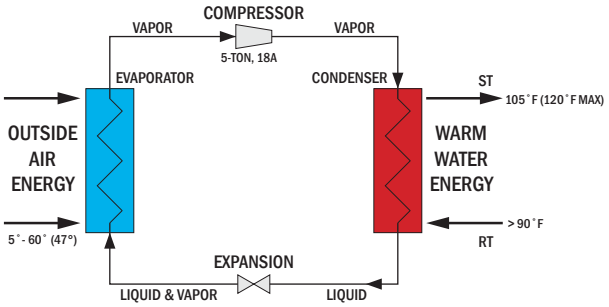
NorAire® Heat Pump Boiler

AIR TO WATER

Is there heat in winter air?

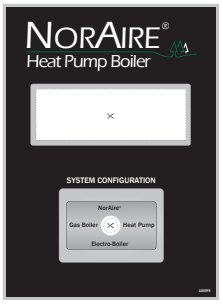
Yes, but the refrigeration cycle is required to capture and transfer this “heat”.



With the Heat Pump Boiler the outside air energy is converted to hot water and as a bonus the system is 332% efficient.

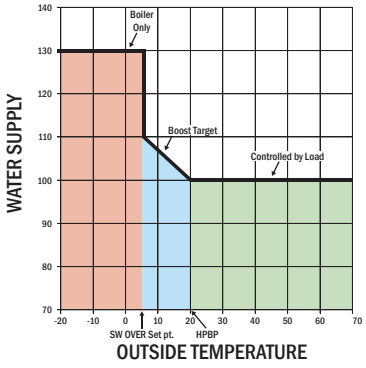
Indoor Unit (IDU)

- Wall-hung, easy access, 2 front panels
- Includes standard Electro-Boiler
- Coax condenser coil, no water filter required
- Circuit breakers, Electro-Boiler power
- Cabinet bottom refrigerant line set stubs and water pipe connection



System Controller

- Control and monitor for the ODU
- Safety redundant circuit
  - Safety limits are not part of microprocessor software
- 4 digital temperature sensors
- WarmFlo® technology, OT reference
  - Blending HP and EB for best annual COP
  - Boiler is used to boost the HP supply
  - Boiler has its own set point, target



Outdoor Unit (ODU)

- Standard, R-410A, high efficiency
- Installer can use his own brand
  - Must specify brand/model on order
  - Buy local, save freight
- Factory provided hookup and setup drawings to match the specific brand used
- In addition, Electro stocks the Nordyne ODU
- TXV required, kit included with each system

