

# SCHIENLE

## MAGNETTECHNIK

### Operating instructions

#### Flame proof solenoid Explosion – proof twin solenoid

Type : 01 EX04 039x yzyz

Design certificate acc. ATEX:	FM 15ATEX 0012 X ⊕ II 2G Ex db IIB T4 Gb ⊕ II 2D Ex tb IIIC T135°C Db
Design certificate acc. IECEx:	IECEx FMG 15.0007 X Ex db IIB T4 Gb Ex tb IIIC T135°C Db
Design certificate acc. NEC500 And CEC Anex J:	XP, Class I, Div. 1, Grp C, D, T4
Design certificate acc. NEC500 And CEC Section 18:	DIP, Class II, Div. 1, Grp E,F,G T4 DIP, Class III, Div. 1 & 2
Design certificate acc. NEC505:	Class I, Zone 1, AEx d IIB T4 Gb
Design certificate acc. NEC506:	Zone 21, AEx tb IIIC T135°C Db
Design certificate acc. CEC Section 18:	Class I, Zone 1, Ex d IIB T4 Gb Zone 21, Ex tb IIIC T135°C Db



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## 1 Introductions

The solenoid was designed, manufactured and tested in compliance with the standards and regulations generally applicable within of the FM approval, ATEX, IECEx and CEC. On leaving the factory the solenoids safety-related conditions were proven to be faultless. In order to maintain this status and to ensure safe operation, the operator has to read and observe the notes and warnings contained within this operating instruction.

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

## 2 Usage

The solenoid is provided for use on hydraulic plants. The device is mounted flame-enclosed on the hydraulic device. With this structure an actual heat conduction is warranted. The interior of the twin solenoid is filled with hydraulic oil and is exposed to high pressure.

Further on, there are two exciter coils in the interior of the solenoid, whereas only one shall be activated. The activated coil generates a magnetic field, which executes a force on the solenoid's movable part. This force changes the pressure or the flow rate of the medium and causes a hydraulic actuation which initiates further actuations. The device is manufactured for use as a proportional solenoid, but can also be used as a black/white device.

An accurate dimension you can find on the page 9, figure 4.

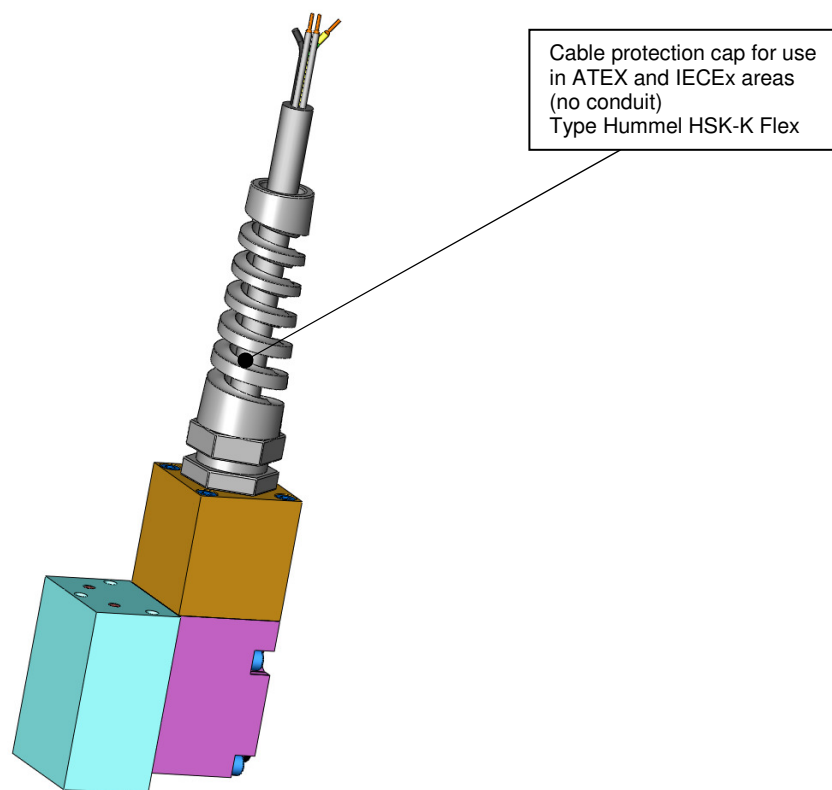


Figure 1 — Flame-proof twin solenoid

### 3 Versions

#### 3.1 Type coding

The twin solenoid is manufactured with different supply voltage. The mechanical structure remains the same.

