



Burner management system

LMV6...

The LMV6 is a microprocessor-based unit with matching system components for controlling and supervision of forced draft burners of medium to large capacity.

The LMV6 and this data sheet are intended for original equipment manufacturers (OEMs) using the LMV6 in or on their products.

Notes



Attention!

All the safety, warning, and technical notes given in the basic documentation for the LMV6 (P7560) also apply to this document in full. Failure to observe this poses a risk of damaging the safety functions and the risk of electric shock.

Use

The LMV6 burner management system carries out all supervision tasks associated with medium to large-capacity forced draft burners, and features integrated communication interfaces that enable modular system extensions.

Flame supervision takes place with the following sensors:

Operating mode	Flame detector
Continuous operation	Ionization probe
Intermittent operation	<ul style="list-style-type: none"> QRA2 / QRA2M / QRA4 / QRA10 Ionization probe

- Type-tested and approved in accordance with DIN EN 298

- Burner control
- Electronic ratio control
- Gas pressure switch valve proving
- Flue gas recirculation (FGR)
- Fault status messages counter
- Error history
- Separate restart counter for each fuel
- Program stop function
- Forced intermittent operation (can be deactivated)
- Low-fire load shutdown
- Alarm in case of start prevention
- Parameterizable program times and functions

The following items are integrated into the LMV6:

- Burner control complete with valve proving system
- Plug-in space for additional AGQ6.x flame signal amplifier
- Electronic fuel-air ratio control system for a maximum of 3 actuators
- Flue gas recirculation (FGR), started via time or power input (thermostat)
- CAN bus interface for connecting components (e.g., AZL66, SQM4 ...)
- Control for actuators

Supplementary documentation

Product type	Designation	Documentation type	Documentation number
LMV60.110A2	Burner management system	User Documentation	A7560.1
LMV6	Burner management system	Environmental Product Declaration	E7560 *)
LMV60.110A2	Burner management system	Parameter list and error code list	I7560
LMV6	Burner management system	Product range overview	Q7560
LMV6	Burner management system	Basic documentation	P7560

*) On request only



Note!

This document only refers to the product type – not the *product designation*. See the table below for details.

Product type	Product designation
AGG6.200A5	100 to 240 V DC power supply unit
AGG6.500	Shielding plate
AGG6.635	Ready-fitted CAN bus connecting cable
AGG6.641	CAN bus connecting cable
AGG9	Connector set
ASK33.4	Mounting kit
AZL66	Display and operating unit
LMV6	Burner management system
QRA2	UV flame detector
QRA2M	UV flame detector
QRA4	UV flame detector
QRA10	UV flame detector
SQM4	Actuators
VKF41.xxxC	Butterfly valves
VKF41.xxxH	Butterfly valves
VKP	Proportional controlling element



Applied directives:

- Low Voltage Directive 2014/35/EU
- Electromagnetic compatibility EMC (immunity) *) 2014/30/EU

*) The compliance with EMC emission requirements must be checked after the burner management system is installed in equipment

Compliance with the regulations of the applied directives is verified by the adherence to the following standards/regulations:

- Automatic burner control systems for burners and appliances burning gaseous or liquid fuels DIN EN 298
- Safety and control devices for gas burners and gas-burning appliances – Valve proving systems for automatic shutoff valves DIN EN 1643
- Safety and control devices for gas burners and gas-burning appliances – General requirements DIN EN 13611
- Automatic electrical controls for household and similar use Parts 2–5: Special requirements on automatic electric burner control and monitoring systems EN 60730-2-5

The edition of the standards that applies in each case can be found in the declaration of conformity.



Note on **DIN EN 60335-2-102!**

Household and similar electrical appliances – Safety
Part 2-102: Particular requirements for gas, oil, and solid-fuel burning appliances having electrical connections. The electrical connections of the LMV6 comply with the requirements of EN 60335-2-102.



ISO 9001:2015
ISO 14001:2015
OHSAS 18001:2007



China RoHS
Hazardous substances table:
<http://www.siemens.com/download?A6V10883536>

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Open Source Software (OSS) declaration

Embedded in – or bundled with – the LMV6 are open source software (OSS) components and other third-party components identified below. You will find the specific product type and the valid version in the OSS document.

Title: Readme_OSS System LMV6 V01.

