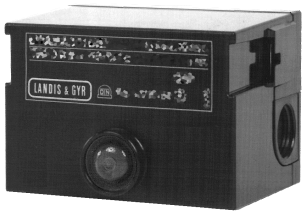
ISO 9001

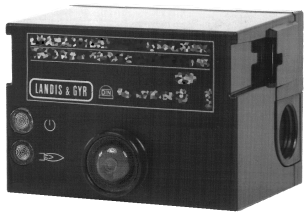
Oil Burner Controls

LOA2...
LOA3...

for single- or two-stage pressure-jet burners
with intermittent operation [1)]



LOA2...



LOA3...

Burner controls for automatic startup, control and supervision of pressure-jet oil burners with an oil throughput of up to 30 kg / h.
The burner controls are tested to EN 230 and CE-certified in compliance with the directives for electromagnetic compatibility.

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

Mechanical design

The **burner controls** are of plug-in design. The casing is made of impact-proof and heat-resistant plastic and accommodates the

– thermal-electric sequence switch which acts on a multiple snap-action switching system
– flame signal amplifier with the flame relay
– lockout reset button with integrated fault indication lamp

Ordering

Burner control	**refer to table overleaf**
Flame detectors	
– Photo-resistive detectors QRB1...	**refer to data sheet 7714**
– Blue-flame detectors QRC1...	**refer to data sheet 7716**
Plug-in base, without cable gland holder or without cable holder	
– With screw terminals	**AGK11**
Plug-in base, for clip connection [2)]	**AGK12**
– Clipses (single pieces in lots of 100) [2)]	**AGK 4 408 5625 0**
– Clipses (10,000 pieces on strap) [2)]	**AGK 4 408 5626 0**
– Mounting tool [2)]	**KF8883**
– Removal tool [2)]	**KF8884**
Cable gland holder for 5 x Pg11, for insertion in plug-in base	**AGK65**
Cable holder, for insertion in plug-in base and introduction of cable	**AGK66**
Spacer (empty casing), to increase the overall height of LOA...-types to LAB / LAI height	**AGK21**
Adapter, for replacing LAB1 / LAI... by LOA... (rewiring of plug-in base not required)	**KF8819**
Service adapter, with signal lamps for making a functional check and with jacks for making detector current measurements	**KF8833**
Remote reset module for use with LOA26... / LOA36... (printed circuit board)	**ARK21A27**

1) For safety reasons (self-test of flame supervision circuit, etc.), at least one controlled shutdown must take place every 24 hours

2) On request only

Type summary

The type references given in the table apply to burner controls **without** base and **without** flame detector.

Version	Voltage (VAC)	Type reference	Under-voltage detection	CE	t1 (s)	t3 (s)	t2 max. (s)	t3n (s)	t3n' (s)	t4 (s)	Replace-ment for:
Without bridging contact for the release contact of the oil pre-heater											
Standard version	220	**LOA21.171B27** 3)	–	–	13	13	10	15	–	15	LAB1, LAI1, LAI2 LAI2.2, LAI4
	110	**LOA21.171B17** 3)	–	–	13	13	10	15	–	15	
	220	**LOA21.173A27** 3)	–	–	13	13	10	20	2	20	
	220	**LOA28.173A27** 1)	x	–	13	13	10	2	–	15	–
With bridging contact (fr)** for the release contact of the oil pre-heater											
Standard version	220	**LOA22.171B27** 3)	–	–	13	13	10	15	–	15	LAI2.3
	110	**LOA22.171B17** 3)	–	–	13	13	10	15	–	15	LAI2.3
	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 plants or similar	220	**LOA25.173C27** 1)	x	–	13	13	10	2	–	15	LAB2
	110	**LOA25.173C17** 1)	x	–	13	13	10	2	–	15	LAB2

1) LOA25... and LOA28... can only be used with photo-resistive detectors QRB1...
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 infrared flicker detector IRD1010 (refer to data sheet 7120)

3) Since LOA21... and LOA22... do not feature undervoltage detection, they **do not** conform to EN 230

