Honeywell

R7847, R7849, R7852, R7861 Amplifiers for 7800 Series Relay Modules

OPERATING INSTRUCTIONS

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CONTENTS

1 Safety 1
2 Checking the usage 2
3 Features 2
4 Installation 2
5 Checkout 5
6 Technical data 6
7 Accessories 7
8 Certification 7
9 Disposal 8

1 SAFETY

1.1 Read the operating instructions before use

Please read through these instructions carefully before installing or operating. Following the installation, pass the instructions on to the operator. This unit must be installed and commissioned in accordance with the regulations and standards in force. These instructions can also be found at www.docuthek.com.

1.2 Explanation of symbols

1, **2**, **3**, **a**, **b**, **c** = Action

➔ = Instruction

1.3 Liability

We will not be held liable for damage resulting from non-observance of the instructions and non-compliant use.

1.4 Safety instructions

Information that is relevant for safety is indicated in the instructions as follows:

⚠ DANGER
Indicates potentially fatal situations.

⚠ WARNING
Indicates possible danger to life and limb.

⚠ CAUTION
Indicates possible material damage.

All interventions may only be carried out by qualified gas technicians. Electrical interventions may only be carried out by qualified electricians.

1.5 Conversion, spare parts

All technical changes are prohibited. Only use OEM spare parts.

2 CHECKING THE USAGE

The R7847A,B Rectification Flame Amplifiers are solid state plug-in amplifiers that respond to a rectified signal from a rectification type flame detector to indicate the presence of flame when used with 7800 SERIES Relay Modules.

The R7849A,B Ultraviolet Flame Amplifiers are solid state plug-in amplifiers that respond to an ultraviolet signal from a C7027, C7035 or C7044 Ultraviolet Flame Detector to indicate the presence of flame when used with 7800 SERIES Relay Modules.

➔ The use of R7849B with C7027, C7035 or C7044 is not CE approved.

The R7852A,B Infrared Flame Amplifiers are solid state plug- in amplifiers that respond to an infrared signal from a C7915 Infrared Flame Detector to indicate the presence of flame when used with 7800 SERIES Relay Modules.

The R7861A Self-Check Ultraviolet Flame Amplifier is a solid state plug-in amplifier that responds to an ultraviolet signal from a C7061 Self-Check Ultraviolet Flame Detector to indicate the presence of flame when used with 7800 SERIES Relay Modules.

3 FEATURES

- Flame failure response time of 0.8 or 1 second; or 2.0 or 3.0 seconds, depending on the amplifier and relay module selected. See page 7 (6.2 Relay Module Flame Failure Response Time (FFRT)).
- Plug-in to 7800 SERIES Relay Module through printed circuit board edge connector keyed for proper orientation.
- Flame signal test jacks measure amplifier flame signal voltage.
- 0.0 to 5.0 Vdc Flame signal strength reading range.
- Color coded label identifies flame detection type:
  Green–rectification
  Purple—ultraviolet
  White—optical
  Red—infrared
  Blue—pulsed rectification
- R7847B, R7849B and R7852B Dynamic Ampli-Check® circuitry tests all flame amplifier components 12 times per minute. The 7800 SERIES Relay Module locks out on safety shutdown with amplifier failure.
- R7861 Self-Check Ultraviolet Flame Amplifier test the detectors and all electronic components in the flame detection system 12 times per minute. The 7800 SERIES Relay Module locks out on safety shutdown with flame detection system failure.

4 INSTALLATION

⚠ CAUTION

Equipment Damage Hazard!
Incorrect combination of relay module, amplifier and flame detector can cause equipment damage.
In infrared applications (C7915 Infrared Flame Detector and R7852 Amplifier) using the RM7890 Relay Module with software version 4004 or less requires a tensecond delay to start sequence. This applies only to the initial power of the EC/RM7890.

4.1 When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced, flame safeguard control technician.
4. After installation is complete, check out the product operation as provided in these instructions.

⚠ WARNING

Electric Shock Hazard!
Can cause electrical shock, serious injury or death.
Disconnect the power supply before beginning installation. More than one power supply disconnection can be involved.

