Wiring and Drawing Diagrams for:

**Bosch Heatronic 4000 Controls**

Applications Manual
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1 Introduction

This manual is intended to address some of the many applications that are possible using the Bosch Heatronic 4000 control. The diagrams in this manual are for reference use by code officials, designers and licensed installers. It is expected that installers have adequate knowledge of national and local codes, as well as accepted industry practices, and are trained on equipment, procedures, and applications involved. Drawings are not to scale. Auxiliary equipment depicted in this manual does not necessarily represent any one particular manufacturer or specific model number. There are a wide variety of techniques, practices and piping arrangements possible with hydronic heating systems and it is the responsibility of the system engineer or the installing contractor to determine which of these is best suited for a specific application. Information for wiring of burners can be found in section 4 of this manual. Refer to control Installation Manual for additional detailed information. Should you encounter an application that is not covered in this manual or have questions regarding any of its content, we encourage you to contact us here at Bosch Thermotechnology Corp. Bosch Thermotechnology Corp. reserves the right to make changes without notice due to continuing engineering and technological improvements.
2 Controls Description & Specifications

2.1 Brief description

The Heatronic 4000 is designed to operate up to four boilers to produce and maintain a target temperature. The Heatronic 4000 operates both condensing and non-condensing boilers that have modulating, single stage, two stage, or dual fuel burners to provide a more flexible, cost effective mixed plant solution with better system control, energy efficiency and overall performance.

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### Features:
- Control and monitor up to 4 condensing, or non-condensing boilers
- BacNet® and Modbus® compatible
- Programmable scheduling
- DHW priority
- Outdoor temperature reset
- Compatible with modulating, single stage, two stage, and dual fuel burners
- Compatible with NG, LPG & oil burners
- Programmed Bosch / Buderus boiler list
- Pre-configured boiler default parameters

![Fig. 1](image_url)

### Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Literature</td>
<td>I/O Manual 7738003455, App Manual 7738003456, Building Integration 7738003457, ESS 7738003458</td>
</tr>
<tr>
<td>Control</td>
<td>Microprocessor control. This is not a safety (limit) control (part# 7738003450)</td>
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<td>Packaged weight</td>
<td>5.5 lb. (2490 g)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>8-1/16&quot; H x 11-1/8&quot; W x 2-15/16&quot; D (204 x 282 x 74 mm)</td>
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<td>Enclosure</td>
<td>Grey PC+ABS plastic with metal top and bottom conduit connection walls, NEMA type 1</td>
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<td>Approvals</td>
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<td>Ambient conditions</td>
<td>Indoor use only, 32 to 122°F (0 to 50°C), &lt; 90% RH non-condensing</td>
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<td>Power supply</td>
<td>115 V (ac) ±10%, 60 Hz, 18 VA</td>
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<td>Primary pump relays</td>
<td>230 V (ac) 10 A, 1/2 hp</td>
</tr>
<tr>
<td>Boiler &amp; IDHW pump relays</td>
<td>230 V (ac) 5 A, 1/3 hp</td>
</tr>
<tr>
<td>Auxiliary &amp; Alert Relays</td>
<td>230 V (ac) 5 A, 1/6 hp</td>
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<tr>
<td>Boiler Stage Relays</td>
<td>230 V (ac) 5 A</td>
</tr>
<tr>
<td>Modulating outputs</td>
<td>4 x 0-10 V (dc) 500 Ω minimum load impedance / 4-20 mA 1 kΩ max load impedance</td>
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<td>Calls</td>
<td>24 V (ac) or Short</td>
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<td>Sensors</td>
<td>NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) 6+3892</td>
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<td>–Optional</td>
<td>Outdoor Sensor (part #7738003452) and 5 Universal Sensors (part #7738003451)</td>
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<tr>
<td>Warranty</td>
<td>Limited 3 Year</td>
</tr>
</tbody>
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Bosch Thermotechnology Corp. Data subject to change
2.2 Heatronic 4000 Outdoor Sensor

The Outdoor Sensor is designed to provide accurate sensing of the outdoor temperature for display and control operation. Controls that operate based on Outdoor Temperature Reset use this product to provide outdoor reset operation.

