blue)	Indicates important information not related to personal injury.

3.2 General Precautions

- Never operate the generator set in an enclosed or partially enclosed space, including garages, basements, hangars, or any building. Exhaust gases contain carbon monoxide (CO), a deadly, odorless, and colorless gas.
- Risk of carbon monoxide (CO) poisoning: CO can cause death within minutes. Always install the generator set outdoors, in a well-ventilated area, at least 1.5 meters from any opening (windows, doors, air intakes).
- Keep flammable materials away from the generator set. Maintain a minimum clearance of 1 meter around the unit. Never store fuel, solvents, or other combustible substances nearby.

- Never refuel during operation. Stop the engine and allow it to cool before filling the tank. Diesel vapors are flammable.
- Wear personal protective equipment (PPE) during maintenance: protective gloves, safety glasses, and hearing protection if necessary.
- Allow the engine to cool before any maintenance. Engine components, the exhaust system, and coolant can cause severe burns.
- Never modify the exhaust system. Any unauthorized modification may create fire hazards, CO poisoning risks, or damage the engine.
- Keep children and animals away from the generator set at all times. The unit contains moving parts, hot surfaces, and live electrical components.
- Always consult a qualified technician for repairs and technical work. Do not attempt to repair the generator set without the proper skills and tools.

3.3 Electrical Precautions

- Risk of electrocution: Always disconnect the power and ensure the generator set is completely stopped before performing any electrical work.
- Never connect the generator set directly to the electrical grid without a certified transfer switch. Direct connection causes a deadly backfeed to utility workers.
- Ensure that grounding is properly installed in accordance with local electrical codes before commissioning.
- Use only cables rated for the generator set's nominal power. Undersized cables present a fire hazard.
- Do not expose electrical connections to moisture. Protect all connections and outlets from rain, snow, and standing water.
- Comply with local electrical codes (Quebec Building Code) for any permanent installation.
- Have the generator set installed by a certified electrician. The electrical installation must be inspected and approved by the competent authorities.

⚠ DANGER — Risk of BackfeedNever connect the generator set directly to your building's electrical panel without a certified transfer switch. Backfeed sends high-voltage electricity into the public utility lines, posing a lethal danger to utility workers and neighbors. This practice is illegal and constitutes a violation of the Electrical Code. Have a transfer switch installed by a certified electrician.

⚠ WARNING — Carbon Monoxide (CO) Poisoning Carbon monoxide (CO) is an odorless, colorless, and deadly gas produced by diesel combustion. Inhaling CO can cause loss of consciousness and death within minutes. Never operate the generator set indoors, in a garage, basement, or any enclosed space. Install the unit outdoors only, in a well-ventilated area, with the exhaust directed away from any dwelling. Install certified CO detectors in your building.

Section 4: Generator Set Overview

4.1 General Description

The RoyalGen RGS35Y is a professional-grade diesel generator set designed to provide reliable emergency electrical power to residences, businesses, and critical facilities. Offering 32 kW (32 kVA) continuous power and 35 kW (35 kVA) emergency power at 120/240V and 60 Hz, it is capable of accepting 100% of its rated load in one step, ensuring a seamless transition during a grid outage.

At the heart of the RGS35Y is the Yanmar 4TNV98-ZGGES engine, a 4-cylinder diesel engine recognized worldwide for its reliability, efficiency, and longevity. This direct electronic injection engine, equipped with 12V glow plugs, provides reliable starts even in extremely cold weather. The engine is coupled with a Stamford S1L2-K1 alternator, manufactured by Cummins Generator Technologies, the world's number one manufacturer of generator alternators.

Intelligent management of the generator set is provided by the Deep Sea Electronics DSE4520-MKII controller, offering automatic, manual, test, and exercise modes, as well as comprehensive monitoring of engine parameters. A SmartGen BAC06A-12V intelligent battery charger maintains the starting battery at optimal charge to always ensure reliable automatic starting.

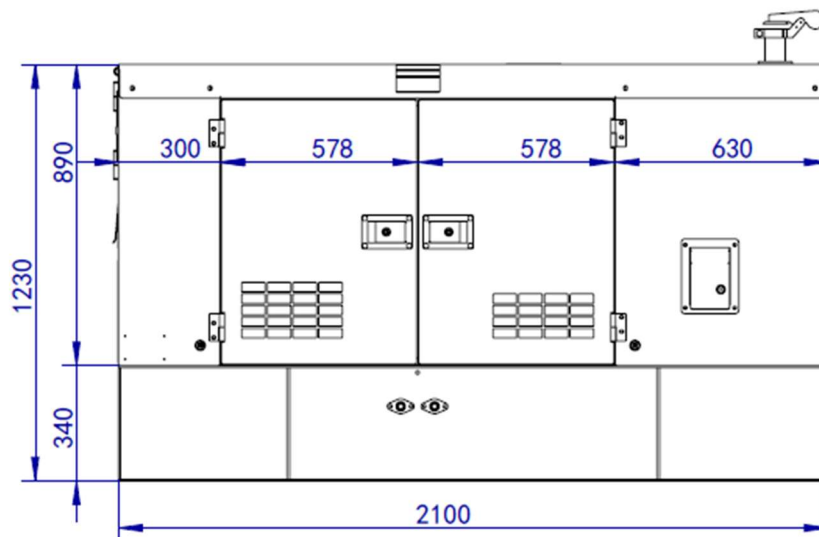
The RGS35Y features a sound-attenuated enclosure for quiet operation, a 100-liter fuel tank providing approximately 24 hours of runtime at 75% load, and a standard 120V / 1500W block heater for cold weather starting. The quick-drain system for oil and coolant simplifies maintenance. Built with CSA-rated components to CSA standards, and EPA Tier 3 certified for stationary emergency use, the RGS35Y represents the best in reliability and performance.

