



# Engineering Specification

## **WC-16-H-C-\*D-\*\***

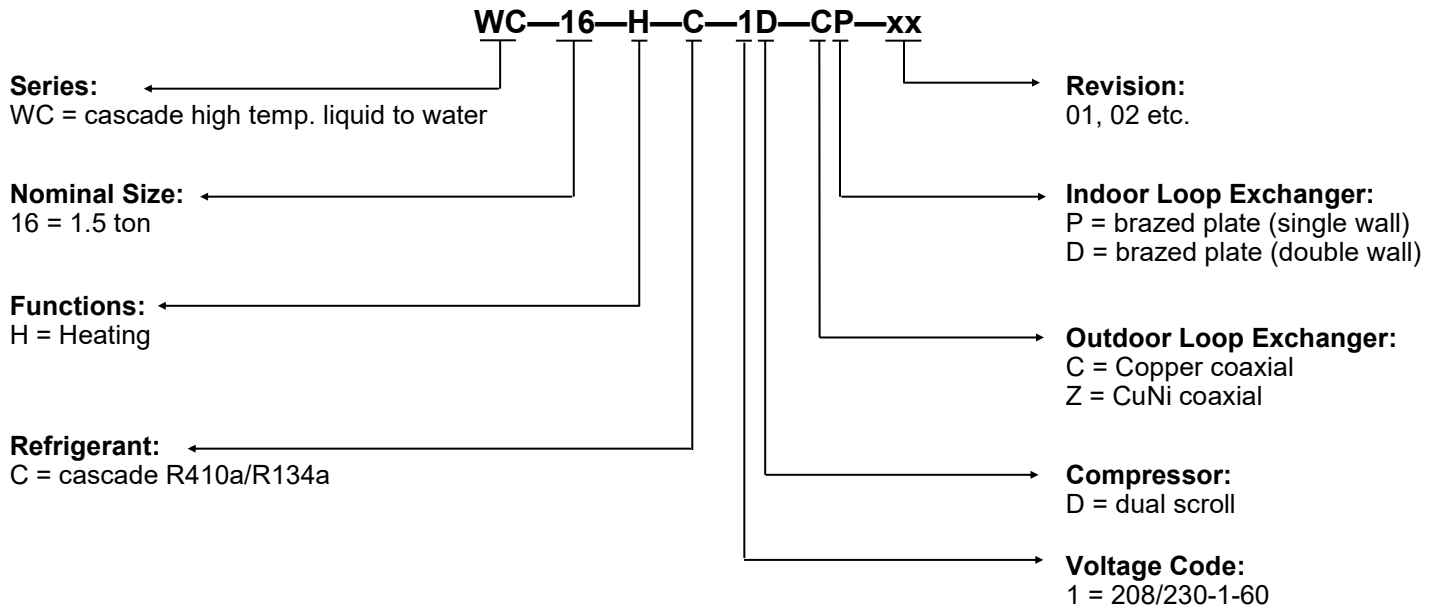
High Temperature Cascade Water to Water Heat Pump  
60 Hz



Maritime Geothermal Ltd.  
P.O. Box 2555, 170 Plantation Road  
Petitcodiac, NB E4Z 6H4  
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**002242SPC-02**

# Model Nomenclature



| APPLICATION TABLE |          |             |         |            |              |             |           |  |  |  |
|-------------------|----------|-------------|---------|------------|--------------|-------------|-----------|--|--|--|
| MODEL SIZE        | FUNCTION | REFRIGERANT | VOLTAGE | COMPRESSOR | OUTDOOR COIL | INDOOR COIL | REVISIONS |  |  |  |
| WC-16             | H        | C           | 1       | D          | C<br>Z       | P<br>D      | 04        |  |  |  |

This manual applies only to the models and revisions listed in this table.

