



Engineering Specification

ATW-45-HACW-P-*T-*

Air to Water Heat Pump

60 Hz

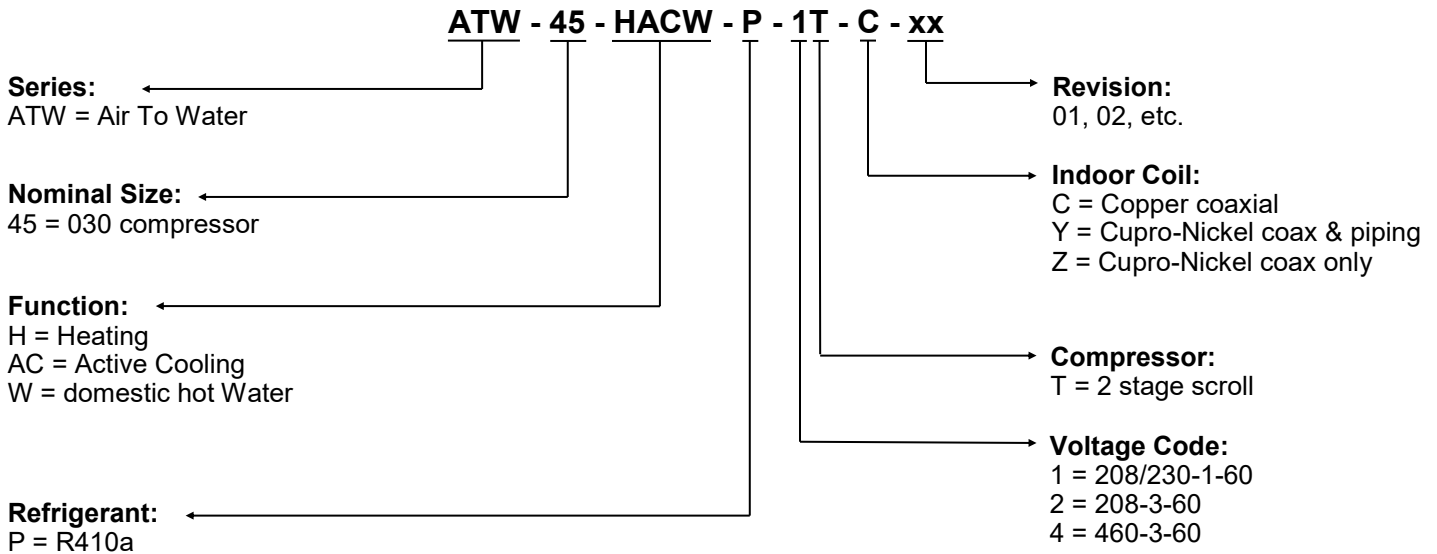


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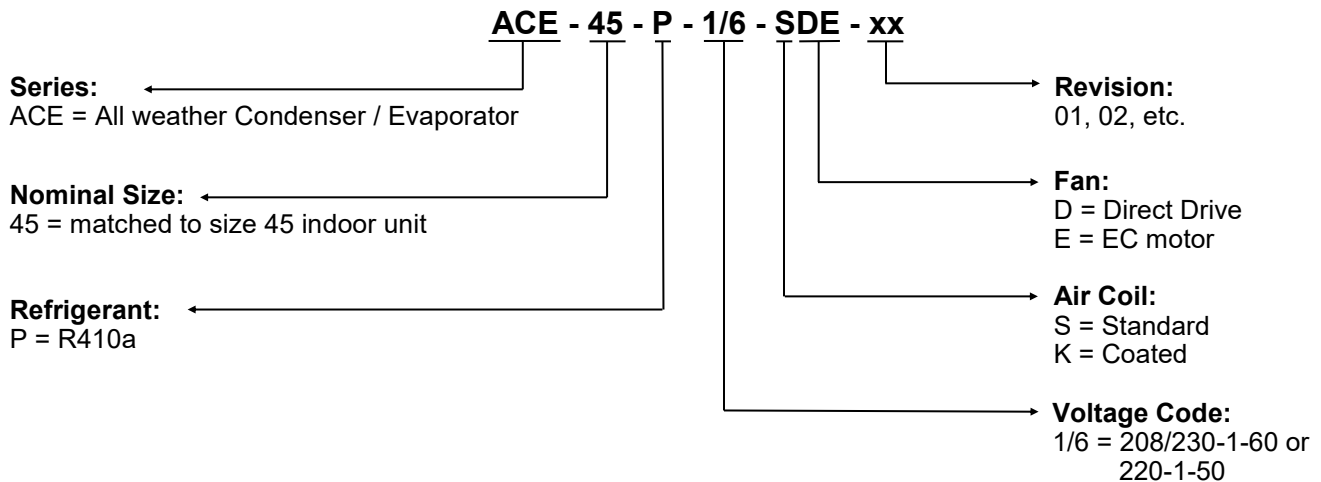
Model Nomenclature

Indoor Unit:



APPLICATION TABLE										
SERIES	SIZE	FUNCTION	REFRIGERANT	VOLTAGE	COMPRESSOR	INDOOR COIL	REVISIONS			
ATW	45	HACW	P	1 2 4	T	C Y Z	05			

Matching Outdoor Unit:



APPLICATION TABLE									
SERIES	SIZE	REFRIGERANT	VOLTAGE	AIR COIL	FAN	REVISIONS			
ACE	45	P	1/6	S K	DE	03	04		

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

Design Features

- Split air to water heat pump system with hydronics completely indoors, not a 'monoblock' unit
- Easy refrigerant connection between indoor and outdoor units using 3-way access valves, like a mini split
- Sturdy satin galvanized indoor and outdoor cabinets with powder coat finish
- Swing out electrical box for unobstructed access to compressor; layout allows easy access for service
- 1" Brass FPT fittings for hydronic connections
- Copeland 2-stage scroll compressor with start capacitor kit on single phase models
- Dual grommet mounting system for compressor and acoustically insulated indoor cabinet for quiet operation
- Indoor cabinet completely insulated to abate noise, including 1" fiberglass insulation in side panels
- Suction line accumulator for compressor protection
- Two Electronic Expansion Valves (EEVs)
- Coaxial hydronic heat exchanger, available in CuNi
- High and low refrigerant pressure sensors
- Temperature sensors on both water lines and refrigerant suction line
- 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.
- External USB port for complete data access including real-time charting, data logging, and diagnostic functionality with manual override operation; free PC App software included
- LCD user interface
- Built in outdoor reset hydronic temperature control, for better COP during warm weather
- 24VAC output and dry contacts for auxiliary heat, controlled by ATW

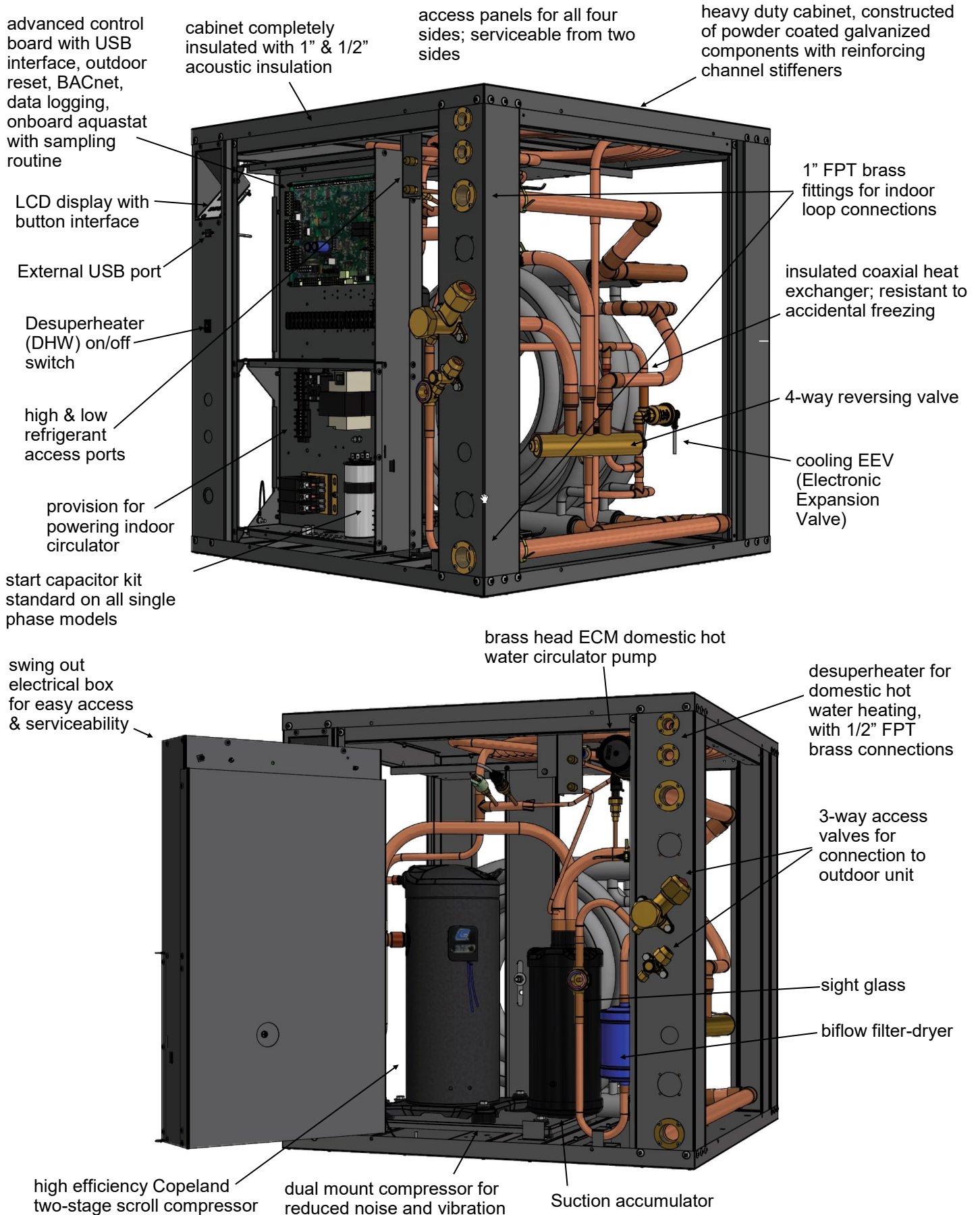
- Double wall Domestic Hot Water desuperheater suitable for potable water connections.
- Brass head ECM circulator for domestic hot water circuit uses less than half the power of traditional circulating pumps and allows motor replacement without tools
- 1/2" brass FPT fittings for Domestic Hot Water connections

- TUV listed for electrical certification (CSA / UL / ETL equivalent)

Options & Accessories

- Hydronic buffer tank with 12, 15, or 20kW of electric backup elements
- Barbed P/T port adapters for heat pump
- Anti-vibration pad for under unit
- Compressor sound jacket
- Secure Start module
- CuNi hydronic heat exchanger
- Compressor current sensor

