



Actuators

SQM33...

For air dampers and control valves of oil or gas burners

Electromotoric actuators

- **Torques:**
 - SQM33.4... up to 1.2 Nm nominal output torque
 - SQM33.5... up to 3 Nm nominal output torque
 - SQM33.7... up to 10 Nm nominal output torque
- **Running times for 90°:**
 - SQM33.4... 5 seconds
 - SQM33.5... 5 seconds
 - SQM33.7... 17 seconds
- **Versions:** Choice of cables (refer to «Type summary»)

self-holding torque
(refer to «Type summary»)

The SQM33... and this Data Sheet are intended for use by OEMs which integrate the actuators in their products!

Use

The actuators of the SQM33... range are used to drive and position gas dampers, air dampers, oil control valves 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 burner's current output.

Warning notes



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

Do not open, 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 of the units, completely isolate the equipment from mains supply (all-polar disconnection). 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 units must not be put into operation, even if they do not exhibit any damage
- The notes in chapter *Section of actuator version, Positive connection and Unambiguous assignment* must be observed, for safeguarding of correct fuel / air ratio

Housing cover



Caution!

The actuator's housing must not be opened. The actuator contains an optical feedback system.

Selection of actuator version

- Select the type of actuator depending on the torque required for driving the controlling element
- Ensure that any other torque acting on the controlling element (e.g. torque due to the airflow produced by the burner's fan) is smaller than the actuator's self-holding torque when power not applied
- 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: The airflow in the burner's air duct exerts a torque on the air damper's asymmetrical bearing so that the air damper will slightly travel towards the fully open position. This leads to a certain amount of excess air in the combustion process, which is less critical than lack of air

Mounting notes

- Ensure that the relevant national safety regulations are complied with
- The connection between actuator drive shaft and controlling element must be form-fitted (no mechanical play permitted)
- When mounting the actuator, ensure that the permissible axial and radial load acting on the bearing will not be exceeded
- When fitting the actuator to the controlling element, proceed as follows:
 1. Fit and secure the actuator.
 2. Connect the actuator's drive shaft to the controlling element by means of a coupling pin.

Positive connection



Caution!

Possible connection with drive shaft or hub:

- Drive shaft with flat edge and matching counter piece

To avoid inadmissible loads on the bearing caused by rigid coupling hubs, Siemens recommends using compensating coupling without mechanical play (e.g. metal bellows coupling).

- When sizing a drive shaft connection, consider that – during operation – the effective torque can exceed the actuator's rated torque:
 - Under optimum operating conditions, the actuator may deliver a higher torque
 - Mass moments of inertia (produced by rotating motor components and on the controlling element) can lead to sudden peak loads
- Siemens recommends to adequately oversize the drive shaft connection in relation to the actuator's rated torque
- The connection between actuator and burner or controlling element must be very rigid (no bending). This is of particular importance when using structures incorporating columns

Unambiguous assignment



Caution!

To prevent mix-up of actuators connected to the LMV2... / LMV3..., these types of burner controls carry various reference marks.

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 range «Stop open» and «Stop closed».

Cable

SQM33.41... / SQM33.51... / SQM33.71...:

- The actuators are supplied complete with attached connecting cable and plug.

SQM33.550A9 / SQM33.750A9:

