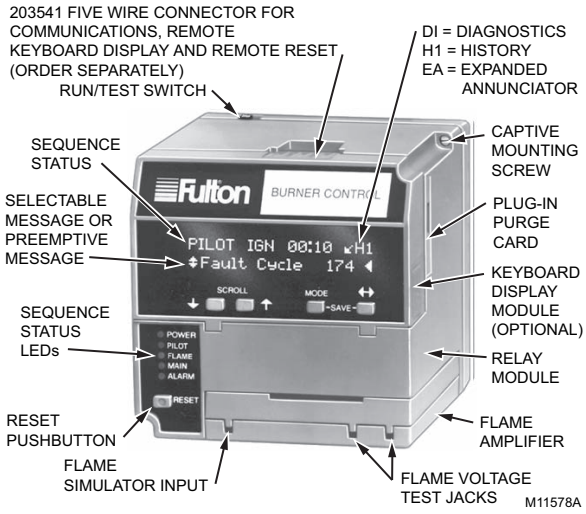
7800 SERIES System Annunciation Diagnostics and Troubleshooting

PRODUCT DATA



FULTON 7800 SERIES DIAGNOSTICS

Troubleshooting control system equipment failures is made easier with the Fulton 7800 SERIES self-diagnostics and first-out annunciation. In addition to an isolated single pole single throw (spst) alarm relay (audible annunciation), the Fulton 7800 SERIES provides visual annunciation by displaying a fault code and fault or hold message at the Keyboard Display Module (KDM) (optional). The Fulton 7800 SERIES provides 127 different diagnostic messages for troubleshooting the system.

Self-diagnostics of the Fulton 7800 SERIES enables it to detect and annunciate both external and internal system problems. Internal and external faults (e.g., interlock failures, flame failures, and false flame signals) are annunciated by the Fulton 7800 SERIES through the device ALARM light emitting diode (LED). Alarm output and can be visually displayed on the Keyboard Display Module (KDM).

The KDM displays a sequence status message indicating: STANDBY, SAFE START CHECK, PREPURGE, PILOT IGN, MAIN IGN, RUN, and POSTPURGE. The selectable messages also provide visual indication of current status and historical status of the equipment such as: Flame Signal, Total Cycles, Total Hours, Fault History, Diagnostic Information and Expanded Annunciator terminal status (if used). With this information, most problems can be diagnosed without extensive trial and error testing.

Table 1 provides the sequence and status hold messages. Table 6 provides a summary of all Fulton 7800 SERIES fault messages and fault codes. In addition, Diagnostic Information and History Data are available to assist in troubleshooting the Fulton 7800 SERIES (See Table 2).

The Fulton 7800 SERIES provides diagnostic information to aid the service technician in obtaining information while troubleshooting the system (See Tables 1, 2, 3 and 4). Diagnostics Information includes Device Type, Device Suffix, Software Revision, Manufacturing Code, Purge Time, Flame Amplifier Type, Flame Failure Response Time, Selectable Jumper Configuration Status, Run/Test Switch Status and Terminal Status.

Diagnostic Information Index

The Fulton 7800 SERIES monitors input/output terminals and can display the status of the terminal at the KDM; for example: Pilot Valve T8 1< (See Table 3). A complete terminal description and terminal number are provided. The display shows the actual status of the terminal. If voltage is detected at the terminal, 1 is displayed, but if no voltage is detected at the terminal, 0 is displayed.

Historical Information Index

The Fulton 7800 SERIES retains historical information for the six most recent lockouts. Each of the six lockout records retains the cycle when the fault occurred, a fault code, a fault message and burner status when the fault occurred (See Table 2).

SERVICE NOTES:

1. The Fulton 7800 SERIES Relay Module can not operate without a KDM, Data ControlBus Module™, or an Extension Cable Assembly installed. These devices are optional with all other Fulton 7800 SERIES controls.
2. If the KDM display is scrambled, remove and remount the KDM and reset the Fulton 7800 SERIES Relay Module.
3. Reset Fulton 7800 SERIES Relay Modules by pressing the RESET button, or pressing a remote reset pushbutton wired through the Keyboard Display Module, Data ControlBus Module™, or Remote Reset Module. A power-up reset causes an electrical reset of the Fulton 7800 SERIES, but does not reset a lockout condition.
4. Use the access slots on the sides of the Q7800A,B Wiring Subbase to check terminal voltages.
5. Maximum operating temperature of a C7012E,F Series 1 through 6 Flame Detector is reduced to 125° F (52° C) because of the duty cycle operation of the Fulton 7800 SERIES Relay Module.
6. Configuration jumpers must be selected prior to 200 hours of operation. If configuration jumpers are changed after 200 hours, lockout 110 occurs.

NOTE: In Table 1, normal sequences are in bold type, while abnormal sequences are in regular type.

Table 1. Sequence and States Hold Messages for all Fulton 7800 SERIES Controls.

Sequence	Burner Control Status
INITIATE mm:ss	A stabilization period for the relay module to check for any fluctuations in ac line voltage inputs or control inputs on power-up or during normal operation. The timing of the INITIATE period is ten seconds before entering STANDBY.
If the relay module is in an INITIATE HOLD status, the following conditions could exist:	
INITIATE HOLD: (AC Frequency/Noise)	The relay module is waiting for excess line noise to clear up. The burner sequence cannot advance into STANDBY until the excess line noise, which prevents sufficient reading of the line voltage inputs, ceases or a line frequency error (perhaps caused by using a 60 Hz device on a 50 Hz line, or vice versa, on relay modules with date codes prior to 9730 is corrected.
INITIATE HOLD: (AC LineDropout)	Indicates that ac line power has momentarily dropped out. The burner sequence cannot advance into STANDBY until the ac line voltage has stabilized throughout the INITIATE sequence.
INITIATE HOLD: (AC Frequency)	Indicates that line frequency is faster than the expected value. The burner sequence cannot advance into STANDBY until the line frequency returns to the proper value (perhaps caused by using a 60 Hz device on a 50 Hz line on relay modules with date codes prior to 9730).
INITIATE HOLD: (Low LineVoltage	Indicates that low line voltage has occurred. The burner sequence cannot advance into STANDBY until the line voltage is at a sufficient level for operating parameters.
STANDBY	Indicates STANDBY status. The burner can be placed in STANDBY by opening the burner switch or if the operating controller indicates its setpoint was satisfied. If a demand is present for burner operation, the burner sequence cannot advance from STANDBY into PURGE until the recycle limits close. If an Expanded Annunciator is connected, the display messages are enhanced.
If a relay module is in a STANDBY HOLD status, the following conditions could exist:	
STANDBY HOLD: F/G (Flame Detected)	Indicates that a flame is detected. A demand is present for burner operation. The burner sequence will not advance to PREPURGE because a flame is detected as being present. The sequence cannot advance to PREPURGE until the flame signal clears. If the flame signal does not clear within 40 seconds, the relay module locks out.
STANDBY HOLD: (Preignition Interlock)	Indicates that the Preignition Interlock is not closed. A demand is present for burner operation, but the burner sequence cannot advance to PREPURGE until the Preignition Interlock proves closed. If this time exceeds a 30 second hold, the relay module locks out.
STANDBY HOLD: (Lockout Interlock)	Indicates that the Lockout Interlock is closed. A demand is present for burner operation, but the burner sequence cannot advance to PREPURGE until the Lockout Interlock proves open. If this time exceeds the 120 second hold, the relay module locks out.
STANDBY HOLD: (Running Interlock)	Indicates that the Running Interlock is closed. A demand is present for burner operation, but the burner sequence cannot advance to PREPURGE until the Running Interlock proves open. If this time exceeds the 120 second hold, the relay module locks out.
PURGE	Indicates PURGE status, the period of time the blower motor is running before Ignition period. The timing of the PURGE period is selectable.
If the relay module is in a PURGE HOLD status, the following conditions could exist:	

