SIEMENS



7802

# Actuators SQN72...

**Electromotoric actuators for air dampers and control valves of oil or gas burners of small to medium capacity.**

**The SQN72... and this Data Sheet are intended for use by OEMs which integrate the actuators in their products!**

## Use / 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 the combustion air volume:

- In connection with P-PI or PID controllers, such as the RWF40..., RWF5...
- Directly via the different types of burner controls, such as LOA..., LMO..., LME..., or LFL...
- In connection with 1- or 2-wire control or 3-position controllers

- Features:
  - Impact-proof and heat-resistant plastic housings
  - Plug terminals for the electrical connections
  - Maintenance-free gear train (can be disengaged)
  - Internal position indication
  - Easy-to-adjust end and auxiliary switches for setting the switching points
  - Integrated electronic circuits
  - Degree of protection IP54
- Holding torque: 0.7...1.3 Nm
- Running time: 4...30 s
- Direction of rotation: counterclockwise

## Warning notes

**To avoid injury to persons, damage to property or the environment, the following warning notes must 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.

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.

## Standards and certificates

**Applied directives:**

- Low-voltage directive 2014/35/EC
- Electromagnetic compatibility EMC (immunity) 2014/30/EC

Compliance with the regulations of the applied directives is verified by the adherence to the following standards / regulations:

- Automatic electrical controls for household and similar use Part 1: General requirements DIN EN 60730-1
- Automatic electrical controls for household and similar use Part 2-14: Particular requirements for electric actuators DIN EN 60730-2-14

**The relevant valid edition of the standards can be found in the declaration of conformity!**

EAC Conformity mark (Eurasian Conformity mark)

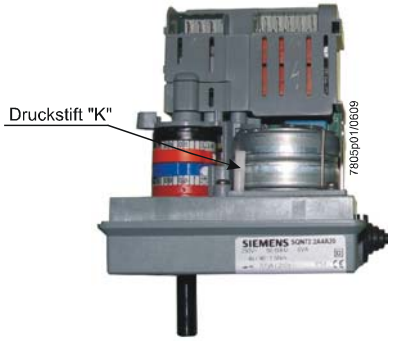
ISO 9001:2008
ISO 14001:2004
OHSAS 18001:2007

## Disposal notes

The actuators contain 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 | - Made of impact-proof and heat-resistant plastic<br>- The housing accommodates:<br>– The reversible synchronous motor with gear train, which can be **disengaged**<br>– The camshaft of the control section<br>– The relays, depending on the type of actuator<br>– The switches, connected to the terminals via the printed circuit board<br><br>Color: Gear train housing dark-grey, cover light-grey |
| Drive motor | - Reversible and locking-proof synchronous motor |
| Coupling | - Drive shaft can be manually disengaged from the gear train and motor (by pressing pin «K»)<br>- Automatic reengagement |




| | |
|---|---|
| Adjustment of switching points | - Via adjustable cams<br>- Scales beside the cams indicate the angle of the switching point<br>- Assignment of cams to the end and auxiliary switches is color-coded (refer to «Connection diagrams»)<br>- Some of the cams feature fine adjustment; they can be adjusted with a standard screwdriver<br>- The other cams can be adjusted manually or with the enclosed hook-spanner or 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<br>- Ready fitted to the front of the gear train<br>- As different actuator versions available |
| Mounting and fixing | - Front of the gear train is used as the mounting surface<br>- Actuator is secured via through-holes |

## Versions for fitting potentiometer

| | |
|---|---|
| Fitting a potentiometer | Certain types of actuators are supplied ready prepared for fitting a potentiometer.<br>They are prepared for housing the potentiometer. Accessories are not required.<br>The required type of potentiometer is to be ordered as a separate item (refer to «Ordering»).<br>A detailed Mounting Instruction M7921 (4 319 9604 0) is included in delivery of ASZ... |

