

**WARNING:**

Improper installation, set-up, modification, operation or maintenance of the heating system can cause personal injury and property damage.

Follow these instructions precisely.

If you require assistance or further information, contact a licensed contractor / gas fitter.

# Bosch Buderus SSB Boiler Control Operations

SSB800SA | SSB1000SA | SSB1000TL



**BOSCH**

## Control Operations Guide





## Table of Contents

<b>1 Key to Symbols and Safety Instructions</b>	<b>4</b>
1.1 Key to Symbols	4
1.2 Safety	4
<b>2 Boiler Parameters</b>	<b>5</b>
<b>3 Module Cascade Settings</b>	<b>7</b>
<b>4 Boiler Cascade Settings</b>	<b>8</b>
<b>5 Heating Modes</b>	<b>9</b>
5.1 Central Heating (CH) Mode	9
5.1.1 Central Heating Mode 0	9
5.1.2 Central Heating Mode 1	10
5.1.3 Central Heating Mode 2	11
5.1.4 Central Heating Mode 3	12
5.1.5 Central Heating Mode 4	13
<b>6 Domestic Hot Water</b>	<b>14</b>
6.1 Domestic Hot Water Operation	14
<b>7 Boiler Cascade Settings</b>	<b>15</b>
7.1 Cascade Quick Set-Up	15

## 1 Key to Symbols and Safety Instructions

### 1.1 Key to Symbols

#### Warnings



Warnings in this document are identified by a warning triangle printed against a grey background. Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:

- ▶ **DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- ▶ **WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- ▶ **CAUTION** indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.
- ▶ **NOTICE** is used to address practices not related to personal injury.

#### Important information



This symbol indicates important information where there is no risk to people or property.

## 1.2 Safety

Please read safety precautions before installation



#### WARNING:

- ▶ Improper installation, set-up, modification, operation or maintenance of the heating system can cause personal injury and property damage.
- ▶ Follow these instructions precisely.
- ▶ If you require assistance or further information, contact a licensed contractor / gas fitter.

