

# Gas Burner Controls

for natural draught burners  
with intermittent operation\*

# LGA...



FM739



## Application

The burner controls type LGA... are used for the startup and supervision of natural draught burners without fan of low to medium capacity.

The burner controls units are tested in accordance with EN298, EN50081-2 and CE certified on the basis of the guidelines on gas consumer devices and electromagnetic compatibility.

The flame is supervised with an ionization current detector electrode.

When used with the appropriate adapters, these burner controls replace their predecessor types LFI1 and LFI5 in terms of function and sizes (see «Ordering»).

Burner controls LGA41.173A27 and LGA52.171B27 may also be used for direct fired air heaters («WLE» according to DIN4794).

## Technical Data

### Burner control

Mains voltage	220 V -15%...240 V +10%
	100 V -15%...110 V +10%
Mains frequency	50 Hz -6%...60 Hz +6%
Power consumption	3 VA
Radio interference protection	N according to VDE 0875
Input current to terminal 1	5 A max.
Permissible terminal ratings	
- terminals 4 and 8	4 A max.
- terminals 6, 7 and 9	2 A max.
- terminals 5 and 10	1 A max.
Primary fuse	10 A max., slow
Protection standard	IP40
Perm. ambient temperatures	
- operation	0... +60°C <sup>1)</sup>
- transport and storage	-50... +60°C
Mounting position	optional
Weight, without / with base	approx. 180 / 260 g
Weight AGK65 or AGK66	approx. 12 g

1) For LGA41.173A27 and LGA52.171B27: -20...+60°C

### Supervision of ionization current

Voltage at the detector electrode	nominal voltage
Min. required ionization current	2 µA
Max. possible ionization current	approx. 100 µA
Max. perm. length of detector line	20 m (separate cable!)
Min. required insulation resistance between detector electrode with its connecting cable and earth	50 MΩ

### Identification code to EN298:

LGA...	A T C L X N	with two-stage operation
	A M C L X N	with single-stage operation

## Ordering

**Burner control** (without base) refer to page 2

**Plug-in base**, without cable gland and cable holder. Two holes of Ø 16.2 mm dia. for cable entry from below  
- With screw terminals  
- For clip connectors

AGK11  
AGK12

### Clips

- Separately, 100 pieces  
- On straps, 10,000 pieces

AGK 4 408 5625 0  
AGK 4 408 5626 0

### Mounting / demounting tool:

- Mounting tool  
- Demounting tool

KF 8883  
KF 8884

**Pedestal** (empty housing) for increasing the height of the LGA (62.5 mm) to that of the LFI1 or LFI5 (90 mm)

AGK21

**Cable gland holder**, for 5 x Pg11 can be pushed into the base

AGK65

**Cable holder**, can be pushed into the base with 6 knockout cable entries (without cable tension relief) of which there is one 8.8 mm dia. and one 17 mm dia. entry on the side and three 7 mm dia. and one rectangular opening 6x20 mm on the front

AGK66

**Adapter** for replacing LFI1 by LGA  
**Adapter** for replacing LFI5 by LGA

KF8828  
KF8829

**RC unit** for supervision of ionization current in networks with unearthead neutral

ARC 4 668 9066 0

\* For reasons of safety (self-testing of the flame supervision circuit, etc.), at least one controlled shutdown must be provided every 24 hours.

## Design Features

The controls are of plug-in type, suitable for installation in any position on burners, in control cabinets or control panels. The housing is made from impact-proof, heat resisting plastic and contains:

- The thermal sequencing device (compensated for ambient temperature), acting on a multiple snap-action switching system
- The flame signal amplifier with its flame relay, and
- The lock-out warning lamp with lock-out reset button (spray water proof).

The **plug-in baseplate** is also made from impact-proof, heat resisting plastic and contains 12 connecting terminals plus

- 3 neutral terminals (with terminal 2 prewired)
- 4 earth terminals with earthing lug for the burner
- 2 auxiliary terminals with terminal markings «31» and «32»

The bottom of the baseplate has 2 knock-out holes for the cable entry.

Another 5 threaded knock-out holes for the cable entry glands Pg11 or 3/4" UNP are in the **removable** cable gland holder, one at the two sides and three on the front of the holder. A removable cable holder is also available (see «Ordering»).

