Benchmark® with Edge® Controller

High-Efficiency Boilers

AERCO.com

AERCO®
A WATTS Brand

Smart, Powerful Boiler Built to Last

In an *ideal world*, high efficiency, commercial condensing boilers would operate as designed – condensing as you expect and delivering the highest efficiency possible.

However, in the *real world*, external variables arise causing faults and problems that can wreak havoc on your system, such as:

- Combustion O_2 level fluctuations
- Air temperature and pressure changes
- Humidity, occupancy/load variations
- Low ΔT operation
- Gas quality and pressure changes

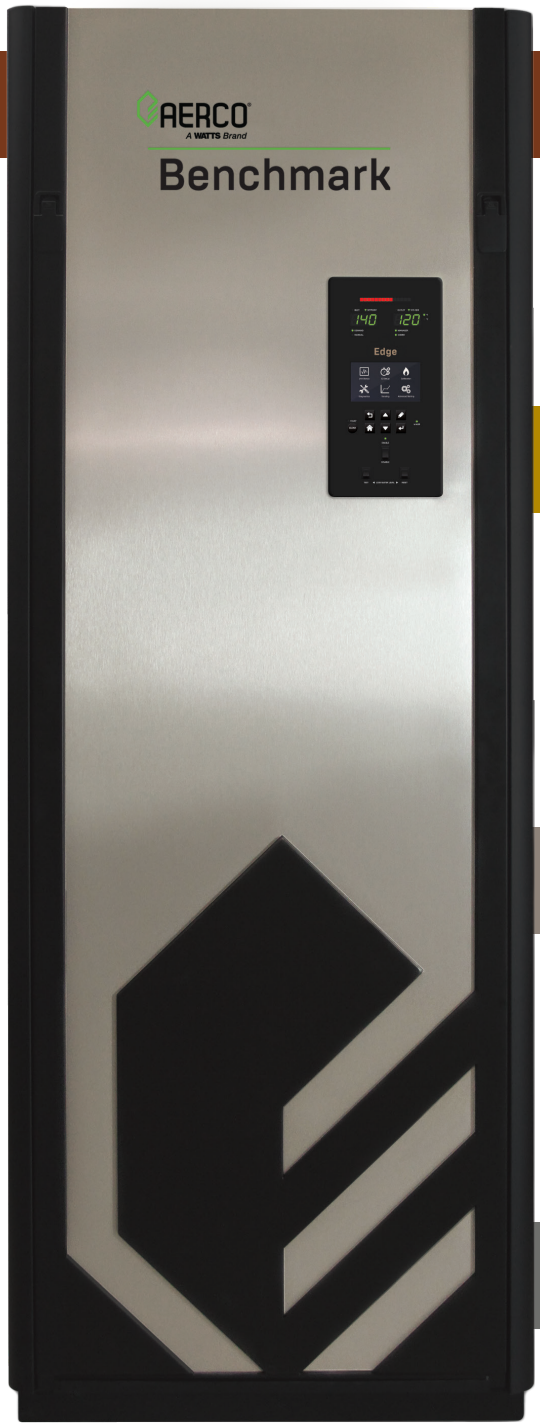
These problems lead to system inefficiency, increased utility costs, unit downtime and costly unscheduled maintenance.

A Smarter Way to Heat

The Benchmark, the "Smart Boiler," optimizes your system for the real world by self-correcting these problems and giving you predictive maintenance tools to ensure your system operates optimally, maximizes efficiency and delivers big savings.

Industry-Leading Warranty

Gives you among top of class coverage so you can rest easy knowing you've bought a reliable, premium system that will last for years to come.



Smallest footprint in the industry translates to big installation savings!

Provides Lowest Cost of Ownership

Edge
Advanced Controller

Designed to save you time and money, and make system operation easier resulting in the lowest cost of ownership.

- Save money by reducing install, start-up and annual operating costs
- Simplify start-ups and maintenance
- Strengthen system design, performance and efficiency
- Edge Mobile App enables full unit setup and control as well as enhanced diagnostics and configuration capabilities

AERtrim
Patented O_2 Trim

Ensures your system works properly with precise air/fuel ratios during combustion, lowering operating and maintenance costs.

- Self-adjusts the combustion process to ensure optimal O_2 levels despite ever-changing environmental factors unrelated to the boiler itself
- Saves energy and lowers operating costs by delivering the exact fuel needed
- Reduces unscheduled maintenance
- Increases condensing zone in heat exchanger to maximize efficiency and deliver additional seasonal efficiency gains
- Decreases emissions

onAER
Predictive Maintenance

Allows access to real-time system performance so you're not merely correcting faults, but predicting when you need to take action to prevent them.

- See exactly how efficient your units and plants are, how many cycles per hour, O_2 levels and more
- Know at-a-glance when you need to perform maintenance
- Pro-actively review data and trends to ensure units are operating optimally
- Receive instant alerts if a unit is down and see which ones need attention - view possible causes and suggested actions

Dual Returns
Maximum Efficiency

Keeps high temperature and low temperature return water separate to increase the heat exchanger's condensing zone, maximizing efficiency.

- Improves overall system plant thermal efficiency by up to an additional 7%
- Extends boiler condensing operating hours
- Saves energy
- Allows engineers to design customized systems with diverse load demands specific to a site/project

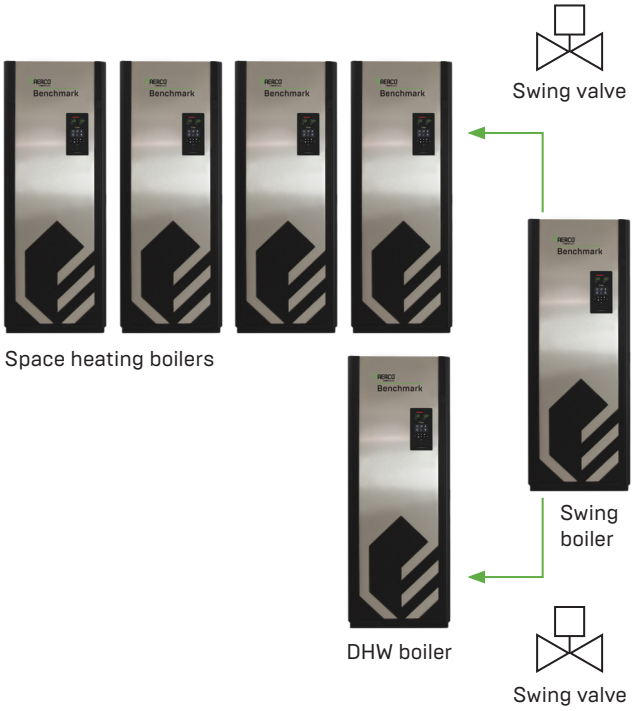
Edge™ Controller with Advanced Technology

With advanced features such as EZ Setup, Combustion Calibration Assist, and a mobile app that enables full unit setup and control, the Edge Controller is specifically designed to save you time and money, and make system operation easier resulting in the lowest cost of ownership. Edge also delivers many industry firsts including flow balancing, combination plant setup through manager, (i.e., setup and manage two boiler groups for heating and hot water with swing boilers in combination plant), Combustion Calibration Assist, and the ability to submit service forms to AERCO directly from the app.

