



342 N. Co. Rd. 400 East
Valparaiso, IN 46383
219-464-8818 • Fax 219-462-7985
www.heatwagon.com

Installation and Maintenance Manual

Please retain this manual for future reference.

TD300

Ground Thawing Unit



For your safety: Do not use this heater in a space where gasoline or other liquids having flammable vapors are stored.

WARRANTY

All new Heat Wagon and Sure Flame heaters and fans are guaranteed against defective materials and workmanship for one (1) year from invoice date.

Warranty repairs may be made only by an authorized, trained and certified Heat Wagon dealer. Warranty repairs by other entities will not be considered. Warranty claims must include model number and serial number.

LIMITATIONS

Warranty claims for service parts (wear parts) such as spark plugs, igniters, flame rods will not be allowed. Diagnostic parts such as voltage meters and pressure gauges are not warrantable.

Evidence of improper fuel usage, fuel pressures outside of manufacturer's specification, poor fuel quality, and improper electric power, misapplication or evidence of abuse may be cause for rejection of warranty claims.

Travel time, mileage and shipping charges will not be allowed. Minor adjustments of heaters are dealers' responsibility. Defective parts must be tagged and held for possible return to the factory for 60 days from date of repair. The factory will provide a return goods authorization, (RGA) for defective parts to be returned.

No warranty will be allowed for parts not purchased from Heat Wagon.

Heater is not intended for use in pest remediation.



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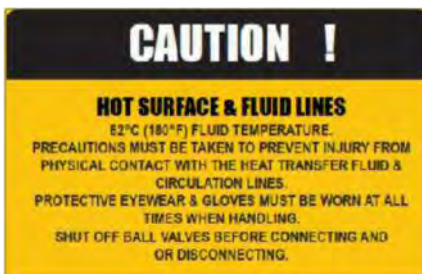
Safety Concerns

General Safety Guidelines

- Make certain that the operator reads and understands all the information in this manual.



- All unauthorized people must be kept away from the equipment when in operation.
- Maintain instructional and safety decals. Replace damaged decals.
- All guards must be in place when the equipment is in operation.



Water Heater Module

CAUTION! The water heater is a heating appliance.

- When dealing with any heating appliance, observe all posted warnings and cautions.
- Keep children and pets away from all piping and fuel accessories.
- The water heater housing panels must be kept closed when the system is operating. This prevents drafts from affecting water heater operation.

Heat Transfer Fluid

For complete "heat transfer fluid" information, refer to the Material Safety Data Sheets for "Dowfrost HTF" & "Boss Chill PG" in this section.



MATERIAL SAFETY DATA SHEET

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: BOSS CHILL PROPYLENE GLYCOL
 PROPYLENE-GLYCOL BASED
 Heat Transfer Fluid Concentrate

Date Prepared: Sept 19, 2014

COMPANY IDENTIFICATION

Supplier: BOSS LUBRICANTS
 112, 6303 – 30 STREET SE
 Calgary, AB T2C 1R4

Telephone: 403-279-2223

Fax: 403-279-2272

Toll Free: 800-844-9457

National Fire Protection Association

1	Health
1	Flammability
0	Reactivity
	Special



Product Name: BOSS CHILL PROPYLENE GLYCOL

Product Description: Propylene Glycol based industrial coolant and/or heat transfer fluid

Chemical Name: Inhibited propylene glycol, aqueous solution

Chemical Family: Mixture

Formula: Mixture

Synonyms: Heat transfer fluid, coolant

DOT Identification: Not regulated

DOT Shipping No.: Not regulated

Manufacturer: BOSS LUBRICANTS

SECTION 2: TYPICAL COMPOSITION

<u>Material</u>	<u>CAS No</u>	<u>%Wt</u>
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Propylene Glycol	000057-55-6	96%
Proprietary inhibitors	Not applicable	4%
Deionized Water	007732-18-5	Balance

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.122). In addition, other substances not "Hazardous" per this OSHA Standard may be listed. Where proprietary ingredients shows, the identity may be made available as provided in this standard.

**BOSS CHILL PROPYLENE GLYCOL
BOSS LUBRICANTS: MATERIAL SAFETY DATA SHEET**

SECTION 3: HAZARDOUS IDENTIFICATION

Health: 2
Flammability: 0
Reactivity: 0
Special: 0
 0 = minimal 1 = slight 2 = moderate 3 = serious 4 = severe

HMIS
H # 2
F # 0
R # 0
PPE†
†Sec.8

ROUTE(S) of Entry

Inhalation

A single prolonged (hours) inhalation exposure is not likely to cause adverse effects. Mists in high concentrations may cause irritation of nose and throat, cause headache, nausea or drowsiness. Prolonged or repeated exposure may result in the absorption of potentially harmful amounts of material.

Skin:

A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Repeated exposure may cause slight flaking, tenderness and softening of skin.

Ingestion:

Single dose oral toxicity is low. If more than several mouthfuls are swallowed, abdominal discomfort, nausea or diarrhea may occur

Eyes:

May cause minor irritation of eyes in some individuals. Corneal injury is unlikely.

Target Organs:

None known

Effect of overexposure:

Repeated excessive ingestion may cause central nervous system effects. No carcinogenic effects have been seen in long-term animal studies. Birth defects are unlikely. Exposure having no adverse effects on the mother should have no effect



on the fetus. In animal studies, it has been shown not to interfere with reproduction. Results of mutagenicity tests in-vitro (test tube) and in animals have been negative.

Signs and Symptoms of Exposure:

Redness and/or stinging sensation in eyes or on skin. Minor eye or skin irritation may occur with some people.

Medical conditions Generally Aggravated by Long-Term Exposure:

Chronic Effects: None known.

Carcinogenicity

NTP: None known

IARC Monographs: None known

OSHA regulations: None known

ACGIH None known

SECTION 4: FIRST AID MEASURES

Emergency and First Aid Procedures

Eye Contact: Flush eyes with large amounts of water for 15 minutes. If irritation persists, get medical attention.

Skin Contact: Wash off in flowing water or shower. Wash contaminated clothing before reuse.

Ingestion: DO NOT induce vomiting immediately and GET IMMEDIATE MEDICAL ATTENTION.

Never give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air. If breathing has stopped, start artificial respiration. Seek medical attention.

Note to Physicians: Treat symptomatically. No specific antidote. Supportive care. Treatment based on judgment of physician in response to reactions of the patient.

Special Precautions/ Procedure. None known

SECTION 5: FIRE-FIGHTING MEASURES

NFPA

Flash Point: None

Flash Point Method: Not applicable



Autoignition

Burning Rate: Not available
Temperature: Not available
Flammable limits in air (% by Volume)
LEL: Not available
UEL: Not available

Extinguishing Media: Water for, fog, foam, CO₂, dry chemical. Alcohol resistant foams (ATC type) are best when available. Do not use direct water stream as it may spread the fire.

Unusual Fire or Explosion Closed containers may rupture or explode due to steam pressure build-up when exposed to extreme heat.

Hazards: Water may be used to cool closed containers. Do not use a direct water stream on fire. Container may rupture from gas generation in a fire situation.

Fire-Fighting Instructions: Do not release runoff from fire control methods to sewers or waterways.

Fire Fighting Equipment: Full protective equipment including positive-pressure, self-contained breathing apparatus. During emergency conditions, overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Seek medical attention.

Unusual Fire Fighting Keep people out of the area and isolate fire. Burning liquids may be moved by flushing with water.

Procedures: Do not use a direct water stream as it may spread fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Spill/Leak Procedures: Recover useable material by convenient method; residual may be removed by wipe or wet mop.

Small Spills Small spills should be absorbed with a suitable inert material (sand, earth, clay, etc.) Remove the absorbed material and place in an appropriate chemical waste container for disposal.

Large Spills: Large spills should be diked and pumped.

Containment: For large spills, dike far ahead of liquid spill for later disposal.

Regulatory Requirements: Follow applicable OSHA REGULATIONS (29 CFR 1910.120).



SECTION 7: HANDLING AND STORAGE

- Handling Procedures:** Wear impermeable gloves and other protective clothing to avoid prolonged or repeated skin contact. When handling, wear eye protection.
- Storage Requirements:** Keep containers tightly closed when not in use. Store only in containers resistant to alkaline solutions with a pH of 9.0-12.0.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

- Exposure Guidelines:** Propylene Glycol: AIHA WEEL is 50 ppm total, 10mg/m³ aerosol only. 10mg.m³ for Propylene Glycol mist, 400ppm for Propylene Glycol vapors.
- Ventilation:** Provide general or local exhaust ventilation systems.
- Administrative Controls**
- Respiratory Protection:** If personal exposure cannot be controlled below applicable exposure limits by ventilation, wear respiratory devices approved by NIOSH/MSHA, for protection against organic vapors, dust, fumes and mists.
- Protective Clothing/ Equipment:** Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear protective eyeglasses or chemical safety goggles.
- Work and Hygienic Practices:** Wash or rinse hands before touching eyes or contact lenses, and before eating.
- Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

- Appearance and odor:** dyed purple odor less
- Boiling point (760 mmHg):** 317°F 188°C
- Specific Gravity (water=1)** 1.040 - 1.060
- Solubility in Water (%by wt):** Complete
- pH:** 9.0 - 10.5
- Vapor Density (air=1):** <1.0
- Vapor Pressure:** 2.2mmHg

SECTION 10: STABILITY AND REACTIVITY

- Stability:** Stable
- Polymerization:** Hazardous polymerization cannot occur
- Chemical Incompatibilities:** Oxidizing materials, strong acids
- Conditions to avoid:** Avoid contact with strong acids and strong oxidizers



Hazardous decomposition Products: Depends upon temperature, air supply and the presence of other materials

SECTION 11: TOXICOLOGICAL INFORMATION

Eye Effects: Irritating to eyes.
Skin Effects: The LD50 for skin absorption in rabbits is >10,000 mg/kg.
Acute Inhalation Effects: Significant vapors are only generated at elevated temperatures; may irritate nose and respiratory system.
Acute Oral Effects: The oral LD50 for rats is 20,000-34,000 mg/kg.
Chronic Effects: Liver and kidney damage in a 2 year rat feeding study using 1-2% Propylene Glycol
Oral administration of very high doses of Propylene Glycol produced birth defects in laboratory animals.
Carcinogenicity: None known
Mutagenicity: Not mutagenic
Teratogenicity: Not Teratogenic

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity: Base primarily on data for the major components, product is practically non-toxic to aquatic organisms.
Irritation Index/Estimation of Irritation (Species): Not determined.
Environmental Fate: Decomposes to carbon, oxygen, nitrogen and water.
Environmental Degradation: Biodegradable
Soil Absorption/Mobility: Not determined

SECTION 13: DISPOSAL CONSIDERATIONS

Waste disposal method; Sanitary landfill or incinerate in approved facilities in accordance with local, state and federal regulations. Do not dump into any sewers, on the ground or into any body of water.
Disposal Regulatory This product, if unused, does not meet the RCRA criteria for being identified as a hazardous waste by characteristics.
Requirements:
Container Cleaning and Disposal: Containers should be cleaned or residual product before disposal, and disposed of in accordance with all applicable laws and regulations.

SECTION 14: TRANSPORT INFORMATION

DOT Shipping Name: Not regulated
Shipping Symbols: Not applicable
Hazard Class: Not applicable **DOT**
Identification No.: Not regulated



Packing Group: Not applicable
Label: Not applicable
Special Provisions (172.102): Not applicable

Packaging Authorizations

a) **Exceptions** Not applicable
b) **Non-bulk Packaging:** Not applicable
c) **Bulk Packaging:** Not applicable

Quantity Limitations

a) **Passenger, Aircraft, or Railcar:** Not applicable
b) **Cargo Aircraft Only:** Not applicable

Vessel Stowage Requirements

a) **Vessel Stowage:** Not applicable
b) **Other:** Not applicable

SECTION 15: REGULATORY INFORMATION

Regulatory Information: **Notice:** The information herein is presented in good faith and believed to be as accurate as the effective date shown above. However, no warranty, expressed or implied, is given. Regulatory requirements are subject to change and may differ from one location to another. It is the buyer's responsibility to ensure that its activities comply with federal, state or provincial and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations

(Not meant to be all-inclusive -selected regulations represented.)

EPA Regulations

RCRA Hazardous Waste Number and RCRA
Hazardous Waste Classification: Not applicable
CERCLA Hazardous Substance and CERCLA Reportable Quantity: Not applicable

SARA313: To the best of our knowledge this product contains no chemical subject to SARA TITLE 111 Section 313 supplier notification requirements

SARA Hazard Category: This product has been reviewed according to the EPA "Hazard Categories promulgated under Section 311 and 312 of the Superfund Amendment and



Re-Authorization Act of 1986 (SARA Title III) and is considered, under applicable definitions not to have met any hazard category.

OSHA regulations:

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

WHMIS:
(The Canadian Workplace
Materials Information
System)

Not a “Controlled Product” under WHMIS
4000 division B (A toxic material causing other chronic effects) Hazardous

SECTION 16 OTHER INFORMATION

Additional Hazard Rating Systems: None

Disclaimer: THE INFORMATION GIVEN HEREIN IS GIVEN IN GOOD FAITH AND FROM SOURCES WE BELIEVE RELIABLE. BUT NO WARRANTY, EXPRESS OR IMPLIED, REGARDING ITS CORRECTNESS IS MADE.

The conditions or methods of handling, storage, use and disposal of this product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

This MSDS was prepared and is to be used only for this product. If the product is used as a component in another product, this MSDS information may not apply.

CONSULT COMPANY LISTED IN SECTION 1 FOR FURTHER INFORMATION.



Material Safety Data Sheet

DOW CHEMICAL CANADA ULC

Product name: DOWFROST™ Heat Transfer Fluid

Issue Date: 01/23/2015

Print Date: 06/29/2015

DOW CHEMICAL CANADA ULC 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™ Heat Transfer Fluid

Recommended use of the chemical and restrictions on use

Identified uses: Intended as a heat transfer fluid for closed-loop systems. This product is acceptable for use where there is possibility of incidental food contact and as a product for use in the immersion or spray freezing of wrapped meat and packaged poultry products. 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.

COMPANY IDENTIFICATION

DOW CHEMICAL CANADA ULC
SUITE 2100
450 - 1ST STREET S.W.
CALGARY AB T2P 5H1
CANADA

For MSDS Updates and Product Information: 800-258-2436

Prepared by: Prepared for use in Canada by EH&S, Hazard Communications.

Revision Date: 01/23/2015

Print Date: 06/29/2015

Customer Information Number:

800-258-2436

SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 989-636-4400

Local Emergency Contact: 613-996-6666

2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance

Physical state Liquid.

Color Colorless

Odor

Characteristic

Hazard Summary

No significant immediate hazards for emergency response are known.

Potential Health Effects

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

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

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature: Glycol

This product is a mixture.

Component	CASRN	Weight percent
Propylene glycol	57-55-6	> 95.0 %
Dipotassium hydrogen phosphate	7758-11-4	< 3.0 %
Water	7732-18-5	< 3.0 %

4. FIRST AID MEASURES

Description of first aid measures

General advice: If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Skin contact: Wash off with plenty of water.

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.

Ingestion: No emergency medical treatment necessary.

Most important symptoms and effects, both acute and delayed: Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed

Notes to physician: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIREFIGHTING MEASURES

Suitable extinguishing media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

Unsuitable extinguishing media: Do not use direct water stream. May spread fire.

Special hazards arising from the substance or mixture

Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

Unusual Fire and Explosion Hazards: Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

Advice for firefighters

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. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage.

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.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: 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.

Methods and materials for containment and cleaning up: 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. Recover spilled material if possible. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling: No special precautions required. Keep container closed. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

Conditions for safe storage: Do not store in: Galvanized steel. Opened or unlabeled containers. 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

Control parameters

Exposure limits are listed below, if they exist.

Component	Regulation	Type of listing	Value/Notation
Propylene glycol	US WEEL	TWA	10 mg/m ³
	CA ON OEL	TWAEV Total	155 mg/m ³ 50 ppm
	CA ON OEL	TWAEV	10 mg/m ³
	CA ON OEL	TWA	155 mg/m ³ 50 ppm
	CA ON OEL	TWA	10 mg/m ³

Consult local authorities for recommended exposure limits.

Exposure controls

Engineering controls: 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.

Individual protection measures

Eye/face protection: Use safety glasses (with side shields).

Skin protection

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.

Other protection: Wear clean, body-covering clothing.