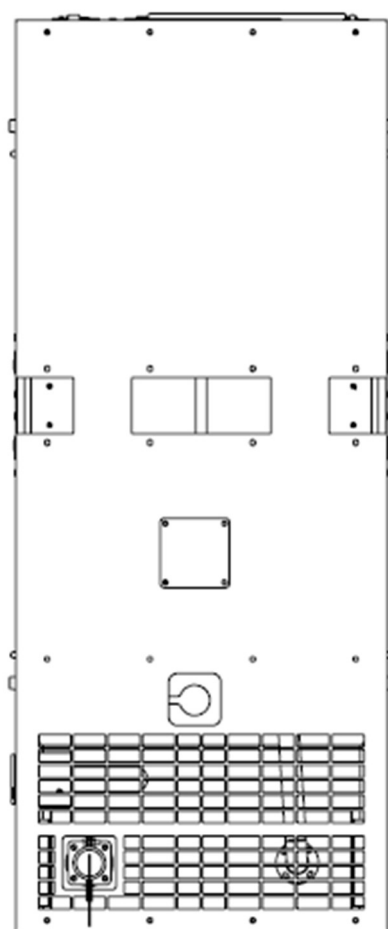
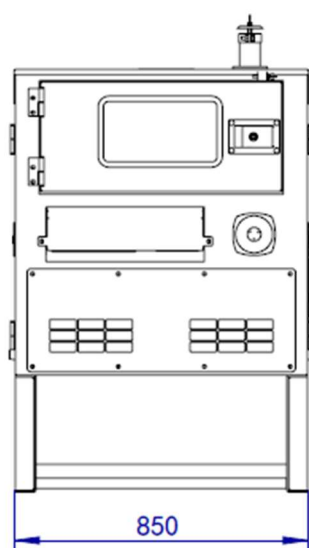
4.2 Main Specifications

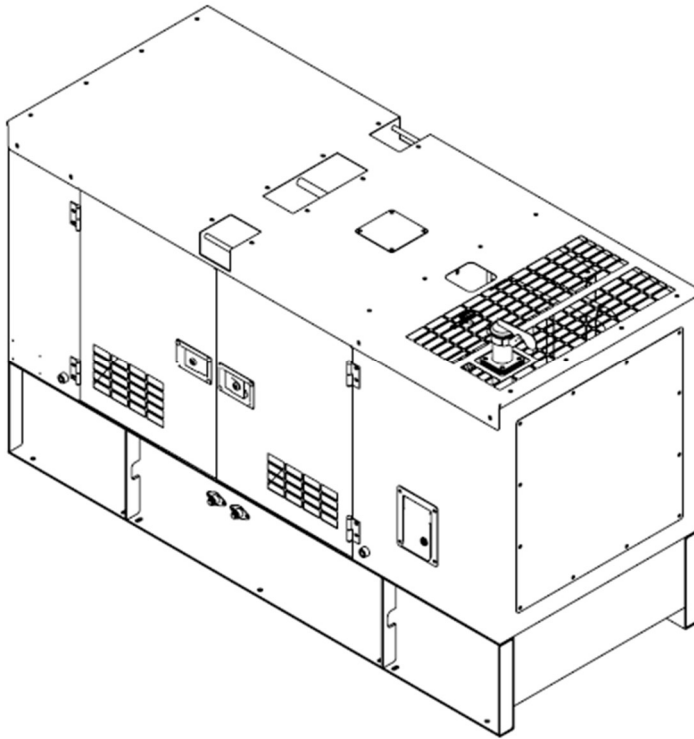
Parameter	Value
Model	RGS35Y
Continuous Power (Prime)	32 kW / 32 kVA
Emergency Power	35 kW / 35 kVA
Voltage	120/240V
Frequency	60 Hz
Power Factor	1,0
Emergency Current	145 A
Engine	Yanmar 4TNV98-ZGGES
Alternator	Stamford S1L2-K1
Controller	DSE4520MKII
Fuel Tank	200 litres
Runtime at 75% Load	~24 heures
Certification	EPA Tier 3 — Stationary Emergency Use

4.3 Dimensions and Weight

Parameter	Value
Length	2005 mm
Width	855mm
Height	1230 mm
Weight	975 kg







Section 5: Technical Specifications

5.1 Performance

Voltage	Emergency Power (kW)	Power Factor	Emergency KVA	Continuous Power (kW)	Continuous KVA	Emergency Current (A)
120/240V	35	1,0	35	32	32	100

5.2 Sound Levels

Distance	Sound Level
1 meter	69 dB
7 meters	64 dB

Measured at full load conditions (100%). Levels may vary depending on installation and environment.

5.3 Fuel Consumption

The data below is based on emergency rated values:

Load	Consumption (L/h)	Approximate Runtime (hours)
25 %	4.46	~45
50 %	5.65	~35
75 %	8.25	~24
100 %	11	~18

Fuel tank capacity: 200 litres. Runtime based on 200L tank at emergency rating. Actual runtime may vary depending on load conditions, ambient temperature, and altitude.

Section 6:

Diesel Engine — Yanmar 4TNV98-ZGGE

6.1 Engine Specifications

Parameter	Value
Manufacturer	Yanmar
Model	4TNV98-ZGGE
Type	4-cycle, vertical in-line, water-cooled diesel
Number of Cylinders	4
Displacement	3.319 L (202.5 cu in)
Bore × Stroke	98 x 110 mm (3.86 x 4.33 in)
Compression Ratio	18.5:1
Aspiration	Naturally Aspirated
Fuel Injection	Distributor-type MP4 pump
Rated Speed	1800 RPM
Net Intermittent Power	40.8 kW (54.7 hp) @ 1800 RPM
Gross Power	42.4 kW (56.9 hp) @ 1800 RPM
Governor Type	Electronic

Parameter	Value
Starting System	12V electric with glow plugs
Engine Dry Weight	235 kg

The Yanmar 4TNV98-ZGGE is a naturally aspirated, 4-cycle, water-cooled diesel engine with a displacement of 3.319 litres. It delivers 40.8 kW (54.7 hp) net intermittent power at 1800 RPM, providing ample reserve capacity for the RGS35Y generator set. The engine features direct injection via a distributor-type MP4 fuel injection pump and an electronic governor for precise speed regulation under varying load conditions.

6.2 Lubrication System

Parameter	Value
Crankcase Capacity	10.5 litres
Recommended Oil Type	API CI-4 or higher, SAE 15W-40
Normal Oil Pressure	50 psi (379 kPa)
Low Pressure Shutdown	7 psi (48 kPa)
Change Interval	250 hours or annually

Check the oil level daily before each start, with the engine stopped and cold. Remove the dipstick, wipe it clean, reinsert it fully, then remove it again to read the level. The level must be between the "Min" and "Max" marks on the dipstick. Never exceed the "Max" mark and never operate the engine with the level below the "Min" mark.

Use exclusively a diesel engine oil classified API CI-4 or higher. For summer conditions and temperatures above 0°C, use SAE 15W-40 oil. For winter conditions and temperatures below 0°C (typical in Quebec), use SAE 10W-30 or synthetic appropriate oil to facilitate cold starting.

Always use API CI-4 or higher classified oil and strictly follow the 250-hour or annual change intervals, whichever comes first.

6.3 Air Intake System

Parameter	Value
Filter Type	Replaceable dry element
Maximum Restriction	2,9 kPa
Inspection Interval	250 hours

A clean air supply is essential for proper operation of the engine. The air filter prevents abrasive particles (dust, sand, debris) from entering the engine cylinders. A clogged filter reduces airflow and decreasing its efficiency, increasing exhaust temperatures, and potentially causing permanent damage to the engine.

