Operator's Manual

Hydronic Surface Heater

E 1250

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Manufacturer

Wacker Neuson Production Americas LLC

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www.wackerneuson.com

Original instructions

This Operator's Manual presents the original instructions. The original language of this Operator's Manual is American English.

Foreword

THIS HEATER IS SUITABLE FOR OUTDOOR USE ONLY.

WARNING
FAILURE TO COMPLY WITH THE PRECAUTIONS AND INSTRUCTIONS PROVIDED WITH THIS HEATER CAN RESULT IN DEATH, SERIOUS BODILY INJURY AND PROPERTY LOSS OR DAMAGE FROM HAZARDS OF FIRE, BURN, ASPHYXIATION, CARBON MONOXIDE POISONING, AND / OR ELECTRICAL SHOCK.

- ONLY PERSONS WHO CAN UNDERSTAND AND FOLLOW THE INSTRUCTIONS SHOULD USE OR SERVICE THIS HEATER.
- IF YOU NEED ASSISTANCE OR HEATER INFORMATION SUCH AS AN INSTRUCTION MANUAL, LABEL, ETC. CONTACT THE MANUFACTURER.

WARNING
WORK SITE FIRE, BURN, INHALATION, AND EXPLOSION HAZARDS.

- KEEP SOLID COMBUSTIBLES, SUCH AS BUILDING MATERIALS, PAPER, OR CARDBOARD AT A SAFE DISTANCE AWAY FROM THE MACHINE AS RECOMMENDED BY THE INSTRUCTIONS.
- NEVER USE THIS MACHINE IN SPACES WHICH DO OR MAY CONTAIN VOLATILE OR AIRBORNE COMBUSTIBLES, OR PRODUCTS SUCH AS GASOLINE, SOLVENTS, PAINT THINNER, DUST PARTICLES, OR UNKNOWN CHEMICALS.

WARNING
NOT FOR HOME OR RECREATIONAL VEHICLE USE.

- OPERATE THE MACHINE ONLY FOR APPLICATIONS SPECIFIED IN *MACHINE DESCRIPTION AND INTENDED USE.*

NOTICE: WHAT TO DO IF YOU SMELL GAS:

1. Do not try to light any appliance.
2. Do not touch electrical switches; do not use any phone in your building.
3. Immediately call your gas supplier from a neighbor’s phone. Follow the gas supplier’s instructions.
4. If you cannot reach your gas supplier, call the fire department.

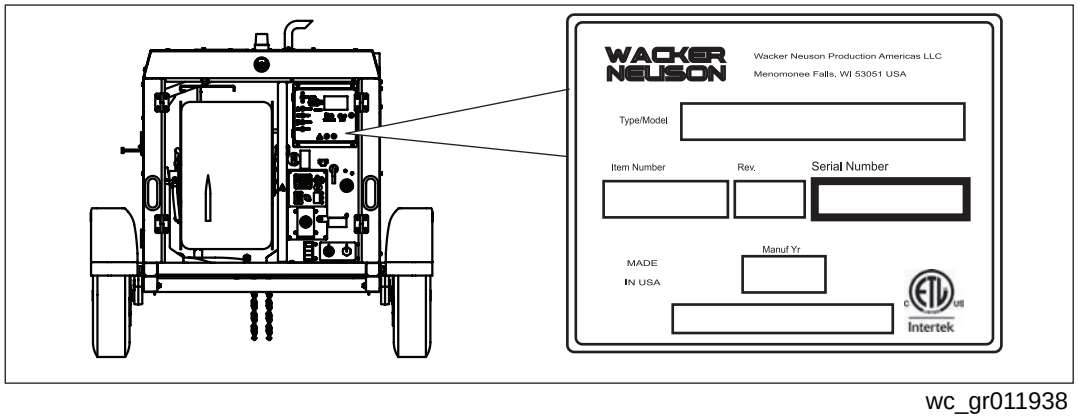
This heater is designed and approved for use as a construction heater in accordance with Standard ANSI Std Z21.13, UL Stds 726, CSA Std C22.2 No. 3, CSA Std B140.0 & B140.7.

The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1.

The machine, when installed, must be electrically bonded to ground in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the National Electrical Code, ANSI/NFPA 70, and/or the Canadian Electrical Code Part I, CSA C22.1, Electrical Code.

READ AND SAVE THESE INSTRUCTIONS—This manual contains important instructions for the machine models below. These instructions have been written expressly by Wacker Neuson Production Americas LLC and must be followed during installation, operation, and maintenance of the machines.

Machine	Item Number	Revisions
E1250 B	5200007613	All
E1250 B	5200012353	All



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Machine identification A nameplate listing the model number, item number, revision number, and serial number is attached to this machine. The location of the nameplate is shown above.

Serial number (S/N)

For future reference, record the serial number in the space provided below. You will need the serial number when requesting parts or service for this machine.

Serial Number:

Machine documentation

- From this point forward in this documentation, Wacker Neuson Production Americas LLC will be referred to as Wacker Neuson.
- Keep a copy of the Operator's Manual with the machine at all times.
- Use the separate Parts Book supplied with the machine to order replacement parts.
- If you are missing any of these documents, please contact Wacker Neuson to order a replacement or visit www.wackerneuson.com.
- When ordering parts or requesting service information, be prepared to provide the machine model number, item number, revision number, and serial number.

Expectations for information in this manual

- This manual provides information and procedures to safely operate and maintain the above Wacker Neuson model(s). For your own safety and to reduce the risk of injury, carefully read, understand, and observe all instructions described in this manual.
- Wacker Neuson expressly reserves the right to make technical modifications, even without notice, which improve the performance or safety standards of its machines.
- The information contained in this manual is based on machines manufactured up until the time of publication. Wacker Neuson reserves the right to change any portion of this information without notice.
- The illustrations, parts, and procedures in this manual refer to Wacker Neuson factory-installed components. Your machine may vary depending on the requirements of your specific region.

CALIFORNIA Proposition 65 Warning

Combustion exhaust, some of its constituents, and certain vehicle components contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Laws pertaining to spark arresters

NOTICE: State Health Safety Codes and Public Resources Codes specify that in certain locations spark arresters be used on internal combustion engines that use hydrocarbon fuels. A spark arrester is a device designed to prevent accidental discharge of sparks or flames from the engine exhaust. Spark arresters are qualified and rated by the United States Forest Service for this purpose. In order to comply with local laws regarding spark arresters, consult the engine distributor or the local Health and Safety Administrator.

Manufacturer's approval

This manual contains references to *approved* parts, attachments, and modifications. The following definitions apply:

- **Approved parts or attachments** are those either manufactured or provided by Wacker Neuson.

- **Approved modifications** are those performed by an authorized Wacker Neuson service center according to written instructions published by Wacker Neuson.
- **Unapproved parts, attachments, and modifications** are those that do not meet the approved criteria.

Unapproved parts, attachments, or modifications may have the following consequences:

- Serious injury hazards to the operator and persons in the work area
- Permanent damage to the machine which will not be covered under warranty

Contact your Wacker Neuson dealer immediately if you have questions about approved or unapproved parts, attachments, or modifications.

1 Safety Information

1.1 Signal Words Used in this Manual

This manual contains DANGER, WARNING, CAUTION, *NOTICE,* and NOTE signal words which must be followed to reduce the possibility of personal injury, damage to the equipment, or improper service.

This is the safety alert symbol. It is used to alert you to potential personal hazards.

- ▶ Obey all safety messages that follow this symbol.

DANGER

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

- ▶ To avoid death or serious injury from this type of hazard, obey all safety messages that follow this signal word.

WARNING

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

- ▶ To avoid possible death or serious injury from this type of hazard, obey all safety messages that follow this signal word.

CAUTION

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

- ▶ To avoid possible minor or moderate injury from this type of hazard, obey all safety messages that follow this signal word.

NOTICE: Used without the safety alert symbol, NOTICE indicates a situation which, if not avoided, could result in property damage.

Note: *A Note contains additional information important to a procedure.*

1.2 Machine Description and Intended Use

This machine is a hydronic surface heater. The Wacker Neuson Hydronic Surface Heaters consist of a trailer-mounted enclosure that houses an optional diesel generator, a hydronic heater, electric motors, fixed pump(s) and plumbing, a diesel (or gas) burner, a fuel tank, and a hose handling system.

The hydronic heating system utilizes a burner that indirectly warms the Heat Transfer Fluid (HTF). The warmed HTF is continuously circulated through a vented, closed loop hose system. A positive displacement pump pushes the warmed HTF through the hose system, thereby radiating and transferring the heat to the required application area.

An insulated blanket may be laid over the hoses to increase efficiency. The low HTF level protection device shuts down the machine if the HTF level drops below minimum operational capacity.

This machine is intended to be used as a surface heater in order to thaw frozen ground, to cure concrete, or to prevent frost and freezing. In addition, when used with other Wacker Neuson accessories, this machine can be used to heat air.

This machine has been designed and built strictly for the intended use(s) described above. Using the machine for any other purpose could permanently damage the machine or seriously injure the operator or other persons in the area. Machine damage caused by misuse is not covered under warranty.

The following are some examples of misuse:

- Using the machine to heat anything other than what is stated above
- Using the machine to pump anything other than the factory recommended Heat Transfer Fluid
- Using the generator (if equipped) to power anything other than the machine itself or Wacker Neuson accessory machines, as instructed in the Operator's Manual
- Using the machine as a ladder, support, or work surface
- Using the machine to carry or transport passengers or equipment
- Using the machine to tow other machines
- Operating the generator (if equipped) in a manner that is inconsistent with all federal, state, and local codes and regulations
- Operating the machine outside of factory specifications
- Operating the machine in a manner inconsistent with all warnings found on the machine and in the Operator’s Manual

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This machine has been designed and built in accordance with the latest global safety standards. It has been carefully engineered to eliminate hazards as far as practicable and to increase operator safety through protective guards and labeling. However, some risks may remain even after protective measures have been taken. They are called residual risks. On this machine, they may include exposure to:

- Heat, noise, and exhaust from the engine or hydronic heater
- Burns from the HTF or radiant heat from the hoses
- Fire hazards from improper refueling techniques
- Fuel and its fumes

- Personal injury from improper lifting of the trailer tongue
- Tripping hazards from the hoses

To protect yourself and others, make sure you thoroughly read and understand the safety information presented in this manual before operating the machine.

1.3 Safety Guidelines for Operating the Machine

Operator training

Before operating the machine:

- Read and understand the operating instructions contained in all manuals delivered with the machine.
- Familiarize yourself with the location and proper use of all controls and safety devices.
- Contact Wacker Neuson for additional training if necessary.

When operating this machine:

- Do not allow improperly trained people to operate the machine. People operating the machine must be familiar with the potential risks and hazards associated with it.

Operator qualifications

Only trained personnel are permitted to start, operate, and shut down the machine. They also must meet the following qualifications:

- have received instruction on how to properly use the machine
- are familiar with required safety devices

The machine must not be accessed or operated by:

- children
- people impaired by alcohol or drugs

Application area

Be aware of the application area.

- Keep unauthorized personnel, children, and pets away from the machine.
- Remain aware of changing positions and the movement of other equipment and personnel in the application area/job site.
- Identify whether special hazards exist in the application area, such as toxic gases, or unstable ground conditions, and take appropriate action to eliminate the special hazards before using the machine.

Be aware of the application area.

- Do not operate the machine in areas that contain flammable objects, fuels, or products that produce flammable vapors.

Safety devices, controls, and attachments

Only operate the machine when:

- All safety devices and guards are in place and in working order.
- All controls operate correctly.
- The machine is set up correctly according to the instructions in the Operator's Manual.
- The machine is clean.
- The machine's labels are legible.

To ensure safe operation of the machine:

- Do not operate the machine if any safety devices or guards are missing or inoperative.
- Do not modify or defeat the safety devices.
- Only use accessories or attachments that are approved by Wacker Neuson.
- Do not start the machine unless all cleanout doors are secured in place.
- Do not attempt to start the machine when excess oil has accumulated, when machine is full of vapor, or when the combustion chamber is very hot.
- Do not tamper with the unit or controls—call your service personnel.
- Should overheating occur or the gas supply fails to shut off, do not turn off or disconnect the electrical supply to the pump. Instead, shut off the gas supply at a location external to the machine.
- Do not use this heat exchanger if any part has been under waters. Immediately call a qualified service technician to inspect the heat exchanger and to replace any part of the control system and any gas control which has been under water.

Safe operating practices

When operating this machine:

- Remain aware of the machine's moving parts. Keep hands, feet, and loose clothing away from the machine's moving parts.

When operating this machine:

- Do not operate a machine in need of repair.

Personal Protective Equipment (PPE)

Wear the following Personal Protective Equipment (PPE) while operating this machine:

- Close-fitting work clothes that do not hinder movement
- Safety glasses with side shields
- Hearing protection
- Safety-toed footwear
- Safety gloves

1.4 Safety Guidelines for Lifting and Transporting the Machine

When lifting the machine:

- Make sure slings, chains, hooks, ramps, jacks, forklifts, cranes, hoists, and any other type of lifting device used is attached securely and has enough weight-bearing capacity to lift or hold the machine safely. See section *Technical Data* for machine weight.
- Remain aware of the location of other people when lifting the machine.
- Only use the lifting points and tie-downs described in the Operator's Manual.
- Make sure the transporting vehicle has sufficient load capacity and platform size to safely transport the machine.

To reduce the possibility of injury:

- Do not stand under the machine while it is being lifted or moved.
- Do not get onto the machine while it is being lifted or moved.

1.5 Safety Guidelines for Towing the Machine

WARNING
Risk of severe injury or death. Improper trailer condition and towing technique can lead to an accident.

- ▶ Obey the trailer manufacturer's instructions and the instructions below to reduce the risk of an accident.

When towing the machine:

- Do not tow the machine if the towing vehicle's hitch or the trailer's coupler are damaged.
- Do not tow the machine if any of the trailer's lug nuts are missing.
- Do not tow the machine if the trailer's tires have less than 1.5 mm (1/16 inch) of tread.
- Do not tow the machine unless the trailer's brakes are functioning properly.
- Do not exceed the trailer manufacturer's speed limitations.

When towing the machine:

- Only tow the machine when the trailer's lug nuts are properly torqued.
- Only tow the machine when the trailer's tires are properly inflated.
- Only tow the machine when all trailer lights are functioning correctly.
- Only tow the machine when the trailer's safety chains are connected to the towing vehicle in a crisscross pattern.
- Maintain extra distance between the towing vehicle and other vehicles.
- Avoid soft shoulders, curbs, and sudden lane changes.
- Abide by all licensing requirements for your area.

If you have not driven a towing vehicle with trailer before, practice turning, stopping, and backing up the towing vehicle with trailer in an area away from traffic. Only drive the towing vehicle with trailer when you are confident in your ability to do so.

1.6 Safety Guidelines for Operating Combustion Burners

When using the machine:

- Make sure you have proper certification or licensing required by the locality, state, or province in which the machine is being installed to connect natural gas or LP.
- Clean up any spilled fuel immediately.
- Replace the fuel tank cap after refueling the machine.
- Refill the fuel tank in a well-ventilated area.
- Always keep the oil supply valve shut off if the burner is shut down for an extended period of time.

DANGER

Carbon monoxide. Using this machine indoors CAN KILL YOU IN MINUTES. Exhaust gas contains carbon monoxide (CO). This is a deadly poison you cannot see or smell. If you can smell the exhaust, you are breathing CO. Even if you cannot smell the exhaust, you could be breathing CO.

- ▶ NEVER operate the machine inside an enclosed area, such as a home, tunnel, or garage.
- ▶ ONLY use the machine outside and far away from windows, doors, and vents. These openings can pull in exhaust gas.
- ▶ ALWAYS use a battery-powered or battery-backup CO alarm in nearby structures. Even when you use the machine correctly, CO may leak into nearby structures.
- ▶ If you start to feel sick, dizzy, or weak after the machine has been running, move to fresh air IMMEDIATELY. See a doctor. You could have carbon monoxide poisoning.

When using the machine:

- Do not fill or drain the fuel tank near an open flame, while smoking, or while the machine is running.
- Do not smoke when refueling the machine.
- Do not smoke when connecting natural gas or LP.
- Do not attempt to start the burner when excess oil has accumulated, when the unit is full of vapors, or when the combustion chamber is very hot.

Note: *Some machines may not be capable of supporting natural gas or LP. Please see the burner manufacturer's literature for more information.*

1.7 Reporting Safety Defects

If you believe your trailer has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Wacker Neuson.

If NHTSA receives similar complaints, it may open an investigation; and if it finds that a safety defect exists in a group of trailers, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Wacker Neuson.

To contact NHTSA, you may either contact the Vehicle Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424-9153); go to http://www.safercar.gov; or write to:

Administrator
NHTSA
1200 New Jersey Avenue S.E.
Washington, DC 20590

You can also obtain other information about your motor vehicle safety from http://www.safercar.gov

1.8 Safety Guidelines for Operating Gensets

DANGER
Carbon monoxide. Using a generator indoors CAN KILL YOU IN MINUTES. Generator exhaust contains carbon monoxide (CO). This is a poison you cannot see or smell. If you can smell the generator exhaust, you are breathing CO. But even if you cannot smell the exhaust, you could be breathing CO.

WARNING
Electrocution hazard. Generators present special hazards during operation and servicing. These include the risk of electrocution or severe electrical shock. Failure to follow the safety information below can result in severe injury or death.

- ▶ Read and follow the safety instructions in this Operator's Manual.
- ▶ Contact the genset manufacturer for additional information regarding the genset.

WARNING
Internal combustion engines present special hazards during operation and fueling. Failure to follow the warnings and safety instructions could result in severe injury or death.

- ▶ Read and follow the safety instructions in this Operator's Manual.
- ▶ Contact the genset manufacturer for additional information regarding the genset.

This machine is built with user safety in mind; however, like any electrical device it can present serious hazards if improperly operated and serviced. Follow instructions carefully. Should questions arise during operation or service of this equipment, contact your Wacker Neuson dealer.

General precautions

- Keep a multi-class, type ABC or equivalent fire extinguisher at hand when using the genset. Refer to NFPA No. 10 for further information regarding fire extinguishers.
- Do not use evaporative starting fluids. They are highly explosive.
- Do not store items such as excess oil, oil rags, or tools within the genset compartment. Items stored within the genset compartment are a fire hazard and can restrict cooling air.

Before operating the genset

- Know how to start, operate, and stop the genset before starting it.
- Obtain the proper training for operating the genset. Do not allow untrained personnel to operate or service the genset.
- Check the fuel lines and the fuel tank for leaks and cracks before starting the engine.
- Clean the genset of any spilled fuel.

Running the genset

- Do not start the engine if fuel has spilled or a fuel odor is present.
- Keep the area around the exhaust pipe free of flammable materials.
- Do not smoke while operating the genset.
- Keep sparks, flames, electrical arcs, and other sources of ignition far away from the genset.
- Do not touch the engine or muffler while the engine is running or immediately after it has been turned off.
- Do not operate the genset with the maintenance covers off.
- Do not overload the genset. The total amperage of the tools and equipment attached to the genset must not exceed the load rating of the genset.
- Do not operate the genset with wet hands.
- Do not remove the radiator cap when the genset is running or is hot.

Refueling safety

When adding fuel to the fuel tank:

- Do not smoke.
- Do not refuel a hot or running engine.

When adding fuel to the fuel tank:

- Keep sparks, flames, electrical arcs, and other sources of ignition far away from the genset.
- Refill the fuel tank only in a well-ventilated area.
- Re-install the fuel tank cap after refueling.

Maintenance safety

- Only a trained technician should attempt to repair the genset.
- Test procedures which require that the generator be running must be performed using extreme caution.
- Make sure clothing and shoes are dry, stand on a dry wooden platform or rubber insulating mat, and use tools with insulated handles when servicing the genset.
- Engine antifreeze is toxic to humans and animals. Clean up spills and dispose of used engine antifreeze in accordance with local environmental regulations.
- Make sure all fasteners are secure and torqued properly.

1.9 Service Safety

Service training

Before servicing or maintaining the machine:

- Read and understand the instructions contained in all manuals delivered with the machine.
- Familiarize yourself with the location and proper use of all controls and safety devices.
- Only trained personnel shall troubleshoot or repair problems occurring with the machine.
- Contact Wacker Neuson for additional training if necessary.

When servicing or maintaining this machine:

- Do not allow improperly trained people to service or maintain the machine. Personnel servicing or maintaining the machine must be familiar with the associated potential risks and hazards.

Precautions

Follow the precautions below when servicing or maintaining the machine.

- Read and understand the service procedures before performing any service to the machine.
- All adjustments and repairs must be completed before operating the machine. Do not operate the machine with a known problem or deficiency.
- All repairs and adjustments shall be completed by a qualified technician.
- Turn off the machine before performing maintenance or making repairs.
- Remain aware of the machine's moving parts. Keep hands, feet, and loose clothing away from the machine's moving parts.
- Re-install the safety devices and guards after repair and maintenance procedures are complete.

CAUTION

Wiring errors can cause improper and dangerous operation.

- ▶ Label all wires prior to disconnection when servicing controls.
- ▶ Verify proper operation after servicing.

Machine modifications

When servicing or maintaining the machine:

- Use only accessories/attachments that are approved by Wacker Neuson.

When servicing or maintaining the machine:

- Do not defeat safety devices.
- Do not modify the machine without the express written approval of Wacker Neuson.

Replacing parts and labels

- Replace worn or damaged components.
- Replace all missing and hard-to-read labels.
- When replacing electrical components, use components that are identical in rating and performance to the original components.

- When replacement parts are required for this machine, use only Wacker Neuson replacement parts or those parts equivalent to the original in all types of specifications, such as physical dimensions, type, strength, and material.

Cleaning

When cleaning and servicing the machine:

- Keep the machine clean and free of debris such as leaves, paper, cartons, etc.
- Keep the labels legible.

When cleaning the machine:

- Do not clean the machine while it is running.
- Never use gasoline or other types of fuels or flammable solvents to clean the machine. Fumes from fuels and solvents can become explosive.

Personal Protective Equipment (PPE)

Wear the following Personal Protective Equipment (PPE) while servicing or maintaining this machine:

- Close-fitting work clothes that do not hinder movement
- Safety glasses with side shields
- Hearing protection
- Safety-toed footwear

In addition, before servicing or maintaining the machine:

- Tie back long hair.
- Remove all jewelry (including rings).

After Use

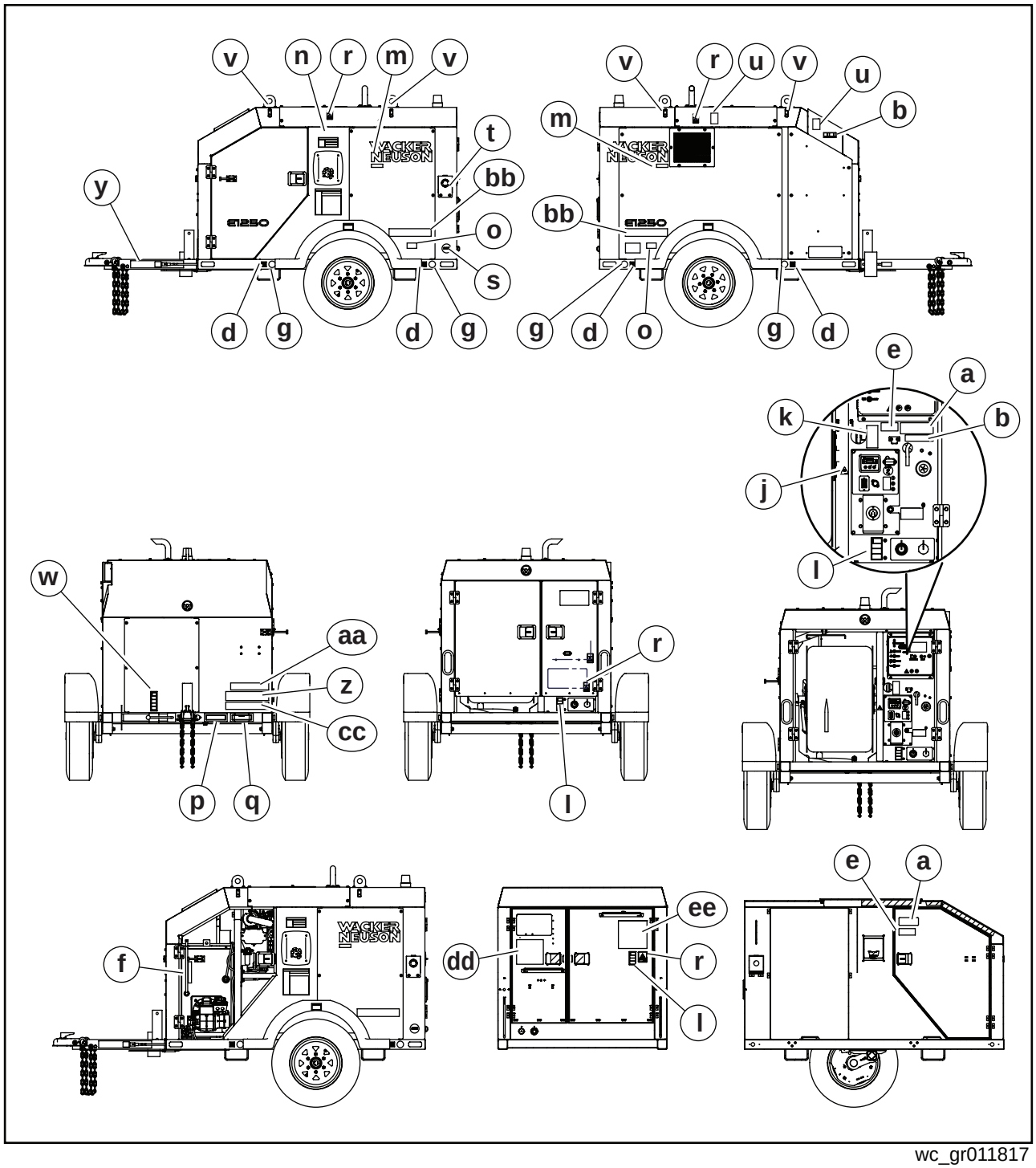
- Stop the engine when the machine is not being operated.
- Close the fuel valve on engines equipped with one when machine is not being operated.
- Ensure that the machine will not tip over, roll, slide, or fall when not being operated.
- Store the machine properly when it is not being used. The machine should be stored in a clean, dry location out of the reach of children.

Maintenance guidelines

When maintaining the machine:

- Keep the fuel lines in good condition and properly connected.
- Allow the burner to cool before serevicing the machine.
- Allow the Heat Transfer Fluid (HTF) to cool before maintaining the machine.
- Keep all electrical cords away from heat, oil, vibrating surfaces, and sharp edges.

2 Labels



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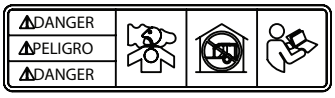
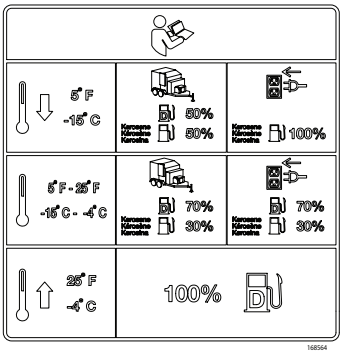
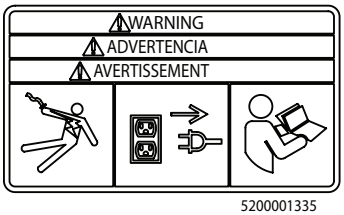
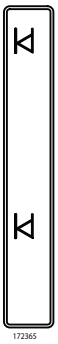
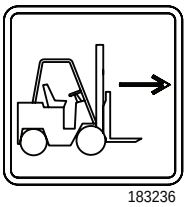
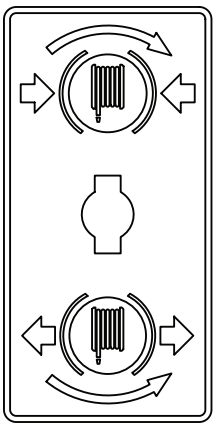
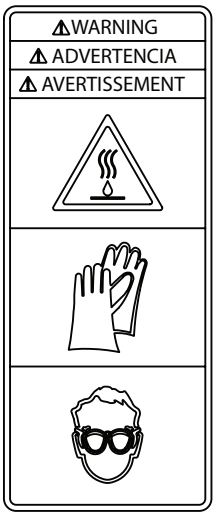
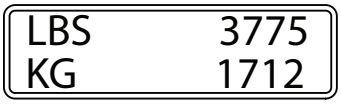
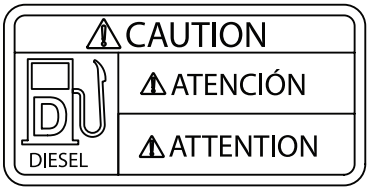
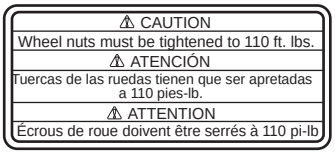
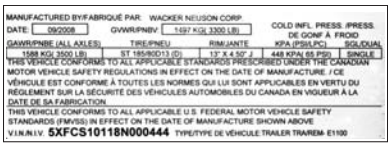
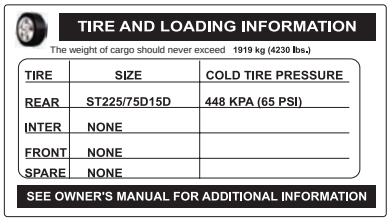
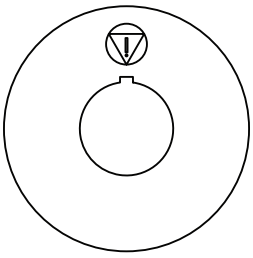
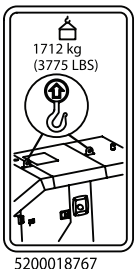
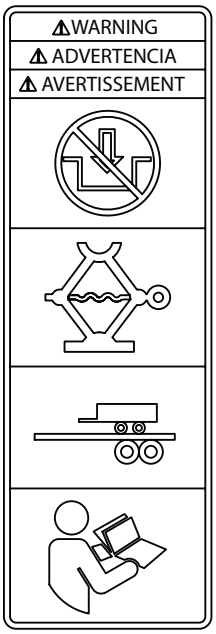
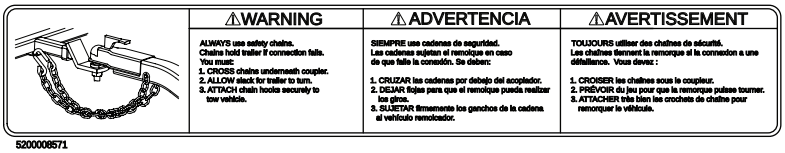
2.1 Label Meanings

a		WARNING Never operate in an explosive environment or near flammable vapors, fuels, or combustibles. Explosion or fire may occur. Risk of severe injury or death.
b		DANGER Asphyxiation hazard. Using a Hydronic Surface Heater indoors CAN KILL YOU IN MINUTES. Generator and burner exhaust contains carbon monoxide. This is a poison you cannot see or smell. Never use inside an enclosed area even if doors and windows are open. Only use outside away from windows, doors, and vents. Read Operator's Manual before use.
c		Diesel fuel blend guide: This label gives diesel fuel blending requirements. Refer to the Operator's Manual for more information.
d		Tie-down location marker: This label indicates areas on the machine that may be used for securing the machine during transport or storage.
e		WARNING! Electric shock hazard inside. Disconnect electrical connections and read the Operator's Manual before opening this box.

