SIEMENS







SQN70... / SQN71...

SQN74... / SQN75...

Actuators

SQN7...

Reversible electromotoric actuators for air dampers and valves of oil or gas burners of small to medium capacity.

The SQN7... and this Data Sheet are intended for use by OEMs which integrate the actuators in their products!

Use and features

The SQN7... actuators are designed for driving gas or air dampers of oil or gas burners of small to medium capacity, for load-dependent control of the fuel and combustion air volume:

- In connection with P-PI or PID controllers, such as the RWF40...
- Directly via the different types of burner controls, such as LFL..., LME..., LMG..., LMO..., LOA...
- In connection with 1- or 2-wire control or 3-position controllers
- All types of actuators -

feature:

- Impact-proof and heat-resistant plastic housings
- Screw 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
- Integrated electronic circuits
- SQN70... / SQN71... / SQN75... Holding torque: 0.7...1.3 Nm
 - 0.7 Nm SQN74...
- Running time: SQN70... / SQN71... / SQN75... 4...30 s
 - SQN74... 4 s
- SQN70... / SQN74... Direction of rotation: counterclockwise
- SQN71... / SQN75... clockwise
- SQN74... / SQN75... -Fixing holes and cable entries
 - Equivalent to actuators of the same category made by Conectron and Berger



To avoid injury to persons, damage to property or the environment, the following warning notes should be observed!

Do not interfere with or modify the actuators!

- All activities (mounting, installation and service work, etc.) must be performed by qualified staff
- Before making any wiring changes in the connection area, completely isolate the
 plant from mains supply (all-polar disconnection). Ensure that the plant cannot be
 inadvertently switched on again and that it is indeed dead. If not observed, there is
 a risk of electric shock hazard
- Ensure protection against electric shock hazard by providing adequate protection for the connection terminals and by securing the housing cover
- Each time work has been carried out (mounting, installation, service work, etc.), check to ensure that wiring is in an orderly state
- Fall or shock can adversely affect the safety functions. Such actuators must not be put into operation, even if they do not exhibit any damage

Mounting notes

• Ensure that the relevant national safety regulations are complied with

Standards and certificates



Conformity to EEC directives

- Electromagnetic compatibility EMC (immunity)
- Low-voltage directive

2004/108/EC 2006/95/EC



ISO 9001: 2000 Cert. 00739



ISO 14001: 2004 Cert. 38233



Disposal notes



The actuators contain electrical and electronic components and must not be disposed of together with household waste.

Local and currently valid legislation must be observed.

Mechanical design

Housing

- Made of impact-proof and heat-resistant plastic
- The housing accommodates:
 - The reversible synchronous motor with gear train, which can be disengaged
 - The camshaft of the control section
 - The relays, depending on the type of actuator
 - The switches, connected to the terminals via the printed circuit board

Color: SQN70... / SQN71...: Gear train housing dark-grey, cover light-grey

SQN74... / SQN75...: Gear train housing black, cover black

Drive motor Reversible and locking-proof synchronous motor

Drive shaft can be manually disengaged from the gear train Coupling

and motor (by pressing pin «K»)

Automatic reengagement



Adjustment of switching points

- By means of adjustable cams
- Scales beside the cams indicate the angle of the switching point
- Assignment of cams to the end and auxiliary switches is color-coded (refer to «Connection diagrams»)
- Some of the cam feature fine adjustment; they can be adjusted with a standard screwdriver
- The other cams can be adjusted manually or with the enclosed hook-spanner or a similar tool

Position indication

Internally: Scale at the beginning of the camshaft on the gear train side

Electrical connections

Refer to «Technical data»

Gear train

Maintenance-free

Drive shaft

- Made of black-finished steel
- Ready fitted to the front of the gear train
- Different versions available

Mounting and fixing

- Front of the gear train is used as the mounting surface
- Actuator is secured via through-holes

Special versions for fitting potentiometer

Fitting a potentiometer

Certain types of actuators are supplied ready prepared for fitting a potentiometer. These actuators differ from the basic type only in that the cover is higher.

They are prepared for housing the potentiometer. Accessories are not required. With these types of actuators, the third digit after the dot in the actuator's type reference is an «8».

Example:

SQN7x.xx8Axx → version for fitting a potentiometer, mounted higher cover AGA34

With the other types of actuators which are suited for fitting a potentiometer, the higher cover AGA34 must be ordered (refer to «Ordering»).

The required type of potentiometer is to be ordered as a separate item (refer to «Ordering»).