## 2 Boiler Parameters

Number	Parameter Name	Description	Default	Min	Max
1	CH Mode	Set Central Heating <b>CH Mode</b> based upon the desired control strategy for the boiler.	0	0	4
3	CH Set Point	Central Heating Setpoint only applies to <b>CH Mode</b> #0 ( On/Off using dry contacts) and <b>CH Mode</b> #3 (Permanent set point demand). The value set for <b>CH Setpoint</b> will be the boiler supply water temperature (system supply for cascade).	140 °F	86 °F	194 °F
109	Calc. SetP. Offset	Factor used in the PID calculation to offset <b>CH Setpoint</b> up or down.	0 °F	-1.8 °F	1.8 °F
110	CH Min Setpoint	<b>CH Mode</b> 4 setpoint at 1.5 - 2 VDC.	68 °F	68 °F	122 °F
111	CH Max Setpoint	<b>CH Mode</b> 4 setpoint at 9-10 VDC.	194 °F	122 °F	194 °F
5	Boiler Pump Overrun	The post circulation time of the module pump at the end of the heating request. The amount of time in seconds the boiler pump contacts will be energized after the demand for heat has ended.	30 sec.	0 sec.	900 sec.
7	CH Hysteresis Up	If the supply temperature reaches a temperature above the <b>CH Setpoint</b> plus <b>CH Hysteresis up</b> , then the burner will be switched OFF.	36 °F	0 °F	36 °F
112	CH Hysteresis Down	If the supply temperature reaches a temperature below the <b>CH Setpoint</b> minus <b>CH Hysteresis down</b> , then the burner will be switched ON.	9 °F	0 °F	36 °F
9	Anti-Cycle Period	The amount of time in seconds the boiler will wait before restarting in 10 second increments.	180 sec.	10 sec.	900 sec.
10	Anti-Cycle Temp. Period Diff	In addition to the <b>Anti Cycle Period</b> (see above) the boiler will monitor the System Supply Temperature Sensor. If the system temperature drops below the <b>Anti Cycle Temp. Period Diff</b> , the <b>Anti Cycle Period</b> will be ignored and burner will start.	28.8 °F	0 °F	36 °F
14	Max Power CH	The Maximum burner power for Central Heating can be limited during operation.	100%	50%	100%
15	Min Power CH	The Minimum burner power for Central Heating operation can be limited during operation.	1%	1%	30%
19	Design Supply Temp	The water temperature the boiler will supply at <b>Design Outdoor Temperature</b> .	194 °F	86 °F	194 °F
20	Design Outdoor Temp	The outdoor air temperature at which the boiler will supply the <b>Design Supply Water Temperature</b> .	23 °F	-13 °F	77 °F
21	Baseline Supply Temp	The water temperature the boiler will supply at the <b>Baseline Outdoor Temperature</b> .	104 °F	68 °F	194 °F
22	Baseline Outdoor Temp	The outdoor air temperature at which the boiler will target the <b>Baseline Supply Temperature</b> .	68 °F	32 °F	86 °F
23	Design Supply Min Limit	The minimum supply water temperature the heating system will provide to the system.	86 °F	39.2 °F	179.6 °F
24	Design Supply Max Limit	The maximum supply water temperature the heating system will provide to the system.	194 °F	80.6 °F	194 °F
25	Warm Weather Shut Dn	The temperature above which heating is no longer necessary. All calls for heat will be ignored as long as the outdoor temperature remains above the <b>Warm Weather Shutdown</b> value.	71.6 °F	32 °F	95 °F
26	Boost Temp Increment	<b>Boost Temp Increment</b> is active for <b>CH Mode</b> 1. If a call for heat has not been satisfied within the period of time defined within <b>Boost Time Delay</b> (see below) the targeted supply temperature will be increased by the value of <b>Boost Temp Increment</b> . This process of Boosting supply water will continue until the call for heat is satisfied.	0 °F	0 °F	54 °F
27	Boost Time Delay	<b>Boost Time Delay</b> is active only for <b>CH Mode</b> 1. If a call for heat has not been satisfied within the time limit (in minutes) defined within <b>Boost Time Delay</b> , the supply water temperature will be increased by <b>Boost Temp Increment</b> (see above). Supply water temperature increases again if the call for heat still is not satisfied in another time increment.	20 min.	1 min.	120 min.
28	Night Setback Temp	Only available for <b>CH Modes</b> #2 and #3. The value the heating curve will be reset as long as contacts #11 & #12 are "open" (i.e. via an external clock timer or switch).	18 °F	0 °F	90 °F
35	DHW Mode	When an Indirect tank is present in the system set <b>DHW Mode</b> to <b>1</b> when using the factory supplied 10K ohm sensor or set to <b>2</b> if using a third-party aquastat. Default value is <b>0</b> (Off).	0	0	2
113	Max Power DHW	The maximum power for DHW can be limited during operation.	50%	50%	100%
114	Min Power DHW	The minimum power for DHW operation can be limited during operation.	1%	1%	30%
36	DHW Tank Hyst. Down	The necessary temperature drop of the indirect tank temperature needed before the boiler will begin to recover the tank. Only active when <b>DHW Mode</b> (par. #35) is set to <b>1</b> and a 10k ohm sensor is used.	9 °F	0 °F	36 °F
37	DHW Tank Hyst. Up	The necessary temperature drop of the indirect tank temperature needed before the boiler will begin to recover the tank. Only active when <b>DHW Mode</b> (par. #35) is set to <b>1</b> and a 10k ohm sensor is used.	9 °F	0 °F	36 °F
38	DHW Tank Supply Extra	The Target Supply Water temperature to the indirect coil is equal to <b>DHW Tank Setpoint</b> (par. #48) plus <b>DHW Tank Supply Extra</b> .	27 °F	0 °F	54 °F
42	DHW Priority	Default setting is <b>Time</b> Time - DHW has priority to CH during <b>DHW Max Priority Time*</b> Off - CH always has priority to DHW On - DHW always has priority to CH Parallel - DHW always has priority to CH. CH pump can be started if CH has a request and <b>CH setpoint</b> > supply for DHW	TIME	N/A	N/A

Table 1

Number	Parameter Name	Description	Default	Min	Max
43	DHW Max Priority Time	See <b>DHW Priority</b> (par.#42)	60 MIN	1 MIN	255 MIN
44	DHW Pump Overrun	Factory Setting - Do Not Change	N/A	N/A	N/A
48	DHW / Tank Setpoint	Target temperature of the indirect tank.	120	104 °F	158.9 °F
64	Pre-heat Mode	Factory Setting - Do Not Change	N/A	N/A	N/A
92	Fan Speed Maximum	Factory Setting - Do Not Change	N/A	N/A	N/A
93	Fan Speed Minimum	Factory Setting - Do Not Change	N/A	N/A	N/A
94	Fan Speed Ignition	Factory Setting - Do Not Change	N/A	N/A	N/A
116	Prog. Input 1	Factory Setting - Do Not Change	N/A	N/A	N/A
117	Prog. Input 2	Factory Setting - Do Not Change	N/A	N/A	N/A
118	Prog. Input 3	Factory Setting - Do Not Change	N/A	N/A	N/A
120	Prog. Input 5	Factory Setting - Do Not Change	N/A	N/A	N/A
121	Prog. Input 6	Factory Setting - Do Not Change	N/A	N/A	N/A
122	Prog. Input 7	Factory Setting - Do Not Change	N/A	N/A	N/A
123	Prog. Input 8	Factory Setting - Do Not Change	N/A	N/A	N/A
124	Prog. Input RT	Factory Setting - Do Not Change	N/A	N/A	N/A
125	Prog. Output 1	Factory Setting - Do Not Change	N/A	N/A	N/A
126	Prog. Output 2	Factory Setting - Do Not Change	N/A	N/A	N/A
127	Prog. Output 3	Factory Setting - Do Not Change	N/A	N/A	N/A
128	Prog. Output 4	Factory Setting - Do Not Change	N/A	N/A	N/A
129	Flow Sensor	Factory Setting - Do Not Change	N/A	N/A	N/A
130	Flow Scaling Factor	Factory Setting - Do Not Change	N/A	N/A	N/A
131	Min Pressure	N/A	N/A	N/A	N/A
132	Pressure Fill Hyst.	N/A	N/A	N/A	N/A
133	Mod Pump dT	Factory Setting - Do Not Change	N/A	N/A	N/A
134	Mod Pump Start Time	Factory Setting - Do Not Change	N/A	N/A	N/A
135	Mod Pump Type	Factory Setting - Do Not Change	N/A	N/A	N/A
136	Mod Pump Mode	Factory Setting - Do Not Change	N/A	N/A	N/A
137	Mod Pump Min Power	Factory Setting - Do Not Change	N/A	N/A	N/A
138	Appliance Type	Factory Setting - Do Not Change	N/A	N/A	N/A
139	DeAir Active	Cycles the boiler pump every 10 seconds for 14 minutes every time power is applied to the boiler.	OFF	ON	OFF
140	Minimum Flow	Factory Setting - Do Not Change	N/A	N/A	N/A
107	Anti Legionella Day	N/A	N/A	N/A	N/A
108	Anti Legionella Hour	N/A	N/A	N/A	N/A

