Your Specialists for electromagnetic Actuators and Sensors

Technical Explanations Electromagnetic Actuators in explosion-proof execution

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- Regulations, standards and specifications
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1. Terms, Definitions, Explications

1.1 (Electrical) Equipment

All objects serving totally or partly to the application of electric energy. Objects for generation, transmission, distribution, storage, measuring, controlling, transformation and consumption of electric energy as well as objects for telecommunication belong to this.

Electrical equipment for explosion-proof areas is classified in:

 Group I:
 Electrical equipment for mine workings with firedamp explosion risk

 Group II:
 divided into groups IIA, IIB and IIC, equipment intended for use in areas where explosive gas atmospheres are likely to occur, excluding mines susceptible to firedamp

Group III: divided into groups IIIA, IIIB and IIIC, equipment intended for use in areas where explosive dust atmospheres are likely to occur, excluding mines susceptible to firedamp

Furthermore another classification in so-called categories is made, where category 1 and category 2 are used for groups I and II. Category 3 refers only to group II:

 Category 1:
 highest degree of protection, thus very high degree of safety

 Category 2:
 increased degree of protection, thus high

Category 3: degree of safety normal degree of protection, thus normal degree of safety

With the classification in categories, also an assignment is made to the application area (underground, gas-explosive areas, areas with combustible dust) where the equipment is used:

Group I:	M1, M2	(mining)
Group II:	1G, 2G, 3G	(gas)
-	1D, 2D, 3D	(dust)
(see noint 2)		. ,

(see point 2)

1.2 Explosive Atmosphere

Mixture of air and combustible gases, steams, mists or dusts under atmospheric conditions in which the combustion process has transferred to the complete unburnt mixture after effected ignition.

- Atmospheric conditions mean :
- Temperature from -20°C up to +60°C
- Pressure from 0,9 bar up to 1,1 bar
- Air with oxygen content of approx. 21%

1.3 Explosive Area

Zone where the atmosphere may become explosive due to the local and operational conditions.

Generally explosive areas are classified in zones according to frequency and duration of potentially explosive atmosphere whereas a differentiation is also made between combustible gases, steams and mists, as well as combustible dusts:

Danger areas gas / steam:	Zone 0
	Zone 1
	Zone 2
Danger areas dust:	Zone 20
-	Zone 21
	Zone 22
(see point 2)	

1.4 Flashpoint Temperature

The lowest temperature at which a combustible gas or a combustible liquid can generate a suitable quantity of steam at its surface under special testing conditions so that with an effective ignition source an ignition of the steam-air-mixture might become possible.

1.5 Ignition Temperature – Temperature Class

The ignition temperature of a combustible material is the lowest temperature at which the combustible material just ignites in connection with air.

By means of fixed proceedings (ISO/IEC 80079-20-1 respectively IISO/IEC 80079-20-2) the ignition temperature of any substances is determined so they can be classified in temperature classes. (see point 3)

Temperature classes	Ignition temperature ranges of mixtures [°C]	Max. admissible surface temperature ele- kof electrical equipment [°C]
T1	> 450	450
T2	> 300 ≤ 450	300
Т3	> 200 ≤ 300	200
T4	> 135 ≤ 200	135
T5	> 100 ≤ 135	100
Т6	> 85 ≤ 100	85

Table 1.5 Temperature classes and respective temperature ranges

1.6 Explosion Subgroups

Classification of combustible gases and steams within group II according to their ratio of min. ignition current related to methane or according to their border gap width.

The value of the MESG (Maximum Experimental Safe Gap) is very important for constructions with ignition protection class "flameproof enclosures". The value of the MIC (minimum ignition current) is very important for constructions with ignition protection class "intrinsic safety". (See point 3)

Explosion sub- group	Minimum ignition current related to methane (MIC:CH4)	maximum experi- mental safe gap (MESG)	Hazardousness
IIA	> 0,8	> 0,9 mm	low
IIB	0,45 0,8	0,5 0,9 mm	average
IIC	0 0,45	< 0,5 mm	high

Table 1.6 Explosion subgroups and their classification

1.7 Ignition Protection Classes

Designation for actions which assure that an ambient explosive mixture of gas, air, mist or dust may not lead to an ignition due to different protection principles. (see point 4)

All protection classes of the same category are equal concerning safety!