Important

1. Wiring must comply with all applicable codes, ordinances and regulations.
2. Wiring (where required) must comply with NEC Class 1 (Line Voltage) wiring.
3. Perform all required checkout tests after installation is complete.

⚠ CAUTION

Equipment Damage Hazard!
Can cause equipment damage.
Disconnect 7800 SERIES Relay Module power before removing amplifier.

4.2 Installing Plug-In Flame Signal Amplifier

⚠ WARNING

Electric Shock Hazard!
Can cause severe injury, death or property damage.
Disconnect the power supply before beginning installation. More than one power supply disconnection can be involved.

1. Align the amplifier circuit board edge connector with the keyed receptacle on the 7800 SERIES Relay Module. Be sure the amplifier nameplate faces away from the Relay Module.
2. Push in the amplifier until the circuit board is fully inserted into the receptacle and then push the amplifier toward the 7800 SERIES Relay Module retaining clasp.

3 Be sure the amplifier is firmly in place.
4 Perform all required checkout tests.

4.2.1 Installing flame signal amplifier



4.3 Installing Flame Detector

➔ page 3 (4.3.1 Flame Detection Systems) lists flame detection systems available for use with 7800 SERIES Relay Modules. Be sure to use the correct combination of amplifier and flame detector.

Proper flame detector installation is the basis of a safe and reliable flame safeguard installation. Refer to the Instructions packed with the flame detector and the equipment manufacturer instructions.

Keep the flame signal leadwires as short as possible from the flame detector to the wiring subbase. Capacitance increases with leadwire length, reducing the signal strength. The maximum permissible leadwire length depends on the type of flame detector, leadwire and conduit. However, the ultimate limiting factor for the flame detector leadwire is the flame signal; see page 5 (5.2.2 Flame signal).

4.3.1 Flame Detection Systems

Plug-in Flame Signal Amplifiers				Applicable Flame Detectors			
Type	**Color**	**Self-Checking**	**Model**	**Flame Failure Response Time (sec)[a]**	**Fuel**	**Type**	**Models**
Rectification	Green	No	R7847A[g]	0.8/1 or 2/3	Gas	Rectification Flame Detectors	Flame rods UVC 1
Rectification	Green	Dynamic Ampli-Check®	R7847B[b]	0.8/1 or 2/3	Gas	Rectification Flame Detectors	Flame Rods UVC 1
Infrared	Red/ White	No	R7852A[g]	2/3	Gas, oil, coal	Infrared (Lead Sulfide)	C7915
Infrared	Red/ White	Dynamic Ampli-Check®	R7852B[b]	2/3	Gas, oil, coal	Infrared (Lead Sulfide)	C7915
Ultraviolet	Purple	No	R7849A[g]	0.8/1 or 2/3	Gas, oil	Ultraviolet (Minipeeper)	C7027, C7035, C7044[f]
Ultraviolet	Purple	Dynamic Ampli-Check®	R7849B[d]	0.8/1 or 2/3	Gas, oil	Ultraviolet (Minipeeper)	C7027, C7035, C7044[f]
Ultraviolet	Purple	Dynamic Self-Check	R7861A[c,e]	0.8/1 or 2/3	Gas, oil, coal	Ultraviolet	C7061

[a] Flame Failure Response Time (FFRT) depends on selection of amplifier and 7800 SERIES Relay Module.

[b] Circuitry tests flame signal amplifier 12 times a minute during burner operation and shuts down burner if amplifier fails.

[c] Circuitry tests all electronic components in flame detection system (amplifier and detector) 12 times a minute during burner operation and shuts down burner if detection system fails.

[d] Circuitry tests flame signal amplifier 12 times a minute during burner operation and shuts down burner if amplifier fails. R7849B is not CE approved.

[e] 200/220/240 Vac applications require a 120 Vac, 10 VA minimum stepdown transformer (not provided) to drive the shutter. Applies to R7861 series 1 or greater. Fig. 2 shows flame detector wiring. Not applicable for C7061A1020 and C7061F1011-N, which have selectable 110/230V shutter voltage.