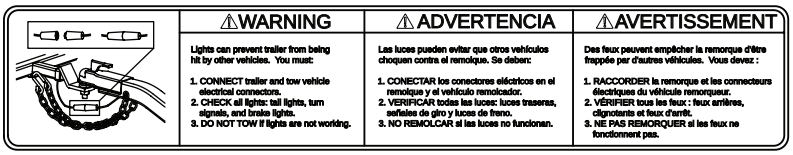
f		Heat Transfer Fluid level. This label indicates the minimum and maximum levels for the Heat Transfer Fluid. This label is located adjacent to the sight gauge on the Heat Transfer Fluid reservoir.
g		Forklift lift point
h		WARNING Hot surface
j		WARNING Pinching hazard. Rotating machinery.
k		Turn the handle clockwise to engage the hose reel brake. Turn the handle counterclockwise to release the hose reel brake.

l	 173199	WARNING Hot surface hazard. Wear hand protection. Wear eye protection.
m	 5200018780	Weight/mass label
n	 116679	CAUTION This machine uses diesel fuel.
o		CAUTION Lug nuts must be tightened to 110ft.lbs.
p q	 	VIN and Tire and Loading Information labels. These manufacturer's labels display vehicle identification numbers and tire and loading information for the trailer.

r	 110164	CAUTION! Pressurized contents. Do not open when hot!
s		Notification of National Association of Trailer Manufacturers (NATM) compliance
t	 155460	Emergency stop
u		WARNING Hot surface
v	 5200018767	Lifting point

w	 173200	WARNING Do not engage trailer jack while transporting the machine. Read the Operator's Manual for further instructions.
y	 5200008570	
		Uncoupling will cause trailer to come loose from tow vehicle. 1. CHECK the pintle LOAD RATING is same or great than ring LOAD RATING. 2. LOCK the clamp in place using a pin or lock.
z	 5200008571	
		ALWAYS use safety chains. Chains hold trailer if connection fails. You must: 1. CROSS chains underneath coupler. 2. ALLOW slack for trailer to turn. 3. ATTACH chain hooks securely to tow vehicle.

aa

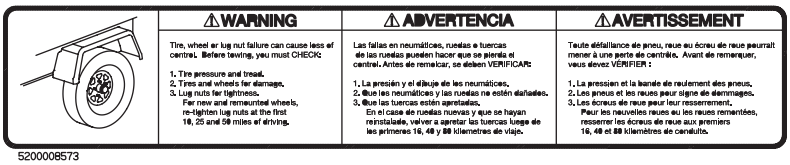


5200008572

Lights can prevent trailer from being hit by other vehicles. You must:

1. CONNECT trailer and tow vehicle electrical connectors.
2. CHECK all lights: tail lights, turn signals, and brake lights.
3. DO NOT TOW if lights are not working.

bb

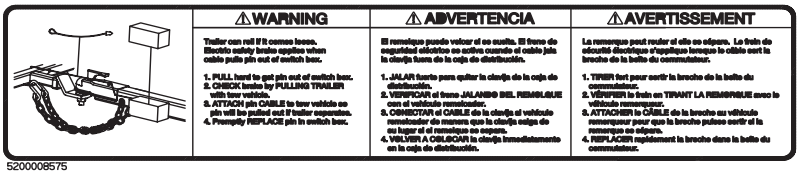


5200008573

Tire, wheel, or lug nut failure can cause loss of control. Before towing you much check:

1. Tire pressure and tread.
2. Tires and wheels for damage.
3. Lug nuts for tightness.
   - For new and remounted wheels, re-tighten lug nuts at the first 10, 25, and 50 miiles of driving.

cc

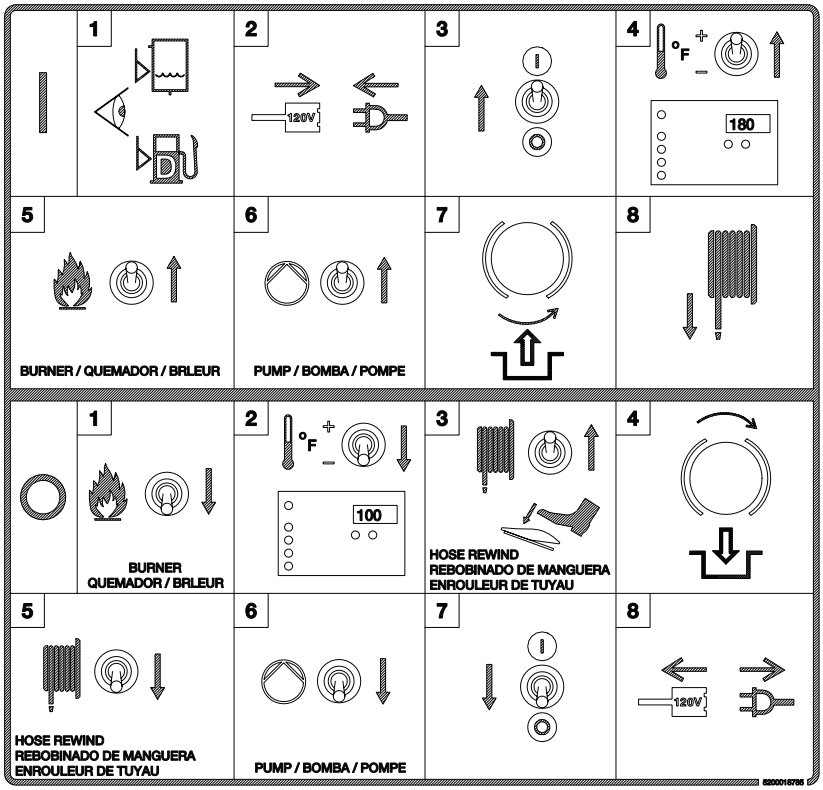


5200008575

Trailer can roll if it comes loose. Electric safety brake applies when cable pulls pin out of switch box.

1. PULL hard to get pin out of switch box.
2. CHECK brake by PULLING TRAILER with tow vehicle.
3. ATTACH pin CABLE to tow vehicle so pin will be pulled out if trailer separates.
4. Promptly REPLACE pin in switch box.

dd

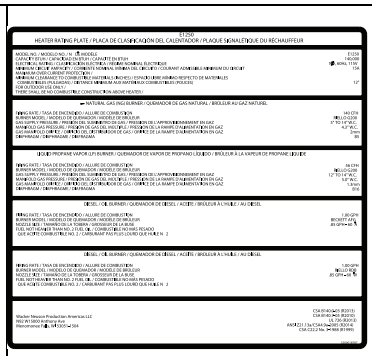
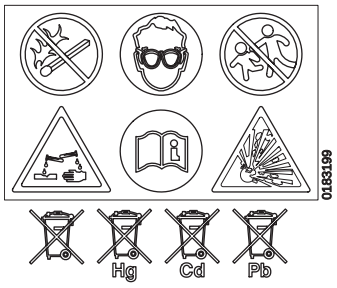


To start the machine (I):

1. Check the level of the Heat Transfer Fluid. Also check the level of fuel in the diesel fuel tank.
2. Connect the machine to the electric power source.
3. Move the circuit breaker switch to the ON position. Also press the ON/OFF switch.
4. Set the temperature to 82°C (180°F).
5. Move the burner switch to the ON position.
6. Move the pump switch to the ON position.
7. Unlock the hose reel by turning the T-handle counterclockwise.
8. Unwind the hose and position it on the surface to be heated.

To shut down the machine (O):

1. Move the burner switch to the OFF position.
2. Set the temperature to less than 38°C (100°F).
3. Move the hose rewind switch to the ON position, and rewind the hose.
4. Lock the hose reel by turning the T-handle clockwise.
5. Move the hose rewind switch to the OFF position.
6. Move the circuit breaker to the OFF position.
7. Move the pump switch to the OFF position
8. Disconnect the electric power supply.

ee		Heater rating plate: This plate displays important technical information relating to the setup and operation of the machine.
—		WARNING Licensed gas technician required. Natural gas / liquid propane burner setup and installation, fuel supply connection, test firing, and burner adjustment MUST be performed by a LICENSED professional gas technician and must conform to the requirements of all relevant local, state, provincial, and Federal authorities. Failure to heed this warning may result in an explosion and/or fire causing property damage, personal injury, or death.
—		WARNING ■ Keep all sparks and open flames away from the battery. ■ Wear eye protection. ■ Keep away from children. ■ Battery acid is poisonous and corrosive. ■ Read the Operator's Manual. ■ Explosion hazard. Dispose of waste batteries in accordance with local environmental regulations. Battery contains mercury (Hg), cadmium (Cd), or lead (Pb).

3 Lifting and Transporting

3.1 Preparing the Machine for Transport on a Truck or Trailer

Requirements

- Machine stopped.
- Flatbed truck or trailer capable of supporting the machine's weight.
- Chains, hooks, or straps capable of supporting the machine's weight.

WARNING
Crushing hazard. Improperly securing the machine can lead to a crushing hazard.

▶ Use only the designated tie-down points to secure the machine to a truck or trailer.

Checklist

Before transporting the machine, check the following items:

Machine

- ☐ Check that all accessories are securely stored within the machine.
- ☐ Check that all doors and access panels of the machine are closed.
- ☐ Check that all electrical supplies are disconnected from the machine.
- ☐ For machines with external fuel supplies, check that all fuel supplies are disconnected from the machine.
- ☐ For machines with generators, check that the generator is shut down.

Loading and transporting equipment

- ☐ Check that the transport vehicle or trailer can support the weight of the machine.
- ☐ Check that the transport vehicle or trailer is wide enough to support the machine.
- ☐ Check that the wheels of the transport vehicle or trailer are chocked during the loading process.
- ☐ Check that the transport vehicle or trailer is clean and free of grease, oil, ice, and other loose material.
- ☐ If the machine is mounted to a trailer, check that the jackstand or other transport block (piece of wood or other similar material) is available to support the trailer tongue during transporting. Do not use the machine's trailer jack to support the trailer tongue during transporting.
- ☐ Check that any ramps used in the loading process:
  - Can support the weight of the machine
  - Are clean and free of grease, oil, ice, and other loose material.
  - Are securely connected to the transport vehicle or trailer.
  - Are of sufficient length to keep the loading angle 15° or less.

In addition:

- ☐ Check that the loading area is flat and the ground is stable.
- ☐ Check the overall height of the machine once loaded. Plan your travel route so there will be adequate clearance for overpasses, road signs, buildings, etc.
- ☐ Check local regulations regarding transporting and obey these regulations.

3.2 Transporting the Machine on a Truck or Trailer

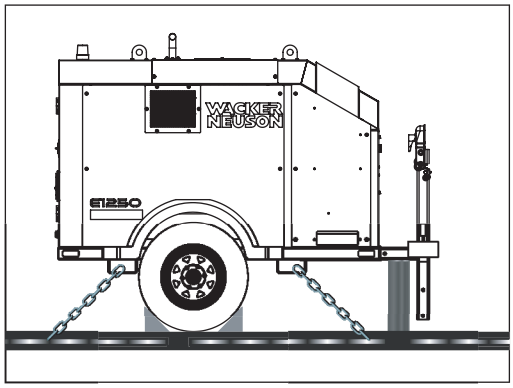
WARNING
Crushing hazard. Improperly securing the machine can lead to a crushing hazard.
▶ Use only the designated tie-down points to secure the machine.

NOTICE: Do not run chains or straps across any painted surface. The machine may be damaged by chaines or straps.

Guidelines

Observe the following when transporting the machine on a flat bed truck.

- Use properly rated ramps, docks, chains, straps and other epuipment to move, load and secure them machine.
- Use a wood block or other support mechanism under the trailer tongue.
- Do not use the trailer jack to support the machine during transport.
- If desired, the tongue can be removed and vertically secured in the bracket.
- Install chocks under both wheels to prevent accidental movement.
- Rotate the trailer jack to a horizontal position.



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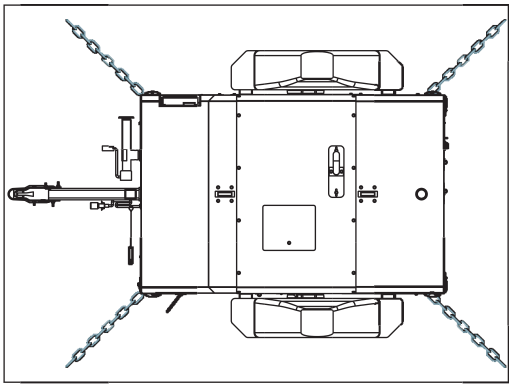
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3.3 Before Towing Checklist

Before towing the machine, check the licensing requirements for trailers in your area. Also check the following items:

Hitch and coupler

- ☐ Check that the towing vehicle and hitch have a rating equal to or greater than the GVWR of the machine. See *Technical Data*.
- ☐ Check that the hitch of the towing vehicle and coupler of the trailer are compatible.
- ☐ Check the condition of both the coupler and hitch.
- ☐ Check that all fasteners on the coupler are secure.
- ☐ Check that the coupler has fresh grease applied to it.

Wheels

- ☐ Check that all lug nuts are in place and are properly torqued.
- ☐ Check the tread wear of the tires.
- ☐ Check that the tires are inflated to the proper air pressure.

Trailer operation

- ☐ Test the function of breakaway system. See *topic Testing the Breakaway System (Battery and Brakes)*.
- ☐ Check that the directional and running lights on the trailer function correctly.
- ☐ Check that the safety chains of the trailer are connected to the towing vehicle using a crisscross pattern.
- ☐ Check that the trailer's breakaway cable is attached to the towing vehicle.
- ☐ Check the operation of the trailer brakes by braking the towing vehicle at a slow speed. Both the vehicle and the trailer must brake smoothly. If the trailer pushes, check the fluid level in the surge brakes or the operation of the electric brakes.

3.4 Lifting the Machine

Requirements

- Properly-rated lifting equipment (crane or hoist)
- Machine stopped
- All doors and access covers closed and secured

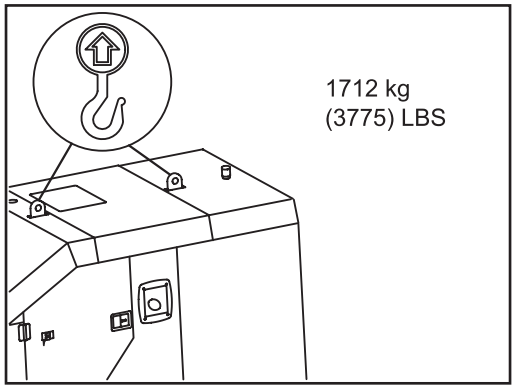
WARNING
Crushing hazard. You may be crushed if the lifting devices fail.

- ▶ Never stand under, or get onto, the machine while it is being lifted or moved.
- ▶ Use only the designated lifting points to lift the machine.

Procedure

Follow the procedure below to lift the machine.

1. Attach the lifting equipment to both of the lifting eyes on the machine using hooks, shackles, and chains — OR, insert the lifting forks of an appropriate lifting vehicle at the labeled locations and skip to step 3.



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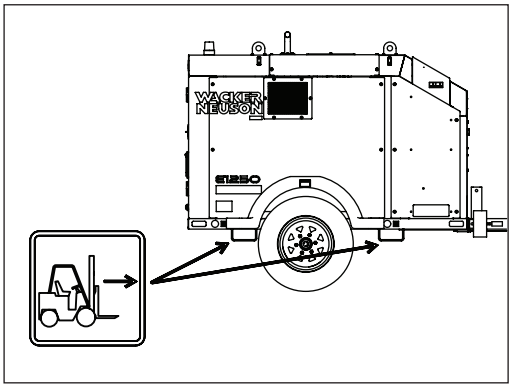

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2. Lift the machine a small distance.

WARNING
Crushing hazard. An unstable machine may cause the lifting devices to fail. You may be crushed if the lifting devices fail.

- ▶ Check for stability before continuing.

3. Check for stability. If necessary, lower the machine, reposition the lifting device, and lift the machine a small distance again.
4. Continue lifting the machine as necessary.

3.5 Testing the Breakaway System (Electric Brakes)

Requirements

- Voltmeter
- Battery charger or backup battery (charged)

When

Test the breakaway system:

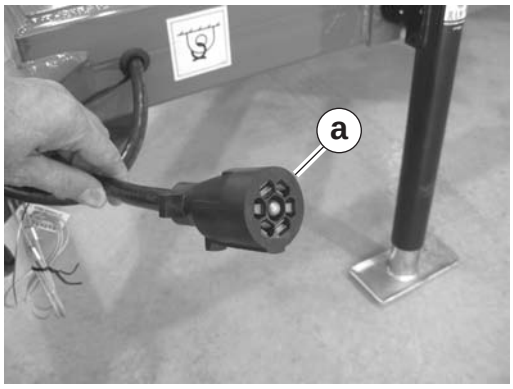
- Before towing
- Monthly if the machine is not in service

Procedure

Perform the following procedure to test the breakaway system.

NOTICE: Disconnect the trailer wiring plug from the tow vehicle before testing. Failure to do so will result in severe damage to the electronic brake control.

1. Connect the machine/trailer to the tow vehicle.
2. Disconnect the trailer wiring plug **(a)** from the tow vehicle.



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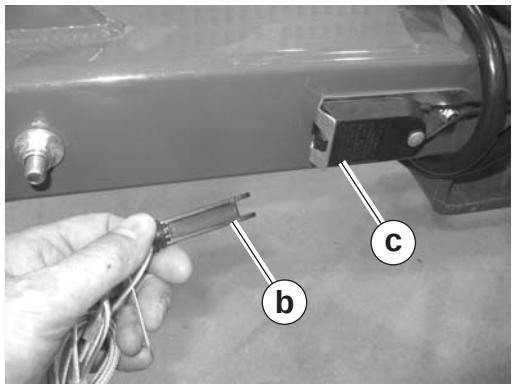


wc_gr008471

3. Pull the breakaway pin **(b)** out of the brake switch **(c)** (to activate the brakes) and attempt to tow the machine/trailer at a very slow speed (less than 5 mph (8 km/hr)). When activated, a properly working breakaway system will cause substantial drag on the trailer wheels and may even cause the trailer wheels to lock.
4. Stop the tow vehicle.

WARNING

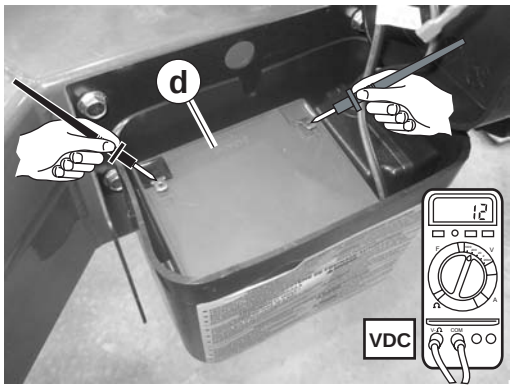
Personal injury hazard. A faulty breakaway system may lead to an accident and personal injury if the machine/trailer breaks away.

► Do not tow the machine/trailer if the breakaway system is faulty.

This procedure continues on the next page.

Continued from the previous page.

5. If the brakes did not function, check the voltage of the breakaway battery. To do so:
   a. Remove the cover of the battery box.
   b. Remove the wires connected to the breakaway battery **(d)**.
   c. Measure the voltage. If 12–14 VDC is not measured, replace or recharge the breakaway battery.



wc_gr008472

6. If 12–14 VDC was measured but the brakes did not function, there is a wiring or mechanical fault with the brakes. Repair any faults before towing.
7. If the brakes function properly:
   a. Reconnect the wires to the breakaway battery.
   b. Re-install the cover to the battery box.
   a. Re-install the breakaway pin **(b)** into the brake switch.
   b. Connect the trailer wiring plug to the tow vehicle.

Result The procedure to test the breakaway system is now complete.

4 Operation

4.1 Preparing the Machine for First Use

1. Make sure all loose packaging materials have been removed from the machine.
2. Check the machine and its components for damage. If there is visible damage, do not operate the machine! Contact your Wacker Neuson dealer immediately for assistance.
3. Take inventory of all items included with the machine and verify that all loose components and fasteners are accounted for.
4. Attach component parts not already attached.
5. Add fluids as needed and applicable, including fuel, engine oil, and battery acid.
6. Move the machine to its operating location.

4.2 Breaking-in the Engine

On new or reconditioned engines, immediately after the first 50 hours of operation—also known as the break-in period—perform the following procedures.

- Allow the engine to warm up before operating the machine at low ambient temperatures.
- Change the engine oil.
- Change the oil filter.

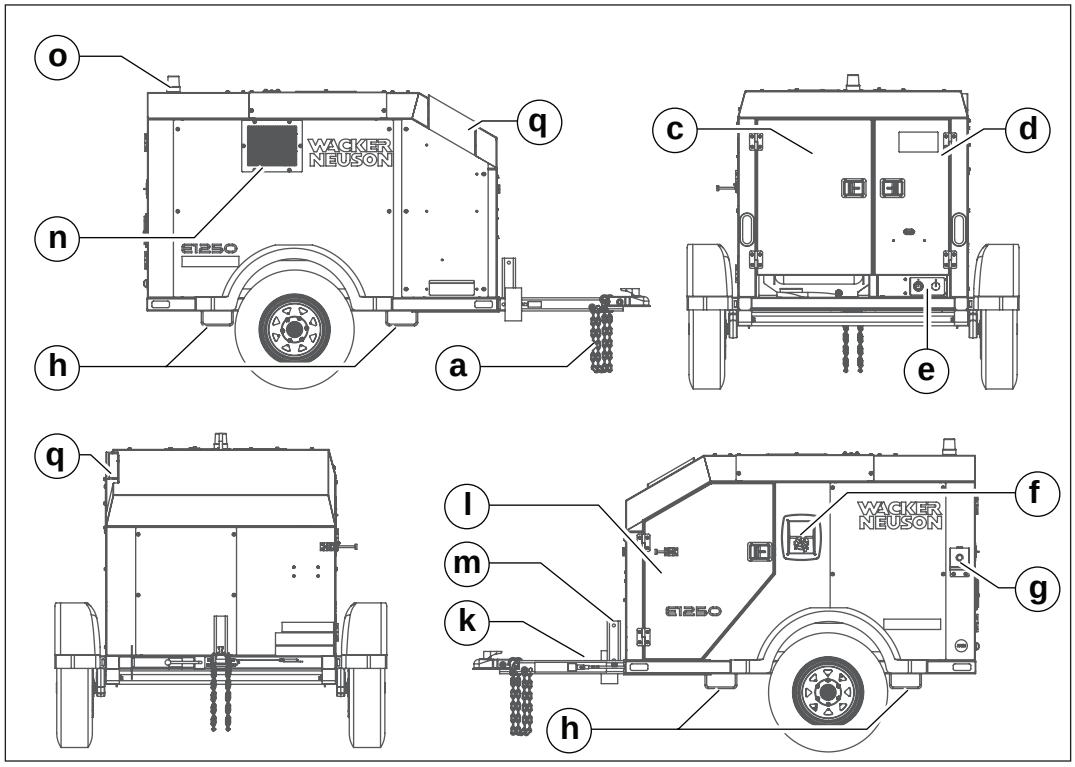
Note: *Refer to the engine manufacturer's documentation for lubrication specifications.*

4.3 General Sequence of Operation

Follow the sequence of operation below. Refer to the specific topic for details.

Task	When/Where	See Topic
1. Check HTF level.	Before leaving for the job site. Or, when at the job site before daily operation.	4.10
2. Check fuel level.		—
3. Position the machine.	At the job site.	4.13
4. Perform before starting checks.		4.14
5. Connect power. OR 4. Start the genset.		4.15 4.16
6. Start the machine.		4.17
7. Unwind and position the hoses.		4.18
8. Monitor the machine during operation.		4.20
9. Adjust the burner (if necessary).		Chapter 6 Chapter 7
10. Rewind the hoses		4.21
11. Shut down and pack up the machine.		4.22 4.23

4.4 External Components

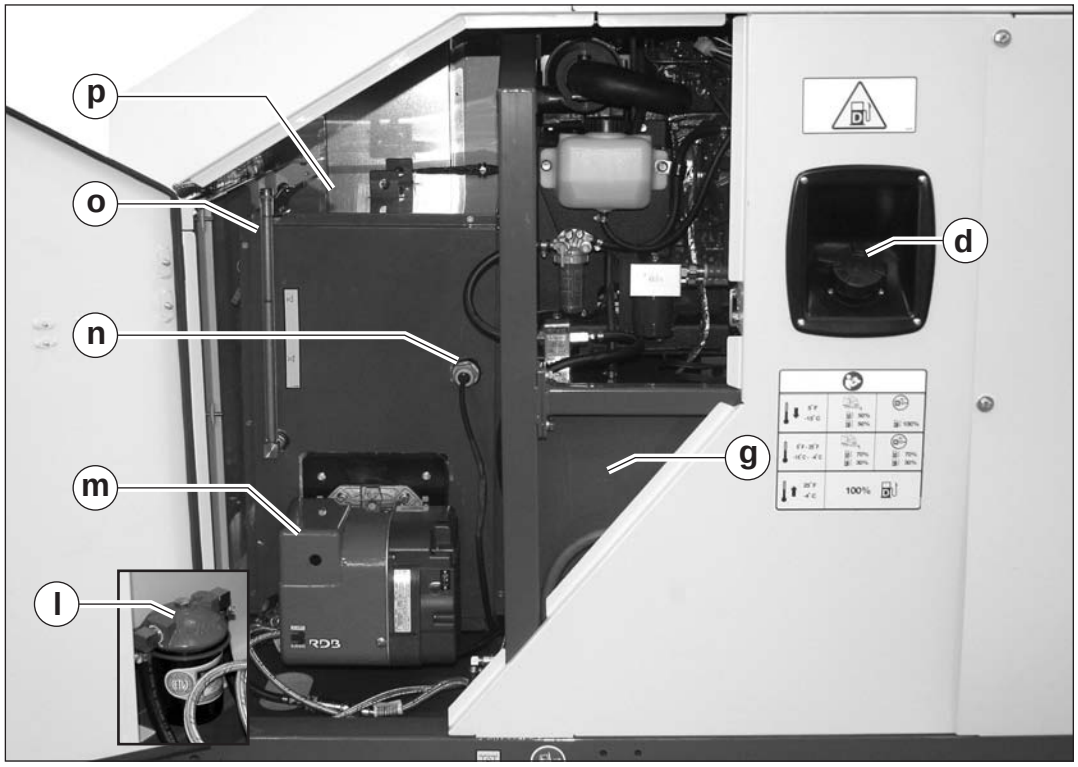


wc_gr011924

Note: *Graphic is representative only. Your machine may vary.*

Ref.	Description	Ref.	Description
a	Trailer with safety chains	**k**	Trailer
c	Hose reel access door	**l**	Burner access door
d	Control panel access	**m**	Trailer tongue bracket
e	Accessory hose manifold	**n**	Air intake grate
f	Fuel fill port	**o**	Strobe light
g	Emergency stop push-button	**q**	Burner exhaust stack
h	Fork truck pockets	**—**	—

4.5 Internal Components-Burner Access Door

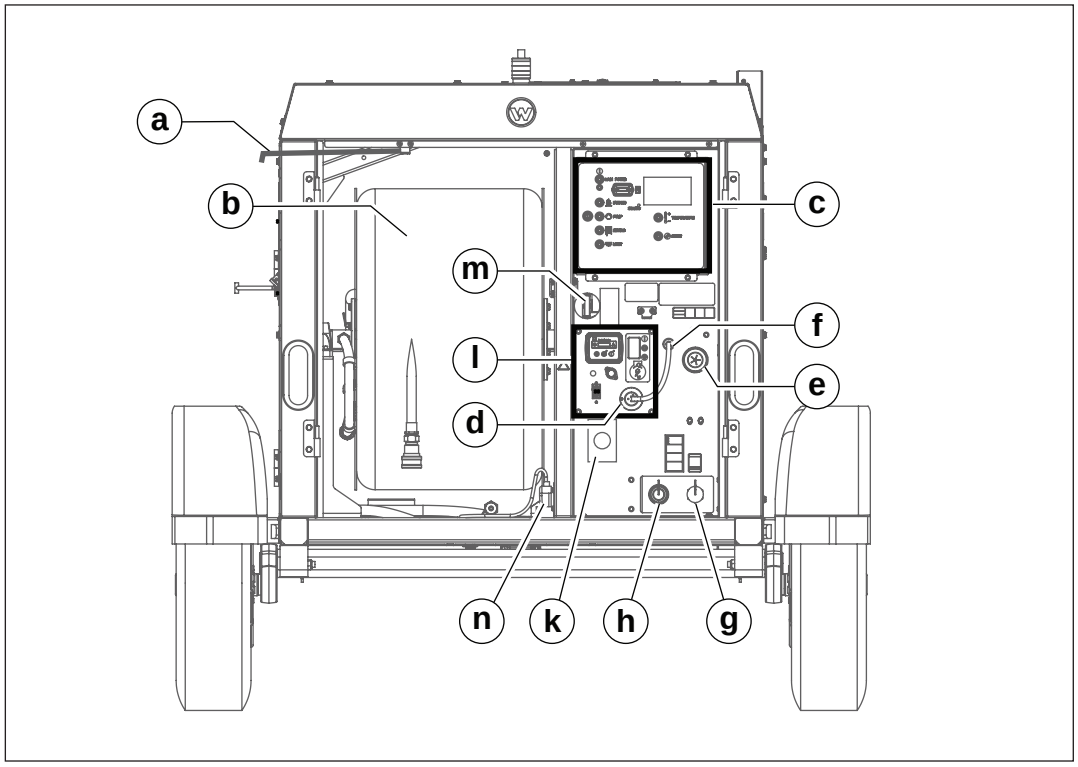


wc_gr011925

Note: *Graphic is representative only. Your machine may vary.*

Ref.	Description	Ref.	Description
d	Fuel fill	n	HTF temperature probe
g	Fuel tank	o	HTF sight gauge
l	Fuel filter	p	Hydronic heater
m	Burner	—	—

