Engineering Specification / Submittal

PC-80-X-*S-T/X-KDER* Pool Conditioner

Pool Room Dehumidifier (R454b)
with Heat Recovery to Air (standard)
with Heat Recovery to Pool Water (option)
with Heat Rejection to Outdoor Unit or Ground Loop (option)

optional outdoor unit for air conditioning

Maritime Geothermal Ltd.
P.O. Box 2555, 170 Plantation Road
Petitcodiac, NB E4Z 6H4
(506) 756-8135

info@nordicghp.com
www.nordicghp.com
003014SPC-01

A2L refrigerant: mildly flammable.

Read ***Application, Installation, and Service Manual*** for precautions and procedures.

Installation of a unit with **A2L** refrigerant may require calculations involving the size of the mechanical room and/or rooms served by the unit. These calculations may affect installation procedures used and ventilation provided, and should be fully understood and considered to ensure code compliance.

Model Nomenclature

PC—80—X—1S—T—KDERS—xx

Series:
PC = Pool Conditioner

Nominal Size:
45 = 031 compressor
55 = 042 compressor
65 = 054 compressor
75 = 061 compressor
80 = 072 compressor

Refrigerant:
X = R454b **[A2L]**

Voltage Code:
1 = 208/230-1-60
2 = 208-3-60
4 = 460-3-60

Compressor:
S = single stage scroll

Revision:
01, 02 etc.

Air Discharge:
S = Side (end)
T = Top (up)
D = Down

Air Return:
R = Right Side

Blower Motor:
E = ECM (Variable Speed)

Blower Type:
D = Direct Drive

Air Coil:
K = Coated

Indoor Loop (Pool) Exchanger:
T = Titanium
X = NONE

AC2—80—X—1—KDE—xx

Series:
AC2 = PC Outdoor Condenser

Nominal Size:
45 = for PC-45
55 = for PC-55
65 = for PC-65
75 = for PC-75
80 = for PC-80

Refrigerant:
X = R454b **[A2L]**

Revision:
01, 02 etc.

Blower Motor:
E = ECM (Variable Speed)

Blower Type:
D = Direct Drive

Air Coil:
S = Standard
K = Coated

Voltage Code:
1 = 208-277VAC, 1ph, 60Hz

APPLICATION/AVAILABILITY TABLE - PC-SERIES

SERIES	SIZE	REFRIGERANT	VOLTAGE	STAGES	INDOOR COIL	AIR COIL/BLOWER/ MOTOR/AIR RETURN	AIR DISCHARGE	REVISIONS			
PC	80	X	1 2 4	S	T X	K D E R	T S D	01			

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

Features

⇒ **PC Series** is a **pool room dehumidifier,** an energy efficient alternative to ventilating air for pool room humidity control

⇒ Rejects its heat to pool water (if equipped, providing all the heat for pool), pool room air, or optional outdoor unit / existing geo-thermal ground loop

⇒ Available with or without pool water coil for heat rejection to pool water

⇒ **AC2-Series outdoor condenser** is optional, to enable air cooling when pool is already heated to desired setpoint

