Honeywell

7800 SERIES
Programmer Control

A. GENERAL

A.1 Overview

The contractor shall furnish, install, and place in operating condition a Programmer Control as described herein. The system shall be located in accordance with these specifications.

A.2 Type of System

A.2.1 Major functions of the Programmer Control shall provide:

a. Automatic sequencing of the burner system through Initiation, Standby, Prepurge, Pilot Flame Establishing Period, Main Flame Establishing Period, Run and Postpurge.

b. Flame proving and lockout on flame failure during pilot flame proving, main flame proving, or run.

c. Low fire firing rate motor position for flame ignition trials.

d. Modulating switching control of fuel and combustion air[a].

e. Status light emitting diodes (LED) indicating:
- Power present, green.
- Pilot valve, yellow.
- Flame present, red.
- Main valve energized, yellow.
- Alarm, red.

f. NEMA 1 rated enclosure.

g. Line voltage terminal inputs for lockout, preignition, and recycle limits and interlocks.

h. Separate annunciation faults including Programmer Control, flame failure, preignition interlocks, lockout interlocks and firing rate interlocks.

i. Self-test for proper operation.

j. Monitor system circuit status.

k. Tamper resistant internal safety logic and timing.

l. First-out annunciation and diagnostics including display of flame signal, total burner cycles, burner hours, fault history of last six lockouts, and diagnostic voltage tests of burner I/O via a Keyboard Display Module (KDM). The KDM shall be able to be mounted remotely within 4000 feet of the Programmer Control.

m. Nonvolatile lockup and history files.

n. Dynamic ampli-check flame amplification protection.

o. Dynamic self-check flame amplification protection.

p. Characterization to the applied burner.

q. Capability for remote or local communication to a personal computer.

r. Ability to be installed in a continuous 0.5G environment.

s. Run/Test switch to pause the burner sequence in prepurge and pilot ignition trials to support startup testing and burner adjustments[a].

t. Remote resetting of safety lockouts via a momentary pushbutton. Remote reset switch can be placed up to 1000 feet from the Programmer Control.

u. High firing rate motor position for purge trials[a].

[a] Device specific.

A.2.2 Major System Components

a. Relay Module:
- RM7800M, RM7840M—On-off.
- RM7800G, RM7840G—Modulation.
- RM7800E/L, RM7840E/L—Modulation with proven high fire.
- EC/RM7830—On-off.
- EC/RM7850—Modulation.

b. Keyboard Display Module, S7800[a].

c. Flame Amplifier:
- Ultraviolet, R7849A/B, R7861A, R7886A.
- Infrared, R7848A/B.
- Rectification, R7847A/B/C.
- Optical, R7851B.

d. Flame Sensor:
- Ultraviolet, C7012, C7027, C7035, C7044, C7061, C7076.
- Infrared, C7015.
- Rectifying flame rod/photocell.
- Optical, C7927, C7935 (UV), C7915 (IR), C7962 (Visual Light).

e. Mounting Subbase:
- Q7800A/B.

f. Prepurge Timing Module:
- ST7800A.

[a] Device specific.

CE

A.3 Codes and Standards

A.3.1 The Programmer Control shall be an accepted system by:

- UL
- CSA
- FM
- IRI
- NFPA
- Kemper
- CSD-1
- European Directives (EC)—EC/RM7830, EC/RM7850

NOTE: European Directives (EC) and the CE logo apply only to EC7830/EC7850 in this specification.

A.4 Wiring

A.4.1 All Programmer Control wiring shall be in accordance with the National Electrical Codes (NEC) and local electrical codes.

B. SEQUENCE OF OPERATION

B.1 Safety Provisions

B.1.1 The Programmer Control shall provide the following safety provisions:

a. Dynamic self check safety circuit. The Programmer Control microcomputer shall test itself and related hardware for correct circuit operation.
b. Examination of all load terminals to check its ability of recognizing the true status of external controls, limits and interlocks. If any input fails this test, the Programmer Control should lockout on safety shutdown.
c. Closed loop logic test of all safety critical loads (main valve, ignition transformer and pilot valve) and must be able to lock out on safety shutdown if any safety critical load is identified as operating incorrectly.
d. Dynamic safety relay and contact to check the correct operation of the safety circuit and the ability to open and close the relay contact so the Programmer Control is capable of de-energizing all safety critical terminals (main valve, pilot valve, and ignition transformer).

e. Safe start check and expanded check to include monitoring flame signal during Standby.
f. Dynamic airflow check to monitor the airflow switch and check that the switch is proven open before prepurge.
g. Tamper resistant timing and safety logic.
h. Low/high fire interlock tests to determine if the interlocks are prematurely closed and add a 30-second delay to drive the firing rate motor toward high fire for purge rate or low fire for ignition trials[a].
i. Preignition interlock input dynamic check on exiting burner run (five seconds of postpurge) and before entering prepurge (exiting standby).

[a] Device specific.

