**Operator's Manual** 

**Ground Heaters**<sup>®</sup>

E 1100 E 1100G





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Manufacturer	Wacker Neuson Corporation N92W15000 Anthony Avenue Menomonee Falls, WI 53051 U.S.A. Tel: (262) 255-0500 · Fax: (262) 255-0550 · Tel: (800) 770-0957 www.wackerneuson.com
Original instructions	This Operator's Manual presents the original instructions. The original language of this Operator's Manual is American English.

## E 1100

### Foreword

Machines			_
covered by	Machine	Item Number	
unis manual	E 1100	0620172	
	E 1100G	0620244	
Machine documentation	<ul> <li>Keep a copy of the</li> <li>Use the separate P parts.</li> <li>Refer to the separar repairing the machine a Corporation to ordet</li> <li>When ordering part the machine model</li> </ul>	Operator's Manual with Parts Book supplied with the Repair Manual for de ine. any of these documents or a replacement or visit ts or requesting service number, item number,	a the machine at all times. the machine to order replacement etailed instructions on servicing and , please contact Wacker Neuson www.wackerneuson.com. information, be prepared to provide revision number, and serial number.
Expectations for information in this manual	<ul> <li>This manual provid maintain the above reduce the risk of ir described in this ma</li> <li>Wacker Neuson Co modifications, even standards of its ma</li> <li>The information con up until the time of to change any porti</li> </ul>	es information and prod Wacker Neuson model njury, carefully read, und anual. prporation expressly res without notice, which in chines. ntained in this manual is publication. Wacker Ne ion of this information w	cedures to safely operate and (s). For your own safety and to derstand, and observe all instructions erves the right to make technical mprove the performance or safety s based on machines manufactured uson Corporation reserves the right ithout notice.
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CALIFORNIA Proposition 65 Warning:	Engine exhaust, some or emit chemicals kno defects or other reproc	e of its constituents, and wn to the State of Califo ductive harm.	certain vehicle components, contain prnia to cause cancer and birth

### Foreword

Laws pertaining to 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.

#### NOTICE:

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## Foreword

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### **1.1** Signal Words Found in this Manual



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.

Obey all safety messages that follow this symbol to avoid injury or death.



#### WARNING

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

Obey all safety messages that follow this symbol to avoid possible injury or death.



#### CAUTION

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

Obey all safety messages that follow this symbol to avoid possible minor or moderate injury.

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

Note: Contains additional information important to a procedure.

## **1.2** Safety Guidelines for Operating the Machine

Operator training	<ul> <li>Before operating the machine:</li> <li>Read and understand the operating instructions contained in all manuals delivered with the machine.</li> <li>Familiarize yourself with the location and proper use of all controls and safety devices.</li> <li>Contact Wacker Neuson Corporation for additional training if necessary.</li> <li>When operating this machine:</li> <li>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.</li> </ul>
Machine condition	<ul> <li>Only operate the machine when:</li> <li>All safety devices and guards are in place and in working order.</li> <li>All controls operate correctly.</li> <li>The machine is set up correctly according to the instructions in the Operator's Manual.</li> <li>The machine is clean.</li> <li>The machine's labels are legible.</li> </ul>
	<ul> <li>When operating the machine:</li> <li>Do not modify or defeat the safety devices.</li> <li>Do not use worn electrical cords.</li> <li>Do not use faulty fuel supplies.</li> </ul>
Guidelines for operator	<ul> <li>When operating the machine:</li> <li>Remain aware of the machine's moving parts. Keep hands, feet, and loose clothing away from the machine's moving parts.</li> <li>Wear protective clothing appropriate to the job site when operating the machine.</li> <li>Wear safety glasses.</li> <li>Wear gloves when handling the heat transfer hoses.</li> </ul>
	<ul> <li>When operating the machine:</li> <li>Do not operate a machine in need of repair.</li> <li>Do not smoke near the machine.</li> <li>Do not disconnect the heat transfer hoses when the pumps are operating or a burner is firing.</li> </ul>
Work space	<ul> <li>When operating the machine:</li> <li>Position the machine on a firm, noncombustible, level surface, and chock the wheels.</li> <li>Position the machine on the job site so that neither it nor the operator are standing in water.</li> </ul>

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- Keep the area immediately surrounding and underneath the machine clean, neat, and free of debris and combustible materials.
- Keep the area above the machine clear of debris that could fall on the machine.
- Store the machine properly when it is not being used.
- Keep unauthorized personnel, children, and pets away from the machine.

When operating the machine:

 Never operate the machine in areas that contain flammable objects, fuels, or products that produce flammable vapors.

#### 1.3 Safety Guidelines for Lifting the Machine

Lifting/ transporting the machine When lifting/transporting the machine:

- Make sure all lifting devices are attached securely and have enough weightbearing capacity to lift or hold the machine safely.
- 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.
- Only use suitable transport vehicles with sufficient load-carrying capacity.

When lifting the machine:

- Never walk or stand under a suspended machine.
- Never climb, sit, or stand on the machine while it is being lifted or transported.
- Do not operate the machine when it is being lifted or towed.

#### Safety Guidelines for Towing the Machine 1.4



#### WARNING

Towing a large trailer requires special care. To reduce the possibility of an accident: ▶ Both the trailer and vehicle must be in good condition.

• The trailer and the vehicle must be securely fastened to each other.

Hitch and coupling	<ul> <li>Before towing, follow the instructions below to ensure that the hitch and coupling are ready for use.</li> <li>Check that the hitch and coupling on the vehicle are rated equal to, or greater than, the trailer's Gross Vehicle Weight Rating (GVWR).</li> </ul>
	<ul> <li>Inspect the hitch and coupling for wear or damage. DO NOT tow the trailer using defective parts.</li> </ul>
	<ul><li>Make sure the coupling is securely fastened to the vehicle.</li><li>Connect the safety chains.</li></ul>
	<ul> <li>Connect the breakaway cable safety hook to the bumper or rear of the vehicle. Do not attach to the vehicle hitch.</li> </ul>
Tires and wheels	Before towing, follow the instructions below to ensure that the tires and wheels are ready for use.
	<ul> <li>Check the tires on the trailer for tread wear, inflation, and condition. Replace worn tires.</li> </ul>
	• Check that the lug nuts holding the wheels are tight and that none are missing.
Brakes and lights	Before towing, follow the instructions below to ensure that the brakes and lights are ready for use.
	<ul> <li>Test the surge brakes on the trailer.</li> </ul>
	<ul> <li>Test the brakes on the vehicle that will be used for towing.</li> </ul>
	<ul> <li>Make sure directional and trailer lights are connected and working property</li> </ul>

Make sure directional and trailer lights are connected and working properly.

### 1.5 Safety Guidelines While Using Combustion Burners

When using the machine:

- Clean up any spilled fuel immediately.
- Replace the fuel tank cap after refueling the machine.
- Refill the fuel tank in a well-ventilated area.
- Shut down the generator, if equipped, when refueling.

When using the machine:



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#### DANGER

Exhaust gas from the burner contains carbon monoxide, a deadly poison. Exposure to carbon monoxide can kill you in minutes.

- Never run the machine indoors or in an enclosed area unless the machine is vented properly.
- Do not fill or drain the fuel tank near an open flame or while the machine is running.
- Do not smoke when refueling the machine.

#### **1.6 Safety Guidelines while Using Internal Combustion Engines**

Running the When running the engine:

- Keep the area around exhaust pipe free of flammable materials.
- Check the fuel lines and the fuel tank for leaks and cracks before starting the engine. Do not run the machine if fuel leaks are present or the fuel lines are loose.

When running the engine:



#### DANGER

Exhaust gas from the engine contains carbon monoxide, a deadly poison. Exposure to carbon monoxide can kill you in minutes.

- Never run the machine indoors or in an enclosed area unless the machine is vented properly.
- Do not smoke while operating the machine.
- Do not run the engine near open flames.
- Do not touch the engine or muffler while the engine is running or immediately after it has been turned off.
- Do not operate a machine when its fuel cap is loose or missing.

