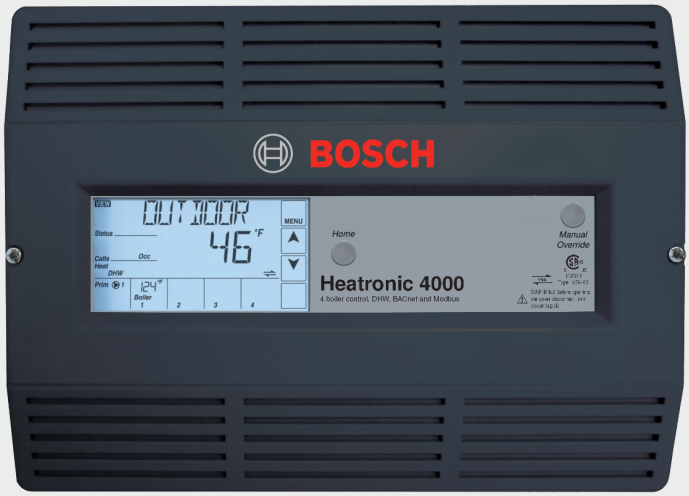


Wiring and Drawing Diagrams for:

Bosch Heatronic 4000 Controls

BOSCH

Applications Manual

C SA US

Table of Contents

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.

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

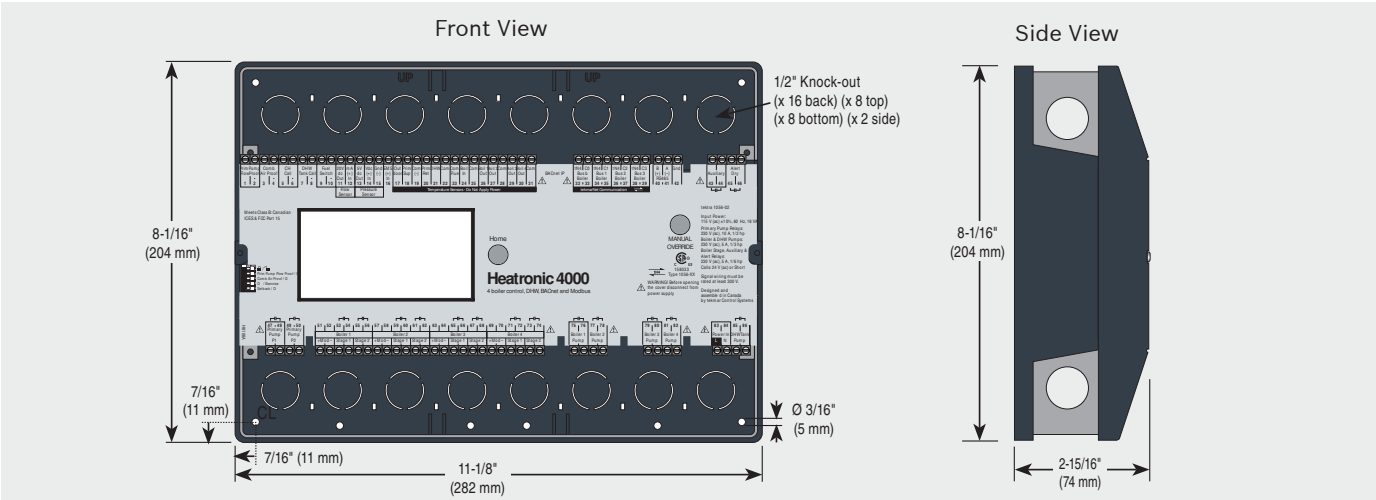


Fig. 1

Specifications **Table 1**

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

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

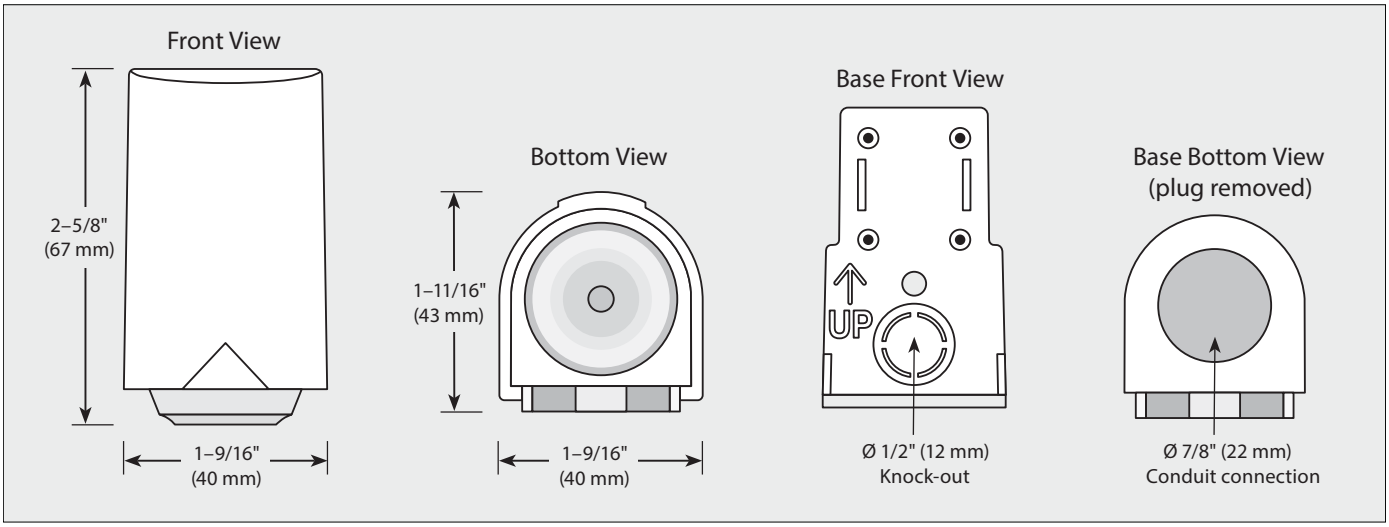


Fig. 2

Specifications — **Table 2**

Description	Value
Literature	Heatronic 4000 Engineering Submittal Sheet 7738003458
Packaged weight	0.17 lb. (77 g)
Dimensions	2-5/8” H x 1-9/16” W x 1-11/16” D (67 x 40 x 43 mm)
Enclosure	White PVC plastic, NEMA type 2
Approvals	CSA C US
Operating range	-60 to 140°F (-51 to 60°C)
Sensor	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) ß=3892 (part# 7738003452)
Warranty	Limited 3 Year

Temperature vs. Resistance — **Table 3**

Temperature		Resistance	Temperature		Resistance	Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω	°F	°C	Ω	°F	°C	Ω
-50	-46	490,813	20	-7	46,218	90	32	7,334	160	71	1,689
-45	-43	405,710	25	-4	39,913	95	35	6,532	165	74	1,538
-40	-40	336,606	30	-1	34,558	100	38	5,828	170	77	1,403
-35	-37	280,279	35	2	29,996	105	41	5,210	175	79	1,281
-30	-34	234,196	40	4	26,099	110	43	4,665	180	82	1,172
-25	-32	196,358	45	7	22,763	115	46	4,184	185	85	1,073
-20	-29	165,180	50	10	19,900	120	49	3,760	190	88	983
-15	-26	139,402	55	13	17,436	125	52	3,383	195	91	903
-10	-23	118,018	60	16	15,311	130	54	3,050	200	93	829
-5	-21	100,221	65	18	13,474	135	57	2,754	205	96	763
0	-18	85,362	70	21	11,883	140	60	2,490	210	99	703
5	-15	72,918	75	24	10,501	145	63	2,255	215	102	648
10	-12	62,465	80	27	9,299	150	66	2,045	220	104	598
15	-9	53,658	85	29	8,250	155	68	1,857	225	107	553

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

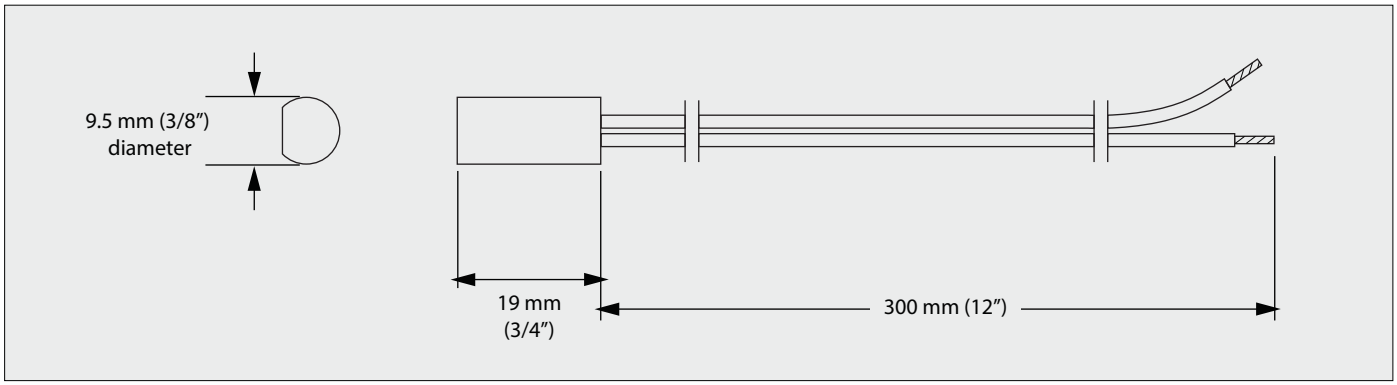


Fig. 3

Specifications — Table 4

Description	Value
Literature	Heatronic 4000 Engineering Submittal Sheet 7738003458
Packaged weight	0.1 lb (50 g)
Dimensions	3/8" OD x 3/4" (9.5 OD x 19 mm)
Enclosure	Brass sleeve, 12" (2438 mm) 20 AWG, 300V PVC insulated zipcord
Approvals	CSA C US
Operating range	-60 to 221°F (-51 to 105°C)
Sensor	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) ß=3892 (part# 7738003451)
Warranty	Limited 3 Year