Inspect the air filter every 250 hours and replace it every 500 hours or as soon as it is visibly dirty. In dusty environments, more frequent inspections and replacements may be necessary if operated in heavy dust environment. Never operate the engine without the air filter installed. Unfiltered air will rapidly and irreversibly damage the internal engine components.

6.4 Exhaust System

Parameter	Value
Exhaust Flow	N/D
Exhaust Temperature	N/D
Maximum Restriction	1,42 PSI (9,8 kPa)

The exhaust system must be installed in accordance with local building codes and safety requirements. Exhaust back pressure must never exceed the maximum restriction of 1.42 PSI (9.8 kPa). Excessive back pressure reduces engine power, increases fuel consumption, and can damage the engine. Ensure that the exhaust piping and muffler are rated to withstand these elevated temperatures. Maintain adequate clearance between exhaust components and any combustible material.

⚠ WARNING — Carbon Monoxide Exhaust gases contain carbon monoxide (CO), a deadly gas. Ensure the exhaust system is leak-tight and that gases are vented outdoors, away from any window, door, or building air intake.

6.5 Diesel Fuel Requirements

- Use No. 2 diesel fuel conforming to ASTM D975 or equivalent.

- Minimum cetane number: 45.
- Ultra-low sulfur diesel (ULSD) is recommended.
- **Do not use biodiesel blends above B5 without manufacturer approval.**
- Fuel tank capacity: 200 liters.
- The generator set is equipped with a low fuel level alarm set at 10%.
- A quick-drain system is integrated to facilitate fuel maintenance.
- Store fuel properly in approved containers, away from light and moisture. Use a fuel stabilizer for long-term storage (beyond 30 days).
-

6.6 Cooling System

Parameter	Value
Capacity	10 litres (aprox with engine heater installed)
Antifreeze Type	Yanmar Long Life (LL) or equivalent
Radiator Cap Pressure	13 PSI (90 kPa)
Block Heater	120V / 1500W (standard)

The cooling system must be filled with a 50/50 mixture of approved antifreeze (Yanmar Long Life or equivalent) and distilled or demineralized water. This mixture provides freeze protection down to approximately -37°C and overheat protection up to approximately 108°C. Never use water only, even in summer.

The 120V / 1500W block heater is an essential standard feature, particularly in Canada where winter temperatures can drop well below -20°C. The block heater maintains coolant at an adequate temperature, ensuring quick and reliable starts in cold weather and reducing engine wear at startup. It must be plugged in at all times when the generator set is in standby mode during the cold season.

Check the coolant level daily, with the engine cold. Never open the radiator cap when the engine is hot — pressurized fluid can cause severe burns. Perform a complete drain and replacement of the antifreeze annually to maintain the anti-corrosion and antifreeze properties of the fluid.

Section 7: Alternator — Stamford S1L2-K1

7.1 Alternator Specifications

Parameter	Value
Manufacturer	Stamford (Cummins Generator Technologies)
Model	S0L2-U1
Continuous Power	37,5 kVA
Emergency Power	39,8 kVA
Voltage	120/240V
Frequency	60 Hz
Insulation	Classe H (180 °C)
Protection	IP23
Maximum Overspeed (2 min)	2250 tr/min
Total Harmonic Distortion (THD)	< 5 %
Bearing	1 ball bearing
Winding	4-wire

7.2 Alternator Maintenance

The Stamford S0L2-U1 alternator is designed for reliable operation with minimal maintenance. Follow these recommendations to ensure its longevity:

- **Keep ventilation openings clear.** The alternator requires adequate airflow for cooling. Never obstruct ventilation grilles with debris, tools, or other objects.
- **Check for abnormal vibrations and noises.** Excessive vibrations or unusual noises may indicate an alignment, bearing, or imbalance problem. Stop the unit and have it inspected by a qualified technician.
- **Inspect winding insulation annually.** Degraded insulation can cause short circuits and alternator failures. Have an insulation resistance test (megohmmeter) performed by a qualified technician.
- **Check the bearing condition.** A worn bearing produces a characteristic rumbling noise. Replace the bearing at the first signs of wear.

- Complete professional inspection every 2,000 hours. Have a thorough alternator inspection performed by a certified technician, including insulation tests, bearing checks, AVR verification, and visual inspection of the windings.

Section 8: Controller — DSE4520 MKII

8.1 Description

The DSE4520MKII, manufactured by Deep Sea Electronics, is an automatic engine control module designed for standby generator sets. It provides complete management of engine starting and stopping, whether in automatic or manual mode. Its main features include:

- Automatic and manual engine starting
- Configurable exercise timer for periodic testing
- Real-time monitoring of engine parameters: oil pressure, coolant temperature, battery voltage, and speed (RPM)
- Backlit LCD display for viewing data and alarms
- Programmable alarms and shutdowns for engine protection
- User-friendly interface with dedicated control buttons

8.2 Specifications

Parameter	Value
Manufacturer	Deep Sea Electronics
Model	DSE4520MKII
Supply Voltage	8-35V DC
Starting Modes	Automatic / Manual
Exercise	Programmable
Display	Backlit LCD
Protection	IP65 (face avant)

8.3 Operating Modes

The DSE4520MKII controller offers the following operating modes:

- **OFF Mode:** The generator set is deactivated. The engine cannot start, whether manually or automatically. Use this mode during maintenance or when the unit should not be in service.
- **MANUAL Mode:** The operator controls engine starting and stopping via the controller buttons. Load transfer is performed manually by closing the main circuit breaker.
- **AUTO Mode:** The generator set starts automatically when a mains failure signal is detected. Load transfer is performed automatically after engine stabilization. Upon mains return, the unit executes a cooldown sequence then stops automatically.
- **TEST Mode:** The engine starts for a test period without performing load transfer. This mode allows verifying engine operation without interrupting mains power.
- **EXERCISE Mode:** The controller automatically starts the engine according to a programmed schedule (e.g., weekly) for an exercise cycle. This mode ensures the engine remains in good operating condition and the battery stays charged.

8.4 Control Buttons

The front panel of the DSE4620-06 controller includes the following buttons:

- **STOP / RESET Button (Stop/Reset):** Stops the engine in any mode. Also press this button to reset an alarm after identifying and correcting the cause. In automatic mode, this button deactivates the generator set.
- **MANUAL Button (Manual):** Places the controller in manual mode. Allows manual engine starting and stopping by the operator.
- **AUTO Button (Auto):** Places the controller in automatic mode. The generator set is ready to start automatically on mains failure signal.
- **START Button (Start):** Starts the engine in manual mode. This button has no effect in automatic mode (starting is managed by the mains failure signal).
- **Navigation Buttons:** Allow browsing the LCD screen menus, viewing real-time parameters, reviewing alarm history, and accessing configuration options.

