



Gas burner controls

LME39...

Burner controls for the supervision of 1- or 2-stage gas or gas burners of small to medium capacity, with or without fan in intermittent operation.

The LME39... and this Data Sheet are intended for use by OEMs which integrate the burner controls in their products.

Use, features

Use	<p>LME39... are used for the startup and supervision of 1- or 2-stage gas or gas burners in intermittent operation. The flame is supervised by an ionization probe or flame detector type QRA... with ancillary unit AGQ3.xA27 for gas forced draft burners.</p> <ul style="list-style-type: none"> • Applications in accordance with EN 267: Gas burners for liquid fuels • Type-tested and approved in accordance with DIN EN 298
Features	<ul style="list-style-type: none"> - Undervoltage detection - Air pressure supervision with function check of the air pressure switch during startup and operation - Electrical remote reset facility - Multicolor indication of fault status and operational status messages - Limitation of the number of repetitions - Accurate program sequences thanks to digital signal handling - Controlled intermittent operation after a maximum 24 hours of continuous operation - BCI

Supplementary documentation

ASN	Title	Documentation no.	Type of document
LME...	Burner control	CC1Q7101	Range Overview
LME39...	Burner control	CC1P7106	Basic Documentation

Note



Warning!

All safety, warning and technical notes given in the Basic Documentation of the LME39 (P7106) also apply to this document! If this is not observed, there is a risk of loss of safety functions and a risk of electric shock.

Standards and certificates



Applied directives:

- Low-voltage directive 2014/35/EC
- Directive for pressure devices 2014/68/EU
- Gas Appliances Regulation (EU) (EU) 2016/426
- Electromagnetic compatibility EMC (immunity) *) 2014/30/EC

*) The compliance with EMC emission requirements must be checked after the burner control is installed in equipment

Compliance with the regulations of the applied directives is verified by the adherence to the following standards / regulations:

- Automatic burner control systems for burners and appliances burning gaseous or liquid fuels DIN EN 298
- Safety and control devices for burners and appliances burning gaseous and/or liquid fuels — General requirements DIN EN 13611
- Automatic electrical controls for household and similar use Part 2-5: Particular requirements for automatic electrical burner control systems DIN EN 60730-2-5

The relevant valid edition of the standards can be found in the declaration of conformity!



Note on DIN EN 60335-2-102

Household and similar electrical appliances - Safety - Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections. The electrical connections of the LME39 and the AGK11 comply with the requirements of EN 60335-2-102.



EAC Conformity mark (Eurasian Conformity mark)



ISO 9001:2015
ISO 14001:2015
OHSAS 18001:2007



China RoHS
Hazardous substances table:
<http://www.siemens.com/download?A6V10883536>



Life cycle

Burner controls have a designed lifetime* of 250,000 burner startup cycles which, under normal operating conditions in heating mode, correspond to approx. 10 years of usage (starting from the production date given on the type field).

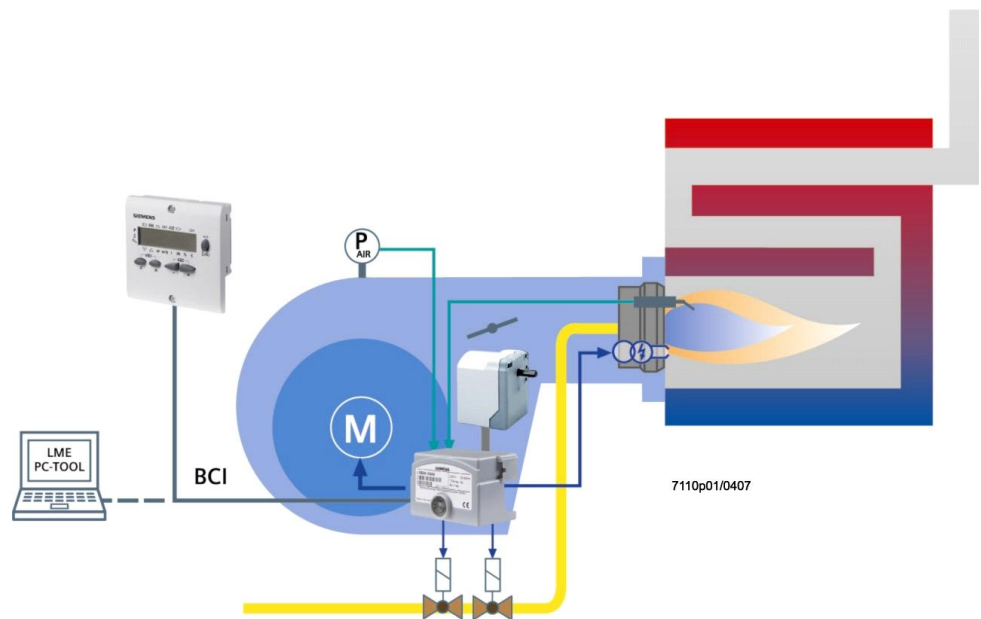
This lifetime is based on the endurance tests specified in standard EN 298.

A summary of the conditions has been published by the European Control Manufacturers Association (Afecor) (www.afecor.org).

The designed lifetime is based on use of the burner controls according to the manufacturer's Data Sheet and Basic Documentation. After reaching the designed lifetime in terms of the number of burner startup cycles, or the respective time of usage, the burner control is to be replaced by authorized personnel.

* The designed lifetime is not the warranty time specified in the Terms of Delivery

System overview



Example: Modulating gas burner

The diagram shows the full scope of functions of the LME39... system. The actual functions are to be determined based on the respective execution / configuration!

Type summary (other types on request)

The type reference given below applies to the LME39... without plug-in base and without flame detector. For ordering information on plug-in bases and other accessories, see *Ordering*.

