

**SIEMENS**

**7<sub>118</sub>**



ISO 9001  
 CE



LOA2...

LOA3...

**Oil Burner Controls**

**LOA2...  
 LOA3...**

Oil burner controls for the supervision, startup and control of single- or 2-stage forced draft oil burners in intermittent operation. Oil throughput up to 30 kg/h.

The LOA2... / LOA3... and this Data Sheet are intended for use by OEMs which integrate the oil burner controls in their products.

**Use, features**

|                   |  |
|-------------------|--|
| Use               | <p>The LOA... are used for the startup, supervision and control of single- or 2-stage forced draft oil burners in intermittent operation.<br/>                 Yellow-burning flames are supervised with photoresistive detectors QRB..., blue-burning flames with blue-flame detectors QRC...</p> <ul style="list-style-type: none"> <li>- Forced draft oil burners conforming to EN 267</li> <li>- Oil atomization burners as monoblocks conforming to EN 230</li> </ul> |
| General features  | <ul style="list-style-type: none"> <li>- Undervoltage detection</li> <li>- Bridging contact for oil preheater (not with LOA28.173A27)</li> </ul>   |
| Specific features | <ul style="list-style-type: none"> <li>- Special versions including models for incinerator plant and flash-steam generators</li> <li>- LOA36... with color LED for indicating flame strength and operation</li> </ul>  |

**Warning notes**



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

**Do not open, interfere with or modify the unit!**

- Before performing any wiring changes in the connection area of the LOA..., completely isolate the unit from the mains supply (all-polar disconnection)
- Ensure protection against electric shock hazard by providing adequate protection for the burner control's connection terminals
- Check to ensure that wiring is in an orderly state and that the wires are firmly connected
- Press the lockout reset button / operating button only manually (applying a force of no more than 60 N), without using any tools or pointed objects
- Fall or shock can adversely affect the safety functions. Such units may not be put into operation, even if they do not exhibit any damage

**Mounting notes**

Ensure that the relevant national safety regulations are complied with

**Installation notes**

- Installation and commissioning work must be carried out by qualified staff
- Do not mix up live and neutral conductors
- Always run high-voltage ignition cables separately while observing the greatest possible distance to the unit and to other cables

**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 lengths of the flame detector cables (refer to Data Sheets 7714 (QRB...) and 7716 (QRC...))

**Commissioning notes**

- Commissioning work must be carried out by qualified staff
- When commissioning the plant, when carrying out maintenance work, or after longer off periods, make the following safety checks:

|    | <b>Safety check</b>  | <b>Anticipated response</b>                        |
|----|--|--|
| a) | Burner startup with flame detector darkened  | Lockout at the end of «TSA»                        |
| b) | Burner startup with flame detector exposed to extraneous light   | Lockout after approx. 40 seconds                   |
| c) | Simulation of flame failure during operation. For that purpose, darken the flame detector during operation and maintain this state | Repetition followed by lockout at the end of «TSA» |

## Standards

Conformity to EEC directives  
 Electromagnetic compatibility EMC (immunity) 89 / 336 EEC  
 Low-voltage directive 73 / 23 EEC

## Service notes

Maintenance work must be carried out by qualified staff  
 Each time a unit has been replaced, check wiring to ensure it is in an orderly state and that the wires are firmly connected; make the safety checks as indicated in «Commissioning notes» above  
 Use the KF... test adapters for short periods of time only

## Disposal notes



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

## Mechanical design

The housing is made of impact-proof, heat-resistant and flame-retarding plastic.  
 The oil burner control is of plug-in design and engages audibly in its base.

The housing accommodates the

- thermal-electric sequence switch
- flame signal amplifier with the flame relay
- lockout reset button with its integrated fault indication lamp

## Type summary

The type references given below apply to burner controls without base and without flame detector.

