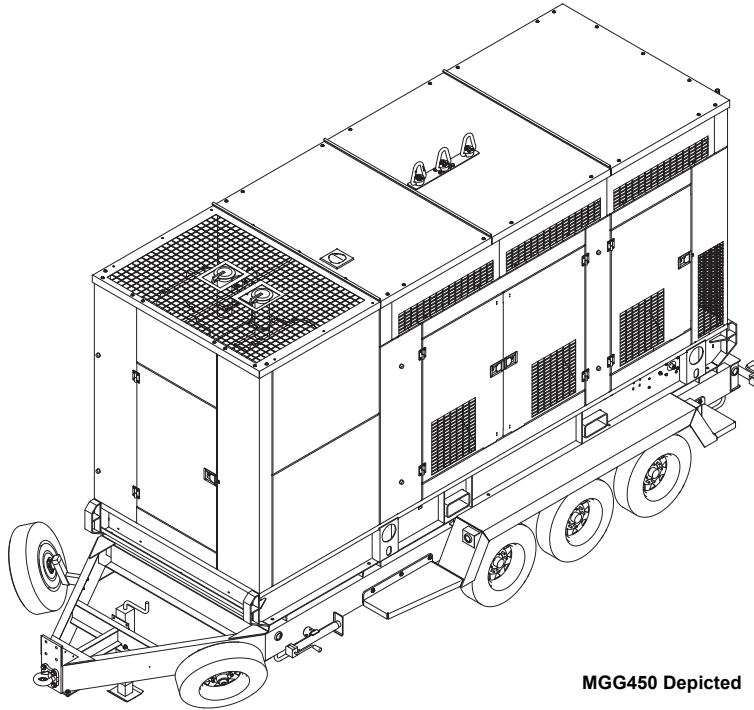




Owner's Manual
For
MGG450 / CG300 Gaseous Generator



MGG450 Depicted

MODEL NUMBER: _____

SERIAL NUMBER: _____

DATE PURCHASED: _____

Register your Generac product at:

WWW.GENERAC.COM

1-888-GENERAC

(1-888-436-3722)

SAVE THIS MANUAL FOR FUTURE REFERENCE

▲WARNING

California Proposition 65. Engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.

(000004)

▲WARNING

California Proposition 65. This product contains or emits chemicals known to the state of California to cause cancer, birth defects, and other reproductive harm.

(000005)

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Section 1 Introduction and Safety

Introduction

Thank you for purchasing a Generac Power Systems Inc. Product. This unit has been designed to provide high-performance, efficient operation, and years of use when maintained properly.



WARNING

Consult Manual. Read and understand manual completely before using product. Failure to completely understand manual and product could result in death or serious injury. (000100a)

If any section of the manual is not understood, contact your nearest Independent Authorized Service Dealer (IASD), or contact Generac Customer Service at 1-888-GENERAC (1-888-436-3722), or www.generac.com with any questions or concerns.

The owner is responsible for proper maintenance and safe use of the equipment. Before installing, operating, or servicing this generator:

Save these instructions for future reference. This manual contains important instructions for the generator that should be followed during installation, operation and maintenance of the generator and batteries. ALWAYS supply this manual to any individual that will use this machine.

THE INFORMATION CONTAINED HEREIN WAS BASED ON MACHINES IN PRODUCTION AT THE TIME OF PUBLICATION. GENERAC RESERVES THE RIGHT TO MODIFY THIS MANUAL AT ANY TIME.

Safety Rules

The manufacturer cannot anticipate every possible circumstance that might involve a hazard. The warnings in this manual, and on tags and decals affixed to the unit are, therefore, not all inclusive. If using a procedure, work method or operating technique that the manufacturer does not specifically recommend, verify that it is safe for others. Also make sure the procedure, work method or operating technique utilized does not render the equipment unsafe.

Throughout this publication, and on tags and decals affixed to the unit, DANGER, WARNING, CAUTION and NOTE blocks are used to alert personnel to special instructions about a particular operation that may be hazardous if performed incorrectly or carelessly. Observe them carefully. Their definitions are as follows:

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

(000001)

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

(000002)

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

(000003)

NOTE: Notes contain additional information important to a procedure and will be found within the regular text of this manual.

These safety warnings cannot eliminate the hazards that they indicate. Common sense and strict compliance with the special instructions while performing the action or service are essential to preventing accidents.

General Hazards



⚠ DANGER

Asphyxiation. Running engines produce carbon monoxide, a colorless, odorless, poisonous gas. Carbon monoxide, if not avoided, will result in death or serious injury. (000103)



⚠ WARNING

Hearing Loss. Hearing protection is recommended when using this machine. Failure to wear hearing protection could result in permanent hearing loss. (000107)



⚠ WARNING

Vision Loss. Eye protection is required to avoid spray from spark plug hole when cranking engine. Failure to do so could result in vision loss. (000181)



⚠ WARNING

Moving Parts. Keep clothing, hair, and appendages away from moving parts. Failure to do so could result in death or serious injury. (000111)



⚠ WARNING

Hot Surfaces. When operating machine, do not touch hot surfaces. Keep machine away from combustibles during use. Hot surfaces could result in severe burns or fire. (000108)



⚠ WARNING

This product is not intended to be used in a critical life support application. Failure to adhere to this warning could result in death or serious injury. (000209a)

⚠ CAUTION

Equipment or property damage. Do not block air intake or restrict proper air flow. Doing so could result in unsafe operation or damage to unit. (000229)

Explosion and Fire Hazards



⚠ DANGER

Explosion and Fire. Fuel and vapors are extremely flammable and explosive. Add fuel in a well ventilated area. Keep fire and spark away. Failure to do so will result in death or serious injury. (000105)



⚠ WARNING

Risk of Fire. Unit must be positioned in a manner that prevents combustible material accumulation underneath. Failure to do so could result in death or serious injury. (000147)

Trailer Hazards (MGG450 Only)

⚠ WARNING

Trailer must be securely coupled to the hitch and chains correctly attached. Uncoupled or unchained towing could result in death or serious injury. (000233)

⚠ WARNING

Do not operate this unit while transporting. Doing so could result in death or serious injury. (000231)

⚠ WARNING

Verify unit is properly secured with wheel chocks and on level ground. Failure to do so could result in death or serious injury. (000234)

⚠ WARNING

Property or Equipment Damage. Tighten wheel lug nuts after first 50 miles to factory specifications. Failure to do so could result in death, serious injury, property or equipment damage. (000235)

Electrical Hazards



⚠ DANGER

Electrocution. In the event of electrical accident, immediately shut power OFF. Use non-conductive implements to free victim from live conductor. Apply first aid and get medical help. Failure to do so will result in death or serious injury. (000145)



⚠ DANGER

Electrocution. Water contact with a power source, if not avoided, will result in death or serious injury.

(000104)



⚠ DANGER

Electrocution. Contact with bare wires, terminals, and connections while generator is running will result in death or serious injury.

(000144)



⚠ DANGER

Electrocution. Verify electrical system is properly grounded before applying power. Failure to do so will result in death or serious injury.

(000152)



⚠ DANGER

Electrocution. Turn utility supply OFF before working on utility connections of the transfer switch. Failure to do so will result in death or serious injury.

(000123)



⚠ DANGER

Electrocution. Never connect this unit to the electrical system of any building unless a licensed electrician has installed an approved transfer switch. Failure to do so will result in death or serious injury.

(000150)

Battery Hazards



⚠ DANGER

Electrocution. Do not wear jewelry while working on this equipment. Doing so will result in death or serious injury.

(000188)



⚠ WARNING

Explosion. Batteries emit explosive gases while charging. Keep fire and spark away. Wear protective gear when working with batteries. Failure to do so could result in death or serious injury.

(000137a)



⚠ WARNING

Explosion. Do not dispose of batteries in a fire. Batteries are explosive. Electrolyte solution can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention.

(000162)



⚠ WARNING

Risk of burn. Do not open or mutilate batteries. Batteries contain electrolyte solution which can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention.

(000163a)

⚠ WARNING

Environmental Hazard. Always recycle batteries at an official recycling center in accordance with all local laws and regulations. Failure to do so could result in environmental damage, death or serious injury.

(000228)

Always recycle batteries in accordance with local laws and regulations. Contact your local solid waste collection site or recycling facility to obtain information on local recycling processes. For more information on battery recycling, visit the Battery Council International website at: <http://batteryCouncil.org/>.

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Section 2 General Information

Component Locations

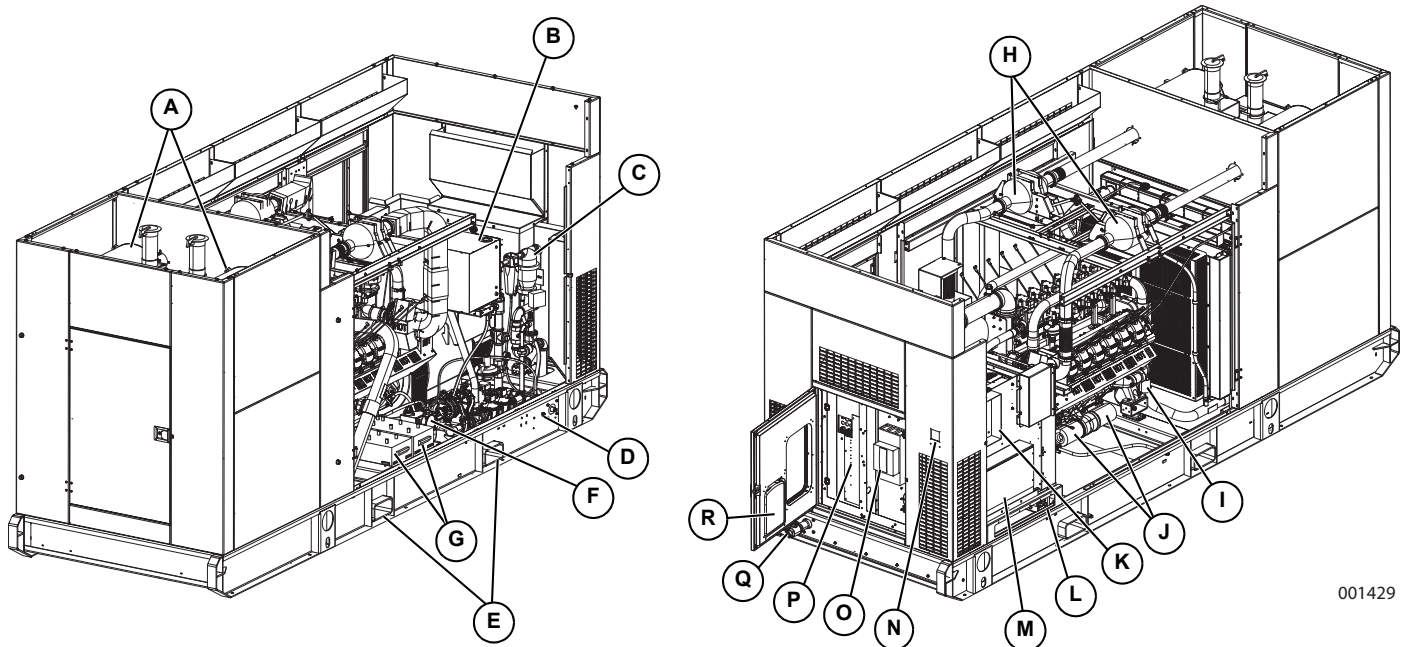


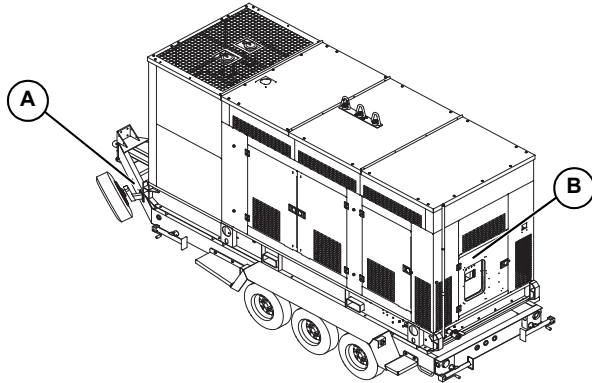
Figure 2-1. Features and Controls (MGG450 Shown)

Table 2-1. Generator Components

A	Silencer (2)	H	Catalyst (2)
B	Oil reservoir	I	Oil makeup filter
C	Scrubbing unit	J	Engine oil filter (2)
D	Scrubbing unit drains	K	Load center
E	Forklift pockets	L	Black start (power in)
F	Oil leveler	M	Generator output connections
G	Battery (2)	N	Emergency stop switch
		O	Main circuit breaker
		P	Control panel
		Q	3/8" LP fuel inlet and 2" gaseous fuel inlet
		R	Manual location

Unit and Serial Number Locations

See **Figure 2-2** to locate the unit ID tag (A) and Vehicle Identification Number (VIN) tag (B). Important information, such as the unit model number, serial number, VIN and tire loading information is found on these tags. Record the information from these tags so it is available if the tags are lost or damaged. When ordering parts or requesting assistance, you may be asked to provide this information.



001430

Figure 2-2. Unit and Serial Number Locations (MGG450 Shown)

Engine Oil Recommendations

To maintain the product warranty, the engine oil should be serviced in accordance with the recommendations of this manual. For your convenience, Generac Maintenance Kits are available that include engine oil, oil filter, air filter, spark plug(s), a shop towel and funnel. These kits can be obtained from an Independent Authorized Service Dealer (IASD).

The engine has been filled with factory engine oil of a grade recommended by the engine supplier. See the applicable engine service manual for engine oil recommendations.

Use a high quality detergent oil with an appropriate classification and viscosity for the engine type and ambient temperature conditions. Consult your IASD for oil recommendations.

- Shell Mysell S5 N 15W40 (1500 hour change)
- Valvoline Premium Blue GEO LA 15W40 (1500 hour change)

Coolant Recommendation



DANGER

Risk of poisoning. Do not use mouth to siphon coolant. Doing so will result in death or serious injury.

