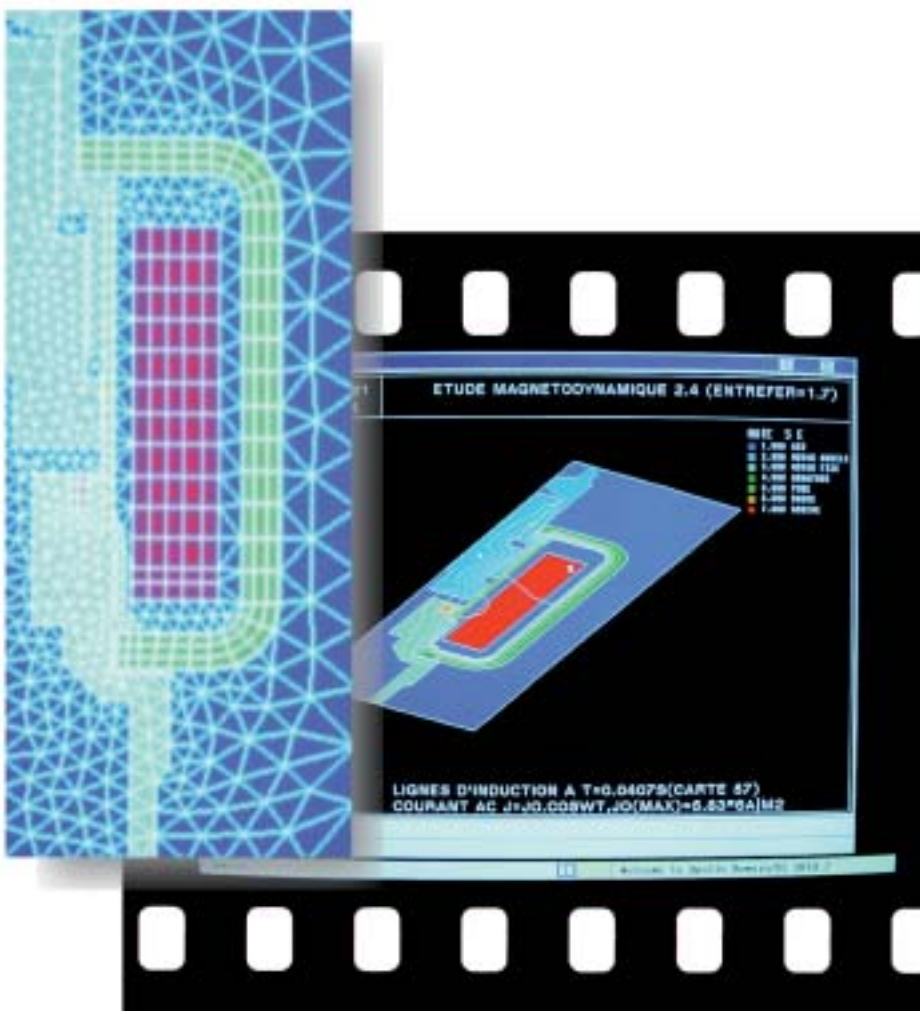
LUCIFER®

Coils | Housings
Electrical Parts

Catalogue 8700/GB
August 2002



Certified Management System ISO 9001/14001 Reg. No. 10440

Parker

Parker Lucifer SA

Perfect compatibility between a multinational approach and integration into the local industrial community.

Parker Lucifer's Valve Division, manufacturing fluid control solenoid valves and pressure regulators, is located in Carouge-Geneva, Switzerland with manufacturing sites both in Geneva and Gessate near Milan, Italy.

Established for over 80 years in Geneva, we are members of the "OPI" or Office for Industrial Promotion ever since it was set up in 1976.

With the multinational structure of the Parker Group we now have support that enables us to face the international market.

To date we are represented in over 50 Countries with an established network of distributors in each industrial market open to us.

Parker Lucifer is located in Geneva, Switzerland, a European communications and traffic centre.

This situation helps us in our policy of being close to our customers.

Mastering technologies in anticipation of your needs.

We aim always to stay a step ahead of our customers' demands.

You are looking for someone who has expertise in the latest technology, who has a solid body of know-how and who will participate directly in the development of your products.

Parker Lucifer takes advantage of the developments made in various divisions of Parker Corporation and, in doing so, of all the skills and synergy generated by our Group.

Parker's technology transfer policy provides us with the know-how of a global corporation. You derive direct advantage from this for our expertise in these technologies which enables us to anticipate your needs.

Total quality and innovation. Our strong points for building the future with you

Quality has now become the essential condition for the survival of a corporation. You know it. We know it.

Your future depends on offering your customers ever more efficient, more reliable products.

To do that, you have to be able to rely on first-rate suppliers who share your vision of the future and are capable of understanding your needs.

In order to better meet your demands and to ensure that we can offer you full guarantees of reliability, we have perfected a total quality program.

At the same time, we pursue a strategy of innovation both in our processes and functions as well as in safety.

In this way, we are already able to meet your needs and demands for the future.

Introduction

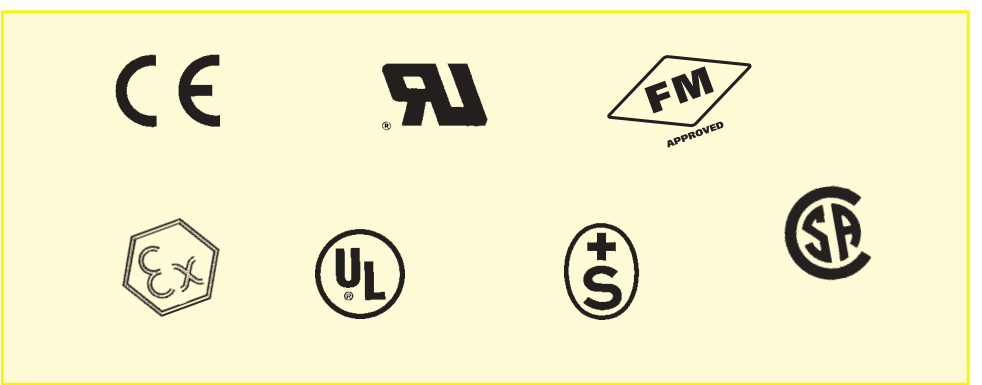
The 7000 or the 2000 Series is a unique valve range which allows various specific requirements to be met concerning the degree of protection of the electrical equipment. The modular concept, including the valve - housing - coil group, enables many application requirements to be met especially in the various explosion-proof protection classes. The full interchangeability between these electrical parts in combination with the AC or DC coil interchangeability, gives you the unique advantage of keeping your inventory of electrical parts to a minimum level.

Most Lucifer electrical parts are designed for continuous duty and permanent switch-on (100% ED). The encapsulation with synthetic material offers a most effective protection against mechanical damage, dust and moisture. The class of insulation material of the coils is generally F 155°C. High temperature resisting coils H 180°C are also available.

The voltage tolerance is generally -10% to +10% of the nominal voltage. Most of our coils can be mounted in various coil housings to suit various protection requirements. Please contact your local distributor for combinations other than those mentioned in the catalogue.

*The **available voltages** are stated for each coil type. Each voltage has been coded as a two-digit (alphanumerical) element in order to simplify and suit electronic order processing.*

***CENELEC, UL, CSA and other approvals -** A specific range of electrical parts corresponding to the European, American and Canadian standards is available on request. Please do not hesitate to ask your local distributor about it.*



Parker Lucifer SA
Fluid Control Division Europe
CH-1227 Carouge-Genève

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Housings or coil assembly kits, coils and electrical parts

Definitions:

Housing:
We define a **housing** as the combination of the fixing elements including the nameplate **(1)**, the cover **(2)** or the subplate **(6)** and the envelope itself **(4 or 5)** which protects the coil and its electrical components. The housings may be made of metal or plastic material.

Coil assembly kit:
The coil assembly kit **(7 or 9)** is the set comprising a plate, washer and nut. Sometimes coil assembly kits consist only of a nut or a special fixing device.

Coil:
This consists of the winding and its plastic moulding. There are three different types of coils distinguished by their shape and dimensions: 40 mm **(3)**, 32 mm **(8)** and 22 mm **(10)**.

Electrical part:
The electrical part is the set comprising the housing, the assembly kit and the coil.

Warning:

Any Lucifer coil or electrical part may be energized **only when mounted on a valve**.
Otherwise there is a risk of damaging the product and its surroundings (overheating, explosion, fire, etc.).

The data supplied in the Parker Lucifer Catalogs are to be consulted, and pertinent accident prevention regulations are to be followed during product installation and use. Any unauthorized work performed on the product by the purchaser or by third parties can impair its function, and relieves us of all warranty claims and liability for any resulting damage.

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Part 1: Housings or coil assembly kits

1.1 Coil housing with screw terminals

1.1.1 Standard housing

Reference: 4270 or **E0**

Material: epoxy-coated steel

Degree of protection: **IP** according to IEC/EN 60529
IP 10 with armoured conduit
IP 44 with cable gland

Electrical connection:

Can be made with armoured conduit or cable gland Pg9. Parts No. 484092 and 484093 (cable gland Pg9) to be ordered separately.

Grounding connection by screw M3 on the inside of housing base plate.

Weight: 120 g.

Benefits:

This metal housing offers the ideal protection against shocks and corrosion – rotatable 360° – easy mounting in confined spaces – single-nut mounting – light weight – simplifies conversion of existing equipment to other requirements.

Application:

The majority of the Lucifer valves can be fitted with this standard housing, and can be mounted with several compatible Lucifer coils.

Compatible coils:

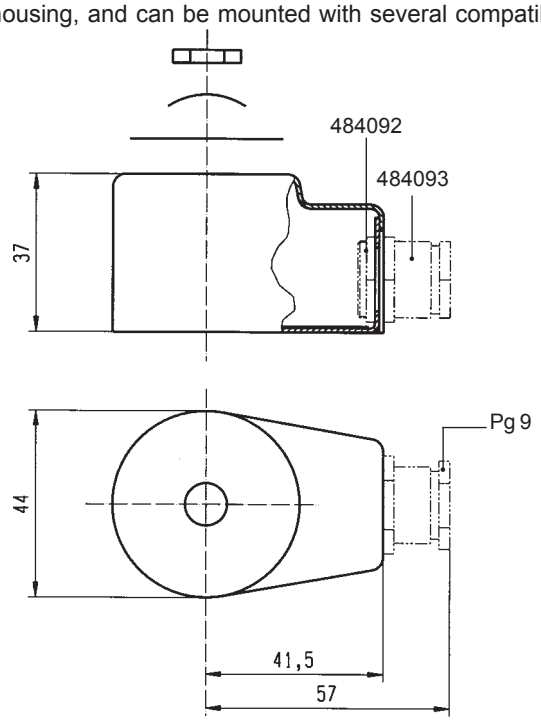
481000 or **EZ01**
Standard coil,
8 W, class F (155°C), page 12

483520 or **EZ90**
Double-frequency coil,
9 W, class F (155°C), page 12

481044 or **EZ91**
Standard high-power coil,
14 W, class F (155°C), page 12

485100 or **EZ02**
Standard high-temperature coil,
8 W, class H (180°C), page 12

486265 or **EZ92**
High-temperature and high-power coil,
14 W, class H (180°C), page 12



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1.1.2 Housing for bistable (impulse) coils

Reference: 4269 or **E1**

Material: epoxy-coated steel

Degree of protection: **IP** according to IEC/EN 60529
IP 10 with armoured conduit
IP 44 with cable gland

Electrical connection:

Can be made with armoured conduit or cable gland Pg9. Cable gland Pg9 no. 484092 and 484093 to be ordered separately.

Grounding connection by screw M3 on the inside of housing base plate.

Weight: 120 g.

Benefits:

This metal housing offers the ideal protection against shocks and corrosion – rotatable 360° – easy mounting in confined spaces – single-nut mounting – light weight – simplifies conversion of existing equipment to other requirements.

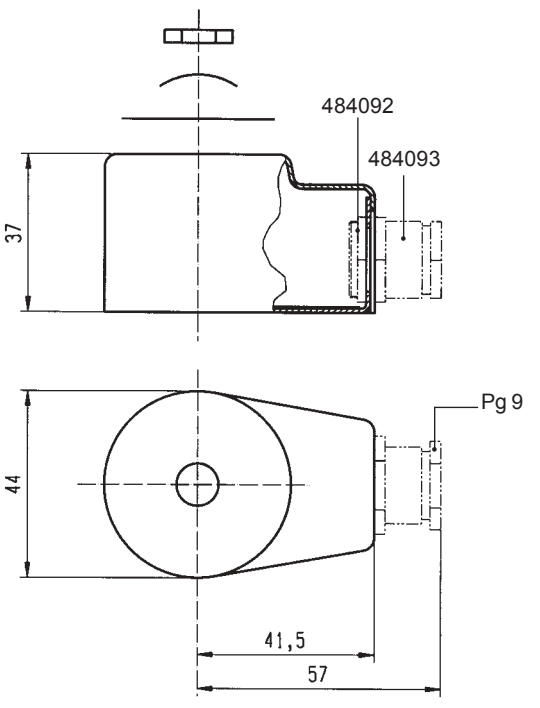
Application:

This housing is specially designed for group 4 coils and can be mounted only with valves controlled by electrical impulses.

Compatible coils: Gr. 4

484990 or **MZ01**
Impulse coil for AC,
11 W, class F (155°C), page 13

485400 or **MZ02**
Impulse coil for DC,
13 W, class F (155°C), page 13



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1.2 Waterproof and dustproof housing

1.2.1 Waterproof housing

Reference: 4538 or **G1** **M20 x 1.5**

Material: Galvanized passivated steel

Degree of protection: **IP** according to IEC/EN 60529
IP 67 with cable gland

Electrical connection:

Cable connection by cable gland according to DIN 46320. Cable with outer diameter 6.5 -13.5 mm (M20 x 1.5) can be simply sealed using a rubber gland with resilient sealing rings.

The enclosure is internally and externally fitted with grounding and earthing screw terminals.

Weight: 180 g.

Benefits:

This enclosure is dust- and waterproof. It corresponds to the degree of ''International Protection'' **IP 67** according to IEC / EN 60529. Corrosion resistant, the metal housing offers good protection for the coil against shocks and other outside influences – rotatable 360° – easy mounting in confined spaces – easy access to the screw terminals – single-nut mounting – light weight – simple conversion of existing electrical equipment to other requirements without interruption of fluid passage in the valve.

Application:

This housing can be equipped with several coils of our programme, like the standard, double-frequency and magnetic latch coils

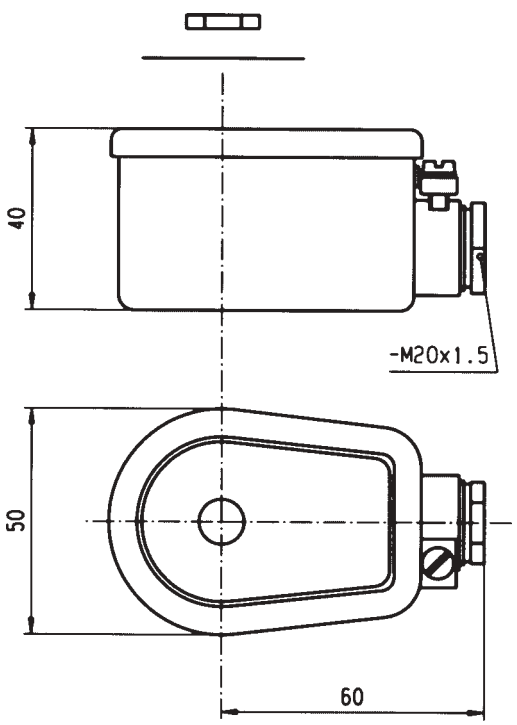
Compatible coils:

481000 or **EZ01**
Standard coil,
8 W, Class F (155°C), page 12

483520 or **EZ90**
Double-frequency coil,
9 W, class F (155°C), page 12

484990 or **MZ01**
Impulse coil for AC,
11 W, class F (155°C), page 13

485400 or **MZ02**
Impulse coil for DC,
13 W, class F (155°C), page 13



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1.2.2 Waterproof housing for high-temperature coils

Reference: 8520 or **G5** **M20 x 1.5**

Degree of protection: **IP** according to IEC/EN 60529
IP 67 with cable gland

Electrical connection:

Cable connection by cable gland according to DIN 46320. Cable with outer diameter 6.5 - 13.5 mm can be simply sealed using a rubber gland with resilient sealing rings.

The enclosure is internally and externally fitted with grounding and earthing screw terminals.

Weight: 180 g.

Benefits:

This enclosure is dust- and waterproof. It corresponds to the degree of ''**I**nternational **P**rotection'' **IP 67** according to IEC / EN 60529. Corrosion resistant, the metal housing offers good protection for the coil against shocks and other outside influences – rotatable 360° – easy mounting in confined spaces – easy access to the screw terminals – single-nut mounting – light weight – simple conversion of existing electrical equipment to other requirements without interruption of fluid passage in the valve.

Application:

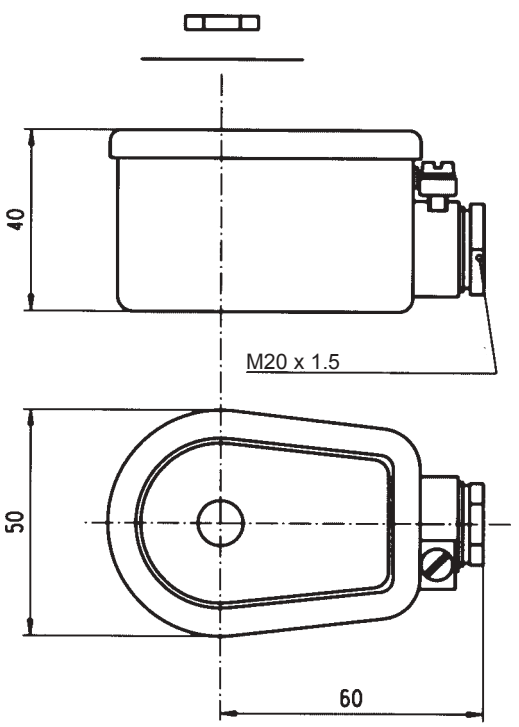
The majority of the Lucifer valves can be fitted with this housing and can be mounted with several compatible Lucifer coils for high temperature (14W, 8W class F or H).

Compatible coils:

481044 or **EZ91**
High power coil,
14 W, Class F (155°C), page 12

486265 or **EZ92**
High power coil,
14 W, class H (180°C), page 12

485100 or **EZ02**
Coil for high temperature,
8 W, class H (180°C), page 12



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1.3 Coil assembly kits

1.3.1 Coil assembly kit for 22 mm coil

The coil assembly kit corresponds to the numbering system for Lucifer valve housings (Valve-housing - coil - voltage).

It is composed of a nameplate with the details of the valve type, a washer and a nut to secure the 22 mm coil to the valve.

Reference	Code	Specification	Application
8993	**A0**	Standard - aluminium nameplate - passivated washer and nut - pressure indication in [bar]	Standard valves
8993.03	**A1**	Standard - aluminium nameplate - passivated washer and nut - pressure indication in [psi]	Standard valves
8122	**A2**	Special - aluminium nameplate - stainless steel washer and nut - pressure indication in [kPa]	316L St. Steel Valves
8567	**A3**	Special - knurled flat aluminium nut	Water valves- series 321K3...

1.3.2 Coil assembly kit for 32 mm coil

The coil assembly kit corresponds to the ‘‘housing’’ of Lucifer valve numbering system (Valve - housing - coil - voltage).

It is composed of a nameplate giving details of the valve type, a round washer and a nut to ensure the fixing between 32 mm coil and the valve.

Reference	Code	Specification	Application
2995	**N1**	Standard - aluminium nameplate - passivated iron washer and nut - pressure indication in [bar]	Standards valves
2995.03	**N3**	Standard - aluminium nameplate - passivated iron washer and nut - pressure indication in [kPa]	UL / CSA valves
8132	**NL**	Special - aluminium nameplate - stainless steel washer and nut - pressure indication in [psi]	316L St. Steel valves

1.3.3 Coil assembly kit for 32 mm CPR coils

It is composed of a plastic nut with a metal insert to secure the 32 mm CPR coil to the valve.

