Part # 200103
Date # July 2019

HEAT KING

HK300B
Operation Manual

HEAT KING

As a new customer of Heat King we would like to welcome you! We are looking forward to providing you with technical support for your Heat King unit. Whatever you need we are here to help.

Ways to contact us for support

By Phone : 1-800-661-0304

The main Technical support phone line is staffed monday-friday 7:00 AM to 4:30 PM CST excluding Manitoba statuatory holidays.

After hours support

Calls received outside of regular hours are directed to the On-call technician. After hours support is reserved for issues that cannot wait until the next business day for resolution. If no answer please leave a message and we will get back to you as soon as possible.

By Email : Support@tamarack-ind.com

Feel free to email us at any time with technical questions or parts inquiries. Please include the year make and model of your Heat King if you have a specific question about your machine so we can better help you. If it is an emergency please call 1-800-661-0304

For more information please visit our website

www.heat-king.ca

WARNING

CALIFORNIA - Proposition 65 Warning

Engine exhaust and some of its constituents and some dust created by power sanding, sawing, grinding, drilling and other construction activities contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm.

Some examples of these chemicals are:-

Lead from lead-based paints
Crystalline silica from bricks
Cement and other masonry products
Arsenic and chromium from chemically treated lumber

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals:
ALWAYS work in a well ventilated area, and work with approved safety equipment, such as dust masks that are specially designed to filter out microscopic particles.

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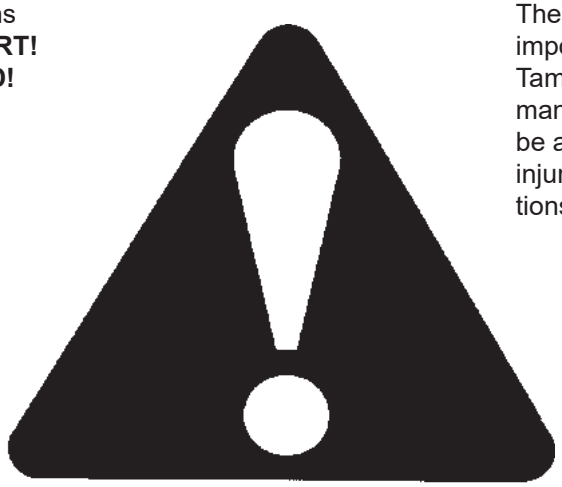
SAFETY

SAFETY ALERT SYMBOL

This Safety Alert symbol means
ATTENTION! BECOME ALERT!
YOUR SAFETY IS INVOLVED!



The Safety Alert symbol identifies important safety messages on the Tamarack Heat King and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

Why is SAFETY important to you?

3 Big Reasons

Accidents Disable and Kill
Accidents Cost
Accidents Can Be Avoided

SIGNAL WORDS:

Note the use of the signal words **DANGER, WARNING** and **CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guide-lines:

DANGER - Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.

WARNING - Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION - Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Safety, Installation & Operation

SAFETY

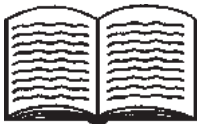
YOU are responsible for the **SAFE** operation and maintenance of your Tamarack Industries Heat King. **YOU** must ensure that you and anyone else who is going to operate, maintain or work around the Heat King be familiar with the operating and maintenance procedures and related **SAFETY** information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practices that should be adhered to while operating the Heater.

Remember, **YOU** are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** operating this equipment is familiar with the recommended operating and maintenance procedures and follows all the safety precautions. Most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- Heater owners must give operating instructions to operators or employees before allowing them to operate the machine, and at least annually thereafter.
- The most important safety device on this equipment is a SAFE operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the manual and to follow these. Most accidents can be avoided.
- A person who has not read and understood all operating and safety instructions is not qualified to operate the machine. An untrained operator exposes himself and bystanders to possible serious injury or death.
- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety and could affect the life of the equipment.
- Think SAFETY! Work SAFELY!

GENERAL SAFETY

1. Read and understand the Operator's manual and all safety signs before operating, maintaining, adjusting, servicing or cleaning the Heater.



2. Only trained competent persons shall operate the Heater. An untrained operator is not qualified to operate the machine.

3. Have a first-aid kit available for use, should the need arise and know how to use it.

4. Do not allow riders.

5. Have a fire extinguisher available for use should the need arise and know how to use it.

6. Wear appropriate protective gear. This list includes, but is not limited to:
   - A hard hat
   - Protective boots with slip resistant soles
   - Protective goggles
   - Heavy gloves
   - Hearing protection

7. Place all controls in their OFF position, disconnect power cords and wait for all moving parts to stop before servicing, adjusting or maintaining

8. Wear appropriate hearing protection when operating for long periods of time.

9. Wear protective gloves

10. Ventilation ~ Never operate in a poorly ventilated or enclose area. Avoid prolonged breathing of exhaust gases.

11. Hot surface ~ Avoid contact with hot exhaust and glycol system. Allow to cool before performing repairs or service.

12. Electrocution Hazard ~ Always use proper size grounded extension cord. Inspect all extension cords for cuts, frayed wires and broken connectors. Do not use cords if not in good condition.

13. Fire Hazard ~ Do not operate machine in the vicinity of open flames, sparks or while smoking.

14. Explosion Hazard ~ Battery Take care when handling battery (if installed)

ELECTRICAL SAFETY

1. Place all controls in their OFF position, disconnect power cords and wait for all moving parts to stop before servicing, adjusting or maintaining.
2. Place all controls in their OFF position before plugging in power cords.
3. Keep all electrical components in good repair before starting.
4. Do not lay power lines or connectors in water or on a wet surface. Dry connectors and raise power lines out of the water before and during operation.
5. Do not operate machine if there are electrical malfunctions. Correct problem before resuming work.

TIRE SAFETY

1. Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death.
2. Do not attempt to mount a tire unless you have the proper equipment and experience to do the job.
3. Have a qualified tire dealer or repair service perform required tire maintenance.
4. Torque wheel nuts to 120 ft-lbs

STORAGE SAFETY

1. Store unit in an area away from human activity.
2. Do not permit children to play on or around the stored Heater.

FUEL SAFETY

Danger: To avoid possible injury, fire, or explosion, please read and follow these instructions.

1. Handle fuel with care. It is highly flammable.
2. Allow burners to cool for 5 minutes before refueling. Clean up spilled fuel before restarting engine.
3. Do not refuel the machine while smoking or when near open flame or sparks.
4. Always use an approved fuel container.
5. Fill fuel tank outdoors.
6. Prevent fires by keeping machine clean of ac cumulated trash, grease and debris.

INSTALLATION SAFETY

1. Use only fuel for the heater burner specified in the specifications section of this manual**.** The use of incorrect fuel may result in fire or explosion and sever injury to the operator.

2. Fuel burning equipment must have proper ventilation for cooling, combustion air, and exhausting of combustion products

3. Personnel trained in and familiar with the type of equipment being serviced should only perform adjustments to fuel burning equipment.

WARNING: This machine emits carbon monoxide, a deadly gas, and must be vented if used in an enclosed area. Improper venting can cause poor combustion, delayed ignition, down drafts and possibility of freezing of the coil.

The information contained herein is offered for reference only. You must comply with local codes and investigate through your local gas or utility companies when installing, as there may be some local requirements you must comply with. Also see ANSI Z223.1

Never reduce the stack size, the diverter and stacking should be the same size as the stack opening on the machine

BEFORE INSTALLATION

1.LOCATION: This machine should be installed by only qualified technicians. The machine should be set upon a level surface, minimizing the effect of winds, rain and snow. Install the machine considering locations for fuel connections, electrical connections, venting, and maintenance. All wiring and electrical connections should comply with the National Electrical Code (NEC) and with localcodes and practices.

2.GAS AND ELECTRICITY: Gas and electricity must be shut off when installing or servicing.

3.LOCAL CODES: Installation and servicing must only be performed by qualified personnel and must conform to local codes.

4.FIRE HAZARD: Keep combustible materials away from the machine. DO NOT allow lint or dust to collect in the burner area.

5. QUALIFIED PERSONNEL: All installation andservicing must only be performed by qualifiedpersonnel and must conform to the local codes.

MAINTENANCE SAFETY

1. Review the Operator's Manual and all safety items before working with, maintaining or operating the Heater.

2. Place all controls in their OFF position, disconnect power cords and wait for all moving parts to stop before servicing, adjusting or maintaining.

3. Follow good shop practices:

   - Keep service area clean and dry.
   - Be sure electrical outlets and tools are properly grounded.
   - Use adequate light for the job at hand.

4. Keep hands, feet, clothing and hair away from all moving and/or rotating parts.

5. Always wear heavy gloves to prevent burns when handling hot components. Wait until burners, coils and glycol system components have cooled before working on them.

6. Do not attempt any adjustment or maintenance to any system of the Heater unless the power wires are disconnected from the battery.

7. Make sure that all guards, shields and hoods are properly installed and secured before operating the Heater.

8. Securely support the machine using blocks or safety stands before working beneath it or changing tires.

9. Store and transfer diesel fuel, solvents, cleaners or any flammable liquids only in safety standard approved containers.

OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before operating, servicing, maintaining or adjusting the Heater.

2. Place all controls in their OFF position, disconnect power cords and wait for all moving parts to stop before servicing, adjusting or maintaining.

3. Do not allow riders in or on machine during transport.

4. Clear the area of bystanders, especially small children, before starting and operating.

5. Keep the working area clean and free of debris to prevent slipping or tripping. Clean up fuel spills immediately if they occur.

6. Slow down. Use care when working around unit - the steps, frame or floor may be wet and/or slippery.

7. Do not allow personnel that are taking drugs, alcohol or any medications that impair the senses or when excessively tired or stressed to operate the Heater.

