



Actuators for air and gas dampers

SQN72... SQN73...

Electromotoric actuators for air dampers and control valves of oil and gas burners of small to medium heat capacity.

The SQN72/SQN73 and this data sheet are intended for original equipment manufacturers (OEMs) using the SQN72/SQN73 in or on their products.

Use

The SQN72/SQN73 actuators are designed for positioning and driving air/gas dampers of oil burners, gas burners, and other ancillary equipment of small and medium heat capacity. They also offer load-dependent control of the amount of fuel and combustion air.

The controlling elements are controlled as follows depending on the current burner load:

- In connection with P-PI or PID controllers, such as the RWF5
- Directly via the different types of burner controls, such as LOA, LMO, LME, or LFL
- In connection with 1- or 2-wire control or 3-position controllers

Features

- Impact-proof and heat-resistant plastic housings
- Plug terminals for the electrical connections
- Maintenance-free gear train, which can be disengaged
- Internal position indication
- Easy-to-adjust end and auxiliary switches for adjusting the switching points
- Internal electronic circuits
- Protection type IP54
- Holding torque 0.7–1.3 Nm
- Running time 4–30 s
- Direction of rotation: SQN72 counterclockwise and SQN73 clockwise

Supplementary documentation

Product type	Documentation type	Documentation number
LAL	Data sheet	N7153
LFL	Data sheet	N7451
LFL1.148	Data sheet	N7454
LGK16	Data sheet	N7785
LME2	Data sheet	N7101
LME7	Data sheet	N7105
LMO2 LMO4 LMO39	Data sheet	N7130
LOA2 LOA3	Data sheet	N7118
LOK16	Data sheet	N7785
RWF50	Data sheet	N7866
	User manual	U7866
RWF55	Data sheet	N7867
	User manual	U7867



To avoid personal injury or damage to property or the environment, the following warning notes must be observed.

- Read the documentation on the actuators carefully and fully.
If not observed, dangerous situations might occur
- The user must ensure that the actuators meet the requirements of the relevant application standards
- Safety-related applications are only possible with Siemens burner controls
- All product-related activities (mounting, settings and maintenance) must be performed by appropriately qualified and authorized personnel
- Before carrying out any work in the connection area of the plant, disconnect all poles from the power supply. Ensure that the plant cannot be inadvertently switched on again and that it is indeed dead. If the plant is not switched off, there is a risk of electric shock
- Take suitable measures to provide touch protection at the electrical connections and ensure the housing cover is screwed down tight
- Each time work has been carried out (mounting, installation, service work, etc.), check to ensure that wiring is in an orderly state
- These devices must not be put back into operation following impact or shock; even if they do not exhibit any visible damage, their safety functions may be impaired



Please note!

- Risk of electric shock – to disconnect the unit from the power, it may be necessary to open more than one switch. Before performing maintenance work, the unit must be disconnected from power
- All cam switch settings must satisfy the requirements of the relevant application standards
- To ensure protection against electric shock, the connection terminals must have adequate touch protection. Make certain that non-insulated connections or wires cannot be touched. The housing cover must be screwed tight
- Static charges must be avoided since they can damage the electronic components of the unit on contact.

Recommendation:

Use ESD equipment

Selection of actuator version

- Ensure that any torque from outside acting on the controlling element (e.g., torque from the airflow produced by the burner fan) will be smaller than the zero-current state self-holding torque of the actuator
- The mechanical design of the burner must be such that any inadmissibly high torque from outside acting on the controlling element will not lead to critical burner operation.

Example:

If a torque acts on the asymmetrical bearing of the air damper due to the airflow in the air duct of the burner, the air damper is moved in the OPEN direction. This leads to a certain amount of excess air during combustion, which is less critical than a lack of air.

Mounting notes

- Ensure that the relevant national safety regulations and notes on standards are complied with
- In the geographical areas where DIN regulations are in use for mounting and installation, the requirements of VDE must be complied with, especially DIN/VDE 0100, 0550 and DIN/VDE 0722
- Make certain that the actuator is not exposed to direct solar radiation
- The connection between the actuator drive shaft and controlling element must be **form-fitted** and **backlash-free**
- Additional axial and radial bearing loads are not permitted while mounting
- Be sure to observe the correct mounting sequence when mounting the actuator to the controlling element.
This is usually as follows:
 1. Fit and secure the actuator
 2. Connect the actuator drive shaft to the controlling element via a coupling pin.

IP54

To ensure protection class IP54 throughout the lifetime of the actuator, the bearing of the actuator drive shaft must be located somewhere it will not be directly exposed to water or dust.

Form-fitted design



Please note!

Possible shaft/hub connections:

- Flattened shaft with corresponding counterpart

To avoid inadmissible bearing loads caused by rigid hubs, it is recommended to use compensating couplings with no mechanical play (e.g., metal bellows couplings).

- When dimensioning a shaft connection, note that torques higher than the rated output torque of the actuator can also act during operation:
 - The actuator itself can generate a higher torque under optimum operating conditions
 - The effect of mass moments of inertia (caused by the rotating parts in the motor as well as on the actuator) can lead to sudden impulse loads
- Siemens recommends overdimensioning the shaft connection by a factor of 2 compared to the rated torque of the actuator
- The connection between the actuator and burner or controlling element must be very rigid (no bending). This is particularly important when using column-mounted structures

Installation notes

- Ensure that the electrical wiring is in compliance with national and local regulations
- Make certain that strain relief of the connected cables is in compliance with the relevant standards (e.g., as per EN 60730 and EN 60335 series of standards)
- Ensure that spliced wires cannot come into contact with neighboring connections. Fit suitable ferrules
- SQN72/SQN73 terminals that are not used must be protected by dummy plugs
- When wiring the unit, the 230 V AC range must be strictly separated from the other voltage areas to ensure protection against electric shock
- The connection between the actuator shaft and the relevant controlling element must be form-fitted
- Only plastic versions of cable glands may be used

Standards and certificates



Applied directives:

- Low Voltage Directive 2014/35/EC
- Electromagnetic compatibility EMC (immunity) 2014/30/EC

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

- Automatic electrical controls for household and similar use Part 1: General requirements DIN EN 60730-1
- Automatic electrical controls for household and similar use Part 2-14: Particular requirements for electric actuators DIN EN IEC 60730-2-14

The edition of the standards that applies in each case can be found in the declaration of conformity.



