SIEMENS



LME7…
Burner control

Basic Documentation

The LME7… and this Basic Documentation are intended for use by OEMs which integrate the burner controls in their products.

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Supplementary documentation

Product type	Type of documentation	Documentation number
PME71.111...	User Documentation	A7105.1
PME71.112...	User Documentation	A7105.2
PME71.401...	User Documentation	A7105.3
PME71.402...	User Documentation	A7105.4
PME71.901...	User Documentation	A7105.5
PME72.521...	User Documentation	A7105.11
PME72.541...	User Documentation	A7105.12
PME73.810...	User Documentation	A7105.21
PME73.811...	User Documentation	A7105.22
PME73.812...	User Documentation	A7105.23
PME73.820...	User Documentation	A7105.24
PME73.830...	User Documentation	A7105.25
PME73.831...	User Documentation	A7105.26
PME73.840...	User Documentation	A7105.27
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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 LME7... are safety devices! Do not open, interfere with or modify the unit. Siemens does not assume responsibility for damage resulting from unauthorized interference!

Additional safety notes contained in other chapters of this document must be observed as well!

- All activities (mounting, installation and service work, etc.) must be performed by qualified personnel
- The burner or boiler manufacturer must ensure degree of protection IP40 for burner controls as per DIN EN 60529 through proper installation of the LME7...
  If not observed, there will be a risk of electric shock
- Before making any wiring changes in the connection area, completely isolate the plant from mains supply (all-polar disconnection). Ensure that the plant cannot be inadvertently switched on again and that it is indeed dead. If not observed, there is a risk of electric shock hazard
- Ensure protection against electric shock hazard by providing adequate protection for the burner control's connection terminals (e. g. with dummy plugs for inputs and outputs not used). If not observed, there is a risk of electric shock hazard
- Ensure protection against electric shock at the LME7... and at all connected electrical components through proper installation. In terms of execution, stability and protection, covers must conform to EN 60730. If not observed, there will be a risk of electric shock
- The space where the program module is located is defined as plugging space and therefore back-off-hand-proof when the program module is not fitted
- Each time work has been carried out (mounting, installation, service work, etc.), check to ensure that wiring and parameterization is in an orderly state and make the safety checks as described in *Commissioning notes*. If not observed, there is a risk of impairment of safety functions and of electric shock hazard
- If the housing or the area near the operating panel is damaged, the unit must immediately be put out of operation. If not observed, there is a risk of electric shock hazard
- Press the buttons on the operating panel only manually without using any tools or pointed objects. If the film of the operating panel is damaged, there is a risk of electric shock hazard
- The data line for the AZL2… or other accessories, such as the OCI410… (plugs into the BCI), must be connected or disconnected only when the burner control is dead (all-polar disconnection), since the BCI does not ensure safe separation from mains voltage. If not observed, there is a risk of electric shock hazard
- If the BCI (jack RJ11) is not used, protection against electric shock hazard must be provided (jack must be covered up). If not observed, there is a risk of electric shock hazard
- Fall or shock can adversely affect the safety functions. Such burner controls must not be put into operation, even if they do not exhibit any damage. If not observed, there is a risk of impairment of safety functions and of electric shock hazard
- To ensure protection against electric shock hazard, make certain that, prior to switching on power, the signal cable AGV50... is correctly connected to the AZL2…
- The mains-powered ionization probe is not protected against electric shock hazard. Protection against accidental contact must be ensured. If not observed, there is a risk of electric shock hazard

To ensure safety and reliability of the LME7... 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! If not observed, there will be a risk of electric shock
- Static charges must be avoided since they can damage the unit's electronic components when touched.
  Recommendation: Use ESD equipment

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
- The LME7... basic unit must be secured with fixing screws M4 (UNC32) or M5 (UNC24), observing a maximum tightening torque of 1.8 Nm and using all 3 fixing points. The additional mounting surfaces on the housing 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

Installation notes

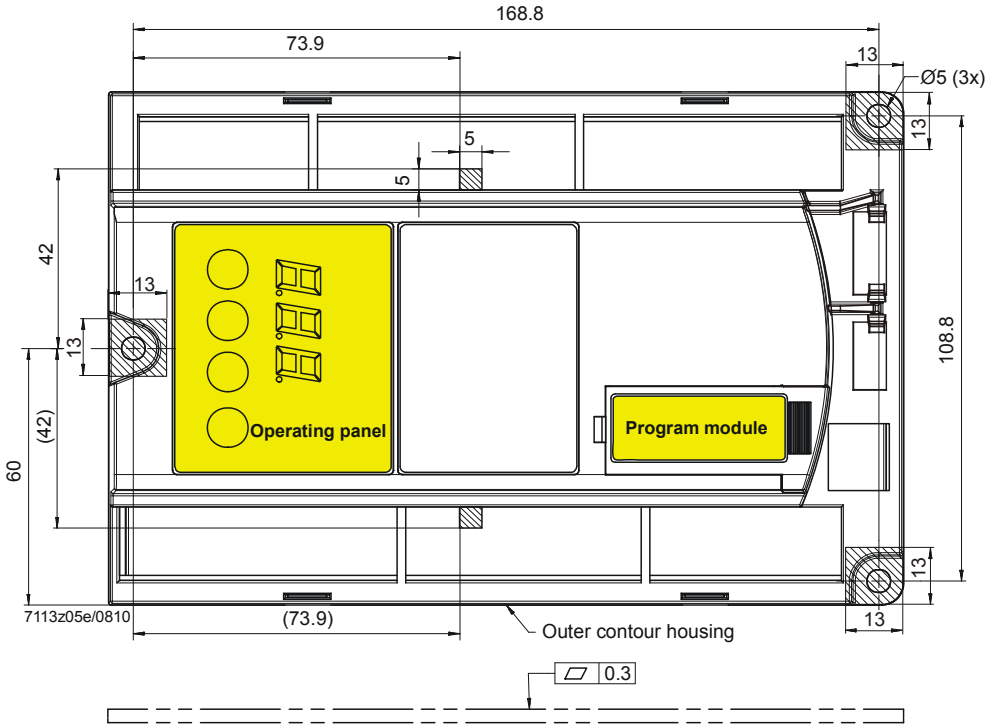


Figure 1: Mounting – mounting surface

Mounting surface

1.3 Installation notes

- Always run the high-voltage ignition cable separate from the unit and other cables while observing the greatest possible distance
- Do not mix up live and neutral conductors
- Install switches, fuses and earthing in compliance with local regulations
- The connection diagrams show the burner controls with earthed neutral conductor. In networks with nonearthed neutral conductor and ionization current supervision, terminal X10-05 pin 1 must be connected to the earth conductor. It must be made certain that local regulations are complied with (e.g. protection against electric shock hazard) since AC 230 V (60 Hz) mains voltage produces peak leakage currents of 2.7 mA
- Make certain that the maximum permissible current rating of the connection terminals is not exceeded
- Make certain that strain relief of the connected cables is in compliance with the relevant standards
- Do not feed external mains voltage to the control outputs of the unit. When testing the devices controlled by the burner control (fuel valves, etc.), the LME7… must not be connected to the units
- 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
- Make certain that strain relief of the connected cables is in compliance with the relevant standards (e.g. as per DIN EN 60730 and DIN EN 60335)
- Ensure that spliced wires cannot get into contact with neighboring terminals. Use adequate ferrules. If this is not observed, there is a risk of loss of safety functions or a risk of electric shock
- For protection, the burner manufacturer must fit dummy plugs to unused LME7... terminals
- The connectors of the connecting cables for the LME7…, may only be removed or exchanged when the plant is shut down (all-polar disconnection), since the connections (especially BCI interface) does not provide safe separation from mains voltage
- The mechanical coupling between the actuators and the controlling elements for fuel and air, or any other controlling elements, must be rigid
- Signal cable AGV50... from LME7… to AZL2…or from LME7… to OCI410…:
  Since the BCI has no safe separation from mains voltage, the signal cable AGV50... between LME7… and AZL2…, or LME7… and OCI410…, must conform to certain specifications. Siemens has specified the signal cable AGV50... for use under the burner hood (cable supplied by Hütter; see Technical data). When using signal cables of other manufacture, Siemens' requirement will not necessarily be met
- Do not lay the signal cable AGV50... from the LME7… to the AZL2… together with other cables; use a separate cable
- Service operation with a longer signal cable from LME7… to AZL2…, or from LME7… to OCI410…:
  If a longer signal cable is required for service work for example (short-time, <24 hours), note that above usage under the burner hood no longer applies and, for this reason, the signal cable can be subjected to increased mechanical stress. In that case, extra cable sheathing is required
- Both the signal cable AGV50... and the AZL2… must be shipped and stored so that no damage due to dust and water can occur when used in the plant later on
- The AZL2… must be used in a dry and clean environment
- Check the connecting lines of the air pressure switch for short-circuits

1.4 Electrical connection of flame detectors

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

- Never run the detector cable together with other cables
  – Line capacitance reduces the magnitude of the flame signal
  – Use a separate cable
- Observe the permissible detector cable lengths (see Technical Data)
- The mains-powered ionization probe is not protected against electric shock hazard. Protection against accidental contact must be ensured
- Locate the ignition electrode and the ionization probe such that the ignition spark cannot arc over to the ionization probe (risk of electrical overloads) and that it cannot adversely affect the supervision of ionization
  - Insulation resistance
    – Must be a minimum of 50 MΩ between ionization probe and ground
    – Soiled detector holders reduce the insulation resistance, thus supporting creepage currents
  - Earth the burner in compliance with the relevant regulations; earthing the boiler alone does not suffice

1.5 Commissioning notes

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

- Correct assignment of the valves to the valve outputs at the LME7...
- 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
- During commissioning, check **all safety functions**
- There is no absolute protection against incorrect use of the RASTx 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

    - For display of the flame on the AZL2…, following general conditions apply:
      - Display is subject to various component tolerances so that deviations of ±10% can occur
      - Note that for physical reasons there is no linear relationship between flame display and detector signal values

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

- Air pressure
- Minimum gas pressure and maximum gas pressure or POC
- Safety loop (e.g. safety limit thermostat)

Duties of the expert when making the approval tests

	Action	Check/response
a)	Burner startup with flame detector disconnected	Lockout at the end of 1st safety time
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 during prepurge time
c)	Simulation of loss of flame during operation. For that, disconnect 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 fuel valves by the burner control within the period of time permitted for the respective time of plant

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

After installation and commissioning, the parameterized values and settings must be **documented** by the person/heating engineer responsible for the plant. These data can be printed out with the help of the ACS410 PC software, for example, or must be written down. The documentation must be checked by the expert and then kept in a safe place.



Warning!
On the OEM access level of the LME7…, it is possible to make parameter settings that differ from application standards. When setting the parameters, it must be made certain that the application will run safely in accordance with legal requirements. If not observed, there is a risk that safety functions will be impaired.

1.6 Standards and certificates

Conformity to EEC directives

- Electromagnetic compatibility EMC (immunity)	2004/108/EC
- Directives for gas-fired appliances	2009/142/EC
- Low-voltage directive	2006/95/EC

ISO 9001: 2008
Cert. 00739

ISO 14001: 2004
Cert. 38233

Only for AC 120 V versions

Identification code to EN 298 chapter 4

- **PME71.111..: F B C L B N**
- **PME71.112..: A B C L B N**
- **PME71.401..: F M C L J N**
- **PME71.402...:F B C L J N**
- **PME71.901...: F M C L J N**
- **PME72.521..: F M L L X N**
- **PME72.541..: F B L L X N**
- **PME73.810..: F M C L J N**
- **PME73.811..: F B C L B N**
- **PME73.812..: F B C L B N**
- **PME73.820..: F M C L J N**
- **PME73.830..: F B C L J N**
- **PME73.831..: F B L L J N**
- **PME73.840..: F B C L J N**

1.7 Lifetime

Burner controls LME7… have 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 230/EN 298 and the table containing the relevant test documentation as published by the European Association of Component Manufacturers (Afecor) (www.afecor.org).

The designed lifetime is based on use of the burner controls according to the manufacturer's Data Sheet and Basic Documentation. 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

1.8 Disposal notes

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

1.9 Typographical conventions

1.9.1 Safety notes

This Basic Documentation contains instructions which must be observed to ensure your own personal safety and to prevent damage to equipment and property. The instructions and notes are highlighted by warning triangles or a hand symbol and are presented as follows, depending on the hazard level:



Warning means that death, severe personal injury or substantial property damage **can** occur if adequate precautionary measures are not taken.



Caution means that minor personal injury or property damage can occur if adequate precautionary measures are not taken.



Note draws your attention to **important information** on the product, on product handling, or to a special part of the documentation.

Qualified personnel

Only **qualified personnel** are allowed to install and operate the equipment. Qualified personnel in the context of the safety-related notes contained in this document are persons who are authorized to commission, ground and tag devices, systems and electrical circuits in compliance with established safety practices and standards.

Correct use

Note the following:

The device may only be used on the applications described in the technical documentation and only in connection with devices or components from other suppliers that have been approved or recommended by Siemens.

The product can only function correctly and safely if shipped, stored, set up and installed correctly, and operated and maintained as specified.

2 System makeup/function description

The LME7... is a microprocessor-based burner control with matching system components for the control and supervision of forced draft burners of medium to high capacity.

LME7… are used for the startup and supervision of 1- or 2-stage forced draft burners in intermittent operation. The flame is supervised with an ionization probe, optionally with flame detector QRA2..., QRA4.U or QRA10....

- Gas burner controls to EN 298 : 2003
- Oil burner controls to EN 230 : 2005
- For forced draft gas burners to EN 676
- For industrial thermo process plants to EN 746-2
- For forced draft oil burners to EN 267

Integrated in the LME7... basic unit are:

- Burner control
- BCI **for connection a display or PC**
- Only LME72.../LME73...: Control for one actuator
- Lockout reset button (info button)
- 3 multicolor signal lamp LED for operations and fault notifications
- Optional: Analog inputs for load controller DC 0...10 V, DC 0/4...20 mA, 0...135 Ω
- 3 x 7-segment display for service, fault and operating state information
- Interface for program module

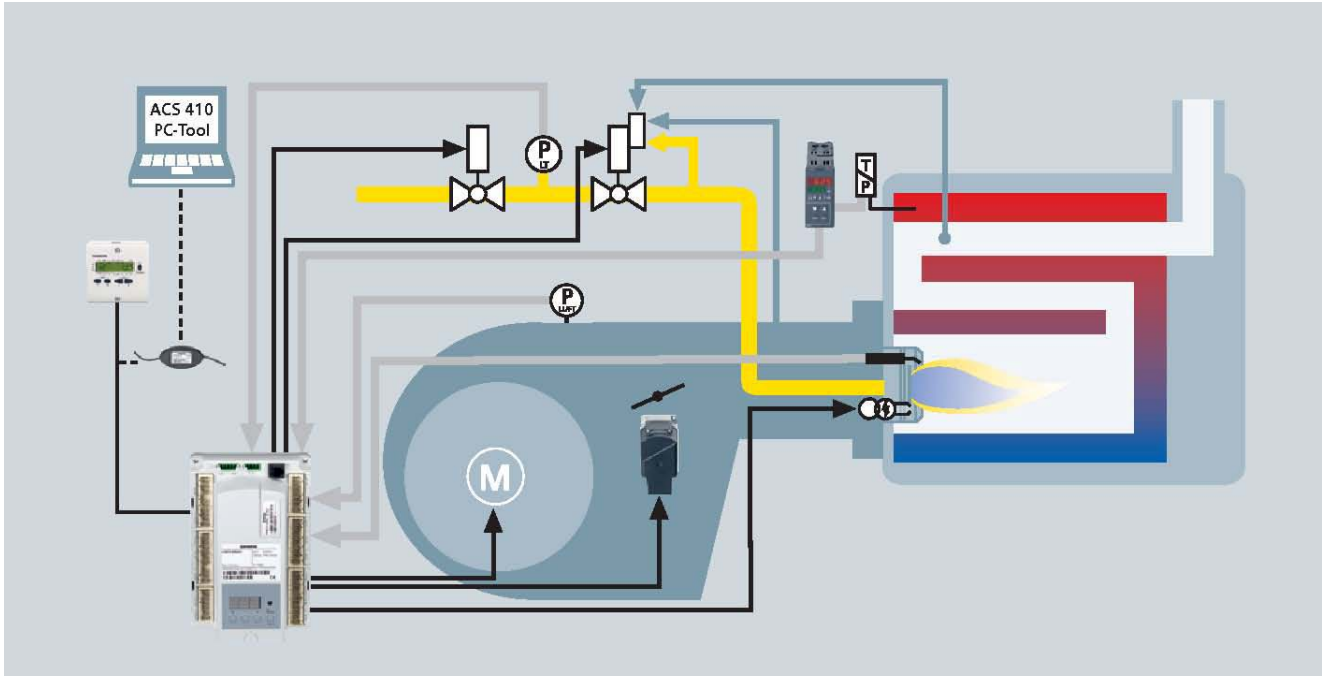


Figure 2: Example: Modulating gas burner

The LME7... system components (display and operating unit AZL2...) are connected directly via BCI to the LME7... basic unit. All safety-related digital inputs and outputs of the system are monitored by a contact feedback network. For intermittent operation in connection with the LME7..., the ionization probe and, optionally, the flame detector QRA2..., QRA4.U or QRA10... can be used. The burner control is operated and parameterized via the AZL2... display and operating unit or via PC tool. The AZL2... display and operating unit features an LCD and menu-driven operation, offering straightforward operation and targeted diagnostics. When making diagnostics, the display shows the operating states, the type of error and meter readings. Passwords protect the different parameter levels of the burner/boiler manufacturer and heating engineer against unauthorized access. Basic settings that the plant operator can make on site require no password.

Indication and diagnostics

- Multicolor indication for operating state and fault status messages via 3-color LED
- Diagnostics of cause of fault via blink code
- Extensive service, fault and operating state information via built-in 3 x 7 segment display
- Extensive service, fault and operating state information via BCI and AZL2...

