



ISO 9001



## Burner Controls

## LGB...

The LGB... are designed for use with burners of small to medium capacity, with or without fan assistance, in intermittent operation.

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

### Use

The LGB... burner controls are used for the startup and supervision of single- or two-stage gas or gas / oil burners having a capacity of up to about 350 kW in intermittent operation.

The flame is supervised with either an ionization current detector electrode, a QRC1... blue-flame detector for forced draught gas / oil burners, or a UV detector QRA... (with AGQ1... auxiliary unit), depending on the type of burner control.

When used with the respective adapters, the LGB... burner controls replace their predecessor types LFI7..., LFM1... and LFD... in terms of function and size (also refer to «Replacement types» under «Ordering»).

Other application-related features:

- Undervoltage protection in compliance with the relevant standards
- Air pressure supervision with functional check of the air pressure monitor during startup and operation
- Choice of electrical remote reset
- LGB41... for use with atmospheric gas burners

## 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 LGB..., completely isolate the burner control from the mains supply
- Ensure protection against electric shock hazard by providing adequate 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 exhibit any visible damage

## Mounting notes

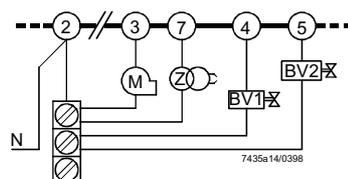
- The relevant national safety regulations must be complied with
- The ionization current detector electrode and the ignition electrode must be positioned such that the ignition spark cannot arc over to the detector electrode

## Installation notes

- Installation and commissioning work may only be carried out by qualified staff
- Observe the permissible length and shielding of the detector cables (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
- Switches, fuses, earthing, etc., must be in compliance with local regulations
- Secure the earthing lug in the base with a metric screw and a lockwasher or similar
- The connection diagrams show the burner controls with an earthed neutral. In networks with **non-earthed** neutral and ionization current supervision, terminal 7 must be connected to the earth conductor via an RC unit.

**Ordering number of RC unit: ARC 4 668 9066 0**

- The maximum permissible current rating of the connection terminals may not be exceeded
- No external mains voltage may be fed to the control outputs of the burner control. Hence, when testing the devices controlled by the burner control (gas valves or similar), the burner control may **never** be plugged in
- **In the case of burners with no fan assistance, the AGK25 must be connected to terminal 3 as a burden, or else the burner cannot be started**
- For safety reasons, it is a mandatory to feed the neutral wire to the neutral distributor in the plug-in base or to terminal 2 and, from there, to the different pieces of equipment (fan, ignition transformer and gas valves), or to an external neutral distributor
- Correct connection via the neutral distributor in the plug-in base:



Electrical connection of ionization and UV detectors

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

- With both ionization current and UV supervision, the cable length for flame detection may not exceed **20 m**
- With both ionization current and UV supervision, 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 ionization current detector electrode and ground must be a minimum of 50 MΩ, even after a large number of operating hours. Prerequisite is not only high quality heat-resistant insulation of the electrode cable, but also of the ionization current detector electrode itself (ceramic holder)
- A soiled electrode holder offers favourable conditions for surface leakage currents which reduce the magnitude of the flame signal
- The burner (being the counter-electrode) must be correctly earthed, or else no ionization current will flow.  
Earthing the boiler alone does not suffice!
- Live, neutral and central point conductors may **not** be incorrectly connected to terminals 2 and 12 of the burner control, or else no flame signal will be generated
- **For electrical connection of the QRC1... blue-flame detector, refer to data sheet 7716**



**Commissioning notes**

- Commissioning and maintenance work may only be carried out by qualified staff
- When commissioning the plant for the first time, when doing maintenance work, or after longer off periods, make the following safety checks:

a)	Burner startup without flame signal	Lockout at the end of «TSA»
b)	Burner startup with flame signal	Lockout at the beginning of the pre-purge time «t1»
c)	Normal burner start after a new startup attempt; turn flame signal off when flame is detected	Immediate lockout

**Mechanical design**

**Burner control**

The compact housing of the plug-in type burner controls (measuring 91 x 62 x 63 mm, including the plug-in base) is made of impact-proof and heat-resistant plastic and accommodates the

- programming mechanism with the synchronous motor
- electronic flame signal amplifier with the flame relay and the other switching devices
- lockout reset button with its integrated fault indication lamp

Plug-in base AGK11

Refer to data sheet 7201.

Cable gland holder AGK65

Refer to data sheet 7201.

Cable holder AGK66

Refer to data sheet 7201.

Cable holder AGK67...

Refer to data sheet 7201.

## Type summary

The type references given below refer to burner controls with **no** plug-in base and with **no** flame detector.

For ordering information on plug-in bases and other accessories, refer to «Mechanical design», «Ordering», «Flame supervision ...» and «Technical data».

Type of flame detector	Type reference	Approved in:	tw/s	t1/s	TSA/s	t3n/s	t3/s	t4/s	t5/s	t10/s	t11/s	t12/s	t20/s
			ca.	min.	max.	ca.	ca.	ca.	6) max.	min.	3) max.	3) max.	ca.
<b>Burner controls featuring air damper control for pre-purging with low-fire air volume</b>													
Ionization electrode (FE) or UV detector QRA...	<b>LGB21.130A27</b> 4)7)	CH, EU, S, SF	8	7	3	2.4	2	8	---	5	---	---	6
	<b>LGB21.230A27</b> 5)	CH, EU, S, SF	8	15	3	2.4	2	8	---	5	---	---	38
	<b>LGB21.330A27</b> 5)	CH, EU, H, S, SF	8	30	3	2.4	2	8	---	5	---	---	23
	<b>LGB21.350A27</b> 5)7)	CH, EU, H, S, SF	8	30	5	4	2	10	---	5	---	---	21
	<b>LGB21.550A27</b> 5)	AUS, CH, EU	8	50	5	4	2	10	---	5	---	---	2
<b>Burner controls featuring air damper control for pre-purging with nominal load air volume</b>													
Ionization electrode (FE) or UV detector QRA...	<b>LGB22.130A27</b> 4)	CH, EU, N, S	9	7	3	2.4	3	8	---	3	12	12	21
	<b>LGB22.230B27</b> 5)	CH, EU, N, S, SF	9	20	3	2.4	3	8	---	3	16.5	16.5	2
	<b>LGB22.330A27</b> 5)7)	AUS, CH, EU, H, N, S, SF	9	30	3	2.4	3	8	---	3	12	11	2
	<b>LGB22.330A270</b> 5)8)	EU	9	30	3	2.4	3	8	---	3	12	11	2
Blue-flame detector QRC1...	<b>LGB32.130A27</b> 4)1)	CH, EU	9	7	3	2.4	3	8	---	3	12	12	21
	<b>LGB32.230A27</b> 5)1)	CH, EU	9	20	3	2.4	3	8	---	3	16.5	16.5	2
	<b>LGB32.330A27</b> 5)	CH, EU	9	30	3	2.4	3	8	---	3	12	11	2
	<b>LGB32.350A27</b> 5)	CH, EU	9	30	5	4.4	1	10	---	3	12	9	2
<b>Burner controls for atmospheric burners</b>													
Ionization electrode (FE) or UV detector QRA...	<b>LGB41.255A27</b>	EU	18	---	5	4	2	10	5	---	---	---	10
	<b>LGB41.258A27</b> 2)5)7)	CH, EU, H, SF	18	---	5	4	2	10	9	---	---	---	10

