MARITIME GEOTHERMAL LTD.

Installation and Service Manual

IFM-Series
In-Floor Warming Module
Model Size 48

In-Floor Warming Module

external desuperheater for 3rd party air source heat pumps

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SAFETY PRECAUTIONS

WARNING: **Ensure all access panels are in place and properly secured before applying power to the unit. Failure to do so may cause risk of electrical shock.**

WARNING: **Before performing service or maintenance on a heat pump system, ensure all power sources are DISCONNECTED. Electrical shock can cause serious personal injury or death.**

WARNING: **Heat pump systems contain refrigerant under high pressure and as such can be hazardous to work on. Only qualified service personnel should install, repair, or service a heat pump.**

CAUTION: **Safety glasses and work gloves should be worn at all times whenever a heat pump is serviced. A fire extinguisher and proper ventilation should be present whenever brazing is performed.**

CAUTION: **Venting refrigerant to atmosphere is illegal. A proper refrigerant recovery system must be employed whenever repairs require removal of refrigerant from the heat pump.**

MODEL NOMENCLATURE

IFM - 48 - W - P - 01 - D - xx

Series:
IFM = In Floor warming Module

Nominal Size:
48

Function:
W = Desuperheater

Refrigerant:
P = R410a

Revision:
01, 02 etc.

Heat Exchanger:
D = double wall

Voltage Code:
01 = dual voltage
115/1/60 or 230/1/60

APPLICATION TABLE						
	REVISIONS					
IFM-48-W-P-01-D	01					
This manual applies only to the models and revisions listed in this table.						

Table of Contents

Installation Information

UNIT DESCRIPTION

The IFM-48 is a module that can be added to an air source heat pump, in order to add hydronic desuperheating capability.

Suitable systems for use with an IFM unit are 3rd party air source heat pumps, consisting of an outdoor unit housing the compressor and an indoor unit housing the indoor distribution (fan or indoor hydronics). In these type of systems, the heating mode discharge gas unit enters the house from the outdoor unit, where it will pass through the IFM on its way to the indoor condenser unit. In cooling mode, suction gas from the indoor evaporator will pass through the same line, but the IFM heat exchanger will be bypassed through the IFM's internal check valve. Therefore, the IFM has no heat output in cooling mode.

The IFM is not suitable for use with NORDIC air source heat pumps, which have the compressor in the indoor unit. However, the NORDIC air source system allows for built-in desuperheaters as standard equipment, so the IFM is not necessary.

The IFM consists of a double wall heat exchanger (sized for minimum discharge line pressure drop), an energy saving ECM-style circulation pump with bronze head, taps and valves necessary for air bleeding, and a 75 psi pressure relief valve. It is suitable for heating water for hydronic heating systems, or preheating domestic hot water.

Like any desuperheater, the IFM only operates when the main heat pump is running (in heating mode) in order to satisfy its demand. That is, for example, the IFM will not heat water on demand in order to satisfy an aquastat. It does come equipped with a thermal cut-out which will turn the circulation pump off if the water temperature exceeds 140°F (60°C).

UNPACKING THE UNIT

When the unit reaches its destination it should be unpacked to determine if any damage has occurred during shipment. Any visible damage should be noted on the carrier's freight bill and a suitable claim filed at once.

OPTIMUM PLACEMENT

The IFM must be located between the point where refrigerant piping from the outdoor compressor unit comes into the house, and the indoor unit of the air source heat pump. The IFM may be mounted on a wall to keep it out of the way.

The removable cover should remain clear of obstruction for a distance of **two feet** to facilitate servicing and air bleeding.

ELECTRICAL CONNECTIONS

The air handler has a 0.875" knockout for power supply connection to the electrical box, as well as a 0.375" I.D. grommet for thermostat wire connection.

A schematic diagram (SCH) can be found inside the electrical box cover of the unit as well as in the Model Specific Information section of this manual. The Electrical Tables in the Model Specific Information section and the SCH diagram contain information about the size of wire for the connections, as well as the recommended breaker size.

NOTE: A properly qualified electrician should be retained to make the connections to the unit. The connections to the unit MUST CONFORM TO LOCAL CODES. Electrical code requirements shall supersede the recommendations of this manual.

Connect 115VAC, 208VAC, or 230VAC single phase power to the **POWER** terminal strip in the left side of the electrical box. The only high voltage component is the ECM circ. pump, which can be powered from any voltage from 115 to 230 VAC (similar to a laptop computer).

CONTROL CONNECTIONS

The IFM does not have its own transformer; instead, its two relays run from 24VAC signals from the main heat pump.

TABLE 1 - Control Signal Description

Signal	Description
O	cooling mode signal (energized in cooling)
Y or Y1	compressor run signal
C	24VAC common (ground)

These relays will draw maximum 3.6VA from that unit's transformer.

An 18-3 wire should be used to connect the terminal strip positions in the IFM electrical box listed in Table 1 to the corresponding terminals in the air source heat pump.

REFRIGERANT CONNECTIONS

The 7/8" refrigerant lines on the IFM must be connected in the larger refrigerant line between the outdoor compressor unit and the indoor fan unit. That is, this line should be cut and the IFM placed in series with the two units. The proper line for connection is the line that carries hot discharge gas in heating mode, and cool suction gas in cooling mode.

Do not connect the IFM in the smaller refrigerant line, which carries liquid refrigerant in both heating and cooling modes. **Refrigerant lines should only be installed and serviced by a qualified technician, following all standard procedures and safety precautions.**