[f] Use C7027, C7035 and C7044 Flame Detectors only on burners that cycle on-off at least once every twenty-four hours. Use C7061A Ultraviolet Detector with R7861A Amplifier as ultraviolet flame detection system for appliances with burners that remain on continuously for twenty-four hours or longer.

[g] R7847A, R7849A and R7852A enable the mandatory 24h recycle timer in the 7800-series models that are CE approved against the EN 298 standards.

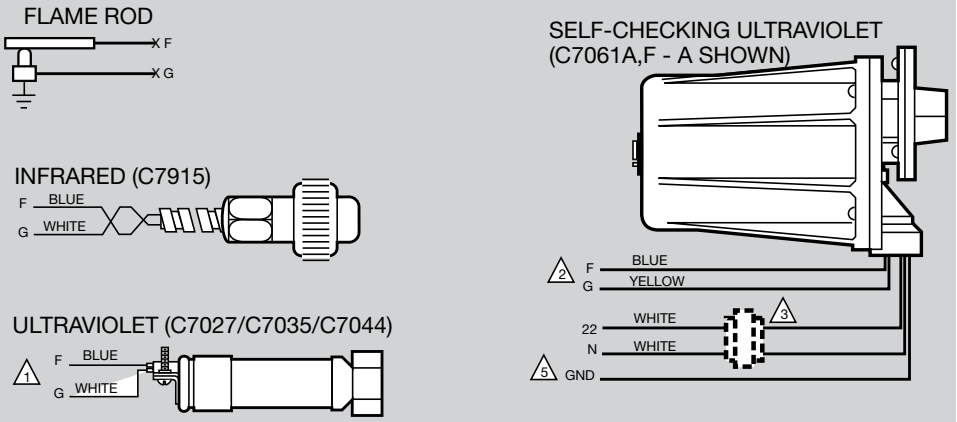
4.4 Wiring

⚠ WARNING
Electrical Shock Hazard!
Can cause severe injury, death or property damage.
Disconnect power supply before beginning installation. More than one disconnection can be involved.

1 Remove the 7800 SERIES Relay Module from the wiring subbase.
2 Refer to page 4 (4.4.1 Flame detector wiring) for proper flame detector wiring.
3 Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.
4 All wiring must comply with appropriate electrical codes, ordinances and regulations including NEC Class 1 (Line Voltage) wiring where required.
5 Use recommended wire size and type no. 18 copper conductors TTW(60C) or THW (75C) or THNN(90C). Avoid using shielded cable.
6 Use recommended wire routing:

a Keep the flame signal leadwire as short as possible from the detector to the 7800 SERIES Relay Module. The maximum permissible leadwire length depends on the type of leadwire, conduit type and leadwire diameter. The ultimate limiting factor for flame signal leadwire length is the flame signal voltage.
b Do not run high voltage ignition transformer wires in the same conduit with the flame detection wiring.
c If the flame detector leadwires are not long enough to reach the 7800 SERIES Relay Module electrical connectors, make splices in a junction box.
(1) Enclose scanner wiring without armor cable in metal cable or conduit.
(2) Follow flame detector Instructions.
7 Check wiring, see page 4 (4.4.1 Flame detector wiring).
8 Install 7800 SERIES Relay Module.
9 Restore power to the 7800 SERIES Relay Module.

4.4.1 Flame detector wiring



1 ! **CAUTION: EQUIPMENT DAMAGE HAZARD. INCORRECT WIRING POLARITY CAN DAMAGE OR DESTROY UV SENSING TUBES.** CONNECT FLAME DETECTOR WIRES ACCORDING TO FOOTNOTES 1 AND 2 TO PREVENT UV SENSING TUBE DAMAGE.FLAME DETECTOR LEADS ARE COLOR CODED. THE BLUE LEAD MUST BE CONNECTED TO THE F TERMINAL AND THE WHITE MUST BE CONNECTED TO THE G TERMINAL. THE UV SENSING TUBE IS POLARITY SENSITIVE.

2 FLAME DETECTOR LEADS ARE COLOR CODED. THE BLUE LEAD MUST BE CONNECTED TO THE F TERMINAL AND THE YELLOW MUST BE CONNECTED TO THE G TERMINAL. THE UV SENSING TUBE IS POLARITY SENSITIVE.

