



Actuators for air and gas dampers

SQM9...

Electromotoric actuators

- **Torques** up to 60 Nm
- **Running times ¹⁾** 30...120 s

¹⁾ Predefined by the LMV5 or LMV6 burner management system

The SQM9 and this Data Sheet are intended for use by OEMs which integrate the actuators in their products!

Use

The actuators SQM9 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 process plants. The actuators are used primarily for the load-dependent control of the gas flow, oil volume and combustion air volume in connection with the electronic ratio control LMV5/LMV6.

Supplementary documentation

Product type	Designation	Type of documentation	Documentation number
LMV5	Burner management system	Data sheet	N7550
		Basic documentation	P7550
AZL5	Display and operating unit	User documentation	A7550
		Data sheet	N7542
LMV6	Burner management system	Data sheet	N7560
		Basic documentation	P7560
AZL66	Display and operating unit	Data sheet	N7562
		User documentation	U7562

Warning notes



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

Not permitted: Interventions or modifications.

To commission the actuator, the housing cover may be opened!

- 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-relevant applications are only possible with Siemens LMV5/LMV6 burner management systems
- All product-related activities (mounting, settings and maintenance) must be performed by qualified and authorized personnel



Attention!

- **Risk of electric shock – to disconnect the SQM9 from power, it may be necessary to open more than one switch. Before performing maintenance work, the SQM9 must be disconnected from the power supply**
- **The electrical connection between the conduit fittings is not made automatically. It must be established on installation site**

- To ensure protection against electric shock, the connection terminals must have adequate touch protection. Make certain that noninsulated connections or wires cannot be touched
- Whenever work has been carried out (mounting, installation, service work, etc.), check to ensure that wiring is in an orderly state
- 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
- During operation, the actuator's surface can reach high temperatures.
Recommendation: After operation, allow the actuator to cool down. If not observed, there is a risk of burning

Notes on use in North America

Only flexible conduits with relevant accessories may be used.



Note!
Also refer to chapter 'Mounting instructions'.

- Ensure that the relevant national safety regulations and notes on standards are complied with
- In geographical areas where DIN regulations apply, the mounting and installation requirements of VDE must be satisfied, especially DIN/VDE 0100, 0550 and DIN/VDE 0722
- The actuator must be disconnected from power before its cover is removed. This allows the actuator to cool down. During operation, the actuator's internal components get hot, especially the motor, which may reach 100 °C. If not observed, there is a risk of burning

Positive connection



Caution!
The drive shaft connection must be form-fitted using a key type A as per DIN 6885.

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

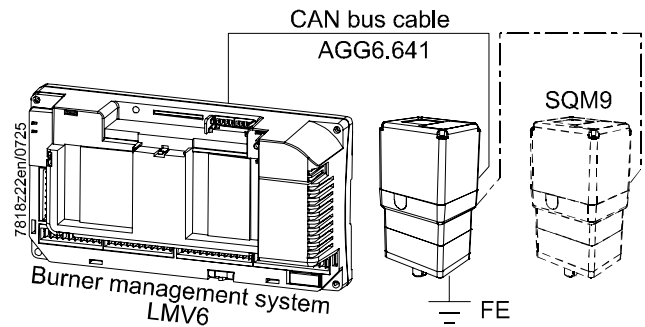
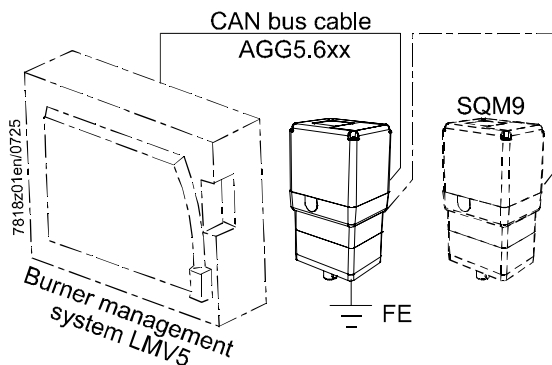
Example: Use metal bellows coupling without mechanical play.

Cable and cable shielding

Only the specified cable may be used; refer to the basic documentation for the LMV5 (P7550) or LMV6 (P7560). The cable's shield must be connected to the printed circuit board using the tab provided.