8. Do not operate unit in a poorly ventilated or enclosed area to prevent asphyxiation when the heaters are operating.

9. Do not smoke when connecting fuel source or when working around machine.

10. Always wear heavy gloves when working on the machine to prevent burns when touching hot components.

11. Use the foot pedal switch to engage the hose reel take up or extend function and guide the hose by hand.

12. Keep all electrical lines and components in good working order. Do not operate in wet conditions or when standing in water. Damp or wet conditions can cause shocks or trip the breakers.

13. Keep all components in good condition.

14. Do Not plug or block access doors or vents. Keep 1 foot of clearance around unit.

15. Review safety instructions with operators annually.

SAFE TRANSPORTATION AND STORAGE

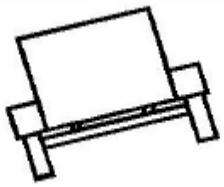
TRANSPORTING SAFETY

1. Attach to towing vehicle and secure with a mechanical retainer. Cross the safety chains under the hitch and anchor to truck frame.
2. Connect the brake anchor cable to the truck frame to activate the trailer brakes if the trailer unexpectedly unhooks. Provide sufficient slack for turning.
3. Check that all lights and reflectors required by the DOT are clean and functioning.
4. Do not exceed 55 mph under ideal conditions.
5. Do not allow riders on machine.
6. Do not drink and drive.

When transporting the machine, review and follow these instructions:

1. Be sure all bystanders are clear of the machine.
2. Back the truck up to the hitch and lower hitch over the ball.
3. Secure with a mechanical retainer.
4. Cross the safety chains under the hitch and attach to truck frame.
5. Attach the brake line to the truck frame. Be sure to leave sufficient slack for turning.
6. Connect electrical harness to truck plug-in.
7. Raise and secure the hitch jack.
8. Reverse the Heat King set-up procedure.
9. Check and be sure that all lights are working.
10. Do not allow riders on machine.
11. Never exceed a safe travel speed.
12. Do not drink and drive.
13. Check with local highway authorities on the specific requirements for transporting fuel oil through their jurisdiction. Always comply with the requirements before transporting.

WARNING



TRAILER TOWING CAN BE HAZARDOUS

* DO NOT exceed 55 mph under ideal conditions
* Reduce speed under adverse weather, road or terrain conditions
* Avoid sudden lane changes, U-turns etc.
* Sudden maneuvers may cause tipping, rollover, jackknifing or sliding of the trailer and without warning loss of control of the towing vehicle may result.
* Allow for increased braking distance due to weight of trailer
* Read the Operator's Manual before towing.

STORAGE SAFETY

1. Store unit in an area away from human activity.

2. Do not permit children to play on or around the stored Heater.

PLACING IN STORAGE

After the season's use, the machine should be thoroughly inspected and prepared for storage. Repair or replace any worn or damaged components to prevent any unnecessary down time at the start of next season. To insure a long, trouble free life, this procedure should be followed when preparing the unit for storage:

1. Clear the area of bystanders, especially small children.

2. Thoroughly wash the machine using a pressure washer to remove all dirt, mud, debris and residue.

3. Inspect the hoses and burners for damage. Repair or replace damaged parts. Remove all entangled material.

4. Drain and remove the diesel fuel from the tank whenever the unit will be stored for more than 30 days. Removing the fuel during storage eliminates the formation of organic matter in the system and prevents leaks. Always refill the tank before its next use.

5. Lubricate all grease fittings. Make sure that all grease cavities have been filled with grease to remove any water residue from the washing.

6. Touch up all paint nicks and scratches to prevent rusting.

7. Move to storage area.

8. Select an area that is dry, level and free of debris.

9. Place blocks under the hitch if required.

10. Padlock each door.

11. Unhook from tow unit

12. If the machine cannot be placed inside, cover with a waterproof tarpaulin and tie securely in place.

13. Store the machine in an area away from human activity.

14. Do not allow children to play on or around the stored machine.

INTRODUCTION

Congratulations on your choice of a Tamarack Industries Heat King HK300B to complement your construction operation. This equipment has been designed and manufactured to meet the needs of the buyer for the efficient heating of construction sites.

Safe, efficient and trouble free operation of your HK300B requires that you and anyone else who will be operating or maintaining the Heater, read and understand the Safety, Operation, Maintenance and Trouble Shooting information contained in the Operator's Manual.

This manual is applicable to the HK300B built by Tamarack Industries. Use the Table of Contents as a guide when searching for specific information.

Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your Heat King distributor or customer service if you need assistance or information at 1-800-661-0304

SIGN-OFF FORM

Tamarack Industries follows the general Safety Standards specified by the Society of Automotive Engineers (SAE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be operating and/or maintaining the Heat King must read and clearly understand ALL Safety, Operating and Maintenance information presented in this manual.

Do not operate or allow anyone else to operate this equipment until such information has been reviewed. Annually review this information before the season start-up.

Make these periodic reviews of SAFETY and OPERATION a standard practice for all of your equipment. We feel that an untrained operator is unqualified to operate this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment.

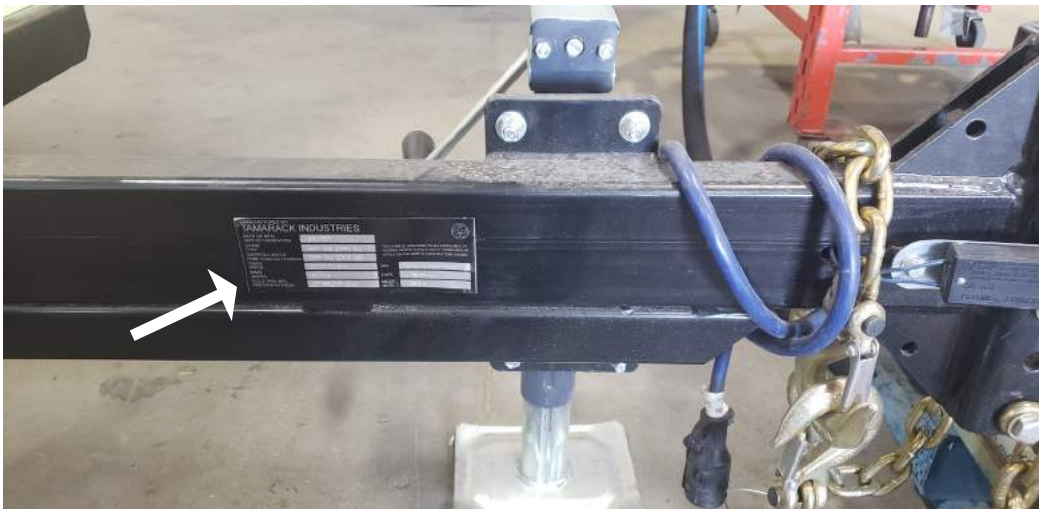
SIGN-OFF FORM

DATE	EMPLOYEES SIGNATURE	EMPLOYERS SIGNATURE

VIN NUMBER LOCATION

Always give your dealer, distributor or factory the serial number of your Heat King when ordering parts or requesting service or other information.

The serial number plate is located inside the front frame where indicated and the VIN plate is located on the front left corner of the frame. Please mark the number in the space provided for easy reference.



Vehicle Identification Number

MODEL HK300B

VIN NUMBER _____

TAMARACK INDUSTRIES

HEAT KING

WARRANTY REGISTRATION FORM & INSPECTION REPORT

WARRANTY REGISTRATION (please print)

This form must be filled out by the dealer and signed by both the dealer and the customer at the time of delivery.

Customer's Name _____

Address _____

City, State, Code _____

Phone Number (____) _____

Contact Name _____

Heat King Model _____

Serial Number _____

Delivery Date _____

Distributor Name _____

Address _____

City, State, Code _____

Check One:

Private ☐

Contractor ☐

Other _ _ _ _

DISTRIBUTOR INSPECTION REPORT

____ Tire Pressure Checked
____ Wheel Bolts Torqued
____ Brakes Work
____ Check Fluid Levels (Fuel and Glycol)
____ Lubricate Machine
____ Check That All Controls Function
____

SAFETY

____ Emergency Stop Switch Works
____ All Decals Installed and Legible
____ Lights and Reflectors Installed, Clean and Working
____ Review Operating And Safety Instructions

I have thoroughly instructed the buyer on the above described equipment which review included the Operator's Manual content, equipment care, adjustments, safe operation and applicable warranty policy.

Date _____ Dealer's Rep. Signature _____

The above equipment and Operator's Manual have been received by me and I have been thoroughly instructed as to care, adjustments, safe operation and applicable warranty policy.

Date _____ Owner's Signature _____

Tamarack Industries CONDITIONS OF SALES & LIMITED WARRANTY

All sales made by Tamarack Industries, here after refered to as Tamarack, a Division of ELJO Industries Inc. are subject to these conditions unless otherwise agreed in writing with a duly authorized officer of Tamarack. In all cases of conflict between these conditions and the requirements of the purchase order, these conditions shall prevail.

(1) SALES POLICY: Nothing herein shall be construed as abridging the right of Tamarack to sell directly or indirectly to: (a) Federal, State or Provincial Governments or Agencies thereof, or to Agencies employing Federal, State or Provincial Government aid; (b) Purchasers who buy Tamarack's products for sale as integral or assembled parts of their products; (c) Firms operating on a national scale; (d) Any other class of purchaser to whom Tamarack may from time to time, elect to sell.

(2) PRICES: All prices are F.O.B. our warehouses, freight allowance as specified on Distributor Net Price Lists. The suggested list prices and discounts schedules are established by Tamarack and are intended to act as a guide for our distributors. Unless otherwise stated in writing, prices are subject to change without notice and will be applied as in effect at time of shipment.