Design Features - Indoor Unit



Design Features - Outdoor Unit

minimal components in outdoor unit, for maximum component life and ease of service

electrical box contains only connection terminal strips

side cover protects refrigerant pipes & wiring connection point

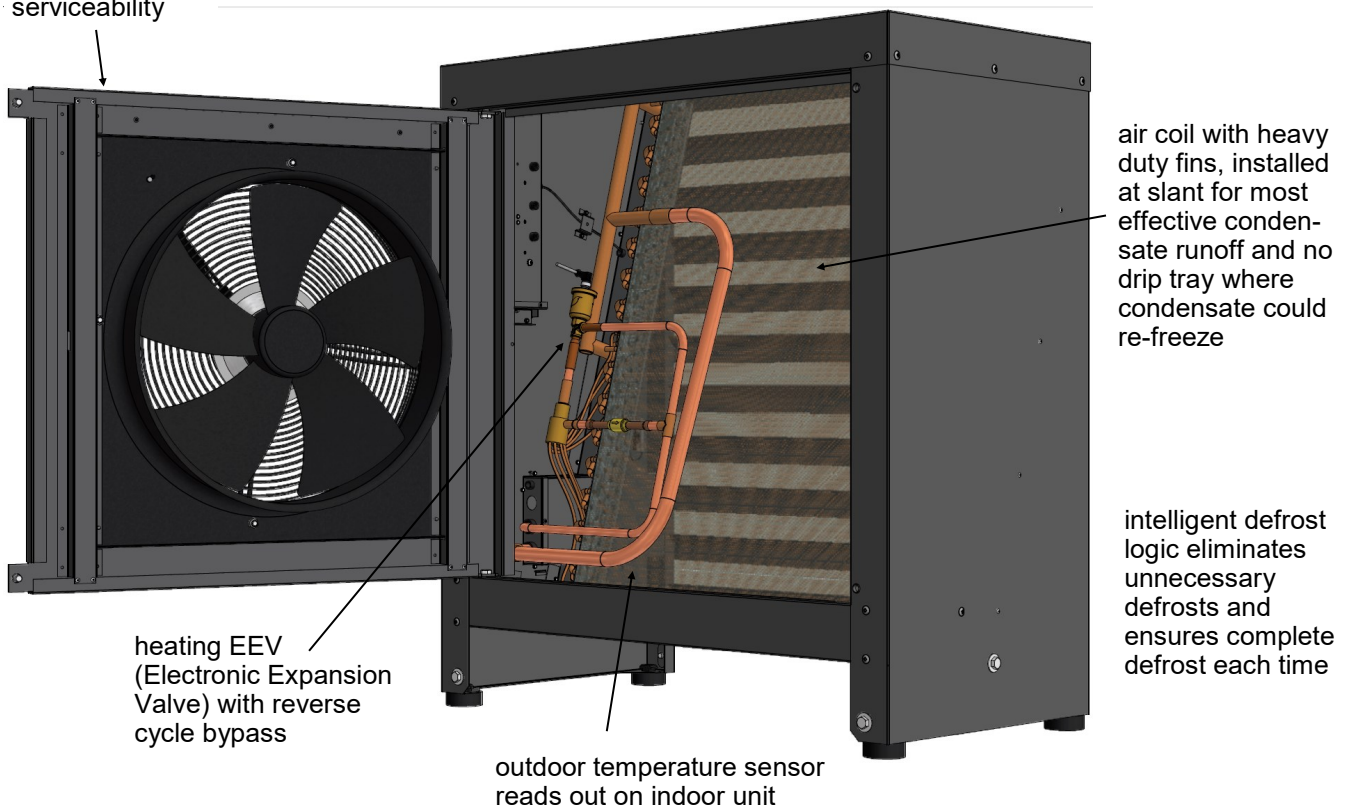
visor protects motor from water ingress and immobilization from freezing

EC (electronically commutated) fan hub motor, for full variable speed operation and maximum energy efficiency

heavy duty cabinet, constructed of powder coated galvanized components

mounting grommets for vibration isolation

swing out fan panel for easy access & serviceability



air coil with heavy duty fins, installed at slant for most effective condensate runoff and no drip tray where condensate could re-freeze

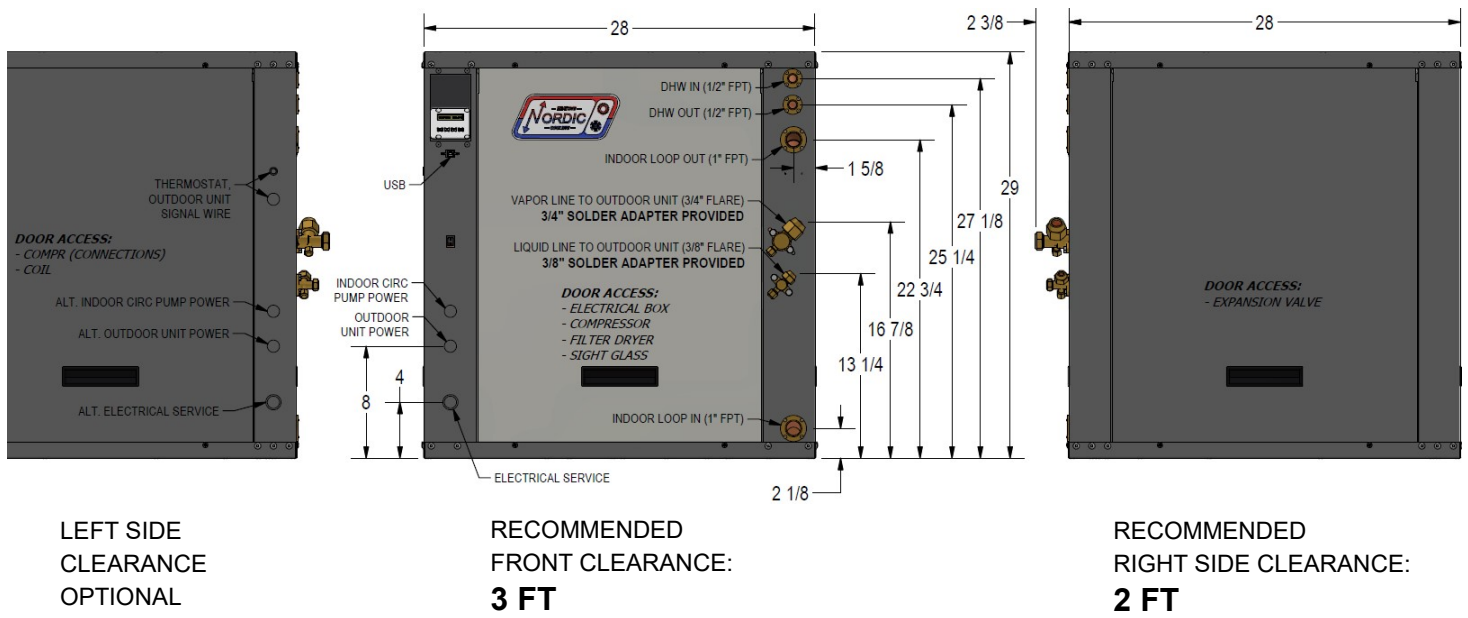
intelligent defrost logic eliminates unnecessary defrosts and ensures complete defrost each time

heating EEV (Electronic Expansion Valve) with reverse cycle bypass

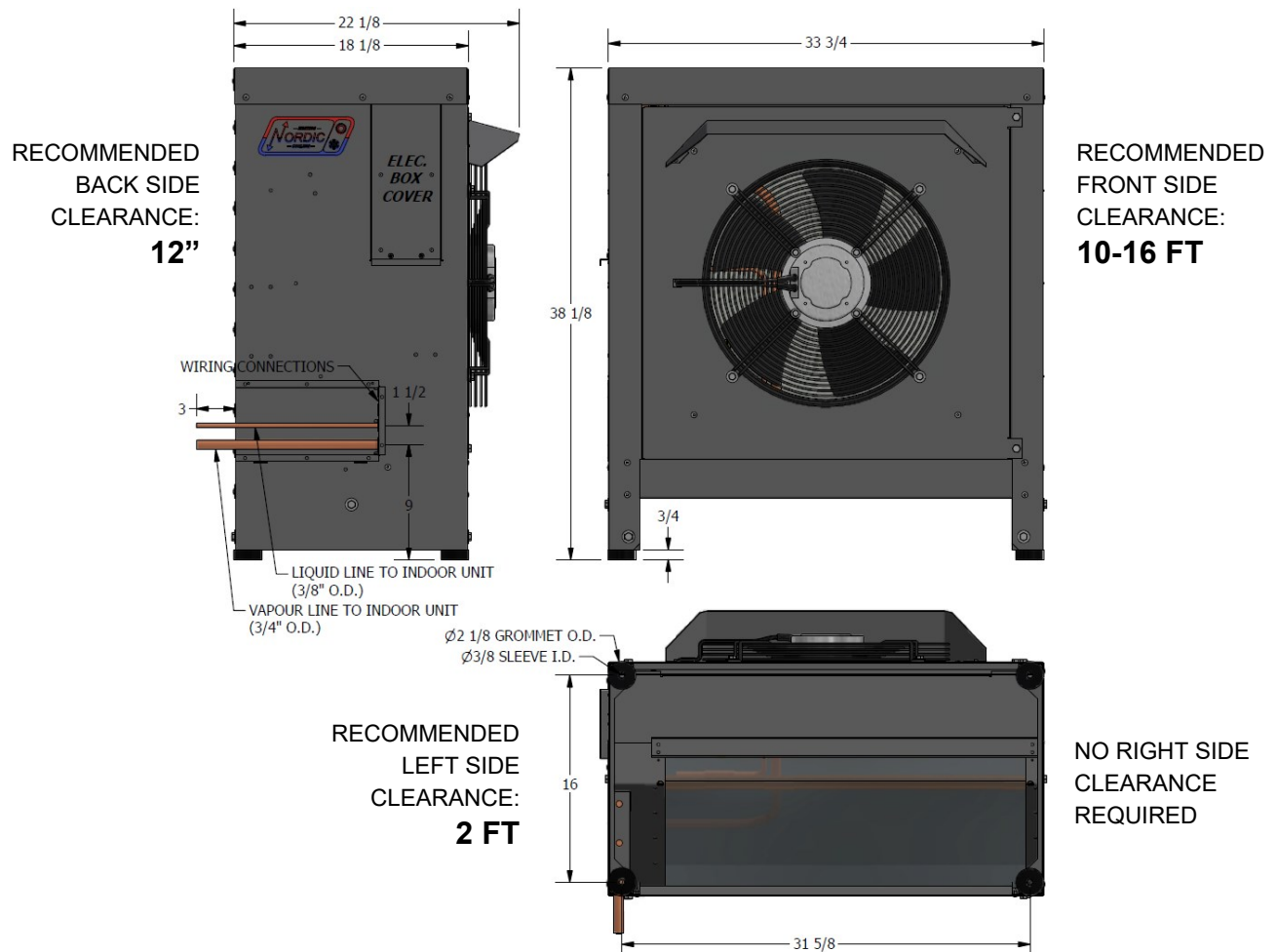
outdoor temperature sensor reads out on indoor unit