PLUMBING CONNECTIONS

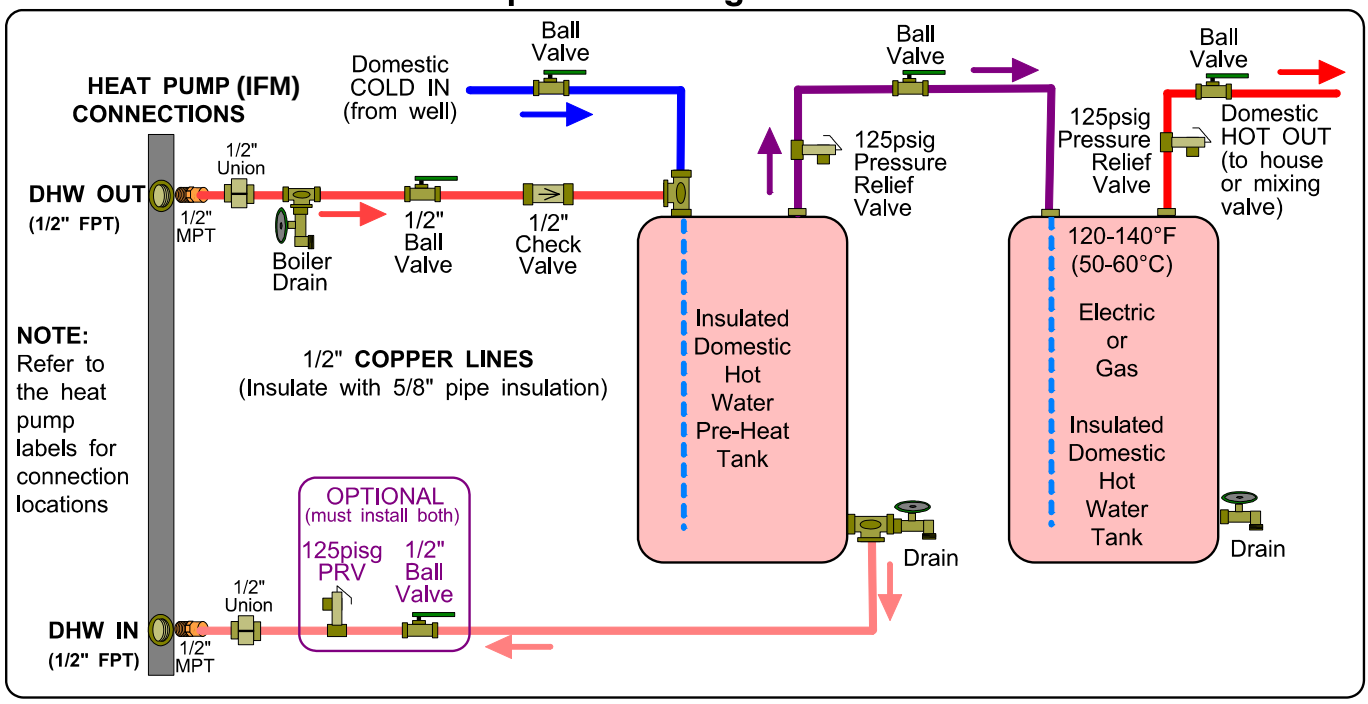
The unit is equipped with 1/2" brass FPT fittings for water line connections. Connect the **IN** port to the cooler water to be heated, such as the return from an in-floor heating system or the bottom port of a domestic hot water pre-heat tank. Connect the **OUT** port to the in-floor supply or the top port of a domestic hot water pre-heat tank. Connect to the unit using standard plumbing techniques.

When planning the hydronic system to be heated, care should be taken to consider the pump curve of the built-in circulation pump, which can be found later in this manual. The pressure drop of the system should be limited in order to provide at least 1 gpm of flow. At lower flow rates, some hydronic heating will still occur, but the heat output will be lower.

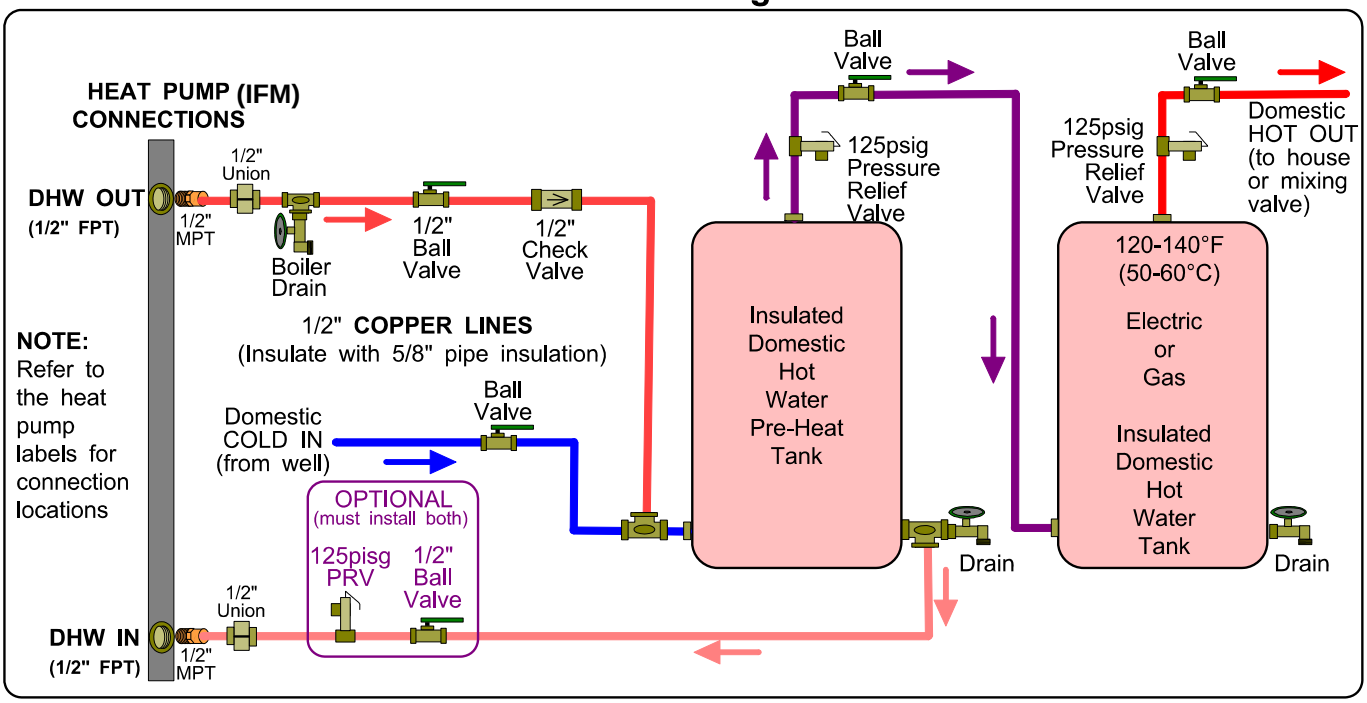
As a guideline, the pump will deliver a no-flow head of ~4.3 psi (9.8 ft), and at 1.0 gpm the pump head will be ~4.0 psi (9.2 ft).

