

# SIEMENS



## LMV37.4...

### Basic Unit with integrated Fuel / Air Ratio Control for Forced Draft Burners

## Basic Documentation

The LMV37.4... and this Basic Documentation are intended for OEMs which integrate the units in their products!

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V1.80

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**Building Technologies**  
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# Supplementary documentation

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# 1 Safety notes

## 1.1 Warning notes



To avoid injury to persons, damage to property or the environment, the following warning notes must be observed!

**The LMV37.4... are safety devices! Do not interfere with or modify the units. Siemens will not assume responsibility for damage resulting from unauthorized interference!**

**The chapters covering the LMV37.4... contain additional warning notes which should also be observed when using the different unit versions!**

**After commissioning and after each service visit, check the flue gas values across the entire load range!**

The present Basic Documentation describes a wide choice of applications and functions and shall serve as a guideline. The correct functioning of the units is to be checked and proven by function checks on a test rig or on the plant itself!

- All activities (mounting, installation and service work, etc.) must be performed by qualified staff
- Degree of protection IP40 as per DIN EN 60 529 for the basic unit must be ensured through adequate mounting by the burner or boiler manufacturer
- Before performing any work in the connection area of the LMV37.4..., disconnect the unit from the mains supply (all-polar disconnection) → If plant is not shut down, there is a risk of electric shock
- Protection against electric shock hazard on the LMV37.4... and on all connected electrical components must be ensured through adequate mounting
- After each activity (mounting, installation and service work, etc.), check to ensure that wiring is in an orderly state and that the parameters are correctly set
- Fall or shock can adversely affect the safety functions. Such units must not be put into operation even if they do not exhibit any damage
- When programming the fuel / air ratio control curves, the commissioning engineer is obliged to constantly watch the quality of the combustion process (e.g. by means of a flue gas analyzer) and, in the event of poor combustion values or dangerous conditions, take appropriate actions, e.g. by shutting down the system manually
- The connectors of the connecting cables for the AZL2...display and operating unit or other accessories, such as the OCI410 (plugged into the BCI interface), may only be removed or exchanged when the plant is shut down (all-polar disconnection), since the BCI interface does not provide safe separation from mains voltage
- The connections for the SQM3... or SQN1... actuators do not provide safe separation from mains voltage. Prior to connecting or changing one of these actuators, the plant must be shut down (all-polar disconnection)

To ensure safety and reliability of the LMV37.4... system, the following points must also be observed:

- Condensation and ingress of humidity must be avoided. Should such conditions occur, make sure that the unit will be completely dry before switching on again!
- Static charges must be avoided since they can damage the unit's electronic components when touched

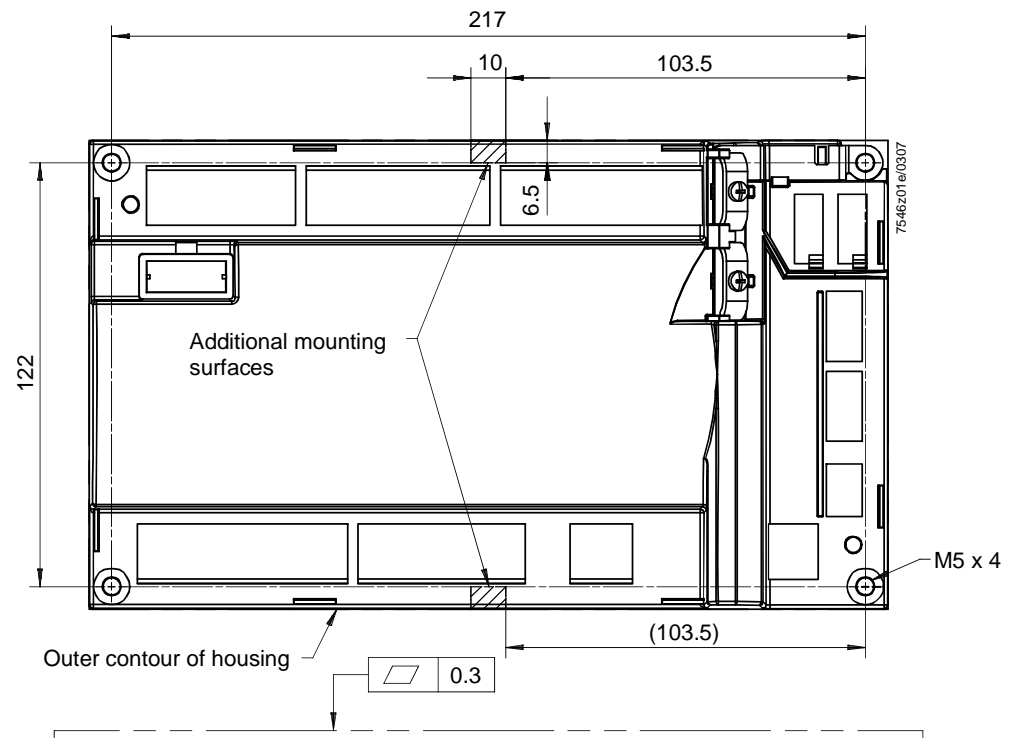
**Recommendation:** Use ESD equipment

- If the unit fuse was blown due to overload or a short-circuit at the connection terminals, the LMV37.4... must be replaced since the switching contacts might have been damaged
- If error codes 95...98 appear during operation, this may be an indication of contact problems and the LMV37.4... should be replaced

## 1.2 Mounting notes

- Ensure that the relevant national safety regulations are complied with
- In the geographical areas where DIN regulations are in use, the requirements of VDE must be satisfied, especially DIN / VDE 0100, 0550 and DIN / VDE 0722
- Observe the European / Asian / North America regulations relating to standards
- The LMV37.4... basic unit must be secured with fixing screws M4 (UNC32) or M5 (UNC24) by observing a maximum tightening torque of 1.8 Nm and by making use of all 4 fixing points. The additional mounting surfaces on the housing (refer to Data Sheet N7546 under «Dimensions») are provided to improve mechanical stability. These must fully rest on the mounting surface to which the unit is secured. The flatness of that mounting surface must be within a tolerance band of 0.3 mm

Notes for mounting



## 1.3 Installation notes

- Ensure that the electrical wiring inside the boiler is in compliance with national and local safety regulations
- Mains power must always be supplied via *L* and *N*. This means that no potential differential must exist between the neutral conductor *N* and protective earth *PE*
- *L* and *N* must not be interchanged (risk of fire, dangerous malfunctions, loss of protection against electric shock hazard, etc.)
- Make certain that strain relief of the connected cables is in compliance with the relevant standards (e.g. as per DIN EN 60 730 and DIN EN 60 335)
- Ensure that spliced wires cannot get into contact with neighboring terminals. Use adequate ferrules
- Lay the high-voltage ignition cable completely separate from all other cables
- The burner manufacturer must protect unused terminals by fitting dummy plugs (exception: X64 (reserve) and X74)
- When wiring the units, ensure that AC 120 V or AC 230 V mains voltage cables are run strictly separate from extra low-voltage cables to warrant protection against electric shock hazard
- The connectors of the connecting cables for the AZL2... may only be removed or exchanged when the plant is turned off (all-polar disconnection), since the BCI interface does not provide safe separation from mains voltage
- Connecting cable between LMV37.4... and AZL2...:  
Since the BCI interface does not provide safe separation from mains voltage, the connecting cable between LMV37.4... and AZL2... must conform to certain specifications (refer to Data Sheet N7546). Siemens specified the cable for use under the burner hood. When using cables that do not conform to the specification, it is not certain that the required cable characteristics are met
- Do not lay the connecting cable from the LMV37.4... to the AZL2... together with other cables
- Service operation with a longer connecting cable for LMV37.4...:  
If a longer cable is required for service work for example (short-time usage, < 24 hours), note that the above application under the burner hood no longer applies and, for this reason, the cable can be subjected to increased mechanical stress. In that case, use a reinforced cable (refer to Data Sheet N7546)
- Both the cable and the AZL2... must be shipped and stored so that no damage due to dust and water can occur when the products are used in the plant
- To ensure protection against electric shock hazard, make certain that, prior to switching on power, the cable is correctly connected to the AZL2...
- The AZL2... must be used in a dry and clean environment
- The mechanical coupling between the actuators and the controlling elements for fuel and air, or any other controlling elements, must be rigid

## 1.4 Electrical connection of flame detectors

It is important to achieve practically disturbance- and loss-free signal transmission:

- Never run the detector cables together with other cables
  - Line capacitance reduces the magnitude of the flame signal
  - Use a separate cable
- Observe the permissible detector cable lengths
- The mains-powered ionization probe is not protected against electric shock hazard. It must be protected against accidental contact

## 1.5 Commissioning notes

- When commissioning the unit, check **all safety functions**
- There is no absolute protection against incorrect use of the RAST5 connectors. For this reason, prior to commissioning the plant, check the correct assignment of all connectors
- Electromagnetic emissions must be checked on an application-specific basis

After the plant has been installed and commissioned, the person responsible for the plant / heating engineer must **document** the parameterized values and settings (e.g. curve characteristics) that describe fuel / air ratio control.

These data can be printed out with the help of the ACS410 PC software, for example, or must be written down.

This document must be kept in a safe place and checked by the expert.



### Caution!

**On the OEM level of the LMV37.4..., parameter settings other than those specified in the application standards can be made. For this reason, check whether the parameter settings made are in compliance with the relevant application standards (e.g. EN 298, EN 230, EN 676, EN 267, etc.), or whether the respective plant demands special approval!**

Fuel / air ratio  
control system

The selected setting values of fuel and combustion air must be assigned such that – while giving consideration to the combustion chamber / fuel pressure, temperature and combustion air pressure, as well as wear of actuators and controlling elements, etc. – correct operation with sufficient amounts of excess air will be ensured across the burner's full load range for a long period of time (until the next regular inspection is due; also refer to section 7.5 «Monitoring the positions»). This must be proven by the burner / boiler manufacturer by measuring the characteristic combustion process values. If the standardization process is repeated, the fuel / air ratio control system must be re-checked.

Burner control section

Prior to commissioning the system, the following points must be checked:

- Parameterization of operating mode (e.g. «Gmod», «Gp1 mod», «Lo mod», etc.) must accord with the type of burner used (refer to chapter 4 «Selection of operating mode»)
- Correct assignment of the valves to the valve outputs at the LMV37.4...
- Correct setting of the time parameters, especially the safety and prepurge times
- Correct functioning of the flame detector in the event of loss of flame during operation (including the response time), with extraneous light, during the prepurge time and, when there is no establishment of flame, at the end of the ignition safety time
- Activation of the valve proving function and determination of the correct leakage rate, if required by the application (refer to subsection 3.5.2 «Valve proving»)

The functions of the following available or required input status signals must be checked:

- Air pressure
- Minimum gas pressure / maximum gas pressure or POC
- Valve proving
- Minimum oil pressure / maximum oil pressure
- Safety loop (e.g. safety limiter)

Duties of the expert when making the approval tests

	<b>Action</b>	<b>Check / response</b>
a)	Burner startup with flame detector darkened	Lockout at the end of TSA1
b)	Burner startup with flame detector exposed to extraneous light, e.g. to incandescent light with detectors for visible radiation, quartz-halogen bulb or cigarette lighter flame with detectors for UV radiation	Lockout at prepurge time t1
c)	Simulation of loss of flame during operation. For that, darken the flame detector in the operating position and maintain that state	Lockout or restart, depending on the burner control's configuration
d)	Check the plant's response time with loss of flame during operation. For that purpose, manually disconnect the fuel valves from power and check the time from this moment the burner control requires to turn off power to the valve	Turning off power to the valves by the burner control within the period of time permitted for the respective time of plant
e)	Check the safe operation of the burner while giving consideration to system tolerances	<p>System tolerances are the result of a number of factors, such as:</p> <ul style="list-style-type: none"> <li>- Tolerances of actuators plus mechanical linkage to the controlling elements</li> <li>- Environmental conditions (temperature, air conditions)</li> <li>- Type of fuel (calorific value / pressure)</li> <li>- Type of supply air path and flue ways</li> </ul> <p>Example of procedure for checking the burner's response to actuator tolerances:</p> <ul style="list-style-type: none"> <li>- Approach a load point in programming mode (e.g. low-fire or nominal load)</li> <li>- Change the actuator's position against the optimum ratio setting as can be expected in the case of tolerances</li> <li>- Check the flue gas values with a flue gas analyzer</li> </ul> <p><b>Suggestion:</b> Perform this adjustment restricted of optimum ratio setting respective separate for one actuator!</p>

Further checks may be required, depending on the field of use and the relevant standards.

## 1.6 Setting and parameter setting notes

- When adjusting the electronic fuel / air ratio control system integrated in the LMV37.4..., allow for sufficient amounts of excess air since – over a period of time – the flue gas settings will be affected by a number of factors (e.g. density of air, wear of actuators and controlling elements, etc.). For this reason, the flue gas values initially set must be checked at regular intervals
- To safeguard against inadvertent or unauthorized parameter transmissions from the PC software to the burner control, the OEM must assign an **individual burner identification** (ID) for each burner. Compliance with this regulation is mandatory to ensure that the LMV37.4... system will prevent parameter sets of some other plant (with unsuited and possibly dangerous parameter values) from being transmitted to the LMV37.4... system via the PC tool. In addition, the fuel / air ratio control parameters must be manually approached and the combustion values checked
- With the LMV37.4... system, it is to be noted that the unit's characteristics are determined primarily by the specific parameter settings rather than the type of unit. This means that, among other things, each time a plant is commissioned, the parameter settings must be checked and the LMV37.4... must not be transferred from one plant to another without adapting the parameter settings to the new plant
- When using the ACS410 PC software, the safety notes given in the relevant Operating Instructions (CC1J7352) must also be observed
- A password protects the parameter level against unauthorized access. The OEM allocates individual passwords to the setting levels he can access. The standard passwords used by Siemens must be changed by the OEM. These passwords are confidential and may only be given to persons authorized to access such setting levels
- The responsibility for setting the parameters lies with the person who – in accordance with his access rights – made changes to the respective setting level

**In particular, the OEM (burner and / or boiler manufacturer) will assume responsibility for the correct parameter settings in compliance with the standards covering the specific applications (e.g. EN 676, EN 267, EN 1643, etc.).**

## 1.7 Standards and certificates



Conformity to EEC directives

- Electromagnetic compatibility EMC (immunity)
- Directive for gas-fired appliances
- Low-voltage directive

89 / 336 / EEC

90 / 396 / EEC

73 / 23 / EEC



ISO 9001: 2000  
Cert. 00739



ISO 14001: 2004  
Cert. 38233

- **Identification code to EN 298 chapter 4**

**FT / M C L B B**



## 1.8 Service notes

- **If fuses are blown, the unit must be returned to Siemens** (refer to section 1.1 «Warning notes»)
- Burner control type LMV3... has a designed lifetime\* of 250,000 burner startup cycles which, under normal operating conditions in heating mode, correspond to approx. 10 years of usage (starting from the production date given on the type field). This lifetime is based on the endurance tests specified in standard EN 298 and the table containing the relevant test documentation as published by the European Association of Component Manufacturers (Afecon) ([www.afecor.org/Designed Lifetime of Safety Relevant Controls.pdf](http://www.afecor.org/Designed_Lifetime_of_Safety_Relevant_Controls.pdf)).

The designed lifetime is based on use of the burner control according to the manufacturer's Operating Instructions.

After reaching the designed lifetime in terms of the number of burner startup cycles, or the respective time of usage, the burner control is to be replaced by authorized personnel.

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

## 1.9 Disposal notes



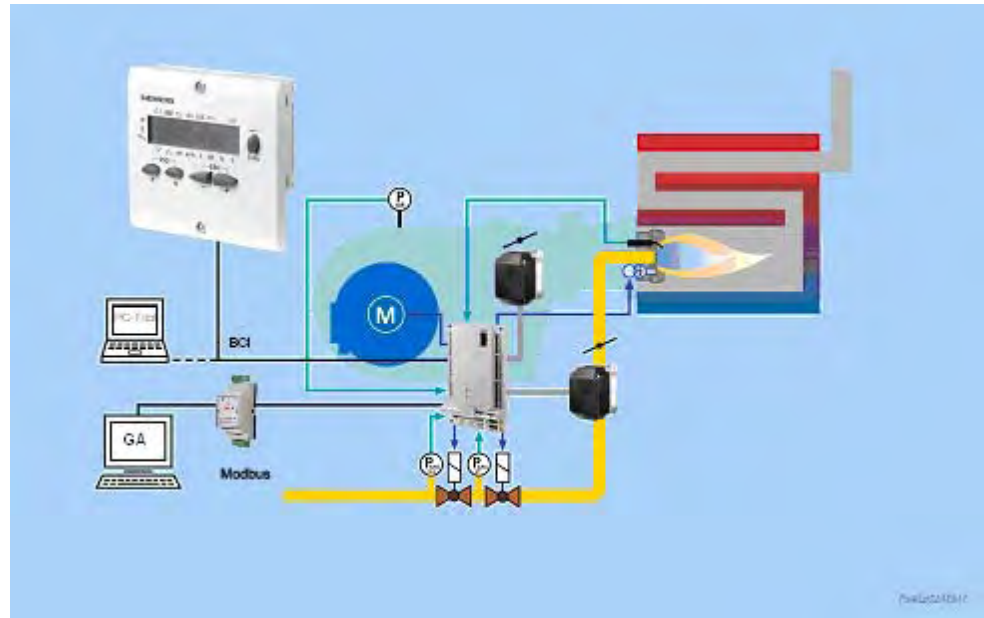
The unit contains electrical and electronic components and must not be disposed of together with household waste. Legal and currently valid legislation must be observed.

## 2 System make-up / function description

The LMV37.4... is a microprocessor-based burner management system with matching system components for the control and supervision of forced draft burners of medium to high capacity.

The following components are integrated in the basic unit of the LMV37.4...:

- Burner control complete with valve proving system
- Electronic fuel / air ratio control system for a maximum of 2 actuators
- Control VSD air fan
- Modbus interface



### Example:

Modulating gas burner

The system components (display and operating unit, actuators) are connected directly to the LMV37.4... basic unit. All safety-related digital inputs and outputs of the system are monitored by a contact feedback network.

For Europe

For intermittent operation in connection with the LMV37.4..., the ionization probe or the QRA..., QRB... or QRC... optical flame detector can be used. **Continuous operation is possible only when using an ionization probe.**

For North America

For intermittent operation in connection with the LMV37.4..., the optical flame detector QRA4... can be used. **Continuous operation is possible only when using an ionization probe.**

General

The burner management system is operated and parameterized either via the AZL2... display and operating unit or with the help of the PC tool. The AZL2... with LCD and menu-driven operation facilitates straightforward use and targeted diagnostics. When making diagnostics, the display shows operating states, the type of error and the point in time the error occurred. Passwords protect the different parameter levels of the burner / boiler manufacturer and heating engineer against unauthorized access. There is also a COM port which can be accessed from a superposed system, such as a building automation and control system (BACS). A PC with ACS410 software can be connected via the BCI and OCI410... interface. Among other things, the ACS410 software affords convenient readout of settings and operating states, parameterization of the LMV37.4..., and trend recordings. The burner / boiler manufacturer can select from different types of fuel trains and make use of a wide choice of individual parameter settings (program times, configuration of inputs / outputs, etc.), enabling him to make optimum adaptations to the relevant application. The actuators are driven by stepper motors and can be positioned with high resolution. Specific features and actuator settings are defined by the LMV37.4... basic unit.

## 3 Basic unit

### 3.1 Description of inputs and outputs

This chapter covers the basic features of the basic unit's inputs and outputs. For exact use of the inputs and activation of outputs, refer to the sequence diagrams.

#### 3.1.1 Flame signal input and flame detector X10-05 and X10-06

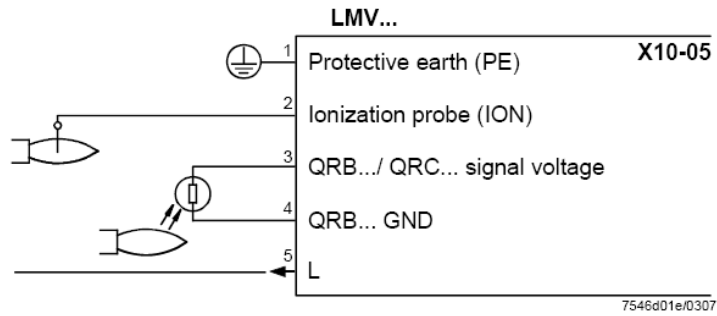


Figure 1: Flame signal input X10-05

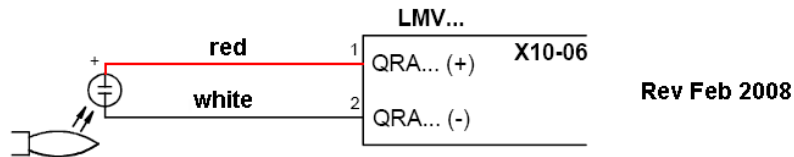


Figure 2: Flame signal input X10-06

The following connection choices exist:

- Ionization probe
- QRB...
- QRA2... / QRA10...
- QRA4... (North America)
- QRC...

## 3.2 Flame detectors

The LMV37.4... system can be used with different types of flame detectors. For the correct use of the flame detectors, refer to the sequence diagrams.  
The flame detector installed must be correctly parameterized.



### Caution!

**Only ionization probes are suited for continuous operation!**

In the hardware of the LMV37.4..., the flame signals are subdivided into 2 groups: Group 0 covering types QRB... and QRC..., and group 1 covering ionization and QRA...  
The flame detector selection for gas is made via parameter 221, for oil via parameter 261.

No.	Parameter
221	Gas: Active detector flame evaluation 0 = QRB... / QRC... 1 = ION / QRA...
261	Oil: Active detector flame evaluation 0 = QRB... / QRC... 1 = ION / QRA...

## 3.2.1 Operating mode

### 3.2.1.1. Ionization

No-load voltage at terminal ION (X10–05, terminal 2)

approx. U<sub>Netz</sub>



#### Caution!

The ionization probe must be protected against electric shock hazard!

Short-circuit current

max. AC 1 mA

Required flame detector current

min. DC 4  $\mu$ A, display flame approx. 30 %

Possible flame detector current

max. DC 16...40  $\mu$ A, display flame approx. 100 %

Permissible length of flame detector cable (laid separately) 3 m (core-earth 100 pF / m)

#### Note:

As the detector line capacitance (line length) increases, the voltage at the ionization probe and thus the detector current will drop. Extremely long line lengths and very high-ohmic flames might necessitate the use of low-capacitance cable (e.g. ignition cable). In spite of special electronic circuits designed to compensate possible adverse effects of the ignition spark on the ionization current, it must be made certain 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.

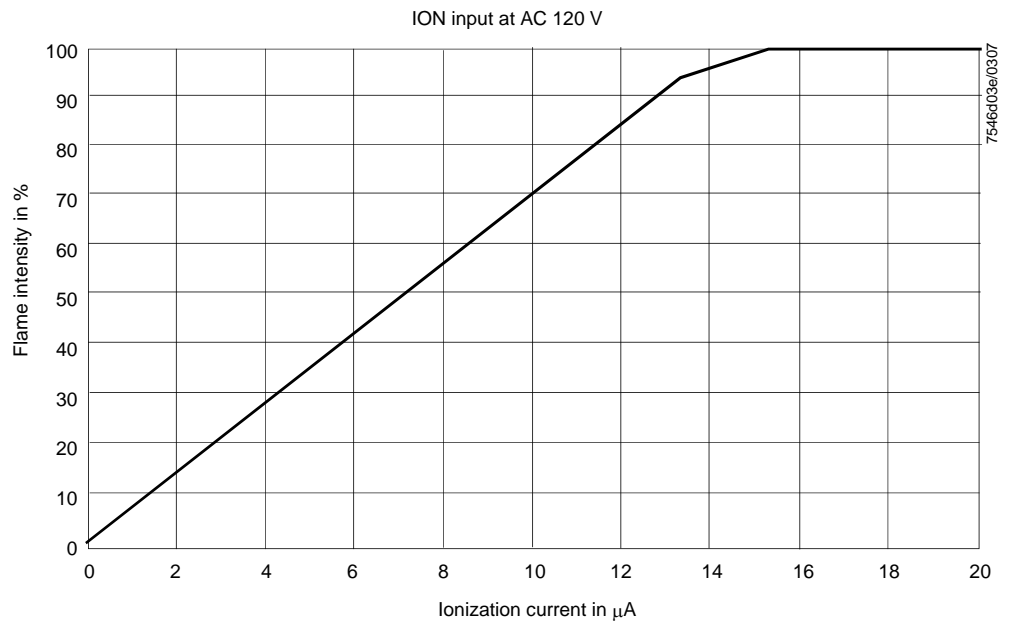


Figure 3: Ionization input at AC 120 V

### 3.2.1.2. QRB...

No-load voltage at the QRB... terminal (X10-05, terminal 3)

approx. DC 5 V

Permissible length of QRB... detector cable (laid separately) 3 m (core-core 100 pF / m)

#### Notes:

A flame detector resistance of  $R_F < 500 \Omega$  is identified as a short-circuit and leads to safety shutdown in operation, like in the case of loss of flame.

For this reason, when considering usage of a highly sensitive photoresistive flame detector (QRB1B... or QRB3S), it must be carefully checked whether this type of flame detector is indeed required!

Increasing line capacitance between QRB... connection and live conductor  $L$  (mains) has an impact on sensitivity and increases the risk of detector damage due to mains overvoltages.

The separate routing of flame detector cables as specified in Data Sheet N7546 must be observed!

#### Threshold values QRB... flame supervision with LMV37.4...

Start prevention (extraneous light) with RQRB

$< 400 \text{ k}\Omega$

Intensity  $> 10 \%$

Operation with RQRB

$< 230 \text{ k}\Omega$

Intensity  $> 16 \%$

Short-circuit detection with RQRB

$< 0.5 \text{ k}\Omega$

For more detailed information, refer to Data Sheet N7546.

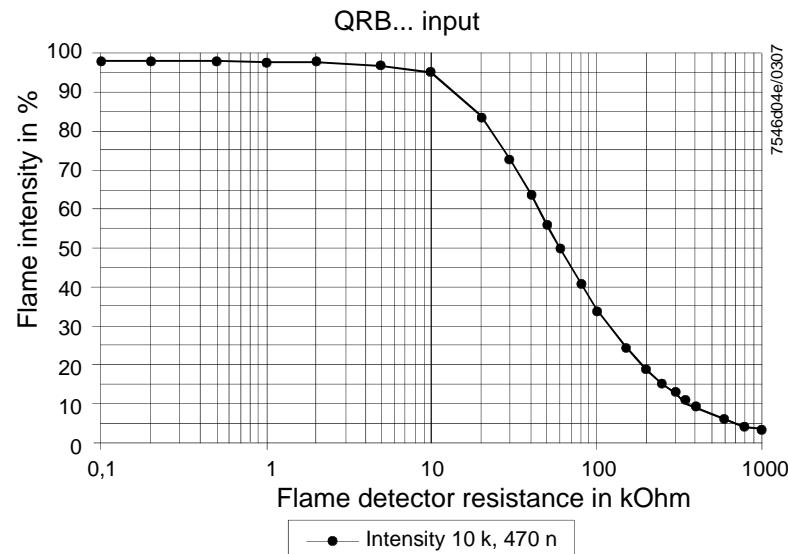


Figure 4: QRB... input at AC 120 V

### 3.2.1.3. QRA2... / QRA4... (North America) / QRA10...



#### Caution!

If QRA2... / QRA4... / QRA10... UV tubes are used for flame supervision in connection with the LMV37.4..., it must be taken into account that these types of flame detectors require continuous power supply (as per EN 230), thus enabling the system to recognize flame detector faults on startup.

### 3.2.1.4. QRC...

Check the flame intensity via AZL2...

For system specific reasons, the display by AZL2... of maximum intensity is limited to approx. 55 %.

## 3.2.2 Loss of flame

In the event of loss of flame, the unit will initiate safety shutdown, followed by a restart, if required. A repetition counter can be used to select after how many losses of flame the unit shall initiate lockout (refer to subsection 3.5.3.4 «Repetition counter»).

Error code	Diagnostic code	Meaning for the LMV37.4... system
7	3	Loss of flame

No.	Parameter
240	Gas: Repetition limit loss of flame
280	Oil: Repetition limit loss of flame

## 3.2.3 Extraneous light

Extraneous light during standby (Phase 12) leads to start prevention, followed by a restart. Extraneous light during the prepurge phase leads to immediate lockout. If extraneous light occurs during the shutdown phase, the system will switch to the safety phase.

One repetition is permitted. This means that if the error occurs again the next time the system is shut down, the unit will initiate lockout.

Error code	Diagnostic code	Meaning for the LMV37.4... system
4	0	Extraneous light during startup
	1	Extraneous light during shutdown
	2	Extraneous light during startup – start prevention

## 3.2.4 No flame at the end of «TSA1»

If no flame has been established at the end of the first safety time, the unit will initiate lockout.

Error code	Diagnostic code	Meaning for the LMV37.4... system
2	4	No flame at the end of «TSA1»

### 3.2.5 Flame intensity

The flame's intensity can be read out.  
It is standardized from 0...100 %.

No.	Parameter
954	Flame intensity

### 3.2.6 Supervision of flame detector

Error code	Diagnostic code	Meaning for the LMV37.4... system
93	3	Short-circuit of sensor

At the QRB... / QRC... flame detector's input, the LMV37.4... checks the detector for short-circuits in operation.



## 3.3 Digital inputs

### 3.3.1 Safety loop X3-04, terminals 1 and 2

Input for the safety loop. When any of the series-connected contacts included in the loop opens, power supply to the fuel valves, the fan and the ignition equipment is instantly cut.

The following contacts are included in the safety loop:

- External burner switch (ON / OFF)
- Safety limiter / safety pressure limiter (SL / SPL)
- External limit thermostat and / or pressure switch, if required
- Water shortage switch

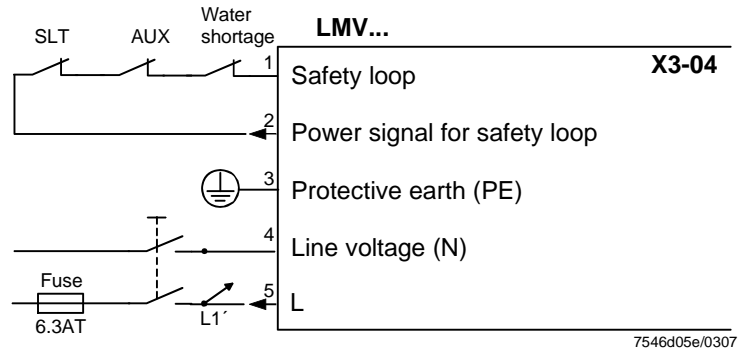


Figure 5: Safety loop X3-04

For diagnostics, the contacts of the safety loop and the burner flange are combined for delivering the «Safety loop» signal. If there is no such signal, the system will initiate safety shutdown in any case.

Error code	Diagnostic code	Meaning for the LMV37.4... system
22	0	Safety loop / burner flange open

For the input, a repetition counter can be parameterized. Here, it is possible to set the number of errors that are permitted until lockout occurs (refer to subsection 3.5.3.4 Repetition counter).

No.	Parameter
215	Repetition limit safety loop

### 3.3.2 (Burner flange) X3-03, terminals 1 and 2

- End switch burner flange (component of safety loop)

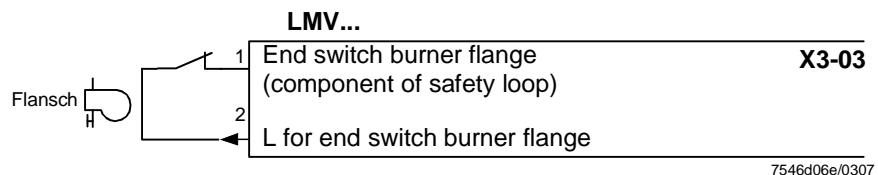


Figure 6: Burner flange X3-03

For error diagnostics and parameters, refer to subsection 3.3.1 «Safety loop».

### 3.3.3 Input for external controller (ON / OFF) X5-03, terminal 1

When the external control loop is closed, internal input message «Heat request» is generated.

A heat request exists when the external controller signal is pending and, depending on the configuration, a load controller calls for heat (refer to chapter 5 «Connection of load controller»).

When there are no more requests for heat, the burner shuts down. The fuel valves will be closed, either immediately when the timer has elapsed, or when the low-fire position is reached, depending on the parameterization (refer to section 6.5 «End of running position»).

Note:

Burner startup can take place only when this contact is closed.

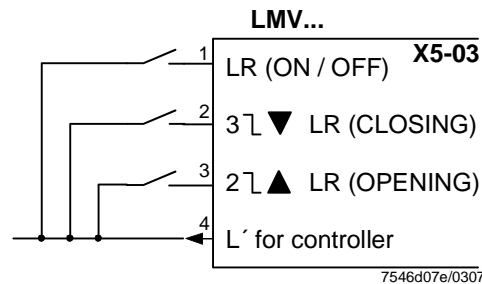


Figure 7: Inputs for external load controller ON / OFF X5-03

### 3.3.4 Inputs X5-03 terminal 2 and terminal 3 (ON / OFF or stage 2 / stage 3) ,

Inputs for connection of an external controller with contact outputs (refer to subsection 5.2 «External load controller via contacts X5-03, terminals 2 and 3»).

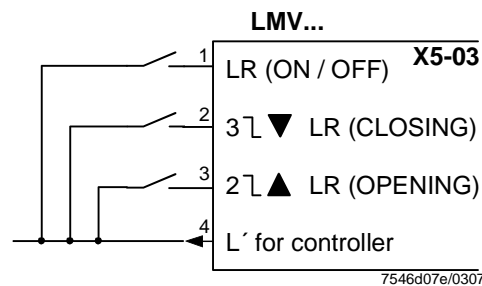


Figure 8: Inputs OPEN / CLOSE X5-03

### 3.3.5 Air pressure switch (APS) X3-02

Input for connection of an air pressure switch.

Air pressure is anticipated after the fan has been switched on. If there is no air pressure signal, the system will initiate lockout.

The air pressure switch must have an NO contact.

If no air pressure switch is required (e.g. when firing on oil), a wire link to the fan output must be fitted (between X3-02, terminal 1, and X3-05, terminal 1).



#### Caution!

**The OEM must check whether the burner may be operated without an air pressure switch. This may necessitate a special approval, depending on the application.**

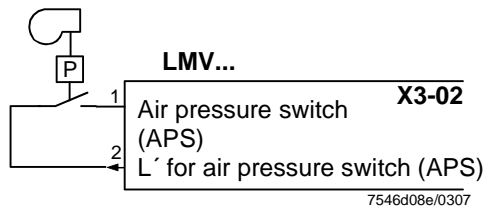


Figure 9: Air pressure switch (APS) X3-02

Error code	Diagnostic code	Meaning for the LMV37.4... system
3	0	Air pressure switch off
	1	Air pressure switch on
	4	Air pressure on – start prevention

### 3.3.6 Pressure switch leakage test gas (GP LT) X9-04

Input for the pressure switch leakage test (P LT).

No.	Parameter
241	Gas: Execution leakage test 0 = no leakage test 1 = leakage test on startup 2 = leakage test on shutdown 3 = leakage test on startup and shutdown

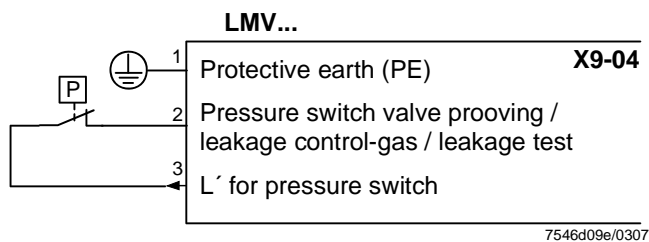


Figure 10: Pressure switch leakage test gas (GP LT) X9-04

#### Pressure switch leakage test (P LT)

Input for connection the leakage test with a specific pressure switch. The input is active only when firing on gas and when the leakage test is activated.

Error code	Diagnostic code	Meaning for the LMV37.4... system
12	0	V2 leaking
	1	V1 leaking

### 3.3.7 Pressure switch-min-gas (GPmin) / -min-oil, start release gas X5-01

Input for connection of a pressure switch-min for gas or oil: If the plant does not require a pressure switch-min, a wire link between terminal 2 and terminal 3 must be fitted.



#### Caution!

The OEM must check whether the burner may be operated without an air pressure switch-min. This may necessitate a special approval, depending on the application.

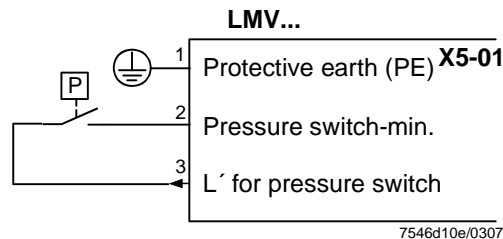


Figure 11: Pressure switch-min-gas (GPmin) / -min-oil X5-01

#### Pressure switch-min-gas

On all gas trains, the minimum gas pressure is anticipated from Phase 22. If no gas pressure is detected after the maximum time (P214) has elapsed, the gas shortage program will be started (refer to subsection 3.5.3.6 «Gas shortage program»).

No.	Parameter
214	Max. time to start release

During the TSA1 and TSA2 safety times, the signal received from pressure switch-min is only assessed after a certain period of time has elapsed, in order to ignore the pressure shocks that occur the moment the valves open. The time to elapse for signal assessment can be parameterized.

No.	Parameter
229	Gas: Time to respond to pressure faults within «TSA1» and «TSA2»

If the gas pressure fails, at least safety shutdown will be initiated.

Error code	Diagnostic code	Meaning for the LMV37.4... system
20	0	<b>Pmin</b> No min. gas / oil pressure

For the input, a repetition counter can be parameterized. It can be used to set the number of errors permitted until lockout occurs. The counter also impacts the gas shortage program (refer to subsection 3.5.3.4 «Repetition counter»).

No.	Parameter
223	Repetition limit pressure switch-min-gas

### Start release gas

If, at the same time, the input is used as a start release input, e.g. for an air supply damper, it can be connected in series with the pressure switch.

### Pressure switch-min-oil

On all types of oil train, the minimum oil pressure is anticipated from Phase 38. If no oil pressure is detected after the maximum time (P217) has elapsed or if, subsequently, the oil pressure fails, the system will initiate lockout.

No.	Parameter
217	Max. time to detector signal

Error code	Diagnostic code	Meaning for the LMV37.4... system
20	0	<b>Pmin</b> No min. gas / oil pressure

During the TSA1 and TSA2 safety times, the signal from pressure switch-min is only assessed after a certain period of time has elapsed in order to ignore the pressure shocks that occur the moment the valves open. The time to elapse for signal assessment can be parameterized.

No.	Parameter
269	Oil: Time to respond to pressure faults within «TSA1» and «TSA2»

### 3.3.8 Pressure switch-max-gas (GPmax) / or POC contact / max-oil, start release oil X5-02

Input for connection of a pressure switch-max for gas or oil: The pressure switch must have an NC contact, which means that the contact will open when the adjusted maximum pressure is exceeded. If the plant does not require a pressure switch-max, a wire link must be fitted between terminal 2 and terminal 3.



#### Caution!

The OEM must check whether the burner may be operated without a pressure switch-max. This may necessitate a special approval, depending on the application.

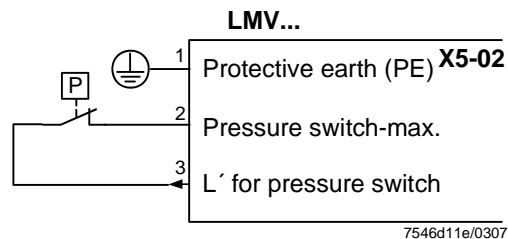


Figure 12: Pressure switch-max-gas (GPmax) / -max-oil X5-02

The connection can also be used as POC (Proof of Closure) (refer to sequence diagram).

No.	Parameter
237	Gas: Pressure switch-max / POC input 0 = deactivated 1 = Pressure switch-max 2 = POC

#### Pressure switch-max-gas

On all types of gas trains, the maximum gas pressure is monitored from Phase 40. If the maximum gas pressure is exceeded, the system will initiate lockout.

Error code	Diagnostic code	Meaning for the LMV37.4... system
21	0	<b>Pmax:</b> Max. gas / oil pressure exceeded <b>POC:</b> POC open
	1	POC closed

During the TSA1 and TSA2 safety times, the signal from pressure switch-max is only assessed after a certain period time has elapsed in order to ignore the pressure shocks that occur the moment the valves open.

No.	Parameter
229	Gas: Time to respond to pressure faults within «TSA1» and «TSA2»

### Pressure switch-max-oil

On all types of oil trains, the maximum oil pressure is monitored from Phase 22. If the maximum oil pressure is exceeded after the maximum time (P214) has elapsed, or during the subsequent phases, the system will initiate lockout.

No.	Parameter
214	Max. time start release

Error code	Diagnostic code	Meaning for the LMV37.4... system
21	0	<b>Pmax:</b> Max. gas / oil pressure exceeded POC: POC open

During the TSA1 and TSA2 safety times, the signal from pressure switch-max is only assessed after a certain period of time has elapsed in order to ignore the pressure shocks that occur the moment the valves open.

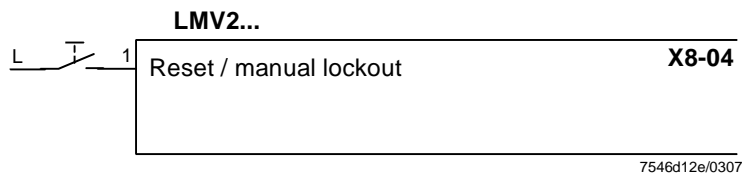
No.	Parameter
269	Oil: Time to respond to pressure faults within «TSA1» and «TSA2»

### Start release oil

If the input is simultaneously used as a start release input, e.g. for an air supply damper, the latter can be connected in series with the pressure switch.

### 3.3.9 Reset X8-04, terminal 1

Input for connection of a reset button. The burner control can be reset or manually locked via this input (refer to subsection 3.5.3.1 «Reset / manual locking»).



7546d12e/0307

Figure 13: Reset X8-04

## 3.4 Digital outputs

### Safety-related outputs, type SI

Using a contact feedback network (CFN), these contacts are read back by the micro-computers and checked for their correct positions.

### Non-safety-related outputs, type No-SI

These outputs are not monitored by the CFN and, for this reason, can only be used for non-safety-related actuators, or actuators made safe in some other form (e.g. alarm).

#### 3.4.1 Output alarm, type No-SI X3-05, terminal 2

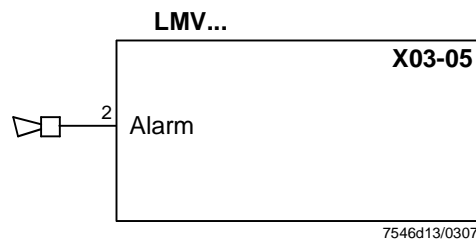


Figure 14: Output alarm X3-05

Output for connection of an alarm lamp or horn.

The output is activated when the unit is in the lockout position (Phase 00).

This output can also be used to indicate start prevention.

#### 3.4.2 Fan contactor, type SI X3-05, terminal 1

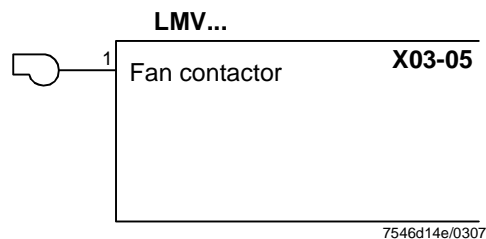


Figure 15: Fan motor contactor X3-05

Output for control of a fan power contactor (200 VA). In accordance with the sequence diagrams, the fan is on in Phase 22 (refer to the sequence diagrams).



### 3.4.3 Fan continuous purging X3–05, terminal 3

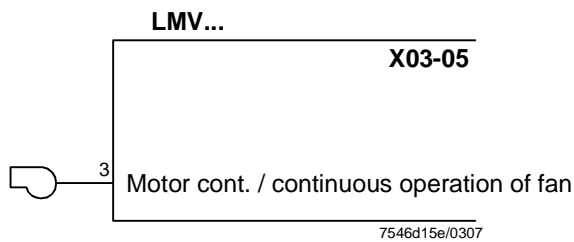


Figure 16: Fan continuous purging X3-05

If continuous purging is required, the fan contactor must be connected to fan continuous purging X3-05, terminal 3. This terminal is tapped behind the unit fuse and the safety loop (refer to subsection 3.5.3.10 «Continuous fan»).

### 3.4.4 Output ignition (Z), type SI (IGNITION) X4–02

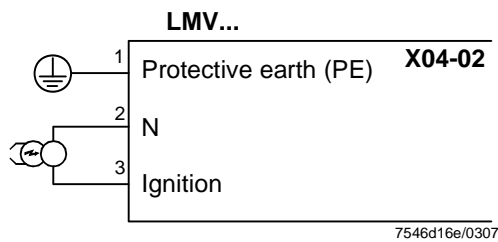


Figure 17: Output ignition (Z) X4-02

Output for the connection of ignition transformers or electronic ignition modules.

#### Gas

When firing on gas, ignition will be switched on in Phase 38 just before reaching TSA1.

The preignition time in Phase 38 can be parameterized.

No.	Parameter
226	Gas: Preignition time

#### Oil

When firing on oil, there is a choice of short preignition and long preignition (same as with gas).

No.	Parameter
281	Oil: Point in time oil is ignited 0 = short preignition (Ph38) 1 = long preignition (with fan) (Ph22)

When using long preignition, ignition is switched on in *Phase 22*, together with the fan.

In the case of short preignition, the preignition time can be parameterized.

No.	Parameter
266	Oil: Preignition time

### 3.4.5 Outputs fuel valves, type SI (V1...V3 / PV) X8-02, X7-01, X7-02

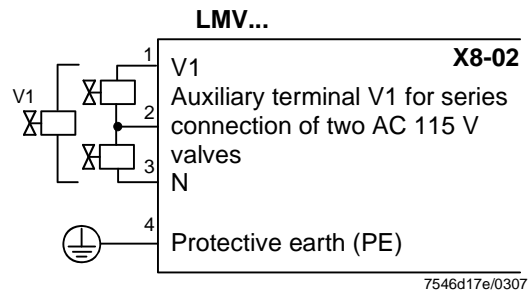


Figure 18: Output fuel valve (V1) X8-02

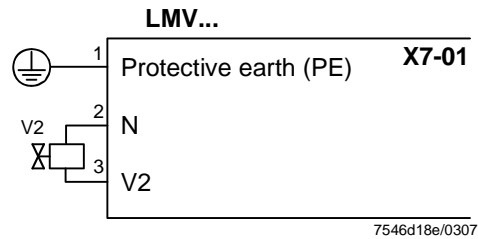


Figure 19: Output fuel valve (V2) X7-01

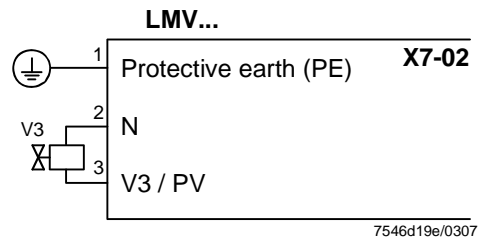


Figure 20: Output fuel valve X7-02

Outputs for connection of the gas or oil valves, depending on the selected type of fuel train (refer to the sequence diagrams).

### 3.4.6 Output extra valve (SV), type SI X6-03

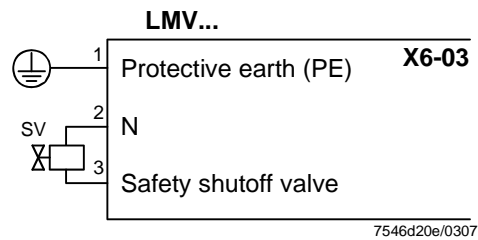


Figure 21: Output extra valve (SV) X6-03

Output for connection of an oil shutoff valve / oil connection valve or extra valve for liquefied gas. The output is connected parallel to output fan.

### 3.4.7 Output for indication (B4) of operation X8-04, terminal 2

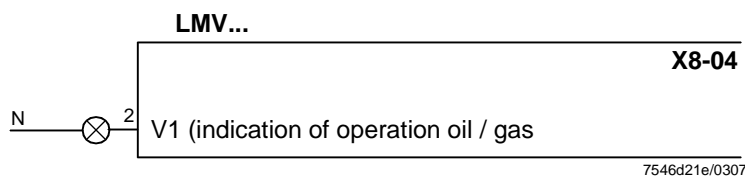


Figure 22: Output for indication (B4) of operation X8-04

Output for connection for indication of operation.



The output is connected parallel to the fuel valve (V1).

## 3.5 Program sequence

The program sequence is shown in the form of sequence diagrams (refer to section 3.6). Using a number of parameters, the program sequence can be adapted to the respective application.

### 3.5.1 Time parameters

Using a number of time parameters, the time characteristics of the different types of fuel trains can be matched to the requirements of the respective application.

No.	Parameter
211	Fan ramp up time
212	Max. time to low-fire
213	Min. time home run
225	Gas: Prepurge time
226	Gas: Preignition time
227	Gas: Safety time 1 (TSA1)
229	Gas: Time to respond to pressure faults within TSA1 and TSA2
230	Gas: Interval 1
231	Gas: Safety time 2 (TSA2)
232	Gas: Interval 2
233	Gas: Afterburn time
234	Gas: Postpurge time
242	Gas: Leakage test evacuation time
243	Gas: Leakage test time test atmospheric pressure
244	Gas: Leakage test filling time
245	Gas: Leakage test time test gas pressure
246	Gas: Gas shortage waiting time
265	Oil: Prepurging
266	Oil: Preignition time
267	Oil: Safety time 1 (TSA1)
269	Oil: Time to respond to pressure faults within «TSA1» and «TSA2»
270	Oil: Interval 1
271	Oil: Safety time 2 (TSA2)
272	Oil: Interval 2
273	Oil: Afterburn time
274	Oil: Postpurge time



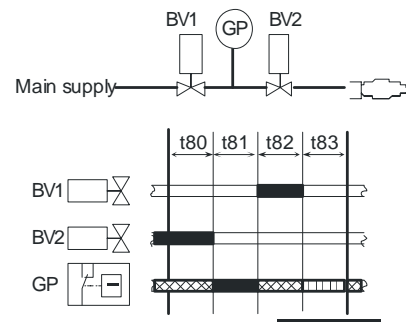
#### Caution!

The OEM or the heating engineer is responsible for making certain that the times conform to the standards covering the respective type of plant.

### 3.5.2 Valve proving

Valve proving is only active when firing on gas. This is a leakage test designed to detect leaking gas valves and, if necessary, to prevent the valves from opening or ignition from being switched on. Lockout will be initiated.

#### Valve proving with separate pressure switch (P LT)



When performing valve proving, the gas valve on the burner side will be opened first to bring the test space to atmospheric pressure.

Then, the valve is closed whereupon the pressure in the test space must not exceed a certain level. Then, the gas valve on the mains side is opened to fill the gas pipe.

When the valve is closed again, the gas pressure must not drop below a certain level.

- t80 Evacuation (P242)
- t81 Atmospheric test (P243)
- t82 Filling (P244)
- t83 Pressure test (P245)
- BV... Fuel valve
- GP Gas pressure switch
- Signal ON
- ▨ Signal OFF
- ▩ Permissible signal



Combined valve proving is not permitted.

Valve proving can be parameterized to take place on startup, shutdown, or on both.

Recommendation:

Perform valve proving on shutdown.

No.	Parameter
241	Gas: Execution leakage test 0 = no leakage test 1 = leakage test on startup 2 = leakage test on shutdown 3 = leakage test on startup and shutdown
242	Gas: Leakage test evacuation time
243	Gas: Leakage test time atmospheric pressure
244	Gas: Leakage test filling time
245	Gas: Leakage test time gas pressure



#### Caution!

If valve proving is parameterized to take place «on startup and shutdown», the gas valves must run through additional switching cycles. As a result, strain on the gas valves (wear) will increase.



#### Caution!

The OEM must set the evacuation, filling and test times for atmospheric or mains pressure on every plant in compliance with the requirements of EN 1643.

It must be ensured that the 2 test times are correctly set. It is to be checked whether the gas required for the test may be fed into the combustion chamber (on the relevant application). The test times are safety-related. After a reset and in the case of aborted or prevented valve proving, the unit will perform valve proving on the next startup (only when valve proving is activated). In the case of a leakage test, prepurging is active during the startup phase, even if it has been deactivated.

Examples of aborted valve proving:

When the safety loop or the start prevention input for gas (containing Pmin) opens during valve proving.

#### Valve proving – calculation of leakage rate

$$t_{\text{Test}} = \frac{(P_G - P_W) \cdot V \cdot 3600}{P_{\text{atm}} \cdot Q_{\text{Leak}}}$$

QLeak	in l / h	Leakage rate in liters per hour
PG	in mbar	<b>Overpressure</b> between the valves at the beginning of the test phase
PW	in mbar	Overpressure set on the pressure switch (normally 50 % of the gas inlet pressure)
Patm	in mbar	<b>Absolute air pressure</b> (1013 mbar normal pressure)
V	in l	Volume between the valves (test volume) including valve volume and pilot pipe, if present (Gp1 mod)
tTest	in s	Test time

#### 3.5.2.1. Lockout phase (Phase 00)

The relays of the fuel valves and the safety relay (fan) are de-energized, the alarm relay is energized and lockout takes place. This means that Phase 00 can only be quit via a manual reset. The time of Phase 00 is unlimited.

#### 3.5.2.2. Safety phase (Phase 01)

The safety phase is an intermediate phase which is completed prior to triggering lockout. The relays of the fuel valves and the safety relay (fan) are de-energized, but lockout does not yet take place. The alarm relay is not yet activated. If possible or permitted, safety checks or repetition counter checks are made whose results decide on the transition to «Lockout phase» or «Standby». The duration of the safety phase is dynamic (depending in the extent of testing), the maximum being 30 seconds. This process is aimed primarily at avoiding unwanted lockouts, e.g. resulting from EMC problems.

### 3.5.3 Special functions during the program sequence

#### 3.5.3.1. Reset / manual lockout

The system can be manually locked by simultaneously pressing the **InFo** button and **any other button** on the AZL2.... This function allows the user to stop the system from the operating level should an emergency occur.

When making a reset, the following actions are carried out:

- The alarm relay and the fault display will be switched off
- The lockout position will be canceled
- The unit will make a reset and then change to standby

There are 3 choices to reset the system.

##### 1. Resetting on the AZL2... display and operating unit

If the unit is in the lockout position, a reset can be made by pressing the **InFo** button for 1...3 seconds. The function is available only when the unit is in the lockout position. Longer or shorter pushes on the button do not produce a reset so that the system will maintain the lockout position.

Error code	Diagnostic code	Meaning for the LMV37.4... system
167	2	Manual lockout by AZL2...

##### 2. Resetting by pressing the button at the «Reset» connection terminal on the LMV37.4... basic unit (X8-04, terminal 1)

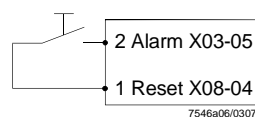
If the unit is in the lockout position, a reset can be made by pressing the button for 1...3 seconds. Longer or shorter pushes on the button are ignored so that the system will maintain the lockout position.

If the unit is **not** in the lockout position and the reset button is pressed for 1...6 seconds, a change to the lockout position will take place.

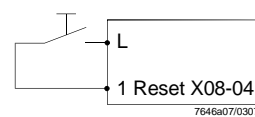
If this response is not desirable, it is possible to tap the supply for the reset button from the alarm output, thus achieving the same response as described above under 1.

Error code	Diagnostic code	Meaning for the LMV37.4... system
167	1	Manual lockout by contact

Without manual lockout



With manual lockout



##### 3. Resetting via the PC tool

Refer to the documentation on the PC tool (J7352).

Error code	Diagnostic code	Meaning for the LMV37.4... system
167	3	Manual lockout by PC tool

### 3.5.3.2. Alarm upon start prevention

If start prevention occurs, the display of the AZL2... will show it.

Start prevention takes place only when a heat request is delivered **and** one of the startup criteria is not fulfilled.

The period of time to elapse from start prevention to display on the AZL2... can be adjusted. For that, parameter «Max. time to detector signal» is used.

In addition, it is possible to indicate start preventions via the alarm output. This function can be activated per parameter.

No.	Parameter
210	Alarm in the event of start prevention 0 = deactivated 1 = activated

If «Alarm in the event of start prevention» is activated via the alarm relay, start prevention and lockout can only be distinguished via the display on the AZL2... Start preventions are displayed as **Err:**, lockouts as **Loc:**.

No.	Parameter
217	Max. time to detector signal



**Caution!**

**The maximum waiting time is used for other maximum times in the program sequence and cannot be freely selected.**

Note:

If reset contact X8-04, terminal 1, is activated in the event of start prevention, the unit will be manually locked.

The period of time from occurrence of start prevention to indication by the alarm contact equals the time to the display on the AZL2...

### 3.5.3.3. Possible start preventions

Error code	Diagnostic code	Meaning for the LMV37.4... system
201	1	No operating mode selected
	2...3	No fuel train defined
	4...7	No curve defined
	8...15	Standardized speed undefined
	16...31	Backup / restore was not possible
		Other start preventions:
3	4	Air pressure on – start prevention
4	2	Extraneous light during startup – start prevention
12	0	V2 leaking
22	0	Safety loop / burner flange open
83	#	Speed error VSD
97	#	Error relay supervision
	0	Safety relay contacts have welded or external power supply fed to safety relay
136	1	Restore started

No.	Parameter
642	Standardized speed Index 0 = $\mu C1$ Index 1 = $\mu C2$
935	Absolute speed
936	Standardized speed



### 3.5.3.4. Repetition counter

Repetition counters are available for different types of errors. They are used to set the number of errors that are permitted until lockout occurs. The last error initiates lockout. When setting the number of errors to 3, for example, a repetition (restart) will take place after the first 3 errors, and after the third error, the system will initiate lockout.

Note:

Setting 16 means an infinite number of repetitions = no lockout.

#### Functions with adjustable repetition counter

No.	Parameter
215	Repetition limit safety loop
223	Repetition limit pressure switch-min gas  Recharging time: After "Operation" phase
240 280	Repetition limit loss of flame  Recharging time: After "Operation" phase  Parameter assignment: 240 Gas / fuel 0 280 Oil / fuel 0

Error code	Diagnostic code	Meaning for the LMV37.4... system
7	3	Loss of flame
20	0	<b>Pmin</b> No min. gas / oil pressure
22	0	Safety loop / burner flange open

If the adjustable repetition counter limits are changed, the actual counter will be re-charged only when the associated recharging time is reached: After power-on or after a reset.

Note:

If immediate recharging shall be enforced, the burner control can be manually locked and then reset.

## Functions with fixed repetition counters

These counters cannot be set.

Meaning	Settings	
	Unit	Basic setting
Number of repetitions in the event of error: - Speed standardization VSD - Speed error - Referencing error actuator - Positioning error actuator Recharging time: - End of "Shutdown" phase	---	3
Number of repetitions in the event of error: - Relay - Relay control Recharging time: - End of "Operation" phase	---	2
Internal errors  Recharging time: - After 24 hours of operation	---	5

Error code	Diagnostic code	Meaning
7	3	Loss of flame
82	#	Error during speed standardization of the VSD
83	#	Speed error VSD
85	#	Referencing error of an actuator
86	#	Error fuel actuator
87	#	Error air actuator
95	#	Error relay supervision
96	#	Error relay supervision
97...98	#	Error relay supervision
99...100	#	Internal error relay control

### 3.5.3.5. Start without prepurging (as per EN 676)

When using valve proving and 2 fuel valves of class A, prepurging is not required (conforming to EN 676).

Prepurging can be deactivated per parameter.

No.	Parameter
222	Gas: Prepurging 0 = deactivated 1 = activated

When prepurging is activated, it will be performed in accordance with the adjusted pre-purge time.

If not activated, it will nevertheless be performed if one or several of the following conditions apply:

- Alterable lockout position
- After an off time of >24 hours
- In the event of a power failure (power-on)
- In the event of shutdown due to an interruption of gas supply (safety shutdown)

No.	Parameter
225	Gas: Prepurge time

### 3.5.3.6. Gas shortage program

If the gas pressure is too low, startup will be aborted in Phase 22. In that case, the system makes a selectable number of start attempts until lockout occurs. The waiting time from one start attempt to the next is doubled each time, starting from a waiting time that can be parameterized.

No.	Parameter
246	Gas: Gas shortage waiting time

If gas shortage occurs with the last of the parameterized number of start attempts, the system will initiate lockout.

No.	Parameter
223	Repetition limit pressure switch-min-gas

### 3.5.3.7. Program stop function

To simplify the burner settings in connection with commissioning and service work, the program sequence of the LMV37.4... can be stopped at the following positions:

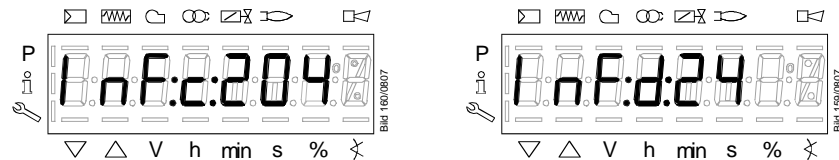
- |                                    |    |
|------------------------------------|----|
| 1) Air damper in prepurge position | 24 |
| 2) Ignition position               | 36 |
| 3) Interval 1                      | 44 |
| 4) Interval 2                      | 52 |

The program stops are integrated in the setting sequence when the plant is commissioned (refer to chapter «Fuel / air ratio control settings»).

After the initial settings, program stops can be activated on the parameter level.

No.	Parameter
208	Program stop 0 = deactivated 1 = PrePurgP (Ph24) 2 = IgnitPos (Ph36) 3 = Interv1 (Ph44) 4 = Interv2 (Ph52)

The program stop function is maintained until manually deactivated. If the system halts at one of the program stops, a message appears on the display of the AZL2...



### 3.5.3.8. Forced intermittent operation (< 24 hours)

When forced intermittent operation is activated, the unit will shut down for a moment after 23 hours and 45 min of uninterrupted operation.

Forced intermittent operation is a standard feature.

No.	Parameter
239	Gas. Forced intermittent operation 0 = deactivated 1 = activated
279	Oil: Forced intermittent operation 0 = deactivated 1 = activated

### 3.5.3.9. Part load shutdown

To prevent the boiler from being shut down under full or nearly full load conditions, electronic fuel / air ratio control can run the burner to the low-fire position first, when there is no more heat request (refer to section 6.5 «End of running position»).

### 3.5.3.10. Continuous fan

For burners that can be damaged by heat (e.g. several burners using the same combustion chamber), continuous purging may be required. In that case, the fan operates in all phases.

For that purpose, the fan contactor is to be connected to X3-05, terminal 3, tapped after the unit fuse and the safety loop.

For checking the air pressure switch, a pressure switch relief valve must be connected to fan contactor X3-05, terminal 1. When output X3-05, terminal 1, is activated, the relief valve diverts the fan pressure to the air pressure switch and, when deactivated, ensures that no pressure will be fed to the switch.

Example:

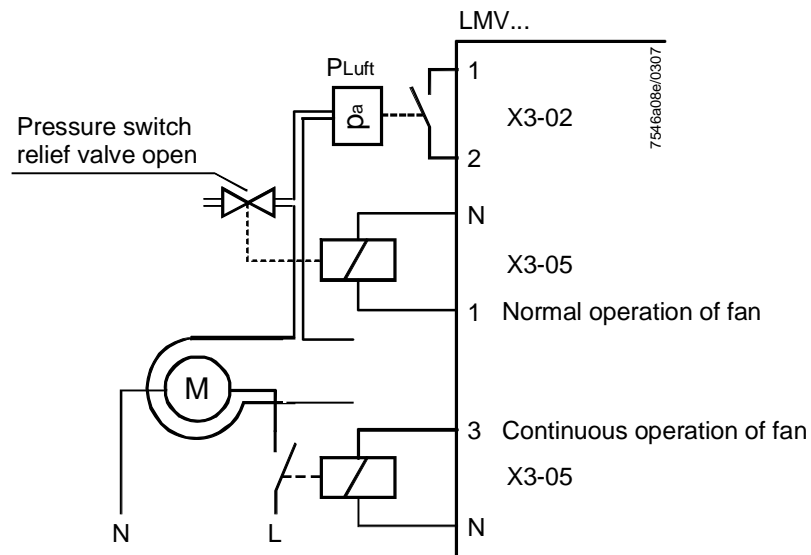
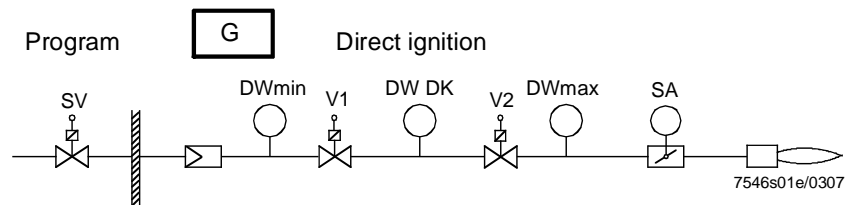


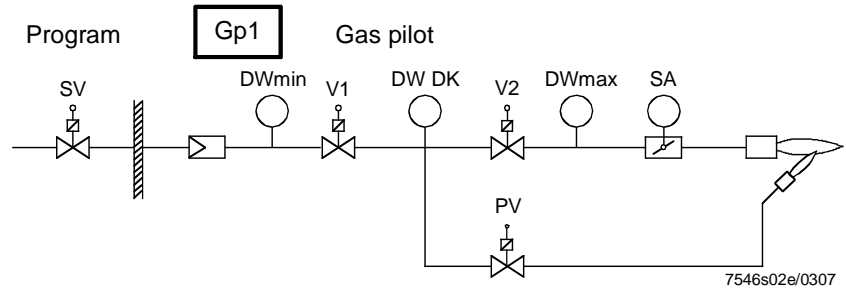
Figure 23: Continuous fan

### 3.6 Fuel trains (application examples)

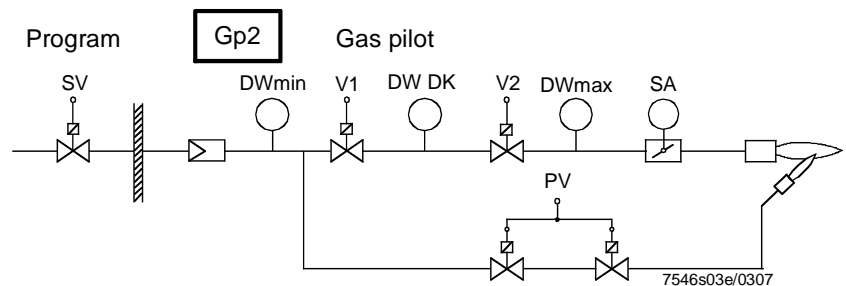
Gas direct ignition



Gas pilot ignition 1

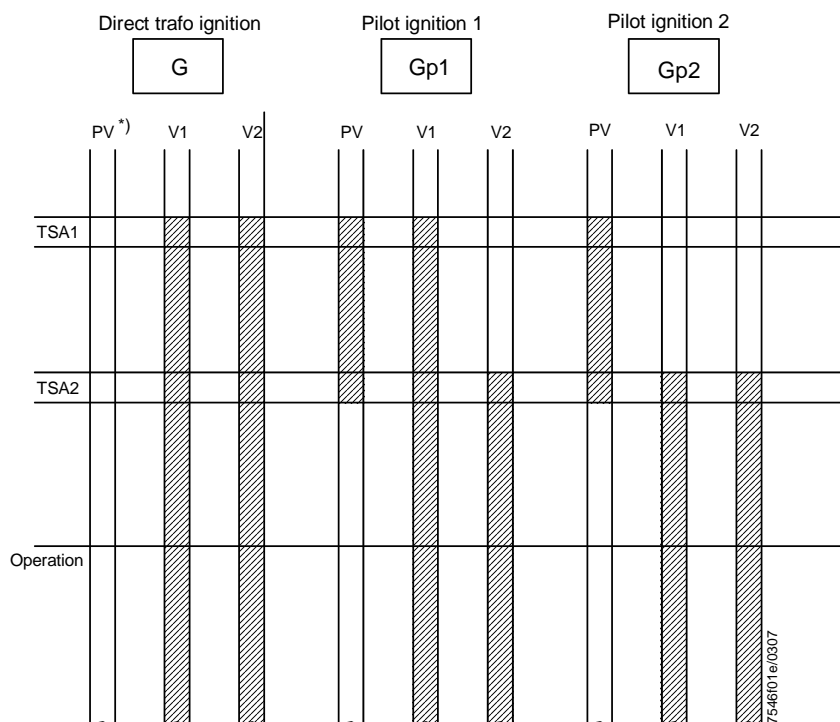


Gas pilot ignition 2



Fuel valve  
control program

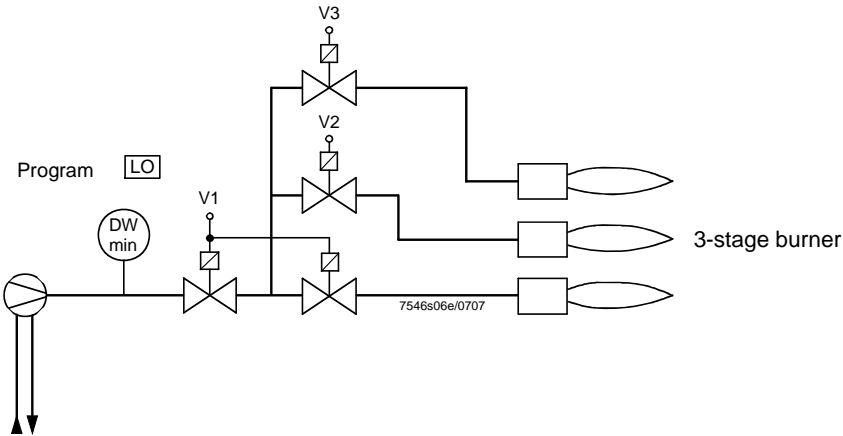
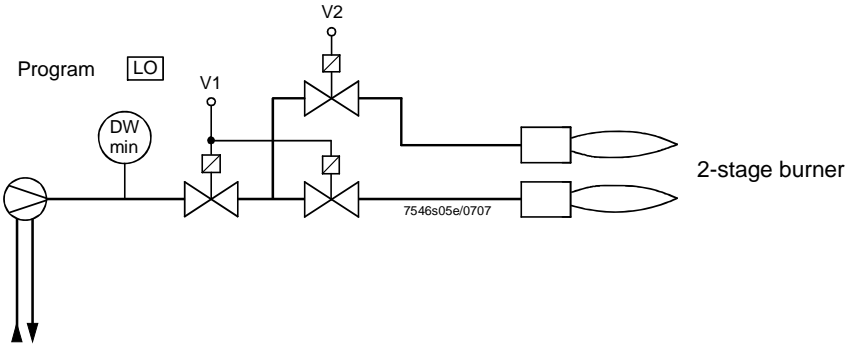
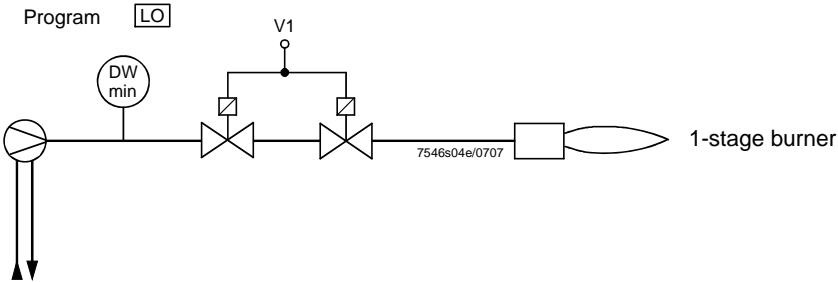
Gas (always modulate)



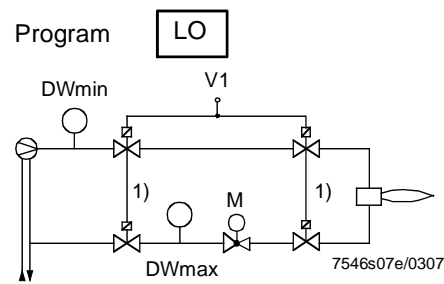
#### Legend for fuel trains:

- \*) Not used
- 1) Series connection of two DC 115 V valves (each requiring approx. 25 VA control power)
- 2) Preheating device
- V Fuel valve
- VP Valve proving
- PS Pressure switch
- HE Heating element
- HO Heavy oil
- LO Light oil
- ACT Actuator
- No Normally Open
- SV Safety shutoff valve (outside the building)
- PV Pilot valve

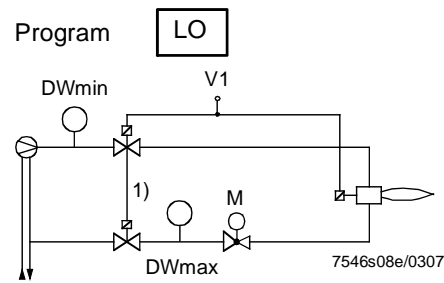
Light oil direct ignition,  
multistage



Light oil direct ignition,  
modulating



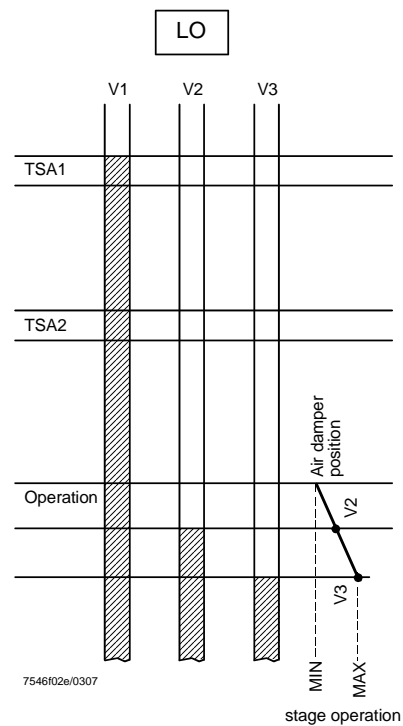
Modulating burner  
(without shutdown facility for adjustable head)



Modulating burner  
(with shutdown facility for adjustable head)

Fuel valve control  
program

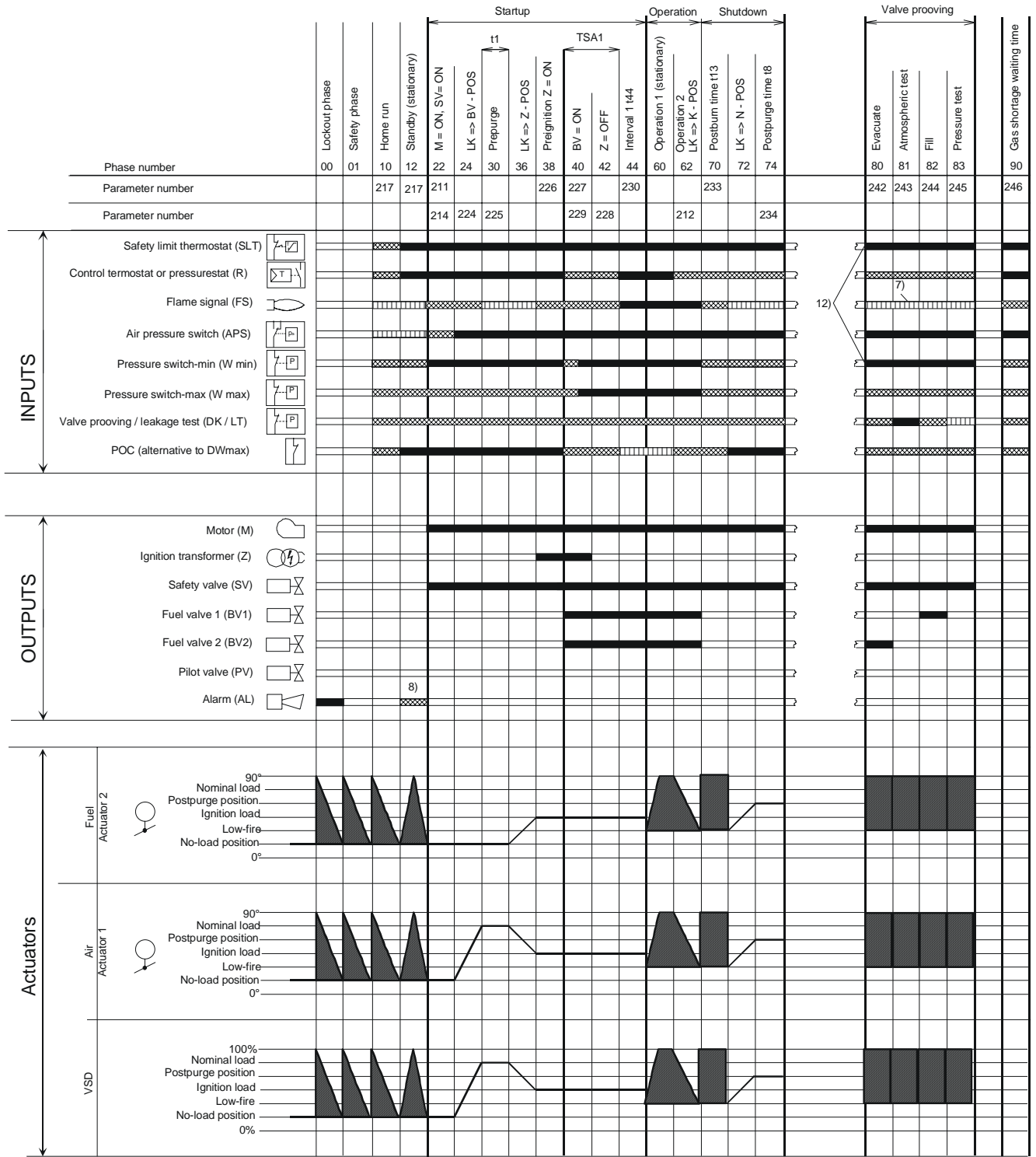
Light oil (transformer direct ignition)