1.7 Safet	ty Guidelines for Maintaining the Machine
Training	<ul> <li>Only trained personnel should troubleshoot or repair electrical problems occurring with the machine.</li> </ul>
Cleaning	<ul> <li>When cleaning and servicing the machine:</li> <li>Keep the area around the burner free of debris such as leaves, paper, cartons, etc.</li> <li>Keep the machine clean and labels legible.</li> <li>When cleaning the machine:</li> <li>Do not clean the machine while it is running.</li> <li>Never use gasoline or other types of fuels or flammable solvents to clean parts.</li> </ul>
	Fumes from fuels and solvents can become explosive!
Maintenance guidelines	<ul> <li>When maintaining the machine:</li> <li>Keep the fuel lines in good condition and properly connected.</li> <li>Allow the burner to cool before maintaining the machine.</li> <li>Allow the Heat Transfer Fluid (HTF) to cool before maintaining the machine.</li> <li>Re-install the safety devices and guards after repairs and maintenance.</li> <li>Keep all electrical cords away from heat, oil, vibrating surfaces, and sharp edges.</li> </ul>
Replacing parts and labels	<ul> <li>When maintaining the machine:</li> <li>Replace worn or damaged components.</li> <li>Use only spare parts recommended by Wacker Neuson Corporation.</li> <li>Replace all missing and hard-to-read labels.</li> <li>Replace or repair electrical components with components that are identical in rating and performance as the original component.</li> </ul>
	<ul><li>When maintaining the machine:</li><li>Do not attempt tire repairs.</li></ul>
Accessories, safety devices and modifications	<ul> <li>When using the machine:</li> <li>Use only accessories/attachments that are recommended by Wacker Neuson Corporation.</li> </ul>
	<ul> <li>When using the machine:</li> <li>Never operate the machine if any safety devices or guards are missing or inoperative.</li> <li>Do not defeat safety devices.</li> <li>Do not modify the machine without the express written approval of Wacker Neuson Corporation.</li> </ul>

## 1.8 Label Locations



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## 1.9 Warning Labels

Ref.	Label	Definition
1	Before operating this Ground Heater", read and fully understand the operator's manual, Failure to do so could result in the machine functioning improperly or in serious injury to operator or bystander.	WARNING! Before operating this Ground Heater™, read and fully understand the Operator's Manual. Failure to do so could result in serious injury to the operator or bystander(s).
2	Image: Second	WARNING: Read Operator's Manual before operating machine. Exhaust gas is deadly. Operate machine only in well ventilated area. Do not operate machine indoors.
3	<b>A WARNING</b> LUGNUTS FACTORY TORQUED TO ## LB-FT. VERIFY LUGNUTS ARE PROPERLY TORQUED BEFORE TRANSPORTING. Failure to heed above warning could result in wheel loss which can cause injury or death.	WARNING: Lug nuts factory torqued to 75 ft.lbs. Verify lugnuts are properly torqued before transporting. Failure to heed warning could result in wheel loss which can cause injury or death.
4	Attach Chains or Straps <u>ONLY</u> to Axles and Designated "TIE DOWN" Points Never Run Straps Across Any Surface on this Machine Which is Painted RED. Failure to heed above warning could result in damage to personal property or cause serious injury or death.	WARNING: Attach chains or straps only to axles and designated "tie-down" points. Never run straps across any surface on this machine which is painted red. Failure to heed above warning could result in damage to personal property or cause serious injury or death.



Ref.	Label	Definition
9	Description           Jack Should NOT be Deployed for Truck Bed Transport           Properly Support Tongue with Wood Block and Retract           Jack Before Tightening Chains or Straps           Jack Before Tightening Chains           Jack Before Tightening Chains	WARNING! Jack should not be deployed for truck bed transport. Properly support tongue with wood block and retract jack before tightening chains or straps. Jack is not designed to take loads that ratcheting straps or load binded chains can deliver. Use jack for raising or lowering trailer tongue only. Failure to heed these warnings could result in damage to personal property or cause serious injury or death.

## 1.10 Informational Labels

Ref.	Label	Definition
10	Wacker Neuson Corporation         Model         Item Number       Rev.         Serial Number         kg       Ibs         hbs       HW         max.kg       max.lbs         Manul. Yr.         To max.kg       Manul. Yr.         To max.kg       Manul. Yr.         To max.kg       Manul. Yr.	A nameplate listing the model number, item number, revision number, and serial number is attached to each unit. Please record the information found on this plate so it will be available should the nameplate become lost or damaged. When ordering parts or requesting service information, you will always be asked to specify the model number, item number, revision number, and serial number of the unit.
11	Macker Corporation Menomore Falls, Wisconsin USA         Dec.           MODEL FRING NOZZE CAPACIT BUNKER RECTORM         MARCHY MODEL CAN TAKE THE CAPACIT BUNKER RECTORM         MARCHY MARCHY MODEL CAN TAKE THE CAPACIT BUNKER NO. CLOWN TAKE THE CAPACIT BUNKER BUNKER LATAKE DURING COMPARING TO SUBJECT AND THE CAPACITY MARCHY MODEL CAN THE CAPACIT BUNKER BUNKER EINO 0.0         MARCHY	Machine rating label: This label indicates rating information for the machine.
12	E1100 BURNER SETUP           BURNER NOZZLE	Burner setup. This label indicates important setup information for the burner.
13		HTF MSDS label. This label is the Material Safety Data Sheet for the HTF installed in the factory.
14	THIS HEATER OPERATES AT ZERO (ATMOSPHERIC) PRESSURE AND IS NOT SUBJECT TO REGULATIONS APPLICABLE TO PRESSURIZED "BOILERS"	This heater operates at zero (atmospheric) pressure and is not subject to regulations applicable to pressurized boilers.

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Ref.	Label	Definition
15	TIRE AND LOADING INFORMATION           The winght of cargo should never exceed         1919 kg (4230 Bx).           TIRE         SIZE         COLD TIRE PRESSURE           REAR         ST225/75D15D         448 KPA (65 PSI)           INTER         NONE         SPARE           SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION	(on trailer) Tire and loading information label: This label indicates tire and loading information for the trailer.
16	MNUFACTURED BYFARROLF PAR WACKEN KUUSON CORP MTE	(on trailer) VIN label. This label displays vehicle identification numbers and other related information.

## 1.11 Procedural Labels

Ref.	Label	Definition
17	STOP ! DO NOT RESET RED "LOW LEVEL FAULT" LIGHT ON CONTROL PANEL INDICATES HTF IS BELOW MINIMUM OPERATING LEVEL FOLLOW PROCEDURE BELOW: 1. SHUT OFF BURNER SWITCH AND PUMP SWITCH(ES) 2. FIND AND REPAR HTF LEAK. 3. ADD HTT TO "MIN" LEVEL ON HTF SIGHT GAUGE. 4. PRESS MANUAL RESET. 5. TURN ON BURNER SWITCH. 6. STURN ON BURNER SWITCH. 7. TURN ON BURNER SWITCH. 7. TURN ON PUMP(5). ONE AT A TIME. 7. TURN ON PUMP(5). ONE AT A TIME.	Do not reset. Refer to Operator's Manual.
18	2 WAY VALVE OPERATION	Valve operation label This label indicates the functions of the operational positions for valve #2.
19	<section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header>	Machine operating guide This label is a guide to operating the machine. Refer to the Operator's Manual for detailed instructions.

Notes:

## E 1100

### 2 Lifting and Transporting

### 2.1 Lifting the Machine

**Prerequisites** • Properly rated lifting equipment (crane or hoist). See Chapter *Technical Data*.

- Machine stopped. See topic *Stopping the Machine*.
- 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 one of the lifting eyes (a) on the machine using hooks, shackles, and chains.



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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.

## Lifting and Transporting

### 2.2 Transporting the Machine on a Flat Bed

**Prerequisites** • Machine stopped. See topic *Stopping the Machine*.

All doors and access covers closed and secured.



#### 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. Failure to comply may cause damage to your machine.

Move the machine

1. Move the machine onto the flat bed using properly rated ramps or docks.

**NOTICE:** The flat bed must be at least 80 inches wide.



**Support the** 2. Install a support **(a)** under the trailer tongue. A piece of wood will work. **tongue.** 



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- 3. Rotate the trailer jack (b) to the horizontal position.
- 4. If desired, rotate the trailer tongue (c) to a vertical position.
- 5. Install properly rated securing mechanisms (d) such as chains or straps.
- 6. Install chocks (e) under all four wheels.

**Result** The machine is ready to be transported.

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### 2.3 Towing the Machine

Prerequisites

Properly rated towing equipment. See Chapter *Technical Data* for applicable machine weights.

- Machine stopped. See topic *Stopping the Machine*.
- 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.



#### WARNING

Risk of severe injury or death. Improperly torqued lug nuts can lead to loss of wheels. Loss of wheels can cause severe injury or death.

Verify that the lug nuts are torqued to 75 ft.lbs. before towing the machine.

NOTICE: The towing vehicle must be equipped with a Class II or above hitch.

#### Towing

Follow the procedure below to tow the machine.