Caution!
Ensure that the actuator's housing is connected to functional earth (FE) of the system. If necessary, remove isolating layers of paint from the fixing points on the burner's casing or run separate earth wires. For further information, refer to the installation guide for the LMV5 (J7550.1) or LMV6 (P7560).



Working range of actuator

The working range is given on the type field and must be observed when mounting the actuator. To ensure the actuator is accurately located on the burner, a positioning pin of 6 mm diameter must be fitted on the mounting surface.

IP66 / NEMA 4

To ensure degree of protection **IP66 / NEMA 4**, the user must mount suitable M20 glands or M20 plugs into the M20 opening of the actuator. The M20 glands used must provide cable strain relief.

Drive shaft

The actuator comes with the key fitted. During transport, the key is held in the groove by means of an O-ring. Remove the O-ring before mounting the actuator.

Installation notes

- Ensure that the electrical wiring is in compliance with national and local safety regulation
- Make certain that strain relief of the connected cables conforms to the relevant standards (e.g. as per DIN EN 60730 and DIN EN 60335)
- Ensure that spliced wires cannot get into contact with neighboring terminals. Use adequate ferrules
- Unused terminals of the actuator must be covered by dummy plugs
- The connection between the actuator drive shaft and the relevant controlling element must be form-fitted.
- The holding torque is reduced when the actuator is disconnected from power

Housing cover



Caution!

The housing cover may only be removed for short periods of time for wiring or when making the addressing. It must be made certain that dust or dirt does not get inside the actuator while such work is carried out. If the housing cover is removed and fitted again, power must be turned off to avoid short-circuits caused by conducting housing components.

ESD



Caution!

The actuator contains a printed circuit board with ESD-sensitive components. The top side of the board carries a cover which affords protection against 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 actuator is to operate as a:

- fuel actuator
- air actuator
- auxiliary actuator

This assignment is configured using the AZL5 or AZL66 display and operating unit, along with the addressing button on the actuator when the cover is removed (refer to the basic documentation for the LMV5 (P7550) or LMV6 (P7560)).

The correct assignment of actuator functions can be checked with the help of flashing LEDs.

Cable length topology

The maximum permissible cable length can be found in the basic documentation for the LMV5 (P7550) or LMV6 (P7560). Cabling must be strictly serial (**no branching permitted!**).

Standards and certificates



Note!

Only in connection with the LMV5 or LMV6 (refer to Basic Documentation P7550 or P7560).



EAC Conformity mark (Eurasian Conformity mark)



China RoHS

Hazardous substances table:

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

Only valid for SQM91.391A9



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 (starting from the production date given on the type field). This is based on the endurance tests specified in the standard EN 298. A summary of the conditions has been published by the European Control Manufacturers Association (Afecon) (www.afecor.org).

The 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 is to be replaced by authorized personnel.

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

Service notes

Replacement

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

- Addressing (assignment of functions)
- Bus termination
- Adjustment of curve points for the electronic ratio control (e.g., in the LMV5 or LMV6 burner management system)



Caution!

Before performing maintenance work, the actuator must be disconnected from the power supply.

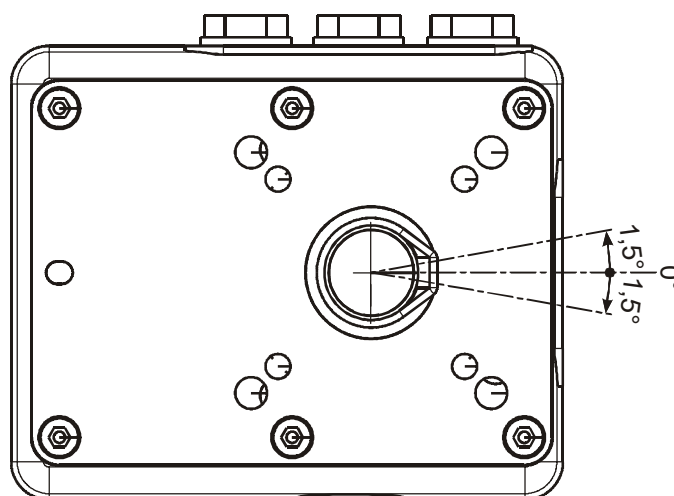
Disposal notes

The SQM9 contains electrical and electronic components and must not be disposed of together with domestic waste. Local and currently valid legislation must be observed.