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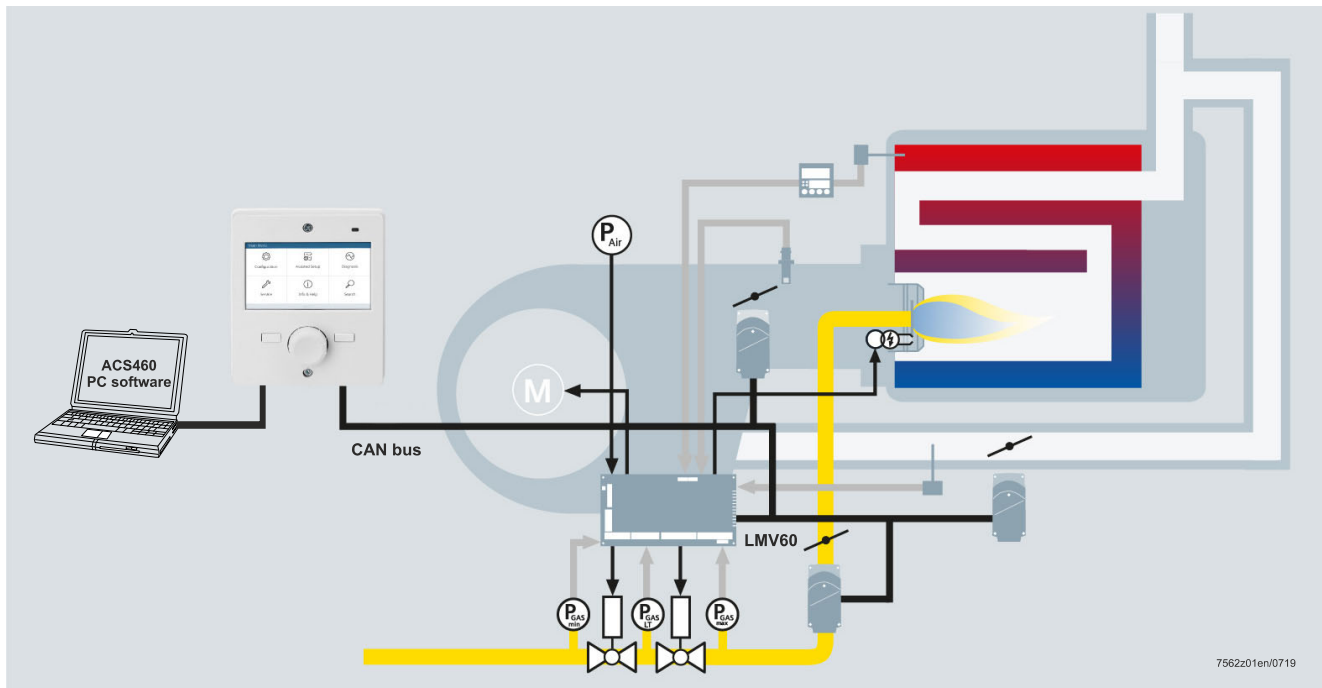
Lifetime

The LMV6 has a designed lifetime* of 250,000 burner startup cycles which, under normal operating conditions in heating mode, corresponds to approx. 10 years of service (starting from the date of manufacture on the nameplate). This is based on the endurance tests specified in the EN 298 standard. A summary of the conditions has been published by the European Control Manufacturers Association (Afecor) (www.afecor.org).

The designed lifetime is based on use of the LMV6 according to the manufacturer's data sheet and the basic documentation. After reaching the designed lifetime in terms of the number of burner startup cycles, or after the corresponding usage time, the LMV6 must be replaced by authorized personnel.

* The designed lifetime is not the warranty time specified in the Terms of Delivery.

System overview



The system components for the LMV6 (e.g., AZL66) are connected directly to the LMV6 via the CAN bus. All safety-related digital inputs and outputs of the LMV6 are monitored via a contact-feedback network. The LMV6 is operated and parameterized via the AZL66. The AZL66 features menu-driven operation, offering straightforward operation and targeted diagnostics. When performing diagnostics, the operating statuses and type of error are communicated via the display as well as via the signal lamp (LED). The various parameterization levels of the burner/boiler manufacturer and heating engineer are password-protected against unauthorized access. Simple settings that the plant operator can make on site do not require a password.

