



Operators Manual

For models:

H150 (2M)* & H250 (6A)*

Thawzall™

Manufactured by [Thawzall, LLC](#)

1215 First Ave. NE

P. O. Box 100



Glenwood, MN 56334

Phone 320-634-4455 Fax: 320-634-4563 Tech Support 888-757-3545

Website: www.thawzall.com

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Thawzall, LLC

*Older Models similar to the H150 and H250.

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Please record the following information from your new Thawzall for future reference. This information is required for all warranty claims.

Purchase date: ____ / ____ / ____ . Generator make: _____.

Machine model:_____. Generator KW: _____.

Machine serial number:_____. Generator Serial #:_____.

(located on trailer hitch pole)

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Company General Information

Mission

Incomparable Relationships, Quality, Innovation.

Vision

To become a world-class Open Book Managed company.

Values

Customers delighted, Employees appreciated, Owners satisfied.

About Us

Thawzall machines were developed to help make winter construction feasible and cost effective. Our Thawzall machines thaw frozen ground, enabling contractors to excavate in the winter. They also provide a clean and safe temporary heat source for ground frost prevention and concrete curing.

History of Thawzall, LLC

The idea of a portable hydronic heating system was conceived by and named Thawzall in a workshop in Alexandria, MN in 1996 by a Norwegian plumber who had a contractor friend who was behind schedule on a construction site when the winter freeze-up caught him off guard.

About Thawzall

The plumber, Jerome Jakobson, developed his version of a portable hydronic heat system using a low pressure closed loop system. The first of hundreds of machines to come was produced that first winter. Because Jakobson felt that he had a better idea than a competitor's product, he applied for and received patent # 5,964,402 on his portable hydronic heater in 1999 for a manifold fluid distribution system that featured quick disconnects and multiple heat zones.

Jakobson, an avid hunter and fisherman, decided to sell his company known as the T. H. E. Machine Company to a group of five local investors from the Alexandria area and on July 1st, 2007, the company known as Thawzall came under new ownership and management.

The new management team is committed to listening to its customers for their ideas about product design, keeping our machines at a cutting edge level. By listening carefully to our customers, we are confident that in the next generation, Thawzall heat units will exceed our customers expectations and set new standards for **quality and innovation** in the industry for portable hydronic heater technology.

All Thawzall employees are committed to Q/EARcs standards of workmanship, service and communication. Simply stated: We don't deserve your business unless the product we deliver to you is of the highest quality.

Quality-as defined by our customers.

Etiquette-is properly used in all communications.

Attitude-our customers receive a positive experience with every time.

Response-is in accordance with customer expectations.

convenience-of doing business with Thawzall is exceptional.

service-after the sale is even more important than the sale.

Q/EARcs is the benchmark to which we at Thawzall aspire and expect to achieve if we are to be favored by future business from our customers. We seek out and expect critical input from our customers and others in our channel of distribution to help us become an icon company with which customers are eager to do business.

U. S. Patent Number 5,964,402

CSA Certified

President-Jim Conn

Vice President of Sales

Joe Ruttger

Tech Support

Jim Olson

Office Manager

Julie Stevens

Frequently Asked Questions

Q.: What can I do with a Thawzall™?

- A:
1. Remove ground frost.
 2. Prevent ground frost.
 3. Use as a temporary heat source.
 4. Cure concrete.

Q: How does it work?

A: Models H 150 and H 250 units are configured with a fuel oil fired furnace.

All Thawzall™ models are fully contained units which use the furnace system to heat a biodegradable, environmentally safe propylene glycol solution. The solution is circulated through industrial hydronic hose. Each section of hose is provided with quick disconnects. The patented multi-zone manifold system allows Thawzall™ to perform multiple heating applications. Thawzall uses a tempering valve for curing concrete, making it unnecessary to turn the furnace operating temperature down to control fluid temperature during the cure.

Q: How long does it take to remove frost?

A: Up to 12 inches of frost can be removed in a 24 hour period depending on the layout of hose used and on soil conditions.

Performance

THAW & CURE performance in the field is affected by a wide range of factors to include soil type, density of frozen ice in the soil, hose spacing, thermal rating of covering blankets, and outside ambient temperatures. HEAT performance in interior work spaces is also affected by several factors to include outside ambient temperature, heat loss, and volume of space to be heated.

Q: Can Thawzall™ operate at high altitudes?

A: Yes, but operation at high altitudes may require adjustments.

See **High Altitude** section in this operator's manual.

Q: What kind of vehicle do I need to tow a Thawzall™?

A: A minimum of a 1/2 ton truck with a brake controller will work for most models.

However, we recommend a 3/4 ton truck with a brake controller.

Please see **Specification** section in this operator's manual.

Important

Safety Recommendations and Warnings



Recognize safety information and symbols contained in this manual and on decals and signs on your Thawzall machine.

This sign means **Warning** or **Danger**. Injury or death may result if ignored.

If you do not understand any part of this manual, call (888)757-3545 for assistance.

Read and understand safety measures in this manual and on the machine. Keep safety signs in good condition. Replace damaged and missing signs. Signs and instructional decals are available from Thawzall.

This is the **Caution sign** and calls attention to safety measures in this manual.



This indicates a possible **fire hazard**.



Instructional signs and other decals are placed on your Thawzall at convenient locations.

Please consult the pictures at the back of this **Safety** section to find the locations of the **Warning and Instructional** decals and signs on your Thawzall.



Outside Safety Features

Your Thawzall is equipped with DOT certified outside LED lights, reflectors, safety chains, and electronic breakaway brakes.

Make use of these features:

- Before pulling, be sure that all lighting is connected and working.
- Connect the safety chains to the towing vehicle.
- Connect the small cable from the breakaway switch to the towing vehicle.
- Close the fuel valve at the bottom of the fuel tank on your Thawzall.

Parking Your Thawzall



Avoid unexpected movement of your Thawzall.

- Avoid parking on a hill.
 - Use blocks on both wheels to prevent movement.
 - Always use the jack to support the hitch.
-

Towing Your Thawzall

Tow Safely:



- A 3/4 ton truck with a brake controller is recommended for towing the H150 and H250 model Thawzall trailers.
 - Thawzall axles, wheels, and tires are rated to travel at legal posted speeds on the highway.
 - Connect safety chains, lights and brake cable to towing vehicle.
 - Thawzall trailers are equipped with electronic breakaway brakes in case the trailer should become disconnected from the towing vehicle. Trailer brakes will apply automatically.
 - Failure to connect trailer in a safe manner could result in a serious accident or death.
 - Always verify that the hitch ball size on the towing vehicle matches the size of the coupler on the Thawzall trailer.
-

General Operating Instructions



Do not operate your Thawzall without instruction and knowing the startup and shutdown procedures thoroughly.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or the safety and affect the life of the machine.

If you do not understand any part of this manual or need assistance in any way, call Thawzall Technical Support at (888) 757-3545.

General Operating Instructions, cont.



Wear Gloves. Always wear gloves when handling hot hoses and quick disconnects.

Hose Reel Danger Be very careful to keep hands and gloves clear from the hose reel when rewinding the hose. A glove can get caught in the wraps of the hose on the reel and pull the operator into the hose reel.

Stand Back when rewinding the hose. Close the ball valve between each of the quick disconnects and the fluid manifold when coupling or uncoupling the hoses. This will prevent accidental fluid loss and possible injury from hot fluid.



No loose clothing Do not wear loose clothing that can get caught in the hose reel or on levers or latches on your Thawzall.

Do not use gasoline or kerosene to fire the furnace on your Thawzall. It will explode and cause severe damage to you and your Thawzall. Only #1 fuel oil or a winter blend of fuel oil is recommended for the furnace.



GFI Outlet Always plug the electrical cord from your Thawzall in to a GFI protected outlet. Failure to do so could cause shock or electrocution.

Safety Glasses Always wear safety glasses when operating your Thawzall, especially when connecting and disconnecting hoses, fueling or maintaining the battery on the generator.



Fire Extinguisher Check and maintain the fire extinguisher that is mounted inside the back door of your Thawzall. An annual check and fill is recommended.

Caution and Warning Decals Carefully observe and maintain all of the caution and warning decals placed on your Thawzall machine. They are there to remind you to be safe.



Never 'Hot-Wire' any of the electrical wiring on your Thawzall or generator. Wiring circuits are carefully designed to provide for safe Startup and operation of the furnace, pumps and hose reel. Any alteration may cause an unsafe condition and could cause any or all components to malfunction or operate out of sequence.

General Operating Instructions, cont.

Operate only **Outdoors**.



Never operate an engine or a furnace inside a building without proper venting of the exhaust to the outside. Carbon monoxide poisoning and asphyxiation may occur if exhaust is inhaled.

Handle fuel safely.



Avoid fires by handling fuel with care. Both diesel fuel, used in the generator and #1 fuel oil or a winter blend of fuel oil used in the furnace are extremely flammable.

Do not refuel the machine while smoking or near an open flame or sparks. Always stop the generator engine and shutdown the furnace before refueling the machine. Fill the tanks outdoors.

A clean machine is a safe machine. Prevent fires by keeping your Thawzall clean of accumulated trash, grease and debris. Clean up spilled fuel.

Wear gloves when handling hot hoses and couplers. Even a small spill of fluid can burn the skin.

Wear safety glasses when fueling your Thawzall and when connecting and disconnecting the quick disconnects on the hoses.

Handle Chemical Products Safely



Direct exposure to hazardous chemicals can cause injury. Potentially hazardous chemicals used in your Thawzall include, grease, paint and adhesives. Grease, paint and adhesives are especially toxic when heated.



Please read with care the Material Safety Data Sheets (MSDS) provided in this manual. They provide specific details on the products used in your Thawzall, physical and health hazards, safety procedures and emergency response techniques.

Check the MSDS's before operating your Thawzall so you will know the risks and first aid techniques in case of an accident.



Keep emergency phone numbers for doctors, ambulance service, hospital and fire department near your phone.

A fire extinguisher is mounted on the inside of the back door of your Thawzall.

Safety Includes Preventive Maintenance



Remove paint and adhesives before welding or heating.

Avoid heating near pressurized pipes and hoses, and near a fuel tank.

Dispose of waste properly. Improperly disposing of waste including Cryo-Tek 100, grease, and plastics, filters and batteries, threaten the ecology of the environment.

Do not pour Cryo-Tek on the ground, down a drain or into any water source. Inquire about the proper way to dispose of wastes in your area, at your recycling center.

Handling Batteries Safely



Battery gas can explode. Keep sparks and flames away from the battery on the generator on your Thawzall.

Never place a metal object across the battery posts.

Always remove the grounded (-) battery clamp first and replace it last.

Battery acid is poisonous and can burn skin and eat holes in clothing and cause blindness if splashed into the eyes.

Flush contaminated skin with water and baking soda. If acid is swallowed, drink water or milk and get medical attention immediately.

Storing Your Thawzall



To store your Thawzall for the summer months:

- Park on level ground and block the wheels to prevent accidental movement.
 - Close the valve on the fuel tank.
 - See applicable service bulletins at the back of this manual for annual maintenance items.
-

Safety Equipment, Sign and Decal Locations



"Startup/Shutdown
Troubleshooting"
Inside left door



"Hot Fluid" on
deck below hose
reel



"Danger" front of
fuel tank



Fire extinguisher
inside rear door



Outside light, reflectors and
decals



Digital Return Tem-
perature Display and
rooftop beacon
control



Main Breaker Panel



Furnace Switch



Fill Pump Switch and
Hour Meter

HeatZone™ Series Product Enhancements

By Thawzall, LLC

Performance Improvements

- Improved heat distribution for faster THAW, more uniform CURE.
- Improved circulation performance for greater head pressure and gpm flow.
- Full Strength HTF (heat transfer fluid) for pumpability down to—80°F.
- Simplified Configuration easy to operate and understand .

