



**CREST**<sup>®</sup>  
CONDENSING BOILER

WITH

**HELLCAT**<sup>™</sup>  
COMBUSTION TECHNOLOGY

2021 PRODUCT PROSPECTUS

 **Lochinvar**<sup>®</sup>

DELIVERING  
THE BEST  
IS IN  
OUR DNA



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## A HISTORY OF INNOVATION

For more than 80 years, Lochinvar, an American company, has been a leader of innovation and high-efficiency water heating solutions. Through Lochinvar's pride in leadership and commitment to excellence, the company has continually improved year after year.

Today, Lochinvar exhibits the broadest line of high-efficiency water heating solutions, a world-class research & development department, and comprehensive service with every sale and industry-leading training through Lochinvar University.

Introduced in 2011, the CREST® Condensing Boiler was a breakthrough product for Lochinvar. With five sizes ranging from 1.5 to 3.5 million BTU/hr and boasting a 92% thermal efficiency, the CREST led the way for Lochinvar in the commercial condensing boiler industry.

A unique combustion system featuring two fans, two gas valves, and a dual chamber burner allowed the CREST to maximize turndown unlike any other product. The Wave™ fire tube, designed and engineered at Lochinvar, delivered robust heat transfer and set itself apart from the competition.

In 2015, the product line was enhanced by expanding the product offering down to 750,000 BTU/hr and up to 5 million BTU/hr.

In addition, a new combustion system was introduced that allowed greater flexibility and more robust operation. In 2016, the 6 million BTU/hr input model was introduced making this product line even broader in its capability.

Now, the entire CREST Condensing Boiler line features Hellcat Combustion Technology™ along with the same great thermal efficiency of up to 96.2%. Combined with the standard offering of CON-X-US®, CREST brings the best tools together in one product. Complete control from anywhere, installation flexibility, high turndown, and excellent serviceability are what set CREST above the rest.

**UP TO 6 MILLION BTU**  
**UP TO 96.2% EFFICIENCY**

CREST boilers are equipped with a top-mounted micro-metal fiber burner, engineered specifically for fire-tube technology. The system is designed to ensure smooth, quiet modulating combustion with up to 25:1 turndown. The 2 million BTU Crest with Hellcat fires at its maximum 1,999,999 BTU/hr rate when the heat load is highest, and then gradually turns down to as low as 4% (80,000 BTU/hr) as load decreases. A modulating system runs smoothly and efficiently, without frequent on/off cycling. When the system is zoned, CREST's high turndown works to match the actual system demand. In return, CREST reduces the customer's fuel bill and provides better comfort by load-matching the heat loss of the system.

2011-2012

1.5 Million - 5 Million Released

2015

Enhanced Efficiency  
New Models

New Combustion Technology  
96.2% Efficiency on Models  
From 750,000 - 2 Million BTU

2016

6 Million Released

2018

Outdoor Model Released  
New Combustion Technology  
96% Efficiency on Models  
From 2.5 - 6 Million BTU

2021

Crest with Hellcat  
Combustion Technology  
on 1 - 6 Million BTU



## HELLCAT COMBUSTION TECHNOLOGY

After increasing the thermal efficiency up to **96.2%**, developing a single fan combustion system with up to **25:1 TURNDOWN**,

### REALTIME O<sub>2</sub> FEEDBACK™

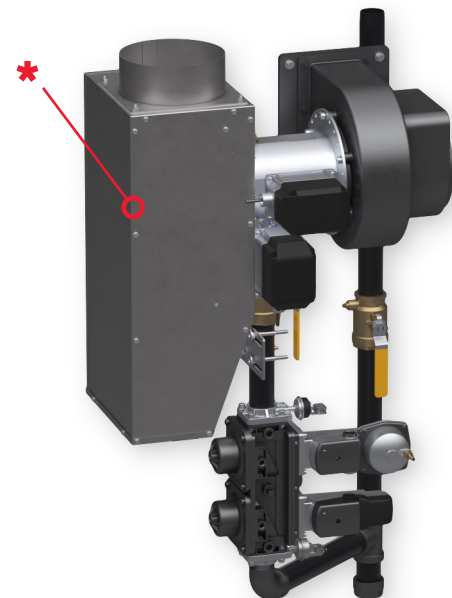
and adding Lochinvar is proud to introduce CREST with Hellcat Combustion Technology.

This new technology brings several new ideas to CREST; a combustion system that delivers **REALTIME O<sub>2</sub> TRIM™** with feedforward, feedback, and learned information to drive the system; a new industrial design and control platform provide greater agility.



### AIR & GAS TRAIN

The Hellcat Combustion Technology features a highly accurate butterfly valve-actuator assembly that will adjust the air and fuel supply to the burner independently.



This straightforward design and all new control platform allows maximized turndown, expanded venting capability, and optimized combustion fuel/air ratio.

\* Integrated into the boiler cabinet, the air filter stops particles from entering the burner. This is especially helpful when boilers are installed and operational while building construction might still be underway.

## COMBUSTION SYSTEM

The O<sub>2</sub> sensor is one of the most integral components in the combustion system. Lochinvar entered an sole relationship arrangement with a global supplier to identify a superior O<sub>2</sub> sensor.

Evaluation of several sensor brands included an accelerated test to examine fouling. Fouling is a common culprit affecting the O<sub>2</sub> sensor's precision and accuracy. Evaluation results showed competing sensors had drifted due to fouling, but our chosen supplier's sensor was still functioning reliably.

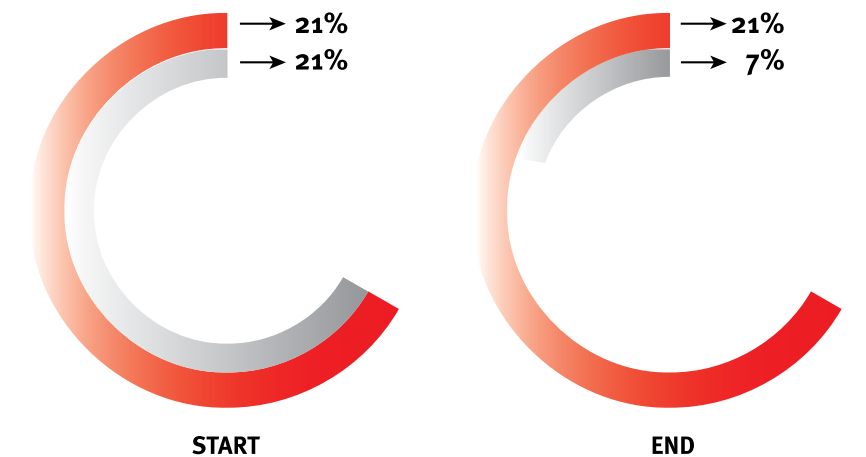
### TURNDOWN

- Minimum of 20:1 and a Maximum of 25:1 across the model range
- Automatically changes firing rate with building heat demand
- Reduces on/off cycling
- Extended run times
- Increased system efficiency

## O<sub>2</sub> SENSOR

### O<sub>2</sub> SENSOR TEST

O<sub>2</sub> READING IN AIR (TARGET OF 21%)



After identifying the most reliable O<sub>2</sub> sensor, our engineers optimized its use within the system. A free air calibration occurs at every combustion cycle. This calibration ensures the O<sub>2</sub> sensor accurately reads O<sub>2</sub> in free air prior to using it during the combustion process. Because of compensating for altitude, the calibration corrects the O<sub>2</sub> reading based on elevation of the installation. This **initialize, read, and correct** sequence ensures the O<sub>2</sub> sensor sends an accurate air/fuel ratio reading to the controller before each cycle.



