

SCHIENLE

MAGNETTECHNIK

Operating instructions

Single solenoid, explosion-proof version

Types :

| | |
|--|-----------|
| 01 EX02 037A x024 up to x205 (23 Watt) | version A |
| 01 EX02 037B x024 up to x205 (28 Watt) | version B |
| 01 EX02 037C x024 up to x205 (23 Watt) | version C |



ATEX regulation 2014/34/EU

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Producer:

Schienle Magnettechnik GmbH
In Oberwiesen 3
D-88682 Salem-Neufrach
Germany



+49 (0)7553-8268 60



+49 (0)7553-8268 61



www.schienle.de

| Summary | | page |
|----------------|--|-------------|
| 1 | Introduction | 3 |
| 2 | Intended Usage | 3 |
| 3 | Type coding | 4 |
| 4 | Electrical data | 4 |
| 4.1 | Version A and C with 23 Watt | 5 |
| 4.2 | Version B with 28 Watt | 5 |
| 5 | Initial installation | 5 |
| 6 | Installation notice - installation, mounting, demounting | 6 |
| 7 | Specification | 6 |
| 8 | Suppressor circuit | 6 |
| 9 | Maintenance, service, troubleshooting | 7 |
| 10 | Standards and regulations | 7 |
| 11 | Safety notice - <u>Please read carefully</u> | 7 |
| 12 | Assembling of solenoid and valve | 8 |
| 12.1 | General | 8 |
| 12.2 | Indications - <u>Please read carefully</u> | 8 |
| 13 | Non intended usage | 10 |
| 14 | EU-Declaration of conformity | 11 |

1 Introduction

The solenoid was designed, manufactured and tested in compliance with the standards and regulations generally applicable within the European Union. On leaving the factory the solenoids safety-related conditions were proven to be faultless.

The operator must only read and observe the notes and warnings provided with this operating instruction in order to maintain this status and to ensure safe operation.

The solenoid must only be installed and wire-connected by a qualified technician, who is familiar with and works according to the generally accepted engineering standards and the latest legal regulations and standards of explosion protection.

2 Intended Usage

This solenoid is assigned to the group II, category 2 of the ATEX directive.

This device can be used in areas where explosion hazard occurs through:

- Gas/air mixtures, vapours or mists of flammable materials according to classes IIA, IIB and hydrogen
- Flammable dust/air mixtures.

This device is applicable in explosion hazardous zones 1, 2, 21 and 22.

The maximum surface temperature (according to the specification in point 6) behaves:

for the version A: 120 °C, temperature class T4

for the version B and C: 135 °C, temperature class T4.

Table 1 Comparison of equipment groups and categories and the associated zones acc. the regulation 2014/34/EU

| Equipment group acc. 2014/34/EU | Category acc. 2014/34/EU | Area of use, characteristics (extract from the Directive) | Usability in zone acc. to 1999/92/EG |
|---------------------------------|--------------------------|--|--------------------------------------|
| I | M1 | Atmospheres endangered by firedamp (equipment group I), i.e. underground mines and their surface installations. Can remain operational in the presence of a potentially explosive atmosphere. Very high level of safety. | - |
| I | M2 | Atmospheres endangered by firedamp (equipment group I), i.e. underground mines and their surface installations. Must be able to be switched off in the presence of a potentially explosive atmosphere. High level of safety. | - |
| II | 1G | Potentially explosive atmospheres in which potentially explosive gases, mists, or vapours are present permanently, or frequently, or for long periods (equipment group II). Equates to Zone 0 in accordance with Directive 1999/92/EC. Very high level of safety. | 0, 1, 2 |
| II | 2G | Potentially explosive atmospheres in which potentially explosive gases, mists, or vapours are occasionally present (equipment group II). Equates to Zone 1 in accordance with Directive 1999/92/EC. High level of safety. | 1, 2 |
| II | 3G | Potentially explosive atmospheres in which potentially explosive gases, mists, or vapours are normally not present, or present only infrequently, or for short periods (equipment group II). Equates to Zone 2 in accordance with Directive 1999/92/EC. Normal level of safety. | 2 |
| II | 1D | Potentially explosive atmospheres in which potentially explosive dust/air mixtures are present permanently, or frequently, or for long periods (equipment group II). Equates to Zone 22 in accordance with Directive 1999/92/EC. Very high level of safety. | 20, 21, 22 |
| II | 2D | Potentially explosive atmospheres in which potentially explosive dust/air mixtures are occasionally present (equipment group II). Equates to Zone 21 in accordance with Directive 1999/92/EC. High level of safety. | 21, 22 |
| II | 3D | Potentially explosive atmospheres in which a potentially explosive atmosphere from raised dust is normally not present, or present only infrequently, or for short periods (equipment group II). Equates to Zone 22 in accordance with Directive 1999/92/EC. Normal level of safety. | 22 |

