

# NORAIRE®

## Air To Water Heat Pump System



- ~ RADIANT HEATING WITH ELECTRO-BOILER® ASSIST
- ~ COOLING WITH CHILLED WATER



**(OUTDOOR UNIT SOLD SEPARATELY)**

### Features

- Air to water heat pump system with complete hydronic HVAC capability
- Concept - Split HP/AC system with standard line sets
- Self-contained outdoor evaporator/condenser (ODU)
- Indoor cabinet (IDU) with heat/cool exchanger, hydronic pump, standard Electro-Boiler, defrost energy boost technique, chilled water out, integrated control system
- When needed the heat pump's heating water is boosted with the integrated Electro-Boiler

### Refrigerant System

- Copeland scroll compressor
- R-410A
- 2-row ODU coil
- Quiet ODU fan
- Coax coil exchanger
- Unique defrost system (average 3 minutes)



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# Specification Table

	Units	3-Ton	4-Ton	5-Ton
Heating capacity ① ②	Btu/h	33,000	46,000	55,000
	kW	9.7	13.5	16.2
Cooling capacity ③	Btu/h	35,000	47,000	57,000
	kW	10.3	13.8	16.8
Power voltage	Volts/60Hz	208/240, 1 phase	208/240, 1 phase	208/240, 1 phase
ODU source breaker	Amps	40	50	60
ODU RLA	Amps	17.6	23.5	28.1
ODU LRA	Amps	88	123	155
ODU noise level	dB	65	65	65
ODU width	Inches	29	28	28
ODU height	Inches	25	33	33
ODU depth	Inches	29	28	28
ODU shipping weight	Pounds	270	286	298
Line sets	Inches	3/8 and 3/4	3/8 and 7/8	3/8 and 7/8
R-410A charged (if packaged with factory ODU)	Feet	25	25	25
Max line set	Feet	100	100	100
Max vertical separation	Feet	35	35	35
IDU non-backup	Amps	3	4	5
IDU backup ④	Amps	38	63	84
IDU source breaker	Amps	50	80	125
Hydronic pump	-	26-64	26-99	26-99
Water connection	NPT, female	1"	1"	1"
Nominal water flow	GPM/L per minute	8/30	11/41	14/53
Min water flow	GPM/L per minute	6.5/24	9/34	11/41
Internal pressure drop	Ft of head	7	7	12
IDU width	Inches	20	20	20
IDU height	Inches	48	48	48
IDU depth	Inches	23	23	23
IDU shipping weight	Pounds	212	233	236

① HEATING CAPACITY AT 47° F (8° C) ODU INLET AIR

② HEATING HYDRONIC SUPPLY AT 100° F (38° C)

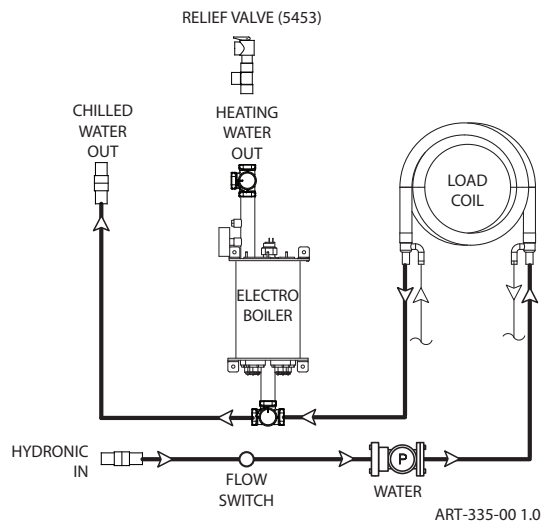
③ COOLING CAPACITY AT 95° F (35° C) ODU INLET AIR

④ REPRESENTS MAXIMUM, CONFIGURATION ALLOWS 4 AND 5 TON MODELS REDUCED KW TO MATCH THE LOCAL COLDEST BTU/H REQUIRED

⑤ DATA MAY BE UPDATED WITHOUT NOTICE

## Hydronic Circuit

- Coax coil, copper or cupronickel
- Water filter not necessary
- 1" internal piping, female flange cabinet plates
- Internal circulator pump, included
- Safety flow switch
- Separate heating and chilled water outputs
  - Water coil gets coolest water
  - Chilled water does not go through boiler
  - Can be piped direct
  - Internal pump supplies both

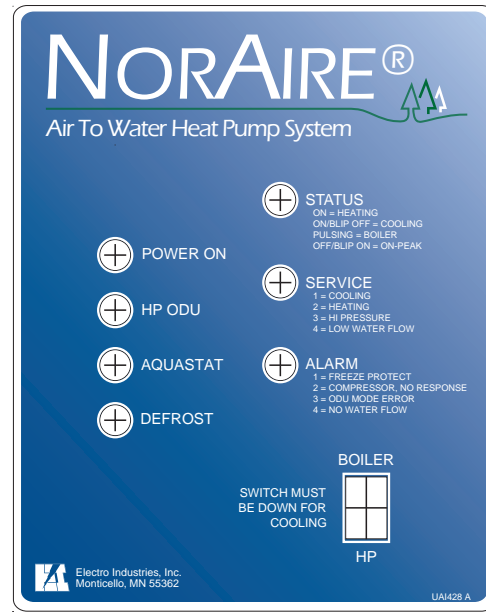


## System Controller

- Activated with basic W or Y input
- Proper control and monitor interface to the ODU
- Safety redundant circuit/logic/components
  - Safety and limits are not part of the microprocessor software
- HP cycles on preset temperature limits or 500 psig limit
- Mode dial switch, field select system configuration
  - A - heat pump only
  - B - internal AUX boiler
  - C - external AUX source
- AUX boiler used during tank cold to hot switchover

## WarmFlo® Supply Sensing, Modulation Control

- Auxiliary is only used to temper or boost the HP supply output
- Auxiliary does not switch on at a fixed water temperature
- Boiler supply has its own set point (target)
  - Below HP ODT, target can be higher



## Heat Pump Operating Conditions

<u>Outdoor Temperature</u>	<u>Mode</u>	<u>3-Ton Btu/h Output</u>	<u>5-Ton Btu/h Output</u>
> 20° F (-7° C)	Heat pump only	@ 20° F (-7° C) = 21,000 (Cooling = 36,000)	@ 20° F (-7° C) = 33,000 (Cooling = 56,500)
0° F to 20° F (-18° C to -7° C)	Heat pump and resistance*	@ 10° F (-12° C) = 27,000	@ 10° F (-12° C) = 44,000
< 0° F (-18° C)	Resistance only	@ 0° F (-18° C) or less = 31,000	@ 0° F (-18° C) or less = 68,000

\*WarmFlo technology modulates resistance heat.



**ODU SERVICE HOOKUP**  
**(OUTDOOR UNIT SOLD SEPARATELY)**



**IDU SERVICE HOOKUP**  
**CB DISCONNECT INCLUDED**

## NorAire Model Numbers

<u>Heating @ 47° F (8° C)</u>			
NC-FE-036-1-CPXX1-XX	3-ton system	33,000 Btu/h	No boiler
NC-FE-036-1-CPXX1-10	3-ton system	33,000 Btu/h	10 kW boiler
NC-FE-048-1-CPXX1-XX	4-ton system	46,000 Btu/h	No boiler
NC-FE-048-1-CPXX1-10	4-ton system	46,000 Btu/h	10 kW boiler
NC-FE-048-1-CPXX1-15	4-ton system	46,000 Btu/h	15 kW boiler
NC-FE-060-1-CPXX1-XX	5-ton system	55,000 Btu/h	No boiler
NC-FE-060-1-CPXX1-15	5-ton system	55,000 Btu/h	15 kW boiler
NC-FE-060-1-CPXX1-20	5-ton system	55,000 Btu/h	20 kW boiler

## Forced Air, Cool/Heat

- IDU piping is direct to water coil
- Radiant output (buffer tank) is set up independent
- Conventional 4-wire room thermostat connection, independent input and air handler/coil pump control
- Radiant load can be up to 8 zones
- Air handler can be a gas furnace (dual fuel)
- Full installation drawings and procedure
- Use optional Electro Buffer Tank Controller

## Options, Control Integrated

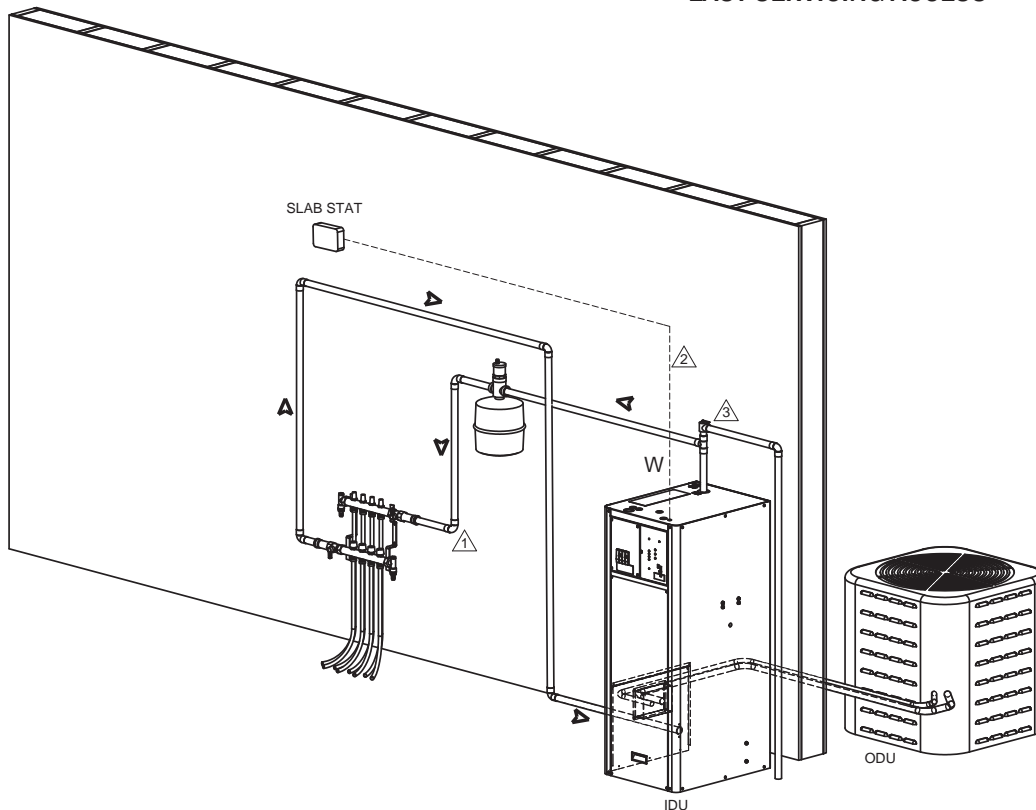
- Heat/cool buffer tank
- Buffer Tank Controller, heat and cool
- Water coil air handler
- Water coil for gas furnace
- Gas boiler, dual fuel

## Additional Helps

- Radiant floor zones HX103, pages 1, 3, 7, 8
- Cooling air handler HX103, pages 2, 4, 5
- Buffer tank system HX103, pages 6, 7, 8, 9, 10
- Gas furnace/dual fuel HX103, pages 6, 7, 8
- Gas boiler, backup HH120, page 5



EASY SERVICING ACCESS



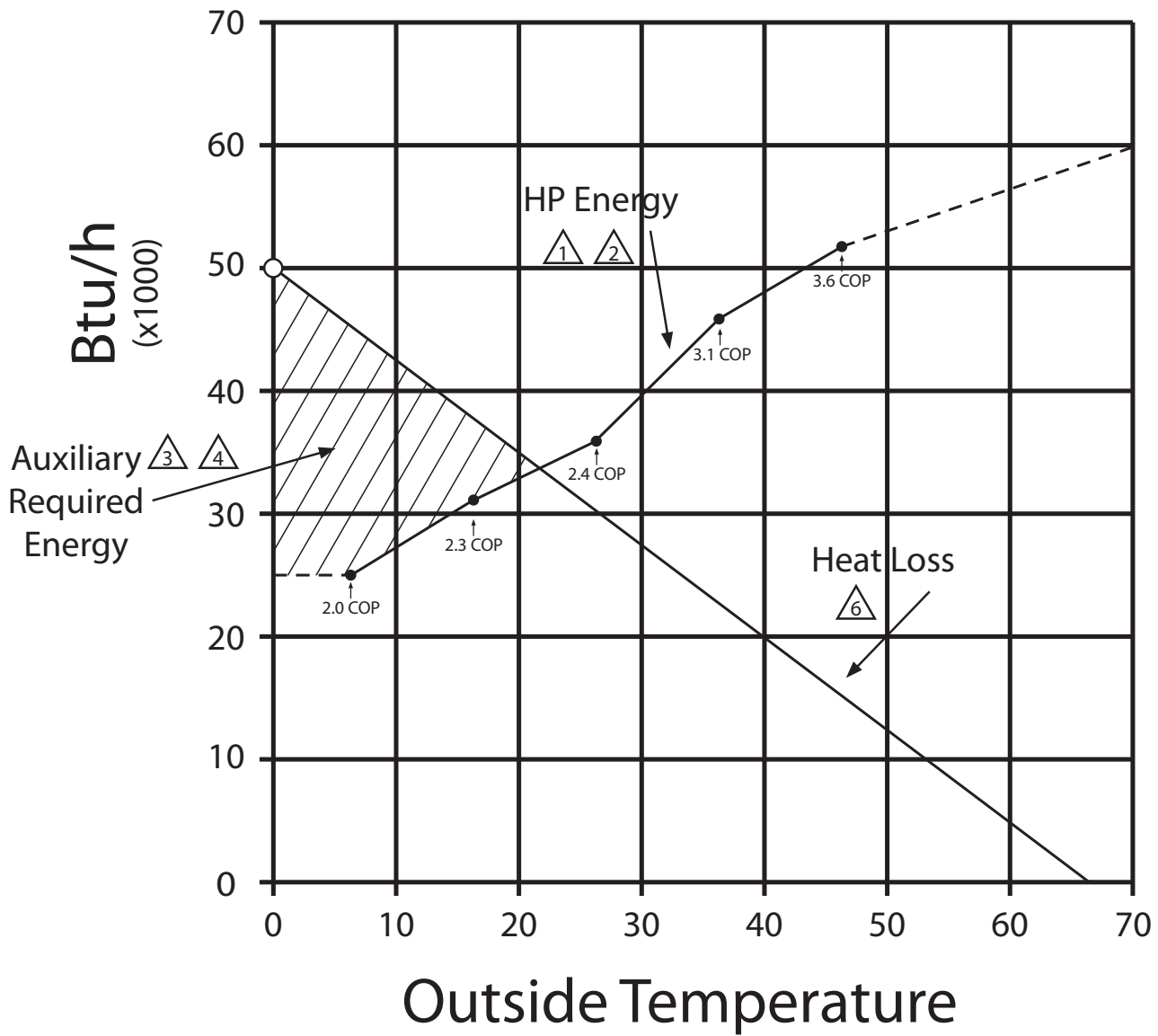
### OTHER ELECTRO PRODUCTS

MAKE-UP AIR  
ELECTRIC BOILERS  
PLENUM HEATERS

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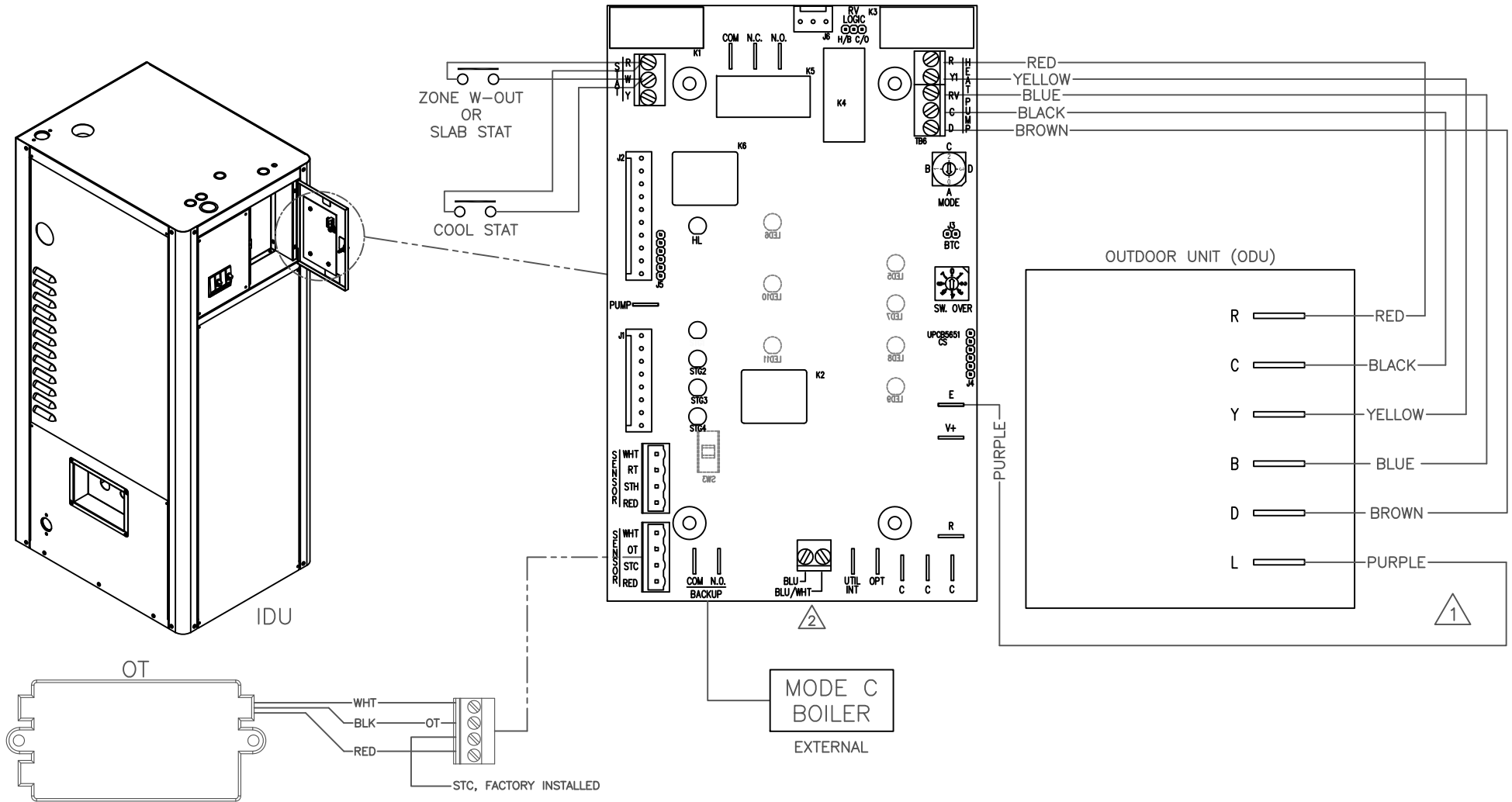
### NorAire® 5-Ton, EI ODU Series

#### Notes:

1. 105° F supply water temperature
2. 14 GPM flow
3. Auxiliary - internal Electro-Boiler™
4. Supply sensing, stage 1 modulation from WarmFlo balance point to about 0° F
5. Additional 10 kW or 15 kW (stages 2-4) available, as required, for any colder conditions
6. Building heat loss, Btu/h requirement plotted against outside temperatures.  
Design - 0° F at 50,000 Btu/h, -20° F at 65,000 Btu/h (20 kW).

# NORAIRE BASIC SYSTEM HOOKUP

## V2.0\*



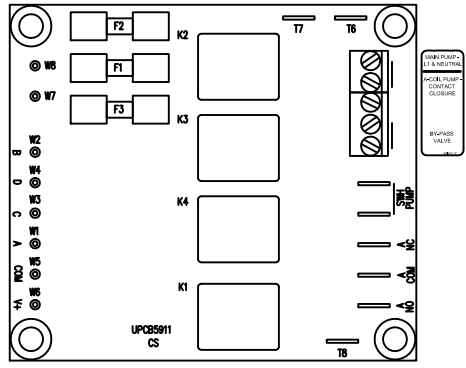
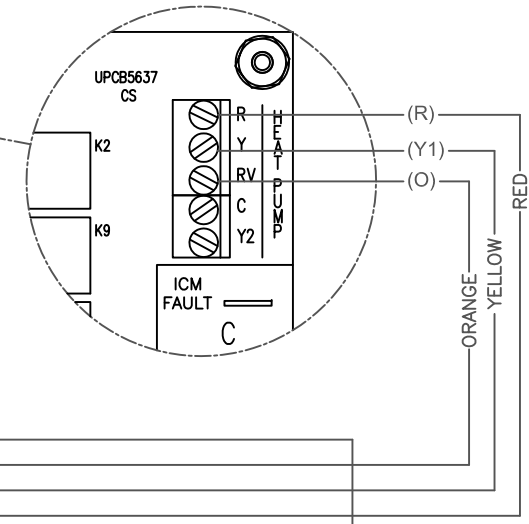
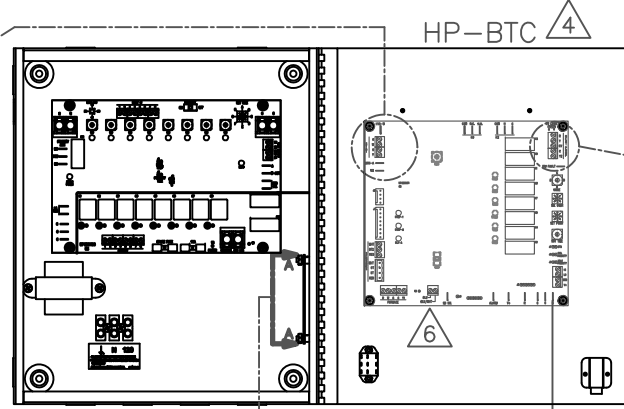
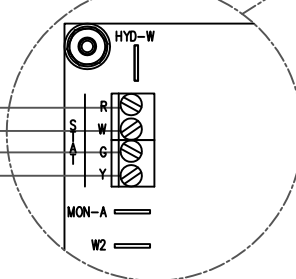
NOTES:

- ① NOT AVAILABLE ON ALL ODU'S. SEE INSTALL MANUAL FOR CONNECTION USAGE- MUST NOT GO HIGH WITH DEFROST, ONLY CONNECT FOR BACK-UP HEAT DURING COMPRESSOR HARD LOCK-OUT.
- ② WHERE APPLICABLE, REMOVE BLUE JUMPER, UTILITY CONTROL CONNECTION

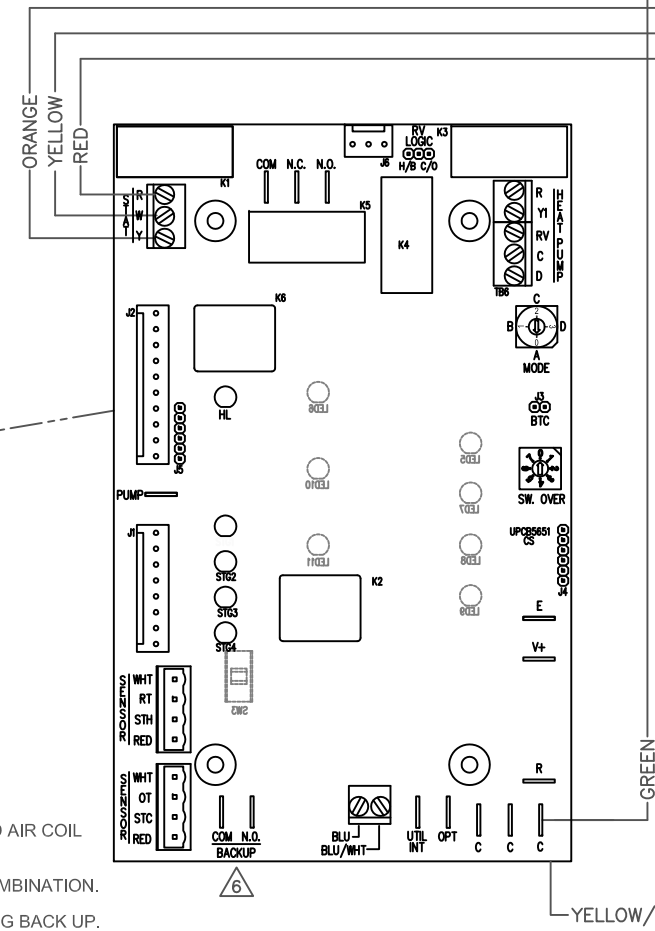
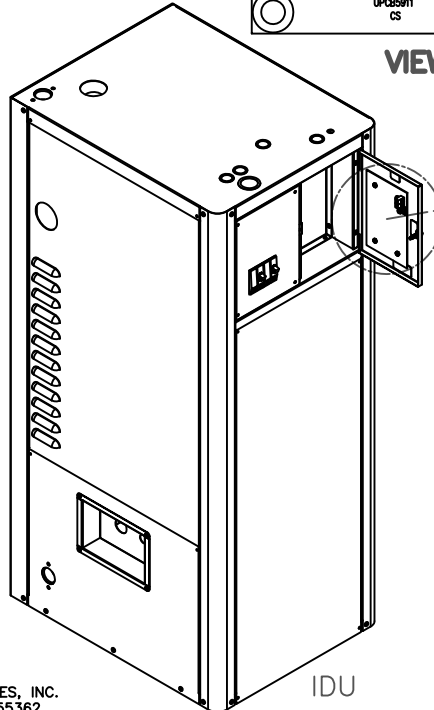
# NORAIRE - HP-BTC HOOK-UP V2.0\*

## AIR STAT

- R ⊗ 24VAC HOT
- W ⊗ HEAT
- G ⊗ BLOWER
- Y ⊗ COOL

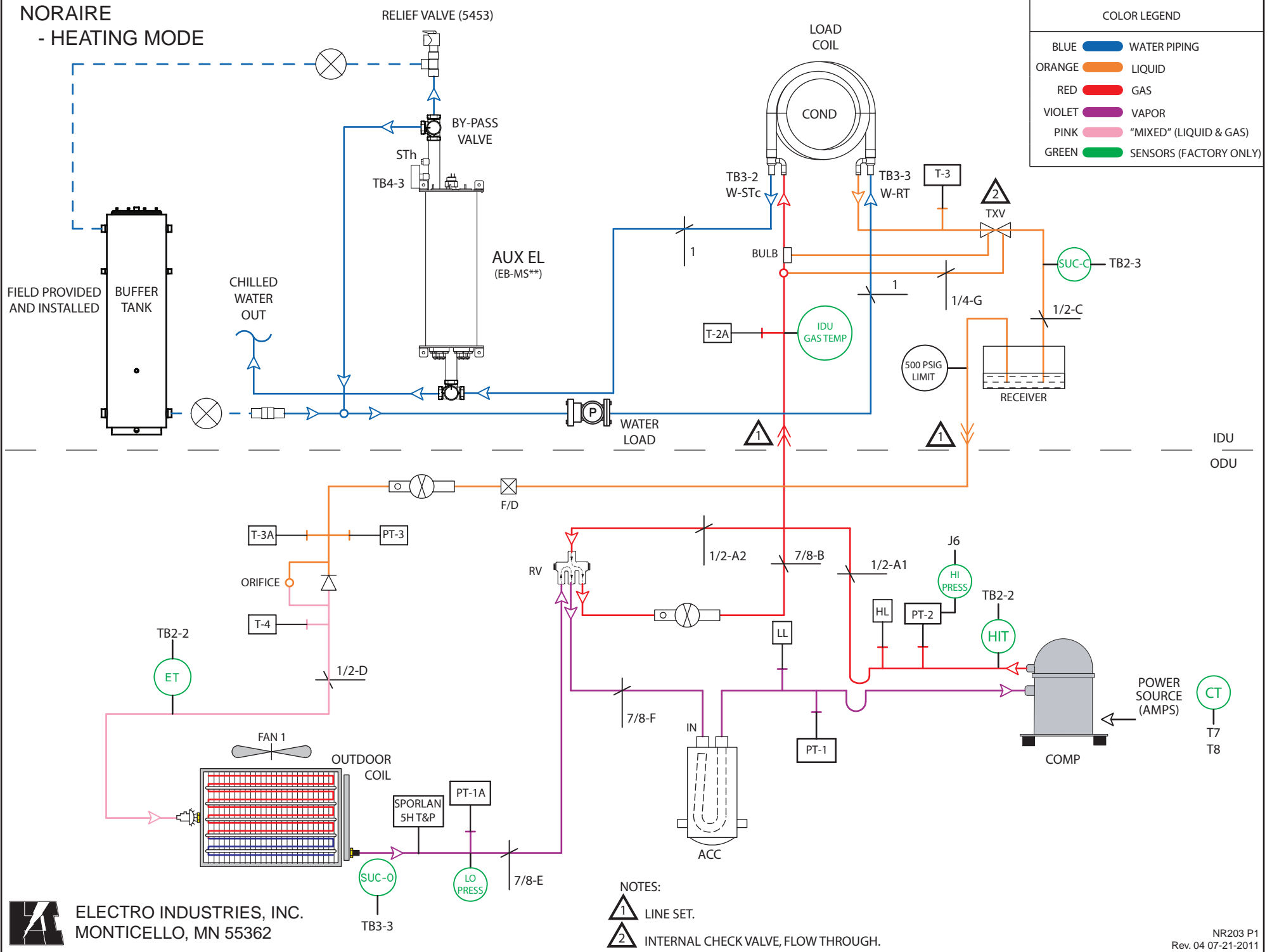


VIEW A-A



- NOTES:
- ⚠️ 3 SEE BTC INSTALL MANUAL FOR FORCED AIR COIL PUMP AND/OR N-3WVK-1 HOOK-UP.
  - ⚠️ 4 MUST USE V3.00 FOR THIS NORAIRE COMBINATION.
  - ⚠️ 5 ONLY APPLIED TO GAS FURNACE DURING BACK UP. BTC REQUIRED, EXTEND TO MON-A TAB AND SET UP PER HP-BTC INSTALL MANUAL.
  - ⚠️ 6 NOT USED WITH BTC COMBINATION.

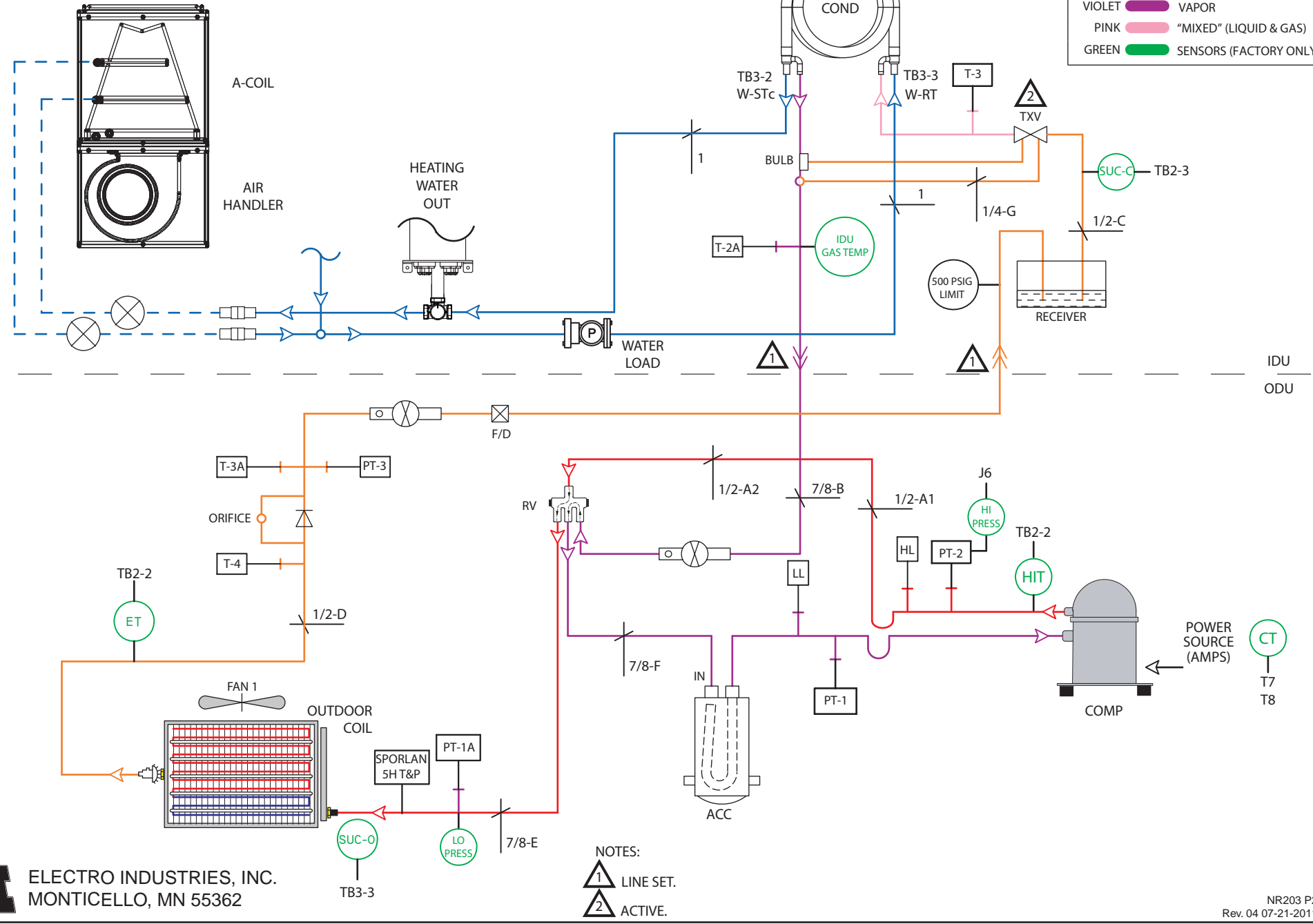
# NORAIRE - HEATING MODE





# NORAIRE - COOLING MODE

COLOR LEGEND	
BLUE	WATER PIPING
ORANGE	LIQUID
RED	GAS
VIOLET	VAPOR
PINK	"MIXED" (LIQUID & GAS)
GREEN	SENSORS (FACTORY ONLY)