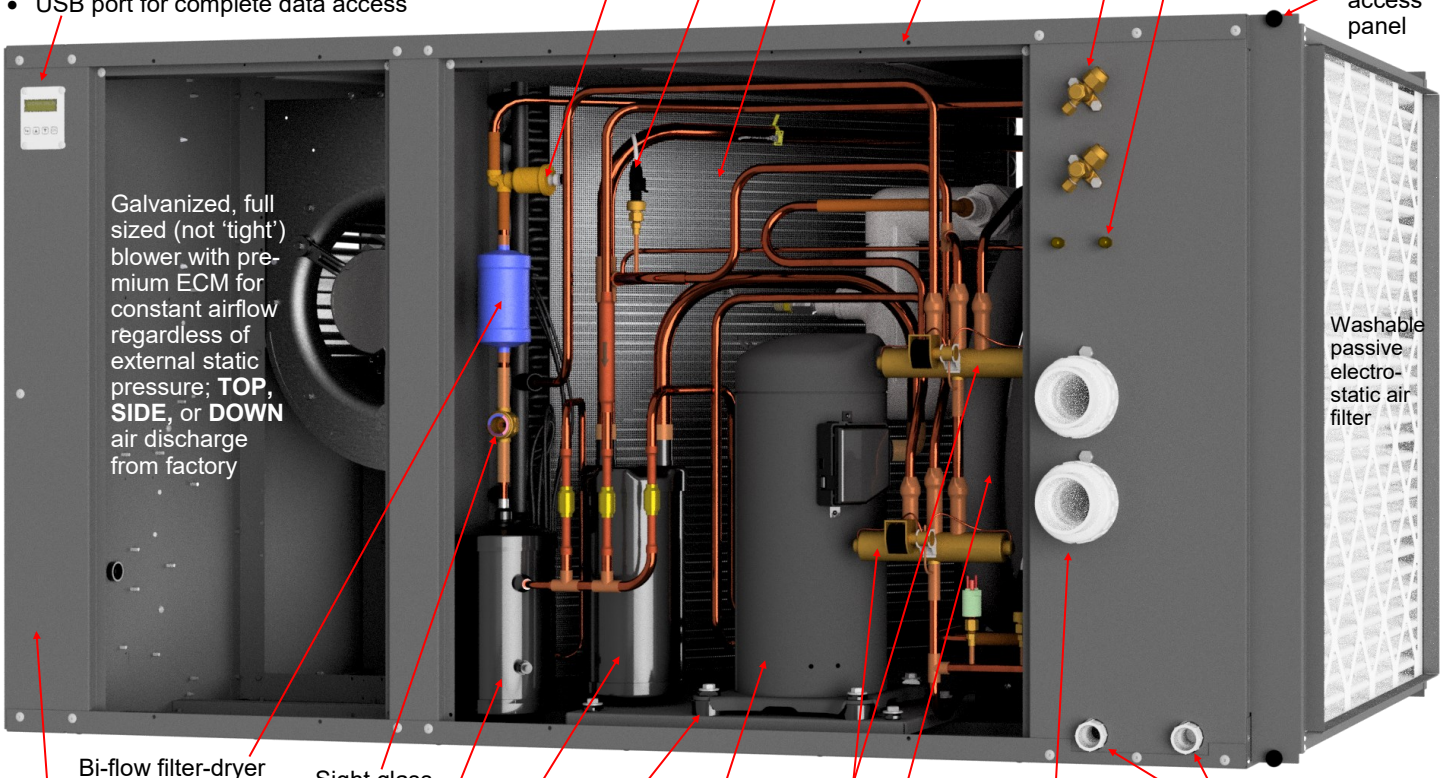
⇒ **R454b** refrigerant (GWP=466) is climate change-friendly. Note that R454b is an A2L.

⇒ Communicating air thermostat with temperature & humidity, and 50 ft. wire, included

⇒ **TUV listed** (CSA/UL/ETL equivalent)