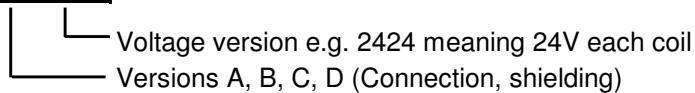
**Table 1 Versions**

Version	Labeling NEC500, CEC Anex J	Labeling NEC 505, NEC 506, CEC Section 18
Flame-proof	XP, Class I, Div. 1, Grp C, D, T4 DIP, Class II, Div. 1, Grp E,F,G T4 DIP, Class III, Div. 1 & 2	Class I, Zone 1, AEx d IIB T4 Gb Zone 21, AEx tb IIIC T135°C Db  Class I, Zone 1, Ex d IIB T4 Gb Zone 21, Ex tb IIIC T135°C Db

Version	Labeling ATEX	Labeling IECEx
Flame-proof	Ex II 2G Ex db IIB T4 Gb Ex II 2D Ex tb IIIC T135°C Db	Ex db IIB T4 Gb Ex tb IIIC T135°C Db

**Table 2 Type coding**

Type coding
01 EX04 039x yzyz



Example: solenoid 01 EX04 039A 1212 contains two 12 V coils connected to common ground, without shielded cable

**Table 2 Voltage versions and current consumption**

Version	Voltage	Resistance	Limiting current	Suppressor
	$U_N$	$R_{20}$	$I_G$	
	[VDC]	[Ω]	[A]	
01 EX04 039x 1212	12	6,9	1,2	2x2 voltage- suppressor diode
01 EX04 039x 2424	24	28	0,6	2x2 voltage- suppressor diode