## O<sub>2</sub> SENSOR (CONT.)

Placement of the O<sub>2</sub> sensor inside the combustion chamber was a critical decision for a variety of reasons. Sensor material and operating temperature make it vitally important to avoid malfunction by keeping it away from moisture. By placing the sensor inside the combustion chamber instead of the flue, exposure to moisture is greatly reduced. Lab testing confirmed placement in the flue with its high moisture content led to the shortest life span. Another reason for sensor placement inside the combustion chamber is proximity to the flame where H<sub>2</sub>O remains in its vapor state. Keeping the sensor protected from moisture by placing it in a very hot environment contributes to a longer lifespan.

Despite the apparent contradiction, sensor placement in the combustion chamber allows our control to read a “wet” O<sub>2</sub> sample. “Wet” O<sub>2</sub> refers to the fullness of the sample, not moisture content.

**A Wet O<sub>2</sub> reading is directly informative of the actual air/fuel ratio and is accurate regardless of fuel type.**

Dry O<sub>2</sub> readings from exhaust fumes are “polluted” by fuel and condensate. Dry samples will also indicate a higher percentage of CO<sub>2</sub> because there are more contaminants to filter through.

Lochinvar has addressed one of the biggest complaints about O<sub>2</sub> sensors in condensing boilers by protecting them from moisture and other products of combustion. Through our supplier partnership and extensive testing, Lochinvar’s O<sub>2</sub> sensor is not prone to drift, fouling, or premature failure.

In combustion analysis, there are 2 values that could be used to drive optimal performance; the Wet O<sub>2</sub> value and the Dry O<sub>2</sub> value. The Wet O<sub>2</sub> value represents the air/fuel ratio and is not influenced by fuel type, condensate, etc. The Dry O<sub>2</sub> on the other hand has a higher percentage of CO<sub>2</sub> in its composition and is fuel type specific. By sensing this Wet O<sub>2</sub> value, Hellcat Combustion Technology can zero in on the required air/fuel mix and perform at a peak level in its installed environment.

## FEEDFORWARD

To understand how Lochinvar can deliver this state-of-the-art combustion system, we will begin with the sequence of operation. The first step is to utilize our innovative “feedforward” system to approximate the air/fuel mixture needed for clean combustion. Two components within the feedforward system are a barometric pressure sensor and a temperature sensor. The pressure sensor detects local barometric pressure while the temperature sensor determines air supply temperature. These sensor readings are interpreted and applied to the combustion process to supply an optimal air/fuel mix.

After ignition, Hellcat determines if an optimal O<sub>2</sub> value is achieved from inside the combustion chamber. If any adjustments are needed, the system uses a feedback loop of learned O<sub>2</sub> readings to correct the combustion mixture.

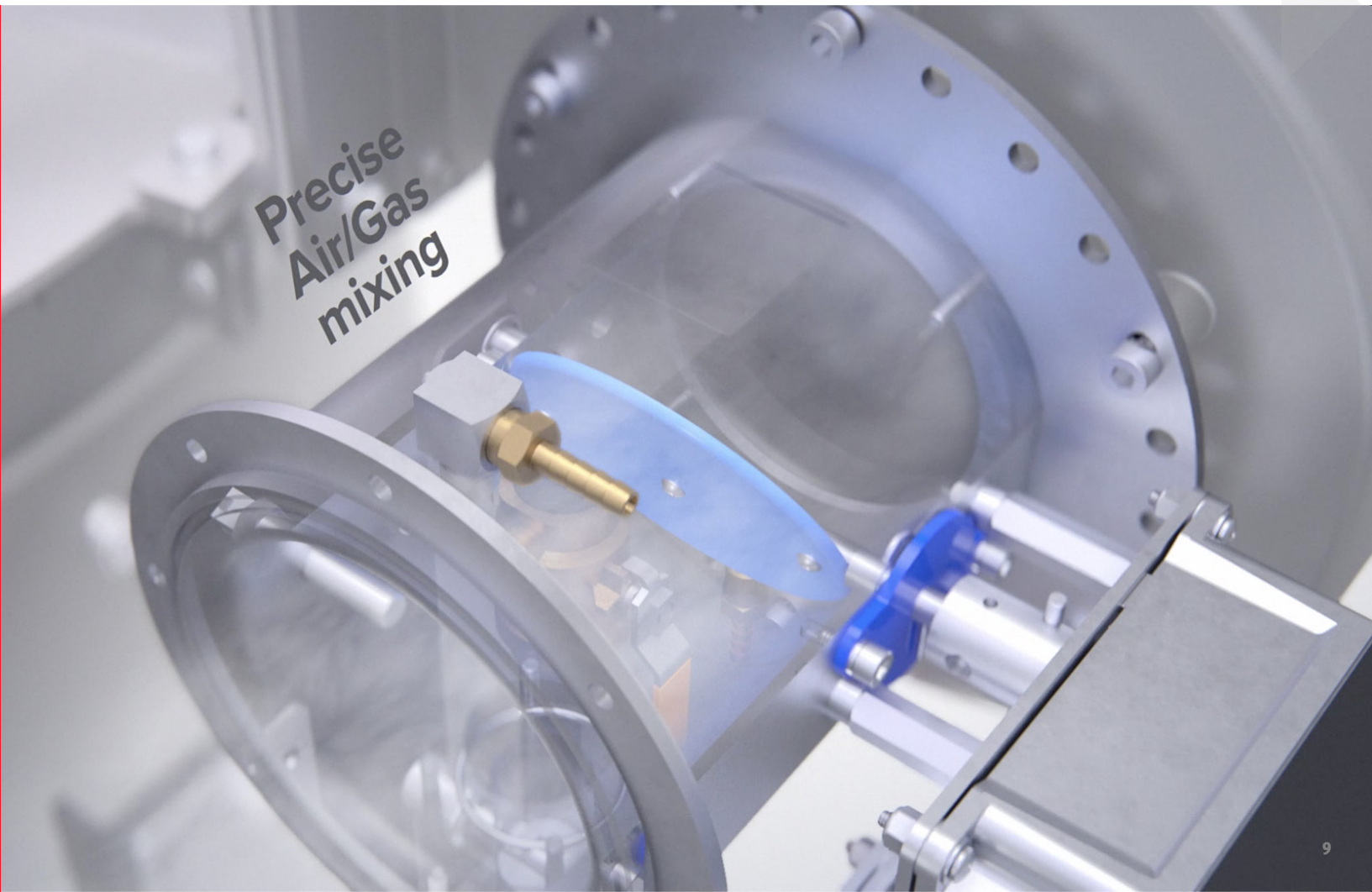
## COMMISSIONED TRIM

Commissioned Trim is established during initial operation through a process made simple with the Hellcat Combustion Technology’s Commissioning Wizard. Adjusting gas valves with a screwdriver is no longer needed since fine tuning combustion is now accomplished on the touchscreen display. The system features nine pre-set points on the design curve for the air and gas dampers. This design curve has been tested and evaluated at Lochinvar’s Research and Development Lab and is based on the maximum direct vent length of 150 feet. These dampers will not move from these pre-defined positions. Instead, any adjustments will ramp fan speed up or down.