Protection principle	Electrical equipment of catego- ries 1G, 2G, 3G	Electrical equipment of cate- gories 1D, 2D, 3D
Protection principle ensures that an ignition source may not occur	Increased safety "e" Not sparking devices "nC"	-
Protection principle ensures that an ignition source may not become effective	Intrinsic safety "i"	Intrinsic safety "i"
Protection principle prevents the explosive atmosphere from reaching the ignition source	Pressurized enclosures "p" Encapsulation "m" Oil enclosure "o" Hermetically sealed devices encapsul- ated/sealed equipment "nC" Protection against explosive gases and dusts "nR"	Protection by enclosures "t" Pressurized enclosures "p" Encapsulation "m"
Protection principle allows ignition but prevents the flame propagation by means of the housing	Pressure proof enclosures "d" Powder filling "q"	_

Table 1.7 Protection principle and protection types

1.8 Protection Class

Describes the safety degree by an enclosure.

- protection against contact
The IP-protection class offers - foreign body protection.
 - protection against ingress of water



2. Classification of explosive areas in zones and coherence with electrical equipment

Due to the classification of electrical equipment in different groups and categories and due to the division of the explosive areas into different zones the equipment can be categorized in relevant explosive areas where they may be applied.

For the European community the definition of zones is standardized in regulation 1999/92/EG.



	Rating of explosion hazard		Necessary mark cable eq	ting of the appli- uipment
			Device group	Category
	Operation at explosion hazard	Mining	I	M1
	Cut-off at explosion hazard	Mining	I	M1 or M2
as / steams	Zone where explosive atmosphere as mixture of air, combustible gases, steams or fogs is always, for long periods or often existing	Zone 0	11	1G
danger by ga	Zone where at normal operation an explosive atmosphere as mixture of air, combustible gases, steams or fogs may form from time to time	Zone 1	11	2G or 1G
Zones for o	Zone where at normal operation an explosive atmosphere as mixture of air, combustible gases, steams or fogs may normally not form or even temporarily		II	3G, 2G or 1G
ombustible	Zone where an explosive atmosphere in form of a cloud of combustible dust contained in the air exists always, for a long time or often	Zone 20	11	1D
danger of cc powder	Zone where an explosive atmosphere in form of a cloud of combustible dust contained in the air exists from time to time at normal operation	Zone 21	11	2D or 1D
Zones for	Zone where at normal operation an explosive atmosphere in form of a cloud of combustible dust contained in the air does not form normally or even temporarily	Zone 22	II	3D, 2D or 1D

Table 2.1 Definition of zones and applicable equipment

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3. Ignition Temperature – Temperature Class

Temperature class / ignition temperature range of mixtures	IIA	IIB	IIC	Applicabilit with tempe	y of material erature class
T1 > 450 °C	Acetone Ammoniac Benzol – pure Acetic acid Ethyl acetate Ethyl chloride Carbon monoxide Methane Methanol Methylene chloride Naphthaline Phenol Propane Toluol	City (illuminating-)gas Acrylon nitrile	Hydrogene	T1	
T2 >300 °C <u><</u> 450 °C	Ethyl alcohol i-amy acetate n-butane n-butyl alcohol Cyclohexane Acetit anhydride	Ethylene Ethylene oxide	Ethine (Acetylene)	T2	
T3 >200 °C ≤300 °C	Gasolines – generally diesel fuel kerosine heating oil DIN 51603 n-hexane	Ethylene glycol Hydrosulphide		Т3	
T4 >135 °C ≤ 200 °C	Acetaldehyde	Ethyl ether		T4	
T5 >100 °C ≤ 135 °C				T5	
T6 >85 °C ≤100 °C			Carbon disulphide	Т6	
Applicability of the equipment with explosion subgroup	IIA	IIB	IIC		

3.1 Safety-related identification numbers of combustible gases and steams for determination of temperature class and explosion subgroup

Fig. 3.1 Examples for classification of different flammable gases and steams in temperature classes and explosion subgroups

3.2 Dust deposit: Max. admissible surface temperatures



Fig. 3.2

Reduction of the max. admissible surface temperature with increasing layer thickness of the dust layer (IEC/EN 61241-14)