- 1. Completely wind the hoses and secure all hose ends.
- 2. Attach the machine to the towing vehicle (a).
- 3. Connect the trailer wires (b).
- 4. Inspect the following items before towing:
- tire pressure and condition (c)
- brakes and lights (d)
- lug nut torque (75 ft.lbs. required)
- fuel level (e; 70% recommended)



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## Lifting and Transporting

#### 2.4 **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 first seasonal use.

Before 1 machine Perform the procedures below before you power up the machine.

power	ing	up	
machii	ne		

Item Task		See Topic	
Machine exterior	Clean all outside surfaces		
Heater and burner	<ul> <li>Remove protective coverings from chimney and burner.</li> </ul>	—	
	<ul> <li>Remove any carbon buildup from the heater and burner assemblies.</li> </ul>	—	
	<ul> <li>Replace the burner nozzle.</li> </ul>		
	<ul> <li>Verify burner electrode position.</li> </ul>		
Controls and wiring	<ul> <li>Inspect all wires for damage, corrosion, or wear. Replace damaged wiring.</li> </ul>	—	
	<ul> <li>Inspect all electrical components for damage, corrosion, or wear. Replace damaged electrical components.</li> </ul>	—	
HTF system	<ul> <li>Inspect all hoses and couplings for wear or damage. Replace damaged hoses and cou- plings.</li> </ul>	_	
	<ul> <li>Clean the HTF strainer basket.</li> </ul>	6.9	
Fuel system	Replace the fuel filter element.	6.10	

#### With machine powered up

Perform the procedures below with the machine powered up.

ltem	Task	See Chapter
Burner	<ul> <li>Verify fuel pump pressure.</li> </ul>	5
	<ul> <li>Verify burner combustion.</li> </ul>	

### 3 Operation

#### 3.1 Intended Purpose and System Description

Intended This machine is a Hydronic Surface Heater intended to thaw frozen ground, cure concrete, prevent frost, and temporarily heat work spaces. Do not use this machine for any other purpose.

System Components The machine consists of the following components.

- Single-stage diesel burner
- Hydronic heater assembly
- 180L (48 gallon) tank for Heat Transfer Fluid (HTF)
- Digital temperature controller
- One positive-displacement pump
- Low HTF level protection device
- One 335 m (1100 ft.) hose loop
- Optional accessories to expand the machine's capacities and capabilities

System Description The diesel burner, controlled by the digital temperature controller, indirectly warms the HTF in the hydronic heater assembly. The warmed HTF is continuously circulated through a vented, closed-loop hose system by positive displacement pumps. The hoses of the hose system are spread evenly throughout the application area. The HTF transfers heat to the application area through the hoses or, in air heating applications, to the ambient air through Heat Exchangers. The low HTF level protection device stops machine operation if the HTF level drops below the minimum operating capacity.

Optional Red Wave<sup>™</sup> insulation blankets may be positioned over the hoses to increase system efficiency.





## Expanding the machine

The machine's capabilities and capacities can be increased by using Wacker Neuson accessories.

- Heat Exchangers for air heating applications
- Single (SPP) or Dual Pump Packs (DPP) and a Hose Handling System (HHS) to increase the application area

See Chapter Accessories for more information.

## 3.2 External Components



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Ref.	Description	Ref.	Description
1	Hitch (ball or pintle)	6	Fender
2	Tie-down	7	Onan genset (option)
3	Fuel tank	8	Jack stand
4	Fuel cap	9	Lifting bail (option)
5	Performance monitoring light	-	

## 3.3 Internal Components



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Ref.	Description	Ref.	Description
а	Duplex receptacle	h	Hose reel and hose
b	Pressure and temperature gauges	i	Hose quick-connect
С	Flow gauge	j	Hose reel brake T-handle
d	Rewind system foot control pedal	k	Fuel filter
е	Temperature controller	I	Low-level shut-down device
f	Control panel	m	Burner
g	Heat Transfer Fluid (HTF) reservoir gauge	n	Hydronic heater <sup>1</sup>

1 This heater operates at zero (atmospheric) pressure and is not subject to regulations applicable to pressurized "boilers".

### 3.4 Recommended Fuels

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	

**Note:** The burner on this machine was calibrated by test-firing for correct operation at Wacker Neuson Corporation located 180 m (600 ft.) above sea level using #2 diesel fuel combined with an anti-gelling additive.

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#### 3.5 Using the Anti-Theft Fuel Cap

Background The fuel tank cap is designed to prevent theft of the fuel inside. The cap includes a locking mechanism that is easily operated and locked using a standard padlock (not supplied by Wacker Neuson Corporation).

**NOTICE:** Refer to topic *Recommended Fuels* for the proper fuel requirements.

Removal To remove the anti-theft fuel cap, carry out the following procedure:

- 1. Unlock and remove the padlock (not shown).
- 2. Lift the locking lever (a) and twist counter-clockwise to release.
- 3. Lift the cap off the tank.



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#### Installation

#### To install the anti-theft fuel cap, carry out the following procedure:

- 1. Place the cap on the access hole.
- 2. Twist the locking lever (a) clockwise to latch and rotate the lever down over the locking eye.
- 3. Install and lock a padlock (not shown).







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## 3.6 Control Panel Detail



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Ref	Description	Function
а	Ground Fault Circuit Interrupt	Provides protection for the operator.
b	Circuit breaker	Controls power to the machine.
С	Low level indicator	Indicates low heat transfer fluid level.
d	Burner fault indicator	Indicates burner faults.
е	HTF fill ON/OFF switch	Overrides the Low Level Fault mode to enable HTF filling procedures.
f	Pump ON/OFF switch	Controls power to the pump.
g	Hose rewind ON/OFF switch	Controls power to the hose rewind motor.
h	Burner ON/OFF switch	Controls power to the burner.
i	Temperature controller	<ul> <li>Allows the user to control the HTF target application temperature.</li> <li>Shows the actual temperature of the HTF.</li> </ul>
j	Hour meter	Meters usage of the machine.

## 3.7 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.	3.9
2. Check fuel level.	Or, when at the job site before daily operation.	3.10
3. Position the machine.	At the job site.	3.11
4. Connect power.		3.12
5. Perform pre-starting checks.		3.13
6. Power up the machine.		3.14
5. Run the machine.		
a. Preheat the HTF (if necessary).		3.15
b. Initiate HTF flow.		3.16
c. Unwind and position the hoses.		3.17
d. Monitor the operating parameters.		3.18
e. Adjust the burner (if necessary).		Burner Setup
6. Stop the machine.		3.19
7. Shut down and pack up the machine.		3.20

## Operation

## 3.8 Monitoring the Operating Parameters

**Background** Monitor the machine while it is operating to ensure safe and efficient operation.

#### **Parameters** Monitor the following parameters every 8–24 hours.

Parameter	Notes
Fuel level	Add fuel as needed.
HTF level	Add HTF as needed.
HTF operating pressure	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 strobe signifies that all systems are OK.

E 1100 Operati				
3.9 Cheo	3.9 Checking the HTF Level			
When	<ul><li>Before leaving for the job site, or</li><li>Before beginning operation at the job site</li></ul>			
Prerequisites	<ul><li>The machine is level.</li><li>The machine is cool.</li></ul>			
Procedure The Heat Transfer Fluid (HTF) level must be between the marks on the sightglass (c).				
If low	If the HTF level is low, HTF must be added. Filling the HTF reservoir requires			

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

## Operation

#### 3.10 Positioning the Machine

Operating at<br/>high<br/>elevationsIf using the machine at or above elevations of 1524 m (5000 ft.) asl, modifications<br/>and additional maintenace may be necessary to preserve the machine's systems.<br/>See topic Operating at High Elevations.

**Guidelines** Use the following guidelines when positioning the machine for normal operation:



1. Place machine near the application area (a) on solid, stable ground.

2. Install chocks (b) under the wheels.

3. Level the machine using the trailer jack (c) if available.

**Note:** The machine may be air lifted to the top of a structure for operation if necessary. See topic "Lifting the Machine".

**Result** Your machine is now properly positioned.
### 3.11 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 circuit breaker switch (a) to the OFF position.



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2. Connect the main power cord **(b)** to a properly-rated power source or to the generator if included.

**Result** Power has now been connected. The machine is ready for pre-starting checks.

#### **Before Starting** 3.12

#### Prerequisites

- Machine properly positioned
- Power connected to the machine -

Checks

Before starting the machine, check the following items:

#### Fuel System

Fuel sight gauge (a)

Check the fuel level.

Fuel quick-connects (b)

HTF sight gauge (c)

Check that the quick-connect couplings are secure.



Check that there is an adequate amount of HTF in the reservoir.

**NOTICE:** Starting the machine with low HTF will damage the pumps.

**HTF Hose connections** 

Check that all HTF hose quick-connects are secure. ghi\_gr006605

Result

The machine is ready to be powered up.

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### 3.13 Applying Power to the Machine

#### Prerequisites

- Pre-starting checks have been completed
  - Power connected to the machine
  - Generator started, if applicable

#### Procedure

- Follow the procedure below to power up the machine.
  - 1. Move the circuit breaker switch (a) to the ON position.