Table 1 Continued

### 3 Module Cascade Settings

Number	Parameter Name	Description	Default	Min	Max
72	Permit Emergency Mode	Not Applicable.	N/A	N/A	N/A
74	Emergency Setpoint	Not Applicable.	N/A	N/A	N/A
75	Delay Per Stop Next Mod	See <b>Hyst Up Stop Boiler</b> .	200 sec.	5 sec.	255 sec.
76	Delay Per Start Next Mod	See <b>Hyst Down Start Boiler</b> .	180 sec.	5 sec.	255 sec.
142	Delay Quick Start Next	See <b>Hyst Down Quick Start</b> .	50 sec.	5 sec.	255 sec.
143	Delay Quick Stop Next	See <b>Hyst Up Quick Stop</b> .	30 sec.	5 sec.	255 sec.
77	Hyst Down Start Module	If the system temperature is <b>Hyst Down Start Module</b> degrees below the system set point the modules are started at intervals of <b>Delay Per Start Next Mod</b> .	9 °F	0 °F	72 °F
78	Hyst Up Stop Module	If the system temperature is <b>Hyst Up Stop Module</b> degrees above the system set point the modules are stopped at intervals of <b>Delay Per Stop Next Mod</b> .	7.2 °F	0 °F	72 °F
144	Hyst Down Quick Start	If the system temperature is <b>Hyst Down Quick Start</b> degrees below the system set point the modules are started at intervals of <b>Delay Quick Start Next</b> .	18 °F	0 °F	72 °F
145	Hyst Up Quick Stop	If the system temperature is <b>Hyst Up Quick Stop</b> degrees above the system set point the modules are stopped at intervals of <b>Delay Quick Stop Next</b> .	10.8 °F	0 °F	71 °F
146	Hyst Up Stop All	If the system temperature is <b>Hyst Up Stop All</b> degrees above the system set point all modules are stopped.	14.4 °F	0 °F	72 °F
147	Number Of Units	The amount of modules in the boiler.	2	1	8
148	Power Mode	Power mode 0: Power control disabled, each burner modulates based on the system setpoint. Power mode 1: Power control algorithm to have a minimum amount of burners active. Power mode 2: Power control algorithm to have a maximum amount of burners active. Power mode 3: Power control algorithm to have a balanced amount of burners active.	2	0	3
79	Max Setp Offset Down	In order to achieve the desired Target System Supply Temperature during a call for heat the modules may need to operate at temperatures greater than or less than the desired Target System Supply Temperature. The operating range in which the modules are allowed to adjust the individual module supply temperatures is defined by the <b>Max Setp Offset Down</b> and <b>Max Setp Offset Up</b> (parameter #80) values. Each dependent module will display a <b>Calculated Setpoint</b> temperature on the display which will be within this Off set Range either above or below the overall Target System Supply Temperature.	0 °F	0 °F	72 °F
80	Max Setp Offset Up	See Parameter #79 for explanation of <b>Max Setp Offset Up</b> .	36 °F	0 °F	72 °F
81	Start Mod Delay Fact	The Managing module will calculate the difference between the Target Setpoint and the measured Supply Temperature once a period of time equal to <b>Delay Per Start Next Mod</b> x <b>Start Modulation Delay Factor</b> has passed.	60 min.	0 min.	60 min.
82	Next Module Start Rate	The percentage of burner power a module must reach before the Managing module will begin the process of bringing on the next module within the cascade. See Parameter #75 for further information on the amount of time which must pass at this power percentage before the next module in the cascade rotation is enabled.	80%	10%	100%
83	Next Module Stop Rate	The percentage of burner power a boiler must reach before the Managing boiler will begin the process of turning off the last module enabled within the cascade rotation sequence. See Parameter #76 for further information on the amount of time which must pass at this power percentage before a module is turned off.	30%	10%	100%
84	Module Rotation Interval	Number of days selectable.	5 DAYS	0 DAYS	30 DAYS
149	First Module To Start	Lead module in the Cascade.	1	1	8
152	Pwr Mode 2 Min Power	Minimum average burner power setting.	20%	0%	100%
153	Pwr Mode 2 Hysteresis	Hysteresis for the minimum average burner power setting.	40%	0%	100%
154	Post-Pump Period	The post circulation time of the DHW circuit pump and CH circuit pump.	30 sec.	0 sec.	255 sec.
155	Frost Protection	If the module supply or return temperature drops below <b>Frost Protection</b> temperature the burner starts at minimum power until the lower of the two sensors is 14 degrees °F above <b>Frost Protection</b> .	59 °F	50 °F	86 °F
184	N. Active Burner DHW	Maximum number of modules that will run for DHW.	1	0	8