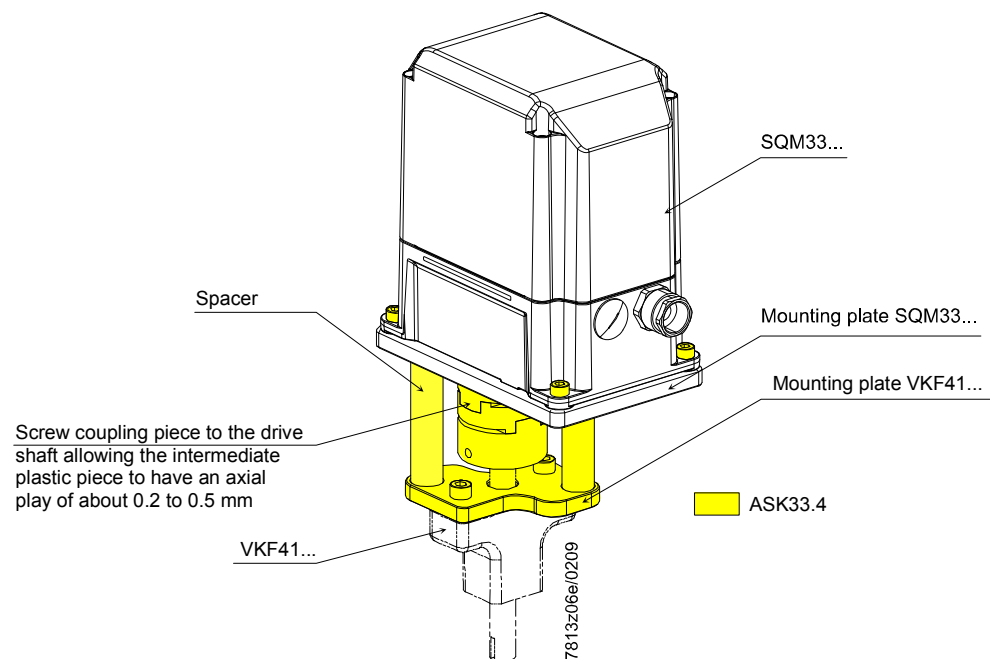
- The actuators are supplied with cable ready connected, complete with ferrules
- The 6-poles RAST2.5 / RAST3,5 connecting plug (included in scope of delivery)
- One-time bend when laying the cable: 2 x cable diameter

Mounting notes (cont'd)

IP54

To ensure degree of protection IP54 over the actuator's entire service life, the bearing of the drive shaft must be located such that it will not be directly exposed to water or dust.