## **Type summary** (other types on request)

| Diagram No. | Drive shaft [1] No. | Running time [2] for 90° s | Nominal torque [4] (max.) Nm | Holding torque Nm | AS [5] Pcs. | Relay Pcs. | Pot. [7] | Length of housing [1] mm | Types for mains voltage / mains frequency AC 120 V [3] +10 % -15 % 50...60 Hz | AC 230 V [3] +10 % -15 % 50...60 Hz |
|---|---|---|---|---|---|---|---|---|---|---|
| **Actuators SQN70… / counterclockwise rotation** [6] | | | | | | | | | | |
| A | 0 | 4 | 1.5 | 0.7 | 2 | 2 | x | 117 | **---** | **SQN72.2A4A20** |
| A | 0 | 12 | 2.5 | 1.2 | 2 | 2 | x | 117 | **---** | **SQN72.4A4A20** |
| B | 0 | 4 | 1.5 | 0.7 | 2 | 3 | --- | 117 | **---** | **SQN72.2B4A20** [8] |
| C | 0 | 4 | 1.5 | 0.7 | 2 | --- | x | 117 | **---** | **SQN72.2C4A20** |
| C | 1 | 4 | 1.5 | 0.7 | 2 | --- | x | 117 | **---** | **SQN72.2C4A21** [8] |
| C | 0 | 30 | 2.5 | 1.3 | 2 | --- | x | 117 | **---** | **SQN72.6C4A20** |
| C | 1 | 30 | 2.5 | 1.3 | 2 | --- | x | 117 | **SQN72.6C4A11** | **SQN72.6C4A21** |

Legend

1) Refer to «Dimensions»
2) Valid for 50 Hz; at 60 Hz, running times are about 20 % shorter
3) But in the case of undervoltage, torque is reduced by about 20 %
4) Under nominal conditions; under extreme conditions (e.g. +60 °C, AC 230 V –15 %) approx. –25 %
5) Auxiliary switches (in addition to the 2 end switches)
6) When facing the drive shaft and when control voltage is supplied to end switch I
7) Suited for direct fitting of potentiometer (refer to «Fitting a potentiometer»)
8) On request

## **Ordering**

**Actuator** refer to «Type reference»

**Potentiometer ASZ…** refer to Data Sheet N7921
refer to Mounting Instructions M7921 (4 319 9604 0)

## Technical data

| | | |
|---|---|---|
| **Actuator** | Mains voltage | AC 230 V –15 % +10 % |
| | Mains frequency | 50...60 Hz ± 6 % |
| | Drive motor | Synchronous motor |
| | Power consumption | 6 VA |
| | Angular adjustment | Max. 160°, scale range 0...130° |
| | Mounting position | Optional |
| | Degree of protection | IP54 to DIN 40050, when using the cable entry gland provided plus plastic washers for the fixing screws **M** as shown under *Dimensions.* |
| |  **Caution!**<br>**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.** | |
| | Safety class | II to DIN EN 60730 |
| | Cable entry | Rubber grommet for single cable with a max. jacket dia. of 11 mm.<br>The hole in the grommet must be adequately matched to the dia. of the jacket.<br>To ensure that the grommet will be tight, the cable must be correctly laid in this area (no bends); the grommet is provided |
| | Cable strain relief | Cable strain relief with 2 fixing screws is provided |
| | Cable connections | 2 plug-in spaces with connection terminals type CUM, made by Stelvio for the following types of connectors:<br>- CUF 5-4 (plug-in space X1)<br>- CUF 5-5 (plug-in space X2)<br><br>Recommended cross-sectional area of stranded wire: min. 0.5 mm² , max. 1.5 mm² |
| | Ferrules | Adapted to cross-sectional area of stranded wire |
| | Direction of rotation | Refer to «Type summary» |
| | Nominal and holding torque | Refer to «Type summary» |
| | Running times | Refer to «Type summary» |
| | Lifecycle | Cycles (CLOSE ⇨ OPEN ⇨ CLOSE) with rated torque: typically 250.000 |
| | 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 «Connection diagrams»)<br>switches with fine adjustment: II and III |
| Breaking voltage | AC 24...250 V |
| Adjustment of cams | |
| - Without fine adjustment | 1° |
| - With fine adjustment | Infinitely |
| Max. perm. amperage at cos φ = 0.9<br>(values in parentheses: short-time peaks for max. 0.5 s) | |
| • Diagram **A** | |
| – Terminals 1, 2, 3, 8 | 0.5 A |
| – Terminal 4, 5 | 2 A (14 A) |
| – Terminal 6, 7 | 1 A (7 A) |
| • Diagram **B** | |
| – Terminals 1, 3, 8 | 0.5 A |
| – Terminal 4, 5 | 3 A (14 A) |
| – Terminal 6, 7 | 1 A (7 A) |
| • Diagram **C** | |
| – Terminals 1, 2, 3, 4, 5 | 0.5 A |
| – Terminal 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. |