Single Unit Connection to Domestic Hot Water Pre-Heat Tank (Brass FPT)

Top Port Configuration



Side Port Configuration



REV	ECO #	IMPL BY	APVD BY	DATE
01	Initial Release	C. GEDDES	C. GEDDES	10 MAR 09

Drawn By: Chris Geddes	Date: 10 MAR 09	
Checked By: Chris Geddes	Date: 10 MAR 09	
Approved By (ENG): Chris Geddes	Date: 10 MAR 09	
Approved By (MFG):	Date:	
Approved By:	Date:	

MARITIME GEOTHERMAL LTD.
170 Plantation Rd.
Petitcodiac, NB
E4Z 6H4

Drawing Name: Single Unit Connection to DHW Pre-Heat Tank (Brass FPT)

Size	Drawing Number	REV	SHEET
A	000970PDG	01	1 of 1

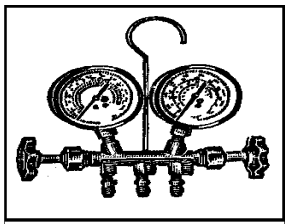
Troubleshooting Guide

POWER SUPPLY TROUBLESHOOTING			
Fault	**Possible Cause**	**Verification**	**Recommended Action**
No power to the unit	Disconnect switch open (if installed)	Verify disconnect switch is in the ON position.	Determine why the disconnect switch was opened, if all is OK close the switch.
	Fuse blown / Breaker Tripped.	At heat pump disconnect box, voltmeter shows 115-230VAC on the line side but not on the load side.	Reset breaker or replace fuse with proper size and type. (Time-delay type "D")

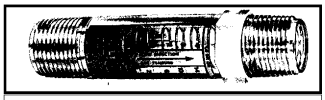
CONTROL SIGNAL TROUBLESHOOTING			
Fault	**Possible Cause**	**Verification**	**Recommended Action**
No Y or O signal to IFM.	Incorrect thermostat set-up.	Thermostat does not indicate a call for heat. No 24VAC signal present across C and Y of the thermostat	Correct the setup.
	Faulty wiring between heat pump and IFM.	24VAC signal present across Y and C of the heat pump but not present across Y and C of the IFM terminal strip.	Correct or replace wiring.
Relays in IFM do not engage reliably.	Heat pump transformer overloaded.	Voltage between R and C of air source heat pump is at least 24VAC with no heating or cooling call, but drops below 24VAC when heating or cooling is engaged. Problem disappears when IFM is disconnected.	Up-size transformer. Additional demand from IFM on heat pump transformer is 3.6 VA.

HYDRONIC HEATING TROUBLESHOOTING			
Fault	**Possible Cause**	**Verification**	**Recommended Action**
Insufficient hot water	Circulator pump not operating.	Visually inspect the pump to see if shaft is turning. Use an amprobe to measure current draw.	Replace circ pump if faulty.
	Blockage or restriction in the water line or hot water heat exchanger.	Check water flow and power to pump. Check water lines for obstruction	Remove obstruction in water lines. Acid treat the domestic hot water coil.
	Faulty high temp. cutout (failed open).	Check contact operation. Should close at 120°F and open at 140°F.	Replace cutout if faulty.
	Low flow due to high pressure drop in hydronic circuit.	Measure pressure drop across IFM water connections, and ensure it doesn't closely approach the no-flow head of ~ 4.3 psi (9.8 ft).	Modify hydronic circuit to decrease pressure drop, for example with parallel in-floor circuits.
Water is too hot.	Faulty high temp. cutout (failed closed).	Check contact operation. Should close at 120°F and open at 140°F.	Replace cutout if faulty.

DOMESTIC HOT WATER (DHW) TROUBLESHOOTING			
Fault	**Possible Cause**	**Verification**	**Recommended Action**
Insufficient hot water (Tank Problem)	Thermostat on hot water tank set too low. Should be set at 120°F. (140°F if required by local code)	Visually inspect the setting.	Readjust the setting to 120°F. (140°F if required by local code)
	Breaker tripped, or fuse blown in electrical supply to hot water tank.	Check both line and load sides of fuses. If switch is open determine why.	Replace blown fuse or reset breaker.
	Reset button tripped on hot water tank.	Check voltage at elements with multimeter.	Push reset button.
Insufficient hot water (Heat Pump Problem)	Circulator pump not operating.	Visually inspect the pump to see if shaft is turning. Use an amprobe to measure current draw.	Replace if faulty.
	Blockage or restriction in the water line or hot water heat exchanger.	Check water flow and power to pump. Check water lines for obstruction	Remove obstruction in water lines. Acid treat the domestic hot water coil.
	Faulty DHW cutout (failed open).	Check contact operation. Should close at 120°F and open at 140°F.	Replace DHW cutout if faulty.
	Heat pump not running enough hours to make sufficient hot water.	Note the amount of time the heat pump runs in any given hour.	Temporarily turn up the tank thermostats until colder weather creates longer run cycles.
Water is too hot.	Faulty DHW cutout (failed closed).	Check contact operation. Should close at 120°F and open at 140°F.	Replace DHW cutout if faulty.
	Thermostat on hot water tank set too high. Should be set at 120°F. (140°F if required by local code)	Visually inspect the setting.	Readjust the setting to 120°F. (140°F if required by local code)

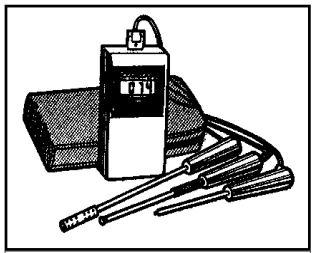


Refrigeration Gauges

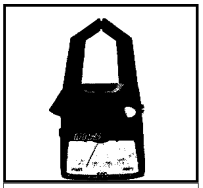


In-line Flowmeter

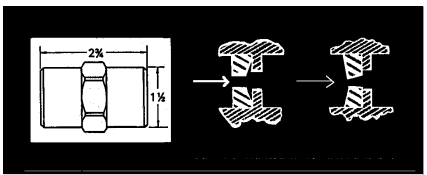
Trouble Shooting Tools



Digital Thermometer



Multimeter - Voltmeter / Amprobe



Dole flow control Valve

The Dole® flow control is a simple, self-cleaning device designed to deliver a constant volume of water from any outlet whether the pressure is 15 psig or as high as 125 psi. The controlling mechanism consists of a flexible orifice that varies its area inversely with pressure so that a constant flow is maintained.

Model Specific Information

This section provides general information particular to each model. For complete specifications please see the specifications document for the desired model.

