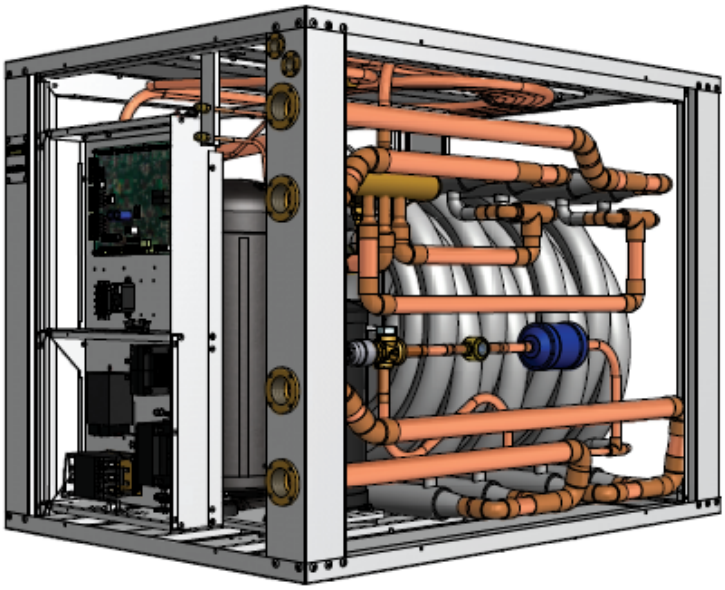
MARITIME GEOTHERMAL LTD.

ENGINEERING SPECIFICATIONS

W-100-HAC(W)-P-*S-CC

Single-Stage R410a
Nominal Size 9 Ton
Reversing (Heating AND *Cooling*)
Optional Domestic Hot Water (desuperheater)

Commercial Hydronic Geothermal Heat Pumps



CE

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Document Number: 001729SPC-02

MODEL NOMENCLATURE

W—100—HACW—P—2S—CC—03

Series:
W = water to water

Nominal Size:
100 = 9 ton

Functions:
H = heating
AC = active cooling
W = desuperheater for DHW

Refrigerant:
P = R410a

Revision:
01, 02 etc.

Indoor Loop Exchanger:
C = copper coaxial

Outdoor Loop Exchanger:
C = copper coaxial

Compressor Stages:
S = single stage

Voltage Code:
2 = 208-3-60 VAC
4 = 460-3-60 VAC
5 = 575-3-60 VAC

The models and revisions covered by this document are listed in the table below.

MODEL	REVISION
W-100-HAC-P-2S-CC	03
W-100-HAC-P-4S-CC	03
W-100-HAC-P-5S-CC	03
W-100-HACW-P-2S-CC	03
W-100-HACW-P-4S-CC	03
W-100-HACW-P-5S-CC	03

DESIGN FEATURES LIST

The geothermal heat pump described in this specification document features the following:

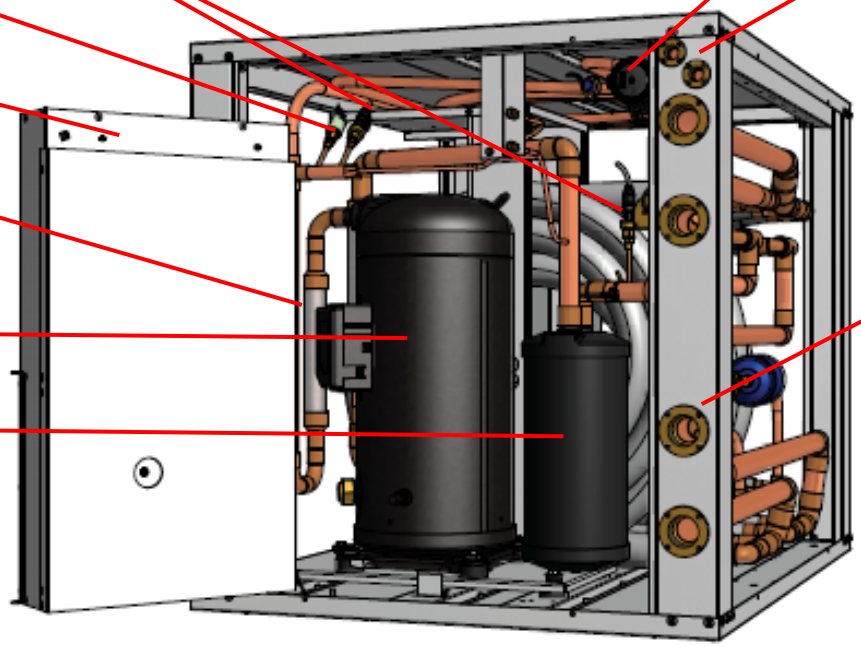
- ETL listed for electrical certification
- 20ga satin galvanized case with reinforcing channel stiffeners
- Baked enamel finish
- Acoustically insulated cabinet (1/2” thick)
- Completely insulated heat exchangers and piping
- Four removable access panels
- Refrigeration service ports located inside unit (1/4” Schrader)
- 1-1/4” brass FPT fittings for Outdoor and Indoor Loop connections
- Single scroll compressor with sump heater
- Suction line and discharge line vibration absorbers
- Suction line accumulator
- Liquid line filter-drier
- Liquid line sight glass
- Electronic Expansion Valve (EEV)
- Reversing, can be used for heating and cooling
- High and low pressure sensors
- Phase protector
- High and low pressure sensors
- Suction line temperature sensor
- Manual reset high pressure control (each circuit)
- ECM circulator for domestic hot water circuit uses less than half the power of traditional circulating pumps, and allows motor replacement without tools (HACW only)
- 1/2” brass FPT fittings, double wall heat exchanger and high temperature cutout switch for domestic hot water (HACW only)
- Advanced control board with BACNet interface for remote operation and data access including all sensor data and alarm conditions, PWM outputs (or 0-10VDC), configurable analog inputs (0-10VDC or 4-20mA) with on board 5VDC, 12VDC or 24VDC power supplies.
- USB port for complete data access including real-time charting, data-logging and diagnostic functionality with manual override operation
- 2 x 16 LCD display for control and data access , unit may be configured for stand alone operation (requires optional temperature probes(s)
- Random start on power up (between 0-2 minutes)
- Dry contacts for external pump control (24VAC 5A MAX)
- Electrical box layout and schematic diagrams
- Installation and service manual

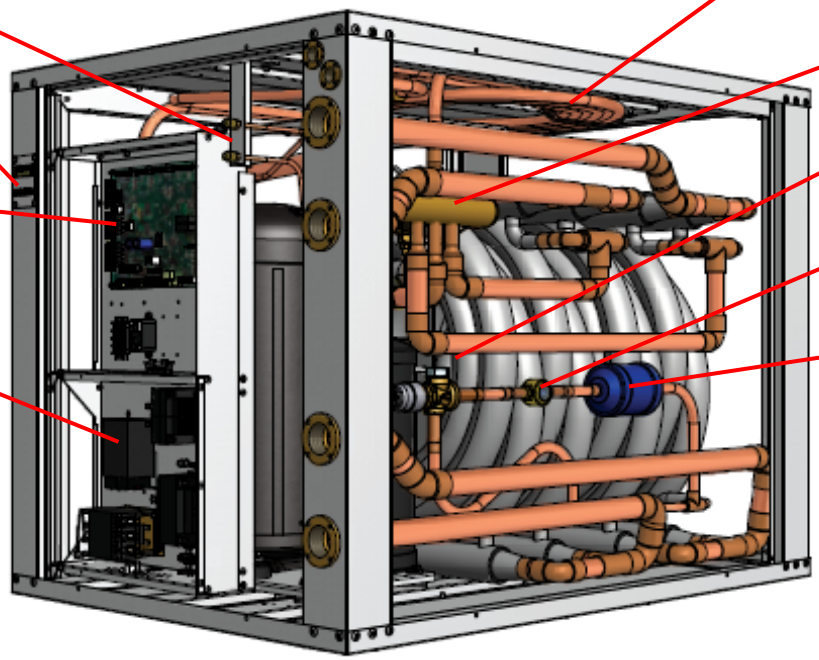
OPTIONAL EQUIPMENT

The following is a list of optional equipment that may be ordered with the geothermal heat pump:

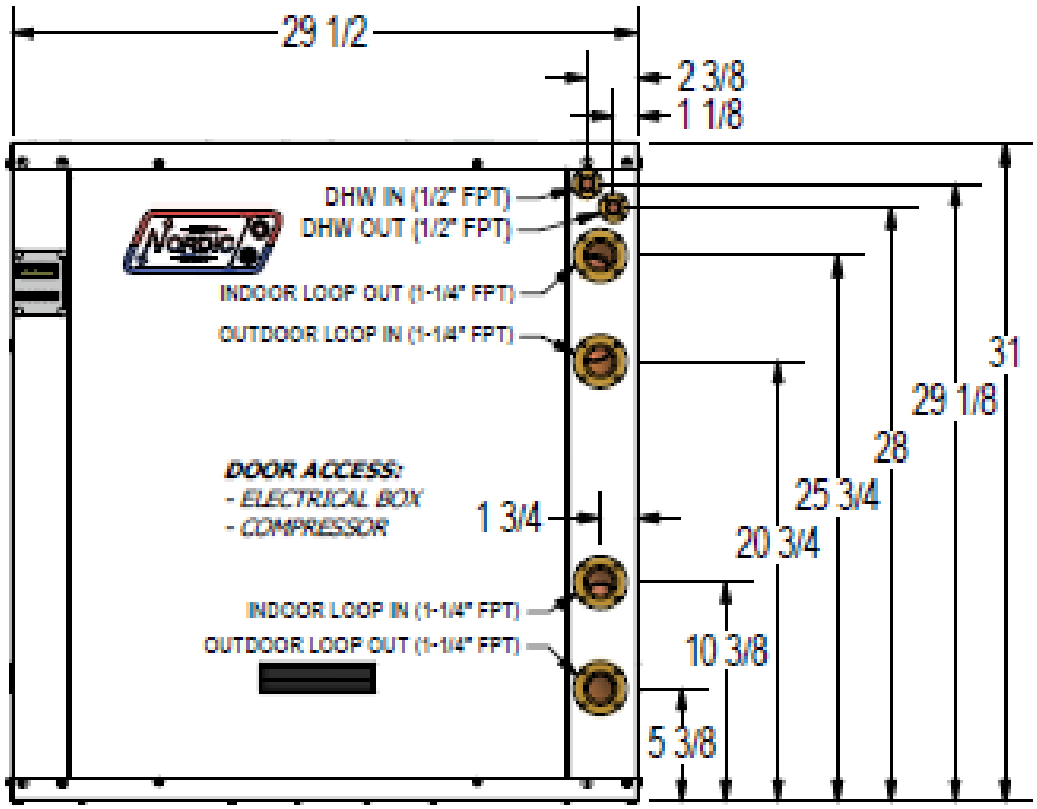
- Temperature probes(s) for stand alone operation configuration
- 1-1/4” solenoid water valve (24VAC)

DESIGN FEATURES

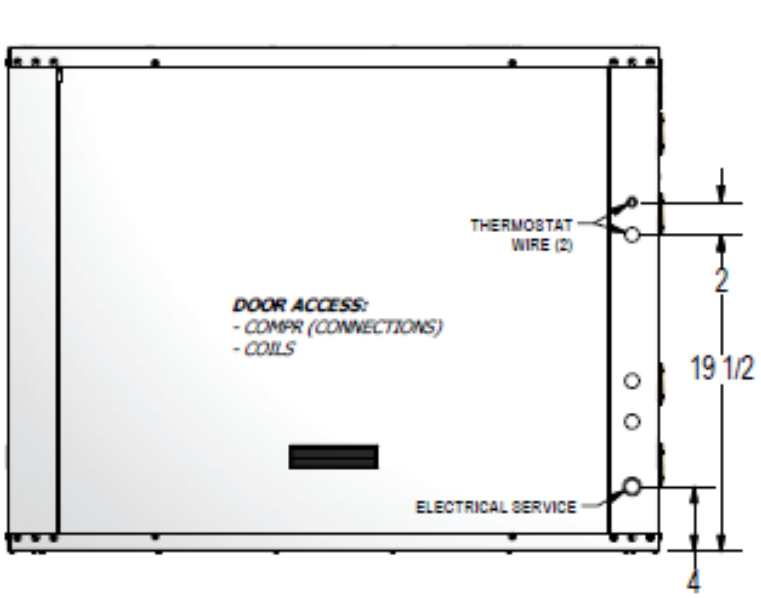




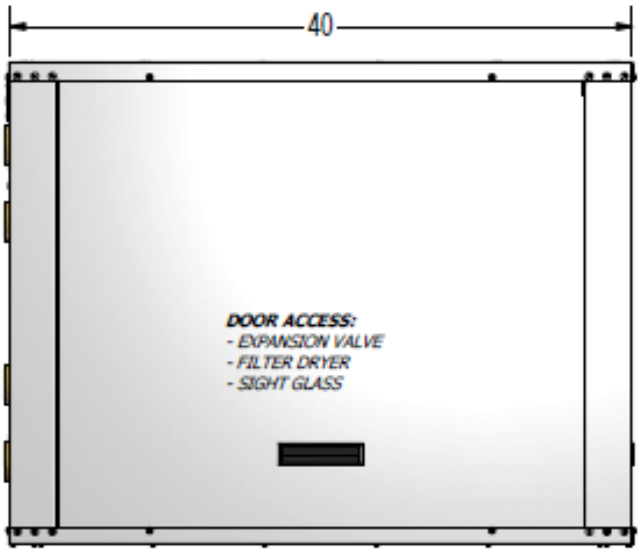
CASE DETAILS



Front View

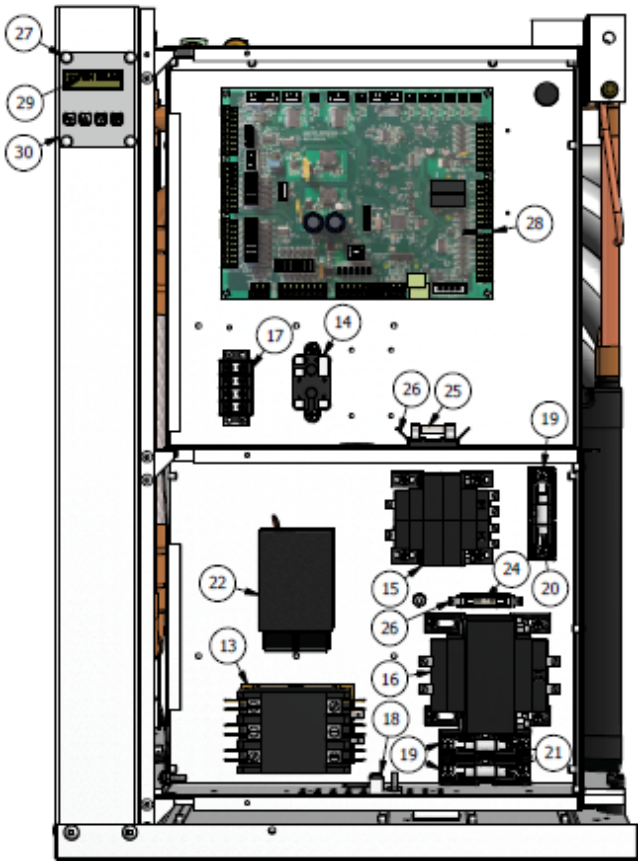


Left Side View



Right Side View

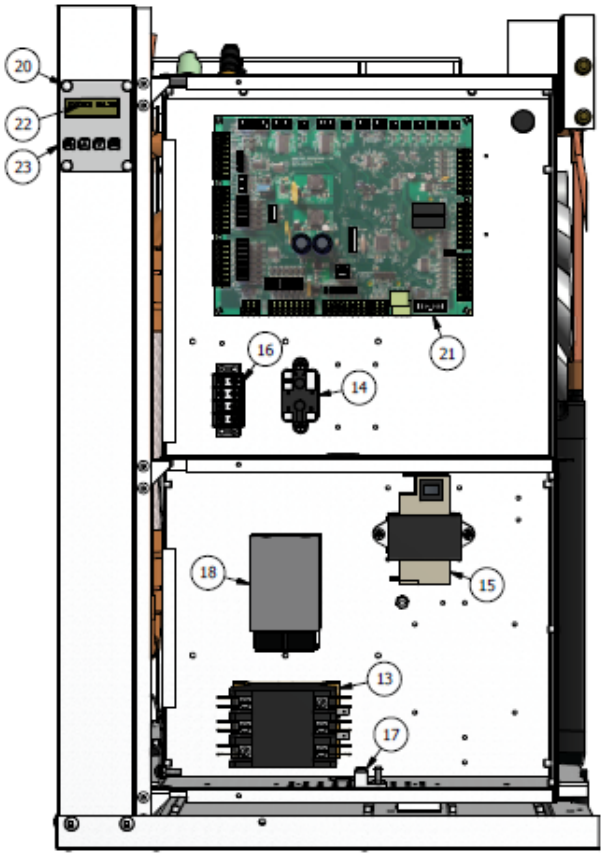
ELECTRICAL BOX LAYOUT 460-3-60 and 575-3-60



