

AquaSmart™

Model 7600 Boiler Control

Beckett
PARTS & ACCESSORIES

Features & Benefits

- Beckett HeatManager™ dynamic temperature reset
- Cycle history diagnostic information
- Reduce inventory through universal design
- Backlit LCD screen with programming touch pad
- Freeze resistance
- Energy saving through circulator hold-on function
- Priority override for domestic hot water
- Built-in power disconnect switch (optional)
- Oil and gas offerings available
- Self checking sensor

HeatManager™
Inside



Description

The Beckett AquaSmart™ is a patent-pending, advanced boiler control designed for use on residential and light commercial boiler systems. The control includes a backlit LCD digital display with touch pad to easily program temperature limits, differentials, and other advanced options. The AquaSmart™ also has memory storage of system history for help with diagnostics and troubleshooting. All models include the option of enabling Beckett HeatManager™ dynamic temperature reset that, when selected, provides 10-20% fuel consumption savings.

HeatManager™ Functionality

The HeatManager™ contains a Department of Energy (DOE) 2012 compliant load-matching energy saving algorithm. This feature saves fuel by dynamically changing the temperature high operating limit to the minimum temperature necessary to meet the heating demand. The Contractor can adjust the HeatManager™ algorithm to align comfort and energy savings.

Example of LCD display screen



Ordering Information:

Part Number	Description	Additional Comments
7600A0001U	120 Vac - AquaSmart Boiler Temperature Control	• HeatManager dynamic temperature reset (DOE 2012 compliant)
7600B0001U	24 Vac - AquaSmart Boiler Temperature Control	• Field programmable limits and differentials
7600RMU	48" AquaSmart Remote Mount Kit	
7600TSU	Replacement Unit Pack Temperature Sensor	

USA: R.W. Beckett Corporation • ph: (800)645-2876 • fax: (440)327-1064 | Canada: R.W. Beckett Canada Ltd. • ph: (800)665-6972 • fax: (519)763-5656

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**R.W. Beckett Corporation**

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Cross-Reference Guide

Table 1a - Direct Replacements

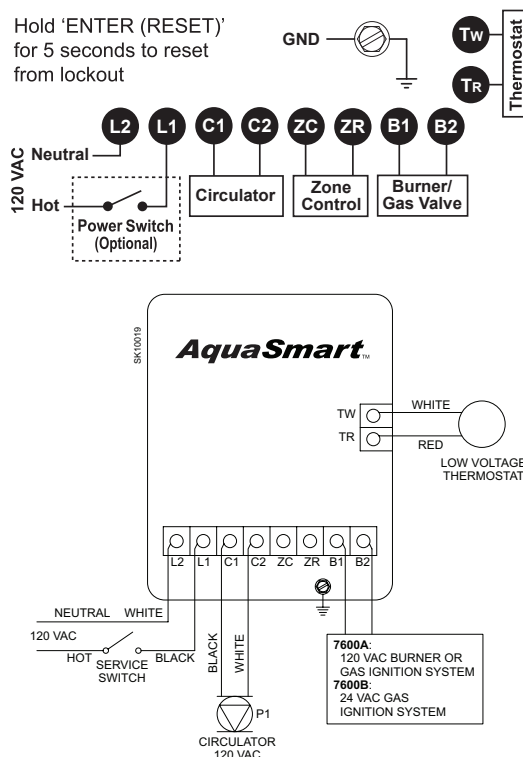
Beckett Replacement	
7600A (Oil - 120 Vac Output)	Honeywell
	• L7124 A,C (All) • L8124 A,C, M (All) • L7224 A,C,U (All) • L8148 A,C (All) • L7248 A,C (All) • L8151 A • L7148 A (All)
	Hydrolevel
	• 3150
	Carlin
	• 90524A
7600B (Gas - 24 Vac Output)	White Rodgers
	• 8B48A-217 • 11C30-3 • 11B54-4 • 11C61-12 • 11C15-11
	Honeywell
	• L8148E1265
	Hydrolevel
	• 3100
7600B (Gas - 24 Vac Output)	White Rodgers
	• 8B43A-601 • 8F48A-351

