

Tom,

9/28/2023

Hamden High Boilers:

We have 3 hot water heating boilers at the high school that need replacement, one boiler is already nonfunctional, we can operate on 2 during the majority of the year, on very cold winter days we really need the 3,

- Current 3 boilers are from 1996
- Boiler #3 is un-repairable and out of service
- Boiler 2 is showing signs of leakage
- Pool is heated by one boiler year-round.

I have looked at a few options as how to best proceed, we could replace existing boilers with similar units at a cost of \$300,000 for all three, however this is old technology and is not as efficient as newer technology,

I recommend looking at replacing the current 3 boilers with condensing boilers which will be more efficient, in addition provide efficient heat for swimming pool.

While the cost is higher the payback in energy savings is 3-5 years,

There are a few options on how to do it which I will work out, this cost would be \$750-800k

I have sent you the engineering study I worked on this summer with Cenergistics.

Central Office Boilers:

As you know the central office boilers are more than 100 years old, one boiler went out of service last year and is un repairable, the remaining boiler is barely functional and may go at any time. If that happens the building will have very little heat and will not be occupiable during cold days

- Boilers are from 1918
- Boiler 2 is un repairable
- Boilers are steam and extremely in efficient

I also recommend installing 2 efficient condensing boilers and gas fired unit heaters for the gym

Again, the payback is 3-5years, cost of \$-100k

Other boilers that will need addressing in the next 5 years

Dunbar Hill -2 hot water sectional boilers

Church Street-2 hot water sectional boilers

Thanks

John Cross

Director of Facilities

Cenergistic®

Energy Conservation Measure Hamden Admin & High School



June 29, 2023

Energy Conservation Measures (ECM): Administration and High School Boiler Replacements

Administration Building-New Boilers

Boiler Room General Scope of work

- Demolish and remove (1) of the existing HB Smith steam boiler including condensate tanks and boiler feed water tanks. Remove boiler flue and cap at main. 2nd boiler and associated piping to remain in place.
- Demolish and remove steam and condensate return line which currently feeds two steam to hot water heat exchangers and cap steam line serving gymnasium.
- Demolish and remove two heat exchangers and hot water pumps.
- Disconnect all power wiring and conduits to boilers and pumps, disconnect at electrical panels.
- Furnish and install (2) Aerco 750 MBH condensing hot water boilers. To include combustion and ventilation air ducts.
- Furnish and install (2) In-line hot water pumps.
- Furnish and install hot water supply and return lines, valves, fittings, etc. from boilers and hot water pumps to existing hot water lines in mechanical room.
- Furnish and install new gas train for boilers, connect to existing gas line.
- Furnish and install electrical wiring and conduit to boilers and hot water pumps.
- Insulate new hot water supply and return lines.
- BAS to include enable/disable of boilers and pumps, Bacnet controllers to integrate to existing BAS.
- Startup/commission of boilers.

Gymnasium General Scope of Work

- Demolish and remove existing steam unit heater serving gymnasium. Steam supply and condensate lines to remain in place.
- Furnish and install new gas line from gas meter on the roof to gymnasium.
- Furnish and install two gas 100 MBH fired unit heaters for gymnasium and one 50 MBH for stage area.
- Combustion flue to be ducted through sidewall, Unit heaters will be standalone thermostats.

Budget for scope of work: \$85K-95K, final equipment size selection to be completed during design phase.

High School-New Boilers/Pool Combined Heat and Power (CHP)

Boiler Room General Scope of work

- Demolish and remove (2) of the existing Burnham hot water boilers. Hot water piping removal will be limited from the boilers to the hot water supply and return main. HWS/R connections will be valved off for new connections.
- Disconnect all power wiring and conduits to boilers disconnect at electrical panels.
- Furnish and install (2) Aerco 3000 MBH non-condensing hot water boilers and (1) 1500 MBH condensing boilers with inline boiler hot water pumps, automatic isolation valves and on board boiler sequencing technology.
- Furnish and install stainless steel combustion duct to connect to existing boiler flue.
- Furnish and install (2) In-line hot water pumps.
- Furnish and install hot water supply and return lines, valves, fittings, from boilers to existing HWS/R taps on main.
- Furnish and install new gas train for boilers, connect to existing gas line.
- Furnish and install electrical wiring and conduit to boilers and boiler pumps.
- Insulate new hot water supply and return lines.
- BAS to include enable/disable of boilers, Bacnet controllers to integrate to existing BAS.
- Startup/commission of boilers.