Type summary

Burner management system The LMV6 is a microprocessor-based burner control with coordinated system components for controlling and monitoring forced draft burners of medium to large capacity.



All LMV6 systems are approved for intermittent operation and continuous operation in accordance with DIN EN 298.

Article no.	Type (ASN)	For forced draft gas burners	With dual-fuel operation	Max. number of actuators	With variable speed drive	With flue gas recirculation (FGR)		With load controller	With O2 control	Parameter set (country specific)	Mains voltage
						Temperature compensation					
						Without	With				
S55402-C403-A100	LMV60.110A2	•	---	3	---	•	---	---	---	EU	230 V~



Note!

Details on the accessories and required system components can found in the LMV6 product range overview Q7560.

Technical data

Basic unit LMV6

Mains voltage	230 V AC -15% / +10%
Mains frequency	50 Hz \pm 6%
External primary fuse (Si)	Max. 6.3 A, slow



Caution!

Risk of damage to the switching contacts!

If the external primary fuse (Si) or internal fuse (F1) is blown due to overload or short-circuit at the terminals, the LMV6 must be replaced.

Internal consumption	< 35 W, typically
Safety class	I, with parts according to II in accordance with DIN EN 60730-1
Degree of protection	IP00



Note!

The burner or boiler manufacturer must ensure degree of protection IP40 for the LMV6 in accordance with DIN EN 60529 through adequate installation.

Rated surge voltage Category III (DIN EN 60664)	4 kV
• Creepage distances and air gaps	2.5 kV due to voltage limitation measures
Pollution degree	2 in accordance with DIN EN 60730-1
Software class	Class C in accordance with DIN EN 60730-1:2017 / DIN EN 60730-2-5:2015
Permissible mounting position	Any
Weight	Approx. 870 g
Top hat rail	TH 35-7.5 in accordance with DIN EN 60715

Technical data (continued)

Terminal loading: *Inputs*

Mains supply: The input current for the power supply is dependent on the operating status of the LMV6

Rated voltage	UMains 230 V
---------------	--------------

- Safety shutdown from the operating position at mains voltage $\leq 185 \text{ V AC}$

- Restart is initiated when mains voltage exceeds $\geq 195 \text{ V AC}$

Status inputs (with the exception of the safety loop) of the contact feedback network are used for system supervision and require mains-related input voltage

- Safety loop Refer to *Terminal loading: Outputs*

- Contact material recommended for external signal sources (air pressure switch, gas pressure switch-min, gas pressure switch-max, etc.) Gold-plated silver contacts

- Transition / settling behavior / bounce

- Permissible bounce time of contacts when switching on/off Max. 20 ms (after the bounce time, the contact must stay closed or open)

- Inputs for voltage detection

- ON $> 160 \text{ V AC}$

- OFF $< 80 \text{ V AC}$

- Input currents 0.7 to 1.5 mA peak

Technical data (continued)

Terminal loading: *Outputs*

Total contact loading:

- | | |
|--------------------------------------|-----------------|
| • Rated voltage | 230 V AC, 50 Hz |
| • LMV6 input current and safety loop | Max. 5 A |

Note!

The input current at terminal X93 pin 5 also flows through safety loop terminal X93 pin 1 / pin 2. Fusing is provided via the unit fuse (F1) of the LMV6.



The components of the safety loop disconnect the energy supply to the following loads when tripped:

- Ignition transformer
- Fuel valves

Individual contact loading:

Fan motor (M) terminal X72 pin 4

- | | |
|-----------------|------------------------------|
| • Rated voltage | 230 V AC, 50 Hz |
| • Rated current | 2 A |
| • Power factor | $\text{Cos}\varphi \geq 0.4$ |

Alarm (AL) terminal X92 pin 2

- | | |
|-----------------|------------------------------|
| • Rated voltage | 230 V AC, 50 Hz |
| • Rated current | 1 A |
| • Power factor | $\text{Cos}\varphi \geq 0.6$ |

Ignition transformer (Z) terminal X82 pin 3

- | | |
|-----------------|------------------------------|
| • Rated voltage | 230 V AC, 50 Hz |
| • Rated current | 2 A |
| • Power factor | $\text{Cos}\varphi \geq 0.2$ |

Fuel valve (V1) terminal X84 pin 3

Fuel valve (V2) terminal X91 pin 4

- | | |
|-----------------|------------------------------|
| • Rated voltage | 230 V AC, 50 Hz |
| • Rated current | 2 A |
| • Power factor | $\text{Cos}\varphi \geq 0.4$ |

Note!