EAC conformity (Eurasian conformity)



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



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

Lifetime

The actuator has a designed lifetime* of 250,000 start cycles (OFF ⇒ ON ⇒ OFF) under load with the rated torque in the entire rotation angle range, which under normal operating conditions in heating mode corresponds to approx. 10 years of service life (starting from the production date given on the type label). This lifetime is based on the endurance tests in the standard EN 298. A summary of the conditions has been published by the European Control Manufacturers Association (Afecon) (www.afecor.org).

The designed lifetime is based on use of the actuator according to the manufacturer's data sheet. After reaching the designed lifetime in terms of the number of burner startup cycles, or after the corresponding usage time, the actuator must be replaced by authorized personnel.

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

Service notes

Unit replacement

When replacing an actuator, the following points must be checked and corrected if necessary:

- Correct connection to the basic unit
- Assignment of functions

Disposal notes

The unit contains electrical and electronic components and must not be disposed of together with domestic waste. Local and currently valid legislation must be complied with.

Design

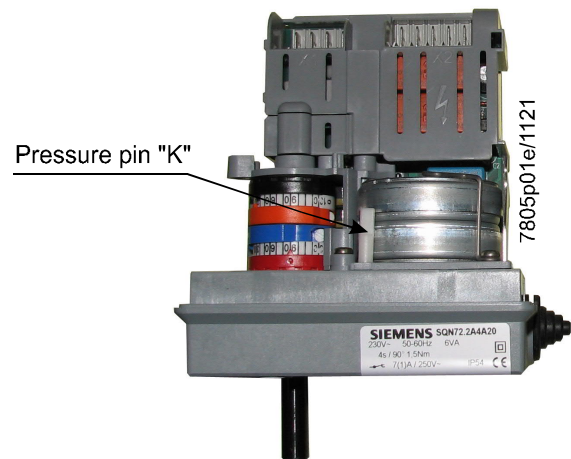
- Housing
- The lower housing is made of dark gray, impact-proof and heat-resistant plastic
 - The housing cover is made of light gray, impact-proof and heat-resistant plastic

The housing encloses:

- the synchronous motor with the **disengageable** reduction gear
- the camshaft of the control section
- the relays – depending on the type
- the switch section – connected to the plug-in spaces of the connection terminals via an assembled PCB

- Actuator motor
- Synchronous motor

- Coupling
- Shaft can be disengaged from the gear and motor by manually actuating the coupling (pressure pin (K))
 - Automatic reset



- Switching point adjustment
- Via rotating cam disks
 - Scales adjacent to the cams indicate the angle of the switching point
 - Cam disks with fine adjustment, adjustable with standard screwdriver
 - Assignment of the cam disks to the color-coded end switches and auxiliary switches, refer to *Circuit diagrams*

Position display Internal: Scale at the beginning of the camshaft on the gear side.

Connection technology Refer to *Technical data*.

Gear Maintenance free.

- Drive shaft
- Burnished steel
 - Fixed on one side on the front of the gear
 - Available as an actuator variant in different versions

- Mounting and fixing
- Front of gear as bearing surface
 - Fastening with through holes

Versions for potentiometer installation

Potentiometer installation Some actuators are directly suitable for potentiometer installation ex works. They are manufactured to accommodate the potentiometer and do not require any other further parts. The chosen potentiometer must be ordered separately, refer to *Accessories*. Detailed mounting instructions M7921 (4 319 9604 0) are included in the scope of delivery of the ASZ.

Type summary (further types on request)

SQN72 actuators / direction of rotation ⁶⁾ left

Diagram no.	Shaft ¹⁾ no.	Running time at 50 Hz ²⁾ for 90° (s)	Loading torque ⁴⁾ (max.) Nm	Holding torque Nm	Auxiliary switch ⁵⁾ Piece	Relay Piece	Potentiometer ⁷⁾	Housing length ¹⁾ mm	Types for mains voltage / mains frequency	
									230 V AC ³⁾ +10%/-15% 50–60 Hz	
									Article no.	Type
A	0	4	1.5	0.7	2	2	x	117	BPZ:SQN72.2A4A20	SQN72.2A4A20
A	0	12	2.5	1.2	2	2	x	117	BPZ:SQN72.4A4A20	SQN72.4A4A20
B	1	4	1.5	0.7	2	3	---	117	S55454-D303-A100	SQN72.2B4A21
C	0	4	1.5	0.7	2	---	x	117	BPZ:SQN72.2C4A20 ⁸⁾	SQN72.2C4A20 ⁸⁾
C	0	12	2.5	0.7	2	---	x	117	S55454-D301-A100	SQN72.4C4A21 ⁸⁾
C	0	30	2.5	1.3	2	---	x	117	BPZ:SQN72.6C4A20	SQN72.6C4A20
C	1	30	2.5	1.3	2	---	x	117	BPZ:SQN72.6C4A21	SQN72.6C4A21

Key

- 1) Refer to *Dimensions*
- 2) Specifications apply to 50 Hz; at 60 Hz, the running times are about 17% shorter.
- 3) Approx. 20% torque reduction with undervoltage
- 4) Under rated conditions, under extreme conditions (e.g., +60°C, 230 V AC -15%) approx. -25%
- 5) Free auxiliary switches (along with 2 end switches)
- 6) When looking at the shaft and control voltage at end switch I
- 7) Directly suitable for potentiometer installation, refer to the *Potentiometer installation* chapter
- 8) On request

Type summary (further types on request)

SQN73 actuators / direction of rotation ⁶⁾ right

Diagram no.	Shaft ¹⁾ no.	Running time at 50 Hz ²⁾ for 90° (s)	Loading torque ⁴⁾ (max.) Nm	Holding torque Nm	Auxiliary switch ⁵⁾ Piece	Relay Piece	Potentiometer ⁷⁾	Housing length ¹⁾ mm	Types for mains voltage / mains frequency	
									230 V AC ³⁾ +10%/-15% 50–60 Hz	
									Article no.	Type
									B	0

Key

- 1) Refer to *Dimensions*
- 2) Specifications apply to 50 Hz; at 60 Hz, the running times are about 17% shorter.
- 3) Approx. 20% torque reduction with undervoltage
- 4) Under rated conditions, under extreme conditions (e.g., +60°C, 230 V AC -15%) approx. -25%
- 5) Free auxiliary switches (along with 2 end switches)
- 6) When looking at the shaft and control voltage at end switch I
- 7) Directly suitable for potentiometer installation, refer to the *Potentiometer installation* chapter
- 8) On request

Accessories

To be ordered separately:

Proportional controlling element with mounting plate **VKP**
Proportional controlling element for mounting between threaded flanges in gas trains.
Refer to Data Sheet N7646.



Example:

ASZxx.3x potentiometer
Refer to Data Sheet N7921.
Refer to Mounting Instruction 4 319 9604 0 (M7921).



RWF50 compact universal controller
For load-dependent control of the amount of fuel and combustion air in connection with P-PI or PID controllers.
Refer to Data Sheet N7866.



RWF55 compact universal controller
For load-dependent control of the amount of fuel and combustion air in connection with P-PI or PID controllers.
Refer to Data Sheet N7867.



Technical data

Actuator

Mains voltage	230 V AC -15%/+10%
Mains frequency	50 to 60 Hz $\pm 6\%$
Actuator motor	Synchronous motor
Internal consumption	Max. 6 VA
Positioning angle, usable range	Max. 160°, scale range 0–130°
Mounting position	Optional
Degree of protection	IP54 in accordance with EN 60529:1991 + A1:2000 + A2:2013 when using the cable entry provided plus plastic washers for the M fixing screws as shown in the <i>Dimensions</i> chapter.



Please note!

The drive shaft bearing must be installed appropriately to protect against direct exposure to water and dust, otherwise IP54 cannot be guaranteed for the entire lifetime.

Protection class	II according to EN 60730-1:2016 + A1:2019 and EN IEC 60730-2-14:2019
External primary fuse (Si)	6.3 AT (to be installed on site) according to IEC 60127-2-5
Cable entry	Rubber grommet for the insertion of a single sheathed cable with a maximum diameter of 11 mm. The opening of the rubber grommet must be suitably adapted to the sheath diameter of the cable. To ensure that the rubber grommet will be tight, the cable must be correctly laid in this area with no openings. The rubber grommet is included in the scope of delivery.
Cable strain relief	Cable strain relief bridge with 2 fixing screws included in scope of delivery
Cable connection	2 plug-in spaces with connection terminals Type CUM / manufactured by Stelvio For the following connector types: <ul style="list-style-type: none"> • CUF 5-4 (plug-in space X1) • CUF 5-5 (plug-in space X2) Recommended cross-sectional area of stranded wire Min. 0.5 mm ² and max. 1.5 mm ² The connectors are not included in the scope of delivery (order directly from Stelvio).
Ferrules	Matching the cross-sectional area of the stranded wire
Direction of rotation (the opening facing the shaft)	<ul style="list-style-type: none"> • SQN72 Counterclockwise • SQN73 Clockwise
Torque and holding torque	Refer to <i>Type summary</i>
Running times	Refer to <i>Type summary</i>
Pause times at change in direction of rotation	>100 ms

Technical data (continued)

Lifetime	250,000 start cycles (OFF ⇒ ON ⇒ OFF) under load with the rated torque in the entire rotation angle range.
Weight (on average)	Approx. 500 g
Permissible on time	60%, maximum 3 minutes without interruption
Gear backlash between the actuator motor and actuator shaft	
• Ex works	≤1.2° ±0.3
• After 250,000 cycles	≤1.5° ±0.3°
End switches and auxiliary switches	
Switching voltage	24–250 V AC
Number of end switches	2
Number of auxiliary switches	Refer to <i>Type summary</i>
Actuation	Via camshaft, color-coded cam disks, refer to <i>Connection diagrams</i> .
Engagement of the cam disks with fine adjustment	Infinitely variable
Maximum permissible current load at $\cos \varphi = 0.9$: (Values in brackets: short-term peak load for max. 0.5 s)	
• Circuit A	
– Terminals 1, 2, 3, 8	Max. 0.5 A
– Terminals 4, 5	Max. 2 A (5 A)
– Terminals 6, 7	Max. 1 A (2 A)
• Circuit B	
– Terminals 1, 2, 3, 8	Max. 0.5 A
– Terminals 4, 5	Max. 2 A (5 A)
– Terminals 6, 7	Max. 1 A (2 A)
• Circuit C	
– Terminals 1, 2, 3, 4, 5	Max. 0.5 A
– Terminals 6, 7, 8	Max. 1 A (2 A)
• Circuit D	
– Terminals 1, 2, 3, 8	Max. 0.5 A
– Terminals 4, 5	Max. 2 A (5 A)
– Terminals 6, 7, 9, 10, 11	Max. 1 A (2 A)
• Circuit E	
– Terminals 1, 2, 3, 4, 5	Max. 0.5 A
– Terminals 6, 7*), 8, 9, 10, 11	Max. 0.5

*) In case of modulating operation, fuel valve 'BV2' is replaced by a gas control valve 'RV'



Please note!

When connecting a fuel valve: Max. 0.3 A, $\cos\phi > 0.8$ inductive.

Safety-relevant applications are only available with Siemens burner controls!

Technical data (continued)

Environmental conditions



Please note!
Condensation, formation of ice, and ingress of water are not permitted.
Failure to observe these poses a risk of damaging the safety functions and a risk of electric shock.

Climatic conditions

Storage

Temperature range -20 to +60°C

Humidity < 95% r.h.

Transport

Temperature range -50 to +60°C

Humidity < 95% r.h.

Operation

Temperature range -20 to +60°C

Humidity < 95% r.h.

Installation altitude Max. 2,000 m above sea level

Mechanical conditions

Vibration tests According to IEC 60068-2-6:2008 with acceleration of 10 m/s²

Shock tests According to IEC 60068-2-27:2010 with peak accelerations of 100 m/s²

Function

A synchronous motor drives the drive shaft with a mounted camshaft via a gear. The camshaft actuates end switches and auxiliary switches. The switch position of each end switch and auxiliary switch can be adjusted by an assigned cams disk within the running range. Some actuator versions are equipped with electronic switching modules that perform additional functions in connection with the end switches and auxiliary switches and external units, such as controllers (refer to *Circuit diagrams*).

Circuit diagrams (examples)



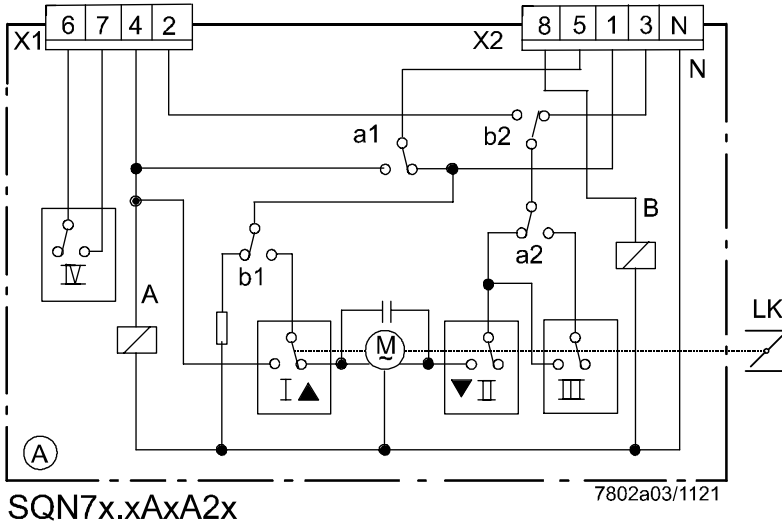
Please note!

All of the following circuit diagrams show the start position as supplied:

- End switch position II CLOSED
- No voltage

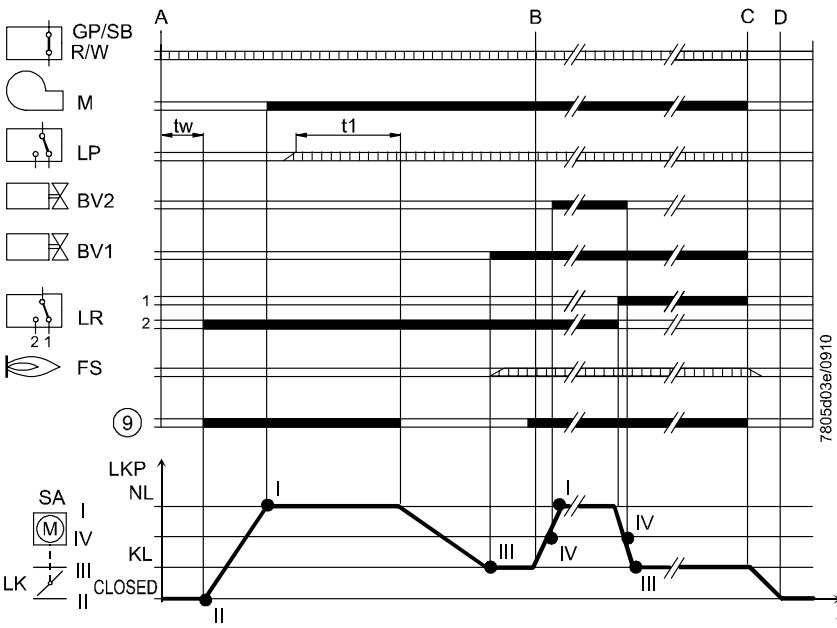
No. A → LME22

2-stage or modulating operation → prepurging at high-fire position (NL)



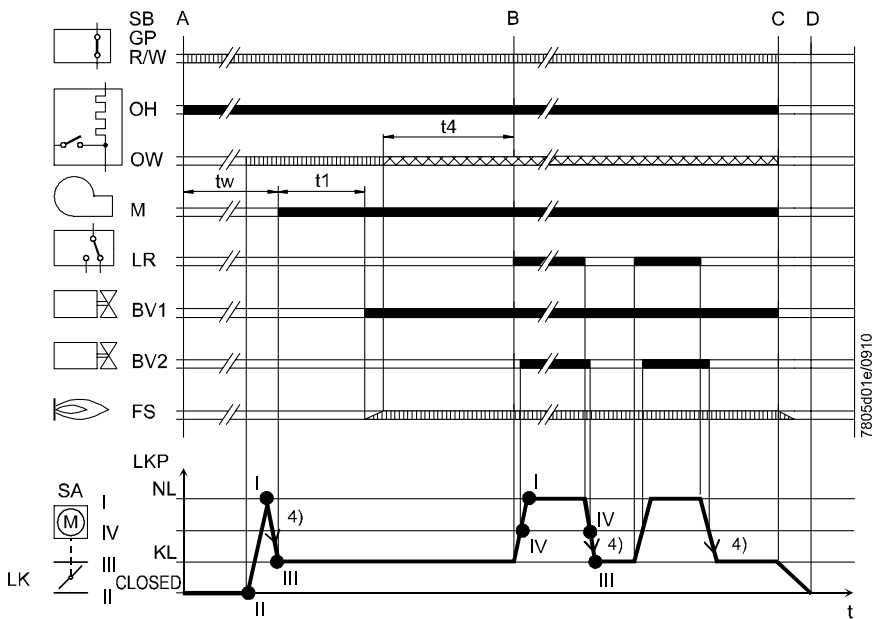
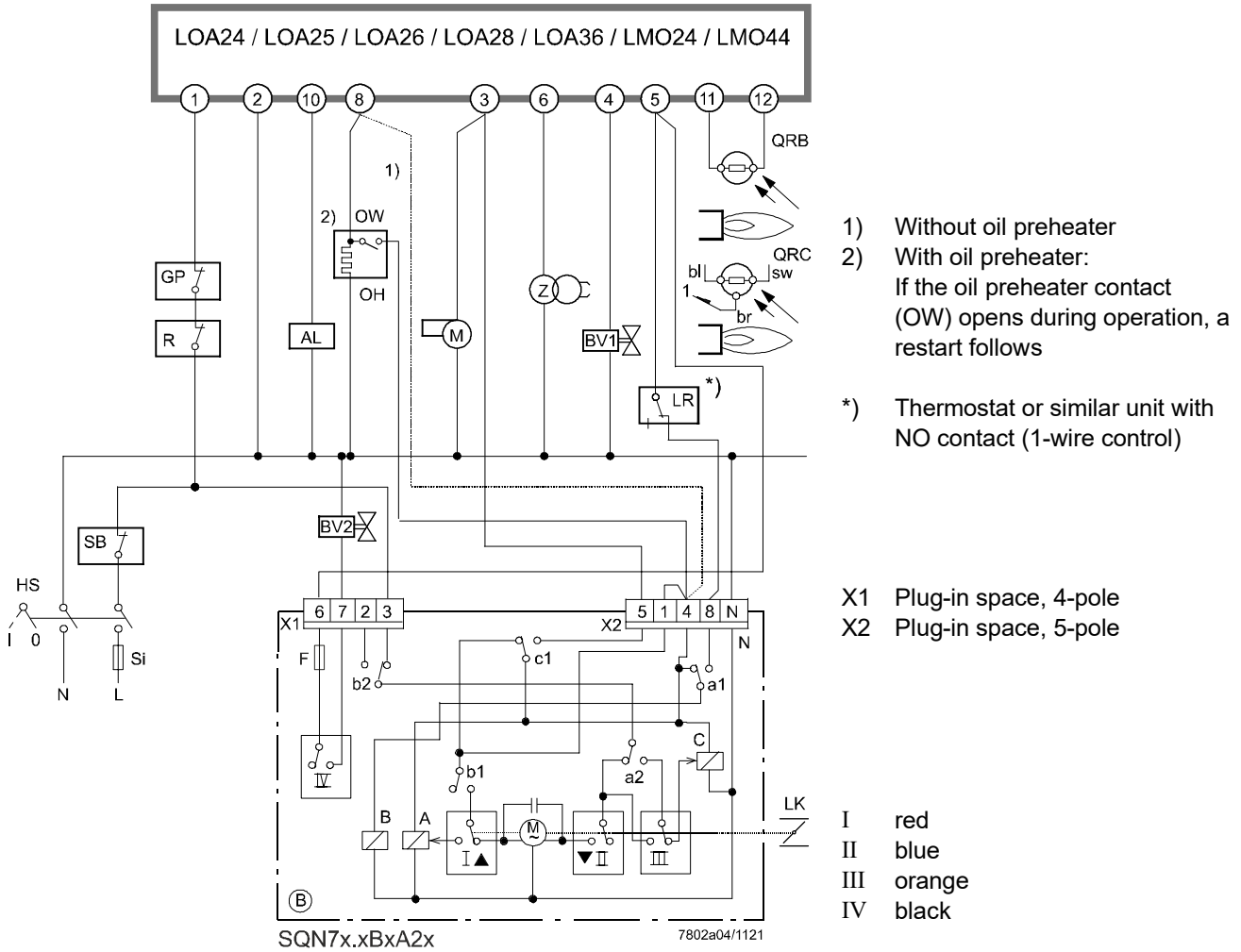
X1 Plug-in space, 4-pole
X2 Plug-in space, 5-pole

- I red
- II blue
- III orange
- IV black



Program sequence diagram shows 2-stage operation.

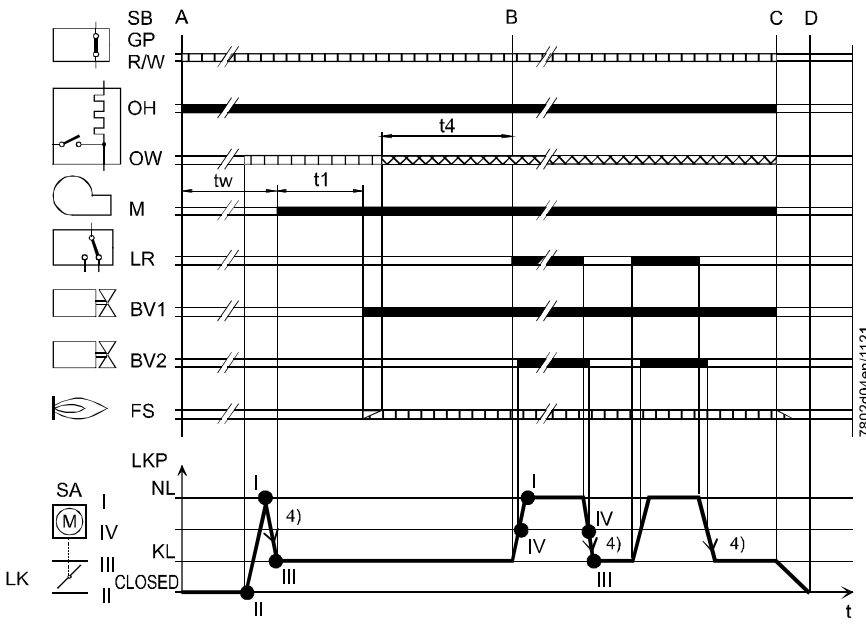
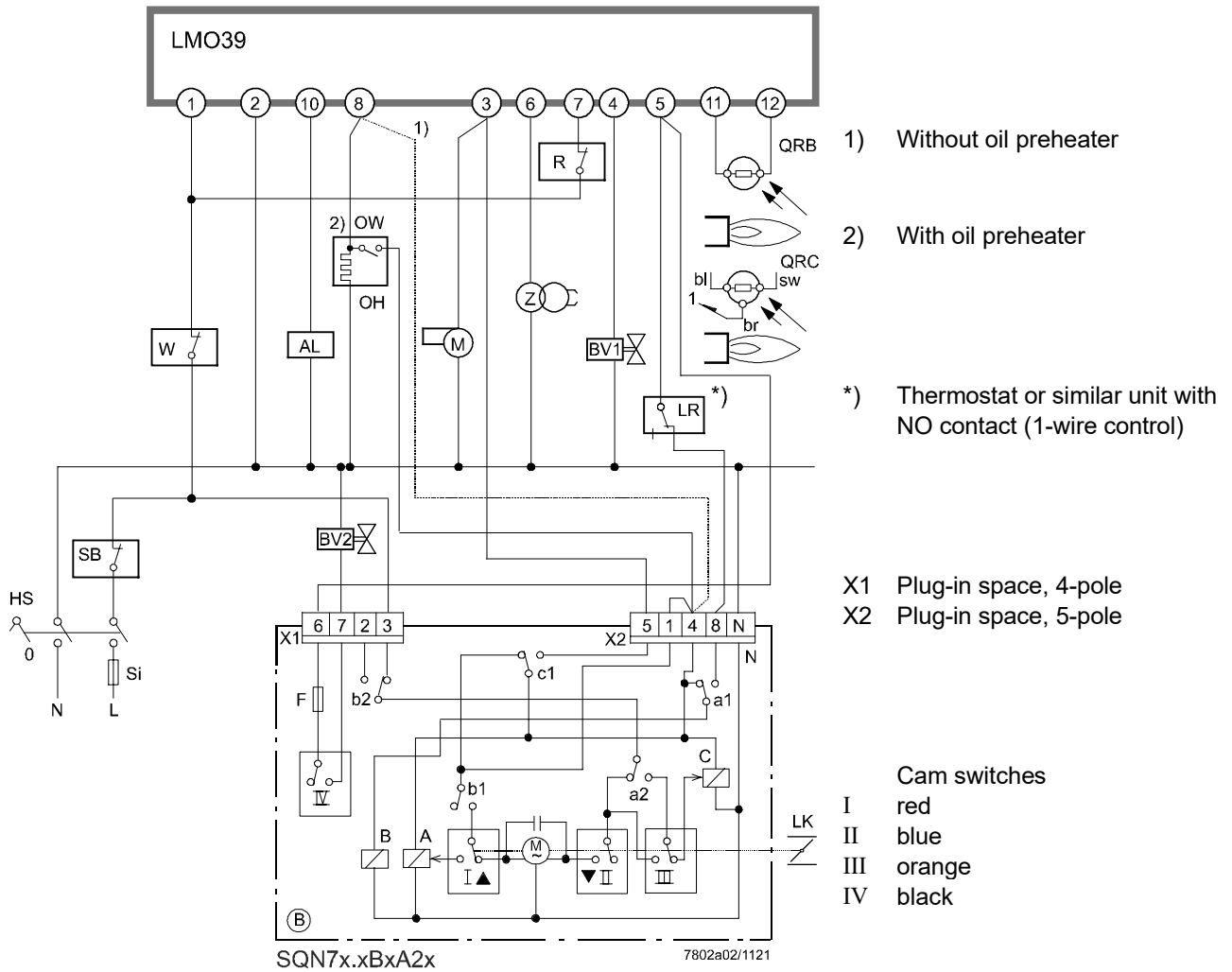
2-stage operation → prepurging at low-fire position (KL)



4) One-sided approach to the target position to eliminate the switching differential (backlash compensation).

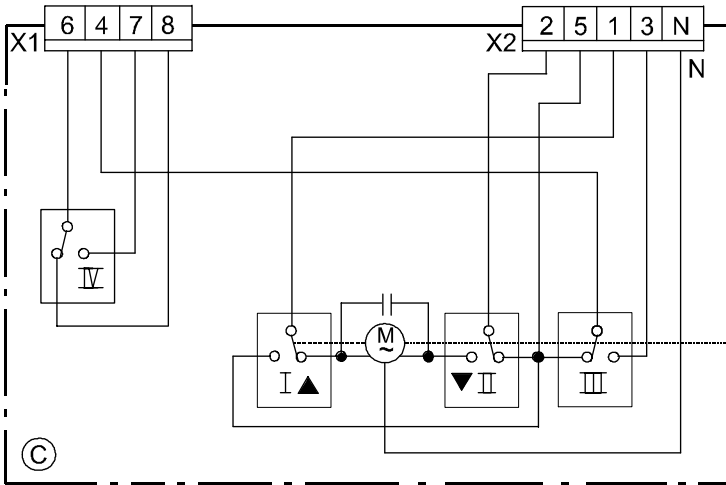
No. B → LMO39

2-stage operation → prepurging at low-fire position (KL)



4) One-sided approach to the target position to eliminate the switching differential (backlash compensation)

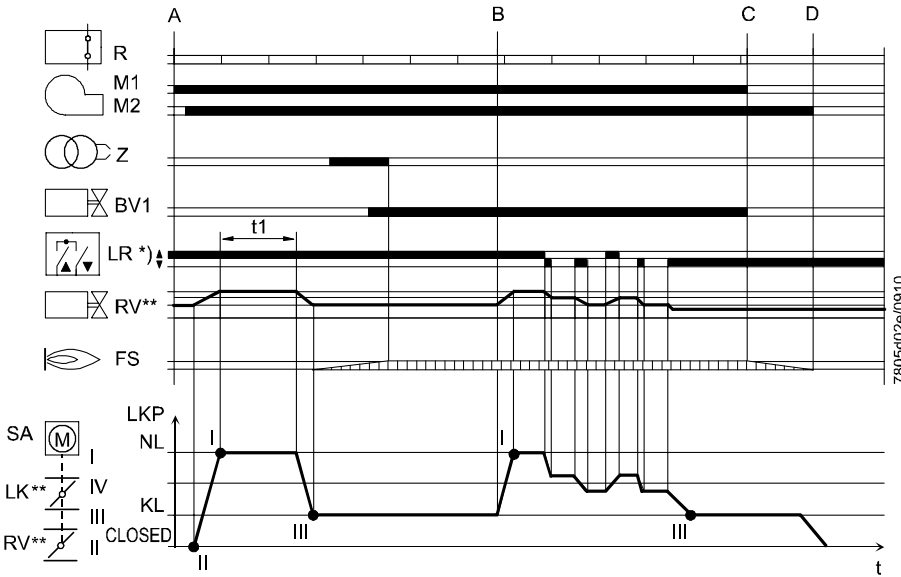
2-stage or modulating operation → prepurging at high-fire position (NL)



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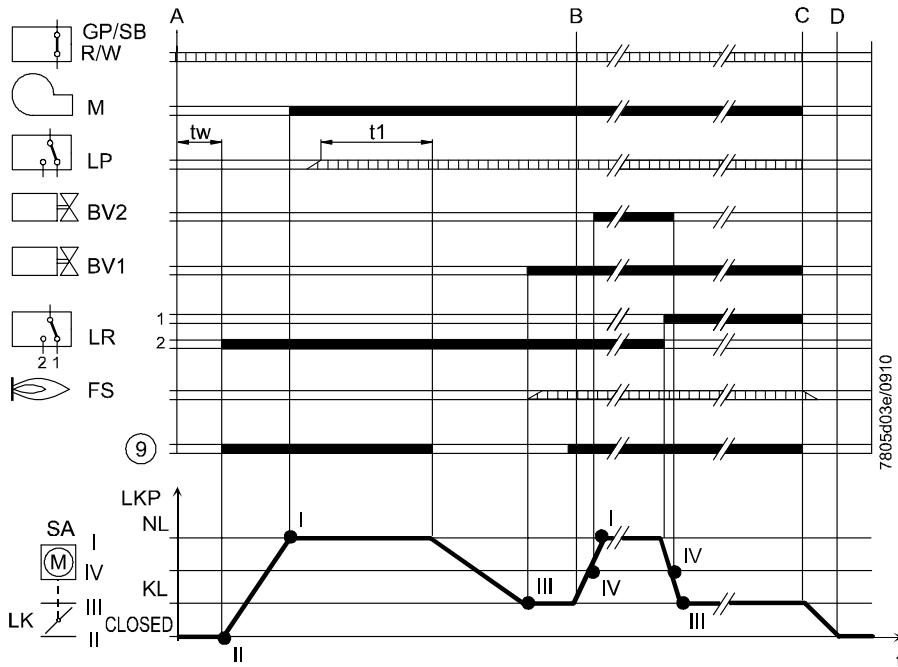
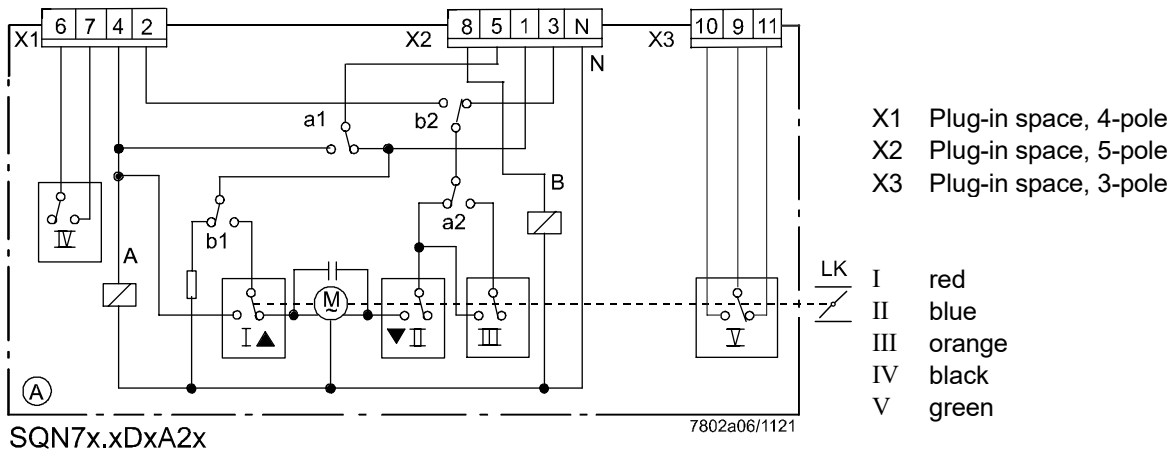
X1 Plug-in space, 4-pole
X2 Plug-in space, 5-pole

I red
II blue
III orange
IV black



Program sequence diagram shows modulating operation.