**Caution!**
**Condensation and formation of ice are not permitted!**

## Function

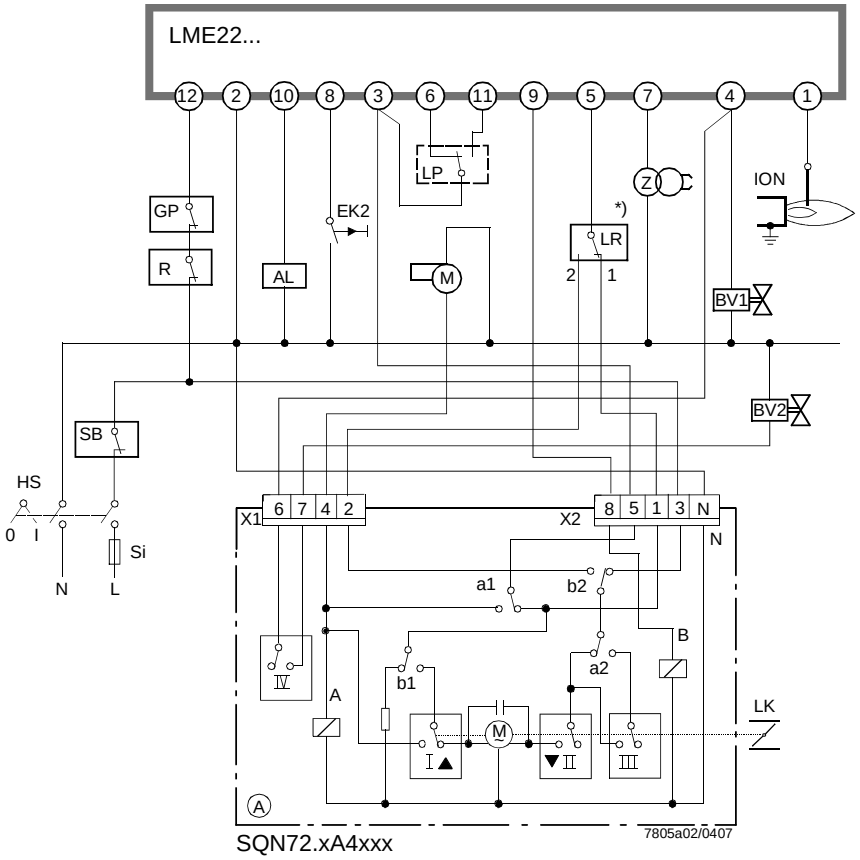
A synchronous motor drives a driveshaft with attached camshaft via a gear train. The camshaft actuates the end and the auxiliary switches. Using the associated cam, the switching position of each end and auxiliary switch can be adjusted within the working range. Some of the actuator versions are equipped with electronic modules, which perform auxiliary functions in connection with the end and auxiliary switches and external devices, such as controllers (refer to «Connection diagrams»).

## **Connection diagrams** (examples)

**Caution!**
**All following connection diagrams show the start position as supplied:**
**- End switch position II «Closed»**
**- Dead**