## 3.7 Sequence diagrams

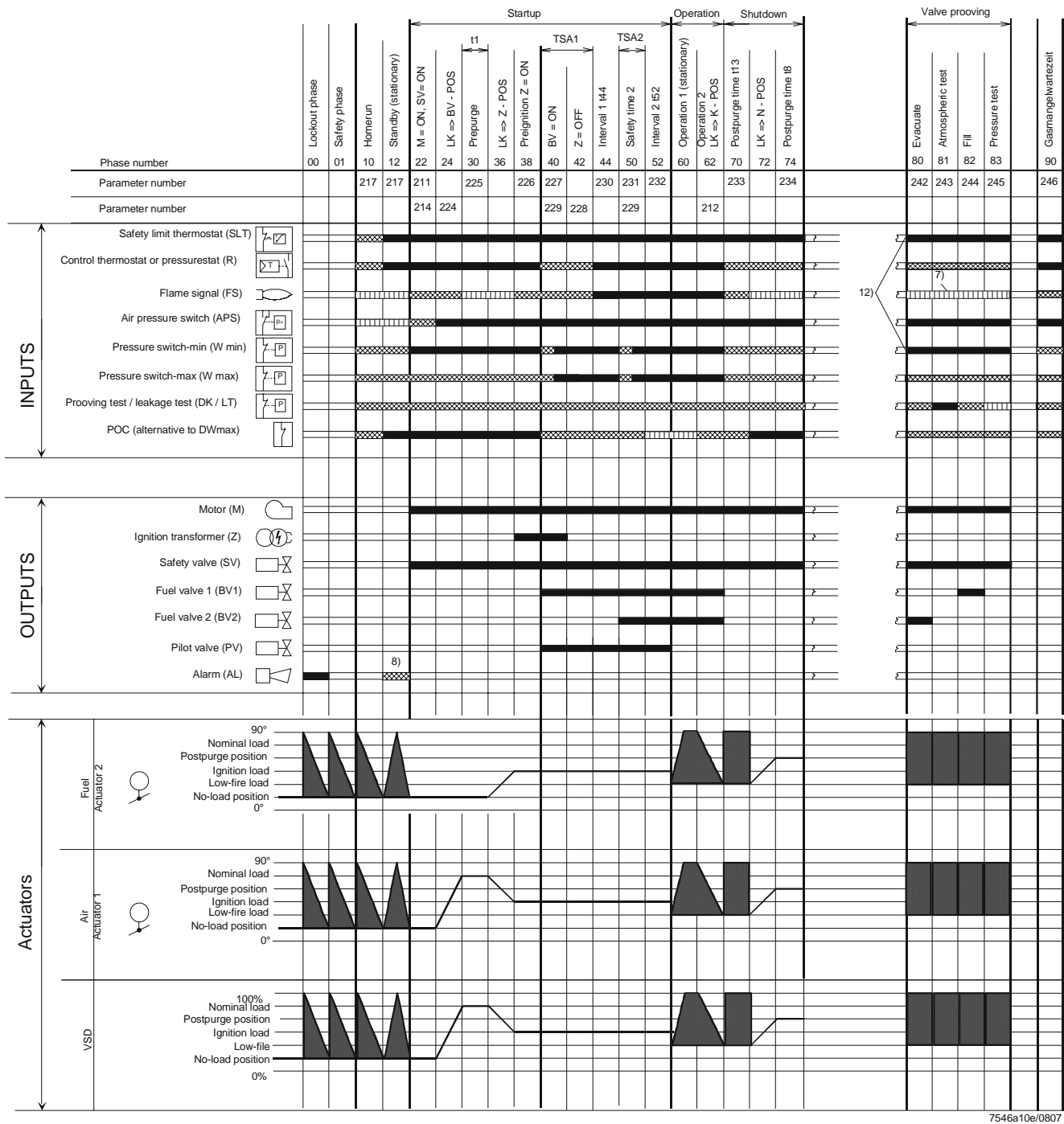
### 3.7.1 Gas direct ignition «G mod», «G mod pneu»



7546a09e/0707

Figure 24: Program for gas direct ignition (G)

### 3.7.2 Gas pilot ignition 1 «Gp1 mod», «Gp1 mod pneu»



7546a10e/0807

Figure 25: Program for gas pilot ignition (Gp1)

### 3.7.3 Gas pilot ignition 2 «Gp2 mod», «Gp2 mod pneu»

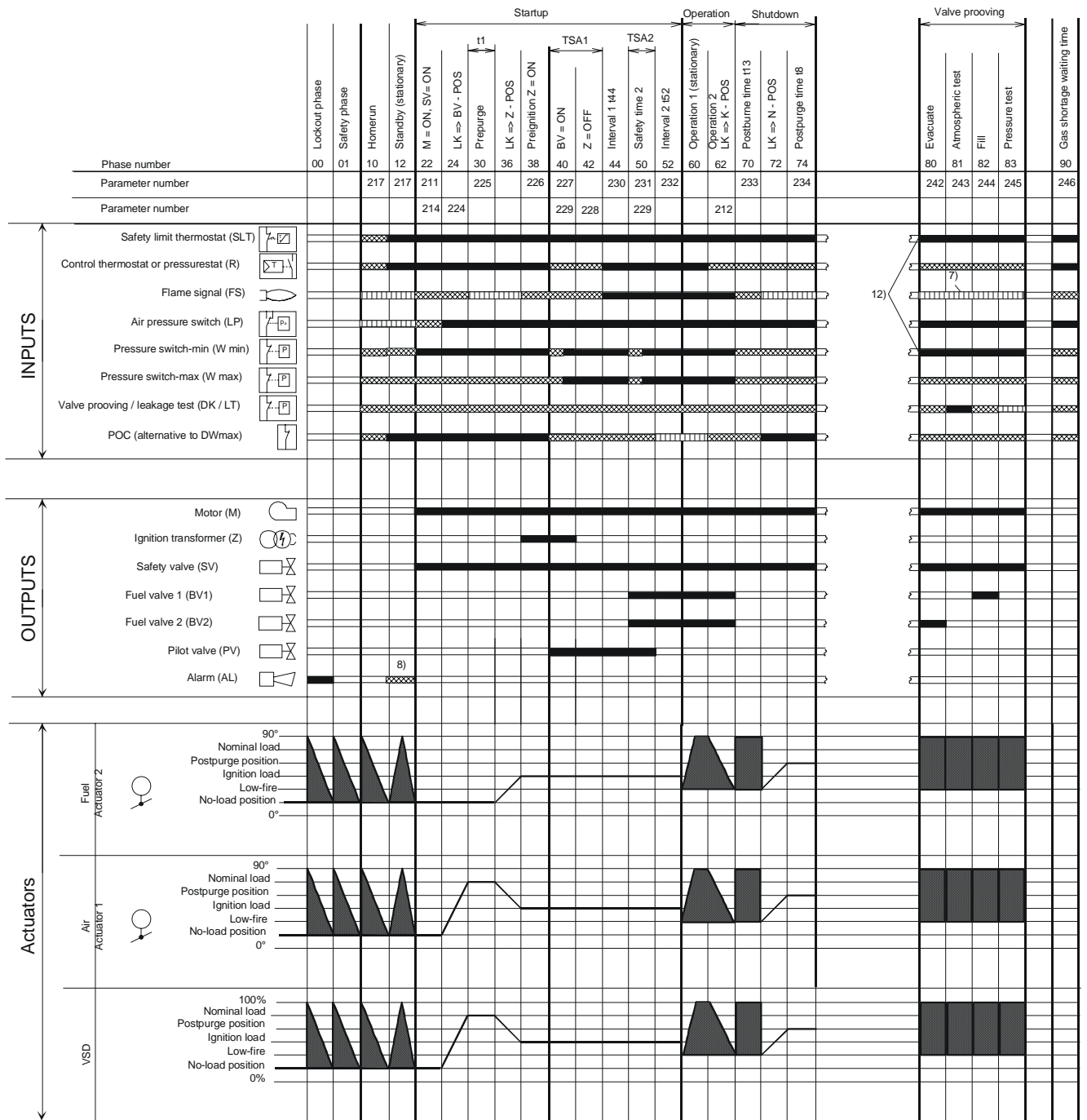
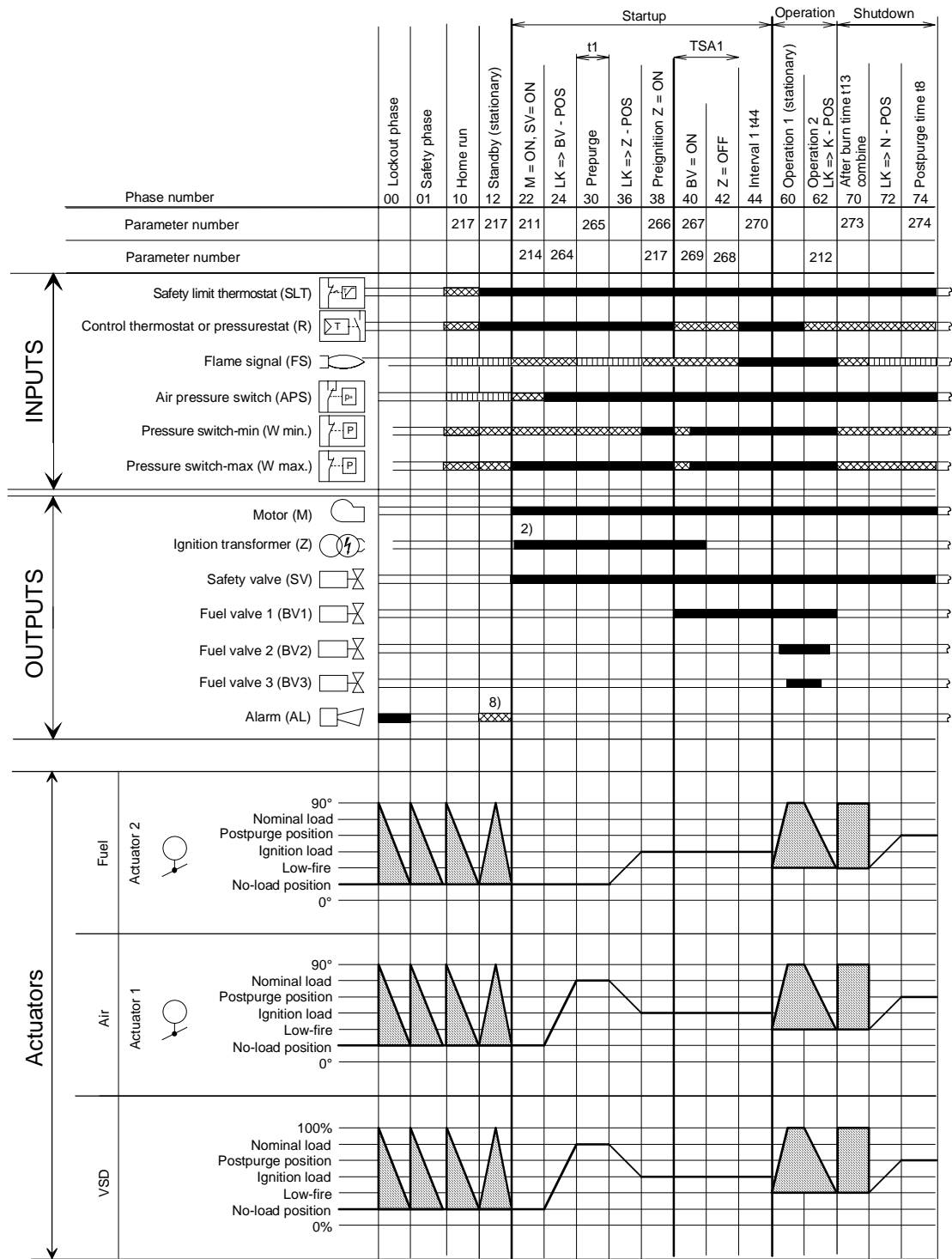


Figure 26: Program for gas pilot ignition (Gp2)

### 3.7.4 Light oil direct ignition «Lo mod», «Lo 2-stage», «Lo 3-stage»



7546a12e/0807

Figure 27: Program for light oil (LO)

### 3.7.5 Legend to the sequence diagrams


Valve proving takes place depending on the parameter:

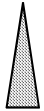
Between Phase 62 and Phase 70 or / and between Phase 24 and Phase 30

- 2) Parameter: Short / long preignition time for oil only  
Short / long oil pump switch – switch-on time – time
- 7) Only with valve proving on startup
- 8) Parameter: With / without alarm in the event of start prevention
- 12) With valve proving on startup, continue with program phase 10

Assignment of times:

t1	Prepurge time
t8	Postpurge time
t13	Permissible afterburn time
t44	Interval 1 gas / oil
t52	Interval 2 gas / oil
TSA1	Safety time 1 gas / oil
TSA2	Safety time 2 gas / oil

 Permissible position range




In standby: After referencing, the actuator will be driven to the no-load position


0° Position as supplied (0°)

90° Actuator fully open (90°)

AL	Alarm
BV...	Fuel valve
DK	Valve proving (pressure switch leakage test)
FS	Flame signal
K	Low-fire position
LK	Leakage test
LP	Air pressure switch
M	Fan motor
N	Postpurge position / postpurging
POC	Proof of closure
PV	Pilot valve
R	No-load position
SA...	Actuator
SV	Safety shutoff valve
SL	Safety limiter
V	Nominal load position
GPmin	Pressure switch-min
GPmax	Pressure switch-max
Z	Ignition position

 Signal ON

 Signal OFF

 Permissible signal

## 4 Selection of operating mode

To facilitate straightforward adaptation of the LMV37.4... to different types of burners, the system offers automatic configuration of the operating mode. This means that – derived from parameter 201 – the most important configurations relating to the operating mode are made automatically. Very often in that case, the only manual settings to be made are those for the fuel / air ratio control system.

No.	Parameter
201	Burner operating mode (fuel train, modulating / multistage, actuators, etc.) -- = undefined (delete curves) 1 = G mod 2 = Gp1 mod 3 = Gp2 mod 4 = Lo mod 5 = Lo 2-stage 6 = Lo 3-stage 7 = G mod pneu 8 = Gp1 mod pneu 9 = Gp2 mod pneu

Operating mode P201	Fuel train	Fuel / air ratio control	Fuel actuator	Air actuator	Feedback signal VSD	Description
1	G mod	Modulating electronic	x	x	x	Gas direct ignition, modulating electronic fuel / air ratio control Optional with VSD with speed feedback signal
2	Gp1 mod	Modulating electronic	x	x	x	Gas pilot ignition 1, modulating electronic fuel / air ratio control Optional with VSD with speed feedback signal
3	Gp2 mod	Modulating electronic	x	x	x	Gas pilot ignition 2, modulating electronic fuel / air ratio control Optional with VSD with speed feedback signal
4	Lo mod	Modulating electronic	x	x	x	Oil direct ignition, modulating electronic fuel / air ratio control Optional with VSD with speed feedback signal
5	Lo mod	2-stage		x	x	Oil direct ignition, electronic 2-stage fuel / air ratio control Optional with VSD with speed feedback signal
6	Lo mod	3-stage		x	x	Oil direct ignition, electronic 3-stage fuel / air ratio control Optional with VSD with speed feedback signal
7	G mod	Modulating pneumatic		x		Gas direct ignition, modulating pneumatic fuel / air ratio control Optional with VSD without speed feedback signal
8	Gp1 mod	Modulating pneumatic		x		Gas pilot ignition 1, modulating pneumatic fuel / air ratio control Optional with VSD without speed feedback signal
9	Gp2 mod	Modulating pneumatic		x		Gas pilot ignition 2, modulating pneumatic fuel / air ratio control Optional with VSD without speed feedback signal

(Also refer to section 3.6 «Fuel trains»)

The VSD can be used with any of the operating modes (refer to chapter 8 «VSD»).

No.	Parameter
542	Activation of VSD / PWM fan



For configuration of the analog output when the VSD is activated, refer to chapter «Load output X74.3»!

## 5 Connection to load controllers

The LMV37.4... system can be connected to different load controllers. The heat request and the required burner output are determined in accordance with the priorities of the different heat sources.

### 5.1 Controller on contact X5-03, terminal 1

This contact is given priority over all load sources. A heat request can be made only when this contact is closed. The contact is safety-related and can also be used in connection with controllers featuring an integrated temperature limiter function.

### 5.2 External load controller via contacts X5-03, terminals 2 / 3

The heat request is delivered via terminal 1. Modulation of burner output is effected via terminals 2 and 3. Here, a differentiation is made between modulating and multistage operation (refer to chapter 4 «Selection of operating mode»).

#### Modulating operation X5-03 (OPEN «▲» terminal 3 / CLOSE «▼» terminal 2)

If input OPEN is active, the burner's output will be increased. If input CLOSE is active, the burner's output will be decreased. If none of the inputs is active, the burner's output stays the same.

The rate of integration is 32 seconds for changing the output from low-fire to nominal load, that is from 20 % to 100 %, or vice versa. Output integration always takes place in the operation position.

200 ms is the shortest positioning step that is securely detected.

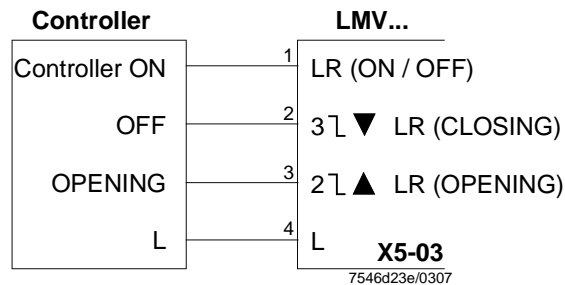


Figure 28: Modulating operation X5-03

### Multistage operation X5-03 (stage 2, terminal 3 / stage 3, terminal 2)

In multistage operation, one or 2 thermostats can be connected to activate the different burner stages. Multistage operation is possible only when firing on oil.

If neither input «Stage 2» nor input «Stage 3» is active, the burner will switch to «Stage 1».

If input «Stage 2» becomes active, the burner will switch to the second stage.

If input «Stage 3» becomes active, the burner will switch to the third stage. In that case, input «Stage 2» can be active or inactive. The third stage can only be activated with 3-stage operation.

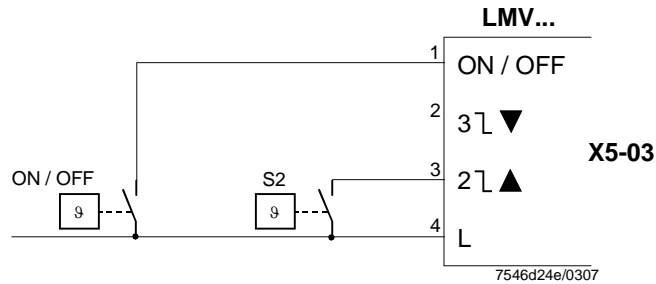


Figure 29: 2-stage operation X5-03

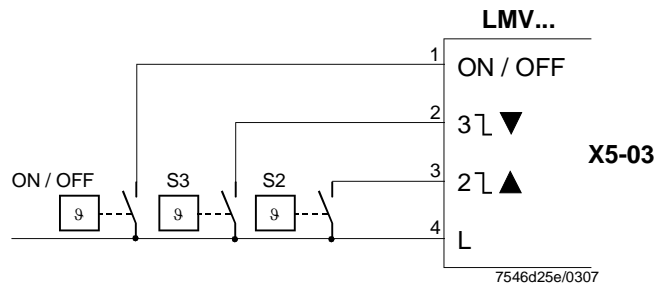


Figure 30: 3-stage operation X5-03

### Shifting multistage operation (OPEN ▲ terminal 3 / CLOSE ▼ terminal 2)

Using a simple thermostat, a modulating burner can be operated in shifting 2-stage mode. In that case, there must be a firm connection between terminal CLOSE and the live conductor (L), and terminal OPEN must be connected to the thermostat or the controller.

If OPEN is inactive, the active CLOSE terminal drives the burner to low-fire.

If OPEN becomes active, priority is given over terminal CLOSE so that the output will be increased by driving the burner to nominal load.

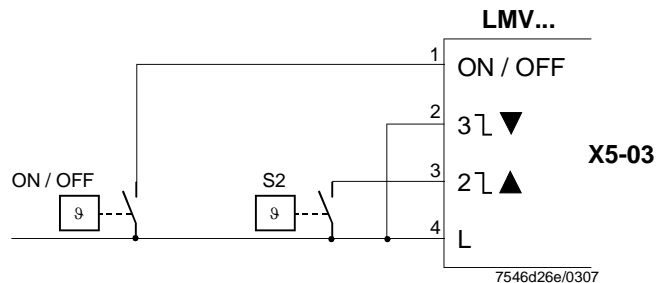


Figure 31: Shifting multistage operation (OPEN ▲ terminal 3 / CLOSE ▼ terminal 2)



## 5.3 Preselection of output via the building automation system

For the control of the LMV37.4... basic unit, the output can be preselected from the building automation system via the X92 interface.

For more detailed information, please refer to the Modbus User Documentation (A7541).

### Behavior in the event the building automation and control system fails

If the system receives no more data from building automation, it will deliver the output set with parameter 148.

Parameter	
148	<p>Performance standard at interruption of communication with building automation</p> <p>For <b>modulation operation</b> the setting range is as follows: 0...19.9 = burner off 20...100 = 20...100 % burner rating</p> <p>For <b>multistage operation</b> apply to setting range: 0 = burner OFF, P1, P2, P3 Invalid = no performance standards of the building automation</p>

Setting choices:

- a) Output preset with parameter 148 set undefined (--):  
In the event of communication breakdown, the last valid preselected output will be maintained. The next load controller activated in accordance with the priority (refer to section 5.2) will ensure control from this load position.
- b) Output preset with parameter 148 set to 0, 20...100 %, or parameterized as multistage:  
If communication breaks down, the output requested by the building automation and control system will be set invalid and the output set under parameter 148 will be delivered.

Note:

In that case, outputs via load controllers with a priority lower than that of the building automation and control system cannot be delivered.

## 5.4 Manual output

A manual output can be set with the «Normal display» of the display and operating unit or via the PC tool.

### Manual output via the display and operating unit

Manual output can be activated or adjusted by keeping the **F** button depressed for at least 1 second and by pressing the **+** or **–** button.

Output **0** means «Manually off».

As long as manual output is active, the output appearing on the normal display flashes.

To deactivate and to change to automatic operation, press **Escape** for 3 seconds.

If «Manually off» is activated, it will be stored via mains OFF.

On power return, the burner assumes the «Manually off» position (**OFF** flashing) (refer to chapter «Operation»).

#### Activation of «Manually off» in operation

To activate «Manually off», first run the system to the minimum output limit. Then, keep the **F** button depressed for at least 1 second and press the **–** button.

«Manually off» will be activated by releasing the **F** button and by pressing again the **–** button.



#### **Caution!**

«Manually off» must not be used by it self to put a burner out of operation when doing mounting work, or when the burner is not ready for operation.

### Manual output via the PC tool

Refer to description of the PC tool (J7542).

## 5.5 Output with curve settings

To set the curves via the display and operating unit or the PC tool, a special parameterization output is provided. Using this output, it is also possible to approach the point of ignition. The output is delivered automatically and cannot be set manually. It is only mentioned here for the sake of completeness.

## 5.6 External load controller via analog input

For the preselection of external outputs, an analog 4...20 mA input is provided.

### Switching thresholds / minimum positioning step

A disruption of the current input or a current signal < 2 mA leads to deactivation of the analog input's external preselected load. For the preselected load of the analog input, a minimum positioning step of 1% is set as a fixed value for modulating operation.

#### 1. Thresholds for modulating operation

Actual value	Current	Display / load value
Off	4 mA	Off
Low-fire	6 mA	20%
nominal load	20 mA	100%

#### 2. Switching thresholds for 2-stage operation

Actual value	Current	Display / load value
Off	4 mA	Off
Stage 1	10 mA	P1
Stage 2	20 mA	P2

#### 3. Switching thresholds for 3-stage operation

Actual value	Current	Display / load value
Off	4 mA	Off
Stage 1	7.5 mA	P1
Stage 2	14 mA	P2
Stage 3	20 mA	P3

## 5.7 Prioritization of load sources

To simplify configuration of the system, the load source need not be selected. The system automatically detects the available load sources and selects them. If several sources are used, they will be selected according to the following priorities:

Parameter 942	Priority	Active load source
	1 highest	5.1 Controller-on-contact X5-03, terminal 1 When the input is activated, the other load sources will be assessed according to their priorities. When the input is deactivated, the burner is off
1	2	5.5 Output with curve settings
2	3	5.4 Manual output
3	4	5.3 Load controller via the building automation system
4	5	5.6 External load controller via analog input X64 terminal 1 / terminal 2
5	6 lowest	5.2 External load controller via contacts X5-03, terminal 2 / terminal 3

The active load source can be read out via parameter 942.

### 5.7.1 Emergency operation with several load controllers

By making use of the prioritization described above, it is also possible to implement emergency operation. Should the building automation and control system fail (provided parameter 148 is set to undefined (--)), the unit will automatically switch over to the external load controller.

A load controller via analogue input or, if existing via contacts can be connected.

### 5.7.2 Manual control

If the external load controller via analogue input or via contacts is not used, a simple manual output adjustment via switch can be implemented by cutting the connection to the load controller for switching from automatic to manual operation. In that case, the system switches to the external load controller via contact. An ON / OFF switch or stage 2 / stage 3 can then be connected to its terminals.

## 6 Electronic fuel / air ratio control

### 6.1 General

Electronic fuel / air ratio control is used for controlling the burner's actuators depending on burner output. It is possible to connect 2 actuators and, optionally, one VSD. Resolution is 0.1° with the actuators and 0.1 % with the VSD. Output can be regulated in increments of 0.1 % in modulating mode and with a maximum of 3-stages in multistage mode.

To reduce the amount of electric power required for the actuators, they are never operated simultaneously, but in successive order, or alternately.

### 6.2 Behavior outside operation

Outside the running position, the actuators approach the different positions in successive order.

The program phase determines the position to be approached.

#### 6.2.1 Running speed

The actuators' running speed is fixed at 5 seconds for a positioning angle of 90°.

The ramp speed of the VSD can be adjusted separately for higher and lower speeds.

No.	Parameter
522	Ramp up
523	Ramp down

The setting also applies to the running position (refer to subsection 6.3.5).

#### 6.2.2 No-load position

This position is approached in the «Home run» (10), «Standby» (12) and «Lockout position» (00) phases.

The position can be set via the following parameters:

Parameter	Actuator
501.00	No-load position fuel actuator
502.00	No-load position air actuator
503.00	No-load speed VSD

### 6.2.3 Prepurgig

This position is approached in phase «Traveling to prepurging» (24).

The position can be set via the following parameters:

Parameter	Actuator
501.01	Prepurge position fuel actuator
502.01	Prepurge position air actuator
503.01	Prepurge speed VSD

No.	Parameter
222	Gas: Prepurge 0 = inactive 1 = active
262	Oil: Prepurgig 0 = deactivated 1 = activated

### 6.2.4 Ignition

The ignition position is approached in phase «Traveling to the ignition position» (38).  
The position is set via curve parameterization under **P0**. In modulating operation, this point is assigned to an output of 10 %.

### 6.2.5 Postpurging

This position is approached in phase «Traveling to postpurging» (72).

The position can be set via the following parameters:

Parameter	Actuator
501.02	Postpurge position fuel actuator
502.02	Postpurge position air actuator
503.02	Postpurge speed VSD

## 6.3 Modulating operation

In modulating mode, it is possible to operate 2 actuators and one VSD. The burner's output can be regulated between 20.0 % (low-fire) and 100.0 % (nominal load) in increments of 0.1 %. Since the actuators are never allowed to operate simultaneously, the output is increased in small steps of 1 %. In the case of an operating ramp of 20 % after 100 % in 32 seconds, this represents one step in 400 ms. Within such an output step, the air actuator is operated in the first 200 ms and the VSD, and the fuel actuator in the second 200 ms.

### 6.3.1 Definition of curves

The fuel / air ratio curves are defined by 10 curve points that are firmly distributed across the output range.

The following assignment applies:

Curve point	Output	Meaning
P0	10 %	Point of ignition, is not approached in the running position
P1	20 %	Low-fire
P2	30 %	
P3	40 %	
P4	50 %	
P5	60 %	
P6	70 %	
P7	80 %	
P8	90 %	
P9	100 %	nominal load

The actuator positions can be set with a resolution of 0.1°. Between the curve points, the positions are interpolated in a linear manner.

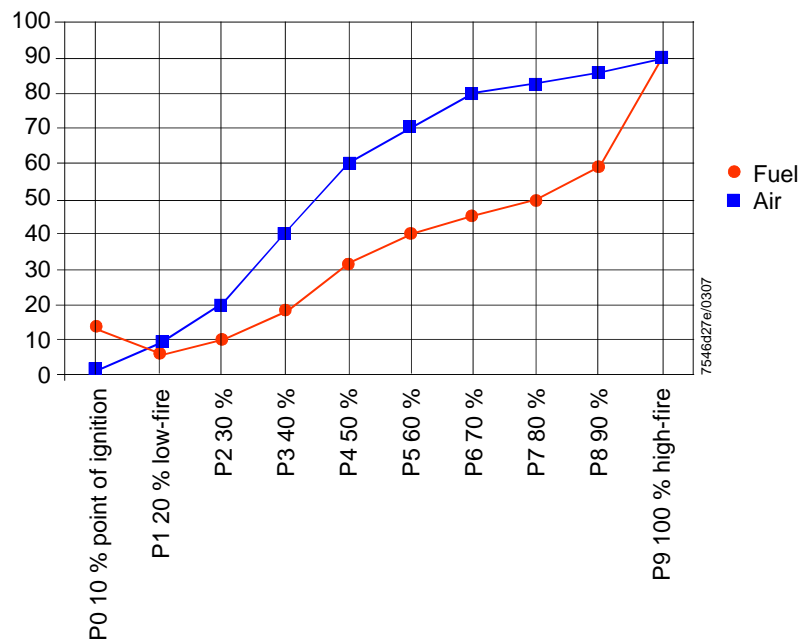


Figure 32: Definition of curves

No.	Parameter
401	Ratio control curves fuel actuator
402	Ratio control curves air actuator
40	Ratio control curves VSD

### 6.3.2 Running speed / maximum curve slope

The time required to modulate from low-fire to nominal-load is 32 seconds.

In connection with the actuator's ramp, the following maximum positioning angles or speed changes between 2 curve points can be covered:

Type of actuator	Positioning speed	Positioning angle
Electromotoric actuator	5 s / 90°	31°
VSD	5 s / 100 %	40 %
	10 s / 100 %	20 %
	20 s / 100 %	10 %

No.	Parameter
522	Ramp up
523	Ramp down

The setting also acts outside the running position (refer to subsection driving speed).

Error code	Diagnostic code	Meaning for the LMV37.4... system
84	1	VSD: Curve too steep in terms of the ramp rate
	2	Fuel actuator: Curve too steep in terms of ramp speed
	4	Air actuator: Curve too steep in terms of ramp speed

The parameterized curve is steeper than permitted with the selected actuator speed.

### 6.3.3 Adjustment of output

To ensure that, during modulation, no dynamic O<sub>2</sub> change will occur, the air actors (air actuator and VSD) lag behind the fuel actuator when the burner's output is increased, the difference being minus 0.5 %, and plus 0.5 % when the burner's output is decreased. Hence, on average, the actuators follow exactly the required curve.

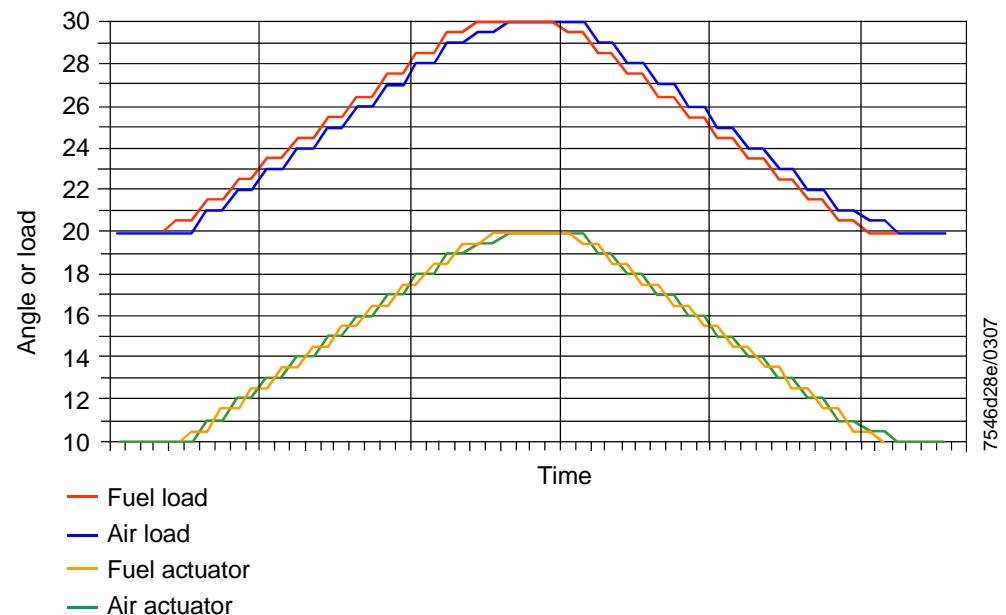


Figure 33: Adjustment of output



### 6.3.4 Entering the running position

The burner is ignited when ignition position **P0** is reached. When entering operating phase **60**, the actuators will follow the defined curves until the low-fire position is reached (20 % or parameter 545).

### 6.3.5 Running position

As demanded by the load controller, the actuators will be driven along the defined 20 % and 100 % curves. Point of ignition **P0** can only be reached via the curve setting.

### 6.3.6 Restriction of modulation range

If the modulation range shall be further restricted from 20 % to 100 % against the defined curve, 2 parameters are available to define a new low-fire and new nominal load position.

No.	Parameter
545	Lower load limit
546	Upper load limit

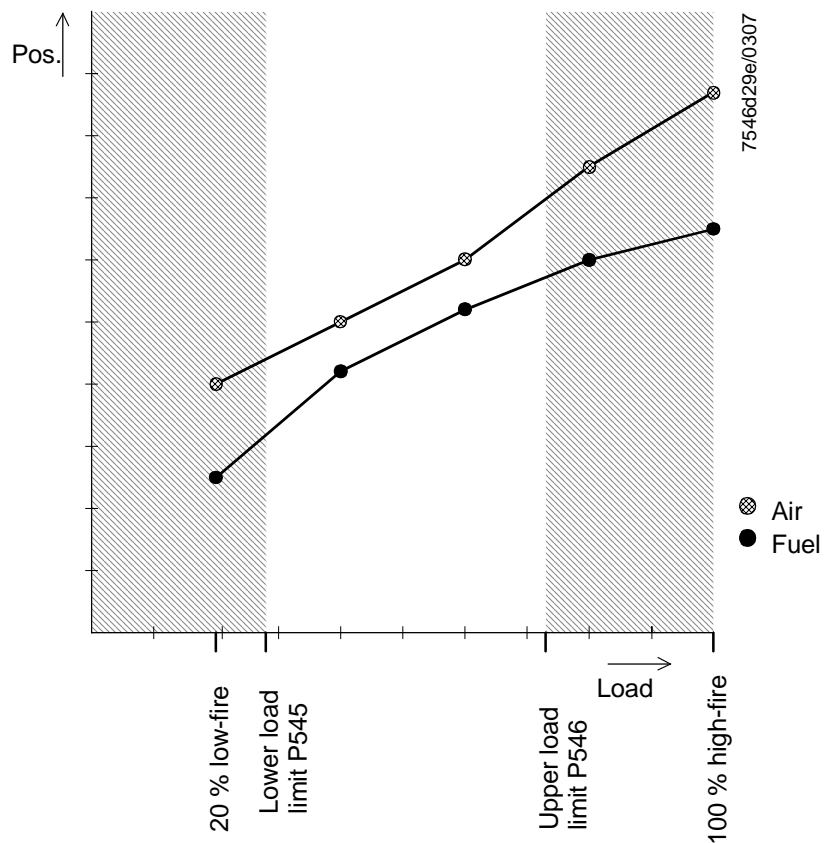


Figure 34: Restriction of modulation range

## 6.4 Multistage operation

This operating mode is only available when firing on oil. There is a choice of 2-stage and 3-stage operation. Hence, the burner's output can be regulated via 2 or 3-stages. Modulation is accomplished by adjustment of the air actuator or of VSD and by switching the fuel valves for changing the amount of fuel delivered.

### 6.4.1 Definition of curves

Fuel / air ratio control is defined via the 2 or 3 static load points. To switch the valves on and off, switch-on and switch-off points must be defined.