Diagram	Drive	Running	Nominal	Holding	AS	Relay	Pot.	Length of	Types for ma	ains voltage /	SQN7 replaces	
J	shaft	time	torque	torque	7)		9) 10)	housing 1)	mains fro	ŭ		
	1)	2)	6)					,	AC 230 V 4)	AC 115 V ³⁾		
	,	for 90°	(max.)						+10 % -15 %	+10 % -15 %		
No.	No.	s	Nm	Nm	pcs.	pcs.		mm	5060 Hz	5060 Hz	type	
Actuators	Actuators SQN70 / counterclockwise rotation 8)											
2	0	4	1.5	0.7	2	2		117	SQN70.224A20			
4	0	4	1.5	0.7	2	3		117	SQN70.244A20		SQN30.121A2700	
6	0	4	1.5	0.7	2		10)	80	SQN70.264A20		SQN30.101A2700	
9	0	4	1.5	0.7	2	1		117	SQN70.294A20		SQN30.111A2700	
2	0	6	1.5	0.7	2	2		117	SQN70.324A20		SQN30.151A2700	
2	0	12	2.5	1.2	2	2		117	SQN70.424A20			
5	0	12	2.5	1.2	2	3		117	SQN70.454A20			
6	0	12	2.5	1.2	2		10)	80	SQN70.464A20			
6	3	12	2.5	1.2	2		10)	80	SQN70.464A23			
2	0	30	2.5	1.3	2	2		117	SQN70.624A20			
6	0	30	2.5	1.3	2		10)	80	SQN70.664A20		SQN30.401A2700	
6	3	30	2.5	1.3	2		10)	80	SQN70.664A23		SQN30.401A2730	
Actuators	s SQN70	. / counterclo	ckwise rotatio	on ⁸⁾ / UL «	Regist	ered» fo	r use ir	u.S. and Ca	anada			
0	0	30	2.5	1.3	1		10)	80		SQN70.603R10		
Actuators	s SQN71	/ clockwise	rotation 8)									
4	0	4	1.5	0.7	2	2		117	SQN71.244A20		SQN31.121A2700	
6	0	4	1.5	0.7	2		10)	80	SQN71.264A20		SQN31.101A2700	
2	0	12	2.5	1.2	2	2		117	SQN71.424A20			
4	0	12	2.5	1.2	2	2		117	SQN71.444A20			
5	0	12	2.5	1.2	2	3		117	SQN71.454A20			
6	1	12	2.5	1.2	2		10)	80	SQN71.464A21			
2	3	30	2.5	1.3	2	2		117	SQN71.624A23			
6	0	30	2.5	1.3	2		10)	80	SQN71.664A20	SQN71.664A10	SQN31.401A2700	
6	3	30	2,5	1,3	2		9)	117	SQN71.669A23			
9	0	30	2.5	1.3	2	1		117	SQN71.694A20			
Actuators SQN71 / clockwise rotation 8) / UL «Registered» for use in U.S. and Canada												
0	9	4	1.5	0.7	1		10)	80		SQN71.203R19		
0	9	12	2.5	1.2	1		10)	80		SQN71.403R19		
0	0	30	2.5	1.3	1		10)	80		SQN71.603R10		
0	9	30	2.5	1.3	1		10)	80		SQN71.603R19		
0	0	30	2.5	1.3	1		9)	84		SQN71.608R10 ⁵⁾		
0	0	30	2.5	1.3	1		9)	84	SQN71.608R20 ⁵⁾			

The UL-registered types of actuators

- also meet CE requirements
- are of the same basic design as the equivalent standard types

The only difference between the standard versions and the UL-registered versions is the use of other materials, especially plastics. In addition, the UL-registered versions are supplied complete with an adapter for use in the U.S. and Canada (refer to «Dimensions»).

Diagram	Drive	Running	Nominal	Holding	AS	Relay	Pot.	Length of	Types for m	ains voltage /	SQN7
	shaft	time	torque	torque	7)		9) 10)	housing 1)	mains fi	requency	replaces
	1)	2)	6)						AC 230 V 4)	AC 115 V 3)	
		for 90°	(max.)						+10 % -15 %	+10 % -15 %	
No.	No.	S	Nm	Nm	pcs.	pcs.		mm	5060 Hz	5060 Hz	type
Actuators SQN74 / counterclockwise rotation 8)											
5	1	4	1,5	0,7	4	3	9)	115	SQN74.254A21		
9	1	4	1.5	0.7	2	1	9)	115	SQN74.294A21		
9	1	30	2.5	1.3	2	1	9)	115	SQN74.694A21		
Actuators SQN75 / clockwise rotation 8)											
2	1	4	1.5	0.7	2	2		115	SQN75.224A21		
2	6	4	1.5	0.7	4	2		115	SQN75.224A26		
3	1	4	1.5	0.7	4	2		115	SQN75.236A21		
4	1	4	1.5	0.7	2	3		115	SQN75.244A21		
4	6	4	1.5	0.7	2	3		115	SQN75.244A26		
9	1	4	1.5	0.7	2	1	9)	115	SQN75.294A21		
9	1	4	1.5	0.7	4	1	9)	115	SQN75.294A26		
F	1	4	1.5	0.7	4	2		115	SQN75.2F6A21		
F	1	12	2.5	1.2	4	2		115	SQN75.4F6A21		
2	1	12	2.5	1.2	2	2		115	SQN75.424A21		
4	1	12	2.5	1.2	2	3		115	SQN75.444A21		
9	1	12	2.5	1.2	2	1	9)	115	SQN75.494A21		
2	6	23	2.5	1.2	4	2		115	SQN75.524A26		
К	1	30	2.5	1.3	2		9)	115	SQN75.6K4A21	SQN75.6K4A11	
2	6	30	2.5	1.3	2	2		115	SQN75.624A26		
6	6	30	2.5	1.3	4		9)	115	SQN75.664A26		
9	1	30	2.5	1.3	2	1	9)	115	SQN75.694A21		