4.6 Internal Components-Rear Access Doors

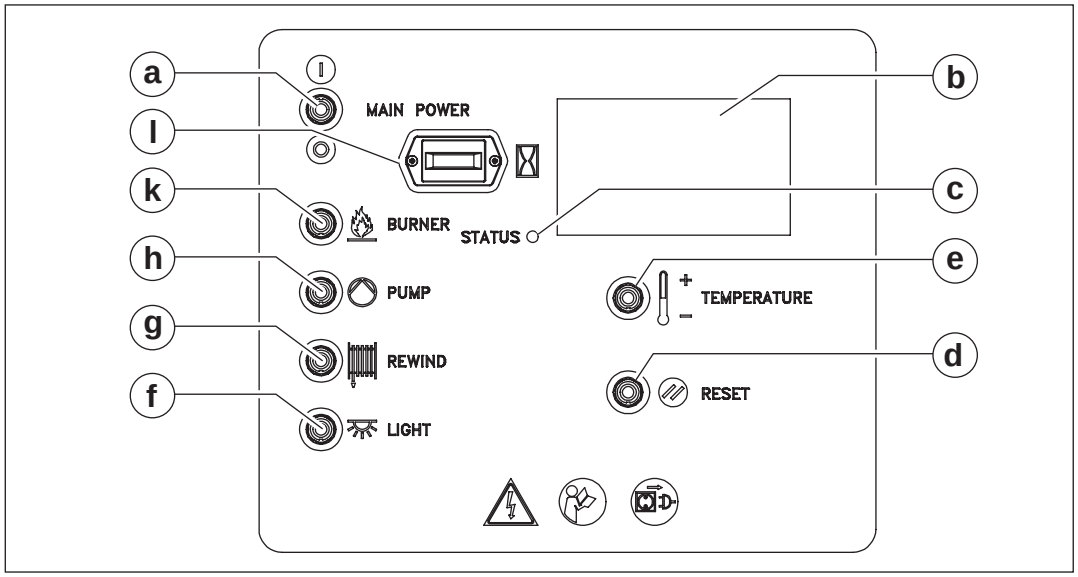


wc_gr011926

Note: *Graphic is representative only. Your machine may vary.*

Ref.	Description	Ref.	Description
a	Door prop rod	g	HTF accessory supply
b	Hose reel and HTF hose	h	HTF accessory return
c	Main control panel	k	Accessory power receptacle
d	Main power receptacle	l	Generator control panel
e	HTF flow indicator	m	Hose reel brake
f	Generator power supply cord (if equipped)	n	Hose reel foot pedal

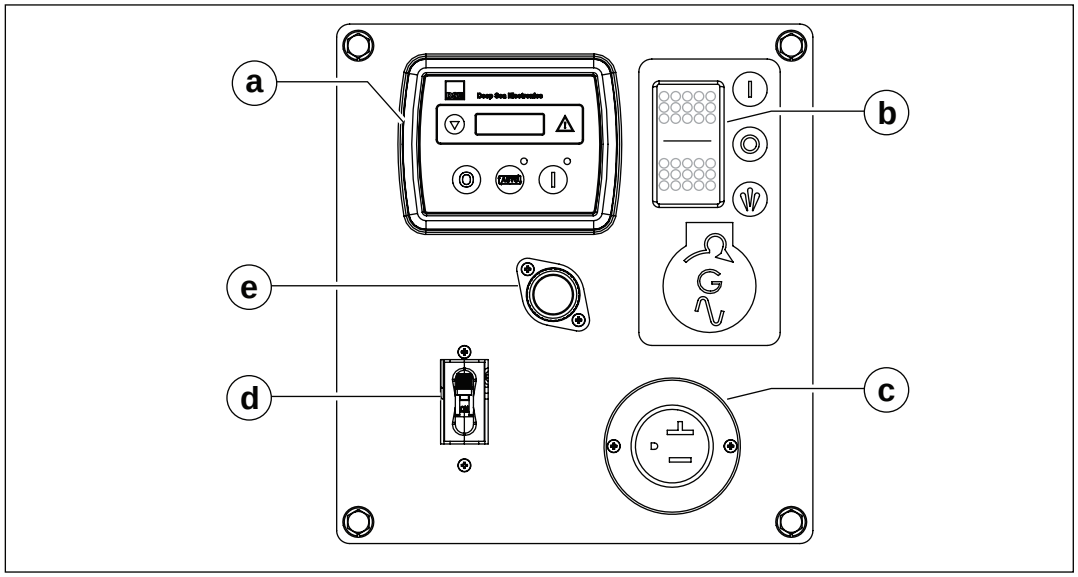
4.7 Main Control Panel Components



wc_gr011562

Ref	Description	Main Function(s)
a	Main power switch	Switches power on and off
b	Control display	■ Displays status message ■ Instructs the user on machine operation ■ See *Control Display Screen*
c	Status indicator	Shows overall status of the machine as follows: ■ Red - Fault ■ Yellow - Warning (preheating) ■ Green - OK ■ Green • Red • Green - Low fuel (if equipped)
d	Reset button	Resets the machine faults
e	Temperature switch	Allows the user to adjust the set point temperature
f	Light switch	Controls power to the interior lights
g	Rewind switch	Controls power to the hose rewind motor
h	Pump switch	Controls power to the pump
k	Burner switch	Controls power to the burner
l	Hour meter	Meters usage of the machine (pump)

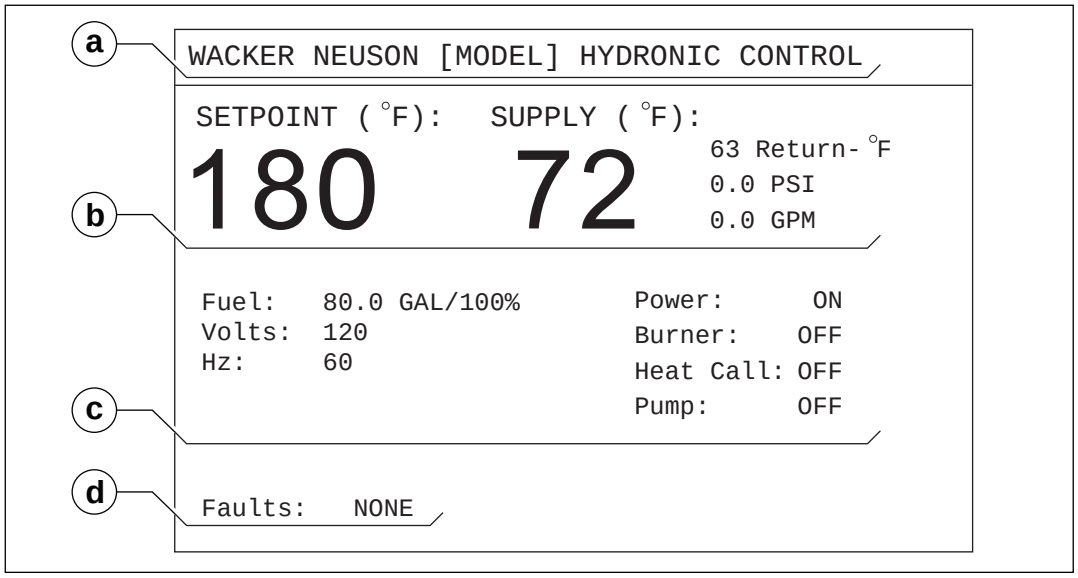
4.8 Generator Control Panel Components



wc_gr011570

Ref	Description	Function
a	Engine control	■ Controls engine starting and stopping procedures. ■ Allows the user to select auto start mode. ■ Refer to user manual for control.
b	Control switch	■ Controls power to the engine starter solenoid. ■ Allows the user to prime the fuel system.
c	Power receptacle	■ Connects the generator power (option) to the control circuit. ■ Allows the user to connect shore power to the machine.
d	Circuit breaker	■ Controls power to the engine control. ■ Protects the user from electrical discharge.
e	Fuse	■ Protects the generator circuit.

4.9 Control Display Screen



wc_gr011618

Ref.	Description	Parameters
a	**Manufacturer information** Displays the machine model	■ E1250 (U.S./Can) ■ HSH380 (EU)
b	**HTF monitor** Monitors HTF parameters	■ Setpoint: °F or °C ■ Supply[1]: °F or °C ■ Return[1]: °F or °C (if equipped) ■ HTF pressure: PSI (if equipped) ■ GPM (if equipped)
c	**Machine monitor** Monitors the machine's core functional parameters	■ Fuel level: gal/% (if equipped) ■ Voltage ■ Frequency: Hz ■ Power: ON/OFF ■ Burner: ON/OFF ■ Heat Call: ON/OFF ■ Pump(s): ON/OFF
c	**Status, faults, and warnings[2]** Displays the machine's status, fault conditions, and warnings	■ Main power off ■ Emergency Stop activated ■ Low level (HTF) ■ Burner fault/alarm ■ High limit fault (over-temperature) ■ Low fuel level ■ Low level fill mode fault ■ High fluid pressure fault

1 In cure mode, the supply and return temperature display locations are reversed.
2 During fault conditions, the screen shows only the current fault(s) and related instructions.

4.10 Checking the HTF Level

When

- Before leaving for the job site, or
- Before beginning operation at the job site.

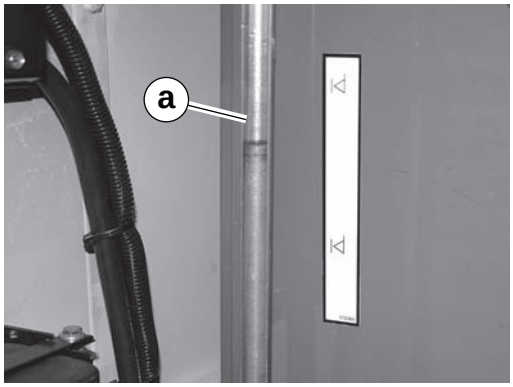
NOTICE: Running the machine with low HTF will damage the pumps.

Requirements

- The machine is level.
- The machine is cool.

Procedure

The Heat Transfer Fluid (HTF) level must be within the operating range on the sightglass **(a)**.



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If low

If the HTF is low, more must be added. Filling the reservoir requires electric power to the machine and knowledge of the machine operation. Familiarize yourself with the function of the machine's controls, then see topic *Filling the HTF Reservoir* for detailed instructions.

4.11 Recommended Fuels and Fuel Blending Guide

Low ambient temperatures cause diesel fuels to gel. Gelled fuels will cause burner ignition failure and/or burner fuel pump damage. Always use the proper fuel for the conditions.

Fuel Blend Guide		
Lowest expected ambient temperature °F (°C)	**Generator-powered**	**Shore-powered**
Below 5 (-15)	50-50 blend of #2 diesel and #1 diesel, plus additives OR 50-50 blend #2 diesel and K1 kerosene, plus additives	100% #1 diesel plus additives OR 100% K1 kerosene, plus additives
5 to 25 (-15 to -4)	70-30 blend of #2 diesel and #1 diesel, plus additives OR 70-30 blend of #2 diesel and K1 kerosene, plus additives	
Above 25 (-4)	Winter-blend diesel	

NOTICE: Do not use B20 or any other type of biodiesel fuel in this machine.

CAUTION
Fire hazard.
- ▶ Do not use gasoline, crankcase oil, or any oil containing gasoline.

4.12 Refueling the Machine

Requirements

- Machine shut down
- Machine level with the ground
- Diesel fuel supply

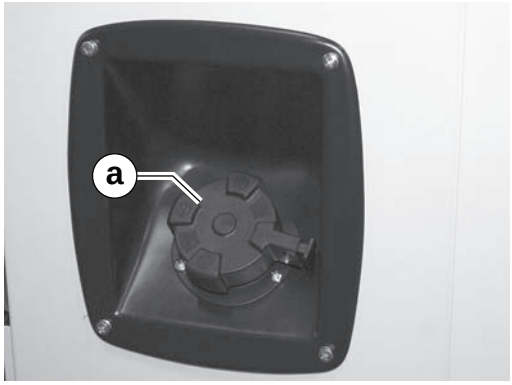
CAUTION
Fire and health hazard. Fuel expands when heated. Expanding fuel in a overly-full tank can lead to spills and leaks.

► Do not overfill the fuel tank.

Procedure

Follow the procedure below to refuel the machine.

1. Remove the fuel cap **(a)** from the tank.



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2. Fill the tank with the appropriate grade of fuel for the weather conditions until the gauge reads full. Leave room within the tank for possible fuel expansion.
3. Re-install the fuel cap.

4.13 Positioning the Machine

DANGER
Asphyxiation hazard.
Exhaust gas from the burner contains carbon monoxide, a deadly poison you cannot see or smell. Exposure to carbon monoxide can kill you in minutes.

- ▶ Position the machine so that burner exhaust will not enter any nearby structures.

WARNING
Fire hazard. Do not move the machine while it is running.

- ▶ Shut down the machine before moving or repositioning it.

WARNING
Fire hazard. Machines positioned on a hill or an incline may slide, break away or roll over.

- ▶ Do not position the machine on a hill or an incline.

WARNING
Explosion and fire hazard. Risk of severe injury or death.

- ▶ Do not operate the machine near flammable vapors, fuels, or combustibles.

CO Alarms

Because this machine produces carbon monoxide (CO), Wacker Neuson recommends that CO alarms be installed in all structures in close proximity to the machine. CO alarms provide an extra measure of protection against this poison that you cannot see or smell.

Install battery-operated CO alarms or plug-in CO alarms with battery backup, according to the manufacturer's instructions. CO alarms should be certified to the requirements of the latest safety standards (UL 2034, IAS 6-96, or CSA 6.19.01). Test the CO alarm batteries monthly.

This procedure continues on the next page.

Continued from the previous page.

Requirements Position the machine:

- On solid, stable, and level ground.
- So that 1 ft. (305 mm) clearance is maintained on all sides during operation.
- So that the air intake on the machine are not obstructed during operation.
- So that proper ventilation is maintained during operation.
- So that burner exhaust will not enter nearby structures.
- So that the machine does not block traffic.
- So that the machine is not close to combustible material or flammable vapors.
- So that all of the machine's access doors/panels may be accessed.
- So that hoses and/or cords do not pose tripping hazards, and so the HTF hoses cannot be damaged by machines or other equipment on the job site.
- With chocks under the wheels.

4.14 Before Starting the Machine

WARNING
Personal injury hazard. Failure to follow the listed procedures may cause injury to personnel or damage to the machine.

- ▶ Make sure that all persons setting up the machine are certified or fully trained on the installation of the machine.

Before putting the machine into service, perform each item on the following checklist.

Exterior checks

- ☐ Check for damage that may have occurred during towing or travel to the jobsite. Repair any damage.
- ☐ Make sure that the machine is level.
- ☐ Chock the trailer wheels.

Internal checks

- ☐ Check all HTF hoses, connections, and reservoir for leaks—repair any leaks.
- ☐ Check HTF, engine oil, coolant, and fuel levels—fill as required.
- ☐ Check the fan belt and hoses on the engine for loose connections or fraying—tighten or replace belts and hoses as required.
- ☐ Remove any debris that has lodged in vents, near the radiator, burner, or around the fan.
- ☐ Make sure the interior compartment is clean, with nothing touching the burner, muffler, or the exhaust pipes.

Pre-operation checks

- ☐ Read and understand the engine owner's manual.
- ☐ Read and understand the burner owner's manual.
- ☐ Review and follow the safety instructions found in the front of this Operator's Manual.

4.15 Connecting Power to the Machine

Prerequisites

- Power source
- Machine properly positioned

WARNING
Fire hazard and electric shock hazard. The use of under-sized extension cords can lead to fire and electric shock. Fire and electric shock can cause severe injury.

▶ Do not use under-sized extension cords.

Extension cords

Restrictions for extension cords:

- Use only 3-wire type extension cords with heavy-duty plugs.
- The maximum length of extension cord usage per circuit is 30 m (100 ft).
- Use 12-gauge extension cords for lengths up to 15 m (50 ft).
- Use 10-gauge extension cords for lengths up to 30 m (100 ft).

Procedure

Follow the procedure below to connect power to the machine.

1. Move the main power switch to the OFF position.
2. Connect the main power cord to a properly-rated power source or to the generator power cord if equipped.

4.16 Starting the Generator Engine

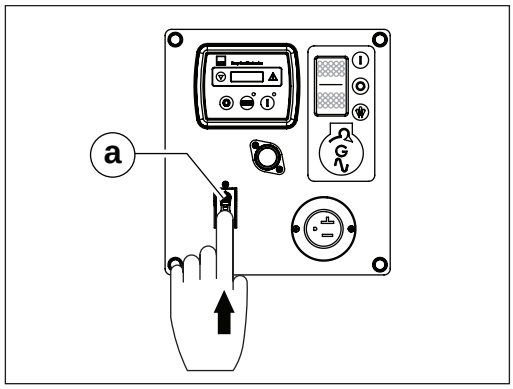
Requirements

- Machine positioned
- Prestarting checks complete

Powering

Perform the procedure below to start the engine.

1. Move the circuit breaker **(a)** to the ON position.



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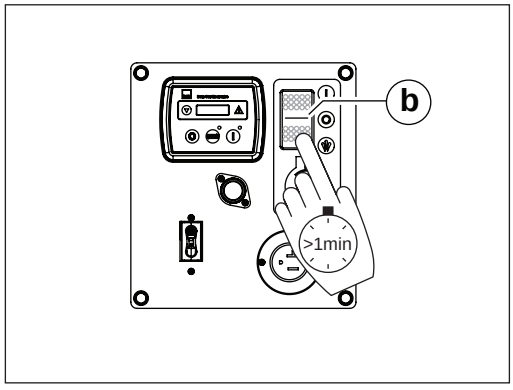
Priming

NOTICE: The fuel system will need to be primed if:

- Fuel system has run dry
- Fuel system has been drained
- The fuel filter has been changed
- The genset has not been run for several weeks

2. Press and hold the control switch **(b)** in the “Prime” position.
   - The fuel pump will start.
   - Hold the control switch for at least one minute.



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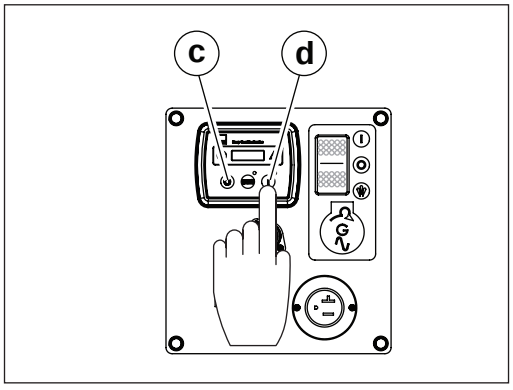

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Starting

3. Press the Stop push-button **(c)** on the engine control then, press the Start push-button **(d)** on the engine control.
   - The engine will preheat (for up to 15 seconds).
   - The starter will engage.

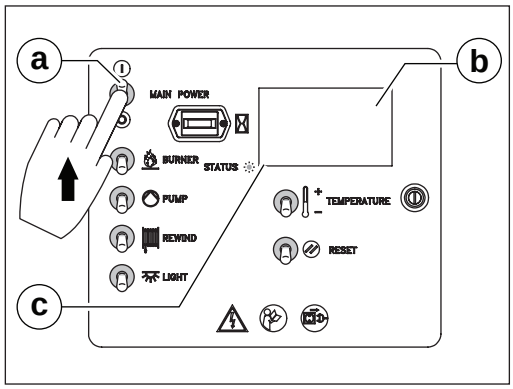
4.17 Starting the Machine

Requirements

- Pre-starting checks completed
- Generator started or power connected

Powering up

1. Verify that all switches and circuit breakers are in the OFF position.
2. Move the Main Power switch **(a)** to the ON position.
   - The control display **(b)** indicates that power is ON.
   - The status indicator light **(c)** flashes green.
   - All other functions are be disabled.



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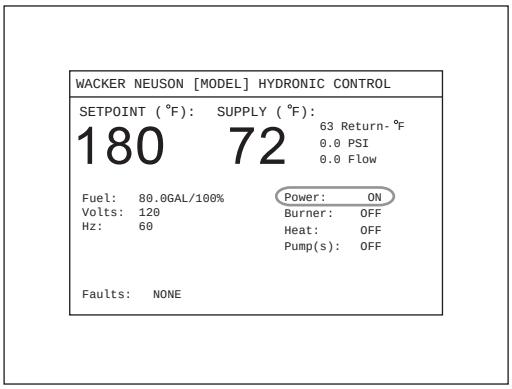

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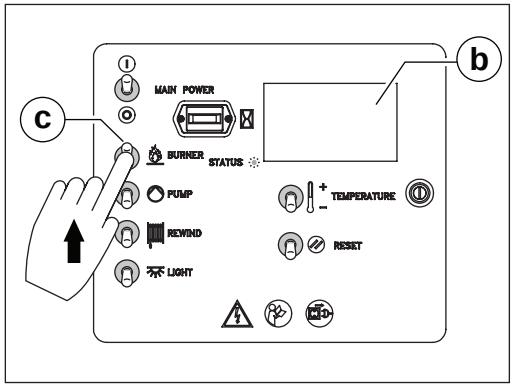
3. Move the burner switch **(c)** to the ON position. The following will occur:
   a. The control display indicates that the burner and [call for] heat are ON.
   b. The burner motor starts after a 5-second delay.
   c. The burner fires after a 15-second delay.
   d. The burner will operate until the HTF reaches a minimum of 50°F (10°C) or the set point value—whichever is higher—at which time, it the burner cycles off.
   e. The control display indicates that the [call for] heat is OFF.
   f. The burner will re-fire if the set point temperature is increased or the temperature of the HTF falls below the set point.



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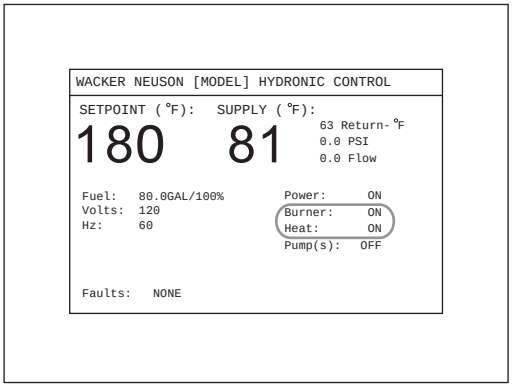

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4. Check the control display. Troubleshoot and rectify faults if necessary.

This procedure continues on the next page.

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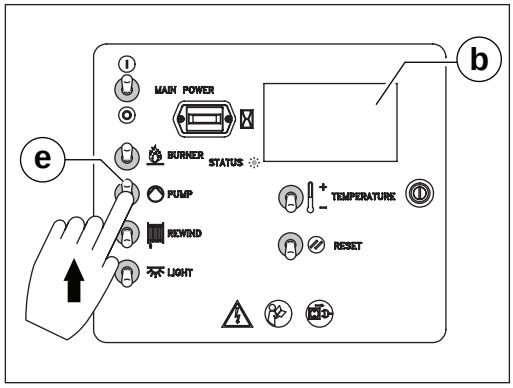
Initiating HTF flow

5. Move the Pump switch **(e)** to the ON position.
   - The pump will activate when the HTF reaches 50 °F (10 °C).
   - The control display indicates that the pump is on.
   - The return, pressure, and flow parameters display current values.



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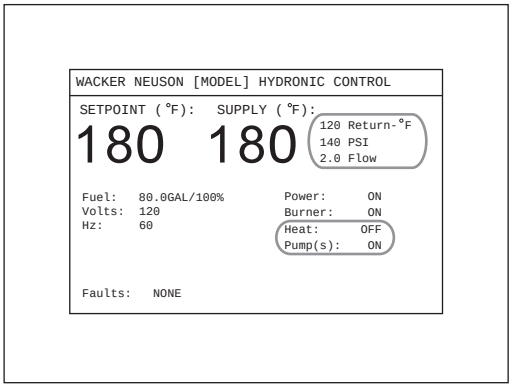

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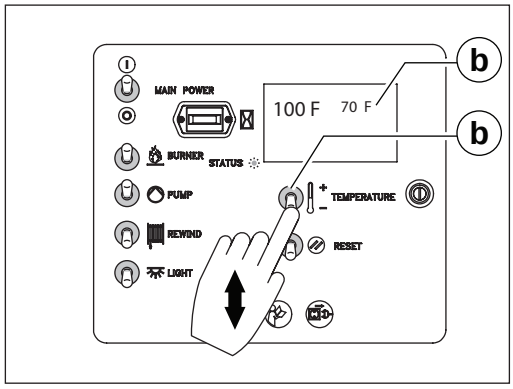
6. Check the control display **(b)**. The following should occur:
   a. Pressure will slowly rise during the first minute to approximately 140 psi (9.65 bar).
   b. When flow is established, pressure should be: 125–140 psi (8.6–9.6 bar).
   c. When the HTF is warm, operating pressure should be: 90–110 psi (6.2–7.6 bar).
7. Hold the temperature switch **(d)** in the up (+) or down (-) position to adjust the set point temperature.



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4.18 Unwinding and Positioning the Hoses

Requirements

- HTF preheated if applicable
- HTF flow initiated

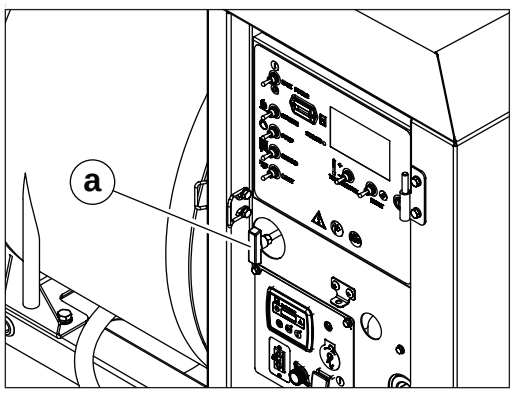
CAUTION
Burn hazard. The hoses and components of the plumbing system may be very hot. Hot hoses and hot plumbing components may cause severe burns.
▶ Wear hand protection when handling hot hoses and plumbing components.

CAUTION Pinch hazard. The hose reel disc creates a pinching hazard while it's moving.
▶ Keep hands away from the area between the hose reel and door frame.

Procedure

Perform the procedure below to unwind and position the hoses.

1. Rotate the T-Handle **(a)** counter-clockwise to unlock the hose reel.



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2. Pull the hose off the reel by hand and place it in the application area. See *Hose Spacing Guidelines* for recommendations based on application.
3. Cover the hoses with insulation blankets and plastic vapor barriers to increase heat penetration and retention.
4. Rotate the T-handle **(a)** clockwise to lock the hose reel.

NOTICE: The machine must be periodically monitored during operation to ensure system efficiency. See topic *Operating the Machine*.

4.19 Hose Spacing Guidelines

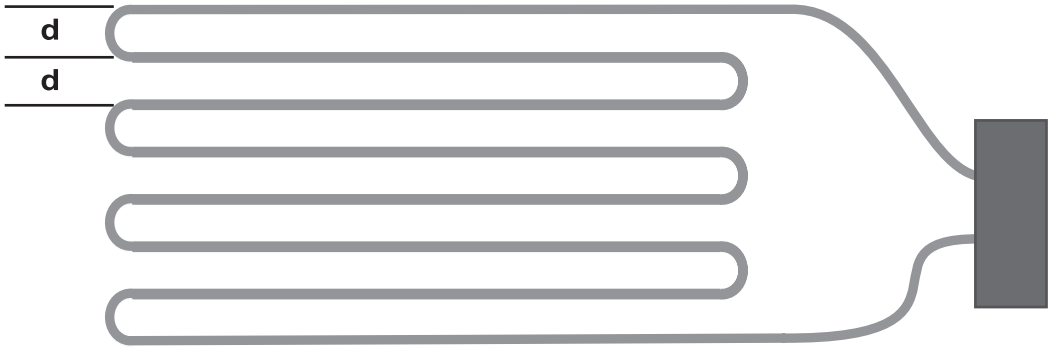
Background

When laying hose in the application area, the space between individual lines of hose significantly affects the progress of the application. Although it is impossible to predict the ambient conditions for each job site, Wacker Neuson recommends observing the following guidelines to maximize efficiency.

Hose spacing diagram

Refer to the diagram and table below when placing hoses in the application area.

Note: *Adjustments may be necessary to achieve maximum efficiency.*



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Application	Distance (d)	Description
Frost prevention	91.5 cm (36 in.)	Prevents frost in the application area.
Concrete curing	61 cm (24 in.)	Allows concrete to cure.
Excavation thaw	61 cm (24 in.)	Partially thaws the ground for excavation.
Compaction thaw	45.7 cm (18 in.)	Completely thaws the ground for compaction.
Accelerated thaw	30.5 cm (12 in.)	Up to 50% faster than compaction thaw.

Notes

- To increase heat penetration, cover the hoses with a plastic vapor barrier and two layers of insulatopm blankets. For concrete curing, cover the concrete with plastic, place the hoses on top of the plastic, then cover the hoses with two layers of insulation blankets.
- The hoses may be positioned vertically along concrete framing walls for curing applications. Contact Wacker Neuson Application Support for more information.

4.20 Operating the Machine

Important points

- The machine can run without operator presence for extended periods.
- Changes in environmental conditions affect the machine's performance.
- The machine must be checked during operation to ensure efficient operation.
- The core components must be checked after stopping, relocating, or servicing.

Periodic checks

Check the following items every 8-24 hours.

Item	Notes
Fuel level	Add fuel as needed.
HTF level	Add HTF as needed.
HTF operating pressure	■ Nominal operating pressure: 90–110 psi. ■ If operating pressure is higher than 110 psi, check for kinked hoses. ■ If operating pressure is less that 90 psi, check HTF level.
HTF return temperature	The HTF return temperature tells you how much heat is being transferred. It can also tell you when a thawing process is complete, as very little heat will be transferred at that point. Consult Wacker Neuson Product Support for detailed information.
Strobe light	■ Flashing green strobe signifies that all systems are OK. ■ Flashing red strobe indicates something is wrong. See chapter *Troubleshooting*
Burner operation	Check the exhaust stack for visible smoke, sooting, or obstructions. If smoke is visible, the burner performance must be verified. See chapter *Burner Setup.*
Hydronic heater	Check the hydronic heater for signs of visible sooting or exhaust leaks, bubbling paint, or other damage. If any sooting, leaking or heat damage is evident, shut down the machine immediately and perform maintenance as necessary.

Core component checks

Check the following items after stopping, moving, or servicing the machine.