Quality Improvements

- Steel manifold and non-copper piping for improved durability and reparability.
- DOT certified LED lights for operational reliability.
- Industrial door struts to secure door open or closed.
- Coupler cleaning station to reduce contamination.

Control System Improvements

- Centralized controls convenience for startup and monitoring.
- Rooftop mounted message beacon for visual assurance of proper operation.
- Digital display of HeatZone™ 1 to monitor critical return temperatures.
- Hour Meter to keep track of rental hours.

Operational Improvements

- Automatic Fuel Bleed System no fuel line bleeding required.
 - Fork Picks for H150 and H250 for ease of placement on job site.
 - Back flow check valve to eliminate HTF fill tank overflow.
 - Lockable cover over temp controls to prevent unauthorized tampering.
 - Furnace Troubleshooting guide to reduce non-revenue service calls.
-

Model H150 (2M) Specifications and Performance**Specifications: Model H150 (2M)**

<u>LxWxH</u>	144x74x79
<u>Weight w/fuel and fluid</u>	3460 lbs.
<u>Weight of optional generator</u>	500 lbs.
<u>Fuel Capacity</u>	102 gal.
<u>(HTF) Heat Transfer Fluid Capacity</u>	56 gal.
<u>HTF Circulation Pump</u>	single, closed loop centrifugal
<u>Hose Length (2 zones x 600 ft.)</u>	1200 ft.
<u>Electrical, GFI</u>	20 amp x 120 vac
<u>HTF Pumpability</u>	-80° F
<u>Fuel</u>	Winter blended Diesel or #1 fuel oil
<u>Hitch Choices</u>	Forged, Stamped, or Pintle
<u>Generator Choices</u>	3.5 or 5.5 KWH liquid cooled

Performance: Model H150 (2M)

<u>THAW frozen ground</u>	1200 to 2400 sq. ft.
<u>Cure Concrete</u>	2400 sq. ft.
<u>With Accessories</u>	6000 sq. ft.
<u>FROST Prevention</u>	2400 sq. ft.
<u>With Accessories</u>	6000 sq. ft.
<u>Heat Buildings</u>	210,000 cu. ft.
<u>Input/Output/Usable</u>	175/148/129 MBH
<u>Operating Temperature</u>	180° F
<u>Operating Pressure</u>	1-5 PSI
<u>Fuel Consumption full load</u>	1.0 gph
<u>Run Time</u>	4+ days
<u>Pump Capacity</u>	28/1680 gpm/gph

H150 START UP PROCEDURE

Updated 8/28/08

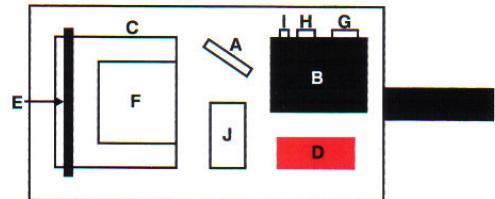
- 1 All electrical circuit breakers OFF.
Location: A - Electrical panel #1
- 2 Furnace switch OFF.
Location: I
- 3 Plug machine into 120 VAC ground fault circuit.
Location: Exterior
- 4 Turn main circuit breaker and furnace circuit breaker ON.
Location: A - Circuit breakers #2 and #5
- 5 OPEN valves 4S.&4D
Location: Near D
- 6 Make sure all manifold valves (3S & 3R per zone) are CLOSED.
Location: E
- 7 Hose reel DISENGAGED by flipping hand lever clutch to the right.
Location: F
- 8 Set hose reel brake. Move handle fully forward (toward hose reel).
Location: F
- 9 PULL hose. When first set of disconnects rolls off reel, SEPARATE disconnects. PLUG into manifold zone to be used.
Location: F - Hose reel, E - Manifold
- 10 REPEAT step 9 to lay out additional zones.
- 11 OPEN ball valves 3S & 3R to first zone being used.
Location: E
- 12 Turn circulation pump circuit breaker ON.
Location: A - Circuit breaker #6
- 13 CHECK pressure gauge. **If no pressure - Add fluid** ►
Location: B **Open Auto Bleeder**
- 14 CHECK flow indicator. If spinning proceed with start up. **If not** ►
Location: B
- 15 CHECK fuel tank valve OPEN.
Location: C - Valve #1. Handle in line with pipe.
- 16 Turn furnace switch ON.
If furnace fires proceed with start up. NOTE: 30 Sec. delay **If not** ►
Location: I

SHUT DOWN

- Furnace switch OFF (I). Furnace breaker OFF (A).
 Circulation pump, breaker(s) OFF (A)
 Manifold valves OFF (E)
 Rewind hose:
 Circuit breaker #7 ON (A). Engage clutch (F), Release Brake
 Disconnect hose (F). Use foot pedal.
 Fuel valve CLOSED (C)
 All breakers in electrical panel OFF (A). Unplug cord.

Machine Diagram

A = Electrical Panel	F = Hose Reel
B = Furnace	G = Fill Pump Switch
C = Fuel Line	H = Beckett Burner
D = Circulation Pump	I = Furnace Switch
E = Manifold	J = Fill Tank



*Note: Expansion Tank valve must remain open for operation.

◀ Go to step 13

To add fluid to system:

ENERGIZE fill pump.
 Location: A - Circuit breaker #8
 Turn switch to ON. Must be held in ON position.
 Location: B
 Open ball valve on fill pump
 Location: B
 Check furnace gauge. Recommended not to exceed 10 PSI.
 Location: B
 Close fill pump ball valve, release switch.
 Location: H - Valve #2, Switch

Flow indicator(s) not spinning:

CHECK ball valves 3S & 3R at appropriate zone
 CHECK hose layout for kinks

Furnace does not fire:

CHECK furnace switch (I)
 CHECK fuel valve #1 (C)
 CHECK red reset button on Beckett Burner
 Location: H - On face

See Troubleshooting guide on left door.

NOTES:

Hose needs to be **NEATLY** rewound to fit properly on the reel.

When transporting **THAWZALL** hose reel clutch must be in the engaged position and fuel line must be closed.

REMEMBER to disengage hose reel brake prior to rewinding hose.

Model H 250 Specification and Performance

Specifications: Model H250 (6A)

L x W x H	170 x 84 x 96
Weight w/fuel & fluid	5,605 lbs
Weight of optional generator	300 lbs
Fuel Capacity	160 gal
(HTF) Heat Transfer Fluid	122 gal
HTF circulation pump	twin, closed loop centrifugal
Hose length (5 zones x 600')	3,000 ft
Electrical, GFI	20 amp x 120 vac
HTF Pumpability	-80° F
Fuel	Winter blend diesel or #1 fuel oil
Hitch Choices	Forged, Stamped, or pintle
Generator Choices	5.5 or 7.0 KWH liquid cooled

PERFORMANCE: MODEL H250 (6A)

THAW frozen ground with additional 600' hose	3,000 sq ft 6,000 sq ft max
CURE concrete with accessories	6,000 sq ft 18,000 sq ft max
FROST prevention with accessories	9,000 sq ft 27,000 sq ft max
HEAT buildings	400,000 cu ft
Input/Output/Useable	280/234/203 MBH
Operating Temperature	180° F
Operating Pressure	1-5 PSI
Fuel consumption full load	1.0 gph
Run time	3+ days
Pump capacity	28/1680 gpm/gph

H 250 Startup/Shutdown

H250 START UP PROCEDURE

1 All electrical circuit breakers OFF.

Location: A-Electrical Panel ▼

2 Furnace switch OFF.

Location: J ▼

3 Plug machine into 120 VAC ground fault circuit.

Location: Exterior-Labeled Pump #1 ▼

4 Turn On circuit breakers #'s 2 and 5.

Location: Electrical panel, Light switch on inside sheeting above the operators door. ▼

5 Open ball valves 4S & 4D. If using accessories →

Location: E-Circulation pump #1 ▼

6 Make sure all manifold valves (3S & 3R per zone) are CLOSED.

Location: F ▼

7 Hose Reel in NEUTRAL by flipping hand lever clutch to the right.

Location: G ▼

8 Set hose reel brake. Move handle fully forward (toward hose reel). ▼

Location: G-Lower left side base of hose reel. ▼

9 PULL hose. When first set of disconnects rolls off reel, SEPARATE disconnects.

PLUG into manifold zone to be used.

Location: G- Hose reel, F- manifold. ▼

10 Open ball valves 3S & 3R to first zone being used.

Location: F ▼

11 Turn circulation pump circuit breaker ON.

Location: A- Electrical panel, circuit breaker #7. ▼

12 CHECK pressure gauge. Approx. 5 psi. Add fluid. →

Location: B ▼

13 CHECK flow indicator. If spinning proceed with start up. If not →

Location: above I. ▼

14 OPEN fuel tank valve.

Location: Valve #1. Handle in line with pipe. ▼

15 Furnace switch ON. If boiler fires proceed with start up. If not →

Location: J- Furnace switch. ▼

Furnace switch OFF (J) Furnace breaker OFF (A)

Circulation pump (s) breaker (s) OFF (A)

Manifold valves OFF (F)

Rewind hose: Circuit breaker #5 ON. (A). Disengage hose reel brake,

Pull handle toward you (G) Engage clutch (G). Use foot pedal.

Fuel valve CLOSED ©

All breakers in electrical panel OFF (A). Unplug cord.

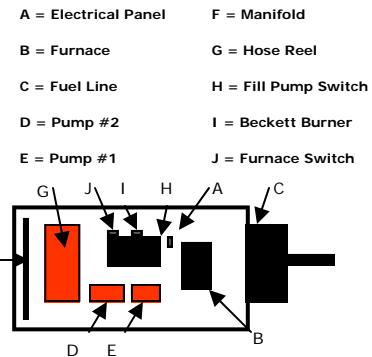
NOTES:

Hose needs to be NEATLY rewound to fit properly on the reel.

When transporting THAWZALL hose reel clutch must be in the engaged position and fuel line must be closed.

REMEMBER to disengage hose reel brake prior to rewinding hose.

Machine Diagram



Use both pumps:

Open ball valves 5S & 5D

Location: D- Circulation Pump #2

Plug machine into 120 VAC ground fault circuit.

Location: Exterior- Labeled Pump #2.

ENERGIZE Pump

Location: A- Electrical panel, breaker #8

NOTE: 2 pumps needed only if using accessories

← Go to step 6

To add fluid to system:

Open Auto Bleeder.

Location: in B area

Energize fill pump.

Location: A- Electrical panel, breaker #7

Turn switch to ON. Must be held in ON position.

Location: H-Directly above valve #2

Open ball valve on fill pump.

Location: H-Valve #2

Check furnace gage. Recommended not to exceed 10 psi.

Location: B- Valve #2

Close fill pump ball valve, release switch.

Location: H- Valve #2, Switch

Location: H Valve #2, Switch

Flow indicator (s) not spinning:

CHECK ball valves 3S &3R at appropriate zones.

CHECK hose layout for kinks

Furnace does not fire:

CHECK furnace switch (J)

CHECK fuel valve #1 ©

CHECK red reset button on Beckett Burner

Location: I On face

SHUT DOWN

Refer to the Trouble Shooting Guide on the left door of your Thawzall as needed.

Ground Thaw Setup Charts

1. Prepare the site by clearing the work area of snow and ice.
2. Determine soil conditions.
3. Determine hose spacing from the estimate chart on the following pages.

With mud conditions and zero frost below, lay hoses in the mud and then use your Thawzall, Inc. Unit Heaters to blow warm air across the hoses to dry the mud.

4. Lay the hoses directly on the ground and cover with insulating blankets as directed below.
-

Ground Thaw Setup Charts cont.