Article no.	Type		Times in seconds												
			tw max. s	TSA max. s	tfz (P228) approx. s	t1 (P225) min. s	t1' (P256) min. s	t3 (P226) approx. s	t3n (P257) approx. s	t4 (P230) approx. s	t8 (P234) min. s	t10 (P224) approx. s	t11 (P259) min. s 1)	t12 (P260) min. s 1)	t22 (P231) max. s
BPZ:LME39.100C1	LME39.100C1	Requirement	2.5	3	0.3	30	---	3	2.5	10	0	180	30	30	---
BPZ:LME39.100C2	LME39.100C2	Requirement	2.5	3	0.3	30	---	3	2.5	10	0	180	30	30	---
		Setting range	Min.	---	0.3	0	0	---	1.2	0 + 0.3	1.2	0	0	0	---
			Max.	---	37.5 + 1.5 + 0.3	1.5	75	---	37.5	37.5 + 0.3	75	1237	179.5	75	75
		Increments (s)	---	0.147	0.147	0.294	---	0.147	0.147	0.294	4.851	4.851	0.294	0.294	---
		Factory setting	---	t3n + tfz	0.294	32.34	---	3.234	2.205 + 0.3	9.996	0	179.487	32.34	32.34	---
BPZ:LME39.400C1	LME39.400C1	Requirement	2.5	5	0.3	---	14.5	1.7	4.4	10	0	---	---	---	5
BPZ:LME39.400C2	LME39.400C2	Requirement	2.5	5	0.3	---	14.5	1.7	4.4	10	0	---	---	---	5
		Setting range	Min.	---	0.3	0	---	0	1.2	0	1	0	---	---	0
			Max.	---	37.5 + 1.5 + 0.3	1.5	---	75	37.5	37.5 + 0.3	75	1237	---	---	---
		Increments (s)	---	0.147	0.147	---	0.294	0.147	0.147	0.294	4.851	---	---	---	0.147
		Factory setting	---	t3n + tfz	0.294	---	15.582	1.911	4.116 + 0.3	9.996	0	---	---	---	4.557

Function parameter

Repetition limit value loss of flame and no flame at the end of safety time
 0 = none
 1 = none
 2 = 1 x repetition
 3 = 2 x repetition
 4 = 3 x repetition

Parameter number

240

Factory setting

1

Note on parameterization:

Use the AZL2 or ACS410 to always set the exact value of the required time (multiples of increments of 0.147 seconds, 0.294 seconds or 4.851 seconds). When parameterizing minimum or maximum times, the possibility of a $\pm 7\%$ tolerance must be taken into consideration.

For **minimum values**: The value to be parameterized must be at least 7% **greater**. For **maximum values**: The value to be parameterized must be at least 7% **smaller**.



Example: Prepurge time shall be set to 30 seconds
 Calculation: 30 seconds + 7% = 32.1 seconds
 Value to be parameterized (parameter 225): Must be equal to or **greater** than the calculated value (e.g. 32,34 seconds)

Example: Safety time shall be set via the change of postignition time to 5 seconds
 Special case here: Safety time is set directly via the change of postignition time and flame detection time using the following formula:

$$\mathbf{TSA = t3n + tfz = \text{parameter 257} + 0.3 \text{ seconds} + \text{parameter 228}$$

Calculation: 5 seconds - 7% = 4.65 seconds
 $t3n = 4.65 \text{ seconds} - 0.3 \text{ seconds} - \text{parameter 228}$
 $t3n = 4.05 \text{ seconds (with tfz = 0.3 seconds)}$

Value to be parameterized (parameter 257): Must be equal to or **smaller** than the calculated value (e.g. 3.969 seconds)

Legend	tfz	Flame detection time	t4	Interval between ignition OFF and release fuel valve V2
	TSA	Safety time	t8	Postpurge time
	tw	Waiting time	t10	Specified time for air pressure signal
	t1	Prepurge time	t11	Programmed opening time for actuator
	t1'	Purge time	t12	Programmed closing time for actuator
	t3	Preignition time	t22	2nd safety time
	t3n	Postignition time (parameter 257 + 0.3 seconds)		
	1)	Maximum running time available for actuator. The actuator's running time must be shorter, otherwise, the actuator will not reach the required position		

Accessories (to be ordered separately)

Connection accessories for small burner controls

AGK11.6

Article no.: **BPZ:AGK11.6**

Gray plug-in base for connecting the LME39 to the burner plant.

Refer to Data Sheet N7201



Cable holder **AGK66**

Article no.: **BPZ:AGK66**

For plug-in base AGK11.

Refer to Data Sheet N7201



Cable holder **AGK65**

Article no.: **BPZ:AGK65**

For plug-in base AGK11.

Refer to Data Sheet N7201



Cable strain relief elements **AGK67**

Article no.: **BPZ:AGK67**

For plug-in base AGK11.

Refer to Data Sheet N7201.



Service tools

Optical Interface **OCI400**

Article no.: **BPZ:OCI400**

- Optical interface between burner control and PC
- Facilitates viewing and recording setting parameters on site using the ACS410 software

Refer to Data Sheet N7614



BCI interface module **OCI410**

Article no.: **BPZ:OCI410**

- BCI interface module between burner control and PC
- Facilitates viewing, processing, and recording setting parameters on site using the ACS410 software

Refer to Data Sheet N7616.



PC Software **ACS410**

Article no.: **BPZ:ACS410**

For setting the parameters and for visualizing the burner controls.

Refer to Software Documentation J7352



Accessories (to be ordered separately) (continued)

Flame detector

UV flame detector **QRA2**
Only in conjunction with ancillary unit AGQ3
Refer to Data Sheet N7712



UV flame detector **QRA10**
Only in conjunction with ancillary unit AGQ3
Refer to Data Sheet N7712



UV flame detector **QRA4**
Only in conjunction with ancillary unit AGQ3
Refer to Data Sheet N7711



Ionization probe
To be supplied by customer



Actuators

Actuator **SQN3**
Refer to Data Sheet N7808



Actuator **SQN7**
Refer to Data Sheet N7804



Actuator **SQN9**
Refer to Data Sheet N7806



Accessories (to be ordered separately) (continued)

Display and operating units

Display and operating unit **AZL21.00A9**
 Article no.: **BPZ:AZL21.00A9**
 Detached unit, choice of mounting methods, 8-digit LCD, 5 buttons, BCI interface for LME39, degree of protection IP40.
 Refer to Data Sheet N7542.



Display and operating unit **AZL23.00A9**
 Article no.: **BPZ:AZL23.00A9**
 Detached unit, choice of mounting methods, 8-digit LCD, 5 buttons, BCI interface for LME39, degree of protection IP54.
 Refer to Data Sheet N7542.



Others

Valve proving system **LDU11** (only LME39.100)
 Designed to check the tightness of shutoff valves in connection with gas burners and gas devices. In the event of inadmissible leakage, the system prevents the burner from starting up.
 Refer to Data Sheet N7696



PTC resistor **AGK25**
 Article no.: **BPZ:AGK25**

- AC 230 V
- To burden terminal 3 (for burners without fan motor such as atmospheric gas burners)



Ancillary unit **AGQ3**
 For UV supervision. Can be fitted under the plug-in base.



Article no.	Type	Cable length (mm)
BPZ:AGQ3.1A27	AGQ3.1A27	500
BPZ:AGQ3.2A27	AGQ3.2A27	300

Reset button extension **AGK20**



Signal cable **AGV50.100**
 Article no.: **BPZ:AGV50.100**
 For AZL2, with RJ45 connector, cable length 1 m, pack of 10.



RC unit **ARC 4 668 9066 0**
 Article no.: **BPZ:ARC466890660**
 For the supervision of ionization currents in networks with non-earthed neutral conductor



Technical data

General unit data

Mains voltage	AC 120 V
<ul style="list-style-type: none"> LME39.xxxx1 LME39.xxxx2 	AC 230 V
Mains frequency	50...60 Hz
Power consumption	12 VA
External primary fuse (Si)	Max. T10H250V to IEC 60127-2
	Recommendation: T6.3H250V to IEC 60127-2
Perm. mounting position	Optional
Input current at terminal 12	Max. 5 A
Weight	Approx. 160 g
Safety class I (burner control with plug-in base)	In accordance with DIN EN 60730-1 For applications without safe separation. Protection against electric shock is achieved through double or reinforced insulation. Provision for the protective earth connection is made in the plug-in base AGK11.
Degree of protection	IP40 (to be ensured through mounting) (if RJ11 jack is not covered, only IP10)
Rated surge voltage category III (DIN EN 60664)	
<ul style="list-style-type: none"> LME39total unit Creepage distances and air gaps 	4 kV 2.5 kV due to voltage limitation measures
Pollution degree	2 in accordance with DIN EN 60730-1
Software class	Class C in accordance with DIN EN 60730-2-5:2011 2-channel structure
Reaction time in the event of loss of flame	Max. 1 s
Perm. cable length terminal 1	Max. 1 m at a line capacitance of 100 pF/m, unshielded (max. 3 m at 15 pF/m)
Perm. cable length from QRA... to AGQ3.xA27 (lay separate cable)	Max. 20 m at 100 pF/m, unshielded
Perm. cable length terminals 8, 10 and 11	Max. 20 m at 100 pF/m, unshielded (lay separate cable)
Perm. cable lengths remaining terminals	Max. 3 m at 100 pF/m, unshielded
Perm. input voltage terminals 6 and 11	AC 120 V AC 230 V
Possible input current terminals 6	0.5 mA
Possible input current terminals 8 and 11	1 mA

Perm. current rating	At $\cos\varphi \geq 0.6$	At $\cos\varphi = 1$
Terminal 3	Max. 2.7 A (15 A for max. 0.5 s)	Max. 3 A
Terminals 4, 5 and 7	Max. 1.7 A	Max. 2 A
Terminal 9		
<ul style="list-style-type: none"> LME39.100 LME39.400 	Max. 1 A Max. 1.7 A	Max. 1 A Max. 2 A
Terminal 10	Max. 1 A	Max. 1 A

Technical data (cont'd)

Signal cable AGV50... Display → BCI	Signal cable	Color white Unshielded Conductor 4 x 0.141 mm ² with RJ11-connector
	Cable length AGV50.100	1 m
	Location	Under the burner hood (extra measures required for compliance with SKII EN 60730-1)
Environmental conditions	Storage	DIN EN 60721-3-1
	Climatic conditions	Class 1K3
	Mechanical conditions	Class 1M2
	Temperature range	-20...+70 °C
	Humidity	<95% r.h.
	Transport	DIN EN 60 721-3-2
	Climatic conditions	Class 2K3
	Mechanical conditions	Class 2M2
	Temperature range	-20...+70 °C
	Humidity	<95% r.h.
	Operation	DIN EN 60 721-3-3
	Climatic conditions	Class 3K3
	Mechanical conditions	Class 3M3
	Temperature range	-20...+60 °C
	Humidity	<95% r.h.
	Installation altitude	Max. 2,000 m above sea level



Attention!

**Condensation, formation of ice and ingress of water are not permitted!
If this is not observed, there is a risk of loss of safety functions and a risk of electric shock.**

AGK11...

Connectable conductor cross-sections	
• Terminals 1...12	Min. 0.5 mm ² Max. 1.5 mm ² Wire or stranded wire with ferrules
• Auxiliary terminals N, PE, 31, 32	Min. 0.5 mm ² Max. 1.5 mm ² Wire or stranded wire with ferrules (when connecting 2 wires or stranded wires per terminal, the same cross-sectional areas must be used for each terminal)

Technical data (cont'd)

Flame supervision with ionization probe

	At mains voltage	
	UN = AC 120 V ¹⁾	UN = AC 230 V ¹⁾
Detector voltage between ionization probe and ground (AC voltmeter $R_i \geq 10 \text{ M}\Omega$)	AC 50...120 V	AC 115...230 V
Switching threshold (limit values): Switching on (flame on) (DC ammeter $R_i \leq 5 \text{ k}\Omega$) Switching off (flame off) (DC ammeter $R_i \leq 5 \text{ k}\Omega$)	$\geq \text{DC } 1.5 \mu\text{A}$ $\leq \text{DC } 0.5 \mu\text{A}$	$\geq \text{DC } 1.5 \mu\text{A}$ $\leq \text{DC } 0.5 \mu\text{A}$
Detector current required for reliable operation	$\geq \text{DC } 3 \mu\text{A}$	$\geq \text{DC } 3 \mu\text{A}$
Switching threshold in the event of poor flame during operation (LED flashes green)	Approx. DC 5 μA	Approx. DC 5 μA
Short-circuit current between ionization probe and ground (AC ammeter $R_i \leq 5 \text{ k}\Omega$)	AC 50...150 μA	AC 100...300 μA

¹⁾ For applications outside the European Community, operation at mains voltage AC 120 V / AC 230 V $\pm 10\%$ is ensured

Flame supervision via ionization is accomplished by making use of the conductivity and rectifying effect of the flame.

The DC current that flows in the presence of a flame (ionization current) is largely proportional to the flame quality. This current is measured in the flame signal amplifier.

The amplifier is designed such that it only responds to the DC current component of the flame signal. This ensures that a short circuit between the ionization probe and ground cannot simulate a flame signal (since in that case AC current would flow).

Note!

The ignition (ignition spark) can have a negative effect on the ionization current formation during startup.

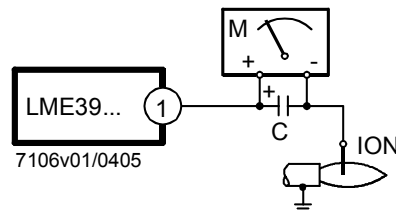


To minimize the impact

- the positioning of the ionization probe must be checked and optimized
- it may be beneficial to replace the electrical connections (phase / neutral) on the primary side of the ignition transformer

A short-circuit between ionization probe and ground initiates a non-alterable lockout.