4. Protection class of electrical equipment of group II

Protection class	Gases / steams	Dusts	Marking	Principle and constructive measures	Application examples
Flameproof enclosures flameproof enclosures	•		db / dc	The components which may ignite an explosive atmosphere are incorporated in an enclosure which withstands the pressure resulting from an explosion of an explosive mixture inside. Technologically necessary gap and notches are designed concerning length and tightness that a transmission of the explosion on the explosive atmosphere surrounding the enclosure is avoided.	Control solenoids with built-on switch, transformers, control and switch devices, engines and generators with collector and collector rings, variable resistors, lamps etc. Control solenoids in parti- cularly solid execution
Pressurized enclosures pressurized enclosures	•	•	px / py / pz	The enclosure of electrical materials is filled with an ignition protection gas (air, inert or other suitable gas) which is kept under overpressure compared with the ambient atmosphere. So the ambient atmosphere may not penetrate in the enclosure. Possibly the overpressure will be maintained by an ongoing purging with ignition protection gas.	Large-scale machines, measuring stations, switch and control units, analysis devices, large-scale engines, heating devices etc. No importance for control solenoids
Powder filling powder filling	•		qb	The filling of an enclosure with fine-grained fill effects that the penetration of explosive atmosphere is reduced and at occurrence of an electric arc in the enclosure an explosive atmosphere surrounding the enclosure will not be ignited. No ignition may occur due to increased temperature on the enclosure surface.	Actuating solenoids, switching devices, power supply units, electronic components
Oil immersion oil immersion	•		ob	The parts of electrical equipment from which an ignition of explosive atmosphere may come are dipped so deeply in a protection liquid (mostly insulating oil) that gases and vapours upside the liquid and outside the enclosure may not be ignited by electric arcs or similar.	Large transformers, switching devices, starting resistances and complete run-up controls. Rarely applied for actuating solenoids.
Increased safety increased safety	•		eb / ec	The possibility of inadmissibly high temperatures and emerging sparks or electric arcs inside and at external parts of electrical equipment are avoided by additional measures and a higher degree of safety.	Actuating solenoids, transformers, accumulators, lamps, squirrel-cage motors, installation materials, terminal and junction boxes
Intrinsic safety intrinsic safety	•	•	ia / ib / ic	Intrinsic materials contain only electric circuits which comply with the requirements for intrinsic circuits. Intrinsic circuits are realized when energy and switching capacity are so low that no spark or thermal effect occurs which may cause (at normal operation and under certain error conditions) an ignition of explosive atmosphere of the subgroups IIA, IIB or IIC resp. of a dust-air-mixture.	For actuating sensors often applied measuring / monitoring information systems or devices Sensors and actors
Protection class n type of protection n	•		nC / nR	Protection is achieved by different constructive actions, e.g. devices which can not be opended during standard operation and sealed in such way that the penetration of external atmosphere is avoided or reduced or prevents the penetration of external atmosphere in enclosures.	Contact systems, batteries, material with low energy etc.
Encapsulation encapsulation	•	•	ma / mb / mc	The parts of the electrical material which could ignite an explosive atmosphere by sparks or heating are embedded in a moulding mass. So the explosive atmosphere may not be ignited. This is made by an overall coating of the components with a suitable moulding mass.	For actuating solenoids commonly used circuit boards with circuits, relays, switching devices.
Schutz durch Gehäuse protection by enclosures		•	ta / tb / tc	The enclosure is so tight that no combustible powder may penetrate inside. The surface temperature of the external enclosure is limited.	Actuating solenoids, control systems, diverse materials

Table 4.1 Protection classes for electrical equipment of group II

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5. Marking / Designation examples

5.1 ATEX-Marking

	CE	0637	⟨£x⟩	Ш	2G	Ex eb mb	IIC	Т4	Gb	IBexU 16 ATEX 1143	Х
Iropean Community											
number of certification authority ATEX											
-symbol ATEX											
EX device group			_								
evice category ATEX				_							
nition protection types											
vice group IEC (Explosion subgroup)											
mperature class											
² L (Equipment protection level)								_			
umber of the EU type termination certific	ate in th	is case	e.g. IBI	ExU							
		> nlease	refer to	type	exami	nation and opera	ating in	structio	n	_	

Fig. 5.1.1 Marking example for explosion proof electrical material according to ATEX, suitable for gas explosive areas

material is designed for a range of ambient temperatures from - 20°C up to + 40 °C.

