SCC Inc.

Specifications

Document No. LV3-1010

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LMV3 Control

Product Description

The LMV3 is a microprocessor-based burner management system with matching system components for the control and supervision of forced draft burners. Functionality includes primary flame safety control, integral parallel positioning, and Variable Frequency Drive (VFD)/Pulse Width Modulation (PWM) control.

Sample Specification

1. The burner management system (BMS) shall be UL listed, FM approved, CSA listed, and SIL3 certified.
2. The major components of the BMS shall consist of:
   - LMV3 controller
   - AZL23 operator interface display
   - SQM33 actuators for gas, oil, and air
     - Rated up to 10NM (90 inch-pounds) with NEMA4 option
   - Factory assembled gas and/or oil valve assemblies
     - Gas and oil metering valves factory assembled with SQM33 actuators
   - Flame supervision with one (1) of the following:
     - QRA UV scanner
     - Flame rod
3. The following components shall be optional for the BMS:
   - AGM60 dual fuel module for switching between fuels, with the LMV36
   - 6 or 10 inch touchscreen interface
   - OCI412 Modbus interface
   - Variable Speed Drive (VSD) with safety related feedback and control of closed loop combustion air blower
     - VFD speed wheel and sensor
   - PWM control with safety related feedback and control of closed loop combustion air blower
4. All safety and combustion control related components including the controller, remote display, actuators, valve assemblies, and flame scanner shall be from the same manufacturer. Non-safety related items, such as a PLC or touchscreen, can be from various manufacturers.
5. All actuators shall utilize non-contact shaft position sensing for safety related feedback.
6. The BMS shall have the following safety functions:
   - Primary burner flame safeguard control
   - Parallel positioning fuel-to-air ratio control

- Gas valve proving and leak detection via a pressure switch between the main gas safety shutoff valves
- Gas valve proving on startup, shutdown, or both
- Available programming for 29 different fuel train orientations/control options
- Adjustable pre-purge timing between 5 seconds and 60 minutes, without requiring a separate purge timer card
- Adjustable post-purge timing between 0.2 seconds and 108 minutes, without requiring a separate purge timer card
- Password protection for Service and OEM accessible configuration parameters including:
  - Programmable overlap time of the ignition spark and the pilot valve
  - Programmable overlap time of the pilot valve and the main gas safety shutoff valves
  - Programmable time for pilot trial for ignition, and main flame trial for ignition
- Programmable sequence stops for the following phases:
  - Pre-purge
  - Pre-ignition
  - Pilot ignition
  - Main flame
- Independent programmable actuator positions for pre-purge, ignition, post-purge, and standby conditions
- A constant, algorithm-based check of each actuator's position that evaluates the following:
  - Deviation from the required position on the fuel-to-air ratio curve
  - Maximum time allowed at the deviated position
- The flame failure response time shall be password protected and adjustable between 1 and 4 seconds
  - Adjustable time is in tenths of seconds

7. The BMS fuel-to-air ratio control shall have the following functionality:
   - Two independent sets of fuel-to-air ratio curves, with the LMV36
   - Capability of positioning two (2) actuators and one VFD/PWM simultaneously on their programmed fuel-to-air ratio curves with an accuracy of 0.1 degree for actuators and 0.1% for the VSD
   - Capability of nine (9) programmable points for each fuel-to-air ratio curve
   - Capability of programming four (4) independent actuator/VFD/PWM positions for each fuel, including pre-purge, ignition, post-purge, and standby conditions
   - Programmable timing to set the ramp speed of the actuators and VSD during normal operation
   - Independent, programmable actuator positions for ignition and low-fire
   - Capability to use one or two fuel actuators for dual fuel burners, with the LMV36
8. The BMS shall have the following load control functions:
   - External load control, utilizing an analog input signal, that will directly control the burner load
   - External load control via a floating/bumping 120 VAC input, with the LMV37
   - External load control, via Modbus communication, that will directly control the burner load
   - Retransmission of the burner load as an analog output signal or via Modbus
9. The BMS shall have the following communication capabilities:
   - Modbus RTU, RS-485, communication
     - Loss of Modbus communication, based upon a programmable watchdog timer, results in the LMV3 operating on a fire rate command from another active load source

- Internal registers having both read and write capabilities
- Separate RJ11 connection available for configuring the unit with a PC/laptop when utilizing the ACS410 software
- Ability to integrate with any BMS communication via a protocol translator