Reference	Code	Specification	Application
8886	**NT**	Plastic nut with metal insert	CPR valves

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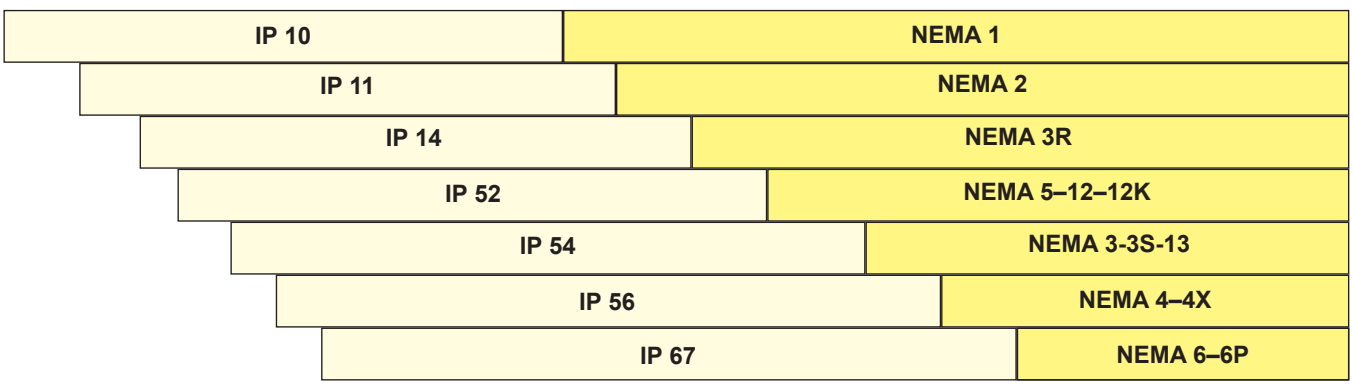
1.4 Degrees of protection "IP"

Full-enclosure protection is often required, either in the standards concerning ''potentially explosive environments'' or for other specific needs.

First figure indicates protection against dangerous access and foreign objects	Index	IP	Index	Second figure indicates protection against water penetration
Non-protected	0		0	Non protected
Protected against solid objects Ø 50 mm or more	1		1	Protected against vertically falling water drops
Protected against solid objects Ø 12.5 mm or more	2		2	Protected against vertically falling water drops when enclosure tilted 15°
Protected against solid objects Ø 2.5 mm or more	3		3	Protected against spraying water up to 60° from vertical
Protected against solid objects Ø 1 mm or more	4	5 4	4	Protected against splashing water from any direction
Dust-protected	5		5	Protected against jets of water from any direction
Dust-tight	6		6	Protected against powerful jets of water from any direction
			7	Protected against immersion
			8	Protected against continuous immersion

Correlation between IP (IEC) and NEMA[1] 250 standards



[1] NEMA: National Electrical Manufacturers Association (USA)

The enclosures to NEMA standards 7 to 10 concern equipment for hazardous areas.

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Part 2: Coils

Groups:

Lucifer coils and electrical parts are classified by groups determining their compatibility with Lucifer solenoid valves.

In this catalogue you will find the global reference of these groups which is given in most Lucifer catalogues.

The global reference of these groups is composed of one number (principal reference from 1 to 12) defined as follows:

1 Application on valves of 2000 series with 22 mm pilot

2 Application on standard valves or on 7000 series with M20 x 1 pilot

3 Specific application

4 Application on standard valves or on 7000 series with magnetic latch pilot

5 Application on special valves for flameproof electrical parts

6 Application on standard valves or on 7000 series, for coils and low-power electrical parts

7 Application on standard valves or on 7000 series, for intrinsically safe coils and electrical parts

8 Application on special valves, for intrinsically safe coils and electrical parts with booster

9 Application on special valves, for CPR or Offshore coils and electrical parts

10 Application on valves for Offshore coils and electrical parts

11 Application flameproof ‘‘d’’ for Offshore coils and electrical parts

12 Application on Offshore valves with manual reset.

How to order:

1. Valve reference or global reference
2. Housing reference or global reference
3. Coil / electrical part or global reference
4. Voltage or voltage code (see table on page 64)

Ordering example:

121K0756-2995-481865-220-230/50 **or**
7121KBG2LVM0-2995-481865 3D **or**
7121KBG2LVM0-N1-DZ02 3D

Important: valve, housing or coil can be ordered separately for use as a replacement or spare part.

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2.1 Coils with screw terminals:

2.1.1 Standard coils

2

These coils can be mounted with the majority of the Lucifer solenoid valves. They can be mounted with all Lucifer metal housings. The coil winding is completely encapsulated in synthetic material. Easy mounting in confined spaces. Electrical connection with screw terminals for wire up to 1.5 mm².

CE

This coil conforms to the IEC/CENELEC safety standards and complies with European low-voltage directive 73/23/EC.

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Coil / specification			Standard	Double frequency	High power	High temperature	High temp. + high power
Reference			481000 or **EZ01**	483520 or **EZ90**	481044 or **EZ91**	485100 or **EZ02**	486265 or **EZ92**
Class of insulation			F 155°C	F 155°C	F 155°C	H 180°C	H 180°C
Ambient temperature			-40°C to +50°C	-40°C to +50°C	-40°C to +50°C	-40°C to +80°C	-40°C to +80°C
			The application is limited also by the temperature range of the valve				
Elect. Power	**DC**	**Pn** (hot)	8 W	-	-	8 W	14 W
		P (cold) 20°C	9 W	-	-	9 W	21 W
	AC	**Pn** (holding)	8 W	9 W	14 W	8 W	14 W
		Attraction cold	32 VA (9 W)	36 VA (10 W)	56 VA (20 W)	32 VA (9 W)	56 VA (20 W)
Weight			130 g	130 g	130 g	140 g	140 g

Voltage tolerance: -10% to +10% of Un (-15% to +5% for double-frequency coil with voltage code S6 if 240 V/50/Hz is used).

Duty: Continuous duty coil (ED 100%)

Voltages: see voltage code table

Mounting: examples

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2.1.2 Bistable (impulse) coils

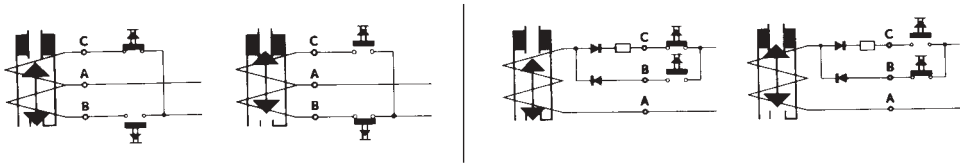
4

These coils are specially designed for Lucifer bistable (or impulse or magnetic latch) solenoid valves.

They can be mounted only with the Lucifer metallic housing 4269. The coil winding is completely encapsulated in synthetic material. Easy mounting in confined spaces. Electrical connection with screw terminals for wire up to 1.5 mm².

CE

This coil conforms to the IEC/CENELEC safety standards and complies with European low-voltage directive 73/23/EC.

Coil / Specification			Direct Current		Alternating Current
Diagram			 Only an electrical impulse given to terminals A-C reverses the magnetic field. This magnetic field demagnetises the reversible magnet enough to allow the return spring to bring the plunger back to its initial position and close the valve.		
Length of impulses			Switch on (terminals A-B): minimum 50 ms Switch off (terminals A-C): minimum 35 ms		
Reference			485400 or **MZ02**	* 482245 or **MZ90**	484990 or **MZ01**
Electr. Power consuption	**DC**	Attraction (hot)	13 W	13 W	-
		Attraction (cold)	19 W	19 W	-
		Release (hot)	8 W	8 W	-
		Release (cold)	10 W	10 W	-
	AC	Attraction (hot)	-	-	11 W
		Attraction (cold)	-	-	17 W
		Release (hot)	-	-	4 W
		Release (cold)	-	-	7 W

* Electrical part IP67; contact your distributor for details.

Class of insulation material: F 155°C

Ambient temperature: -20°C to +50°C

Voltage tolerances: -10% to +10% of the nominal voltage

Voltages: See voltage code table

Duty: Continuous duty coil (ED 100%)

Weight: 150 g

Mounting: example

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2.2 Coils for DIN plug connection:

2.2.1 32 mm Coils

2

These coils can be mounted with the majority of the Lucifer solenoid valves. This is an encapsulated assembly comprising a coil, integral magnetic iron path and snap-on plug connection. The synthetic material encapsulation provides an effective compact housing, offering full protection against dust, oil, water, etc. Ease of mounting in confined space - offers shock and corrosion protection - simplifies conversion of existing equipment to other requirements, etc.

CE

This coil conforms to the IEC/CENELEC safety standards and complies with European low-voltage directive 73/23/EC.

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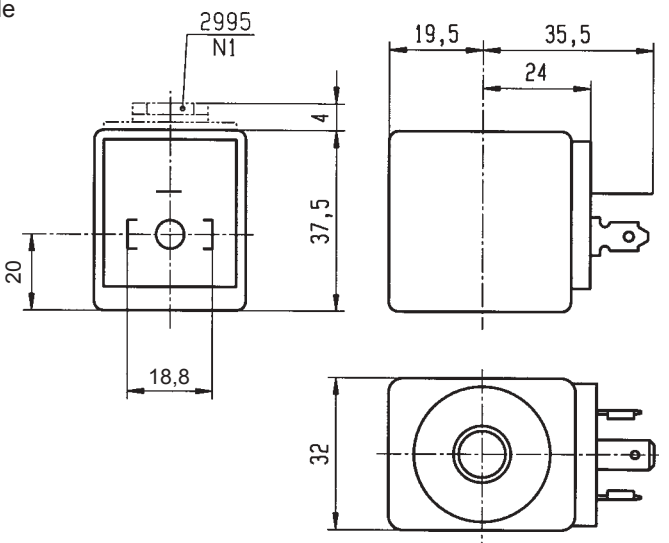
Specification			Standard	Double frequency	Reduced power	High temperature	High temp. + High power
Ref. (without plug) **Ref.** (with plug)			481865 or **DZ02** 482725 or **DZ03**	483510 or **DZ06** 482635 or **DZ07**	482730 or **DZ90** 482735 or **DZ91**	492453 or **DZ04** 492726 or **DZ05**	492425 or **DZ08** 492727 or **DZ09**
Degree of protection			IP65 according to IEC / EN 60529 standards (with plug connection)				
Class of insulation			F 155°C	F 155°C	F 155°C	H 180°C	H 180°C
Electrical connection			The coil is connected with a 2 P + E plug according to DIN 43650 type A				
Ambient temperature			-40°C to +50°C The application is limited also by the temperature range of the valve	-40°C to +50°C	-40°C to +50°C	-40°C to +80°C	-40°C to +80°C
Elect. Power	**DC**	**Pn** (hot)	9 W	-	7 W	9 W	14 W
		P (cold) 20°C	12 W	-	9 W	12 W	21 W
	AC	**Pn** (holding)	8 W	9 W	6 W	8 W	14 W
		Attraction cold	26 VA (9 W)	32 VA (10 W)	20 VA (7 W)	26 VA (9 W)	55 VA (18 W)

Voltage tolerances: -10% to +10% of the nominal voltage

Duty: Continuous duty coil (ED 100%)

Voltages: see voltage code table

Weight: 130 g (without plug)



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2.2.1.1 32 mm UL-recognized Coil

2

These coils can be mounted with the majority of the Lucifer solenoid valves. This is an encapsulated assembly comprising a coil, integral magnetic-iron path and snap-on plug connection. The synthetic material encapsulation provides an effective compact housing, offering full protection against dust, oil, water, etc. Ease of mounting in confined space - offers shock and corrosion protection - simplifies conversion of existing equipment to other requirements, etc.

This coil is UL-approved as a recognized component for the insulation class F, conforms to the IEC/CENELEC safety standards and complies with European low-voltage directive 73/23/EC.

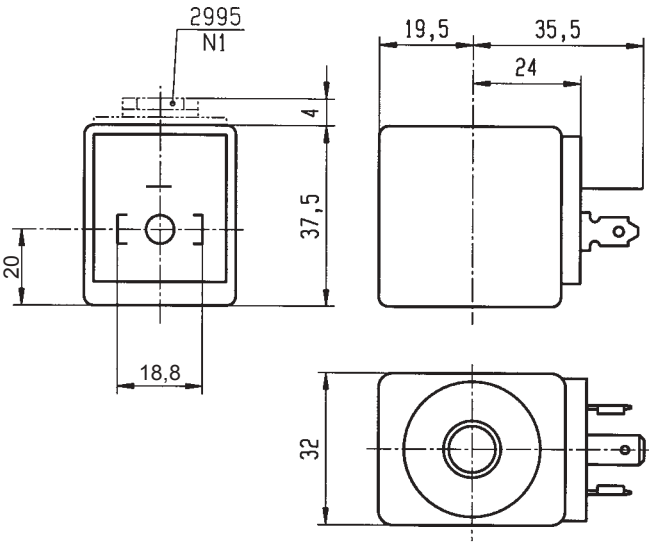
Specification			UL-recognized coil - UL File E125678 - designation AMIF	
Reference (without plug) **Reference** (with plug)			491514 or **D400**	491514 or **D500**
Degree of protection			**IP65** according to IEC / EN 60529 standards (with plug connection)	
Class of insulation			F 155°C	F 155°C
Electrical connection			The coil is connected with a 2 P + E plug according to DIN 43650 type A	
Ambient temperature			-40°C to 50°C The application is limited also by the temperature range of the valve	- 40°C to 50°C
Elect. Power	**DC**	**Pn** (hot)	-	12 W
		P (cold) 20°C	-	16 W
	AC	**Pn** (holding)	11 W	-
		Attraction cold	40 VA (13 W)	-

Voltage tolerances: -15% to +10% of the nominal voltage

Duty: Continuous duty coil (ED 100%)

Voltages: see voltage code table

Weight: 130 g (without plug)



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2.2.1.2 32 mm Miniwatt Coil

6

This reduced power coil is compatible with certain types of Lucifer solenoid valves only. This is an encapsulated assembly comprising a coil, integral magnetic iron path and snap-on plug connection. The synthetic material encapsulation provides an effective compact housing, offering full protection against dust, oil, water, etc. Ease of mounting in confined space - offers shock and corrosion protection - simplifies conversion of existing equipment to other requirements, etc.

CE

This coil conforms to the IEC/CENELEC safety standards and complies with European low-voltage directive 73/23/EC.

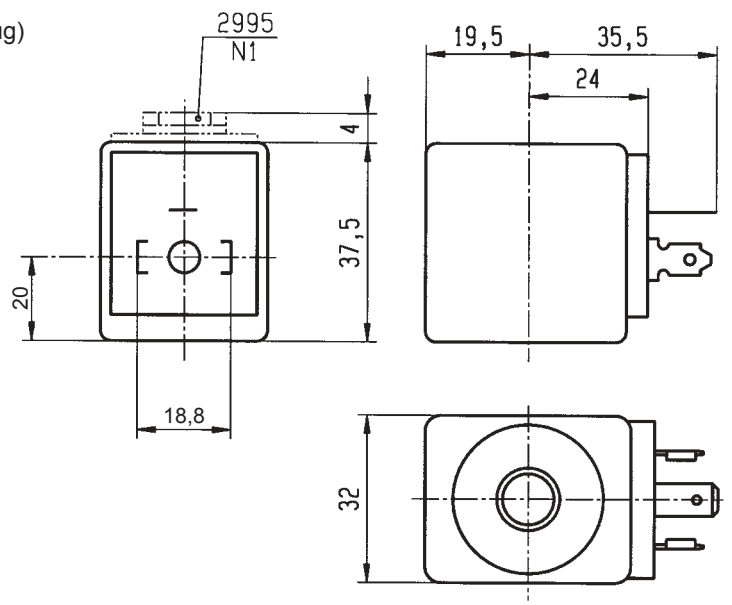
Specification			Miniwatt
Reference (without plug) **Reference** (with plug)			482740 or **DZ10** 482745 or **DZ11**
Degree of protection			**IP65** according to IEC / EN 60529 standards (with plug connection)
Class of insulation			F 155°C
Electrical connection			The coil is connected with a 2 P + E plug according to DIN 43650 type A
Ambient temperature			-40°C to +50°C The application is limited also by the temperature range of the valve
Elect. Power	**DC**	**Pn** (hot)	1.6 W
		P (cold) 20°C	2.1 W
	AC	**Pn** (holding)	-
		Attraction cold	-

Voltage tolerance: -10% to +10% of the nominal voltage

Duty: continuous duty coil (ED 100%)

Voltages: see voltage code table

Weight: 130 g (without plug)



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2.2.1.2 32 mm CPR Coil

9

This coil is compatible only with the Offshore and CPR* types of Lucifer solenoid valves. This is an encapsulated assembly comprising a coil, integral magnetic iron path and snap-on plug connection. The synthetic material encapsulation provides an effective compact housing, offering full protection against dust, oil, water, etc. Ease of mounting in confined space - offers shock and corrosion protection - simplifies conversion of existing equipment to other requirements, etc.
(* CPR = Chemical, Petrochemical and Refinery application)

CE

This coil conforms to the IEC/CENELEC safety standards and complies with European low-voltage directive 73/23/EC.

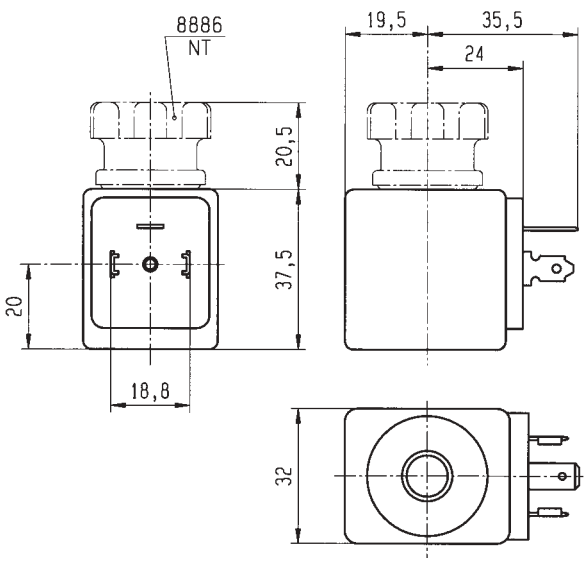
Specification			CPR
Reference (without plug) **Reference** (with plug)			492385 or **DZ92** 492387 or **DZ93**
Degree of protection			**IP65** according to IEC / EN 60529 standards (with plug connection)
Class of insulation			F 155°C
Electrical connection			The coil is connected with a 2 P + E plug according to DIN 43650 type A
Ambient temperature			-40°C to +50°C The application is limited also by the temperature range of the valve
Elect. Power	**DC**	**Pn** (hot)	9 W
		P (cold) 20°C	12 W
	AC	**Pn** (holding)	8 W
		Attraction cold	26 VA (9 W)

Voltage tolerance: -10% to +10% of the nominal voltage

Duty: continuous duty coil (ED 100%)

Voltages: see voltage code table

Weight: 130 g (without plug)



Important:

For AC voltage this coil must be mounted with a connector (DIN plug) including a rectifier bridge.

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2.2.2 22 mm Coil

1

This miniature coil is designed for valves equipped with a miniature tube assembly (2000 series valves). This is an encapsulated assembly comprising a coil, integral magnetic iron path and snap-on plug connection. The synthetic material encapsulation provides an effective compact housing, offering full protection against dust, oil, water, etc. Ease of mounting in confined space - offers shock and corrosion protection - simplifies conversion of existing equipment to other requirements, etc.

CE

This coil conforms to the IEC/CENELEC safety standards and complies with European low-voltage directive 73/23/EC.

Specification			Low power	High power	Standard UL / CSA*	Double frequency
Ref. (without plug) **Ref.** (with plug)			488980 or **DA01** 481045 or **DA02**	481180 or **DA03** 481530 or **DA04**	492912 or **DA05** 492919 or **DA06**	483590 or **DA07**
Degree of protection			IP65 according to IEC / EN 60529 standards (with plug connection)			
Classe of insulation			F 155°C	F 155°C	A 105°C for UL/CSA	F 155°C
Electrical connection			The coil is connected with a 2 P + E plug according to DIN 43650 type B			
Ambient temperature			-40°C to +50°C The application is limited also by the temperature range of the valve	-40°C to +50°C	-40°C to +50°C	-40°C to +50°C
Elect. Power	**DC**	**Pn** (hot)	2.5 W DC	5 W DC	4 W	-
		P (cold) 20°C	3 W	6.5 W	4.5 W	-
	AC	**Pn** (holding)	2 W	4 W	3 W	3 W
		Attraction cold	5.7 VA (2.5 W)	8.9 VA (5 W)	7.5 VA (4 W)	7.5 VA (4 W)

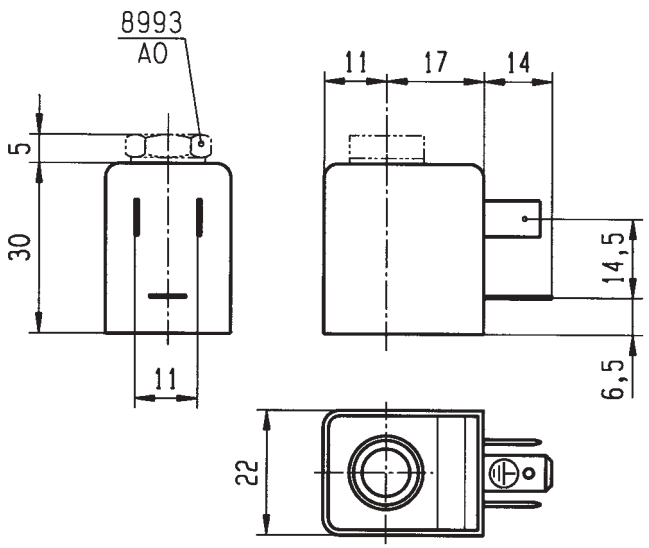
* This coil is UL/CSA accepted with corresponding approved valves only.