Table 1. Sequence and States Hold Messages for all Fulton 7800 SERIES Controls. (Cont.)

Sequence	Burner Control Status
PURGE HOLD: (High Fire Switch)	Indicates that the HIgh Fire Switch is not closed. The firing rate motor is driven to its PURGE rate position. If this time exceeds four minutes and fifteen seconds, the relay module locks out.
PURGE DELAY: (High Fire Switch Jumpered)	Indicates that the High Fire Switch is jumpered. The High Fire Switch is bypassed, welded, or otherwise prematurely closed. The system automatically adds 30 seconds to allow the firing rate motor additional drive time to attain or approach the open damper position before starting the PURGE sequence.
PURGE HOLD: TEST (Run/Test Switch)	Indicates that the Run/Test Switch is in the TEST position. The sequence cannot continue until the Run/Test Switch is placed in the RUN position.
PURGE HOLD: (Low Fire Switch Jumpered)	Indicates that the Low Fire Switch is jumpered. The Low Fire Switch is bypassed, welded, or otherwise prematurely closed. The system automatically adds 30 seconds to allow the firing rate motor additional drive time to attain or approach the closed damper position before starting the ignition sequence.
PURGE HOLD: (Running Interlock)	Indicates the Running Interlock is not closed. The sequence cannot advance to Ignition until the Running Interlock proves closed. If this time exceeds 30 seconds, the relay module locks out.
PILOT IGN mm:ss	Indicates that the timing of the PILOT IGN trial begins, in seconds. During this period of time the relay module permits the pilot valve to be open and the pilot flame to be established.
If the relay module is in a PILOT HOLD status, the following conditions could exist:	
PILOT HOLD: TEST (Run/Test Switch)	Indicates that the Run/Test Switch is in the TEST position. The sequence cannot continue until the Run/Test Switch is placed in the RUN position. (not applicable to the RM7865A).
MAIN IGN mm:ss	Indicates that the timing of the MAIN IGN trial begins, in seconds. During this period of time, the relay module permits the main valve to be open and the main flame to be established.
RUN	Indicates RUN status, which is the period of time after the Ignition Trials and before the operating controller setpoint is reached. During this time, the burner is firing under the firing rate control.
If the relay module is in a RUN HOLD status, the following condition could exist:	
RUN LOWFIRE: TEST (Run/Test Switch)	Indicates that the Run/Test Switch is in the TEST position. Normal modulation or operation cannot continue until the Run/Test Switch is in the RUN position. (Not applicable to RM7865A.)
POSTPURGE mm:ss	Indicates POSTPURGE status, which is the period of time after the RUN period, when the blower motor continues to run. The timing of the POSTPURGE period is 15 seconds. (POSTPURGE for RM7865A is 35 seconds.)
Waiting for connection...	The KDM has power but is waiting to receive a signal from the relay module to continue operation.
RESET/ALARM TEST	Indicates that the RESET button is pressed. If it is held for more than four seconds, the alarm output is energized. The alarm output will be de-energized when the RESET button is released.
ADDITIONAL SEQUENCE STATUS INFORMATION IF AN EXPANDED ANNUNCIATOR IS CONNECTED TO THE RM7800.	
BURNER OFF: (Burner Switch)	The KDM indicates the Burner Switch is not closed. The burner sequence cannot advance to PREPURGE until the Burner Switch closes.
STANDBY	The KDM indicates the burner status, STANDBY, and the Operating Control is not closed. The burner sequence cannot advance to PREPURGE until the Operating Control closes.
STANDBY HOLD: (EA Hold Message)	The KDM indicates the burner status, STANDBY, and a limit is not closed. The burner sequence cannot advance to PREPURGE until one or all limits close downstream from the Operating Control.
STANDBY HOLD: (Circuit Fault)	The KDM indicates the burner status, STANDBY, and the control input is not closed. The burner sequence cannot advance to PREPURGE until the control input closes.

Table 2. Accessing Historical and Diagnostic Selectable Messages

Step	Operation	Press	Display	Comments
1.	Press scroll key to access Diagnostic Information	(⇕)	STANDBY Diagnostic Info>	Use the up/down scroll keys to access the selectable message. The second line will display Diagnostic Information.
2.	Press change level key to access Diagnostic Information.	(⇔)	STANDBY Diagnostic Info>	Use the change level key to access the Diagnostic Information.
3.	Continuous display of Diagnostic Information.	(⇕)	STANDBY DI Device RM7865<	Push the (⇳) scroll key to the next Diagnostic message.
4.	Continue through the remaining Diagnostic Information display following step 3 as required.			
5.	Press change level key to return to the first level of Diagnostic Information data prompt or to other selectable messages.	(⇔)	STANDBY Diagnostic Info>	Another display can be selected or discontinue accessing Diagnostic Information review.

NOTE: Historical files may be similarly selected.

Table 3. Selectable Messages.

Selectable Message/Display	Description	Possible States/ Range (Terminals)	Comments
Flame Signal	Flame signal strength.	0-5.0 Vdc Flame Amp (+ and - [Com])	Flame relay pull-in and drop-out value 1.25 Vdc.
Total Cycles	Total number of equipment operating cycles.	0-99,999 cycles.	Cycle counter is updated each time the main valve is energized.
Total Hours	Total number of equipment operating hours.	0-99,999 hours.	Hour counter is updated each time the main valve output is energized for 60 minutes.
Fault History> (Six most recent faults)	First level prompt for history information. Has subset level.	—	—
Fault Cycle ↙H1	Cycle when fault occurred.	0-99,999 cycles.	—
Fault Hours ↙H1	Run hour when fault occurred.	0-99,999 hours.	—
Fault Code ↙H1	Number that identifies reason for lockout.	0-999.	—
Fault Message ↙H1	Indicates lockout cause.	—	—
Sequence Message ↙H1	Indicates where lockout occurred in sequence.	—	—
Second Line Message ↙H1	Second Line Message explains any further information available from the Fulton 7800 SERIES or can be blank if there is not a preemptive second line. H2.H6, etc.	—	—
Diagnostic Information	First level prompt for history information. Has subset level.	—	—
Device	Device type number.	RM78XX	—
Device Suffix	Device suffix number.	nnnn	—

Table 3. Selectable Messages. (Cont.)