**Features:**
- 10K thermistor
- UV resistant enclosure
- Mounts directly to a wall
- Sensor built right into enclosure

---

**Specifications**

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<tr>
<th>Description</th>
<th>Value</th>
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<td>Literature</td>
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<td>Packaged weight</td>
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<td>Dimensions</td>
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<td>Operating range</td>
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<td>Sensor</td>
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<tr>
<td>Warranty</td>
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**Temperature vs. Resistance**

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<th>Temperature</th>
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<td>°F</td>
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Data subject to change
2.3 Heatronic 4000 Universal Sensor

The Universal Sensor is a 10 kΩ temperature sensor designed to be strapped onto a pipe. It can be used with any control sensor input, but is most commonly used to monitor supply and return water temperatures. This product has a brass sleeve for fast response, a wide operating range, an indent to allow pipe strap on installation, and 1 ft. (300 mm) of 2-conductor wire.

**Features:**
- 10K thermistor
- Very fast temperature response
- Thermistor accuracy of +/-0.2°F
- Corrosion resistant brass sleeve
- CSA and C US Approved for use in USA and Canada

### Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Literature</td>
<td>Heatronic 4000 Engineering Submittal Sheet 7738003458</td>
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<tr>
<td>Packaged weight</td>
<td>0.1 lb (50 g)</td>
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<tr>
<td>Dimensions</td>
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<td>Enclosure</td>
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<td>Approvals</td>
<td>CSA C US</td>
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<tr>
<td>Operating range</td>
<td>-60 to 221°F (-51 to 105°C)</td>
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<tr>
<td>Sensor</td>
<td>NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) ß=3892 (part# 7738003451)</td>
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<tr>
<td>Warranty</td>
<td>Limited 3 Year</td>
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#### Temperature vs. Resistance

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3 Applications

3.1 Common Boiler Piping/Wiring Configurations

DISCLAIMER: Improper installation, setup, modification, operation or maintenance of the heating system can cause personal injury and property damage. Follow each appliances’ instructions precisely. For assistance or further information, contact a trained and certified installer, service provider, or the gas supply company. Application drawings in this manual are conceptual only and do not purport to address all design, installation, code, or safety considerations. The diagrams in this manual are for reference use by code officials, designers and licensed installers. It is expected that installers have adequate knowledge of national and local codes, as well as accepted industry practices, and are trained on equipment, procedures, and applications involved. Drawings are not to scale. Refer to the boiler, control and module installer manuals for additional detailed information!

Application 1
Single Temperature System with two 2-Stage non-condensing boilers for space heating and indirect DHW loads. Installed with Primary/Secondary piping arrangement. (pg 10)

Application 2
Single Temperature System with two modulating condensing boilers for space heating and indirect DHW loads. Installed with reverse / return piping arrangement. (pg. 12)

Application 3
Single Temperature System with two modulating condensing boilers for space heating and indirect DHW loads. Installed with Primary/Secondary piping arrangement. (pg. 14)

Application 4
Single Temperature System with four modulating condensing boilers for space heating loads. The fourth boiler also provides indirect DHW priority. Installed with Primary/Secondary piping arrangement with near DHW piping arrangement. (pg. 16)

Application 5
Single Temperature System with one Dual Fuel modulating condensing gas / non condensing oil and one modulating condensing gas boilers for space heating and indirect DHW loads. Installed with reverse / return and injection piping arrangement. (pg. 18)

Application 6
Two Temperature System with two 2-Stage non-condensing boilers and two modulating condensing boilers for space heating and indirect DHW loads. Installed with unique high and low temperature return piping arrangement. (pg. 20)
3.2 Boiler Connections

The SB Series condensing boilers can utilize a variety of fuel sources, natural gas, LP gas, oil, ultra low sulfur diesel. Riello, Beckett and Powerflame Burner models are available in single stage, two stage, modulating and dual fuel type signals. SB Series Boilers have three connections points all out the top. One connection is the heating flow outlet (supply). The supply is near the front of the boiler. Next looking from front to back is the heating return high temperature connection, and the last is the heating return low temperature connection.