Pool Heating Options

- Option #1- Hot water to be provided by new boilers, existing piping to remain as-is. During the summer months condensing boiler to be online.
- Option #2- Furnish and install an additional condensing boiler to serve pool hot water heat exchanger, estimated size 500 MBH. Boiler to be piped in parallel with existing hot water supply and return line. New boilers to serve as backup.
- Option #3- Furnish and install a small CHP system to generate hot water and electricity. Similar piping configuration, electrical to serve nears electrical panel. AEGIS TP-75 or similar SPB 3-6 years

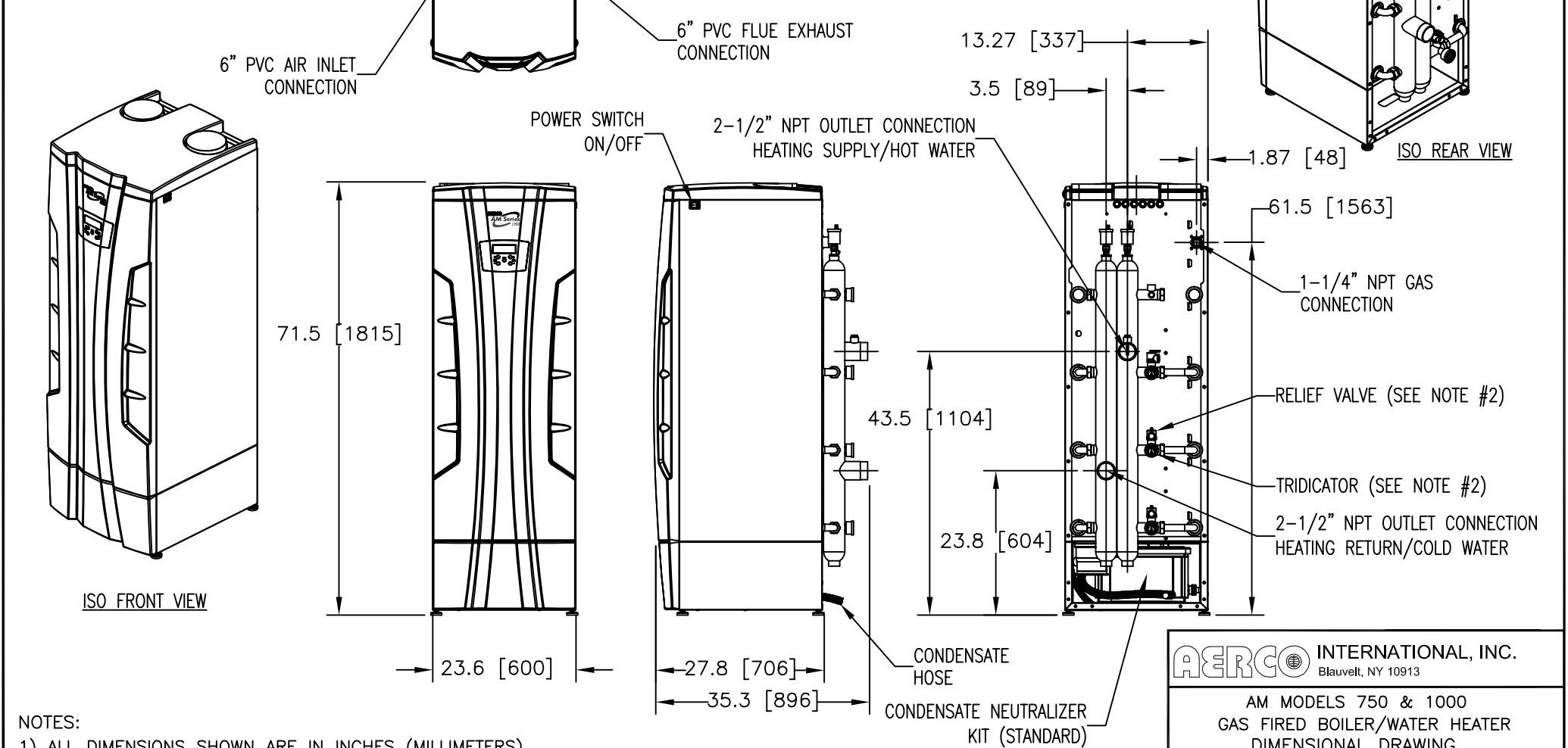
Boiler room budget for scope of work Budget: \$600K-750K, final equipment size selection to be completed during design phase. Includes scope of for pool option #1.