Selectable Message/Display	Description	Possible States/ Range (Terminals)	Comments
Run/Test Sw	Position of Run/Test Switch.	RUN or TEST.	Indicates if Fulton 7800 SERIES is in RUN or TEST mode.
OperControl	Operating Control Input.	1 or 0.	Indicates if input is 1 or 0, energized or de-energized
Interlock	Running/lockout Interlock.	1 or 0.	Indicates of input is 1 or 0, energized or de-energized.
Pilot Valve	Pilot Valve.	1 or 0.	Indicates if output terminal is 1 or 0, energized or de-energized.
Main Valve	Main Fuel Valve.	1 or 0.	Indicates if output terminal is 1 or 0, energized or de-energized.
Ignition	Ignition.	1 or 0.	Indicates if output terminal is 1 or0, energized or de-energized.
LowFire Sw	Low Fire Switch.	1 or 0.	Indicates if input is 1 or 0, energized or de-energized.
HighFire Sw	High Fire Switch.	1 or 0.	Indicates if input is 1 or 0, energized or de-energized.
PreIgn ILK	Preignition Interlock.	1 or 0.	Indicates if input is 1 or 0, energized or de-energized.
Valv/Start	Interrupted/Intermittent Pilot Valve.First stage oil valve or start input (RM7800L, M).	1 or 0.	Indicates if input is 1 or 0, energized or de-energized.

Lockout Messages (Table 4)

When the Fulton 7800 SERIES is locked out, it displays a repeating cycle of messages (in English text) (See Table 4). In addition to the blockout messages, Table 4 provides the system failure and recommended troubleshooting. There are four states in the cycle:

1. State 1, see Fig. 1. Display of first state message lasts six seconds. The first line on the display shows the word LOCKOUT, followed by the fault code number and a lower case letter if an Expanded Annunciator is connected. The status of the relay module at the time of the lockout is shown on the right side of the first line as either INITIATE, STANDBY, PURGE, PFEP, MFEP, RUN or POSTPRG. The lockout reason corresponding to the fault code number is displayed on the second line, highlighted by asterisks to each side. If the lockout reason is being enhanced due to the presence of an Expanded Annunciator, a lower case letter follows the fault code number. This letter corresponds to the firstout code supplied by the Expanded Annunciator.

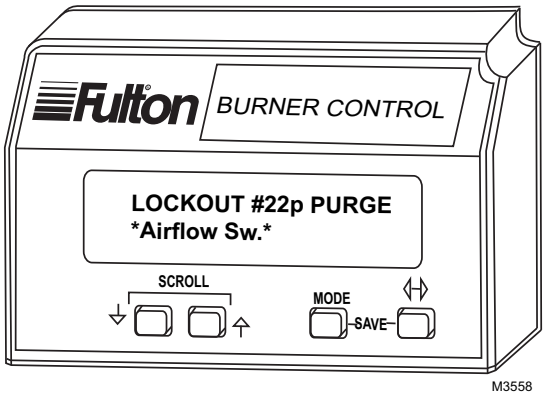


Fig. 1. Lockout message state 1.

2. State 2, see Fig. 2. Display of the second state message lasts two seconds.

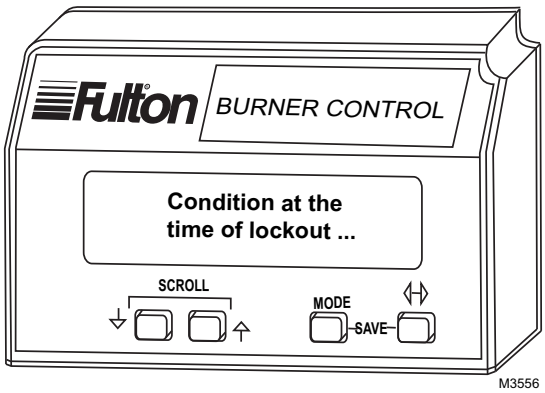


Fig. 2. Lockout message state 2.

3. State 3, see Fig. 3. Display of the third state message lasts three seconds. It is a replica of the burner status as it existed at the time of the lockout. The second line is blank if the burner status at the time of the lockout did not include a pre-emptive message (in parentheses) for the second line.
4. State 4. In the fourth state, both lines are blanked for one-half second, then sequenced to the first state.

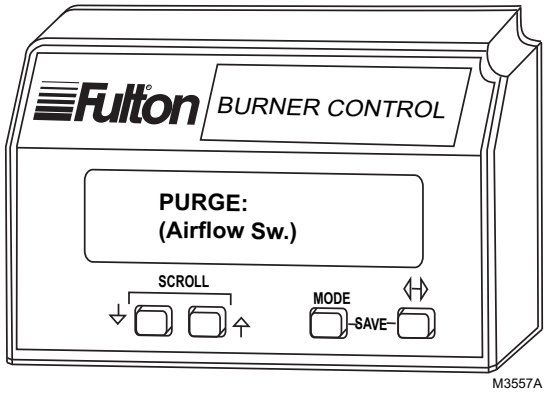


Fig. 3. Lockout message state 3.

Table 4. Fault Messages and Recommended Troubleshooting.

Fault Code	System Failure	Recommended Troubleshooting
Fault 1 *No Purge Card*	No card is plugged into the purge card slot.	**1.** Make sure the purge card is seated properly. **2.** Inspect the purge card and connector on the relay module for damage or contaminants. **3.** Reset and sequence the relay module. **4.** If the fault code reappears, replace the purge card. **5.** Reset and sequence the relay module. **6.** If the fault persists, replace the relay module.
Fault 2 *AC Frequen/Noise*	Excess noise or device running on slow AC.	**7.** Check the relay module and display module connections. **8.** Reset and sequence the relay module. **9.** Check the relay module power supply and make sure that both frequency and voltage meet the specifications. **10.** Check the backup power supply, as appropriate.
Fault 3 *AC Line Dropout*	AC line dropout detected.	
Fault 4 *AC Frequency*	Device running on fast AC.	
Fault 5 *Low Line Voltage*	Low AC line detected.	
Fault 6 *Purge Card Error*	Purge card timing changed since card was initially read.	**1.** Make sure the purge card is seated properly. **2.** Inspect the purge card and connector on the relay module for damage or contaminants. **3.** Reset and sequence the relay module. **4.** If the fault code reappears, replace the purge card. **5.** Reset and sequence the relay module. **6.** If the fault persists, replace the relay module.
Fault 7 *Flame Amplifier*	Flame sensed when flame not present.	**1.** Check wiring and correct any errors. Make sure that flame sensor wires are in separate conduits. Check for noise coupling into the flame detector leadwires. **2.** Make sure that flame detector and flame amplifier are compatible. **3.** Remove the flame amplifier and inspect connections. Reseat the amplifier. **4.** Reset and sequence the relay module. **5.** If the code reappears, replace the amplifier and/or the flame detector. **6.** If the fault persists, replace the relay module.
Fault 8 *Flame Amp/ Shutter*	Flame sensed when no signal expected during shutter-check or Ampli-Check versions.	