2.1 Features

- Undervoltage detection
- Electrical remote reset facility
- Accurate control times thanks to digital signal handling
- Multicolor indication of fault status and operating state messages
- Air pressure supervision with function check of air pressure switch during start and operation
- Repetition limitation
- Controlled intermittent operation after 24 hours of continuous operation (can be parameterized via parameter 239) depending on program module PME...
- BCI
- Indication of program sequence
- **Connection for program module** PME...
- Unit parameter adjustable either via display or PC software ACS410

3 Type summary

3.1 Burner controls

Microprocessor-based burner control for single-/dual-fuel burner of medium to large capacity, one actuator.

Type	LME71.000A1	LME71.000A2	LME72.000A2	LME73.000A1	LME73.000A2
Mains voltage AC 120 V	●	---	---	●	---
Mains voltage AC 230 V	---	●	●	---	●
Gas pressure switch-min/POC	●	●	●	●	●
Pressure switch valve proving	●	●	●	●	●
Air pressure switch	●	●	●	●	●
Ionization probe	●	●	●	●	●
QRA2.../QRA4.U/QRA10...	●	●	●	●	●
Load controller analog input signal (0...10 V, 4...20 mA, 0...135 Ω)	●	●	---	●	●
Load controller input 3-position step input/2-stage	●	●	●	●	●
Output actuator control	---	---	●	●	●
Input feedback for actuator with potentiometer 0...1 kΩ	---	---	---	●	●
Output PWM control	●	●	●	●	●
Onboard LED 7-segment display	●	●	---	●	●
BCI bus for AZL2...	●	●	●	●	●

3.2 Program module

Example:



Type reference	PME71.111A1	PME71.112A1	PME71.401A1	PME71.402A1	PME71.901A1	PME73.810A1	PME73.811A1	PME73.812A1	PME73.820A1	PME73.830A1	PME73.831A1	PME73.840A1
Mains voltage AC 120 V	●	●	●	●	●	●	●	●	●	●	●	●
For use with LME71.000A...	●	●	●	●	●	---	---	---	---	---	---	---
For use with LME72.000A...	---	---	---	---	---	---	---	---	---	---	---	---
For use with LME73.000A...	---	---	---	---	---	●	●	●	●	●	●	●
Gas program forced draft burner	●	---	●	●	●	●	●	●	●	●	●	●
Gas program atmospheric burner	---	●	---	---	---	---	---	---	---	---	---	---
1-stage or 1-stage modulating	●	●	●	●	●	●	●	●	●	●	●	●
2-stage or 1-stage modulating	---	---	●	●	●	●	---	---	●	●	●	●
Pilot burner simultaneously/alternately	●	●	---	●	---	---	●	●	---	●	●	●
Modulating via actuator (pneumatic or mechanic gas-air ratio control)	---	---	---	---	---	●	●	●	●	●	●	●
Modulating via PWM fan (pneumatic or mechanic gas-air ratio control)	---	---	---	---	●	---	---	---	---	---	---	---
Fan speed control/control via analog signal/3-position step signal	---	---	---	---	●	---	---	---	---	---	---	---
Actuator control via analog signal/3-position step signal for actuator with potentiometer	---	---	---	---	---	●	●	●	---	●	●	---
3-position signal for actuator without potentiometer	---	---	---	---	---	---	---	---	●	---	●	●
Control sequence programmable time	●	●	●	●	●	●	●	●	●	●	●	●
POC (valve closure control)	●	●	●	●	●	●	●	●	●	●	---	●
Valve proving	---	---	---	---	●	●	●	---	●	●	●	●
Input valve proving ON/OFF	---	---	---	---	---	---	---	---	---	---	●	---

Example:



Type reference	PME71.111A2	PME71.112A2	PME71.401A2	PME71.402A2	PME71.901A2	PME72.521A2	PME72.541A2	PME73.810A2	PME73.811A2	PME73.812A2	PME73.820A2	PME73.830A2	PME73.831A2	PME73.840A2
Mains voltage AC 230 V	●	●	●	●	●	●	●	●	●	●	●	●	●	●
For use with LME71.000A...	●	●	●	●	●	---	---	---	---	---	---	---	---	---
For use with LME72.000A...	---	---	---	---	---	●	●	---	---	---	---	---	---	---
For use with LME73.000A...	---	---	---	---	---	---	---	●	●	●	●	●	●	●
Gas program forced draft burner	●	---	●	●	●	●	●	●	●	●	●	●	●	●
Gas program atmospheric burner	---	●	---	---	---	---	---	---	---	---	---	---	---	---
1-stage or 1-stage modulating	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2-stage or 1-stage modulating	---	---	●	●	●	●	●	●	---	---	●	●	●	●
Pilot burner simultaneously/alternately	---	---	---	●	---	---	●	---	●	●	---	●	●	●
Modulating via actuator (pneumatic or mechanic gas-air ratio control)	---	---	---	---	---	●	●	●	●	●	●	●	●	●
Modulating via PWM fan (pneumatic or mechanic gas-air ratio control)	---	---	---	---	●	---	---	---	---	---	---	---	---	---
Fan speed control/control via analog signal/3-position step signal	---	---	---	---	●	---	---	---	---	---	---	---	---	---
Actuator control via analog signal/3-position step signal for actuator with potentiometer	---	---	---	---	---	---	---	●	●	●	---	●	●	---
3-position signal for actuator without potentiometer	---	---	---	---	---	●	●	---	---	---	●	---	●	●
Control sequence programmable time	●	●	●	●	●	---	---	●	●	●	●	●	●	●
POC (valve closure control)	●	●	●	●	●	●	●	●	●	●	●	●	---	●
Valve proving	---	---	---	---	●	---	---	●	●	---	●	●	●	●
Input valve proving ON/Off	---	---	---	---	---	---	---	---	---	---	---	---	●	---

3.3 External display and operating units

AZL21.00x9
Display and operating unit, detached, choice of mounting methods, 8-digit LCD, 5 buttons, BCI for LME7..., degree of protection IP40.
See Data Sheet N7542



AZL23.00x9
Display and operating unit, detached, choice of mounting methods, 8-digit LCD, 5 buttons, BCI for LME7..., degree of protection IP54.
See Data Sheet N7542



Built-in in the LME7...
3-colored LED, reset button, 3 other buttons for operation in connection with 3 x 7-segment display

AGV50.100
Signal cable for AZL2..., with RJ11 connector, cable length 1 m, pack of 10



3.4 Flame detectors

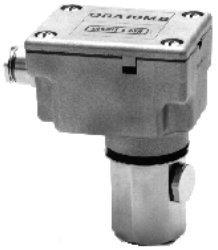
QRA2…
UV flame detector for the supervision of gas flames, yellow-/blue-burning oil flames and for ignition spark proving.
Plastic insulated housing, metalized to prevent static charging caused by the air flow from the fan, lateral illumination.
See Data Sheet N7712



QRA4.U
UV flame detector for the supervision of gas flames, yellow-/blue-burning oil flames and for ignition spark proving, metal housing, front illumination.
See Data Sheet N7711



QRA10…
UV flame detector for the supervision of gas flames, yellow-/blue-burning oil flames and for ignition spark proving.
Die-cast aluminium housing with a 1 in. mounting coupling and connection facility for cooling air.
See Data Sheet N7712



3.5 Actuators

SQN3…
Electromotoric actuators for air dampers and control valves of oil and gas burners of small to medium capacity.



Holding torque:/running time 0,8 Nm/4,5 s
until 3 Nm/30 s

See Data Sheet N7808

SQN7…
Electromotoric actuators for air dampers and control valves of oil and gas burners of small to medium capacity.



Holding torque:/running time 0,7 Nm/4 s
until 2,5 Nm/30 s

See Data Sheet N7804

SQM40…/SQM41...
Electromotoric actuators for air dampers and control valves of oil and gas burners of small to medium capacity, with UL-registered.



Holding torque:/running time 5 Nm/15 s
until 10 Nm/30 s

See Data Sheet N7817.

SQM5...
Electromotoric actuators for air dampers and control valves of oil and gas burners of small to medium capacity, with UL-registered.



Holding torque:/running time 10 Nm/15 s
until 40 Nm/60 s

See Data Sheet N7815

3.6 Pressure switch

QPLx5…
The pressure switch is used for monitoring of gas or air pressure.
See Data Sheet N7221



3.7 Dummy plugs for RJ11

Dummy plug
For 6-pole modular connector (RJ11)
Supplier recommendation:
Molex, order no.: 085 999 3256

3.8 Connector sets for LME7...

AGG3.710
Connector set complete for LME7…
RAST5 and RAST3.5
Single packs
See List or parts C7105 (74 319 0642 0)

AGG3.720
10 standard connector sets complete for LME7…
RAST5 and RAST3.5
Single packs
The several connectors are delivered into bags to 10 pieces each as a unit.
See List or parts C7105 (74 319 0642 0)

Example:
Terminal X5-03



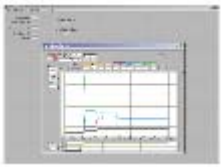
AGG3.730
50 standard connector sets complete for LME7…
RAST5 and RAST3.5
Single packs
The several connectors are delivered into bags to 50 pieces each as a unit.
See List or parts C7105 (74 319 0642 0)

3.9 Service- tools

OCI410…
Interface between burner control and PC
Facilitates viewing, handling and recording setting parameters on site in connection with the ACS410 software
See Data Sheet N7616



ACS410
PC software for setting the parameters and for visualizing the burner controls
See Software Documentation J7352



3.10 Test case and accessories

KF8895.1x9

Test case for LME...

- For simulations of burner functions as startups, sequence of operations in connection with the specified burner controls
- For check and test purposes of burner controls
- For operation in laboratories by expert qualified personnel

See User Manual U7993



AGV8895.01

Connection cable set for LME7…

- For test case KF8895.1A9
- Consisting of:

AGV8895.01X1

Connection cable for mains potential

- For test case KF8895.1A9



AGV8895.01X3

Connection cable for extra-low voltage, PELV

- For test case KF8895.1A9



4 Technical data

4.1 Basic unit LME7...

Mains voltage	AC 120 V	AC 230 V
Mains frequency	50/60 Hz	50/60 Hz
External primary fuse (Si)	Max. 6.3 A (slow)	Max. 6.3 A (slow)
Power consumption	<10 W, typical	<10 W, typical
Safety class	I with parts according to II and III to DIN EN 60730-1	
Degree of protection	IP00	
	☞ Note: The burner or boiler manufacturer must ensure degree of protection IP40 for burner controls as per DIN EN 60529 through adequate installation of the LME7...	
Perm. mounting position	Optional	
Weight	Approx. 490 g	

4.2 Terminal rating *Inputs*

Mains voltage: Input current depending on the operating state of the unit		
Under voltage	UMains 120 V	UMains 230 V
• Safety shutdown from the operating position takes place should mains voltage drop	≤AC 75 V	≤AC 165 V
• Restart is initiated when mains voltage exceeds	≥AC 100 V	≥AC 195 V
State inputs, temperature controller, temperature switch, load controller, pressure switch, air pressure switch, actuator (except safety loop) of the contact feedback network (CFN) are used for system supervision and require mains-related input voltage		
• Input safety loop	See Terminal rating outputs	
• Input currents and input voltages		
- UeMax	UN +10%	UN +10%
- UeMin	UN -15%	UN -15%
- IeMax	1.5 mA peak (peak value)	1 mA peak (peak value)
- IeMin	0.8 mA peak (peak value)	0.5 mA peak (peak value)
• Contact material recommended for external signal sources (air pressure switch, pressure switch-min, pressure switch-max, etc.)	Gold-plated silver contacts	
• Transition/settling behavior/bounce - Perm. bounce time of contacts when switching ON/OFF	Max. 50 ms (after the bounce time, the contact must stay closed or open)	
• UN	AC 120 V	AC 230 V
• Voltage detection		
- ON	>AC 60 V	>AC 120 V
- OFF	<AC 40 V	<AC 80 V
Analog input terminal X65	DC 0...10 V/DC 0/4...20 mA/0...135 Ω	

4.3 Terminal rating *Outputs*

Total contact loading:

• Rated voltage	AC 120 V 50/60 Hz	AC 230 V 50/60 Hz
• Unit input current terminal X3-04 (safety loop) from: - Fan motor contactor - Ignition transformer - Fuel valves	Max. 5 A	Max. 5 A

Individual contact loading:

Fan motor contactor terminal X2-01 pin 3		
• Rated voltage	AC 120 V 50/60 Hz	AC 230 V 50/60 Hz
• Rated current	2 A (15A max. 0.5 s)	2 A (15A for max. 0.5s)
• Power factor	Cosφ ≥0.4	Cosφ ≥0.4
Alarm output terminal X2-03 pin 3		
• Rated voltage	AC 120 V 50/60 Hz	AC 230 V 50/60 Hz
• Rated current	1 A	1 A
• Power factor	Cosφ >0.6	Cosφ >0.6
Ignition transformer terminal X4-02 pin 3		
• Rated voltage	AC 120 V 50/60 Hz	AC 230 V 50/60 Hz
• Rated current	2 A	2 A
• Power factor	Cosφ >0.4	Cosφ >0.4
Auxiliary output		
• Rated voltage	AC 120 V 50/60 Hz	AC 230 V 50/60 Hz
• Rated current	1 A	1 A
• Power factor	Cosφ >0,6	Cosφ >0,6
Output relay contact 2 terminal X2-09 pin 7		
• Rated voltage	AC 120 V 50/60 Hz	AC 230 V 50/60 Hz
• Rated current	1 A	1 A
• Power factor	Cosφ >0.4	Cosφ >0.4
Fuel valves/pilot valve terminal X7-01 pin 3		
• Rated voltage	AC 120 V 50/60 Hz	AC 230 V 50/60 Hz
• Rated current	1 A	1 A
• Power factor	Cosφ >0.4	Cosφ >0.4
Fuel valves 1 terminal X7-04 pin 4/fuel valve 2 terminal X7-02 pin 3		
• Rated voltage	AC 120 V 50/60 Hz	AC 230 V 50/60 Hz
• Rated current - Valve proving inactive - Valve proving active	2 A 1 A	2 A 1 A
• Power factor	Cosφ >0.4	Cosφ >0.4

Note:
When activating valve proving (e.g. on shutdown), the load on the valve terminals is restricted. If the load is not reduced, the design lifetime is about 100,000 burner start cycles!

Safety valve terminal X6-03 pin 3		
• Rated voltage	AC 120 V 50/60 Hz	AC 230 V 50/60 Hz
• Total current	1.5 A	1.5 A
• Power factor	Cosφ >0.6	Cosφ >0.6
Safety loop terminal X3-04 pin 2, safety valve terminal X6-03 pin 3, POC terminal X2-02 pin 3		
• Rated voltage	AC 120 V 50/60 Hz	AC 230 V 50/60 Hz
• Total current	2 A	2 A
• Power factor	Cosφ >0.4	Cosφ >0.4

4.4 Cable lengths

• Mains supply line	Max. 100 m (100 pF/m)
• Display, BCI	For use under the burner hood or in a control panel Max. 1 m (100 pF/m)
• Load controller terminal X5-03	Max. 30 m (100 pF/m)
• Safety Loop	Max. 30 m (100 pF/m)
• Safety valve	Max. 30 m (100 pF/m)
• Fuel valve	Max. 30 m (100 pF/m)
• Pilot valve	Max. 30 m (100 pF/m)
• Ignition transformer	Max. 30 m (100 pF/m)
• Remote reset (lay separate cable)	Max. 30 m (100 pF/m)
• Other lines	Max. 30 m (100 pF/m)

Specification as per EN 60730-1	
Type of shutdown or interruption of each circuit	
Shutdown with microswitch	1 pole
Mode of operation	Type 2 B

4.5 Actuators

CLOSE/ignition position/OPEN terminal X2-09 pin 1, X2-09 pin 2, X2-09 pin 3	1 mio. switching cycles	1 mio. switching cycles
• Rated voltage	AC 120 V 50/60 Hz	AC 230 V 50/60 Hz
• Rated current	0,1 A	0,1 A
• Power factor	Cosφ >0.6	Cosφ >0.6

4.6 Cross-sectional areas

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

Min. cross-sectional area	0.75 mm² (single- or multicore to VDE 0100)

Cable insulation must be suited for the respective temperature and environmental conditions!

4.7 Signal cable AGV50...

4.7.1 AZL2... → BCI

Signal cable	Color white Unshielded Conductor 4 x 0.141 mm² With jack RJ11
Cable length - AGV50.100	 1 m
Supplier (alternative)	Recommendation: Hütter http://www.hkt-netzwerktechnik.at/index.htm
Location	Under the burner hood (arrangements for SKII EN60730-1 additionally required)

4.8 Dummy plug for RJ11

Dummy plug	For 6 pin modular plug (RJ11)
Supplier	Recommendation: Molex Order no.: 085 999 3256

4.9 Environmental conditions

Storage	DIN EN 60721-3-1
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-40...+70 °C
Humidity	<95% r.h.
Transport	DIN EN 60721-3-2
Climatic conditions	Class 2K3
Mechanical conditions	Class 2M2
Temperature range	-40...+70 °C
Humidity	<95% r.h.
Operation	DIN EN 60721-3-3
Climatic conditions	Class 3K3
Mechanical conditions	Class 3M2
Temperature range	-40...+60 °C
Humidity	<95% r.h.



Warning!
Condensation, formation of ice and ingress of water are not permitted! If not observed, there is a risk of impairment of safety functions and of electric shock hazard.

4.10 Flame supervision

4.10.1 Ionization probe

No-load voltage at terminal ionization probe (terminal X10–05 pin 2)	AC 300 V

Warning!
- **The ionization probe must be protected against electric shock hazard!**
- **When monitoring ionization currents in earth-free mains, connect terminal X10-05 pin 1 to burner ground**

Short-circuit current	Max. AC 1 mA
Required detector current	Min. DC 1 µA, display approx. 20%
Possible detector current	Max. DC 40 µA, display approx. 100%
Permissible length of detector cable (laid separately)	30 m (core-earth 100 pF/m)

Note:
As the detector line capacitance (line length) increases, the voltage at the ionization probe und 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.