(000149)



WARNING

Risk of burns. Do not open coolant system until engine has completely cooled. Doing so could result in serious injury.

(000154)

CAUTION

Do not use any chromate base rust inhibitor with propylene glycol base antifreeze, boosters or additives. Doing so will cause overheating.

(000165)

Recommended coolant is ZEREX™ Nitrate Free Extended Life Antifreeze/Coolant. See table below for mixtures:

Freezing Point °F (°C)	-12 (-24)	-34 (-36)	-54 (-48)	-90 (-67)
Coolant (% Volume)	60	50	40	30
Antifreeze (% Volume)	40	50	60	70*

* Maximum freeze protection is at 70%.

Control Box



001433

Figure 2-3. Control Box

Black Start Feature

The unit is designed to facilitate starting in cold weather with aids powered by an external power source, typically a 7.5kW or larger portable generator. The unit is supplied with a 50A male twist-lock connection point to supply power to the unit. The power is routed to a load center, where it can be distributed to the following starting aids by switching the circuit breakers (see [Figure 2-1](#) for breaker location):

- Battery heater
- Battery charger
- Jacket water heater
- Oil heater

At temperatures below 40°F (4°C) engage all starting aids for at least 30 minutes. Coolant temperature should reach a minimum of 30°F (-1°C) before starting unit. Disengage starting aids before starting unit.

Containment Pan

The unit is equipped with a containment pan to catch engine fluids in the event of a failure. The containment pan is sloped to facilitate draining through the drain hole located in pan. To empty drain pan:

1. Remove external drain plug at frame rail.
2. Attach a hose barb and hose to external drain bung. It is recommended that a pump be used to draw fluids into an appropriate storage container.
3. Remove internal drain plug in drain pan.

4. Dispose of fluids according to all local rules and regulations.

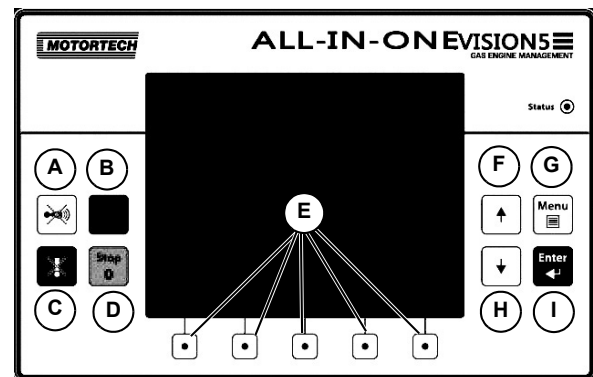
DC Fuses

IMPORTANT NOTE: Replace fuse only with the same recommended type and rating.

Fuses protect the control panel wiring and components from damaging overload. For fuse location and identification, see [Control Box](#).

Digital Controller

The unit leaves the factory with the controller warning set at 105% load and shutdown set at 110% load. The unit is equipped with a digital controller with paralleling capabilities. The paralleling feature allows the operator to synchronize multiple controllers and distribute the load between units. Contact an authorized Generac Service Dealer for more information about this feature.



001442

Figure 2-4. Digital Controller Features

- A Silences horn (audible alarm).
- B Starts generator when MANUAL (MAN) mode is selected.
- C Clears active alarms from alarm list page, alarm is still in history record.
- D Initiates stop sequence, press during stop sequence to skip stop sequence.
- E Function depends on screen display above button.
- F Scrolls through display screens, alarms, or history events, and adjusts a selected setpoint value.
- G Opens menu options. When in menu options, pressing again closes menu.
- H Scrolls through display screens, alarms, or history events, and adjusts a selected setpoint value.
- I Enters setpoint value or enters highlighted menu selection.

NOTE: For more detailed controller information, refer to the controller operator guide included with the generator.

Fuel Selection Screen

The fuel selection screen is the second metering screen and allows the user to select the generator fuel type. **Figure 2-5** shows NG has been selected by the operator.

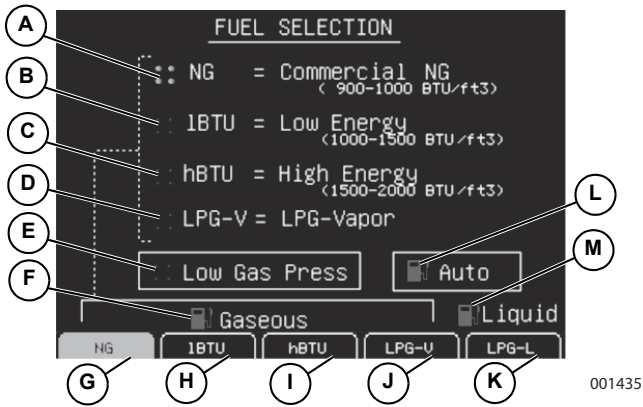


Figure 2-5. Fuel Selection Screen

- A Green indicates commercial natural gas fuel operation has been selected.
- B Green indicates low energy (lower heating value or BTU/ft³) non-commercial fuel has been selected.
- C Green indicates high energy (higher heating value or BTU/ft³) non-commercial fuel has been selected.
- D Green indicates LPG-Vapor fuel operation has been selected
- E Green indicates gaseous fuel supply pressure is low.
- F Indicates unit is currently operating on a gaseous fuel source.
- G User specified selection of commercial NG fuel.
- H User specified selection of low-energy (lower heating value or BTU/ft³) non-commercial fuel.
- I User specified selection of high-energy (higher heating value or BTU/ft³) non-commercial fuel.
- J User specified selection of HD-5 grade LPG vapor fuel.
- K Soft key (button below screen) user specified selection of liquid-LPG fuel.
- L Grey indicates unit is not in auto, yellow indicates unit is in auto, green indicates unit is in auto and running on LPG-Liquid.
- M Indicates the unit is currently operating on a liquid-LPG fuel source.

Engine Knock Intensity Screen

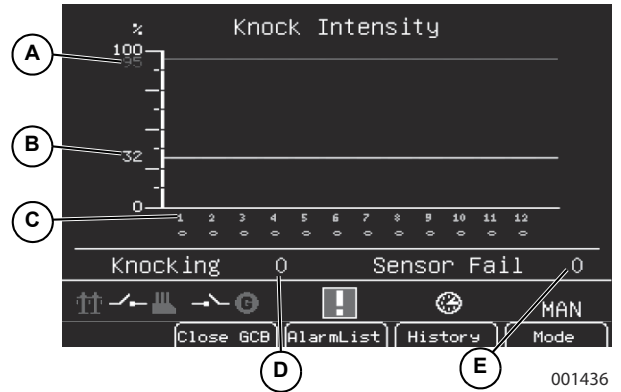


Figure 2-6. Knock Intensity Screen

- A Levels of normalized engine knock above this will cause a unit shutdown.
- B Levels of normalized engine knock above this will cause a warning as engine automatically adjusts.
- C Columns pertain to a single engine cylinder.
- D Level 0 indicates engine has no knock. Level 1 (ON), indicates engine is adjusting to knocking operation (Only applies to currently operating unit).
- E Level 0 indicates all knock sensors are functional. Level 1 indicates knock sensor has failed (Only applies to currently operating unit).

Ignition Secondary Voltage Display Screen

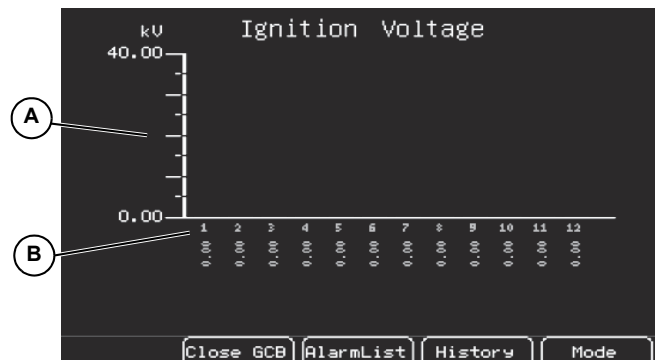


Figure 2-7. Ignition Secondary Voltage Display

- A Secondary ignition voltage
- B Engine cylinder number

Setting the Clock

To set clock on the digital controller:

1. Press MENU.
2. Select Setpoints>Date/Time>Time.
3. Press ENTER.
4. Adjust settings by using the up and down arrows.
5. Press ENTER.

Dual Fuel System



▲ DANGER

Explosion and Fire. Fuel and vapors are extremely flammable and explosive. Keep fire and spark away. Failure to do so will result in death or serious injury.

(000168)

The dual fuel system allows the unit to run on either natural gas (primary) or LP liquid (secondary, if equipped). In the event that the primary source becomes unavailable, the unit will automatically switch to the secondary source and can do so while in operation.

IMPORTANT NOTE: Comply with all laws regulating the storage and handling of fuels.

Allow at least 5% of the tank capacity for fuel expansion. Do not overfill.

Natural Gas (Well Gas) Fuel System

Natural gas is supplied from a utility supply line or well site in its vapor state through in-ground piping. The vapor enters the large fuel inlet located on the back end of the unit frame.

LP Liquid Withdrawal Fuel System

LP is supplied as a liquid in pressurized tanks. The liquid must be converted to its gaseous state before it is introduced into the engine carburetor. The unit is equipped with two vaporizers to accomplish this. The LP liquid enters the fuel system through the small fuel inlet located on the back end of the frame. As the liquid passes through the vaporizer, heated engine coolant is passed through the vaporizer to provide the necessary heat for conversion of the fuel from a liquid to a gaseous state.

Standard Generator Features

The generator is a revolving field, alternating current type generator set. The generator is designed to supply electrical power for the operation of compatible electrical loads.

The revolving field is directly connected to, and driven by an engine by means of flexible discs. Generators with a

four-pole rotor are driven at a rated speed of 1800 rpm to supply a frequency of 60 Hz.

Refer to the data label affixed to the generator for rated AC voltage, wattage, amperage, number of phases, etc. This generator uses a wye configuration. The generator incorporates the following features:

- The rotor insulation system is Class “H” rated, and the stator insulation is Class “H” rated as defined by NEMA MG1-22.4 and NEMA MG1-1.65.
- The generator is self-ventilated and drip-proof constructed.
- The voltage waveform deviation, total harmonic content of the AC waveform and “telephone influence factor” have been evaluated and are acceptable according to NEMA MG1-22.

Generator and Load Compatibility

Generator must be fully compatible with the rated voltage, phase rotation, and frequency of the connected electrical loads. The generator, connected electrical devices, or both, can be damaged if voltage, phase, and frequency are not compatible.

Engine/Generator Protective Devices

The generator may be required to operate for long periods of time without an operator on hand to monitor conditions such as coolant temperature, oil pressure, voltage, frequency, etc. For this reason, the generator has numerous sensors to provide the control panel with the information it needs to protect both the engine and generator. The control panel is designed to shut down the engine if potentially damaging conditions occur. These conditions can include low oil pressure, high coolant temperature, low coolant level, engine overspeed, over or under voltage, over or under frequency, etc. These settings are configured at the factory and can be changed/adjusted by an authorized service technician, if required.

Lifting the Unit

The unit is capable of being lifted by three methods: Single point lift, four point lift, or fork pockets.

Single Point Lift

The unit has three hoist rings located on top of the unit. The center hoist ring is the main attachment point and the two forward and aft are for redundancy. Only lift the unit with a crane rated to lift the entire unit. Visually inspect the hoist ring before each use. Apply load slowly. Do not use oversized hooks that might spread the hoist ring. Do not attach guidelines to the hoist ring.

Four Point Lift

To ensure personal safety and prevent damage to the unit, use only personnel experienced with rigging, lifting and moving heavy machinery.

Use a spreader bar to prevent damage to the unit. Failure to use a spreader bar will result in scratches and damage to painted surfaces on closed generator sets. Likely equipment or component damage may occur on open generator sets.

Installation drawings show the lifting points and the CG (center of gravity) location for rigging and lifting purposes. Always attach lifting and rigging devices at the designated points on the generator set. Do not use the lifting points of the engine or alternator to move the generator set. See [Figure 2-8](#).

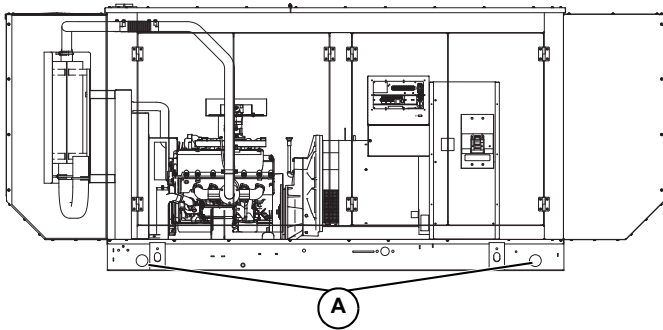


Figure 2-8. Lifting Points

A Lifting eye (4)

Fork Pockets

The lift truck needs to be rated for at least 17,500 lbs at 24 in CG. Do not carry the unit over uneven ground.

Section 3 Operation

Generator Set Up



⚠️ WARNING

Risk of Fire. Unit must be positioned in a manner that prevents combustible material accumulation underneath. Failure to do so could result in death or serious injury. (000147)



⚠️ WARNING

Consult Manual. Read and understand manual completely before using product. Failure to completely understand manual and product could result in death or serious injury. (000100a)

NOTE: The operation of this unit should only be performed by an authorized operator who has been properly trained by an IASD. Contact your local IASD for assistance in training authorized operators. Read the operating manual thoroughly and understand all instructions before operating the equipment.

The unit should be installed, serviced, tested, adjusted, and otherwise prepared for use by a Generac Authorized Service Dealer. The owner is responsible for ensuring the unit's emission control system meets all applicable state and local regulations.

Well Site Approval

A well gas chromatography analysis must be performed prior to installation of the unit. A copy of the test report must be sent to, and pre-approved by, Generac. If the unit is moved to a new location, a new well test must be performed. For more information, contact Generac Technical Service.

Natural Gas Connections

NOTE: The generator is a 5-50 psig or 40-300 psig gas pressure capable unit.

NOTE: Installer must verify that all fuel connections comply with all building codes.