When first started, the boiler will modulate to low fire. The display will show the first pre-set target O<sub>2</sub> and the actual O<sub>2</sub> reading. The gas regulator on the unit will need to be adjusted to reach the target O<sub>2</sub>. After gas pressure adjustments, the unit will pause for 30-45 seconds to self-adjust using the fan speed to dial into the O<sub>2</sub> target. The unit will again self-adjust to achieve the target O<sub>2</sub> at each of the nine pre-set points. If the target O<sub>2</sub> at a certain setting is not satisfactory (such as combustion noise), it can be manually moved. The control interface features a +/- button to make appropriate O<sub>2</sub> adjustments and eliminates the need to adjust the gas valve. Each pre-set point requires confirmation to proceed to the next. In addition to the nine pre-sets, there is also an ignition setting that can be fine-tuned. After all settings are confirmed, set-up is complete. Each step takes approximately 1 to 1½ minutes with commissioning estimated to take less than 30 minutes.

## HELLCAT COMBUSTION TECHNOLOGY

- Continuous RealTime O<sub>2</sub> Trim™ throughout operational range
- Feedforward continuously monitors environmental conditions
- Commissioned Trim sets the target O<sub>2</sub> based on the installation conditions
- Learned Trim looks at past performance for optimal settings to achieve Target O<sub>2</sub>
- Feedback confirms via the Wet O<sub>2</sub> Value if the Target O<sub>2</sub> was achieved





# LEARNED TRIM

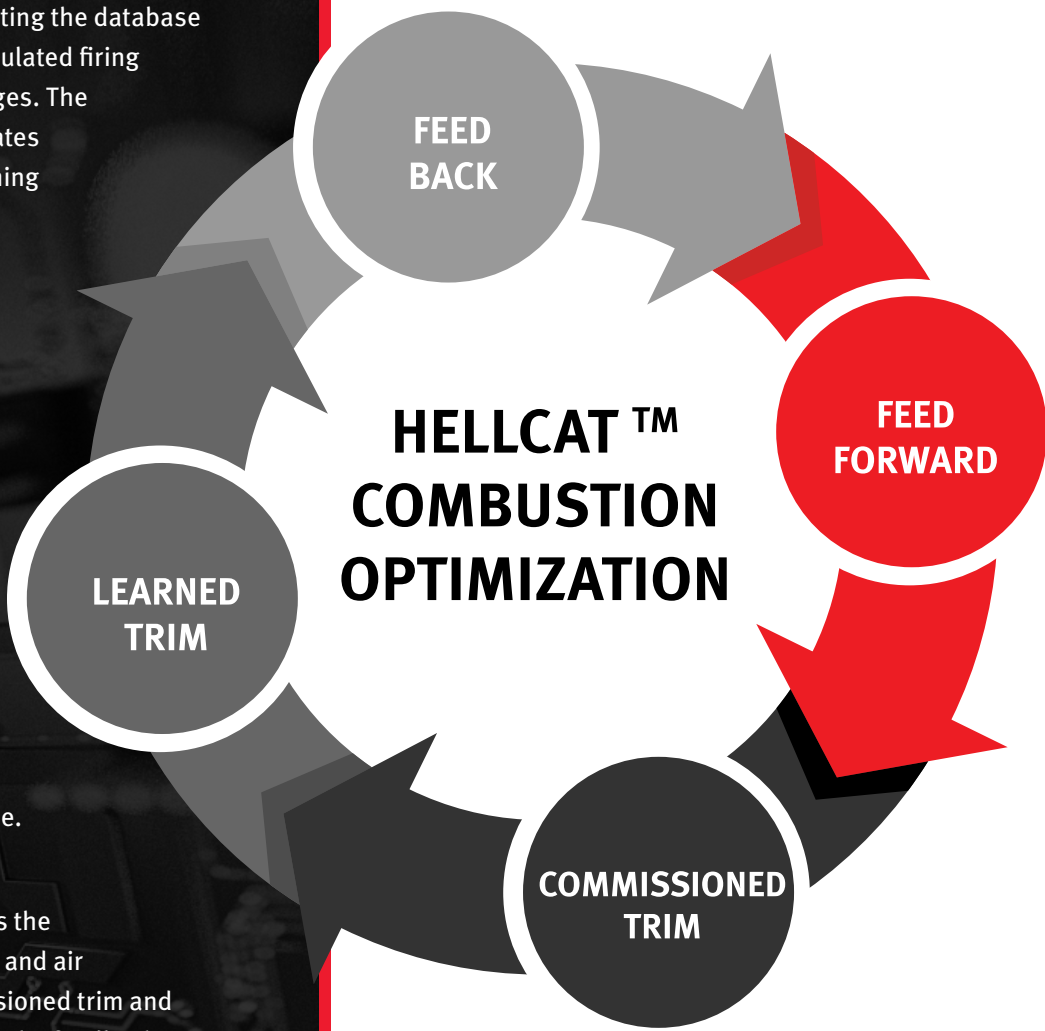
Learned Trim functions by evaluating the database of RealTime O<sub>2</sub> readings and modulated firing rates due to environmental changes. The evaluation anticipates and mitigates potential operating issues by aiming toward a recorded optimal air/fuel ratio for specific operating conditions. Because Learned Trim looks at past performance, the control system will continue to function even if the O<sub>2</sub> sensor becomes compromised. If the unit is unable to achieve the optimal air/fuel ratio during operation, modulation will decrease to allow more movement in the fan's air speed. This provides a greater adjustment range of the air/fuel ratio to drive optimal performance.

Through the range of operation, the system continuously monitors the feedforward barometric pressure and air temperatures, evaluates commissioned trim and learned trim settings, and checks the feedback O<sub>2</sub> reading. At the same time, RealTime O<sub>2</sub> Trim is active to achieve the optimal air/fuel ratio.

This method of continuous monitoring provides air/fuel adjustments by three different means:

- 1 The air damper controls air supply**
- 2 The gas damper controls fuel supply**
- 3 The fan speed fine tunes the mixture**

Combining all three independent adjustment methods creates precision combustion control.



# INTEGRATED CONTROL PLATFORM

This innovative control platform consists of five boards which gives it ultimate flexibility.

## User Interface

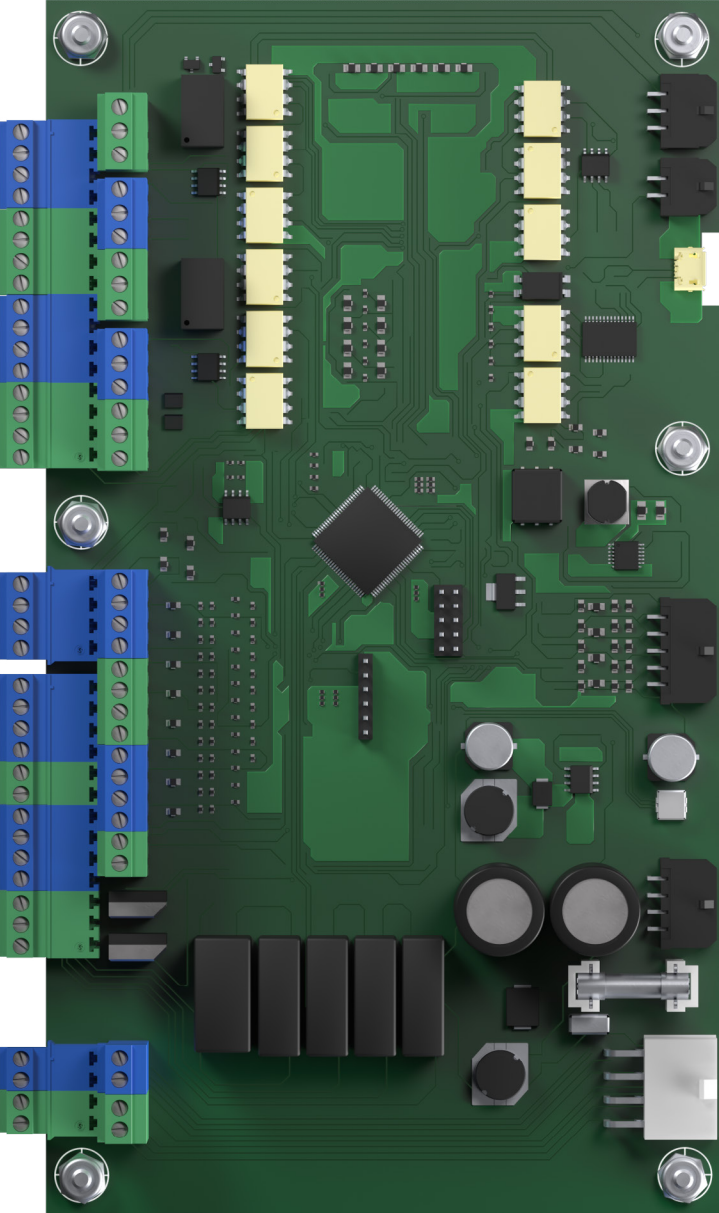
**Comfort Control Board**  
(including low voltage board connections)