Threshold values when flame is supervised by ionization	
- Start prevention (extraneous light)	Intensity (parameter 954) approx. 12%
- Operation	Intensity (parameter 954) approx. 13%

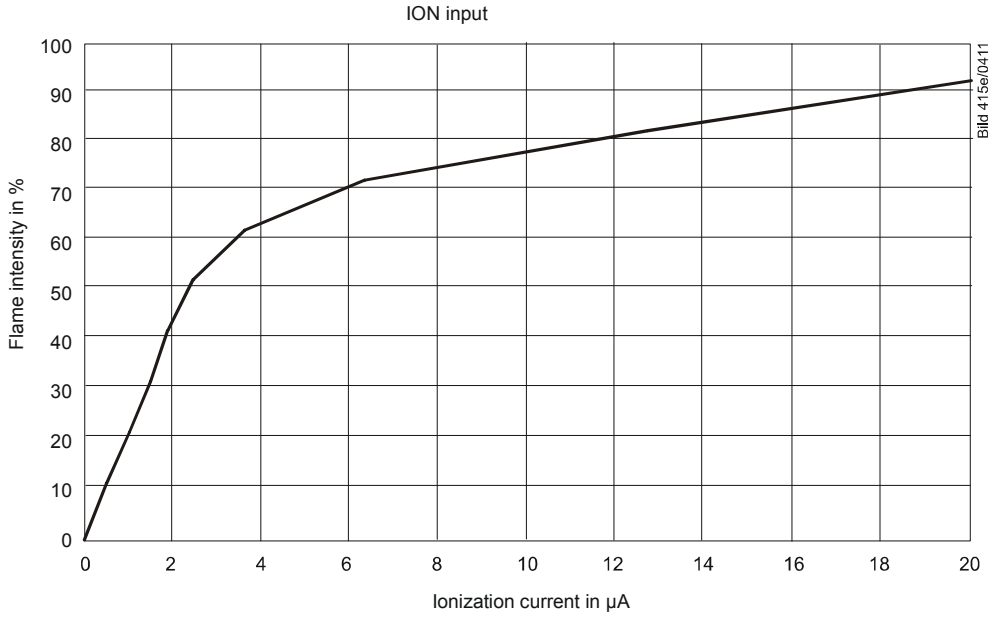


Figure 3: Ionization input at AC 120 V/AC 230 V

Measuring circuit for detector current measurement

Ionization probe

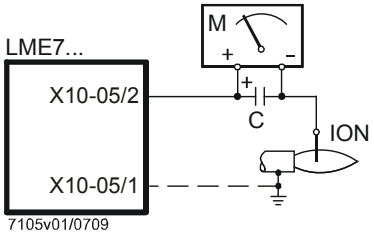


Figure 4: Measuring circuit for ionization probe

Legend

C	Electrolytic condenser 100...470 µF; DC 10...25 V
ION	Ionization probe
M	Microammeter Ri max. 5,000 Ω

Warning!
Simultaneous operation of QRA... and ionization probe is not permitted!
If not observed, there is a risk of impairment of safety functions.

4.10.2 Flame detector QRA2.../QRA4.U/QRA10...

Caution!
If flame detectors QRA2…/QRA4.U/QRA10... are used for flame supervision with the LME7..., it must be ensured that the burner control is permanently connected to power (conforming to EN 298), thus enabling the system to detect flame detector failures during startup and shutdown.
Generally, the system works with QRA... flame detectors in intermittent operation. If this is not observed, there is a risk of loss of safety functions.
***Technical Data see* Data Sheet N7712, flame detector QRA2.../QRA10…!**
***Technical Data* see Data Sheet N7711, flame detector QRA4.U!**

Threshold values when flame is supervised by QRA...	
- Start prevention (extraneous light)	Intensity (parameter 954) approx. 12%
- Operation	Intensity (parameter 954) approx. 13%

Operating voltage	AC 280 V ±15%
Mains frequency	50...60 Hz ±6%
Required detector current	Min. 70 µA
Possible detector current during operation	Max. 700 µA
Perm. length of detector cable (normal cable, laid separately) [1])	Max. 100 m

[1]) Multicore cable not permitted

Measuring circuit for detector current measurement

Flame detector QRA...

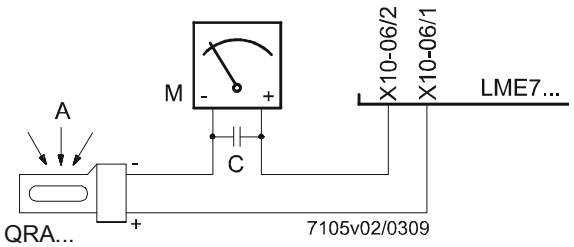


Figure 5: Measuring circuit for QRA...

Legend

A Exposure to light
C Electrolytic condenser 100...470 µF; DC 10...25 V
M Microammeter Ri max. 5,000 Ω

Warning!
- **Input QRA... is not short-circuit-proof!**
  Short-circuits of terminal X10-06 pin 2 against earth can destroy the QRA... input
- **Simultaneous operation of flame detector QRA... and ionization probe is not permitted. If not observed, there is a risk of impairment of safety functions.**

5 Dimensions

Dimensions in mm

LME7...

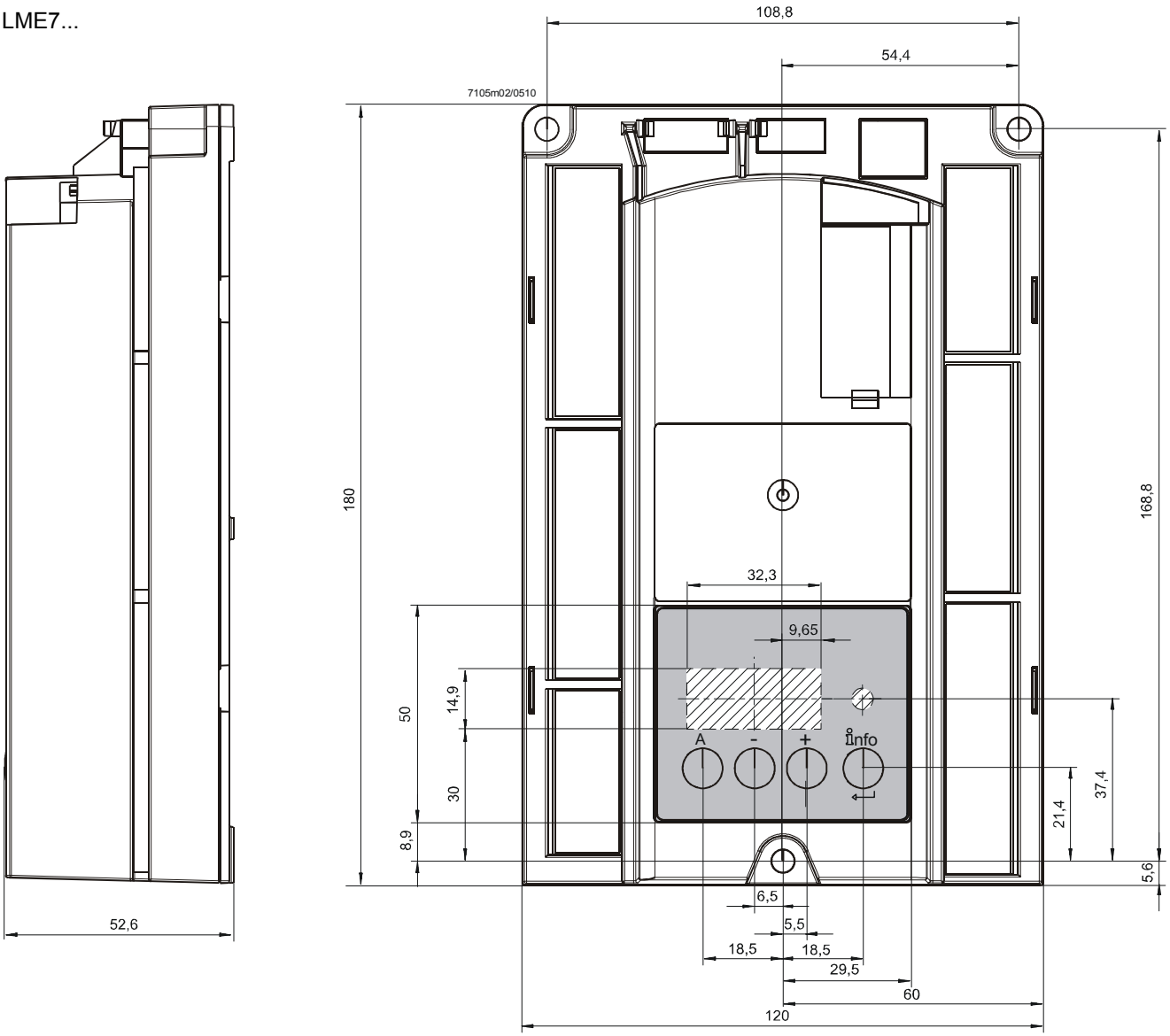


Figure 6: Dimensions of LME7...

6 Function

6.1 Preconditions for burner startup

- Burner control must be reset
- All contacts in the line are closed, there is a request for heat
- No undervoltage
- Air pressure switch or POC must be in its no-load position, or Dbr1 is connected to terminal X2-02 (depending on program sequence)
- Flame detector is darkened and there is no extraneous light
- All contacts in the safety loop are closed

6.2 Undervoltage

- Safety shutdown from the operating position takes place should mains voltage drop below about AC 75 V (UN = AC 120 V)

- Restart is initiated when mains voltage exceeds about AC 100 V (UN = AC 120 V)

- Safety shutdown from the operating position takes place should mains voltage drop below about AC 165 V (UN = AC 230 V)

- Restart is initiated when mains voltage exceeds about AC 195 V (UN = AC 230 V)

6.3 Controlled intermittent operation

Depending on program module, see *User Documentations*.

After no more than 24 hours of continuous operation, the burner control initiates automatic controlled shutdown followed by a restart, against parameter 239.

6.4 Control sequence in the event of fault

If lockout occurs, the outputs for the fuel valves, the burner motor and the ignition equipment are immediately deactivated (<1 second).

Cause	Response
Mains voltage failure	Restart
Voltage below undervoltage threshold	Safety shutdown
Voltage above undervoltage threshold	Restart
Extraneous light before safety time	Lockout
Extraneous light during waiting time	Start prevention, lockout after approx. 30 seconds at the latest
No flame at the end of safety time	Lockout end of safety time
Loss of flame during operation	Depending on program module, see *User Documentations*. Lockout or 1 x repetition
Air pressure switch has welded in the operating position	Start prevention, lockout after 30 seconds
Air pressure switch has welded in the no-load position	Lockout at the end of the specified time
No air pressure signal on completion of the specified time	Lockout, with breakdown time ≥0.3 seconds
POC contact is open during startup	Lockout, approx. 5 seconds after temperature thermostat or pressurestat or temperature or pressure switch on
Pressure switch-min: Failure during operation	Shutdown and start prevention

In the event of lockout, the LME7… remains locked and the red fault signal lamp lights up. The burner control can immediately be reset. This state is also maintained in the event of mains failure.

6.5 Resetting the burner control

When lockout occurs, the burner control can immediately be reset. To do this, press the lockout reset button (info button) for about 1 second (<3 seconds). The LME7… can only be reset when all contacts in the line are closed and when there is no undervoltage.

6.6 Limitation of repetitions

Depending on program module, see *User Documentations*.

6.6.1 Repetition in case of loss of flame

If the flame is lost during operation, a maximum 1 repetition per controlled startup can be performed via the temperature thermostat or pressurestat, or else lockout will be initiated.

6.6.2 Repetition in case of *no flame is established by the end of safety time (TSA)*

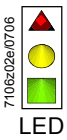
If no flame is established by the end of the safety time, a maximum of 3 repetitions per controlled shutdown are possible. With repetitions from the operating position (loss of flame), the flame must have been established on completion of the safety time, or else lockout will be initiated.

7 Operation, indication, diagnostics

7.1 Operation



The lockout reset button (info button) is the key operating element for resetting the burner control and for activating/deactivating the diagnostics functions.



The multicolor signal lamp is the key indicating element for visual diagnostics.

Both lockout reset button and signal lamp are located in the control panel.

There are 2 diagnostics choices:
1. Visual diagnostics: Indication of operating state or diagnostics of cause of fault
2. Diagnostics: Via BCI to AZL2... display and operating unit

Visual diagnostics:
In normal operation, the different operating states are indicated in the form of color codes according to the color code table given below.

7.2 Indication of operating state

During startup, state indication takes place according to the following table:

Color code table for multicolor signal lamp		
State	**Color code**	**Color**
Waiting time, other waiting states	❍.....	OFF
Ignition phase, ignition controlled	● ❍ ● ❍ ● ❍ ● ❍ ● ❍ ●	Blinking yellow
Operation, flame o.k.	□.....	Green
Operation, flame not o.k.	□ ❍ □ ❍ □ ❍ □ ❍ □ ❍	Blinking green
Extraneous light on burner startup	□ ▲ □ ▲ □ ▲ □ ▲ □ ▲	Green-red
Undervoltage	● ▲ ● ▲ ● ▲ ● ▲ ● ▲	Yellow-red
Fault, alarm	▲.....	Red
Error code output (see Error code table)	▲❍ ▲❍ ▲❍ ▲❍	Blinking red
Interface diagnostics	▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲	Red flicker light
Heating request	●.....	Yellow
New program card	● ● ▲ ● ● ▲ ● ● ▲ ● ●	Yellow-yellow-red

Legend

..... Steady on
❍ OFF
▲ Red
● Yellow
□ Green

7.3 Diagnostics of cause of fault

After lockout, the red fault signal lamp remains steady on. In that condition, visual diagnostics of cause of fault according to the error code table can be activated by pressing the lockout reset button (info button) for more than 3 seconds. Pressing the lockout reset button (info button) again for at least 3 seconds, interface diagnostics will be activated. If, by accident, interface diagnostics has been activated, in which case the slightly red light of the signal lamp flickers, it can be deactivated by pressing again the lockout reset button (info button) for >3 seconds. The instant of switching over is indicated by a yellow light pulse.

The following sequence activates the diagnostics of cause of fault:

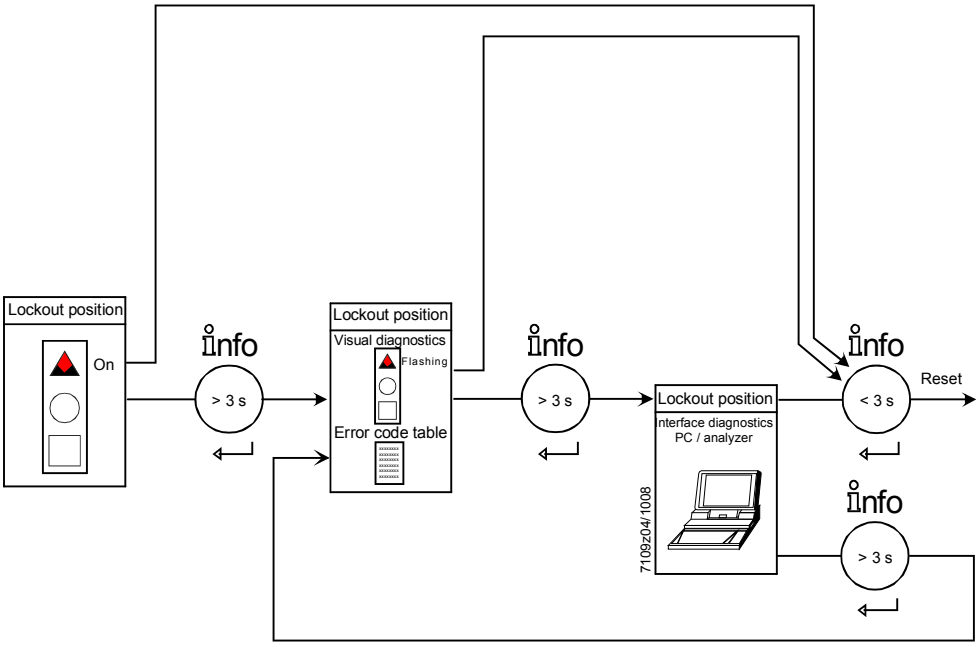


Figure 7: Diagnostics of cause of fault

Error code table	
Red blink code of fault signal lamp	**Possible cause**
2 x blinks	No establishment of flame at the end of the safety time - Faulty or soiled fuel valves - Faulty or soiled flame detector - Poor adjustment of burner, no fuel - Faulty ignition equipment
3 x blinks	Air pressure switch faulty - Loss of air pressure after specified time - Air pressure switch welded in no-load position
4 x blinks	Extraneous light on burner startup
5 x blinks	Time supervision air pressure switch - Air pressure switch welded in working position
6 x blinks	Actuator position not reached - Actuator faulty - Wrong adjustment of cam - Actuator defective or blocked - False connection - Misadjustment
7 x blinks	Too many losses of flame during operation (limitation of repetitions) - Faulty or soiled fuel valves - Faulty or soiled flame detector - Poor adjustment of burner
8 x blinks	Free
9 x blinks	Free
10 x blinks	Wiring error or internal error, output contacts, other faults
12 x blinks	Valve proving - Fuel valve 1 leaking
13 x blinks	Valve proving - Fuel valve 2 leaking
14 x blinks	Error in connection with valve closure control POC
15 x blinks	Error code ≥15, depending on type of program module E.g. error code 20: Failure of gas pressure switch-min E.g. error code 22: Error of safety loop

During the time the cause of fault is diagnosed, the control outputs are deactivated
- Burner remains shut down
- External fault indication (alarm) at terminal X2-03 pin 3 steady on

Diagnostics of cause of fault is quit and the burner switched on again by resetting the burner control. Press the lockout reset button (info button) for about 1 second (<3 seconds).