Follow the steps below:

1. Before connecting the natural gas fuel line to the unit, apply pipe sealant to the NPT threads of the fitting at the end of the fuel line.

NOTE: Do not apply pipe sealant to flared (flanged) end of the fitting.

2. Connect fuel line to the two inch inlet, located on the right side of the unit's frame.

3. Verify all connections are sealed and no leaks are present. The installer must verify that all gas connections comply with all building codes.
4. Verify fuel supply pressure is adequate.

Formula Example:

If a unit has a 160 hp engine 60 feet from the supply, the engine needs 10,000 BTU/hr per hp to run efficiently. For natural gas fuel, there are 1015 BTU/ft³. From [Table 3-2](#), a 60 foot run requires a minimum 1 inch pipe at full engine load.

$$160 \text{ hp} \times 10,000 \text{ BTU/Hr per hp} = 1,600,000 \text{ BTU's / per hour for proper operation}$$

$$\frac{1,600,000}{1,015} = 1576 \text{ cubic feet per hour}$$

Table 3-2. Natural Gas Flow Rate (Cubic Feet per Hour) per Pipe Length

Pipe Length (Feet)	Iron Pipe Size										
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	6"	8"
15	73	165	332	722	1174	2386	3704	6253	13352	37229	–
30	50	115	232	515	818	1712	2646	4521	9331	26330	53728
45	41	95	191	418	673	1419	2213	3752	7600	22462	43867
60	37	83	166	366	587	1241	1924	3319	6542	18595	37999
75	–	74	149	332	524	1077	1684	2886	5772	16652	33959
90	–	67	137	298	433	962	1501	2597	5291	15200	31025
105	–	63	126	274	415	885	1376	2357	4906	14064	28715
120	–	–	115	260	404	827	1289	2213	4618	13160	26859
150	–	–	105	233	366	750	1174	2011	4185	11775	24050
180	–	–	96	216	337	693	1077	1876	3848	10736	21934
210	–	–	89	197	308	635	991	1712	3559	9937	20298
240	–	–	–	183	289	596	933	1616	3357	9235	18990
270	–	–	–	171	274	558	875	1520	3127	8658	17903
300	–	–	–	164	260	524	827	1433	2886	8177	16998

LP Liquid Connections (Liquid Withdrawal System)

Use [Table 3-3](#) to determine the supply pipe size for LP liquid.

Table 3-3. LP Liquid Line Sizing Chart

Liquid Propane Flow	Iron Pipe Size													
	1/4"		3/8"		1/2"		3/4"		1"		1-1/4"		1-1/2"	
	Schedule		Schedule		Schedule		Schedule		Schedule		Schedule		Schedule	
GPH	40	80	40	80	40	80	40	80	40	80	40	80	40	80
10	729	416	–	–	–	–	–	–	–	–	–	–	–	–
15	324	185	–	–	–	–	–	–	–	–	–	–	–	–
20	182	104	825	521	–	–	–	–	–	–	–	–	–	–
40	46	26	205	129	745	504	–	–	–	–	–	–	–	–
60	20	11	92	58	331	224	–	–	–	–	–	–	–	–
80	11	6	51	32	187	127	735	537	–	–	–	–	–	–
100	7	4	33	21	119	81	470	343	–	–	–	–	–	–
120	–	–	23	15	83	56	326	238	–	–	–	–	–	–
140	–	–	15	9	61	41	240	175	813	618	–	–	–	–
160	–	–	13	8	47	32	184	134	623	473	–	–	–	–
180	–	–	–	–	37	25	145	106	491	373	–	–	–	–
200	–	–	–	–	30	20	118	86	399	303	–	–	–	–
240	–	–	–	–	21	14	81	59	277	211	–	–	–	–
280	–	–	–	–	15	10	60	44	204	155	–	–	–	–
300	–	–	–	–	13	9	52	38	177	135	785	623	–	–
350	–	–	–	–	–	–	38	28	130	99	578	459	–	–
400	–	–	–	–	–	–	30	22	99	75	433	344	980	794

How to use chart:

1. Having determined the required flow at point of use, locate this flow in the left hand column. If this falls between two figures, use the larger of the two.
2. Determine total length of piping required from source to point of use.
3. Read across chart from left (required flow) to right to find the total length which is equal to, or exceeds, the distance from source to use.
4. From this point, read up to find the correct size of pipe required.

Table 3-4. Valve & Fitting Pipe Equivalents

Fitting	Equivalent Length Of Steel Pipe (Feet)													
	Nominal Pipe Size (NPT)													
	3/4"		1"		1-1/4"		1-1/2"		2"		2-1/2"		3"	
	Schedule		Schedule		Schedule		Schedule		Schedule		Schedule		Schedule	
	40	80	40	80	40	80	40	80	40	80	40	80	40	80
45° Screwed Elbow	1.2	0.9	1.3	1.2	1.7	1.5	2.0	1.8	2.6	2.4	3.0	2.8	3.8	3.7
90° Screwed Elbow	1.8	1.6	2.3	2.1	3.1	2.9	3.7	3.4	4.6	4.4	5.3	5.1	6.9	6.5
Screwed T Thru Run	1.4	1.3	1.7	1.6	2.4	2.3	2.8	2.6	3.6	3.3	4.2	4.0	5.4	5.0
Screwed T Thru Branch	4.6	4.0	5.6	5.3	7.9	7.3	9.3	8.6	12.0	11.0	15.0	14.0	17.0	16.0
Screwed Globe Valve*	14.0	10.0	21.0	16.0	24.0	19.0	39.0	27.0	42.0	34.5	24.0	20.0	46.0	39.0
Screwed Angel Valve*	11.0	8.0	13.0	10.0	10.5	8.5	20.0	16.0	32.0	26.5	7.5	6.0	19.0	16.0
Flanged Globe Valve*	-	-	-	-	-	-	30.0	24.0	4.10	34.0	-	-	46.0	39.0
Flanged Angle Valve*	-	-	-	-	-	-	12.0	10.0	14.5	12.0	-	-	19.0	16.0

* Reg O A7500 series valves.

Fuel Scrubbing System

This unit is equipped with a two-stage gas filtration system. Once the gas enters the unit at a minimum of 40 psi (276 kPa) and a maximum of 300 psi (2068 kPa), it goes through a step down regulator. This will bring the gas pressure down to 30 psi (413 kPa). The gas will then go through the first stage of scrubbing in the cyclonic gas/liquid separator.

The second stage is the coalescing filter. This stage removes 99% of solid or liquid 0.01µm or larger. Both units are equipped with an auto drain system which allows any particles removed from the gas stream to be evacuated from the generator through a port on the frame rail.

IMPORTANT NOTE: Altering the fuel scrubbing system will void the warranty.

NOTE: A minimum of 10 psi (68.95 kPa) is required in order for the auto drain ports to seal properly.

System Set Up

The regulator should be factory-set at 30 psi (413 kPa) prior to gas introduction. The 30 psi (413 kPa) setting is achieved by removing the adjustment screw protective cap and loosening the locknut. Output pressure is increased by turning the adjustment screw clockwise, while turning it counterclockwise decreases the outlet pressure. Use the downstream gauge to set the outlet pressure correctly.

Once the desired outlet pressure is achieved, the locknut should be tightened and the protective cap replaced.

Electrical Connections



▲ DANGER

Electrocution. Never connect this unit to the electrical system of any building unless a licensed electrician has installed an approved transfer switch. Failure to do so will result in death or serious injury. (000150)

▲ DANGER

Connection of fuel source must be done by a qualified professional technician or contractor. Incorrect installation of this unit will result in death, serious injury, and damage to equipment and property damage. (000151)



▲ DANGER

Electrocution. Verify electrical system is properly grounded before applying power. Failure to do so will result in death or serious injury. (000152)

Class 1 wiring methods must be used for field wiring connections to terminals of a class 2 circuit. It is the responsibility of the owner to arrange for these procedures to be performed by a licensed electrical contractor and verify conformance to all applicable codes, including local codes specific to your municipality/city/county and state. Wire size and insulation type must meet National Electrical Code (NEC) and local regulations.

NOTE: NEC requires the frame and exposed conductive surfaces (metal parts) be connected to an approved earth ground. Local regulations may also require proper grounding of generator systems. Check local regulations for generator system grounding requirements.

Prestart Checklist

▲ CAUTION

Do not apply high voltage to windings in moisture-saturated conditions. Serious damage to genset and property can result.

(000153)

- Verify battery disconnect switch is ON
- Verify unit is positioned stably
- Verify proper clearance exists on all sides and top of enclosure
- Verify unit is a safe distance from any flammable or combustible material
- Verify no load is connected to unit
- Verify there are no loose wires or components. Tighten if necessary
- Verify engine oil level is correct. Refer to engine manual if necessary
- Verify engine coolant level is correct. Refer to engine manual if necessary
- Verify controller is in STOP mode by pushing the STOP button
- Verify frequency select switch is in the desired position and the position of the jumper on the voltage regulator is consistent with frequency selection
- Verify fuel valve is open and the pressure and flow rate are correct
- Remove all tools, rags, etc. from inside unit enclosure
- Verify enclosure doors are closed

NOTE: Some installation environments are more corrosive than others. Be sure to follow all installation precautions, especially in high-humidity areas.

Starting the Generator



▲ DANGER

Explosion and Fire. Fuel and vapors are extremely flammable and explosive. Keep fire and spark away. Failure to do so will result in death or serious injury. (000168)

NOTE: After initial power on (after battery disconnect is switched from OFF to ON) the controller will display the following errors, which are normal during a controller power loss:

- Sd ECU
- Fls Mix Pos Low
- Fls Mix Pos High

The “Sd ECU” error can be cleared immediately and the other two will clear automatically in 20 seconds. The user will be unable to start the unit during this time.

This unit is designed to operate on Natural Gas (NG), non-commercial fuels ranging in lower heating value from 1000 BTU/ft³ to 2000 BTU/ft³, or LP liquid. At oil well sites, LP liquid is typically used to start the unit until the pump jack brings the well gas (non-commercial fuel) up to the surface. In automatic mode, the unit’s fuel system will detect when there is sufficient pressure to switch to well gas as the primary fuel source.

Automatic Fuel Switching

In automatic fuel selection mode, unit detects loss of gaseous fuel supply pressure and switches to LPG-liquid fuel operation. Unit will return to gaseous fuel supply operation when pressure has been present for more than 30 minutes. Current fuel operation is shown on fuel selection screen ([Figure 2-5](#)). If problems with the automatic fuel switch occur:

- Verify both NG and LPG-liquid fuels are present at fuel inlets
- Verify engine block coolant hose shut-off valves are open
- Verify pressure switch is set to 1.5-2 psi.
- Verify primary LPG-liquid shut-off valve filter screen is not plugged

Natural Gas Only Operation

Table 3-1.

Municipal (without scrubbing system; not recommended for well gas use)	5 psig minimum (50 psig maximum)
Well Gas (with scrubbing system)	40 psig minimum (300 psig maximum)

If there is sufficient pressure in the gaseous fuel inlet ([Table 3-1](#)), the unit can be started directly on natural gas:

1. Open the manual ball valve located just outside the frame.
2. Check for any leaks in the gas line.
3. Push the down arrow on the controller until you reach the fuel selection screen.
4. Push the soft key just below the NG ON display on the digital controller. Controller will illuminate the NG commercial fuel green.
5. Push the up arrow on display to return to home metering screen.
6. Push the soft key just below the mode label, select MANUAL mode, and press ENTER.
7. Push the START. If engine fails to start, see [General Troubleshooting Guide](#).

Non-Commercial (Well Gas) Only Operation

If there is sufficient pressure in the gaseous fuel line ([Table 3-1](#)), the unit can be started directly on well gas (non-commercial):

1. Open the manual ball valve located just outside the frame.
2. Check for any leaks in the gas line.
3. Push the down arrow on the display to display the fuel selection screen.
4. Push the soft key just below the IBTU ON display for fuels with a lower heating value range of 1000-1500 BTU/ft³, or press the hBTU ON button for fuels with a lower heating value range of 1500-2000 BTU/ft³. If the fuel energy content is unknown, select hBTU ON and see step 8.

NOTE: Only one gaseous fuel selection can be selected at a time. Multiple selections will default to the fuel selection with higher energy content.

5. Push the up arrow to return to the home metering screen.
6. Push the soft key just below the mode label, select MANUAL mode and press ENTER.

7. Push START. If the engine fails to start, see [General Troubleshooting Guide](#).
8. If the fuel content is unknown and the engine did not start, select IBTU ON and turn off hBTU ON.

LP Liquid Only Operation

If unit is to be operated only on LP liquid:

1. Check for leaks in the LP liquid line connection
2. Push the down arrow on the controller until it displays the fuel selection screen
3. Push the soft key just below the mode label, select MANUAL mode, then select LP Liquid and press Enter.
4. Push START. If engine fails to start, see [General Troubleshooting Guide](#).

Gaseous and LP Liquid (Automatic mode) Operation

If there is sufficient pressure in the gaseous fuel line, the unit can be started directly on well gas (non-commercial):

1. Open the manual ball fuel valve located just inside the frame.
2. Check for any leaks in the gas line.
3. Push the down arrow on the controller until it displays the fuel selection screen.
4. Push the soft key for both the gaseous fuel selection and LP liquid operation. The AUTO mode indicator should illuminate.

NOTE: Only one gaseous fuel selection can be selected at a time. Multiple selections will default to the fuel selection with higher energy content.

5. Push the up arrow to return to the home metering screen.
6. Push the soft key just below the mode label, select MANUAL mode and press ENTER.
7. Push START. If engine fails to start, see [General Troubleshooting Guide](#).

Operation Checks

With engine running, check for the following:

- Fuel leaks. If a leak is detected, stop engine immediately by pushing STOP on controller. Repair leak before proceeding.
- Coolant or oil leaks. If a leak is detected, stop engine immediately and repair leak before proceeding.
- Smooth operation. If belt squeals, vibrations or other sources of noise exist, stop engine immediately and repair before proceeding.
- Correct voltage (line-to-line and line-to-neutral) at generator.