With activated valve proving via fuel valve circuit

- | | |
|-----------------|------------------------------|
| • Rated current | 1 A |
| • Power factor | $\text{Cos}\varphi \geq 0.4$ |



Pilot valve (PV) terminal X83 pin 3

- | | |
|-----------------|------------------------------|
| • Rated voltage | 230 V AC, 50 Hz |
| • Rated current | 1 A |
| • Power factor | $\text{Cos}\varphi \geq 0.4$ |

Technical data (continued)

Cable lengths	Mains supply line	Max. 100 m (100 pF/m)
	Fan motor	Max. 50 m (100 pF/m), unshielded
	Pressure switch valve proving	Max. 50 m (100 pF/m), unshielded
	Remote lockout reset (laid separately)	Max. 50 m (100 pF/m), unshielded
	Alarm	Max. 50 m (100 pF/m), unshielded
	Air pressure switch	Max. 50 m (100 pF/m), unshielded
	Safety loop	Max. 50 m (100 pF/m), unshielded
	Ignition transformer	Max. 50 m (100 pF/m), unshielded
	Gas pressure switch-max	Max. 50 m (100 pF/m), unshielded
	Gas pressure switch-min	Max. 50 m (100 pF/m), unshielded
	Load controller	Max. 50 m (100 pF/m), unshielded
	Fuel valve	Max. 50 m (100 pF/m), unshielded
	Pilot valve	Max. 50 m (100 pF/m), unshielded
	Flame detector	Refer to <i>Flame supervision</i> chapter
	SQM4	Refer to Data Sheet N7820
	AZL66	Refer to Data Sheet N7562

Specifications as per EN 60730-1

Type of shutdown or interruption for each circuit

Shutdown with micro switch 1-pole

Mode of operation Type 2 B

Cross-sectional areas

The cross-sectional areas of the mains power lines (L, N, and PE) and, if required, the safety loop (safety temperature limiter, water shortage, etc.) must be sized for rated currents according to the selected external primary fuse. The cross-sectional areas of the other cables must be sized in accordance with the primary fuse for the LMV6 (max. 6.3 AT).

Minimum cross-sectional area	0.75 mm ² (single-core or multi-core in accordance with VDE 0100)
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Cable insulation must be suitable for the respective temperatures and environmental conditions.

Technical data (continued)

RAST3.5 connector

Mechanical data

Connection cross sections, conductor screw connection

- | | |
|--|--|
| • Stranded conductor, fine-wired (flexible) | Cross section
Min. 0.14 mm ²
Max. 1.5 mm ² |
| • Stranded conductor, fine-wired (flexible) with ferrule | Cross section
Min. 0.25 mm ²
Max. 1 mm ² |
| • Stripping length | Approx. 7 mm |
| • Screw tightening torque | 0.25 Nm |

Note!



AGG9 connector sets!

The AGG9 connectors on the connecting cables for the LMV6 may only be removed or replaced when the plant is shut down (all-pole disconnection)!

RAST5 connector

Mechanical data

Insertion force / contact	≤4 N
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Withdrawal force / contact	≥1 N
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Tightening torque / screw	0.5 Nm in accordance with DIN EN 60335-1
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Contacting with flat pin connector	6.3 x 0.8 mm in accordance with DIN EN 46244 Male multipoint connector in accordance with RAST5 standard
------------------------------------	---

Connection cross sections, conductor screw connection

- | | |
|-----------------------------------|--|
| • Stranded conductor | Cross section max. 2.5 mm ² |
| • Stranded conductor with ferrule | Cross section max. 2.5 mm ² |
| • Stripping length | Approx. 8 mm |

Note!



AGG9 connector sets!

The AGG9 connectors on the connecting cables for the LMV6 may only be removed or replaced when the plant is shut down (all-pole disconnection)!

Technical data (continued)

Environmental conditions

Storage

Climatic conditions	EN 60721-3-1 Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-20 to +60°C
Humidity	< 95% r.h.

Transport

Climatic conditions	EN 60721-3-2 Class 2K3
Mechanical conditions	Class 2M2
Temperature range	-20 to +60°C
Humidity	< 95% r.h.