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- 2. Check that the indicator light of the GFCI (b) is off. Press the "**RESET**" button of the GFCI if its indicator light is ON.
- 3. Check that the low-level-fault indicator light (c) is OFF. If this light is ON, add Heat Transfer Fluid (HTF) to the reservoir. See Topic *Filling the HTF Reservoir*.
- 4. Check that the displays of the temperature controller (d) illuminate. If the displays of the temperature controller do not illuminate, there is a problem with GFCI or a problem with the wiring to the temperature controller. Disconnect the main power supply and rectify the problem before continuing.

**Result** The machine is ready for operation.

#### 3.14 Preheating the HTF

**NOTICE:** Starting the machine with frozen or partially frozen Heat Transfer Fluid (HTF) will permanently damage the pumps. Preheat the HTF when ambient air temperature is below -26°C (-15°F).

#### **Prerequisites** HTF reservoir full

Machine powered up

Procedure Follow the procedure below to preheat the HTF.

> 1. Use the up and down arrows (a) on the temperature controller to set the HTF temperature to 70°F (21°C). This is the set point temperature.





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- 2. Move the burner ON/OFF switch (b) to the ON position. The following sequence occurs:
  - a. The burner motor starts after a 5-second delay.
  - b. The burner fires after a 15-second delay.
  - c. The burner will operate, with little or no visible exhaust smoke, until the HTF reaches 70°F (21°C) (the set point temperature); at which time, the burner will stop firing.
  - d. The burner will re-fire if the set point temperature is increased or the temperature of the HTF falls below 70°F (21°C).





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When the temperature controller displays "70.0" (b) the HTF is preheated. Result

### 3.15 Initiating the HTF Flow

Prerequisites

**s** • Heat Transer Fluid (HTF) preheated. See Topic *Preheating the HTF* 

Gloves



#### 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 gloves when handling hot hoses or hot plumbing components.

Note: If you are using accessories, see Chapter "Accessories".

Procedure

Follow the procedure below to initiate HTF flow.

1. Open valve #2.



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2. Move the Pump ON/OFF switch (b) to the ON position.



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This procedure continues on the next page.

Continued from the previous page.

- 3. Check the pump pressure gauge (e). The following should occur:
  - During the first minute of operation, the pressure should build to as high as 170 psi.

**NOTICE:** If the HTF reaches 170 psi (11.7 bar) after only a second or two of operation, there is a problem. Shut down the machine and rectify the problem before continuing.

- Once flow is established, pressure should be: 125–140 psi (8.6–9.6 bar).
- When the HTF is warm, operating pressure should be: 90–110 psi (6.2–7.6 bar).



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4. Check the HTF flow indicator (f). The flow indicator should be spinning. If it is not, there is a problem. Shut down the machine and rectify the problem before continuing.

**Result** HTF is now flowing.

### 3.16 Unwinding and Positioning the Hoses

Prerequisites

- 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 gloves when handling hot hoses and plumbing components.

Procedure

Follow the procedure below to unwind and position the hoses.

1. Rotate the T-Handle (a) counter-clockwise to unlock it.



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- 2. Pull the hose **(b)** off the reel by hand and place it in the application area. See topic *Hose Spacing Guidelines* for hose spacing recommendations based on appication.
- **Result** The hose is now positioned and the machine is operating.

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

#### 3.17 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 Corporation recommends observing the following guidelines to maximize efficiency.

Hose spacing diagram Refer to the graphic 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.

**NOTICE:** The hoses may be positioned vertically along concrete framing walls for curing applications. Contact Wacker Neuson Application Support for more information.

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### 3.18 Stopping the Machine Temporarily

**Precautions NOTICE:** This procedure is to be used for stopping the machine temporarily for routine maintenance such as refueling or repositioning hoses. Do not use this procedure for any other purpose.

**Stopping the** Follow the procedure below to stop the machine temporarily.

1. Move the burner On/Off switch (a) to the OFF position.



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- 2. Allow the burner to complete the burner-motor-off delay period.
- 3. Move the pump On/Off switch (b) to the OFF position.
- 4. Turn off all accessories if applicable.

Your machine is now stopped.

Perform the necessary task(s) (refueling, repositioning hoses, etc.).

 Restarting the machine
 Follow the procedure below to restart the machine.

 1. Move the burner On/Off switch (a) to the ON position.

 2. Wait until the burner fires.

 3. Move the pump On/Off switch (b) to the ON position.

 4. Start accessories if applicable.

 Your machine has resumed operating.

## E 1100

#### 3.19 Shutting Down the Machine

**Procedure** Follow the procedure below to shut down the machine.

1. Move the burner switch (a) to the OFF position.



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- 2. Allow the burner to complete the burner-motor-off delay period.
- 3. Move the pump switch (b) to the OFF position.
- 4. Turn off all accessories if applicable.
- 5. Rewind the hoses. See Topic Rewinding the Hoses.
- 6. Move the circuit breaker switch (c) to the OFF position.



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- 7. Disconnect and store all accessories.
- 8. Disconnect power from the machine.
- 9. Close and lock all doors.

**Result** The machine is now shut down.

### 3.20 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 gloves 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 guick-connect couplings. Do not use dirty or contaminated quick-connect couplings. Do not lubricate quick-connect couplings. Usage Follow the instructions below when using the quick-connect couplings. Instructions 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 Follow the instructions below when cleaning the quick-connect couplings. Instructions 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. Install caps or protective covers after each use. а





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E 1100

#### 3.21 **Rewinding the Hoses**

**Prerequisites** 

- Pump off
- All accessories off, if applicable

Burner off and cooled



#### 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 gloves when handling hot hoses and plumbing components.

#### Release the brake

Follow the procedure below to release the hose reel brake:

- 1. Release the hose reel brake by turning the T-handle (a) counter-clockwise.
- 2. Remove the foot pedal (b) and place it on a firm, flat, and dry surface.





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**Rewind the** hoses

Follow the procedure below to rewind the hoses:

1. Move the hose rewind On/Off switch (c) to the On position.

Note: The rewind motor will start but will not rotate the hose reel until the clutch is engaged.



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- 2. Press down on the foot pedal (b) to engage the clutch.
- 3. Guide the hose evenly onto the hose reel as it rotates. This procedure continues on the next page.

Continued from the previous page.

4. Release the foot pedal to disengage the clutch before reaching the hose end.

**NOTICE:** Disengage the clutch before reaching the hose end. Failure to comply may damage the machine.

5. Manually wind the remainder of the hose onto the reel.



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- 6. Engage the hose reel brake by turning the T-handle (a) clockwise.
- 7. Return the foot pedal (b) to its storage location.





Your hoses are now wound onto the hose reel and your machine is ready to be placed into storage. See chapter *Lifting and Transporting* and the topic *Storing the Machine.* 

### 3.22 Resetting a Low HTF Fault

Prerequisites   Genuine Wacker Neuson Heat Transfer Fluid, o	r
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Dowfrost HD 50 Heat Transfer Fluid

**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 differs slightly from that when a low level fault is encountered. If you are filling the reservoir during normal operation, see topic *Filling the HTF Reservoir*.

**Background** The HTF reservoir includes a sensor that will trigger the low-level shut-down device to stop the machine's function if the HTF falls below the minimum operational capacity. During a low HTF level condition the following occurs:

- The control panel low level fault light illuminates
- Power is cut to the burner
- Power is cut to the pumps
- The low-level shut-down device "LOW WATER" light illuminates

#### Resetting a low HTF fault

Follow the procedure below to reset a low HTF fault.

- 1. Move the burner switch to the OFF position.
- 2. Move the pump switch to the OFF position.
- 3. Clean the fill hose.
- 4. Move valve #2 to the maintenance position (valve handle pointing up).





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5. Place the open end of the fill hose **(a)** into a container full of HTF. *This procedure continues on the next page.* 

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6. Lift and hold the HTF fill switch (b) in the ON position and watch the HTF reservoir sightglass (c)—release the HTF fill switch when the HTF level is at the minimum level in the HTF reservoir sightglass.

**NOTICE:** Do not overfill the HTF reservoir. Doing so may damage the machine.





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ghi\_gr006624

7. Press and release the "RESET" button (d) on the low-level shut-down device. The following will occur:

- The "POWER" (green) (f) and "LOW WATER" (red) (e) lights will blink for fifteen seconds while the low-level shut-down device performs a selfdiagnostic test.
- After 15 seconds, the "LOW WATER" light will go out—the "POWER" light will stay on.
- The low HTF level indicator will go out.
- Power will be returned to the pumps.
- Power will be returned to the burner.
- Move the pump On/Off switch to the ON position and continue to fill the HTF reservoir until the HTF level is between the two marks on the HTF reservoir sightglass.