Voltage tolerance: -10 to +10% of the nominal (for coil 492912 and 492919 : - 15% to + 10% of the nominal voltage)

Duty: continuous duty coil (ED 100%)

Voltages: see voltage code table

Weight: 100 g with plug



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Part 3: Explosion proof electrical parts

3.1 Encapsulated electrical parts “m”:

3.1.1 22 mm electrical part

1

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx m II T4 or T5 is required.

Benefits: coil and magnetic circuit encapsulated in synthetic material - offering shock and corrosion protection. AC coils with integrated thermal fuse.

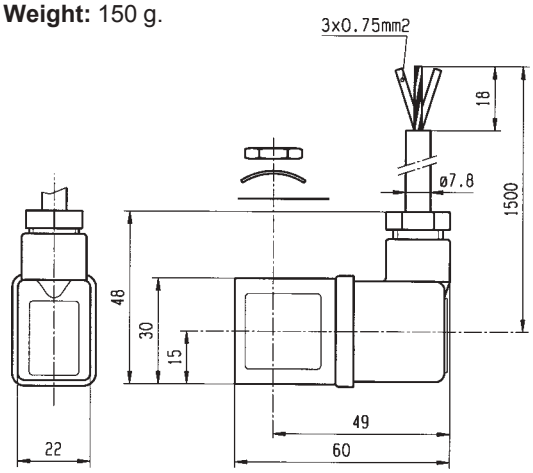
Small size for ease of mounting in confined spaces.

All Lucifer 2000 series valves which are suitable for standard 22 mm coils can be fitted with those electric parts.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			482605 or **VA01**	482606 or **VA02** * 482606.10 or **VA12** ° 482606.160 or **VA07**
Approval			**LCIE 02 ATEX 6014 X**	
Type of protection		**Gas**	II 2 G - EEx m II T4	II 2 G - EEx m II T5
		Dust	II 2 D - 130°C	II 2 D - 95°C
Degree of protection			**IP65** according to IEC / EN 60529 standards (with DIN plug)	
Ambient temperature			-40°C to +50°C The application is limited also by the temperature range of the valve	-40°C to +50°C
Class of insulation			F (155°C)	F (155°C)
Electrical connection			Cable connection (3 x 0.75 mm²) encapsulated with coil, cable material according to application	
Elect. Power	**DC**	**Pn** (hot)	5 W	2.5 W
		P (cold) 20°C	6.5 W	3 W
	AC	**Pn** (holding)	4 W	2 W
		Attraction cold	8.9 VA (5 W)	5.7 VA (2.5 W)
Voltage / Voltage tolerance			see voltage code table / tolerance ± 10% of the nominal voltage	
Solenoid duty			Continuous duty solenoid (ED 100%)	

Weight: 150 g.



* 482606.10 for stainless steel application - 1.5 m cable length.
° 482606.160 - 6 m cable length.

Fuses:

Both electrical parts VA01 and VA02 have to be connected in series with a safety fuse according to CEI 60127-3.

VA01:

DC: 12V, 1000mA - 24V, 500mA - 48V, 200mA - 110V, 100mA

AC 50 Hz: 24V, 500mA - 48V, 250mA - 110/115V, 100mA - 220/230V, 3mA

AC 60 Hz: 24V, 630mA - 110/115V, 125mA - 220/230V, 63mA

VA02:

DC: 12V, 400mA - 24V, 200mA - 48V, 100mA - 110V, 50mA

AC 50 Hz: 24V, 250mA - 48V, 125mA - 110/115V, 63mA - 220/230V, 32mA

AC 60Hz: 24V, 315mA - 110/115V, 63mA - 220/230V, 32mA

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3.1.2 32 mm electrical part

2

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx m II T4 is required.

Benefits: Coil and magnetic circuit encapsulated in synthetic material - offering shock and corrosion protection. AC/DC coils with integrated thermal fuse. DC coils with integrated surge suppression diode.

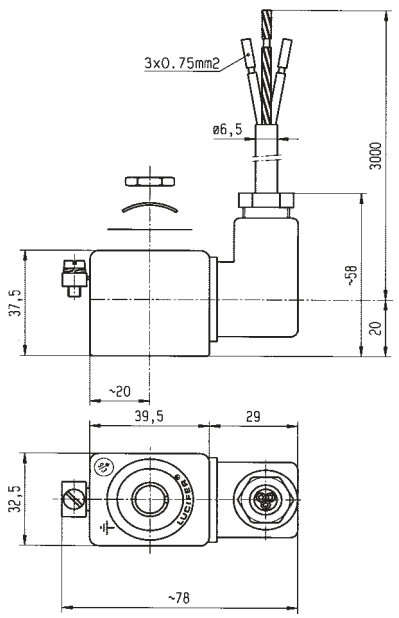
Small size for ease of mounting in confined spaces.

All Lucifer valves which are suitable for standards coils (9W DC or 8W AC) can be fitted with this electrical part.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			492670 or **HZ05** * 492670.10 or **HZ90** ° 492670.160 or **HZ91**
Approval			**LCIE 02 ATEX 6015 X**
Type of protection		**Gas**	II 2 G - EEx m II T4
		Dust	II 2 D - 130°C
Degree of protection			IP65
Ambient temperature			-40°C to +40°C The application is limited also by the temperature range of the valve
Class of insulation			F (155°C)
Electrical connection			Cable connection (3 x 1.5 mm²) encapsulated with coil, cable material according to application
Elect. Power	**DC**	**Pn** (hot)	9 W
		P (cold) 20°C	12 W
	AC	**Pn** (holding)	8 W
		Attraction cold	26 VA (9 W)
Voltage / Voltage tolerance			see voltage code table / tolerance ±10% of the nominal voltage
Solenoid duty			Continuous duty solenoid (ED 100%)

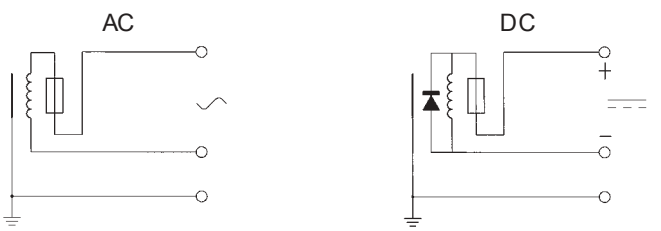
Weight: 320g.



* 492670.10 for stainless steel application - 3 m cable length.
° 492670.160 - 6 m cable length

Special conditions:

The supply connection lines have to be fixed and positioned in such a way that they are protected against mechanical damages.



It is necessary to use a safety fuse with a nominal current corresponding to the coil current (max. 3 x nominal according to IEC 60127 and IEC 60269) against short-circuits.

Recommended values:

DC: 12V, 1250mA - 24V, 630mA - 48V, 315mA - 110V, 125mA
AC 50 Hz: 24V, 1000mA - 48V, 500mA - 110, 250mA - 230V, 100mA
AC 60 Hz: 240V, 100mA

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3.1.3 Standard electrical parts with waterproof metal housing:

2 / 6

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx m II T4 or T5 is required.

Benefits: Epoxy-coated steel housing - solenoid coil, rectifier (silicium diodes), fuse and varistor protection element are completely encapsulated in the coil housing by means of epoxy resin.

Small size for ease of mounting in confined space. Simplifies conversion of existing equipment to hazardous area requirements.

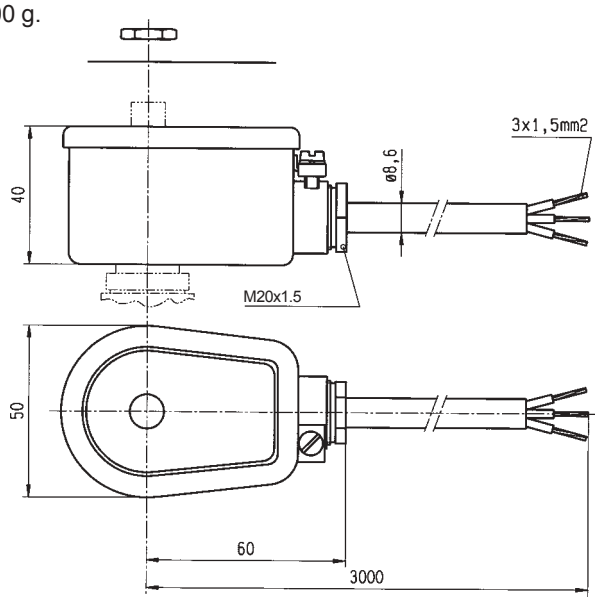
All Lucifer valves which are suitable for standards coils (8 W or 2.5 W DC) can be fitted with these electrical parts.

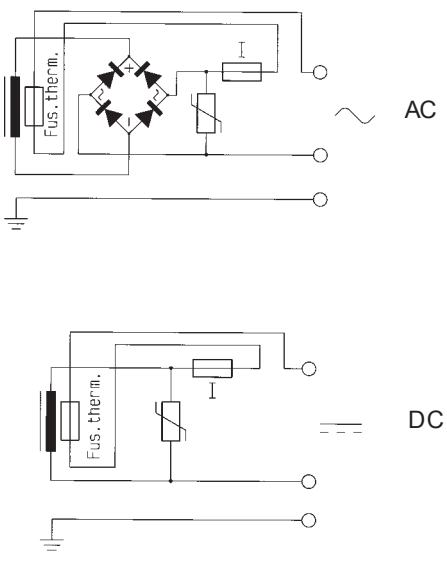
These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

			2		6
Reference			492070 or **VZ01** *492070.60 or **VZ96**	492370 or **VZ05**	492070.03 or **VZ21**
Approval			**LCIE 02 ATEX 6017 X**		**AUS Ex. 321**
Type of protection		**Gas**	II 2 G - EEx m II T4	II 2 G - EEx m II T5	Ex m IIC T4 / T5 Classe I - Zone 1
		Dust	II 2 D - 130°C	II 2 D - 95°C	
Degree of protection			IP67		IP67
Ambient temperature			-40°C to +65°C	-40°C to +40°C	-40 to +65°C / +40 °C
			The application is limited also by the temperature range of the valve		
Class of insulation			F (155°C)		F (155°C)
Electrical connection			Cable connection (3 x 1.5mm²) with cable gland M20x1.5, external earth screw connection		
Elect. Power	**DC**	**Pn** (hot)	8 W	2.5 W	8 W
		P (cold) 20°C	10 W	3 W	10 W
	AC	**Pn** (holding)	9 W	2.5 W	9 W
		Attraction cold	11 W	3 W	11 W
Voltage / Voltage tolerance			see voltage code table / tolerance ± 10% of the nominal voltage		
Solenoid duty			Continuous duty solenoid (ED 100%)		

Weight: 500 g.

* 492070.60 - 6 m cable length





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3.1.4 CPR electrical parts with waterproof metal housing:

9

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx m II T4 or T5 is required.

Benefits: Epoxy-coated steel housing - solenoid coil, rectifier (silicium diodes), fuse and varistor protection completely encapsulated in the coil housing by means of epoxy resin.

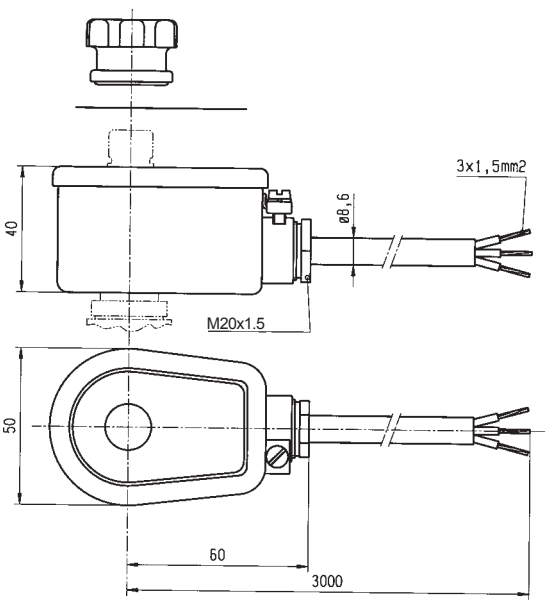
Small size for ease of mounting in confined space. Simplifies conversion of existing equipment to hazardous area requirements.

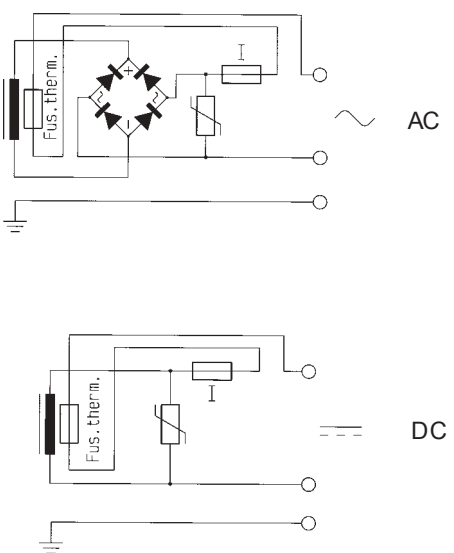
All Lucifer valves equipped with the specific CPR* upper parts, can be fitted with this electrical part.
(*** CPR** = Chemical, Petrochemical and Refinery application)

These electrical parts conform to the IEC/CENELEC safety standards and complies with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			492270 or **VZ02**	
Approval			**LCIE 02 ATEX 6017 X**	
Type of protection		**Gas**	II 2 G - EEx m II T4	II 2 G - EEx m II T5
		Dust	II 2 D - 130°C	II 2 D - 95°C
Degree of protection			IP67	
Ambient temperature			-40°C to +65°C The application is limited also by the temperature range of the valve	-40°C to +40°C
Class of insulation			F (155°C)	
Electrical connection			Cable connection (3 X 1.5mm²) with cable gland M20 x 1.5, external earth screw connection	
Elect. Power	**DC**	**Pn** (hot)	5 W	
		P (cold) 20°C	6 W	
	AC	**Pn** (holding)	5 W	
		Attraction cold	6 W	
Voltage / Voltage tolerance			see voltage code table / tolerance ±10% of the nominal voltage	
Solenoid duty			Continuous duty solenoid (ED 100%)	

Weight: 500 g.





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3.2 Increased safety electrical parts “e”:

3.2.1 Electrical parts 483371 or HZ06 and 494040 or HZ23

2

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx me II T3 or T4 is required.

Benefits: Rotatable housing 360°, galvanized steel with internal and external screw terminals for earth connection.

Small size for ease of mounting in confined space. Simplifies conversion of existing equipment to hazardous area requirements.

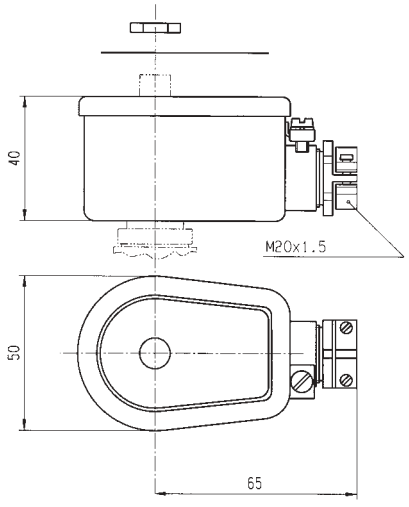
All Lucifer valves suitable for standard 8 W DC or AC coils can be fitted with these electrical parts.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			483371 or **HZ06** * 483371.01 or **HZ14**	494040 or **HZ23**	
Approval			**LCIE 02 ATEX 6011 X**	**LCIE 02 ATEX 6013 X**	
Type of protection		**Gas**	II 2 G - EEx me II T4	II 2 G - EEx me II T3	II 2 G - EEx me II T4
		Dust	II 2 D - 130°C	II 2 D - 195°C	II 2 D - 130°C
Degree of protection			IP67	IP67	
Ambient temperature			-40°C to +80°C	-40°C to +90°C	-40°C to +80°C
			The application is limited also by the temperature range of the valve		
Class of insulation			F (155°C)	H (180°C)	
Electrical connection			By special cable gland M20 x 1.5 EExe on screw terminals for wires up to 1.5 mm². Cables with outside diameter 6.5 to 13.5 mm can be simply sealed using the rubber gland with resilient sealing rings supplied.		
Elect. Power	**DC**	**Pn** (hot)	8 W	8 W	
		P (cold) 20°C	9 W	9 W	
	AC	**Pn** (holding)	8 W	8 W	
		Attraction cold	32 VA (9 W)	32 VA (9 W)	
Voltage / Voltage tolerance			see voltage code table / tolerance -10/ +10% of the nominal voltage		
Solenoid duty			Continuous duty solenoid (ED 100%)		

Weight: 320 g.

*483371.01 for CPR coil



Fuses:

Both electrical parts HZ06 and HZ23 have to be connected in series with a safety fuse according to IEC 60127-3.

HZ06:

DC: 24V, 400mA - 48V, 250mA - 110V, 100mA

AC 50 Hz: 24V, 630mA - 48V, 315mA - 110, 160mA - 220/230V, 80mA

HZ23:

DC: 12V, 400mA - 24V, 200mA - 48V, 100mA - 110V, 50mA

AC 50 Hz: 24V, 250mA - 48V, 125mA - 110/115V, 63mA - 220/230V, 32mA

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3.2.2 Low power electrical part 491117 or VZ04

6

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx me II T5 is required.

Benefits: Rotatable housing 360°, galvanized steel with internal and external screw terminals for earth connection.

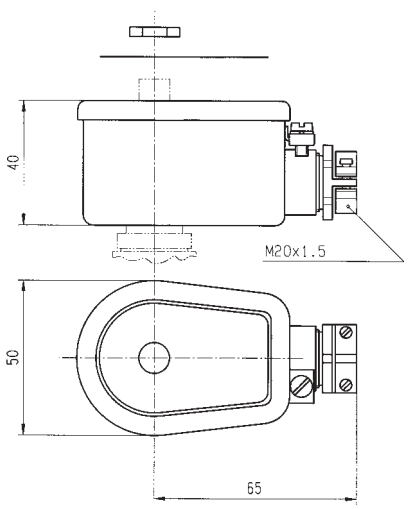
Small size for ease of mounting in confined space. Simplifies conversion of existing equipment to hazardous area requirements.

All Lucifer valves which are suitable for standard coils 2.5 WDC only can be fitted with this electrical part.

This electrical part conforms to the IEC/CENELEC safety standards and complies with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			491117 or **VZ04**
Approval			**LCIE 02 ATEX 6012 X**
Type of protection		**Gas**	II 2 G - EEx me II T5
		Dust	II 2 D - 95°C
Degree of protection			IP67
Ambient temperature			-40°C to +65°C The application is limited also by the temperature range of the valve
Class of insulation			F (155°C)
Electrical connection			By special cable gland M20 x 1.5 ''EEx e'' on screw terminals for wires up to 1.5 mm². Cables with outside diameter 6.5 mm to 13.5 mm can be simply sealed using the rubber gland with resilient sealing rings supplied.
Elect. Power	**DC**	**Pn** (hot)	2.5 W
		P (cold) 20°C	3 W
	AC	**Pn** (holding)	-
		Attraction cold	-
Voltage / Voltage tolerance			see voltage code table / tolerance -10/ +10% of the nominal voltage
Solenoid duty			Continuous duty solenoid (ED 100%)

Weight: 320 g.



Fuses:

The electrical part VZ04 has to be connected in series with a safety fuse according to IEC 60127-3

VZ04:
DC: 24V, 160mA

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3.3 Encapsulated and increased safety electrical parts “me”:

3.3.1 Electrical parts 492190 or VZ03 and 492390 or VZ06

2 / 6

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx me II T3 to T6 is required.

Benefits: Rotatable 360°, fibreglass-reinforced plastic housing. Solenoid coil, rectifier (silicium diodes), fuses and varistor protection are completely encapsulated into the coil housing by epoxy resin for shock and corrosion protection.

Small size for ease of mounting in confined space.