Dimensions

All dimensions in inches

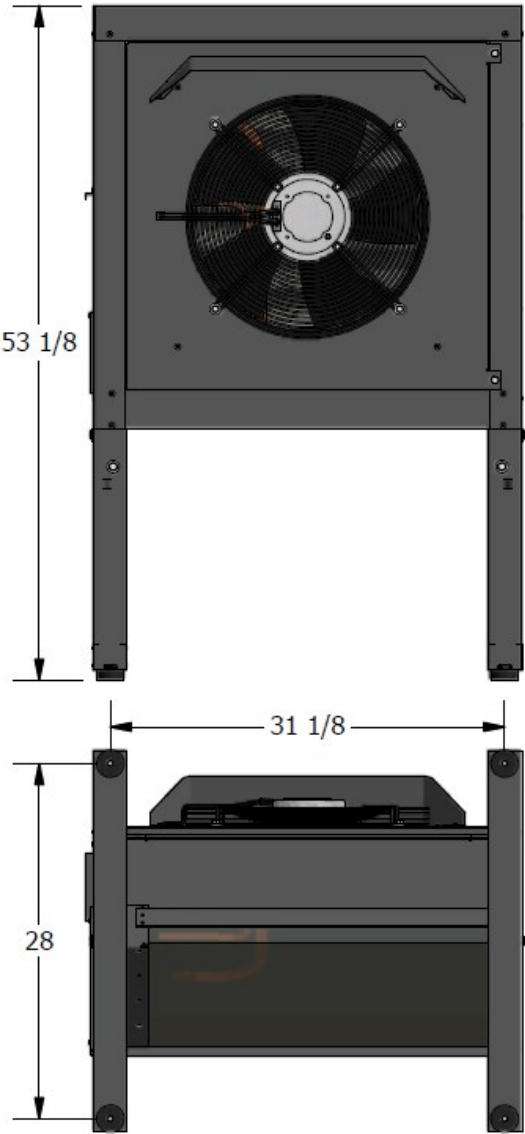


NO BACK CLEARANCE REQUIRED



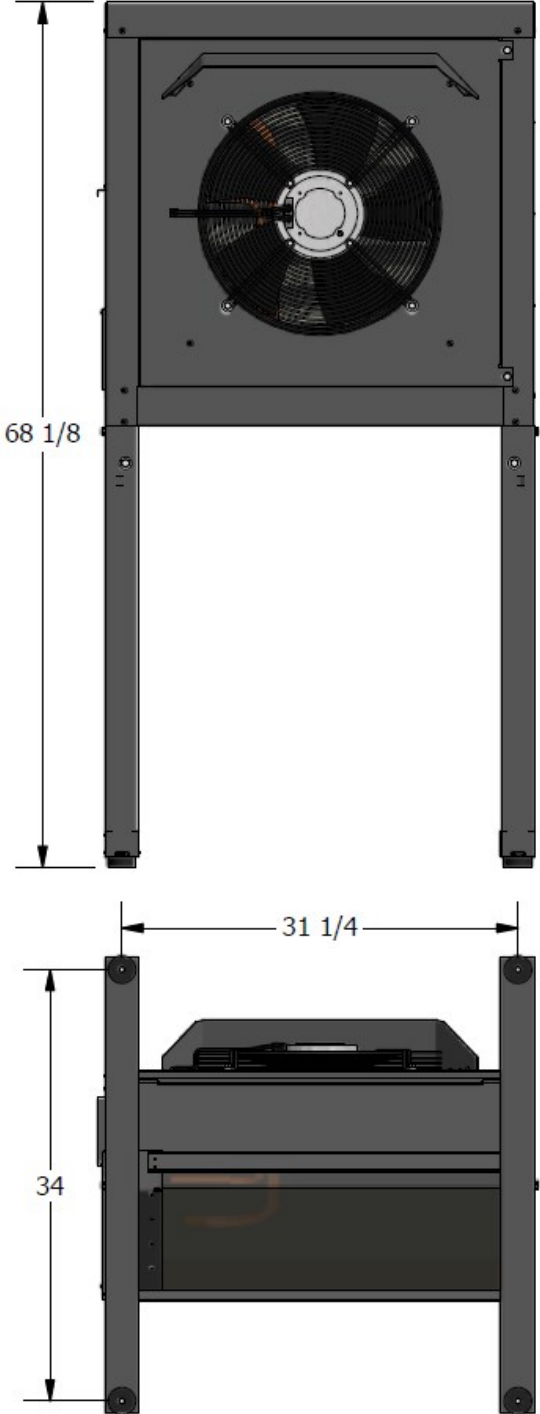
Dimensions

WITH LEG KIT



All dimensions in inches

WITH TALL LEG KIT



Specifications

Electrical Information											
Code	Power Supply			Compressor		Indoor Circulator	Outdoor Unit	FLA	MCA	Maximum Fuse/Breaker	Minimum Wire Size
	V-ø-Hz	MIN	MAX	RLA	LRA	Max A	Max A	Amps	Amps	Amps	ga
1	208/230-1-60	187	253	14.1	84	3.0	1.6	19.5	23.0	40	#8-2*
2	208-3-60	187	229	9.6	74	3.0	1.6	15.0	17.4	30	#10-3*
4	460-3-60	414	506	5.1	37	3.0	1.6	10.5	11.8	15	#14-4

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

Shipping Information					
ITEM	WEIGHT lb. (kg)	DIMENSIONS in (cm)			
		L	W	H	
ATW-45 Indoor Unit	294 (133)	34 (86)	34 (86)	35 (89)	
ATW-45 Outdoor Unit	230 (104)	36 (91)	70 (178)	45 (114)	

Refrigerant Charge				
MODEL	lb	kg	Refrigerant	Oil Type
ATW-45	7.5	3.4	R410a	POE

- Oil capacity is marked on the compressor label.
 - **Refrigerant charge is subject to revision;** actual charge is indicated on the unit nameplate.

Indoor Unit Sound Levels (dBA)*		
MODEL	1 ft distance	3 ft distance
ATW-45	57.2	56.0

* With all doors installed.

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
ATW-45	68.0	61.1	66.4	59.7	63.5	57.4	59.3	56.7

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

Operating Temperature Limits					
Loop	Mode	Parameter	(°F)	(°C)	Note
Indoor	Heating	Minimum ELT	60	15	Reduce flow if necessary during startup.
	Heating	Maximum LLT	120	49	
	Cooling	Minimum LLT	41	5	Water system (no antifreeze).
	Cooling	Minimum LLT	32	0	Antifreeze system. Adequate freeze protection required.
	Cooling	Maximum ELT	80	27	
Outdoor	Heating	Minimum EAT	-7	-22	ACE Outdoor Unit automatically stops compressor below this temp.
	Cooling	Maximum EAT	120	49	ACE Outdoor Unit automatically stops compressor above this temp.

* Values in this table are for rated liquid flow values.

BACnet Specifications
See <i>Application, Installation, & Service Manual: ATW Series</i>

**Loop Pressure
Drop Data**

			Water 104°F		Water 50°F		15% Methanol 32°F		35% prop. glycol 32°F	
	gpm	L/s	psi	kPa	psi	kPa	psi	kPa	psi	kPa
ATW-45	4	0.25	0.8	5.5	0.9	6.2	1.0	6.9	1.3	9.0
	5	0.32	1.1	7.6	1.2	8.3	1.4	9.6	1.8	13
	6	0.38	1.6	11	1.7	12	2.0	14	2.6	18
	7	0.44	1.9	13	2.1	14	2.5	17	3.3	23
	8	0.50	2.6	18	2.8	19	3.0	21	4.0	27
	9	0.57	3.2	22	3.5	24	3.8	26	5.0	34
	10	0.63	3.8	26	4.0	28	4.7	32	6.2	43
	11	0.69	4.3	30	4.6	32	5.5	38	7.2	50
	12	0.76	5.2	36	5.5	38	6.6	45	8.7	60
	13	0.82	5.9	41	6.2	43	7.4	51	9.7	67
	14	0.88	6.7	46	7.0	48	8.6	59	11.3	78
	15	0.95	8.0	55	8.2	57	9.5	65	12.5	86

Standard Capacity Ratings

The tables show the heat pump performance at the standard rating conditions specified in **AHRI standard 550/590 with Addendum 1, September 2017**. There is currently no AHRI certification program for air to water heat pumps; therefore, the blue **AHRI CERTIFIED** mark is not applicable to any manufacturer's air to water heat pumps.

All data is for **60 Hz operation** with **water** as the indoor loop fluid.

METRIC

Standard Capacity Ratings: HEATING							
Model	Loop Flow (gpm)	ΔP (psi)	LLT	Outdoor Air Temp	Input Energy (W)	Capacity (Btu/hr)	COP _H
ATW-45	10.0	3.8	105°F	47°F	2340	33,700	4.23
				17°F	2600	22,200	2.51
			120°F	47°F	2800	32,400	3.40
				17°F	3150	22,100	2.07

Standard Capacity Ratings: HEATING (METRIC)							
Model	Loop Flow (L/s)	ΔP (kPa)	LLT	Outdoor Air Temp	Input Energy (W)	Capacity (W)	COP _H
ATW-45	0.63	26	41°C	8°C	2340	9,890	4.23
				-8°C	2600	6,510	2.51
			49°C	8°C	2800	9,500	3.40
				-8°C	3150	6,470	2.07

Standard Capacity Ratings: COOLING							
Model	Loop Flow (gpm)	ΔP (psi)	ELT	Outdoor Air Temp	Input Energy (W)	Capacity (Btu/hr)	EER COP _c
ATW-45	10.0	4.0	54°F	95°F	2590	26,300	10.2 2.99

Standard Capacity Ratings: COOLING (METRIC)							
Model	Loop Flow (gpm)	ΔP (psi)	ELT	Outdoor Air Temp	Input Energy (W)	Capacity (W)	EER COP _c
ATW-45	0.63	28	12°C	35°C	2590	7,700	10.2 2.99

Performance Tables

ATW-45-HACW-P-1T

R410a, 60 Hz, ZPS30K5E-PFV

HEATING	OUTDOOR			ELECTRICAL		INDOOR						
	Outdoor Air Temperature	Evaporating Temperature	Heat Absorbed (Btu/hr)	Compressor Current (A)	Input Power (W)	ELT	Condensing Temperature	Liquid Flow (gpm)	LLT	Delta T	Heating (Btu/hr)	COP _H
	-5°F	-16°F	5,530	13.5	3290	102°F	110°F	10	105°F	3°F	16,600	1.48
	5°F	-8°F	9,490	11.5	2830	101°F	110°F			4°F	19,000	1.96
	15°F	1°F	12,600	10.5	2620	101°F	109°F			4°F	21,400	2.39
	25°F	9°F	17,100	10.1	2520	100°F	109°F			5°F	25,500	2.97
	35°F	17°F	21,400	9.7	2430	99°F	109°F			6°F	29,500	3.56
	45°F	26°F	25,200	9.4	2360	98°F	109°F			7°F	33,100	4.12
	55°F	34°F	28,800	9.1	2270	98°F	109°F			7°F	36,400	4.70
	65°F	43°F	32,700	8.8	2180	97°F	108°F			8°F	39,900	5.38
	-5°F	-16°F	-	-	-	-	-	10	120°F	LLT is limited to 105°F at these outdoor temperatures		
	5°F	-8°F	-	-	-	-	-			4°F	21,300	1.98
	15°F	1°F	10,900	13.0	3180	116°F	124°F			5°F	25,100	2.42
	25°F	9°F	14,900	12.3	3040	115°F	124°F			6°F	28,600	2.88
	35°F	17°F	18,900	11.8	2920	114°F	124°F			6°F	31,800	3.30
	45°F	26°F	22,400	11.4	2820	114°F	124°F			7°F	34,800	3.76
	55°F	34°F	25,700	11.0	2710	113°F	123°F			8°F	38,000	4.28
	65°F	43°F	29,300	10.6	2600	112°F	123°F			8°F	38,000	4.28

