

# SB Series Commercial Condensing Boilers

**Buderus**

Bosch Group



## Innovative Commercial Condensing Gas Boiler Design

- Ultra High Efficiency - Up to 98%
- No Restriction on Return Temperature and Flow Rates
- Stainless Steel Hydro-Formed Fire Tubes for Long Life
- Dual Returns Provide Unique Design Opportunities
- Suitable for Natural Gas or Liquid Propane Forced Draft Burners
- Low NOx and CO Levels, Meeting Air Quality Control Regulations
- 484 to 4,079 MBH Output

**Comfortable. Efficient. Intelligent Heating.**

# SB Series

## Condensing Boiler Technology

Condensing boiler technology is the most efficient, environmentally friendly form of gas heating available today. Thanks to lower fuel consumption and lower heating costs, condensing boilers usually pay for themselves in only 2 to 5 years. Additionally, a modern condensing heating system increases the value of the building as well as quality of life by reducing emissions. Contemporary condensing technology offers an intelligent, easy-to-install solution to rising fuel costs and meets air quality regulation requirements. High efficiency condensing equipment also aids in LEED Certification of commercial buildings.



## Condensing Technology Improves Energy Utilization By Up To 15%

Condensing technology recovers the condensation heat retained latently in flue gases—part of the energy that normally disappears up the chimney in other heating systems. With condensing technology, the water vapor contained in the flue gases condenses on the cooler heat exchanger surfaces of the boiler, transferring heat into the boiler water. Large heat-transfer surfaces, a counter-flow heat exchanger design, and cold return water temperatures together optimize condensation opportunities.

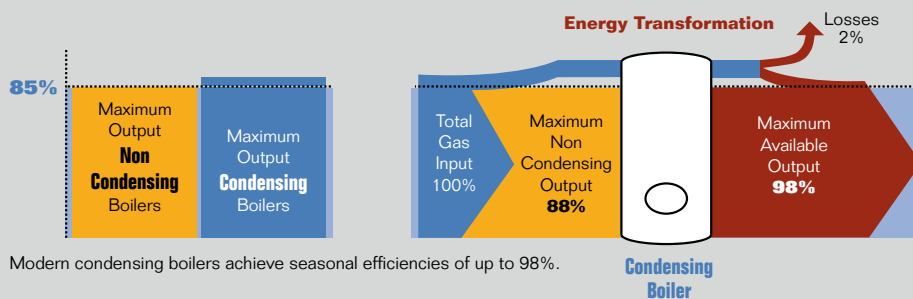
The heat released from condensation is transmitted directly into the boiler water, minimizing thermal flue gas losses. The seasonal efficiency of the Buderus SB Series Condensing Boilers can reach up to 98%, reducing heating costs by up to 20% in comparison with conventional heating systems, especially in radiant floor and snow melt applications.

## SB Series Design Advantages

- Ultra-high efficiency – up to 98%
- Inexpensive installation with comprehensive equipment and simple system technology
- NOx ratings as low as <20 ppm and low CO output levels with conventional burners as a result of the full three-pass flue design
- Kondens® technology



## Condensing and Standard Boiler Energy Efficiency Comparison



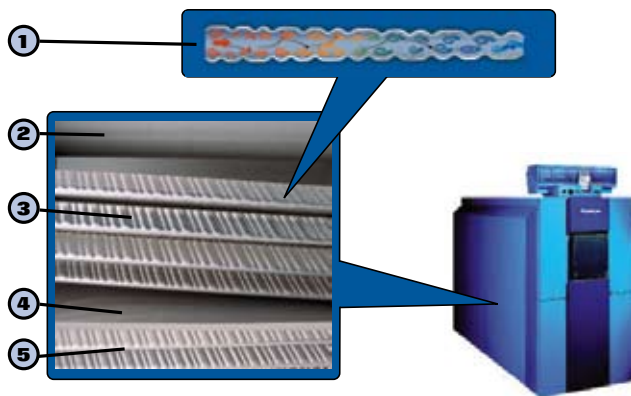
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## The Buderus Kondens® Heating Surface Technology Enables High Energy Utilization

Buderus Kondens® heating surfaces significantly improve the efficiency of heat-generating condensing technology. The secondary heating surfaces are long and extremely large in order to ensure optimal heat transfer and a high degree of condensation during contact with combustion gases.