In common single temperature heating systems applications the return low temperature connection is utilized while the return high temperature connection is capped. In multi-temperature applications, both returns are used to take better advantage of the SB Series condensing technology. In Multi-temperature systems, the low temperature return is separated from the high. This configuration requires that a minimum of 20% of the total heating system load is split into the low temperature return connection.

The G Series boilers with Thermostream Technology are conventional non-condensing boilers that utilize the same burners as the SB Series. G Series boilers have one supply and one return connection, both coming out the back center of the boiler, supply is the top connection and return is the bottom connection.

The GB Series Boilers are gas only boilers. The GB142 and GB162 are both wall hung gas condensing boilers with heating supply and return connections out the bottom of the unit. Same as for the gas connections. The supply connection is on the left and the return connection is on the right when facing the boiler, the gas connection is in the middle. The GB312 is a floor standing gas condensing boiler with the supply connection is the upper right corner and the return in the lower left corner when facing the front of the boiler.
3.3 Application 1

Description:
Single temperature system with two two stage non-condensing boilers are operated to provide a boiler target temperature for space heating and indirect DHW loads. The boiler target temperature for the space heating load is determined from outdoor temperature reset. Piping schematic is primary/secondary.

Essential Source (#) Settings:
- ENABLE (1) = AUTO
- BOSC BOILER (1) = YES
- BOSC MODL (1) = “G-Series”
- ENABLE (2) = AUTO
- ENABLE (3) = OFF
- ENABLE (4) = OFF

Essential System Settings:
- APP MODE = RSET
- AUX RELAY = DMPR
- PUMP 1 = AUTO
- PUMP 2 = AUTO
- IDHW MODE = ON
- IDHW LOCATION = PRIM
- IDHW SENSOR = ON
- IDHW PRIM PUMP = OFF
- FLOW SENSOR = ON
- PRES SENSOR = ON

Application 1 Piping:

Features:
- The boiler plant is sequenced to obtain maximum efficiency based on the boiler types & target temperatures. For detailed information about sequencing, rotation & staging, refer to the Installation & Operation Manual.
- Dual primary pumps with a flow proof provide redundancy. Pumps can be sequenced with equal run-time rotation. A pressure differential switch is used to prove primary pump flow.
- A pressure sensor is used for monitoring flow, energy and gauge pressure.
- Boiler ΔT monitoring is available when using optional boiler outlet sensors (S6 & S7) & boiler inlet sensor (S5).
- This schematic could also be used for a #2 oil or ultra low sulfur diesel dual fuel application.

LEGEND:
- S1 = Outdoor Sensor
- S2 = Primary Supply Sensor
- S3 = Primary Return Sensor
- S4 = DHW Sensor
- S5 = Boiler Inlet Sensor
- S6, S7 = Boiler Outlet Sensors
- P1, P2 = Primary Pumps
- P3, P4 = Boiler Pumps
- P5, = IDHW Pump
- X1 = Pressure Differential Switch
- X2 = Comb Air Proof
- C.A. Damper
- Pressure Differential Switch
- Comb Air Proof External Flow Proof
- External C.A. Proof
Application 1 Wiring:

- **Pump 1**
  - Prim Pump
  - Flow Proof
- **Comb Air**
  - Comb Air Proof
- **Call**
  - CH Call
- **DHW Tank Call**
- **Fuel Switch**
- **20V dc Out**
- **mA (+) In**
- **5V dc (+) In**
- **Gnd (-)**
- **EMS (+)**
- **Outdoor Sensor (S1)**
- **Prim Supply Sensor (S2)**
- **Primary Return Sensor (S3)**
- **DHW Sensor (S4)**
- **Boiler Inlet Sensor (S5)**
- **Boiler 1 Outlet Sensor (S6)**
- **Boiler 2 Outlet Sensor (S7)**
- **RS485 A**
- **Gnd**
- **Auxiliary C.A. Damper**

**Key Components:**

- **Heatronic 4000**
- **4 boiler control, BACnet, BACnet and Modbus**

**Input Power:**

- Class B: Canadian

**Boiler & DHW Pumps:**

- 230 V (ac) 10 A, 1/2 hp
- 115 V (ac) ±10% 60 Hz, 18 VA

**Power Supply:**

- Rated at least 300 V.

