



Actuators for air and gas dampers

SQM45.29xC8
SQM46.49xC8
SQM47.49xC8
SQM48.69xC8

Electromotoric actuators

- **Torques:**
 - SQM45 up to 3 Nm
 - SQM46 up to 10 Nm
 - SQM47 up to 20 Nm
 - SQM48 up to 35 Nm
- **Running times: 1)**
 - SQM45.2 10 to 120 s
 - SQM46.4 30 to 120 s
 - SQM47.4 30 to 120 s
 - SQM48.6 60 to 120 s
- **Versions:**
 - **Shaft designs** (refer to *Type summary*)

1) Determined by LMV6

The SQM45/SQM46/SQM47/SQM48 and this data sheet are intended for original equipment manufacturers (OEMs) using the SQM45/SQM46/SQM47/SQM48 in or on their products.

Use

The SQM4 units are suited for driving oil pressure controllers, butterfly valves, dampers or for use on other applications that require rotary motion.

Areas of application are oil and gas burners of medium to larger capacity, as well as thermal processing plants.

The application is intended primarily for the load-dependent control of the gas flow, oil volume, and combustion air volume in connection with the electronic ratio control of the LMV6.

Supplementary documentation

Product type	Type of documentation	Documentation number
LMV6	Data Sheet	N7560
	Basic Documentation	P7560
AZL66	Data Sheet	N7562
	User manual	U7562

Warning notes



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 can occur
- The user must ensure that the actuators meet the requirements of the relevant application standards
- Safety-related applications are only possible with the LMV6
- All product-related activities (mounting, settings and maintenance) must be performed by qualified and authorized personnel



Attention!

- Risk of electric shock – to disconnect the actuator from the power, it may be necessary to open more than one switch. Before performing maintenance work, the actuator must be disconnected from the power supply
 - The electrical connection between the conduit fittings is not made automatically. It must be established on the installation site
 - The connecting plate is made of plastic and does not provide earthing of the conduit fittings. Earthing must be ensured by adequate washers and wire links
 - To ensure protection against electric shock, the connection terminals must have adequate protection. Make certain that non-insulated connections or wires cannot be touched
- Each time work has been carried out (mounting, installation, service, etc.), check that the wiring is correctly set
 - These actuators must not be put into operation following impact or shock; even if they do not exhibit any visible damage, their safety functions may be impaired
 - Static charges must be avoided since they can damage the electronic components of the actuator on contact.

Recommendation: Use ESD equipment

Notes on use in North America

Only flexible conduits with relevant accessories may be used.

Mounting notes

- Ensure that the relevant national safety regulations and notes on standards are complied with
- In Germany, the requirements of VDE, especially DIN/VDE 0100, 0550, and DIN/VDE 0722, must be complied with when carrying out mounting and installation
- Make certain that the SQM4 is not exposed to direct solar radiation
- Required tightening torques for the fixing screws of the housing cover: 3.5 Nm
- The connection between the actuator drive shaft and controlling element must be **form-fitted** and **backlash-free**

Form-fitted design



Note!

Possible drive shaft-hub connections include:

- Keyway with sunk key
- Flattened shaft with corresponding counterpiece

To avoid inadmissible bearing loads and torques due to mechanical overload, appropriate measures must be taken at the mechanical coupling.

Example: Metal bellows coupling as a backlash-free compensating coupling

Cable AGG6.641 and cable shielding

Only the specified cable AGG6.641 (refer to chapter *Accessories*) may be used. The cable shielding must be connected to the printed circuit board using the flat connector provided.



Warning!

Ensure that the housing of the SQM4 is connected to functional earth (FE) of the LMV6. If necessary, remove insulating layers of lacquer at the fixing points of the burner housing or run separate earthing lines.