GEN2 Control

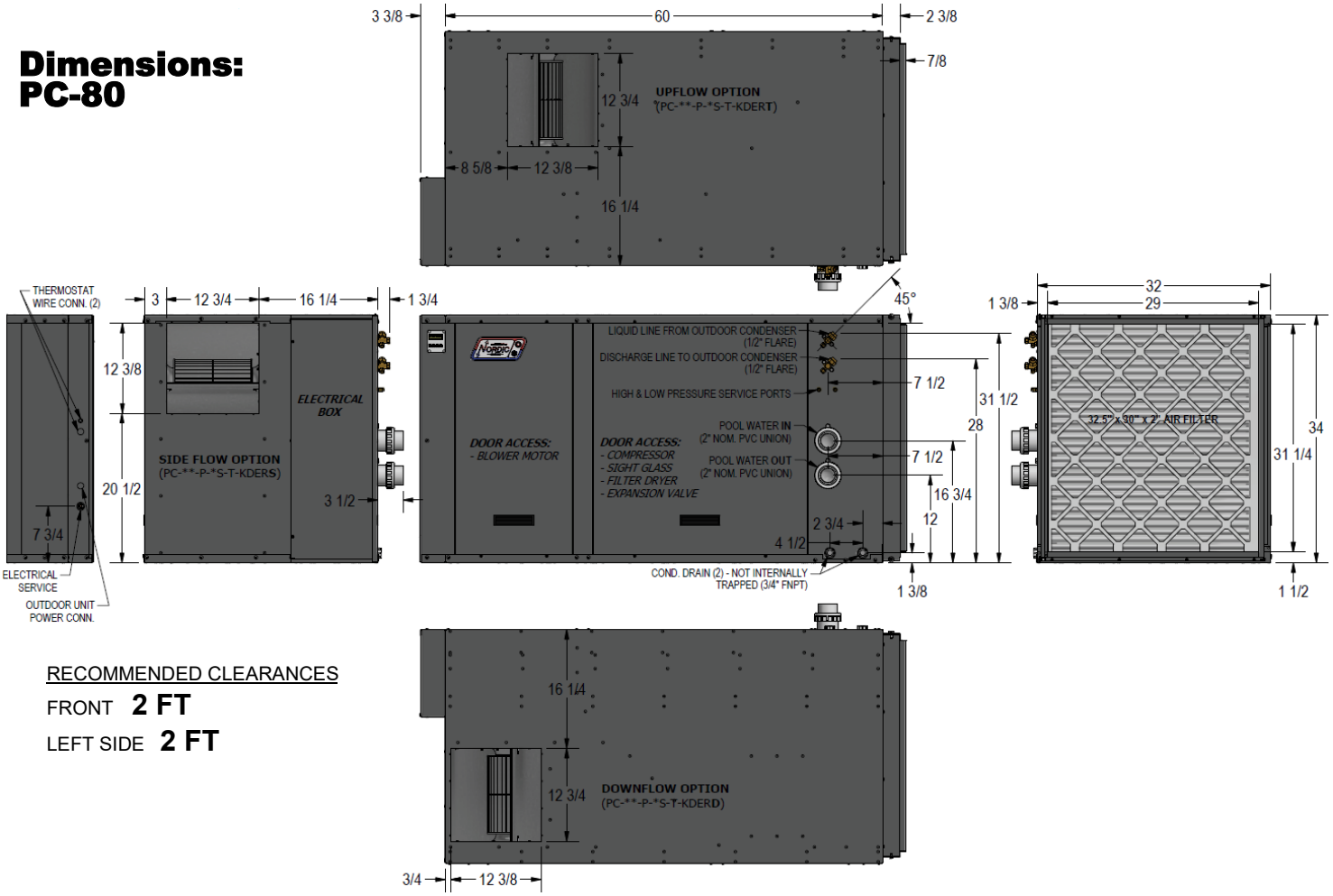
- Dry contacts for air auxiliary heat, with included plenum heater 15 or 20 kW (externally mounted)
- Dry contact to control pool pump, if required
- Dry contacts to control pool auxiliary heat
- Onboard pool water temperature control means no external sensor or aquastat required
- Advanced control board with BACnet MS/TP interface for remote control and data access including all sensor data & alarm conditions
- LCD display/user interface
- USB port for complete data access



Dimensions

All dimensions in inches

Dimensions: PC-80

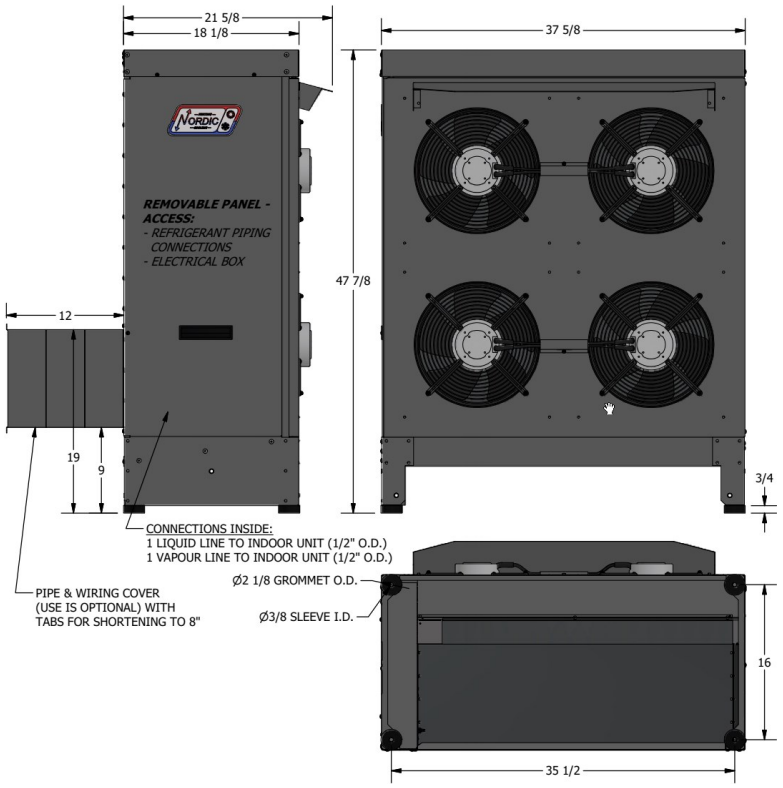


RECOMMENDED CLEARANCES

FRONT **2 FT**

LEFT SIDE **2 FT**

Dimensions: AC2-80



RECOMMENDED CLEARANCES

FRONT **10-16 FT**

BACK SIDE **12”**

LEFT SIDE **2 FT**

Specifications

Shipping Information (PC)				
MODEL	WEIGHT lb. (kg)	DIMENSIONS in (cm)		
		L	W	H
PC-80	610 (277)	70 (178)	44 (112)	40 (102)

Shipping Information (AC2 Outdoor Unit)				
MODEL	WEIGHT lb. (kg)	DIMENSIONS in (cm)		
		L	W	H
AC2-80	295 (134)	36 (91)	70 (178)	56 (142)

Refrigerant Charge (Per Circuit)				
MODEL	TYPE	lb	kg	Oil Type
PC-80	R454b	11.0	*5.0*	POE

- Note that R454b charge per refrigeration circuit is greater than '***m1***' but less than '***m2***' as defined in the UL/CSA 60335-2-40 standard
- **Refrigerant charge is subject to slight revision** but always below ***m2*****;** actual charge is indicated on the unit nameplate
- Oil capacity is marked on the compressor label

Control Temperature Limits			
Parameter	Device	MIN.	MAX.
Room Relative Humidity (RH)	Room Thermostat or BACnet	30%	80%
Room Air Temperature	Room Thermostat or BACnet	60°F (10°C)	95°F (35°C)
Pool Water Temperature	Internal Setpoint Control or optional aquastat or BACnet	70°F (21°C)	108°F (42°C)

AC2-Series Outdoor Unit Sound Levels (dBA)*								
MODEL	1 ft distance		3 ft distance		5 ft distance		10 ft distance	
	Front	Side	Front	Sides	Front	Sides	Front	Sides
AC2-80	71.7	66.8	68.7	63.7	65.7	61.2	60.0	57.1

* At maximum fan speed. This occurs in heating mode, or in cooling mode with outdoor greater than ~27°C.

PC-Series Electrical Data										
MODEL	Nomenclature Identifier	Power Supply			Compressor		FLA	MCA	Maximum Fuse/Breaker	Minimum Wire Size
		V-ø-Hz	MIN	MAX	RLA	LRA	Amps	Amps	Amps	ga
PC-80	1	208/230-1-60	187	253	32.8	184	40.0	48.2	80	#4-2
	2	208-3-60	187	229	22.4	166	29.6	35.2	50	#8-3
	4	460-3-60	414	506	8.8	75	16.0	18.2	30	#10-3