The following assignment is used:

Curve-point	Meaning	Valve
P0	Point of ignition (will not be approached in the running position)	V1
P1	Stage 1	V1
P2on	Switch-on point stage 2. When this point is exceeded, the fuel valve for the second stage will be switched on	V1
P2_d	Presetting of point P2 with no approach	V2
P2	Stage 2	V2
P2of	Switch-off point stage 2. When this point is crossed, the fuel valve for the second stage will be switched off	V2
P3on	Switch-on point stage 3. When this point is exceeded, the fuel valve for the third stage will be switched on	V2
P3_d	Presetting of point P3 with no approach	V3
P3	Stage 3	V3
P3of	Switch-off point stage 3. When this point is crossed, the fuel valve for the third stage will be switched off	V3

The actuator positions can be set with a resolution of 0.1°, the speeds with a resolution of 0.1 %.

### 6.4.2 Running speed

The air actuator or the VSD is operated like outside the running position. The defined ramp speeds are used.

The running speed of the actuators is fixed at 5 seconds for a positioning angle of 90°. For increasing or degrading the speed, the speed of the VSD can be separated adjusted.

No.	Parameter
522	Ramp up
523	Ramp down

The setting also acts outside the operating position (refer to subsection «Running speed»).

### 6.4.3 Adjustment of output

When the load increases, the system moves from the curve point of stage 1 (P1) to the switch-on point of stage 2 (P2on). If the switch-on point is exceeded, the valve for the second stage will be switched on. Then, the system moves to the curve point for stage 2 (P2). When the load decreases, the system moves from the curve point of stage 2 (P2) to the switch-off point of stage 2 (P2of). If this point is crossed, the valve for the second stage will be switched off. Then, the system moves to the curve point for stage 1 (P1). In 3-stage operation, the output between stage 2 and stage 3 is adjusted analogously to 2-stage operation. As static outputs, only **P1**, **P2** and **P3** can be approached.

The switch-on and switch-off points are crossed only when changes between stages take place. The running speeds are fixed. Depending on the positioning angles to be covered, air actuator and VSD do not reach the operating or switch-on / switch-off points at the same time. The valves are switched on / off only after both actuators have reached their correct positions.

When parameterizing the curves, the switch-on points can also be approached in a stationary manner. In addition, when setting the curve via *P2\_d* (*P3\_d*), curve point *P2* (*P3*) can be readjusted without traveling to it. In that case, the system is at the respective switch-on point. This procedure is used to cut the operating time if there is shortage of air.

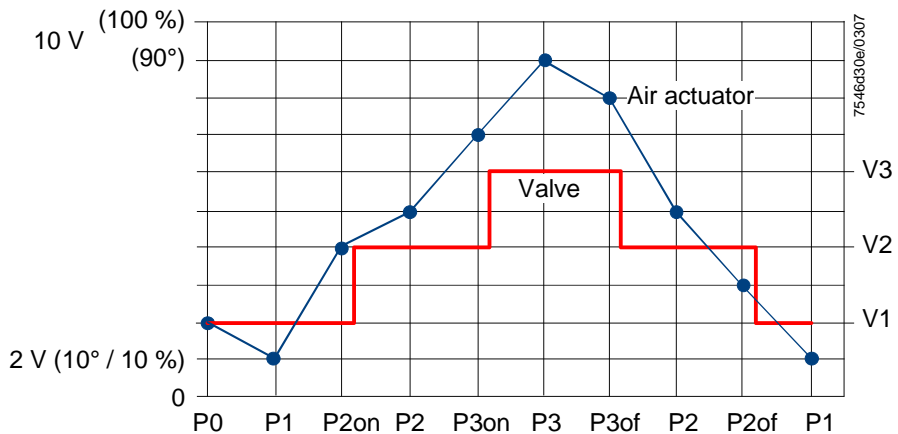


Figure 35: Adjustment of output

### 6.4.4 Changing to the running position

The burner is ignited at ignition position **P0**. When entering running phase **60**, the actuators are driven from ignition position **P0** to the running position of stage 1 (P1) at the respective running speed.

### 6.4.5 Running position

In the running position, the burner's output can be adjusted between running positions **P1** and **P2** or **P3** in accordance with the load controller's presetting, as described in subsection 6.4.3 Adjustment of output. Ignition position **P0** will not be approached anymore. It can only be reached via curve adjustment.

### 6.4.6 Restriction of the modulation range

If the modulation range for stage 1 and stage 2, or stage 3, shall be further restricted, 2 parameters can be used to define a new low-fire and new nominal load position.

No.	Parameter
545	Lower load limit
546	Upper load limit

## 6.5 End of running position

When there is no more heat request, the system switches to Phase 62. Here, the burner runs down to low-fire as long as possible before the valves are shut.

The available period of time can be set via parameter 212. If this period of time is set to the minimum value, the burner will immediately be shut down should the heat request disappear. If the time exceeds 32 seconds, the burner will always be run to the low-fire position. Naturally, it is also possible to set intermediate times.

No.	Parameter
212	Max. time down to low-fire

## 6.6 Setting and parameter setting notes

- When making the settings for the electronic fuel / air ratio control system integrated in the LMV37.4..., it must be ensured that sufficient amounts of excess air will be available because over a period of time, the flue gas values will be impacted by a number of factors, such as air density, wear of the actuators and controlling elements, etc. For this reason, the flue gas values initially set must be checked at regular intervals
- To safeguard against accidental or unauthorized transfer of parameters from the parameter backup of the ACS410 to the LMV37.4... basic unit, the OEM (burner or boiler manufacturer) must enter an individual burner identification for every burner. Only when this requirement is satisfied does the LMV37.4... system make certain that the ACS410 will not transfer a parameter set from a plant (with unsuited and possibly dangerous parameter values) to the LMV37.4... basic unit
- With the LMV37.4..., it is to be noted that the unit's characteristics are determined primarily by the parameter settings and not so much by the type of unit. This means that – among other considerations – the parameter settings must always be checked prior to commissioning the plant, and that the LMV37.4... must never be transferred from one plant to another without adapting the parameters to the new plant
- When using the ACS410 PC software, the safety notes given in the relevant Operating Instructions (CC1J7352) must also be observed
- The parameter level is password-protected. The OEM assigns individual passwords for the parameter levels he can access. The unit is supplied with default passwords entered by Siemens; they must be changed by the OEM. These passwords are confidential and may only be assigned to authorized staff
- The responsibility for setting parameters is assumed by the person who, in accordance with the access rights, has made changes on the respective setting level

**In particular, the OEM will assume responsibility for the correct parameter settings in compliance with the standards covering the specific applications (e.g. EN 676, EN 267, EN 1643, etc.).**

## 7 Actuators

One or 2 actuators can be connected to the LMV37.4... system, depending on the selected operating mode (refer to chapter 4 «Selection of operating mode»).



### Caution!

When mounting the actuators, it must be made certain that the mechanical link to the controlling elements is rigid!

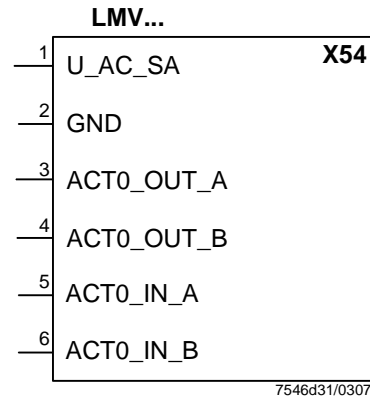


Figure 36: Actuator fuel (X54)

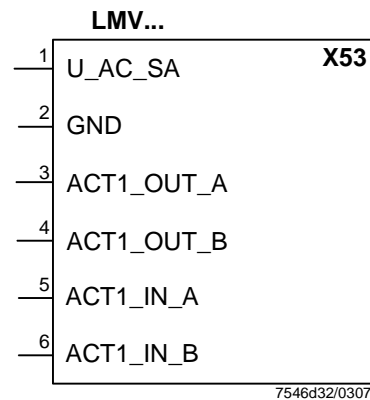


Figure 37: Actuator air (X53)

### 7.1 Function principle

The actuators are driven by stepper motors. The resolution reached when making one positioning step is 0.1°. The running speed is fixed at 5 seconds for a positioning angle of 90°.

An optical incremental transducer is used to monitor the actual position. Due to the use of a gear train with almost no backlash, position control is not required.

### 7.2 Definition of angles

The angles and angular ranges are specified in the Data Sheets of the relevant actuators.

SQM33...: Refer to Data Sheet N7813

SQN1... refer to Data Sheet N7803

Also refer to Figure 38:

## 7.3 Referencing

An incremental transducer is used to ensure position feedback. Hence, referencing of the actuators must be performed after power-on. In addition, at the end of each shut-down in Phase 10, the actuators are referenced to ensure that individual stepping errors, which could lead to shutdown, do not accumulate. If a position error occurs, the system will switch to the safety phase (Phase 01), enabling the actuators with detected position errors to be referenced. During the following Phase 10, the only actuators that will be referenced are those that were not referenced before in the safety phase (Phase 01). The position of the reference point can be selected depending on the type of burner design, either the CLOSED position ( $< 0^\circ$ ) or the OPEN position ( $> 90^\circ$ ).

No.	Parameter
601	Selection of reference point Index 0 = fuel Index 1 = air 0 = closed ( $< 0^\circ$ ) 1 = open ( $> 90^\circ$ )

### Example of an actuator with counterclockwise rotation:

When referencing in the CLOSED position, the actuator first travels a certain distance into the working range (towards the OPEN position). Then, it travels to a position representing maximum  $-7.7^\circ$ , thereby crossing the reference mark for the first time. Then, the actuator moves in the other direction again and detects the inner ramp of the reference mark. This is the reference point used by all positions. If the reference point is parameterized in the OPEN position, referencing will take place in a mirror-symmetrical manner. In that case, the actuator first travels into the working range (towards the OPEN position). Then, it crosses the reference mark and travels to a position representing maximum  $110.6^\circ$ , then back to the inner ramp of the reference mark.

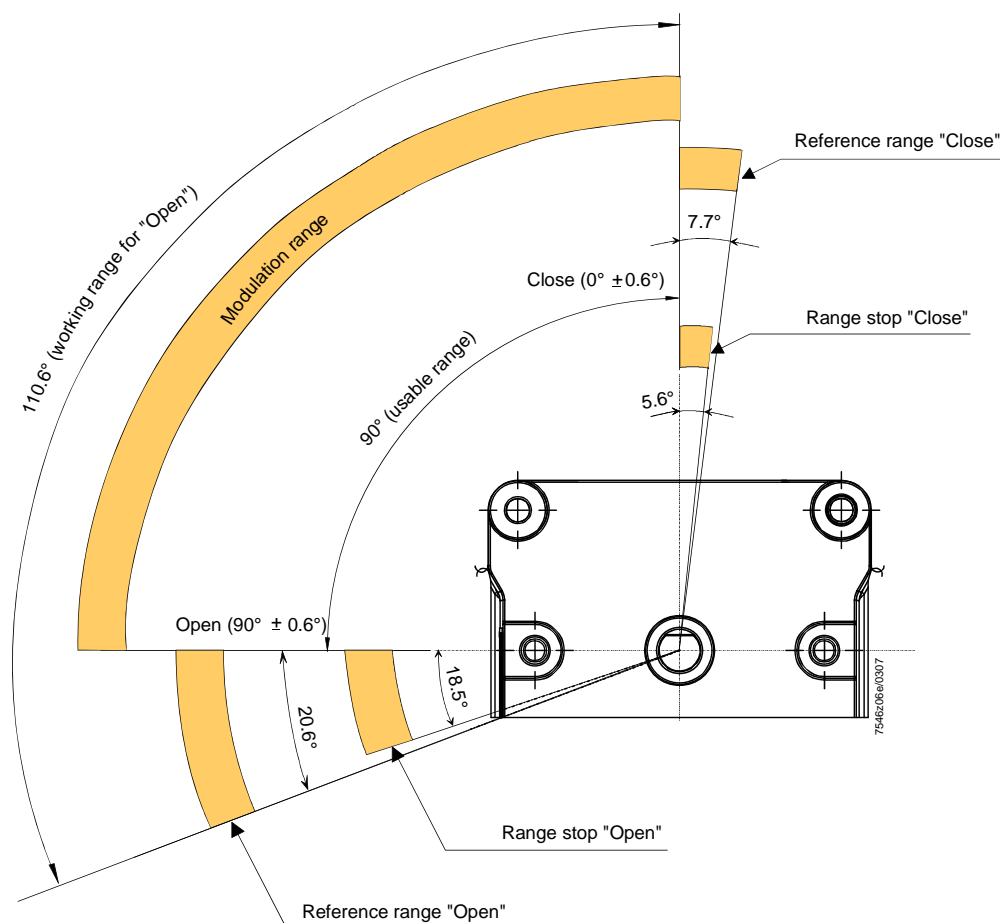


Figure 38: Angle definitions with SQM33...

Error code	Diagnostic code	Meaning for the LMV37.4... system
85	0	Referencing error of fuel actuator
	1	Referencing error of air actuator
	7	Referencing error due to parameter change

## 7.4 Direction of rotation

With the SQM3...actuator, the direction of rotation can be selected on an individual basis.

Parameter	
602.00	Direction of rotation of fuel actuator 0 = counterclockwise 1 = clockwise (only SQM3...)
602.01	Direction of rotation of air actuator 0 = counterclockwise 1 = clockwise (only SQM3...)

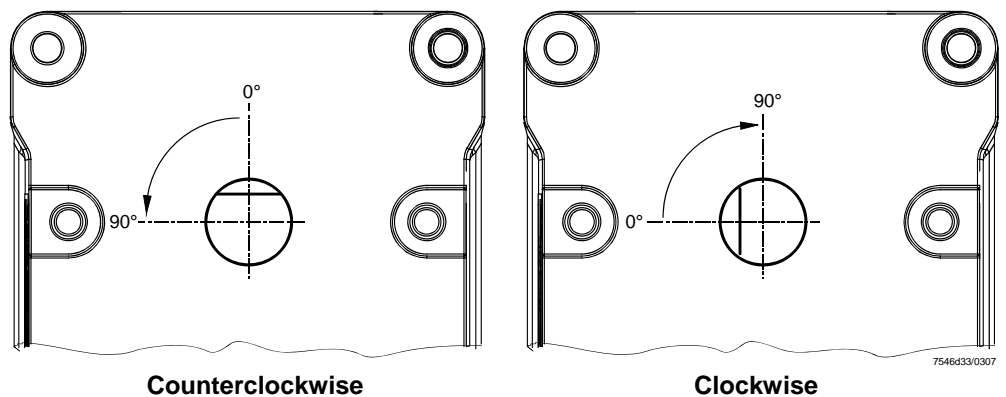


Figure 39: Direction of rotation (example SQM3...)

When SQN1..., always rotation direction left must be select.

The direction of rotation is be fixed by respective type of SQN1... actuator:

- SQN13...: direction of rotation left
- SQN14...: direction of rotation right



The actuators are always supplied with the flat of the drive shaft facing upward.

## 7.5 Monitoring the positions

To monitor the actuator's actual positions, an optical incremental transducer with a resolution of  $0.7^\circ$  is used. The correct position of the drive shaft is ensured by comparing the motor steps made with the position obtained from the incremental transducer. Due to the different resolutions of motor steps and incremental transducer plus the selected tolerance band, the following error identification band is obtained. The decision where, in the error identification band, shutdown takes place depends on the currently required position.

For the default setting made in the factory, the error detection band is as follows:

Smallest position error where an error can be detected	1.1°
Greatest position error where an error is securely detected (default setting parameter 606)	1.7°

At referencing under load addition resilience of actuator gearing should be considered:

Type reference	Resilience at max. rated driving torque
SQM33.41...	0.2°
SQM33.51...	0.2°
SQN13.14...	0.3°
SQN13.17...	0.8°
SQN14.14...	0.3°
SQN14.17...	0.8°

The error recognition time is < 1 second.

### Caution!

This means that – for the design and setting of the burner – a position error resulting from the sum of



- greatest position error from which an error is detected in all positions
- resilience at the max. rated torque
- mechanical influence from the link between actuator and regulating unit (e.g. coupling) must not lead to a critical state from the point of view of safety.

No.	Parameter
606	Tolerance limit of position monitoring ( $0.1^\circ$ ) Max. position error where an error is securely detected → Error detection band: (P606 - $0.6^\circ$ ) up to P606

Error code	Diagnostic code	Meaning for the LMV37.4... system
86	0	Position error fuel actuator
87	0	Position error air actuator



## 7.6 Changing the error detection band for monitoring the positions

The error detection band can be changed via parameter 606.

A change is to be made only when using SQN13.17... / SQN14.17... actuators which, due to their mechanical design, require greater tolerances.

For these types of actuators, set parameter 606 to 2.2°.

No.	Parameter
606	Tolerance limit of position monitoring (0.1°) Greatest position error where an error is securely detected → Error detection band: (P606 -0.6°) up to P606

## 7.7 Forced travel

There are errors in the actuators' feedback unit that can only be detected in connection with position changes. To be able to also detect such errors when maintaining the same position for longer periods of time, travel is enforced when, for more than 50 minutes, an actuator moves no more than 2.8°. With forced travel, both actuators are driven 2.8° in the direction of smaller positioning angles and back again to the initial angular position. If a damper is less than 2.8° open, the actuator will be driven in the direction of positive angles in order not to run against mechanical stops, if present. Forced travel lasts a total of 1 second.

## 7.8 Detection of open-circuit

The connecting line ensuring position feedback from the actuator to the basic unit is monitored for open-circuit, which means that position feedback cannot fail without being noticed.

Error code	Diagnostic code	Meaning for the LMV37.4... system
86	1	Open-circuit fuel actuator
87	1	Open-circuit air actuator

## 7.9 Protection against actuator mixup

Mixup of actuators can be detected through appropriate mounting (using different reference marks for the air and fuel actuator: OPEN / CLOSED / 0° / 90°). With at least one of the actuators, the reference mark not used must be blocked by a mechanical stop. Now, if the actuator connections with the basic unit have been interchanged, one of the actuators cannot reach the reference mark, which is detected by the basic unit. Protection against mixup is a question of the burner application and must be ensured by the OEM.



### Caution!

**To be able to detect mixup of actuators, the burner manufacturers must ensure that the 2 actuators use opposing reference points. One of the actuators uses the OPEN reference, the other the CLOSED reference. Approach of the reference point not used must be blocked with at least one of the actuators!**

### 7.9.1 Proposal for implementation

- Parameterize referencing of the air damper in the CLOSED position
- Parameterize referencing of the fuel damper in the OPEN position. Unnecessary travel can be avoided by defining a no-load position of **90°** for the fuel damper
- Mechanical stop at the air damper in the range between 90° and 108.5°, and / or mechanical stop at the fuel damper in the range between 0° and -5.6°

#### Referencing process

- From any position in the working range (0...90°), but typically from the no-load position, the air damper travels to the **-7.7°** position and back again to the no-load position
- From any position in the working range (0...90°), but typically from the no-load position, the fuel damper travels to the **110.6°** position and back again to the no-load position

#### Process in the event of mixup

- The fuel damper (fitted in place of the air damper) travels to the **-7.7°** position and back again to the no-load position
- The air damper (fitted in place of the fuel damper) tries to travel to the **110.6°** position, but is prevented from doing so by the mechanical stop. This is unsuccessful travel and identified as mixup

## 8 Fan control

## 8.1 Function principle

Optionally, the LMV37.4... system can be operated with a VSD or PWM fan. Control is accomplished via a DC 0...10 V interface. For control of the fan's speed, a safety-related speed feedback signal is required. With pneumatic fuel / air ratio control, the speed feedback signal is not evaluated. To facilitate the use of fans with different speed ranges, the fan's speed will be standardized between 0...100 %. If a fan control is not connected, a load output and, alternatively, a fuel meter output are available (refer to chapter 9 «Load output X74.3» and chapter 10 «Fuel meter input X75.1 / X75.2»).

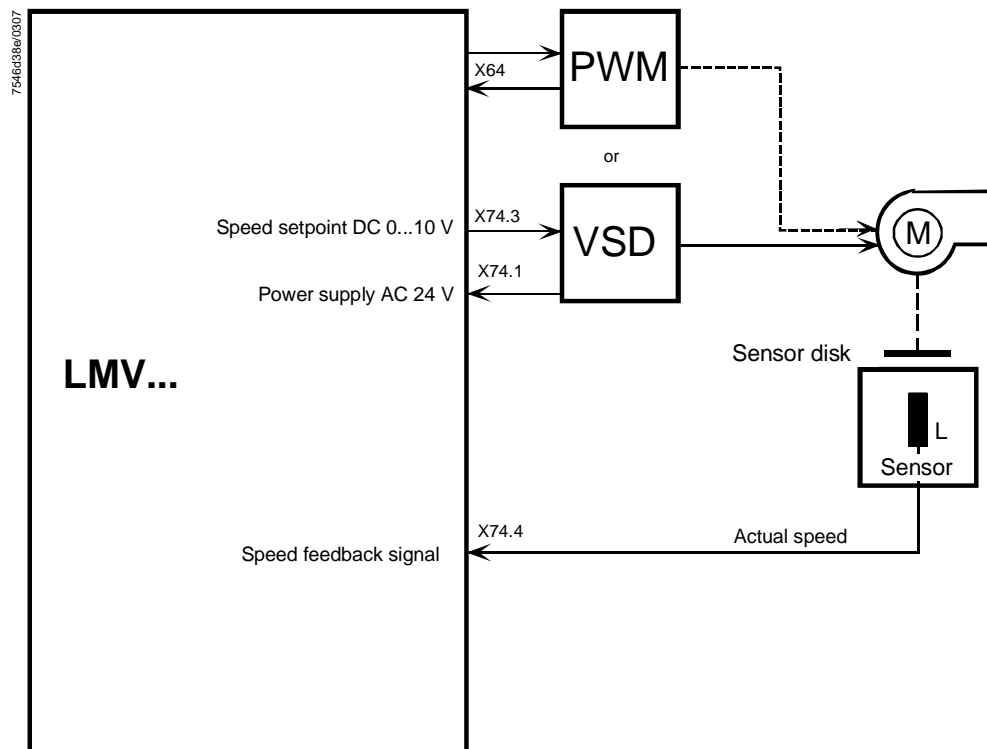


Figure 40: Function principle of VSD

## 8.2 Activation of VSD / PWM fan

The VSD can be activated in any of the operating modes (P201).

No.	Parameter
542	Activation of VSD / PWM fan



For configuration of the analog output when the VSD is activated, refer to chapter «Load output X74.3»!

## 8.3 VSD control X74.3

The VSD is controlled via a voltage interface (refer to chapter «Load output X74.3»!)

## 8.4 PWM fan control X64.3

The PWM fan is controlled via PWM voltage interface X64.3.

## 8.5 Safe separation of mains voltage and protective extra-low-voltage



### Caution!

All inputs and outputs of PWM fan control are designed for use with protective extra-low-voltage. For this reason, strict separation from the mains voltage side must be ensured!

This necessitates an external power supply by the VSD or an external power pack (X74.1, X74.2).



Power must also be supplied via X74.1/2 in the case a PWM fan is used.

## 8.6 Ramp time

The ramp time for **PWM fan control** can be set separately for acceleration and deceleration (also refer to subsection 6.2.1 «Running speed / maximum curve slope»).

No.	Parameter
522	Ramp up
523	Ramp down

If shutdown occurs because the speed has not been reached, the VSD / PWM fan might not be able to follow quickly enough the set ramp.

### Remedy:

Shorten further the ramp of the VSD / PWM fan or increase the ramp in the basic unit (parameters 522 / 523) (also refer to subsection 6.2.1 «Running speed / maximum curve slope»).

### For VSD operation



### Caution!

The ramps parameterized in the VSD should be at least 20% shorter than the ramps in the LMV37.4...

Example:

10 s ramp	LMV37.4...	8 s ramp VSD
5 s ramp	LMV37.4...	4 s ramp VSD

## 8.7 Acquisition of speed

### 8.7.1 Acquisition of speed with proximity switch

The actual speed is acquired by an inductive proximity switch which scans a metal sensor disk. The sensor disk must be attached directly to the motor's drive shaft. Speed acquisition is safety-related. To facilitate the detection of the direction of rotation and to be able to make the plausibility check with only one sensor, a sensor disk with angular steps of 60°, 120° and 180° is used. It generates 3 pulse intervals of different length.

Speed acquisition is designed for the connection of different types of sensors.



#### Caution!

**With electronic fuel / air ratio control, speed acquisition is safety-related!**

We recommend using the AGG5.310 accessory set.

The absolute speed can be read out via the AZL2...

No.	Parameter
935	Absolute speed

The current speed in standardized form can be read out via the AZL2...

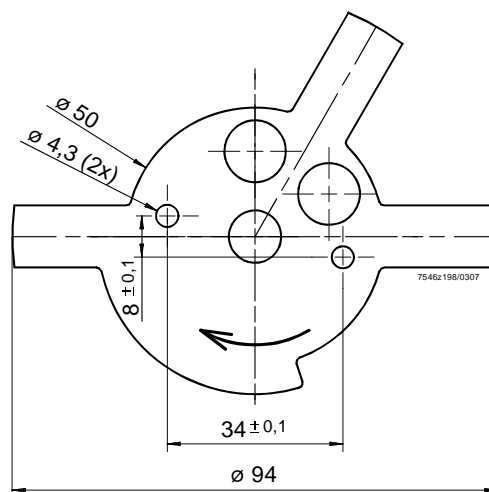
No.	Parameter
936	Standardized speed

#### Speed input X74.4

Motor speed:	300...6500 1/rpm
100 % speed:	650...6500 1/rpm
Sensor:	Inductive sensor to DIN 19234 (Naur) or Open Collector (npn) at $U_{CEsat} < 4\text{ V}$ , $U_{CEmin} > DC\ 15\text{ V}$
Power supply:	DC 10 V, max. 15 mA
Switching current:	$> 10\text{ mA}$
Cable length:	max. 100 m (sensor cable must be laid <b>separately!</b> )

#### Sensor disk

Sensor disk and speed sensor can be ordered as accessory set AGG5.310.



Number of tappets:	3
Angular steps:	60°, 120°, 180°
Accuracy:	$\pm 2^\circ$

Figure 41: Sensor disk

## Speed sensor

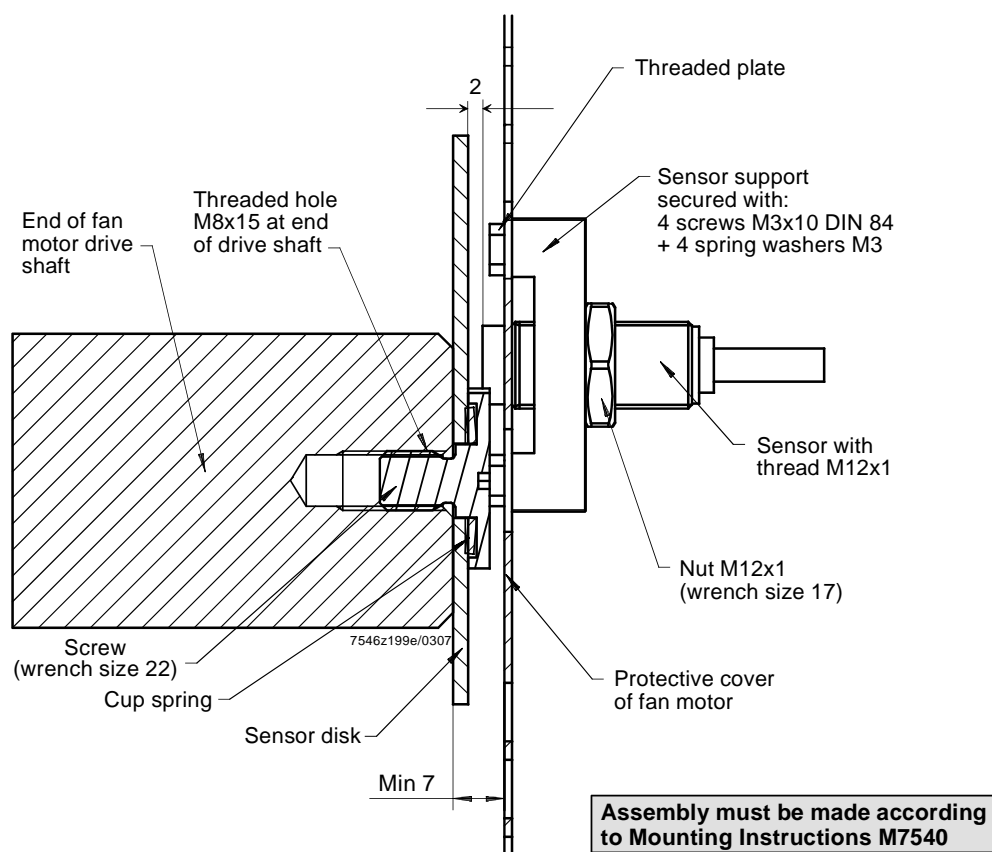


Figure 42: Speed sensor

## Selection of fan motor

Motor supplier:

Selection of a motor **with** a threaded hole M8 x 15 at the end of the fan motor's drive shaft.

Standard motor and machining (drilling hole and cutting thread M8 x 15)

### 8.7.2 Acquisition of speed with Hall generator

If the speed is acquired via a Hall generator, the requirements for safety-related applications are the same as those for the speed feedback signal via sensor disk.

Required is an asymmetric signal with the 3 pulses of 60°, 120° and 180° for the detection of the direction of rotation.

## 8.8 Speed control

The LMV37.4... controls the fan motor's speed to the setpoint. To ensure that the actual speed can still be increased when the maximum is reached, the speed is standardized when the motor is controlled at 95 %. Hence, with a speed setpoint of 100 %, a speed increase of 5 % is still possible.

The control range of the LMV37.4... is +15 % / -10 %. If this range is not sufficient, error 80 or 83 can occur.

Error code	Diagnostic code	Meaning for the LMV37.4... system
80	1	Control range limitation at the bottom
	2	Control range limitation at the top



Internal control with a VSD or PWM fan motor must not be activated. Otherwise, speed variations can occur, resulting from simultaneous control actions from both the basic unit and internal control.

## 8.9 Speed supervision

The fan's actual speed is acquired by the LMV37.4... and assessed from a safety point of view. If the fan does not operate at the speed setpoint, speed control makes a corrective action, trying to reach the setpoint. If it is not reached within a certain period of time, safety shutdown will be initiated. To ensure a high level of availability and safety, a number of monitoring bands with different response times are defined.

Speed deviation in % points	Shutdown time
0...0.5 %	Speed reached → no shutdown
0.6...2 %	< 8 s
2.1...10 %	< 3 s
>10 %	< 1 s

Error code	Diagnostic code	Meaning for the LMV37.4... system
83	Bit 0 Valency 1	Lower control range limitation
	Bit 1 Valency 2...3	Upper control range limitation
	Bit 2 Valency 4...7	Interrupt shutdown due to electromagnetic interference
	Bit 3 Valency $\geq 8$	Curve too steep in terms of ramp speed
	Bit 4 Valency $\geq 16$	Interruption of speed signal
	Bit 5 Valency $\geq 32$	Quick shutdown due to excessive speed deviation

## 8.10 Parameterizing of the VSD

If the burner's rated capacity is not reached at 95 % (9.5 V) control, you can proceed as follows:

- Set the maximum frequency to 105.3 % of the motor's rated speed

In the case of a motor frequency of 50 Hz, this means:

Set the maximum frequency of the VSD to  $50 \text{ Hz} \times 1.053 = 52.6 \text{ Hz}$  (on the VSD).

- Then, standardize the speed (refer to section 8.11 «Standardizing the speed»)

There is no risk of motor overload since only 95 % of the maximum control signal is delivered during standardization and, later in operation, the actual speed will be controlled and monitored.

Frequencies of between 50 Hz and 52.6 Hz are delivered only if these are needed for reaching the required speed due to increased load.

- Set the ramp times of the VSD according to subsection 8.6 «Setting the ramp times»



## 8.11 Standardization of speed

Since the different types of fans operate at different speeds and signal handling should be as straightforward as possible, all speeds in the system are standardized between 0...100 %. For this reason, the VSD module uses a parameter which contains the «standard speed» (100 % speed). All absolute speeds refer to this speed.

If changes to the VSD or the fan are made, speed standardization should be repeated.

### Caution!



- If automatic speed standardization is activated or if the standardized speed is changed, the settings of fuel / air ratio control must be checked! Any change of the standardized speed alters the assignment between the percentage values parameterized on the curves and the speed.
- When the parameter set (refer to ACS J7352) is restored, the standardized speed will also be reset. In that case, new standardization of the speed is required

### Automatic speed standardization

To facilitate determination of the standardized speed, the LMV37.4... features automatic speed standardization. The speed should be standardized while in standby mode. Speed standardization is integrated in the setting process for electronic fuel / air ratio control, but can also be started later from the parameter setting level.

#### 1. Start speed standardization

To start automatic speed standardization, set parameter 641 to 1.

Parameter	
641	Control of VSD' speed standardization Error diagnostics of negative values (refer to error 82)

#### 2. Drive the air damper to the prepurge position

Speed standardization begins when the air damper travels to the prepurge position. When this position is reached, the air damper should be fully open so that the fan will operate at full capacity.

#### 3. Control the VSD

Control the VSD at 95 % of maximum voltage.

A margin of 5 % allows the speed to be readjusted should environmental conditions change. This means that full speed (100 %) is reached with 95 % VSD control (refer to section 8.10 «Parameterizing the VSD»).

#### 4. Wait until the speed is higher and has stabilized

Before the 100 % speed can be measured, the fan must have reached stationary conditions. This means that the fan must operate under stable conditions above 650 rpm. When this state is reached, a certain waiting time is observed, allowing the speed to finally stabilize.

#### 5. Measure the speed and store it

When the speed has stabilized, measure and store it as the «standardized speed» (100 % speed).

#### 6. Close the standardization

When standardization is successfully completed, reset parameter 641 to 0.

If standardization was not successful, parameter 641 will assume a negative value.

The value provides information on the cause of fault:

<b>Value</b>	<b>Error</b>	<b>Recommended measures</b>
-1	<i>Timeout of standardization (VSD's ramp down time too long)</i>	Timeout at the end of standardization during ramp down of VSD  1. VSD ramp time settings are not shorter than those of the basic unit (parameter 523).
-2	<i>Storage of standardized speed not successful</i>	Error during storage of standardized speed → lock basic unit and reset it again, repeat standardization
-3	<i>Open-circuit speed sensor</i>	Basic unit receives no pulses from the speed sensor  1. Motor does not turn. 2. Speed sensor is not connected. 3. Speed sensor is not actuated by the sensor disk (check distance).
-4	<i>Speed variation / VSD ramp up time too long / speed below minimum limit for standardization</i>	Motor has not reached a stable speed after ramp up.  1. VSD ramp time settings are not shorter than those of the basic unit (parameters 522, 523). 2. VSD's characteristic is not linear. Configuration of voltage input at the VSD must accord with that of the basic unit (DC 0...10 V). 3. VSD does not follow quickly enough the change of the basic unit. Check VSD settings (input filter, slippage compensation, hiding various speeds). 4. Speed of VSD lies below the minimum for standardization (650 1/min).
-5	<i>Wrong direction of rotation</i>	Motor's direction of rotation is wrong  1. Motor turns in the wrong direction → change parameterization of the direction of rotation or inter change 2 live conductors. 2. Sensor disk is fitted the wrong way → turn sensor disk.

Value	Error	Recommended measures
-6	<i>Unplausible sensor signals</i>	The required pulse pattern (60°, 120°, 180°) has not been correctly identified  1. Speed sensor does not detect all tappets of the sensor disk → check distance. 2. As the motor turns, other metal parts are detected also, in addition to the tappets → improve mounting. 3. Electromagnetic interference on the sensor lines → check cable routing, improve EMC.
-7	<i>Invalid standardized speed</i>	Standardized speed measured does not lie in the permissible range  1. Motor turns too slowly or too fast.
-20	<i>Wrong phase of phase manager</i>	Standardization was made in a wrong phase  1. Permitted are only phases $\leq 12$ → controller OFF, start standardization again.
-21	<i>Safety loop / burner flange open</i>	Safety loop or burner flange is open  1. Repeat standardization with safety loop closed.
-22	<i>Air actuator not referenced</i>	Air actuator is not referenced or has lost its reference  1. Check if the reference position can be approached. 2. Check if actuators have been mixed up. 3. If error only occurs after standardization was started, the actuator is possibly overloaded and cannot reach the required position.
-23	<i>VSD deactivated</i>	Standardization was started with VSD deactivated → activate VSD and repeat standardization

The result of speed standardization (100 % speed) can be read out via parameter. The speeds acquired by the 2 microcontrollers can differ by about 1.5 %, the reason being slightly different resonator frequencies.

Parameter	
642.0	Standardized speed of $\mu\text{C1}$
642.1	Standardized speed of $\mu\text{C2}$

## 8.12 Control of fan motor with pneumatic fuel / air ratio control

If the control of the fan motor is employed for burners with pneumatic fuel / air ratio control, only the control path is used. There is no need to connect a speed feedback signal and to have speed control (for operating modes, refer to chapter 4 «Selection of operating mode»).

## 8.13 EMC LMV37.4... – VSD

The function and EMC tests with the LMV37.4... system have been successfully conducted in connection with the following makes and types of VSDs:

**Siemens:** SED2-0.37 / 22 X

**Danfoss:** VT2807

During operation, VSDs generate electromagnetic interference on the mains network. For this reason, the instructions provided by the supplier must be strictly observed to ensure that makeup of the system is in compliance with EMC regulations:

**Siemens:** Operating Instructions → Installation conforming to EMC

**Danfoss:** Technical Brochure → Radio suppression filter

Data Sheet on Danfoss EMC filter for long motor cables



**Caution!**

**When using other types of VSDs, compliance with EMC regulations and trouble-free operation are not ensured!**

## 8.14 Description of the terminals

### 8.14.1VSD

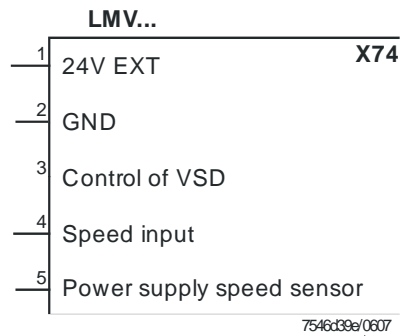


Figure 43: VSD module X74

### 8.14.2PWM fan

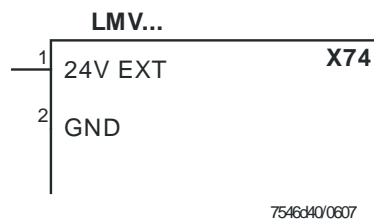


Figure 44: PWM fan X74

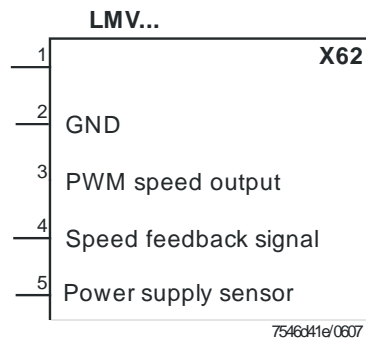


Figure 45: PWM fan X62

## 9 Load output X74.3

The load output is only available as an alternative to VSD control. If the VSD is deactivated, the output for the VSD delivers the current burner output. The analog output is a voltage output and – using parameter 645 – can be switched between DC 0...10 V, DC 2...10 V and DC 0 / 2...10 V.