TEMPERATURE: 30° F or higher

LAYERS OF BLANKETS TO USE: SINGLE (R6 insulation factor)

SOIL CONDITION: Gravel or Sand (good drainage)

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	24"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

**Hose spacing is measured inches on center

TEMPERATURE: 30° F or higher

LAYERS OF BLANKETS TO USE: SINGLE (R6 insulation factor)

SOIL CONDITION: Clay or Silt (poor to moderate drainage)

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

**Hose spacing is measured inches on center

TEMPERATURE: 15° to 30° F

LAYERS OF BLANKETS TO USE: SINGLE (R6 insulation factor)

SOIL CONDITION: Gravel or Sand (good drainage)

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	24"	24"	24"	24"	24"
Hours to run	24	48	72	96	120

**Hose spacing is measured inches on center

TEMPERATURE: 15° to 30° F

LAYERS OF BLANKETS TO USE: SINGLE (R6 insulation factor)

SOIL CONDITION: Clay or Silt (poor to moderate drainage)

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	24"	24"	24"	24"	24"
Hours to run	24	48	72	96	120

**Hose spacing is measured inches on center

Ground Thaw Setup Charts cont.**TEMPERATURE: 0° to 15° F****LAYERS OF BLANKETS TO USE: DOUBLE (R12 insulation factor)****SOIL CONDITION: Gravel or Sand (good drainage)**

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	24"	24"	24"	24"	24"
Hours to run	24	48	72	96	120

**Hose spacing is measured inches on center

TEMPERATURE: 0° to 15° F**LAYERS OF BLANKETS TO USE: DOUBLE (R12 insulation factor)****SOIL CONDITION: Clay or Silt (poor to moderate drainage)**

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

**Hose spacing is measured inches on center

TEMPERATURE: -20° to 0° F**LAYERS OF BLANKETS TO USE: DOUBLE (R12 insulation factor)****SOIL CONDITION: Gravel or Sand (good drainage)**

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

**Hose spacing is measured inches on center

TEMPERATURE: -20° to 0° F**LAYERS OF BLANKETS TO USE: DOUBLE (R12 insulation factor)****SOIL CONDITION: Clay or Silt (poor to moderate drainage)**

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

**Hose spacing is measured inches on center

Ground Thaw Setup Charts, cont.

TEMPERATURE: -20° F or lower

LAYERS OF BLANKETS TO USE: DOUBLE (R12 insulation factor)

SOIL CONDITION: Gravel or Sand (good drainage)

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

**Hose spacing is measured inches on center

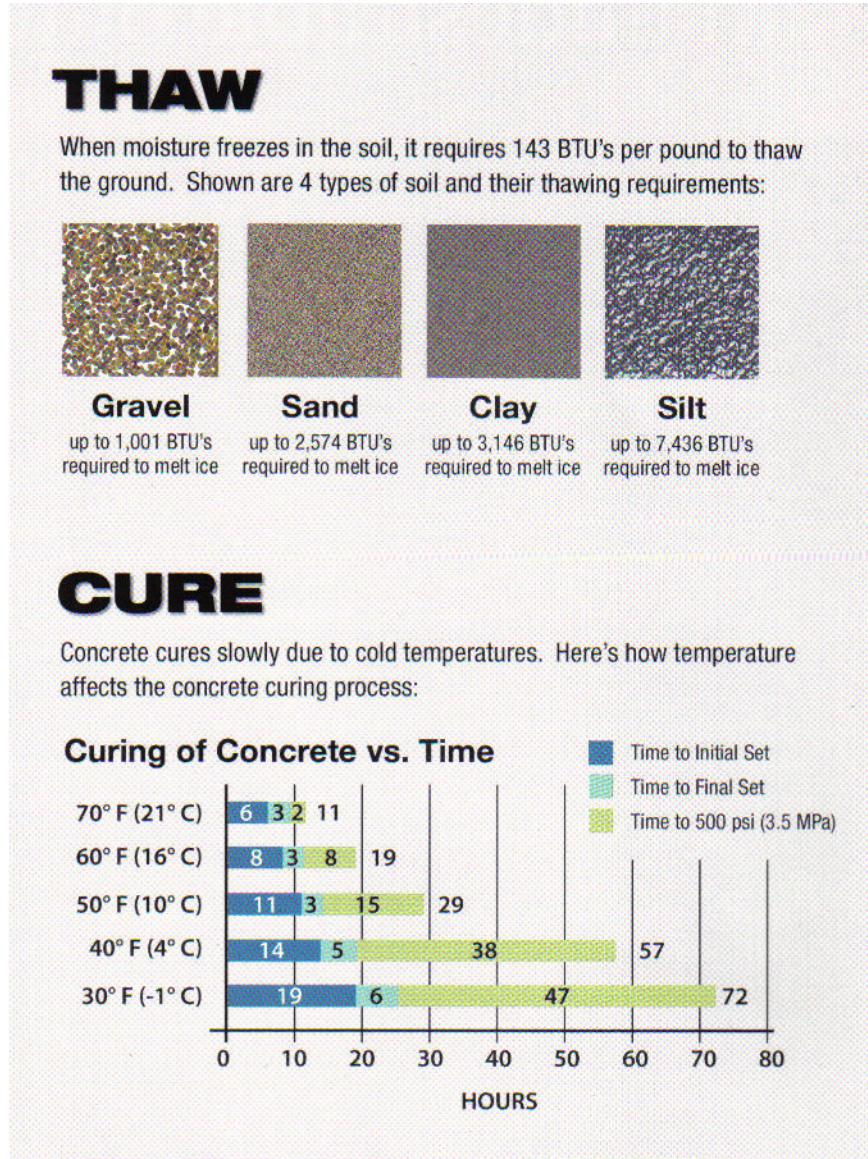
TEMPERATURE: -20° F or lower

LAYERS OF BLANKETS TO USE: DOUBLE (R12 insulation factor)

SOIL CONDITION: Clay or Silt (poor to moderate drainage)

Frost Depth	12"	24"	36"	48"	60"
Hose Spacing**	16"	16"	16"	16"	16"
Hours to run	24	48	72	96	120

**Hose spacing is measured inches on center



Performance

Thaw and Cure performance in the field is affected by a wide range of factors to include soil type, density of frozen ice in the soil, hose spacing, thermal rating of the covering insulating blankets, and ambient temperatures.

Heat performance in interior spaces is also affected by several factors to include outside ambient temperatures, heat loss through walls and ceiling, and the volume of the space to be heated.

In general, with proper hose spacing and adequate insulation, the operator should be able to THAW about one foot of soil per day. Consult our Thawzall Technical Support personnel with questions regarding proper hose spacing. (888) 757-3545.

High Altitude Adjustments

If your Thawzall is to be used at altitudes above 5000 ft., the burner nozzle and air intake setting must be changed to accommodate lower oxygen levels at higher altitudes. **Please see service bulletin no. 501** at the back of this manual for information about high altitude changes.

Hose Capacity Fill Chart

<u>HOSE SIZE</u> (Inside Dimension)	<u>GALLONS PER FOOT</u>
1/2"	0.016
5/8"	0.019
3/4"	0.023
1"	0.04
1 1/4"	0.063

Quick Disconnect Maintenance

Water and dirt may get into a disconnect piece and cause it to corrode or to work improperly. It is vital that disconnects be cleaned and lubricated at least once per season or when they get dirty. Failure to maintain disconnects properly will void the warranty.

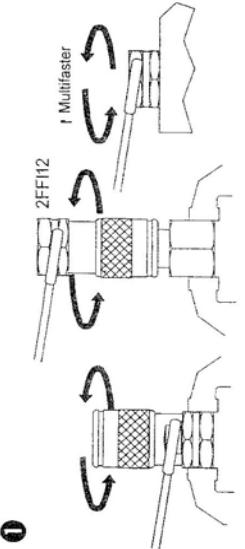
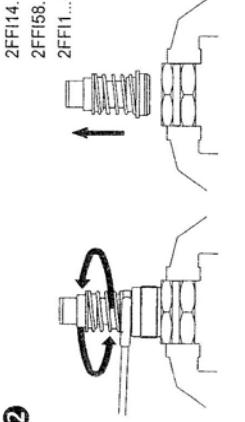
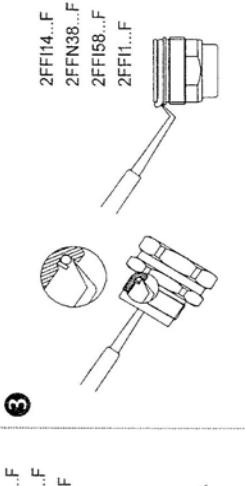
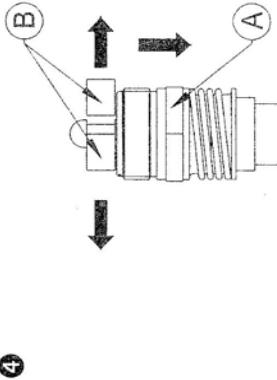
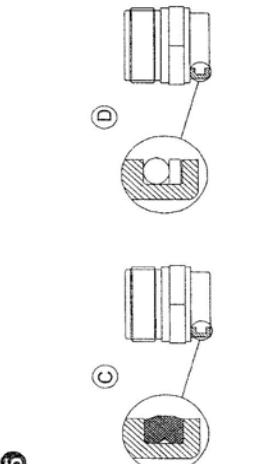
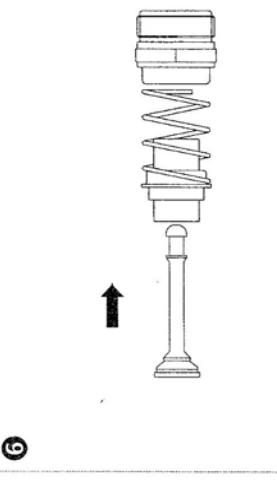
To Clean disconnects:

- Use a mild soap and water or all purpose cleaner like dish soap or Windex.
- Use a nylon bristle brush to scrub the couplers. (Do not use a metal brush.)
- Rinse and wipe parts dry.
- Allow parts to dry.

To Lubricate disconnects:

- Use only Silicon based products that do not contain any penetrating oils like LPS or Lubrimatic. Silicone based lubricants are available at automotive parts stores or farm equipment dealerships.
 - Apply silicone lubricant liberally.
 - **Do not use WD-40 or similar products that contain penetrating oil.**
 - Silicone based lubricants will displace water trapped in the disconnects and will not damage the seals inside.
-

Quick Disconnect Maintenance

FASTER		ISTRUZ.N 59 mod. A5
I SOSTITUZIONE GUARNIZIONI: GB SEALS REPLACEMENT:		KIT 2FFI...F
		MOD. 020166
1		<p>I SVITARE IL CORPO DALL'ADATTATORE (PER IL MULTIFASTER SVITARE L'INNESTO DALLA PIASTRA), PER GLI INNESTI 2FFI12 BLOCCARE IL CORPO CON L'APPOSITO UTENSILE CODICE KIT UT 2FFI12F.</p> <p>GB UNSCREW THE BODY FROM THE ADAPTOR (FOR MULTIFASTER UNSCREW THE COUPLING FROM THE PLATE). FOR 2FFI12 COUPLINGS: BLOCK THE BODY BY THE SPECIFIC TOOL CODE KIT UT 2FFI12F.</p>
2		<p>I SVITARE IL CORPO INTERNO DALL'ADATTATORE (PER LE VERSIONI 2FFI14...F, 2FFI58...F, 2FFI1...F, ESTRARRE IL CORPO INTERNO DALL'ADATTATORE).</p> <p>GB UNSCREW THE INTERNAL BODY FROM THE ADAPTOR (2FFI14...F, 2FFI58...F, 2FFI1...F VERSIONS; PULL OUT THE INTERNAL BODY FROM THE ADAPTOR).</p>
3		<p>I SOSTituIRE O-RING E ANELLO ANTIESTRUSSIONE TRA CORPO INTERNO E ADATTATORE (PER LE VERSIONI 2FFI14...F, 2FFI58...F, 2FFI1...F; SOSTituIRE O-RING E ANTIESTRUSSIONE DEL CORPO INTERNO).</p> <p>GB REPLACE O-RING AND BACK-UP BETWEEN INTERNAL BODY AND ADAPTOR (2FFI14...F, 2FFI58...F, 2FFI1...F VERSIONS; REPLACE O-RING AND BACK-UP RING OF THE INTERNAL BODY).</p>
4		<p>I IMPACCIARE IL GRUPPO VALVOLA "A" RIMUovere i SEMIGUSCI "B"</p> <p>GB PACK THE VALVE GROUP "A" AND REMOVE THE SEMI-GUIDES "B".</p>
5		<p>I SOSTituIRE LA GUARNIZIONE SAGOMATA "C" OPPURE O-RING E ANELLO ANTIESTRUSSIONE "D" DEL CORPO INTERNO, MONTANDO PER PRIMO L'ANELLO ANTIESTRUSSIONE POSIZIONATO VERSO L'ESTERNO E SUCCESSIVAMENTE L'O-RING.</p> <p>GB REPLACE THE PROFILED SEAL "C" OR THE O-RING WITH BACK-UP RING "D" WITHIN THE INTERNAL BODY, ASSEMBLING THE BACK-UP RING FIRST (POSITIONING IT OUTWARDS) AND THEN THE O-RING SEAL.</p>
6		<p>I RICOMPOSSE il GRUPPO VALVOLA COME MOSTRATO IN FIGURA.</p> <p>GB REASSEMBLE THE VALVE GROUP AS SHOWN IN THE PICTURE.</p>