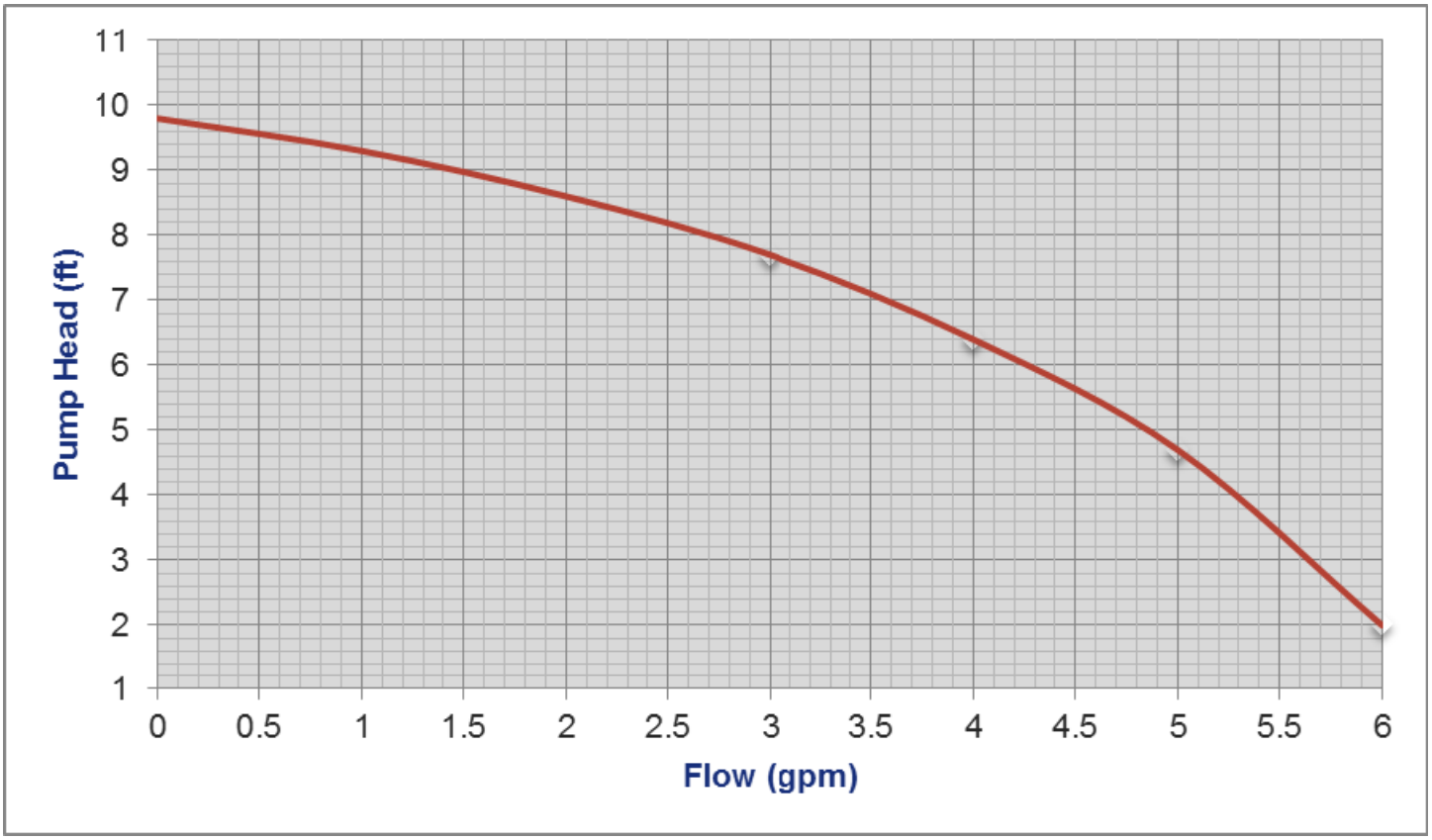
SHIPPING INFORMATION

MODEL	WEIGHT	DIMENSIONS in (cm)		
	lb (kg)	L	W	H
48	75 (34)	48 (121)	12 (30)	24 (61)

ELECTRICAL TABLE (115/230-1-60)

Model	Zone Circulator	FLA	MCA	Max Fuse/ Breaker	Wire Size
		Amps	Amps	Amps	ga
48	**1.0**	**1.0**	**1.0**	**15**	**#14-2**