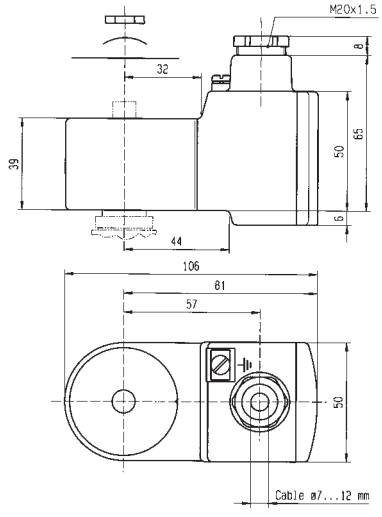
All Lucifer valves suitable for standard 8WDC coils can be fitted with the VZ03, and all Lucifer valves with the suffix “80” can be fitted with VZ06 electrical parts.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

			2		**6**	
Reference			492190 or **VZ03** *492190.10 or **VZ90**		492390 or **VZ06**	492190.03 or **VZ34**
Approval			**LCIE 02 ATEX 6023 X**			**AUS Ex 321**
Type of protection		**Gas**	II 2 G - EEx me II T3	II 2 G - EEx me II T4	II 2 G - EEx me II T5	Ex me IIC T3 / T5 Classe I - Zone 1
		Dust	II 2 D - 195°C	II 2 D -95°C	II 2 D -130°C / 80°C	
Degree of protection			IP66		IP66	IP65
Ambient temperature			-40°C to +75°C		-40°C to 75/+40°C	-40°C to 75/+40°C
			The application is limited also by the temperature range of the valve			
Class of insulation			F (155°C)		F (155°C)	
Electrical connection			Screw terminals within terminal box. Cable connection through a cable gland M20 x 1.5 Additional earth connection on external screw terminal			
Elect. Power	**DC**	**Pn** (hot)	9 W		2.5 W	9W
		P (cold) 20°C	11 W		3 W	11 W
	AC	**Pn** (holding)	11 W		2.5 W	11 W
		Attraction cold	13 W		3 W	13 W
Voltage / Voltage tolerance			see voltage code table / tolerance ±10% of the nominal voltage			
Solenoid duty			Continuous duty solenoid (ED 100%)			

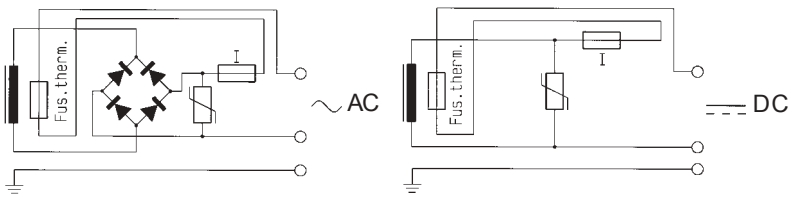
Weight: 500 g.

* 492190.10 for stainless steel valves.



Simplifies conversion of existing equipment to hazardous area requirements (according to CENELEC standards EN 50014, EN 50019 and EN 50028).

The electrical part **VZ06** can be used only with the low-power valves.



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3.3.2 Electrical parts 492200 or VZ13, 492210 or VZ26

9 / 10

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx me II T5 to T6 is required.

Benefits: Rotatable 360°, fibreglass-reinforced plastic housing. Solenoid coil, rectifier (silicium diodes), fuses and varistor protection are completely encapsulated into the coil housing by epoxy resin for shock and corrosion protection.

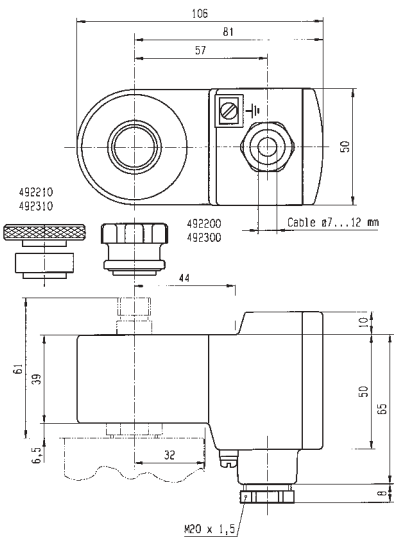
Small size for ease of mounting in confined space.

All Lucifer valves suitable for CPR/Offshore application can be fitted with these electrical parts.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

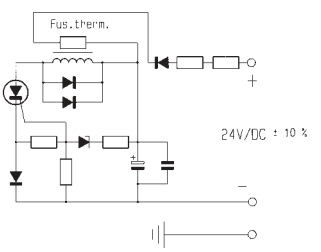
		9		10	
Reference		492200 or **VZ13**		492210 or **VZ26**	
Approval		**LCIE 02 ATEX 6023 X**			
Type of protection	**Gas**	II 2 G - EEx me II T5	II 2 G - EEx me II T6	II 2 G - EEx me II T5	II 2 G - EEx me II T6
	Dust	II 2 D -95°C	II 2 D -80°C	II 2 D -95°C	II 2 D -80°C
Degree of protection		IP66		IP66	
Ambient temperature		-40°C to +75°C	-40°C to +40°C	-40°C to +75°C	-40°C to +40°C
		The application is limited also by the temperature range of the valve			
Class of insulation		F (155°C)		F (155°C)	
Electrical connection		Screw terminals within terminal box. Cable connection through a cable gland M20X1.5 Additional earth connection on external screw terminal			
Power consumption DC		1 bis 1.8 W, depending on cable length		1 bis 1.8 W, depending on cable length	
Inrush current (attraction) min. required for holding		Provided by booster circuit during ~50 ms as soon as the Zener voltage of 21.6 V is reached I mini = 60 mA (I nominal = 75 mA)			
Voltage DC		U nominal = 24 VDC, Umini = 21.6 VDC			
Resistance/additional resistance		23 Ω + (R = 270 Ω)			
Inductance		0 mH			
Capacitance		0 µF			
Response time		2 - 4 s			
Voltage / Voltage tolerance		see voltage code table / tolerance ± 10% of the nominal voltage			
Solenoid duty		Continuous duty solenoid (ED 100%)			

Weight: 500 g.



Indications:

VZ13 = Booster for CPR valves
VZ26 = Booster for Offshore valves



These electrical parts need an external fuse of I = 100 mA

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3.3.3 Electrical part 492300 or VZ14 and 492310 or VZ27

9/10/12

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx me II T5 to T6 is required.

Benefits: Rotatable 360° fibreglass-reinforced plastic housing. Solenoid coil, rectifier (silicium diodes), fuses and varistor protection are completely encapsulated into the coil housing by epoxy resin for shock and corrosion protection.

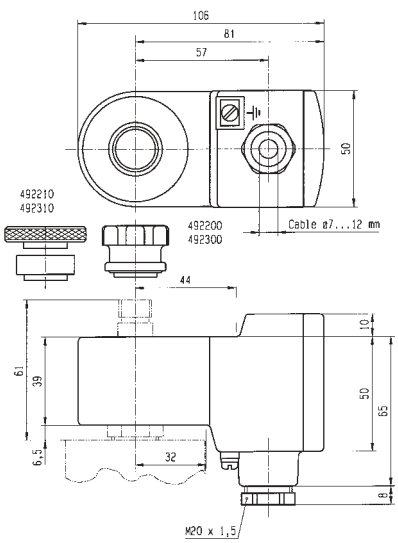
Small size for ease of mounting in confined space.

All Lucifer valves suitable for CPR/Offshore application can be fitted with these electrical parts.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

			9		10/12
Reference			492300 or **VZ14**	492310 or **VZ27**	492310.03 or **VZ29**
Approval			**LCIE 02 ATEX 6023 X**		**AUS Ex 321**
Type of protection		**Gas**	II 2 G - EEx me II T4	II 2 G - EEx me II T5	Ex me IIC T4 / T5 Classe I - Zone 1
		Dust	II 2 D - 130°C	II 2 D - 95°C	
Degree of protection			IP66		IP65
Ambient temperature			-40°C to +75°C	-40°C to +40°C	-40 to +40 / + 75°C
			The application is limited also by the temperature range of the valve		
Class of insulation			F (155°C)		
Electrical connection			Screw terminals within terminal box. Cable connection through a cable gland M20 x 1.5 Additional earth connection on external screw terminal		
Elect. Power	**DC**	**Pn** (hot)	6 W		6 W
		P (cold) 20°C	7.5 W		7.5 W
	AC	**Pn** (holding)	6 W		6 W
		Attraction cold	7.5 W		7.5 W
Voltage / Voltage tolerance			see voltage code table / tolerance ±10% of the nominal voltage		
Solenoid duty			Continuous duty solenoid (ED 100%)		

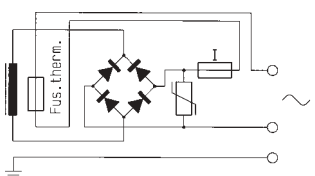
Weight: 500 g.



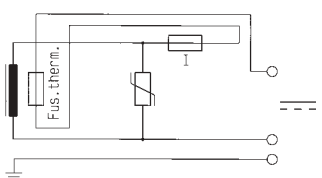
Indications:

VZ14 = for CPR valves
VZ27 = for Offshore valves

AC



DC



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3.4 Flameproof electrical parts “d”:

3.4.1 Electrical part 483250 or HZ08

5

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx d IIC T4 to T6 is required.

Benefits: Rotatable 360°, housing made of cast iron with internal connection chamber: Cover made of aluminium alloy fixed with 4 screws. The electromagnetic control pilot is composed of three main elements: housing, coil and plunger tube including housing plate.

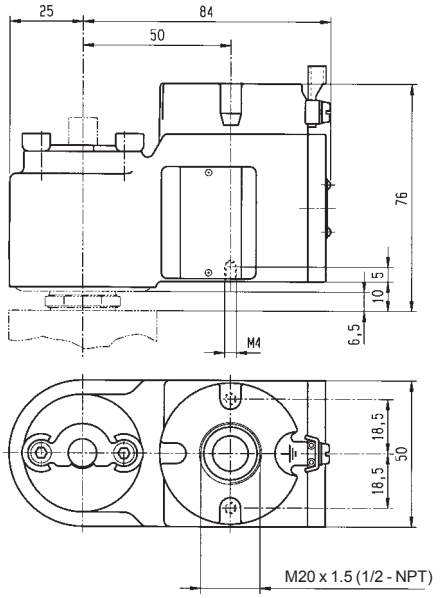
Small size for ease of mounting in confined space.

All Lucifer valves with the suffix ‘‘1D’’ can be fitted with these electrical parts.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			483250 or **HZ08**		
Approval			**LCIE 02 ATEX 6007**		
Type of protection		**Gas**	II 2 G - EEx d IIC T4	II 2 G - EEx d IIC T5	II 2 G - EEx d IIC T6
		Dust	II 2 D - 130°C	II 2 D - 95°C	II 2 D - 80°C
Degree of protection			IP64 with appropriate cable gland		
Ambient temperature			-40 to +80°C	-40 to +75°C	-40 to +60°C The application is limited also by the temperature range of the valve
Class of insulation			F (155°C)		
Electrical connection			The electrical connection is made within the housing connection chamber on an accessible screw terminal. The cable entry to the connecting chamber is made through 1/2" NPT thread suitable for fitting an approved EEx d IIC cable gland (493426).		
Elect. Power	**DC**	**Pn** (hot)	8 W		
		P (cold) 20°C	9 W		
	AC	**Pn** (holding)	8 W		
		Attraction cold	32 VA (9 W)		
Voltage / Voltage tolerance			see voltage code table / tolerance -10/ +10% of the nominal voltage		
Solenoid duty			Continuous duty solenoid (ED 100%)		

Weight: 1100 g (with coil)



Plunger tube

The plunger tube is welded to the stainless steel plate and is therefore integrated into the housing, which is screwed on the valve body.

This electrical part is supplied only as complete unit mounted on a valve, as the ‘‘EEx d’’ protection depends on minimum gap between plunger tube, plate and housing.

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3.4.2 Electrical parts 483270 or HZ19 and 483270.02 or HZ21

9

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx d IIC T4 to T6 is required.

Benefits: Rotatable 360°, housing made of cast iron with internal connection chamber: Cover made of aluminium alloy fixed with 4 screws. The electromagnetic control pilot is composed of three main elements: housing, coil and plunger tube including housing plate.

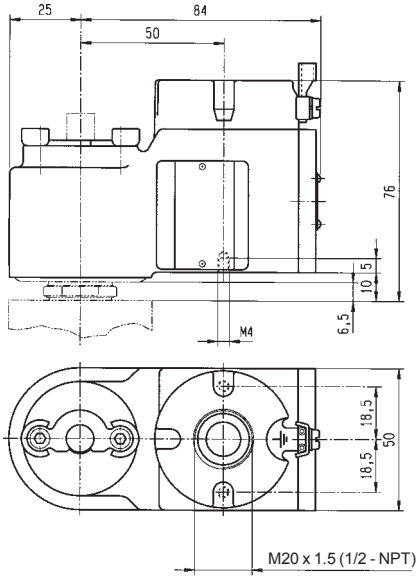
Small size for ease of mounting in confined space.

All Lucifer valves with suffix ''1D'' and suited for CPR/Offshore application can be fitted with these electrical parts

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			483270 or **HZ19** (M20 x 1.5)		483270.02 or **HZ21** (1/2 NPT)
Approval			**LCIE 02 ATEX 6008 X**		
Type of protection	**Gas**		II 2 G - EEx d IIC T4	II 2 G - EEx d IIC T5	II 2 G - EEx d IIC T6
	Dust		II 2 D - 130°C	II 2 D - 95°C	II 2 D - 80°C
Degree of protection			IP65 with appropriate cable gland		
Ambient temperature			-40 to +80°C	-40 to +75°C	-40 to +60°C The application is limited also by the temperature range of the valve
Class of insulation			F (155°C)		F (155°C)
Electrical connection			The electrical connection is made within the housing connection chamber on an accessible screw terminal. The cable entry to the connecting chamber is made through 1/2" NPT or M20 x 1.5 thread suitable for fitting an approved EEx d IIC cable gland.		
Elect. Power	**DC**	**Pn** (hot)	8 W		
		P (cold) 20°C	9 W		
	AC	**Pn** (holding)	8 W		
		Attraction cold	9 W		
Voltage / Voltage tolerance			see voltage code table / tolerance -10/ +10% of the nominal voltage		
Solenoid duty			Continuous duty solenoid (ED 100%)		

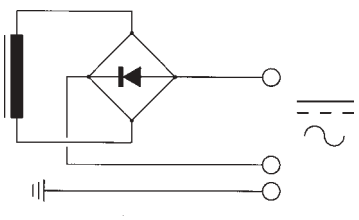
Weight: 1100 g (with coil)



Plunger tube

The plunger tube is welded to the stainless steel plate and is thus integrated to the housing which is screwed on the valve body.

This electrical part is supplied only as complete unit mounted on a valve, as the ''EEx d'' protection depends on minimum gap between plunger tube, plate and housing.



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3.4.3 Electrical part HZ09

5

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx md IIC T4 to T5 is required.

Benefits: Metal armature encapsulated in synthetic material provides high shock and corrosion protection.

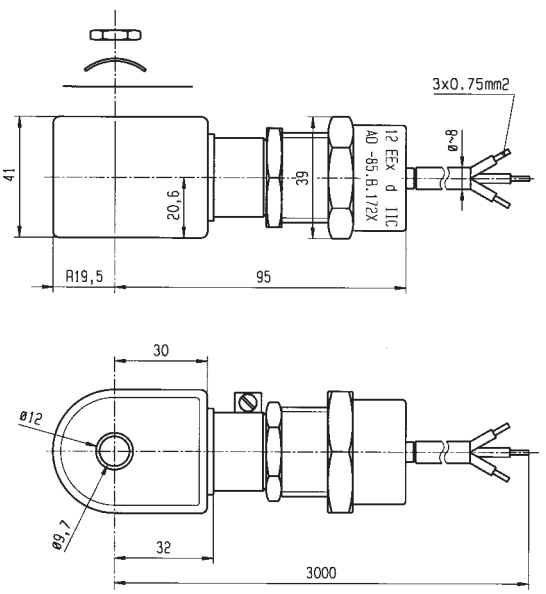
Small size for ease of mounting in confined space.

All Lucifer valves suitable for standard 8W coils can be fitted with this electrical part.

These electrical part conforms to the IEC/CENELEC safety standards and complies with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			493640 or **HZ09**	
Approval			**LCIE 02 ATEX 6009 X**	
Type of protection		**Gas**	II 2 G - EEx md IIC T4	II 2 G - EEx md IIC T5
		Dust	II 2 D - 130°C	II 2 D - 95°C
Degree of protection			IP65	
Ambient temperature			-40°C to +75°C	-40°C to +40°C
			The application is limited also by the temperature range of the valve	
Class of insulation			F (155°C)	
Electrical connection			Special ''EEx d'' cable gland, galvanized steel, with EPDM sealing. (EPR) cable, outside diameter 7.3 ± 0.5 mm and 3000 mm long	
Elect. Power	**DC**	**Pn** (hot)	8 W	
		P (cold) 20°C	9 W	
	AC	**Pn** (holding)	8 W	
		Attraction cold	32 VA (9 W)	
Voltage / Voltage tolerance			see voltage code table / tolerance -15/ +10% of the nominal voltage	
Solenoid duty			Continuous duty solenoid (ED 100%)	

Weight: 500 g



Fuses

The HZ09 electrical part is equipped with a standard thermal cut-off fuse on all models and voltages

This electrical part HZ09 must be connected in series with a safety fuse according to IEC 60127-3.

DC: 24V, 400 mA
AC: 110/50-120/60, 200 mA - 220/50-240/60, 100mA - 230/50, 95 mA

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3.5 Intrinsically safe electrical parts “i”:

Intrinsic safety

A system or an element of a system in an hazardous area is intrinsically safe when in any circumstance no explosion can be caused by either a spark or other heat source. The power level of an intrinsically safe electrical system is therefore extremely low.

Application

Intrinsically safe valves are recommended or even compulsory where the highest safety level against explosions is required: chemical industry, refineries, mines, on-and off-shore platforms, etc. In addition to the «intrinsic safety» characteristic, a remarkable low power consumption is needed to control such valves. They can be triggered directly from an electronic circuit such as in a computerised system as they require neither relay nor amplifier.

Safety barriers

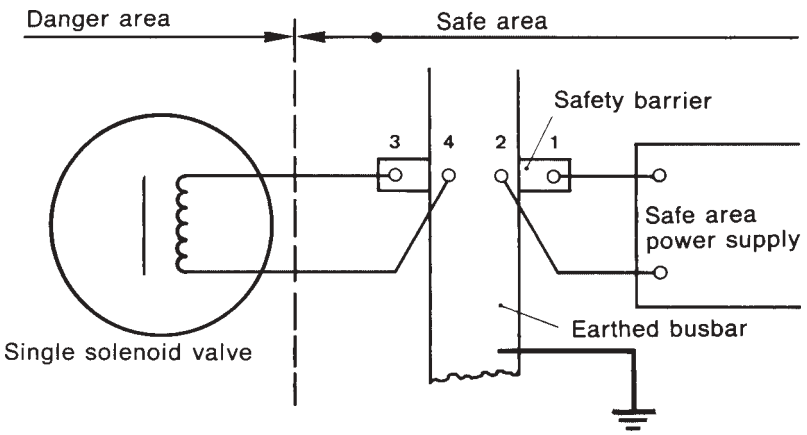
Each electrical apparatus, e.g. solenoid valves within the hazardous area must be further protected by safety barriers. Lucifer solenoid operators are compatible with commercially available safety barriers (see guidance chart page 39 to 44). In order to determine whether a barrier is compatible, one must be fully aware of its electrical characteristics.

Minimum voltage calculations for proper valve functioning must be made with the total resistance value of barrier, coil (hot) and wiring (total length), and with the maximum ambient temperature.

Electrical suply

Parker Lucifer intrinsically electrical parts may only be fed from:
- Certified I.S, power supplies or
- Through an adequate intrinsic safe safety barrier
- Through intrinsically safe Remote I/O

Installation sketch



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3.5.1 Electrical part 32 mm IS

7

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx ia or ib IIC T6 is required.

Benefits: Fully encapsulated assembly comprising a coil, metal armature, three diodes circuit and DIN plug connection.

The encapsulation provides an effective compact housing offering full protection against dust, oil, water, etc.

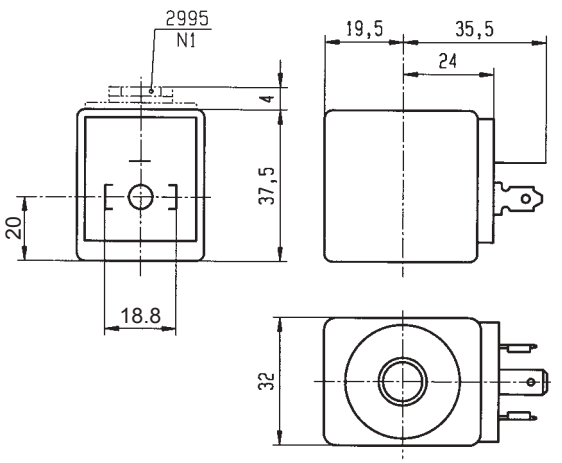
Small size for ease of mounting in confined space.

All Lucifer valves with the suffix ‘‘90’’ can be fitted with these electrical parts.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere 94/9/EC «ATEX» directive.