Save

Edge Controller saves valuable time and money by reducing install and start-up costs.

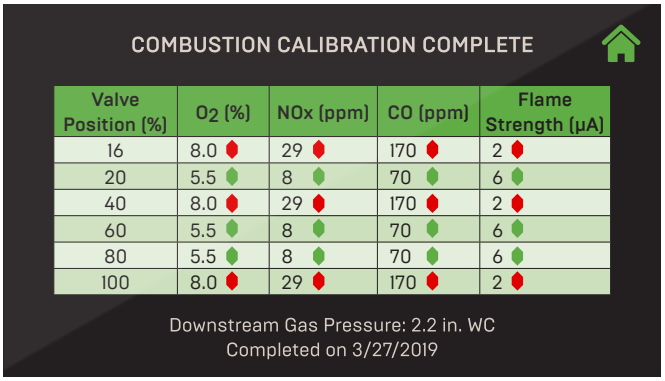
- Flow Balancing eliminates balancing valves and reduces commissioning costs
- Built-in communication for BACnet IP, BACnet MS/TP, Modbus IP, Modbus RTU (no gateway required)
- Save on boiler plant size and initial investment when using swing boilers



Simplify

Edge simplifies start-ups and maintenance cutting time up to 50% enabling even the most complex systems to be setup in minutes through intuitive, guided instructions.

- Easily calibrate units with Assisted or Manual options saving up to 50% time
  - Assisted: guided steps that automatically adjust precise air/fuel ratios for optimal performance
  - Manual: all necessary parameters in a comprehensive, user-friendly interface
- Upload known settings without having to redo the same steps for each unit in the plant
- View important unit and plant performance details without sifting through multiple screens



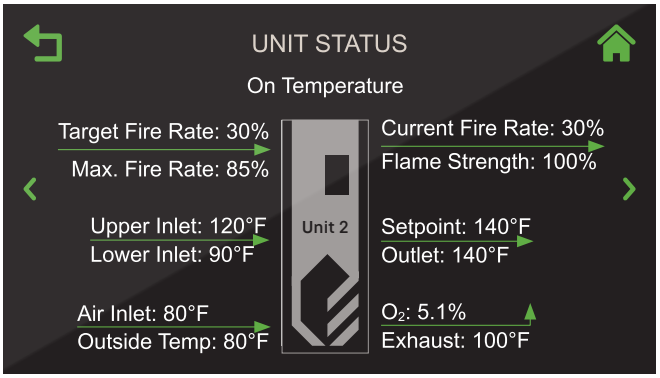
Utility and design patents pending

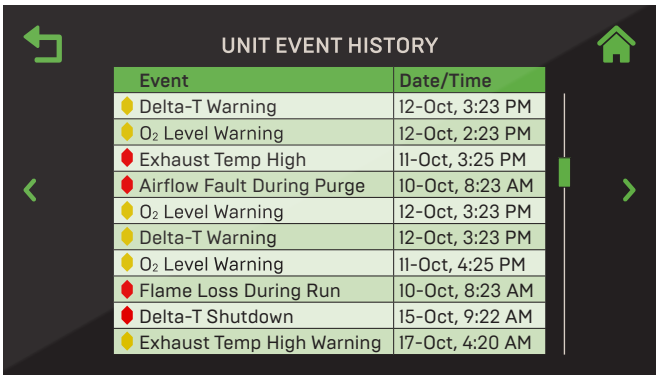
Designed to Save, Simplify and Strengthen

Strengthen

Edge strengthens performance by optimizing the overall system and increasing efficiency.

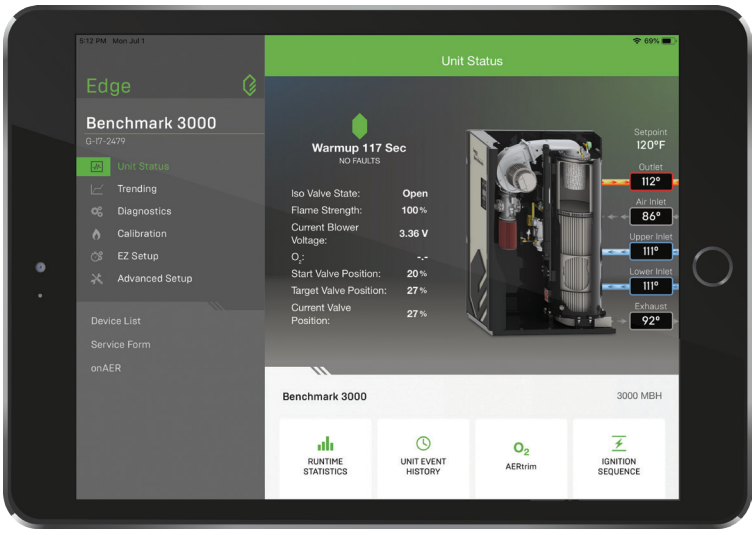
- Enhanced connectivity including Bluetooth, Wi-Fi, Ethernet, and Modbus
- Easily troubleshoot with visual ignition sequence
- Allows AERCO boilers and water heaters to operate with a single controller and work together for smoother, more efficient operation
- Provide easy combination plant setup with two boiler groups for simultaneous yet independent heating and DHW temperature control
  - Unique swing boilers with swing valves control for heating and DHW with SmartPlate control
- Trend multiple parameters simultaneously for a more holistic insight on the health of system
- Variable speed pump control optimizes boiler efficiency in primary secondary applications

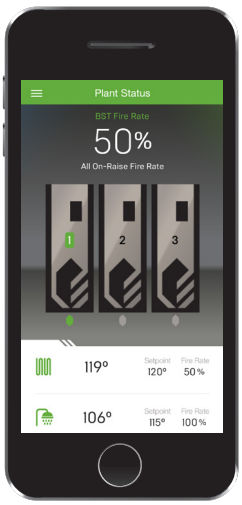




Mobile App

For greater flexibility, the Edge Mobile App enables full unit setup and control. The app incorporates all the functionalities as the touchscreen controller, but features the added benefit of enhanced diagnostics and configuration capabilities on a large screen. You'll also be able to trend multiple parameters of unit performance on one screen and submit service forms from the app. Edge Mobile App also gives you the freedom to move around the unit when configuring, diagnosing and troubleshooting.