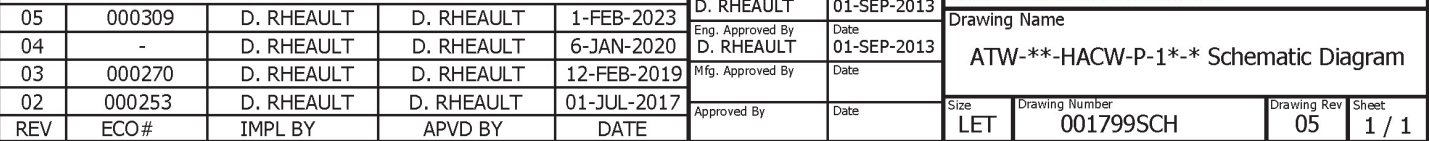
COOLING	Outdoor Air Temperature	Condensing Temperature	Heat Rejected (Btu/hr)	Compressor Current (A)	Input Power (W)	ELT	Evaporating Temperature	Liquid Flow (gpm)	LLT	Delta T	Cooling (Btu/hr)	EER	COP _c
	50°F	62°F	41,300	5.2	1490	54°F	39°F	10	47°F	7°F	36,500	24.5	7.19
	60°F	72°F	40,100	6.2	1740		39°F		47°F	7°F	34,400	19.8	5.79
	70°F	83°F	38,700	7.2	1990		40°F		48°F	6°F	32,100	16.2	4.74
	80°F	93°F	37,100	8.2	2200		40°F		48°F	6°F	29,900	13.6	3.97
	90°F	104°F	35,600	9.5	2460		40°F		49°F	6°F	27,400	11.2	3.27
	100°F	114°F	34,200	10.7	2720		40°F		49°F	5°F	25,100	9.2	2.70
	110°F	125°F	32,900	12.4	3070		40°F		50°F	5°F	22,700	7.4	2.16
	120°F	135°F	31,700	14.2	3440		41°F		50°F	4°F	20,200	5.9	1.72

METRIC

HEATING (METRIC)	OUTDOOR			ELECTRICAL		INDOOR						
	Outdoor Air Temperature	Evaporating Temperature	Heat Absorbed (W)	Compressor Current (A)	Input Power (W)	ELT	Condensing Temperature	Liquid Flow (L/s)	LLT	Delta T	Heating (W)	COP _H
	-21°C	-27°C	1620	13.5	3290	39°C	43°C	0.63	40.5°C	1.8°C	4,860	1.48
	-15°C	-22°C	2780	11.5	2830	38°C	43°C			2.1°C	5,560	1.96
	-9°C	-18°C	3700	10.5	2620	38°C	43°C			2.4°C	6,270	2.39
	-4°C	-13°C	5020	10.1	2520	38°C	43°C			2.8°C	7,480	2.97
	2°C	-8°C	6280	9.7	2430	37°C	43°C			3.3°C	8,660	3.56
	7°C	-4°C	7400	9.4	2360	37°C	43°C			3.7°C	9,700	4.12
	13°C	1°C	8440	9.1	2270	37°C	43°C			4.0°C	10,700	4.70
	18°C	6°C	9580	8.8	2180	36°C	42°C			4.4°C	11,700	5.38
	-21°C	-27°C	-	-	-	-	-	0.63	49°C	LLT is limited to 40.5°C at these outdoor temperatures		
	-15°C	-22°C	-	-	-	-	-			2.4°C	6,240	1.98
	-9°C	-18°C	3180	13.0	3180	47°C	51°C			2.8°C	7,350	2.42
	-4°C	-13°C	4370	12.3	3040	46°C	51°C			3.2°C	8,390	2.88
	2°C	-8°C	5530	11.8	2920	46°C	51°C			3.5°C	9,320	3.30
	7°C	-4°C	6560	11.4	2820	45°C	51°C			3.9°C	10,200	3.76
	13°C	1°C	7530	11.0	2710	45°C	51°C			4.2°C	11,100	4.28
	18°C	6°C	8590	10.6	2600	4°C	51°C			4.2°C	11,100	4.28

COOLING (METRIC)	Outdoor Air Temperature	Condensing Temperature	Heat Rejected (W)	Compressor Current (A)	Input Power (W)	ELT	Evaporating Temperature	Liquid Flow (L/s)	LLT	Delta T	Cooling (W)	EER	COP _c
	10°C	17°C	12,100	5.2	1490	12°C	4°C	0.63	8°C	4.1°C	10,700	24.5	7.19
	16°C	22°C	11,800	6.2	1740		4°C		8°C	3.8°C	10,100	19.8	5.79
	21°C	28°C	11,300	7.2	1990		4°C		8°C	3.6°C	9,420	16.2	4.74
	27°C	34°C	10,900	8.2	2200		4°C		9°C	3.3°C	8,750	13.6	3.97
	32°C	40°C	10,400	9.5	2460		4°C		9°C	3.1°C	8,040	11.2	3.27
	38°C	46°C	10,000	10.7	2720		5°C		9°C	2.8°C	7,360	9.2	2.70
	43°C	52°C	9,640	12.4	3070		5°C		10°C	2.5°C	6,640	7.4	2.16
	49°C	57°C	9,280	14.2	3440		5°C		10°C	2.2°C	5,910	5.9	1.72

Optional DISABLE switch:
- jumper COM_IN to GND
- close switch to disable demand from control system



ATW-Series Electrical Box Diagram

208/230-1-60

SYSTEM CONTROL DESCRIPTION

System Control by BACNet or External Control Signals		
BACNet Object	External	Activation
SYSTEM_Y1A	Y1A	Compressor Stage 1
SYSTEM_Y2A	Y2A	Compressor Stage 2
SYSTEM_O	O	Heating (OFF) / Cooling (ON)

BACNet INTERFACE CONNECTIONS (MS/TP RS-485)

Use twisted pair shielded cable.

A - Communication (+)

B - Communication (-)

GND - Ground

EXTERNAL CONTROL CONNECTIONS (24VAC)

For cooling mode activation, use 18-2 wire to terminal strip to connect:

R - 24VAC Hot

O - Cooling Mode (Active) / Heating Mode (Inactive)

If using an external aquastat ("Signals" control method), use these connections in addition:

C - 24VAC Common (terminal strip)

Y1A - Compressor Stage1 (right board connector)

Y2A - Compressor Stage2 (right board connector)

A dry contact connection between R and any external control connection (Y1A, Y2A or O) will activate the external control signal input to the control board.

AUXILIARY HEAT CONTROL CONNECTIONS

Use an 18-2 conductor cable. Choose one of 3 types of auxiliary heat connections. Default is "ON".

Tank's temperature limiter must remain in place.

D1 Dry contacts, closed when ATW calls for aux. heat

D2 To use tank element contactor that has a 24VAC coil,

jumper R to D1 and connect contactor coil between D2

and Co.

H1 Dry contacts, closed when ATW calls for aux. heat (only

when compressor OFF; use for high temp heating devices)

OUTDOOR UNIT SIGNAL CONNECTIONS (24VAC)

Use an 18-8 shielded cable to connect the Outdoor Unit Signal Connections to the matching Outdoor Unit Signal Connections in the heat pump electrical box.

Connect the shield ground to the Shield Ground terminal.

OUTDOOR UNIT POWER CONNECTIONS (230VAC)

Use a minimum of #14-2 outdoor rated cabling to connect the power supply of the outdoor unit to the matching terminals of the Outdoor Power Supply terminal strip in the electrical box of the heat pump.

CIRCULATOR CONNECTIONS (230/115VAC)

REFER TO LABEL IN UNIT FOR MAX LOAD (AMPS)

Connect 115VAC circulators to 115V

Connect 230VAC circulators to 230V

POWER SUPPLY CONNECTIONS

*NOTE: Neutral (N) is only required if connecting 115VAC circulators.

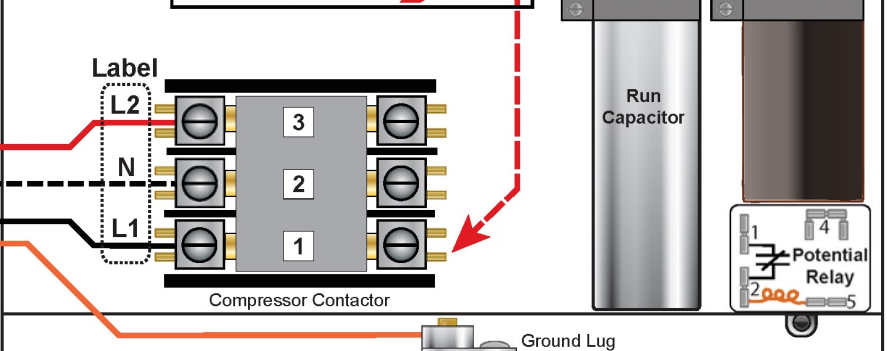
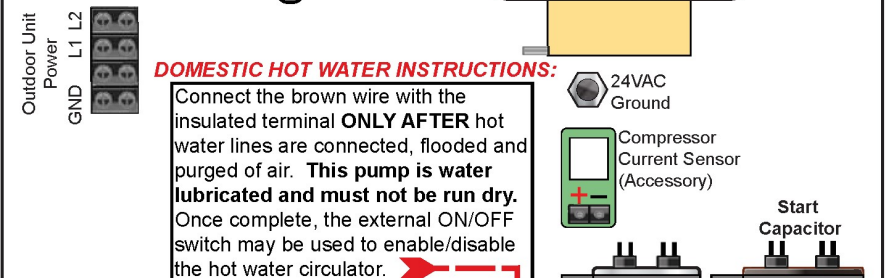
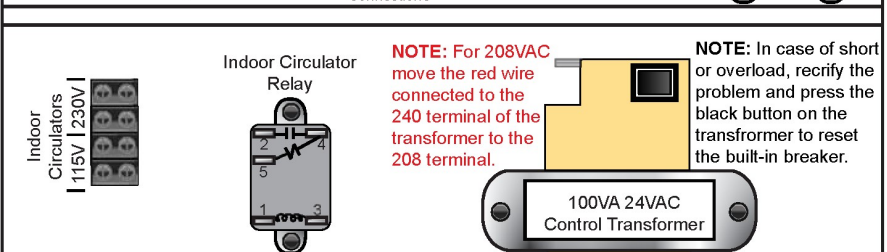
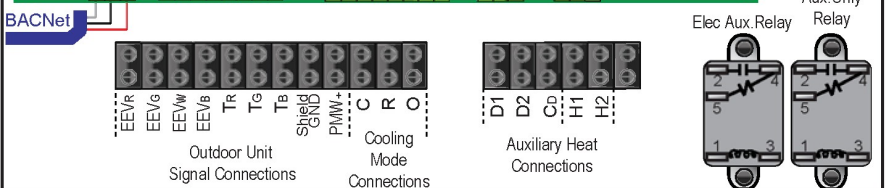
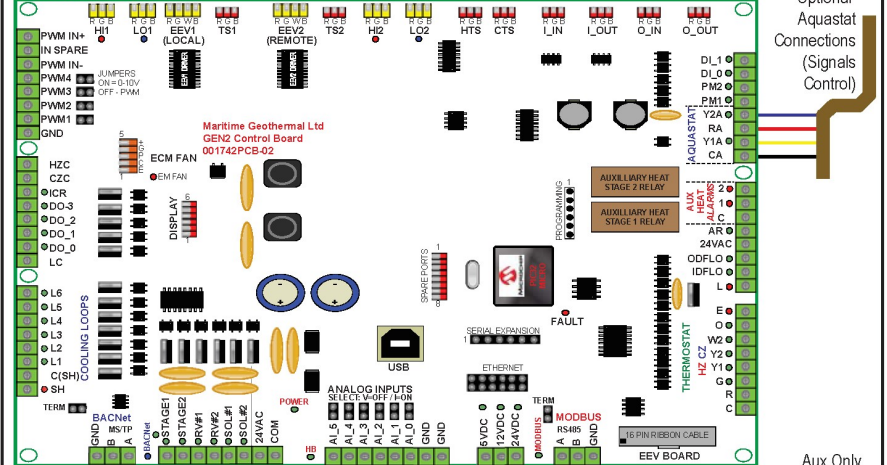
The heat pump itself does not require a neutral.

