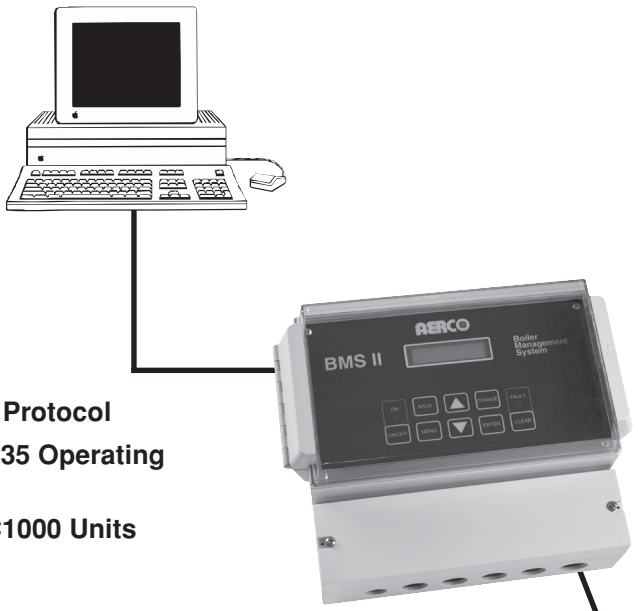
MODEL 5R5-384
PRODUCT SPECIFICATION

BMS II

AERCO Boiler Management System II

- ✔ **Increase System Turndown to Maximize Operating Efficiency**
- ✔ **Control Up to 32 Boilers via Modbus Interface**
- ✔ **Automatic Load Matching Precisely Meets Demand Changes**
- ✔ **"Bumpless" Energy Transfer**
- ✔ **Multiple Configuration Options**
- ✔ **User-Friendly Software Makes Programming Easy**
- ✔ **Full Information VFD Display**
- ✔ **Complete Control of Auxiliary Boiler Equipment**
- ✔ **Easy Integration to BAS or EMS via Modbus Open Protocol**
- ✔ **Single Point BAS or EMS Data Gathering for up to 35 Operating Parameters of Each Boiler**
- ✔ **For Use with AERCO Benchmark, Modulex and KC1000 Units**



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 BMS II will employ as many boilers as available, each operating at its lowest (but most efficient) firing rate. Importantly, because the BMS II reacts in real-time to changes in the number of boilers available, users can take a unit offline for maintenance at any time or bring on back-up boilers for extremely cold conditions without changes to the BMS II. And as individual boilers are added or deleted, the energy delivered is automatically adjusted to prevent fluctuations in the header temperature of the plant.

Typical Staging Example Demonstrates "Part Load" Efficiency

The first boiler unit comes online and will gradually increase its air-fuel valve position to meet demand. When it reaches 50% – a second unit is called into service.

The two boilers will split the load – each firing at 25% air-fuel valve position to meet demand. If additional heat is required, a third unit is called into service.

Three boilers, each firing at 33% air-fuel valve position, satisfies the demand more efficiently than either two units at 50% or one unit at 100%. This same principle applies to much larger plants.

State-of-the-Art Control System Supports Efficient Boiler Plant Operation!

The AERCO Boiler Management System Model 5R5-384 (BMS II) is a flexible controller designed to maximize energy savings in modular boiler plants. The BMS II can stage and coordinate the operations of up to 32 boilers and is uniquely designed to maximize the operating efficiency of condensing equipment capable of unmatched modulation. With individual unit turndown as high as 20:1, a five-boiler plant delivers 100:1 system turndown when staged to operate sequentially.

Able to regulate overall plant output with precise accuracy, a boiler plant with ±2°F header temperature variation is assured under normal load conditions. It offers sequential or parallel operation flexibility, 100% control of auxiliary equipment, and user programmable modes of operation that can be changed in the field. The BMS II automatically rotates the lead unit to help equalize boiler runtime.

The rugged controller is designed for easy installation with low voltage, twisted pair, shielded wire between the panel and boilers. Fault alarm contacts, automatic system start, two interlock circuits and the ability to start an auxiliary piece of equipment (at both start and 100% load) combine all critical functions of the boiler plant into one reliable control center.

Fully Compatible with BAS or EMS Systems via Modbus Open Protocol

For facilities that have taken a building-wide approach to energy efficiency, the BMS II supports easy integration with Building Automation Software (BAS) or Energy Management Software (EMS) programs via Modbus protocol and RS-232 interface. A standards-based open protocol used throughout the buildings controls market, Modbus integration will enable facility managers to drive all BMS II operations from any building control platform. BAS or EMS integration also offers a communications gateway to poll up to 35 operating parameters from individual boilers through a single connection to the BMS II, including: (consult AERCO Modbus Communications Manual GF-114 and Modulex E8 Controller/Boiler Communications Module Manual GF-115-C for complete list)

- Unit Type
- Unit Size
- Unit Status
- Default Message Codes
- Outlet Temperature
- Run Cycles
- Run Hours
- Flame Strength
- Active Set Point
- High/Low Limits
- Mode of Operation
- Outdoor Temperature
- Valve Position/Modulation Level
- Time
- Date