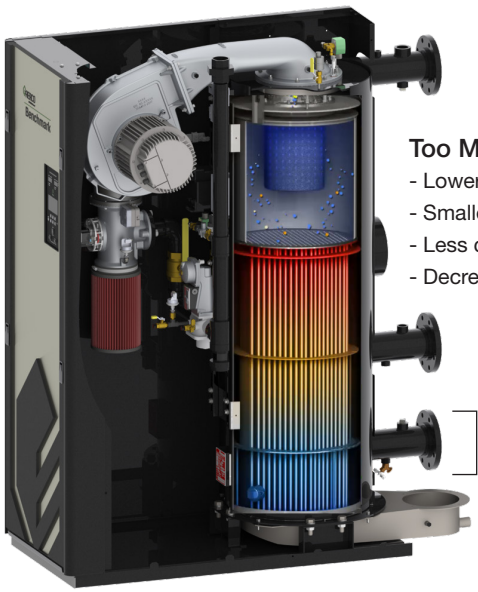


AERtrim® – Patented O_2 Trim Technology

Advanced combustion control systems in high efficiency boilers need to maintain precise air/fuel ratios in order to work properly and maximize efficiency. However, environmental variations (such as humidity, atmospheric pressure, filter dust loading, delivered gas energy content and other factors) can often create problems in gas and oil-fired boilers causing them to deviate from the ideal oxygen-fuel ratio.

If O_2 levels are too low, it can cause unstable combustion resulting in faults and increased unscheduled maintenance. Conversely, if O_2 levels are too high, the Dew Point will be lower and the boiler is less likely to condense – and if the boiler isn't condensing, you're not getting the energy savings you should.

Too Little O_2
- Flame loss or other faults
- Increased emissions
- Additional unscheduled maintenance

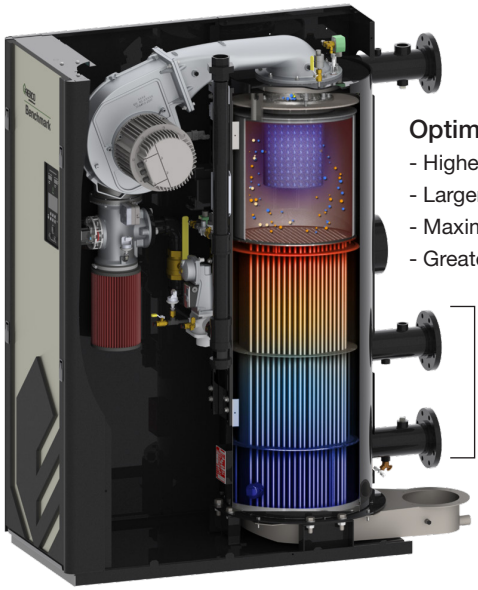


Too Much O_2
- Lower dew point
- Smaller condensing zone
- Less condensation
- Decreased energy savings

Condensing Zone
90% Efficiency
118° Dew Point

AERtrim Ensures Your System is Working Properly; Lowers Operating and Maintenance Costs

AERCO's innovative, patented AERtrim monitors the actual conditions of the Benchmark and self-adjusts its combustion process to ensure your system is operating at optimal O_2 levels and peak system efficiency. With proper O_2 levels, you'll have greater uptime reliability, save money with increased efficiencies, produce lower emissions, and create the ideal environment for condensing to occur.



Optimal O_2 Levels
- Higher dew point
- Larger condensing zone
- Maximum efficiency
- Greater savings

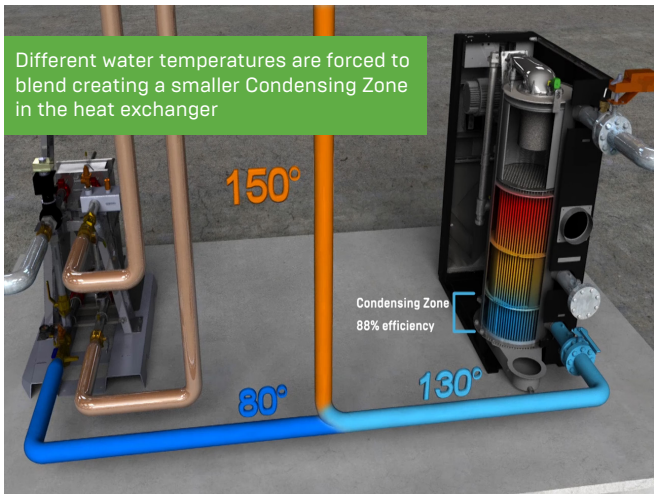
Condensing Zone
95% Efficiency
130° Dew Point

U.S. Patent: 9,175,853

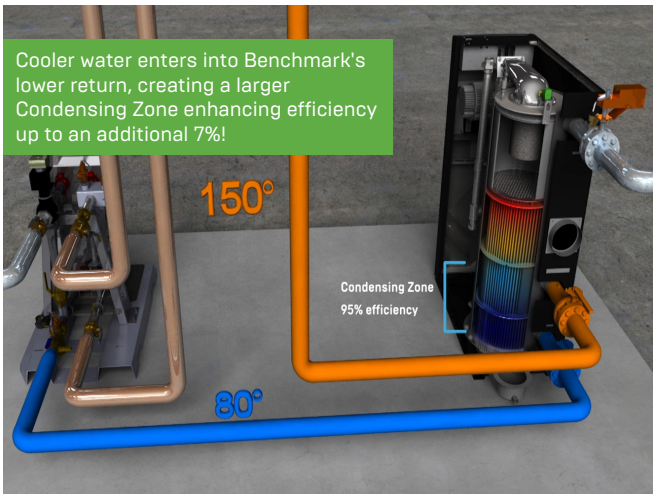
Dual Returns Maximize Efficiency up to Additional 7%

Most traditional boilers only have Single Returns which limit engineers to designing generic applications that force the blending of hot and cold water temperatures, reducing efficiencies. However, Benchmark's Dual Returns allow engineers to take full advantage of diverse load demands specific to a site and design a customized option that maximizes operational efficiencies.