**No. A → LME22...**

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



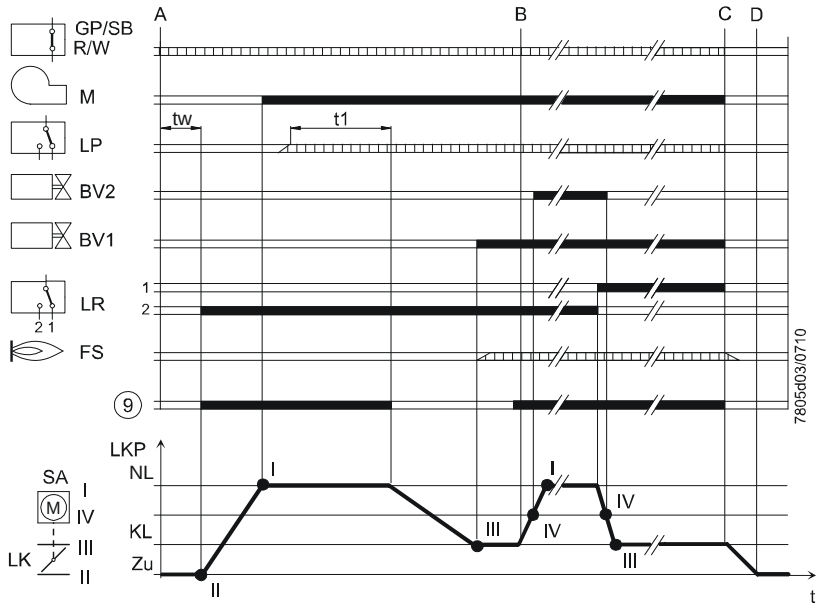

SQN72.xA4xxx

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

X1 Plug-in space, 4-pole

X2 Plug-in space, 5-pole

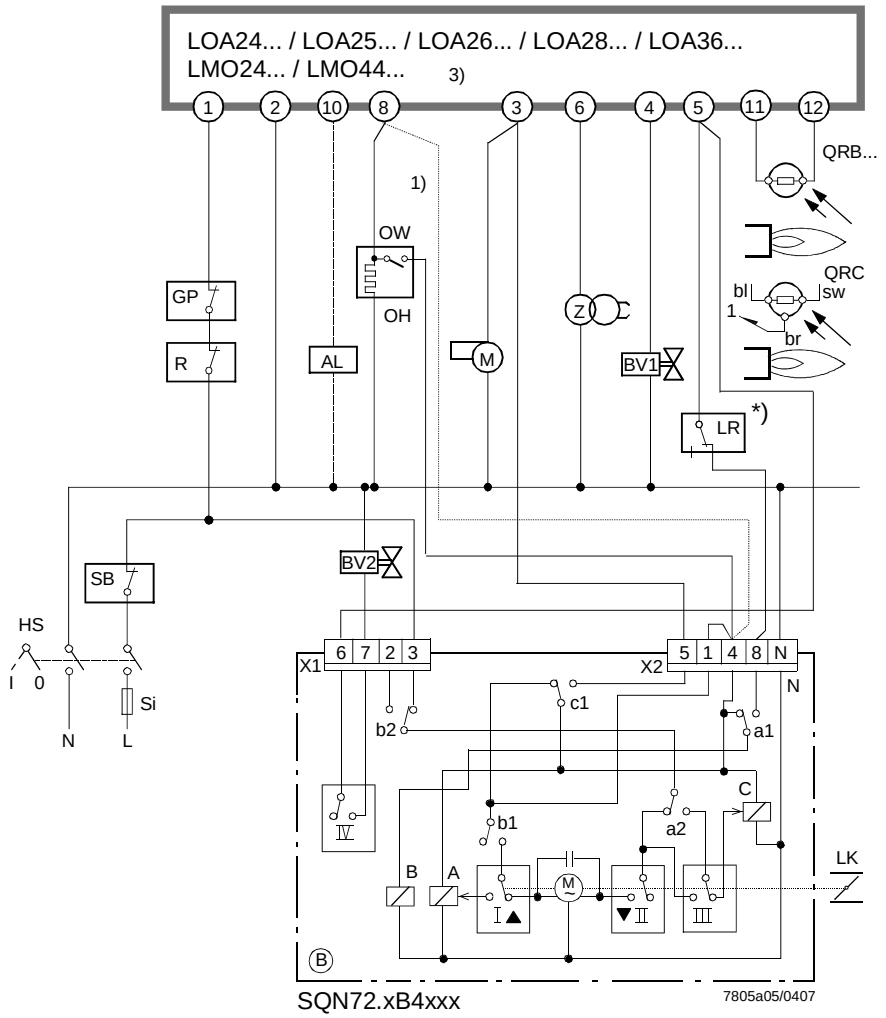
I Red
II Blue
III Orange
IV Black




Sequence diagram shows 2-stage operation

