Energy Audit Report

REPORT DATE: May 2, 2025

PROPERTY INFORMATION:
Main Water Treatment Plant
226 Duck Brook Road
Bar Harbor, Hancock County, Maine 04609

PROJECT INFORMATION:
AEI Project No. 498457
Site Assessment Date: October 1, 2024

PREPARED FOR:
Town of Bar Harbor
93 Cottage Street
Bar Harbor, Maine 04609

PREPARED BY:
AEI Consultants - Corporate Headquarters
2500 Camino Diablo
Walnut Creek, California 94597

1.800.801.3224
www.aeiconsultants.com

May 2, 2025

James Smith
Town of Bar Harbor
93 Cottage Street
Bar Harbor, Maine 04609

Subject: **Energy Audit Report**
Main Water Treatment Plant
226 Duck Brook Road
Bar Harbor, Maine 04609
AEI Project No. 498457

Dear James Smith:

AEI Consultants is pleased to provide the *Energy Audit Report* of the above referenced property. This assessment was authorized and performed in accordance with the scope of services engaged.

We appreciate the opportunity to provide services to you. If you have any questions concerning this report, or if we can assist you in any other matter, please contact me at (201) 332-1844 or bmorgan@aeiconsultants.com.

Sincerely,

Brian Morgan

Brian Morgan
Business Development Manager
AEI Consultants

TABLE OF CONTENTS

TABLE OF APPENDICES

1.0 CERTIFICATION/DISCLAIMER

AEI has completed an Energy Audit for the Property located at 226 Duck Brook Road, Bar Harbor, Hancock County, Maine (the "Property"). AEI visited the site on October 1, 2024.

The energy conservation opportunities contained in this report have been reviewed for technical accuracy. The reader is reminded that energy savings ultimately depend on variable factors including occupant behavior, weather, and quality of installation. Estimated installation costs are based on a variety of sources, including our own experience at similar facilities, our own pricing research using local contractors and vendors, and cost handbooks such as those produced by RS Means. The cost estimates represent the best judgment of the auditors for the proposed action. The Owner is encouraged to confirm these cost estimates independently since actual installed costs can vary widely for a particular installation. AEI does not guarantee installed cost estimates and shall in no event be liable should actual installed costs vary from the estimated costs herein.

AEI does not guarantee the costs savings estimated in this report. AEI shall in no event be liable should the actual energy savings vary from the savings estimated herein.

AEI certifies that it has no undisclosed interest in the Property and that AEI’s employment and compensation are not contingent upon the findings or estimated costs to remedy any deficiencies due to deferred maintenance and any noted component or system replacements.

2.0 EXECUTIVE SUMMARY

AEI Consultants (AEI) was retained by Town of Bar Harbor to conduct an ASHRAE Level II Energy Audit, in conformance with the scope and limitations of ASHRAE *Procedures for Commercial Building Energy Audits*, Second Edition (2011), ANSI/ASHRAE/ACCA Standard 211-2018, *Standard for Commercial Building Energy Audits* for the Property located at 226 Duck Brook Road, Bar Harbor, Hancock County, Maine (the "Property").

2.1 PURPOSE AND SCOPE

AEI has performed a comprehensive analysis of the Property to identify possible areas where Energy and Water may be conserved. The areas being considered include HVAC equipment, lighting, domestic water heating, appliances, fenestrations, insulation, roofing, bathroom fixtures, and miscellaneous equipment.

Utility Analysis

AEI has performed a comprehensive utility analysis to determine the Energy and Water consumption of the buildings. The analysis utilizes at least 12 months of common area utility bills and as many tenant utility bills as possible. By observing peak loads during the year, a baseline for energy and water consumption can be determined.

Energy Audit Process

Where possible, in addition to the Site Survey, AEI has utilized construction drawings, interviews, repair records, etc. to determine the actual current efficiency of the Property's building envelopes and equipment.

Accuracy of Analysis

AEI used spreadsheet calculations that base estimated savings on the as-built facility and energy consuming equipment's current operating condition. The simple payback calculations are based on the labor and material cost of the new equipment divided by the cost savings per year. AEI shall not be responsible for equipment that may not reach the end of its useful life or costs more to operate than noted in the EEMs.

Current Energy Code

The energy code adopted by Maine at the time of this report is 2015 International Energy Conservation Code (2015 IECC) or equivalent for Commercial construction. [https://www.energycodes.gov/status-state-energy-code-adoption]

2.2 SIGNIFICANT ASSUMPTIONS

The following assumptions are made by AEI in this report. AEI relied on information derived from secondary sources including governmental agencies, the client, designated representatives of the client, property contact, property owner, property owner representatives, computer databases, and personal interviews. AEI has reviewed and evaluated the thoroughness and reliability of the information derived from secondary sources including government agencies, the client, designated representatives of the client, property contact, property owner, property owner representatives, computer databases, or personal interviews.

It appears that all information obtained from outside sources and reviewed for this assessment is thorough and reliable. However, AEI cannot guarantee the thoroughness or reliability of this information.

2.3 Limitations

Available information has been analyzed using currently accepted assessment techniques and it is believed that the inferences made are reasonably representative of the Property. AEI makes no warranty, expressed or implied, except that the services have been performed in accordance with generally accepted industry practices applicable at the time and location of the study.

Responses received from local government agencies or other secondary sources of information after the issuance of this report may change certain facts, findings, conclusions, or circumstances to the report. A change in any fact, circumstance, or industry-accepted procedure upon which this report was based may adversely affect the findings, conclusions, and recommendations expressed in this report.

2.4 Reliance

All reports, both verbal and written, are for the benefit of Town of Bar Harbor. This report has no other purpose and may not be relied upon by any other person or entity without the written consent of AEI. Either verbally or in writing, third parties may come into possession of this report or all or part of the information generated as a result of this work. In the absence of a written agreement with AEI granting such rights, no third parties shall have rights of recourse or recovery whatsoever under any course of action against AEI, its officers, employees, vendors, successors or assigns.

Reliance is provided in accordance with Town of Bar Harbor and AEI's contract and Terms and Conditions dated August 28, 2024. The limitation of liability defined in the contracted terms is the aggregate limit of AEI's liability to the client and all relying parties.

2.5 Financial Analysis Definitions

Simple Payback = The estimated installation cost divided by the calculated annual cost avoidance.

EUL = Estimated Useful Life of components and systems as determined by manufacturers, ASHRAE, HUD, Fannie Mae, Freddie Mac and other authorities.

SIR = Savings to Investment Ratio; (EUL x Annual Savings) ÷ Initial Cost

ROI = Return on Investment; (EUL x Annual Savings - Initial Cost) ÷ Initial Cost

IRR = Internal Rate of Return; the annual yield from a project, usually expressed as a percentage of the total amount invested; the compound rate of interest which, when used to discount cash flows, will result in zero net savings. If the IRR is greater than the investor's stated discount rate, the measure is considered beneficial.

NPV = Net Present Value; The value (the gain minus the cost) of an investment in today's dollars over some specified time period. If the investment has a positive NPV, it is generally considered to be beneficial.

2.6 Summary of Building Performance

The following table summarizes the current and proposed building performance with the recommended Energy and Water Efficiency Measures (EWEMs) described in the following section.

EWEM Summary Table	
Current Building Energy Usage	1,339,769 kBtu
Current Building Energy Cost	$49,582
Proposed Energy Savings	261,794 kBtu
Proposed Energy Cost Savings	$3,962
Energy Savings	19.5%
Energy Cost Savings	8.0%
Investment for EEM's	$25,385
Payback for Investments (without water savings)	6.4 Years
Payback for Investments (with water savings)	6.4 Years
Site Energy Use	
Current Electric Site Energy Consumption	281,890 kWh
Proposed Electric Savings	-14,370 kWh
Proposed Electric Savings	-5.1%
Current Natural Gas Site Energy Consumption	0 Therms
Proposed Natural Gas Savings	0 Therms
Proposed Natural Gas Savings	0.0%
Current District Steam Energy Consumption	0 kLb
Proposed District Steam Savings	3,397 kLb
Proposed District Steam Savings	
Current District Chilled Water Energy Consumption	0 Ton-hr
Proposed District Chilled Water Savings	0 Ton-hr
Proposed District Chilled Water Savings	
Current Propane Energy Consumption	4,130 Gal
Proposed Propane Savings	3,397 Gal
Proposed Propane Savings	82.2%
Current Fuel Oil (No. 2) Energy Consumption	0 Gal
Proposed Fuel Oil (No. 2) Savings	0 Gal
Proposed Fuel Oil (No. 2) Savings	0.0%
Site Energy Use Intensity	
Total Building Area	0 Sq. Ft.
Current Site Energy Use Intensity	0 kBtu/Sq. Ft.
Proposed Site Energy Use Intensity	0 kBtu/Sq. Ft.
Source Energy Use Intensity	
Current Source Energy Use Intensity	0 kBtu/Sq. Ft.
Proposed Source Energy Use Intensity	0 kBtu/Sq. Ft.
Site Greenhouse Gas Emissions	
Current Site GHG Emissions	92.42 MTCO2e/Yr
Proposed Site GHG Emissions	76.41 MTCO2e/Yr

2.7 Recommended Energy and Water Efficiency Measures (EWEM)

The following recommended EWEMs have been analyzed using calculations based on occupant usage, localized climate conditions, HVAC and ventilation operating hours, and lighting hours. The HVAC operating hours are approximations and may vary depending on the severity of the weather. Water consumption is based on the number of occupants and assumed running times for water consuming devices. The EWEM table shows the initial investment cost, energy and water consumption and cost savings, estimated equipment expected useful life (EUL), investment simple payback, savings to investment ratio (SIR), and return on investment (ROI) for each EWEM. The utility cost increase over the life of the EWEMs implemented was not considered as a factor in the financial analysis for each measure. Any analyzed EWEMs with a Savings to Investment Ratio less than 1.0 (or a negative Return on Investment) are not included in this table.

Energy And Water Efficiency Measure (EWEM) Description	Initial Cost ($$)	Electricity Savings (kWh)	Propane Savings (Gal)	Annual Utility Savings ($$)	Simple Pay Back (Years)	EUL (years)	SIR	ROI	Owner % Energy Savings	Projected GHG Emissions Reduction MTCO2e	kBTU Savings
Integrate a Heat Pump Boiler into the existing propane boiler system and use propane boiler for backup heat when the outside air temperature is below 25˚.	$24,422	-18,547	3,397	$3,338	**7.3**	15	2.05	1.05	18.5%	14.98	247,542
Retrofit 42 Interior Linear Fluorescent T5 and T8 Lighting Fixtures with 92 DLC Certified Linear LED Lamps	$963	4,177	0	$625	**1.5**	10	6.49	5.49	1.1%	1.025	14,253
Totals =	**$25,385**	**-14,370**	**3,397**	**$3,962**	**6.4**	**n/a**	**n/a**	**n/a**	**19.5%**	**16.01**	**261,794.37**

3.0 BACKGROUND

3.1 General Property Description

The Property consists of a Water Treatment plant totaling approximately 7.52 acres located at 226 Duck Brook Road and five separate booster pump stations located in commercial areas of Bar Harbor, Maine. The gross building area of the Water Treatment facility is 2,756 square feet. The Property was originally developed in 1936 and underwent a substantial remodel in 2013.

The Project Team assessed a representative sample of the tenant spaces. The assessment also included the roof, parking areas and structures, building operational and structural components, and all exterior and common areas.

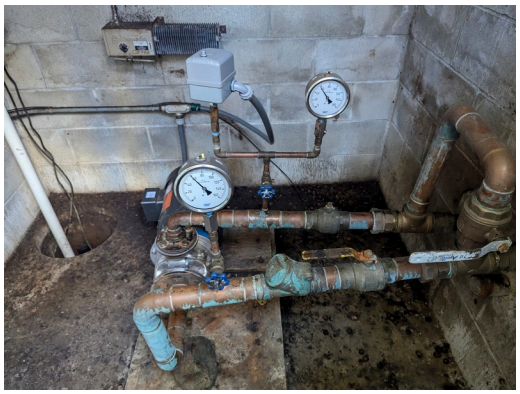
The site contact was James Smith.

226 Duck Brook Water Treatment Facility

14 Mountain Ave Booster Station

Arata Booster Station

Arata Booster Station



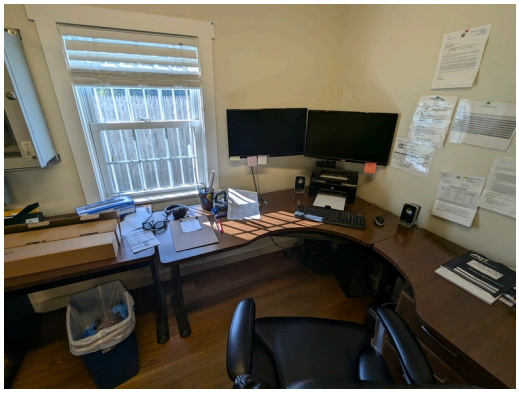
138 Eagle Lake Rd Booster Station

138 Eagle Lake Rd Booster Station

422 Eagle Lake Rd Booster Station

422 Eagle Lake Rd Booster Station

226 Duck Brook Water Treatment Facility Exterior



226 Duck Brook Water Treatment Facility Interior

226 Duck Brook Water Treatment Facility Interior

226 Duck Brook Water Treatment Facility Interior

226 Duck Brook Water Treatment Facility Exterior

226 Duck Brook Water Treatment Facility Exterior

3.2 Existing Energy and Water Efficiency Measures

The following existing energy and water efficiency improvements were observed at the Property:

1. One 95% Efficient 138 MBH Navien propane-fired hot water boiler
2. Double glazed windows
3. NEMA Premium Efficiency electric motors
4. Exterior LED Lighting
5. Occupancy sensor controlled lighting in the basement and chlorine room

3.3 Space Type and Usage Schedules

The following table lists the space types and typical occupied hours of operation per week.

Space	Mon	Tues	Wed	Thurs	Fri	Sat	Su
226 Duck Brook Water Treatment Facility	9AM - 5PM	9AM - 5PM	9AM - 5PM	9AM - 5PM	9AM - 5PM	9AM - 12PM	9AM - 12PM

3.3.1 Space Type Breakdown

The following table shows the unit types, unit quantities, unit square footage, and the total square footage per unit type.

Building	Address	Unit Area (SF)	Total Area (SF)
Water Treatment Facility	226 Duck Brook Rd	2,756	2,756
Lakehouse Booster Station	422 Eagle Lake Rd	N/A	N/A
Strawberry Hill Booster Station	17 Strawberry Hill Rd	N/A	N/A
Kebo Booster Station	138 Eagle Lake Rd	N/A	N/A
Rockwood Booster Station	14 Mountain Ave	N/A	N/A
Arata Booster Station	Arata Dr	N/A	N/A
Total		N/A	2,756

4.0 UTILITY ANALYSIS

The following utility analysis covers the period of May 2023 to April 2024.

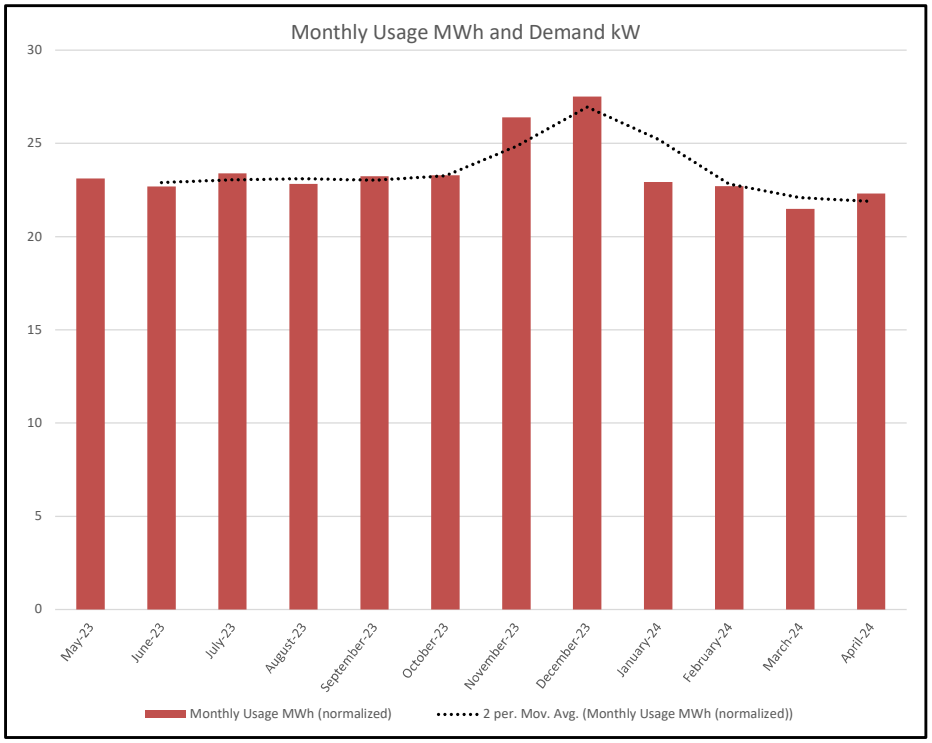
4.1 UTILITY PROVIDERS

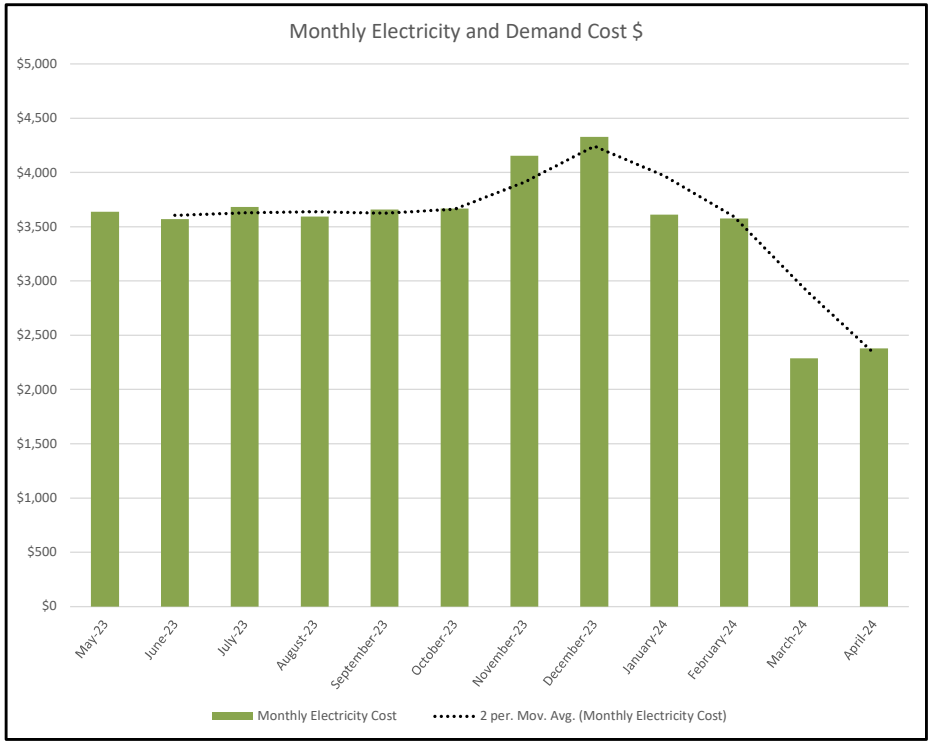
Utility Type	Utility Provider Name
Electricity	Constellation NewEnergy
Natural Gas	No Frills Oil Company
Propane	No Frills Oil Company
Water	Town of Bar Harbor
Sewage Disposal/Treatment	Town of Bar Harbor

4.1.1 ELECTRICITY

The electricity consumption shown is based on bills obtained from the property owner. The chart below shows the monthly consumption and cost of electricity for the Property. The cost per kWh is calculated in the fourth column. The bottom row shows the annual electrical energy consumption and cost for the Property.

Billing Month & Year	Monthly Electricity Usage (kWh)	Monthly Electricity Cost	Cost per kWh	kBTU Usage (kWh x 3.41)
May-23	23,115	$3,639	$0.16	78,872
June-23	22,688	$3,572	$0.16	77,415
July-23	23,399	$3,684	$0.16	79,841
August-23	22,821	$3,593	$0.16	77,868
September-23	23,236	$3,658	$0.16	79,284
October-23	23,295	$3,667	$0.16	79,486
November-23	26,397	$4,156	$0.16	90,070
December-23	27,502	$4,330	$0.16	93,841
January-24	22,935	$3,611	$0.16	78,257
February-24	22,707	$3,575	$0.16	77,479
March-24	21,480	$2,290	$0.11	73,293
April-24	22,315	$2,379	$0.11	76,142
Annual Electricity Usage & Cost:	281,890	$42,152	$0.15	961,848

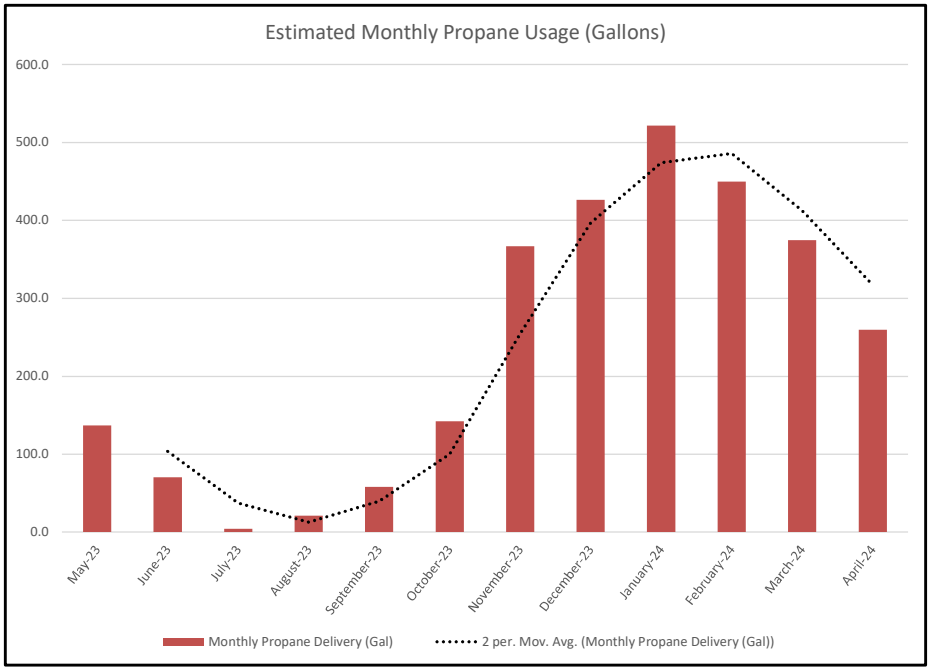

Monthly Usage MWh and Demand kW
30
25
20
15
10
5
0
May-23
June-23
July-23
August-23
September-23
October-23
November-23
December-23
January-24
February-24
March-24
April-24
Monthly Usage MWh (normalized)
2 per. Mov. Avg. (Monthly Usage MWh (normalized))

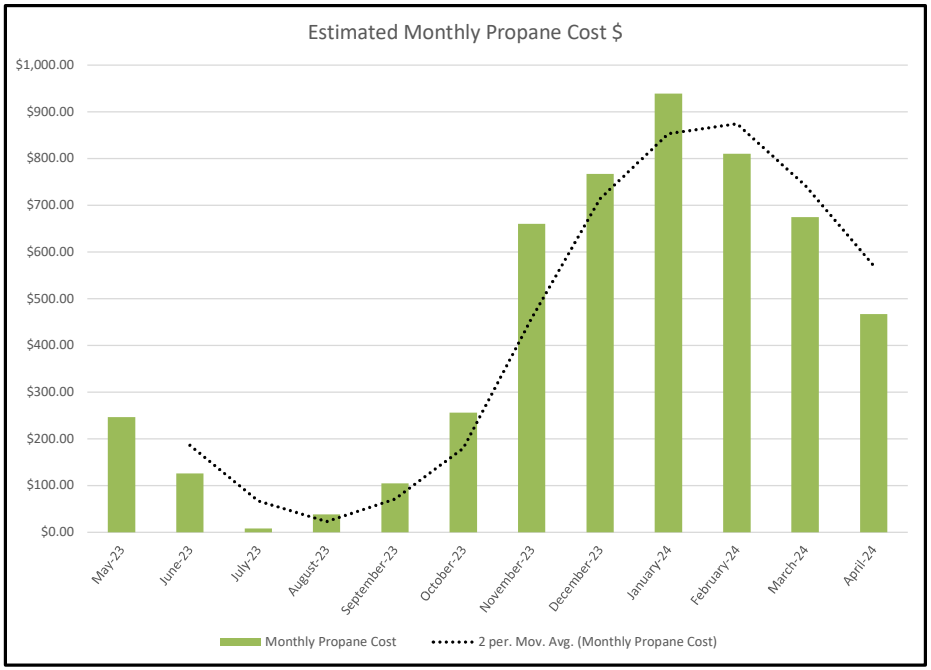

Monthly Electricity and Demand Cost $
$5,000
$4,500
$4,000
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
May-23
June-23
July-23
August-23
September-23
October-23
November-23
December-23
January-24
February-24
March-24
April-24
Monthly Electricity Cost
2 per. Mov. Avg. (Monthly Electricity Cost)

4.1.2 Liquid Propane (LP) Gas

Propane billing history for this facility was not provided. The propane consumption shown below was estimated. The chart below shows the estimated monthly consumption and cost of propane for the Water Treatment facility. The cost per Gallon is shown in the fourth column. The bottom row shows the annual propane consumption and cost for the Property.

Billing Month & Year	Monthly LP Gas Usage (Gal)	Monthly LP Gas Cost	Cost per Gal	kBTU Usage (Gal x 91.547)
May-23	199.7	$359.29	$1.80	18,274.1
June-23	102.3	$184.08	$1.80	9,362.7
July-23	6.4	$11.47	$1.80	583.4
August-23	30.9	$55.63	$1.80	2,829.2
September-23	84.8	$152.48	$1.80	7,755.5
October-23	207.4	$373.14	$1.80	18,978.6
November-23	535.0	$962.40	$1.80	48,949.2
December-23	621.9	$1,118.78	$1.80	56,902.9
January-24	760.7	$1,368.55	$1.80	69,606.6
February-24	656.2	$1,180.57	$1.80	60,045.8
March-24	546.6	$983.29	$1.80	50,011.5
April-24	378.4	$680.70	$1.80	34,621.7
Annual Propane Delivery (Gal) and Cost:	4,130.3	$7,430.39	$1.80	377,921


Estimated Monthly Propane Usage (Gallons)
600.0
500.0
400.0
300.0
200.0
100.0
0.0
May-23
June-23
July-23
August-23
September-23
October-23
November-23
December-23
January-24
February-24
March-24
April-24
Monthly Propane Delivery (Gal)
2 per. Mov. Avg. (Monthly Propane Delivery (Gal))


Estimated Monthly Propane Cost $
$1,000.00
$900.00
$800.00
$700.00
$600.00
$500.00
$400.00
$300.00
$200.00
$100.00
$0.00
May-23
June-23
July-23
August-23
September-23
October-23
November-23
December-23
January-24
February-24
March-24
April-24
Monthly Propane Cost
2 per. Mov. Avg. (Monthly Propane Cost)

4.1.3 Water and Sewer

Water consumption was not provided for this facility.

