

Operation And Service Manual



Modular Stage 5 With GC01 Controller

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Warning:

This machine contains rotating and live parts. When used incorrectly, hazardous situations and injury can occur.

Therefore: read this manual carefully before using the machine or carrying out maintenance.

Turn off the machine before any covers are removed or opened.

Always place all covers back and close all covers before starting the machine.

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2 Introduction

This manual is for the operators of the Genmark Modular Stage 5 and those who perform maintenance or repairs on it. This manual should be available for the operator of the unit and/or the service company at all times.

The correct use of the Modular Stage 5 and observance of its safety regulations will allow a long and safe use of the Modular Stage 5.



The instruction manual of the Modular Stage 5 must be included at the time of purchase.

This manual is written for those who use the Modular Stage 5 and must be able to operate it. In addition to this instruction manual also a parts list for the Modular Stage 5 is available. Contact Genmark for mounting instructions on a trailer.

This operating manual is intended for the final user of the Modular Stage 5. Using this guide assumes that the end user can operate the product properly and is able to fix simple problems with the unit.

Any actions and/or problems which are not covered by these operating instructions require more knowledge than provided by this guide. Contact Genmark or an authorized dealer. Allow only authorized personnel to maintain, assemble and commission the Modular Stage 5. Do not make any modifications to the Modular Stage 5 without the express permission of the supplier, this particularly applies to the safety features of the Modular Stage 5.

This generator is solely and exclusively intended to be mounted on a trailer and to provide electrical power to an external application. Any other use can lead to damage and/or injury and is not allowed. In case of doubt, contact the supplier.

In this manual the following symbols are used:



→ Warning



→ Danger, High Voltage



→ Attention



→ Information/hint

3 Safety

The safety around the use and implementation of maintenance and/or repair work starts with the familiarization of the operating and maintenance instructions. Make sure that anyone who works with or performs repairs on the Modular Stage 5 has read and understood the regulations.

Only authorized personnel should operate and/or maintain the unit. New staff must be guided by experienced personnel on operation and service of the Modular Stage 5.

Do not make any modifications to the Modular Stage 5 without the express permission of the supplier.



Before installation, adjusting and operating the generator set, read this manual and only use the generator set when this manual is fully understood. When used incorrectly, damage and/or injury can occur. Instruct therefore all employees who work near the generator set. Make sure no unauthorized persons go near the generator.

- Make sure all applicable safety and electrical regulations are strictly followed. Installation is only allowed by qualified professional dealers. When the controller is not functioning correctly, have the controller checked by the supplier. Never use the generator set when it is not functioning properly or is damaged.

- Before using the generator set: check for any kind of leakages. Have them repaired before using the generator set. If the generator set gets damaged during operation, turn off the generator set and inspect the damage. Repair the damage before using the generator set again.

- Adjusting the diesel engine speed is done with running engine. CAUTION: The running engine can cause injury. Adjusting the engine speed can be done by opening the right cover and adjusting the engine governor. Immediately close the cover when the adjusting is done. Adjusting the engine speed is only allowed to be done by professionals to prevent injury and/or damage.

- The exhaust is located inside the genset frame. The exhaust becomes very hot during use. Make sure when servicing and/or cleaning the generator set, the exhaust is cooled down adequately to not cause any burns. Wear gloves when servicing and/or cleaning the generator set. CAUTION: also the radiator gets hot and can cause burns.

- When filling the diesel tank make sure the exhaust doesn't get in contact with diesel. Wait until the exhaust is cooled down before you fill the diesel tank.

- CAUTION: a badly serviced diesel engine or generator can cause serious injuries and/or damage. Service the generator set according to this manual. Regularly (once per day) check the state of the generator set for any damages or leakages.

- The generator is built in a closed frame. Removable covers are built in to allow for maintenance and cleaning. Mind the limited space inside the frame and prevent injuries by bumping and scratching into sharp objects. Wear gloves, work clothes and safety boots. Always close all covers before starting the generator set and keep all covers closed during operation.

- Do not let children play with or near the generator set. Children are not allowed to operate or move the generator.

- Make sure when servicing / cleaning / repairing the generator set is off (diesel engine is not running). All maintenance and cleaning should be done only when the generator set is off and the battery negative disconnected!

- Prevent leaking of oil, coolant, battery acid during maintenance or repair. If necessary place a properly sized tray beneath the location where leakage would occur. CAUTION: these liquids can cause severe soil pollution!



Never use the generator set if covers are missing or open. This can lead to damage and injuries. Assemble all covers first, check if they are properly assembled and not damaged. Then turn on the generator set.

CAUTION: The generator set contains rotating and moving parts (diesel engine, electric powered fan, v-belt). Keep a safe distance from these parts to prevent injuries.

FIRE HAZARD: When leakages of diesel, battery acid, or coolant are not directly remedied and all leaked fluid are removed, a fire can start in the generator set! Always keep the generator set clean and free of any leakages.



Safe and efficient use can only be reached with correct use of the equipment and with regular maintenance. An electric shock can cause severe personal injury or death.

3.1 General Safety Notices

The following general safety notices supplement the specific warnings and cautions appearing elsewhere in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered herein. The general safety notices are presented in the following three sections labelled: First Aid, Operating Precautions and Maintenance Precautions. A listing of the specific warnings and cautions appearing elsewhere in the manual follows the general safety notices.

3.2 First Aid

An injury, no matter how slight, should never go unattended. Always obtain first aid or medical attention immediately.

3.3 Operating Precautions

- Always wear safety glasses and hearing protection.
- Keep hands, clothing and tools clear of the radiator fan and rotating belts.
- No work should be performed on the unit until all circuit breakers and start-stop switches are turned off and the negative battery terminal has been disconnected.
- Always work in pairs. Never work on the equipment alone.
- In case of severe vibration or unusual noise, stop the unit and investigate.

3.4 Maintenance Precautions









Installation and servicing of equipment can be hazardous due to moving parts, hot coolant and electrical components. Only trained and qualified service personnel should install, repair, or service the equipment. Be sure power is turned off and the negative battery cable is disconnected before working on generator set.

Do not bypass any electrical safety devices, e.g. bridging an overload, or using any sort of jumper wires without written approval of Genmark. Problems with the system should be diagnosed, and any necessary repairs performed, by qualified service personnel. In case of electrical fire, open circuit switch and extinguish with CO₂ (never use water).

Fuel Tanks present explosion, fire and rupture hazards even if liquid fuel has been drained. Do not attempt any repairs, especially repairs using flame, welder or torch, unless you have been properly trained and the tank has been emptied of liquid fuel and fuel vapors and the tank is properly ventilated.

3.5 Warning symbols

In order to be able to understand the warning symbols on the gensets, an overview is given below of the used symbols.

	<p>GM. 001 – Forklift Lifting Pockets</p>
	<p>GM. 002 – DANGER, ELECTRICITY</p>
	<p>GM. 003 – ROTATING components may cause serious injuries.</p> <ul style="list-style-type: none"> - Switch off the engine before performing any work.
	<p>GM. 004 – ROTATING parts can crush and cut.</p>
	<p>GM. 005 – HEATED Components may cause burns.</p> <ul style="list-style-type: none"> - Do NOT touch until the genset has cooled down sufficiently.
	<p>GM. 006 – HEATED (hot) Coolant can cause serious burns.</p> <ul style="list-style-type: none"> - DO NOT remove radiator cap when it is still hot.
	<p>GM. 007 – Work on gensets only in ventilated areas.</p> <ul style="list-style-type: none"> - Do not inhale exhaust fumes.
	<p>GM. 008 – Do NOT use a pressure washer to clean the unit.</p> <ul style="list-style-type: none"> - This can damage electronics and cause short circuits.

3.6 Specific Hazards Indication

The indication that follows will be applicable to Genmark gensets. These recommended precautions must be understood and applied during operating the unit and maintenance work.