- Phase rotation is the same as attached equipment.



WARNING

Risk of burns. Do not open coolant system until engine has completely cooled. Doing so could result in serious injury.

(000154)

After operation checks are completed, stop engine by pushing STOP on controller. Wait for engine to cool. When engine is cool, check engine oil and coolant levels.

Overcrank Shutdown

After a pre-specified duration of cranking, this function ends cranking if engine fails to start. The default settings are as follows:

- The generator will attempt to start (crank) three times.
- Each crank cycle lasts 15 seconds, followed by a 15 second pause to cool the starter.
- After three start attempts, controller alarm will sound and LCD window on controller will display "Start Fail Alarm".

Emergency Stop Switch

The emergency stop switch is located on the outside of the enclosure on the rear of the unit. Push the red button to stop engine. Switch will remain locked until button is pulled out to release.

NOTE: Use emergency stop switch only when unit must be shut down immediately. For any other shut down, see [Disabling Generator for Maintenance](#).

Engine Oil Replenishment System

This unit is equipped with an engine oil replenishment system. The system eliminates the need for frequent filling and checking of the crankcase. The system consists of an oil reservoir tank and an oil level regulator. The regulator is mounted so the centerline of the sight glass is at the same height as the level of the oil in the crankcase. When the engine oil level is low, the float will trigger the reservoir tank to send fresh oil to the crankcase. The regulator delivers only that amount of oil required to maintain a constant oil level in the crankcase. A fine mesh screen in the regulator provides protection against damage by contaminants and abrasive foreign matter.

The regulator is pre-set to the correct level at the factory and should not require adjustment. See [Engine Oil Recommendations](#) for more information.

Generator Output Connections



⚠ DANGER

Electrocution. Do not disable or modify the connection box door safety switch. Doing so will result in death or serious injury.

(000157)



⚠ DANGER

Electrocution. Before connections are made to the unit, verify the main circuit breaker and battery disconnect switch are OFF. Failure to do so will result in death or serious injury.

(000156)

⚠ WARNING

Only a trained and licensed electrician should perform wiring and connections to unit. Failure to follow proper installation requirements could result in death, serious injury, and damage to equipment or property. (000155)

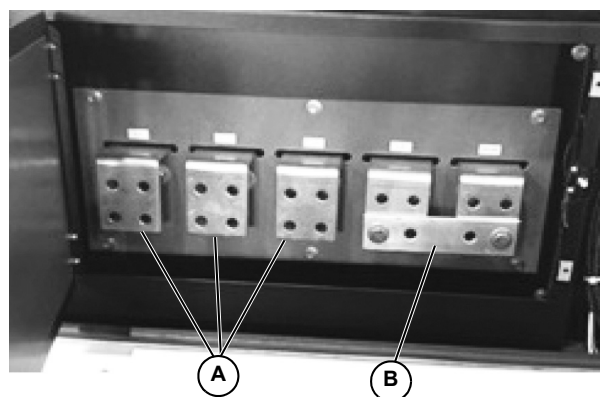
The unit is equipped with bus bars, located behind the rear door on the right side of the unit (see [Figure 3-1](#)). The bus bars provide connection points for attachment of external loads to the generator.

Connections to the bus bars should be made by running the power cables up through the opening in the bottom of the box. Do not make any connections directly to the bus bars without routing the cables through the slot.

The door is equipped with a safety interlock switch that will trip the main circuit breaker and disable the voltage regulator if the door is opened while the unit is operating.

A ground connection is included. The generator neutral is bonded to ground when it is shipped from the factory. The bonding plate may need to be removed if the unit is used as a standby power source.

IMPORTANT NOTE: Installation should be in compliance with the national electrical code (nec), state and local regulations.



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Figure 3-1. Generator Output Connections

- A Bus bars
- B Grounding lug

Customer Convenience Receptacles

The unit is equipped with two 120VAC Ground Fault Circuit Interrupt (GFCI) receptacles, located inside the double doors on the right side of the unit. These receptacles are not routed through the main circuit breaker. Power is available any time the generator is running.

Main Circuit Breaker

The main circuit breaker is located to the right of the control panel. When the breaker is in the open (O) position, power is interrupted between the bus connections and the generator. The input receptacles will continue to receive power, even when the main circuit breaker is open.

Once connections have been made to the bus bars and the generator has been started and allowed to reach normal operating conditions, pushing the “Open/Close Breaker” button on the controller will switch the main circuit breaker CLOSE.

IMPORTANT NOTE: Do not use the buttons on the main circuit breaker to open or close the breaker. Only use the buttons on the controller. If the circuit breaker buttons are pressed, the unit will shutdown immediately. It is especially important to only use the controller when operating in a parallel configuration, as the controller will determine when the breaker can be opened and closed based on generator phase rotation and load levels.

The main circuit breaker will be tripped, disconnecting power to the bus connections, if any of the following conditions occur while the unit is running:

- Overload of the generator circuits to the bus connections. At 105% load, there will be an audible warning. At 110% load, the breaker opens and power will be disconnected.

- The customer connection box door is opened.
- If the emergency stop switch is activated.

Verify any problems that cause the main circuit breaker to trip are corrected before returning the switch to the CLOSE (I) position.

Circuit Breaker Box

The circuit breaker box is located on the right side of the unit. It contains five 20A breakers and two 15A breakers for unit equipment, relays, and GFCI receptacles.

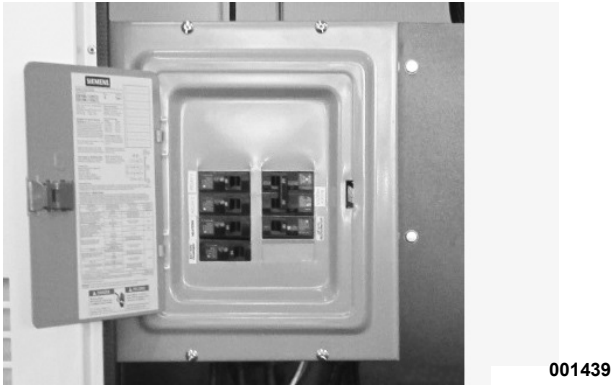


Figure 3-2. Circuit Breaker Box

Frame Ground Connection

The NEC may require that the frame and exposed metal surfaces be at local ground reference potential to avoid electrical shock hazard. A local ground reference may require a driven earth ground conductor at the unit installation site. Make the ground connection to the ground lug located on the outside of the frame. Use the appropriate size wire as required by the NEC and local regulations.

Determine ground stud location and connect the ground wire to the “earth ground” terminal. This ground is the local reference ground to ground the unit frame only.

Paralleling Startup

Up to 32 MGG450s of the same rated voltage and frequency can be operated in parallel without extra equipment for extended quantity paralleling. The total electrical load (real, kW, and reactive, kVAr) will be divided equally among all gensets connected.

IMPORTANT NOTE: Verify all setup procedures have been performed prior to following the steps below. Refer to “Optimizing PID loop procedure”.

Parallel MGG450 to Any Generac Genset

1. Attach a communication cable between each genset 216, 217 and 218 terminal, located next to the load cable connection box.

NOTE: The genset controllers must all have a unique controller address.

2. Place controllers in MANUAL mode and start generators. Allow all start sequence timers to expire.
3. Verify the following parameters:
 - Comms settings > Nomin power: (set to 300 or 360 for COP or PRI)
 - Comms settings > Cont.address: (unique number for each genset)
 - Pwr management > Pwr management: DISABLED (Contact Generac Service)
 - Pwr management > Priority: 0
 - Pwr management > Control group: 2 or COMMON
 - Pwr management > ControlLinkLeft: 2 or COMMON
 - Pwr management > ControlLinkRight: 2 or COMMON
 - IG-AVRi module output level adjusted to max (full CW)
 - AVR remote control voltage authority set to $\pm 10\%$

NOTE: The amount of total load taken by each genset is dependent on Nomin Power setting.

Parallel MGG450 to Other Gensets

The MGG450 can be operated in parallel to other (non-Generac) gensets. The real portion (kW) of total electrical load will be divided among all gensets connected. The reactive (kVAr) power can be shared by activating the droop CT in the alternator AVR.

The controller can communicate with other controllers via an analog signal of either 0-3.0 V or 0-4.5 V. The other genset must also be capable of load communication with an analog load sharing line of the same voltage range. The number of gensets connected via the analog line will depend on quality of the signal and the desired resolution of load sharing.

1. Attach an analog cable to the LSM+ and LSM- terminals, located next to the load cable connection box.
2. Route the analog cable away from sources of EMI/RFI.

To change the range of the analog signal:

1. See [Figure 3-3](#). Locate the NT-Converter module (A) in the control cabinet.



Figure 3-3. Load Share Module Location

- See Figure 3-4. Close jumper 1 for a 0-3 volt range or close jumper 2 for a 0-4.5 volt range.



Figure 3-4. Load Share Module Jumpers Location

- To share reactive load, kVAR, activate the droop CT in the alternator AVR.

NOTE: The droop CT is not activated for island operation or MGG-to-MGG parallel operation.

- Connect a PC to the AVR (located within the alternator tower) via USB cable.
- Using Leroy-Somer EasyReg software, in the REGULATION MODE activate the REACTIVE DROOP COMPENSATION.
- Verify the droop CT is listed under GENERATOR SETTINGS.
- Save configuration to AVR and close software.

Paralleling Shutdown

- Completely unload generators and verify none of them shuts down on Loss of Field or Reverse Power.
- Press the GCB button on both generators.
- Press STOP to shut down both generators.

General Wiring Considerations

⚠ WARNING

Only a trained and licensed electrician should perform wiring and connections to unit. Failure to follow proper installation requirements could result in death, serious injury, and damage to equipment or property. (000155)

- When routing the interface wiring, do not route it against anything that could cut or chafe the wiring. Do not route the wire against any hot or potentially hot object.
- Verify all electrical components share a common hard wired ground.
- Check with your local building inspector to determine what is required to comply with local regulations for grounding this type of permanent installation.

Battery Connections



⚠ DANGER

Electrocution. Verify electrical system is properly grounded before applying power. Failure to do so will result in death or serious injury. (000152)



⚠ WARNING

Explosion. Batteries emit explosive gases while charging. Keep fire and spark away. Wear protective gear when working with batteries. Failure to do so could result in death or serious injury. (000137a)



⚠ WARNING

Explosion. Do not dispose of batteries in a fire. Batteries are explosive. Electrolyte solution can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention. (000162)



⚠ WARNING

Risk of burn. Do not open or mutilate batteries. Batteries contain electrolyte solution which can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention. (000163a)

⚠ WARNING

Environmental Hazard. Always recycle batteries at an official recycling center in accordance with all local laws and regulations. Failure to do so could result in environmental damage, death or serious injury. (000228)

- Always recycle batteries in accordance with local laws and regulations. Contact your local solid waste collection site or recycling facility to obtain

information on local recycling processes. For more information on battery recycling, visit the Battery Council International website at: <http://batteryCouncil.org/>.

An authorized operator should inspect the engine battery system monthly. At this time, the battery fluid level should be checked and distilled water added if needed. Battery cables and connections should also be inspected for cleanliness and corrosion.

Once every six months, an Independent Authorized Service Dealer (IASD) should inspect the battery system. At this time, the battery condition and state of charge should be checked using a battery hydrometer. The battery should be recharged or replaced as required.

Battery service is to be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away.

Observe the following precautions when working on batteries:

- Remove five amp controller fuse from control panel.
- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of battery.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Wear full eye protection and protective clothing.
- Do not open or mutilate batteries. Released electrolyte has been known to be harmful to the skin and eyes and to be toxic.
- Where electrolyte contacts the skin, wash it off immediately with water.
- Where electrolyte contacts the eyes, flush thoroughly and immediately with water and seek medical attention.
- Spilled electrolyte is to be washed down with an acid neutralizing agent. A common practice is to use a solution of one pound (500 grams) bicarbonate of soda (baking soda) to one gallon (four liters) of water. The bicarbonate of soda solution is to be added until the evidence of reaction (foaming) has ceased. The resulting liquid is to be flushed with water.
- Discharge static electricity before touching battery by first touching a grounded metal surface.

Battery Disconnect Switch

The unit is equipped with a battery disconnect switch which allows the operator to disconnect power from the batteries by turning the switch OFF.

NOTE: The battery disconnect switch does not cut power from the main circuit breaker motor operator or the remote monitoring circuit.

Derating

NOTE: Generac Continuous and Prime ratings are defined by ISO 8528-1.

All units are subject to derating based on fuel quality, ambient temperature and altitude; this will reduce the available power for operating tools and accessories connected to the receptacles. See [Table 3-2](#).

Table 3-2. COP Derate Temperature and Fuel Quality

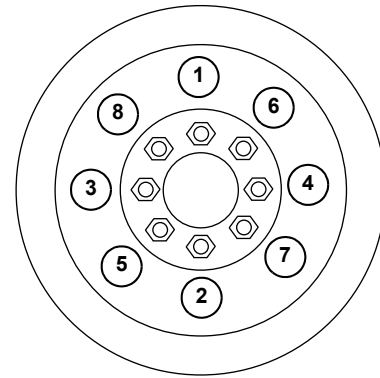
Methane Number	Ambient Temperature						
	77°F (25°C)	86°F (30°C)	95°F (35°C)	104°F (40°C)	113°F (45°C)	122°F (50°C)	131°F (55°C)
35	300	279	266	254	223	187	148
40	300	300	288	277	242	206	167
45	300	300	300	300	261	225	186
50	300	300	300	300	281	245	206
55	300	300	300	300	300	264	225
60	300	300	300	300	300	283	244
65	300	300	300	300	300	300	264
70	300	300	300	300	300	300	270
75	300	300	300	300	300	300	270
80	300	300	300	300	300	300	270
85	300	300	300	300	300	300	270
90	300	300	300	300	300	300	270

Table 3-3. Prime Derate Temperature and Fuel Quality

Methane Number	Ambient Temperature					
	77°F (25°C)	86°F (30°C)	95°F (35°C)	104°F (40°C)	113°F (45°C)	122°F (50°C)
10	203	178	165	152	122	86
15	223	198	185	172	142	106
20	243	218	205	192	162	126
25	264	238	225	213	183	147
30	284	259	246	233	203	167
35	300	279	266	253	223	187
40	300	297	284	272	242	206
45	319	316	303	290	260	224
50	338	335	322	309	279	243
55	356	354	341	328	298	262
60	360	354	345	339	317	281
65	360	354	345	339	330	299
70	360	354	345	339	330	318
75	360	354	345	339	330	324
80	360	354	345	339	330	324
85	360	354	345	339	330	324
90	360	354	345	339	330	324

Towing the Trailer (MGG450 Only)

1. Use the jack to raise or lower the trailer onto the hitch of the towing vehicle. Lock the hitch coupling and attach the safety chains or cables to the vehicle. Raise the jack foot completely.
2. Connect any trailer wiring to the tow vehicle. Check for proper operation of the directional and brake lights.
3. Make sure all doors are properly latched.
4. Check for proper inflation of the trailer tires. Maximum tire pressure is 125 psi (861 kPa).
5. Check the wheel lugs. Tighten or replace any that are loose or missing. If a tire has been removed or replaced, tighten lugs in the order shown in [Figure 3-5](#).



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Figure 3-5. Lug Tightening Sequence

6. Start all lug nuts by hand.
 - First pass tighten to 20-25 ft-lbs (27-33 Nm)
 - Second pass tighten to 50-60 ft-lbs (67-81 Nm)
 - Third pass tighten to 90-120 ft-lbs (122-162 Nm)

NOTE: After the first road use, re-tighten the lug nuts in sequence.

Maximum recommended speed for highway towing is 45 mph (72 km/h). Recommended off-road towing speed is not to exceed 10 mph (16 km/h) or less, depending on terrain.

Trailer Wheel Bearings (MGG450 Only)

Some trailers are equipped with a grease zerk fitting to allow lubrication of the wheel bearings without the need to disassemble the axle hub. To lubricate the axle bearings, remove the small rubber plug on the grease cap, attach a standard grease gun fitting to the grease zerk fitting and pump grease into the fitting until new grease is visible around the nozzle of the grease gun. Use only a high quality grease made specifically for lubrication of wheel bearings. Wipe any excess grease from the hub with a clean cloth and replace the rubber plug when finished. The minimum recommended lubrication is every 12 months or 12,000 miles (19,312 km). More frequent lubrication may be required under extremely dusty or damp operating conditions.

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Section 4 Maintenance

Emissions Information

For emissions information, see the OEM engine manual.

Disabling Generator for Maintenance



Accidental Start-up. Disconnect the negative battery cable, then the positive battery cable when working on unit. Failure to do so could result in death or serious injury. (000130)

1. Verify power to the load can be interrupted. Warn any equipment users that there will be a temporary power disruption.
2. Allow the generator to cool down (running at no-load) for approximately five minutes to prevent damage to critical engine components.
3. Push the stop button on the controller.
4. Perform the necessary maintenance (based on the hourly requirements).
5. Push START on the controller.
6. When the generator is running, and all engine/generator parameters (voltage, frequency, coolant temp, oil pressure, etc.) have been verified as correct, close the Main Circuit Breaker (MCB).
7. Make a final visual inspection of the generator to verify proper operation.

Maintenance Tasks

Regular maintenance will improve performance and extend engine/equipment life. Generac Power Systems, Inc. recommends that all maintenance work be performed by an Independent Authorized Service Dealer (IASD). Regular maintenance, replacement or repair of the emissions control devices and systems may be performed by any repair shop or person of the owner's choosing. However, to obtain emissions control warranty service free of charge, the work must be performed by an IASD. See the emissions warranty.

NOTE: Normal maintenance service and replacement of parts is the responsibility of the owner and, as such, are not considered defects in materials or workmanship within the terms of the warranty. It is strongly recommended that equipment be periodically checked by an IASD.

Daily checks must be performed when unit is operated continuously for extended periods of time. Daily checks and routine monthly checks can be performed by an IASD.

Daily Walk Around Inspection

Look for conditions that could hinder performance or safety, such as (but not limited to) oil, coolant, fuel leakage, blocked vents, loose or missing hardware and electrical connections. Check for foreign matter blocking the vents and on top of unit. When unit is not running:

- Visually check belts for damage.
- Coolant should be checked daily. Coolant should be visible in the sight glass located near the top of the radiator.
- Check electrical connectors, battery and ground points. Look for loose or missing hardware.
- Check all flexible rubber hoses for deterioration.

Calibrate Oil Level Sight Gauge

This unit is equipped with an engine oil replenishment system. The system consists of a 30 gallon (113.5 liter) oil reservoir tank and an engine oil level sight gauge. This gauge is pre-set to the appropriate oil level while the engine is in operation. When the engine oil level is low, approximately ¼ inch below the lower green line, a float will trigger the reservoir tank to send fresh oil to the crankcase.

To calibrate the oil level sight gauge, use the following procedure:

1. Verify the engine is OFF and cooled.
2. With the unit on a level surface, remove the engine dipstick and verify the oil level is between the Full and Add markings.
3. Start the engine and let it warm up to normal operating temperature.
4. Loosen the hardware which connects the gauge's bracket to the unit. Move the bracket up or down until the oil level is centered between the two green lines.
5. Tighten the hardware to secure the bracket.

The unit can also be configured to initiate an alarm or an automatic shutdown. Contact Generac Technical Service for more information.

Check Engine Oil Level

An authorized operator should check the engine oil level daily. The oil level should be maintained between the Full and Add marks on the engine dipstick. Recommended fluids are listed in [Engine Oil Recommendations](#). To check the engine oil using the dipstick:

NOTE: If engine was running, wait at least ten minutes before proceeding.

1. Remove dipstick and wipe it dry with a clean, lint free cloth.
2. Slowly insert the clean dipstick into the tube. Verify dipstick is fully seated in the dipstick tube.
3. After ten seconds, remove the dipstick and look at the oil level on both sides. The lower of the two readings will be the correct oil level measurement.
4. Add oil (if necessary) to adjust the level. After adding or changing the oil, the engine should run for one minute before checking the oil level. Wait ten minutes to allow the engine to cool and oil to fully drain into the oil pan.

Typical causes of inaccurate oil level readings:

- Reading the high level of the dipstick.
- Reading the dipstick before the oil fully drains into the oil pan.
- Inserting and removing the dipstick too quickly.
- The dipstick is not fully seated in the dipstick tube.

Changing the Oil



WARNING

Risk of burns. Allow engine to cool before draining oil or coolant. Failure to do so could result in death or serious injury.

(000139)

WARNING

Potential of cancer. Prolonged or repeated contact with used motor oil has been shown to cause cancer in laboratory animals. Thoroughly wash exposed areas with soap and water.

(000127a)

See the 1500 Hour Service Interval Manual (0L5448) for instructions on changing the engine oil.

Adding Coolant



DANGER

Risk of poisoning. Do not use mouth to siphon coolant. Doing so will result in death or serious injury.

(000149)



WARNING

Risk of burns. Do not open coolant system until engine has completely cooled. Doing so could result in serious injury.

(000154)

CAUTION

Do not use any chromate base rust inhibitor with propylene glycol base antifreeze, boosters or additives. Doing so will cause overheating.

(000165)

With engine stopped and cooled, visually check the coolant level in the sight glass located near the top of the radiator. If coolant is not visible, coolant will need to be added to the system. Let engine cool before adding coolant. Add a 50/50 mixture of the correct antifreeze and distilled or deionized water to the coolant system.

Maintenance Schedule

Periodic inspection, service, and maintenance of this unit is critical to ensure reliable operation. The following is the manufacturer's recommended maintenance schedule. The maintenance items will need to be performed more frequently if the generator is used in severe applications (such as very high or very low ambient conditions or extremely dirty or dusty environments). Use the generator's hour meter or calendar time, whichever occurs first, from the previous maintenance interval to determine the next required maintenance interval. Note that some checks are based on hours of operation.

Follow all applicable safety alerts found in this manual or engine service/maintenance manual before performing any maintenance checks or service.

This maintenance schedule reflects the minimum tasks that need to be accomplished to verify the generator remains operational. The manufacturer recommends that all service maintenance or repairs be completed by an IASD.

Table 4-5. Basic Maintenance Schedule

Daily	<ul style="list-style-type: none"> • Walk around inspection (see <i>Daily Walk Around Inspection</i>) • Check oil level • Check coolant level
Every 1500 Hours**	<ul style="list-style-type: none"> • Replace oil filters (engine and by-pass) • Replace engine oil (see <i>Engine Oil Recommendations</i> for oil types) • Inspect filter minder/replace element as needed • Inspect fuel and radiator hoses • Inspect and tension belts* • Inspect batteries • Inspect coalescing filter • Inspect flexible couplings • Clean and inspect radiator • Inspect coolant • Replace spark plugs • Check and adjust valve lash
Every 7500 Hours	<ul style="list-style-type: none"> • Replace spark plug wires and coils • Replace thermostats • Rebuild water pump • Replace block heater • Replace coolant • Replace cooling fan belt • Replace rubber cooling and charge air couplings • Replace DC alternator and belt • Replace exhaust flex • Replace exhaust blankets
First 15,000 Hours, Then Every 13,500 Hours (Every Second Water Pump Replacement)	<ul style="list-style-type: none"> • Replace turbo chargers and gaskets • Replace oxygen sensors • Replace valve cover gaskets
Every 21,000 Hours	<ul style="list-style-type: none"> • Replace cylinder liners • Replace piston rings • Check connecting rods/replace as needed • Replace cylinder heads • Replace catalysts • Replace intake and exhaust manifold gaskets • Replace connecting rod bearings <p>NOTE: "Every 7,500 Hours" maintenance items must also be completed at this interval.</p>
Every 42,000 Hours	<ul style="list-style-type: none"> • Complete engine overhaul • Bottom end evaluation • Cam replacement • Crank evaluation • Replace bearings • Overhaul alternator • Enclosure touch-up • Frame repair/touch-up • Replace cooling package <p>NOTE: "Every 7,500 Hours" maintenance items must also be completed at this interval.</p>

* Visually check belts for damage each time the unit is serviced.

** See the 1500 Hour Service Interval Manual (0L5448).

NOTE: The manufacturer recommends that all service maintenance or repairs be completed by an IASD.

NOTE: For additional maintenance information, refer to the engine manual.

Battery Inspection



⚠ DANGER

Electrocution. Do not wear jewelry while working on this equipment. Doing so will result in death or serious injury.

(000188)



⚠ WARNING

Explosion. Batteries emit explosive gases while charging. Keep fire and spark away. Wear protective gear when working with batteries. Failure to do so could result in death or serious injury.

(000137a)



⚠ WARNING

Explosion. Do not dispose of batteries in a fire. Batteries are explosive. Electrolyte solution can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention.

(000162)



⚠ WARNING

Risk of burn. Do not open or mutilate batteries. Batteries contain electrolyte solution which can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention.

(000163a)

⚠ WARNING

Environmental Hazard. Always recycle batteries at an official recycling center in accordance with all local laws and regulations. Failure to do so could result in environmental damage, death or serious injury.

(000228)

- Always recycle batteries in accordance with local laws and regulations. Contact your local solid waste collection site or recycling facility to obtain information on local recycling processes. For more information on battery recycling, visit the Battery Council International website at: <http://batteryCouncil.org/>.

An authorized operator should inspect the engine battery system monthly. At this time, the battery fluid level should be checked and distilled water added if needed. Battery cables and connections should also be inspected for cleanliness and corrosion.

Once every six months, an Authorized Service Technician should inspect the battery system. At this time, the battery condition and state of charge should be checked using a battery hydrometer. The battery should be recharged or replaced as required.

Battery service is to be performed or supervised by personnel knowledgeable of batteries and the required

precautions. Keep unauthorized personnel away.

Observe the precautions in [Battery Hazards](#) when working on batteries.

NOTE: A negative ground system is used. Make sure the battery is correctly connected and terminals are tight. Observe battery polarity when connecting the battery to the generator. Verify battery connection is correct per wiring diagrams.

Battery Installation and Replacement

When required, the battery must be replaced with one of equivalent size, voltage, and CCA (cold crank amp capacity). Minimum CCA for this generator is 2200 (two pairs of two 1100 CCA 12 volt batteries in series to give 1100 Amps at 24 volts. connected in parallel to provide 2200 CCA at 24 volts). Contact the local authorized Generac Service Dealer for correct battery size. A new battery must be filled with the proper electrolyte and be fully charged before install.

Battery cables are connected to the generator at the factory. Connect cables to battery posts as follows.



⚠ CAUTION

Do not make battery connections in reverse. Doing so will result in equipment damage.

(000167)

1. Connect battery cable from starter contactor to positive (POS or +) battery post.
2. Connect black battery cable to negative (NEG or -) battery post.
3. Refer to [Starting the Generator](#).

Other Maintenance Checks

The following inspections should be performed by an authorized service technician, or a properly trained authorized operator.

- Inspect engine accessory drive belts
- Inspect hoses and connections
- Inspect fuel supply system
- Inspect exhaust system
- Inspect exhaust pipe sleeve

Jack Maintenance (MGG450 Only)

The following procedures should be performed at least annually.

Side-wind models

- The internal gearing and bushings of the jack must be kept lubricated. Apply a small amount of automotive grease to the internal gearing by removing the jack cover, or if equipped, use a needle nose applicator or standard grease gun on the lubrication point found on the side of the jack near the crank. Rotate the jack handle to distribute the grease evenly.
- A lightweight oil must be applied to the handle unit at both sides of the tube.
- If equipped, the axle bolt and nut assembly of the caster wheel must also be lubricated with the same lightweight oil.

Top-wind models

Apply a lightweight oil to the screw stem.

Fuel Scrubbing System (If Equipped)

The coalescing filter system is used to separate emulsions and remove particulates from the fuel source. The auto drain removes water build up in the filter body. The BX filter is 99.9% efficient for particles and droplets 0.01 micron or greater.