| Version                    | Type reference             | Voltage (VAC) | Under-voltage detection | CE  | t1 | t3 | TSAmax. | t3n | t3n´ | t4 | Replacement for |
|----------------------------|----------------------------|---------------|-------------------------|-----|----|----|---------|-----|------|----|-----------------|
| Standard version           | LOA24.171B27 <sup>2)</sup> | 220           | X                       | x   | 13 | 13 | 10      | 15  | ---  | 15 | LAI2.3          |
|                            | LOA24.171B17 <sup>2)</sup> | 110           | X                       | x   | 13 | 13 | 10      | 15  | ---  | 15 |                 |
|                            | LOA24.173A27               | 220           | X                       | x   | 13 | 13 | 10      | 20  | 2    | 20 | LAI2.3          |
|                            | LOA24.174A27               | 220           | X                       | x   | 13 | 13 | 10      | 35  | 2    | 35 | ---             |
| With remote reset facility | LOA26.171B27 <sup>2)</sup> | 220           | X                       | x   | 13 | 13 | 10      | 15  | ---  | 15 | ---             |
|                            | LOA36.171A27               | 220           | X                       | x   | 13 | 13 | 10      | 15  | ---  | 15 | ---             |
| For flash-steam generators | LOA24.571C27               | 220           | X                       | x   | 6  | 6  | 10      | 20  | ---  | 20 | LAI5            |
| For incinerator plant      | LOA25.173C27 <sup>1)</sup> | 220           | X                       | --- | 13 | 13 | 10      | --- | 2    | 15 | LAB2            |
|                            | LOA25.173C17 <sup>1)</sup> | 110           | X                       | --- | 13 | 13 | 10      | --- | 2    | 15 |                 |
|                            | LOA28.173A27 <sup>1)</sup> | 220           | X                       | --- | 13 | 13 | 10      | --- | 2    | 15 | ---             |

Legend 1) LOA25... and LOA28... are designed for use on incinerator plant where lockout by extraneous light is not desired. These types of oil burner controls are not covered by EN 230  
 2) IRD1010 infrared flicker detectors can also be used

t1 Prepurge time  
 t3 Preignition time  
 t3n Long postignition time  
 t3n´ Short postignition time  
 t4 Interval from establishment of flame to the release of «BV2»  
 TSA Ignition safety time

**Ordering**

**Oil burner control** without plug-in base refer to «Type summary»

**Electrical connections**

refer to Data Sheet 7201

- Plug-in base AGK11...
- Cable holders AGK65..., AGK66, AGK67...
- Cable strain relief elements for AGK67...

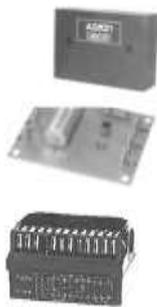
**Electrical connections**

refer to Data Sheet 7203

- Plug-in base AGK13
- Plug-in housing AGK56
- Cover AGK68

**Flame detectors**

- Photoresistive detectors QRB1... refer to Data Sheet 7714
- Blue-flame detectors QRC1... refer to Data Sheet 7716



**Pedestal (empty housing)**

**AGK21**

- To increase the overall height of the LOA...to that of the LAI... / LAB...

**Remote reset module** **ARK21A27**

- For use with the LOA26... / LOA36... printed circuit board versions

**Adapter**

**KF8819**

- For replacing LAB1... / LAI... by LOA...
- No rewiring of plug-in base required

**Demo case**

**KF8891**

- For showing the functioning of burner controls
- Refer to Operating Instructions B7989

**Test case, for making functional tests**

**KF8843**

- For testing burner controls
- Refer to Operating Instructions B7986

**Test adapter**

**KF8885**

- For testing burner controls
- With switch for manual startup of burner
- With switch for simulating the oil preheater's release contact
- With 2 pairs of jacks for measuring the flame detector current
- Refer to Mounting Instructions C7981



**Test adapter**

**KF8833**

- For testing burner controls fitted to the burner
- With signal lamps for program indication
- With 2 jacks for measuring the flame detector current



**Test adapter**

**KF8840**

- For testing burner controls fitted to the burner
- With signal lamps for program indication
- With switch for simulating the flame signal
- With holes for checking the control voltages at the tabs of the burner control
- With 2 jacks for measuring the flame detector's resistance

**Technical data**

General unit data

|                                  |  |
|----------------------------------|--|
| Mains voltage                    | AC 220 V -15 %...AC 240 V +10 %<br>AC 100 V -15 %...AC 110 V +10 % |
| Mains frequency                  | 50...60 Hz ±6 %  |
| External primary fuse (Si)       | 10 A (fast)  |
| Power consumption                | approx. 3 VA   |
| Degree of protection             | IP 40, must be ensured through mounting                            |
| Safety class                     | I  |
| Perm. cable lengths              | max. 3 m with 100 pF/m line capacitance                            |
| - Detector cable laid separately | max. 20 m  |
| - Remote reset laid separately   | max. 20 m  |
| Mounting position                | optional   |
| Weight                           | approx. 180 g  |
| Input current to                 |  |
| - Terminal 1                     | 5 A (short-time 15 A for max. 0.5 s)                               |
| - Terminal 3                     | 5 A (excl. current draw of burner motor and oil preheater)         |

