



ISO 9001



LOA2...

LOA3...

Oil Burner Controls

LOA2...
LOA3...

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

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

Use

- Oil burners with / without oil pre-heaters
- Forced draught oil burners conforming to EN 267, with an oil throughput of up to 30 kg/h
- Oil atomization burners as monoblocks conforming to EN 230, with an oil throughput of up to 30 kg/h
- Special versions including models for incinerator plants and flash-steam generators

Warning notes



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

It is not permitted to open, interfere with or modify the unit.

- Before performing any wiring changes in the connection area of the LOA..., the burner control must be completely isolated from the mains supply
- Ensure protection against electric shock hazard by providing adequate protection when mounting the burner control
- Check wiring and all safety functions
- Press the lockout reset button only manually, 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

- The relevant national safety regulations must be complied with

Installation notes

- Installation and commissioning work may only be carried out by qualified staff
- Observe the permissible lengths of the flame detector cables; refer to data sheets 7714 (QRB...) and 7716 (QRC...)
- Always run ignition cables separately while observing the greatest possible distances to the unit and to other cables
- Do not mix up live and neutral conductors

Commissioning notes

- Commissioning and maintenance work may only 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:

a)	Burner startup with darkened flame detector	Lockout at the end of «TSA»
b)	Burner startup with flame detector exposed to extraneous light	Lockout at the end of the pre-purge time
c)	Simulation of flame failure during operation. For that purpose, darken the flame detector during operation and maintain this status.	Restart followed by lockout at the end of «TSA»

Mechanical design

LOA...	The oil burner controls are of plug-in design. The housing is made of impact-proof and heat-resistant plastic and accommodates the <ul style="list-style-type: none"> - thermal-electric sequence switch which acts on a multiple snap-action switching system - flame signal amplifier with the flame relay - lockout reset button with the integrated fault indication lamp
AGK11 plug-in base	Refer to data sheet 7201.
AGK65 cable gland holder	Refer to data sheet 7201.
AGK66 cable holder	Refer to data sheet 7201.
AGK67... cable holder	Refer to data sheet 7201.
QRB... photoresistive detectors	Refer to data sheet 7714.
QRC1... blue-flame detectors	Refer to data sheet 7716.

Type summary

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

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

Legend 1) Since LOA25... and LOA28... do not feature extraneous light lockout, they do not conform to EN 230

2) It is also possible to use an IRD1010 infrared flicker detector

t1 Pre-purge time







t3 Pre-ignition time

t3n Long post-ignition time

t3n´ Short post-ignition time

t4 Interval from establishment of flame to the release of the 2nd fuel valve

TSA Ignition safety time

	Oil burner control without plug-in base	refer to «Type summary»
	Photoresistive detectors (refer to data sheet 7714)	QRB1...
	Blue-flame detectors (refer to data sheet 7716)	QRC1...
	Plug-in base (refer to data sheet 7201)	AGK11
	Cable gland holder (refer to data sheet 7201)	AGK65
	Cable holder (refer to data sheet 7201)	AGK66
	Cable holder (refer to data sheet 7201)	AGK67...
	Pedestal (empty housing) To increase the overall height of the LOA...to that of the LAI... / LAB...	AGK21
	Remote reset module For use with the LOA26... / LOA36... printed circuit board versions	ARK21A27
	Adapter For replacing LAB1... / LAI... by LOA... No rewiring of the plug-in base required	KF8819
	Test adapter - With signal lamps for program indication - For functional check - With 2 jacks for measuring the flame detector current	KF8833
	Test adapter - With signal lamps for program indication - With holes for checking the control voltages at the tabs of the LOA2... / LOA3... - With 2 jacks for measuring the flame detector current - With on / off switch for simulating the flame signal	KF8840
	Test adapter - With switch for manual burner startup - With switch for simulating the oil pre-heater' s release contact - With 2 pairs of jacks for measuring the flame detector current	KF8885

Technical data

General unit data	Mains voltage	AC 220 V –15 %...AC 240 V +10 % 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
	Mounting orientation	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 pre-heater)

Perm. terminal loading	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						
LOA24.173A27	1A	1 A	2 A	1.5 A	5 A	1 A
LOA24.174A27						
LOA26.171B27	1 A	1 A	2 A	0.1 A	5 A	1 A
LOA36.171A27						