8 Inputs/outputs

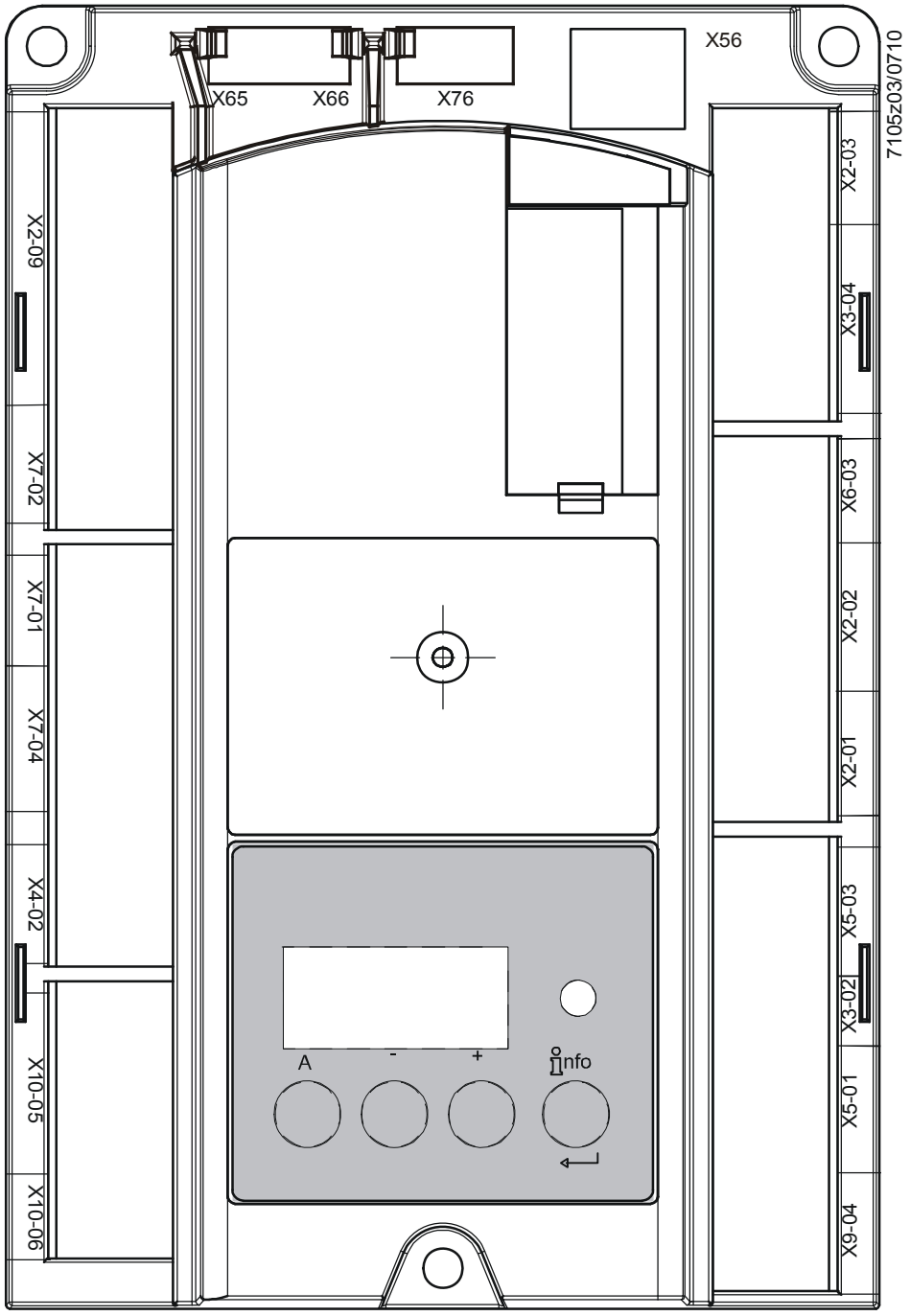


Figure 8: Inputs/outputs

9 Basic unit

9.1 Description of inputs and outputs

Note!
This section covers the key features of the basic unit's inputs and outputs. For exact use of the inputs and the activation of outputs, see chapter *Sequence diagrams*.

Flame signal input and flame detector terminal X10–06

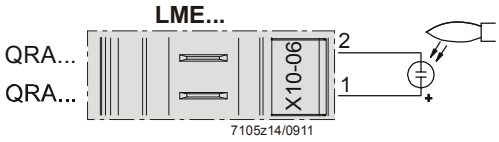


Figure 9: Flame signal input terminal X10-06

Connection choices:

- Ionization probe
- QRA2.../QRA10...
- QRA4.U

9.2 Digital input

9.2.1 Safety Loop terminal X3–04 pin 1 and 2

Input for connection of 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 safety loop includes the following components:
- External burner switch (ON/OFF)
- Safety limiter/safety pressure limiter (SB/SDB)
- External control thermostat and/or pressurestat, if required
- Water shortage switch

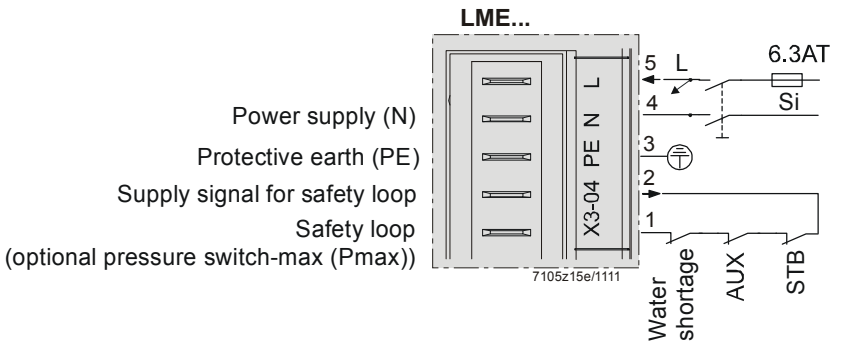


Figure 10: Safety Loop terminal X3-04

For diagnostic purposes, the contacts of the components included in the safety loop are combined for delivering the safety loop signal. If there is no such signal, the system initiates safety shutdown in any event.

If, with *Load controller ON/OFF)* there is no signal from the safety loop (start prevention), error code **LOC 22** is translated to text display.

9.2.2 Input for external controller (ON/OFF) terminal X5–03 pin 1

When the external control loop is closed, the 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
When there are no more requests for heat, the burner shuts down. The fuel valves are closed, either immediately when the timer has elapsed, or when the low-fire position is reached, depending on the parameter settings

Note
Burner startup takes place only when this contact is closed.

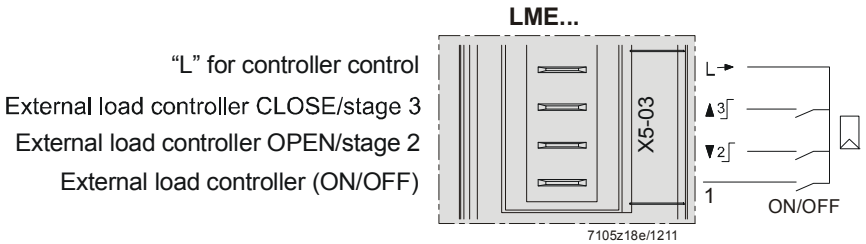


Figure 11: Inputs for external load controller ON/OFF terminal X5-03

9.2.3 Air pressure switch terminal X3–02

Input for connection of an air pressure switch. Air pressure is anticipated when the fan is switched on. If there is no air pressure signal, the system initiates 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 (terminal X3-02 pin 1 to terminal X2-01 pin 3).

Caution!
The OEM must check to see whether the burner can be operated without air pressure switch. This may necessitate a special approval, depending on the type of application.

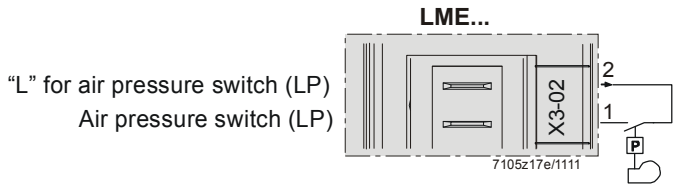


Figure 12: Air pressure switch terminal X3-02

9.2.4 Input gas pressure switch-min

Behavior when gas pressure switch-min opens (terminal X5-01 pin 2 and pin 3)

If the minimum gas pressure is not reached (opening of the gas pressure switch-min), the burner control moves to fault position (error code Loc: 20). If the gas pressure switch-min is closed again following reset, the burner control carries out a restart (if the heat request is still in place). If the gas pressure switch-min is still open following reset, the burner control is locked again.
The minimum gas pressure is tested after the prepurge time, in the interval time and during operation. The gas pressure switch-min is not evaluated during the first and second safety time.

Behavior in the event gas pressure switch-min fails (terminal X5-01 pin 2 and pin 3)

If gas pressure switch-min fails, safety shutdown is triggered and startup prevented until gas pressure switch-min closes again. During start prevention, the yellow LED is lit and the safety circuit is active. Burner control operates in phase 90

10 Multistage or modulating mode with actuator

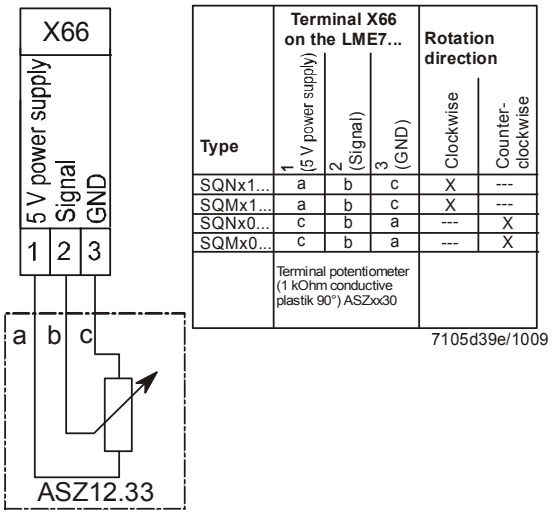
10.1 Relevant parameters

Parameter	Meaning
123	Minimum output control step
259	Opening time of actuator (timeout)
260	Closing time of actuator (timeout)
654	Analog input (feedback potentiometer ASZxx.3x required) 0 = 3-position step input 1 = DC 0...10 V 2 = 0...135 Ω 3 = 0...20 mA 4 = 4...20 mA with lockout at I <4 mA (AZL2…: Loc: 60) 5 = 4...20 mA

10.1.1 Connection diagram for feedback potentiometer ASZ12.33

Note:
The connection diagram shown is merely an example which must be verified in the individual case depending on the application!

PME7...



Type	Terminal X66 on the LME7... 1 (5 V power supply)	2 (Signal)	3 (GND)	Rotation direction Clockwise	Counter-clockwise
SQNx1...	a	b	c	X	---
SQMx1...	a	b	c	X	---
SQNx0...	c	b	a	---	X
SQMx0...	c	b	a	---	X
	Terminal potentiometer (1 kOhm conductive plastik 90°) ASZxx30				

7105d39e/1009

Figure 13: Connection diagram for feedback potentiometer ASZ12.33

10.1.2 Connection diagram for load controller

Note:
The connection diagram shown is merely an example which must be verified in the individual case depending on the application!

PME7...

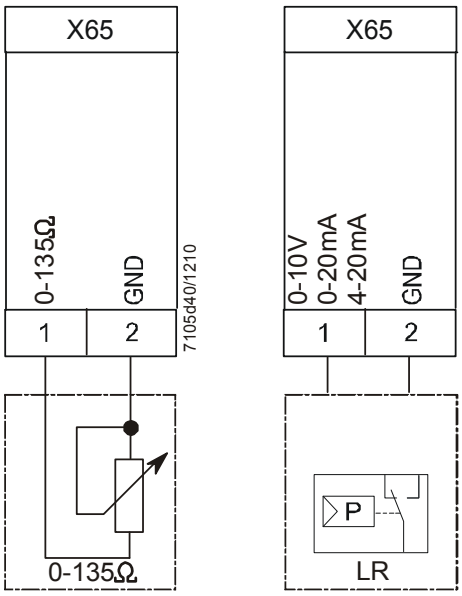


Figure 14: Connection diagram for load controller

10.2 Actuators

The LME7... has terminals for the connection of electromotoric actuators for the control of air dampers and regulating dampers of oil and gas burners.

Possible types of actuator:

Type	Data Sheet	Operating mode [1]) stage/modulating via 3-position step input terminal X5-03	Operating mode [1]) modulating via analog input signal terminal X65	Potentiometer ASZxx.3x
SQN3...	N7808	●	●	●
SQN7...	N7804	●	●	●
SQM2...	N7812	●	●	●
SQM40... SQM41...	N7817	●	●	●
SQM5...	N7815	●	●	●

[1]) Depending on the program sequence of LME7... or in the PME7...

10.3 Function

The internal program cycle time of the LME7... is about 0.147 s (≈ 0.15 s). In each program sequence, each input is read and the outputs are switched on or off accordingly.

10.4 Load controller inputs

10.4.1 3-position step input terminal X5-03

The load controller input is valued by making a 2-out-of-3 section. This means that to trigger a control action via the actuator outputs, an ON or OFF signal must be identified within at least 2 successive cycles. As a result of this sampling process, an ON or OFF signal must be present for a time between minimum 0.3 seconds and maximum 0.45 seconds to produce an output signal change at the LME7...

10.4.2 Analog input terminal X65

The LME7... handles the analog input signals with the help of an 8-bit A/D converter.

10.4.3 Selection source preset output analog/3-position step input (parameter 654)

The following input signals can be selected and handled via parameter 654

- 3-position step input (feedback potentiometer ASZxx.3x required/depending on the program sequence)
- 0...10 V
- 0...135 Ω
- 0...20 mA
- 4...20 mA with lockout at I <4 mA (AZL2...: Loc: 60)
- 4...20 mA

10.4.4 Actuator output terminal X2-09

The actuators are powered by mains voltage delivered directly via the LME7...

10.4.5 Setting the maximum running time of the actuator (parameter 259/260 timeout)

Parameters 259 and 260 are used to set the actuator's running time in accordance with the type of actuator used. The time set must at least correspond to the running time required by the actuator to travel from the fully closed to the high-fire position (e.g. 30 seconds for 90° or more). If the actuator does not reach its position within this period of time, the LME7... will initiate lockout.

10.5 Multistage/modulating mode via 3-position step input terminal X5-03

The signal time of a control pulse is a minimum of 147 ms.

10.5.1 Maximum possible resolution

The maximum possible resolution via 3-position step input terminal X5-03 is calculated according to the following formula:

$$\frac{\text{Working range in angular degrees} \times 0.147\ \text{s}}{\text{Running time in seconds}} = \text{maximum possible resolution in angular degree}$$

Example: Actuator, 30 seconds running time for 90°

$$\frac{90° \times 0.147\ \text{s}}{30\ \text{s}} = 0.441° \approx 0.5°$$

10.6 Modulating mode via analog input signal terminal X65

10.6.1 Maximum possible resolution

For maximum possible resolution see chapter *Setting the minimum power control step (dead band) (parameter 123) in modulating mode via analog input signal terminal X65*.

10.6.2 Standardization of modulation range

In the modulation range, the analog input signal is standardized. This means that the low-fire position corresponds to a preset output of 0% = 0 V-/0 mA-/4 mA-/0 Ω input signal and the high-fire position corresponds to a preset output of 100% = 10 V-/ 20 mA-/135 Ω input signal.

The modulation range in angular degrees corresponds to the angular rotation from the low-fire to the high-fire position.

Calculation: High-fire position minus low-fire position = modulation range.

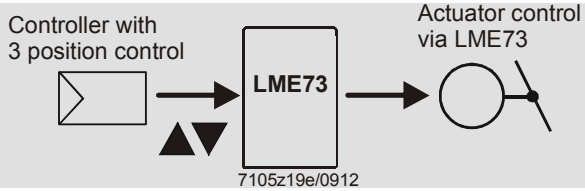
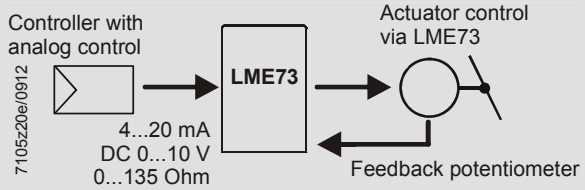
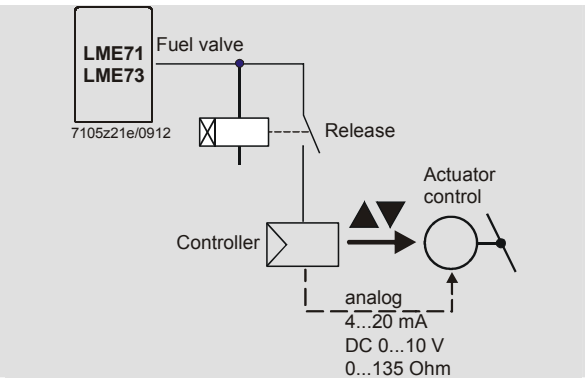
10.7 Setting the minimum power control step (dead band) (parameter 123) in modulating mode via analog input signal terminal X65

The minimum output control step must be greater than or equal to the percentage proportion of the maximum resolution of the entire modulation range and, depending on the actuator's running time (protection against hunting).

Typical actuator values and settings:

Presettings				Parameter		Comment
Low-fire cam position in °	High-fire cam position in °	Maximum working range in °	Actuator running time in s	Setting value parameter 123 in %	Typical number of steps (between low-fire and high-fire cam position)	
0	90	90	15	2.1	27	Actuator running time at 50 Hz mains frequency
0	90	90	30	1.3	43	
0	90	90	60	1.0	55	
20	90	90	15	2.1	21	
20	90	90	30	1.3	33	
20	90	90	60	1.0	43	
0	90	90	12.5	2.4	24	Actuator running time at 60 Hz mains frequency
0	90	90	24	1.5	37	
0	90	90	50	1.1	51	
20	90	90	12.5	2.4	19	
20	90	90	24	1.5	29	
20	90	90	50	1.1	40	
0	135	135	45	1.1	50	Actuator running time at 50 Hz mains frequency
20	135	135	45	1.1	43	
0	135	135	38	1.2	47	Actuator running time at 60 Hz mains frequency
20	135	135	38	1.2	40	

User limitations / application examples

Application	Typical resolution	Typical modulation range
	- pulse lengths min. 150 ms - approx. 0,5° - with 30 s running time 0...90° with 50 Hz	1 : 30 / 1 : 50 For boiler and process heat
	See table *Typical actuator values and settings*. - approx. 2...3° - with 30 s running time 0...90° with 50 Hz	1 : 10 / 1 : 15 For boiler and process heat with lower resolution
	Resolution depending on controller. - 0.5...2° / 0.5...3° - with 30 s running time 0...90° with 50 Hz	1 : 10 / 1 : 50 depending on controller For boiler and process heat

Note:
If the value set for parameter 123 is too small, the actuator oscillates about the setpoint, leading to more running cycles, increased switching frequency and more wear and tear.