**Boiler Control Board**

**Combustion Feedback Board**

**O<sub>2</sub> Sensor Board**

**Pump Board**



Lochinvar developed a new separate Comfort Control Board which provides more flexibility and quicker adjustments. Previously the single boiler control board contained safety controls (high limits for example) and comfort controls (outdoor air reset) making an adjustment to an unrelated certified safety control a complicated process. The Boiler Board, Combustion Feedback Board, the Comfort Control Board, and the O<sub>2</sub> Sensor Board also feature LED status and fault indicators to help with diagnosis in the field.

**The new Comfort Control Board allows Lochinvar to make operational enhancements and adjustments without having to go through the certification process.**

As updates are developed, Lochinvar can quickly implement them on the comfort control board in-house for a faster response in the field.



CONTROLS (CONT.)

All five of the control boards are universal, which means they will not be designated by model size. If a board needs to be replaced, the universal board can be used since the individual boiler’s settings remain on an external personality key. This helps with inventory and with field replacement.

THE BOILER CONTROL BOARD OFFERS SEVERAL NEW FEATURES

TWO GAS PRESSURE SWITCH INPUTS

One switch for high and one for low. The control can now tell which switch has locked out, where the previous version only identified the lock out as gas pressure switch.

AIR FILTER SWITCH INPUT

Indicates when a filter is dirty and impacting performance.

BLOCKING REPORT

Identifies the last blocking code as well as what time it occurred.

LOCKOUTS NOW LOG THE BURNER STATE

Lockout during flame stabilization after ignition for example.

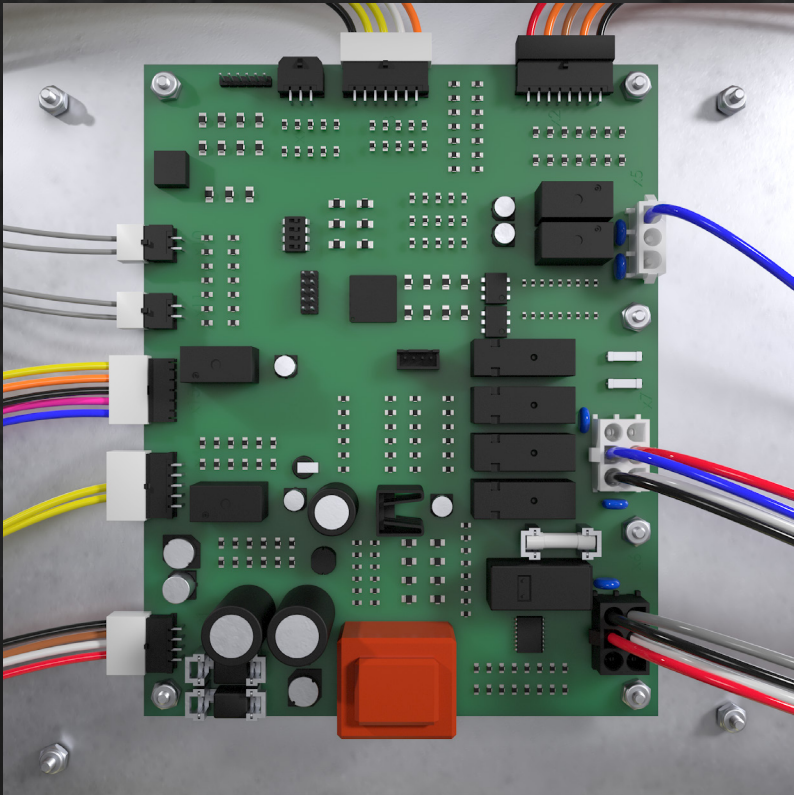
RECYCLING REPORT

This helps troubleshoot situations where recycling occurs but there is no lockout. One such example includes a severe wind condition that caused the unit to recycle but not lockout. Previously only the lockout conditions would have been reported and logged.

LED INDICATOR LIGHTS TO AID IN TROUBLESHOOTING

COMBUSTION FEEDBACK

While the Combustion Feedback and O<sub>2</sub> Sensor Board are integral to the RealTime O<sub>2</sub> Trim feature, they also aid in troubleshooting. The Combustion Feedback board shows a solid yellow light when the boiler is running, a flashing yellow light when a demand is present, and a red light on a lockout. The O<sub>2</sub> Sensor Board features a green light for normal conditions.



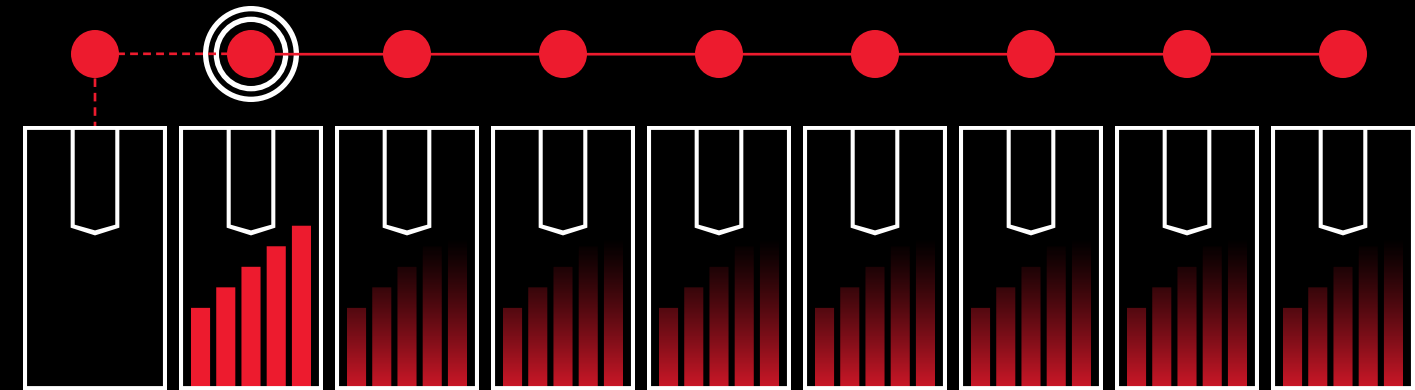
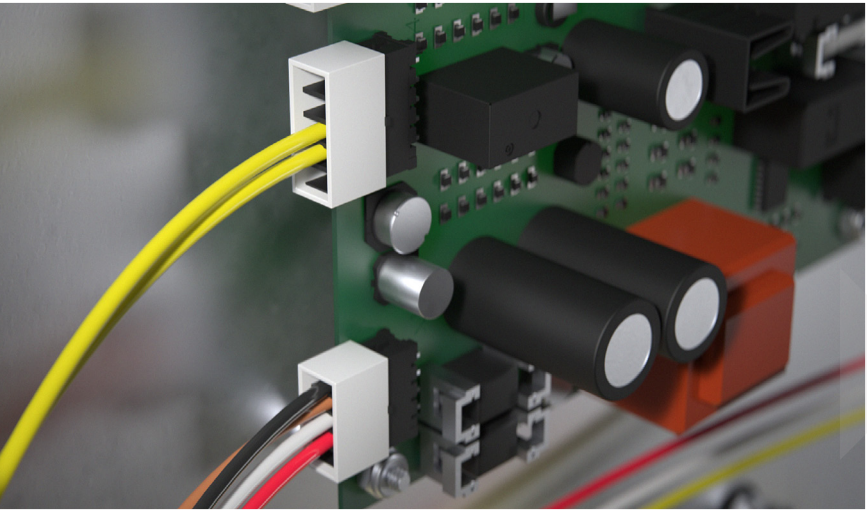
LOW VOLTAGE BOARD

