# Solenoid actuator

Series MG004m, MG008m, MG005A7m, MG008A8m

With ⟨Ex⟩ protection for use for intended purpose
in Ex-Zone 1 in accordance with 2014/34/EU (ATEX) CE

UNI geräte
elektrotechnische fabrik gmbh

## Operating instructions

*(translation of the original)*

### Basics

Valve / solenoid actuator combinations are delivered fully assembled and tested as standard. When solenoid actuators are replaced or exchanged, it must be ensured that combination with a UNI fitting is approved and that the magnet is properly attached to the fitting (e.g. with the permissible tightening torque). The device-specific serial number and the year of manufacture can be found on the nameplate for clear identification.
Solenoid actuators are electrotechnical components which cannot be operated without an associated fitting, and may not be operated on their own! Always use solenoid actuators with IP65 with a rain protection cover for outdoor installations. Solenoid actuators which are obviously damaged must not be installed or must be replaced. If the solenoid actuators are exposed to certain kinds of external stress, additional protective measures are required and must be provided by the operator. Any modifications to the device which are undefined or have not been agreed can have a negative influence on the explosion protection, and may even be omitted completely in the worst case. UNI Geräte does not accept liability for damage (to the device / beyond) caused by modification(s) to the device. The same applies to warranty claims.

### Explosion protection

The solenoid actuators and the integrated solenoid valve controllers comply with explosion protection types "mb" and "eb" in device category II2G. They can be used in areas in which explosive mixtures of air and combustible gas, vapour or aerosol may occur, i.e. in Ex-zone 1. The electrical and thermal parameters of the individual variants can be obtained from the respective type plates. The explosion protection relates to the operation of the device. The relevant explosion protection regulations must be observed during installation, maintenance or repair, particularly EN 60079-14 (VDE 0165-1). The electrical installation must be carried out by a qualified electrician or under the supervision thereof, taking the relevant national regulations into consideration (VDE 0100 in Germany). Prior to installation, the device specifications must be compared with the intended operating conditions in order to ensure that proper operation takes place.

### Description of the device

The solenoid actuator (pot magnet) is used as a drive unit for valves. The actuator consists of a magnetic housing (pipe, base, magnetic plate and cover), a coil and electronics if necessary. Depending on the version, the solenoid actuator can be operated with direct or alternating voltage. A rectifier is built into the AC voltage version. The different types of coil therefore always have direct current flowing through them when they are live. The MG004m and MG008m solenoid actuators have a conventional coil with one winding and resulting average sustained pickup forces with average current consumption during continuous operation. The MG005A7m and MG008A8m solenoid actuators, on the other hand, have two windings on their coil body, a pull-in winding and a hold-in winding. The installed TS200 valve controller switches from the pull-in winding to the hold-in winding or from higher to lower power after a defined time. In this way, very high pull-in forces can be achieved for short periods with low power consumption in continuous (hold-in) operation at the same time.

# Solenoid actuator

Series MG004m, MG008m, MG005A7m, MG008A8m

With Ⓔx protection for use for intended purpose
in Ex-Zone 1 in accordance with 2014/34/EU (ATEX) CE

## Special Conditions

- Only a heat-resistant connecting cable with an upper operating temperature of at least 100 °C may be used to connect the solenoid actuator.
- The solenoid actuators must be protected against the dangerous effects of short circuits, earth faults and overloading. A line-side fuse that is appropriate for the rated current (max. $3xI_B$ acc. to IEC 60127-1) must be selected. A line-side motor circuit breaker - with overload and short-circuit tripping - must be adjusted for the rated current. If the magnet has very low rated currents, fusing with the lowest current value in keeping with the stated IEC standard is sufficient. Protective devices must be of the kind that prevent automatic reactivation under fault conditions. The rated voltage of the fuse must be equal to or greater than the specified nominal voltage of the solenoid actuator. The breaking capacity of the fuse link must match or exceed the maximum short-circuit current that is expected at the installation location (usually 1500 A).
- If a silicone (or silicone-containing) connecting cable or a cable that is not scratch-resistant is being used, it must be protected against mechanical damage (e.g. an interrupted tube system with edge protection).
- A maximum permissible ripple of 20% applies to all solenoid actuators with the direct current design.

