



Actuators

SQN13.xxxB9 SQN14.xxxB9

For air/gas dampers and control valves for oil burners or gas burners

SQN1x electromotoric actuator

- Torque: Up to 1 Nm rated output torque
- Direction of rotation: - SQN13 Counterclockwise
- SQN14 clockwise
- Running time for 90°: 5...120 s Determined by the basic unit (LMV2/LMV3 burner management system)
- Versions: Choice of cables (refer to *Type summary*)

The SQN1x and this Data Sheet are intended for use by OEMs which integrate the SQN1x in their products!

Use

The SQN1x are used to drive and position air / gas dampers or other ancillary equipment. When used in connection with burner controls or electronic fuel / air ratio control, the controlling elements are operated depending on the current burner output.



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

Do not to open, interfere with or modify the actuator!

- All activities (mounting, installation and service work, etc.) must be performed by qualified staff
- Before making any wiring changes in the connection area of the actuator, 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
- Protection against accidental contact must be ensured on the SQN1x and all electrical connections by tightening the housing cover
- Each time work has been carried out (mounting, installation, service work, etc.), check to ensure that the wiring and parameter settings are correct
- The SQN1x must not be put into operation following impact or shock; even if it does not exhibit any visible damage, its safety functions may be impaired
- The notes in chapters 'Selecting the SQN1x version', 'Form-fitted design' and 'Clear assignment' must be observed to ensure a correct fuel-to-air ratio

Housing cover



Caution!

The SQN1x's housing must not be opened. The SQN1x features an optical feedback system.

Selecting the SQN1x version

- Select the SQN1x version according to the required direction of rotation for positioning the SQN1x
- Ensure that any other torque acting on the controlling element (e.g. torque from airflow produced by the burner's fan) is smaller than the SQN1x's self-holding torque when dead
- The mechanical design of the burner must be such that any inadmissibly high torque from outside acting on the controlling element does not lead to any 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 of rotation. This leads to a certain amount of excess air during combustion, which is less critical than a lack of air.

- Ensure that the relevant national safety regulations are complied with
- The connection between the SQN1x shaft and the controlling element must be **form-fitted** and **backlash-free**
- The tightening torque of 1.5 Nm for the fixing screws (in the case of cut threads) must not be exceeded to prevent damage to the SQN1x and to ensure that the SQN1x does not twist on its mounting surface
- When mounting the actuator, ensure that the permissible axial and radial loads on the bearing are not exceeded
- When fitting the SQN1x to the controlling element, the correct mounting order must be observed. It is usually as follows:
 1. Screw on the SQN1x
 2. Connect the SQN1x shaft to the controlling element via a coupling pin

Positive connection



Caution!

Possible connection with drive shaft or hub:

- Drive shaft with flat edge and matching counterpiece

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

- When sizing the drive shaft connection, consider that during operation the maximum torque can exceed the SQN1x's rated torque:
 - Under optimum conditions, the SQN1x itself can deliver a higher torque (up to 1.7 Nm)
 - Mass moments of inertia (produced by rotating parts of the motor and the controlling element) can lead to pulsating loads
- Siemens recommends to oversize the drive shaft connection in relation to the SQN1x's rated torque
- When fitting the SQN1x to the burner or the controlling element, ensure that bending cannot occur. This is of particular importance in the case of column structures

Protection against overtravel (built-in end stops)

The actuator's working range is limited by built-in end stops. These are sized such that they withstand the maximum torques mentioned in paragraph *Positive connection* above.

Unambiguous assignment



Caution!

To prevent accidental interchange of an SQN1x connected to the LMV2/LMV3 burner management system, different reference marks are defined in the respective LMV2/LMV3 burner management system. The burner must be designed such that, in the event of false connections, the relevant reference mark cannot be approached. For that purpose, mechanical stops are to be provided in the ranges *Stop open* and *Stop closed*.

Cables

- The SQN1x are supplied with attached connecting cable and plug
- Single bend when laying the cable: 2 x cable diameter

Mounting notes (cont'd)

Working range of SQN1x

The SQN1x's working range consists of usable range and reference range. The usable range of the actuator is shown on the type field. When mounting the SQN1x, the connected controlling element (e.g. air damper) must allow travel in the reference range and the adjusted usable range. The OPEN and CLOSED reference ranges vary in length. For an SQN1x with **counterclockwise** rotation, the CLOSED reference range is between 0° and -7.7° , and the OPEN reference range is between 90° and 110.6° .