3 ! **CAUTION: EQUIPMENT DAMAGE HAZARD. INCORRECT VOLTAGE CAN DAMAGE SHUTTER MECHANISM ONLY ON EC7800 SERIES RELAY MODULES.** INSTALL A 200/220/240 VAC TO 120 VAC, 10VA MINIMUM, STEPDOWN TRANSFORMER (NOT PROVIDED) TO DRIVE THE SHUTTER MECHANISM. Not applicable for C7061A1020 and C7061F1011-N, which have selectable 110/230V shutter voltage.

5 GND (GREEN/YELLOW) LEAD WIRE (C7061A1020/C7061F1011-N).

5 CHECKOUT

5.1 Preliminary Inspection

1. Make sure, that Wiring connections are correct and all terminal screws and electrical connections are tight.
2. Select Proper flame failure response time.
3. Mount Amplifier securely on the 7800 SERIES Relay Module.
4. Position and clean Detectors properly according to Detector Instructions.
5. Use correct combination of amplifier and flame detector.

5.2 Flame Signal Measurement

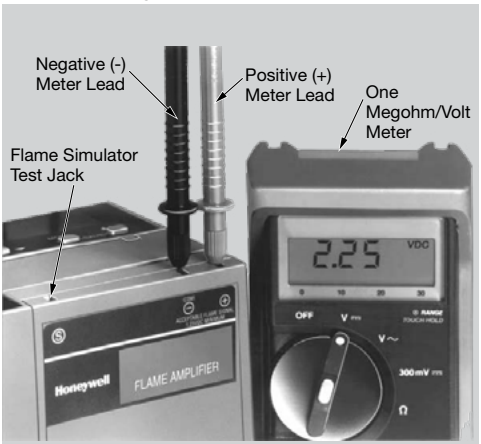
Flame signal can be measured at the Flame Signal Test Jacks, see page 5 (5.2.1 Flame signal measurement with meter), and at the Keyboard Display Module. Measure the flame signal at the appropriate times defined in the Checkout section; see applicable 7800 SERIES Relay Module Instructions. See page 5 (5.2.2 Flame signal) for acceptable and maximum flame signal voltage strengths.

⚠ CAUTION

Equipment Damage Hazard!
Improper wiring can destroy ultraviolet sensing tube.
Carefully follow polarity sensitive wiring instructions for the C7027, C7027, C7035, C7044 and C7061. Reversing the leadwires, even momentarily, can destroy the ultraviolet sensing tube.

1. Connect blue leadwire from detector to terminal F and white leadwire from C7027/C7035/C7044/C7061 to terminal G.
2. Follow lightoff Instructions for applicable 7800 SERIES Relay Module.

5.2.1 Flame signal measurement with meter



5.2.2 Flame signal

Flame Detector	Flame Signal Amplifier	Minimum Acceptable Steady dc Voltage[a]	Maximum Expected dc Voltage
Flame Rod, UVC 1	R7847A,B[b]	1.25 Vdc	5.0 Vdc at Keyboard Display Module or on volt-ohm-meter
C7027A C7035A C7044A	R7849A,B[b]	1.25 Vdc	5.0 Vdc at Keyboard Display Module or on volt-ohm-meter
C7915	R7852A,B[b]	1.25 Vdc	5.0 Vdc at Keyboard Display Module or on volt-ohm-meter
C7061A/F	R7861A[c]	1.25 Vdc	5.0 Vdc at Keyboard Display Module or on volt-ohm-meter

[a] This minimum or stronger signal can be easily obtained if the detector is correctly installed and positioned to properly sense the flame. Obtain this voltage before completing checkout.

[b] The flame amplifiers are Ampli-Check® type. The flame signal amplifier circuitry is tested one-half second every five seconds during burner operation and shuts down the burner if the amplifier fails (all installations).

➔ R7847A, R7849A and R7852A models enable the 24h auto recycle timer function in CE approved 7800-series Relay Modules with program sequence (not EC/RM7823). R7849B models are not CE approved.