Plenum Heater Electrical Data										
Size (kW)	(230-1-60)					(208-1-60)				
	Actual (kW)	FLA (A)	MCA (A)	Breaker (A)	Wire Size	Actual (kW)	FLA (A)	MCA (A)	Breaker (A)	Wire Size
5	5	20.8	26.0	30	#10	3.8	18.1	22.6	30	#10
7	7	29.2	36.5	40	#8	5.3	25.3	31.6	40	#8
10	10	41.7	52.1	60	#6	7.5	36.1	45.1	50	#6
15	15	62.5	78.1	80	#4	11.3	54.2	67.7	80	#4
20	20	83.3	104.2	100	#3	15.0	72.2	90.3	100	#3

Maritime Geothermal Ltd. has a continuous improvement policy and reserves the right to modify specification data at any time without prior notice .

HEAT REJECTION ACCESSORIES			
PC MODEL SIZE	**ACCESSORY TYPE**	**MGL P/N**	**RECOMMENDED CIRCULATOR**
PC-80	Geothermal ground loop heat rejection coil	03-7040 (BTSSC-84)	UP26-99/NRF-36 OR EQUIV.
	Outdoor condenser fan unit	AC2-65/75/80-X-1-KDE	-

OTHER ACCESSORIES AVAILABLE

- Anti-vibration pad for under unit
- Compressor sound jacket
- Compressor Secure Start module

Required Water Flow Rates *(PC-T only)*						
MODEL	**POOL WATER FLOW**		**ACCESSORY GROUND LOOP HEAT REJECTION WATER COIL**			
	gpm	***L/s***	MGL P/N	COIL	gpm	*L/s*
PC-80	**45**	***2.8***	03-7040	BTSSC-84	17	*1.1*

Pool Water Pressure Drop *(PC-T only)*		
Flow (gpm)	**psi**	***kPa***
20	1.5	*10*
25	2.2	*15*
30	2.9	*20*
35	3.8	*26*
40	4.7	*32*
45 ← PC-80	5.8	*40*
50	6.9	*48*
60	9.5	*66*

Pressure Drop for Accessory Ground Loop Heat Rejection Coil			**Water 104°F**		**Water 50°F**		**15% Methanol 32°F**		**35% prop. glycol 32°F**	
PC-80 (coil 03-7040)	11	*0.69*	2.9	*20*	3.2	*22*	4	*28*	5.3	*36*
	12	*0.76*	3.6	*25*	3.9	*27*	4.6	*32*	6.0	*42*
	13	*0.82*	4.1	*28*	4.4	*30*	5.2	*36*	6.8	*47*
	14	*0.88*	4.7	*32*	5	*34*	5.8	*40*	7.6	*53*
	15	*0.95*	5.5	*38*	5.7	*39*	6.5	*45*	8.5	*59*
	16	*1.01*	6.3	*43*	6.5	*45*	7.3	*50*	9.6	*66*
	17	***1.07***	**7.1**	***49***	**7.3**	***50***	**8.1**	***56***	**10.7**	***74***

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PC-Series Capacity Ratings (60Hz)									
Model	**Pool Flow** *(PC-T only)*		**Airflow**	**Input Energy**	**Cooling Capacity**	**Heat Rejection (Pool, Room Air, or Outdoor Unit)**	**Moisture Removal @ 50%RH**	**Moisture Removal @ 60%RH**	**Typical Pool Surface Area**
	gpm	**L/s**	**cfm (L/s)**	**Watts**	**Btu/hr (kW)**	**Btu/hr (kW)**	**lb(kg) / hr**	**lb(kg) / hr**	**ft² (m²)**
PC-80	45	2.8	2300 (1085)	5790	103,300 (30.3)	123,100 (36.1)	32 (14)	38 (17)	1350 (130)
*EWT (Tp)=80°F (26.7°C) and EAT (Ta)=82°F (27.8°C)									

