

Mini Mk8 Controller

Complete Boiler Management in a Compact, Affordable System

The Mini Mk8 is a cutting-edge Micro-Modulating system that provides an easily programmable and flexible means of optimising combustion throughout the load requirement range of the boiler/burner.

This control module encompasses all the functions required for reliable burner management. Built into this system is a fully automated flame safeguard and valve proving system, MODBUS connectivity, and a new touchscreen interface.

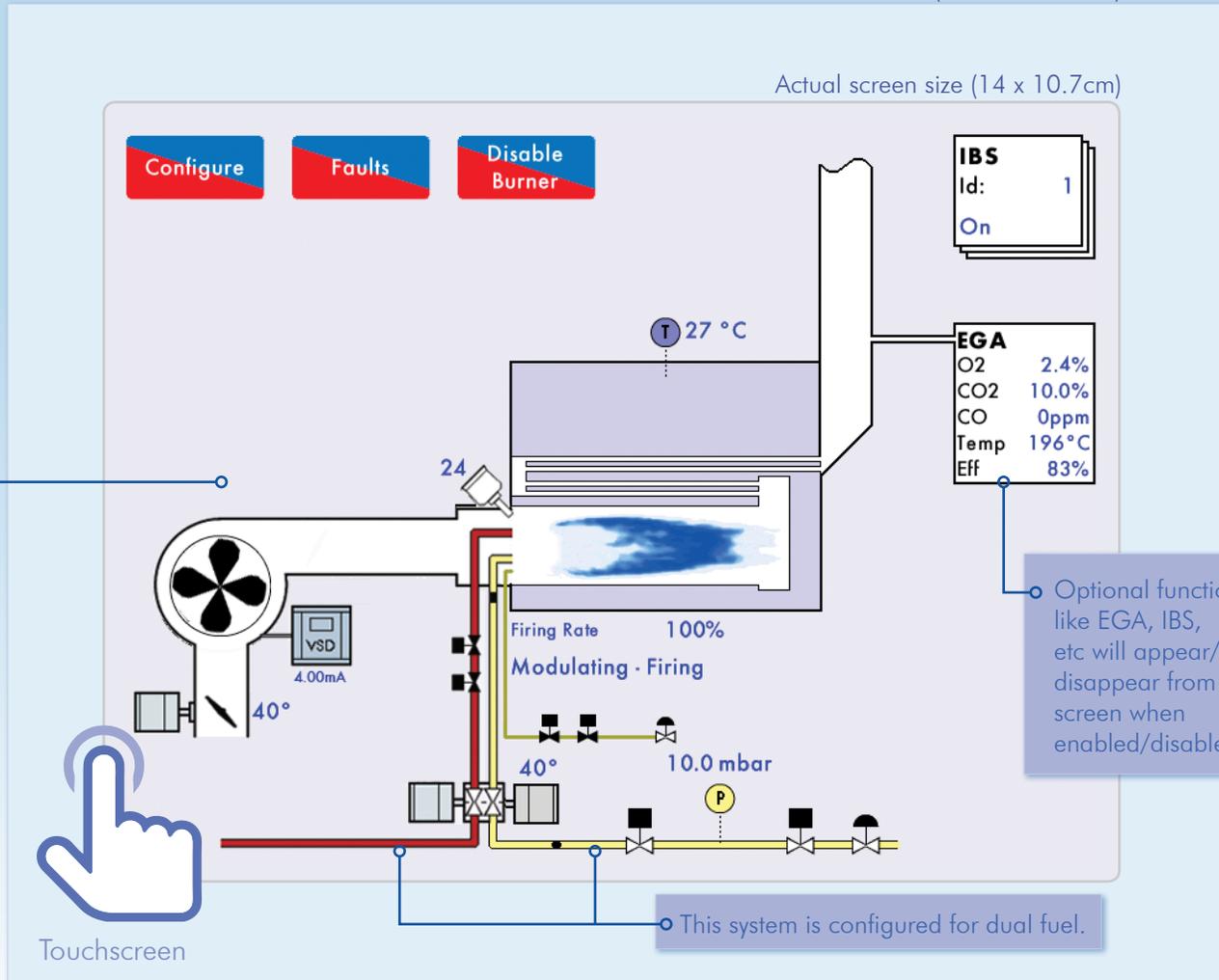
This system ensures the burner temperature is accurate to within 1° and pressure to within 1 PSI. The positioning accuracy of the direct drive motors controlling the air damper and fuel valve is 0.1 angular degrees throughout the load range. This accuracy ensures repeatable fuel-to-air ratio that leads to improved fuel economy and reduced carbon footprint.