## Notes for installation and safe operation

- With respect to painting, please note that the total thickness of the coating must not exceed the tolerance of 0.2 mm (200 µm) from EN IEC 60079-0:2018 Table 9.
- The solenoid actuator must not be subjected to any charge-generating processes (presence of accelerated particles on the surface, e.g. electronics in high-voltage electrodes, flowing powder particles or liquids).

## Electrical connection

- A certified Ex-cable gland with ignition protection class “eb” and EPL Gb must be used for connecting. It must be approved for a minimum operation temperature of -20 °C (or below) and maximum operation temperature of 95 °C (or above). The cable gland must match the diameter of the used connecting cable, ensuring the protection class IP 65. For installation, it must be equipped with a thread of size M20 x 1.5 and a length of 6...12 mm.
- When flexible connecting cables are used, wire end sleeves in accordance with DIN 46228 must be used. Crimped cable shoes in accordance with DIN 46237 are recommended for the protective conductor connections.
- The supply voltage at the solenoid actuator must be within the range of –15% to + 10% of the nominal voltage. Connection takes place in accordance with the wiring diagram in these operating instructions.
- To guarantee an IP65 degree of protection, the cover of the magnet housing must be refitted carefully. Versions which are delivered with a connecting cable from the factory are ready for use, i.e. the terminal compartment does not need to be opened.
- A line-side motor circuit breaker - with overload and short-circuit tripping - must be set to the rated current of the solenoid actuator. With solenoid actuators with pull-in/hold-in control (MG005A7m and MG008A8m), the higher value (pull-in current) must be taken into consideration. Based on its characteristic curve, the motor protection switch must be set so that it trips after 20 s with a pull-in current.
- The length and cable cross-section of the connecting cable should be dimensioned so that a maximum voltage drop of 4% (in accordance with VDE 0100-520) is not exceeded. The "recommended maximum cable length" tables for the respective actuator types can be used for the calculation.

## CE markings

The Council of the European Union has issued common directives for the free movement of goods within the Union, which specify minimum requirements for health and safety protection. The CE mark confirms that products are compliant with the EU directives, i.e. compliant with the relevant standards, particularly the harmonized ones.

Note concerning directive 2014/34/EU (Explosion protection directive / ATEX directive):
The solenoid actuators fulfil the relevant requirements of Directive 2014/34/EU. Therefore, they bear the CE mark according to Annex II of the directive. The declaration of conformity is enclosed.

Note concerning directive 2014/30/EU (EMC directive):
The solenoid actuators fulfil the requirements of the product family standards to be used in the industrial sector and also in the residential, business and commercial sectors as well as in small businesses. When AC and DC versions are being used, the user must provide a suitable line filter (e.g. X-capacitor 47 nF) at the power supply input in order to attenuate the physically-related cable-bound switch-off interference of the solenoid. Solenoid actuators as drive elements for valves do not represent independently operating devices in the sense of the EMC directive, and are only subjected to further processing or installed into a machine by specialist companies. Starting up is not allowed until it has been established that the entire machine or system complies with the provisions of the EMC directive.

## Operation

100% duty cycles are also permitted at the most unfavourable specified ambient temperatures.

**WARNING!**
**Risk of injury from hot surfaces!**

- Do not touch the solenoid actuator during operation without suitable personal protection equipment.

During operation it must be ensured that the maximum surface temperature in accordance with the existing temperature class is adhered to (130 °C with solenoid actuators MG004m and MG008m; 95 °C with MG005A7m and MG008A8m). This is guaranteed if neither the maximum permissible ambient and medium temperature nor the maximum permissible supply voltage level are exceeded. The solenoid actuator must be protected from inadmissible heating if necessary. All solenoid actuators are wired with a protective measure to reduce the induction voltage. To avoid potentially damaging residual induction voltage, the user must take suitable measures that go beyond the built-in protective measures if necessary.