Table 1b - Advanced Wiring Needed

Beckett Replacement	
7600A or 7600B (Based on system requirements)	Honeywell
	• L4006A (All) • L6006A (All) • L4006G 1022 • L6006C 1018 • L4006H 1004 • L6008A 1192 • L4008A (All) • L6008A 1242 • L4006E (All) • L8124B 1039 • L4008E (All) • L8148J 1009
	Carlin
	• 90200A • 90200EL • 90000 (All) • 90300B • 90200E • 90200D
	White Rodgers
	• 11B06-1 • 11B18-153 • 11D18-1 • 11D82-1 • 11B18-101 • 11D31-1 • 11B30-104 • 1131-102 • 11B02-1 • 1127-2 • 11A5-33 • 11A79-2 • 11B06-46 • 1127-9 • 11B95-31 • 11B27-9
7600B (Gas - 24 Vac Output)	Honeywell
	• L7148F (All) • L8148E (All)

Wiring

Hold 'ENTER (RESET)' for 5 seconds to reset from lockout



Product Specifications

Electrical Ratings

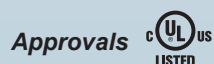
- **Input Voltage:** 120 Vac - 50/60 Hz.
- **Input Current:** 0.1 A + B1 + C1 + ZC
- **MAX Input Current:** 20A (Reduce to 15A if optional power switch is used)
- **24 Vac thermostat anticipator current:** 0.1 Amp.
- **Burner Current Rating (B1):**
7600A: 7.4 A at 120 Vac FLA; 44.4 A inrush LRA.
7600B: 1.25 A at 24 Vac; 30 VA (total load).
- **Circulator Current Rating (C1):** 7.4 A at 120 Vac FLA; 44.4 A inrush LRA.
- **Zone Control Current Rating (ZC):** 7.4 A at 120 Vac FLA; 44.4 A inrush LRA.

Temperature Ranges and Differentials

- High Limit Setting Range: 100 to 240°F (38 to 116°C)
- High Limit Differential Range: 5 to 45°F (3 to 25°C)
- Low Limit Setting Range: 100 to 220°F (38 to 104°C)
- Low Limit Differential Range: 10 to 45°F (6 to 25°C)
- Factory Range Stops available - consult factory

Environmental Ratings

- Storage Temperature: -40 to +150 °F (-40 to +65 °C)
- Operating Temperature: -4 to +150 °F (-20 to +65 °C)
- Relative Humidity: 5 to 85% RH, non-condensing and non-crystallizing



Approvals Underwriters Laboratories Listed to UL353, UL1998 for U.S. and Canada

QUICK REFERENCE GUIDE

The Beckett AquaSmart is an advanced boiler control designed for use on residential and light commercial boiler systems. All models include the option of enabling Beckett HeatManagerTM dynamic temperature reset that, when selected, provides up to 20% fuel consumption savings. The control includes a backlit LCD digital display with touch pad to easily program temperature limits, differentials, and other advanced options. The AquaSmart also has memory storage of system history for help with diagnostics and troubleshooting.

Please refer to the AquaSmart Owner's Manual for more detailed instructions and advanced programming options.

Technical Specifications



Do Not Use This Control in an Application that is Not Within the Ratings Listed in This Section. Improper Control Operation May Result.

Electrical Ratings

Input Voltage: 120 Vac - 50/60 Hz.

Input Current: 0.1 A + B1 + C1 + ZC

MAX Input Current: 20A (Reduce to 15A if optional power switch is used)

24 Vac Thermostat Anticipator Current: 0.1 Amp.

Burner Current Rating (B1):

7600A (oil): 7.4 A at 120 Vac FLA; 44.4 A inrush LRA.

7600B (gas): 1.25 A at 24 Vac; 30 VA (total load).

Circulator Current Rating (C1): 7.4 A at 120 Vac FLA; 44.4 A inrush LRA.

Zone Control Current Rating (ZC): 7.4 A at 120 Vac FLA; 44.4 A inrush LRA.