## No. B → LOA24... / LOA25... / LOA26... / LOA28... / LOA36... / LMO24... / LMO44...

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




1) Without oil preheater

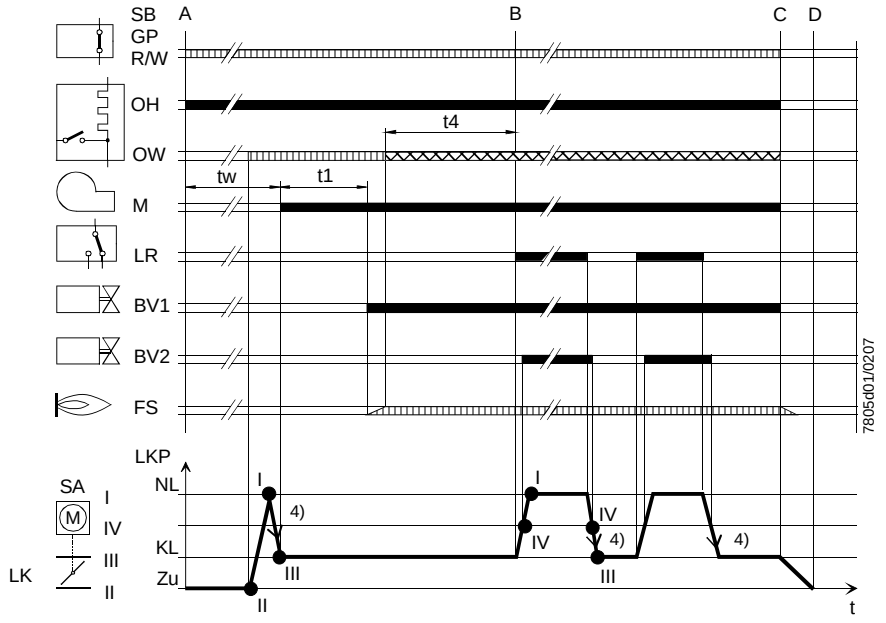
2) With oil preheater:
If oil preheater contact opens during operation, a new start will be made

*) Thermostat or similar unit with n.o. contact (1-wire control)