**Signal Wiring:**

- Must be assembled in Canada by Tekmar Control Systems
3.4 Application 2

Description:
Single temperature system with two modulating condensing boilers operated to provide heat for space heating and indirect DHW loads. The boiler target temperature for the space heating load is determined from outdoor temperature reset. Piping schematic is reverse / return with bypass.

Essential Source (#) Settings:
- ENABLE (1) = AUTO
- BOSC BOILER (1) = YES
- BOSC MODL (1) = “SB-Series”
- ENABLE (2) = AUTO
- BOSC BOILER (2) = YES
- BOSC MODL (2) = “SB-Series”
- ENABLE (3) = OFF
- ENABLE (4) = OFF

Essential System Settings:
- APP MODE = RSET
- PUMP 1 = AUTO
- PUMP 2 = OFF
- IDHW MODE = ON
- IDHW LOCATION = PRIM
- IDHW SENSOR = ON
- IDHW PRIM PUMP = OFF

Application 2 Piping:

**Features:**
- The boiler plant is sequenced to obtain maximum efficiency based on the boiler types & target temperatures. For detailed information about sequencing, rotation & staging, refer to the Installation & Operation Manual.
- Outdoor Temperature Reset saves energy by operating the boiler plant using the lowest possible temperatures. Lower water temperatures ensure modulating condensing boilers operate at maximum efficiency.
- Optional indirect DHW (IDHW) priority.
- Boiler ΔT monitoring is available when using optional boiler outlet sensors (S6 & S7) and boiler inlet sensor (S5).
- The Common Flue Sensor (S8) is optional.
Application 2 Wiring:
3.5 Application 3

**Description:**
Single temperature system with two modulating condensing boilers operated to provide heat for space heating and indirect DHW loads. The boiler target temperature for the space heating load is determined from outdoor temperature reset. Piping Schematic is Primary /Secondary Piping.

**Essential Source (#) Settings:**
- ENABLE (1) = AUTO
- BOSC Boiler (1) = YES
- BOSC MODL (1) = “SB-Series”
- ENABLE (2) = AUTO
- BOSC BOILER (2) = YES
- BOSC MODL (2) = “SB-Series”
- ENABLE (3) = OFF
- ENABLE (4) = OFF

**Essential System Settings:**
- APP MODE = RSET
- IDHW LOCATION = PRIM
- PUMP 1 = AUTO
- IDHW SENSOR = ON
- PUMP 2 = OFF
- IDHW PRIM PUMP = OFF

**Features:**
- The boiler plant is sequenced to obtain maximum efficiency based on the boiler types & target temperatures. For detailed information about sequencing, rotation & staging, refer to the Installation & Operation Manual.
- Outdoor Temperature Reset saves energy by operating the boiler plant using the lowest possible temperatures. Lower water temperatures ensure modulating condensing boilers operate at maximum efficiency.
- Optional indirect DHW (IDHW) priority.
- Boiler ΔT monitoring is available when using optional boiler outlet sensors (S6 & S7) and boiler inlet sensor (S5).
- The Common Flue Sensor (S8) is optional.

**Application 3 Piping:**

---

**LEGEND:**
- S1 = Outdoor Sensor
- S2 = Primary Supply Sensor
- S3 = Primary Return Sensor
- S4 = DHW Sensor
- S5 = Boiler Inlet Sensor
- S6, S7 = Boiler Outlet Sensors
- S8 = Vent Sensor
- P1 = Primary Pump
- P2, P3 = Boiler Pump
- P4 = IDHW Pump

**DIP Settings:**
- [ ] External Flow Proof
- [ ] External C.A. Proof
- [ ] Off

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Refer to the boiler, control and module installer manuals for additional detailed information!
Application 3 Wiring:
3.6 Application 4

Description:
Single temperature system with four modulating condensing boilers are operated to provide an outdoor temperature reset boiler target for a space heating load. The fourth boiler also operates to provide heat for an indirect DHW load with priority over space heating. Piping schematic is primary/secondary with DHW near piping.