Temperature Ranges and Differentials

- High Limit Setting Range: 100 to 240°F (38 to 116°C)
- High Limit Differential Range: 5 to 45°F (3 to 25°C)
- Low Limit Setting Range: 100 to 220°F (38 to 104°C)
- Low Limit Differential Range: 10 to 45°F (6 to 25°C)
- Factory Range Stops available - consult factory

Environmental Ratings

- Storage Temperature: -40 to +150°F (-40 to +65°C)
- Operating Temperature: -4 to +150°F (-20 to +65°C)
- Maximum Sensing Element Temperature: 250°F (121°C)
- Relative Humidity: 5 to 85% RH, non-condensing and non-crystallizing

Approvals

Underwriters Laboratories Recognition to UL353, UL1998 for U.S. and Canada

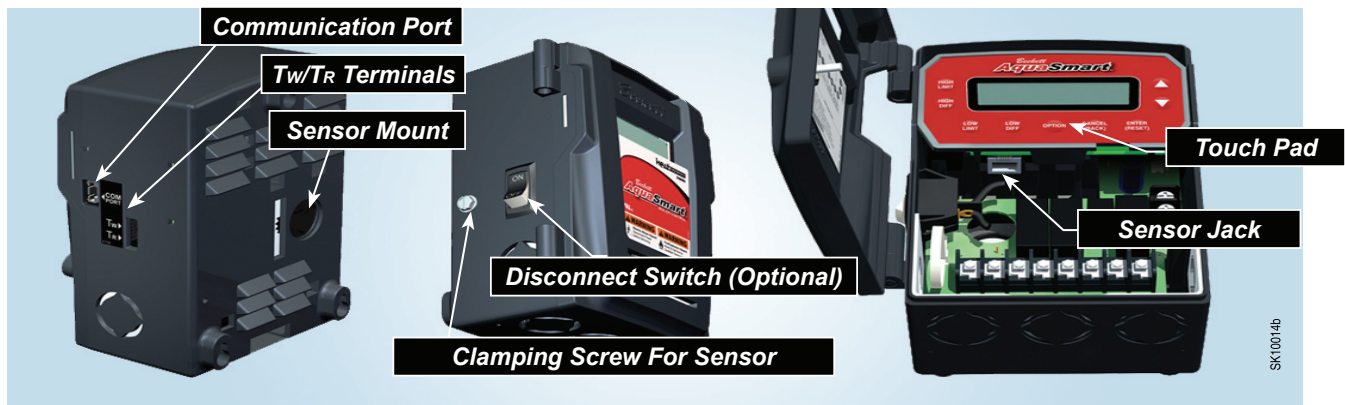


Electrical Shock, Fire, Explosion and Burn Hazards

This control must be installed, adjusted and put into operation only by a trained, licensed, qualified professional or service agency in accordance with the National Electric Code ANSI/NFPA 70 (Canada CSA C22.1) state, local codes and authorities having jurisdiction.

The installer must carefully read and follow the installation and service instructions contained in this pamphlet and in the owner's manual. Make them available to the equipment owner, so they can be kept for future reference.

Figure 1 - Getting to know the AquaSmart 7600 Series Control



Installation

OEM Installation: When replacing an OEM-installed AquaSmart, consult the appliance manufacturer's wiring diagrams and instructions for additional information.

Retrofit Installation: The AquaSmart can be used to replace most standard boiler temperature controls. For a cross-reference of compatible replacements, refer to **Owner's Manual**.

There are two basic methods for mounting the AquaSmart to the boiler.

1. **Sensor/Immersion Well Mounting** – This is the most common method. If the existing well is not suitable for any reason, a standard design aftermarket immersion well with the proper dimensions can be purchased from a HVAC distributor. The AquaSmart can then be mounted in the typical way.
2. **Surface Mounting** – This is sometimes required and is part of the AquaSmart base design. The base has adequate clearance built-in to accommodate the temperature sensor lead exiting the back of the control. A 48" extension cable (Pt. No. 52120) can be purchased separately for applications where needed.

Basic Programming

To ensure smooth appliance operation, the AquaSmart requires a separation between the High and Low limits no less than the **greater** differential plus 5°F.

For example: If the High Limit is set to 180°F, the High Diff to 20°F, and the Low Diff to 10°F, the control will not allow a Low Limit above 155°F (180°F - 20°F [the greater of the two differentials] - 5°F = 155°F).

A. Temperature High Limit

1. In any mode or screen other than an *OPTION* sub-menu, press the **"HIGH LIMIT"** key.
2. The temperature displayed is the current setting. Use the **▲** and **▼** keys to select the desired setting. Tap the button to increase or decrease the temperature by 1°, or hold it to increase or decrease the temperature by 5° at a time.
3. Press the **"ENTER (RESET)"** key. Confirm the setting by pressing **"ENTER (RESET)"** again if the value is correct, or **"CANCEL (BACK)"** if it is not.