Mounting example

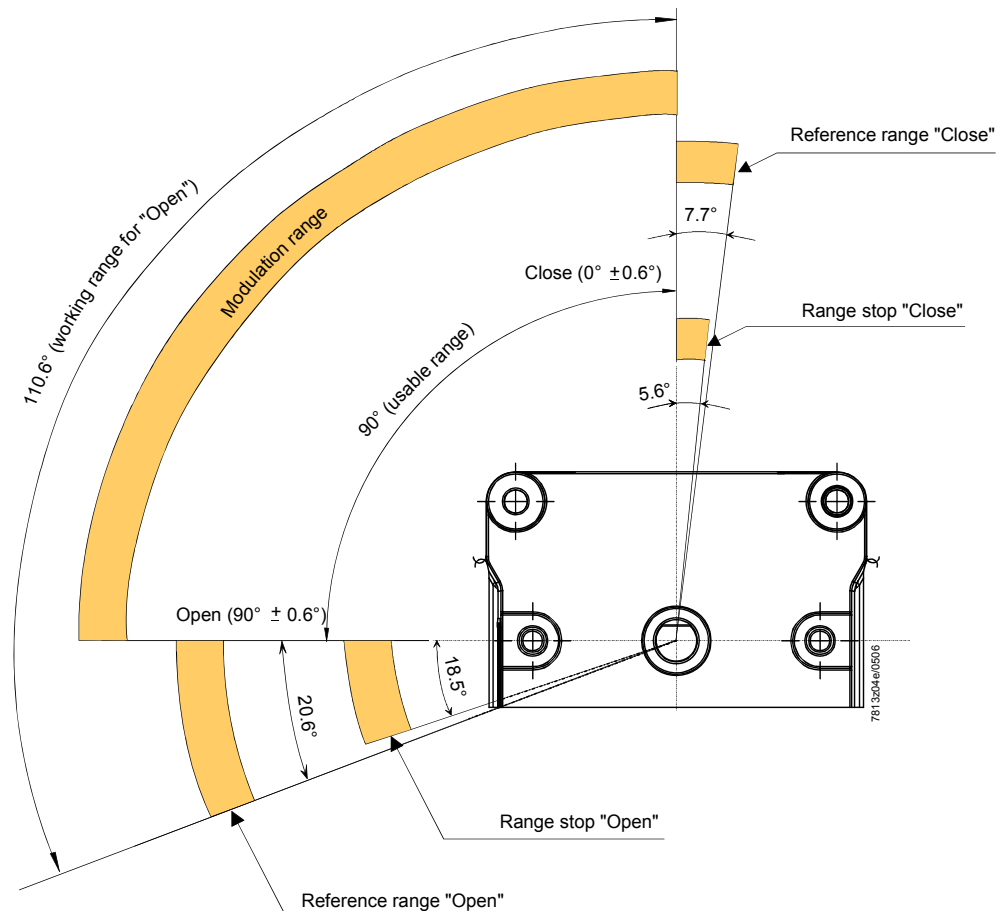


Mounting notes (cont'd)

Working range of actuator

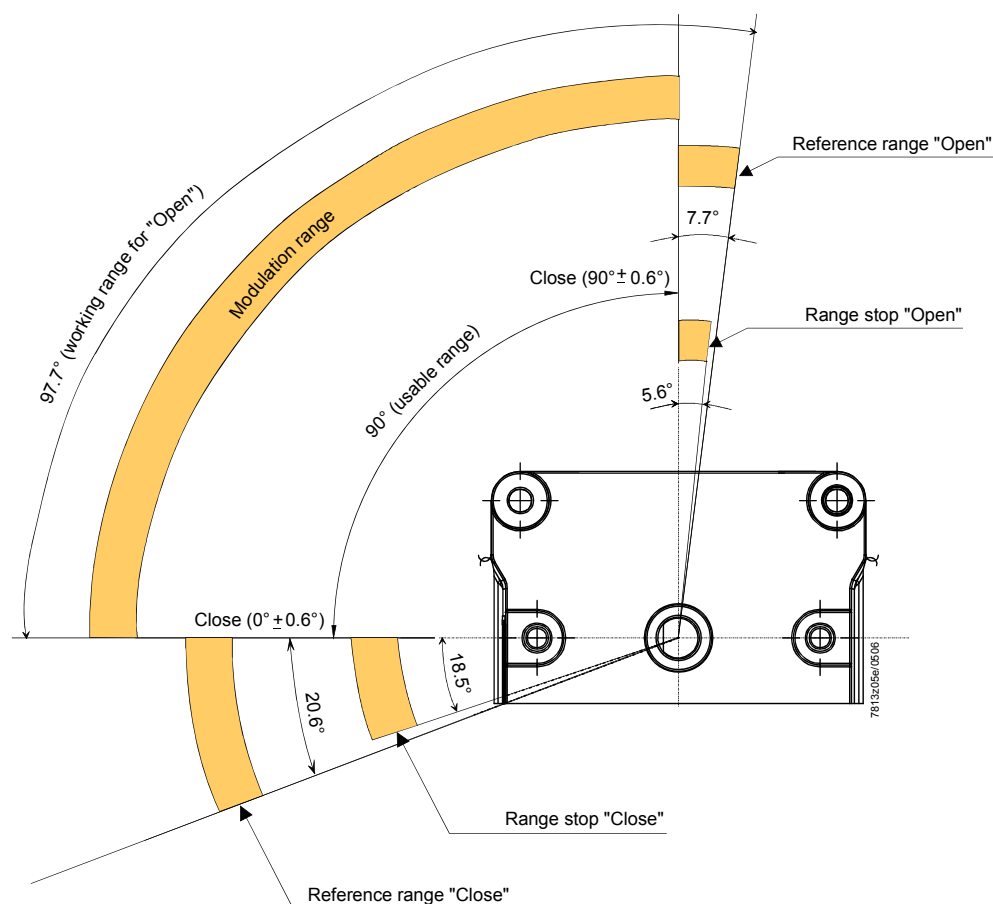
The actuator's working range consists of usable range and reference range. The usable range is specified on the type field. When mounting the actuator, the connected controlling element (e.g. air damper) must allow travel both in the reference range and the adjusted usable range. Reference ranges «Open» and «Close» differ. In the case of an actuator with **counterclockwise** direction of rotation, reference range «Close» lies between 0° and -7.7° , and reference range «Open» between 90° and 110.6° . To ensure precise positioning of the actuator on the burner, a positioning pin of 6 mm dia. must be fitted to the mounting surface (refer to detail A under «Dimensions»).