NOTES:  
 1 LINE SET.  
 2 ACTIVE.

## **HX103 Application Drawings – Disclaimer**

Not all Buffer Tank Controller/NorAire combinations shown in this drawing set are factory supported or considered “in production”.

Examples – pages 5, 10, and 11



# NorAire® Air to Water Heat Pump Application & Piping Suggestions

## Reference HX103 Drawing Package

### IDU Concept

1. Coax refrigerant to water heat exchanger connected to a generic air source outdoor heat pump (ODU).
2. However, each ODU supported by Electro Industries and this IDU must be tested and verified at Electro Heat Pump Test Facility (representative sample may be adequate).
3. Supplementary, auxiliary, or backup heating is supplied by an internally integrated and piped Electro-Boiler, typically EB-MS-\*\* Series.
4. An internal 3-way valve bypasses chilled water ahead of the Electro-Boiler vessel. A special supply pipe is provided for chilled water output. When the system operating mode is forced air chilled water cooling, this 3-way valve follows the ODU reversing valve (RV).
5. The NorAire controller has a peg jumper to select ODU reversing valve control logic (high for cooling or heating). Factory default is high for heating.
6. Typical with heat pump hydronic applications, the forced air water coil is connected as a buffer tank outlet zone. This is **not** Electro's suggestion. With the NorAire (and NHP) concept the water coil source is directly from the refrigerant heat exchanger. With this arrangement the water coil will always receive either the hottest or the coolest water. In most configurations this also saves one pump.
7. However, the above arrangements provide some interesting control and pumping challenges. But these challenges are answered by Electro Buffer Tank Controller. Actually the HP-BTC-\*\* provides very simple installation and wiring features. No extra relays, etc. are required.

### Optional, Buffer Tank Controller (HP-BTC)

Literature sheet NL009, hookup drawing set NH205 and HX103 sheet 12 can provide additional evaluation and useful information.

### User Guide

HX103 drawing set is an attempt to suggest workable piping and control possibilities. There certainly are other possibilities which could be a cross or combination of these various sheets. However, the descriptive phrases at each page top and associated notes need to be carefully considered when selecting a piping sheet and certainly also very important if there is a modification or cross between sheets. The following summary or indexing may help.

- Radiant heating only – sheet 1, 3
- Add forced air cooling – sheet 2, 4
- Heating buffer tank – sheet 4, 6, 7, 11
  - Cooling water coil must match HP Btu/h
  - Tank change-over not required
- Two buffer tank arrangement – sheet 5
- Zone valves – sheet 7
- Heating and cooling shared buffer tank – sheet 8, 9
  - Tank change-over required
- Radiant heating/forced air cool and heat – sheet 9, 10
- Radiant heating/forced air room terminal units – sheet 10
- Possible water heater buffer tank – sheet 11
- HP-BTC suggested – sheet 3, 4, 5, 6, 7; required – sheet 8, 9, 10, 11

**Comment:** Buffer tank method can be identified by studying the chilled water return pipe. Example, compare sheet 6 with sheet 8.

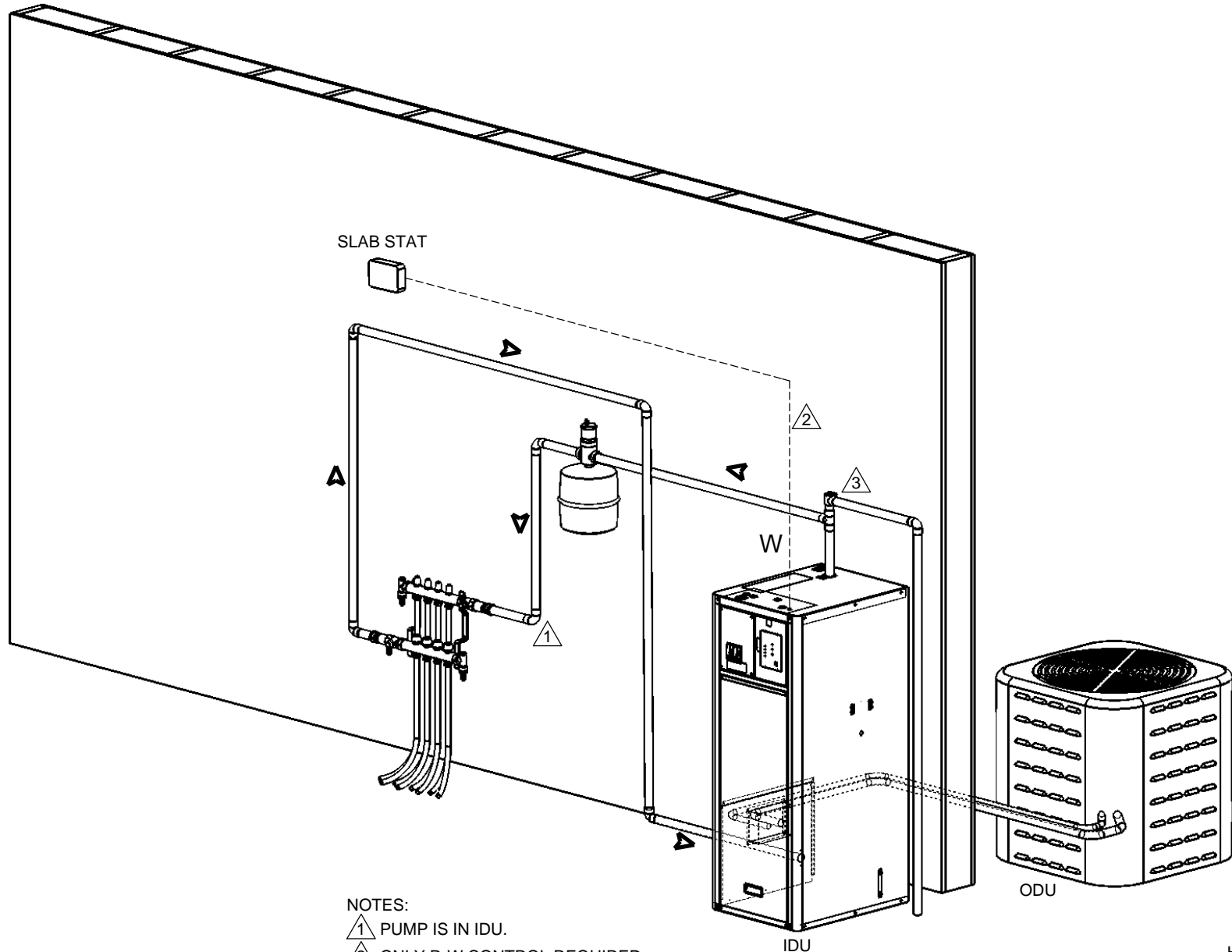


# NORAIRE AIR TO WATER HEAT PUMP

- Heating only - radiant floor
- One large zone
- Must size to match heat pump BTU/h

**NOTE:** AS SHOWN NORAIRE RECOMMENDS PRESSURE SYSTEM, SEE INSTALLATION MANUAL.

**WARNING:** THESE ARE SUGGESTED AND CONCEPT DRAWINGS. INSTALLER IS RESPONSIBLE FOR ALL EQUIPMENT, ADDITIONAL COMPONENTS, AND DETAILING REQUIRED BY LOCAL CODES.