### 3.2 Label

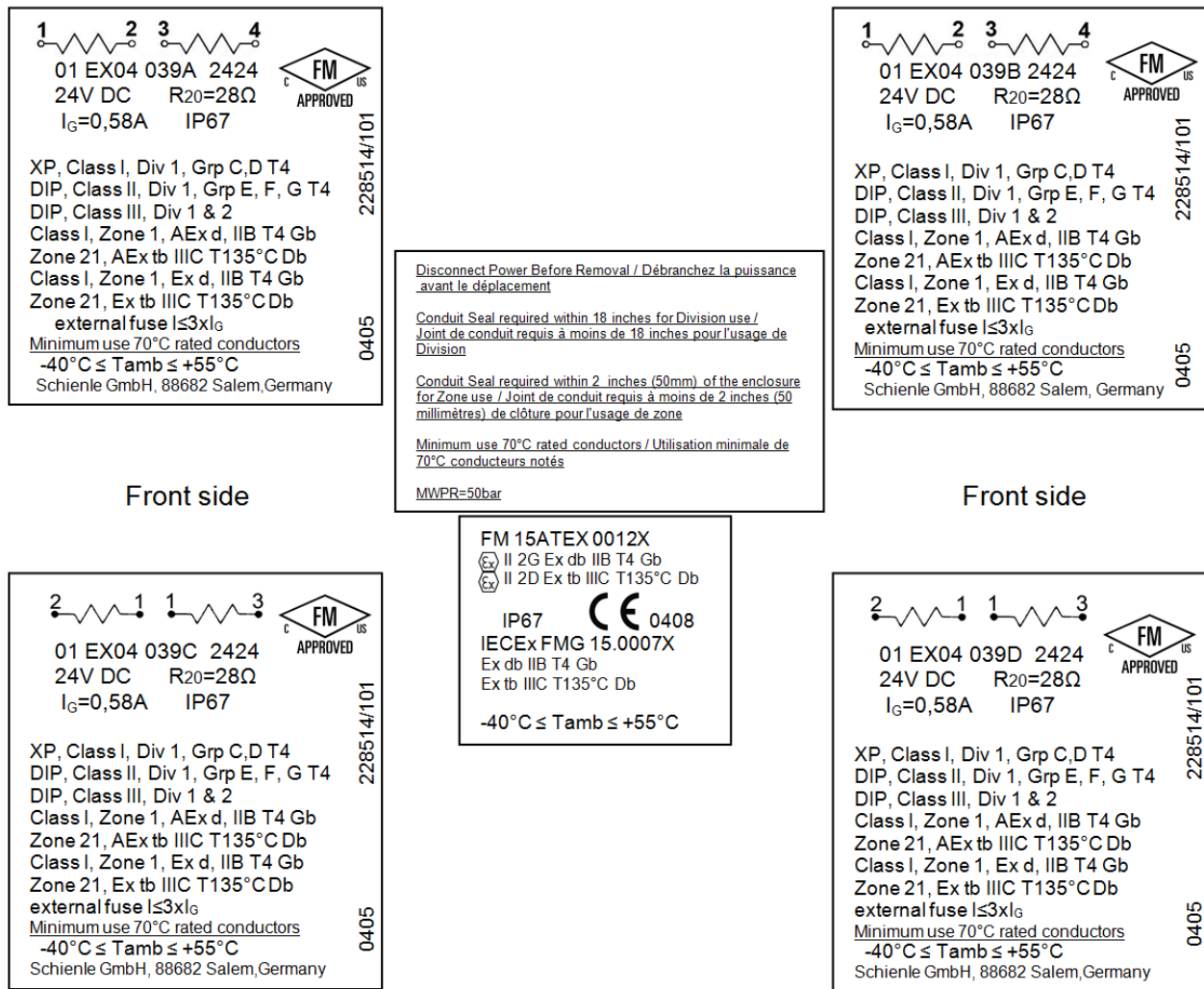


Figure 2 — Separated ground with normal (Version A), shielded cable (Version B) and common ground normal cable (Version C) and shielded cable (Version D)

## 4 Technical data

### 4.1 General parameters

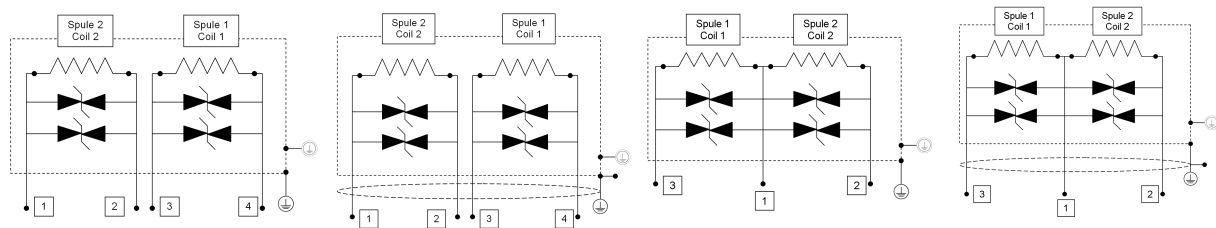
- Protection type EN 60529, IEC 60529: IP 67
- Operating pressure: max. 50 bar
- Cracking pressure (static): 300 bar
- Coils and coil area are moulded water-proof and indecomposable.
- Insulation class according to DIN VDE 0580 „F“ (155C°)
- Max. temperature of medium (normally hydraulic oil): 70°C
- Ambient temperature: -40°C up +55°C

## 4.2 Electrical data

### 4.2.1 Generally

The electrical data vary depending on the version of the solenoid, see point 3, table 3.

- Nominal voltage:  $U_N = 12[V\ DC]$        $24[V\ DC] \pm 10\% \text{ max.}$
- Resistance at 20°C:  $R_{20} = 6,9[\Omega]$        $28[\Omega] \pm 5\%$
- Power-on-time: S1 (100%), but simultaneously only one coil.
- Cold power:  $P_{20} = 20,5[W]$
- Electrical connection:  $3(4)+1 \times 0,5\text{ mm}^2$  (minimum cross section),  
Acc. to IEC 60079-14
- Protection circuit: Voltage suppressor diode
- The user has to safeguard each solenoid against short-circuit or overload with a fuse according to IEC 60127-2/V or EN 60127-2/V.



**Figure 3 — Connection diagram versions A, B, C, D**

## 5.0 Installation and implementing

### 5.1 General

The EX-solenoid presented must only be operated on a valve body.

If many valve bodies are connected to a valve composite, the operator shall take care of a minimum distance between single valves according to point 5.3.1 and point 5.3.2.

The protection class is performed on the label of the solenoid.

The device must only be mounted on an adequately sized hydraulic valve. Minimum volume is given according chapter 5.3.