Table 2 Device groups II – Temperature classes

| Temperature class | Highest surface temperature | Ignition temperature of the gas, mist or vapour |
|-------------------|-----------------------------|---|
| T1 | 450°C | >450°C |
| T2 | 300°C | >300°C |
| T3 | 200°C | >200°C |
| T4 | 135°C | >135°C |
| T5 | 100°C | >100°C |
| T6 | 85°C | >85°C |

Please notice the points 5, 6 and 12 before the initiation and installation of the device.

3 Type coding

| Type coding |
|-------------------|
| 01 EX02 037x yzzz |

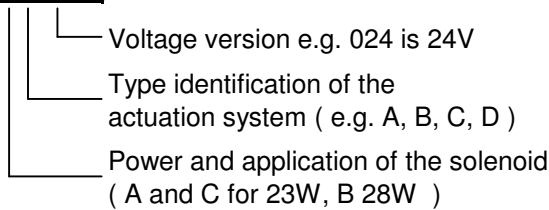


Table 3 Type coding

| Version | Type coding | Legend |
|---------------|-------------------|--|
| A (23 Watt) | 01 EX02 037A yzzz | II 2G Ex db IIB+H2 120°C (T4) Gb II 2D Ex tb IIIC T120°C Db |
| B (28 Watt) | 01 EX02 037B yzzz | II 2G Ex db IIB+H2 T4 Gb II 2D Ex tb IIIC T135°C Db |
| C (23 Watt) | 01 EX02 037C yzzz | II 2G Ex db IIB+H2 T4 Gb II 2D Ex tb IIIC T135°C Db |

Example: Version A, 23 Watt, actuation system C, voltage 24 V: **01 EX02 037A C024**

4 Electrical data

- Rated voltage: U_N [V DC] \pm 10% max.
- Supply voltage: U_N [V DC] (for electronics)
- Ripple voltage: \pm 15%
- Resistance: R_{20} [Ω] \pm 5% bei 20 [°C]
- Working duty: S1 (100%ED)

4.1 Version A and C with 23 Watt

Table 4 Voltage versions A and C

| Type coding | Voltage | Resistance | Limiting current | Suppressor |
|-------------------|---------|------------|------------------|------------------|
| | U_N | R_{20} | I_G | |
| | [VDC] | [Ohm] | [A] | |
| 01 EX02 037x y012 | 12 | 6,5 | 1,35 | Diode |
| 01 EX02 037x y024 | 24 | 25,6 | 0,67 | Diode |
| 01 EX02 037x y036 | 36 | 59 | 0,45 | Diode |
| 01 EX02 037x y078 | 48 | 105,5 | 0,34 | Diode |
| 01 EX02 037x y072 | 72 | 240 | 0,23 | Bridge rectifier |
| 01 EX02 037x y080 | 80 | 292 | 0,2 | Bridge rectifier |
| 01 EX02 037x y098 | 98 | 450 | 0,17 | Bridge rectifier |
| 01 EX02 037x y110 | 110 | 550 | 0,15 | Bridge rectifier |
| 01 EX02 037x y180 | 180 | 1565 | 0,09 | Bridge rectifier |
| 01 EX02 037x y205 | 205 | 1910 | 0,08 | Bridge rectifier |