### 10% More Condensation with Micro-Turbulence

The Kondens® heating surface, designed with a special swirling effect, generates micro-turbulence within each fire tube. Channeling practically all combustion gases to the cold heating surface generates up to 10% more condensation than with a smooth heating surface. The tapered design of the fire tubes also helps to maintain constant flue gas velocity for increased heat transfer.



1. Cross Section of spiral tube of the Kondens® heating surface with a diagram of the flue gas flow.
2. Combustion Chamber
3. Upper Kondens® heating surface
4. Water baffle
5. Lower Kondens® heating surface

## Ultra High Efficiency, Air Quality Control, Simple System Design

With seasonal efficiencies of up to 98%, Buderus SB Series condensing boilers are among the most efficient condensing boilers available today. The Kondens® heating surface, developed by Buderus, is designed to ensure ultra-efficient condensation utilization. This advanced technology is also conducive to low NOx and CO levels, a perfect choice for any application and ideal for those needing to meet air quality control regulations.

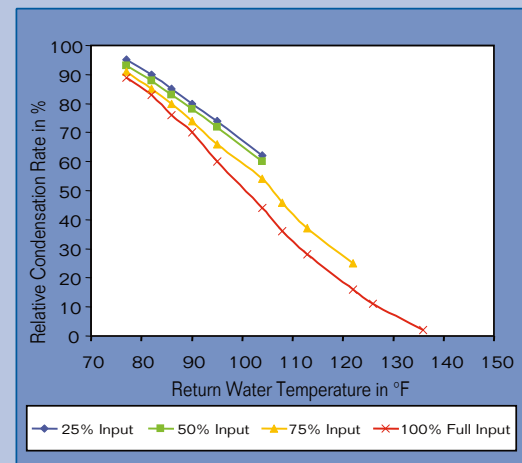
## Maximum Heat Gain through Counter-Flow Heat Exchange and Optimized Water Channeling

The efficiency of the Kondens® heating surface is supported by a unique water channeling system between the second and third flue passes. The main return water flow runs counter to the combustion gas flow, so that combustion gasses always meet the coldest return water. Simultaneously the lower water-channeling element ensures that the main condensation zone is fully separated from the return flow water of the high-temperature heating circuit, further increasing the condensation rate. A minimum of 20% of the total low-temperature return water volume will achieve maximum efficiency.

### The Kondens® Advantage

- The large Kondens® heating surfaces ensure optimal heat transfer by reducing the flue gas temperature even at full fire inputs
- Micro-turbulences and optimized water flow result in an additional 10% condensation
- Large, full-swing openings of the main combustion chamber and Kondens® fire tube heating surface assure easy inspection and service.

### Condensation Potential vs. Return Water Temperature at Various Outputs



### 30/20/10 Rule: 3 Parameters for Maximum Efficiency

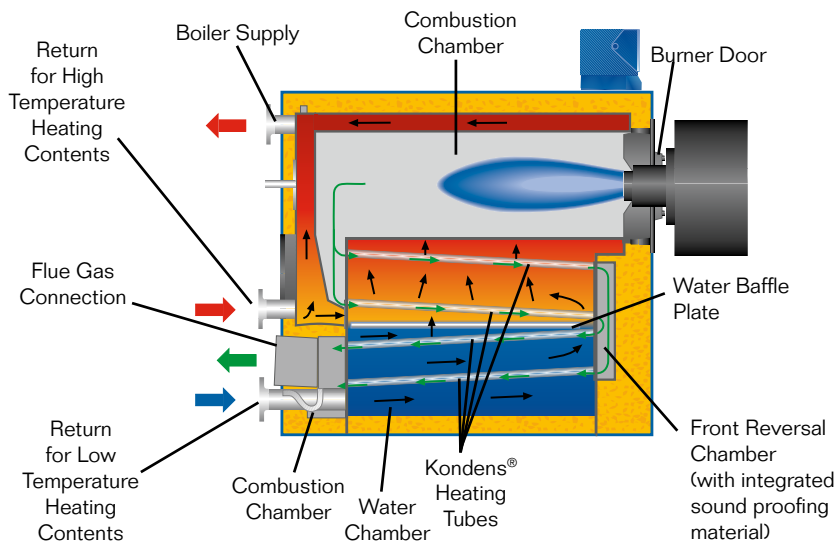
- **30** The exiting flue gas temperature is only up to 30 degrees Fahrenheit above the return water temperature
- **20** The minimum proportion for maximum efficiency of low-temperature water returning to the lower boiler connection is 20% of the total return-flow volume
- **10** Maximum condensate production is 10 gallons per hour per million BTU of gas input