# Design Features

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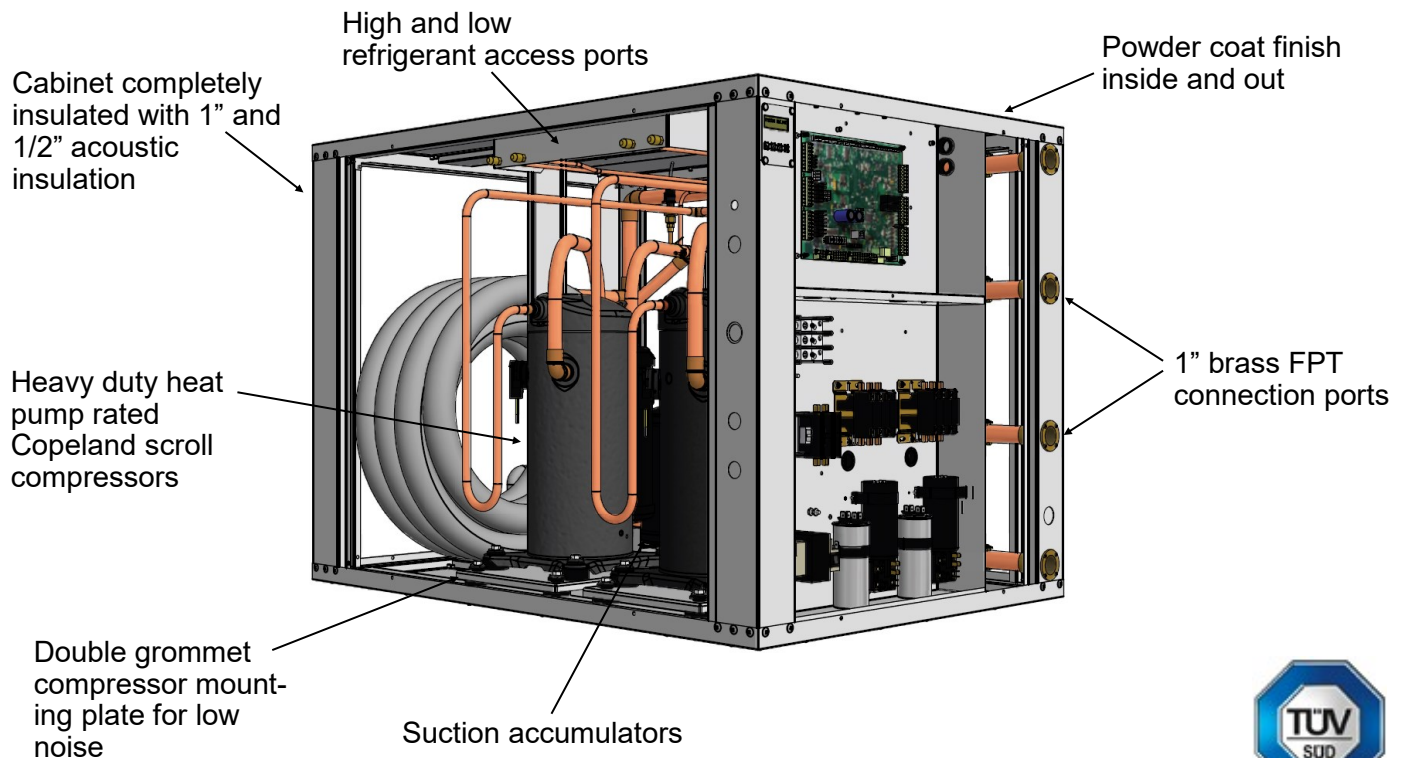
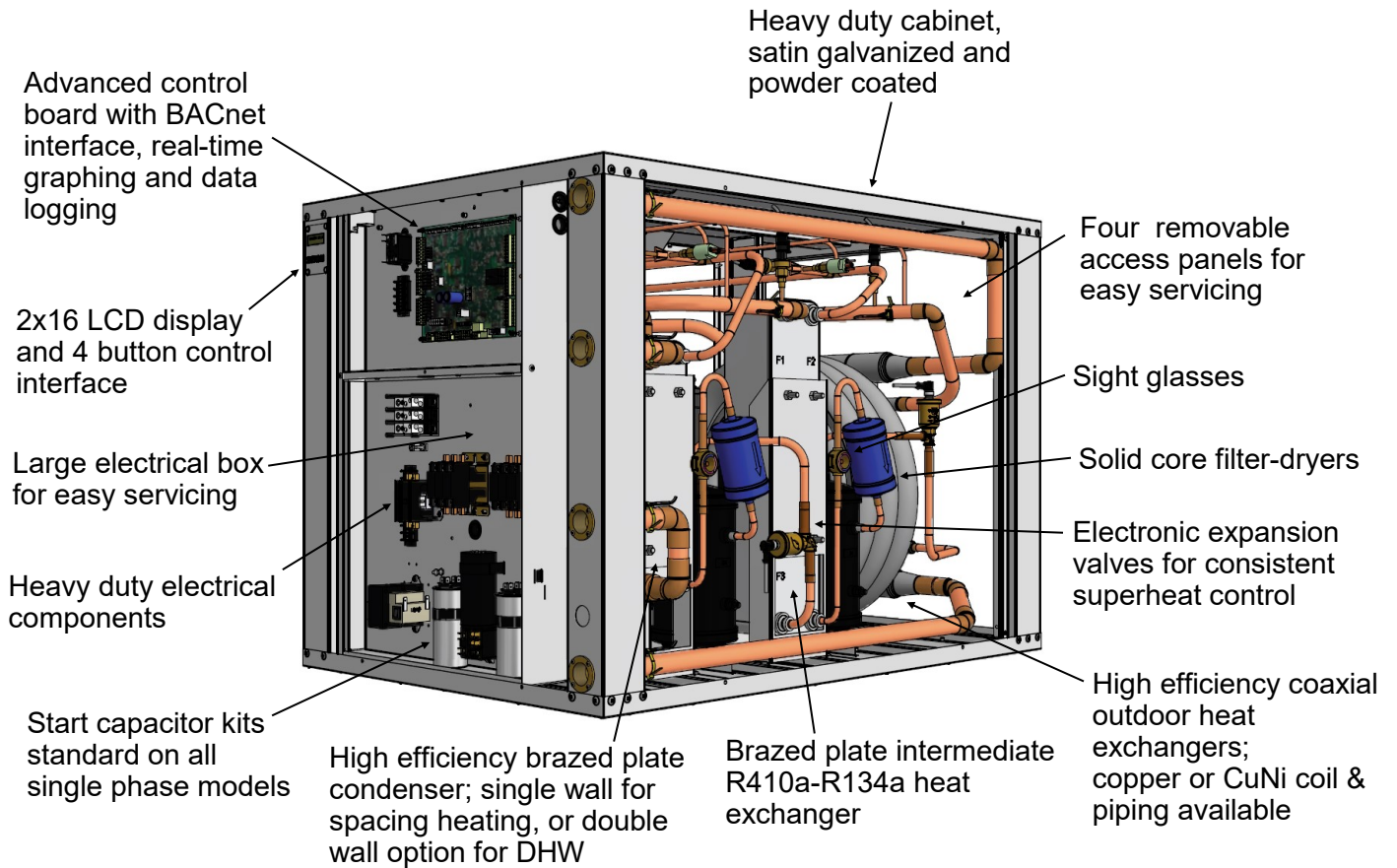
- Two refrigerant circuits, with each doing half the temperature lift; results in a true geothermal unit that can heat water to 160° F / 71° C on the indoor loop
- Lower-temp R410a and higher-temp R134a circuits exchange heat through an intermediate brazed plate heat exchanger
- Two Copeland scroll compressors with start capacitor kits on single phase models
- Outdoor loop: coaxial heat exchanger, with CuNi option available
- Indoor loop: brazed plate condenser, with double wall option available for direct heating of domestic hot water
- 18/20ga satin galvanized cabinet with reinforcing channel stiffeners, powder coat finish
- Acoustically insulated cabinet (1" and 1/2" thick)
- Completely insulated heat exchangers and piping
- Four removable access panels
- Refrigeration service ports located inside unit (1/4" Schrader)
- Oversized electrical box for clarity and easy service
- Component layout allows easy access for service
- 1" Brass FPT fittings for Outdoor Loop and Indoor Loop connections
- Dual grommet mounting system for compressors reduces noise and vibration
- Suction line accumulators
- Liquid line filter-dryers
- Liquid line sight glasses
- Electronic Expansion Valves (EEVs)
- Refrigerant high and low pressure sensors
- Suction line temperature sensors
- Manual reset high pressure controls
- Temperature sensors on all 4 water lines
- Control transformer with resettable breaker or fuse protection
- 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 (0-5VDC or 4-20mA) with onboard 5VDC, 12VDC and 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 standalone operation with outdoor reset functionality (requires outdoor temperature sensor accessory)
- Random start on power up (0-2 minutes)
- TUV listed for electrical certification