The two narrow sides of the baseplate are provided with catches which engage in the housing of the control when the latter is plugged in. To disengage the catches, a screwdriver must be slightly tilted in the appropriate guiding slots (when doing this, the control slightly lifts from the baseplate).

Length and width of the baseplate are identical to the dimensions of the LAI baseplate. Also maintained were the position and the diameter of the lock-out reset knob, the two fixing holes and the hole in the earthing lug for the burner.

### Recognition of under-voltage

In the event of undervoltages (approx. <165 V), the electronic circuit ensures that burner start is prevented.

## Types Summary

The type references contained in the following table refer to burner controls with **no base and other accessories**

Controls with detection of undervoltages	220...240V	LGA41.173A27	LGA41.153B27	LGA52.150B27	LGA52.171B27	LGA52.191B27	LGA63.191A27*
	100...110V	-	-	LGA52.150B17	-	-	-
Connection facility for auxiliary fan <sup>1)</sup>		-	-	x	x	x	x
Connection facility for pressure switch		-	-	x	x	x	x
Control outputs for gas valves		2	2	2	2	2	2
Safe against incorrect wiring of line and neutral		x	x	x	x	x	x

### Control sequence: ( Times in sec. )<sup>4)</sup>

		LGA41.173A27	LGA41.153B27	LGA52.150B27	LGA52.171B27	LGA52.191B27	LGA63.191A27*
t1	Pre-purge with auxiliary fan	15	10	approx. 13	approx. 13	approx. 13	approx. 13
t3	Pre-ignition	15	10	-	-	-	-
t3'	Ignition time from start of TSA	-	-	max. 5	4.5...7.5	7...10	max. 10
TSA	Safety time startup	10	5	5	4.5...7.5	7...10	10
TSA <sub>max.</sub>	Safety time startup max.	20	10	10	20	20	20
t3n	Ignition after flame establishment	max. 2	max. 1	-	-	-	-
t4	Interval BV1-BV2	approx. 13	approx. 18	approx. 18	approx. 13	approx. 23	approx. 23

### Control sequence in the event of faults:

• Faulty flame signal during t1 or t3	Lock-out <sup>2)</sup> prior to gas release	Lock-out <sup>2)</sup> prior to ignition and gas release
• No flame on completion of safety time TSA	Lock-out <sup>2)</sup>	Lock-out <sup>2)</sup>
• Flame failure during operation	Repetition	Repetition
• No air pressure signal during t1	-	No start
• Air pressure failure during operation	-	Controlled shutdown

### \* LGA63.191A27 features:

- Under voltage treshold: 178 V ±10 V
- Safety time startup: with smaller tolerance
- Flame signal amplifier: increased sensitivity, for typical application with pilot flame

1) The supervision of the auxiliary fan does not comply with EN298

2) Upon lock-out of the control, resetting is possible after approx. 60...90 s

4) All times given are valid for 220 V and 110 V  
For 240 V operation, the times indicated are to be multiplied by 0.7

## Flame Supervision with Detector Electrode

The conductivity and the rectifying effect of the hot flame gases are used for flame supervision.

For this purpose, an AC voltage is applied to the detector electrode which projects into the flame.

The current which flows in the presence of a flame (ionization current) produces the flame signal for the input of the flame signal amplifier.

The amplifier is designed such that it responds only to the **DC current component** of the flame signal, thereby ensuring that no short-circuit can be simulated between detector electrode and earth (since in that case an AC current would flow).

### Siting of detector electrode

- The detector electrode and ignition electrode must be so positioned that the ignition spark cannot arc-over to the detector electrode.
- The position and polarity of the ignition electrode can have a detrimental influence upon the value of the flame signal. Reversal of polarity of the primary connection to the ignition transformer will correct this fault in the majority of cases.
- As the burner bars form the counter-electrode, the burner must be so adjusted that the flame is stable and in good contact with the burner bars.

With pulsating flame or yellow burning flame, caused by air deficiency, a very low or even no ionization current is generated, which will result in the burner control going to lock-out.

## Electrical Connection of Detector Electrode

**It is important that signal transmission will take place with the smallest possible losses:**

- The length of line for flame detection must not exceed 20 m.
- The detector line must not be run together with other conductors in the same cable since line capacities reduce the magnitude of the flame signal.
- The insulation resistance between the detector electrode and ground must be at least 50 M $\Omega$ , even after a large number of operating hours.  
Prerequisite for this is not only high-quality heat-resistant insulation of the electrode cable, but also of the detector electrode itself (ceramic holder).