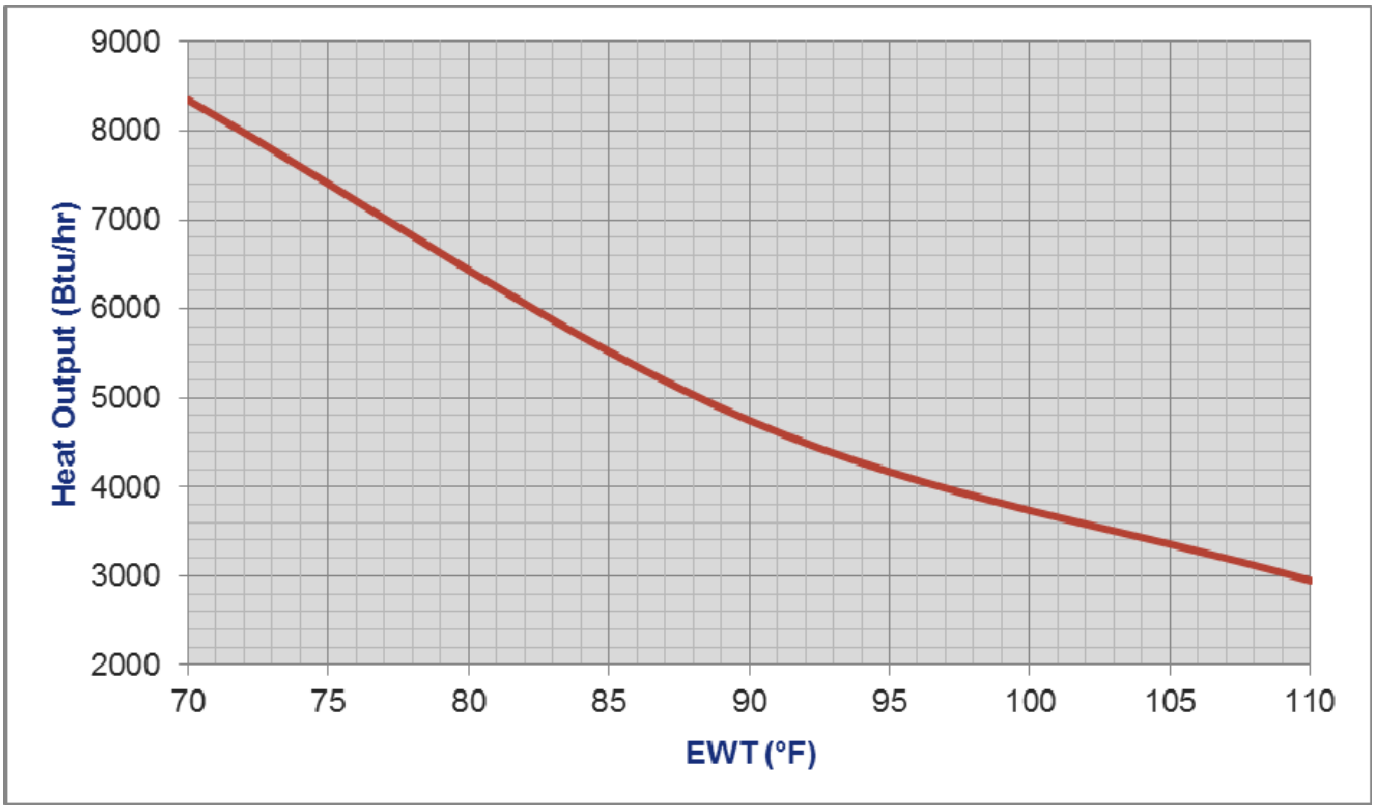
CIRCULATION PUMP PERFORMANCE

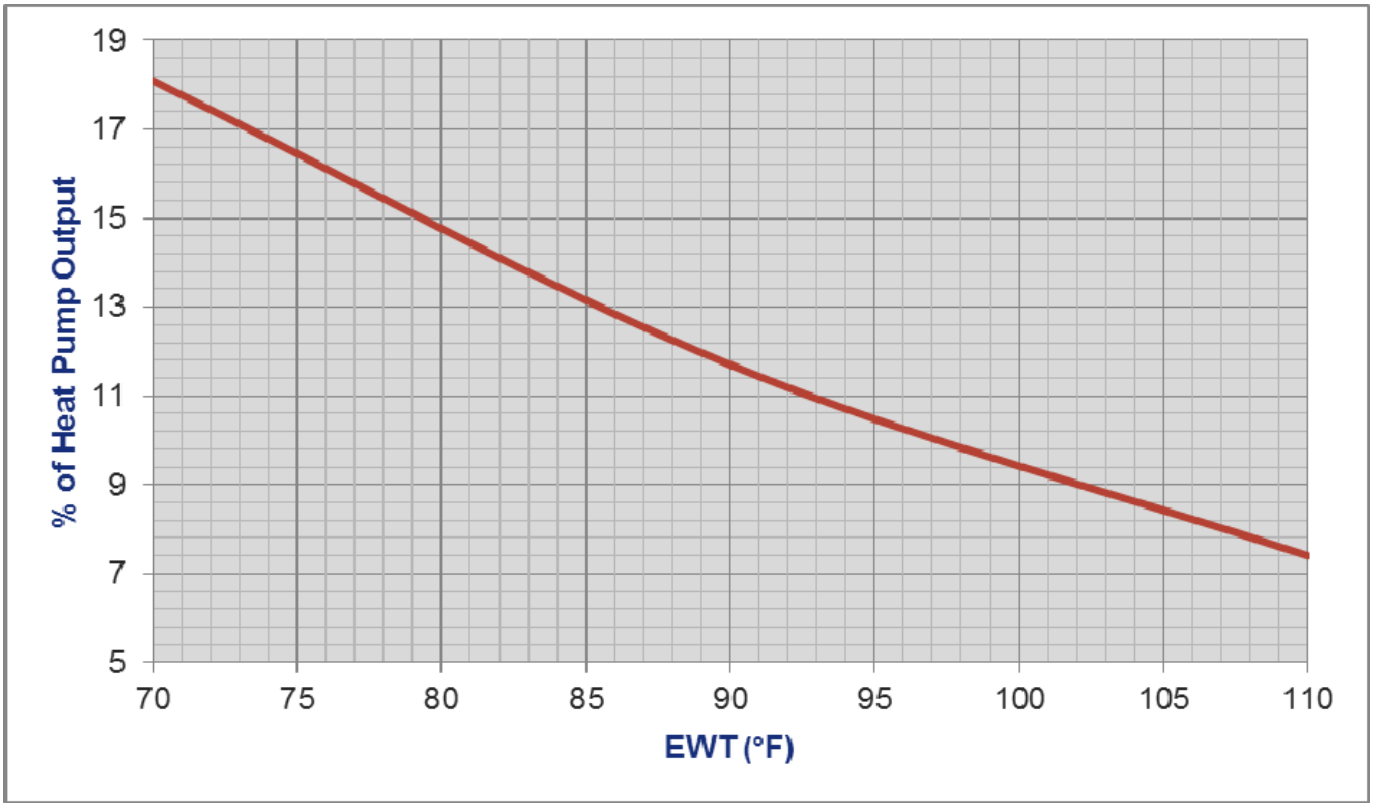


Factors contributing to the pump head include the pressure drop of the hydronic circuit connected to the IFM, and pressure drop through the IFM's internal heat exchanger. See following tables for total combined pressure drop information.

NOTE: to convert feet of water to psi, multiply by 0.433.