Environmental conditions

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



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

CE conformity

According to the directives of the European Union

Electromagnetic compatibility EMC	89 / 336 EEC incl. 92 / 31 EEC
Low voltage directive	73 / 23 EEC

Flame detectors

For measurement 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) ¹⁾	Max. perm. detector current (without flame)	Max. detector current possible (with flame)
LOA24.171B27 / LOA24.171B17	70 µA	5.5 µA	210 µA
LOA24.571C27			
LOA25.173C27 / LOA25.173C17			
LOA26.171B27			
LOA28.173A27			
LOA24.173A27	45 µA	5.5 µA	45 µA
LOA24.174A27			
LOA36.171A27	70 µA	5.5 µA	900 µA

QRC1...

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

¹⁾ These types of LOA... may not be used in connection with the QRC...blue-flame detectors



Only with LOA36...
Indication of flame strength

- Detector current LED lit with QRB... min. 60 µA ±15 %
- Detector current LED lit with QRC... min. 40 µA ±15 %

Functions

Control sequence in the event of fault	<p>Whenever a fault occurs, the supply of fuel will immediately be shut down. With every lockout, the control outputs will be de-energized in less than one second, while terminal 10 («AL») for remote lockout indication receives voltage.</p> <p>The LOA... can be reset no earlier than approx. 50 seconds after lockout.</p>
Extraneous light / premature flame signal	<p>No flame signal may be present during the pre-purge time.</p> <p>If, however, a signal is delivered during this period of time, the LOA... locks out on completion of the pre-purge and safety time, and there will be no release of oil.</p> <p>An erroneous flame signal can be caused by</p> <ul style="list-style-type: none">- premature establishment of the flame due to a leaking oil valve- extraneous light- a short-circuit in the flame detector or flame detector cable- faults in the flame signal amplifier, or similar <p>Exception:</p> <p>With LOA25... / LOA28..., there will be no lockout, but burner startup will be prevented until the premature flame signal is no longer present.</p> <p>This means that the LOA25... / LOA28... may be used only where the requirements of EN 230 need not be satisfied.</p>
Non-appearance of flame	<p>If, at the end of «TSA», there is no flame signal, the LOA... will immediately lock out.</p> <p>If, with the LOA25... / LOA28..., there are flame signal failures of short duration during «TSA» and «t4», the ignition transformer will automatically be switched on again.</p> <p>The total duration of the repeated ignition attempts equals «TSA» (10 seconds).</p>
Flame failure during operation	<p>On flame failure during operation, the LOA... will immediately shut down the fuel supply and automatically make a restart attempt (repetition).</p> <p>If flame failure occurs on completion of «t4», nearly the complete startup sequence will be repeated.</p>
Undervoltage detection	<p>With burner controls featuring undervoltage detection, an additional electronic circuit ensures that if mains voltage drops below about 165 V, burner startup will be prevented, or – without opening the oil valve – lockout will be triggered.</p>

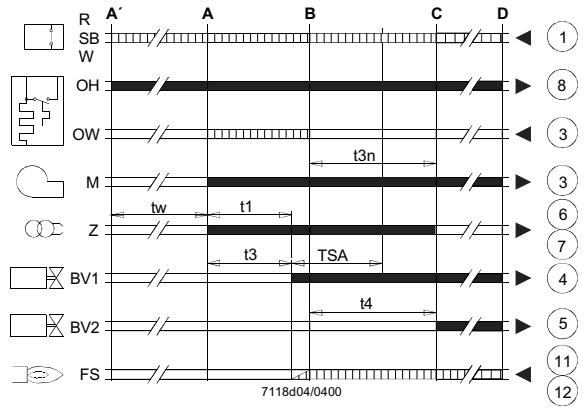
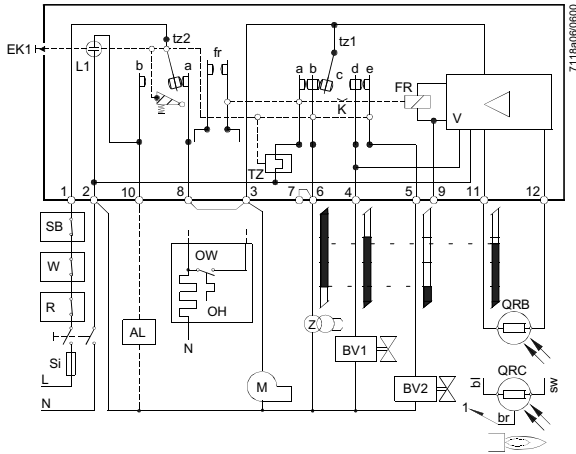
Indications