X1 Plug-in space, 4-pole

X2 Plug-in space, 5-pole

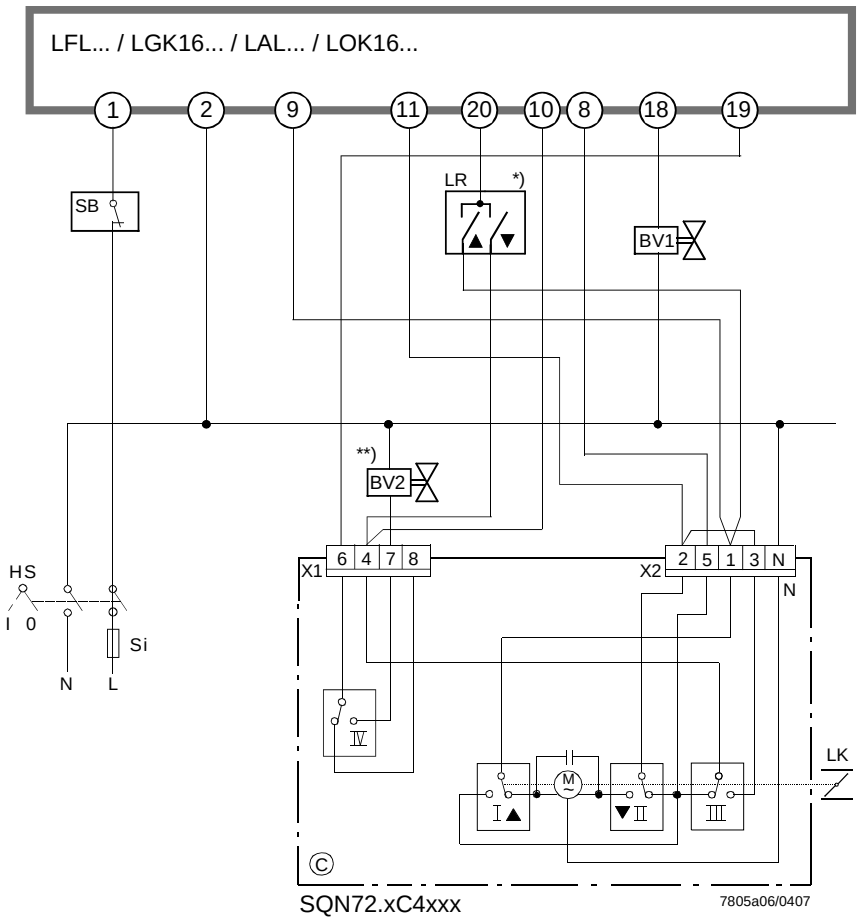
I Red
II Blue
III Orange
IV Black




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

## No. C → LFL... / LGK16... / LAL... / LOK16...

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



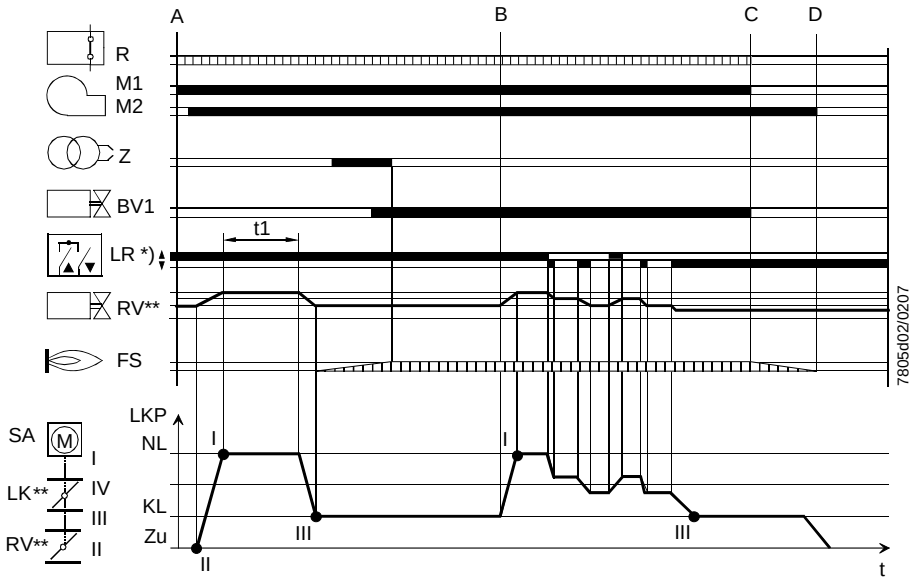

*) Thermostat or similar unit with changeover contact or 3-position controller for «on / off» positioning pulses and neutral position