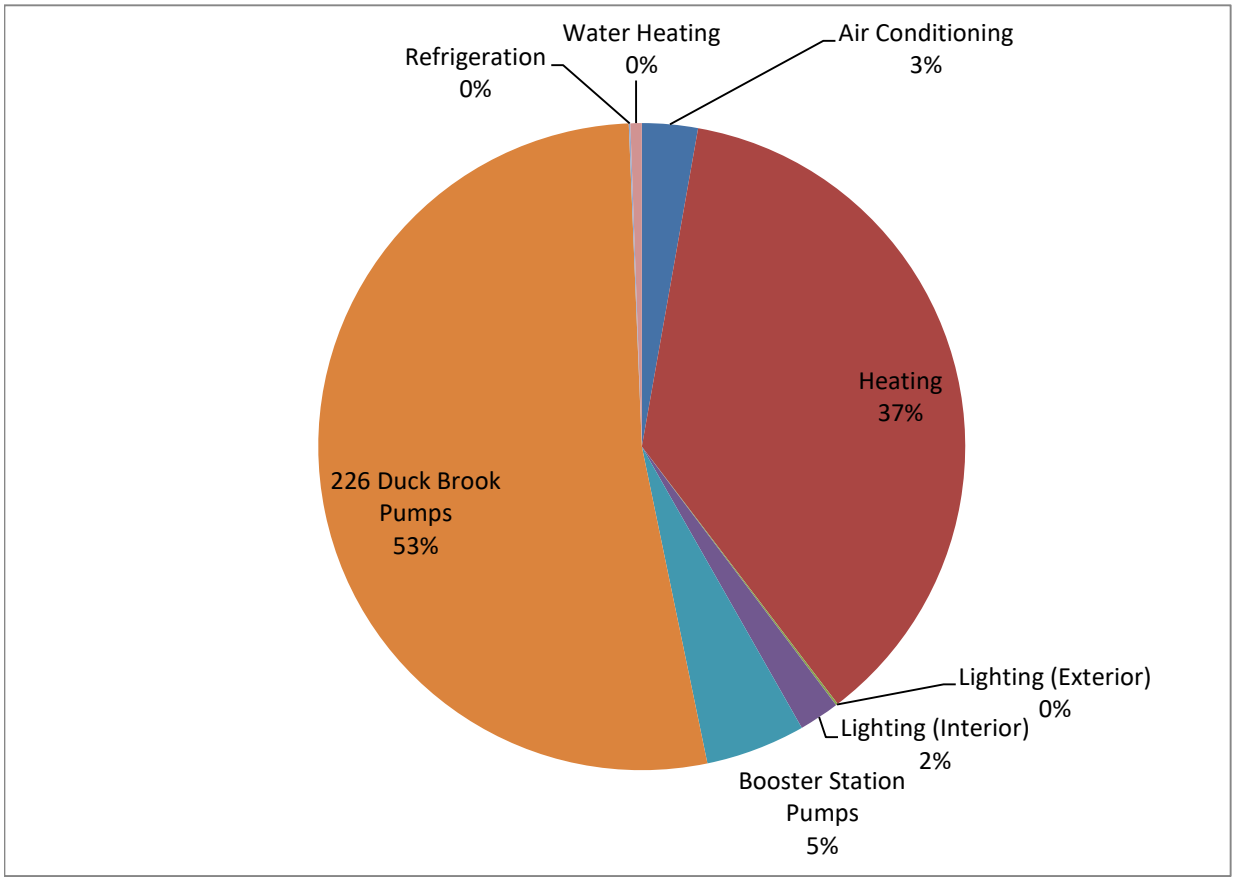
4.2 Energy End Use Analysis

The following table shows the estimated end use analysis for all energy utilities on the Property.

	Input Energy Units		Combined Energy Use	
End Use	**kWh**	**Gallons Propane**	**kBtu**	**%**
Air Conditioning	11,292	-	38,529	3%
Heating	28,221	4,130	509,222	37%
Lighting (Exterior)	438	-	1,495	0%
Lighting (Interior)	8,174	-	27,890	2%
Booster Station Pumps	20,197	-	68,915	5%
226 Duck Brook Pumps	213,079	-	727,056	53%
Refrigeration	277	-	945	0%
Water Heating	-	78	7,836	1%
Total Estimated	**281,890**	**4,209**	**1,382,614**	**100%**
Historical Billing	**281,890**	**-**	961,849	
Percent of Actual	**100.0%**	**0.0%**	**143.7%**	
Total per ft^2	-	-	-	

0

Combined Fuel End-Use Breakdown



4.3 Energy & Water Benchmarking

The buildings associated with this report are not eligible for an Energy Star Score; therefore, these properties have not been benchmarked in Energy Star Portfolio Manager.

5.0 BUILDING SYSTEMS

5.1 ENVELOPE

The following table shows the building envelope components that were observed at the Property.

Building Component	Description	Condition
Foundation	Slab-on-grade	Good
Framing	Wood Framed	Good
Exterior Cladding	Clapboard	Good
Roof	Pitched, asphalt shingles.	Good
Windows	Vinyl-framed double pane glazing	Good
Exterior Doors	Double pane	Good
Attic Insulation	Not Accessible	Not Accessible

5.2 LIGHTING

The following tables provide an inventory of observed lighting fixtures, lamp type, and wattage.

Lighting Audit

Area of Building	Exitsting Fixture	Total # Fixures	Bulbs Per Fixture	Total # of Bulbs	LED Equivalent Wattage	Current kWh Usage	kWh Usage w/ LED	kWh Saved Per Year	Cost Per kWh	Current Annual Op Cost	Annual Cost Using LEDs	Savings	Cost to Install Lighting	Pay back
Interior Ceiling Lights	4B 28W T5	4	4	16	18	3924	2523	1402	0.15	$587	$377	$210	$218	1.0
Lime and Fluoride Rooms Ceiling Lights	2B 28W T5	7	2	14	18	36	23	13	0.15	$5	$3	$2	$191	99.8
Chlorine Room Ceiling Lights	2B 28W T5	2	2	4	18	7	4	2	0.15	$1	$1	$0	$54	149.7
Upstairs Ceiling Lights	2B 32W 4' T8	15	2	30	11	2296	789	1507	0.15	$343	$118	$225	$259	1.1
Downstairs Ceiling Lights	2B 32W 4' T8	14	2	28	11	1910	657	1254	0.15	$286	$98	$187	$241	1.3
Exterior Lights	1B 25W LED	2	1	2	0	0	0	0	0.15	$0	$0	$0	$0	-
						8,174	**3,996**	**4,177**		**$ 1,222**	**$ 598**	**$ 625**	**$ 963**	**1.54**

Lighting Photographs

226 Duck Brook Water Treatment Facility
Exterior LED Lights

422 Eagle Lake Rd Booster Station

226 Duck Brook Water Treatment Facility
Fluorescent Light Fixture

226 Duck Brook Water Treatment Facility
Fluorescent Lamp

226 Duck Brook Water Treatment Facility
Indoor Fluorescent Lighting

5.3 Building Mechanical Systems

This section details the mechanical systems serving the Water Treatment Facility and the associated Wastewater Treatment Plant.

Water Treatment Facility HVAC Systems

- **Primary Heating:** A central 95% efficient propane-fired boiler provides hot water for space heating and domestic hot water generation.
- **Space Heating Distribution:** Boiler-supplied hot water is distributed to individual unit heaters.
- **Supplemental Heating & Primary Cooling:** A 3-ton mini-split heat pump system serves both supplemental heating and primary cooling needs.
- **Supplemental Cooling:** A 1/3-ton wall-mounted direct expansion (DX) AC unit provides additional cooling.
- **Dehumidification:** A HI-E DRY 195 dehumidifier operates as needed (typically during summer) for moisture control.
- **Controls:** Unit heaters are controlled by wall-mounted mechanical thermostats; the heat pump system is controlled by wall-mounted digital thermostats.

Water Treatment Facility Support Systems

- **Compressed Air:** A 1.5HP air compressor supplies compressed air for operating pneumatic system valves.
- **Process Pumps:** Various pumps and motors are employed for water circulation and chemical treatment within the facility.
- **Booster Station Freeze Protection:** Equipment at booster pump stations is protected from freezing by 0.5kW electric resistance heaters controlled by mechanical thermostats.

Wastewater Treatment Plant Systems

- **Operation:** The plant operates continuously (24 hours/day, 7 days/week).
- **Primary Pumping:** Multiple large pumps (up to 25HP) handle wastewater transfer.
- **Chemical Dosing:** Smaller pumps are used for chemical injection processes.
- **Emergency Pumping:** A 75HP pressure booster pump is available for emergency use and periodic testing.
- **Treatment:** A UV treatment system operates continuously year-round.

Building Mechanical System Photographs

Propane Generator for 226 Duck Brook Water Treatment Facility

Arata Booster Station

138 Eagle Lake Rd Booster Station

226 Duck Brook Water Treatment Facility Heater

226 Duck Brook Water Treatment Facility Condensing Propane Boiler

226 Duck Brook Water Treatment Facility Hot Water Storage Tank

226 Duck Brook Water Treatment Facility Air Compressors

226 Duck Brook Water Treatment Facility Dehumidifier

226 Duck Brook Water Treatment Facility Interior Pump

226 Duck Brook Water Treatment Facility Interior Occupancy Sensor for Light Fixture

226 Duck Brook Water Treatment Facility Hydronic Unit Heater

226 Duck Brook Water Treatment Facility Hot Water Unit Heater

5.4 APPLIANCES

Appliances in the Duck Brook Water treatment facility consists of a residential refrigerator.

Appliance Photographs

226 Duck Brook Water Treatment Facility
Refrigerator

5.5 Laundry Equipment

There is no laundry equipment at the Property.

6.0 RECOMMENDED EWEMS

The Recommended EWEMs table found at the beginning of the report identifies the measures that should be considered for further evaluation or implementation. This section describes each Recommended EWEM in further detail.

6.1 CAPITAL COST EEMS

AEI has identified *(2)* capital cost EWEMs for this Property. This includes recommended measures for which the total individual cost is greater than $1,000.

EWEM #1 - HEAT PUMP BOILER INTEGRATION FOR HOT WATER HEATING

Existing Condition: The facility's hot water heating system (serving space heating via unit heaters and domestic hot water) currently relies entirely on a single, 95% efficient central propane-fired boiler. While efficient for a combustion appliance, this system uses propane exclusively, a fossil fuel subject to price fluctuations and associated greenhouse gas emissions. There is an opportunity to reduce propane consumption by integrating highly efficient heat pump technology.

Proposed Condition/Solution Description: This measure recommends integrating an air-to-water heat pump boiler (HPB) system with the existing propane boiler. The HPB would utilize electricity to efficiently extract heat from the ambient air and transfer it to the hot water system. The proposed operational strategy involves using the HPB as the primary heat source when the outside air temperature is above 25◦F. The existing 95% efficient propane boiler would remain operational, providing supplemental heat during peak loads and serving as the primary heat source when outside air temperatures fall below 25◦F.

The proposed HPB system is sized to have approximately half the heating capacity of the existing propane boiler. This allows for a potentially staged implementation:

1. **Phase 1 (Pilot/Supplement):** Install a single HPB unit to supplement the propane boiler, significantly offsetting propane use during milder conditions and validating performance.
2. **Phase 2 (Optional):** If deemed necessary based on Phase 1 performance and facility goals, install a second HPB unit to further maximize propane displacement.

This integrated system leverages the high efficiency (Coefficient of Performance - COP) of heat pumps in favorable conditions while retaining the existing boiler for reliable operation in very cold weather and for meeting peak demands.

Benefits:

- **Significant Energy Savings:** Substantially reduced propane consumption, leading to lower overall energy costs (expected decrease in net fuel/electricity cost) and site energy use intensity.
- **Reduced Operating Costs:** Lower expenditures on propane fuel. Reduced propane delivery frequency may also offer minor logistical savings.
- **Reduced Environmental Impact:** Lower greenhouse gas emissions due to decreased propane combustion, contributing to facility sustainability goals.

- **Fuel Diversification & Resiliency:** Reduces dependence on propane, mitigating risks associated with price volatility or potential supply constraints.
- **Phased Investment Option:** Allows for staged implementation, enabling performance validation and spreading capital expenditure over time.

Total Estimated Cost (including labor and materials): $24,422

Estimated Annual Savings: $3,338

Estimated Annual Operational & Maintenance (O&M) Savings: Reduced runtime on the propane boiler may slightly decrease its specific maintenance requirements. However, the new HPB system will introduce its own maintenance schedule (e.g., coil cleaning, refrigerant checks). Overall O&M costs require detailed analysis but are expected to be manageable, potentially shifting costs rather than significantly increasing or decreasing them in the short term.

Operational Changes for Staff: Facility staff will require training on the operation and monitoring of the integrated HPB and boiler system. This includes understanding the control system's automatic switchover logic based on outside air temperature, basic performance monitoring of the HPB unit(s), and awareness of new maintenance requirements or service contacts.

Implementation Impact to Occupants: Installation work will primarily occur in the facility's mechanical areas. Occupants (facility staff) may experience temporary construction noise during installation. Brief, scheduled shutdowns of the heating hot water system may be required for system tie-ins. Work should be planned to minimize disruption to core facility operations.

Available Rebates or Incentives:

For a heat pump boiler project in Bar Harbor, Maine, with electricity service provided by Constellation/New Energy, several potential rebates and incentives may be available. It's crucial to verify the specific eligibility requirements and application processes for each program.

1. Federal Tax Credits:

The federal government offers tax credits for energy-efficient home improvements:

- **Energy Efficient Home Improvement Credit (25C):** This credit offers up to $2,000 annually for qualified energy-efficient improvements, including heat pumps. This is 30% of the net cost of the equipment and installation, with a maximum annual credit of $2,000 for heat pumps and heat pump water heaters combined. A separate $600 credit is available for electrical panel upgrades if required for the heat pump installation. This credit can be claimed annually for improvements made each tax year.
    - **Eligibility:** The home must be located in the United States. The credit is claimed in the tax year when the property is installed.

2. Constellation/New Energy Rebates:

While Constellation/New Energy primarily focuses on commercial and industrial customers for rebate administration, it's worth investigating if they offer any specific residential energy efficiency incentives in Maine. You can check their website or contact their customer service directly to inquire about any potential programs for heat pump installations. Their services include helping customers identify and capture available rebates from utilities and other third parties.

Important Considerations:

- **Equipment Eligibility:** Ensure that the heat pump boiler system you choose meets the specific requirements of each rebate program, including efficiency ratings and inclusion on approved lists.
- **Installation Requirements:** Follow the installation guidelines set by Efficiency Maine and any other relevant programs. Using a registered vendor is often a requirement for Efficiency Maine rebates.
- **Application Deadlines:** Be aware of any deadlines for application submissions or project completion to ensure you qualify for the incentives. Note that Efficiency Maine's residential heat pump rebate structure changed on April 5, 2025, so ensure you are applying under the correct guidelines based on your project timeline.
- **Coordination of Incentives:** It may be possible to combine state and federal incentives for greater savings. For example, the federal tax credit can be claimed in addition to the Efficiency Maine rebates.
- **Professional Advice:** Consult with a qualified HVAC contractor experienced in heat pump boiler installations and familiar with Maine's rebate programs. They can help you choose the right equipment and navigate the application process. You may also want to consult with a tax advisor regarding the federal tax credits.

By exploring these potential rebates and incentives, residents of Bar Harbor, Maine, can significantly reduce the upfront costs associated with installing an energy-efficient heat pump boiler system. Remember to verify all eligibility criteria and application procedures with the relevant program administrators.

EWEM #2 - Retrofit Interior Lighting with Energy Star Certified LEDs

Existing Condition: This measure recommends retrofitting 42 existing common area light fixtures containing 92 linear fluorescent T5 and T8 tube lamps with new Energy Star-certified LED fixtures or lamps. The current fluorescent lighting system exhibits inefficient energy consumption and can be significantly improved by transitioning to modern LED technology.

LED lighting offers a significantly higher lumen-per-watt ratio than traditional fluorescent lighting. LED fixtures consume considerably less energy for the same light output, which results in substantial energy savings. Additionally, LED lamps have a significantly longer lifespan, reducing the frequency of replacements and associated maintenance costs.

The retrofit should prioritize Energy Star-certified LED products to ensure optimal energy efficiency and product quality. The selection of LED fixtures or lamps should be based on the existing fixture types and the desired light output, color temperature, and distribution to maintain or improve the existing lighting quality.

Benefits:

- **Significant Energy Savings:** Reduced electricity consumption due to the higher lumen-per-watt efficiency of LEDs.
- **Reduced Operating Costs:** Maintenance costs will be reduced due to the longer LED lifespans, leading to less frequent replacement intervals.
- **Improved Lighting Quality:** Consistent light output, improved color rendering, and reduced flicker.
- **Extended Lifespan:** LEDs offer a significantly longer lifespan than fluorescent lamps, minimizing replacement frequency.
- **Reduced Environmental Impact:** Lower energy consumption translates to reduced greenhouse gas emissions.

Total Estimated Cost (including labor and materials): $963

Estimated Annual Savings: $625

Estimated Annual Operational & Maintenance (O&M) Savings: The extended lifespan of LED lamps will significantly reduce replacement and maintenance costs over time.

Operational Changes for Staff: None required.

Implementation Impact to Occupants: The retrofit will occur in common areas and on-site during regular business hours. Minimal disruption to occupants is expected.

Available Rebates or Incentives:

- Efficiency Maine offers the 2025 Discounted Screw-In LEDs Program. This program provides discounted screw-in LEDs at retailers and distributors across the state. While this program focuses on screw-in bulbs, it is worth investigating whether any common area fixtures can utilize these discounted bulbs.
- Efficiency Maine offers the 2025 Commercial and Industrial (C&I) Custom Program - Electric Projects. This program is for electrical energy efficiency projects that result in at least 36,000 kWh of annual reductions in grid-supplied energy. If the total project savings meet the minimum requirements, this project may qualify for custom incentives. Performing a detailed energy savings calculation to determine eligibility is highly recommended.
- This project may also qualify for the 2025 Commercial and Industrial (C&I) Custom Program - Electric Projects because this program funds electrical energy efficiency projects.
- It is advised to review the Program Opportunity Notice (guidelines and project application) found on the Efficiency Maine website.

More information about available incentives and funding opportunities can be found in Section 8.1 State Level Incentives .

6.2 General Pump and Motor Recommendations

Pump Tests - Replace pumps when the efficiency drops below ~60%

This is a practical and proactive approach to maintaining system efficiency and minimizing energy costs. Here's why it's important and some things to consider:

- **Why 60%?** This threshold represents a significant drop from the best efficiency point (BEP) of most pumps. Operating far from the BEP leads to:
    - **Increased Energy Consumption:** The pump works harder to deliver the same flow and pressure, wasting electricity.
    - **Increased Wear and Tear:** Off-design operation can cause cavitation, vibration, and excessive bearing and seal loads, shortening the pump's lifespan and increasing maintenance needs.
    - **Reduced System Performance:** Inefficient pumps may struggle to meet demand, especially during peak periods.

- **Regular Testing:** Implementing a schedule for pump performance testing is crucial. This can involve:
    - **Flow and Pressure Measurements:** Using calibrated instruments to determine the actual operating point.
    - **Power Consumption Monitoring:** Measuring the electrical input to the motor.
    - **Efficiency Calculation:** Comparing the hydraulic power output to the electrical power input.
    - **Vibration Analysis:** Identifying potential mechanical issues that can impact efficiency.

- **Documentation:** Maintaining a detailed record of pump performance over time will help track efficiency degradation and justify replacement decisions.
- **Life Cycle Cost Analysis:** When a pump's efficiency drops below the threshold, perform a life cycle cost analysis comparing the cost of continued operation (including increased energy and maintenance) with the cost of a new, more efficient pump.

NEMA Premium Efficiency Motors Upon Replacement

This is a no-brainer for long-term cost savings and environmental responsibility.

- **Higher Efficiency:** NEMA Premium Efficiency motors are designed to convert more electrical energy into mechanical work compared to standard efficiency motors, resulting in lower energy bills.
- **Longer Lifespan:** Often built with higher quality materials and better cooling designs, premium efficiency motors can have a longer operational life.

- **Reduced Heat Generation:** They typically run cooler, which can improve the lifespan of connected components like bearings and seals.
- **Environmental Benefits:** Lower energy consumption translates to a reduced carbon footprint.
- **Cost Justification:** While the initial cost might be slightly higher, the energy savings over the motor's lifespan usually provide a significant return on investment, especially for continuously operating pumps in a water treatment facility.

Rewinding Old Motors vs. New Motors

This decision requires careful consideration and depends on several factors:

- **Motor Size and Age:** For smaller, older motors, rewinding might not be cost-effective compared to purchasing a new, high-efficiency motor. Larger, specialized motors might be worth rewinding.
- **Condition of the Motor:** If the motor has significant bearing damage, rotor issues, or frame corrosion, rewinding might only address the stator windings and not the underlying problems.
- **Quality of Rewind:** The quality of the rewinding process is critical. Poorly done rewinds can significantly reduce efficiency and reliability, negating any potential cost savings. Ensure you use reputable rewind shops with experience in maintaining motor efficiency.
- **Efficiency Impact:** Rewinding can sometimes slightly reduce a motor's original efficiency. It's essential to inquire about the rewind shop's ability to maintain or improve efficiency during the process.
- **Cost Comparison:** Obtain quotes for both rewinding and purchasing a new NEMA Premium Efficiency motor and perform a cost-benefit analysis considering the potential energy savings and lifespan differences.

Rebuilding Old Pumps vs. New Pumps

Similar to motors, this decision involves weighing several factors:

- **Pump Size and Complexity:** Rebuilding large, complex pumps can be more cost-effective than replacing them entirely, especially if the major components (casing, impeller) are still in good condition. Smaller, simpler pumps might be cheaper and more efficient to replace.
- **Extent of Damage:** If the pump has severe corrosion, cavitation damage to the casing or impeller, or significant wear on critical internal components, rebuilding might be extensive and costly, potentially exceeding the cost of a new pump.
- **Availability of Parts:** For older pumps, finding genuine replacement parts can be challenging and expensive. Aftermarket parts might not meet the original specifications, affecting performance and reliability.
- **Performance Improvement:** Rebuilding offers an opportunity to upgrade certain components (e.g., seals, bearings) with more modern and reliable alternatives. However, it's unlikely to significantly improve the pump's hydraulic efficiency beyond its original design.

- **Cost Comparison:** Obtain detailed quotes for the rebuild scope of work and compare it with the cost of a new pump with comparable specifications and efficiency. Consider the potential downtime associated with the rebuild process.

VFDs as Soft Starters for Any Electrical Issues - Will not save energy unless the VFD is used to actively reduce pump speed as demand drops

This is a crucial point to understand.

- **Soft Starting Benefits:** VFDs (Variable Frequency Drives) offer excellent soft starting capabilities, which can:
    - **Reduce Mechanical Stress:** By gradually ramping up the motor speed, they minimize the high starting torque and current surges that can damage the pump, motor, and connected piping.
    - **Prevent Water Hammer:** The controlled acceleration reduces pressure transients in the water system.
    - **Lower Peak Electrical Demand:** This can potentially reduce demand charges from the utility.

- **Energy Savings Through Speed Control:** The key to energy savings with VFDs lies in their ability to **actively reduce the pump speed** when the system demand is lower than the pump's rated capacity. This is because the power consumed by a centrifugal pump is roughly proportional to the cube of its speed. Even a small reduction in speed can lead to significant energy savings.
- **Applications for Speed Control:** Consider using VFDs for pumps where the flow or pressure demand fluctuates significantly, such as:
    - **Distribution Pumps:** Adjusting flow based on water consumption patterns throughout the day.
    - **Booster Pumps:** Maintaining a consistent pressure in the distribution system despite varying demand.
    - **Influent/Effluent Pumps:** Matching flow rates to treatment process requirements.

- **Initial Investment:** VFDs have an initial cost, so a careful analysis of the potential energy savings and other benefits is necessary to justify the investment.

Match pumps to system requirements so they operate at the most efficient point on the pump curve

This is fundamental for efficient pump operation.

- **System Head and Flow Requirements:** Accurately determine the required flow rate and total dynamic head (TDH) for each pumping application under various operating conditions (e.g., peak demand, low demand, fire flow).
- **Pump Curve Analysis:** Select pumps whose best efficiency point (BEP) on their performance curve closely matches the typical operating point of the system.

- **Oversized Pumps:** Operating a pump significantly to the left of its BEP (at lower flow and higher head than optimal) leads to:
    - **Low Efficiency:** Wasted energy.
    - **Increased Radial Thrust:** Can shorten bearing and seal life.
    - **Potential for Cavitation and Vibration.**

- **Undersized Pumps:** Operating a pump significantly to the right of its BEP (at higher flow and lower head than optimal) might not meet system demand and can also lead to efficiency losses.

Trim or replace impellers on oversized pumps

This is a common practice to optimize the performance of pumps that were initially selected with excess capacity.

- **Impeller Trimming:** Reducing the diameter of the impeller reduces the pump's head and flow capacity. This can shift the operating point closer to the BEP and improve efficiency.
- **Considerations for Trimming:**
    - **Manufacturer's Guidelines:** Always follow the pump manufacturer's recommendations and limitations for impeller trimming.
    - **Minimum Allowable Size:** There's a minimum impeller diameter below which pump performance and efficiency can be negatively impacted.
    - **Impact on NPSH:** Trimming can slightly affect the Net Positive Suction Head Required (NPSHr) of the pump.
    - **Cost vs. Replacement:** For significant oversizing, replacing the impeller or the entire pump with a properly sized unit might be more efficient in the long run.