- A dirty detector electrode holder offers favourable conditions for surface leakage currents which reduce the magnitude of the flame signal.

- The burner (as the counter-electrode) must be correctly earthed, or else no ionization current will flow.

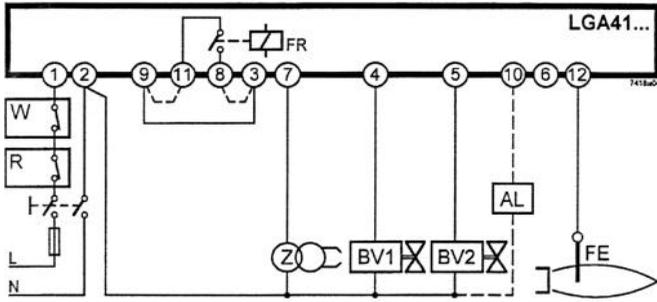
### Earthing of the boiler alone does not suffice!

In networks with **unearthed neutral** use RC unit 4 668 9066 0

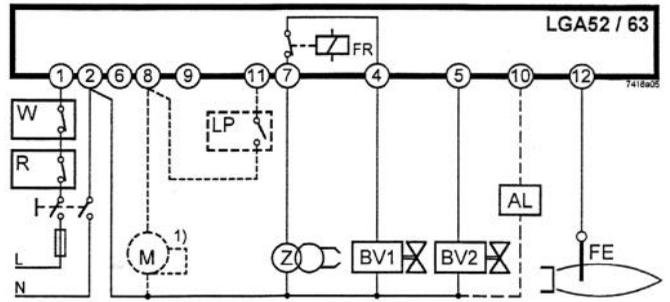
- The line, neutral and central point conductors must not be incorrectly connected to terminals 1 and 2 of the burner control; otherwise there will be no flame signal!

# Wiring Diagram and Control Sequence

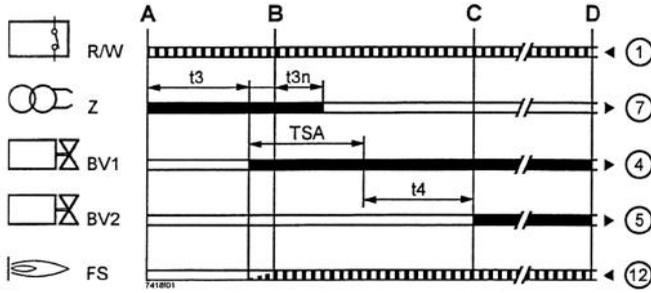
## LGA41...



## LGA52... / LGA63...

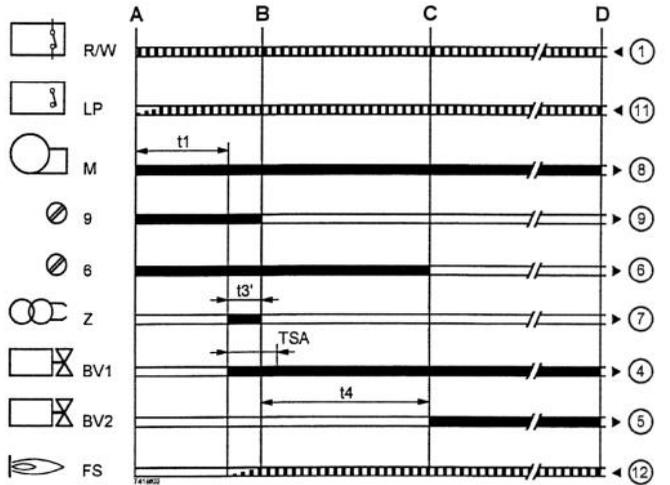


1) The supervision of the auxiliary fan does not comply with EN298



Required input signals  
Control signals of the control unit

A Commencement of startup  
B Time when flame is detected  
C Operating position  
D Controlled shutdown by «R»



## Internal Diagram LGA41...

### Function

When the switch on command is given, voltage is supplied to both the ignition transformer and the heating coil «TZ» of the bimetal sequencing device. The bimetal starts to bend and pushes contact set «c, d, e» towards «f».