	C €	0637	⟨£x⟩	 	2G 2D	Ex e mb Ex tb	IIC IIIC	T4 T130°C	Gb Db	IBexU 16 ATEX 1143
European Community				\square						
ID number of certification authority ATEX										
Ex-symbol ATEX										
ATEX device group										
Device category ATEX										
Protection class(es)					-					-20 °C ≤ Ta ≤ +50 °C
Device group IEC (Explosion subgroup)						-				Specifications of
Max. surface temperature							_			temperature areas
EPL (Device protection level)										
Number of EU-type examination certificate	in this	case IB	ExU						-	
According to ATEX marking above example sub-group, temperature class etc with the	is a ma e exam	aterial wh ple in fig	nich is i . 5.1.1	dent for a	ical – c opplicat	oncerning dev ion in gas exp	ice grou losive a	up, device c areas.	ategor	y, protection class, explosion
As per marking it is additionally a material l	pelongi	ng to gro	oup II fo	or ap	plicatio	on in an area w	vith dar	iger by com	bustib	le dusts, zone 21.
Evaluation materian is have achieved by					"" (tastica bu cas) The devi		

Explosion protection is here achieved by means of protection class "t" (protection by enclosures). The device group IEC "IIIC" states that the material can be used for conductive, combustible dusts. The max. surface temperature is 130°C.

The additional marking of the ambient temperature means that the material is designed for a range of ambient temperatures from – 20 °C up to + 50 °C.

Fig. 5.1.2 Marking example for explosion proof electrical material according to ATEX, suitable for gas and dust explosive areas

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6. Explosion Protection at \clubsuit

6.1 Certificats and Audits

For many years a has been working in the field of explosion-proof electromagnetic actuators and sensors.

Since 2000 a valid certification of the QS-system according to annex VII of the **directive no. 94/9/EG (ATEX 95)** respectively now RL 2014/34/EU has existed for devices and protection systems destined for the exists use in explosive areas.

is certified for devices of group II in the categories 2G and 2D in protection classes "e", "i", "m", "t".



		IBExU Institut für Sicherheitstechnik Gmb An-Institut der TU Bergakademie Freiberg	н			On the base of that ATEX (EC-type examination certif	certification a m ficate) exist for ele	ultitude of approvals ectromagnetic devices
[1]	EU-BAU	MUSTERPRÜFBESCHEINIGUNG		(c)				
[2]	Geräte und sexplosionsge	Schutzsysteme zur bestimmungsgemäßen Verwendung in efährdeten Bereichen, Richtlinie 2014/34/EU		(CX)				
[3]	EU-Baumus	terprüfbescheinigung Nummer IBExU15ATEX1017 X Ausga	be 1					
[4]	Produkt:	Ventilmagnet Typ: GBRE 022 L01						
[5]	Hersteller:	Magnet-Schultz GmbH & Co. KG				nstitut für Sicherheitstechnik GmbH		
[6]	Anschrift:	Allgäuer Straße 30 87700 Memmingen GERMANY				PRÜFBESCHEINIGUNG		
			[2]	Geräte und So explosionsgef	chutzsyste ährdeten E	me zur bestimmungsgemäßen Verwendung in Bereichen, Richtlinie 2014/34/EU	(Ex)	
			[3]	EU-Baumuste	erprüfbesch	einigung Nummer IBExU19ATEX1035 Ausgabe 0		
			[4]	Produkt	Ventilm Typ: GB	agnet KE 010 S01		
			[5]	Hersteller:	Magnet-	Schultz GmbH & Co. KG		
			[6]	Anschrift:	Allgäuer 87700 M GERMAN	Straße 30 Iemmingen Y		

	CE-	IECEx Certific	cate							
		of Conformity								
INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres for rules and details of the IECEX Scheme Visit www.iacex.com										
Certificate No.:	IECEx IBE 14.0052X	Issue No: 1	Certificate history: Issue No. 1 (2018-09-19)							
Status:	Current	Page 1 of 4	Issue No. 0 (2015-01-19)							
Date of Issue:	2018-09-19									
Applicant:	Magnet-Schultz GmbH & Co. KG									
	Allgäuer Str. 30									
	87700 Memmingen									
	Germany									
Equipment:	Valve Solenoid									
Optional accessory:	Type GBRE 022 L01									
Type of Protection:	Encapsulation "m"									

To facilitate the worldwide approvals the QA system of \clubsuit has been also audited for IECEx since 2008.