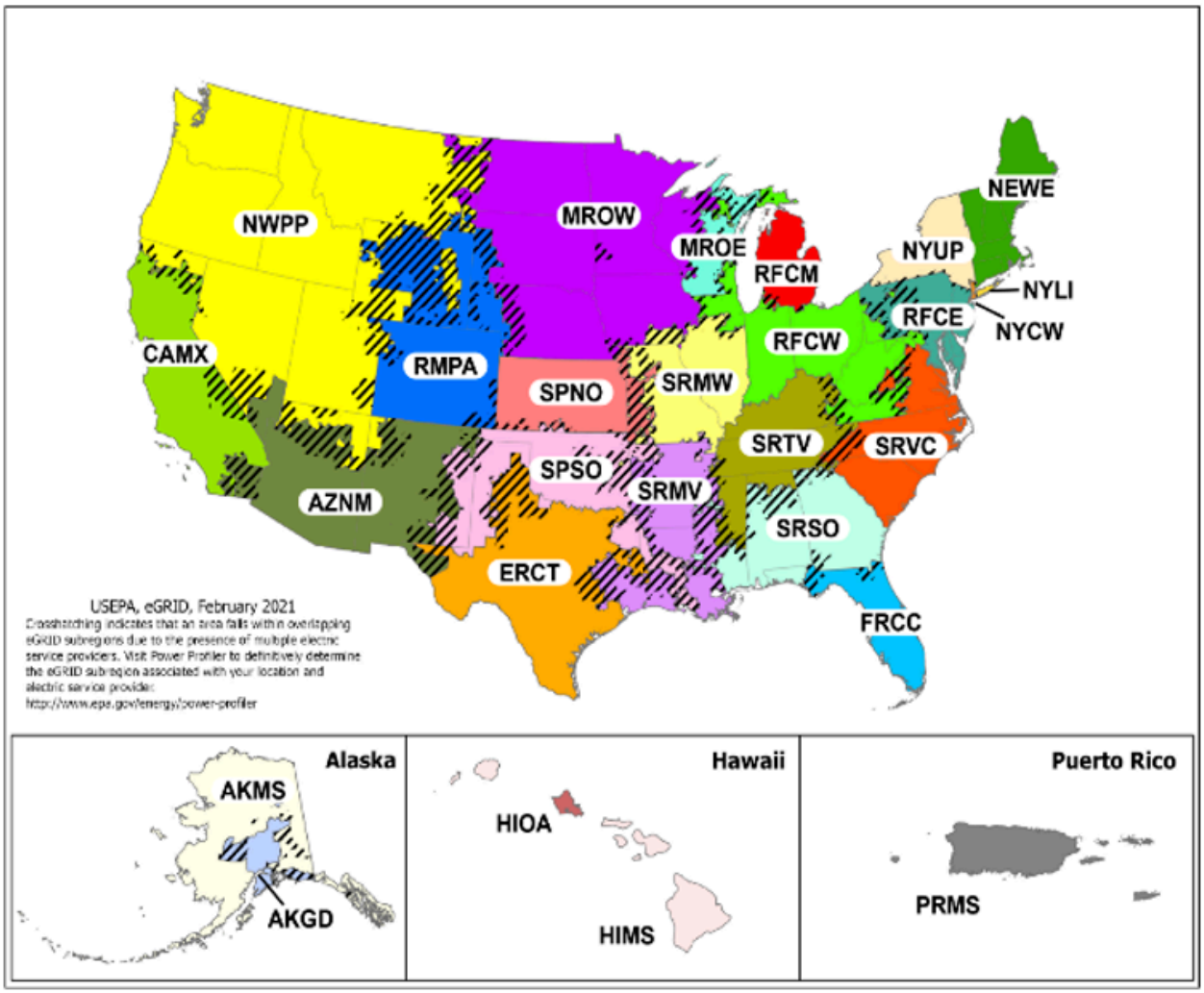
- **Impeller Replacement:** If trimming is insufficient or not recommended, replacing the existing impeller with one that is properly sized for the system requirements is another viable option.

By thoughtfully implementing these recommendations, your water treatment facility in Bar Harbor can significantly improve its pump and motor efficiency, reduce energy consumption, lower maintenance costs, and ensure reliable operation. Remember to document all changes and monitor performance to verify the effectiveness of these measures.

7.0 GHG EMISSIONS ANALYSIS

7.1 eGRID Subregions

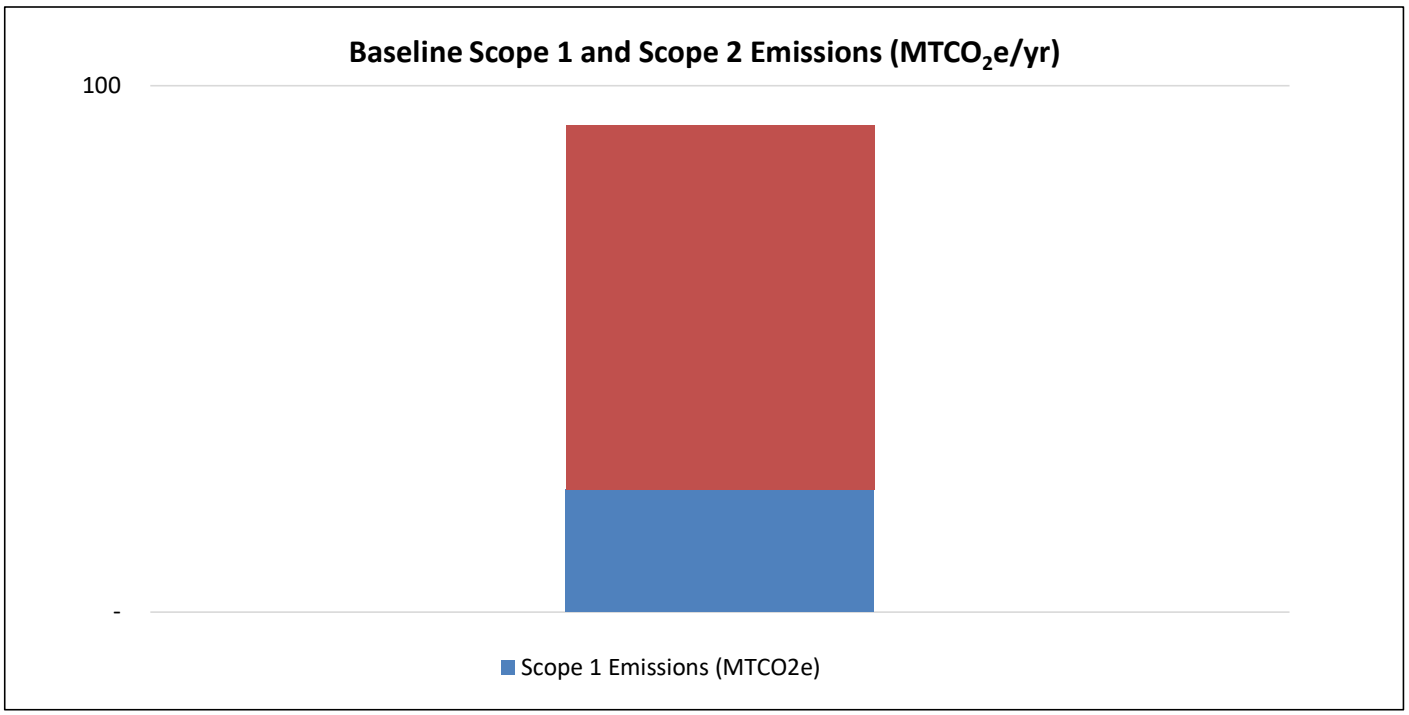
A map of the the eGRID subregions and the equivalent CO_2 emissions factor used in the GHG emissions analysis calculations are shown below.

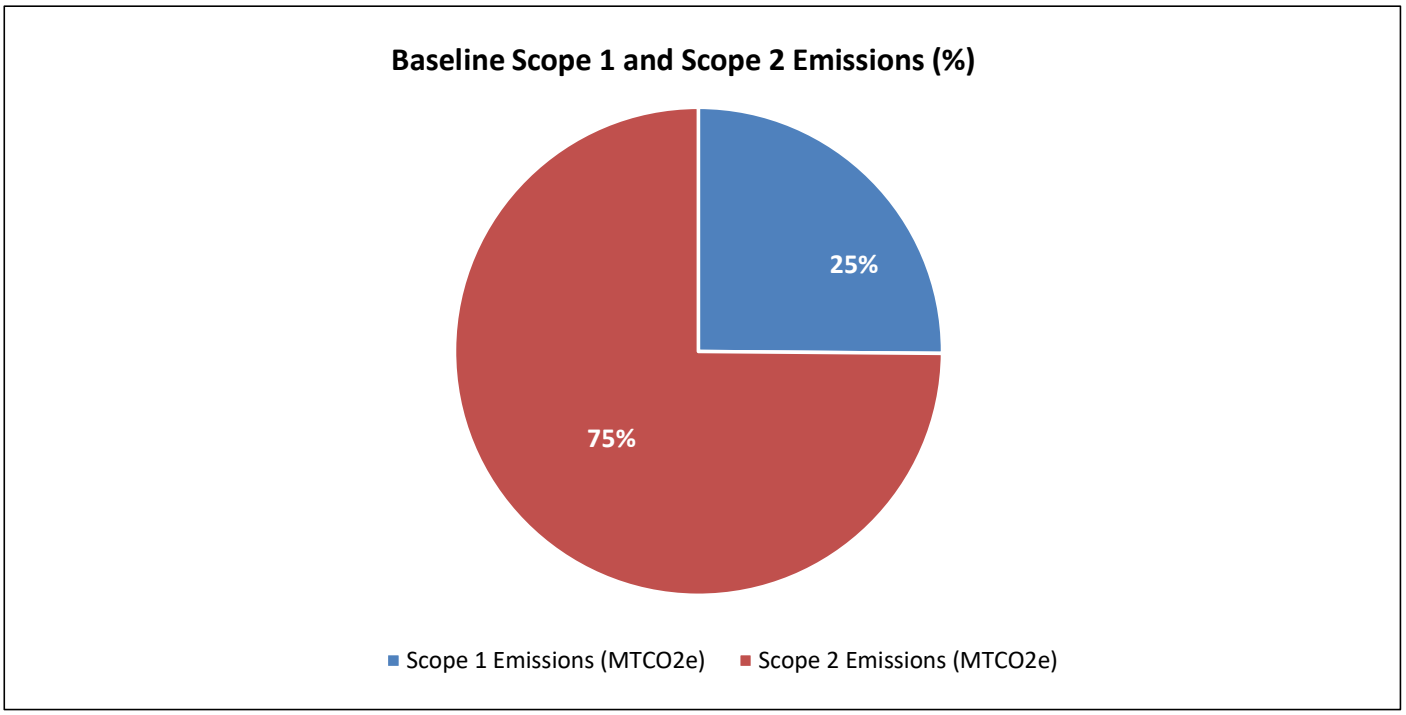


eGRID Subregion Name	eGRID Acronym	CO2e Emissions Factor (lb/ MWh)
NPCC New England	NEWE	541.1
National Average	N/A	775.2

7.2 Baseline Scope 1 and Scope 2 GHG Emissions

The following charts show the existing Scope 1 and Scope 2 emissions calculated for the Property using the above equivalent CO_2 emissions factor for the applicable region.

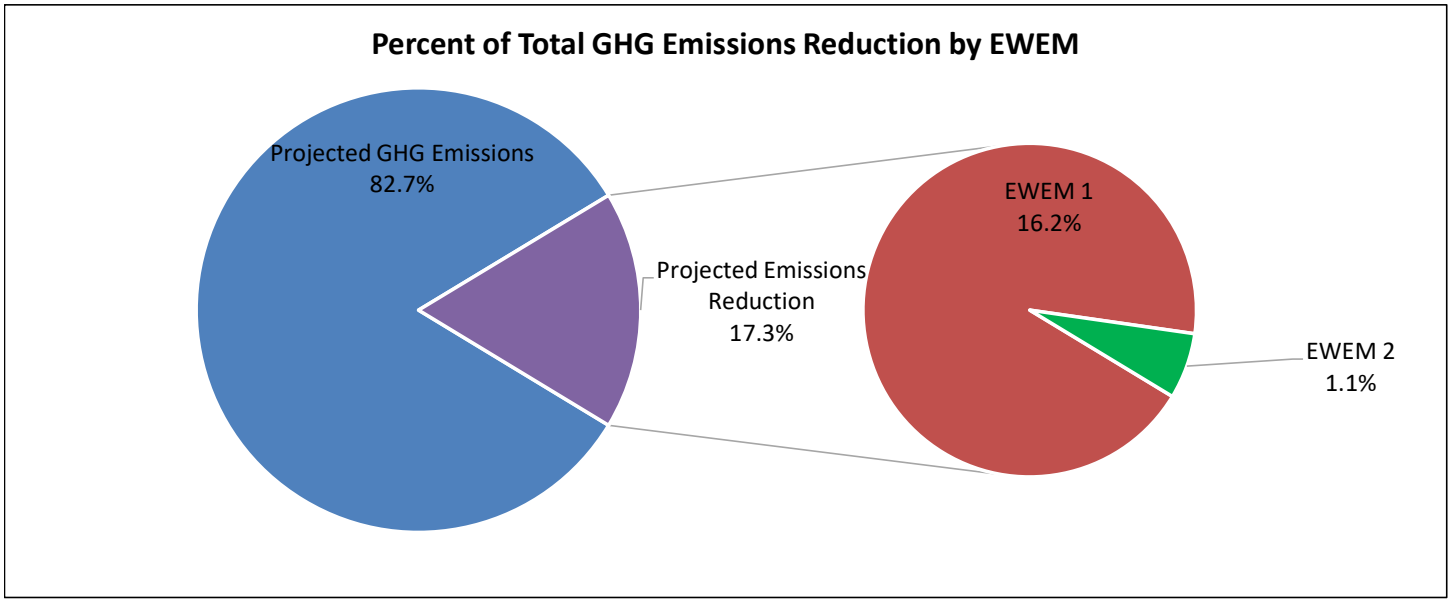

Baseline Scope 1 and Scope 2 Emissions (MTCO2e/yr)
100
-
Scope 1 Emissions (MTCO2e)

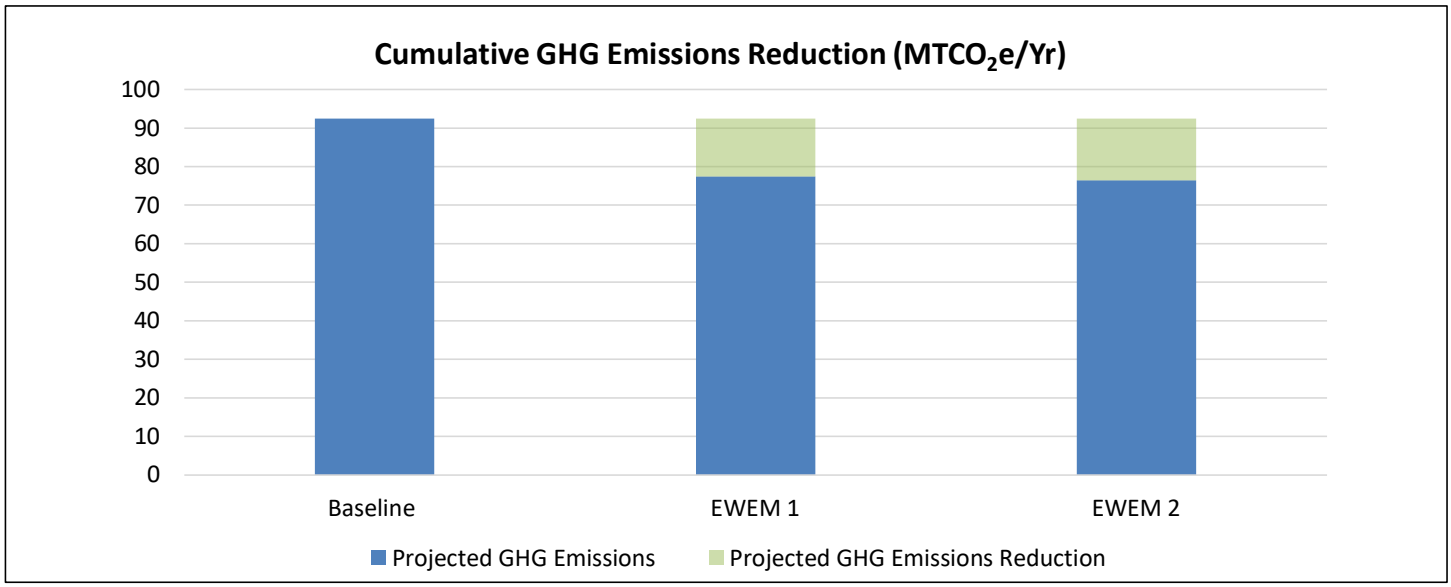

Baseline Scope 1 and Scope 2 Emissions (%)
25%
75%
Scope 1 Emissions (MTCO2e)
Scope 2 Emissions (MTCO2e)

7.3 GHG Emissions Reduction per EWEM

The following table and chart show the equivalent CO_2 emissions reduction per EWEM and the cumulative reduction of the combined EWEMs. The cumulative reduction chart assumes each EWEM will be implemented.

EWEM #	Energy And Water Efficiency Measures (EWEM) Summary Description	Projected GHG Emissions (MTCO2e)	Emissions Reduction (MTCO2e)	Emissions Reduction (%)
Baseline	Current GHG emissions	92.42		
EWEM 1	Integrate a Heat Pump Boiler into the existing propane boiler system and use propane boiler for backup heat when the outside air temperature is below 25°.		14.98	16.2%
EWEM 2	Retrofit 42 Interior Linear Fluorescent T5 and T8 Lighting Fixtures with 92 DLC Certified Linear LED Lamps		1.03	1.1%
Total	**Projected GHG emissions and reduction from baseline**	**76.41**	**16.01**	**17.3%**





8.0 FINANCIAL INCENTIVES

The following section will identify available incentives across the country and how they may or may not apply to the property and the recommendations made in this report. AEI will provide a summary of available energy efficiency incentives. The best resource to stay current on active energy efficiency incentives is at: dsireusa.org.

8.1 STATE LEVEL INCENTIVES

2025 Technical Assistance

(Existing Buildings)

Administrator: Efficiency Maine

Apply Services

IncentiFind can connect you to our expert who can explain why this incentive may be right for your project.

Description

Efficiency Maine offers incentives for Technical Assistance Studies to those customers that have already identified a project but need additional outside assistance to move it forward. Customers are guided through the process of developing the energy savings analyses and project cost estimates necessary for our Custom Program application. Efficiency Maine may provide up to 50% of the cost of an approved Technical Assistance Study up to $20,000.

Eligible Scope

Efficiency Maine's Commercial and Industrial (C&I) Custom Program provides funding for Technical Assistance (TA) Studies to help program participants lay the necessary groundwork for project investment. The Program incentive is 50% of the approved TA Study cost up to $25,000. Eligible TA Studies include investment-grade analysis of large and more complex projects, as well as development of systems designs and preparation of construction bid documents for targeted measures. Additionally, Efficiency Maine will support interconnection applications and studies required for battery projects that are applying for an incentive through the Energy Storage System (ESS) Program Opportunity Notice

Funded TA Studies must focus on complex projects that require engineering to proceed, and that are found likely to be eligible for Custom Program or ESS Program funding. All award decisions will be made by Efficiency Maine based on a review of potential project eligibility, alignment with Program goals, and a preliminary cost effectiveness screening. Examples of potentially eligible studies include: custom process improvement upgrades, large or complex beneficial electrification or HVAC projects, and battery system designs.

C&I Custom Program Technical Assistance guidelines

Estimated Funds

Min Funds

Varies by Project.

Max Funds

- Efficiency Maine may provide 50% of the cost of an approved Technical Assistance Study up to $25,000.
- $200,000 is being initially allocated to this program for the remainder of the 2024 fiscal year (July 1, 2023 through June 30, 2024).

Next Steps

1. The customer and/or TA Provider provide Efficiency Maine preliminary estimates of measure costs and energy impacts in order to determine cost effectiveness. These preliminary estimates could also come from an Efficiency Maine scoping audit.

2. If cost effectiveness found positive, customer and TA Provider submit a TA Study application.

3. Coordinate a TA Study kick off meeting between the customer, TA Provider, and Efficiency Maine in order to clearly define the study scope, and agreed upon deliverables.

4. The Efficiency Maine representative reviews the TA Study application package and, if applicable, recommends award of the TA incentive to the Efficiency Maine Program Manager. The Efficiency Maine representative communicates the final decision to the customer and the TA Provider.

5. The customer authorizes the TA Provider to proceed with the study. The Efficiency Maine representative remains engaged with the process to address questions and provide input, guidance, and assistance as necessary. The TA provider must inform Efficiency Maine of any changes in the TA Study scope of work as soon as they are known.

6. Once the TA Study is complete, it is submitted to Efficiency Maine for review.

7. Efficiency Maine reviews the study to confirm the agreed-upon deliverables are completed.

8. Efficiency Maine requests clarification or elaboration, if appropriate.

9. Efficiency Maine issues TA incentive award.

2025 Commercial and Industrial (C&I) Custom Program - Thermal Projects

(Existing Buildings)

Administrator: Efficiency Maine

Apply Services

IncentiFind can help you APPLY to this incentive. Our fee is 30% of the total rebate value.

Description

Maine businesses, nonprofits, institutions, and governments are eligible for funding for a variety of thermal energy efficiency projects through Efficiency Maine's Commercial and Industrial (C&I) Custom Program. Funding is available for thermal projects that involve a measure (or set of measures) that reduces the consumption of natural gas, oil, biomass, and other fuels.

Awarded projects have included heat recovery measures, boiler upgrades and controls, and HVAC controls. For a list of previously awarded custom projects, click here.

Eligible Scope

Eligible Projects

- A measure (or set of such measures) at a single facility or campus that reduces inefficient energy use (or increases efficient energy use), leading to fuel savings related to producing thermal energy for end uses such as heating, steam production and hot water.
- Projects must save a minimum of 400 MMBtu annually (4,000 therms of piped natural gas).

Ineligible Projects

- Measures that are eligible for Efficiency Maine's C&I Prescriptive Incentive Program.
- Projects that have a benefit-to-cost ratio less than 1, as per Efficiency Maine's Total benefit-cost test.
- Projects that have a simple payback of under one year (after factoring in the Efficiency Maine incentive).
- Projects that involve measures required by state or federal law or local building or energy codes, or projects that are deemed by Efficiency Maine to represent standard industry practice measures.
- Projects for which the customer (or its affiliate) has made binding commitments to proceed prior to the official award of funding under the Custom Program.
- Measures that rely solely on human behavior changes or facility maintenance.
- Feasibility studies.
- Fundraising seed money for projects to be completed and funded subsequently.

Estimated Funds

Min Funds

Varies by project.

Max Funds

- Funding levels will range from a minimum of $5,000 to a maximum of $1,000,000 per facility up to 50% of the total project costs.
- Incentive awards are capped based on the magnitude of the validated annual reduction in grid-supplied energy (kWh/year) and/or fuel savings (MMBtu/year). Incentives will not exceed $0.30 per kWh of validated annual reduction in grid supplied electricity plus $25 per MMBtu of annual fuel savings.

Next Steps

1. To get started, review the Thermal Project Application Cover Sheet. and Program Opportunity Notice (guidelines and project application).

2025 Lighting Solutions

Lighting can be a significant operating expense in existing buildings. Maine businesses can reduce lighting expenses by upgrading to high-efficiency fixtures and installing lighting controls. Lighting control technologies allow building managers to carefully tailor lighting conditions to the requirements of specific spaces. These upgrades can also enhance productivity and improve aesthetics. Efficiency Maine also incentivizes high-efficiency screw-in LEDs at participating distributors across Maine. Click here to learn more about the Discounted Screw-in LED Program.

Eligible Scope

Solutions

Interior LED Lighting

- LED Retrofit Kits
- New LED Fixtures
- Refrigerated Case Fixtures and Controls
- Lighting Controls

Exterior LED Lighting

- LED Retrofit Kits
- New LED Fixture

Distributor Pathway Interior Lighting

- High/Low Bay Lamps (Mogul Screw Base)

- Tubular Lamps: T-8 • T8 U-Bend • T-5 • T-5HO replacement

Distributor Pathway Exterior Lighting

- Outdoor LED Mogul Screw-Base Replacement Lamp

Estimated Funds

Min Funds

Varies by Project

Max Funds

Incentives

Interior LED Lighting

- $0.28 per kWh of first year savings up to 65% of measure cost

Exterior LED Lighting

- $0.28 per kWh of first year savings up to 65% of measure cost

Small Business LED Lighting

- 75% of total measure cost for qualifying interior and exterior lighting
- Small business customers must have an electric account labeled “Small General Service” (SGS), “General Service” (GS), or “Medium General Service” (MGS) with an average monthly electrical demand under 50kW
- Click here for more information on small businesses

Distributor Pathway Interior Lighting

- Incentive depends on the specific distributor
- Click here to find a participating distributor

Distributor Pathway Exterior Lighting

- Incentive depends on the specific distributor
- Click here to find a participating distributor

Next Steps

1. Work with an Efficiency Maine Qualified Partner to install high-efficiency lighting. Click here to find a Qualified Partner working near you. or If you work with a contractor that is not yet a Qualified Partner, urge your contractor to find out more information here.

2. Efficiency Maine reserves the right to require pre-approval for any Program application proposing an incentive of **$5,000 or more**.

3. As part of the project approval process, you will accept the C&I Prescriptive Program's Terms and Conditions.

2025 Water Heating Solutions

Maine businesses can reduce water heating costs by upgrading to high-efficiency water heating systems. Efficiency Maine offers incentives for heat pump water heaters and ECM circulator pumps. These upgrades can reduce water heating costs and provide hot water when you need it.

Eligible Scope

Eligible Equipment

Light Duty Commercial Heat Pump Water Heaters

- Light duty heat pumps can be used for small commercial or residential facilities that have some hot water demand. These typically have a tank with up to 50 gallon storage capacity.
- Tens of thousands of Mainers own these heat pump water heaters. They're popular because they produce lots of hot water, can save more than $5,000 over their 10-year life, and help to dehumidify.

Heavy Duty Commercial Heat Pump Water Heaters

- Heavy duty commercial heat pump water heaters can offer hot water needs for commercial settings, including hospitals, hotels, motels, multifamily buildings, long-term care facilities, and offices.

ECM Circulator Pumps

- Businesses can reduce electric costs with the installation of ECM circulator pumps. Forced hot water ("hydronic") heating systems use circulator pumps to move heated water from boilers to radiators and back. These pumps run whenever a thermostat calls for heat. Traditional circulator pumps run at one fixed speed and use some electricity to magnetize their rotor. Electronically commutated motor (ECM) circulator pumps can modulate their speed and use permanent magnet motors that don't require any electricity to have magnetic properties. ECM circulator pumps cost less to buy and less to operate than traditional circulator pumps.

- Click here to learn more about this technology and click here to find a participating distributor.

Estimated Funds

Min Funds

Varies by equipment type.

Max Funds

Incentives

Light Duty Commercial Heat Pump Water Heaters

- Click here for information on incentives for light duty heat pump water heaters.

Heavy Duty Commercial Heat Pump Water Heaters

- See the table below for information on incentives for both retrofit and new construction projects.
- Incentives are limited to hospitals, hotels, motels, multifamily buildings, long-term care facilities, and offices.

Heat Pump Water Heater Integrated Storage || Minimum Qualifying Efficiency Criteria || Incentive Amount

- 80 gallons || ENERGY STAR® || $1,800 per unit
- 120 gallons || ENERGY STAR® || $3,000 per unit
- Split-system with minimum of 80 gallons || ENERGY STAR® || $3,000 per unit

ECM Circulator Pumps

- Click here for information on incentives for ECM circulator pumps.

Next Steps

1. Click here to find a Qualified Partner working near you. If you work with a contractor that is not yet a Qualified Partner, urge your contractor to find out more information here.