DANGER

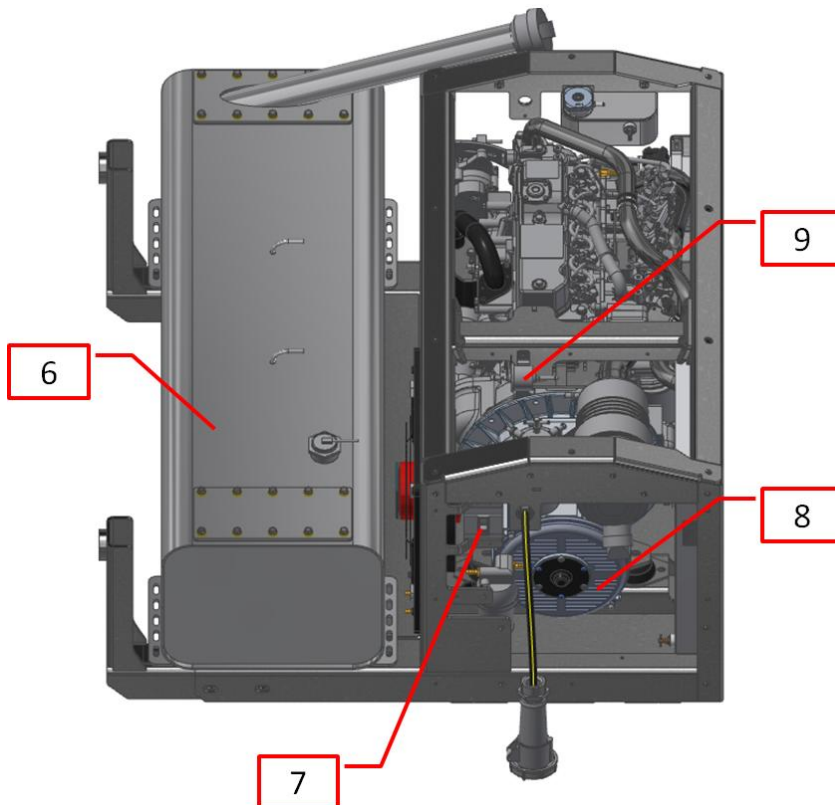
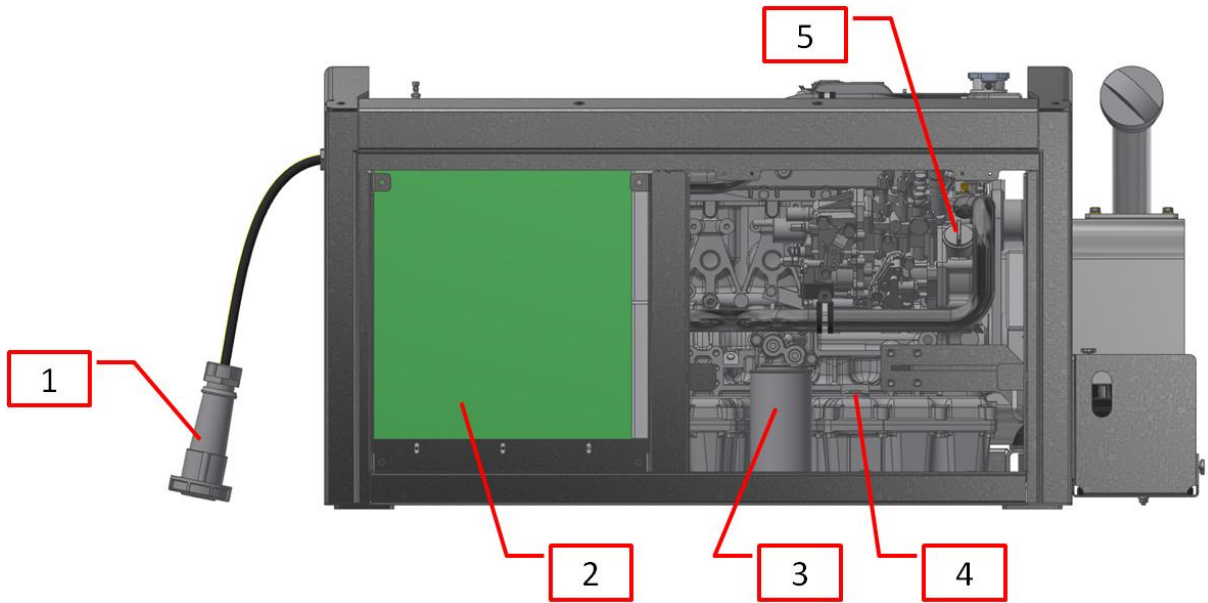
- In order to avoid accidents, the procedures for installation and disassembly of the gensets must be followed carefully.
- Pay close attention to rotating and hot (exhaust) parts.
- Pay close attention to pinch points.
- Do not use fuel (diesel) to clean the air filter.
- High pressure cleaning is not allowed.
- Do not allow soap and water in the generator.

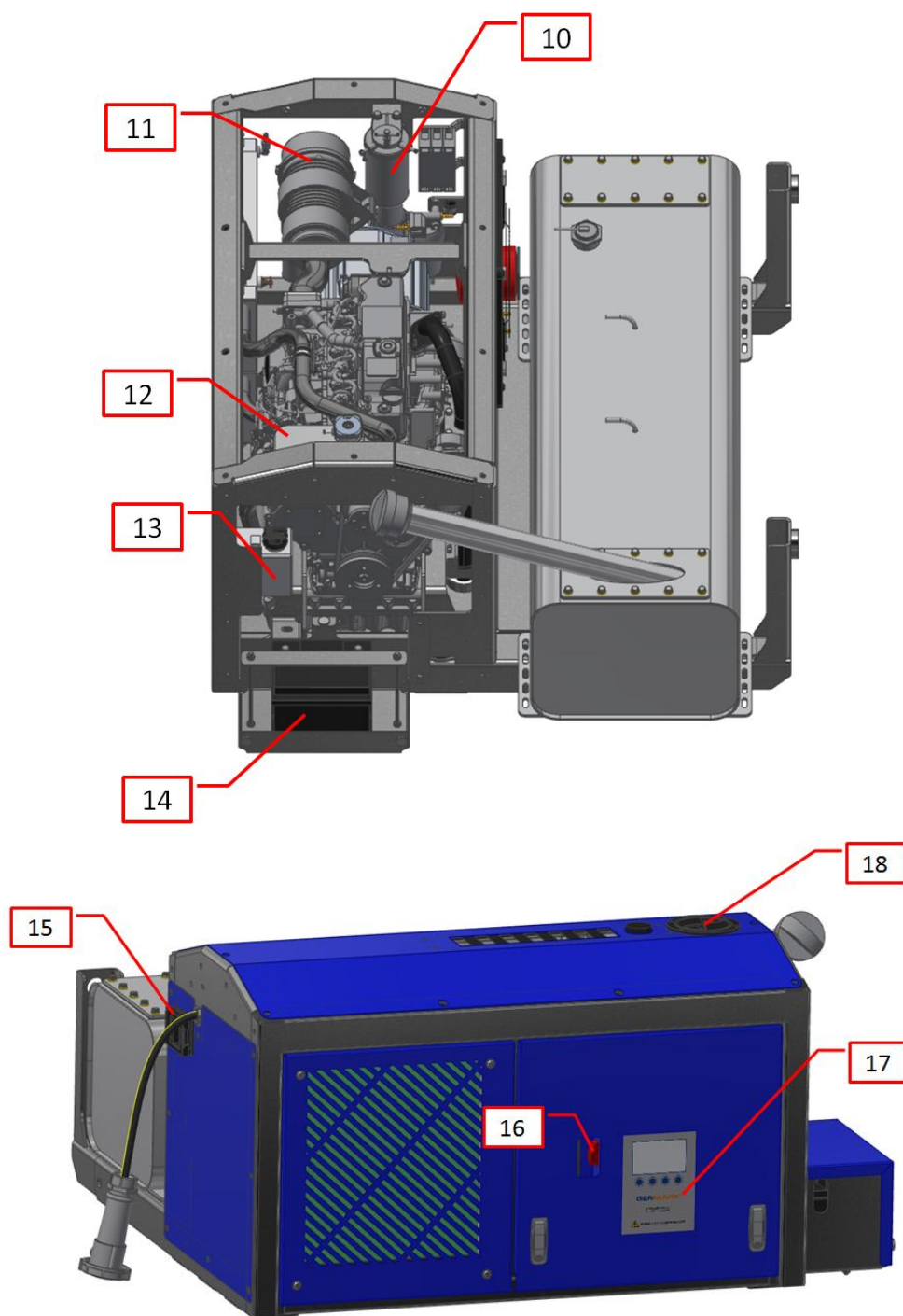
CAUTION

- NEVER add cold water to a hot engine.
- Only anti-freeze with ethylene glycol is allowed in the system. Anti-freeze without inhibitors will damage the gensets cooling system.
- During service maintenance of the air filter, the motor inlet tube must be covered.