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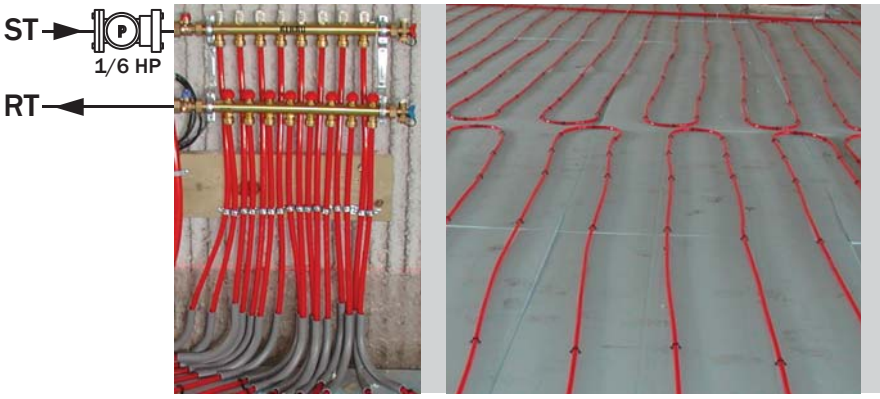
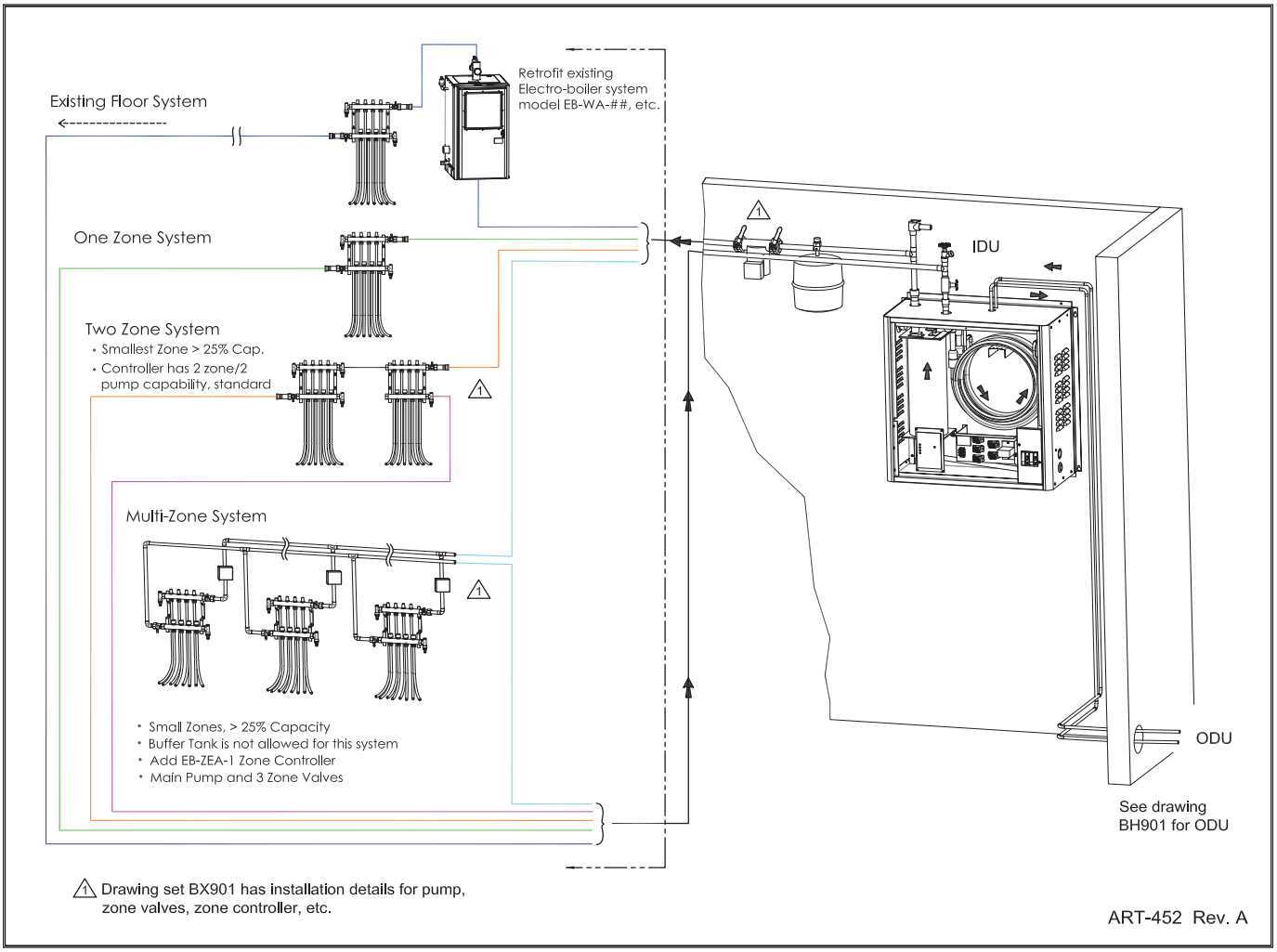
APPLICATION - Radiant Floor



Electro Industries is the only US manufacturer of an integrated air to water heat pump providing -20° F to 70° F comfort.



Why should I be interested in Electro-Boiler Heat Pump?

EFFICIENCY - - - EFFICIENCY - - - EFFICIENCY

$$\text{Coefficient of Performance (COP)} = \frac{\text{Heated Energy Output}}{\text{Net Input Energy}}$$

$$\text{Efficiency \%} = \text{COP} \times 100$$

NorAire Heat Pump Boiler

Output Energy (Btu/h) = 500 x (ST - RT) x GPM

Net Input Energy (Btu/h) = Compressor Watts x 3.412

Output vs. Input Difference = Captured Air Energy - Internal Losses

Example, Mpls:

Output @47°OT = 500 x (105°- 91°) x 8 = 56,000
Input @47°OT = 17.2A x 240 x 3.41 = 14,076 (COP = 3.98)