B. Temperature Low Limit

1. In any mode or screen other than an *OPTION* sub-menu, press the **"LOW LIMIT"** key.
2. The temperature displayed is the current setting. Use the **▲** and **▼** keys to select the desired setting. Tap the button to increase or decrease the temperature by 1°, or hold it to increase or decrease the temperature by 5° at a time. For cold-start operation, turn the low limit off by pressing the down arrow key repeatedly until *OFF* is displayed.
IMPORTANT: To prevent flue gas condensation and reduce fatigue caused by thermal cycling on conventional (non-condensing) boilers, the LOW LIMIT set point should be 150° F or above.
NOTE: Boiler manufacturer's temperature requirements supersede this recommendation.
3. Press the **"ENTER (RESET)"** key. Confirm the setting by pressing **"ENTER (RESET)"** again if the value is correct, or **"CANCEL (BACK)"** if it is not.

C. Temperature High Limit Differential

1. In any mode or screen other than an *OPTION* sub-menu, press the **"HIGH DIFF"** key.
2. The temperature displayed is the current setting. Use the **▲** and **▼** keys to select the desired setting. Tap the button to increase or decrease the temperature by 1°, or hold it to increase or decrease the temperature by 5° at a time.
3. Press the **"ENTER (RESET)"** key. Confirm the setting by pressing **"ENTER (RESET)"** again if the value is correct, or **"CANCEL (BACK)"** if it is not.

D. Temperature Low Limit Differential

1. In any mode or screen other than an *OPTION* sub-menu, press the **"LOW DIFF"** key.
2. The temperature displayed is the current setting. Use the **▲** and **▼** keys to select the desired setting. Tap the button to increase or decrease the temperature by 1°, or hold it to increase or decrease the temperature by 5° at a time.
3. Press the **"ENTER (RESET)"** key. Confirm the setting by pressing **"ENTER (RESET)"** again if the value is correct, or **"CANCEL (BACK)"** if it is not.

Control Wiring:

- programming
for further
- programming
further
- SK10019
- AquaSmart™**
- TW
TR
- WHITE
RED
- LOW VOLTAGE
THERMOSTAT
- NEUTRAL WHITE
120 VAC
HOT SERVICE SWITCH
- BLACK
WHITE
- P1
CIRCULATOR
120 VAC
- 7600A:**
120 VAC BURNER OR
GAS IGNITION SYSTEM
7600B:
24 VAC GAS
IGNITION SYSTEM
-
- The diagram shows the AquaSmart unit with terminals L2, L1, C1, C2, ZC, ZR, B1, and B2. A 120 VAC service switch with HOT and NEUTRAL (WHITE) lines is connected to L2 and L1. L2 is connected to the BLACK line of a CIRCULATOR (P1, 120 VAC). L1 is connected to the WHITE line of the CIRCULATOR. C1 is connected to the WHITE line of the 7600A/B system. C2 is connected to the BLACK line of the 7600A/B system. ZC and ZR are connected to the common ground of the 7600A/B system. B1 and B2 are connected to the 24 VAC line of the 7600B system. The TW and TR terminals are connected to the WHITE and RED lines of a LOW VOLTAGE THERMOSTAT.

Control Wiring Option: Utilizing a Zone Panel

- [illegible]

Page 3

Limited
WARRANTY
For Residential, Commercial and Specialty Burners

The R. W. BECKETT CORPORATION ("Beckett") warrants to persons who purchase its Beckett burners from Beckett for resale or for incorporation into a product for resale ("Customers") that its equipment is free from defects in material and workmanship under normal use and service for 60 months from the date of manufacture for Residential Burners and 18 months from the date of manufacture for Commercial and Specialty Burners. Residential burner models include: AF, AFG, AFII, NX, SF, SR and SMG. Commercial burner models include: CF375, CF500, CF800, CF1400, CF2300A, CF2500, CF3500A, CG10, CG15, CG25 and CG50. Specialty burner models include: ADC, ADCP, ARV, SDC and SM. The provisions of this warranty are extended to individual major burner components as follows:

- a) 60 months from date of manufacture for all Beckett-branded major components, except for 12 Vdc components.
- b) 18 months from date of manufacture for all non-Beckett-branded major components and Beckett branded 12 Vdc components.
- c) 12 months from date of manufacture for all Beckett-branded tools, such as the GeniSys Display.