Features:
- The boiler plant is sequenced to obtain maximum efficiency based on the boiler types & target temperatures. For detailed information about sequencing, rotation & staging, refer to the Installation & Operation Manual.
- Dual primary pumps with a flow proof provide redundancy. Pumps can be sequenced with equal run-time rotation.
- Boiler ΔT monitoring is available when using optional boiler outlet sensors (S6 to S9) and boiler inlet sensor (S5).
- The boiler outlet sensor S9 is required for indirect DHW operation.

Essential Source (#) Settings:
- ENABLE (1) = AUTO
- BOSC BOILER (1) = YES
- BOSC MODL (1) = “SB-Series”
- ENABLE (2) = AUTO
- BOSC BOILER (2) = YES
- BOSC MODL (2) = “SB-Series”
- ENABLE (3) = AUTO
- BOSC BOILER (3) = YES
- BOSC MODL (3) = “SB-Series”
- ENABLE (4) = AUTO
- BOSC BOILER (4) = YES
- BOSC MODL (4) = “SB-Series”

Essential System Settings:
- APP MODE = RSET
- PUMP 1 = AUTO
- PUMP 2 = AUTO
- IDHW MODE = ON
- IDHW LOCATION = NEAR
- IDHW SENSOR = ON

Application 4 Piping:

LEGEND:
- S1 = Outdoor Sensor
- S2 = Primary Supply Sensor
- S3 = Primary Return Sensor
- S4 = DHW Sensor
- S5 = Boiler Inlet Sensor
- S6-S9 = Boiler Outlet Sensors
- P1, P2 = Primary Pumps
- P3-P6 = Boiler Pumps
- P7 = IDHW Pump

DIP Settings:
- External Flow Proof
- External C.A. Proof
- Off

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Application 4 Wiring:

1. Prim Pump Flow Proof
2. Comb Air Proof
3. CH Call
4. DHW Tank Call
5. Fuel Switch
6. 20V dc Out
7. mA (+) In
8. V dc (+) In
9. Gnd (-)
10. EMS (+)
11. Outdoor
12. Prim Sup
13. Com (-)
14. Prim Ret
15. DHW
16. Com Flue
17. Vent
18. Boiler In
20. Com
21. Boiler 1 Out
22. Boiler 2 Out
23. Boiler 3 Out
24. Boiler 4 Out
25. Auxiliary

Outdoor Sensor (S1)
Primary Supply Sensor (S2)
Primary Return Sensor (S3)
DHW Sensor (S4)
Vent Sensor (S8)
Boiler Inlet Sensor (S5)
Boiler 1 Outlet Sensor (S6)
Boiler 2 Outlet Sensor (S7)

115 V (ac) Power Supply
Indirect DHW Pump (P4)
3.7 Application 5

Description:
Single temperature system with dual fuel condensing gas & non-condensing oil boilers operated to provide heat for space heating and indirect DHW loads. The boiler target temperature for the space heating load is determined from outdoor temperature reset.

Features:
- The boiler plant is sequenced to obtain maximum efficiency based on the boiler types & target temperatures. For detailed information about sequencing, rotation & staging, refer to the Heatronic 4000 Installation & Operation Manual.
- Outdoor Temperature Reset saves energy by operating the boiler plant using the lowest possible temperatures. Lower water temperatures ensure modulating condensing boilers operate at maximum efficiency.
- Optional indirect DHW (IDHW) priority.
- Pump logic feature for protection against low water temperatures for Bosch non-condensing boilers.

Essential Source (#) Settings:
- ENABLE (1) = AUTO
- BOSC BOILER (1) = YES
- BOSC MODL (1) = “SB-Series”
- BOSC FUEL TYPE (1) = DUAL
- ENABLE (3) = AUTO
- BOSC BOILER (3) = YES
- BOSC MODL (3) = “SB-Series”
- ENABLE (4) = OFF

Essential System Settings:
- APP MODE = RSET
- PUMP 1 = AUTO
- PUMP 2 = OFF
- IDHW MODE = ON
- IDHW LOCATION = PRIM
- IDHW SENSOR = ON
- IDHW PRIM PUMP = OFF

Application 5 Piping:

LEGEND:
- S1 = Outdoor Sensor
- S2 = Primary Supply Sensor
- S3 = Primary Return Sensor
- S4 = DHW Sensor
- S6, S7 = Boiler Outlet Sensors
- P1 = Primary Pump
- P2 = Boiler Pump
- P4 = IDHW Pump

DIP Settings:
- Prim Pump Flow Proof / Off
- Comb Air Proof / Off
- Off / Exercise
- Setback / Off

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Application 5 Wiring:

- Prim Pump 1
- Comb Air 3
- CH 5
- DHW Tank 7
- Fuel Switch 9
- 20V dc Out 11
- mA (+) In 12
- 5V dc Out 13
- V dc (+) In 14
- Grd (-) 15
- Outdoor Sensor (S1) 17
- Prim Sup 18
- Com (-) 19
- Prim Ret 20
- DHW 21
- Com 22
- Com Flue 23
- Boil In 24
- Com 25
- Boiler 1 Out 26
- Com 27
- Com 28
- Boiler 3 Out 29
- Boiler 4 Out 30
- Com 31
- Bus b 32
- Boiler C0 33
- Bus 1 tN4 34
- Boiler C1 35
- Bus 2 tN2 36
- Boiler C2 37
- Bus 3 tN4 38
- Boiler C3 39
- RS485 A 40
- B 41
- Grd 42
- Auxiliary 43
- Permanent Call (Jumper)
3.8 Application 6

**Description:**
Two temperature system with two two stage non-condensing boilers & two modulating condensing boilers are operated to provide a boiler target temperature for space heating & indirect DHW. The boiler target temperature for the space heating load is determined from outdoor temperature reset.

**Essential Source (#) Settings:**
- ENABLE (1) = AUTO
- BOSC BOILER (1) = YES
- BOSC MODL (1) = “G-Series”
- ENABLE (2) = AUTO
- BOSC BOILER (2) = YES
- BOSC MODL (2) = “G-Series”
- ENABLE (3) = AUTO
- BOSC BOILER (3) = YES
- BOSC MODL (3) = “SB-Series”
- ENABLE (4) = AUTO
- BOSC BOILER (4) = YES
- BOSC MODL (5) = “SB-Series”

**Essential System Settings:**
- APP MODE = RSET
- AUX RELAY = DMPR
- PUMP 1 = OFF
- PUMP 2 = OFF
- IDHW LOCATION = PRIM
- IDHW SENSOR = ON
- IDHW SENSOR = ON
- IDHW PRIM PUMP = OFF
- SETP PRIM PUMP = OFF

**Application 6 Piping:**

**Features:**
- The boiler plant is sequenced to obtain maximum efficiency based on the boiler types & target temperatures. For detailed information about sequencing, rotation & staging, refer to the Installation & Operation Manual.
- System includes a combustion air (C.A.) damper. Proving of C.A. damper via external C.A. proof (motor end switch).
- Communication with a Building Automation System (BAS) is available using BACnet® IP or Modbus®.

**LEGEND:**
- S1 = Outdoor Sensor
- S2 = Primary Supply Sensor
- S3 = Primary Return Sensor
- S4 = DHW Sensor
- S6-S9 = Boiler Outlet Sensors
- P1, P2 = Boiler Pumps
- P3 = IDHW Pump

**DIP Settings:**
- External Flow Proof
- External C.A. Proof
- Off

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Application 6 Wiring:

- **Flow Proof**: H7019A
- **Meet Class B**: Canadian ICES & FCC Part 15
- **Input Power**: Meets Class B: Canadian

**Applications Manual**

**Bosch Heatronic 4000 Controls**

**Bosch Thermotechnology Corp.**

Data subject to change
4 Burner Wiring Diagrams

4.1 Riello RS Modulating Burner Wiring:

Connect all Stage 1 terminals from boiler to burner.
For Boiler 1 connect Stage 1 terminals 53 & 54 to the T1 & T2 terminals on Burner 1.
For Boiler 2 connect Stage 1 terminals 59 & 60 to the T1 & T2 terminals on Burner 2.
For Boiler 3 connect Stage 1 terminals 65 & 66 to the T1 & T2 terminals on Burner 3.
For Boiler 4 connect Stage 1 terminals 71 & 72 to the T1 & T2 terminals on Burner 4.