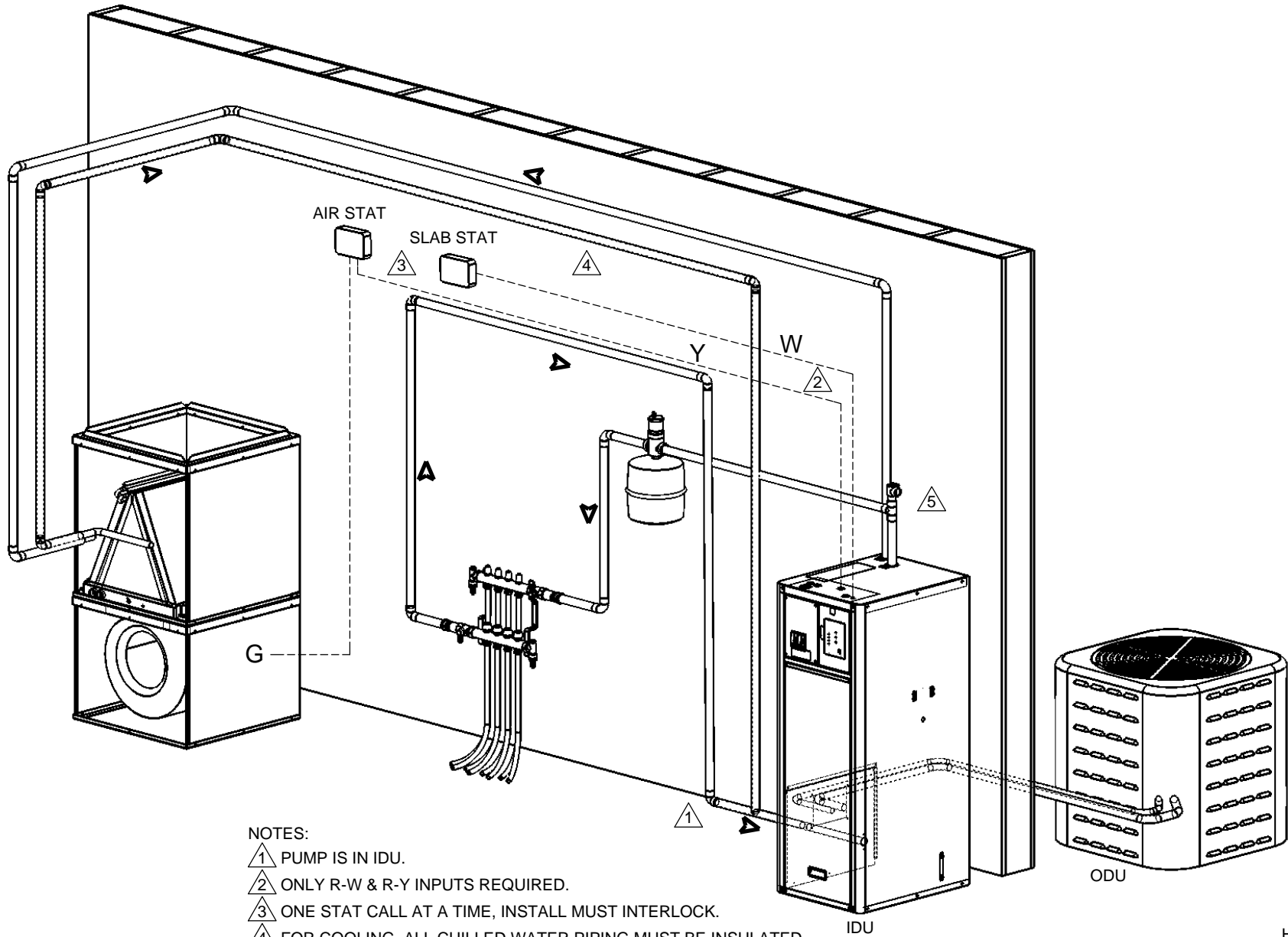


**NOTES:**

- 1 PUMP IS IN IDU.
- 2 ONLY R-W CONTROL REQUIRED.
- 3 RELIEF VALVE MUST HAVE PIPE TO FLOOR OR DRAIN.

# NORAIRE AIR TO WATER HEAT PUMP

- Add cooling forced air water coil, see sheet 1
- Must size to match heat pump BTU/h
- Water coil **not** configured for heating, water coil heating see sheets 9 & 10

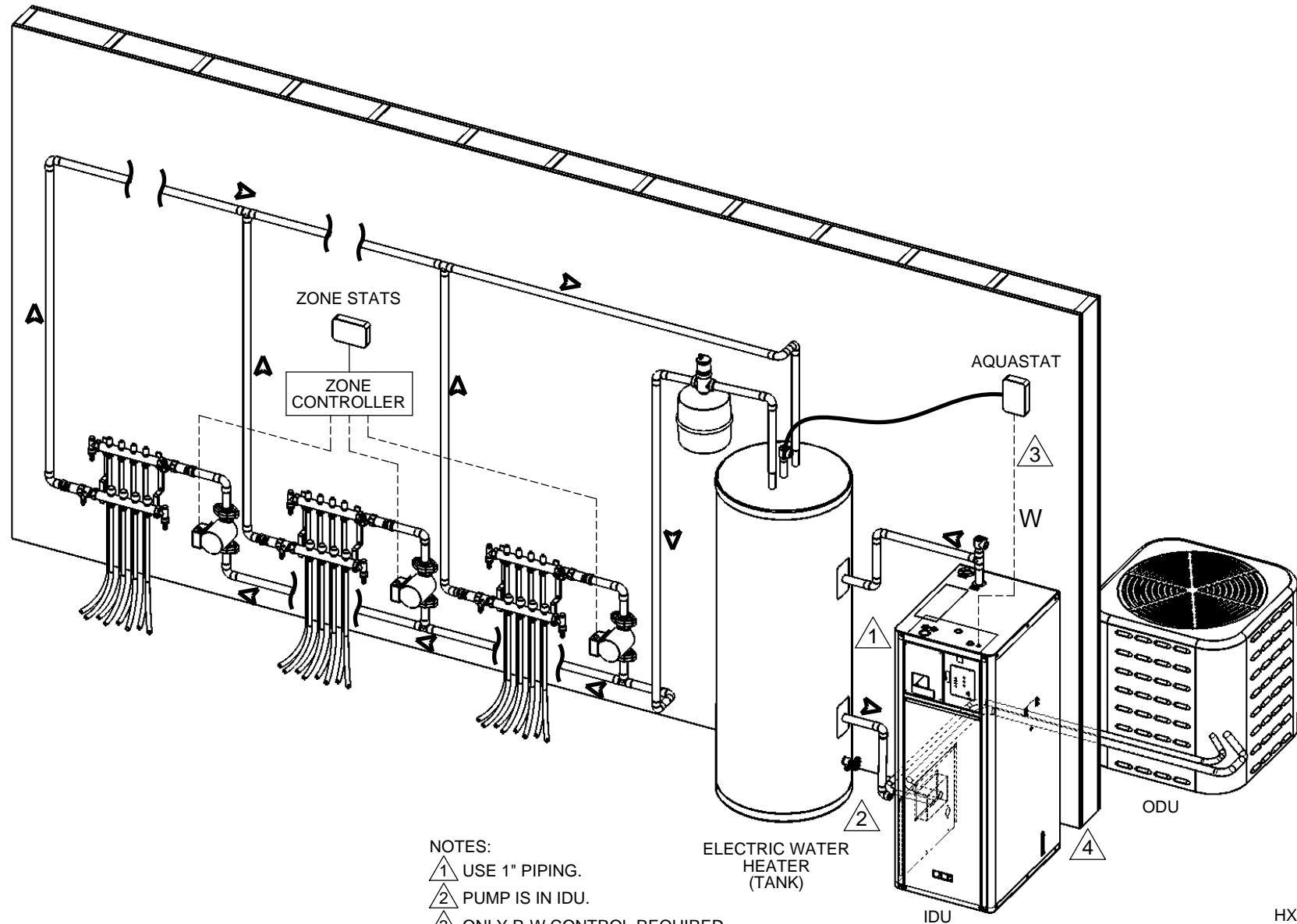


NOTES:

- ① PUMP IS IN IDU.
- ② ONLY R-W & R-Y INPUTS REQUIRED.
- ③ ONE STAT CALL AT A TIME, INSTALL MUST INTERLOCK.
- ④ FOR COOLING, ALL CHILLED WATER PIPING MUST BE INSULATED.
- ⑤ SEE P.1 FOR RELIEF VALVE.

# NORAIRE AIR TO WATER HEAT PUMP

- Heating only
- Using standard electric water heater as the tank.
- Suggest 35,000 BTUh maximum load capacity. For larger systems, must use sheet 6, type buffer tank.

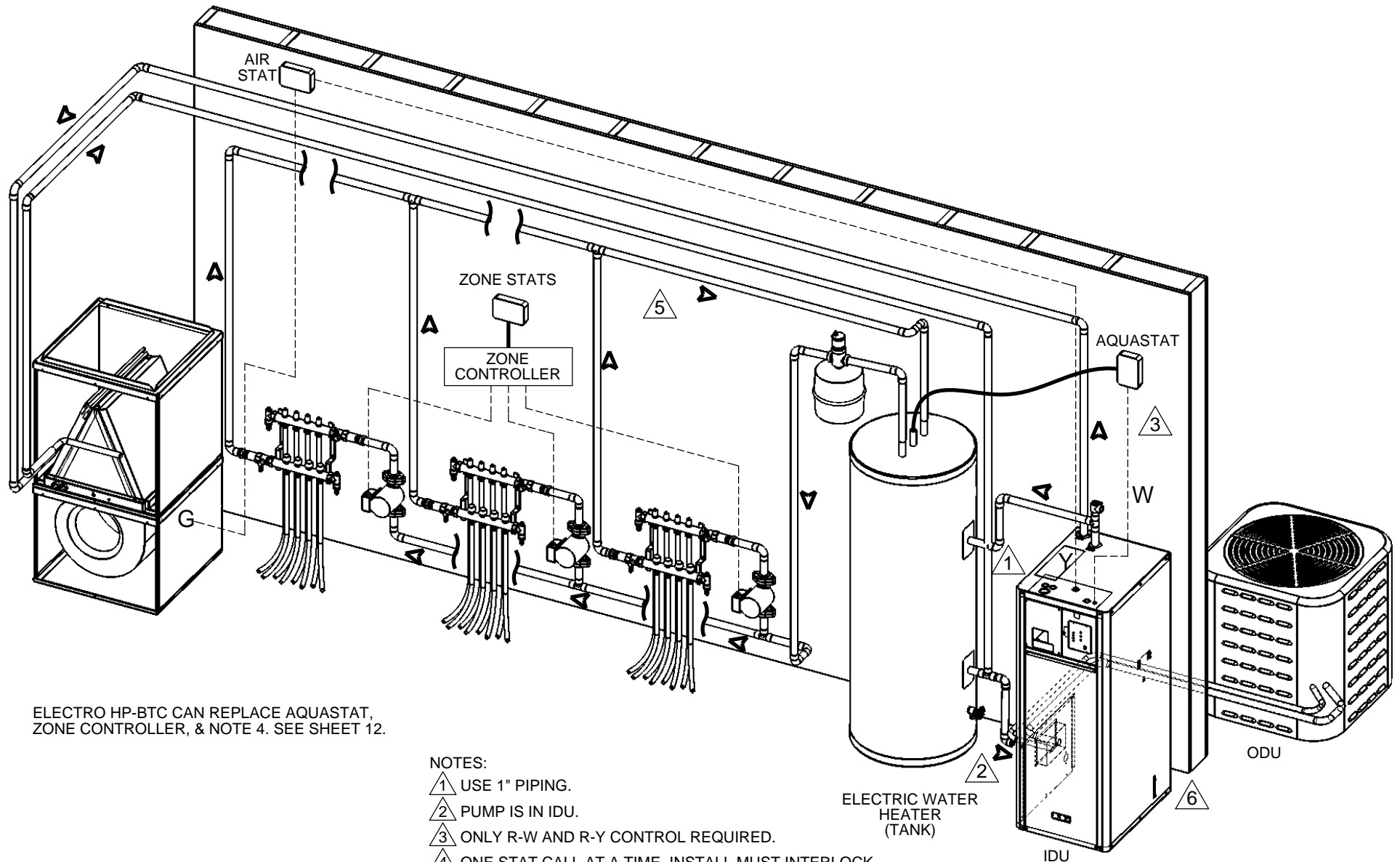


- NOTES:
- ① USE 1" PIPING.
  - ② PUMP IS IN IDU.
  - ③ ONLY R-W CONTROL REQUIRED.
  - ④ SEE P.1 FOR RELIEF VALVE.

# NORAIRE AIR TO WATER HEAT PUMP

- Add cooling forced air water coil, see sheet 3.
- Must size to match heat pump BTU/h
- Water coil not configured for heating, see sheets 9 & 10

- Heating uses standard electric water heater as the tank.
- Suggest 35,000 BTU/h maximum load capacity. For larger systems, must use sheet 6, type buffer tank.



ELECTRO HP-BTC CAN REPLACE AQUASTAT, ZONE CONTROLLER, & NOTE 4. SEE SHEET 12.