Mechanical design

Housing	• Housing sections are made of die-cast aluminum and die-cast zinc • The housing is powder-coated (RAL 7032)
Drive motor	Stepper motor
Adjustment of switching points / position indication	In connection with the LMV5 or LMV6 burner management system, via the AZL5 or AZL66 display and operating unit (refer to the basic documentation for the LMV5 (P7550) or LMV6 (P7560)).
Electrical connections	• RAST3.5 plug-in screw terminals for the LMV5 burner management system (AGG5.720/AGG5.721 connector sets included in the scope of delivery) • RAST3.5 plug-in screw terminals for the LMV6 burner management system (AGG9.848 connector set included in the scope of delivery) • Wiring via basic unit • Easy insertion of cables through large openings in the housing
Gear train	Spur gears made of steel with only little backlash and permanent lubrication.
Drive shaft	• Alloyed steel, hardened, ready fitted to the front of the gear train • The torque is transferred to the controlling element via a form-fitted key type A conforming to DIN 6885 • The actuator comes with the key fitted • During transport, the key is held in the groove by means of an O-ring • The O-ring must be removed prior to mounting

The actuator is supplied with the drive shaft in the following position:

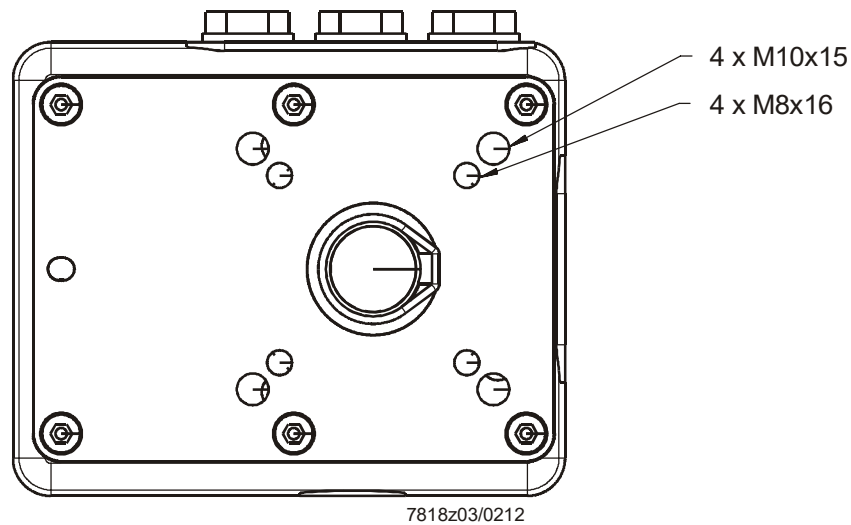


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Mechanical design (cont'd)

Mounting and fixing

- The actuator is to be mounted from the side of the controlling element, using the 4 threaded holes M10 or M8 (see illustration)
- For tightening torques, see “Technical data”



Type summary (other types on request)

When ordering, please give product no. of actuator according to “Type summary” and product nos. of accessories according to “Accessories”.

Article no.	Product no.	Running time for 90°	Nominal output torque	Holding torque	Radial force perpendicular to the drive shaft	Axial force in the direction of the drive shaft	CAN bus control	Shaft Ø	With parallel key
				1)					
		(min.)	(max.)	(max.)	(max.)	(max.)			
		s	Nm	Nm	N	N		mm	
BPZ:SQM91.391A9	SQM91.391A9	30	60	60	1300	1000	•	25	•
S55451-D401-A100	SQM91.391C8	30	60	60	1300	1000	•	25	•

1) Power applied

Accessories for the LMV5 burner management system

Accessories must be ordered as separate items:



CAN bus connecting cable

AGG5.641

Article no.: **BPZ:AGG5.641**

- CAN bus connecting cable between the LMV5 burner management system and the actuator or between the actuators
- Shielded 5-core cable
- Cable length 100 m, 8 mm dia.
- Power supply 2 x 1.3 mm², 1 x 0.56 mm²
- Data line 2 x 0.22 mm²
- Double shielding

Refer to Basic Documentation P7550.



CAN bus connecting cable

AGG5.631

Article no.: **BPZ:AGG5.631**

- Shielded 5-core cable, 100 m
- Refer to Basic Documentation P7550.