208/230/115VAC CONNECTIONS

Wire	Colour	Contactor (Label)
Line 2	Red	L2
Neutral*	White	N*
Line 1	Black	L1

Connect "GND" to Gnd.Lug

CONTROL BOARD



Drawn By	D. RHEAULT	Date	01-SEP-2013
Checked By	D. RHEAULT	Date	01-SEP-2013
Eng. Approved By	D. RHEAULT	Date	01-SEP-2013
Mfg. Approved By		Date	
Approved By		Date	

MARITIME GEOTHERMAL LTD.

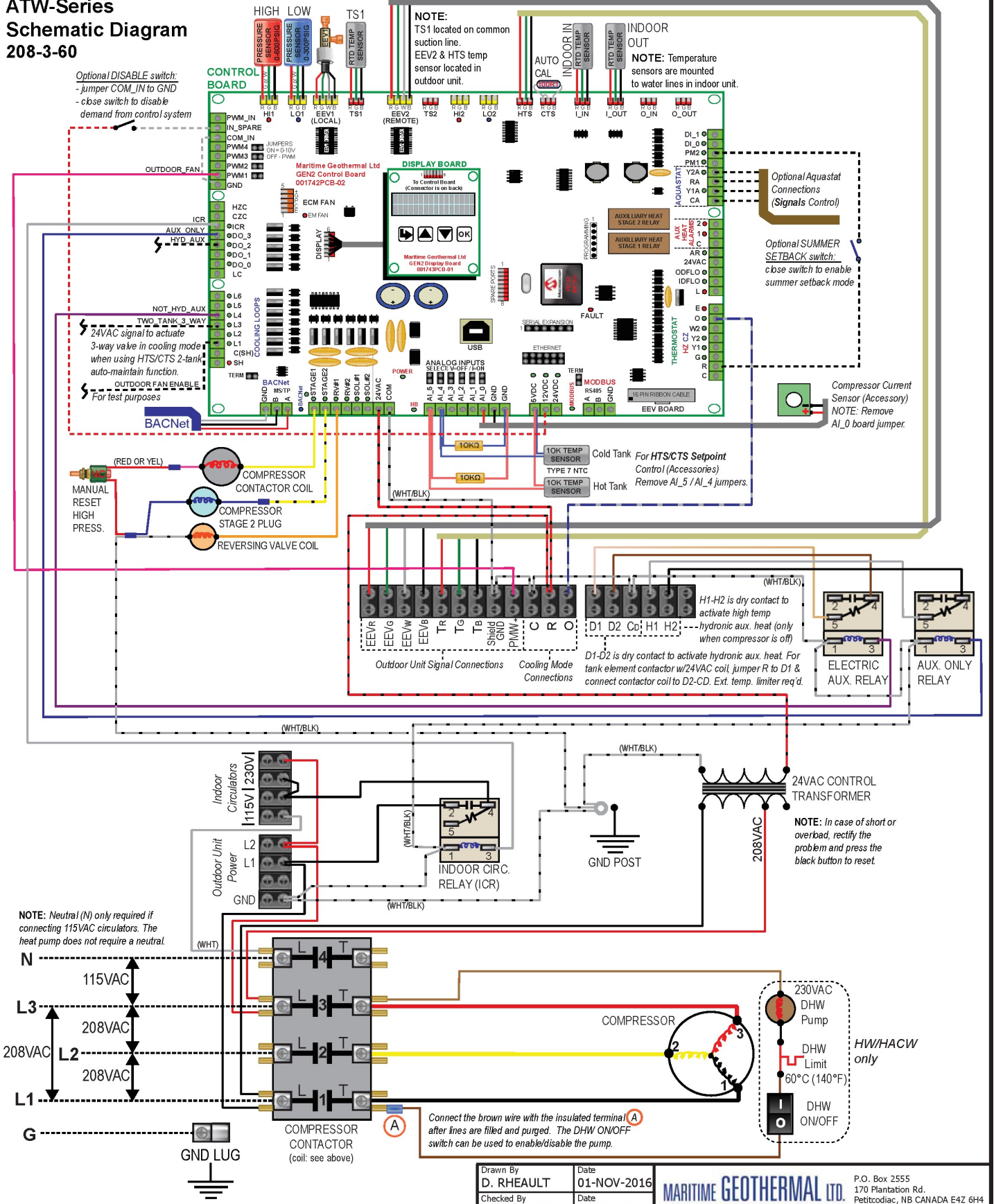
P.O. Box 2555
170 Plantation Rd.
Pebblecreek, NB CANADA E4Z 6H4

Drawing Name

ATW-**-HACW-P-1*-* Electrical Box Diagram

Size	LET	Drawing Number	001800ELB	Drawing Rev	03	Sheet	1 / 1
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ATW-Series Schematic Diagram 208-3-60



06	000309	D. RHEAULT	D. RHEAULT	1-FEB-2023	Drawn By D. RHEAULT	Date 01-NOV-2016	MARITIME GEOTHERMAL LTD. P.O. Box 2555 170 Plantation Rd. Pettitcodiac, NB CANADA E4Z 6H4 Drawing Name ATW-**-HACW-P-2*-* Schematic Diagram Size LET Drawing Number 002190SCH Drawing Rev 06 Sheet 1 / 1
05	000296	D. RHEAULT	D. RHEAULT	7-DEC-2021	Checked By D. RHEAULT	Date 01-NOV-2016	
04	-	D. RHEAULT	D. RHEAULT	6-JAN-2020	Eng. Approved By D. RHEAULT	Date 01-NOV-2016	
03	000270	D. RHEAULT	D. RHEAULT	12-FEB-2019	Mfg. Approved By	Date	
REV	ECO#	IMPL BY	APVD BY	DATE	Approved By	Date	

ATW-Series Electrical Box Diagram

208-3-60

SYSTEM CONTROL DESCRIPTION

System Control by BACNet or External Control Signals		
BACNet Object	External	Activation
SYSTEM_Y1A	Y1A	Compressor Stage 1
SYSTEM_Y2A	Y2A	Compressor Stage 2
SYSTEM_O	O	Heating (OFF) / Cooling (ON)

BACNet INTERFACE CONNECTIONS (MS/TP RS-485)

Use twisted pair shielded cable.

A - Communication (+)

B - Communication (-)

GND - Ground

EXTERNAL CONTROL CONNECTIONS (24VAC)

For cooling mode activation, use 18-2 wire to terminal strip to connect:

R - 24VAC Hot

O - Cooling Mode (Active) / Heating Mode (Inactive)

If using an external aquastat ("Signals" control method), use these connections in addition:

C - 24VAC Common (terminal strip)

Y1A - Compressor Stage1 (right board connector)

Y2A - Compressor Stage2 (right board connector)

A dry contact connection between R and any external control connection (Y1A, Y2A or O) will activate the external control signal input to the control board.

AUXILIARY HEAT CONTROL CONNECTIONS

Use an 18-2 conductor cable. Choose one of 3 types of auxiliary heat connections. Default is "ON".

Tank's temperature limiter must remain in place.

D1 : Dry contacts, closed when ATW calls for aux. heat

R : To use tank element contactor that has a 24VAC coil, jumper R to D1 and connect contactor coil between D2 and Co.

H1 : Dry contacts, closed when ATW calls for aux. heat (only when compressor OFF; use for high temp heating devices)

OUTDOOR UNIT SIGNAL CONNECTIONS (24VAC)

Use an 18-8 shielded cable to connect the Outdoor Unit Signal Connections to the matching Outdoor Unit Signal Connections in the heat pump electrical box. Connect the shield ground to the Shield Ground terminal.

OUTDOOR UNIT POWER CONNECTIONS (208VAC)

Use a minimum of #14-2 outdoor rated cabling to connect the power supply of the outdoor unit to the matching terminals of the Outdoor Power Supply terminal strip in the electrical box of the heat pump.

CIRCULATOR CONNECTIONS (208~230/115VAC)

REFER TO LABEL IN UNIT FOR MAX LOAD (AMPS)

Connect 115VAC circulators to 115V

Connect 230VAC circulators to 230V

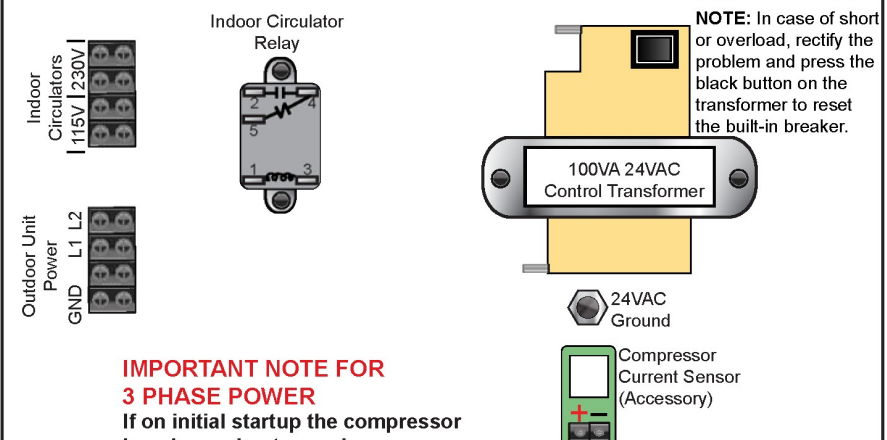
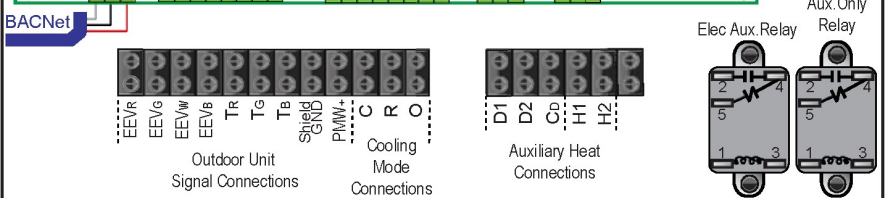
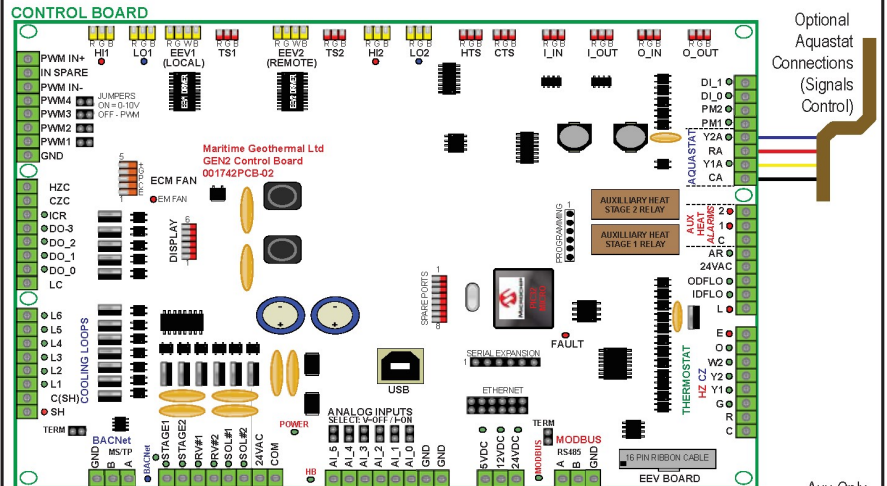
POWER SUPPLY CONNECTIONS

*NOTE: Neutral (N) is only required if connecting 115VAC circulators.