The Low Voltage Board has experienced a major redesign. The Low Voltage Board connections are now integral to the comfort control board and feature “pluggable terminal blocks” or connectors. Installers no longer have to run the wiring to the unit, strip the wires, and attach the wire directly at the boiler. Now the wiring connection can easily be done in the palm of your hand and then plugged directly onto the low voltage board.

This pluggable terminal block also aids in troubleshooting. To diagnose an issue, a sensor can easily be unplugged from the unit to confirm operation. For example, the Cascade Bus can be unplugged to isolate units within the Cascade. In this case, the Cascade’s A, B, and Ground wires have been spliced together on the printed circuit board as opposed to on the connection which allows for discreet connections to the cascade.

TERMINAL POSITION ASSURANCE RETAINERS (TPA)

Another new feature seen on these control boards is the use of **Terminal Position Assurance (TPA)** Retainers with the wiring connections. These retainers ensure that the wire and connector are positively positioned inside of the Molex plug and prevent the wire from backing out. This provides a secure connection point between the wiring harness and the control board.



CASCADE REDUNDANCY

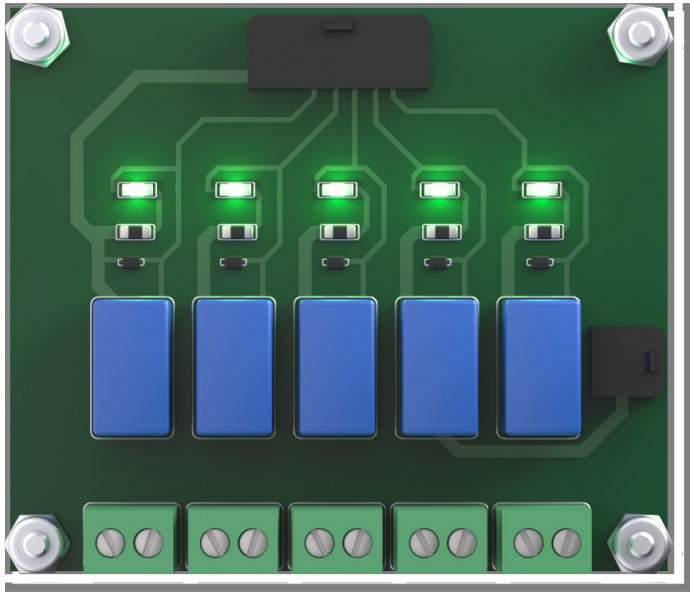
Crest with Hellcat Combustion Technology continues to offer performance favorites like Cascade Redundancy. This feature automatically shifts the cascade’s lead role to the #2 boiler in the sequence should the lead boiler be taken offline. This keeps the boiler plant up and running until the lead boiler is brought back online.



PUMP BOARD

The new Pump Board also features these pluggable terminal blocks. The relays are designed for 24V output, connections are directly wired to the Comfort Control Board, and feature identification lights. These lights will indicate which pump relays are being powered by the control, also aiding in field troubleshooting.

Compared to previous generations, the internal wiring features several advantages. Ribbon cables have been replaced with a shielded twisted pair cable featuring a plug connection with the TPA retainer. Sensors now connect straight into the board. Fewer connections have reduced the amount of wiring inside the boiler.



TOUCH SCREEN DISPLAY

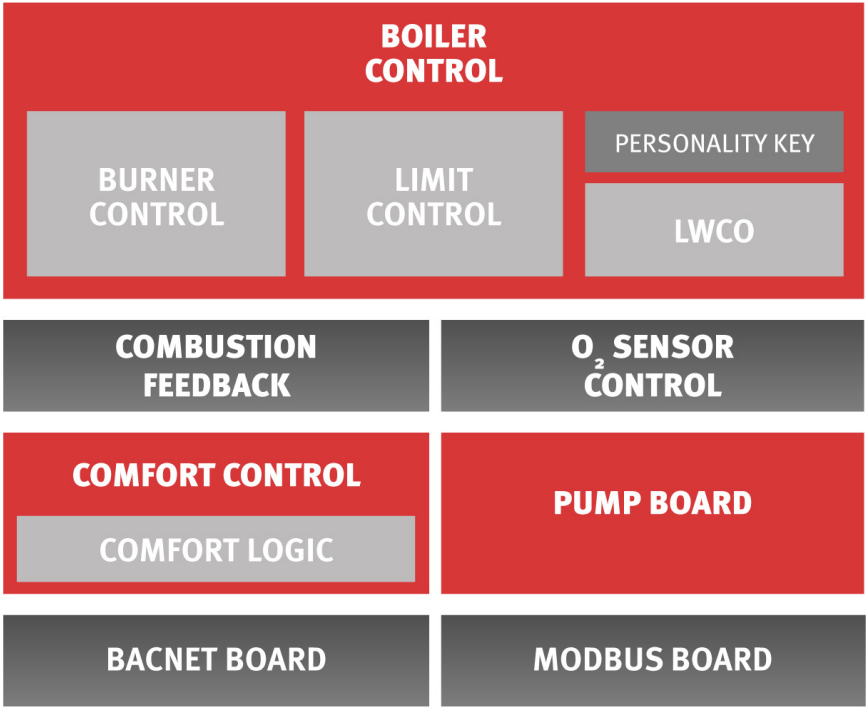
The user interface features a newly designed 10" LCD capacitive touch screen display with a 50% larger viewing area. When the CREST boiler's capacitive screen is touched, a small amount of charge is drawn to that location. The result is an easy-to-interact with and acknowledging interface that is both robust and durable in performance.

The display also features In Plane Switching (IPS) technology, known for its ability to deliver vivid color and provide wider viewing angles. The screen has improved brightness and contrast that produces a sharper image. It is viewable both indoors and outdoors with its "Outdoor Viewable Display." Lochinvar is confident these outstanding user interface features will benefit any application.