8.5 Alarms and Protections

The DSE4620-06 controller continuously monitors engine parameters and triggers alarms or protective shutdowns when abnormal conditions are detected:

Alarm	Action
Low Oil Pressure	Shutdown
High Coolant Temperature	Shutdown
Overspeed	Shutdown
Underspeed	Shutdown
Start Failure	Shutdown
Low Battery Voltage	Warning
High Battery Voltage	Warning
Low Fuel Level	Warning
Charger Fault	Warning

Shutdown: The controller immediately stops the engine to prevent damage. The engine cannot restart until the alarm is reset after correcting the problem.

Warning: The controller displays the alarm on screen and activates the audible indicator, but the engine continues to run. The operator must identify and correct the cause as soon as possible.

8.6 Configuration

The DSE4520MKII controller has numerous configurable parameters accessible via the LCD screen menu. Configurable elements include:

- Start and stop timers
- Alarm thresholds (oil pressure, temperature, battery voltage)
- Exercise schedule (day, time, duration)
- Remote start input
- Number of start attempts
- Preheat and cooldown duration

! NOTICE Modification of controller configuration parameters must be performed only by a certified technician. Incorrect settings may compromise engine protection or cause system failures.

Section 9: Battery Charger — SmartGen

BAC06A-12V

9.1 Description

The RGS35Y generator set is equipped with a SmartGen BAC06A switch-mode battery charger. This charger is designed for maintenance (float) charging of lead-acid starting batteries. It automatically maintains the battery in full charge condition when the generator set is in standby mode.

The installed model is the BAC06A-12V, providing a maximum charge current of 6 A.

Main features:

- Switch-mode power supply — wide AC input voltage range (95~280 V), compact and lightweight
- Two-stage charging (constant current then constant float voltage)
- Short-circuit and reverse polarity protection
- Adjustable voltage and current via potentiometers (VOLTS ADJ. and AMP ADJ.)
- Two LED indicators: POWER and CHARGING
- Replaceable 10 A output fuse

9.2 Specifications

Parameter	Value
Input	
AC Input Voltage	95~280 V CA
Frequency	50 / 60 Hz
Maximum Input Current	2 A
Output (12 V)	
Maximum Charge Current	6 A (factory setting)
Maximum Power	85 W
Open Circuit Voltage (float)	13.8 V ($\pm 1\%$)
No-Load Consumption	< 3 W
Protection	
Output Fuse	10 A
Protection	Short circuit, reverse polarity
Insulation	
Insulation Resistance	DC 500 V, $R \geq 500 \text{ M}\Omega$

Parameter	Value
Insulation Voltage	AC 1500 V, 50 Hz, 1 min
Environment	
Operating Temperature	-30 °C to +55 °C
Storage Temperature	-40 °C to +85 °C
Humidity	20% to 93% RH (non-condensing)
Physical	
Dimensions	143 × 96 × 55 mm
Weight	0,65 kg
Efficiency	85 %

9.3 Charging Principle

The BAC06A charger uses a two-stage charging method:

- **Stage 1 — Constant current:** When battery voltage is low, the charger provides a constant current of up to 6 A. The battery charges rapidly.
- **Stage 2 — Constant voltage (float):** When the battery voltage reaches the threshold, the current gradually decreases. The charger maintains a stable voltage of 13.8 V. When the current drops below 0.3 A, the battery is considered fully charged and the CHARGING indicator turns off.

9.4 Panel Indicators and Controls

Element	Description
POWER (green LED)	Lights up when the charger is powered and operating normally
CHARGING (LED)	Lights up when charge current exceeds 0.3 A. Turns off when battery is fully charged
VOLTS ADJ. (potentiometer)	Output voltage adjustment. Disconnect battery, measure voltage and adjust
AMP ADJ. (potentiometer)	Charge current adjustment. Connect battery and measure current during adjustment
Terminals L and N	AC Input (95~280 V). BVR copper wire 1 mm ²
Terminals B+ and B-	DC Output to battery. BVR copper wire 1.5 mm ²
10 A Fuse	Output protection. Reverse polarity will blow the fuse

9.5 Troubleshooting

Symptom	Probable Cause	Corrective Action
POWER LED on but no output voltage	10 A fuse blown (short circuit or reverse polarity)	Check and replace the 10 A fuse
No voltage after fuse replacement	Internal charger failure	Return charger for repair
POWER LED off	No AC power at terminals L and N	Check AC input voltage (95~280 V)
CHARGING LED does not light up	Battery fully charged (current below 0.3 A)	Normal condition — no action required
CHARGING LED does not light up	Battery not connected or poor contact	Check connections at terminals B+ and B-
Battery does not fully charge	Output voltage improperly adjusted	Adjust VOLTS ADJ. to 13.8 V (battery disconnected)
Insufficient charge current	Output current improperly adjusted	Adjust AMP ADJ. to desired current (max 6 A)
Fuse blows repeatedly	Short circuit in output wiring	Inspect wiring between charger and battery

Section 10: Operating Procedures

10.1 Pre-Start Checks

Before each start of the generator set, perform the following checks:

- ☐ Check engine oil level (between Min and Max marks on the dipstick)
- ☐ Check coolant level
- ☐ Check fuel level
- ☐ Visually inspect for leaks (oil, fuel, antifreeze)
- ☐ Check battery connections (clean and tight)
- ☐ Check battery voltage (min. 12.4V)
- ☐ Ensure the main circuit breaker is in the OPEN position
- ☐ Check the air filter condition
- ☐ Ensure the enclosure is closed and secured
- ☐ Verify that the exhaust system is clear

⚠ CAUTION — Cold Weather Starting the block heater (120V / 1500W) for at least 2 hours before starting in cold weather (below 0 °C). The block heater maintains coolant at an adequate temperature, facilitating starting and reducing engine wear. In standby mode during winter, the block heater must remain plugged in at all times.

10.2 Startup Procedures

A) Manual Start

- Set the controller to MANUAL mode by pressing the corresponding button.
- Press the START button. The controller will automatically activate the preheat (12V glow plugs) before engaging the starter.
- The engine starts with automatic preheat. If the engine does not start after the first attempt, the controller will make additional attempts according to its configuration.
- If possible, allow the engine to warm up at idle for 3 to 5 minutes before applying load. This warm-up period is essential for the engine components.
- Close the main circuit breaker to supply the load.