Working range of the SQM4

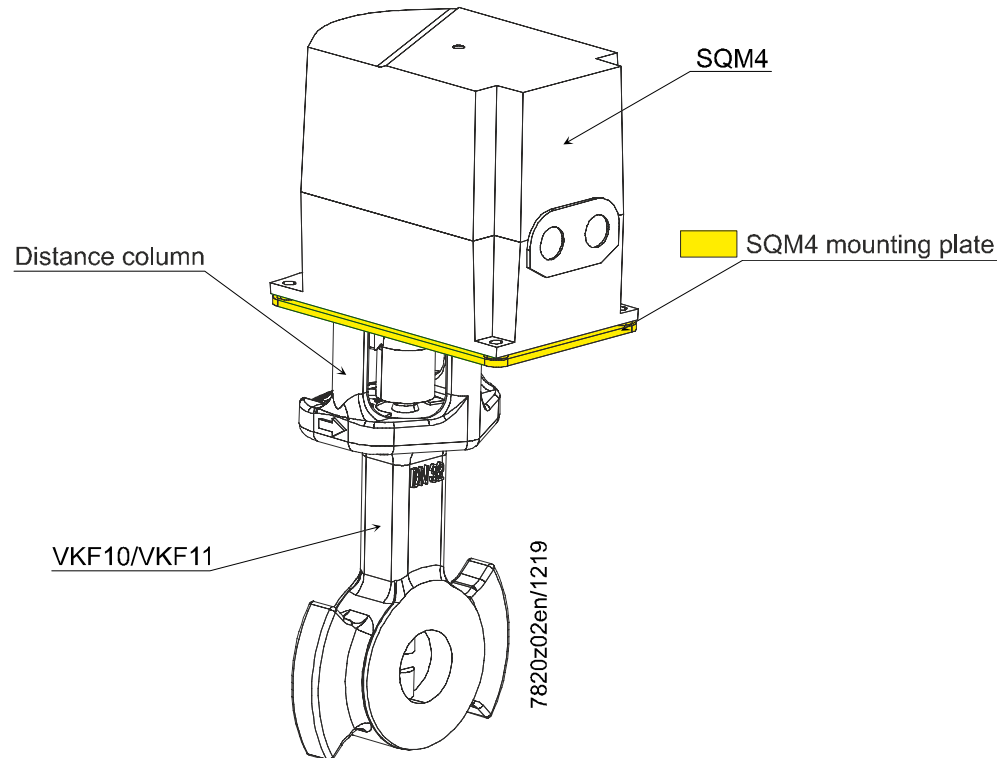
The working range of the SQM4 is given on the nameplate and must be observed when mounting.

Mounting notes (continued)**IP54**

To ensure **degree of protection IP54**, the user must fit suitable M16 glands or M16 plugs in the M16 openings of the SQM4. The M16 glands used must feature cable strain relief. To ensure degree of protection IP54 throughout the lifetime of the SQM4, the bearing of the actuator drive shaft must be located somewhere it will not be directly exposed to water or dust.

Mounting example

SQM4x.x95Cx mounted on VKF10/VKF11.

**Warning!**

The SQM4 units must be installed at a sufficient distance from magnetic fields (e.g., permanent magnets, transformers, electric motors etc.). With magnetic fields of ≤ 1000 mT, a minimum distance of 10 cm must be observed. For stronger magnetic fields (> 1 to 10 T), a minimum distance of 40 cm must be observed.

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., according to the series of standards EN 60730 and EN 60335)
- Ensure that spliced wires cannot come into contact with neighboring connections. Use suitable ferrules
- In case of increased vibration requirements, the internal plug system must be additionally secured
- The holding torque is reduced when the SQM4 is disconnected from the power supply

Housing cover



Warning!

The housing cover may only be removed for short periods of time for wiring or addressing. It must be ensured that dust and dirt do not get inside the SQM4 while such work is carried out.

ESD



Warning!

The SQM4 contains a printed circuit board with ESD-sensitive components. The top side of the board includes a protective cover to prevent direct contact. This protective cover must not be removed. The underside of the board must not be touched.

Addressing

Addressing (assignment of functions) defines whether the SQM4 is to operate as a

- fuel actuator
- air actuator, or
- auxiliary actuator

and is carried out with the AZL66 and addressing button on the SQM4 under the housing cover (refer to *LMV6 Basic Documentation P7560*). The correct assignment of SQM4 functions can be checked with the help of flashing LEDs.

Cable length topology

The maximum permissible length of cable AGG6.641 can be found in the *LMV6 Basic Documentation (P7560)*. Cabling must be strictly serial (**no branching permitted!**).

Electrical connection

The supplied RAST3.5 connector with screw terminals must be used for electrical connections. A tightening torque of 0.25 Nm must be observed for fitting the screw.

Standards and certificates



Note!
Only in connection with the LMV6 (refer to *Basic Documentation P7560*).



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

Device replacement	<p>When replacing an SQM4, the following points must be checked and corrected if necessary:</p> <ul style="list-style-type: none"> • Addressing (assignment of functions) • Bus termination • Adjustment of curve points for the electronic ratio control in the LMV6
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Disposal notes

The SQM4 contains electrical and electronic components and must not be disposed of together with domestic waste. Local and currently valid legislation must be complied with.

Open Source Software (OSS) declaration

Due to the license terms of the software we use, Siemens AG wishes to note that the OEM is obligated to provide the following license text for the end user in the documentation:

Open Source Software (OSS) declaration

Embedded in – or bundled with – the SQM4 are open source software (OSS) components and other third-party components identified below. You will find the specific product type and the valid version in the OSS document.

Title: Readme_OSS System SQM4 V01.

You may obtain, distribute, and/or modify a copy of the open source code for the component under the terms of their respective licenses. These may be a GNU General Public License, the GNU Lesser General Public License, a modified BSD license, or an MIT license. In the event of conflicts between Siemens license conditions and the open source software license conditions, the open source software conditions shall prevail with respect to the open source software portions of the software.

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Design

Housing	Die-cast aluminum lower housing. Housing cover made of impact-proof and heat-resistant plastic. Cover color: Black															
Drive motor	Stepper motor															
Type of position feedback	Hall sensor															
Adjustment of switching points / position indication	Only in connection with the LMV6 via the AZL66 (refer to <i>Basic Documentation P7560</i>).															
Connection technology	RAST3.5 plug-in screw terminals (included in the scope of delivery of the AGG6.710).															
Gear train	<table border="1"> <thead> <tr> <th></th> <th>SQM45</th> <th>SQM46</th> <th>SQM47</th> <th>SQM48</th> </tr> </thead> <tbody> <tr> <td>Plastic spur gear trains with minimal backlash and lifetime lubrication</td> <td>•</td> <td>•</td> <td>---</td> <td>---</td> </tr> <tr> <td>Steel spur gear trains with minimal backlash and lifetime lubrication</td> <td>---</td> <td>---</td> <td>•</td> <td>•</td> </tr> </tbody> </table>		SQM45	SQM46	SQM47	SQM48	Plastic spur gear trains with minimal backlash and lifetime lubrication	•	•	---	---	Steel spur gear trains with minimal backlash and lifetime lubrication	---	---	•	•
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Plastic spur gear trains with minimal backlash and lifetime lubrication	•	•	---	---												
Steel spur gear trains with minimal backlash and lifetime lubrication	---	---	•	•												
Output shaft	Burnished steel, fitted to the front of the gear train on one side (with hardened shaft for SQM47/SQM48).															
Mounting and fixing	Front mounting from the actuator side by means of 4 external fixing holes and an elongated hole for the positioning pin. Alternatively, the actuator can be secured from the side of the controlling element using 3 thread-forming tapping screws.															
ASK33.1 mounting kit	An ASK33.1 mounting kit is always required for mounting the SQM4x.x95Cx on a VKP40 butterfly valve.															

Type summary

SQM4 actuators

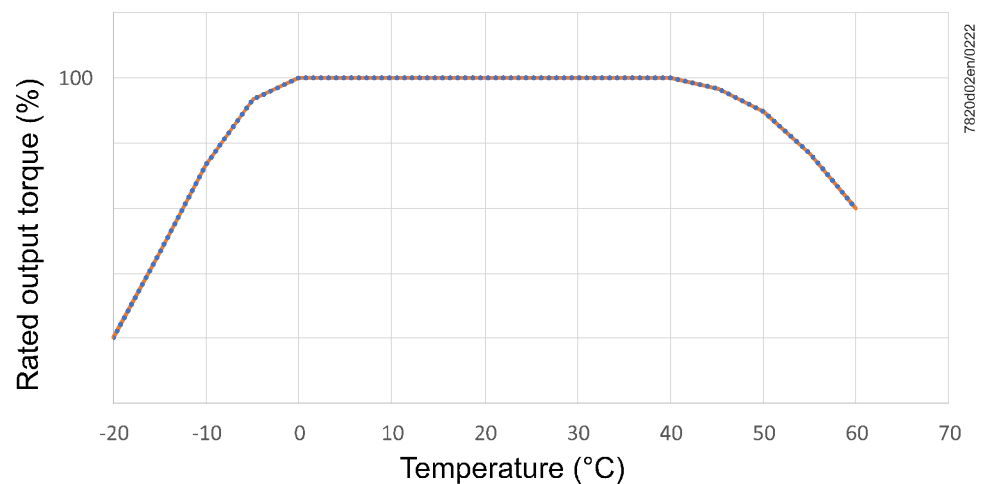
The type references of the SQM4 and accessories according to the *Type summary* must be specified when placing an order.