Direction of rotation: Counterclockwise



Mounting notes (cont'd)

Direction of rotation:
Clockwise



Installation notes

- Always run the high-voltage ignition cables separate from the unit and other cables while observing the greatest possible distance
- The holding torque is reduced when the actuator is disconnected from power

Standards and certificates



Conformity to EEC directives

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

2004/108/EC
2006/95/EC



ISO 9001: 2008
Cert. 00739



ISO 14001: 2004
Cert. 38233



C US



APPROVED



1)

1) For SQM33.7... → Approval in progress

Service notes

Replacement	When replacing an actuator, the following points must be checked and, if necessary, corrected: • Correct connection of the basic unit • Assignment of functions • Adjustment of curve points of electronic fuel / air ratio control (e.g. with the LMV27...)
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Disposal notes



The actuator 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	The housing is made of die-cast aluminum. The cover is made of impact-proof and heat-resistant plastic. SQM33.550A9 / SQM33.750A9 has a flange for the connection of a Conduit connecting thread (NPSM ½"-14). Color of cover: Black
Actuator	Stepper motor
Adjustment of switching points / position indication	In connection with the basic unit (e.g. LMV27...): Via the AZL2... display and operating unit (refer to the Basic Documentation of the LMV27...).
Cable / electrical connections	SQM33.41xA9 and SQM33.51xA9 / SQM33.71xA9 only: RAST2.5 connectors complete with cable. SQM33.550A9 / SQM33.750A9 only: Cable with ferrules, RAST2.5 / RAST3.5 connector (included in scope of delivery).
Gear train	Spur gears made of steel and plastic, with little backlash and permanent lubrication.
Drive shaft	Made of black-finished steel, ready fitted to the front of the gear train.
Mounting and fixing	The front of the gear train is used as the mounting surface. The actuator has 4 fixing holes and an elongated hole for the positioning pin. Alternatively, the actuator can be secured with 3 self-tapping screws from the side of the controlling element.

Type summary

Actuators SQM33...

Type	Rated output torque (max.) Nm	Holding torque when power applied (max.) Nm	Holding torque when power not applied (max.) Nm	Cable length m	Radial load on bearing middle of driveshaft (max.) N	Axial load on bearing middle of drive shaft (max.) N
SQM33.410A9	1,2	1,2	0,8	1,5	100	10
SQM33.411A9	1,2	1,2	0,8	3	100	10
SQM33.510A9	3	3	2,6	1,5	100	10
SQM33.511A9	3	3	2,6	3	100	10
SQM33.550A9	3	3	2,6	3,6	100	10
SQM33.711A9	10 ¹⁾	10	6	3	100	10
SQM33.750A9	10 ¹⁾	10	6	3,6	100	10

¹⁾ For ambient temperatures below 0°: Approx 10 % torque reduction

Accessories

Accessories must be ordered as separate items:



Mounting plate

For assembly of SQM33... and VKP... proportional controlling element
See Mounting instruction 74 319 0843 0 (M7646)

ASK33.1



Mounting kit

For assembly of SQM33 and VKF41...C butterfly valve
See Mounting instruction 74 319 0916 0 (M7813/7814)