Quick Disconnect Maintenance

ISTRUZ.N 59 mod. A5																																											
 7	<p>RIVARRE IL CORPO INTERNO NELL'ADATTATORE E SERRARE CON LE COPPIE SPECIFICATE (PER LE VERSIONI 2FF14...F, 2FF158...F, 2FF11...F, INSERIRE IL CORPO INTERNO NELL'ADATTATORE). RESREW THE INTERNAL BODY INTO THE ADAPTER AND BLOCK WITH THE SPECIFIED TORQUES (2FF14...F, 2FF158...F, 2FF11...F VERSIONS, INSERT THE INTERNAL BODY INTO THE ADAPTER).</p>	<p>8</p> <p>RIVAVITARE IL CORPO SULL'ADATTATORE (PER IL MULTIFASTER: RIAVITARE L'INNESTO SULLA PIASTRA) E SERRARE CON LE COPPIE SPECIFICATE. PER GLI INNESTI 2FF112 BLOCCARE IL CORPO CON L'APPOSITO UTENSILE CODICE KIT UT 2FF12F. RESREW THE BODY ON THE ADAPTER (FOR MULTIFASTER RESREW THE COUPLING ON THE PLATE) WITH THE SPECIFIED TORQUE. FOR 2FF112 COUPLINGS: BLOCK THE BODY BY THE SPECIFIC TOOL CODE KIT UT 2FF112F.</p>	<p>9</p> <p>IMPACCARE IL GRUPPO VALVOLA "A", INSERIRE I SEMIGUIDI "B" E QUINDI RILASCIARE. PACK THE VALVE GROUP "A", INSERT THE SEMI-GUIDES "B" AND THEN RELEASE</p>																																								
 10	<p>10</p> <p>RICOMPARIRE IL CORPO COME MOSTRATO IN FIGURA. REASSEMBLE THE BODY AS SHOWN IN THE PICTURE.</p>																																										
		<p>BASE / SIZE</p> <table border="1"> <tr> <td>06</td> <td>3/8"</td> <td>COPPIA / TORQUE</td> <td>35 Nm</td> </tr> <tr> <td>08</td> <td>1/2"</td> <td></td> <td>40 Nm</td> </tr> <tr> <td>12</td> <td>3/4"</td> <td></td> <td>60 Nm</td> </tr> <tr> <td>16</td> <td>1"</td> <td></td> <td>60 Nm</td> </tr> </table>	06	3/8"	COPPIA / TORQUE	35 Nm	08	1/2"		40 Nm	12	3/4"		60 Nm	16	1"		60 Nm	<p>BASE / SIZE</p> <table border="1"> <tr> <td>04</td> <td>1/4"</td> <td>COPPIA / TORQUE</td> <td>50 Nm</td> </tr> <tr> <td>06</td> <td>3/8"</td> <td></td> <td>70 Nm</td> </tr> <tr> <td>08</td> <td>1/2"</td> <td></td> <td>80 Nm</td> </tr> <tr> <td>10</td> <td>5/8"</td> <td></td> <td>90 Nm</td> </tr> <tr> <td>12</td> <td>3/4"</td> <td></td> <td>100 Nm</td> </tr> <tr> <td>16</td> <td>1"</td> <td></td> <td>100 Nm</td> </tr> </table>	04	1/4"	COPPIA / TORQUE	50 Nm	06	3/8"		70 Nm	08	1/2"		80 Nm	10	5/8"		90 Nm	12	3/4"		100 Nm	16	1"		100 Nm
06	3/8"	COPPIA / TORQUE	35 Nm																																								
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General Maintenance

General Maintenance Chart

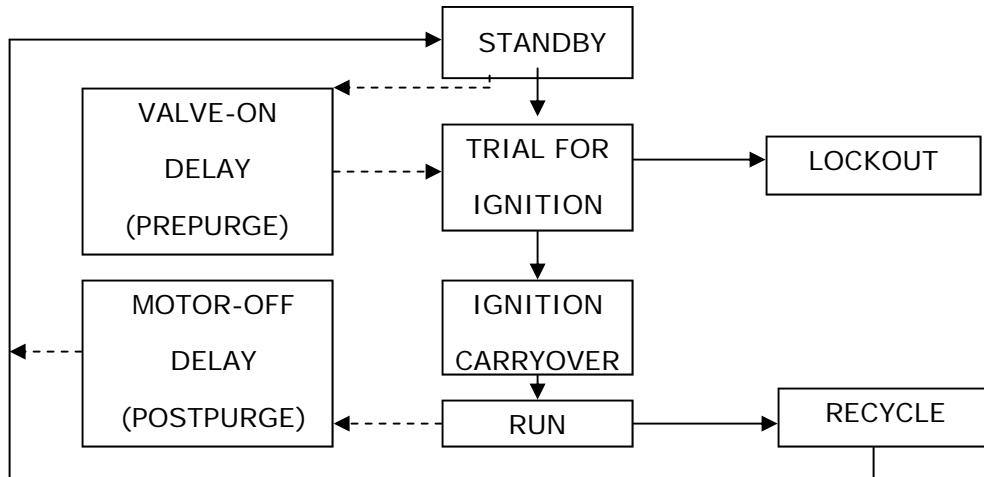
Part	Maintenance Frequency
Fuel Filter	Replace once per year.
Furnace	Maintenance-annually by qualified technician
Hose Reel	Grease all fittings twice per year.
Hose Reel	Check fluid levels in gear box twice per year. (H150 only)
Hose Reel	Check allen screws and bearing locking collars for tightness frequently.
Hoses	Inspect for damage at each use.
Quick disconnect couplers	Clean thoroughly at least twice per year.

(See Quick Disconnect Maintenance Section)

For further information about general maintenance items, see Service Bulletin #503 in the service bulletin section at the back of this manual.

TIPICAL SEQUENCE OF OPERATION

1. **Standby.** The burner is idle, waiting for a call for heat. When a call for heat is initiated, there is a 2-6 second delay while the control performs safe start check.
2. **Valve-On Delay.** If applicable the ignition and motor are turned on for a 15 second valve-on delay.
3. **Trial for ignition (TFI).** The fuel valve is opened, if applicable. A flame should be established within the 15 second lockout time (30 sec. lockout time is available).
4. **Lockout.** If a flame is not sensed by the end of the TFI, the control shuts down on safety lockout and must be manually reset. If the control locks out three times in a row, the control enters restricted lockout. Follow the instructions on previous pages to rest the the control.
5. **Ignition Carryover.** Once flame is established, the ignition remains on for 10 seconds to ensure flame stability before turning off. If the control is wired for intermittent duty ignition, the ignition unit stays on the entire time the motor is running.
6. **Run.** The burner runs until the call for heat is satisfied. The burner is then sent to burner motor-off delay, if applicable, or it is shut down and sent to standby.
7. **Recycle.** If the flame is lost while the burner is firing, the control shuts down the burner and enters a 60 second recycle delay, and then repeats the above ignition sequence. If flame is lost three times in a row, the control locks out to prevent cycling with repetitious flame loss due to poor combustion.
8. **Burner Motor-off Delay.** If applicable, the fuel valve is closed and the burner motor is kept on for the selected motor-off delay time before the control returns the burner to standby.



Beckett Burner Technician Reference Guide

For

Honeywell R7184 Series Primary Control

PRIMING THE PUMP

1. Initiate a call for heat.
2. While the ignition is on, press and release the reset button (hold 1/2 second or less).
If the control has not locked out since its most recent complete heat cycle, the lockout time will be extended to 4 minutes (45 seconds on earlier units), and the ignition will remain on for the entire heat cycle.
3. Bleed the pump until all froth and bubbles are purged. If prime is not established within the extended lockout time, the control will lock out. Press the reset button to reset the control's lockout counter to zero and send the control to standby.
4. Repeat steps 2 and 3 if needed until the pump is fully primed and the oil is free of bubbles. Then terminate the call for heat and the control will resume normal operation.

RESETTING THE RESTRICTED LOCKOUT

If the control locks out three times in a row without a complete heat cycle between attempts, the lockout becomes restricted in order to prevent repetitious resetting. To reset, hold down the reset button for 60 seconds (until the LED flashes one time).

DISABLE FUNCTION

Any time the motor is running, press and hold the reset button to disable the burner. The burner will remain off as long as the button is held and will return to standby when released.

LED INDICATOR KEY

LED	STATUS
ON	Flame Sensed
OFF	Flame Not Sensed
Flashing (1/2 sec. on, 1/2 sec. off)	Lockout/Restricted Lockout
Flashing (2 sec. on, 2 sec. off)	Recycle

Beckett Burner Technician Reference Guide-cont.**Honeywell R7184 Series Primary Control****CAD CELL RESISTANCE CHECK**

While the burner is firing, and after the ignition has been turned off, press and release the reset button (hold 1/2 sec. or less) to check the cad cell resistance. The LED will flash 1 to 4 times, depending on the cad cell resistance (see the chart below), and then return to solid green. For proper operation, it is important that the cad cell resistance is below 1600 Ohms.

LED FLASHES	CAD CELL
1	0-400 Ohms
2	400-800 Ohms
3	800-1600 Ohms
4	1600 Ohms or more

R7184 Series control features

MODEL*	ADVANCED FEATURES
R 7184A	Interrupted/Intermittent duty ignition microprocessor-bases control
R 7184B	All features of the R 7184 plus 15 second valve-on delay
R 184P/ R184U	All features of the R 7184B plus burner motor-off delay which is selectable for most models (1/2, 2, 4, & 8 minutes typical), fixed 15 second for R7184P1080. 30 VAC dry alarm contact terminals are available on some models. Valve-on delay and motor-off delay on some models can be field disabled together by DIP switch.

*4 digit model extensions designate label, timings, and other options.

MATERIAL SAFETY DATA SHEETS

Material Safety Data Sheet (MSDS) for heat-conductive compound, which is included with L4006A,B,E Aquastast Controllers.