2025 Commercial Heating, Ventilation, and Air Conditioning (HVAC) Solutions

Businesses can save money, increase equipment reliability, and create more comfortable and productive workplaces by making energy-efficient choices when installing, renovating, or replacing HVAC equipment. By upgrading to an efficient electric HVAC system, a business can move towards beneficial electrification, or the transition of electric systems in a way that reduces overall emissions and energy costs.

Incentives for these HVAC systems are designed to encourage the installation of primary whole building heating and cooling systems. Installing electric heat pump equipment can help a business's operating systems become fossil fuel free.

Click here for more information on incentives for HVAC solutions.

Eligible Scope

Eligible Equipment

Heat Pump Solutions

- Mini-Split Heat Pumps (Air-to-Air) Heat Pump Rooftop Units (RTUs)
- Packaged Terminal Heat Pumps
- Vertical Packaged Terminal Heat Pumps
- Variable Refrigerant Flow (VRF) Systems
- Water Source Heat Pumps

Other Electric HVAC Solutions

- Demand Control Ventilation
- Electronically Commutated Motor (ECM) Circulator Pumps
- Energy Recovery Ventilator (ERV) Systems
- Variable-Frequency Drive (VFD) Systems

Propane and Naturas Gas Solutions

- Biomass Boilers and Furnaces
- Commercial Boilers and Furnaces
- Commercial Boiler Controls and Ancillary Equipment (retrofit only)**

Estimated Funds

Min Funds

Varies by equipment type.

Max Funds

Heat Pump Incentives

Mini-Split Heat Pumps

- Single-zone – $1,000
- Single-zone air source heat pumps

Small Business Mini-Split Heat Pump Retrofits

- Single-zone – $1,400
- Single-zone air source heat pumps
- Click here for more information on eligibility.

Multifamily Mini-Split Heat Pumps

- 1 to 3 Zones: $6.00/sq. ft.

Variable Refrigerant Flow (VRF) Systems

- $8.00/sq. ft. single-phase without heat recovery
- $10.00/sq. ft. without heat recovery
- $12.00/sq. ft. with heat recovery

Heat Pump Rooftop Units (RTUs)

- 60 to <= 120 MBH: $168 per MBH
- 121 to <= 450 MBH: $125 per MBH

Packaged Terminal Heat Pumps

- < 7,000 Btu/h: $430 per unit
- >= 7,000 Btu/h and =15,000: $450 per unit
- > 15,000 Btu/h: $480 per unit

Vertical Packaged Terminal Heat Pumps

- < 7,000 Btu/h: $700 per unit
- >= 7,000 Btu/h and =15,000: $850 per unit
- > 15,000 Btu/h: $1,000 per unit

Other Electric HVAC Incentives

ECM Circulator Pumps

- ECM Circulator Pump Instant Discount: $100

- Click here for more information.

Energy Recovery Ventilator (ERV) Systems

- Sensible heat recovery = 55% to< 65% – $1.50/CFM
- Sensible heat recovery = 65% to< 75% – $1.75/CFM
- Sensible heat recovery = 75% to< 85% – $2.00/CFM
- Sensible heat recovery = 85% – $2.25/CFM

Variable-Frequency Drive (VFD) Systems

- $400 – $2,300 per unit (incentive varies by system horsepower)

Biomass Boilers and Furnaces

- Click here for information on incentives for these systems.

Next Steps

1. Work with an Efficiency Maine Qualified Partner to install high-efficiency cooling solutions. Click here to find a Qualified Partner working near you. Or If you work with a contractor that is not yet a Qualified Partner, urge your contractor to find out more information here.

2. Efficiency Maine reserves the right to require pre-approval for any Program application proposing an incentive of **$5,000 or more**.

3. As part of the project approval process, you will accept the C&I Prescriptive Program's Terms and Conditions.

2025 Discounted Screw-In LEDs Program

(Existing Buildings)

Administrator: Efficiency Maine

Description

Efficiency Maine discounts screw-in LEDs at retailers and distributors across the state. There's no paperwork for customers to file and no waiting for rebate checks.

Eligible Scope

Eligibility

- All customers are eligible as long as the bulbs are installed in Maine.
- Customers buying more than 20 bulbs at a retail location need to ask for a bulk-purchase waiver.
- Customers buying from a distributor must provide a Maine installation address as well as other information.
- Bulbs purchased from a distributor may be subject to inspection.
- It is not necessary to work with a registered contractor.
- Discounts are available on LEDs of various bulb shapes, bases, and wattages.
- Eligible products include A-line bulbs, spotlights, floodlights, and candelabra bulbs.

Resources

- Find a participating retailer
- Find participating distributors
- Learn about business incentives for other types of lighting
- Learn more about screw-in bulbs
- Read Retail LED Upgrade Case Studies

Estimated Funds

Min Funds

Incentive depends on the specific distributor.

Max Funds

Incentive depends on the specific distributor.

Next Steps

1. Discounts are available on LEDs of various bulb shapes, bases, and wattages.
   > To find a participating retailer, click here.
   > To find a participating distributor, click here.
   > To find the best prices on retail bulbs, click here.

2025 Commercial and Industrial (C&I) Custom Program - Electric Projects

(Existing Buildings)

Administrator: Efficiency Maine

Apply Services

IncentiFind can help you APPLY to this incentive. Our fee is 30% of the total rebate value.

Description

Maine businesses, nonprofits, institutions and governments are eligible for funding for electrical energy efficiency projects through Efficiency Maine's Commercial and Industrial (C&I) Custom Program.

Eligible Scope

Maine businesses, nonprofits, institutions and governments are eligible for funding for electrical energy efficiency projects through Efficiency Maine's Commercial and Industrial (C&I) Custom Program.

Awarded projects include process improvements, HVAC controls, installation of VFDs on motors, chiller and refrigeration enhancements, and pump upgrades. For a list of previously awarded custom projects, click here.

Eligible Projects

- A measure (or set of measures) at a single facility or campus that increases the end-use electrical efficiency, resulting in at least 36,000 kWh of annual reductions in grid-supplied energy when compared to a baseline.

Ineligible Projects

- Measures that are eligible for Efficiency Maine's C&I Prescriptive Incentive Program. This includes the majority of lighting measures, with a few specific exceptions.
- Projects that have a benefit-to-cost ratio less than 1, as per Efficiency Maine's benefit-cost test.
- Projects that have a simple payback under one year (after factoring in the Efficiency Maine incentive).
- Projects that involve measures required by state or federal law or local building or energy codes, or are deemed by Efficiency Maine to be standard industry practice measures.
- Projects for which the customer (or its affiliate) has made binding commitments to proceed prior to the official award of funding under this Custom Program.
- Measures that rely solely on human behavior changes or facility maintenance.
- Projects for customers that do not have an account with a Maine electric utility.
- Feasibility studies.
- Power quality, power factor, and power conditioning projects.
- Projects that do not result in an overall kWh use reduction. An exception is made for measures that are intended to expand facility use or production and will result in an overall kWh use reduction when compared to an alternative code-compliant, baseline alternative.
- Fundraising seed money for projects to be completed and funded subsequently.

Custom Program's Terms and Conditions

Program Opportunity Notice (guidelines and project application).

Estimated Funds

Min Funds

Varies by project.

Max Funds

Funding Overview

- Funding levels will range from a minimum of $10,000 to a maximum of $1,000,000 per facility up to 50% of the total project costs.
- Projects with an estimated incentive over $200,000 will require a formal contract with the Efficiency Maine Trust.
- Projects with an estimated incentive below $200,000 require that participants agree to the Custom Program's Terms and Conditions.
- For retrofits of existing equipment, applicants must provide a minimum 50% cost share for the project.
- Incentive awards are capped based on the magnitude of the validated annual reduction in grid-supplied energy (kWh/year). Incentives will not exceed $0.28 per kWh of validated annual reduction in grid supplied energy.
- Efficiency Maine will consider new applications until the available program funding is exhausted.

Next Steps

1. To get started, review the Electric Project Application Cover Sheet and review the Program Opportunity Notice (guidelines and project application).

2025 Commercial and Industrial (C&I) Custom Program - Energy Storage System Projects

(Existing Buildings)

Administrator: Efficiency Maine

Apply Services

IncentiFind can connect you to our expert who can explain why this incentive may be right for your project.

Description

Efficiency Maine's Energy Storage System (ESS) Program Opportunity Notice (PON) offers performance based incentives for the deployment of energy storage systems during summer peak demand conditions.

All demand metered customers (commercial, nonprofits, institutions and government) are eligible to participate.

Eligible Scope

Efficiency Maine's Energy Storage System (ESS) Program Opportunity Notice (PON) offers performance based incentives for the deployment of energy storage systems during summer peak demand conditions.

All demand metered customers (commercial, nonprofits, institutions and government) are eligible to participate.

Eligible Projects
Eligible projects must be interconnected behind the facility utility meter and must be located in Maine with a Maine electric utility account. Awarded incentives will be based on the amount of facility electric load (kW) that the proposed system can reduce during summer peak demand hours. Additionally, awarded systems must:

- Be approved by the Trust prior to installation.
- Be at least 20 kW.
- Maintain a minimum 80% round-trip efficiency.
- Be able to collect and transmit 15-minute interval data.
- Carry a 10-year manufacturer warranty.
- Be UL-listed or certified by another nationally recognized testing lab.

Ineligible Projects

- Systems configured for grid export.
- Participants without the required interval metering and data transmission capability.
- Facilities not located in Maine or served by a Maine electric utility.
- Residential and small business customers.

Estimated Funds

Min Funds

Varies by project.

Max Funds

Funding Overview
Incentives awarded through this PON will be paid each fall for 5 years following an annual evaluation of the project's performance. Additionally, incentives will be subject to the following limitations:

- $200 per kW of validated reduction in grid supplied power.
- Incentives will be on average load reduction achieved for fifteen (15) dispatches during summer peak demand conditions.
- Incentive awards will be at least $4,000 and not more than $600,000 per year, per project, for 5 years.
- All projects awarded will require a formal contract with Efficiency Maine.

Next Steps

1. Check your eligibility.
2. To get started, please review the Program Opportunity Notice (application guidelines, award criteria, and limitations).

2025 Commercial and Industrial (C&I) Custom Program - Custom Distributed Generation Projects

(Existing Buildings)

Administrator: Efficiency Maine

Apply Services

IncentiFind can help you APPLY to this incentive. Our fee is 30% of the total rebate value.

Description

Maine businesses, nonprofits, institutions and governments are eligible for funding for distributed generation projects through Efficiency Maine's Commercial and Industrial (C&I) Custom Program. Distributed generation projects are behind-the-meter generation projects that reduce the consumption of grid-supplied electricity and meet Efficiency Maine's cost-benefit analysis.

Combined heat & power (CHP) projects are the most common type of distributed generation project completed through the C&I Custom Program.

Eligible Scope

Maine businesses, nonprofits, institutions and governments are eligible for funding for distributed generation projects through Efficiency Maine's Commercial and Industrial (C&I) Custom Program. Distributed generation projects are behind-the-meter generation projects that reduce the consumption of grid-supplied electricity and meet Efficiency Maine's cost-benefit analysis.

Combined heat & power (CHP) projects are the most common type of distributed generation project completed through the C&I Custom Program.

Eligible Projects

- A distributed generation project that reduces on-site electricity consumption from the grid.
- A distributed generation project must have an operating efficiency of 60% or greater.
- The project must result in kWh reductions of at least 36,000 kWh annually
- The project also must include a meter dedicated to providing 15-minute interval energy data to Efficiency Maine.

Ineligible Projects

- Projects that have a benefit-to-cost ratio less than 1, as per Efficiency Maine's benefit-cost test.
- Projects that have a simple payback under one year (after factoring in the Efficiency Maine incentive).
- Projects that export electricity to the grid (net metering) or to other customers.
- Projects for which the customer (or its affiliate) has made binding commitments to proceed prior to the official award of funding under this Custom Program.
- Projects for customers that do not have an account with a Maine electric utility.
- Feasibility studies.
- Power quality, power factor, and power conditioning projects.
- Fundraising seed money for projects to be completed and funded subsequently.

Estimated Funds

Min Funds

Varies by project.

Max Funds

Funding Overview

- Funding levels will range from a minimum of $10,000 to a maximum of $1,000,000 per facility up to 50% of the total project costs.
- Projects of all sizes will require a formal contract with the Efficiency Maine Trust.
- Applicants must provide a minimum 50% cost share for the project.
- Incentive awards are capped based on the magnitude of the validated annual reduction in grid-supplied energy (kWh/year). Incentives will not exceed $0.28 per kWh of validated annual reduction in grid-supplied energy.
- Efficiency Maine will consider new applications until the available program funding is exhausted.

Next Steps

1. Check your eligibility.

2. To get started, please review the following:
   Distributed Generation Project Application Cover Sheet
   Program Opportunity Notice (project application and guidelines)
   Distributed Generation Technical Analysis Checklist for those projects involving a Technical Assistance (TA) study
   Distributed Generation Project Application Checklist

8.2 Federal Incentives

179D - Energy Efficient Commercial Buildings Deduction

Section 179D of the U.S. Internal Revenue Code provides a tax deduction for investments in energy-efficient improvements made to commercial buildings. The provision is designed to incentivize property owners and tenants to enhance the energy performance of their properties, thereby promoting energy conservation and reducing utility costs. The deduction can be claimed by the owner of the commercial building or, if they are not the taxpayer, the tenant who makes the qualifying improvements. The deduction applies to improvements made to buildings used for commercial purposes, including retail spaces, office buildings, and industrial facilities. The deduction is allowed under Internal Revenue Code (IRC) Section 179D. It was expanded under the Inflation Reduction Act of 2022.

1. **Types of Improvements:**

   - The interior lighting systems, the heating, cooling, ventilation, and hot water systems, or the building envelope
   - It must be certified as being installed as part of a plan to reduce the total annual energy and power costs for the above systems by 25% or more in comparison to a reference building meeting the minimum requirements of ASHRAE Reference Standard 90.1.

2. **Amount of Deduction**

   - The cost of the installed property, or;

   - The savings per square foot calculated as:

     - $0.50 per square foot for a building with 25% energy savings
     - **Plus** $0.02 per square foot for each percentage point of energy savings above 25%
     - **Up to** a maximum of $1.00 per square foot for a building with 50% energy savings

   - Expenses deducted in the prior 3 years (4 years for an allocated deduction) reduce the maximum deduction before computing the current-year deduction.

- Prevailing wage and apprenticeship bonus: Beginning in 2023, if local prevailing wages are paid and apprenticeship requirements are met, an increased maximum deduction applies. The maximum amount increases to **5 times** the savings per square foot amount.

3. **Certification Process:**
    - **Qualified Professional:** A certification must be provided by a qualified professional confirming that the improvements meet the required energy savings.
    - **Documentation:** Detailed documentation and calculations are required to substantiate the claim, including energy modeling and performance testing.
4. **Benefits:**
    - **Tax Savings:** The deduction can significantly reduce a business's tax liability, offering a financial incentive to invest in energy-efficient upgrades.
    - **Operational Savings:** Beyond tax benefits, energy-efficient improvements often lead to reduced utility bills and lower operational costs.
5. **Legislative Context:**
    - **Expiration and Extensions:** Now that the IRC 179D provision is permanent, there is an inflation adjustment for the deduction for property placed in service after December 31, 2020.
6. **What can the property do?**
    - AEI can connect the property with partners qualified to complete 179D certification if requested.

2025 National Electric Vehicle Infrastructure (NEVI) Formula Program

(Existing Buildings)

Administrator: U.S. Department of Energy

Apply Services

IncentiFind can connect you to our expert who can explain why this incentive may be right for your project.

Description

The U.S. Department of Transportation's (DOT) Federal Highway Administration (FHWA) NEVI Formula Program will provide funding to states to strategically deploy electric vehicle (EV) charging stations and to establish an interconnected network to facilitate data collection, access, and reliability.

Eligible Scope

The NEVI Formula Program will provide funding to states to strategically deploy electric vehicle (EV) charging stations and to establish an interconnected network to facilitate data collection, access, and reliability.

Eligibility:

- EV charging stations must be non-proprietary, allow for open-access payment methods, be publicly available or available to authorized commercial motor vehicle operators from more than one company, and be located along designated FHWA Alternative Fuel Corridors (AFCs).
- If a state and DOT determine that all AFCs in the state have been fully developed, then the state can propose alternative public locations and roads for EV charging station installation.

FHWA must distribute the NEVI Program Formula Program funds made available each fiscal year (FY) through FY 2026, so that each state receives an amount equal to the state FHWA funding formula determined by 23 U.S. Code 104

Project Eligibility:

- NEVI Formula Program funds are restricted to projects that are directly related to EV charging infrastructure that is open to the public or to authorized commercial motor vehicle (see 23 CFR 658.5) operators from more than one company.
- Publicly accessible means the equipment is available to the public without restriction. A station that is not maintained or restricts access only to customers, tenants, employees, or other consumers is not publicly accessible.
- Please note that while hydrogen, propane, and natural gas fueling infrastructure are not eligible under the NEVI Formula Program, these additional fuels are eligible under the Corridor Charging Grants and the Community Charging Grants (23 U.S.C. § 151).
- Paragraph (2) under the Highway Infrastructure Program heading in title VIII of division J of BIL.

NEVI Formula Program Q&A
The National Electric Vehicle Infrastructure (NEVI) Formula Program Guidance

For additional information, see the FHWA NEVI website and the Joint Office website.

Estimated Funds

Min Funds

Varies by project

Max Funds

Funding is available for up to 80% of eligible project costs, including:

- The acquisition, installation, and network connection of EV charging stations to facilitate data collection, access, and reliability;
- Proper operation and maintenance of EV charging stations; and,
- Long-term EV charging station data sharing.

Next Steps

1. To receive funding, states must submit plans FHWA and the Joint Office of Energy and Transportation for review and public posting annually, describing how the state intends to distribute NEVI funds.

2025 Electric Vehicle (EV) Charging Reliability Grants

(New Construction)

Administrator: U.S. Department of Energy

Apply Services

IncentiFind can help you APPLY to this Incentive. Our fee is 30% of the incentive value.

Description

The U.S. Department of Transportation's (DOT) Federal Highway Administration (FHWA) EV Charger Reliability and Accessibility Accelerator offers funding for the repair and replacement of existing, non-operational publicly accessible Level 2 and direct current fast charging (DCFC) stations.

Eligible Scope

Eligible applicants include State departments of transportation and local governments.

For more information, see the DOT FHWA EV Charger Reliability and Accessibility Accelerator website.

Reference Public Law 117-58

Estimated Funds

Min Funds

Varies by Project

Max Funds

Funding is available for up to 80% of eligible project costs.

Next Steps

1. For more information, see the DOT FHWA EV Charger Reliability and Accessibility Accelerator website.

2025 Community Alternative Fuel Infrastructure Grants

(Existing Buildings)

Administrator: U.S. Department of Transportation

Apply Services

IncentiFind can help you APPLY to this incentive. Our fee is 30% of the total incentive received.

Description

The U.S. Department of Transportation (DOT) shall establish a competitive grant program to fill gaps in publicly accessible electric vehicle charging and hydrogen, propane, and natural gas fueling infrastructure in community locations, such as a parking facilities, public schools, public parks, or along public roads.

Eligible Scope

Eligibility

The U.S. Department of Transportation (DOT) shall establish a competitive grant program to fill gaps in publicly accessible electric vehicle charging and hydrogen, propane, and natural gas fueling infrastructure in community locations, such as a parking facilities, public schools, public parks, or along public roads.

Funding of up to 80% of project costs will be available for both development-phase planning activities and the acquisition and installation of charging or alternative fueling infrastructure. Five percent of the grant fund awarded may be used for educational and community engagement activities to develop and implement education programs through partnerships with schools, community organizations, and vehicle dealerships to support the use of zero-emission vehicles and associated infrastructure.

DOT must prioritize projects that expand access to charging and alternative fueling infrastructure within rural areas, low- and moderate-income neighborhoods, and communities with limited parking space or a high ratio of multi-unit dwellings to single-family homes. Eligible entities include states, metropolitan planning organizations, local governments, political subdivisions, and tribal governments. Additional funding eligibility and considerations will apply.

Estimated Funds

Min Funds

Varies by Project.

Max Funds

Funding of up to 80% of project costs will be available for both development-phase planning activities and the acquisition and installation of charging or alternative fueling infrastructure.

Next Steps

1. For more infomration, please contact 866.835.5322.

2025 Clean Renewable Energy Bonds (CREBs)

(Existing Buildings)

Administrator: U.S. Internal Revenue Service (IRS)

Apply Services

IncentiFind can connect you to our expert who can explain why this incentive may be right for your project.

Description

The Clean Renewable Energy Bonds (CREBs) Federal Loan Program is a Tribal Government, Municipal Utility, Rural Electric Cooperative, Local Government, and State Government program for those who have energy efficient improvements made with the following: Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Hydrokinetic Power, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Solar Thermal Electric, and Photovoltaic.

Eligible Scope

The Clean Renewable Energy Bonds (CREBs) Federal Loan Program is for:

- Tribal Government,
- Municipal Utility,
- Rural Electric Cooperative,
- Local Government, and
- State Governments

The program is eligible for the above entities if they have or plan have energy efficient improvements made with the following:

- Landfill Gas,
- Wind,

- Biomass,
- Hydroelectric,
- Geothermal Electric,
- Municipal Solid Waste,
- Hydrokinetic Power,
- Anaerobic Digestion,
- Tidal Energy,
- Wave Energy,
- Ocean Thermal, -Solar Thermal Electric, and
- Photovoltaic (PV).

For more details use the following links and contact below:

- http://www.irs.gov/irb/2007-14_IRB/ar17.html
- https://www.treasurydirect.gov/GA-SL/SLGS/selectCREBDate.htm
- https://www.treasurydirect.gov/GA-SL/SLGS/selectQTCDate.htm
- http://www.ustreas.gov/press/releases/tg333.htm

Estimated Funds

Min Funds

Varies by project

Max Funds

Varies by project

Next Steps

1. **Contact for more information:**
   Public Information – IRS
   U.S. Internal Revenue Service
   1111 Constitution Avenue, N.W.
   Washington, DC 20224
   Phone: (800) 829-1040
   Web Site: http://www.irs.gov

8.3 Loan Programs

C-PACE (Commercial Property Assessed Clean Energy)

C-PACE (Commercial Property Assessed Clean Energy) is a financing program that helps commercial property owners fund energy-efficient and renewable energy improvements to their buildings. Through C-PACE, property owners can access long-term financing for upgrades like solar panels, energy-efficient HVAC systems, lighting, and water conservation measures.

The unique feature of C-PACE is that the financing is repaid through a property tax assessment, which is tied to the property rather than the owner. This allows for longer repayment terms and can often result in positive cash flow for property owners, as the energy savings from the upgrades can exceed the cost of the financing.

C-PACE programs are available in many states in the U.S., and they aim to promote environmental sustainability while helping businesses lower energy costs.

C-PACE is not available everywhere and is administered by independent programs in each state.

The State of Maine offers a C-PACE program. https://copace.com/

This program can be used to finance recommendations made in this report and can also include energy/water audit costs.

Energy Savings Performance Contracting (ESPC)

ESPC is a financing mechanism that enables organizations to implement energy efficiency improvements without upfront capital costs. The ESPC process includes the following:

1. **Partnership with an Energy Service Company (ESCO):** The organization partners with an ESCO, which conducts an energy audit to identify potential energy-saving projects, such as lighting upgrades, HVAC improvements, or renewable energy installations.

2. **Project Financing:** The ESCO typically arranges financing for the project, so the organization doesn't need to invest its own funds. The project is paid for over time through the energy savings it generates.

3. **Guaranteed Savings:** The ESCO guarantees that the energy savings will be sufficient to cover the project costs. If the savings fall short, the ESCO is responsible for making up the difference.

4. **Implementation and Monitoring:** The ESCO manages the project from start to finish, including design, installation, and maintenance. The ESCO also monitors the energy performance to ensure that savings are realized as expected.

5. **Contract Duration:** ESPC contracts typically last several years, during which the energy savings are used to pay off the project costs. After the contract period, the organization benefits from reduced energy costs without additional payments.

Overall, ESPC allows organizations to improve energy efficiency, reduce utility costs, and minimize environmental impact without needing upfront capital, while transferring the performance risk to the ESCO.

AEI is not an ESCO and does not offer this program as a service.

9.0 SIGNATURES OF PARTICIPATING PROFESSIONALS

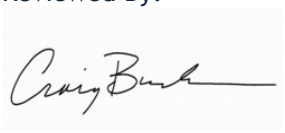
AEI Consultants performed this ASHRAE Level II Energy Audit for the Property located at 226 Duck Brook Road, Bar Harbor, Hancock County, Maine, in conformance with the scope and limitations of ASHRAE *Procedures for Commercial Building Energy Audits, Second Edition*, ANSI/ASHRAE/ACCA Standard 211-2018, *Standard for Commercial Building Energy Audits*.