10. The BMS shall have the following annunciation capabilities:
    - Error code annunciation of every digital input
    - Log of the last 24 faults
    - Warnings for non-lockout events that may disrupt normal operation
11. The BMS shall have a Variable Frequency Drive (VFD) feature with the following capabilities:
    - The system shall utilize an asymmetrical speed wheel and an inductance sensor mounted to the blower motor shaft for closed loop feedback of the combustion air fan speed
    - The asymmetrical speed wheel shall also allow the LMV3 to determine the direction of rotation of the blower motor
    - The system shall provide a pulse feedback that will constantly monitor the speed of the blower motor
    - The speed shall be corrected if a small deviation from the programmed curve occurs:
        - Deviation above a maximum limit on the programmed combustion curve shall result in a lockout
    - The BMS shall transmit a 0-10VDC or 2-10VDC analog signal to the VSD:
        - The VSD increases or decreases speed in accordance with the analog signal
12. The BMS shall be able to utilize Pulse Width Modulation (PWM) blowers:
    - The system shall utilize a symmetrical, pulsed tachometer signal for closed loop feedback of the combustion air fan speed
    - The BMS shall transmit a 0-100% PWM signal to the blower
        - The blower increases or decreases speed in accordance with the PWM signal
    - The system shall be able to operate at speeds up to 14,000 RPM
13. The BMS shall have capabilities to interface externally via Modbus RTU. Devices include touchscreen HMI, building management systems, PLCs, or chart recorders that are capable of acting as a Modbus Master. The Modbus interface allows monitoring and adjustment of all non-password, non-safety related, user-adjustable parameters such as:
    - Burner status
    - Hours run on a specific fuel, and the number of starts for each fuel
    - Load
    - Actuator position
    - Flame signal
    - Fuel flow, if a flow meter is connected
    - Alarm status
    - Fault history
14. The actuators used with the BMS shall have the following features:
    - Actuators shall utilize an optical feedback system
    - High accuracy stepper motor with 900 motor positions through 90 degrees of rotation
    - Direction of rotation is electronically selected and does not require re-wiring to change directions
    - Actuators shall reference outside of their operating range upon system startup and after a lockout
    - Actuators are factory calibrated and do not require on-site calibration
    - Designated air and fuel terminals on the LMV3 controller

- Low voltage 24VAC power

15. The BMS shall have the following special features:
    - Programmable high/low fuel pressure switch time buffer to allow pressure shocks to be ignored for a specified, short period of time
    - Capability to use “revert to pilot” function to re-light the pilot and close the main gas valves, with the LMV37
    - Blower air pressure switch evaluation, before each pre-purge, without de-energizing the fan motor starter
    - Gas pilot valve proving for double pilot valve applications
    - The ability to run full modulation on gas, full modulation on oil, or multi-stage on oil
    - The ability to backup the entire commissioned parameter set, and store it in the local operator interface display, AZL23, for future downloading
    - A laptop computer shall not be required to commission the LMV3. However, utilizing the ACS410 software, the complete parameter set can be saved to a PC for future downloading. The software also provides the ability to generate a startup report detailing parameter settings of the controller
    - The fuel-to-air ratio curve can be easily adjusted at any point in the firing rate
    - The ability to adjust the speed of the combustion air blower with an analog control signal when using a VFD/PWM blower. Programmable limits shall be available to restrict how far the blower speed can be adjusted off of the normal fuel-to-air ratio curve. This feature can be used to adjust the following physical conditions:
        - Combustion air temperature
        - Percentage of O_2 in the exhaust gas
        - Wobbe Index of the fuel being used

Environmental Conditions

LMV3 Environmental Conditions		
Storage DIN EN 60721-3-1	Climatic conditions	Class 1K3
	Mechanical conditions	Class 1M2
	Temperature range	-20 - 60 °C (-4 - 140 °F)
	Humidity	<95% r.h.
Transport DIN EN 60721-3-2	Climatic conditions	Class 2K2
	Mechanical conditions	Class 2M2
	Temperature range	-30 - 60 °C (-22 - 140 °F)
	Humidity	<95% r.h.
Operation DIN EN 60721-3-3	Climatic conditions	Class 3K3
	Mechanical conditions	Class 3M3
	Temperature range	-20 - 60 °C (-4 - 140 °F)
	Humidity	<95% r.h.
	Installation altitude	Max. 2000m above sea level