## Disassembly of the solenoid actuator

The solenoid actuator must be taken out of operation before dismantling.

**WARNING!**
**Risk of injury from hot surfaces!**

- The solenoid actuator may only be touched if suitable personal protective equipment is being worn.
- Prior to dismantling, allow the solenoid actuator to cool off.

**WARNING!**
**Danger of electric shock!**

- De-energize the solenoid actuator prior to opening the housing.
- Observe the electrical safety rules.
- The device may only be connected by a qualified electrician.

Undo hexagon bolt (900) and remove with washer (906). Remove the magnet housing cover (105) from the solenoid actuator. Disconnect the electrical cables from the terminals (706, 717) and remove from the actuator. Undo and remove the connecting bolt (501/2). Remove the connecting plate (500/2) Undo and remove the connecting bolt (501/1). The actuator can then be removed from the valve.

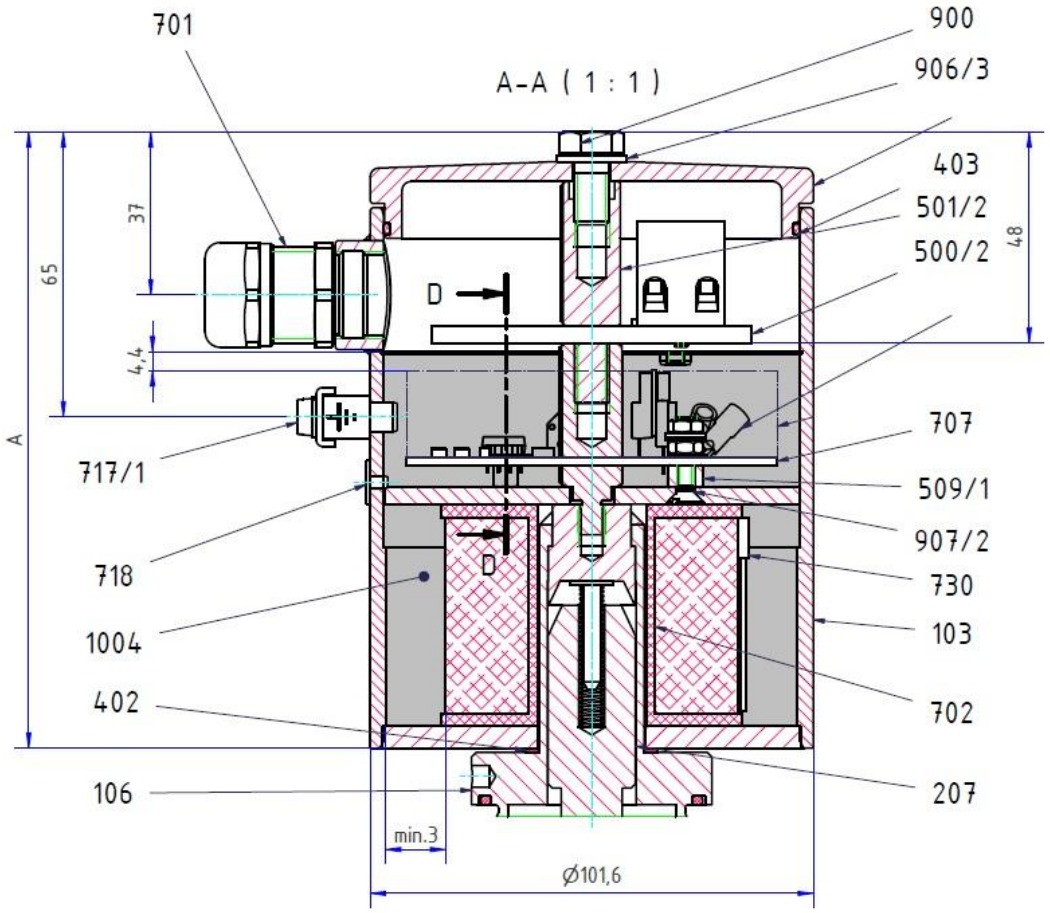
## Assembly of the solenoid actuator

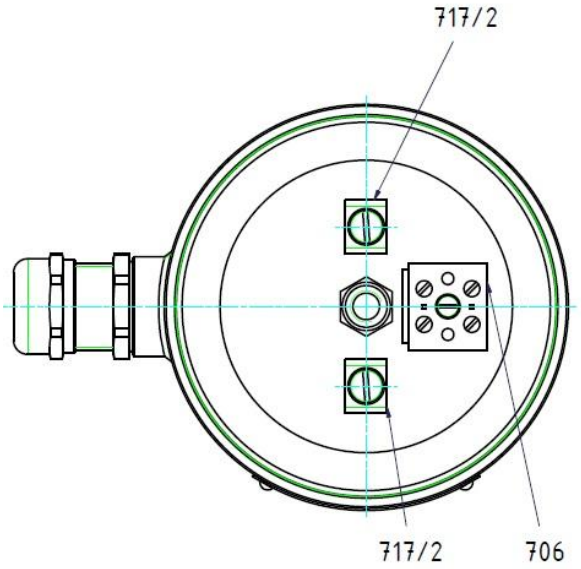
Assembly takes place in reverse order as the dismantling.

## Tightening torques of the connecting bolts (501) and the hexagon bolt (900)

| Position | Number | Connection | Thread | Tightening torque |
|---|---|---|---|---|
| 501/1 | 1 | Magnetic plate (500/1) / upper part of valve housing (106) | M6 | 4.6 Nm |
| | | | M8 | 11 Nm |
| 501/2 | 1 | Connecting plate (500/2) / Connecting bolt (lower) (501/1) | M8 | 11 Nm |
| 900 | 1 | Magnetic housing cover (105) / Connecting bolt (upper) (501/2) | M8 | 11 Nm |

## Solenoid actuator MG...m, MG...A.m



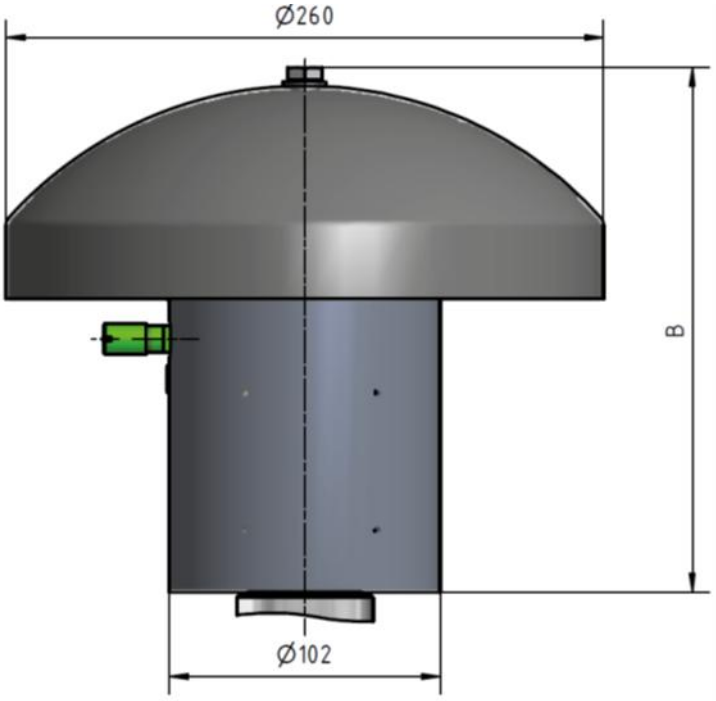
# Solenoid actuator

Series MG004m, MG008m, MG005A7m, MG008A8m

With ⟨Ex⟩ protection for use for intended purpose
in Ex-Zone 1 in accordance with 2014/34/EU (ATEX) CE