Measuring circuit



Legend

- C Electrolytic capacitor 100...470 μF ; DC 10...25 V
- ION Ionization probe
- M Microammeter, R_i max. 5,000 Ω

For detector currents, see *General unit data*.

Technical data (cont'd)

Flame supervision with AGQ3.xA27 and flame detector QRA...

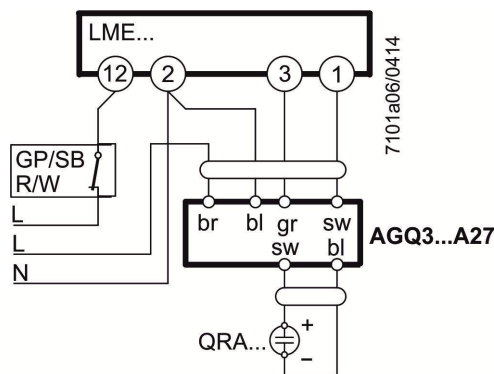
Only in connection with LME39.xxxx2 (AC 230 V)!	
Mains voltage	AC 230 V +10%/-15%
Mains frequency	50...60 Hz ±6%
Perm. cable length from QRA... to AGQ3.xA27 (lay separate cable)	Max. 20 m, unshielded
Perm. cable length from AGQ3.xA27 to LME39.xxxx2	Max. 2 m, unshielded
Weight of AGQ3.xA27	Approx. 140 g
Perm. mounting position	Optional
Degree of protection	IP40, to be ensured through mounting
Power consumption	4.5 VA

	At mains voltage UN	
	AC 220 V	AC 240 V
Detector voltage at QRA... (with no load)		
Terminal 3 OFF (see <i>Program sequence</i>)	DC 400 V	DC 400 V
Terminal 3 ON (see <i>Program sequence</i>)	DC 300 V	DC 300 V
Detector voltage Load by DC measuring instrument Ri >10 MΩ		
Terminal 3 OFF (see <i>Program sequence</i>)	DC 380 V	DC 380 V
Terminal 3 ON (see <i>Program sequence</i>)	DC 280 V	DC 280 V
DC current detector signals with flame detector QRA...	Min. required	Max. possible
Measurement at the flame detector QRA...	200 µA	500 µA

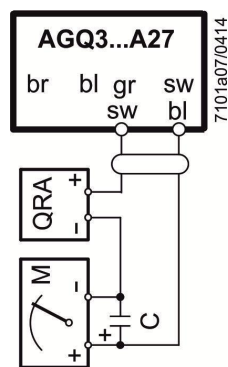
Ancillary unit AGQ3.xA27

The correct functioning of aged UV cells can be checked with a UV test by applying a higher voltage to the UV cell after controlled shutdown until terminal 3 ON carries voltage.

Connection diagram



Measuring circuit for measuring the UV detector current



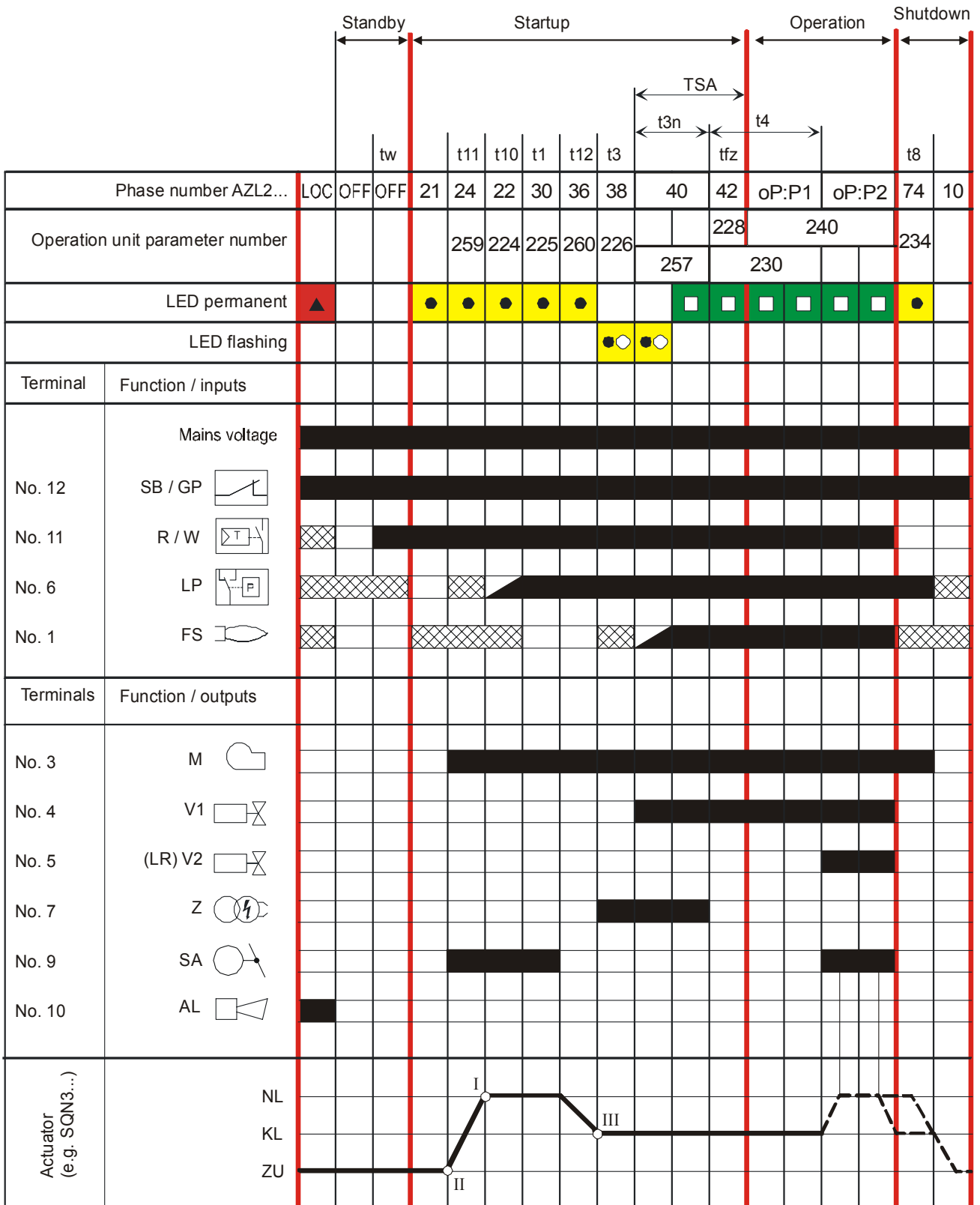
Measurement made at the flame detector QRA...