Note: Normal service items found to be defective upon receipt by the customer are covered by this warranty.

THIS WARRANTY DOES NOT EXTEND TO EQUIPMENT SUBJECTED TO MISUSE, NEGLIGENCE, OR ACCIDENT; NOR DOES THIS WARRANTY APPLY UNLESS THE PRODUCT COVERED BY IT IS PROPERLY INSTALLED BY A QUALIFIED, COMPETENT TECHNICIAN, WHO IS LICENSED WHERE STATE AND LOCAL CODES REQUIRE, AND WHO IS EXPERIENCED IN MAKING SUCH INSTALLATIONS, IN ACCORDANCE WITH THE LATEST EDITION OF NFPA NO. 31 OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE LATEST EDITION OF THE NATIONAL FUEL GAS CODE (NFPA NO. 54) AND IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND NATIONAL CODES HAVING JURISDICTIONAL AUTHORITY.

Equipment, which is defective in material or workmanship and within the warranty period, may be returned for credit as follows: Beckett Burners, Beckett-branded major components and non-Beckett-branded major components that came as original equipment on a Beckett burner or were sold as a replacement part by Beckett should be returned, freight prepaid, to Beckett's home office. Credit will be issued to the customer unless the returned equipment is determined by Beckett to be out of warranty or damaged by user, in which case the equipment will be scrapped.

Note: Beckett is not responsible for any labor cost for removal and replacement of equipment.

THIS WARRANTY IS LIMITED TO THE PRECISE TERMS SET FORTH ABOVE, AND PROVIDES EXCLUSIVE REMEDIES EXPRESSLY IN LIEU OF ALL OTHER REMEDIES, AND IN PARTICULAR THERE SHALL BE EXCLUDED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT WILL BECKETT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE OF ANY NATURE. Beckett neither assumes nor authorizes any person to assume for Beckett any other liability or obligation in connection with the sale of this equipment, Beckett's liability and Customer's exclusive remedy being limited to credit as set forth above.

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Form No. 61545 R07



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Control Replacement Cross-Reference Guide

Features & Benefits

- Beckett HeatManager™ dynamic temperature reset
- Cycle history diagnostic information
- Reduce inventory through universal design
- Backlit LCD screen with programming touch pad
- Freeze resistance
- Energy saving through circulator hold-on function
- Priority override for domestic hot water
- Self checking sensor
- Built-in power disconnect switch (optional)
- Oil and gas offerings available



Table 1a - Direct Replacements

Honeywell		Beckett Replacement	Notes
L8124A (All)	L8124C (All)	7600A	7600 outputs are not rated for 240 VAC.
L7124A (All) L7124C (All) L7148A (All) L7224A (All)	L7224C (All) L7224U (All) L7248A (All) L7248C (All)	7600A	The 7600 has no Honeywell EnviraCOM™ Communications port. The diagnostic LED lights are replaced by the 7600's display.
L8148A (All)		7600A	7600 outputs are not rated for 240 VAC. B1 terminal on 7600 utilizes a 1/4" quick connect. Set low limit on 7600 to OFF.
L8124E 1016	L8148E 1265	7600B	7600 outputs are not rated for 240 VAC. B2, TW and TR terminals replace TV, T and Z, respectively.
L8124M (All)		7600A	For replacement with the 7600: Turn low limit off so the circulator is controlled directly by the thermostat and ZC is constantly powered.
L8151A		7600A	7600 outputs are not rated for 240 VAC. Remote mount sensor cable needed (Part No. 52120)
Hydrolevel		Beckett Replacement	Notes
3100		7600B	Not a suitable replacement if Low Water Cutoff (LWCO) functionality is used.
3150		7600A	
Carlin		Beckett Replacement	Notes
90524A		7600A	Make sure 7600 outputs do not exceed 7.4A. Available operating limit and differential ranges are not equivalent.
White Rodgers		Beckett Replacement	Notes
11C15-11		7600A	Make sure 7600 outputs do not exceed 7.4A @ 120 VAC. 7600 outputs are not rated for 240 VAC.
11C30-3	11B54-4		
8B48A-217			Not a suitable replacement if SPDT switch action is required; only break-on-rise available on 7600. Make sure 7600 outputs do not exceed 7.4A @ 120 VAC. 7600 outputs are not rated for 240 VAC.
11C61-12			
8F48A-351	8B43A-601	7600B	