2-stage or modulating operation → prepurging at high-fire position (NL)






Key

A	Designation for internal circuit. Appears in the second position after the period in the type reference
I/II	End switches
III/IV/V	Auxiliary switches
AL	Remote lockout display (alarm)
BV1	Fuel valve stage 1
BV2	Fuel valve stage 2
BV3	Fuel valve stage 3
EK2	External remote lockout reset button
ION	Ionization probe
F	Internal fuse, not replaceable
FS	Flame signal
GP	Gas pressure switch
HS	Main switch
KL	Low-fire
L	Phase
LK	Air damper
LKP	Air damper position
LP	Air pressure switch
LR	Load controller
M	Burner motor or fan motor
Ⓜ	Actuator synchronous motor
M1	Without postpurging
M2	With postpurging
N	Neutral conductor
NL	High-fire
OH	Oil preheater
OW	Oil preheater release contact
QRB	Photoresistive detector
R	Control thermostat or pressurestat
⚡	Relay
RV	Control valve
SA	Actuator
Si	External primary fuse, as specified in the data sheet of the relevant burner control
SB	Safety limiter
STx	Stage
tx / Tx	Program times (refer to the data sheet of the relevant burner control)
TSA	Safety time
$\frac{\square}{R}$	Resistor
Z	Ignition transformer
CLOSED	Damper closed
▲	Direction of rotation OPEN
▼	Direction of rotation CLOSED

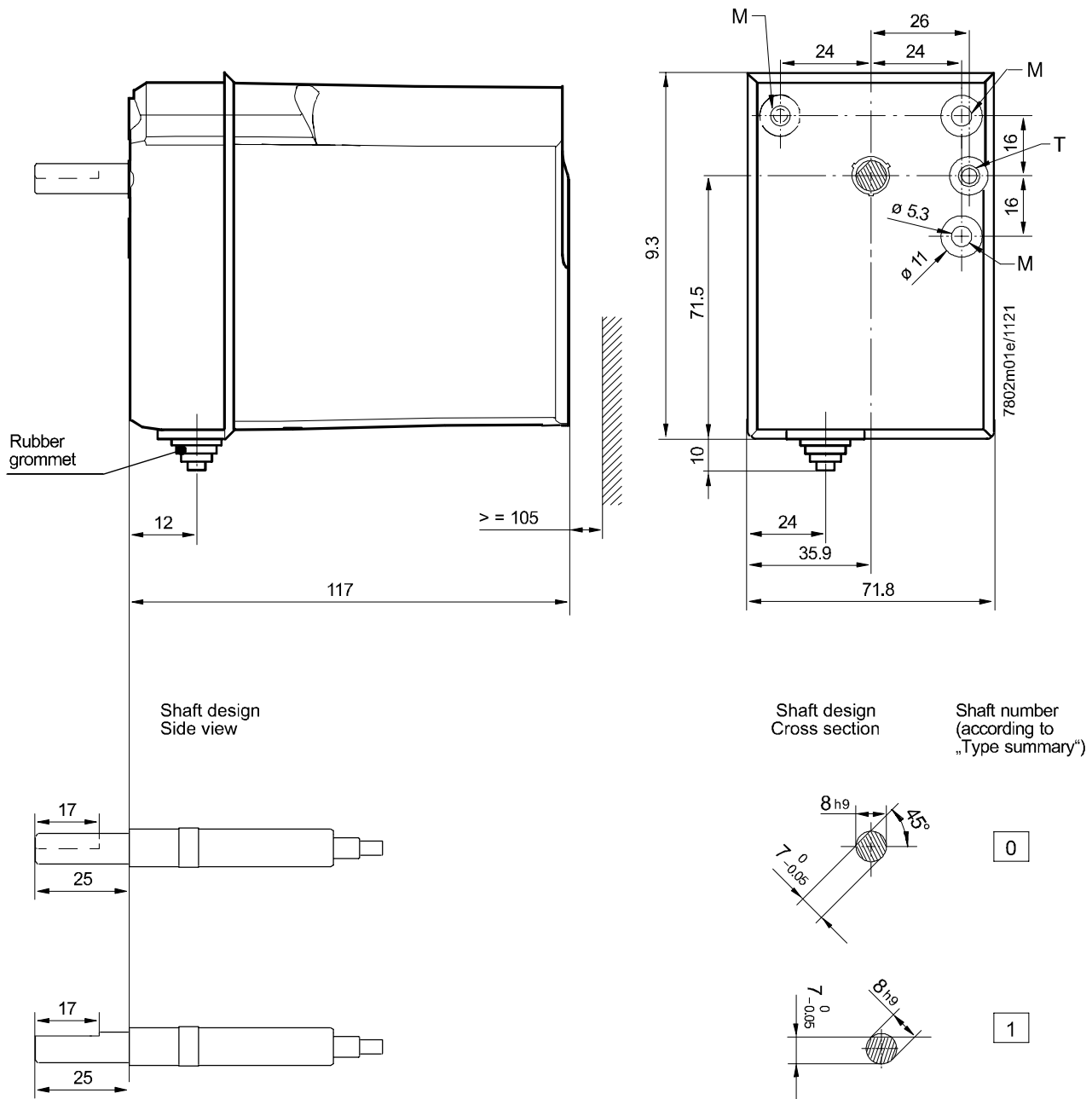
Program sequence – Diagrams

A	Burner ON
A–B	Burner startup
B–C	Burner operation / load control operation, modulating or 2-stage
C	Burner OFF
C–D	Postpurge time
D	End of program sequence, burner control ready for restart

	Control signals delivered by burner control
	Required input signals
	Permissible input signals

Dimensions

Dimensions in mm



All shafts are shown in end switch position II CLOSED (as supplied).

- M Through-hole $\phi 5.3$ mm
- T Knockout opening $\phi 5.3$ mm

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Subject to change!