Reference (without plug) (with plug)			483580.01 or **DZ12** 483960.01 or **DZ13**	483580.03 or **DZ16** 483960.03 or **DZ17**	490880 or **DZ18** 493997 or **DZ19**
Zulassungsnummer			**LCIE 02 ATEX 6065 X**	**AUS 1146 X**	**LCIE/FM -** CSA (pending)
Type of protection		**Gas**	II 1 G - EEx ia IIC T6	Ex ia IIC T6 Classe I - Zone 0	CI. I, Div. I, Gr. A, B, C, D CI. II, Div. I, Gr. E, F, G
		Dust	II 1 D - 80°C		
Degree of protection			IP65 with plug connection		NEMA 4-4X
Ambient temperature			-25°C to +55°C The application is limited also by the temperature range of the valve		60°C
Class of insulation			F (155°C)		
Electrical connection			The coil is connected with a 2P + E plug according to EN 175301-803 type A - contact 1 is marked as the positive pole O+		
Maximum supply voltage			28 VDC – 110 mA		30 VDC – 100 mA
			The minimum operating voltage at maximum 60°C is 14 VDC		
Power	**DC**	Minimum	500 mW		500 mW
		Maximum	3 W		3 W
	Depending on applied voltage, IS barrier type and resistance of connected cable				
Coil resistance at 20°C **Impedance** **Apparent inductance** **Apparent capacitance**			340 Ω 340 Ω 0 mH 0 μF		
Solenoid duty			Continuous duty solenoid (ED 100%)		

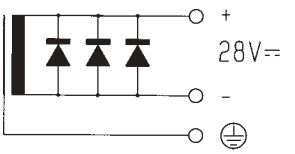
Weight: 160 g (with plug)



Important

The intrinsically safe supply circuit should have enough capacity in all environmental conditions to assure a **minimum operating current of 35 mA** through the coil.

The minimal holding current is 20 mA



For the barrier compatibility see the corresponding table on pages 39, 40 and 41.

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3.5.2 Electrical part 488650.01 or VZ07 and 494035.10 or VZ93

7

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx ia or ib IIC T6 is required.

Benefits: Rotatable 360° housing, polyamid with fibreglass housing and cover. Coil, electronic circuits and other elements required for intrinsic safety are completely encapsulated in the housing with epoxy material for shock and corrosion protection.

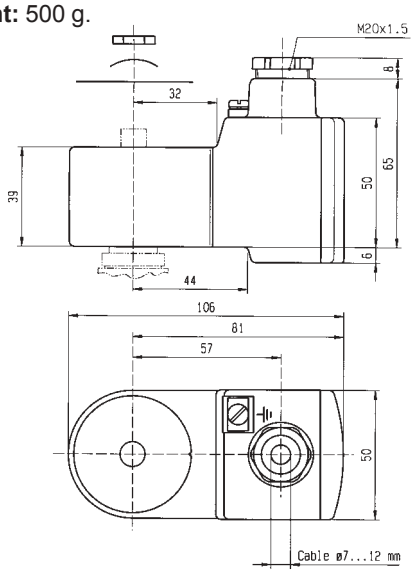
Small size for ease of mounting in confined space.

All Lucifer valves with the suffix ‘‘90’’ can be fitted with these electrical parts.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			488650.01 or **VZ07**	494035.10 or **VZ33**	488650.03 or **VZ31**	490885 or **VZ33**
Approval			**LCIE 02 ATEX 6024 X**		**AUS Ex 137 X**	**LCIE / FM / CSA**
Type of protection		**Gas**	II 1 G - EEx ia IIC T6		Ex ia IIC T6	Cl. I, Div. I, Gr. A, B, C, D
		Dust	II 1 D - 80°C		Classe I - Zone 0	Cl. II, Div. I, Gr. E, F, G
Degree of protection			IP66		IP65	NEMA 4-4X
Ambiant temperature			-40°C to +65°C		-40°C to +65°C	+60°C
			The application is limited also by the temperature range of the valve			
Electrical connection			Cable entry through a cable gland M20 x 1.5. Screw terminals for leads 3 x 1.5 mm² max. Additional earth connection possible with external screw terminal			
Maximum supply voltage			28 VDC – 110 mA		30 VDC – 100 mA	28 VDC – 110 mA
			The minimum operating voltage at maximum 60°C is 11.5 VDC			
Power	**DC**	Minimum	300 mW		300 mW	300 mW
		Maximum	3 W		3 W	3 W
	Depending on applied voltage, IS barrier type and resistance of connected cable					
Coil resistance at 20°C			295 Ω			
Impedance			345 Ω			
Apparent inductance			0 mH			
Apparent capacitance			0 μF			
Solenoid duty			Continuous duty solenoid (ED 100%)			

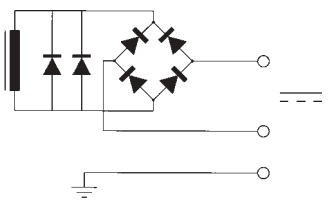
Weight: 500 g.



Important

The intrinsically safe supply circuit should have enough capacity in all environmental conditions to assure a minimum operating current of 29 mA through the coil.

The minimal holding current is 20 mA



For the barrier compatibility see the corresponding table in pages 39, 40 and 41.

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3.5.3 Electrical part 488660.01 or VZ08

7

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx ia or ib IIC T6 is required.

Benefits: Rotatable 360° housing, epoxy-coated metal housing and cover. Coil, electronic circuits and other elements required for intrinsic safety are completely encapsulated in the housing with epoxy material for shock and corrosion protection.

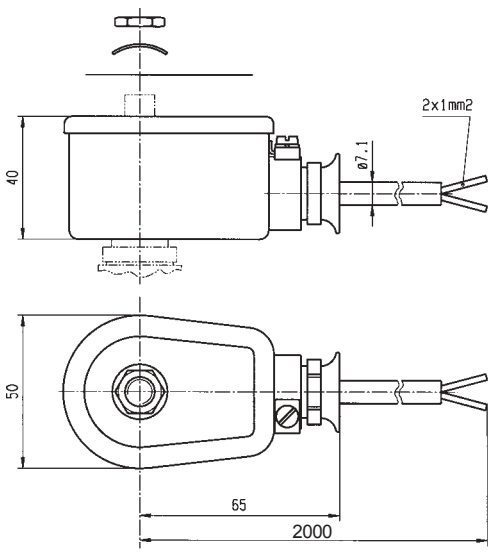
Small size for ease of mounting in confined space.

All Lucifer valves with the suffix ‘‘90’’ can be fitted with these electrical parts.

These electrical part conforms to the IEC/CENELEC safety standards and complies with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			488660.01 or **VZ08**	488660.03 or **VZ17**	490890 or **VZ18**
Approval			**LCIE 02 ATEX 6024 X**	**AUS Ex 137 X**	**LCIE / FM / CSA**
Type of protection	**Gas**		II 1 G - EEx ia IIC T6	Ex ia IIC T6 Classe I - Zone 0	Cl. I, Div. I, Gr. A, B, C, D Cl. II, Div. I, Gr. E, F, G
	Dust		II 1 D - 80°C		
Degree of protection			IP67		NEMA 4-4X
Ambiant temperature			-25°C to +65°C The application is limited also by the temperature range of the valve		60°C
Electrical connection			Fixed and potted dual-core (2 x 1mm²), blue connection cable, entry cable gland M20 x 1.5. Additional earth connection possible with external screw terminal		
Maximum supply voltage			28 VDC – 110 mA The minimum operating voltage at maximum 60°C is 11.5 VDC		30 VDC – 100 mA
Power	**DC**	Minimum	300 mW		300 mW
		Maximum	3 W		3 W
	Depending on applied voltage, IS barrier type and length resistance of connected cable				
Coil resistance at 20°C **Impedance** **Apparent inductance** **Apparent capacitance**			295 Ω 345 Ω 0 mH 0 μF		
Solenoid duty			Continuous duty solenoid (ED 100%)		

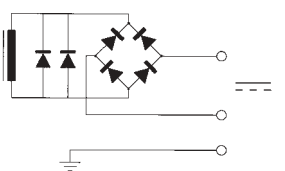
Weight: 500 g.



Important

The intrinsically safe supply circuit should have enough capacity in all environmental conditions to assure a **minimum operating current of 29 mA** through the coil.

The minimal holding current is 20 mA



For the barriers compatibility see the corresponding table in pages 39, 40 and 41.

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3.5.4 Electrical part 488670.01 or VZ09

7

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx ia or ib IIC T6 is required.

Benefits: Rotatable 360° housing, epoxy-coated metal housing and cover. Coil, electronic circuits and other elements required for intrinsic safety are completely encapsulated in the housing with epoxy material for shock and corrosion protection.

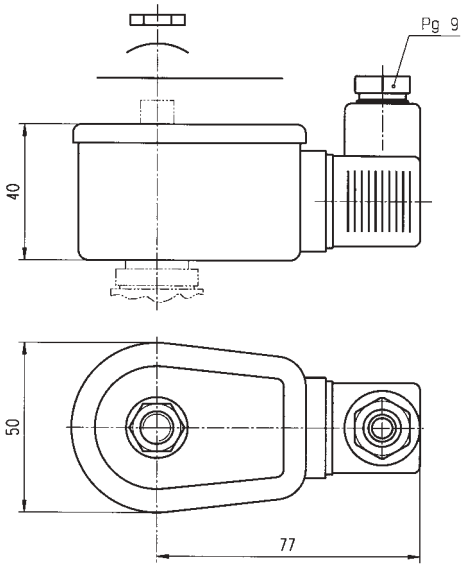
Small size for ease of mounting in confined space.

All Lucifer valves with the suffix ‘‘90’’ can be fitted with these electrical parts

These electrical part conforms to the IEC/CENELEC safety standards and complies with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			488670.01 or **VZ09**	490895 or **VZ20**
Approval			**LCIE 02 ATEX 6024 X**	**LCIE / FM / CSA**
Type of protection		**Gas**	II 1 G - EEx ia IIC T6	Cl. I, Div. I, Gr. A, B, C, D
		Dust	II 1 D - 80°C	Cl. II, Div. I, Gr. E, F, G
Degree of protection			IP67	NEMA 4-4X
Ambiant temperature			-25°C to +65°C	60°C
			The application is limited also by the temperature range of the valve	
Electrical connection			DIN standard plug interface 2P + T (DIN 43650 A) with Pg 9 to Pg11 cable gland.	
Maximum supply voltage			28 VDC – 110 mA	30 VDC – 100 mA
			The minimum operating voltage at maximum 60°C is 11.5 VDC	
Power	**DC**	Minimum	300 mW	300 mW
		Maximum	3 W	3 W
	Depending on applied voltage, IS barrier type and resistance of connected cable			
Coil resistance at 20°C **Impedance** **Apparent inductance** **Apparent capacitance**			295 Ω 345 Ω 0 mH 0 µF	
Solenoid duty			Continuous duty solenoid (ED 100%)	

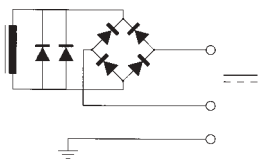
Weight: 500 g.



Important

The intrinsically safe supply circuit should have enough capacity in all environmental conditions to assure a **minimum operating current of 29 mA** through the coil.

The minimal holding current is 20 mA



For the barriers compatibility see the corresponding table in pages 39, 40 and 41.

Parker Lucifer SA
Fluid Control Division Europe
CH-1227 Carouge-Genève

3.5.5 Electrical parts 482160.01 or VZ95 and 482870.01 or VZ23

12

Application: Control of solenoid valves in dangerous areas where explosion-proof protection EEx ia IIB or IIC T6 is required.

Benefits: Rotatable 360° housing, polyamid with fibreglass housing and cover. Coil, electronic circuits and other elements required for intrinsic safety are completely encapsulated in the housing with epoxy material for shock and corrosion protection.

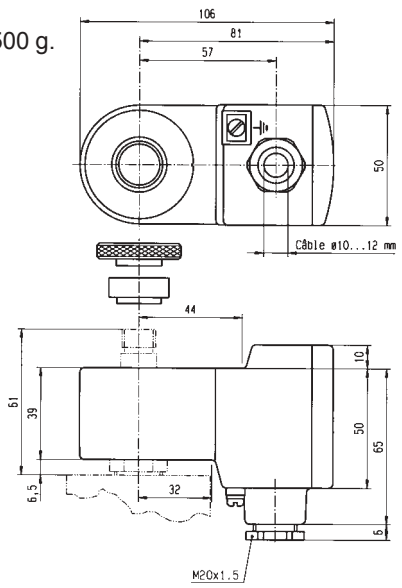
Small size for ease of mounting in confined space.

All Lucifer valves labelled ‘‘033X’’ with manual-reset can be fitted with these electrical parts.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

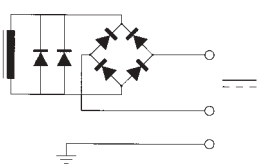
Reference			482160.01 or **VZ95**	482870.01 or **VZ23**	482870.03 or **VZ24**	492335 or **VZ30**
Approval			**LCIE 02 ATEX 6024 X**		**AUS Ex 137 X**	**LCIE / FM / CSA**
Type of protection	**Gas**		II 1 G - EEx ia IIB T6	II 1 G - EEx ia IIC T6	EEx ia IIC T6 Classe I - Zone 0	Cl. I, Div. I, Gr. A, B, C, D Cl. II, Div. I, Gr. E, F, G
	Dust		II 1 D - 80°C			
Degree of protection			IP66		IP65	NEMA 4-4X
Ambiant temperature			-25°C to +65°C The application is limited also by the temperature range of the valve			60°C
Electrical connection			Cable connection through a stainless steel cable gland M20 x 1.5 allowing use of cable diameter from 10 to 12 mm. Additional earth connection possible with external screw terminal			
Maximum supply voltage			28 VDC – 280 mA		28 VDC – 110 mA	30 VDC – 100 mA
Power	**DC**	Minimum	300 mW			300 mW
		Maximum	3 W			3 W
	Depending on applied voltage, IS barrier type and resistance of connected cable					
Coil resistance at 20°C **Impedance** **Apparent inductance** **Apparent capacitance**			295 Ω 345 Ω 0 mH 0 μF			
Solenoid duty			Continuous duty solenoid (ED 100%)			

Weight: 500 g.



Important

The required minimal holding current is 25 mA



For the barriers compatibility see the corresponding table in pages 39, 40 and 41.

Parker Lucifer SA
Fluid Control Division Europe
CH-1227 Carouge-Genève

3.5.6 Electrical part 482660 or VZ11 with booster

9

Application: Control of solenoid valves in dangerous areas where an explosion-proof protection EEx ib IIB or IIC T6 is required.

Benefits: Rotatable 360° housing, polyamid with fibreglass housing and cover. Coil, electronic circuits and other elements required for intrinsic safety are completely encapsulated in the housing with epoxy material for shock and corrosion protection.

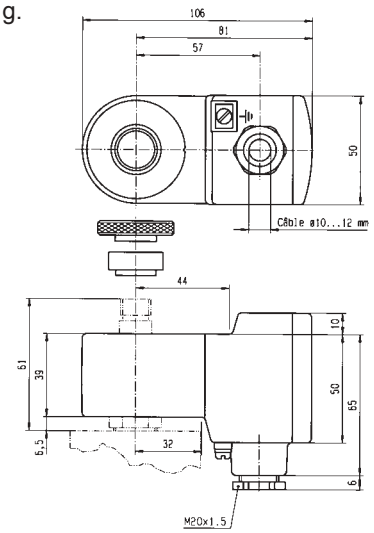
Small size for ease of mounting in confined space.

Only 316L stainless steel Lucifer valve types for chemical, onshore and offshore applications can be fitted with these electrical parts.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

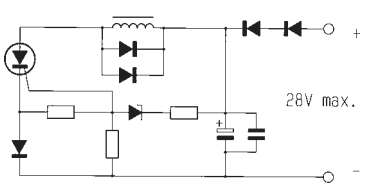
Reference			482600 or **VZ11**	483330.01 or **VZ12**	483330.03 or **VZ25**	490860 or **VZ28**
Approval			**LCIE 02 ATEX 6024 X**		**AUS Ex 137 X**	**LCIE / FM / CSA**
Type of protection		**Gas**	II 2 G - EEx ib IIB T6	II 2 G - EEx ib IIC T6	EEx ib IIC T6 Classe I - Zone 1	Cl. I, Div. I, Gr. A, B, C, D Cl. II, Div. I, Gr. E, F, G
		Dust	II 2 D - 80°C			
Degree of protection			IP66		IP65	NEMA 4-4X
Ambiant temperature			-25°C to +75°C The application is limited also by the temperature range of the valve			60°C
Electrical connection			Cable connection through a stainless steel cable gland M20X1.5 allowing use of cable diameter from 10 to 12 mm. Additional earth connection possible with external screw terminal			
Maximum supply voltage			28 VDC – 280 mA		28 VDC – 110 mA	30 VDC – 100 mA
			The minimum operating voltage is 21.6 VDC			
Power	**DC**	Minimum	300 mW			300 mW
		Maximum	3 W			3 W
	Depending on applied voltage, IS barrier type and resistance of connected cable					
Coil resistance at 20°C **Impedance** **Apparent inductance** **Apparent capacitance**			23 Ω 50 Ω 0 mH 0 µF			
Response time			2 – 4 s			
Solenoid duty			Continuous duty solenoid (ED 100%)			

Weight: 500 g.



Important

The intrinsically safe supply circuit should have enough capacity under all environmental conditions to assure a **minimum operating current of 40 mA** through the coil.



For the barriers compatibility see the corresponding table in pages 42, 43 and 44.

Parker Lucifer SA
Fluid Control Division Europe
CH-1227 Carouge-Genève

3.5.7 Electrical parts 492965.01 or VZ91 with ''Booster''.

9

Application: Control of solenoid valves in dangerous areas where an explosion-proof protection EEx ia IIC T6 is required.

Benefits: Rotatable 360° housing, polyamid with fibreglass housing and cover. Coil, electronic circuits and other elements required for intrinsic safety are completely encapsulated in the housing with epoxy material for shock and corrosion protection.

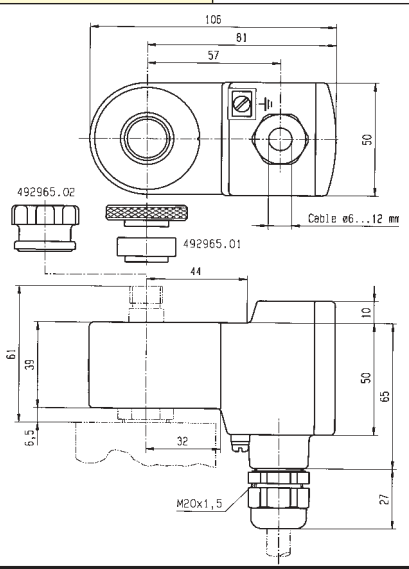
Small size for ease of mounting in confined space.

Only 316L stainless steel Lucifer valve types for chemical, onshore and offshore applications can be fitted with these electrical parts.

These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

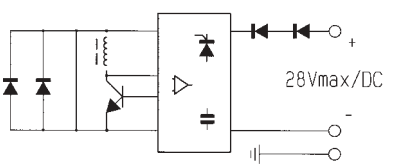
Reference			492965.01 or **VZ91** - stainless steel fixation 492965.02 or **VZ92** - plastic fixation
Approval			**LCIE 02 ATEX 6066 X**
Type of protection		**Gas**	II 1 G - EEx ia IIC T6
		Dust	II 1 D - 80°C
Degree of protection			IP66
Ambiant temperature			-40°C to +65°C The application is limited also by the temperature range of the valve
Electrical connection			Cable connection through a plastic or stainless steel cable gland M20 x 1.5 allowing use of cable diameter from 10 to 12 mm. Additional earth connection possible with external screw terminal
Maximum supply voltage			28 VDC – 110 mA
Power	**DC**	Minimum	0.3 W (with 13 VDC)
		Maximum	2.3 W (with 24 VDC)
	Depending on applied voltage, IS barrier type and resistance of connected cable		
Line check			4 mA or 5 VDC max
Coil resistance at 20°C **Impedance** **Apparent inductance** **Apparent capacitance**			85 Ω 275 Ω (with 13 VDC) – 260 Ω (with 24 VDC) 0 mH 0 μF
Response time			2 – 4 s
Solenoid durty			Continuous duty solenoid (ED 100%)

Weight: 500 g.



Important

The intrinsically safe supply circuit should have enough capacity under all environmental conditions to assure a **minimum operating current of 20 mA** through the coil.



For the barriers compatibility see the corresponding table in pages 42, 43 and 44.