- ✦ Able to reduce fuel consumption by 5-7% over traditional linkage systems
- ✦ Capable of reducing CO₂ emissions by 10%
- ✦ Repeatable and accurate positioning system reduces maintenance costs
- ✦ Controls fuel, VSD, scheduling, sequencing and other automatic settings
- ✦ Robust steel construction
- ✦ Available in a control panel package

Main Screen

Actual fascia size (16.75 x 13.5cm)

Actual screen size (14 x 10.7cm)



The user can get back to this Main Screen from anywhere in the system with a few taps.

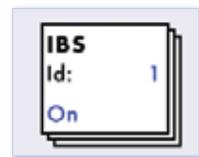
Navigate to advanced screens and history with the touch of a finger from the Main Screen.



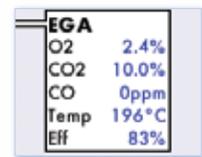
Steam Pressure or Water Temperature Setpoints



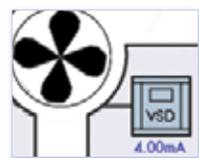
Flame Safeguard



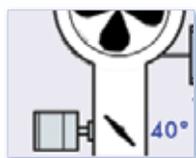
Intelligent Boiler Sequencing



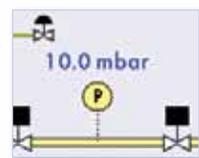
Exhaust Gas Analyser (Requires installation of EGA)



VSD (Variable Speed Drive)



Air/Fuel Servomotors

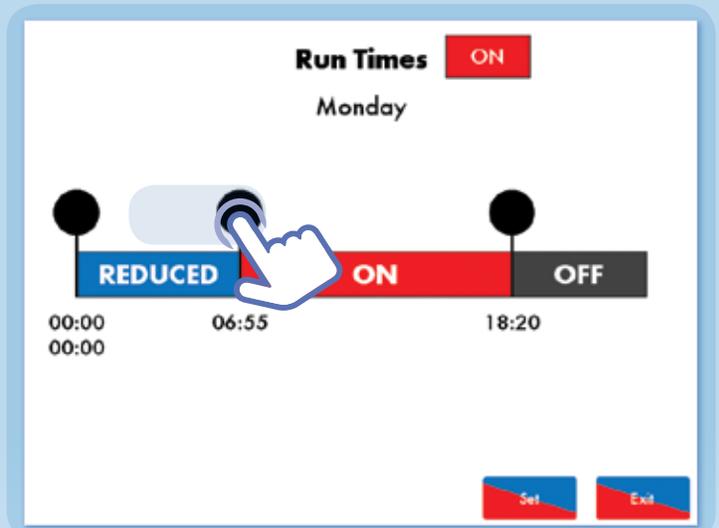


VPS (Valve Proving System)