| Max. perm. current at cos0.6 | Terminal 4 | Terminal 5 | Terminal 6 | Terminal 7 | Terminal 8 | Terminal 10 |
|------------------------------|------------|------------|------------|------------|------------|-------------|
| LOA24.171B27                 | 1 A        | 1 A        | 2 A        | 2 A        | 5 A        | 1 A         |
| LOA24.171B17                 |            |            |            |            |            |             |
| LOA24.571C27                 |            |            |            |            |            |             |
| LOA25.173C27                 |            |            |            |            |            |             |
| LOA25.173C17                 |            |            |            |            |            |             |
| LOA28.173A27                 | 1A         | 1 A        | 2 A        | 1.5 A      | 5 A        | 1 A         |
| LOA24.173A27                 |            |            |            |            |            |             |
| LOA24.174A27                 | 1 A        | 1 A        | 2 A        | 0.1 A      | 5 A        | 1 A         |
| LOA26.171B27                 |            |            |            |            |            |             |
| LOA36.171A27                 |            |            |            |            |            |             |

Environmental conditions

|                       |                   |
|-----------------------|-------------------|
| <b>Transport</b>      | DIN EN 60 721-3-2 |
| Climatic conditions   | class 2K2         |
| Mechanical conditions | class 2M2         |
| Temperature range     | -50...+60 °C      |
| Humidity              | < 95 % r.h.       |
| <b>Operation</b>      | DIN EN 60 721-3-3 |
| Climatic conditions   | class 3K5         |
| Mechanical conditions | class 3M2         |
| Temperature range     | -20...+60 °C      |
| Humidity              | < 95 % r.h.       |



**Condensation, formation of ice and ingress of water are not permitted!**

Flame detectors

For measuring circuits and detector cable lengths, refer to Data Sheets 7714 (QRB...) and 7716 (QRC...).

QRB...

| Type of burner control      | QRB... (typically)                          |   |   |
|-----------------------------|---|---|---|
|                             | Min. detector current required (with flame) | Max. perm. detector current (without flame) | Max. detector current possible (with flame) |
| LOA24.171B27 / LOA24.171B17 | 70 $\mu$ A                                  | 5.5 $\mu$ A                                 | 210 $\mu$ A                                 |
| LOA24.571C27                |   |   |   |
| LOA25.173C27 / LOA25.173C17 |   |   |   |
| LOA26.171B27                |   |   |   |
| LOA28.173A27                | 45 $\mu$ A                                  | 5.5 $\mu$ A                                 | 45 $\mu$ A                                  |
| LOA24.173A27                |   |   |   |
| LOA24.174A27                | 70 $\mu$ A                                  | 5.5 $\mu$ A                                 | 900 $\mu$ A                                 |
| LOA36.171A27                |   |   |   |

QRC1...

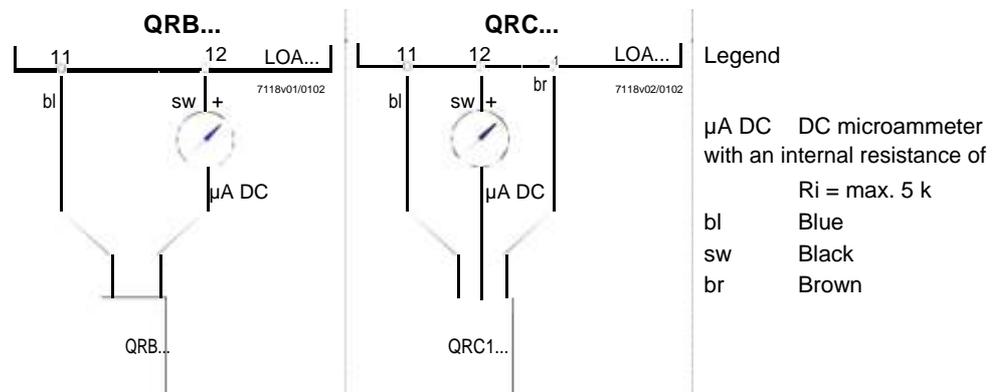
| Type of burner control     | QRC... (typically)                          |   |   |
|----------------------------|---|---|---|
|                            | Min. detector current required (with flame) | Max. perm. detector current (without flame) | Max. detector current possible (with flame) |
| LOA24.171B27               | 70 $\mu$ A                                  | 5.5 $\mu$ A                                 | 110 $\mu$ A                                 |
| LOA24.571C27               |   |   |   |
| LOA26.171B27               |   |   |   |
| LOA24.171B17               | 70 $\mu$ A                                  | 5.5 $\mu$ A                                 | 90 $\mu$ A                                  |
| LOA25.173C27 <sup>1)</sup> | ---   | ---   | ---   |
| LOA25.173C17 <sup>1)</sup> |   |   |   |
| LOA28.173A27 <sup>1)</sup> |   |   |   |
| LOA24.173A27               | 45 $\mu$ A                                  | 5.5 $\mu$ A                                 | 45 $\mu$ A                                  |
| LOA24.174A27               |   |   |   |
| LOA36.171A27               | 70 $\mu$ A                                  | 5.5 $\mu$ A                                 | 110 $\mu$ A                                 |