Parker Lucifer SA
Fluid Control Division Europe
CH-1227 Carouge-Genève

IS Standard coils parameters

IS- STANDARD ELECTRICAL PARTS								
Type of IS-protectiom		**EEx ia IICT6**	**EEx ia IICT6**	**EEx ia IIC T6**	**Ex ia**	**EEx ia IIB T6**	**EEx ia IIC T6**	**Ex ia**
Order references		**488650.01/03** **488660.01/03** **488670.01/03**	**490885** **490890** **490895**	**483580.01/03** **483960.01/03**	**490880** **493997**	**482160.01**	**482870.01**	**492335**
Certified by		**LCIE/AUS**	**LCIE/FM/CSA**	**PTB/AUS**	**LCIE/FM**	**LCIE**	**LCIE**	**LCIE/FM/CSA**
Function parameters	**Resistance of coil winding at 20°C** (for information only)	295 Ohm	295 Ohm	340 Ohm	340 Ohm	295 Ohm	295 Ohm	295 Ohm
	Impedance of electrical part	345 Ohm	345 Ohm	340 Ohm	340 Ohm	345 Ohm	345 Ohm	345 Ohm
	Minimum voltage required for functionning at 60°C	11.5 V	11.5 V	14 V	14 V	manual reset	manual reset	manual reset
	Minimum current required for functionning (attraction)	**29 mA**	**29 mA**	**35 mA**	**35 mA**	**manual reset**	**manual reset**	**manual reset**
	Minimum current required for holding	20 mA	20 mA	20 mA	20 mA	25 mA	25 mA	25 mA
	Inductance [L] of coil (mH apparent)	0	0	0	0	0	0	0
	Capacitance [C] of coil (µF apparent)	0	0	0	0	0	0	0
	Ambient temperatures	(-40 à +65°C)	(-40 à +65°C)	(-40 à +55°C)	(-40 à +55°C)	(-40 à +65°C)	(-40 à +65°C)	(-40 à +65°C)
Security parameters	**Maximum admissible voltage/current**	28V / 110mA 27V / 120mA 26V / 135 mA 25V / 150 mA 24V / 170 mA	30V/100mA 28V/330 Ohm -	28V / 110mA 27V / 120mA 26V / 135 mA 25V / 150 mA 24V / 170 mA	30V / 100mA - -	28V / 280mA 27V / 320mA 26V / 350 mA 25V / 390 mA 24V / 430 mA	28V / 110mA 27V / 120mA 26V / 135 mA 25V / 150 mA 24V / 170 mA	30V / 100mA 28V/300Ohm -

Cable resistance (there and back): 0.6 mm² - 59 Ohm/km; 1.0 mm² - 35 Ohm/km: 1.5 mm² - 24 Ohm/km . Assign approx. 30 Ohm for line-resistance.

Parker Lucifer SA
Fluid Control Division Europe
CH-1227 Carouge-Genève

Guidance chart for IS-barriers, Isolating interface units and Remote I/O for Standard IS -coils

TYPE	MANUFACTURER	REFERENCE	EEx..	RESIST. of barrier in Ohm	IS ELECTRICAL PARTS						
					EEx ia IIC T6 LCIE/AUS 488650.01/03 488660.01/03 488670.01/03	EEx ia IIC T6 LCIE/FM/CSA 490885 490890 490895	EEx ia IIC T6 LCIE/AUS 483580.01/03 483960.01	Exia LCIE/FM/CSA 490880 493997	EEx ia IIB T6 LCIE 482160.01	EEx ia IIC T6 LCIE 482870.01	Ex ia LCIE/FM/CSA 492335
Shunt Diode	MTL	7128P	ia	275					x		
Safety barriers		728.7028	ia	332	x	x	x	x	x	x	x
(passive)											
	Pepperl & Fuchs	Z 728	ia	300	x	x	x	x	x	x	x
		Z779	ia	300	x	x	x	x	x	x	x
	STAHL	9001/01-252-100-14	ia	252	x	x	27Vmin./LRmax 3	27Vmin./LRmax 3	x	x	x
		9001/01-280-100-10	ia	280	x	x	24Vmin./LRmax 3	24Vmin./LRmax 3	x	x	x
		9001/01-280-110-10	ia	255	x		24Vmin./LRmax 3		x	x	
		9002/13-280-100-04	ia	340	24Vmin./LRmax3	24Vmin./LR3	27Vmin./LRmax 3	27Vmin./LRmax 3	24Vmin./LRmax 3	24Vmin./LRmax 3	24Vmin./LRmax 3
Galvanic Isolated	A puissance 3	NAEV 22-140	ia		x		x		x	x	
Interface Units		NAEV 26 -100	ia		x		x		x	x	
(actives)											
and Remote I/O	ABB	V17132-54	ib		x		LRmax 5		x	x	
		V17132-55	ib		x				x	x	
		V17132-61	ia		x				x	x	
		DO 890	ib		x		x		x	x	
		S900- DO4-Ex	ib		x		x		x	x	
	BRADLEY	FEX-EX 24V	ia		x	x	x	x	x	x	
	COOPER	LB 2101	ia		x	x	LRmax15	LRmax15	x	x	x
		LB 2105	ia		x	x	x	x	x	x	x
		LB 2112	ia		x	x	x	x	x	x	x
	ELCON	1881 / 1882	ia		x	x	x	x	x	x	x
		471 / 472	ia		x	x	x	x	x	x	x
		2871/2872	ia		x	x	x	x	x	x	x
		2875/2876	ia		x	x	x	x	x	x	x
	GEORGIN	AVB 122	ia		x		x		x	x	
		AVB 125	ia		x		x		x	x	
		AVB 128	ia		x		x		x	x	
	HIMA	3328	ib		x		LRmax 5		x	x	
		H4006	ib		x		x		x	x	

Conditions: ED 100%, Max. ambient temp. 60°C. Coils marked with **x**: Suitable for > 30 Ohm addiditional Line Resistance. LRmax = max.additional Line Resistance in Ohm with min. voltage if required.

Parker Lucifer SA
Fluid Control Division Europe
CH-1227 Carouge-Genève

Guidance chart for IS-barriers, Isolating interface units and Remote I/O for Standard IS -coils

TYPE	MANUFACTURER	REFERENCE	EEx..	RESIST. of barrier in Ohm	IS ELECTRICAL PARTS						
					EEx ia IIC T6 LCIE/AUS 488650.01/03 488660.01/03 488670.01/03	EEx ia IIC T6 LCIE/FM/CSA 490885 490890 490895	EEx ia IIC T6 LCIE/AUS 483580.01/03 483960.01	Ex ia LCIE/FM/CSA 490880	EEx ia IIB T6 LCIE 482160.01	EEx ia IIC T6 LCIE 482870.01	Ex ia LCIE/FM/CSA 492335
Galvanic Isolated	MTL	3021, 4021, 4021S	ia		x		x		x	x	
Interface Units		3022	ia						x		
(actives)		4023	ia						x		
and Remote I/O		4024	ia		x		x		x	x	
		4025	ia		x	x	x	x	x	x	x
		5021, 5023, 5024	ia		x		x		x	x	
		5025	ia		x		x		x	x	x
	Pepperl & Fuchs	EGA-041-3	ia		x	x	x	x	x	x	x
		KFD2-SD-Ex1.36	ia						x		
		KFD2-SL-Ex1.36	ia						x		
		KFD2-SD-Ex1.48	ia		x		x		x	x	x
		KFD2-SL-Ex1.48	ia		x		x		x	x	x
		KSD2-BO-Ex	ia		x	x	x	x	x	x	x
		RSD-BO-Ex4	ib		x		x		x	x	x
	STAHL	9311/52-11-10	ia		x	x	25Vmin/LRmax 3	25Vmin./LRmax 3	x	x	x
		9111/63-11-00	ia		x	x	25Vmin./LRmax3	25Vmin./LRmax 3	x	x	x
		9351/10-15-10	ia		x	x			x	x	x
		9351/10-16-10	ia		x		x		x	x	
		9351/10-17-10	ia						x		
		9381/10-187-050-10	ib		x	x	x	x	x	x	x
		9381/10-246-055-10	ib		x	x	x	x	x	x	x
		9381/10-246-070-10	ib		x	x	x	x	x	x	x
		9475/12-04-11	ia		x	x			x	x	x
		9475/12-04-21	ia/ib		x		x		x	x	
	TURCK	MK72-S01-Ex	ib						x	x	
		MK72-S02-Ex	ib						x	x	
		MK72-S04-Ex	ib		x		x		x	x	
		MK72-S05-Ex	ib		x				x	x	
		MK72-S06-Ex	ib		x		x		x	x	
		MK72-S07-Ex	ib		x				x	x	
		MK72-S12-Ex	ia		x		x		x	x	

Conditions: ED 100%, Max. ambient temp. 60°C. Coils marked with **x**: Suitable for > 30 Ohm addiditional Line Resistance. LRmax = max.additional Line Resistance in Ohm with min. voltage if required.

Parker Lucifer SA
Fluid Control Division Europe
CH-1227 Carouge-Genève

IS Booster coils parameters

IS - BOOSTER ELECTRICAL PARTS					
Type of IS-protection		**EEx ia IIC T6**	**EEx ib IIB T6**	**EEx ib IIC T6**	**Ex ia**
Order reference		**492965.01/02**	**482660**	**483330.01**	**490860**
Certified by		**LCIE**	**LCIE**	**LCIE**	**LCIE/FM/CSA**
Function parameters	**Resistance of coil winding at 20°C** (for information only)	85 Ohm	23 Ohm	23 Ohm	23 Ohm
	Impedance of electrical part	275 Ohm/13V	50 Ohm *	50 Ohm *	50 Ohm *
	Minimum voltage required for functionning at 60°C	13 V	21.6 V	21.6 V	21.6 V
	Minimum current required for functionning (attraction)	-	-	-	-
	Minimum current required for functionning (holding)	**20 mA**	**40 mA**	**40 mA**	**40 mA**
	Inductance [L] of coil (mH apparent)	-	0	0	0
	Capacitance [C] of coil (µF apparent)	-	0	0	0
	Ambient temperatures	+65°C -25°C	+65°C -25°C	+65°C -25°C	+65°C -25°C
	Maximum current for continuous line check	4 mA	0	0	0
Security parameters	**Maximum admissible voltages /current**	28V / 110mA 27V / 120mA 26V / 135 mA 25V / 150 mA 24V / 170 mA	28V / 280mA 27V / 320mA 26V / 350 mA 25V / 390 mA 24V / 430 mA	28V / 110mA 27V / 120mA 26V / 135 mA 25V / 150 mA 24V / 170 mA	see certif. FM/CSA.

Cable resistance (there and back): 0.6 mm² - 59 Ohm/km; 1.0 mm² - 35 Ohm/km; 1.5 mm² - 24 Ohm/km. Assign 30 Ohm for line-resistance.

*** Attention : For function tests without barrier, only with in series connected resistance of min. 170 Ohm.**
Assign approx. 30 Ohm for line - resistance.

Parker Lucifer SA
Fluid Control Division Europe
CH-1227 Carouge-Genève

Guidance chart for IS-barriers, Isolating Interface Units and Remote I/O for Booster IS -coils

TYPE	MANUFACTURER	REFERENCE	EEx..	RESIST. of barrier in Ohm	IS Booster coil			
					EEx ia IIC T6 492965.01/02	EEx ib IIB T6 482660	EEx ib IIC T6 483330.01	Ex ia 490860
					LCIE	LCIE	LCIE	LCIE/FM/CSA
Shunt Diode	MTL	728	ia		x			
Safety Barriers		728.7028	ia		x			
(passive)	Pepperl & Fuchs	Z 728	ia		x	x	x	
		Z 779	ia		x	x	x	
	STAHL	9001/01-252-100-14	ia	252	x	x	x	
		9001/01-280-100-10	ia	280	x	x	x	x
		9001/01-280-110-10	ia	255	x	x	x	
		9002/13-280-100-04	ia	340	17Vmin/LRmax30	26Vmin/LRmax3	26Vmin/LRmax3	26Vmin/LRmax3
Galvanic Isolated	A puissance 3	NAEV 26 - 1002-140	ia		x	x	x	
Interface Units	ABB	V171132-54	ib		x			
(active)		V171132-55	ib		x			
and Remotes I/O		V171132-61	ia		x			
		DO 890	ib		x	x	x	
		S900-DO4-Ex	ib		x	x	x	
	BRADLEY	FEX-EX 24V	ia		x	x	x	x
	COOPER	LB 2101	ia		x			
		LB 2105	ia		x	x	x	x
		LB 2112	ia		x	x	x	x
	ELCON	1881 / 1882	ia		x	x	x	x
		471 / 472	ia		x	x	x	x
		2871/2872	ia		x	x	x	x
		2875/2876	ia		x	x	x	x
	GEORGIN	AVB 122	ia		x	x	x	
		AVB 125	ia		x	x	x	
		AVB 128	ia		x	x	x	
	Hima	3328	ib		x	x	x	
		H4006	ib		x	x	x	
	MTL	3021, 4021, 4021S	ia		x	x	x	x
		3022	ia			x		x
		4023	ia			x		
		4024	ia		x	x	x	x
		4025	ia		x	x	x	x
		5021, 5025	ia		x			

Conditions: ED 100%, Max. ambient temp. 60°C. Coils marked with x: Suitable for > 30 Ohm addiditional Line Resistance.
LRmax = max.additional Line Resistance in Ohm with min. voltage if required.

Parker Lucifer SA
Fluid Control Division Europe
CH-1227 Carouge-Genève

Guidance chart for IS-barriers, Isolating Interface Units and Remote I/O for Booster IS -coils

TYPE	MANUFACTURER	REFERENCE	EEx..	RESIST. of barrier in Ohm	IS Booster coil			
					EEx ia IIC T6 492965.01/02	EEx ib IIB T6 482660	EEx ib IIC T6 483330.01	Exia 490860
					LCIE	LCIE	LCIE	LCIE/FM/CSA
Galvanic Isolated	Pepperl & Fuchs	EGA-041-3	ia		x			
Interface Units		KFD2-SD-Ex1.36	ia			x		
(active)		KFD2-SL-Ex1.36	ia			x		
and Remotes I/O		KFD2-SD-Ex1.48	ia		x			
		KFD2-SL-Ex1.48	ia		x			
		KFD2-SL-Ex1.48.90A	ia		x	x	x	x
		KFD2-SL-Ex1.48.90A	ia		x	x	x	x
		KSD2-BO-Ex	ia		x			
		RSD-BO-Ex4	ib		x			
		RSD-VO-Ex8	ib		x			
	PULS	5RD00-0AB0	ib					
	STAHL	9311/52-11-10	ia		15Vmin/LRmax30	x	x	
		9111/63-11-00	ia		15Vmin/LRmax30	x	x	
		9351/10-15-10	ia		x	x	x	
		9351/10-16-10	ia		x	x	x	
		9351/10-17-10	ia			x		
		9381/10-187-050-10	ib		x		x	
		9381/10-246-055-10	ib		x	x	x	
		9381/10-246-070-10	ib		x	x	x	
		9465/12-08-11	ib		x			
		9475/12-04-31	ib		x			
		9475/12-08-51	ib		x			
	Turck	MK72-S01-Ex	ib		x			
		MK72-S02-Ex	ib		x			
		MK72-S04-Ex	ib		x			
		MK72-S05-Ex	ib		x			
		MK72-S06-Ex	ib		x			
		MK72-S07-Ex	ib		x			
		MK72-S09-Ex	ia			x	x	
		MK72-S12-Ex	ia		x			

Conditions: ED 100%, Max. ambient temp. 60°C. Coils marked with x: Suitable for > 30 Ohm addiditional Line Resistance.
LRmax = max.additional Line Resistance in Ohm with min. voltage if required.

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Part 4: Explosive environments

4.1. Introduction

Current European regulations concerning electrical equipment for potentially explosive environments are based on optional and partial European directives which require regular modification in the form of application or adaptation directives in order to keep pace with technical developments.

The basic European text in this field, directive **76/117/EC**, which allow the free circulation of goods within the European Union, provides the general framework for the present regulations.

Electrical equipment for use in potentially explosive environments is certified by a government-approved body when it meets relevant European standards (EN 50014 and upwards) covering each type of protection (**d, i, e, m, p**, etc.). Such equipment is then issued with a **European certificate of conformity and control**, entitling it to carry the distinctive mark:

This mark opens the way for trading within the European Union and occasionally beyond.

This system has now been in operation for more than 15 years. Although largely beneficial, it has revealed certain drawbacks, notably a lack of flexibility and the absence of a global concept for safety. It has now been completely revised by the **new European directive 94/9/EC from March 23, 1994**.

The certificates of conformity to harmonised standards obtained in compliance with previous directives will remain valid until June 30, 2003, but their validity will cover only conformity to the harmonised standards specified in these directives.

European Commission mark for "Ex" equipment

European Community member states

Austria - A	Belgium - B	Denmark - D	Germany - D	Finland - FIN
France - F	Great Britain - GB	Greece - GR	Ireland - IRL	Italy - I
Luxembourg - L	Netherlands - NL	Portugal - P	Spain - E	Sweden - S

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4.2 Definitions *(ref. IEC 60079-10)*

4.2.1 Explosive gas environments

Mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapour, mists or dusts in which, after combustion has occured, combustion spreads to the entire unburned mixture.

4.2.2 Hazardous areas

A hazardous area is an area in which an explosive gas environment is present, or may be expected to be present, in quantities such as to require special precautions for construction, installation and use of electrical apparatus.

4.2.3. Ingredients for an explosion

When combustible materials are mixed with air, an explosive mixture is produced. Danger of explosion therefore exists wherever these hazardous materials are handled: such a condition is to be found on the biggest chemical plant as well as at the smallest filling station.

Nowadays with the use of electronic and electrical instrumentation in process control, the risk of combustion by electrical energy has increased sharply.

To protect personnel and expensive equipment special precautions should be taken to prevent combustion of those dangerous substances. Conditions likely to ignite explosive mixtures are as follows:

- Electrical sparks and arcs produced when circuits are opened and closed (e.g. relay contacts)
- Conductors heated by passage of current or by faulty apparatus.
- Mechanical sparks; moving object hitting stationary object.
- Electrostatic sparks caused by charged components.
- Chemical action.
- Lightning strikes.
- Radio waves

4.2.4 Zones

The hazardous areas are classified in zones based on the frequency of the occurrence and the duration of an explosive gas environment as follows:

- **Zone 0**

An area in which an explosive gas environment is present continuously or is present for long periods
Type of protection: ia - intrinsic Safety

- **Zone 1**

An area in which an explosive gas environment is likely to occur in normal operations.
Type of protection: d - flameproof enclosure, e - increased safety, ib - intrinsic safety, m - encapsulation

- **Zone 2**

An area in which an explosive gas environment is not likely to occur and if it does occur it will exist for a short period only.
Type of protection: n - protection (IEC 60079-15)

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Classification of hazardous location

Explosive environment	Continuous presence	Intermittent presence (normal operation conditions)	Occasional presence (abnormal operation)
IEC	Zone 0 (gas) Zone 20 (dust)	Zone 1 (gas) Zone 21 (dust)	Zone 2 (gas) Zone 22 (dust)
Europe	Zone 0 (gas) Zone 20 (dust)	Zone 1 (gas) Zone 21 (dust)	Zone 2 (gas) Zone 22 (dust)
Canada (CEC)[1] **USA** (NEC)[2]	Cl. I Div.1 (gas) Cl. II Div.1 (dust) Cl.III Div.1 (fibres)	Cl. I Div.1 (gas) Cl. II Div.1 (dust) Cl.III Div.1 (fibres)	Cl. I Div.2 (gas) Cl. II Div.2 (dust) Cl.III Div.2 (fibres)

[1] **(CEC)**: Code Canadien d'Electricité / [2] **(NEC)**: National Electrical Code

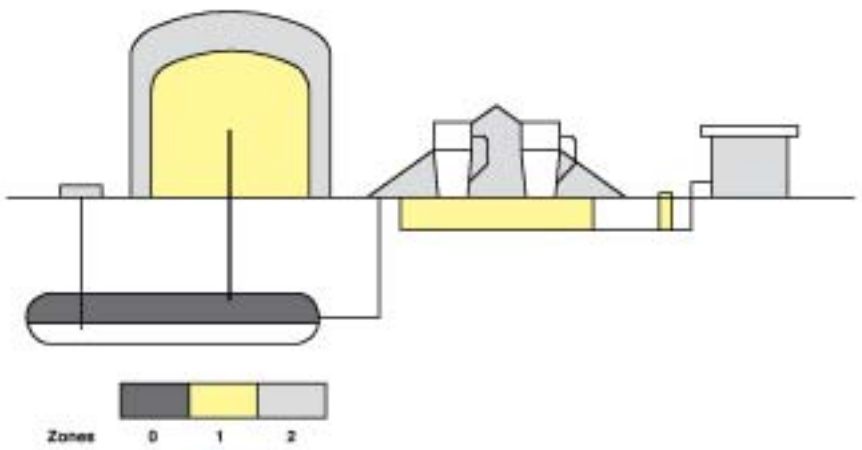
Zones and types of protection (gas applications)

Type of protection	ia	ib	**o, p, q, d, e, m,** or combination between 2 or more types
Suitable zones	**0**	**1**	1, 2

Some additional tests for gas and dust applications are applied to the product according to the new ATEX directive related to the EN 50281-1-1 and EN 50281-1-2 standards:

Type of protection	ia	ib	**o, p, q, d, e, m,** or a combination of 2 or more types
Suitable zones	**20**	**21**	21, 22

Example of classification:



4.3 European directives prior to the New Approach

The Council and the Commission of the European Union have periodically adopted directives intended to reconcile the laws of member states concerning electrical equipment intended for use in potentially explosive environments.