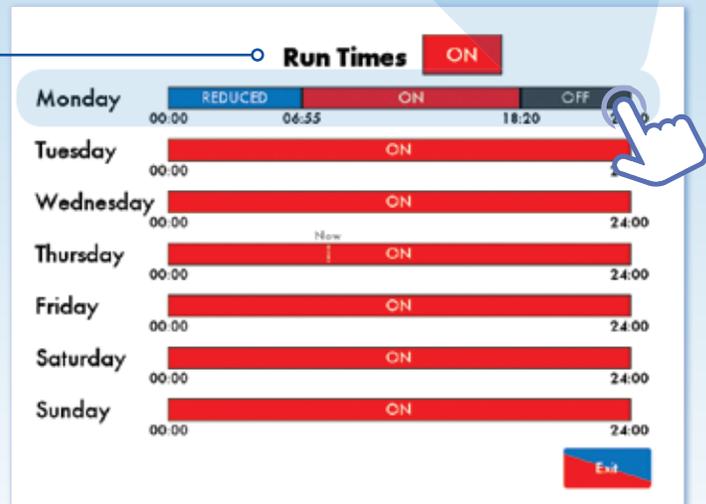


Online Settings & Fault History

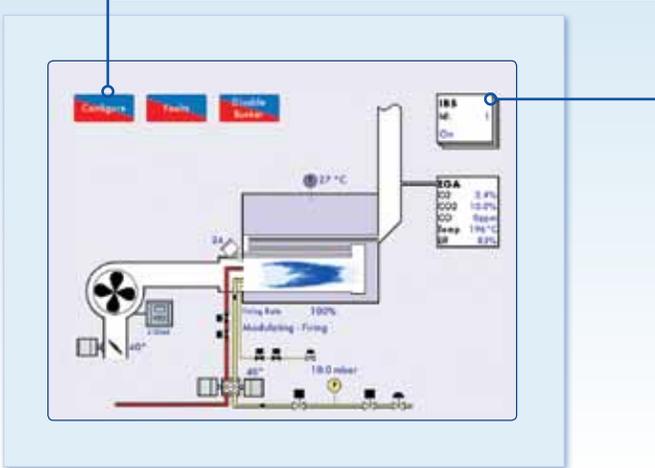
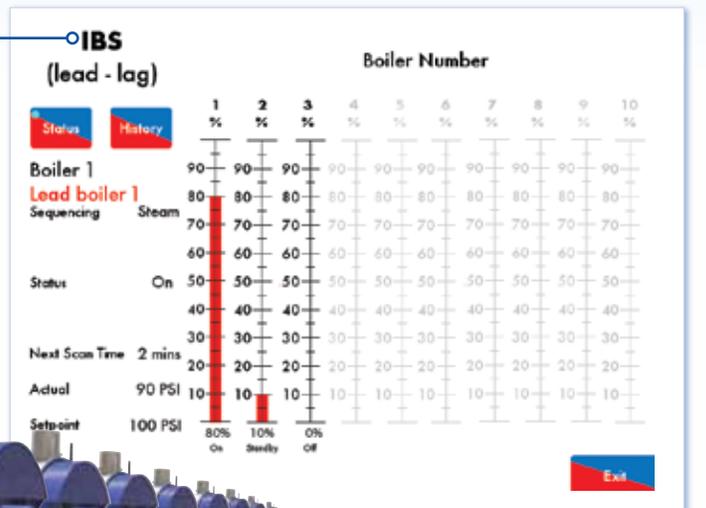
Schedule the boiler plant to run when and how you need it.



Drag slider to adjust timer. Tap to adjust function.

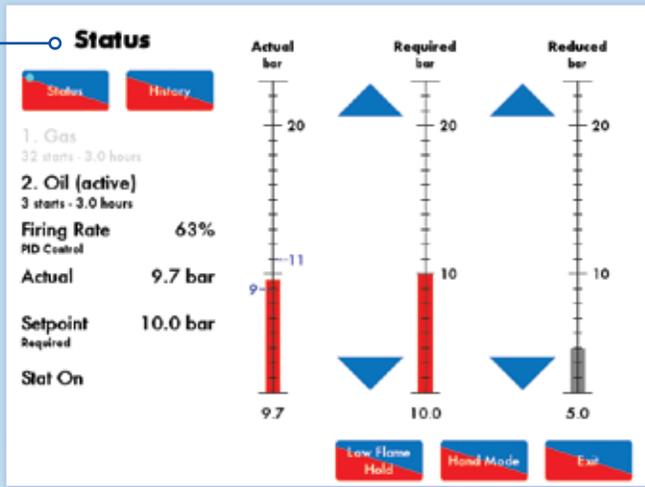


Schedule on, off and reduced (weekend) required temperature/pressure by day of week.