Table 4. Fault Messages and Recommended Troubleshooting. (Cont.)

Fault Code	System Failure	Recommended Troubleshooting
Fault 9 *Flame Detected*	Flame sensed when shutter open and no flame is expected during STANDBY.	**1.** Check that flame is not present in the combustion chamber; correct any errors. **2.** Check wiring and correct any errors. Make sure that flame sensor wires are in separate conduits. Check for noise coupling into flame detector leadwires. **3.** Remove the flame amplifier and inspect its connections. **4.** Reseat the amplifier. Reset and sequence the relay module. **5.** If the code reappears, replace the amplifier and/or the flame detector. **6.** If the fault persists, replace the relay module.
Fault 10 *Pre-Ignition ILK*	Pre-Ignition Interlock fault during STANDBY *(EC/RM7800, 7840, 7838B only).	**1.** Check wiring and correct any errors. **2.** Check Pre-Ignition Interlock switches to assure proper functioning. **3.** Check fuel valve operation. **4.** Reset and sequence the relay module; monitor the Pre-Ignition Interlock status. **5.** If the code persists, replace the relay module.
Fault 11 *Running ILK On*	Running Interlock powered at improper sequence point.	**1.** Check wiring to make sure that interlocks are connected properly between terminals 6 and 7. Correct any errors. **2.** Reset and sequence the relay module. **3.** If the fault persists, measure the voltage between terminals 6 and G (ground), then terminals 7 and G. If there is line supply voltage present at terminal 6 when the controller is off, the controller switch may be bad or is jumpered. **4.** If steps 1 through 3 are correct and there is line supply voltage present at terminal 7 when the controller is closed and the fault persists, check for a welded or jumpered Running Interlock, Lockout Interlock, or Airflow Switch. Correct any errors. **5.** If steps 1 through 4 are correct and the fault persists, replace the relay module.
Fault 12 *Lockout ILK On*	Lockout Interlock powered at improper point in sequence.	—
Fault 13 *Airflow Sw. On*	Combustion airflow interlock fault during STANDBY.	—
Fault 14 *High Fire Sw.*	High Fire Interlock Switch failure to close during PREPURGE.	**1.** Check wiring and correct any errors. **2.** Reset and sequence the relay module. **3.** Use either the manual motor potentiometer to drive the motor to the High Fire position or use the Run/Test Switch option, if available. Sequence to Prepurge drive to High Fire and place in the Test position. Adjust the High Fire Switch while in this state to make sure that it closes properly. **4.** Measure the voltage between terminal 19 and G (ground) while in the Prepurge drive to High Fire state. Line supply voltage should be present. If not, the switch adjustment is incorrect and/or the switch is defective and needs replacing. **5.** Reset and sequence the relay module. If line supply voltage was present between the High Fire Switch and terminal 19, and the fault still persists, replace the relay module.
Fault 15 *Flame Detected*	Flame sensed when no flame is expected during STANDBY.	**1.** Check that the flame is not present in the combustion chamber; correct any errors. **2.** Make sure that the flame amplifier and flame detector are compatible. **3.** Check wiring and correct any errors. **4.** Remove the flame amplifier and inspect the connections. Reseat the amplifier. **5.** Reset and sequence the relay module. **6.** If the code reappears, replace the amplifier and/or the flame detector. **7.** If the fault persists, replace the relay module.

Table 4. Fault Messages and Recommended Troubleshooting. (Cont.)

Fault Code	System Failure	Recommended Troubleshooting
Fault 16 *Flame-Out Timer*	No flame detected during Pilot Flame Establishing Period.	**1.** Measure the flame signal. If one exists, make sure it meets specifications. **2.** Make any necessary burner adjustments using manufacturer instructions. Make sure that the flame amplifier and flame detector are compatible. **3.** If the code reappears, replace the amplifier and/or the flame detector. **4.** If the fault persists, replace the relay module.
Fault 17 *Main Flame Failure*	Main flame failure during RUN after flame is established and on for at least 10 seconds.	**1.** Inspect the main fuel valve(s) and connection(s). **2.** Make sure that the fuel pressure is high enough to supply fuel to the combustion chamber. **3.** Check the flame detector sighting for adequate flame signal throughout the burner firing rate.
Fault 18 *Flame Detected*	Flame sensed when shutter is open and no flame is expected during PREPURGE.	**1.** Check that flame is not present in the combustion chamber. Correct any errors. **2.** Make sure that the flame amplifier and flame detector are compatible. **3.** Check the wiring and correct any errors. Make sure F and G wires are in individual conduits and protected from stray noise pickup. **4.** Remove the flame amplifier and inspect the connectors. Reseat the flame amplifier. **5.** Reset and sequence the relay module. **6.** If the code reappears, replace the flame amplifier and/or the flame detector. **7.** If the fault persists, replace the relay module.
Fault 19 *Main Flame Ignition*	Flame was lost during MFEP or the first 10 seconds of the RUN state.	**1.** Inspect the main fuel valve(s) and connection(s). **2.** Make sure that the fuel pressure is high enough to supply fuel to the combustion chamber. **3.** Make sure the flame detector is positioned to obtain the required flame signal strength; reset and recycle.
Fault 20 *Low Fire Switch Off*	Low Fire Interlock switch failure to close during PREPURGE.	**1.** Check wiring and correct any errors. **2.** Reset and sequence the relay module. **3.** Use either the manual motor potentiometer to drive the motor to the Low Fire position or use the Run/Test Switch option, if available. Sequence to Prepurge drive to Low Fire and place in the Test position. Adjust the Low Fire Switch to make sure that it closes properly. **4.** Measure the voltage between terminal 18 and G (ground) while in the Prepurge drive to Low Fire state. Line supply voltage should be present. If not, the switch adjustment is incorrect and/or the switch is defective and needs replacing. **5.** Reset and sequence the relay module. If line supply voltage was present between the Low Fire Switch and terminal 18, and the fault still persists, replace the relay module.
Fault 21 *Running ILK*	Running Interlock fault during PREPURGE.	**1.** Check wiring; correct any errors. **2.** Inspect the fan; make sure there is no blockage of the air intake and that it is supplying air. **3.** Make sure the Interlock Switches are working properly and that all switch contacts are free of contaminants. **4.** Reset and sequence the relay module to PREPURGE (place the Run/Test Switch in the Test position, if available). Measure the voltage between terminals 7 and G (ground). Line voltage should be present. **5.** If steps 1 through 4 are correct and the fault persists, replace the relay module.
Fault 22 *Lockout ILK*	Lockout Interlock fault during PREPURGE.	—
Fault 23 *Airflow Switch*	Combustion airflow interlock fault during PREPURGE.	—
Fault 24 *Internal fault*	The flame interlock (relay module) was on when it should be off.	**1.** Check for F leadwire routing. Make sure routing is in its conduit and isolated from noise-producing circuits.
Fault 25 *Internal fault*	The flame interlock (relay module) was off when it should be on.	