Legend

- 1) Refer to «Dimensions»
- 2) At 60 Hz, running times are about 20 % shorter
- 3) AC 115 V +10 % / -15 % possible, but in the case of undervoltage, torque is reduced by about 20 %
- 4) AC 230 V +10 % / -15 % possible, but in the case of undervoltage, torque is reduced by about 20 %
- 5) On request
- $^{6)}$ Under nominal conditions; under extreme conditions (e.g. +60 °C, AC 230 V –15 %) approx. –25 %
- 7) Auxiliary switches (in addition to the 2 end switches)
- 8) When facing the drive shaft and when control voltage is supplied to end switch I
- 9) Suited for direct fitting of potentiometer (refer to «Fitting a potentiometer»)
- 10) Suited for fitting potentiometer. Cover AGA34 to be ordered as a separate item

Actuator

refer to «Type reference»

Potentiometer ASZ...

refer to Data Sheet N7921 refer to Mounting Instruction M7921



Mounting kit

AGA70.3

- For mounting the SQN70... / SQN71... in place of the SQN3...
- Fitted to the SQN70... / SQN71... with a self-tapping screw (included as standard)



Cover AGA34

- For SQN70... / SQN71... backfitting with potentiometer ASZxx.3x

General actuator data

Actuator

Mains voltage	AC 230 V -15 % +10 %						
	AC 115 V –15 % +10 %						
Mains frequency	5060 Hz ±6 %						
Drive motor	Synchronous motor						
Power consumption	6 VA						
Angular adjustment	Max. 160°, scale range 0130°						
Mounting position	Optional						
Degree of protection							
- All types	IP40 to DIN 40050, provided adequate						
	cable entries and fixing screws are used						
- SQN74 / SQN75	IP20 to DIN 40050, provided lateral knock-						
	out hole for cable is used						
Safety class							
- SQN70 / SQN71	II to DIN EN 60730						
- SQN74 / SQN75	I to DIN EN 60730						
Cable entry							
- SQN70 / SQN71	Insertable threaded cable gland holder for						
	2 x Pg9, no locknut required						
- SQN74 / SQN75	Openings for locknut for fixing cable glands						
	Type of locknut						
	1 x Pg9 M Pg9 DIN 46320 MS						
	1 x Pg11 M Pg11 DIN 46320 MS						
	Additional lateral knockout hole for loose						
	introduction of 2 cables with a maximum						
	dia. of 6 mm, cable strain relief to be pro-						
	vided by the user (also refer to «Degree of						
	protection»)						
	Pg glands and locknuts are not part of the delivery						
Cable connections	Screw terminals for min. 0.5 mm ² and max.						
	2.5 mm ² cross-sectional area						
Ferrules	Matching the dia. of the stranded wire						
Direction of rotation	Refer to «Type summary»						
Nominal and holding torque	Refer to «Type summary»						
Running times	Refer to «Type summary»						
Weight (average)	Approx. 500 g						
On time	60 % max. 3 min. continuous operation						
Backlash between drive motor							
and drive shaft							
- As supplied	≤1.2° ±0.3°						
- After 250,000 cycles	≤1.5° ±0.3°						