(3) TERMS: Unless otherwise agreed upon in writing by an officer of Tamarack, all invoices become due and payable net 30 days following the date in invoice. Interest at the maximum legal rate will be charged on all overdue accounts. Minimum net charge per invoice is $75.00

(4) CANCELLATION AND CHANGES: No orders or sales may be cancelled or changed without the consent of Tamarack. At Tamarack's option cancelled/changed orders are subject to payment of cancellation charges equal to all costs incurred by Tamarack up to the date of cancellation/change.

(5) DELAYED DELIVERIES: Tamarack shall not be liable for any delay of merchandise for any cause whatsoever.

(6) CLAIMS: All goods shall be deemed delivered to purchaser at the time they are placed in the hands of carrier and consigned to purchaser: loss, damage or destruction of any said merchandise is assumed by purchaser. No claims may be made for shortages unless made in writing within ten days from receipt of merchandise.

(7) RETURN OF GOODS: Written permission from Tamarack must be obtained before returning any merchandise. All transportation charges must be borne by the purchaser. Credit for returned goods will be based on the original price paid, less 20%. Special parts or custom-built items cannot be returned for credit.

(8) LIMITATION OF LIABILITY: Tamarack's liability on any claim of any kind, including negligence, for any loss or damage arising out of, connected with, or resulting from contract, or the performance or breach thereof, or the design, manufacture, sale, delivery, resale, installation, technical direction of installation, inspection, repair, operation or use of any equipment covered by or furnished under contract shall in no case exceed the price paid by the purchaser for the equipment. Tamarack also disclaims all purchaser for the equipment. Tamarack also disclaims all liability, whether in contract, tort, warranty, or otherwise, to any party other than purchaser.

(9) All Price Lists, Catalogues and other material shall remain the property of Tamarack and are subject to return on demand. The Suggested List Prices are established by Tamarack and are intended to act as a guide. All shipping weights shown are approximate.

LIMITED TAMARACK WARRANTY

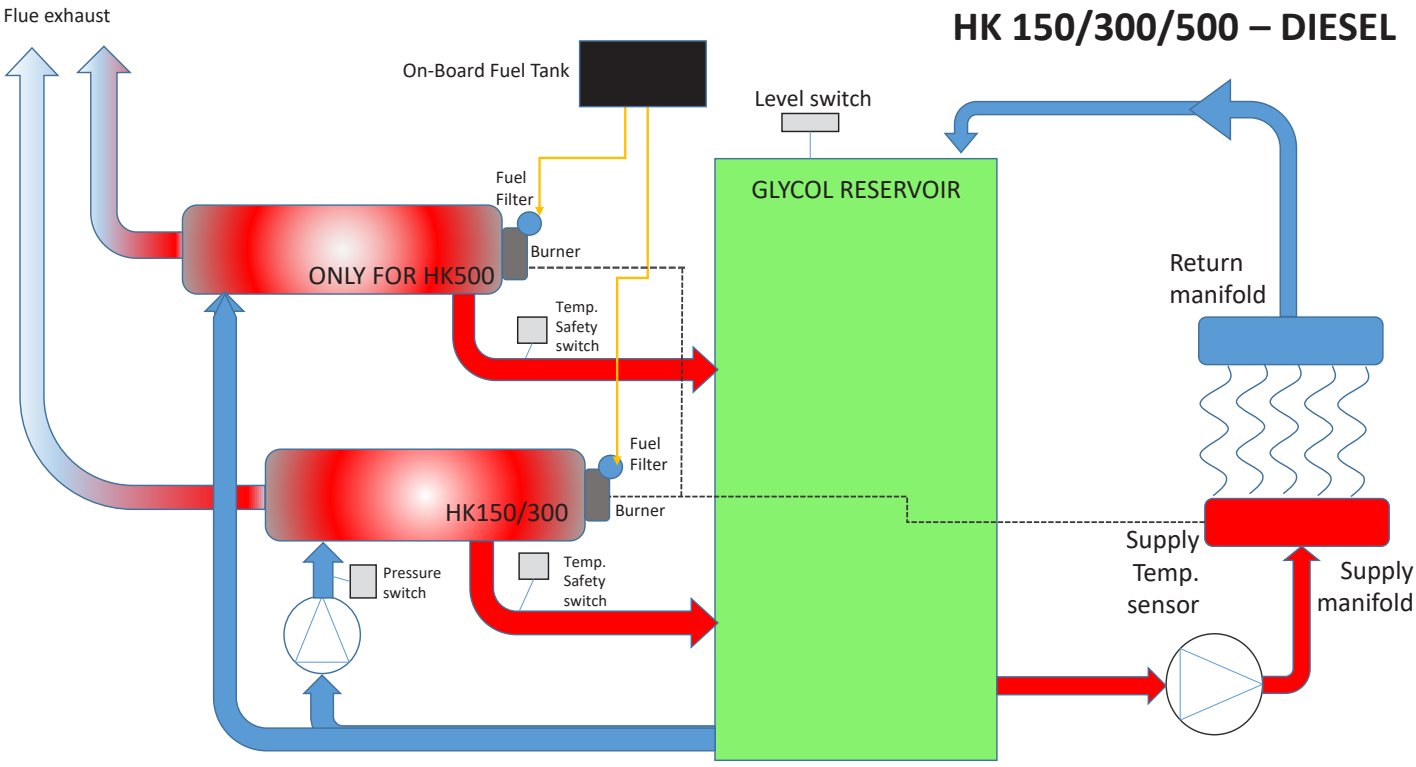
For one year from date of purchase, Tamarack will replace or repair for the original purchaser, free of charge, any part or parts, found upon examination by any Tamarack Authorized Service Depot or by the Tamarack factory, to be defective in material or workmanship or both. Equipment and accessories not manufactured by Tamarack are warranted only to the extent of the original manufacturer's warranty. All transportation charges on parts submitted for replacement or repair under this warranty must be borne by the purchaser. For warranty service contact your nearest Tamarack Authorized Service Depot.

THERE IS NO OTHER EXPRESS WARRANTY, IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO ONE YEAR FROM PURCHASE AND TO THE EXTENT PERMITTED BY LAW. LIABILITY FOR CONSEQUENTIAL DAMAGES UNDER ANY AND ALL WARRANTIES ARE EXCLUDED TO THE EXTENT EXCLUSION IS PERMITTED BY LAW. (THIS WARRANTY IS AN ADDITION TO ANY STATUTORY WARRANTY.)

WARRANTY VOID IF NOT REGISTERED

P.O. Box 234, Station "L"
Winnipeg, Manitoba
Canada R3H 0Z5

How It Works



HOW THE MACHINE WORKS

The Heat King HK300B unit is designed to heat a propylene glycol water solution which is then used for ground thawing, concrete curing or space heating. The glycol solution is pumped out of its storage reservoir and heated in a high capacity heat exchanger and returned to the reservoir until it reaches a user settable temperature. The heat exchanger is a coiled pipe with a Diesel fired burner. The reservoir is open to atmosphere.

A field pump draws the hot solution out of the reservoir and pumps it to the field loop for heating the area as required. There are supply and return manifolds on the back of the unit. Heated solution is then pumped to the supply manifold, through the hoses and back to the return manifold.The solution is then returned to the reservoir for reheating. Controls panels hold the electronics and user controls.

Protective Devices

The HK300B is equipped with the following protective devices to protect the user and the machine:

Emergency stop switch

The emergency stop switch is monitored by the controller inputs. The input is connected to ground when the switch is pressed. In the event of an e-stop condition the system mode is set to OFF and all output functions are shut down by the controller.

Pressure Switch

The pressure switch is designed to protect the burners and burner coils in the even of a pump failure. The pressure switch is a normally open switch that closes when senses 12PSI from the pump. If the switch does not sense pressure it wont allow power to go to the burners.

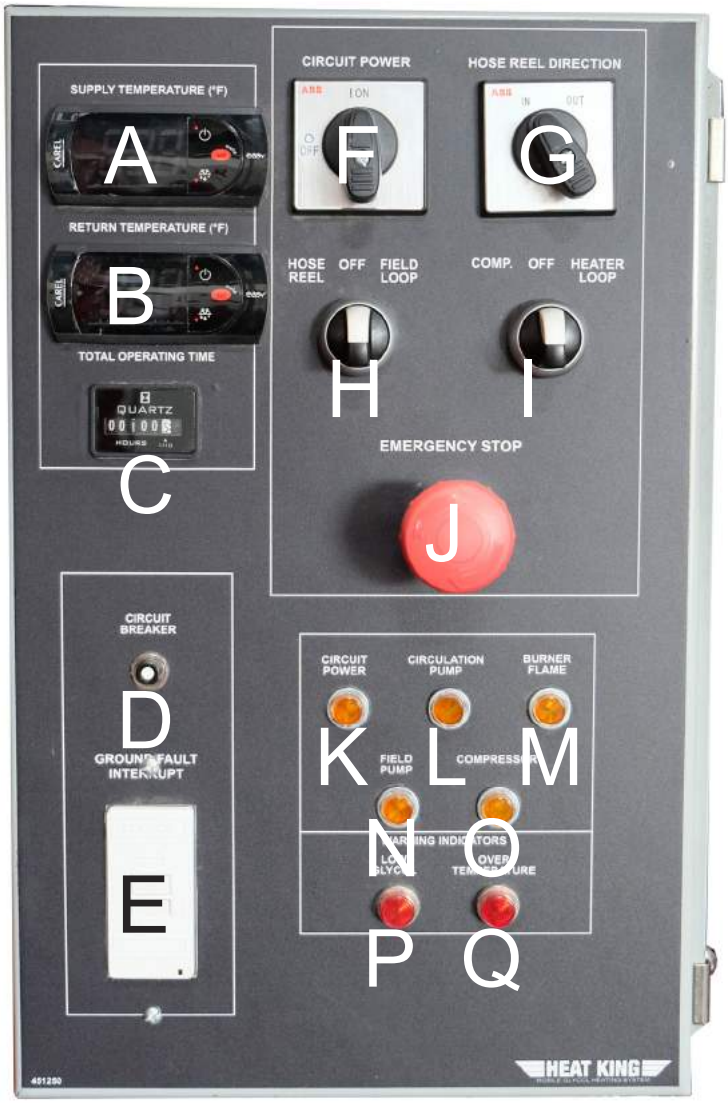
Low Water Cut Off Switch

The low water cut off switch is in place to protect the burners and burner coils as well as the circulating pumps in the unlikely event of loss of glycol. If the glycol goes down below the switch level, the switch contacts will close and shut off power to the pumps and burners to avoid damage.