Table 4. Fault Messages and Recommended Troubleshooting. (Cont.)

Fault Code	System Failure	Recommended Troubleshooting
Fault 26 *Man-Open Sw. Off*	The Manual Open Valve Switch was off when it should be on (RM7838B only).	**1.** Check wiring and correct any errors. **2.** Make sure that the Manual Open Valve Switch is fully open. **3.** Make sure that the Manual Open Valve Switch is functioning properly and that the switch contacts are free from contaminants. **4.** Reset and sequence the relay module. **5.** Make sure that the Manual Open Valve Switch provides an electrical path when closed. Verify that the relay module is receiving power at terminal 17. **6.** If steps 1 through 5 are correct and the fault persists, replace the relay module.
Fault 27 *Start Switch On*	Start Switch was on during PREPURGE (RM7838A, RM7838B only).	**1.** Start Switch held on too long. **2.** Check wiring; verify that Start Switch is correctly connected. **3.** Make sure that the Start Switch is functioning properly and that the switch contacts are free of contaminants. **4.** Reset and sequence the relay module to PREPURGE; set the Run/Test Switch to Test. **5.** Make sure there is no power at terminal 6 during PREPURGE. **6.** If steps 1 through 3 are correct and the fault persists, replace the relay module.
Fault 28 *Pilot Flame Fail*	Pilot flame failure.	**1.** Check pilot valve wiring and operation. Correct any errors. **2.** Check fuel supply. **3.** Check pilot pressure and repeat pilot turndown test. **4.** Check ignition transformer electrode, flame detector, flame detector sighting and flame amplifier. **5.** If steps 1 through 4 are correct and the fault persists, replace the relay module.
Fault 29 *Lockout ILK*	Lockout Interlock fault.	**1.** Check wiring; correct any errors. **2.** Inspect the fan; make sure that there is no blockage of the air intake and that it is supplying air. **3.** Make sure that the Lockout Interlock Switches are working properly and that all switch contacts are free of contaminants. **4.** Reset and sequence the relay module to PREPURGE (place the Run/Test Switch in the Test position, if available). Measure the voltage between terminals 7 and G (ground). Line voltage should be present. **5.** If steps 1 through 4 are correct and the fault persists, replace the relay module.
Fault 30 *Running ILK*	Running Interlock fault.	**1.** Inspect the Running Interlocks, including the Airflow Switch, and the connections. **2.** Make sure that the Running Interlocks, including the Airflow Switch, are functioning properly and that switch contacts are free of contaminants. **3.** Reset and sequence the relay module to PREPURGE. Set the Run/Test Switch, if available, to Test. Measure the voltage between terminal 7 and G (ground). Line voltage should be present. **4.** If steps 1 through 3 are correct and the fault persists, replace the relay module.
Fault 31 *Low Fire Switch Off*	Low Fire Interlock Switch failure to close during RUN (RM7838B only).	**1.** Check wiring; correct any errors. **2.** Reset and sequence the relay module. **3.** Use either the manual motor position to drive the motor to the Low Fire position, or use the Run/Test Switch option, if available. Sequence to Run drive to Low Fire and place in the Test position. Adjust the Low Fire Switch while in this state to make sure it is closing properly. **4.** While in Run, drive to Low Fire state, measure the voltage between terminal 18 and G (ground). Line voltage should be present. If not, the switch adjustment is incorrect and/or the switch is defective and needs replacement. **5.** Reset and sequence the relay module. If line voltage was present between the Low Fire Switch and terminal 18 and the fault persists, replace the relay module.

Table 4. Fault Messages and Recommended Troubleshooting. (Cont.)

Fault Code	System Failure	Recommended Troubleshooting
Fault 32 *Airflow Switch*	Combustion Airflow Interlock fault.	**1.** Check wiring; correct any errors. **2.** Inspect the fan; make sure there is no blockage of the air intake and it is supplying air. **3.** Make sure the Airflow Interlock Switches are working properly and all switch contacts are free of contaminants. **4.** Reset and sequence the relay module to PREPURGE. Place the Run/Test Switch in the Test position, if available. Measure the voltage between terminals 7 and G (ground). Line voltage should be present. **5.** If steps 1 through 4 are correct and the fault persists, replace the relay module.
Fault 33 *Pre-Ignition ILK*	Pre-Ignition interlock fault.	**1.** Check wiring; correct any errors. **2.** Inspect the Pre-Ignition Interlock switches and make sure they function properly. **3.** Check fuel valve operation. Valve must close within five seconds. **4.** Reset and sequence the relay module. **5.** During STANDBY or PREPURGE, measure the voltage between terminal 20 and G (ground). For EC/RM7810, 7820, 7830, 7850, check voltage between terminal 17 and G. Line voltage should be present. If not, the Pre-Ignition Interlock switches could be defective and need replacing. **6.** If the fault persists, replace the relay module.
Fault 34 *Control On*	CTL input was energized at the wrong time for the relay module. This fault implies a field wiring error.	**1.** Check wiring; correct any errors. **2.** Reset and sequence the relay module. **3.** If fault persists, replace the relay module.
Fault 35 *Call Service*	Safety relay was off when it should be on or a fuse has blown.	**1.** Reset and sequence the relay module. If fault repeats, replace relay module, but be sure to test for excessive loads on appropriate terminals described by fault code. **2.** If fault does not repeat on next cycle, check for electrical noise being coupled into the relay module through the loads on appropriate terminals described by the fault code. **3.** If fault persists, replace the relay module.
Fault 36 *Call Service*	Main valve terminal was off when it should be on.	
Fault 37 *Call Service*	Pilot (ignition) valve terminal was off when it should be on.	
Fault 38 *Call Service*	Ignition terminal was off when it should be on.	
Fault 39 *Call Service*	V2S valve terminal (usually terminal 21) was off when it should be on.	
Fault 40 *Call Service*	Safety relay was on when it should be off.	
Fault 41 *Main Valve On*	Main valve terminal was on when it should be off.	**⚠ WARNING** **Explosion Hazard.** **Can cause explosion, serious injury or death.** **1.** Remove system power, turn off fuel supply. **2.** Check for wiring errors that could provide power to terminals described by the fault. Correct any errors. **3.** Re-power system; reset and sequence the relay module. **4.** If fault persists, replace the relay module. **5.** When fault is corrected, turn on fuel supply.
Fault 42 *Pilot Valve On*	Pilot (ignition) valve terminal was on when it should be off.	
Fault 43 *Ignition On*	Ignition terminal was on when it should be off.	
Fault 44 *Pilot Valve 2 On*	V2S valve terminal, used as a pilot, is on when it should be off.	