Connect all Mod + | - terminals from boiler to burner.
For Boiler 1 connect Mod + | - terminals 51 & 52 to the Y1 & M terminals on Burner 1.
For Boiler 2 connect Mod + | - terminals 57 & 58 to the Y1 & M terminals on Burner 2.
For Boiler 3 connect Mod + | - terminals 63 & 64 to the Y1 & M terminals on Burner 3.
For Boiler 4 connect Mod + | - terminals 69 & 70 to the Y1 & M terminals on Burner 4.
4.2 Riello Dual Fuel Burner (2 Stage Oil & Modulating Gas) Wiring:

Dual Fuel Boilers can only be connected to Boiler 1 or Boiler 3 terminals. Dual Fuel burners require a switch to change operation from gas to the oil. When connecting a Dual Fuel burner to Boiler 1 the burner wiring connects to Boiler 1 and Boiler 2 terminals. When connecting a Dual Fuel burner to Boiler 3, the burner wiring connects to Boiler 3 and Boiler 4 terminals.

The wiring schematic above is a Dual Fuel modulating condensing gas and non-condensing oil burner.

Wiring the terminals from boiler to burner.

For Boiler 1 connect Mod + | - terminals 51 & 52 to the Y1 & M terminals on Burner 1. For Boiler 1 connect Stage 1 terminals 53 & 54 to the T1 & T2 terminals on Burner 1.

For Boiler 2 connect Stage 1 terminals 59 & 60 to the T1 & T2 terminals on Burner 2. For Boiler 2 connect Stage 2 terminals 61 & 62 to the T6 & T8 terminals on Burner 2.
4.3 Becket CG Burner Wiring:

Connect all Stage 1 terminals from boiler to burner.
For Boiler 1 connect Stage 1 terminals 53 & 54 to the LIM1 & LIM2 terminals on Burner 1.
For Boiler 2 connect Stage 1 terminals 59 & 60 to the LIM1 & LIM2 terminals on Burner 2.
For Boiler 3 connect Stage 1 terminals 65 & 66 to the LIM1 & LIM2 terminals on Burner 3.
For Boiler 4 connect Stage 1 terminals 71 & 72 to the LIM1 & LIM2 terminals on Burner 4.

Connect all Stage 2 terminals from boiler to burner.
For Boiler 1 connect Stage 2 terminals 55 & 56 to the RC1 & RC2 terminals on Burner 1.
For Boiler 2 connect Stage 2 terminals 61 & 62 to the RC1 & RC2 terminals on Burner 2.
For Boiler 3 connect Stage 2 terminals 67 & 68 to the RC1 & RC2 terminals on Burner 3.
For Boiler 4 connect Stage 2 terminals 73 & 74 to the RC1 & RC2 terminals on Burner 4.
4.4 Power Flame Burner Wiring:

Connect all Stage 1 terminals from boiler to burner. For Boiler 1 connect Stage 1 terminals 53 & 54 to the CL1 & CL2 terminals on Burner 1. For Boiler 2 connect Stage 1 terminals 59 & 60 to the CL1 & CL2 terminals on Burner 2. For Boiler 3 connect Stage 1 terminals 65 & 66 to the CL1 & CL2 terminals on Burner 3. For Boiler 4 connect Stage 1 terminals 71 & 72 to the CL1 & CL2 terminals on Burner 4.

Connect all Mod + | - terminals from boiler to burner. For Boiler 1 connect Mod + | - terminals 51 & 52 to the TC+ & TC- terminals on Burner 1. For Boiler 2 connect Mod + | - terminals 57 & 58 to the TC+ & TC- terminals on Burner 2. For Boiler 3 connect Mod + | - terminals 63 & 64 to the TC+ & TC- terminals on Burner 3. For Boiler 4 connect Mod + | - terminals 69 & 70 to the TC+ & TC- terminals on Burner 4.
4.5 Riello RS Lo/Hi/Lo Burner Wiring:

Connect all Stage 1 terminals from boiler to burner.
For Boiler 1 connect Stage 1 terminals 53 & 54 to the T1 & T2 terminals on Burner 1.
For Boiler 2 connect Stage 1 terminals 59 & 60 to the T1 & T2 terminals on Burner 2.
For Boiler 3 connect Stage 1 terminals 65 & 66 to the T1 & T2 terminals on Burner 3.
For Boiler 4 connect Stage 1 terminals 71 & 72 to the T1 & T2 terminals on Burner 4.