Article no.	Type	Nominal output torque / holding torque 2) (max.) Nm	Running time for 90° (min.) s	Shaft 1) No.
S55451-D201-C100	SQM45.291C8	3	10	1
S55451-D205-C100	SQM45.295C8	3	10	5
S55451-D501-C100	SQM46.491C8	10	30	1
S55451-D505-C100	SQM46.495C8	10	30	5
S55451-D607-C100	SQM47.497C8	20	30	7
S55451-D307-C100	SQM48.697C9	35	60	7

Key

- 1) Refer to *Dimensions*
- 2) Supply voltage applied and rated conditions of 20°C. Deviations are possible at temperatures below -15°C and above 40°C (refer to the diagram below)

Torque under extreme/unfavorable test conditions (e.g., 100% continuous load)



Accessories (to be ordered separately)**Butterfly valve with mounting plate****VKF1...**

Butterfly valve for mounting between threaded flanges in gas trains.
Refer to *Data Sheet N7673*.

**Note!**

Only suitable for SQM4x.x95Cx actuators.

**Gas damper****VKG...**

Gas damper for mounting between threaded flanges in gas trains.
Refer to *Data Sheet N7652*.

**Note!**

Only suitable for SQM4x.x95Cx actuators.

**Proportional controlling element with mounting plate****VKP40...**

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

**Note!**

Only suitable for SQM4x.x95Cx actuators.

**Mounting plate****ASK33.1**Article no.: **BPZ:ASK33.1**

(ASK33.1 with 3 x M5 countersunk screws included in the scope of delivery)
Mounting plate for mounting the SQM4x.xx5xx on the VKP40.
Refer to *Mounting Instruction 74 319 0516 0 (M7673)*.

**Note!**

The required screws are included in the VKP40 basic package.

**Note!**

Only suitable for SQM4x.x95Cx actuators.

Accessories (to be ordered separately) (continued)



CAN bus connecting cable

AGG6.641

Article no.: **S55854-Z609-A100**

- CAN bus connecting cable between LMV6 and system components
- Shielded 4-core cable
- Cable length 100 m
- Feed lines 2 x 1.25 mm²



Separable cable entry, single pack, minimum order quantity of 50 pieces

AGG5.812

Article no.: **BPZ:AGG5.812**



Note!

Only the specified connecting cables may be used.



Single connector X15

AGG9.848

Article no.: **S55854-Z537-A100**

- Connector type RAST3.5
- 4-pole
- Single connector order, minimum order quantity of 300 pieces

Single connector X16

AGG9.849

Article no.: **S55854-Z538-A100**

- Connector type RAST3.5
- 4-pole
- Single connector order, minimum order quantity of 300 pieces

Technical data

SQM4	Supply voltage	24 V DC via CAN bus connection cable AGG6.641 from LMV6, extension module AGG6 or separate power supply unit AGG6.200A5
	Drive motor	Stepper motor
	Internal consumption	
	<ul style="list-style-type: none"> • SQM45 • SQM46 • SQM47 • SQM48 	<ul style="list-style-type: none"> 6 to 11 VA 6 to 11 VA 11 to 22 VA 11 to 22 VA
	Positioning angle	Max. 90°
	Mounting position	Optional
	Degree of protection	According to EN 60529:1991 + A1:2020 + A2:2013, IP54, provided adequate cable entries are used
	Protection class	III according to EN 60730-1:2016 and EN 60730-2-14:2017
	External overload fuse	Max. 4 AT (slow) according to EN 60127-2:2014 and EN 60127-5:2016
	Cable entry	Plug-in threaded insert for cable glands, 2 x M16
	Direction of rotation (when facing the shaft)	
	<ul style="list-style-type: none"> • Default • Inverted 	<ul style="list-style-type: none"> Counterclockwise Clockwise
	Positioning direction	Adjustable in the LMV6
	Repetition accuracy	±0.3° (during operation on the LMV6) 1° with maximum tolerance of angle detection and bearing play occurring
	Position detection resolution	0.1°
	Nominal output torque and holding torque	Refer to <i>Type summary</i>
	Running times	Refer to <i>Type summary</i> (adjustable and variable in the LMV6)
	Output shaft	Supplied as standard, not replaceable
	Weight	
	<ul style="list-style-type: none"> • SQM45 • SQM46 • SQM47 • SQM48 	<ul style="list-style-type: none"> Approx. 1 kg Approx. 1 kg Approx. 1.6 kg Approx. 1.6 kg
	Temperature of the mounting surface	Max. 60°C
	Lifetime	250,000 start cycles (OFF ⇔ ON ⇔ OFF) 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°, distributed over the entire positioning angle range
	On time	50% Max. 3 min. continuously
	Cable connection	RAST3.5 plug-in screw terminals (for details, refer to <i>LMV6 Basic Documentation P7560</i>)
	Ferrules	Matching the wire cross section