Budget for option #2 35K-45K, final equipment size selection to be completed during design phase.

Budget for option #3 Option #3- additional 160K-180k, final equipment size (KW) selection to be completed during design phase.

Attached are equipment sheets for boilers, pumps and CHP

MATERIALS OF CONSTRUCTION	
HEAT EXCHANGER:	316 (Ti)
HEAT EXCHANGER DESIGN STANDARDS	
MAX. WORKING PRESS. (PSIG):	160
MAXIMUM TEMP. (°F):	210
TEST PRESS. (PSIG):	240
BOILER/WATER HEATER UNITS:	
ASME B & PV CODE SECTION IV STAMP H	
OPTIONAL:	
ASME B & PV CODE SECTION IV STAMP HLW	
(ONLY BY REQUEST FOR WATER HEATER UNITS)	



NOTES:

1) ALL DIMENSIONS SHOWN ARE IN INCHES (MILLIMETERS).

2) RELIEF VALVE AND TRIDICATOR ARE INCLUDED ONE SET ON EACH MODULE.

AERCO INTERNATIONAL, INC. Blauvelt, NY 10913	
AM MODELS 750 & 1000 GAS FIRED BOILER/WATER HEATER DIMENSIONAL DRAWING	
DWN.BY <u>K.S.</u> DATE <u>112713</u>	REV.
SCALE <u> </u> SIZE <u>A</u>	AP-A-943 C
CHKD. <u> </u> APPD. <u> </u>	
REV.DATE <u>K.S. 050515</u>	

Series e-90E Smart Pump

Close Coupled, In-Line Centrifugal Smart Pump Systems

A complete system offering market leading efficiency and performance

Series e-90E Smart Pumps are close coupled, in-line centrifugal pumps combining the wide hydraulic coverage of the e-90 pump and the efficiency of Xylem's Smart Motor in a pre-assembled package. Each e-90E Smart Pump provides power, intelligence and performance right out of the box.

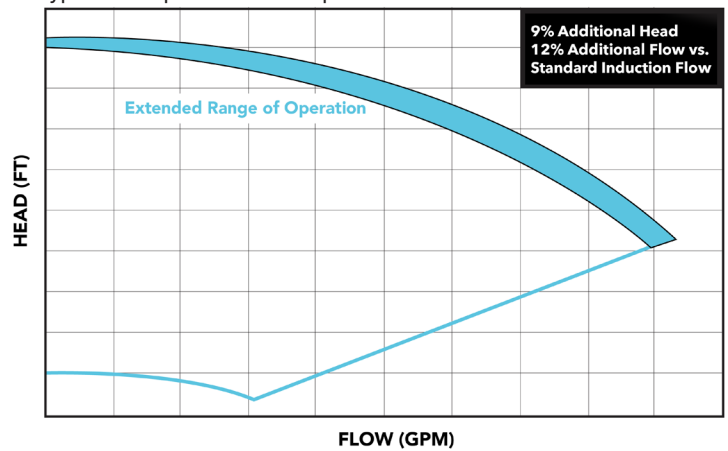
Xylem's permanent magnet Smart Motor is highly efficient, minimizing power loss while transferring maximum energy to the hydraulic parts of the pump. The refined control system with integrated microprocessor adjusts the motor speed, matching the required operating point of the pump or system requirements. This reduces demand on electricity according to the required working conditions. Built-in pump protection controls and monitoring help optimize pump operations, increasing energy savings up to 70% (vs. fixed speed) while reducing installation time.

Series e-90E Smart Pumps are designed for small commercial HVAC systems with a wide range of applications including hydronic heating and cooling, pressure boosting, refrigeration and heat exchanger circulation. They are available in bronze fitted or all bronze construction to meet a wide range of pump needs.

- Pre-programmed package
- High performance, low energy use
- Robust pump design
- Best-in-class efficiency
- Ease of installation



Typical example of increased performance



Features and benefits

Pre-programmed package

Series e-90E Smart Pumps feature the 1) motor; 2) variable speed drive; and 3) hydraulic pump in pre-programmed packages with built in pump protection controls and monitoring to help optimize pump performance. The pre-assembled package does not require an external control panel or programmable logic controller (PLC).