### Legend

tw	Waiting time	1)	On request
t1	Checked pre-purge time	2)	For atmospheric burners up to 120 kW
TSA	Ignition safety time	3)	Maximum running time available for actuator
t3n	Post-ignition time	4)	Also for flash steam generators
t3	Pre-ignition time	5)	Also for stationary direct fired air heaters
t4	Interval «BV1-BV2» or «BV1-LR»	6)	«t5» + reaction time of flame relay
t5	Second safety time (only with LGB41...)	7)	Also available for AC 100...110 V, in which case the last two digits read ...17 in place of ...27
t10	Specified time for air pressure signal	8)	Without internal microfuse. Use only in connection with an AGK86... base or with an external microfuse 6.3 A (slow)!
t11	Programmed opening time for actuator «SA»		
t12	Programmed closing time for actuator «SA»		
t20	Interval up to self-shutdown of programming mechanism		

**Burner control**, without plug-in base refer to «Type summary»

**Flame detectors**

- Ionization current detector electrode supplied by thirds
- UV detectors QRA... refer to data sheet 7714
- Blue-flame detectors QRC1... refer to data sheet 7716

**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...**



**RC unit** for the supervision of ionization currents in networks with **non-earthed** neutral **ARC 4 668 9066 0**



**PTC resistor** to burden terminal 3, mandatory with burners with no fan motor connected to terminal 3 **AGK25** (AC 230 V)



**Auxiliary unit for UV supervision**, can be fitted in the LGB... plug-in base; height 27.5 mm **AGQ1.1A27** (cable length 500 mm)  
**AGQ1.2A27** (cable length 300 mm)



**Pedestal** (empty housing) for increasing the height of the LGB... (62.5 mm) to that of the LFM... or LFI7... (90 mm) **AGK21**



**Service adapter**, with signal lamps for functional check, detector current measurement, etc., of the burner control **KF8872**



**Test case**, for checking the burner control's functions **KF8843**

**Adapters / replacement types**

For burner controls LFI7..., LFM1... and LFD... (no rewiring required)

LGB21... with adapter	KF8852		LFI7...
	KF8880		LFM1... LFM1...-F
	KF8857		LFD1...
LGB22... with adapter	KF8853-K		LFI7...
	KF8880		LFM1...
LGB41... with adapter	KF8862		LFM1...
	KF8858		LFD2.35

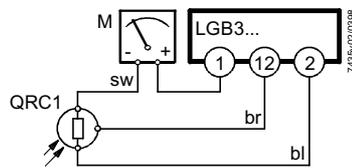
## Technical data

General unit data LGB...	Mains voltage	AC 220 V –15 % ...AC 240 V +10 % (LGB2... / LGB4...) AC 230 V –15 % / +10 % (LGB32..!) AC 100 V –15 % ...AC 110 V +10 %	
	Mains frequency	50...60 Hz ±6 %	
	Input current at terminal 12	max. 5 A within the perm. voltage range, that is AC 187...264 V or AC 195...253 V	
	Terminal rating		
	- Terminal 3	max. 3 A ( 15 A for max. 0.5 s)	
	- Terminals 4, 5 and 7	max. 2 A	
	- Terminal 10	max. 1 A	
	- Terminal 12	max. 5 A (at U <sub>max</sub> . AC 264 V or AC 253 V)	
	Cable length terminal 8 and terminal 10	20 m	
	Power consumption	3 VA	
	Primary fuse	max. 10 A (slow)	
	Degree of protection	IP 40	
	Mounting orientation	optional	
	Weight	approx. 230 g	
	<b>Identification code to EN 298</b>		
	<b>LGB21... / LGB22...</b>	<b>FTLLXN</b> with two-stage operation	
	<b>LGB32...</b>	<b>FMLLXN</b> with two-stage operation	
	<b>LGB41...</b>	<b>ABLLXN</b> with two-stage operation («BV1 + BV2» or «ZBV + BV2») <b>AMLLXN</b> with single-stage operation	
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	-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	
	Directive for gas-fired appliances	90 / 396 EEC	
	Low voltage directive	73 / 23 EEC	
Flame supervision	DC detector signals	min. required	max. possible
	- With ionization electrode (FE)	3 µA	100 µA
	- With UV detector QRA...		
	a: measurement on the LGB...	3 µA	15 µA
b: measurement on the UV detector	200 µA	500 µA	

Flame supervision with QRC1...

Perm. detector current during pre-purge time (dark current)	5 $\mu$ A
Min. detector current required during operation	50 $\mu$ A

**Measurement circuit with QRC1...**



**Legend**

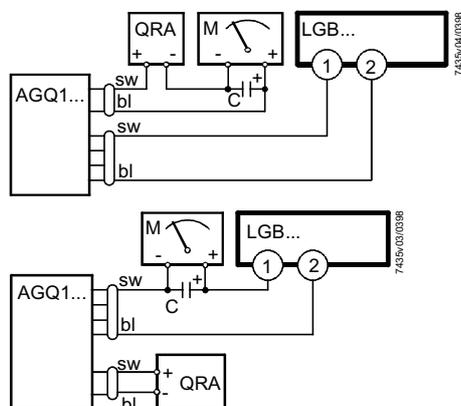
- M Microammeter Ri max. 5000  $\Omega$
- sw Black wire
- br Brown wire
- bl Blue wire

Flame supervision with QRA... and AGQ... for LGB21... / LGB22... / LGB41...

Mains voltage	AC 220 V $-15\%$ ...AC 240 V $+10\%$
Mains frequency	50...60 Hz $\pm 6\%$
Power consumption	4.5 VA
Degree of protection	IP 40
Perm. ambient temperature	
- In operation	$-20...+60\text{ }^{\circ}\text{C}$
- During transport and storage	$-40...+70\text{ }^{\circ}\text{C}$
Perm. length of detector cable (use separate cable for connecting the QRA... to the AGQ1...)	max. 20 m
Mounting orientation	optional
Perm. length of connecting cable (between AGQ1... and LGB...)	max. 20 m

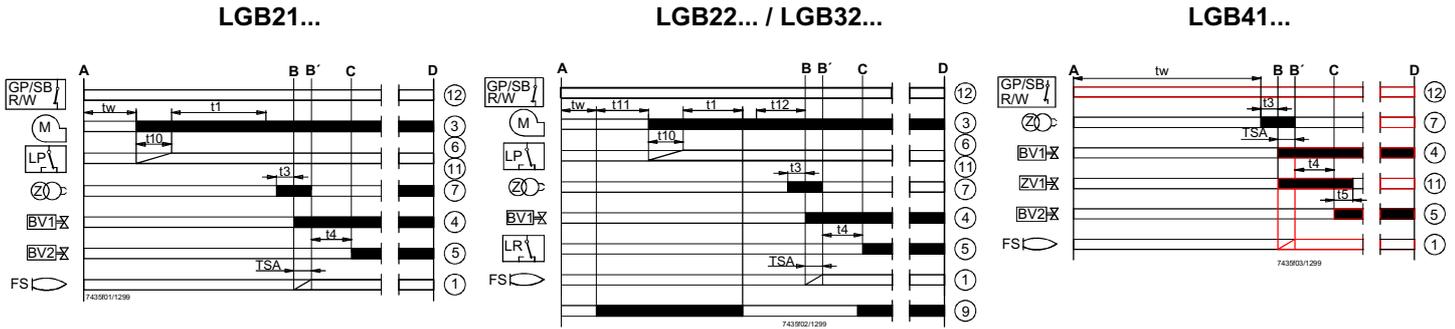
Detector voltage with no load on the QRA...	At mains voltage UN:	
	AC 220 V	AC 240 V
- Up to the end of «t10» and after shutdown	DC 620 V	DC 675 V
- From the start of «t1»	DC 300 V	DC 300 V
Detector voltage (load by DC measurement instrument Ri > 10 M $\Omega$ )		
- Up to the end of «t10» and after shutdown	DC 500 V	DC 550 V
- From the start of «t1»	DC 280 V	DC 280 V
DC detector signals with QRA...		
a: measurement on the LGB...	3 $\mu$ A	15 $\mu$ A
b: measurement on the QRA...	200 $\mu$ A	500 $\mu$ A

**Measurement circuit with QRA... and AGQ1...**



**Legend**

- C Electrolytic capacitor 100...470  $\mu$ F; DC 10...25 V
- M Microammeter Ri max. 5000  $\Omega$
- sw Black wire
- bl Blue wire



The function diagrams show the required or permissible input signals to the control section and to the flame supervision circuit hatched. If these input signals are missing, the burner control will stop the startup sequence to trigger lockout where required by safety regulations.

The LGB... are capable of detecting **undervoltages**. This means that load relay «AR» will be de-energized if the mains voltage drops below AC 160 V (for nominal AC 220...240 V) or AC 75 V (for nominal AC 100...110 V). The burner control will automatically make a restart attempt when the supply voltage again exceeds AC 160 V or AC 75 V respectively.

Pre-conditions for burner startup

- Burner control must be reset
- The contacts of gas pressure monitor «GP», of thermal reset limit thermostat / pressure monitor «W», of control thermostat / pressure controller «R» and of safety limit thermostat «SB» must be closed
- Fan motor «M» must be connected
- Air pressure monitor «LP» must be in its idle position

Startup program

A – C Startup program

**A Start command** (switching on)  
 This command is triggered by control thermostat / pressure controller «R». Terminal 12 receives voltage and the programming mechanism starts running. On completion of waiting time «tw» with the LGB21... or after air damper «SA» has reached the nominal load position (that is, on completion of «t11») with the LGB22... / LGB32..., fan motor «M» will be started.

**TSA Ignition safety time**  
 On completion of «TSA», a flame signal must be present at terminal 1. That flame signal must be continuously available until shutdown occurs, or else flame relay «FR» will be de-energized, resulting in burner lockout.

**tw Waiting time**  
 During the waiting time, air pressure monitor «LP» and flame relay «FR» are tested for correct contact positions.

**t1 Pre-purge time**  
 Purging the combustion chamber and the secondary heating surfaces: required with low-fire air volumes when using the LGB21... and with nominal load air volumes when using the **LGB22... / LGB32...**  
 The «Type summary» and the «Function and sequence diagrams» show the so-called **checked pre-purge time «t1»** during which air pressure monitor «LP» must indicate that the required air pressure is available. The effective pre-purge time comprises interval end «tw» and interval start «t3».

- t3 Pre-ignition time**  
 During «t3» and up to the end of «TSA», flame relay «FR» is forced to close.  
 On completion of «t3», the release of fuel is triggered at terminal 4 or at terminal 11 of the LGB41...
- t3n Post-ignition time**  
 Ignition time during «TSA».  
 Just before reaching the end of «TSA», the ignition transformer will be switched off.  
 This means that «t3n» is somewhat shorter than «TSA».  
 This is necessary in order to give the forcedly closed flame relay «FR» sufficient time to drop out if there is no flame.
- t4 Interval**  
**LGB21... / LGB41...:** time to the release of the second fuel valve «BV2»  
**LGB22... / LGB32...:** on completion of «t4», the heat source is controlled depending on the load (release of load controller «LR»).
- t5 Second safety time**  
 (Only with LGB41...)  
 For pilot burners with main flame supervision that are equipped with a pilot gas valve «ZV1».
- t10 Specified time for air pressure signal**  
 On completion of this period of time, the set air pressure must have built up, or else lockout will occur.
- t11 Programmed opening time for actuator «SA»**  
 (Only with LGB22... / LGB32...)  
 The air damper opens until the nominal load position is reached. Only then will fan motor «M» be switched on.
- t12 Programmed closing time for actuator «SA»**  
 (Only with LGB22... / LGB32...)  
 During «t12», the air damper travels to the low-fire position.
- B – B' Interval for establishment of flame**
- C Burner operating position reached**
- C – D Burner operation** (generation of heat)  
 Nominal output or, in connection with a load controller «LR», part load operation.
- D Shutdown by «R»**  
 The burner is immediately shut down and the programming mechanism is ready for a new start.

## Control program in the event of fault

In principle, whenever a fault occurs, the fuel supply will immediately be shut down. If lockout occurs at a point in time between startup and pre-ignition, which is not indicated by a symbol, the usual cause is air pressure monitor «LP» shutting down, or a premature, faulty flame signal.

• <b>After a mains failure or in the event of undervoltage:</b>	Startup repetition with full program sequence
• <b>Premature flame signal</b> from the start of «t1»:	Immediate lockout
• <b>Contacts of air pressure monitor «LP»</b> have welded during «tw»:	Prevention of startup
• <b>No air pressure signal:</b>	Lockout on completion of «t10»
• <b>Air pressure failure</b> on completion of «t10»:	Immediate lockout
• <b>Burner does not ignite:</b>	Lockout on completion of «TSA»
• <b>Flame is lost during operation:</b>	Immediate lockout

## Resetting the burner control

Whenever lockout occurs, the burner control can **immediately** be reset.

## Lockout and control sequence indication

### LGB...

The position of the programming mechanism can be seen through the viewing window on the front of the burner control.

In the event of fault, the programming mechanism stops and thus the lockout indicator also.

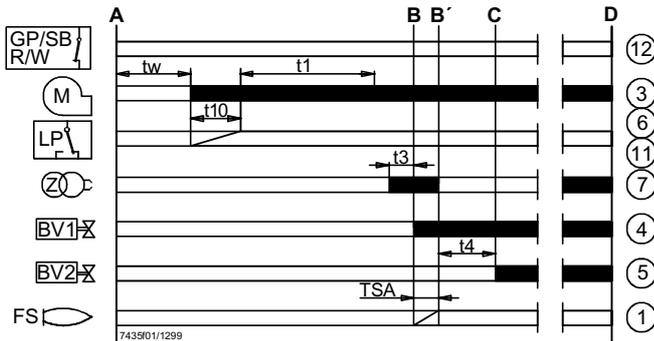
The symbol in the viewing window indicates both the position in the control sequence and the type of fault according to the following legend:

◀	No startup as the start control loop is open
	Interval «tw» or «t10» (LGB21...) Interval «tw» or «t11» (LGB22... / LGB32...) Interval «tw», «t3» or «TSA» (LGB41...)
▲	Air damper fully open (LGB22... / LGB32...)
P	Lockout due to absence of air pressure signal
◀◀◀	Interval «t1», «t3» and «TSA» (LGB21...) Interval «t1», «t3» («t12») (LGB22... / LGB32...)
▼	Release of fuel
1	Lockout because there is no flame signal on completion of the first safety time
2	Release of second fuel valve (LGB21... / LGB41...) Release of load controller (LGB22... / LGB32...)
3	Lockout because there is no flame signal on completion of the second safety time (LGB41...)
●●●●	Part load or nominal load operation (or return to the operating position)

## LGB21...

Burner controls for single- or two-stage forced draught burners.

Air damper control for pre-purging with **low-fire air volume**.



### Connection examples

Air damper control for two-stage or two-stage modulating burners.

Pre-purging («t1») with low-fire air volume.

Exactly the same low-fire air damper position (switching cam III) during startup and operation!

For detailed information about the air damper actuators, refer to the following data sheets:

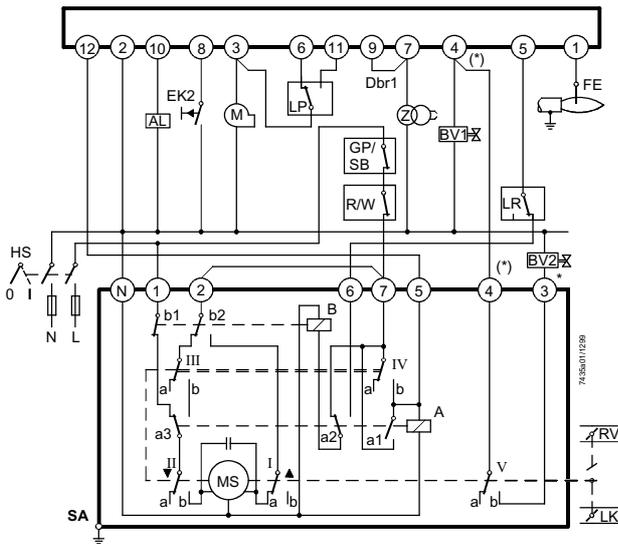
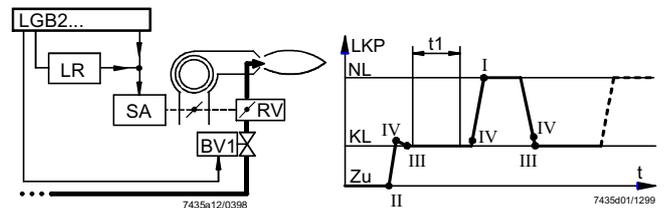
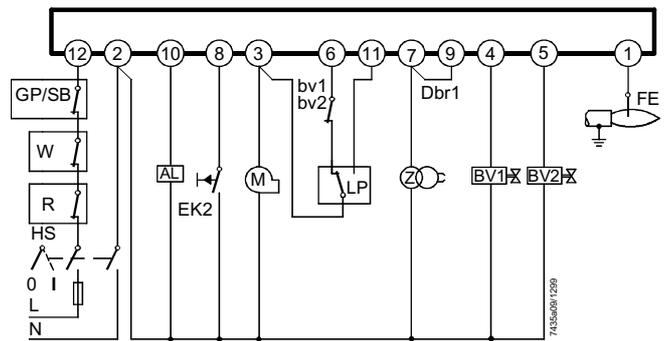
SQN30...: data sheet 7808

SQN7...: data sheet 7804

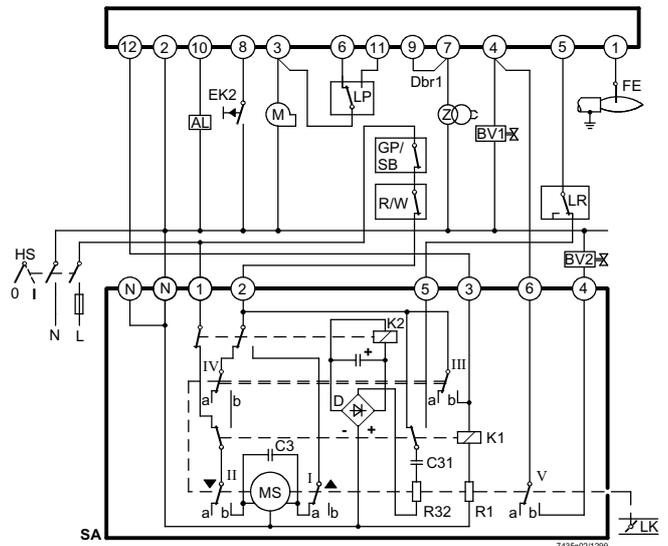
SQN90... / SQN91...: data sheet 7806

## Flame supervision

**LGB21...**: with ionization current detector electrode or AGQ1... auxiliary unit for UV detector QRA...



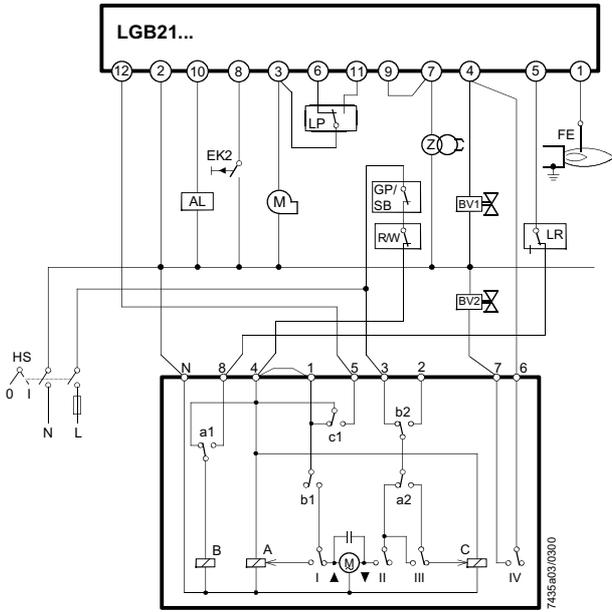
SQN3...121...



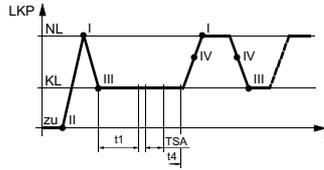
SQN91.140... / two-stage control

### \* Note:

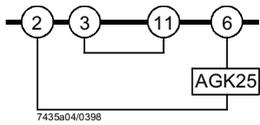
With two-stage modulating burners (with gas regulation damper «RV»), «BV2» and the connection between the terminals marked (\*) are not required.



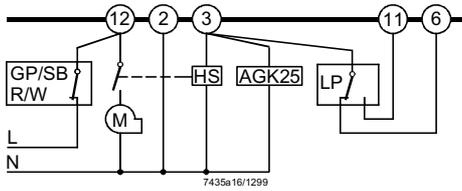
**SQN7...244 / two-stage control**



Burner without fan assistance and **without «LP»**

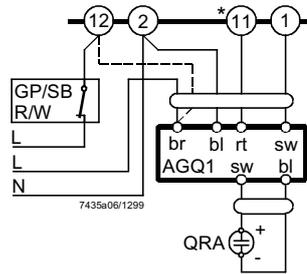
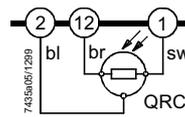


Burner with fan control via auxiliary contactor («HS») **with «LP»**  
(does not apply to LGB41...)



QRC1... with LGB3... (diagram 7435a02)

QRA... with auxiliary unit AGQ1... with LGB2... / LGB4... (diagram 7435a06)



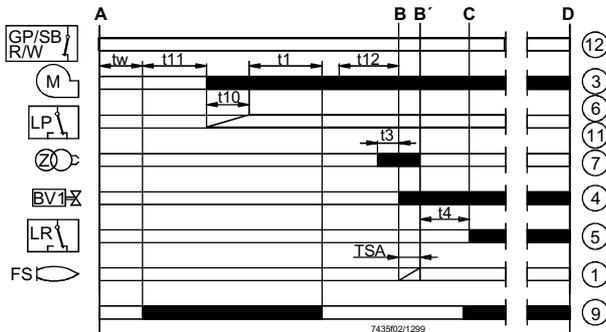
Legend

- bl Blue wire
- br Brown wire
- rt Red wire
- sw Black wire

\* With LGB41... terminal 3

## LGB22... / LGB32...

Burner controls for single- or two-stage forced draught burners.  
Air damper control for pre-purging with **nominal load air volume**.



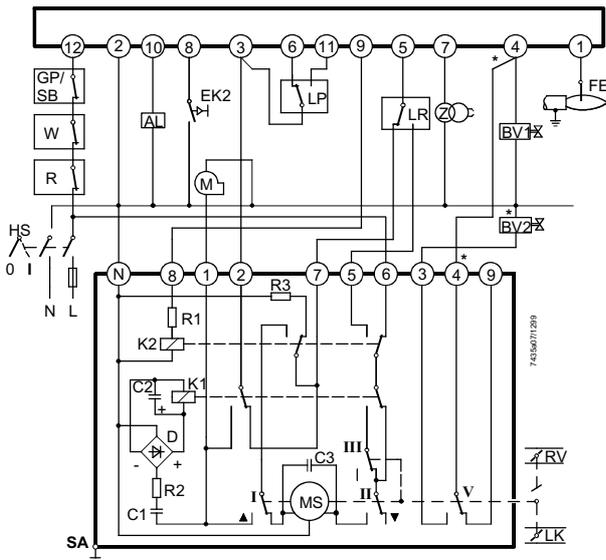
### Connection examples

Air damper control for two-stage or two-stage modulating burners.  
Pre-purging («t1») with nominal load air volume.  
For detailed information about the air damper actuators, refer to the following data sheets:

SQN30...: data sheet 7808

SQN7...: data sheet 7804

SQN90... / SQN91...: data sheet 7806



SQN3...151... or SQN3...251...

### \* Note:

With two-stage modulating burners (with gas regulation damper «RV»), «BV2» and the connection between the terminals marked (\*) are not required.

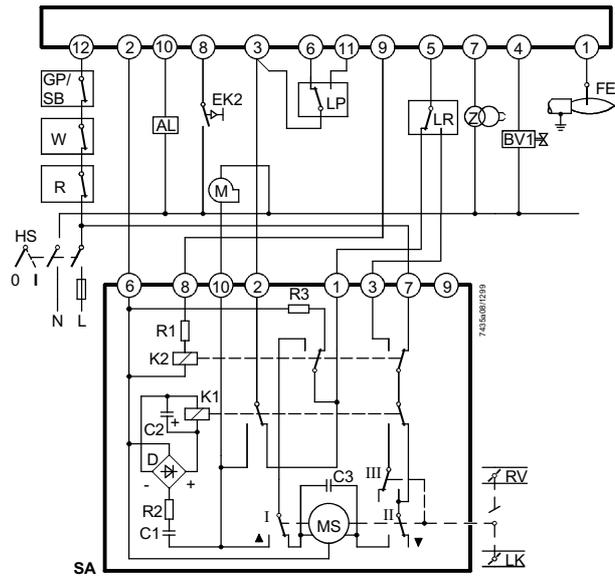
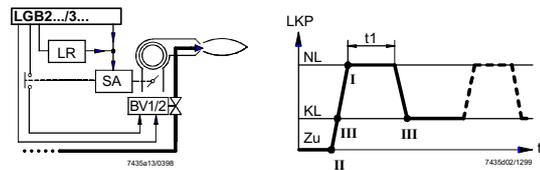
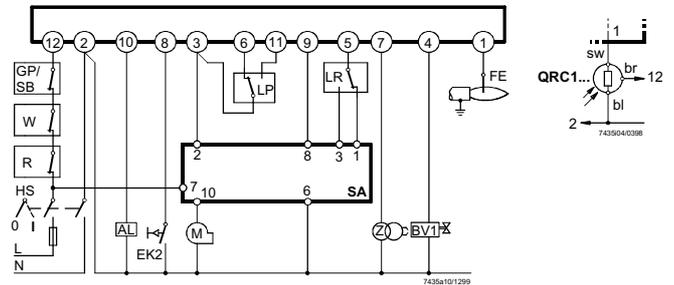
## Flame supervision

**LGB22...:** with ionization current detector electrode or AGQ1... auxiliary unit for UV detector QRA...

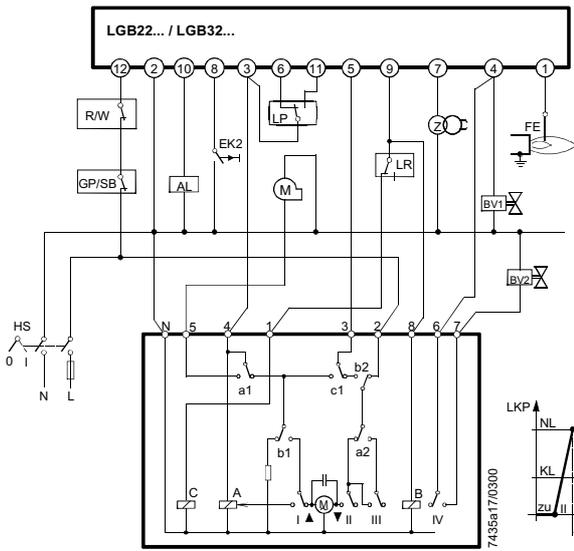
**LGB32...:** with blue-flame detector QRC1...

Only LGB22...

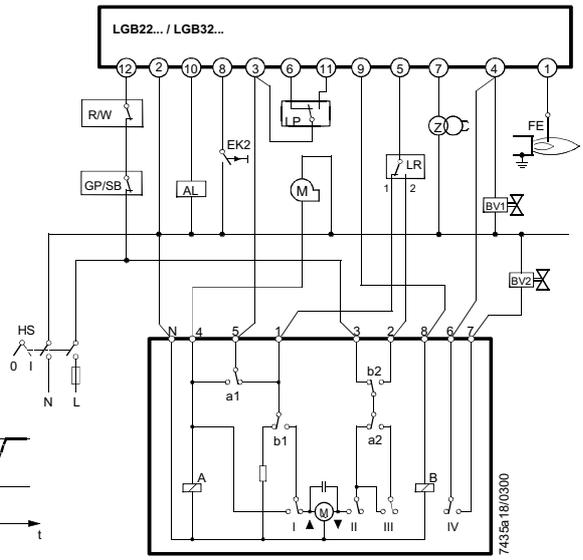
Only LGB32...



SQN90.220... / two-stage modulating control



**SQN7...454 / two-stage control**  
**Single-wire control**



**SQN7...424 / two-stage control**  
**Two-wire control**

**Legend**

- A Startup (switching on by «R»)
- B – B' Interval for establishment of flame
- C Operating position of burner or release of the second stage by load controller «LR»
- D Shutdown by «R»
- tw Waiting time
- TSA Ignition safety time
- t1 Checked waiting time
- t3 Pre-ignition time
- t4 Interval «BV1 – BV2»  
LGB22... / LGB32...: interval «BV1 - LR»
- t5 Second safety time
- t10 Specified time for air pressure signal
- t11 Programmed opening time for actuator «SA»
- t12 Programmed closing time for actuator «SA»

- Required input signals
- Burner control's output signals

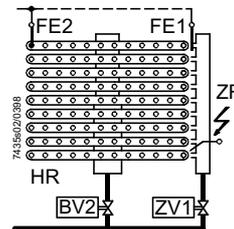
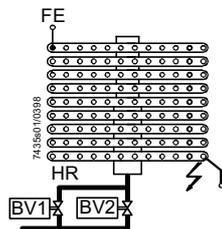
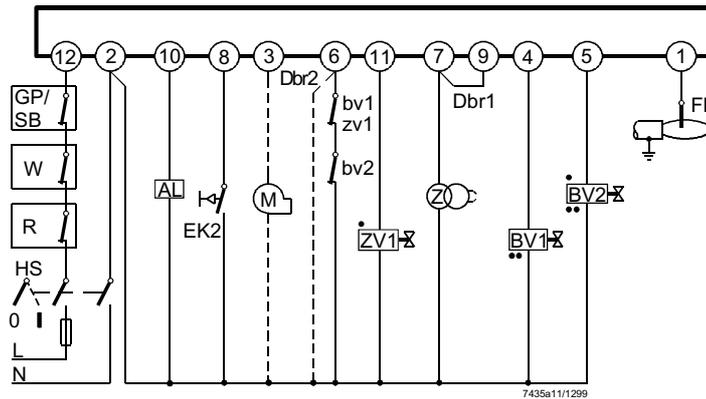
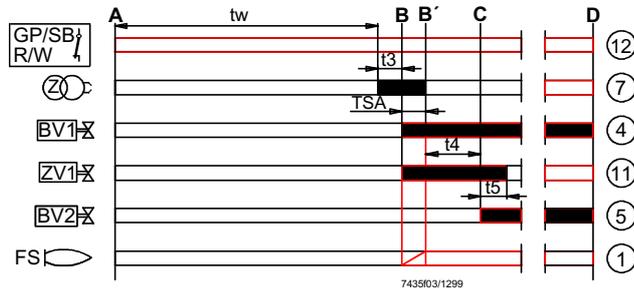
- AL Fault status signal (alarm)
- BV... Fuel valve
- bv Auxiliary switch in the fuel valves (for checking the fully closed position)
- Dbr1 Wire link
- Dbr2 Wire link, required if contact «bv» or «zv1» is missing
- EK2 Remote reset button
- FE Ionization electrode
- FS Flame signal
- GP Gas pressure monitor
- HS Mains isolator
- KL Low-fire
- LKP Air damper position
- LP Air pressure monitor
- LR Load controller
- M Fan motor
- NL Nominal load
- R Control thermostat or pressure controller
- SA Actuator SQN...
- SB Safety limit thermostat
- W Thermal reset limit thermostat
- Z Ignition transformer
- ZV1 Pilot gas valve
- zv1 Auxiliary switch in the pilot gas valve

**LGB41...**

Burner controls for atmospheric gas burners with or without fan assistance.

**No** air damper control.

Flame supervision with ionization current detector electrode



**Legend**

- |        |   |       |  |
|--------|---|-------|--|
| A      | Startup (switching on by «R»)   | AL    | Fault status signal (alarm)  |
| B – B' | Interval for establishment of flame   | BV... | Fuel valve   |
| C      | Operating position of burner or release of the second stage by load controller «LR»                           | bv    | Auxiliary switch in the fuel valves (for checking the fully closed position) |
| D      | Shutdown by «R»   | Dbr1  | Wire link  |
| tw     | Waiting time  | Dbr2  | Wire link, required if contacts «bv» or «zv1» is missing                     |
| TSA    | Ignition safety time  | EK2   | Remote reset button  |
| t3     | Pre-purge time  | FE    | Ionization electrode   |
| t4     | Interval «BV1 – BV2»  | FS    | Flame signal   |
| t5     | Second safety time  | HR    | Main burner  |
|        | Required input signals  | HS    | Mains isolator   |
|        | Burner control's output signals   | M     | (Auxiliary) fan motor  |
| •      | Connection of valves in the case of pilot burners with main flame supervision                                 | R     | Control thermostat or pressure controller                                    |
| ••     | Connection of valves in the case of two-stage atmospheric burners with supervision of the first stage («BV1») | SB    | Safety limit thermostat  |
|        |   | W     | Thermal reset limit thermostat   |
|        |   | Z     | Ignition transformer   |
|        |   | ZR    | Pilot burner   |
|        |   | ZV1   | Pilot gas valve  |
|        |   | zv1   | Auxiliary switch in the pilot gas valve                                      |

## 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 heat-resistant ionization current detector electrode which projects into the flame.

The current that 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 a short-circuit between ionization electrode and ground cannot simulate a flame signal (since in that case an AC current would flow).

**Basically, the flame supervision circuit is insensitive to adverse effects of the ignition spark.**

**However, should the disturbing effects of the ignition spark on the ionization current exceed a certain level, the electrical connections on the primary side of the ignition transformer must be changed and / or the siting of the ionization electrode is to be checked.**

Ionization current supervision with burner controls operating on AC 110 V

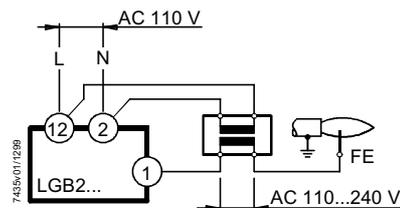
Since the ionization current with burner controls operating on AC 110 V is only about 50 % of that with burner controls operating on AC 230 V, it may be necessary to raise it with a transformer.

Capacity of transformer: min. 2 VA

Transforming ratio: ca. 1.1...1.5

Primary and secondary windings galvanically separated.

Connection of transformer



## Flame supervision with QRC1... blue-flame detector

The QRC1... has been designed specifically for use with blue-burning flames.

Light incidence is from the front and laterally.

The detector is secured by means of a soft plastic plug.

The connection is made with a three-wire cable (pre-amplifier integrated in the detector's casing).

For the different versions, connections and technical data, refer to data sheet 7716.

## Flame supervision with UV detector QRA... and AGQ... auxiliary unit for LGB21... / LGB22... / LGB41...

### UV detector QRA...

Flame detector for universal use with gas and gas / oil burners.

Light incidence from the front and laterally.

Total length 97 mm.

Available with normal or, as QRA2M, with higher sensitivity.

Secured by means of a flange and clamp.

Also available as a metal-encapsulated version in the form of the QRA10....

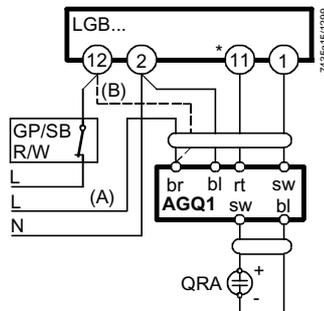
For details, refer to data sheet 7712.

## Auxiliary unit AGQ...

In connection with LGB... burner controls, a special UV auxiliary unit AGQ... is required. That unit is to be connected to the mains supply via two cables, and to the burner control via terminals 1, 2 and 11.

There are two possibilities to check the arc-through tendency of ageing cells or to detect UV light, depending on the way the AGQ... is connected (refer to diagram 7435a15):

- (A) Operation with permanent phase:  
UV test by doubling the supply voltage (2 x UN = AC 460 V) across the UV tube on startup, that is, until terminal 11 receives voltage, and after shutdown.
- (B) Operation with controlled phase:  
UV test by doubling the supply voltage on startup only, that is, during the interval between switching on and air pressure signal.  
After shutdown, there is no voltage across the UV cell.  
Since in that case, an aged UV cell could regenerate itself and the quench test would be eliminated, this type of operation does not represent a valid substitute for operation (A) with permanent phase as described above.



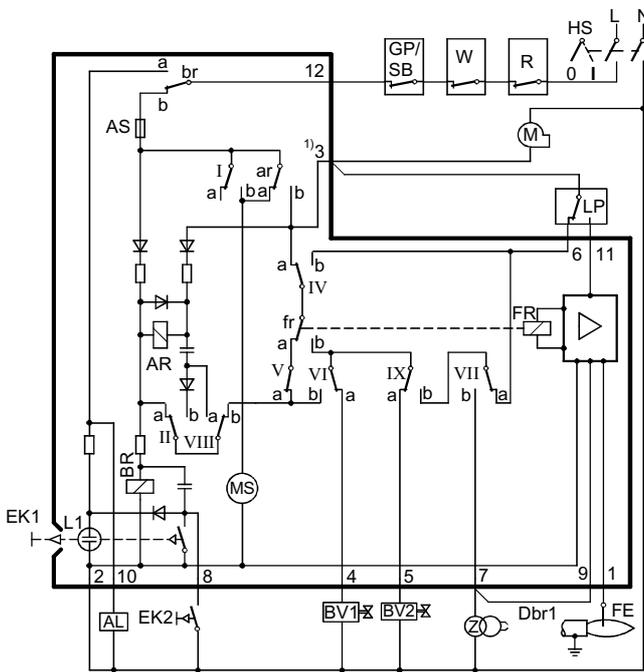
**AGQ1.1A27**  
**AGQ1.2A27**

## Legend

(A)	Operation with permanent phase	*	With LGB41...: terminal 3
(B)	Operation with controlled phase		
GP	Gas pressure monitor	br	Brown wire
QRA...	UV detector	bl	Blue wire
R	Control thermostat or pressure controller	rt	Red wire
SB	Safety limit thermostat	sw	Black wire
W	Thermal reset limit thermostat		

**Internal diagram and time diagram of the programming mechanisms**

**LGB21...**

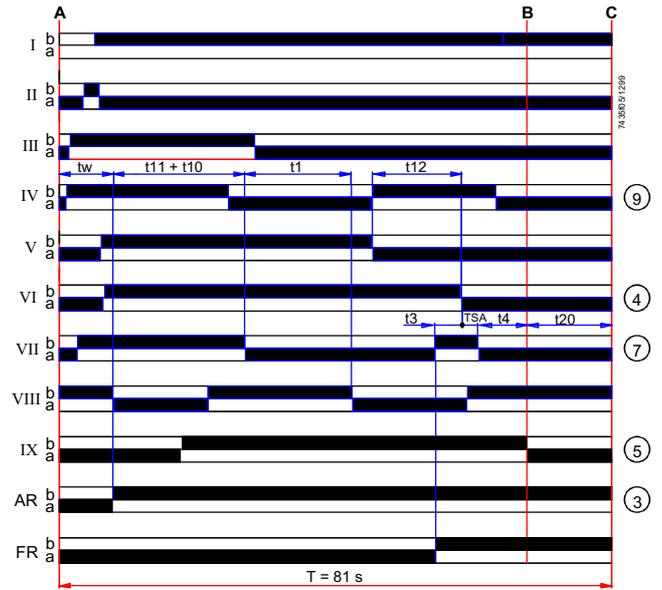
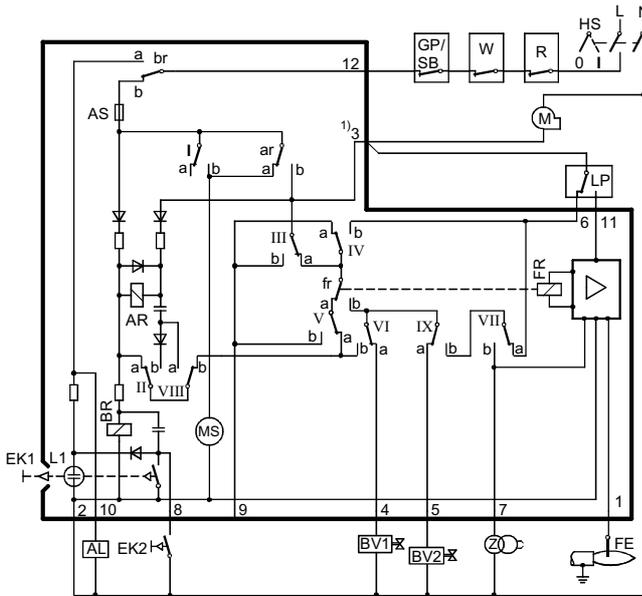


**Legend**

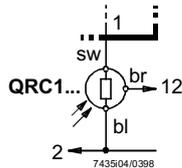
- |       |  |        |   |
|-------|--|--------|---|
| AL    | Fault status signal (alarm)                        | A      | Start position (switching on)                                 |
| AR    | Load relay with contact «ar»                       | B      | Operating position of burner                                  |
| BR    | Locking relay with contact «br»                    | C      | Operating position of programming mechanism or start position |
| BV... | Fuel valve   | I...IX | Cam switches  |
| Dbr1  | Wire link  | tw     | Waiting time  |
| EK... | Lockout reset button                               | TSA    | Ignition safety time  |
| FE    | Ionization electrode                               | T      | Total running time of programming mechanism                   |
| FR    | Flame relay  | t1     | Checked pre-purge time  |
| GP    | Gas pressure monitor                               | t3     | Pre-ignition time   |
| HS    | Mains isolator                                     | t4     | Interval «BV1 – BV2»  |
| L1    | Lockout warning lamp                               | t10    | Specified time for air pressure signal                        |
| LP    | Air pressure monitor                               | t20    | Interval up to self-shutdown of the programming mechanism     |
| M     | Fan motor  |        |   |
| MS    | Synchronous motor                                  |        |   |
| R     | Control thermostat or pressure controller          |        |   |
| SB    | Safety limit thermostat                            |        |   |
| W     | Thermal reset limit thermostat or pressure monitor |        |   |
| Z     | Ignition transformer                               |        |   |