System example with LMV2/LMV3 burner management system and two SQN13s

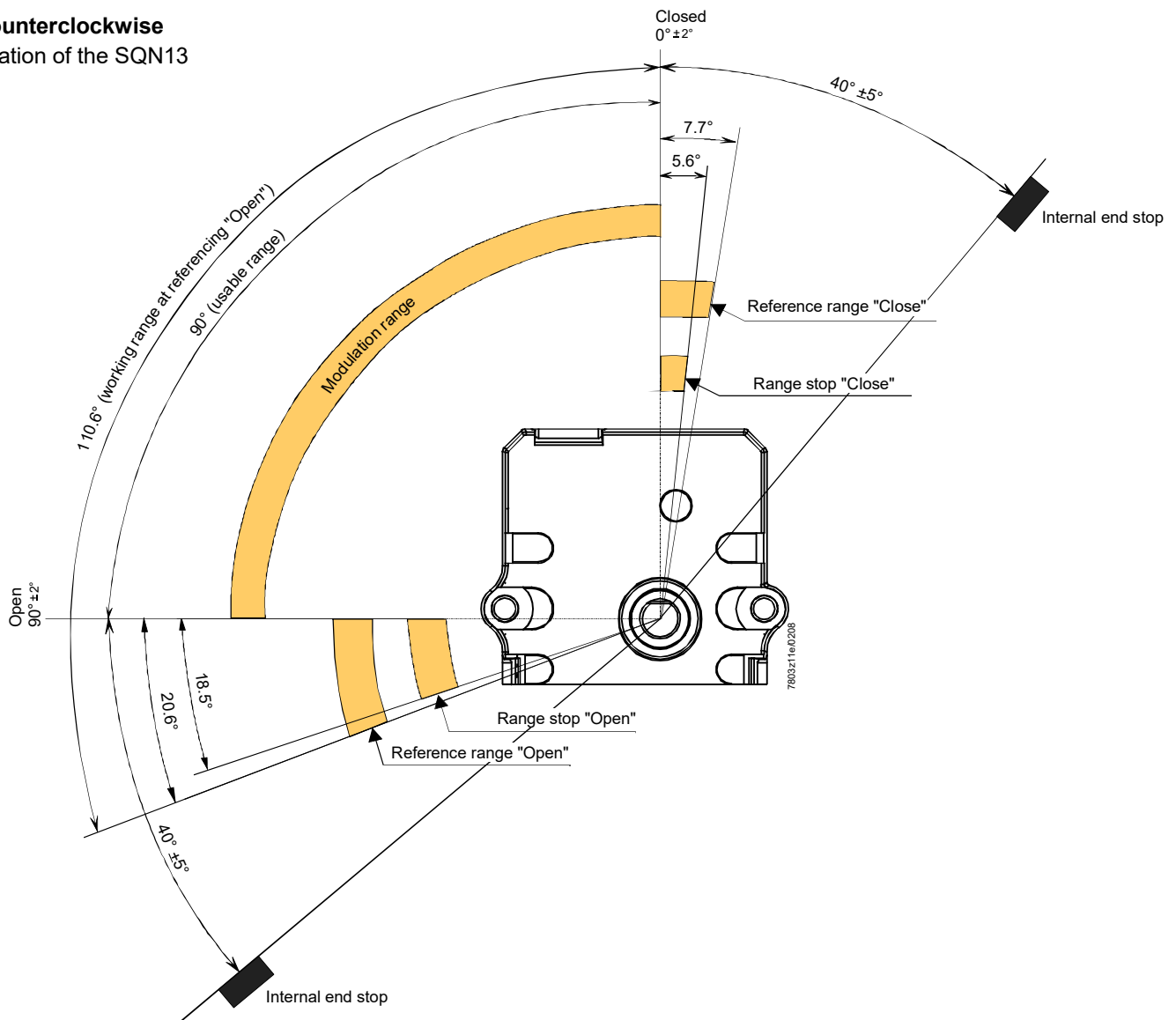
Actuator 1: type SQN13, air damper, referencing in the *Open* range:

- LMV2/LMV3 burner management system parameter 601.01: 1
- End stop in reference range *Close*

Actuator 2: type SQN13, gas damper, referencing in the *Close* range:

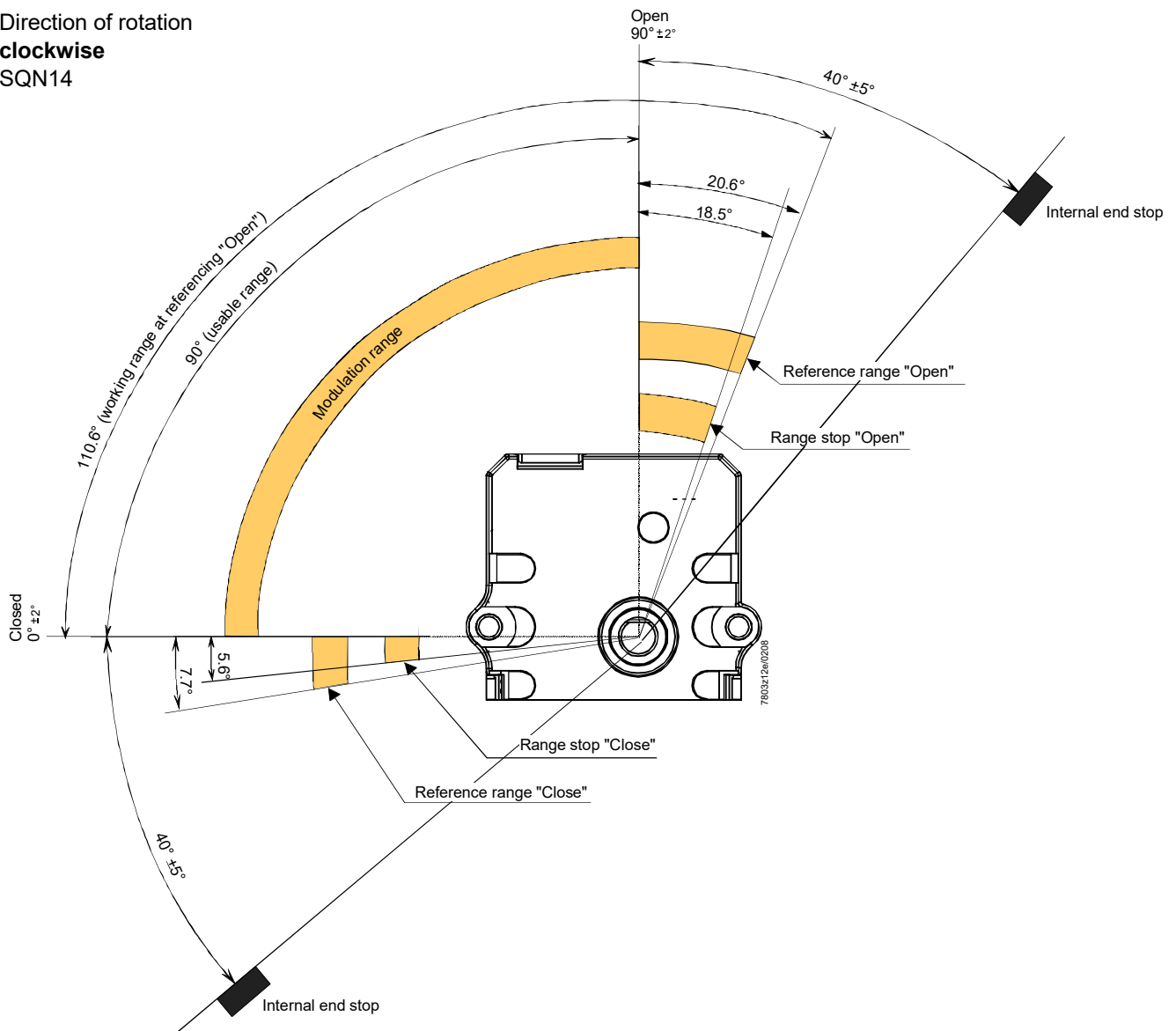
- LMV2/LMV3 burner management system parameter 601.00: 0
- No end stop required

Counterclockwise rotation of the SQN13



Mounting notes (cont'd)

Direction of rotation
clockwise
SQN14



Turning the drive shaft
back to the working
position

If, due to external influences, the drive shaft leaves the working range without automatically returning after resetting the basic unit, it can be cautiously turned back manually. To do this, disconnect power to the plant and drive the SQN1x cautiously to the beginning of the usable range. During this action, the form-fitted connection between SQN1x and controlling element must be maintained.