Technical data (continued)

Environmental conditions



Warning!
Condensation, formation of ice, and ingress of water are not permitted.
Failure to observe this information poses a risk of damaging the safety functions.

Climatic conditions

Storage

Temperature range	-20 to +60°C
Humidity	< 95% r.h.

Transport

Temperature range	-20 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 test	According to IEC 60068-2-6:2008 with acceleration of 10 m/s ²
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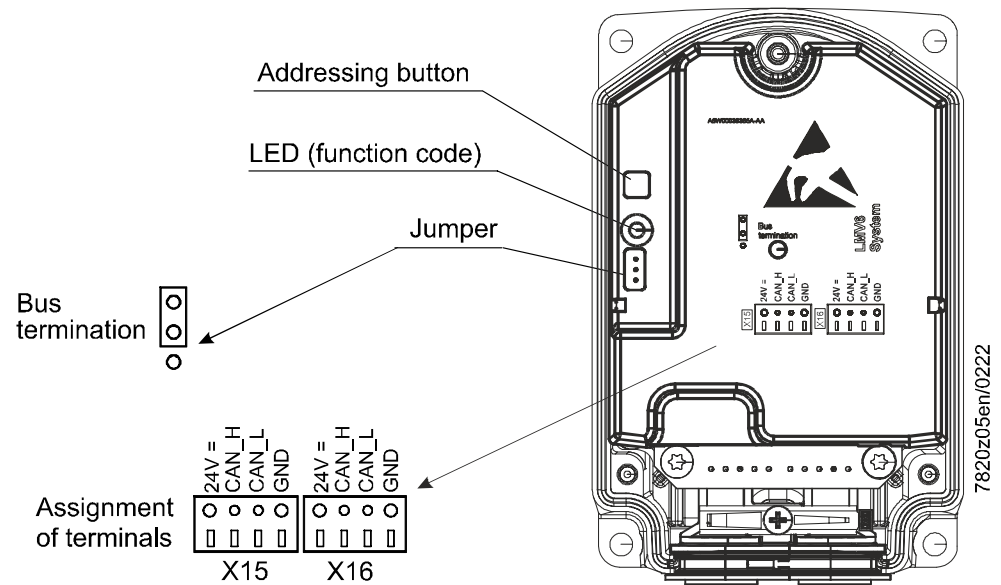
Shock tests	According to IEC 60068-2-27:2010 with peak accelerations of 100 m/s ²
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Function

The SQM4 units feature a rugged mechanical design and have a gear train with minimal backlash. Control and position feedback take place via a CAN bus system. The AGG6.641 CAN bus connection cable also provides the power supply. The SQM4 units are driven by stepper motors and can be positioned with a resolution of 0.1°. Relevant characteristics and settings (running time, direction of rotation, end positions) of the SQM4 units are controlled and determined by the LMV6 (for details, refer to the *LMV6 Basic Documentation P7560*). The running times of the controlling elements are determined and controlled by the LMV6 program phases (e.g., startup: short running time; operation: long running time).

Terminating resistor

A terminating resistor must be fitted to the end of the serial CAN bus cabling. A jumper also has to be connected to the *BUS TERMINATION* position in the SQM4. The figure describes the position with activated bus termination. This jumper must not be connected in this position for any other SQM4 units (with no end point).



The two connection jacks (X15, X16) are identical.

Dimensions

Dimensions in mm

SQM4