Item	Notes
Burner	See chapter *Burner Setup.*
Generator/engine	Check the operating fluids, belts, filters, and power output. Refer to the engine owner's manual.
Hydronic heater	Check the hydronic heater for signs of visible sooting or exhaust leaks, bubbling paint, or other damage. If any sooting, leaking or heat damage is evident, shut down the machine immediately and perform maintenance as necessary.

4.21 Rewinding the Hoses

Requirements

- All accessories off—if applicable
- Machine main power on
- Insulation blankets removed—if applicable

CAUTION
Burn hazard. The hoses and components of the plumbing system may be very hot. Hot hoses and hot plumbing components may cause severe burns.
▶ Wear hand protection when handling hot hoses and plumbing components.

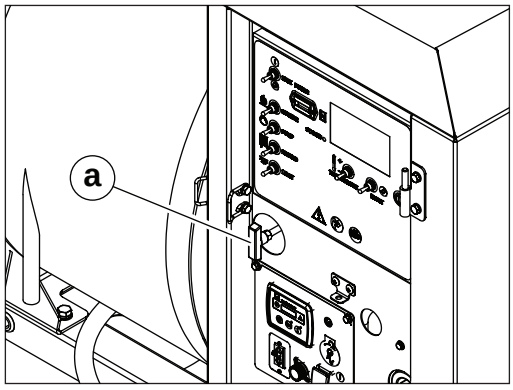
Tip

Warm, pressurized hoses are easier to handle and will prevent the hose from collapsing upon rewinding. Turn the pump on to circulate the HTF and warm up the hoses before rewinding.

Procedure

Perform the procedure below to rewind the hose.

1. Rotate the T-Handle **(a)** counter-clockwise to unlock the hose reel.



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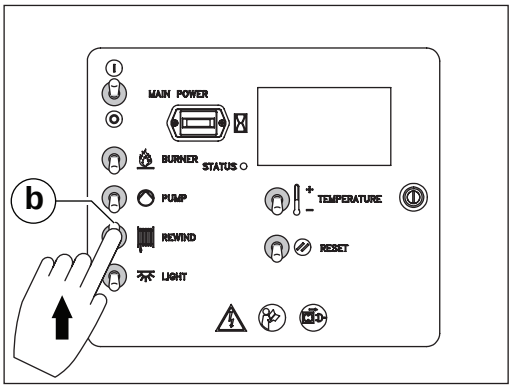

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2. Place the foot pedal on a firm, flat, and dry surface.
3. Move the rewind switch **(b)** to the ON position.
   - The rewind motor will engage.
   - The hose reel will not rotate untl the foot switch is pressed.
4. Press the foot pedal to engage the clutch. The hose reel will rotate.
5. Guide the hose evenly onto the hose reel as it rotates.

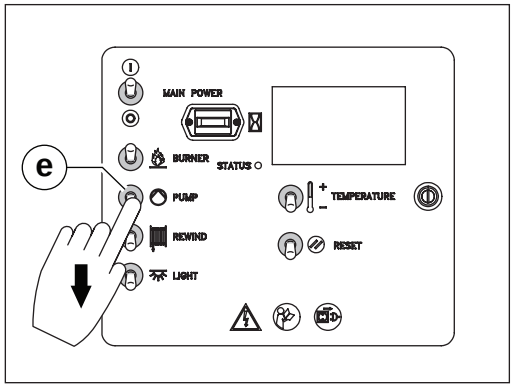
NOTICE: Disengage the foot pedal before reaching the end of the hose.

6. Manually wind the remainder of the hose onto the reel.
7. Rotate the T-handle **(a)** clockwise to lock the hose reel, move the rewind switch **(b)** to the OFF position, and store the foot pedal.

4.22 Stopping

Perform the procedure below to stop the machine.

1. Turn off any external pumps, hose handling systems, or other accessories if applicable.
2. Set the pump **(e)** and burner **(c)** switch to the OFF position.



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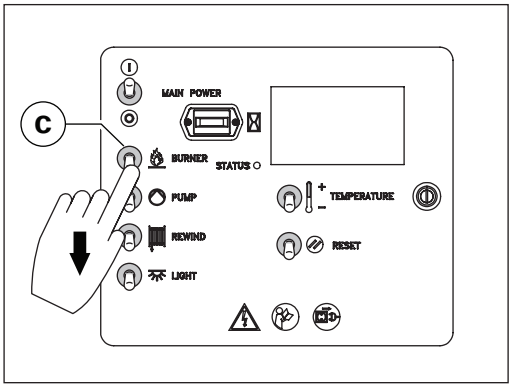

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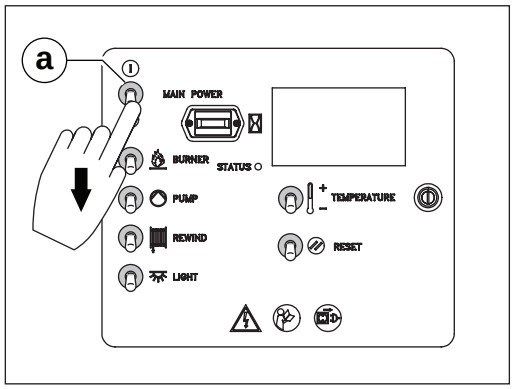
3. Rewind the hoses. See topic *Rewinding the Hoses.*
4. Set the main power switch **(a)** to the OFF position.



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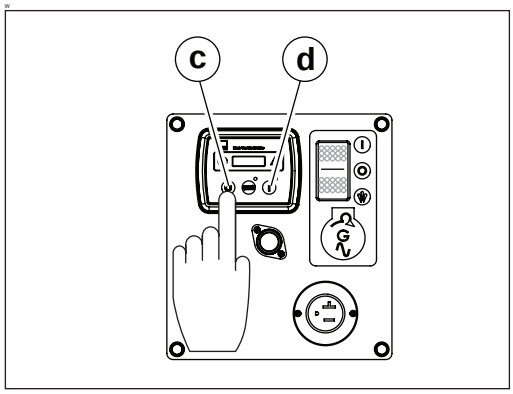
4.23 Stopping the Engine

Stopping

Perform the procedure below to stop the engine.

1. Press the STOP push-button **(c)** on the engine control.



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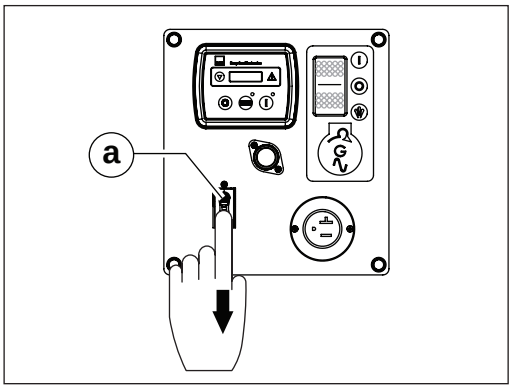

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2. After the engine has stopped, set the circuit breaker **(a)** to the OFF position.

4.24 Quick-Connect Coupling Usage and Care

CAUTION
Burn hazard. The hoses and components of the plumbing system may be very hot. Hot hoses and hot plumbing components may cause severe burns.
▶ Wear hand protection when handling hot hoses and plumbing components.

Precautions

- Do not join or separate quick-connect couplings when the pressure gauge indicates the lines are pressurized.
- Do not join or separate quick-connect couplings when the HTF temperature is above 48°C (120°F).
- Do not use damaged quick-connect couplings.
- Do not use dirty or contaminated quick-connect couplings.
- Do not lubricate quick-connect couplings.

Usage Instructions

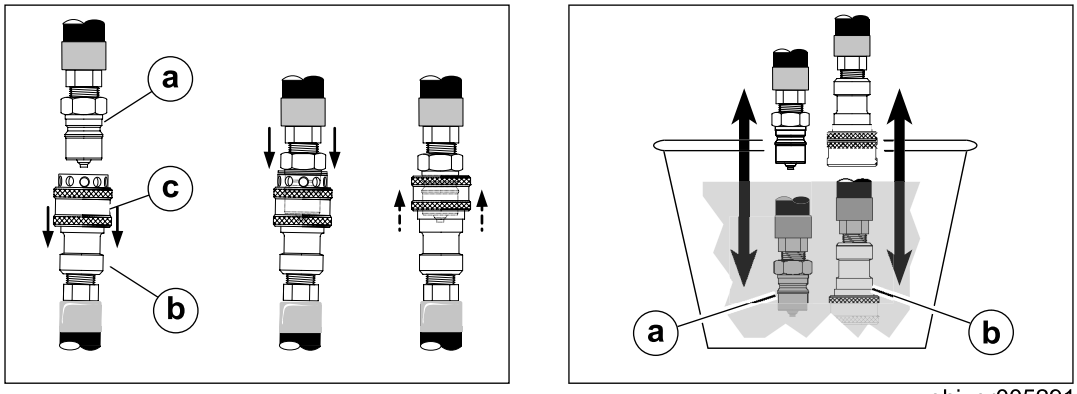
Follow the instructions below when using the quick-connect couplings.

1. Clean both the male **(a)** and female **(b)** couplings before and after each use.
2. Push and hold the locking collar **(c)** on the female coupling **(b)** down.
3. Insert the male coupling **(a)**.
4. Release the locking collar to lock.

Cleaning Instructions

Follow the instructions below when cleaning the quick-connect couplings.

1. Rinse each coupling with clean water before and after each use.
Note: *Be sure that each coupling is free of dirt and debris.*
2. Inspect seals and gaskets before and after each use.
3. Install caps or protective covers after each use.



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4.25 Filling the HTF (Low Level Fault Condition)

Requirements

- Genuine Wacker Neuson Heat Transfer Fluid, or
- Dowfrost HD 50 Heat Transfer Fluid
- An assistant

NOTICE: Use only factory-recommended Heat Transfer Fluid (HTF). Failure to do so may damage the machine.

Important

The procedure for routine filling of the HTF reservoir during maintenance procedures differs from that when a low level fault condition has occurred. If you are filling the reservoir during routine maintenance, see *Maintaining the HTF Level*.

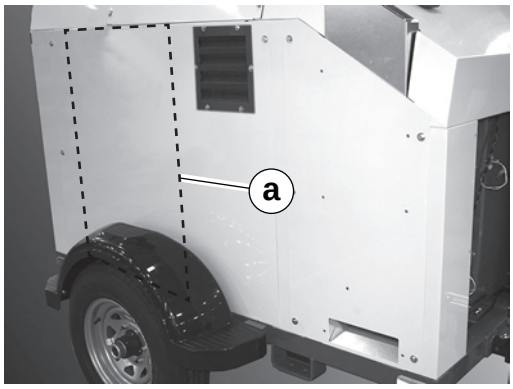
Background

The HTF reservoir includes a float switch that triggers a machine shutdown if the HTF falls below the minimum operational capacity. During a low HTF level condition the following occurs.

- Power is disconnected from the burner.
- Power is disconnected from the pumps.
- The control screen will display the fault message.
- The strobe light will flash RED.

FIlling the reservoir using the pump

1. Set the burner and pump switches to the OFF position.
2. Remove the side panel **(a)** from the machine.



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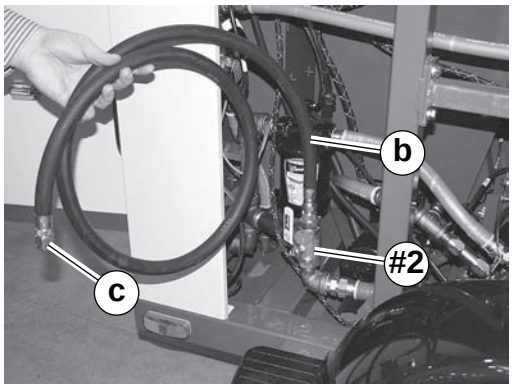

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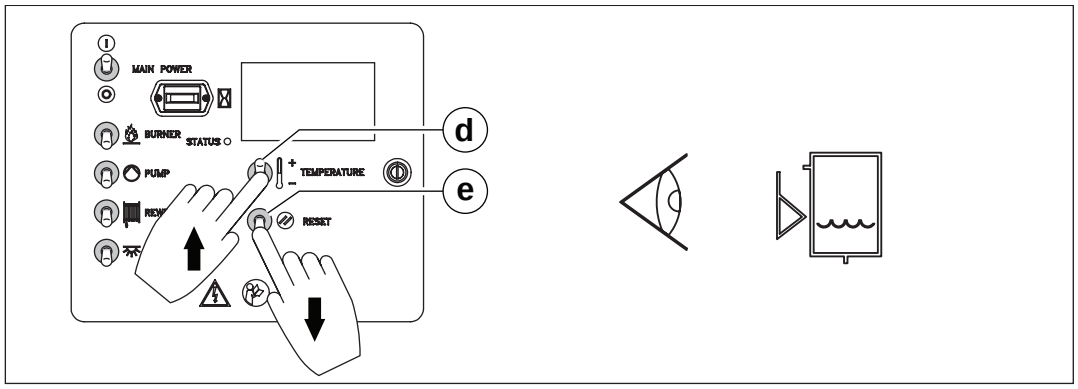
3. Locate and pull out the fill hose **(b).**
4. Remove the plug **(c)** from the end of the fill hose, clean the end of the hose, and place it into the container of HTF.

This procedure continues on the next page.

Continued from the previous page.

5. Hold the reset switch **(e)** down while pushing up on the temperature switch **(d)**. The pump will activate and begin filling the HTF reservoir.



wc_gr012391

6. Release the switches when the pump stops.
   - The float switch has activated signalling the reservoir is mostly full.
   - To top off the reservoir, use the main pump switch to activate the pump.

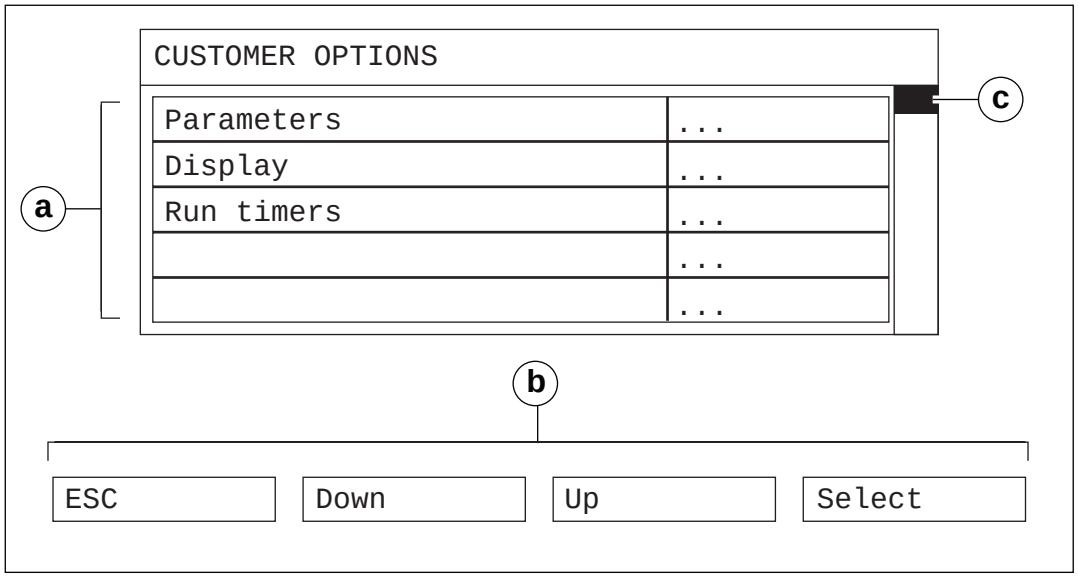
NOTICE: Do not overfill the HTF reservoir. Damage to the machine will occur.

7. Move valve #2 to the normal position.
8. Remove the fill hose from the HTF container and allow any HTF within the hose to drip back into the container. Cap the fill hose if a cap is provided.
9. Move the fill hose to its storage location.

The low HTF level fault has been reset and the HTF reservoir has now been filled.

4.26 Options Menu

Background The controller includes an options menu on which the user can adjust functional parameters, screen brightness and contrast, and view run timers. The machine must be shut down in order to access this menu.



wc_gr011619

Ref.	Item	Description
a	Menu display	The menu display shows the options for the current menu.
b	Control switch indicators	These indicators show what each control switch will do on the current menu screen. These functions may change with each menu screen.
c	Menu scroll indicator	The scroll indicator shows the relative position of the current menu displayed.

Accessing the options menu

To acces the options menu, the machine must be shut down according the instructions in this manual. See *Stopping.* Follow the procedure below.

NOTICE: Do not use the customer options menu unless you have the proper training on machine function, parameters, and setup.

1. Press down and hold the reset switch.
2. While holding the reset switch, set the burner switch to ON and then back to OFF. The control display will change to the CUSTOMER OPTIONS main menu screen.
3. Release the reset switch.

Navigating the menus

- Use the burner switch to exit the current menu (ESC) or exit from the CUSTOMER OPTIONS menu.
- Use the temperature switch to navigate UP or DOWN any menu screen or adjust a parameter's setting.
- Use the reset switch to SELECT the parameter that is highlighted and move into the next menu screen or change the current selection's status.
- Use the reset switch to save a setting after making a selection or changing a parameter.

5 Accessories

To expand the machine's capabilities and capacities, the following Wacker Neuson accessories can be purchased at your local Wacker Neuson dealer.

Basic machines are not compatible with accessories. Contact your local Wacker Neuson dealer to determine the capabilities of your machine.

5.1 HX Series Heat Xchangers

Powerful liquit-to-air heat Xchangers, available in three sizes, bring clean, dry heat to your workspace. Simply position the HX Heat Exchangers inside the structure and aim where you would like to heat to go. Finish work is a breeze in a warm, dry environment and comfortable employees are more productive.

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wc_gr011773

5.2 Pump Packs

Pump Packs provide a dedicated pump to each extra hose loop, maintaining a high flow rate for even distribution of BTUs over the entire job surface. Incrase thaw rate by 50% or increase curing capactiy by 200%. Use Pump Packs with HX Heat Xchangers and your Hydronic Heater to provide clean, dry heat to enclosed work spaces. Use the Booster Pump for applications requiring Heat Xchangers to be placed greater than 400 feet from the Pureheat Hydronic Heater or above 50 ft.

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wc_gr011770

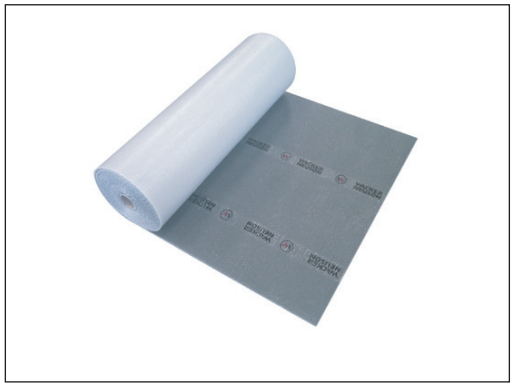
5.3 Hose Handling Systems

Add a Hose Handling System (and a Pump Pack) to Hydronic Heater models to thaw even more faster, or increase size of area for frost prevention or concrete curing. Available in several sizes, all units are equipped with Heat Transfer Hose filled with Heat Transfer Fluid, quick-connect brass fittings, and electric foot pedal rewind system.

wc_gr011769

5.4 Insulation Blankets

Designed specifically to work with portable hydronic heating systems, IB 750 insulation blankets reflect heat downward.These blankets allow faster thawing and more even curing. You will see huge savings in labor, storage, and freight costs.



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5.5 Accessory Expansion Capacities

Surface heat expansion

The table below shows available options for expanding the surface heating capacity of your machine.

Option	Description		Application Area		
			Thaw	Cure	Frost Prevention
1 (U.S. only)	1 X HHS + 1 X SPP	m^2 (ft^2)	204 (2200)	408 (4400)	610 (6600)
2	1 X HHS +1 X DPP + adapter	m^2 (ft^2)	—	610 (6600)	915 (9900)

Air Heat Conversion

The standard Hydronic Heater can be combined with Wacker Neuson accessories to convert the target application to air heat. The typical configurations are shown below; however, these do not represent all possible configurations. Contact Wacker Neuson for more information.

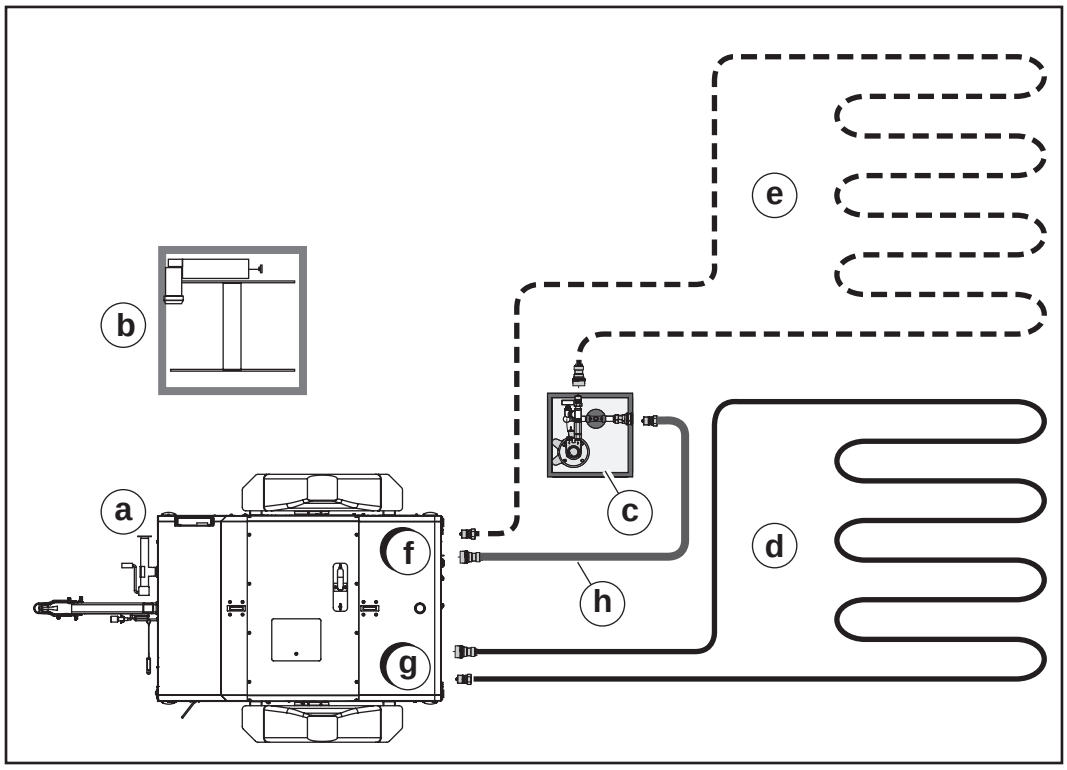
In order to connect Heat Xchangers to the machine, additional accessories are required to support the additional load on the machine's systems.

NOTICE: Use caution when adding accessories; failure to adhere to these requirements will damage your machine.

Heat Exchanger Model	Max. Qty.	Additional components required for maximum quantity of Heat Exchangers	
		1-2 Adapter	2-1 Adapter
HX 50 / HX 15	2	--	--
HX 100 / HX 30	1	1	1

5.6 Expansion Diagram - 1 X HHS1101 + 1 X SPP (U.S. only)

NOTICE: Shut down the machine before connecting accessories.



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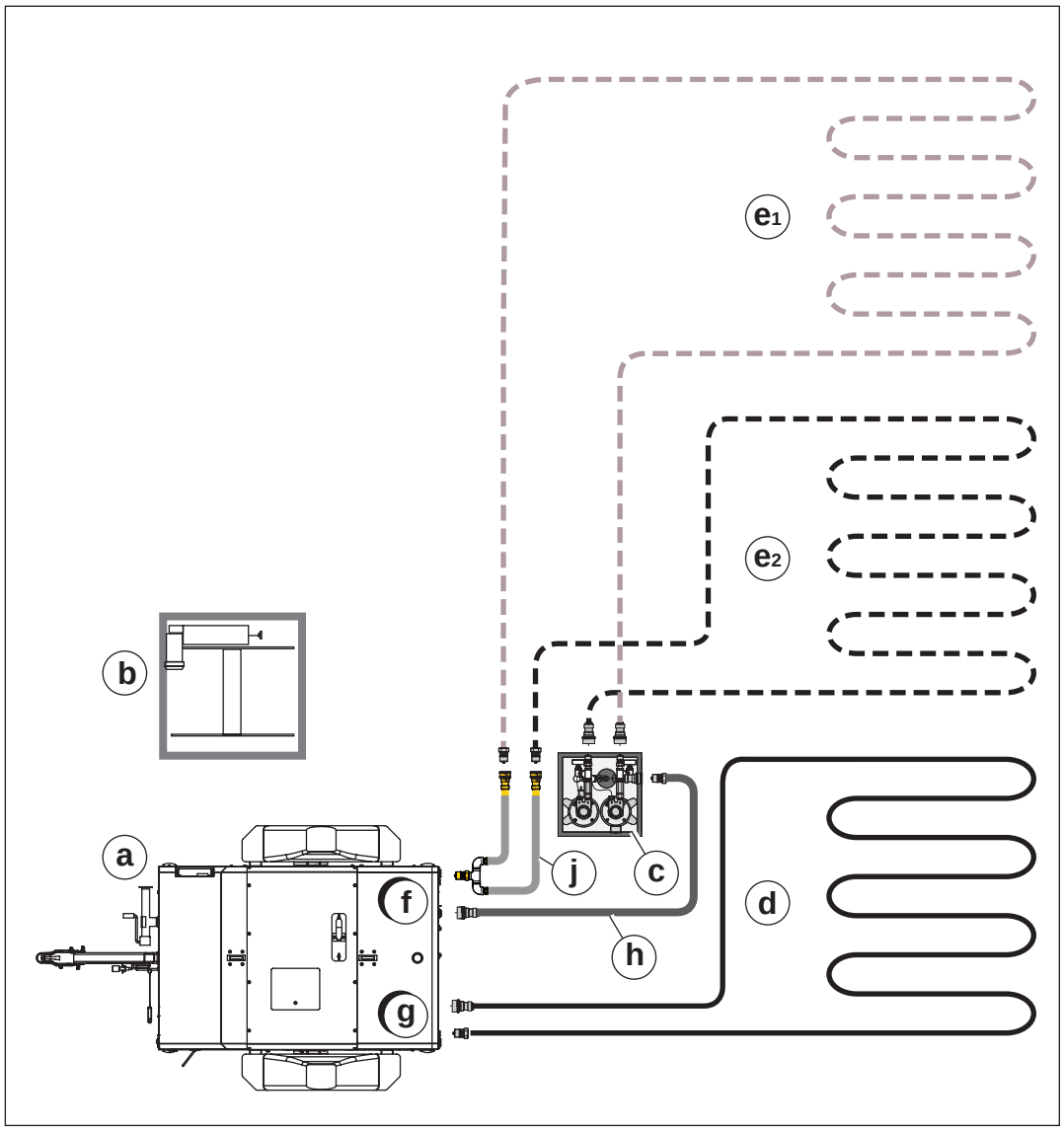
Ref.	Description	Ref.	Description
a	Hydronic Surface Heater	**e**	HHS hose
b	Hose Handling System (HHS)	**f**	Accessory connection manifold
c	Single Pump Pack (SPP)	**g**	Main hose connection manifold
d	Main hose	**h**	Pump pack adapter hose

5.7 Expansion Diagram - 1 X HHS2202 (702) + 1 X DPP + Adapter

NOTICE: Shut down the machine before connecting accessories



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Ref.	Description	Ref.	Description
a	Hydronic Surface Heater	**e_2**	HHS hose (loop 2)
b	Hose Handling System (HHS)	**f**	Accessory connection manifold
c	Dual Pump Pack (DPP)	**g**	Main hose connection manifold
d	Main hose	**h**	Pump pack adapter hose
e_1	HHS hose (loop 1)	**j**	Adapter (1 to 2)

5.8 Connecting Two HX 50 (HX 15) Heat Exchangers

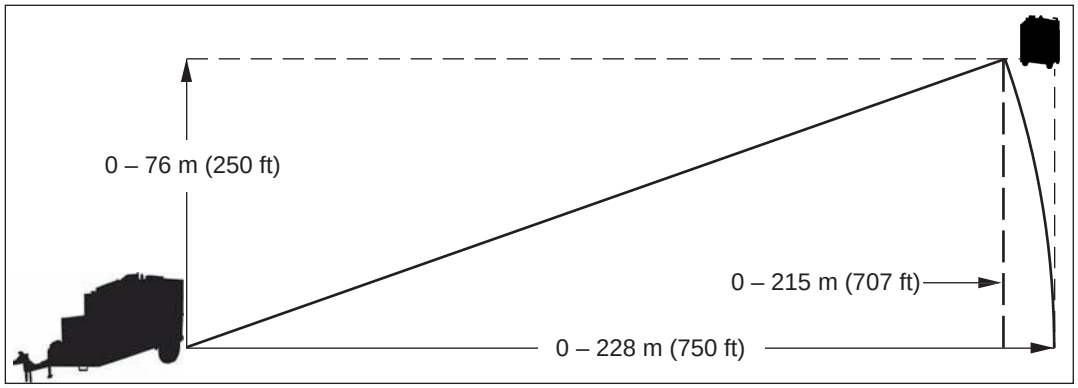
Requirements

- Machine stopped
- Two HX 50 or HX 15 Heat Exchangers
- One 2-1 adapter
- One 1-2 adapter

Limitations

- Maximum run (horizontal distance from HX to machine): 228 m (750 ft)
- Maximum rise (vertical distance of HX above machine): 76 m (250 ft)
- Maximum run at maximum rise: 215 m (707 ft)

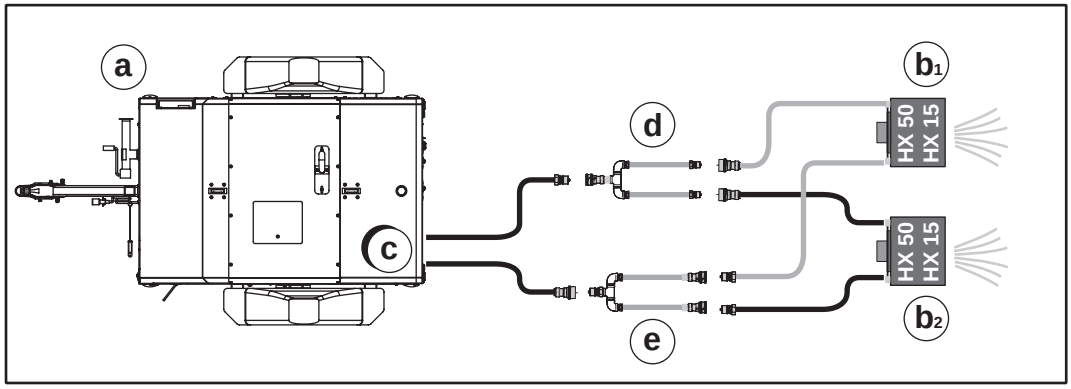
Note: *The farther the HX is positioned from the parent machine, the more heat will be lost through the hose. This may affect HX performance.*



wc_gr008096

Connection diagram

Refer to the diagram below to connect your Heat Exchangers. Insulate the hoses with IB 750 insulation blankets for maximum heat retention.



wc_gr011779

Ref.	Description	Ref.	Description
a	Hydronic Surface Heater	**d**	Adapater hose (1-2)
b	Heat Exchanger (HX) with hose	**e**	Adapater hose (2-1)
c	Main hose connection manifold	**—**	—

5.9 Connecting a HX 100 (HX 30) Heat Exchanger

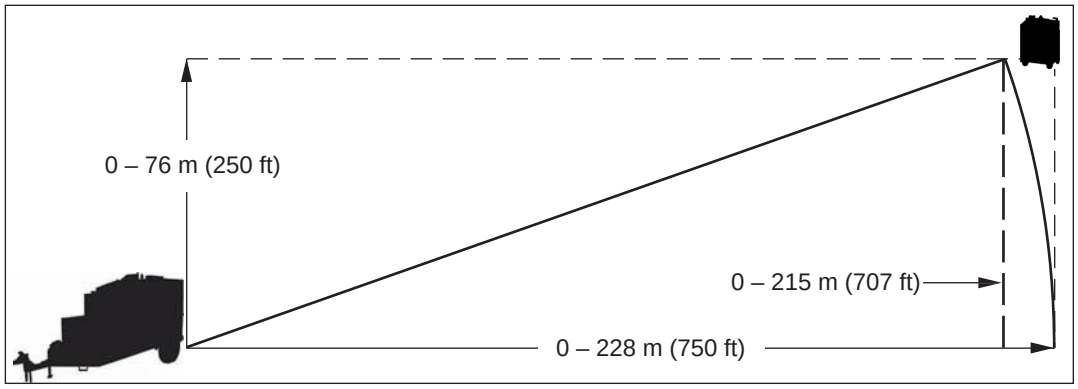
Requirements

- Machine stopped
- One HX 100 or HX 30 Heat Exchanger

Limitations

- Maximum run (horizontal distance from HX to machine): 228 m (750 ft)
- Maximum rise (vertical distance of HX above machine): 76 m (250 ft)
- Maximum run at maximum rise: 215 m (707 ft)

Note: *The farther the HX is positioned from the parent machine, the more heat will be lost through the hose. This may affect HX performance.*



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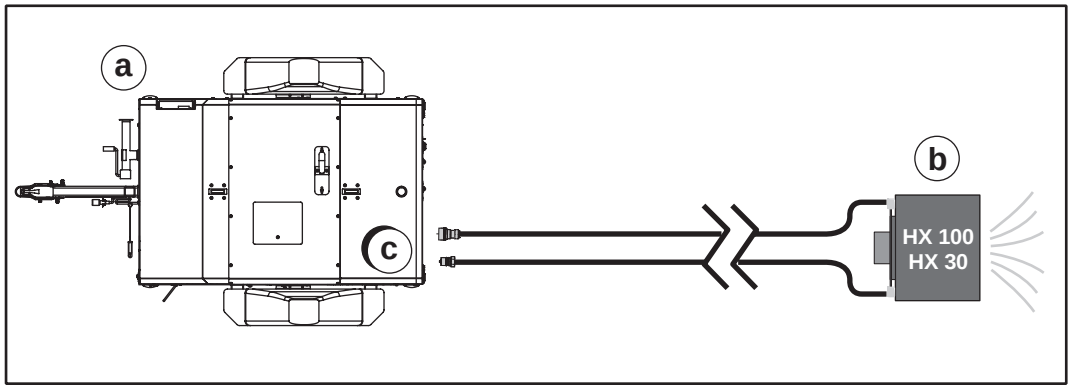
Connection diagram

Refer to the diagram below to connect your Heat Exchanger. Insulate the hoses with IB 750 insulation blankets for maximum heat retention.