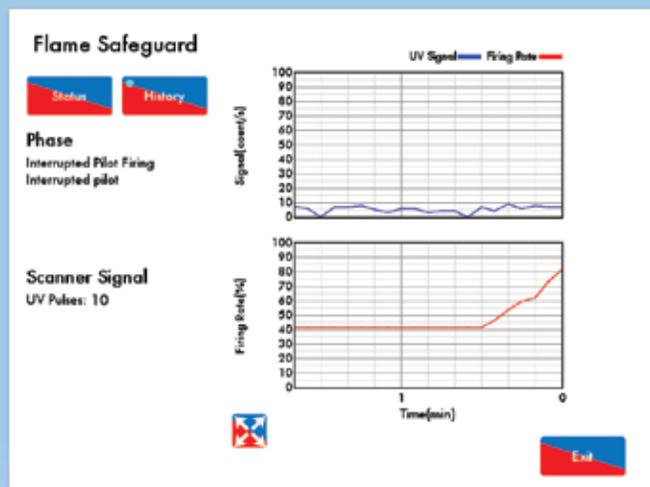


It is much more fuel efficient to run two boilers at 60% than three boilers at 20%. Intelligent Boiler Sequencing (IBS) manages the number of boilers firing at any given time, automatically taking unneeded boilers offline or into standby warming modes to maintain load demand. Users can manage up to 10 boilers.

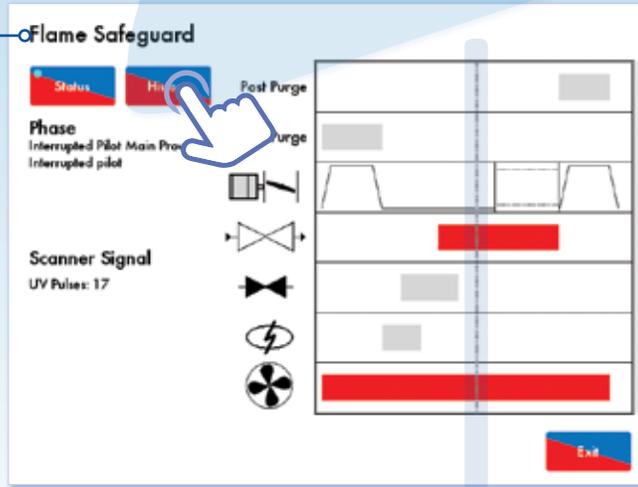
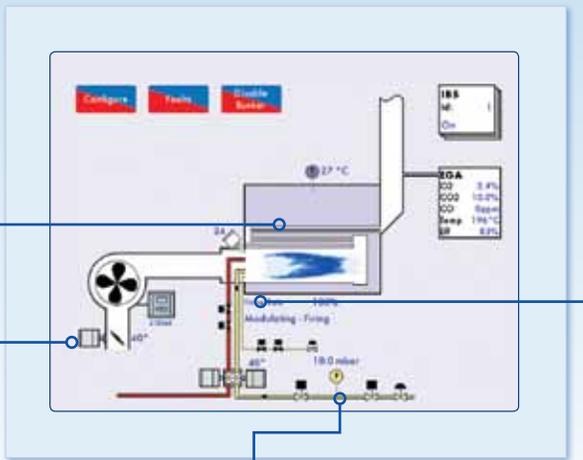




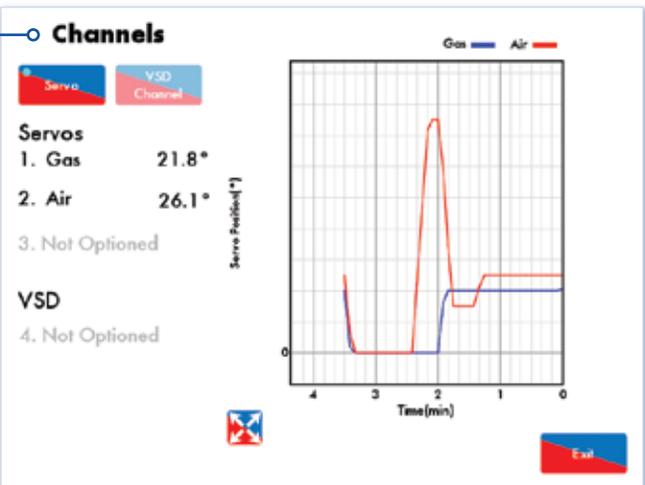
Easily change target set points for both the Required setpoints (used for general output) and the Reduced setpoints (used for when less steam or hot water is required).



