Honeywell

7800 SERIES
RM7838B,C Relay Module

SPECIFICATION DATA

APPLICATION

The Honeywell RM7838B,C is a microprocessor based, integrated burner control for industrial process semi-automatically fired gas, oil, coal or a combination of fuels for single burner industrial applications. The RM7838B,C System consists of a Relay Module, Wiring Subbase, Amplifier, Keyboard Display Module (KDM) and Purge Card for operation. Options include Modbus™ Module, Data ControlBus™ Module, Remote Display Mounting, and First-Out Expanded Annunciator.

The RM7838B,C is programmed to provide a level of safety, functional capability and features beyond the capability of conventional controls.

Functions provided by the RM7838B,C include automatic, modulated, high fire and low fire proven purge; burner pilot startup with pilot valve hold; a special pilot valve hold from the Run condition; flame supervision; system status indication; system self-diagnostics and troubleshooting.

The RM7838C differs from the RM7838B as follows:

1. Alarms only on Safety Shutdown.
2. Has 15 second MFEP.
3. Requires ST7800C Purge Timer.

The RM7838B1021 and RM7838C1012 Relay Modules offer VPS, so they differ from the RM7838B1013 and RM7838C1004 in the following ways:

1. Terminal 16 changes from Pilot Valve Hold Input to Valve Proving Switch Input.
2. Terminal 17 changes from Manual Valve Open Input to Main Valve 2 Output.
3. JR3-Deferred or Immediate Function is replaced with Fan On for VPS.
4. Blinkum fault annunciation on safety shutdown (power LED blinks a fault code).
5. Built-in features set up only using the S7800A1142 Keyboard Display Module.
   a. Valve Proving System.
   b. Programmable Postpurge.

FEATURES

- **Safety features:**
  - **Combustion Interlock check.**
  - **Closed loop logic test.**
  - **Dynamic input check.**
  - **High Fire Purge Switch Test.**
  - **Dynamic safety relay test.**
  - **Dynamic self-check logic.**
  - **Expanded safe-start check.**
  - **Internal hardware status monitoring.**
  - **Tamper resistant timing and logic.**
  - **Low Fire Purge Switch Test.**
- **Access for external electrical voltage checks.**
- **Provides either 0.8 or 3.0 second Flame Failure Response Time (FFRT), depending on amplifier selected.**
- **Application flexibility.**
- **Communication interface capability through Modbus™.**
- **First-out annunciation and system diagnostics are provided by 2 row by 20 column Vacuum Fluorescent Display (VFD) located on the Keyboard Display Module.**
- **First-out expanded annunciation with 26 light emitting diodes (LEDs) for limits and interlocks (optional).**
- **Five sequence information LEDs, see Fig. 1.**
- **Interchangeable plug-in flame amplifiers.**
- **Local or remote annunciation of RM7838 operation and fault information through Keyboard Display.**

SIL3 Capable

- **Dependable, long-term operation provided by microcomputer technology.**
- **Nonvolatile memory for retaining history files and sequencing status after loss of power.**
- **Remote reset capability (optional).**
- **Burner controller data:**
  - **— Sequence status.**
  - **— Sequence time.**
  - **— Hold status.**
  - **— Lockout/alarm status.**
  - **— Flame signal strength.**
  - **— Expanded annunciator status.**
  - **— Total cycles of operation.**
  - **— Total hours of operation.**
  - **— Fault history of six most recent faults:**
    - **Cycles of operation at the time of the fault.**
    - **Expanded annunciator data at the time of the fault.**
    - **Fault message and code.**
    - **Hours of operation at the time of the fault.**
    - **Sequence status at the time of the fault.**
    - **Sequence time at the time of the fault.**
  - **— Diagnostic information:**
    - **Device type.**
    - **Flame amplifier type.**
    - **Flame failure response time.**
    - **Manufacturing code.**
    - **On/Off status of all line voltage digital inputs.**
    - **Selected purge time.**
    - **Software revision and version of RM7838B and Keyboard Display Module.**
    - **Status of configuration jumper.**
    - **Status of Run/Test Switch.**

SPECIFICATIONS

Electrical Ratings (see Table 1):
Voltage and Frequency: 120 Vac (+10/-15%), 50 or 60 Hz (±10%).
Keyboard Display Module: 13.0 Vdc peak full wave rectified (+20/-15%).
Power Dissipation:
RM7838B: 10 watts maximum.
Display Module: 3 watts maximum.
Maximum Total Connected Load: 2000 VA.
Fusing: Total Connected Load: 15A maximum, Fast Blow, type SC or equivalent.