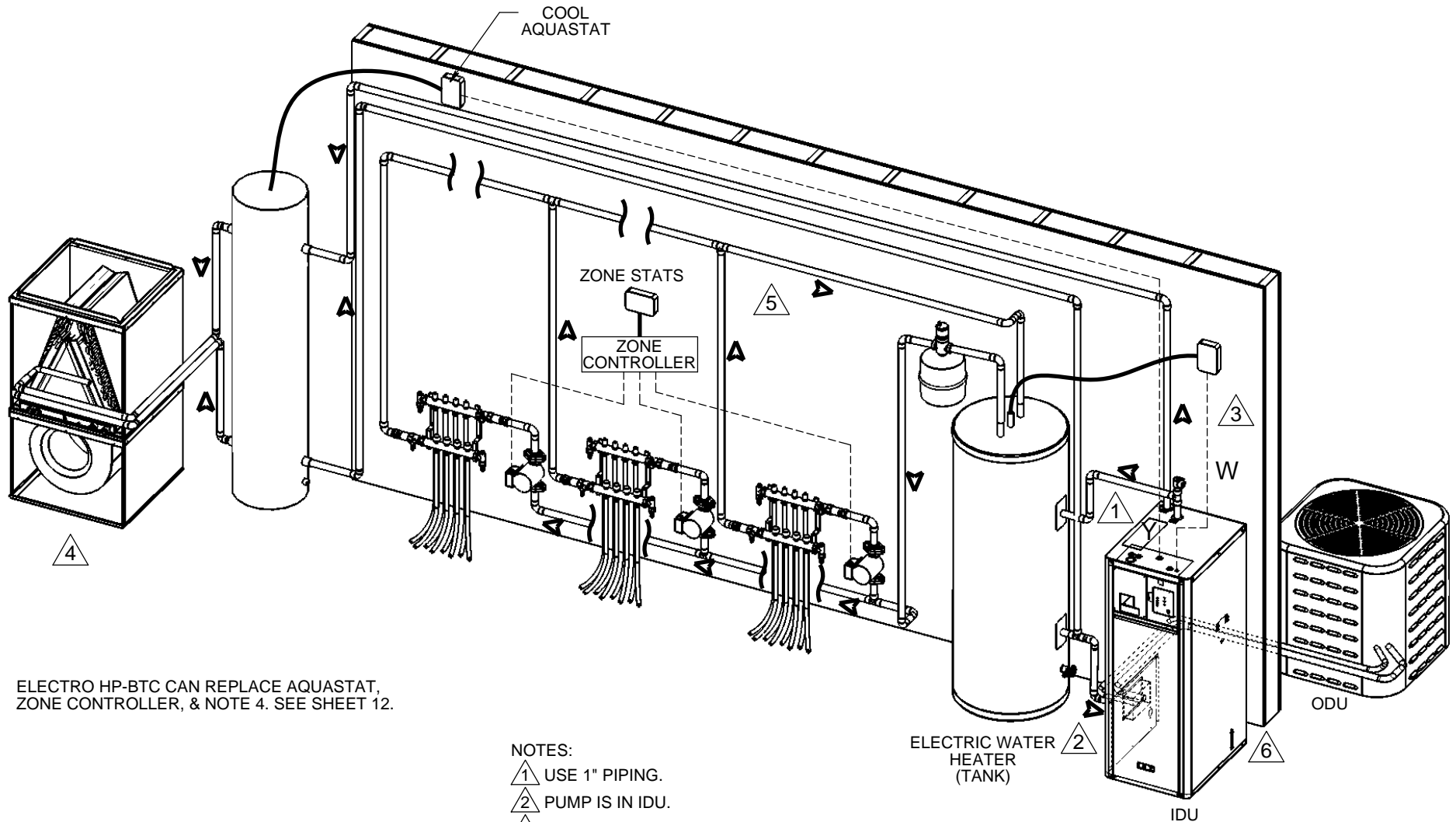
## NOTES:

- ① USE 1" PIPING.
- ② PUMP IS IN IDU.
- ③ ONLY R-W AND R-Y CONTROL REQUIRED.
- ④ ONE STAT CALL AT A TIME, INSTALL MUST INTERLOCK.
- ⑤ FOR COOLING, ALL CHILLED WATER PIPING MUST BE INSULATED.
- ⑥ SEE P.1 FOR RELIEF VALVE.

# NORAIRE AIR TO WATER HEAT PUMP

- Heating
  - Using standard electric water heater as the tank.
  - Suggest 35,000 BTUh maximum load capacity.
- For larger systems, must use sheet 6, type buffer tank.

- Cooling, 2nd tank, pressure water coil air handler (or furnace).
- Must use stainless steel tank and insulate all piping
- Undersized air coil or multiple air coils
- Water coil not configured for heating, see sheets 9 & 10



ELECTRO HP-BTC CAN REPLACE AQUASTAT, ZONE CONTROLLER, & NOTE 4. SEE SHEET 12.

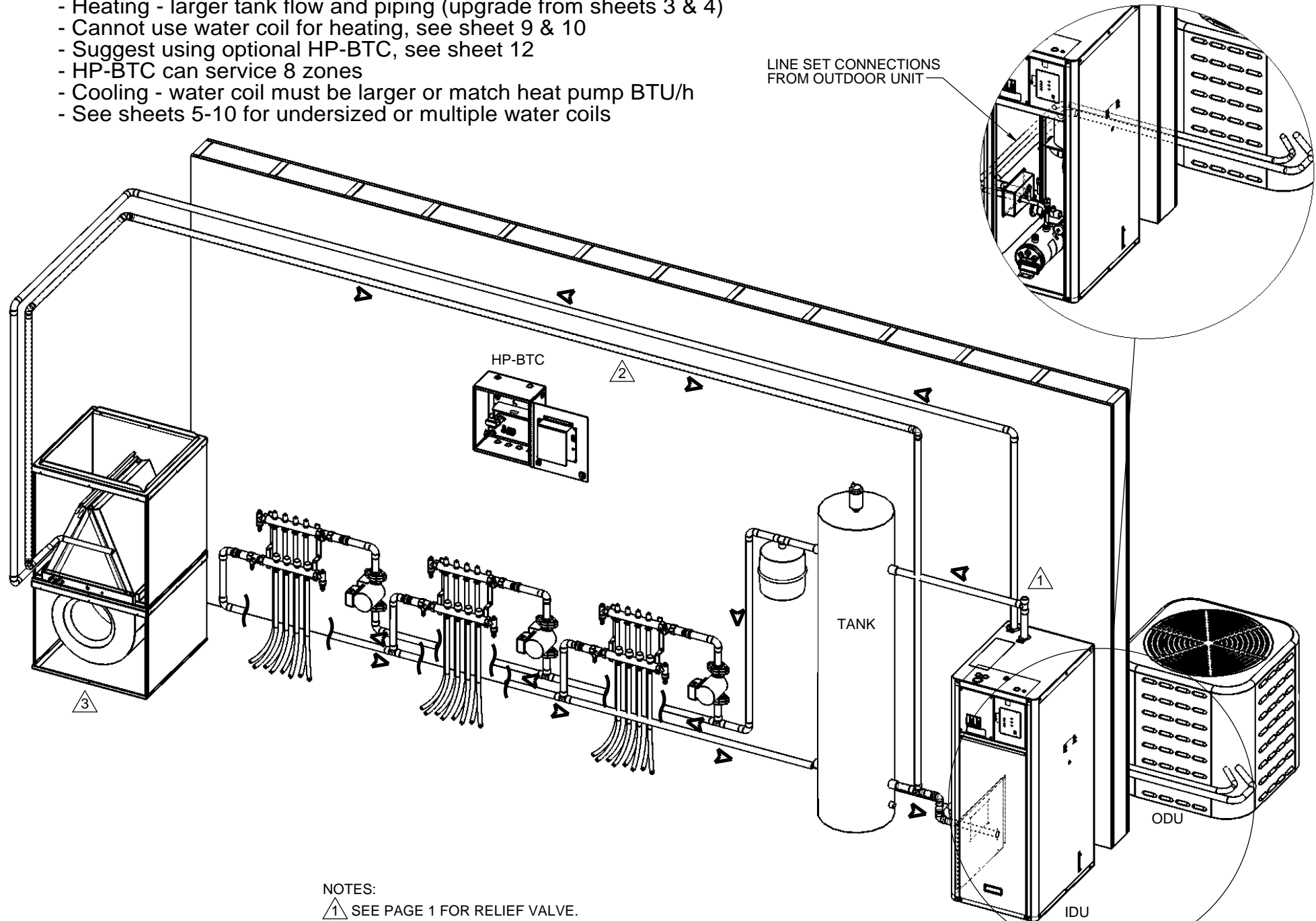
## NOTES:

- ① USE 1" PIPING.
- ② PUMP IS IN IDU.
- ③ ONLY R-W & R-Y CONTROL REQUIRED.
- ④ WHEN USING BTC MODE B, THIS CAN BE A GAS FURNACE.
- ⑤ FOR COOLING, ALL CHILLED WATER PIPING MUST BE INSULATED.
- ⑥ SEE P.1 FOR RELIEF VALVE.



# NORAIRE AIR TO WATER HP BUFFER TANK SYSTEM

- Heating - larger tank flow and piping (upgrade from sheets 3 & 4)
- Cannot use water coil for heating, see sheet 9 & 10
- Suggest using optional HP-BTC, see sheet 12
- HP-BTC can service 8 zones
- Cooling - water coil must be larger or match heat pump BTU/h
- See sheets 5-10 for undersized or multiple water coils