Table 2

## 4 Boiler Cascade Settings

Number	Parameter Name	Description	Default	Min	Max
73	Boiler Address	Set boiler address i.e. Stand-Alone, Managing, Dependent 1....7	MANAGING	0	16
156	Permit Emergency Mode	Enable <b>Emergency Mode</b> in a multiple boiler cascade installation to ensure that any dependent boiler can operate independently should communication with the managing boiler be interrupted or the managing boiler loses communication with the supply sensor. The boiler will operate at a predetermined <b>Emergency Setpoint</b> which is set using Parameter #157.	YES	NO	YES
157	Emergency Setpoint	<b>Emergency Setpoint</b> is the fixed set point which a boiler will operate at within a cascade installation if that boiler has lost communication with the Managing boiler or the Managing boiler loses communication with the supply sensor. Parameter #156 must be "Yes" on each dependent boiler and <b>Emergency Setpoint</b> set for the desired Emergency Temperature at which the boiler is to operate.	158 °F	68 °F	194 °F
158	Delay Per Start Next Blr	See <b>Hyst Down Start Boiler</b> .	1275 sec.	0 sec.	1275 sec.
159	Delay Per Stop Next Blr	See <b>Hyst Up Stop Boiler</b> .	1275 sec.	0 sec.	1275 sec.
160	Delay Quick Start Next	See <b>Hyst Down Quick Start</b> .	400 sec.	0 sec.	1275 sec.
161	Delay Quick Stop Next	See <b>Hyst Up Quick Stop</b> .	240 sec.	0 sec.	1275 sec.
162	Hyst Down Start Boiler	If the system temperature is <b>Hyst Down Start Boiler</b> degrees below the system set point the boilers are started at intervals of <b>Delay Per Start Next Blr</b> .	9 °F	0 °F	72 °F
163	Hyst Up Stop Boiler	If the system temperature is <b>Hyst Up Stop Boiler</b> degrees above the system set point the boilers are stopped at intervals of <b>Delay Per Start Next Blr</b> .	3.6 °F	0 °F	72 °F
164	Hyst Down Quick Start	If the system temperature is <b>Hyst Down Quick Start</b> degrees below the system set point the boilers are started at intervals of <b>Delay Quick Start Next</b> .	18 °F	0 °F	72 °F
165	Hyst Up Quick Stop	If the system temperature <b>Hysteresis Up Quick Stop</b> degrees is above the system set point the boilers are stopped at intervals of <b>Delay Quick Stop Next</b> .	7.2 °F	0 °F	72 °F
166	Hyst Up Stop All	If the system temperature is <b>Hyst Up Quick Stop</b> degrees above the system set point the boilers are stopped at intervals of <b>Delay Quick Stop Next</b> .	14.4 °F	0 °F	108 °F
167	Number Of Boilers	The amount of boilers in the cascade.	1	1	8
168	Power Mode	Power mode 0: Power control disabled, each boiler modulates based on the system setpoint. Power mode 1: Power control algorithm to have a minimum amount of boilers active. Power mode 2: Power control algorithm to have a maximum amount of boilers active. Power mode 3: Power control algorithm to have a balanced amount of boilers active.	2	0	3
169	Max Setp Offset Down	In order to achieve the desired Target System Supply Temperature during a call for heat the boilers may need to operate at temperatures greater than or less than the desired Target System Supply Temperature. The operating range in which the boilers are allowed to adjust the individual boiler supply temperatures is defined by the <b>Max Setp Offset Down</b> and <b>Max Setp Offset Up</b> (parameter #170) values. Each dependent boiler will display a "Calculated Setpoint" temperature on the display which will be within this Off set Range either above or below the overall Target System Supply Temperature.	0 °F	0 °F	72 °F
170	Max Setp Offset Up	See Parameter #169 for explanation of <b>Max Setp Offset Down</b> and <b>Max Setp Offset Up</b> .	36 °F	0 °F	72 °F
171	Start Mod Delay Fact	The Managing boiler will calculate the difference between the System Target Setpoint and the measured System Supply Temperature once a period of time equal to <b>Delay Period Start Next Boiler x Start Modulation Delay Factor</b> has passed.	20	0	255
172	Next Boiler Start Rate	The percentage of power a boiler must reach before the Managing boiler will begin the process of bringing on the next boiler within the cascade. See Parameter #158 for further information on the amount of time which must pass at this power percentage before the next boiler in the cascade rotation is enabled.	80%	10%	100%
173	Next Boiler Stop Rate	The percentage of power a boiler must reach before the Managing boiler will begin the process of turning off the last boiler enabled within the cascade rotation sequence. See Parameter #159 for further information on the amount of time which must pass at this power percentage before a boiler is turned off.	25%	10%	100%
174	Boiler Rotation Interval	Number of days selectable.	5 DAYS	0 DAYS	30 DAYS
175	First Boiler To Start	First boiler in cascade that will start.	1	1	8
180	Pwr Mode 2 Min Power	Minimum average burner power setting.	20%	0%	100%
181	Pwr Mode 2 Hysteresis	Hysteresis for the minimum average boiler power setting.	40%	0%	100%
182	Post-Pump Period	Factory setting - Do Not Change	N/A	N/A	N/A