Legend

- C Electrolytic capacitor 100...470 µF; DC 10...25 V
- M Microammeter Ri max. 5,000 Ω
- QRA... Flame detector
- GP Pressure switch
- SB Safety limit thermostat
- R Control thermostat or pressurestat
- W Limit thermostat or pressure switch

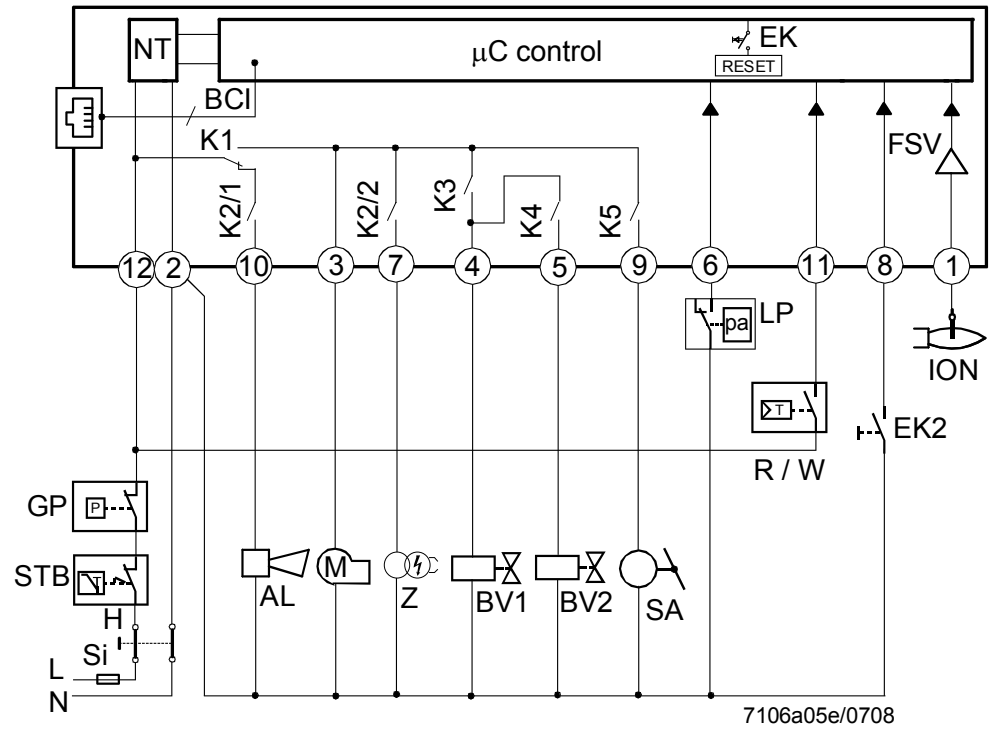
- bl Blue
- br Brown
- gr Grey (old: rt = red)
- sw Black

Program sequence LME39.100...



7106d04e/0312

Inputs and outputs/internal connection diagram LME39.100...



Application examples



Attention!

The connection diagrams shown are merely examples which must be adapted in the individual case depending on the application!

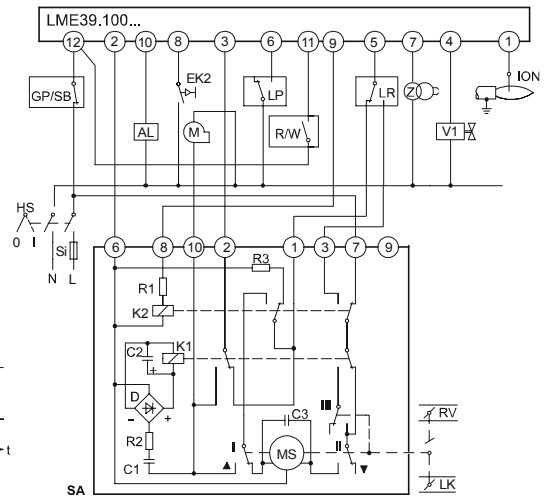
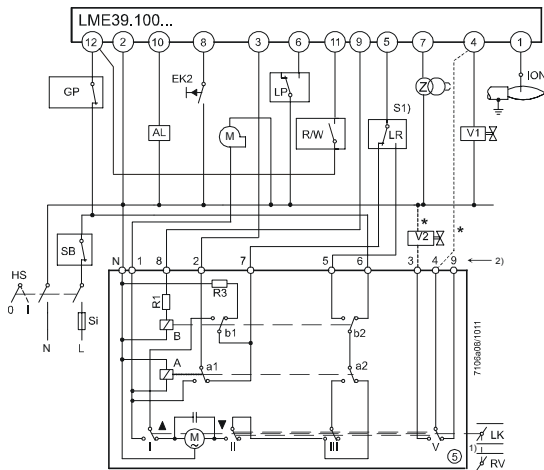
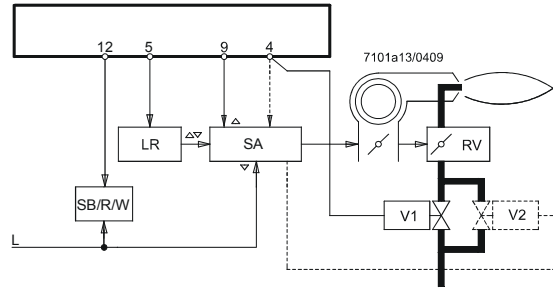
Control of actuators of 2-stage or 2-stage modulating burners.
Controlled prepurging with high-fire air volume.

For information about actuators:

SQN3... see Data Sheet N7808

SQN7... see Data Sheet N7804

SQN9... see Data Sheet N7806

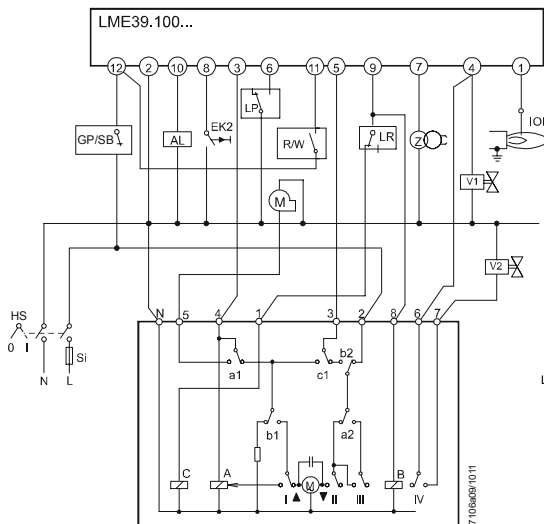


SQN3...151... or SQN3...251...

