RTC™

Return Temperature Control
for Commercial Boiler Applications

BURNHAM COMMERCIAL
AMERICA'S BOILER COMPANY®
www.commercialcastiron.com

The Burnham Commercial RTC Return Temperature Control provides an economical and effective means of boiler protection from thermal shock and sustained condensing operation. The RTC monitors the boiler return water temperature and operates a 3-way diverting valve and boiler circulator to maintain a minimum return temperature of 135°F or greater. An outdoor reset function is also available to reset the system water temperature based on outdoor air temperature. Studies indicate that resetting the boiler and system water temperature increases efficiency and reduces operating costs. The controls is available in two configurations: Basic RTC Kit and RTC kit with Outdoor Reset Control.

RTC
Return Temperature Control

Includes:
Outdoor Reset option
LCD display of return water temperature

Return Sensor
Monitors Boiler Return Water Temperature

RTC RETURN TEMPERATURE CONTROL

Why Boiler Protection?

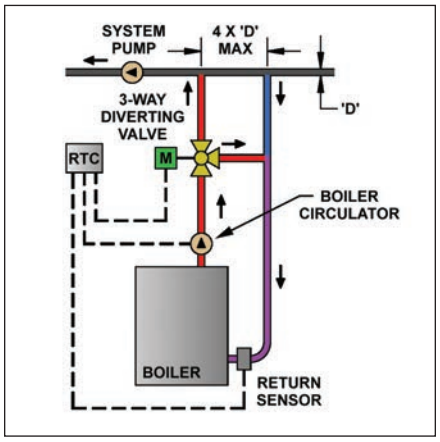
Today's demands for comfort and efficiency require greater attention to the temperature and volume of return water to the boiler. Many premature boiler failures can be traced to these two uncontrolled variables. Operating below minimum temperatures and flow rates creates thermal shock conditions and flue gas condensation issues, each of which can shorten the life expectancy of a boiler. Other factors that affect return temperature and flow include:

- snow melt and radiant flooring applications
- complex system integration and control
- outdoor reset and warm weather shutdown
- misunderstanding the protection value of primary/secondary systems
- conversion of steam or gravity flow systems to pumped water systems, while retaining the original oversized distribution systems

The concept of boiler protection has existed for many years. However, the primary focus in hydronic systems is often the demand and delivery design characteristics. Frequently, little attention is given to the heat source – the boiler.

Controlling Return Temperatures

The Burnham Commercial RTC Return Temperature Control provides an economical and effective means of boiler protection from thermal shock and sustained condensing operation. By expanding the "boiler envelope" to incorporate a 3-way valve and flow control system, the RTC Return Temperature Control maintains a minimum return water temperature of 135°F or greater.



The RTC system is supplied as a kit and can be incorporated into most hydronic hot water applica-tions with minimal modifications to the system design and operation. It provides a simple means for boiler protection and an opportunity to increase operational efficiency.

Outdoor Reset Option

The addition of the outdoor reset option provides additional energy savings by modulating the system supply water temperature based upon outdoor air temperature. This allows the system to closely match the heating needs of the building regardless of weather conditions.

Features Include:

- Indoor/Outdoor Reset Control
- Thermal Shock and Flue Gas Condensation Protection
- Maintains Minimum Return Water Temperature
- Simple Self-Diagnostic Test Sequence with Error Messages
- Adjustable Boiler Pump Purge
- Off-Season Built-in Pump and Valve Exerciser
- 24 Vac Floating Motor Actuator on 3-way Valve

Standard Equipment

Basic RTC Kit
3 x 12 Nipple with Tapping
24 Vac Actuator
3-way Valve
J-Box
Mounting Bracket

RTC Kit with Outdoor Reset
Basic RTC Kit with additional items below:

917-14 Universal Sensor for Mixing
070 Outdoor Sensor

Additional Components
Boiler Circulator
one required per RTC kit (not included)
Flange Kits for 3-way valves
available in 2-1/2" to 5" sizes