4 Description of the Modular Stage 5

4.1 Main components





1	Receptacle	10	Fuel Filter
2	Radiator	11	Air Cleaner
3	Oil Filter	12	Coolant Filler Tank
4	Oil Dip Stick / Fill Cap	13	Coolant Recovery Tank
5	Oil Fill Cap	14	Battery
6	Diesel Tank	15	Circuit Breaker Cover
7	Circuit Breaker	16	Controller Main Switch
8	Main Generator	17	Control Panel
9	Fuel Feed Pump	18	Inspection Hatch Coolant

4.2 Safety Devices

Engine

Unsafe Condition	Safety Switch	Switch Setting
Low engine lubricating oil pressure	Low Oil Pressure Switch	0.5 kg/cm ²
High engine cooling water temperature	Cooling Water Temperature Switch	110 °C
Motor speed too high	Genmark Controller	
Excessive current draw by the Air Heater	Fuse XF1	30 A
Excessive current draw by the Fuel Pull Solenoid	Fuse XF2	30 A
Excessive current draw by the Starter Solenoid	Fuse XF3	30 A

Main Generator

Unsafe Condition	Safety Switch
Line voltage too high / low	Genmark Controller
Frequency too high / low	Genmark Controller
Excessive current draw by load	Circuit Breaker. Manual reset

Genmark Controller

Unsafe Condition	Safety Switch
PCB temperature too high	Genmark Controller

5 Unit Specification

Engine Data

Type		4 cycle, inline, water-cooled Diesel		
No. of cylinders-Bore x Stroke		mm	4-88 x 90	
Combustion system			Direct injection	
Compression ratio			19.1	
Displacement		liter	2.19	
Rated output		kW(PS)	17.7 (24.1) / 21.6 (29.4)	
		Min-1	1500 / 1800	
Governor Type			Centrifugal – all speed governor	
Gradients	Longitudinal	deg	15 (20)	continuous (Intermitted)
	Lateral	deg	15 (20)	
Firing order		1-3-4-2-1		Order from F.W.
Direction of rotation			counter clockwise	Viewed from F.W.
Engine dry weight		kg	200	
Fuel system	Fuel type		Diesel oil	
	Fuel filter		Paper element	
Lubrication system	Oil grade		SAE class CD	
	Oil viscosity		15W40	For ambient temperature -15 °C to +40 °C
	Oil filter		Paper element	
	Oil capacity	liter	13.3	max
	Oil pressure	Mpa	0.38	At rated output
Cooling system	Pressure cap	Bar	1.0	
	Fan		Three-phase two pole 400V	
	Coolant capacity	liter	7	
	Temperature protection switch	°C	110	
	Thermostat	C	71	
Air Cleaner	type		Dry element	
Air heater		W	400	
Applied regulation			EC (NRMM) Stage III A	

Main generator specification

Power output	voltage	VAC @ 50Hz (60Hz)	380 (460)	
	Power	kVA @ 50Hz (60Hz)	20 (24)	

Unit specification

Fuel tank	Option A	liter	130	
	Option B	liter	170	
Weight	Unit (dry, 130L tank)	kg	476	excluding mounting brackets
	Unit (dry, 170L tank)	kg	482	excluding mounting brackets
Power output	voltage	VAC @ 50Hz (60Hz)	380 (460)	
	Power	kW @ 50Hz (60Hz)	15 (17)	
	Frequency	Hz	50 / 60	Option for 50Hz or 60Hz
Fuel consumption		liter / hour @ 50Hz	2	With average reefer
Dimensions		mm	1133 x 1020 x 669	Width x depth x height (excluding battery box and fuel tank. See Figure 5-1 for more detail)
Sound pressure level		dBA	< 73	
Air Flow direction			Intake at fan, exit at radiator	

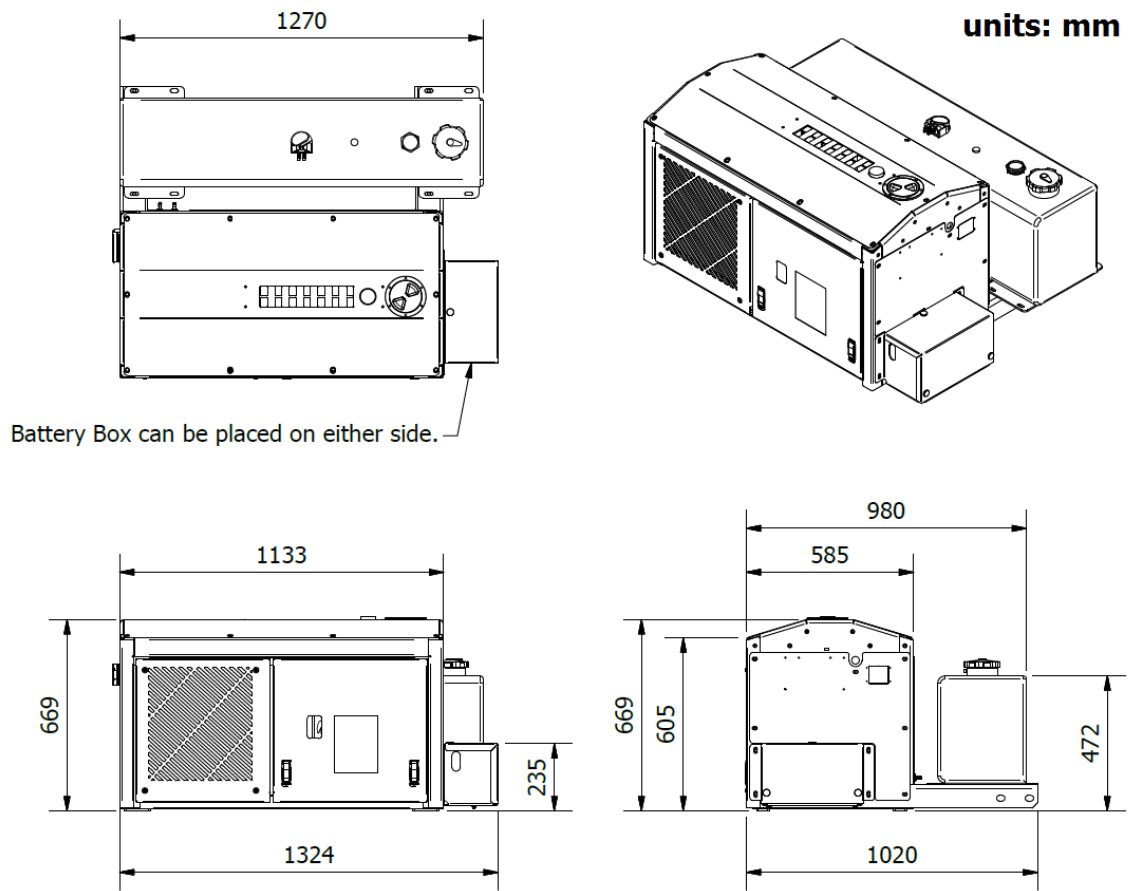


Figure 5-1. Dimensions (version with 130L fuel tank shown, without mounting brackets)

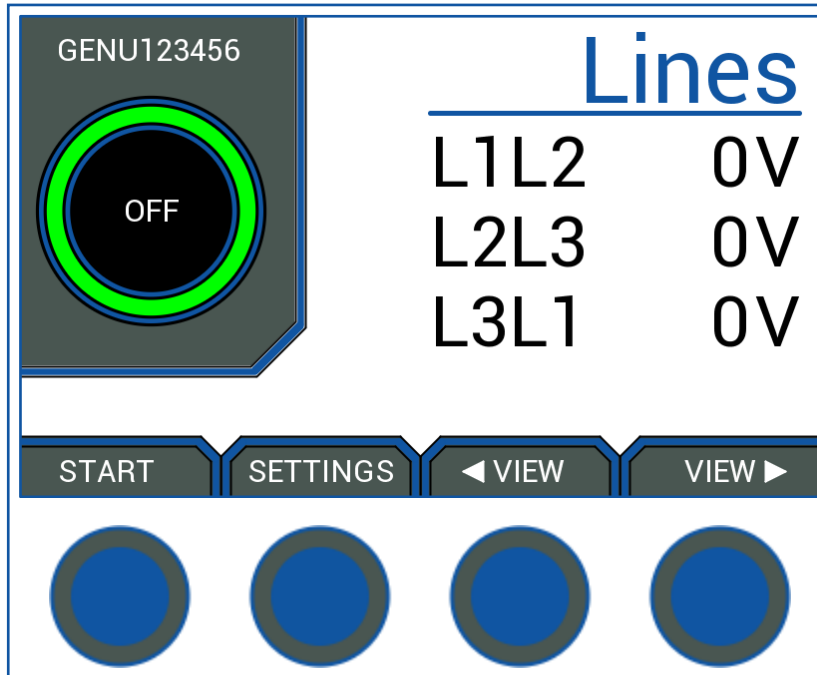
6 Operating the unit

The generator consists of an enclosed alternator driven by a diesel engine. For the purpose of starting and operating, a control panel and a battery are integrated.

6.1 Genmark Controller General Overview

Note: a more extensive manual for the Genmark Controller is available.

