



ISO 9001

CE



## Gas Burner Controls

## LGA...

The LGA... are used for the startup and supervision of atmospheric gas burners of low to medium capacity, without fan assistance, in intermittent operation.

The LGA... and this data sheet are intended for use by OEMs which integrate the gas burner controls in their products.

### Use

The flame is supervised with an ionization current detector electrode. Using the appropriate adapters, the LGA... can replace their predecessor types LFI7... and LFI5... in terms of both function and size (refer to «Ordering»). LGA41.173A27 and LGA52.171B27 can also be used on direct fired air heaters (WLE to DIN 4794).

## Warning notes

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

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

- Before performing any wiring changes in the connection area of the LGA..., completely isolate the burner control from the mains supply
- Ensure protection against electric shock hazard by providing appropriate protection for the burner control's terminals
- 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 show any damage

## Mounting notes

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**The relevant national safety regulations must be complied with.**

Siting the detector electrode

- The ionization current detector electrode and the ignition electrode must be positioned such that the ignition spark cannot arc over to the detector electrode
- The position and the polarity of the ignition electrode can adversely affect the magnitude of the flame signal. Reversal of polarity of the ignition transformer's connections on the primary side usually solves the problem
- Since the burner bars form the earthed counter-electrode, the burner must be adjusted such that the flame is hot and stable and in firm contact with the burner bars.

With pulsating flames or yellow-burning flames resulting from lack of air, a very low or even no ionization current is generated so that the burner control will initiate lockout

- Installation and commissioning work may only be carried out by qualified staff
- Observe the permissible length and shielding of the detector cable (refer to «Technical data»)
- Always run the ignition cables separate from the unit and other cables while observing the greatest possible distances
- To isolate the burner control from the mains supply, use an all-polar switch with a contact gap of at least 3 mm
- Secure the earthing lug in the terminal base with a metric screw and a lockwasher or similar
- Switches, fuses, earthing, etc., must be in compliance with local regulations. Primary fuse max. 10 A (slow)
- Make absolutely certain that life conductor «L» is connected to terminal 1. Otherwise, no flame signal will be generated
- Connect the gas pressure monitor and other monitoring devices - whose contacts must be closed from startup to controlled shutdown - in series with «R» and «W»

Only with the LGA41...

- If the fully closed position of the main gas valve «BV2» shall be checked on startup, the closed position contact must be included in the loop between terminals 9 and 3. In addition, the connecting links between terminals 9 and 11 and 8 and 3 must be fitted
- During the startup sequence, terminal 6 carries voltage and may 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

Only with the LGA52... /  
LGA63...

- During the startup sequence, terminals 9 and 6 carry voltage and may not be used as auxiliary terminals
- Connect the load controller of two-stage burners to terminal 5 in series with «BV2»

Electrical connection of  
the ionization electrode

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

- The cable length may not exceed 20 m
- The detector line may not be run together with other conductors in the same cable since line capacitance reduces the magnitude of the flame signal
- The insulation resistance between the ionization electrode and ground must be a minimum of 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 soiled ionization electrode holder offers favourable conditions for surface leakage currents which reduce the magnitude of the flame signal
- The burner (acting as the counter-electrode) must be correctly earthed, or else no ionization current will flow



Earthing the boiler alone does not suffice!

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

- Live, neutral and central point conductors may not be incorrectly connected to terminals 1 and 2 of the burner control, or else no flame signal will be generated

## Mechanical design

LGA...	<p>The gas burner controls are of plug-in design, suitable for installation in any position on burners, in control cabinets or on control panels.</p> <p>The housing is made of impact-proof, heat-resistant plastic and accommodates:</p> <ul style="list-style-type: none"> <li>- The thermal sequencing device (ambient temperature-compensated) acting on a multiple snap action switching system</li> <li>- The flame signal amplifier with the flame relay, and</li> <li>- The lockout warning lamp and the lockout reset button (splash-proof)</li> </ul>
AGK11 plug-in base	Refer to data sheet 7201.
Undervoltage detection	In the event of undervoltage (below approximately AC 165 V), an electronic circuit ensures that the burner control will prevent burner startup.
Only with the LGA63.191A27	<ul style="list-style-type: none"> <li>• Undervoltage threshold: AC 178 V <math>\pm</math>10 V</li> <li>• «TSA»: smaller tolerance band</li> <li>• Flame signal amplifier: higher sensitivity, for typical applications with pilot flames</li> </ul>

## Type summary

The type references given in the table refer to burner controls with no base and no accessories.


Burner control with under-voltage detection	AC 220...240 V	LGA41.173A27	LGA41.153B27	LGA52.150B27	LGA52.171B27	LGA52.191B27	LGA63.191A27
	AC 100...110 V	---	---	LGA52.150B17	---	---	---
Connection facility for auxiliary fan <sup>1)</sup>		---	---	x	x	x	X
Connection facility for air pressure monitor		---	---	x	x	x	X
Control outputs for gas valves		2	2	2	2	2	2
Reversed polarity protection		x	x	x	x	x	x

1) Auxiliary fan not monitored to EN 298

## Ordering

<b>Gas burner control</b> without plug-in base	refer to «Type summary»
<b>Plug-in base</b> (refer to data sheet 7201)	<b>AGK11</b>
<b>Cable gland holder</b> (refer to data sheet 7201)	<b>AGK65</b>
<b>Cable holder</b> (refer to data sheet 7201)	<b>AGK66</b>
<b>Cable holder</b> (refer to data sheet 7201)	<b>AGK67...</b>
<b>Pedestal</b> (empty housing) For increasing the height of the LGA... (62.5 mm) to that of the LFI1... or LFI5... (90 mm)	<b>AGK21</b>
<b>Adapter</b> for replacing LFI1... by LGA...	<b>KF8828</b>
<b>Adapter</b> for replacing LFI5... by LGA...	<b>KF8829</b>
<b>RC unit</b> for the supervision of ionization currents in networks with unearthed neutral	<b>ARC 4 668 9066 0</b>

## 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 %
	Power consumption	3 VA
	Input current at terminal 1	max. 5 A
	Terminal rating	
	- Terminals 4 and 8	max. 4 A
	- Terminals 6, 7 and 9	max. 2 A
	- Terminals 5 and 10	max. 1 A
	Primary fuse	max. 10 A (slow)
	Degree of protection	IP40
	Mounting orientation	optional
	Weight	
	- Without plug-in base	approx. 180 g
	- With plug-in base	approx. 260 g
Environmental conditions	<b>Transport</b>	IEC 721-3-2
	Climatic conditions	class 2K2
	Temperature range	-50...+60 °C
	Humidity	< 95 % r.h.
	Mechanical conditions	class 2M2
	<b>Operation</b>	IEC 721-3-3
	Climatic conditions	class 3K5
	Temperature range	0...+60 °C for LGA41.173A27 and LGA52.171B27: -20...+60 °C
	Humidity	< 95 % r.h.
	 <b>Condensation, formation of ice and ingress of water are not permitted!</b>	
	<b>CE conformity</b>	
According to the directives of the European Union		
Electromagnetic compatibility EMC	89 / 336 EEC incl. 92 / 31 EEC	
Directives for gas-fired appliances	90 / 396 EEC	
Flame rectification probe	Voltage between ionization electrode and ground	mains voltage
	Required detector current	min. 2 µA
	Possible detector current	max. approx. 100 µA
	Detector line length	max. 20 m (separate cable)
	Required insulation resistance between ionization electrode with its cable and ground	min. 50 MΩ
	<b>Identification code to EN 298</b>	
	<b>A T C L X N</b>	two-stage
<b>A M C L X N</b>	single-stage	

## Function

Control sequence (times in seconds) <sup>1)</sup>

	AC 220...240 V	LGA41.173A27	LGA41.153B27	LGA52.150B27	LGA52.171B27	LGA52.191B27	LGA63.191A27
	AC 100...110 V	---	---	LGA52.150B17	---	---	---
t1	Pre-purging 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	Ignition safety time	10	5	5	4.5...7.5	7...10	10
TSAmax.	Max. ignition safety time	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

<sup>1)</sup> All times specified are valid for AC 220 V and AC 110 V respectively  
For AC 240 V operation, the above times must be multiplied by 0.7

Control sequence in the event of fault

Erroneous flame signal during «t1» or «t3»	Lockout <sup>2)</sup> prior to the release of gas	Lockout <sup>2)</sup> prior to ignition and the release of gas
No flame on completion of «TSA»	Lockout <sup>2)</sup>	Lockout <sup>2)</sup>
Flame failure during operation	Repetition	Repetition
No air pressure signal during «t1»	---	No start
Air pressure failure during operation	---	Shutdown

<sup>2)</sup> After lockout, the burner control can be reset after about 60...90 seconds

Flame supervision with ionization electrode

The conductivity and the rectifying effect of hot flame gases are used for flame supervision. For this purpose, an AC voltage is applied to the ionization electrode which projects into the flame.

The current that flows in the presence of a flame (ionization current) generates the flame signal which is then fed to the input of the flame signal amplifier.

The amplifier is designed such that it only responds to the DC current component of the flame signal, thus ensuring that a short-circuit between ionization electrode and ground cannot simulate a flame signal (since in that case, an AC current would flow).

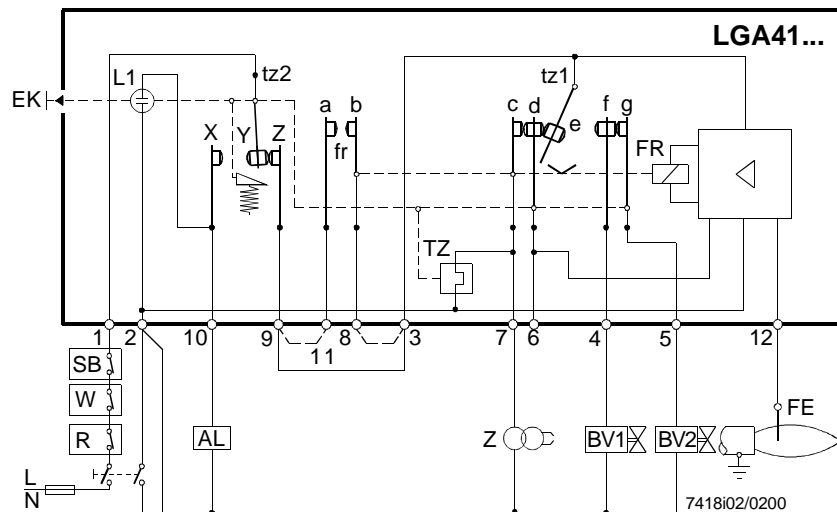
Internal diagram  
LGA41...

When the switch-on command is given, power is supplied to both the ignition transformer and the heating coil of the bimetal sequencing device.  
The bimetal bends and pushes contact set «c, d, e» towards «f».  
On completion of the pre-ignition time, the system tilts so that «e - f» closes and «f - g» opens.  
Contacts «c - d» still remain closed («c» resting on «d»).

On flame establishment, the flame relay is energized, latching mechanically «e - f» in the position now assumed.  
The relay also closes contact «f» and, at the same time, opens «c - d», so that the ignition transformer and the bimetal heating element will be switched off.  
Then, «d» slowly returns to its starting position, also catching «g».  
When tilting back, «g - f» closes, so that the main gas valve «BV2» will be energized.

If no flame signal is generated, the flame relay does not open «c - d», so that the bimetal will continue to be heated.  
The bimetal thus continues to bend until – tilting – it actuates contact «tz2»: → Lockout.

In the event of an erroneous premature flame signal, the flame relay – by means of its latch - prevents «e - f» from making, which means no release of gas.  
«TZ», however, remains under voltage, so that the bimetal continues to bend until, eventually, lockout is initiated by «tz2».



Legend

AL	Fault status signal	SB	Safety limit thermostat
BV...	Fuel valve	TZ	Electro-thermal timer (bimetal system) with contacts «tz»
EK	Lockout reset button	W	Thermal reset limit thermostat or manual reset safety limit thermostat
FE	Ionization current detector electrode	Z	Ignition transformer
FR	Flame relay		
L1	Built-in lockout warning lamp		
R	Thermostat or pressurestat		

Internal diagram  
LGA52... / LGA63...

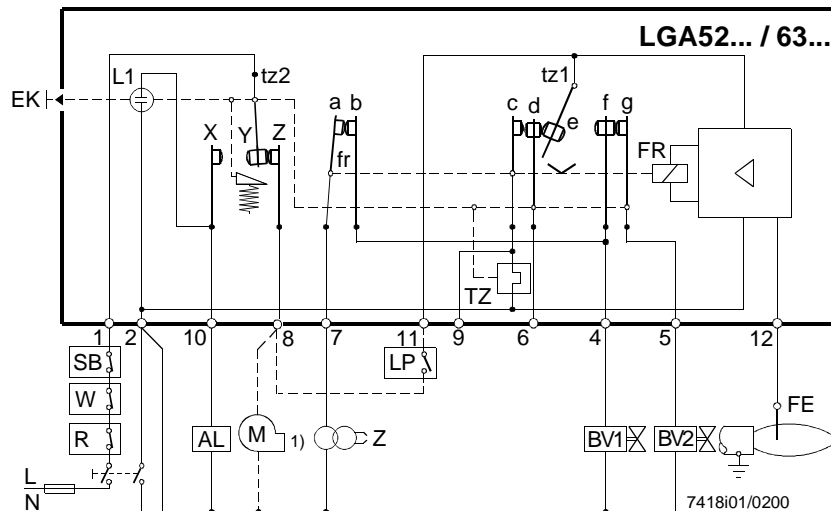
When the switch-on command is given, the auxiliary fan starts to run.  
 When the air pressure monitor closes its contact, the heating coil of the bimetal sequencing device is energized and the bimetal pushes contact set «c, d, e» towards «f» (thereby opening «f - g»).

On completion of the pre-purge time, «e - f» is closed so that both the gas valve «BV1» and the ignition transformer receive voltage: the safety time starts.  
 On flame establishment, the flame relay latches mechanically «e - f», pushes «c» back at the same time and opens «fr».

The ignition transformer is thus switched off and the heating coil de-energized, so that «d» can revert to its starting position.  
 When tilting back, «g - f» closes, so that the main gas valve «BV2» receives voltage.

If no flame signal is generated, the flame relay does not open «c - d», so that the bimetal will continue to be heated.  
 The bimetal thus continues to bend until – tilting – it actuates contact «tz2»: → Lockout

In the event of an erroneous premature flame signal, the flame relay – by means of its latch - prevents «e - f» from making, which means no release of gas.  
 «TZ», however, remains under voltage, so that the bimetal continues to bend until, eventually, lockout is initiated by «tz2».



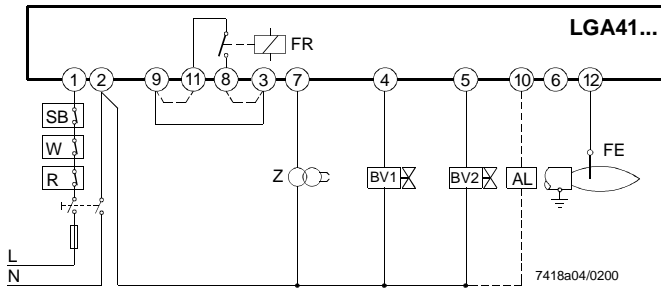
Legend

AL	Fault status signal	R	Thermostat or pressurestat
BV...	Fuel valve	SB	Safety limit thermostat
EK	Lockout reset button	TZ	Electro-thermal timer (bimetal system) with contacts «tz»
FE	Ionization current detector electrode	W	Thermal reset limit thermostat or manual reset safety limit thermostat
FR	Flame relay	Z	Ignition transformer
L1	Built-in lockout warning lamp	1)	Not monitored to EN 298
LP	Air pressure monitor		
M	Auxiliary fan		

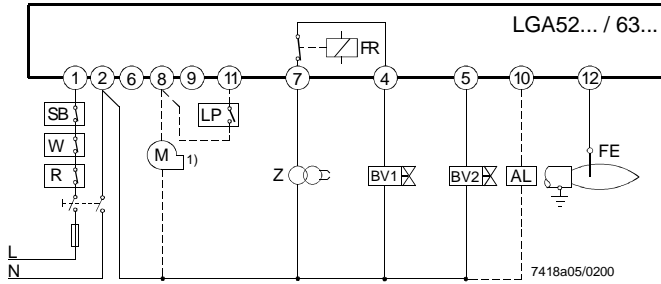


## Connection diagram

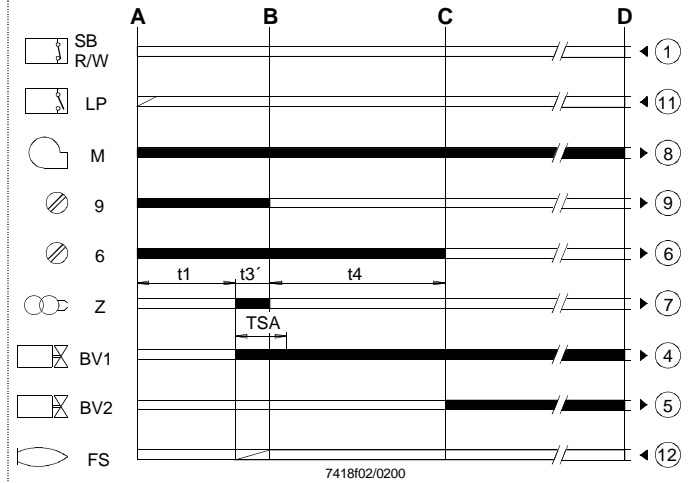
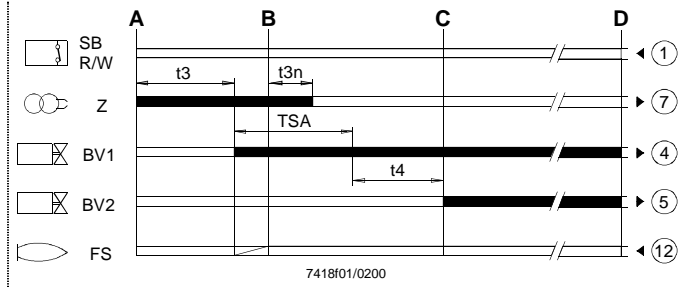
### LGA41...



### LGA52... / LGA63...



## Control sequence



## Legend

AL Fault status signal  
 BV... Fuel valve  
 FE Ionization electrode  
 FR Flame relay  
 FS Flame signal  
 LP Air pressure monitor

Required input signals  
 Burner control's output signals

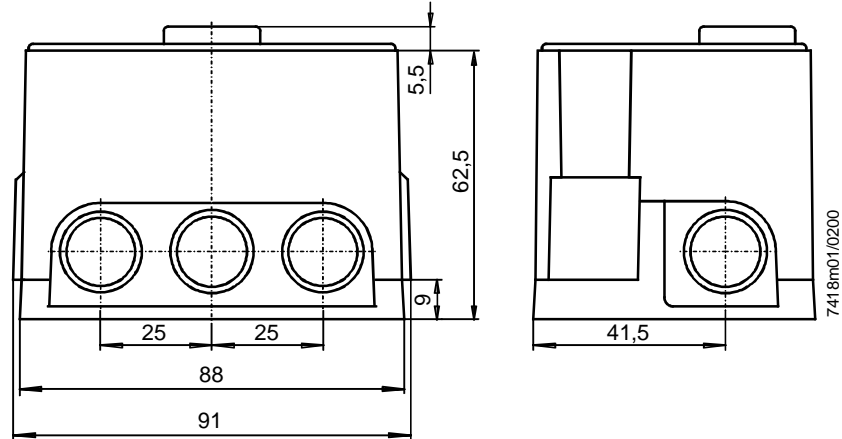
A Commencement of startup sequence  
 B Time of flame establishment  
  
 t1 Pre-purging with auxiliary fan  
 t3 Pre-ignition  
 t3' Ignition time from the start of «TSA»

M Auxiliary fan  
 R Thermostat or pressurestat  
 SB Safety limit thermostat  
 W Thermal reset limit thermostat or manual reset safety limit thermostat  
 Z Ignition transformer  
  
 1) Not monitored to EN 298  
  
 C Operating position  
 D Controlled shutdown by «R»  
  
 t3n Ignition on flame establishment  
 t4 Interval «BV1 – BV2»  
 TSA Ignition safety time

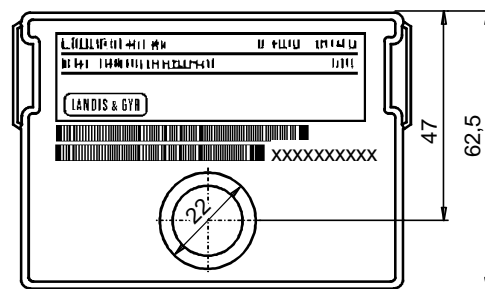
## Dimensions

Dimensions in mm

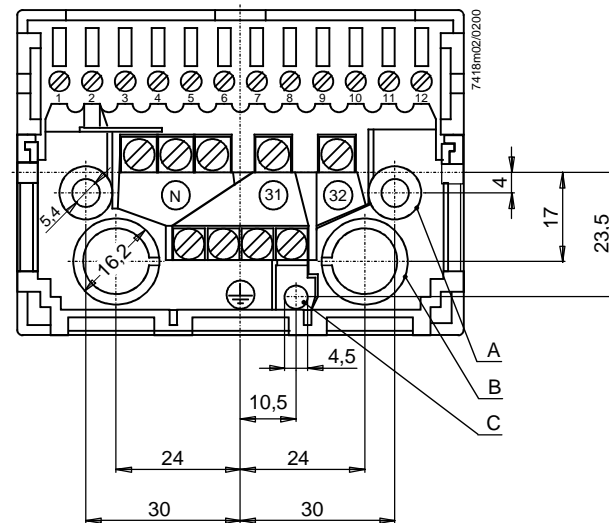
LGA...



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



AGK11 plug-in base



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)

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

Also refer to data sheet 7201

### Mandatory:

Earthing lug «C» and fixing screws in «A» must be connected to burner ground (using a metric screw with a lockwasher or similar).

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