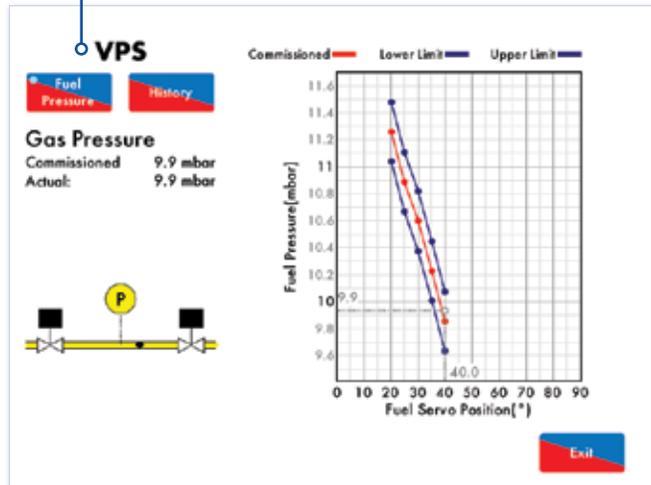
The flame is monitored via UV or IR scanner or ionization probe. The UV scanner can feature self-checking to cover an unmanned boiler house.



Flame Safeguard monitors & manages every stage of burner startup, including valve proving & IR/UV testing. Dotted vertical line slides right as the system advances through burner sequence.



3 servomotors and 1 VSD provide accurate and repeatable control of valves and dampers. 24 hour on-screen history enables immediate troubleshooting and optimising.



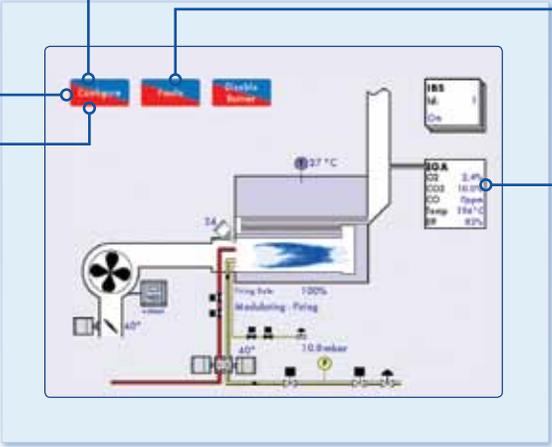
VPS (Valve Proving System) tests the main gas valves to ensure seal integrity and safety.

Online Changes

#	Description	Value
110	BC: Burner flame scanner type	Standard scanner
111	BC: Pilot type	Interrupted pilot
112	BC: Pre-purge time	6 seconds
113	BC: Pre-ignition time	3 seconds
114	BC: First safety time	3 seconds
115	BC: Pilot prove time - pilot trial for ignition (PTR)	3 seconds
116	BC: Fuel 1 second safety time - main trial for ignition (MTR)	3 seconds
117	BC: Main flame proving time	5 seconds
118	BC: Post-purge time	10 seconds
119	BC: Control box recycle time	10 seconds
120	BC: UV Threshold	10
121	BC: Delay from start of pre-purge until air switch checked	5 seconds
122	BC: Flame switch operation	Ionisation
123	BC: Fuel 2 second safety time - main trial for ignition (MTR)	3 seconds

Buttons: All, MM, EGA, DTI, BC, Up, Down, Exit

Over 150 options and parameters can be adjusted providing a sophisticated level of customisation. All of these are viewable while the boiler is online. A selection of these changes can be set while the burner is running, ensuring minimum boiler downtime.



Single Point Change

Channel 1: 40.0° [HIGHER]

Channel 2: 29.3° [LOWER]

Channel 3: [EDIT]

Channel 4: [EXIT]

Buttons: Status, Fuel-Air, EGA, Trim, VPS

Single Point Change allows a technician to edit the combustion curve without the need of a full re-commission, reducing downtime.