One of these directives, 76/117/EC (JO no. L24/45), is particularly important.

It stipulates that member states forbid any restriction, for reasons relating to the safety of products when used in potentially explosive environments, on the sale, free movement or suitable use of equipment whose conformity to harmonized standards has been confirmed by a body approved by the member states (notified body).

Proof of this conformity is provided with the issue of a certificate of conformity bearing the EC's distinctive mark 

The above ruling applies also in cases where harmonized standards are not applied but where it can be proved (through a special procedure involving consultation of the commission and the member states) that a safety level equivalent to that required in the standards has been attained.

In such cases proof is provided in the form of an inspection Certificate bearing the EC's -  Mark, issued by one of the bodies approved by the member states.

Previous directions to the new approach concern only electrical equipments and the harmonisation in this framework is optional and partial.

The "framework" directive 76/117/CEE rev. on 18.12.1995 is followed by so-called application or adaptation directives.

4.3.1 Mines

- Directive 82/130/EC 15 Feb 1988
- Directive 88/35/EC 02 Dec 1987
- Directive 91/269/EC 30 Apr 1991

4.3.2 Surface

- Directive 79/196/EC 06 Feb 1979
- Directive 84/47/EC 16 Jan 1984
- Directive 88/571/EC 10 Nov 1988
- Directive 88/665/EC 21 Dec 1988
- Directive 90/487/EC 17 Sep 1990
- Directive 94/26/EC 15 Sep 1994

Previous directions to the New Approach concern only electrical equipment, and the harmonisation in this framework is optional and partial.

The "framework" directive 76/117/CEE rev. on 18 Dec. 1995 is followed by so-called application or adaptation directives.

These directives apply until June 30, 2003, and will be repealed as of July 1, 2003. From this date products certified under the old regulations are no longer to be sold.

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4.4 Protection or prevention

Ignitions or explosions can be avoided by two means:

- Preventing the occurrence of an explosive environment = Primary explosion protection
- Preventing ignition of an explosive environment = Secondary explosion protection

4.4.1 Primary explosion protection

- Avoid the use of inflammable liquids or gas
- Limit their concentration
- Natural or artificial ventilation

4.4.2 Secondary explosion protection

Must be applied when primary protection cannot be realised. This requires the construction of devices (electrical equipment) according to protection models prescribed under CENELEC standards.

- The construction of anti-explosive electrical devices which avoid an internal explosion
  Example: protection method EEx m, EEx me, EEx e
- The construction of anti-explosive electrical devices which admit an internal explosion but does not allow it to reach the proximity of an explosive environment.
  Example: protection method EEx d, EEx ia, EEx ib

Notes

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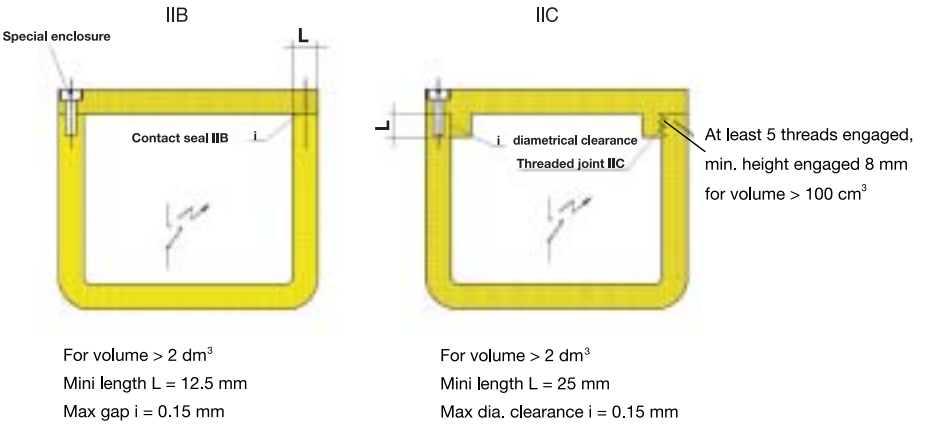
4.5. Types of protection used by Lucifer

4.5.1 Flameproof enclosure

"d"

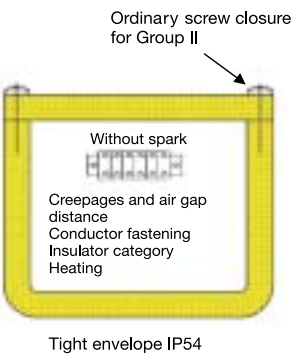
A type of protection where the parts that can ignite an explosive environment are placed in an enclosure which can withstand the pressure developed during an internal explosion of an explosive mixture and which prevents the transmission of the explosion to the explosive environment surrounding the enclosure.



4.5.2 Increased safety

"e"

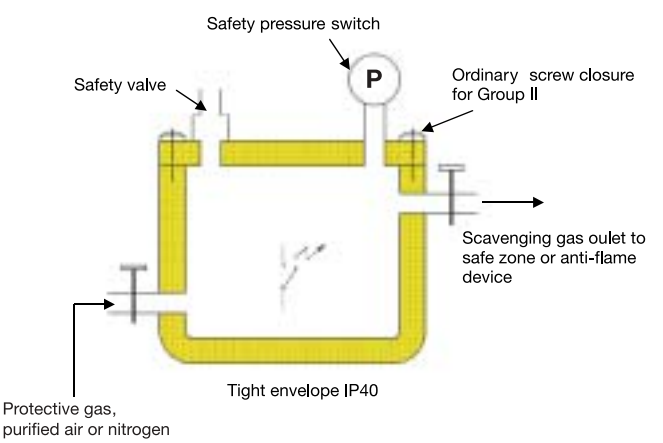
Type of protection applied to electrical apparatus that does not produce arcs or sparks in normal service, in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks.



4.5.3 Pressurized apparatus

"p"

A type of protection by which the entry of a surrounding environment into the enclosure of the electrical appartus, is prevented by maintaining, inside the said enclosure, a protective gas at a higher pressure than that of the surrounding environment. The overpressure is maintained either with or without a continuous flow of the protective gas.



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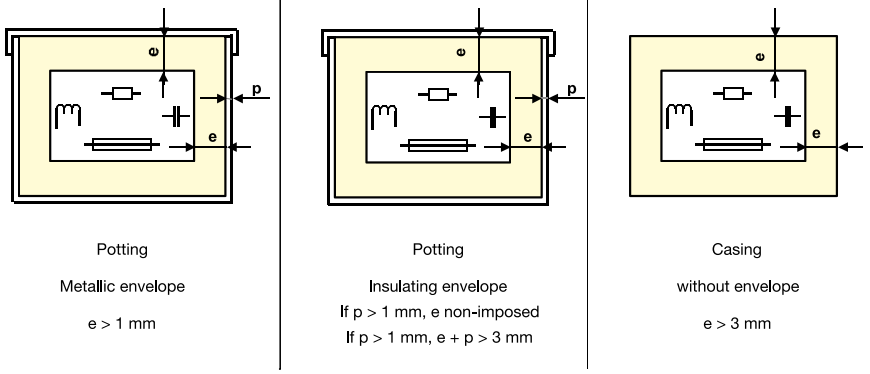
4.5.4 Encapsulation

“m”

A type of protection in which the parts which could ignite an explosive environment by either sparking or heating are enclosed in a compound in such a way that this explosive environment cannot be ignited



Potting
Metallic envelope
e > 1 mm

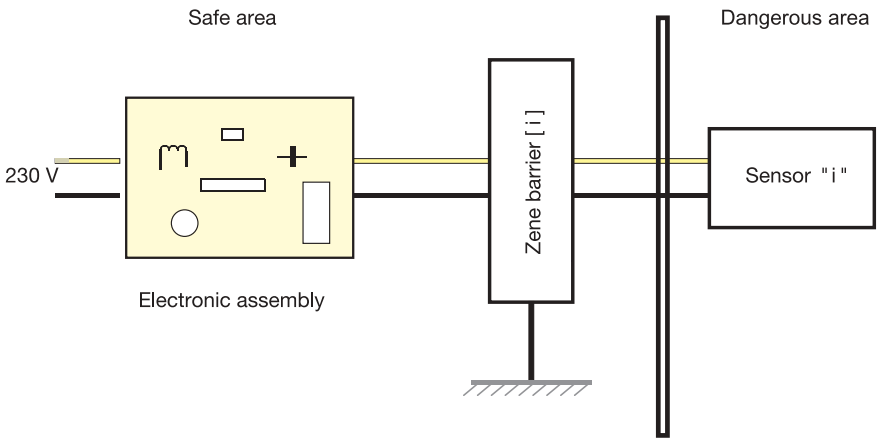
Potting
Insulating envelope
If p > 1 mm, e non-imposed
If p > 1 mm, e + p > 3 mm

Casing
without envelope
e > 3 mm

4.5.5 Intrinsic safety

“i”

A circuit in which no spark or any thermal effect produced in the test conditions prescribed in the standard EN 50020 (which include normal operation and specified fault conditions) is capable of causing combustion of a given explosive environment.



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4.5.6 Standards and type of protection

It is essential to know which standards apply to equipment according to the type of protection chosen.
Each type of protection corresponds to a specific concept.

CENELEC standards	IEC standards	Type of protection	Symbol
EN 50014	60079-0	General rules	
EN 50015	60079-6	Oil immersion	**"o"**
EN 50016	60079-2	Pressurized apparatus	**"p"**
EN 50017	60079-5	Powder filling	**"q"**
EN 50018	60079-1	Flameproof enclosure	**"d"**
EN 50019	60079-7	Increased safety	**"e"**
EN 50020	60079-11	Intrinsic safety	**"i"**
EN 50028	60079-18	Encapsulation	**"m"**
EN 50033	–	Cap lights (mines)	
EN 50039	–	Intrinsically safe systems	**"syst"**
EN 50050	–	Hand-held electrostatic spraying equipment	
EN 50053	–	Hand-held electrostatic paint spray guns	

4.6. Gas groups

To ensure that equipment can be safely used in hazardous areas, its gas group must be known and its temperature class must be compared with the spontaneous combustion temperature of the gas mixtures concerned.

Place of use	Group: CENELEC / IEC	Class and Group: Canada and USA	Representative gas
Mines susceptible to firedamp	**I**	gaseous mines	methane
Surface industries	**II A**	**I - D**	propane
	II B	**I - C**	ethylene
	II C	**I - B** **I - A**	hydrogen acetylene

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4.7 Surface temperatures (EN 50014)

The highest temperature which is attained in service under the most unfavourable conditions by any part or surface of an electrical part and which is able to produce combustion of the surrounding environment.

Group I

150°C	Where coal dust can form a layer (T5)
450°C	For methane / air mixture, only if the risk is avoided by sealing or ventilation

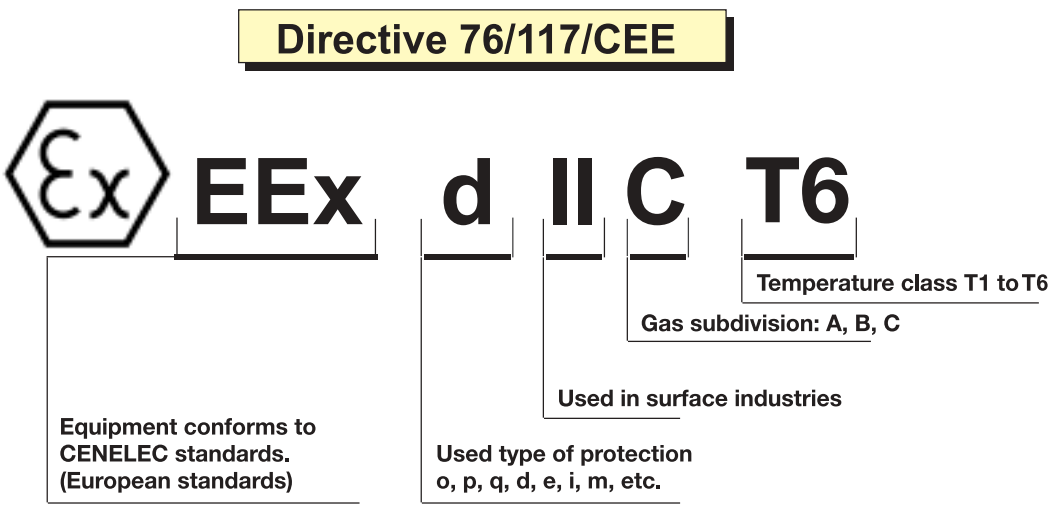
Group II

Temperature classes	-	T1	T2	T3	T4	T5	T6
Surface max. temperature	°C	450	300	200	135	100	85

4.8. Marking

The marking is valid for any electrical equipment certified by an approved body according to the application directive 76/117/CEE (for applications in explosive environment).

This becomes a supplementary marking for the new directive 94/9/CE (obligatory application beginning on 01.07.2003).



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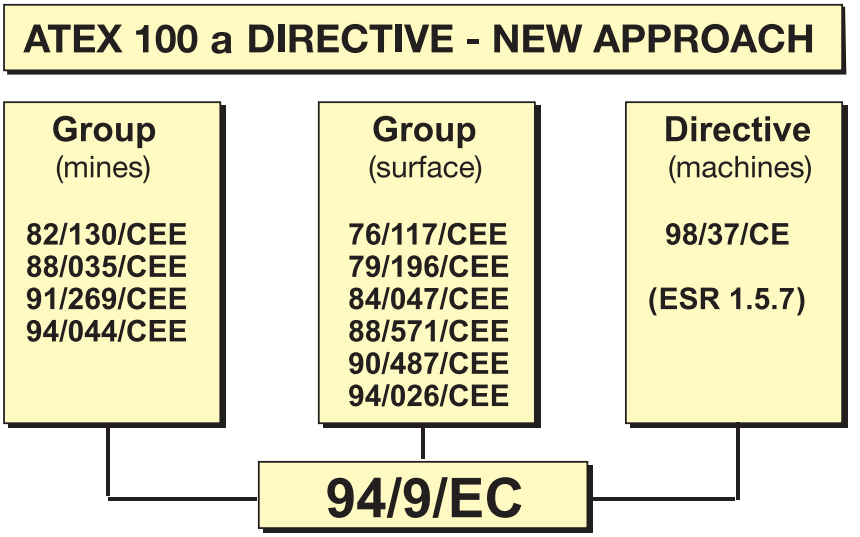
4.9. New directive *(94/9/EC - 1994-03-23)*

In keeping with the ‘‘**new approach**’’, the new directive lays down the framework for a total harmonization of regulations covering this field.

It makes no direct references to standards but sets out the essential health and safety requirements to be met and introduces the **CE** marking



4.9.1 The framework of the directive

The main principles of the new directive can be summarized as follows:

- It applies to **electric** and **non-electric** equipment.
- It defines **essential health and safety requirements**.
- It takes into consideration **all potential hazards** equipment may cause, in particular at design and production level.
- **The one directive** applies to both **mines** susceptible to fire damp and **surface industries**.
- It stresses the importance of equipment being **used in accordance with its intended purpose**.
- It recognises The European Standards Committee **CEN** and the European Committee for Electrotechnical Standardisation **CENELEC** as competent bodies to fix the required harmonised standards.
- It provides for the **contribution of labour and management**.
- It defines **procedures for assessing conformity** to essential requirements, on the basis of modules which qualify equipment to carry the **CE** mark of conformity.

4.9.2 Applications

The directive applies to the industrial field and concerns the following equipment:

- **Equipment** (machines, apparatus, etc.)
- **Protective systems** (discharge devices, explosion suppression devices, etc.)
- **Components** (parts with no autonomous function, terminals, etc.)
- **Safety devices, controlling devices and regulating devices** intended for use outside potentially explosive environments but required for safety with respect to explosions (relays, barriers, pressure switches, thermostats, etc.)

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4.9.3 Excluded from the scope of the new directive

The following equipment falls outside the scope of the new directive:

- Medical devices intended for use in a medical environment.
- Equipment and protective systems relating only to the risk of explosion of unstable chemical substances (explosives, etc.)
- Equipment intended for use in domestic and non-commercial environments.
- Personal protective equipment covered by directive 89/686/EC.
- Seagoing vessels and mobile offshore units.
- Means of transport, except for vehicles intended for use in a potentially explosive environment.

4.9.4 Application dates

ATEX 100 a DIRECTIVE - NEW APPROACH

94/9/EC

Application dates

• Transposition to national law	1 . 9 . 1995
• Application (optional)	1 . 3 . 1996
• Application (total)	1 . 7 . 2003

4.9.5 Essential safety requirements:

These cover a wide field, fully detailed in annex II of the new directive.

- Principle of integrated safety
- Specific conditions of inspection and maintenance
- Environmental conditions
- Marking
- Instruction for use
- Choice of materials
- Design and manufacture
- Potential combustion sources (sparks - flames - electric arcs - high surface temperature - acoustic energy - radiation: optical, electromagnetic or other sources)
- Risks caused by software
- Explosive environments caused by the presence of gas, vapour and mist
- Explosive environments caused by the presence air-dust mixtures.

Equipment covered by the new directive 94/9/EC must also meet the requirements of the other relevant directives:

- Electromagnetic Compatibility Directive (89/336/EC / application from January 1, 1996)
- Machinery Directive (89/392/EC - 98/37/EC / application from January 1, 1995)

Other directives will have to be considered in some case, such as those relating to simple pressure vessels (87/404/EC), to gas appliances (90/396/EC), and others, which are yet to be issued. It should be noted that equipment for explosive environments is excluded from the Low Voltage Directive 73/23/EC. Nevertheless the manufacturer must guarantee that his equipment is in full compliance with the safety rules. The rules defined by the Low Voltage Directive may serve as a guideline to reach this objective

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4.9.6 Potential ignition sources and other hazards to be controlled

The following all represent potential hazards:

- Various sources of ignition, such as sparks, flames, electric arcs, high surface temperature, acoustic energy, optical radiation or electromagnetic waves.
- Static electricity.
- Pressure compensation operations.
- Disturbance from external sources, such as changing environmental conditions, extraneous voltage, humidity, vibration or contamination.

Provision is also made for specific requirements governing devices used to provide additional equipment safety.

These requirements necessitate detailed analysis to asses the operational reliability of such devices and their interaction with other components connected with the equipment.

Notes

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4.10. The conformity assessment procedures

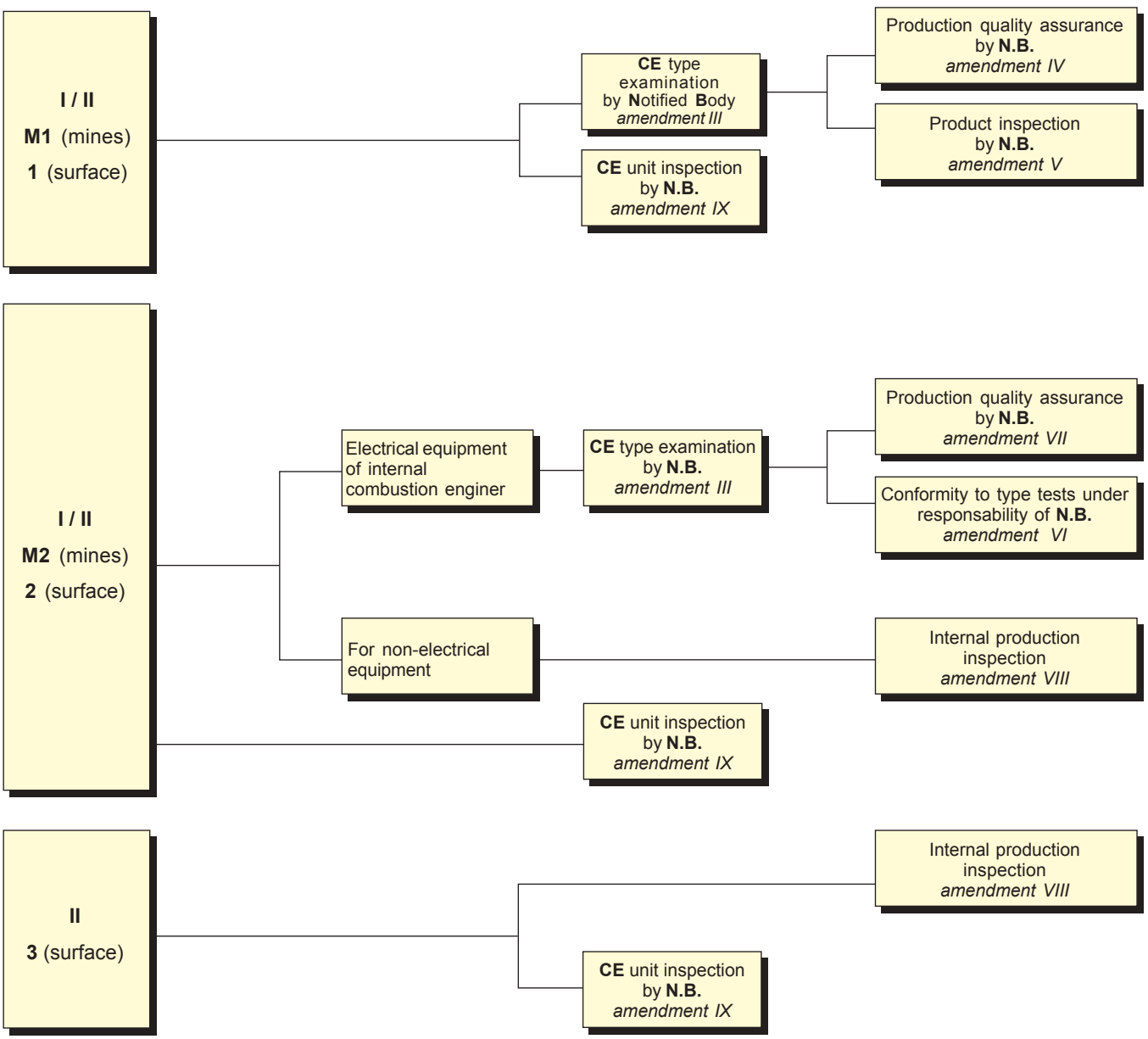
There are various conformity assessment procedures which enable equipment to carry a **CE** marking.