End and auxiliary switches

Number of end switches	2
Number of auxiliary switches	Refer to «Type summary»
Actuation	Via camshaft, color-coded cams (refer to
Actuation	«Connection diagrams»)
	Switches with fine adjustment
	- SQN70 / SQN71 : II and III
	- SQN74 / SQN75 : III and IV
Breaking voltage	AC 24250 V
Adjustment of cams	710 Z 1Z00 V
- Without fine adjustment	1°
- With fine adjustment	Infinitely
Perm. amperage at $\cos \varphi = 0$	•
(values in parentheses: short-	
Connection diagram	The pound is made of
- Terminals 1, 2, 3, 4	0.5 A
- Terminals 5, 6, 7	1 A (7 A)
Connection diagram ①	(/
- Terminals 1, 2, 6, 7	0.5 A
- Terminals 3, 4	1 A (7 A)
Connection diagram ②	()
- Terminals 1, 2, 3, 8	0.5 A
- Terminal 4, 5	2 A (14 A)
- Terminal 6, 7	1 A (7 A)
Connection diagram ③	
- Terminals 1, 2, 3, 8, 11	0.5 A
- Terminals 1, 2, 3, 6, 11 - Terminals 4, 5, 7, 10	1 A (7 A)
• Connection diagram ④	
- Terminals 1, 3, 8	0.5 A
- Terminal 4, 5	3 A (14 A)
- Terminal 4, 3	1 A (7 A)
Connection diagram	
- Terminals 1, 2, 3, 8	0.5 A
- Terminal 4, 5	2 A (14 A)
– Terminal 6, 7	1 A (7 A)
Connection diagram 6	
- Terminals 1, 2, 3, 4, 5	0.5 A
- Terminal 6, 7, 8	1 A (7 A)
Connection diagram	
- Terminals 1, 2, 3, 4, 5,	8 0.5 A
	1 A (7 A)
- Terminal 6, 7	171(171)
• Connection diagram (F)	0.5 A
- Terminals 27	1 A (7 A)
- Terminals 1, 8, 9	ΙΛ (ΙΛ)
• Connection diagram (K)	0.5.4
- Terminals 1, 2	0.5 A
- Terminals 3, 4, 5, 6, 7,	8 1 A (7 A)

Environmental conditions

Storage	DIN EN 60721-3-1
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-20+60 °C
Humidity	<95 % r.h.
Transport	DIN EN 60721-3-2
Climatic conditions	Class 2K2
Mechanical conditions	Class 2M2
Temperature range	-50+60 °C
Humidity	<95 % r.h.
Operation	DIN EN 60721-3-3
Climatic conditions	Class 3K5
Mechanical conditions	Class 3M2
Temperature range	-20+60 °C
Humidity	<95 % r.h.



Condensation, formation of ice and ingress of water are not permitted!

Function

A synchronous motor drives the camshaft via a gear train. The camshaft actuates the end and auxiliary switches. Using the associated cam, the switching position of each end and auxiliary switch can be adjusted within the working range. Some of the actuator versions are equipped with electronic modules, which perform auxiliary functions in connection with the end and auxiliary switches, or with external devices, such as controllers (refer to «Connection diagrams»). The functions and technical data of both lines of actuators SQN70... / SQN71... and SQN74... / SQN75... are nearly identical.

Replacement of SQN30... / SQN31...

The «Type summary» contains actuators type **SQN3...**, which can be replaced by SQN70... / SQN71... with the help of a mounting kit (refer to «Ordering»).

The SQN30... and SQN31... contained in the «Type summary»

- Refer to the SQN7... AC 230 V versions
- are versions with no facility for fitting a potentiometer (refer to Data Sheet N7808)

Mechanical adaptations are not normally required.

To be noted are the different terminal assignments used with the 2 lines of actuators.

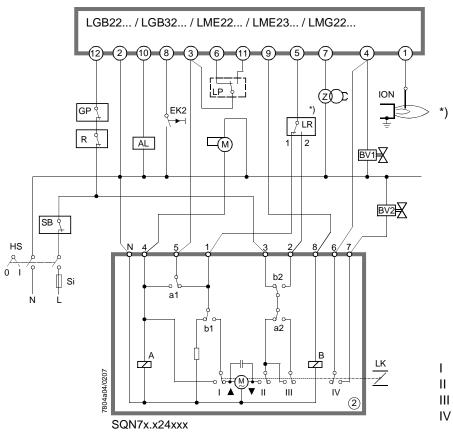


The following connection diagrams show the start position as supplied:

- End switch position II «Closed»
- Dead

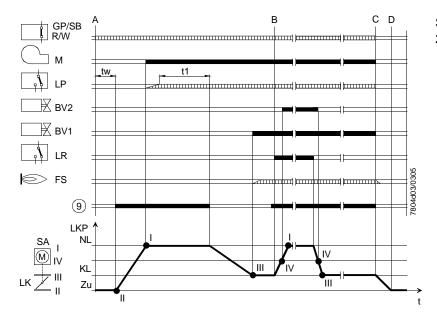
No. \bigcirc \rightarrow LGB22... / LME22... / LME23... / LMG22...

2-stage or modulating operation → prepurging at nominal load position «NL»



Thermostat or similar unit with changeover contact (2-wire control), or 3-position controller for «on / off» positioning pulses and neutral position

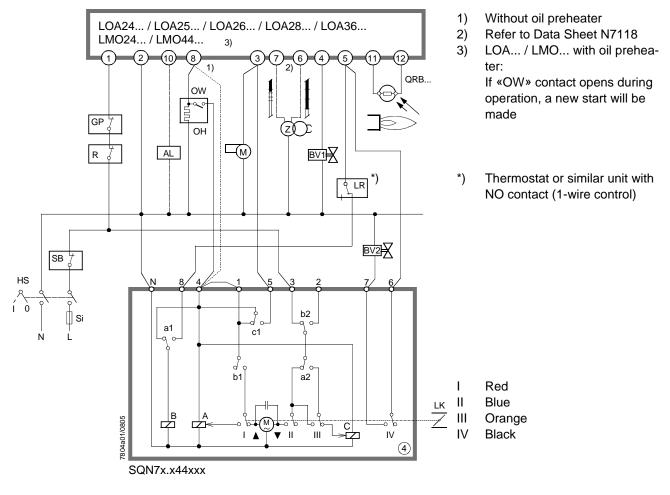
- I Red II Blue
- III Orange
- V Black

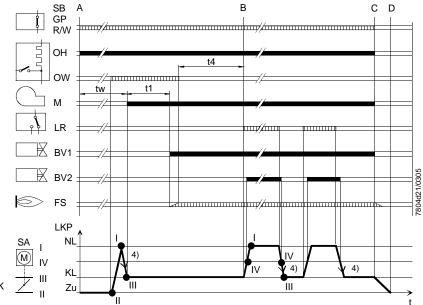


Sequence diagram shows 2-stage operation

No. ④ → LOA24... / LOA25... / LOA26... / LOA28... / LOA36... / LMO24... / LMO44...

2-stage operation → prepurging at low-fire position «KL»

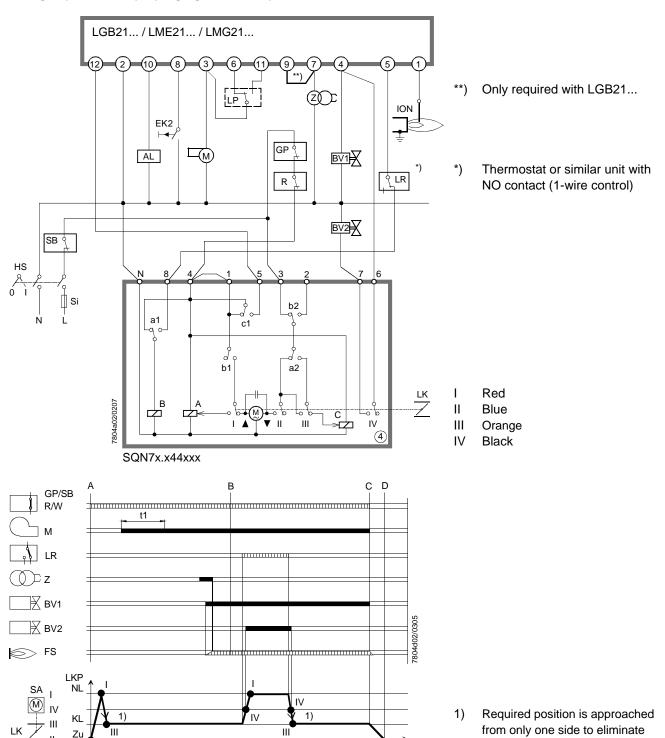




Required position is approached from only one side to eliminate switching differential (compensation of backlash)

No. $\textcircled{4} \rightarrow LGB21... / LME21... / LMG21...$

2-stage operation → prepurging at low-fire position «KL»

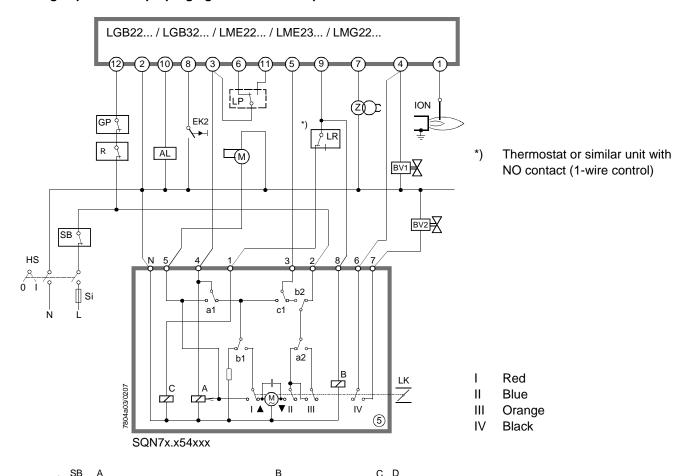


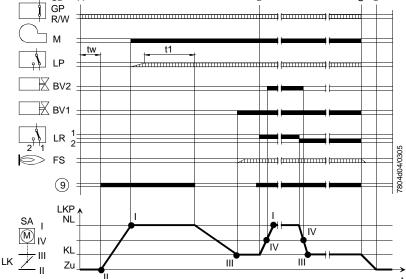
switching differential (compensa-

tion of backlash)

No. \bigcirc \rightarrow LME22... / LME23... / LGB22... / LGB32... / LMG22...