High performance, low energy use

High efficiency hydraulics combined with permanent magnet motor technology and variable speed drive provide the lowest possible operating cost. The refined control system with integrated microprocessor adjusts the motor speed to match the demand of the operating system. This results in significant energy savings while also extending the life cycle of the equipment.

Robust pump design

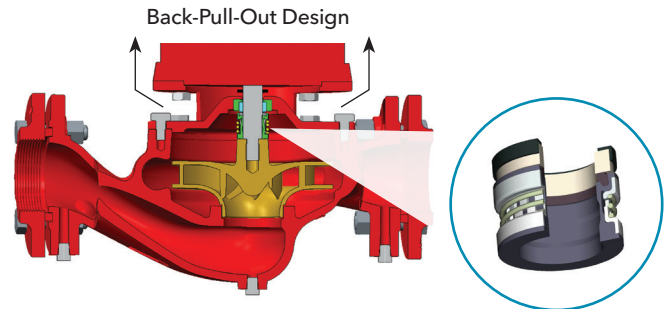
The compact, close coupled platform eliminates the need for a bearing frame or coupler. A stub-shaft or shaft sleeve is not required. The modern unitized EPR/Carbon/Silicon-Carbide mechanical seal is standard, offering easy removal and long service life. The back-pull-out design allows service access without disturbing the piping.

Best-in-class efficiency

The ultra-premium combined with permanent magnet motor technology and efficiency rating is the top efficiency level for motors designed to operate directly on-line. Each e-90E Smart Pump features Xylem's IE5 Smart Motor, providing efficiency well above a standard IE3 NEMA Premium efficient asynchronous induction motor.

Ease of installation

The pre-assembled, pre-programmed package simplifies installation. The in-line mounted, close coupled pump is compact and versatile, designed to be mounted in the piping and can be installed either horizontally or vertically.



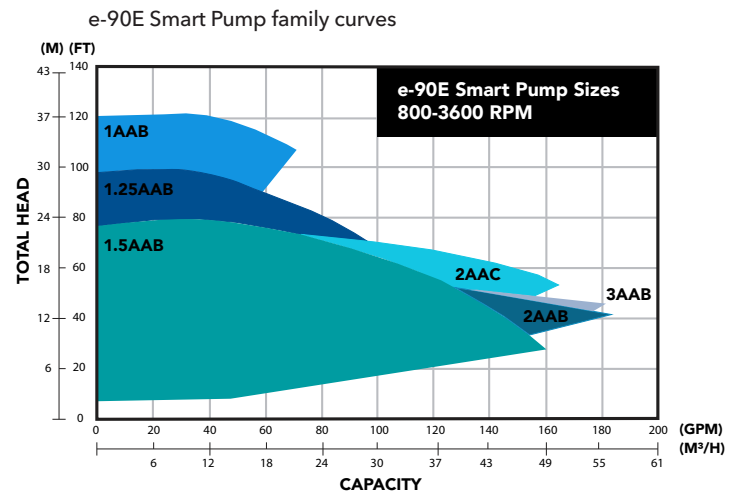
Series e-90E Smart Pump specifications

Pump

- **Hydraulic range:** 30 GPM to 265 GPM (6.8 to 60.2 m³/hr)
- **Head:** 115' TDH (35m)
- **Liquid temperature:** -10° to 250°F (-23 to 121°C)
- **Maximum operating pressure:** 175 psi (12 bar)
- **Construction:** Available in bronze fitted or all bronze
- **Horizontal or vertical mounting**

Xylem Smart Motor

- **Phase/voltage:** Three phase, 460V
- **Power:** 3 HP (2.2 kW)
- **Multipump capacity:** Up to 3 units
- **Power supply:** 50/60 Hz
- **Communication:** BACnet and MODBUS® standard in single pumps
- **Motor:** IES2 package with IE5 motor
- **Enclosure rating:** IP55/NEMA 3R
- **Ambient temperature:** -4°F / 122°F (-20°C / +50°C) full power
- **Shut down protections:** No flow, broken pipe and dry run
- **Controls:** Constant pressure, system curve match and external signal
- **Other standard:** Automatic test starts, auto smart cycle, change of lead and lag pump units, inverter fault signal memory and operating-hours run counter. Optional - failure and over-temperature sensors.