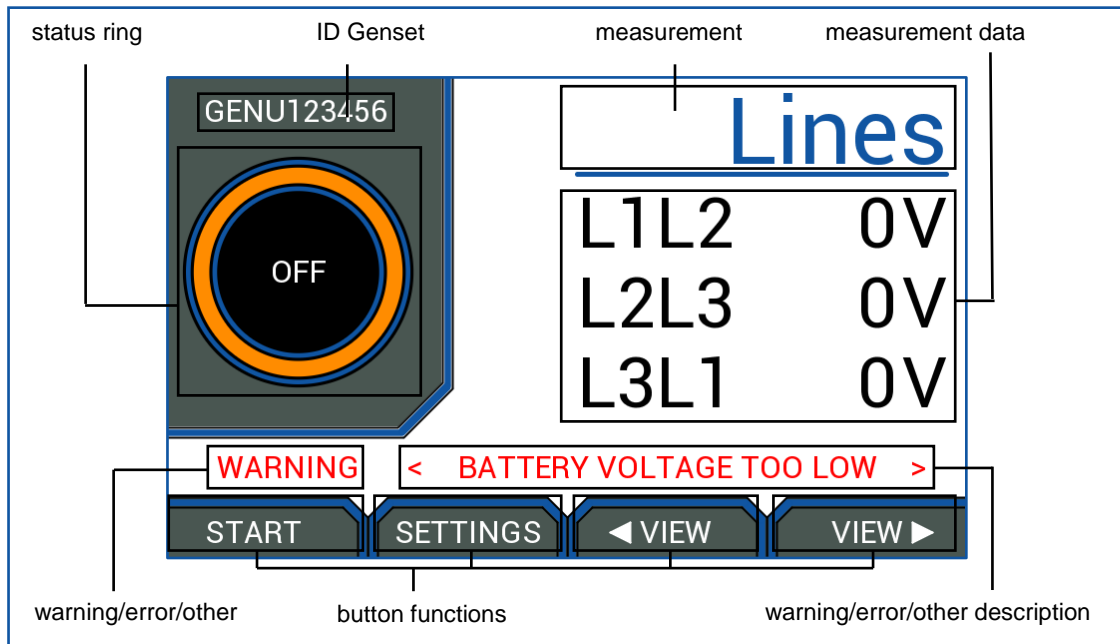
Most of the time, the controller shows the information as below. Each button has its own functionality which is described in the boxes above the buttons.



For clarity, the buttons in the manual are numbered as follows:



The available information can be split up as below:



Status ring

The status ring has two functionalities. It shows if there are any warnings or errors and it shows the state of the Genset. The color of the ring is green if there are no warnings or errors, orange if there is a warning and red if there is an error. The background of the ring flashes in the same color as the ring when a warning or error occurred.

The states that are available are:

State	Ring color	Description
OFF	Green/Orange/Red	Genset does not run
STARTING	Blue	Genset tries to start
RUNNING	Green/Orange	Genset runs
STOPPING	White	Genset tries to stop
CHARGING	Light blue	Genset runs to charge the battery
CHARGES EXTERN	Light blue	Genset runs to charge an extern battery. This is additional option.

ID Genset

Each Genset has its own identification number that is unique for a Genset.

Measurement

The measurement field indicates which measurement data is shown on the display.

Measurement data

Shows the data which is selected by the user. This data changes periodically.

Warning/error/other

WARNING indicates that there is at least one warning and ERROR indicates at least one error. It is also possible that there are warnings at the same time while ERROR is shown. This field is empty if there are not any warnings or errors present.

During the STARTING process, the field shows the amount of start attempts and during the starting of the charging process, CHARGING is shown in the field.

Warning/error/other description

This description bar shows which warnings and errors currently occur. The description bar rolls over automatically for multiple warnings or/and errors messages. A list of all the errors and warnings is available in the display lists 'Warnings' and 'Errors'.

During the start process of the Genset, this field shows when the Genset is preheating (PREHEATING ENGINE) and starting (STARTING ENGINE). After a failed start process, the field shows the total amount of start attempts.

The Genset is turned off if there is an error. The Genset is stopping and in this case the field shows AN ERROR OCCURRED. After the Genset is stopped successfully the field shows SHUT OFF.

Button functions

Each box contains the functionality of the button below. In the case of the previous image, ① is START which starts the Genset, ② is SETTINGS which shows the settings, ③ is ◀VIEW which shows the previous display list and ④ is VIEW▶ which shows the next display list.

6.2 Pre-Start Inspection

The generator set can run unmanned safely. Before every start a Pre-Trip Inspection (PTI) has to be performed. The following has to be checked during a PTI:

System	Actions
Cooling System	Check and refill engine coolant if needed
	Check and clean radiator fins
Electrical equipment	Check for loose electrical connections, frayed cables and cracked insulation
	Check battery and clean and coat terminals with terminal sealant
Main generator	Check and clean air vents
Engine oil	Check and refill engine oil level
Fuel	Check and refill fuel tank level
	Check fuel filter/water separator
Hoses	Check fuel lines, coolant hoses and connection for leaks
Intake and exhaust	Check air cleaner and air cleaner hose for leaks
	Check exhaust system for leaks
Complete engine	Overall visual check daily
Shock mounts	Check Engine / Generator shock mount for cracks, cuts, abrasion or flaring.
Complete unit	Check and tighten as required all hardware, brackets etc.
	Overall visual check. Check for damage (corroded parts, impact damaged parts)
Fan	Check and clean electrical cooling fan
Mounting	Check for correct mounting on the trailer

- Have damages and leakages fixed IMMEDIATELY and don't start the generator set before all defects and all leakages are fixed and cleaned.
- When everything is in decent shape the power plug can be connected. Always check if the cables are routed correctly and the external application is connected according to the manual. Always check the electrical cables for damage and replace them for appropriate ones if necessary.
- Make sure the external application is turned off when performing a PTI.

6.3 Starting the Modular Stage 5 with the Genmark Controller

After the Pre-start inspection is completed the generator set can be started using the control panel.



Before starting the genset, the application (reefer) should be turned off.

1. Use the **Controller Main Switch**, located on the left side of the controller, to power on and off the Genset controller. During boot up, the company logo of Genmark will be displayed as shown below. Meanwhile, the controller checks for warnings and/or errors.



It is possible to show your own company logo during the startup of the controller. Please contact Genmark for more information.



Note: *Please make sure the Reefer unit is in the OFF position before you start the Modular Stage 5 unit.*

2. Press the start button on the control box of the Modular Stage 5 unit, the unit will automatically pre-heat and start afterwards.
3. While the diesel engine is running, the output voltage is shown on the control panel. Check if the voltage is appropriate for the application and have it adjusted when necessary.
4. Let the generator run for 5 minutes before turning on the external application and check generator speed under full load.
5. The Modular Stage 5 is designed to work unmanned as long as everything is done in accordance with this manual.

6.4 Switching OFF the Modular Stage 5

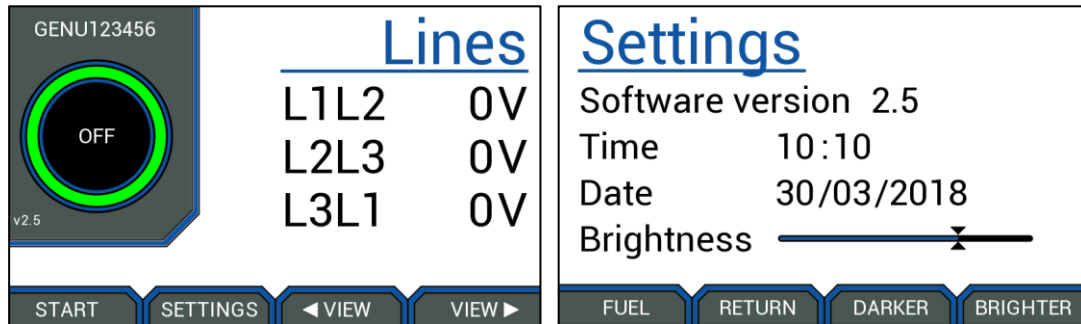
The stop button is used to switch off the Modular Stage 5. The main switch also has to be used to turn the Genset and its controller off. This might be unwanted since the Genset controller can keep track of the battery voltage which might discharge.

The controller will automatically charge the battery if necessary, this means the engine will start!

This option can be turned off. Contact Genmark to change this setting.