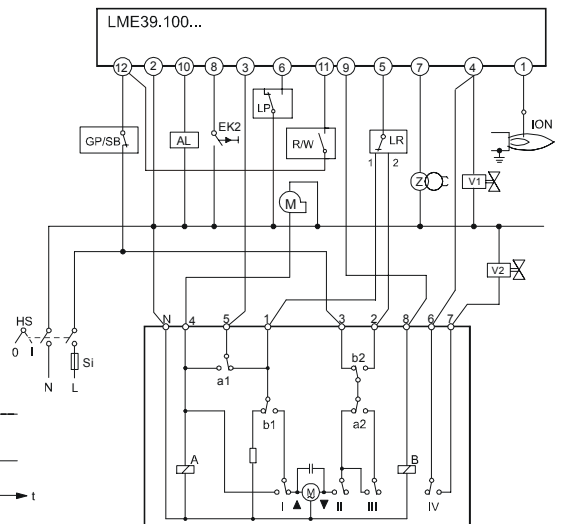
* Note:

With 2-stage modulating burners (with gas regulation damper), fuel valve 2 and the dotted connection between terminals (*) are not required.

SQN90.220.../2-stage modulating control

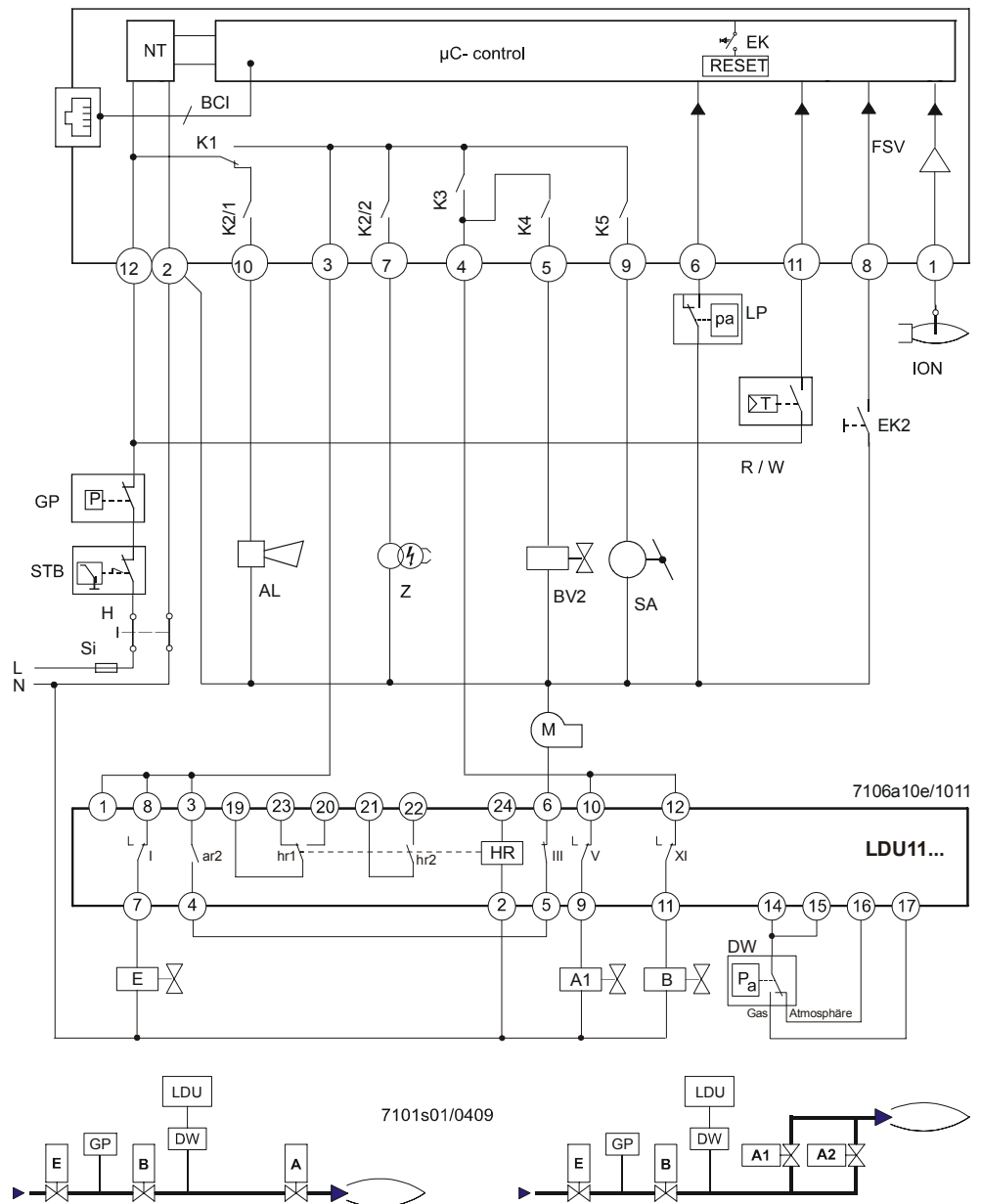


SQN7...454/2-stage control
1 wire control



SQN7...424/2-stage control
2 wire control

- Before startup of burner
- In the case of plants without vent pipe to atmosphere