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Ref.	Description	Ref.	Description
a	Hydronic Surface Heater	c	Main hose connection manifold
b	Heat Exchanger (HX) with hose	—	—

6 Burner Setup

6.1 Factory settings

Head	Firing rate L/hr (gph)	Nozzle size	Fuel pressure bar (psi)	Air band setting	Air shutter
L1	—	0.85 60° A	12.1 (175)	2	8

6.2 Setting up the Burner

Background The burner consists of several different components and subsystems. Each of these components or subsystems must be operating correctly for the burner to function properly.

Fuel Low ambient temperatures cause diesel fuels to gel. Gelled fuels will cause burner ignition failure and/or burner fuel pump damage. Always use the proper fuel for the conditions.

Fuel Blend Guide		
Lowest expected ambient temperature °F (°C)	**Generator powered**	**Shore powered**
Below 5 (-15)	50-50 blend of #2 diesel and #1 diesel, plus additives OR 50-50 blend #2 diesel and K1 kerosene, plus additives	100% #1 diesel plus additives OR 100% K1 kerosene, plus additives
5 to 25 (-15 to -4)	70-30 blend of #2 diesel and #1 diesel, plus additives OR 70-30 blend of #2 diesel and K1 kerosene, plus additives	
Above 25 (-4)	Winter-blend diesel	

Tools required The following tools are required to adjust the burner:

- High-quality combustion analyzer
- Smoke spot tester
- Fuel pressure test gauge
- General hand tools

Mandates

- Adjustments must be made so that the machine conforms to the requirements of local, state, and federal codes and authorities.
- Adjustments shall be made at the job site.

This procedure continues on the next page.

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When

Adjust the burner:

- Before operating the machine at elevations 305 m (1,000 ft) above or below the location of the previous adjustments
- Before starting at a new job site
- After any burner maintenance or repair has been performed
- If burner performance is in question

Procedure

Follow the procedures below to set up the burner.

1. Shut down the machine.
2. Set the burner electrodes.
   (See topic *Setting/Checking the Electrodes*.)
3. Check the burner nozzle.
   (See topic *Checking/Replacing the Nozzle*)
4. Check/set the “Z” distance.
   (See topic *Setting the “Z” Distance*.)
5. Set the air settings.
   (See topic *Adjusting the Air Settings*)
6. Start the machine and the burner.
7. Check/set the fuel pressure.
   (See topic *Setting the Fuel Pressure*)
8. Conduct a smoke spot test. Follow the smoke spot tester manufacturer’s instructions and the general guidelines below.

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- Use the access hole in the exhaust stack.
- Several samples should be taken as the heater warms.
- The final sample should be taken just before the heater reaches 71°C (160°F).

This procedure continues on the next page.

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9. Analyze the combustion. Follow the combustion analyzer manufacturer's instructions and the general guidelines below.

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- Use the access hole in the exhaust stack.
- Take several samples as the heater warms.
- Take the final sample just before the heater reaches 71°C (160°F).

10. Re-adjust the air setting(s) if necessary until the smoke spot test and combustion analysis are within the following parameters:

- O_2 content: 4–6%
- Smoke spot: 1 or less

Result The procedure to set up the burner is now complete.

6.3 Setting/Checking the Electrodes

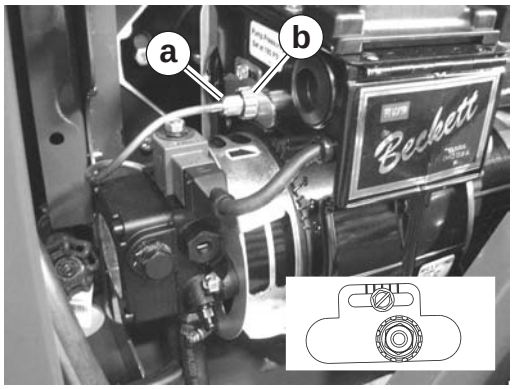
Requirements

- Power supplies disconnected
- Measuring device

Procedure

Perform the procedure below to check the electrodes.

1. Disconnect the power supplies feeding the machine.
2. Loosen the copper fuel line **(a)** between the fuel pump and the burner housing.



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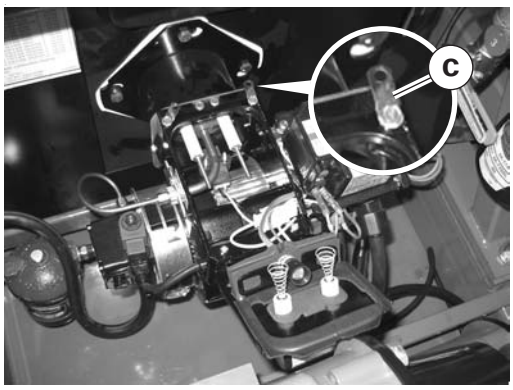
3. Remove the spline nut **(b)** that is seated against the escutcheon plate.
4. Loosen tabs **(c)** and open the igniter cover.



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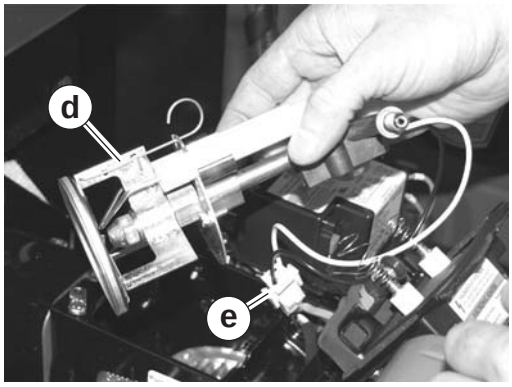

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5. Maneuver the nozzle assembly **(d)** up and out of the burner.
6. Disconnect the wiring **(e)** from the fuel preheater.

This procedure continues on the next page.

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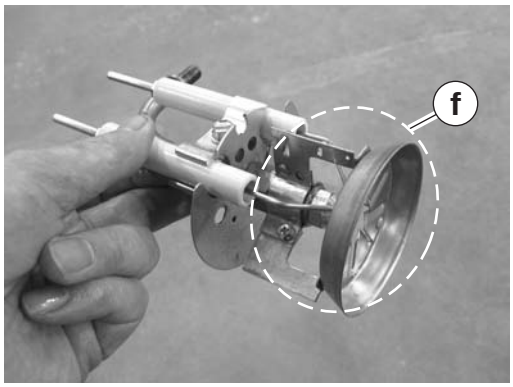
7. Remove the turbulator assembly **(f)** from the nozzle assembly.



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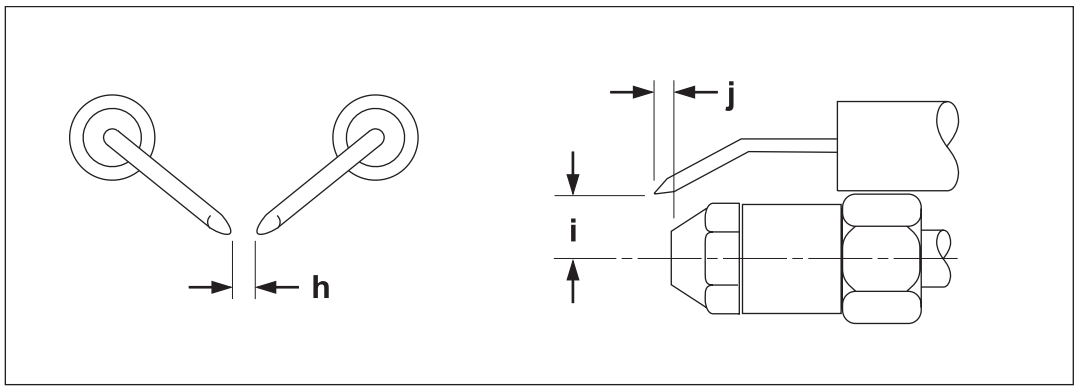
8. Use the measurements below to properly set the electrodes.



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Ref.	Description	Gap distance
h	Electrode tip to electrode tip	5/32 in. (4 mm)
i	Nozzle center to electrode tip	5/16 in. (7.5 mm)
j	Nozzle end to electrode tip end	1/16 in. (1.5 mm)

9. After the electrodes are set, reinstall the turbulator assembly.
10. Reconnect the preheater wiring.
11. Re-install the nozzle assembly into the burner.

Result The electrodes have now been checked/adjusted.

6.4 Checking/Replacing the Burner Nozzle

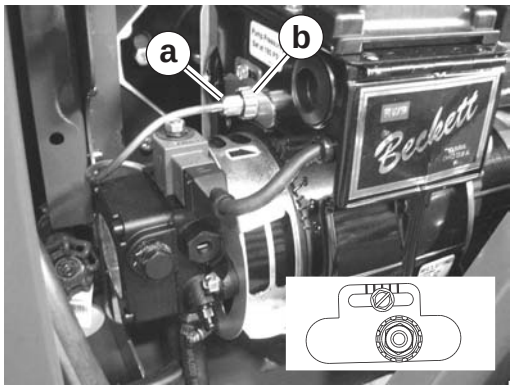
Requirements

- Power supplies disconnected
- Machine cool

Procedure

Perform the procedure below to replace the burner nozzle.

1. Disconnect the power supplies feeding the machine.
2. Loosen the copper fuel line **(a)** from the burner housing.



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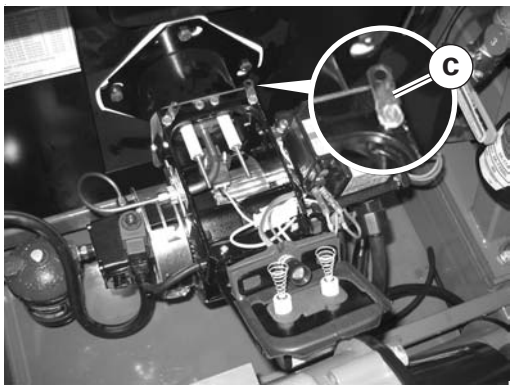
3. Remove the spline nut **(b)** that is seated against the escutcheon plate.
4. Loosen tabs **(c)** and open the igniter cover.



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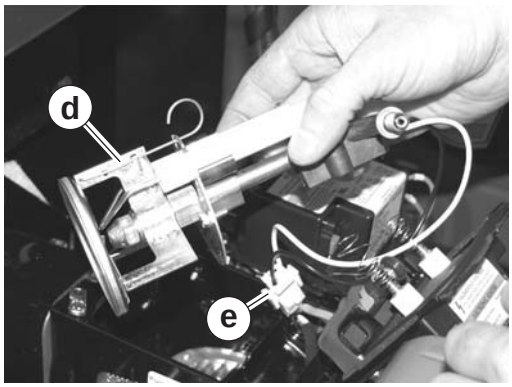

wc_gr008522

5. Maneuver the nozzle/electrode assembly **(d)** up and out of the burner.
6. Disconnect the wiring **(e)** from the fuel preheater.

This procedure continues on the next page.

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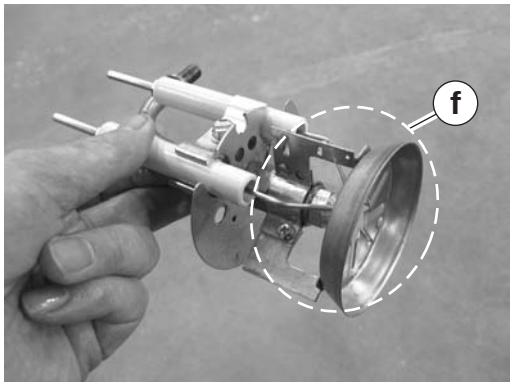
7. Remove the turbulator assembly **(e)** from the nozzle/electrode assembly.



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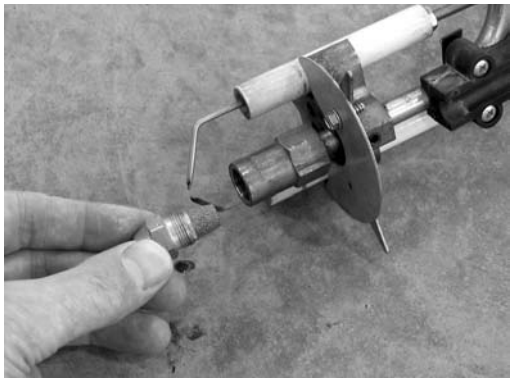

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8. Unscrew the burner nozzle from the burner tube and install a new burner nozzle.

Note: *Do not use thread sealant on the threads of the nozzle.*

9. After the nozzle is installed, re-install the turbulator assembly.
10. Reconnect the preheater wiring.
11. Re-install the nozzle/electrode assembly into the burner.

Result The burner nozzle has now been replaced.

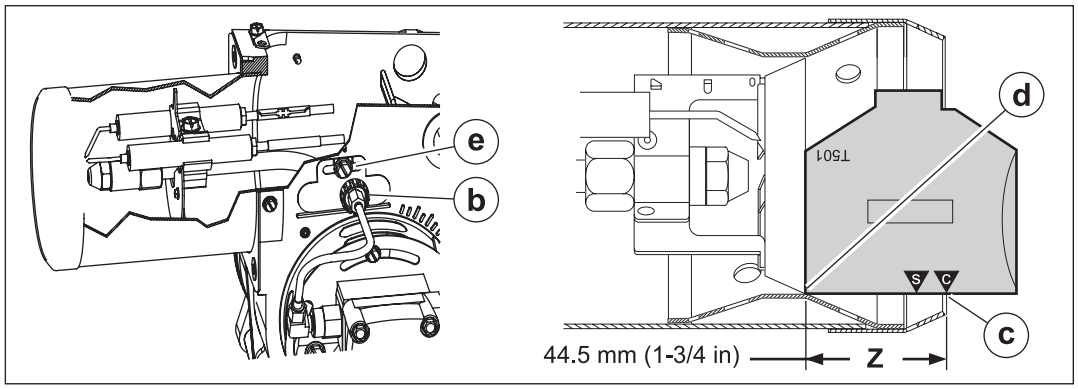
6.5 Setting the “Z” Distance

Requirements

- Burner removed from the machine
- T501 gauge or measuring device

Procedure Follow the procedure below to set the “Z” distance on “L” heads.

1. Remove the burner from the machine.



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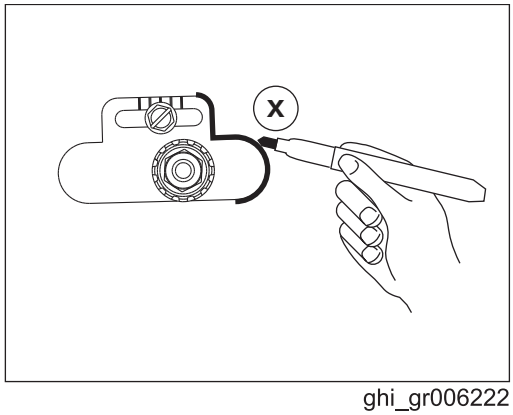
2. Loosen the spline nut **(b)**.
3. Loosen the hex head screw **(e)**.
4. Butt-up the T501 gauge or a ruler to the leading edge of the head **(d)**.
5. Slide the head in or out as needed so that the “C” mark **(c)** of the T501 gauge aligns with the outside edge of the conical-shaped shroud. Or, adjust the distance from the leading edge of the head to the outside edge of the conical-shaped shroud to be 44.5 mm (1-3/4 in.).
6. Tighten the hex screw **(e)**.
7. Tighten the spline nut **(b)**.
8. Mark **(x)** the escutcheon plate for later reference.



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Result The “Z” distance has now been set.

6.6 Adjusting the Air Settings

Factory settings

Air band: 2

Air shutter: 4

These settings are initial settings only. Adjust the air settings as necessary to obtain the proper smoke spot and combustion analysis values.

Background

There are two parts to adjusting the air setting: 1) air band; and 2) air shutter. Adjust the air band to make large adjustments. Adjust the air shutter to make small adjustments.

Effects

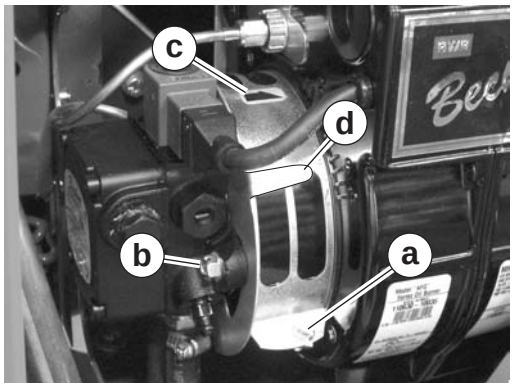
The air setting has the following effects on combustion.

- Higher O_2 percentage (excess air settings) lowers soot production but raises stack temperature and reduces efficiency: lean mixture.
- Lower O_2 percentage (inadequate air settings) increases efficiency and lowers stack temperature but may cause soot build-up: rich mixture.

Procedure

Follow the procedure below to adjust the air settings.

1. Initial setting of the air damper should be performed with the machine shut down.
2. Loosen the air band locking screw **(a)** and the air shutter locking screw **(b)**.



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3. Using the band position pointer **(c)** to determine position, move the air band to a higher number to increase air volume. Turn it to a lower number to decrease air volume.
4. Using the shutter position pointer **(d)** to determine position, move the air shutter to a higher number on the shutter position pointer to increase air volume. Turn it to a lower number to decrease air volume.
5. After the air settings have been made, tighten the band-locking screw **(a)** and the shutter-locking screw **(b)**.

Result

The air settings have now been adjusted.

6.7 Setting the Fuel Pressure

Factory setting

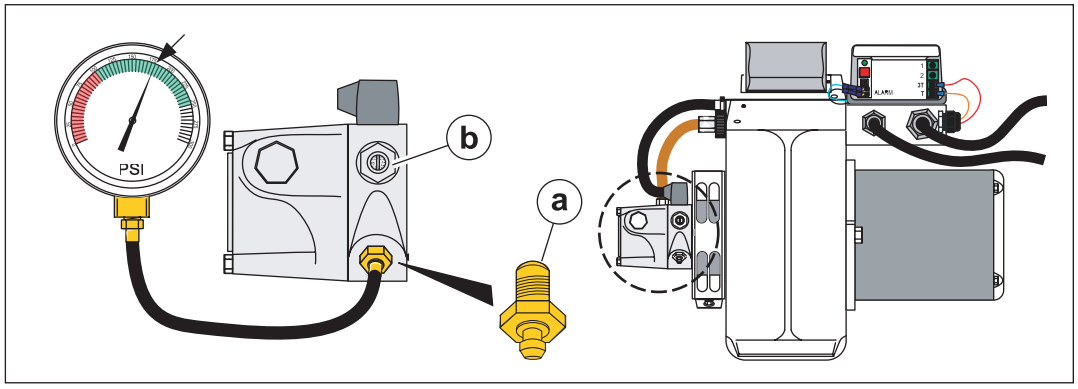
Factory settings:

- “L” head: 175 psig (12.1 bar)

Procedure

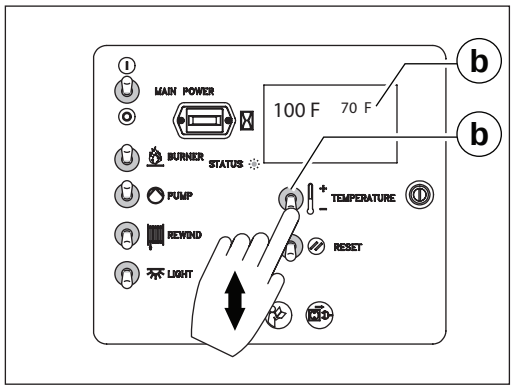
Follow the procedure below to check and adjust the fuel pressure.

1. Shut down the machine.
2. Remove the bleeder valve **(a)** from the fuel pump.



ghi_gr006188

3. Insert the gauge in place of the bleeder valve.
4. If your machine has a generator, start it.
5. Hold the temperature switch **(d)** in the up (+) position to adjust the set point temperature to a value that is higher than the current temperature **(b)**; this creates a call for heat.



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6. Move the burner ON-OFF switch to the ON position. The burner will go through a pre-purge cycle. Monitor and make adjustments during the pre-purge cycle.
7. Turn the adjusting screw **(b)** clockwise to increase fuel pressure, counterclockwise to decrease fuel pressure.

Result

The fuel pressure has now been adjusted.

6.8 Removing the Burner

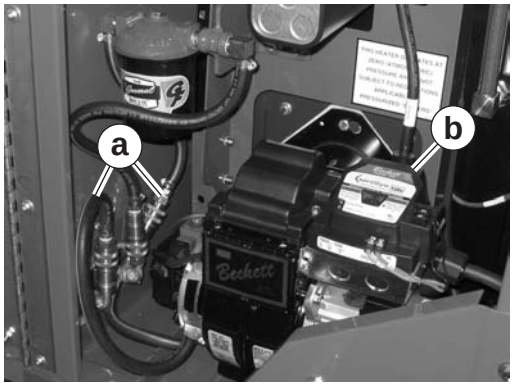
Requirements

- Power supplies disconnected
- Machine cool

Procedure

Perform the procedure below to remove the burner.

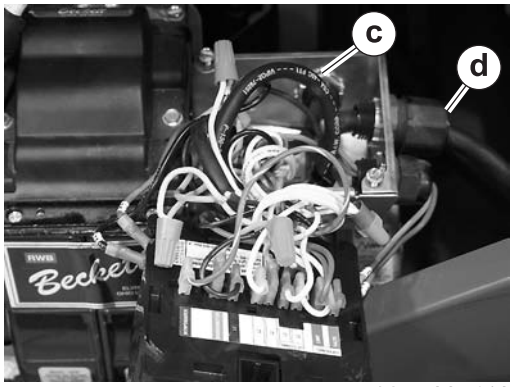
1. Disconnect the power supplies.
2. Disconnect fuel lines **(a)** at the quick-connects.



wc_gr008524

3. Remove the primary control **(b)** to expose the wiring. Label all the wires to assist in reconnecting.
4. Disconnect all wires coming from the snap switch cable **(c)**.

Note: *The snap switch cable is a large black insulated wire that enters the electrical enclosure from the rear.*



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ghi_gr005411

5. Disconnect all wires coming from the burner cable (**d**).

Note: *The burner cable is a large black insulated wire that enters the electrical enclosure from the left side.*

6. Remove the screws that secure the burner to the machine and maneuver the burner from the machine.

Result

The procedure to remove the burner is now complete.

6.9 Installing the Burner

Requirements

- Power supplies disconnected
- Machine cool

Procedure

Perform the procedure below to install the burner.

1. Position the burner inside the machine and secure it to the hydronic heater.

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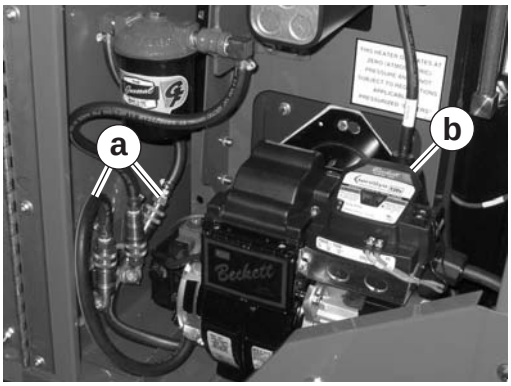

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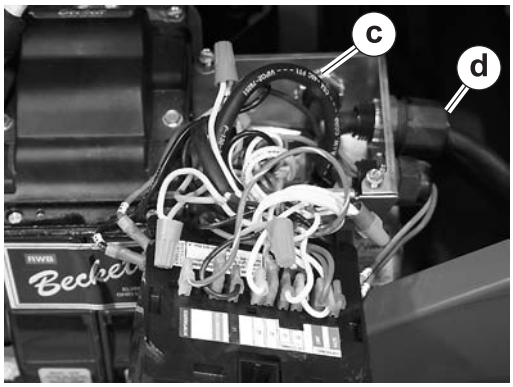
2. Connect fuel lines **(a)** at the quick-connects.
3. Connect all wires coming from the burner cable **(d)**.



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4. Connect all wires coming from the snap switch cable **(c)**.
5. Install the primary control **(b)**.

Result

The procedure to install the burner is now complete.

7 Burner Setup—Gas

7.1 Factory Settings - NG/LP

Parameter	NG	LP
Air damper setting	**4.0**	**7**
Combustion head setting	**1**	**0**
Gas manifold pressure (in. w.c.)	**4.3**	**5.0**
Orifice (mm) / Diaphragm	**2.0 / B5**	**1.3 / B16**

7.2 Setting up the Burner

Background The burner consists of several different components and subsystems. Each of these components or subsystems must be operating correctly for the burner to function properly.

Tools required The following tools are required to adjust the burner:

- High-quality combustion analyzer
- Smoke spot tester
- Fuel pressure test gauge
- General hand tools

Mandates

- Adjustments must be made so that the machine conforms to the requirements of local, state, and federal codes and authorities.
- Adjustments shall be made at the job site.

When Adjust the burner:

- Before operating the machine at elevations 305 m (1,000 ft) above or below the location of the previous adjustments
- Before starting at a new job site
- After any burner maintenance or repair has been performed
- If burner performance is in question

Sequence Follow the sequence of procedures below to set up the burner.

Task	See Topic
1. Shut down the machine.	—
2. Adjust the ionization probe and the electrode.	7.4
3. Check the burner orifice.	7.5
4. Set the air settings.	7.6
5. Adjust the head setting.	7.7
6. Check/set the supply gas pressure.	—
7. Start the machine and the burner.	4.17
8. Check/set the burner gas pressure.	—
9. Conduct a smoke spot stest. Follow the smoke spot tester manufacturer's instructions and the general guidelines below.	—

This procedure continues on the next page.

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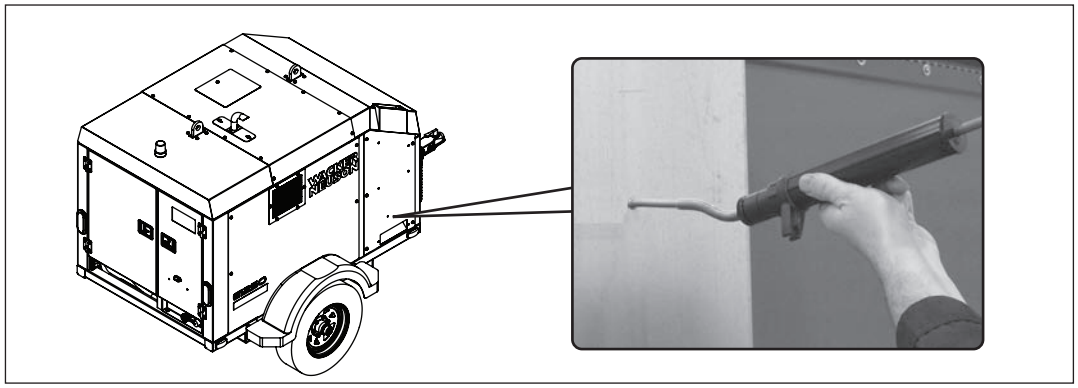
Smoke spot testing guidelines



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- Use the access hole in the exhaust stack.
- Several samples should be taken as the heater warms.
- The final sample should be taken just before the heater reaches 71°C (160°F).