MATERIAL SAFETY DATA SHEET (MSDS)					
ISSUED: Dec 2 1986	REVISED: Jan 15 1992 DS 9c 21				
SECTION I		EMERGENCY TELEPHONE NO.			
TRADE NAME (if None, Put Chemical) Heat Conductive Compound		(612) 542-7684			
CHEMICAL NAME AND SYNONYMS NA					
MANUFACTURER'S NAME AND INFO TELEPHONE NO. Honeywell, Inc.		(612) 542-7500			
ADDRESS (Number, Street City, State, Zip Code) 1985 Douglas Drive North Minneapolis		MN		55422	
SECTION II - HAZARDOUS INGREDIENTS		%	TLV	PEL	UNITS
Petroleum hydrocarbon Barium, acetate tallow fatty acids complex (*) Aluminum, as Al, Pyro Powders Stearic Acid		0000A-06-7 68201-19-4 A7429-90-5 00057-11-4	60-70 5-10 25-30 1-5	NE NE 5 NE	NE NE 5 mg/m ³ NE
Part No. 120650 (0.5 oz. tube); Part No. 107408 (4 oz. can); Part No. 197007 (5 gal. container); M.S. 1699. Specific chemical identity and C.A.S. number withheld as trade secret pursuant to 29 CFR 1910.1200 (i). HMIS RATING: H=0, F=1, R=0, PPE=Sec. VII					
(*) SARA 313 Reportable; (C) Ceiling Value; (S) Skin Notation; CAS numbers prefaced by the letters A-G refer to different forms of a compound for TLV and PEL purposes; Numbers beginning with 0000A are PACE ID numbers, not valid CAS numbers.					
SECTION III - PHYSICAL DATA					
BOILING POINT (°F)	UN	SPECIFIC GRAVITY (Water = 1)		UN	
VAPOR PRESSURE (MM HG.)	NA	PERCENT VOLATILE BY VOLUME		NA	
VAPOR DENSITY (AIR = 1)	NA	pH		NA	
SOLUBILITY IN WATER	Neglible	EVAPORATION RATE		NA	
APPEARANCE AND ODOR Aluminum color, semi-solid material; pleasant odor.					
SECTION IV-FIRE AND EXPLOSION HAZARD DATA					
FLASH POINT (Method used)	450 F (COC)	FLAMMABLE LIMITS % by Vol.	LEL UN	UEL UN	
EXTINGUISHING MEDIA	CO ₂ , dry chemical or foam.				
SPECIAL FIREFIGHTING PROCEDURES	None. As in all fire situations, firefighters should wear SCBA.				
UNUSUAL FIRE AND EXPLOSION HAZARDS	None.				
ADDITIONAL INFORMATION	NA				

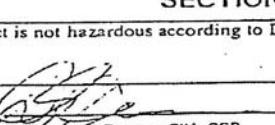
NA - Not Applicable

NE - Not Established

UN - Unavailable

PACE MBH039

Material Safety Data Sheets

SECTION V - HEALTH HAZARD INFORMATION									
ACUTE EFFECTS/SYMPOTOMS No data has been found regarding acute exposures to this material.									
DS 96-21									
CHRONIC EFFECTS/SYMPOTOMS Prolonged and/or repeated contact may cause skin, eye, and mucous membrane irritation. These potential effects are greatly minimized if good personal hygiene practices are used. No irritation has been noted in all the years of production and packaging.									
CARCINOGENICITY NTP yes <input type="checkbox"/> no <input checked="" type="checkbox"/> IARC yes <input type="checkbox"/> no <input checked="" type="checkbox"/> OSHA yes <input type="checkbox"/> no <input checked="" type="checkbox"/> OTHER NA									
FIRST AID									
EYES	Immediately flush eyes with water for 15 minutes. Obtain medical attention if irritation persists.								
SKIN	Remove excess with cloth or paper. Wash with soap and water. Obtain medical attention if irritation develops or continues.								
INHALATION	Inhalation is unlikely to be a route of exposure. However if this does occur, remove victim to fresh air and treat symptomatically.								
INGESTION	Contact local poison control center or physician IMMEDIATELY.								
SECTION VI - REACTIVITY DATA									
STABILITY	Stable.								
INCOMPATIBILITY	Strong oxidizing agents and halogens.								
DECOMPOSITION	Carbon dioxide, carbon monoxide, oxides of barium.								
POLYMERIZATION	Will not occur.								
SECTION VII - SPILL OR LEAK PROCEDURES									
PROCEDURES	Use absorbant material to clean up spills. Place in appropriate containers for proper disposal.								
WASTE DISPOSAL METHOD	Dispose of in accordance with Local, State and Federal regulations.								
SECTION VIII - SPECIAL PROTECTION INFORMATION									
RESPIRATORY	None.								
EYEWEAR	Not normally required. However, use chemical safety goggles or faceshield if potential for eye contact exists, especially if material is heated.								
CLOTHING/ GLOVES	Not normally required. However, protective clothing and gloves are recommended because material is difficult to remove from skin and clothing.								
VENTILATION	No special ventilation is required when working with this product.								
SECTION IX - ADDITIONAL INFORMATION									
This product is not hazardous according to DOT criteria. Keep containers closed until ready for use. Do not store near open flame or heat.									
APPROVAL	 David E. Downs, CIH, CSP				Manager, Industrial Hygiene			DATE 2/13/82	
<small>The information contained herein has been developed based upon current available scientific data. New information may be described from time to time which may render the conclusions of this report obsolete. Therefore, no warranty is extended as to the applicability of the information to the user's intended purpose or for the consequences of its use or misuse.</small>									

Material Safety Data Sheets

107408, 120650, 197007 HEAT CONDUCTIVE COMPOUND

MATERIAL SAFETY DATA SHEET (MSDS)

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Heat Conductive Compound

Synonyms: MS1699

PRODUCT USE: Heat conductive material used to enhance contact and heat transfer in temperature sensor applications.

MANUFACTURER: Honeywell Inc., 1985 Douglas Drive North, Minneapolis, MN 55422

DATE RELEASED: April 16, 1999

MSDS ID: MBH039

Customer Response Center: 800-328-5111
Emergency Telephone Information: 888-809-3787

NFPA Ratings:

Health 0

Flammability 1

Reactivity 0

Personal Protection B

SECTION 2. COMPOSITION, INFORMATION ON INGREDIENTS

Ingredients	CAS No.	Percent	PEL	TLV
No. 2 Lithium Complex Grease (70%) :				
Mineral Oil	64742-65-0	35-50	5 mg/m ³	5 mg/m ³
Mineral Oil	64742-62-7	20-25	5 mg/m ³	5 mg/m ³
Lithium Hydrostearate/Sebacate Complex				
	68815-49-6	4-9	—	—
Zinc Alkyldithiophosphate	68649-42-3	0-2	—	—
Aluminum Paste (30%) :				
Aluminum, as Al	7429-90-5	20-25	15 mg/m ³	10 mg/m ³
Aliphatic Petroleum Distillates	8052-41-3	10-15	2900 mg/m ³	525 mg/m ³
Stearic Acid	57-11-4	1-2	—	—
Aromatic Petroleum Distillates	64742-95-6	1-2	5 mg/m ³	5 mg/m ³

Additional Information: Part No. 120650 (0.5 oz tube); Part No. 107408 (4 oz can); Part No. 197007 (5 gal container). May also contain minute amounts of lithium and molybdenum lubricant compounds.

SECTION 3. HAZARD IDENTIFICATION

ACUTE HEALTH EFFECTS:

Skin: Excessive contact may cause skin irritation and dermatitis.

Eye: Direct contact with eye will cause irritation.

Inhalation: No adverse effects are expected.

Ingestion: Ingestion of product may cause nausea, vomiting and diarrhea.

CHRONIC HEALTH EFFECTS: Existing skin rash or dermatitis may be aggravated by repeated contact.

Material Safety Data Sheets

107408, 120650, 197007 HEAT CONDUCTIVE COMPOUND

HAZARD CLASSIFICATIONS: None.

CARCINOGENICITY: Not considered to be a carcinogen by either OSHA, NTP, IARC, or ACGIH.

TARGET ORGANS: None known.

SECTION 4. FIRST AID MEASURES

EYE CONTACT: Flush eyes with water for 15 minutes. Remove any contact lenses and continue to flush. Obtain medical attention if irritation develops and persists.

SKIN CONTACT: Remove excess with cloth or paper. Wash thoroughly with mild soap and water. Obtain medical attention if irritation develops and persists.

INGESTION: Contact physician or local poison control center immediately.

INHALATION: Remove patient to fresh air and obtain medical attention if symptoms develop.

SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT: >383 F (COC) Will burn if exposed to flame.

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical or foam.

SPECIAL FIRE FIGHTING PROCEDURES: None.

EXPLOSION HAZARDS: None. Aluminum powder can react with water to release flammable hydrogen gas. In the form of this product, this reaction is not expected.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Scrape up and dispose as solid waste in accordance with state and federal regulations.

SECTION 7. HANDLING AND STORAGE

Store in dry place. Keep container closed when not in use.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

VENTILATION: No special ventilation is required when working with this product.

RESPIRATORY PROTECTION: None.

EYE PROTECTION: Not normally required. However, use chemical safety goggles or faceshield if potential for eye contact exists, especially if material is heated.

HAND/CLOTHING PROTECTION: Not normally required. Protective gloves and clothing are recommended, as material is difficult to remove from skin and clothing.

OTHER PROTECTIVE EQUIPMENT: None.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

PEARANCE/ODOR: Aluminum color, semi-solid material, pleasant odor.

LUBLE IN WATER: Negligible.

SPECIFIC GRAVITY: 0.86.

Material Safety Data Sheets

107408, 120650, 197007 HEAT CONDUCTIVE COMPOUND

SECTION 10. STABILITY AND REACTIVITY

STABILITY: Stable.

REACTIVITY: Hazardous polymerization will not occur.

INCOMPATIBILITIES: Strong oxidizing agents and halogens.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon dioxide, carbon monoxide.

SECTION 11. TOXICOLOGY INFORMATION

No data available.

SECTION 12. ECOLOGICAL INFORMATION

CHEMICAL FATE INFORMATION: Hydrocarbon components will biodegrade in soil; relatively persistent in water.

SECTION 13. DISPOSAL CONSIDERATION

Dispose of as solid waste in accordance with Local, State and Federal regulations.

SECTION 14. TRANSPORTATION INFORMATION

DOT CLASSIFICATION: Not classified as hazardous.

SECTION 15. REGULATORY INFORMATION

SARA TITLE III SUPPLIER NOTIFICATION: Include in Section 311/312 inventory reports if amounts exceed 10,000 pounds. Aluminum compounds are subject to the reporting requirements under Section 313 of Emergency Planning and Community Right-to-Know Act of 1986 (40 CFR 372). Ingredients listed in TSCA Inventory.

SECTION 16. OTHER INFORMATION

This information is furnished without warranty, expressed or implied, except that it is accurate to the best of our knowledge.

PREPARED BY: PROSAR, 1295 Bandana Blvd, Suite 335, St Paul, MN 55108
(651-917-6100)

Honeywell

Home and Building Control
Honeywell Inc.
Honeywell Plaza
P.O. Box 524
Minneapolis, MN 55408-0524

Home and Building Control
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155 Gordon Baker Road
North York, Ontario
M2H 3N7

69-0955-1 J.S. Rev. 5-99

 Printed in U.S.A. on recycled paper containing at least 10% post-consumer paper fibers.

Material Safety Data Sheets



Spec Sheet #S00041
February 2007

ANTI-FREEZE for heating and cooling systems



DESCRIPTION

A blend of virgin (not recycled) propylene glycol and high purity Triple Protection additives, formulated for use in closed loop hydronic heating and cooling systems. **Cryo-tek** can also be used in radiant tube heating systems, most solar heating systems and geothermal loops. Hercules' exclusive Triple Protection formula stabilizes pH to prevent acid corrosion, chelates hard water minerals and inhibits the formation of scale and sediment. These components work together to keep the system clean and operating efficiently by eliminating system deposits, improving heat transfer and minimizing wear to moving parts and seals. **Cryo-tek** is compatible with PEX and elastomeric radiant tubing, commonly used materials for seals and bushings and provides corrosion protection for cast iron, steel, copper, brass and solder. **Cryo-tek** has not been tested for use in systems containing CPVC plastic. Standard **cryo-tek** products should not be used in systems containing aluminum and operating above 160°F/71°C. **Cryo-tek -100/AL** is available for aluminum systems. **Cryo-tek** should not be used in systems with galvanized piping as the zinc coating will be dissolved. **Cryo-tek** is a 94-98% efficient heat transfer solution in most application dilutions. It has a lower freeze point and higher boiling point than water and is non-flammable, odorless, non-toxic, non-irritating and compatible with Hercules boiler stop leaks and heating system cleaner products.