IFM HEAT OUTPUT

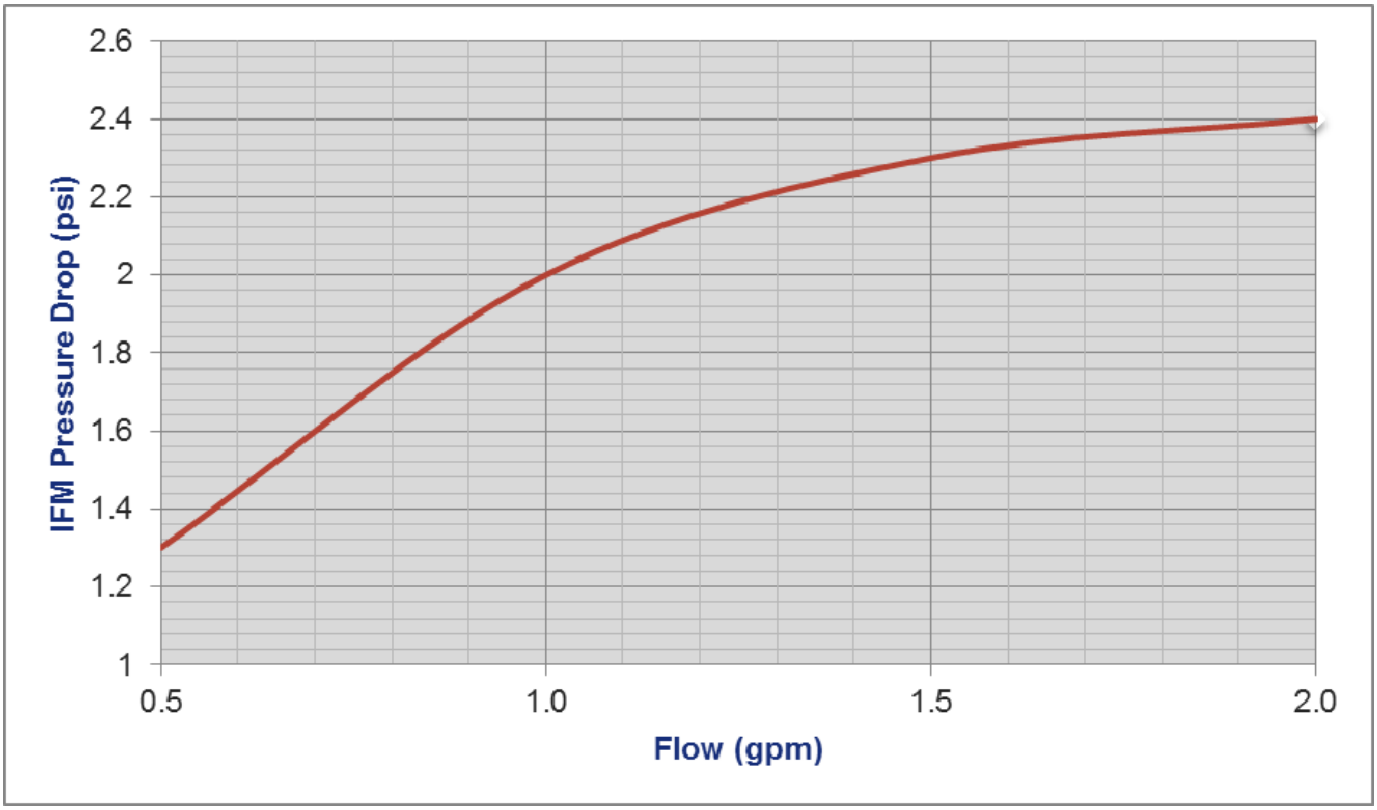


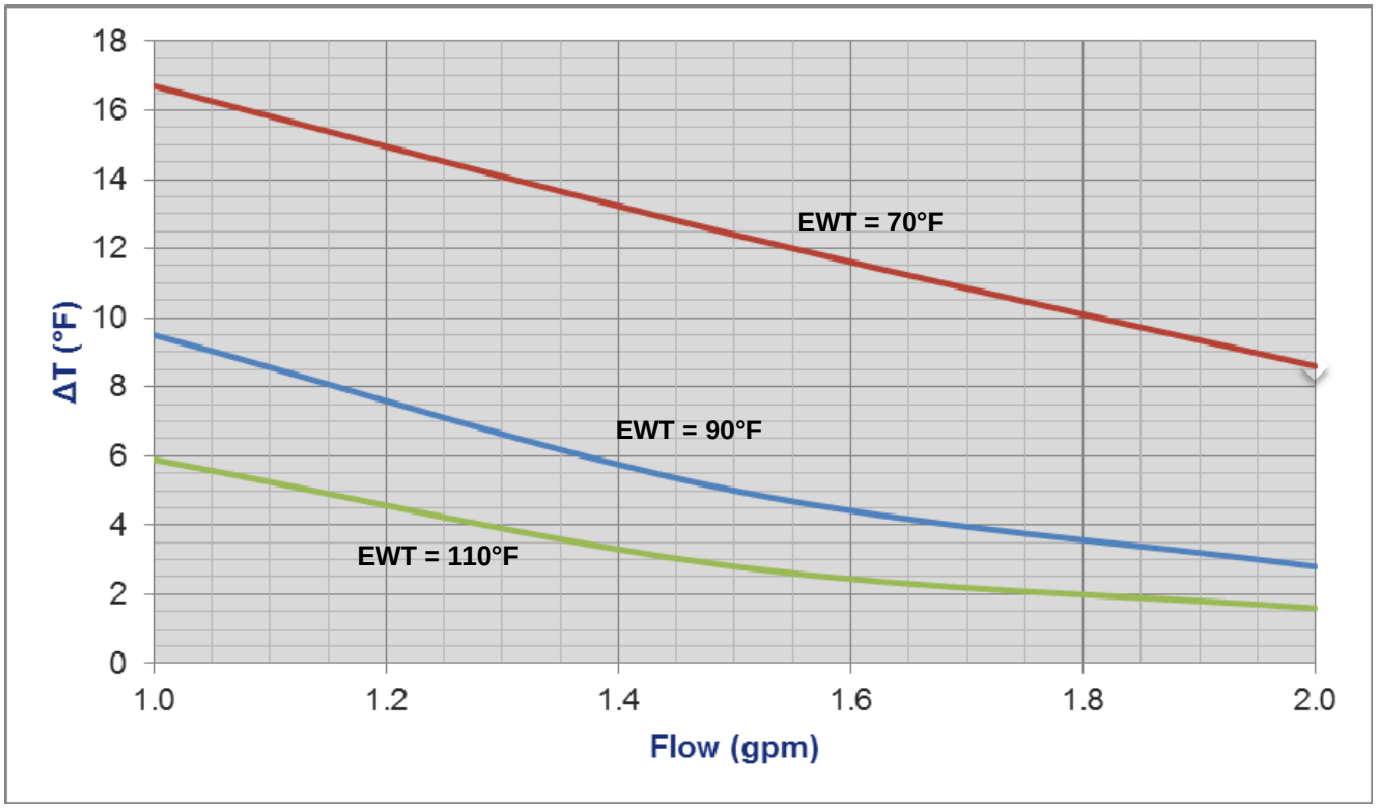


These chart are based on a Nordic IFM-48 used with a nominal 4 ton heat pump, in a typical heating mode condition of 25°F (-4°C) evaporating temperature and 105°F (41°C) condensing temperature, with a hydronic system water flow of 1.0 gpm.

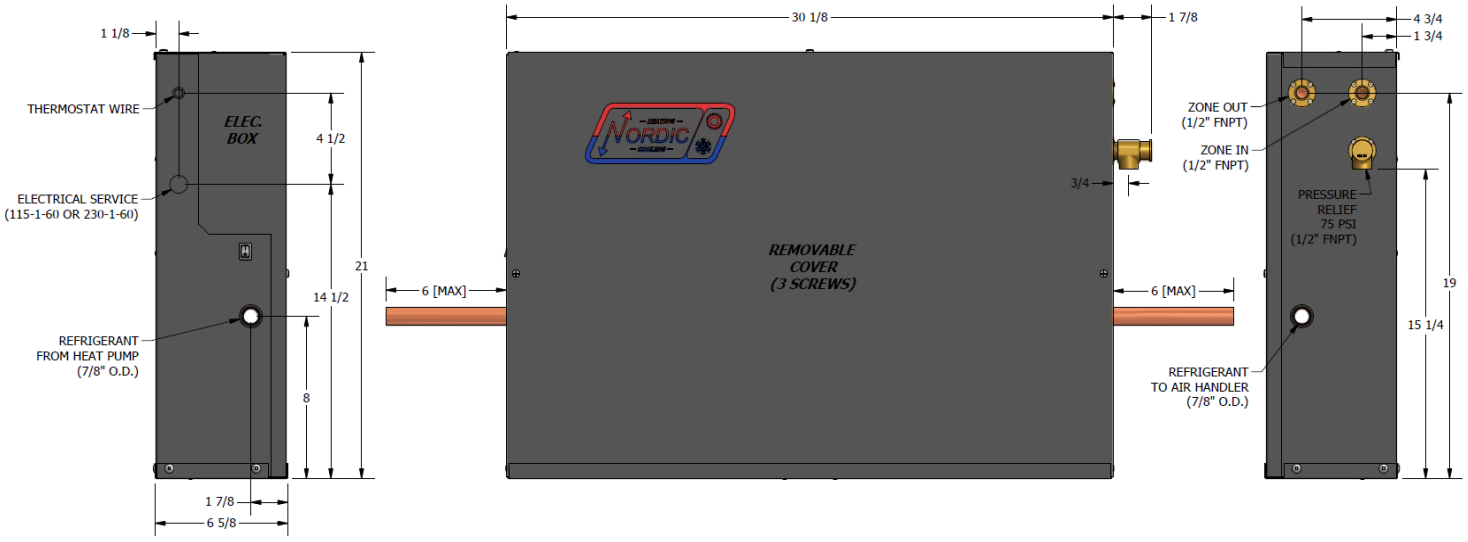
Lab testing revealed that heating output is relatively insensitive to water flow rate, so these charts may be considered valid at any water flow rate > 1.0 gpm.