Table 4. Fault Messages and Recommended Troubleshooting. (Cont.)

Fault Code	System Failure	Recommended Troubleshooting
Fault 45 *Low Fire Sw. Off*	Low Fire Interlock switch failure to close or stay closed.	**1.** Check wiring; correct any errors. **2.** Reset and sequence the relay module. **3.** Use either the manual motor position to drive the motor to the Low Fire position, or use the Run/Test Switch option, if available. Sequence to Run, drive to Low Fire and place in the Test position. Adjust the Low Fire Switch while in this state to make sure it is closing properly. **4.** While in Run, drive to Low Fire state, measure the voltage between terminal 18 and G (ground). Line voltage should be present. If not, the switch adjustment is incorrect and/or the switch is defective and needs replacement. **5.** If steps 1 through 4 are correct and the fault still persists, replace the relay module.
Fault 46 *Flame Amp Type*	This fault indicates: a. The Flame Failure Response Time (FFRT) or TYPE input from the amplifier changed while the device was powered; or b. A standard amplifier was used in a pilot valve application; or c. A three-second FFRT Amplifier was used with the relight option on the RM7890 Relay Module.	**1.** Remove power to the device. **2.** Reseat the flame amplifier and reset and sequence the relay module. **3.** For EC/RM7890 only; make sure that Jumper JR2 is completely clipped if a three-second FFRT amplifier is being used. If Jumper JR2 is intact (relight option is selected), use 0.8 second FFRT amplifier. **4.** For RM7838B only; make sure that a Shutter Check Flame Amplifier is being used with the Pilot Valve Hold option selected.
Fault 47 *Jumpers Changed*	The configuration jumpers differ from the sample taken at startup.	**1.** Inspect the jumper connections. Make sure that clipped jumpers are completely removed. **2.** Reset and sequence the relay module. **3.** If fault persists, replace the relay module.
Fault 48 *Delayed MV On*	V2S valve terminal, used as a delayed main valve, was on when it should be off.	**⚠ WARNING** **Explosion Hazard.** **Can cause explosion, serious injury or death.** **1.** Remove system power, turn off fuel supply. **2.** Check wiring; correct any errors. **3.** Inspect the V2S Fuel Valve and its connections. Make sure the switch is working correctly and is not jumpered or welded. **4.** Reset and sequence the relay module. **5.** If fault persists, replace the relay module.
Fault 49 *Manual - Open Switch On.*	The manual open switch was on when it should be off.	**⚠ WARNING** **Explosion Hazard.** **Can cause explosion, serious injury or death.** **1.** Remove system power, turn off fuel supply. **2.** Check wiring; correct any errors. **3.** Inspect the Manual-Open Switch and its connections. Make sure the switch is working correctly and is not jumpered or welded. **4.** Reset and sequence the relay module. **5.** If fault persists, replace the relay module.
Fault 50 *Jumpers Wrong*	The sequence logic detected a combination of jumpers that is illegal for the sequence e.g., if it is correct to clip Jumper JR1 or Jumper JR2, but not both, this fault would be used when both are clipped (RM7888 only).	**1.** Inspect the jumpers and refer to the installation instructions for compatible jumper configurations. **2.** Make sure that clipped jumpers are completely removed. **3.** Reset and sequence the relay module. **4.** If fault persists, replace the relay module.

Table 4. Fault Messages and Recommended Troubleshooting. (Cont.)

Fault Code	System Failure	Recommended Troubleshooting
Fault 51 *Flame Too Strong*	Flame signal value is too high to be valid.	**1.** Make sure that flame detector and flame amplifier are compatible. **2.** Remove the flame amplifier and inspect the connections. **3.** Reset the flame amplifier. Reset and sequence the relay module. **4.** Check the flame detector sighting position, reset and cycle. **5.** Verify that no ignition noise is present in the F lead due to wire routing. **6.** Measure the flame strength. Verify it meets specifications. **7.** If not, refer to the flame amplifier and/or flame detector checkout procedures. If the code reappears, replace the flame amplifier and/or the flame detector. **8.** If the fault persists, replace the relay module.
Fault 52 *Internal fault*	Pilot Valve 2 (terminal 21) was off when it should be on.	**1.** Inspect terminal 21 and connections. **2.** Make sure that the valve is operating properly. **3.** Reset and sequence the relay module. If the fault persists, replace the relay module.
Fault 53 *Lockout Switch*	Lockout Input fault (EC/RM7810, 7820, 7830, 7850 only).	**1.** Check wiring; correct any errors. **2.** Inspect the Lockout Switch to make sure it is working properly. **3.** Reset and sequence the relay module. **4.** During STANDBY or PREPURGE, measure the voltage between terminal 20 and G (ground). Supply voltage should be present. If not, the lockout switch is defective and needs replacing. **5.** If the fault persists, replace the relay module.
Fault 54 *Combustion Pressure*	Combustion pressure switch fault (Fulton pulse only).	**1.** Check wiring; correct any errors. **2.** Inspect the Combustion Pressure Switch to make sure it is working correctly. **3.** Reset and sequence the relay module. **4.** During STANDBY or PREPURGE, measure the voltage between terminal 20 and G (ground). Supply voltage should be present. If not, the Combustion Pressure Switch is defective and needs replacing. **5.** If the fault persists, replace the relay module.
Fault 55 *Purge Fan Sw. On*	Purge fan switch is on when it should be off (Fulton pulse only).	**1.** Check wiring; correct any errors. **2.** Inspect the Purge Fan Switch terminal 18 and its connections. Make sure the switch is working correctly and is not jumpered or welded. **3.** Reset and sequence the relay module. **4.** If the fault persists, replace the relay module.
Fault 56 *Block Intake*	Block intake fault (Fulton pulse only).	**1.** Check wiring; correct any errors. **2.** Inspect the Block Intake Switch and make sure it is working properly. **3.** Reset and sequence the relay module. **4.** During PREPURGE, measure the voltage between terminal 7 and G (ground). Supply voltage should be present. If not, the Block Intake Switch is defective and needs replacing. **5.** If the fault persists, replace the relay module.
Fault 57 *Purge Fan Sw. Off*	Purge Fan Switch is off when it should be on (Fulton pulse only).	**1.** Inspect the Prepurge Fan Switch terminal 18 and the connections. **2.** Make sure the switch is working properly. Reset and sequence the relay module. **3.** If the fault persists, replace the relay module.
Fault 58 *Combustion pressure/Flame*	Flame is indicated by both the combustion pressure and the flame amplifier when it should be off (Fulton pulse only).	—
Faults 59–66 *Call Service*	Unused faults.	—
Fault 67 *AC Phase*	L1 and L2 miswired/exchanged (EC/RM7810, 7820, 7830, 7850 only).	**1.** Check L1 and L2 for proper line phasing.