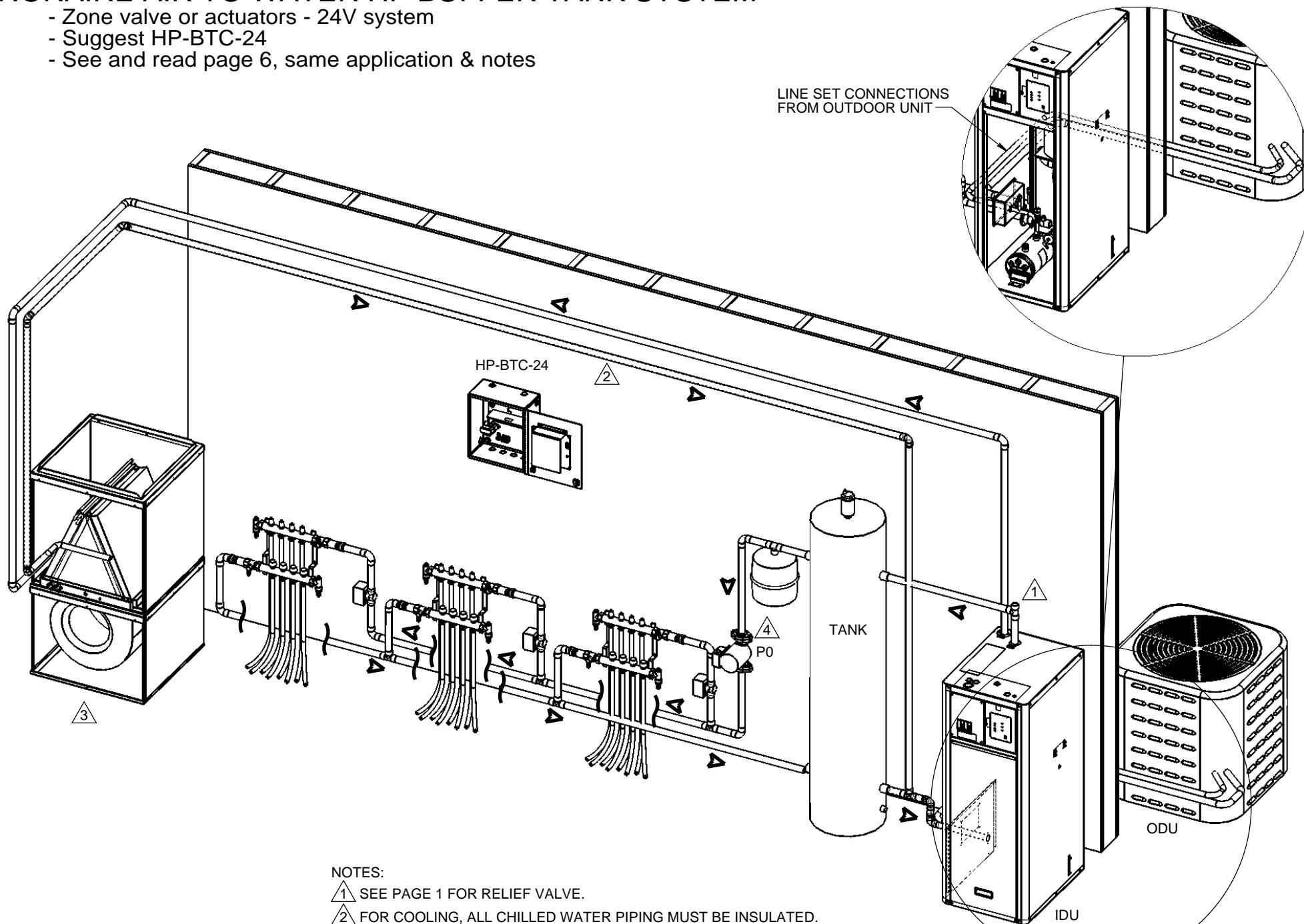


**NOTES:**

- ① SEE PAGE 1 FOR RELIEF VALVE.
- ② FOR COOLING, ALL CHILLED WATER PIPING MUST BE INSULATED.
- ③ WHEN USING BTC MODE B, THIS CAN BE A GAS FURNACE.

# NORAIRE AIR TO WATER HP BUFFER TANK SYSTEM

- Zone valve or actuators - 24V system
- Suggest HP-BTC-24
- See and read page 6, same application & notes

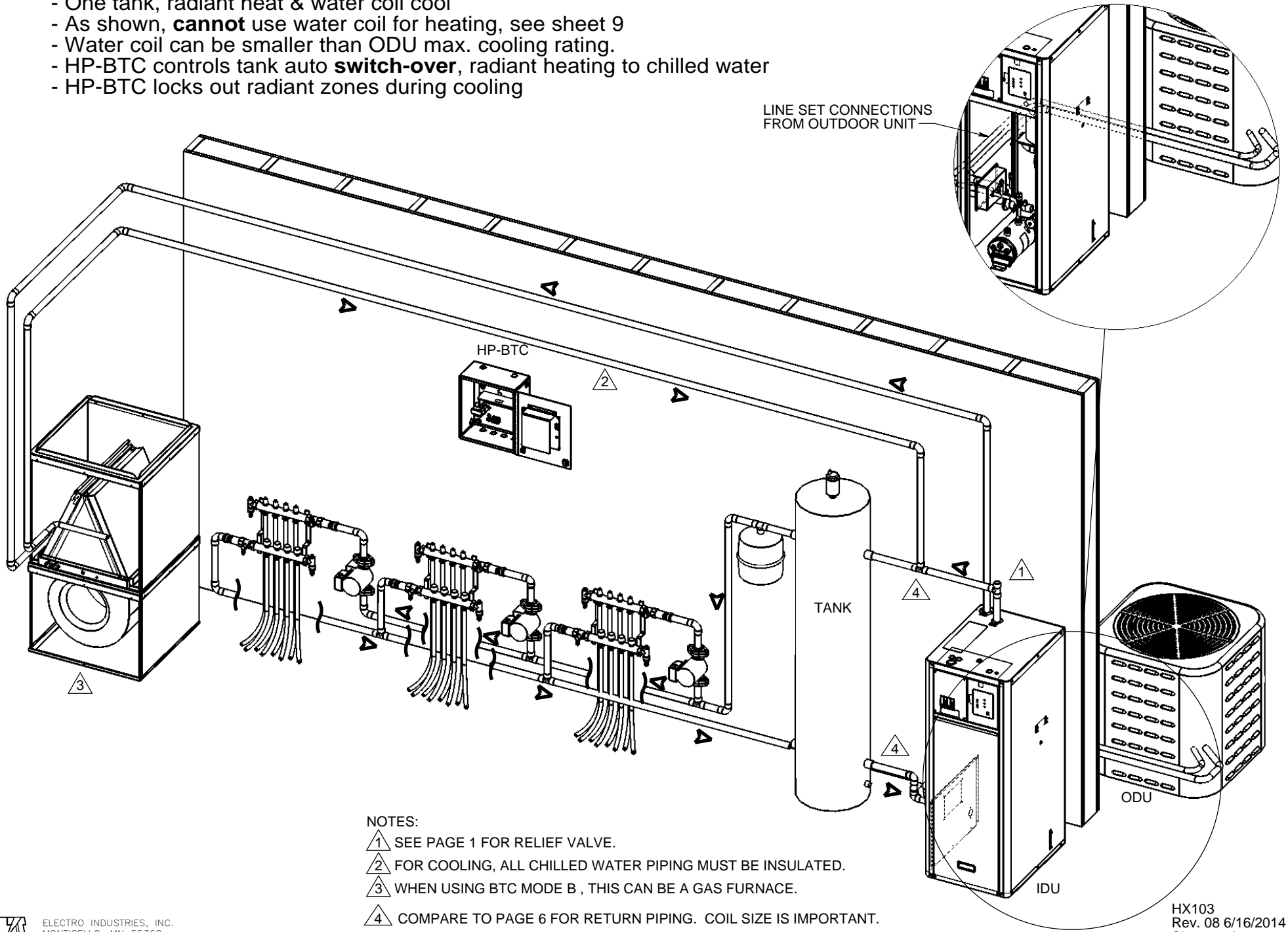


NOTES:

- ① SEE PAGE 1 FOR RELIEF VALVE.
- ② FOR COOLING, ALL CHILLED WATER PIPING MUST BE INSULATED.
- ③ WHEN USING BTC MODE B , THIS CAN BE A GAS FURNACE.
- ④ P0 IS CONTROLLED BY ZONE BOARD. W-OUT & PUMP RELAY.

# NORAIRE AIR TO WATER HP BUFFER TANK SYSTEM

- One tank, radiant heat & water coil cool
- As shown, **cannot** use water coil for heating, see sheet 9
- Water coil can be smaller than ODU max. cooling rating.
- HP-BTC controls tank auto **switch-over**, radiant heating to chilled water
- HP-BTC locks out radiant zones during cooling

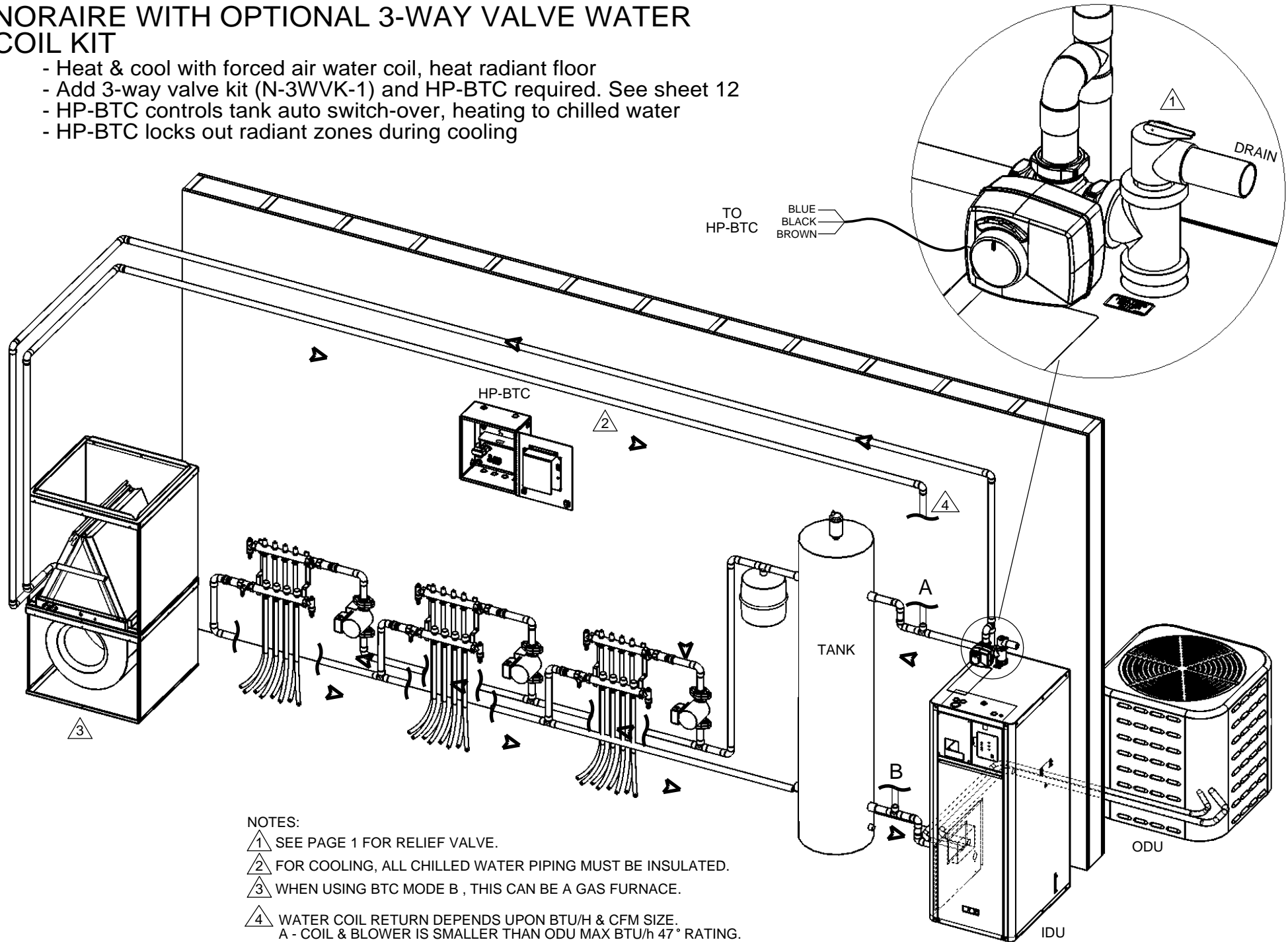


NOTES:

- ① SEE PAGE 1 FOR RELIEF VALVE.
- ② FOR COOLING, ALL CHILLED WATER PIPING MUST BE INSULATED.
- ③ WHEN USING BTC MODE B, THIS CAN BE A GAS FURNACE.
- ④ COMPARE TO PAGE 6 FOR RETURN PIPING. COIL SIZE IS IMPORTANT.