Output @10° = 500 x (98°- 90°) x 8 = 32,000
Input @10° = 17.8A x 240 x 3.41 = 14,567 (COP = 2.20)

Boost (EB modulating) is only 16,000 Btu/h or 4.7 kW average

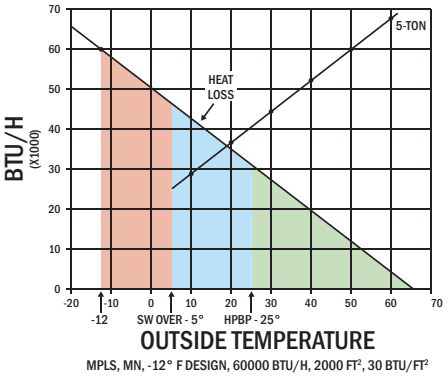
Various COP's

Old Oil Boiler	0.50
Open Flame Flue	0.75
Direct Vent Gas	0.87
Condensing Gas	0.95
Electric Heat (Electro-Boiler)	1.00
HPB, 5-Ton at 47° F	3.89
HPB, 5-Ton at 30° F	3.78
HPB, 5-Ton at 10° F	2.28
Below HP Lockout (5° F)	1.00

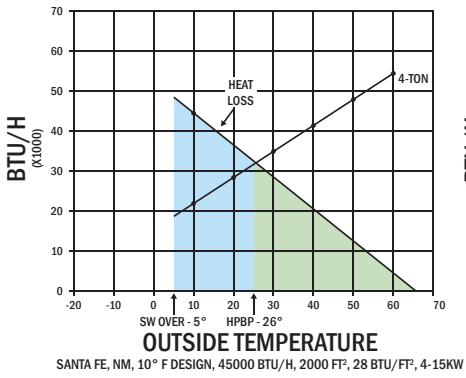
$$\text{*Annual COP} = \frac{\text{Weather Bin Hours (per 5° bins) x BTU Energy}}{\text{Input BTU for each weather bin cell}}$$

Reference Information, Selected City

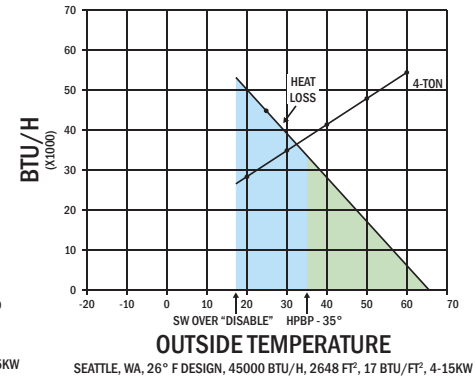
ARI Region	City	NA HPB Size	Manual J Design Temp	Hours < 5° F	Annual BTU-NA (x 1,000,000)	HP Bal. Point	Boost BTU (HP + EB)	Design BTU/FT²	Est. Annual COP*	Annual Savings (10¢/kWh)
V	Minneapolis, MN	5-20	-12° F	526	86.68	20° F	8,280	34	1.73 (1.99)	$2,218
IV (N)	Omaha, NE	5-15	-3° F	169	49.02	18° F	3,507	26	2.1 (2.54)	$1,900
IV (S)	Santa Fe, NM	4-15	10° F	3	25.12	28° F	760	23	2.8	$1,325
III	Kansas City, MO	4-15	6° F	30	32.39	25° F	2,919	22	2.3	$1,048
VI	Seattle, WA	4-10	26° F	0	53.36	32° F	0	20	3.0	$3,114