Legend

Times

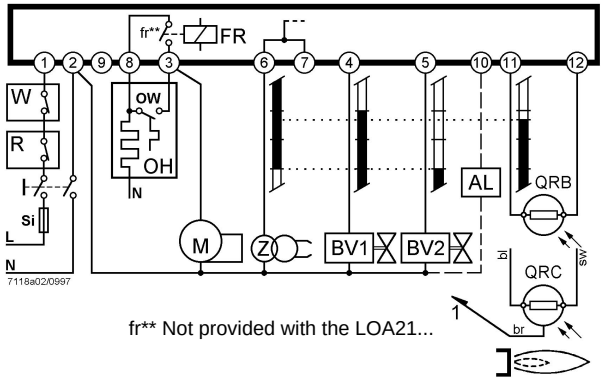
tw	Heating up time of «OH» until contact «OW» delivers a signal	t1	Pre-purge time
t2	Safety time	t3	Pre-ignition time
t3n	Long post-ignition time	t3n'	Short post-ignition time
t4	Interval from establishment of flame to release of the 2nd fuel valve		

Functions and components

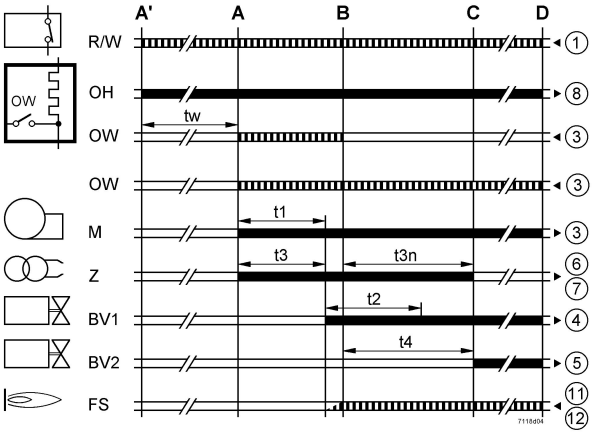
▬▬	Burner control output signals		
▯▯▯▯▯▯▯▯	Required input signals		
A'	Beginning of startup sequence with burners using an oil pre-heater «OH»	M	Burner motor
A	Beginning of startup sequence with burners using no oil pre-heater	K	Catch of flame relay for locking contact «tz1» in the case of premature flame signals or for locking this contact when flame signal is correct
B	Time of flame establishment	OH	Oil pre-heater
C	Running position	OW	Release contact of «OH»
D	Controlled shutdown by «R»	QRB	Photo-resistive detector
		QRC	Blue-flame detector bl = blue br = brown sw = black
AL	Alarm device		
BV	Fuel valve	R	Control thermostat or pressurestat
EK1	Lockout reset button	SA	Actuator with automatic setback
EK2	Remote lockout reset button	Si	External pre-fuse
FR	Flame relay	TZ	Thermal-electric sequence switch
fr**	Bridging contact for release contact of «OH»	tz...	Contacts of «TZ»
FS	Flame signal	V	Flame signal amplifier
LED1	Indication of flame strength (green)	W	Limit thermostat or pressure monitor
L1	Indication of faults (red)	Z	Ignition transformer
L2	Indication of operation (orange)		

Connection diagram, control sequence

LOA21.171B27
LOA21.171B17
LOA22.171B27
LOA22.171B17
LOA24.171B27
LOA24.171B17
LOA24.571C27



fr** Not provided with the LOA21...