| Item | Unit | Designation | Item | Unit | Designation |
|---|---|---|---|---|---|
| 103 | 1 | Magnet housing | 701 | 1 | Cable gland |
| 105 | 1 | Magnet housing cover | 702 | 1 | Solenoid coil |
| 106 | Valve housing upper part* | | 706 | 1 | Connecting terminal |
| 402 | 1 | Gasket | 717/1 | 1 | Earthing terminal (external) |
| 403 | 1 | O-ring | 717/2 | 2 | Earthing terminal (inner) |
| 500/1 | 1 | Magnetic plate | 718 | 1 | Earthing symbol |
| 500/2 | 1 | Connecting plate | 900 | 1 | Hex bolt |
| 501/1 | 1 | Connecting bolt (lower) | 906 | | Washer |
| 501/2 | 1 | Connecting bolt (upper) | | | |

* Not a constituent of the solenoid actuator




| Type | Height [mm] | |
|---|---|---|
| | A | B (with rain protection hood, size 3) |
| MG004m | 141 | 187 |
| MG008m | 160 | 206 |
| MG005A7m | 141 | 187 |
| MG008A8m | 160 | 206 |

## Technical data

| | | |
|---|---|---|
| Ex marking: | | ⟨Ex⟩ II 2 G Ex eb mb IIC T4/T5 Gb |
| | | or ⟨Ex⟩ II 2 G Ex eb mb IIB T4/T5 Gb |
| Protection type: | | IP65 |
| Max. housing temperature: | | 130 °C (T4); 95 °C (T5) |
| Ambient temperature: | | -20 to +60 °C |
| Media temperature: | top part of the valve housing | |
| | with media contact | -20 to +60 °C |
| | without media contact | no influence |
| Duty cycle: | | 100% |
| Mains frequency for AC version: | | 40 to 60 Hz |

UNI-Geräte E. Mangelmann Elektrotechnische Fabrik GmbH
Holtumsweg 13, 47652 Weeze, Germany, Tel. +49 2837/9134-0, Fax +49 2837/1444
www.uni-geraete.de info@uni-geraete.de

# Solenoid actuator

Series MG004m, MG008m, MG005A7m, MG008A8m

With Ex protection for use for intended purpose
in Ex-Zone 1 in accordance with 2014/34/EU (ATEX) CE

## Solenoid actuator MG...m

| Type | Rated power | Rated current A | | |
|---|---|---|---|---|
| MG | W | 24 V DC | 110 V AC | 230 V AC |
| 004m | 10 | 0.58 | 0.22 | 0.11 |
| 008m | 30 | 2.00 | 0.45 | 0.22 |

**Switching frequency:** 1000 switching operations / hour
**Temperature class:** T4

## Recommended maximum cable length

Cable length for a maximum voltage drop of 4% in accordance with VDE 0100-520
(See sample calculations on page 8)

| Type | P | Length factor* m/mm² | | |
|---|---|---|---|---|
| MG | W | 24 V DC | 110 V AC | 230 V AC |
| 004m | 10 | 39 | 468 | 1956 |
| 008m | 30 | 11 | 229 | 978 |

* Cable length = length factor x cable cross-section

UNI-Geräte E. Mangelmann Elektrotechnische Fabrik GmbH
Holtumsweg 13, 47652 Weeze, Germany, Tel. +49 2837/9134-0, Fax +49 2837/1444
www.uni-geraete.de info@uni-geraete.de

# Solenoid actuator

Series MG004m, MG008m, MG005A7m, MG008A8m

With Ⓔx protection for use for intended purpose
in Ex-Zone 1 in accordance with 2014/34/EU (ATEX) CE

## Solenoid actuator MG...A.m

| Type | Rated power | Rated current A | | |
|---|---|---|---|---|
| MG | W | 24 V DC | 110 V AC | 230 V AC |
| 005A7m | 30/3 | 1.65 | 0.40 | 0.20 |
| 008A8m | 50/5 | 2.80 | 0.70 | 0.35 |

**Switching frequency:** 600 switching operations / hour
**Changeover time:** 1.5 seconds
**Temperature class:** T5

## Recommended maximum cable length

Cable length for a maximum voltage drop of 4% in accordance with VDE 0100-520
(See calculation examples)

| Type | P | Length factor* m/mm² | | |
|---|---|---|---|---|
| MG | W | 24 V DC | 110 V AC | 230 V AC |
| 005A7m | 30/3 | 14 | 257 | 1076 |
| 008A8m | 50/5 | 8 | 147 | 615 |

* Cable length = length factor x cable cross-section

## Sample calculations for the maximum cable length and the required cable cross-section

The maximum cable length results from multiplying the length factor with the selected cable cross-section.