Indoor Airflow												
Mode	**Nominal**		**Range**		**Airflow Reduction - 20%**		**Airflow Reduction - 15%**		**Airflow Reduction - 10%**		**Airflow Reduction - 5%**	
	cfm	**L/s**	**cfm**	**L/s**	**cfm**	**L/s**	**cfm**	**L/s**	**cfm**	**L/s**	**cfm**	**L/s**
NORMAL	**2300**	**1085**	**1850-2500**	**873-1180**	**1840**	**870**	**1955**	**920**	**2070**	**980**	**2185**	**1030**
AUX. HEAT	**2300**	**1085**	**2100-2500**	**991-1180**	**1840**	**870**	**1955**	**920**	**2070**	**980**	**2185**	**1030**
RECIRC.	**1300**	**615**	**1050-1550**	**496-732**	**1040**	**490**	**1105**	**520**	**1170**	**550**	**1235**	**585**

Maximum external static pressure: 0.50in H_2O

Cooling Mode Performance Tables *(Heat Rejection to AC2 Outdoor Unit)*

PC-80 with AC2-80 *R454b, 60 Hz*

	OUTDOOR LOOP *(Air)*			ELECTRICAL			INDOOR LOOP *(Air @ 50% RH)*								
	Outdoor Air Temperature	Condensing Temperature	Heat Rejected (Btu/hr)	Compressor Current (A)	Fan (W)	Input Power (W)	**EAT**	Evap. Temp.	Airflow (cfm)	LAT (°F)	Delta T (°F)	Latent (Btu/hr)	Sensible (Btu/hr)	**Cooling** (Btu/hr)	**EER**
COOLING	**50°F**	63	104,148	16.5	450	3,907	**80°F**	45	2,300	51	30	27,360	62,937	**90,297**	**23.1**
	60°F	73	101,294	18.3	450	4,247		45	2,300	52	28	26,076	59,984	**86,060**	**20.3**
	70°F	83	98,313	20.1	450	4,701		45	2,300	53	27	24,759	56,952	**81,711**	**17.4**
	80°F	93	95,004	22.1	450	5,066		45	2,300	54	26	23,347	53,707	**77,054**	**15.2**
	90°F	104	91,934	24.6	450	5,594		46	2,300	56	24	21,566	50,562	**72,128**	**12.9**
	100°F	114	88,431	27.2	450	6,132		46	2,300	58	22	19,988	46,861	**66,848**	**10.9**
	110°F	124	85,342	30.2	450	6,845		46	2,300	60	20	18,354	43,030	**61,384**	**9.0**
	120°F	134	82,325	33.8	450	7,612		46	2,300	61	19	16,644	39,020	**55,664**	**7.3**

METRIC

	OUTDOOR LOOP *(Air)*			ELECTRICAL			INDOOR LOOP *(Air @ 50% RH)*								
	Outdoor Air Temperature	Condensing Temperature	Heat Rejected (W)	Compressor Current (A)	Fan (W)	Input Power (W)	**EAT**	Evap. Temp.	Airflow (L/s)	LAT (°C)	Delta T (°C)	Latent (W)	Sensible (W)	**Cooling** (W)	**COP_C**
COOLING	**10°C**	17.2	30,515	16.5	450	3,907	**27°C**	7.2	1090	10.4	16.6	8,017	18,440	**26,457**	**6.77**
	16°C	22.8	29,679	18.3	450	4,247		7.3	1090	11.2	15.8	7,641	17,575	**25,215**	**5.94**
	21°C	28.3	28,805	20.1	450	4,701		7.4	1090	11.9	15.1	7,254	16,686	**23,941**	**5.09**
	27°C	33.9	27,836	22.1	450	5,066		7.5	1090	12.8	14.2	6,840	15,736	**22,577**	**4.46**
	32°C	40.0	26,937	24.6	450	5,594		7.6	1090	13.6	13.4	6,318	14,814	**21,134**	**3.78**
	38°C	45.6	25,910	27.2	450	6,132		7.7	1090	14.6	12.4	5,856	13,730	**19,586**	**3.19**
	43°C	51.1	25,005	30.2	450	6,845		7.8	1090	15.7	11.3	5,377	12,607	**17,985**	**2.63**
	49°C	56.7	24,122	33.8	450	7,612		8.1	1090	16.7	10.3	4,877	11,433	**16,310**	**2.14**

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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.