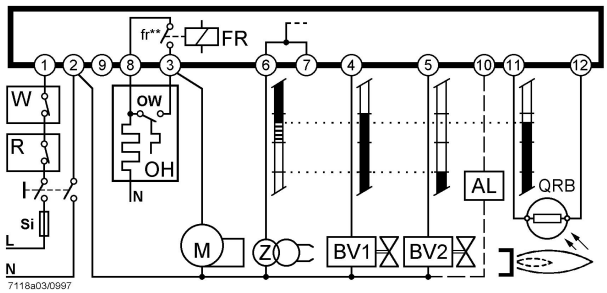


LOA22.171B27 / LOA22.171B17 / LOA24.171B27
LOA24.171B17 / LOA24.571C27

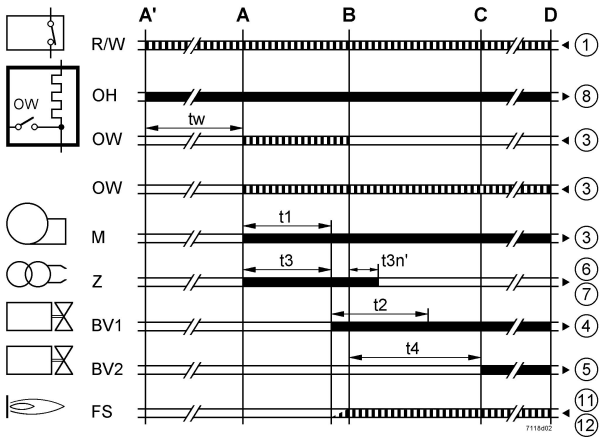
LOA21.171B27 / LOA21.171B17

These types of LOA… may **not** be used with blue-flame detectors QRC...