B.2 Annunciation and Diagnostics: The Programmer Control Shall Provide:

a. First-out annunciation plus time in sequence of fault occurrence.
b. Indication of sequence failures at startup or during normal sequence operation.
c. Test of itself for failure, detecting and isolating an alarm, and reporting internal circuit faults.
d. Display of limit, interlocks, and switched outputs at Keyboard Display Module (KDM).
e. Multi-language display gives description of system fault.
f. System fault log history.

C. MAJOR EQUIPMENT

C.1 System Specifications

a. Temperature—Programmer Control shall be able to operate in a –40°F to +140°F (-40°C to +60°C) temperature range environment. The Programmer Control should be able to be shipped and stored in a –40°F to +150°F (-40°C to +66° C) temperature range environment.
b. Humidity—Programmer Control shall be able to operate in an 85% RH continuous, noncondensing environment.
c. Vibration—Programmer Control shall be able to operate in a 0.5G continuous environment.
d. Electrical:
  - Voltage/Frequency—Programmer Control shall be able to operate in a 120 Vac (+10/–15%) 50 or 60 Hz (±10%) environment.
  - EC7830/EC7850 shall operate in 220 to 240 Vac (+10%/-15%), 50 or 60 Hz (±10%) environment.
  - Load Capacity—Programmer Control shall be able to provide a 2000 VA maximum connected load.

C.2 Model Description

Table 1. Model Description.

Model Number	Description	Function
RM7800G/M RM7840G/M	Relay Module	Provides burner sequence logic to meet UL/CSA approval body requirements. The Relay Module is the location of the system microcomputer that generates fault messages and descriptions and processes burner I/O.
RM7800E/L RM7840E/L	Relay Module	Provides burner sequence logic to meet FM/IRI approved body requirements. The Relay Module is the location of the system microcomputer that generates fault messages and descriptions and processes burner I/O.
EC7830 EC7850	Relay Module	Provides burner sequence logic to meet European Directive (EC) requirements. The Relay Module is the location of the system microcomputer that generates fault messages and descriptions and processes burner I/O.
S7800	Keyboard Display Module (Standard with RM7800E,G,L,M)	Provides user interface to the system for sequence status indication, lockout status, fault history, system configuration and diagnostics by using a 2 row by 20 character VFD. Seven languages available.
R7849	Ultraviolet Flame Amplifier	Provides flame signal amplification when used with an ultraviolet power tube flame sensor. An option shall be a dynamic ampli-check of the flame signal amplifier circuitry, checks the ability of the amplifier to respond to a flame loss.
R7848	Infrared Flame Amplifier	Provides flame signal amplification when used with an infrared flame sensor. An option shall be a dynamic ampli-check of the flame signal amplifier circuitry, checks the ability of the amplifier to respond to a flame loss.
R7847	Rectification Flame Amplifier	Provides flame signal amplification when used with a rectification flame sensor. An option shall be a dynamic ampli-check of the flame signal amplifier circuitry, checks the ability of the amplifier to respond to a flame loss. An option shall be a dynamic self-check of the flame signal amplifier circuitry and ultraviolet flame detector sensing tube to check the ability of the amplifier and flame detector to respond to a flame loss.
R7861 R7886	Dynamic Ultraviolet Amplifier	Provides flame signal amplification when used with a dynamic self-check ultraviolet flame detector. This provides dynamic self-check of the flame signal amplifier circuitry and the ultraviolet flame detector sensing tube to check the ability of the amplifier and flame detector to respond to flame loss.
R7851	Optical Flame Amplifier	Provides flame signal amplification when using the solid state detectors C7927, C7935 (UV), C7915 (IR), or C7962 (Visual Light). This provides dynamic ampli-check of the flame signal amplifier circuitry.
ST7800	Prepurge Timer	Provides prepurge timing (15 selectable types from 2 seconds to 30 minutes) to purge the combustion chamber of unburned fuels.

D. OPTIONS

Table 2. Optional Equipment.

Model Number	Description	Function
Q7700	Communication Interface Base	Provides interfacing capability with up to six Programmer Controls, QS7800A or up to 222 in a multi-drop arrangement. Includes local RS-232 serial communications port for personal computer interface and dedicated RS-232 port for external modem.
QS7800A	Control Bus Module	Mounts into the Q7700 and interfaces with one Programmer Control.
ZM7850	Personal Computer Software	Provides support software for IBM® equivalent personal computers that use MicroSoft Windows™ software. Provides data logging, remote polling, historical logging, point trending, real time graphic display of burner operating parameters and fault reporting for 1000 Programmer Control sites (6000 Programmer Controls).
S7830	Expanded Annunciator	Supports first out annunciation through 21 LED and communication to the S7800 KDM to diagnose burner interlock and limit faults.
A7800	Tester	Provides a common means to test Programmer Controls.
QS7800B	Control Bus Module for Multi-Dropping	Mounts into Q7700 and interfaces with up to 31 multi-dropped 7800 SERIES subnetworks (61 with RS485 repeater).

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