# SB Series

## A Two-Stage Burner and Two Return-Water Connections Ensure High Energy Efficiency / Low Pollutant Emissions

The SB Series Condensing Boilers have more than exemplary economy to offer. Equipped with a two-staged or modulating forced-draft gas burner, they achieve extremely low pollutant emissions. High- and low-temperature heating circuit returns to the boiler should be connected separately to achieve higher efficiencies and higher rates of condensation. Buderus condensing boilers are equipped with two return water connections, which allow for separate return flows and optimal efficiencies.

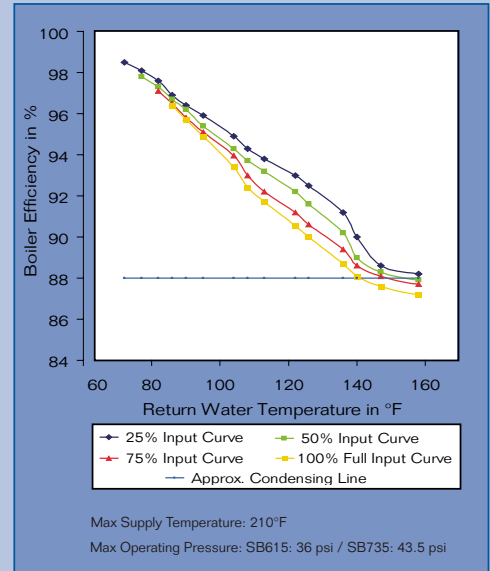
When return-flow temperatures below the dew point of combustion gases are reduced further, even more heat is reclaimed from the flue products. In the SB Series, low flue gas temperatures are ensured by low return water flow temperatures, highly efficient heat exchanger surfaces, two-stage or full modulating burners, and also continuous operation. Condensing boilers are ideally suited for direct piping in commercial systems to make maximum use of low return water temperatures. Direct piping lowers system complexity, and installation and maintenance costs. Outdoor reset can be done directly through the boiler without the use of costly 3- or 4-way valves or primary/secondary piping.



## Simple System Technology Reduces Planning Time and Cost

- The SB Condensing Boilers have no operational requirement with regard to water flow, minimum return temperature, temperature rise through the boiler, or minimum burner capacity.
- The heating circuit flow and low-temperature return flow can be connected without any additional equipment, e.g. flow monitors or shunt pumps.
- Optimal condensation is required in order to achieve seasonal efficiencies of up to 98%, and a separate return flow connection provides the ideal practical solution.
- In Buderus SB boilers, 20% of low-temperature return water volume is adequate to achieve maximum efficiency.

## Buderus SB615/735 Boiler Thermal Efficiency vs. Return Temperatures



This graph illustrates how thermal efficiency increases in relation to return-water flow temperatures, at various inputs. Boilers can achieve 98% thermal efficiency with return flow in the 60–70 degree Fahrenheit range. These efficiencies are achieved under full fire conditions.