Xylem Product Cybersecurity

Xylem values system security and resilience. Defending against cybersecurity threats is a shared responsibility. Xylem builds products that are secure by design. Our customers have a responsibility to understand the risks inherent in their processes and take steps to operate and maintain their solutions securely. For details and updates on Xylem product cybersecurity visit xylem.com/security.

xylem
Let's Solve Water

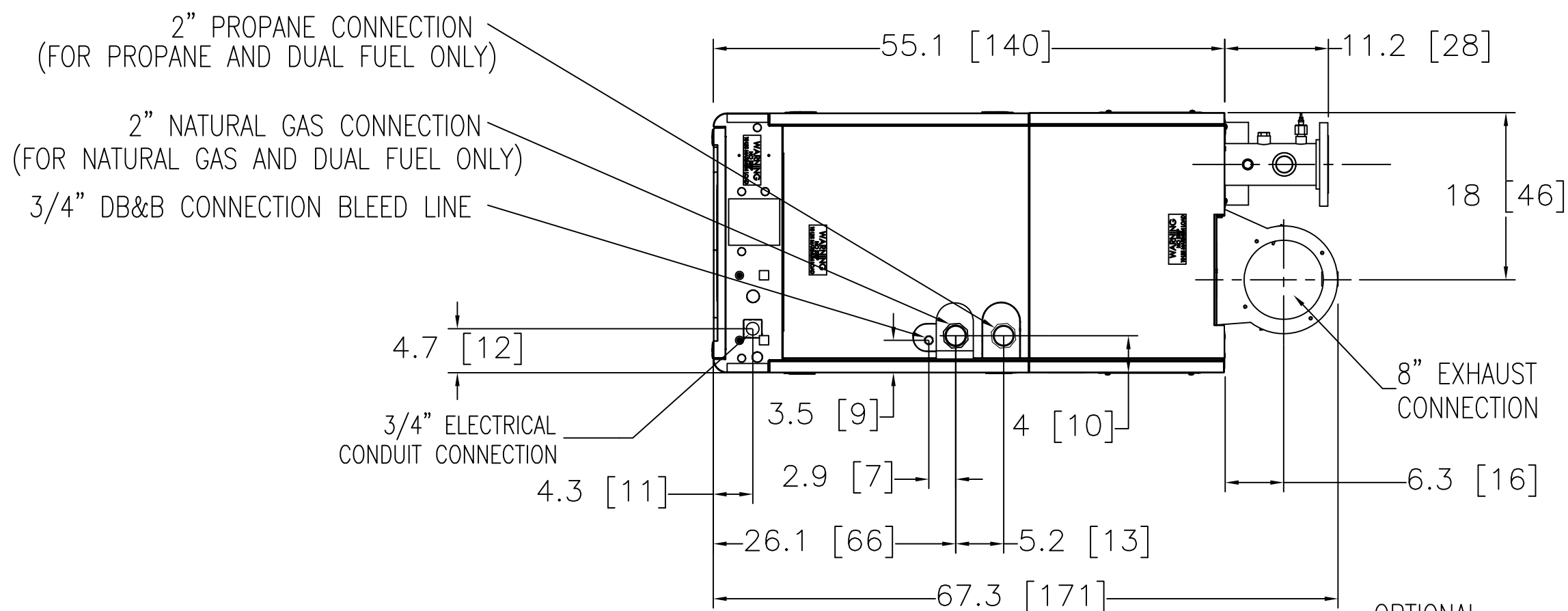
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Fax: (847) 965-8379
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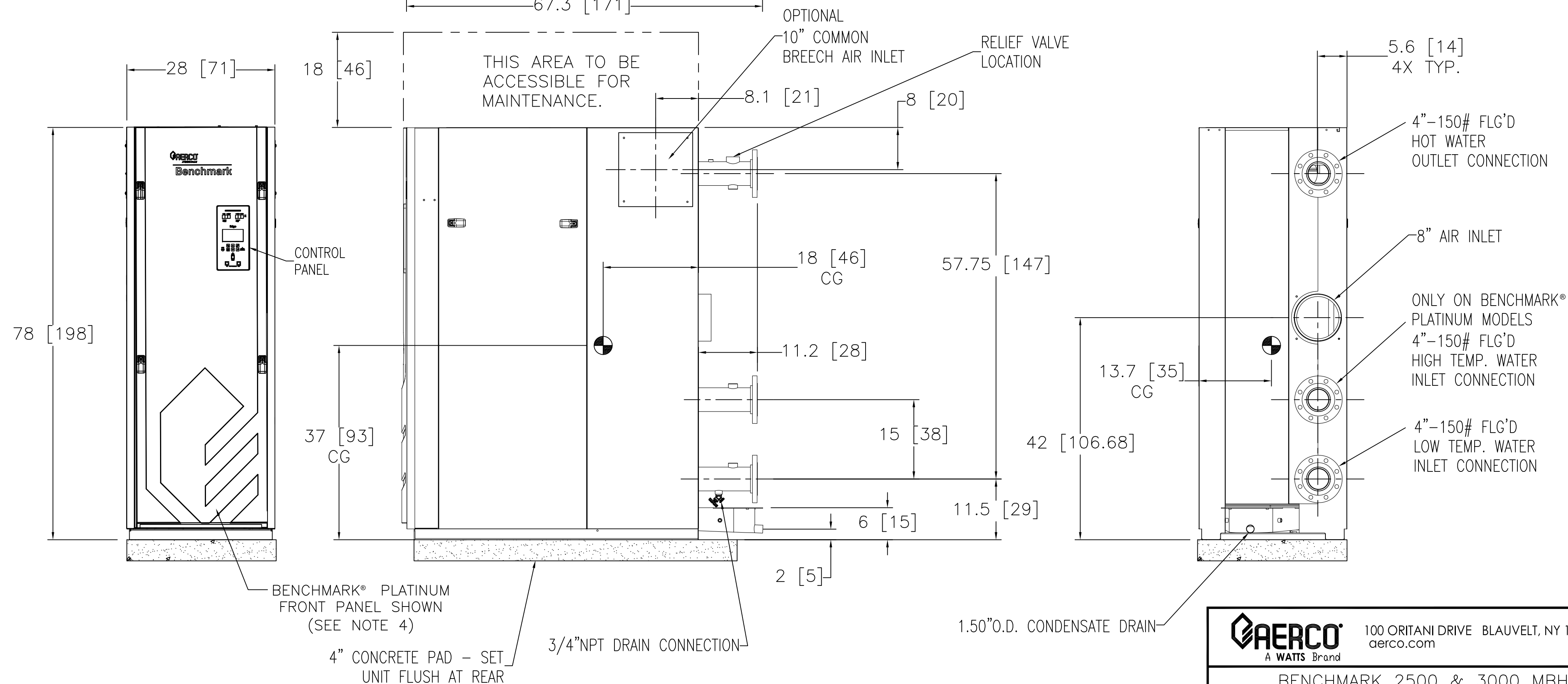
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Learn more about
Series e-90 Pumps