High Limit Switch (aquastat)

The high limit switch is in place to be a backup to the other safety devices. It is an analog switch that is set to 230°F, there is one on each coil. In the event that the burner coil was to heat up past the user set point the High limit switch cuts the power to the burner to avoid overheating of the coil.

Controls



Before starting the unit , all operators should familiarize themselves with the location and function of the controls.

A. **Digital Display:**
This system monitors the temperature of the glycol in the reservoir and entering the circulation manifold. It is shown on the digital display.

B. **Return Temperature:**
This gage monitors and displays the temperature of the glycol in the return manifold. It functions only when the field pump is running.

C. **Total Operating Time:**
This hour meter displays the total time that power is provided to the heater loop.

D. Circuit Breaker:
Under normal operation, circuit breaker is depressed. If circuit breaker load is exceeded, it will trip the breaker and extend.

E. **Ground Fault Interrupter:**
This interrupter circuit monitors the power flow through the system and trips or breaks the circuit when there is a ground or short. Correct the condition, depress the red button to reset interrupter and resume work.

F. **Circuit Power:**
This 2 position rotary switch controls the power to circuit. Turn the switch clockwise to turn the power to circuit on and counterclockwise for off. The circuit power light will come on when the power is turned on. The burner oil preheater comes on to preheat the nozzle.

G. **Hose Reel Direction:**
This 2 position rotary switch selects the direction of hose reel operation. Turn the switch fully clockwise to extend the hose and counterclockwise for retracting.

H. **Hose Reel/Field Loop Selector Switch:**
This 3 position rotary switch selects the system that will be supplied with power. Turn fully counterclockwise to select the hose reel system. Move the switch to its vertical position to turn off. Turn fully clockwise to provide power to the field loop system. In this position, the field pump light will come on.

I. **Compressor/Heater Loop Selector Switch:**
This 3 position rotary switch selects the system that will be supplied with power. Turn fully counterclockwise to select the (compressor system). When this system is turned on, the compressor light will come on. Move the switch to the vertical position to turn off. Turn fully clockwise to turn the heater loop circuit on. When this system is turned on, the burner start-up sequence starts. First, the circulation pump light comes on as the pump starts. Then the burner igniter starts. When that burner is operating, the burner flame light comes on.

J. **Emergency Stop:**
This 2 position push-pull switch controls the power to the machine. Push the switch in to stop all machine functions and pull out to provide power. It is recommended that all controls be placed in their off position before the switch is pulled out and power restored.

K. Circuit Power:
This light comes on when the power is turned on and everything is functioning normally. It goes out when the breaker or interrupter trips or the power is turned off.

L. **Circulation Pump:**
This light comes on when the burner coil circulation pump is on, and the pump is creating pressure, and goes out when the pump is off.

M. **Burner Flame:**
This light comes on when the main burner is on. The light goes out when the main flame goes out.Light is not on when pilot is lit.

N. **Field Pump:**
This light comes on when the field pump is turned on and goes out when the pump is off.

O. **Compressor:**
This light comes on when there is power to the compressor and goes out when the power is off.

Warning Indicators:

P. **Low Glycol:**
This left red light comes on when the glycol reservoir level goes below the switch level and goes off when the level is above. Stop unit immediately and add glycol to the reservoir when this light comes on. Do not over fill reservoir.

Q. **Overtemp:**
This right red light come on when the burners are on with no call for heat.

Operating Temperature Selection

The Heat King is designed with an electronic programmable temperature controller. The temperature controller will measure the temperature of the reservoir and will then control the burner to maintain a set temperature range. The unit comes with a factory set operating temperature of 180°F with a 10°F (5.5°C) temperature drop before the burner will fire again.

The operating temperature can be set to operate at any temperature up to 180°F (82°C) by following this procedure:

a. Press 'SET' for 1 second. The set value (desired temperature) will then start flashing after a few moments.

b. Use the UP and DOWN buttons on the right of the display to increase or decrease the value.

c. Press 'SET' to confirm the selected temperature press as the new set point.

* The return temperature is only a display and does not need to be set.

SUPPLY TEMPERATURE CONTROLLER

Flashing Beacon
The Flashing Beacon is located on the rear of the Heat King Unit. This beacon providesa visual indication that the Heater Loop Circuit is in the "ON" position.

Foot Pedal / Hose Reel:
The hose reel extend-retract function is controlled by the foot pedal switch. Depress the pedal with your foot to activate the reel drive and release it to stop. Set the operating direction with the switch on the control panel.Guide the hose with your hands while the reel is turning. Always wear heavy gloves to prevent burns.

Starting in model year 2015-16, Heat Kings have the ability to free wheel out, you no longer need a person to press the foot pedal to unspool the hose making it a one person operation. There is still the option to use the foot pedal to spool out like the previous models if you wish to.

Unspooling: To spool out the hose, release the lock pin as shown in the picture below. Loosen the belt tension knob to allow the hose reel to free-wheel out. Start pulling the hose off the reel, if you find that the reel is free-wheeling too fast, increase the drag tension by turning the knob clockwise.

Spooling In: To spool the hose onto the reel, turn the selector switch on the control panel to the hose reel position. Select "IN" on the hose reel direction switch. Adjust the belt tension knob by turning clockwise. Depress the foot switch to begin spooling in the hose. If you find the reel is not pulling the hose in and the belt is slipping, increase the belt tension, with the belt tensioning knob.

Once the hose is all spooled in, release the lock pin to lock the reel in position for transport.

Valves:
Many circuits are designed with valves that control the flow in the circuit. Move the handle parallel to the line to open the valve and at right angles to close the valve. In most cases, a valve is placed in a line to allow for convenient isolation and servicing of a system.

Valve Closed

Valve Open

Set Up

The machine must be placed and set-up properly to perform as expected. Follow these instructions when bringing the Heat King to a work site and preparing it for operation.

1. Locate the unit in an area that is firm, level and with good drainage to minimize standing water. Be sure there is sufficient space on all sides to access the machine as required.

2. Level the frame using the jack on the hitch. Use a carpenters level to be sure.

3. Open all the doors and secure with the anchor latch on the side of the frame behind each door. Wait at least 10 minutes for the unit to vent and air out before connecting power wires or starting unit to allow the fumes and vapors to dissipate.

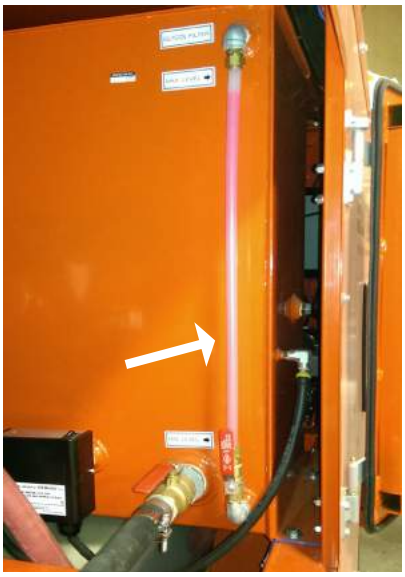
HITCH JACK

NOTE
If the frame is not level, the burners will not be able to use the total amount of fuel in the tanks.

LEVELING

4. Check the fuel level on the fuel gauge under or beside the fuel filter or the back of the fuel tank, add as required. Do not smoke when refueling.

FUEL FILL



GLYCOL LEVEL

5. Check the glycol level in the reservoir. Be sure the level is between minimum and maximum levels.

6. Pull the Emergency Stop button out on the control panel.

EMERGENCY STOP

Operating Procedure

Pre-Start checks & procedures

1. Level unit.
2. Ensure that all switches on the control panel are in the off position.
3. Plug plug-ends into two dedicated 115 Volt, 60Hz, 20Amp circuits or optional onboard generator.
4. Check for adequate fuel level.
5. Check glycol level using sight gauge on the reservoir. Glycol level must be above the minimum level and below the maximum level.

Start-up procedure

1. Turn “CIRCUIT POWER” switch on.
2. Set desired temperature on the temperature controller on the control panel.
3. Unlock the Hose Reel Locking Pin.
4. Turn the “REEL MOTOR/FIELD LOOP” switch to the “REEL MOTOR” position.
5. Turn the “HOSE REEL DIRECTION” switch to the “OUT” position, and using the foot switch, uncoil the hose as required.
6. The hose reel can alternatively be used in the “Free Wheeling” mode without the use of the foot switch.
7. Remove one length of hose at a time, plugging the quick connects in to the corresponding quick disconnect on the manifolds.
8. Repeat step 7 with as many circuits as required.
9. Turn the “COMP/HEATER LOOP” switch to the “HEATER LOOP” position.
10. When the glycol resivoir reaches operating temperature, (small light in the top left of the temperature controller screen stops flashing) turn the “HOSE REEL/FIELD LOOP” switch to the “FIELD LOOP” position.
11. Inspect hoses to ensure they are not leaking, repeat after one hour.

Shut-Down procedure

1. Turn the “COMP/HEATER LOOP” switch on the control panel to the “OFF” position.
2. Blow out field hoses if required.
3. Turn the “REEL MOTOR/FIELD LOOP” switch on the control panel to the “REEL MOTOR” position.
4. Turn the “HOSE REEL DIRECTION” switch to the “IN” position.
5. Depress the foot switch to begin reeling up the hose.
6. Reel in all hose circuits.
7. Turn all switches on the control panel to the “OFF” position.