RTC Kit Selection Chart (1)

SELECT BOILER SIZE BASED ON Δ T (4)		VALVE SIZE (1) (2)	BASIC RTC KIT PART #	RTC KIT w/ OUTDOOR RESET PART #	APPROXIMATE SHIPPING WEIGHT
20° Δ T	40° Δ T				
—	V903	1.0 NPT"	60160851	60160861	17
—	V904	1.25 NPT"	60160852	60160862	17
V903 V904	V905, V906 V1104, V1105	1.5 NPT"	60160853	60160863	20
V905 V1104	V907, V908, V909 V1106, V1107, V1108	2.0 NPT"	60160854	60160864	24
V906, V907, V908 V1105, V1106	V910, V911, V912 V1109, V1110, V1111	2.5" FLG (3)	60160855	60160865	47
V909, V910, V911 V1107, V1108, V1109	V1112, V1113, V1114 V1115, V1116, V1117	2.5" FLG (3)	60160856	60160866	47
V912 V1110, V1111, V1112, V1113	V1118 V1119, V1120 V1121, V1122, V1123	3.0" FLG	60160857	60160867	55
V1114, V1115 V1116, V1117, V1118	—	4.0" FLG	60160858	60160868	80
V1119, V1120 V1121, V1122, V1123	—	5.0" FLG	60160859	60160869	93

1. Requires addition of a boiler circulator, to be provided by installer. See back page for circulator selection.
2. Pipe size varies on application – Refer to I & O Manual for details.
3. The 2.5" valves have diferent Cv values. Refer to the I & O Manual for details.
4. RTC can be used on other Burnham Commercial products. Consult factory for application.

RTC Return Temperature Control Specification

1. The Burnham RTC Return Temperature Control is a CSA certified microprocessor based control that will control boiler return water temperature to prevent thermal shock and flue gas condensation.
2. The control shall have a 120V power supply with a built in 24V transformer to power a floating action type actuator.
3. The control shall provide a 24V floating output signal to modulate a three-way or a four-way diverting valve based on a signal from the return temperature sensor mounted in the return piping to the boiler.
4. The control shall have an LCD display to view system status and operating information.
5. The control shall have a non-volatile memory to monitor supply and return water temperatures and boiler run times.
6. The control shall have a boiler minimum setting of 135°F and shall not be programmable any lower than 135°F.
7. The control shall have a warm weather shut down feature, a heat demand input, boiler contact and pump contact.
8. The control must receive a heat demand before it can operate. When the demand is removed, the diverting valve shall fully close before it is allowed to respond to the new heat demand.
9. The control shall have a test sequence to ensure proper component operation, an adjustable pump post purge of zero to 240 seconds, exercising of pump and diverting valve, error messages when it detects a malfunction and an adjustable actuator motor speed setting of 30 to 230 seconds.
10. The control shall have the ability to operate with an outdoor reset function. This requires the use of a mixed water sensor and an outdoor air sensor.

20° ΔT Circulator Sizing (1)