Environmental Ratings:
Ambient Temperature:
Operating: -40° to +140°F (-40° to +60°C).
Storage: -40° to +150°F (-40° to +66°C).
Humidity: 85 percent RH continuous, noncondensing.
Vibration: 0.5G environment.

Dimensions: See Fig. 2.

Weight:
RM7838B: 1 pound 10 ounces, unpacked.
Keyboard Display Module: 4 ounces, unpacked.

SIL 3 Capable:
SIL 3 Capable in a properly designed Safety Instrumented System using Dynamic self check or ampli-check Flame Amplifiers and the appropriate flame detector.

Approval Bodies:
Underwriters Laboratories Inc. listed, File No. MP268, Guide No. MCCZ.
Canadian Standards Association certified, LR9S329-3.
Factory Mutual approved, Report No. 1V9A0.AF.
SwissRe (formerly IRI) acceptable.
Federal Communications Commission, Part 15, Class A—Emissions.

Mounting:
Q7800A for panel mount or Q7800B for wall or burner mount.

Required for Operation: Plug-in Flame Signal Amplifier (see Table 6).
ST7800 Plug-in purge timer cards, selectable: (see Table 5)
Q7800A or Q7800B wiring subbase

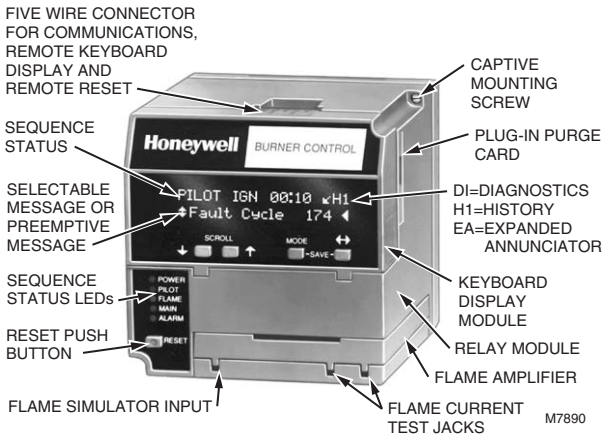

Fig. 1. Keyboard Display Module and sequence status LEDs.

Accessories:
Keyboard Display Modules (KDM):
S7800A1001 English language (standard).
S7800A1035 French language.
S7800A1043 German language.
S7800A1050 Italian language.
S7800A1068 Spanish language.
S7800A1118 Katakana (Japanese) language.
S7800A1126 Portuguese language.
S7800A1142 English language for programming VPS (standard on RM7838B1021, C1012)
S7800A1167 Spanish language for programming VPS.

Communications:
S7810A1009 Data ControlBus™ Module (if no KDM is used).
S7810M1003 ModBus Module.

Miscellaneous:
A7800A1010 7800 SERIES Tester.
S7820A1007 Remote Reset Module.
S7830A1005 Expanded Annunciator, 120 Vac, 50/60 Hz.
203541 Data ControlBus Connector, 5-wire.
203765 Remote Display Mounting Bracket.
221729 Dust Cover, Relay Module.
50023821-001 Keyboard Display Module Cover, NEMA 4, clear.
204718B Keyboard Display Module Cover, NEMA 1, clear.
50023821-002 Keyboard Display Module Cover, NEMA 4, clear with reset button.
205321B Flush Display mounting kit.
221818A Extension Cable, display, 5 ft (1524 mm).
221818C Extension Cable, display, 10 ft (3048 mm).

123514A Rectification Flame Simulator.