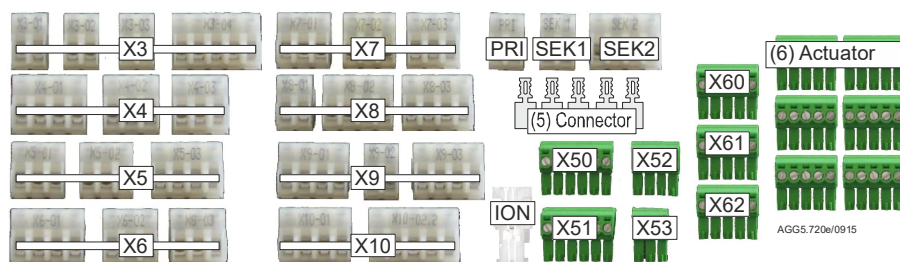
Specified connecting cables are mandatory!

Connector set

AGG5.720

Article no.: **BPZ:AGG5.720**

- Standard connector set for gas applications / oil applications with up to 3 actuators
- Refer to Basic Documentation P7550.



Connector set

AGG5.721

Article no.: **BPZ:AGG5.721**

- Extension connector set
 - Complementing the AGG5.720 connector set, all connector variants are covered
- Refer to Basic Documentation P7550.



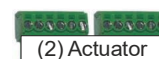
Transformer
AGG5.2



Flame detector
QRB



- VSD
- Fuel meter



Actuator
SQM45
SQM48

Example



Single connectors

AGG9.853

Article no.: **BPZ:AGG9.853**

- Connector type RAST3.5
- 5-pole
- Packing unit 200 in total

Accessories for the LMV6 burner management system

To be ordered separately:



CAN bus connecting cable

AGG6.641

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

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

Refer to Basic Documentation P7560.



Note

Only the specified connecting cables may be used.

Example:



X15 single connector

AGG6.7x0

- RAST3.5 connector type
- 4 pole
- For the connection of the actuator
- CAN bus connection

Single connector set for...	Designation	Number of single connectors included	Type	Article no.
LMV60	Burner management system	6	AGG6.710	S55854-Z605-A100
LMV62	Burner management system	6	AGG6.720	S55854-Z606-A100
LMV63	Burner management system	6	AGG6.720	S55854-Z606-A100
AGG6.200Ax	Power supply unit	4	AGG6.730	S55854-Z607-A100
AGG6.320Ax	I/O extension module	6	AGG6.740	S55854-Z619-A100

Example:



X15 single connector

AGG9.848

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

- RAST3.5 connector type
- 4 pole
- Fixed packaging unit of 300 units

X16 single connector

AGG9.849

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

- RAST3.5 connector type
- 4 pole
- Fixed packaging unit of 300 units



Note

The connectors can only be ordered as single connectors in the respective quantities of the packaging units.

Example:



Power supply unit

- 120 V AC power supply unit, for CAN bus users

AGG6.200A1

Article no.: **S55854-Z617-A220**

- 230 V AC power supply unit, for CAN bus users

AGG6.200A:

Article no.: **S55854-Z616-A220**

Technical data

General unit data	Operating voltage	
	SQM91.391A9	2 x 12 V AC via separate AGG5.2x0 supply transformer, refer to Basic Documentation (P7550)!
	SQM91.391C8	24 V DC via AGG6.641 CAN bus connecting cable, refer to Basic Documentation (P7560)!
	Drive motor	2-phase stepper motor
	Power consumption	Approx. 40 VA at rated mains voltage
	On time	50% at a maximum operating time of 90 s without interruption
	Angular adjustment	Max. 0...90°
	Mounting position	Optional
	Degree of protection	IP66 as per EN 60529, provided adequate cable entries are used North America: NEMA4
	Safety class	The actuator is designed for operation in environments of safety class III (as per DIN EN 60730-1)
	External overload fuse	Max. 4 AT (slow) to DIN EN 60127/2-5
	Cable entry	Cable glands 3 x M20, adapter for 1/2" NPT protection well thread (packaged with the actuator)
	Electrical connections	RAST3.5 plug-in screw terminals (for details, refer to the LMV5 or LMV6 burner management system)
	Ferrules	Must match the dia. of the stranded wire
	Direction of action	Adjustable in the burner management system LMV5 or LMV6
	Direction of rotation (when facing the drive shaft)	
	Standard	Counterclockwise
	Reverse	Clockwise
	Nominal output torque and holding torque	Refer to "Type summary"
	Running time	See "Type summary" (selectable on the basic unit)
	Reproducibility of actuator positions across the usable angular range of 0...90°	±0.8° (typical) (when used with the LMV5 or LMV6 burner management system)
	Drive shaft	Supplied as standard (not replaceable)
	Weight	Approx. 7.2 kg
	Tightening torques	
	Cover screws	1 Nm
	Fixing screws for the actuator	
	M10	26 Nm
	M8	16 Nm
	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°

Technical data (cont'd)

Environmental conditions

Storage	EN 60721-3-1:1997
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-20...60 °C
Humidity	<95% r.h.
Transport	EN 60721-3-2:1997
Climatic conditions	Class 2K2
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	-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

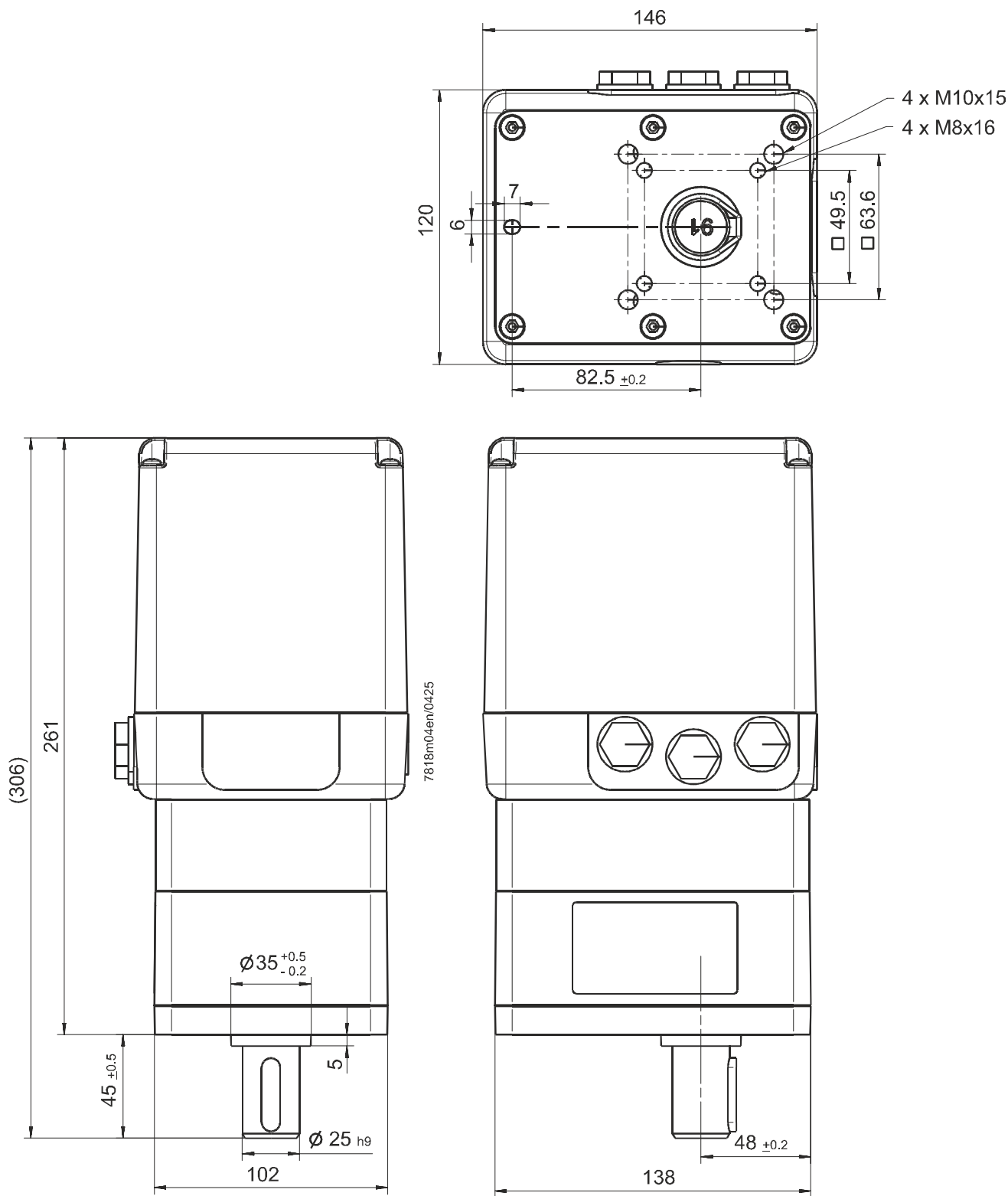
Function

The actuators are of rugged design and have a gear train with only little backlash. Control and position feedback take place via a bus system (CAN). The bus cable is also used for powering the actuators. The actuators 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 actuators are determined by the controlling LMV5 or LMV6 burner management system (for details, refer to Basic Documentation (P7550) or (P7560)). The running times of the controlling elements are varied by the LMV5 or LMV6 burner management system in the burner control phases (e.g., startup: short running time; operation: long running time).