ASK33.4

Technical data

Actuator	Operating voltage	AC / DC 24 V $\pm 20\%$ (load on interface)
	Safety class	2 to EN 60 730 part 1 and parts 2-14
	Power consumption	
	- SQM33.4...	Max. 7.5 W
	- SQM33.5... / SQM33.7...	Max. 10 W
	Perm. on time	50%, max. 3 minutes continuously
	Angular adjustment, usable range	Max. 90°
	Mounting position	Optional
	Load on bearing	Refer to «Type summary»
	Degree of protection	
	- SQM33.41... / SQM33.51...	IP54 to EN 60 529-1
	- SQM33.550A9 / SQM33.750A9	IP40 (at the cable outlet, with no conduit connected) IP54 can be achieved with conduit connected
	 Caution! The bearing of the driven shaft must be protected against direct hazard of water and dust via corresponding mounting. If not, IP54 cannot be ensured over the full life cycle.	
	Direction of rotation	Can be selected on the basic unit
	Nominal output torque	Refer to «Type summary»
	Holding torque (when power applied)	Refer to «Type summary»
	Holding torque (when power not applied)	Refer to «Type summary»
	Reproducibility (typically when new)	$\pm 0.2^\circ$ (when used with the basic units of the LMV2... / LMV3...)
	Nominal resolution encoder supervision	0.7°
	Running times	Can be selected on the basic unit
	Weight	Approx. 1.4 kg
	Direction of rotation (when facing the shaft)	
	- Standard	Counterclockwise
	- Reverse	Clockwise
	0-position of actuator drive shaft	Supply state 0 $\pm 0.6^\circ$
	Conduit connecting thread	
	- SQM33.550A9	NPSM 1/2"-14 Usable depth of thread: Min. 10 mm
	Life cycle	250,000 start cycles (CLOSE $\Rightarrow$ OPEN $\Rightarrow$ 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°

Cable connection

SQM33.41... / SQM33.51... / SQM33.71...

- Connector Duomodule RAST2.5
6-poles
Supplied by Lumberg
Part no. 3521 06 K00

SQM33.55... / SQM33.75...

- Free from halogen
- UL-listed
- Color Black
- Number of conductors 6
- Outside dia. of jacket 5.5...6.5 mm
- Cross-sectional area AWG22 / 0.34 mm² / 7 wires
- Insulation dia. single conductor 1.45...1.6 mm
- Shore hardness of outer jacket Defined by UL (88A)
- Temperature range -20...+70 °C
- Conductor resistance <100 Ω / km
- Insulation resistance >20 MΩ x km
- Operating voltage <50 V
- conductor-conductor
- Test voltage 50 Hz effective / 1 min
- conductor-conductor >300 V
- Test voltage >3.75 kV to DIN EN 60730, chapter 13
- conductor-outer jacket
- Degree of protection IP40 at cable exit without connected conduit
- Connector With screw terminal RAST3.5
6-poles
Supplied by PTR
Part no. AK 1550

as well as

Duomodul plug connector RAST2.5
6-pole
Supplier Lumberg
Order number: 3521 06 K00

Environmental conditions

Storage	DIN EN 60 721-3-1
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-20...+70 °C
Humidity	<95% r.h.
Transport	DIN EN 60 721-3-2
Climatic conditions	Class 2K3
Mechanical conditions	Class 2M2
Temperature range	-20...+70 °C
Humidity	<95% r.h.
Operation	DIN EN 60 721-3-3
Climatic conditions	Class 3K5
Mechanical conditions	Class 3M4
Temperature range	-20...+60 °C
Humidity	<95% r.h.



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

Function

The SQM33... actuators are of robust design and have a gear train with only little backlash.

Control and position feedback take place via a common cable.

The same cable is used for powering the actuator.

The actuators are driven by stepper motors and can be positioned with a resolution of 0.1°.

The characteristics and settings (running time, direction of rotation, end positions) of the SQM33... are determined by the controlling basic unit (e.g. LMV27...; for details, refer to the Basic Documentation of the LMV27...).

The running times of the controlling elements are varied by the basic unit depending on the burner's control phase (e.g. startup phase: short running time; operation: long running time).