**NOTICE:** Do not overfill the HTF reservoir. Doing so may damage the machine.

- 9. Move valve #2 to the normal position.
- 10.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.
- 11. Move the fill hose to its storage location under the hose reel.
- **Result** The low HTF level fault has been reset and the HTF reservoir has now been filled. You may now resume operation of the machine.

## 3.23 Burner Controller Periods and Modes



#### Periods

The burner controller has several periods it sequences through during normal operation. These periods are described below.

Period	Action or Function
Power up	As soon as power is supplied to the burner controller, it conducts an internal safety check. If all internal conditions are OK, the burner controller enters the idle mode and will remain there until there is a call for heat, or power is disconnected.
Safety (5 seconds)	When the setpoint of the temperature controller is set at a temperature higher than that of heat transfer fluid, the output contacts of the temperature controller close, completing a circuit between terminal "T" and "3T" of the burner controller. This is the call for heat.
	The burner controller initiates the safety period.
	If flame or light is detected, the burner controller remains in the idle mode and no other functions take place.
	<ul> <li>If flame or light is not detected after 5 seconds:</li> <li>Power is sent to the burner motor/fuel pump. Fuel is pumped from the supply tank and returned to the supply tank through the return/ bypass port of the fuel pump. This process purges air from the fuel lines.</li> </ul>
	<ul> <li>Power is sent to the electrodes and any residual fuel is burned off.</li> <li>Fresh air fills the combustion chamber.</li> <li>The valve-on-delay period starts.</li> </ul>
Valve-on- delay	The valve-on-delay period lasts 15 seconds. It is enabled (turned on or off) with DIP switch 3. When enabled:
	<ul> <li>Power is sent to the burner motor/fuel pump.</li> <li>Power is sent to the electrodes.</li> <li>The fuel shut-off valve is energized (opens) and fuel flows to the nozzle after the valve-on-delay times out.</li> </ul>

Period	Action or Function		
Trial-for- ignition	The trial-for-ignition period immediately follows the valve-on-delay period. During this period:		
	<ul> <li>The fuel shut-off valve is opened (energized).</li> </ul>		
	<ul> <li>Pressurized fuel atomizes at the burner nozzle.</li> </ul>		
	<ul> <li>The atomized fuel is vaporized and ignited by the electrodes.</li> <li>The burner fires and the flame is monitored by the cad cell.</li> </ul>		
	If flame is not detected:		
	<ul> <li>The burner controller enters lockout mode.</li> </ul>		
	<ul> <li>Power is disconnected from the fuel shut-off valve, electrodes, and the burner motor.</li> </ul>		
	<ul> <li>The indicator light flashes.</li> </ul>		
Carry-over	The ignition carry-over period starts as soon as the flame is established. During this cycle:		
	<ul> <li>The fuel shut-off valve is open (energized).</li> </ul>		
	<ul> <li>Pressurized fuel atomizes at the burner nozzle.</li> </ul>		
	<ul> <li>The atomized fuel is ignited by the electrodes.</li> </ul>		
	The electrodes stay powered for up to 30 seconds after flame is sensed.		
	Once the carry-over period has expired:		
	<ul> <li>The ignition transformer is shut off.</li> </ul>		
	The burner controller enters the run mode.		
	If the flame is lost:		
	<ul> <li>If the lockout time has not expired, the burner controller returns to trial-for-ignition period.</li> </ul>		
	<ul> <li>If the lockout time has expired, the burner controller enters the recycle mode.</li> </ul>		
Burner-motor-	The burner-motor-off-delay period starts immediately after the setpoint		
off delay	is reached, i.e., the call for heat has been satisfied. The time of this period is set by the DIP switches (DIP switches 1 and 2 in the down position; 3 in the up position). During this period:		
	<ul> <li>The fuel shut-off valve is closed (de-energized).</li> </ul>		
	<ul> <li>The burner motor runs until the burner-motor-off delay expires, then the burner motor turns off.</li> </ul>		
	<ul> <li>The burner controller returns to the idle mode.</li> </ul>		

# Non-fault

The burner non-fault modes are described below.

modes
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Mode	Functional description
Idle	<ul> <li>The burner controller will enter the idle mode if:</li> <li>At power up, the internal conditions are correct and the cad</li> </ul>
	<ul> <li>cell senses no light.</li> <li>The cad cell senses light during the safety period.</li> <li>The call for heat has been satisfied.</li> <li>During this mode:</li> <li>The burner controller powers no outputs.</li> </ul>

Mode	Functional description		
Startup	<ul> <li>The burner controller will enter the startup mode as soon as there is a call for heat. This mode consists of the following periods:</li> <li>Safety</li> <li>Valve-on-delay</li> <li>Trial-for-ignition</li> <li>Carry-over</li> </ul>		
Run	<ul> <li>The run mode starts and continues once the ignition carry-over period has elapsed. During this mode:</li> <li>The fuel shut-off valve is open (energized).</li> <li>Pressurized fuel atomizes at the burner nozzle.</li> <li>The flame is monitored by the cad cell.</li> <li>Once the setpoint is reached (call for heat satisfied):</li> <li>The output contacts of the temperature control open, interrupting the circuit between terminal "T" and "3T".</li> <li>The fuel shut-off valve is closed (de-energized).</li> <li>The burner motor runs for the selected burner-motor-off delay time (period), then turns off.</li> <li>The burner controller returns to the idle mode.</li> <li>If the flame is lost during the run mode:</li> </ul>		
Recycle	<ul> <li>The burner controller enters the recycle mode.</li> <li>The burner will enter the recycle mode when the burner stops firing due to loss of flame. During the recycle mode:</li> <li>The diagnostic light on the burner controller will flash in two-second intervals.</li> <li>The burner will attempt to automatically restart.</li> <li>Flame must be detected during each restart attempt. If no flame is detected, the burner controller goes into burner fault lockout mode.</li> <li>The burner controller will wait 60 seconds between restart attempts.</li> <li>After three restart attempts in which the call for heat is not satisfied, the burner controller will go into burner fault lockout mode.</li> </ul>		

This procedure continues on the next page.

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## Operation

#### Continued from the previous page.

Fault modes The burner controller fault modes are described below.

Lockout	The burner will enter the lockout mode after three unsuccessful attempts to re-light the flame.	
	During the lockout mode:	
	<ul> <li>The diagnostic light on the burner controller will flash in half- second intervals.</li> </ul>	
	<ul> <li>The burner fault light on the control panel will illuminate.</li> </ul>	
	To clear the lockout fault so a restart can be attempted, press and release the reset button. <b>Note:</b> After the third attempt to manually clear the lockout fault, the burner controller will enter the restricted lockout mode.	
Restricted lockout	The burner will enter the restricted lockout mode after three unsuccessful attempts to manually reset the lockout fault.	
	<ul><li>During the restricted lockout mode:</li><li>The burner will not fire.</li></ul>	
	<ul> <li>The diagnostic light on the burner controller will flash in half- second intervals.</li> </ul>	
	<ul> <li>The burner fault light on the control panel will illuminate.</li> </ul>	
	To clear the restricted lockout fault so a restart can be attempted, press and hold (approximately 30–45 seconds) the reset button until the diagnostic light flashes once. <b>Note:</b> <i>The burner will return to the lockout mode with each unsuccessful burner restart, until a successful heating cycle has occurred.</i>	



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### 3.24 Operating at High Elevations

**Background** If using the machine at or above elevations of 1524 m (5000 ft.) asl, periodic monitoring and additional maintenance are necessary to preserve the machine's systems. The following procedures will ensure that the machine runs smoothly and that premature soot build-up inside the hydronic heater will be reduced.

Guidelines

Use the guidelines below to ensure efficient operation of the machine. Refer to the specific topic for details.

Task	When	See Topic
1. Conduct a smoke spot test.	After making any adjustments and/or Every 1000 hours	5.1
2. Adjust the air settings	Before operation	5.6
3. Adjust the fuel pressure	Before operation	5.7
4. Replace the burner nozzle	Before operation	5.4



#### WARNING

Fire hazard. The use of incorrect nozzles could cause fire or impaired combustion. Impaired combustion may cause under-firing, over-firing, sooting, sudden expulsion of hot gases, and smoke.

Use only the factory-installed or recommended nozzles.

### 4 Accessories

### 4.1 Available Accessories

Available<br/>AccessoriesTo increase the machine's capabilities and capacities, the following Wacker<br/>Neuson accessories are available.