Hose Blow-Out procedure

1. Close all supply manifold shut-off valves except for one.
2. Ensure that the air compressor shut-off valve is in the open position.
3. Turn the “COMP/HEATER LOOP” switch on the control panel to the “COMP” position.
4. Wait approximately 5 minutes for the hose to blow out completely, or untill a bubbling sound can be heard in the reservior.
5. Continue to blow-out the rest of the field loop circuits one at a time.
6. Turn the compressor “ON/OFF” switch to the “OFF” position.
7. Turn the COMP/HEATER LOOP” switch on the control panel to the “OFF” position.

MAINTENANCE SAFETY

1. Review the Operator's Manual and all safety items before working with, maintaining or operating the Heater.

2. Place all controls in their OFF position, disconnect power cords and wait for all moving parts to stop before servicing, adjusting or maintaining.

3. Have a first-aid kit available for use should the need arise and know how to use it.
   - Keep service area clean and dry.
   - Be sure electrical outlets and tools are properly grounded.
   - Use adequate light for the job at hand.

4. Keep hands, feet, clothing and hair away from all moving and/or rotating parts of the hose reel and drive system.

5. Always wear heavy gloves to prevent burns when handling hot components. Wait until burners, coils and glycol system components have cooled before working on them.

6. Do not attempt any adjustment or maintenance to any system of the Heater unless the power wires are disconnected.

7. Make sure that all guards, shields and hoods are properly installed and secured before operating the Heater.

8. Securely support the machine using blocks or safety stands before working beneath it or changing tires.

9. Store and transfer diesel fuel, solvents, cleaners or any flammable liquids only in safety standard approved containers.

FLUIDS AND LUBRICANTS

1. **Grease:**
   Use SAE multipurpose high temperature grease or a multipurpose lithium base grease.

2. **Fuel:**
   #1 or #2 Diesel Fuel

3. **Glycol:**
   Use only Tamarack glycol for all operating conditions. Polypropylene 50% glycol 50% water. Do not mix or combine other types.
   Hk300 reservoir Capacity: 96 gallon.
   Hk500 reservoir Capacity: 130 gallon.

4. **Gearbox Oil:**
   Use an SAE 80W90 oil for all operating conditions. Do not mix oil types or viscosities.
   Gearbox Capacity: 1.5 US qts.

5. **Storing Lubricants and Fluids:**
   Your machine can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all fluids. Store them in an area protected from dust, moisture and other contaminants.

GREASING

Use the Maintenance Checklist provided to keep a record of all scheduled maintenance.

1. Use only a hand-held grease gun for all greasing. An air-powered greasing system can damage the seals on bearings and lead to early failures.

2. Wipe grease fitting with a clean cloth before greasing to avoid injecting dirt and grit.

3. Replace and repair broken fittings immediately.

4. If fittings will not take grease, remove and clean thoroughly. Also clean lubricant passage. Replace fitting if necessary.

HEAT KING

Maintenance Chart

Description	Operation	Every 1000 Hours	Monthly	Annually
Burner Nozzle	Change	X		
Burner Electrodes	Change	X		
Burner Fuel filter	Change	X		
Glycol Filter	Clean			X
Grease Axle Hubs	Service		X	
Grease Reel Bearings	Service		X	
Reel Gear Box	Check			X

Burner Maintenance

WARNING

DO NOT TAMPER WITH THE UNIT OR CONTROLS - CALL YOUR SERVICE PERSONNEL.

To ensure continued reliable operation, a qualified service technician must service this burner every **1000 hours.**
More frequent service intervals may be required in dusty or adverse environments.

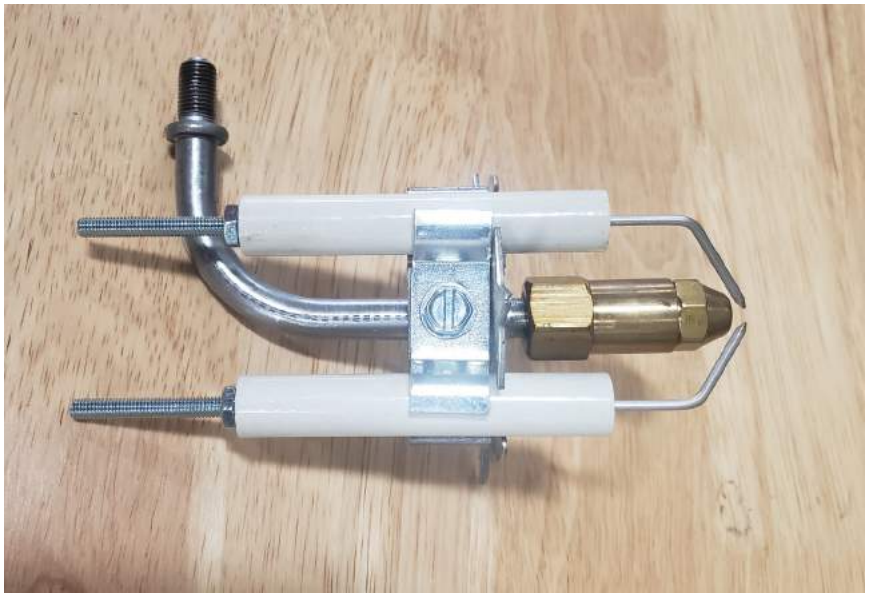
Operation and adjustment of the burner requires technical training and skillful use of combustion test instruments and other test equipment.

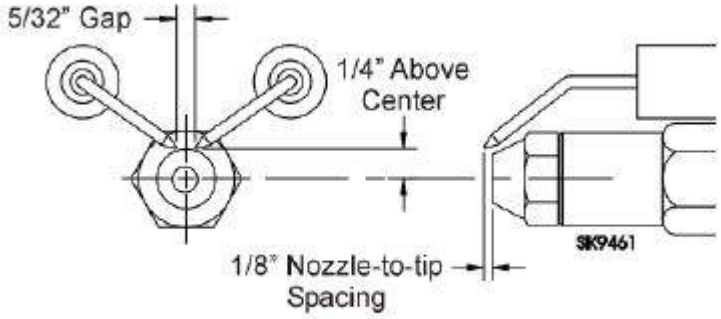
Tools Required

- 5/16” wrench
- 3/8” wrench
- 7/16” wrench
- 5/8” wrench
- 3/4” wrench
- pliers

CHANGING FUEL NOZZLE AND ELECTRODES

Annually or every 1000 hours (or more often if fuel quality is poor) the fuel nozzles and elecrodes should be changed. To change, follow this procedure:





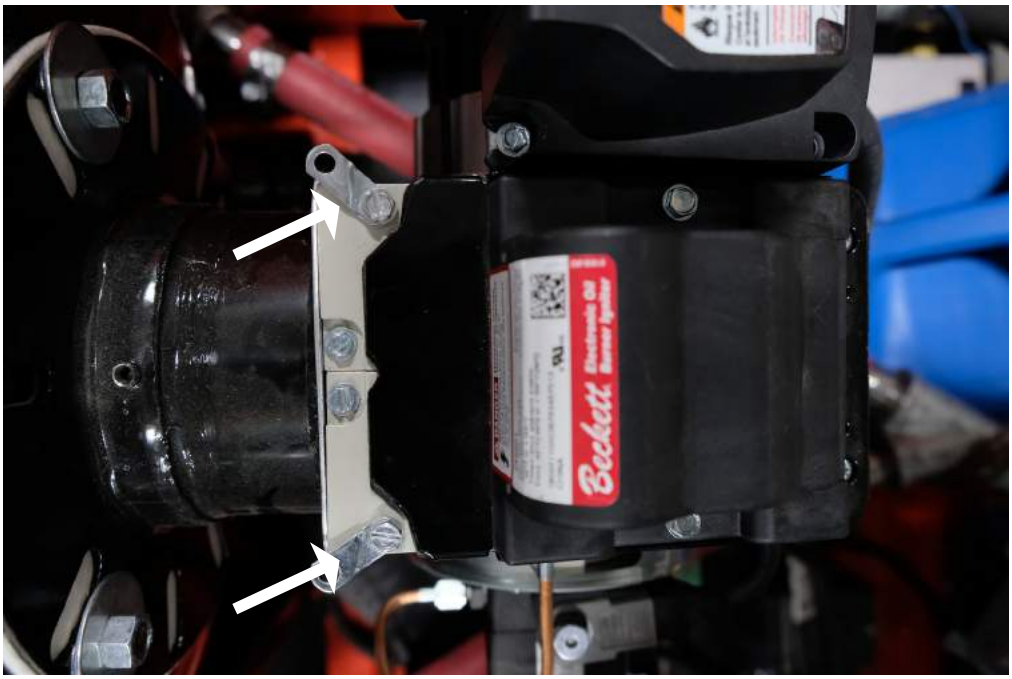
Check/adjust electrodes

Check the electrode tip settings. Adjust if necessary to comply with the dimensions shown. To adjust, loosen the electrode clamp screw and slide/rotate electrodes as necessary. Securely tighten the clamp screw when finished.