Prepared By:

Joshua Martin
Report Author

Joshua Martin
Site Assessor

Reviewed By:



Craig Burcham, CEM
Senior Author

APPENDIX A

PROPERTY PHOTOGRAPHS

1. 226 Duck Brook Water Treatment Facility

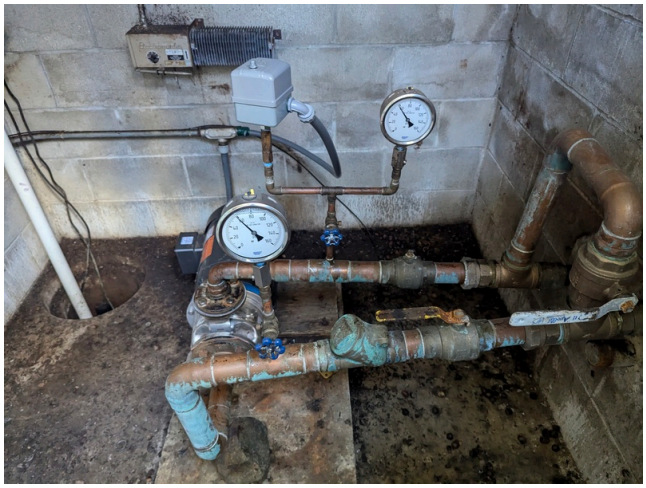
2. Propane Generator for 226 Duck Brook Water Treatment Facility

3. 226 Duck Brook Water Treatment Facility Exterior LED Lights

4. 14 Mountain Ave Booster Station

5. Arata Booster Station

6. Arata Booster Station



7. 138 Eagle Lake Rd Booster Station

8. 138 Eagle Lake Rd Booster Station

9. 422 Eagle Lake Rd Booster Station

10. 422 Eagle Lake Rd Booster Station

11. 422 Eagle Lake Rd Booster Station

12. 226 Duck Brook Water Treatment Facility Fluorescent Light Fixture

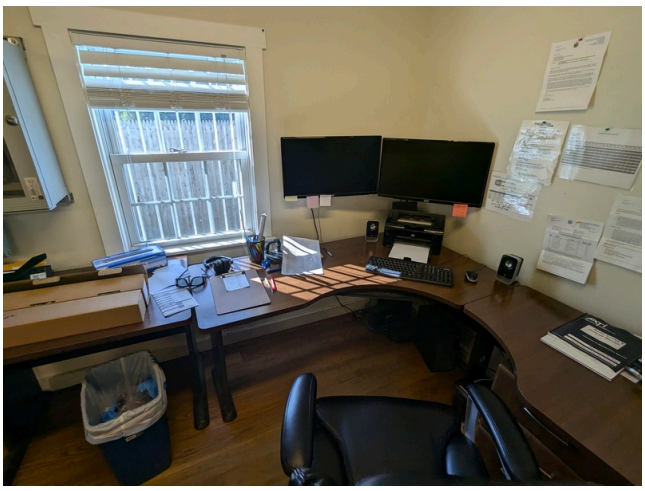
13. 226 Duck Brook Water Treatment Facility Heater

14. 226 Duck Brook Water Treatment Facility Fluorescent Lamp

15. 226 Duck Brook Water Treatment Facility Indoor Fluorescent Lighting

16. 226 Duck Brook Water Treatment Facility Exterior

17. 226 Duck Brook Water Treatment Facility Window



18. 226 Duck Brook Water Treatment Facility Interior

19. 226 Duck Brook Water Treatment Facility Interior

20. 226 Duck Brook Water Treatment Facility Interior

21. 226 Duck Brook Water Treatment Facility Condensing Propane Boiler

22. 226 Duck Brook Water Treatment Facility Hot Water Storage Tank

23. 226 Duck Brook Water Treatment Facility Air Compressors

24. 226 Duck Brook Water Treatment Facility Dehumidifier

25. 226 Duck Brook Water Treatment Facility Interior Pump

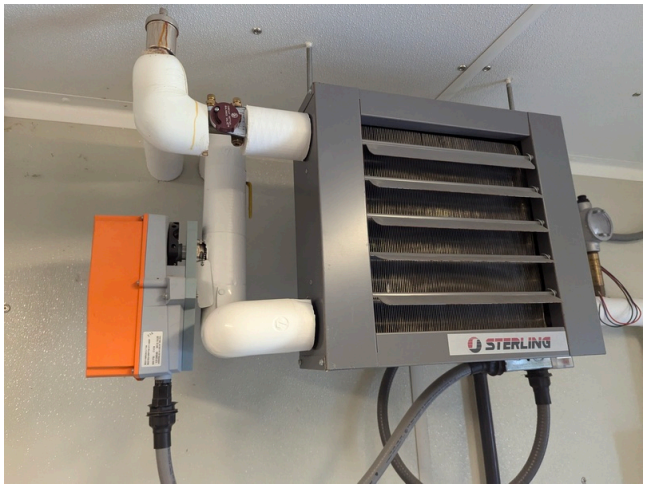
26. 226 Duck Brook Water Treatment Facility Interior Occupancy Sensor for Light Fixture

27. 226 Duck Brook Water Treatment Facility Exterior

28. 226 Duck Brook Water Treatment Facility Hydronic Unit Heater

29. 226 Duck Brook Water Treatment Facility Exterior

30. 226 Duck Brook Water Treatment Facility Refrigerator



31. 226 Duck Brook Water Treatment Facility Hot Water Unit Heater

APPENDIX B

SUPPORTING DOCUMENTATION

ABBREVIATIONS AND ACRONYMS

AC	Air Conditioning	**kBTU**	Kilo-British Thermal Unit
AEI	AEI Consultants	**kGal**	Kilogallons
ALTA	American Land Title Association	**kW**	Kilowatt
APN	Assessor's Parcel Number	**kWh**	Kilowatt hour
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers	**LED**	Light Emitting Diode
BTU	British Thermal Unit	**M**	Model
CH	Clubhouse	**MBH**	1,000 BTUs/hour
DHW	Domestic Hot Water	**O**	Occupied
ECM	Energy Conservation Measure	**OFC**	Office
EEM	Energy Efficiency Measures	**OSHA**	Occupational Safety and Health Administration
EUI	Energy Use Intensity	**PCA**	Property Condition Assessment
EUL	Estimated Useful Life	**PCR**	Property Condition Report
EWEM	Energy and Water Efficiency Measures	**ROI**	Return On Investment
F	Fahrenheit	**RP**	Responsible Party
FCU	Fan Coil Unit	**SEDI**	Statement of Energy Design Intent
Gal	Gallon	**SF**	Square Footage/Square Feet
GFA	Gross Floor Area	**SIR**	Savings to Investment Ratio
GPF	Gallons Per Flush	**SP**	Subject Property
GPM	Gallons Per Minute	**SEP**	Statement of Energy Performance
HUD	Department of Housing and Urban Development	**V**	Vacant
HVAC	Heating, Ventilation and Air Conditioning	**ZAR**	Zoning Analysis Report

ASHRAE Equipment Life Expectancy chart

ASHRAE is the industry organization that sets the standards and guidelines for most all HVAC-R equipment. For additional info about ASHRAE the website is www.ashrae.org .

Equipment Item	Median Years
Air conditioners	
Window unit	10
Residential single or Split	
Package	15
Commercial through-the wall	15
Water-cooled package	15
Heat Pumps	
Residential air-to-air	15
Commercial air-to-air	15
Commercial water-to-air	19
Roof-top air conditioners	
Single-zone	15
Multi-zone	15
Boilers, hot water (steam)	
Steel water-tube	24 (30)
Steel fire-tube	25 (25)
Cast iron	35 (30)
Electric	15
Burners	21
Furnaces	
Gas- or oil-fired	18
Unit heaters	
Gas or electric	13
Hot water or steam	20
Radiant Heaters	
Electric	10
Hot water or steam	25

Equipment Item	Median Years
Air terminals	
Diffusers, grilles, and registers	27
Induction and fan coil units	20
VAV and double-duct boxes	20
Air washers	17
Ductwork	30
Dampers	20
Fans	
Centrifugal	25
Axial	20
Propeller	15
Ventilating roof-mounted	20
Coils	
DX, water, or steam	20
Electric	15
Heat Exchangers	
Shell-and-tube	24
Reciprocating compressors	20
Packaged chillers	
Reciprocating	20
Centrifugal	23
Absorption	23
Cooling towers	
Galvanized metal	20
Wood	20
Ceramic	34

Equipment Item	Median Years
Air-cooled condensers	20
Evaporative condensers	20
Insulation	
Molded	20
Blanket	24
Pumps	
Base-mounted	20
Pipe-mounted	10
Sump and well	10
Condensate 15	
Reciprocating engines	20
Steam turbines	30
Electric motors	18
Motor starters	17
Electric transformers	30
Controls	
Pneumatic	20
Electric	16
Electronic	15
Valve actuators	
Hydraulic	15
Pneumatic	20
Self-contained	10

Property Heat Type	Heating Fuel	Average Input	Input Units	Efficiency	Efficiency Units	Quantity	Hrs/Year	Annual Consumption	HP kW/Ton
Electric Resistance Heater	Electricity	0.5	kW	1.00	COP	2	4,108	4,108 kWh	
Electric Resistance Heater	Electricity	0.5	kW	1.00	COP	1	4,108	2,054 kWh	
Mini-Split Heat Pump	Electricity	36,400	Btu/hr	9.00	HSPF2	1	6,162	17,825 kWh	0.95
Tankless Condensing Water Heater	Propane	138,000	Btu/hr	95%	TE	1	2,739	4,130 Gal Propane	
Electric Resistance Heater	Electricity	0.5	kW	1.00	COP	1	4,108	2,054 kWh	
Electric Resistance Heater	Electricity	0.5	kW	1.00	COP	1	4,108	2,054 kWh	
Dehumidifier	Electricity	1.5	kW	2.60	L/kWh	1	84	126 kWh	

Property Cooling Type	Heating Fuel	Average Input (kW)	Input Units	Efficiency	Efficiency Units	Quantity	Hrs/Year	Annual Consumption	DX kW/Ton
Mini-Split Heat Pump	Electricity	2.93	Tons	19.00	SEER2	1.00	2,602	6,387 kWh	0.84
DX AC Unit	Electricity	4,000	Btu/hr	8.17	Full-Load kW/Ton	1	1800	4,905 kWh	

APPENDIX C

EWEM CALCULATION WORKSHEETS

Integrate a Heat Pump Boiler into the existing propane boiler system and use propane boiler for backup heat when the outside air temperature is below 25°.		
Quantity of Existing Boilers	1	Each
Heating Hours	2,739	Hours
Existing Boiler Fuel	Propane	Gal
Total Energy Consumption of Existing Boiler	4,130	Gal
Total Energy Consumption of Existing Boiler	377,921	kBTU
Existing Boiler Cost	$7,430.39	
Existing Boiler Capacity	138,000	BTUH
Current Boiler Efficiency	95.0%	
Actual Heat Produced	3,924	Gal
New Boiler Efficiency	415.4%	
Energy Required to Produce Equivalent Heat with HP Boiler	86,425	kBTU
Energy Required to Produce Equivalent Heat with HP Boiler	25,329	kWh
# Hours backup heat is required	486	Hours
Proposed Backup Propane Consumption	733	Gal
Proposed Heat Pump Consumption	18,547	kWh
Energy Savings with High Eff Boiler	291,496	kBTU
Cost Per Gallon	$1.80	$$$/Gal
Cost Per kWh	$0.15	$$$/kWh
Annual Cost Savings	$3,337.87	Dollars
Number of Boiler(s) to Replace with High Efficiency:	2	Each
Capacity of Replacement High Efficiency Boiler(s):	72	BTUH
Total Cost to Replace w/ 4.2 COP Efficient Boiler	$24,422.00	Dollars
Payback to Replace if Boilers are Relatively New	7.32	Years

Lighting Audit

Area of Building	Exitsting Fixture	Total # Fixures	Bulbs Per Fixture	Total # of Bulbs	LED Equivalent Wattage	Current kWh Usage	kWh Usage w/ LED	kWh Saved Per Year	Cost Per kWh	Current Annual Op Cost	Annual Cost Using LEDs	Savings	Cost to Install Lighting	Pay back
Interior Ceiling Lights	4B 28W T5	4	4	16	18	3924	2523	1402	0.15	$587	$377	$210	$218	1.0
Lime and Fluoride Rooms Ceiling Lights	2B 28W T5	7	2	14	18	36	23	13	0.15	$5	$3	$2	$191	99.8
Chlorine Room Ceiling Lights	2B 28W T5	2	2	4	18	7	4	2	0.15	$1	$1	$0	$54	149.7
Upstairs Ceiling Lights	2B 32W 4' T8	15	2	30	11	2296	789	1507	0.15	$343	$118	$225	$259	1.1
Downstairs Ceiling Lights	2B 32W 4' T8	14	2	28	11	1910	657	1254	0.15	$286	$98	$187	$241	1.3
Exterior Lights	1B 25W LED	2	1	2	0	0	0	0	0.15	$0	$0	$0	$0	-
						8,174	**3,996**	**4,177**		**$ 1,222**	**$ 598**	**$ 625**	**$ 963**	**1.54**

APPENDIX D

EWEM PRODUCT BROCHURES

WEIL-McLAIN®
Solutions that Matter™

Air-to-Water Heat Pump

Eco™ Hybrid

Dual Fuel Hydronic System

Integrating an air-to-water heat pump within a boiler hydronic heating system

CLIMATE CONSCIOUS

Easier. Better. Smarter.

Weil-McLain understands the importance of simplicity and energy-efficiency for both homeowners and contractors. The ECO™ HP is designed to streamline installation, operation and serviceability, making it an ideal choice for heating needs.

The Most Efficient Solution for High-Temp Hydronic Heating Systems.

Climate Conscious Energy Efficiency
Our hybrid solution is up to five times more efficient than traditional boilers, providing significant energy savings and reducing environmental impact. Our heat pump uses state of the art, eco-friendly R32 refrigerant.

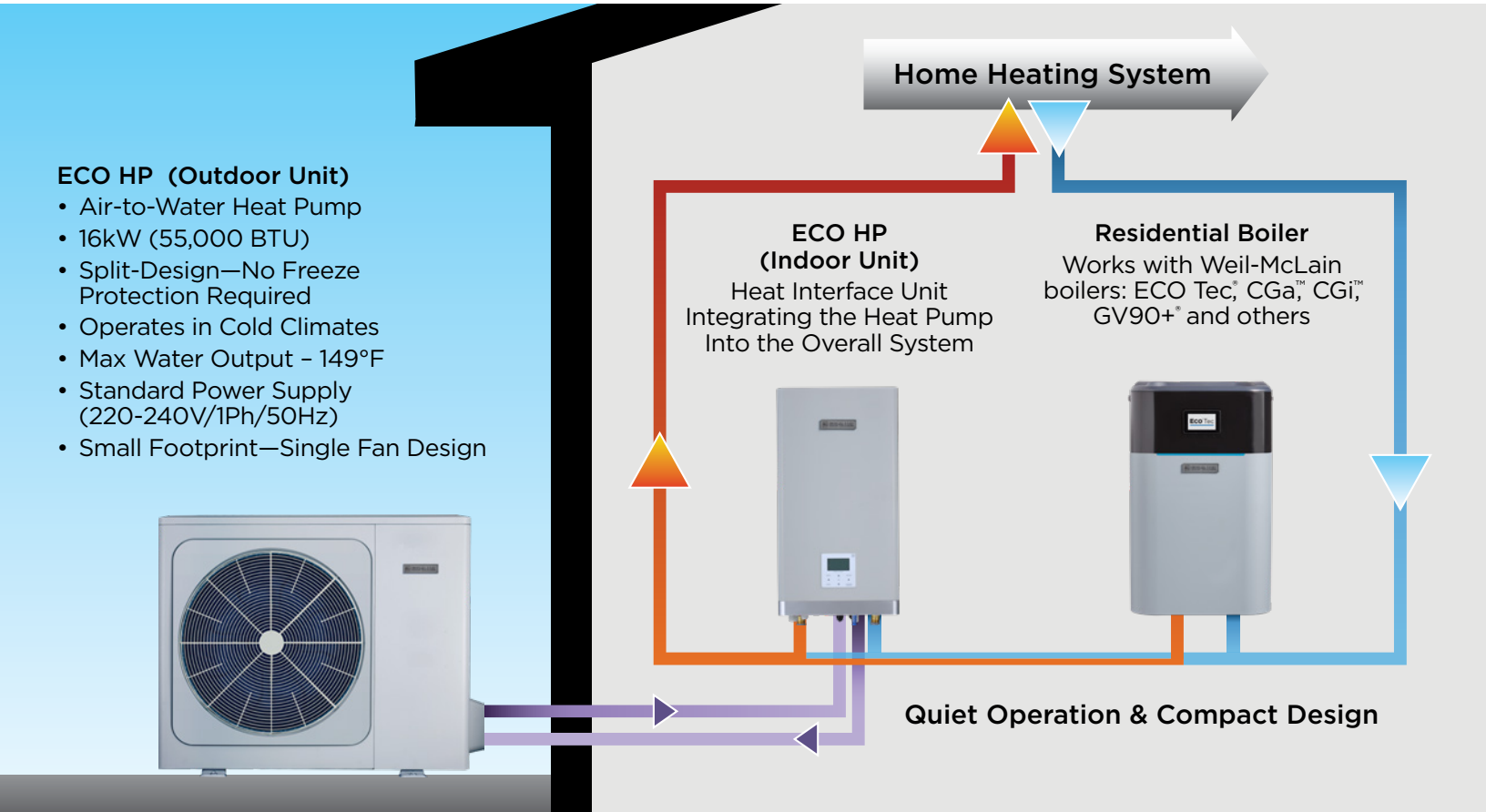
Consistent Comfort with Dual Fuel
Our ECO HP heat pump with boiler backup ensures homes remain warm even in the coldest climates. The heat pump operates during milder temperatures to maximize efficiency and carbon reduction, while seamlessly switching to the boiler as the always-ready backup heating source on the coldest days.

Dependable Heating Solution
Enjoy peace of mind with our reliable heating system that does not require freeze protection with our innovative split design, ensuring hassle-free maintenance and long-lasting performance. Operating as dual fuel and positioning the boiler as a backup, extends both appliance life expectancy.

Budget-Friendly Rebate Options
Offset equipment costs by taking advantage of federal, state and local rebate incentive programs.*

*Varies by location

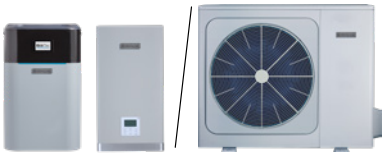
ECO HP (Outdoor Unit)
- Air-to-Water Heat Pump
- 16kW (55,000 BTU)
- Split-Design—No Freeze Protection Required
- Operates in Cold Climates
- Max Water Output – 149°F
- Standard Power Supply (220-240V/1Ph/50Hz)
- Small Footprint—Single Fan Design



Flexible Installation Options

All-at-Once Installation
If your current boiler fails at the end of cold season, you're in a location with mild winters, or setting up a new construction, the full Hybrid System can be installed together.

While an all-at-once installation will be a greater up-front cost, you will save on total labor costs for the complete installation.



Phased Installation
Most boilers are replaced when they stop working, often in the cold of winter. It is not always practical to install the outdoor heat pump during the winter.

The Hybrid System is designed to be installed in two phases. A heat-pump-ready boiler and the indoor heat pump unit installed now—restoring the heat, and followed by adding the outdoor heat pump later during the warmer months.

Retrofit Upgrade
If you already have a heat-pump-ready boiler, your system may be able to be retrofitted into the Hybrid System.

Contact a Weil-McLain authorized contractor to assess you current system and outline a plan for installing the indoor and outdoor heat pump units.

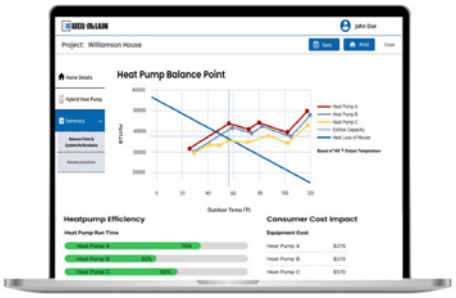
Key Advantages of the ECO™ HP Indoor Unit

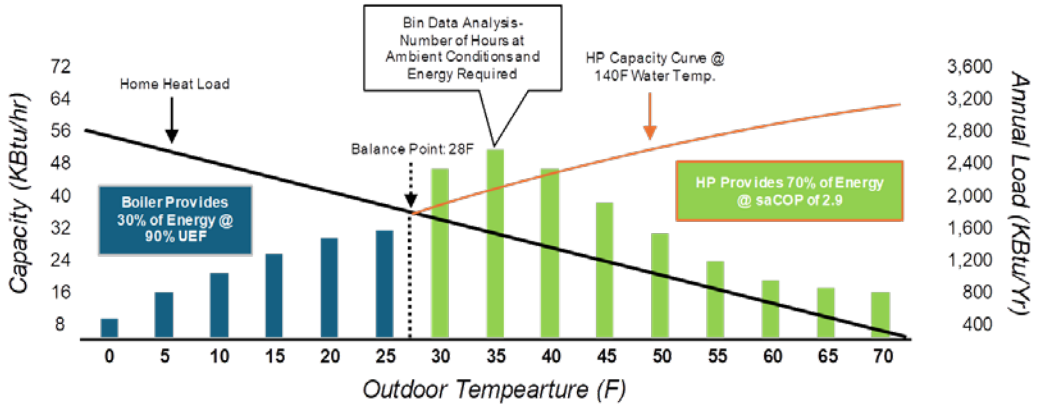
The ECO Indoor Unit features a refrigerant-to-water heat exchanger, circulator, and controls. Through an Easy-Up manifold, the unit seamlessly integrates the heat pump into the existing heating system significantly reducing installation time, labor, and the need for additional parts. For routine maintenance, the manifold features shut-off valves that allow for quick isolation of the boiler and circulator for the system.

ECO Calc Application Sizing Tool

To ensure the comfort, efficiency, and durability benefits of the Hybrid System—the application must be properly sized. Weil-McLain has created the ECO Calc Application Sizing Tool, an industry-first tool to guarantee the correct sizing incorporating:

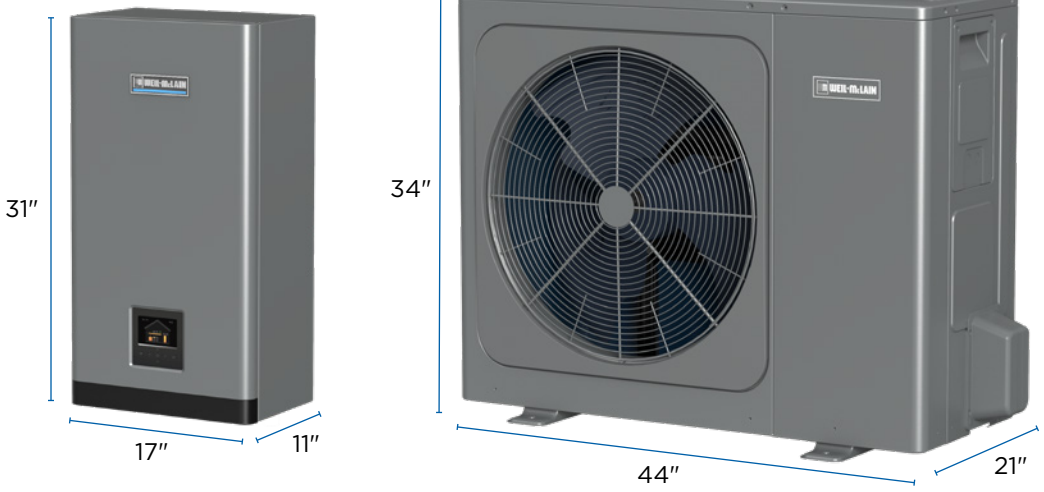
- Manual J (Heat Load)
- Heat Pump Capacity
- Heat Emitter Capacity
- DHW Consideration
- Localized Weather "Bin" Data
- Localized Utility Rates
- Rebates & Tax Credits





Hybrid Dual Fuel Operating View

Dimensions



Specifications

Spec	Model	Description	Measure	Value (range)
Heating*	41	Capacity	MBH	19.04–41.29
		Efficiency	COP	4.96–5.37
		Power Input	kW	1.04–2.44
		Current Input	Amps	4.33–25
		Delivery Temp	Deg °F	77–149
		Outdoor Temp	Deg °F	-13–109.4
	48	Capacity	MBH	20.2–49.48
		Efficiency	COP	4.60–5.29
		Power Input	kW	1.12–3.15
		Current Input	Amps	4.67–26
		Delivery Temp	Deg°F	77–149
		Outdoor Temp	Deg°F	-13–109.4
	55	Capacity	MBH	21.94–54.25
		Efficiency	COP	4.50–5.06
		Power Input	kW	1.27–3.53
		Current Input	Amps	5.29–27
		Delivery Temp	Deg °F	77–149
		Outdoor Temp	Deg °F	-13–109.4

Spec	Description	Measure	Value (range)
Refrigerant	Type	R-32	
	Charge	LBS	4.04
	Pressure Low Side	PSIG	377.1
	Pressure High Side	PSIG	623.6
Fan	Type	Brushless DC	
	Quantity	1	
	Input	W	170
	Speed	RPM	200-730
Compressor	Type	Rotary	
	Quantity	1	
	Speed	RPS	24 - 92
Hydronic	Flow	GPM	12.1
	Max Temp	Deg°F	149
	Piping Conn.	Inch	1
	Pressure Drop @ 12.1 gpm	PSI	3.9

Spec		Description	Measure	Value (range)
Electrical	ODU	Power	V/Ph/Hz	208–230/1/60
		Fan Motor	A	1.3
		Compressor	A	26
		MCA 41/48/55	A	25/26/27
		MOPD	A	30
		SCCR	kA	5
	IDU	Power	V/Ph/Hz	110-120/1/60
		MCA	A	1.5
		MOPD	A	15
Weight	IDU	IDU Net	LBS	69
		IDU Shipping	LBS	78
	ODU	ODU Net	LBS	212
		ODU Shipping	LBS	255

*Outdoor temperature at 44.8°F, water outlet temperature 95°F

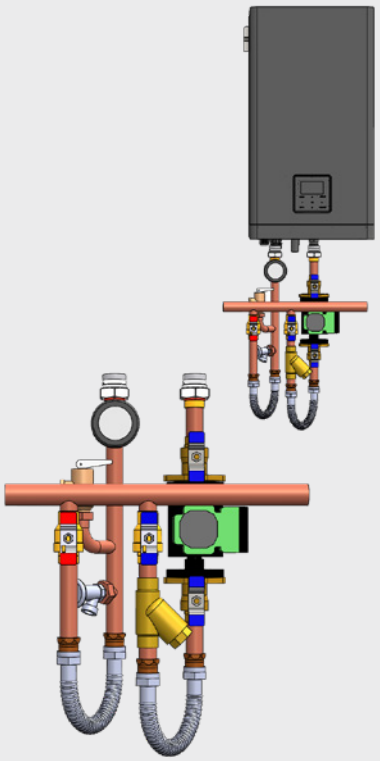
ECO HP—Split Easy Up Manifold

Items included on Easy Up Manifold:

- Dielectric unions
- Isolation valves
- Y-strainer
- Stainless steel flex lines
- Plugged port for drain valve

Items included in installation Accessory kit:

- Taco 0018e circulator
- Pressure relief valve
- Pressure & temperature gauge



Product Warranty

Outdoor Unit (ODU)
& Indoor Unit (IDU)

- 5 years on ODU Compressor
- 2 years on Parts without registration
  *Or **5 years on Parts with registration***

Non-Transferable, Non-Prorated

Our Brand Promise

For over 140 years, Weil-McLain has been a trusted leader in innovative heating solutions. Our commitment to reliability and a consultative approach is unwavering. With Weil-McLain, customers receive more than just a product; they receive a premium, experienced, and trusted brand dedicated to meeting their heating needs.

Experience the future of heating with Weil-McLain's Hybrid Dual Fuel Solution. Contact us today to learn more about how we can elevate home comfort systems while reducing environmental impact.

WHP125R
Commercial Heat Pump Water Heating Systems

WATER SOURCE HEAT PUMP

c LC US

DESIGNED ★ ENGINEERED ★ ASSEMBLED
USA

Lochinvar®

WHP125R

Specifications

Operating Conditions	Model Number	WHP125R
	Recovery Rate [1]	233 Gal/hr
	Nominal DOE Capacity	137,160 BTU/h
	Nominal DOE Performance	4.4 COP
	Compressor Type	Scroll
	Refrigerant	R513A
	Factory Charge	14 lbs.
	Max Water Temperature	160° F
	Source Water Range	35° F - 120° F
	Min Ambient Exposure	33° F
	Max Working Water Pressure	150 psig (DHW); 300 psig (Source)

Multi-Pass Unit Sizing	DHW & Source Water Connections	1 ½" FPT Copper
	DHW Water Flow Rate	20 GPM
	DHW Pressure Drop [2]	8.4 ft Head
	DHW Water Circuit Cv Value [2]	11.0
	Source Water Flow Rate	23 GPM
	Source Water Circuit Pressure Drop	13.9 ft Head
	Source Water Circuit Cv Value	9.0
	External Head Pressure Allowed by Unit [3]	13.4 ft Head
	Min Cold Cycle Volume [5]	61 Gal.
	Min. Warm Cycle Volume [6]	171 Gal.
	Min. Tank Recovery [7]	427 Gal.