The maximum ambient temperature of 55°C and the maximum temperature of the medium (as a rule hydraulic oil) of 70°C shall not be overstepped.

It is the user duty to ensure free and unhindered heat emission during the operation. That means that the solenoid shall neither be covered nor stored adjacent to heat sources during the operation. Care is to be given that the solenoid is not subjected to direct sunlight during operation.

The connection cable must be passed sufficiently protected.

Additionally, the solenoid must be connected to ground via the purpose-built ground clamp at the connector casing.

Conduit Seal required within 18 inches for use in Division area. Conduit Seal required within 2 inches (50mm) of the enclosure for use in Zone area.

To maintain IP67 ingress protection, suitable pipe dope or 3 wraps of ½ inch width Teflon tape shall be required when installing.

## 5.2 Mounting, Demounting

Disconnect Power Before Removal!

The solenoid consists of several individual components. These components are fine-tuned to one another and shall not be replaced or demounted individually.

**Notice:** The cable and the cable gland must not be changed!

The solenoid is mounted on the hydraulic valve with 3 screws according to ISO 4762-M5x70. To assure the hydraulic impermeability, two o-rings are placed in the valve slot. The screws must be tightened with 2,8 Nm. No material that can downgrade the heat emission shall be placed between the solenoid and the valve.

The user has to ensure that the configuration of the solenoids on the valve block is observed according to the description to point 5.3.

The connection of the free cable must be carried out either outside the potentially explosive atmosphere or in equipment certified for this device category.

## 5.3 Compound of the twin solenoid and valve

To ensure adequate cooling, the solenoid shall only be operated in conjunction with a valve block. When many valve bodies are connected to a valve composite, make sure that the required minimum size of the single valve and the allowed design of the valve composite are warranted. Following general condition has to be followed:

All solenoids on a valve composite can be operated simultaneously according to the terms of the operating instructions. The system only may be used if appropriate plates are assembled on the both sides of the valve. The plates provide a mechanical protection for the solenoids.

### 5.3.1 Valve bank design

The minimum volume of a valve body is 186.845 mm<sup>3</sup>. Valves of bigger dimensions can be used. When using more than one valve, these valves may be directly stringed together in the same axis with adequate connecting members (screws, con-rods).

On each valve only one twin solenoid must be mounted.

## 6 Maintenance, service, troubleshooting

The solenoid is largely maintenance-free. The electrical connection shall regularly be inspected on damages (visual inspection).

The solenoid's surface is to be checked to dust deposits and is to be cleansed at regular intervals.

The user must not try to open or to repair the device. When failure or damage occurs, the device is to be replaced.

## 7 Norms and regulations

Regulation 94/9/EG of European parliament and of the European council  
(known as ATEX 95)

DIN VDE 0580, release 2011-11

Electromagnetic devices and components - general requirements

FM3600, FM 3615, FM3616, FM3810, ANSI/IEC 60529

ISA 60079-0, ISA 60079-1, ISA 60079-31, ISA 60529

CSA-C22.2 No.0.4, 0,5, 25, 30, 60079-0, 60079-1, 60079-31, 60529

IEC 60079-0, IEC 60079-1, IEC 60079-31

EN 60079-0, EN 60079-1, EN 60079-31, DIN VDE 0580

## 8 Specific Conditions of Use – read carefully !

- When failure, external damage or defect (also significant corrosion) occurs, the device has to be shot down and replaced.
- No sedimentations on the solenoid surface shall affect the heat emission.
- In order not to affect the readability of the solenoid label, the solenoid must not be varnished.
- Before executing any operation, the solenoid shall be disconnected from the power supply.
- The dimensions of the flameproof joints are other than the relevant minimum or maximum given in Table 1 of IEC 60079-1, a repair is not possible. A solenoid shall always be replaced. It must never be repaired!
- No modifications, which could affect the explosion-safety, must be carried out on the solenoid, on the cable gland or on the cable.
- To keep the temperature class, the solenoid may only be operated in combination with a valve block in accordance with the operating instructions. The maximum process media temperature of 70 °C shall not be exceeded. See point 5.0
- A solenoid must only be demounted in a non-explosive-area.
- To keep the temperature class the explosion-proof solenoid may only be operated in combination with a valve block with minimum volume according to the operating instructions. The maximum media temperature of 70 °C must not be exceeded.
- The apparatus has flying lead cable conductors that exit the enclosure. A suitably certified Ex d or Ex e terminal box is required to be connected to apparatus enclosure for completing to external supply circuit.
- A repair is not possible.