Example: Type: MG008m 230 VAC
Length factor table value: 978 m/mm²
Selected cable cross-section: 1.5 mm²
→ Maximum cable length = 978 m/mm² x 1.5 mm² = 1467 m

Alternatively, the required cable cross-section can be determined by dividing the specified cable length by the length factor:

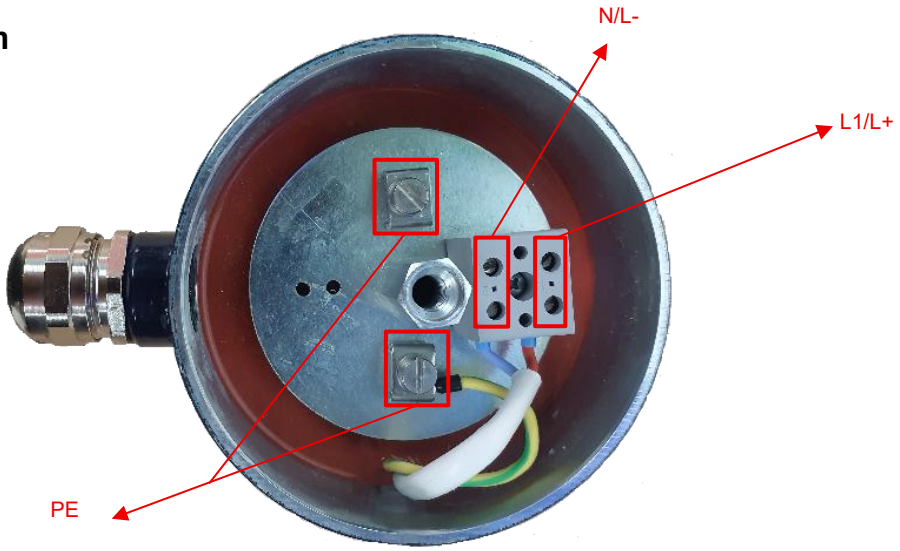
Example: Type: MG005A7m 110 VDC
Length factor table value: 257 m/mm²
Specified cable length: 200 m
→ Required cable cross-section = 200 m / 257 m/mm² = 0.78 mm²
→ Selected cable cross-section: 1.0 mm²

# Solenoid actuator

Series MG004m, MG008m, MG005A7m, MG008A8m

With Ⓔx protection for use for intended purpose
in Ex-Zone 1 in accordance with 2014/34/EU (ATEX) CE

## Wiring diagram




## Protective conductor connection

The solenoid actuator must always be integrated into the equipotential bonding. A connection option is available for this purpose in the terminal compartment (717/2). Pursuant to EN IEC 60079-0, together with the internal protective conductor terminal, an additional external earthing terminal must be provided.

**NOTE!**
The solenoid actuator must be **additionally** earthed via the external earthing connection (717/1).

## Connection cross-section

| | |
|---|---|
| Terminals L/L+ / N/L-: | 0.2…4 mm² |
| Earthing connections PE: | 1.5…4 mm² (6 mm² with forked cable shoe) |

**NOTE!**
The connection cross-section of the earthing connections must **at least** correspond to that of terminals L/L+ / N/L-.

**NOTE!**
The clamping bracket of the earthing terminal must have conductors placed beneath it at both sides, e.g. by using a cable shoe.

UNI-Geräte E. Mangelmann Elektrotechnische Fabrik GmbH
Holtumsweg 13, 47652 Weeze, Germany, Tel. +49 2837/9134-0, Fax +49 2837/1444
www.uni-geraete.de info@uni-geraete.de