11 Safety notes relating to operation of AZL2...

Caution!
To prevent the risk of fire or explosion, damage to the heating plant or damage resulting from improper usage, following must be observed:

Use the burner control covered by this Basic Documentation in compliance with the specification and only in connection with the matching burner and heating plant. If not observed, the safety functions are no longer ensured.

The burner control together with the AZL2… and the plant control system must be installed and commissioned by authorized personnel. If not observed, the safety functions are no longer ensured or there will be a risk of electric shock.



The AZL2… is designed for use in dry rooms only. Do not install the unit outdoors and protect it from heat, frost and liquids, such as water, oil, fuel oil, etc. If not observed, there will be a risk of electric shock.

Follow strictly the operating steps and settings instructions as detailed in this Basic Documentation. Settings identified as such must only be made by authorized personnel. If not observed, the safety functions are no longer ensured.

If dirty or dusty, always clean the unit with a dry cloth.

Do not try to repair the unit. Such work must only be performed by authorized personnel. If not observed, there will be a risk of electric shock.

If you have any other questions relating to the unit, please contact your heating engineer or get in touch with any of the Siemens addresses given in this Basic Documentation.

12 Operation via AZL2…
12.1 Description of the unit/display and buttons

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

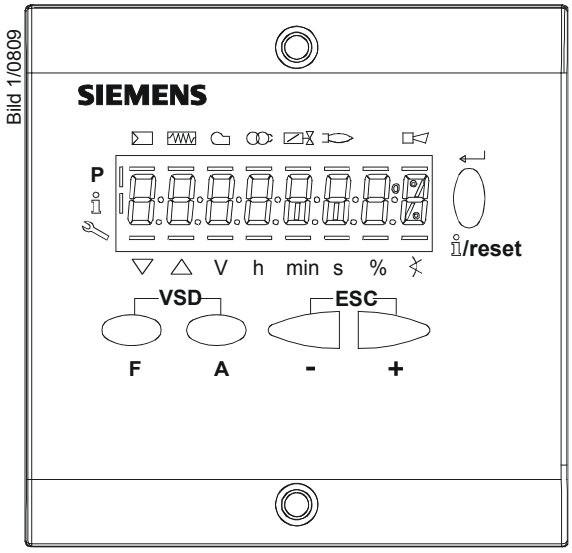


Figure 15: Description of the unit/display and buttons

Button	Function
VSD F A	**Buttons A and F: Parameterized function** - For switching to parameter setting mode **P** (press F and A simultaneously)
/reset	**Info and Enter button** - For navigation in info and service mode * For selection (symbol blinking) (press button for <1 second) * For changing to a lower menu level (press button for 1…3 seconds) * For changing to a higher menu level (press button for 3…8 seconds) * For changing to the normal display (press button for >8 seconds) - **Enter** in parameter setting mode - **Reset** in the event of fault - One menu level down
-	**- button** - For decreasing the value
+	**+ button** - One menu level down - For increasing the value
ESC - +	**+ and - button: Escape function** (press - and + simultaneously) - No adoption of value - One menu level up

12.2 Meaning of symbols on the display

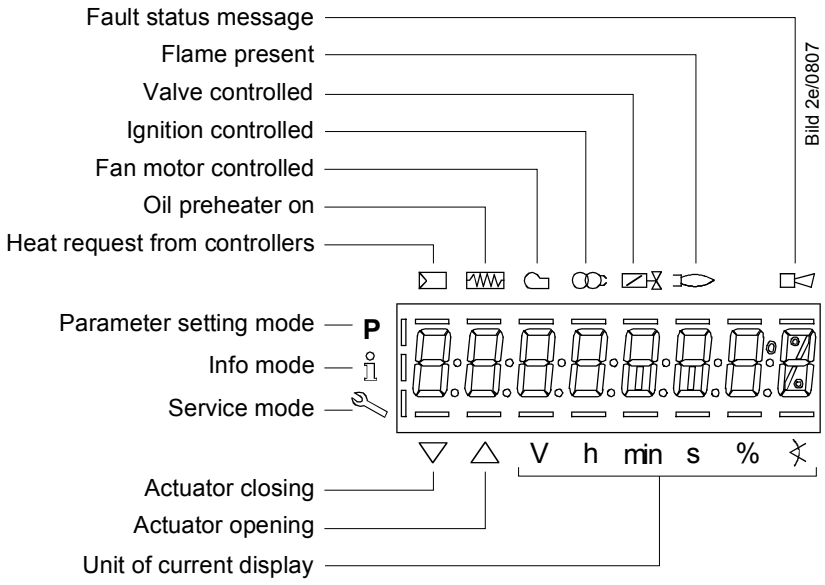
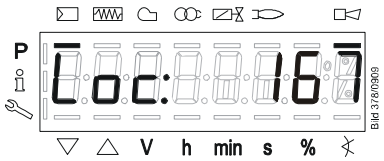


Figure 16: Meaning of display

12.3 Special functions

12.3.1 Manual lockout

i/reset plus any other button		Press i/reset **together** with any other button. The basic unit switches instantly to the lockout position, no matter what the operating position. Display shows the fault status message. (see chapter *Error code list…*) Display: **Loc: 167**

12.4 Operation

Warning!
Any changes to parameters and settings are only set and saved in the basic unit's onboard memory.
To save the modified settings to the program module PME7..., backup must be triggered manually. If this is not observed, there is a risk of loss of safety functions**.**

→ **Chapter *Operation via AZL2.../backup***
→ **Chapter *Operation via internal LED/backup***

Warning!
On first startup or after exchange of the program module, the sequence of functions and parameter settings must be checked upon completion of the restore process. If this is not observed, there is a risk of loss of safety functions.

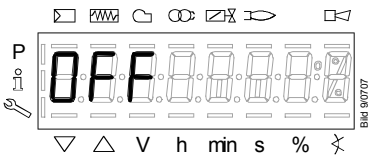
→ **See chapter *Operation via AZL2.../first startup, restore***
→ **See chapter *Operation via internal LED/first startup, restore***

Warning!
If any parameters are changed, a backup must be made! If this is not observed, there is a risk of loss of safety functions.

12.4.1 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.

12.4.1.1. Display in standby mode

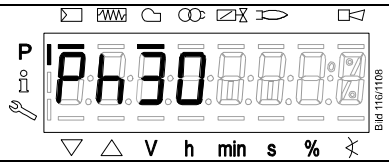


Unit is in standby mode.

Note:
OFF flashes when manual OFF function or manual control is active, and when controller is OFF.

12.4.1.2. Display during startup/shutdown

Display of program phases



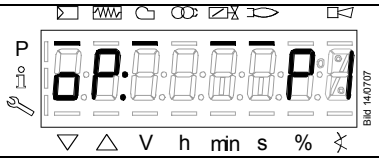
The unit is in **Ph**ase **30**. The controller calls for heat. The bar below the ⊠ and ⌂ symbol appears. The individual program phases and controlled components are displayed in accordance with the program sequence.

List of phase display (display depending on program)

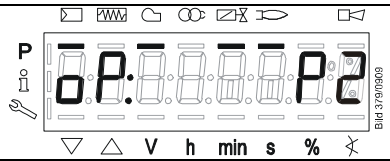
Note:
Display depends on program module, see *User Documentations*!

Phase number AZL2... display	Function
Standby	
OFF	Standby, waiting for heat request
Ph08	Power ON/test phase (e.g. detector test)
Startup	
Ph21	Safety valve ON, air pressure switch test/POC test (timeout/locking after 5 seconds), actuator opens in low-fire position/CLOSE position
Ph22	Fan motor ON and air pressure switch test/settling time
Ph24	Actuator travels to the prepurge position
Ph30	Prepurging
Ph36	Actuator closes until ignition load/low-fire is reached, and parameter 259.02: Actuator opens to a position > ignition load
Ph38	Preignition
Ph40	1st safety time/ignition transformer ON
Ph42	Safety time (ignition transformer OFF), flame check
Ph44	Interval: End of safety time and fuel valve 1 ON Interval: End of safety time and load controller release Interval: End of safety time and fuel valve 2 ON
Ph50	2nd safety time
Ph54	Parameter 259.01: Actuator opens to a position > low-fire
Ph54	Parameter 260: Actuator closes until low-fire position is reached
oP:P1	Interval to release of preset load controller (analog or 3-position step input)
Operation	
oP:xx	Operation, modulating operation
oP:P1	Operation first stage
oP:P2	Operation second stage
Shutdown	
Ph10	Actuator travels to the CLOSED position (home run)
Ph72	Actuator opens until high-fire position/operation shutdown is reached
Ph74	Postpurging
Valve proving	
Ph80	Test space evacuating
Ph81	Test atmospheric pressure
Ph82	Test space filling
Ph83	Test gas pressure
Waiting phases (start prevention)	
Ph01	Undervoltage / overvoltage
Ph02	Safety shutdown following by lockout with locking → e.g. safety loop open
Ph04	Extraneous light on burner startup (timeout/locking after 30 seconds)
Ph90	Pressure switch-min open → safety shutdown / lockout with locking
Lockout	
LOC	Lockout phase

12.4.1.3. Display of operating position

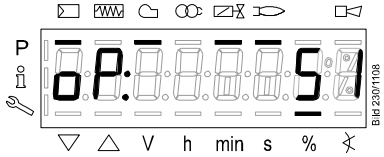


Display **oP: P1** means stage 1.
Display after **oP** is unit-specific.



Display **oP: P2** means stage 2.
Display after **oP** is unit-specific.

Display **oP:** means modulating operation.
Display after **oP:** is unit-specific.



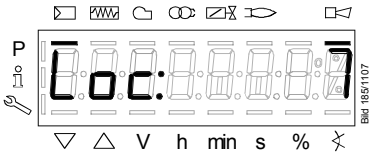
Display shows the relative value of the actual position of actuator (51).

Position of actuator 0° = 0 Ω value of potentiometer = 0% display.

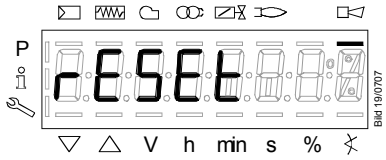
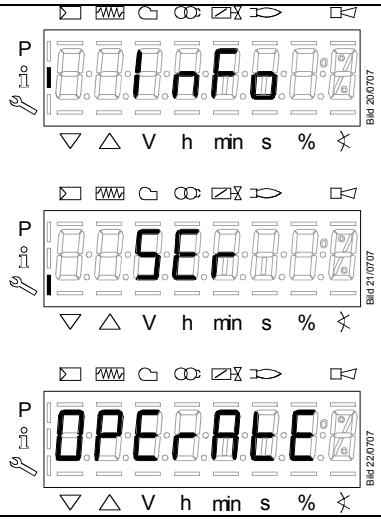
Position of actuator high-fire >0° = >0 Ω <1000 Ω value of potentiometer = 100% display.

12.4.1.4. Fault status messages, display of errors and info

Display of errors (faults) with lockout

		Display shows **Loc:**. The bar under the fault status message appears. Unit is in the lockout position. The current error code is displayed (see chapter *Blink code table*). Example: Error code **7**

Reset

		When pressing /reset for 1 second, **rESEt** appears on the display. When the button is released, the basic unit is reset.
		When pressing /reset for >3 seconds, the display shows **InFo**, **SEr** and then **OPErAtE**. When the button is released, the basic unit is reset.

Note:
For meaning of the error and diagnostic codes, see chapter *Error code list…*
When an error has been acknowledged, it can still be read out from the error history.

12.5 Menu-driven operation

12.5.1 Assignment of levels

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

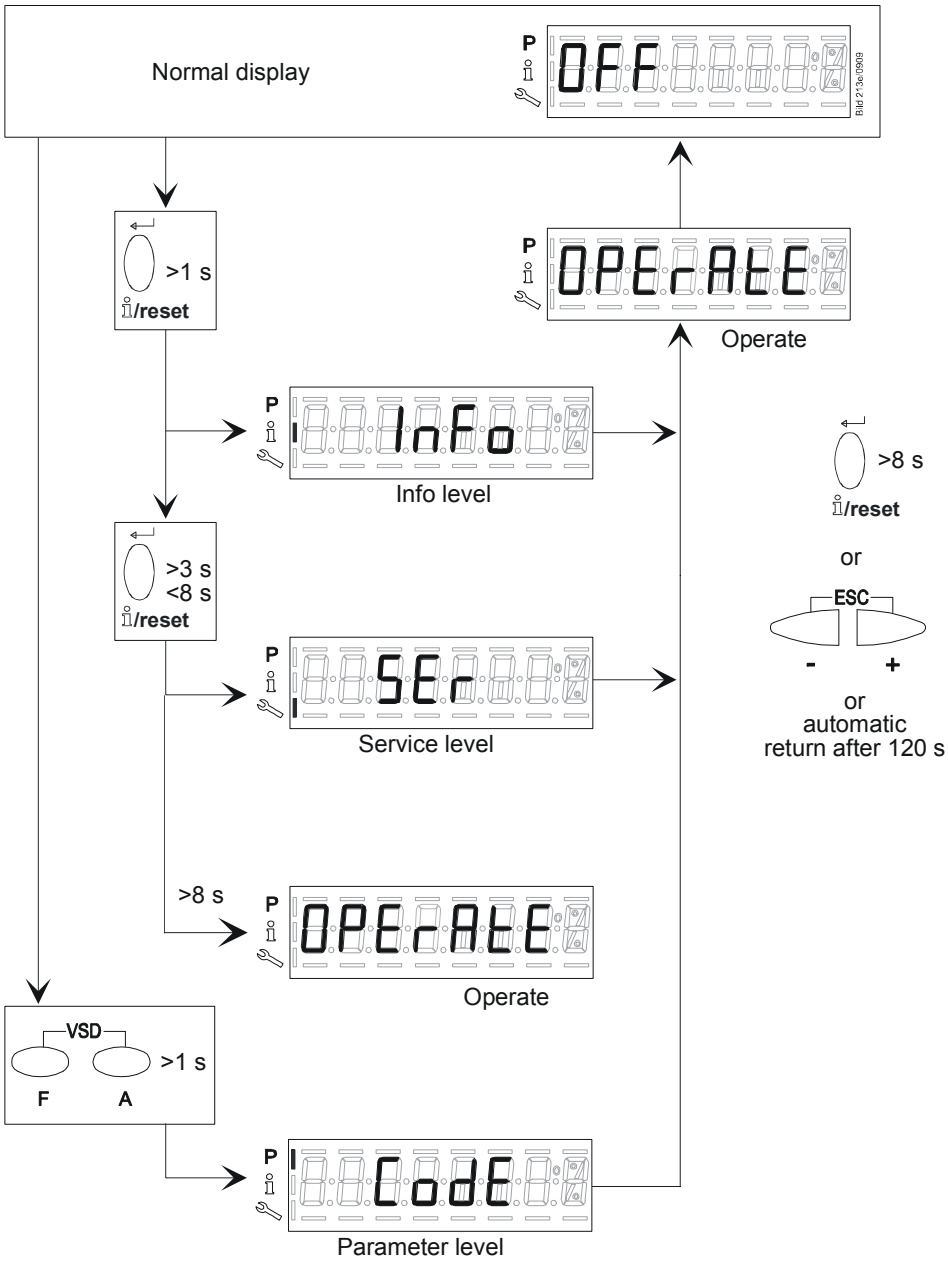


Figure 17: Assignment of levels

12.6 Info level

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

Note:

On the info level, you can press - or + to display the next or the previous parameter.

In place of the + button, you can also press i/reset for <1 second.

Note:

You can press ESC - + or i/reset for >8 seconds to return to the normal display.

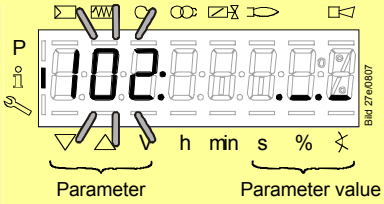


Figure 18: Info level

Note:
No change of value on the info level.

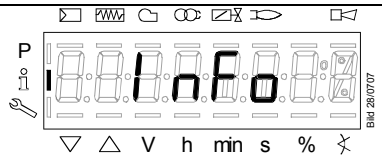
If the display shows ._._ together with the parameter, the value may consist of more than 5 digits.

When pressing i/reset for >1 second and <3 seconds, the value will be displayed.

By pressing i/reset for >3 seconds or ESC - + , you return to the selection of the parameter no. (parameter number blinks).

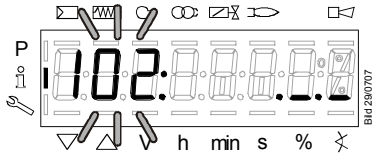
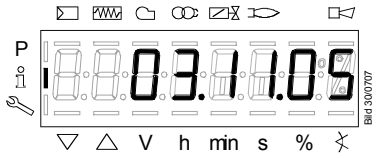
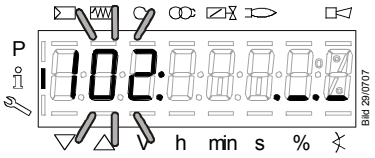
No.	Parameter
Info level	
102	Identification date
103	Identification number
113	Burner identification
123	Minimum output control step
140	Mode display of display and operating unit AZL2... 1 = standard (program phase) 2 = flame 1 (QRA.../ION) 3 = flame 2 (QRB.../QRC...) ⇨ not used 4 = active power (power value)
164	Number of startups resettable
166	Total number of startups
170.00	Switching cycles relay K12
170.01	Switching cycles relay K11
170.02	Switching cycles relay K2
170.03	Switching cycles relay K1
171	Max. switching cycles relay
End	

12.6.1 Display of info level

ℹ/reset 1…3 s		Press ℹ/reset until **InFo** appears. When releasing ℹ/reset, you are on the info level.