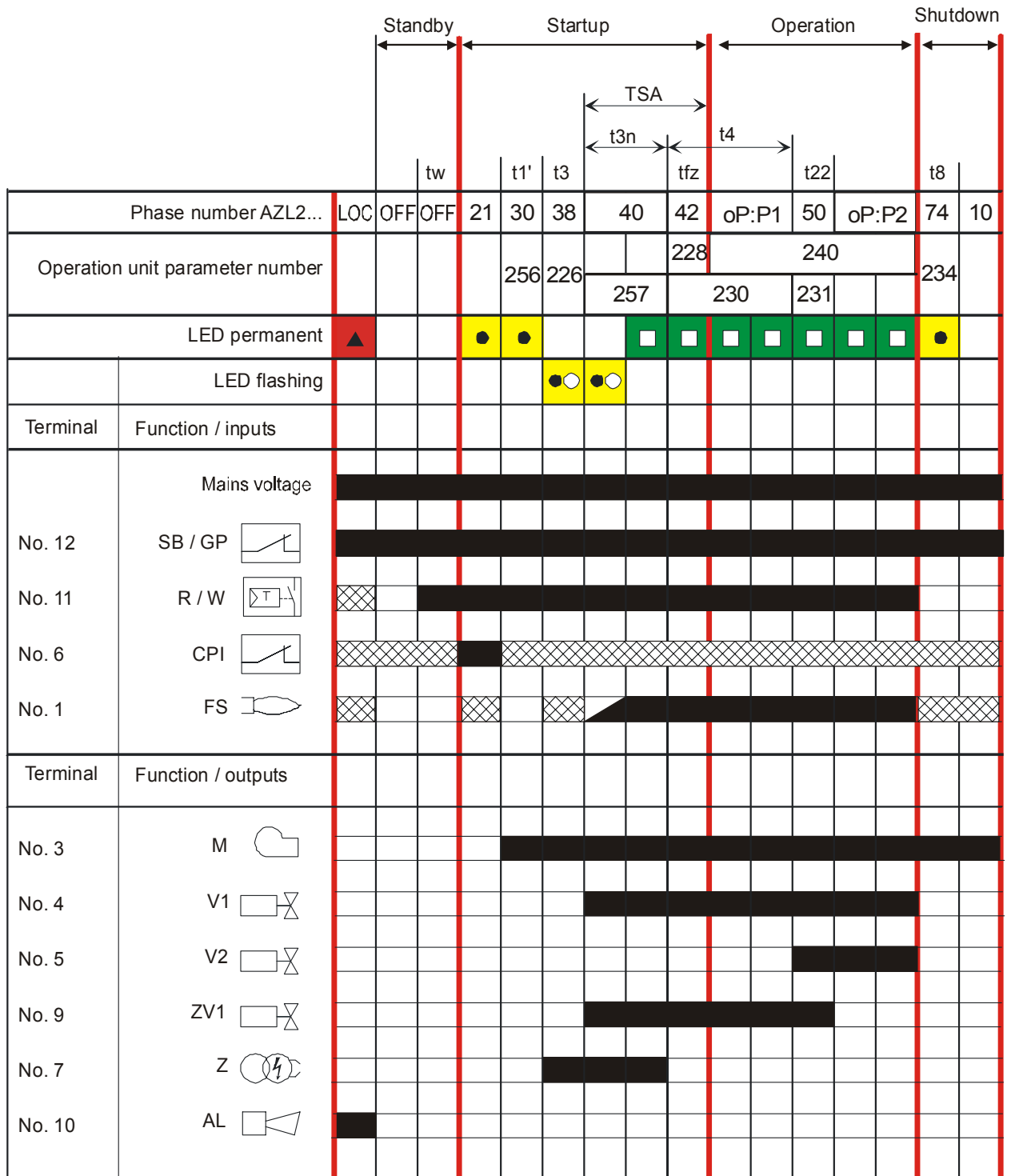


- Valve proving is started each time the system is switched on, with connection of terminal 3, after controller ON or after lockout
- If the LDU11... initiates lockout, valve proving can take up to 160 seconds. Therefore, the maximum permissible response time of the air pressure switch is 180 seconds
- With the LDU11..., faults during valve proving lead to lockout and, with the LME39.100..., to lockout due to air pressure switch timeout (blink code 3)

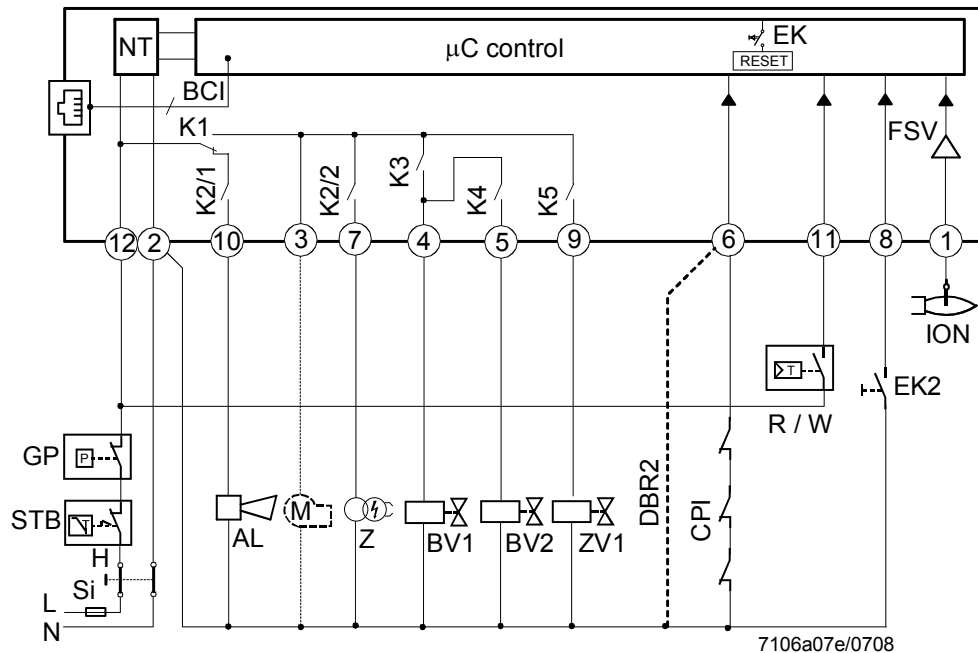


- **Note!**
A faulty air pressure switch (air pressure switch does not closing) leads to lockout (blink code 3) on completion of the pressure switch response time of 180 seconds and can be distinguished from lockout due to faulty valve proving only because the LDU11... did not go to lockout
- The fan motor must be connected to terminal 6 of the LDU11... since release takes place via the air pressure switch upon successful valve proving

Program sequence LME39.400...



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Application examples

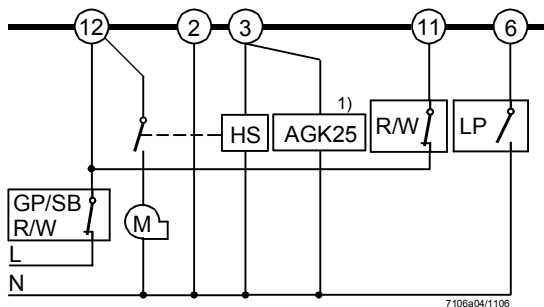


Attention!
The connection diagram shown is merely an example which must be adapted in the individual case depending on the application!