B) Automatic Start

- Set the controller to AUTO mode by pressing the corresponding button. The generator set is now in standby mode.
- The unit starts automatically during a mains failure. The controller detects the mains failure and initiates the automatic start sequence (preheat, start, stabilization).
- Load transfer is performed automatically after engine and output voltage stabilization.

10.3 During Operation

While the generator set is running, observe the following recommendations:

- **Monitor the parameters displayed on the DSE4520MKII controller screen: output voltage, frequency, oil pressure, coolant temperature, battery voltage, and engine speed.**
- **Check oil pressure — the nominal value is 50 PSI (345 kPa). A pressure drop indicates a problem requiring immediate shutdown.**

- Monitor coolant temperature. An abnormal rise may indicate a circulation problem, low level, or fan failure.
- Listen carefully for any abnormal noise: clicking, rumbling, whistling, or unusual vibrations.
- Do not exceed the rated power of 22 kW in continuous operation.
- The 35 kW power rating is reserved for emergency mode only and must not be used for extended periods.

⚠ WARNING Do not exceed the rated power. Overloading the generator set can damage the alternator and engine. In continuous mode, do not exceed 32 kW. The 35 kW rating is strictly reserved for emergency mode. Never refuel during operation. Stop the engine, allow it to cool for at least 5 minutes, then refuel. Diesel vapors near hot components present a fire hazard.

10.4 Shutdown Procedures

A) Manual Shutdown

- Gradually reduce the load by disconnecting powered equipment, starting with the largest loads.
- Open the main circuit breaker to disconnect the load from the generator set.
- Press the STOP button on the controller.
- The engine stops. Verify that no alarm is displayed on the controller.

B) Automatic Shutdown

- When start contact close, the generator will automatically start
- When start contact close, the generator will automatically stop
- Automatic engine shutdown occurs at the end of the cooldown period (if programmed). The generator set returns to standby mode.

Section 11: Periodic Maintenance

Regular maintenance is essential to ensure the reliability, performance, and longevity of your RGS35Y generator set. Strictly follow the maintenance schedule below and record every service in the maintenance log (Section 16).

11.1 Maintenance Schedule

Task	Daily	50 h	250 h	500 h	1000 h	Annual
Check oil level	✓					
Check coolant level	✓					
Check fuel level	✓					
Visual inspection (leaks, damage)	✓					
Check battery voltage	✓					
Check air filter condition		✓				
Oil change and filter replacement			✓			
Replace fuel filter				✓		
Replace air filter				✓		
Replace antifreeze						✓
Check / adjust belts				✓		
Inspect exhaust system						✓
Alternator maintenance					✓	
Load test						✓
Radiator cleaning				✓		

11.2 Oil and Filter Change

Interval: Every 250 operating hours or annually, whichever comes first.

- Warm up the engine for 5 to 10 minutes to thin the oil and suspend contaminants.
- Stop the engine and wait 5 minutes to allow the oil to settle in the crankcase.
- Place a collection container of at least 8 liters under the drain point.
- Use the quick-drain system to drain the used oil. Allow the oil to drain completely.

- Remove the old oil filter. Wipe the filter mounting surface on the engine block. Apply a thin coat of new oil on the new filter gasket. Hand-tighten the new filter until the gasket contacts, then tighten an additional half-turn by hand. Do not use a tool to tighten the filter.
- Close the drain plug and fill the crankcase with 10.5 litres of new API CI-4, SAE 15W-40 oil (or SAE 10W-30 in cold weather, below 0°C).
- Check the oil level on the dipstick. The level must be between the Min and Max marks.
- Start the engine and let it run for 2 minutes. Check for leaks at the filter and drain plug. Stop the engine, wait 2 minutes, then recheck the oil level and top up if necessary.

⚠ CAUTION —Engine oil is hot and can cause burns. Wear heat-resistant protective gloves. Avoid all skin contact. Dispose of used oil in accordance with local environmental regulations — never dispose of used oil in drains, soil, or household waste. Return used oil to an approved collection point.

11.3 Fuel Filter Replacement

Interval: Every 500 operating hours or per manufacturer recommendations.

- Stop the engine and allow it to cool.
- Close the fuel supply valve (if applicable) to prevent diesel flow.
- Place a collection container under the fuel filter to catch residual fuel.
- Remove the old fuel filter. Clean the mounting surface.
- Fill the new filter with clean diesel before installation. Apply a thin coat of diesel on the new filter gasket.
- Install the new filter by hand. Tighten until the gasket contacts, then tighten an additional half-turn by hand.
- Open the fuel supply valve.
- Bleed the fuel system: Use the manual priming pump (located on the fuel pump) to pump fuel into the system. Pump slowly and steadily until firm resistance is felt, indicating that the system is bled of all air.
- Start the engine and let it run for a few minutes. Check for leaks at the filter and fittings.

- If the engine runs irregularly or stalls, repeat the bleeding procedure.

Use exclusively genuine Yanmar fuel filters or approved equivalent filters. Use of unapproved filters may affect engine performance and could void the warranty.

11.4 Air Filter Maintenance

Inspection: Every 50 hours. Replacement: Every 500 hours or when visibly dirty.

- Stop the engine and allow it to cool.
- Open the air filter housing. Remove the latches or clips securing the cover.
- Carefully remove the filter element to prevent debris from falling into the intake duct.
- Inspect the filter element. Visually check for dust and debris accumulation. If the filter is moderately dirty, gently tap it to remove surface dust. If the filter is very dirty, damaged, or deformed, replace it.
- Clean the inside of the air filter housing with a clean, damp cloth.
- Install the new or cleaned filter element. Ensure it is properly seated and the seal is airtight.
- Close the housing and ensure all latches are securely fastened.

! NOTICE —A clean air filter is crucial. A clogged filter reduces airflow to the engine decreasing its efficiency and potentially causing overheating of engine. Never operate the engine without an air filter installed. Unfiltered air contains abrasive particles that will rapidly and irreversibly damage the internal engine components.

11.5 Battery Maintenance

The starting battery is an essential component for the automatic operation of the generator set. Regular maintenance ensures reliable starts at all times.

- Check terminals for corrosion. Inspect battery terminals and cables for any signs of corrosion (whitish or greenish deposits). Corrosion increases electrical resistance and may prevent starting.
- Clean with a baking soda solution if corrosion is present. Mix one tablespoon of baking soda in a glass of warm water. Apply with a brush, rinse with clean water, and dry. Apply a thin coat of dielectric grease to the terminals after cleaning.

- Check electrolyte level (for maintainable batteries). Plates must be fully submerged. Top up with distilled water only if necessary. Never add acid.
- Test battery voltage. A fully charged battery should read between 12.6V and 12.8V. A voltage below 12.4V indicates insufficient charge. Below 12.0V, the battery is significantly discharged and must be recharged or replaced.
- Ensure the charger is functioning properly. The steady green LED on the SmartGen BAC4812-KP charger indicates the battery is in maintenance charge (float mode). If the LED is off or red, refer to Section 9.5 (Charger Troubleshooting).
- Replace the battery every 3 to 5 years, or sooner if it no longer maintains an adequate charge. Use a battery of equivalent capacity and type to the original battery.

SECTION 12 — TROUBLESHOOTING GUIDE

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NOTICE This troubleshooting guide covers the most commonly encountered problems on the RGS35Y generator set equipped with the Yanmar 4TNV98-ZGGES engine. For major repairs, consult a certified RoyalGen dealer.

12.1 Organigramme de diagnostic rapide

Use the table below to quickly identify the source of the problem and the corrective action to take.

Symptom	Check	Action
Engine does not start	Battery, fuel, preheat	Charge battery, bleed fuel, check glow plugs
Engine starts but stalls	Fuel filter, air in system	Replace filter, bleed
Engine runs but no power output	Breaker, alternator, AVR	Reset breaker, check AVR
Unstable voltage	Load, regulator, connections	Reduce load, adjust AVR, tighten
Excessive black smoke	Air filter, overload,	Clean filter, reduce load
White smoke at startup	Insufficient preheat, injection timing	Wait for full preheat, check timing
Engine overheating	Antifreeze level, radiator, belt	Add antifreeze, clean radiator, adjust belt
Abnormal vibrations	Mounts, alignment	Tighten mounts, check alignment,

12.2 Engine — Problems and Solutions

The following table lists 55 common problems for the Yanmar 4TNV98-ZGGES engine, organized by category. Consult the probable cause and apply the recommended solution.

#	Problem	Possible Cause	Solution
STARTING (1–10)			
1	Engine does not crank	Discharged battery / corroded cables	Charge/replace battery, clean terminals
2	Starter cranks, engine does not start	No fuel / air in system	Check level, bleed system
3	Difficult cold weather starting	Defective glow plugs	Test/replace 12V glow plugs
4	Starter engages but slips	Worn pinion / damaged ring gear	Inspect/replace pinion or ring gear
5	Engine starts then stalls	Clogged fuel filter	Replace fuel filter
6	No starter click	Defective relay / blown fuse	Test relay, check fuse
7	Engine cranks very slowly	Oil too viscous	Use recommended oil (15W-40 or 10W-30)
8	Starter spins without engaging	Defective solenoid	Test/replace solenoid
9	Preheat does not work	Defective preheat control module	Check/replace module
10	Engine stalls after a few seconds	Defective fuel shutoff solenoid	Test/replace solenoid
OPERATION (11–25)			
11	Engine runs irregularly	Water in fuel	Drain tank, replace filter, bleed
12	Progressive power loss	Clogged air filter	Clean/replace filter element
13	Excessive fuel consumption	Worn / miscalibrated injectors	Test/recalibrate injectors
14	Engine stalls under load	Defective injection pump / contaminated fuel	Check pump, drain fuel
15	Unstable idle speed	Misadjusted mechanical governor	Adjust governor per Yanmar specifications
16	Engine accelerates/decelerates without intervention	Air leak in fuel system	Tighten fittings, replace gaskets
17	Engine does not reach speed	Stuck throttle cable / seized governor	Lubricate cable, clean governor
18	Engine knocking	Injection timing off	Check/adjust injection timing
19	Metallic knocking at idle	Excessive connecting rod play	Have inspected (major repair)
20	Excessive vibrations	Worn / loose engine mounts	Inspect/tighten/replace vibration mounts
21	Continuous black smoke under load	Overload or Clog air filter	Reduce load, inspect air filter

#	Problem	Possible Cause	Solution
22	Blue exhaust smoke	Worn rings — oil consumption	Measure compression, replace rings
23	Persistent white smoke	Failing injector / damaged head gasket	Test injectors, check head gasket
24	Unburnt fuel odor	Injector stuck open	Replace defective injector
25	Engine continues after shutoff	Shutoff solenoid does not close	Check solenoid power, replace
LUBRICATION (26–30)			
26	Low oil pressure (alarm 7 psi)	Insufficient oil level	Check/top up level (7.4 L)
27	Oil pressure too high when cold	Oil too viscous / stuck relief valve	Check viscosity, clean valve
28	Oil turns black quickly	Normal for diesel / oil change intervals too long	Follow oil change every 250 hours
29	Oil leak at crankcase	Worn crankcase gasket / loose bolts	Torque to spec, replace gasket
30	Oil pressure light flickers when hot	Clogged oil filter / worn pump	Replace filter, check pump
COOLING (31–38)			
31	Overheating (alarm)	Low antifreeze level	Check/top up (10 L)
32	Temperature rises rapidly	Clogged radiator	Clean fins with compressed air
33	Antifreeze leak	Punctured hose / loose clamp	Replace hose, tighten clamp
34	Fan does not turn	Broken belt / defective clutch	Replace belt, check clutch
35	Temperature stays low	Thermostat stuck open	Replace thermostat
36	Overheating after extended operation	Failing water pump	Replace water pump
37	Antifreeze in oil (creamy emulsion)	Blown head gasket	Stop immediately, replace head gasket
38	Radiator cap does not hold pressure (13 PSI)	Worn cap gasket	Replace radiator cap
EXHAUST AND INTAKE (39–45)			
39	Power loss + black smoke	Saturated air filter (max 2.9 kPa)	Replace filter element immediately
40	Unusual intake whistling	Leak between filter and intake	Check intake clamps and hoses
41	Power loss at altitude	Air rarefaction	Consult dealer for adjustment
42	Excessive exhaust restriction (max 1.42 PSI)	Obstructed muffler / crushed pipe	Inspect/clean/replace muffler
43	Excessive exhaust soot	Incomplete combustion	Operate between 30% and 80% load
44	Exhaust smell in enclosure	Manifold / gasket leak	Tighten manifold bolts, replace gasket

12.3 Battery and Electrical System

The 12V DC electrical system powers the starter, the DSE4620-06 controller, and accessories. The BAC4812-KP battery charger (5A) maintains the battery charge during idle periods.

#	Problem	Possible Cause	Solution
1	Battery does not hold charge	End of life / defective cell	Test; replace if <12.4V at rest
2	Charge voltage too high	BAC06A-12V charger improperly adjusted	Check charger settings
3	Charge voltage too low	Defective charger / oxidized connections	Clean terminals, test charger
4	Excessive terminal corrosion	Acid vapors / overcharge	Clean with baking soda, dielectric grease
5	Charger does not work	Blown fuse / no 120V	Check fuse and power supply
7	Charger LEDs off	Power fault / defective board	Check input voltage, replace charger
8	Fuse blows repeatedly	Persistent short circuit / wrong rating	Identify short circuit, correct fuse rating
9	Battery discharges in days	Parasitic drain current	Measure rest current, isolate circuit
10	Hot battery cables	loose connection	Tighten connections
11	Intermittent 12V system	Poor grounding	Clean/tighten ground point
12	DSE low voltage alarm	Weak battery / inadequate charger	Charge battery, check BAC4812-KP charger (5A)

12.4 DSE4520 MKII Controller Description

The DSE4620-06, manufactured by Deep Sea Electronics (United Kingdom), is an automatic engine control module designed for standby generator sets (AMF — Auto Mains Failure). It provides complete management of engine starting and stopping, whether in automatic or manual mode.

Main features:

- Automatic and manual engine starting
- Configurable exercise timer for periodic tests
- Real-time monitoring of engine parameters: oil pressure, coolant temperature, battery voltage, and engine speed (RPM)
- Backlit LCD display for viewing data and alarms

- Programmable alarms and shutdowns for engine protection
- User-friendly interface with dedicated control buttons
- Mains monitoring (voltage and frequency) with automatic switching
- USB port for configuration via PC software (DSE Configuration Suite)

12.5 Complete Technical Specifications

GENERAL

Parameter	Value
Manufacturer	Deep Sea Electronics (DSE)
Model	DSE4520MKII
Type	AMF Control Module
DC Supply Voltage	8 V to 35 V DC
Max. Operating Current	85 mA at 12V / 96 mA at 24V
Max. Standby Current	51 mA at 12V / 47 mA at 24V
Max. Sleep Current	35 mA at 12V / 32 mA at 24V
Deep Sleep Current	< 10 μ A at 12V / < 10 μ A at 24V
Cranking Dropout Tolerance	Survives 0V for 50 ms (if supply $\geq$ 10V before dropout)
Operating Temperature Range	-30°C to +70°C
Storage Temperature	-40°C to +80°C
Protection	IP65 (front panel installed)
Overall Dimensions	140 × 113 × 43 mm
Panel Cutout	118 × 92 mm
Max. Panel Thickness	8,0 mm
Weight	0,28 kg
Certifications	UL, CE

VOLTAGE AND FREQUENCY SENSING

Parameter	Value
Generator Voltage Range	15 V to 415 V AC (Ph-N) / 26 V to 719 V AC (Ph-Ph)
Mains Voltage Range	15 V to 415 V AC (Ph-N) / 26 V to 719 V AC (Ph-Ph)
Frequency Range	3.5 Hz to 75 Hz
Magnetic Pickup (MPU)	$\pm$ 0.5 V to 70 V / max 10,000 Hz

OUTPUTS

Parameter	Value
Output A (Fuel)	10 A short-term / 5 A continuous, at supply voltage
Output B (Starter)	10 A short-term / 5 A continuous, at supply voltage
Auxiliary Outputs C and D	2 A DC at supply voltage
Auxiliary Outputs E and F	2 A DC at supply voltage

DISPLAY AND CONFIGURATION

Parameter	Value
Display Type	Backlit LCD
Configuration Interface	USB Port (DSE Configuration Suite software)

12.6 Safety Pictograms and Display Indicators

The table below presents the safety pictograms and status indicators used on the DSE4620-06 controller display. Familiarize yourself with these symbols before putting the generator set into service.

Symbol	Designation	Description
	DANGER	Risk of serious or fatal injury if instructions are not followed
	WARNING	Risk of equipment damage or injury if precautions are not followed
	NOTICE	Important information for proper generator set operation
	SHUTDOWN	The controller immediately stops the engine — Red icon on LCD screen
	WARNING	The controller displays the alarm but the engine continues — Yellow icon on LCD screen
	ELECTRICAL TRIP	Electrical overload protection — Lightning icon on LCD screen
	MAINTENANCE	Scheduled maintenance reminder reached — Wrench icon on LCD screen
	RUNNING	The engine is running — Green icon on LCD screen
	AUTO MODE	The unit is in automatic mode, ready to start on mains failure
	OFF MODE	The unit is deactivated, no starting possible

Operating Modes

The DSE4620-06 controller offers five distinct operating modes, selectable via the front panel control buttons. Each mode determines the generator set's behavior in response to operating conditions.

Mode	Description	Use
OFF Mode	The generator set is deactivated. The engine cannot start.	Maintenance, storage, out of service
MANUAL Mode	The operator controls starting and stopping via the controller buttons.	Tests, voluntary starting
AUTO Mode	Automatic start on mains failure signal. Automatic transfer after stabilization. Cooldown sequence on mains return.	Normal operation in standby mode
TEST Mode	The engine starts without load transfer.	Engine operation verification
EXERCISE Mode	Automatic start according to programmed schedule.	Maintaining operational readiness

12.7 Control Buttons

The front panel of the DSE4620-06 controller is equipped with dedicated control buttons for direct control of the generator set.

Button	Function
STOP / RESET (Stop/Reset)	Stops the engine in any mode. Resets an alarm after correction. In auto mode, deactivates the unit.
MANUAL (Manual)	Places the controller in manual mode.
AUTO (Auto)	Places the controller in automatic mode.
START (Start)	Starts the engine in manual mode only.
Navigation ▲ ▼ ◀ ▶	Browse LCD menus, view parameters and alarm history.

12.8 Alarm Codes and Protections

The DSE4620-06 controller continuously monitors engine and mains parameters. It triggers alarms or protective shutdowns when abnormal conditions are detected. Alarms are classified into three categories based on severity.

12.8.1 Shutdown Alarms — ● IMMEDIATE ENGINE SHUTDOWN

The controller immediately stops the engine to prevent damage. The engine cannot restart until the alarm is reset after correcting the problem.

Code	Alarm	Description	Corrective Action
	Low Oil Pressure	Engine oil pressure has dropped below the critical threshold (default: 7 psi / 0.48 bar)	Check oil level. Inspect pressure sensor. Check for leaks.
	High Coolant Temperature	Coolant temperature exceeds the critical threshold (default: 104°C / 220°F)	Check coolant level. Inspect radiator and thermostat. Clean radiator fins.
	Overspeed	Engine speed exceeds the programmed maximum limit (default: 1980 RPM for 60 Hz)	Check governor and injection system. Inspect speed actuator.
	Underspeed	Engine speed has dropped below the programmed minimum limit (default: 1620 RPM for 60 Hz)	Check fuel supply. Inspect fuel filters. Check governor.
	Start Failure (Overcrank)	Engine did not start after the programmed number of attempts (default: 3 attempts)	Check fuel level. Test battery and starter. Check preheat circuit.
	Emergency Stop	The emergency stop button has been activated	Identify the cause of the emergency stop. Reset the button. Reset the controller.
	Configurable Digital Input (Shutdown)	A digital input configured in shutdown mode has been activated	Identify the sensor or device connected to the input. Correct the detected condition.