- Improved Resolution
- Improved Viewing Angle
- New Menus
- Commissioning Wizard for Combustion



TOUCH SCREEN DISPLAY  
(10" CAPACITIVE TOUCH SCREEN)





INDUSTRIAL DESIGN

Performance, serviceability, installation requirements and even aesthetics are top factors in product development at Lochinvar. Before the CREST boiler was first introduced in 2011, the product went through an industrial design process that yielded a sharp look and a functional design. After years of performance in the field, Lochinvar received feedback about the CREST's look and feel.

Acting on that feedback, Lochinvar is pleased to introduce a substantially new look and feel for the CREST Boiler with Hellcat Combustion Technology. The doors are redesigned to be sturdier and provide a firm closure with different locking mechanisms. Additionally, the corner supports are sized proportionally so the width of the front door is reduced and is easier to handle. Bracing has also been integrated into the side panels to increase rigidity for easy removal. For better visibility when servicing, an interior LED light has been added. These updates have made CREST jacketing stronger and more manageable.

**Manageability has also improved with a reduction of weight by nearly 25% in one side panel alone.**



1000  
1500  
2000



2500  
3000



4000



5000



6000

ALTERNATIVES

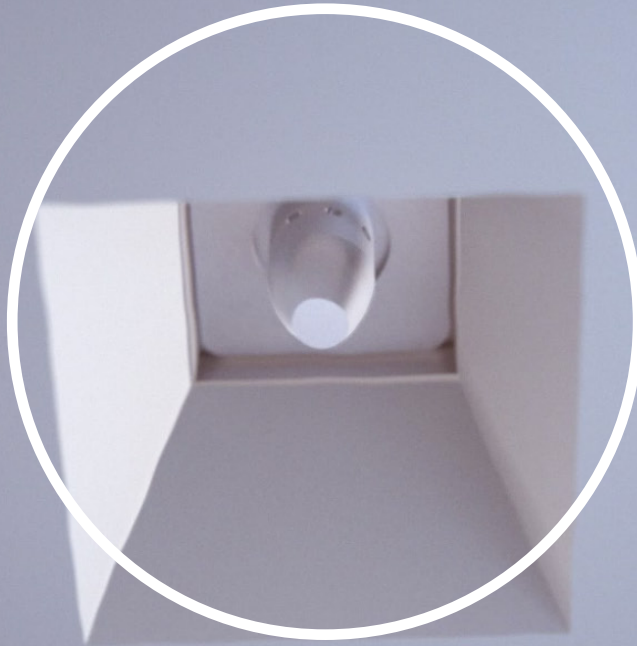
Other manufacturers advertise having an O<sub>2</sub> trim feature on their commercial condensing hydronic boilers. What sets Lochinvar apart is not just the O<sub>2</sub> trim, but **how** it trims. The O<sub>2</sub> sensor is placed inside the combustion chamber to read a wet O<sub>2</sub> value to the control platform. This wet O<sub>2</sub> value is not fuel specific and is directly indicative of the fuel/air ratio. This value is directly communicated to the control as the feedback portion of the RealTime O<sub>2</sub> Trim.

Another factor is the location of the O<sub>2</sub> sensor. While some competitors place their O<sub>2</sub> sensor in the flue, Lochinvar has placed the O<sub>2</sub> sensor inside the combustion chamber. The combustion chamber has less moisture content than the flue. With the sensor's internal heater reaching 1,300°C for operation, it is paramount for the sensor to

avoid moisture in order to extend its lifetime. At 2,372°F any moisture contacting the O<sub>2</sub> sensor could quickly destroy it. Sensors that are placed in the flue, surrounded by the condensate from a condensing boiler, run the risk of a much shorter lifetime.

A prime example of how Lochinvar's O<sub>2</sub> sensor differs from the competition is the replacement frequency. One competitor states in their manual that their O<sub>2</sub> sensor is intended to be replaced annually, and if the boiler is running on propane or year round, such as with a re-heat application, it may need to be replaced twice a year. Another competitor advertises replacing the sensor every 5 years, but that is with the sensor being on a 4 hours on/10 hours off schedule. This places the burden on the customer by having to replace a key component of the O<sub>2</sub> trim system once, if not twice, per year.

O<sub>2</sub> SENSOR





CONTROL PLATFORM

The control platform puts Lochinvar well ahead of the competition. Lochinvar has developed this control platform in collaboration with key suppliers to ensure that everything needed to adjust the unit is included. There is no need for a separate controller or special software. Other manufacturers require a 3<sup>rd</sup> party device to dial in the boiler and access key features, such as air/gas damper positions and fan speeds. These systems can be very tedious and complex for the average user. Lochinvar developed Hellcat to be straightforward and easy.

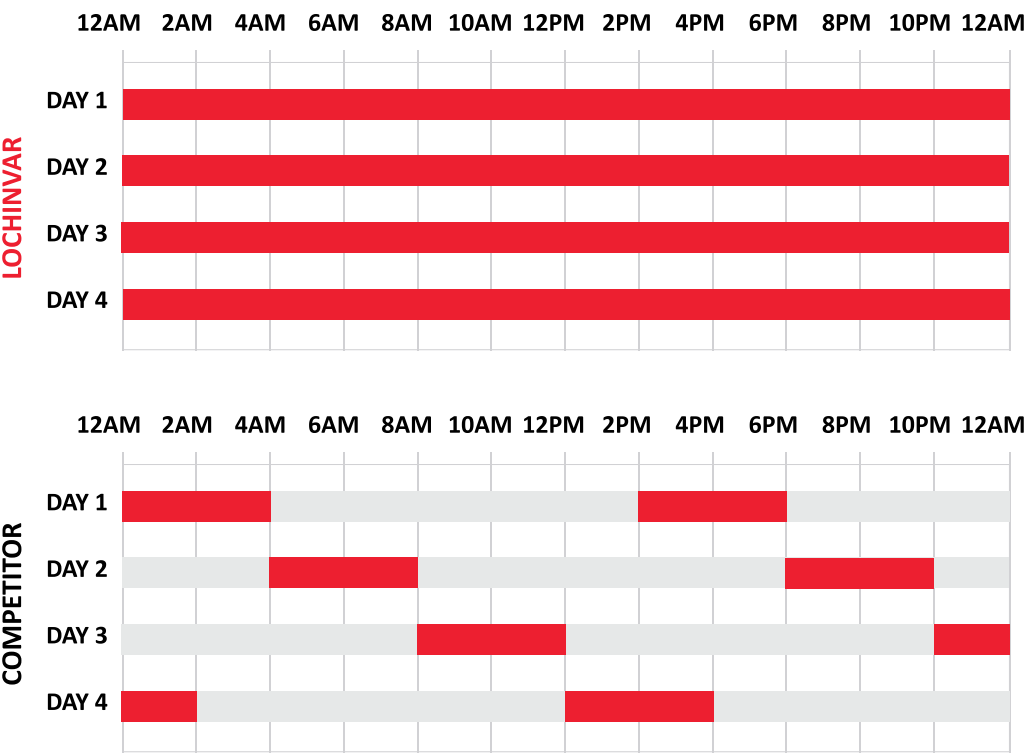
Lochinvar’s control is trimming directly based on the wet O<sub>2</sub> sensor reading. Some competitors are using a 0-10V signal to set their O<sub>2</sub> trim. Their control is reading a 0-10V signal that is based off the O<sub>2</sub> value being delivered from the sensor. The O<sub>2</sub> value, in this case, is not directly driving the O<sub>2</sub> trim of the combustion system. By basing the trim on the 0-10V signal instead

of the O<sub>2</sub> value, the trimming is not a direct correlation to the combustion process. Another differentiator is the timing when the O<sub>2</sub> trimming takes place.