203659 Ultraviolet Flame Simulator.

Table 1. Terminal Ratings.

Terminal No.	Description	Rating
G	Flame Sensor Ground	60 to 220 Vac, current limited.
Earth G	Earth Ground[a]	—
L2(N)	Line Voltage Common	—
3	Alarm	120 Vac, 1A pilot duty.
4	Line Voltage Supply (L1)	120 Vac (+10/-15%), 50 or 60 Hz (±10%).[b]
5	Combustion Blower	120 Vac, 9.8 AFL, 58.8 ALR (inrush).
6	Stop Input	120 Vac, 1mA.
7	Lockout Interlock	120 Vac, 8A run, 43A inrush.
8	Interrupted Pilot	120 Vac.[c]
9	Main Fuel Valve	120 Vac.[c]
10	Ignition	120 Vac.[c]
F(11)	Flame Sensor	60 to 220 Vac, current limited.
12	Firing Rate High Fire	120 Vac, 75 VA pilot duty.
13	Firing Rate Common	120 Vac, 75 VA pilot duty.
14	Firing Rate Low Fire	120 Vac, 75 VA pilot duty.
15	Firing Rate Modulate	120 Vac, 75 VA pilot duty.
16	PIlot Valve Hold Input	120 Vac, 1 mA.
17	Manual Open Switch	120 Vac, 1 mA.
18	Low Fire Switch	120 Vac, 1 mA.
19	High Fire Switch	120 Vac, 1 mA.
20	Preignition Interlock	120 Vac, 1 mA.
21	Start Switch Input	120 Vac, 1A pilot duty.
22	Shutter	120 Vac, 0.5A.

[a] The RM7838B,C must have an earth ground providing a connection between the subbase and the control panel or the boiler. The earth ground wire must be capable of conducting the current to blow the 15A fuse (or breaker) in event of an internal short circuit. The RM7838B,C needs a low impedance ground connection to the equipment frame, which, in turn, needs a low impedance connection to earth ground. For a ground path to be low impedance at RF frequencies, the connection must be made by minimum length conductors having maximum surface areas. Wide straps or brackets are preferred rather than leadwires. Be careful to ensure that mechanically tightened joints along the ground path, such as pipe or conduit threads or surfaces held together with fasteners, are free of nonconductive coatings and are protected against mating surface corrosion.

[b] 2000 VA maximum connected load to RM7838B,C Assembly.

[c] See Table 2 and 3 for device load combinations for terminals 8, 9, and 10.

Table 2. Combinations for terminals 8, 9 and 10.

Pilot Fuel 8	Main 9	Ignition 10
C	F	No Load
B	F	No Load
No Load	F	No Load
F	F	A
No Load	F	A
D	F	A
D	D	A
No Load	D	A

Table 3. Composition of each combination.

A.	B.	C.	D.	F.
4.5A ignition.	50 VA Pilot Duty plus 4.5A ignition.	180 VA ignition plus Motor valves with: 660 VA inrush, 360 VA open, 250 VA hold.	2A Pilot Duty.	65 VA Pilot Duty plus Motor valves with: 3850 VA inrush, 700 VA open, 250 VA hold.

Table 4. Sequence Timing for Normal Operation.

Device	Initiate	Standby	Purge	Pilot Flame Establishing Period (PFEP)	Main Flame Establishing Period (MFEP)	Run
RM7838B,C	10 sec.	*	**	4/10	10 ***	*

* STANDBY and RUN can be an infinite time period.
** PURGE will be determined by which ST7800 Purge Card is selected.
*** Immediate or deferred main flame.

Table 5. ST7800 Plug-in Purge Timer Cards, Prepurge Timing.