Parameter 645	Voltage range	Remarks
0	0...10 V	No detection of open-circuit
1	2...10 V	Detection of open-circuit possible
2	0 / 2...10 V	No detection of open-circuit Recommended setting in connection with Micro master VSD

Note:

When changing the analog output configuration from 0...10 V to 2...10 V or 0 / 2...10 V, the voltage values with modulating, 2-stage and 3-stage operation will change (refer to section 9.2 «Modulating operation», section 9.3 «2-stage operation» and section 9.4 «3-stage operation»).

**Conversion:** New value = (initial value \* 0.8) + 2

Example: Initially 2 V → (2 \* 0.8) + 2 = 3.6 V  
Initially 5 V → (5 \* 0.8) + 2 = 6 V

### 9.1 Safe separation of mains voltage and extra low-voltage



**Caution!**

The load output is designed for use with extra low-voltage.  
For this reason, strict separation from the mains voltage side must be ensured!

This necessitates power supply by an external power pack (X74.1, X74.2).

### 9.2 Modulating operation

Actual value	Voltage	Curve point	Display / load value
Off	0 V	---	Off
Ignition load	1 V	P0	10 %
Low-fire	2 V	P1	20 %
Nominal load	10 V	P9	100 %

The values between low-fire and nominal load are interpolated in a linear manner.

### 9.3 2-stage operation

Actual value	Voltage	Curve point	Display / load value
Off	0 V	---	Off
Stage 1	5 V	P1	P1
Stage 2	10 V	P2	P2

## 9.4 3-stage operation

Actual value	Voltage	Curve point	Display / load value
Off	0 V	---	Off
Stage 1	3 V	P1	P1
Stage 2	5 V	P2	P2
Stage 3	10 V	P3	P3

## 10 Fuel meter input X75.1 / X75.2

A fuel meter can be connected to acquire the amount of fuel burnt.

The fuel meter function is only available as an alternative to VSD control. If the VSD is deactivated, a fuel meter can be connected to terminals X75.1 and X75.2.

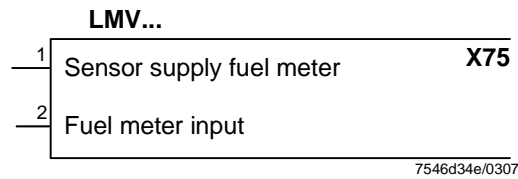


Figure 46: Fuel meter input X75

### 10.1 Configuration of fuel meter

#### 10.1.1 Types of fuel meters

The LMV37.4... system is designed for use with fuel meters equipped with a Reed contact. Pulse frequency at maximum fuel throughput must be below 300 Hz.

#### 10.1.2 Configuration of pulses per volume unit

Depending on the type of fuel meter used, the number of pulses supplied by it per  $\text{m}^3$  or l fuel must be parameterized. A maximum of 400 pulses per volume unit can be preset. The correct amount of fuel will be acquired only when this parameter is set.

When the parameter is 0, the fuel meter stops.

No.	Parameter
128	Fuel meter: Pulse valency (pulses / volume unit)

#### 10.1.3 Reading and resetting the meter readings

No.	Parameter
167	Fuel volume resettable ( $\text{m}^3$ , l, $\text{ft}^3$ , gal)

The cumulated fuel volume can be read out per parameter. The meter reading can also be reset on the parameter level.



## 10.2 Fuel throughput

With the fuel meter connected, the system calculates continuously the current fuel throughput. The time required for calculating the fuel throughput varies and lies between 1 and 10 seconds. If the fuel meter delivers no pulses for more than 10 seconds, the display shows "0" fuel throughput. This means that when fuel throughput is at its minimum, the sensor should have a pulse frequency of at least 0.1 Hz. The display is smoothed to improve the settling process. With fuel throughput at its maximum, the maximum frequency is 300 Hz.

### 10.2.1 Configuration

Calculation of fuel throughput is configured based on the pulse valency of the connected fuel meter.

No.	Parameter
128	Fuel meter: Pulse valency (pulses / unit of volume)

When the pulse valency is set to 0.00, the display shows "0" throughput.

### 10.2.2 Reading out the fuel throughput

The current fuel throughput can be read out via the following parameter on the service menu:

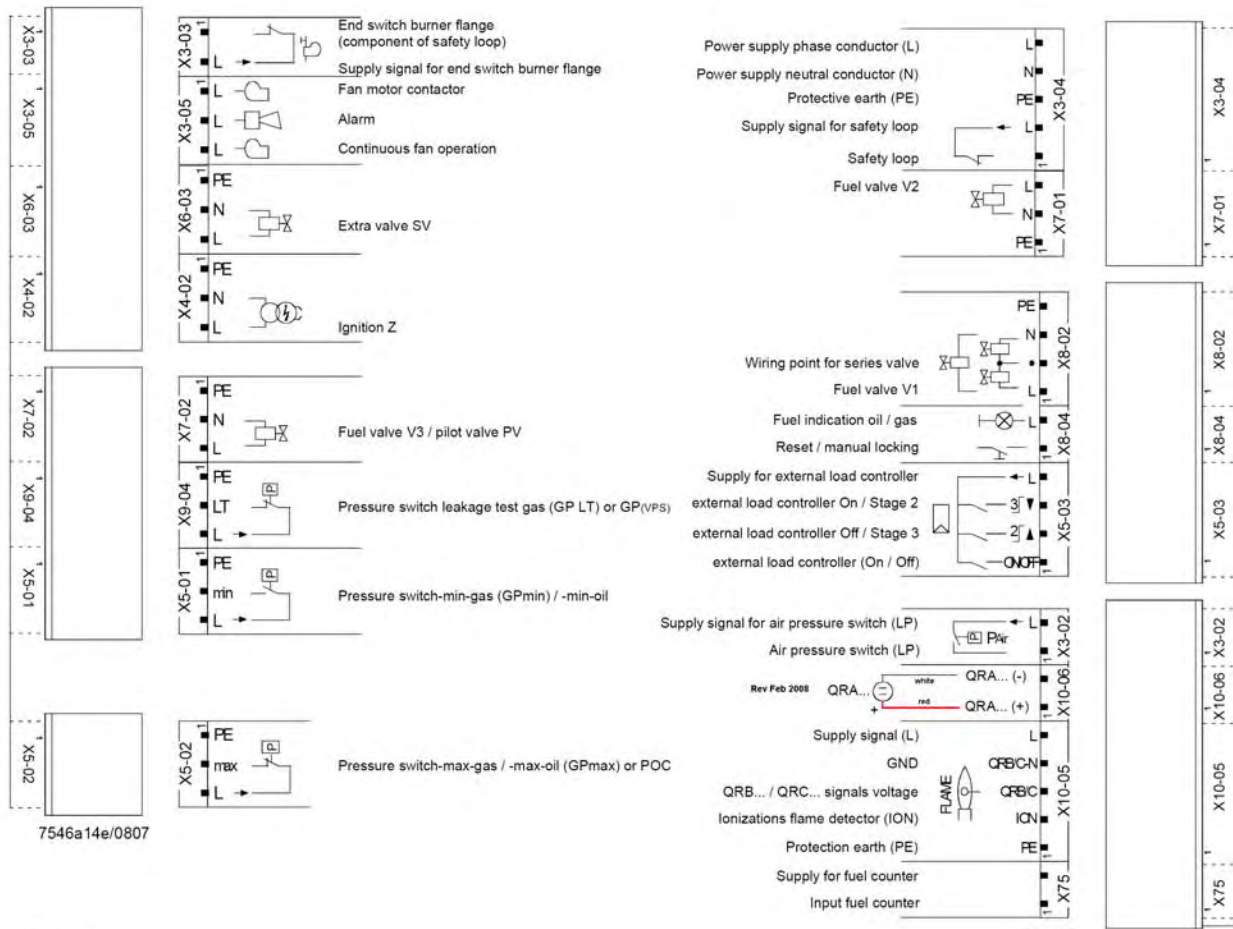
No.	Parameter
960	Fuel throughput in unit of volume / h (m <sup>3</sup> /h, l/h, ft <sup>3</sup> /h, gal/h)

Display of fuel throughput is possible up to 6553 units of volume / h.



Display of fuel throughput up to a value of 99.9 on the service menu is made with one decimal place, from 100 with no decimal place.

# 11 Inputs and outputs



Shielding:

For shielding the cables on the VSD, refer to:

- Siemens *SED2* VSD Commissioning Manual (G5192) chapter 4 and chapter 7 or
- Danfoss Operation Manual *VLT 6000* (MG60A703) chapter «Installation»

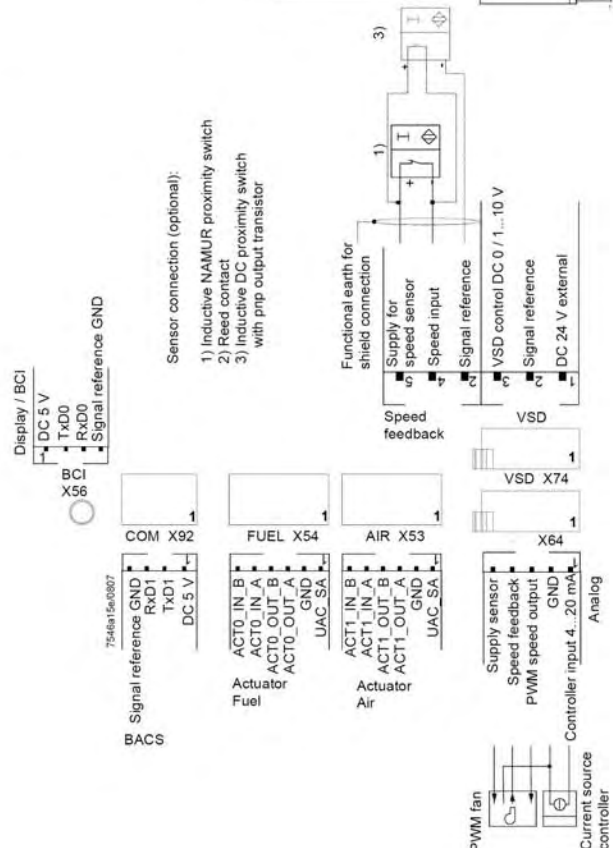


Figure 47: Inputs and outputs

## 12 Special feature: Identification of burner (ID)

The OEM must assign an individual burner identification to every burner. This ensures that during backup / restore, incompatible parameter sets cannot be copied between different burners (also refer to documentation on PC tool under «Backup / Restore»).

No.	Parameter
113	Burner identification

## 13 Connection to superposed systems

### 13.1 General and functions of building automation system

Communication with a building automation and control system is accomplished via a data link using the COM X92 port and a special interface with galvanic separation and physical bus level adaptation. This port can be used for connection of a Modbus, depending on the configuration made.

No.	Parameter
141	Operating mode building automation 0 = off 1 = Modbus 2 = reserved

### 13.2 Modbus

With this type of bus protocol, the LMV37.4... basic unit operates as a slave on the Modbus and the transmission mode used is RTU (Remote Terminal Unit).  
For more detailed information, refer to the Modbus User Documentation (A7541).

No.	Parameter
145	Device address for Modbus
146	Baud rate for Modbus 0 = 9600 1 = 19200
147	Parity for Modbus 0 = none 1 = odd 2 = even

## 14 PC software ACS410

The ACS410 PC software serves primarily as an operating module for the LMV37.4... system, providing the following basic functions:

- Visualization of system state via the following data:
  - Parameters
  - Process data
- Configuration and parameterization of the basic unit (individual parameters)
- Backup and recovery of parameter sets



For notes on operation and commissioning, refer to chapter «Operation»

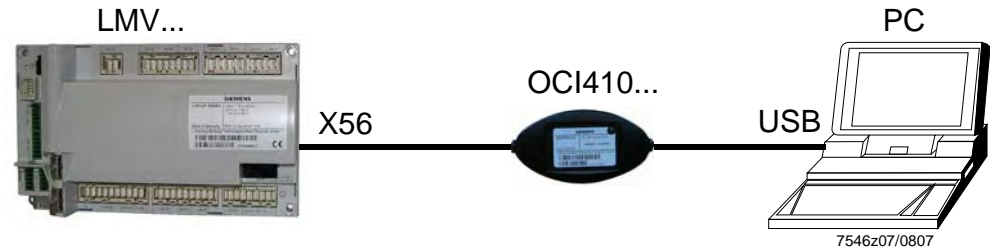


Figure 48: Communication with display / BCI (X56)

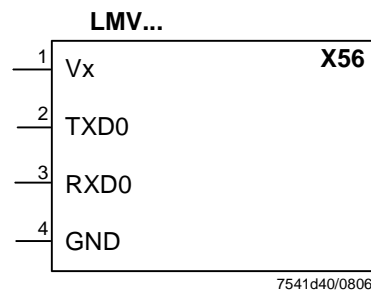


Figure 49: Display input X56

# 15 Error history

The LMV37.4... system features an error history in which the last 25 errors are stored. The first entry represents the current error state and can also be «error free», refer to error code list.

Error code	Diagnostic code	Meaning for the LMV37.4... system
200	#	System error-free

## 15.1 Error classes

The errors are subdivided into error classes, depending on the severity of the switch-off response. The current error shows all classes. Only the errors of the most important classes are included in the history.

Error class	Priority	Meaning	History
0	Highest	Lockout	X
1		Safety shutdown with software reset	X
2		Undervoltage	
3		Safety shutdown: Safety phase	X
4		Safety shutdown: Start prevention	
5		Safety shutdown: Shutdown	X
6	Lowest	Message without shutdown response	

## 15.2 Make-up of error history

Parameter	Index	Description
701		Current error state, can also be error-free
	.01	Error code (200 = error free) → refer to «Error code list»
	.02	Diagnostic code → refer to «Error code list»
	.03	Error class → error classes
	.04	Error phase: Phase in which error occurred → sequence diagrams
	.05	Reading of startup counter (P166) at which the error occurred
	.06	Burner output at which the error occurred
702	.01..06	Latest error in the history
.		
.		
.		
725	.01..06	Oldest error in the history

### Deleting the error history

Both the service menu and the parameter setting menu show the error history. The display on the service menu can be deleted in a way that the only errors shown are those that occurred after the deletion.

The error history on the parameter setting menu cannot be deleted.

For the deletion, parameter 130 must be set to **1** and then to **2** within 6 seconds.

When the parameter has returned to **0**, the deletion process is completed.

No.	Parameter
130	Delete display of error history To delete the display, set to 1, then to 2 Return value 0: Job successful completed Return value -1: Timeout of 1_2 sequence

## 16 Lifecycle function

If the startup counter exceeds a defined threshold, a display error code will be set and displayed. The error can be acknowledged.

The display code is always set in standby (when there is no heat request). Hence, the moment the threshold is exceeded, the user is notified that the end of the lifecycle will soon be reached.

Error code	Diagnostic code	Meaning for the LMV37.4... system
116	0	Lifecycle in critical range



The unit should be replaced when the message appears.

## 17 Safety notes for use of the AZL2...



**To prevent the risk of fire and explosions, damage to heating plant or damage resulting from improper use of the products, ensure that the following safety notes are observed:**

The Burner Management System covered by the present User Manual may only be used as specified and only in connection with the appropriate burner and heating plant.

The Burner Management System with its display and operating unit and the associated heating control system may only be installed and commissioned by authorized technical staff.

The operating unit may only be used in dry spaces. Do not use it outdoors and protect it against excessive temperatures and frost, and liquids, such as water, oil, fuel oil, etc.

Follow exactly the procedures and setting notes given in this User Manual. Appropriately identified settings must only be made by authorized technical staff.

If the display and operating unit is dusty or dirty, clean it with a dry cloth.

Do not carry out any maintenance or repair work on the unit. Such work may only be performed by authorized technical staff.

If you have any questions in connection with the display and operating unit, please contact your heating engineer or refer to one of the addresses given in this User Manual.

# 18 Operating the AZL2... unit

## 18.1 Description of the unit / display and buttons

Function and operation of unit versions AZL21... and AZL23... are identical.

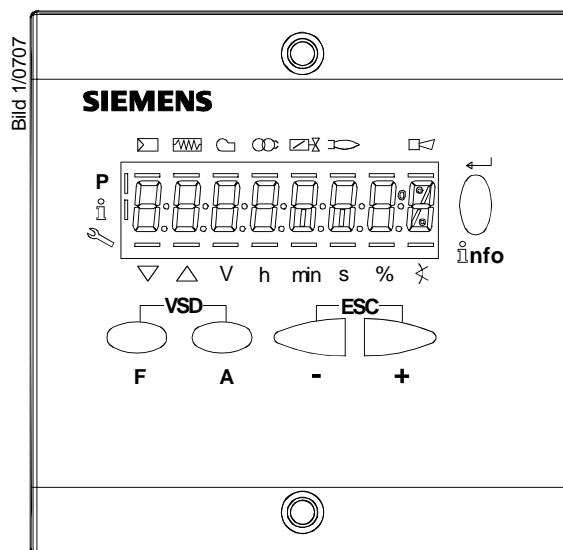








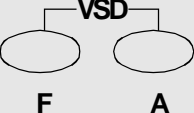







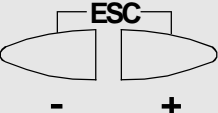




Figure 50: Description of the unit / display and buttons

Button	Function
 <b>F</b>	<b>Button F</b> - For adjusting the fuel actuator (keep  depressed and adjust the value by pressing  or  )
 <b>A</b>	<b>Button A</b> - For adjusting the air actuator (keep  depressed and adjust the value pressing  or  )
 <b>F A</b>	<b>Buttons A and F: VSD function</b> - For changing to parameter setting mode <b>P</b> (press simultaneously  and  plus  or  )
 <b>info</b>	<b>Info and Enter button</b> - For navigating in info or service mode * Selection (symbol flashing) (press button for <1 s) * For changing to a lower menu level (press button for 1...3 s) * For changing to a higher menu level (press button for 3...8 s) * For changing the operating mode (press button for > 8 s) - <b>Enter</b> in parameter setting mode - <b>Reset</b> in the event of fault - One menu level down
 <b>-</b>	<b>- button</b> - For decreasing the value - For navigating during curve adjustments in info or service mode
 <b>+</b>	<b>+ button</b> - For increasing the value - For navigating during curve adjustments in info or service mode
 <b>- +</b>	<b>+ and - button: Escape function</b> (press  and  simultaneously) - No adoption of value - One menu level up



## 18.2 Meaning of symbols on the display

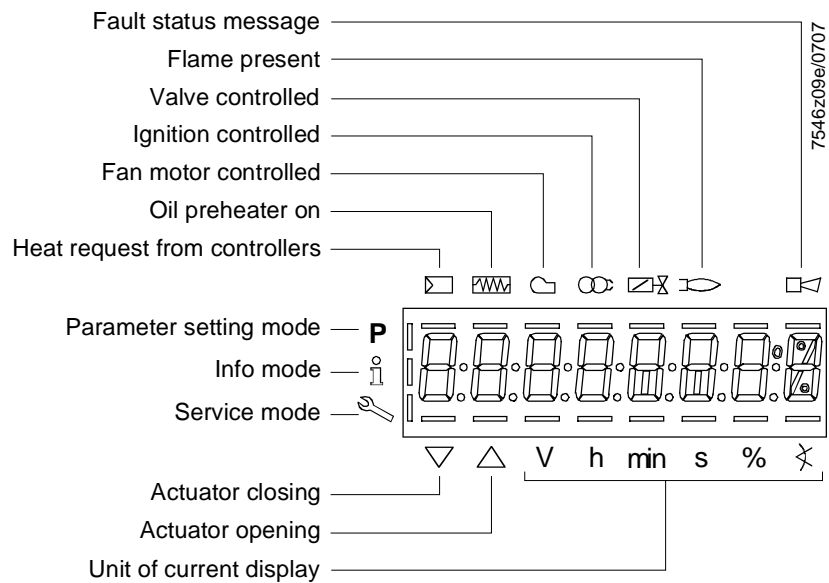


Figure 51: Display

## 18.3 Brightness of the display

Only available with backlit LCD:

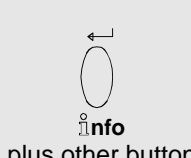
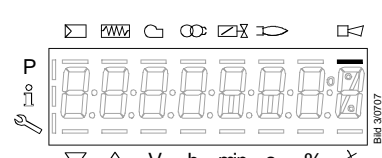

The function of the backlit display is dependent on the type of basic unit used.

The brightness of the display can be adjusted from 0...100 % using the following parameter:

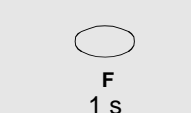
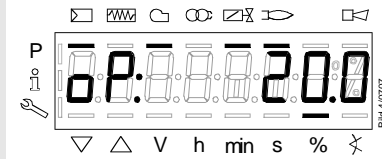
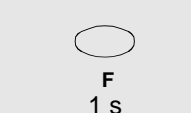
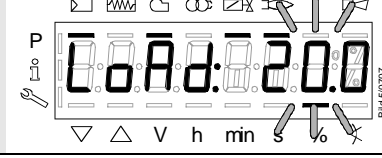

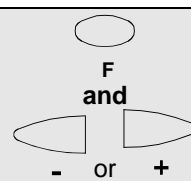
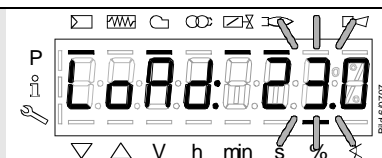


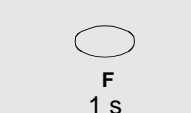
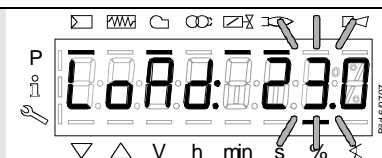

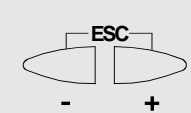
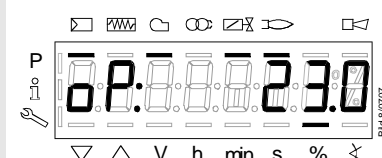


No.	Parameter
126	Brightness of display

## 18.4 Special functions

### 18.4.1 Manual lockout

		<p>Press  <b>together</b> with any other button.</p> <p>The basic unit switches instantly to the lockout position, no matter what the operating position.</p> <p>The display shows the fault status message, except when in parameter setting mode.</p>
---	---	--

### 18.4.2 Manual control (manual request for output)

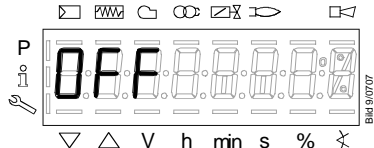
		<p>Burner is in operation.</p> <p>The display shows <b>oP:</b> on the left, the <b>percentage</b> of the current output on the right.</p> <p>Example: <b>oP: 20.0</b></p>
		<p>Press  for 1 s.</p> <p>The display shows <b>LoAd:</b>, the current output flashes.</p>
		<p>Press  or  to adjust the required manual output.</p> <p>Example: <b>oP: 23.0</b></p>
		<p>Release .</p> <p>The current manual output flashes, indicating that manual control is activated.</p>
		<p>Press   for 3 s to return to automatic mode.</p> <p>The output no longer flashes.</p> <p>The display shows <b>oP:</b> on the left, the <b>percentage</b> value on the right.</p> <p>Example: <b>oP: 23.0</b></p>

# 19 Operation of basic unit via AZL2...

## 19.1 Normal display

Normal display is the standard display in normal operation, representing the highest menu level. From the normal display, you can change to the info, service or parameter level.

### 19.1.1 Display in standby mode



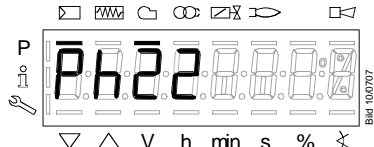
Unit is in standby mode.


Note:

**OFF** flashes when the manual OFF function, the manual output and controller OFF is activated.

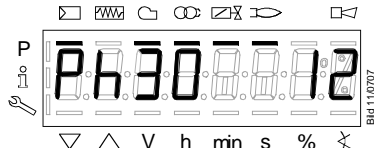
### 19.1.2 Display during startup / shutdown

#### 19.1.2.1. Display of program phases



The unit is in **Phase 22**. The controller calls for heat. The bar below the  symbol appears. The individual program phases and controlled components are displayed in accordance with the program sequence.

#### 19.1.2.2. Display of program phase with remaining running time until end of the phase is reached



The unit is in **Phase 30** and shows the remaining running time in that phase.

Example: 12 s, **Phase 30**

#### 19.1.2.3. List of phase displays

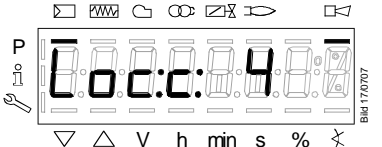

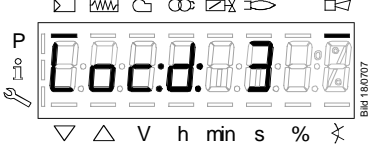
Phase	Function
Ph00	Lockout phase
Ph01	Safety phase
Ph10	t10 = home run
Ph12	Standby (stationary)
Ph22	t22 = fan ramp up time (fan motor = ON, safety shutoff valve = ON)
Ph24	Traveling to the prepurge position
Ph30	t1 = prepurge time
Ph36	Traveling to the ignition position
Ph38	t3 = preignition time
Ph40	TSA1= 1st safety time (ignition transformer ON)
Ph42	TSA1 = 1st safety time (ignition transformer OFF), t42 = preignition time OFF
Ph44	t44 = interval 1
Ph50	TSA2 = 2nd safety time
Ph52	t52 = interval 2
Ph60	Operation 1 (stationary)
Ph62	t62 = max. time low-fire (operation 2, preparing for shutdown, traveling to low-fire)
Ph70	t13 = afterburn time
Ph72	Traveling to the postpurge position
Ph74	t8 = postpurge time
Ph80	t80 = valve proving test evacuation time
Ph81	t81 = leakage time test time atmospheric pressure, atmospheric test
Ph82	t82 = leakage test filling test, filling
Ph83	t83 = leakage test time gas pressure, pressure test
Ph90	Gas shortage waiting time

### 19.1.3 Display of operating position




	<p>Display <b>oP</b> stands for «Operating position reached».</p> <p>Modulating mode: Current output in %</p>
	<p>Display <b>oP: P0</b> stands for «Ignition point».</p> <p>Multistage operating mode: Current fuel stage</p>
	<p>Display <b>oP: P1</b> stands for «Stage 1».</p> <p>Multistage operating mode: Current fuel stage</p>
	<p>Display <b>oP: P2</b> stands for «Stage 2».</p> <p>Multistage operating mode: Current fuel stage</p>
	<p>Display <b>oP: P3</b> stands for «Stage 3».</p> <p>Multistage operating mode: Current fuel stage</p>

## 19.1.4 Fault status message, display of errors and info


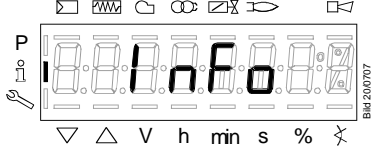




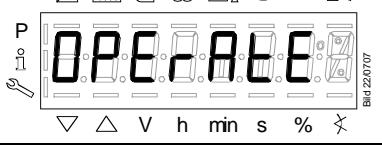
### 19.1.4.1. Display of errors (faults) with lockout

		<p>The display shows <b>Loc:</b>, the bar under the fault status message  appears.</p> <p>The unit is in the lockout position.</p>
		<p>The display shows current error code <b>c:</b> alternating with diagnostic code <b>d:</b> (refer to «Blink code list»).</p> <p>Example: Error code <b>4</b> / diagnostic code <b>3</b></p>

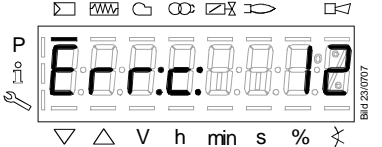
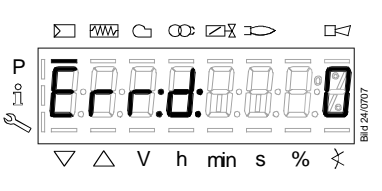

### 19.1.4.2. Reset

 <b>info</b> 1 s		<p>When pressing  for 1 s, <b>rESEt</b> appears on the display.</p> <p>When the button is released, the basic unit will be reset.</p>
---	---	---

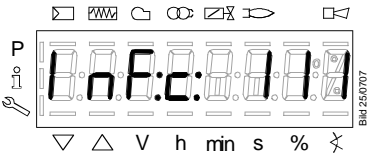
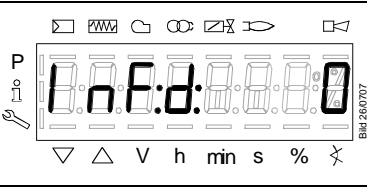

### 19.1.4.3. Activating info / service mode from lockout

 <b>info</b> > 3 s		
 <b>info</b> > 5 s		<p>When pressing  for &gt;3 s, the display shows <b>InFo</b>, <b>SEr</b> and then <b>OPeRAtE</b>.</p>
 <b>info</b> > 8 s		<p>When the button is released, a change to info / service mode will be made.</p>

### 19.1.4.4. Error with safety shutdown

		<p>The display shows <b>Err:</b>.</p> <p>The unit initiates safety shutdown.</p>
		<p>The display shows current error code <b>c:</b> alternating with diagnostic code <b>d:</b>.</p> <p>Press  to return to the normal display.</p> <p>Example: Error code <b>12</b> / diagnostic code <b>0</b></p>

#### 19.1.4.5. General information

	<p>The unit displays an event which does not lead to shutdown.</p> <p>The display shows current error code <b>c</b>: alternating with diagnostic code <b>d</b>..</p>
	<p>Press  to return to the display of phases.</p> <p>Example: Error code <b>111</b> / diagnostic ode <b>0</b></p>

#### Note:

For meaning of the error and diagnostic codes, refer to section «Error code list».  
When an error has been acknowledged, it can still be read out from the error history.

## 20 Menu-driven operation

### 20.1 Assignment of levels

The various levels can be accessed via different button combinations. The parameter level can only be accessed via password.

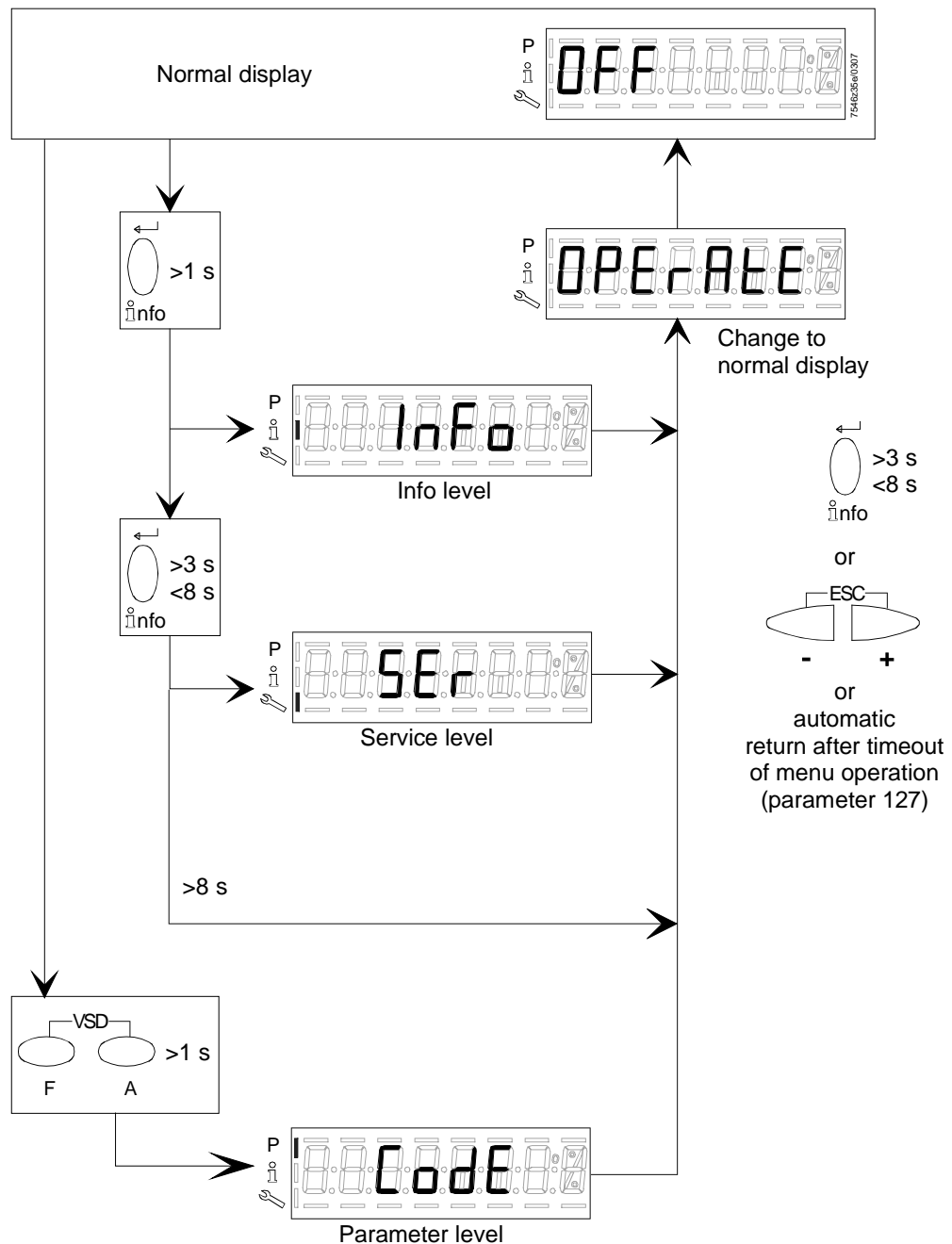


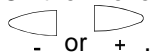
Figure 52: Assignment of levels



## 21 Info level

The info level displays information about the basic unit and operation in general.




Note:

On the info level, you can display the next or the previous parameter by pressing



Instead of pressing , you can also press  for <1 s.

Note:

Press   or  for >3 s to return to the normal display.

Note:

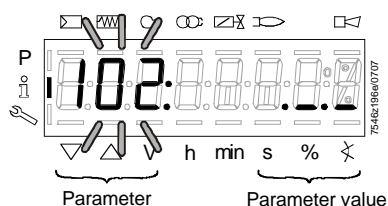






Fig. 53: Info level

No change of values on the info level!

If the display shows  below the parameter value, the value may consist of more than 5 digits.


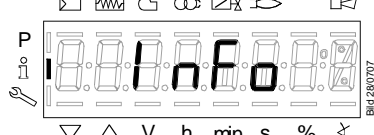


The value is displayed by pressing  for > 1 s and < 3 s.

Press  for > 3 s or press   to return to the selection of the parameter numbers (parameter no. flashes).

No.	Parameter
<b>Info level</b>	
167	Fuel volume resettable (m <sup>3</sup> , l, ft <sup>3</sup> , gal)
162	Operating hours resettable
163	Operating hours when unit is live
164	Startups resettable
166	Total number of startups
113	Burner identification
107	Software version
108	Software variant
102	Identification date
103	Identification number
104	Preselected parameter set: Customer code
105	Preselected parameter set: Version
143	Reserve
End	

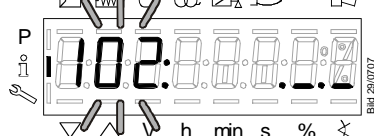





## 21.1 Display of info level


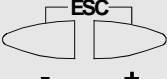




 <b>info</b> 1...3 s		<p>Press  until <b>InFo</b> appears.</p> <p>When releasing , you are on the info level.</p>
---	---	--

## 21.2 Display of info values (examples)

### 21.2.1 Identification date

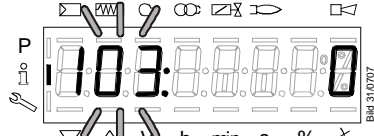
	<p>The display shows parameter <b>102</b>: flashing on the left, characters <b>._.</b> on the right.</p> <p>Example: <b>102: ._.</b></p>
---	--

 <b>info</b> 1...3 s		<p>Press  for 1...3 s to show the identification date <b>TT.MM.JJ.</b></p> <p>Example: Identification date <b>03.11.05</b></p>
---	---	--

 <b>info</b> or <b>ESC</b> 		<p>Press  for &gt;3 s or   to return to the display of parameters.</p>
---	--	--

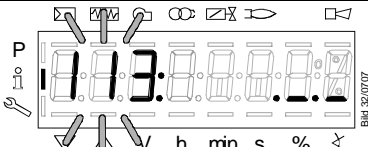
To the next parameter	
-----------------------	---

### 21.2.2 Identification number

	<p>The display shows parameter <b>103</b>: flashing on the left, identification number <b>0</b> on the right.</p> <p>Example: <b>103: 0</b></p>
---	---


To the next parameter		 <b>info</b> <1s		Back to the previous parameter
-----------------------	---	---	---	--------------------------------

### 21.2.3 Identification of burner

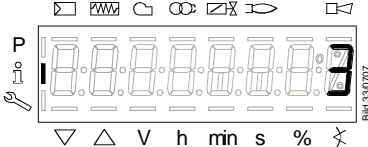



The display shows parameter **113**: flashing on the left, characters . \_ \_ on the right.