## Available Accessories

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- Hydronic buffer tank with 12, 15, or 20kW of electric backup elements
- Circulator pump module with loop / unit isolation valves (230VAC) for ground loop applications
- Barbed P/T port adapters for heat pump
- Anti-vibration pad for under unit
- Compressor sound jackets
- Secure Start modules
- 1" water valve (slow closing or solenoid) & wiring harness for open loop applications
- CuNi heat exchanger option for outdoor loop
- Double wall condenser option for direct domestic hot water heating
- Outdoor temperature sensor with enclosure, for outdoor reset functionality
- Compressor current sensors

# Design Features



# Specifications

| Electrical Specifications |              |     |     |                    |     |                    |     |             |      |      |              |           |
|---------------------------|--------------|-----|-----|--------------------|-----|--------------------|-----|-------------|------|------|--------------|-----------|
| Code                      | Power Supply |     |     | Compressor (R410a) |     | Compressor (R134a) |     | Circulators | FLA  | MCA  | Max. Breaker | Min. Wire |
|                           | V-ø-Hz       | MIN | MAX | RLA                | LRA | RLA                | LRA | Max A       | Amps | Amps | Amps         | ga        |
| 1                         | 208/230-1-60 | 187 | 253 | 9.0                | 46  | 8.3                | 13  | 5.0         | 17.5 | 24.8 | 30           | #10-2*    |

\*one additional conductor required if connecting 115VAC circulators to unit.

| Refrigerant Charge |       |     |       |     |
|--------------------|-------|-----|-------|-----|
| MODEL              | R410a |     | R134a |     |
|                    | lb.   | kg  | lb.   | kg  |
| WC-16              | 3.0   | 1.4 | 3.0   | 1.4 |

Refrigerant charge is subject to revision; actual charge is indicated on the unit nameplate.  
POE oil capacity is marked on the compressor label.

| Shipping Information |                    |                    |         |         |
|----------------------|--------------------|--------------------|---------|---------|
| MODEL                | WEIGHT<br>lb. (kg) | DIMENSIONS in (cm) |         |         |
|                      |                    | L                  | W       | H       |
| WC-16                | 345 (157)          | 46 (117)           | 36 (91) | 35 (89) |

| WC-Series Operating Temperature Limits |         |             |          |         |   |
|--|---------|-------------|----------|---------|---|
| Loop                                   | Mode    | Parameter   | (°F)     | (°C)    | Note  |
| Indoor                                 | Heating | Minimum EWT | 70 - 110 | 21 - 43 | Use formula (Outdoor ELT + 20°F) or (Outdoor ELT + 11°C).           |
|  | Heating | Maximum LWT | 160      | 71      |   |
| Outdoor (Water)                        | Heating | Minimum ELT | 39       | 4       |   |
|  | Heating | Maximum ELT | 70       | 21      | Reduce flow above this temp. to limit refrigerant suction pressure. |
| Outdoor (Antifreeze)                   | Heating | Minimum ELT | 23       | -5      | Adequate antifreeze protection required.                            |
|  | Heating | Maximum ELT | 70       | 21      | Reduce flow above this temp. to limit refrigerant suction pressure. |

Values in this table are for rated liquid flow values.  
EWT - Entering Water Temp., LWT - Leaving Water Temp., ELT - Entering Liquid Temp., LLT - Leaving Liquid Temp.

| Pressure Drop Data |     |      | INDOOR<br>Single wall option<br>(water 140°F) |     | INDOOR<br>Double wall option<br>(water 140°F) |     | OUTDOOR<br>(water 50°F) |     | OUTDOOR<br>(15% methanol<br>32°F) |     | OUTDOOR<br>(35% propylene<br>glycol 32°F) |     |
|--------------------|-----|------|---|-----|---|-----|-------------------------|-----|-----------------------------------|-----|---|-----|
|                    | gpm | L/s  | psi   | kPa | psi   | kPa | psi                     | kPa | psi                               | kPa | psi                                       | kPa |
| WC-16              | 4   | 0.25 | 0.9   | 5.9 | 0.8   | 5.5 | 1.0                     | 6.9 | 1.1                               | 7.6 | 1.7                                       | 12  |
|                    | 5   | 0.32 | 1.3   | 8.9 | 1.2   | 8.3 | 1.5                     | 10  | 1.7                               | 12  | 2.3                                       | 16  |
|                    | 6   | 0.38 | 1.8   | 13  | 1.6   | 11  | 2.1                     | 15  | 2.3                               | 16  | 2.9                                       | 20  |
|                    | 7   | 0.44 | 2.5   | 17  | 2.1   | 14  | 2.7                     | 19  | 3.0                               | 21  | 3.8                                       | 26  |
|                    | 8   | 0.50 | 3.2   | 22  | 2.8   | 19  | 3.4                     | 23  | 3.8                               | 26  | 4.8                                       | 33  |