Single Returns



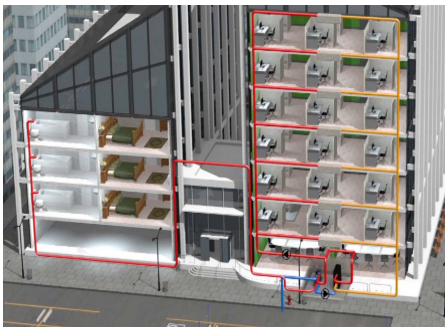
Dual Returns



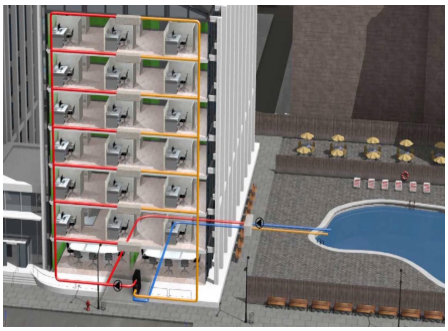
Applications

Dual Returns are ideal for systems with multiple return water temperatures (higher ΔT zones with lower return temperatures) and applications that include combination systems including:

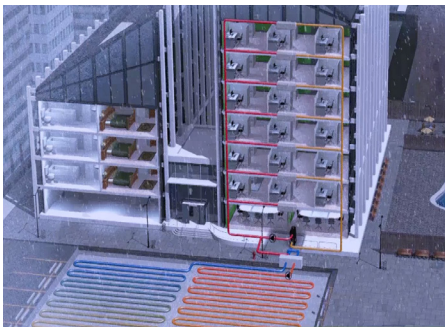
- Space heating with domestic hot water combination systems
- Multi-zone space heating
- Radiant floor heating
- Pool heating
- Snow melt
- Air pre-heating and reheating
- Supplementary heat for heat pump system



Space Heating and Domestic Hot Water



Pools



Snow Melt

onAER® Predictive Maintenance

AERCO's onAER Predictive Maintenance is an affordable, easy-to-use health of system monitoring that gives you instant access to unit performance details, event history, maintenance schedules and more. onAER helps ensure your system operates at peak performance while reducing cost of ownership.

Reduce Cost of Ownership

- Avoid lost revenue due to undetected equipment faults and downtime
- Generate regular reports that aid in decision making and cost-saving improvements
- Prevent unnecessary wear-and-tear/premature failure of your equipment

Increase Reliability and Energy Savings

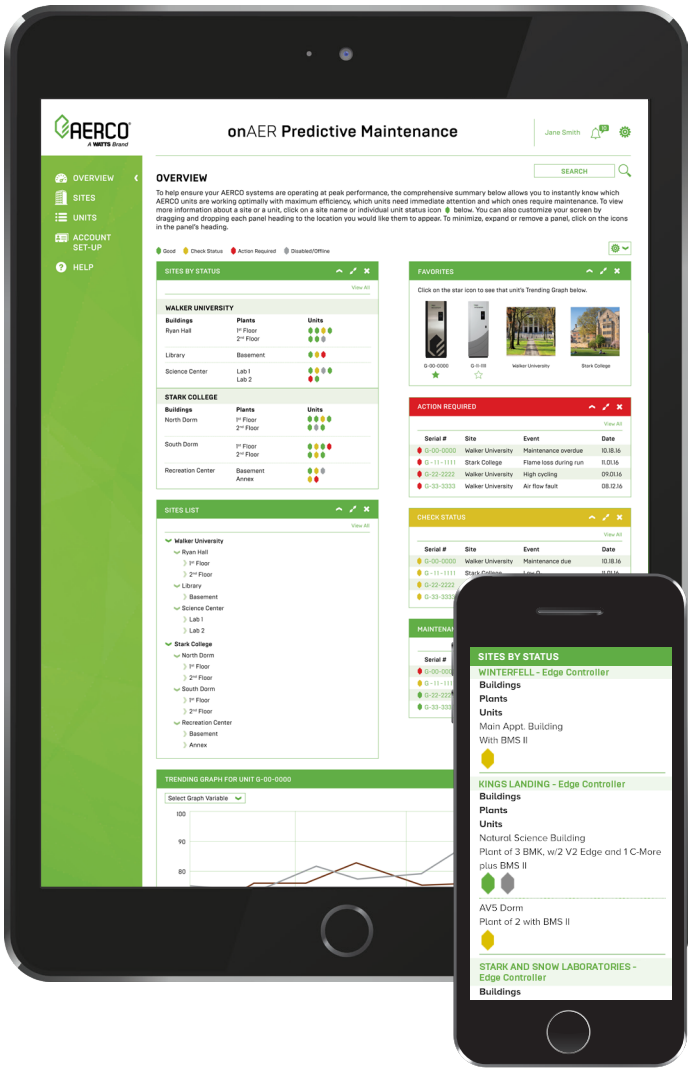
- Optimize system performance with real-time data
- Identify energy-saving opportunities by trending multiple data points including efficiency, cycles per hour, O_2 levels, temperature readings, etc.

Decrease Service Calls up to 50%

- Identify and fix potential issues before they become a problem and reduce labor costs from emergency service calls
- Implement a more responsive and scheduled maintenance plan

onAER typically identifies 4-5% system efficiency losses which can translate into $2,000 to $6,000* in fuel savings

Plant BTU	10 Year Identified Savings
2,000,000	$12,000
4,000,000	$21,000
6,000,000	$25,000
8,000,000	$31,000
10,000,000	$47,000
12,000,000	$55,000
14,000,000	$75,000
16,000,000	$81,000



*Based on typical AERCO heating system design

Simplify Service and Reduce Unscheduled Maintenance

Reduce Downtime with Instant Alerts

- Receive immediate email alerts about a fault or decline in equipment performance
- Pro-actively resolve issues quickly
- Prevent more serious problems from developing