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.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state	Liquid.
Color	Colorless
Odor	Characteristic
Odor Threshold	No test data available
pH	10.0 50% <i>Literature</i>
Melting point/range	Not applicable to liquids
Freezing point	supercools
Boiling point (760 mmHg)	152 °C <i>Literature</i>
Flash point	closed cup 104 °C <i>Pensky-Martens Closed Cup ASTM D 93</i> (based on major component), Propylene glycol. open cup <i>Cleveland Open Cup ASTM D92</i> None
Evaporation Rate (Butyl Acetate = 1)	<0.5 <i>Estimated.</i>
Flammability (solid, gas)	Not applicable to liquids
Lower explosion limit	2.6 % vol <i>Literature</i> Propylene glycol.
Upper explosion limit	12.5 % vol <i>Literature</i> Propylene glycol.
Vapor Pressure	2.2 mmHg <i>Literature</i>
Relative Vapor Density (air = 1)	>1.0 <i>Literature</i>
Relative Density (water = 1)	1.05 at 20 °C / 20 °C <i>Literature</i>
Water solubility	100 % <i>Literature</i>
Partition coefficient: n-octanol/water	no data available
Auto-ignition temperature	371 °C <i>Literature</i> Propylene glycol.
Decomposition temperature	No test data available
Kinematic Viscosity	43.4 cSt at 20 °C <i>Literature</i>
Explosive properties	no data available
Oxidizing properties	no data available
Molecular weight	76.9 g/mol <i>Literature</i>

NOTE: The physical data presented above are typical values and should be used for specification.

10. STABILITY AND REACTIVITY

Reactivity: no data available

Chemical stability: Stable under recommended storage conditions. See Storage, Section 7.
Hygroscopic

Possibility of hazardous reactions: Polymerization will not occur.

Conditions to avoid: Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems. Avoid direct sunlight or ultraviolet sources.

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

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Aldehydes. Alcohols. Ethers. Organic acids.

11. TOXICOLOGICAL INFORMATION

Toxicological information on this product or its components appear in this section when such data is available.

Acute toxicity

Acute oral toxicity

Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

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

Acute dermal toxicity

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

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

Acute inhalation toxicity

At room temperature, exposure to vapor is minimal due to low volatility. Mist may cause irritation of upper respiratory tract (nose and throat).

For the major component(s):
LC50, Rat, 4 Hour, vapour, 6.15 mg/l No deaths occurred following exposure to a saturated atmosphere.

Skin corrosion/irritation

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

Serious eye damage/eye irritation

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

Sensitization

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

For respiratory sensitization:
No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Specific Target Organ Systemic Toxicity (Repeated Exposure)

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

Carcinogenicity

Similar formulations did not cause cancer in laboratory animals.

Teratogenicity

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.

Mutagenicity

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

Aspiration Hazard

Based on physical properties, not likely to be an aspiration hazard.

12. ECOLOGICAL INFORMATION

Ecotoxicological information on this product or its components appear in this section when such data is available.

Toxicity

Propylene glycol

Acute toxicity to fish

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).
LC50, *Oncorhynchus mykiss* (rainbow trout), static test, 96 Hour, 40,613 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates

LC50, Ceriodaphnia dubia (water flea), static test, 48 Hour, 18,340 mg/l, OECD Test Guideline 202

Acute toxicity to algae/aquatic plants

ErC50, Pseudokirchneriella subcapitata (green algae), 96 Hour, Growth rate inhibition, 19,000 mg/l, OECD Test Guideline 201

Toxicity to bacteria

NOEC, Pseudomonas putida, 18 Hour, > 20,000 mg/l

Chronic toxicity to aquatic invertebrates

NOEC, Ceriodaphnia dubia (water flea), semi-static test, 7 d, number of offspring, 13,020 mg/l

Dipotassium hydrogen phosphate

Acute toxicity to fish

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).

LC50, Leuciscus idus (Golden orfe), static test, 48 Hour, > 900 mg/l, Method Not Specified.

Persistence and degradability

Propylene glycol

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Biodegradation may occur under anaerobic conditions (in the absence of oxygen).

10-day Window: Pass

Biodegradation: 81 %

Exposure time: 28 d

Method: OECD Test Guideline 301F or Equivalent

10-day Window: Not applicable

Biodegradation: 96 %

Exposure time: 64 d

Method: OECD Test Guideline 306 or Equivalent

Theoretical Oxygen Demand: 1.68 mg/mg

Chemical Oxygen Demand: 1.53 mg/mg

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	69.000 %
10 d	70.000 %
20 d	86.000 %

Photodegradation

Atmospheric half-life: 10 Hour

Method: Estimated.

Dipotassium hydrogen phosphate

Biodegradability: Biodegradation is not applicable.

Bioaccumulative potential

Propylene glycol

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Partition coefficient: n-octanol/water(log Pow): -1.07 Measured

Bioconcentration factor (BCF): 0.09 Estimated.

Dipotassium hydrogen phosphate

Bioaccumulation: No bioconcentration is expected because of the relatively high water solubility.

Mobility in soil

Propylene glycol

Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient(Koc): < 1 Estimated.

Dipotassium hydrogen phosphate

No relevant data found.

13. DISPOSAL CONSIDERATIONS

Disposal methods: 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

TDG

Not regulated for transport

Classification for SEA transport (IMO-IMDG):

Not regulated for transport

Transport in bulk

Consult IMO regulations before transporting ocean bulk

**according to Annex I or II
of MARPOL 73/78 and the
IBC or IGC Code**

Classification for AIR transport (IATA/ICAO):

Not regulated for transport

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. 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

Hazardous Products Act Information: CPR Compliance

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

Hazardous Products Act Information: WHMIS Classification

This product is not a "Controlled Product" under WHMIS.

Canadian Domestic Substances List (DSL) (DSL)

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. OTHER INFORMATION

Hazard Rating System

NFPA

Health	Fire	Reactivity
0	1	0

Revision

Identification Number: 101234106 / A208 / Issue Date: 01/23/2015 / Version: 6.0

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

Legend

CA ON OEL	Canada. Ontario OELs
TWA	8-hr TWA
TWAEV	time-weighted average exposure value
US WEEL	USA. Workplace Environmental Exposure Levels (WEEL)

Information Source and References

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

DOW CHEMICAL CANADA ULC 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.

Introduction

Components

Central Mobile Enclosure (CME)

- A compact and portable design.
- Easy access from rear and side doors.
- Automatic temperature control and fuel usage which responds to work site demands.
- Low pressure atmospherically vented circulation system ... no special boiler certification is required to operate the system.
- Circulation system "automatic air vent" component for quick setup-and-go operation.
- A central heat module control center which monitors and controls system operations.
- A multi-light system operation feature for easy system troubleshooting.
- Flow-reversing "Green Thaw" system.



1 - TD300 Central Mobile Enclosure (side view)



2 - TD300 Central Mobile Enclosure (back view)

Passive heat transfer

Circulation line heat exchangers

The circulation line heat exchangers are the perfect solution for:

- Heating and/or thawing cold or frozen ground.
- Frost prevention.
- Concrete curing and heating in subzero environments.

This system can be applied to all types of concrete applications. Circulation line heat exchangers can be secured directly against the surface of the concrete or concrete forms. Alternately, an expendable circulation line can be incorporated into the concrete structure during the pour. Thus the slab floor can continue being heated, to provide radiant floor heat during construction.

Hose reel

- The on board hose reel comes with 3000ft. of 5/8" I.D circulation line heat exchanger hose.
- The reel provides convenient storage for the "circulation line heat exchange" hose required for thawing and/or curing concrete.
- The electric drive system provides "power on" or "power off" capability.
- A torque-limiting device provides breaking.
- The on-board reel comes with an integral 6-port manifold and a pair of 1 1/4" quick connections to accommodate a remote manifold.



3 - Hose reel

Accessories

Mixing/booster pump

The multifunctional mixing/booster ensures maximum flexibility in the use of this system.

- Tempering mode supplies lower temperature fluid for concrete cure and radiant floor heat applications eliminating the need to reduce the water heater operating temperatures below safe operating ranges.
- When operating in booster mode, the system can increase flow rates or function as a pumping station to increase pumping distances by over 300 feet per station.
- The system also allows for dual-temperature control. High temperature fluid can be provided to portable heat exchangers, along with a lower temperature fluid for concrete cure and radiant floor heat applications.
- The multifunctional mixing/booster ensures maximum flexibility in the use of this system.



4 - Mixing/booster pump

Optional remote manifold

- Allows for additional distribution and/or separation between the central heating trailer and the manifold.

Insulated line jackets

Insulated circulation line jackets are also available. These insulated jackets will prevent exposed circulation line heat loss in extreme subzero conditions.



5 - Optional remote manifold & Fluid circulation lines

Portable heat exchanger

Portable heat exchangers are the ideal way to heat and/or dry enclosed structures. Their compact and mobile design allows them to be positioned where required on the job site. The efficient fan/coil design provides a high rate of heat transfer. High volume fans then deliver this heat evenly throughout a large area. The clean, low relative humidity heat delivery minimizes energy costs by eliminating the need to draw in fresh outside air. With this system, you just reheat warm internal air, rather than heating cold external air.



6 - Portable Heat Exchangers

How the system works

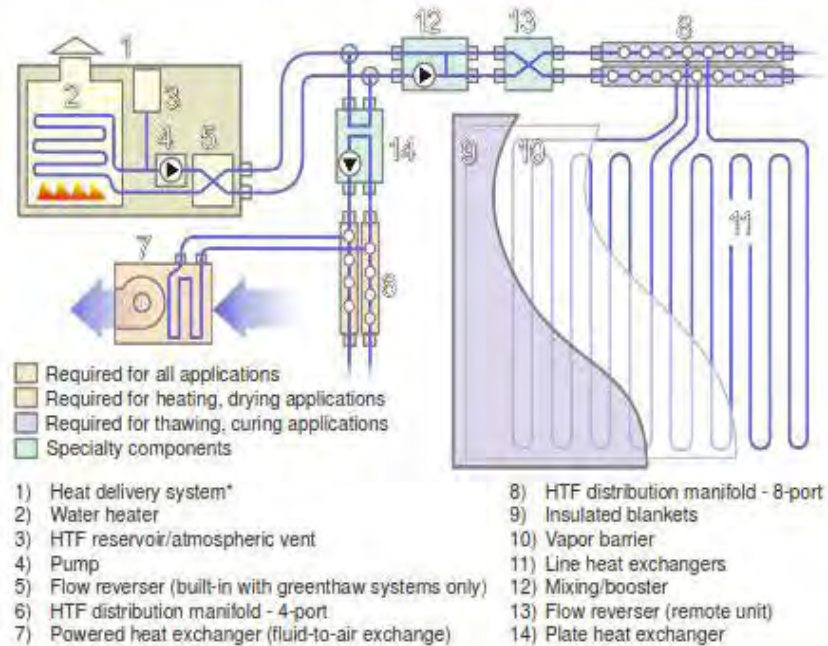
The system uses a low-pressure, open fluid loop distribution system with an atmospherically vented fluid reservoir. A central heating module warms the heat transfer fluid. This heated fluid is pumped through a distribution system loop, passing through heat exchangers in remote locations.

Two types of exchangers are available:

- Portable heat exchangers include a heat transfer coil, fan and thermostatic temperature control. The heat transfer fluid flows through the transfer coil, where heat is transferred to the air being drawn through the coil by the fan. The coil is specially designed for optimum heat transfer, without adding any moisture or combustion by-products to the air.
- Circulation line heat exchangers use flexible hose with hydraulic-style quick-couplers for ease in hookup. Heat transfer occurs by direct contact heat transfer and radiant heat conduction.

The mixing/booster unit can be utilized to:

- Provide lower temperature fluid for concrete cure and radiant floor heat applications.
- Provide dual temperature control with a single fluid circulation system.
- Boost fluid flow and increase pumping distances.



*Central heating module' (CHM - propane, nat gas or diesel fired) or 'steam plate heat exchanger'

Setup (CME)

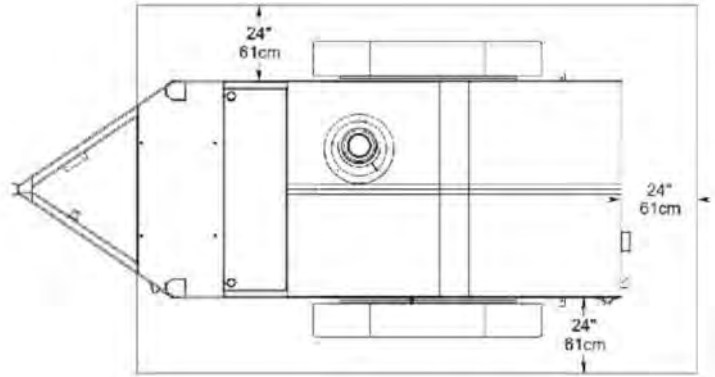
The positioning of all the system components on the site will be influenced by a number of factors. Please read all of the "Setup" section before beginning.

Be sure to observe all local electrical codes and fire regulations when positioning the central heat module.

Required safety clearances

The TD300 is a heating appliance, therefore safe heat and exhaust clearances must be observed from combustible materials and for service access.

- Maintain 24" (61 cm) of clearance on all sides of the unit.
- Maintain 36" (91 cm) of clearance on all sides of the flue pipe and chimney cap



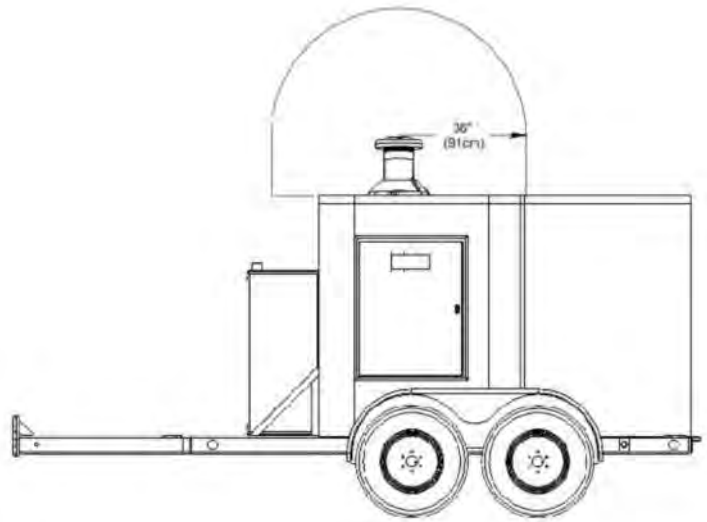
7 - GTS 300 top view

TD300

Elevation concerns

Do not place any "portable heat exchangers" or "circulation line heat exchangers" higher than the top level of the heat transfer fluid fill tank without using a reservoir extension kit. If this is not observed, the following can occur:

- Insufficient fluid in the system.
Fluid will drain back to the heat transfer fill tank from the over-elevated fluid lines when the pump is shut off. The heat transfer fill tank will show adequate fluid but, when the pump is started, extra fluid will be required to recharge the over-elevated fluid lines and portable heat exchangers and the system will then have insufficient fluid in the reservoir.
- Fluid overflow
If fluid is added to maintain proper fluid levels while the pump is running, overflow at the fill tank will occur when the pump is shut off. This would occur because of drain back from the over-elevated fluid lines.



8 - GTS 300 side view

TD300

Electrical requirements & connection

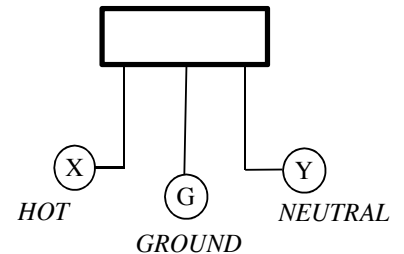
When determining the "central mobile enclosure" location on site, consider setting up in close proximity to the electrical power supply.

Note: This applies mainly to systems not equipped with a dedicated generator.

- The TD300 main feed wiring must be adequately sized to carry the minimum ampacity shown on the water heater cabinet's rating label. All electrical connections, connectors and wire must be CSA/UL compliant and installed according to local laws and codes.
- Before making any electrical connections, be sure that the power supply is "Off".

TD300 Electrical Connection (Figure 9):

- The TD300 requires 115VAC single phase power. The module is factory wired so that only connection is made to an 115VAC service outlet.
- The main feed wiring must be adequately sized to carry the minimum ampacity shown on the central heat module's rating label.
- All electrical connections, connectors and wire must be CSA/UL approved, and installed according to local laws and codes.
- A 3-wire hookup is required for all systems to work properly. Warranty is void if the wiring hookup is not done correctly.