Temperature vs. Resistance — Table 5

Temperature		Resistance	Temperature		Resistance	Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω	°F	°C	Ω	°F	°C	Ω
-40°	-40°	336,479	68°	20°	12,493	176°	80°	1,255	284°	140°	235
-31°	-35°	242,681	77°	25°	10,000	185°	85°	1,070	293°	145°	208
-22°	-30°	176,974	86°	30°	8,057	194°	90°	915	302°	150°	186
-13°	-25°	130,421	95°	35°	6,531	203°	95°	786	311°	155°	166
-4°	-20°	97,081	104°	40°	5,326	212°	100°	678	320°	160°	148
5°	-15°	72,957	113°	45°	4,368	221°	105°	587	329°	165.°	133
14°	-10°	55,329	122°	50°	3,602	230°	110°	510	338°	170°	119
23°	-5°	42,327	131°	55°	2,986	239°	115°	445	347°	175°	107
32°	0°	32,650	140°	60°	2,488	248°	120°	389	356°	180°	97
41°	5°	25,392	149°	65°	2,083	257°	125°	341	365°	185°	87
50°	10°	19,901	158°	70°	1,752	266°	130°	301	374°	190°	79
59°	15°	15,712	167°	75°	1,480	275°	135°	265	383°	195°	72

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 sulfer 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- temperatures systems, the low temperature return is seperated 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 conneciton 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 (2) = YES
BOSC BOILER (1) = YES	BOSC MODL (2) = “G-Series”
BOSC MODL (1) = “G-Series”	ENABLE (3) = OFF
ENABLE (2) = AUTO	ENABLE (4) = OFF

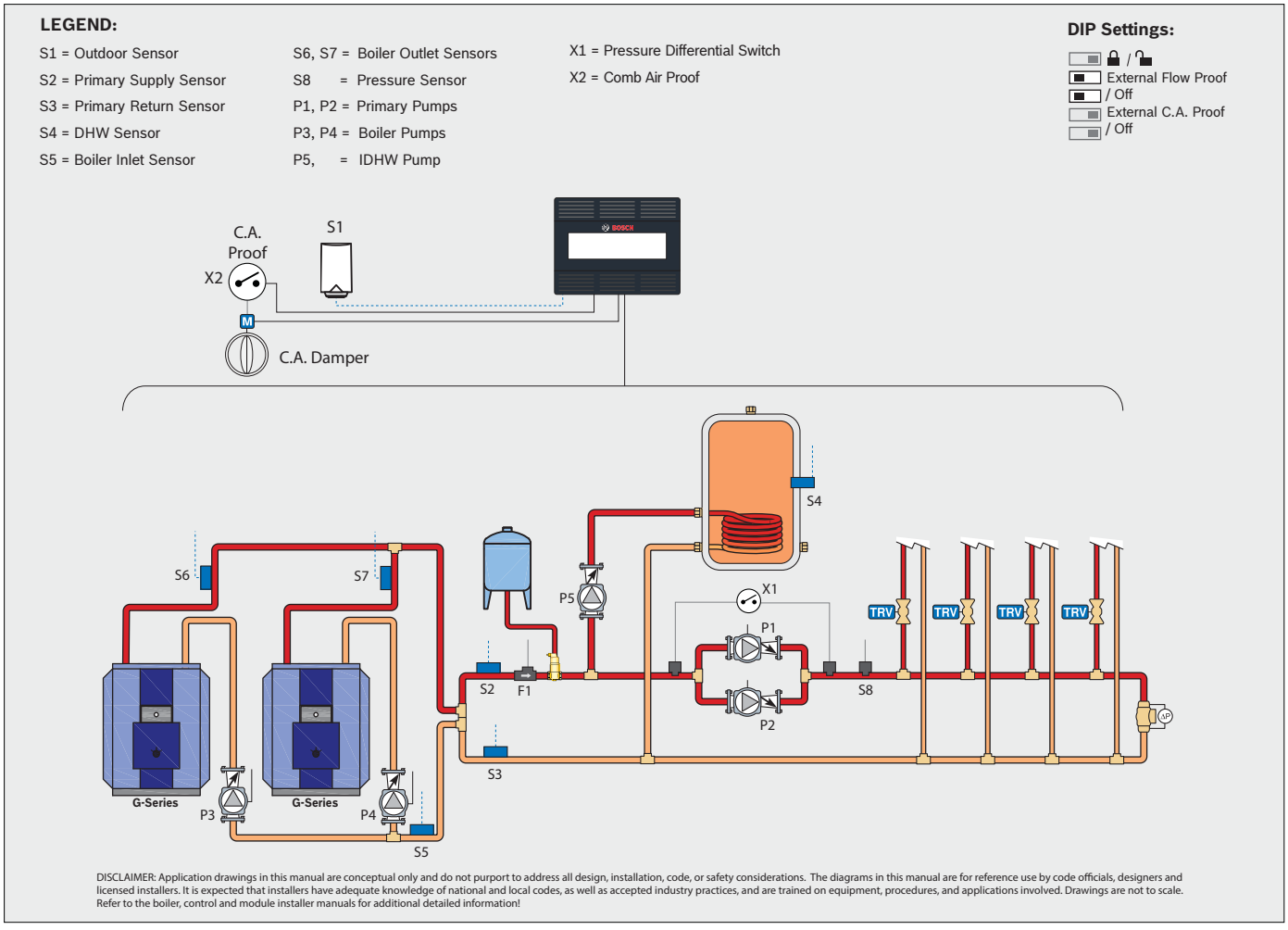
Essential System Settings:

APP MODE = RSET	IDHW LOCATION = PRIM
AUX RELAY = DMPR	IDHW SENSOR = ON
PUMP 1 = AUTO	IDHW PRIM PUMP = OFF
PUMP 2 = AUTO	FLOW SENSOR = ON
IDHW MODE = ON	PRES SENSOR = ON

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.
- System includes combustion air (C.A.) damper. Proving of C.A. damper via external C.A. proof (motor end switch).
- 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.

Application 1 Piping:



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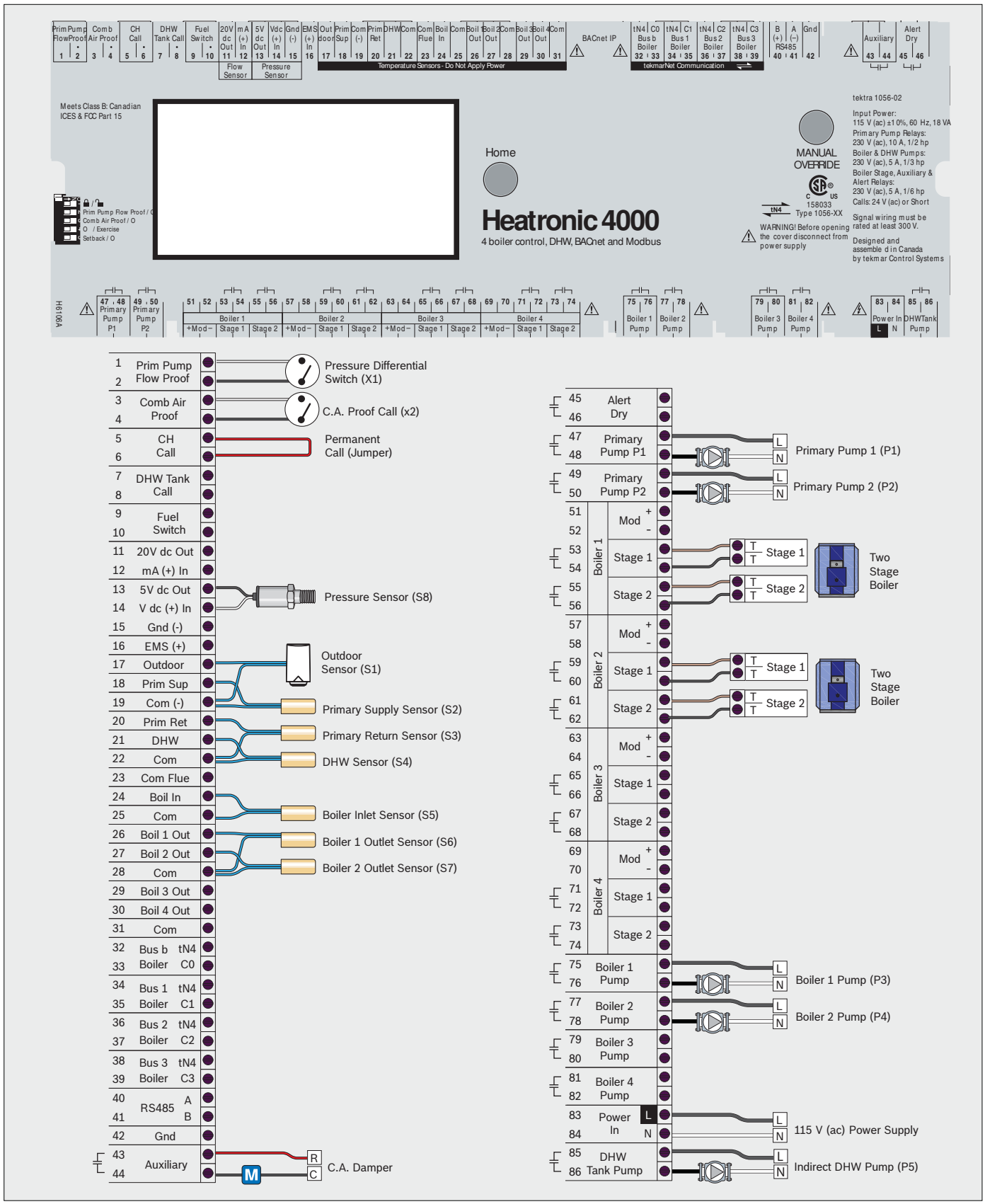
Application 1 Wiring:



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

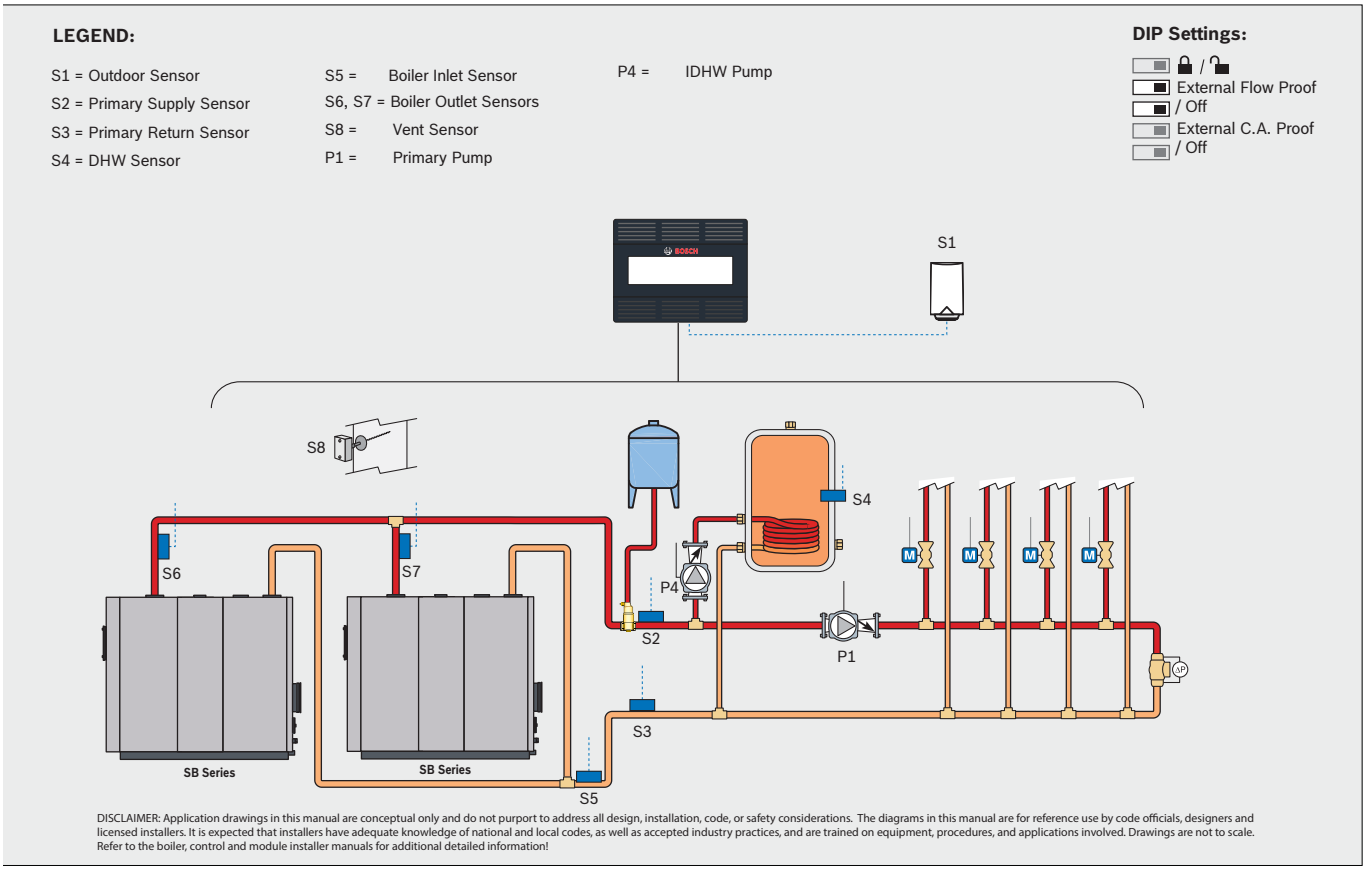
Essential System Settings:

APP MODE = RSET
PUMP 1 = AUTO
PUMP 2 = OFF
IDHW MODE = ON
IDHW LOCATION = PRIM
IDHW SENSOR = ON
IDHW PRIM PUMP = OFF

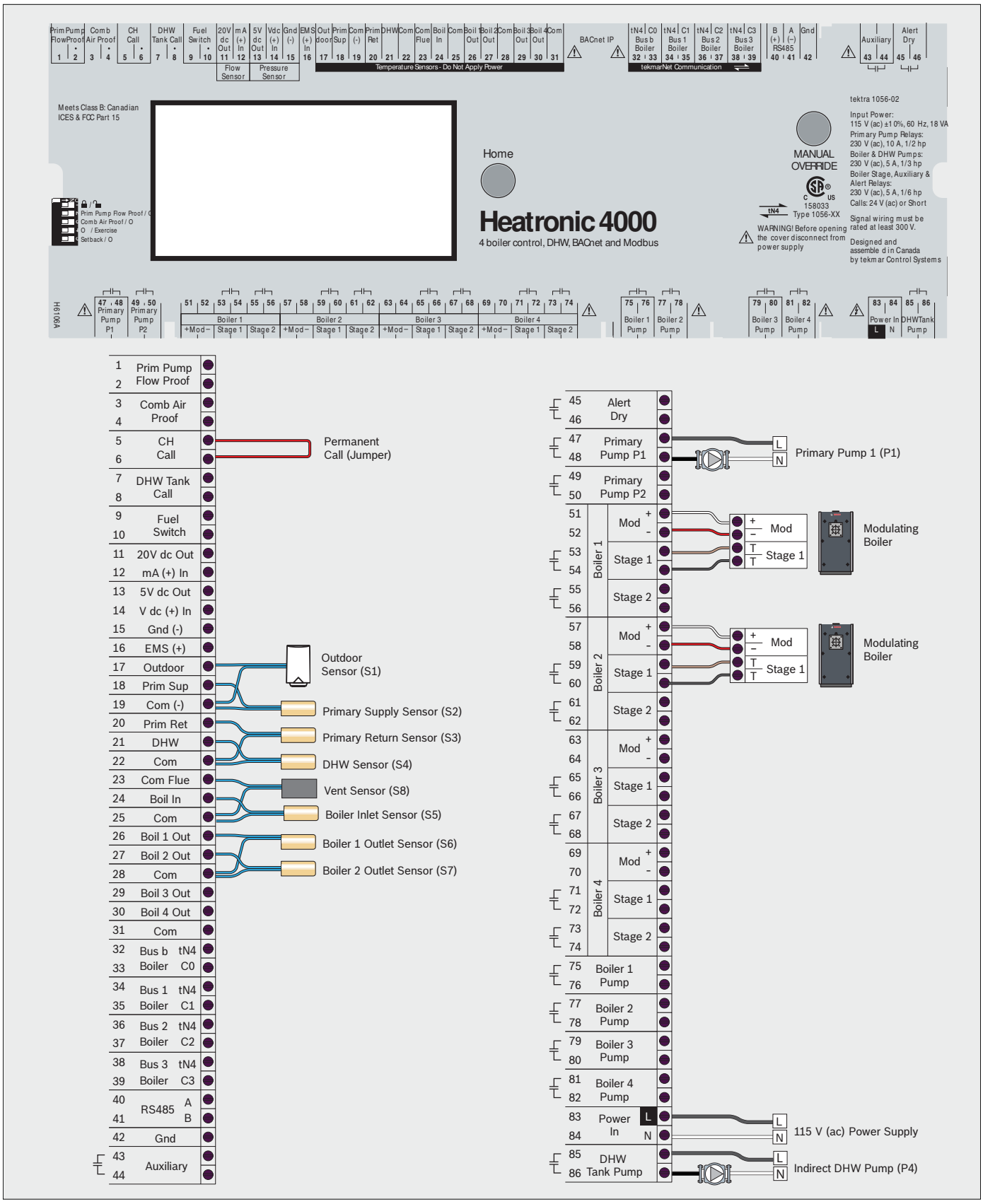
Features:

- 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 Piping:



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

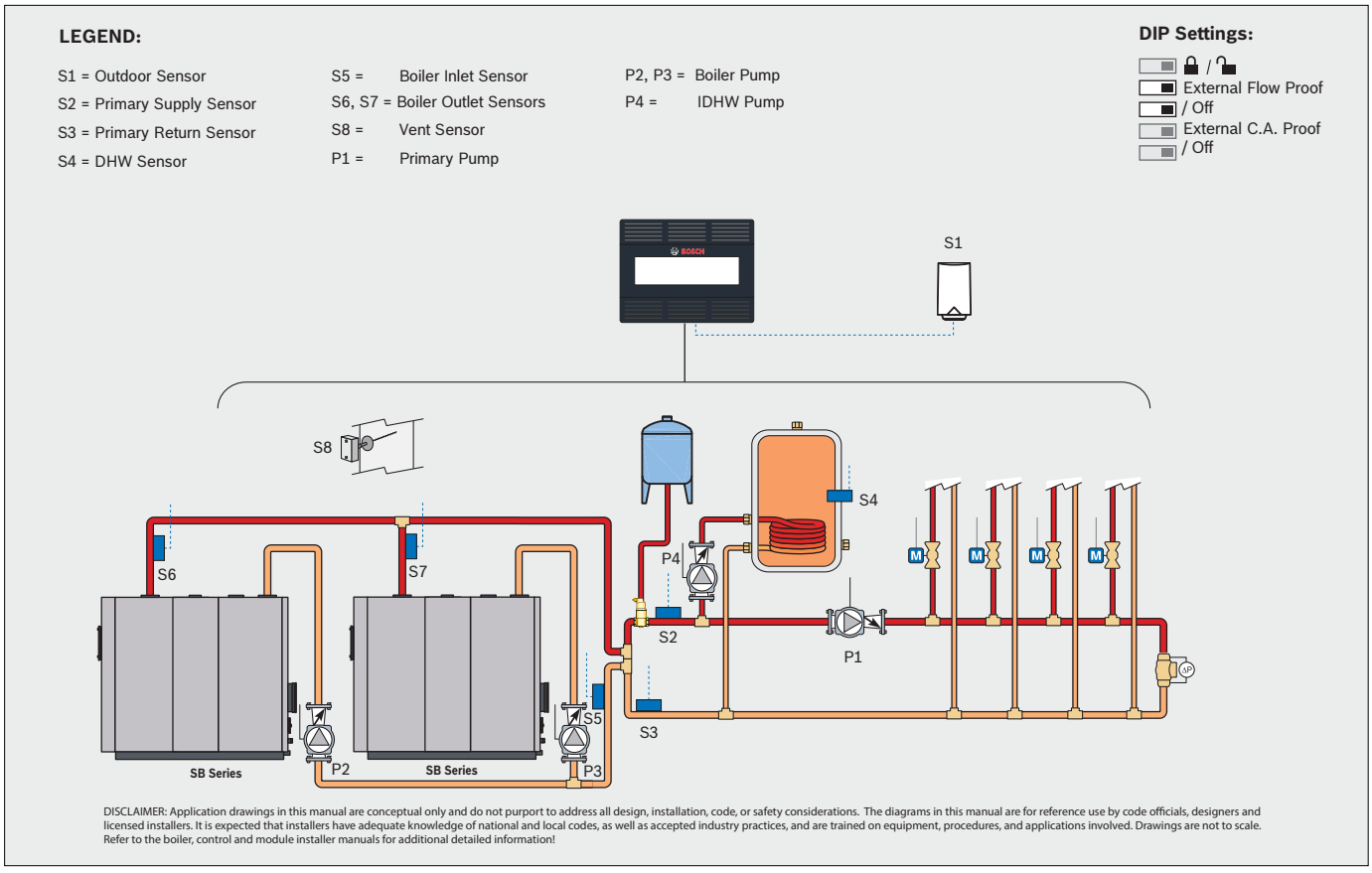
Essential System Settings:

APP MODE = RSET
PUMP 1 = AUTO
PUMP 2 = OFF
IDHW MODE = ON
IDHW LOCATION = PRIM
IDHW SENSOR = ON
IDHW PRIM PUMP = OFF

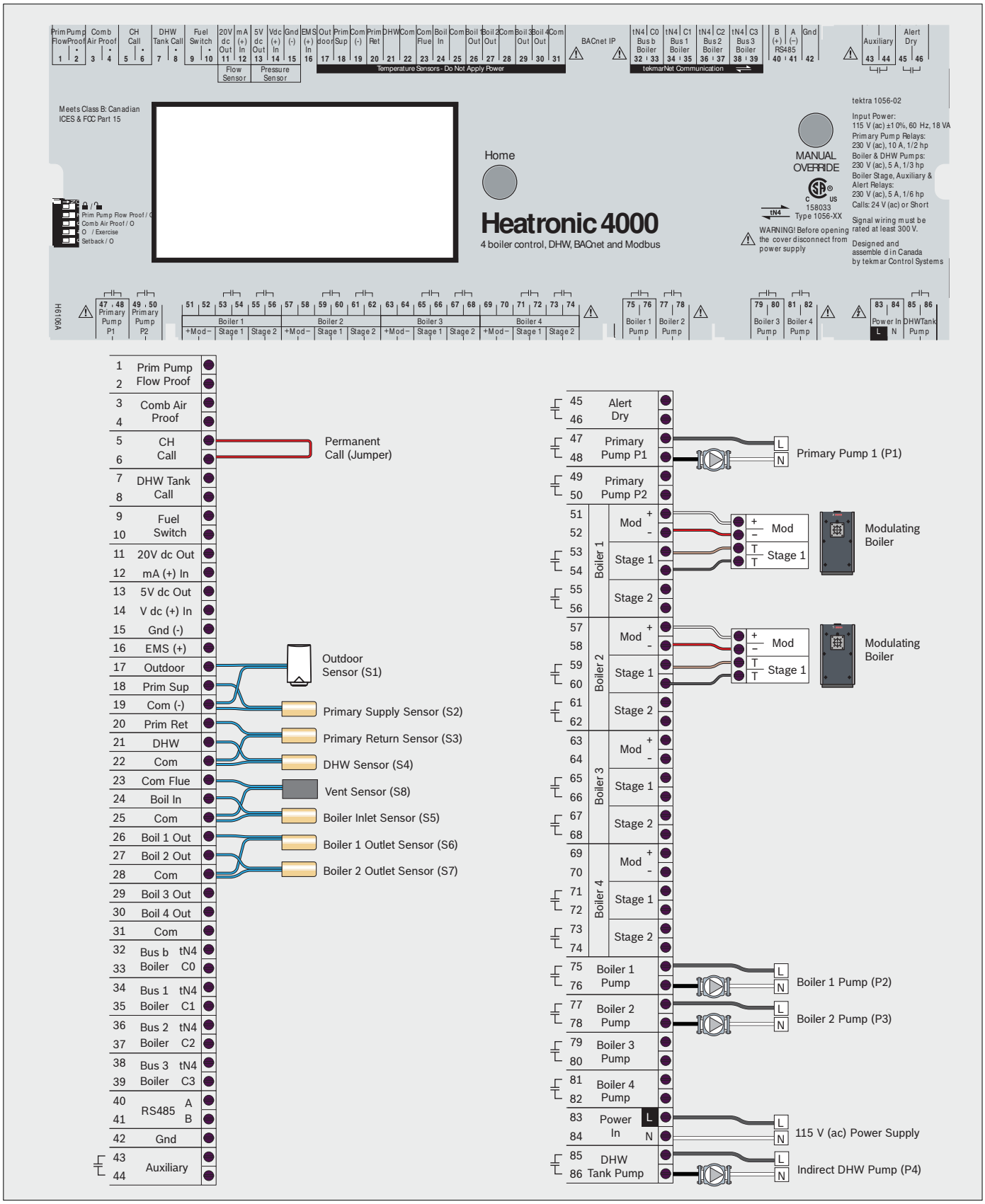
Features:

- 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:



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.

Essential Source (#) Settings:

ENABLE (1) = AUTO	ENABLE (3) = AUTO
BOSC BOILER (1) = YES	BOSC BOILER (3) = YES
BOSC MODL (1) = “SB-Series”	BOSC MODL (3) = “SB-Series”
ENABLE (2) = AUTO	ENABLE (4) = AUTO
BOSC BOILER (2) = YES	BOSC BOILER (4) = YES
BOSC MODL (2) = “SB-Series”	BOSC MODL (4) = “SB-Series”

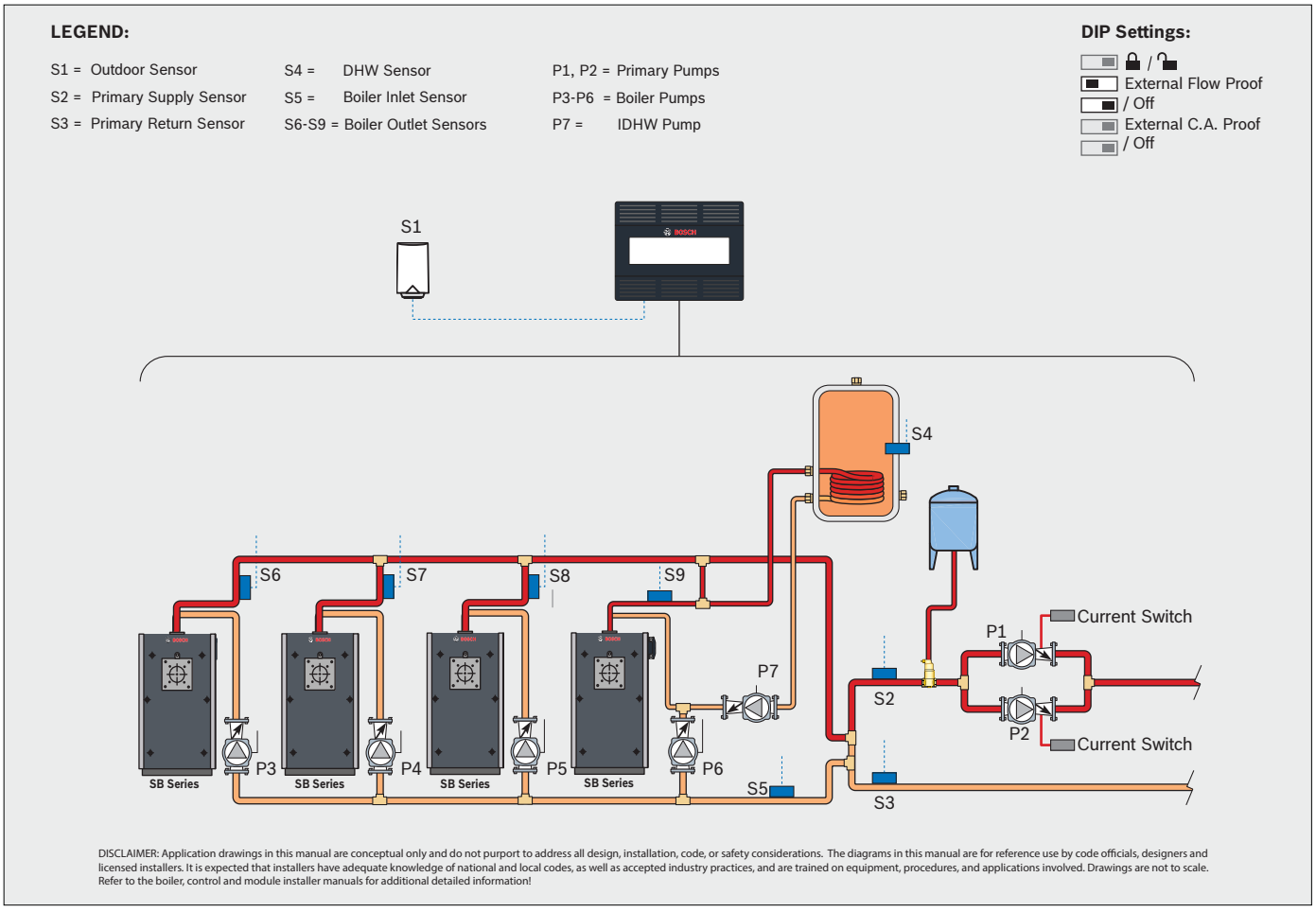
Essential System Settings:

APP MODE = RSET	IDHW MODE = ON
PUMP 1 = AUTO	IDHW LOCATION = NEAR
PUMP 2 = AUTO	IDHW SENSOR = ON

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.