## Applications for Optimum Efficiency

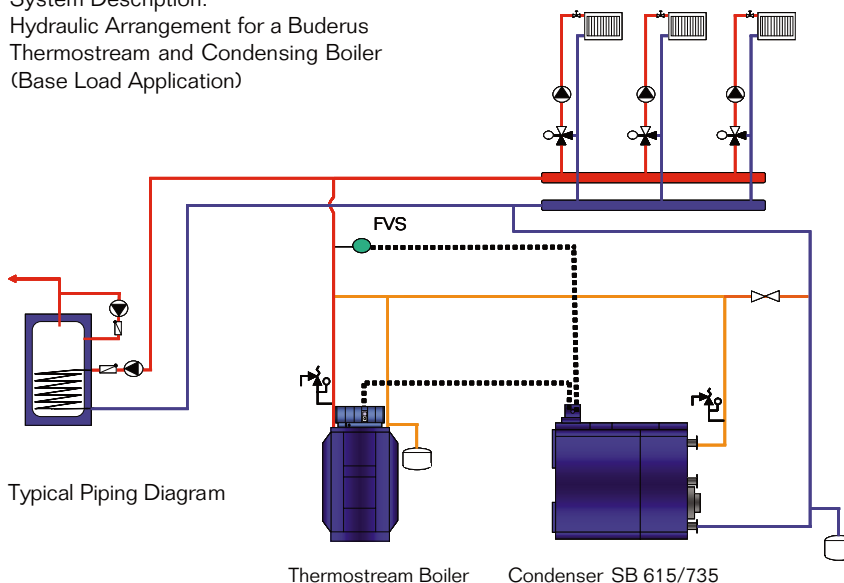
- Radiant
- Snow Melt
- Preheating Domestic Hot Water
- Heat Pump Systems
- Base Loading
- Preheat Make-Up Air or Combustion Air

## Lower-Cost Alternative: Buderus Thermostream Boilers Used in Conjunction with the SB Series

Pairing an SB Series condensing boiler with a G Series cast iron boiler reduces the initial investment and still achieves higher seasonal efficiencies than conventional boiler systems. The operational requirements of Buderus Thermostream boilers make them an ideal partner for the SB Series as a lower-cost solution for maximizing efficiencies.

### System Description:

Hydraulic Arrangement for a Buderus Thermostream and Condensing Boiler (Base Load Application)



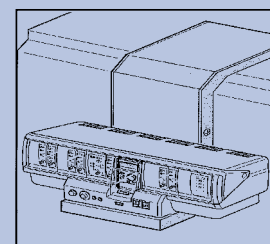
The system diagram above is just one example of many possible applications for the SB condensing boiler in a base load application. Additional configurations, designs, and options are available from your local Buderus dealer.

## Logamatic 4000 Control



- Multiple 2-stage or modulating boilers (up to 3)
- On/Off control for up to 8 boilers
- Series or parallel boiler operation
- Mixed boiler operation: condensing, conventional, hi-temp, and low temp
- Over 20 zones of mixed temperature heating
- DHW tank
- Solar panels
- Multiple temperature curves
- 0-10V external influence - BMS compatible
- 60+ points of LON control

## Ergonomic Control Location



A side-mounting holder for the Logamatic control is available for the SB615 and SB735

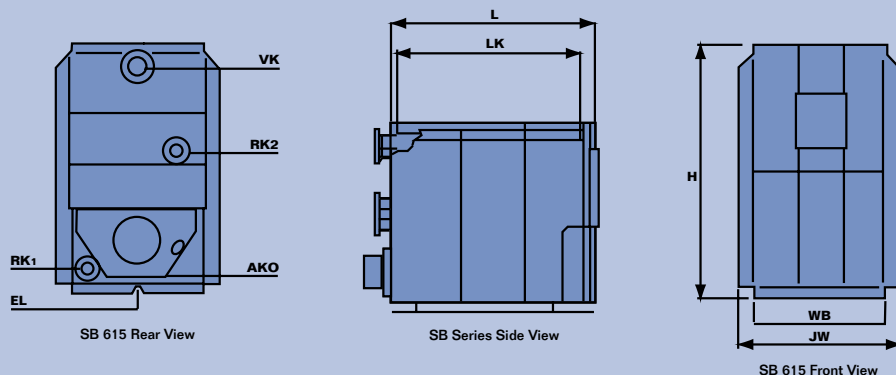
gas-fired condensing boilers. The holder may be configured for either the right or left side of the boiler, and positions the Logamatic control at eye level for convenient operation.