Operation

Climatic conditions	DIN EN 60721-3-3 Class 3K3
Mechanical conditions	Class 3M2
Temperature range	-20 to +60°C
Humidity	< 95% r.h.
Installation altitude	Max. 2,000 m above sea level



Warning!

Condensation, formation of ice, and ingress of water are not permitted. Failure to observe this poses a risk of damaging the safety functions and a risk of electric shock.

Flame supervision with ionization probe

With LMV6 at terminal X52.



Warning!
Provide protection to prevent people from coming into contact with the ionization probe (risk of electric shock)!

Short-circuit current	Max. AC 850 μ A
Permissible length of flame detector cable (laid separately)	10 m (100 pF/m), unshielded



Note!
Display on the AZL66 in the event of a short-circuit!
In the event of a short-circuit, a flame signal of 12% is displayed on the AZL66.

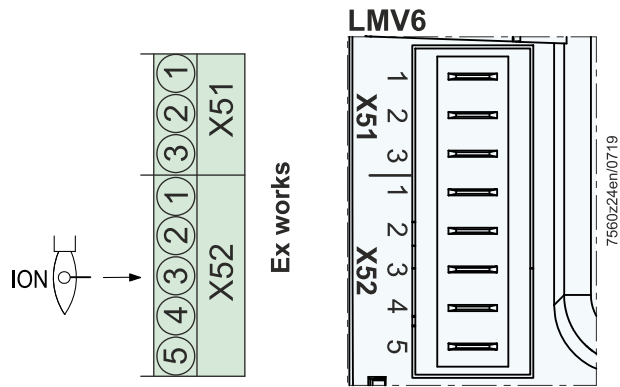
	At mains voltage 230 V AC	Flame intensity
Detector voltage between ionization probe and ground (AC voltmeter $R_i \geq 10 \text{ M}\Omega$)	Approx. 230 V AC	---
Switching threshold (limit values):		
Switching on (flame ON) (DC ammeter $R_i \leq 5 \text{ k}\Omega$)	3 μ A	25%
Switching off (flame OFF) (DC ammeter $R_i \leq 5 \text{ k}\Omega$)	---	18%
Recommended flame intensity for reliable operation	---	> 40%
Switching threshold in the event of poor flame during operation	---	Approx. 30%
Possible detector current with flame (typical)	> 15 μ A	100%
Maximum detector current	60 μ A DC	---



Note!
As the detector line capacitance (detector line length) increases, the voltage at the ionization probe – and thus the detector current – will drop. Long line lengths and very high-ohmic flames may necessitate the use of a low-capacitance cable. In spite of special electronic circuits designed to compensate possible adverse effects of the ignition spark on the ionization current, it is important to ensure that the minimum detector current required is already available during the ignition phase. If this is not the case, the primary ignition transformer connections must be interchanged and/or the electrodes relocated.

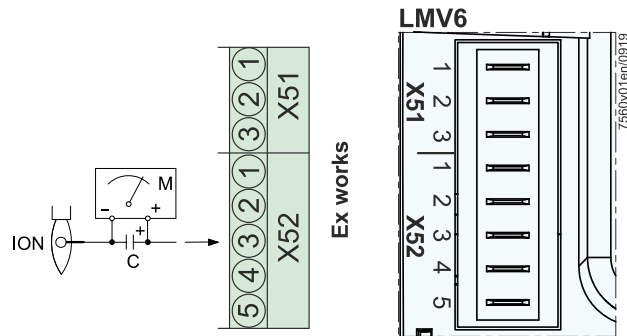
Technical data (continued)

Connection diagram



Measuring circuit for detector current measurement

Ionization probe



Legend

- C Electrolytic capacitor 100 to 470 μ F; 10 to 25 V DC
- ION Ionization probe
- M Micro-ammeter R_i max. 5000 Ω

Flame supervision with QRA2 / QRA2M / QRA4 / QRA10



Caution!