1) Resistance between terminal 3 and «N» may not exceed 1.6 kΩ

### Only LGB22...



### Only LGB32...

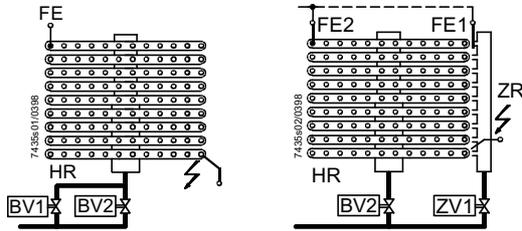
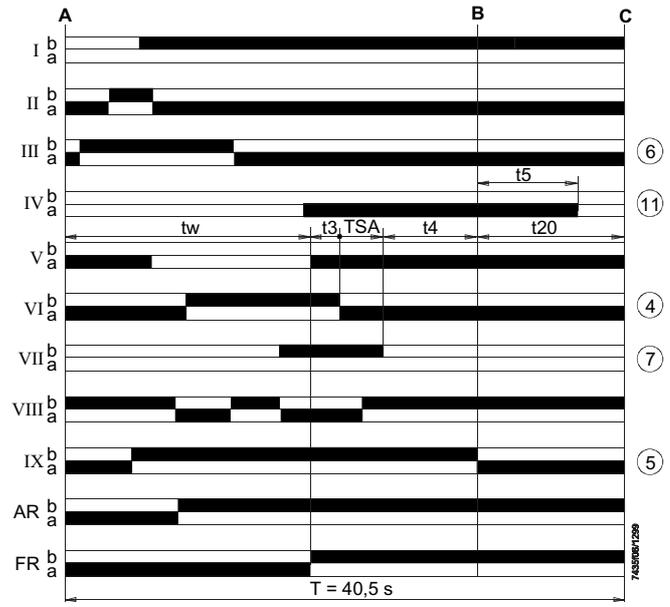
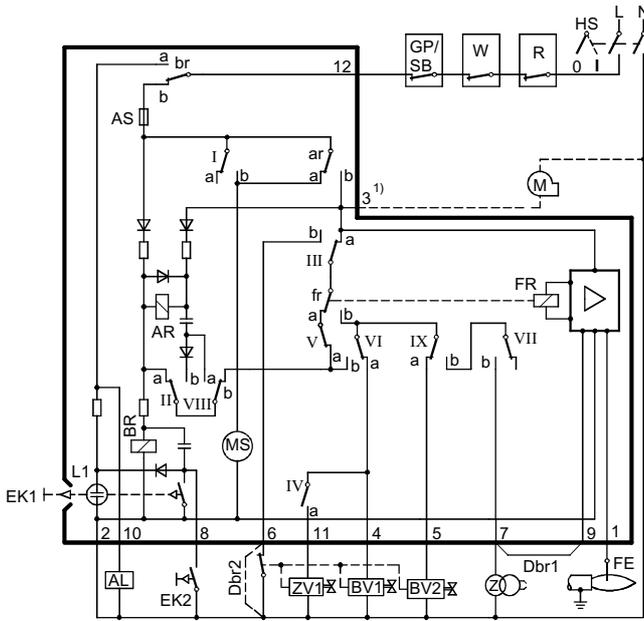


#### Legend

AL	Fault status signal (alarm)	A	Start position (switching on)
AR	Load relay with contact «ar»	B	Operating position of burner
BR	Locking relay with contact «br»	C	Operating position of programming mechanism or start position
BV...	Fuel valve	I...IX	Cam switches
EK...	Lockout reset button	$t_w$	Waiting time
FE	Ionization electrode	TSA	Ignition safety time
FR	Flame relay	T	Total running time of programming mechanism
GP	Gas pressure monitor	$t_1$	Checked pre-purge time
HS	Mains isolator	$t_3$	Pre-ignition time
L1	Lockout warning lamp	$t_4$	Interval «BV1 – BV2» or «BV1 – LR»
LP	Air pressure monitor	$t_{10}$	Specified time for air pressure signal
M	Fan motor	$t_{11}$	Programmed opening time for actuator «SA»
MS	Synchronous motor	$t_{12}$	Programmed closing time for actuator «SA»
R	Control thermostat or pressure controller	$t_{20}$	Interval up to self-shutdown of the programming mechanism
SB	Safety limit thermostat		
W	Thermal reset limit thermostat or pressure monitor		
Z	Ignition transformer		

1) Resistance between terminal 3 and «N» may not exceed 1.6 kΩ

Only LGB41...



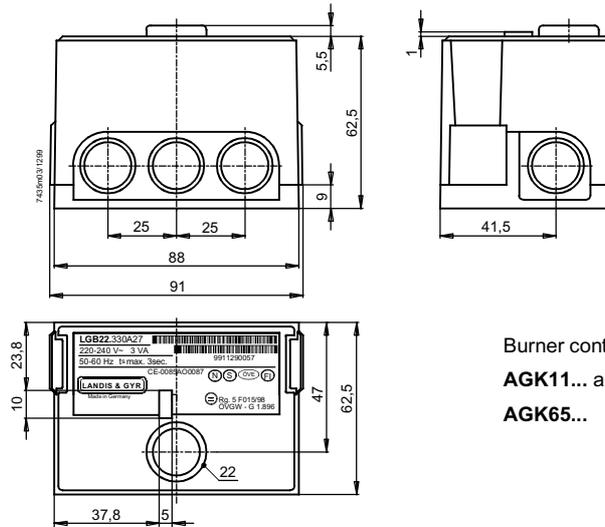
Legend

- |       |  |        |  |
|-------|--|--------|--|
| AL    | Fault status signal (alarm)  | HS     | Mains isolator   |
| AR    | Load relay with contact «ar»   | L1     | Lockout warning lamp   |
| BR    | Locking relay with contract «br»                                       | M      | Fan motor  |
| BV... | Fuel valve   | MS     | Synchronous motor  |
| Dbr1  | Wire link  | R      | Control thermostat or pressure controller  |
| Dbr2  | Wire link, terminal 6-2 required when contact «bv» or «zv1» is missing | SB     | Safety limit thermostat  |
| EK... | Lockout reset button   | W      | Thermal reset limit thermostat or pressure monitor   |
| FE    | Ionization electrode   | Z      | Ignition transformer   |
| FR    | Flame relay  | ZR     | Pilot burner   |
| GP    | Gas pressure monitor   | ZV1    | Pilot gas valve in place of «BV1» in the case of pilot burners with main flame supervision |
| HR    | Main burner  |        |  |
| tw    | Waiting time   | A      | Start position (switching on)  |
| TSA   | Ignition safety time   | B      | Operating position of burner   |
| T     | Total running time of the programming mechanism                        | C      | Operating position of programming mechanism or start position                              |
| t3    | Pre-ignition time  | I...IX | Cam switches   |
| t4    | Interval «BV1 – BV2»   | 1)     | Resistance between terminal 3 and «N» may not exceed 1.6 kΩ                                |
| t5    | Second safety time   |        |  |
| t20   | Interval up to the self-shutdown of the programming mechanism          |        |  |

## Dimensions

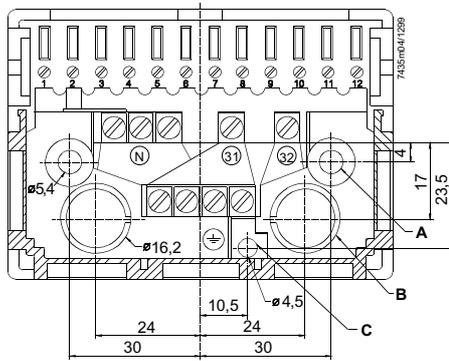
### Burner control

Dimensions in mm



Burner control with plug-in base  
**AGK11...** and cable gland holder  
**AGK65...**

### Plug-in base



#### AGK11...

Plug-in base with screw terminals.

Hatched: position of insertable cable gland holder or cable holder.

«A»: holes for fastening screws

«B»: holes for cable entry

«31», «32»: auxiliary terminals

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

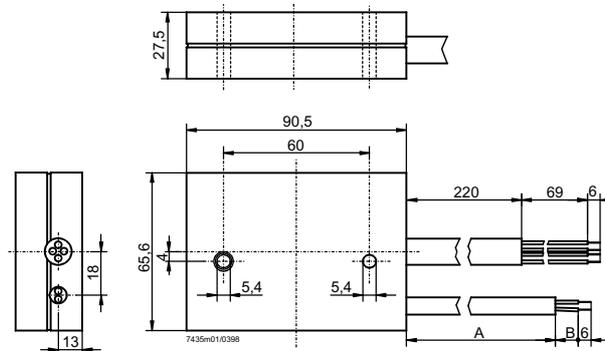
Underneath: 4 earth terminals, joining in a lug for earthing the burner.

#### Mandatory:

Earthing lug «C» must be connected to burner ground (using a metric screw with a lockwasher or similar!)

### UV auxiliary unit

#### AGQ1...



Type reference	Dimensions	
	A	B
AGQ1.1A27	500	19
AGQ1.2A27	300	34