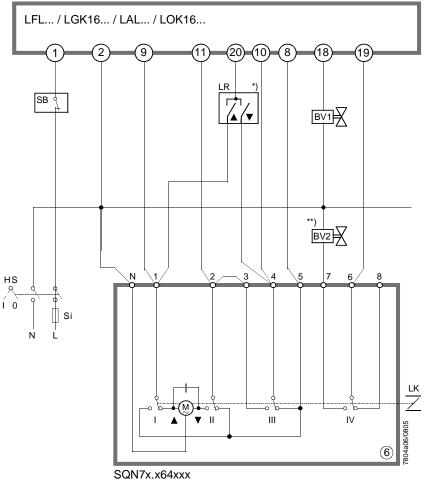
2-stage operation → prepurging at nominal load position «NL»





No. $\textcircled{6} \rightarrow LFL... / LGK16... / LAL... / LOK16...$

2-stage or modulating operation → prepurging at nominal load position «NL»



В

- Thermostat or similar unit with changeover contact or 3-position controller for «on / off» positioning pulses and neutral position
- **) In the case of modulating operation, fuel valve «BV2» is replaced by a gas control valve «RV»

Z804406/0305

I Red II Blue III Orange IV Black

Program sequence diagram shows modulating operation.

M1 M2

LR *) **\$**RV**

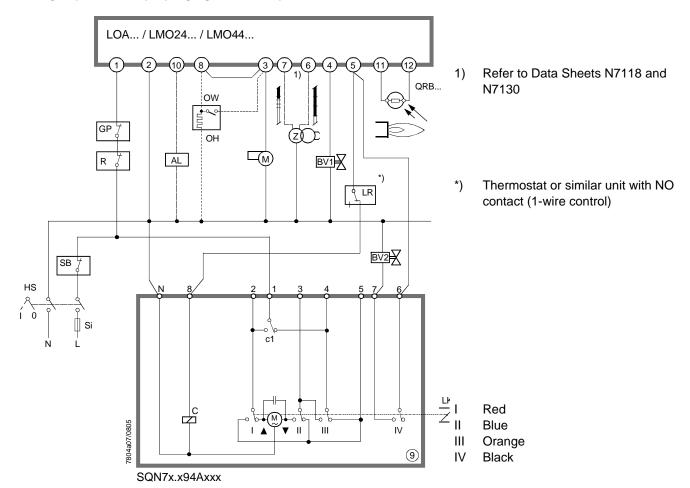
LKP NL

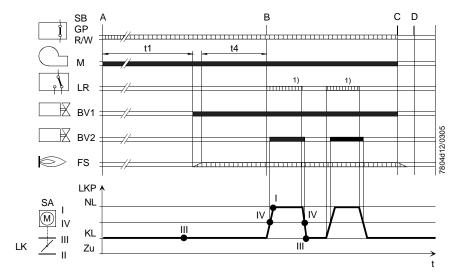
KL

Ш

No. $9 \rightarrow LOA... / LMO24... / LMO44...$

2-stage operation → prepurging at low-fire position «KL»



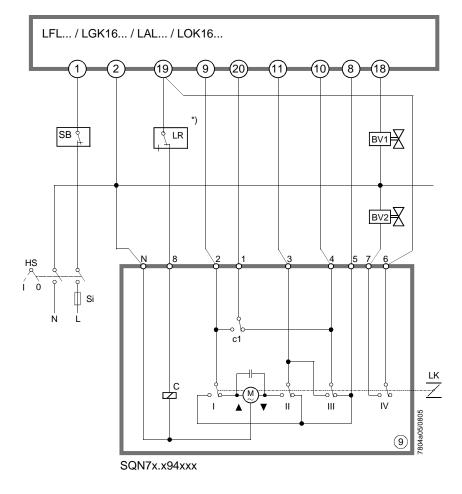


Program sequence without oil preheater

In the case of burner OFF, the air damper will stop at position «KL». To be noted are the heat losses that normally occur during off times.