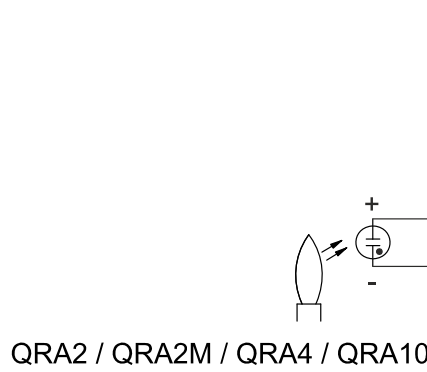
If QRA2 / QRA2M / QRA4 / QRA10-UV tubes are used for flame supervision on the LMV6, it must be ensured that the LMV6 is permanently connected to power (EN 298), thus enabling the LMV6 to detect flame detector failures during startup and shutdown. The LMV6 generally operates with QRA flame detectors in intermittent operation. For *Technical data*, refer to Data Sheet N7712, UV flame detector QRA2 / QRA2M / QRA10! For *Technical Data*, refer to Data Sheet N7711, UV flame detector QRA4!

Operating voltage in operation	Max. 350 V peak
Possible detector current in operation	Max. 80 µA
Permissible length of the standard detector cable (laid separately)	Max. 10 m

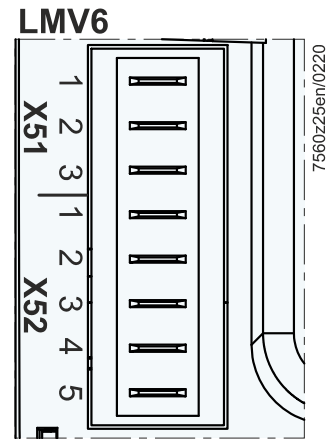
Threshold values when flame is supervised by QRA	
• Start prevention (extraneous light)	Flame intensity $\geq 18\%$
• Operation	Flame intensity $> 25\%$

For more detailed information on QRA2 / QRA2M / QRA10, refer to Data Sheet N7712. For more detailed information about QRA4, refer to data sheet N7711.

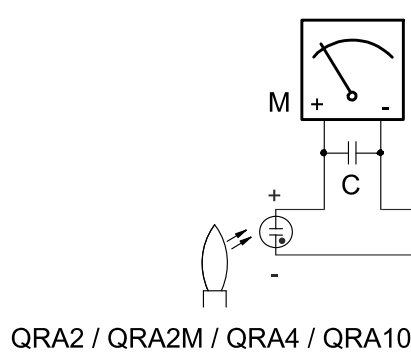
Connection diagram QRA2 / QRA2M / QRA4 / QRA10