[c] The flame amplifiers are Dynamic Self-Check types combining Ampli-Check(R) with a mechanical shutter for testing the amplifier circuitry and UV sensing tube, and are tested one-half second every five seconds during burner operation and shuts down the burner if the amplifier fails (all installations).

5.3 Measuring Flame Signal With Keyboard Display Module

Consult Instructions for applicable 7800 SERIES Relay Module or Keyboard Display Module.

5.4 Measuring Flame Signal with a Voltmeter

Two test jacks, positive and negative (Com) are accessible on the top of the amplifier when plugged into the 7800 SERIES Relay Module. These jacks are provided for monitoring flame signal strength. Use a one DC/volt meter to measure the flame signal strength. Connect the positive meter lead (red) to the positive (+) amplifier test jack and the negative meter lead (black) to the negative (-) amplifier test jack. The test jacks use standard 0.180 inch diameter voltmeter probes. A minimum 1.25 Vdc flame signal is required.

➔ The probes need to tip toward the relay module in order to make electrical contact.

The flame signal for the pilot alone, the main burner flame alone, and both together must be steady and a minimum of 1.25V. If the flame signal is unsteady, or less than the minimum acceptable voltage, check the flame detector installation and circuitry in the following procedure.

1 Check the supply voltages at terminals (L1) and L2 (N). Make sure the master switch is closed, connections are correct, and the power supply is of the correct voltage and frequency and is sinusoidal.

2 Check the detector wiring for defects including:

1 Incorrect connections.
2 Wrong type of wire.
3 Deteriorated wire.
4 Open circuits.
5 Short circuits.
6 Leakage paths caused by moisture, soot or accumulated dirt.

3 For a flame rod, make sure:

1 There is enough ground area.
2 The flame rod is properly located in the flame.
3 Temperature at the flame rod insulator is no greater than 500°F (260°C).

4 For all optical detectors, clean the detector viewing window, lens, and inside of the sight pipe as applicable.

5 With the burner running, check the temperature at the detector. If it exceeds the detector maximum rated temperature:

a Add a heat block to stop conducted heat traveling up the sight pipe.
b Add a shield or screen to reflect radiated heat.
c Add cooling (refer to sight pipe ventilation in the detector Instructions).

6 Make sure that the flame adjustment is not too lean.

7 Make sure the optical detector is properly sighting the flame.

8 If necessary, resight or reposition the detector.

9 If you cannot obtain proper operation, replace the plug-in amplifier.

10 If you cannot yet obtain proper operation, replace the flame detector.

Important

If you make any changes to the flame detection system, repeat all required Checkout tests in Checkout section of the Instructions for the applicable 7800 SERIES Relay Module.

6 TECHNICAL DATA

Models:

Flame Detection Systems, see page 3 (4.3.1 Flame Detection Systems):

Rectification:

– R7847A,B for use with flame rods or UVC 1 Ultraviolet Detectors.

Infrared:

– R7852A,B for use with C7915 Infrared (lead sulfide) Detector.

Ultraviolet:

– R7849A,B for use with C7027/C7035/C7044 Minipeeper Ultraviolet Detectors.
– R7861A for use with C7061A,F Ultraviolet Detector.

Flame Signal (Volts dc):

Minimum Acceptable: 1.25 Vdc.

Flame Signal Voltage Range (displayed on Keyboard Display Module or measured with a DC/volt meter plugged into amplifier test jacks): 0.0 to 5.0 Vdc.

Remark: The DC value of the flame signal is maximized at 5.0 VDC. To get values beyond 5.0VDC use the Modbus interface that reads 000h to 255h (where 000h represents 0.0 VDC and 255h represents 25.5 VDC. The 5.0 VDC reading is represented by 050h.

Environmental Ratings:

Ambient Temperature:

Operating: -40°F to 140°F (-40°C to 60°C).

Storage: -40°F to 150°F (-40°C to 65°C).