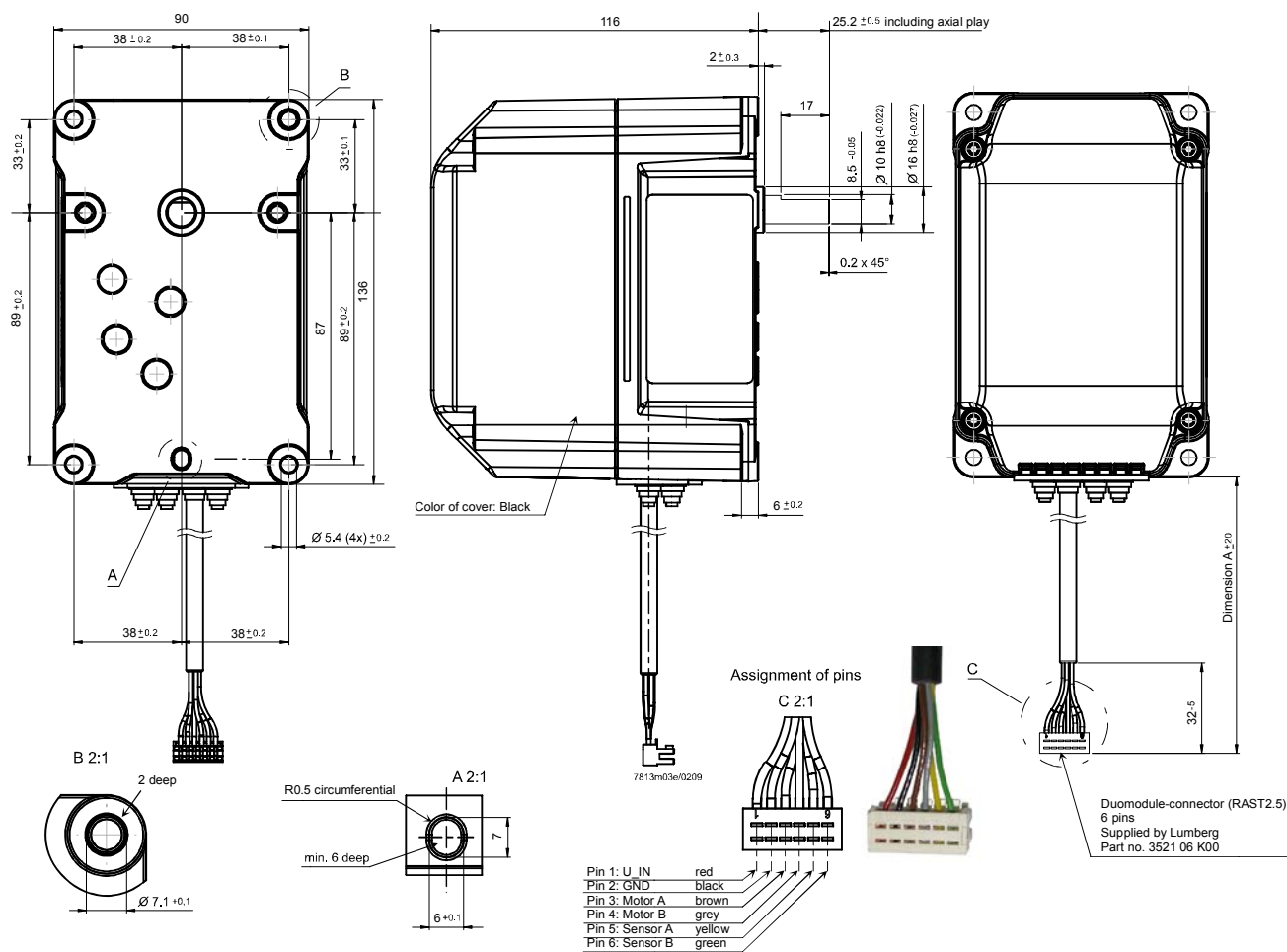
Application note!

Single-sided load torque is recommended due to the type of gear train for the SQM33.6 / SQM33.7 actuators. In the event of load on both sides, a backlash of $\pm 0.3^\circ$ must also be considered in addition to plant design or setting.

Dimensions

Dimensions in mm

SQM33.41... / SQM33.51... / SQM33.71...