Simplify On-Site Repairs

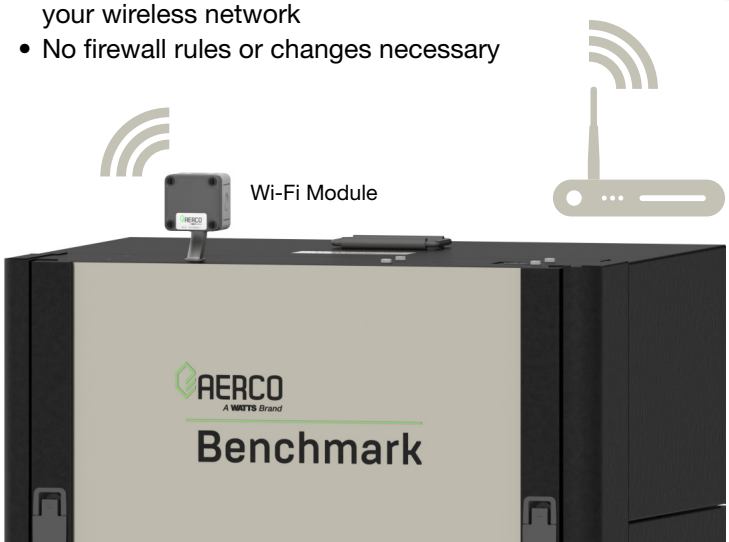
- Armed with performance and historical fault details technicians can arrive equipped with parts to allow them to work faster and more cost-efficiently
- View list of possible causes and suggested actions to help technicians fix problems quickly
- Submit maintenance/service and start-up forms via onAER

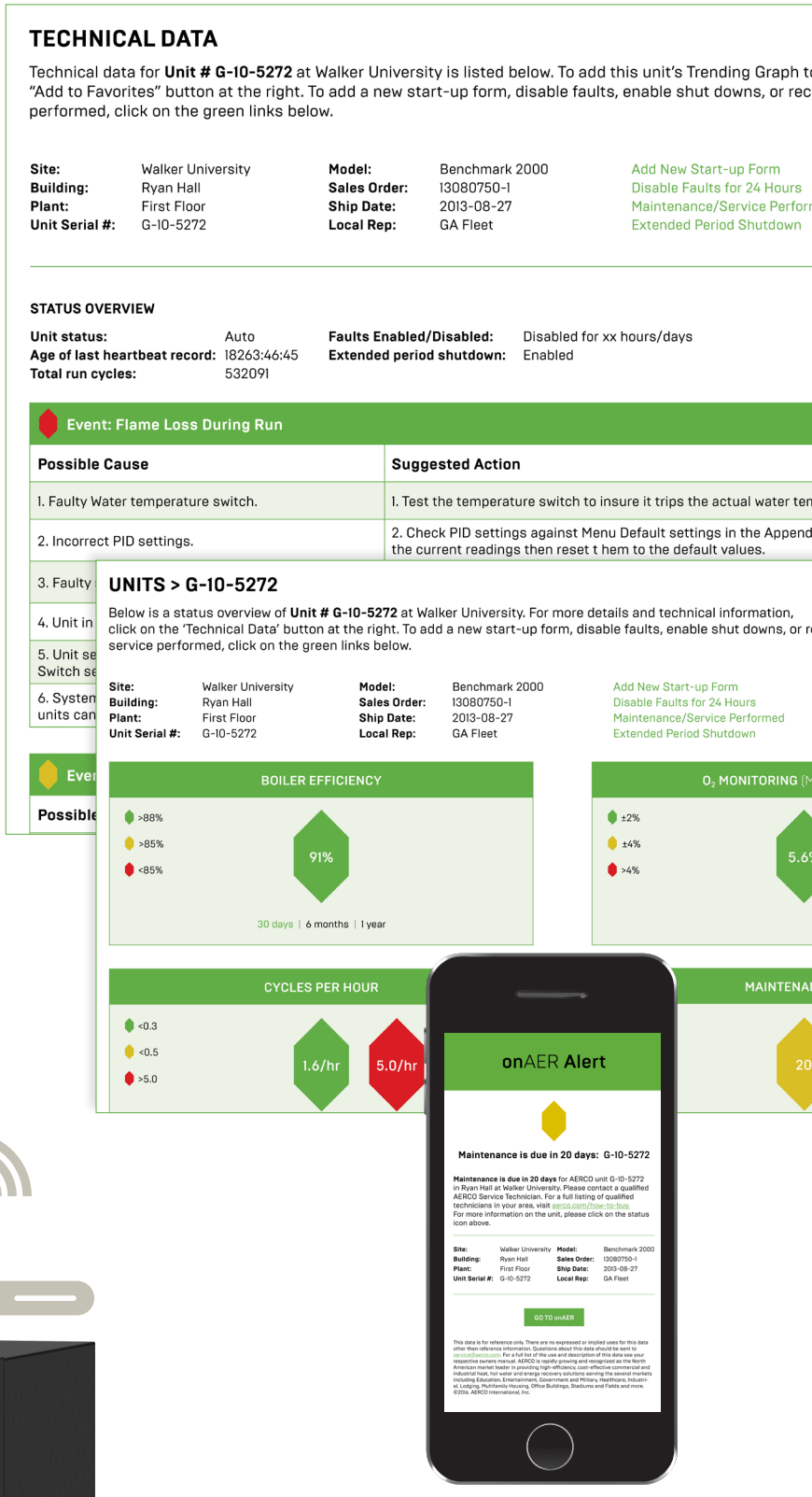
Solve Non-Critical Problems on Your Time

- Schedule service at your convenience
- Minimize facility and occupant disruptions

Secure, Remote Monitoring and Management

- Easily installed over secure, authorized ethernet connection
- Data travels outbound only eliminating any security risks
- Wi-Fi module is available to connect to your wireless network
- No firewall rules or changes necessary





Unmatched Reliability and ROI

Benchmark boilers provide maximum efficiency and deliver significant ROI to thousands of customers including increased energy savings, reliable heat, and lower installation and operational costs — all in a space-saving, compact footprint.

Saves Space, Easy to Install

The Benchmark is a powerful boiler packed into a small footprint. Each stainless steel unit fits through standard 36" doorways and can travel via elevators – no need to tear down walls, use cranes or other expensive tools. In fact, our Benchmark 6000 is the smallest of its kind – up to a third the size of the competition.

Superior Construction for Greater Uptime Reliability

AERCO's 439 stainless steel heat exchanger delivers a longer life through a simplified design that has only two moving parts. The condensing heat exchanger is built to withstand thermal shock and eliminates the need for traditional boiler pumping equipment. The forced draft, modulating burners operate with unmatched turndown to minimize cycling and maximize seasonal efficiency while simplifying the venting system. AERCO's patented air/fuel delivery system and fully modulating burner reduces cycling losses, as well as wear and tear.