MATERIALS OF CONSTRUCTION				
COMBUSTION CHAMBER	SHELL OUTER-1/4" CARBON STEEL,SA-53 GR.B			
	SHELL INNER-1/4"STAINLESS STEEL,SA-240, 439SS			
	HEAD-1/2" CARBON STEEL,SA-516 GR.70			
	EXPANSION JOINT-1/4" STAINLESS STEEL,SA-240,439SS			
HEAT EXCHANGER	UPPER TUBESHEET- 1/4" STAINLESS STEEL,SA-240,439SS			
	LOWER TUBESHEET- 1/4" STAINLESS STEEL,SA-240,439SS			
	TUBES-STAINLESS STEEL,9/16"O.D. X .049 WALL			
	SA-249,439SS			
SHELL-1/4" CARBON STEEL,SA-53,GR.A OR B				
HEAT EXCHANGERS & COMBUSTION CHAMBER DESIGN STANDARDS				
MAX. WORKING PRESS. (PSIG)	MAXIMUM TEMP. (°F)	TEST PRESS. (PSIG)	HT'G SURFACE SQ.FT.	MIN. RELIEF VA. CAPACITY MBH
160	210	240	184	2500
160	210	240	205	3000
ASME B & PV CODE: SECTION IV STAMP H				



- NOTES:
- 1) ALL DIMENSIONS SHOWN ARE IN INCHES (CENTIMETERS).
 - 2) RELIEF VALVE, TRIDICATOR & CONDENSATE TRAP ARE INCLUDED SEPARATELY IN SHIPMENT.
 - 3) AERCO RESERVES THE RIGHT TO MODIFY BOILER DIMENSIONS WITHOUT PRIOR NOTICE
 - 4) BENCHMARK® PLATINUM SHOWN. SAME DIMENSIONS APPLY TO STANDARD BENCHMARK MODELS.