4.2 Version B with 28 Watt

Table 5 Voltage version B

| Type code | Voltage | Resistance | Limiting current | Suppressor |
|-------------------|---------|------------|------------------|------------------|
| | U_N | R_{20} | I_G | |
| | [VDC] | [Ohm] | [A] | |
| 01 EB02 037B y012 | 12 | 5,4 | 1,56 | Diode |
| 01 EB02 037B y024 | 24 | 21,5 | 0,78 | Diode |
| 01 EB02 037B y036 | 36 | 48 | 0,52 | Diode |
| 01 EB02 037B y078 | 48 | 86,5 | 0,39 | Diode |
| 01 EB02 037B y072 | 72 | 195 | 0,26 | Bridge rectifier |
| 01 EB02 037B y080 | 80 | 240 | 0,23 | Bridge rectifier |
| 01 EB02 037B y098 | 98 | 359 | 0,19 | Bridge rectifier |
| 01 EB02 037B y110 | 110 | 450 | 0,17 | Bridge rectifier |
| 01 EB02 037B y180 | 180 | 1205 | 0,1 | Bridge rectifier |
| 01 EB02 037B y205 | 205 | 1565 | 0,09 | Bridge rectifier |

5 Initial installation

- The ambient temperature of -35°C until +40°C shall not be in excess while the maximum temperature of the medium (generally hydraulic fluid) shall not exceed 70°C
- It is the users duty to ensure free and unhindered heat emission during operation. This means that the solenoid shall neither be covered nor stored immediately adjacent to heat sources (e.g. fan heaters) during operation.
- Care is to be given that the solenoid is not subjected to direct sunlight during operation.

6 Installation notice - installation, mounting, demounting

The solenoid consist of different individual components (field coil, guide tube and screw nut). These components are fine-tuned to one another and must not be replaced individually.

- The user has to safeguard each solenoid with a fuse: $I_N \leq 3 \times I_G$, with trigger characteristic "slow blow". The breaking capacity of the fuse link has to be stronger than the max short circuit current at the users operating area.
- EX-secured components must be used during mounting in case the fuse and/or the interface are within the EX-range.
- In addition, the solenoid must be connected to ground via the purpose-built ground clamp an the connector casing.
- The EX-Solenoid presented herewith shall only be operated with a valve body according to the Instructions in point 11.
- The guide tubes and field coils fixing nuts must be tightened with 10 Nm. In addition, the fixing nut must be secured against disengagement with a headless screw. The coil must never be operated separately.
- The connection cable must be laid out with sufficient cover and cord grip.
- After de-energizing the solenoid, wait 10 minutes to cool down the solenoid to avoid possible skin damage.

7 Specification

- Coils and plug cavity to be molded watertight. Insulation class "F"(155C°)
- Protection type DIN VDE 0470, EN 60529 and/or IEC 529 Device: IP 67,
- Surface protection (casing) DIN50979 Fe//ZnNi4-8//Cn//T0
- Max. temperature of operating medium (generally hydraulic fluid): 70 °C
- Max. ambient temperature: 40 °C, minimum -35 °C
- **Please note: is not allowed to change the cable or the cable connection!**

8 Suppressor circuit

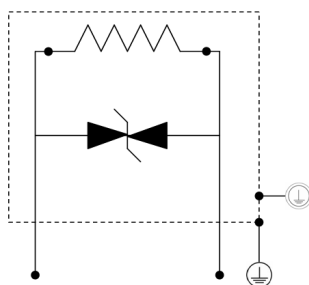


Figure 1 — D-Bidirectional voltage limiter – diodes:
 $U_Z = 36V$, bipolar for $U_N = 12$ and $24V$
 $U_Z = 75V$, bipolar for $U_N = 36$ and $48V$