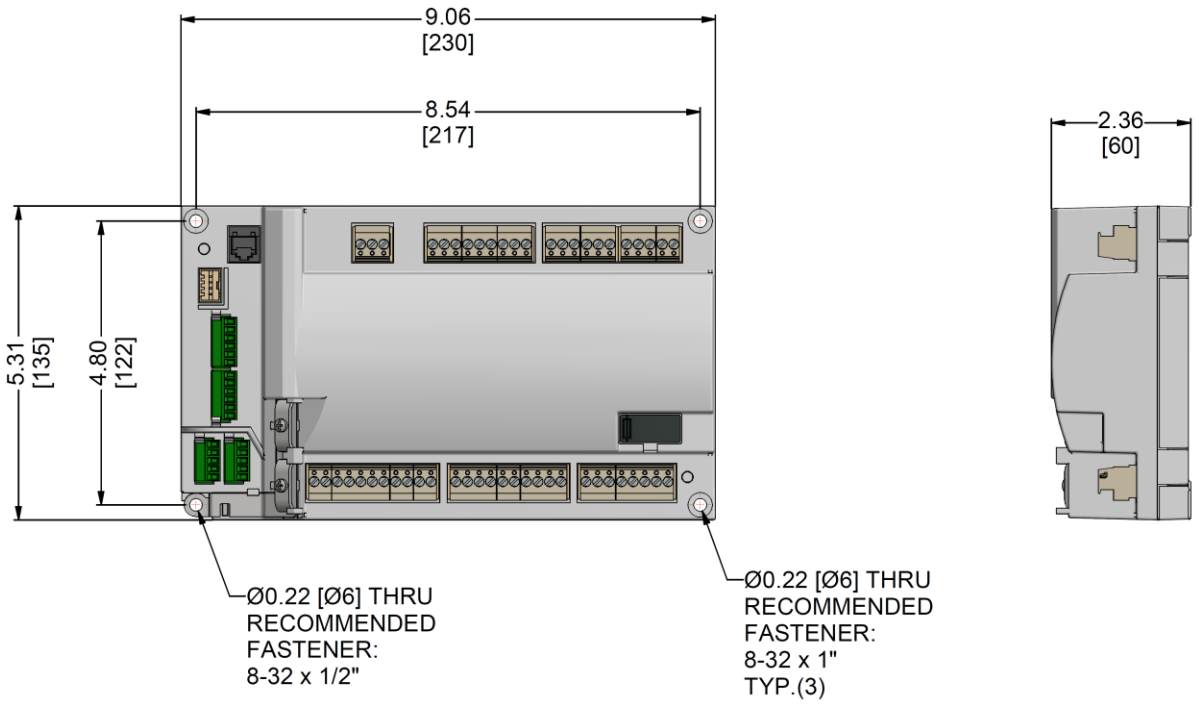
SQM33 Environmental Conditions		
Storage DIN EN 60721-3-1	Climatic conditions	Class 1K3
	Mechanical conditions	Class 1M2
	Temperature range	-20 - 70 °C (-4 - 158 °F)
	Humidity	<95% r.h.
Transport DIN EN 60721-3-2	Climatic conditions	Class 2K3
	Mechanical conditions	Class 2M2
	Temperature range	-20 - 70 °C (-4 - 158 °F)
	Humidity	<95% r.h.
Operation DIN EN 60721-3-3	Climatic conditions	Class 3K5
	Mechanical conditions	Class 3M4
	Temperature range	-20 - 60 °C (-4 - 140 °F)
	Humidity	<95% r.h.
	Installation altitude	Max. 2000m above sea level

Dimensions

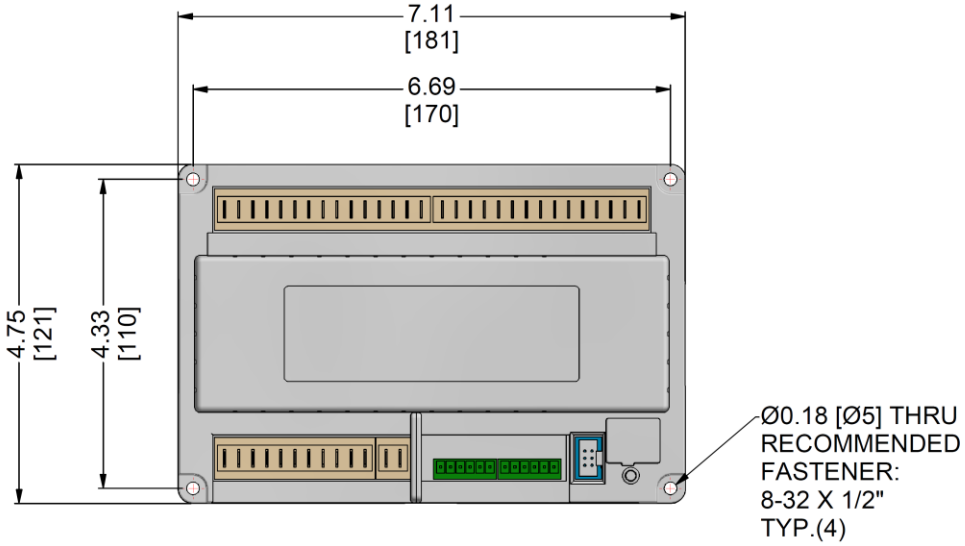
Dimensions in inches; millimeters in brackets

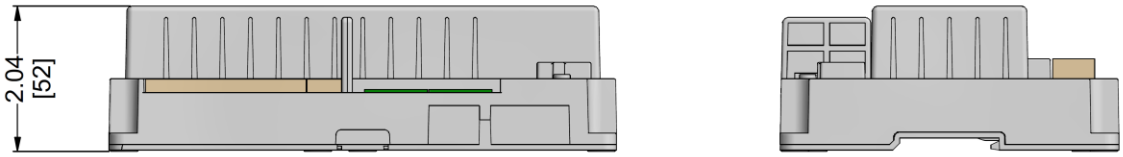
For other major component dimensions, please see the corresponding data sheet.

LMV3 Dimensions:



AGM60 Dimensions:





SQM33 Dimensions: