

ПРЕДПРИЯТИЕ МАКСАЭРО

- Производство воздуховодов и систем вентиляции
- Клапаны противопожарные
- Клапаны дымоудаления
- Вентиляторы общепром, дымоудаления, крышные

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Соленоидные клапаны Parker Lucifer типа NAMUR 19



Parker Lucifer - the experts in fluid control

Welcome to the Parker Lucifer catalogue. It's your entry point to an entire programme of solenoid valves based on the unique Lucifer modular concept. This gives you the widest choice of specifications and options to match your requirements exactly.

Making business as simple as possible

The catalogue is just one part of a very special kind of supplier-specifier relationship. In short, we want to make doing business as simple as possible. It begins with organising **products by application** for the quickest selection of a product for a specified application. It extends to ease of ordering, fast delivery, and additional customer services. All backed by highly qualified support engineers willing and able to discuss your needs and suggest solutions. Work with us, for example, to create customised products; we have a proud record of customer partnership projects resulting in innovative products - and satisfied customers.

The Parker Lucifer

The Parker Lucifer Series products have been designed to offer customers the ultimate in performance. Every valve is engineered for optimal operation, is constructed with modern machinery that use stringent processes, and provides standard features not necessarily offered in any competitive line.

The Parker Lucifer Series portfolio offers a broad range of solenoid valves. Sizes range from G1/8 to G3, with K_v as high as 1385 L/min. Pressure capabilities range up to 100 bar; the whole range is available with various seal materials, such as NBR, FKM, EPDM, PTFE, PCTFE, PUR and Ruby. Brass, stainless steel and plastic valves are available to control a wide variety of air, neutral gases and liquids, water, oils, process fluids and steam.



Availability

With over 750 product listings, the valve you need is probably available from our standard range. What's more, the same valves are **available from our distributors anywhere in the world**. So wherever you are you can order with complete confidence.

Thanks to the breadth of our product offering, the flexibility of the modular architecture, and the use of automated manufacturing processes, you can count on the ready availability of the valve you require.

Modular construction ensures that even unusual configurations can be assembled from stock components. It provides a high degree of "mix & match" flexibility with a minimum number of parts, giving Parker Lucifer the ability to quickly deliver a great variety of valves.

Quality assured

Certification by SQS (the Swiss Association for Quality Certification), Category ISO 9001/14001, is formal recognition of Parker Lucifer's commitment to total Quality. It is the outward sign of a company dedicated to customer satisfaction at every level of the organisation. It was first achieved back in 1987, long before Quality certification became an everyday business issue, and Parker Lucifer was one of the first to qualify in Switzerland.

All the approvals you need

A wide range of valves and electrical parts are approved by recognised organisations (BASEEFA in UK, PTB in Germany, LCIE in France, CESI in Italy etc.) and meet CENELEC, IEC, and ISO standards. Lucifer valves are also certified by organisations such as TÜV, VDE, SEV/ASE, UL, CSA, etc.



How to select your valve

This catalogue has been designed to make selection as easy as possible. The structure allows you to find your valve step by step, beginning with the most basic features and gradually focusing on more and more precise details.

First, decide what kind of valve you want: 2-way, 3-way, pneumatic or special. Then check the contents page and turn to the beginning of the relevant section.

For ease of use, each valve section is divided by application. At the front of the application sub-section you choose, you will find an overview table of the products featured (see sample below).

Using the table as a guide, decide what kind of actuation you want, then go across the columns, choosing the body material, function, connection, orifice size and maximum pressure: this

process takes you to the specific page number with your product,

Further technical information to help with specification is given in the final section of the catalogue.