The heat pump itself does not require a neutral.

208/115VAC CONNECTIONS		
Wire	Colour	Contactor (Label)
Neutral*	White	N*
Line 3	Red	L3
Line 2	Blue	L2
Line 1	Black	L1

Connect "GND" to Gnd.Lug

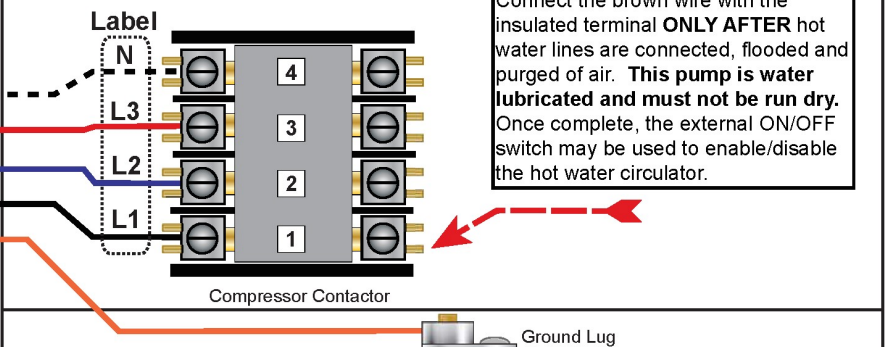


IMPORTANT NOTE FOR 3 PHASE POWER

If on initial startup the compressor is noisy and not pumping, reverse L1 and L2 supply wires.

DOMESTIC HOT WATER INSTRUCTIONS:

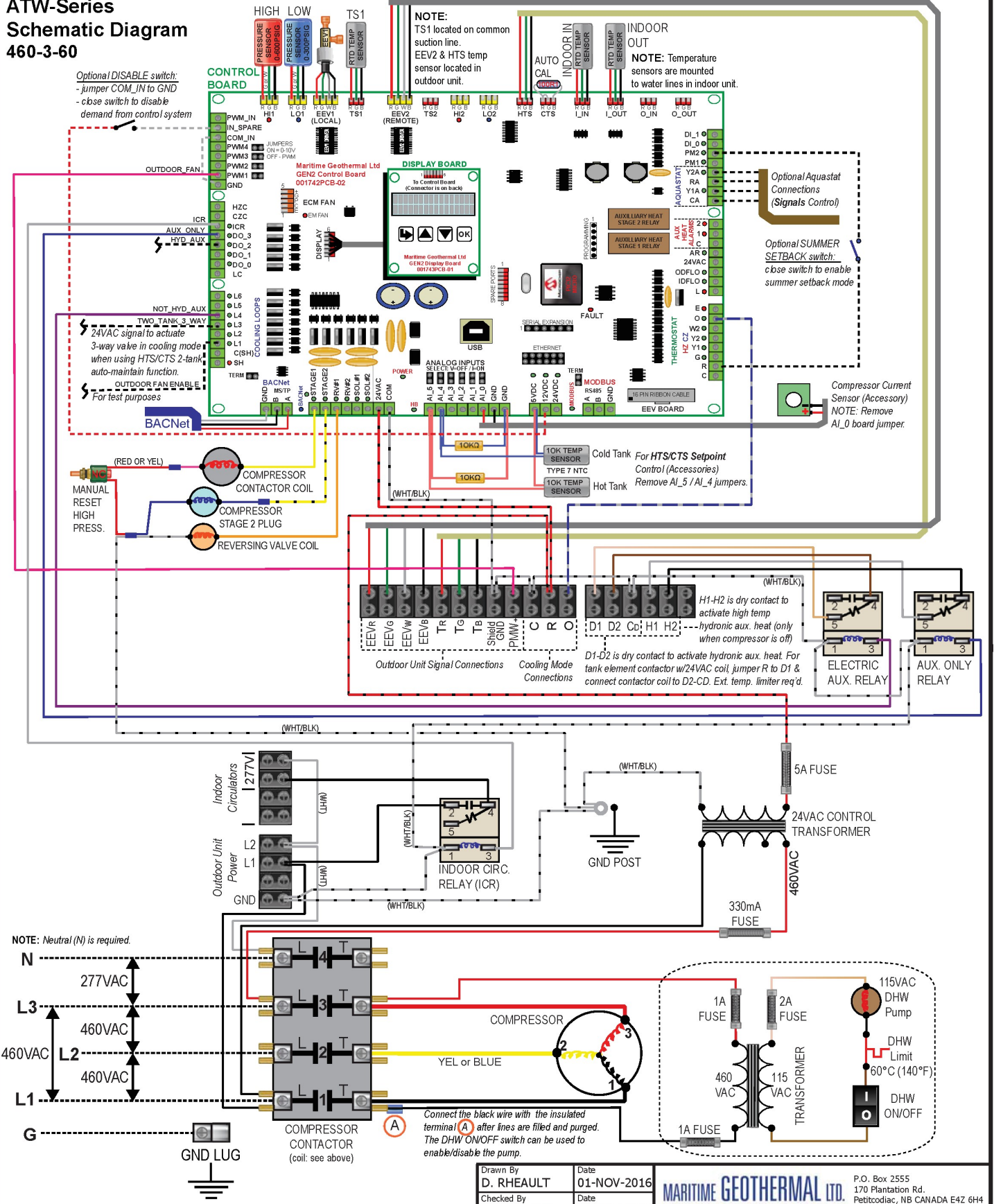
Connect the brown wire with the insulated terminal **ONLY AFTER** hot water lines are connected, flooded and purged of air. **This pump is water lubricated and must not be run dry.** Once complete, the external ON/OFF switch may be used to enable/disable the hot water circulator.



Drawn By	D. RHEAULT	Date	01-NOV-2016
Checked By	D. RHEAULT	Date	01-NOV-2016
Eng. Approved By	D. RHEAULT	Date	01-NOV-2016
Mfg. Approved By		Date	
Approved By		Date	

MARITIME GEOTHERMAL LTD.		P.O. Box 2555 170 Plantation Rd. Peticodiac, NB CANADA E4Z 6H4	
Drawing Name			
ATW-**-HACW-P-2*-* Electrical Box Diagram			
Size	Drawing Number	Drawing Rev	Sheet

ATW-Series Schematic Diagram 460-3-60



06	000309	D. RHEAULT	D. RHEAULT	1-FEB-2023	Drawn By D. RHEAULT	Date 01-NOV-2016	MARITIME GEOTHERMAL LTD. P.O. Box 2555 170 Plantation Rd. Petitcodiac, NB CANADA E4Z 6H4 Drawing Name ATW-**-HACW-P-4*-* Schematic Diagram Size LET Drawing Number 002192SCH Drawing Rev 06 Sheet 1 / 1
05	000296	D. RHEAULT	D. RHEAULT	7-DEC-2021	Checked By D. RHEAULT	Date 01-NOV-2016	
04	-	D. RHEAULT	D. RHEAULT	6-JAN-2020	Eng. Approved By D. RHEAULT	Date 01-NOV-2016	
03	000270	D. RHEAULT	D. RHEAULT	12-FEB-2019	Mfg. Approved By	Date	
REV	ECO#	IMPL BY	APVD BY	DATE	Approved By	Date	

ATW-Series Electrical Box Diagram 460-3-60

SYSTEM CONTROL DESCRIPTION

System Control by BACNet or External Control Signals		
BACNet Object	External	Activation
SYSTEM_Y1A	Y1A	Compressor Stage 1
SYSTEM_Y2A	Y2A	Compressor Stage 2
SYSTEM_O	O	Heating (OFF) / Cooling (ON)

BACNet INTERFACE CONNECTIONS (MS/TP RS-485)

Use twisted pair shielded cable.

A - Communication (+)

B - Communication (-)

GND - Ground

EXTERNAL CONTROL CONNECTIONS (24VAC)

For cooling mode activation, use 18-2 wire to terminal strip to connect:

R - 24VAC Hot

O - Cooling Mode (Active) / Heating Mode (Inactive)

If using an external aquastat ("Signals" control method), use these connections in addition:

C - 24VAC Common (terminal strip)

Y1A - Compressor Stage1 (right board connector)

Y2A - Compressor Stage2 (right board connector)

A dry contact connection between R and any external control connection (Y1A, Y2A or O) will activate the external control signal input to the control board.

AUXILIARY HEAT CONTROL CONNECTIONS

Use an 18-2 conductor cable. Choose one of 3 types of auxiliary heat connections. Default is "ON".

Tank's temperature limiter must remain in place.

D1 : Dry contacts, closed when ATW calls for aux. heat

D2 : Dry contacts, closed when ATW calls for aux. heat

R : To use tank element contactor that has a 24VAC coil, jumper R to D1 and connect contactor coil between D2 and Co.

H1 : Dry contacts, closed when ATW calls for aux. heat (only

H2 : when compressor OFF; use for high temp heating devices)

OUTDOOR UNIT SIGNAL CONNECTIONS (24VAC)

Use an 18-8 **shielded** cable to connect the Outdoor Unit Signal Connections to the matching Outdoor Unit Signal Connections in the heat pump electrical box. Connect the shield ground to the Shield Ground terminal.

OUTDOOR UNIT POWER CONNECTIONS (277VAC)

Use a minimum of #14-2 outdoor rated cabling to connect the power supply of the outdoor unit to the matching terminals of the Outdoor Power Supply terminal strip in the electrical box of the heat pump.

CIRCULATOR CONNECTIONS (277VAC)

REFER TO LABEL IN UNIT FOR MAX LOAD (AMPS)