On completion of the pre-ignition time, the system tilts, closing «e-f» and opening «f-g». Contacts «c-d» remain closed for a certain period of time («c» rests on «d»).

On establishment of the flame, the flame relay is energized, thereby **mechanically** latching «e-f» in its present position. In addition, the relay closes contact «fr» and opens simultaneously «c-d», so that both the ignition transformer and the bimetal heating coil «TZ» are switched off. Then «d» reverts slowly to its start

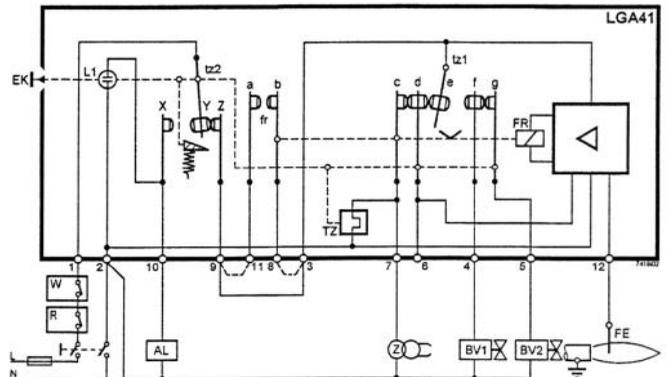
position, pushing simultaneously on «g». When retilting, «g-f» closes so that the main gas valve BV2 receives voltage.

If no flame signal is available, the flame relay does not open the contact «c-d», so that heating of the bimetal is not interrupted. The bimetal thus bends further until it tilts, thereby actuating contact «tz2»: → Lock-out.

In the event of an erroneous premature flame signal, the flame relay, by means of its latch, prevents contacts «e-f» from making, this means no gas release. «TZ», however, remains under voltage so that the bimetal bends further until, finally, lock-out is initiated by means of «tz2».

### Legend

- AL Fault status signal (alarm)
- BV Gas valve
- EK Lock-out reset button
- FE Flame detector electrode
- FR Flame relay
- FS Flame signal
- L Line
- L1 Lock-out warning lamp, internal
- N Neutral
- R Thermostat or pressurestat
- TZ Electro-thermal timer with contacts «tz...»
- W Temperature or pressure limiter
- Z Ignition transformer



## Internal Diagram LGA52... / LGA63...

### Function

When the switch on command is given, the auxiliary fan starts to run. When the air pressure switch closes its contacts, the heating coil of the bimetal sequencing device is energized and the bimetal pushes contact set «c, d, e» towards «f» (opening at the same time «f-g»). On completion of the pre-purge time, «e-f» is closed so that both the gas valve and the ignition transformer receive voltage simultaneously:

The safety time begins.

On establishment of the flame, the flame relay latches **mechanically** contacts «e-f», pushes at the same time «c» back and opens «fr». The ignition transformer is thus switched off and heating coil «TZ» de-energized, so that «d» can revert to its start position.

When retilting, «g-f» closes so that the main valves BV2 receives voltage.

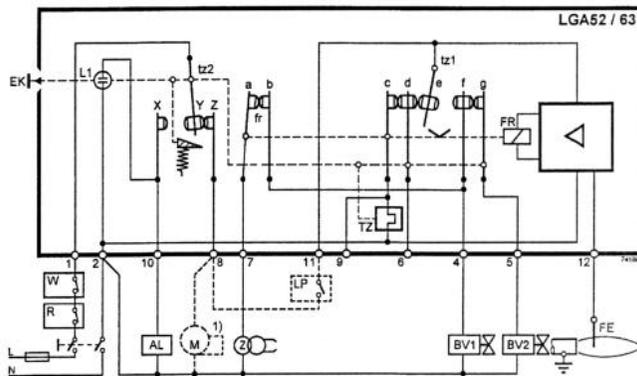
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In the event of an erroneous premature flame signal, the flame relay, by means of its latch, prevents contacts «e-f» from making, this means no gas release.

«TZ», however, remains under voltage so that the bimetal bends further until, finally, lock-out is initiated by means of «tz2».