Online Changes

Settings

Buttons: Options, Parameters

Commission

Buttons: Fuel Flow Commission, Gas Pressure Commission

Reset

Buttons: Burner History, Fuel Flow, Fault Logs, System Log, Confirm Reset

Exit

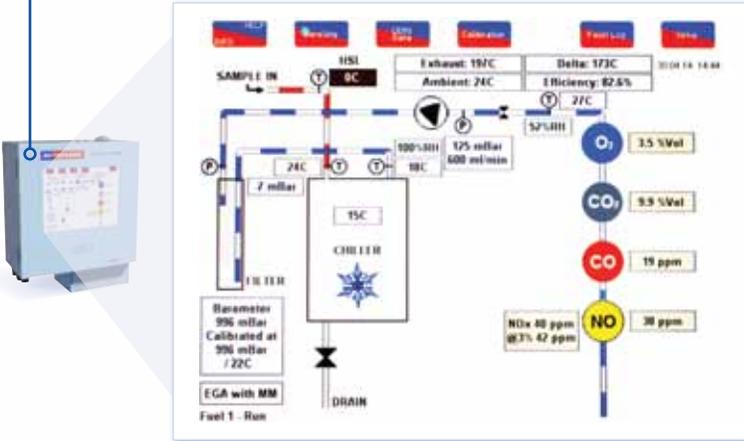
A technician can view & modify a variety of settings without having to take the boiler offline, reducing boiler downtime.

Lockouts

Lockouts	Phase	Occurred	Reset
1. No flame signal	Pilot Ignition	29 Jan 2014 21:06	29 Jan 2014 21:08
2. No air proving	Run to Ignition	26 Jan 2014 00:04	26 Jan 2014 00:04
3. Start gas outlet fault	Pilot 1st Safety	25 Jan 2014 00:06	25 Jan 2014 00:14
4. Start gas outlet fault	Pilot 1st Safety	24 Jan 2014 00:03	24 Jan 2014 00:03
5. Start gas outlet fault	Pilot 1st Safety	23 Jan 2014 00:48	23 Jan 2014 00:03
6. No air proving	Run to Purge	22 Jan 2014 00:01	22 Jan 2014 00:03
7. No air proving	Run to Purge	17 Jan 2014 00:02	17 Jan 2014 00:03
8. No air proving	Run to Purge	16 Jan 2014 00:02	16 Jan 2014 00:03
9. No air proving	Run to Purge	14 Jan 2014 00:18	14 Jan 2014 20:03
10. No air proving	Run to Purge	13 Jan 2014 00:01	13 Jan 2014 00:01

Buttons: Lockouts, MM Errors, EGA Errors, Up, Down, Reset, Exit

Error and Lockout logs allow engineers to view a history of burner operation to aid in troubleshooting. View the most recent 64 errors and lockouts.



The optional Exhaust Gas Analyser (EGA) enables three parameter trim features to maintain commissioned exhaust values. This ensures optimum burner operation at all times.

Main Features

- ◆ Direct replacement for Mini Mk7
- ◆ Micro Modulation of fuel/air ratio control
- ◆ 2 fuel curve capability
- ◆ 3 servomotor channel control
- ◆ 1 VSD channel control
- ◆ Internal flame safeguard control
- ◆ Full flame supervision with self-check UV, IR or ionisation flame detection
- ◆ Self-check UV detection (optional)
- ◆ Lead-Lag/Intelligent Boiler Sequencing (IBS)
- ◆ Precise target setpoint control (PID)
- ◆ 3 parameter trim, O₂, CO₂, & CO (requires EGA option)
- ◆ NFPA compliant
- ◆ Outdoor Temperature Compensation (requires OTC module)
- ◆ Time clock feature

Improvements over Mini Mk7

- ◆ Touchscreen interface XVGA 1024X768
- ◆ Software update through Micro SD card
- ◆ Dual-core safety processor. Both processors run the same code in parallel, and if there are discrepancies the system fails safe
- ◆ Direct power to the IR scanner removes need for external power supply
- ◆ Logging of 64 most recent lockouts and 64 most recent errors
- ◆ Add additional “inter” points during single point change

- ◆ Scheduling enables up to 5 different states per day (Reduced/Off/On)
- ◆ Grouping of options/parameters in relation to function
- ◆ Gas pressure sensor monitoring
- ◆ Gas valve proving system
- ◆ Air pressure sensor proving system
- ◆ Low Flame Hold integrated into interface, removing need for panel switch operation