BOILER SIZE	TOTAL GPM	TACO (1)				BELL & GOSSETT (1)				GRUNDFOS (1)				ARMSTRONG (1)			
		MODEL #	IMP "	HP	RPM	MODEL #	IMP "	HP	RPM	MODEL #	IMP "	HP	RPM	MODEL #	IMP "	HP	RPM
V903A	35	IL 111	N/A	1/8	1725	PL-36-1.5"	Std.	1/6	3300	UPS32-40/4	3.39	1/3	1667	E-10	Full	1/6	1800
V904A	48	1615	4.7	1/3	1750	PL-75-2"	Std.	1/6	3400	UPS32-80/4	2.52	1/2	3400	E-16	Full	1/6	1200
V905A	65	1611	4.5	1/3	1750	PL-130-2"	Std.	2/5	3200	UPS40-80/4	4.86	1/2	1587	S-46	4.25	1/3	1200
V906A	81	KV2006	4.3	1	1750	PL-130-2"	Std.	2/5	3200	UPS40-80/4	4.86	1/2	1587	S-46	4.25	1/3	1200
V907A	96	1635	4.5	1/2	1750	PL-130-2"	Std.	2/5	3200	UPS50-80/4	4.97	3/4	1607	4380 3x3x6	5.04	1/3	1200
V908A	111	1635	4.9	3/4	1750	Ser. 60, Mod. 610-2	4	1/2	1750	UPS50-80/2	2.91	3/4	3426	4380 3x3x6	5.567	1/2	1200
V909A	134	KV3006	4.7	1	1750	Ser. 60, Mod. 610-2	4	1/2	1750	TP80-40/4	3.73	1/2	1750	4380 3x3x6	5.23	1/3	1200
V910A	153	KV3006	5.0	1	1750	Ser. 80, Mod. 3x3x7B	5	1	1750	TP100-40/4	4.10	1	1750	4380 4x4x6	4.971	1/2	1200
V911A	171	KV3006	5.3	1	1750	Ser. 80, Mod. 3x3x7B	5	1	1750	TP100-40/4	4.10	1	1750	4380 4x4x6	5.371	1/2	1200
V912A	190	KV3007	5.6	1	1750	Ser. 80, Mod. 3x3x7B	5	1	1750	TP100-80/4	5.24	2	1750	4380 4x4x6	4.891	1/2	1200
V1104	67	KV2606	4.7	1	1750	PL-130-2"	Std.	2/5	3200	UPS40-80/4	4.86	1/2	1587	S-45	3.875	1/4	1800
V1105	86	KV2006	4.5	1	1750	PL-130-2"	Std.	2/5	3200	UPS40-80/4	4.86	1/2	1688	4380	4.529	1/3	1200
V1106	107	1635	4.8	3/4	1750	Ser. 60, Mod. 610-2	4	1/2	1750	UPS50-80/4	4.97	3/4	1694	4380 3x3x6	5.418	1/2	1200
V1107	128	KV3006	4.4	1	1750	Ser. 60, Mod. 610-2	4	1/2	1750	UPS50-80/2	2.91	3/4	3426	4380 3x3x6	5.057	1/3	1200
V1108	152	KV3006	5.0	1	1750	Ser. 80, Mod. 3x3x7B	5	1	1750	TP100-40/4	4.1	1	1750	4380 4x4x6	4.983	1/2	1200
V1109	173	KV3007	5.5	1	1150	Ser. 80, Mod. 3x3x7B	5	1	1750	TP100-40/4	4.1	1	1750	4380 4x4x6	5.01	1/2	1200
V1110	194	KV3007	5.5	1	1150	Ser. 80, Mod. 4x4x7	5.5	3/4	1150	—	—	—	—	4380 4x4x6	4.91	1/2	1200
V1111	215	KV3007	6.0	1	1150	Ser. 80, Mod. 4x4x7	5.5	3/4	1150	—	—	—	—	4380 4x4x6	5.149	1/2	1200
V1112	233	KV3007	6.2	1	1150	Ser. 80, Mod. 5x5x7	5.25	3/4	1150	—	—	—	—	4380 4x4x6	5.78	3/4	1200
V1113	250	KV4007	5.6	1	1160	Ser. 80, Mod. 5x5x7	5.375	3/4	1150	UPS80-160/2	3.56	3	3513	4380 4x4x6	5.9	3/4	1200
V1114	273	KV4007	5.8	1	1160	Ser. 80, Mod. 5x5x7	5.25	3/4	1150	—	—	—	—	4380 4x4x6	6	3/4	1200
V1115	296	KV5007	5.7	1	1160	Ser. 80, Mod. 5x5x7	5.5	1	1150	—	—	—	—	4380 5x5x8	7.03	1.5	1200
V1116	313	KV5007	5.5	1	1160	Ser. 80, Mod. 5x5x7	5.5	1	1150	—	—	—	—	4380 6x6x8	5.662	1.5	1200
V1117	335	KV5007	5.8	1	1160	Ser. 80, Mod. 5x5x7	5.5	1	1150	—	—	—	—	4380 6x6x8	5.72	1.5	1200
V1118	358	KV5007	5.9	1-1/2	1160	Ser. 80, Mod. 5x5x7	5.875	1.5	1150	—	—	—	—	4380 6x6x8	5.774	1.5	1200
V1119	374	C13009	6.3	1-1/2	1160	Ser. 80, Mod. 5x5x7	6	1.5	1150	—	—	—	—	4380 6x6x8	5.811	1.5	1200
V1120	396	C13009	6.5	1-1/2	1160	Ser. 80, Mod. 5x5x7	6.5	1.5	1150	—	—	—	—	4380 6x6x8	5.16	1.0	1200
V1121	417	C14007	6.6	1-1/2	1160	Ser. 80, Mod. 5x5x7	6.5	1.5	1150	—	—	—	—	4380 6x6x8	5.319	1.0	1200
V1122	433	C14007	6.7	2	1160	Ser. 80, Mod. 6x6x7	5.625	1	1150	—	—	—	—	4380 6x6x8	5.3	1.0	1200
V1123	455	C14007	6.9	2	1160	Ser. 80, Mod. 6x6x7	6	1.5	1150	—	—	—	—	4380 6x6x8	6.56	1.0	1200