Internal end stop



Caution!

When turning the drive shaft back, make absolutely certain that mechanical loads do not damage the controlling element's built-in end stops since the SQN1x could leave its working range, making it impossible for the system to maintain the correct fuel / air ratio.

Installation notes

- Always run the high-voltage ignition cables separately, keeping as much distance as possible from the SQN1x and other cables
- The holding torque is reduced when the SQN1x is disconnected from the power supply

**Note!**

Only in connection with the LMV2/LMV3 burner management system – (refer to the basic documentation LMV2 → P7541 / LMV3 → P7546).



EAC Conformity mark (Eurasian Conformity mark)

**China RoHS**

Hazardous substances table:

<http://www.siemens.com/download?A6V10883536>

Service notes

Unit replacement	When replacing an SQN1x, the following points must be checked and, if necessary, corrected: • Correct connection of the basic unit • Assignment of functions • Adjustment of curve points for the electronic ratio control (e.g., in the LMV2/LMV3 burner management system)
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Disposal notes

The SQN1x contains electrical and electronic components and must not be disposed of together with domestic waste.

Mechanical design

Housing	Base and cover are made of shockproof and heat-resistant plastic. Color of housing and cover: Black
Actuator	Stepper motor
Adjustment of switching points / position indication	In connection with the basic unit – e.g., LMV2/LMV3 burner management system – via the AZL2 display and operating unit (refer to the basic documentation LMV2 → P7541 / LMV3 → P7546).
Cable / electrical connections	RAST2.5 connectors attached to the connecting cable, complete with cable gland.
Gear train	Plastic spur gear trains with zero backlash and lifetime lubrication.
SQN1x shaft	Made of black-finished steel, ready fitted to the front of the gear train.
Mounting and fixing	Front fastening of the SQN1x from the side using two external fastening holes.

Type summary

Article no.	Product no.	Direction of rotation	Rated output torque in direction of rotation <i>Open</i> (max.)	Holding torque when live (max.)	Holding torque when dead (max.)	Cable length	Radial load on bearing ¹⁾ (max.)	Axial load on bearing (max.)	Gear
			Nm	Nm	Nm	m	N	N	
BPZ:SQN13.170B9	SQN13.170B9	Counterclockwise	1	0.7	0.4	1.2	30	5	Plastic
BPZ:SQN14.170B9	SQN14.170B9	Clockwise	1	0.7	0.4	1.2	30	5	Plastic

¹⁾ Middle of drive shaft

Technical data

SQN1x	Supply voltage	AC / DC 24 V ±20 % (load on interface)
	Safety class	2 to EN 60730 part 1-14
	Power consumption	Max. 7.5 W
	Perm. on time	Max. 50 %
	Perm. running time	Max. 60 s
	Angular adjustment, usable range	Max. 90°
	Mounting position	Optional
	Load on bearing	Refer to <i>Type summary</i>
	Degree of protection	IP40 to EN 60529-1
	Direction of rotation	Not adjustable in the LMV2/LMV3 burner management system, but fixed by the respective motor type
	Rated output torque	Refer to <i>Type summary</i>
	Holding torque (when live)	Refer to <i>Type summary</i>
	Holding torque (when dead)	Refer to <i>Type summary</i>
	Reproducibility (typical when new)	±0.2° (when used with an LMV2/LMV3 burner management system)
	Rated resolution encoder monitoring	0.7°
	Running times	Adjustable via the LMV2/LMV3 burner management system
	Life cycle	250,000 start cycles (CLOSE □ OPEN □ CLOSE) under load with the rated torque in the entire rotation angle range. 2,000,000 control cycles under load with 75% of rated torque in rotation angle range of 10°
	Weight	Approx. 0.3 kg
	Direction of rotation (when facing the shaft)	• SQN13 Counterclockwise • SQN14 Clockwise
	0-position of the SQN1x shaft	As supplied 0 +2° / -2°
Cable connection	Perm. external mass of inertia	Max. 2 g/m ²
	Perm. axial force of bearing	Max. 5 N
Cable connection	Connector	Duomodule RAST2.5
		6-poles
		Supplied by Lumberg
		Part no. 3521 06 K00