Cryo-tek is available in 3 formulations:

Cryo-tek Original

Contains virgin (not recycled) propylene glycol with Triple Protection corrosion inhibitor, pre-mixed ready to use formulation. Can be added directly into system undiluted or diluted as required. Certified Performance: Freeze Protection Down to -22°F / -30°C, Pumpable Down to -27°F / -33°C, and Burst Protection Down to -80°F / -62°C. **Cryo-tek Original** can be further diluted with water for less severe conditions. (see Table II, page 3)

Cryo-tek -100

Contains virgin (not recycled) propylene glycol with Triple Protection corrosion inhibitor, pre-mixed ready to use formulation. Certified Performance: Freeze Protection Down to -70°F / -57°C, Pumpable Down to -80°F / -62°C, and Burst Protection Down to -100°F / -73°C. **Cryo-tek -100** can be diluted with water for less severe conditions. (see Table II, page 3)

Cryo-tek AG

A concentrated virgin (not recycled) propylene glycol with Triple Protection corrosion inhibitor, which can be diluted with water to desired protection levels. (see Table II, page 3)

Test Kits and Accessories

Freeze protection levels and corrosion protection levels should be checked annually. Use **Hercules Refractometer** (35290) and **pH Meter** (35272) or, **cryo-tek Test Kit** (35271). Add additional **cryo-tek** product if freeze protection is inadequate. Add **cryo-tek Inhibitor** (35276) if pH is below 8.5. (see Maintenance, page 4)

*Please check with equipment manufacturer of system to determine compatibility with this product.

**Minimum flow protection levels are estimated and are dependent on system and equipment.



specifications

cryo-tek™

cryo-tek™

ANTI-FREEZE for heating and cooling systems

SIZES AND PACKING

STOCK NO.	SIZE	PACKING	WEIGHT/CASE	STOCK NO.	SIZE	PACKING	WEIGHT/CASE	STOCK NO.	SIZE	PACKING	WEIGHT/CASE			
cryo-tek Original														
35253	1 gal.	6	53.2 lbs.	35282	1 gal.	6	54.0 lbs.	35271	-	6-10 packs	0.3 lbs.			
35260	5 gal.	1	46.5 lbs.	35285	5 gal.	1	46.9 lbs.	35290	1	0.25 lbs.				
35267	55 gal.	1	518.0 lbs.	35288	30 gal.	1	286.0 lbs.	35272	1	0.3 lbs.				
cryo-tek -100														
35281	1 gal.	6	54.0 lbs.	35289	55 gal.	1	521.0 lbs.	35276	8 oz.	24	17.8 lbs.			
35284	5 gal.	1	46.9 lbs.	ALSO AVAILABLE										
35286	30 gal.	1	286.0 lbs.	35279	Protection Tags	<i>Free/available upon request</i>								
35287	55 gal.	1	521.0 lbs.											

APPROVALS AND LISTINGS

The virgin propylene glycol used in **cryo-tek** is "GRAS" (Generally Recognized As Safe) for incidental contact with food.

SPECIFIC USES

Use any **cryo-tek** Anti-Freeze in hydronic closed loop heating and cooling systems, solar heating systems, and general plumbing systems that require freeze protection.

SPECIFIC APPLICATIONS

Add any **cryo-tek** product to protect pipes from freezing and bursting. Also prevents freeze-ups in chiller systems, recreational vehicles, seasonal homes, mobile homes, trailers, boats, sprinkler systems, and industrial use.

PHYSICAL PROPERTIES

	cryo-tek Original	cryo-tek -100	cryo-tek AG
pH	8.5 - 9.0	9.0 - 9.5	9.5 - 10.0
Density lb/gal. 60°F - 65°F	8.7 lb./ gallon	8.78 lb./ gallon	8.78 lb./ gallon
Specific Gravity 60°F - 65°F	1.04	1.054	1.054
Specific Heat BTU/lb°F @ 160° F	.908	.843	.681
Boiling Point:	220°F / 104°C	230°F / 110°C	370°F / 188°C
Appearance and color:	Blue liquid. Odorless.	Red liquid. Odorless.	Blue liquid. Odorless.

WARNINGS OR CAUTIONS

- Read all cautions and directions carefully before using this product.
- Not for use in steam systems.
- Not for use with CPVC pipe and fittings.
- Use **Hercules boiler liquid or base hit™ II** to stop leaks on system containing **cryo-tek** products.
- Use **Hercules boiler & heating system cleaner or sizzle®** to clean system prior to using **cryo-tek** (see installations instructions).
- Do not use in internal combustion engines as a coolant.
- Do not use in water softeners. Disconnect all water softeners from system or provide back flow protection to prevent contamination of brine or resin bed.
- **Cryo-tek** Products are not recommended: 1. For use in systems containing galvanized components. 2. For open solar systems and systems where operating stagnation temperatures are regularly over 300°F / 150°C. 3. For systems with concentrating solar collectors or evacuated tube solar collectors. 4. In systems containing aluminum and operating temperatures over 160°F / 71°C. (Please check with equipment manufacturer of system to determine compatibility with this product).

CAUTION REGARDING COMPETITIVE PRODUCTS:

Hercules cryo-tek products are formulated using virgin propylene glycol and high purity Triple Protection Additives for assurance of materials compatibility and non-toxicity characteristics. Dilution or mixing of **cryo-tek** products with other manufacturers' products may compromise these critical requirements and is not recommended.

INSTALLATION INSTRUCTIONS

1. **CLEAN THE SYSTEM** - It is recommended that any system, whether new or existing, be thoroughly cleaned prior to being charged with **cryo-tek** products. Any system contaminated with dirt and other materials reduces efficiency and wears the system prematurely. New systems need to be free of flux, solder residue, grease and any foreign particles. Most boiler manufacturers recommend cleaning new systems with a solution of Tri-Sodium Phosphate (TSP), or **Hercules boiler and heating system cleaner** (Follow instructions on container). Existing systems need to be flushed and cleaned to eliminate any build-up of rust, scale, lime and other non-organic matter. These systems should be cleaned with an inhibited hydrochloric acid such as **Hercules sizzle** (except aluminum systems, check with **boiler manufacturer**). All systems should be checked for leaks prior to installation of any **cryo-tek** product.

2 † For special applications which may not be covered on this or other Hercules literature, please contact Hercules Technical Services Department by phone at 1-800-221-9330 or send a fax to 1-800-333-3456.

2. MEASURE THE TOTAL CAPACITY OF THE SYSTEM using one of the following methods:**DIRECT METHOD**

- A. Fill system completely, making sure all components of system are full.
- B. Shut system down, let pressure drop to a safe level.
- C. Drain out fluid into suitable container and record the number of gallons removed. This is TOTAL SYSTEM FLUID CAPACITY.

ESTIMATION METHOD

- A. Determine system pipe sizes and amount of linear footage for each size. Using Table I, calculate the volume of the system piping.
- B. Add this number to the gallon capacity of the boiler or equipment in the system to determine the TOTAL SYSTEM FLUID CAPACITY.

TABLE I (Note: 1 US Gallon = 3.785 Liters)

Description	Pipe Diameter Nominal Size	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
Standard	US Gallons of	1.0	1.6	-	2.8	4.5	7.8	10.6	17.5	24.9	38.5
Steel Pipe	Fluid per 100 ft. pipe										
Type "L"	US Gallons of	0.76	1.22	1.81	2.52	4.30	6.55	9.27	16.12	24.86	35.48
Copper Tubing	Fluid per 100 ft. pipe										

3. SELECT DESIRED TEMPERATURE COVERAGE

Using Table II determine protection level desired and match it to the appropriate **cryo-tek** product concentration.

TABLE II

Cryo-tek Original

% Concentration of cryo-tek Original	MIXING RATIO		PROTECTIONS		
	Parts of cryo-tek Original	Parts of Water	Freeze Protection Down to	Pumpable [☆] Down to	Burst Protection Down to
100%	Undiluted	-	-22°F / -30°C	-27°F / -33°C	-80°F / -62°C
90%	9	1	-17°F / -27°C	-22°F / -30°C	-60°F / -51°C
80%	4	1	-5°F / -21°C	-10°F / -23°C	-50°F / -46°C
67%	2	1	+2°F / -17°C	-2°F / -19°C	-20°F / -29°C

Cryo-tek -100

% Concentration of cryo-tek -100	MIXING RATIO		PROTECTIONS		
	Parts of cryo-tek -100	Parts of Water	Freeze Protection Down to	Pumpable [☆] Down to	Burst Protection Down to
100%	undiluted	-	-70°F / -57°C	-80°F / -62°C	-100°F / -73°C
75%	3	1	-21°F / -30°C	-33°F / -36°C	-60°F / -51°C
60%	3	2	0°F / -18°C	-10°F / -23°C	-40°F / -40°C
50%	1	1	+10°F / -12°C	+5°F / -15°C	-20°F / -29°C

Cryo-tek AG

% Concentration of cryo-tek AG	MIXING RATIO		PROTECTIONS		
	Parts of cryo-tek AG	Parts of Water	Freeze Protection Down to	Pumpable [☆] Down to	Burst Protection Down to
70%	7	3	-70°F / -57°C	-80°F / -62°C	-100°F / -73°C
50%	1	1	-29°F / -34°C	-47°F / -44°C	-80°F / -62°C
40%	4	6	-8°F / -22°C	-30°F / -34°C	-60°F / -51°C
35%	3.5	6.5	+2°F / -17°C	-20°F / -29°C	-50°F / -46°C
30%	3	7	+11°F / -11°C	-15°F / -26°C	-20°F / -29°C

[☆]Pumpable down to protection levels are estimated and are dependent on system and equipment. Attempting to circulate fluid below freeze point may overload and/or cause pump failure.

4. DETERMINE AMOUNT OF CRYO-TEK PRODUCT REQUIRED IN SYSTEM

Determine the amount of **cryo-tek** product needed in system by multiplying total system capacity in gallons by the concentration factor of **cryo-tek** product (first column in each chart above).

$$\text{Total System Capacity (gal)} \times \text{Concentration Factor of cryo-tek Product (\%)} = \text{Amount of cryo-tek Product to be used (gal)}$$

5. CHARGING THE SYSTEM

System should be completely empty with burner and pump shut off. All internal valves, including zone valves, should be open. THE ENTIRE SYSTEM SHOULD BE OPEN TO PREVENT ANY AREA OF IT FROM BEING ISOLATED. First, add the computed amount of **cryo-tek** product, second add water if necessary. The system can be filled using one of the following two alternatives. The main objective is to fill the system with little or no air trapped in it.

- A. After providing for an air exit, pump solution into boiler through the boiler drain valve using a small pump.
- B. Pour solution through a removed air vent at the HIGHEST point in the system.

6. PURGE THE AIR IN SYSTEM

Since air (which includes oxygen) trapped in a system not only results in inefficiencies in the operation of the system (wasted energy and excessive noise), it can also cause corrosion. To prevent this, the system, once filled, needs to be purged of all air.

Cont.

7. TEST THE SYSTEM

Once installed and fully operational, use **Hercules Refractometer** with **Refractometer Reading Adjustment Chart** and **pH Meter** or **Cryo-tek Test Strips** to test fluid to assure proper freeze and corrosion protection. **Note:** An automotive coolant tester will not work with cryo-tek or other propylene glycol anti-freeze mixtures.