General application valves for dry or lubricated air, neutral gases and liquids 2/2

ACTUATION	BODY MATERIAL	FUNCTION	CONNECTION	ORIFICE (MM)	MAX. PRESSURE (BAR)	PAGE
Direct operated	Brass body	Normally closed	1/8	1.5 to 3	70.0	8
			1/4	1.2 to 5	100.0	8
			3/8	4 to 6	10.0	12
			1/2	8.5 to 11	4.0	12
			SB	1.5 to 3	100.0	14

How to order a valve

Normally a complete valve is composed of 3 elements: the valve itself (body + pilot), the coil and the housing. For integrated coil/housings, the housing reference indicates the fixing nut and nameplate.

Two valve body references are indicated in the tables:

- the Lucifer reference
- the global reference

Either reference can be used when ordering. The Global valve reference permits a common numbering system between Lucifer and Skinner products. A complete cross-reference list of valve reference numbers can be found at the end of this catalogue. In both cases, it is necessary to order the coil and housing reference as well.

Port size	Orifice (mm)	Flow factors (l/min)			Admissible differential pressure bar			Fluid temp. °C			Seat disc	Reference numbers				Power consumption (W)		Wt. (g)	El. Part Group *	Dim ref.
		Liquids kv	Gases Qmax	Gases Qn	Min	Max DC	AC	Gas	Liquid	Oil		Global valve reference	Valve reference no.	Housing	Coil	DC	AC			
G																				

Normally closed

1/8	1.5	1.5	6	80	0	20	20	75	75	75	FKM	7121CBG1GV00	121C14	2995	481865	9	8	270	2	2
	1.5	1.5	6	80	0	20	20	75	75	75	FKM			4270	481000	8	8	390	2	
	1.5	1.5	6	80	0	20	20	75	75	75	FKM			2995	482730	7	6	270	2	
	1.5	0.9	2.4	70	0	12	20	75	75	75	FKM	-	121M14	8993	481180	5	4	150	1	1
	1.5	0.9	2.4	70	0	4	20	75	75	75	FKM			8993	488980	2.5	2	150	1	
	1.5	1.5	12.5	80	0	25	60	75	75	75	PCTFE	7121KBG1GF00	E121K14	2995	481865	9	8	300	2	3
	1.5	1.5	12.5	80	0	30	70	75	75	75	PCTFE			4270	481000	8	8	420	2	
	1.5	1.5	12.5	80	0	55	70	75	75	75	PCTFE			4270	486265	14	14	430		
	2	2	8	160	0	7	10	75	75	75	FKM	-	121M13	8993	481180	5	4	150	1	1
	2	2	8	160	0	2.5	10	75	75	75	FKM			8993	488980	2.5	2	150	1	
	2.5	2.8	8.5	220	0	10	10	75	75	75	FKM	7121CBG1LV00	E121C13	2995	481865	9	8	270	2	2

Therefore please specify:

- I. Valve reference **or** Global valve reference
- II. Housing
- III. Coil
- IV. Voltage or voltage code (see tables in the Electrical parts section).

Ordering example:

121K0756-2995-481865-220/50
or
7121KBG2LVM0-2995-481865-220/50

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

	Page
Electropneumatic pressure regular EPP3	324
EP - Transducer.	326
Electropneumatic pressure regulator EPP3 -High Flow Series.	328

The product

A range of electropneumatic pressure regulators (G 1/8, G 1/4 and G 1/2) which, by means of an integrated electronic control system and pulse width modulated solenoid valve, controls the output pressure proportional to an analogue or digital electrical signal. A high precision is achieved by means of internal feedback through an integrated pressure sensor.

Applications

Pressure control independent of flow in electropneumatic control systems, in particular for the following industries:

- Robotics: welding, painting lines etc.
- Paper and printing: tension regulations, speed and brake control for rolls
- Machine Tools: Plastic moulding, laser welding, presses, polishing etc.
- Trucks and Trains: control of adaptive suspensions.

Benefits

- More flexibility of the controls
- Very fast response times
- Excellent linearity and hysteresis
- No air consumption in rest position
- Increase of productivity (performance, Quality, reliability)
- Direct interface to programmable controllers.