No. $9 \rightarrow LFL... / LGK16... / LAL... / LOK16...$

2-stage operation \rightarrow prepurging at nominal load position «NL»



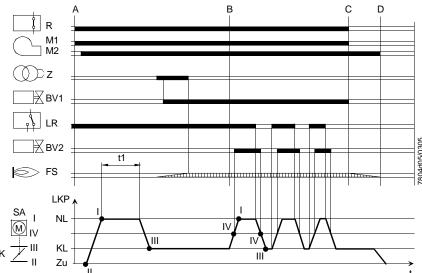
 *) Thermostat or similar unit with NO contact (1-wire control)

I Red

II Blue

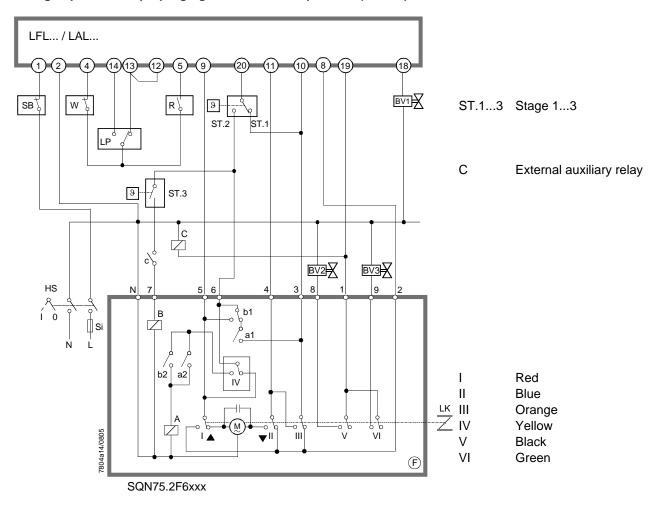
III Orange

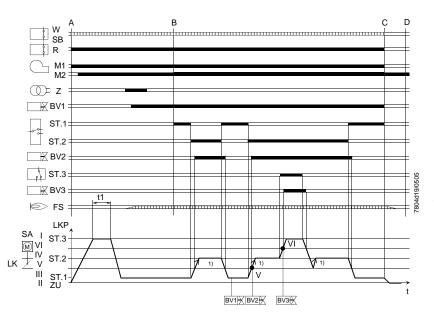
IV Black



No. F → LAL... / LFL...

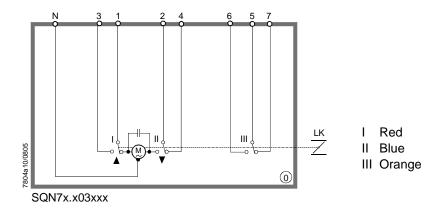
3-stage operation → prepurging at nominal load position («ST.3»)



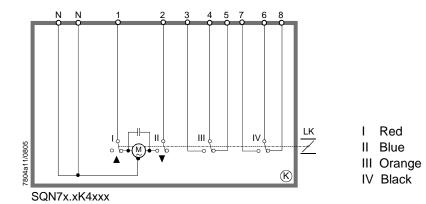


1) Required position is approached from only one side to eliminate switching differential (compensation of backlash)

No. $@ \rightarrow Universal use$

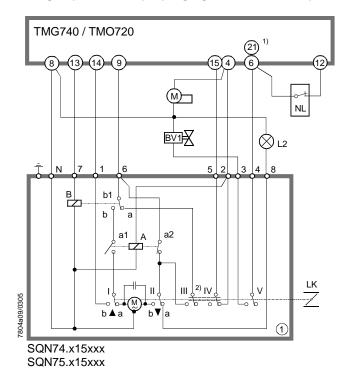


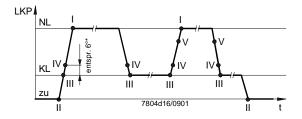
No. \bigcirc \rightarrow Universal use



No. \bigcirc \rightarrow TMG740 / TMO720

2-stage operation \rightarrow prepurging at nominal load position «NL»





1) TMO720 terminal no. 6 TMG740 terminal no. 21

- 2) Cams of auxiliary switches III and IV rigidly connected
- I Red
- II Blue
- III Orange
- IV Orange
- V Black
- TMG... / TMO... are burner controls of other manufacture.

The user must check with the supplier of the TMG... / TMO... the proposed combination with the actuator from a safety point of view and with regard to the type of burner control used. The user will assume full responsibility for this application.

Connection diagram no. ① corresponds to connection diagram no. ③ of the SQN3...