Application 4 Piping:



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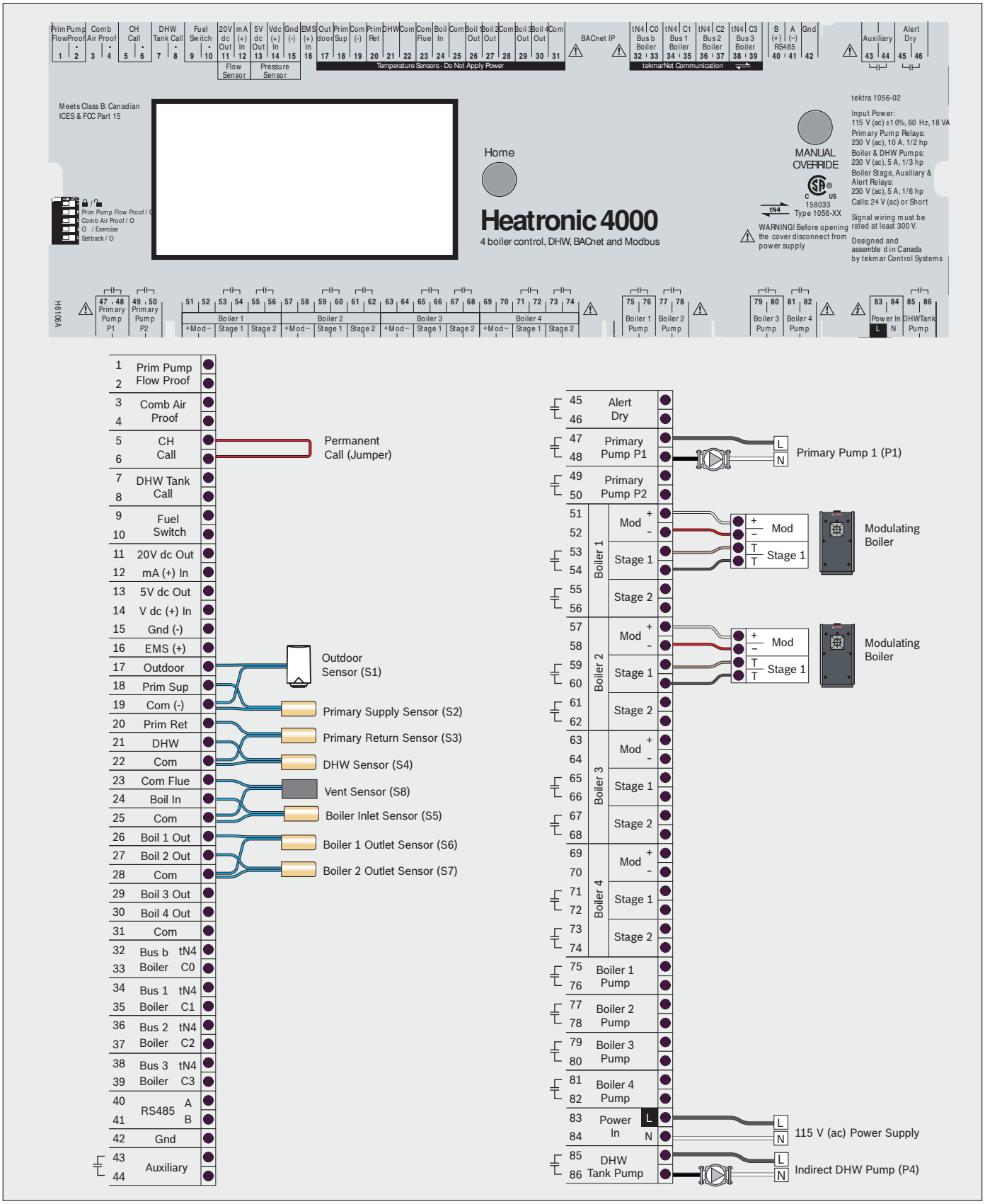
Application 4 Wiring:



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.

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

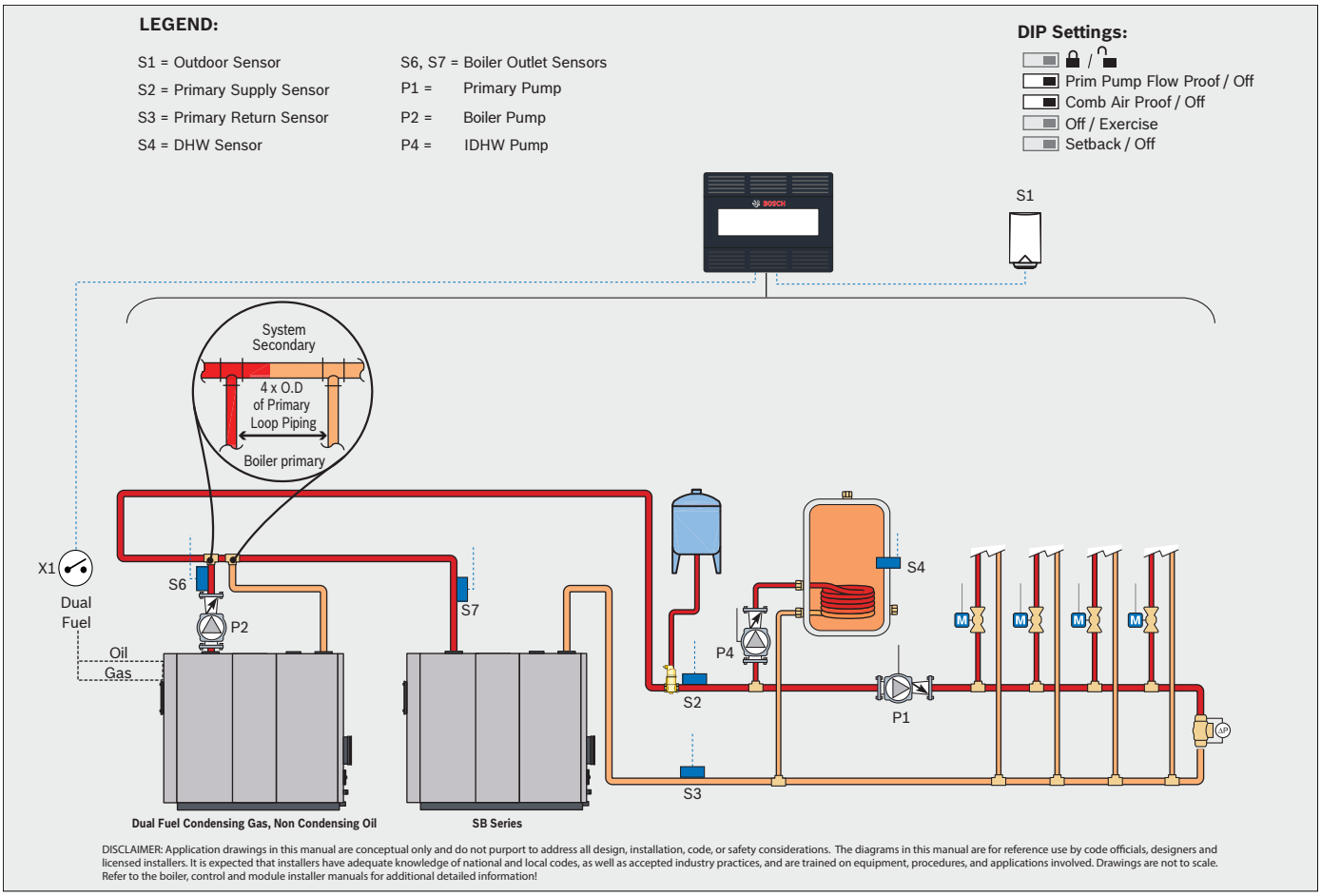
Essential System Settings:

APP MODE = RSET
PUMP 1 = AUTO
PUMP 2 = OFF
IDHW MODE = ON
IDHW LOCATION = PRIM
IDHW SENSOR = ON
IDHW PRIM PUMP = OFF

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.

Application 5 Piping:



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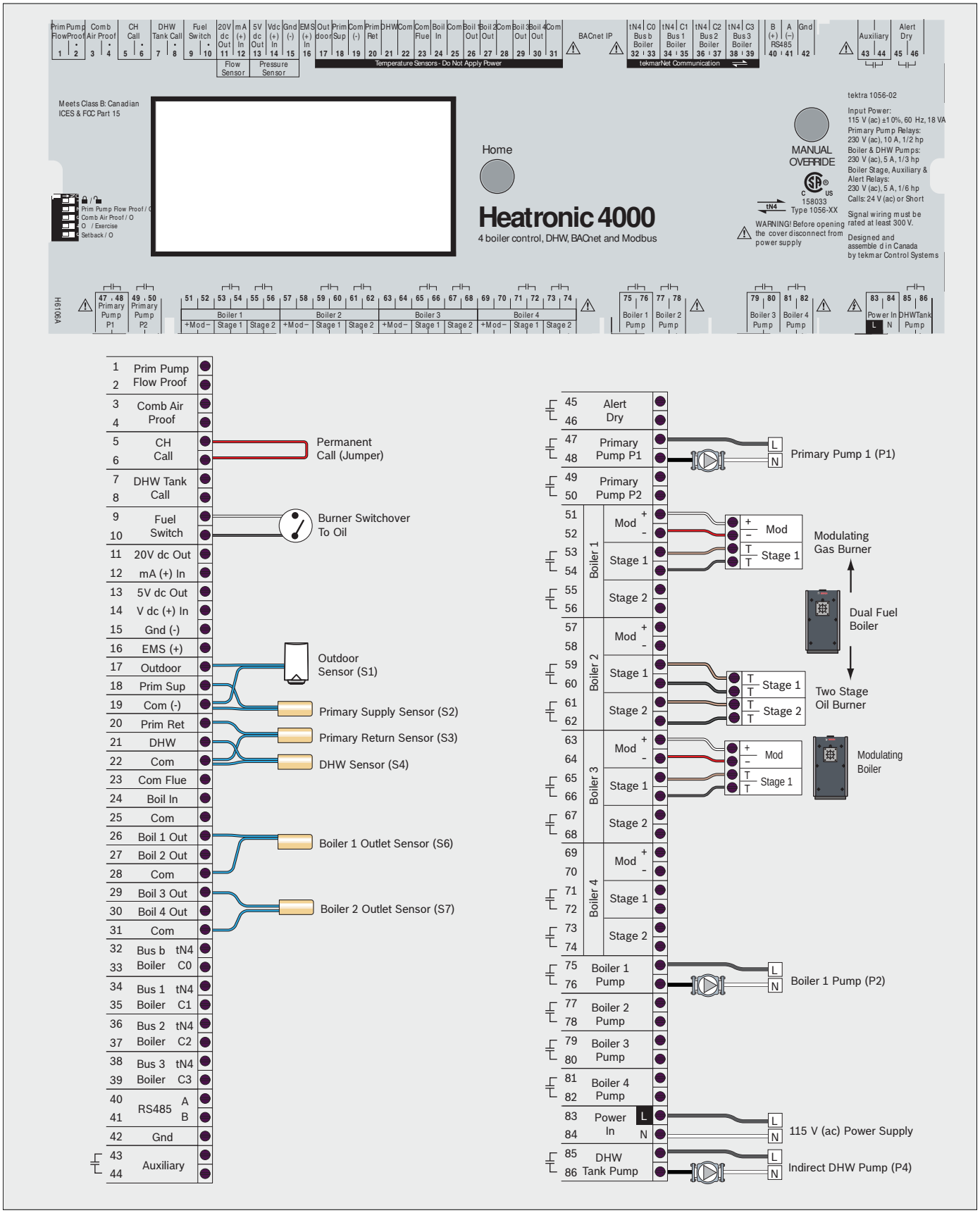
Application 5 Wiring:



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.