**Any warranty claims are denied in case the regulations in this operating manual are not observed !**



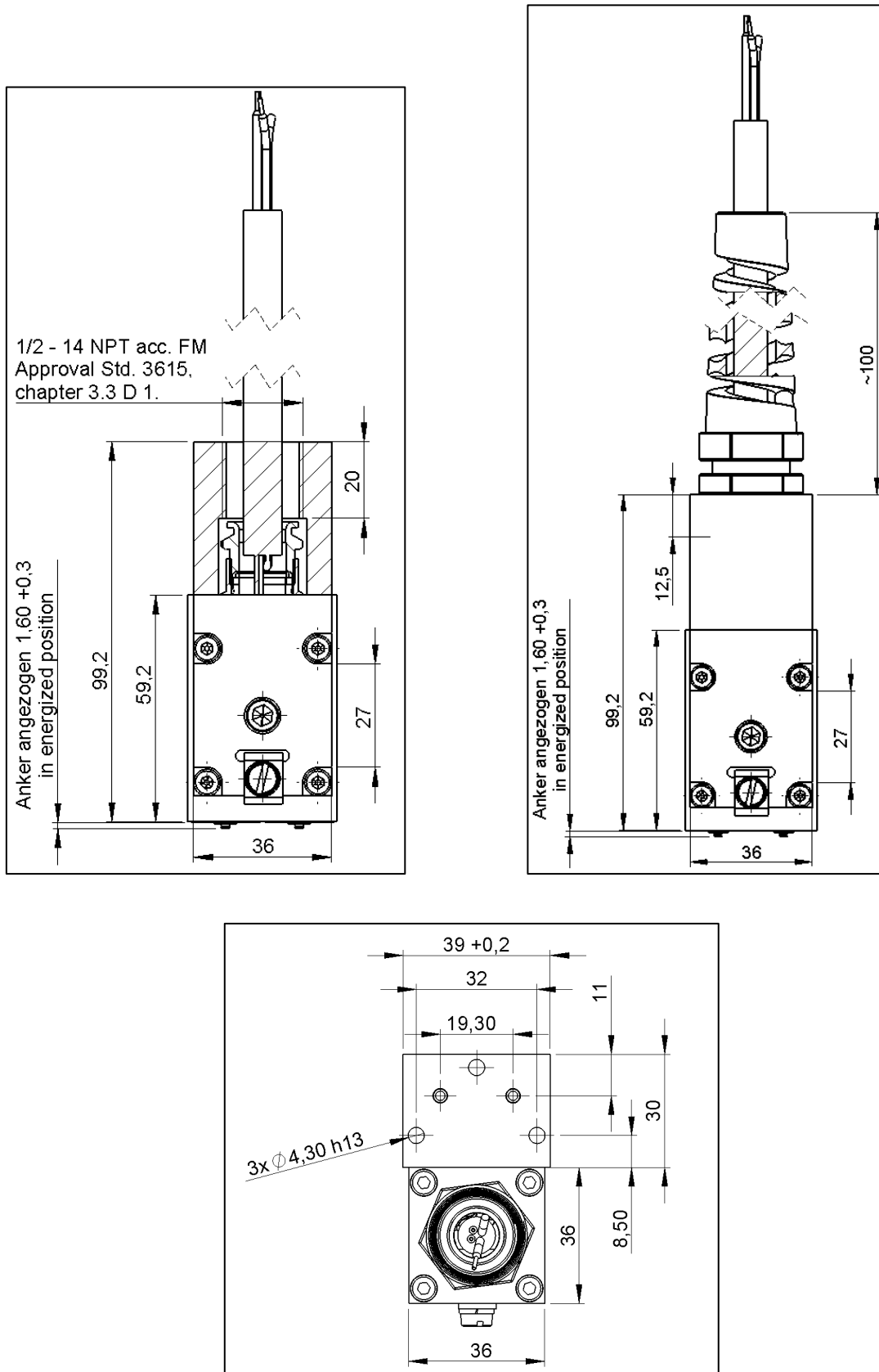


Figure 4 — Dimensioned drawing