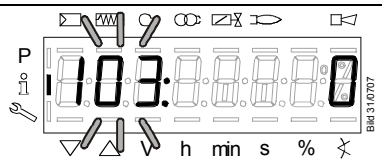
12.6.2 Display of info values

12.6.2.1. Identification date

		On the left, parameter **102:** is displayed blinking. On the right, **._._** is displayed. Example: **102: ._._**
ℹ/reset 1…3 s		Press ℹ/reset for 1…3 seconds to display the identification date **DD.MM.YY**. Example: Identification date **03.11.05**
ℹ/reset or ESC - +		Press ℹ/reset or ESC - + to return to the display of parameters.

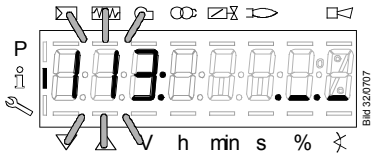
To the next parameter	+

12.6.2.2. Identification number

		On the left, parameter **103:** is displayed blinking. On the right, identification number **0** appears. Example: **103: 0**

To the next parameter	+ or ℹ/reset for <1 s	- Back to the previous parameter

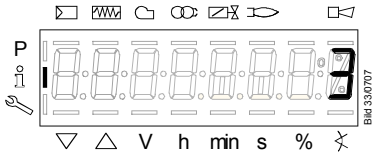
12.6.2.3. Identification of burner



On the left, parameter **113:** is displayed blinking.
On the right, **._._** appears.

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



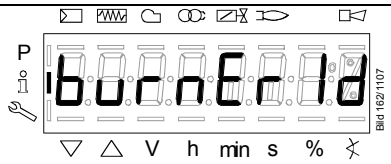


Press /reset for 1…3 seconds to display the burner's identification.

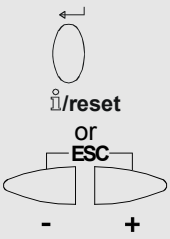
Factory setting: **- - - - - - - -**

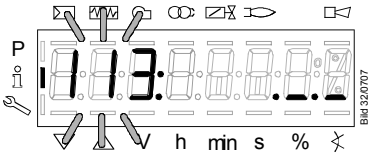
Example: **3**





burnEr Id can only be changed with the ACS410 PC software diagnostic tool.



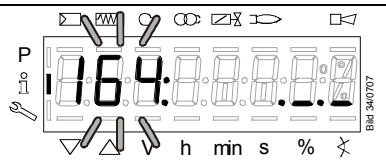
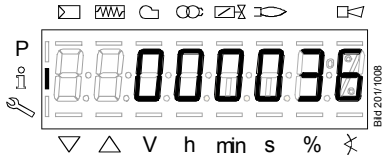
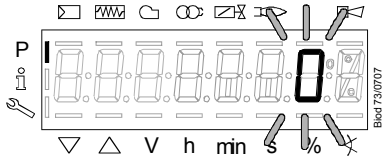
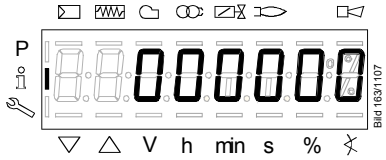
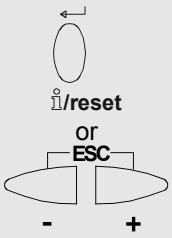
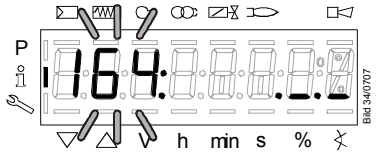


Press /reset or ESC - + to return to the display of parameters.

To the next parameter	+	-	Back to the previous parameter

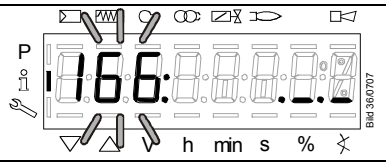
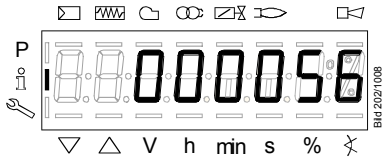
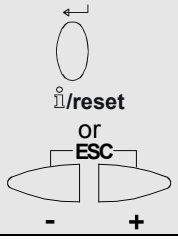
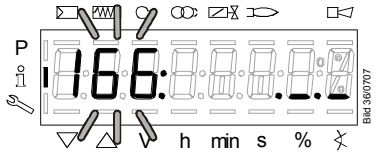
12.6.2.4. Number of startups resettable

Note:
Can be deleted for service (see chapter *Parameter list*)!

		On the left, parameter **164:** is displayed blinking. On the right, characters **._._** appear. Example: Parameter **164: ._._**
 **i/reset** 1…3 s		Press **i/reset** for 1…3 seconds to display the number of startups (resettable). Example: **000036**
 **i/reset** 3…8 s		Press **i/reset** for 3…8 seconds to go to the range that can be changed. Digit **0** blinks.
 **i/reset**		By pressing **i/reset**, the number of startups is reset to **0**. Display: **000000**
		Press **i/reset** or **-** **+** to show parameter **164** blinking again.

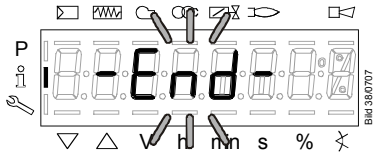
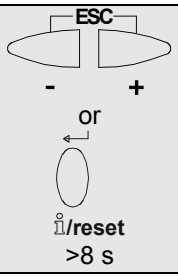
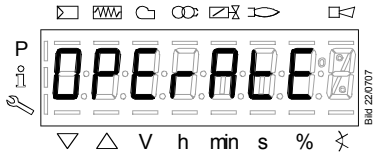
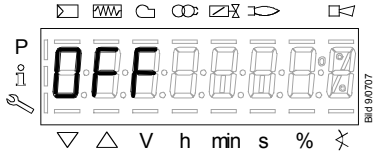
To the next parameter		Back to the previous parameter

12.6.2.5. Total number of startups

		On the left, parameter **166:** is displayed blinking. On the right, characters **._._** appear. Example: Parameter **166: ._._**
		Press /reset for 1…3 seconds to display the total number of startups. Example: **000056**
		Press /reset or ESC - + to go back to the display of parameters.

To the next parameter	 	Back to the previous parameter

12.6.2.6. End of info level

		When this display appears, you have reached the end of the info level. Display shows **– End –** blinking.
To start of info level	 	To end of info level
		Press ESC - + or info to return to standby mode. Display shows **OPErAtE**.
		When this display appears, you are back on the normal display and you can change to the next level mode.
		Press /reset to switch between the service and the parameter level.

12.7 Service level

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

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 i/reset for <1 second.

Note:

Press ESC - + or i/reset for >8 seconds to return to the normal display.

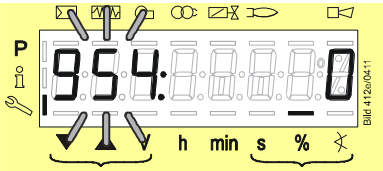


Figure 19: Service level

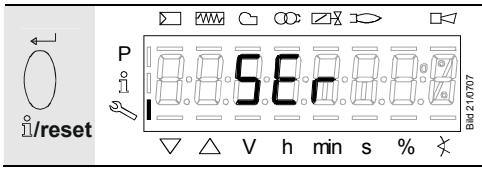
Note:
No change of values on the service level.

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

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

Press i/reset for >3 s or ESC - + to return to the selection of the parameter number (flashing).

12.7.1 Display of the service level



Press i/reset for >3 s until **SEr** appears.

When releasing i/reset, you are on the service level.

No.	Parameter
Service level	
920	Current PWM signal fan
936	Normalized speed
951	Mains voltage
954	Flame intensity

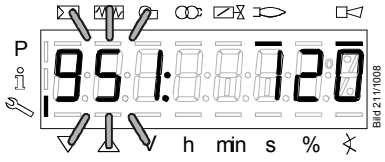
12.7.2 Display of service values

12.7.2.1. Error history

See Parameter with index, with or without direct display/Example of parameter 701 Error history.

Note
Can be deleted for service (see chapter *Parameter list*)!

12.7.2.2. Mains voltage



Parameter **951:** appears blinking.

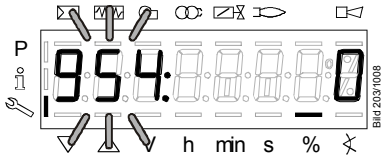
Mains voltage is displayed on the right.

Example: **951: 120**

To the next parameter: **+**

Back to the previous parameter: **-**

12.7.2.3. Intensity of flame



Display shows parameter **954:** blinking.

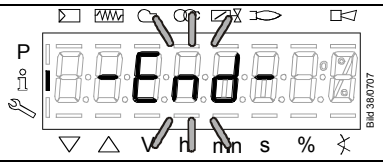
On the right, the intensity of the flame is displayed in 0...100%.

Example: **954: 0**

End of service level **– End –**: **+**

Back to the previous parameter: **-**

12.7.2.4. End of service level



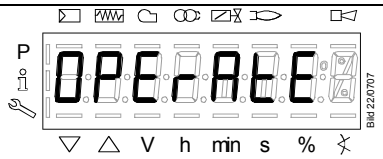
When this display appears, you have reached the end of the service level.

Display shows **– End –** blinking.

To the start of the service level: **+**

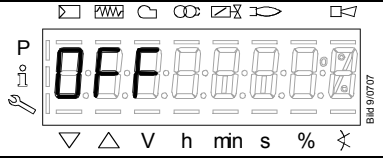
To the end of the service level: **-**

ESC - +



Press ESC - + to return to standby mode.

Display shows **OPErAtE**.



When this display appears, you are back on the normal display and you can change to the next level mode.

12.8 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 entry of a password.

Siemens supplies the LME7... with the factory settings according to *Type summary*.

The OEM can change the Siemens factory settings to match its own requirements.

With the LME7..., the burner control's characteristics are determined primarily through parameterization. Every time the unit is recommissioned, the parameter settings must be checked. The LME7... 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 personnel**.
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 AG 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 LME7... in the form of an adhesive label. According to EN 298, the label should be easy to read and wipeproof.

The label with a maximum size of 50 mm x 40 mm can be attached to the upper part of the housing.

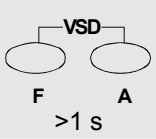
Example of label:

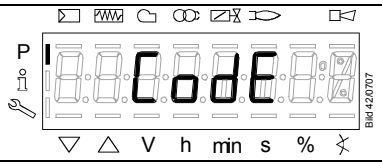
OEM logo
Type/part no.: 1234567890ABCD

CAUTION! OEM settings:
Parameter no.
225 = 30 s (t1)
234 = 0 s (t8)
257 = 2 s (t3n) TSA = t3n + 0.45 s
259 = 30 s (t11)

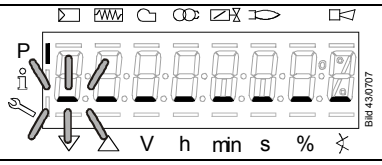
12.8.1 Entering the password

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

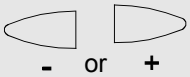


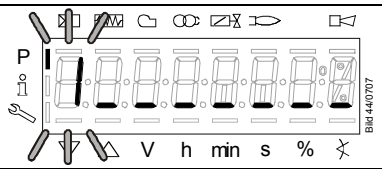


Press button combination VSD F A to display **CodE**.



When releasing the buttons, 6 bars appear the first of which blinks.

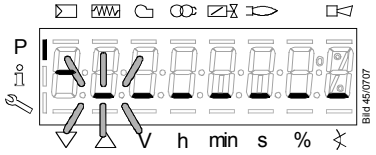




Press - or + to select a numeral or letter.







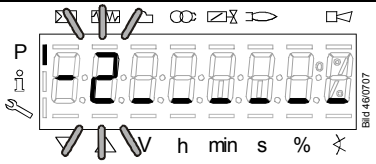
Press i/reset to confirm the entry.

The value entered changes to a minus sign (**–**).

The next bar starts blinking.

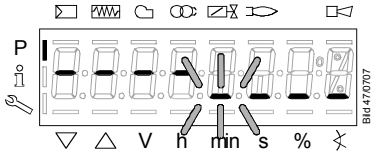






Press - or + to select a numeral or letter.

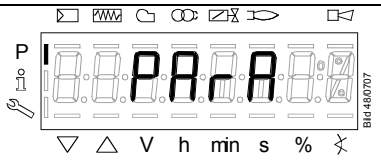




After entry of the last character, the password must be confirmed by pressing i/reset.

Press i/reset again to finish entry of the password.

Example: Password consisting of 4 characters.



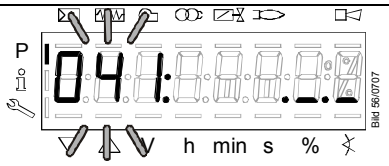
As a confirmation of correct entry, **PArA** appears for a maximum of 2 seconds.

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

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

12.8.2 Changing the heating engineer's password

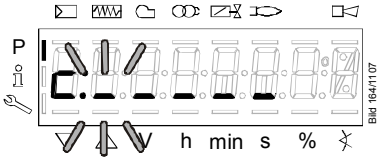
Note:
For the OEM to change the heating engineer's password, **c:** demands entry of the OEM password!



Parameter **041:** blinks.

Press i/reset to go to level **c:** for password changes.

i/reset

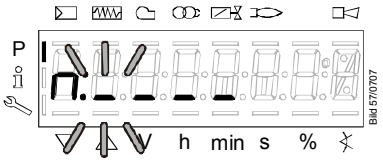


Letter **c:** for **c**onfirmation appears blinking.

Proceed as described in section *Entering the password* and enter the former password.

After entry of the last character, the password must be confirmed by pressing i/reset.

i/reset

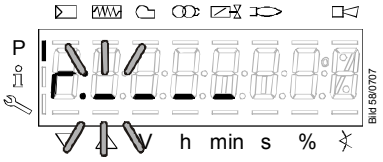


Letter **n:** for **n**ew appears blinking.

Proceed as described in section *Entering the password* and enter the new password (4 characters).

After entry of the last character, the password must be confirmed by pressing i/reset.

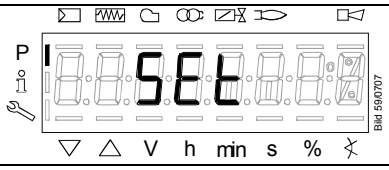
i/reset



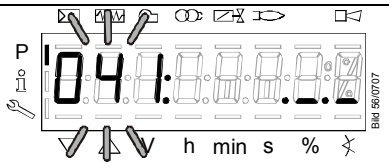
Letter **r:** for **r**epeat appears blinking.

Proceed as described in section *Entering the password* and repeat entry of the new password.

After entry of the last character, the password must be confirmed by pressing i/reset.

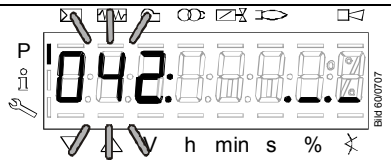


SEt confirms that the new password has been saved.



Parameter **041:** blinks again.

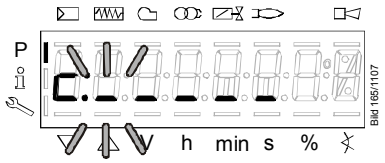
12.8.3 Changing the OEM's password



Parameter **042:** blinks.

Press i/reset to go to level **c:** for password changes.

i/reset

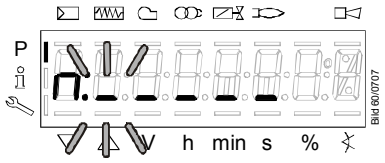


Letter **c:** for **c**onfirmation appears blinking.

Proceed as described in section *Entering the password* and enter the former password.

After entry of the last character, the password must be confirmed by pressing i/reset.

i/reset

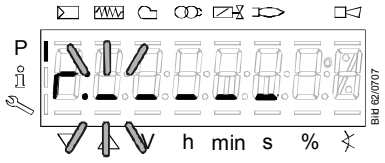


Letter **n:** for **n**ew appears blinking.

Proceed as described in section *Entering the password* and enter the new password (5 characters).

After entry of the last character, the password must be confirmed by pressing i/reset.

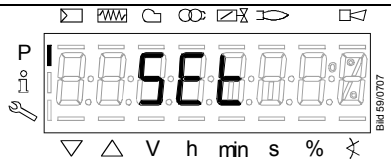
i/reset



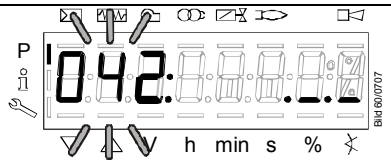
Letter **r:** for **r**epeat appears blinking.

Proceed as described in section *Entering the password* and repeat entry of the new password.

After entry of the last character, the password must be confirmed by pressing i/reset.

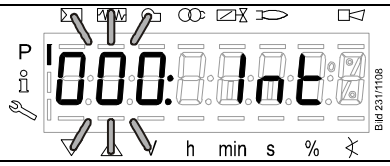


SEt confirms that the new password has been saved.



Parameter **042:** blinks again.

12.8.4 Backup

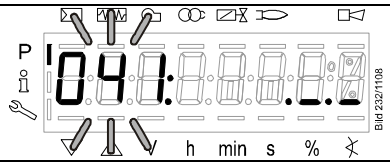


Parameter **000:** blinks.

Display: Parameter **000:** blinks, display **Int** does not

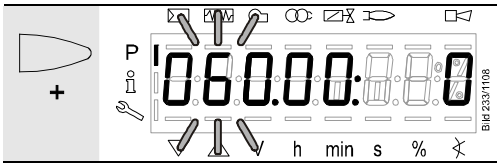


i/reset



Press i/reset for parameter group **041**.