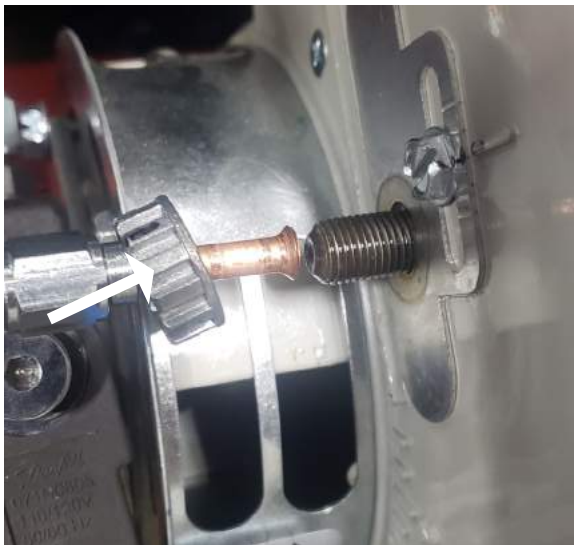
Removing Nozzle Line Assembly

1. Turn off power before servicing.

2. Disconnect oil connector tube from nozzle line.



3. Loosen the two screws securing igniter retaining clips and rotate both clips to release igniter baseplate. Then tilt igniter back on its hinge.

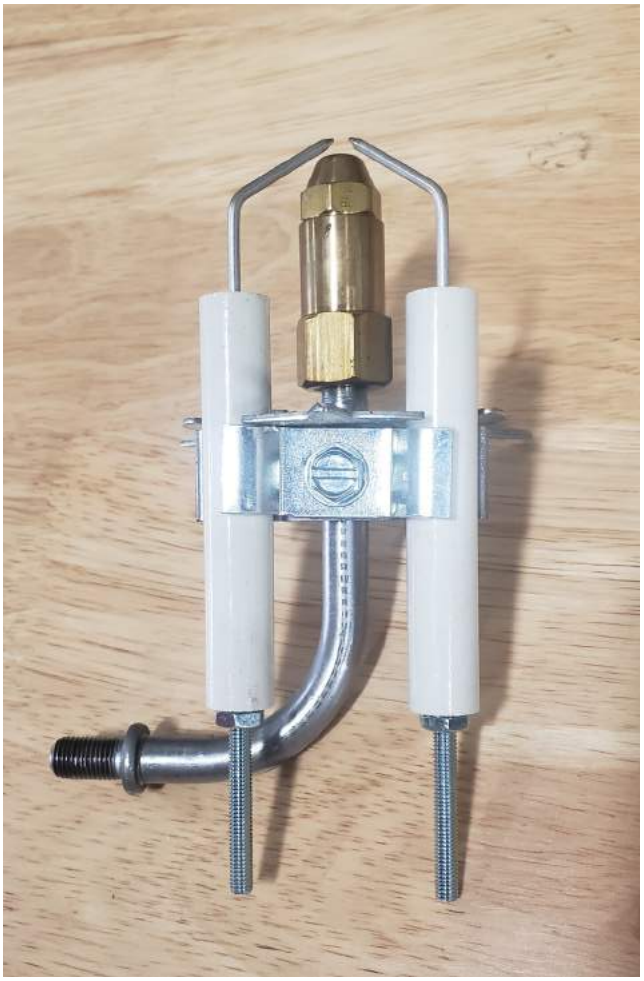


4. Remove splined nut.

5.Remove nozzle line assembly from burner, being careful not to damage the electrodes or insulators while handling. To ease removal of the assembly rotateassembly 180° from installed position after pulling partially out of tube.

*To replace the nozzle assembly, reverse the above steps.

Complete Drawer Assembly Removed



Nozzle and Electrodes Removed

Filters

Fuel Filter:

The burner fuel circuit is designed with a filter to remove contaminants and water from the fuel. Change filter every 1000 burner hours to keep the system clean. Change more frequently if contaminants are introduced into the system during re-fuelling. In the bottom of each of the filter is a knob that can be loosened to drain water out that gathers in the bottom of the filter.

Note: Put a pan under the fuel filter when changing them, to capture any fuel that may leak or drip. Dispose all fuel related items responsibly.

Glycol Filter:
The glycol circuit is designed with a strainer in the field loop circuit to remove all contaminants from the system. Clean the filter every year to keep the system clean. Clean more frequently if dirt gets in during filling or hose attaching.

SERVICING INTERVALS

Daily or 8 Hours

1. Check glycol reservoir level. Top up as required.

GLYCOL LEVEL

2. Check the oil level in the gearbox (view shown is system removed from machine).

GEARBOX OIL LEVEL

Each Heating Season

3. Grease the reel bearings (2 locations).

Right

Left

Service Parts

Item	Part #
Burner	
2.0 80° A GPH Nozzle	448552
Electrode Kit (LH/RH)	448553
Cad cell	448550
Transformer	448549
Primary Control	448548
Fuel filter	445157
Circulation Pump 1/2 HP	
Mechanical Seal Kit	449063
Pump Assembly	441185
Field Pump 1 HP	
Mechanical Seal Kit	449063
Pump Assembly	448360

Troubleshooting

The Tamarack Construction Heat King is a self-contained glycol heating system that can be used to thaw frozen ground or maintain a work area at a constant temperature. It is a simple system that requires minimal maintenance.

In the following trouble shooting section, we have listed many of the problems, causes and solutions to the problems which you may encounter.

If you encounter a problem that is difficult to solve, even after having read through this trouble shooting section, please contact your authorized dealer, distributor or the factory. Before you call, please have this Operator's Manual and the serial number from your machine ready.

PROBLEM	CAUSE	SOLUTION
Burners won't start.	No fuel.	Fill the fuel tank.
	No power.	Plug machine in and turn on.
		Breaker tripped. Reset breaker.
	Low glycol.	Fill glycol reservoir.
	Switch off.	Pull out Emergency Stop switch.

NOTE: For the burners to be able to fire, three conditions must be met.

1) The Pressure switch on the circulation loop must see pressure. (gray plastic box on circ pump)
2) The low glycol sensor must sense glycol. (blue box on glycol tank)
3) The aquastat temperature has to allow the call for heat, by being below 230°F. This condition would be very rare, and should only trip off if there is not enough flow through the coil or the burner is burning too hot. (gray box on coil discharge beside exhaust)

Buners give off black smoke.	Wrong fuel/air mixture.	Reset air mixture.
	Fouled burner.	Clean burners.
	Plugged fuel filter(s).	Change filter(s).

Reel won't move.	No power.	Turn power on.
		Reset circuit breaker.

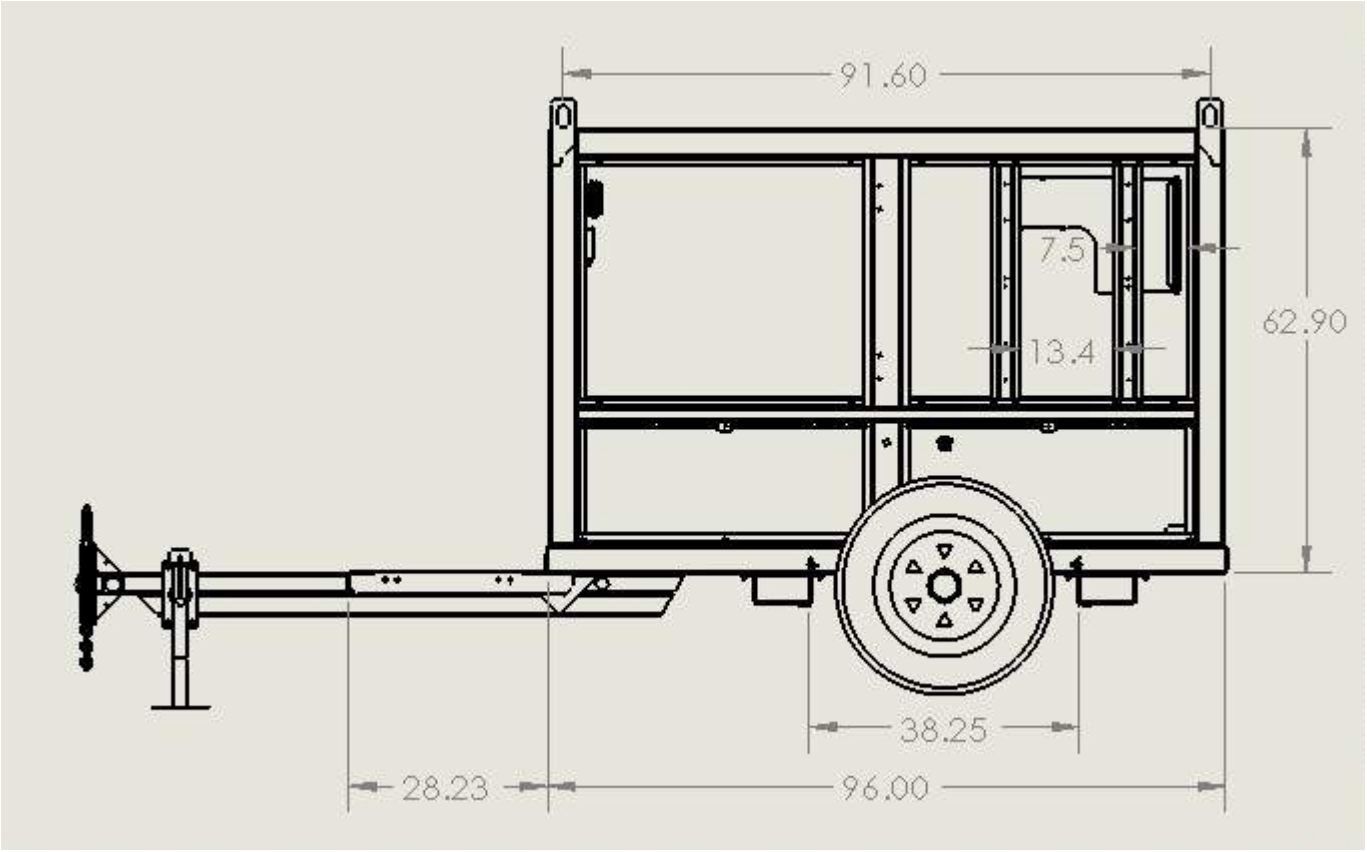
If the burner is in the below state:	Pushing the reset button will:		
	Button Click (press < 1 second)	Button Hold (press > 1 second)	Button Hold (press 15+ seconds)
Lockout	Reset from Soft Lockout		Reset from Restricted (Hard) Lockout
Valve-on Delay, Trial for Ignition, Ignition Carryover	Go to Pump Prime (see "Priming the Pump" above)	Disable the Burner: Any time the burner is running, press and hold the reset button to disable the burner. The burner will remain off as long as the button is held.	Enables Pump Priming: After the reset button has been held for 15 seconds, the button can then be clicked during the next ignition sequence to enter Pump Prime mode.
Run (igniter is shut off)	No action		
Motor-Off Delay, Standby	No action		
Pump Prime	No action	Exit Pump Prime mode and return to Standby	

Light Color	On Continuously	Flashing
Red	Restricted (Hard) Lockout	Soft Lockout
Green	Flame Sensed during normal operation (Could be stray light during standby)	Recycle
Yellow	Control is in Pump Prime mode or Reset button currently held for 15+ seconds.	N/A

Lifting Instructions

LIFTING SAFETY

1. Follow safe lifting procedures.
2. Use properly rated lifting equipment.
3. Secure all doors and panels.
4. Use only designated lifting points.