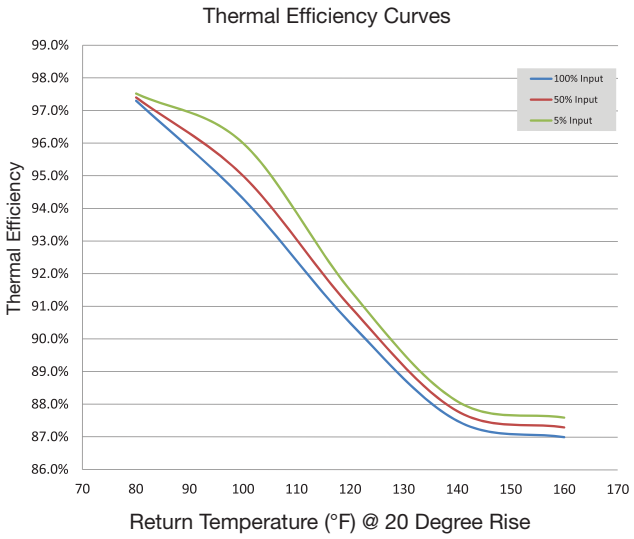
Boiler Sequencing Technology (BST) – Load Sharing Strategy Maximizes Energy Efficiency

It requires less energy for a group of modulating boilers, each firing at "part load," to heat a building, than for a single boiler operating at "full fire" to carry the entire workload. To meet building demand, the BST employs as many boilers as available, each operating at its most efficient firing rate. Because the BST reacts in real-time (up to 16 boilers), users can take a unit offline for maintenance at any time or bring on back-up boilers for extremely cold conditions without changes to your system's performance. And as individual boilers are added or deleted, the energy delivered is automatically adjusted to prevent fluctuations in the header temperature of the plant.

Simple to Service

Removable enclosure panels provide easy access to all piping making the Benchmark extremely easy to service which simplifies lifetime maintenance. It's also compatible with popular EMS software, and can be remotely controlled providing detailed LCD diagnostics that can help prevent any issues from developing.

High Efficiency, Increased Energy Savings



*For BMK1000

State-of-the-Art Technology and Features

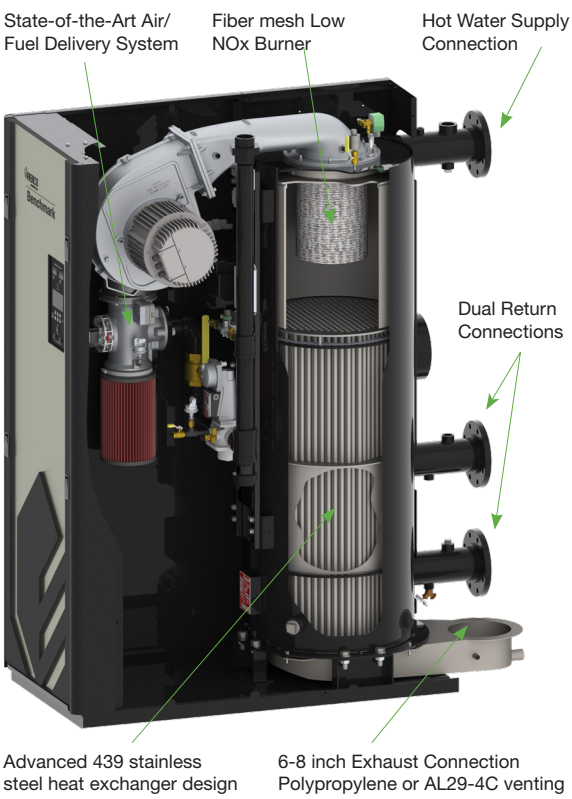
The Greenspec® Listed Benchmark boilers are perfect for “green” designs. Their small footprint, flexible venting/piping options, high efficiency and lower operating costs can help facilities earn LEED points. Benchmark® has been designed with several environmental advantages.

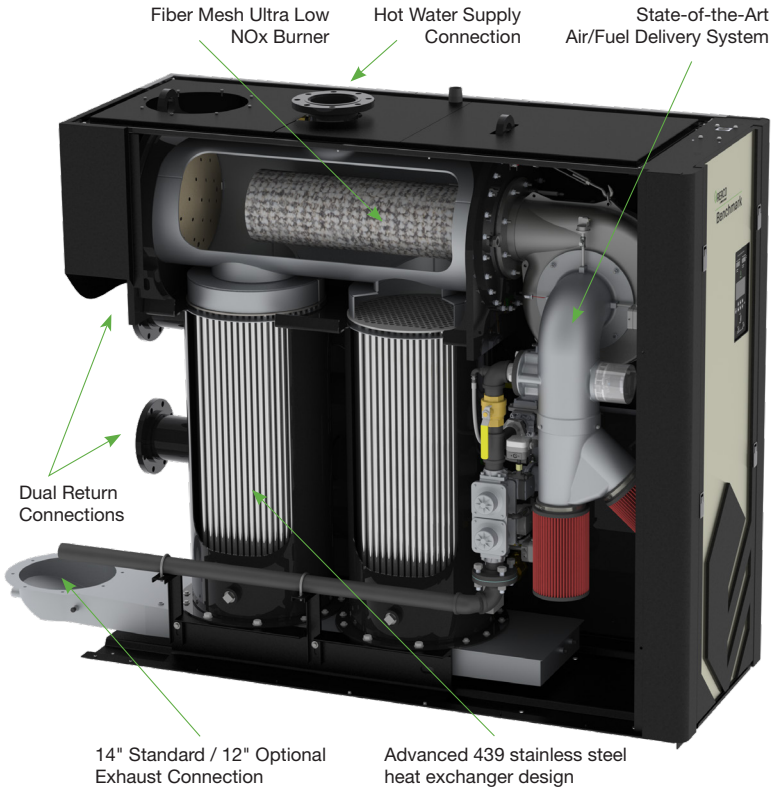
750, 1000, 1500, 2000, 2500, 3000, 4000, 5000N