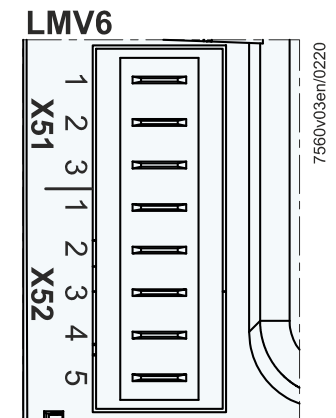
Ex works



Measuring circuit for detector current measurement



Ex works



Legend

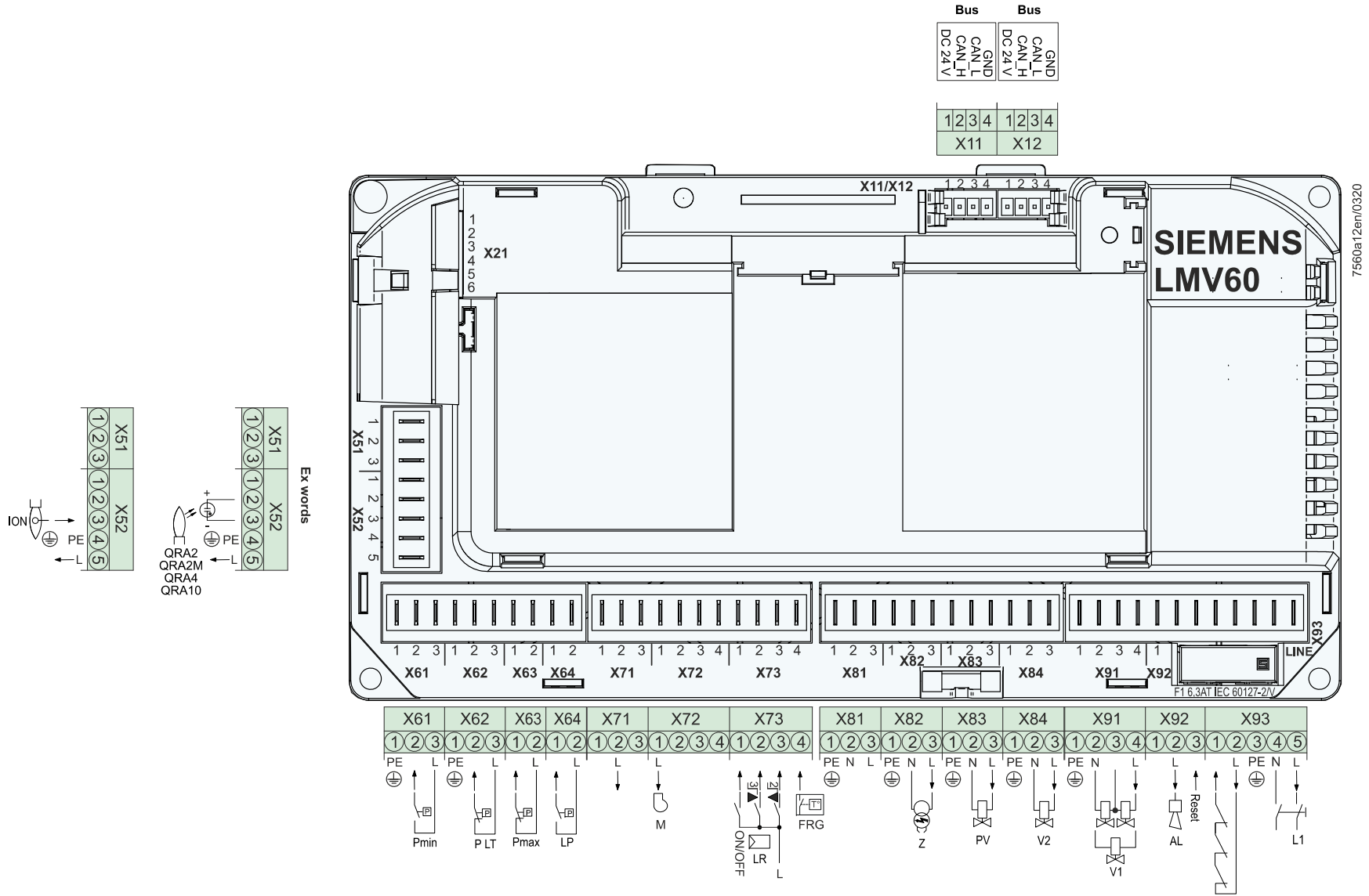
- C Electrolytic capacitor 100 to 470 µF; 10 to 25 V DC
- M Micro-ammeter Ri max. 5000 Ω




Warning!

Simultaneous operation of the ionization probe and QRA2 / QRA2M / QRA4 / QRA10 is not permitted. Failure to observe this information poses a risk of damaging the safety functions.