Always wear proper protective clothing and use appropriate tools for maintaining the filter system.

Check all pipes and connections before running the unit. Look for degradation. The assembly should be solid with all connections and hardware tightened. Pipe torques are not applicable. It is recommended that experienced pipe assembly personnel (pipe fitters) perform all service on the pipes.

If pipe assemblies must be replaced:

- Use proper sized fittings for the pressures, relative to the “high” and “low” pressure sides of the regulator.
- Use an appropriate thread sealant for the environment (temp ranges, fuel mix type, detergents, fuel oils etc.). Call Generac for a recommended sealant and replacement parts if needed.

Before operating the unit, pressure and sniff test the entire assembly and any newly replaced portions for leaks.

After shut down and removal of fuel pressure to the unit, pressure may still exist between the regulators. If this occurs, verify fuel supply is removed from unit and run unit until any remaining fuel in the line is used up.

Verify you are in a flame/spark free environment before working on any portion of the fuel system. If you think there might be pressure in the system, assume that there is, and act accordingly. Slow and careful removal of any parts is essential to allow the pressure to escape slowly.

Operation

1. Connect the fuel line to the two inch inlet, located at the frame on the rear of the unit.
2. Open the manual ball valve, located on the outside of the frame on the rear of the unit.
3. Check for any leaks in the gas line.
4. Push the Start button on the digital controller. The controller will sense the type of fuel entering the system and will display “ALI NG Fuel Select”.

Pressure Settings

The operation range for the coalescing filter system and fuel delivery system is 40 psig before entering the regulator. Pressure less than 60 psi (276 kPa) may not provide optimal performance.

Beyond the regulator, the system is factory set to operate at 30 psig. To adjust the pressure setting, remove the cover to access the adjusting screw.

Both scrubbing system filters must maintain a minimum of 15 psi (103.4 kPa) for proper operation, not to exceed a maximum of 150 psi (1034 kPa). The regulator will provide internal relief to the downstream components through the venting systems, preventing downstream overpressure at values greater than 300 psi (2068 kPa), but the assembly limit pressure is 300 psi (2068 kPa). Do not exceed 300 psi (1551 kPa) fuel pressure to the 2 in. (50.8 mm) NG/Well Gas port.

The operating range of the fuel scrubbing system is 40-300 psi at the rail. The primary pressure regulator is factory set to supply 30 psi to the filtration system components. To adjust the primary pressure setting, remove the cover to access the adjusting screw. Pressures less than 30 psi will result in poor performance of the filtration system and generator. The regulator provides internal relief venting to the outside of the unit if overpressure is detected downstream of the regulator. The unit may continue to run in the event of the regulator venting due to slight overpressure.

Automatic Filtration

Both filters have an automatic drain. The coalescing filter is equipped with a float valve which will automatically expel water from the filter. The auto water drain valve must have a minimum of 15 psi (103.4 kPa) for the auto discharge to operate. The drain hose at the bottom of the filter assembly will expel fluids collected through an outlet located at the left frame rail near the rear of the unit. Collect and dispose of the fluids per local, state and federal regulations.

NOTE: Drains must be inspected occasionally and cleaned based on how dirty the fuel being scrubbed is.

Replacing the Filter

The coalescing filter is equipped with a filter-minder located at the top of the filter body. The filter-minder provides a visual indication of the condition of the filter, indicating Dirty (red), Change (yellow) and Clean (green). The filter should be replaced when the indicator is in the Change position. Replace filter as follows:

NOTE: Filter minder will only be accurate while the unit is running on natural gas. While running on any other fuel, the filter minder will show “green” status regardless of actual filter status.



001731

Figure 4-1. Coalescing Filter and Filter-Minder

1. Twist off filter body.
2. Replace old filter cartridge with new cartridge.
3. Twist on filter body.

Air Filter Drain Inspection

Squeeze dust boot at base of air cleaner while engine is OFF.

Filter Minder Inspection

Verify indicator is in the green color on the filter-minder. If it is not, replace air filter.

NOTE: Reset filter-minder after air filter replacement.

Cold Weather Kit

The CG300 and MGG450 are available with or without a cold weather kit. The manufacturer recommends installing the cold weather kit for operation of the unit at 40°F or below.

The kit can be purchased with either a reverse flow fixed pitch fan (**Figure 4-2**) or a variable pitch automatic fan (**Figure 4-3**). The reverse flow fixed pitch fan must be swapped for a forward flow fixed pitch fan when operating in ambient conditions above 50°F (10°C).

The kit contains the following:

- Fan (manual or automatic)
- Heated, insulated enclosure around fuel conditioning system
- 2.5 kW integrated coolant pump/heater
- Resistive heat trace
- Insulation along flexible fuel line
- Mixer
- Demand regulator heater

This kit is additive to the basic starting aids package.

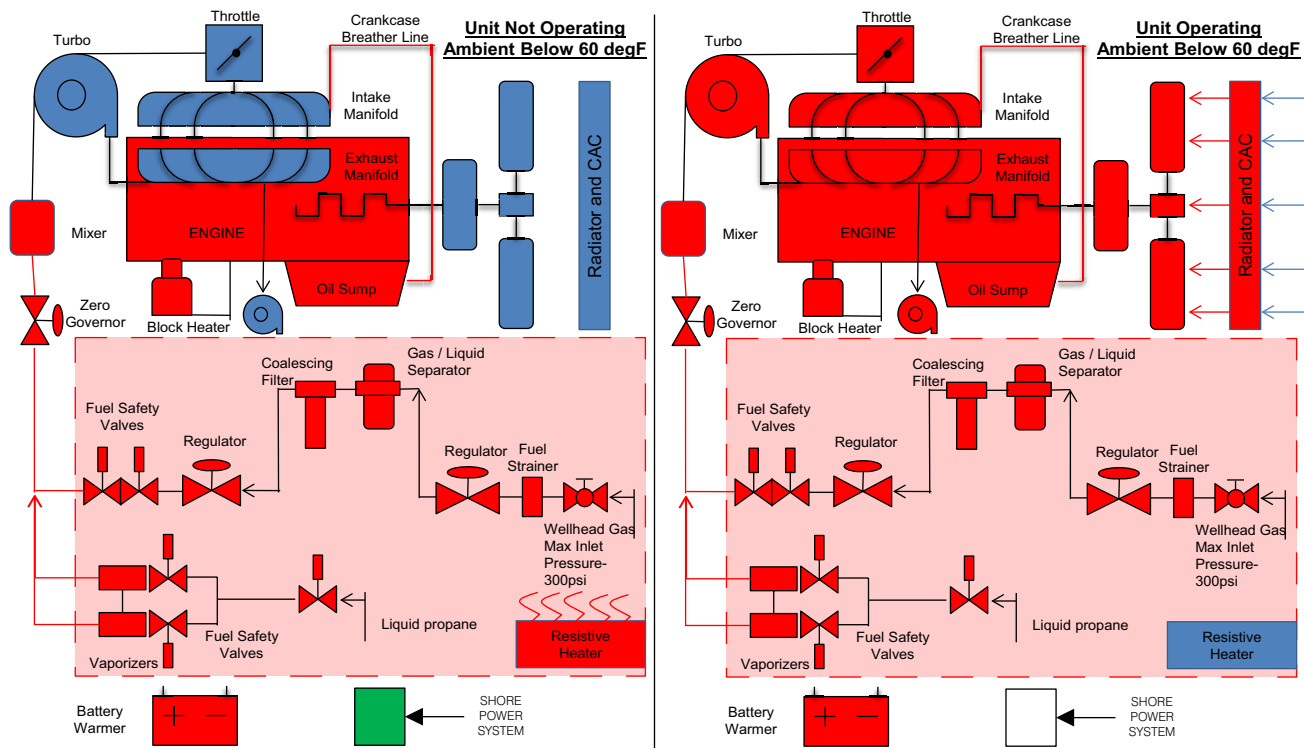
Operation

If the unit is not operating and the temperature is below 60°F ambient, shore power operates a 500 watt resistive heater inside the fuel conditioning enclosure, a 3 kW resistive coolant heater and 2.5 kW integrated coolant pump/heater activates, and a submersed resistive oil pan heater activates. The devices activate independently of one another.

If the unit is operating and the temperature is below 60°F ambient, generator power operates a blower to move air across the exterior of the exhaust manifold into the fuel conditioning enclosure.

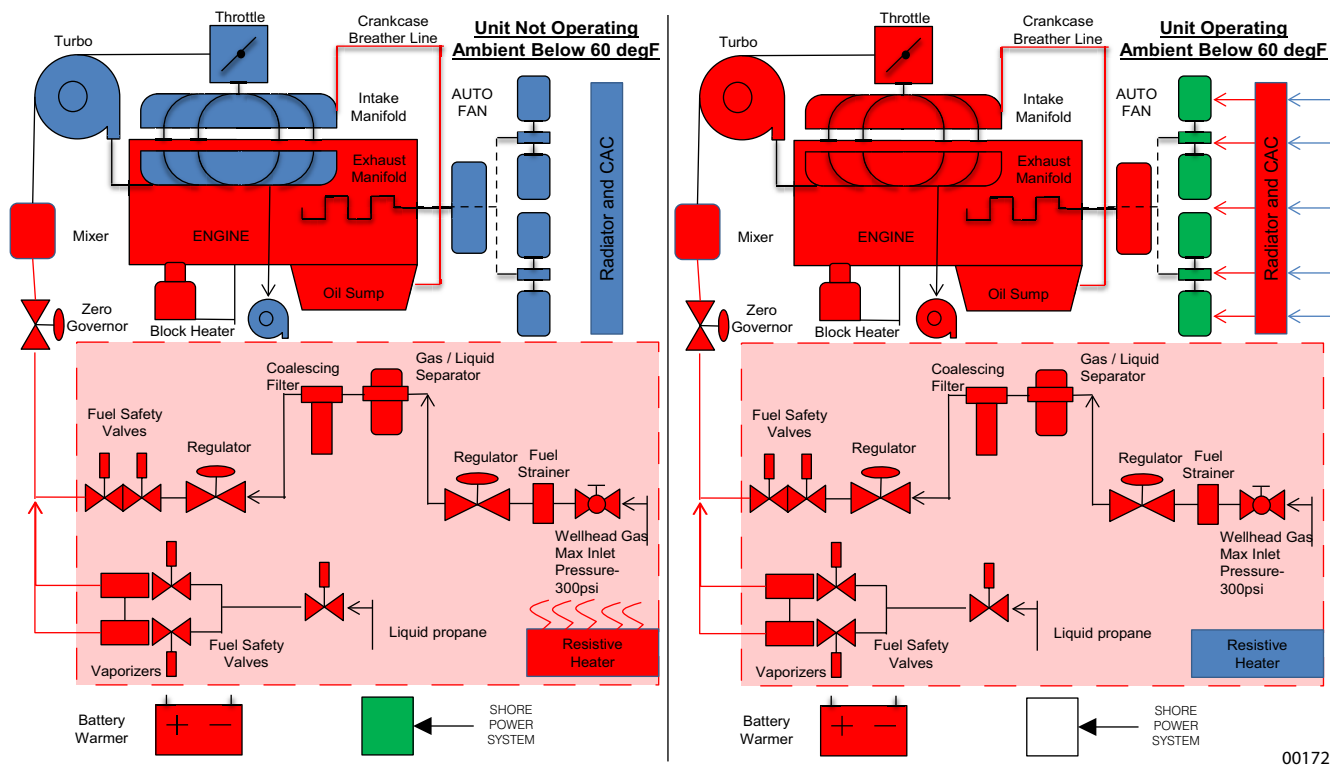
NOTE: Block heater and oil pan heaters are not active while operating.

If a variable pitch automatic fan is installed, it automatically varies the pitch of the blades to maintain optimal airflow controlling coolant temperature and intake manifold temperature, while minimizing fan power required and lowering overall fuel consumption. In addition to airflow control, the automatic fan's controller detects radiator blockage (snow, ice, leaves, etc.) and can reverse flow in an attempt to clear the blockage. If the fan cannot clear the blockage, the unit may shutdown due to high coolant temperature and/or intake manifold temperature.



001728

Figure 4-2. Fixed Pitch Reverse Flow Fan



001729

Figure 4-3. Variable Pitch Automatic Fan

Section 5 Troubleshooting

General Troubleshooting Guide

Problem	Cause	Solution
Engine Cranks But Will Not Start	No fuel.	Verify fuel valves are open.
	Low oil level.	Replenish oil to full.
	Restricted air flow.	Check/replace air filter.
Engine Will Not Crank (Electric Start)	Dead battery.	Replace battery.
	Emergency stop is activated.	Reset controller.
Engine Will Not Start (Gaseous)	Gaseous fuel lines have not been purged with fuel (contain air).	Unit may require multiple crank cycles to start.
Engine Starts But Will Not Run Smoothly	Fuel problem.	Refer to engine manual or contact Generac Technical Service.
Engine Overheats	Excessive load.	Remove one or more electrical loads.
	Debris or dirt buildup on engine/radiator.	Remove debris and clean engine surfaces to allow cooling.
No Output Voltage	Circuit breaker tripped or failed.	Reset or replace circuit breaker.
	Internal failure of alternator.	Check electrical connections.
High Output Voltage	Excessive speed.	Verify engine RPM.
Low Output Voltage	Incorrect speed.	Check AVR adjustment.
Electrical Shock When Frame Is Touched	Static charge.	Ground unit frame at local reference ground.
	Grounded armature or field coil.	Contact Generac Technical Service.
Mechanical Noise	Internal failure of alternator.	Contact Generac Technical Service.
	Engine fan or belts issues.	
	Loose flexplate.	Tighten flexplate to flywheel and alternator shaft.
Throttle Does Not Move	Battery not fully charged.	Charge or replace battery.
Oil Pan Over-Full		Readjust Murphy fill.