Numerous other national approvals already exist, e.g. for Brazil (INMETRO), Korea (KOSHA), Japan (TIIS), China (NEPSI or CCC), North America (CSA or FM).

The extension of the Quality Assessment Report with other protection classes is possible on request by test and approval (Test Report – TR) of other devices.

The Quality Assessment Report – QAR as well as test reports and the Certificate of Conformity – CoC can be seen and printed on the homepage of IECEx (www.iecex.com).



6.2 Constructive Assembly of Control Solenoids in Different Protection Classes



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6.3 Ambient Temperatures, Battery Assembly

Generally electromagnetic actuators for explosive areas are designed for the use in an ambient temperature range of -20°C up to +40°C. In this case an additional identification of the ambient temperature T_a is not necessary.

If the electromagnetic actuator is designed for the application in a different temperature range, this is regarded as special design and the ambient temperature range is indicated by a special identification.

Generally the influence of vicinal heat sources as e.g. for battery assembly of solenoids / valves (see fig. 6.3.1 and fig. 6.3.2),has to be considered.



Figure 6.3.1: Example for battery assembly of pneumatic valve solenoids with distances x and y



Figure 6.3.2: Battery assembly of pneumatic solenoids in explosion-proof design on a valve line

If an arrangement of several devices is made by a battery assembly in accordance to the distances x and y, the devices may have negative thermal influences against each other. In such cases please contact us indicating the present case of application: • Valve dimensions

- Denomination of the distances x, y
- Duty cycle of the different solenoids
- Temperature at the area of application
- Temperature of medium (hydraulic oil, air, etc.)



6.4 Protection Class According to IEC/EN 60529, Corrosion Protection, Mechanical Strength

Besides the protection classes described under point 4 the IP protection classes according to IEC/EN 60529 (VDE 0470-1) are relevant for explosion-proof control solenoids for

- protection against contact
- protection against foreign objects
- protection against ingress of water
- concerning operational safety.

Explosion-proof MSM control solenoids are designed among others for a protection class of min. IP54 for G (gas explosive areas) resp. IP65 for D (areas with combustible dust) according to IEC/EN 60529 (VDE 0470-1).

In order to execute the solenoids in explosion-proof design by preventive means – in addition to the requested protection type – also with

- adequate corrosion protection
- sufficient mechanical strength
- eventually higher protection class

concerning the requirements of the area of application, it is necessary to indicate in inquiries or orders - in addition to the requested protection type according to IEC/EN 60529 (VDE 0470-1) – detailed information about

- mechanical strength
- influence of water
- · influence of aggressive media

and similar information about the area of application as e.g.:

- unprotected installation outside
- installation in a control cabinet
- assembly on a ship deck
- relative humidity
- etc.

6.5 Limitation of Over-voltage

Inductance (inductance – L) causes high voltage peaks when switching off DC control solenoids.

In order to exclude these phenomenon and for safety reasons explosion-proof DC control solenoids are provided with a protective circuit which is integrated in the solenoid and situated in parallel to the exciter coil.

(see fig. 6.5.1 and fig. 6.5.2)





Wiring diagram DC version

Wiring diagram AC version

•

ò

Fig. 6.5.1: Wiring diagram for

- DC version with protective circuit bidirectional diode
- AC version with protective circuit diode and rectifier

Fig. 6.5.2:

Wiring diagram for

 DC version with protective circuit varistor

• AC version with protective circuit varistor and rectifier

If no protective circuit exists the over-voltage has to be limited externally with appropriate means.

7. Production and Test of Explosion-proof Control Solenoids

In *m*-manufacturing the production of individual parts for the solenoids, the assembly and the test according to the relevant regulations and standards are only carried out by particularly skilled and qualified workers.

All individual parts which are important for the explosion protection are checked with a testing accuracy of 100%. By means of construction and test prescriptions details for a realisation of a safe explosion protection are reliably verified.

After a successful detailed conformity inspection each device is separately marked and the test results of the individual parts and of the finished devices are accurately recorded in detailed test reports.

For *P*-ATEX executions of explosion-proof control solenoids an instruction manual is delivered with each device for category 2. This instruction manual contains information about ambient conditions, installation and starting up as well as information about assembly and detailed technical data. It has to be respected by the user in any case!

Betriebsanleit	ung	BA013433-00
Ventilmagnet GBRE 0 Valve Solenoid	22 L01 B01	
EU-Baumusterprüfbescheinigung EU-Type Examination Certificate	IBExU 15 ATEX 1017 X	
IECEy Cartificate of Conformity	IECEx IBE 14.0052X	
IECEX Certificate of Comonnity		
Explosionsschutz ATEX / IECEx Explosion protection ATEX / IECEx	6637 🕢 II 2G Ex mb I II 2D Ex mb I	IIC T5 Gb IIC T95°C Db
Explosion state of contorning Explosion protection ATEX / IECEx Angewandte Normen	CE 0637 (II 2G Ex mb II 2D Ex mb EN 60079-0:2018 (IE	IIC T5 Gb IIC T95°C Db C 60079-0:2017)
Explosionsschutz ATEX / IECEx Explosion protection ATEX / IECEx Angewandte Normen Applied standards	CE 0637 II 2G Ex mb II 2D Ex mb I	IC T5 Gb IIC T95°C Db C 60079-0:2017) C 60079-18:2017)
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Explosionsschutz ATEX / IECEx Explosion protection ATEX / IECEx Explosion protection ATEX / IECEx Angewandte Normen Applied standards Schutzart gemäß IEC / EN 60529 Protection System acc. to IEC / EN 60529 Schutzkissee gemäß DIN VDE 6680	0637 III 2G Ex mb i EN 60079-0.2018 (EE	IIC T5 Gb IIC T95°C Db C 60079-0-2017) C 60079-18-2017) intended assembly)
Explosionsschutz ATEX / IECEx Explosion protection ATEX / IECEx Explosion protection ATEX / IECEx Angewandte Normen Applied standards Schutzart gemäß IEC / EN 60529 Protection System acc. to IEC / EN 60529 Schutzklasse gemäß DIN VDE 6880 Protection Class acc. to IEU / IEO 6880 Protection Class acc. to IUN VDE 6890 Mitgletiende Unterlagen:	0637 III 2G Ex mb i EN 60079-0.2018 (EE EN 60079-0.2018 (EE EN 60079-18.2015 + A1:2017 (EE IP65 (be bestimmungsgemäßer Mortage) / (with I I	IIC T5 Gb IIC T95°C Db C 60079-0.2017) C 60079-18:2017) intended assembly)
Exclosionsschutz ATEX / IECEx Explosion protection ATEX / IECEx Explosion protection ATEX / IECEx Angewandte Normen Applied standards Schutzart gemäß IEC / EN 60529 Protection Issystem acc. to IEC / EN 60529 Protection Issa ec. to IEC / EN 60529 Protection Issa ec. to IEC / EN 60529 Protection Classe ec. to IEV 006 650 Protection Classe II Development of Conformitiv	0637 III 2G Ex mb i EN 60079-0,2018 (EE EN 60079-0,2018 (EE EN 60079-18,2015 + A1:2017 (EE IP65 (tei bestimmungsgemäßer Mortage) / (with I DC0113433	IIC T5 Gb IIC T95°C Db C 60079-0-2017) C 60079-18-2017) intended assembly)
IECEX definition of commonly Explosions protection ATEX / IECEX Explosions protection ATEX / IECEX Angewandle Normen Applied standards Schutzart gemäß IEC / EN 60529 Protection System acc. to IEC / EN 60529 Schutzklasse gemäß DIN VDE 0580 Protection Class acc. to IEV / EN 60529 Schutzklasse gemäß DIN VDE 0580 Protection Class acc. to IEV / EN 60529 Evotection Clas	0637 III 2G Ex mb i EN 60079-0,2018 (ER EN 60079-0,2018 (ER EN 60079-18,2015 + A1:2017 (ER IP65 (Ex) bestimmungsgemäßer Mortage) / (with L DC0134333 G013433	IIC T5 Gb IIC T95°C Db C 60079-0-2017) C 60079-18-2017) intended assembly)
Even of initial of comonity Explosion protection ATEX/IECEx Explosion protection ATEX/IECEx Angewandte Normen Applied standards Schutzart gemäß IEC / EN 60529 Frotection Cases gemäß DIN VED 6580 Mitgeltende Unterlagen: Related Documents: EU-Konformitätserklärung EU-Aberlamiton Conformity Maßbild Dimensional dewring Kanninionbiatt Dugram aheet	0637 III 2G Exmbit EN 60079-0.2018 (EE EN 60079-18.2015 + A1 2017 (EE IP65 (bet bestimmungsgemäßer Montage) / (with I DC013433 G013433<	IIC T5 Gb IIC T59C Db 2 60079-0-2017) 2 60079-18-2017) intended assembly)
IECE Voluments of community Explosion protection ATEX / IECEx Explosion protection ATEX / IECEx Angewandte Normen Applied standards Schutzart gemäß IEC / EN 60529 Protection System acc. to IEC / EN 60529 Protection System acc. to IEC / EN 60529 Protection Class acc. to DIV VDE 6580 Protection Class acc. to DIV VDE 6580 Protection Class acc. to Class Evolution Clas	0637 III 2G Ex mb il EN 60079-0.2018 (EE EN 60079-18.2015 + A1:2017 (EE IP65 (cei bestimmungsgemäßer Mortage) / (with I DC013433 G013433<	IIC T5 G9 IIC T5 G9 5 60079-0-2017) 5 60079-18:2017) Intended assembly)

Figure 7.1: Example, ATEX operating manual

EU DECLARATION OF CONF DÉCLARATION DE CONF	ONFORM FORMITÉ	UE	ouur Mirti	
DC013433-003				
Wir (Name des Anbieters) We (name of supplier) Nous (nom du fournisseur)		Magnet-Sc	chultz GmbH & Co. KG	
Anschrift		Aligäuer S	traße 30	
Address Adresse		87700 Mer Germany	nmingen	
erklären in alleiniger Verantwortung, dass declare under our sole responsibility that déclarons sous notre propre responsabilit	i das Produkt: the product: lé que le produi			
Bezeichnung		Ventilmag	net	
Name		Valve Sole	Valve Solenoid	
reom		Electro-air	Electro-aimant pour électro-vannes	
Type, Modell		GBRE 022	GBRE 022 L01 B01	
Type, modèle		• ** 🖑 FP	8	
mit zusätzlicher Kennzeichnung with artifikingal marking		IBExU 15	ATEX 1017 X	
avec marquage supplémentaire	€ 0637	Ex II 2G Ex m	b IIC T5 Gb	
2014/34/EU 2014/34/EU 2014/34/UE				
Die Anforderungen der Normen The requirements of the standards Les exigences des normes		EN 60079- EN 60079-	0:2018 18:2015 + A1:2017	
		DIN VDE 0	580:2011	
werden erfüllt.				
will be met. sont remplies.				
Benannte Stelle der EG-Baumusterprüfung: Notified body of EC type examination: L'organisme notifié responsable de l'examen C Kennnummer / identification number / numéro	E de type: d'identification:	IBExU Instit Fuchsmühle D-09599 Fre 0637	ut für Sicherheitstechnik GmbH nweg 7 siberg, Germany	
	0	Magnet-S	chultz GmbH & Co. KG	
Memmingen, 14.11.2018	tio	0.04	in two	
Ort und Datum der Ausstellung Leitin Place and date of issue R&D M Lieu et date de délivrance Direct	p. Peter Tappe g Konstruktion Er Anager on Construction I	bwicklung Développement	DiplIng. (FH) Peter Miller Leitung Qualitätssicherung Quality Assurance Manager Direction Assurance Qualité	
Diese Enlarung entepricht EN ISO/IEC 17050-1 This deck	aration corresponds to	EN ISOREC 17050-1 0	Sette déclaration correspond à EN ISO/IEC 17050-1	
Meanet-Bohute Grebh & Co. KG Allower Strafe 30 D.67	700 Methingen 1 Tel.	+49 83311040 Fax +4	i 83.31 10.43.33 ° info@Magnet-Schultz.com ° www.Magnet-S	

Figure 7.2: Example, ATEX declaration of conformity

Additionally a manufacturer's CE certificate of conformity is delivered for and joint to each delivery lot (devices for category 2 and category 3). This certificate of conformity proves that the respective -control solenoid is conform to the underlying EC-Type Examination Certificate (devices for category 2) resp. to the manufacturer's examinations (devices for category 3) and that it fulfills the requirements of the respective standards and the prescriptions of the EC directive 2014/34/EU.