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Ref	Description	Ref.	Description
а	Hose Handling System (Models 1101 and 2202)	f	1-2 Adapter
b	Heat Exchanger (HX 50)	g	2-1 Adapter
С	Heat Exchanger (HX 100)	h	Accessory hoses (various lengths)
е	Red Wave™ insulation blanket	i	Single (SPP) or Dual (DPP) Pump Pack

For compatibility and configuration information, continue reading.

### Accessories

### 4.2 Expanding the Surface Heating Capacity

**Background** The standard E1100 can be combined with Wacker Neuson Hose Handling Systems (HHS 1101 and 2202) and Single or Dual Pump Packs (SPP or DPP) to increase the surface heating capacity. The typical configurations are shown below; however, this does not represent all possible configurations. For more information, contact Wacker Neusion Application Support.

**Estimated** The machine is capable of the following when utilizing the expansion configurations illustrated below.

	Description		Application		
Option			Thaw	Cure	Frost Prevention
1	1 HHS 1101, 1 SPP	m² (ft²)	204 (2200)	408 (4400)	610 (6600)
2	1 HHS 2202, 1 DPP	m <sup>2</sup> (ft <sup>2</sup> )	Not applicable	610 (6600)	915 (9900)

#### Option 1

Standard E1100 combined with one HHS 1101 (a) and one SPP (b).



# Option 2 Standard E1100 combined with one HHS 2202 (a) and one DPP (b) and one 1-2 Adapter (c).



For more information regarding setup of these configurations, continue reading.

## 4.3 Surface Heat Expansion Detail - Option 1



#### Legend

Ref	Description	Condition
#1	HTF supply valve	Open after connection (in the "normal" position)
а	SPP	Connected to E1100 using leaders and HHS hoses
b	Hose loop 1 (E1100)	Placed in application area and connected to onboard HTF supply QC (e).
С	Hose loop 2 (HHS 1101)	Removed from HHS and placed in application area Connected to SPP supply QC (g) and accessory return QC (f).
d	HHS 1101 (hoses removed)	Placed in a suitable storage area during application.

## Accessories

### 4.4 Surface Heat Expansion Detail - Option 1



#### Legend

Ref	Description	Condition
#1	HTF supply valve	Open after connection (in the "normal" position)
а	DPP	Connected to E1100 using leaders and HHS hoses
b	Hose loop 1 (E1100)	Placed in application area and connected to onboard HTF supply QC (e)
С	Hose loop 2 (HHS 2202)	Removed from HHS and placed in application area Connected to DPP supply QC (g) and 2-1 adapter (e)
d	Hose loop 3 (HHS 2202)	Removed from HHS and placed in application area. connected to DPP supply QC (g) and 2-1 adapter (e)
e	2-1 Adapter	Connected to hose loops 2 and 3 and accessory return QC (h)
f	HHS 2202 (hoses removed)	Placed in a suitable storage area during application

### Accessories

#### 4.5 Using Heat Exchangers (to Heat Air)

**Background** The standard E 1100 can be combined with Wacker Neuson Heat Exchangers (HX 50 and HX 100) and Single (SPP) and Dual Pump Packs (DPP) to convert the heating application from surface to air. The typical configurations are shown below; however, this does not represent all possible configurations. For more information, contact Wacker Neuson Application Support.

**Configuration** In order to connect Heat Exchangers to the machine, additional accessories are requirements 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	2			
HX 100	1	1	1	

For more information regarding setup and connection of these configurations, continue reading.

# E 1100

## 4.6 HX 100 Connection Diagram



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#### Legend

Ref	Description	Condition
#1	HTF supply valve	Open to NORMAL position after connection
а	HX 100 supply leader hose	Connected to HTF supply line
b	HX 100 return leader hose	Connected to accessory return plumbing (on the rear of the machine)
С	HX 100	See above.

## Accessories

## 4.7 HX 50 Connection Diagram



#### Legend

Ref	Description	Condition
#1	HTF supply valve	Open to NORMAL position after connection
а	HX 50 (1)	Connected to machine HTF supply (via 1-2 adapter) and accessory return (via 2-1 adapter)
b	HX 50 (2)	Connected to machine HTF supply (via 1-2 adapter) and accessory return (via 2-1 adapter)
С	1-2 adapter	See above
d	2-1 adapter	See above

### 5 Burner Setup

## Factory settings

Head	Firing rate L/hr (gph)	Nozzle size	Fuel pressure bar (psi)	Air band setting	Air shutter
L1	3.4 (0.90)	0.65 60° A	12.4 (180)	2	4
F3	3.4 (0.90)	0.75 80° A	10.0 (145)	2	4

**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

The following tools are required to adjust the burner:

required

High-quality combustion analyzer

- Smoke spot tester
- Fuel pressure test gauge
- General hand tools

Mandates

- Adjustments made shall be done 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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Continued from the previous page.

#### When Adjust the burner:

- Before operating the machine at elevations 305 m (1,000 ft) above or below the location of where the last adjustments were made.
- 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 Section 5.2 *Setting/Checking the Electrodes* on page 70.)
- 3. Check the burner nozzle. (See Section 5.3 *Checking/Replacing the Nozzle* on page 72.)
- Check/set the "Z" distance. (See Section 5.4 Setting the "Z" Distance ("L" head) on page 75.) or

(See Section 5.5 Setting the "Z" Distance ("F" head) on page 76.)

- 5. Set the air settings. (See Section 5.6 *Adjusting the Air Settings* on page 78.)
- 6. Start the machine and the burner.
- 7. Check/set the fuel pressure. (See Section 5.7 *Setting the Fuel Pressure* on page 79.)
- 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.

Continued from the previous page.

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** You have now set up the burner.

## **Burner Setup**

### 5.1 Determining the Burner Head Type

**Prerequisites** • Power supplies disconnected from the machine

Machine cool

**Procedure** Follow the procedure below to determine the burner head type.

1. Disconnect the power supplies.

2. Remove the copper fuel line (a) between the fuel pump and the burner housing. **Note:** *Only remove the fuel fitting closest to the burner housing.* 



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3. Remove the knurl nut (b) that is seated against the escutcheon plate. *NOTICE:* Handle the knurled knob with care. It is easily damaged.

4. Loosen tabs (c) and hinge back the igniter cover.





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- 5. Disconnect the wiring to the electrode/nozzle assembly.
- 6. Maneuver the electrode/nozzle assembly (d) up and out of the burner.

This procedure continues on the next page.

## E 1100

Continued from the previous page.

7. Determine which type of head your burner has.

If the electrode/nozzle assembly looks like (L), the head is an "L" style.





ghi\_gr006194 ghi\_gr006193 If the electrode/nozzle assembly looks like (F), the head is an "F" style.

**Result** You have now determined the burner type.

### **Burner Setup**

### 5.2 Setting/Checking the Electrodes

#### Prerequisites

- Power supplies disconnected
  - Measuring device

Procedure

Note: Procedure shows the "F" head.

Follow the procedure below to check the electrodes.

1. Disconnect the power supplies.

2. Remove the copper fuel line (a) between the fuel pump and the burner housing. **Note:** *Only remove the fuel fitting closest to the burner housing.* 



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3. Remove the knurl nut (b) that is seated against the escutcheon plate. *NOTICE:* Handle the knurled knob with care. It is easily damaged.

4. Loosen tabs (c) and hinge back the igniter cover.





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5. Disconnect the wiring to the electrode assembly.

6. Maneuver the electrode assembly (d) up and out of the burner.

This procedure continues on the next page.

### E 1100

Continued from the previous page.

7. Use the measurements below to properly set the electrode tips on both the "F" and the "L" head.

Note: Beckett also has special tools for measuring the "Z" distance:

- The Beckett "Z" gauge may be used on "F" heads.
- The Beckett T501 gauge may be used on both "F" and "L" heads.



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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)

Result

You have now checked/adjusted the electrodes.

## **Burner Setup**

## E 1100

### 5.3 Checking/Replacing the Nozzle

#### Prerequisites Power supplies disconnected

Machine cool

Removal

Follow the procedure below to remove the burner nozzle.

- 1. Disconnect the power supplies.
- 2. Remove the copper fuel line (a) between the fuel pump and the burner housing.



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3. Remove the knurl nut (b) that is seated against the escutcheon plate. Note: Handle the knurled knob with care. It is easily damaged.

4. Loosen tabs (c) and hinge back the igniter cover.





- 5. Disconnect the preheater wiring.
- 6. Maneuver the electrode assembly (d) up and out of the burner.

This procedure continues on the next page.
Continued from the previous page.

7. Unscrew the burner nozzle from the burner tube.





The procedure to remove the burner nozzle is now complete.

Installation

Follow the procedure below to install the burner nozzle.

1. Thread the new burner nozzle into the burner tube. **Note:** *Do not use thread sealant on the threads.* 

2. Position the igniter assembly (d) into the burner.





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- 3. Connect the preheater wiring.
- 4. Close the igniter cover and secure it with tabs (c).

This procedure continues on the next page.

## **Burner Setup**

Continued from the previous page.

5. Install the knurl nut **(b)** that is seated against the escutcheon plate. **Note:** *Handle the knurled knob with care. It is easily damaged.* 



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6. Install the copper fuel line (a) between the fuel pump and the burner housing.

**Result** You have now replaced the nozzle.

## 5.4 Setting the "Z" Distance ("L" head)

#### Prerequisites •

- Burner removed from the machine
  - T501 gauge

**Procedure** Follow the procedure below to set the "Z" distance on "L" heads.

1. Remove the burner from the machine.



- 2. Loosen the knurled 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 knurled nut (b).
- 8. Mark (x) the escutcheon plate for later reference.



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#### Result

You have now set the "Z" distance.

## **Burner Setup**

### 5.5 Setting the "Z" Distance ("F" head)

#### Prerequisites

- Burner removed from the machine
  - T501 gauge or "Z" gauge

**Procedure** Follow the procedure below to set the "Z" distance on F-style heads.

- 1. Remove the burner from the machine.
- 2. Loosen the knurled nut (b).



- ghi\_gr006186
- 3. Loosen the position locking screw (e).
- 4. Set the "Z" distance by using one of the three following methods: using Beckett T501 gauge, by measuring, or using Beckett "Z" gauge.

Beckett T501 Using the Beckett T501 gauge.

a. Position the gauge into the flame retention head as shown.



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- b. Slide the nozzle assembly so that the front face of the burner nozzle touches the T501 gauge.
- c. Tighten the position locking screw.
- d. Tighten the knurled nut.
- e. Mark the escutcheon plate for later reference. See step 5.

This procedure continues on the next page.

## E 1100

Continued from the previous page.

#### Measuring

Measuring the "Z" distance.

a. Place a straight edge over the end of the flame retention head.



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- b. Adjust the nozzle assembly until the distance between the front face of the burner nozzle and the end of the head measures 1-1/8 inches (28 mm).
- c. Tighten the position locking screw (e).
- d. Tighten the knurled nut.
- f. Mark the escutcheon plate for later reference. See step 5.
- **Beckett "Z"** The Beckett "Z" gauge may also be used. Refer to the Beckett instructions for detailed information.





5. Mark (x) the escutcheon plate for later reference.

**Result** You have now set the "Z" distance.

## **Burner Setup**

### 5.6 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.			
	<ul> <li>Higher O<sub>2</sub> percentage (excess air settings) lowers soot production but raises stack temperature and reduces efficiency: lean mixture.</li> </ul>			
	<ul> <li>Lower O<sub>2</sub> percentage (inadequate air settings) increases efficiency and lowers stack temperature but may cause soot build-up: rich mixture.</li> </ul>			
Procedure	Follow the procedure below to adjust the air settings.			
	<ol> <li>Initial setting of the air damper should be performed with the machine shut down.</li> </ol>			
	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** You have now adjusted the air settings.

## 5.7 Setting the Fuel Pressure

## Factory

### Factory settings:

- setting
- "F" head: 145 psig (10.0 bar)
- "L" head: 180 psig (12.4 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.



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- 3. Insert the gauge in place of the bleeder valve.
- 4. If your machine has a generator, start it.
- 5. Move the Burner On/Off switch to ON. The burner will go through a pre-purge cycle. Monitor and make adjustments during the pre-purge cycle.
- 6. Turn the adjusting screw (b) clockwise to increase fuel pressure, counterclockwise to decrease fuel pressure.

**Result** You have now adjusted the fuel pressure.

# E 1100

# 6.1 Periodic Maintenance Schedule

	Interval* (hours of service)			
	Daily	2 Week	6 Month	Yearly
Task		(50)	(1000)	(1200)
Inspect hoses .				
Inspect hose connectors.				
Inspect hose couplings.				
Inspect electrical cords/ connections.				
Check/adjust burner air setting.				
Check HTF level. Fill if necessary.		•		
Check/adjust fuel pressure.				
Inspect pump.				
Replace burner nozzle.				
Clean HTF strainer.				
Replace fuel filter.				
Lubricate hose reel chain.				
Lubricate hose reel bearings.				
Clean boiler tubes.				
Clean quick-connect couplings.				
Test the burner exhaust and adjust the settings.	As needed or upon changing job sites			
* Use whichever comes first				

## E 1100

### 6.2 Repairing a Hose

#### Prerequisites Hose nipple

- Two hose ferrules
- Hose crimping tool, part number 0169002

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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4. Install a ferrule (b) on either end of the freshly cut hose.

5. Install the nipple (c) into one of the hoses.

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





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

This procedure continues on the next page.

Continued from the previous page.

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



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

The procedure is now complete.

### 6.3 Inspecting Hoses, Connectors, and Couplings

- Prerequisites 

  Machine stopped
  - Circuit breaker off
  - Burner cool

#### HTF System Hose reel:

- 1. Open access doors.
- 2. Rotate the hose reel brake T-handle (a) counter-clockwise to release.
- 3. Pull all the hose off the reel and inspect for leaks and/or damage.
- 4. Repair any leaks and repair/replace any damaged hoses. See topic *Repairing a Hose*.



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Pump, motor, and boiler:

- 1. Inspect pump and motor assembly (a) and associated plumbing (b) for leaks and/or damage.
- 2. Inspect boiler (c) and associated plumbing (d) for leaks and/or damage.
- 3. Repair/replace any damaged hoses or connectors.
- 4. Repair any leaks.





This procedure continues on the next page.

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Continued from the previous page.

#### Fuel System Burner

- 1. Inspect all fuel lines and connections (a) for leaks and/or damage.
- 2. Inspect the fuel filter and associated fuel lines (b) for leaks and/or damage.
- 3. Repair/replace any damaged hoses, pipes, or connectors.
- 4. Repair any leaks.

#### Fuel tank

- 1. Inspect all fuel lines into and out of the fuel tank (c) for leaks and/or damage.
- 2. Repair/replace any damaged hoses, pipes, or connectors.
- 3. Repair any leaks.





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### 6.4 Inspecting Electrical Cords and Connections

### **Prerequisites** • Machine stopped

- Circuit breaker off
- All power disconnected from machine

#### **Procedure** 1. Open all access doors and remove all access covers.

- 2. Inspect control panel and associated electrical cords for wear and/or damage.
- 3. Inspect pump and associated electrical cords for wear and/or damage.
- 4. Inspect hose reel and associated electrical cords for wear and/or damage.
- 5. Inspect burner and associated electrical cords for wear and/or damage.
- 6. Repair/replace any worn or damaged cords. Refer to your Parts Book for replacement parts.

## 6.5 Changing the HTF Filter

#### Prerequisites

Machine cool

Machine shut down

Removal

Follow the procedure below to remove the HTF filter.

- 1. Shut down the machine and allow the (Heat Transfer Fluid) HTF to cool.
- 2. Locate the filter assembly (a).





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**Note:** *HTF may spill when changing the filter.* Do not allow the HTF to spill on the ground. Clean up spilled HTF immediately. Dispose of the HTF and soiled rags in accordance with local environmental regulations.

3. Remove the bolt (c) from the top of the filter head (d) and separate the filter head from the bowl (e).



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- 4. Remove and inspect the filter (f) and the gaskets (g). Discard a damaged filter or gaskets.
- 5. If reusing the filter or gaskets, wash them thoroughly with tap water.

The procedure to remove the filter is now complete.

Installation Follow the procedure below to install the HTF filter.

This procedure continues on the next page.

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# E 1100

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1. Install gaskets (g) to the filter (f).





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- 2. Place the filter and gaskets into the bowl (e).
- 3. Install the assembly using bolt (c).

The procedure to change the HTF filter is now complete.

### 6.6 Changing a Turbulator/Cleaning a Turbulator Tube

#### Prerequisites ■ Machine shut down

Machine cool

Procedure

Follow the procedure below to clean/change the turbulator tubes.

1. Allow the machine to cool.



### 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.
- 2. Remove the nuts (a) that secure the flue box door.



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3. Open the flue box door (b).

**NOTICE:** If the door panel insulation does not open with the door, carefully remove it from where it is caught on the bolts (c).

4. Locate the turbulators housed in the burner tubes.



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- 5. Remove the turbulators (d) by pulling the turbulator tab. Replace any turbulator that is badly corroded.
- 6. Clean each burner tube with a bottle brush.

7. Vacuum out each burner tube.

The procedure is now complete. Reassemble the machine.