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Table 2 - Functional Replacement (Advanced Wiring Needed)

Honeywell	Beckett Replacement	Notes
L4006A (All) L4006G 1022 L4006H 1004 L4008A (All)	7600A or 7600B (Based on System Voltage Requirements)	Make sure 7600 outputs do not exceed 7.4A @ 120 VAC. 7600 outputs are not rated for 240 VAC. 7600 will require an additional wire (L2) for operation. Short TW-TR terminals. C1, C2, ZC, and ZR are unused. Set low limit on 7600 to OFF.
L4006E (All) L4008E (All)		Requires the addition of a manual-reset high limit. 7600 outputs are not rated for 240 VAC. 7600 will require an additional wire (L2) for operation. Short TW-TR terminals. C1, C2, ZC, and ZR are unused. Set low limit on 7600 to OFF.
L6006A (All) L6006C 1018 L6008A 1192 L6008A 1242		Not a suitable replacement if SPDT switch action is required; only break-on-rise available on 7600. To use with a millivolt system an appropriate voltage relay with isolated gold plated contacts must be added to switch the millivolt circuit. Make sure 7600 outputs do not exceed 7.4A @ 120 VAC. 7600 outputs are not rated for 240 VAC. 7600 will require an additional wire (L2) for operation. Short TW-TR terminals. C1, C2, ZC, and ZR are unused. Set low limit on 7600 to OFF.
L8124B 1039 L8148J 1009		To use with a millivolt system an appropriate voltage relay with isolated gold plated contacts must be added to switch the millivolt circuit. 7600 outputs are not rated for 240 VAC.
L7148F (All) L8148E (All)	7600B	Must confirm that 7600 VA rating is adequate to meet VA requirements of system. Make sure 7600 B1 output does not exceed 1.25A @ 24VAC (30 VA). 7600 outputs are not rated for 240 VAC. B2, TW and TR terminals replace TV, T and Z, respectively. If damper is used, consult damper manufacturer's wiring instructions for using damper without damper plug.
Carlin	Beckett Replacement	Notes
90200A	7600A or 7600B (Based on System Voltage Requirements)	Make sure 7600 outputs do not exceed 7.4A. Set low limit on 7600 to OFF.
90000 (All) 90200E 90200EL 90300B		Requires the addition of a manual-reset high limit. Make sure 7600 outputs do not exceed 7.4A. Set low limit on 7600 to OFF.
90200D		Not a suitable replacement if SPDT switch action is required; only break-on-rise available on 7600. Make sure 7600 outputs do not exceed 7.4A. Set low limit on 7600 to OFF.
White Rodgers	Beckett Replacement	Notes
11B06-1 11D18-1 11B18-101 11B30-104 11B02-1 1145-33 11B06-46 11B95-31 11B18-153	7600A or 7600B (Based on System Voltage Requirements)	Make sure 7600 outputs do not exceed 7.4A @ 120 VAC. 7600 outputs are not rated for 240 VAC. 7600 will require an additional wire (L2) for operation. Short TW-TR terminals. C1, C2, ZC, and ZR are unused. Set low limit on 7600 to OFF.
11D82-1 11D31-1 1131-102 1127-2 11A79-2 1127-9		Not a suitable replacement if SPDT switch action is required; only break-on-rise available on 7600. 7600 outputs are not rated for 240 VAC. 7600 will require an additional wire (L2) for operation. Short TW-TR terminals. C1, C2, ZC, and ZR are unused. Set low limit on 7600 to OFF.
11B27-9		Requires the addition of a manual-reset high limit. Make sure 7600 outputs do not exceed 7.4A @ 120 VAC. 7600 outputs are not rated for 240 VAC. 7600 will require an additional wire (L2) for operation. Short TW-TR terminals. C1, C2, ZC, and ZR are unused. Set low limit on 7600 to OFF.
8J48A-209		To use with a millivolt system an appropriate voltage relay with isolated gold plated contacts must be added to switch the millivolt circuit.