Example: **113**: . \_ \_



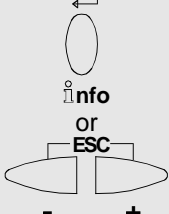
info  
1...3 s



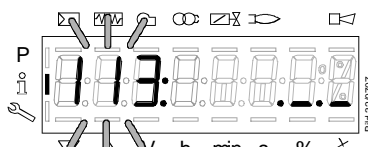
Press  for 1...3 s to show the burner's identification.



Default setting: - - - - -

Example: **3**



info  
or  
ESC



Press  or  to return to the display of parameters.

The burner's identification can be set on the parameter level!

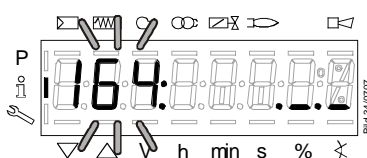
To the next parameter






Back to the previous parameter

### 21.2.4 Number of startups resettable

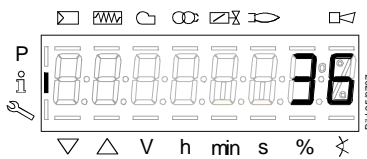



The display shows parameter **164**: flashing on the left, characters . \_ \_ on the right, since display of the number of startups may comprise more than 5 digits.

Example: Parameter **164**: . \_ \_

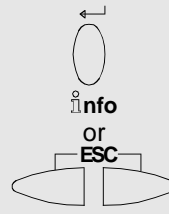


info  
1...3 s

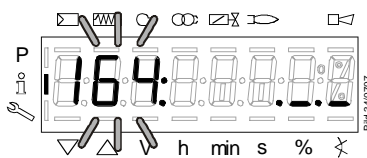



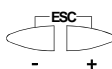
Press  for 1...3 s to show the number of startups (resettable).

Example: **36**



info  
or  
ESC



Press  or  to show parameter **164** flashing again.

The number of startups can be reset on the parameter level!

To the next parameter





Back to the previous parameter

## 21.2.5 Total number of startups

		<p>The display shows parameter <b>166</b>: flashing on the left, characters <b>._.</b> on the right, since the display of the total number of startups may comprise more than 5 digits.</p> <p>Example: Parameter <b>166</b>: <b>._.</b></p>
<p>Info 1...3 s</p>		<p>Press  for 1...3 s to show the total number of startups.</p> <p>Example: <b>56</b></p>
<p>Info or ESC</p> <p>- +</p>		<p>Press  - + to return to the display of parameters.</p>
<p>To the next parameter</p>		<p>Back to the previous parameter</p>



## 21.2.6 End of the info level



		<p>When this display appears, you have reached the end of the info level.</p> <p>The display shows <b>- End -</b> flashing.</p>
<p>To the start of the info level</p>	<p>+ or Info &lt;1s</p>	<p>Back to the previous parameter</p>
<p>- +</p> <p>or</p> <p>Info &gt; 3 s</p>		<p>Press  for &gt;3 s or  - + to return to the normal display.</p> <p><b>OPERAtE</b> appears for a short moment.</p>
		<p>When this display appears, you are back on the normal display and you can change to the next level mode.</p>

## 22 Service level

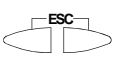

The service level is used to display information about errors including the error history and information about the basic unit.

Note:

When on the service level, you can press  or  to display the next or the previous parameter.

Instead of pressing  + , you can also press  for <1 s.

Note:

Press  or  for >3 s to return to the normal display.

Note:

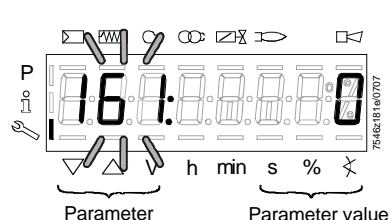


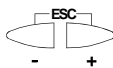


Figure 54: Service level


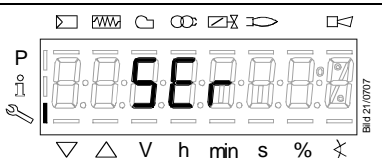
No change of values on the service level.


If characters **---** are displayed by the parameter, the value may consist of more than 5 digits.


Press  for >1 s and < 3 s to display the value.

Press  for >3 s or  to return to the selection of the parameter number (flashing).

### 22.1 Display of the service level

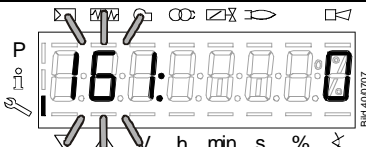
Press  for >3 s until **SER** appears.

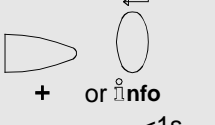

When releasing , you are on the service level.

No.	Parameter
<b>Service level</b>	
954	Flame intensity
960	Actual fuel throughput in unit of volume / h (m <sup>3</sup> /h, l/h, ft <sup>3</sup> /h, gal/h)
121	Manual output Undefined = automatic operation
922	Incremental position of actuators Index 0 = fuel Index 1 = air
936	Standardized speed
161	Number of faults
701	Error history: 701-725.01.Code
.	
.	
725	

## 22.2 Display of service values (example)

### 22.2.1 Number of faults

	<p>The display shows parameter <b>161</b>: flashing on the left, the number of faults that occurred thus far on the right <b>0</b>.</p> <p>Example: Parameter <b>161</b>: <b>0</b></p>
---	--

To the next parameter			Back to the previous parameter
-----------------------	---	---	--------------------------------

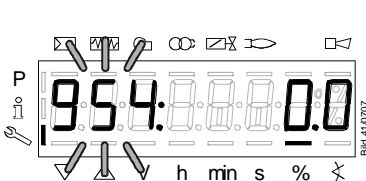
### 22.2.2 Error history

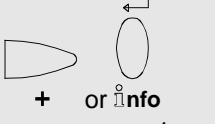

Refer to section «Parameter with index, without direct display / Example of parameter 701: Error history»!



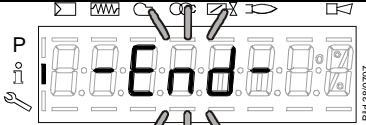
Can be deleted for service (refer to chapter «Parameter list»)!

### 22.2.3 Intensity of flame

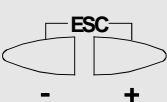
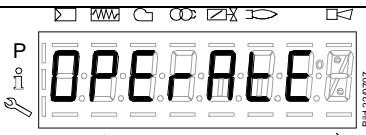
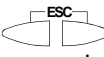
	<p>The display shows parameter <b>954</b>: flashing on the left.</p> <p>On the right, the flame's intensity is displayed as a percentage.</p> <p>Example: <b>954</b>: <b>0.0</b></p>
--	--

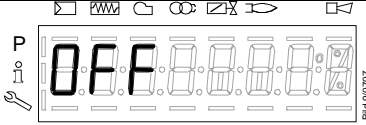
To the next parameter			Back to the previous parameter
-----------------------	---	---	--------------------------------

### 22.2.4 End of the service level

	<p>When this display appears, you have reached the end of the service level.</p> <p>Display – <b>End</b> – appears flashing.</p>
---	--

To the start of the service level			Back to the previous parameter
-----------------------------------	---	---	--------------------------------

		<p>Press  to return to the normal display.</p> <p><b>OPeArTE</b> appears for a short moment.</p>
---	---	--

	<p>When this display appears, you are back on the normal display and you can change to the next level mode.</p>
---	---

## 23 Parameter level

The parameters stored in the basic unit can be displayed or changed on the parameter level.

The change to the parameter level requires a password.

Siemens supplies the LMV37.4... gas burner controls with the factory settings according to «Type summary».

The OEM can change the Siemens default settings to match his own requirements.

With the LMV37.4..., the burner control's characteristics are determined primarily through parameterization. Every time the unit is recommissioned, the parameter settings must be checked. The LMV37.4... must never be transferred from one plant to another without matching the parameters to the new plant.



### Caution

Parameters and settings may only be changed by **qualified staff**.

If parameters are changed, responsibility for the new parameter settings is assumed by the person who – in accordance with the access rights – has made parameter changes on the respective access level.

After parameterization, the OEM must check to ensure that safe burner operation will be warranted.

The OEM which made the settings is always responsible for the parameters, their settings and compliance of the respective application with the relevant national and international standards and safety regulations, such as EN 676, EN 267, EN 1643, etc.

Siemens, its suppliers and other Group Companies of Siemens Ltd. do not assume responsibility for special or indirect damage, consequential damage, other damage, or damage resulting from wrong parameterization.



### Warning

If the factory settings are changed, all changes made must be documented and checked by the OEM.

The OEM is obliged to mark the unit accordingly and to include at least the list of device parameters and settings in the burner's documentation.

Siemens also recommends attaching an additional mark on the LMV37.4... in the form of an adhesive label. According to EN 298, the label should be easy to read and wipe proof.

The label with a maximum size of 70 mm x 45 mm can be attached to the upper part of the housing.

Example of label:

OEM logo	
Type / part no.: 1234567890ABCD	
<b><u>CAUTION! OEM settings:</u></b>	
Parameter no.	
225 = 30 s (t1)	226 = 2 s (t3)
230 = 10 s (t4)	234 = 0 s (t8)
240 = 1 (repetition)	
257 = 2 s (t3n)	TSA = t3n + 0.7 s
259 = 30 s (t11)	
260 = 30 s (t12)	

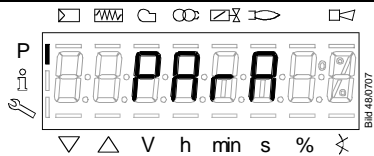
## 23.1 Entering the password



### Note

The **OEM's** password must consist of **5** characters,  
that for the **heating engineer** of **4** characters.

		<p>Press button combination  to display <b>CodE</b>.</p>
		<p>When releasing the buttons, 8 bars appear the first of which flashes.</p>
		<p>Press  to select a number or letter.</p>
<div style="text-align: center;"> <p>Info</p> </div>		
		<p>Press  to confirm the value.</p> <p>The value entered changes to a minus sign (–).</p> <p>The next bar starts flashing.</p>
		<p>Press  to select a number or letter.</p>
<div style="text-align: center;"> <p>Info</p> </div>		
<div style="text-align: center;"> <p>•</p> <p>•</p> <p>•</p> </div>		
		<p>After entry of the last character, the password must be confirmed by pressing .</p> <p>Example: Password consisting of 4 characters.</p>



As a confirmation of correct entry, **PARA** appears for a maximum of 2 s.

**Note:**

For the entry of passwords or burner IDs, the following numbers and letters can be used:

	= 1		= A		= L
	= 2		= b		= n
	= 3		= C		= o
	= 4		= d		= P
	= 5		= E		= r
	= 6		= F		= S
	= 7		= G		= t
	= 8		= H		= u
	= 9		= I		= Y
	= 0		= J		



## 23.2 Entering the burner's identification

The burner's identification is to be entered like a password (character by character), but from right to left and concluding with “\_”.

		<p>Parameter <b>113</b>: flashes.</p> <p>Press  to go to editing mode.</p>
		<p>You are on the display for undefined burner identification.</p> <p>8 bars appear.</p>
		<p>Press  or  to select a number.</p> <p>Example: Number <b>3</b> flashes</p>
		<p>Press  to confirm the value.</p> <p>Make the entry number by number</p>
		<p>Press  or  to select the next number.</p> <p>Example: Number <b>9</b> flashes</p>
<p>•</p> <p>•</p> <p>•</p>		
		<p>After entry of the last number, burner identification must be confirmed by pressing .</p>

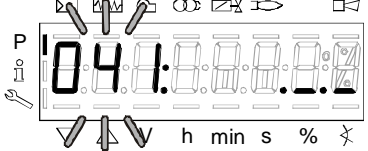








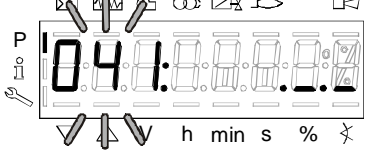
The display no longer flashes.

Example: Burner identification **9993**

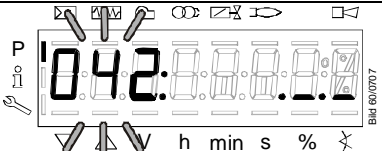



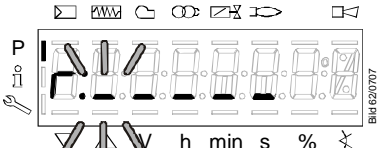


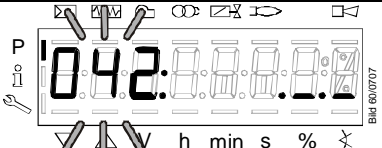
Press to return to the parameter level.

**PArAmeter 113:** for burner identification

## 23.3 Changing the heating engineer's password

		<p>Parameter <b>041</b>: flashes.</p> <p>Press  to go to level <b>c</b>: for password changes.</p>
		<p>Letter <b>n</b>: for new appears flashing.</p> <p>Proceed as described in section «Entering the password» and enter the new password (4 characters).</p> <p>After entry of the last character, the password must be confirmed by pressing .</p>
		<p>Letter <b>r</b>: for repeat appears flashing.</p> <p>Proceed as described in section «Entering the password» and repeat entry of the new password.</p> <p>After entry of the last character, the password must be confirmed by pressing .</p>
		<p><b>SEt</b> confirms that the new password has been saved.</p>
		<p>Parameter <b>041</b>: flashes again.</p>

## 23.4 Changing the OEM's password

	<p>Parameter <b>042</b>: flashes.</p> <p>Press  to go to level <b>c</b>: for password changes.</p>
	<p>Letter <b>n</b>: for new appears flashing.</p> <p>Proceed as described in section «Entering the password» and enter the new password (5 characters).</p> <p>After entry of the last character, the password must be confirmed by pressing .</p>
	<p>Letter <b>r</b>: for repeat appears flashing.</p> <p>Proceed as described in section «Entering the password» and repeat entry of the new password.</p> <p>After entry of the last character, the password must be confirmed by pressing .</p>
	<p><b>SEt</b> confirms that the new password has been saved.</p>
	<p>Parameter <b>042</b>: flashes again.</p>

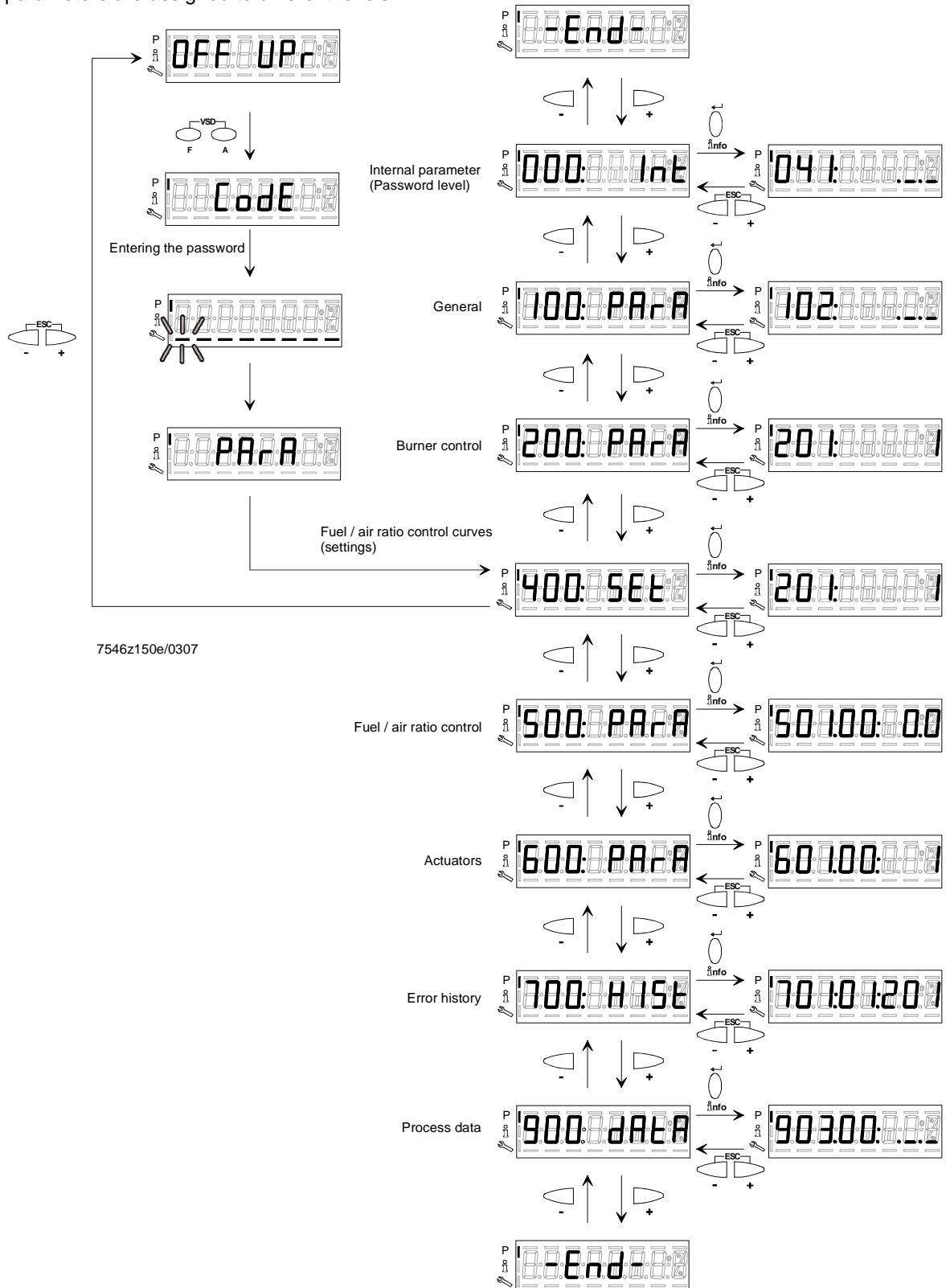
## 23.5 Use of the parameter level

The parameters stored in the LMV37.4... basic unit can be displayed and changed on the parameter level. Normally, all parameters have been set by the burner manufacturer – with the exception of those for the fuel train and for fuel / air ratio control.

A description of parameter level **400**, which is used for setting the fuel train and the ratio curve, is given in chapter «Fuel / air ratio curves – settings and commissioning».

## 23.6 Assignment of the parameter levels

The parameters are assigned to different levels.



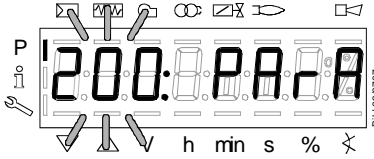



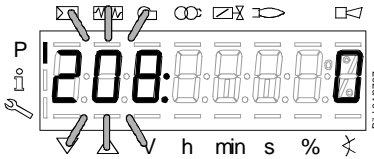


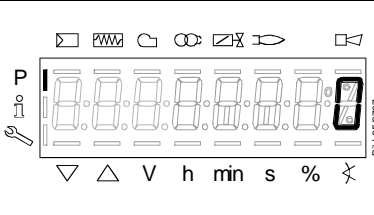

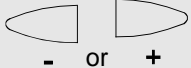
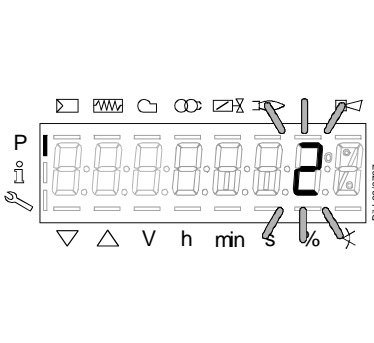


The following sections explain the operating philosophy behind the parameter levels using a number of examples.



Chapter «Safety notes on settings and parameterization» must be particularly observed!

## 23.7 Parameters without index, with direct display

### 23.7.1 Using the example of parameter 208: Program stop

	 <p>Parameter level 200 display showing '200: P P P P' with unit indicators 'h min s %' below. Arrows point to the 'P' and the first '0'.</p>	<p><b>PArAmeter level 200:</b> for burner controls.</p>
	 <p>info</p>	<p>Press  to go to menu level <b>200:</b></p>
 <p>+</p>	 <p>Parameter level 208 display showing '208: P P P P' with unit indicators 'h min s %' below. Arrows point to the 'P' and the first '0'.</p>	<p>Press  to select «Program stop».</p> <p>Display: Parameter <b>208</b>: flashes, value <b>0</b> does not.</p>
	 <p>info</p>	
	 <p>Parameter level 208 display in editing mode showing '208: P P P P' with unit indicators 'h min s %' below. Arrows point to the 'P' and the first '0'.</p>	<p>Press  to go to editing mode.</p> <p>Display: Program stop time set Here: Value <b>0</b> → corresponding to program stop deactivated</p>
 <p>- or +</p>	 <p>Parameter level 208 display in editing mode showing '208: P P P P' with unit indicators 'h min s %' below. Arrows point to the 'P' and the first '0'.</p>	<p>Press  or  to select the required program stop time.</p> <p>0 = deactivated 1 = PrePurgP (Ph24) 2 = IgnitPos (Ph36) 3 = Interv1 (Ph44) 4 = Interv2 (Ph52)</p> <p>Example: <b>2</b> IgnitPos (Ph36)</p>

Adopt the value!

ESC

- +

Discard the change!

Press to return to editing mode.

The value set will be adopted.

Press - + to return to the parameter level.

Display: Parameter **208**: flashes, value **0** does not.

**Note:**  
**To detect potential display errors, the value is displayed one position shifted to the right.**

Display: Value **2**

Press - + to return to the parameter level.

**PArA**meter **208**: flashes, value **2** does not.

Press - + to return to the parameter level.

**PArA**meter **200**: for burner controls.

To the next parameter level

Back to the previous parameter level

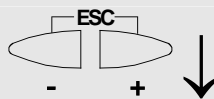
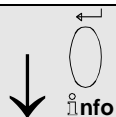
## 23.8 Parameters without index, with no direct display (with parameters having a value range > 5 digits)

### 23.8.1 Using the example of parameter 162: Operating hours resettable

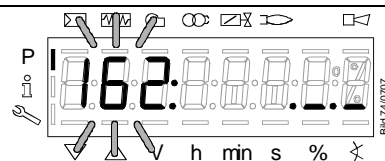
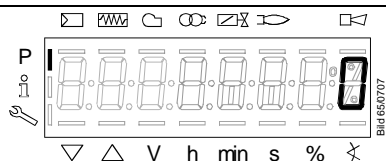
		<p>PArAmeter level <b>100</b>: for general.</p>
		<p>Press  to go to menu level <b>100</b>..</p>
		<p>Press  to select «Operating hours resettable».</p> <p>Display: Parameter <b>162</b>: flashes, characters <b>---</b> do not.</p>
		<p>Press  to go to editing mode.</p> <p>Display: <b>123457</b></p>
		<p>You can press  or  to set the number of operating hours to <b>0</b>.</p> <p>Display: Operating hours <b>0</b> flashes</p>




Adopt the value!



Discard the change!



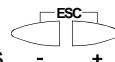
Press  to return to editing mode.

The value set will be adopted.

**Note:**

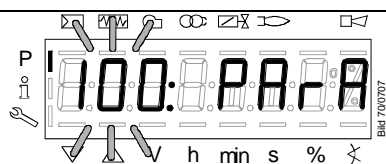
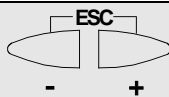
To detect potential display errors, the value is displayed one position shifted to the right.

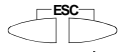
Display: Value 0



Press - + to return to the parameter level.

Display: Parameter **162**: flashes, characters '-.-' do not.



Press  to return to the parameter level.

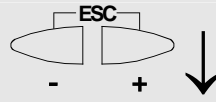
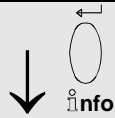
**ParA**meter 100: for general

## 23.9 Parameter with index, with direct display

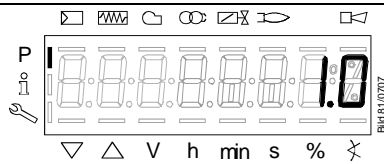
### 23.9.1 Using the example of parameter 501: Non-flame positions fuel actuator


		<p><b>PARAmeter level 500:</b> for fuel / air ratio control.</p>
		<p>Press  to go to menu level <b>500:</b>.</p> <p>Display: Parameter <b>501.</b> flashes, index <b>00:</b> and value <b>0.0</b> do not.</p>
		<p>Press  to go to the index.</p> <p>Display: Parameter <b>501.</b> does not flash, index <b>00:</b> flashes, value <b>0.0</b> does not.</p>
		<p>Press  or  to select the required index.</p> <p>.00 = no-load position .01 = prepurge position .02 = postpurge position</p> <p>Display: Index <b>01:</b> for prepurge position flashes, value <b>0.0</b> does not.</p>
		<p>Press  to go to editing mode.</p> <p>Display: Value <b>0.0</b></p>
		<p>Press  or  to select the required prepurge position.</p> <p>Example: <b>1.0</b></p>

Adopt the value!



Discard the change!



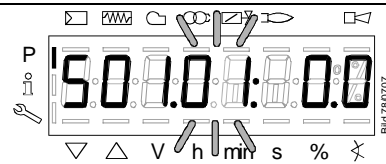
Press  to return to editing mode.

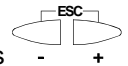
The value set will be adopted.

**Note:**

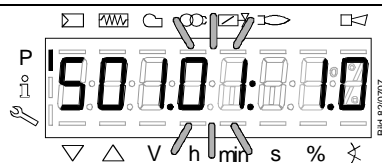
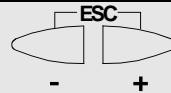
To detect potential display errors, the value is displayed one position shifted to the right.

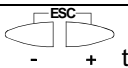
Display: Value 1.0



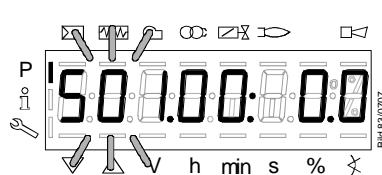
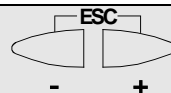
Press  to return to the index.

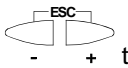
Display: Parameter **501**. does not flash, index **01**: flashes, value **0.0** has not changed and does not flash.



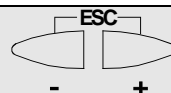
Press  to return to the index.

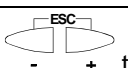
**PArAmeter 501**: does not flash, index **01**: flashes, value **1.0** does not.



Press  to return to the parameter level.

Display: Parameter **501**. flashes, index **00**: and value **0.0** do not.



Press  to return to the parameter level.

**PArAmeter 500**: for fuel / air ratio control.

## 23.10 Parameters with index, with no direct display

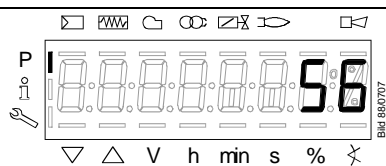
### 23.10.1 Using the example of parameter 701: Errors

Refer to chapter «Error code list»!



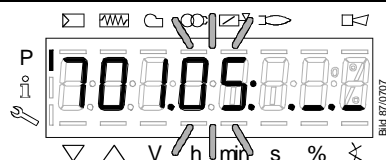
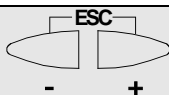
Can be deleted for service, refer to chapter «Parameter list»!

	<b>HIStorie 700:</b> for error history.
	Press  to go to the parameter level.
	Press  to select parameter <b>701</b> . Display: Parameter <b>701</b> . flashes, index <b>01</b> : and value <b>201</b> do not.
	Press  to go to index <b>01</b> :. Display: Parameter <b>701</b> . does not flash, index <b>01</b> : flashes, value <b>201</b> does not.
To the next index	Back to the previous index
	Press  to select the index: .01 = error code .02 = diagnostic code .03 = error class .04 = error phase .05 = startup counter .06 = Load  Example: Parameter <b>701</b> ., index <b>05</b> : for startup counter, diagnostic code -.-



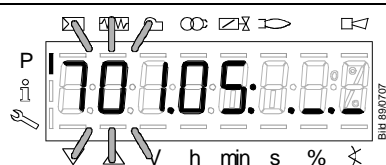
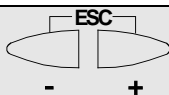
Press to go to display mode.

Display: Value **56**



Press to return to the index.

Display: Parameter **701.** does not flash, index **05:** flashes, characters **---** do not.



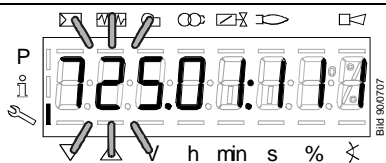
Press to return to the parameter level.

Display: Parameter **701.** flashes index **05:** does not, characters **---** do not.

To the next older error



•  
•  
•



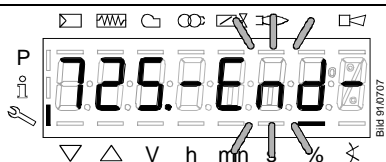
Parameters cover the period of time back to the last error since history was deleted (max. to parameter **725.**)

Example:  
Parameter **725.**, index **01:**, error code **111**

To the next parameter



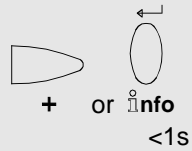
Back to the previous parameter



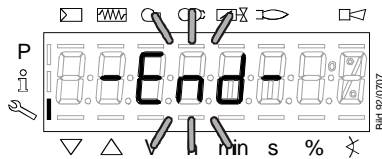
When this display appears, you have reached the end of the error history index.

Display **– End –** appears flashing.

To the next parameter

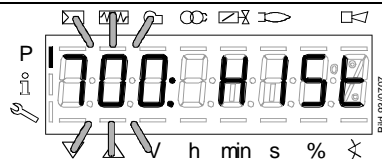
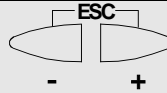



Back to the previous parameter



When this display appears, you have reached the end of the error history.

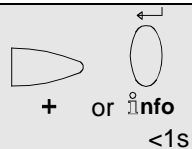
Display – **End** – appears flashing.



Press  to return to the parameter level.

**HIS**t 700: for error history

To the next parameter



Back to the previous parameter

#### Note:

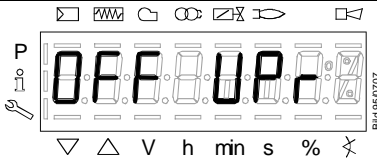
If you wish, you can delete the error history via parameter 130.  
To delete the display, set the parameter to 1 and then to 2.  
The error history is deleted when the parameter has returned to 0.

## 23.11 Fuel / air ratio curves – settings and commissioning



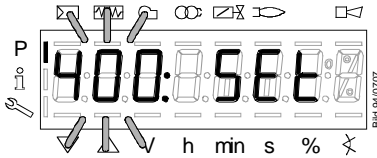
The display shows **400**: flashing on the left, **SEt** appears on the right.


## 23.11.1 Initial commissioning

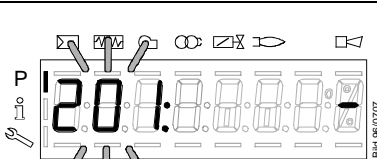



An un-programmed unit or a unit whose operating mode has been reset or changed displays **OFF UPr**.

For initial commissioning, change to the parameter level (refer to chapter «Operation»).  
The settings can then be made on parameter level **400**.



Press  to select parameter **400** for initial commissioning and for setting fuel / air ratio control.

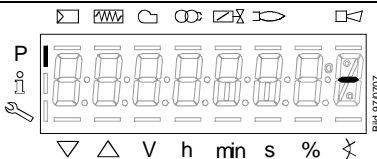



Press  to go to the settings for fuel / air ratio control and parameter **201** for selecting the operating mode.

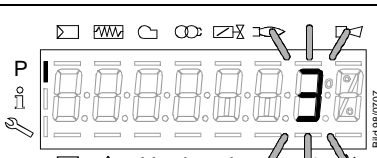
**201:** appears flashing.



**Note:** Ensure that the fuel train is correctly set in accordance with the type of burner.

No.	Parameter	Actuator controlled	
		Air	Fuel
201	Burner operating mode (fuel train, modulating / multi-stage, actuators, etc.)	x	x
	-- = undefined (delete curves)		
	1 = gas modulating (G mod)		
	2 = gas modulating with pilot valve (Gp1 mod)		
	3 = gas modulating with pilot valve (Gp2 mod)		
	4 = oil modulating (Lo mod)		
	5 = oil 2-stage (Lo 2-stage)		---
	6 = oil 3-stage (Lo 3-stage)		
	7 = gas modulating (G mod pneu)		
	8 = gas modulating (Gp1 mod pneu)		
	9 = gas modulating (Gp2 mod pneu)		




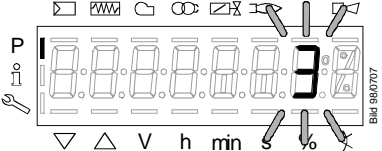
Press  to go to editing mode.




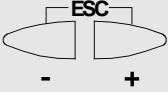
Press  or  to select the required setting.

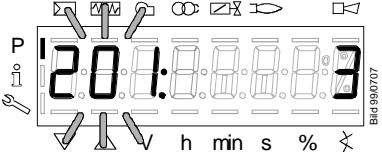
Example: **3** for gas modulating with pilot valve (Gp2 mod)

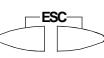




Press  to save the selected setting.




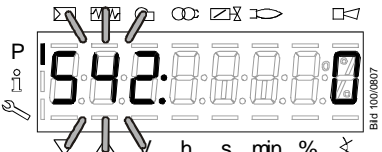



Press  to return to the parameter level.

To the next parameter







Press  to change to parameter **542**: to activate the VSD.

You can choose:

0 = VSD OFF


1 = VSD ON


To the next parameter





Back to the previous parameter



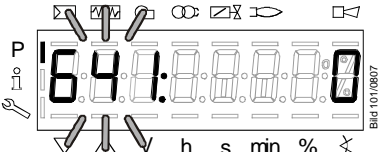
Press  to change to parameter **641**: to control speed standardization of the VSD.

You can choose:

0 = speed standardization OFF

1 = speed standardization ON

After setting speed standardization to **1**, standardization of the VSD commences. If successful, the parameter will be reset to **0**. Negative values indicate errors (refer to subsection 8.8.1 «Automatic speed standardization»).



- For operating modes 1, 2, 3, 4, 7, 8 and 9, refer to subsection «Setting curve points P0, P1 and P9 for modulating mode («Gmod», «Gp1 mod», «Gp2 mod» and «Lo mod»)
- For operating modes 5 and 6, refer to subsection «Setting the curve points for multistage mode («Lo 2-stage» and «Lo 3-stage»)

To the next parameter





## 23.11.2 Setting curve points P0 and P9 for modulating mode («G mod», «Gp1 mod», «Gp2 mod» and «Lo mod»)

### Example of «G mod»

		<p>Display <b>P0</b> appears flashing.</p> <p>Curve point for ignition load.</p>
		<p>Keep  depressed.</p> <p>You are now in setting <b>P0</b> of fuel setting <b>F</b> for ignition position <b>P0</b>.</p>
		<p>Press simultaneously  and  or  to set ignition position <b>P0</b> of the fuel damper.</p> <p>Example: <b>30.0</b></p>
		<p>Release .</p> <p>The selected value will be adopted.</p> <p>Example: <b>30.0</b></p>
		<p>Keep  depressed.</p> <p>You are now in setting <b>P0</b> of air actuator <b>A</b> for ignition position <b>P0</b>.</p>
		<p>Press simultaneously  and  or  to set ignition position <b>P0</b> of the air actuator.</p> <p>Example: <b>22.0</b></p>
		<p>Release .</p> <p>The selected value will be adopted.</p> <p>Example: <b>22.0</b></p>
		<p>Keep  and  depressed.</p> <p>You are now in setting <b>n0</b>, speed <b>n</b> is for ignition position <b>n0</b></p>

Press simultaneously **F** and **A** and **-** or **+** to adjust speed **n0** of the load controller.

Example: **20.0**

Release **F** and **A**.

The selected value will be adopted.

Example: **20.0**

To the next curve point

Press **+**.

**P9** appears flashing.

Curve point for nominal load.

Same procedure as with **P0**

**Note:**

If **-** is pressed first, the display jumps to 90!

To the next curve point

Back to the previous curve point

Press **+**.

The display shows **run** (identification of start for setting the curve parameters).

**Note:** When pressing , you are given the choice of proceeding with the "warm settings" (refer to subsection «Warm settings for modulating mode («G mod», «Gp1 mod», «Gp2 mod» and «Lo mod»)» or, by pressing **-** **+**, with the "cold settings" (refer to subsection «Cold settings for «G mod», «Gp1 mod», «Gp2 mod» and «Lo mod»)»).

### 23.11.3 Setting curve points P0 and P9 for «G mod pneu», «Gp1 mod pneu» and «Gp2 mod pneu»



Refer to subsection «Setting curve points P0 and P9 for modulating mode («G mod», «Gp1 mod», «Gp2 mod» and «Lo mod»)»!

Here, only the air must be adjusted with **A**.

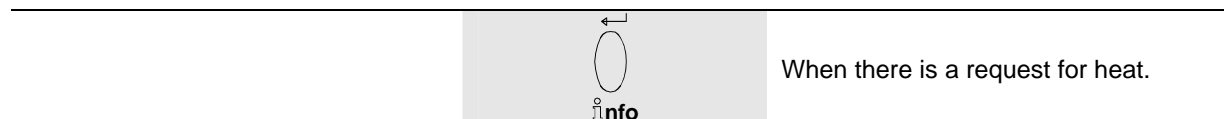
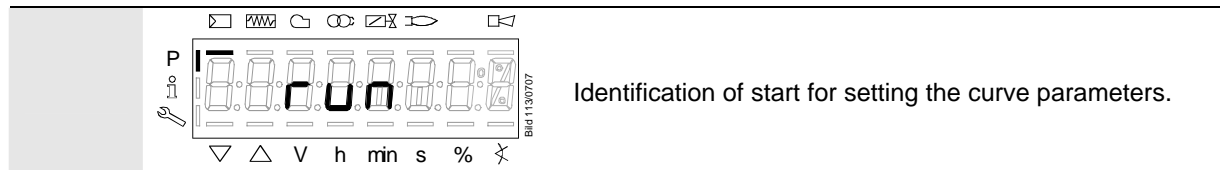
## 23.11.4 Warm settings for modulating mode («G mod», «Gp1 mod», «Gp2 mod» and «Lo mod»)

### Note:

With the "warm settings", the burner is started up after pressing **InFo**. Fuel / air ratio control can now be accurately set while the flame is present. When traveling along the precalculated curve to nominal load point **P9**, all intermediate curve points (**P2...P8**) must be set.