Table 3



## 5 Heating Modes

### 5.1 Central Heating (CH) Mode

There are 5 onboard CH Mode settings which may be selected with the SSB Boiler.

1. **CH Mode = "0"** Setpoint control of the boiler using dry contacts (TT)
2. **CH Mode = "1"** Outdoor Reset using ON/OFF control of the boiler using dry contacts (TT)
3. **CH Mode = "2"** Outdoor reset with night setback
4. **CH Mode = "3"** Setpoint with night setback
5. **CH Mode = "4"** Analog control (0-10Vdc) of set point temperature

#### 5.1.1 Central Heating Mode 0

##### (Setpoint control of the boiler using dry contacts #9 and #10)

**CH Mode "0"** - Boiler demand is generated thru a call for heat on low voltage contacts #9 and #10 (dry contacts only). The Boiler will then target a temperature equal to **CH Setpoint** (par.#3) at the Supply Temperature Sensor.

Central Heating (CH) Mode	Description	Set these Parameters			
		Parameter #	Description	Default	Range
CH Mode = "0"	Setpoint control using dry contacts (TT)	1	CH Mode	0	0-5
		3	CH Setpoint	140°F	86 - 194°F
		109	Calc. Set point Offset	0 °F	-1.8 - 1.8 °F
		5	Boiler pump overrun	30 sec.	0 – 900 sec.
		7	CH Hysteresis up	36°F	0 - 36°F
		112	CH Hysteresis down	9 °F	0 - 36°F
		9	Anti-cycle period	180 sec.	10 – 900 sec.
		10	Anti-cycle Temp Diff	28.8°F	0 - 36°F
		14	Max Power CH	100%	50-100%
		15	Min Power CH	1%	1-30%
		23	Design Supply Min Limit	86°F	39.2 - 179.6 °F
		24	Design Supply Max Limit	194 °F	80.6 - 194 °F

Table 4

### 5.1.2 Central Heating Mode 1

#### (On/Off with Outdoor Reset using dry contacts #9 and #10)

**CH Mode “1”** - Boiler demand is generated thru a call for heat on low voltage contacts #9 and #10 (dry contacts only). Boiler will target a system supply water temperature equal to the corresponding point on the installer programmed heating curve.

Central Heating (CH) Mode	Description	Set these Parameters			
		Parameter #	Description	Default	Range
CH Mode = “1”	On/Off with reset water temperature	1	CH Mode	0	0 - 5
		109	Calc. Set point Offset	0°F	-1.8-1.8°F
		5	Boiler Pump Overrun	30 sec.	0 – 900 sec.
		7	CH Hysteresis Up	36°F	0-36°F
		112	CH Hysteresis Down	9°F	0 - 36°F
		9	Anti-cycle Period	180 sec.	10 – 900 sec.
		10	Anti-cycle Temp Diff	28.8°F	0 - 36°F
		14	Max Power CH	100%	50 - 100%
		15	Min Power CH	1%	1 - 30%
		19	Design Supply Temp	194°F	86 - 194°F
		20	Design Outdoor Temp	23°F	-13 - 77°F
		21	Baseline Supply Temp	104°F	68 - 194°F
		22	Baseline Outdoor Temp	68°F	32- 86°F
		23	Design Supply Min Limit	86°F	39.2 – 179.6°F
		24	Design Supply Max Limit	194°F	80.6 - 194°F
		25	Warm Weather Shut Dn	71.6°F	32- 95°F
26	Boost Temp Increment	0°F	0 - 54°F		
27	Boost Temp Delay	20 min.	0 – 120 min.		