Digital Controller Troubleshooting Guide

Problem	Cause	Solution
LCD Display Cannot Be Viewed	Improper supply voltage.	Check DC supply voltage at terminals B+ & B- (10-30 VDC).
	Improper contrast adjustment.	Adjust LCD contrast for best display.
Controller Cannot Be "Reset"	Engine not stopped.	Verify the engine is at a complete stop before trying to reset.
	Controller not OFF.	Turn controller OFF before resetting.
No "RUN" Output Signal	"Shutdown Faults" not reset.	All shutdown faults must be reset (red shutdown LED must be OFF).
	Engine speed not detected at cranking.	Engine speed signal must be detected (speed signal green LED on) during cranking if the "run-output fail safe" feature is enabled. Verify correct magnetic pickup signal at cranking (2.0 VAC minimum during cranking).
Overspeed Shutdown Occurs at Normal Speed	Controller programmed values are wrong or controller has failed.	Verify the controller programmed values are correct for the number of flywheel teeth, nominal RPM, and overspeed set point percentage. Replace controller if failed.
	Wiring incorrect.	Check wiring.
Voltage or Current Metering is Incorrect	Controller programmed values are wrong.	Verify the controller programmed values are correct for the voltage sensing PT ratio and/or current sensing CT ratio.
	Ground is missing.	Verify that the battery supply DC negative conductor is properly grounded to the engine block (i.e. to a common ground point).
	Voltage sensing wiring mistake.	Verify the voltage sensing wiring connection to the controller matches power distribution type.
Engine Temperature or Oil Pressure Display is Incorrect	Failed engine sensor. Ground is missing.	Verify engine sensors. Verify that the battery supply DC negative conductor is properly grounded to the engine block (i.e. to a common ground point).
Engine Alarms Are on For High Engine Temperature or Low Oil Pressure when Engine is Operating Properly	Wrong temperature	Verify engine mounted senders have correct resistance values for corresponding input temperature or pressure.
	Wrong pressure calibration.	Verify calibration.
Keypad Buttons (Switches) Do Not Operate	Keypad not connected to controller.	Verify the interconnecting ribbon cable between the lexan faceplate and main printed circuit board is correctly connected. Replace controller if failed.

Digital Controller Alarm Abbreviations

Abbreviation	Definition
AI	Analog Input
AO	Analog Output
ATS	Automatic Transfer Switch (switches load to supplied bus (by mains or generators)
AVR	Automatic Voltage Regulator
BI	Binary Input
BO	Binary Output
BOC	Breaker Open & Cool-down - protection type (see application manual for details)
BTB	Bus-Tie Breaker
CAN1	CAN bus for ComAp extension modules (e.g. IGS-PTM) and engine ECU connection
CAN2	CAN bus for communication between ComAp controllers and communication modules connection (e.g. I-LB+)
COX	Application for Complex Systems where actions are taken by a PLC and controller only follows orders => needs an external driver (cox)
CT	Current Transformer
ECU	Engine Electronic Control Unit
ESF	Engine Specific File
Forward Synchronization	Synchronization of unloaded generator to mains (GCB closing process)
FMI	Failure Mode Identifier
GC	Graphical Characters - option for additional support of one "graphical" language
GCB	Generator Circuit Breaker
CHP	Combined Heat & Power - co-generation application, usually with Nm engine
I-AOUT8	Extension module with 8 AO
I-CB	Communication Bridge - interfaces IS, IG/IS-NT, ID controllers and non-standard engine ECU
IG-AVRi	IG Automatic Voltage Regulator interface
IG-EE	InteliGen for Electronic Engines (HW optimized for connection to an engine equipped with ECU)
IG-EEC	InteliGen EE controller with extended communication possibilities + switchable sensing ranges of AC voltages and currents
IG-IB	IG-Internet Bridge - for internet/ethernet communication
IGL-RA15	Indication panel with LEDs signaling state of 15 BO
IG-NT	InteliGen New Technology gen-set controller
IG-NTC	InteliGen NT controller with extended communication possibilities + switchable sensing ranges of AC voltages and currents
IGS-NT-LSM+PMS	Dongle for IG-XX and IS-NT to enable Load Sharing and VAr sharing control loops and PMS
IGS-PTM	Extension module with 8 BI/BO, 4 AI and 1 AO
I-LB	Local Bridge – for direct and modem monitoring and control of multiple gen-sets
IM-NT	InteliMains New Technology - Mains supervision controller; the same controller with a different SW configuration can work as a bus-tie synchronizer
I-RB	Relay Board
IS-AIN8	Extension module with 8 AI
IS-BIN8/16	Extension module with 8 BO and 16 BI
IS-NT	InteliSys New technology gen-set controller
IS-NT-BB	InteliSys New Technology Basic Box (without display)
KWP2000	Key Word Protocol of Scania S6 unit (for engine diagnostics)
LAI	Logical Analog Inputs (card in GenConfig which is used to assign source signal to controller Logical Analog Input functions, e.g. Oil press)

Abbreviation	Definition
LBI	Logical Binary Inputs (card in GenConfig which is used to assign source signal to controller Logical Binary Input functions, e.g. Sys Start/Stop)
LS	Load Sharing - analog load sharing line to interconnect gen-sets on site (for island parallel or mains parallel operation of multiple gen-sets); IG/IS/IM-NT controllers use digital Load Sharing via the CAN2 bus
LSM	Load Sharing Module
LT	Option for Low Temperature modification (display equipped with heating foil)
MCB	Main Circuit Breaker
MGCB	Master Generator Circuit Breaker (sometimes used with multiple gen-sets in island parallel or mains parallel operation)
MINT	Multiple application with INTERNAL control loops - for multiple gen-sets in island parallel or mains parallel operation; Load Sharing and VAr Sharing controlled internally; PMS available
MP	Mains Protection
MultIslOp	Multiple Island Operation (MCB is opened, GCB's are closed)
MultParOp	Multiple Parallel Operation (MCB is closed, GCB's are closed)
NPU	Mains protection relay (voltage, frequency, vector shift protections)
OC	Occurrence Count (number of fault occurrences transmitted in diagnostic frame from ECU)
OfL	Off load - protection type (see application manual for details)
PF	Power Factor
PGN	Parameter Group Number (refer to SAE J1939-71)
PMS	Power Management System - ensures optimization of running gen-sets on sites with multiple gen-sets; based on kW/kVA spinning reserve or on relative (%) load; no-master system ensures high reliability
Reverse synchronisation	Synchronisation of loaded generator to mains (MCB closing process)
RTC	Real Time Clock
SG	Speed Governor
SHAIN	SHared (virtual) Analog INput module
SHAOUT	SHared (virtual) Analog OUTput module
SHBIN	SHared (virtual) Binary INput module
SHBOUT	SHared (virtual) Binary OUTput module
Soft load	Generator soft loading according to Load ramp loop setting
Soft unload	Generator soft unloading according to Load ramp loop setting
SPI	Single Parallel Island application - for single gen-sets in parallel with mains or in island operation; suitable for CHP applications; no MCB control
SPM	Single Prime Mover application - for single gen-sets without mains
SPN	Suspect Parameter Number (refer to SAE J1939-71)
SPtM	Single Parallel to Mains application - for single gen-sets in parallel with mains or in island operation, with AMF support; both MCB and GCB controlled
SSB	Single Stand-By application - for single gen-sets with mains and break transfer to mains
VPIO	Virtual periphery I/O module – internal “SW wires” linking binary outputs to inputs controllers via inter-controller CAN2
VS	VAr Sharing - ensures VAr sharing between gen-sets on site via the CAN2 bus (for island parallel or mains parallel operation of multiple gen-sets)
VT	Voltage Transformer
#	Setting of setpoints (with this character in front of them) is shared between controllers controllers via inter-controller CAN2

Digital Controller List of Alarms

Alarm	Definition
ECU	<p>Indication of error in communication with ECU. Check if the ECU is:</p> <ul style="list-style-type: none"> • Correctly connected to the CAN1 port of the controller (refer to Comap Electronic Engines Support manual for information about ECU connection) • Powered up • Terminating resistors are properly connected • CAN bus Low and High wires are not swapped
SHAinCfgErr	Shared Analog module configuration error – i.e. more than one source module (SHAOUT) were configured (on the CAN2 bus). Make sure that only one SHAOUT x module is configured in controllers.
ECUdiagBlocked	Alarm is active when Comms settings: ECU diag = DISABLED. This setting means that ECU alarms are not displayed and considered by controller and this alarm is the setting notification.
Wrong config	Wrong controller configuration indication. Indicates that controller hardware doesn't support PLC used in configuration. To check it send the IDch and Dngl strings3 from controller Info screen 2 and archive to your technical support.
RTCbatteryFlat	Appears in Alarmlist when battery is close to being completely flat. If power supply cut comes when the RTC battery is flat, the statistic values, history and setpoints settings are lost. Send a controller to your distributor for battery exchange if the RTCbatteryFlat message is displayed.
Al/Hist. msg 1-165	Al/Hist. msg 1-16 activity indication (Al/Hist. msg means Alarm/History message). Al/Hist. msg can be used as a customized message for additional protection configured to any controller internal value. See GenConfig manual - Protections.
Batt volt	Indication of battery voltage protection activity. This protection is based on Analog protect: Batt >V, Batt <V, and Batt volt del setpoints. Check if engine alternator or independent battery charger works properly.
EarthFaultCurr	Indication of Earth fault current protection activity. This protection is based on Gener protect: EarthFaultCurr and EthFltCurr del setpoints. Setpoint EarthFltCurrCT from Basic settings group of setpoints is related to this protection too.
Gen V unbal	Generator voltage unbalance alarm is based on Gener protect: Gen V unbal and Gen V unb del setpoints. The voltage unbalance is calculated as a maximum difference between phase voltages.
Gen I unbal	Generator voltage unbalance alarm is based on Gener protect: Gen V unbal and Gen V unb del setpoints. The voltage unbalance is calculated as a maximum difference between phase voltages.
BusL I	unbal Left bus current asymmetry (unbalance) alarm is based on Gener protect: BusL I unbal and BusL I unb del setpoints. The current unbalance is calculated as a maximum difference between phase currents.
Mains V unbal	Mains voltage unbalance alarm is based on Mains protect: Mains V unbal and MainsV unb del setpoints. The voltage unbalance is calculated as a maximum difference between phase voltages.
Mains I unbal	Mains current asymmetry (unbalance) alarm is based on Mains protect: Mains I unbal and Mains Iunb del setpoints. The current unbalance is calculated as a maximum difference between phase currents.
Bus V unbal	Bus voltage unbalance alarm is based on Gener protect (Bus protect): Bus V unbal and Bus V unb del setpoints. The voltage unbalance is calculated as a maximum difference between phase voltages.

Alarm	Definition
BusL V unbal	Left bus voltage unbalance alarm is based on BusL protect: BusL V unbal and BusL V unb del setpoints. The voltage unbalance is calculated as a maximum difference between phase voltages.
BusR V unbal	Right bus voltage unbalance alarm is based on BusR protect: BusR V unbal and BusR V unb del setpoints. The voltage unbalance is calculated as a maximum difference between phase voltages.
Dongle incomp	Incompatible (usually missing) dongle indication. IGS-NT-LSM+PMS dongle (green one) is required if load sharing and power management functions are used in MINT, COX or COMBI application. Check a Reference Guide for information whether a dongle is required for requested functionality or not.
Emergency stop	Emergency stop activity indication. Check binary input with Emergency stop function.
CAN2 bus empty	This alarm is active if controller doesn't "see" any other controllers on the CAN2 bus. Alarm activation can be enabled/disabled using setpoint Comm settings: CAN2empt-Detect. This setpoint should be set to DISABLED for single generator applications. Check Reg16/Reg32 strings to see which controllers are in the same group18.
ChrgAlternFail	Charger fail detection. This alarm means that voltage on the D+ terminal is lower than 80% of controller power supply voltage and it means that battery is no longer charged. Check function of engine alternator or independent battery charger.
Sd Stop fail	Engine stop fail indication. Stop fail means that engine does not reach "still engine" state within Engine params: Stop time. "Still engine" conditions: <ul style="list-style-type: none"> • Engine speed (RPM) = 0 • AI: Oil press < Starting POil • D+ terminal is not active • BI: RunIndication 1 and 2 and 3 are not active • Generator voltage < 15V (in all phases) • Generator frequency = 0 Hz if all these conditions are fulfilled, additional two second delay is used to confirm "still engine" state.
Overspeed	Gen-set over speed alarm is based on Engine protect: Overspeed setpoint setting.
Underspeed	Gen-set under speed alarm is based on Engine protect: Underspeed setpoint setting.
Pickup fail	Loss of RPM signal in running state ("engine running" state is active). "Engine running" conditions: <ul style="list-style-type: none"> • Engine speed > Engine params: Starting RPM • AI: Oil press > Starting POil • D+ terminal active (this condition is used only if Engine params: D+ function = ENABLED) • BI: RunIndication 1 or 2 or 3 is active • Generator voltage > 15V (in any phase) Refer to Speed pick-up input section in the Technical data chapter in IGS-NT-x.y.-Installation Guide manual for information about requested pick-up signal parameters.