100 ORITANI DRIVE BLAUVELT, NY 10913
aerco.com

BENCHMARK 2500 & 3000 MBH
NATURAL GAS, PROPANE, DUAL FUEL &
DF-DB&B BOILER DUAL INLET
DIMENSIONAL DRAWING

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SCALE _____ SIZE A
CHKD. _____ APPD. _____
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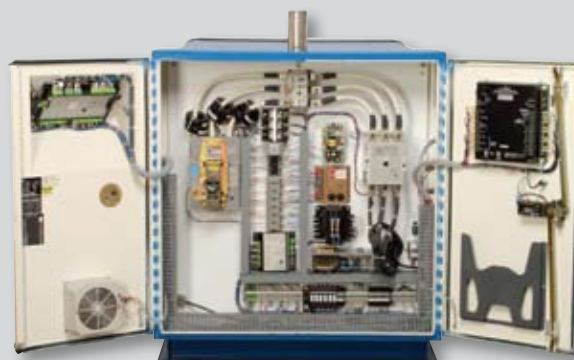
AEGEN THERMO POWER™ TP-75



The AEGEN THERMO POWER 75 is a compact, modular combined heat and power (CHP) system producing 75 kW of power and 5.23 therms of heat per hour. A three-way non-selective catalyst reduction (NSCR) emissions control package includes a catalytic converter and temperature and oxygen controls designed to reduce emissions of nitrogen oxide, carbon monoxide, and hydrocarbons. The CHP module has a natural gas-fired reciprocating engine, an induction generator, heat recovery system, a sound attenuating enclosure, electrical switchgear, and solid-state controls for automatic and unattended operation. High efficiency heat recovery components consist of oil cooler, engine jacket for heat transfer, marine type exhaust gas manifolds and exhaust gas heat exchangers. The AEGEN THERMO POWER 75 operates in parallel with existing mechanical and electrical systems in the facility. The module includes an advanced utility-grade relay (U.L., C.S.A., and C.E. listed or certified) for electrical protection and redundancy as standard equipment.

Features

- ✦ Reliable, proven technology
- ✦ Highly efficient
- ✦ Environmentally sound with low emissions
- ✦ Quiet operation
- ✦ Modular – scaleable into larger systems
- ✦ Compact – easily fits in most buildings
- ✦ Indoor or outdoor installation
- ✦ Ease of installation – no business disruption
- ✦ U. L. listed
- ✦ Remote monitoring and control
- ✦ Digital display and user-friendly interface
- ✦ Infinite system life with maintenance program
- ✦ Electric and thermal load following
- ✦ Modbus compatible for networking with building automation systems



Characteristic	MODELS			
	Induction		Synchronous	
	TP-75	TP-75 LE	TPS-75	TPS-75 LE
Electrical Power Output	75 kW	75 kW	75 kW	75 kW
Thermal Output	484,000 Btus/hour	523,000 Btus/hour	484,000 Btus/hour	523,000 Btus/hour
Gas Input	865 standard cubic feet per hour (scfh)	930 standard cubic feet per hour (scfh)	865 standard cubic feet per hour (scfh)	930 standard cubic feet per hour (scfh)
Required Gas pressure	4 to 10 inches water column	10 to 14 inches water column	4 to 10 inches water column	10 to 14 inches water column
Efficiency	83.9%, at HHV of 1,020 Btus/scf	82.1%, at HHV of 1,020 Btus/scf	83.9%, at HHV of 1,020 Btus/scf	82.1%, at HHV of 1,020 Btus/scf
Max Output Water Temperature	230° F			
Weight	3,050 pounds			
Suspension	Vibration isolation mounts			
Dimension	46" width x 89" length x 49" height			
Acoustic Level (enclosed)	70 decibels (dba) from 20 feet away			
Output Voltage	208V or 460V nominal, 3 Phase, 3-wire			
Emissions	Each Aegen Thermo power model meets stringent air quality standards and requirements			