9-GTS 300 electrical hookup (115VAC)

Heat transfer fluid "HTF"

CAUTION! At no time should you use automobile antifreeze in your system. The use of automobile antifreeze will void your warranty.

- The heat transfer fluid "HTF" level should show no more than 1/2 on the gauge (cold fluid) at start-up. As the "HTF" warms to operating temperature, fluid expansion will raise the level to 1/2 or 3/4 on the gauge (depending on the total volume of fluid in the circulation system).

Heat transfer fluid specifications

- The system is shipped with pre-mixed "HTF", made up of 60% "Dowfrost ® HTF" or "Boss Chill PG" and 40% water*, by weight - freeze protection down to -40°F (-40°C).
- The "glycol/water mixture chart", to the right, will provide you with more information on the proper mixture for your area. "Dowfrost ® HTF" or "Boss Chill PG" must be used. The pure "Dowfrost ® HTF" or "Boss Chill PG" heat transfer fluid used in the system is made up of a blend of 95-97% Propylene glycol, <5% Dipotassium phosphate and deionized water (see Safety Concerns section - MSDS sheets for additional information,
- Soft water with a neutral pH level (#7) must be used.

CAUTION! Whenever coupling or uncoupling quick couplers, make sure that the isolation valves are closed and the pump is off. Failure to do so may put you at risk of injury from eye and/or skin exposure to hot glycol.

Percent Propylene Glycol		Freezing Point	
By Mass	By Volume	F°	C°
0.0	0.0	32.0	0.0
10.0	9.6	26.1	-3.2
20.0	19.4	17.9	-7.8
30.0	29.4	6.7	-14.0
40.0	39.6	-8.1	-22.3
50.0	49.9	-28.9	-33.8
60.0	60.0	-54.9	-48.3

10 - glycol/water mixture chart

Fuel

- Only clean #1 or #2 diesel fuel or light heating oil is suitable for use in the system.
- The "central heat module" comes equipped with its own tank, so there are no fuel line hookups required.
- The fuel system utilizes a two-pipe system to ensure efficient fuel supply to the burner.

Contact your local fuel supplier to inform them of the requirements.

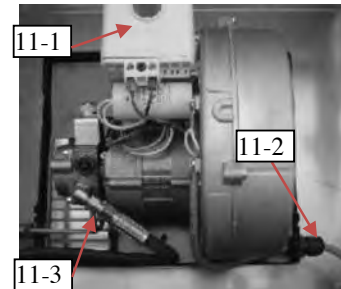
Primary "HTF" circulation lines

- If possible, position the primary circulation lines out of high traffic areas.
- If primary "HTF" circulation lines are required, connect the primary circulation lines to manifold "supply" and "return" kamlocks at the back of the central mobile enclosure. Quick couplers are attached to both ends of the primary circulation lines to enable quick coupling. This also allows the isolation of the primary lines while retaining the heat transfer fluid "HTF" in the lines. Plus ... setup and dismantling of the circulation system is much quicker.

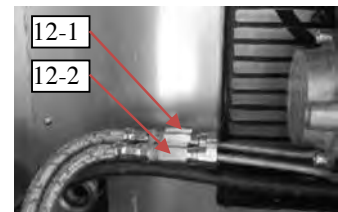
Burner Removal

To remove an existing **Riello model 40-F10 Diesel/Light Oil Burner**, use the following sequence:

1. Make certain that the power supply to the central heat module is disconnected.
2. Disconnect the electrical connection to the burner by disconnecting the # 1, #2 and green/yellow wires attached to the control box (11-1) on the burner assembly. Slip the water tight connection (11-2) from the burner chassis, located in the bottom right corner of the burner assembly.
3. Disconnect the oil supply hose (12-1) and oil return hose (12-2) by unscrewing the fuel line connections on the side of the burner. The loose supply and return hose ends should be plugged and pushed aside out of the way inside the cabinet. Mark hoses for correct reconnection.
4. Remove the fuel pressure line (11-3) from burner fuel pump.
5. Remove 2 bolts (13-1) from top of burner tube bracket.
6. Pull burner toward you and away from the mounting bracket (13-2).



11 - Riello burner

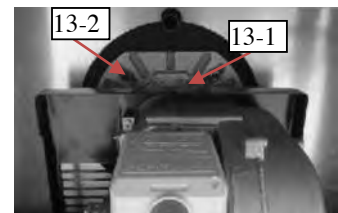


12-oil supply and return

Burner Installation

To install a **Riello model 40-F10 Diesel/Light Oil Burner**:

1. Insert burner into the mounting bracket (13-2).
2. Install 2 bolts (13-1) at top of burner tube bracket.
3. Connect the oil supply hose (12-1) and oil return hose (12-2) by coupling them to the JIC connections on the side of the burner. Insure hoses are attached to correct connectors.
4. Connect the fuel pressure line (11-3) to the burner fuel pump.
5. Connect the electrical connection to the burner by connecting the # 1, #2 and the green/ yellow wires to the control box on the burner assembly (11-1). Once the wires have been reconnected, slip the water tight connection (11-2) into the burner chassis, located in the bottom right corner of the burner assembly.



13-Riello burner tube and mounting bracket

Setup

Site Preparation

It is recommended that snow and ice be removed from the thaw site before laying out the heat exchanger loops.

Although heat conduction will be optimum with the high moisture conditions when the ice and snow is melted, it would take a large amount of energy (143 BTU is per pound of ice) and time to first thaw the surface snow and ice.

Positioning & Setup

The positioning of all the system components on the site will be influenced by a number of factors. Please read all of the "Positioning & Setup" section before beginning.

Trailer

Local Codes

Be sure to observe all local electrical codes and fire regulations when positioning the trailer.

Required safety clearances

The water heater module on the trailer is a heating appliance, therefore, safe heat and exhaust clearances must be observed.

- The trailer will require 12' x 8' of on-site space.
- Maintain 24" of clearance on the control panel side of the unit (1-1) and the opposite side (1-2).
- Maintain 36" of clearance (1-3) on all sides of the flue pipe and chimney cap
- Confirm that the water heater module air intakes (1-4) on three sides of the water heater module, are free of any obstructions.

Elevation concerns

- Do not place any fluid lines higher than the heat transfer fluid fill tank (1-5) in the water heater cabinet. If this is not observed, the following can occur:
 - Insufficient fluid in the system
Fluid will drain back to the heat transfer fill tank from the over-elevated fluid lines when the pump is shut off. The heat transfer fill tank will show adequate fluid but, when the pump is started, extra fluid will be required to recharge the over-elevated fluid lines and portable heat exchangers and the system will then have insufficient fluid in the reservoir.
 - Fluid overflow
If fluid is added to maintain proper fluid levels while the pump is running, overflow at the fill tank will occur when the pump is shut off. This would occur because of drain back from the over-elevated fluid lines.

Position trailer for hose deployment

Position the trailer so that the reel is backed up to the thaw site with the hose reel facing the thaw site. This will allow the hose reel a direct "heat exchanger loop" feed onto the thaw site.

Level & secure the trailer

The trailer should be reasonably level (+5 degrees) to ensure proper operation of the water heater. Trailer jack may be used to level the trailer.

Heat exchanger loops

Hose specs

- 5/8" hose for ground thaw & concrete cure
- Recommended loop lengths-1,000' (two 500' hose lengths)
- The hose reel holds up to 3,000 feet of 5/8" hose (6-500' hose lengths)

Layout procedure

The thaw site, on the following page, is a 6,000 sq. foot rectangular area. Although most sites will not be this straight forward, the following layout procedures will work for any shape or size of site.

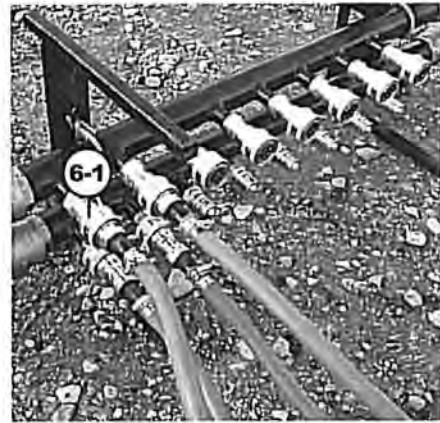
- On the hose reel, locate the end of the outermost hose. The end has a female 3/4" quick coupler attached. The 3/4" quick couplers are similar to those used with hydraulic systems.

Note: the connection of these couplers can be accomplished with the system under pressure.

- Couple the 3/4" female quick coupler onto the first male coupler (6-1) on the circulation manifold

Note:

- **Max hose length per loop is 1,000' (2 - 500' lengths)**
- **A minimum of 2 loops must be connected or you may get flow switch alarm**



6 - Connecting the first 3/4 coupler to first male coupler on the manifold

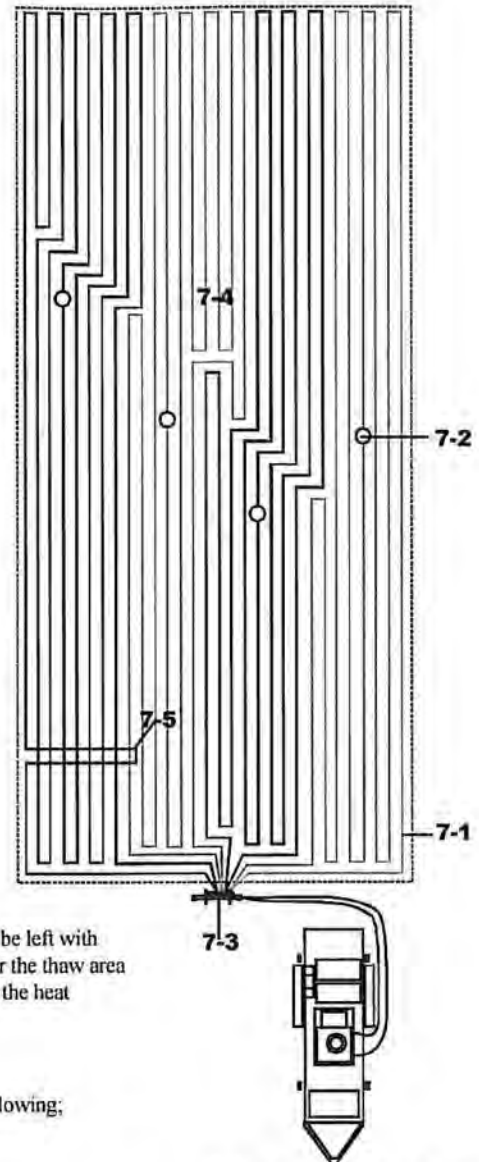
- The diagram "Heat exchanger loop layout", shows the first loop (7-1) to be placed up the right side of the thaw site (right-to-left), although you may also start left-to-right if you prefer.
- Start laying the hose on an outside edge of the thaw site.
- Lay the hose so that the majority of the hose is parallel to the line of travel of the hose reel. This allows for easier placement and retrieval of the hose later.
- If a footing or grade beam encloses the thaw site, lay the outside hose directly against the footing or grade beam.
- Common hose spacing is 18" for the majority of the thaw site.
- The exception to this is with the lines located at:
 - A) the outside edges of the thaw site, or
 - B) the north-side, outside edge of the thaw site.
 We recommend that you lay these with a tighter spacing (8" to 12"). This will increase the outside edge thaw capacity. If this is not done, the outside edge of the thaw site will thaw more slowly.

NOTE: A wider hose spacing (24") may be acceptable when ambient conditions are not extreme (above 0°F/-17°C).

A narrower spacing (12") can also be considered for faster ground thaw.

NOTE:

- Recommended loop length is 1,000 feet (Two 500 ft. hose sections are used for each loop). Keeping this in mind, leave connected the first male/female couplers (7-2) you come to. They are the midpoint of the loop. When you reach the second male/female couplers, walk the connected couplers back to the circulation manifold (7-3) and disconnect the couplers.
- Connect the female coupler that has just been disconnected to the second male coupler on the circulation manifold
- Position the male coupler of the first loop close to the circulation manifold but do not connect at this time. The connection of the heat exchanger loop male coupler will occur later during "Startup".
- When laying the hose, the layout will become irregular from the shorter loop sections created from loop end connections to the manifold. Straighten the layout by doubling back with the hose (7-4).
- Repeat the previous steps until the thaw site has full hose coverage or all the heat exchanger loops have been deployed.
- In thaw site cases where the area to be thawed is less than 6,000 sq. ft., you may be left with extra hose. Deal with the excess hose by simply looping the extra hose (7-5) over the thaw area and connecting the final male coupler into the distribution manifold to complete the heat exchange loop layout.



7 - Heat exchanger loop layout

Vapor barrier & insulation

For the best thawing results, the heat exchanger loops should be covered with the following;

Vapor barrier

- A vapor barrier is recommended, especially when doing outside thaws.
- Regular polyethylene plastic construction vapor barrier can be used. The vapor barrier's main function is to prevent the loss of ground surface moisture. This ensures that good heat conduction is maintained down through the lower levels of the thaw.
- The vapor barrier is placed on top of the circulation line

Insulation

- Insulated blankets, preferably with a high r-value (R-20 or higher), are recommended. The insulated blanket's function is to keep heat loss to a minimum.
- A minimum of two (2) layers should be considered. The higher you maintain the ambient temperature under the tarp at ground level, the quicker the thaw.
- The insulated blankets are placed on top of the vapor barrier.
- Refer to the "Ground Thaw Plan" for help in calculating insulation requirements.

NOTE:

NOTE:

Fuel Setup

- This appliance is rated for #1 or #2 light oil/diesel.
- The water heater module comes equipped with its own tank, so there are no fuel line hookups required.
- The fuel system utilizes a two-pipe system to ensure efficient fuel supply to the burner.

Ground Thaw Plan

Thawing Tips

- **General Rule...** The colder it is, the more insulation is required and the closer you may wish to space the heat transfer loops. The higher you maintain the ambient temperature under the tarp at ground level, the quicker the thaw.
- Thaw through the frost line. Excess moisture will be able to drain away through the thawed formation. This will allow the site to dry and eventually achieve normal soil moisture levels.
- When ground thawing, it is recommended that a vapor barrier be used. The vapor barrier's function is to prevent the loss of ground surface moisture. The moisture content in the soil ensures that good thermal conduction is maintained down through the lower levels of the thaw.
- If soil moisture levels on the site are extremely low, adding water to the site before adding the vapor barrier and insulation could be considered.
- Never use the ice and snow on site for that purpose. Always remove surface snow and ice from the thaw site. It takes a great deal of energy to melt this surface snow and ice (143 BTU's per pound of ice). If you do not remove the ice and snow, thaw times will be longer and energy costs will be higher.
- When thawing a site with sand/gravel fill in place, it may be a consideration to thaw the site in two stages. The reason for this is that when the sand/ gravel fill is thawed, the moisture will drain down and away from the "heat transfer loops". As a result, thermal conductivity will be lost and the thaw times will increase.
The recommended procedure for a two stage thaw is:
 - First thaw the sand/gravel fill
 - Remove the heat transfer loops and remove the sand/gravel fill.
 - Set up heat transfer loops again.
 - Re-initiate the thawing process
- Thawing a hillside will take longer. The reason is again that moisture has a tendency to drain away when on an incline. Not only will this cause a decrease in thermal conductivity, the latent heat stored in the moisture will also be lost if the moisture exits from the underside of the insulated thaw site area.

General Guidelines

Temperature setting

- Adjust the aqua-stat on the water heater module to set the supply fluid temperature at 180°F to 200°F.

Hose spacing

- 18" centers recommended, 24" maximum

Heat exchange loop lengths

- 1,000 maximum

Heat exchange loop cover

- **Vapor barrier** - Regular plastic construction vapor barrier can be used. The vapor barrier is placed on top of the circulation line
- **Insulation** - Insulated blankets, preferably with a high r-value, are recommended. The insulated blanket's function is to keep heat loss to a minimum. A minimum of two (2) layers should be considered. Insulated blankets are placed on top of the vapor barrier.

Thaw time

- Thaw times can be very difficult to calculate since the rate of thaw is affected by a number of variables. The five main variables are listed below.

Soil type

- Different types of soils have different conduction characteristics. We will break soil types down into four categories; 1) sand, 2) gravel, 3) clay and 4) silt. All four types conduct heat differently with sand generally conducting the best... then gravel... then clay, and finally silt which will conduct the least efficiently.

Depth of frost

- As the thaw proceeds downwards, efficiencies are lost and the thaw progress will slow down. For deep thaws, a high ambient temperature must be maintained under the tarp at ground level.
- This can be achieved with:
 - Tighter hose spacings or
 - More layers of insulated blankets.

Compaction

- The compaction of the soil before freezing will also have an effect of the conduction of heat.
- Undisturbed soil or packed soil will conduct the best, while loose fill will conduct poorly.

Ambient temperature under tarp

- The higher the ambient temperature under the tarp, the quicker the thaw.

Moisture content

- Moisture content of the soil can greatly affect heat conduction.
 - **Very wet soils** - Although heat conduction will be optimum when the frozen water within the soil is melted, it will take a lot of energy and time to first thaw the frozen water. This is also why we recommend that, if snow covers the thaw site, it should be removed.
 - **Wet soils** - The energy required to thaw a moderate amount of ice present in the soil is acceptable. Once the ice is thawed, heat conduction is good.
 - **Dry soils** - The less moisture present in the soil, the poorer the heat conduction.

Thaw calculation

The charts and information, below, will aid you in doing a rough calculation of thaw times.

Note: the results of the calculations are an estimate only and are only to be used as a guideline. DRYAIR or, if leasing the equipment, the leasee is not responsible financially or otherwise for actual results that differ from this estimate.

Thaw times

The chart, to the right, factors in:

- Soil type - The chart shows the thaw progress of all four types of soils 1) sand, 2) gravel, 3) clay and 4) silt
- Frost depth - The chart also shows the variation in the rate of thaw progress at different depths

The results are arrived at assuming 1) proper site insulation, 2) undisturbed or packed soil conditions and 3) normal soil moisture content

Thaw time moisture adjustment

The "Thaw times" chart reflects only "normal" soil moisture content. Therefore, when soil moisture content is determined to be either "very dry" or "saturated", adjustments to the thaw time is required.

The "Thaw times moisture adjustment chart" factors in the soil moisture content and provides this adjustment. The chart uses "normal" moisture content as a base line, therefore only "very dry" and "saturated" need be shown.

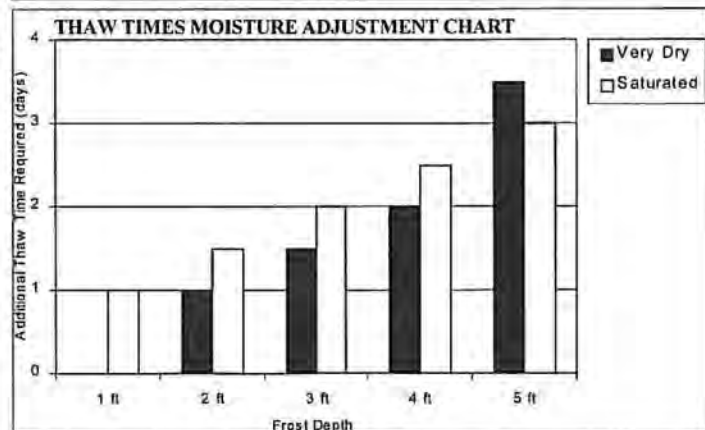
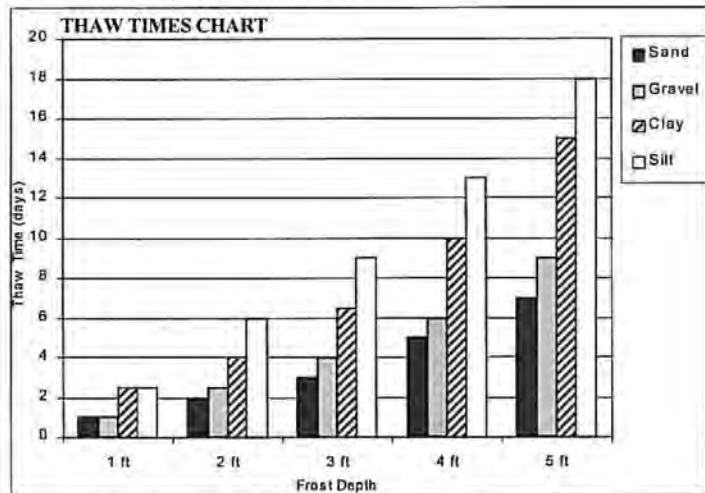
Combined Estimation

Combine the results of the "Thaw times chart" and "Thaw times moisture adjustment chart" to arrive at a thaw progress estimation.

Example:

The frost line on your site is down 4 feet, the soil type is packed gravel and the moisture content is high.

- Refer to the "Thaw times chart". Find your frost depth (4 ft) across the bottom of the chart. The top of the Gravel bar (solid "grey") will align with the "thaw time" (6 days).
- As the soil moisture content is high, the "Thaw times moisture adjustment chart" must be referred to. Find your frost depth (4 ft) across the bottom of the chart. The top of the "saturated" bar (white) will align with the "additional thaw time required" (2-1/2 more days to thaw)
- Total thaw time would be 8-1/2 days (6 + 2-1/2=8-1/2).



Concrete Cure Plan

Maintaining the optimum concrete curing environment, especially in sub-zero conditions, will help ensure a good quality cure and ensure an optimum curing schedule. A temperature of 55°F to 75°F around the concrete will provide this environment. Please note that too much heat can cause undesirable curing results such as thermal expansion, premature surface drying or hair-line cracking of the concrete.

There are a number of approaches to consider for concrete curing with the Heat Wagon system

Combination site thaw & concrete curing – heat exchange loops on top

- Applies in situations where you must thaw the site where the concrete pour will occur.
- Applies to slabs, footing & any formed concrete structures.
- Requires a Heat Wagon "Mixing/ Booster" unit to provide lower circulation fluid temperatures (down to 90°F).

Procedure

- Set up thaw site by laying out "heat exchange loops" on the surface area where the concrete pour will occur.
- After the thaw operation is complete, remove the tarps, vapor barrier and heat exchange loops.
- Pour the concrete.
- Allow to harden sufficiently to prevent marking.
- Lay out "heat exchange loops" on top of concrete at 18" centers.
- Cover with concrete curing blankets.
- "Water heater" temperature settings must be maintained in the 160°F to 200°F range.
- Adjust temperature at "Mixing/ Booster" unit. Try initial setting of 90°F and adjust accordingly until a 55°F to 75°F range at the concrete surface is maintained.

Concrete curing -loops wrapped around or fastened under formed structure

- Applies to formed concrete structures (ie: grade beams, pillars & elevated slabs).
- Requires a Heat Wagon "Mixing/ Booster" unit to provide lower circulation fluid temperatures (down to 90°F).

Procedure

- Wrap forms or walls with "heat exchange loops". Note that elevated slab setup can be approached a number of ways:
 - From the bottom and sides by fastening the "heat exchange loops" to the forms. The best heat transfer results will be achieved if the hose makes direct contact with the forms. Assorted strapping can be used to fasten the hose in place. Cover with insulation. Note that when dealing with vertical and underside applications, concrete cure blankets can be used although a more rigid type of insulation may be easier to work with.
 - and/or from the top by laying the "heat exchange loops" on top.
- Lay out "heat exchange loops" against concrete at 18" centers.
- Cover with concrete curing blankets.
- "Water heater" temperature settings must be maintained in the 160°F to 200°F range.
- Adjust temperature at "Mixing/ Booster" unit. Try initial setting of 90°F and adjust accordingly until a 55°F to 75°F range at the concrete surface is maintained.

Combination concrete curing & structure heating application

- Concrete curing & radiant heat for temporary heating of enclosed structure
- Applies to slabs, footing & any formed concrete structures.
- Requires a Heat Wagon "Mixing/ Booster" unit to provide lower circulation fluid temperatures (down to 90°F).
- Applies primarily to slabs.
- The use of lower-cost poly hose as heat exchange loops is good idea as this hose will not be recovered.

Procedure

- Heat exchange loops placed below grade
 - Prepare the floor area as you normally would with the exception that the compacted grade of the fill be 3 to 4 inches lower than normal.
 - Lay the heat exchange loops.
 - Add remaining sand fill to the desired height over the heat exchange loops and compact.
 - Pour the concrete slab
 - When the building is enclosed, the radiant floor heat will provide a comfortable, safe and efficient temporary heating solution.
- Heat exchange loops incorporated into concrete
 - Could apply to slabs with permanent hydronic floor heat installations.
 - The Heat Wagon system could provide temporary heat and circulation until the permanent system is operational
 - If the floor heat application is to be used as part of the building's heating system after project completion, make sure that the installation follows all local codes and current, recognized hydronic floor heat procedures.
 - If this is a permanent hydronic floor heat installation and is to be installed by another floor heat contractor, it is important, before attaching a Heat Wagon system, that you consult with this contractor for approvals and Heat Wagon system tie-in consultation.

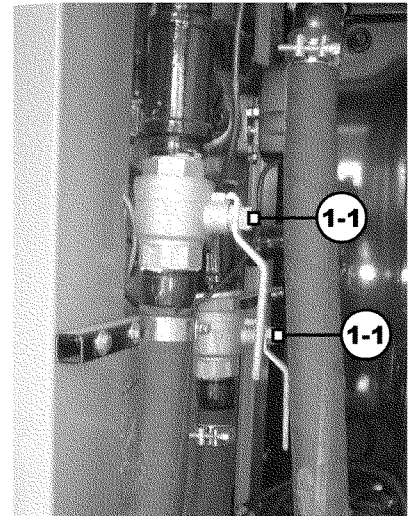
Frost Prevention

- Applies in situations where the surface area is not frozen but the ambient temperature can drop low enough to affect the concrete curing process.
- Applies to slabs & footing.
- Requires a Dryair "Mixing/ Booster" unit to provide lower circulation fluid temperatures (down to 90°F).
- In most cases, the ambient temperature is not extreme and the ground is not frozen. Insulation above the hose is not as critical but we recommend that you provide cover to hold the heat in. this will keep energy cost down
- Placement of the "heat exchange loops can be:
 - Above the poured concrete
 - To the side of the forms
 - To the side of the forms, covered with 3 to 4 inches of sand.

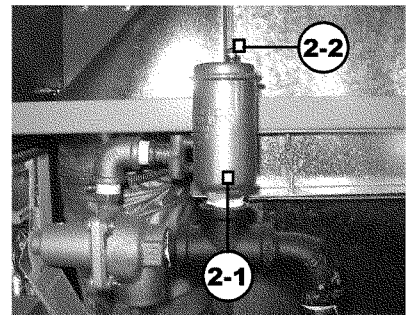
Operation (CME)

Purging air from the “HTF” circulation system

- Verify that the primary circulation lines are connected to a distribution manifold.
- Complete the connection for one “heat exchanger loop” or “portable heat exchanger” This will close the circulation loop and allow circulation.
- Verify that the “supply” and “return” isolation valves (1-1) and the isolation valves at both ends of the primary circulation lines (hard connection to the manifold) are in the “open” position.
- The automatic air vent (2-1) valve cap (2-2) should not need adjustment. The valve cap should be opened 1 1/2 turns (counter clockwise) from fully closed to allow air escape from “HTF” system.
- Toggle the pump switch (3-1) to the “On”(up) position and run the pump. This will release the air from the system.
- Monitor the “heat transfer fluid sight glass” (4-1) and make sure that the heat transfer fluid level stays between 1/4 to 1/2 full at all times during this process.
- Note that there may be a certain amount of air in the system. “HTF” levels may change as air is displaced from the system. Add “HTF” fluid to maintain 1/4 to 1/2 levels when the fluid is cold.



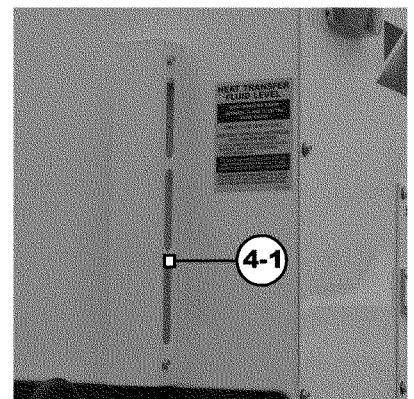
1 - “supply” & “return” isolation valve in the “open” position



2 - automatic air vent

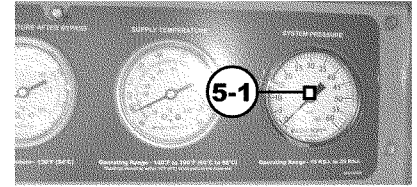


3 - pump, water heater & flow reverser switch



4 - heat transfer fluid sight glass

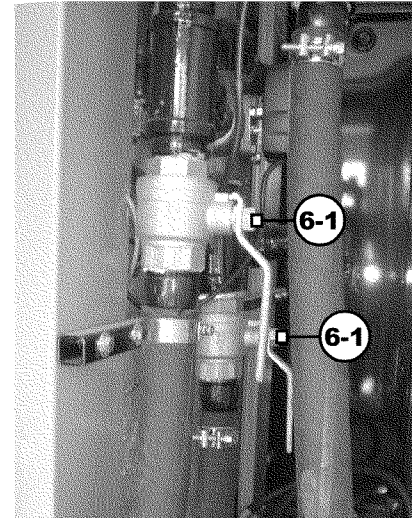
- When the air is eliminated, the “System Pressure” gauge (5-1) will hold at a steady reading of between 15 to 40 P.S.I.



5 - system pressure gauge

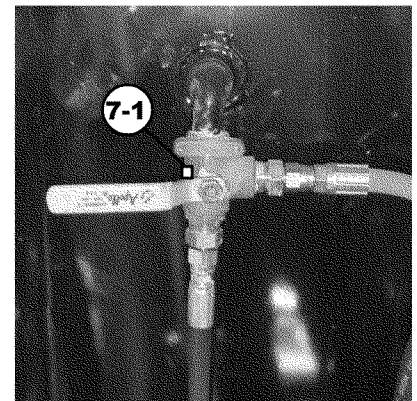
Before firing the system

- Verify that the power supply is correct and that the electrical hook up is as specified in “Setup”. Also review; Start the Whisper Watt Generator 5-2-1
- Verify that the water heater is being supplied with the same fuel type as indicated on the water heater data plate “*LIGHT OIL/DIESEL FUEL*”.
- Verify that the “supply” and “return” isolation valves (6-1) are closed.



6 - “supply” & “return” isolation valve in the “closed” position

- Verify that the fuel line valves (7-1) & (8-1) are in the positions as shown, to the right.
- Verify that the heat transfer fluid level gauge (4-1) shows approximately 1/4 full.
- Start the generator (page 5-2-1)



7 - fuel return valve



8 - fuel supply valve and filter

GENERATOR STARTING PROCEDURES

STARTING THE ENGINE(NORMAL)



CAUTION

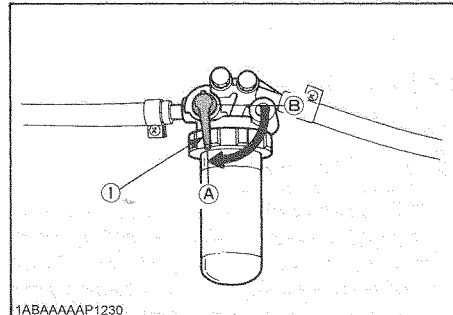
To avoid personal injury:

- Do not allow children to approach the machine while the engine is running.
- Be sure to install the machine on which the engine is installed, on a flat place.
- Do not run the engine on gradients.
- Do not run the engine in an enclosed area. Exhaust gas can cause air pollution and exhaust gas poisoning.
- Keep your hands away from rotating parts (such as fan, pulley, belt, flywheel etc.) during operation.
- Do not operate the machine while under the influence of alcohol or drugs.
- Do not wear loose, torn or bulky clothing around the machine. It may catch on moving parts or controls, leading to the risk of accident. Use additional safety items, e.g. hard hat, safety boots or shoes, eye and hearing protection, gloves, etc., as appropriate or required.
- Do not wear radio or music headphones while operating engine.
- Check to see if it is safe around the engine before starting.
- Reinstall safeguards and shields securely and clear all maintenance tools when starting the engine after maintenance.

IMPORTANT :

- Do not use ether or any starting fluid for starting the engine, or a severe damage will occur.
- When starting the engine after a long storage (of more than 3 months), first set the stop lever to the "STOP" position and then activate the starter for about 10 seconds to allow oil to reach every engine part.

1. Set the fuel lever to the "ON" position.



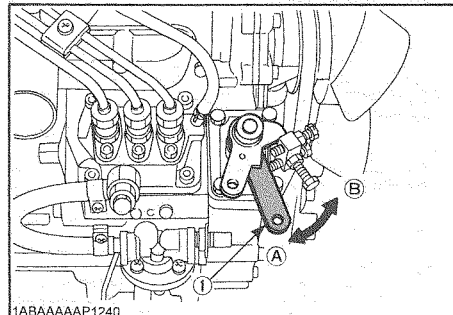
1ABAAAAAP1230

(1) Fuel lever

(A) "ON"

(B) "OFF"

2. Place the engine stop lever in the "START" position.
3. Place the speed control lever at more than half "OPERATION"



1ABAAAAAP1240

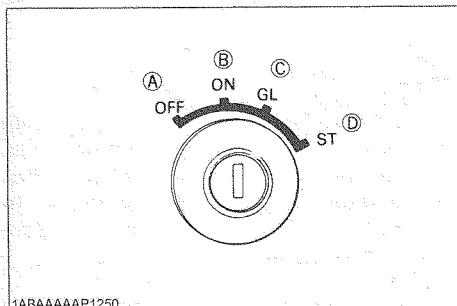
(1) Speed Control lever

(A) "OPERATION"

(B) "IDLING"

GENERATOR STARTING PROCEDURES

4. Insert the key into the key switch and turn it to the "OPERATION" position.



1ABAAAAAP1250

- (A) "OFF" SWITCHED OFF
 (B) "ON" OPERATION
 (C) "GL" PREHEATING
 (D) "ST" STARTING

5. Turn the starter switch to the "PREHEATING" position to allow the glow lamp to redden.
 6. Turn the key to the "STARTING" position and the engine should start. Release the key immediately when the engine starts.
 7. Check to see that the oil pressure lamp and charge lamp are off. If the lamps are still on, immediately stop the engine, and determine the cause.

(See "CHECKS DURING OPERATION" in "OPERATING THE ENGINE" section.)

NOTE :

- If the oil pressure lamp should be still on, immediately stop the engine and check;
 - if there is enough engine oil.
 - if the engine oil has dirt in it.
 - if the wiring is faulty.

8. Warm up the engine at medium speed without load.

IMPORTANT :

- If the glow lamp should redden too quickly or too slowly, immediately ask your KUBOTA dealer to check and repair it.
- If the engine does not catch or start at 10 seconds after the starter switch is set at "STARTING" position, wait for another 30 seconds and then begin the engine starting sequence again. Do not allow the starter motor to run continuously for more than 20 seconds.

COLD WEATHER STARTING

If the ambient temperature is below* -5° C(23° F) and the engine is very cold, start it in the following manner: Take steps (1) through (4) left.

5. Turn the key to the "PREHEATING" position and keep it there for a certain period mentioned below.

IMPORTANT :

- Shown below are the standard preheating times for various temperatures. This operation, however, is not required, when the engine is warmed up.

Ambient temperature	Preheating time	
	Ordinary heat type	With glow lamp timer
Above 10° C (50° F)	NO NEED	See NOTE:
10° C (50° F) to -5° C (23° F)	Approx. 5 seconds	
*Below -5° C (23° F)	Approx. 10 seconds	
Limit of continuous use	20 seconds	

NOTE :

- In case of installing standard glow lamp, glow lamp goes off after about 6 seconds, when the starter switch key is turned to the "PREHEATING" position. However if necessary, keep the starter switch key at the "PREHEATING" position for longer time, according to the left recommendation.

6. Turn the key to the "STARTING" position and the engine should start.
 (If the engine fails to start after 10 seconds, turn off the key for 5 to 30 seconds. Then repeat steps (5) and (6).)

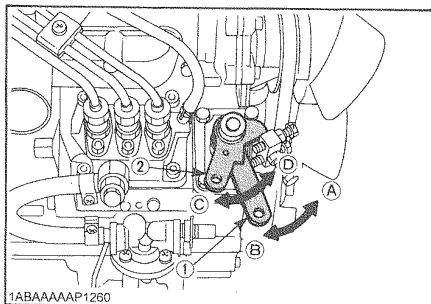
IMPORTANT :

- Do not allow the starter motor to run continuously for more than 20 seconds.
- Be sure to warm up the engine, not only in winter, but also in warmer seasons. An insufficiently warmed-up engine can shorten its service life.
- When there is fear of temperature dropping below -15° C (5° F) detach the battery from the machine, and keep it indoors in a safe area, to be reinstalled just before the next operation.

GENERATOR STARTING PROCEDURES

STOPPING THE ENGINE

1. Return the speed control lever to low idle, and run the engine under idling conditions.
2. Set the engine stop lever to the "STOP" position.
3. With the starter switch placed to the "SWITCHED OFF" position, remove the key. (Be sure to return the engine stop lever to the "START" position to be ready for the next start.)



- (1) Speed control lever (A) "IDLING"
(2) Engine stop lever (B) "OPERATION"
(C) "START"
(D) "STOP"

CHECKS DURING OPERATION

While running, make the following checks to see that all parts are working correctly.

■ Radiator Cooling water(Coolant)



WARNING

To avoid personal injury:

- Do not remove radiator cap until coolant temperature is well below its boiling point. Then loosen cap slightly to the stop position, to relieve any pressure, before removing cap completely.

If the coolant temperature warning lamp lights up or if steam or coolant does not stop squirting from the radiator overflow pipe, turn off the load and keep the engine idling (COOLING-DOWN) for at least 5 minutes to let it cool down gradually. Then stop the engine and take the following inspection and servicing.

1. Check to see if the coolant runs short or if there is any coolant leak;
2. Check to see if there is any obstacle around the cooling air inlet or outlet;
3. Check to see if there is any dirt or dust between radiator fin and tube;
4. Check to see if the fan belt is too loose; and
5. Check to see if radiator water pipe is clogged.

■ Oil pressure lamp

The lamp lights up to warn the operator that the engine oil pressure has dropped below the prescribed level. If this should happen during operation or should not go off even after the engine is accelerated more than 1000rpm, immediately stop the engine and check the following:

1. Engine oil level (See "ENGINE OIL" in "PERIODIC SERVICE" section.)

■ Fuel



CAUTION

To avoid personal injury:

- Fluid escaping from pinholes may be invisible. Do not use hands to search for suspected leaks; Use a piece of cardboard or wood, instead. If injured by escaping fluid, see a medical doctor at once. This fluid can produce gangrene or a severe allergic reaction.
- Check any leaks from fuel pipes or fuel injection pipes. Use eye protection when checking for leaks.

Be careful not to empty the fuel tank. Otherwise air may enter the fuel system, requiring fuel system bleeding. (See "FUEL" in "PERIODIC SERVICE" section.)

■ Color of exhaust

While the engine is run within the rated output range:

- The color of exhaust remains colorless.
- If the output slightly exceeds the rated level, exhaust may become a little colored with the output level kept constant.
- If the engine is run continuously with dark exhaust emission, it may lead to trouble with the engine.

■ Immediately stop the engine if;

- The engine suddenly slows down or accelerates.
- Unusual noises are suddenly heard.
- Exhaust fumes suddenly become very dark.
- The oil pressure lamp or the water temperature alarm lamp lights up.

REVERSED ENGINE REVOLUTION AND REMEDIES



CAUTION

To avoid personal injury:

- Reversed engine operation can make the machine reverse and run it backwards. It may lead to serious trouble.
- Reversed engine operation may make exhaust gas gush out into the intake side and ignite the air cleaner; It could catch fire.

Reversed engine revolution must be stopped immediately since engine oil circulation is cut quickly, leading to serious trouble.

■ How to tell when the engine starts running backwards

1. Lubricating oil pressure drops sharply. Oil pressure warning light, if used, will light.
2. Since the intake and exhaust sides are reversed, the sound of the engine changes, and exhaust gas will come out of the air cleaner.
3. A louder knocking sound will be heard when the engine starts running backwards.

■ Remedies

1. Immediately set the engine stop lever to the "STOP" position to stop the engine.
2. After stopping the engine, check the air cleaner, intake rubber tube and other parts, and then replace parts as needed.

INITIAL SETTINGS FOR THE ACTUATOR MOTOR ON THE FLOW REVERSERS FOR THE TD300

Step 1



When setting actuators motor on the flow reverser for the first time the notch in the plastic sleeve should be set as indicated in this picture.

Step 2



The result should look like this when actuator motor is installed without cap. The actuator motor will have to be turned fully to one side.

Step 3



Install cap and turn until it falls down into position. This happens after 45° rotation of the actuator cap.

Step 4



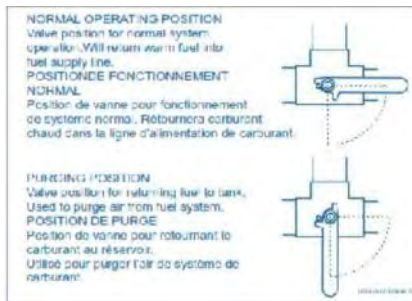
After power is applied to the actuator, the valve will move into an operational position.

Before firing the system

- Verify that the power supply is correct and that the electrical hook up is as specified in "Setup".
- Verify that the water heater is being supplied with the same fuel type as indicated on the water heater data plate "LIGHT OIL/DIESEL FUEL".



- Verify that the fuel line valves are in the correct positions.



- Verify that the heat transfer fluid level gauge shows approximately 1/4 full.



POWER SUPPLY

1 HOSE REEL

POWER SUPPLY CONNECTION

120 VAC 1PH
3-WIRE NEMA 3-15

NOTE:

FOR NORMAL OPERATION OF WATER HEATER IN FREE-BOAT MODE WHILE OPERATING HOSE REEL, ONE DEDICATED 3A CIRCUIT IS REQUIRED FOR EACH REEL.

FOR SIMULTANEOUS OPERATION OF WATER HEATER IN HEATING MODE AND HOSE REEL, TWO SEPARATE 10A CIRCUITS ARE NECESSARY.

POUR FONCTIONNEMENT DE CHAUFFE-EAU DANS LE MODE DE FREDI-BATAGE NORMAL TANDIS QUE L'OPERATION EN COURSE DE TIRAGE D'UN REROLEUR DE CIRCUIT 3A SPECIALE EST REQUISE.

POUR FONCTIONNEMENT DE CHAUFFE-EAU DANS LE MODE DE CHAUFFAGE ET TIRAGE D'UN REROLEUR DE 10A DEUX CIRCUITS 15A SEPARES SONT NECESSAIRES.

2 CENTRAL HEATING MODULE

101-002966

- Monitor the "heat transfer fluid sight glass" (17-1) and make sure that the heat transfer fluid level stays between 1/4 to 1/2 full at all times during this process.
- Note that there may be a certain amount of air in the system. "HTF" levels may change as air is displaced from the system. Add "HTF" fluid to maintain 1/2 to 5/8 levels when the fluid is cold.



17-heat transfer fluid sight glass

- When the air is eliminated, the "System Pressure" gauge (18-1) will hold at a steady reading of between 15 to 40 P.S.I.



18-system pressure gauge

Cold start procedure

This procedure must be completed if the ambient outdoor air temperature is lower than 50° F (10° C).

Consider initiating this process well in advance of firing the system

In -30F (-34C) conditions, this process could take up to 6 hours.

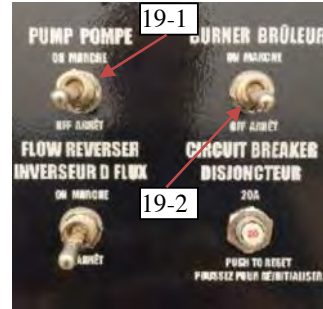
- The system has a built-in, electric "cold start" fluid pre-heater which will heat the "heat transfer fluid" in the water heater heat exchanger.
- Confirm that the pump switch (19-1) and water heater switch (19-2) are in the "Off" (down) position.
- This will automatically energize the electric "cold start" circulation heater.
- Wait until the "supply temperature gauge" (20-1) reads between 80° F to 100° F (60° C to 65° C). The time required for the heat transfer fluid in the heat exchanger to reach this temperature will depend on the outdoor ambient air temperature.
- Toggle the pump switch (19-1) located on the control panel to the "On" (up) position. Once the pump is turned on, the "cold start" fluid pre-heater is automatically shut off.
- With the pump on, the "heat transfer fluid" will circulate through the heat module's internal bypass system. This will supply warm "heat transfer fluid" to the combustion air and fuel preheat systems, which tempers combustion air and fuel for smooth burner start-up and operation.
- Continue circulating the "heat transfer fluid" within the heat module's distribution system until the "combustion air gauge" (20-2) and the "fuel temperature gauge" (20-3) read approximately 60° F to 70° F (15° C to 21° C).

*

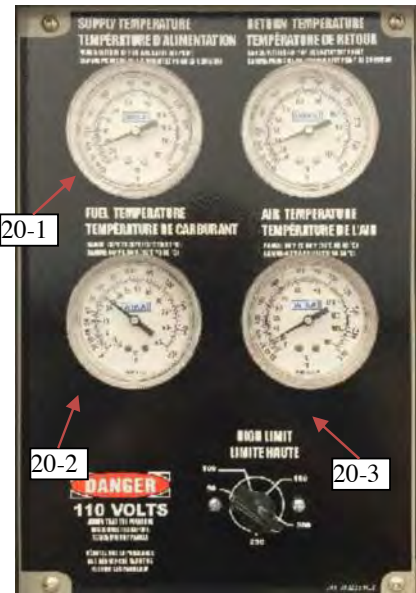
The time required for the combustion air and fuel to reach this temperature will again depend on the outdoor ambient air temperature.

- The burner is now ready to be fired. Proceed with the "Temperate Start Procedure"

- * Do not attempt to start burner until 60°
- * This is the best time to layout your hose.



19-GTS 300 control panel



20-temperature gauge panel

Temperate start procedure

You can proceed with this procedure when;

- a) The ambient outdoor air temperature is above 50° F (10° C).
- b) The "cold start procedure" has been completed.

Control settings

Low Flow Situations

Utilizing only one Model 80 or Model 200 portable heat exchanger or only one or two circulation line exchanger loops

- Water heater heat exchanger temperature overrun can be expected, therefore, initially set the Aquastat (23-1) at 140°F (60°C).

Note: A single line heat exchanger loop may not have enough flow to activate the system flow switch. If this occurs, consider adding another loop of hose to increase flow and activate the system.

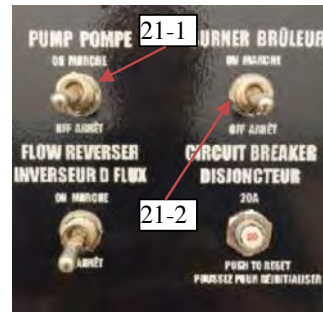
High Flow Situations

Utilizing two or more portable heat exchangers or three or more circulating line heat exchanger loops

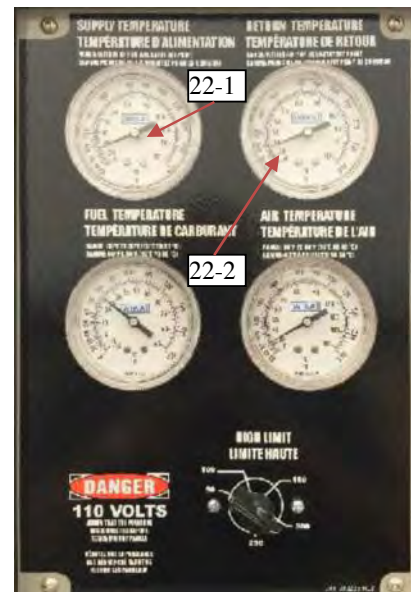
- Set the Aquastat (23-1) at 190°F (88°C).

Initiate firing

- Verify that the "Pump Switch" (21-1) is in the "On" (up) position.
- Toggle the water heater switch (21-2) to the "On" (up) position.
- The burner will proceed through its firing sequence.
- Once the burner is operating smoothly and the system pressure is steady (air has been eliminated from the system), monitor the "supply temperature" (22-1) until it is within 10° F of the Aquastat temperature setting (23-1).
- Verify that only one "heat exchanger loop" or one "portable heat exchanger" is connected to the primary lines through the distribution manifold.
- Monitor the "Return temperature before bypass" gauge (22-2). Before fully connecting more "heat exchanger loops" or "portable heat exchangers", this gauge must show a noticeable rise in temperature indicating the heat transfer fluid has made the full circuit. With "heat exchanger loops, this may take 10 minutes or more.
- Repeat the previous step until all "portable heat exchangers" or "heat exchanger loops" are connected and circulating.



21- GTS 300 control panel



22- Supply and return temperature gauges

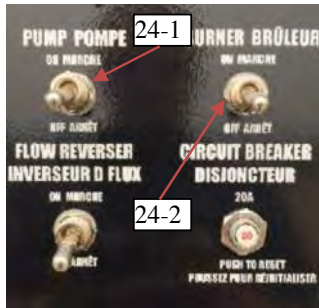


23- GTS 300 Aquastat

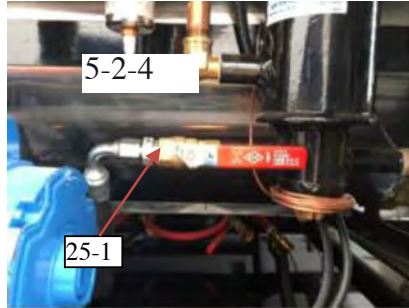
Purging air from the fuel system

If the burner does not fire, the fuel system may have to be purged of air.

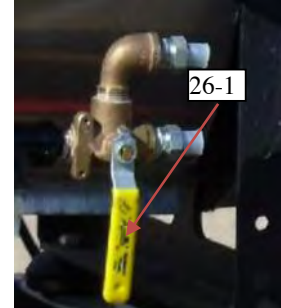
- Confirm that there is an adequate fuel supply.
- Toggle the water heater switch (24-2) to the "Off" (down) position.
- Ensure that the main fuel valve (25-1) is in the open position. Set valve (26-1) to the "purge" position.
- Confirm that the pump switch (24-1) is in the "On"(up) position.



24 – Pump & Water Heater switches



25 – Main Fuel Supply Valve



26 - Fuel Purge Valve

- Toggle the water heater switch (24-2) to the "On" (up) position.
- Depress the reset button (27-1). This will activate the fuel pump & burner firing sequence.

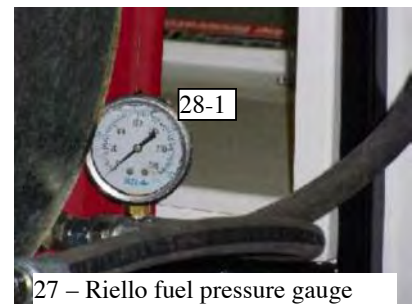


27 – Riello burner

- When the fuel system is primed, the fuel pressure gauge (28-1) will show a steady reading and the water heater should attempt to ignite.

Note: If the water heater does not fire after several attempts see the accompanying "Water Heater Module- Service Manual" or the "Riello Burners Installation Manual" for information and/or contact Technical Support.

- Once the water heater has ignited and the fuel pressure has stabilized, set the 3-way fuel bypass valve (26-1) to the two-pipe fuel system position (horizontal position).

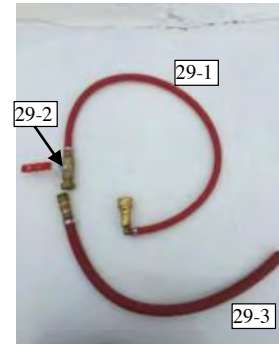


27 – Riello fuel pressure gauge (~ 140psi when operating)

Adding "HTF" to system

Verify that the power supply is correct and the electrical hook up is as specified in "Setup".

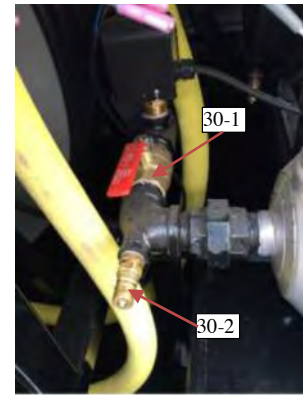
- Ensure all breakers are in the "On" position.
- Attach fill/drain hose extension (29-3) to the Fill/Drain hose (29-1).
- Submerge the fill/drain hose into the bottom of the barrel/pail or jug of pre-mixed "HTF" (See "Setup" for heat transfer fluid specifications).
- Connect the fill/drain hose into the quick coupler located on the intake side of the pump (30-2).
- Turn the pump isolation valve (30-1) to the "Closed" position. (Perpendicular to flow through pipe).
- Turn the fill/drain ball valve (29-2) to the "Open" position.
- Toggle the pump switch to the "On" (up) position.
- Once the pump switch is in the "On" position, the pump will commence to draw the "HTF" into the system. By watching the glycol level gauge (31-1), continue to fill the system until the glycol level gauge shown 1/2 full.



29- fill/drain hose and plug

Caution must be taken when approaching the 1/2 full mark as it could take 2-3seconds to register the actual level once pumping has ceased.

- In the case of an overfull situation, do the following:
 - Toggle the pump switch to the "Off" (down) position.
 - Verify that the fill/drain ball valve (29-2) is in the "Open" position.
 - Turn the pump isolation valve (30-1) to the "Open" position. Gravity will immediately drain the glycol out of the system through the fill/drain hose. The fill/drain hose should be submerged into a barrel/pail or jug with sufficient room for the "HTF".
 - Once the desired amount of "HTF" has been attained and the glycol level gauge is showing half full, turn the pump isolation valve (30-1) to the "closed" position and continue with the following procedures
- Turn the fill/drain ball valve (29-2) to the "Closed" position.
- Toggle the pump switch to the "Off" (down) position.
- Uncouple the fill/drain hose from the pump.
- Turn the supply ball valve (30-1) back to the "Open" position.



30-Pump isolation valve (open) & Fill/Drain quick coupler



31-Glycol level sight gauge

Setup/Operation/Maintenance (HR2250)

Danger! It is very important that you read and understand this section before operating the hose reel! Failure to follow the procedures and cautions in this manual could lead to injury or possible death!

Manual Controls

The Hose Reel has a manual method of controlling the spool rotation "UNLOAD/LOAD" and a general ON/OFF power switch.

Caution! When NOT operating the reel, put the reel speed toggle switch (32-1) in the "Off" position to prevent accidental activation and possible injury. When the hose reel is to be left unsupervised, the power cord should be unplugged from the power supply.

Reel Power

Power is present when the power switch (32-1) is in the "ON" position. By connecting the foot switch you can load or unload hose by depressing the foot switch (32-2) which is momentary (will only operate when depressed).

Reel Direction Modes

Mode 1 - UNLOAD

Mode 2 - LOAD

Caution! Do not allow your hands, feet or clothing to become trapped by any of the reel's moving mechanisms.

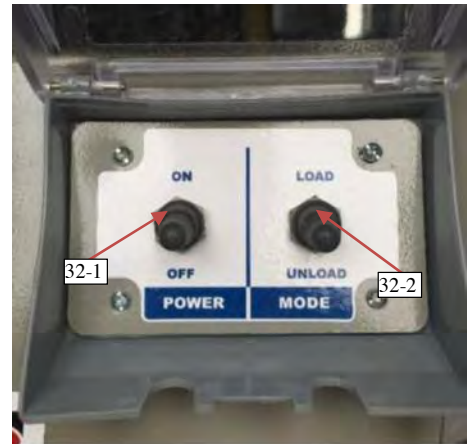
Mode 1 - "UNLOAD"

- The UNLOAD mode is achieved with the mode toggle switch (32-2) in the UNLOAD position.
- The foot switch (33-1) is momentary and will only operate when it is depressed.

Mode 2 - "LOAD"

- The LOAD mode is achieved with the mode toggle switch (32-2) in the LOAD position.
- The foot switch (33-1) is momentary and will only operate when it is depressed.
- The hose must be directed manually into position on the hose reel.

Note: To eliminate initial clutch slippage when loading hose, one loop of hose should be left slack prior to initiating hose loading.



32-Power & mode toggle switches



33 - Foot Switch

Mechanical Drive Components

Precautions

Electric shock will result in death or serious injury.

- The user is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- DO NOT touch unshielded components or screw connections with voltage present.
- Install and close all covers before applying power or starting and stopping the hose reel.
- Before servicing:
 - Disconnect all power.
 - Place a "DO NOT TURN ON" label on the drive controller disconnect.
 - Lock disconnect in the open position.

Access to the internal mechanical drive components is provided through the access door.

Manual Resets

If a fault occurs due to a prolonged overload, overvoltage, under voltage or phase failure, the control must be manually restarted. The control can be restarted by:

- 1) Disconnect AC power.
- 2) Check reset button located near the back and on the reel side of the motor.
- 3) Reconnect the AC power.

Electric Motor

- No regular maintenance is required.
- Low temperature manual reset thermal protector.
- Totally enclosed and fully gasketed construction for dirty environments.
- Make sure that, during operation or storage, the motor is not in prolonged contact with moisture.
- Refer to the chart "Table 1 - Electric motor features & data", below for motor data.



34 - Access door



35 - Motor & gearbox

PRODUCT FEATURE - ENCLOSED HIGH TORQUE MOTOR			
Model Number:	56C17F5913	Phase:	1
HP:	3/4	Mult. Symb.	F1
RPM:	1725	F.L. Amps	11 /5.4-5. 5
Volts:	115/208-230	Weight Lbs.	30
Frame:	56C	"C" Dim.	12.32
Overload:	MANUAL	Foot Notes:	2
Mounting:	C-FACE	S.F.:	1.15

Table 1 - Electric motor features & data

Gear box specifications

- HUB CITY - Poweratio 2000, Model HW2042ER (Assy #: 0251-00534)
- Modified helical worm reducer
- 102:1 gear reduction
- 5/8" input shaft size
- 1" output shaft

CAUTION

Do not operate the unit without ensuring it contains the correct amount of oil. Do not overfill or under fill with oil. Injury to personnel, unit, or other equipment may result.

Oil should be changed with greater frequency if unit is used in severe environment (dusty or high humidity).

WARNING

Oil, housing, and other components can reach high temperatures during operation, and can cause severe burns. Use extreme care when removing lubrication plugs and vents while servicing the unit.

Maintenance & Operation

Oil, housing, and other components can reach high temperatures during operation, and can cause severe burns. Use extreme care when removing lubrication plugs and vents while servicing the unit.

- Do not operate the unit without making sure it contains the correct amount of oil. Do not overfill or under fill with oil, or injury to personnel, unit, or other equipment may result.
- For proper operation in subzero conditions, it is mandatory that the following oil be used: "SWEPCO 212 MOLY MULTI-GRADE GEAR LUBE" any other gear oil will void warranty!

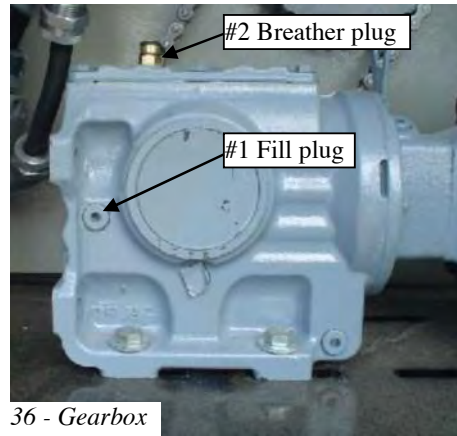
Oil Filling Procedure

- Remove Fill (#-1) and Breather Plug (#-2).
- Clean threads on the removed plugs and the plug holes with degreaser.
- Fill gear box with the recommended lubricant (see above) to a level near the center line of the uppermost horizontal shaft or until lubricant comes out of the oil level plug hole.
- Install plugs secure in gear case.

Break-In Period

After the first 100 hours of operation, drain out initial oil, flush out the gear case with an approved non-flammable, non-toxic solvent, such as Whitmore's Flushing Oil (#06802030) or Medallion Flushing Oil Kosher (#06812010), and refill. Thereafter, oil should be changed at least every 2500 operating hours or every 6 months - whichever occurs first.

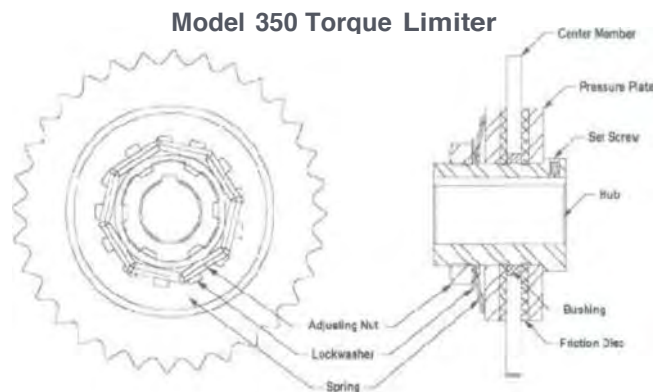
Note: Oil should be changed with greater frequency if unit is used in severe environments (dust or high humidity).



Torque Limiter Clutch

- The Torque limiter protects the drive line from damage due to overload conditions. The driven center member slips on non-asbestos friction discs during overload situations in the drive line.
- Torque Ratings;
GLI Model 350 w/ two springs
 - minimum: 60 lb.-ft.
 - maximum: 190 lb.-ft.

Please note that the torque ratings are estimates. Actual torque capacity may vary significantly depending on many factors. Field conditions such as oil, humidity, water and temperature as well as the frequency and duration of slippage all affect torque capacity.



Although the torque limiter clutch is factory set at Dryair, periodic adjustment may be required. It is recommended the torque setting of the clutch be checked twice per season (see "Maintenance" section). With prolonged use, the two friction disks, located on either side of the A-plate sprocket, will eventually show wear.

- It is important that the torque limiter clutch is adjusted properly. If the clutch slips too easily, the spool will take too long to stop and hose will pile up on the reel. If the clutch does not slip at all, damage will occur to the drive system.

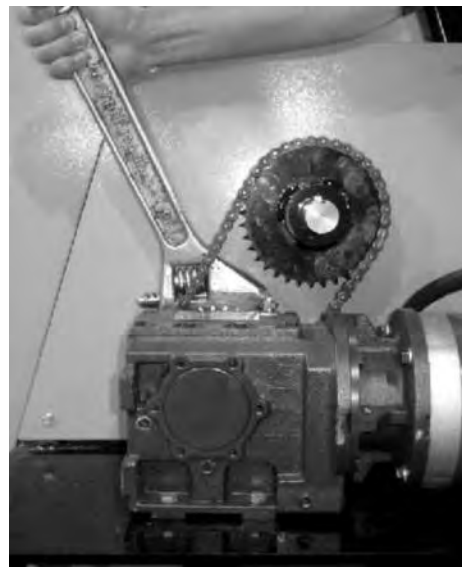
Note: A visual check may be required to confirm whether it is the clutch that is slipping or the motor.

Torque Limiter Adjustment

- Although the torque limiter clutch is factory (Dryair) set, periodic adjustment may be required. It is recommended the torque setting of the clutch be checked twice a season. With prolonged use, the two friction disks, located on either side of the A-plate sprocket, will eventually show wear.
- It is important that the torque limiter clutch is adjusted properly. If the clutch slips too easily, the spool will take too long to stop and hose will pile up on the reel.
- Check that the clutch is adjusted properly with the following procedure:

Physical check

- With no power being applied to the reel, grip the edge of the spool plate and apply full upward force, making sure that you are lifting with your legs and not your back.
- You should be able to cause the clutch to just slip with full lifting force.
- If the clutch does not slip or slips too easily, refer to the "torque adjust procedure", below.



37 - Torque Limiter Adjustment

Torque adjust procedure

- Insure that the adjusting nut is in a finger tight position.
- If the adjustment nut is tighter than finger tight, loosen and complete previous step.
- Using a torque wrench tighten the adjusting nut to 90ft*lb.

After the break-away torque is set, bend the tabs of the lock washer over *39 - Torque limiter adjuster* the hex flats of the adjusting nut.

Note: The torque limiter clutch nut requires a reasonable amount of force to adjust. Use a torque wrench that provides you with at least 18" of leverage.

Run-in procedure

- If the Torque Limiter has been taken apart and reassembled or friction disks have been changed, it is recommended that the clutch be "run in" by "slipping" the center member (sprocket)
- Insure that the adjusting nut is in a finger tight position.
- Match mark the adjusting nut and hub. Advance the adjusting nut 1/4 tum from finger tight.
- Slip the torque limiter sprocket for 8 minutes at full RPM.
- Refer back to the "Torque adjust procedure" for final readjustment.

Troubleshooting (CME)

- There are 6 green lights on the control panel, which indicate the status of a sequence of functions while the unit is running.
- Aquastat and burner light go off and on as the burner cycles.
- When the burner is on, all green lights should be on. With the burner on, any light which is not on should be considered burned out.
- Troubleshoot power issues at the control panel terminal control strip. Remove control panel to expose terminal strip.