# SB Boiler Specifications

## SB 615 Series Ratings, Dimensions and Connections

Model	145	185	240	310	400	510	640
<b>Performance Data</b>							
Gas Input (MBH)	506	644	835	1080	1393	1776	2228
Gross IBR Output* (MBH)	484	612	791	1022	1317	1678	2104
Max Output Range** (MBH)	440-484	560-612	730-791	940-1022	1220-1317	1550-1678	1950-2104
Net IBR Rating (MBH)	421	532	688	889	1145	1459	1830
Thermal Efficiency	95.6%	95%	94.8%	94.6%	94.5%	94.5%	94.4%
Combustion Efficiency	97.1%	96.7%	96.5%	96.4%	96.3%	96.2%	96.2%
Boiler Horse Power	14.4	18.2	23.6	30.5	39.3	50.1	62.8
Breeching Pressure Range	+0.1 – +0.2	+0.1 – +0.2	+0.1 – +0.2	+0.1 – +0.2	+0.1 – +0.2	+0.1 – +0.2	+0.1 – +0.2
Fireside Pressure Drop (Inch WC)	0.49	0.63	0.89	0.97	1.22	1.44	1.78
<b>Piping Connections</b>							
Vent Pipe Diameter (inner)	7"	7"	8"	8"	10"	12"	12"
Vent Connection Height	11¾"	11¾"	12"	12"	13"	14½"	14½"
Boiler Supply Connection (VK)	2½"	2½"	3"	3"	4"	4"	4"
Boiler Return (low) (RK1)	2½"	2½"	3"	3"	4"	4"	4"
Boiler Return 2 (RK2)	2"	2"	2½"	2½"	2½"	3"	3"
<b>Physical Dimensions</b>							
Length w/o Burner (L)	68¾"	68¾"	70"	70"	70"	75¼"	75¼"
Length w/o Jacket (LK)	60"	60"	61"	61"	61"	66¼"	66¼"
Height (H)	54¼"	54¼"	55½"	55½"	63½"	69¾"	69¾"
Width (W)	35½"	35½"	38¼"	38¼"	38¼"	43¼"	43¼"
Width w/o Jacket (WB)	28¼"	28¼"	31¼"	31¼"	31¼"	36¼"	36¼"
Dry Weight (lbs.)	1690	1700	1950	2030	2600	2970	3020
Approx. Water Content (gal.)	148	147	179	171	180	229	223

\* Listed output based on IBR testing procedure. \*\* Output dependent on return temperature and firing rate.



**VK** - Supply Connection  
**AKO** - Condensate Drain  
**WB** - Width without Jacket

**RK1** - Low Temperature Return Connection  
**EL** - Boiler Drain  
**JW** - Width with Jacket

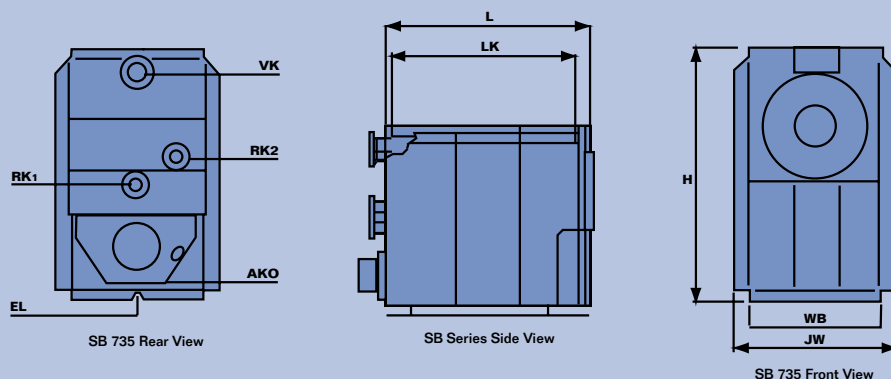
**RK2** - High Temperature Return Connection  
**H** - Height  
**L** - Length

## SB 735 Series Ratings, Dimensions and Connections

Model	790	970	1200
<b>Performance Data</b>			
Gas Input (MBH)	2751	3378	4179
Gross IBR Output* (MBH)	2650	3251	4079
Max Output Range ** (MBH)	2400-2650	2950-3251	3650-4079
Net IBR Rating (MBH)	2265	2827	3547
Thermal Efficiency	96.9%	96.3%	97.6%
Combustion Efficiency	94.7%	95.6%	96.5%
Boiler Horse Power	77.8	97	121.8
Breeching Pressure Range	+0.01 – +0.2	+0.01 – +0.2	+0.01 – +0.2
Fireside Pressure Drop (Inch WC)	1.98	2.31	2.60
<b>Piping Connections</b>			
Vent Pipe Diameter (inner)	14"	14"	14"
Vent Connection Height	19"	19"	19"
Boiler Supply Connection (VK)	4"	5"	5"
Boiler Return (low) (RK1)	4"	5"	5"
Boiler Return 2 (RK2)	3"	4"	4"
<b>Physical Dimensions</b>			
Length w/o Burner (L)	91½"	108¼"	108¼"
Length w/o Jacket (Lk)	75½"	92"	92"
Height (H)	81¼"	81¼"	81¼"
Width (W)	54"	54"	54"
Width w/o Jacket (WB)	43¾"	43¾"	46"
Dry Weight (lbs.)	3811	4780	4855
Approx. Water Content (gal.)	494	660	668