# Performance Tables

WC-16-H-C-\*D-\*\* 60 Hz, ZP14K5E-PFV / ZR16K5E-PFV

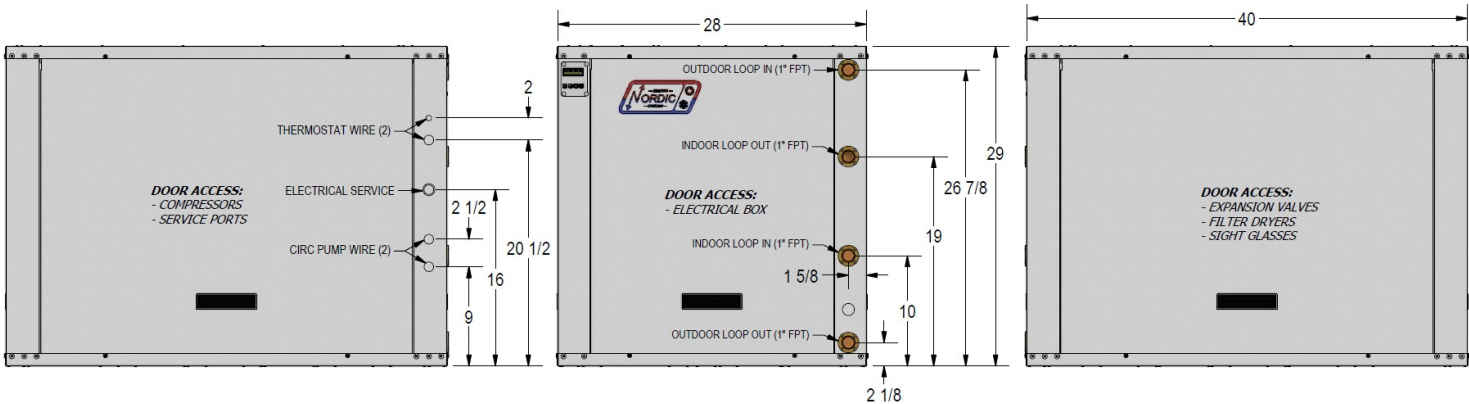
|         | OUTDOOR LOOP (35% Propylene Glycol) |             |            |          |              |                    | ELECTRICAL      | INDOOR LOOP (Water) |             |            |          |              |                  |                  |
|---------|-------------------------------------|-------------|------------|----------|--------------|--------------------|-----------------|---------------------|-------------|------------|----------|--------------|------------------|------------------|
|         | ELT (°F)                            | Evap. Temp. | Flow (gpm) | LLT (°F) | Delta T (°F) | Heat Abs. (Btu/hr) | Input Power (W) | EWT (°F)            | Cond. Temp. | Flow (gpm) | LWT (°F) | Delta T (°F) | Heating (Btu/hr) | COP <sub>H</sub> |
| HEATING | 25                                  | 14          | 6.0        | 22       | 3.1          | 8,600              | 1,840           | 115                 | 123         | 6.0        | 120      | 4.9          | 14,900           | 2.38             |
|         | 30                                  | 18          | 6.0        | 27       | 3.4          | 9,600              | 1,870           | 115                 | 123         | 6.0        |          | 5.4          | 16,000           | 2.50             |
|         | 35                                  | 23          | 6.0        | 31       | 3.7          | 10,200             | 1,930           | 114                 | 125         | 6.0        |          | 5.6          | 16,800           | 2.56             |
|         | 40                                  | 27          | 6.0        | 36       | 4.0          | 10,900             | 1,980           | 114                 | 125         | 6.0        |          | 5.9          | 17,700           | 2.62             |
|         | 45                                  | 32          | 6.0        | 41       | 3.9          | 11,600             | 2,050           | 114                 | 127         | 6.0        |          | 6.2          | 18,600           | 2.67             |
|         | 50                                  | 37          | 6.0        | 46       | 4.2          | 12,700             | 2,100           | 113                 | 128         | 6.0        |          | 6.7          | 19,900           | 2.77             |
|         | 25                                  | 14          | 6.0        | 22       | 3.2          | 8,800              | 2,110           | 135                 | 143         | 6.0        | 140      | 5.3          | 16,000           | 2.22             |
|         | 30                                  | 19          | 6.0        | 27       | 3.4          | 9,600              | 2,150           | 134                 | 144         | 6.0        |          | 5.7          | 17,000           | 2.31             |
|         | 35                                  | 24          | 6.0        | 31       | 3.6          | 10,000             | 2,200           | 134                 | 145         | 6.0        |          | 5.9          | 17,500           | 2.34             |
|         | 40                                  | 28          | 6.0        | 36       | 3.8          | 10,500             | 2,250           | 134                 | 145         | 6.0        |          | 6.0          | 18,200           | 2.37             |
|         | 45                                  | 32          | 6.0        | 41       | 3.8          | 11,200             | 2,340           | 134                 | 146         | 6.0        |          | 6.3          | 19,200           | 2.41             |
|         | 50                                  | 36          | 6.0        | 46       | 4.1          | 12,300             | 2,410           | 133                 | 147         | 6.0        |          | 6.9          | 20,500           | 2.49             |
|         | 25                                  | 15          | 6.0        | 22       | 3.1          | 8,600              | 2,470           | 154                 | 165         | 6.0        | 160      | 5.6          | 17,100           | 2.02             |
|         | 30                                  | 19          | 6.0        | 27       | 3.4          | 9,500              | 2,500           | 154                 | 166         | 6.0        |          | 6.1          | 18,000           | 2.11             |
|         | 35                                  | 24          | 6.0        | 32       | 3.5          | 9,900              | 2,560           | 154                 | 167         | 6.0        |          | 6.2          | 18,700           | 2.14             |
|         | 40                                  | 29          | 6.0        | 36       | 3.8          | 10,400             | 2,610           | 154                 | 167         | 6.0        |          | 6.4          | 19,300           | 2.17             |
|         | 45                                  | 33          | 6.0        | 41       | 3.8          | 11,100             | 2,710           | 153                 | 168         | 6.0        |          | 6.7          | 20,400           | 2.20             |
|         | 50                                  | 36          | 6.0        | 46       | 4.1          | 12,200             | 2,790           | 153                 | 169         | 6.0        |          | 7.3          | 21,700           | 2.28             |