Legend

13. Compressor contactor
14. Circulator Control Relay
15. Control transformer
16. DHW circulator transformer (HACW only)
17. Circulator Control terminal strip
18. Ground lug
19. Fuse holders
20. Control Transformer Primary Fuse
21. DHW Primary Fuses (HACW only)
24. DHW Secondary Fuse (HACW only)
25. Control Transformer Secondary Fuse
26. Fuse Holders
28. Control board
29. 16x2 LCD display
30. Menu buttons

ELECTRICAL BOX LAYOUT 208-3-60



Legend

13. Compressor contactor
14. Circulator Control Relay
15. Control transformer
16. Circulator Control terminal strip
17. Ground lug
18. Phase monitor
21. Control board
22. 16x2 LCD display
23. Menu buttons

ELECTRICAL SPECIFICATIONS

Heat Pump Electrical Information									
Nomenclature Identifier	Power Supply			Compressor #1		FLA	MCA	Maximum Fuse/Breaker	Minimum Wire Size
	V-ø-Hz	MIN	MAX	RLA	LRA	Amps	Amps	Amps	ga
2	208-3-60	187	229	33.6	225	34.1	42.5	70	#6-4
4	460-3-60	414	506	18.6	114	19.1	23.8	40	#8-3
5	575-3-60	518	632	13.6	80	14.4	17.8	30	#10-3

MISCELLANEOUS INFORMATION

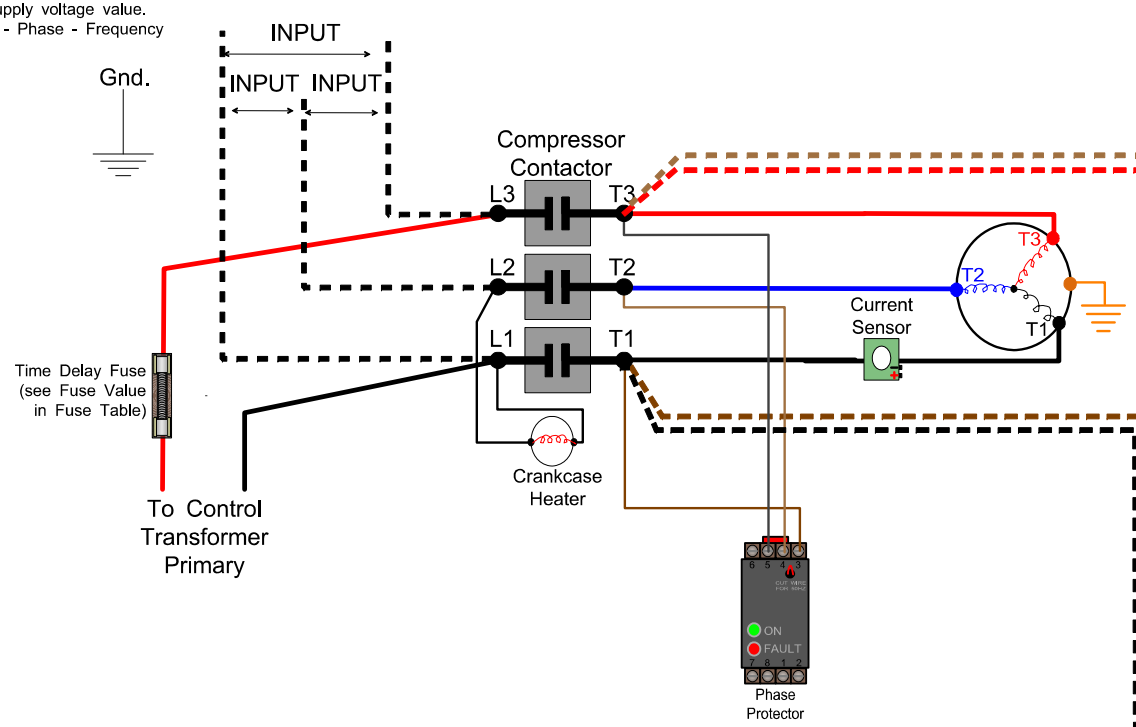
Unit Weight		Refrigerant Type	Refrigerant Charge		Outdoor Pressure Drop		Indoor Pressure Drop	
Lbs.	kg		Lbs.	kg	ELT	PSI (kPa)	EWT	PSI (kPa)
670	304	R410a	16.0	7.3	50F(10C)	5.7 (39.3)	80F (27C)	4.1 (28.3)
NOTE: Pressure drops are for water at 28USGPM (1.74L/s)								

W-100 Series High Voltage Schematic Diagram

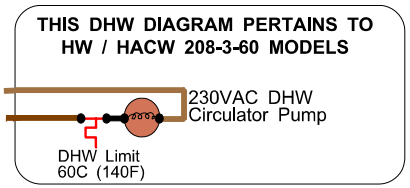
Scroll / Optional Domestic Hot Water

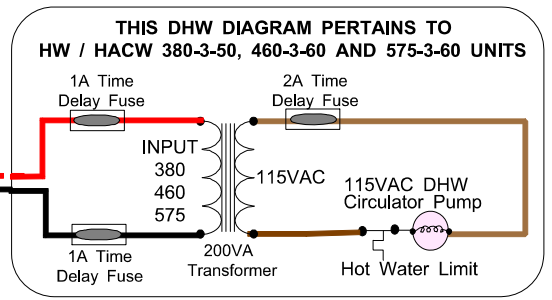
FUSE TABLE		
Supply Voltage* (V-P-F**)	INPUT Value (VAC)	Fuse Value (mA)
208-3-60	208	------
460-3-60	460	330
575-3-60	575	250
380-3-50	380	500

*Refer to the unit nameplate or labels for the supply voltage value.
** Voltage - Phase - Frequency



NOTE (HW and HACW only):
To disconnect the DHW circulator pump, remove the brown (or black) wire with the insulated terminal from the bottom right terminal of the compressor contactor (T1) marked "A"





DANGER: HIGH VOLTAGE. Ensure power is off before opening the electrical box cover.

REV	ECO #	IMPL BY	APVD BY	DATE
01	000226 (IR)	C. GEDDES	C. GEDDES	15 NOV 2014

Drawn By: Chris Geddes	Date: 15 NOV 14	
Checked By: Chris Geddes	Date: 15 NOV 14	
Approved By (ENG): Chris Geddes	Date: 15 NOV 14	
Approved By (MFG):	Date:	
Approved By:	Date:	