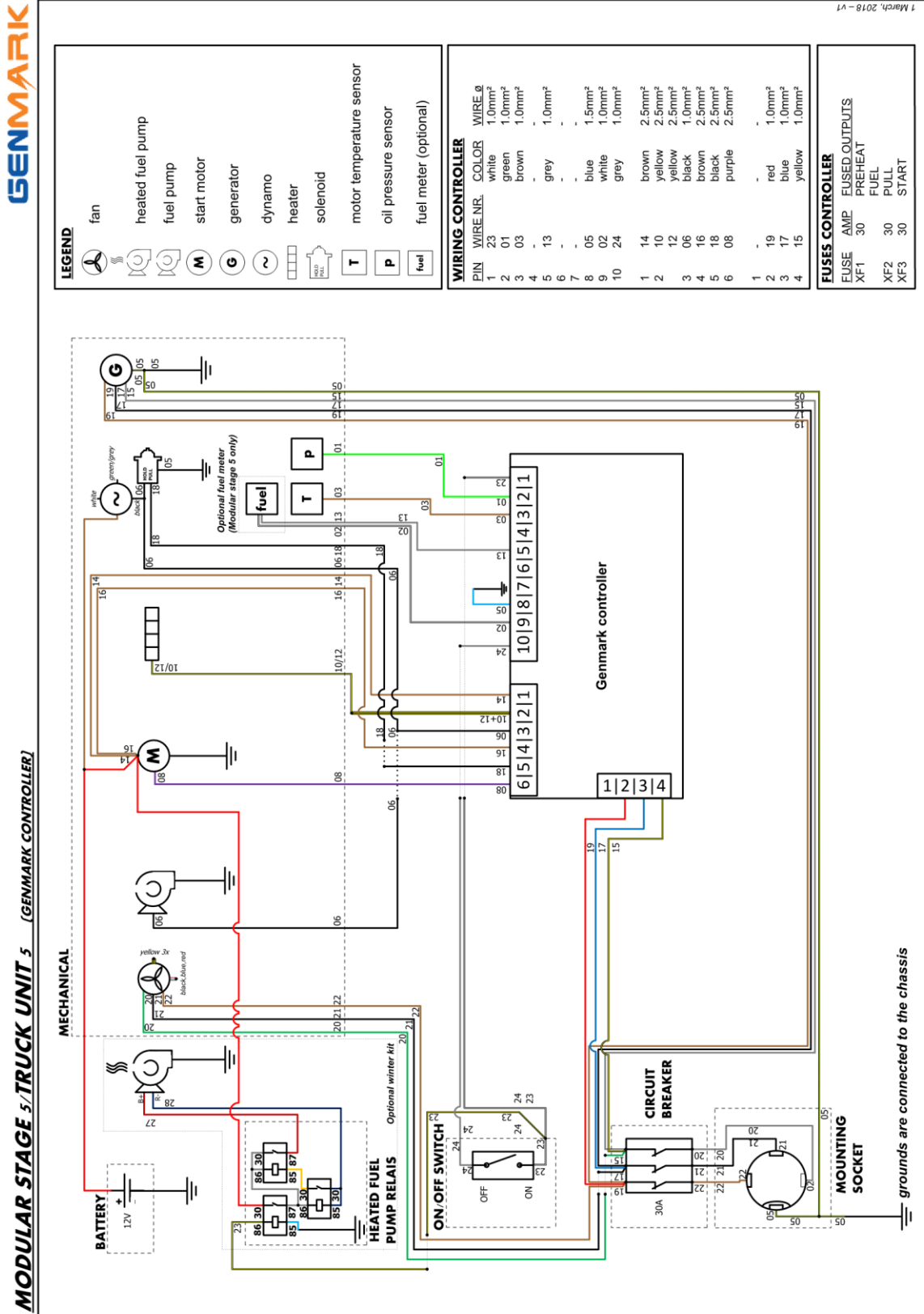
6.5 Bleeding the Fuel System

An option to bleed the fuel system is available in the Genmark Controller. This option can be useful when the Genset has completely run out of fuel and air came into the fuel system. Press SETTINGS to access this option. The settings cannot be opened if the Genset is STARTING or STOPPING.



1. Use the **Controller Main Switch**, located on the left side of the controller, to power on and off the Genset controller.
2. Press SETTINGS, then press FUEL. The fuel pump will be on and fuel will be pumped through the system. The text FUEL is red while the fuel pump is on.
3. Press button (FUEL) again to turn off the fuel pump.

6.6 Genmark Controller Schematic



7 Installation and commissioning

Check on delivery if the generator set is complete and undamaged. Also check for leakages. If there is damage or leakages, directly contact the supplier and do NOT use the generator set until everything is repaired and in good condition.

Have the generator installed by a certified company or by the supplier. The generator set needs to be mounted correctly on the trailer or truck. T

he generator set is only allowed to be lifted on a pallet using a fork lift or other capable devise with forks. Also a certified lifting frame specially designed to lift the modular stage 5 is allowed.

Lift the generator set, standing on a pallet, with a forklift or other capable devise with forks which can handle the weight. Before lifting mind the protruding parts (battery box, fuel tank, etc.).

Mount the generator set in such a way it cannot come loose as a result of vibrations. Fasten the bolt with the indicated torque and use thread locker or lock washers or lock nuts.

After the installation check if everything is well fixed and is installed correctly.

The generator set is now ready for use. Connect the power plug with an appropriate cable and check if everything is correctly connected. Start de generator set by starting the engine with the control box.



When storing the Modular Stage 5 it is highly recommended to store it on a pallet and disconnect the battery negative.

8 Maintenance

8.1 Periodic maintenance

Periodic full maintenance is required on the Modular Stage 5 units after 1000 running hours or after maximum 12 months since the last maintenance was completed. For an overview of periodic maintenance use **Table 8-1 Preventative Maintenance Actions and Schedule**.



200 operating hours or 4 weeks after putting the unit in service (whatever comes first), the first inspection is required to take place.



Parts are identified with numbers corresponding to the figures in chapter 4 **Description of the Modular Stage 5**

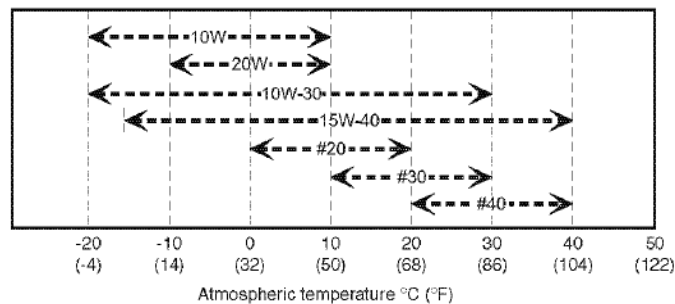
Oil levels and coolant water levels should be checked regularly. Oil checks can be done by opening the Front Right cover and check the oil dip stick [4]. Perform close monitoring during the first weeks of operation, the units may use more oil during the starting period. In case the oil requires replenishing, use oil with the below stated classification. Never mix the different types (brands) of engine oil.

Engine Oil

API Classification	CD, CF, CF-4, CI-4
TBN value*	≥9 (CD), ≥9 (CF), ≥7(CF-4), ≥7(CI-4)
ACEA classification	E-3, E-4, E-5
TBN value*	≥10(E-3), ≥10(E-4), ≥10(E-5)
JASO classification	DH-1
TBN value*	≥10(DH-1)

* TBN = Total Base Number

For ambient temperature of -15 °C to 40 °C use multi-grade oil 15W-40.



Note: If a unit operates at low temperatures (less than -15° Celsius), use 5W40 oil. Also check whether the coolant is resistant to low temperatures.

Engine Coolant

Replenishing coolant water can be done via the inspection hatch [18] at the Top Cover. Also check the Coolant Recovery Tank [13]. This should be half filled.

The coolant switch is activated at 110 °C as an overheat alarm. Therefore the engine coolant needs to be within the specified limits under all working conditions. Use Ethylene Glycol based Long Life Coolant ("LLC").

Important

- Always add LLC to soft water, or use pre-mixed coolant.
- Be sure to use the proper amount of coolant concentrate specified by the LLC manufacturer depending on the ambient temperature. LLC concentrate should be 30 vol% as a minimum and 60 vol% as a maximum.
- Never mix different brands of LLC, otherwise harmful sludge may form.
- Replacement interval according to *Table 8-1 Preventative Maintenance Actions and Schedule*

ATTENTION! Before maintenance or cleaning is done, the generator set has to be turned off. Remove or open covers only for maintenance purpose and close or reinstall them immediately after the maintenance / cleaning is done.



Do not carry out maintenance while the engine is running!