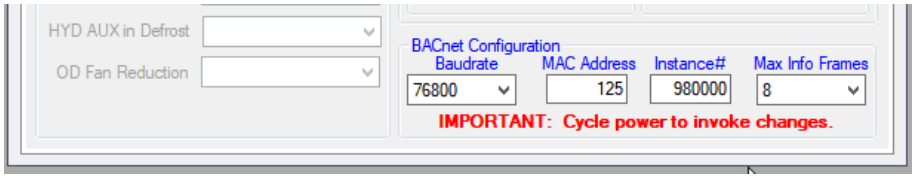
The connector on the control board is a three wire removable screw connector. The signals are as follows:
A: Communications line (+) (right pin)
B: Communications line (-) (middle pin)
C: Ground connection (left pin)

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 via the 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.



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.

Refer to *Application, Installation, & Service Manual* for BACnet objects (read and write).

Engineering Guide Specifications

General

The pool conditioner shall be a single package indoor unit, with optional outdoor condenser unit or geothermal ground loop heat exchanger for outdoor heat rejection provided as an accessory. The pool conditioner shall be capable of cooling and dehumidifying indoor air, and rejecting heat to the indoor air, pool water, or optional outdoor condenser, with user-adjustable heating priority setting. The pool conditioner shall be available without the pool water heat rejection coil for applications where pool heat is not required. The unit shall be listed by a nationally recognized safety-testing laboratory (NRTL) or agency, such as UL, CSA, TUV, or ETL. The package unit, as manufactured by Maritime Geothermal, Petitcodiac, New Brunswick, shall be designed to operate correctly within liquid temperature ranges specified on the "Control Temperature Limits" table in this engineering specification document.

Factory Quality

Each unit shall be run tested at the factory with normal operating airflow and water circulating through the pool loop. Quality control system checks shall include: computerized nitrogen pressurized leak test, evacuation of refrigeration circuit to sustained vacuum, accurate system charge, detailed operating tests in pool water heat and air reheat modes, and quality cross check all operational and test conditions to pass/fail criteria. Units tested without air flow or without water flow are not acceptable. Units provided with optional outdoor condenser shall be run tested with outdoor condenser. 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 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 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 only one sealed refrigerant circuit, containing a hermetic motor scroll compressor, two coated air coils, pool water coaxial heat exchanger, electronic expansion valve (EEV), 4-way reversing valves, high and low refrigerant pressure sensors, manual reset high pressure control, refrigerant service ports, liquid line filter-dryer, sight glass, refrigerant receiver, and suction accumulator.

Compressors shall be supplied with isolation consisting of rubber vibration isolators between the compressor and mounting plate, and rubber vibration isolators between the mounting plate and cabinet. Compressor motors shall have internal overload protection.

The water to refrigerant heat exchangers shall consist of a PVC outer jacket with twisted titanium inner tube, designed and certified for 600 psig [4136 kPa] working pressure on the refrigerant side and 75 psig [520 kPa] on the water side.

The refrigerant to air heat exchangers shall be of a multi-circuit design with copper tubing and aluminum fins with nozzle -style refrigerant distributor for evaporator service. They shall be designed and certified for 650 psig [4482kPa] working pressure on the refrigerant side, and shall be electro-coated ('e-coated' or 'i-coated') for corrosion protection.

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. 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'.

Fan/Blower
The blower shall be a squirrel cage type, constructed of corrosion resistant material, with unobstructed removable venturi to allow front-side-only servicing of fan motor. The air return shall be on the right when looking at the front of the unit. Top, side (left end), or down air discharge shall be provided as factory options. The fan motor shall be direct drive electrically commutated motor (ECM) with soft start, variable speed, and constant airflow functionality that maintains selected air flow up to a maximum external static of 0.5" WC.

Auxiliary Heat (Plenum Heater)
A plenum heater shall be provided as standard to be field installed in the discharge ductwork outside the unit. Two stages of the plenum heater shall be controlled by two provided dry contacts in the PC unit.