Table 5

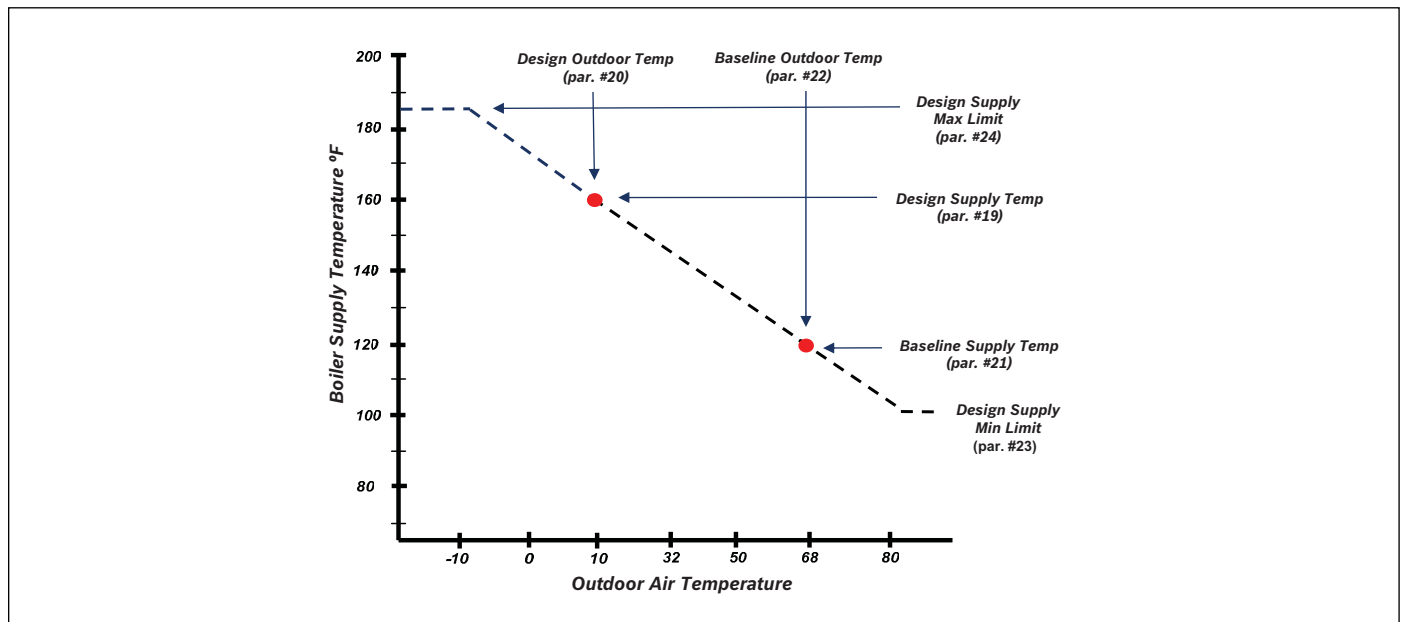


Figure 1

### 5.1.3 Central Heating Mode 2 (Full Outdoor reset with no heat demand)

**CH Mode“2”** - Boiler demand is generated when the outdoor temperature falls below the value of **Warm Weather Shut Down** (par.#25). When this occurs the Boiler and CH pump contacts are energized and the Boiler will target a system supply water temperature corresponding to a point on the installer programmed heating curve. **Night Setback Temp** (par.# 28) controls the parallel temperature shift that is applied to the curve when #9 and #10 contacts are “open” using a clock or switch.

Central Heating (CH) Mode	Description	Set these Parameters			
		Parameter #	Description	Default	Range
CH Mode = “2”	Full Outdoor reset with no heat demand	1	CH Mode	0	0 - 5
		109	Calc. Set point Offset	0°F	-1.8-1.8°F
		5	Boiler pump overrun	30 sec.	0 - 900 sec.
		7	CH Hysteresis Up	36°F	0 - 36°F
		112	CH Hysteresis Down	9°F	0 - 36°F
		9	Anti-cycle Period	180 sec.	10 - 900 sec.
		10	Anti-cycle Temp Diff	28.8°F	0 - 36°F
		14	Max Power CH	100%	50 - 100%
		15	Min Power CH	1%	1 - 30%
		19	Design Supply Temp	194°F	86- 194°F
		20	Design Outdoor Temp	23°F	-13 - 77°F
		21	Baseline Supply Temp	104°F	68 - 194°F
		22	Baseline Outdoor Temp	68°F	32- 86°F
		23	Design Supply Min Limit	86°F	39.2 - 179.6°F
		24	Design Supply Max Limit	194°F	80.6 - 194°F
		25	Warm Weather Shut Dn	71.6°F	32- 95°F
		26	Boost Temp Increment	0°F	0 - 54°F
27	Boost Temp Delay	20 min.	0 - 120 min.		