### Legend

AL	Fault status signal (alarm)
BV	Gas valve
EK	Lock-out reset button
FE	Flame detector electrode
FR	Flame relay
FS	Flame signal
M	Auxiliary fan <sup>1)</sup>
L	Line
L1	Lock-out warning lamp, internal
LP	Air pressure switch
N	Neutral
R	Thermostat or pressurestat
TZ	Electro-thermal timer with contacts «tz...»
W	Temperature or pressure limiter
Z	Ignition transformer



1) The supervision of the auxiliary fan does not comply with EN298

### Notes on the Electrical Installation

- To isolate the burner control from the mains network, an all-polar isolator with a contact gap of least 3 mm is required.
- Protection against electric shock hazard on the burner control and on all associated electrical items must be ensured by appropriate mounting.
- The earthing lug in the terminal base must be secured with a metric screw and a lock washer or similar.
- Switches, fuses, earthing, etc. must be in compliance with local standards and regulations. External fuse max. 10A, slow.
- Phase conductor L must be connected to terminal 1 (otherwise no flame signal).
- Other limiters or similar the contacts of which must be closed from the start to controlled shutdown, are to be connected in series to «R» and «W».
- LGA41:** If the closed position of the main gas valve is to be checked during burner startup, the closed position contact must be included in the link between terminals 9 and 3.

In addition, the links between terminals 9 and 11 and 8 and 3 must be fitted.

- During the startup phase, terminal 6 is under voltage and must therefore **not be used** as an auxiliary terminal.
- The auxiliary contact of a gas valve for checking the fully closed position must be included in the loop between terminals 9 and 3.
- LGA52 / 63:** During the startup phase, terminals 6 and 9 are under voltage and must therefore **not be used** as auxiliary terminals.
- The load controller of 2-stage burners must be connected to terminal 5, in series with «BV2».

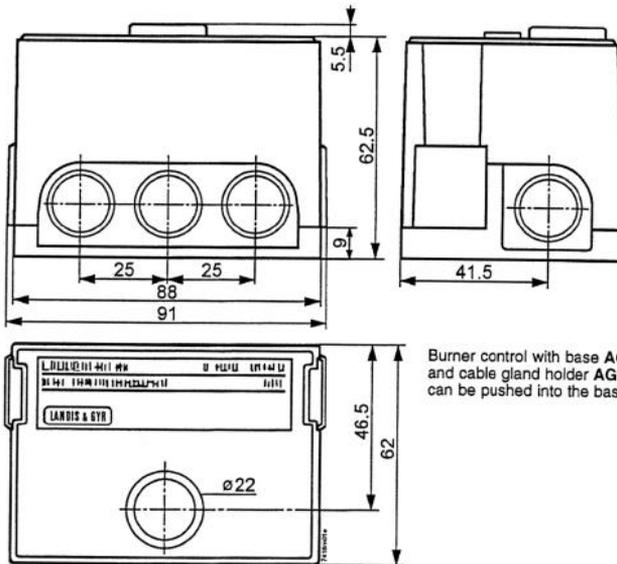
### Caution! Do not open burner control

Burner controls are safety devices.  
Any unauthorized interference can result in unforeseen detrimental consequences!

## Dimensions

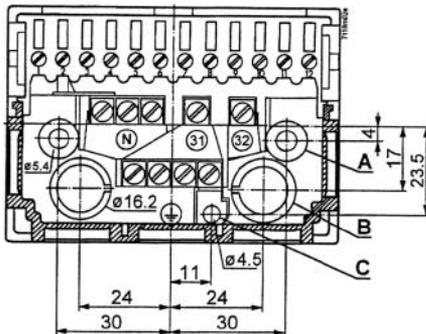
Dimensions in mm

### Burner controls



Burner control with base AGK11 and cable gland holder AGK65, can be pushed into the base

### Base



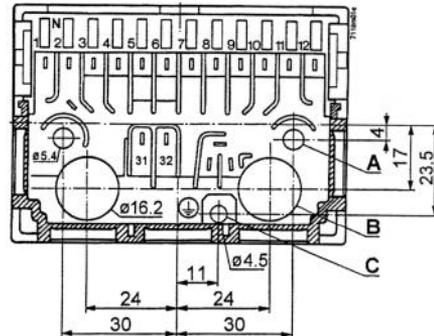
#### AGK11

Plug-in base with screw terminals. Hatched: Position of cable gland holder or cable holder, can be pushed into the base.

«B»: Holes for cable entry. «31» and «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 cable gland holder or cable holder, can be pushed into the base.

«B»: Holes for cable entry from below.

Connecting possibilities:

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

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