Switch OFF the main switch before you carry out any maintenance work on the unit



Disconnect the battery negative terminal before carrying out maintenance

Table 8-1 Preventative Maintenance Actions and Schedule

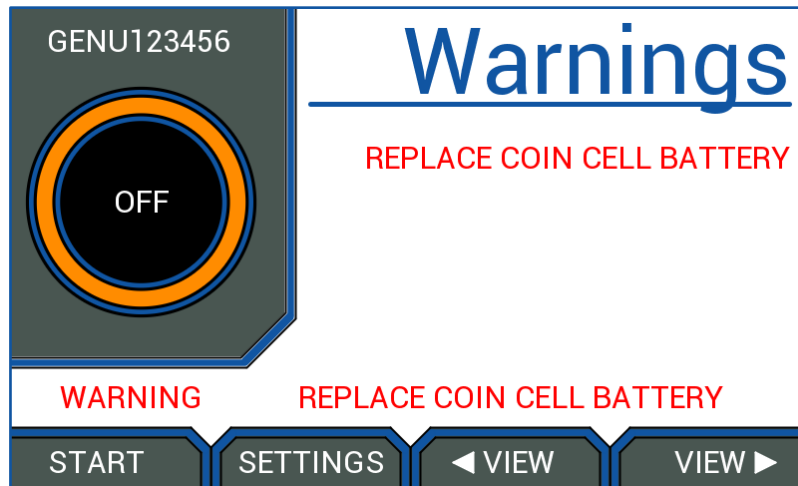
System	Actions	Pre-Trip Inspection	First service at 200 hours / 4 weeks	Every 500 Hours	Every 1000 hours / one year	Every 2000 hours / 2 years	Every 3000 hours / 3 years
Cooling System	Check and refill engine coolant if needed	x	x		x		
	Check and clean radiator fins	x	x		x		
	Check and adjust water pump V-belt		x		x		
	Drain, flush and refill cooling system with new coolant					x	
Cylinder head	Adjust intake/exhaust valve clearance (if required)				x		
	Lap intake/exhaust valve seat (if required)					x	
Electrical equipment	Check battery and clean and coat terminals with terminal sealant	x			x		
	Check intake heater amperage				x		
	Check for loose electrical connections, frayed cables and cracked insulation	x			x		
Main generator	Check and clean air vents	x			x		
	Check terminals for tightness and cleanliness				x		
	Perform generator maintenance, replace generator bearing						x
	Check generator output voltage.	x			x		
	Turn refrigeration unit on and check generator speed under full load.	x			x		

System	Actions	Pre-Trip inspection	First service at 200 hours / 4 weeks	Every 500 Hours	Every 1000 hours / one year	Every 2000 hours / 2 years	Every 3000 hours / 3 years
Engine oil	Check engine oil level	x			x		
	Drain and fill engine oil				x		
	Replace engine oil filter				x		
Engine speed control	Check and adjust governor lever and engine speed control				x		
Emission control	Inspect, clean and test fuel injectors, if necessary				x		
	Inspect crankcase breather system				x		
Fuel	Check and refill fuel tank level	x			x		
	Drain fuel tank (if needed)				x		
	Drain fuel filter/water separator			x			
	Check fuel filter/water separator	x		x			
	Clean fuel filter/water separator				x		
	Replace fuel filter				x		
Hoses	Replace fuel system and cooling system hoses					x	
	Check fuel lines, coolant hoses and connection for leaks	x			x		
Intake and exhaust	Clean or replace air cleaner element			x	x		
	Check air cleaner and air cleaner hose for leaks	x	x		x		
	Check exhaust system for leaks	x	x		x		
Complete engine	Overall visual check daily	x					
Shock mounts	Check Engine / Generator shock mount for cracks, cuts, abrasion or flaring.	x			x		
	Remove and check engine / generator shock mounts for cracks, cuts, abrasion or flaring						x
Complete unit	Check and tighten as required all hardware, brackets etc.	x	x		x		
	Tighten engine and generator mounting bolts		x		x		
	Overall visual check. Check for damage (corroded parts, impact damaged parts)	x			x		
Control box	Tighten all electrical connections in control box						x
Fan	Check and clean electrical cooling fan	x			x		

9 Genmark Controller

9.1 Warnings

The status ring is orange if there are any warnings. The background of the ring is flashing orange. The display list 'Warnings' shows all the warnings as a list. The list may consist of several display lists. As well, the warnings are shown in the warning description bar on the bottom of the display. This field rolls over if there are multiple warnings or errors. If there are errors at the same time, the status ring and the flashing background are red.



The Genset is still able to run if a warning occurred. A description of potential warnings is given in the upcoming paragraphs. Please contact the service centre when a warning regularly returns.

Oil pressure too low

The warning 'Oil pressure too low' occurs if the Genset is RUNNING. It means that the oil pressure of the Gensets engine is too low. The oil pressure is measured by a sensor. The warning will hold on for a maximum time before it turns into an error. The Genset can continue to operate stable during this warning time.

Motor temperature too high

The warning 'Motor temperature too high' occurs if the Genset is RUNNING. It means that the coolant temperature of the Gensets engine is too high. The coolant temperature is measured by a sensor. The warning will hold on for a maximum time before it turns into an error. The Genset can continue to operate stable during this warning time.

Line voltage L1L2, L2L3, L3L1 too low/high

The Gensets three phase system should have three stable line voltages. The value of the line voltages may resonate because of the electrical load. There is a safe zone with minimum and maximum voltages before a warning appears. If a warning shows up, it means that the Genset is still able to operate, but there might be something wrong with the load. It is possible that the warning becomes an error after a certain amount of time and the Genset automatically turns off.

Typical values of the line voltages are 400V in Europe and 480V in the USA. These values might be different in other areas or particular applications.

Frequency too low/high

Just as the line voltages, the frequency fluctuates around a certain value (in Europe about 50Hz, in the USA about 60Hz). These values might be different in other areas or particular applications.

If the drift is too large a warning is given. The Genset can still operate during this warning, but the warning can change into an error after a certain amount of time or if the drift becomes too large.

Motor speed too low/high

The frequency and the motor speed are dependent of each other. If the motor speed is too low, the frequency is. The same applies to a too high motor speed.

A too low or high motor speed can cause damage to the system. During a warning it is still safe to run the Genset, but after a while the warning can become an error which turns the Genset off due to safety reasons.

Battery voltage too low/high

The Genset has a 12V battery. If the Genset is OFF, the voltage should be slightly above 12V. While the Genset is running, the voltage should be a few volts higher.

A too low battery voltage may indicate a weak battery while a too high voltage can damage the system. A warning means that the battery voltage might become a risk for proper functionality. It is possible that the battery is aging or (slightly) damaged. It is also possible that there is something wrong with the alternator so the battery is not charging correctly. The Genset can still operate during this warning.

PCB temperature too high

If it becomes too hot inside the controller box, the warning 'PCB temperature too high' appears. This warning appears while the electronics inside the controller box are still able to operate safely, but it is recommended to turn off the Genset by the main switch if it is not used. A further increase of the temperature can change the warning into an error.

Replace coin cell battery

To keep track of the date and time, a coin cell battery is used. This coin cell battery can be found in the controller box and should not be replaced by the user. Please contact the service centre to replace the coin cell battery. Opening the controller box voids the warranty.

The Genset can only be used for a limited time of period if this warning is given. If the battery dies, the Genset is not able to start anymore since the controller is unable to keep track of the Run hours.

Logging unavailable

The controller logs all events. If the logging unit is unavailable a warning is given. The Genset works as normal, but it is recommended to contact the service centre since the log unit makes it easier to solve any problems from the past and makes it easier to prevent possible malfunctions in the future.

9.2 Errors

An error can occur at three states: if the Genset is OFF, RUNNING or if the STARTING process fails. While the Genset is OFF and an error occurs, it is not possible to start the Genset. If the Genset is RUNNING and there is an error, the Genset turns off automatically. An overview of the errors is given in the upcoming paragraphs. Please contact the service centre for further information.

Oil pressure too low

The error 'Oil pressure too low' occurs if the Genset is RUNNING. It means that the oil pressure of the Gensets engine is too low. The oil pressure is measured by a sensor. Make sure that the oil level is correct.

Motor temperature too high

The error 'Motor temperature too high' occurs if the Genset is RUNNING. It means that the coolant temperature of the Gensets engine is too high. The coolant temperature is measured by a sensor. Check the coolant level.

Line voltage L1L2, L2L3, L3L1 too low/high

If the line voltages are too low or high, it is unsafe to power the electrical load. Make sure that the electrical load is not consuming too much power.

Frequency too low/high

A frequency which is too low or high can be caused by an unstable electrical load. Another reason might be the engine which is not steady enough.

Motor speed too low/high

The frequency has the same problem as the motor speed which means that both variables are too low or high at the same time. See for more information 'Frequency too low/high' (paragraph above).

Battery voltage too low/high

If the Genset is off and the battery voltage is too low, it is impossible to start the Genset since there is not enough power. The battery is empty. This might be because of aging or a damaged battery. Charging the battery or replacing the battery with another battery will probably solve the problem.

The battery is unreliable if the battery voltage is too high during the OFF state of the Genset. This high voltage can damage the system and therefore should be replaced by another reliable battery.

If the Genset runs and turns off because of a too low or high battery voltage error, something is wrong with the alternator. The alternator should charge the battery to a stable voltage while the Genset is on.

PCB temperature too high

A too high PCB temperature means that the electronics inside the controller box are too hot. To protect the electronics it is not possible to run the Genset. Starting of the Genset is not possible and the Genset will be turned off if it was running.