1. For any motor over 1/3 hp, use additional relay for single phase power. Use motor starter for 3 phase power.

40° ΔT Circulator Sizing (1)

BOILER SIZE	TOTAL GPM	TACO (1)				BELL & GOSSETT (1)				GRUNDFOS (1)				ARMSTRONG (1)			
		MODEL #	IMP "	HP	RPM	MODEL #	IMP "	HP	RPM	MODEL #	IMP "	HP	RPM	MODEL #	IMP "	HP	RPM
V903A	17	007	N/A	1/25	3250	NRF-33	Std.	1/5	2950	UPS32-40/4	3.39	1/3	1594	S-25	2.75	1/6	1800
V904A	24	0010	N/A	1/8	3250	PL-36	Std.	1/6	3300	UPS32-40/4	3.39	1/3	1667	S-25	2.75	1/12	1800
V905A	32	111C	N/A	1/8	1725	PL-36	Std.	1/6	3300	UPS32-40/4	3.39	1/3	1712	E-8	Full	1/6	3600
V906A	40	121C	N/A	1/7	1725	PL-45	Std.	1/6	3300	UPS32-80/2	2.52	1/2	3400	S-35	3.375	1/6	1800
V907A	48	120C	N/A	1/6	1725	PL-75	Std.	1/6	3400	UPS32-80/2	2.52	1/2	3400	S-46	3.375	1/4	1800
V908A	56	1611	4.1	1/4	1750	PL-75	Std.	1/6	3400	UPS40-80/4	4.86	1/2	1450	S-45	3.875	1/4	1800
V909A	67	122C	N/A	1/4	1725	PL-130-2"	Std.	2/5	3200	UPS40-80/4	4.86	1/2	1587	S-46	3.875	1/3	1800
V910A	76	121C	N/A	1/4	1725	PL-130-2"	Std.	2/5	3200	UPS40-80/4	4.86	1/2	1587	4380 3x3x6	4.998	1/3	1200
V911A	86	131	N/A	1/3	1725	PL-130-2"	Std.	2/5	3200	UPS40-80/4	4.86	1/2	1688	4380 3x3x6	4.667	1/3	1200
V912A	95	1635	4.5	1/2	1750	PL-130-2"	Std.	2/5	3200	UPS50-80/4	4.97	3/4	1607	4380 3x3x6	5.019	1/3	1200
V1104	33	111	N/A	1/8	1725	PL-1361-1/2"	Std.	1/6	3300	UPS32-40/4	3.39	1/3	1667	E-8	Full	1/6	3600
V1105	43	120	N/A	1/6	1725	PL-75	Std.	1/6	3400	UPS32-80/2	2.52	1/2	3281	S-35	3.375	1/6	1800
V1106	53	120	N/A	1/6	1725	PL-75	Std.	1/6	3400	UPS32-80/2	2.52	1/2	3400	S-45	3.875	1/4	1800
V1107	64	121	N/A	1/4	1725	PL-130-2"	Std.	2/5	3200	UPS40-80/4	4.86	1/2	1587	S-45	3.875	1/4	1800
V1108	76	131	N/A	1/3	1725	PL-130-2"	Std.	2/5	3200	UPS40-80/4	4.86	1/2	1688	S-46	4.25	1/3	1800