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®.

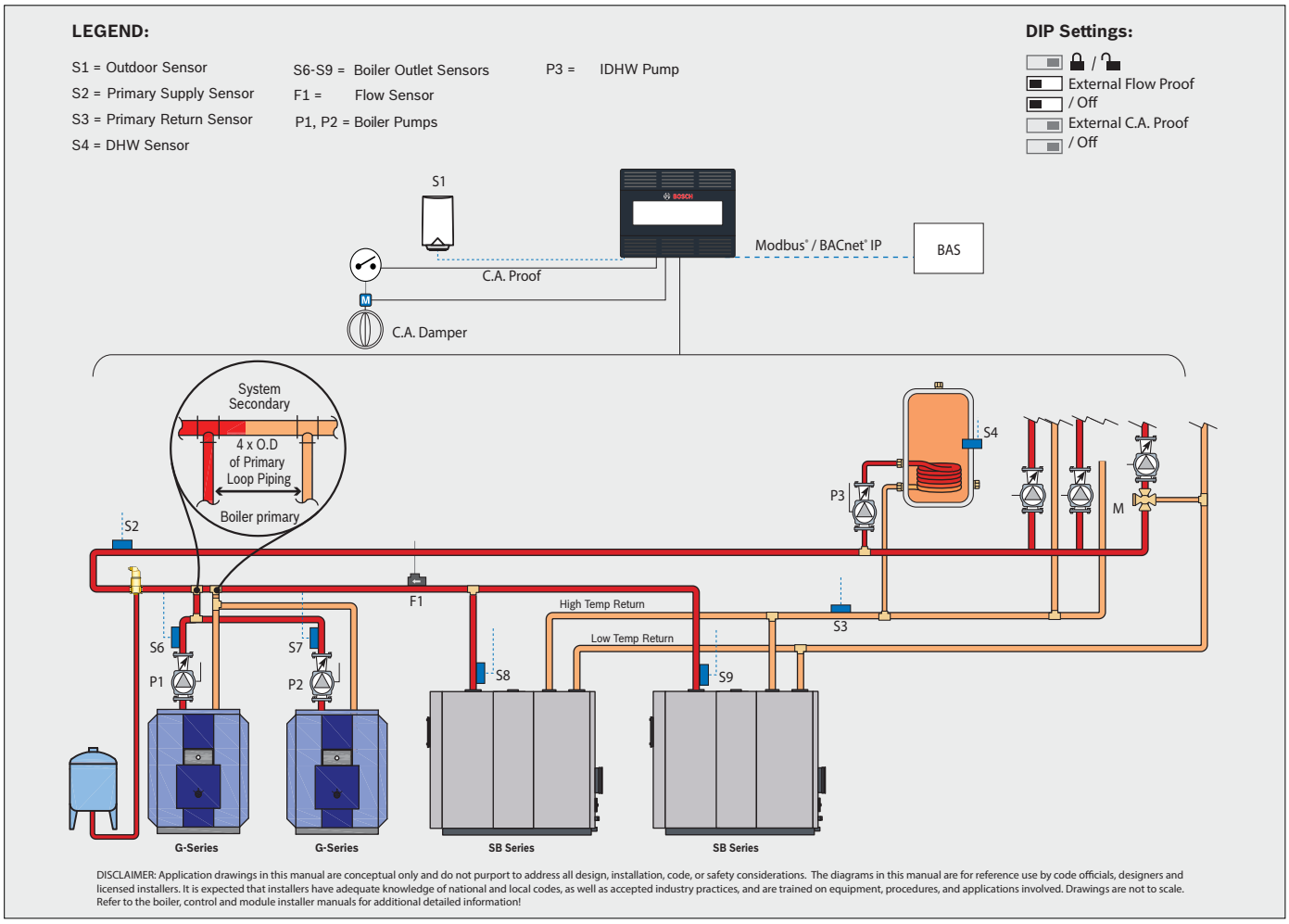
Essential Source (#) Settings:

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:

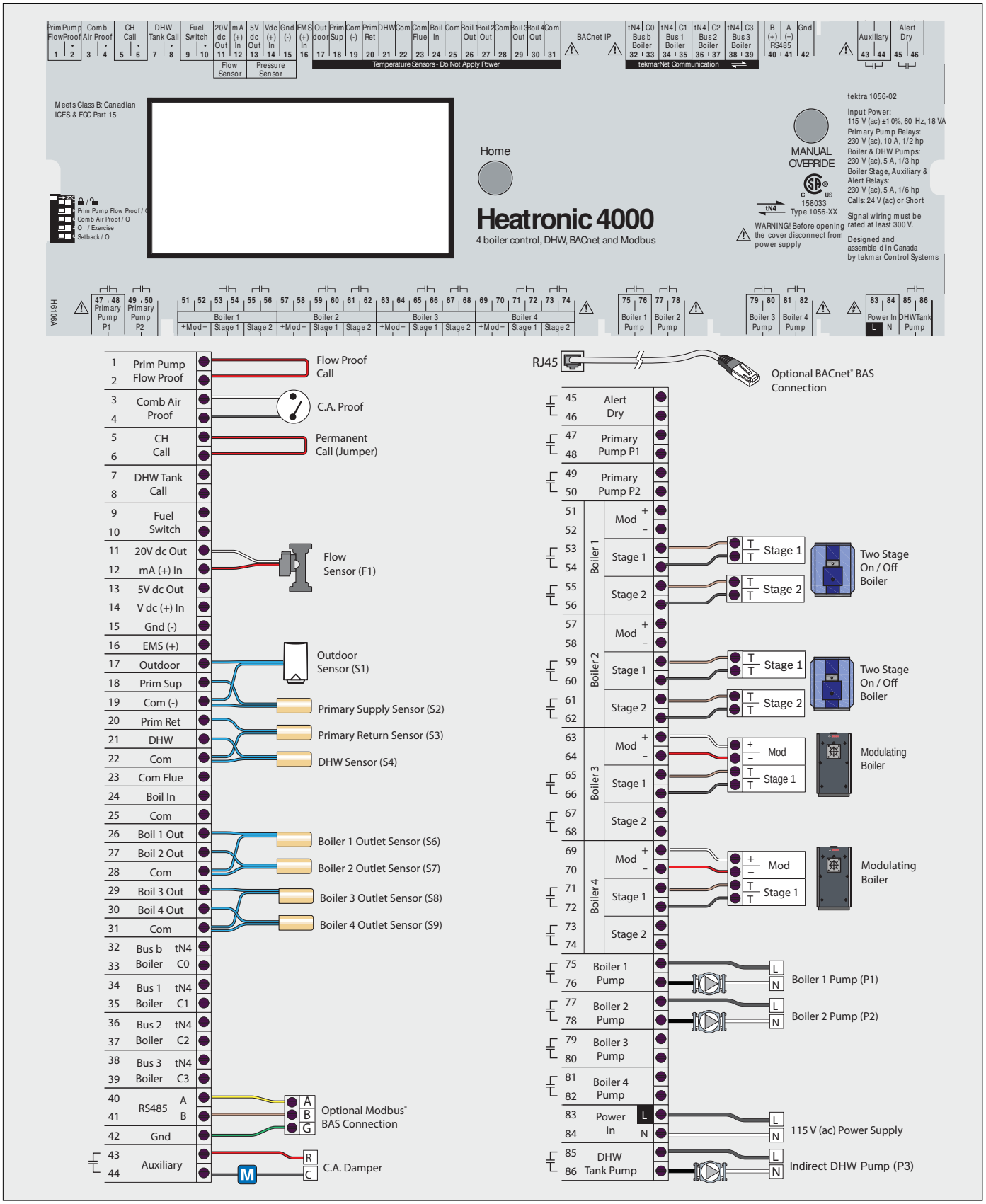
APP MODE = RSET
AUX RELAY = DMPR
PUMP 1 = OFF
PUMP 2 = OFF
IDHW MODE = ON
IDHW LOCATION = PRIM
IDHW SENSOR = ON
IDHW PRIM PUMP = OFF
SETP PRIM PUMP = OFF

Application 6 Piping:



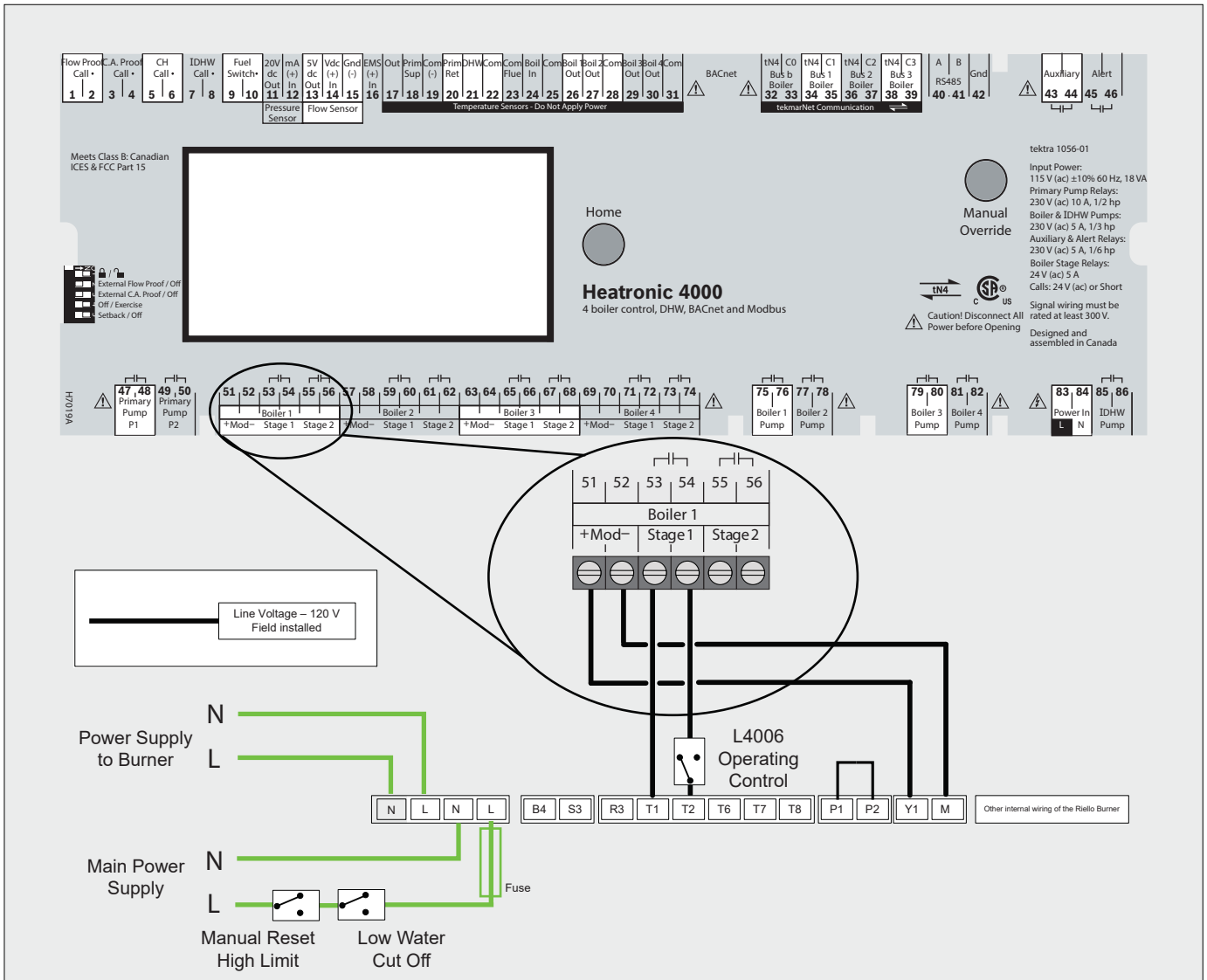
DISCLAIMER: Application drawings in this manual are conceptual only and do not purport to address all design, installation, code, or safety considerations. The diagrams in this manual are for reference use by code officials, designers and licensed installers. It is expected that installers have adequate 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 6 Wiring:



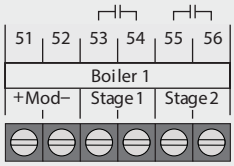
4 Burner Wiring Diagrams

4.1 Riello RS Modulating Burner Wiring:



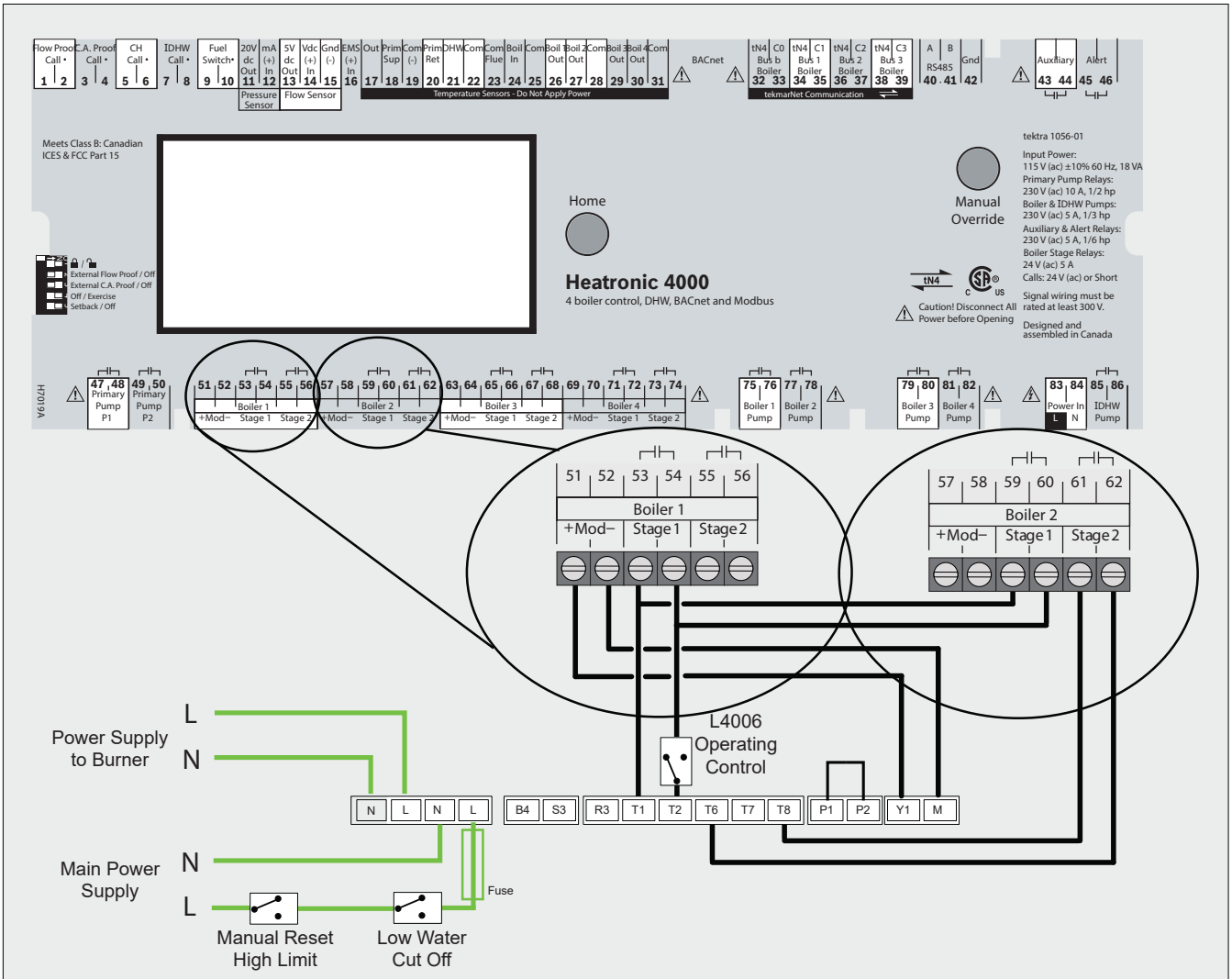
Connect all Stage 1 terminals from boiler to burner.
For Boiler 1 connect Stage 1 terminals 53 & 54 to the T1 & T2 terminals on Burner 1.
For Boiler 2 connect Stage 1 terminals 59 & 60 to the T1 & T2 terminals on Burner 2.
For Boiler 3 connect Stage 1 terminals 65 & 66 to the T1 & T2 terminals on Burner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

Heatronic 4000



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 fro 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.

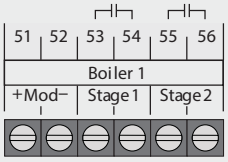
The wiring schematic above is a Dual Fuel modulating condensing gas and non-condensing oil burner.

Wiring the terminals from boiler to burner.

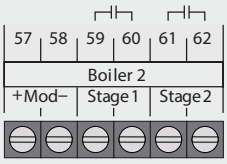
For Boiler 1 connect Mod + | - terminals 51 & 52 to the Y1 & M terminals on Burner 1.
For Boiler 1 connect Stage 1 terminals 53 & 54 to the T1 & T2 terminals on Burner 1.

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.