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



fr** Not provided with the LOA28.173A27

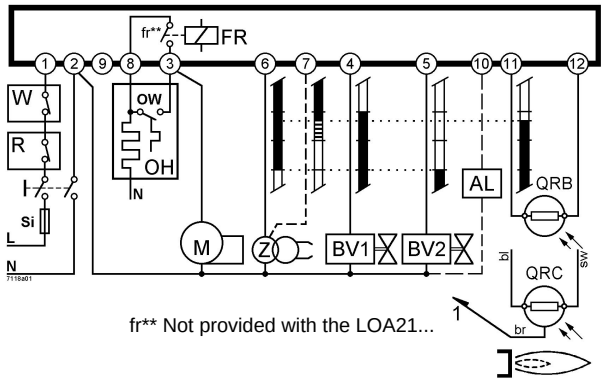


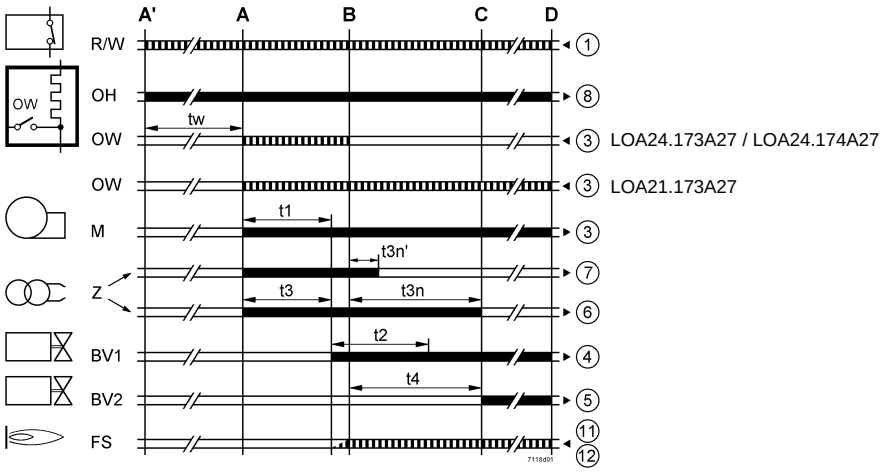
LOA25.173C27 / LOA25.173C17

LOA28.173A27

Connection diagram, control sequence

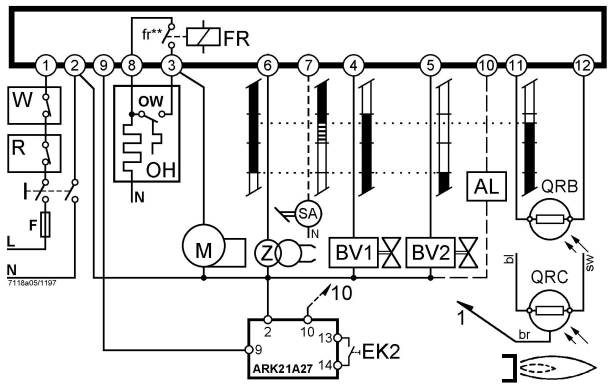
LOA21.173A27
LOA24.173A27
LOA24.174A27

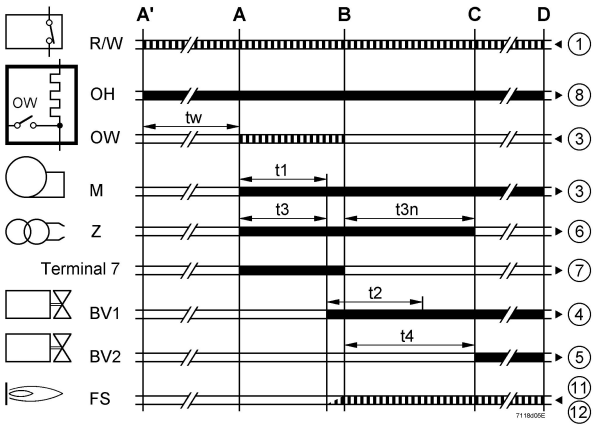




With remote reset module ARK21:

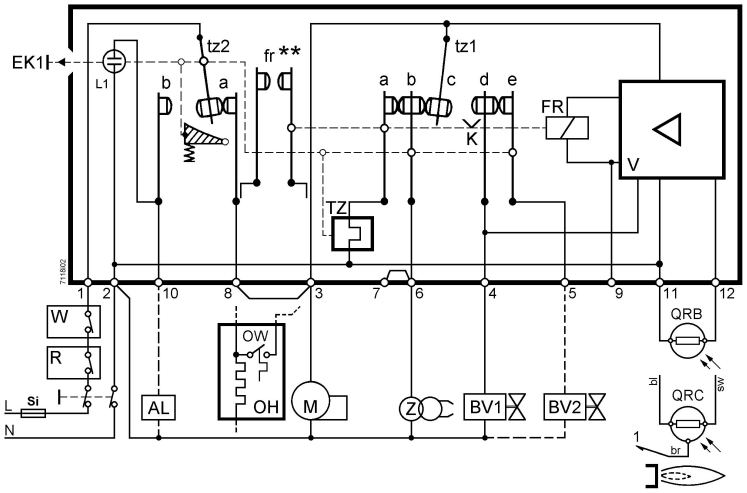
LOA26.171B27
LOA36.171A27





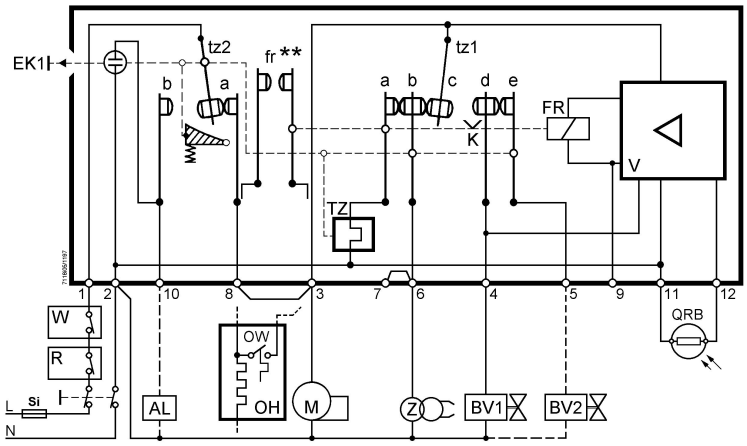
Internal diagram

LOA21.171B27
LOA21.171B17
LOA22.171B27
LOA22.171B17
LOA24.171B27
LOA24.171B17
LOA24.571C27



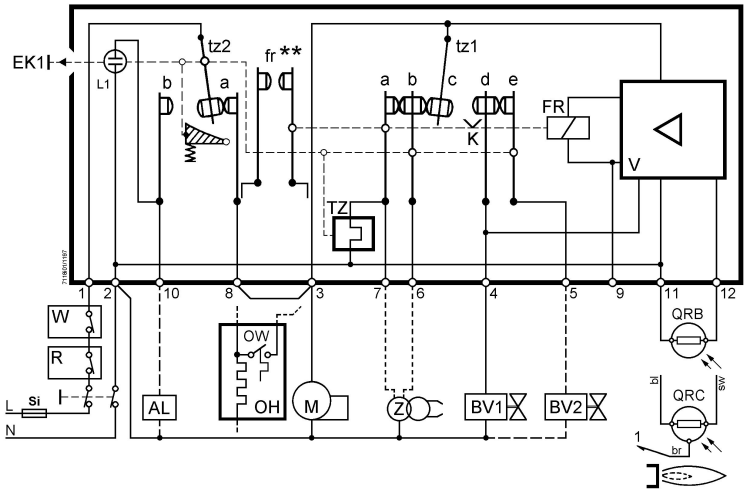
fr** Not provided with the LOA21...

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



fr** Not provided with the LOA28...

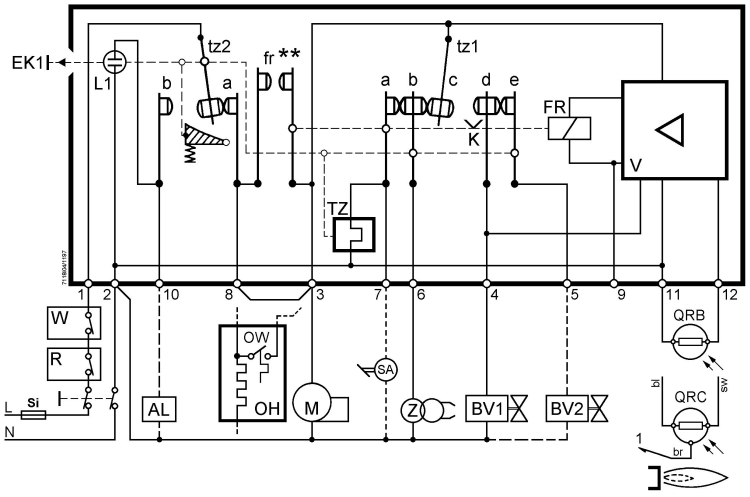
LOA21.173A27
LOA24.173A27
LOA24.174A27



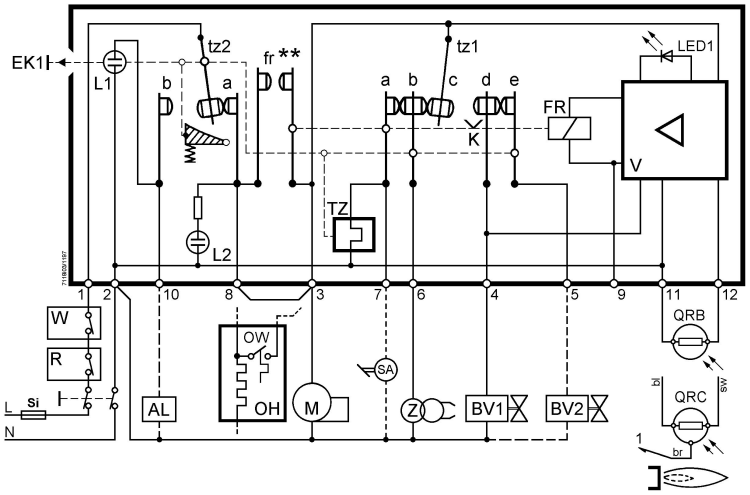
fr** Not provided with the LOA21...

Internal diagram

LOA26.171B27



LOA36.171A27



Control sequence in the event of faults

Whenever a fault occurs, the supply of fuel is immediately interrupted.