Lochinvar’s RealTime O<sub>2</sub> Trim™ is just that, in real time.

Other manufacturers are only running their O<sub>2</sub> sensor at certain intervals and only checking a predefined combustion range as the boiler modulates input. This provides limited feedback of what their boiler is experiencing with its combustion process.

Other manufacturers also trim the O<sub>2</sub> based on a predefined curve. The manufacturer defines this curve, but it may not be applicable to each individual site. The CREST boiler is trimming with the Hellcat Combustion Technology to achieve the optimal air/fuel ratio throughout operation.



ACTIVE O<sub>2</sub> SENSOR CYCLE COVERAGE CHART

■ O<sub>2</sub> SENSOR ON   ■ O<sub>2</sub> SENSOR OFF

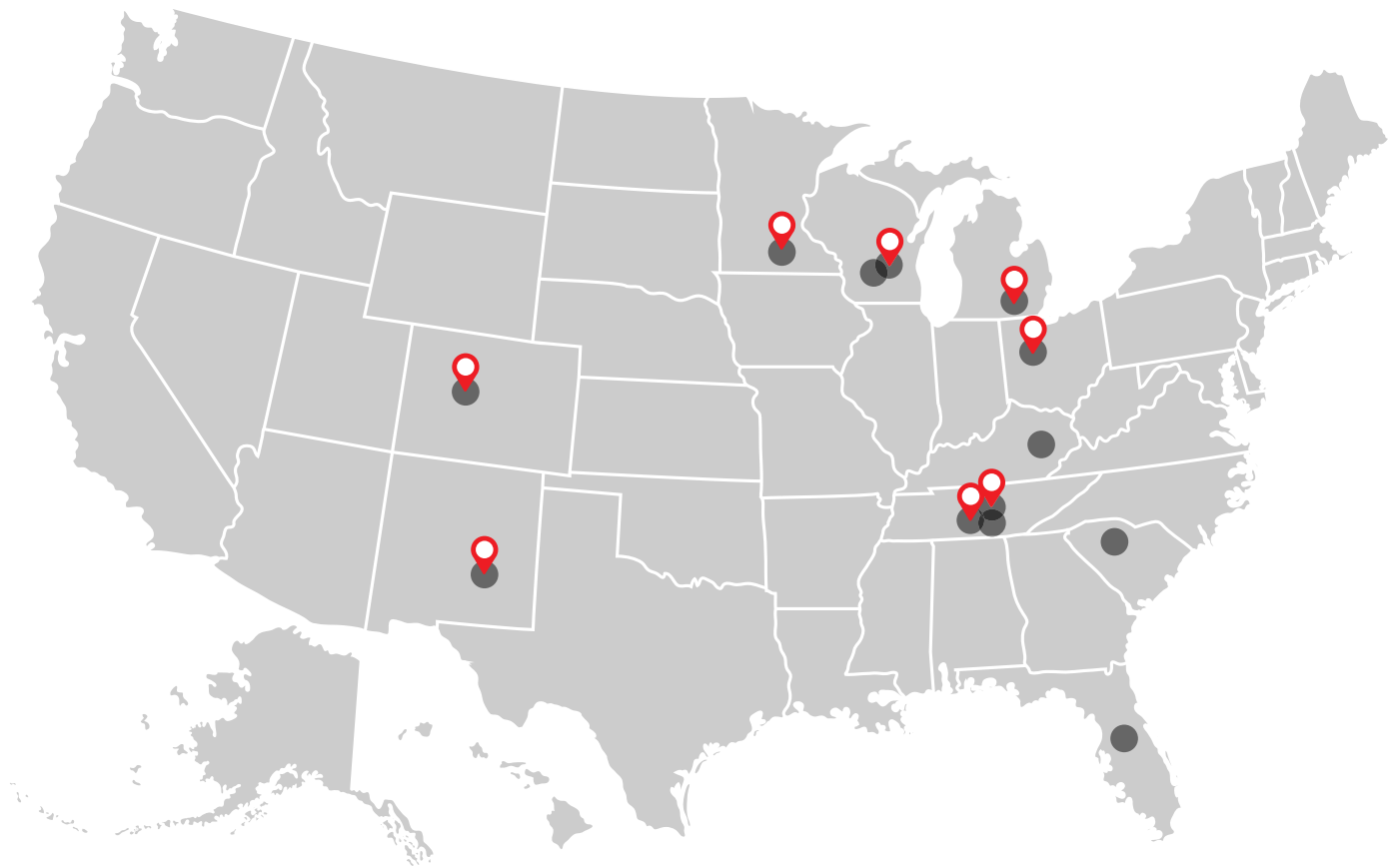
TIME-TESTED FIELD EXAMINATION

Lochinvar always includes field trials in our product development process. We deepened that commitment with this project to obtain real-world feedback from actual applications. We undertook an aggressive field trial campaign that tested the combustion components and the new design functionality.

Using a variety of locations across the country, Lochinvar placed test units in space heating, re-heating, domestic hot water, and pool heating applications. The variety of field trial placements confirmed performance in a wide

array of uses. Different geographic regions were also utilized to expose the units to varying weather patterns and other impactful conditions such as high altitude.

Lochinvar began testing RealTime O<sub>2</sub> feedback in late 2018 and Hellcat Combustion Technology in mid-2020. That allowed us to accumulate over 2 years’ worth of field experience with the O<sub>2</sub> sensor and a fall and winter season with the Hellcat. During all this time, testing was also being conducted in Lochinvar’s R&D Lab. This expanded field trial and exhaustive testing within Lochinvar’s own facility reflects our commitment to product development.



● BOILERS WITH O<sub>2</sub> SENSOR   ■ BOILERS WITH HELLCAT



# REAL WORLD APPLICATION

Equipped with your knowledge of the CREST Boiler with Hellcat Combustion Technology and how it works, you may be wondering how it fits into real world applications and what sets it apart from previous CREST generations. By experiencing seasonal and automatic adjustments, improved integrated design and numerous field trials, Lochinvar has developed a boiler that is state-of-the-art and ready for any challenge.

## SEASONAL ADJUSTMENTS

Start-ups commonly happen in the middle of summer, especially for a school building when students are not in session. A summer day cannot possibly be indicative of the cold winter days that lay ahead when the boiler will be needed most. This is a perfect application to demonstrate an advantage of this technology. The RealTime O<sub>2</sub> Trim™, in conjunction with the feedforward readings of barometric pressure and air temperature, empower the unit to automatically adjust to present conditions.

In the past, boilers commissioned in the summer often resulted in call backs when the seasons changed. The first cold snap, the first Arctic blast, and the first shoulder season day in the spring all led to the well-known service call, “My boiler is making noise.” Those calls become distant memories. By always monitoring weather conditions, having the ability to fine tune the air and gas supply independently, and constantly checking the air/fuel ratio, Hellcat consistently delivers peak combustion performance. Commissioning dates and changing weather patterns will not affect optimal operation.

## PROVEN DESIGN

Lochinvar committed to develop this new platform and exhaustively test it. We partnered with our suppliers to confirm specified components. Our Corporate Technology Center provided analysis on key components concurrent with testing in our onsite Research and Development Lab. Field trials were real tests in mechanical rooms across the country.