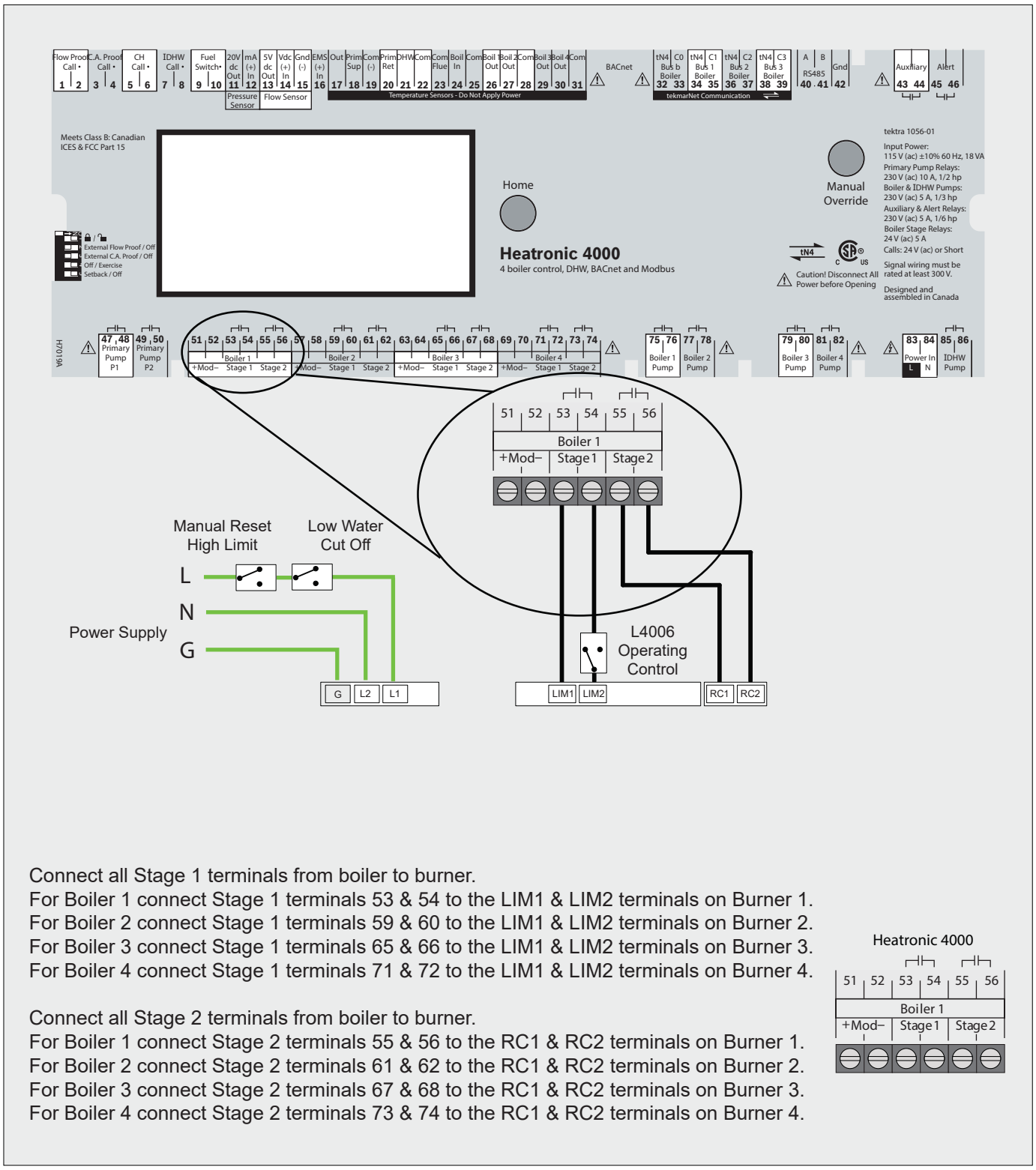
Heatronic 4000



Heatronic 4000



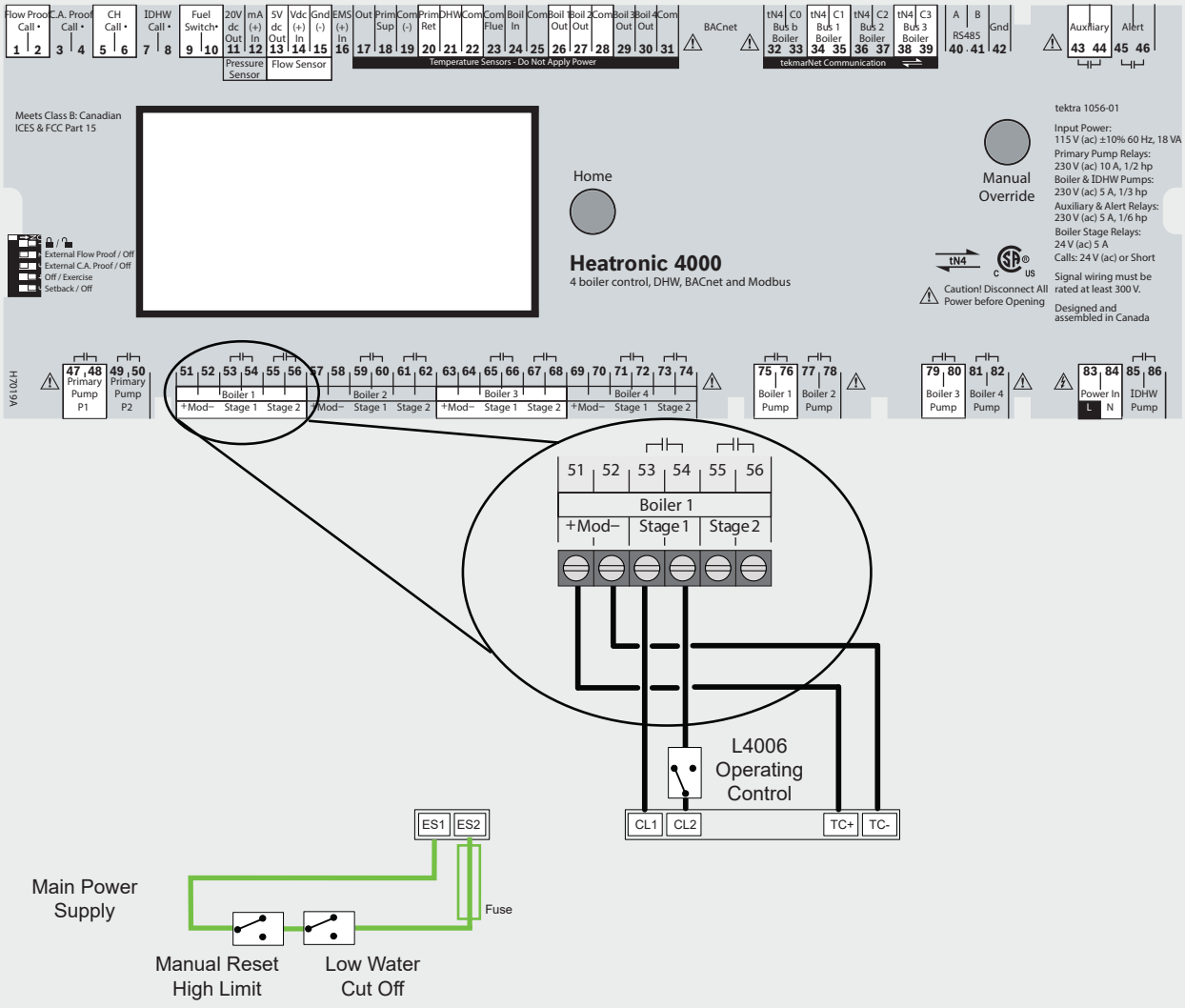
4.3 Becket CG Burner Wiring:



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.

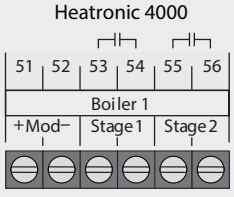
Connect all Stage 2 terminals from boiler to burner.
For Boiler 1 connect Stage 2 terminals 55 & 56 to the RC1 & RC2 terminals on Burner 1.
For Boiler 2 connect Stage 2 terminals 61 & 62 to the RC1 & RC2 terminals on Burner 2.
For Boiler 3 connect Stage 2 terminals 67 & 68 to the RC1 & RC2 terminals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

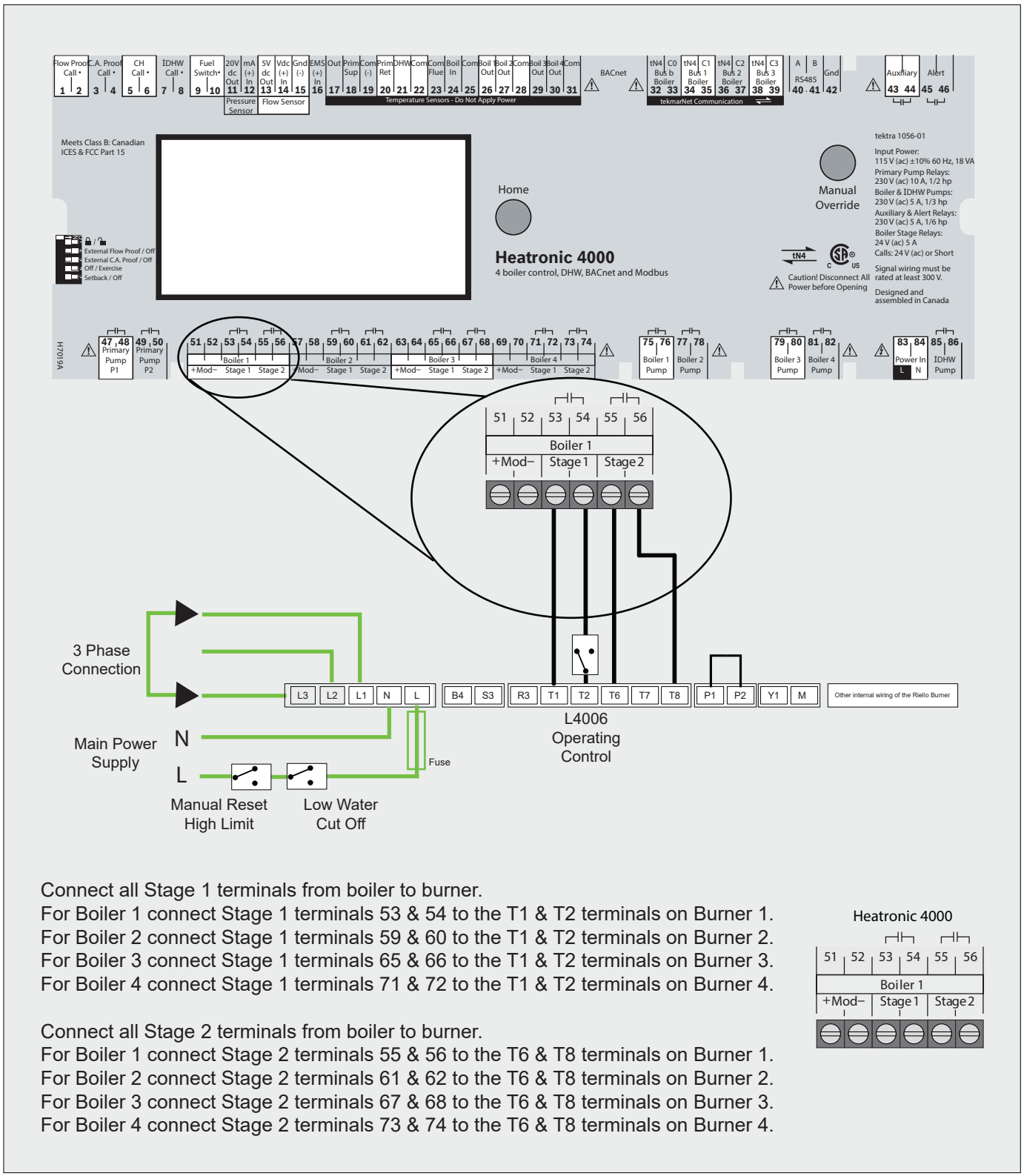


Connect all Stage 1 terminals from boiler to burner.
For Boiler 1 connect Stage 1 terminals 53 & 54 to the CL1 & CL2 terminals on Burner 1.
For Boiler 2 connect Stage 1 terminals 59 & 60 to the CL1 & CL2 terminals on Burner 2.
For Boiler 3 connect Stage 1 terminals 65 & 66 to the CL1 & CL2 terminals 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 adjust able 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, ΔT.
- 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.

United States and Canada

Bosch Thermotechnology Corp.
65 Grove Street
Watertown, MA 02472

Tel: 1-866-642-3198
Fax: 1-603-965-7581
www.boschheatingandcooling.com

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