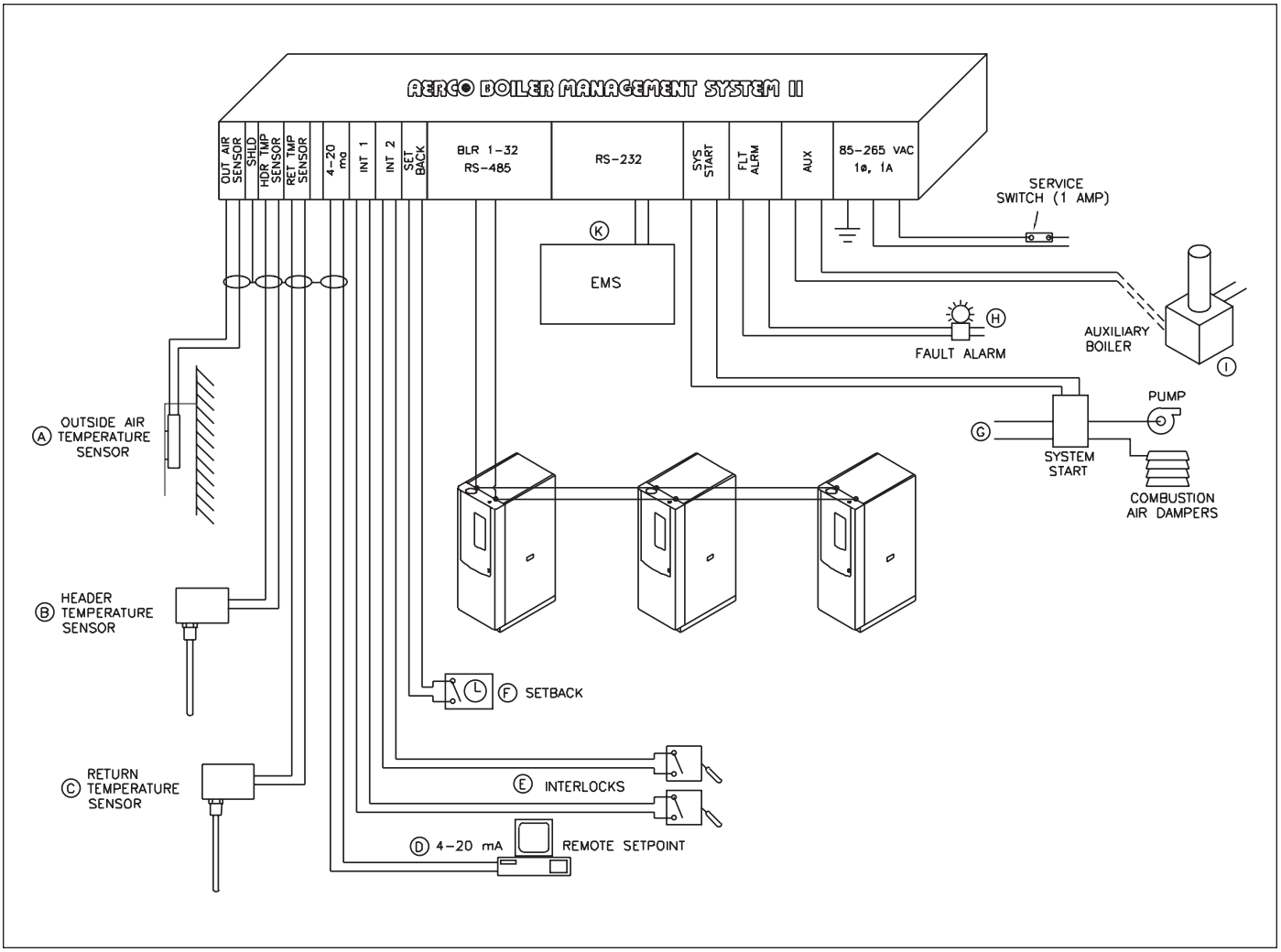
Configuration Options	Typical Applications
Indoor/Outdoor Reset A change in the outside air condition results in a proportionate change in header temperature – a function of the adjustable reset ratio (0.3 – 3.0:1).	**Indoor/Outdoor Reset Hydronic Heating** **Process Application** **Snow Melting**
Constant Setpoint Delivers fixed supply water temperature at set points of 50°F-220°F.	**Water Source Heat Pump** **Domestic Water Generation** **Supplemental Heat Recovery Equipment** **Swimming Pool Heating**
4-20mA Signal Header temperature responds linearly to an external 4-20mA control signal.	**Computer Controlled Building Management** **Industrial Process** **Greenhouse Application**
Network Communications Enables EMS or BAS system to drive boiler plant setting for header set point temperature via Modbus connection to BMS II. Also provides communication gateway to query and capture faults of BMS II and up to 35 operating parameters of individual boilers.	**Computer Controlled Building Management** **EMS Data Logging & Trend Analysis**

NOTE: BMS II package includes Supply Header Temperature Sensor (GM-122790)