Keypad error

A keypad error prevents an undesired start of the Genset. One of the buttons is pressed during the boot process of the controller. Turn off the controller and check if there are no sticking buttons.

Time and date lost

The time and date are lost if the coin cell battery in the controller box is empty or if the electronic device that keeps track of the time and date does not work probably. The warning 'REPLACE COIN CELL BATTERY' probably shows up at the same time.

The time and date are necessary to keep track of the run hours of the Genset. It is, therefore not possible to run the Genset if the time and data are unavailable. You should never replace the coin cell battery yourself. There is no point of doing this, because the time and date can only be reset by the service centre.

PCB Electronics failure

At least one of the electrical components inside the controller box is broken. The controller must be returned to Genmark for repair. Opening the control box will void your warranty.

Troubleshooting

In case of a malfunction, check whether the cause can be established and which action should be taken to solve the problem. If the cause of the malfunction cannot be established, or if you, as a user, are not permitted to solve the problem, contact your dealer immediately.



The Modular Stage 5 unit should be switched OFF immediately in case of a malfunction!.



Do not carry out checks or repair work while the unit is running!



Set the main switch to 0, before you start to work on the unit!

10 Troubleshooting

10.1 Diesel Engine

10.1.1 Engine does not start

Symptom	Probable Cause	Remedy
Starter motor does not operate or low cranking speed	Battery low voltage	Charge
	Battery contacts or battery defective	Check
	12V Connection or ground at starter are bad	Correct
	Starter motor malfunctions	Section 10.1.4
	Starter motor solenoid defective	Engine Manual
	Loose connection(s)	Section 10.1.5
	Incorrect grade of lubricating oil	Section 8.1
Starter motor operates but engine does not start	No diesel fuel	Section 5
	Air in fuel system	Section 6.5
	Water inside the fuel system	Drain the Fuel System
	Clogged fuel filters	Replace
	Improper diesel fuel	Replace
	Faulty air intake heater	Replace
	Oil pressure switch defective	Replace
	Clogged fuel lines to injector(s)	Engine Manual
	Electrical Fuel Feed Pump malfunction	Engine Manual
	Fuses XF1, XF2, XF3 are bad	Check / replace
	Loose or no connection between wire harness and Genmark Controller	Check / correct
	Leak in fuel system / loose fuel line	Check
Starter operates and engages, but dies after a few seconds	Engine lubrication oil too heavy	Section 8.1
	Voltage drop in starter cable(s)	Check
Starter engages, but Engine does not turn	Main generator stuck	Replace

10.1.2 Engine Stops after start

Symptom	Probable Cause	Remedy
Engine stops after start	No fuel	Section 5
	Fuel filter clogged	Replace
	Air cleaner or hose clogged	Correct
	Engine crankcase breather or hose clogged	Clean
	Safety device activated	Section 4.2
	Loose wire fuel solenoid	Check
	Faulty fuel solenoid	Replace
	Fuel supply restricted	Check / replace Fuel Filter, Water separator, Fuel lines
	Electrical Fuel Feed Pump malfunction	Engine Manual
	Oil pressure switch defective	Replace
	Leak in fuel system / loose fuel line	Check
	Faulty spray pattern of fuel injection	Engine Manual
	Injection pump defective	Engine Manual

10.1.3 Engine Will Not Stop

Symptom	Probable Cause	Remedy
Engine will not stop	Improperly seated fuel solenoid	Correct
	Faulty fuel solenoid	Replace

10.1.4 Starter Motor Malfunction

Symptom	Probable Cause	Remedy
Starter motor will not operate or turns slowly	Battery low voltage	Charge
	Battery cable connections loose or oxidized	Check / replace
	Battery cables faulty	Check / replace
	Starter brushes shorted out	Engine Manual
	Faulty Starter brushes	Engine Manual
	Starter solenoid damaged	Engine Manual
	Controller defective	Replace
	Engine oil too heavy	Replace
Starter motor turns, but pinion does not engage	Pinion or ring gear obstructed or worn	Engine Manual
Starter motor does not disengage after start	Controller defective	Replace
	Starter motor solenoid is bad	Engine Manual
Pinion does not disengage after engine is running	Starter defective	Engine Manual

10.1.5 Malfunction In The Engine Starting Circuit

Symptom	Probable Cause	Remedy
No power to starter motor solenoid	Battery defective	Replace
	Loose 12V cable	Tighten
Fuel solenoid does not energize or does not remain energized	Battery defective	Replace
	Loose electrical connections	Tighten
	Oil pressure switch defective	Section 4.2
	Water temperature safety switch activated	Section 4.2
	Fuel solenoid faulty	Engine Manual
	Controller defective	Replace
	Safety device activated	Section 4.2
	Wire Harness damaged	Replace
Intake heater does not energize	Controller defective	Replace
	Heater element faulty	Replace
	Safety device activated	Section 4.2

10.1.6 Engine Safety Devices

Symptom	Probable Cause	Remedy
Engine running: Oil pressure too low	Low engine oil level	Check and adjust oil level
	Too high oil level	Check and adjust oil level
	Clogged engine oil filter	Replace
Engine running: Motor temperature too high	Low engine coolant level	Add engine coolant
	Dirty radiator fins	Clean
	Engine coolant leaking	Check
	V-belt loose or damaged	Adjust / replace
	Contaminated engine coolant	Check
	Faulty engine coolant pump	Check
Engine does not start: Oil pressure too low	Faulty electrical wiring or faulty indicator	Replace
	Engine crankcase breather or hose restricted	Check
Engine does not start: Motor temperature too high	Engine overheated	Cool down and eliminate cause
	Faulty electrical wiring or faulty switch	Tighten / replace

10.1.7 Battery not charging

Symptom	Probable Cause	Remedy
Engine runs but battery is not charging	V-belt loose or damaged	Adjust / replace
	Battery failure	Check battery condition
	Faulty alternator	Replace
	Loose connection	Check / tighten

10.1.8 White or black exhaust smoke

Symptom	Probable Cause	Remedy
Black exhaust smoke	Engine overloaded	Reduce load
	Clogged air cleaner element	Clean or replace
	Improper diesel fuel	Replace
	Faulty fuel injection	Engine manual
	Excessive intake / exhaust valve clearance	Engine manual
White exhaust smoke	Improper diesel fuel	Replace
	Faulty fuel injection	Engine manual
	Engine burning oil	Engine manual

10.1.9 Miscellaneous Engine Troubleshooting

Symptom	Probable Cause	Remedy
Low power	Restriction in air cleaner	Check / clean / replace
	Air in fuel system	Section 6.5
	Clogged fuel lines	Engine Manual
	Faulty fuel injection pump	Engine Manual
	Faulty spraying of fuel injection	Engine Manual
	Poor compression	Engine Manual
Vibration	Shockmounts are bad	Replace
	Poor compression	Engine Manual
Overheating	Restriction in air cleaner	Check / clean / replace
	Exhaust pipe restriction	Remove
	Restriction in engine water jacket	Engine Manual
	Restriction in radiator	Remove
	Low coolant level	Section 8.1
	Loose V-belt	Engine Manual
	Thermostat malfunctioning	Engine Manual
	Water pump malfunctioning	Engine Manual
	Fan direction wrong	Section 5
High crankcase pressure	Clogged crankcase breather	Engine Manual
Excessive noise	Poor compression	Engine Manual
	Loose bolts	Tighten
	Exhaust leaking	Replace
	Electrical fan hits something or is restricted	Check / Remove restriction
	Main generator malfunctioning	Replace

10.2 Alternator (12V)

Symptom	Probable Cause	Remedy
Alternator does not charge	Loose V-belt	Engine Manual
	Alternator output not connected to battery	Tighten
	Alternator faulty	Replace

10.3 Main Generator

Symptom	Probable Cause	Remedy
No voltage	Circuit breaker tripped	Check
	Short circuited	Replace
Low voltage	Engine speed too low	Engine Manual
	Too high load	Check
	Faulty wiring	Tighten
	Shorted field	Replace
	Irregular speed of engine	Engine Manual
	Loose terminal or power plug	Tighten
	Worn bearing	Replace
High voltage	High engine speed	Engine Manual
Overheating	Too high load	Check
	Clogged air vents	Clean
	High ambient temperature	Check
	Insufficient air circulation	Check
	Unbalanced load	Balance
	Faulty bearing	Replace
Mechanical Noise	Faulty bearing	Replace
	Rotor scrubbing on stator	Replace
	Loose Fan Plate	Tighten
	Loose laminations	Replace
	Loose or misaligned coupling	Replace
Generator housing produces shock when touched	Static charge	Check ground to frame
	Grounded field coil	Replace