MPLS, MN, -12° F DESIGN, 60000 BTU/H, 2000 FT², 30 BTU/FT²



SANTA FE, NM, 10° F DESIGN, 45000 BTU/H, 2000 FT², 28 BTU/FT², 4-15KW



SEATTLE, WA, 26° F DESIGN, 45000 BTU/H, 2648 FT², 17 BTU/FT², 4-15KW

Providing Comfort Through Efficient Energy Solutions

Specification Table

	Units	3-Ton	4-Ton	5-Ton
Heating capacity, EB ④⑤⑥⑦	Btu/h	34,000 (10 kW)	51,000 (15 kW)	68,000 (20 kW)
Heating capacity, HP ①②③	Btu/h	33,300	44,400	59,100
Heating capacity, HP @ 47° F	Btu/h	27,300	40,400	49,700
Power voltage	Volts/60Hz	240, 1 phase	240, 1 phase	240, 1 phase
IDU source breaker	Amps	50	80	125
IDU EL boiler	Amps	42	63	84
IDU non-EL boiler	Amps	1	2	2
ODU source breaker	Amps	30	45	60
ODU RLA	Amps	15.1	21.3	27.7
ODU LRA	Amps	76	106	139
ODU noise level	dB	74	75	75
IDU/ODU width	Inches	26.5/31	26.5/31	26.5/31
IDU/ODU height	Inches	30/45	30/45	30/45
IDU/ODU depth	Inches	11/32	11/32	11/32
Line sets	Inches	⅜ and ⅞	⅜ and ⅞	⅜ and ⅞
Max line set	Feet	75	75	75 (1-⅛", 50 and up)
Max vertical separation	Feet	25	25	25
R-410A ODU factory charge	Ounces	See nameplate	See nameplate	See nameplate
Water connection	NPT, female	1"	1"	1"
Maximum water flow	GPM per minute	7	10	10
Nominal water flow ②	GPM per minute	6	8	8
Minimum water flow	GPM per minute	3	3.5	3.5
Internal pressure drop	Ft of head, Rated GPM	2.3	2.4	3
IDU shipping weight	Pounds	162	162	162
ODU shipping weight	Pounds	158	193	201

① HEATING CAPACITY AT 60° F ODU OUTSIDE AIR ② LOAD CONDITIONS, HYDRONIC RETURN 90° F AND NOMINAL GPM
③ TYPICAL RETURN TO SUPPLY TEMP RISE SHOULD BE 10° TO 15° F ④ ELECTRO-BOILER ENTERING TEMP IS HP COIL OUTPUT, 90° TO 110° F
⑤ TYPICAL ELECTRO-BOILER TEMP RISE SHOULD BE 10° TO 20° F ⑥ ELECTRO-BOILER IS DISABLED ABOVE HPBP AND MODULATES BETWEEN HPBP AND SWOVER (BOOST)
⑦ ELECTRO-BOILER SIZE DETERMINES BTU/H RATING AT COOLEST TEMP ⑧ DATA MAY BE UPDATED WITHOUT NOTICE

Product Models, Indoor Unit Only

EB-HPH-3-00 3-Ton Hydronic, 34,000 Btu/h, No AUX Electro-Boiler
EB-HPH-3-10 3-Ton Hydronic, 34,000 Btu/h, 10 kW AUX Electro-Boiler
EB-HPH-3-15 3-Ton Hydronic, 34,000 Btu/h, 15 kW AUX Electro-Boiler
EB-HPH-3-20 3-Ton Hydronic, 34,000 Btu/h, 20 kW AUX Electro-Boiler
EB-HPH-4-00 4-Ton Hydronic, 48,000 Btu/h, No AUX Electro-Boiler
EB-HPH-4-10 4-Ton Hydronic, 48,000 Btu/h, 10 kW AUX Electro-Boiler
EB-HPH-4-15 4-Ton Hydronic, 48,000 Btu/h, 15 kW AUX Electro-Boiler
EB-HPH-4-20 4-Ton Hydronic, 48,000 Btu/h, 20 kW AUX Electro-Boiler
EB-HPH-5-00 5-Ton Hydronic, 57,000 Btu/h, No AUX Electro-Boiler
EB-HPH-5-10 5-Ton Hydronic, 57,000 Btu/h, 10 kW AUX Electro-Boiler
EB-HPH-5-15 5-Ton Hydronic, 57,000 Btu/h, 15 kW AUX Electro-Boiler
EB-HPH-5-20 5-Ton Hydronic, 57,000 Btu/h, 20 kW AUX Electro-Boiler

Optional - Matching Outdoor Unit (ODU)

6400-030 3-Ton Outdoor Unit, 34,500 Btu/h, 14 SEER Nordyne
6400-040 4-Ton Outdoor Unit, 48,000 Btu/h, 14 SEER Nordyne
6400-050 5-Ton Outdoor Unit, 57,000 Btu/h, 14 SEER Nordyne

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