ST7800A Number	ST7800C Number[a]	Prepurge Timing
ST7800A1005	—	2 seconds
ST7800A1013	ST7800C1003	7 seconds
ST7800A1021	—	10 seconds
—	ST7800C1011	20 seconds
ST7800A1039	—	30 seconds
ST7800A1047	—	40 seconds
ST7800A1054	—	60 seconds
ST7800A1062	—	90 seconds
ST7800A1070	—	2.5 minutes
ST7800A1088	ST7800C1029	4 minutes
ST7800A1096	ST7800C1037	6 minutes
—	ST7800C1045	8 minutes
ST7800A1104	—	9 minutes
—	ST7800C1052	10 minutes
ST7800A1112	ST7800C1060	12 minutes
—	ST7800C1078	14 minutes
ST7800A1120	—	15 minutes
—	ST7800C1086	16 minutes
—	ST7800C1094	18 minutes
—	ST7800C1102	20 minutes
ST7800A1138	ST7800C1110	22 minutes
—	ST7800C1128	24 minutes
ST7800A1146	ST7800C1136	30 minutes
—	ST7800C1144	45 minutes

[a] ST7800C for RM7838C only. A mechanical interlock prevents ST7800A from being installed.

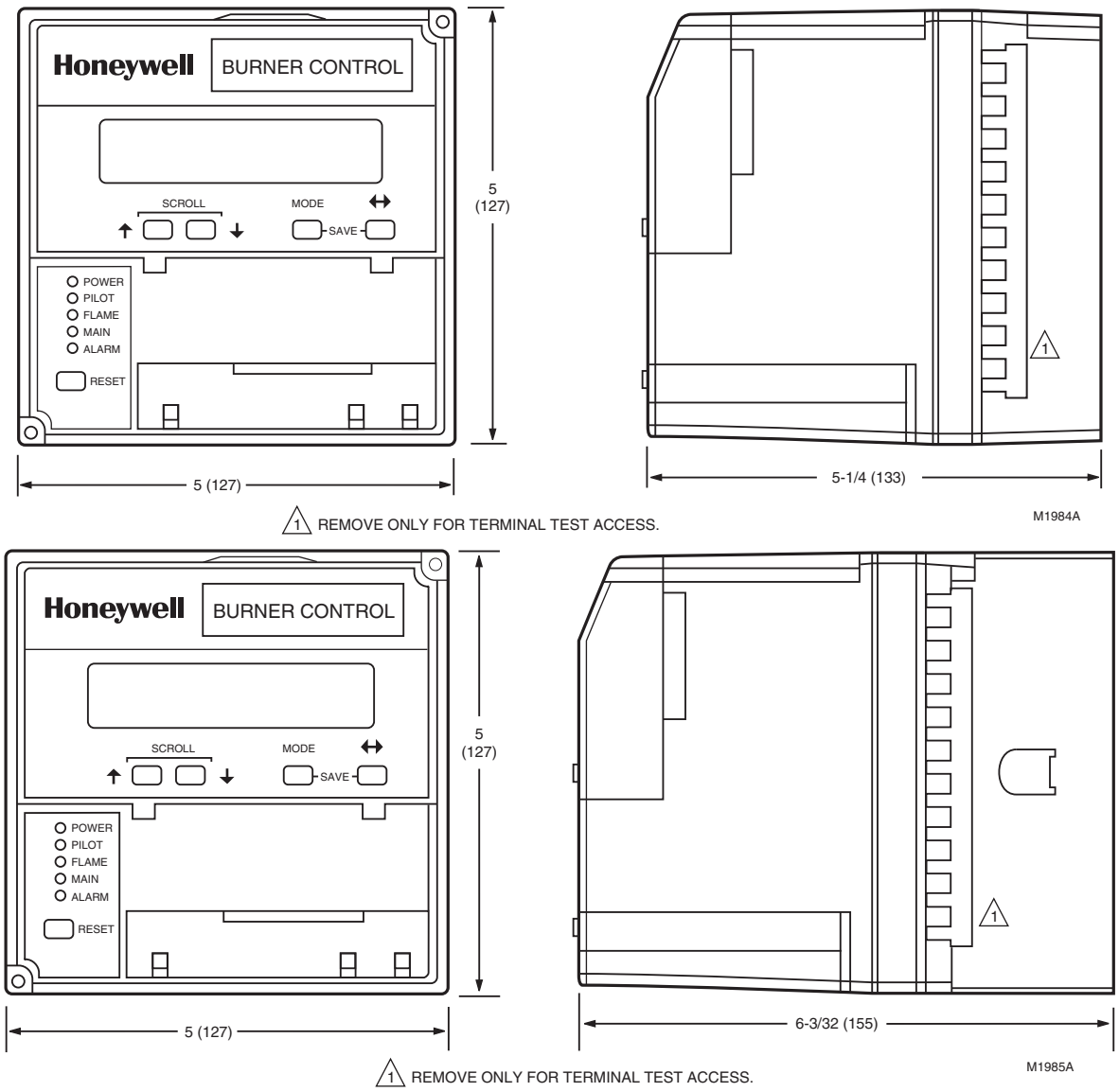

Fig. 2. Mounting dimensions of RM7838B,C Relay Module, Q7800A Subbase, and Q7800B Subbase, respectively, in in. (mm).

Table 6. Flame Detector System.

Plug-In Flame Signal Amplifiers					Applicable Flame Detectors		
Type	**Color**	**Self-Checking**	**Model**	**Flame Failure Response Time**	**Fuel**	**Type**	**Models**
Rectification	Green	No	R7847A	0.8 or 3 sec.	Gas	Rectifying Flame Rod Holders[a]	C7004, C7007 Complete Assemblies: C7005, C7008, C7009, Q179
				3 sec.	Gas, oil, coal	Ultraviolet (Purple Peeper)	C7012A,C[b]
		Dynamic AMPLI-CHECK™	R7847B[c]	0.8 or 3 sec.	Gas	Rectifying Flame Rod Holders[a]	C7004, C7007 Complete Assemblies: C7005, C7008, C7009, Q179
				3 sec.	Gas, oil, coal	Ultraviolet (Purple Peeper)	C7012A,C[b]
		Dynamic Self-Check	R7847C[d]			Ultraviolet (Purple Peeper)	C7012E,F
Infrared	Red/ White	No	R7852A			Infrared (Lead Sulfide)	C7915