<sup>1)</sup> These types of LOA... may not be used in connection with QRC...blue-flame detectors

Data given in the above table only apply under the following conditions:

- Mains voltage AC 230 V
- Ambient temperature 23 °C

Measuring circuit for detector current



**Only with LOA36...**  
 Indication of flame strength

Detector current LED lit

- With QRB... min. 60  $\mu$ A  $\pm$ 15 %
- With QRC... min. 40  $\mu$ A  $\pm$ 15 %

## Function

|  |   |
|--|---|
| Preconditions for startup              | Burner control is reset<br>Contacts in the line are closed<br>No undervoltage<br>Flame detector is darkened, no extraneous light  |
| Undervoltage detection                 | An additional electronic circuit ensures that if mains voltage drops below approximately AC 165 V, burner startup will be prevented, or – without release of oil – lockout will be triggered.   |
| Control sequence in the event of fault | Whenever lockout occurs, the outputs for the fuel valves, the burner motor, oil preheater and ignition equipment will immediately be deactivated (< 1 second).<br>The lockout indication lamp changes to red and terminal 10 («AL») for remote lockout indication receives voltage.<br>This state is also maintained in the event of mains voltage failure. |

| Cause                              | Response   |
|------------------------------------|--|
| Mains voltage failure              | New start  |
| Extraneous light on burner startup | Lockout; with LOA25... / LOA28...: Prevention of start |
| No flame at the end of «TSA»       | Lockout  |
| Loss of flame during operation     | Repetition   |

|       |   |
|-------|---|
| Reset | After lockout, the burner control can be reset after 60...90 seconds (also refer to «Warning notes»). |
|-------|---|

## Indications

|                  |   |
|------------------|---|
| Lockout position | The lockout position is indicated with the lamp integrated in the lockout reset button. |
|------------------|---|

|                |                    |
|----------------|--------------------|
| Flame strength | Only with LOA36... |
|----------------|--------------------|



Indication of the flame strength (green LED) is used for checking the flame signal. To ensure reliable burner operation, this LED must be lit. If the green LED flickers or extinguishes during burner operation, the light conditions at the burner are poor, caused by dirt for instance.

|           |                    |
|-----------|--------------------|
| Operation | Only with LOA36... |
|-----------|--------------------|



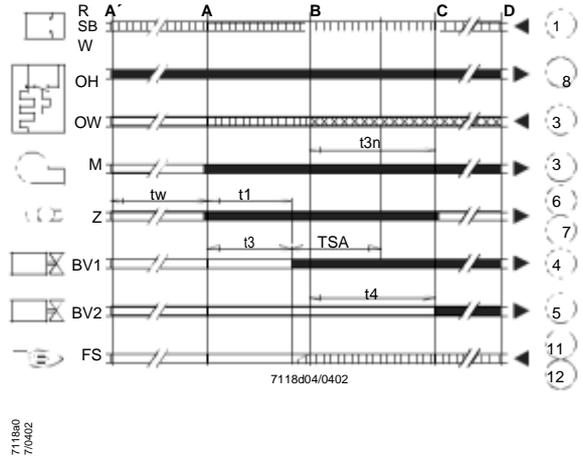
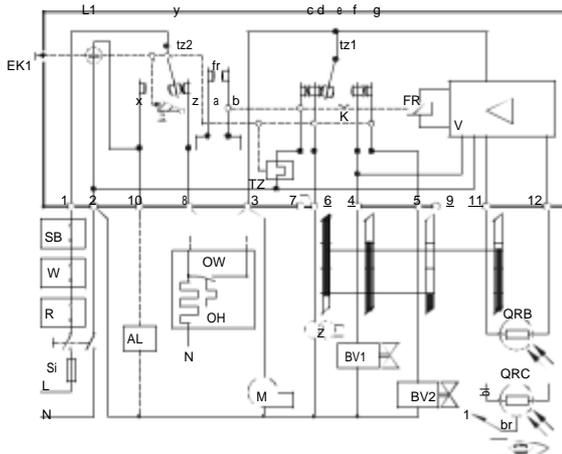
When the contacts of the control thermostat are closed, the orange LED is lit, indicating the start of the oil preheater's heating up phase (if present).