According to directive 1999/92/CE the instruction manual and / or the certificate of conformity have to be respected by the raiser / user and have to be joined to the explosion protection document for documentation.

IECEx executions of explosion-proof control solenoids are also delivered with a correspondent instruction manual.

The correspondent certificate of conformity (CoC) and the Quality Assessment Report (QAR) are stored on the homepage of IECEx (www.iecex.com) where they can be seen and printed if required.

8. Regulations, Standards and Provisions

For the constructive development, design and test of explosion-proof control solenoids the following points 8.1 up to 8.17 are taken into consideration according to table 8.1.

8.1	IEC / EN 60079-0 (VDE 0170-1)	Potentially explosive atmospheres Equipment general requirements
8.2	IEC / EN 60079-1 (VDE 0170-5)	Potentially explosive atmospheres - Equipment protection by flameproof enclosures "d"
8.3	IEC / EN 60079-2 (VDE 0170-301)	Potentially explosive atmospheres - Equipment protection by pressurized enclosure "p"
8.4	IEC/EN 60079-5 (VDE 0170-4)	Potentially explosive atmospheres - Equipment protection by powder filling ,,q"
8.5	IEC / EN 60079-6 (VDE 0170-2)	Potentially explosive atmospheres - Equipment protection by liquid immersion "o"
8.6	IEC / EN 60079-7 (VDE 0170-6)	Potentially explosive atmospheres - Equipment protection by increased safety "e"
8.7	IEC / EN 60079-11 (VDE 0170-7)	Potentially explosive atmospheres - Equipment protection by intrinsic satety "i"
8.8	IEC / EN 60079-15 (VDE 0170-16)	Potentially explosive atmospheres - Equipment protection by type of protection "n"
8.9	IEC / EN 60079-18 (VDE 0170-9)	Potentially explosive atmospheres - Equipment protection by encapsulation "m"
8.10	IEC / EN 6124160079-31 (VDE 0170-15-1)	Potentially explosive atmospheres - Equipment dust ignition protection by enclosure "t"
8.11	IEC / EN 60079-17 (VDE 0165-10-1)	Potentially explosive atmospheres Electrical installations inspection and maintenance
8.12	DIN VDE 0580	Electromagnetic devices and components - General requirements
8.13	IEC / EN 60529 (VDE 0470-1)	Degrees of protection provided by enclosures (IP Code)

Table 8.1: Regulations, standards and provisions

9. Actuators in Explosion-proof Execution

As reputable and potential manufacturer of explosion-proof solenoids as able to provide a wide and manifold programme for explosion-proof electromagnetic actuators in different ignition protection classes according to the effective regulations.



Fig. 9.1: Direct current single solenoids Type G TC E for electromechanical applications

🖾 II 2G Ex eb mb IIC T4/T5 Gb



Fig. 9.2: Direct current single solenoids consisting of solenoid body type F MM E and tube type F MT X for electromechanical applications

II 2G Ex eb mb IIC T6 / T4 Gb
 II 2D Ex tb IIIC T80°C / T130°C Db



Fig. 9.3: Locking units pulling or pushing or pushing version consisting of solenoid body type F MM E and tube type F ST X for electromechanical applications

II 2G Ex eb mb IIC T6 / T4 Gb
 II 2D Ex tb IIIC T80°C / T130°C Db



Fig. 9.4: Switching and proportional solenoids Type GHPE 037... / GRCE 037... for hydraulic applications

II 2G Ex mb IIC T4 Gb
 II 2D Ex mb IIIC T130°C Db



Fig. 9.5: Switching and proportional solenoids consisting of solenoid body type F MM E and tube type F HT S or F HT P for hydraulic applications

II 2G Ex eb mb IIC T6 / T4 Gb
 II 2D Ex tb IIIC T80°C / T130°C Db



Fig. 9.6: Switching and proportional solenoids consisting of solenoid body type F MM E _L02 and tube type F HT S or F HT P for hydraulic applications

II 2G Ex mb IIC T5 Gb
 II 2D Ex mb IIIC T95°C Db



Fig. 9.8: Valve solenoid Type GBRE 022 ... for pneumatic applications

II 2G Ex mb IIC T6/T5 Gb
 II 2D Ex mb IIIC T80°C/T95°C Db

For further information please refer to our homepage. Please ask the support of our responsible technical office when required, or contact our headquarter.