# NORAIRE WITH OPTIONAL 3-WAY VALVE WATER COIL KIT

- Heat & cool with forced air water coil, heat radiant floor
- Add 3-way valve kit (N-3WVK-1) and HP-BTC required. See sheet 12
- HP-BTC controls tank auto switch-over, heating to chilled water
- HP-BTC locks out radiant zones during cooling

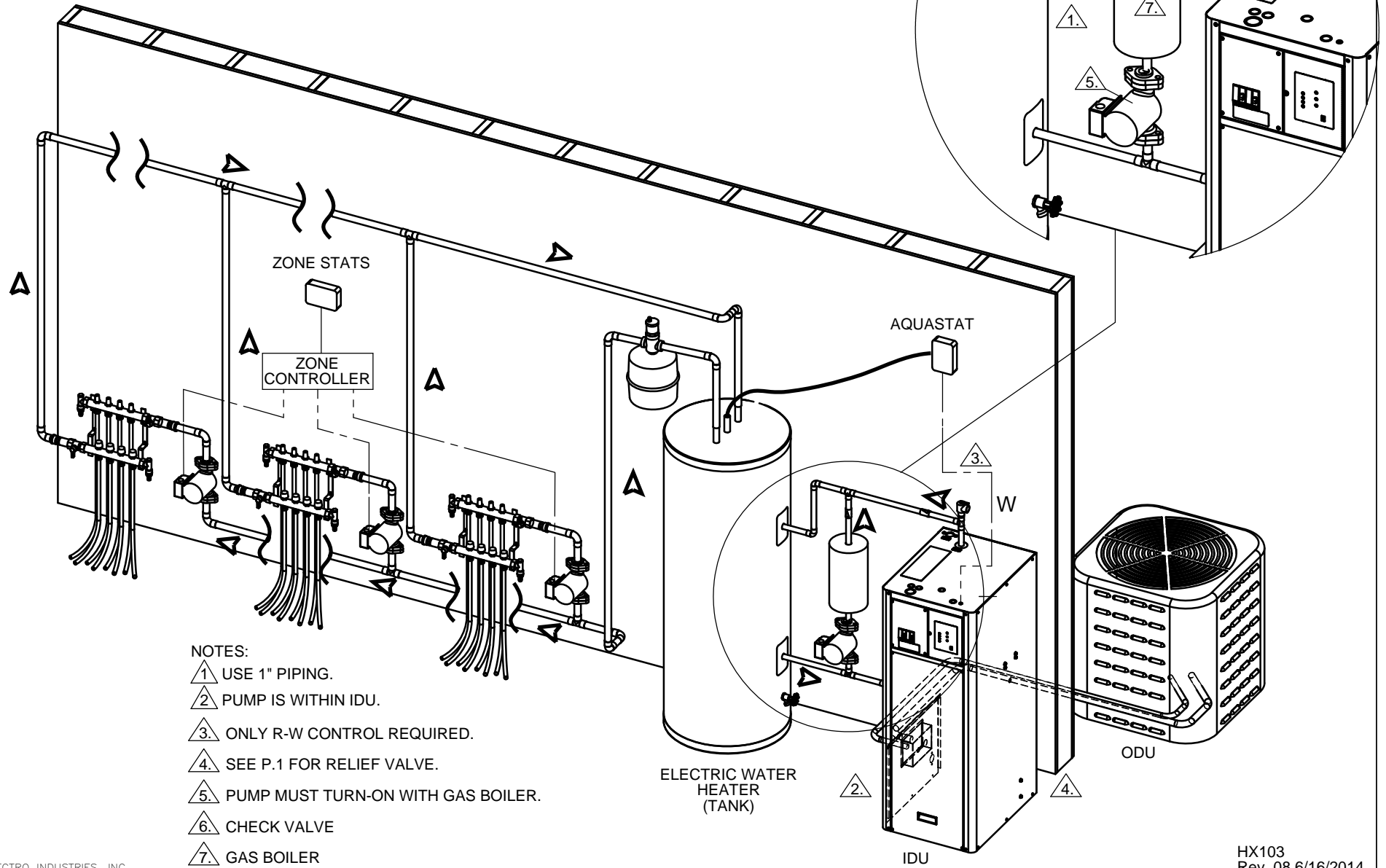


## NOTES:

- ① SEE PAGE 1 FOR RELIEF VALVE.
- ② FOR COOLING, ALL CHILLED WATER PIPING MUST BE INSULATED.
- ③ WHEN USING BTC MODE B, THIS CAN BE A GAS FURNACE.
- ④ WATER COIL RETURN DEPENDS UPON BTU/H & CFM SIZE.  
A - COIL & BLOWER IS SMALLER THAN ODU/H MAX BTU/h 47° RATING.  
B - COIL & BLOWER IS LARGER THAN ODU/H MAX BTU/h 47° RATING.  
ALSO SEE SHEET 6 & 8.

# NORAIRE AIR TO WATER HEAT PUMP (DUAL FUEL)

- Add gas boiler, back-up. NorAire Mode C (NI203, P.19)
- Using standard electric water heater or hydronic tank
- If water heater, suggest 35,000 BTUh maximum load capacity. For larger systems, must use sheet 6, type buffer tank.
- NorAire B/U tab controls gas boiler R & W
- After MU2 time out
- OT temperature below SW OVER setting

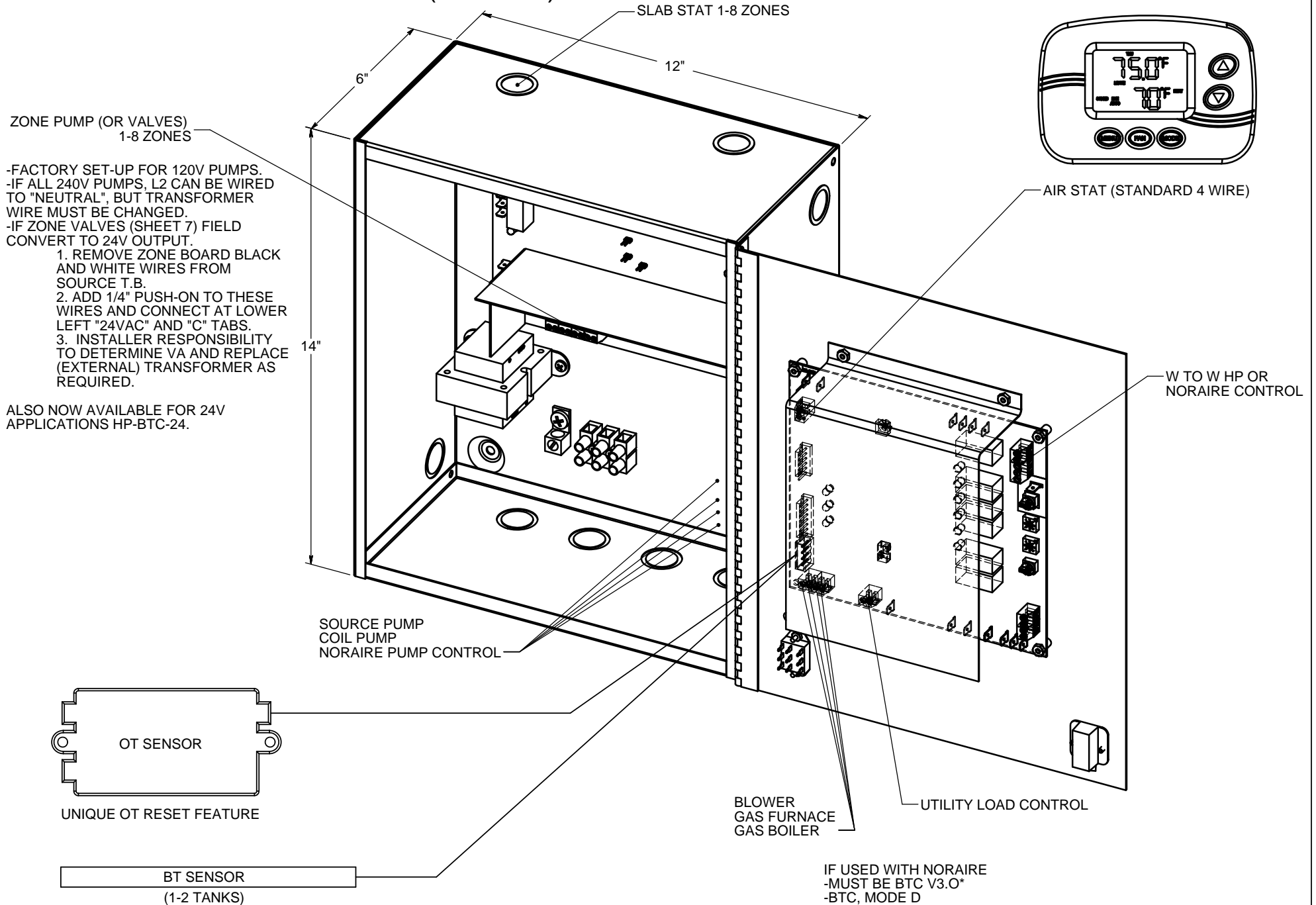


**NOTES:**

- ① USE 1" PIPING.
- ② PUMP IS WITHIN IDU.
- ③ ONLY R-W CONTROL REQUIRED.
- ④ SEE P.1 FOR RELIEF VALVE.
- ⑤ PUMP MUST TURN-ON WITH GAS BOILER.
- ⑥ CHECK VALVE
- ⑦ GAS BOILER



# BUFFER TANK CONTROLLER (HP-BTC)



-FACTORY SET-UP FOR 120V PUMPS.  
-IF ALL 240V PUMPS, L2 CAN BE WIRED TO "NEUTRAL", BUT TRANSFORMER WIRE MUST BE CHANGED.  
-IF ZONE VALVES (SHEET 7) FIELD CONVERT TO 24V OUTPUT.  
1. REMOVE ZONE BOARD BLACK AND WHITE WIRES FROM SOURCE T.B.  
2. ADD 1/4" PUSH-ON TO THESE WIRES AND CONNECT AT LOWER LEFT "24VAC" AND "C" TABS.  
3. INSTALLER RESPONSIBILITY TO DETERMINE VA AND REPLACE (EXTERNAL) TRANSFORMER AS REQUIRED.

ALSO NOW AVAILABLE FOR 24V APPLICATIONS HP-BTC-24.

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**INDUSTRIES**

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