Table 4. Fault Messages and Recommended Troubleshooting. (Cont.)

Fault Code	System Failure	Recommended Troubleshooting
Fault 68 *Pre-Ignition ILK*	Pre-Ignition Interlock fault.	**1.** Check wiring; correct any errors. **2.** Inspect the Pre-Ignition Interlock switches and make sure they work properly. **3.** Check fuel valve operation. Valve must close within five seconds. **4.** Reset and sequence the relay module. **5.** During STANDBY or PREPURGE, measure the voltage between terminal 17 and G (ground). Supply voltage should be present. If not, the Pre-ignition Interlock switches are defective and need replacing. **6.** If the fault persists, replace the relay module.
Fault 69–70 *Call Service*	Unused faults.	—
Fault 71 *Dynamic LFS*	Low Fire Switch closed, High Fire Switch must be open (EC/RM7850 only).	**1.** Check firing rate position switches (usually in Modutrol® Motor) for proper operation. **2.** Check wiring, correct any errors. **3.** Reset and sequence the relay module. **4.** If the fault persists, replace the relay module.
Fault 71 *Limits Complete*	Limit input (terminal 7) is off when it should be on (RM7888 only).	**1.** Check limits to make sure they are satisfied after resetting. **2.** Check electrical connections to terminal 7 of wiring subbase. **3.** Reset relay module. **4.** If the fault persists, replace the relay module.
Fault 72 *Dynamic HFS*	High Fire Switch closed; Low Fire Switch must be open (EC/RM7850 only).	**1.** Check firing rate position switches (usually in Modutrol® Motor) for proper operation. **2.** Check wiring, correct any errors. **3.** Reset and sequence the relay module. **4.** If the fault persists, replace the relay module.
Fault 72 *Spec.Func.2*	Special Function 2 Input (terminal 17) is off when it should be on.	**1.** Check operation of Special Function 2 of PLC. **2.** Check electrical connection to terminal 17 of wiring subbase and confirm presence of supply power when Special Function 2 is activated. **3.** Reset relay module. **4.** If the fault persists, replace the relay module.
Fault 73 *Spec.Func.3*	Special Function 3 Input (terminal 19) is off when it should be on.	**1.** Check operation of Special Function 3 of PLC. **2.** Check electrical connection to terminal 19 of wiring subbase and confirm presence of supply power when Special Function 3 is activated. **3.** Reset relay module. **4.** If the fault persists, replace the relay module.
Fault 74 *Unused*	Unused fault.	—
Fault 75 *Flame Proven Feedback*	Flame Indication Feedback (terminal 21) either on when it should be off or off when it should be on.	**1.** Remove wire to terminal 21 and reset relay module. **2.** If the fault persists, replace relay module. **3.** Reconnect wire to terminal 21. If the fault returns, verify wiring.
Faults 76–87 *Accessory Fault*	Lockout requested by ControlBus module.	—
Fault 88 *Accessory Fault*	T17 powered without Valve Proving feature setup.	**1.** Follow Valve Proving Selection Setup in Appendix B on selected Relay Module. **2.** If No Valve Proving (NEVER) is required, connect controller (Demand) to terminal 6.
Fault 89 *Accessory Fault*	T6 and T17 powered at the same time.	**1.** Correct wiring error.
Fault 90 *Accessory Fault*	T7 opens on RM7890 with VPS Feature.	**1.** Determine what interrupted terminal 7. **2.** Correct any wiring issues. **3.** Reset Relay Module.
Faults 91-93 *Accessory Fault*	Lockout requested by ControlBus module.	—
Fault 94 *Call Service*	Call service.	—

Table 4. Fault Messages and Recommended Troubleshooting. (Cont.)

Fault Code	System Failure	Recommended Troubleshooting
Fault 95 *Relay module self-test failure*	Relay Module self-test failure.	**1.** Reset and sequence the relay module. **2.** If the fault reappears, remove power from the relay module and reapply the power; reset and sequence the relay module. **3.** If the fault persists, replace the relay module.
Fault 96 *Flame circuit diagnostic failure*	Flame circuit diagnostic failure.	**1.** Reset and sequence the relay module. **2.** If the fault reappears, remove power from the relay module and reapply the power; reset and sequence the relay module. **3.** If the fault persists, replace the relay module.
Fault 97 *Over temperature*	Device ambient temperature limit exceeded.	**1.** Check ambient temperature and reduce to within specifications. **2.** If the fault persists, replace the relay module.
Fault 98 *Flame circuit diagnostic failure*	Flame circuit diagnostic failure.	**1.** Reset and sequence the relay module. **2.** If the fault reappears, remove power from the relay module and reapply the power; reset and sequence the relay module. **3.** If the fault persists, replace the relay module.
Fault 99 *Relay module self-test failure*	Relay Module self-test failure.	**1.** Reset and sequence the relay module. **2.** If the fault reappears, remove power from the relay module and reapply the power; reset and sequence the relay module. **3.** If the fault persists, replace the relay module.
Fault 100 *EEPROM not initialized*	Relay Module EEPROM is not initialized or is corrupted.	**1.** Reset and sequence the relay module. **2.** If the fault reappears, remove power from the relay module and reapply the power; reset and sequence the relay module. **3.** If the fault persists, replace the relay module.
Fault 101 *Incompatible subbase*	Installed subbase is incompatible with this relay module.	**1.** Check that the subbase matches the installed Relay module series. **2.** Replace the relay module with a compatible model.
Fault 102 *Valve proving (VP) EEPROM error*	Valve proving configuration in EEPROM is not initialized or is corrupted.	**1.** Enter Setup and re-commission Valve proving settings. **2.** If the fault persists, replace the relay module.
Fault 103 *Postpurge EEPROM error*	Postpurge configuration in EEPROM is not initialized or is corrupted.	**1.** Enter Setup and re-commission Postpurge settings. **2.** If the fault persists, replace the relay module.
Fault 104 *Valve proving (VP) configuration error*	Invalid valve proving configuration detected.	**1.** Enter Setup and re-commission Valve proving settings. **2.** If the fault persists, replace the relay module.
Fault 105 *Call Service*	Relay Module self-test failure.	**1.** Reset and sequence the relay module. **2.** If the fault reappears, remove power from the relay module and reapply the power; reset and sequence the relay module. **3.** If the fault persists, replace the relay module.
Fault 106 *Relay module self-test failure*	Relay Module self-test failure.	
Fault 107 *Call Service*	Relay Module flame signal crosscheck failure.	—
Fault 108 *Unused*	Unused fault	—
Fault 109 *Negative AC cycle detected*	Negative cycle test failed, earth ground absent or line voltage phasing improper.	**1.** Make sure a good earth ground connection exists at the installation site and all earth ground connections are complete and correct. **2.** Make sure the relay module and all loads operate at the same line voltage phase. **3.** Reset and sequence the relay module. **4.** If the fault persists, replace the relay module.
Fault 110 *Locked jumpers do not match configuration*	The configuration jumpers differ from stored values.	**1.** Inspect the jumper connections. Make sure they match the original selection and clipped jumpers are completely removed. **2.** Reset and sequence the relay module. **3.** If the fault persists, replace the relay module. **4.** Configuration jumpers must be selected prior to 200 hours of operation. If configuration jumpers are changed after 200 hours of operation, lockout 110 occurs. Relay module cannot be reset and must be replaced.