Robust Features Simplify Control

- **Application Flexibility** – Four different configuration options meet the needs of any closed loop system and can be changed in the field.
- **Sequential or Parallel Operation** – Choose to sequence individual boilers or run all in parallel. Mode of operation can be changed by a simple keyboard selection.
- **Automatic System Start** – The BMS II can bring auxiliary equipment or boilers online based on outside air temperature. Auto Start Contacts which can be set to close at outside air temperatures between 32°F-100°F eliminate the need for plant operator to turn auxiliary equipment on and off.
- **Time Delay Between Boiler Start** – A fixed, thirty-second time delay between boiler starts allows for a smooth energy input without spikes in electrical, gas or venting conditions.
- **Random Lead Boiler** – Random lead boiler ensures that all boilers are in operating condition and helps equalize runtime.
- **Equalize Boiler Runtime** – First On-First Off unit sequencing helps to equalize run time and does not overtax any one unit.
- **Automatic Allowance for Maintenance** – By continuously monitoring the number of boilers available for operation, the panel will automatically operate the next boiler needed to meet demand if a unit malfunctions or is taken off-line for maintenance.
- **Auxiliary Boiler Capability** – Contacts are available to operate stand-by or back-up boiler equipment when the plant is at 100% load. These can be used to control an auxiliary boiler or notify building management system. Contacts turn-off is adjustable through the keyboard to any percentage of plant input.
- **Adjustable Off Set** – The BMS II includes a 7-day programmable clock to support night setback and/or daily setback periods. The BMS II will shift from the original set point to a higher or lower temperature.
- **Two Interlock Circuits** – Monitor pumps, combustion air dampers, or other equipment using two interlock circuits that must be completed before plant operations begin.
- **Power Off Memory** – By using non-volatile memory, programs are retained through a shut down of more than two years. No batteries required.
- **Continuous Communication** – Via Modbus, the BMS II continually sends information to all boilers in operation and receives information from sensors in the supply header, return header, outdoor air, or other inputs. Eliminating external electrical noise, the response to changes in operating conditions or loads is instantaneous to maximize plant performance.
- **Simple Installation** – The BMS II control system operates on standard 85-265VAC/1/60 power supply. Twisted pair, shielded wire connections to the BMS II and individual boilers are required to support communications. An RS-232 interface is required to link an EMS or laptop to the BMS II. RS-232 communications wiring between the EMS and the BMS II cannot exceed 50 feet. An RS-485 interface can be used to connect the BMS II to the boilers. RS-485 communications wiring supports a distance of up to 4,000 feet between BMS II and boilers. It is possible to use a converter (RS232 to RS485) between the BMS II and a BAS/EMS equipped with an RS485 interface.
- **Rugged & Reliable** – Built to withstand the normal conditions of a commercial boiler room, the BMS II is encased in a NEMA 13 grade enclosure and can operate in an ambient temperature up to 55°C (131°F).
- **Flexible & Expandable** – The BMS II can support up to 32 AERCO boilers – which can be fully integrated with any EMS or BAS software via the Modbus protocol.
- **Fault Alarm Surveillance** – In the absence of a BAS/EMS system to poll individual boilers for faults, an alarm closure contact is provided for the BMS II only. It can be used to notify facility managers of faults associated with the BMS II.
- **Building Reference Temperature Inputs** – The BMS II can accept reference temperatures from a sensor, and external 4-20 signal or via Modbus feed to a BAS/EMS system and will adjust plant operations to accommodate varying conditions.
- **Programmable Minimum/Maximum Setpoints & Building Reference Temperature** – Boilers can be clamped at minimum and maximum temperatures, and the building reference temperature adjusted to drive plant header temperature. This allows a wide range of boiler responses to outside air changes for maximum comfort.
- **Accuracy** – BMS II uses PID (Proportional & Integral + Derivative) and Dynamic Up/Dynamic Down Modulation control algorithm to provide a dynamic response to all changes in plant operation. Header temperatures, as well as percentage boiler input, are precisely controlled with virtually no overshoot or short cycling of equipment. A header temperature of ±2°F is assured during continual plant operation.
- **"Bumpless" Energy Transfer** – When staging boilers sequentially, the BMS II can bring additional units online at an adjustable percentage of input selected by the user.

Typical Installation



NOTES

1. The RS-485 communications port can interface with up to 32 boilers.

		Required	Recommended	Optional
Main Mode Selection	Indoor/Outdoor Reset	B A	H	C E F G I
	Constant Set Point	B	H	C E F G I
	4-20mA Signal	B D	H	C E F G I
	Network Temp Setpoint	B K	H	C E F G I

SPECIFICATIONS

Dimensions ..... 7.25" x 9.50" x 4"
Weight ..... 3 lbs.
Electrical Requirements ..... 85-265VAC/1/60 1 AMP
Enclosure ..... NEMA 13

Accessories Available:

- Outdoor Air Sensor Kit GM-122781
- RS-232 to RS-485 Converter 124943
- Supply Header Sensor Replacement GM-122790

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Specifications subject to change.
Consult website or contact AERCO.
BMS II New Doc 8/08 Print 5M

AERCO
HOT WATER SYSTEMS