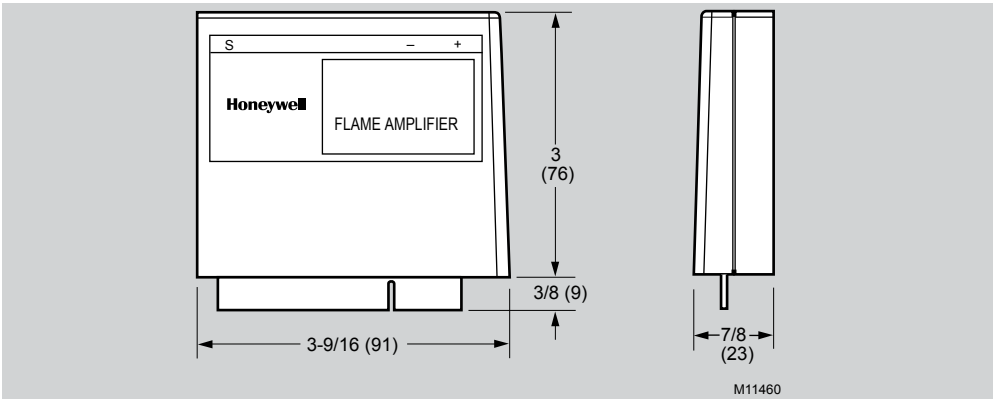
Humidity: Operating 85% rh continuous, noncondensing.

Vibration: Continuous 0.5G environment.

Weight:

2.5 oz (71g), unpacked.

6.1 Flame amplifier dimensions in in. (mm)



6.2 Relay Module Flame Failure Response Time (FFRT)

Relay Module	Flame Failure Response Time (FFRT) in seconds	
	0.8 or 1	2.0 or 3.0
EC7810, EC7820, EC/RM7830, EC/RM7850, EC/RM7823, EC7890B1028, RM7890B1055	1.0	2.0
EC/RM7885, EC/RM7890, RM7895, RM7896, RM7897, RM7898, RM7888, RM7838, RM7800, RM7840	0.8	3.0

7 ACCESSORIES

Flame Simulators:
Rectification: 123514A.
Ultraviolet: 203659.
Flame Detectors (ordered separately): select from Table page 3 (4.3.1 Flame Detection Systems).

8 CERTIFICATION

→ **CE Approved against EN 298:** When these amplifiers are used with an EC7810, EC7820, EC/RM7830, EC/RM7850, EC7890B1028 or RM7890B1055 Relay Module, with R7847A, R7847B, R7849A, R7852A, R7852B, R7861A flame amplifiers. R7849B flame amplifiers are NOT CE approved.

8.1 UL Listed

Underwriters Laboratories Inc. Listed: File no. MP268, Guide no. MCCZZ: R7847A, R7847B, R7861A, R7849A, R7849B.

8.2 CSA approved

Canadian Standards Association Certified: LR95329-3

8.3 FM approved

Report 1V9A0.AF.

8.4 SIL 3 Capable

The Amplifiers R7847B, R7861A or R7852B used with the appropriate flame detector and used in Relay Module EC7810A, 20A, 30A, 40L, 50A; RM7800[E,G,L,M], 30A, 38[A,B,C], 40[E,G,L,M] 50A, 90[A,B,C,D], 97[A,C], 98A is SIL 3 Capable in a properly designed Safety Instrumented System. See form number 65-0312 for Certificate Agreement.

8.5 SwissRe

SwissRe (formerly Industrial Risk Insurers) Acceptable.

9 DISPOSAL

Devices with electronic components:
WEEE Directive 2012/19/EU – Waste Electrical and Electronic Equipment Directive



At the end of the product life (number of operating cycles reached), dispose of the packaging and product in a corresponding recycling centre. Do not dispose of the unit with the usual domestic refuse. Do not burn the product.
On request, old units may be returned carriage paid to the manufacturer in accordance with the relevant waste legislation requirements.

We reserve the right to make technical modifications in the interests of progress.

FOR MORE INFORMATION

The Honeywell Thermal Solutions family of products includes Honeywell Combustion Safety, Eclipse, Exothermics, Hauck, Kromschröder and Maxon. To learn more about our products, visit ThermalSolutions.honeywell.com or contact your Honeywell Sales Engineer.
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