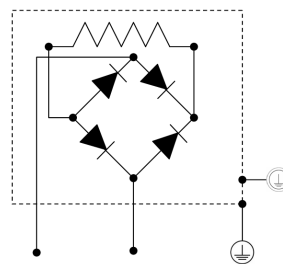


Figure 2 — Bridge rectifier $U_N \geq 72V$

9 Maintenance, service, troubleshooting

- The solenoid generally requires almost no maintenance. All electrical connections shall be checked regularly for possible damages (visual check)
- The surface of the device shall be checked regularly for dust deposits, which should be cleaned off.
- Do not try to open or to repair the device. If any troubles occur, please contact the manufacturer.

10 Standards and regulations

Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres

DIN VDE 0580:2011: Electromagnetic devices and components - General specifications

EN 60079-0:2012+A11:2013: Explosive atmospheres - Part 0: Equipment - General requirements (IEC 60079-0:2011, modified + Cor.:2012 + Cor.:2013);

EN 60079-1:2014: Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d" (IEC 60079-1:2014)

EN 60079-31:2014: Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t" (IEC 60079-31:2013);

11 Safety notice – Please read carefully

- In case the solenoid shows any signs of a defect, malfunctioning or external damage (including corrosion), the device must immediately be taken out of operation.
- Any deposits on the surface of the device shall not obstruct heat emission
- Coating of the equipment is permitted as long as its layer thickness does not exceed the limit value of 2mm for the relevant group "IIB" or EPL "Gb". It is the responsibility of the user to select a suitable coating that meets the requirements of the IEC/EN 60079-0 standard, in particular as regards the risk of electrostatic charging. It is furthermore the user's responsibility to ensure the legibility of the information shown on the type plate when the coating is applied. The technical data relating to the electrical system and explosion protection must be permanently attached by affixing either a type plate or an adhesive label suitable for explosion protection. It must be possible to restore the legibility of the original type plate by removal of the coating. The pins of the manual emergency mechanisms should be covered prior to coating using a small adhesive label for protection.
- Always disconnect the solenoid from the power supply before any maintenance or other work on it.
- Always exchange the complete solenoid (field coil system and guiding tube). Do not try to repair the solenoid.
- In no case shall any changes be made to the solenoid or the connecting cable.
- Never operate the solenoid when disconnected from the valve body. (See also item 11)
- Demount the solenoid only in secure areas (not in EX-areas). If this is not possible, the solenoid must cool off the a temperature below 50 °C before it is demounted.

12 Assembling of solenoid and valve

12.1 General

The current single solenoid must only be operated with a valve body and an anti rotation anchor. Immediate to the solenoid an anti rotation anchor hooks up, which is performed in two different versions (figure 3 and 4).