Condensate Tray
The condensate tray shall be made of stainless steel and be large enough to catch any condensation that drips from the evaporator air coil during operation. There shall be two condensate drain connections provided for redundancy, of type PVC 3/4" FNPT.

Piping and Connections
The unit shall have one set of primary water in and out connections for pool water. The primary connection type shall be 2" nominal PVC union with socket connection. All water connectors shall be rigidly mounted to cabinet with corrosion resistant fasteners. A flow switch with wait to start compressor feature shall be standard equipment.

The indoor unit shall be provided charged with sufficient refrigerant for the installed system to operate properly with up to 20 ft of interconnecting line set to optional outdoor unit. The indoor unit shall be equipped with two 3-way refrigerant access valves for connection to the outdoor unit, so that refrigerant does not need to be removed from the system during installation.

Electrical
Controls and safety devices shall be factory wired and mounted within the unit. Controls shall include 24 volt alternating current (24VAC) activated compressor contactor, 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 powerup 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: after a trip, unit shall automatically restart when short cycle delay expires if the fault has cleared. Should a fault reoccur 2 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.
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.
9. Dry contact input for overall air flow reduction according to a user-adjustable parameter, e.g. 15%.

A communicating air thermostat that measures room temperature and humidity and allows adjustment of air setpoints shall be included with the PC unit, along with suitable twisted-pair connection wire. The PC unit shall have an on-board function for control of pool water temperature without external sensor or aquastat. Dy contacts shall be present to control both auxiliary air and auxiliary pool water heat, as well as the pool pump.

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.

Warranty: PC Series

COMMERCIAL LIMITED EXPRESS WARRANTY

Unless a statement is specifically identified as a warranty, statements made by Maritime Geothermal Ltd. ("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.
SET FORTH HERE IS THE ONLY EXPRESS WARRANTY THAT APPLIES TO 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 COMMERCIAL WARRANTY - PARTS
MG warrants its Commercial 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 unit units built or sold by MG ("MG Units") for two (2) 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 one (1) year 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 two (2) years from the Warranty Inception Date (as defined below).
(4) 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 sixty (60) days 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 Commercial 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 COMMERCIAL WARRANTY - LABOUR
MARITIME GEOTHERMAL LTD. will not be responsible for any consequential damages or labour costs incurred.

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, including but not limited to:
- Indoor or outdoor loop flow lower than listed in engineering specification or as expressly approved by MARITIME GEOTHERMAL LTD.
- Operating the unit either manually or with automated controls so that the unit is forced to function outside its normal operating range
- Disabling of safety controls
- Insufficient loop antifreeze concentration for loop temperature, or antifreeze concentration incorrectly set in control board
- Fouled heat exchangers due to poor water quality
- Failure to use strainers or clean them regularly
- Impact or physical damage sustained by the unit
- Poor refrigeration maintenance practices, including brazing without nitrogen flow, or using wrong braze/flux
- Incorrect voltage or missing phase supplied to unit
- Unit modified electrically or mechanically from factory supplied condition
- Water quality outside of recommended limits (e.g. salinity or pH)
- Unit not mounted with supplied anti-vibration grommets when specified for use
- Corrosion damage due to corrosive ambient environment
- Failure due to excessive cycling caused by improper mechanical setup or improperly programmed external controller
- Physical loads or pressures placed on unit from external equipment

(7) Mold, fungus or bacteria damage
(8) Corrosion or abrasion of the product.
(9) Products supplied by others.
(10) Electricity or fuel, or any increases or unrealized savings in same, for any reason whatsoever.

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 Commercial Warranty.
(2) The costs of **labour**, refrigerant, materials, or service incurred in diagnosis and removal of 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 warranty coverage declined.
(4) The costs of normal maintenance.

MG'S LIABILITY UNDER THE TERMS OF THIS LIMITED WARRANTY SHALL APPLY ONLY TO THE MG UNITS REGISTERED WITH MG THAT BEAR 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 Commercial Warranty is given in lieu of all other warranties. If, notwithstanding 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 Commercial Warranty.

LIMITATION OF REMEDIES
In the event of a breach of the Limited Express Commercial 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, malfunction 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.

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.