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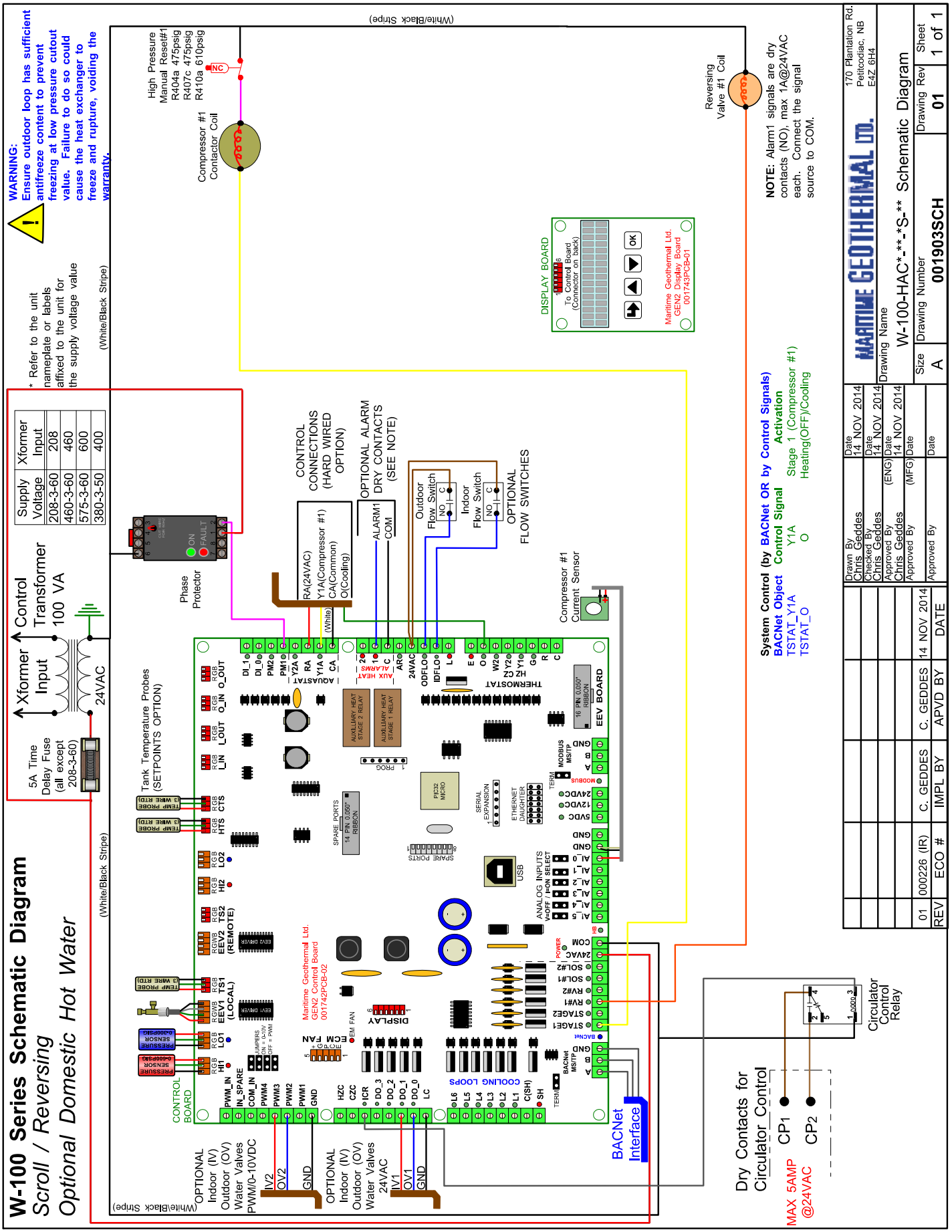
170 Plantation Rd.
Petitcodiac, NB
E4Z 6H4

Drawing Name: W-100-H***-**-*S-**
High Voltage Schematic Diagram

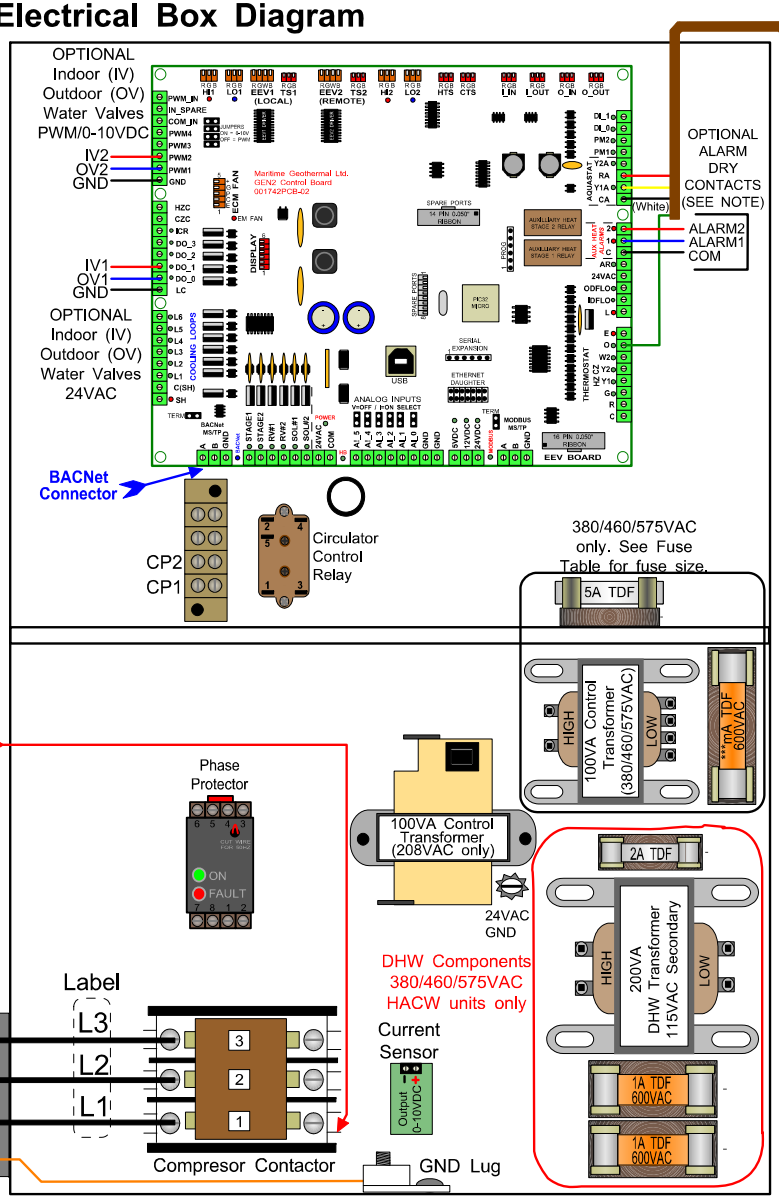
Size	Drawing Number	Drawing Rev	Sheet
A	001902SCH	01	1 of 1


W-100 Series Schematic Diagram
Scroll / Reversing
Optional Domestic Hot Water
WARNING:
Ensure outdoor loop has sufficient antifreeze content to prevent freezing at low pressure cutout value. Failure to do so could cause the heat exchanger to freeze and rupture, voiding the warranty.
* Refer to the unit nameplate or labels affixed to the unit for the supply voltage value
Supply Voltage | Xformer Input
208-3-60 | 208
460-3-60 | 460
575-3-60 | 600
380-3-50 | 400
5A Time Delay Fuse (all except 208-3-60)
Xformer Input
Control Transformer 100 VA
24VAC
(White/Black Stripe)
Phase Protector
Tank Temperature Probes (SETPOINTS OPTION)
CONTROL CONNECTIONS (HARD WIRED OPTION)
RA(24VAC)
Y1A(Compressor #1)
CA(Common)
O(Cooling)
OPTIONAL ALARM DRY CONTACTS (SEE NOTE)
ALARM1
COM
Outdoor Flow Switch
Indoor Flow Switch
OPTIONAL FLOW SWITCHES
Compressor #1 Current Sensor
High Pressure Manual Reset#1
R404a 475psig
R407c 475psig
R410a 610psig
Compressor #1 Contactor Coil
Reversing Valve #1 Coil
DISPLAY BOARD
To Control Board (Connector on back)
Maritime Geothermal Ltd. GEN2 Display Board 001743PCB-01
NOTE: Alarm1 signals are dry contacts (NO), max 1A@24VAC each. Connect the signal source to COM.
System Control (by BACNet OR by Control Signals)
BACNet Object Control Signal Activation
TSTAT_Y1A Y1A Stage 1 (Compressor #1)
TSTAT_O O Heating(OFF)/Cooling
CONTROL BOARD
Maritime Geothermal Ltd. GEN2 Control Board 001742PCB-02
EEV BOARD
THERMOSTAT
AUXILIARY HEAT STAGE 2 RELAY
AUXILIARY HEAT STAGE 1 RELAY
ECM FAN
COOLING LOOPS
BACNet Interface
Circulator Control Relay
Dry Contacts for Circulator Control
MAX 5AMP @24VAC
CP1
CP2
OPTIONAL Indoor (IV) Outdoor (OV) Water Valves PWM/0-10VDC
OPTIONAL Indoor (IV) Outdoor (OV) Water Valves 24VAC
IV2
OV2
GND
IV1
OV1
GND
Drawn By Chris Geddes Date 14 NOV 2014
Checked By Chris Geddes Date 14 NOV 2014
Approved By (ENG) Chris Geddes Date 14 NOV 2014
Approved By (MFG) Date
Approved By Date
MARITIME GEOTHERMAL LTD.
170 Plantation Rd. Petitcodiac, NB E4Z 6H4
Drawing Name W-100-HAC*-**-*S-** Schematic Diagram
Size A
Drawing Number 001903SCH
Drawing Rev 01
Sheet 1 of 1
01 000226 (IR) C. GEDDES C. GEDDES 14 NOV 2014
REV ECO # IMPL BY APVD BY DATE

W-100 Series Electrical Box Diagram

Scroll / Reversing / BACNet Interface
Optional Domestic Hot Water

DANGER: HIGH VOLTAGE. Ensure power is off before opening the electrical box cover.