With every **lockout,** the control outputs will be de-energized in less than one second, while terminal 10 (AL) for the remote indication of lockout receives voltage.
The LOA… can be reset no earlier than **50 seconds** after lockout.

Extraneous light / premature flame signal

During the pre-purge time, **no** flame signal may be present.
If, however, a signal is delivered during this period of time, the LOA… locks out on expiry of the pre-purge and safety time. Under these circumstances, the oil valve **does not open.**

An erroneous flame signal can be caused, for instance, by
– premature establishment of flame due to a leaking oil valve
– extraneous light
– a short-circuit in the detector or its wiring
– faults in the flame signal amplifier, or similar

Exception: with the LOA25… and LOA28…, there will be **no lockout,** but burner startup will be prevented until the premature flame signal is no longer present.
This means that LOA25… and LOA28… may be used **only** where the requirements of EN 230 need not be met.

Non-appearance of flame

If, at the end of the safety time, there is no flame signal, the LOA… will immediately lock out.

If, with the LOA25… and LOA28…, there are flame signal failures of short duration during the safety time «t2» and the interval «t4», the ignition transformer will immediately be switched on again.

The total duration of the repeated ignition attempts equals the safety time «t2» (10 seconds).

Flame failure during operation

On flame failure during operation, the LOA… will immediately shut down the fuel supply and automatically recycle **(restart attempts)**.
If flame failure occurs **on completion** of «t4», almost the complete startup sequence will be restarted.

Undervoltage detection

With burner controls featuring **undervoltage detection,** an additional electronic circuit ensures that in the event of mains voltages below about 165 V, burner startup will be prevented, or - without opening the oil valve - the burner control locks out.

Indications

Fault position

The fault position is indicated by the lamp integrated in the reset button.

Flame strength

Only with the LOA36...

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

Operation

Only with the LOA36...

If the contact of the control thermostat «R» is closed, the orange LED is lit, thus indicating the start of the oil pre-heater's heating up phase (if fitted).

Technical data

Burner control

	Mains voltage	AC 220 V -15 %...240 V +10 % AC 100 V -15 %...110 V +10 %
	Mains frequency	50 Hz -6 %...60 Hz +6 %
	External pre-fuse (Si)	10 A, fast
	Input current to	
	- terminal 1	5 A (short-term 15 A during 0.5 s)
	- terminal 3	5 A (excl. burner motor and oil pre-heater)
	Permissible loading of terminals	
LOA21.171B27 **LOA21.171B17** **LOA22.171B27** **LOA22.171B17** **LOA24.171B27** **LOA24.171B17** **LOA24.571C27** **LOA25.173C27** **LOA25.173C17** **LOA28.173A27**	- Terminal 4 - Terminal 5 - Terminal 6 - Terminal 7 - Terminal 8 - Terminal 10	1 A 1 A 2 A 2 A 5 A 1 A
LOA21.173A27 **LOA24.173A27** **LOA24.174A27**	- Terminal 4 - Terminal 5 - Terminal 6 - Terminal 7 - Terminal 8 - Terminal 10	1 A 1 A 2 A 1.5 A 5 A 1 A
LOA26.171B27 **LOA36.171A27**	- Terminal 4 - Terminal 5 - Terminal 6 - Terminal 7 - Terminal 8 - Terminal 10	1 A 1 A 2 A 0.1 A 5 A 1 A

Environmental conditions

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

• Transport	IEC 721-3-2
– Climatic conditions	class 2K2
- Temperature range	-50...+60 °C
- Humidity	< 95 % r.h.
- Mechanical conditions	class 2M2
• Operation	IEC 721-3-3
– Climatic conditions	class 3K5
- Temperature range	-20...+60 °C
- Humidity	< 95 % r.h.
Power consumption	approx. 3 VA
Degree of protection of housing	IP40
Mounting position	optional
Weight	
- Burner control	180 g
- Base	80 g
- Cable gland holder	12 g
Indication of flame strength **(only with LOA36...)**	
- Min. detector current LED lit with QRB...	60 µA ±15 %
- Min. detector current LED lit with QRC...	40 µA ±15 %
CE conformity	to the directives of the EC 89/336 EEC incl. 92 / 31 EEC and 73 / 23 EEC

Flame detectors

For measurement circuits and lengths of detector cables, refer to data sheets 7714 (QRB…) and 7716 (QRC…).