**Connection diagram and internal diagram**

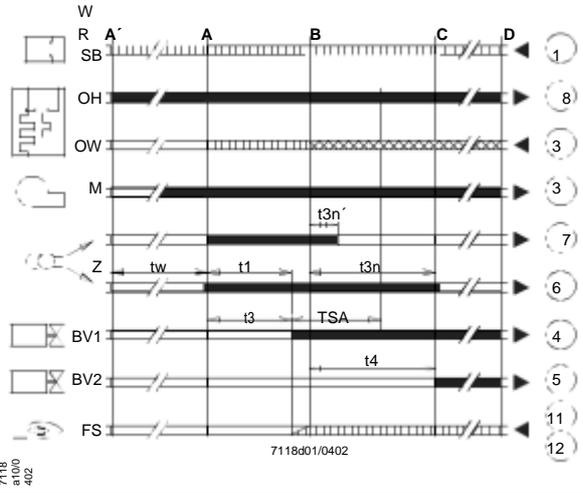
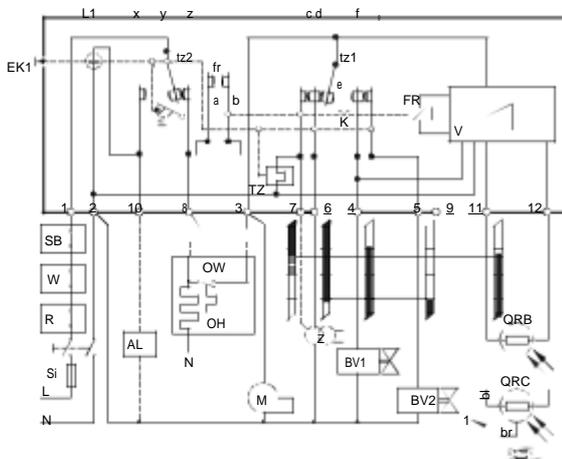
**Control sequence**

LOA24.171B17  
 LOA24.171B27

LOA24.571C27

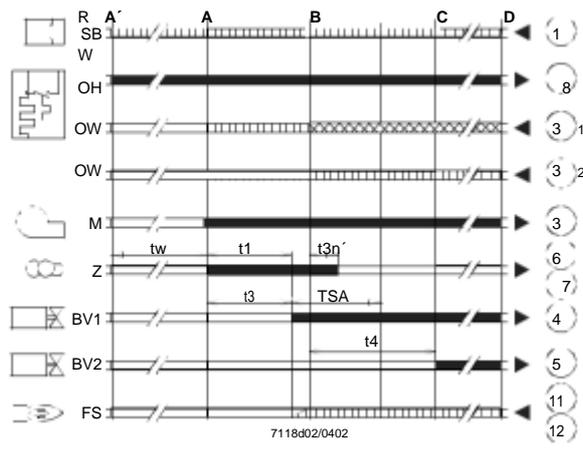
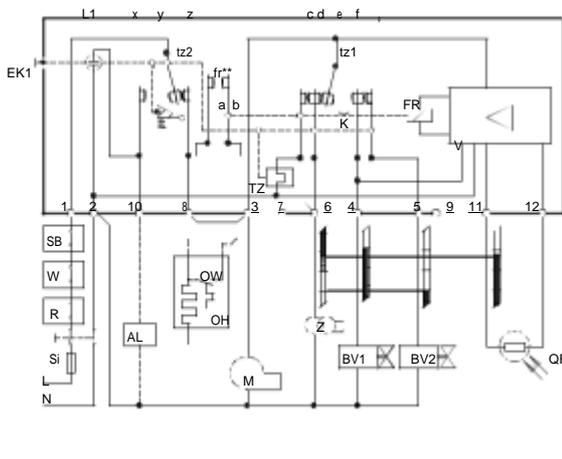