**) In the case of modulating operation, fuel valve 2 (BV2) is replaced by a gas control valve «RV»

X1 Plug-in space, 4-pole

X2 Plug-in space, 5-pole

I
II Red
III Blue
IV Orange
Black




Program sequence diagram shows modulating operation

## Legend

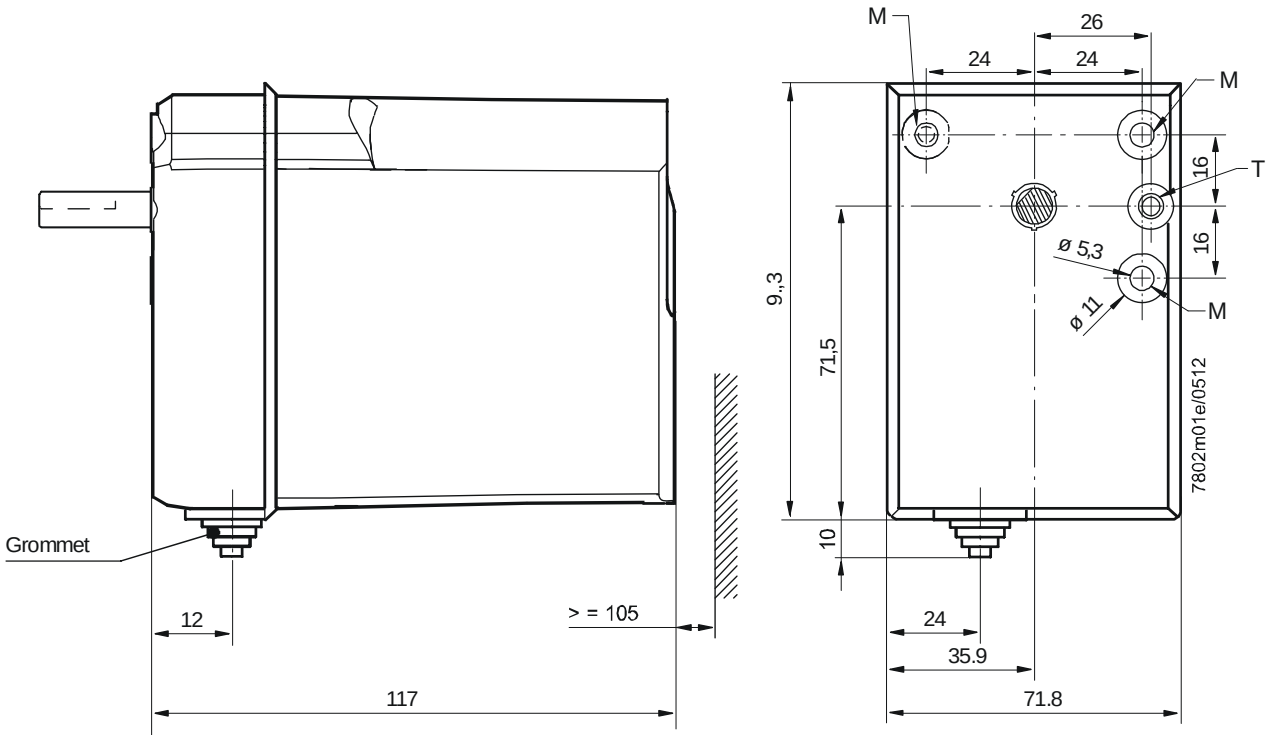
| | |
|---|---|
| No. A | Number of internal diagram (second position after the dot in the type reference) |
| I / II | End switches |
| III / IV / V | Auxiliary switches |
| AL | Remote indication of lockout (alarm) |
| BV1 | Fuel valve stage 1 |
| BV2 | Fuel valve stage 2 |
| BV3 | Fuel valve stage 3 |
| EK2 | External remote reset button |
| ION | Ionization probe |
| FS | Flame signal |
| 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 |
| Ⓜ | Actuator's synchronous motor |
| M1 | Without postpurge |
| M2 | With postpurge |
| N | Neutral conductor |
| NL | Nominal load |
| OH | Oil preheater |
| OW | Oil preheater's release contact |
| QRB... | Photoresistive flame detector |
| R | Temperature or pressure controller |
| | Relay |
| RV | 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 | Postpurge time |
| D | End of program, burner control ready for new start |
| | Control signals delivered by burner control |
| | Required input signals |
| | Permissible input signals |

## Dimensions

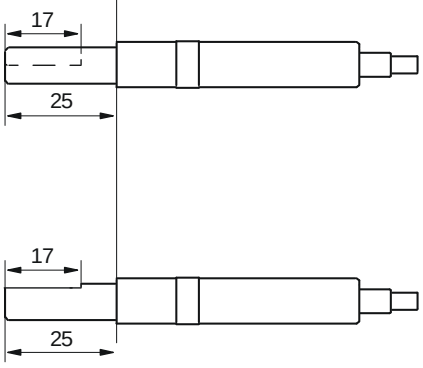
Dimensions in mm

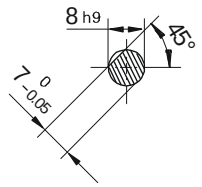



Drive shaft version
Side view

Drive shaft version
Cross section

Drive shaft number
(see type summary)

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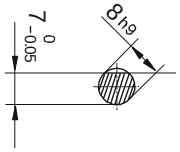


1

All drive shafts shown in end switch position II «Closed» as supplied.

| | |
|---|---|
| M | Through-hole 5.3 mm dia. |
| T | Knockout hole 5.3 mm dia. |