Fault position	<p>The fault position is indicated with the lamp integrated in the lockout reset button.</p>
Flame strength	<p>Only with LOA36...</p>
	<p>Indication of the flame strength (green LED) is used for checking the flame signal.</p> <p>This LED must be lit to ensure reliable burner operation.</p> <p>If the green LED flickers or extinguishes during burner operation, the light conditions at the burner are inadequate, caused by dirt for instance.</p>
Operation	<p>Only with LOA36...</p>
	<p>If the contact of the temperature controller is closed, the orange LED is lit, indicating the beginning of the oil pre-heater's heating up phase (if present).</p>

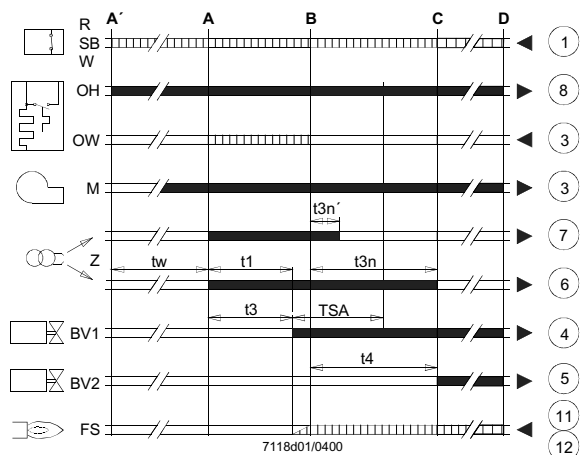
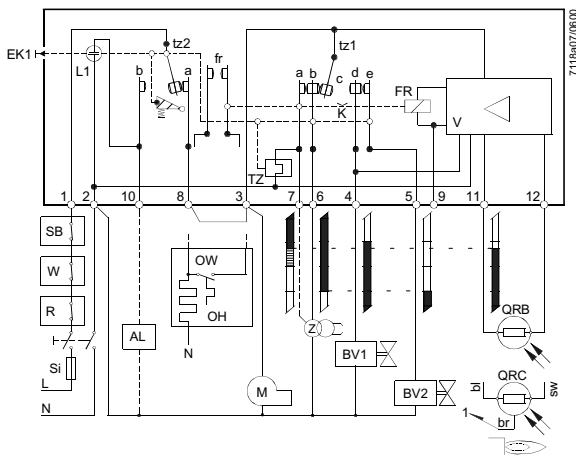
Connection diagram and internal diagram

Control sequence

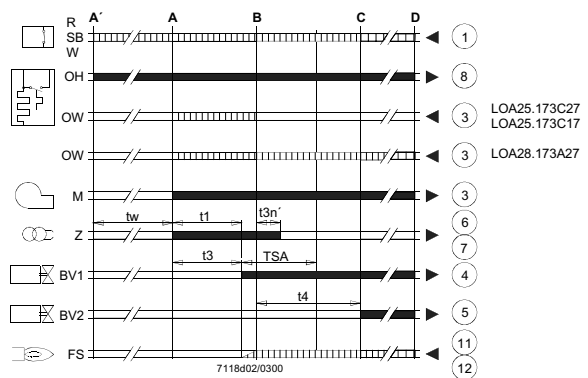
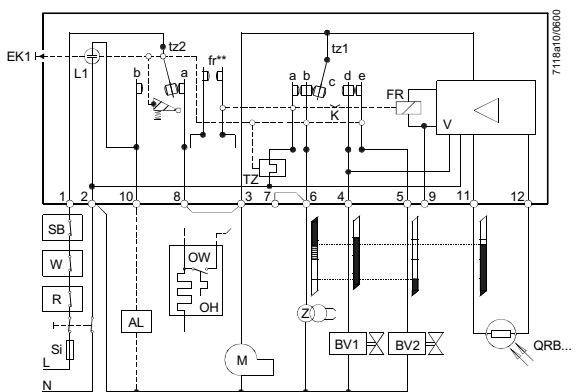
LOA24.171B27
LOA24.171B17
LOA24.571C27