LOA24.174A27  
 LOA24.173A27



LOA25.173C17  
 LOA25.173C27

LOA28.173A27



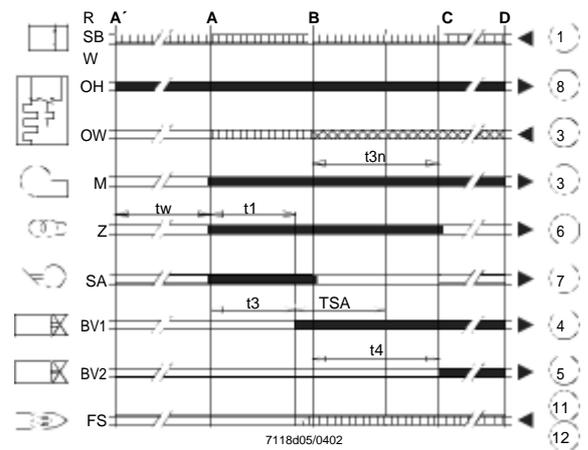
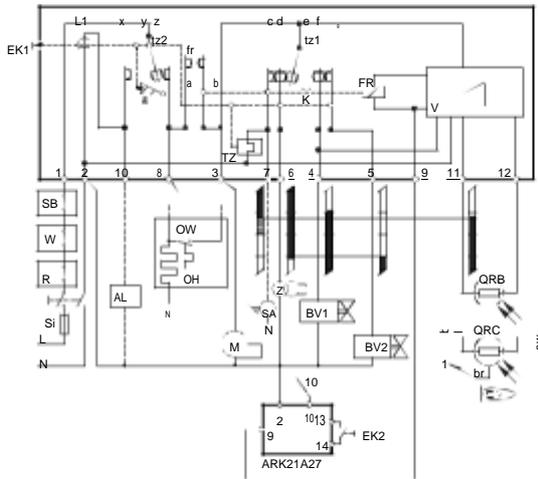
Not provided with the LOA28.173A27 1) LOA25.173C27 / LOA25.173C17 2) LOA28.173A27

**Connection diagram and internal diagram**

**Control sequence**

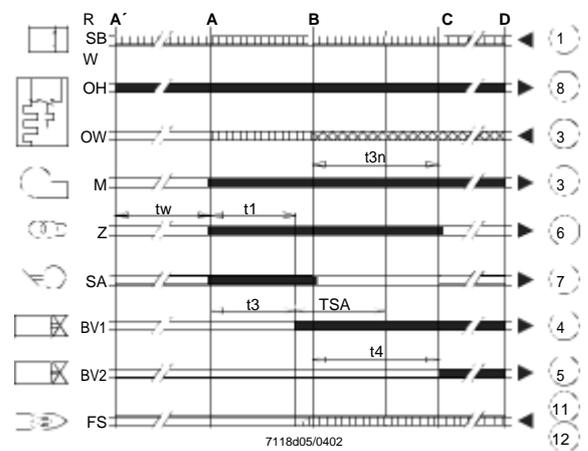
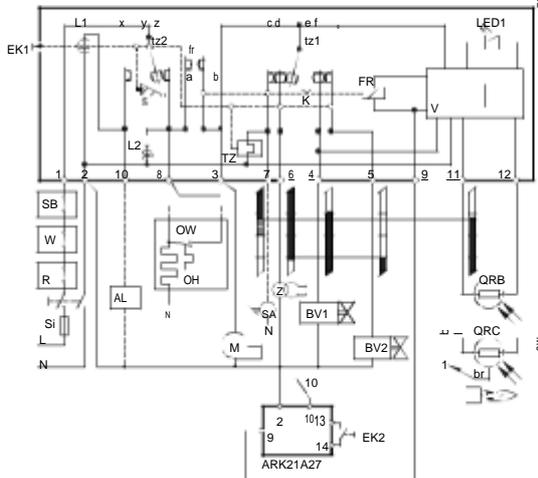
LOA26.171B27