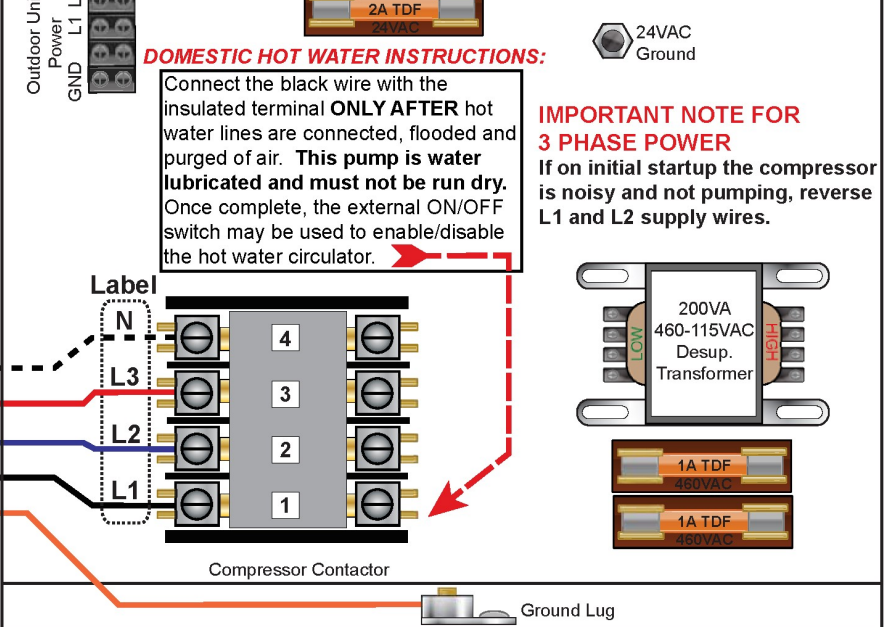
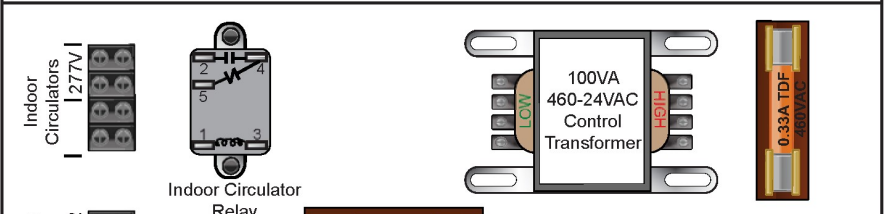
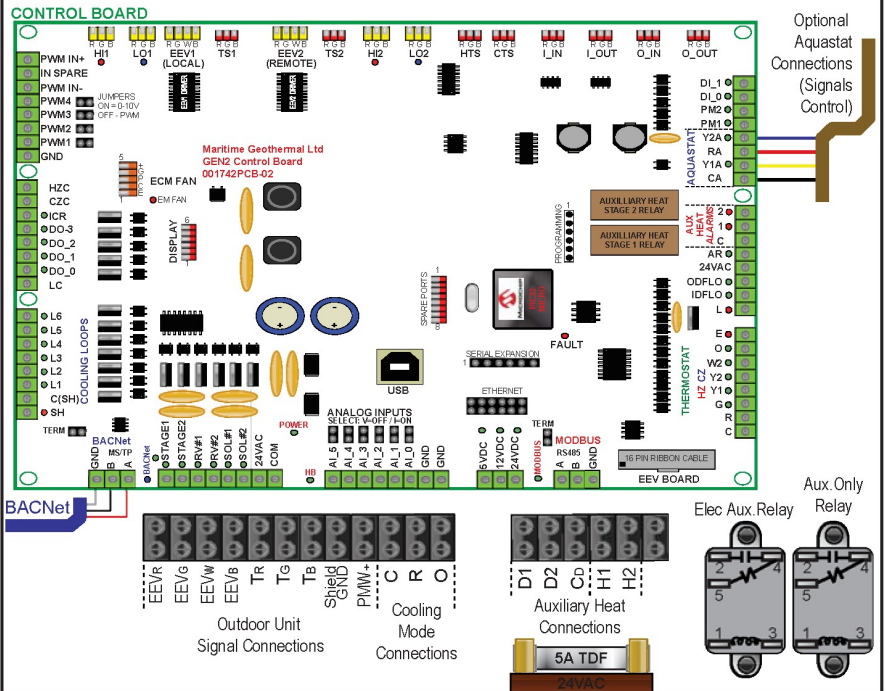
Connect 277VAC circulators to 277V

POWER SUPPLY CONNECTIONS

*NOTE: Neutral (N) is required for heat pump operation.

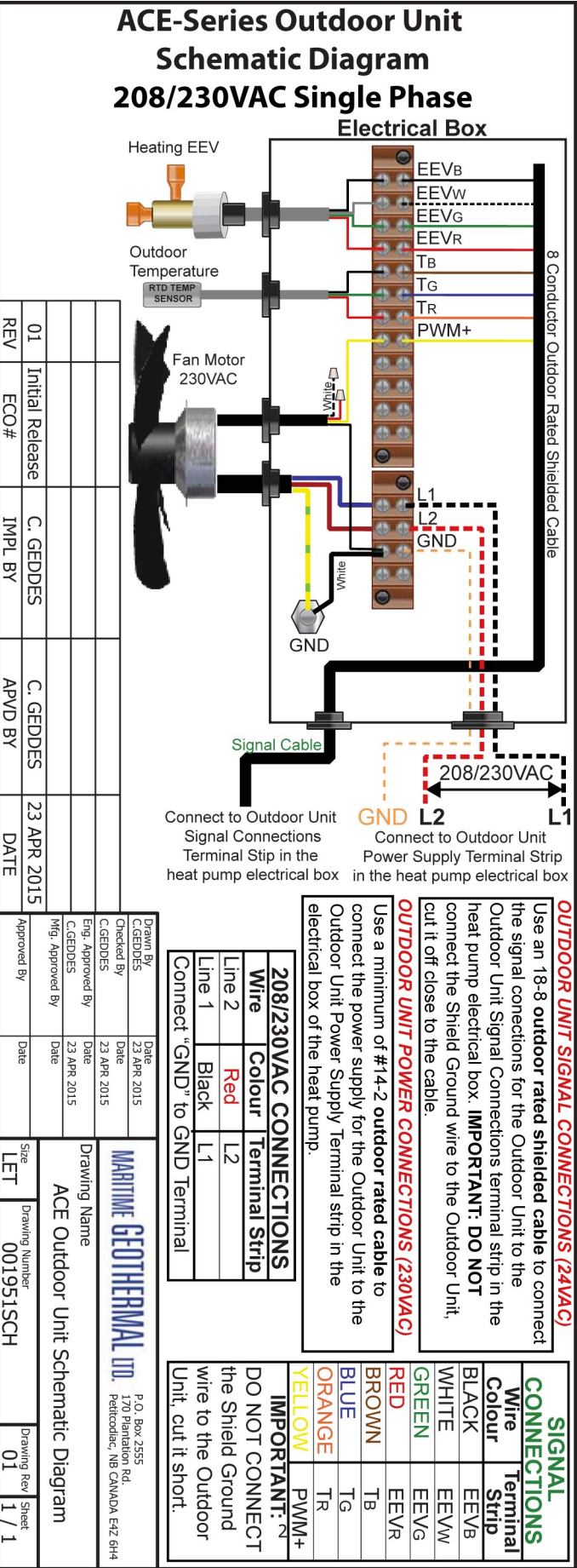
460/277VAC CONNECTIONS		
Wire	Colour	Contactor (Label)
Neutral*	White	N*
Line 3	Red	L3
Line 2	Blue	L2
Line 1	Black	L1

Connect "GND" to Gnd.Lug



Drawn By D. RHEAULT	Date 01-NOV-2016	MARITIME GEOTHERMAL LTD. P.O. Box 2555 170 Plantation Rd. Petitcodiac, NB CANADA E4Z 6H4	
Checked By D. RHEAULT	Date 01-NOV-2016		
Eng. Approved By D. RHEAULT	Date 01-NOV-2016	Drawing Name ATW-**-HACW-P-4** Electrical Box Diagram	
Mfg. Approved By	Date	Size LET	Drawing Number 002191ELB
Approved By	Date	Drawing Rev 03	Sheet 1 / 1

ACE-25/45/55 Wiring Diagram



208/230VAC CONNECTIONS

Wire	Colour	Terminal Strip
Line 2	Red	L2
Line 1	Black	L1

Connect "GND" to GND Terminal

OUTDOOR UNIT SIGNAL CONNECTIONS (24VAC)

Use an 18-8 outdoor rated shielded cable to connect the signal connections for the Outdoor Unit to the Outdoor Unit Signal Connections terminal strip in the heat pump electrical box. **IMPORTANT: DO NOT** connect the Shield Ground wire to the Outdoor Unit, cut it off close to the cable.

OUTDOOR UNIT POWER CONNECTIONS (230VAC)

Use a minimum of #14-2 outdoor rated cable to connect the power supply for the Outdoor Unit to the Outdoor Unit Power Supply Terminal strip in the electrical box of the heat pump.

SIGNAL CONNECTIONS

Wire Colour	Terminal Strip
BLACK	EEVb
WHITE	EEVw
GREEN	EEVg
RED	EEVR
BROWN	Tb
BLUE	Tg
ORANGE	Tr
YELLOW	PWM+

IMPORTANT: DO NOT CONNECT the Shield Ground wire to the Outdoor Unit, cut it short.

MARITIME GEOTHERMAL LTD.