10. Analyze the combustion. Follow the combustion analyzer manufacturer's instructions and the general guidelines below.

ghi_gr006183

- Use the access hole in the exhaust stack.
- Take several samples as the heater warms.
- Take the final sample just before the heater reaches 71°C (160°F).

11. Re-adjust the air setting(s) if necessary until the smoke spot test and combustion analysis are within the following parameters:

- O_2 content: 4–6%
- Smoke spot: 1 or less

Result The procedure to set up the burner is now complete.

7.3 Removing the Combustion Head

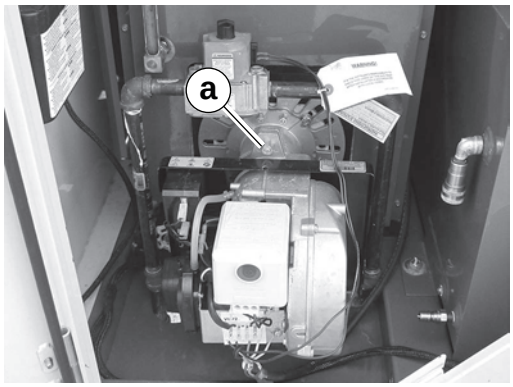
Requirements

- Machine shut down
- Burner cool

Procedure

Perform the procedure below to remove the combustion head assembly.

1. Open the access door and locate the burner.
2. Remove the burner cover.
3. Remove nut **(a)** and open the burner.



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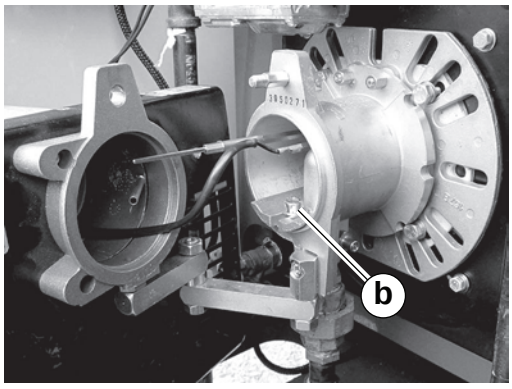

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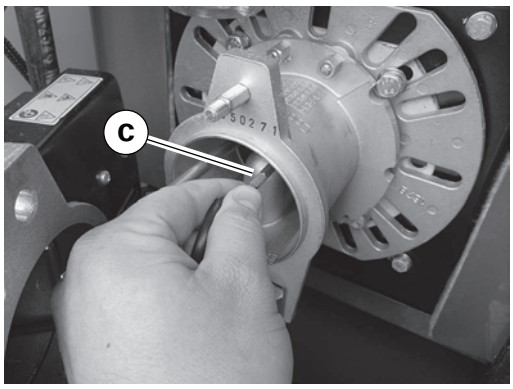
4. Record the position of the screw **(b)** then remove it.
5. Disconnect the electrode wire **(c)**.



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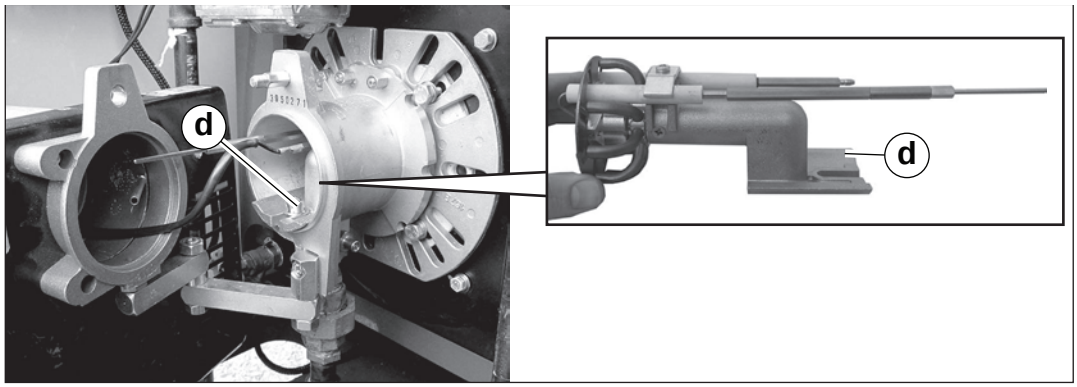
6. Carefully remove the combustion head **(d).**



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7.4 Adjusting the Ionization Probe and the Electrode

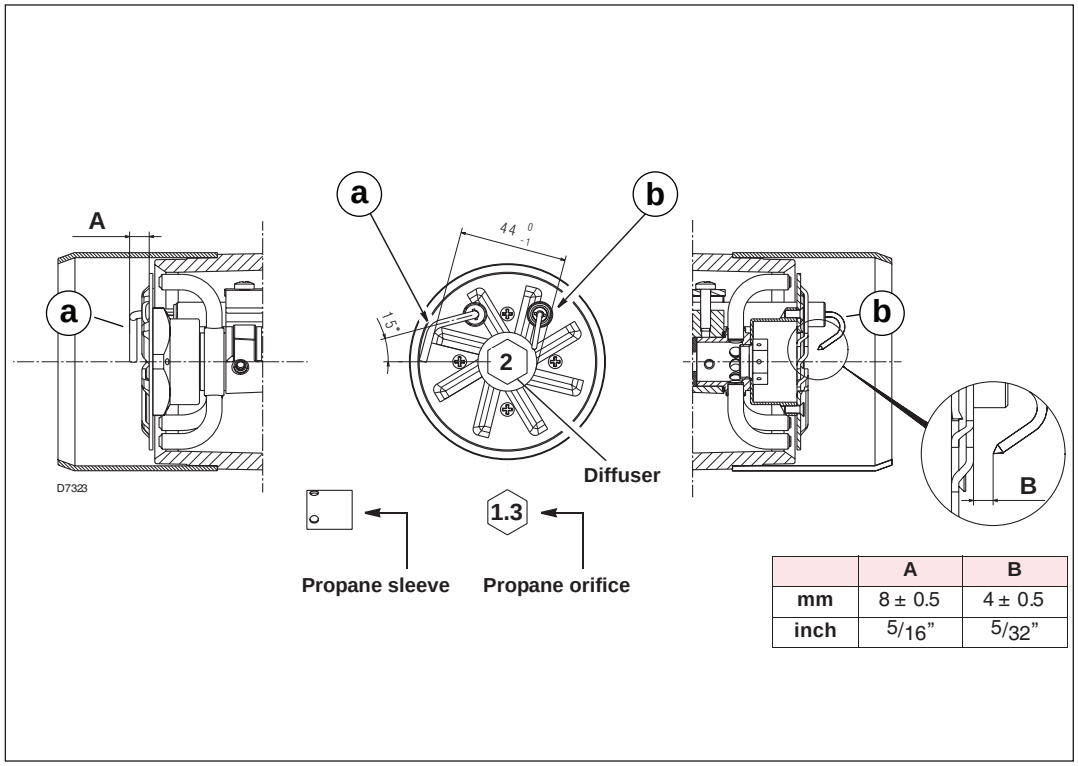
Requirements

- Machine shut down
- Burner cool

Procedure

Perform the procedure below to adjust both the ionizatIon probe and the electrode.

1. Shut down the machine and allow it to cool.
2. Remove the combustion head assembly. See topic *Removing the Combustion Head Assembly*.
3. Clean the combustion head.
4. Adjust the ionization probe **(a)** so that it is positioned from the mixing plate as shown.



	A	B
mm	8 ± 0.5	4 ± 0.5
inch	5/16”	5/32”

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5. Adjust the electrode **(b)** so that it is positioned from the mixing plate as shown.

NOTICE: Do not turn the ignition electrode. Leave it as shown in the drawing. If the ignition electrode is put near the ionization probe, the amplifier of the control box may be damaged.

7.5 Changing the Burner Orifice

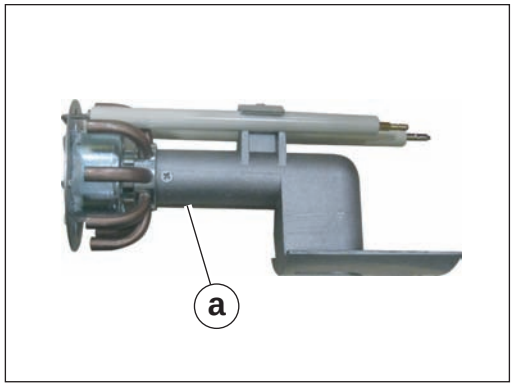
Requirements

- Machine shut down
- Machine cool

Procedure

Perform the procedure below to change the burner orifice.

1. Shut down the machine and allow it to cool.
2. Remove the combustion head assembly **(a)**. See topic *Removing the Combustion Head Assembly*.



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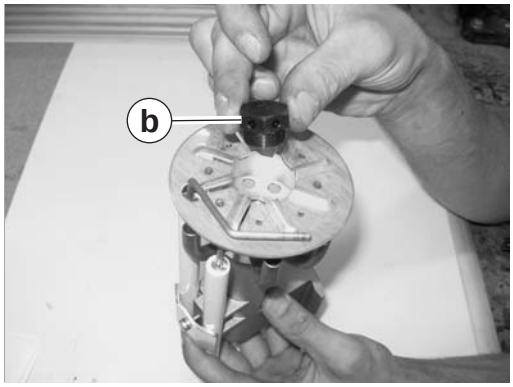

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3. Unscrew the orifice **(b)** and remove it from the combustion head assembly.
4. Clean the existing orifice and re-install it or, install a new orifice.
5. Re-install the combustion head assembly.
6. Re-install the burner assembly cover.

Result

The procedure to change the orifice is now complete.

7.6 Checking the Burner Air Damper Setting

Requirements

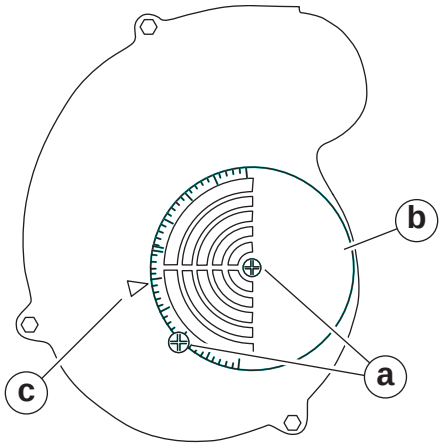
- Machine shut down
- Burner cool

Procedure

Follow the procedure below to check the air damper setting.

Note: *This procedure must be performed at each new job site. The proper setting depends on environmental conditions at the job site.*

1. Shut down the machine and allow it to cool.
2. Remove the burner cover.
3. Loosen the two screws **(a)** that secure the air adjustment plate **(b)**.



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4. Rotate the air adjustment plate so that the proper number on the air adjustment plate lines up with the setting indicator **(c)**. See topic *Factory Settings*.
5. Once the air adjustment plate is set, tighten the two screws **(a)**.

Result

The air damper setting has now been checked.

7.7 Adjusting the Head Setting

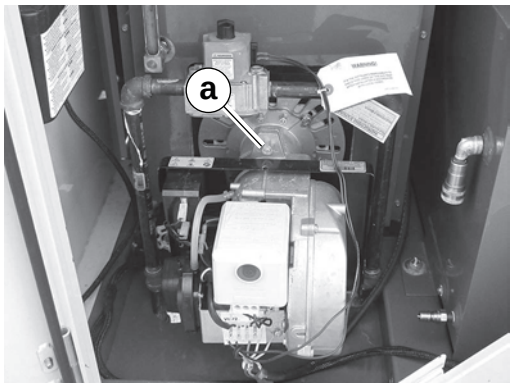
Requirements

- Machine shut down
- Machine cool

Procedure

Perform the procedure below to adjust the head setting.

1. Open the access doors and locate the burner.
2. Remove the burner assembly cover.
3. Remove nut **(a)** and open the burner.



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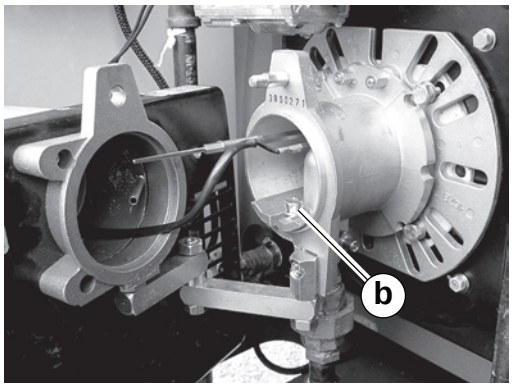

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4. Loosen screw **(b)**.
5. Adjust the combustion head to the appropriate mark. See *Factory Settings*.
6. Tighten screw **(b)**.
7. Close the burner and re-install nut **(a)**.
8. Re-install the burner cover.

7.8 Checking the Supply Gas Pressure

Requirements

- Machine shut down
- Supply gas turned off
- Manometer
- Nipple

Checking pressure

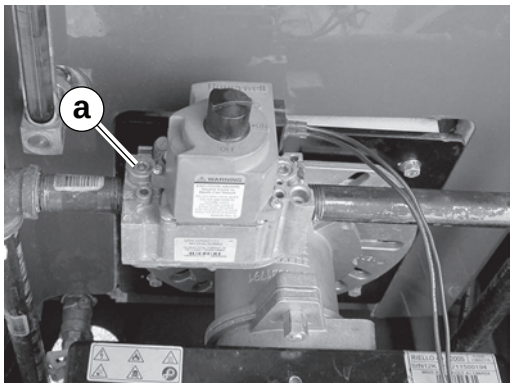
Perform the procedure below to check and adjust the supply gas pressure.

1. Shut down the machine and allow it to cool.
2. Close the supply gas shutoff valve.

WARNING
Explosion and fire hazard. When combined with air, the gas used for this burner is explosive. Explosions can cause severe injury or death.

- ▶ Close the supply gas shutoff valve before continuing with this procedure.
- ▶ Extinguish all sources of ignition before continuing this procedure.

3. Remove the plug **(a)** from the valve using a hex key.



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4. Install a nipple into the port (included with gauge kit).
5. Connect the hose of the manometer to the nipple.
6. Open the supply gas shutoff valve.
7. Check the pressure on reading on the manometer. See *Technical Data* for the correct pressure. Adjust the supply gas pressure as needed.
8. After the supply gas pressure has been set, turn off the supply gas.
9. Remove the manometer and the nipple.
10. Reinstall the plug.

7.9 Changing the Burner from Natural Gas Burning to LP Burning

Requirements

- Machine shut down
- Machine cool

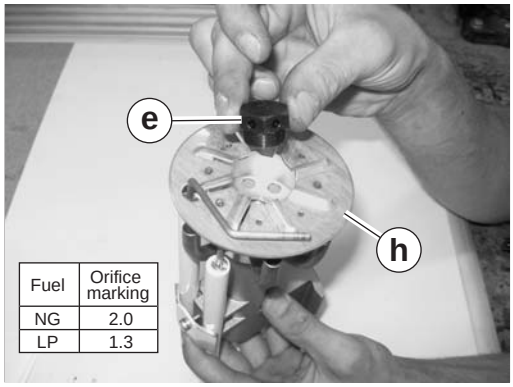
Background

The burner is set up at the factory to burn natural gas (NG). By changing the burner orifice and adding an air restricting washer, the burner can burn LP gas. A kit is included with new machines with the appropriate orifice and the air restricting washer.

Procedure

Perform the procedure below to change the burner from NG to LP.

1. Shut down the machine and allow it to cool.
2. Remove the combustion head assembly. See topic *Removing the Combustion Head Assembly*.
3. Remove the natural gas orifice **(e)** (marked “2.0”).



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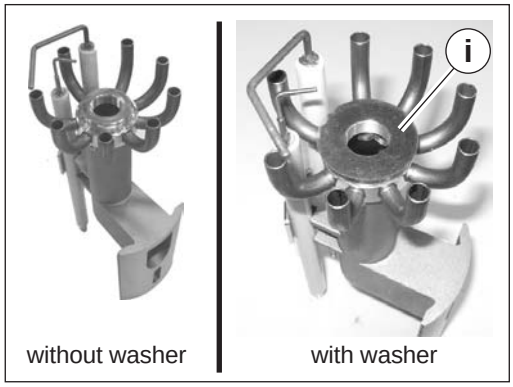

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4. Lift the distributor plate **(h)** off the combustion head assembly and place the air restricting washer **(i)** on the combustion head assembly as shown. Then, reinstall the distributor plate (and the air restricting washer) to the burner head with the new LP/propane orifice (marked “1.3”).

Note: *The air restricting washer must be removed when changing back to NG.*

5. Affix the LP gas label to the burner.
6. Reinstall the combustion head to the burner and adjust the head setting.

Result

The burner is now ready to burn LP.

8 General Maintenance

WARNING
A poorly maintained machine can malfunction, causing injuries or permanent damage to the machine.

- ▶ Keep the machine in safe operating condition by performing periodic maintenance and making repairs as needed.

8.1 Preparing for Maintenance

Do not perform even routine service (oil/filter changes, cleaning, etc.) unless all electrical components are shut down. Use the checklist below to prepare this machine for maintenance.

- ☐ Move the start switch to “OFF”.
- ☐ Open the circuit breakers (move to the “OFF” position).
- ☐ Close the emergency stop switch (push in).
- ☐ Disconnect the negative terminal on the battery.
- ☐ Attach a “DO NOT START” sign to the control panel.
- ☐ If the unit is connected to a remote start or transfer switch, make sure the remote switch is also off and tagged.

8.2 Periodic Maintenance Schedule

The table below lists basic machine maintenance. Tasks designated with check marks may be performed by the operator. Tasks designated with square bullet points require special training and equipment.

Refer to the generator manufacturer's operation manual for generator maintenance procedures.

Task	Interval* (hours of service)		
	Daily	2 Week	Yearly
	---	(50)	(1200)
Inspect hose couplings.	✓		
Clean quick-connect couplings	✓		
Inspect hoses and connectors.	✓		
Visual walkaround inspection	✓		
Inspect electrical cords/ connections.		■	
Check/adjust burner air setting.		■	
Check HTF level. Fill if necessary.		✓	
Check/adjust fuel pressure.		■	
Check/adjust electrodes.			■
Replace burner nozzle.			■
Clean HTF strainer.			■
Replace fuel filter.			■
Lubricate hose reel chain.			■
Lubricate hose reel bearings.			■
Clean turbulator tubes.			■
Inspect rope gasket.			■
Test the burner exhaust and adjust the settings.	As needed or upon changing job sites		
* Use whichever comes first, calendar time or service hours.			

Note: *Test the trailer breakaway system monthly.*

8.3 Cleaning the Machine

When As needed

Suggested cleaning materials

- Compressed air
- Clean water supply
- Mild detergent
- Clean, dry cloths

NOTICE: Do not use a pressure washer to clean this machine. Pressurized water can severely damage the generator and sensitive electronic components.

Cleaning the interior

Clean the interior of the machine.

- ☐ Check the fluid level in the containment skid (if equipped) and drain if necessary. See “Checking / Draining the Containment Skid.”
- ☐ Remove rags, containers, or other debris from the cabinet. Nothing should be stored inside the machine.
- ☐ Remove leaves and twigs from the exhaust compartment.
- ☐ Wipe interior surfaces clean of oil, dust, and dirt.

Cleaning the exterior Clean the exterior of the machine with clean water and a mild detergent.

8.4 Inspecting the Machine

When Daily

Overview Inspect the machine before each use. A thorough inspection will help to identify mechanical faults or potentially unsafe operating conditions. Correct these problems before operating the machine.

External inspection

Perform an external inspection of the machine. Check for:

- ☐ External damage (dents, cracks, broken door latches, etc.)
- ☐ Loose or missing fasteners
- ☐ Loose or missing parts
- ☐ Fluid leaks
- ☐ Restricted air flow in the exhaust compartment
- ☐ Problems with the trailer—refer to topic *Maintaining the Trailer*

Internal inspection

Open the access doors on both sides of the machine. Check for:

- ☐ Damage to control panel, switches, or customer connections
- ☐ Loose or missing fasteners
- ☐ Loose or missing parts
- ☐ Loose or damaged hoses
- ☐ Fluid leaks
- ☐ Rags, containers, or other debris inside the cabinet

8.5 Maintaining the Trailer

Tires

- Keep tires inflated to the proper pressure as shown on the tire sidewall.
- Check tread periodically for wear.
- Replace tires as required.

Wheels

- Check that lug nuts holding wheels are tight.
- Replace any missing lug nuts immediately.

Axle Hubs

- Grease axle hubs using a good wheel-bearing grease.

Brakes

- Check operation of brakes before each trip.
- Check level of brake fluid in actuator at front of trailer at regular intervals.
- Fill brake fluid to approximately 1 inch below top of reservoir using DOT-3 heavy-duty brake fluid.
- Tighten filler plug securely.

Note: *If fluid level has fallen too low, bleed brake lines to remove any air trapped in lines. Then fill to proper level with clean brake fluid.*

8.6 Repairing a Hose

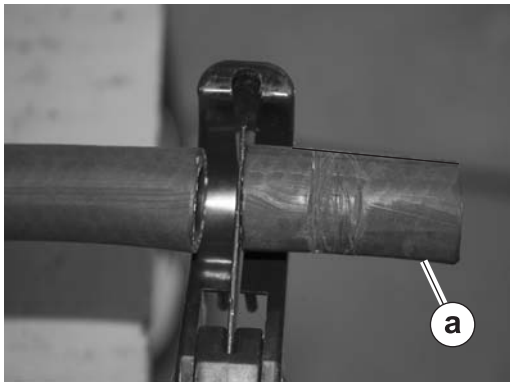
Requirements

- Hose nipple
- Two hose ferrules
- Hose crimping tool, Wacker Neuson part number 5000169002

Procedure

Follow the procedure below to repair a damaged hose.

1. Shut down the machine and allow the Heat Transfer Fluid (HTF) to cool.
2. Locate the damaged portion of the hose and clamp locking pliers on either side of the damaged portion.
3. Cut away the damaged portion of the hose **(a)** using a utility knife or similar tool.



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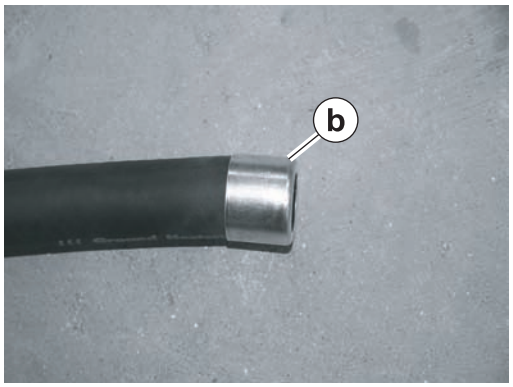

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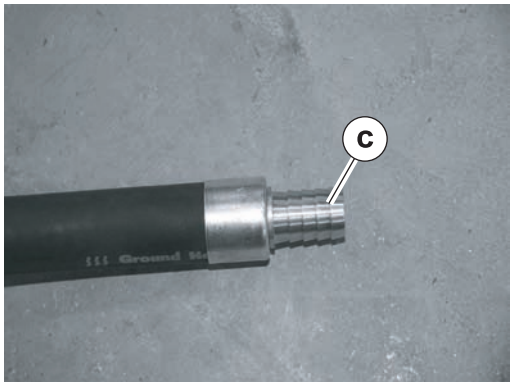
4. Install a ferrule **(b)** on each end of the freshly cut hose.
5. Insert a nipple **(c)** into one of the ferrules.

NOTICE: Do not use petroleum to lubricate the nipple. If lubrication is needed, use HTF.



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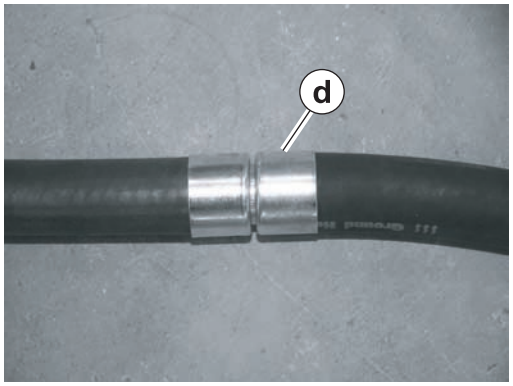

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6. Insert the free end of the nipple into the second ferrule. Be sure to push each end of each hose to the lip of the nipple.

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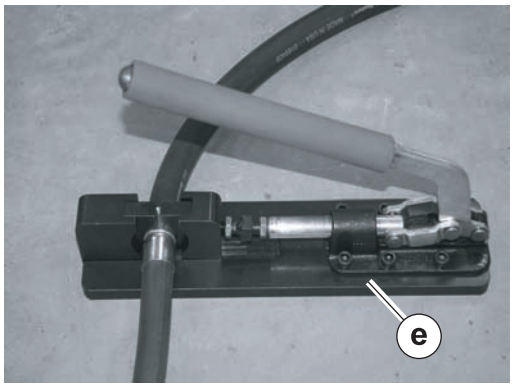
7. Use a Wacker Neuson brand hose crimper **(e)** to crimp both ferrules.



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8. Rotate the hose 90 degrees and crimp both ferrules again.

The procedure is now complete.

8.7 Cleaning the HTF Strainer

Requirements

- Machine shut down
- Source of clean, warm water

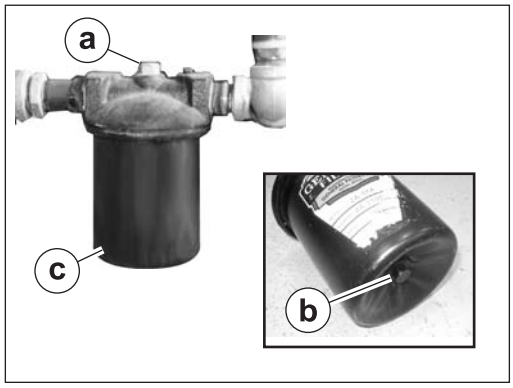
Removal

Perform the procedure below to clean the HTF strainer.

Note: *In the interests of environmental protection, place a plastic sheet and a container under the machine to collect any liquid which drains off. Dispose of this liquid in accordance with local environmental protection laws.*

1. Loosen, but do not remove, the top screw **(a)**.

Note: *There is a second screw **(b)** under the canister **(c)**. Hold this screw while loosening the screw* **(a)**.



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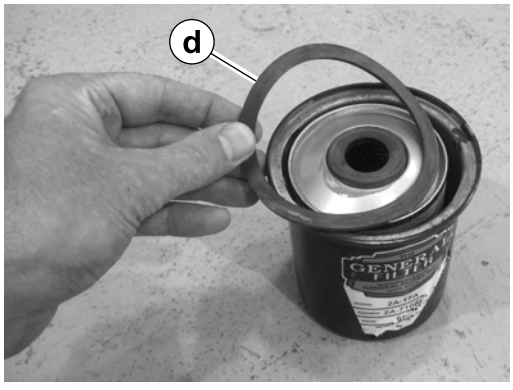
2. Tap on screw **(a)** with a hammer to release the gasket seal.
3. Remove the canister **(c)** by removing screw **(a)**—support the canister while doing so.
4. Dispose of the HTF that remains in the canister.
5. Remove the gasket **(d)** from the canister. Replace it if it is damaged.



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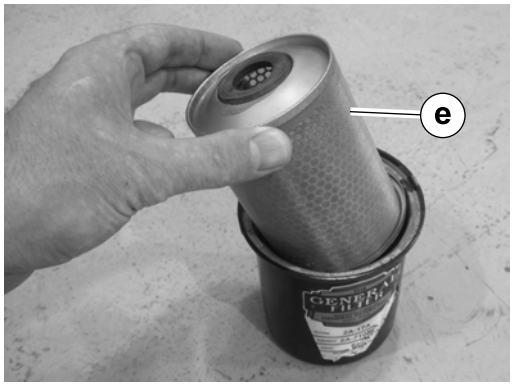

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6. Remove the strainer basket **(e)** from the canister.
7. Rinse the strainer basket and the canister with clean, warm water.

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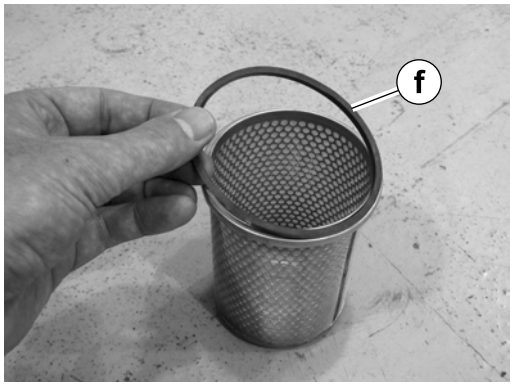
Installation

1. Inspect the strainer gasket **(f)** and replace it if it is damaged.



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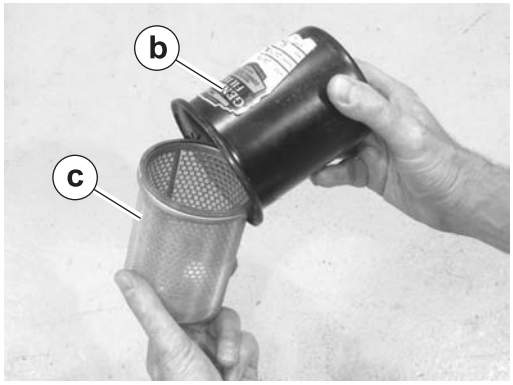

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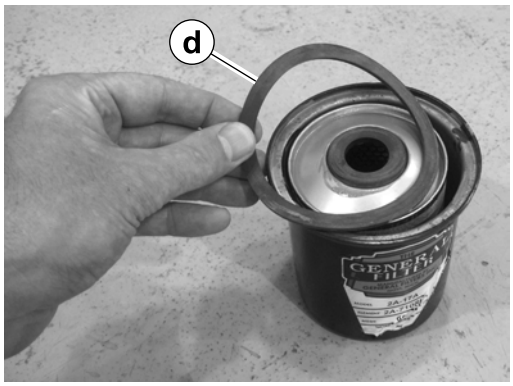
2. To ensure strainer gasket **(f)** placement, install the canister **(b)** over the strainer basket **(c)**.
3. Install the gasket **(d)** to the canister.