## E 1100

### 6.7 Replacing the Fuel Filter

#### Prerequisites

- ites Power components check OK
  - Fundamental components check OK

Removal procedure

- Follow the procedure below to check/change the fuel filter.
  - 1. Place circuit breaker 1 in the OFF position.
  - 2. Locate the fuel filter assembly (a).
  - 3. Disconnect both quick-connect couplings (b and c).





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**Note:** Fuel is within the fuel filter canister. Take measures to capture any fuel that spills. Dispose of this fuel in accordance with local environmental regulations.

- 4. Remove the bolt (d) from the top of the canister cap and remove the canister cap.
- 5. Remove the fuel filter (e) and the gasket (f).
- 6. Clean the inside of the canister.

# Installation procedure

- Follow the procedure below to install the fuel filter.
  - 1. Install a new gasket to the canister.
  - 2. Install a new fuel filter into the canister. Be sure to align the fuel filter properly with the bottom of the canister.
  - 3. Reinstall the canister cap and secure it with the bolt.
  - 4. Reconnect the quick-connect couplings.

The fuel filter has now been changed.

## E 1100

### 6.8 Filling the HTF Reservoir

### Prerequisites Genuine Wacker Neuson Heat Transfer Fluid, or

Dowfrost HD 50 Heat Transfer Fluid

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

**Background** The procedure for routine filling of the HTF reservoir differs slightly from that when a low level fault is encountered. If your machine has experienced a low level fault, see topic *Resetting a Low HTF Fault*.

**Procedure** Follow the procedure below to fill the HTF reservoir.

- 1. Move the burner switch to the OFF position.
- 2. Clean the fill hose (a) and place the open end into a container full of HTF.
- 3. Move valve #2 to the maintenance position (valve handle pointing up).





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**NOTICE:** Do not overfill the HTF reservoir. Doing so may damage the machine.

- 4. When the HTF level is between the MIN and MAX, move valve #2 to the normal position.
- 5. 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.
- 6. Move the fill hose to its storage location under the hose reel.
- 7. Move the burner switch to the ON position.

**Result** The HTF reservoir has now been filled. You may now resume operation of the machine.

## 6.9 Storing the Machine

Short term storage	<ol> <li>Stop and break down the machine. See topic See topic Shutting Down the Machine.</li> </ol>			
	2. Remove and store any accessories.			
	3. Allow the heater to cool sufficiently.			
	4. Verify that all control switches are in the off position.			
	5. If necessary, fill the HTF reservoir.			
	6. If necessary, fill the fuel tank.			
Long-term storage	<ol> <li>Fill fuel tank with stabilized fuel and operate the burner for at least fifteen minutes to ensure circulation through entire fuel system. Any brand of fuel stabilizer is acceptable.</li> </ol>			
	<ol> <li>Allow heater to cool sufficiently. Cover the chimney and the burner with plastic wrap or other waterproof material. This will prevent corrosive moisture build-up and blockages caused by animal nests.</li> </ol>			
	<ol> <li>If applicable, remove the emergency break-away battery and store the battery in a cool, dry place. Connect battery to a trickle charger once every 30 days to maintain full charge.</li> </ol>			
	4. Shut and lock all doors.			
	5. If applicable, protect the trailer tires from direct sunlight.			
	6. When removing from storage, the machine must be prepared for operation. See topic <i>Preparing the Machine for Seasonal Operation</i> .			

# 7 Basic Troubleshooting

## 7.1 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	There is no fuel.	Fill fuel tank.
does not ignite.	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	The fuel pressure is set incorrectly.	Adjust the fuel pressure.
locks out.	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.

# **Basic Troubleshooting**

Problem / Symptom	Reason	Remedy
Thaw progress is below capacity.	The insulation is insufficient.	Add additional Red Wave 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 supply power.	Verify that the breaker switch 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 HTF temperature is below -26°C (-15°F).	Warm the HTF and hoses before starting machine; see topic <i>Preheating the</i> <i>HTF</i> in this manual.
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 <i>or</i> warm the enclosure using an external heat source.
	The foot pedal switch has failed.	Replace the foot pedal switch.
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 <i>Preheating the</i> <i>HTF</i> in this manual.
	The strainer basket is clogged.	Clean the strainer basket; see topic <i>Changing the HTF</i> <i>Filter</i> .

E 1100

### 8 Schematics

## 8.1 E 1100 Composite Schematic (SN 1538 and higher)



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# 8.2 E 1100 Composite Components

Use the following table of symbols for the schematics found throughout this chapter.

Symbol	Ref	Description
CB1	CB1	Circuit breaker 1
	GFCI	Ground Fault Circuit Interrupt
FU1	FU1	Fuse 1
HOSE REWIND	HOSE REWIND	Hose rewind Off/On switch
MTR	MTR	Rewind motor Pump motor Burner motor
FU2 <u>25</u> <u>5.</u> dA <u>23</u> 3AG 5.0 SB	FU2	Fuse 2
	n/a	Rewind transformer
n/a	n/a	To line 14
n/a	n/a	To line 16
n/a	n/a	To line 24
RECT1	RECT1	Rectifier
FTSW1 WHT	FTSW1	Foot switch 1
SOL1 BLK OWHT	SOL1	Solenoid 1 (oil valve)
BLK H N HHT	LOW LEVEL	Low-level shut-down device power connection terminals
	LOW LEVEL	Low-level shut down device normally open contacts
n/a	n/a	Pumps Motor
n/a	n/a	Rewind Motor
	K1	Relay coil (K1)

# E 1100

# Schematics

Symbol	Ref	Description		
K1 	K1	Relay normally open contacts (K1)		
K1 	K1	Relay normally closed contacts (K1)		
(K2)1	K2	Relay coil (K2)		
$\frac{K^2}{4+3}$	K2	Relay normally closed contacts (K2)		
K2 	K2	Relay normally open contacts (K2)		
n/a	n/a	1 phase		
PL1 R	PL1	Pilot light 1 Low level fault		
	PL2	Pilot light 2 Burner fault		
	DUPLEX	Duplex receptacle		
(HR1)	HOUR METER	Hour meter		
	n/a	Ignition transformer		
n/a	n/a	Limit		
n/a	n/a	Alarm		
n/a	n/a	Burner controller (primary control)		
-0/0- SOL 2	SOL 2	Solenoid 2 Rewind clutch		
T/C TYPE T C	T/C type T	Thermocouple Type T		
	TEMPERATURE CONTROLLER	Temperature controller		
	n/a	Cab light		
	GND	Ground		
13 TS114	TS1	Thermal switch 1 (snap disc)		

# **Schematics**

Symbol	Ref	Description
	HTR1	Heater (fuel prewarmer)
CAD	CAD	Cad cell
LOW LEVEL OVERRIDE	LOW LEVEL OVERRIDE MOMENTARY	Low-level shut down device momentary override Off/On switch.
BURNER Off On	BURNER	Burner Off/On switch
REWIND	REWIND	Rewind Off/On switch

E 1100

## 8.3 Burner System Circuit



# **Schematics**

E 1100

# 8.4 Circulation System Circuit



## 8.5 Rewind System Circuit



## 8.6 E 1100 Composite Schematic (SN 1537 and lower)



# E 1100

# Schematics

# **Technical Data**

## 9 Technical Data

### 9.1 E 1100

ltem Number Model	Units	0620172 E 1100	0620244 E 1100G
Weight, no fuel, no generator	kg (lb)	1036 (2283)	
Weight, full fuel, with generator	kg (lb)		1432 (3156)
Weight, no fuel, with generator	kg (lb)		1228 (2708)
Fuel tank capacity	L (gal)	272	(72)
Hose length	m (ft)	335 (	1100)
HTF capacity	L (gal)	189	(50)
Burner nozzle	gph X deg	0.65 X 60, B	
Burner pressure	kPa (psi)	1241 (180)	
Fuel input	kW	35.8	
Heater efficiency	%	87	
Oil gph	L/hr (gph)	3.3 (0.872)	
Pump	L/hr (gph)	1003	(265)
Run time	hrs	1'	15
Hose pressure	bar (psi)	4.83-6.2	1 (70-90)
Standard thaw capacity	m <sup>2</sup> (ft <sup>2</sup> )	102-204 (1	1100-2200)
Expanded thaw capacity	m² (ft²)	204-306 ( 2200-3300)	
Standard cure capacity	m <sup>2</sup> (ft <sup>2</sup> )	204 (2200)	
Expanded cure capacity	m <sup>2</sup> (ft <sup>2</sup> )	612 (6600)	
Standard frost prevention	m <sup>2</sup> (ft <sup>2</sup> )	307 (3300)	
Expanded frost prevention	m <sup>2</sup> (ft <sup>2</sup> )	921 (9900)	
Air heat capacity	m <sup>3</sup> (ft <sup>3</sup> )	5100 (1	80,000)

# 9.2 Dimensions



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