No power at outgoing side of water heater toggle switch



Check for 120 volt power between letter N and #1 on the terminal strip. If no power check the following:

- a) Check that the circuit breaker for the water heater has not been switched off.
- b) Check that the toggle switch for the water heater has not been turned off.
- c) Check for power in and out of breaker and toggle switch.
- d) Check that correct power supply has been connected to the unit. Investigate power source and be certain that the power characteristics are correct.(120 volt, 15 amp, single phase, 3-conductor, 0'-100'-12AWG, over 100' - 10AWG)

No power at Terminal#4 on low water cutoff



Check for 120 volt power between letter N and #2 on the terminal strip. If no power check the following:

- a) Low water situation. Check fluid level in tank and add if necessary.

No power at flow switch



Check for 120 volt power between letter N and #3 on the terminal strip. If no power check the following:

- a) Pump not running. - Check pump breaker and toggle switch on control panel. - Check for 120 volts at pump motor. If correct power is confirmed at motor, but pump won't run, refer to "G&L Pumps, Installation, Operation & Maintenance Instructions, 11- Troubleshooting Chart" for more in-depth troubleshooting.
- b) Inadequate flow.
 - Check that all valves are open in the fluid-transfer loop. - Filter screen may be plugged. Use flush hose/valve attachment into a bucket, while pump is running, for a quick Y-strainer flush (see Y-strainer flush in Maintenance section of Operators Manual). Eventually the system may have to be drained and the filter screen removed and cleaned by hand (see Y-strainer screen in Maintenance section of Operators Manual). - Check that pressure bypass valve is open, if fluid-receiving units are closed off.
 - When performing "ground thaw" or "concrete cure" application, the use of only one "heat exchanger loop" may result in inadequate flow. Utilizing at least two "heat exchange loops" will provide adequate flow or a short bypass loop can also be incorporated to correct this situation.
 - Air present in the circulation system. Air in the system can cause cavitation in the pump and pressure loss. Refer to "Operation, Purging air from the system" for air purging instructions.
 - Supply temperature overrun causing vaporization (steam) & pump pressure to be lost. Cavitation will occur in the "water heater heat exchanger" causing a noticeable bubbling, popping sound. Check the "overflow outlet" to confirm presence of fluid vapor. If vaporization is occurring, the "Aquastat" setting is set too high. Reset the "Aquastat" to a lower temperature (10°F increments) and allow cool-down. When the "heat transfer fluid" cools down, the system will regain pump pressure. Allow the burner to cycle back on and observe to ensure that the vaporization situation does not reoccur. If it does reoccur, reset the "Aquastat" to a lower temperature until the problem is rectified.

Note: This situation will occur more often in a "low flow" situation (refer to Operation, Temperate Start Procedure, Control Settings).

- c) Defective flow switch. - If a) and b) check out good, the flow switch will need to be re-calibrated, or replaced.

No power at Aquastat



Check for 120 volt power between letter N and #6 on terminal strip. If no power check the following:

- a) Check setting on Aquastat.
- b) Check sensor and verify that it is intact in its well.
- c) If a) and b) check out good, replace both Aquastat and sensor.

No power at outgoing side of high limit switches



Check for 120 volt power between letter N and #5 on the terminal strip. If no power check the following:

- a) Manual reset high limit reset button tripped.
- b) Check settings of switches. The automatic high limit should be set 10°F higher than the set point of the Aquastat, and the manual reset high limit should be set 10°F higher than the automatic high limit switch.
- c) Determine which high limit switch is defective and replace.

No power at burner



Check for 120 volt power between letter N and #7 on the terminal strip. If power check the following:

- a) Check for 120 volt power at the burner. If power present there is a fault in the burner. See the enclosed Riello burner information to trouble shoot the burner system.

TROUBLESHOOTING

INDICATOR LIGHTS

* There are 6 green lights on the control panel, which indicate the status of a sequence of functions while the unit is running.

* When burner is on, all green lights should be on as well. Any light which is not on should be considered burned out.

* Aquastat and burner light go off and on as the burner cycles.

* The terminal strip, located behind the control panel, must be accessed to initiate troubleshooting procedures.

No power at out-going side of water heater toggle switch
Check for 120 volt power between letter N and #1 on the terminal strip. If there is no power, check the following:

- a) Check that the circuit breaker has not been switched off.
- b) Check that the water heater toggle switch has not been turned off.
- c) Check for power in and out of breaker and toggle switch.
- d) Check that correct power supply has been connected to the unit. Investigate power source and be certain that the power characteristics are correct. (115 volt, 15 amp, single phase, 3-conductor, 0-100° - 12 AHG, over 100° - 10 AHG.)

No power at terminal #4 on low water cut-off
Check for 120 volt power between letter N and #2 on the terminal strip. If there is no power, check the following:

- a) Low water situation. Check fluid level in tank and add if necessary.
- b) Check fuse in low water cut off. Replace if required.

No power at flow switch
Check for 120 volt power between letter N and #3 on the terminal strip. If there is no power, check the following:

- a) Pump not running. - Check pump breaker and toggle switch on control panel. - Check for volts at pump motor. If correct power is confirmed at motor, but pump won't run, replace pump.
- b) Inadequate flow. - Check that all valves are open in the fluid transfer loop. - Filter screen may be plugged. Use flush hose/valve attachment into a bucket, while pump is running, for a quick flush. Eventually the system may have to be drained and the filter screen removed and cleaned by hand. - If fluid-moving units are closed off, check that the pressure by-pass valve is open.
- c) Defective flow switch. - If a) and b) check out, the flow switch will need to be re-calibrated or replaced.

No power at out-going side of high limit switches.
Check for 120 volt power between letter N and #5 on the terminal strip. If there is no power, check the following:

- a) Manual reset high limit - Check and reset if it has tripped.
- b) Check switch settings. The auto-matic high limit should be set 10°F higher than the set point of the aqua-stat, and the manual reset high limit should be set 10°F higher than the auto-matic high limit switch.
- c) Determine which high limit switch is defective and replace.

No power at aqua-stat
Check for 120 volt power between letter N and #6 on terminal strip. If there is no power, check the following:

- a) Check that setting on aqua-stat is at desired operating temperature.
- b) Check well sensor (electronic), and verify that it is intact and positioned properly in its well.
- c) If a) and b) check out, replace both aqua-stat and well sensor.

No power at burner
Check for 120 volt power between letter N and #7 on the terminal strip. If there is power, check the following:

- a) Check for 120 volt power at the burner. If power is present, there is a fault in the burner. See manual to trouble shoot burner system.

FOR ADDITIONAL ASSISTANCE, CALL 1(888) 750 1700
003-90 2232

DÉPANNAGE

FONCTIONNEMENT

* Il y a 6 lumières verts sur le panneau de commande, qui indiquent état d'une séquence de fonctions tandis que l'appareil fonctionne.

* Lorsque le brûleur est allumé, tous les lumières verts doivent être allumés aussi. Toute la lumière qui ne s'est pas allumée, doit être considérée brûlée.

* La lumière d'aquastat et de brûleur s'arrête et s'allume alors que le brûleur cycle.

* La barre de raccordement, situé derrière le panneau de commande, doit être ouvert pour initier les procédures de dépannage.

Aucune alimentation à côté sortant d'interrupteur à bascule de chauffe-eau
Vérifiez s'il y a 120 volts de puissance entre le lettre N et #1 sur la barre de raccordement. S'il n'y a pas de puissance, vérifiez les points suivants:

- a) Vérifiez que le disjoncteur n'a pas été éteint.
- b) Vérifiez que l'interrupteur à bascule de chauffe-eau n'a pas été éteint.
- c) Vérifiez la puissance en et hors de disjoncteur et d'interrupteur à bascule.
- d) Vérifiez que l'alimentation électrique correcte a été connectée à l'appareil. Enquêter la source d'alimentation et soyez certain que les caractéristiques de puissance sont correctes. (115 volt, 15 amp, monophasé, 3-conducteur, 0-100° - 12 AHG, plus de 100° - 10 AHG.)

Aucune alimentation à terminal #4 sur interrupteur à bas niveau d'eau
Vérifiez s'il y a 120 volt de puissance entre le lettre N et #2 sur la barre de raccordement. S'il n'y a pas de puissance, vérifiez les points suivants:

- a) Situation de bas niveau d'eau. Vérifiez niveau de carburant dans le réservoir et ajoutez au besoin. b) Vérifiez le fusible de l'interrupteur à bas niveau d'eau. Remplacez au besoin.

Aucune alimentation au commutateur de flux
Vérifiez s'il y a 120 volt de puissance entre le lettre N et #3 sur la barre de raccordement. S'il n'y a pas de puissance, vérifiez les points suivants:

- a) Pompe ne fonctionne pas. - Vérifiez le disjoncteur de pompe et l'interrupteur à bascule sur le panneau de commande. - Vérifiez s'il y a volts à l'rotateur de la pompe. Si la puissance correcte est confirmée à moteur, mais la pompe ne fonctionne pas, remplacez la pompe.
- b) Flux inadéquate. - Vérifiez que toutes les vannes sont ouvertes dans la boucle de transfert de fluide. Écran de filtrage peut être branché. Utilisez la fixation du repousser la rampe de fluide dans un seau, lorsque la pompe fonctionne, pour un flush rapide. Finalement le système peut avoir d'être drainé et l'écran de filtrage enlevé et nettoyé à la main. - Si les arêtes de réception de fluide sont obtusées, vérifiez que la vanne de pression de commutement est ouverte.
- c) Commutateur de flux défectueux. - Si a) et b) retiré, le commutateur de flux devrait être recalibré ou remplacé.

Aucune alimentation à côté sortant de commutateur de limite haute.
Vérifiez s'il y a 120 volt de puissance entre le lettre N et #5 sur la barre de raccordement. S'il n'y a pas de puissance, vérifiez les points suivants:

- a) Limite haute réinitialisée manuellement. Contrôlez et réinitialisez s'il s'est déclenché.
- b) Contrôlez paramètres de commutation. La limite haute automatique doit être 10°F plus élevée que le point de consigne de l'aquastat, et la limite haute réinitialisation manuelle doit être 10°F plus élevée que le commutateur de limite haute automatique.
- c) Déterminez quel commutateur de limite haute est défectueux et remplacez.

Aucune alimentation à l'aquastat
Vérifiez s'il y a 120 volt de puissance entre le lettre N et #6 sur la barre de raccordement. S'il n'y a pas de puissance, vérifiez les points suivants:

- a) Vérifiez que le paramètre à l'aquastat est à la température de fonctionnement souhaitable. b) Vérifiez le capteur de puls (électronique), et contrôlez qu'il est intact et correctement positionné dans son puits. c) Si a) et b) retiré, remplacez aquastat et capteur de puls.

Aucune alimentation à le brûleur
Vérifiez s'il y a 120 volt de puissance entre le lettre N et #7 sur la barre de raccordement. S'il n'y a pas de puissance, vérifiez le point suivant:

- a) Vérifiez s'il y a 120 volt de puissance à le brûleur. Si l'alimentation est présente il y a un défaut dans le brûleur. Voir le manuel pour dépannage de le système de brûleur.

TOUTE UNE INFORMATION SUPPLÉMENTAIRE, APPELÉZ 1(888) 750 1700 003-902232R01

Maintenance

Central Heating Module

Daily checklist

A daily inspection of the water heater cabinet should be performed with attention paid to the following:

Check for strong odor of fuel

- If a leak or the odor of fuel is noticed, immediately turn off all power switches and the main fuel supply to the water heater cabinet.
- Ventilate the water heater cabinet.
- Find and correct the leak before turning on any power or trying to relight the water heater.

Check heat transfer fluid "HTF" level every day

- Maintain between 1/4 and 3/4 on the heat transfer level gauge when fluid is hot
- Top up as necessary
- For "HTF" specifications, see "Setup, Heat Transfer Fluid "HTF", Fluid Specifications.
- For "HTF" handling precautions, refer to the "Safety Concerns, Material Safety Data Sheet".
- If loss of fluid is excessive, check for leaks at all fittings and connections in the water heater cabinet as well as the fluid circulation system.

Check the supply temperature gauge

- Verify that the supply temperature gauge is within 10°F of the Aquastat setting.

Seasonal checklist

Fuel (water block / particulate) filter

- The water block/particulate filter should be changed every heating season or as required.

Hoses

- Periodically check all hoses for damage due to aging, elevated temperatures, over-torqued hose clamps, abrasion and weathering.
- Replace damaged hoses as required.
- Seasonally check hose clamp torque and adjust accordingly.

Water heater heat exchanger

- Keep the flues in the water heater clean. Because soot is a nonconductor of heat, a dirty water heater requires more oil to heat a structure than a clean one. Water heaters can corrode on the fireside. This results from corrosive substances in the fuel and can be difficult to control. Some fuel oils contain substances, which cause fireside corrosion. Sulphur, vanadium and sodium are among the materials that may contribute to this problem. The probability of trouble from this source depends to a large degree on the amount of Sulphur in the fuel and on the care used in cleaning the fireside heating surfaces. This is particularly true when preparing a boiler for a period of idleness. Preventing this problem also depends on keeping the boiler heating surfaces dry when a boiler is out of service.
- The person responsible for water heater maintenance should be certain that the fireside surfaces of the water heaters in his care are thoroughly cleaned at the end of the firing season. He should also observe the fireside surfaces during the firing season and if signs of corrosion are discovered, a reputable consultant should be contacted.
- The flue pipe and chimney cap should be taken off once a year and thoroughly cleaned of all soot.

Heat exchanger cleaning procedure

- Remove the burner from the water heater.
- Vacuum all debris.

Heat transfer fluid "HTF"

- A clean, properly maintained hot water system should not be drained unless: there is possibility of freezing, the boiler has accumulated a considerable amount of sludge or dirt on the water side, or draining is necessary to permit repairs. Very little sludge should accumulate in a water heater where little make-up water is added and where an appropriate water heater water treatment is maintained at proper strength.
- The Heat transfer fluid should be tested from year to year for freeze protection and should be strong enough for your area. The heat transfer fluid should be checked with a refractometer. Check the glycol/water mixture chart (see "Setup, Heat transfer fluid HTF) for mixing ratios.
- The "pH level" of the heat transfer fluid requires an annual check to see if the pH level is neutral. The pH level should be at 7. This should be checked with a pH instrument.

See "Setup, Heat transfer fluid HTF, Heat transfer fluid specifications" for complete heat transfer fluid specifications

Burner

- For burner seasonal maintenance, see the "Service Manual".

"Y" strainer

"Y" strainer flush

- The "Y" strainer (38-1) requires regular maintenance every time system is set up or 1000 hours of operation.
 - Remove the end plug from the end of the strainer outlet valve
 - Position a 5-gallon container at the outlet valve.
 - With the pump running, crack the strainer valve a number of times. A quick on/off action of the valve will provide the short bursts required to backwash and clean the strainer. The removal of a couple of gallons of heat transfer fluid should be adequate.

NOTE: Be certain not to run the reservoir empty, as this would allow air to enter the system.

- The extracted heat transfer fluid can be reused. Before pouring the fluid back into the reservoir, the fluid must be filtered to remove impurities. Filtering the fluid through a cotton cloth or paper is adequate.



38 - Back washing Y-strainer

"Y" strainer screen cleaning procedure

- Clean the screen (39-1) located inside the "Y" strainer prior to every installation.
 - Remove the end plug from the end of the strainer outlet valve
 - Position a container at the outlet valve. A couple of 5 gallon containers should do.
 - With the pump "off", drain off the "HTF" until there is no more flow.
 - Remove the top of the "Y" strainer and extract the screen (39-1)
 - The screen should be cleaned using warm water and a soft bristled brush.
 - Reassemble and ensure that all fittings are tight
 - The extracted heat transfer fluid can be reused.
 - Air will have to be purged from the system. Refer to "Operation, Purging air from the "HTF" circulation system" for instructions.