Technical data (cont'd)

Environmental conditions	Storage	EN 60721-3-1:1997
	Climatic conditions	Class 1K3
	Mechanical conditions	Class 1M2
	Temperature range	-20...+70 °C
	Humidity	<95 % r.h.
	Transport	EN 60721-3-2:1997
	Climatic conditions	Class 2K3
	Mechanical conditions	Class 2M2
	Temperature range	-20...+70 °C
	Humidity	<95 % r.h.
	Operation	EN 60721-3-3:1995 + A2:1997
	Climatic conditions	Class 3K3
	Mechanical conditions	Class 3M3
	Temperature range	-10...+60 °C
	Humidity	<95 % r.h.
	Installation altitude	Max. 2,000 m above sea level



Caution!

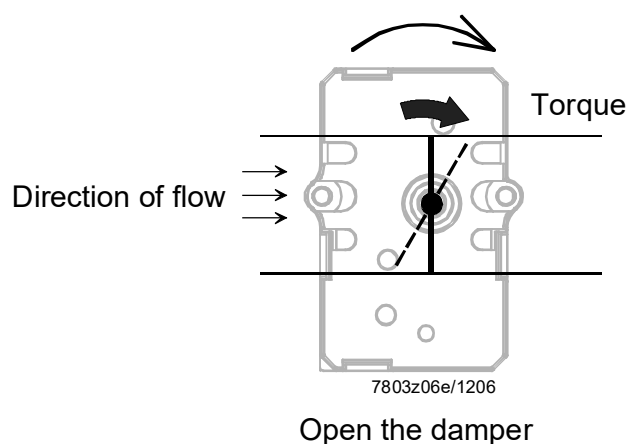
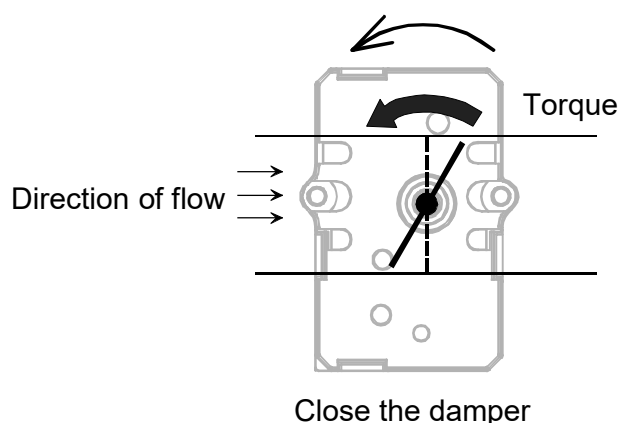
Condensation, formation of ice and ingress of water are not permitted!

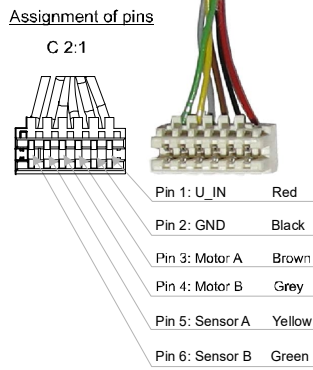
Function

The SQN1x features an integrated reset spring with a backlash-free gear train. The reset spring always acts against the direction of rotation of the SQN1x. This ensures backlash-free operation. The torque on the shaft must always act in the direction of rotation of the SQN1x (e.g., for the SQN13, this is always counterclockwise). To ensure reliable operation, the torque acting in the opposite direction of rotation to the SQN1x must not exceed 0.2 Nm when the connected air or gas damper closes. Control and position feedback are provided via a single cable. The same cable is also used for the power supply. The SQN1x is driven by a stepper motor and can be positioned with a resolution of 0.1°. Relevant properties and settings (running time, end positions) of the SQN1x are defined by the controlling basic unit (e.g., LMV2/LMV3 burner management system) (for details, refer to the basic documentation LMV2 → P7541 / LMV3 → P7546). The running times of the controlling elements are varied by the basic unit in the control phases (e.g., startup: short running time; operation: long running time).

Example:

SQN14 (clockwise)





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