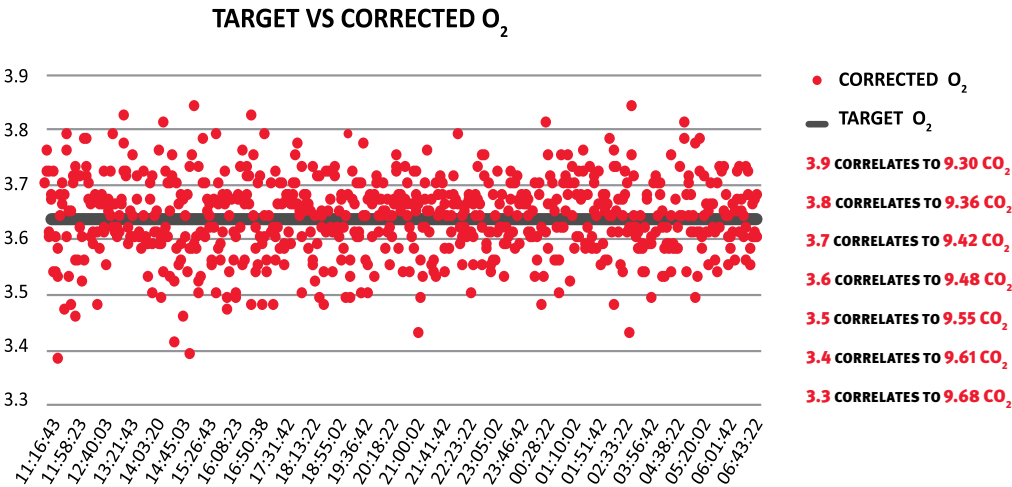
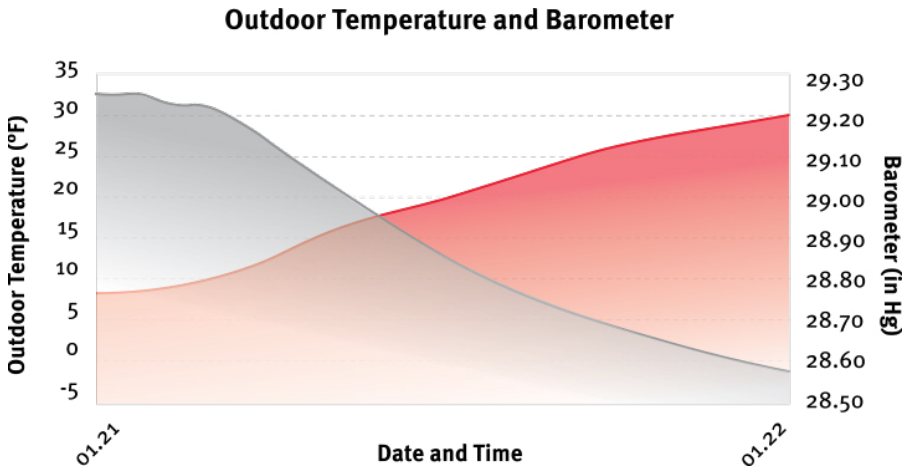
This comprehensive battery of tests allows Lochinvar customers to have peace of mind about reliability and product value. Competitive units with O<sub>2</sub> sensors that need to be replaced more often ultimately drive costs higher due to downtime, material, and labor expenses.

One prime example of how the Hellcat Combustion Technology works can be seen from the Apple Valley, MN site. On January 21-22, 2021, the outdoor air temperature plummeted almost 35°F in a 20-hour period. The barometer (not corrected to sea level) reading also increased during this same time interval.

How did the boiler react? Showing data points from every 40 seconds of operation, the boiler consistently came back to the target O<sub>2</sub> of 3.64. Even when the boiler was off-target it was within a tight window of between 3.4 - 3.8 (9.61 - 9.36% CO<sub>2</sub>) for the majority of the time. With up to 25:1 turndown, Crest will be in a state of modulation much of its performance time. Even in modulation, the boiler maintains a tight window of between 3.4 - 3.8 (9.61-9.36% CO<sub>2</sub>) for the majority of the time. This variation of 0.25% CO<sub>2</sub> is statistically insignificant and results in stable, reliable performance.



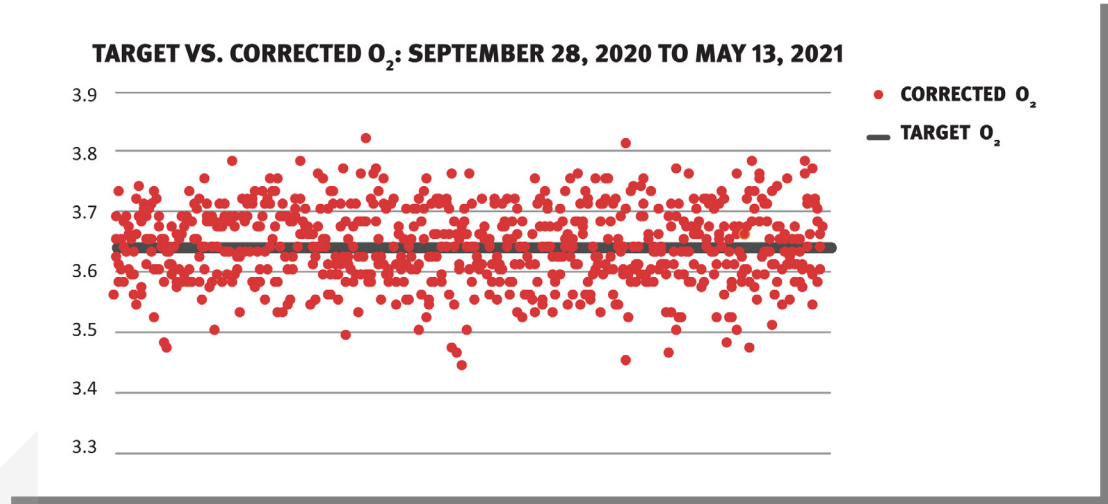
Indoor Model Illustration Only – Outdoor Models Coming Soon





LONG TERM DATA

To further illustrate how effective the Hellcat Combustion Technology is at maintaining the air/fuel ratio, data was again examined from the Apple Valley, MN site. Performance data from September 28, 2020 to May 13, 2021 was taken four times each day at 12:00 a.m., 6:00 a.m., 12:00 p.m., and 6:00 p.m. The data exhibited that during 97% of the boiler’s run time , CO<sub>2</sub> values fell within the window of 9.58% to 9.35% (a range of only 0.23% CO<sub>2</sub>). Furthermore, the CREST with Hellcat was tuned for a 3.64% target Wet O<sub>2</sub> value and achieved it throughout this window of operation.



COMMISSIONING START UP

Lochinvar has made great strides in reducing the amount of time it takes to commission the combustion system in the field. With the new CREST with Hellcat Combustion Technology, setup can be confidently completed in less than an hour. Regardless of experience level, service technicians can breeze through the once tedious procedure with Lochinvar’s simple, on-screen Commissioning Wizard. The intuitive system was designed with every skill level in mind.

For more information, visit [lochinvar.com](http://lochinvar.com).



SAVES  
**TIME & MONEY**

CREST WITH HELLCAT COMBUSTION TECHNOLOGY

- **RealTime O<sub>2</sub> Trim™**
- **Lowest Excess Air**
- **Turndown**  
Up to 25:1 with 20:1 Turndown on 4000 – 6000 models
- **Easy start up**
- **O<sub>2</sub> sensor system designed for a condensing, hydronic boiler**
- **Adaptable Combustion System**  
Seasonal changes  
Drastic weather shifts  
Altitude
- **Lochinvar-developed controls platform**
- **Extended vent lengths**  
Up to 150' Direct Vent
- **New jacket design**  
Stronger, lighter, and easier to handle doors and panels



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