No. ② Number of internal diagram. Appears at the second position after the dot in the type reference

I / II End switches
III / IV / V Auxiliary switches

AL Remote indication of lockout (alarm)

BV1 Fuel valve stage 1 BV2 Fuel valve stage 2 BV3 Fuel valve stage 3

EK2 External remote reset button

ION Ionization probe FS Flame signal

GL Gas / air ratio controller
GP Gas pressure switch

HS Main switch
KL Low-fire
L Live conductor
LK Air damper

LKP Air damper position
LP Air pressure switch
LR Load controller
M Burner or fan motor

M Actuator's synchronous motor

M1 Without postpurge
 M2 With postpurge
 N Neutral conductor
 NL Nominal load
 OH Oil preheater

OW Oil preheater's readiness contact
QRB... Photoresistive flame detector
R Temperature or pressure controller

RV Relay
Control valve
SA Actuator

Si External primary fuse, as specified in the Data Sheet of the relevant burner control

SB Safety limiter

ST... Stage

t... / T... Program times (refer to the Data Sheet of the relevant burner control)

TSA Safety time Resistance

Z Ignition transformer
CLOSED Damper fully closed

▲ Direction of rotation OPEN

Direction of rotation CLOSE

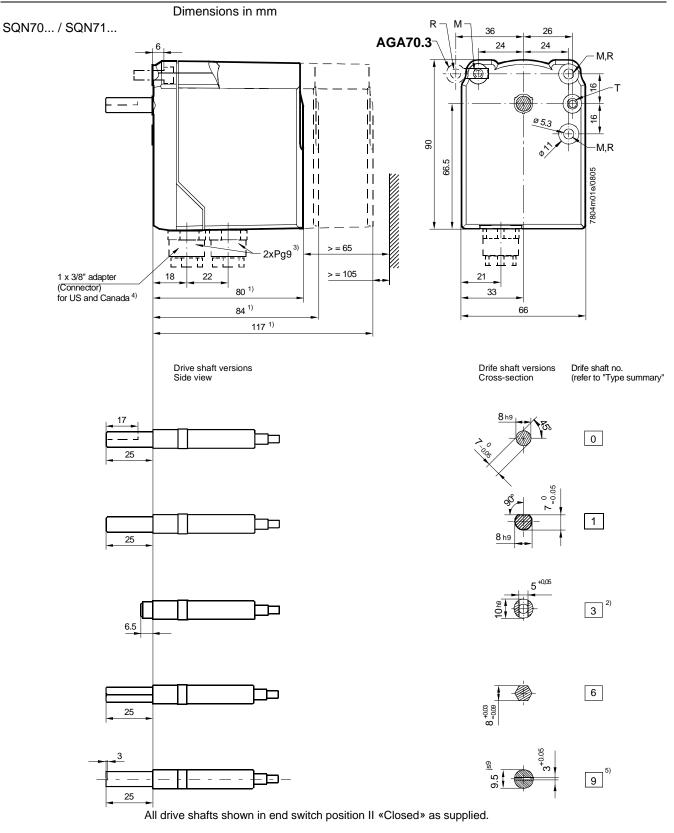
Program sequence diagrams

A Burner ON
A – B Startup of burner

B – C Burner operation / load control operation (modulating or 2-stage)

C Burner OFF C-D Overrun time

D End of program, burner control ready for new start



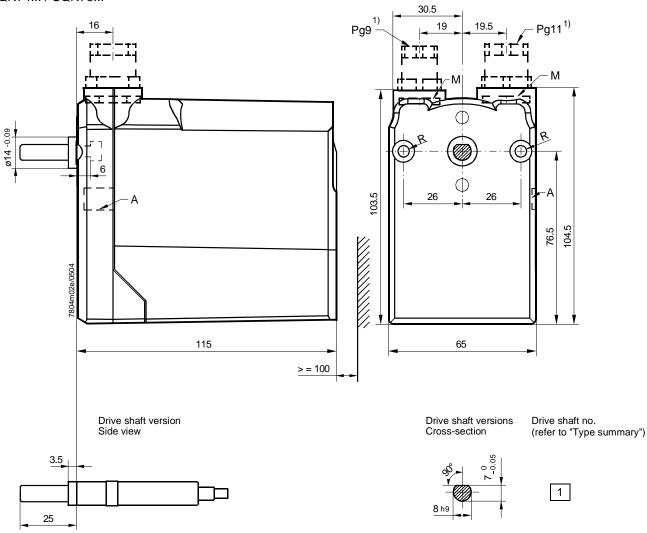
- Housing length depending on the type of actuator 1)
- (refer to «Type summary») Center groove: 6.3 mm deep 2) Hole 5.1 mm dia.: 16.5 mm deep (incl. center groove depth)
- Not included in supply
- 4) Supplied with actuators type SQN7x.xxxRxx
- 5) Groove does not serve for transmission of force
- Fixing positions matched to the SQN3... (for 1-to-1 replacement by SQN70... / SQN71...) requiring AGA70.3
- Through-hole 5.3 mm dia. Μ Т

R

Knockout hole 5.3 mm dia.

Dimensions in mm

SQN74... / SQN75...



Drive shafts shown in «Closed» position (end switch II)

- A Knockout hole for loose cable entry
- R Through-hole 5.3 mm dia.

Fixing positions matched to Conectron LKS 160 and Berger STA

- M Pg nuts (not included in supply; for type reference, refer to «Technical data»)
- 1) Not included in supply