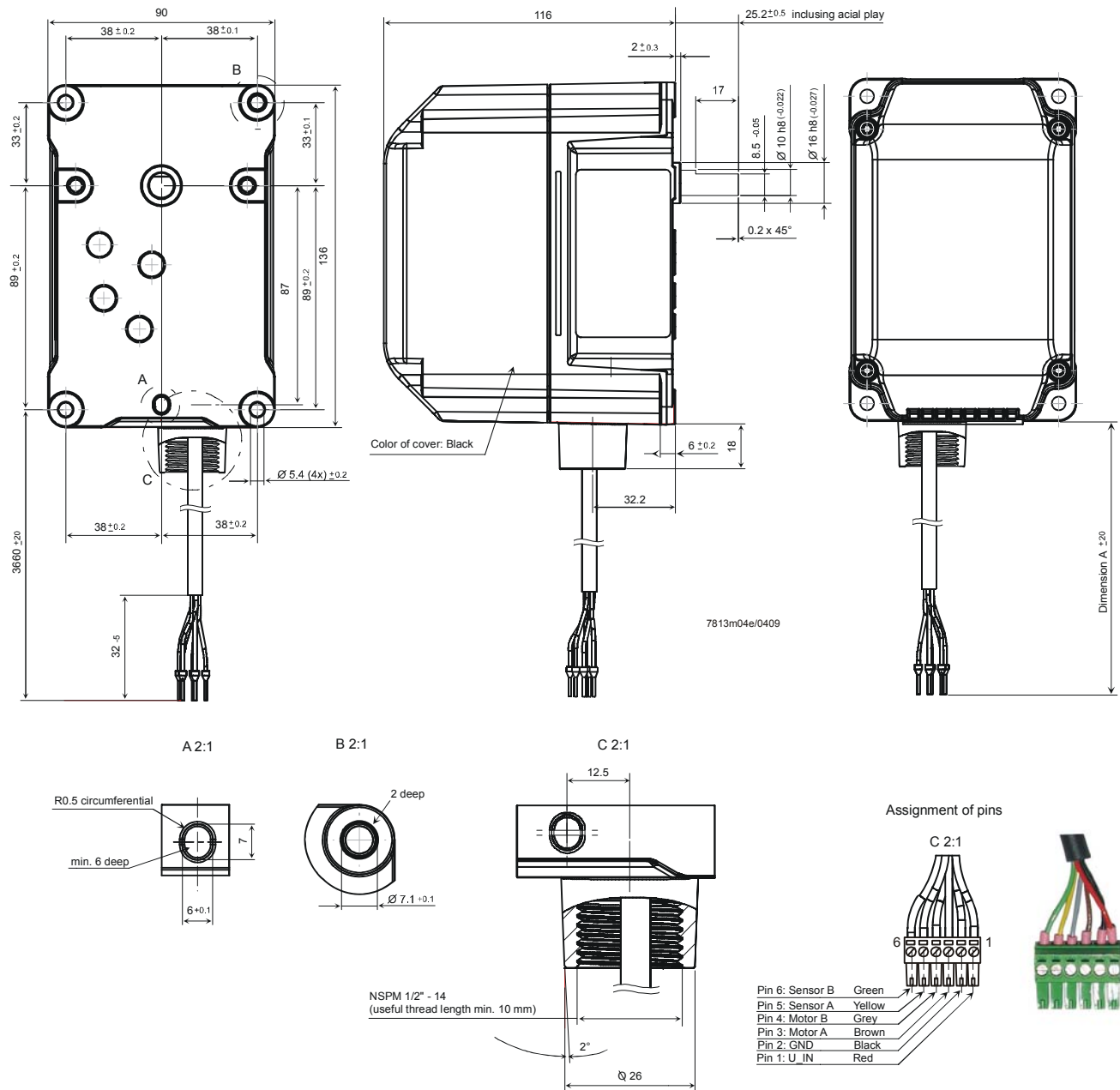


Product No.	Dimension A
SQM33.410A9	1500
SQM33.411A9	3000
SQM33.510A9	1500
SQM33.511A9	3000
SQM33.711A9	3000

Dimensions (cont'd)

Dimensions in mm

SQM33.550A9 / SQM33.750A9



Note!

The connector assignment with the RAST2.5 connector is the same as with the RAST3.5 connector.

Product No.	Dimension A
SQM33.550A9	3600
SQM33.750A9	3600