Table 4. Fault Messages and Recommended Troubleshooting. (Cont.)

Fault Code	System Failure	Recommended Troubleshooting
Fault 111 *Bad jumper reaading*	Relay Module configuration jumper test failure.	**1.** Inspect the jumper connections. Make sure they match the original selection and clipped jumpers are completely removed. **2.** Reset and sequence the relay module. **3.** If the fault persists, replace the relay module.
Fault 112–126 *Call Service*	Relay Module self-test failure.	**1.** Reset and sequence the relay module. **2.** If the fault persists, replace the relay module.
Fault 127 *Call Service*	Safety relay feedback circuit was in an improper state.	**1.** Reset and sequence the relay module. **2.** If the fault persists, replace the relay module.

NOTE: EC78XX controls display *Internal Fault* rather than *Call Service*.

Table 5. Expanded Annuciator Hold Codes.

Annuciation Message	Symbol	System Holds
BURNER OFF: (Burner Switch)	EA	Burner Switch is open.
STANDBY HOLD: (Aux. Limit#1)	EA	Auxiliary Limit # 1 is open.
STANDBY HOLD: (Aux. Limit#2)	EA	Auxiliary Limit # 2 is open.
STANDBY HOLD: (LWCO)	EA	Open low water cutoff.
STANDBY HOLD: (High Limit)	EA	High Limit (pressure or temperature) exceeded.
STANDBY HOLD: (Aux. Limit#3)	EA	Auxiliary Limit # 3 is open.
STANDBY HOLD: (FuelSelect Off)	EA	No fuel selected.
STANDBY HOLD: (BothFuelSelect)	EA	Both fuels selected.
STANDBY HOLD: (High Oil Pres.)	EA	Oil pressure is above high oil pressure limit.
STANDBY HOLD: (Low Oil Pres.)	EA	Oil pressure is below low oil pressure limit.
STANDBY HOLD: (High Oil Temp.)	EA	Oil temperature is above high oil temperature limit.
STANDBY HOLD: (Low Oil Temp.)	EA	Oil temperature is below low oil temperature limit.
STANDBY HOLD: (Atomizing Sw.)	EA	Atomizing switch is open.
STANDBY HOLD: (High Gas Pres.)	EA	Gas pressure is above high gas pressure limit.
STANDBY HOLD: (Low Gas Pres.)	EA	Gas pressure is below low gas pressure limit.
STANDBY HOLD: (Circuit Fault)	EA	Control input is not energized.

Table 6. Expanded Annuciator Fault Codes.

Annuciation Message	Symbol	System Faults
LOCKOUT nna *Aux. Limit # 1*	EA	Auxiliary Limit # 1 is open.
LOCKOUT nnb *Aux. Limit # 2	EA	Auxiliary Limit # 2 is open.
LOCKOUT nnc *LWCO*	EA	Open low water cutoff.
LOCKOUT nnd *High Limit*	EA	High Limit (pressure or temperature) exceeded.
LOCKOUT nne *Aux. Limit # 3*	EA	Auxiliary Limit # 3 is open.
LOCKOUT nnf *FuelSelectOff*	EA	Both fuels selected.
LOCKOUT nng *BothFuelSelect*	EA	No fuel selected.
LOCKOUT nnh *High Oil Pres.*	EA	Oil pressure is above high oil pressure limit.
LOCKOUT nni *Low Oil Pres.*	EA	Oil pressure is below low oil pressure limit.
LOCKOUT nnj *High Oil Temp.*	EA	Oil temperature is above high oil temperature limit.
LOCKOUT nnk *Low Oil Temp.*	EA	Oil temperature is below low oil temperature limit.
LOCKOUT nnm *Atomizing Sw.*	EA	Atomizing switch failed to close.
LOCKOUT nnn *High Gas Pres.*	EA	Gas pressure is above high gas pressure limit.
LOCKOUT nno *Low Gas Pres.*	EA	Gas pressure is below low gas pressure limit.
LOCKOUT nnp *Airflow Switch*	EA	Airflow Switch is open when it should be closed or vice versa.
LOCKOUT nnq *Aux. ILK # 4*	EA	Auxiliary interlock # 4 is open.

Table 6. Expanded Annuciator Fault Codes. (Cont.)

Annuciation Message	Symbol	System Faults
LOCKOUT nnr *Aux. ILK # 5*	EA	Auxiliary interlock # 5 is open.
LOCKOUT nns *Other ILKs*	EA	Other Auxiliary Interlocks are open.
LOCKOUT nny *Valve Closure*	EA	Preignition Interlock or other valve closure switch is open.
LOCKOUT nnz *Other PIIs*	EA	Other Preignition Interlocks are open.

Table 7. Expanded Annuciator Diagnostic Current Status Messages.

Display	Description
Burner Sw.	Burner Switch
Oper.Control	Operating Control
Aux. Limit # 1	Auxiliary Limit # 1
Aux. Limit # 2	Auxiliary Limit # 2
LLWCO	Low Water Cutoff
High Limit	High Temperature or High Pressure Limit
Aux. Limit # 3	Auxiliary Limit # 3
FuelSelectOff	Fuel Select Off
High Oil Pres.	High Oil Pressure
Low Oil Pres.	Low Oil Pressure
High Oil Temp.	High Oil Temperature
Low Oil Temp.	Low Oil Temperature
Atomizing Sw.	Atomizing Switch
High Gas Pres.	High Gas Pressure
Low Gas Pres.	Low Gas Pressure
Airflow Sw.	Airflow Switch
Aux. ILK #4	Auxiliary Interlock #4
Aux ILK #5	Auxiliary Interlock #5
All switches on	—

SAFETY AND SECURITY

Physical device protection

Device shall be accessible to authorized personnel only – Installation on publicly accessible places is not recommended as this could lead to unwanted and potentially unsafe changes to device (wiring, configuration, etc).

It is recommended to lock the device in an enclosed cabinet with access allowed only to approved and trained personnel. Also, it is strongly advised to keep all the wiring of device physically secure.

Physical protection of the device is applied via Run/Test switch label/seal. It is intended to prevent and detect unauthorized access.

Modbus & DDL Interface security

Any conducts critical to device functionality (DDL, Modbus lines etc.) shall be physically protected (installed outside public access) since they could be damaged or tampered-with by unauthorized people, either accidentally or for purpose.

Modbus RS-485 & DDL protocols do not support security features. For DDL interface - only DDL devices shall be connected to the Burner Controller DDL line.

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