LOA24.173A27
LOA24.174A27



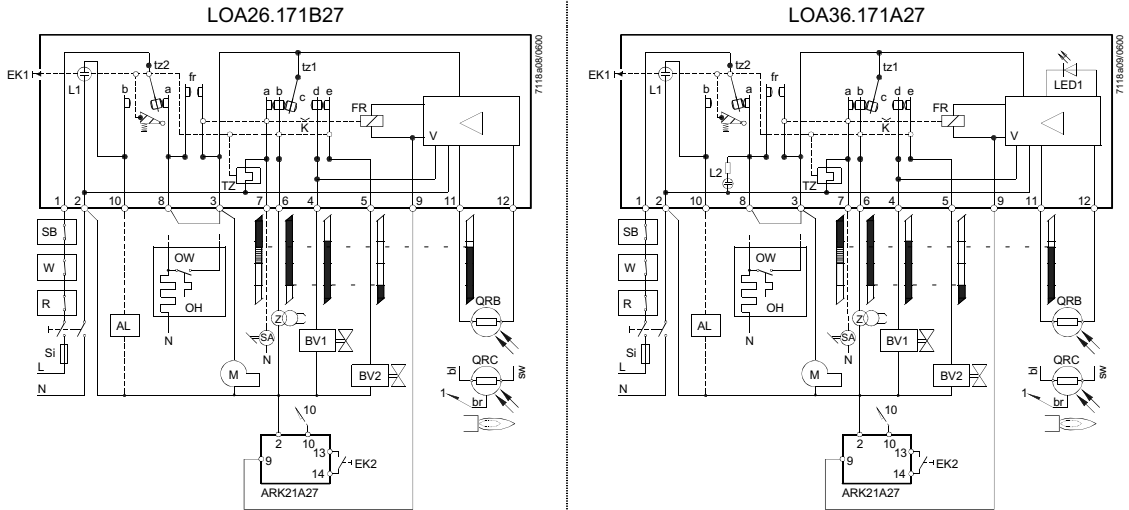
LOA25.173C27
LOA25.173C17
LOA28.173A27



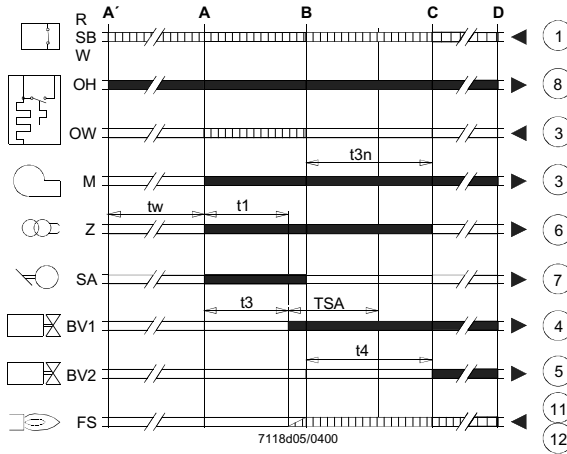
fr** Not provided with the LOA28.173A27

Connection diagram and internal diagram

With ARK21
remote lockout
reset module



Control sequence



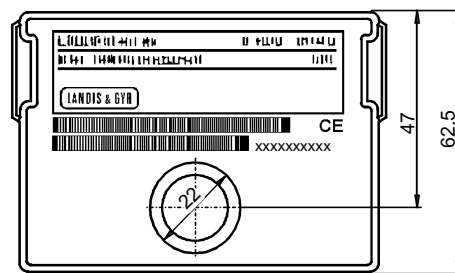
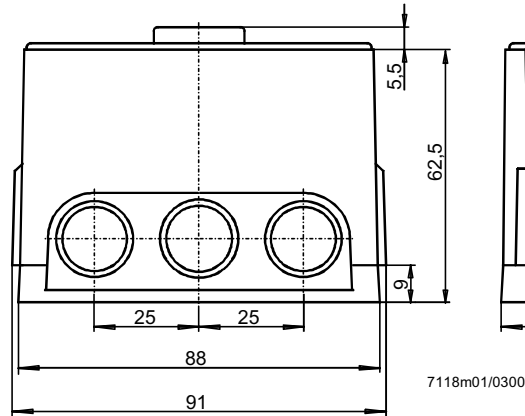
Legend