Assignment of terminals



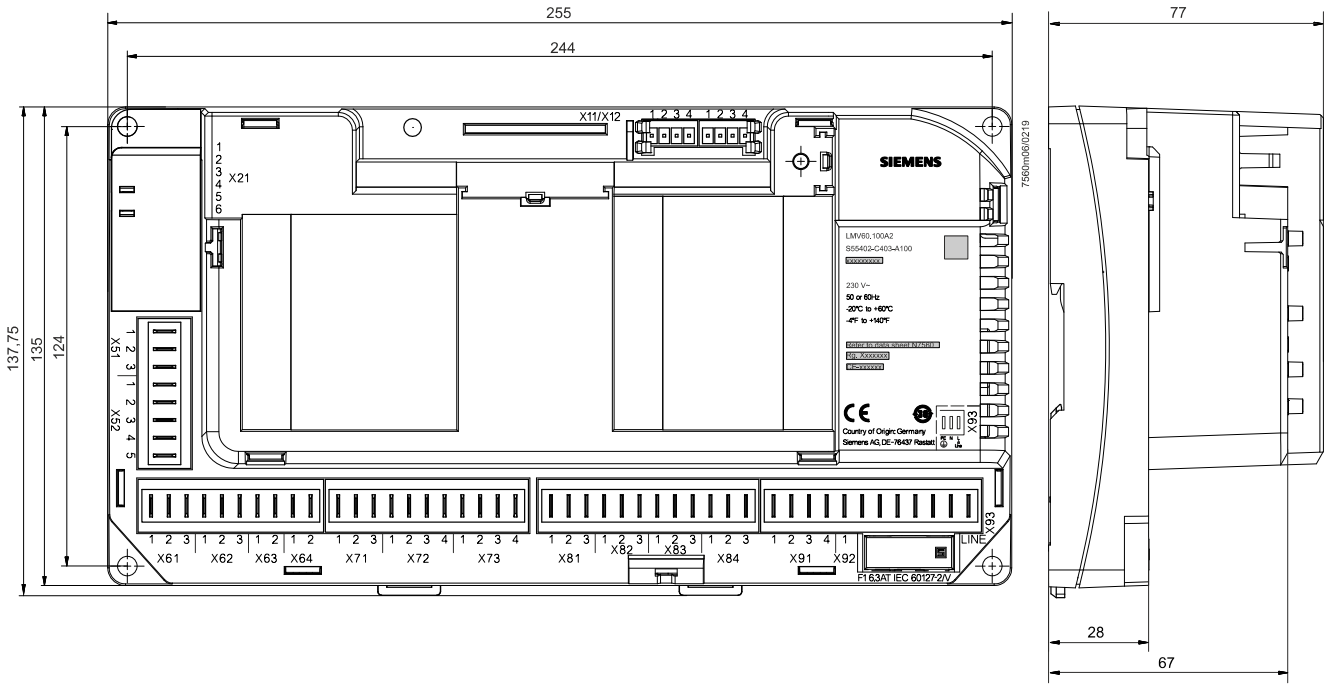
Legend

AL	Alarm device
FGR	Flue gas recirculation
 i/reset (EK1)	Lockout reset button (info button)
ION	Ionization probe
LP	Air pressure switch
LR	Load controller
LR-OPEN	Load controller OPEN position
LR-CLOSED	Load controller CLOSED position
M	Fan motor
P LT	Pressure switch valve proving
Pmax	Pressure switch-max
Pmin	Pressure switch-min
PV	Pilot valve
QRA	UV flame detector
SK	Safety loop
V1	Fuel valve
V2	Fuel valve
Z	Ignition transformer

Dimensions

Dimensions in mm

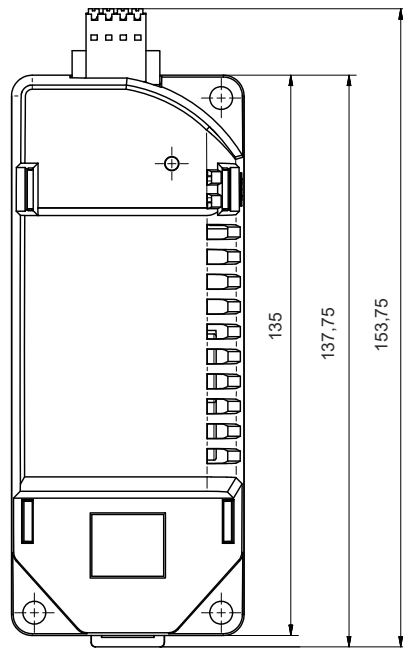
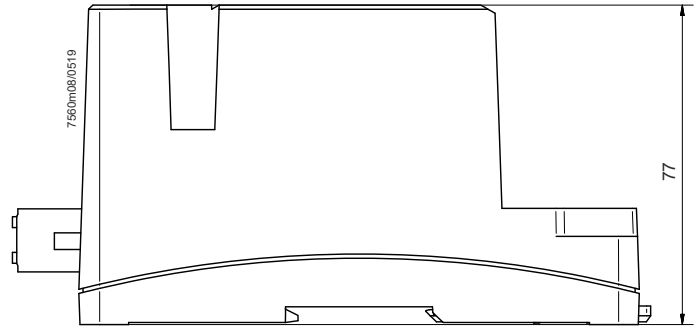
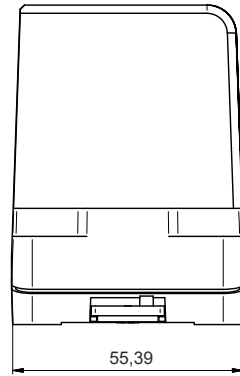
LMV60.110A2



Dimensions (continued)

Dimensions in mm

AGG6.200A5



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Subject to change!