The notified body assists in the conformity assessment procedures as specified in each case.

As a general rule for electrical equipment, if each product cannot be individually inspected the laboratory performs a **CE** type examination and then periodically ensures the conformity of equipment manufactured by means of a ‘‘production’’ or ‘‘product’’ quality assurance audit.

The manufacturer or his authorised representative draws up a **CE** declaration of conformity for the equipment, providing detailed specifications and referring to the relevant documents (certification and qualification documents, technical report and description, instructions for use, circuit and assembly diagrams, etc.).

The procedures may be summarised as follows:



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4.11. Groups and categories of equipment

The directive provides a classification covering the equipment's intended purpose, the nature of inflammable substances and the degrees of presence or duration of the explosive environment.

This classification is summarized below, with required safety conditions and their correlation with the code of hazardous areas commonly used worldwide.

Purpose	Category of equipment	Presence or duration of explosive atmosphere	Inflammable substances	Level of protection Faults to allow for	Correlation with hazardous areas
Equipment group I (Mines)	**M1**	Presence	methane dust	Very high level of protection 2 types of protection or 2 independent fault *Rare faults allowed*	––
	M2	Risks of presence	methane dust	High level of protection 1 type of protection *For normal operation*	––
Equipment group II (surface)	**1**	Continuous presence Long periods Frequent	gas, vapours, mist, dust	Very high level of protection 2 types of protection or 2 independent faults *Rare faults allowed*	Zone 0 gas etc. Zone 20 dust
	2	Likely to occur	gas, vapours, mist, dust	High level of protection 1 type of protection *Usual malfunctions allowed*	Zone 1 gas etc. Zone 21 dust
	3	Unlikely to occur Present for a short period	gas, vapours, mist, dust	Normal Protection Required protection *For normal operation*	Zone 2 gas etc. Zone 22 dust

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4.12. Marking (new directive)

The requirements described in the directive and appendix II necessitates the adoption of a specific marking system for equipment in order to facilitate their use.

This marking system is set out in the table below.

Equipment will carry all essential markings for safe operation, along with the usual information indicating its specific nature.

Equipment category (hazardous areas)	Equipment group	Marking under New directive (G = gas, etc.) (D = dust)	Example of additional marking codes currently used for equipment certification
M1	**I** (mines)	CE ···· Ex **I M1**	**EEx I ia**
M1	**I** (mines)	CE ···· Ex **I M2**	**EEx d I**
1 (Zone 0: gas, etc.) (Zone 20: dust)	**II** (surface)	CE ···· Ex **II 1 G or D**	**EEx ia IIC T6**
2 (Zone 1: gas, etc.) (Zone 21: dust)	**II** (surface)	CE ···· Ex **II 2 G or D**	**EEx d IIC T6 or EEx e IIC T3**
3 (Zone 2: gas, etc.) (Zone 22: dust)	**II** (surface)	CE ···· Ex **II 3 G or D**	**EEx d IIC T6 or EEx e IIC T3**

This marking concerns directive 76/117/EC as an amendment to the new directive.

This marking concerns only the new directive 94/9/EC, date of total application 1 july 2003.

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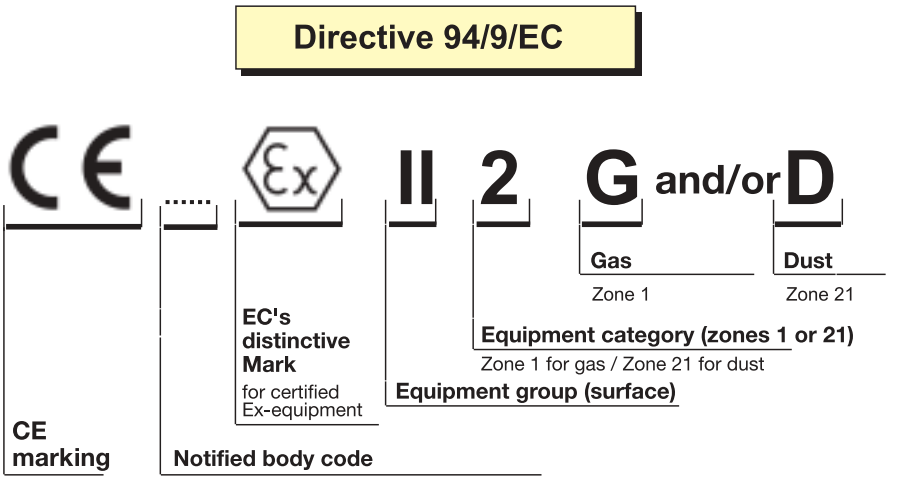
4.12.2 Marking interpretation *(New directive)*



The certificate which authorizes this marking is different from the certificates of conformity established according to the directive 76/117/CEE.

To enable the certificate of conformity in force to be distinguished from the ATEX certificate delivered according to the new directive, the numbering of this latter is as follows:

Example: LCIE 97 ATEX 3340 instead of LCIE 97.D 2136.

4.13. Notified bodies

Symbol	Description	Country
ISSeP	**I**nstitut **S**cientifique de **Se**rvice **P**ublic	Belgium
Demko	**D**anmarks **E**lektiske **M**aterielkontrol	Denmark
PTB	**P**hysikalisch **T**echnische **B**undesanstalt	Germany
BVS	**B**ergbau-**V**ersuchs**s**trecke	Germany
LOM	**L**aboratorio **O**ficial José María **M**adariaga	Spain
INERIS	**I**nstitut **N**at. de l'**E**nvironnement Industriel et des **Ris**ques	France
LCIE	**L**aboratoire **C**entral des **I**ndustries **E**lectriques	France
CESI	**C**entro **E**lletrotecnico **S**perimentale **I**taliano	Italy
KEMA	NV KEMA	Netherlands
EECS	**E**lectrical **E**quipment **C**ertification **S**ervice	Great Britain
.....		

All certificates of conformity or CE type examinations delivered by one of those notified bodies is recognized in all others countries of the European Community.

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Accessories

	**DIN plug connector according to DIN 43650 AB Pg 9 2P+T** No. 481043 Electrical connection suitable for all 22 mm coils (e.g. 488980, 481180)
	**DIN plug connector according to DIN 43650 AA Pg 9 2P+T** No. 486586 for standard version No. 492645 for high temperature version Electrical connection suitable for all 32 mm coils (e.g. 481865, 492425)
	**Stainless steel assembly kit** Nut No. 482213 M14 x 1+ Ring No. 482214 + O-Ring No. 483917 Coil assembly kit for offshore electrical parts. (e.g. 482160.01, 482870.01, 483330.01, 492210, 492965.01)
	**Cable gland** No. 493841 - M20x1.5 - EEx ia IIC Electrical connection and mooring cable with 6 to 12 mm diameter, for electrical parts approved ‘‘me’’, ‘‘ia’’. (e.g. 492190, 492965....)
	**Cable gland** No. 493426 - 1/2"-14 NPT Electrical connection and mooring cable with 6 to 12 mm diameter, for flameproof approved electrical parts. (e.g. 493640)

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Coils and electrical parts data:

Ex approved electrical parts.

Product		Protection	Pnom [W]	IP -	Ambient and fluid temp. * [°C]	Group	Detail see page
Basic reference	Code						
482160.01	**VZ22**	EEx ia IIB T6	0.3 to 3	66	- 40 to 75	12	36
482605	**VA01**	EEx m II T4	4 to 5	65	- 40 to 50	1	19
482606	**VA02**	EEx m II T5	2 to 2.5	65	- 40 to 50	1	19
482606.10	**VA12**	EEx m II T5	2 to 2.5	65	- 40 to 50	1	19
482660	**VZ11**	EEx ib IIB T6	0.4 to 3	66	- 40 to 75	9, 10	37
482870.01	**VZ23**	EEx ia IIC T6	0.3 to 3	66	- 40 to 75	12	36
483250	**HZ08**	EEx d IIC T4/T5/T6	8	65	- 40 to 80/75/60	5	28
483270	**HZ19**	EEx d IIC T4/T5/T6	8	65	- 40 to 80/75/60	11	29
483330.01	**VZ12**	EEx ib IIC T6	0.4 to 3	66	- 40 to 75	9, 10	37
483330.03	**VZ25**	Ex ib IIC T6	0.4 to 3	66	- 40 to 75	9, 10	37
483371	**HZ06**	EEx me II T4	8	67	- 40 to 80	2	23
483371.01	**HZ14**	EEx me II T4	8	67	- 40 to 80	2	23
483580.01	**DZ12**	EEx ia IIC T6	0.5 to 3	65	- 40 to 55	7	32
483960.01	**DZ13**	Ex ia IIC T6	0.5 to 3	65	- 40 to 55	7	32
488650.01	**VZ07**	EEx ia IIC T6	0.3 to 3	66	- 40 to 75	7	33
488660.01	**VZ08**	EEx ia IIC T6	0.3 to 3	67	- 40 to 75	7	34
488670.01	**VZ09**	EEx ia IIC T6	0.3 to 3	65	- 40 to 75	7	35
490860	**VZ28**	Ex ia	0.3 to 3	65	- 40 to 75	9, 10	37
490880	**DZ18**	EEx ia IIC T6	0.3 to 3	65	- 40 to 55	7	32
490885	**VZ33**	EEx ia IIC T6	0.3 to 3	65	- 40 to 75	7	33
490890	**VZ18**	EEx ia IIC T6	0.3 to 3	65	- 40 to 75	7	34
490895	**VZ20**	EEx ia IIC T6	0.3 to 3	65	- 40 to 75	7	35
491117	**VZ04**	EEx me II T5	2.5	67	- 40 to 65	6	24
492070	**VZ01**	EEx m II T4/T5	8 to 9	67	- 40 to 65	2	21
492190	**VZ03**	EEx me II T3/T4	9 to 11	66	- 40 to 75	2	25
492190.03	**VZ34**	Ex me II T3/T4	9 to 11	66	- 40 to 75	2	25
492190.10	**VZ90**	EEx me II T3/T4	9 to 11	66	- 40 to 75	2	25
492200	**VZ13**	EEx me II T5/T6	1 to 1.8	66	- 40 to 75	9	26
492210	**VZ26**	EEx me II T5/T6	1 to 1.8	66	- 40 to 75	10	26
492270	**VZ02**	EEx m II T4/T5	5	67	- 40 to 65	9	22
492300	**VZ14**	EEx me II T4/T5	6	66	- 40 to 75	9	27
492310	**VZ27**	EEx me II T4/T5	6	66	- 40 to 75	10, 12	27
492335	**VZ30**	Ex ia	0.3	65	- 40 to 75	12	36
492370	**VZ05**	EEx m II T4/T5	2.5	67	- 40 to 65	6	21
492390	**VZ06**	EEx me II T5/T6	2.5	66	- 40 to 75	6	25
492670	**HZ05**	EEx m II T4	8 to 9	65	- 40 to 40	2	20
492670.10	**HZ90**	EEx m II T4	8 to 9	65	- 40 to 40	2	20
492965.01	**VZ91**	EEx ia IIC T6	0.3 to 3	66	-40 to 75	10	38
492965.02	**VZ92**	EEx ia IIC T6	0.3 to 3	66	-40 to 75	9	38
493640	**HZ09**	EEx md IIC T4	8	65	- 40 to 75	2	30
494035.10	**VZ93**	EEx ia IIC T6	0.3 to 3	67	- 40 to 75	7	33
494040	**HZ23**	EEx me II T3/T4	8	67	- 40 to 90	2	23

* Temperature: Application is limited also by the temperature range of the valve.

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Basic references and global codes

Electrical parts					
Reference	Code	Page	Code	Reference	Page
482160.01	VZ22	36	**DZ12**	483580.01	32
482605	VA01	19	**DZ16**	483580.03	32
482606	VA02	19	**DZ18**	490880	32
482606.10	VA12	19	**HZ05**	492670	20
482606.160	VA07	19	**HZ06**	483371	23
482660	VZ11	37	**HZ08**	483250	28
482870.01	VZ23	36	**HZ09**	493640	31
482870.03	VZ24	36	**HZ14**	483371.01	23
483250	HZ08	28	**HZ19**	483270	29
483270	HZ19	29	**HZ21**	483270.02	29
483270.02	HZ21	29	**HZ23**	494040	23
483330.01	VZ12	37	**HZ90**	492670.10	20
483330.03	VZ25	37	**HZ91**	492670.160	20
483371	HZ06	23	**VA01**	482605	19
483371.01	HZ14	23	**VA02**	482606	19
483580.01	DZ12	32	**VA07**	482606.160	19
483580.03	DZ16	32	**VA12**	482606.10	19
488650.01	VZ07	33	**VZ01**	492070	21
488650.03	VZ31	33	**VZ02**	492270	22
488660.01	VZ08	34	**VZ03**	492190	25
488660.03	VZ17	34	**VZ04**	491117	24
488670.01	VZ09	35	**VZ05**	492370	21
488670.03	VZ19	35	**VZ06**	492390	25
490860	VZ28	37	**VZ07**	488650.01	33
490880	DZ18	32	**VZ08**	488660.01	34
490885	VZ33	33	**VZ09**	488670.01	35
490890	VZ18	34	**VZ11**	482660	37
490895	VZ20	35	**VZ12**	483330.01	37
491117	VZ04	24	**VZ13**	492200	26
492070	VZ01	21	**VZ14**	492300	27
492070.03	VZ21	21	**VZ17**	488660.03	34
492070.60	VZ96	21	**VZ18**	490890	34
492190	VZ03	25	**VZ19**	488670.03	35
492190.03	VZ34	25	**VZ20**	490895	35
492190.10	VZ90	25	**VZ21**	492070.03	21
492200	VZ13	26	**VZ22**	482160.01	36
492210	VZ26	26	**VZ23**	482870.01	36
492270	VZ02	22	**VZ24**	482870.03	36
492300	VZ14	27	**VZ25**	483330.03	37
492310	VZ27	27	**VZ26**	492210	26
492310.03	VZ29	27	**VZ27**	492310	27
492335	VZ30	36	**VZ28**	490860	37
492370	VZ05	21	**VZ29**	492310.03	27
492390	VZ06	25	**VZ30**	492335	36
492670	HZ05	20	**VZ31**	488650.03	33
492670.10	HZ90	20	**VZ33**	490885	33
492670.160	HZ91	20	**VZ34**	492190.03	25
492965.01	VZ91	38	**VZ90**	492190.10	25
492965.02	VZ92	38	**VZ91**	492965.01	38
493640	HZ09	31	**VZ92**	492965.02	38
494035.10	VZ93	33	**VZ93**	494035.10	33
494040	HZ23	23	**VZ96**	492070.60	21

Coils					
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481000	EZ01	12	**D400**	491514	15
481044	EZ91	12	**D500**	491514	15
481045	DA02	18	**DA01**	488980	18
481180	DA03	18	**DA02**	481045	18
481530	DA04	18	**DA03**	481180	18
481865	DZ02	14	**DA04**	481530	18
482635	DZ07	14	**DA05**	492912	18
482725	DZ03	14	**DA06**	492929	18
482730	DZ90	14	**DA07**	483590	18
482735	DZ91	14	**DZ02**	481865	14
482740	DZ10	16	**DZ03**	482725	14
482745	DZ11	16	**DZ04**	492453	14
483510	DZ06	14	**DZ05**	492726	14
483520	EZ90	12	**DZ06**	483510	14
483590	DA05	18	**DZ07**	482635	14
484990	MZ01	13	**DZ08**	492425	14
485100	EZ02	12	**DZ09**	492727	14
485400	MZ02	13	**DZ10**	482740	16
486265	EZ92	12	**DZ11**	482745	16
488980	DA01	18	**DZ90**	482730	14
491514	D400	15	**DZ91**	482735	14
491514	D500	15	**DZ92**	492385	17
492385	DZ92	17	**DZ93**	492387	17
492387	DZ93	17	**EZ01**	481000	12
492425	DZ08	14	**EZ02**	485100	12
492453	DZ04	14	**EZ90**	483520	12
492726	DZ05	14	**EZ91**	481044	12
492727	DZ09	14	**EZ92**	486265	12
492912	DA05	18	**MZ01**	484990	13
492929	DA06	18	**MZ02**	485400	13

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4269	E1	6	**E0**	4270	5
4270	E0	5	**E1**	4269	6
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2995.03	N3	9	**A1**	8993.03	9
8122	A2	9	**A2**	8122	9
8122	NL	9	**N1**	2995	9
8886	NT	9	**N3**	2995.03	9
8993	A0	9	**NT**	8886	9
8993.03	A1	9	**NL**	8132	9

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Voltage code		A1	A2	A4	A5	0A	A7	3D	F4	A9	B2	K8	6J	B7	J3	B8	7J	S2	4K	P0	S4	P2	P3	1P	S5	0P	R5	P9	3P	S6	S2	Q3	Q1	5P	C1	C2	N7	L8	C4	C5	C7
Coils / Electrical parts		12/50	24/50	48/50	110/50	110/50-115/50	220/50	220/50-230/50	230/50	380/50	24/60	115/60	110/60-115/60	220/60	230/60	240/60	220/60-230/60	200/60-230/60	220/60-240/60	24/50-24/60	48/50-48/60	110/50-60	110/50-120/60	110-115/50,	110-115/50,	100/50, 115/60	220/50-60	230/50-60	220-230/50-60	220-240/50-	220/50-230/60	220/50-240/60	240/50-60	380/50-440/60	12/DC	24/DC	28/DC	30/DC	48/DC	110/DC	220/DC
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481000	EZ01		●	●		●		●			●		●						●															●	●	●			●	●	●
481044	EZ91		●		●		●		●	●	●			●												●				●										
481180	DA03		●			●		●																												●					
481865	DZ02		●	●	●			●		●	●	●			●																			●	●			●	●	
482730	DZ90		●			●		●				●																							●				●		
482740	DZ10																																		●						
483510	DZ06																			●	●				●					●											
483520	EZ90																			●										●											
483590	DA05																			●	●				●					●											
484990	MZ01																			●	●			●					●												
485100	EZ02		●			●		●																												●					
485400	MZ02																																		●	●			●	●	●
486265	EZ92		●		●		●		●	●				●				●								●				●				●	●			●		
488980	DA01		●	●		●		●			●		●				●																	●	●			●	●	
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492425	DZ08		●		●				●																										●					
492453	DZ04		●	●	●			●		●																									●	●					
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482160.01	VZ22																																				●				
482605	VA01		●			●		●																												●				●	
482606	VA02		●	●		●		●			●		●				●																	●	●			●	●	
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482606.160	VA07							●																												●					
482660	VZ11																																				●				
482870.01	VZ23																																				●				
483250	HZ08		●	●	●		●																												●			●	●	
483270	HZ19																			●	●			●					●						●	●			●	●	
483330.01	VZ12																																				●				
483371	HZ06	●	●	●	●		●		●										●																●	●			●	●	
483371.01	HZ14																																			●				●	●
483371.05	HZ15		●	●					●																										●	●			●	●	
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492070.60	VZ96																											●							●						
492190	VZ03																			●		●					●	●					●		●				●	●	●
492190.05	VZ95																											●							●						
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494040	HZ23		●			●		●																												●					

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