		Dynamic AMPLI-CHECK™	R7852B[c]				
Ultraviolet	Purple	No	R7849A	0.8 or 3 sec.	Gas, oil	Ultraviolet (Minipeeper)	C7027, C7035, C7044[b]
		Dynamic AMPLI-CHECK™	R7849B[c]				
		Dynamic Self-Check	R7861A[d]			Ultraviolet	C7061
	Blue	Dynamic Self-Check	R7886A[d]	3 sec.	Gas, oil, coal	Ultraviolet (Adjustable Sensitivity)	C7076
Optical	White	Dynamic AMPLI-CHECK™	R7851B[c]	0.8 or 3 sec.	Gas, oil, coal	Optical (Ultraviolet, visible light)	C7927, C7962

[a] Order flame rod separately, see holder instructions.

[b] The C7012A,C; C7027, C7035 and C7044 Flame Detectors should be used only on burners that cycle on-off at least once every twenty-four hours. Appliances with burners that remain on continuously for twenty-four hours or longer should use the C7012E,F Flame Detector with the R7847C Amplifier; the C7061 Flame Detector with the R7861 Amplifier, or the C7076 Flame Detector with the R7886A Amplifier as the ultraviolet flame detection system.

[c] Circuitry tests the flame signal amplifier at least 12 times a minute during burner operation and shuts down the boiler if the amplifier fails.

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

NOTE: R7847C Series 4 or greater, pulse the shutter when the flame signal of 1.5 is sensed. Display readings of 0.7 to 2.4Vdc are common.

Home and Building Control
Honeywell
1985 Douglas Drive North
Golden Valley, MN 55422

Honeywell Asia Pacific Inc.
Room 3213-3225
Sun Hung Kai Centre
No. 30 Harbour Road
Wanchai
Hong Kong

Honeywell Europe S.A.
3 Avenue du Bourget
1140 Brussels
Belgium

Honeywell Latin American Region
480 Sawgrass Corporate Parkway
Suite 200
Sunrise FL 33325
Wanchai
Hong Kong

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