POWER SUPPLY CONNECTIONS	
Wire	**Compressor Contactor**
Line 3	L3
Line 2	L2
Line 1	L1
Connect "Gnd" to Gnd. Lug	

FUSE TABLE ***	
Supply Voltage	Fuse Value*
208-3-60	--------
460-3-60	330mA
575-3-60	250mA
380-3-50	500mA

*Value is marked in electrical box.

IMPORTANT NOTE FOR 3 PHASE SCROLL COMPRESSORS

This unit is quipped with a scroll compressor which must rotate in the proper direction. After the initial connection, if the phase protection module(s) indicate a fault on power up, turn the power off and reverse the L1 and L2 supply leads. Turn the power on and clear the fault(s).

DANGER: HIGH VOLTAGE. Ensure power is off before opening the electrical box cover.

NOTE: Control of the unit is done **either** via the BACNet interface, Setpoint Control or low voltage wiring.

BACNet Interface (MS/TP) (RS-485)

Use twisted pair shielded conductor cable.

A - Communication
B - Communication
GND - Ground

TSTAT_Y1A: Stage 1 (Compressor#1)
TSTAT_O: Heating/Cooling Mode (active for cooling mode)

Low Voltage Wiring (24VAC)

Use an 18-5 conductor cable.

C - 24VAC Common
R - 24VAC Hot
Y1A - Stage 1 (Compressor#1)
O - Heating/Cooling Mode (active for cooling mode)

A dry connection from "R" to "Y1" will start Compressor#1.

A dry connection from "R" to "O" will activate cooling mode

NOTE: There is a 5 minute anti-short cycle timer for the compressor.

NOTE: CP1 and CP2 provide a dry contact that can be used as a control signal to turn on circulator pumps when the compressor starts. **MAX 5amps @ 24VAC**

NOTE: 24VAC is present across OV1 and GND in heating mode (IV1 and GND in cooling mode) to power an external water valve when either compressor starts. **MAX 1amp @ 24VAC**

NOTE: Alarm1 signals are dry contacts (NO), max 1A@24VAC each. Connect the signal source to COM. Alarm1 relay will be enirgized when a permanent fault occurs.

DHW NOTE: If the heat pump is to be operated without the hot water circulator connected to the water tank and flooded with water, remove the brown (or light brown) wire with the insulated terminal from the location(s) shown in the diagram above. **The pump is water lubricated and must not be run dry.**

REV	ECO #	IMPL BY	APVD BY	DATE
01	000226 (IR)	C. GEDDES	C. GEDDES	14 NOV 2014

Drawn By	Chris Geddes	Date 14 NOV 2014
Checked By	Chris Geddes	Date 14 NOV 2014
Approved By (ENG)	Chris Geddes	Date 14 NOV 2014
Approved By (MFG)		Date
Approved By		Date

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170 Plantation Rd.
Petitcodiac, NB
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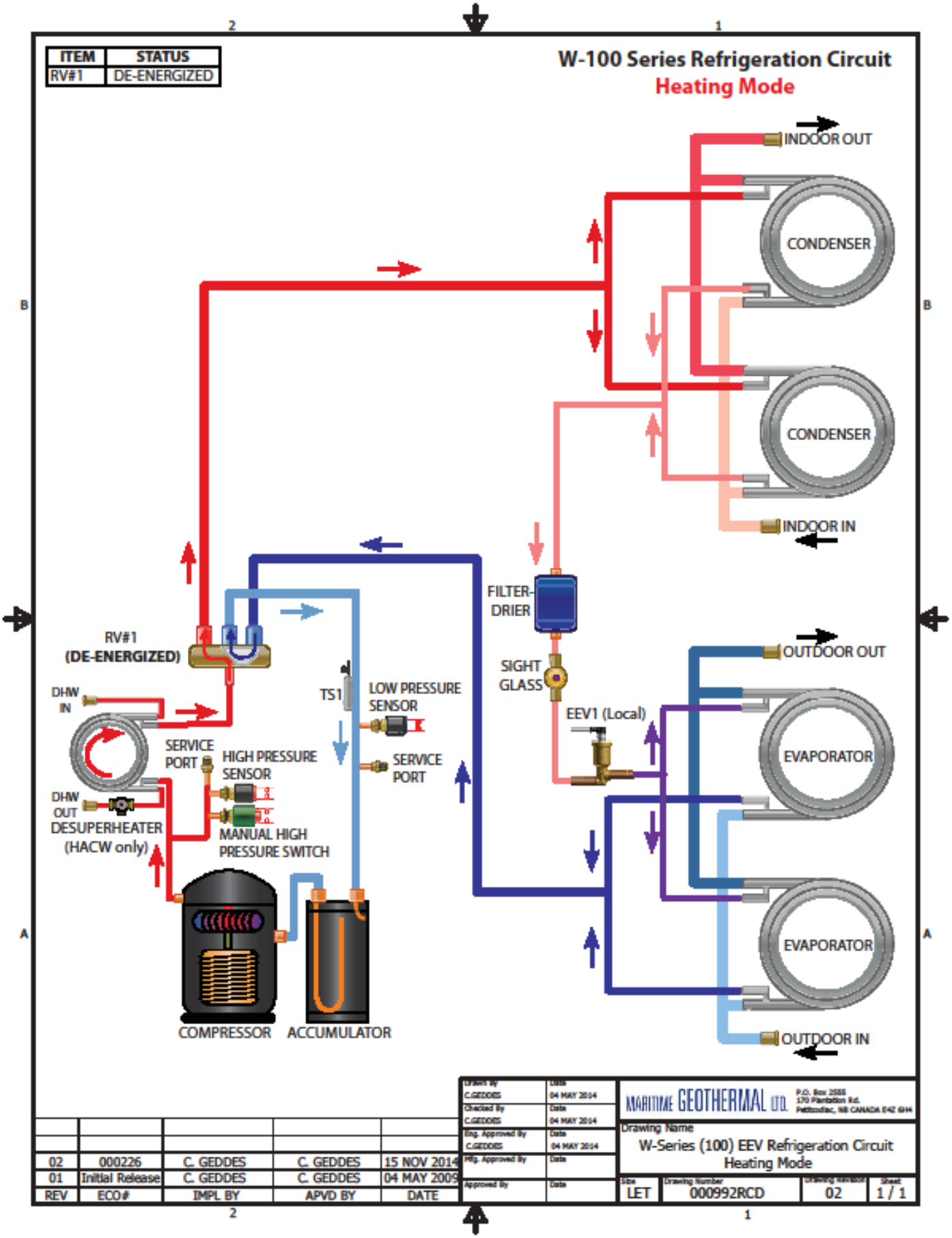
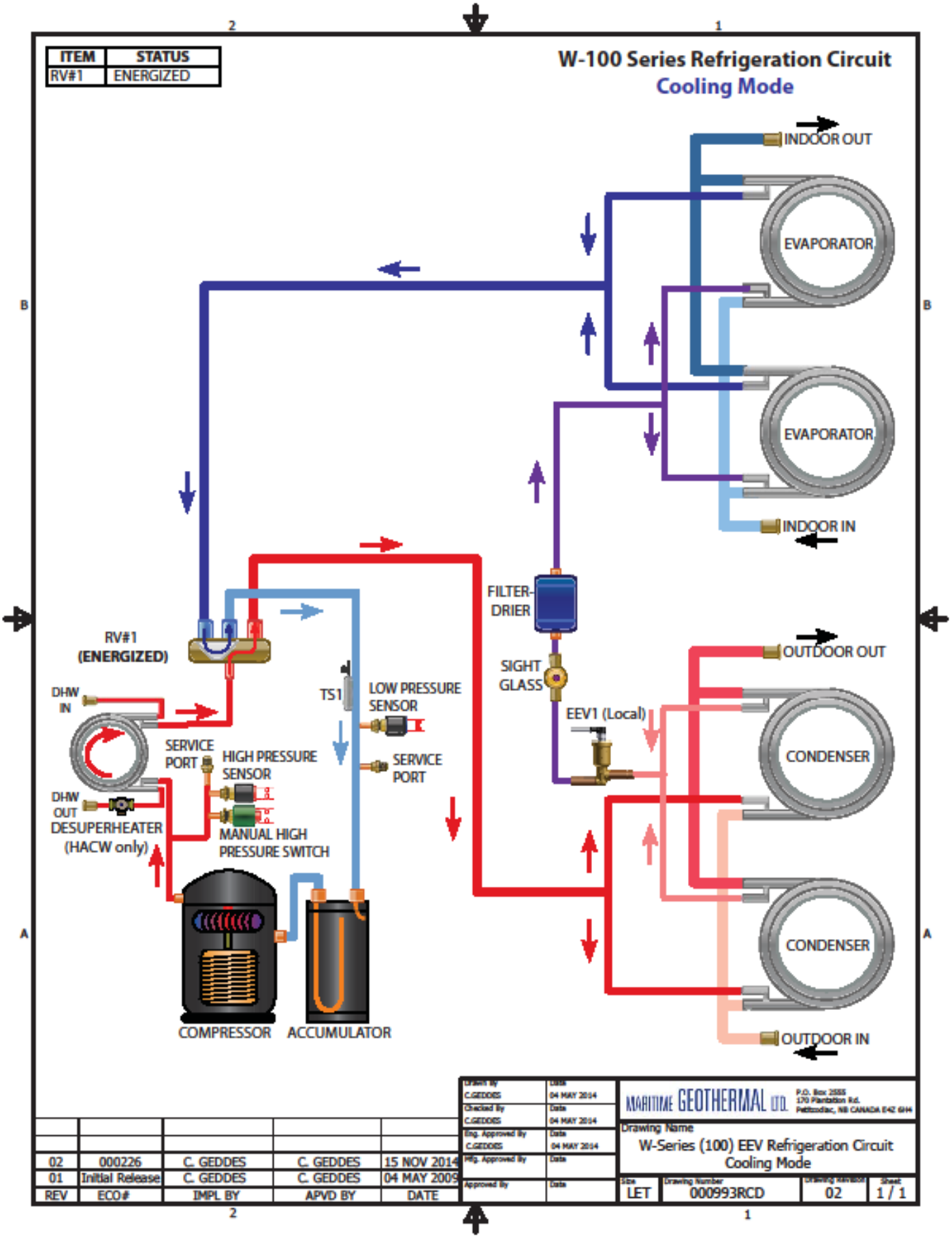
Drawing Name			
W-100-H***-*-*S-** Electrical Box Diagram			
Size	Drawing Number	Drawing Rev	Sheet
A	001904ELB	01	1 of 1

ELECTRICAL DIAGRAMS (continued)


ITEM
STATUS
RV#1
DE-ENERGIZED
W-100 Series Refrigeration Circuit
Heating Mode
INDOOR OUT
CONDENSER
CONDENSER
INDOOR IN
FILTER-DRIER
SIGHT GLASS
EEV1 (Local)
OUTDOOR OUT
EVAPORATOR
EVAPORATOR
OUTDOOR IN
RV#1
(DE-ENERGIZED)
DHW IN
DHW OUT
DESUPERHEATER
(HACW only)
SERVICE PORT
HIGH PRESSURE SENSOR
MANUAL HIGH PRESSURE SWITCH
TS1
LOW PRESSURE SENSOR
SERVICE PORT
COMPRESSOR
ACCUMULATOR
02 000226 C. GEDDES C. GEDDES 15 NOV 2014
01 Initial Release C. GEDDES C. GEDDES 04 MAY 2009
REV ECO# IMPL BY APVD BY DATE
Drawn By C.GEDDES Date 04 MAY 2014
Checked By C.GEDDES Date 04 MAY 2014
Eng. Approved By C.GEDDES Date 04 MAY 2014
Mfg. Approved By Date
Approved By Date
MARITIME GEOTHERMAL LTD.
P.O. Box 2555
170 Plantation Rd.
Pettcodiac, NB CANADA E4Z 6H4
Drawing Name
W-Series (100) EEV Refrigeration Circuit
Heating Mode
Size LET
Drawing Number 000992RCD
Revision 02
Sheet 1 / 1


ITEM
STATUS
RV#1
ENERGIZED
W-100 Series Refrigeration Circuit
Cooling Mode
INDOOR OUT
EVAPORATOR
EVAPORATOR
INDOOR IN
FILTER-
DRIER
SIGHT
GLASS
EEV1 (Local)
OUTDOOR OUT
CONDENSER
CONDENSER
OUTDOOR IN
RV#1
(ENERGIZED)
DHW
IN
DHW
OUT
DESUPERHEATER
(HACW only)
SERVICE
PORT
HIGH PRESSURE
SENSOR
MANUAL HIGH
PRESSURE SWITCH
TS1
LOW PRESSURE
SENSOR
SERVICE
PORT
COMPRESSOR
ACCUMULATOR
C.GEDDES 04 MAY 2014
C.GEDDES 04 MAY 2014
C.GEDDES 04 MAY 2014
MARITIME GEOTHERMAL LTD.
P.O. Box 2555
170 Plantation Rd.
Petitcodiac, NB CANADA E4Z 6H4
Drawing Name
W-Series (100) EEV Refrigeration Circuit
Cooling Mode
Size LET
Drawing Number 000993RCD
Drawing Revision 02
Sheet 1 / 1
02 000226 C. GEDDES C. GEDDES 15 NOV 2014
01 Initial Release C. GEDDES C. GEDDES 04 MAY 2009
REV ECO# IMPL BY APVD BY DATE

CAPACITY RATINGS

Heating

W-100-HAC(W) — **Nominal 9 Ton** — **R410a 60 Hz**

Source Data (Outdoor Loop)						Power Consumption			Sink Data (Indoor Loop)					
ELT	Evap. Temp	Flow	LLT	Delta T	HAB	Total		COPh	EWT	Cond. Temp.	Flow	LWT	Delta T	Output
°F	°F	USGPM	°F	°F	BTU/Hr	Watts	Amps*	W/W	°F	°F	USGPM	°F	°F	BTU/Hr
°C	°C	L/s	°C	°C					°C	°C	L/s	°C	°C	
27.0	15	28.0	22.3	4.7	64,291	7381	9.2	**3.55**	95.0	110	28.0	101.5	6.5	**89,483**
-2.8	-9.4	1.74	-5.4	2.6					35.0	43.3	1.74	38.6	3.6	
33.0	20	28.0	27.8	5.2	71,729	7393	9.2	**3.84**	95.0	110	28.0	102.0	7.0	**96,960**
0.6	-6.7	1.74	-2.3	2.9					35.0	43.3	1.74	38.9	3.9	
39.0	25	28.0	33.2	5.8	79,727	7401	9.2	**4.16**	95.0	110	28.0	102.6	7.6	**104,985**
3.9	-3.9	1.74	0.7	3.2					35.0	43.3	1.74	39.2	4.2	
45.0	30	28.0	38.6	6.4	88,322	7409	9.2	**4.49**	95.0	110	28.0	103.2	8.2	**113,608**
7.2	-1.1	1.74	3.7	3.6					35.0	43.3	1.74	39.6	4.6	
50.0	35	28.0	42.9	7.1	97,555	7419	9.3	**4.85**	95.0	110	28.0	103.9	8.9	**122,875**
11.1	1.7	1.74	6.1	3.9					35.0	43.3	1.74	39.9	4.9	
56.0	40	28.0	48.2	7.8	107,463	7434	9.3	**5.24**	95.0	110	28.0	104.6	9.6	**132,836**
14.4	4.4	1.74	9.0	4.3					35.0	43.3	1.74	40.3	5.3	
62.0	45	28.0	53.4	8.6	118,085	7458	9.3	**5.64**	95.0	110	28.0	105.4	10.4	**143,539**
17.8	7.2	1.74	11.9	4.8					35.0	43.3	1.74	40.8	5.8	
68.0	50	28.0	58.6	9.4	129,461	7493	9.3	**6.06**	95.0	110	28.0	106.2	11.2	**155,033**
21.1	10.0	1.74	14.8	5.2					35.0	43.3	1.74	41.2	6.2	

* Amps for 575VAC; multiply by 2.8 for 208VAC, by 1.25 for 460VAC

Compressor: ZP103KCE-TFE (575-3-60)

Cooling

W-100-HAC(W) — **R410a 60 Hz**

Source Data (Indoor Loop)						Power Consumption			Sink Data (Outdoor Loop)					
ELT	Evap. Temp	Flow	LLT	Delta T	HAB	Total		Efficiency	ELT	Cond. Temp.	Flow	LLT	Delta T	Rejection
°F	°F	USGPM	°F	°F	BTU/Hr	Watts	Amps*	EER	°F	°F	USGPM	°F	°F	BTU/Hr
°C	°C	L/s	°C	°C					°C	°C	L/s	°C	°C	
52.0	40	28.0	42.8	9.2	**127,052**	5302	7.4	**24.0**	65.0	80	28.0	75.5	10.5	145,147
11.1	4.4	1.74	6.0	5.1					18.3	26.7	1.74	24.2	5.8	
52.0	40	28.0	43.0	9.0	**123,911**	5609	7.7	**22.1**	70.0	85	28.0	80.4	10.4	143,054
11.1	4.4	1.74	6.1	5.0					21.1	29.4	1.74	26.9	5.8	
52.0	40	28.0	43.3	8.8	**120,732**	5932	8.0	**20.4**	75.0	90	28.0	85.2	10.2	140,978
11.1	4.4	1.74	6.3	4.9					23.9	32.2	1.74	29.6	5.7	
52.0	40	28.0	43.5	8.5	**117,507**	6273	8.2	**18.7**	80.0	95	28.0	90.1	10.1	138,918
11.1	4.4	1.74	6.4	4.7					26.7	35.0	1.74	32.3	5.6	
52.0	40	28.0	43.7	8.3	**114,226**	6636	8.6	**17.2**	85.0	100	28.0	94.9	9.9	136,874
11.1	4.4	1.74	6.5	4.6					29.4	37.8	1.74	35.0	5.5	
52.0	40	28.0	44.0	8.0	**110,881**	7022	8.9	**15.8**	90.0	105	28.0	99.8	9.8	134,847
11.1	4.4	1.74	6.6	4.5					32.2	40.6	1.74	37.7	5.5	
52.0	40	28.0	44.2	7.8	**107,463**	7434	9.3	**14.5**	95.0	110	28.0	104.6	9.6	132,836
11.1	4.4	1.74	6.8	4.3					35.0	43.3	1.74	40.3	5.3	
52.0	40	28.0	44.7	7.3	**100,370**	8349	10.1	**12.0**	105	120	28.0	114.3	9.3	128,864
11.1	4.4	1.74	7.1	4.0					40.6	48.9	1.74	45.7	5.2	

* Amps for 575VAC; multiply by 2.8 for 208VAC, by 1.25 for 460VAC

Compressor: ZP103KCE-TFE (575-3-60)

*MINIMUM AND MAXIMUM OPERATING TEMPERATURES**

Loop	Parameter	Mode	(°F)	(°C)	Notes
Outdoor (Antifreeze)	Minimum ELT	Heating	26	-3	
	Maximum ELT	Heating	80	27	
	Minimum ELT	Cooling	41	5	Flow control valve may be required in Outdoor Loop.
	Maximum ELT	Cooling	113	45	
Indoor (Antifreeze)	Minimum EWT	Heating	43**	6**	Flow control valve may be required in Indoor Loop.
	Maximum EWT	Heating	120	49	
	Minimum EWT	Cooling	41	5	
	Maximum EWT	Cooling	80	27	

* Values in this table are for rated liquid and water flow values.
** Reduce Indoor Loop flow until value is reached for startup if necessary.

Loop	Parameter	Mode	(°F)	(°C)	Notes
Outdoor (Antifreeze)	Minimum ELT	Heating	26	-3	
	Maximum ELT	Heating	80	27	
	Minimum ELT	Cooling	46	8	Flow control valve may be required in Outdoor Loop.
	Maximum ELT	Cooling	113	45	
Indoor (Water)	Minimum EWT	Heating	50**	10**	Flow control valve may be required in Indoor Loop.
	Maximum EWT	Heating	120	49	
	Minimum EWT	Cooling	45	7	
	Maximum EWT	Cooling	80	27	

* Values in this table are for rated liquid and water flow values.
** Reduce Indoor Loop flow until value is reached for startup if necessary.

Loop	Parameter	Mode	(°F)	(°C)	Notes
Outdoor (Water)	Minimum ELT	Heating	43	6	
	Maximum ELT	Heating	80	27	
	Minimum ELT	Cooling	46	8	Flow control valve may be required in Outdoor Loop.
	Maximum ELT	Cooling	113	45	
Indoor (Water)	Minimum EWT	Heating	50**	10**	Flow control valve may be required in Indoor Loop.
	Maximum EWT	Heating	120	49	
	Minimum EWT	Cooling	45	7	
	Maximum EWT	Cooling	80	27	

* Values in this table are for rated liquid and water flow values.
** Reduce Indoor Loop flow until value is reached for startup if necessary.

Loop	Parameter	Mode	(°F)	(°C)	Notes
Outdoor (Water)	Minimum ELT	Heating	43	6	
	Maximum ELT	Heating	80	27	
	Minimum ELT	Cooling	46	8	Flow control valve may be required in Outdoor Loop.
	Maximum ELT	Cooling	113	45	
Indoor (Antifreeze)	Minimum EWT	Heating	43**	6**	Flow control valve may be required in Indoor Loop.
	Maximum EWT	Heating	120	49	
	Minimum EWT	Cooling	41	5	
	Maximum EWT	Cooling	80	27	

* Values in this table are for rated liquid and water flow values.
** Reduce Indoor Loop flow until value is reached for startup if necessary.

BACNet SPECIFICATIONS

The BACNet interface is an MS/TP connection via RS-485 twisted pair.
The connector on the control board is a three wire removable screw connector. The signals are as follows:
A: Communications line (+)
B: Communications line (-)
C: Ground connection

The following tables provide a list of the available objects along with a description of each.

BACNet OBJECTS - CONTROL (READ/WRITE)				
Name	**Data Type**	**Property**	**Units**	**Description**
TSTAT_Y1A	Binary Input	Present Value	-	Control signal to start / stop stage 1 (active is on)
TSTAT_O	Binary Input	Present Value	-	Control Signal to switch between heating and cooling mode (active in cooling mode)
Note: object names may be subject to change without prior notice.				

BACNet OBJECTS - ALARMS (READ ONLY)				
Name	**Data Type**	**Property**	**Units**	**Description**
LPS1	Analog Input	Alarm	-	Stage 1 low pressure alarm (suction pressure)
HPS1	Analog Input	Alarm	-	Stage 1 high pressure alarm (discharge pressure)
PM1	Analog Input	Alarm	-	Stage 1 phase monitor alarm
PERM1	Analog Input	Alarm	-	Stage 1 permanent lockout alarm
ODFLO	Analog Input	Alarm	-	Outdoor loop flow alarm
IDFLO	Analog Input	Alarm	-	Indoor loop flow alarm
Note: objects may be subject to change without prior notice.				

BACNet OBJECTS - DATA (READ ONLY)				
Name	**Data Type**	**Property**	**Units**	**Description**
HP_MODEL	Analog Value	Description	-	Heat pump model, ie “W-100-H-P-5S-PP-01”
HP_SERIAL	Analog Value	Description	-	Heat pump serial number ie “6500-01-13”
FIRM_REV	Analog Value	Description	-	Firmware revision ie “Firmware REV 01
LPS1	Analog Input	Present Value	PSIG (kPa)	Stage 2 low pressure value (suction pressure)
HPS1	Analog Input	Present Value	PSIG (kPa)	Stage 2 high pressure value (discharge pressure)
TS1	Analog Value	Present Value	degF (degC)	Stage 2 suction line temperature
SH_TS1	Analog Value	Present Value	degF (degC)	Stage 2 superheat
EEV1_POS	Analog Output	Present Value	%	Stage 2 EEV position (% open)
AMPS1	Analog Input	Present Value	A	Stage 2 compressor current draw (AI0)
Note: objects may be subject to change without prior notice.				

General

The liquid source reversing water-to-water heat pump shall be a single packaged reverse-cycle heating/cooling unit, with desuperheating circuit for domestic hot water production (HACW only). The unit shall be listed by a nationally recognized safety-testing laboratory or agency, such as ETL Testing Laboratory, Underwriters Laboratory (UL), or Canadian Standards Association (CSA). The unit shall be rated in accordance with applicable standards of the Air Conditioning, Heating, and Refrigeration Institute / International Standards Organization (AHRI/ISO) and/or Canadian Standards Association (CSA). The liquid source water to water heat pump unit, as manufactured by Maritime Geothermal, Petitcodiac, New Brunswick, shall be designed to operate correctly within liquid temperature ranges specified on the “Minimum and Maximum Operating Temperatures” page of this engineering specification document.

Factory Quality

Each unit shall be run tested at the factory with water circulating in both indoor and outdoor loops. Quality control system checks shall include: computerized nitrogen pressurized leak test, evacuation of refrigeration circuit to sustained vacuum, accurate system charge, detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail criteria. Units tested without water flow are not acceptable. The units shall be warranted by the manufacturer against defects in materials and workmanship for a period of one (1) year from startup or one year plus 60 days from shipment. Optional extended factory warranty coverage shall be available.

Cabinet

Each unit shall be enclosed in a sheet metal cabinet. Cabinet shall be constructed of painted galvanized sheet metal of minimum 20 gauge. Sheet metal gauge shall be higher where structurally required. Design and construction of cabinet shall be such that it is rigid and passes the CSA/UL Loading Test requirements (200 lb roof test and 25 lb guard test). All panels shall be lined with minimum 1/2 inch [12.7 mm] thick acoustic type glass fiber insulation. All insulation shall meet the fire retardant provisions of NFPA 90A. This material shall also provide acoustical benefit. The unit must have a minimum of three access panels for serviceability of the compressor compartment. Units having only one access panel to compressor/heat exchangers/expansion device/refrigerant piping shall not be acceptable. The electrical box shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. All factory-installed wiring passing through factory knockouts and openings shall be protected from sheet metal edges at openings by plastic grommets.

Refrigerant Circuit

All units shall contain only one sealed refrigerant circuit, containing a hermetic motor scroll compressor, bidirectional electronic expansion valve, reversing valve, coaxial heat exchangers, factory installed high and low pressure safety switches, service ports, liquid line filter dryer, sight glass, desuperheating heat exchanger (HACW only), and suction accumulator.

Compressor shall be specified for heat pump duty with internal isolation consisting of rubber vibration isolators. Compressor motor shall have internal overload protection. Compressor shall be mechanically isolated from rest of refrigerant circuit by suction and discharge vibration absorbers. Piping shall be protected from resonant vibration through use of a discharge muffler specifically designed to reduce gas pulsations or equivalent. Compressor shall be equipped with a crankcase/sump heater to prevent liquid refrigerant migration during the off cycle and subsequent flooded starts.

The water to refrigerant heat exchangers shall consist of a steel outer jacket with twisted copper inner tube, designed and certified for 600 psig [4136 kPa] working pressure on the refrigerant side and 450 psig [3108 kPa] on the water side. Heat exchangers headered together in parallel shall use a reverse-return or symmetrical arrangement on the water side and symmetrical arrangement on the refrigerant side to ensure even flow splitting. Heat exchangers shall be insulated over all of their outside surface with minimum 3/8” thick closed cell insulation. Insulation consisting of 1/8” closed-cell insulating tape shall not be acceptable.

The electronic expansion valve shall be of stepper-motor rather than pulsing type, and shall provide proper superheat control over the unit’s operating range with minimal deviation from superheat setpoint. The valve shall operate bidirectionally without the use of check valves. The valve shall be controlled by an electronic superheat controller which provides operator-adjustable superheat and real-time LED/LCD display of current superheat. Superheat shall be determined through the suction pressure-temperature method. Externally mounted pressure controlled water regulating flow valves or thermostatic expansion valve (TXV) in place of an electronic expansion valve are not acceptable.

The following paragraph applies only to HACW models only. The desuperheating circuit for domestic hot water production shall consist of a double-wall refrigerant to water heat exchanger, designed so that any escaped refrigerant will enter the ambient air and not the domestic hot water circuit. Heat exchanger shall be designed for minimal refrigerant pressure drop, and shall not be oversized in order to maintain primary heating output when heating domestic hot water from the temperature of its cold water source. Domestic hot water circuit shall include a circulating pump wired so that it does not require additional controls. Domestic hot water circuit shall include a temperature switch to turn off domestic hot water production when the domestic water out temperature exceeds 140 degrees Fahrenheit.

The suction accumulator shall be insulated with minimum 3/8" thick closed cell insulation to prevent condensation. The accumulator's internal oil return port shall be sized properly for the unit's operating range. To ensure proper oil return, suction accumulator shall not be 'oversized'.

Piping and Connections

The unit shall have one set of primary water in and water out connections. The primary connection type shall be 1-1/4" nominal female National Pipe Thread (NPT). Domestic hot water (desuperheater) water connectors shall be ½" nominal female National Pipe Thread (NPT) (HACW only) All water connectors shall be rigidly mounted to cabinet with corrosion resistant fasteners to prevent relative movement. All water connectors shall be constructed of copper or brass material for corrosion resistance.

All internal water and refrigerant piping shall be insulated with minimum 3/8" thick closed cell insulation. Insulation consisting of 1/8" closed-cell insulating tape shall not be acceptable.

Electrical

Controls and safety devices shall be factory wired and mounted within the unit. Controls shall include 24 volt alternating current (24VAC) activated compressor contactors, 24VAC 100VA transformer with built in circuit breaker or fused on both primary and secondary sides, and 24VAC reversing valve coil. A terminal strip with screw in terminals shall be provided for field control wiring. Units shall be name-plated for use with time delay fuses or circuit breakers. Unit controls shall be 24VAC and provide heating or cooling as required by the remote thermostat or controller. 3-phase protection shall be present in each unit to protect the compressor against loss of phase and reverse rotation. 3-phase protection shall be factory installed. Unit shall have dry contacts for controlling loop circulating pumps via an external 24VAC contactor. Unit shall provide remote fault indication to the thermostat via a 24VAC trouble signal.

Unit Control

The control system shall have the following features:

1. Anti-short cycle time delay on compressor operation. Time delay shall be a minimum of 5 minutes, for both thermostat demand and safety control reset starts. A test jumper shall be provided to disable this delay for unit commissioning and testing purposes.
2. Random compressor start delay of 0-120 seconds (in addition to 5 minute anti-short cycle timer) on unit power up to facilitate starting multiple units on one disconnect switch or after a power failure.
3. Compressor shutdown for high or low refrigerant pressures.
4. Automatic intelligent reset: unit shall automatically restart 5 minutes after trip if the fault has cleared. Should a fault reoccur 3 times sequentially then permanent lockout shall occur, requiring cycling of the power to the unit in order to reset.
5. Manual reset high pressure in case of electronic board failure.
   The low pressure shall not be monitored for the first 90 seconds after a compressor start to prevent nuisance safety trips.

Maritime Geothermal works continually to improve its products. As a result, the design and specifications of any product may be changed without notice. Please contact Maritime Geothermal at 1-506-756-8135 or visit www.nordicghp.com for latest design and specifications. Purchaser's approval of this data set signifies that the equipment is acceptable under the provisions of the job specification. Statements and other information contained herein are not express warranties and do not form the basis of any commercial contract or other agreement between any parties, but are merely Maritime Geothermal's statement of opinion regarding its products.

LIMITED WARRANTY

MARITIME GEOTHERMAL LTD. warrants that its commercial geothermal heat pumps shall be free from defects in materials and workmanship for a period of ONE (1) YEAR after the date of installation or for a period of ONE (1) YEAR AND SIXTY (60) DAYS after the date of shipment, whichever occurs first. This warranty covers all internal components of the heat pump.

MARITIME GEOTHERMAL LTD. shall, at its option, repair or replace any part covered by this warranty. Defective parts shall be returned to MARITIME GEOTHERMAL LTD., transportation charges prepaid. Replacement or repaired parts and components are warranted only for the remaining portion of the original warranty period.

This warranty is subject to the following conditions:

1. The geothermal heat pump must be properly installed and maintained in accordance with MARITIME GEOTHERMAL LTD. guidelines.

2. The installer must complete the **Startup Record** and return it to MARITIME GEOTHERMAL LTD. within 21 days of unit installation.

3. For new construction, it is the responsibility of the building or general contractor to supply temporary heat to the structure prior to occupancy. Geothermal heat pumps are designed to provide heat only to the completely finished and insulated structure. Startup of the unit shall not be scheduled prior to completion of construction and final duct installation for validation of this warranty.

4. It is the customer's responsibility to supply the proper quantity and quality of water or properly sized ground loop with adequate freeze protection.

If a geothermal heat pump manufactured by MARITIME GEOTHERMAL LTD. fails to conform to this warranty, MARITIME GEOTHERMAL LTD.'s sole and exclusive liability shall be, at its option, to repair or replace any part or component which is returned by the customer during the applicable warranty period set forth above, provided that (1) MARITIME GEOTHERMAL LTD. is promptly notified in writing upon discovery by the customer that such part or component fails to conform to this warranty; (2) the customer returns such part or component to MARITIME GEOTHERMAL LTD., transportation charges prepaid, within (30) thirty days of failure, and (3) MARITIME GEOTHERMAL LTD.'s examination of such component discloses to its satisfaction that such part or component fails to conform to this warranty and the alleged defects were not caused by accident, misuse, neglect, alteration, improper installation, repair or improper testing. MARITIME GEOTHERMAL LTD. will not be responsible for any consequential damages or labour costs incurred. In additional, MARITIME GEOTHERMAL LTD. will not be responsible for the cost of replacement parts purchased from a third party.