

## Combustion Safeguards

The term "combustion safeguard" refers to an electronic control device that consists of a control system and a flame sensing system. This equipment is used on industrial heating equipment to minimize the fire and explosion hazards which can result from improper ignition of or failure of the burner flame or from unsafe operating conditions such as excessive or insufficient temperature, air or fuel pressure and water level. The control system will de-energize all valves necessary to shut off the fuel supply within four seconds or less after the flame sensing system detects a flame failure or immediately after a limit switch indicates unsafe operating conditions. Combustion safeguards often can control when and how some or all of the other electrically operated industrial heating equipment components, such as the burner purge fan, damper motor, alarm and automatic combustion controls, are energized. They are classified as being programming or nonprogramming, recycling or nonrecycling and automatic or manual lighting and are used on single or multiburner equipment.

Equipment listed herein can only detect the presence or absence of flame and must not be relied upon to indicate quality or completeness of combustion.

Basically, a combustion safeguard is designed to respond to accidental flame failure by automatically cutting off the fuel supply before a potentially dangerous amount of unburned fuel can accumulate. Proper application is a primary requirement for satisfactory and reliable operation and must take into consideration main and pilot burner arrangements and periodic testing and maintenance.

Loads connected to combustion safeguards, such as electric safety shutoff valves, must not exceed the combustion safeguard terminal ratings.

Because a given combustion safeguard is not necessarily applicable to all types of firing arrangements and, in many cases, provides complex sequencing periods, the listings are tabulated under two main headings for use with:

1. Automatic-Lighted Burners.
2. Manual or Semiautomatic-Lighted Burners.

In addition, the listings indicate any limitations pertaining to type of fuel.

The following definitions are included to assist in correctly applying equipment:

*Automatic-lighted equipment* is that in which fuel to the main burner(s) is turned on and ignited automatically. Firing of the main burner(s) may be high-low, modulated to off, or on-off. Ignition is by direct electric ignition or by an electrically ignited pilot or continuous pilot.

*Manual-lighted equipment* is that in which fuel to the main burner(s) is turned on only by hand and is manually or semiautomatically ignited under the supervision of the burner operator.

*Programming combustion safeguards* automatically turn the ignition system on and off and determine when the pilot and main fuel valves are energized. *Recycling combustion safeguards* automatically make a single attempt to relight the main flame if a main flame failure occurs after the trial-for-ignition period ends and before the end of a call for heat. *Nonprogramming combustion safeguards* require a manual action to provide an ignition source. *Nonrecycling combustion safeguards* de-energize all fuel valves when a main flame failure occurs.

*The trial-for-ignition period* is that period of time a programming combustion safeguard permits a pilot or main burner fuel valve to be open before flame sensing equipment is required to detect the flame.

An *intermittent pilot (IM)* is lighted each time there is a call for heat. It burns the entire time the main valve is energized until the end of a call for heat. An *interrupted pilot (IR)* is ignited each time there is a call for heat. The pilot valve is de-energized at the end of the trial-for-ignition period of the main flame. The pilot flame need not be cut off automatically until some predetermined time after the end of the trial-for-ignition period, if the control system or other arrangement prevents the flame sensing system from detecting the pilot flame at the end of the trial-for-ignition period. *No pilot (N)* (direct spark ignition) refers to an arrangement where the main flame is ignited directly from the ignition source without using a pilot.

## Automatic-Lighted Burners

### LFS1 Independent Flame Safeguard

LFS1... Independent flame safeguard for permanent or non-permanent operation for flame detection of gas and oil burners that may be used combination with a control unit LEC1, burner control unit LME39.xxxRP, LME76, LMV6 or with programmable logic controllers; models LFS1.11 for permanent operation with photocell flame sensor type RAR9; models LFS 1.21 for permanent operation ionization probe or for non-permanent operation with an UV flame sensor type QRA2..., QRA4... or QRA10...; LFS1...A1 for rated supply voltage of 120 VAC and models LFS1...A2 for rated supply voltage of 230 VAC.

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| <b>New/Updated Product Listing:</b> | Yes   |
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