AL	Alarm device	OH	Oil pre-heater
BV...	Fuel valve	QRB	Photoresistive detector
EK1	Lockout reset button	QRC	Blue-flame detector
EK2	Remote lockout reset button	bl = blue	
FR	Flame relay with contacts «fr»	br = brown	
fr	Bridging contact for release contact of «OH»	sw = black	
FS	Flame signal	R	Pressurestat
K	Catch of flame relay for locking contact «tz1» in the event of premature flame signals or for locking this contact when the flame signal is correct	SA	Actuator with automatic setback
L1	Indication of faults (red)	SB	Safety limit thermostat
L2	Indication of operation (green)	Si	External primary fuse
LED1	Indication of flame strength (green)	TZ	Thermal-electric sequence switch
M	Burner motor	tz...	Contacts of «TZ»
OW	Release contact of oil pre-heater	W	Limit thermostat or pressure monitor
		V	Flame signal amplifier
		Z	Ignition transformer
t1	Pre-purge time	t4	Interval «BV1-BV2»
t3	Pre-ignition time	TSA	Ignition safety time
t3n	Long post-ignition time	tw	Waiting time for oil pre-heating
t3n'	Short post-ignition time		
A'	Beginning of the startup sequence with burners using an oil pre-heater	B	Time of flame establishment
A	Beginning of the startup sequence with burners using no oil pre-heater	C	Running position
		C-D	Burner operation
		D	Controlled shutdown by «R»
Control signals delivered by the LOA...		Required input signals	

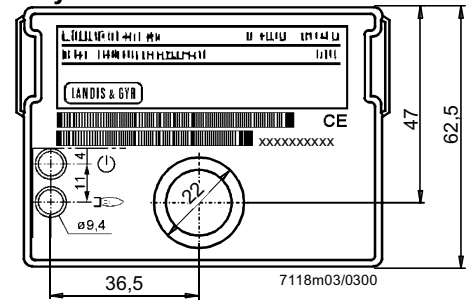
Dimensions

Dimensions in mm

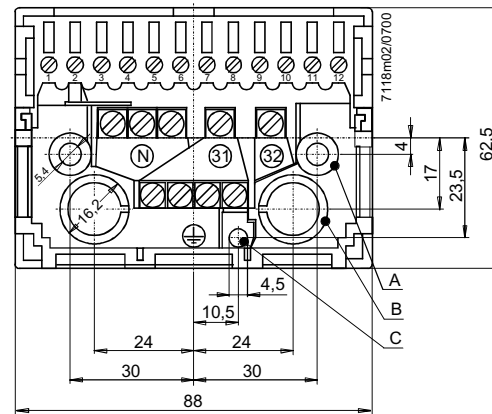
LOA... with AGK11
plug-in base and
AGK65 cable gland
holder



only LOA3...



AGK11 plug-in base



AGK11 Plug-in base with screw terminals

«A»: holes for fastening screws

«B»: holes for cable entry

«C»: earthing lug

«31» and «32»: auxiliary terminals

«N»: neutral terminals, connected to the neutral input (terminal 2)

Underneath:

4 earth conductor terminals, joining in a lug for earthing the burner

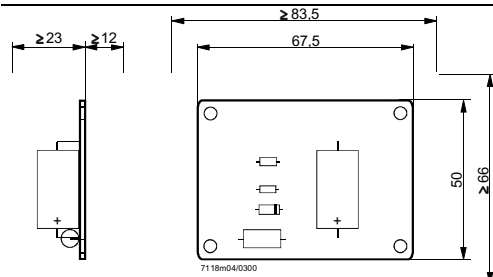
Hatched:

position of insertable AGK65 cable gland holder or AGK66 cable holder



Connection of earthing lug «C» and of fixing screw in «A» to the burner's ground (using a metric screw with a lockwasher or similar)

ARK21A27 remote
lockout reset module



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.

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