8. MAINTENANCE

Systems with **cryo-tek** products installed should be tested annually for product concentration and inhibitor levels using **Hercules Refractometer** with **Refractometer Reading Adjustment Chart** and **pH Meter** or **cryo-tek Test Strips**. If **cryo-tek** product concentration levels are low, add **cryo-tek** product using the following formula:

$$\text{TOTAL SYSTEM CAPACITY (gal)} \times \frac{(\% \text{ cryo-tek} - \% \text{ cryo-tek in system})}{(\% \text{ cryo-tek used} - \% \text{ cryo-tek in system})} = \text{Number of gallons of cryo-tek product to be added.}$$

If the corrosion inhibitor tests low, add one 8 oz. container of **cryo-tek Inhibitor** for every 20 gallons of fluid capacity of the system. If the total system capacity is less than 20 gallons, add one 8 oz. container of **cryo-tek Inhibitor**. If after inhibitor addition and thorough system mixing the corrosion inhibitor still tests low, add another 8 oz. container of **cryo-tek Inhibitor** for every 20 gallons of system capacity. If after this addition the inhibitor still tests low, the system should be drained, cleaned, and recharged with fresh **cryo-tek**.

ADDITIONAL APPLICATIONS

FOR TOILETS: Drain tank and bowl then add 1 quart or more of undiluted **cryo-tek Original** to each toilet bowl to prevent freeze-up.

FOR BOATS AND TRAILERS: For boats and trailers with pressurized hot water systems, see TABLE III. For these systems, disconnect water tank and join inlet and outlet to form a bypass. Drain water tank thoroughly and add **cryo-tek Original** (diluted to desired freeze protection, see Table III) to displace possible water pockets.

TABLE III (Boats and Trailers)

Size of Boat/Trailer	Add Cryo-tek Original to capacity of water tank
Under 18 ft.	2-3 gal.
18 ft. - 23 ft.	3-4 gal.
23 ft. and over	4-5 gal.

MATERIAL SAFETY INFORMATION

FOR MORE INFORMATION ON THIS PRODUCT,
REQUEST MATERIAL SAFETY DATA SHEET (MSDS) #41 **cryo-tek Original**,

(MSDS) #40 **cryo-tek -100**,

(MSDS) #42 **cryo-tek AG**.

For Delivery by Fax	Call 1-800-942-4636
Internet	See MSDS section of www.herchem.com
Mail	Contact Hercules at address below or any Hercules representative

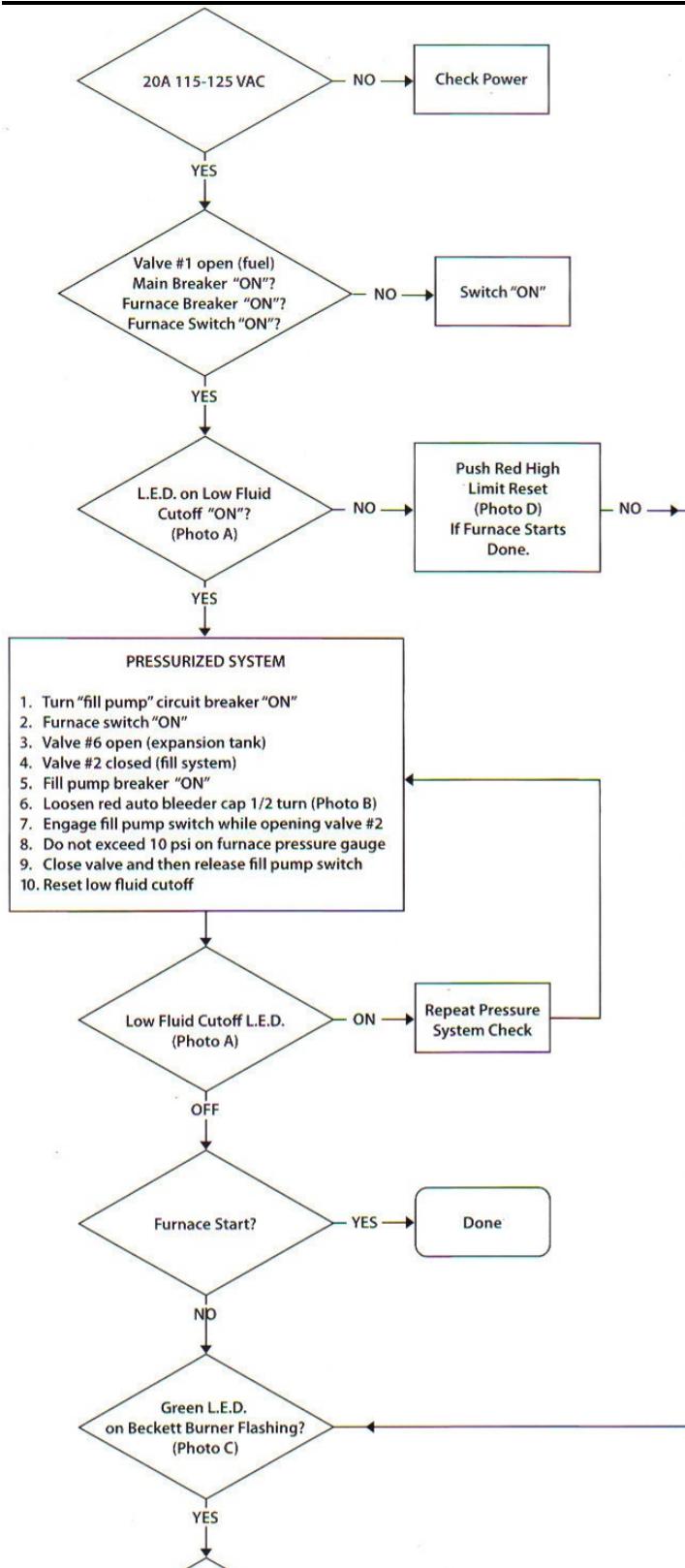
HMIS Hazard Warning 0-0-0-A.

INGREDIENTS	CAS#
PROPYLENE GLYCOL NJ.T.S.R. #31348300 5018P, 5002P	57-55-6

*For special applications which may not be covered on this or other Hercules literature, please contact Hercules Technical Services Department by phone 1-800-221-9330, or fax 1-800-333-3456, or visit our technical database web-site at www.herchem.com.

Section 1 - Product and Company Identification	
MATERIAL SAFETY DATA SHEET # 40 Hercules Cryotek TM -100 & -100/A/I  MATERIAL SAFETY INFORMATION SERVICE HERCULES Hercules Chemical Company Inc. 111 South Street Paramus NJ 07655 Phone (609) 221-9330 Fax (609) 333-3456	
Date Prepared: 6/29/1990	Last Reviewed: 4/2/2003
MSDS © 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003 Hercules Chemical Company Inc.	
Section 2 - Hazardous Ingredients/Identity Information	
Hazardous Components [Specific Chemical Identity, Common Name(s), CAS Number(s)] OSHA PEL: ACGIH TLV Upper Bound Limit if SARA Response This product is not classified as hazardous in accordance with OSHA 1910.1200	
Other Limits	
Ventilation: Local Exhaust Adequate Mechanical N/A	
HMIS Hazard Rating: Health: 0 Flammability: 0 Reactivity: 0 Personal Protection: A	
Section 3 - Physical/Chemical Characteristics	
Boiling Point (°F): 230°	Specific Gravity [H ₂ O = 1]: 1.04
Melting Point (° F): N/A	Evaporation Rate: (Butyl Acetate = 1) Soluble
Appearance And Color: Pink liquid	Vapor Density [Air = 1]: 2.62
Odor: Odorless	
Section 4 - Fire And Explosion Hazard Data	
Flash Point: N/A	Flammable Limits None
Extinguishing Media: Water fog, alcohol foam, dry chemical	LEL: UEL: None
Special Firefighting Procedures: None	
Unusual Fire And Explosion Hazards: None	
Section 5 - Reactivity Data	
Stability: Stable	Conditions To Avoid: None
Incompatibility (Materials To Avoid):	Oxidizing materials.
Hazardous Decomposition:	None
Hazardous Polymerization:	Will Not Occur
Section 6 - Health Hazard Data	
Routes of Entry	Inhalation N/A
Health Hazards:	Skin N/A
Very low single dose oral toxicity; eye and skin essentially no effect.	Ingestion N/A
Carcinogenicity NTP NO IARC NO	OSHA Regulated NO
Signs And Symptoms of Exposure: None	
Medical Conditions Generally Aggravated By Exposure: None	
Emergency And First Aid Procedures: EYE AND SKIN CONTACT: Like with all foreign material, flushing and washing with water is good safety and hygienic practice. INGESTION: Low in toxicity; induce vomiting if large amounts are ingested.	
Continued on Next Page	

Troubleshooting



Furnace Troubleshooting

H150 & H250



Photo A

Low Fluid Cutoff with L.E.D.s



Photo B

Auto Bleeder



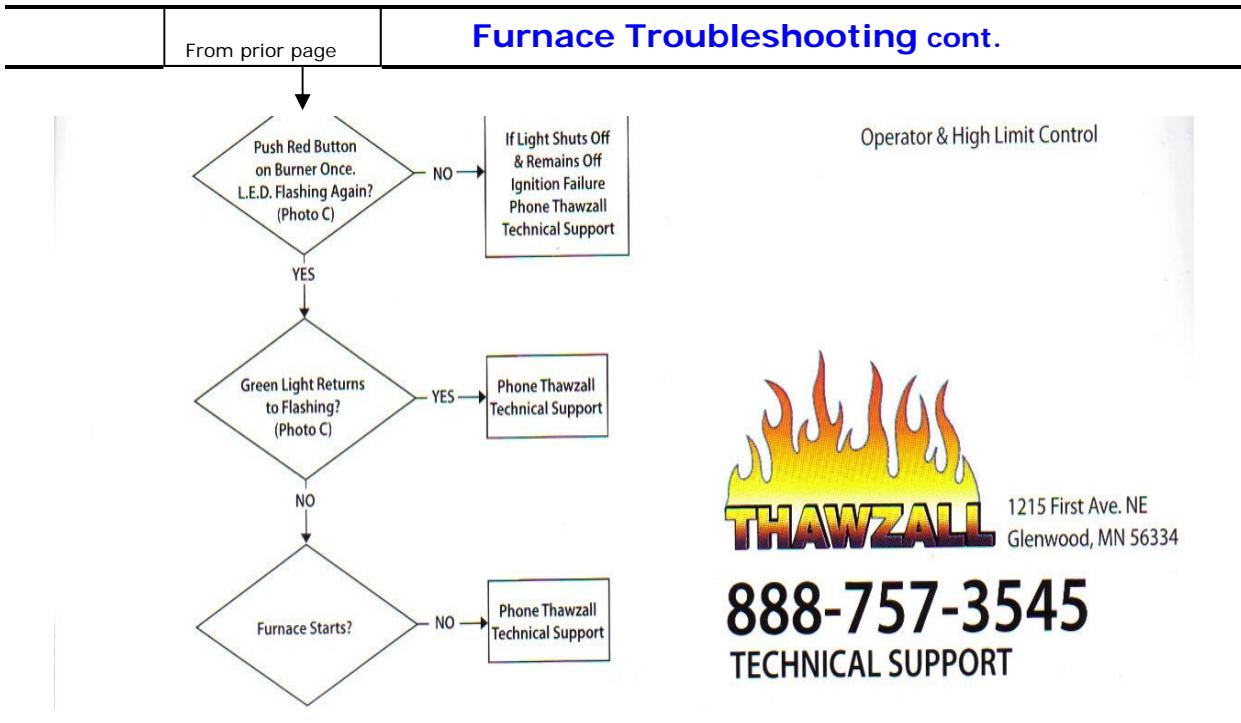
Photo C

Beckett Primary Controller



Photo D

Troubleshooting



1215 First Ave. NE
Glenwood, MN 56334

888-757-3545
TECHNICAL SUPPORT

SYSTEM IS RUNNING BUT POOR OR LOW CIRCULATION

Pressure in System

Check pressure at the furnace.

Cold start positive pressure should be 5-10 PSI.

Any positive pressure requires no fill-just fire furnace.

Machine is operating at 10-20 PSI.