PRESSURE & TEMPERATURE vs. FLOW RATE





DIMENSIONS

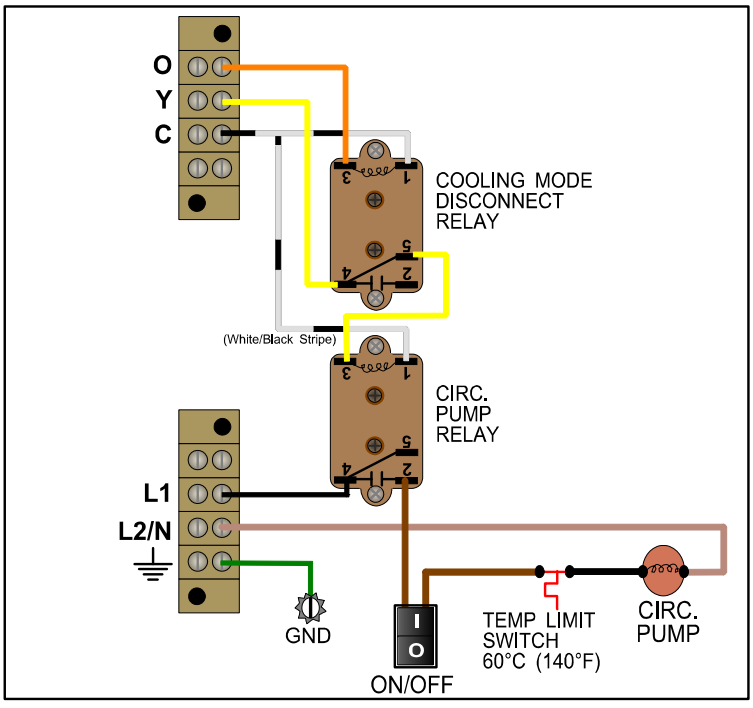


ELECTRICAL DIAGRAM

IFM-Series Schematic Diagram

100-240v / 1ph / 50/60 Hz

ELECTRICAL BOX



24VAC Wiring

Use 18-3 conductor to connect this unit to the heat pump.

O - 24VAC cooling mode signal
Y - 24VAC compressor run signal
C - 24VAC common

High Voltage Wiring

Unit may be powered from any AC voltage between 100V and 240V.

L1 - hot line 1
L2/N - hot line 2 OR neutral
⏚ - ground

Sequence of Operation

Heat pump sends 24VAC signal to thermostat from its 'R' terminal.

When heating is called for, thermostat sends 24VAC signal back to heat pump on 'Y', starting the compressor. This also starts the IFM circ pump, by activating the circ pump relay.

When cooling is called for, thermostat sends both 'Y' and 'O' signals back to heat pump. IFM circ pump will not be activated since 24VAC signal is disconnected by the cooling mode disconnect relay. Suction gas from the air handler will bypass the IFM heat exchanger through the 7/8" internal bypass check valve and continue to the compressor section with minimal pressure drop.

IFM Electrical Service Requirements
100-240VAC Single Phase 50/60Hz

Model Size	Min. Circuit Ampacity	Min. Wire Gauge	TD Fuse or Breaker
48	1.0	14-2	15

REV	ECO #	IMPL BY	APVD BY	DATE
01	Initial Release	Dan Rheault	Dan Rheault	26-Aug-2014

Drawn By	Dan Rheault	Date 26-Aug-2014
Checked By	Dan Rheault	Date 26-Aug-2014
Approved By	(ENG)	Date
Approved By	(MFG)	Date
Approved By		Date

MARITIME GEOTHERMAL LTD.
170 Plantation Rd.
Petitcodiac, NB
E4Z 6H4

Drawing Name: IFM-48-W-P-01-D Schematic Diagram

Size	Drawing Number	Drawing Rev	SHEET
A	001867SCH	01	1 of 1

LIMITED EXPRESS WARRANTY

It is expressly understood that unless a statement is specifically identified as a warranty, statements made by Maritime Geothermal Ltd., a corporation registered in New Brunswick, Canada, ("MG") or its representatives, relating to MG's products, whether oral, written or contained in any sales literature, catalogue or agreement, are not express warranties and do not form a part of the basis of the bargain, but are merely MG's opinion or commendation of MG's products.
EXCEPT AS SPECIFICALLY SET FORTH HEREIN, THERE IS NO EXPRESS WARRANTY AS TO ANY OF MG'S PRODUCTS. MG MAKES NO WARRANTY AGAINST LATENT DEFECTS. MG MAKES NO WARRANTY OF MERCHANTABILITY OF THE GOODS OR OF THE FITNESS OF THE GOODS FOR ANY PARTICULAR PURPOSE.

LIMITED EXPRESS RESIDENTIAL WARRANTY - PARTS
MG warrants its Residential Class products, purchased and retained in the United States of America and Canada, to be free from defects in material and workmanship under normal use and maintenance as follows:
(1) Air conditioning, heating and/or heat pump units built or sold by MG ("MG Units") for five (5) years from the Warranty Inception Date (as defined below).
(2) Thermostats, auxiliary electric heaters and geothermal pumping modules built or sold by MG, when installed with MG Units, for five (5) years from the Warranty Inception Date (as defined below).
(3) Sealed refrigerant circuit components of MG Units (which components only include the compressor, refrigerant to air/water heat exchangers, reversing valve body and refrigerant metering device) for ten (10) years from the Warranty Inception Date (as defined below).
(4) Other accessories and parts built or sold by MG, when installed and purchased with MG Units, for five (5) years from the date of shipment from MG.
(5) Other accessories, when purchased separately, for (1) year from the date of shipment from MG.