## METRIC

|                  | OUTDOOR LOOP (35% Propylene Glycol) |             |            |          |              |               | ELECTRICAL      | INDOOR LOOP (Water) |             |            |          |              |             |                  |
|------------------|-------------------------------------|-------------|------------|----------|--------------|---------------|-----------------|---------------------|-------------|------------|----------|--------------|-------------|------------------|
|                  | ELT (°C)                            | Evap. Temp. | Flow (L/s) | LLT (°C) | Delta T (°C) | Heat Abs. (W) | Input Power (W) | EWT (°C)            | Cond. Temp. | Flow (L/s) | LWT (°C) | Delta T (°C) | Heating (W) | COP <sub>H</sub> |
| HEATING (METRIC) | -3.9                                | -10.0       | 0.38       | -5.6     | 1.7          | 2,500         | 1,840           | 46.2                | 50.3        | 0.38       | 49       | 2.7          | 4,400       | 2.38             |
|                  | -1.1                                | -7.6        | 0.38       | -3.0     | 1.9          | 2,800         | 1,870           | 45.9                | 50.7        | 0.38       |          | 3.0          | 4,700       | 2.50             |
|                  | 1.7                                 | -5.2        | 0.38       | -0.4     | 2.0          | 3,000         | 1,930           | 45.8                | 51.4        | 0.38       |          | 3.1          | 4,900       | 2.56             |
|                  | 4.4                                 | -2.8        | 0.38       | 2.2      | 2.2          | 3,200         | 1,980           | 45.6                | 51.9        | 0.38       |          | 3.3          | 5,200       | 2.62             |
|                  | 7.2                                 | -0.2        | 0.38       | 5.0      | 2.2          | 3,400         | 2,050           | 45.5                | 52.6        | 0.38       |          | 3.4          | 5,500       | 2.67             |
|                  | 10.0                                | 2.6         | 0.38       | 7.6      | 2.4          | 3,700         | 2,100           | 45.2                | 53.1        | 0.38       |          | 3.7          | 5,800       | 2.77             |
|                  | -3.9                                | -9.8        | 0.38       | -5.7     | 1.8          | 2,600         | 2,110           | 57.1                | 61.7        | 0.38       | 60       | 2.9          | 4,700       | 2.22             |
|                  | -1.1                                | -7.2        | 0.38       | -3.0     | 1.9          | 2,800         | 2,150           | 56.8                | 62.1        | 0.38       |          | 3.2          | 5,000       | 2.31             |
|                  | 1.7                                 | -4.7        | 0.38       | -0.3     | 2.0          | 2,900         | 2,200           | 56.7                | 62.5        | 0.38       |          | 3.3          | 5,100       | 2.34             |
|                  | 4.4                                 | -2.1        | 0.38       | 2.3      | 2.1          | 3,100         | 2,250           | 56.6                | 62.8        | 0.38       |          | 3.4          | 5,300       | 2.37             |
|                  | 7.2                                 | 0.1         | 0.38       | 5.1      | 2.1          | 3,300         | 2,340           | 56.5                | 63.2        | 0.38       |          | 3.5          | 5,600       | 2.41             |
|                  | 10.0                                | 2.4         | 0.38       | 7.7      | 2.3          | 3,600         | 2,410           | 56.2                | 64.1        | 0.38       |          | 3.8          | 6,000       | 2.49             |
|                  | -3.9                                | -9.8        | 0.38       | -5.6     | 1.7          | 2,500         | 2,470           | 68.0                | 73.9        | 0.38       | 71       | 3.1          | 5,000       | 2.02             |
|                  | -1.1                                | -7.0        | 0.38       | -3.0     | 1.9          | 2,800         | 2,500           | 67.7                | 74.2        | 0.38       |          | 3.4          | 5,300       | 2.11             |
|                  | 1.7                                 | -4.3        | 0.38       | -0.3     | 2.0          | 2,900         | 2,560           | 67.7                | 74.7        | 0.38       |          | 3.5          | 5,500       | 2.14             |
|                  | 4.4                                 | -1.6        | 0.38       | 2.3      | 2.1          | 3,100         | 2,610           | 67.5                | 74.9        | 0.38       |          | 3.6          | 5,700       | 2.17             |
|                  | 7.2                                 | 0.4         | 0.38       | 5.1      | 2.1          | 3,300         | 2,710           | 67.4                | 75.4        | 0.38       |          | 3.7          | 6,000       | 2.20             |
|                  | 10.0                                | 2.4         | 0.38       | 7.7      | 2.3          | 3,600         | 2,790           | 67.1                | 75.9        | 0.38       |          | 4.0          | 6,400       | 2.28             |

# Dimensions

All dimensions in inches.