Recommendation:






Note!
In extremely EMC-stressed environments, burners without fan motor or burners equipped with fan control via auxiliary contactor should use an AGK25 to produce a burden on terminal 3. If not observed, the burner is not reliably started up



1) AGK25 is required only if an auxiliary relay with a coil resistance of $\geq 50 \text{ k}\Omega$ is used

Legend

I, II, III	Cam actuator
t1	Prepurge time
t1'	Purge time
t3	Preignition time
t3n	Postignition time (parameter 257+0.3 seconds)
t4	Interval between ignition OFF and release of fuel valve 2
t8	Postpurge time
t10	Specified time for air pressure signal
t11	Programmed opening time for actuator
t12	Programmed closing time for actuator
t22	2nd safety time
tfz	Flame detection time
TSA	Ignition safety time (t3n + tfz)
tw	Waiting time
A, A1, A2	Gas valves controlled to evacuate the test space with valve proving
AGK25...	PTC resistor
AL	Error message (alarm)
B	Gas valve controlled to fill the test space with valve proving
BCI	Communication interface
BV...	Fuel valve
CPI	Closed Position Indicator
DBR2	Wire link
DW	Pressure switch - valve proving
E	Safety shut-off valve, dead closed (optional)
EK	Lockout reset button (internal)
EK2	Remote lockout reset button
FS	Flame signal
FSV	Flame signal amplifier
GP	Gas pressure switch
H	Main switch
HS	Auxiliary contactor, relay
ION	Ionization probe
K1...5	Internal relay
KL	Low-fire
LK	Air damper
LKP	Air damper position
LP	Air pressure switch
LR	Load controller
M	Fan motor
MS	Synchronous motor
NL	High-fire
NT	Power supply unit
QRA...	Flame detector
R	Control thermostat / pressurestat
RV	Gas regulation damper
SA	Actuator SQN...
SB	Safety limiter
STB	Safety limit thermostat
Si	External pre-fuse
t	Time
V...	Fuel valve
W	Limit thermostat / pressure switch
Z	Ignition transformer
ZV	Extra valve
	Input signal/output signal 1 (ON)
	Input signal/output signal 0 (OFF)
	Input permissible signal 1 (ON) or 0 (OFF)

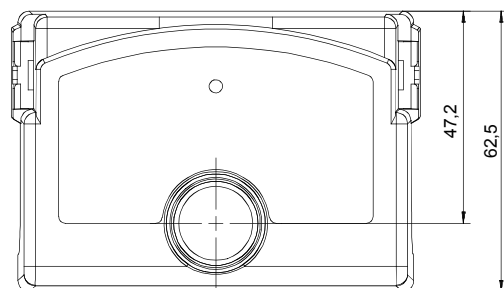
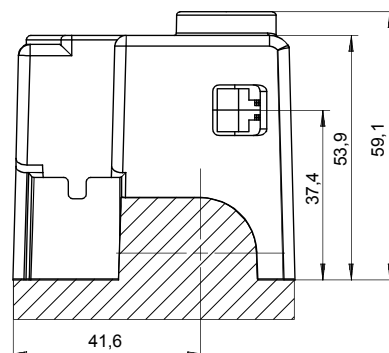
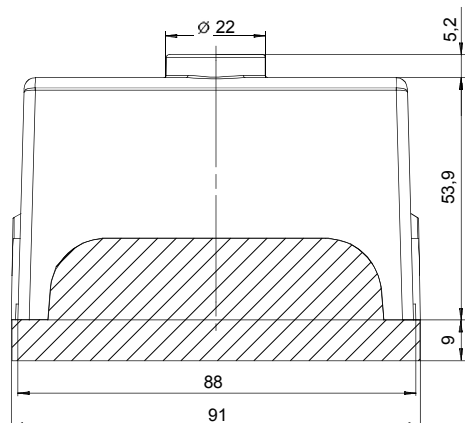
Dimensions

Dimensions in mm

LME39...

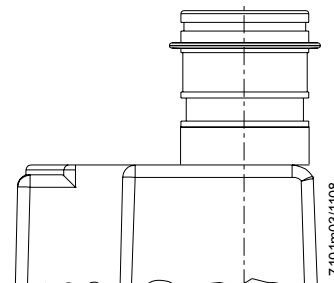
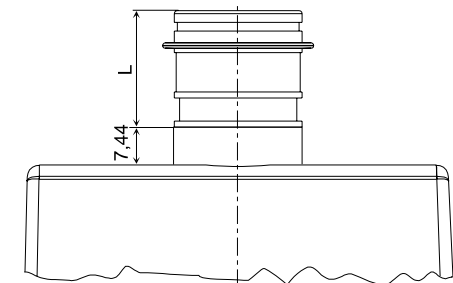


Plug-in base AGK11.6

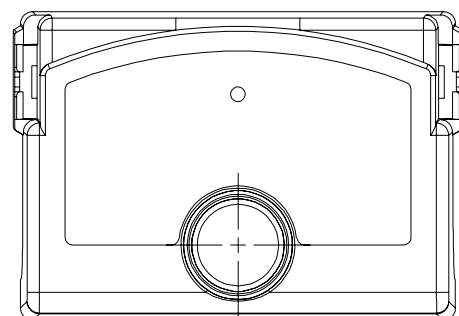


7106m01/0405

LME39... with lockout reset
button extension AGK20...



7101m03/1108

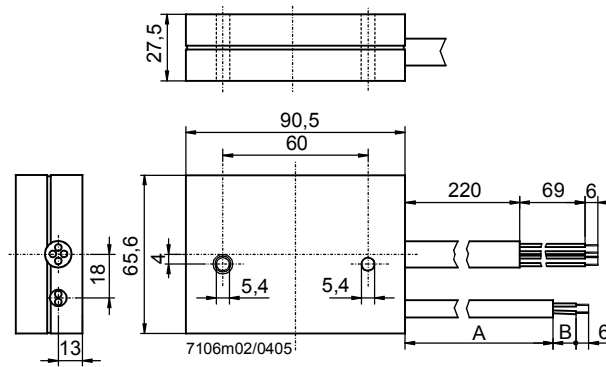


Designation	Length (L) in mm
AGK20.19	19
AGK20.43	43
AGK20.55	55

Dimensions (cont'd)

Dimensions in mm

Ancillary unit AGQ3.xA27



Type	Dimensions	
	A	B
AGQ3.1A27	500	19
AGQ3.2A27	300	34