Display: Parameter **041:** blinks, display **._._** does not

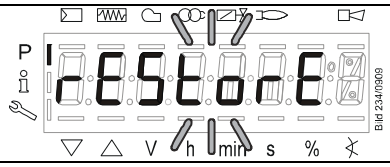


Press + for parameter **060**.

Display: Parameter **060.** blinks, index **00:** and value **0** do not

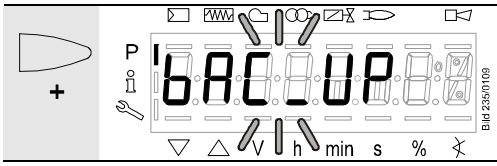


i/reset



Press i/reset for parameter **rEStorE**.

Display: Parameter **rEStorE** blinks

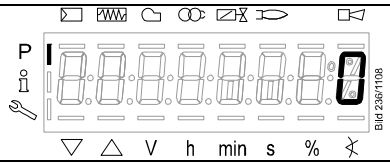


Press + for parameter **bAC_UP**.

Display: Parameter **bAC_UP** blinks

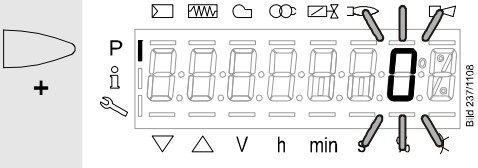


i/reset



Press i/reset for the backup process.

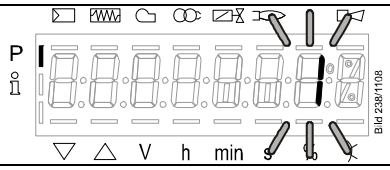
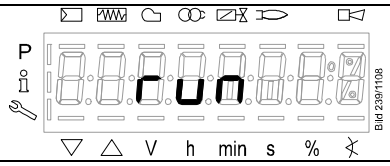
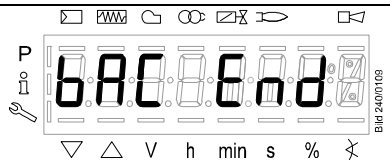
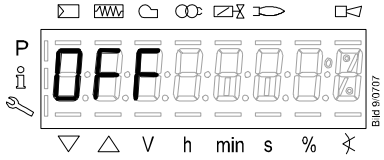
Display: Value **0**



Press + to shift the value to change mode one place to the left.

Display: Value **0** blinks

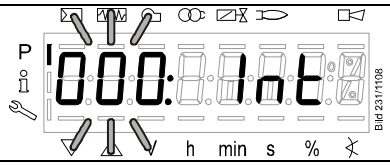
Note:
To identify display faults, the value changes one place to the left.

+		Press + for value **1**. Display: Value **1** blinks
		
		Press /reset to activate the backup process. Display shows **run**
<3 s		After approx. 3 seconds (depending on the duration of the program sequence), the displays shows **bAC End** and signals the end of the backup process. Display: **bAC End**
	It will now be displayed for 2 minutes, or can be finished by pressing the /reset button	
<2 min or /reset		Display shows **OFF** when the backup process is finished.

Note:
During backup, all settings and parameters are transferred from the basic unit's memory to the memory of the program module.

Warning!
If any parameters are changed, a backup must be made! If this is not observed, there is a risk of loss of safety functions.

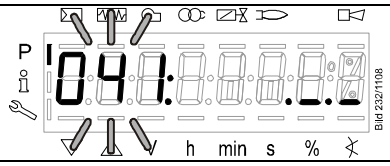
12.8.5 Restore



Parameter **000:** blinks.

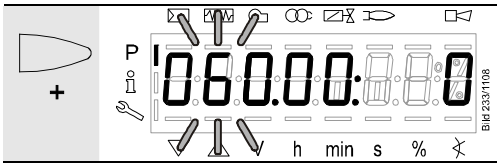
Display: Parameter **000:** blinks, display **Int** dos not





Press i/reset for parameter group **041**.

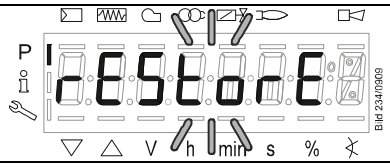
Display: Parameter **041:** blinks, display **._._** does not.



Press + for parameter **060**.

Display: Parameter **060.** blinks, index **00:** and value **0** do not.

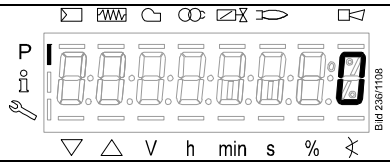




Press i/reset for parameter **rEStorE**.

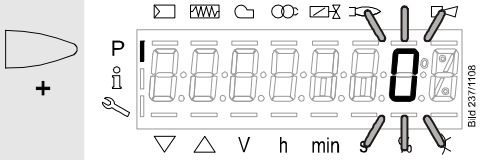
Display: Parameter **rEStorE** blinks.





Press i/reset to select the restore process.

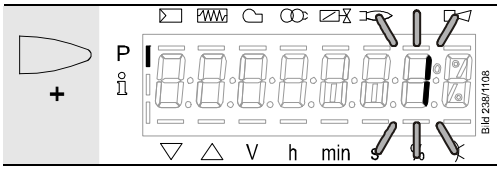
Display: value **0**



Press + to shift the value to change mode one place to the left.

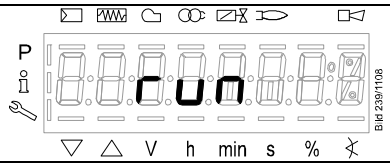
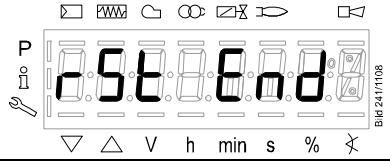
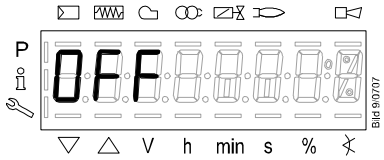
Display: Value **0** blinks

Note:
For realizing display faults, the value change one place to the left.



Press + for value **1**.

Display: Value **1** blinks.

		ⓘ/reset
		Press ⓘ/reset to activate the restore process. Display shows **run**
<3 s		After approx. 3 seconds (depending on the duration of the program sequence), the displays shows **rSt End** and signaled the end of the restore process. Display: **rSt End**
	It will now be displayed for 2 minutes, or can be finished by pressing the ⓘ/reset button ↓	
<2 min or ⓘ/reset		Display shows **OFF** when the restore process is finished.

Note:
During the restore process, all settings and parameters are written from the program module to the basic unit's onboard memory. In the process, it is possible that previous program sequences, parameters and settings in the onboard memory will be overwritten!

Warning!
On first startup or after exchange of the program module, the sequence of functions and parameter settings must be checked upon completion of the restore process. If this is not observed, there is a risk of loss of safety functions.

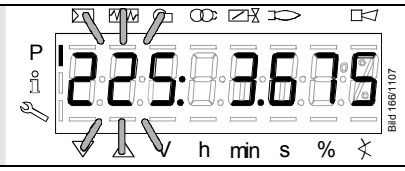
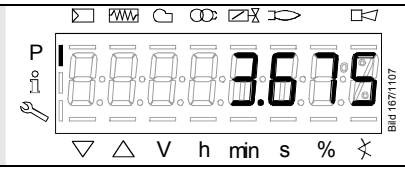
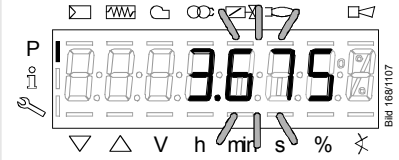
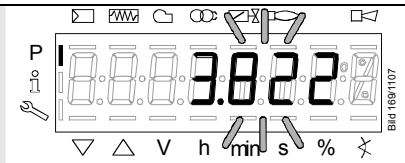
→ **See chapter *Operation via AZL2.../first startup, restore***
→ **See chapter *Operation via internal LED/first startup, restore***

12.9 Operating variants of the parameters

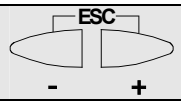
The parameters stored in the burner control LME7... can be displayed and changed on the parameter level.

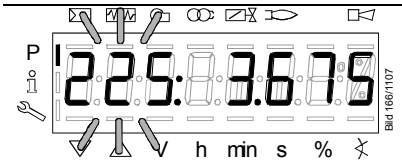
12.9.1 Parameters without index, with direct display

12.9.1.1. Example of parameter 225 (prepurge time) on the parameter level

+		Press + for *prepurge time*. Display: Parameter **225:** blinks, value **3.675** does not.
	i/reset	
		Press i/reset for editing mode. Display: **3.675**
- or +		Press - or + to shift the former prepurge time to change mode one place to the left. Display: Prepurge time **3.675** blinks. Note: To detect display errors, the value appears one place shifted to the left.
- or +		Press - or + for the required prepurge time. Display: Prepurge time **3.822** blinks.

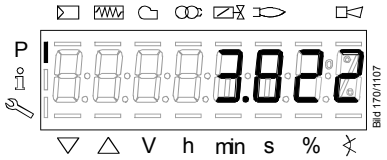
Alternative 1:

Discard the change!	



Alternative 2:

Adopt the value!	



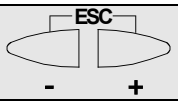


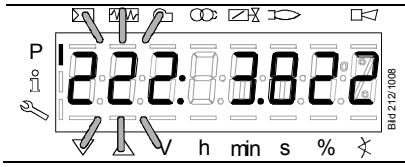
Press /reset to return to editing mode.

The value set will be adopted.

Note:
To detect display errors, the value appears one place shifted to the right.

Display: Value **3.822**

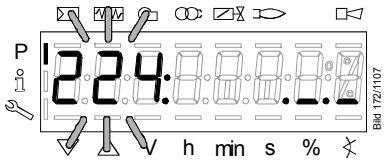
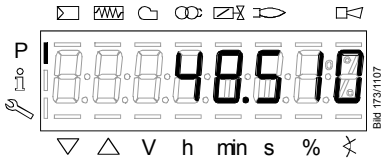
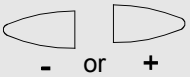
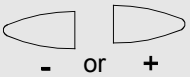
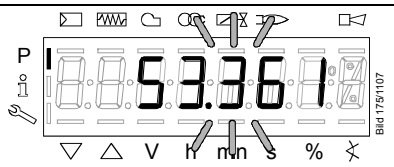




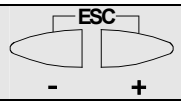
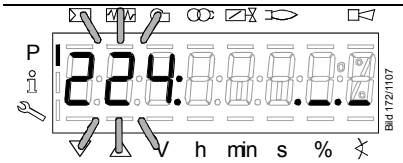
To the next parameter		 Back to the previous parameter

12.9.2 Parameters without index, with no direct display

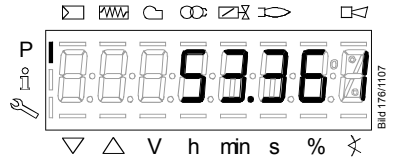
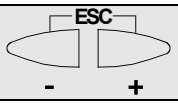
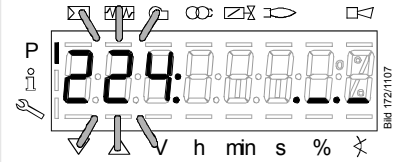
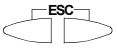
12.9.2.1. Example of parameter 224 (specified time air pressure switch) on the parameter level

		Press + for specified time for air pressure signal. Display: Parameter **224:** blinks, characters ·–·– do not.
		
		Press i/reset for editing mode. Display: **48.510**
		Press - or + to shift the former specified time to change mode one place to the left. Display: Specified time **48.510** blinks. Note To detect display errors, the value appears one place shifted to the left.
		Press - or + to set the specified time. Display: Specified time **53.361** blinks.

Alternative 1:

Discard the change!		
		

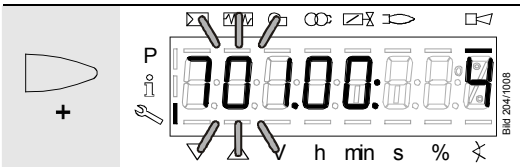
Alternative 2:

Adopt the change!		
		Press  to return to editing mode. The value set will be adopted. Note: To detect display errors, the value is shown again, but shifted one place to the right. Display: Value **53.361**
		
		Press  to return to the parameter level. Display: Parameter **224:** blinks, characters ·–·– do not.
To the next parameter 		 Back to the previous parameter

12.9.3 Parameters with index, with or without direct display

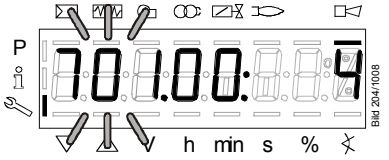
12.9.3.1. Example of parameter 701: Actual error on the service level

See chapter *Error code list*!



Press + to select parameter **701**.

Display: Parameter **701.** blinks, index **00:** and error **4** do not.

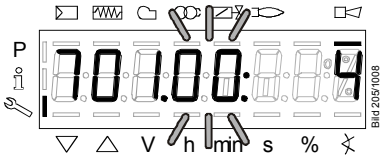


On the left, the current error **701.** appears blinking, index **00:** does not blink.

On the right, error code **4** is displayed.

Example:
Parameter **701.**, index **00:**, error code **4**.

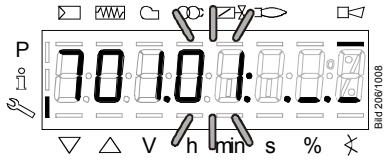
i/reset 1…3 s



Press i/reset for 1…3 seconds to show index **00:** for the error code blinking.

Display: Parameter **701.** does not blink, index **00:** blinks, error **4** does not blink.

To the next index +



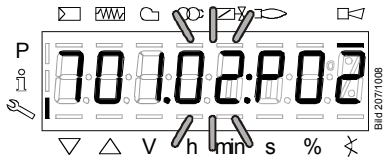
Press + to select the index.

.00 = error code
.01 = startup meter reading
.02 = MMI phase to the time of fault
.03 = power value to the time of fault

Example
Parameter **701.**, index **01:**, startup meter reading**._._**

To the next index +





Press + to select the index.

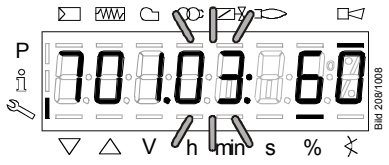
.02 = MMI phase to the time of fault

Example:
Parameter **701.**, index **02:**, **P**hase **02** = safety shutdown

To the next index







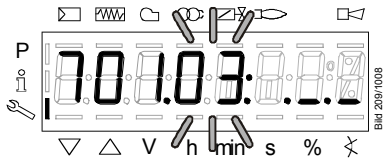
Press + to select the index.

.03 = power value to the time of fault

Example:
Parameter **701.**, index **03:**, power value **60%**



/reset 1…3 s





Press - + to return to the index.

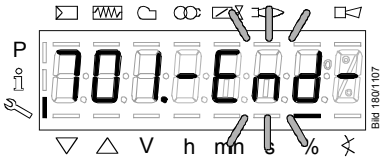
Display: Parameter **701.** does not blink, index **03:** blinks, characters ·–·– do not.

To the next index



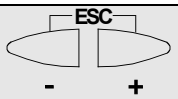


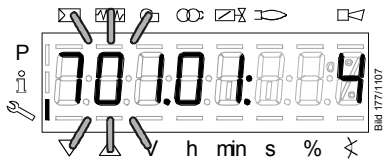
Back to the previous index



When this display appears, you have reached the end of the index level within parameter **701.**

Display **– End –** appears blinking.



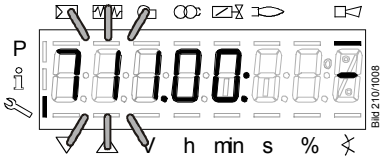


Press ESC - + to return to the parameter level.

Display: Parameter **701.** blinks, index **01:** and diagnostic code **4** do not.

To the next older error +

▪
▪
▪



Parameters cover the period back to the last error since deletion of the history (max. to parameter **711.**)

Example:
Parameter **711.**, index **00: -**

To the next parameter + Back to the previous parameter -

13 Error code list with operation via external AZL2... display

Note:
Display depends on program module, see *User Documentations*!