- 15:1 - 20.1 turndown
- AERtrim (optional)
- Dual Return connections (optional)
- Durable and reliable 439 stainless steel firetube heat exchanger
- Capable of variable primary flow installations
- Low NOx emissions (20 ppm or less at all firing rates)
- 9 ppm optional calibration*
- Compact footprint – all models fit through standard doorway
- Ducted combustion air capable
- Venting versatility with AL29-4C, Polypropylene, CPVC**, or PVC**
- Available in natural gas, propane, and dual fuel
- Optional gas train with VPS (Valve Proving System) for 4000 and 5000N models

5000, 6000

- 12:1 - 15:1 turndown
- AERtrim (optional)
- Dual Return connections (optional)
- Durable and reliable 439 stainless steel firetube heat exchanger
- Capable of variable primary flow installations
- Low NOx emissions (20 ppm or less at all firing rates)
- 9 ppm optional calibration (BMK6000 requires 14” exhaust venting)
- Compact footprint – up to a third the size of the competition
- Ducted combustion air capable
- Venting versatility with AL29-4C, Polypropylene
- Available in natural gas and dual fuel
- Optional gas train with VPS (Valve Proving System)





*BMK 750-2000, 4000/5000N only **BMK 750/1000 only

Save Big with Installation Advantages

Smallest Footprint in the Industry!
Benchmark has the smallest footprint in the industry! Its 6000 model is the most compactly designed 6 million BTU/hr boiler in the market – up to a third the size of the competition. All units easily fit through a standard doorway and can be transported via a freight elevator which translates into big savings on installation. All units are delivered as a single, fully assembled unit. Its quiet operation along with its doorway-sized, small footprint makes it ideal for both new construction and retrofit applications.

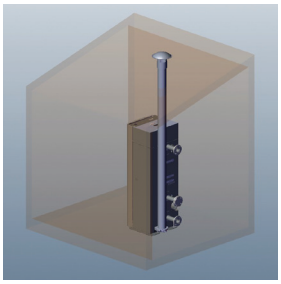
Venting Versatility for Easy Installation
Benchmark products provide numerous venting options including sidewall, through-the-roof, and ducted combustion capabilities (direct-vent). They're approved for venting with PVC, CPVC, Polypropylene, or AL29-4C materials are all available and provide broad installation flexibility and savings.
Take for example the Benchmark 6000. Due to its high efficiency and low flue gas temperatures, the Benchmark 6000 can be installed with 12" flue venting – no other 6000 MBH boiler is able to use polypropylene venting under all operating conditions.
Not only does the ability to use polypropylene venting prove the Benchmark 6000's superior efficiency, but it also provides big savings on total cost, as well as the flexibility to customize its fit making the units even easier to install.

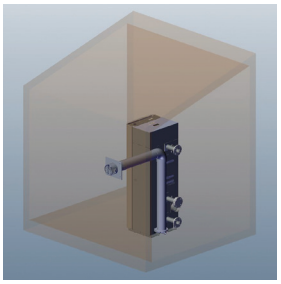
Zero Side Clearance for Easy Maintenance
Benchmark can be serviced via the front or top of the boiler, as well as the side. This flexibility allows units to be configured side by side.

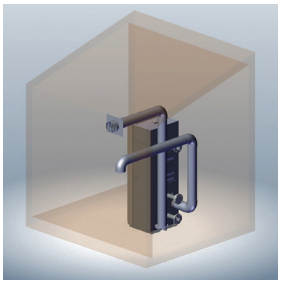

BMK 3000

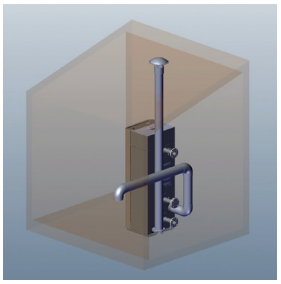

Outdoor solution available

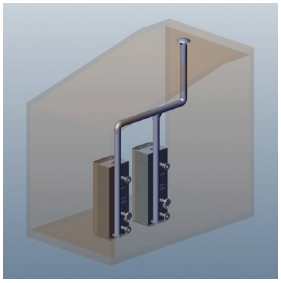
Vent Configurations

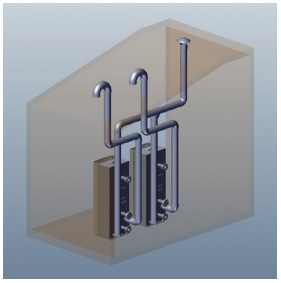

Vertical vent/room air

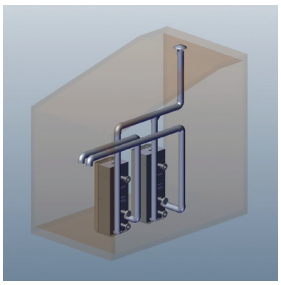

Sidewall vent/room air

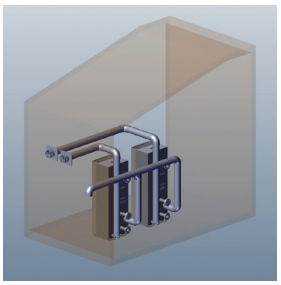

Direct-vent


Vertical vent/sidewall air


Common vertical vent/room air


Common vertical vent/ individual vertical air


Common vertical vent/ individual sidewall air


Individual sidewall vent/ common sidewall air

Consult an AERCO representative for additional venting configuration inquiries.

Accessories

Motorized Valves
The Belimo F6...HDU Series 2-way butterfly valves are designed to meet the needs of HVAC and commercial application requiring bubble tight shut-off for liquids. Typical applications include boiler isolation, chiller isolation, cooling tower isolation, change-over systems, air handler coil control, bypass and process control applications. Valves specifically designed for easy installation on BST configured boiler plants are available as well.

Condensate Neutralizer Kit
AERCO Condensate Neutralizers are ideal for condensing boilers and furnaces operating on natural gas or propane. The condensate is acidic and has the potential to harm the environment and the sewer system. The AERCO Condensate Neutralizer will raise the pH of the condensate to a more neutral level before it is discharged to drain.

Buffer Tanks
AERCO buffer tanks are ASME certified pressure vessels designed for use with high efficiency, low volume systems that incorporate low-mass condensing boilers. They add thermal mass, dampen fast transitions and minimize boiler cycling that occurs during zero or low domestic load conditions. Available in two and four-port (Primary-Secondary) configurations.

Venting Mufflers
AERCO offers 6”, 8”, and 14” exhaust mufflers that are specifically designed with flanged ends to fit directly on the exhaust manifold of Benchmark boilers. The flanged-end design allows the muffler to be used with any venting system manufacturer – the only adapter required is an AERCO starter piece at one or both ends of the muffler.