12.8.2 Warning Alarms — ● ENGINE CONTINUES RUNNING

The controller displays the alarm on screen and activates the audible indicator, but the engine continues to run. The operator must identify and correct the cause as soon as possible.

Code	Alarm	Description	Corrective Action
	Low Battery Voltage	Battery voltage is below the threshold (default: 11.5V for 12V system)	Check engine alternator connections.
	High Battery Voltage	Battery voltage exceeds the threshold (default: 15.5V for 12V system)	Check the charge regulator and BAC06A charger. Test battery.
	Low Fuel Level	Fuel level has dropped below the warning threshold	Refuel the tank. Check the fuel level sensor.
	Charger Fault (Charge Fail)	The battery charging system is not operating correctly	Check the engine charge alternator. Inspect belt. Check BAC06A charger.
	Maintenance Alarm	The hour meter has reached the programmed maintenance threshold	Perform the scheduled maintenance. Reset the maintenance counter via the LCD menu.

12.8.3 Electrical Trips — ⚡ ELECTRICAL PROTECTION

Electrical trips protect the alternator and load circuits against overloads and electrical faults. The engine is stopped and cannot restart until reset.

Code	Alarm	Description	Corrective Action
	Overcurrent	Output current exceeds the alternator's rated capacity	Reduce load. Check load circuits for short circuits. Inspect current transformers (CTs).
	Generator Over Voltage	Alternator output voltage is too high	Check the automatic voltage regulator (AVR). Inspect alternator connections.
	Generator Under Voltage	Alternator output voltage is too low	Check AVR and connections. Check connected load.
	Generator Over Frequency	Output frequency is too high (>63 Hz for 60 Hz system)	Check speed governor. Adjust engine speed.
	Generator Under Frequency	Output frequency is too low (<57 Hz for 60 Hz system)	Check governor. Reduce load if overloaded.

12.9 Configuration

The DSE4620-06 controller has numerous configurable parameters accessible via the LCD screen menu or the DSE Configuration Suite software via USB.

Configurable Parameter	Range / Options
Start Delay	0 to 999 seconds
Number of Start Attempts	1 to 9
Crank Cycle Duration	1 to 99 seconds
Safety Delay (Safety On)	0 to 999 seconds
Preheat Timer	0 to 999 seconds
Cooldown Timer	0 to 999 seconds
Temperature Alarm Thresholds	Configurable (°C or °F)
Battery Voltage Alarm Thresholds	Configurable (V)
Exercise Schedule	Day, time, programmable duration
Digital Input Configuration	Source, polarity, action, delay
Output Configuration	Assignable function
Protection PIN Code	4 digits

ⓘ NOTICE Modification of controller configuration parameters must be performed only by a certified technician. Incorrect settings may compromise engine protection or cause system failures. Refer to the DSE4610/4620 Installation Manual (Document 057-200) for detailed instructions.

Section 13: Long-Term Storage

13.1 Storage Preparation

If the RGS35Y generator set will not be used for more than 30 days, follow these steps to protect the Yanmar 4TNV98-ZGGESengine, the Stamford S0L2-U1 alternator, and auxiliary systems.

13.2 Recommissioning

Before returning the generator set to service after extended storage, follow these steps in order:

⚠ CAUTIONAfter extended storage, apply load gradually in 25% increments every 5 minutes. The engine requires a gradual temperature increase to ensure optimal operation.

Section 14: Warranty

14.1 Warranty Coverage

RoyalGen warrants the RGS35Y generator set against any defects in materials and workmanship under the following conditions:

Component	Warranty Period
Yanmar 4TNV98-ZGGES Engine	24 months or 2,000 hours (whichever comes first)
Stamford S1L2-K1 Alternator (emergency use)	36 months
RoyalGen Generator Set Assembly	12 months or 1,500 hours (whichever comes first)

The warranty takes effect on the date of commissioning or the date of delivery, whichever comes first.

14.2 Conditions and Exclusions

Conditions:

- The generator set must be installed in accordance with manufacturer instructions and applicable local codes.

- Periodic maintenance must be performed according to the schedule prescribed in Section 11, using parts and fluids conforming to manufacturer specifications.
- The maintenance log (Section 16) must be kept up to date with all documented interventions.
- Warranty repairs must be performed by an authorized RoyalGen technician or an authorized service center.

Exclusions — The warranty does not cover:

- Normal wear of consumable parts (filters, belts, batteries, fuses, bulbs).
- Damage caused by misuse, overloading, negligence, or inadequate maintenance.
- Damage caused by extreme environmental conditions (flooding, lightning, earthquake, extreme frost).
- Unauthorized modifications made to the generator set or its components.
- Use of fuel, oil, or coolant not conforming to manufacturer specifications.
- Transportation, travel, and labor costs not previously authorized by RoyalGen.
- Indirect or consequential damages (loss of revenue, damage to other equipment, etc.).

Claim Procedure:

- Contact RoyalGen by phone or email to report the problem (contact information in Section 15).
- Provide the model number (RGS35Y), the unit's serial number, and operating hours.
- Describe the problem in detail and provide relevant maintenance records.
- A RoyalGen technician will evaluate the claim and authorize repairs if the warranty is applicable.

Section 15: Contact and Service

For any technical questions, parts orders, service, or warranty claims, contact RoyalGen:

RoyalGen 120 des Sables St-Colomban, QC J5K 2N1 Canada Phone: 1 (450) 822-0408 Email: info@royalgen.ca Service Hours: Monday to Friday, 8:00 AM to 5:00 PM (EST) Emergency Service: 24/7 for service contract clients

Main Component References

Component	Model	Manufacturer
Engine	4TNV98-ZGGES	Yanmar
Alternator	S1L2-kK1	Stamford (Cummins Generator Technologies)
Controller	DSE4520MKII	Deep Sea Electronics
Battery Charger	BAC06A-12V	SmartGen

NOTICE When contacting RoyalGen or an authorized service center, please have on hand the model number (RGS35Y), the generator set serial number, and the number of operating hours displayed on the controller.

Section 16: Maintenance Log

Use the following tables to record all maintenance and service interventions performed on your RGS35Y generator set. An up-to-date maintenance log is required to maintain the warranty.

16.1 General Service and Repair Log

[illegible]

16.2 Annual Load Test

[illegible]