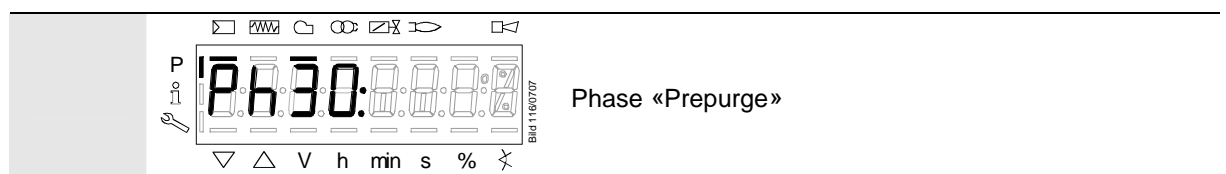
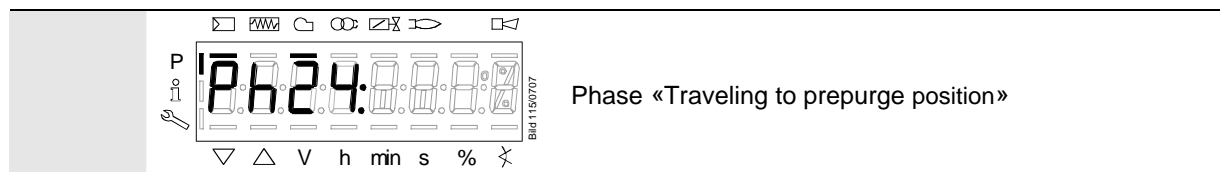
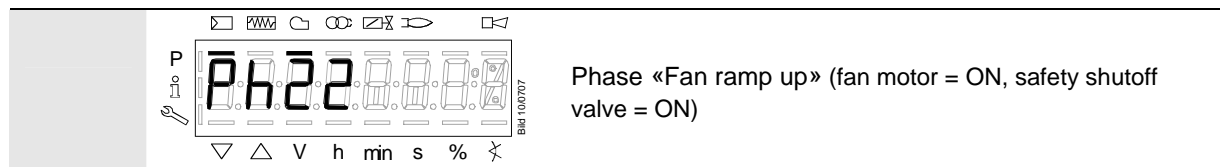
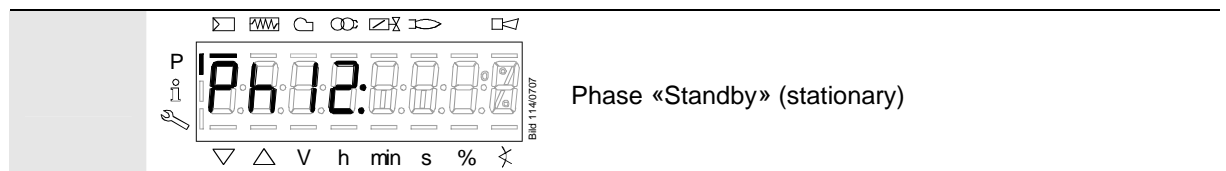
Automatic operation is released when – after reaching **P9** – the curve settings are quit by pressing **ESC**. If the curve settings are aborted earlier (**ESC** or shutdown due to fault), start prevention **OFF UPr** continues to be active until all points are set.

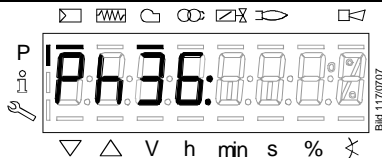
If required, the gas pressure can be set at the nominal load point. In case the gas pressure is changed, all points must be checked by traveling along the curve downward and – if required – must be readjusted.



### Note:

If, during the time the curve is parameterized, an error occurs which leads to safety shutdown, parameterization of the curve will be quit.






Phase «Traveling to ignition position»

Wait until the burner is in operation and symbol ▲ or ▼ is no longer highlighted!  
 The startup sequence stops in Phase 36 «Traveling to ignition position».  
 The ignition position can be adjusted under "cold" conditions.

F or A  
and  
- or +  
as well as  
F and A  
and  
- or +




Ignition position **P0** can only be set after symbol ▲ or ▼ is no longer highlighted.


For fuel, keep **F** depressed, for air, **A**, as well as for VDS **F** and **A**

Press **-** or **+** to adjust the value.


As soon as symbol ▲ or ▼ is no longer highlighted, the next curve point **P1** can be selected with **+**.




+




Phase «Traveling to ignition position»



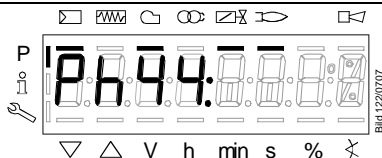
Phase «Preignition»



Phase «1st safety time» (ignition transformer ON)



Phase «1st safety time» (ignition transformer OFF), preignition time OFF



Phase «Interval 1»

## Starting the “warm settings”

Ignition position **P0** can only be set when symbol ▲ or ▼ is no longer highlighted.

For fuel, keep **F** depressed, for air, **A**, as well as for VSD **F** and **A**

Press **-** or **+** to adjust the value.

As soon as symbol ▲ or ▼ is no longer highlighted, the next curve point **P1** can be selected with **+**.

A diagram showing a horizontal line with a shaded gray rectangular region below it. Inside the shaded region is a white, right-pointing triangle. Below the triangle is a plus sign (+).

Low-flame position **P1** can only be set when symbol ▲ or ▼ is no longer highlighted.

The value will be adopted from **P0**.

For fuel, keep **F** depressed, for air, **A** , as well as for VSD **F** and **A**

Press **-** or **+** to adjust the value.

As soon as symbol ▲ or ▼ is no longer highlighted, the next curve point **P2** can be selected with **+** .

To the next curve point			Back to the previous curve point
-------------------------	---	---	----------------------------------

When changing from **P1** to **P2** for the first time, curve points **P2...P8** will automatically be calculated and saved. **CALC** appears for a short moment.

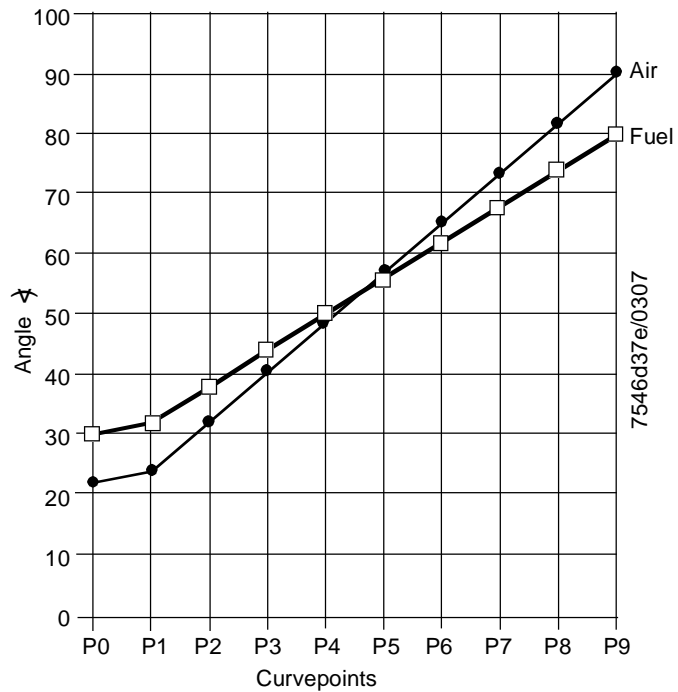


Figure 55: Setting the curve points

**Note:**

Curve points **P2 to P8** are automatically calculated as a straight line between **P1** and **P9**.

**Example 1 = gas modulating**

<b>P0, P1 and P9</b> are set as described:	Curve point	Value 1 fuel	Value 2 air
	<b>P0</b>	30.0	22.0
	<b>P1</b>	32.0	24.0
	<b>P9</b>	80.0	90.0

<b>P2 through P8</b> have automatically been calculated:	Curve point	Value 1 fuel	Value 2 air
	<b>P2</b>	38.0	32.3
	<b>P3</b>	44.0	40.5
	<b>P4</b>	50.0	48.8
	<b>P5</b>	56.0	57
	<b>P6</b>	62.0	65.3
	<b>P7</b>	68.0	73.5
	<b>P8</b>	74.0	81.8

Continue the same way with P2 through P9!

F or A  
and  
- or +  
as well as  
F and A  
and  
- or +

Nominal load position **P9** can only be set when symbol ▲ or ▼ is no longer highlighted. If required, readjust the gas pressure.

For fuel, keep F depressed, for air, A, as well as for VSD F and A.

Press - or + to adjust the value. As soon as symbol ▲ or ▼ is no longer highlighted, the next curve point **P8** can be selected with -.

After setting the nominal load point (P9), either a change to parameter 546 (automatic operation) can be made (Esc) or all curve points can be run through in the reverse order. If the gas pressure is changed, all curve points must be checked and – if required – readjusted.

The maximum capacity is displayed.

If the display shows - - -, the maximum capacity has not yet been specified. The system can be run up to 100 %.

You can press info to go to editing mode, enabling you to change the maximum capacity.

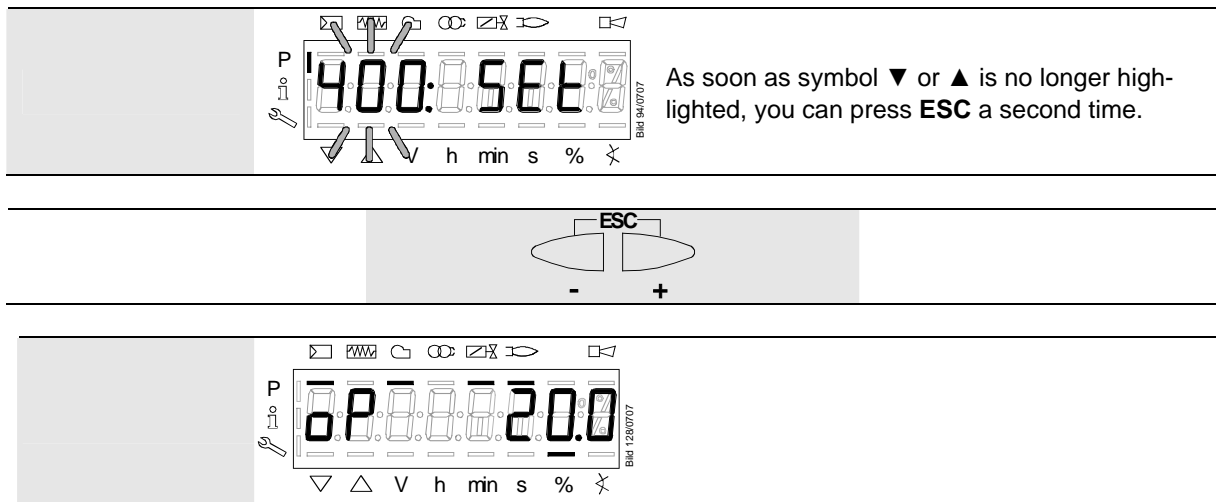
To the next parameter

The minimum capacity is displayed.

If the display shows - - -, the minimum capacity has not yet been entered. The system can be run down to 20 %.

You can press info to go to editing mode, enabling you to change the minimum capacity.


Completing parameterization of the curve



The “warm settings“ for fuel / air ratio control by the LMV37.4... are now completed.

### 23.11.5 Warm settings for modulating mode («G mod pneu», «Gp1 mod pneu» and «Gp2 mod pneu»)



Refer to subsection «Warm settings for modulating mode («G mod», «Gp1 mod», «Gp2 mod» and «Lo mod»)!  
Here, only the air must be adjusted with .


### 23.11.6 Cold settings for «G mod», «Gp1 mod», «Gp2 mod» and «Lo mod»



Refer to subsection «Warm settings for modulating mode («G mod», «Gp1 mod», «Gp2 mod» and «Lo mod»)!  
With no flame, however, no actuator travel and no automatic operation after the settings have been made.



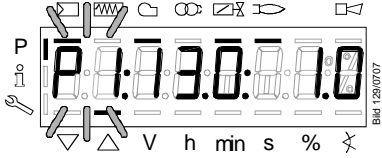

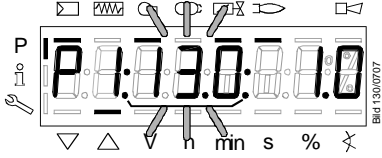

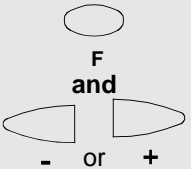









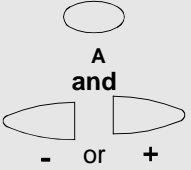




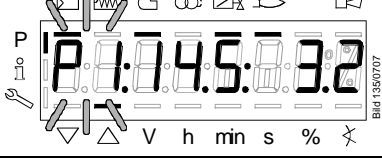



### 23.11.7 Cold settings for «G mod pneu», «Gp1 mod pneu» and «Gp2 mod pneu»



Refer to subsection «Warm settings for modulating mode («G mod», «Gp1 mod», «Gp2 mod» and «Lo mod»)!  
With no flame, however, no actuator travel and no automatic operation after the settings have been made.  
Here, only the air must be adjusted with .



## 23.11.8 Editing the curve points

To the next curve point		or		To select the curve point
				The selected curve point is displayed.
				Keep  depressed. The fuel actuator has been selected for editing.
				Keep  depressed and press  or  to adjust the fuel actuator. In the case of “warm settings“, the actuator follows directly the adjustments made. The changes are saved.
				After releasing  , the curve point is selected again.
				Keep  depressed. The air actuator has been selected for editing.
				Keep  depressed and press  or  to adjust the air actuator. In the case of “warm settings“, the actuator follows directly the adjustments made. The changes are saved.
				After releasing  , the curve point is selected again.
To the next curve point				Back to the previous curve point

23.11.9 Interpolating the curve points

Identification of start for setting the curve parameters.

Example 1 = gas modulating

P0, P1 and P9 are set as described:	Curve point	Value 1 fuel	Value 2 air
	P0	30.0	22.0
	P1	32.0	24.0
	P9	80.0	90.0

P2 through P8 have automatically been calculated:	Curve point	Value 1 fuel	Value 2 air
	P2	38.0	32.3
	P3	44.0	40.5
	P4	50.0	48.8
	P5	56.0	57
	P6	62.0	65.3
	P7	68.0	73.5
	P8	74.0	81.8

P5 shall now be changed:

Keep or depressed.  
Example:

Press or to change the value as required.  
Example: 50.0

F and A  
and  
- or +

Press or to change the value as required.

Example: **00.0**

F or A

Release or .

The required value will be adopted.

Example: **P5:50.0:46.0**

+  
> 3 s

Keep depressed for >3 s.

**CALC** appears.

The display jumps to **P6**.

All curve points from <b>P5 to P9</b> have now been automatically recalculated (linear interpolation):	Curve point	Value 1 fuel	Value 2 air
	<b>P5</b>	50.0	46.0
	<b>P6</b>	57.5	57.0
	<b>P7</b>	65.0	68.0
	<b>P8</b>	72.0	79.0
	<b>P9</b>	80.0	90.0

-  
> 3 s

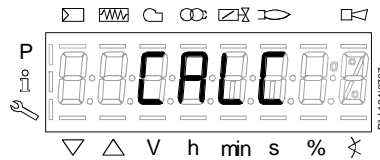
Keep depressed for >3 s.

**CALC** appears.

The display jumps to **P4**.

All curve points from <b>P1 to P5</b> have now been automatically recalculated (linear interpolation):	Curve point	Value 1 fuel	Value 2 air
	<b>P5</b>	50.0	46.0
	<b>P4</b>	45.5	40.0
	<b>P3</b>	41.0	35.0
	<b>P2</b>	36.5	29.5
	<b>P1</b>	32.0	24.0

> 3 s +



- > 3 s

If it is not only the current curve point that shall be changed but all other curve points in the direction of travel as well, a new straight line from the current curve point to **P9** (press + ) or **P1** (press - ) can be calculated by a long push on - or + .

Display **CALC**

### Example of presentation

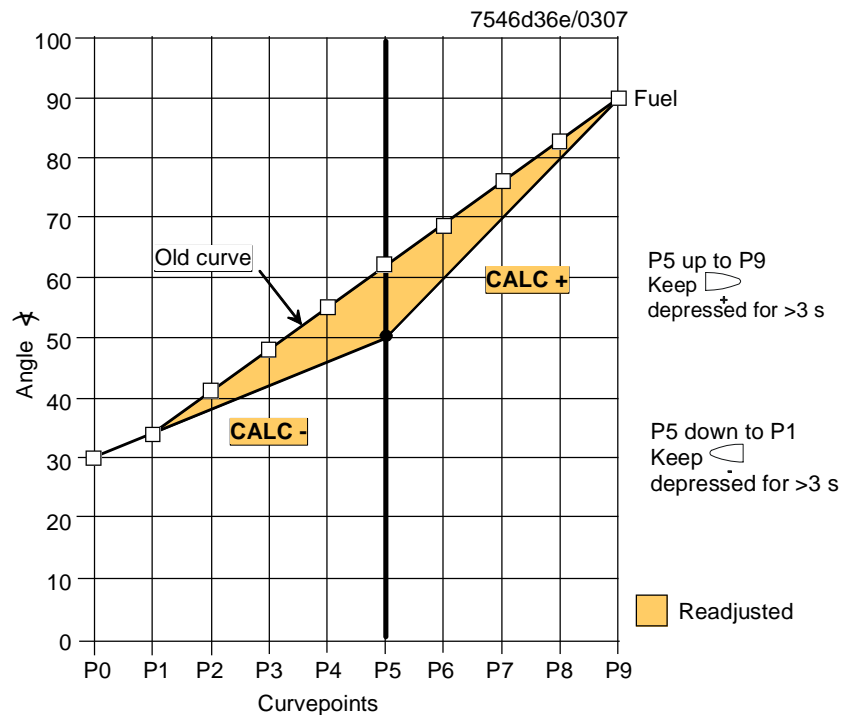


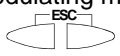




Figure 56: Changing several curve points

### Example of «Lo 2-stage»

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 **Note:** You are now given the choice of proceeding with the “warm settings” by pressing  (refer to subsection «Warm settings for modulating mode «G mod», «Gp1 mod», «Gp2 mod» and «Lo mod»), or with the “cold settings” by pressing  -  +  (refer to subsection «Cold settings for «G mod», «Gp1 mod», «Gp2 mod» and «Lo mod» ).

**Warm settings for «Lo 2-stage» and «Lo 3-stage»**

### 23.11.11 Warm settings for «Lo 2-stage» and «Lo 3-stage»

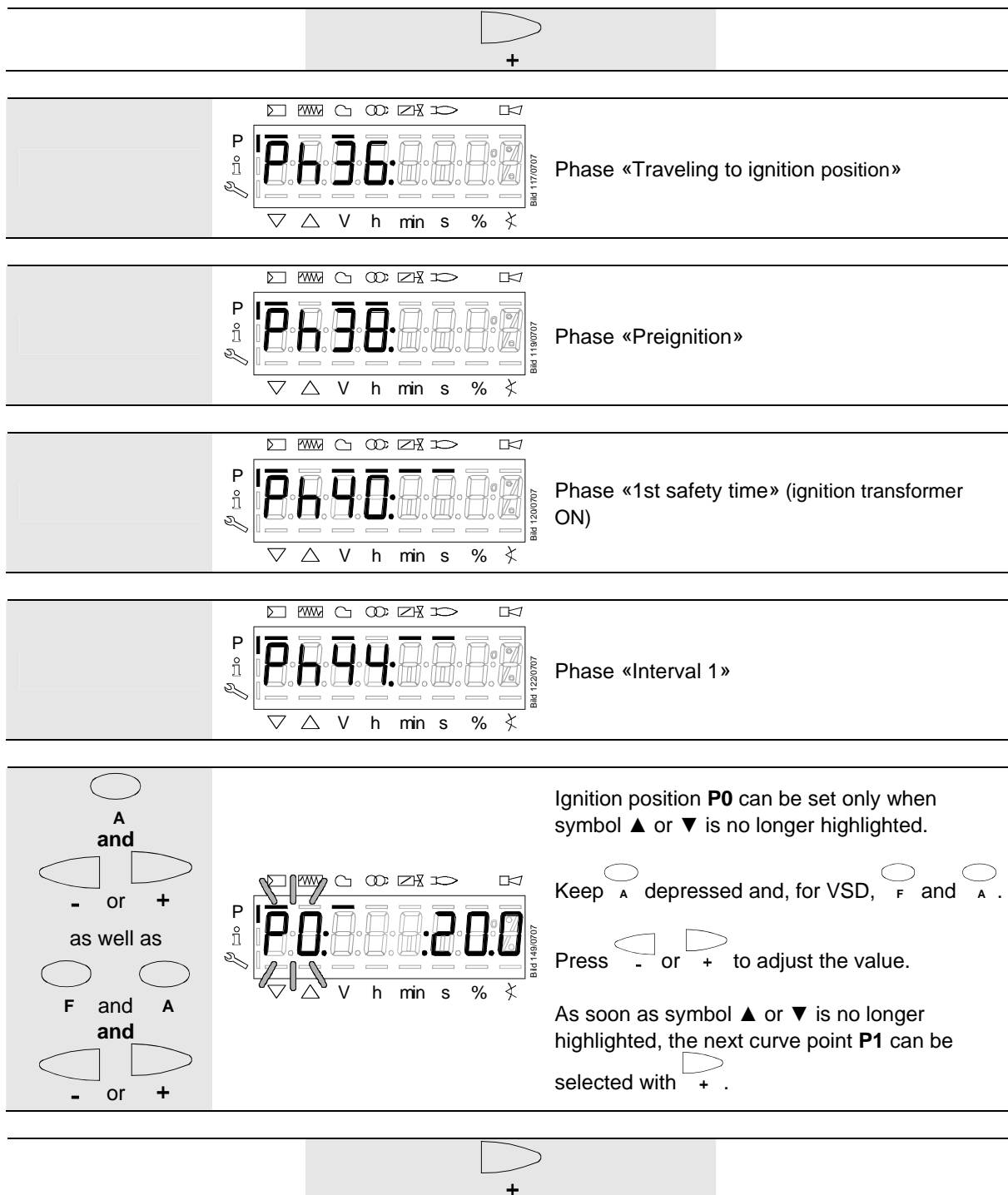
		<p>Identification of start for setting the curve parameters.</p>
		<p>Provided the controller is enabled!</p>
		<p>Phase «Standby» (stationary)</p>
		<p>Phase «Fan ramp up» (fan motor = ON, safety shutoff valve = ON)</p>
		<p>Phase «Traveling to prepurge position»</p>
		<p>Phase «Purge»</p>
		<p>Phase «Traveling to ignition position»</p>

Wait until the burner is in operation and symbol ▲ or ▼ is no longer highlighted!

The startup sequence stops in Phase 36 «Traveling to ignition position».

The ignition position can be adjusted under "cold" conditions.

		<p>Ignition position <b>P0</b> can be set only when symbol ▲ or ▼ is no longer highlighted.</p> <p>Keep <b>A</b> depressed and, for VSD, <b>F</b> and <b>A</b>.</p> <p>Press <b>-</b> or <b>+</b> to adjust the value.</p> <p>As soon as symbol ▲ or ▼ is no longer highlighted, the next curve point <b>P1</b> can be selected with <b>+</b>.</p>
--	--	--





○  
**A**  
and

- or +  
as well as

○ ○  
**F** and **A**  
and

- or +

Low-fire position **P1** can be set only when symbol ▲ or ▼ is no longer highlighted.

Set stage 1 **P1**.

Fuel valve **V1** is switched on.

Keep ○ depressed and, for VSD, ○ and ○  
A .

Press - or + to adjust the value.

As soon as symbol ▲ or ▼ is no longer highlighted, the next curve point **P2on** can be selected with +

To the next curve point

○  
**A**  
and

- or +  
as well as

○ ○  
**F** and **A**  
and

- or +

Curve point **P2on** can be set only when symbol ▲ or ▼ is no longer highlighted.

Set switch-on point stage 2 **P2**.

Fuel valve **V2** is still off.

Keep ○ depressed and, for VSD, ○ and ○  
A .

Adjust the value with - or + .

As soon as symbol ▲ or ▼ is no longer highlighted, the next curve point **P2\_d** can be selected with +

To the next curve point

Back to the previous curve point

○  
**A**  
and

- or +  
as well as

○ ○  
**F** and **A**  
and

- or +

Curve point **P2\_d** can be set only when symbol ▲ or ▼ is no longer highlighted.

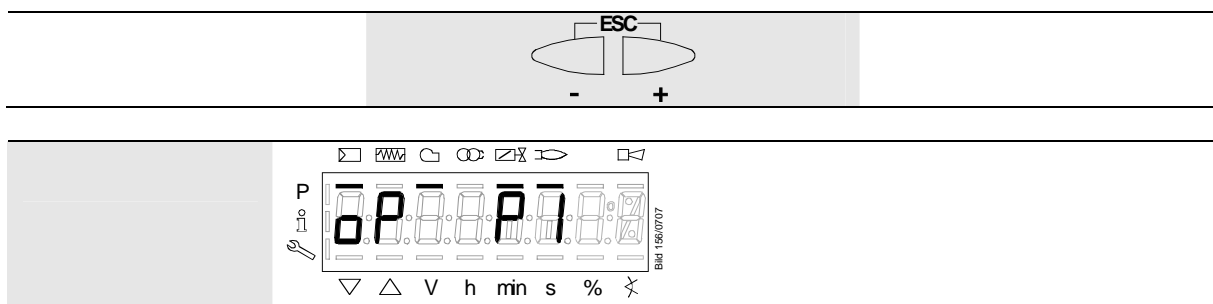
Fuel valve **V2** is still off and the system remains at curve point **P2on**. Presetting of operating stage **P2** with no travel, aimed at cutting the operating time if there is shortage of air.

Keep ○ depressed and, for VSD, ○ and ○  
A .

Press - or + to adjust the value.

As soon as symbol ▲ or ▼ is no longer highlighted, the next curve point **P2** can be selected with - .





The "warm settings" for fuel / air ratio control of the LMV37.4... have now been configured.

### 23.11.12 Cold settings for multistage mode («Lo 2-stage» and «Lo 3-stage»)



Refer to subsection «Warm settings for «Lo 2-stage» and «Lo 3-stage»!  
But with no flame, no traveling of the actuators and no automatic operation after the settings has been made.

## 24 Parameter list

### 24.1 Parameter list LMV37.400A...

Par. no.	Parameter  LMV37.400A...	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
000	Internal parameters								
41	Password heating engineer (4 characters)	1	Std_u16	edit	0	65535	1		OEM
42	OEM password (5 characters)	1	Std_u16	edit	0	65535	1		OEM
100	General								
102	Identification date	1	Date	read only	0	255	1		Info / Service
103	Identification number	1	Std_u16	read only	0	65535	1		Info / Service
104	Preselected parameter set: Customer code	1	Std_u8	read only	0	255	1	9	Info / Service
105	Preselected parameter set: Version	1	Hex_16	read only	0	0xFFFF	1	V 01.01	Info / Service
107	Software version	1	Hex_16	read only	0	0xFFFF	1	V 01.80	Info / Service
108	Software variant	1	Std_u8	read only	0	255	1	1	Info / Service
113	Burner identification	1	Std_s32	edit	0	99999999	1	undefined	Info / Service
121	Manual output Undefined = automatic mode	1	Load	edit / clear	0 %	100 %	0,1 %	undefined	Info / Service
125	Mains frequency 0 = 50 Hz 1 = 60 Hz	1	Selection	edit	0	1	1	0	SO
126	Display brightness	1	Std_u8	edit	0 %	100 %	1 %	75 %	SO
127	Timeout for menu operation	1	Std_u8	edit	10 min	120 min	1 min	30 min	OEM
128	Fuel meter: Pulse valency [pulses / volumetric flow unit]	1	Std_u16	edit	0	400	0,01	0	SO
130	Delete display of error history To delete the display: Set to 1, then to 2 Return value 0: Job successfully completed Return value -1: Timeout of 1 2 sequence	1	Std_s8	edit	-5	2	1	0	SO

Par. no.	Parameter LMV37.400A...	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
141	Operating mode BACS 0 = off 1 = Modbus 2 = reserved	1	Selection	edit	0	2	1	0	SO
142	Setback time in the event of communication breakdown	1	Std_u16	edit	0 s	7200 s	1 s	600 s	SO (BA)
143	Reserved	1	Std_u8	edit	1	8	1	1	Info / Service
144	Reserved	1	Std_u16	edit	10 s	60 s	1 s	30 s	SO
145	Device address for Modbus	1	Std_u8	edit	1	247	1	1	SO
146	Baud rate for Modbus 0 = 9600 1 = 19200	1	Selection	edit	0	1	1	1	SO
147	Parity for Modbus 0 = none 1 = odd 2 = even	1	Selection	edit	0	2	1	0	SO
148	Performance standard at interruption of communication with building automation  For <b>modulation operation</b> the setting range is as follows: 0...19.9 = burner off 20...100 = 20...100 % burner rating  For <b>multistage operation</b> apply to setting range: 0 = burner OFF, P1, P2, P3 Invalid = no performance standards of the building automation	1	Load	edit / clear	0 %	100 %	0,1 %	undefined	SO (BA)
161	Number of faults	1	Std_u16	read only	0	65535	1	0	Info / Service
162	Operating hours resettable	1	Std_s32	reset	0 h	9999999 h	1 h	0 h	Info / Service
163	Operating hours when unit is live	1	Std_s32	read only	0 h	9999999 h	1 h	0 h	Info / Service
164	Number of startups resettable	1	Std_s32	reset	0	9999999	1	0	Info / Service
166	Total number of startups	1	Std_s32	read only	0	9999999	1	0	Info / Service
167	Fuel volume resettable [m³, l, ft³, gal]	1	Std_s32	reset	0	99999999	1	0	Info / Service

Par. no.	Parameter  LMV37.400A...	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
200	Burner control								
201	Burner operating mode (fuel train, modulating / multi-stage, actuators, etc.) -- = undefined (delete curves) 1 = G mod 2 = Gp1 mod 3 = Gp2 mod 4 = Lo mod 5 = Lo 2-stage 6 = Lo 3-stage 7 = G mod pneu 8 = Gp1 mod pneu 9 = Gp2 mod pneu	1	Selection	edit / clear	1	9	1	undefined	SO
208	Program stop 0 = deactivated 1 = PrePurgP (Ph24) 2 = IgnitPos (Ph36) 3 = interval 1 (Ph44) 4 = interval 2 (Ph52)	1	Selection	edit	0	4	1	0	SO (BA)
210	Alarm in the event of start prevention 0 = deactivated 1 = activated	1	Selection	edit	0	1	1	0	SO
211	Fan ramp up time	1	Time	edit	2 s	60 s	0.2 s	2 s	SO
212	Max. time down to low-fire	1	Time	edit	0.2 s	10 min	0.2 s	45 s	SO
213	Min. time home run	1	Time	edit	2 s	60 s	0.2 s	2 s	OEM
214	Max. time start release	1	Time	edit	0.2 s	10 min	0.2 s	25 s	OEM
215	Repetition limit safety loop	1	Std_u8	edit	1	16	1	16	SO
217	Max. time to detector signal	1	Time	edit	5 s	10 min	0.2 s	30 s	OEM
221	Gas: Active detector flame evaluation 0 = QRB / QRC 1 = ION / QRA	1	Selection	edit	0	1	1	1	SO

Par. no.	Parameter LMV37.400A...	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
222	Gas: Prepurging 0 = deactivated 1 = activated	1	Selection	edit	0	1	1	1	SO
223	Repetition limit pressure switch-min-gas	1	Std_u8	edit	1	16	1	16	SO
225	Gas: Prepurge time	1	Time	edit	20 s	60 min	0.2 s	20 s	SO
226	Gas: Preignition time	1	Time	edit	0.2 s	60 min	0.2 s	2 s	SO
227	Gas: Safety time 1 (TSA1)	1	Time	edit	0.2 s	10 s	0.2 s	3 s	OEM
229	Gas: Time to respond to pressure faults in TSA1 and TSA2	1	Time	edit	0.2 s	9.8 s	0.2 s	1.8 s	OEM
230	Gas: Interval 1	1	Time	edit	0.2 s	60 s	0.2 s	2 s	SO
231	Gas: Safety time 2 (TSA2)	1	Time	edit	0.2 s	10 s	0.2 s	3 s	OEM
232	Gas: Interval 2	1	Time	edit	0.2 s	60 s	0.2 s	2 s	SO
233	Gas: Afterburn time	1	Time	edit	0.2 s	60 s	0.2 s	8 s	SO
234	Gas: Postpurge time	1	Time	edit	0.2 s	108 min	0.2 s	0.2 s	SO
237	Gas: Pressure switch-max / POC input 0 = deactivated 1 = pressure switch-max 2 = POC	1	Selection	edit	1	2	1	1	SO
239	Gas: Forced intermittent operation 0 = deactivated 1 = activated	1	Selection	edit	0	1	1	1	OEM
240	Gas: Repetition limit loss of flame	1	Std_u8	edit	1	2	1	2	OEM
241	Gas: Execution leakage test 0 = no leakage test 1 = leakage test on startup 2 = leakage test on shutdown 3 = leakage test on startup and shutdown	1	Selection	edit	0	3	1	2	SO
242	Gas: Leakage test evacuation time	1	Time	edit	0.2 s	10 s	0.2 s	3 s	OEM
243	Gas: Leakage test time atmospheric pressure	1	Time	edit	0.2 s	60 s	0.2 s	10 s	OEM
244	Gas: Leakage test filling time	1	Time	edit	0.2 s	10 s	0.2 s	3 s	OEM
245	Gas: Leakage test time gas pressure	1	Time	edit	0.2 s	60 s	0.2 s	10 s	OEM

Par. no.	Parameter LMV37.400A...	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
246	Gas: Waiting time gas shortage	1	Time	edit	0.2 s	60 s	0.2 s	10 s	OEM
261	Oil: Active detector flame evaluation 0 = QRB / QRC 1 = ION / QRA	1	Selection	edit	0	1	1	0	SO
262	Oil: Prepurging 0 = deactivated 1 = activated	1	Selection	edit	0	1	1	1	OEM
265	Oil: Prepurge time	1	Time	edit	15 s	60 min	0.2 s	15 s	SO
266	Oil: Preignition time	1	Time	edit	0.2 s	60 min	0.2 s	2 s	SO
267	Oil: Safety time 1 (TSA1)	1	Time	edit	0.2 s	15 s	0.2 s	5 s	OEM
269	Oil: Time to respond to pressure faults in TSA1 and TSA2	1	Time	edit	0.2 s	14.8 s	0.2 s	1.8 s	OEM
270	Oil: Interval 1	1	Time	edit	0.2 s	60 min	0.2 s	2 s	SO
271	Oil: Safety time 2 (TSA2)	1	Time	edit	0.2 s	15 s	0.2 s	5 s	OEM
272	Oil: Interval 2	1	Time	edit	0.2 s	60 min	0.2 s	2 s	SO
273	Oil: Afterburn time	1	Time	edit	0.2 s	60 s	0.2 s	8 s	SO
274	Oil: Postpurge time	1	Time	edit	0.2 s	108 min	0.2 s	0.2 s	SO
279	Oil: Forced intermittent operation 0 = deactivated 1 = activated	1	Selection	edit	0	1	1	1	OEM
280	Oil: Repetition limit value loss of flame	1	Std_u8	edit	1	2	1	2	OEM
281	Oil: Time oil ignition 0 = short preignition (Ph38) 1 = long preignition (with fan) (Ph22)	1	Selection	edit	0	1	1	1	SO
<b>400</b>	<b>Ratio curves</b>								
401	Ratio control curve fuel actuator	13	Std_s16	edit	0 °	90 °	0,1 °	0 °; 0 °; 15 °; undefined	SO
402	Ratio control curve air actuator	13	Std_s16	edit	0 °	90 °	0,1 °	0 °; 90 °; 45 °; undefined	SO
403	Ratio control curve VSD	13	Std_s16	edit	20 %	100 %	0,1 %	0 %; 100 %; 50 %; unde- fined	SO



Par. no.	Parameter LMV37.400A...	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
500	Ratio control								
501	No-flame positions fuel actuator Index 0 = no-load position Index 1 = prepurge position Index 2 = postpurge position	3	Std_s16	edit	0 °	90 °	0,1 °	0 °; 0 °; 15 °	SO
502	No-flame positions air actuator Index 0 = no-load position Index 1 = prepurge position Index 2 = postpurge position	3	Std_s16	edit	0 °	90 °	0,1 °	0 °; 90 °; 45 °	SO
503	No-flame speeds VSD Index 0 = no-load speed Index 1 = prepurge speed Index 2 = postpurge speed	3	Std_s16	edit	0 %	100 %	0,1 %	0 %; 100 %; 50 %	SO
522	Ramp up	1	Std_u8	edit	5 s	20 s	1 s	10 s	SO
523	Ramp down	1	Std_u8	edit	5 s	20 s	1 s	10 s	SO
542	Activation of VSD / PWM fan	1	Selection	edit	0	1	1	0	SO
545	Lower load limit	1	Load	edit / clear	20 %	100 %	0,1 %	undefined	SO (BA)
546	Upper load limit	1	Load	edit / clear	20 %	100 %	0,1 %	undefined	SO (BA)

Par. no.	Parameter LMV37.400A...	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
600	Actuators								
601	Selection of reference point Index 0 = fuel Index 1 = air 0 = closed (<0°) 1 = open (>90°)	2	Selection	edit	0	1	1	1; 0	OEM
602	Actuator's direction of rotation Index 0 = fuel Index 1 = air 0 = counterclockwise 1 = clockwise (only SQM3...)	2	Selection	edit	0	1	1	0; 0	OEM
606	Tolerance limit of position monitoring [0.1°] Greatest position error where a fault is securely detected -> shutdown band: (P606-0.6°) to P606	2	Std_u8	edit	0,5 °	2,5 °	0,1 °	1,7 °; 1,7 °	SO
641	Control of speed standardization of VSD Error diagnostics of negative values (refer to error code 82)	1	Std_s8	edit	-25	1	1	0	SO
642	Standardized speed Index 0 = µC1 Index 1 = µC2	2	Std_u16	read only	650	6500	0,1	undefined	SO
645	Configuration of analog output 0 = DC 0...10 V 1 = DC 2...10 V 2 = DC 0/2...10V	1	Std_u8	edit	0	2	1	0	SO
700	Error history								
701	Error history: 701-725.01.Code	25	Std_u8	read only	0	255	1	0	Info / Service
•	Error history: 701-725.02.Diagnostic code	25	Std_u8	read only	0	255	1	0	Info / Service
•	Error history: 701-725.03.Error class	25	Std_u8	read only	0	6	1	0	Info / Service
•	Error history: 701-725.04.Phase	25	Std_u8	read only	0	255	1	0	Info / Service
•	Error history: 701-725.05.Startup counter	25	Std_s32	read only	0	99999999	1	0	Info / Service
725	Error history: 701-725.06.Load	25	Load	read only	0 %	100 %	0,1 %	0 %	Info / Service