39 - Y-Strainer Screen

Addendum




Important Certification & Operational Information Decals

Non-pressure vessel decal

ATTENTION!	
<p>This Unit is Certified to CSA & UL Standards for use as a NON-PRESSURE VESSEL</p> <ul style="list-style-type: none">-The unit includes an open atmospherically vented expansion tank.-The expansion tank is integrally connected to the heat-exchange section of the water heater by means of a permanently open line (no valves).-The heat exchange section connects to the inlet side of the circulating pump and therefore, only neutral atmospheric pressure is present within the heat exchange section.	<p>Cet appareil est certifié aux normes de CSA et UL pour l'utilisation comme un NAVIRE SANS PRESSION</p> <ul style="list-style-type: none">- L'appareil inclut un ouverte réservoir d'expansion atmosphérique ventilé.- Le réservoir d'expansion est relié intégralement à la section d'échange de chaleur du chauffe-eau au moyen d'une ligne ouvert en permanence (pas de vannes).- La section d'échange de chaleur se connecte à le côté d'entrée de la pompe de circulation et donc, seulement la pression atmosphérique neutre est présent à l'intérieur de la section d'échange de chaleur. <p>003-900454R01</p>

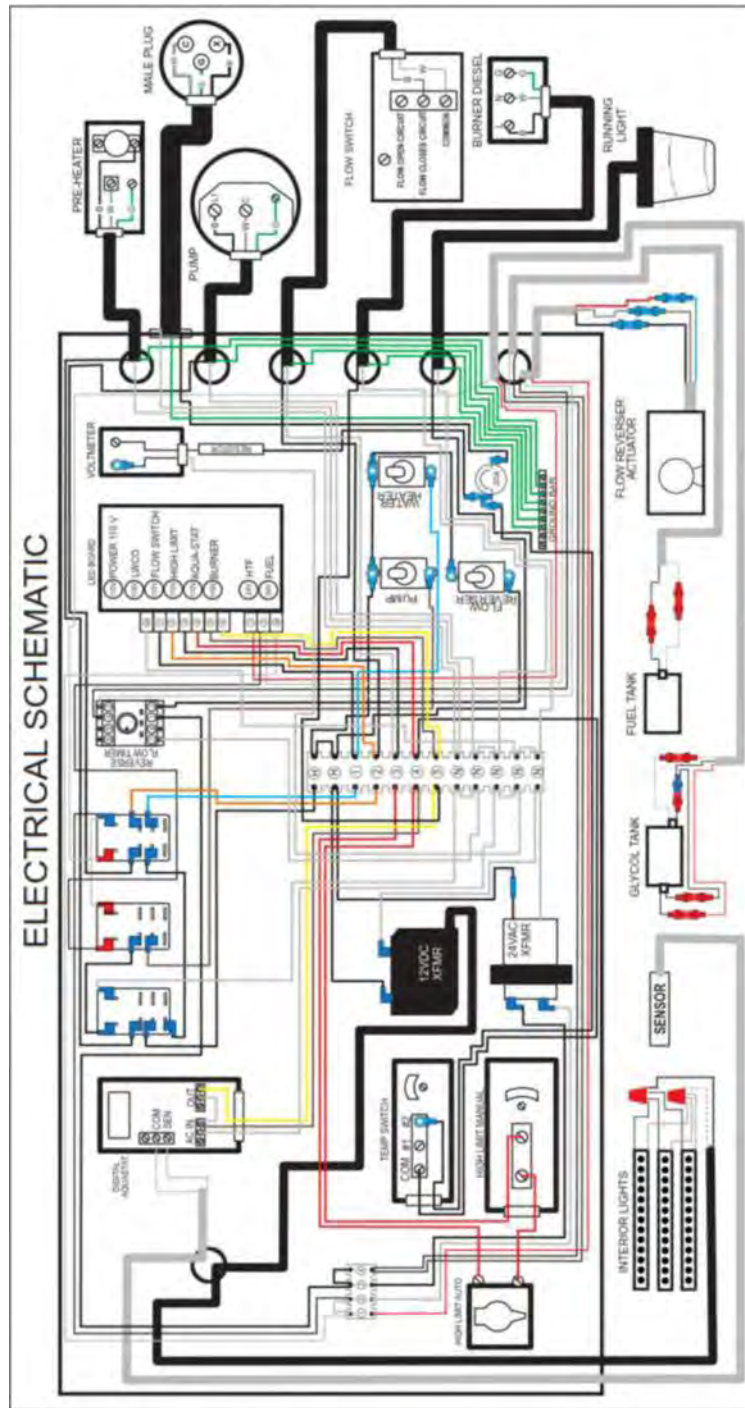
40 - Non-pressure Vessel decal

Certification & Heater Specifications

		P.O Box 126 400 Service Road St. Brieux, SK Canada S0K 3V0		 MADE IN CANADA	
		DRYAIR Model:	300 GTS		Reference:
Serial No.:	[]	Prod. Sched.:	[]	[]	
Main Power		Oil Burner			
Volts:	120 V	Model:	Riello 40-F10		
Phase:	1	Fuel:	#2 Heating Oil	#1 Heating Oil	
Hz:	60 HZ	Calorific Value:	140,000 BTU / US Gal.	136,000 BTU / US Gal.	
Max. Ampacity	20 A	Output:	223,000 BTUH	217,000 BTUH	
Control Voltage	24VAC	Fuel Input:	1.75	US GPH	
		Pump Pressure:	145	P.S.I.	
		COMPLIES TO: UL 508A/CAN CSA C22.2 No.14 UL 726/CAN CSA C22.2 No.3 CAN/CSA C22.2 No. B140.7.2 CAN/CSA C22.2 No.B139 ANSI/NFPA 31			
		Clearances:			
		Sides	24" (61cm)minimum		
		Flue	36" (91cm)minimum		
Floor	0" (0cm) non-combustible				
C NRTL US		003-902772			

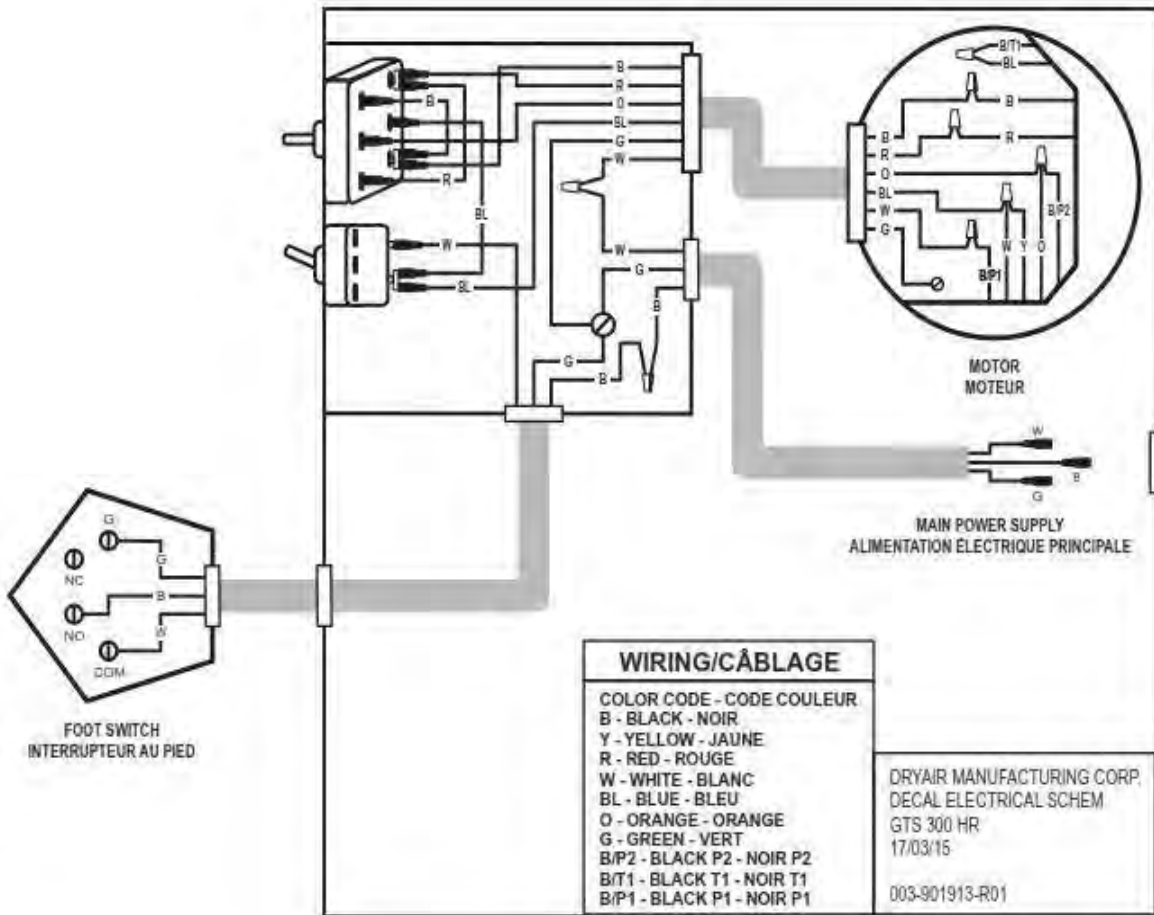
41 - Water Heater Data & Serial Plate

Electrical schematics



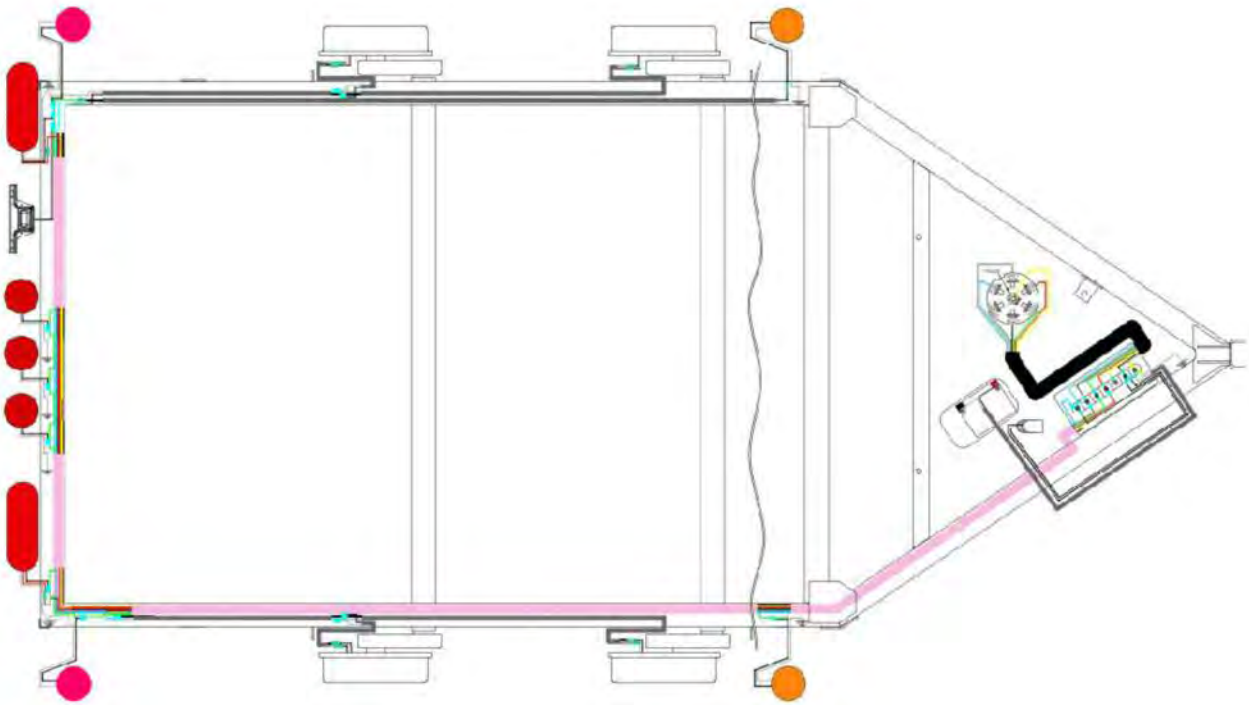
42- Water Heater electrical schematic

Hose Reel Electrical schematics



43 - HR2250 electrical schematic

GTS 300 Trailer Wiring Schematics



Main Trailer Cable = EPM 14/6 (shown in pink)

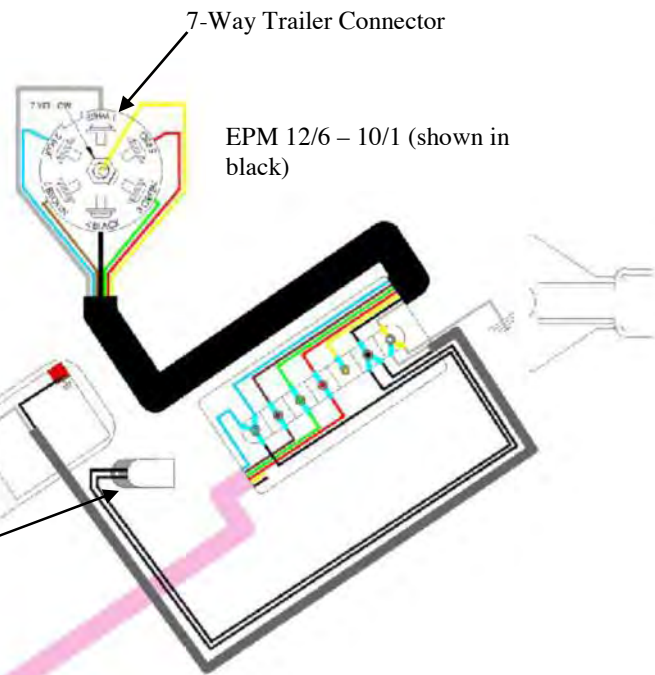
- Black Not Used
- Yellow Not Used
- Red Left Signal
- Brown Right Signal
- Blue Brakes
- Green Running Lights

Miscellaneous Cable = EPM 14/2 (Shown in grey)

- Black Running Lights
Brakes
Battery Charge
- White Ground

Emergency Brake Battery

Emergency Brake-Away Switch



44 – GTS300 Trailer electrical schematic

Mobile Hydronic Heater

TD300



**For Ground Thaw and
Concrete Cure
Applications**

TD600



**Max Thawing Capability With 3,000' Hose...4,500 Sq. Ft.(18" Spacing)
Max Curing Capability With 3,000' Hose...6,000 Sq. Ft.(24" Spacing)**

**Max Thawing Capability With 5,000' Hose...7,500 Sq. Ft.(18" Spacing)
Max Curing Capability With 5,000' Hose...10,000 Sq. Ft.(24" Spacing)**

Heating Unit

Burner
Fuel
Input Capacity
Output Capacity
Fuel Consumption
Fuel Capacity
Max Operating Temp

TD600

Riello single stage
Diesel fuel/#1 or 2 heating oil
620,200 BTU/hr., 182 KW
508,564 BTU/hr., 149 KW
4.43 GPH (100% run time)
250 gallons
195°F

TD300

Riello single stage
Diesel fuel/#1 or 2 heating oil
301,000 BTU/hr., 87.2 KW
255,850 BTU/hr., 71.5 KW
2.15 GPH (100% run time)
150 gallons
195°F

Heat Transfer System

Fluid
Operating Pressure
Flow
Pump
Circulation System
Manifold System

Non-toxic propylene glycol/water mix
35 PSI
965 GPH
1.5 HP
5/8" dia. hose, 500' min. loop length
1000' max loop length, min. of 2 loops
Detachable, 8 port - 3/4" quick disconnect

Non-toxic propylene glycol/water mix
35 PSI
965 GPH
1.5 HP
5/8" dia. hose, 500' min. loop length
1000' max loop length, min. of 2 loops
Detachable, 6 port - 3/4" quick disconnect

Hose Reel

Control
Capacity

Forward/Reverse with foot switch
5,000' of 5/8" dia. hose

Forward/Reverse with foot switch
3,000' of 5/8" dia. hose

Power

Generator

Multiquip Model DA7000 SS
7KW Max power
6KW Continuous power
3600 RPM, 60 Hz AC
Kubota 2-cylinder engine
Liquid cooled
Hour meter

Multiquip Model DA7000 SS
7KW Max power
6KW Continuous power
3600 RPM, 60 Hz AC
Kubota 2-cylinder engine
Liquid cooled
Hour meter

Trailer

Specifications

GVWR 12,000 lbs.
Pintle hitch
6 pole connector light hook up
Electric brakes with break-away switch

GVWR 12,000 lbs.,
Pintle hitch
6 pole connector light hook up
Electric brakes with break-away switch

Total weight package

9,750 lbs. (with reel, water heater module, hoses, loaded with heat transfer fluid & fuel)

5,950 lbs. dry weight

Overall Dimensions

195"L x 94" W x 96" H

188"L x 76" W x 96" H