Table 6

### 5.1.4 Central Heating Mode 3 (Permanent set point demand)

**CH Mode“3”** - Boiler demand is always “ON” in **CH Mode 3** – “Permanent Demand Mode”. In this mode modules and CH Pump contacts will always be energized.

**Night Setback Dif** (par.# 28) controls the parallel temperature shift that is applied to the curve when #9 and #10 contacts are "open" using a clock or switch.

Central Heating (CH) Mode	Description	Set these Parameters			
		Parameter #	Description	Default	Range
CH Mode = “3”	Permanent Setpoint Demand	1	CH Mode	0	0-5
		3	CH Setpoint	140°F	86 - 194°F
		109	Calc. Set point Offset	0 °F	-1.8 - 1.8 °F
		5	Boiler pump overrun	30 sec.	0 – 900 sec.
		7	CH Hysteresis up	36°F	0 - 36°F
		112	CH Hysteresis down	9 °F	0 - 36°F
		9	Anti-cycle period	180 sec.	10 – 900 sec.
		10	Anti-cycle Temp Diff	28.8°F	0 - 36°F
		14	Max Power CH	100%	50-100%
		15	Min Power CH	1%	1-30%
		23	Design Supply Min Limit	86°F	39.2 - 179.6 °F
		24	Design Supply Max Limit	194 °F	80.6 - 194 °F

Table 7

**5.1.5 Central Heating Mode 4  
(Analog 0-10 Vdc Setpoint Control)**

**CH Mode“4”** - Boiler demand is generated by a 0-10 Vdc analog signal from a Building Management System (BMS). An initial heat request is generated via a signal of 1.5 VDC or greater. Boiler modulation between **Design Supply Min** (par.#23) and **Design Supply Max** (par.#24) will occur between 2 and 10 Vdc. Once the initial demand has occurred The Boiler and CH pump contacts will remain energized as long as the voltage from the BMS remains greater than 1 VDC.

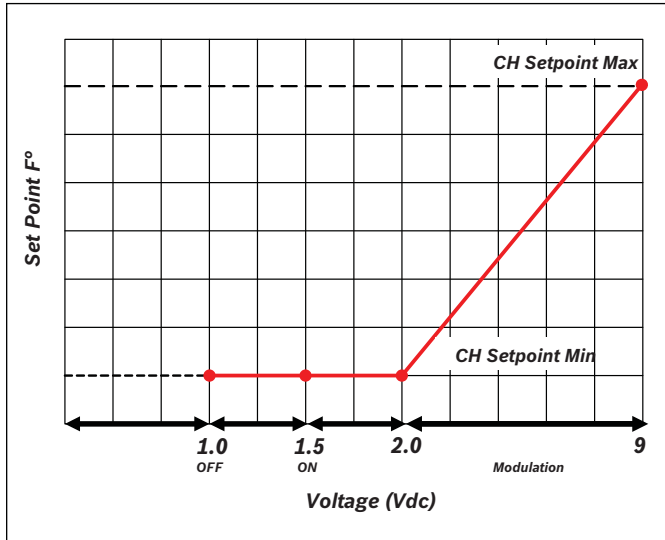


Figure 2

Central Heating (CH) Mode	Description	Set these Parameters			
		Parameter #	Description	Default	Range
CH Mode = “4”	Analog 0-10 VDC Setpoint Control	1	CH Mode	0	0 - 5
		109	Calc. Setpoint Offset	0°F	-1.8 - 1.8°F
		110	CH Min Setpoint	68°F	68-122°F
		111	CH Max Setpoint	194F	122-194°F
		5	Boiler pump overrun	30 sec.	0 – 900 sec.
		7	CH Hysteresis up	36°F	0-36°F
		112	CH Hysteresis down	9°F	0-36°F
		9	Anti-cycle period	180 sec.	10 – 900 sec.
		10	Anti-cycle Temp Diff	28.8°F	0 - 36°F
		14	Max Power CH	100%	50-100%
		15	Min Power CH	1%	1-30%

Table 8

## 6 Domestic Hot Water

### 6.1 Domestic Hot Water Operation

The SSB Boiler onboard control can support domestic hot water production using an indirect tank. The boiler can use either the supplied 10K ohm domestic sensor or a aquastat (dry contact only, aquastat supplied by installer) to control the heating of an indirect tank. The 10k ohm sensor or aquastat are wired to the #9 and #10 low voltage terminal block of the SSB boiler. Parameter #35 **Domestic Hot Water Mode** must be set to the appropriate value depending upon which type of sensor is used. Follow the instructions below for the sensor type you have chosen to use with the SSB Boiler.