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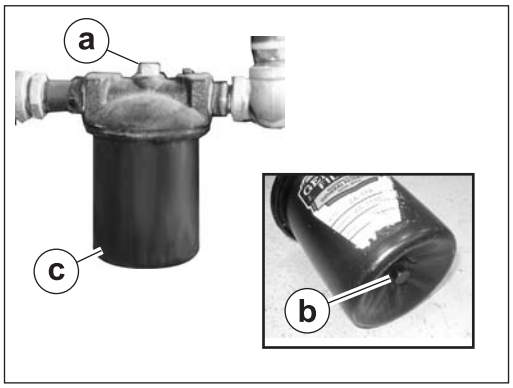

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4. Install the strainer housing (including strainer basket) **(c)** into the machine using the screw **(a)** and screw **(b)**.

Result

The HTF strainer is now clean and ready for operation.

8.8 Replacing the Fuel Filter Element

When Every 1000 hours of operation or yearly.

Requirements
- Machine shut down
- New filter element and gasket set

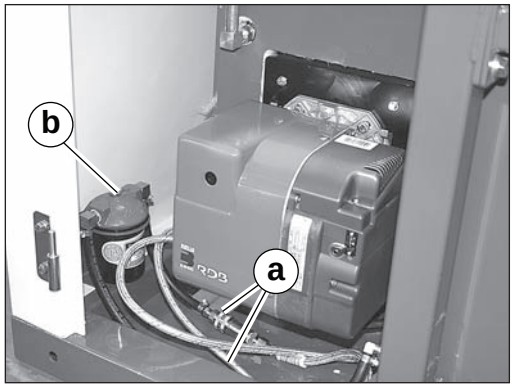
Procedure Follow the procedure below to replace the fuel filter element.

1. Turn off the main power.
2. Open the burner access door.

Note: *In the interests of environmental protection, place a plastic sheet and a container under the machine to collect any liquid which drains off. Dispose of this liquid in accordance with local environmental protection laws.*

3. Disconnect the fuel lines **(a)** from the filter assembly **(b)** at the quick-connects.

NOTICE: Do not disconnect the fuel lines from the filter cap.



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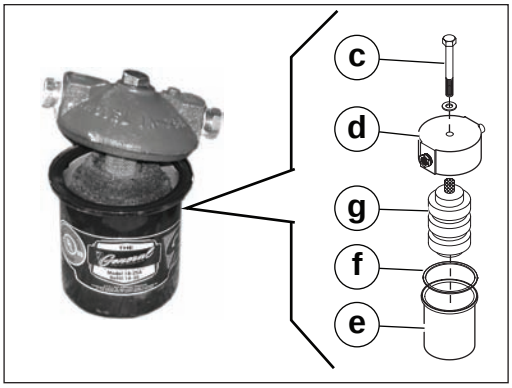

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4. Loosen the bolt **(c)** on the filter cap **(d)**.
5. Hold the filter housing **(e)** and lightly tap the bolt to loosen the filter housing cap.
6. Remove the filter housing cap, bolt, and gasket **(f)**.
7. Remove the filter element **(g)** and clean the filter housing. Remove any gasket material stuck to the flange.
8. Install a new filter element and gasket set.
9. Reassemble the filter and connect the fuel lines at the quick-connects.

Result The fuel filter element has now been replaced.

8.9 Lubricating the Hose Reel System

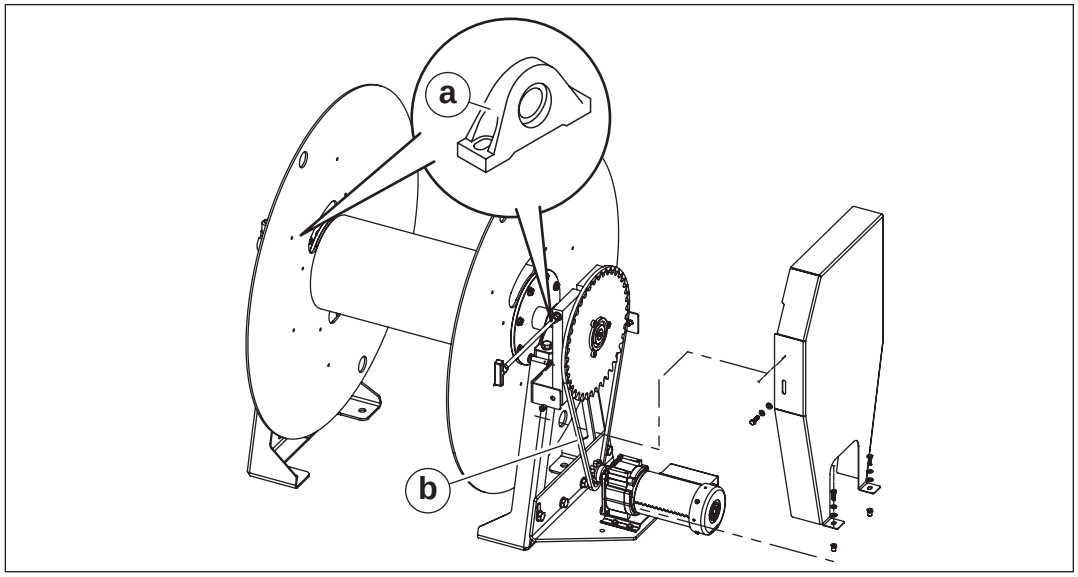
Requirements

- Machine shut down
- Machine cool

Procedure

Perform the procedure below to lubricate the hose reel system.

1. Disconnect electric power from the machine.
2. Apply low temperature bearing grease, with several pumps from a grease gun, to each bearing **(a)**.



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3. Lightly apply a low temperature lubricating oil to the chain **(b)**.

Result

The hose reel system has now been lubricated.

8.10 Cleaning the Turbulator Tubes

When Every 1000 hours of operation or once every year.

Requirements

- Machine shut down
- Machine cool
- Lever

WARNING
Burn hazard. The hydronic heater is very hot when the machine is operating. When hot it can cause severe burns.

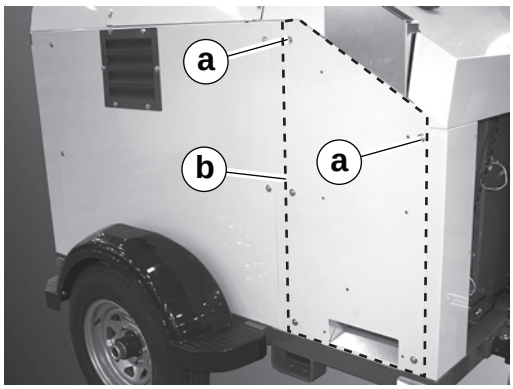
▶ Allow the machine to cool before performing this procedure.

CAUTION
Cut hazard. The panels on the machine may have sharp edges. These edges can cause severe lacerations.

▶ Wear gloves while performing this procedure.

Procedure Follow the procedure below to clean the turbulator tubes.

1. Allow the machine to cool.
2. Remove and set aside the bolts **(a)** that secure the exhaust stack panel **(b)**



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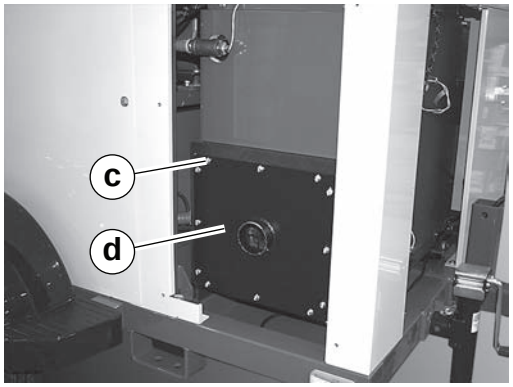

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3. Pull out slightly, then lift and remove the exhaust stack panel.
4. Remove and set aside the bolts **(c)** on the flue box cover **(d)** and remove the cover.

This procedure continues on the next page.

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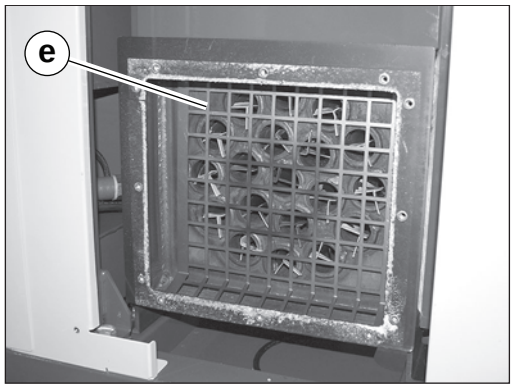
5. Place a lever (large flat screwdriver) under the turbulator retentainer **(e)** and pry it out of the flue box.



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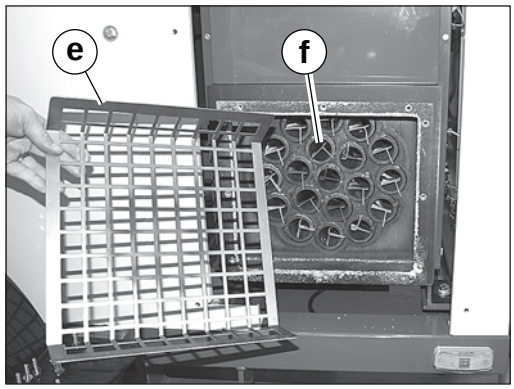

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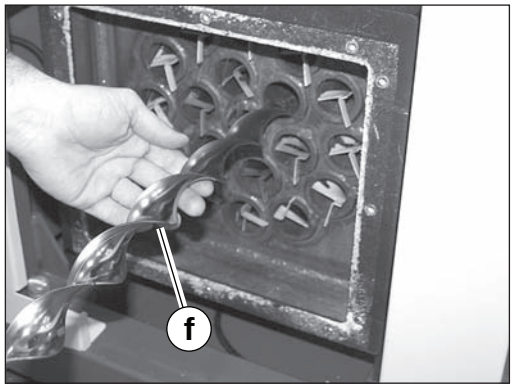
6. Locate the turbulators **(f)** housed in the tubes.
7. Remove the turbulators **(f)**. Replace any turbulator that is badly damaged or eroded.



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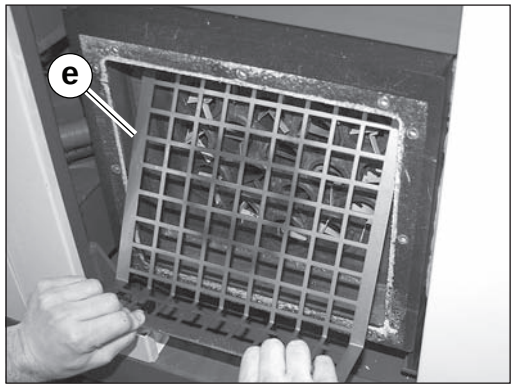

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8. Clean each tube with a bottle brush then with a vacuum.
9. Reinstall the turbulator retainer **(e)**.
10. Reinstall the flue box cover. Torque the bolts **(c)** to **11 Nm (8.1 ft.lbs)**.
11. Reassemble the exhaust stack panel.

Result The procedure is now complete.

8.11 Storage

Introduction

Extended storage of equipment requires preventive maintenance. Performing these steps helps to preserve machine components and ensures the machine will be ready for future use. While not all of these steps necessarily apply to this machine, the basic procedures remain the same.

When

Prepare your machine for extended storage if it will not be operated for 30 days or more.

Preparing for storage

Follow the procedures below to prepare your machine for storage.

- Complete any needed repairs.
- Replenish or change oils (engine, exciter, hydraulic, and gearcase) per the intervals specified in the Scheduled Maintenance table.
- Grease all fittings and, if applicable, repack bearings.
- Inspect engine coolant. Replace coolant if it appears cloudy, is more than two seasons old, or does not meet the average lowest temperature for your area.
- If your machine has an engine equipped with a fuel valve, start the engine, close the fuel valve, and run the engine until it stops.
- Consult the engine owner's manual for instructions on preparing the engine for storage.

Stabilizing the fuel

After completing the procedures listed above, fill the fuel tank completely and add a high-quality stabilizer to the fuel.

- Choose a stabilizer that includes cleaning agents and additives designed to coat/protect the cylinder walls.
- Make sure the stabilizer you use is compatible with the fuel in your area, fuel type, grade and temperature range. Do not add extra alcohol to fuels which already contain it (for example, E10).
- For engines with diesel fuel, use a stabilizer with a biocide to restrict or prevent bacteria and fungus growth.
- Add the correct amount of stabilizer per the manufacturer's recommendations.

Storing the machine

Perform these remaining steps to store your machine.

- Wash the machine and allow it to dry.
- Move the machine to a clean, dry, secure storage location. Block or chock wheels to prevent machine movement.
- Use touch-up paint as needed to protect exposed metal against rust.
- If the machine has a battery, either remove or disconnect it.

NOTICE: Allowing the battery to freeze or completely discharge is likely to cause permanent damage. Periodically charge the battery while the machine is not in use. In cold climates, store and charge the battery indoors or in a warm location.

- Cover the machine. Tires and other exposed rubber items should be protected from the weather. Either cover them or use a readily available protectant.

8.12 Preparing the Machine for Seasonal Operation

Background

After removing the machine from long-term storage, it must be prepared for operation. Perform the procedures below before each seasonal use.

Before powering up machine

Perform the procedures below before you power up the machine.

Item	Task
Machine exterior	Clean all outside surfaces
Heater and burner	■ Remove protective coverings from chimney and burner. ■ Remove any carbon buildup from the heater and burner assemblies. ■ Replace the burner nozzle or orifice. ■ Verify burner electrode position.
Controls and wiring	■ Inspect all wires for damage, corrosion, or wear. Replace damaged wiring. ■ Inspect all electrical components for damage, corrosion, or wear. Replace damaged electrical components.
Fuel system	■ Replace the fuel filter element if applicable. ■ Check gas train for leaks if applicable.

With machine powered up

Perform the procedures below with the machine powered up.

Item	Task
Burner	■ Verify fuel pump pressure if applicable. ■ Verify gas pressure if applicable. ■ Verify burner combustion.

8.13 Machine Disposal / Decommissioning

Introduction

This machine must be properly decommissioned at the end of its service life. Responsible disposal of recyclable components, such as plastic and metal, ensures that these materials can be reused—conserving landfill space and valuable natural resources.

Responsible disposal also prevents toxic chemicals and materials from harming the environment. The operating fluids in this machine, including fuel, engine oil, and grease, may be considered hazardous waste in many areas. Before decommissioning this machine, read and follow local safety and environmental regulations pertaining to the disposal of construction equipment.

Preparation

Perform the following tasks to prepare the machine for disposal.

- ☐ Move the machine to a protected location where it will not pose any safety hazards and cannot be accessed by unauthorized individuals.
- ☐ Ensure that the machine cannot be operated from the time of final shutdown to disposal.
- ☐ Drain all fluids, including fuel, engine oil, and coolant.
- ☐ Seal any fluid leaks.

Disposal

Perform the following tasks to dispose of the machine.

- ☐ Disassemble the machine and separate all parts by material type.
- ☐ Dispose of recyclable parts as specified by local regulations.
- ☐ Dispose of all non-hazardous components that cannot be recycled.
- ☐ Dispose of waste fuel, oil, and grease in accordance with local environmental protection regulations.

9 Genset Maintenance

The engine maintenance schedule(s) in this chapter are reproduced from the engine owner's manual. For additional information, see the engine owner's manual.

SERVICE INTERVALS

Observe the following for service and maintenance.

Interval	Item	Ref. page		
Every 50 hours	Check of fuel pipes and clamp bands	13		@
See NOTE	Change of engine oil (depending on the oil pan)	14,15	◎	
Every 100 hours	Cleaning of air cleaner element	19	*1	@
	Cleaning of fuel filter	14		
	Check of fan belt tightness	20		
	Draining water separator	-		
Every 200 hours	Replacement of oil filter cartridge (depending on the oil pan)	16	◎	
	Check of intake air line	-		@
Every 200 hours of operation or six months	Check of radiator hoses and clamp bands	18		
Every 400 hours	Replacement of fuel filter element	14		@
	Cleaning of water separator in fuel tank	-		
Every 500 hours	Cleaning of water jacket (radiator interior)	-		
	Replacement of fan belt	20		
Every year or every 6 cleanings of air cleaner element	Replacement of air cleaner element	19	*2	@
Every 800 hours	Check of valve clearance	-	*3	
Every 1500 hours	Check of fuel injection nozzle injection pressure	-	*3	@
Every 3000 hours	Check of injection pump	-	*3	@
Every two years	Replacement of radiator hoses and clamp bands	18		
	Replacement of fuel pipes and clamps	13	*3	@
	Change of radiator coolant (L.L.C.)	16		
	Replacement of intake air line	-	*4	@

IMPORTANT :

- The jobs indicated by ◎ must be done after the first 50 hours of operation.

*1 Air cleaner should be cleaned more often in dusty conditions than in normal conditio

*2 After 6 times of cleaning.

*3 Consult your local KUBOTA Dealer for this service.

*4 Replace only if necessary.

- The items listed above (@ marked) are registered as emission related critical nonroad emission regulation. As the engine owner, you are responsible for t maintenance on the engine according to the above instruction. Please see the Warranty Statement in detail.

NOTE :

- **Changing interval of Engine oil and oil filter cartridge.**

		*Oil pan depth
		*101 mm (3.98 in.)
Z602-E4	Engine oil	50 Hrs (Initial)
		100 Hrs
	Oil filter cartridge	200 Hrs

* 101 mm (3.98 in.) oil pan depth is optional for Z482-E4 and D722-E4.

**Standard replacement interval

- American Petroleum Institute (API) classification: above CF-4 grade
- Ambient temperature: below 35°C (95°F)

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The viscosity of the engine oil is an important factor when determining the correct engine oil to use in your machine. Use an engine oil of appropriate viscosity based on the expected outside air temperature. See the table below.

WARNING

Most used liquids from this machine such as oil, gasoline, grease, etc., contain small amounts of materials that can cause cancer and other health problems if inhaled, ingested, or left in contact with skin for prolonged periods of time.

- ▶ Take steps to avoid inhaling or ingesting used liquids.
- ▶ Wash skin thoroughly after exposure to used liquids.

NOTE :

Lubricating oil

With strict emission control regulations now in effect, the CF-4 and CG-4 engine oils have been developed for use with low sulfur fuels, for On-Highway vehicle engines. When a Non-Road engine runs on high sulfur fuel, it is advisable to use a "CF or better" classification engine oil with a high Total Base Number (a minimum TBN of 10 is recommended).

- **Lubricating oil recommended when a low-sulfur or high-sulfur fuel is employed.**

○ : Recommendable X : Not recommendable

Lubricating oil classification	**Fuel		Remarks
	Low-sulfur	High-sulfur	
CF	○	○	*TBN≧ 10
CF-4	○	X	
CG-4	○	X	
CH-4	○	X	
CI-4	○	X	

*TBN: Total Base Number

**Fuel

- Diesel Fuel Specification Type and Sulfur Content % (ppm) used, must be compliant with all applicable emission regulations for the area in which the engine is operated.
- Use of diesel fuel with sulfur content less than 0.10 % (1000 ppm) is strongly recommended.
- If high-sulfur fuel (sulfur content 0.50 % (5000 ppm) to 1.0 % (10000 ppm)) is used as a diesel fuel, change the engine oil and oil filter at shorter intervals. (approximately half).
- DO NOT USE Fuels that have sulfur content greater than 1.0 % (10000 ppm).
- Since KUBOTA diesel engines of less than 56 kW (75 hp) utilize EPA Tier 4 and Interim Tier 4 standards, the use of ultra low sulfur fuel is mandatory for these engines, when operated in US EPA regulated areas. Therefore, please use No.2-D S15 diesel fuel as an alternative to No.2-D, and use No.1-D S15 diesel fuel as an alternative to No.1-D for ambient temperatures below -10 °C (14 °F).
  No.1-D or No.2-D, S15 : Ultra Low Sulfur Diesel (ULSD) 15 ppm or 0.0015 wt.%

- Oil used in the engine should have API classification and Proper SAE Engine Oil according to the ambient temperatures as shown below:

Above 25℃ (77℉)	SAE30, SAE10W-30 or 15W-40
-10 to 25℃ (14℉ to 77℉)	SAE10W-30 or 15W-40
Below -10℃ (14℉)	SAE10W-30

- Recommended API classification
  Refer to the following table for the suitable American Petroleum Institute (API) classification of engine oil according to the engine type (with internal EGR, external EGR or non-EGR) and the Fuel Type Used : (Ultra Low Sulfur or High Sulfur Fuels).

Fuel type	Engine oil classification (API classification)	
	Engines with non-EGR Engines with internal EGR	Engines with external EGR
High Sulfur Fuel [0.05 % (500 ppm) ≦ Sulfur Content < 0.50 % (5000 ppm)]	**CF** (If the "CF-4, CG-4, CH-4 or CI-4" engine oil is used with a high-sulfur fuel, change the engine oil at shorter intervals. (approximately half))	---
Ultra Low Sulfur Fuel [Sulfur Content < 0.0015 % (15 ppm)]	**CF, CF-4, CG-4, CH-4 or CI-4**	**CF or CI-4** (Class CF-4, CG-4 and CH-4 engine, oils cannot be used on EGR type engines.)

EGR: Exhaust Gas Re-circulation

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10 Troubleshooting

10.1 Troubleshooting the Machine

Problem / Symptom	Reason	Remedy
The burner does not start.	Improper switch position or protective function action.	Verify that the breaker is ON. Verify that the HTF level is within range and low level shutdown device is reset (low level indicator light must be OFF).
	The over-temperature limit has tripped.	Allow the burner to cool.
	The wire and/or power supply is faulty.	Replace the faulty wire or power supply.
	The burner primary control is in lockout mode.	Reset the burner control.
The burner starts; the flame does not ignite.	There is no fuel.	Fill fuel tank.
	The burner nozzle is damaged or worn.	Replace the burner nozzle.
	The electrodes are defective.	Replace the electrodes.
	The cadmium cell is malfunctioning.	Replace the cadmium cell.
	The burner primary control is malfunctioning.	Replace the burner primary control.
The burner starts and the flame ignites, but the unit locks out.	The fuel pressure is set incorrectly.	Adjust the fuel pressure.
	The burner nozzle is damaged or worn.	Replace the burner nozzle.
	The air damper is set incorrectly.	Adjust the air damper.
	The cadmium cell is malfunctioning.	Replace the cadmium cell.
	The burner primary control is malfunctioning.	Replace the burner primary control.
Combustion is poor or noisy.	There is a lack of fresh air to burner.	Ensure there is an adequate air supply.

Problem / Symptom	Reason	Remedy
Thaw progress is below capacity.	The insulation is insufficient.	Add additional insulation blankets.
	The moisture is insufficient.	Verify that there is standing water on job site.
	There is no vapor barrier.	Lay down vapor barrier.
	The HTF is not flowing.	Verify that the pump pressure is nominal and hoses are not restricted.
	The temperature control is not set properly.	Set the temperature control to optimum setting. This setting depends on environmental conditions at the job site.
	The soil conditions are not as expected.	Re-evaluate thawing plan based on job site conditions.
Pump will not start.	There is no power.	Verify that the breaker switch is ON. Verify that the HTF level is within range and low level cutoff control is reset (low level indicator light must be OFF).
	The HTF temperature is below -26°C (-15°F).	Warm the HTF and hoses before starting machine.
	The HTF is not warm enought yet.	The pump will not start until the HTF has reached 10°C (50°F). Warm the HTF and hoses before starting machine.
Hose rewind does not work.	The hose reel brake is not fully released.	Fully release the hose reel brake.
	The motor temperature is below nominal value (<18°C (0°F)).	Warm the enclosure by running the machine with all doors closed *or* warm the enclosure using an external heat source.
	The foot pedal switch has failed.	Replace the foot pedal switch.

Problem / Symptom	Reason	Remedy
Pump is noisy and HTF flow is below nominal value.	The suction valve is not fully open.	Verify that the suction valve is fully open.
	The HTF temperature is below -26°C (-15°F).	Warm the HTF and hoses before starting machine; see topic *Preheating the HTF* in this manual.
	The strainer basket is clogged.	Clean the strainer basket; see topic *Cleaning the HTF Strainer*.

Material Safety Data Sheet

The Dow Chemical Company

Product Name: DOWFROST* HD 50 Heat Transfer Fluid, Dyed

Issue Date: 09/24/2010
Print Date: 18 Aug 2011

The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name
DOWFROST* HD 50 Heat Transfer Fluid, Dyed

COMPANY IDENTIFICATION
The Dow Chemical Company
2030 Willard H. Dow Center
Midland, MI 48674
USA

Customer Information Number: 800-258-2436
SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER
24-Hour Emergency Contact: 989-636-4400
Local Emergency Contact: 989-636-4400

2. Hazards Identification

Emergency Overview
Color: Yellow to green
Physical State: Liquid.
Odor: Characteristic
Hazards of product:

No significant immediate hazards for emergency response are known.

OSHA Hazard Communication Standard
This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects
Eye Contact: May cause slight temporary eye irritation. Corneal injury is unlikely.
Skin Contact: Prolonged contact is essentially nonirritating to skin. Repeated contact may cause flaking and softening of skin.
Skin Absorption: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

Inhalation: At room temperature, exposure to vapor is minimal due to low volatility. Mist may cause irritation of upper respiratory tract (nose and throat).
Ingestion: Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.
Aspiration hazard: Based on physical properties, not likely to be an aspiration hazard.
Effects of Repeated Exposure: In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

3. Composition Information

Component	CAS #	Amount
Propylene glycol	57-55-6	> 48.0 - < 54.0 %
Water	7732-18-5	< 50.0 %
Dipotassium hydrogen phosphate	7758-11-4	< 3.0 %

4. First-aid measures

Eye Contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.
Skin Contact: Wash skin with plenty of water.
Inhalation: Move person to fresh air; if effects occur, consult a physician.
Ingestion: No emergency medical treatment necessary.
Notes to Physician: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.
Emergency Personnel Protection: If potential for exposure exists refer to Section 8 for specific personal protective equipment.

5. Fire Fighting Measures

Extinguishing Media: To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam.
Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam.
Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.
Unusual Fire and Explosion Hazards: This material will not burn until the water has evaporated. Residue can burn.
Hazardous Combustion Products: Under fire conditions some components of this product may decompose. The smoke may contain unidentified toxic and/or irritating compounds. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

6. Accidental Release Measures

Steps to be Taken if Material is Released or Spilled: Small spills: Absorb with materials such as: Cat litter. Sawdust. Vermiculite. Zorb-all®. Collect in suitable and properly labeled containers. Large spills: Dike area to contain spill. See Section 13, Disposal Considerations, for additional information.

Personal Precautions: Keep unnecessary and unprotected personnel from entering the area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.
Environmental Precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

7. Handling and Storage

Handling

General Handling: No special precautions required. Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Storage

Do not store in: Galvanized steel. Opened or unlabeled containers. Store in the following material(s): Carbon steel. Stainless steel. Store in original unopened container. See Section 10 for more specific information. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact.

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Propylene glycol	WEEL	TWA Aerosol.	10 mg/m3

Personal Protection

Eye/Face Protection: Use safety glasses (with side shields).
Skin Protection: Wear clean, body-covering clothing.

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl alcohol ("PVA"). Polyvinyl chloride ("PVC" or "vinyl"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. In misty atmospheres, use an approved particulate respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.
Ingestion: Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

Engineering Controls

Ventilation: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

9. Physical and Chemical Properties

Physical State	Liquid.
Color	Yellow to green
Odor	Characteristic
Odor Threshold	No test data available
Flash Point - Closed Cup	Not applicable, Water boils off
Flammability (solid, gas)	Not applicable to liquids
Flammable Limits In Air	**Lower**: 2.6 %(V) *Literature* Propylene glycol. **Upper**: 12.5 %(V) *Literature* Propylene glycol.
Autoignition Temperature	371 °C (700 °F) *Literature* Propylene glycol.
Vapor Pressure	15.5 mmHg @ 20 °C *Literature*
Boiling Point (760 mmHg)	104 °C (219 °F) *Literature* .
Vapor Density (air = 1)	>1.0 *Literature*
Specific Gravity (H2O = 1)	1.06 20 °C/20 °C *Literature*
Freezing Point	-33.8 °C (-28.8 °F) *Literature*
Melting Point	Not applicable to liquids
Solubility in water (by weight)	100 % *Literature*
pH	9.5 *Literature*
Decomposition Temperature	No test data available
Partition coefficient, n-octanol/water (log Pow)	No data available for this product.
Evaporation Rate (Butyl Acetate = 1)	<0.5 *Estimated.*
Kinematic Viscosity	6.3 cSt *Literature*

10. Stability and Reactivity

Stability/Instability

Thermally stable at recommended temperatures and pressures.

Conditions to Avoid: Some components of this product can decompose at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible Materials: Avoid contact with: Strong acids. Strong bases. Strong oxidizers.

Hazardous Polymerization

Will not occur.

Thermal Decomposition

Decomposition products depend upon temperature, air supply and the presence of other materials.

11. Toxicological Information

Acute Toxicity

Ingestion

For the major component(s): Propylene glycol. LD50, Rat > 20,000 mg/kg

Dermal

For the major component(s): Propylene glycol. LD50, Rabbit > 20,000 mg/kg

Inhalation

For the major component(s): No deaths occurred following exposure to a saturated atmosphere. LC50, 8 h, Vapor, Rat 4.1 mg/l

Eye damage/eye irritation

May cause slight temporary eye irritation. Corneal injury is unlikely.

Skin corrosion/irritation

Prolonged contact is essentially nonirritating to skin. Repeated contact may cause flaking and softening of skin.

Sensitization

Skin

For the major component(s): Did not cause allergic skin reactions when tested in humans.

Respiratory

No relevant information found.

Repeated Dose Toxicity

In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

Chronic Toxicity and Carcinogenicity

Similar formulations did not cause cancer in laboratory animals.

Developmental Toxicity

For the major component(s): Did not cause birth defects or any other fetal effects in laboratory animals.

Reproductive Toxicity

For the major component(s): In animal studies, did not interfere with reproduction. In animal studies, did not interfere with fertility.

Genetic Toxicology

In vitro genetic toxicity studies were negative. For the major component(s): Animal genetic toxicity studies were negative.

12. Ecological Information

ENVIRONMENTAL FATE

Movement & Partitioning

For the major component(s): Bioconcentration potential is low (BCF less than 100 or log Pow less than 3). Potential for mobility in soil is very high (Koc between 0 and 50).

Persistence and Degradability

For the major component(s): Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

ECOTOXICITY

For the major component(s): Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

13. Disposal Considerations

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Recycler. Reclaimer. Incinerator or other thermal destruction device.

14. Transport Information

DOT Non-Bulk
NOT REGULATED

DOT Bulk
NOT REGULATED

IMDG
NOT REGULATED

ICAO/IATA
NOT REGULATED

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information

OSHA Hazard Communication Standard
This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	No
Delayed (Chronic) Health Hazard	No
Fire Hazard	No
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313
To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:
The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
Propylene glycol	57-55-6	> 48.0 - < 54.0 %

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:
To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)
This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

Toxic Substances Control Act (TSCA)

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

CEPA - Domestic Substances List (DSL)

This product contains one or more substances which are not listed on the Canadian Domestic Substances List (DSL). Contact your sales or technical service representative for more information.