The "Warranty Inception Date" shall be the date of original unit installation, as per the date on the installation Startup Record or six (6) months from date of unit shipment from MG, whichever comes first.

To make a claim under this warranty, parts must be returned to MG in Petitcodiac, New Brunswick, freight prepaid, no later than ninety (90) days after the date of the failure of the part. If MG determines the part to be defective and within MG's Limited Express Residential Warranty, MG shall, when such part has been either replaced or repaired, return such to a factory recognized distributor, dealer or service organization, freight prepaid. The warranty on any part repaired or replaced under warranty expires at the end of the original warranty period.

LIMITED EXPRESS RESIDENTIAL WARRANTY - LABOUR
This Limited Express Residential Labour Warranty shall cover the **labour** incurred by MG authorized service personnel in connection with the installation of a new or repaired warranty part that is covered by this Limited Express Residential Warranty only to the extent specifically set forth in the current **labour** allowance schedule "A" provided by MG's Warranty Department and only as follows:
(1) MG Units for two (2) years from the Warranty Inception Date.
(2) Thermostats, auxiliary electric heaters and geothermal pump modules built or sold by MG, when installed with MG Units, for two (2) years from the Warranty Inception Date.
(3) Sealed refrigerant circuit components of MG Units (which components only include the compressor, refrigerant to air/water heat exchangers, reversing valve body and refrigerant metering device) for five (5) years from the Warranty Inception Date.

Labour costs are not covered by this Limited Express Residential Warranty to the extent they **exceed** the amount allowed under said allowance schedule, they are not specifically provided for in said allowance schedule, they are not the result of work performed by MG authorized service personnel, they are incurred in connection with a part not covered by this Limited Express Residential Warranty, or they are incurred more than the time periods set forth in this paragraph after the Warranty Inception Date.
This warranty does not cover and does not apply to:
(1) Air filters, fuses, refrigerant, fluids, oil.
(2) Products relocated after initial installation.
(3) Any portion or component of any system that is not supplied by MG, regardless of the cause of the failure of such portion or component.
(4) Products on which the unit identification tags or labels have been removed or defaced.
(5) Products on which payment to MG, or to the owner's seller or installing contractor, is in default.
(6) Products subjected to improper or inadequate installation, maintenance, repair, wiring or voltage conditions.
(7) Products subjected to accident, misuse, negligence, abuse, fire, flood, lightning, unauthorized alteration, misapplication, contaminated or corrosive liquid or air supply, operation at abnormal air or liquid temperatures or flow rates, or opening of the refrigerant circuit by unqualified personnel.
(8) Mold, fungus or bacteria damage
(9) Corrosion or abrasion of the product.
(10) Products supplied by others.
(11) Products which have been operated in a manner contrary to MG's printed instructions.
(12) Products which have insufficient performance as a result of improper system design or improper application, installation, or use of MG's products.
(13) Electricity or fuel, or any increases or unrealized savings in same, for any reason whatsoever.

Except for the limited **labour** allowance coverage set forth above, MG is not responsible for:
(1) The costs of fluids, refrigerant or system components **supplied by others**, or associated **labour** to repair or replace the same, which is incurred as a result of a defective part covered by MG's Limited Residential Warranty.
(2) The costs of **labour**, refrigerant, materials or service incurred in diagnosis and removal of the defective part, or in obtaining and replacing the new or repaired part.
(3) Transportation costs of the defective part from the installation site to MG, or of the return of that part if not covered by MG's Limited Express Residential Warranty.
(4) The costs of normal maintenance.

This Limited Express Residential Warranty applies to MG Residential Class products manufactured on or after February 15, 2010. MG'S LIABILITY UNDER THE TERMS OF THIS LIMITED WARRANTY SHALL APPLY ONLY TO THE MG UNITS REGISTERED WITH MG THAT BEARS THE MODEL AND SERIAL NUMBERS STATED ON THE INSTALLATION START UP RECORD, AND MG SHALL NOT, IN ANY EVENT, BE LIABLE UNDER THE TERMS OF THIS LIMITED WARRANTY UNLESS THIS INSTALLATION START UP RECORD HAS BEEN ENDORSED BY OWNER & DEALER/INSTALLER AND RECIEVED BY MG LIMITED WITHIN 90 DAYS OF START UP.

Limitation: This Limited Express Residential Warranty is given in lieu of all other warranties. If, not withstanding the disclaimers contained herein, it is determined that other warranties exist, any such express warranty, including without imitation any express warranties or any implied warranties of fitness for particular purpose and merchantability, shall be limited to the duration of the Limited Express Residential Warranty.

LIMITATION OF REMEDIES In the event of a breach of the Limited Express Residential Warranty, MG will only be obligated at MG's option to repair the failed part or unit, or to furnish a new or rebuilt part or unit in exchange for the part or unit which has failed. If after written notice to MG's factory in Petitcodiac, New Brunswick of each defect, mal-function or other failure, and a reasonable number of attempts by MG to correct the defect, malfunction or other failure, and the remedy fails of its essential purpose, MG shall refund the purchase price paid to MG in exchange for the return of the sold good(s). Said refund shall be the maximum liability of MG. **THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY OF THE BUYER OR PURCHASER AGAINST MG FOR BREACH OF CONTRACT, FOR THE BREACH OF ANY WARRANTY OR FOR MG'S NEGLIGENCE OR IN STRICT LIABILITY.**

LIMITATION OF LIABILITY MG shall have no liability for any damages if MG's performance is delayed for any reason or is prevented to any extent by any event such as, but not limited to: any war, civil unrest, government restrictions or restraints, strikes, or work stoppages, fire, flood, accident, shortages of transportation, fuel, material, or labour, acts of God or any other reason beyond the sole control of MG. **MG EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGE IN CONTRACT, FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, OR IN TORT, WHETHER FOR MG's NEGLIGENCE OR AS STRICT LIABILITY.**

OBTAINING WARRANTY PERFORMANCE Normally, the dealer or service organization who installed the products will provide warranty performance for the owner. Should the installer be unavailable, contact any MG recognized distributor, dealer or service organization. If assistance is required in obtaining warranty performance, write or call: Maritime Geothermal Ltd • Customer Service • PO Box 2555 • Petitcodiac, New Brunswick E4Z 6H4 • (506) 756□8135 • or e-mail to info@nordicghp.com NOTE: Some states or Canadian provinces do not allow limitations on how long an implied warranty lasts, or the limitation or exclusions of consequential or incidental damages, so the foregoing exclusions and limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state and from Canadian province to Canadian province. Please refer to the MG Installation, Installation and Service Manual for operating and maintenance instructions.

An extended warranty option is also available. Please contact Maritime Geothermal Ltd. via the contact information in the previous paragraph for more information.