Single-Pass Unit Sizing	DHW & Source Water Connections	1½" FPT Copper
	DHW Design Flow Rate	12.0 GPM
	DHW Water Circuit Pressure Drop [2]	7.1 ft Head
	DHW Water Circuit Cv Value [2]	7.0
	Source Water Flow Rate	23 GPM
	Source Water Circuit Pressure Drop	13.9 ft Head
	Source Water Circuit Cv Value	9.0 ft Head
	External Head Pressure Allowed by Unit [3]	9.7 ft Head
	Min Cold Cycle Volume [5]	61 Gal.

Unit Specifications	Dry Weight	649 lbs
	Operating Weight	667 lbs
	Sound Pressure [4]	63.9 dB Front; 66.8 dB Left; 65.9 dB Right; 65.7 dB Rear
	Dimensions (L x W x H)	52" x 31" x 40"

Power Requirements	Voltage	Compressor LRA	RLA	Wire and Disconnect Sizing	
				MCA	MOCP
	208-230/3/60	300	52.0	64	110
	440-480/3/60	150	25.0	30	50

Performance Data

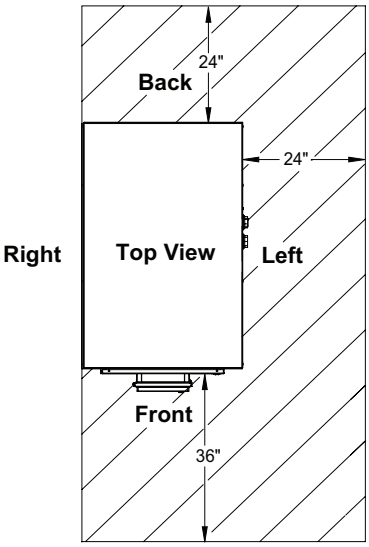
Performance Test Conditions: 50 EWT, 140 LWT, 100% Water Source Side

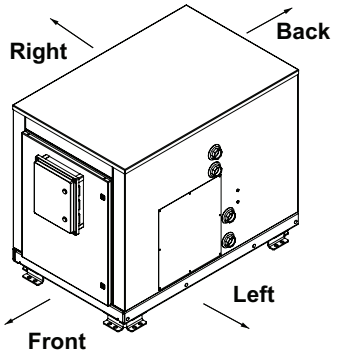
Entering Source Water Temp(˚F)	Supply Heating Capacity (Btu/hr)	Source Cooling Capacity (Btu/hr)	Power Input (kW)	Heating COP	Cooling COP	Combined COP
90A°F	143,600	108,456	10.3	4.1	3.1	7.2
80A°F	129,000	93,515	10.4	3.6	2.6	6.3
70A°F	114,400	78,574	10.5	3.2	2.2	5.4
60A°F	99,700	64,898	10.2	2.9	1.9	4.7
50A°F	85,000	51,221	9.9	2.5	1.5	4
40A°F	77,200	45,468	9.3	2.4	1.4	3.9

In view of ongoing product improvements, design and specification are subject to change without notice. Lochinvar Water Heating Systems can accept no responsibility for possible errors in catalogs, brochures or any other printed material.

Dimensions

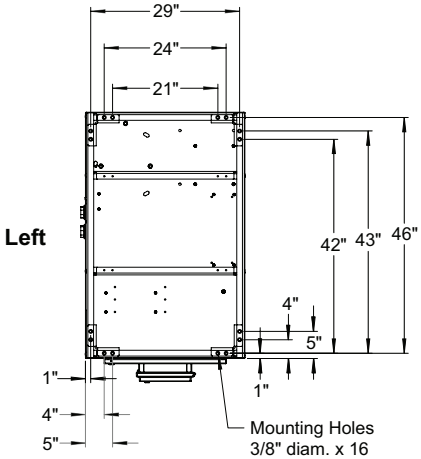
Clearances



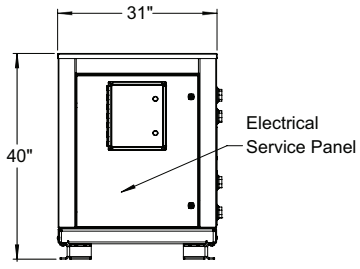


R513A Unit

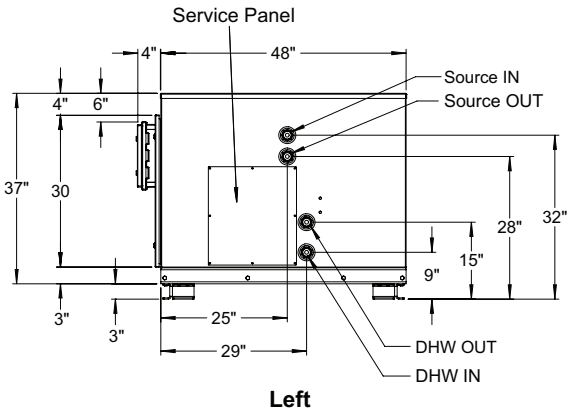
Anchor Locations



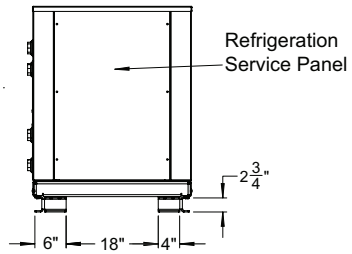
Bottom



Front



Left



Back

Notes:Certified to UL60335-1, UL60335-2-40, CSA C22.2 60335-1, CSA 60335-2-40 (LC16116-1)
1. Recovery Rate at 80 Deg F source 100% water, DHW 50 EWT 140LWT
2 Water Circuit Pressure Drop and Heat Pump Cv value apply to external pump applications.
3 Pressure drop allowed by internal circulator for external piping, at design flow rate.
4 Sound Pressure recorded 3' from unit face, 3' from ground.
5 Cold Cycle volume is the volume below the cold trigger sensor. Cold in water over 70 Deg F will need more volume.
6 Warm Cycle volume is the volume of water below the warm/recirc trigger sensor.
7 Tank volume is based on individual project demands, but cannot be lower than minimum value. Contact factory for sizing.

Legend
LRA: Locked Rotor Amps
RLA: Rated Load Amps
MCA: Maximum Current Ampacity (used for wire sizing)
MOCP: Minimum Overcurrent Protection (minimum disconnect size to be used)

Lochinvar, LLC
300 Maddox Simpson Parkway
Lebanon, Tennessee 37090
P: 615.889.8900 / F: 615.547.1000
Lochinvar.com

ELECTRO INDUSTRIES

North America's Leader in ELECTRIC HEATING TECHNOLOGY

THE FUTURE OF HEATING IS

NORAIRE

AIR TO WATER HEAT PUMP SYSTEM

COOLING WITH CHILLED WATER

C ETL US LISTED Intertek

H

+

NORAIRE HEAT & COOL + CONDENSING UNIT
(sold separately)

NORAIRE®
Air To Water Heat Pump System

At 200-300% efficient, the NorAire Air Source Heat Pump Boiler is one of the most economical ways to supply heated water to your radiant floor heat system and chilled water to a forced air system with one unit.

Call Today
800.922.4138
FAX: 763.295.4434

2150 West River St.
Monticello, MN 55362
sales@electromn.com

www.electromn.com

APPLICATIONS

Basements | Slab on Grade | Garages | Warehouses

Air source heat pumps have the ability to take advantage of free outside energy in the air, and bring it inside to heat and cool your home. Using the refrigerant vapor cycle, the NorAire system transfers the outside energy to water, which is efficiently distributed throughout your radiant floor heating systems.

The NorAire utilizes the "split refrigerant" process. The free energy from the outside air is transferred into refrigerant at the outdoor condenser. Using the refrigerant vapor cycle, the refrigerant becomes a high pressure gas which is easily moved to the inside of your home. A coaxial heat exchanger within the boiler cabinet continues the process by receiving the high pressure gas and exchanging its energy with the water circulating throughout your hydronic system.

With very little energy "wasted" in the process of capturing and transferring the energy to your floors, the NorAire system will yield an average annual operating efficiency of over 200%. This is over twice the efficiency of any fossil fuel boiler system. Achieve efficiencies close to a geothermal system without the expensive geothermal installation costs. This level of efficiency, combined with a competitive electric rate, gives you a clean, safe, and economical choice for your home's heating system.

Energy rebates may apply - please contact your utitlity provider for details.

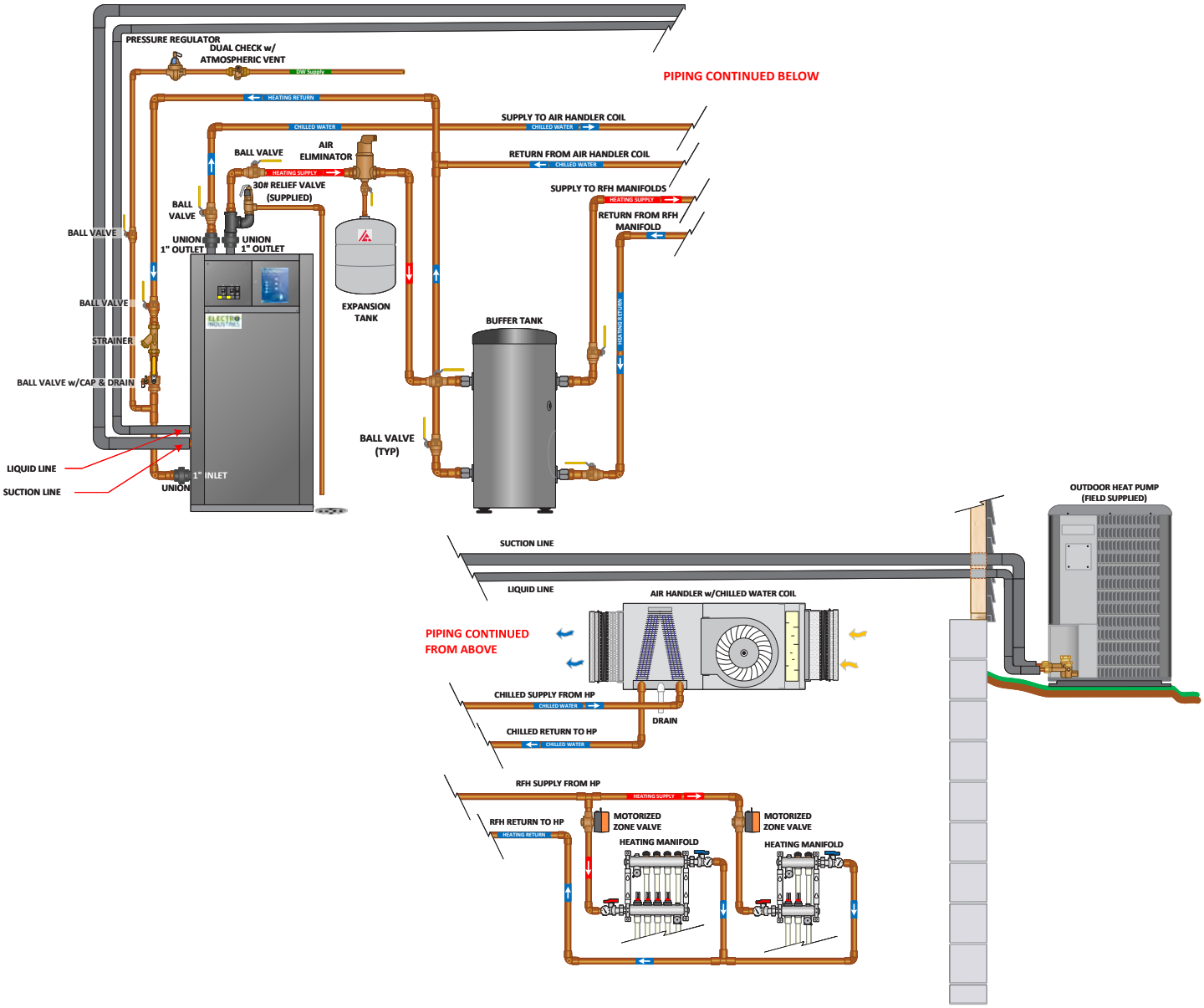
FEATURES

- Easy installation for the trained professional
- WarmFlo® temperature control, monitors and anticipates the BTU needs of your home
- Optional built-in electric boiler backup for really cold days
- Compatible with most major heat pump brands
- Coaxial heat exchanger for highly efficient heat transfer from refrigerant to water

APPLICATIONS

- Primary heat source for your home, garage, or workshop with fan coil cooling
- Warehouses
- Patio homes
- Net Zero and Passive homes

PIPING DIAGRAM



SPECIFICATIONS

Model	Volts/Phase	Tonnage	Auxiliary Electro Boiler kW	Btu/h Output	Total Amps
NC-FE-036-1-CPXX1-XX	208-240/1	3-ton	None	34,000	3
NC-FE-036-1-CPXX1-10	208-240/1	3-ton	10	34,000	45
NC-FE-048-1-CPXX1-XX	208-240/1	4-ton	None	48,000	4
NC-FE-048-1-CPXX1-10	208-240/1	4-ton	10	48,000	46
NC-FE-048-1-CPXX1-15	208-240/1	4-ton	15	48,000	67
NC-FE-060-1-CPXX1-XX	208-240/1	5-ton	None	57,000	5
NC-FE-060-1-CPXX1-15	208-240/1	5-ton	15	57,000	68
NC-FE-060-1-CPXX1-20	208-240/1	5-ton	20	57,000	89

*Request document NL207 for complete specifications.

ELECTRO INDUSTRIES

NORAIRE

AIR TO WATER HEAT PUMP SYSTEM IS THE FUTURE OF HEATING AND COOLING

To locate a contractor or distributor in your area, visit our website and click on Dealer Finder.

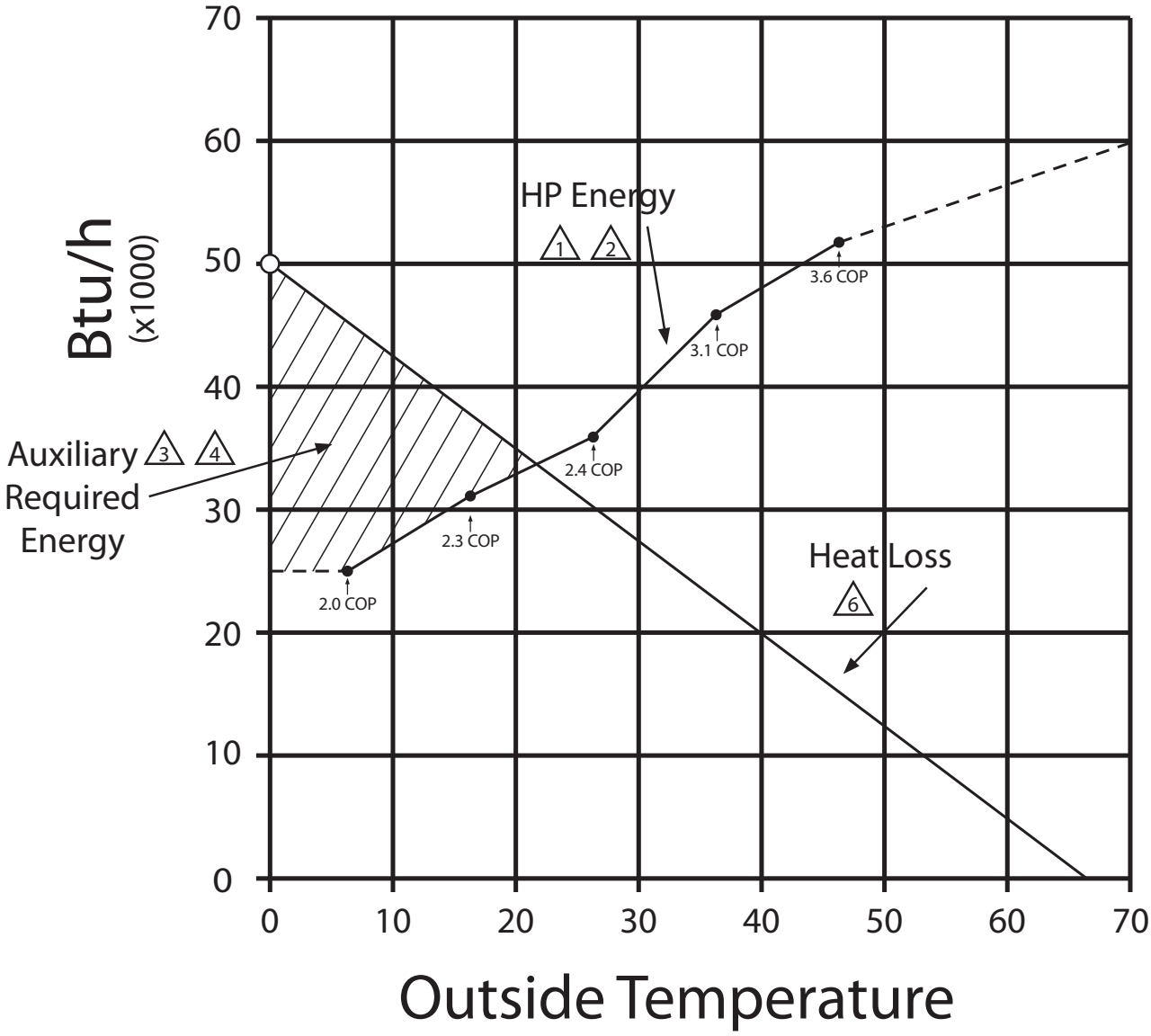
ELECTRO INDUSTRIES

Call Today
800.922.4138
FAX: 763.295.4434

2150 West River St.
Monticello, MN 55362
sales@electromn.com

www.electromn.com

Rev 05/07/2024 - NL202



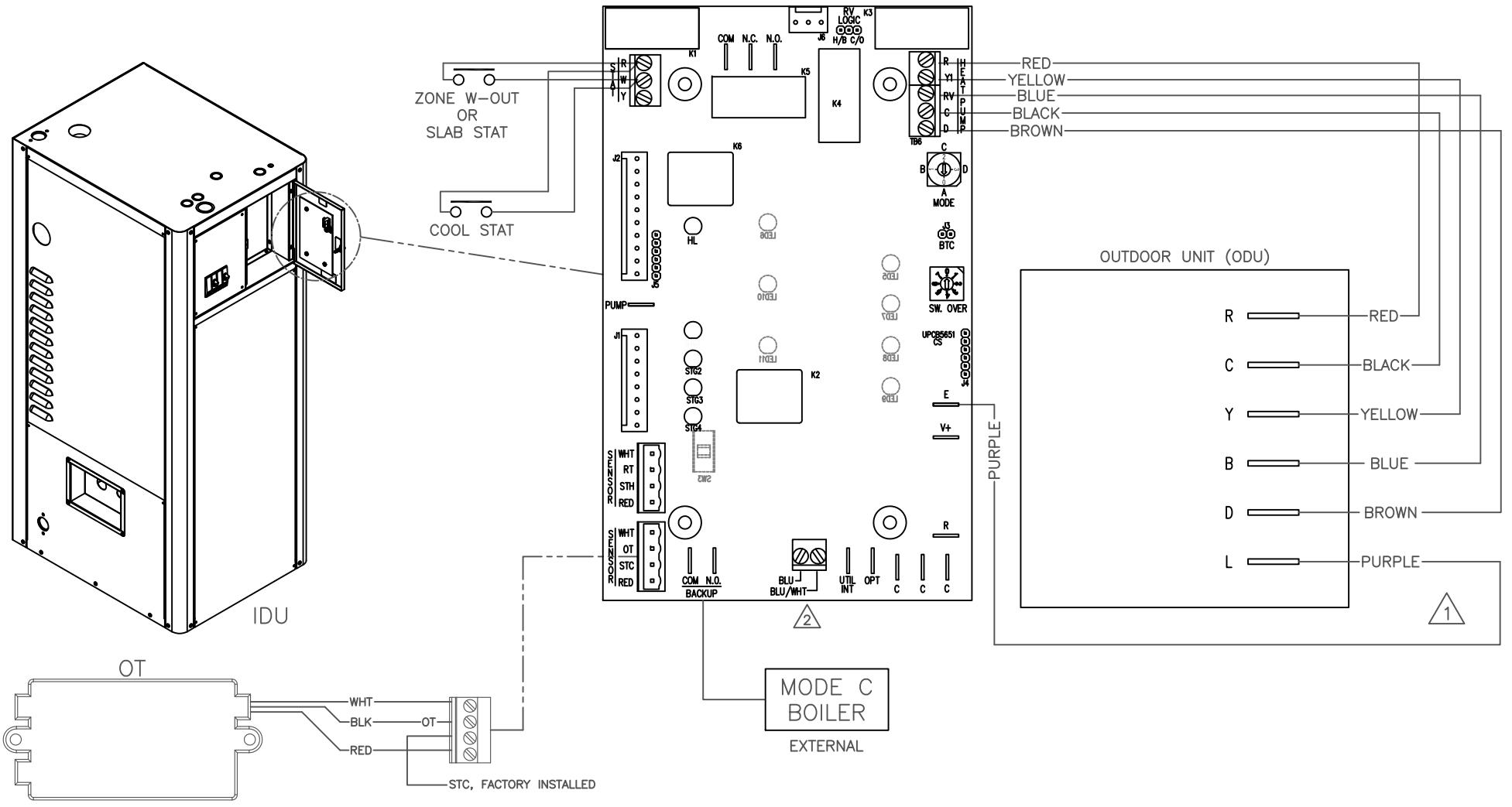
NorAire® 5-Ton, EI ODU Series

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).

ART-338 2.0

NORAIRE BASIC SYSTEM HOOKUP
V2.0*

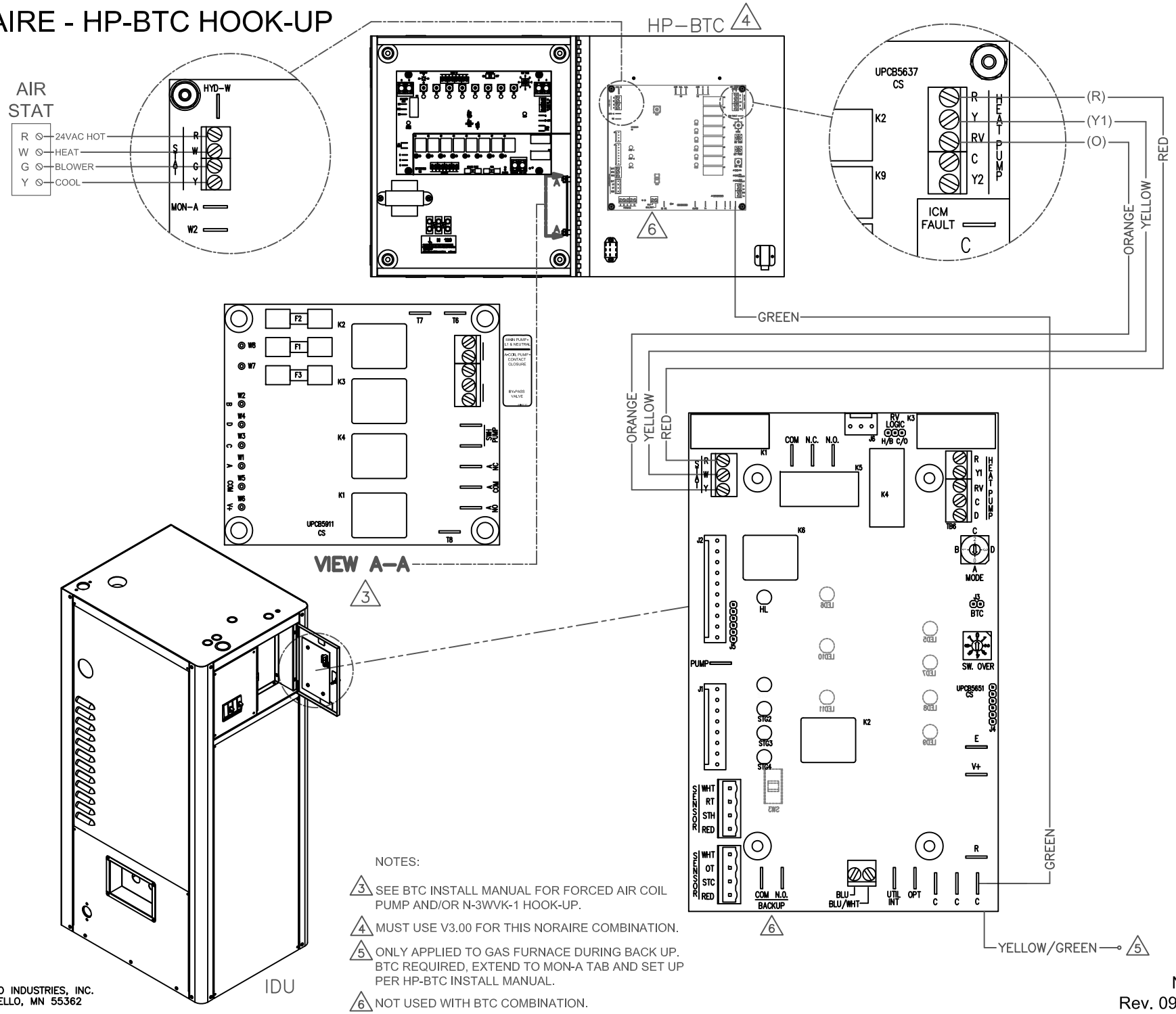


NOTES:

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, UTLITY CONTROL CONNECTION

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

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



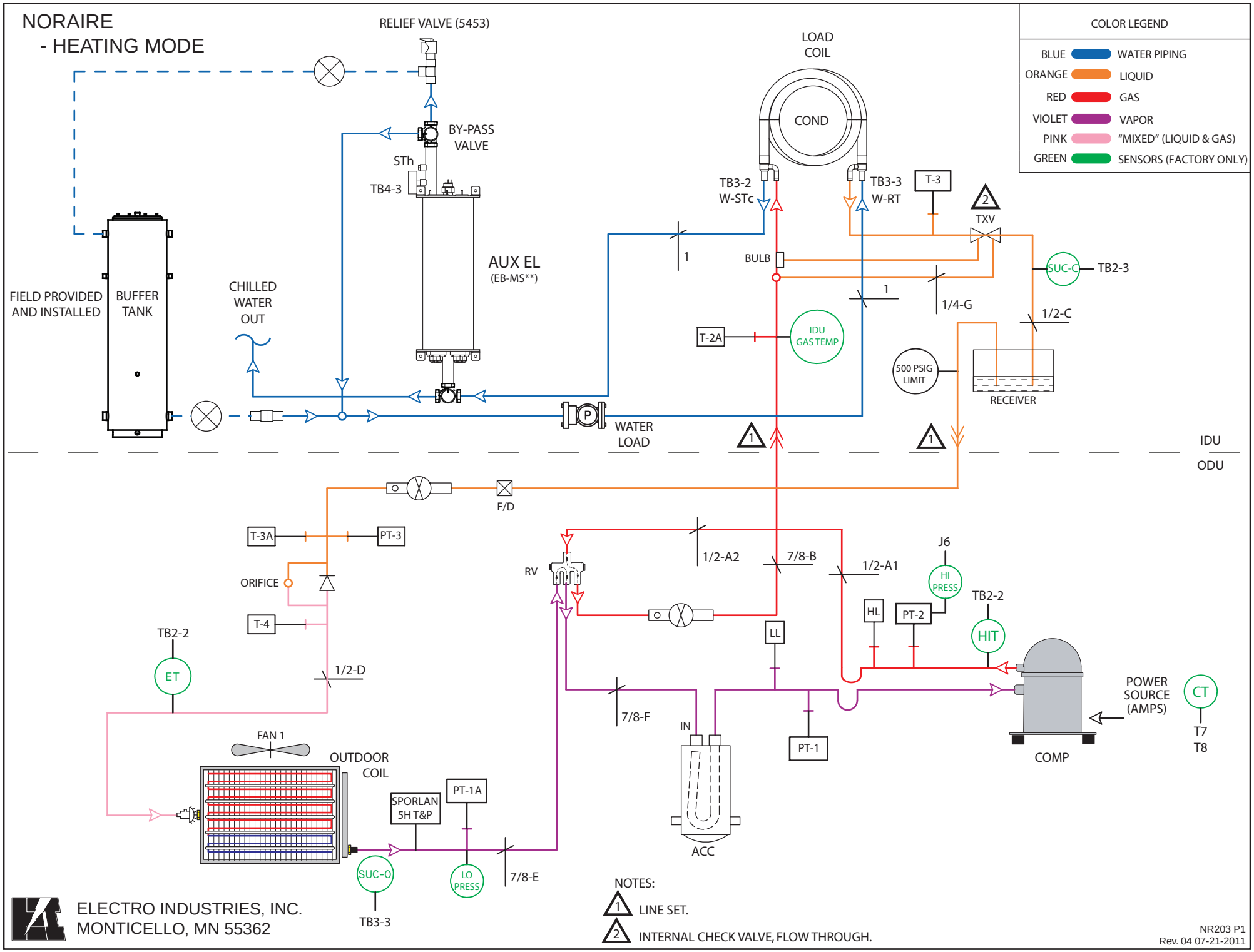
NOTES:

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.