If pressure needs to be added see Start Up procedure.

Valve in Open Position

Check ball valves located by supply pumps.

Check ball valves on supply and return lines.

If all hoses are NOT being used the ball valve which feeds a non-used hose should be shut OFF at the manifold.

Air In System

Open the automatic bleeder valve attached to the top of the furnace. Open the valve by turning the valve stem cover 3 or 4 turns counterclockwise. After all air is out of the system, close the bleeder. Check pressure again and add fluid as needed.

Hoses

Make sure there are no kinks in the hoses.

Make sure the hoses are placed on clean, dry soil.

Check to see if the sight flow indicator is turning.

Do NOT use more than 600 feet of hose per zone.

Be sure that the hoses are not submerged in water.

MANUFACTURER'S PRODUCT WARRANTY



LIMITED WARRANTY

GENERAL:

THAWZALL, LLC hereby extends to the original purchaser of its THAWZALL ("Ground Defrosting, Thawing, Temporary Heat or Concrete Curing Products") a warranty against defects in materials and workmanship for the two year time period indicated below.

The warranty is only valid on "Ground Defrosting, Thawing, Temporary Heat or Concrete Curing Products" purchased and used in accordance with placards and instructions (e.g. Operators Manuals) provided by Thawzall, LLC. This warranty applies only to the original purchaser and is subject to the terms and conditions set forth below.

THAWZALL, LLC will repair or replace (at its sole option) a ground defrosting, thawing, temporary heat or concrete curing product (or component thereof) if it fails to conform to this warranty. In the event a ground defrosting, thawing, temporary heat or concrete curing product is to be repaired pursuant to this warranty, such repair work will be performed by THAWZALL, LLC or at its direction.

WARRANTY PERIOD:

The warranty relating to workmanship, materials and labor on THAWZALL ground defrosting, temporary heat or concrete curing products extends for two (2) years from the date of original invoice.

WARRANTY POLICY:

Within 5 working days after receiving a properly completed warranty claim Thawzall, LLC will make a determination as to the validity of the claim and, if the claim is deemed to have merit, will:

- 1) Issue credit for 50% of the amount entitled based upon current pricing and warranty labor reimbursement rates, and
- 2) Issue an RA for the parts in question, If the RA parts are received with 30 days of the RA date, Thawzall, LLC will issue credit for the balance of the amount entitled.
- 3) RA Parts not returned within 30 days will no longer be eligible for any credit.

WARRANTY PROCEDURE:

RA – (Return Authorization): To ensure processing of warranty claim, a Return Merchandise Authorization ("RA") must be obtained and prominently shown on correspondence and packages. To obtain an RA, call (888)757-3545 (U.S. Central Time) or E-mail warranty@thawzall.com. Parts must be returned within 30 days of an RA being issued.

Freight Charges and Handling Fees: The purchaser is responsible for shipping charges on any items returned with a valid RA number.

Proof of Purchase: Proof of purchase (invoice number and date of invoice) identifying the model number and serial number of ground defrosting, thawing, temporary heat or concrete curing products must accompany warranty claim.

WARRANTY LIMITATIONS:

Thawzall Ground Defrosting, Thawing, Temporary Heat or Concrete Curing products must be installed (where applicable), operated and maintained in accordance with all instructions provided by Thawzall, LLC. Failure to follow our installation (where applicable), operating or maintenance procedures and/or use of unauthorized parts may void this warranty.

Purchasers and Users are responsible for the suitability of the products for their application.

This warranty does not apply to:

- 1) Repairs or replacements necessitated by any cause beyond the control of THAWZALL, LLC including, but not limited to, any malfunction, defect or failure caused by or resulting from unauthorized service or parts; installation (where applicable), operating or maintenance contrary to furnished instructions; local water conditions, handling, shipping or transit accidents; modifications or repair by the user; abuse; misuse; neglect; accident; incorrect power line voltage; power line surge; lightning damage; or fire, flood, or other Acts of God.
- 2) Repair or replacement in the ordinary course of expendable ground defrosting, thawing, temporary heat or concrete curing product part.
- 3) Elements and controls whose damage or failure is attributable to corrosion, scale, or dirt accumulations or to low water conditions.

Thawzall, LLC is not liable for labor and other costs incurred in removal, reinstallation, or unauthorized repair of the Ground Defrosting, Thawing, Temporary Heat or Concrete Curing product or for damages of any type whatsoever including incidental or consequential damages.

There are no warranties which extend beyond the description contained herein and specifically liability for any breach of any implied warranty of merchantability or fitness for a purpose is excluded. The duration of any warranties which may be implied by law notwithstanding the previous sentence (including the warranties of merchantability and fitness) is limited to the term of this warranty. In no event shall Thawzall, LLC be liable for special, incidental or consequential damages arising from ownership or use of any Ground Defrosting, Thawing, Temporary Heat, or Concrete Curing product, or for any delay in the performance of its obligations under this warranty due to causes beyond its control. Some states do not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of consequential damages, so the above limitations and exclusion may not apply to you. This warranty gives you specific legal rights. You may have other rights, which vary from state to state.

This warranty set forth herein is in lieu of all other expressed or implied warranties. THAWZALL, LLC does not assume or authorize any party to assume for it any other obligation or liability.

THAWZALL, LLC
1215 First Avenue NE
PO Box 100
Glenwood, MN 56334 USA
888-757-3545
320-634-4455
Fax: 320-634-4563
Email: warranty@thawzall.com
Website: www.thawzall.com

How to File a Warranty Claim

The warranty on your Thawzall covers parts and labor for two years from the date of purchase.

In the event of a failure which is covered in the Warranty Statement on the preceding two pages,

- please duplicate the claim form on the following page,
 - fill it out completely,
 - and send it to us at Thawzall (ground mail or e-mail).
 - We at Thawzall will determine the validity of the claim and issue a 50% credit to you for all valid claims within 5 days.
 - We will, at your request, send you a Return Authorization (RA) for the failed parts.
 - Please call (888) 757-3545 or e-mail us at "warranty@thawzall.com" to request an RA.
 - Please use this authorization to return the failed parts within 30 days.
 - When the failed parts are returned to us, we will issue the remaining 50% of the credit.
-

Please call (888) 757-3545 for assistance with a warranty claim or for technical assistance of any kind.

Warranty Claim Form

THAWZALL warranties equipment for two years from the original invoice date.

RA (Return Authorization) Number is required for parts return. RA must be clearly marked on the outside of the return package. Parts must be returned within 30 days after RA is issued.



THAWZALL
1215 First Avenue NE
Glenwood, MN 56334
Phone: 320-634-4455
Fax: 320-634-4563
www.thawzall.com

Today's Date:

Your Name:

Company:

Job title:

E-mail:

Phone:

Fax:

Cell Phone:

Describe the problem in detail:

Unit Information

Model Number:

Original Date of Purchase:

Enter the last 3 digits of the VIN (located on trailer tongue).

Vin Number:

How was the problem resolved?

Labor Information

Labor Hours:

Hourly Labor Rate:

If parts were ordered from Thawzall record Sales Order # or Invoice # here.

Labor Performed By Your Company

Labor Performed By An Outside Vendor
(must provide documentation - send via fax)

Internal Use Only

Handled By	Date	Validity	Expiration Date

Revised 07-21-08

Service Bulletin Section

Bulletin 500	Hydronic Hose Leak Check
Bulletin 501	High Altitude Operation
Bulletin 502	Heat Transfer Fluid Check
Bulletin 503	Preventive Maintenance
Bulletin 504	Fuel Bleed Kit Installation

Thawzall™

Manufactured by **Thawzall, LLC**

1215 First Ave. NE

P. O. Box 100

Glenwood, MN 56334

Phone 320-634-4455 Fax: 320-634-4563 Tech Support 888-757-3545

Website: www.thawzall.com

E-Mail: thawzall@thawzall.com



1215 1ST Ave. NE

Glenwood, MN 56334

(888)757-3545

FIELD SERVICE REPAIR KIT

<u>Boiler Components</u>	<u>Old Part #</u>	<u>Description</u>	<u>MSRP</u>	<u>QTY</u>
1-20-0011	401925	1-1/2" Dielectric Gasket 2ALWD06-902	2.45	4
1-27-0210	401550	30 PSI Relief Valve	27.28	1
1-27-0245	401575	Delavan 1.00 80B Oil Nozzle - For Model 2M	9.22	1
1-27-0280	401575	Delavan 1.75 80A Oil Nozzle	9.22	1
1-27-0290	401566	R7458P1072 H/W Oil Primary 5A+	147.18	1
1-27-0295	401565	R8184G4009 H/W Protectorelay - Old	106.19	1
<u>Burner Controls</u>	<u>Old Part#</u>	<u>Description</u>	<u>MSRP</u>	<u>QTY</u>
1-27-0030	401597	2275-628G Transformer Beckett	107.62	1
1-27-0060	401596	675170 Beckett Burner Gasket	5.39	2
1-27-0070	401505	Cad Cell - Beckett	37.98	1
1-27-0305	401560	Aqua stat Controller Operator 100-240 Deg. L4006A 1678 (Open)	102.90	1
1-27-0325	401220	910373061 Press/Temp Gauge	56.98	1
27-080	401261	Low Water Cut Off Model 550 SV	241.08	1
40-215	401562	Aqua stat Controller 130-270 Deg. L4006E 1067 High Limit	149.94	1
<u>Consumables</u>	<u>Old Part#</u>	<u>Description</u>	<u>MSRP</u>	<u>QTY</u>
26-090	401200	Cryo-Tek 100 - 5 Gallons	94.65	2
<u>Fluid System</u>	<u>Old Part#</u>	<u>Description</u>	<u>MSRP</u>	<u>QTY</u>
25-900-070	401540	700 1/8M Brass Air Vent	10.23	1
28-120	401250	PC 4 Utility Pump 1/2 HP EC#20051 (Wayne)	190.37	1
<u>Fuel System</u>	<u>Old Part#</u>	<u>Description</u>	<u>MSRP</u>	<u>QTY</u>
1-27-0155	401210	1A-30 Replacement Cartridge	5.63	2
1-84-0010	401938	Pre-Vent I & II Replacement Cap	17.80	1
27-100	401215	1A-25A Fuel Oil Filter (Complete)	22.54	1
<u>Hose Reel</u>	<u>Old Part#</u>	<u>Description</u>	<u>MSRP</u>	<u>QTY</u>
1-25-0110	401103	1/2" Coupler Set	102.85	4
1-25-0120	401123	1" Faster Coupler Set	185.73	2
1-26-0200	401151	Hose Mender Kit	20.42	4
500-140	401295	Welding Assembly, 3 Piece Clutch Kit	114.27	1
<u>Indicators</u>	<u>Old Part#</u>	<u>Description</u>	<u>MSRP</u>	<u>QTY</u>
1-20-0100	401265	Sight Flow Indicator Repair Kit (Old)	57.04	1
1-20-0101	NA	Sight Flow Indicator Repair Kit w/wrench (New 2008)	90.85	1
1-20-030	401240	3" Bi-Metal Thermometer with Thawzall Logo	41.52	2
<u>Pump Parts</u>	<u>Old Part#</u>	<u>Description</u>	<u>MSRP</u>	<u>QTY</u>
1-28-0010	401420	B & G Volute	369.11	1
1-28-0014	401430	P57410 Body Gasket (B&G Volute Gasket)	2.50	1
1-28-0030	401475	118681 #7 B & G Seal Kit	55.27	1
<u>Tools/Accessories</u>	<u>Old Part#</u>	<u>Description</u>	<u>MSRP</u>	<u>QTY</u>
1-26-0005	401209	Refractometer	273.42	1
1-80-0000	NA	Foot Looker Tote	33.32	1
1-81-0010	401601	Replacement Keys 502 (Set of 2)	4.95	1

TOTAL MSRP FOR KIT: 3405.98

Prices effective 10/2008 and subject to change without notice.