**LEFT SIDE:**  
> 24" service access  
clearance required

**FRONT:**  
> 24" service access  
clearance required

**RIGHT SIDE:**  
> 24" service access  
clearance required

**BACK:**  
no clearance required







Electrical Box Layout (208/230-1-60)

SYSTEM CONTROL DESCRIPTION

|  |          |            |
|--|----------|------------|
| System Control by BACNet or External Control Signals |          |            |
| BACNet Object  | External | Activation |
| SYSTEM_Y1A   | Y1A      | Compressor |

BACNet INTERFACE CONNECTIONS (MS/TP RS-485)

Use twisted pair shielded, conductor cable to connect the BACNet connections to the control board connector.  
A - Communication (+)  
B - Communication (-)  
GND - Ground

EXTERNAL CONTROL CONNECTIONS (24VAC)

If using an external aquastat ("Signals" control method), use an 18-3 cable for these right side board connections to control compressor demand:  
RA - 24VAC Hot  
CA - Common (for use with RA to power aquastat)  
Y1A - Compressor  
  
A dry contact connection between R/RA and an external control connection (Y1A) will activate the external control signal input to the control board.

POWER SUPPLY CONNECTIONS

\*NOTE: Neutral (N) is only required if connecting 115VAC circulators.  
The heat pump itself does not require a neutral.

| 208/230/115VAC CONNECTIONS |        |                    |
|----------------------------|--------|--------------------|
| Wire                       | Colour | Contactors (Label) |
| Line 2                     | Red    | L2                 |
| Neutral*                   | White  | N*                 |
| Line 1                     | Black  | L1                 |
| Connect "GND" to Gnd. Lug  |        |                    |

CIRCULATOR CONNECTIONS (230/115VAC)

REFER TO LABEL IN UNIT FOR MAX LOAD (AMPS)  
Connect 115VAC circulators to 115V  
Connect 230VAC circulators to 230V

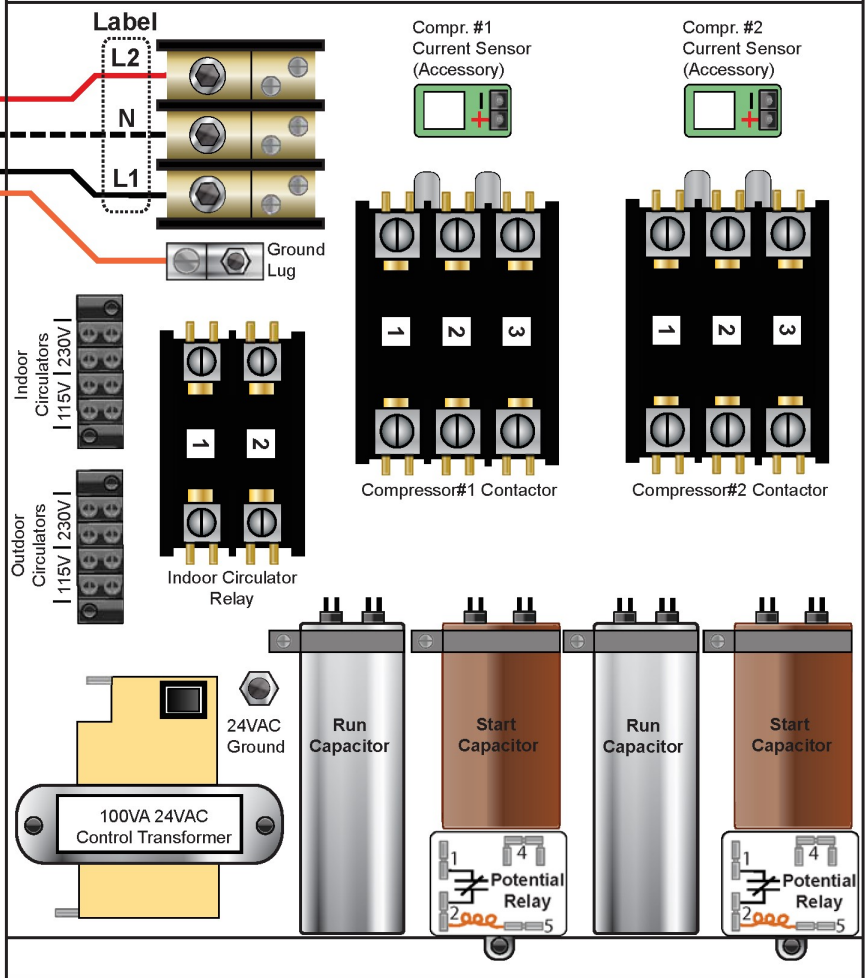
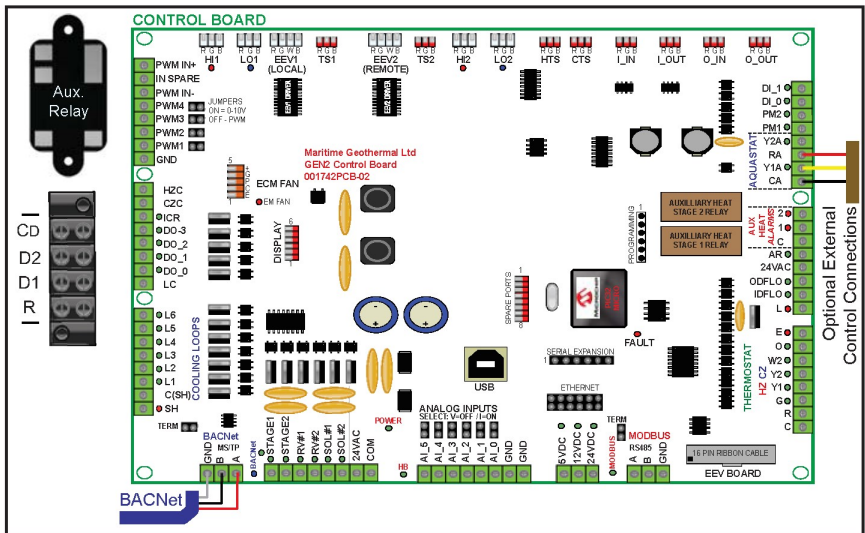
AUXILIARY HEAT CONTROL CONNECTIONS

Use an 18-2 cable.  
Choose one of two types of auxiliary heat connections. In either case, default is "ON".  
**Tank's temperature limiter must remain in place.**  
D2 : Dry contacts, closed during call for auxiliary heat  
D1 :  
  
Cd : To use tank element contactor that has a 24VAC coil, jumper R to D1 and connect contactor coil between D2 and Co.  
D2 :  
D1 :  
R :

NOTE: In case of a control system short or overload, rectify the problem and press the black button on the transformer to reset the built-in breaker.