Lifting Hook Certification

Attention: READ COMMENTS BELOW

Ensure the proper lifting methods are used any time this unit needs to be picked up by crane.

The comment section below describes the method of lift for elevating these units

As described, the lift must be a vertical lift utilizing all 4 points with equal weight distribution

2.0 Comments

On the basis of the review of the drawings and calculations completed by ProForma Engineering it is our opinion that the four (4) lifting hooks on the HK300 trailer as referenced above are suitable for use as designed with the following additional notes:

1) The lifting procedure shall specify that the hooks are to be loaded in the vertical direction only with the load distributed equally between each of the four lifting lugs.
2) It is recommended that shackles be used with the lifting lugs with a minimum nominal pin size of 0.5 inches or greater (7/16 inch nominal Crosby G-209/S-209 – equivalent or greater permitted).

Ryan Swain, Ph.D, P.Eng.
Engineering Manager
ProForma Permit # 5648

Cc: 19-J1257

Specifications

1. General Capacities and Component Specifications

Height	84 in.
Width	84 in.
Length (from hitch)	160 in.
Ground Clearance	13 in.
Weight (w/ glycol)	5526 lbs.
Weight (w/ fuel and glycol)	6970 lbs.
Fuel Capacity	192 US gal. (1344 lbs)
Glycol / water capacity	96 US gal.
Hose length	4 x 700 ft.
Circulation manifold	4 X 1/2” quick disconnects
	1X 1” quick disconnect
Burner	313,600 BTUH Oil Fired Burner
Compressor	1/3 HP
Pumps	1 - 1/2 HP Centrifugal Circulating Pump
	1 - 1 HP Centrifugal Field Pump
Reel motor	1 - 1/2 HP Motor
Axles	1 - 7000 lb. rated w/ Electric Brakes
Tires	235/80R-16
Tire inflation pressure	80 psi.
Torque of wheel nuts	120 ft-lbs
Hitch	2-5/16" Ball, alternatively Pintle
Tie Downs	4 - For Transporting

2. Performance Specifications

Net Heat Input	313,600 BTUH
Fuel Comsumption	2.24 US GPH
Fuel Requirement	#1 or #2 Diesel Fuel
Run Time	85 Hours @ 100% Burn Time
Field Loop Pressure	50 psi
Reservoir Pressure	Atmospheric
Heating Coil Pressure	Atmospheric
Fuel Pump Pressure	135 psi
Maximum Thawing Area	5,600 ft^2
Maximum Curing Area	11,200 ft^2
Nozzle	Delavan 2.0 GPH 80° A
Electrical Requirement	2 x 20 Amp x 120 V AC

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

SAFETY DATA SHEET

THE DOW CHEMICAL COMPANY

Product name: DOWFROST™ Heat Transfer Fluid

Issue Date: 04/09/2015
Print Date: 04/10/2015

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

1. 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
THE DOW CHEMICAL COMPANY
2030 WILLARD H DOW CENTER
MIDLAND MI 48674-0000
UNITED STATES

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

EMERGENCY TELEPHONE NUMBER
24-Hour Emergency Contact: 800-424-9300
Local Emergency Contact: 989-636-4400

2. HAZARDS IDENTIFICATION

Hazard classification
This material is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

Other hazards
no data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature: Glycol

This product is a mixture.

Component	CASRN	Concentration
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/m3

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% *Literature*
Melting point/range	Not applicable to liquids
Freezing point	supercools
Boiling point (760 mmHg)	152 °C (306 °F) *Literature*
Flash point	**closed cup** 104 °C (219 °F) *Pensky-Martens Closed Cup ASTM D 93* (based on major component), Propylene glycol. **open cup** *Cleveland Open Cup ASTM D92* None
Evaporation Rate (Butyl Acetate = 1)	<0.5 *Estimated.*
Flammability (solid, gas)	Not applicable to liquids
Lower explosion limit	2.6 % vol *Literature* Propylene glycol.
Upper explosion limit	12.5 % vol *Literature* Propylene glycol.

Vapor Pressure	2.2 mmHg *Literature*
Relative Vapor Density (air = 1)	>1.0 *Literature*
Relative Density (water = 1)	1.05 at 20 °C (68 °F) / 20 °C *Literature*
Water solubility	100 % *Literature*
Partition coefficient: n-octanol/water	no data available
Auto-ignition temperature	371 °C (700 °F) *Literature* Propylene glycol.
Decomposition temperature	No test data available
Kinematic Viscosity	43.4 cSt at 20 °C (68 °F) *Literature*
Explosive properties	no data available
Oxidizing properties	no data available
Molecular weight	76.9 g/mol *Literature*

NOTE: The physical data presented above are typical values and should not be construed as a 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

DOT

Not regulated for transport

Classification for SEA transport (IMO-IMDG):

Not regulated for transport

Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

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

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

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312
This product is not a hazardous chemical under 29CFR 1910.1200, and therefore is not covered by Title III of SARA.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Pennsylvania Worker and Community Right-To-Know Act:
The following chemicals are listed because of the additional requirements of Pennsylvania law:

Components	**CASRN**
Propylene glycol	57-55-6

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

United States TSCA Inventory (TSCA)
All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

:

16. OTHER INFORMATION

Hazard Rating System
NFPA

Health	Fire	Reactivity
0	1	0

Revision
Identification Number: 101234106 / A001 / Issue Date: 04/09/2015 / Version: 7.0
Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

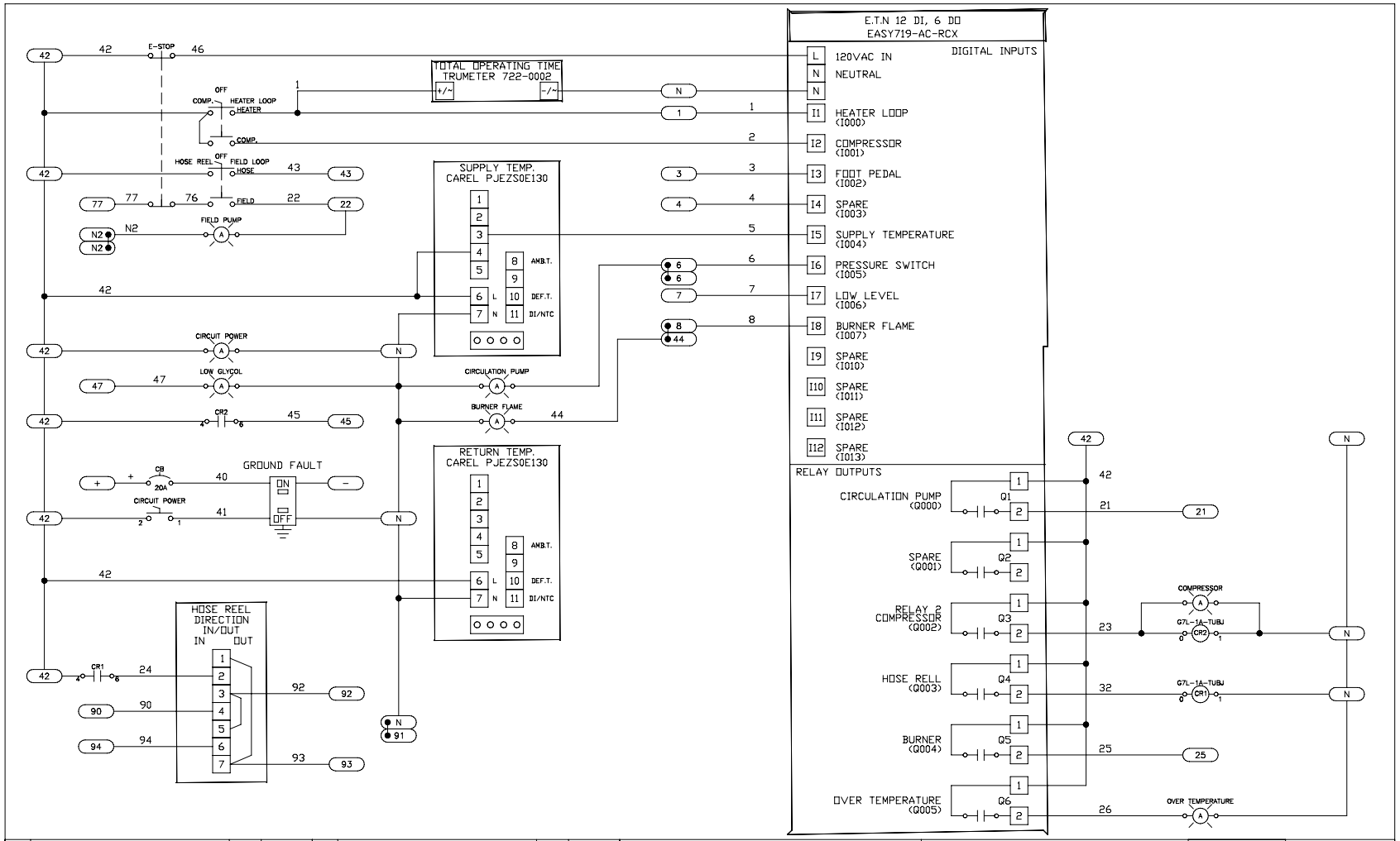
Legend

TWA	8-hr TWA
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.