Dimensions

Dimensions in mm

SQM9



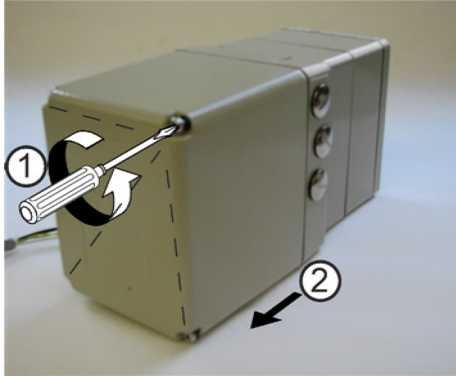
Mounting instructions



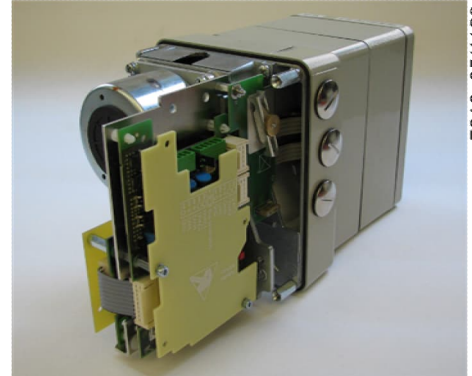
Please note!

- Remove the O-ring at the shaft end before mounting. It serves exclusively as a transport protection feature
- To mount the SQM9 on the burner, first tighten the 4 screws. Tightening torques: 4x M10 with 26 Nm or 4x M8 with 16 Nm
- Only mount the shaft coupling once this step is completed

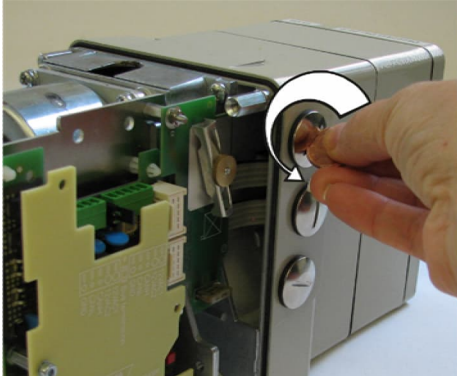
Step 1



Remove the cover.



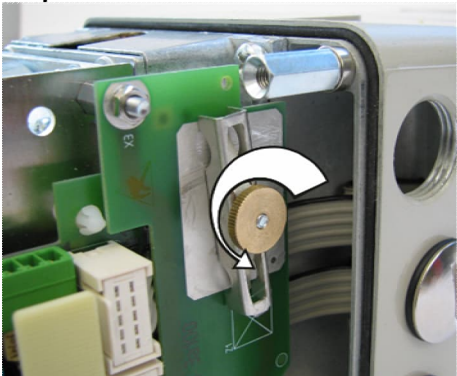
Step 2



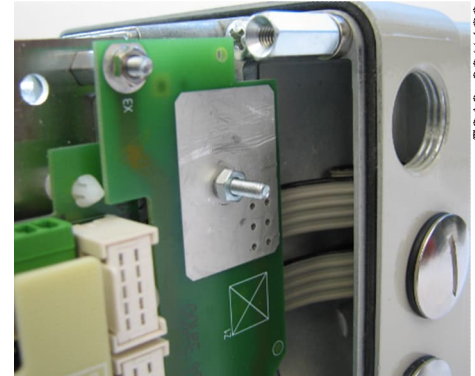
Remove the locking screw using a coin or a flat metal washer.