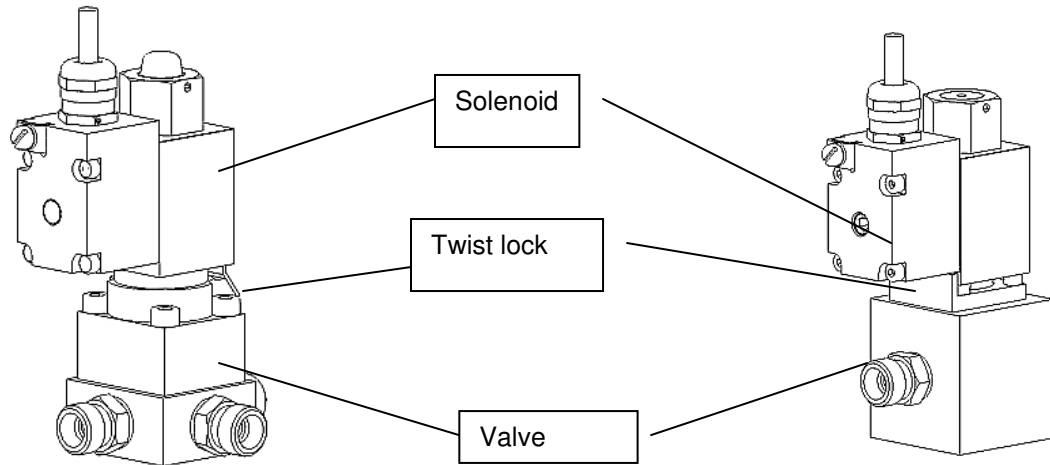


Figure 3 — Anti rotation anchor version 2 (left) with anti-rotation anchor (plate and flange) and valve body.
Anti rotation anchor version 1 (right) with anti-rotation anchor (bracket plate) und valve body.

The cubic valve body hooks up immediate to the anti rotation anchor. The minimum dimensions of the valve body must correspond to the dimensions shown in **table 6**.

Also a possible group configuration with more than one valve body must correspond to the defaults shown in **table 6**.

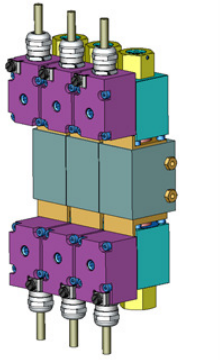
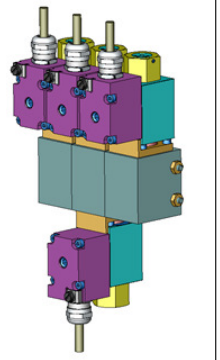
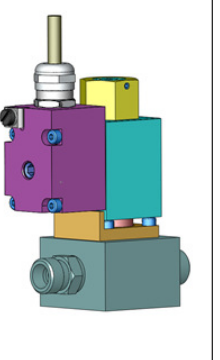
12.2 Indications – **Please read carefully**

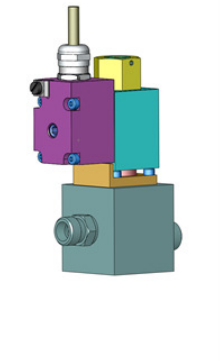
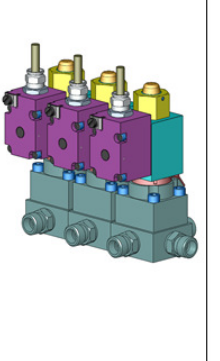
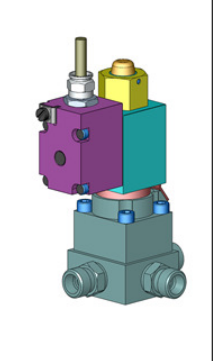
Principally attend following indications concerning table 6:

- The minimum dimensions of each valve body shall not fall below shown dimensions. Valve bodies with major dimensions then in table 4 can be used.
- The usage of other anti rotating anchor is only allowed when released by solenoid manufacturer, Schienle GmbH.
- In case multiple valve bodies are used, these must be lined up directly along the same axis and must be connected with appropriate connecting elements (screws or tie rods etc.).
- In case single valve body is used, it is the users duty to ensure free and unhindered heat emission during operation.
- A valve body can also be composed of many separate component parts, which are strong connected.
- If it is allowed to use 2 solenoids per valve body, they have to be mounted on opposite sides. Furthermore to follow:

The user has to take care that during working only one solenoid per valve body is actuated. A simultaneous activation of solenoids at one and the same valve body is forbidden. The user has to fulfil this by a proper electrical connection.