Alarm	Definition
Sd BatteryFlat	Alarm is activated if controller “wakes up” after a start attempt which caused battery voltage drop (voltage drop below 6V) and consequently controller switch-off. ComAp I-LBA module may help to solve this problem, for information about this module, refer to IGSNT-x.y.-Installation Guide manual.
WrnServiceTime	This alarm is activated when at least one of controller count down service timers Engine protect: Service time X has reached zero. It is necessary to set again a non-zero value to a corresponding setpoint to reset this alarm.
Not lubricated	This Alarm list message is active until the first lubrication cycle has been finished. Refer to Engine states chapter in IGS-NT-x.y.-Reference Guide.
Start fail	This alarm is issued if generator start-up fails. It means that several crank attempts has been done (number of attempts is given by Engine params: Crank attempts) and engine did not start. For more information refer to engine starting procedures chapter in IGS-NT-x.y.-Reference Guide.
Start blocking	This message means that a binary input with Startblocking function is active and engine start is blocked. If active, NotReady state is shown on the controller screen and the message appears in the Alarm list. As soon as input is deactivated, engine start is enabled again.
Wrn CylTemp1-32	Warning protection on AI Cylinder temperature 1-32 is active. Check corresponding setpoints in the Engine protect group.
Wrn MCB fail	MCB failure was detected. Refer to Circuit breakers operation sequence, GCB/MCB fail detection chapter in IGSNT-x.y.-Reference Guide.
Stp GCB fail	GCB failure was detected. Refer to Circuit breakers operation sequence, GCB/MCB fail detection chapter in IGSNT-x.y.-Reference Guide.
Wrn BTB fail	BTB failure was detected. Refer to Circuit breakers operation sequence, GCB/MCB fail detection chapter in IGSNT-x.y.-Reference Guide. It applies to BTB breaker too.
Wrn MGCB fail	MGCB failure was detected. Refer to Circuit breakers operation sequence, GCB/MCB fail detection chapter in IGSNT-x.y.-Reference Guide. It applies to MGCB breaker too.
Sd Oil press B	Engine shut-down was activated by binary input with “Oil press” function (refer to LBI card in GenConfig for information about source signal for this function).
Wrn RSync fail	Reverse synchronization failure indication, generator or group of generators was not synchronized to mains within Sync/Load ctrl: Sync timeout time. Check setting of setpoints in the Sync/Load ctrl and Volt/PF ctrl groups. Frequency regulation loop, Angle regulation loop and Voltage regulation loop are active during synchronisation and you may need to adjust their setting. Actual state of synchronization is visible on the controller measurement screen with synchroscope where speed and voltage regulator's outputs, slip frequency and generator and mains voltages can be observed during the synchronization process.

Alarm	Definition
Stp Sync fail	<p>Synchronization failure indication (alarm Sync timeout is active), gen-set or group of generators was not synchronized to mains/bus within Sync/ Load ctrl: Sync timeout time.</p> <p>Check setting of setpoints in the Sync/Load ctrl and Volt/PF ctrl groups. Frequency regulation loop, Angle regulation loop and Voltage regulation loop are active during synchronisation and you may need to adjust their setting.</p> <p>Actual state of synchronization is visible on the controller measurement screen with synchroscope where speed and voltage regulators' outputs, slip frequency and generator and mains/bus voltages can be observed during the synchronization process.</p>
Wrn Sync fail	<p>Synchronization failure indication (alarm Sync timeout is active), generator or group of generators was not synchronized to mains/bus within Sync/ Load ctrl: Sync timeout time.</p> <p>Check setting of setpoints in the Sync/Load ctrl and Volt/PF ctrl groups. Frequency regulation loop, Angle regulation loop and Voltage regulation loop are active during synchronisation and you may need to adjust their setting.</p> <p>Actual state of synchronization is visible on the controller measurement screen with synchroscope where speed and voltage regulators' outputs, slip frequency and generator and mains/bus voltages can be observed during the synchronization process.</p>
BOC L1, L2 or L3 under	<p>Generator L1, L2 or L3 voltage was under the Gen <V BOC limit for Gen V del time. Undervoltage protections are based on Gener protect: Gen <V BOC and Gen V del setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings: Fix-VoltProtSel is set to PHASE-NEUTRAL.</p>
BOC L1, L2 or L3 over	<p>Generator L1, L2 or L3 voltage was over the Gen >V BOC limit for Gen V del time. Overvoltage protections are based on Gener protect: Gen >V BOC and Gen V del setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings: Fix-VoltProtSel is set to PHASE-NEUTRAL.</p>
Sd L1, L2 or L3 over	<p>Generator L1, L2 or L3 voltage was over the Gen >V SD limit for Gen V del time. Overvoltage protections are based on Gener protect: Gen >V SD and Gen V del setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-NEUTRAL.</p>
BOC L12, L23 or L31 under	<p>Generator L12, L23 or L31 voltage was under the Gen <V BOC limit for Gen V del time. Undervoltage protections are based on Gener protect: Gen <V BOC and Gen V del setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-PHASE.</p>
BOC L12, L23 or L31 over	<p>Generator L12, L23 or L31 voltage was over the Gen >V BOC limit for Gen V del time. Overvoltage protections are based on Gener protect: Gen >V BOC and Gen V del setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings: Fix-VoltProtSel is set to PHASE-PHASE.</p>
Sd L12, L23 or L31 over	<p>Generator L12, L23 or L31 voltage was over the Gen >V SD limit for Gen V del time. Overvoltage protections are based on Gener protect: Gen >V SD and Gen V del setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-PHASE.</p>
BOC fgen under	<p>Generator frequency was under the Gen <f limit for Gen f del time. Under frequency protection is based on Gener protect: Gen <f and Gen f del setpoints.</p>

Alarm	Definition
BOC fgen over	Generator frequency was over the Gen >f limit for Gen f del time. Over frequency protection is based on Gener protect: Gen <f and Gen f del setpoints.
BOC ReversePwr	This alarm is issued by the reverse power protection. This protection is based on Gener protect: Reverse power and ReversePwr del setpoints. This alarm means that either engine speed/power control does not work properly or generator current transformers (CT's) are connected in a wrong way.
MP L1, L2 or L3 under	Mains L1, L2 or L3 voltage was under the Mains <V MP limit for Mains V del time. Undervoltage protections are based on Mains protect: Mains <V MP and Mains V del setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-NEUTRAL.
MP L1, L2 or L3 over	Mains L1, L2 or L3 voltage was over the Mains >V MP limit for Mains V del time. Overvoltage protections are based on Mains protect: Mains >V MP and Mains V del setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-NEUTRAL.
MP L12, L23 or L31 under	Mains L12, L23 or L31 voltage was under the Mains <V MP limit for Mains V del time. Undervoltage protections are based on Mains protect: Mains <V MP and Mains V del setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-PHASE.
MP L12, L23 or L31 over	Mains L12, L23 or L31 voltage was over the Mains >V MP limit for Mains V del time. Overvoltage protections are based on Mains protect: Mains >V MP and Mains V del setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-PHASE.
Mains Avg x >V	If the value of 10 min. average mains voltage of any phase (Mains Avg V1, Mains Avg V2, Mains Avg V3) exceed value given by setpoint Mains Avg >V MP (Mains protect group), the MCB is opened and message Mains Avg x >V appears in alarm list and history record. BO Common MP is activated (x indicates number of phase).
MP fmns under	Mains frequency was under the Mains <f limit for Mains f del time. Under frequency protection is based on Mains protect: Mains <f and Mains f del setpoints.
MP fmns over	Mains frequency was over the Mains >f limit for Mains f del time. Over frequency protection is based on Mains protect: Mains >f and Mains f del setpoints.
Bus meas error	Bus measurement error is issued if bus voltage is out of limits. For details, refer to description of the Gener protect: BusMeasError setpoint in IGS-NT-x.y-Reference Guide.
OfL StartBick	This alarm indicates wrong setpoints setting that disables engine start or load takeover. Incorrect combination of ProcessControl: Island enable; ParallelEnable; Synchro enable; MF start enable setpoints setting is the reason why this alarm is issued. Refer to AUT mode section of the OFF-MAN-AUT mode chapter in IGS-NT-x.y-Reference Guide for SPTM, SPI or COMBI application.
StartBick	This alarm indicates wrong setpoints setting that disables start of generators. Incorrect combination of ProcessControl: Island enable; ParallelEnable; Synchro enable; MF start enable setpoints setting is the reason why this alarm is issued. Refer to OFF-MAN-AUT mode chapter in IM-NT-MCB-MGCB Reference Guide.

Alarm	Definition
BOC IDMT	Indicates current IDMT protection activation. Current IDMT protection is inverse definite minimum time protection which is based on the generator current. Protection reaction time depends on overcurrent value. High overcurrent means short reaction time whereas low overcurrent means longer reaction time. Protection is based on setpoints Generator protect: 2Inom del and Basic settings: Nomin current.
MPR Imains IDMT	Indicates current IDMT protection activation. Current IDMT protection is inverse definite minimum time protection which is based on the mains current. Protection reaction time depends on overcurrent value. High overcurrent means short reaction time whereas low overcurrent means longer reaction time. This protection is active if the Mns2Inom prot setpoint is set to ENABLED. Protection is based on setpoints Mains protect: Mains2Inom del and Basic settings: Nomin current.
BOR IbusL IDMT	Indicates current IDMT protection activation. Current IDMT protection is inverse definite minimum time protection which is based on the left bus current. Protection reaction time depends on overcurrent value. High overcurrent means short reaction time whereas low overcurrent means longer reaction time. This protection is active if the BusL2Inom prot setpoint is set to ENABLED. Protection is based on setpoints BusL protect: BusL2Inom del and Basic settings: Nomin current.
BOC ShortCurr	Generator short current protection was activated. Generator current was over Generator protect: Ishort level for Ishort del. time.
BOC Overload	Indicates overload IDMT protection activation. Overload IDMT protection is inverse definite minimum time protection which is based on the generator power. Protection reaction time depends on generator power value. High generator overload means short reaction time whereas low generator overload means longer reaction time. Protection is based on setpoints Generator protect: OverldStrtEval and 2POverldStEvDel.
MPR Pmains IDMT	Indicates overload IDMT protection activation. Overload IDMT protection is inverse definite minimum time protection which is based on the mains power. Protection reaction time depends on mains power value. High mains overload means short reaction time whereas low mains overload means longer reaction time. This protection is active if the Mns2POvrldProt setpoint is set to ENABLED. Protection is based on setpoints Mains protect: OverldStrtEval and 2POverldStEvDel.
BOR PbusL IDMT	Indicates overload IDMT protection activation. Overload IDMT protection is inverse definite minimum time protection which is based on the left bus power. Protection reaction time depends on the left bus power value. High left bus overload means short reaction time whereas low left bus overload means longer reaction time. This protection is active if the BusL2POvrldProt setpoint is set to ENABLED. Protection is based on setpoints BusL protect: OverldStrtEval and 2POverldStEvDel.
BOC NCB fail	NCB fail is detected if the NeutralCB fdb input doesn't follow Neutral CB C/O output within 400 ms.
Wrn BadPwrCfg	Power format is set differently in controllers which are part of the same control group. Check Power formats setting in GenConfig on the Miscellaneous card (available in the Advanced mode only).

Alarm	Definition
WrnTstOnLdFail	This alarm is issued if the Test on load function is activated (by closing corresponding BI) and generator is not able to take over mains load completely (mains import = 0) within the Sync/Load ctrl: Load ramp time. Message "WrnTstOnLdFail" is recorded into controller history in case of this failure. It is either necessary to extend the Load ramp time or check engine speed regulation.
Wrn SpdRegLim	This alarm indicates that controller Speed governor output has reached its limit. Warning is issued if Speed governor output stays close to one of the limit values for more than two seconds. Close to one of the limits means that Speed governor output value is within SpeedGovLowLim+0,2V range or SpeedGovHiLim-0,2V range. This alarm gives you information that engine speed governor is either connected in a wrong way or one of the speed control related regulation loops6 is set in a wrong way. Warning is blocked if binary output functions SPEED up and SPEED down are configured. Refer also to Sync/load control.
Wrn VoltRegLim	This alarm indicates that controller AVRi output has reached its limit. Warning is issued if the AVRi output stays close to 0% or 100% limit for more than two seconds. Close to limit means that AVRi output value is either <2% or >98%. This alarm gives you information that generator voltage regulator is either connected in a wrong way or one of the voltage control related regulation loops is set in wrong way. Warning is blocked if binary output functions AVR up or AVR down are configured. Refer also to Volt/PF control adjustment chapter in an IGS-NT-x.y-Reference Guide.
G L neg8	Generator phase is inverted. Check generator phases connection, one of generator phases is connected the other way round (swap generator coil leads connection).
G ph+L neg8	Wrong generator phases sequence, additionally one phase is inverted.
G ph opposed8	Wrong generator phases sequence.
M L neg9	Mains phase is inverted. Check mains transformer phases connection, one of transformer phases is connected the other way round (swap transformer coil leads connection).
M ph+L neg9	Wrong mains phases sequence, additionally one phase is inverted.
M ph opposed9	Wrong mains phases sequence.
B L neg13	Bus phase is inverted.
B ph+L neg13	Wrong bus phases sequence, additionally one phase is inverted.
B ph opposed13	Wrong bus phases sequence.
BL L neg12	Left bus phase is inverted.
BL ph+L neg12	Wrong left bus phases sequence, additionally one phase is inverted.
BL ph opposed	Wrong left bus phases sequence.
BR L neg	Right bus phase is inverted.
BR ph+L neg	Wrong right bus phases sequence, additionally one phase is inverted.
BR ph opposed	Wrong right bus phases sequence.
ActCallCH1Fail, CH2Fail, CH3-Fail	Indication of unsuccessful active call 1-3. Refer to Intel Communication Guide for information about active calls. Refer to the IGSNT-x.y-Reference Guide for description of setpoints which are part of the Act.calls/SMS group and are used for active call setup.

Alarm	Definition
PassInsertBck	<p>Break through password function can be ENABLED/DISABLED from the password management window in IntelliMonitor (initial status is DISABLED).</p> <p>Warning “PassInsertBck” appears in alarm list when controller is blocked. It is not allowed to insert the password in case that controller is blocked. There is information that controller is blocked for next password attempt and time remaining till the end of blocation instead of password input window at the terminal screen. The controller is locked for five minutes when the password is wrongly entered six times (in case of next six wrong attempts (correct password was not inserted at all) for 30, 60, 120, 240 minutes). Incorrect password message appears in the history of the controller when the invalid password is used.</p>
No fuel Select	<p>No fuel has been selected, but unit start has been attempted. Clear alarm, select fuel, and restart unit.</p>
MAPControlFLS	<p>Indicates an error with the closed-loop control (manifold air pressure) of the air-fuel feedback system. This could be due to a problem with the oxygen sensor, mixer, or intake air temperature. Contact Generac Technical Service for further diagnosis.</p>
ChkEngP0134	<p>Indicates an issue with emissions compliance. Contact Generac Technical Service for further diagnosis.</p>



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