V1109	86	121	N/A	1/4	1725	PL-130-2"	Std.	2/5	3200	UPS40-80/4	4.86	1/2	1688	S-46	4.25	1/3	1800
V1110	97	1635	4.5	1/2	1750	PL-130-2"	Std.	2/5	3200	UPS50-80/4	4.97	3/4	1694	4380 3x3x6	5.147	1/3	1200
V1111	108	1635	4.8	3/4	1750	Ser. 60, Mod. 610-2	4	1/2	1750	UPS50-80/4	4.97	3/4	1694	4380 3x3x6	5.579	1/2	1200
V1112	117	1635	4.9	3/4	1750	Ser. 60, Mod. 610-2	4	1/2	1750	UPS50-80/4	4.97	3/4	1607	4380 3x3x6	5.119	1/3	1200
V1113	125	1635	5.2	3/4	1750	Ser. 60, Mod. 610-2	4	1/2	1750	UPS50-80/4	4.97	3/4	1694	4380 3x3x6	5.0	1/3	1200
V1114	137	1635	5.5	1	1750	Ser. 80, Mod. 3x3x7B	5	1	1750	UPS50-80/4	5.03	1/2	1694	4380 4x4x6	4.569	1/3	1200
V1115	148	KV3006	4.9	1	1750	Ser. 80, Mod. 3x3x7B	5	1	1750	UPS50-160/2	4.1	1	3395	4380 4x4x6	4.92	1/2	1200
V1116	156	KV3006	5.1	1	1750	Ser. 80, Mod. 3x3x7B	5	1	1750	UPS50-160/2	3.57	3	3395	4380 4x4x6	5.168	1/2	1200
V1117	168	KV3007	5.9	1	1160	Ser. 80, Mod. 3x3x7B	5	1	1750	UPS50-160/2	3.57	3	3513	4380 4x4x6	5.520	3/4	1200
V1118	179	KV3007	5.6	1	1160	Ser. 80, Mod. 3x3x7B	5	1	1750	UPS100-40/4	3.57	3	1712	4380 4x4x6	4.654	1/3	1200
V1119	187	KV3007	5.6	1	1160	Ser. 80, Mod. 3x3x7B	5	1	1750	UPS100-40/4	3.57	3	1712	4380 4x4x6	4.808	1/3	1200
V1120	198	KV3007	5.7	1	1160	Ser. 80, Mod. 3x3x7B	5	1	1750	UPS100-40/4	3.57	3	1712	4380 4x4x6	5.03	1/2	1200
V1121	209	KV3007	5.9	1	1160	Ser. 80, Mod. 3x3x7B	5.5	1-1/2	1750	UPS80-160/2	3.57	3	3513	4380 4x4x6	5.21	1/2	1200
V1122	217	KV3007	6.1	1	1160	Ser. 80, Mod. 3x3x7B	5.5	1-1/2	1750	UPS80-160/2	3.57	3	3513	4380 4x4x6	6.19	1/2	1200
V1123	228	KV3007	6.3	1	1160	Ser. 80, Mod. 3x3x7B	5.5	1-1/2	1750	UPS80-160/2	3.57	3	3513	4380 4x4x6	5.520	3/4	1200

1. For any motor over 1/3 hp, use additional relay for single phase power. Use motor starter for 3 phase power.

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