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

NH205 P2
Rev. 09 5-8-2012

NORAIRE
- HEATING MODE



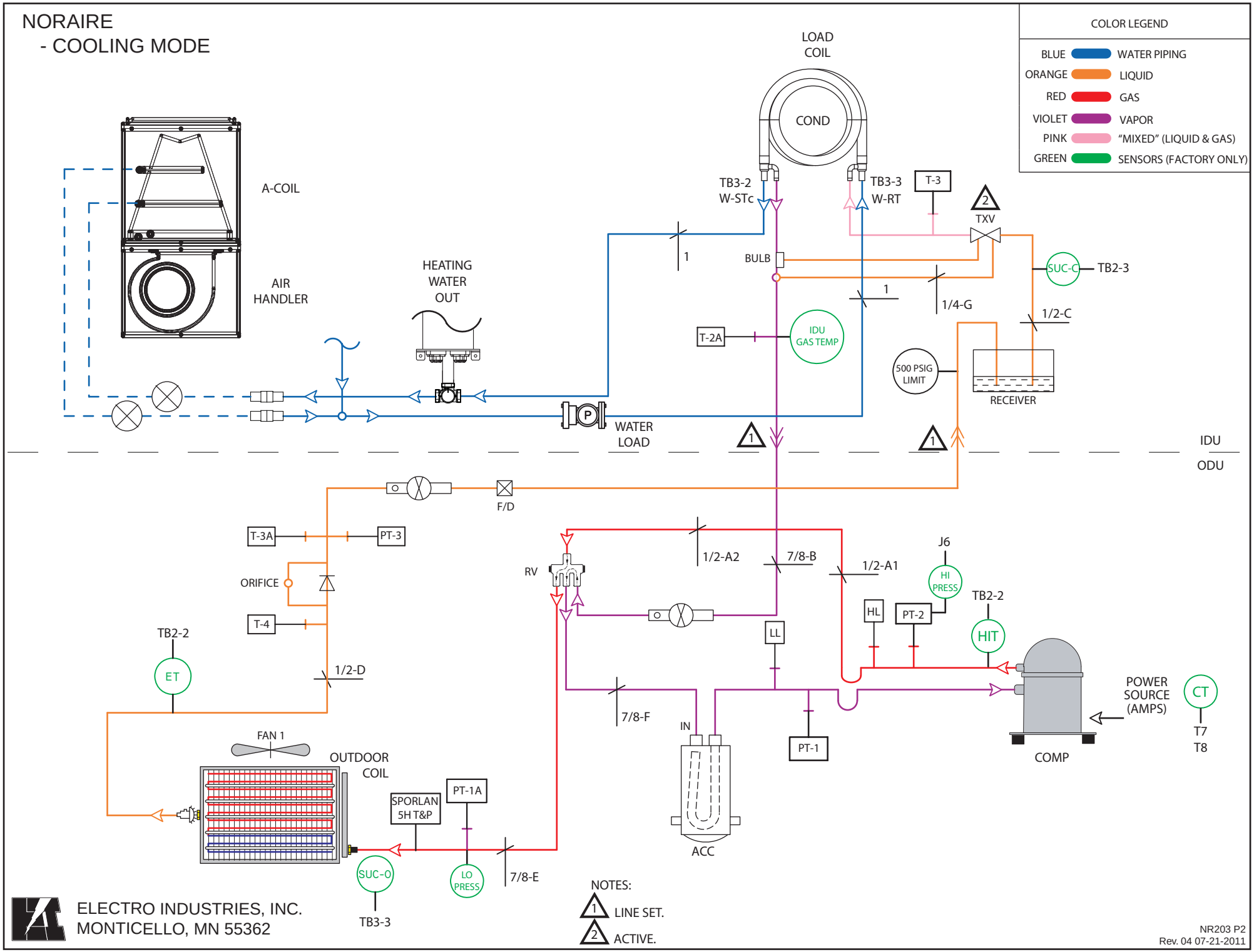
NOTES:

1. LINE SET.
2. INTERNAL CHECK VALVE, FLOW THROUGH.

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

NR203 P1
Rev. 04 07-21-2011

NORAIRE
- COOLING MODE



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

ELECTRO INDUSTRIES
Monticello, Minnesota
800.922.4138
www.electromn.com

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.

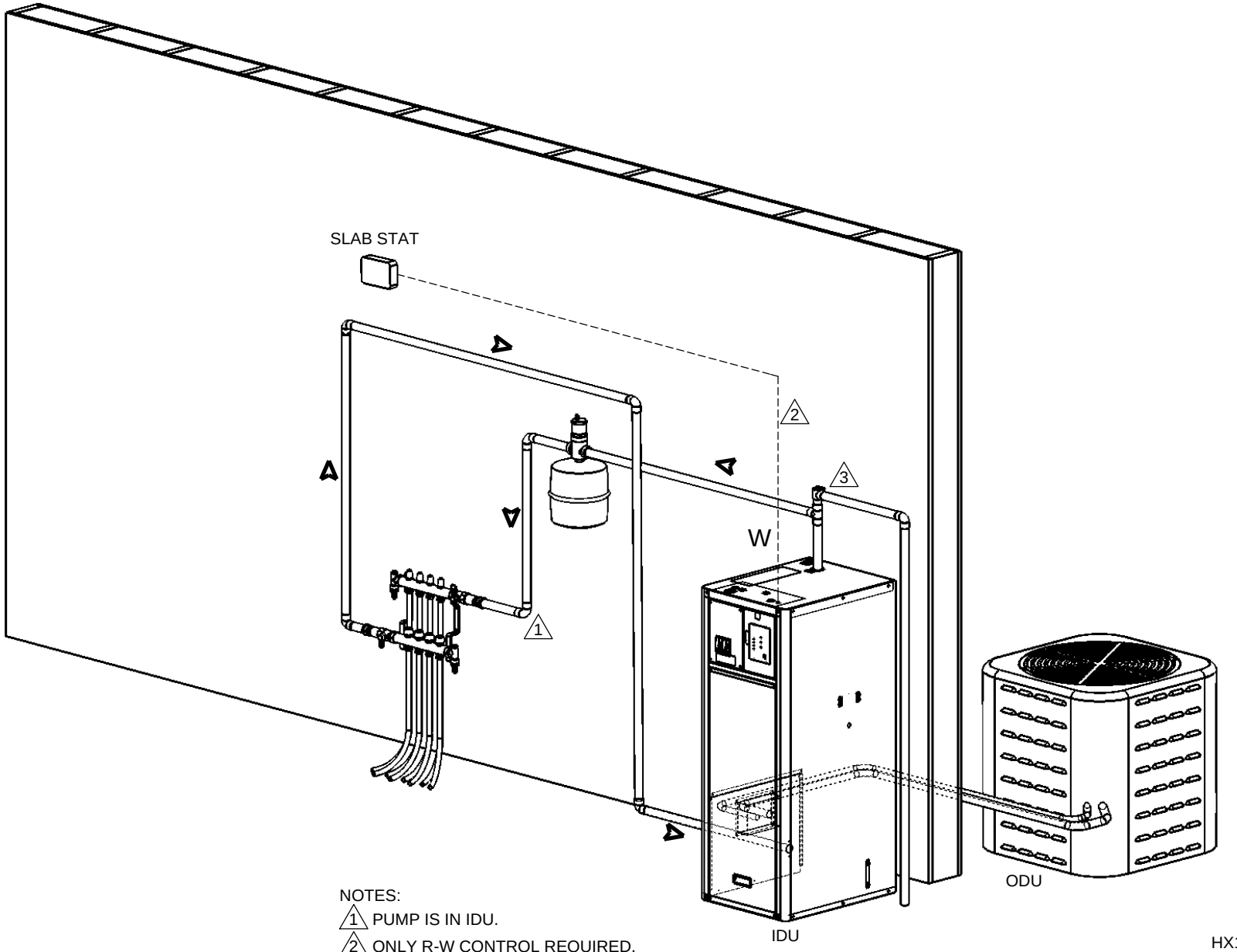
ELECTRO INDUSTRIES
Monticello, Minnesota
800.922.4138
www.electromn.com

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.



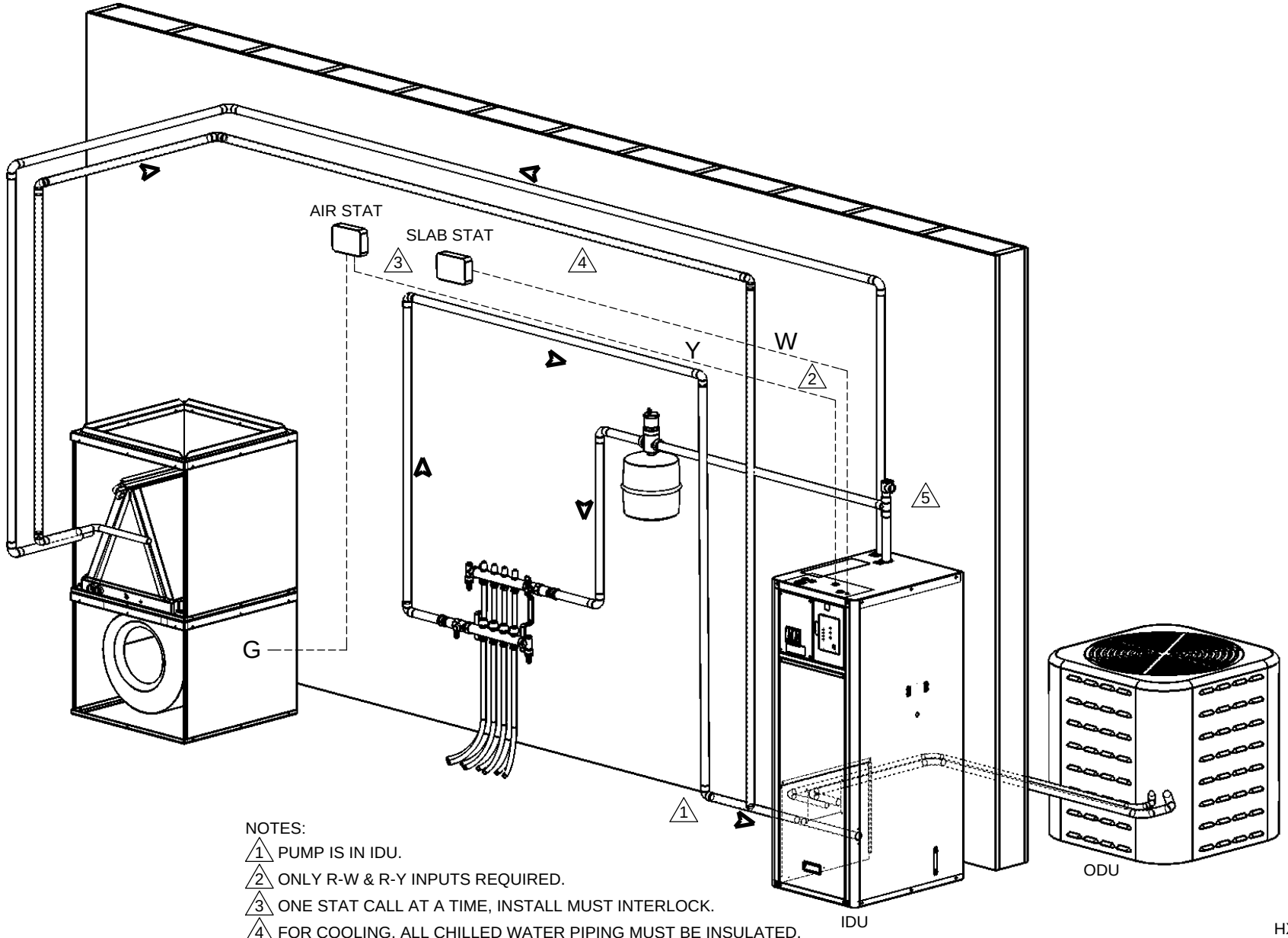
NOTES:

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

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

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

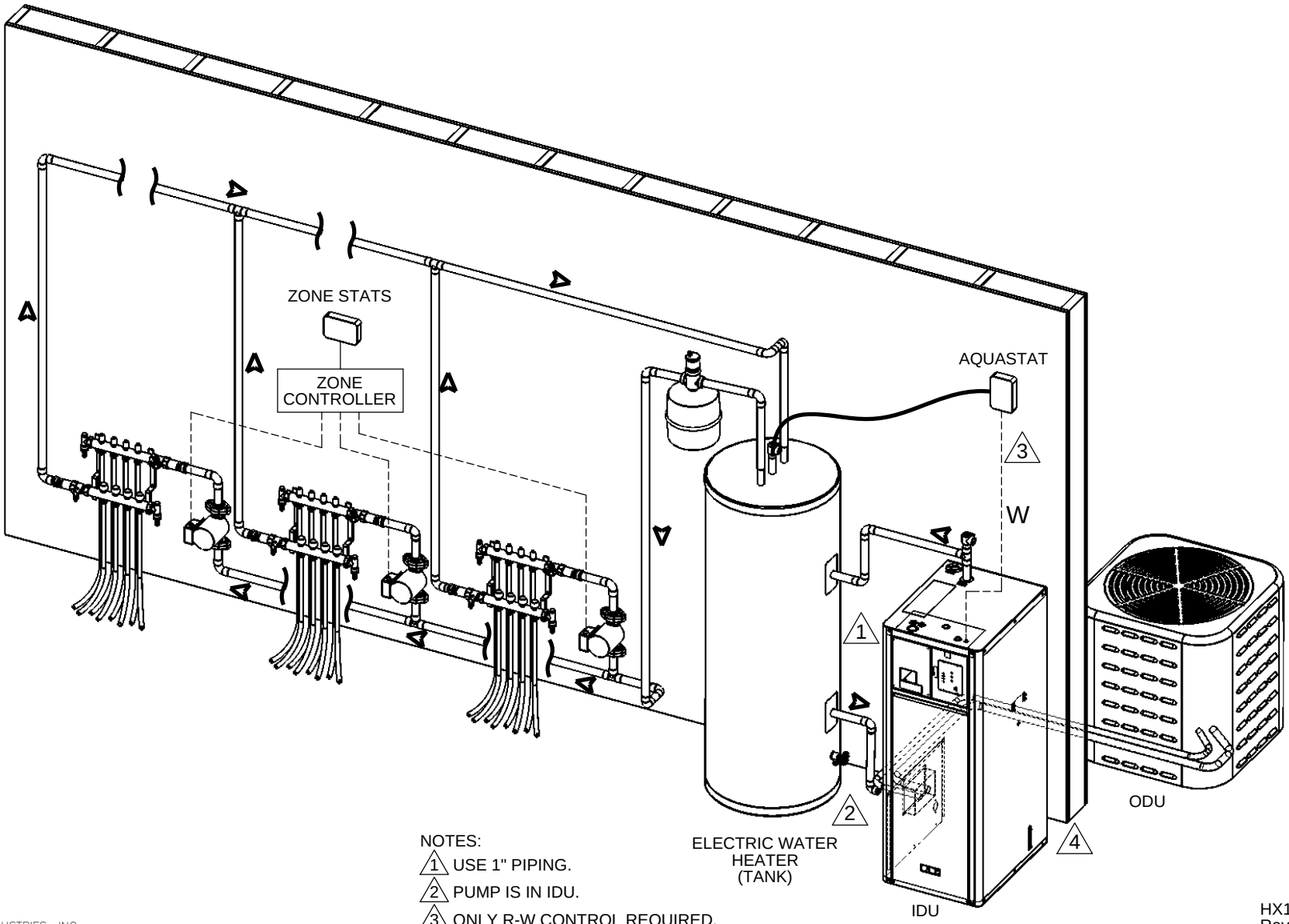


NOTES:

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.

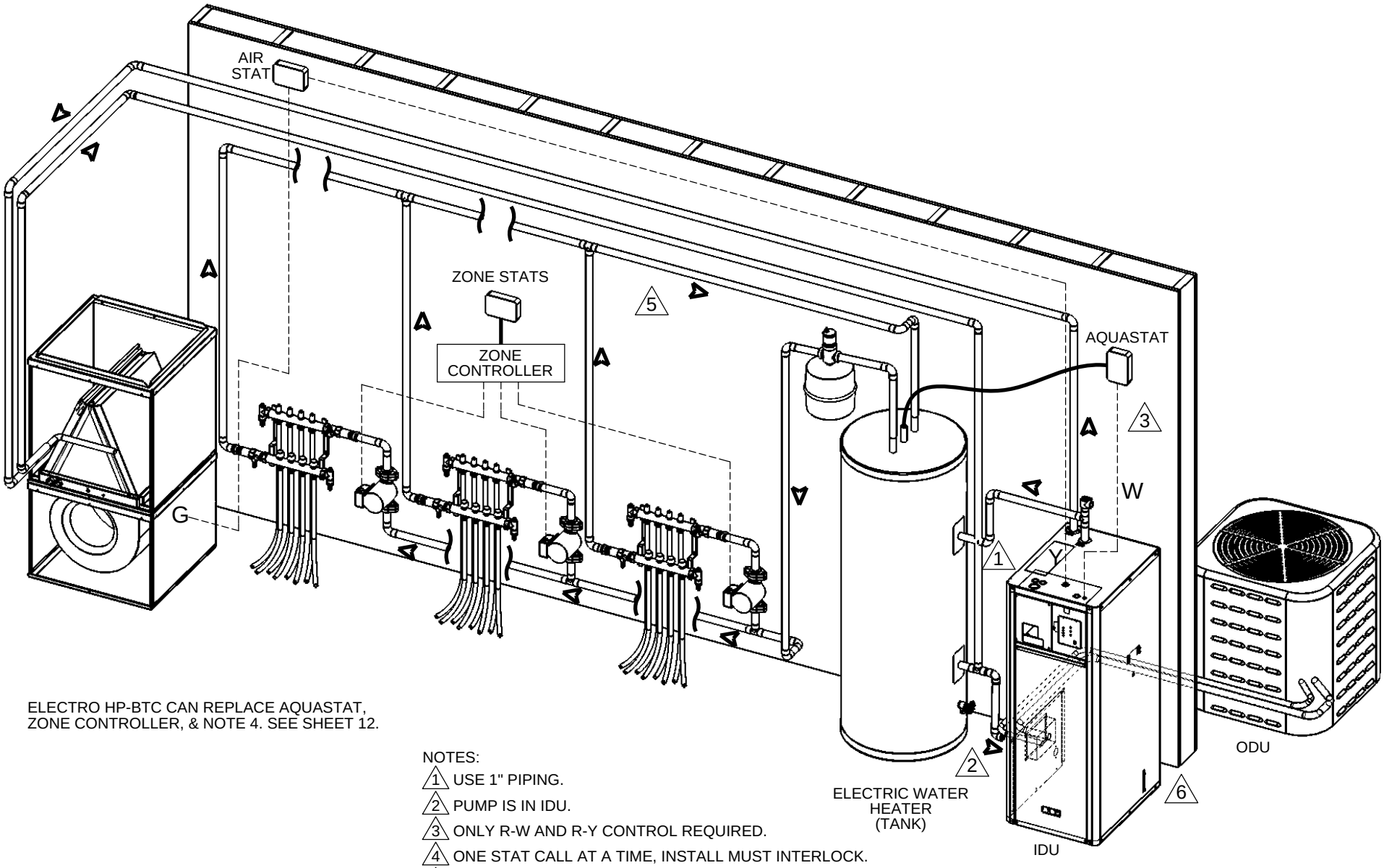


NOTES:

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 BTUh 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.

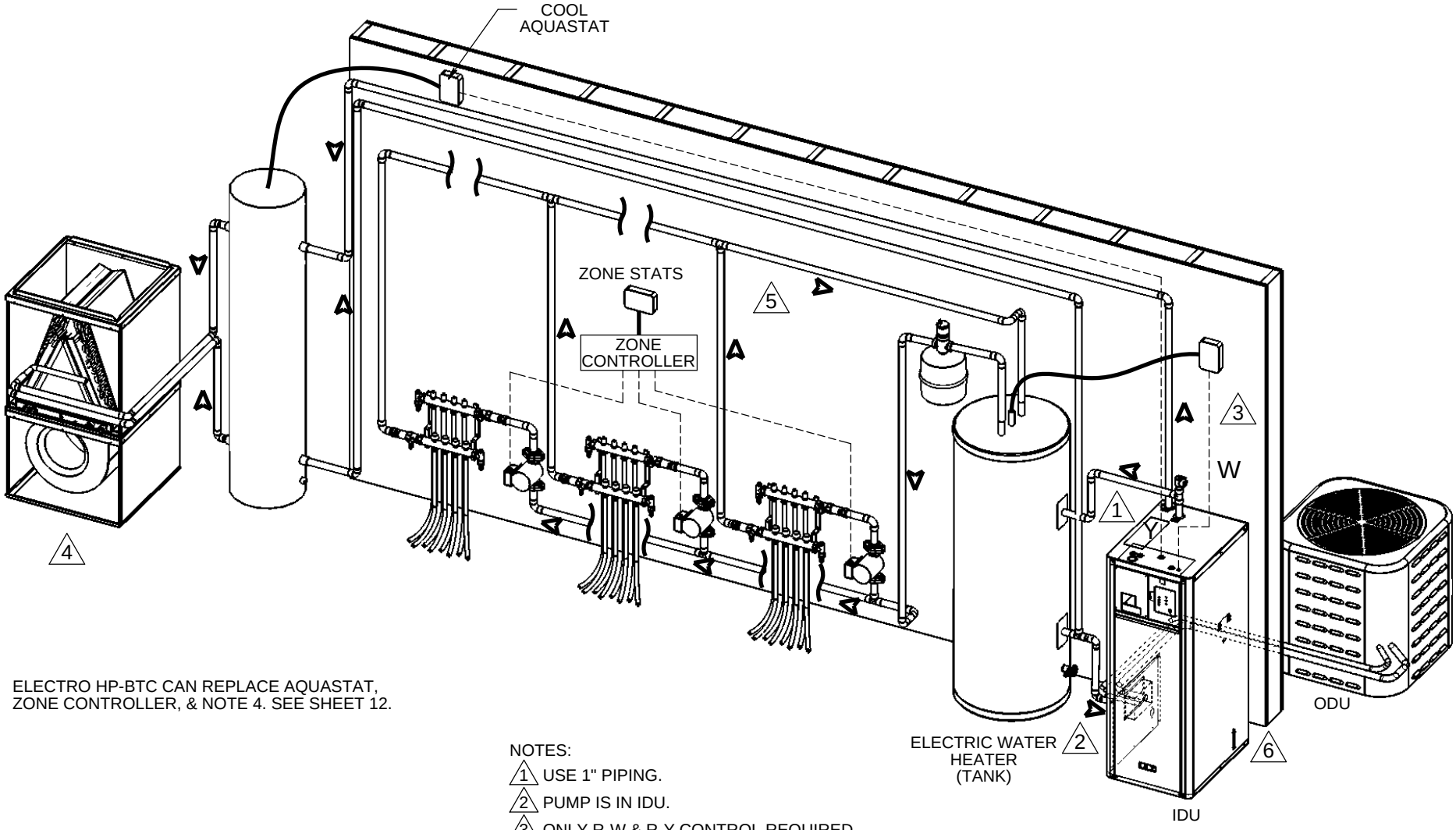
NOTES:

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.

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

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.