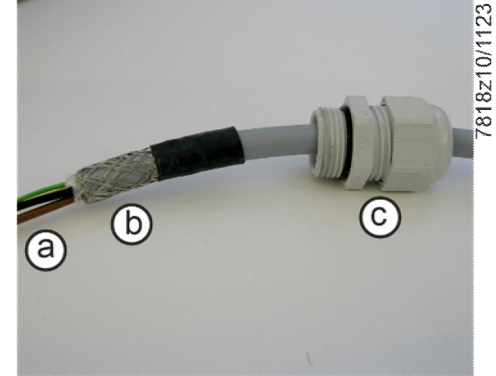
Step 3



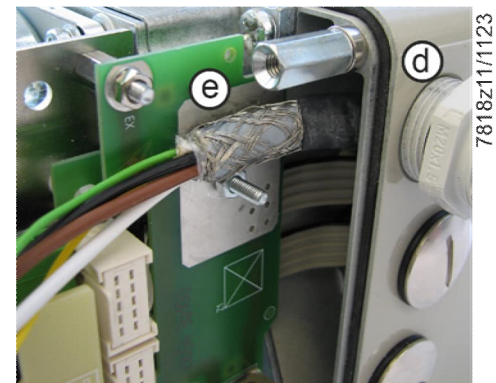
Remove the cable holder.



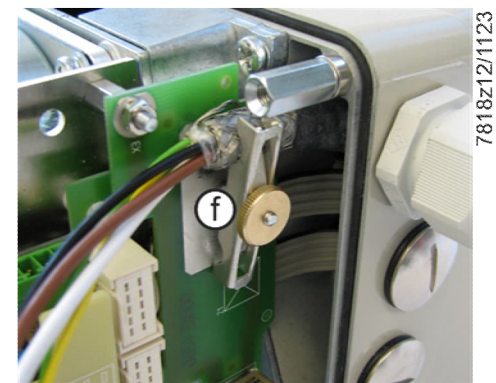
Step 4



Strip the cable to approx. 100 mm (a). Leave an additional 15 mm for the shielding (b). Pull the cable through the opening (d). In this case, use a Pg cable gland (c) (not included in the scope of delivery).



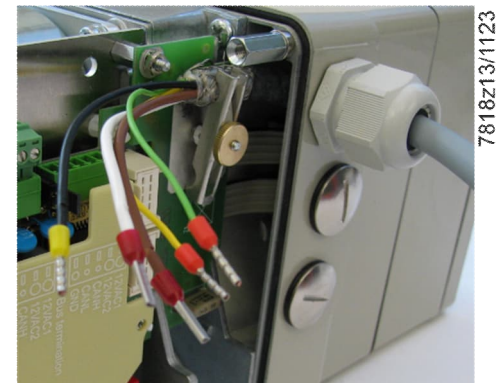
Align the shielding on the metal plate (e) and tighten the Pg cable gland (d).



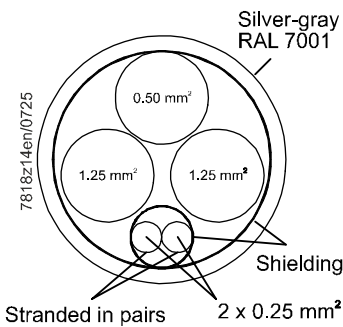
Lock the cable holder (f) in place and tighten it.

Step 5

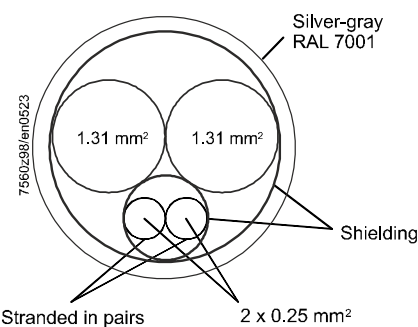
Strip the cable ends. Attach the ferrules depending on the cross-sectional area of the stranded wire.