Specifications and Dimensions

	750	1000	1500	2000	2500
Adjustable Temp. Control	50°F to 190°F				
Ambient Temperature	0°F to 130°F				
Accuracy	+/-4°F				
Thermal Efficiency (80° - 180°F)	95.6%	96.8%	94.6%	94.6%	93.5%
Input (Nat. Gas)	750,000 BTUH	1,000,000 BTUH	1,500,000 BTUH	2,000,000 BTUH	2,500,000 BTUH
Net Output (Nat. Gas)	697,000 BTUH	930,000 BTUH	1,395,000 BTUH	1,860,000 BTUH	2,325,000 BTUH
Turndown Ratio	15:1	20:1			15:1
Flue Connection Dia	6” Diameter			8” Diameter	
Flue Material (per local code)	PVC, CPVC, PP or AL29-4C		AL29-4C, PP	PP or AL29-4C	
Water Inlet and Outlet	3” 150# Flange		4” 150# Flange		
Dual Rear Returns	✓				
Gas Connection	1” NPT Male		2” NPT Male		
Gas Pressure Requirements*	14” WC Maximum, 4” WC Minimum at Full Load				
Min/Max Water Flow	12-175 GPM		25-250 GPM		
Condensate Connection	3/4” NPT Female		1.5” Tube		
Max Condensate Flow	6 GPH	8 GPH	9 GPH	10 GPH	17 GPH
Pressure Rating	160 PSIG at 210°F				
NOx Emissions Cert.	SCAQMD, TCEQ				BAAQMD, TCEQ
Standard Listing and Approvals	UL, CUL, ASME				
Gas Train Options	FM Compliant, FM Compliant with Valve proving, Factory Installed, Double Block and Bleed (Formerly IRI)				
Electrical Requirements	120/1/60 20 AMP (13 AMP FLA)		120/1/60 20 AMP (16 AMP FLA)		208/3/60 20 AMP (10 AMP FLA) 460/3/60 15 AMP (5 AMP FLA)
Water Pressure Drop	3.0 PSIG @100 GPM		3.0 PSIG @170 GPM		3.2 PSIG @ 250 GPM
Water Volume	28 gallons	26 gallons	44 gallons	40 gallons	60 gallons
Weight, Installed (dry)	669 lbs.	700 lbs.	1,406 lbs.	1,500 lbs.	2,000 lbs.

*Values are for Natural Gas FM Compliant gas trains only. See Benchmark Gas Components & Supply Design Guide GF-2030 for Propane, DBB & Duel Fuel gas train gas pressure requirements.

Model	Width	Depth	Height
Benchmark 750	28”	23.5”	78”
Benchmark 1000	28”	24”	78”
Benchmark 1500	28”	42.6”	78”
Benchmark 2000	28”	42.6”	78”
Benchmark 2500	28”	55”	78”

Model	Width	Depth	Height
Benchmark 3000	28”	55”	78”
Benchmark 4000	34"	62.5"	78.2"
Benchmark 5000N	34"	62.5"	78.2"
Benchmark 5000	35”	88.3”	79.8”
Benchmark 6000	35”	88.3”	79.8”

Please find complete dimensions on the Benchmark tech data sheet.

Specifications and Dimensions

	3000	4000	5000N	5000	6000
Adjustable Temp Control	50°F to 190°F				
Ambient Temperature	0°F to 130°F				
Accuracy	+/-4°F				
Thermal Efficiency (80° - 180°F)	94.6%	94.1%	93.8%	93.9%	94.5%
Input (Nat. Gas)	3,000,000 BTUH	4,000,000 BTUH	4,990,000 BTUH	5,000,000 BTUH	6,000,000 BTUH
Net Output (Nat. Gas)	2,790,000 BTUH	3,720,000 BTUH	4,640,000 BTUH	4,650,000 BTUH	5,580,000 BTUH
Turndown Ratio	15:1	15:1	20:1	12:1	15:1
Flue Connection Dia	8” Diameter	12” Flue/ 10” Air Intake		14 Inch Optional / 12 Inch Flue Venting	14 Inch Optional / 12 Inch Flue Venting
Flue Material (per local code)	PP or AL29-4C	PP or AL29-4C		PP or AL29-4C	PP or AL29-4C
Water Inlet and Outlet	4” 150# Flange	6” 150# Flange		6” 150# Flange	6” 150# Flange
Dual Rear Returns	✓				
Gas Connection	2” NPT Male	3” NPT Male		2" NPT Male / 3" NPT Male*	
Gas Pressure Requirements*	14” WC Maximum, 4” WC Minimum at Full Load			14" WC to 2 psi / 4" WC to 10" WC*	
Min/Max Water Flow	25-350 GPM	35-500 GPM		75-600 GPM	
Condensate Connection	1.5” Tube	1.5” Tube			
Max Condensate Flow	20 GPH	30 GPH		40 GPH	
Pressure Rating	160 PSIG at 210°F			80 PSIG at 210°F / 150 PSIG at 210°F	
NOx Emissions Cert.	BAAQMD, TCEQ			SCAQMD, TCEQ	SCAQMD, TCEQ, BAAQMD
Standard Listing and Approvals	UL, CUL, ASME				
Gas Train Options	FM Compliant, FM Compliant with Valve proving, Factory Installed, Double Block and Bleed (Formerly IRI)			FM Compliant 14" - 2PSI, FM Compliant 14" - 2PSI with Valve Proving System (VPS), FM Compliant 4" - 10", FM Compliant 4" - 10" with Valve Proving System (VPS)	
Electrical Requirements	208/3/60 20 AMP (10 AMP FLA) 460/3/60 15 AMP (5 AMP FLA)	460/3/60 20 AMP (12 AMP FLA) 208/3/60 40 AMP (23 AMP FLA)		208/3/60 30 AMP (19 AMP FLA) 460/3/60 20 AMP (9 AMP FLA) 575/3/60 20 AMP (7 AMP FLA)	
Water Pressure Drop	3.2 PSIG @ 250 GPM	3.0 PSIG @ 475 GPM		4.0 PSIG @ 500 GPM	
Water Volume	55 gallons	77 gallons		110 gallons	
Weight, Installed (dry)	2,170 lbs.	2,200 lbs.		3,000 lbs.	

*For Benchmark 5000/6000 offers an optional model for low gas pressure.

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