16. Other Information

Hazard Rating System

NFPA	Health	Fire	Reactivity
	0	0	0

Recommended Uses and Restrictions

Intended as a heat transfer fluid for closed-loop systems. We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative.

Revision

Identification Number: 50551 / 1001 / Issue Date 09/24/2010 / Version: 4.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ_DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

The Dow Chemical Company urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

Tire Safety Information

Introduction to Tire Safety Information

Federal Regulation 49 CFR 575 requires trailer manufacturers to include certain tire information in the owner’s manuals for the trailers they manufacture. This regulation requires that the information be in the English language. This chapter includes all the information required by Federal Regulation 49 CFR 575.

1. TIRE SAFETY INFORMATION

This portion of the User's Manual contains tire safety information as required by 49 CFR 575.6.

Section 1.1 contains "Steps for Determining Correct Load Limit - Trailer".

Section 1.2 contains "Steps for Determining Correct Load Limit – Tow Vehicle".

Section 1.3 contains a Glossary of Tire Terminology, including "cold inflation pressure", "maximum inflation pressure", "recommended inflation pressure", and other non-technical terms.

Section 1.4 contains information from the NHTSA brochure entitled "Tire Safety – Everything Rides On It". This brochure This brochure, as well as the preceding subsections, describes the following items;

- Tire labeling, including a description and explanation of each marking on the tires, and information about the DOT Tire Identification Number (TIN).
- Recommended tire inflation pressure, including a description and explanation of:
  A. Cold inflation pressure.
  B. Vehicle Placard and location on the vehicle.
  C. Adverse safety consequences of under inflation (including tire failure).
  D. Measuring and adjusting air pressure for proper inflation.
- Tire Care, including maintenance and safety practices.
- Vehicle load limits, including a description and explanation of the following items:
  A. Locating and understanding the load limit information, total load capacity, and cargo capacity.
  B. Calculating total and cargo capacities with varying seating configurations including quantitative examples showing / illustrating how the vehicles cargo and luggage capacity decreases as combined number and size of occupants' increases. This item is also discussed in Section 3.
  C. Determining compatibility of tire and vehicle load capabilities.
  D. Adverse safety consequences of overloading on handling and stopping on tires.

1.1. STEPS FOR DETERMINING CORRECT LOAD LIMIT – TRAILER

Determining the load limits of a trailer includes more than understanding the load limits of the tires alone. On all trailers there is a Federal certification/VIN label that is located on the forward half of the left (road) side of the unit. This certification/VIN label will indicate the trailer's Gross Vehicle Weight Rating (GVWR). This is the most weight the fully loaded trailer can weigh. It will also provide the Gross Axle Weight Rating (GAWR). This is the most a particular axle can weigh. If there are multiple axles, the GAWR of each axle will be provided.

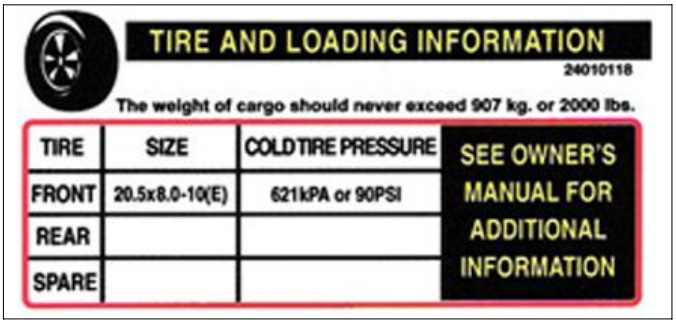
If your trailer has a GVWR of 10,000 pounds or less, there is a vehicle placard located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity. Cargo can be added to the trailer, up to the maximum weight specified on the placard. The combined weight of the cargo is provided as a single number. In any case, remember: the total weight of a fully loaded trailer can not exceed the stated GVWR.

For trailers with living quarters installed, the weight of water and propane also need to be considered. The weight of fully filled propane containers is considered part of the weight of the trailer before it is loaded with cargo, and is not considered part of the disposable cargo load. Water however, is a disposable cargo weight and is treated as such. If there is a fresh water storage tank of 100 gallons, this tank when filled would weigh about 800 pounds. If more cargo is being transported, water can be off-loaded to keep the total amount of cargo added to the vehicle within the limits of the GVWR so as not to overload the vehicle. Understanding this flexibility will allow you, the owner, to make choices that fit your travel needs.

When loading your cargo, be sure it is distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low and as close to the axle positions as reasonable. Too many items on one side may overload a tire. The best way to know the actual weight of the vehicle is to weigh it at a public scale. Talk to your dealer to discuss the weighing methods needed to capture the various weights related to the trailer. This would include the weight empty or unloaded, weights per axle, wheel, hitch or king-pin, and total weight.

Excessive loads and/or underinflation cause tire overloading and, as a result, abnormal tire flexing occurs. This situation can generate an excessive amount of heat within the tire. Excessive heat may lead to tire failure. It is the air pressure that enables a tire to support the load, so proper inflation is critical. The proper air pressure may be found on the certification/VIN label and/or on the Tire Placard. This value should never exceed the maximum cold inflation pressure stamped on the tire.

1.1.1. TRAILERS 10,000 POUNDS GVWR OR LESS



Tire and Loading Information Placard – Figure 1-1

1. Locate the statement, "The weight of cargo should never exceed XXX kg or XXX lbs.," on your vehicle's placard. See figure 1-1.
2. This figure equals the available amount of cargo and luggage load capacity.
3. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity.

The trailer's placard refers to the Tire Information Placard attached adjacent to or near the trailer's VIN (Certification) label at the left front of the trailer.

1.1.2. TRAILERS OVER 10,000 POUNDS GVWR (NOTE: THESE TRAILERS ARE NOT REQUIRED TO HAVE A TIRE INFORMATION PLACARD ON THE VEHICLE)

1. Determine the empty weight of your trailer by weighing the trailer using a public scale or other means. This step does not have to be repeated.
2. Locate the GVWR (Gross Vehicle Weight Rating) of the trailer on your trailer's VIN (Certification) label.
3. Subtract the empty weight of your trailer from the GVWR stated on the VIN label. That weight is the maximum available cargo capacity of the trailer and may not be safely exceeded.

1.2. STEPS FOR DETERMINING CORRECT LOAD LIMIT – TOW VEHICLE

1. Locate the statement, "The combined weight of occupants and cargo should never exceed XXX lbs.," on your vehicle's placard.
2. Determine the combined weight of the driver and passengers who will be riding in your vehicle.
3. Subtract the combined weight of the driver and passengers from XXX kilograms or XXX pounds.
4. The resulting figure equals the available amount of cargo and luggage capacity. For example, if the "XXX" amount equals 1400 lbs. and there will be five 150 lb. passengers in your vehicle, the amount of available cargo and luggage capacity is 650 lbs. (1400-750 (5 x 150) = 650 lbs.).
5. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage capacity calculated in Step # 4.
6. If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult the tow vehicle's manual to determine how this weight transfer reduces the available cargo and luggage capacity of your vehicle.

1.3. GLOSSARY OF TIRE TERMINOLOGY

Accessory weight
The combined weight (in excess of those standard items which may be replaced) of automatic transmission, power steering, power brakes, power windows, power seats, radio and heater, to the extent that these items are available as factory-installed equipment (whether installed or not).

Tire Safety Information

Bead
The part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim.

Bead separation
This is the breakdown of the bond between components in the bead.

Bias ply tire
A pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread.

Carcass
The tire structure, except tread and sidewall rubber which, when inflated, bears the load.

Chunking
The breaking away of pieces of the tread or sidewall.

Cold inflation pressure
The pressure in the tire before you drive.
Cord
The strands forming the plies in the tire.

Cord separation
The parting of cords from adjacent rubber compounds.

Cracking
Any parting within the tread, sidewall, or inner liner of the tire extending to cord material.

CT
A pneumatic tire with an inverted flange tire and rim system in which the rim is designed with rim flanges pointed radially inward and the tire is designed to fit on the underside of the rim in a manner that encloses the rim flanges inside the air cavity of the tire.

Curb weight
The weight of a motor vehicle with standard equipment including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine.

Extra load tire
A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

Groove
The space between two adjacent tread ribs.

Gross Axle Weight Rating
The maximum weight that any axle can support, as published on the Certification / VIN label on the front left side of the trailer. Actual weight determined by weighing each axle on a public scale, with the trailer attached to the towing vehicle.

Gross Vehicle Weight Rating
The maximum weight of the fully loaded trailer, as published on the Certification / VIN label. Actual weight determined by weighing trailer on a public scale, without being attached to the towing vehicle.

Hitch Weight
The downward force exerted on the hitch ball by the trailer coupler.

Innerliner
The layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

Innerliner separation
The parting of the innerliner from cord material in the carcass.

Intended outboard sidewall
The sidewall that contains a white-wall, bears white lettering or bears manufacturer, brand, and/or model name molding that is higher or deeper than the same molding on the other sidewall of the tire or the outward facing sidewall of an asymmetrical tire that has a particular side that must always face outward when mounted on a vehicle.

Light truck (LT) tire
A tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles.

Load rating
The maximum load that a tire is rated to carry for a given inflation pressure.

Maximum load rating
The load rating for a tire at the maximum permissible inflation pressure for that tire.

Maximum permissible inflation pressure
The maximum cold inflation pressure to which a tire may be inflated.

Maximum loaded vehicle weight
The sum of curb weight, accessory weight, vehicle capacity weight, and production options weight.

Measuring rim
The rim on which a tire is fitted for physical dimension requirements.

Pin Weight
The downward force applied to the 5^{th} wheel or gooseneck ball, by the trailer kingpin or gooseneck coupler.

Non-pneumatic rim
A mechanical device which, when a non-pneumatic tire assembly incorporates a wheel, supports the tire, and attaches, either integrally or separably, to the wheel center member and upon which the tire is attached.

Non-pneumatic spare tire assembly
A non-pneumatic tire assembly intended for temporary use in place of one of the pneumatic tires and rims that are fitted to a passenger car in compliance with the requirements of this standard.

Non-pneumatic tire
A mechanical device which transmits, either directly or through a wheel or wheel center member, the vertical load and tractive forces from the roadway to the vehicle, generates the tractive forces that provide the directional control of the vehicle and does not rely on the containment of any gas or fluid for providing those functions.

Non-pneumatic tire assembly
A non-pneumatic tire, alone or in combination with a wheel or wheel center member, which can be mounted on a vehicle.

Normal occupant weight
This means 68 kilograms (150 lbs.) times the number of occupants specified in the second column of Table I of 49 CFR 571.110.

Occupant distribution
The distribution of occupants in a vehicle as specified in the third column of Table I of 49 CFR 571.110.

Open splice
Any parting at any junction of tread, sidewall, or innerliner that extends to cord material.

Outer diameter
The overall diameter of an inflated new tire.

Overall width
The linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

Tire Safety Information

Ply
A layer of rubber-coated parallel cords.

Ply separation
A parting of rubber compound between adjacent plies.

Pneumatic tire
A mechanical device made of rubber, chemicals, fabric and steel or other materials, that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

Production options weight
The combined weight of those installed regular production options weighing over 2.3 kilograms (5 lbs.) in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim.

Radial ply tire
A pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread.

Recommended inflation pressure
This is the inflation pressure provided by the vehicle manufacturer on the Tire Information label and on the Certification / VIN tag.

Reinforced tire
A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

Rim
A metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

Rim diameter
This means the nominal diameter of the bead seat.

Rim size designation
This means the rim diameter and width.

Rim type designation
This means the industry of manufacturer’s designation for a rim by style or code.

Rim width
This means the nominal distance between rim flanges.

Section width
The linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands.

Sidewall
That portion of a tire between the tread and bead.

Sidewall separation
The parting of the rubber compound from the cord material in the sidewall.

Special Trailer (ST) tire
The "ST" is an indication the tire is for trailer use only.

Test rim
The rim on which a tire is fitted for testing, and may be any rim listed as appropriate for use with that tire.

Tread
That portion of a tire that comes into contact with the road.

Tread rib
A tread section running circumferentially around a tire.

Tread separation
Pulling away of the tread from the tire carcass.

Treadwear indicators (TWI)
The projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread.

Vehicle capacity weight
The rated cargo and luggage load plus 68 kilograms (150 lbs.) times the vehicle's designated seating capacity.

Vehicle maximum load on the tire
The load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

Vehicle normal load on the tire
The load on an individual tire that is determined by distributing to each axle its share of the curb weight, accessory weight, and normal occupant weight (distributed in accordance with Table I of CRF 49 571.110) and dividing by 2.

Weather side
The surface area of the rim not covered by the inflated tire.

Wheel center member
In the case of a non-pneumatic tire assembly incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic rim and provides the connection between the non-pneumatic rim and the vehicle; or, in the case of a non-pneumatic tire assembly not incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic tire and provides the connection between tire and the vehicle.

Wheel-holding fixture
The fixture used to hold the wheel and tire assembly securely during testing.

1.4. TIRE SAFETY - EVERYTHING RIDES ON IT

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire Safety, as required by CFR 575.6. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following web site:

http://www.nhtsa.dot.gov/cars/rules/TireSafety/ridesonit/tires_index.html

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling
- Help protect you and others from avoidable breakdowns and accidents
- Improve fuel economy
- Increase the life of your tires.

This booklet presents a comprehensive overview of tire safety, including information on the following topics:
- Basic tire maintenance
- Uniform Tire Quality Grading System
- Fundamental characteristics of tires

Tire Safety Information

Use this information to make tire safety a regular part of your vehicle maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

1.5. SAFETY FIRST–BASIC TIRE MAINTENANCE

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your vehicle. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and vehicle load limits, avoid road hazards, and regularly inspect your tires.

1.5.1. FINDING YOUR VEHICLE'S RECOMMENDED TIRE PRESSURE AND LOAD LIMITS

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- Recommended tire size
- Recommended tire inflation pressure
- Vehicle capacity weight (VCW–the maximum occupant and cargo weight a vehicle is designed to carry)
- Front and rear gross axle weight ratings (GAWR– the maximum weight the axle systems are designed to carry).

Both placards and certification labels are permanently attached to the trailer near the left front.

1.5.2. UNDERSTANDING TIRE PRESSURE AND LOAD LIMITS

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure– measured in pounds per square inch (psi)–a tire requires to be properly inflated. (You will also find this number on the vehicle information placard expressed in kilopascals (kpa), which is the metric measure used internationally.)

Manufacturers of passenger vehicles and light trucks determine this number based on the vehicle's design load limit, that is, the greatest amount of weight a vehicle can safely carry and the vehicle's tire size. The proper tire pressure for your vehicle is referred to as the "recommended cold inflation pressure." (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.)
Because tires are designed to be used on more than one type of vehicle, tire manufacturers list the "maximum permissible inflation pressure" on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

1.5.3. CHECKING TIRE PRESSURE

It is important to check your vehicle's tire pressure at least once a month for the following reasons:

- Most tires may naturally lose air over time.
- Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking.
- With radial tires, it is usually not possible to determine underinflation by visual inspection.

For convenience, purchase a tire pressure gauge to keep in your vehicle. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets.
The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours. When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

1.5.4. Steps for Maintaining Proper Tire Pressure

- Step 1: Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the owner's manual.
- Step 2: Record the tire pressure of all tires.
- Step 3: If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure.
- Step 4: If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add.
- Step 5: At a service station, add the missing pounds of air pressure to each tire that is underinflated.
- Step 6: Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been driving your vehicle and think that a tire is underinflated, fill it to the recommended cold inflation pressure indicated on your vehicle's tire information placard or certification label. While your tire may still be slightly underinflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the vehicle manufacturer's recommended cold inflation pressure than to drive with a significantly underinflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

1.5.5. Tire Size

To maintain tire safety, purchase new tires that are the same size as the vehicle's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with the tire dealer.

1.5.6. Tire Tread

The tire tread provides the gripping action and traction that prevent your vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in treadwear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires. Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

1.5.7. Tire Balance and Wheel Alignment

To avoid vibration or shaking of the vehicle when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the vehicle's frame. This adjustment maximizes the life of your tires. These adjustments require special equipment and should be performed by a qualified technician.

1.5.8. Tire Repair

The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

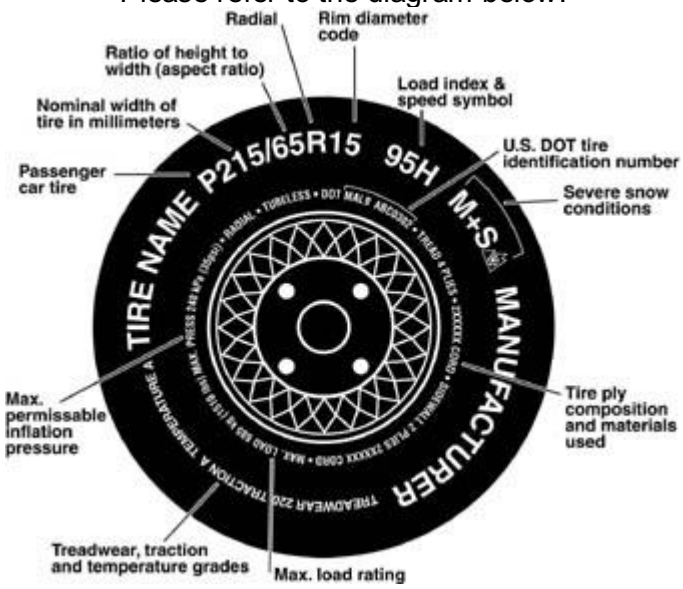
1.5.9. Tire Fundamentals

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

Tire Safety Information

1.5.9.1. Information on Passenger Vehicle Tires

Please refer to the diagram below.



P
The "P" indicates the tire is for passenger vehicles.

Next number
This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

Next number
This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

R
The "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years.

Next number
This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter.

Next number
This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. You may find this information in your owner's manual. If not, contact a local tire dealer. Note: You may not find this information on all tires because it is not required by law.

M+S
The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.

Speed Rating
The speed rating denotes the speed at which a tire is designed to be driven for extended periods of time. The ratings range from 99 miles per hour (mph) to 186 mph. These ratings are listed below. Note: You may not find this information on all tires because it is not required by law.

Letter Rating	Speed Rating
Q	99 mph
R	106 mph
S	112 mph
T	118 mph
U	124 mph
H	130 mph
V	149 mph
W	168* mph
Y	186* mph

* For tires with a maximum speed capability over 149 mph, tire manufacturers sometimes use the letters ZR. For those with a maximum speed capability over 186 mph, tire manufacturers always use the letters ZR.

U.S. DOT Tire Identification Number
This begins with the letters "DOT" and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the numbers 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer's discretion. This information is used to contact consumers if a tire defect requires a recall.

Tire Ply Composition and Materials Used
The number of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others.

Maximum Load Rating
This number indicates the maximum load in kilograms and pounds that can be carried by the tire.

Maximum Permissible Inflation Pressure
This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

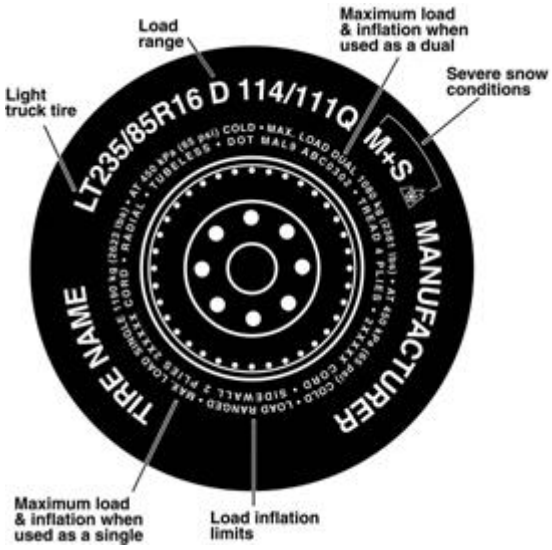
1.5.9.2. UTQGS Information

Treadwear Number
This number indicates the tire's wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

Traction Letter
This letter indicates a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA","A", "B", and "C".

Temperature Letter
This letter indicates a tire's resistance to heat. The temperature grade is for a tire that is inflated properly and not overloaded. Excessive speed, underinflation or excessive loading, either separately or in combination, can cause heat build-up and possible tire failure. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

Please refer to the following diagram.



Tires for light trucks have other markings besides those found on the sidewalls of passenger tires.

LT
The "LT" indicates the tire is for light trucks or trailers.

ST
An "ST" is an indication the tire is for trailer use only.

Max. Load Dual kg (lbs) at kPa (psi) Cold
This information indicates the maximum load and tire pressure when the tire is used as a dual, that is, when four tires are put on each rear axle (a total of six or more tires on the vehicle).

Max. Load Single kg (lbs) at kPa (psi) Cold
This information indicates the maximum load and tire pressure when the tire is used as a single.

Load Range
This information identifies the tire's load-carrying capabilities and its inflation limits.

1.6. TIRE SAFETY TIPS

Preventing Tire Damage

- Slow down if you have to go over a pothole or other object in the road.
- Do not run over curbs or other foreign objects in the roadway, and try not to strike the curb when parking.

Tire Safety Checklist

- Check tire pressure regularly (at least once a month), including the spare.
- Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or other signs of wear or trauma.
- Remove bits of glass and foreign objects wedged in the tread.
- Make sure your tire valves have valve caps.
- Check tire pressure before going on a long trip.
- Do not overload your vehicle. Check the Tire Information and Loading Placard or User's Manual for the maximum recommended load for the vehicle.

11 Technical Data

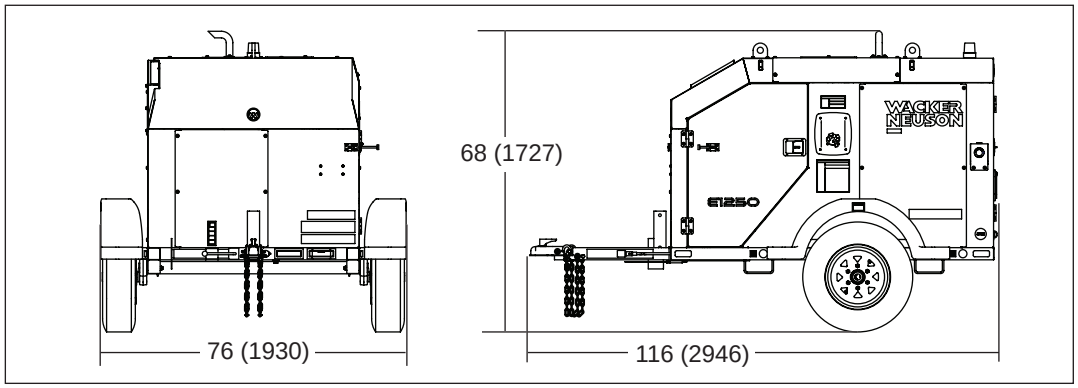
11.1 Machine

Model	Units	E 1250B-D	E 1250B-G
Length x width x height	in. (mm)	116 x 76 x 68 (2946 x 1930 x 1727)	
Operating weight (full fuel)	lb (kg)	3175 (1440)	—
Assembled weight (no fuel)	lb (kg)	2730 (1238)	
Shipping weight no trailer (no fuel)	lb (kg)	2730 (1238)	
Hose length	ft (m)	1250 (381)	
HTF capacity	L (gal)	204 (54)	
Natural Gas (NG)			
Gross input, high heat value (HHV)	BTU/hr (kW)	—	140,000 (41)
Gross input, low heat value (LHV)	BTU/hr (kW)	—	126,560 (37)
Efficiency	%	—	80.0%
Net output	BTU/hr (kW)	—	112,000 (33)
Burner pressure	in. WC	—	4.30
Burner air shutter		—	4.00
Burner fuel consumption	CFH (L/min)	—	140.00 (66.1)
Liquid Propane (LP)			
Gross input, high heat value (HHV)	BTU/hr (kW)	—	140,000 (41)
Gross input, low heat value (LHV)	BTU/hr (kW)	—	129,080 (38)
Efficiency	%	—	83.0
Net output	BTU/hr (kW)	—	116,200 (34)
Burner pressure	(in. WC)	—	5.00
Burner air shutter		—	7.00
Burner fuel consumption	gal/hr (L/hr)	—	1.53 (5.78)
Oil			
Gross input, high heat value (HHV)	BTU/hr (kW)	140,000 (41)	—
Efficiency	%	87	—
Net output	BTU/hr (kW)	121,800 (36)	—
Fuel Pump pressure	psi (kPa)	180 (1241)	—

Model	Units	E 1250B-D	E 1250B-G
Burner nozzle	—	0.75, 60° A	—
Burner air shutter / band		8 / 2	—
Fuel consumption (no generator)	gal/hr (L/hr)	1.00 (3.8)	—
Fuel tank volume	gal (L)	71 (269)	—
Fuel tank capacity	gal (L)	71 (269)	—
Useable fuel	gal (L)	68 (258)	—
Run time @ 100%	hr	68 (258)	—
Run time @ 75%	hr	90	—
Trailer			
GVWR	lb (kg)	3175 (1440)	
GAWR	lb (kg)	4000 (1814)	
Minimum tongue weight	lb (kg)	230 (104)	
Maximum tongue weight	lb (kg)	295 (134)	
Axle rating	lb (kg)	4000 (1814)	
Wheel diameter	in. (mm)	15 (381)	
Wheel rating (rim)	lb (kg)	2830 (1284)	
Tire code		ST205/75R15	
Tire rating	lb (kg)	2150 (975)	
Tire pressure	psi (kPa)	65 (448)	
Lug nut torque	ft-lb (Nm)	110 (149)	
Brake type		Electric	
Hitch Type		2 inch ball	
Electrical			
AC Voltage		120	
Rated Amperage		1 x 15	
Average sound pressure		64.5 dB @ 9.8ft (3m)	

11.2 Dimensions—E1250

in. (mm)



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12 Schematics

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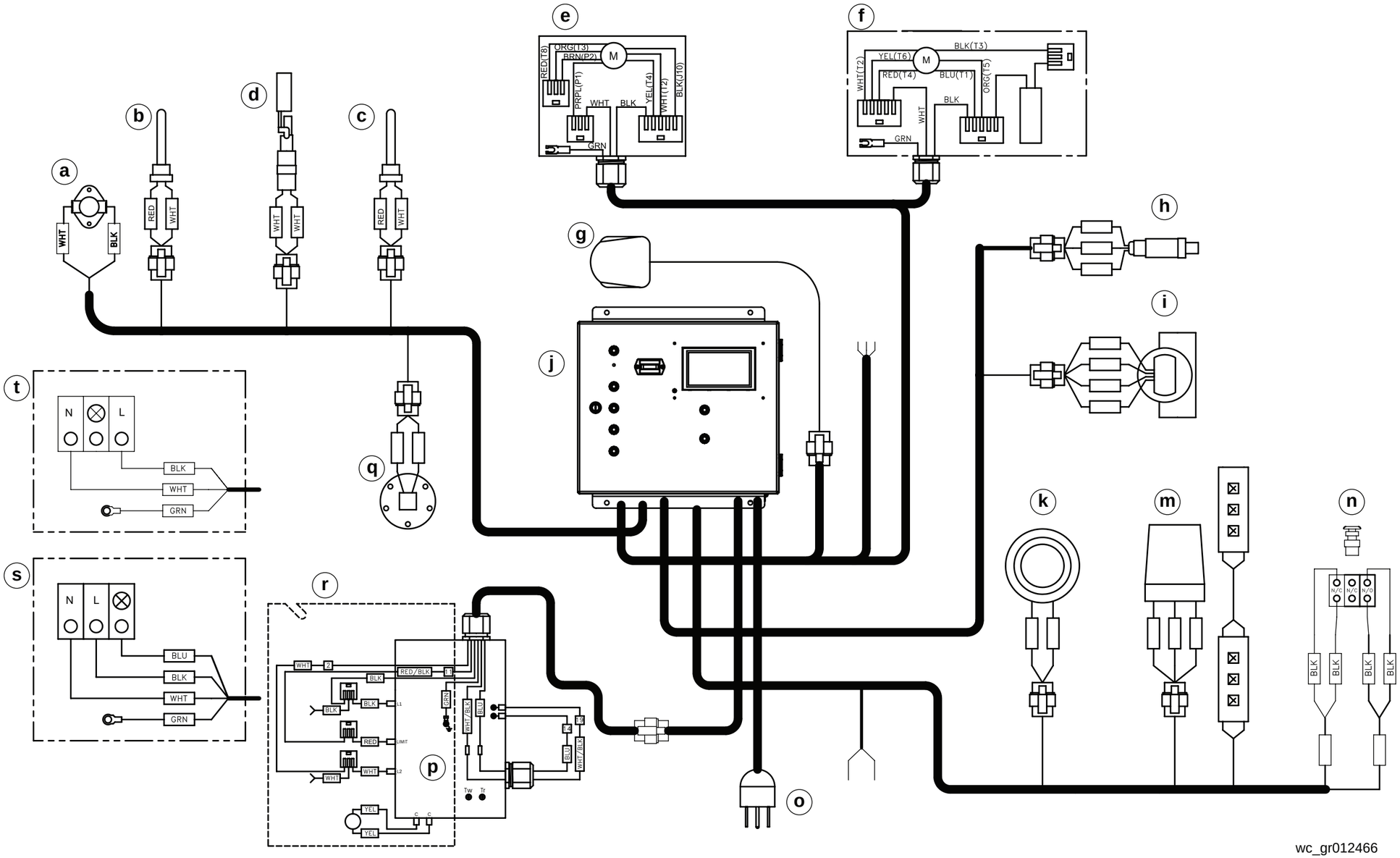
12.1 Electrical Wiring Diagram



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12.2 Wiring Diagram Components

Ref.	Description
a	Snap disc
b	Thermister 1
c	Thermister 2
d	Low limit switch
e	Pump motor
f	Rewind motor
g	Foot switch
h	Pressure sensor
i	Flow sensor
j	Main control panel
k	Rewind clutch
m	Strobe light
n	Emergency stop switch
o	Main power plug
p	Burner controller
q	Fuel level sensor
r	Diesel burner (Beckett)
s	Diesel burner (Riello option)
t	Natural gas/Liquid propane burner (Riello)

Wire Colors							
BK	Black	RD	Red	YL	Yellow	OR	Orange
GN	Green	TN	Tan	BR	Brown	PU	Purple
BU	Blue	VIO	Violet	CL	Clear	SH	Shield
PK	Pink	WH	White	GY	Gray	LB	Lt. blue

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