Connect all Stage 2 terminals from boiler to burner.
For Boiler 1 connect Stage 2 terminals 55 & 56 to the T6 & T8 terminals on Burner 1.
For Boiler 2 connect Stage 2 terminals 61 & 62 to the T6 & T8 terminals on Burner 2.
For Boiler 3 connect Stage 2 terminals 67 & 68 to the T6 & T8 terminals on Burner 3.
For Boiler 4 connect Stage 2 terminals 73 & 74 to the T6 & T8 terminals on Burner 4.
5 Recommended Specifications

The following are the recommended specifications for the Boiler 4000 Control:

- The control shall be capable of sequencing up to four single stage, two stage and modulating boilers, or two dual fuel boilers. Plus a combination of one dual fuel and two single stage, two stage, modulating boilers.
- The control shall be capable of operating combinations of condensing & non-condensing boilers.
- The control shall be capable of adjusting the boiler plant target to provide indirect domestic hot water heating with priority.
- The control shall have the ability to calculate the boiler plant target temperature based on outdoor temperature reset.
- The control shall have the ability to set the boiler plant target temperature using an adjustable setpoint.
- The control shall have the ability to set the boiler plant target temperature as directed by a BAS, BMS or EMS.
- The control shall have an adjustable warm weather shut down applied to outdoor temperature reset operation.
- The control shall be able to operate two primary pumps in standby mode.
- The control shall have the options of a proof demand input or a flow sensor input to prove flow for the primary pump.
- The control shall provide an alert output for flow proof, CA proof & no heat failures.
- The control shall be able to operate one primary pump & one domestic hot water pump during a domestic hot water call.
- The control shall communicate with Modbus®, BACnet® IP & tekmarNet® systems to provide remote monitoring & adjustment.
- The control shall have the ability to display the current temperature difference between the return temperature & the supply temperature, $\Delta T$.
- The control shall have the option to measure fluid pressure & flow rates.
- The control shall have an option to rotate the boilers & primary pumps based on the accumulated running hours.
- The control shall display the run time of the boilers & optionally, primary pumps.
- The control shall use proportional, integral & derivative (PID) logic when modulating the boilers.
- The control shall have the option to modulate the boilers sequentially or in parallel.
- The control shall have an adjustable minimum supply water temperature setting to help prevent condensation of flue gases & subsequent corrosion & blockage of the boiler’s heat exchanger & chimney.
- The control shall have the option of an automatic differential calculation in order to prevent short cycling of the boilers.
- The control shall have the ability to operate individual boiler pumps.
- The control shall have adjustable post purge settings that allow the primary & boiler pumps to run for a set period after the boiler has been shut off.
- The control shall have the option for fixed lead & fixed last boiler rotation.
- The control shall have the option to prove & operate a combustion air damper output.
- The control shall have an adjustable minimum inter-stage delay that can be set manually or calculated by the control.
- The control shall have the option of accepting a 0 – 10 V (dc) or 2 – 10 V (dc) input signal from an energy management system with an adjustable offset.
- The control shall have three separate lockable access levels (Advanced, Installer, User) to limit the number of setting adjustments available to various users.
- The control shall have manual override options to test boiler & pump operation, suspend boiler plant operation, operate pumps for purging & operate the system with a maximum heat output.
- The control shall have the ability to display the current outdoor, boiler supply, return & inlet temperatures.
- The control shall continually monitor the temperature sensors & provide an error message upon a control or sensor failure.
- During extended periods of inactivity, all pumps shall be periodically exercised to prevent seizure during long idle periods.
- The control shall include a setback schedule that can be used by the control itself or shared with other tN4 devices.
- The control shall have the option to operate as a tN4 system control with a tN4 boiler bus.
- The control shall display the current % modulation of each boiler, or the number of stages fired.
- The control shall include an adjustment for the cycle length if connected to a tN4 network.