With ARK21  
 remote lockout  
 reset module



LOA36.171A27

With ARK21  
 remote lockout  
 reset module



**Legend**

- AL Alarm device
- BV... Fuel valve
- EK1 Lockout reset button
- EK2 Remote lockout reset button
- FR Flame relay with contacts «fr»
- fr Bridging contact for release contact of «OH»
- FS Flame signal
- K Catch of flame relay for locking contact «tz1» in the event of premature flame signals or for locking the contact when the flame signal is correct
- L1 Indication of faults (red)
- L2 Indication of operation (green)
- LED1 Indication of flame strength (green)
- M Burner motor
- TSA Ignition safety time
- tw Waiting time
- t1 Prepurge time
- t3 Preignition time
- t3n Long postignition time
- t3n´ Short postignition time
- t4 Interval between flame signal and release of «BV2»

- OW Release contact of oil preheater
- OH Oil preheater
- QRB Photoresistive detector
- QRC Blue-flame detector
- bl = blue, br = brown, sw = black
- R Control thermostat or pressurestat
- SA Actuator with automatic setback
- SB Safety limit thermostat
- Si External primary fuse
- TZ Thermal-electric sequence switch
- tz... Contacts of «TZ»
- W Limit thermostat or pressure switch
- V Flame signal amplifier
- Z Ignition transformer

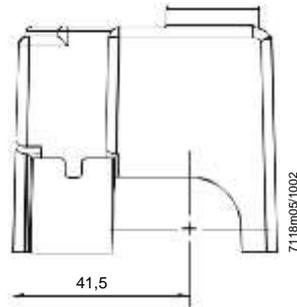
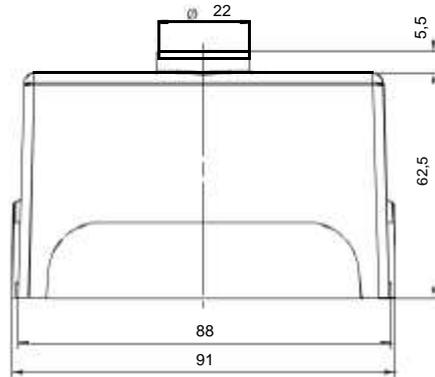
- A´ Beginning of the startup sequence with burners using an «OH»
- A Beginning of the startup sequence with burners using no «OH»
- B Time of flame establishment
- C Running position
- D Controlled shutdown by «R»

- Control signals delivered by the LOA...
- Required input signals
- Permissible input signals

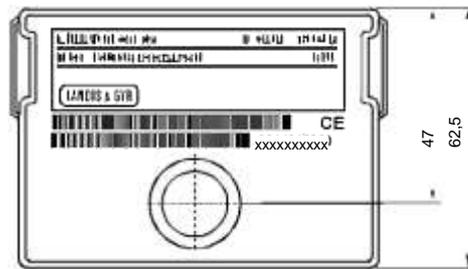
**Dimensions**

Dimensions in mm

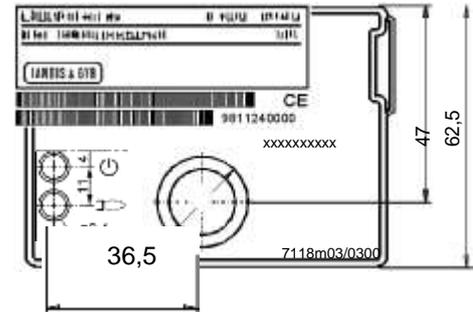
LOA...



LOA2...

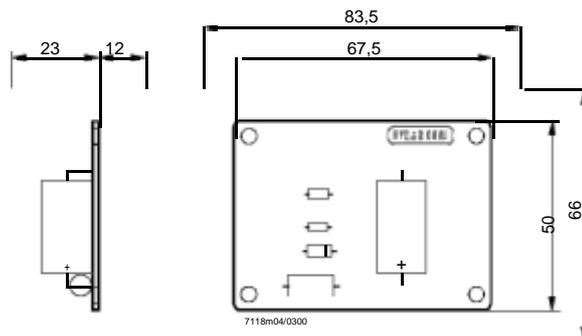


LOA3...



Status indication, orange  
 Indication of flame strength, green

Remote lockout reset  
 module ARK21A27



Remote lockout reset module for use with the LOA26... / LOA36...  
 Printed circuit board with no housing.  
 Degree of protection IP 00, which means that protection against electric shock hazard must be ensured through mounting.  
 Do not place any metal objects in the hatched area.  
 The module must be fitted with the help of spacers made of plastic.  
 Do not use spacers made of metal.