AGG5.641
(Cable type 1)

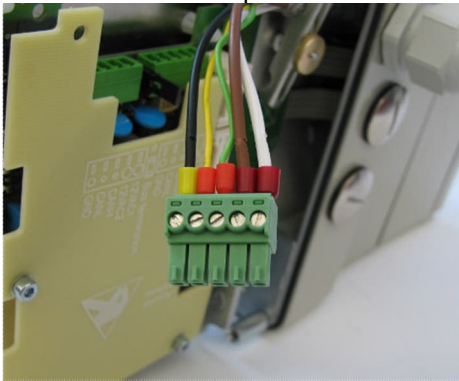


AGG6.641
(Cable type 2)

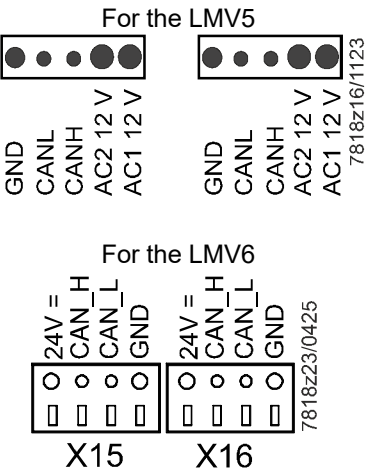


Step 6

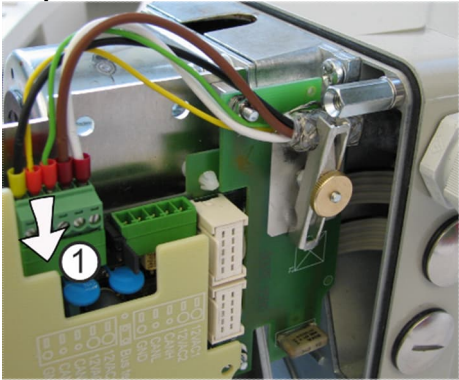
Example LMV5:



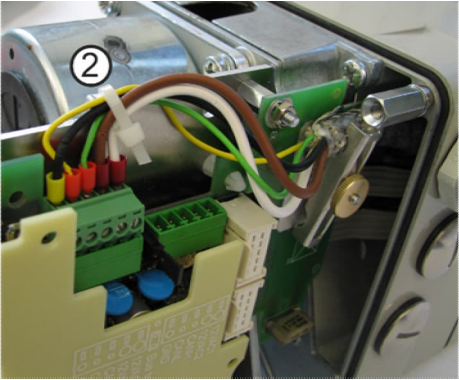
Attach the cables to the corresponding terminal openings.



Step 7



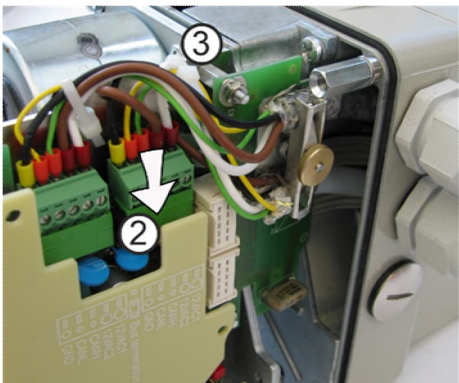
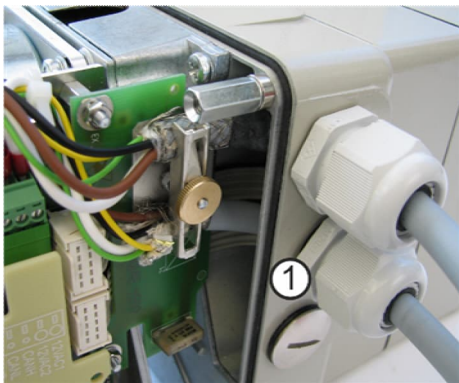
Insert the terminal (1) and secure it to the metal plate (2) with a cable tie.



Step 8

Optional for connecting an additional actuator

The option is available to connect a second cable by opening another locking screw (1). The procedure is identical to steps 1 to 6. Use a free terminal holder (2) and secure the cable with a cable tie (3).



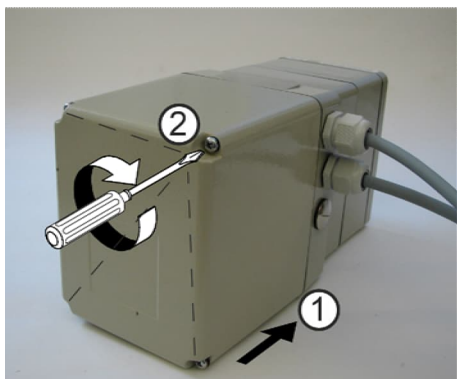
Step 9

Bus termination/addressing process



For details on the bus termination and addressing process, refer to the basic documentation for the LMV5 (P7550) or LMV6 (P7560) burner management system!

Step 10



Attach the cover (1) and screw it down tight (2).

Tightening torque: 1 Nm