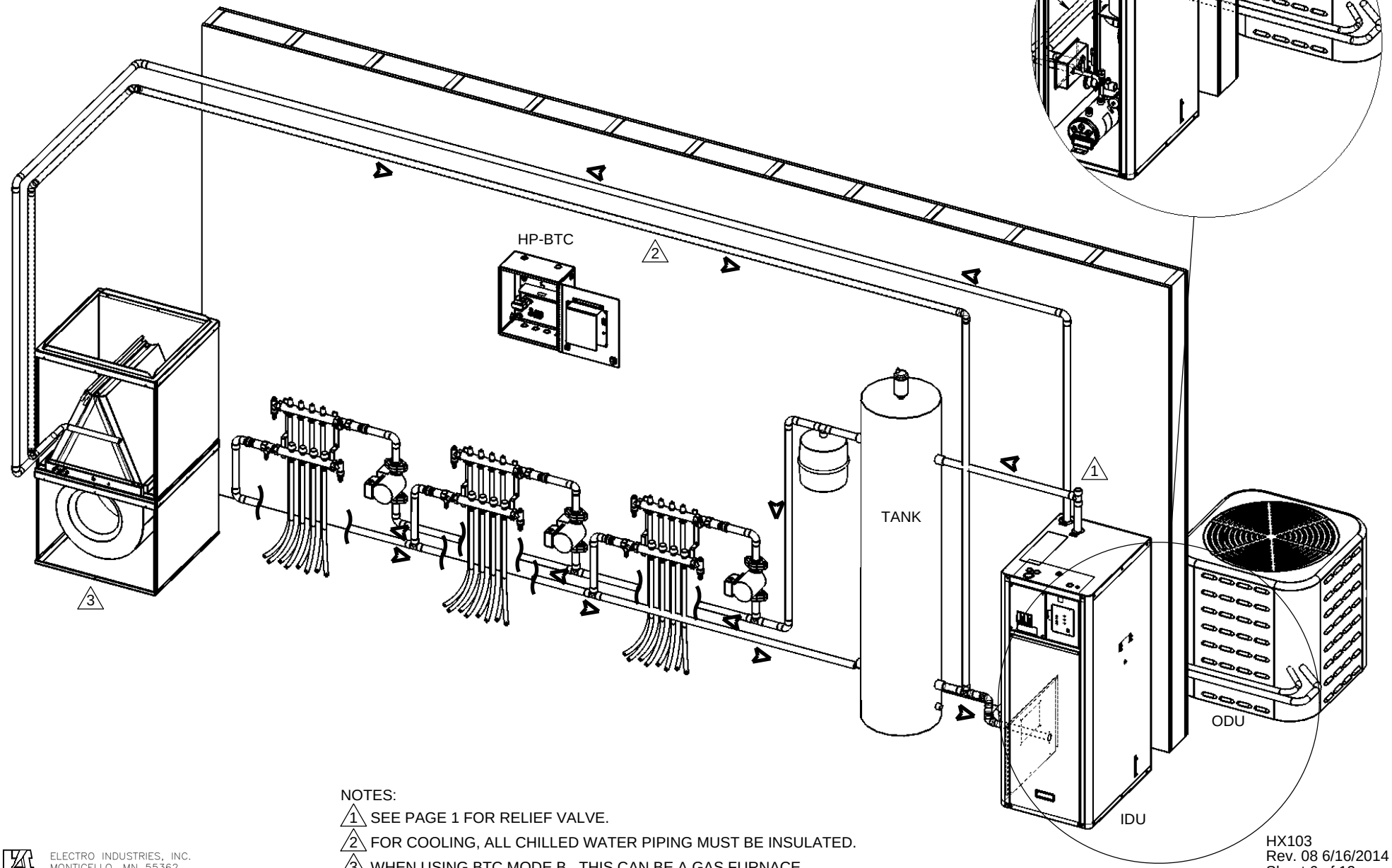
NOTES:

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.

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

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

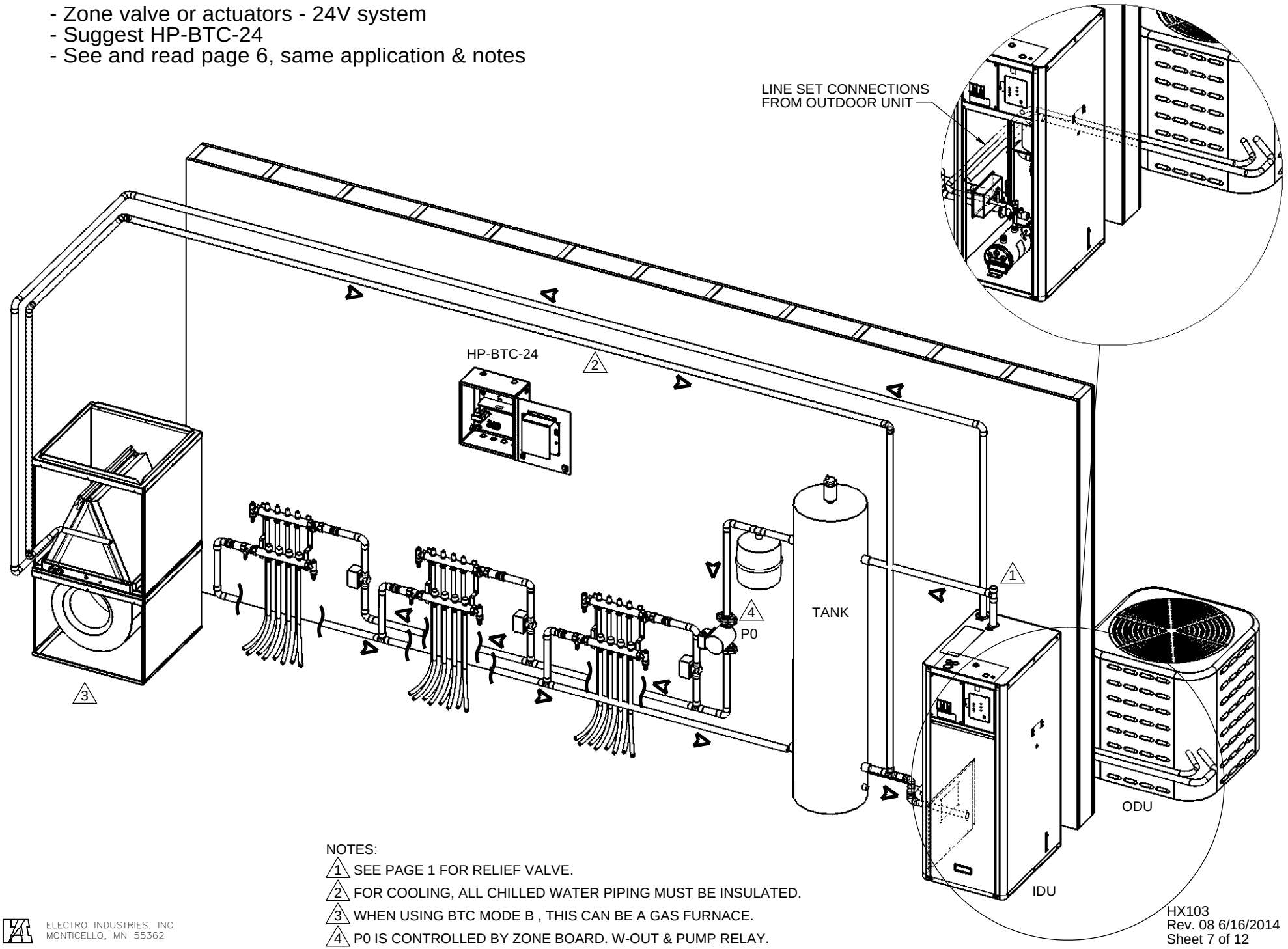


NOTES:

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



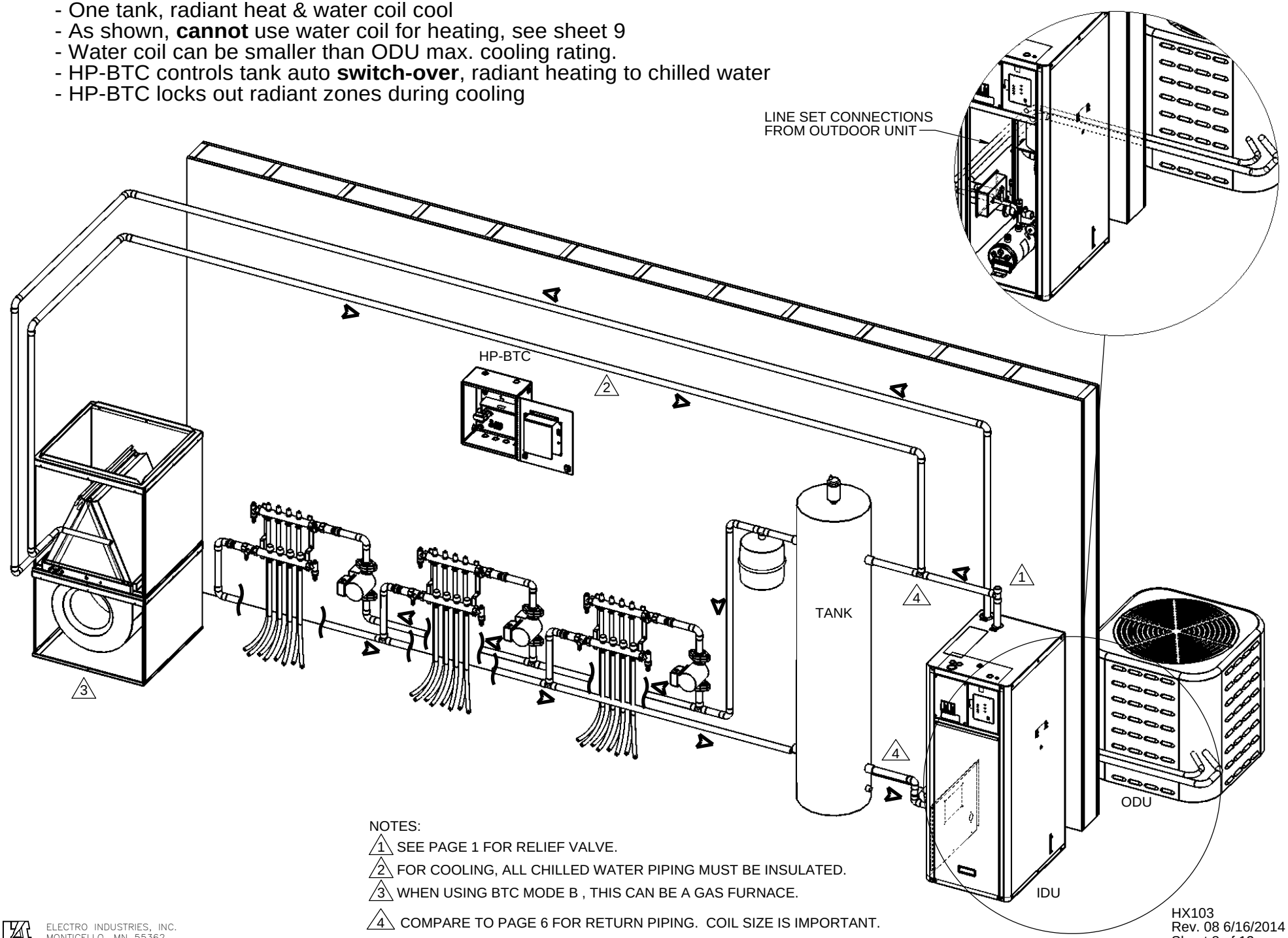
NOTES:

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.

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

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



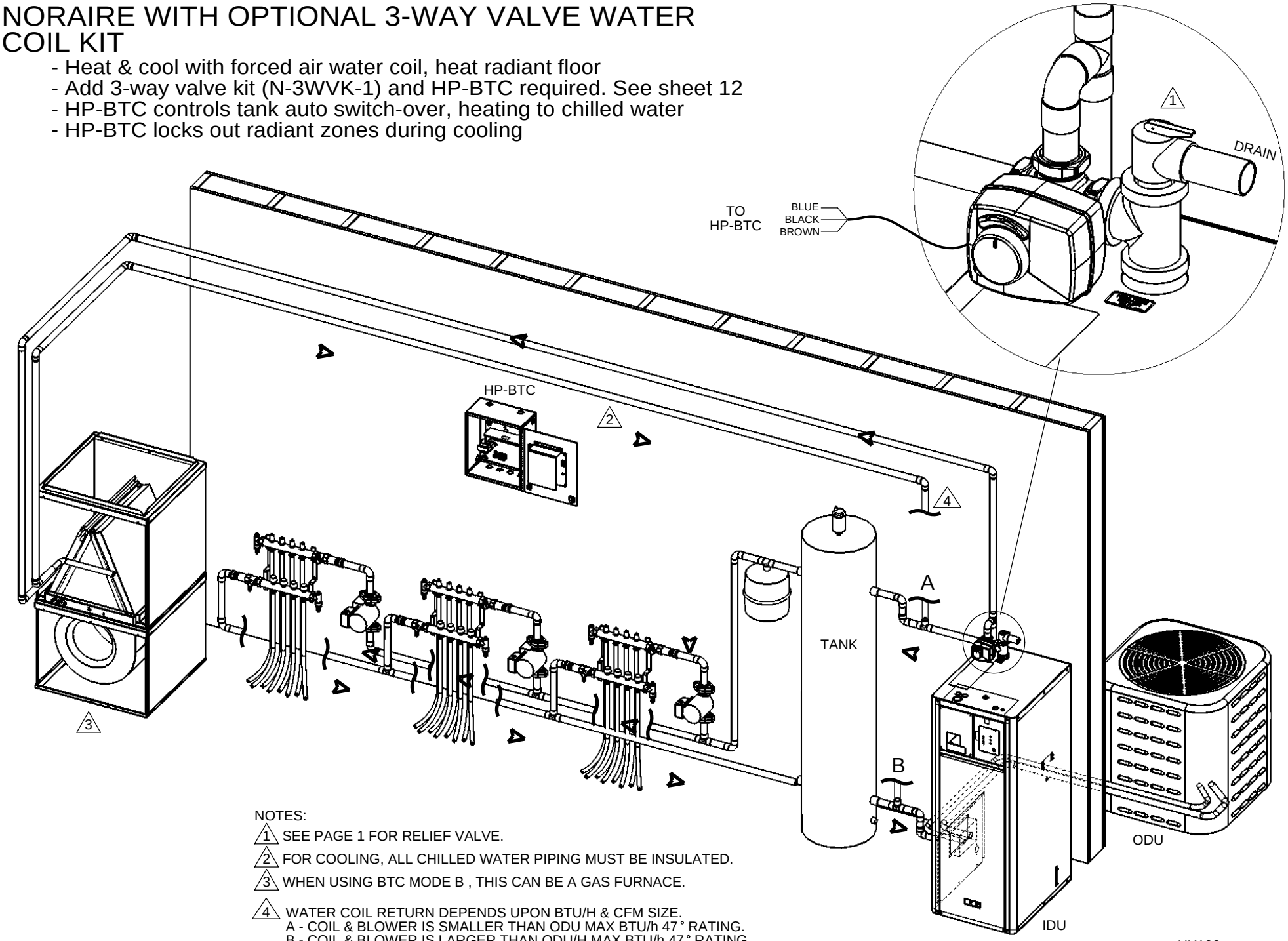
NOTES:

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.

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

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:

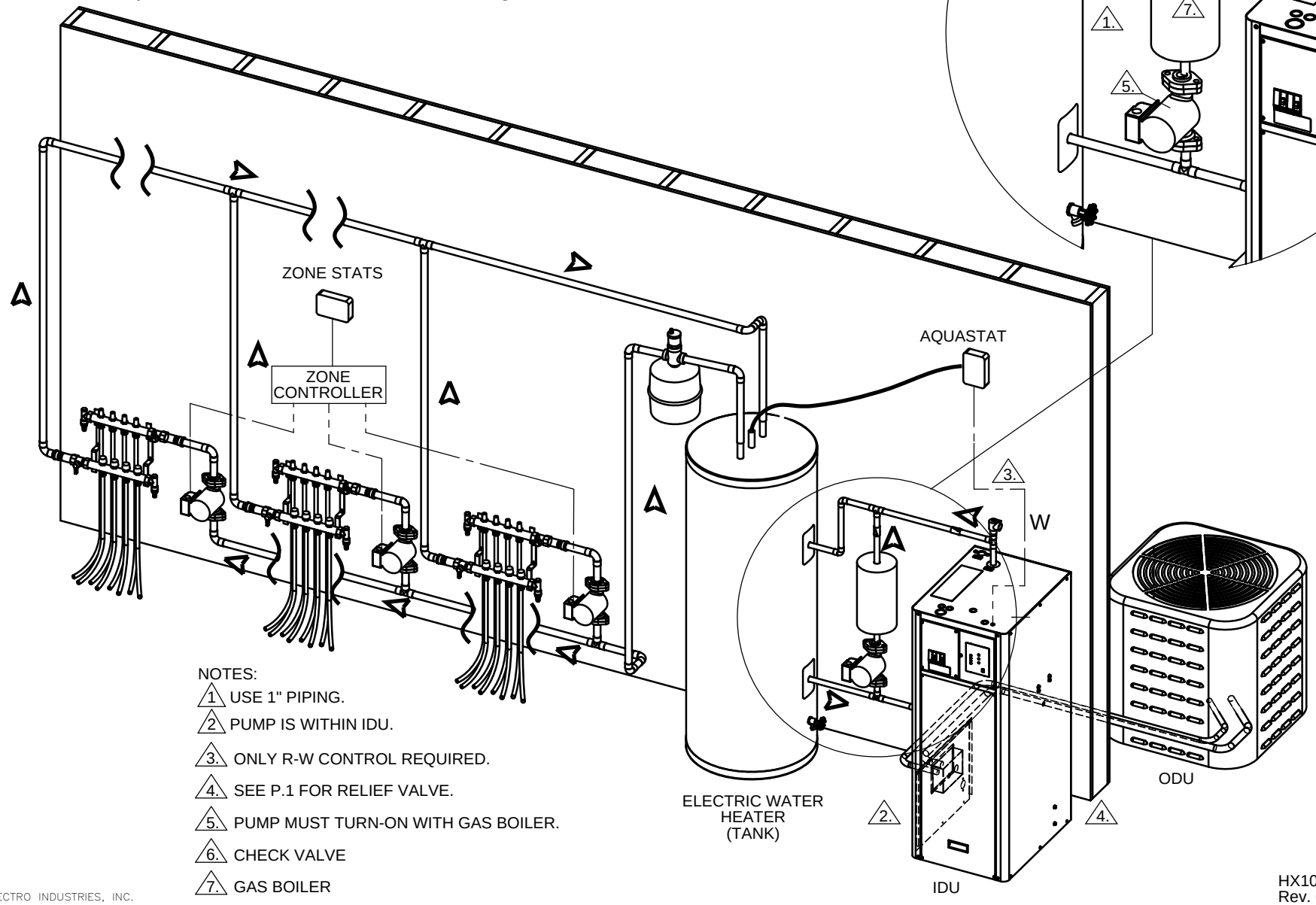
1. SEE PAGE 1 FOR RELIEF VALVE.
2. FOR COOLING, ALL CHILLED WATER PIPING MUST BE INSULATED.
3. WHEN USING BTC MODE B , THIS CAN BE A GAS FURNACE.
4. WATER COIL RETURN DEPENDS UPON BTU/H & CFM SIZE.
   A - COIL & BLOWER IS SMALLER THAN ODU MAX BTU/h 47° RATING.
   B - COIL & BLOWER IS LARGER THAN ODU/H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

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

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



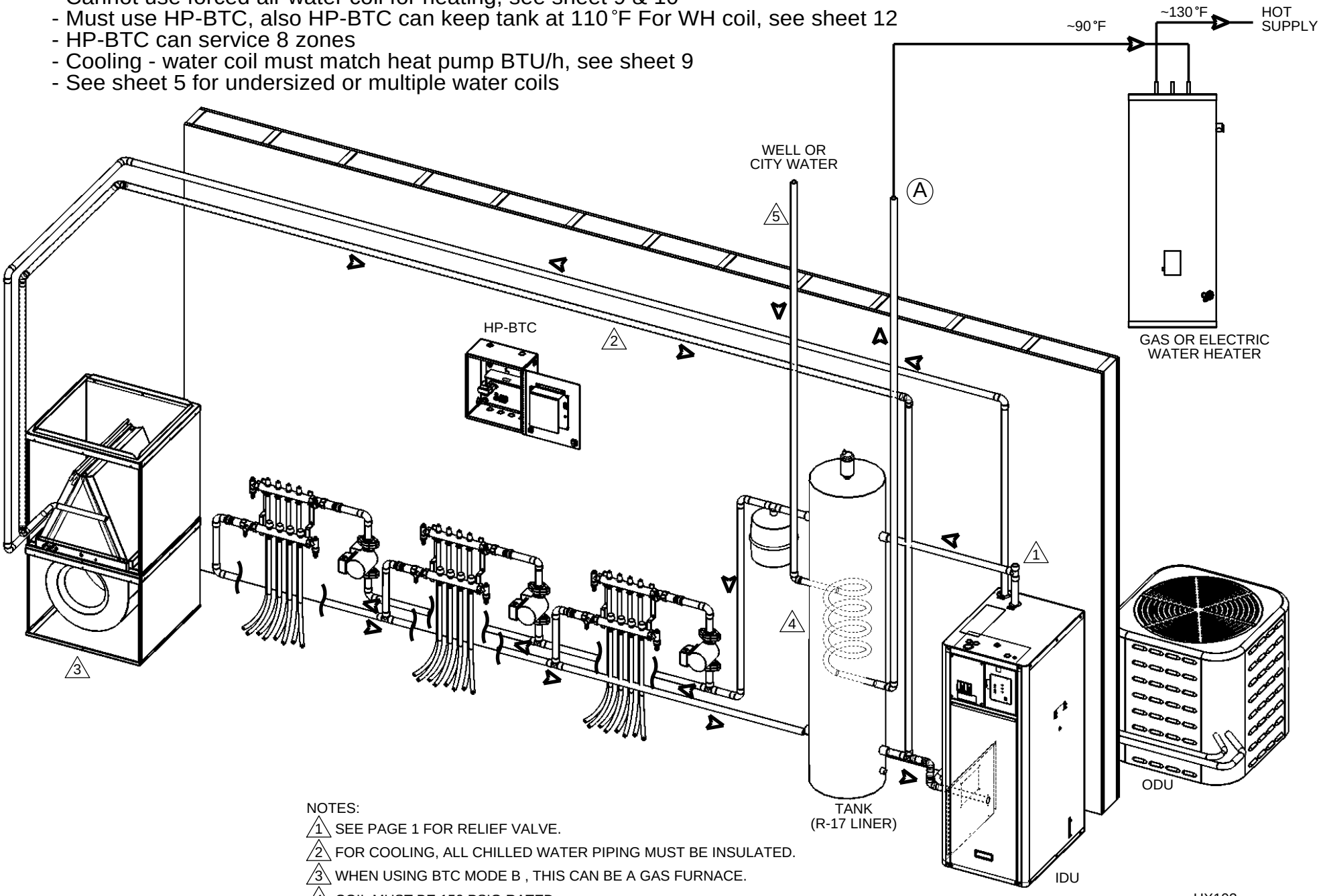
NOTES:

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

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

NORAIRE AIR TO WATER HP BUFFER TANK AND WATER HEATER SYSTEM

- Heating - larger tank flow and piping
- Cannot use forced air water coil for heating, see sheet 9 & 10
- Must use HP-BTC, also HP-BTC can keep tank at 110˚F For WH coil, see sheet 12
- HP-BTC can service 8 zones
- Cooling - water coil must match heat pump BTU/h, see sheet 9
- See sheet 5 for undersized or multiple water coils

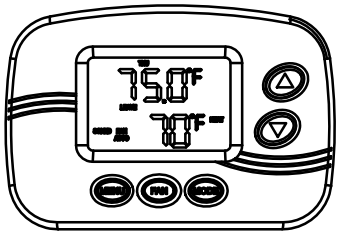


NOTES:

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.
4. COIL MUST BE 150 PSIG RATED.
5. SOME LOCAL CODES MAY REQUIRE FLOW RESTRUCTURE.

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

BUFFER TANK CONTROLLER (HP-BTC)



SLAB STAT 1-8 ZONES

6"

12"

14"

ZONE PUMP (OR VALVES)
1-8 ZONES

-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.

AIR STAT (STANDARD 4 WIRE)

W TO W HP OR
NORAIRE CONTROL

SOURCE PUMP
COIL PUMP
NORAIRE PUMP CONTROL

OT SENSOR

UNIQUE OT RESET FEATURE

BT SENSOR

(1-2 TANKS)

BLOWER
GAS FURNACE
GAS BOILER

UTILITY LOAD CONTROL

IF USED WITH NORAIRE
-MUST BE BTC V3.O*
-BTC, MODE D
-NORAIRE, J3 PEG IF OPEN

ELECTRO INDUSTRIES, INC.
MONTICELLO, MN 55362

ELECTRO
INDUSTRIES

Monticello, MN · 800.922.4138 · www.electromn.com

08/21/2023 NL203

APPENDIX E

PROJECT TEAM

Joshua D. Martin
Senior Energy Engineer

EDUCATION

- Bachelor of Science in Mechanical Engineering with a Minor in Mathematical Sciences - Clemson University, 2009

CERTIFICATIONS

- Certified Energy Manager – Association of Energy Engineers, 2023
- Engineer In Training – South Carolina Board of Professional Engineers, 2009

SUMMARY OF PROFESSIONAL EXPERIENCE

Mr. Joshua D. Martin is a Senior Energy Engineer in the energy services division, distinguished as a Certified Energy Manager (C.E.M.) and Engineer in Training (E.I.T.). His robust background includes over 12 years of experience in energy efficiency engineering, project management, building commissioning, and sustainability consulting. Throughout his career, he has specialized in commercial building energy consulting, executing energy audits, conducting site visits, and identifying energy conservation measures (ECMs) across various sectors, including residential, commercial, multi-family, industrial, MUSH (Municipal, University, School, and Hospital), and agricultural.

Mr. Martin is passionate about helping clients accomplish their sustainability goals, qualify for green loan programs, and satisfy local building code requirements. More recently, Mr. Martin has worked with clients to help them achieve their greenhouse gas reduction goals through decarbonization and electrification studies.

PROJECT EXPERIENCE

Project experience for Mr. Martin includes:

- Project Management
- 50+ Multifamily Building Energy Efficiency Audits
- Fannie Mae and Freddy Mac Green Up program compliance
- Indoor Air Quality Measurement and Compliance for ASHRAE 62.1
- ASHRAE Level I & II Energy Audits for Commercial, Agricultural, and Industrial Facilities
- Building Commissioning and Retro-commissioning for Commercial and Industrial Facilities
- Energy Star Certifications for Residential and Commercial Facilities
- Measurement and Verification of Energy Efficiency Projects
- Energy Efficiency and Sustainability Consulting
- Greenhouse Gas Reduction Studies
- Energy Modeling
- Data Analysis

Mr. Martin has worked in the energy efficiency and sustainability services field since 2011. He is committed to advancing products, services, and ideas that reduce environmental impact and promote sustainability. He believes in contributing to a greener future without compromising resources for future generations.

Craig Burcham

Senior Engineer, Energy Services

EDUCATION

- Master of Business Administration, East Carolina University
- Bachelor of Science - Mechanical Engineering, Louisiana Tech University

CERTIFICATIONS

- Certified Energy Manager – Association of Energy Engineers - 20086
- Arkansas Licensed Professional Engineer - 22152
- South Carolina Licensed Professional Engineer - 39645

SUMMARY OF PROFESSIONAL EXPERIENCE

Mr. Burcham provides expertise in energy efficiency evaluations in several markets including industrial, commercial, and residential properties. He has more than ten years of experience developing guaranteed energy saving performance contracting projects for clients throughout the Southeast and Midwest United States. He also has three years of experience with large utility energy efficiency program execution as well as four years of experience performing single family residential pre-sale home inspections and energy assessments.

PROJECT EXPERIENCE

Project experience for Mr. Burcham includes:

- Lead developer on 18 performance contracting projects, $90M in total project value
- 100+ ASHRAE Level 1, 2, 3 Energy Audits
- 1000+ single family residential home inspections and energy assessments