At AC 230 V or AC 110 V mains voltage

QRB...

Burner control	QRB… detector current (typical)		
	Minimum required (with flame present)	Maximum permitted (without flame)	Maximum possible (with flame present)
LOA21.171B27	**70 µA**	**5.5 µA**	**210 µA**
LOA21.171B17			
LOA22.171B27			
LOA22.171B17			
LOA24.171B27			
LOA24.171B17			
LOA24.571C27			
LOA25.173C27			
LOA25.173C17			
LOA26.171B27			
LOA28.173A27			
LOA21.173A27	**45 µA**	**5.5 µA**	**45 µA**
LOA24.173A27			
LOA24.174A27			
LOA36.171A27	**70 µA**	**5.5 µA**	**900 µA**

QRC1A...C27

Burner control	QRC… detector current (typical)		
	Minimum required (with flame present)	Maximum permitted (without flame)	Maximum possible (with flame present)
LOA21.171B27	**70 µA**	**5.5 µA**	**110 µA**
LOA21.171B17			**90 µA at AC 110 V**
LOA22.171B27			
LOA22.171B17			
LOA24.171B27			
LOA24.171B17			
LOA24.571C27			
LOA26.171B27			
LOA25.173C27	—	—	—
LOA25.173C17			
LOA28.173A27			
LOA21.173A27	**45 µA**	**5.5 µA**	**45 µA**
LOA24.173A27			
LOA24.174A27			
LOA36.171A27	**70 µA**	**5.5 µA**	**110 µA**

Safety notes

Non-observance of the following safety notes may lead to unforeseen detrimental consequences, such as electric shock, explosion, environmental damage, etc.

- **In the geographical areas where DIN standards are in use, the installation must be in compliance with VDE requirements, particularly with the standards DIN / VDE 0100 and 0722!**
  In all other areas in compliance with the national and local standards and regulations.
- **All regulations and standards applicable to the particular application must be observed!**
- **Installation and commissioning work must always be carried out by qualified personnel!**
- **Ignition cables must always be laid separately, maintaining the greatest possible distance to the unit and other cables!**
- **Observe the notes on the laying of detector cables (refer to «Flame detectors»)!**
- **Check wiring carefully before putting the burner control into operation!**
- **LOA... are safety devices. It is therefore not permitted to open, interfere with or modify the units!**
- **The LOA... must be completely isolated from the mains before performing any work on it!**
- **Check all safety functions when putting the burner control into operation or after performing service work!**
- **Ensure protection against electric shock on the unit itself and on all electrical connections through appropriate mounting!**
- **Electromagnetic emissions must be checked from an application point of view!**
- **Always press reset button manually <u>without</u> using any tools or sharp-edged objects!**

