

ControlLinks™ Control System

A GUIDE SPECIFICATION FOR THE ENGINEER

A. GENERAL

A.1 Overview

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

A.2 Type of System

A.2.1 Major functions of the ControlLinks™ Control (R7999):

- a. Four channel output control.
 - Two fuels.
 - Combustion Air.
 - Flue Gas Recirculation (FGR).
- b. Two independent fuel profiles with or without FGR.
- c. 950 actuator positions per channel.
- d. Unique lightoff points per fuel type.
- e. Fast burner setup via PC or laptop.
- f. Minimum 7 point, maximum 24 point profile per fuel type.
- g. Programmable behavior of nonselected fuel actuator.
- h. Programmable behavior of all actuators during purge and standby.
- i. Independent lightoff and minimum modulation positions.
- j. Wide power voltage input range (85 Vac to 132 Vac, 45 to 66 Hz).
- k. Auto/Manual input.
- l. Manual mode firing rate input.
- m. Pluggable controller to wiring subbase.
- n. Integrated boiler shock protection algorithms:
 - (1) Water temperature low fire hold.
 - (2) Stack temperature low fire hold.
 - (3) FGR and low fire hold.
 - (4) FGR hold based on stack water vessel temperatures.
- o. Programmable behavior of FGR actuator during purge.
- p. Maximum modulation limit capability.
- q. Remote reset input.
- r. Automated actuator endpoint seeking process.

- s. Nonvolatile memory stores operating history, current lockouts and alarm status.
- t. Six status light-emitting diodes (LED):
 - System status (green).
 - Fault information (red).
 - Status of four actuator channels (yellow).
- u. Operating temperature: -40°F to +140°F (-40°C to +60°C).
- v. Blink fault code generation using reset button.
- w. Seamless system integration with 7800 SERIES Burner Control.
- x. Functional with competitive full modulation burner controls.

A.2.2 Major functions of the Universal Parallel Position Actuator (ML7999)

Universal power supply (85 Vac to 267 Vac, 45 Hz to 66 Hz).

- a. Password protected with an eight digit identification number.
- b. 100 lb-in torque, 30 second timing, 95 stroke.
- c. Direct coupled output.
- d. External indication of actuator position.
- e. Floating current control input.
- f. NEMA 2 rating.
- g. Operating temperature: -40 F to +140 F.
- h. Separate low and line voltage wiring compartments
- i. NEMA 4 kit available.

A.2.3 Major functions of the Configuration Software (ZM7999):

- a. Windows 95, 98, 2000 compatible.
- b. Upload of commissioned data.
- c. Real time graphing of commissioned points.
- d. Flexible point creation and editing.
- e. Diagnostic capabilities.
- f. Download of existing profiles.

A.2.4 Major System Components

- a. ControlLinks™ Controller: R7999A/R7999B.
- b. Software: ZM7999A.
- c. Universal Parallel Positioning Actuator (UPPA): ML7999A.
- d. Wiring Subbase: Q7999A.



A.3 Codes and Standards

A.3.1 The ControlLinks™ Controller shall be an accepted system by:

- UL
- CUL
- CSA
- FM
- IRI
- NFPA
- Kemper
- CSD-1
- European Directives (R7999B)

A.4 Wiring

A.4.1 ControlLinks™ 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 ControlLinks™ Control shall provide the following safety provisions:

- a. Dynamic self checks of the feedback potentiometer circuitry. The ControlLinks™ Control microprocessor tests the feedback from the ML7999 Actuator and will lockout on safety shutdown if the feedback test fails.
- b. Curve verification algorithms. After the service technician has built the fuel/air curve for the burner, the fuel/air control requires that the curve is verified. This verification is a check that all points on the curve are at the optimum ControlLinks™.
- c. Step size enforcement during commissioning. During the commissioning process of the ControlLinks™ control, the movement of the ML7999 is limited to a maximum of 3 degrees up to 20% of actuator stroke. This prevents the service technician from accidentally entering fuel rich/lean territories.
- d. Point plausibility algorithms. During the commissioning process, the ControlLinks™ control will check the points that are entered to build the curve. If the point is acceptable, a crosshair will be shown. If the point is not acceptable, a crosshair with a diamond will be shown.
- e. Password protection. The R7999 ControlLinks™ Control requires a password to commission the burner profile. The R7999 can be monitored without a password. This safety feature is used to prevent unauthorized personnel from changing the configured/verified burner profile.
- f. Weld-resistant algorithm for limit control input (LCI) and limit control output (LCO) contacts. Dynamic algorithm check of the LCI and LCO relay contacts for weld/short-circuit. This safety feature will cause a safety shutdown and lockout of the R7999 ControlLinks™ Control.
- g. Component anti-swap protection. The R7999 ControlLinks™ Control is programmed with the identification number of the ML7999 Actuator. This safety feature prevents the installation of actuators that have not been configured for the burner application.
- h. Off-curve checking algorithm. Dynamic algorithm checks the feedback of the fuel/air actuators against the burner profiled curve. If an actuator is off the curve and cannot be repositioned on the curve, a safety shutoff and lockout will occur.

B.2 Annunciation and Diagnostics: The ControlLinks™ Control shall Provide:

- B.2.1 First-out annunciation of fault occurrence.
- B.2.2 Indication of sequence failures at start-up or during normal sequence operation.
- B.2.3 Test of itself for failure, detecting and isolating an alarm, and reporting internal circuit faults.
- B.2.4 System fault log history.

C. MAJOR EQUIPMENT

C.1 System Specifications

C.1.1 Temperature—ControlLinks™ Control shall be able to operate in a -40°F to +140°F (-40°C to +60°C) temperature range environment. The ControlLinks™ Control should be able to be shipped and stored in a -40°F to +150°F (-40°C to +66°C) temperature range environment.

C.1.2 Humidity—ControlLinks™ Control shall be able to operate in an 85% RH continuous, noncondensing environment.

C.1.3 Vibration—ControlLinks™ Control shall be able to operate in a 0.5G continuous environment.

C.1.4 Electrical:

C.1.4.1 Voltage/Frequency—R7999A ControlLinks™ Control will operate in a 100 to 120 Vac (+10/-15%), 50/60 Hz environment; R7999B ControlLinks™ Control will operate in 200 to 240 Vac (+10/-15%), 50/60 Hz environment.

C.2 Model Description

Table 1. Model Description.

Model Number	Description	Function
R7999A,B	ControlLinks™ Control	R7999A: Provides ControlLinks™ control of the burner to meet UL, CUL and CSA approval. The controller is the location of the system microcomputer that generates fault messages, descriptions and UPPA input/output. R7999B: Provides ControlLinks™ control of the burner to meet European directives.
ML7999A	Universal Parallel Positioning Actuator	Drives combustion air dampers, gas valves, oil valves, or flue gas recirculation systems based on input from the R7999 ControlLinks™ Control. Provides fuel and air in proper proportion and varies burner firing rate to meet the load demand.
Q7999A	Wiring Subbase	Provides terminals for field wiring. Line voltage and low voltage wiring is separated on the wiring subbase and prevents the incorrect installation of the ControlLinks™ Control.
ZM7999A	Configuration Software	Support software for IBM-equivalent personal or laptop computers that use Microsoft Windows™ software. Provides commissioning and monitoring capability as well as online help information on the operating system.

Honeywell

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