10.4 Controller

Symptom	Probable Cause	Remedy
Time and date lost	Coin cell battery empty	Replace
	Controller defective	Replace
Logging unavailable	Memory defective	Replace
PCB temperature too high	External heat source	Check / remove
Keypad error	One or more of the buttons are pressed in during startup	Check for sticking buttons
PCB Electronics failure	One or more components on the PCB are broken	Replace

10.5 Fuel indicator

Symptom	Probable Cause	Remedy
Low fuel level but tank is not empty	Fuel gauge malfunction	Check / replace
	Controller defective	Replace
	Wire harness malfunction	Check / replace

11 Warranty

11.1 Warranty conditions Genmark

Article14 - Warranty (see General Conditions)

- 14.1 Genmark guarantees that the goods to be delivered and/or the services to be performed meet the usual requirements and standards applicable to this product.
- 14.2 If the warranty provided by Genmark applies to items manufactured by a third party, the warranty will be limited to that provided by the service centre of those items.
- 14.3 The warranty entails that Genmark will carry out repairs or replace the goods, at its discretion, free of charge, provided that Genmark has been notified of the defects by the other party immediately after discovery thereof.
- 14.4 The work to be carried out under the warranty will be done during normal working hours. All additional costs, such as travel and subsistence expenses incurred by the engineer(s) deployed by Genmark and transport costs are at the expense of the other party.
- 14.5 The other party is obliged to keep the damaged goods available for inspection by Genmark. If the goods need to be replaced, the other party hereby undertakes to return the goods to be replaced to Genmark and to not transfer ownership thereof to Genmark.
- 14.6 Parts under warranty that were replaced or repaired, will be warranted only until the end of the original warranty period.
- 14.7 In terms of revision and repair assignments, the warranty exclusively encompasses the soundness of the execution of the agreed tasks.
- 14.8 All rights of the other party by virtue of this article lapse, if repairs or modifications to goods have been carried out by the other party or third parties, without the prior, written approval of Genmark, or if damage was caused as a result of improper use of the goods or if the maintenance schemes were not observed correctly.
- 14.9 This warranty will expire and complaints will not be handled if:
 - a. a defect is observed and Genmark is not being notified immediately and in writing .
 - b. the user instructions and checks supplied by Genmark were not followed precisely.
 - c. the defects are a result of improper use or negligence on the side of the other party or their staff.
 - d. the product is not being used in accordance with the agreed purpose and, failing as such, its destiny.
 - e. defects are the result of normal wear.
 - f. defects are the result of external circumstances, such as fire, natural disasters (force majeure), explosions, terrorism, cleaning agents, fumes, accumulation of dirt, landslides, floods and weather conditions.
 - g. defects are the result of any government regulation concerning the nature or the quality of the applied materials.
 - h. the damage was caused by a third party (vandalism).
 - i. any deviation, commonly marginal practice in distributive trade and/or technically inevitable deviations.
 - j. defects are the result of components and/or products that were not supplied by Genmark / Trademark.
 - k. defects are the result of any use outside of technically permitted specifications.

Continued warranty conditions:

- In the event that your product does not function properly, even if you operate it in the right manner, within 1 year from the purchase date, this product will be repaired in our workshop at Röntgenweg 8, Spijkenisse (NL), without any charges. (Including agreement with the written user and operating instructions)
- The customer will deliver the product, entirely at his own risk, to the Röntgenweg 8, Spijkenisse (NL). Any transport or shipment costs are to be borne by the customer.
- This guarantee does not cover the following situations, for which the customer is charged during the warranty period;
 - Defects as a result of incorrect use (such as an application which is not listed in the user and operating instructions, any short circuit caused by extension cables or connected devices, etc.).
 - Defects or damage as a result of repairs, modifications, cleaning work, carried out by anyone else than our workshop staff.
 - Defects or damage resulting from transport, accidents, abnormal shocks, etc., after the purchase of the product.
 - Defects or damage as a result of fire, earthquakes, floods, lightning strike, other natural disasters, rubble and problems as a consequence of incorrect load of the generator.
 - Defects or damage as a result of careless or improper use, such as failing to check/replenish oil or coolant in time, cleaning by use of a high pressure washer or in case of using harmful substances, etc.
 - Defects or damage as a result of the use of bad batteries.
 - Defects or damage as a result of sand, mud, etc. ending up in the casing of the product.
 - In case changes were made to the purchase date, customer name, dealer name and/or the serial number of the supplied set.

This warranty applies only to this product and does not include any accessories such as the plugs, cables etc. Genmark B.V.'s liability under this warranty is limited to repairing the product. Genmark B.V. accepts no liability for indirect or consequential damages (lost profit, business interruption, loss of business information, etc), or other suffering of the customer arising from any defects the product and for any delays in the repair and/or loss of data. Of course, the current liability provision remain applicable.



A one (1) year full warranty applies to the Modular Stage 5 mentioned in this instruction manual. The warranty starts on the day the Modular Stage 5 is put into service, however no later than 2 months after it was sold by Genmark.

11.2 Problems during the warranty period

Any warranty work on the Modular Stage 5 may only be carried out by recognized service partners.



In case of any malfunction during the warranty term, that may require warranty work, please contact the nearest service partner, or Genmark immediately.

12 Liability

Genmark can be held liable only for any direct damage incurred by the other party. Direct damage is exclusively taken to mean:

- reasonable costs, incurred in order to determine the cause and the extent of the damage or loss, in so far as the determination relates to damage or loss within the meaning of these general terms and conditions;
- any costs reasonably incurred in order to ensure that the poor performance of Genmark complies with the agreement, unless this fault cannot be attributed to Genmark;
- reasonable costs, incurred in order to prevent or limit the damage, insofar as the other party demonstrates that these costs have led to a reduction of the direct damage as referred to in these general terms and conditions.

The liability as referred to in paragraph 1 will be limited to the amount equal to the invoice value, subject to a maximum of EURO 10,000. This reimbursement serves as sole compensation and excludes any other claim for compensation, unless the other party demonstrates that the damage can be attributed to gross negligence on the part of Genmark and/or its subordinates.

- Genmark cannot be held liable for indirect damage, including consequential damage, lost profits, missed savings and losses due to business interruption.
- Genmark is not liable for any loss of cooling medium
- Genmark cannot be obliged to compensate any damage as a direct or indirect consequence of:
 - An event that is actually beyond its power and can as such not be attributed to them
 - Any action, or negligence of the other party, its subordinates or any other person employed by or because of other party.

Genmark is not liable for any accidents with the product, for example, by wrong or improper use or use contrary to the operating instructions. In no event shall Genmark be liable for any damage incurred/occurred if the other party has used the product for a purpose other than that for which it is intended.

If the other party or a third party makes any changes to the product, Genmark will decline all liability in respect of the operation and any (consequential) damage.

The other party indemnifies Genmark against third-party claims in respect of incidents, acts or omissions for which Genmark cannot be held liable by virtue of the above. The other party is obliged to indemnify Genmark against all costs, damage and interests that may arise for Genmark as a direct or indirect results of an action brought against Genmark as referred to in this paragraph, upon first request.

Rights of claim and other powers of the other party for any reason or any kind, against Genmark, will expire after 1 year from the moment of the occurrence of the fact that the other party can use these rights and/or authorizations against Genmark.

The other party is liable for any loss of and/or damage to property, materials, tools, machines, etc. that Genmark stored at the other party during the execution of warranty repair work.

13 Environment, end of live

The generator set consists of a galvanized steel frame with painted steel panels, and plastic parts. The steel parts can be disposed as scrap. The plastic parts can be disposed by a certified waste processor to be recycled.

In the generator set the following components are present:

- Cooling system filled with coolant: Drain the coolant (mind leakage) and dispose according to national environmental law. The radiator and coolant tanks are made of painted aluminum and can be disposed via a recycling company. The coolant hoses have to be offered separately to a recycling company. The fan casing is made of steel the blades of plastic and it has an electric engine. The fan can be disposed via a recycling company.
- Diesel engine with engine oil and coolant: Drain the liquids (mind leakages) and dispose according to national environmental law. The engine can be disposed via a recycling company.
- Main generator: Can be disposed via a recycling company
- Battery: has to be dispose according to national environmental law. It contains acid and lead.
- Control panel: The casing can be disposed via a recycling company. The PCB and cables have to be separately offered to a recycling company.
- Diesel oil tank: The fuel tank has to be emptied before it is offered to a recycling company. It is made of aluminum.
- Shock mounts: The shock mounts are made of rubber and steel. They can be disposed via a recycling company
- Exhaust. The exhaust is made of steel. It can be offered as scrap.
- Air cleaner: The air cleaner casing is made of plastic. It can be disposed by a certified waste processor to be recycled. The element has to be offered separately.

FOR ANY FURTHER INFORMATION OR QUESTIONS,
PLEASE CONTACT GENMARK.