Micro Modulation Fuel/Air Ratio Control

- ◆ Independently controlled fuel and air positioning motors with an accuracy of 0.1 of an angular degree
- ◆ Single point change facility for commissioned fuel/air ratio
- ◆ User-defined optimum ignition position
- ◆ FGR management—delay from startup of FGR until exhaust temperature, boiler setpoint, or time delay achieved

Burner Functions

- ◆ Burner control functions with user configurable timings

User Features

- ◆ Editing of parameters protected by user-configurable password
- ◆ IR COM's port for upload/download of commissioned data and operating history
- ◆ Boiler screen configuration
- ◆ Data exportable via Modbus
- ◆ Internal calendar clock display
- ◆ Multiple languages
- ◆ On-screen 24 hour data logging

Setpoint Control Features

- ◆ Internal 3 term PID control to maintain required setpoint for both pressure and temperature
- ◆ Software-adjustable thermostat/pressure stat facility (lockable)
- ◆ Lead-lag for both steam and hot water
- ◆ Lead boiler select facility
- ◆ 2 port valve operation for hot water sequencing
- ◆ Fuel flow metering—instantaneous and totalised
- ◆ Software-adjustable Hand/Auto/Low flame hold facility
- ◆ 0-10V input for external modulation
- ◆ Ability to use external temperature or pressure detectors



External Inputs

- ◆ Low/high pressure switches
- ◆ Low/high end switches

Specifications

- ◆ 120/230V, 50/60 Hz switchmode
- ◆ IP65/NEMA 4 enclosure with panel facia mounting (IP65 front facia, IP20 back of unit)
- ◆ Manufactured under BS EN ISO 9001:2000

EGA (optional module)

- ◆ O₂, CO₂, CO trim, NO, SO₂, and NO₂ continuous monitoring and display
- ◆ User definable combustion limits on O₂, CO₂, CO, NO, and exhaust gas temperature
- ◆ Exhaust temperature, ambient temperature and difference in temperature displayed
- ◆ Combustion efficiency calculation - net or gross displayed
- ◆ Patented three parameter trim

Intelligent answers to burning questions.

Mini Mk8 Advantages:

- Fuel Savings
- Emission Control
- Repeatability/Durability
- Maintenance Savings
- Safety

About Autoflame

Founded in 1972, Autoflame is a world leader in boiler/burner management systems for both commercial and industrial applications. Based near London, England, it ensures industry-leading quality control and innovation by performing in-house R&D, engineering, software development, manufacturing production, and technical support.

Privately held by its founder, Brendan Kemp, Autoflame currently has more than 10,000 systems in operation globally, and is now specified as standard equipment in some of the world's most prestigious organisations.



Autoflame has partnerships with more than 60 technology centres worldwide. In each market we serve, our technology centres have been thoroughly vetted for quality and reliability. They receive regular training to ensure they are up to date with our latest innovations.

Optional Upgrades

The **Autoflame Exhaust Gas Analyser (EGA)**

evaluates exhaust samples for temperature, O_2 , CO_2 , CO , NO , NO_2 , SO_2 and combustion efficiency. It then provides the O_2 , CO_2 and CO data feedback to the Mini Mk8. The Mini Mk8 then implements minute trim corrections to limit or increase air to the burner automatically to make it more "fuel rich" or "air rich." These automatic corrections optimise combustion at all times, reducing fuel consumption and emissions without user intervention. The degree to which the Mini Mk8 implements these corrections is user-definable. The EGA can also signal an alarm or lockout if temperature or emissions exceed prescribed ranges. The EGA records emission data for up to 2 years.



The **Data Transfer Interface (DTI)** collects data from up to ten Mini Mk8 systems in one site. Data can be transmitted to PC's and Building Management Systems via Ethernet (LAN) or Modbus (RS422).



Autoflame's **CEMS AUDIT Software** brings burner control to the PC, either on-site or LAN/internet, allowing for on/off control, temperature/pressure adjustment, and emissions monitoring. Alarm conditions can be set, and if triggered a user can be notified by their BMS system. The software requires a DTI.



Ancillary Equipment

Autoflame manufactures to the highest quality standards a range of servomotors, probes, scanners, sensors, valves and other parts to support its burner/boiler management system.



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