Accessories

Adapters

KF8833

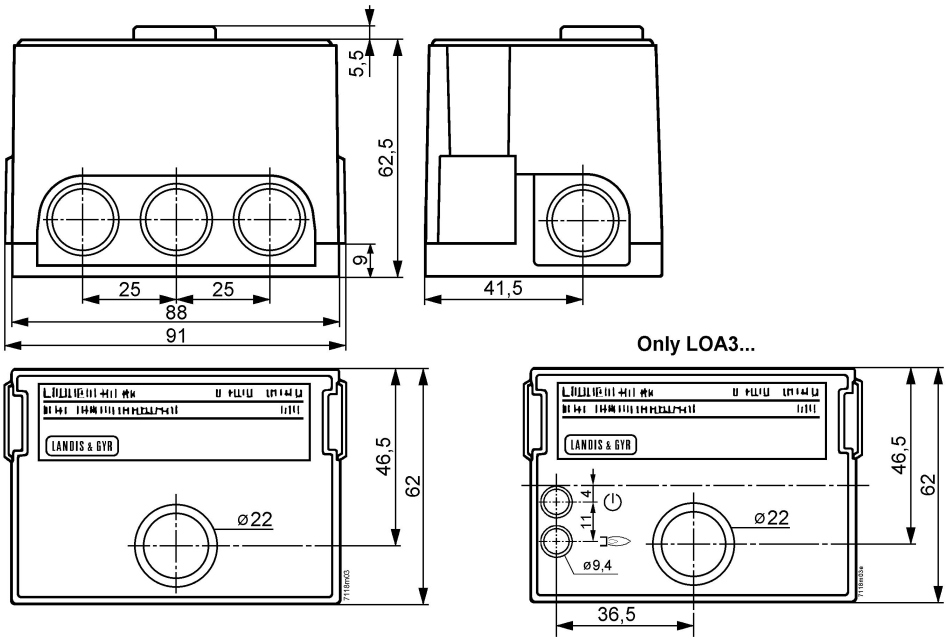
KF8819

For description of adapters, refer to **«Ordering»**.

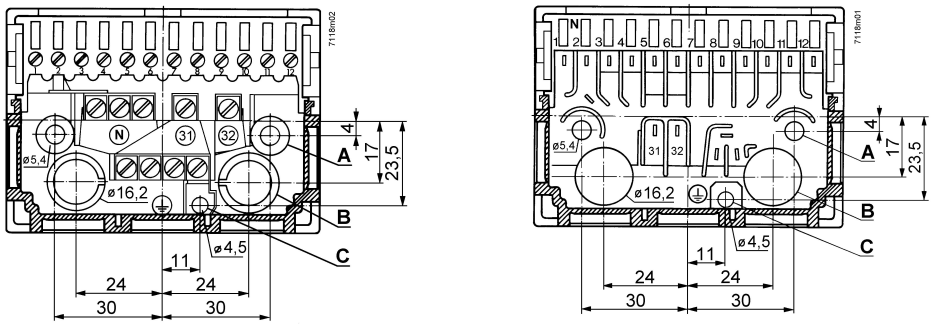
Dimensions

Dimensions in mm

Burner controls



Plug-in bases



AGK11
Plug-in base with screw terminals. Hatched: position of insertable cable gland holder or cable holder
«B»: holes for cable entry
«31», «32»: auxiliary terminals. «N»: neutral terminals, connected to neutral input (terminal 2)
Bottom: 4 earth terminals, joining a lug for earthing the burner

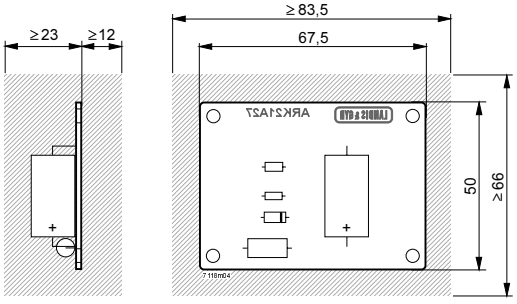
AGK12
Plug-in base for clip connections. Hatched: position of insertable cable gland holder or cable holder
«B»: holes for cable entry from below
Connection choices:

1, 3 and 4 each	max. 4 clips	Earthing: total of 6 clips,
2	max. 8 clips	connected to lug «C»
5 through 10 each	max. 3 clips	for earthing the burner
11, 12 each	max. 4 clips	
31, 32 each	max. 2 clips	

The two narrow sides of the base are provided with catches which engage in the casing when the latter is plugged in. To disengage the catches, a screwdriver must be **slightly** tilted in the appropriate guiding slots.

Mandatory (AGK11 and AGK12): connection of earthing lug «C» **and** of fixing screws in «A» to the ground of the burner (using a metric screw with lockwasher or similar).

Remote reset module ARK21A27



ARK21A27
Remote reset module for use with LOA26... / LOA36... (printed circuit board with no housing).
Degree of protection IP00, that is, 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!**