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

CONTROL PANEL WIRING DIAGRAM



REV. NO.	DESCRIPTION	APP'D BY	DATE	REV. NO.	DESCRIPTION	APP'D BY	DATE
0	PANEL AS BUILT	AN	10-JUL-2019				

INDUS AUTOMATION INC.
460 HIGGINS AVENUE, WINNIPEG, MANITOBA, CANADA R3A 1S5
TEL.: (204) 943-0050 FAX: (204) 943-0112

PROJECT: HK300 CONTROL PANEL WIRING

DRAWN BY: LH
CHECKED BY: AN
DATE: 29-MAY-2018
SCALE: NTS
REV NO: 0
DRAWING NUMBER: S1
SHEET NO: 1 OF 1

MATERIAL
FINISH
UNLESS OTHERWISE SPECIFIED :
X.X ± 1
X.XX ± 1/2
X.XXX ± .005
Fractions ± 1/32
Bend Rad = Thk
Indicate Critical Dimension
Unit of Measurement is Inch

	INITIALS	DATE
DRAWN	PP	11-JUL-2019
DESIGNED	PP	11-JUL-2019
CHECKED		

Third Angle Projection SCALE 1:5 SHEET 1 OF 3

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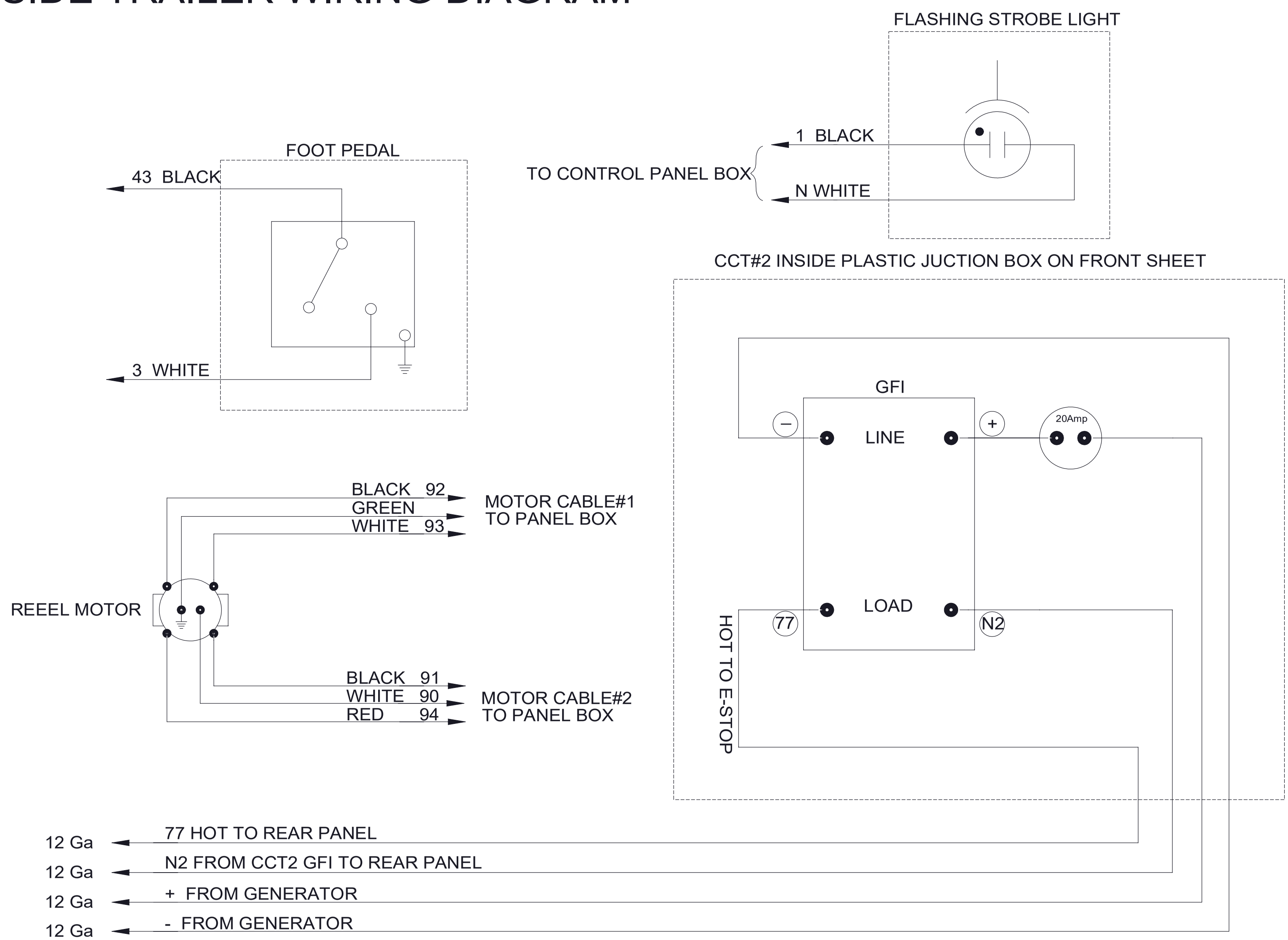
SCHEMATICS,ELECTRICAL
HK300

SIZE C | PART # 448541 | REV 0

INSIDE TRAILER WIRING DIAGRAM



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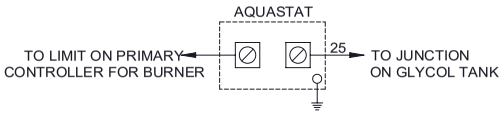
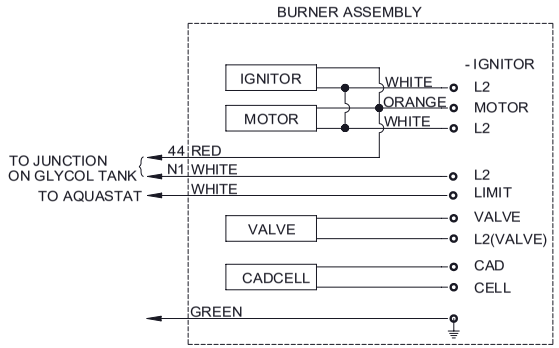
SCHEMATICS,ELECTRICAL
HK300

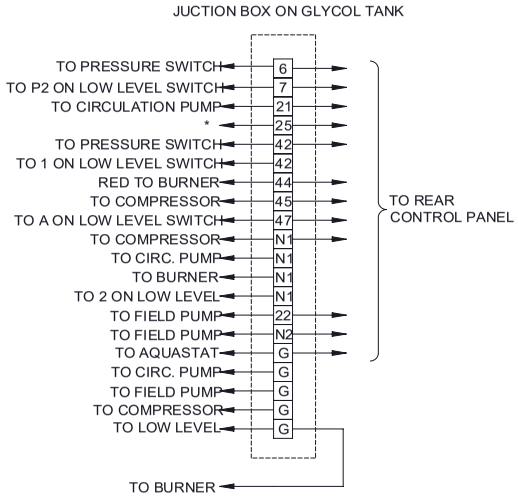
	INITIALS	DATE
DRAWN	PP	11-JUL-2019
DESIGNED	PP	11-JUL-2019
CHECKED		

MATERIAL
FINISH -
SCALE 1:5 SHEET 2 OF 3
SIZE C PART # 448541 REV. 0

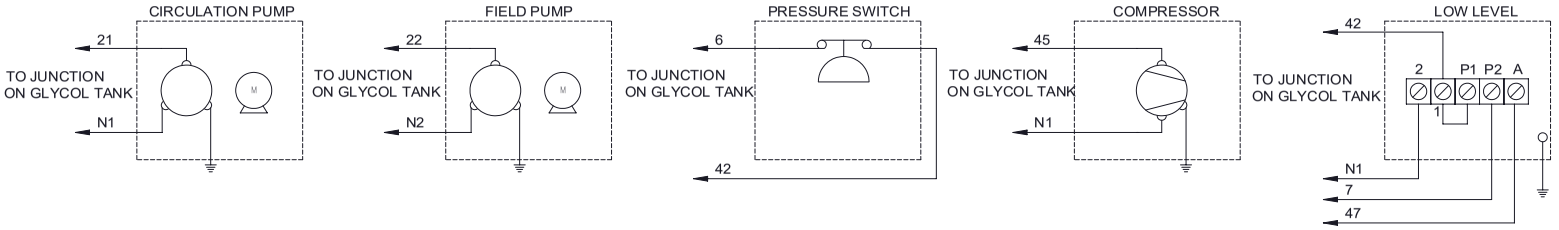
PUMP PLATE WIRING DIAGRAM







"*" CONNECTION IN BURNER THEN THROUGH TO AQUASTAT



MATERIAL

FINISH

UNLESS OTHERWISE SPECIFIED :
X.X ± .1
X.XX ± .03
X.XXX ± .005
Fractions ± 1/32
Bend Rad = Thk

Indicate Critical Dimension
Unit of Measurement is Inch

	INITIALS	DATE
DRAWN	PP	11-JUL-2019
DESIGNED	PP	11-JUL-2019
CHECKED		

Third Angle Projection

SCALE 1:5

SHEET 3 OF 3

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SCHEMATICS,ELECTRICAL
HK300

SIZE C

PART # 448541

REV 0

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