Par. no.	Parameter LMV37.400A...	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
900	Process data								
903	Current output Index 0 = fuel Index 1 = air	2	Load	read only	0 %	100 %	0,1 %	0 %	Info / Service
922	Incremental position of actuators Index 0 = fuel Index 1 = air	2	Std_s16	read only	-50 °	150 °	0,01 °	0 °	Info / Service
935	Absolute speed	1	Std_u16	read only	0	6553,5	0,1	0	SO
936	Standardized speed	1	Std_s16	read only	-200 %	200 %	0,1 %	0 %	Info / Service
942	Active load source	1	Selection	read only	0	255	1	0	SO
947	Result of contact sensing (bit-coded)	2	Std_u8	read only	0	255	1	0	Info / Service
950	Required relay state (bit-coded)	1	Std_u8	read only	0	255	1	0	Info / Service
954	Intensity of flame	1	Std_u8	read only	0 %	100 %	1 %	0 %	Info / Service
960	Actual flow rate (m³/h, l/h, ft³/h, gal/h)	1	Std_u16	read only	0	6553,5	0,1	0	Info / Service
961	Status for external modules and display	1	Std_u8	read only	0	255	1	0	Info / Service
981	Error memory: Code	1	Std_u8	read only	0	255	1	0	Info / Service
982	Error memory: Diagnostic code	1	Std_u8	read only	0	255	1	0	Info / Service
992	Error flags	10	Hex_32	reset	0	0xFFFFFFFF	1	0	SO

## 24.2 Parameter list LMV37.420A1

Par. no.	Parameter	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
	LMV37.420A1				Min	Max			
000	Internal parameters								
41	Password heating engineer (4 characters)	1	Std_u16	edit	0	65535	1		OEM
42	OEM password (5 characters)	1	Std_u16	edit	0	65535	1		OEM
100	General								
102	Identification date	1	Date	read only	0	255	1		Info / Service
103	Identification number	1	Std_u16	read only	0	65535	1		Info / Service
104	Preselected parameter set: Customer code	1	Std_u8	read only	0	255	1	9	Info / Service
105	Preselected parameter set: Version	1	Hex_16	read only	0	0xFFFF	1	V 01.01	Info / Service
107	Software version	1	Hex_16	read only	0	0xFFFF	1	V 01.80	Info / Service
108	Software variant	1	Std_u8	read only	0	255	1	1	Info / Service
113	Burner identification	1	Std_s32	edit	0	99999999	1	undefined	Info / Service
121	Manual output Undefined = automatic mode	1	Load	edit / clear	0 %	100 %	0,1 %	undefined	Info / Service
125	Mains frequency 0 = 50 Hz 1 = 60 Hz	1	Selection	edit	0	1	1	1	SO
126	Display brightness	1	Std_u8	edit	0 %	100 %	1 %	100 %	SO
127	Timeout for menu operation	1	Std_u8	edit	10 min	120 min	1 min	60 min	OEM
128	Fuel meter: Pulse valency [pulses / volumetric flow unit]	1	Std_u16	edit	0	400	0,01	0	SO
130	Delete display of error history To delete the display: Set to 1, then to 2 Return value 0: Job successfully completed Return value -1: Timeout of 1_2 sequence	1	Std_s8	edit	-5	2	1	0	SO
141	Operating mode BACS 0 = off 1 = Modbus 2 = reserved	1	Selection	edit	0	2	1	0	SO

Par. no.	Parameter LMV37.420A1	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
142	Setback time in the event of communication breakdown	1	Std_u16	edit	0 s	7200 s	1 s	120 s	SO (BA)
143	Reserved	1	Std_u8	edit	1	8	1	1	Info / Service
144	Reserved	1	Std_u16	edit	10 s	60 s	1 s	30 s	SO
145	Device address for Modbus	1	Std_u8	edit	1	247	1	1	SO
146	Baud rate for Modbus 0 = 9600 1 = 19200	1	Selection	edit	0	1	1	1	SO
147	Parity for Modbus 0 = none 1 = odd 2 = even	1	Selection	edit	0	2	1	0	SO
148	Performance standard at interruption of communication with building automation  For <b>modulation operation</b> the setting range is as follows: 0...19.9 = burner off 20...100 = 20...100 % burner rating  For <b>multistage operation</b> apply to setting range: 0 = burner OFF, P1, P2, P3 Invalid = no performance standards of the building automation	1	Load	edit / clear	0 %	100 %	0,1 %	undefined	SO (BA)
161	Number of faults	1	Std_u16	read only	0	65535	1	0	Info / Service
162	Operating hours resettable	1	Std_s32	reset	0 h	9999999 h	1 h	0 h	Info / Service
163	Operating hours when unit is live	1	Std_s32	read only	0 h	9999999 h	1 h	0 h	Info / Service
164	Number of startups resettable	1	Std_s32	reset	0	9999999	1	0	Info / Service

Par. no.	Parameter LMV37.420A1	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
166	Total number of startups	1	Std_s32	read only	0	9999999	1	0	Info / Service
167	Fuel volume resettable [m³, l, ft³, gal]	1	Std_s32	reset	0	99999999	1	0	Info / Service
<b>200</b>	<b>Burner control</b>								
201	Burner operating mode (fuel train, modulating / multistage, actuators, etc.) -- = undefined (delete curves) 1 = G mod 2 = Gp1 mod 3 = Gp2 mod 4 = Lo mod 5 = Lo 2-stage 6 = Lo 3-stage 7 = G mod pneu 8 = Gp1 mod pneu 9 = Gp2 mod pneu	1	Selection	edit / clear	1	9	1	undefined	SO
208	Program stop 0 = deactivated 1 = PrePurgP (Ph24) 2 = IgnitPos (Ph36) 3 = interval 1 (Ph44) 4 = interval 2 (Ph52)	1	Selection	edit	0	4	1	0	SO (BA)
210	Alarm in the event of start prevention 0 = deactivated 1 = activated	1	Selection	edit	0	1	1	1	SO
211	Fan ramp up time	1	Time	edit	2 s	60 s	0.2 s	2 s	SO
212	Max. time down to low-fire	1	Time	edit	0.2 s	10 min	0.2 s	45 s	SO
213	Min. time home run	1	Time	edit	2 s	60 s	0.2 s	2 s	OEM
214	Max. time start release	1	Time	edit	0.2 s	10 min	0.2 s	35 s	OEM
215	Repetition limit safety loop	1	Std_u8	edit	1	16	1	1	SO
217	Max. time to detector signal	1	Time	edit	5 s	10 min	0.2 s	30 s	OEM

Par. no.	Parameter LMV37.420A1	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
221	Gas: Active detector flame evaluation 0 = QRB / QRC 1 = ION / QRA	1	Selection	edit	0	1	1	1	SO
222	Gas: Prepurging 0 = deactivated 1 = activated	1	Selection	edit	0	1	1	1	SO
223	Repetition limit pressure switch-min-gas	1	Std_u8	edit	1	16	1	1	SO
225	Gas: Prepurge time	1	Time	edit	20 s	60 min	0.2 s	30 s	SO
226	Gas: Preignition time	1	Time	edit	0.2 s	60 min	0.2 s	2 s	SO
227	Gas: Safety time 1 (TSA1)	1	Time	edit	0.2 s	10 s	0.2 s	5 s	OEM
229	Gas: Time to respond to pressure faults in TSA1 and TSA2	1	Time	edit	0.2 s	9.8 s	0.2 s	1.8 s	OEM
230	Gas: Interval 1	1	Time	edit	0.2 s	60 s	0.2 s	2 s	SO
231	Gas: Safety time 2 (TSA2)	1	Time	edit	0.2 s	10 s	0.2 s	7 s	OEM
232	Gas: Interval 2	1	Time	edit	0.2 s	60 s	0.2 s	2 s	SO
233	Gas: Afterburn time	1	Time	edit	0.2 s	60 s	0.2 s	8 s	SO
234	Gas: Postpurge time	1	Time	edit	0.2 s	108 min	0.2 s	15 s	SO
237	Gas: Pressure switch-max- / POC input 0 = deactivated 1 = pressure switch-max 2 = POC	1	Selection	edit	1	2	1	2	SO
239	Gas: Forced intermittent operation 0 = deactivated 1 = activated	1	Selection	edit	0	1	1	1	OEM
240	Gas: Repetition limit loss of flame	1	Std_u8	edit	1	2	1	1	OEM
241	Gas: Execution leakage test 0 = no leakage test 1 = leakage test on startup 2 = leakage test on shutdown 3 = leakage test on startup and shutdown	1	Selection	edit	0	3	1	0	SO
242	Gas: Leakage test evacuation time	1	Time	edit	0.2 s	10 s	0.2 s	3 s	OEM

Par. no.	Parameter LMV37.420A1	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
243	Gas: Leakage test time atmospheric pressure	1	Time	edit	0.2 s	60 s	0.2 s	10 s	OEM
244	Gas: Leakage test filling time	1	Time	edit	0.2 s	10 s	0.2 s	3 s	OEM
245	Gas: Leakage test time gas pressure	1	Time	edit	0.2 s	60 s	0.2 s	10 s	OEM
246	Gas: Waiting time gas shortage	1	Time	edit	0.2 s	60 s	0.2 s	10 s	OEM
261	Oil: Active detector flame evaluation 0 = QRB / QRC 1 = ION / QRA	1	Selection	edit	0	1	1	1	SO
262	Oil: Prepurging 0 = deactivated 1 = activated	1	Selection	edit	0	1	1	1	OEM
265	Oil: Prepurge time	1	Time	edit	15 s	60 min	0.2 s	30 s	SO
266	Oil: Preignition time	1	Time	edit	0.2 s	60 min	0.2 s	2 s	SO
267	Oil: Safety time 1 (TSA1)	1	Time	edit	0.2 s	15 s	0.2 s	5 s	OEM
269	Oil: Time to respond to pressure faults in TSA1 and TSA2	1	Time	edit	0.2 s	14.8 s	0.2 s	1.8 s	OEM
270	Oil: Interval 1	1	Time	edit	0.2 s	60 min	0.2 s	2 s	SO
271	Oil: Safety time 2 (TSA2)	1	Time	edit	0.2 s	15 s	0.2 s	10 s	OEM
272	Oil: Interval 2	1	Time	edit	0.2 s	60 min	0.2 s	2 s	SO
273	Oil: Afterburn time	1	Time	edit	0.2 s	60 s	0.2 s	8 s	SO
274	Oil: Postpurge time	1	Time	edit	0.2 s	108 min	0.2 s	15 s	SO
279	Oil: Forced intermittent operation 0 = deactivated 1 = activated	1	Selection	edit	0	1	1	1	OEM
280	Oil: Repetition limit loss of flame	1	Std_u8	edit	1	2	1	1	OEM
281	Oil: Time oil ignition 0 = short preignition (Ph38) 1 = long preignition (with fan) (Ph22)	1	Selection	edit	0	1	1	0	SO



Par. no.	Parameter LMV37.420A1	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
400	Ratio curves								
401	Ratio control curve fuel actuator	13	Std_s16	edit	0 °	90 °	0,1 °	0 °; 0 °; 15 °; undefined	SO
402	Ratio control curve air actuator	13	Std_s16	edit	0 °	90 °	0,1 °	0 °; 90 °; 45 °; undefined	SO
403	Ratio control curve VSD	13	Std_s16	edit	20 %	100 %	0,1 %	0 %; 100 %; 50 %; unde- fined	SO
500	Ratio control								
501	No-flame positions fuel actuator Index 0 = no-load position Index 1 = prepurge position Index 2 = postpurge position	3	Std_s16	edit	0 °	90 °	0,1 °	0 °; 0 °; 15 °	SO
502	No-flame positions air actuator Index 0 = no-load position Index 1 = prepurge position Index 2 = postpurge position	3	Std_s16	edit	0 °	90 °	0,1 °	0 °; 90 °; 45 °	SO
503	No-flame speeds VSD Index 0 = no-load speed Index 1 = prepurge speed Index 2 = postpurge speed	3	Std_s16	edit	0 %	100 %	0,1 %	0 %; 100 %; 50 %	SO
522	Ramp up	1	Std_u8	edit	5 s	20 s	1 s	10 s	SO
523	Ramp down	1	Std_u8	edit	5 s	20 s	1 s	10 s	SO
542	Activation of VSD / PWM fan	1	Selection	edit	0	1	1	0	SO
545	Lower load limit	1	Load	edit / clear	20 %	100 %	0,1 %	undefined	SO (BA)
546	Upper load limit	1	Load	edit / clear	20 %	100 %	0,1 %	undefined	SO (BA)

Par. no.	Parameter LMV37.420A1	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
600	Actuators								
601	Selection of reference point Index 0 = fuel Index 1 = air 0 = closed (<0°) 1 = open (>90°)	2	Selection	edit	0	1	1	1; 0	OEM
602	Actuator's direction of rotation [Index 0 = fuel, index 1 = air] 0 = counterclockwise 1 = clockwise (only SQM3...)	2	Selection	edit	0	1	1	0; 0	OEM
606	Tolerance limit of position monitoring [0.1°] Greatest position error where an error is securely de- tected -> Error detection band: (P606-0.6°) to P606	2	Std_u8	edit	0,5 °	2,5 °	0,1 °	1,7 °; 1,7 °	OEM Read permission: SO
641	Control of speed standardization of VSD Error diagnostics of negative values (refer to error code 82)	1	Std_s8	edit	-25	1	1	0	SO
642	Standardized speed Index 0 = µC1 Index 1 = µC2	2	Std_u16	read only	650	6500	0,1	undefined	SO
645	Configuration of analog output 0 = DC 0...10 V 1 = DC 2...10 V 2 = DC 0/2...10V	1	Std_u8	edit	0	2	1	0	SO
700	Error history								
701	Error history: 701-725.01.Code	25	Std_u8	read only	0	255	1	0	Info / Service
•	Error history: 701-725.02.Diagnostic code	25	Std_u8	read only	0	255	1	0	Info / Service
•	Error history: 701-725.03.Error class	25	Std_u8	read only	0	6	1	0	Info / Service
•	Error history: 701-725.04.Phase	25	Std_u8	read only	0	255	1	0	Info / Service
•	Error history: 701-725.05.Startup counter	25	Std_s32	read only	0	99999999	1	0	Info / Service
725	Error history: 701-725.06.Load	25	Load	read only	0 %	100 %	0,1 %	0 %	Info / Service

Par. no.	Parameter LMV37.420A1	Number of elements	Type	Edit	Value range		Resolution	Default setting	Password level
					Min	Max			
900	Process data								
903	Current output Index 0 = fuel Index 1 = air	2	Load	read only	0 %	100 %	0,1 %	0 %	Info / Service
922	Incremental position of actuators index 0 = fuel Index 1 = air	2	Std_s16	read only	-50 °	150 °	0,01 °	0 °	Info / Service
935	Absolute speed	1	Std_u16	read only	0	6553,5	0,1	0	SO
936	Standardized speed	1	Std_s16	read only	-200 %	200 %	0,1 %	0 %	Info / Service
942	Active load source	1	Selection	read only	0	255	1	0	SO
947	Result of contact sensing (bit-coded)	2	Std_u8	read only	0	255	1	0	Info / Service
950	Required relay state (bit-coded)	1	Std_u8	read only	0	255	1	0	Info / Service
954	Intensity of flame	1	Std_u8	read only	0 %	100 %	1 %	0 %	Info / Service
960	Actual flow rate (m³/h, l/h, ft³/h, gal/h)	1	Std_u16	read only	0	6553,5	0,1	0	Info / Service
961	Status for external modules and display	1	Std_u8	read only	0	255	1	0	Info / Service
981	Error storage: Code	1	Std_u8	read only	0	255	1	0	Info / Service
982	Error storage: Diagnostic code	1	Std_u8	read only	0	255	1	0	Info / Service
992	Error flags	10	Hex_32	reset	0	0xFFFFFFFF	1	0	SO

Legend:

Std\_u8            8 Bit integer, non-signed  
Std\_u16          16 Bit integer, non-signed  
Std\_u32          32 Bit integer, non-signed  
Std\_s8            8 Bit integer, signed

Note:

This data type is also used to mark an invalid or non-signed value by using the value of «-1»!

Std\_s16          16 Bit integer, signed

Note:

This data type is also used to mark an invalid or non-signed value by using the value of «-1»!

Std\_s32          32 Bit integer, signed

Note:

This data type is also used to mark an invalid or non-signed value by using the value of «-1»!

## 25 Error code list

Error code	Diagnostic code	Meaning for LMV37.4... system	Recommended measures
2	4	<b>No flame at the end of TSA1</b>	
3	#	Air pressure failure	
	0	<i>Air pressure switch off</i>	
	1	<i>Air pressure switch on</i>	
	4	<i>Air pressure on – start prevention</i>	
4	#	<b>Extraneous light</b>	
	0	<i>Extraneous light during startup</i>	
	1	<i>Extraneous light during shutdown</i>	
	2	<i>Extraneous light during startup – start prevention</i>	
7	3	<b>Loss of flame</b>	
12	#	<b>Valve proving test</b>	
	0	<i>V2 leaking</i>	Check if the valve on the burner side is leaking. Check if pressure switch for the leakage test is closed when there is no gas pressure.
	1	<i>V1 leaking</i>	Check if the valve on the gas side is leaking.
20	0	<b>Pmin:</b> No min. gas / oil pressure	
21	#	<b>Pmax / POC</b>	
	0	<b>Pmax:</b> Max. gas / oil pressure exceeded <b>POC:</b> POC open	Check wiring and open-circuit. POC: Check if the valve's closing contact is closed.
	1	<i>POC closed</i>	Check wiring. Check if the valve's closing contact opens when valve is controlled.
22	0	<b>Safety loop / burner flange open</b>	
50	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit
51	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit
55	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit
56	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit
57	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit
58	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit

Error code	Diagnostic code	Meaning for LMV37.4... system	Recommended measures
60	0	Internal error: No valid load controller	Make a reset; if error occurs repeatedly, replace the unit
65	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
66	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
67	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
70	#	Error fuel / air control: Position calculation modulating	
	21	Load invalid	No valid load
	26	Curve points undefined	Adjust the curve points for all actuators
71	#	Special position undefined	
	0	No-load position	Parameterize the no-load position for all actuators used
	1	Postpurge position	Parameterize the postpurge position for all actuators used
	2	Prepurge position	Parameterize the prepurge position for all actuators used
	3	Ignition position	Parameterize the ignition position for all actuators used
72	#	Internal error fuel / air control	Make a reset; if error occurs repeatedly, replace the unit
73	#	Internal error fuel / air control	
	21	Position calculation, multistep load invalid	No valid load
	26	Position calculation, multistep curve points undefined	Adjust the curve points for all actuators
75	#	Internal error fuel / air ratio control	
	1	Data clocking check, current load different	
	2	Data clocking check, target load different	
	4	Data clocking check, target positions different	
	16	Data clocking check, different positions reached	Can be caused by different standardized speeds (e.g. after restore of data set) when the VSD is activated. → Standardize again and check adjustment of the fuel / air ratio control system
76	#	Internal error fuel / air control	Make a reset; if error occurs repeatedly, replace the unit
80	#	Control range limitation of VSD	Basic unit could not correct the difference in speed and reached a control range limit. 1. Basic unit is not standardized for this motor → repeat standardization. Caution: Settings of fuel / air ratio control must be checked! 2. Ramp time settings of the VSD are not shorter than those of the basic unit (parameters 522, 523). 3. Characteristic of the VSD is not linear. Configuration of the voltage input at the VSD must accord with that of the basic unit (parameter 645). 4. VSD does not follow quickly enough the changes of the basic unit. Check settings of the VSD (input filter, slippage compensation, hiding different speeds)

Error code	Diagnostic code	Meaning for LMV37.4... system	Recommended measures
	1	<i>Control range limitation at the bottom</i>	VSD speed was too high
	2	<i>Control range limitation at the top</i>	VSD speed was too low
81	1	<b>Interrupt limitation speed input</b>	Too much electromagnetic interference on the sensor line → improve EMC
82	#	<b>Error during VSD's speed standardization</b>	
	1	<i>Timeout of standardization (VSD ramp down time too long)</i>	Timeout at the end of standardization during ramp down of the VSD 1. Ramp time settings of the VSD are not shorter than those of the basic unit (parameter: 523)
	2	<i>Storage of standardized speed not successful</i>	Error during storage of the standardized speed → lock the basic unit, then reset it and repeat the standardization
	3	<i>Open-circuit speed sensor</i>	Basic unit receives no pulses from the speed sensor: 1. Motor does not turn. 2. Speed sensor is not connected. 3. Speed sensor is not activated by the sensor disk (check distance)
	4	<i>Speed variation / VSD ramp up time too long / speed below minimum limit for standardization</i>	Motor has not reached a stable speed after ramp up. 1. Ramp time settings of the VSD are not shorter than those of the basic unit (parameters 522, 523). 2. Characteristic of the VSD is not linear. Configuration of the voltage input at the VSD must accord with that of the basic unit (parameter 645). 3. VSD does not follow quickly enough the changes of the basic unit. Check settings of the VSD (input filter, slippage compensation, hiding different speeds) 4. Speed of VSD lies below the minimum for standardization (650 1/min)
	5	<i>Wrong direction of rotation</i>	Motor's direction of rotation is wrong. 1. Motor turns indeed in the wrong direction → change parameterization of the direction of rotation or interchange 2 live conductors. 2. Sensor disk is fitted the wrong way → turn the sensor disk.
	6	<i>Unplausible speed sensor signals</i>	The required pulse pattern (60°, 120°, 180°) has not been correctly identified. 1. Speed sensor does not detect all tappets of the sensor disk → check distance 2. As the motor turns, other metal parts are detected also, in addition to the tappets → improve mounting. 3. Electromagnetic interference on the sensor lines → check cable routing, improve EMC
	7	<i>Invalid standardized speed</i>	The standardized speed measured does not lie in the permissible range. 1. Motor turns too slowly or too fast.

Error code	Diagnostic code	Meaning for LMV37.4... system	Recommended measures
	20	<i>Wrong phase of phase manager</i>	Standardization was made in a wrong phase. Permitted are only phases $\leq 12$ → controller OFF, start standardization again
	21	<i>Safety loop / burner flange open</i>	Safety loop or burner flange is open → repeat standardization with safety loop closed
	22	<i>Air actuator not referenced</i>	Air actuator has not been referenced or has lost its referencing. 1. Check if the reference position can be approached. 2. Check if actuators have been mixed up. 3. If error only occurs after the start of standardization, the actuator might be overloaded and cannot reach its destination.
	23	<i>VSD deactivated</i>	Standardization was started with VSD deactivated → activate the VSD and repeat standardization
	24	<i>No valid operation mode</i>	Standardization was started without valid operation mode → activate valid operation mode and repeat standardization
	128	<i>Running command with no preceding standardization</i>	VSD is controlled but not standardized → make standardization
	255	<i>No standardized speed available</i>	Motor turns but is not standardized → make standardization
<b>83</b>	<b>#</b>	<b>Speed error VSD</b>	Required speed has not been reached
	<i>Bit 0 Valency 1</i>	<i>Lower control range limitation</i>	Speed has not been reached because control range limitation has become active → for measures, refer to error code 80
	<i>Bit 1 Valency 2...3</i>	<i>Upper control range limitation</i>	Speed has not been reached because control range limitation has become active → for measures, refer to error code 80
	<i>Bit 2 Valency 4...7</i>	<i>Interrupt shutdown due to electromagnetic interference</i>	Speed has not been reached due to too much electromagnetic interference on the sensor line → for measures, refer to error code 81
	<i>Bit 3 Valency <math>\geq 8</math></i>	<i>Curve too steep in terms of ramp speed</i>	Speed has not been reached because detected curve slope was too steep. 1. With a VSD ramp of 20 s, the curve's slope may be a maximum of 10 % speed change between 2 curve points in modulating mode. With a VSD ramp of 10 s, the curve's slope may be a maximum of 20 % speed change between 2 curve points in modulating mode. With a VSD ramp of 5 s, the curve's slope may be a maximum of 40 % speed change between 2 curve points in modulating mode. 2. The setting of the VSD ramp must be about 20 % faster than the ramps in the basic unit (parameters 522, 523).

Error code	Diagnostic code	Meaning for LMV37.4... system	Recommended measures
	Bit 4 Valency $\geq 16$	Interruption of speed signal	No speed detected in spite of control. 1. Check if the motor turns. 2. Check if the speed sensor delivers a signal (LED / check distance from the sensor disk). 3. Check wiring of the VSD.
	Bit 5 Valency $\geq 32$	Quick shutdown due to excessive speed deviation	Speed deviation was for about 1 s > 10 % outside the anticipated range. 1. Check ramp times of the LMV37.4... and VSD. 2. Check wiring of the VSD.
<b>84</b>	<b>#</b>	<b>Curve slope actuators</b>	
	Bit 0 Valency 1	VSD: Curve too steep in terms of ramp speed	1. The curve's slope may be a maximum of 10% speed change between 2 curve points in modulating operation, with a VSD ramp of 20 seconds The curve's slope may be a maximum of 20% speed change between 2 curve points in modulating operation, with a VSD ramp of 10 seconds The curve's slope may be a maximum of 40% speed change between 2 curve points in modulating operation, with a VSD ramp of 5 seconds 2. Setting of the VSD ramp must be about 20% shorter than the ramps in the basic unit (parameters 522 and 523)
	Bit 1 Valency 2..3	Fuel actuator: Curve too steep in terms of ramp rate	The slope of the curve may be a maximum position change of 31° between 2 curve points in modulating mode
	Bit 2 Valency 4..7	Air actuator: Curve too steep in terms of ramp rate	The slope of the curve may be a maximum position change of 31° between 2 curve points in modulating mode
<b>85</b>	<b>#</b>	<b>Referencing error ones actuators</b>	
	Bit 0 Valency 1	Referencing error of fuel actuator	Referencing of fuel actuator not successful. Reference point could not be reached. 1. Check to see if actuators have been mixed up 2. Check to see if actuator is locked or overloaded
	Bit 1 Valency 2...3	Referencing error of air actuator	Referencing of fuel actuator not successful Reference point could not be reached. 1. Check to see if actuators have been mixed up 2. Check to see if actuator is locked or overloaded
	Bit 7 Valency $\geq 128$	Referencing error due to parameter change	Parameterization of an actuator (e.g. the reference position) has been changed. To trigger new referencing, this error will be set
<b>86</b>	<b>#</b>	<b>Error fuel actuator</b>	
	0	Position error	Target position could not be reached within the required tolerance band. 1. Check to see if actuator is locked or overloaded.



Error code	Diagnostic code	Meaning for LMV37.4... system	Recommended measures
	Bit 0 Valency 1	Open-circuit	Open-circuit detected at the actuator's terminals. 1. Check wiring.
	Bit 3 Valency $\geq 8$	Curve too steep in terms of ramp rate	The slope of the curve may be a maximum position change of 31° between 2 curve points in modulating mode
	Bit 4 Valency $\geq 16$	Step deviation in comparison with last referencing	Actuator was overloaded or mechanically twisted. 1. Check if the actuator is blocked somewhere along its working range. 2. Check to see if the torque is sufficient for the application.
<b>87</b>	<b>#</b>	<b>Error air actuator</b>	
	0	Position error	Target position could not be reached within the required tolerance band. 1. Check to see if actuator is locked or overloaded.
	Bit 0 Valency 1	Open-circuit	Open-circuit detected at the actuator's terminals. 1. Check wiring.
	Bit 3 Valency $\geq 8$	Curve too steep in terms of ramp rate	The slope of the curve may be a maximum position change of 31° between 2 curve points in modulating mode
	Bit 4 Valency $\geq 16$	Sectional deviation in comparison with last referencing	Actuator was overloaded or mechanically twisted. 1. Check if the actuator is blocked somewhere along its working range. 2. Check to see if the torque is sufficient for the application.
<b>90</b>	<b>#</b>	<b>Internal error burner control</b>	
<b>91</b>	<b>#</b>	<b>Internal error burner control</b>	
<b>93</b>	<b>#</b>	<b>Error flame signal acquisition</b>	
	3	Short-circuit of sensor	Short-circuit at QRB... 1. Check wiring. 2. Flame detector possibly fault.
<b>95</b>	<b>#</b>	<b>Error relay supervision</b>	
	3 Ignition transformer 4 Fuel valve 1 5 Fuel valve 2 6 Fuel valve 3	External power supply active contact	Check wiring
<b>96</b>	<b>#</b>	<b>Error relay supervision</b>	
	3 Ignition transformer 4 Fuel valve 1 5 Fuel valve 2 6 Fuel valve 3	Relay contacts have welded	Test the contacts: 1. Unit connected to power: Fan output must be dead. 2. Disconnect power: Disconnect fan. No resistive connection between fan output and neutral conductor allowed. If one of the 2 tests fails, release the unit since contact have definitively welded and safety can no longer be ensured.

Error code	Diagnostic code	Meaning for LMV37.4... system	Recommended measures
97	#	Error relay supervision	
	0	<i>Safety relay contacts have welded or external power supply fed to safety relay</i>	<p>Test the contacts:</p> <ol style="list-style-type: none"> <li>1. Unit connected to power: Fan output must be dead.</li> <li>2. Disconnect power: Disconnect fan. No resistive connection between fan output and neutral conductor allowed.</li> </ol> <p>If one of the 2 tests fails, release the unit since contacts have definitively welded and safety can no longer be ensured.</p>
98	#	Error relay supervision	
	2 Safety valve 3 Ignition transformer 4 Fuel valve 1 5 Fuel valve 2 6 Fuel valve 3	<i>Relay does not pull in</i>	Make a reset; if error occurs repeatedly, replace the unit
99	#	Internal error relay control	Make a reset; if error occurs repeatedly, replace the unit
100	#	Internal error relay control	Make a reset; if error occurs repeatedly, replace the unit
105	#	Internal error contact sampling	
	0 Pressure switch min 1 Pressure switch max 2 Pressure switch valve proving test 3 Air pressure 4 Load controller open 5 Load controller on / off 6 Load controller closed 7 Safety loop / Burner flange 8 Safety valve 9 Ignition transformer 10 Fuel valve 1 11 Fuel valve 2 12 Fuel valve 3 13 Reset	<i>Stuck-At failure</i>	Can be caused by capacitive loads or supply of DC voltage to the mains voltage inputs. The diagnostic code indicates the input where the problem occurred
106	#	Internal error contact request	Make a reset; if error occurs repeatedly, replace the unit
107	#	Internal error contact request	Make a reset; if error occurs repeatedly, replace the unit
108	#	Internal error contact request	Make a reset; if error occurs repeatedly, replace the unit
110	#	Internal error voltage monitor test	Make a reset; if error occurs repeatedly, replace the unit

Error code	Diagnostic code	Meaning for LMV37.4... system	Recommended measures
111	0	Power supply undervoltage	Mains voltage to low
112	0	Mains voltage recovery	Error code for triggering a reset on power restoration (no error)
113	#	Internal error mains voltage supervision	Make a reset; if error occurs repeatedly, replace the unit
115	#	Internal error system counter	
116	0	Life in critical range	The unit's life expectancy has been exceeded. Replace unit.
117	0	Life exceeded Operation no longer allowed	Switch-off threshold has been reached.
120	0	Interrupt limitation fuel counter input	Too many disturbance pulses at the fuel meters input. → Improve EMC
121	#	Internal error EEPROM access	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs repeatedly, replace the unit
122	#	Internal error EEPROM access	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs repeatedly, replace the unit
123	#	Internal error EEPROM access	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs repeatedly, replace the unit
124	#	Internal error EEPROM access	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs repeatedly, replace the unit
125	#	Internal error EEPROM read access	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
126	#	Internal error EEPROM write access	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
127	#	Internal error EEPROM access	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs repeatedly, replace the unit
128	0	Internal error EEPROM access - synchronization during initialization	Make a reset; if error occurs repeatedly, replace the unit
129	#	Internal error EEPROM access – command synchronization	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
130	#	Internal error EEPROM access - timeout	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
131	#	Internal error EEPROM access - page on abort	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
132	#	Internal error EEPROM register initialization	Make a reset; if error occurs repeatedly, replace the unit

Error code	Diagnostic code	Meaning for LMV37.4... system	Recommended measures
133	#	Internal error EEPROM access – Request synchronization	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
134	#	Internal error EEPROM access – Request synchronization	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
135	#	Internal error EEPROM access – Request synchronization	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
136	1	Restore started	Restore of a backup has been started (no error)
137	#	Internal error – backup / restore	
	157	Restore – ok, but backup < data set of current system	Restore successful, but backup data set is smaller than in the current system
	241	Restore – interruption concerning unpassable ASN	The Backup has a unpassable ASN and may not restore of the unit
	242	Backup – backup made is inconsistent	Backup is faulty and cannot be transferred back
	243	Backup – data comparison between $\mu$ Cs faulty	Repeat reset and backup
	244	Backup data are incompatible	Backup data are incompatible with the current software version, restore not possible
	245	Access error to parameter Restore_Complete	Repeat reset and backup
	246	Restore – timeout when storing in EEPROM	Repeat reset and backup
	247	Data received are inconsistent	Backup data set invalid, restore not possible
	248	Restore cannot at present be made	Repeat reset and backup
	249	Restore – abortion due to unsuitable burner identification	Backup has an unsuitable burner identification and must not be transferred to the unit
	250	Backup – CRC of one page is not correct	Backup data set invalid, restore not possible
	251	Backup – burner identification is not defined	Define burner identification and repeat backup
	252	After restore, pages still on ABORT	Repeat reset and backup
	253	Restore cannot at present be made	Repeat reset and backup
	254	Abortion due to transmission error	Repeat reset and backup
	255	Abortion due to timeout during restore	Make a reset, check the connections and repeat the backup
146	#	Timeout building automation interface	Refer to User Documentation Modbus (A7541)
	1	Modbus timeout	
	2	eBus timeout	
165	#	Internal error	
166	0	Internal error watchdog reset	

Error code	Diagnostic code	Meaning for LMV37.4... system	Recommended measures
167	#	<b>Manual locking</b>	Unit has been manually locked (no error)
	1	<i>Manual locking by contact</i>	
	2	<i>Manual locking by AZL2...</i>	
	3	<i>Manual locking by PC tool</i>	
168	#	<b>Internal error management</b>	Make a reset; if error occurs repeatedly, replace the unit
169	#	<b>Internal error management</b>	Make a reset; if error occurs repeatedly, replace the unit
170	#	<b>Internal error management</b>	Make a reset; if error occurs repeatedly, replace the unit
171	#	<b>Internal error management</b>	Make a reset; if error occurs repeatedly, replace the unit
200	#	<b>System error-free</b>	No error
201	#	<b>Start prevention</b>	Start prevention because unit has not been parameterized
	1	<i>No operating mode selected</i>	
	2..3	<i>No fuel train defined</i>	
	4..7	<i>No curves defined</i>	
	8..15	<i>Standardized speed undefined</i>	
	16..31	<i>Backup / restore was not possible</i>	
202	#	<b>Internal operating mode selection</b>	Redefine the operating mode (parameter 201)
203	#	<b>Internal error</b>	Redefine the operating mode (parameter 201). Make a reset; if error occurs repeatedly, replace the unit
204	Phase number	<b>Program stop</b>	Program stop is active (no error)
205	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit
206	0	<b>Inadmissible combination of units (basic unit - AZL2...)</b>	
207	#	<b>Version compatibility basic unit - AZL2...</b>	
	0	<i>Basic unit version too old</i>	
	1	<i>AZL2... version too old</i>	
208	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit
209	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit
210	0	<b>Selected operation mode is not released for the basic unit</b>	Select a released operation mode for the basic unit
240	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit
245	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit
250	#	<b>Internal error</b>	Make a reset; if error occurs repeatedly, replace the unit

# 26 Revision history of basic unit LMV37.4...

## Software changes

### Software version V01.20

- Optimizations regarding ACS410 (backup / restore)
- Faster parameterization with AZL2... (3-stage)
- Burner identification setting (entering the password)
- Optimization "System hooks itself up in Phase 38"
- Optimization "Cold setting via P0" (adoption P0 → P1, correct CALC function)
- Optimization "Delete history" (acknowledgement upon completion)
- Prepurging oil – activated / deactivated (parameter 262) for OEM level released
- Setting range of pulse valency fuel meter (parameter 128) increased to 400 pulses per volume unit
- New parameter 645 = configuration analog output

### Software version V01.30

- Optimization of phase manager (rectification of error 107)
- Presetting of parameter 281 (time oil ignition) changed to long preignition (with fan)

### Software version V01.40

- Optimization: Modbus mode and operating mode are maintained when a reset is made
- Extension: Additional Modbus addresses (refer to Modbus Documentation A7541)
- Extension: Actuator tolerance can be parameterized by OEM and read by the heating engineer
- Change: The heating engineer can set the time when valve proving takes place
- Optimization: Synchronization of eBus target output
- Extension: Calculation of fuel throughput
- Optimization: Plausibility check for continuous operation with ionization amplifier
- Optimization: Separate diagnostic code in the event standardization has not been successful due to an undefined operating mode
- Optimization: Change of password without having to enter the currently valid password
- Extension: Restore of data set possible only when type references of basic unit and data set are identical
- Optimization: Alarm in the event of start prevention after a fixed time of 5 seconds
- Extension: Selection of POC function or GPmax

### Software version V01.50

Optimization: Correction for output of the amount of fuel via eBus

### Software version V01.60

- Optimization: Filtering of analog load output
- Optimization: Plausibility check of ionization amplifier revised

### Software version V01.70

Optimization: Final test sequence revised

## Software version V01.80

- Change: Combined valve proving via GPmin deactivated
- Optimization: Valve proving during shutdown after display error in operation
- Optimization: Any valve proving aborted by GPmin during shutdown will be repeated with the next startup

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