NOTE: For 208VAC move the red wire connected to the 240 terminal of the transformer to the 208 terminal.

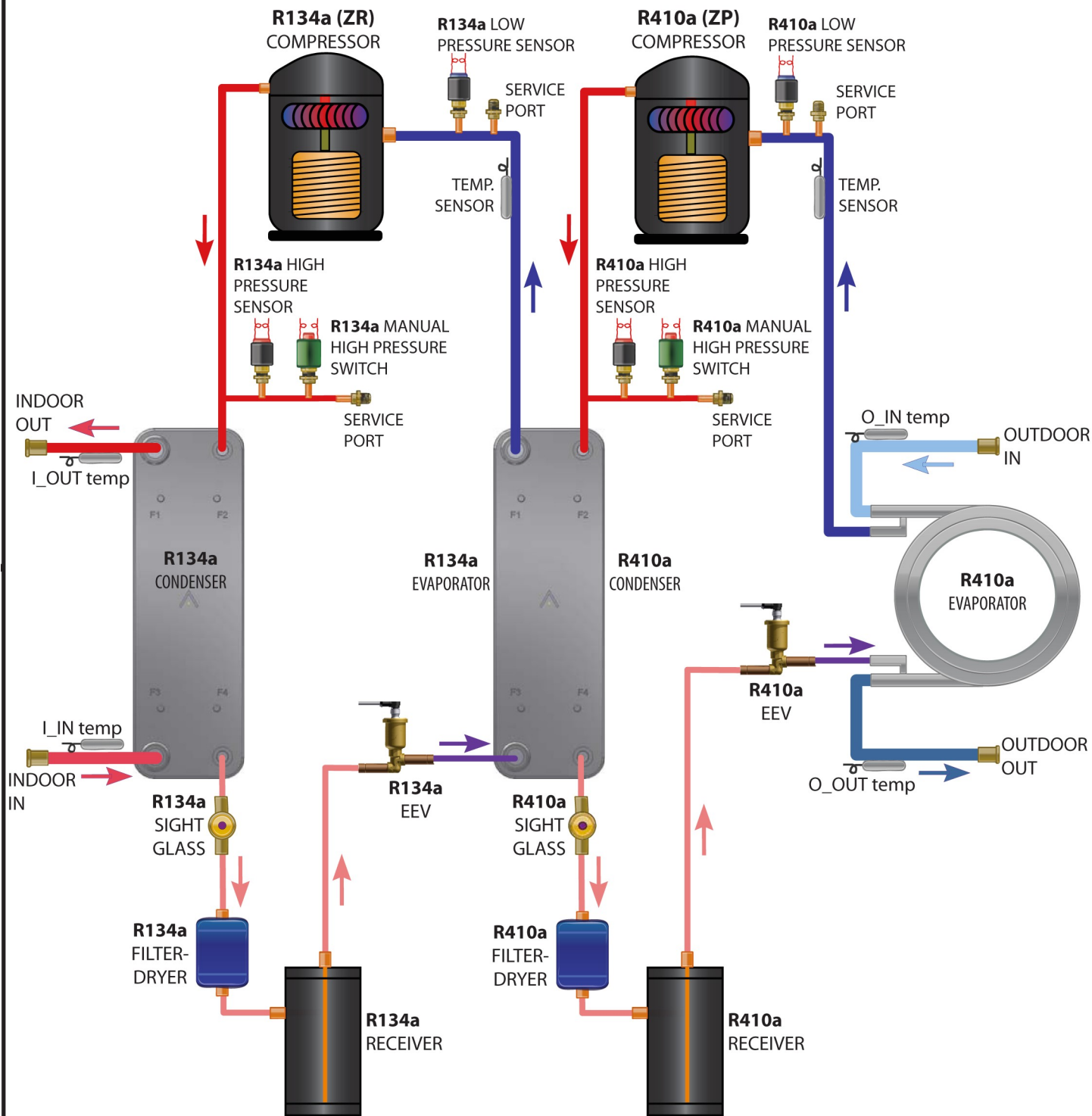
WC-Series Electrical Box Diagram  
208/230-1-60



|     |                 |            |            |             |
|-----|-----------------|------------|------------|-------------|
| 03  | 000297          | D. RHEAULT | D. RHEAULT | 07 JAN 2022 |
| 02  | 000256          | D. RHEAULT | D. RHEAULT | 01 OCT 2017 |
| 01  | Initial Release | C. GEDDES  | C. GEDDES  | 19 JUN 2015 |
| REV | ECO#            | IMPL BY    | APVD BY    | DATE        |

|                               |                             |   |
|-------------------------------|-----------------------------|---|
| Drawn By<br>C. GEDDES         | Date<br>19 JUN 2015         | MARITIME GEOTHERMAL LTD.<br>P.O. Box 2555<br>170 Plantation Rd.<br>Petitcodiac, NB CANADA E4Z 6H4 |
| Checked By<br>C. GEDDES       | Date<br>19 JUN 2015         |   |
| Eng. Approved By<br>C. GEDDES | Date<br>19 JUN 2015         |   |
| Mfg. Approved By              | Date                        |   |
| Approved By                   | Date                        | Drawing Name<br>WC--H-C-1D--** Electrical Box Diagram   |
| Size<br>LET                   | Drawing Number<br>001985ELB | Drawing Rev<br>03   |
|                               |                             | Sheet<br>1 / 1  |