#### Using the supplied 10k ohm Sensor:

1. Wire 10k ohm sensor to #7 and #8 on low voltage terminal strip on managing boiler.
2. Within the **Boiler Settings** menu set Parameter #35 to "1".
3. Set desired domestic hot water temperature using Parameter # 48.
4. When the domestic hot water temperature falls **DHW Tank Hyst Down** degrees below the desired set temperature for hot water the boiler will begin to heat the indirect tank with a setpoint of **DHW / Tank Setpoint** plus **DHW Tank Supply Extra**. The system will stop heating the tank when it reaches **DHW / Tank Setpoint** plus **DHW Tank Hyst. Up**.

#### Using a field-supplied aquastat:

1. Wire your field-supplied aquastat to #7 and #8 on low voltage terminal strip on managing boiler.
2. Within the **Boiler Settings** menu set Parameter #35 to "2".
3. Adjust the field-supplied aquastat to the desired tank temperature according to the manufacturers instructions .
4. Upon a call for heat from the aquastat the boiler will target a supply temperature of **DHW / Tank Setpoint** plus **DHW Tank Supply Extra**.

Depending upon which DHW Mode is selected (Mode 1 = 10 K ohm sensor or Mode 2 = Aquastat) will then determine which of the following parameters can be used to adjust the hot water operation.

DHW Parameter	DHW Mode	Description	Default Value	Range
35	—	DHW Mode	0	0 - 8
36	1	DHW Tank Hyst. Down	9	0 – 36 °F
37	1	DHW Tank Hyst. Up	9	0 – 36 °F
38	1 & 2	DHW Tank Supply Extra	27	0 – 54 °F
42	1 & 2	DHW Priority	Time	Time, Off, On and Parallel
43	1 & 2	DHW Max Priority Time	60	1 – 255 min.
48	1 & 2	DHW/Tank Setpoint	122	104 – 158.9 °F

Table 9

## 7 Boiler Cascade Settings

### 7.1 Cascade Quick Set-Up

Turn power switch "OFF" on all boilers before beginning set-up of the cascade.

1. Identify which boiler in the Cascade group of boilers will be the Managing boiler. All pertinent sensors and controls will be wired to the managing boilers control panels (Figure 4).
2. Switch "OFF" the S4 switch on all modules except the Managing boiler module 1, this must be on. The S1 switch is "OFF" when it is toward the left side. See Figure 3 for locating the S1 switch on the control board.
3. Using 18/2 wire, connect all of the boilers in the cascade using the low voltage contacts #1 and #2 on each boilers control board. Note the polarity.
4. Turn the power on to all boilers:
  - a. Press "**Menu**" → "**Settings**" → "**Boiler Settings**"
  - b. Using the Arrow Key pad enter the passcode "0300" to enter the service level of the control.
  - c. **Boiler Cascade Settings**
5. Scroll to each of the following parameters and adjust the default values to the following values:
  - ▶ Parameter #73 **Boiler Address** - Set Value to "Managing" on Managing boiler.
  - ▶ Parameter #167 **Number of Boilers** - The amount of boilers in the cascade.
6. Repeat steps from Step #4 and enter into the parameter menu for the other boilers.
7. Scroll to each of the following parameters and adjust the default values:
  - ▶ Parameter #73 **Boiler Address** - Set Value to "Dep. 1" on boiler 2, "Dep. 2" on boiler 3, etc.

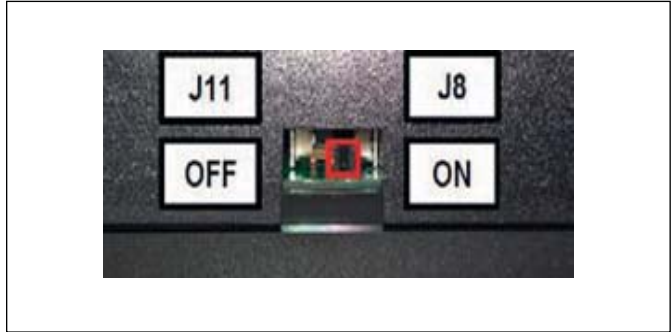


Figure 3

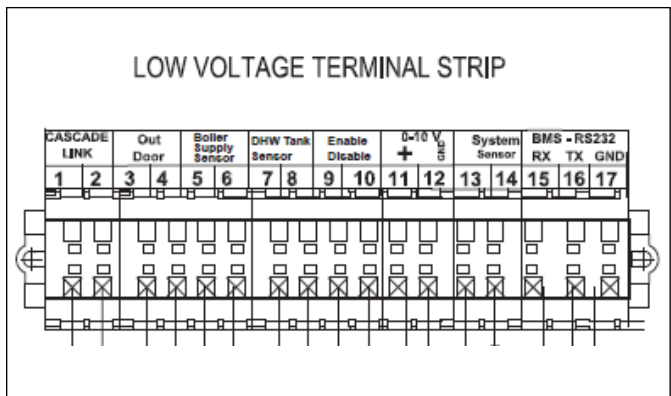


Figure 4

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