Error code	Clear text	Possible cause
Loc: 2	No establishment of flame at the end of safety time	- Faulty or soiled fuel valves - Faulty or soiled flame detector - Poor adjustment of burner, no fuel - Faulty ignition equipment
Loc: 3	Air pressure faulty (air pressure switch welded in no-load position, decrease to specified time (air pressure switch response time)	Air pressure switch faulty - Loss of air pressure signal after specified time - Air pressure switch has welded in no-load position
Loc: 4	Extraneous light	Extraneous light during burner startup
Loc: 5	Air pressure faulty, air pressure switch welded in working position	Timeout air pressure switch - Air pressure switch has welded in working position
Loc: 6	Fault of actuator	- Actuator faulty or blocked - Faulty connection - Wrong adjustment
Loc: 7	Loss of flame	Too many losses of flame during operation (limitation of repetitions) - Faulty or soiled fuel valves - Faulty or soiled flame detector - Poor adjustment of burner
Loc: 8	---	Free
Loc: 9	---	Free
Loc: 10	Error not relatable (application), internal error	Wiring error or internal error, output contacts, other faults
Loc: 12	Valve proving	Fuel valve 1 leaking
Loc: 13	Valve proving	Fuel valve 2 leaking
Loc: 14	POC error	Error valve closure control POC
Loc: 20	Gas pressure switch-min open	Gas shortage
Loc: 22	Safety loop open	- Gas pressure switch-max open - Safety limit thermostat cut out
Loc: 60	Analog power source 4...20 mA, I <4 mA	Wire breakage
Loc: 83	PWM fan faulty	- PWM fan does not reach the target speed within the preset period of time, or - After reaching the target speed, the PWM fan leaves the tolerance band again (parameter 650) for a time exceeding the tolerance time speed deviation (parameter 660)
Loc: 138	Restore process successful	Restore process successful
Loc: 139	No program module detected	No program module plugged in
Loc: 167	Manual locking	Manual locking
Loc: 206	AZL2... incompatible	Use the latest version

Error code	Clear text	Possible cause
Loc: 225	PWM fan faulty	- Fan speed dropped below the minimum prepurge PWM (parameter 675.00) after reaching the prepurge speed, or - After reaching the ignition load speed, the maximum ignition load PWM (parameter 675.01) was exceeded
Loc: 226	PWM fan faulty	Parameterization error: - Speed low-fire > speed high-fire, or - Low-fire = 0 rpm, or - Maximum speed = 0 rpm
Loc: 227	PWM fan faulty	One or several parameters violate the minimum/maximum limit
rSt Er1	Error in compatibility program module to basic unit during restore process	- Program sequence of program module does not match the basic unit
rSt Er2	Error in compatibility program module to basic unit during restore process	- Hardware of basic unit does not match the program module
rSt Er3	Error during restore process	- Program module faulty - Program module removed during restore process
bAC Er3	Fault of compatibility program module to basic unit during backup process	Program sequence of program module does not match the basic unit
Err PrC	Fault of program module	- Error in data content of program module - No program module fitted

14 Operation via internal LED

14.1 Description of display and buttons

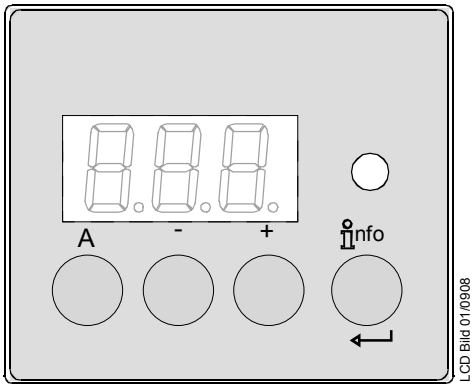


Figure 20: Description of display and buttons

Button	Function
A	**Button A** - Display preset output - In lockout position: Power value to the time of fault
Info	**Info and Enter button** - **Reset** in the event of fault, changeover visual diagnostic of the cause of fault (see chapter *Diagnostics of cause of fault*)
-	**- button** - Display flame signal current 2 or phases display - In lockout position: MMI phase to the time of fault
+	**+ button** - Display flame signal current 1 or phases display - In lockout position: MMI phase to the time of fault
	3 multicolor signal lamp - See chapter *Blink code table*
- and +	**+ and - button: Escape function** (press - and + simultaneously) - No adoption of value - One menu level up - Keep depressed for >1second for backup/restore function

14.2 Normal display

Normal display is the standard display in normal operation.

14.2.1 Display in standby mode

			Unit is in standby mode.

14.2.2 Display during startup/shutdown

14.2.2.1. Display of program phases

			The unit is in **Ph**ase **21**. The individual program phases are displayed in accordance with the program sequence. For color display of signal lamp, see *List of phase display*.

14.2.2.2. List of phase display

Note:
Display depends on program module, see *User Documentations*!

Phase number AZL2... display	LED	Function
Standby		
OFF	Off	Standby, waiting for heat request
P08	Off	Power ON/test phase (e.g. detector test)
Startup		
P21	Yellow	Safety valve ON, air pressure switch test/POC test (timeout/locking after 5 seconds), actuator opens in low-fire position/CLOSE position
P22	Yellow	Fan motor ON and air pressure switch test/settling time
P24	Yellow	Actuator travels to the prepurge position
P30	Yellow	Prepurging
P36	Yellow	Actuator closes until ignition load/low-fire is reached, and parameter 259.02: Actuator opens to a position > ignition load
P38	Yellow flashing	Preignition time
P40	Yellow flashing	1st safety time/ignition transformer ON
P42	Green	Safety time (ignition transformer OFF), flame check
P44	Green	Interval: End of safety time and fuel valve 1 ON Interval: End of safety time and release of load controller Interval: End of safety time and fuel valve 2 ON
P50	Green	2nd safety time
P54	Green	Parameter 259.01: Actuator opens to a position > low-fire
P54	Green	Parameter 260: Actuator closes until low-fire position is reached
oP1	Green	Interval to release of preset load controller (analog or 3-position step input)
Operation		
oP:xx	Green	Operation, modulating operation
oP1	Green	Operation first stage
oP2	Green	Operation second stage
Shutdown		
P10	OFF	Actuator travels to the CLOSED position (home run)
P72	Yellow	Actuator opens in high-fire position/operation shutdown
P74	Yellow	Postpurging
Valve proving		
P80	Yellow	Test space evacuating
P81	Yellow	Test atmospheric pressure
P82	Yellow	Test space filling
P83	Yellow	Test gas pressure

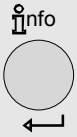
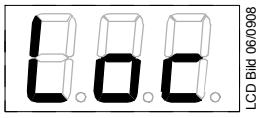
Phase number AZL2... display	LED	Function
Waiting phases (start prevention / safety shutdown phases)		
P01	Red/yellow flashing	Undervoltage
P02	Yellow	Safety loop open → Safety shutdown followed by lockout with interlocking
P04	Red/green flashing	Extraneous light on burner startup (timeout/locking after 30 seconds)
P90	Yellow	Pressure switch-min open → Safety shutdown followed by lockout with interlocking
Lockout		
LOC	Red	Lockout phase

14.2.3 Display of operating position

			Display **oP1** means stage 1. Display after **oP** is unit-specific. The signal lamp blinks green.

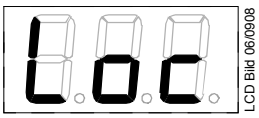
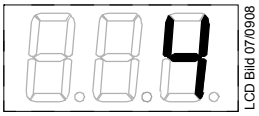
14.3 Special functions

14.3.1 Manual lockout

 and other button	 Alternately 		Press Info simultaneously **with any other button**. Basic unit changes from any operating position directly to lockout. Signal lamp lights up red. Display shows current error code **167**.

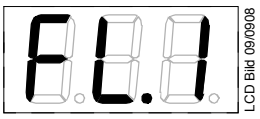
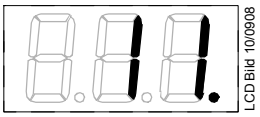
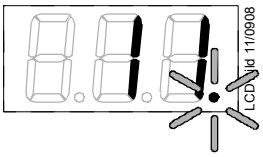
14.4 Fault status messages, display of errors

14.4.1 Display of errors (faults) with lockout

	 Alternately 		Display shows alternately **Loc** and **4**. Unit is in the lockout position. The current error code is displayed and the signal lamp is blinking red. Example: Error code **4**
+ or -			Press + or - for display of the phase, where the fault appeared. Signal lamp blinks red. Example: Phase **P02**
A			**Only with modulation via analog signal** Press A for display of the output position/actuator position where the error occurred. Signal lamp lights up red. Example: Output position/actuator position **49**

14.4.2 Display of flame current ION or QRA...

Note:
This display is only possible in operating mode or standby!

+			Press + for display of the flame signal amplifier. Signal lamp blinks green. Display shows **FL.1**.
+ 1...3 s			When pressing + (1…3 seconds), the flame signal current is displayed. Signal lamp blinks green. Example: **11.**
+ >3 s			When pressing + (>3 seconds), the point after the number begins to blink. When the button is released, the value is displayed for 2 minutes. Signal lamp blinks green. Then, the normal display appears. Display: Point **.** blinks, value **11** does not.

14.4.3 Reset

info ↵ >1 s			For reset the unit, press info ↵ for 1...3 seconds. When the button is released, **OFF** is displayed. The basic unit is reset.

Note:
For meaning of the error and diagnostic codes, see chapter *Error code list...*

14.4.4 Display of preset output

Note:
Display is possible only when …
- in operating mode or standby,
- program sequence for modulating operation via analog preset output.

A			Press A for display of the relative current position of the actuator. Signal lamp blinks green. Display shows **.oP**.
A 1...3 s			Press A (1…3 seconds) for display of the relative current position. Signal lamp blinks green. The **relative** value **.57** of the current position is displayed. **PME7... with actuator control:** Position of actuator 0° 0 Ω value of potentiometer = 0% display Position of actuator high-fire >0° <90° = value of potentiometer <1000 Ω = 100% display >0 Ω <1000 Ω **PME7... with PWM fan:** Current speed 0 rpm = 0% display Current speed corresponds to the rated load speed = 100% display Example: Value **.57**
A >3 s			When pressing + for >3 seconds, the point after the number begins to blink. When the button is released, the value is displayed for 2 minutes. Signal lamp blinks green. Then, the normal display appears. Display: Value **57**, point **.** blinks.

14.5 Manual adjustment (depending on program module)

14.5.1 Position of actuator or speed of PWM fan in modulating operation with analog signal

Note:
Display is possible only when …
- in operating mode or standby,
- program sequence for modulating operation via analog preset output and with connected actuator with potentiometer for position feedback to the LME7...

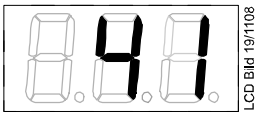
A	 LCD Bild 13/0908		Press A for the relative current position of the actuator or the relative current speed of the PWM fan. Signal lamp blinks green. Display shows **.oP**.
A 1...3 s	 LCD Bild 16/1108		Press A (1…3 seconds) for display of the relative current position or the current speed. Signal lamp blinks green. The **relative** value **.57** of the current position is displayed. Position of actuator 0° 0 Ω value of potentiometer = 0% display Position of actuator high-fire >0° <90° = value of potentiometer >0 Ω <1000 Ω = 100% display Actual speed 0 rpm = 0% display Current speed corresponds to the rated load speed = 100% display Example: Value **.57**
A >3 s	 LCD Bild 17/1108		When pressing A (>3 seconds), the point after the number begins to blink. When the button is released, the value is displayed for 2 minutes. Signal lamp blinks green. Then, the normal display appears. Display: Value **57**, point **.** blinks.

A

>3 s



Alternately



Press A for >3 seconds to display alternately **LoA** and **41**.

The **relative** value **41** of the current position or current speed is displayed.

Actuator position 0° 0 Ω potentiometer value = 0% display Actuator position high-fire >0° <90° = potentiometer value >0 Ω <1000 Ω = 100% display	Current speed 0 rpm = 0% display Current speed corresponds to the rated load speed = 100% display

The actual value (example **41**%) is displayed and the signal lamp blinks green.

Example: Position of actuator or the current speed **41**% (based on range between high-fire and 0° or 0 rpm)

A

and

+

or

-



Press A simultaneously with + or - to adjust the actuator position or the fan speed between low-fire (x%) and high-fire (100%).
Release the buttons when the required position or speed is reached.
Signal lamp blinks s green.

Example: Value **43**



Alternately



Display shows alternately **LoA** and **43**.

Signal lamp blinks green.

Example: Required position of actuator or current speed **43**%

-

and

+



Press - and + simultaneously (Escape) to return to normal operation.

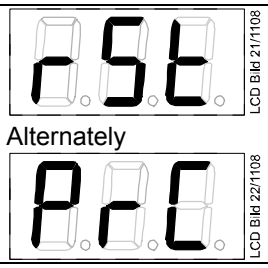
Display: **oP**

When manual adjustment is completed, the actuator or the PWM fan returns to the analog preset output!

Note:

- When the program phase (e.g. P10 - shutdown) changes during manual adjustment, the display blinks
- Manual adjustment mode remains active until *Escape* switches the basic unit back to normal operation or until the basic unit is reset via mains ON/OFF. This means that in the case of a new heat request and after startup, the actuator or the PWM fan is driven to the position or speed of the manually preset value

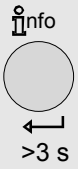
14.6 First startup with a new program module or in case of replacement of program module



Display shows alternately **rSt** and **PrC**.

Display shows the replacement of the program module.

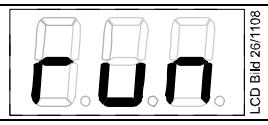
Signal lamp blinks red once and yellow twice alternately.



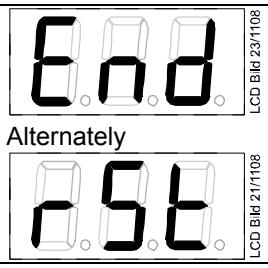
Press Info ↵ for >3 seconds to start data download from the program module.
Signal lamp blinks yellow.
The process of 3 seconds is supported by a short flash of the yellow signal lamp.

Note:

If you press Info ↵ for <3 seconds, data download does not start. To start the restore process again, the LME7... must be reset by switching mains ON/OFF.



Display shows **run** during download (restore process) of the program sequence.

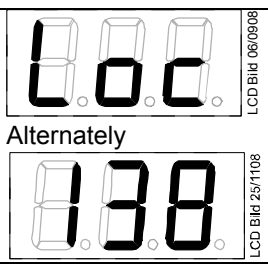


Display shows alternately **End** and **rSt**.

Display shows the end of data exchange.

Signal lamp blinks red.

After 2 minutes, the unit changes to **Loc 138**



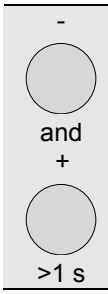
After the restore process, the unit is automatically in the lockout position (LOC 138) and must be reset for operation!

Info >1 s			Press Info for >1 second to reset the unit. Display: **OFF**

Warning!
On first startup or after exchange of the program module, the sequence of functions and parameter settings must be checked upon completion of the restore process

→ See chapter *Operation via AZL2.../first startup, restore*
→ See chapter *Operation via internal LED/first startup, restore*

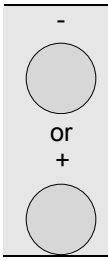
14.7 Manual backup





Press - and + simultaneously for >1 second (Escape) to start a manual backup process.
Parameter **PrC** appears.

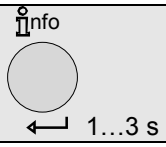
Display: **PrC**

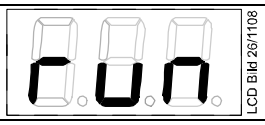




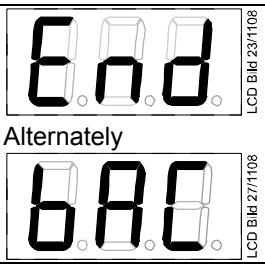
Press - or + for parameter **bAC**.

Display: **bAC**





run appears during download (backup process) of the program sequence.

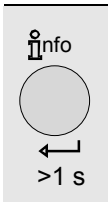


Display shows alternately **End** and **bAC**.

Display shows the end of data exchange.

Display appears for 2 minutes or can be finished by pressing Info .







When the backup process is completed, the display shows **OFF**.

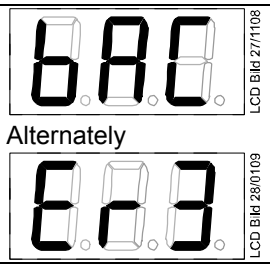
Press Info for >1 second to reset the unit.

Display: **OFF**



Warning!
If any parameters are changed, a backup must be made!
If not observed, there is a risk of impairment of safety functions**!**

14.7.1 Error during backup process



Display shows alternately **bAC** and **Er3**.

For meaning of a possible cause, see chapter *Error code list with operation via internal LED*.

Note:
During backup, all settings and parameters are transferred from the basic unit's memory to the memory of the program module.

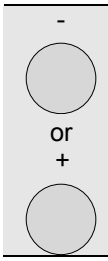
14.8 Manual restore





Press - and + simultaneously for >1 second (Escape) for starting the manual restore process.
Parameter **PrC** appears.

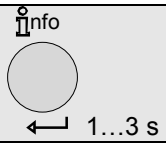
Display: **PrC**

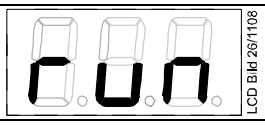




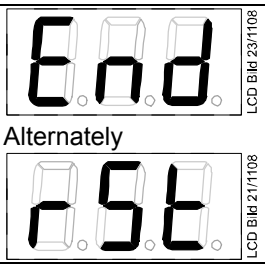
Press - or + for parameter **rSt**.

Display: **rSt**





run appears during download (restore process) of program sequence.

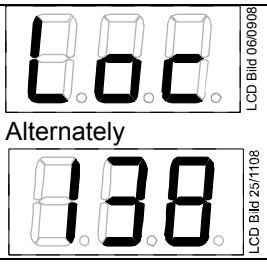


Display shows alternately **End** and **rSt**.

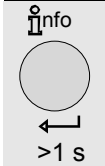
Display shows the end of data exchange.

Signal lamp blinks red.

After 2 minutes, the unit changes to
Loc 138



After the restore process, the unit is automatically in the lockout position (LOC 138) and must be reset for operation!

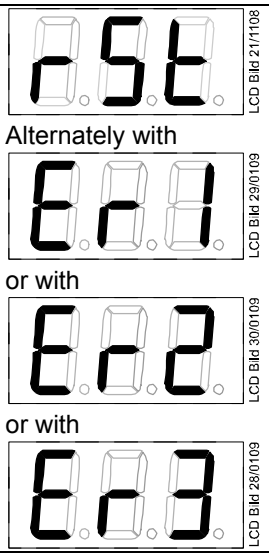




Press Info for >1 second to reset the unit.

Display: **OFF**

14.8.1 Errors during the restore process

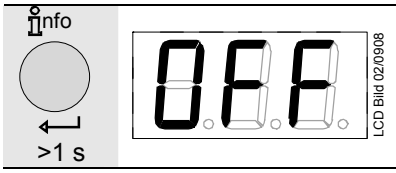


Display shows alternately **rSt** and **Er1**, **Er2** or **Er3**.

For meaning of a possible cause, see chapter *Error code list with operation via internal LED*.

Note:
During the restore process, all settings and parameters are written from the program module to the basic unit's onboard memory. In the process, it is possible that previous program sequences, parameters and settings in the onboard memory will be overwritten!

14.8.2 Reset



When pressing nfo for 1...3 seconds, **OFF** is displayed.

When the button is released, the basic unit is reset.

Note:
For meaning of the error and diagnostic codes, see chapter *Error code list...*

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