WC-Series Refrigeration Circuit



|     |                 |           |           |             |                          |                     |  |                             |                        |                |
|-----|-----------------|-----------|-----------|-------------|--------------------------|---------------------|--|-----------------------------|------------------------|----------------|
|     |                 |           |           |             | Drawn By<br>DAN RHEULT   | Date<br>22-JUN-2015 | <div>MARITIME GEOTHERMAL LTD.</div> <div>P.O. Box 2555<br/>170 Plantation Rd.<br/>Petitcodiac, NB CANADA E4Z 6H4</div> |                             |                        |                |
|     |                 |           |           |             | Checked By<br>DAN RHEULT | Date<br>22-JUN-2015 |  |                             |                        |                |
|     |                 |           |           |             | Eng. Approved By         | Date                | Drawing Name   |                             |                        |                |
|     |                 |           |           |             |                          |                     | WC-Series Refrigeration Circuit  |                             |                        |                |
|     |                 |           |           |             | Mfg. Approved By         | Date                |  |                             |                        |                |
| 01  | Initial Release | D. RHEULT | D. RHEULT | 22-JUN-2015 | Approved By              | Date                | Size<br>LET  | Drawing Number<br>001996RCD | Drawing Revision<br>01 | Sheet<br>1 / 1 |
| REV | ECO#            | IMPL BY   | APVD BY   | DATE        |                          |                     |  |                             |                        |                |

# BACnet Interface

The BACnet interface is an **MS/TP** connection via RS-485 twisted pair. BACnet **IP** is not available.

Recommended wire: 22-24 AWG single twisted pair, 100-120 Ohms impedance, 17pF/ft or lower capacitance, with braided or aluminum foil shield, such as Belden 9841 or 89841.

The connector on the control board is a three wire removable screw connector. The signals are as follows:

- A: Communications line (+) (right pin)
- B: Communications line (-) (middle pin)
- C: Ground connection (left pin)

If connecting multiple units to one RS-485 connection point, connect the signal cable from the master building controller to the first unit. Connect the second unit to the first unit (in same connector), connect the third unit to the second unit, and so on until all units are connected (daisy-chain). Remove the TERM jumper (located just above the BACnet connector on control board) from all units except the last one. The shield ground should be connected only to the GND pin of the unit for single unit installations. For multiple units, the shield ground should only be connected to the GND pin of the last unit. The shield grounds for intermediate units should be connected together. The shield ground should be left unconnected at the building controller end for all cases.

Vendor: Maritime Geothermal Ltd.  
Vendor ID: 260  
Model Name: MGT GEN2 Control Board

The following parameters can be set  
PC App's *Configuration Window*:

- 1) **Baud rate**  
9600, 19200, 38400, or 76800
- 2) **MAC address**  
Maximum value is 125.
- 3) **Instance number**  
Maximum value is 4194303.

via the

The BACnet parameter **Max\_Master** has a fixed value of **127** in this device.

BACnet data is available regardless of the selected control method. In order to control the unit via the BACnet interface, set **Control Source** to **BACnet** either by using the PC App's configuration window or the LCD menus.

For tables listing BACnet objects, refer to **Installation and Service Manual**.

# Engineering Guide Specifications

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## General

The liquid source water-to-water heat pump shall be a single packaged cascade high temperature heating unit. The unit shall be listed by a nationally recognized safety-testing lab (NRTL), such as ETL, TUV, UL or 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), if any. 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 in accordance with the warranty section at the end of this document. Optional extended factory warranty coverage may be available.

## Cabinet

Each unit shall be enclosed in a sheet metal cabinet. Cabinet shall be constructed of powder coated 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). 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 four 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 two sealed refrigerant circuits, containing hermetic motor scroll compressors, Electronic Expansion Valves (EEVs), coaxial outdoor loop heat exchanger, brazed plate intermediate refrigerant-to-refrigerant and indoor loop heat exchangers, factory installed high and low pressure sensors, manual reset high pressure switches, service ports, liquid line filter-dryers, sight glasses, and suction accumulators.

Compressors shall be specified for heat pump duty with internal isolation consisting of rubber vibration isolators and mounting plate with rubber vibration isolators. Compressor motors shall have internal high temperature overload protection.

The outdoor water to refrigerant heat exchanger shall consist of a steel outer jacket with twisted copper inner tube. The indoor brazed plate heat exchangers shall consist of stainless steel plates and nickel or copper brazing. All heat exchangers shall be 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 valves 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. Superheat shall be determined through the suction pressure-temperature method. Externally mounted pressure controlled water regulating flow valves or thermostatic expansion valves (TXV's) in place of electronic expansion valves are not acceptable.

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" nominal female National Pipe Thread (NPT). 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, and 24VAC 100VA transformer with built in circuit breaker or fused on both primary and secondary sides. 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 as required by the remote thermostat or controller, or on-board controller. Unit shall provide remote fault indication to the control system via serial communications as well as provide fault messages on the front panel LCD display.

## **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. An override shall be provided to disable this delay for unit commissioning and testing purposes.
2. Random compressor start delay of 0-120 seconds on unit power up to facilitate starting multiple units after a power failure.
3. Compressor shutdown for high or low refrigerant pressures, Loss of Charge (LOC), optional low flow conditions, and for optional phase protection faults on three phase models.
4. Automatic intelligent reset: unit shall automatically restart after a trip short cycle delay expires if 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.
6. The low pressure shall not be monitored for the first 90 seconds after a compressor start to prevent nuisance safety trips.
7. 2 x 16 backlit Liquid Crystal Display (LCD) and four buttons provide basic configuration and data access . Unit may be configured for stand alone operation.
8. Universal Serial Bus (USB) port for full data access and diagnostic information, including manual override of all inputs and outputs, data-logging and real-time charting.

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](http://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 addition, MARITIME GEOTHERMAL LTD. will not be responsible for the cost of replacement parts purchased from a third party.