P.O. Box 2555

170 Plantation Rd.

Petticoat, NB CANADA E4Z 6H4

ACE Outdoor Unit Schematic Diagram

01

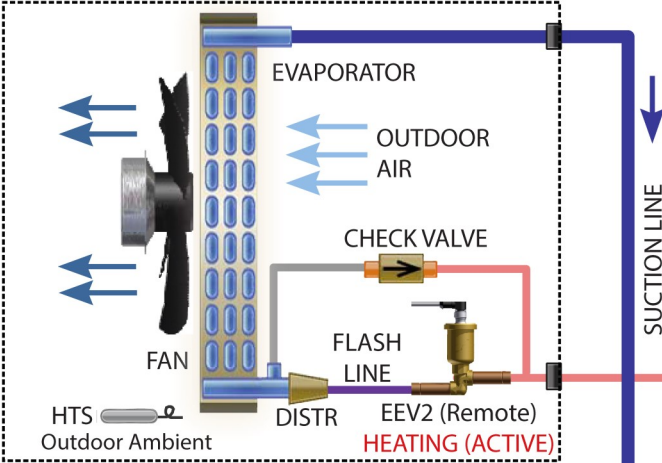
1 / 1

ATW Series Refrigeration Circuit

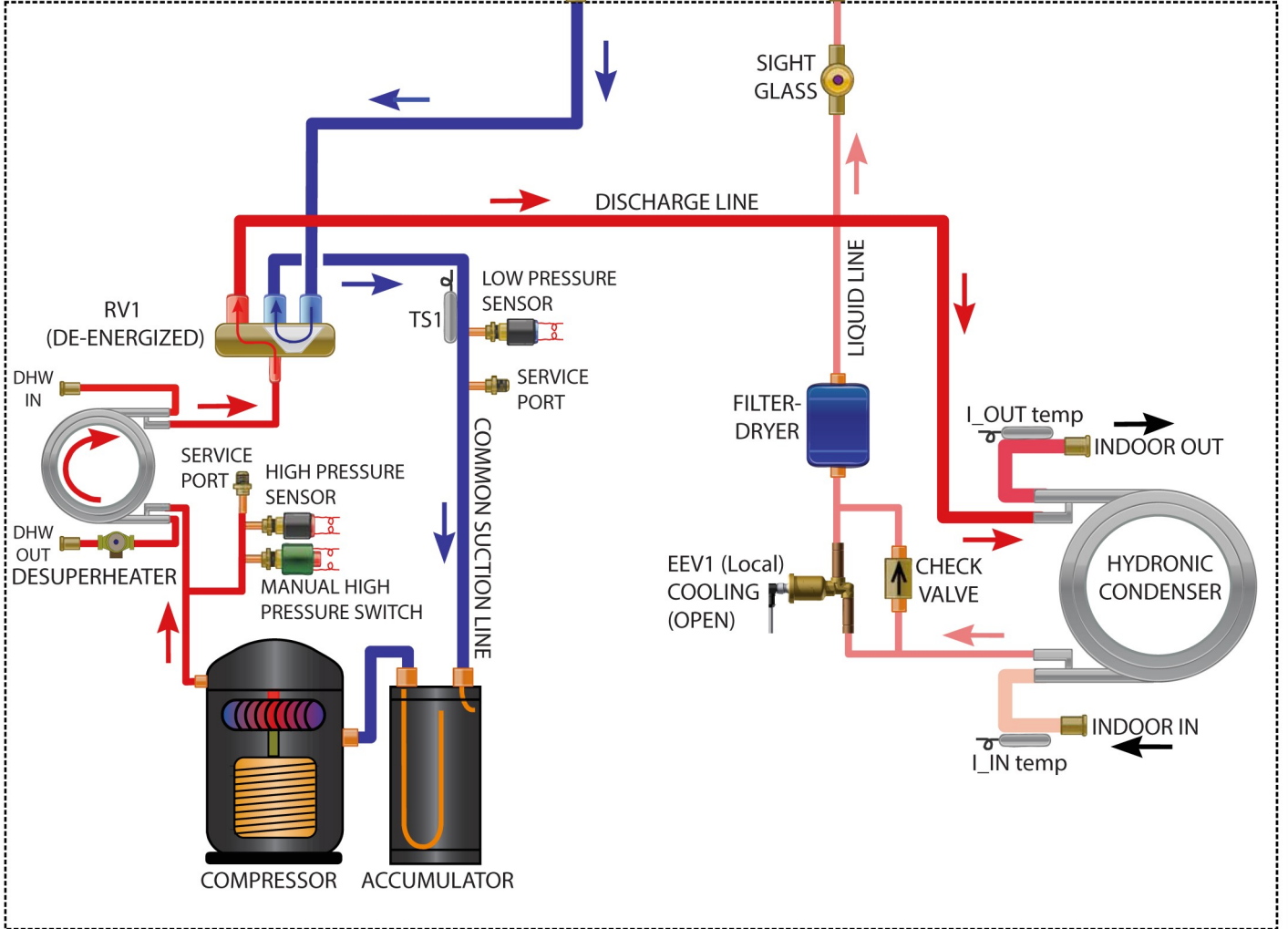
Heating Mode

ITEM	STATUS
RV1	DE-ENERGIZED
EEV1	OPEN
EEV2	ACTIVE

ACE OUTDOOR UNIT



ATW INDOOR UNIT



Drawn By C.GEDDES	Date 16-JUL-2014
Checked By C.GEDDES	Date 16-JUL-2014
Eng. Approved By C.GEDDES	Date 16-JUL-2014
Mfg. Approved By	Date
Approved By	Date

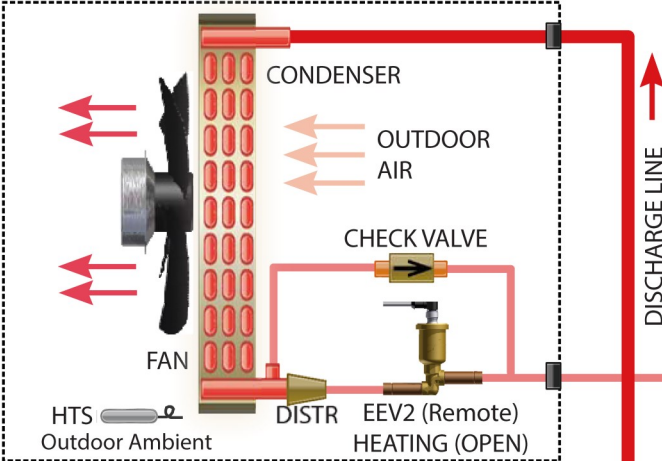
MARITIME GEOTHERMAL LTD.		P.O. Box 2555 170 Plantation Rd. Petitcodiac, NB CANADA E4Z 6H4	
Drawing Name ATW-Series Refrigeration Circuit Heating Mode			
Size LET	Drawing Number 001840RCD	Drawing Revision 03	Sheet 1 of 1

03	000270	D. RHEAULT	D. RHEAULT	12-FEB-2019
02	000253	D. RHEAULT	D. RHEAULT	01-JUL-2017
01	Initial Release	C. GEDDES	C. GEDDES	16-JUL-2014
REV	ECO#	IMPL BY	APVD BY	DATE

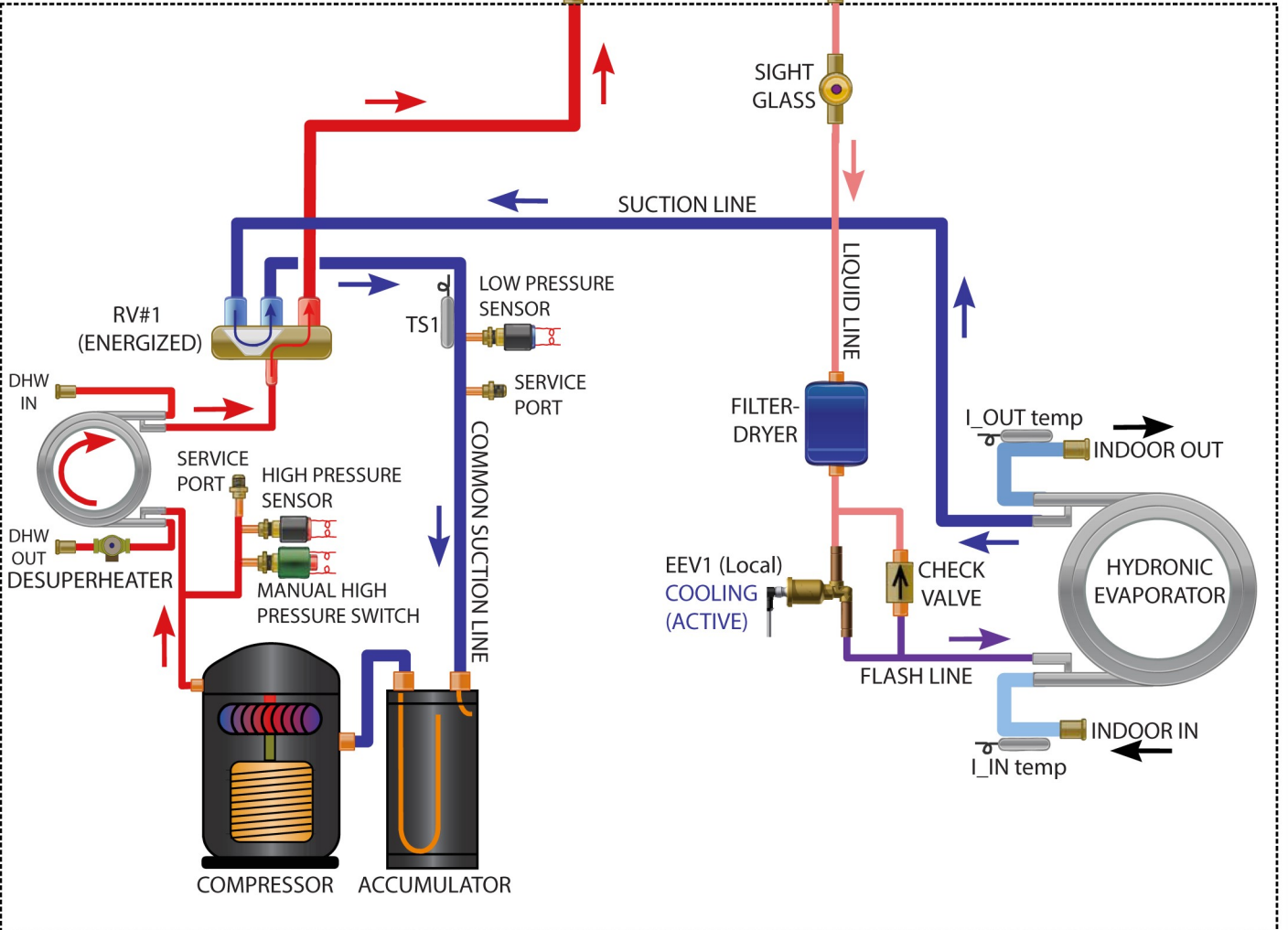
ATW Series Refrigeration Circuit Cooling / Defrost Mode

ITEM	STATUS
RV1	ENERGIZED
EEV1	ACTIVE
EEV2	OPEN

ACE OUTDOOR UNIT



ATW INDOOR UNIT



Drawn By C.GEDDES	Date 16-JUL-2014
Checked By C.GEDDES	Date 16-JUL-2014
Eng. Approved By C.GEDDES	Date 16-JUL-2014
Mfg. Approved By	Date
Approved By	Date

MARITIME GEOTHERMAL LTD.		P.O. Box 2555 170 Plantation Rd. Petitcodiac, NB CANADA E4Z 6H4	
Drawing Name ATW-Series Refrigeration Circuit Cooling / Defrost Mode			
Size LET	Drawing Number 001841RCD	Drawing Revision 03	Sheet 1 of 1

03	000270	D. RHEULT	D. RHEULT	12-FEB-2019
02	000253	D. RHEULT	D. RHEULT	01-JUL-2017
01	Initial Release	C. GEDDES	C. GEDDES	16-JUL-2014
REV	ECO#	IMPL BY	APVD BY	DATE

Engineering Guide Specifications

General

The split air source hydronic heat pump shall consist of an indoor unit, containing the compressor and all electronics, and an outdoor unit containing only an air coil, fan, and expansion valve. The unit shall be capable of heating or cooling the indoor hydronic loop, for space heating or air conditioning purposes. The unit shall be listed by a nationally recognized safety-testing laboratory (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). The heat pump, as manufactured by Maritime Geothermal, Petitcodiac, New Brunswick, shall be designed to operate correctly within the air and liquid temperature ranges specified on the "Operating Temperature Limits" table in this engineering specification document.

Factory Quality

Each unit shall be run tested at the factory with water circulating in indoor loop and outdoor unit connected. 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 indoor 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 refrigerant circuit, containing a hermetic motor scroll compressor, Electronic Expansion Valves (EEVs), coaxial heat exchanger, factory installed high and low pressure sensors, manual reset high pressure switch, service ports, liquid line filter-dryer, sight glass, and suction accumulator.

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 water to refrigerant heat exchanger 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 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'.

The unit shall be equipped with a double wall desuperheating heat exchanger, to heat domestic hot water with a small percentage of the unit's capacity while operating in space heating or cooling modes. A bronze head ECM circ pump and a temperature control to turn it off at 140°F / 60°C shall be built in.

Piping and Connections

The indoor 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.

Desuperheater connections for domestic hot water shall be 1/2" NPT, 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 and potable water safety.

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. 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 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: 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. Unit may be configured for stand alone operation.
8. Externally mounted 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. BACnet connectivity for control by building automation system, and providing alarm feedback.
10. Automatic data logging with onboard data storage, retrievable through PC software application.

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 RESIDENTIAL WARRANTY

MARITIME GEOTHERMAL LTD. warrants that the heat pumps manufactured by it shall be free from defects in materials and workmanship for a period of (5) FIVE YEARS after the date of installation or for a period of (5) FIVE YEARS AND (60) SIXTY DAYS after the date of shipment, whichever occurs first. In addition MARITIME GEOTHERMAL LTD. warrants that the compressor shall be free of defects in materials and workmanship for an additional period of (2) TWO YEARS from said date.

MARITIME GEOTHERMAL LTD. shall, at its option repair or replace any part or parts covered by this warranty which shall be returned to MARITIME GEOTHERMAL LTD., transportation charges prepaid, which, upon examination proves to be defective in materials or workmanship. 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 NORDIC® heat pump must be properly installed and maintained in accordance with MARITIME GEOTHERMAL LTD.'s installation and maintenance instructions.
2. The installer must complete the “**Installation Data Sheet**”, have it endorsed by the owner and return it to Maritime Geothermal Ltd. within 21 days of installation of the unit.
3. It is the responsibility of the building or general contractor to supply temporary heat to the structure prior to occupancy. These heat pumps are designed to provide heat only to the completely finished and insulated structure. Start-up 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.

If the 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 shall disclose to its satisfaction that such part or component fails to meet this warranty and the alleged defects were not caused by accident, misuse, neglect, alteration, improper installation, repair or improper testing.