Table 6 Assembly versions

| | Version 1 - valve bank - | Version 2 - valve bank - | Version 3 - single valve - |
|--|--|---|--|
| Properties/criterion | | | |
| Anti-rotation anchor type | Type 1 | Type 1 | Type 1 |
| Minimum dimensions of a valve body Single valve resp. Valve bodies [mm] (tolerance acc. ISO 2768-c) | 39,5 x 50 x 59 | 39,5 x 50 x 59 | 35 x 35 x 50 |
| Solenoid may be connected (valve bank) | Yes | Yes | No |
| Solenoid may be used separately (single valve) | Yes | Yes | Yes |
| ON each valve body may/must be 2 solenoids on the opposite side of the valve | Always 2 solenoids | 1 or 2 solenoids | Only one solenoid |
| Application on version A (23W, 120°C – T4) | No | No | No |
| Application on version B (28W, T4) | Yes | No | Yes |
| Application on version C (23W, T4) | Yes | Yes | Yes |
| Example – structure drawing |  |  |  |

| | Version 3a - single valve - | Version 4 - valve bank - | Version 5 - single valve - |
|--|---|--|---|
| Properties/criterion | | | |
| Anti-rotation anchor type | Type 1 | Type 2 | Type 2 |
| Minimum dimensions of a valve body Single valve resp. Valve bodies [mm] (tolerance acc. ISO 2768-c) | 40 x 40 x 50 | 25 x 46 x 50 | 29 x 45 x 50 |
| Solenoid may be connected (valve bank) | No | Yes | No |
| Solenoid may be used separately (single valve) | Yes | Yes | Yes |
| ON each valve body may/must be 2 solenoids on the opposite side of the valve | Only one solenoid | Only one solenoid | Only one solenoid |
| Application on version A (23W, 120°C – T4) | Yes | No | Yes |
| Application on version B (28W, T4) | Yes | No | Yes |
| Application on version C (23W, T4) | Yes | Yes | Yes |
| Example – structure drawing |  |  |  |

12.2 Non intended usage

Any warranty claims are denied in case the regulations in this operating manual are not observed!
 Not intended use of this device may rise a risk of serious damage or loose of the explosion proof safety.

| Danger area | Danger | Safety note |
|---|--|--|
| Hydraulic connection between solenoid and hydraulic valve | Disconnection under pressure Lost of explosion proof safety | Unpressurize the hydrailc system before disconnecting Disconnect the solenoid from the valve only in a de-energized state |
| Solenoid surface | Skin burning by hot surface of the solenoid | Let the solenoid cool down after de-energizing |
| Electrical connection | Electric shock | Work on the solenoid only in a de-energized state Disconnect the cable from the electrical voltage supply/junction box only in de-energized state |

13 EU-Declaration of Conformity



The manufacturer,

Schienle Magnettechnik und Elektronik GmbH
In Oberwiesen 3
88682 Salem – Neufrach

herewith declares that the product

Description: Single solenoid, explosion-proof version
Type : 01 EX02 037A x024 bis x205 (23 Watt) - Version A
01 EX02 037B x024 bis x205 (28 Watt) - Version B
01 EX02 037C x024 bis x205 (23 Watt) - Version C
EU-certificate: TÜV-A-12 ATEX 0006X
Marking: II 2G Ex db IIB+H2 120°C (T4) Gb - Version A
II 2D Ex tb IIIC T120°C Db
II 2G Ex db IIB+H2 T4 Gb - Version B
II 2D Ex tb IIIC T135°C Db
II 2G Ex db IIB+H2 T4 Gb - Version C
II 2D Ex tb IIIC T135°C Db

Is been designed, assembled and proved in accordance with the EU regulation 2014/34/EU and following harmonized norms:

EN 60079-0:2012+A11:2013: Explosive atmospheres - Part 0: Equipment - General requirements (IEC 60079-0:2011, modified + Cor.:2012 + Cor.:2013);

EN 60079-1:2014: Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d" (IEC 60079-1:2014)

EN 60079-31:2014: Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t" (IEC 60079-31:2013);

Salem-Neufrach
Place

20.04.2016
Date

Handwritten signature and Ex-Responsible Person label