\* Listed output based on IBR testing procedure. \*\* Output dependent on return temperature and firing rate.

### State-of-the-art Production



**VK** - Supply Connection  
**AKO** - Condensate Drain  
**WB** - Width without Jacket

**RK1** - Low Temperature Return Connection  
**EL** - Boiler Drain  
**JW** - Width with Jacket

**RK2** - High Temperature Return Connection  
**H** - Height  
**L** - Length

# SB Series Commercial Condensing Boilers



## A Tradition of Excellence

The world's leader in heating technologies since 1825, Buderus produced the world's first low-temperature hydronic heating systems. Today, Buderus products are acknowledged as the world standard in high-efficiency, low emissions hydronic heating. All Buderus products are designed to meet strict safety and environmental regulations.

Buderus boilers are quick and easy to install and will outlast and outperform virtually any other commercial hot water heating system. They are designed for easy access and service. With appropriate maintenance, Buderus boilers deliver the highest possible efficiencies throughout the lifespan of operation.

## Commercial Boiler Specifications

The gas-fired SB condensing boilers are equipped with stainless steel heating surfaces specially designed for condensing technology. The SB Series is designed to operate efficiently under a variety of operating conditions, and to meet strict NOx and CO environmental regulations.

- A quantity of \_\_\_\_\_ Buderus SB615 or SB735 Series condensing gas fired boilers, suitable for firing with natural gas or propane utilizing a forced draft combustion system, will be provided and installed. Each SB615/735 series boiler will have an input rating of \_\_\_\_ MBH.
- All SB condensing boilers will have a full three-pass fire tube design to allow complete combustion of the fuel in the main combustion chamber. All flue side surfaces, including the main combustion chamber and second and third flue passages, will be constructed of 316 stainless steel. This design maximizes condensate formation. All flue passages are fully water-backed to minimize the thermal stresses on the boiler vessel.
- All SB condensing boilers will be constructed with dual-return water connections where the lower connection will be aligned with the lowest (coldest) return water temperature for maximum boiler efficiency.
- All SB condensing boilers will be suitable to operate under any return water temperature, any boiler water flow rate, and without any restrictions on temperature rise through the boiler vessel. Boiler(s) shall be able to operate at efficiencies up to 98% at sufficiently low return water temperatures.
- The condensing secondary and tertiary Kondens® fire tube flue passages will be fabricated from 316 stainless steel, with a reduced cross section in the direction of flue-products flow. This construction maintains a near constant velocity of combustion products and enhances micro-turbulences for maximum heat transfer.
- All SB condensing boilers will have an internal water baffle plate separating return water between second and third flue passages for maximum efficiency.
- All SB condensing boiler fire-side surfaces will be fully serviceable from the front by means of a reversible swing burner door and removable access cover.
- Each boiler vessel will be wrapped with a full 4" thermal insulation blanket for minimal stand-by loss.

Model	Massachusetts Approval #	New York MEA #	CRN #
SB615 - 145/185	G1-0506-15	MEA 444-04-E	M0812.5C
SB615 - 240/310	G1-0506-15	MEA 444-04-E	M0815.5C
SB615 - 400	G1-0506-15	MEA 444-04-E	M0816.5C
SB615 - 510/640	G1-0506-15	MEA 444-04-E	M0817.5R1, 67890134YTN, U5610.2
SB735 - 790	G1-0506-15	MEA 613-06-E	M2115.5C
SB735 - 970	G1-0506-15	MEA 613-06-E	M2116.5C
SB735 - 1200	G1-0506-15	MEA 613-06-E	M2114.5C



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