Electropneumatic pressure regulator

EPP3 Series

TECHNICAL DATA

Fluid

Lubricated or non lubricated air and neutral gases recommended filtration : 25-50 μ

Temperature range:

Ambient 0 to 50°C.

Fluid 0 to 50°C.

Inlet pressure range:

1 to 12 bar (the inlet pressure must always be at least 1 bar above the regulated pressure value).

Outlet pressure range:

0.2 to 10 bar

Hysteresis:

~100 mbar. (Factory set up)

Linearity:

1% f.s.o.

Air consumption at constant control signal:

0.

Supply voltage:

24 V DC $\pm$ 15% (Max. ripple 1 V)

Power consumption:

Max. 6 W with 24 V DC and constant changes of the control signal ;< 1W without change of control signal

Control signal:

Analog 0 - 10 V Impedance: 10 k Ω

Analog 4 - 20 mA Impedance: 0.5 k Ω

Outlet sensor signal:

A) proportional pressure outlet signal 0-10 V from integrated sensor (recommended load resistance 10 k Ω)

B) proportional pressure outlet signal 4-20 mA from integrated sensor (recommended load resistance 0.5 k Ω)

C) "Alarm" output signal 0/24 V with adjustable triggering level. (Difference between control signal and sensor pressure signal) (Imax. = 40 mA)

- factory set up: diff. signal = $\pm$ 0.8 V to $\pm$ 1 V

- possible set up: diff. signal = $\pm$ 0.1 V to $\pm$ 5 V

To neutralize the alarm output signal during the control signal changes, the use of a synchronized time lag relay is required.

Indicative response time:

With a volume of 330 cm³ at the outlet of the regulator.

Filling : 2 to 4 bar - 2 to 8 bar

Step response: ~60 ms - ~120 ms

Emptying: 4 to 2 bar - 8 to 2 bar

Step response: ~70 ms - ~130 ms

Safety position:

In case of control failure or if it is less than 1% of its full scale value, the regulated pressure drops automatically to 0 bar (atmospheric pressure). In case of voltage supply failure, the regulated pressure will be kept constant (with eventual discrepancy due to loss of pressure in the servo-chamber).

Electrical connection:

4 screw terminals under the protection cover with Pg 13.5 cable gland or through DIN 43651 connector (6 P + E).

Life expectancy:

> 50 Mio changes of control signal steps.

Attention: It is compulsory to set the control signal at 0 V or 4 mA each time the air pressure supply is turned off (during the night or the weekend). When the air pressure supply cannot be fully exhausted,

it is necessary to assure that the deviation between the control value and the inlet pressure remains smaller than 1 bar.

Mounting position:

Indifferent (recommended position: upright; electronic part on top).

Resistance to vibrations:

30 g in all directions

Degree of protection:

IP 65.

External sensors:

All pressure sensors with following characteristics are compatible with the EP-transducer

Sensitivity: 0.5 V/bar up to 10 V/bar

Zero offset: -3 V/bar to 10 V/bar

Assembly:

Silicone free

Electromagnetic compatibility:

in accordance with IEC 801-4 part 4 standards.

Installation and setting instructions:

see publication MI-9202 and appendix supplied with the product.

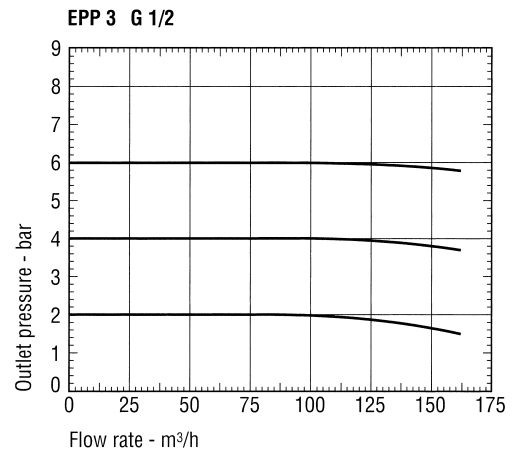
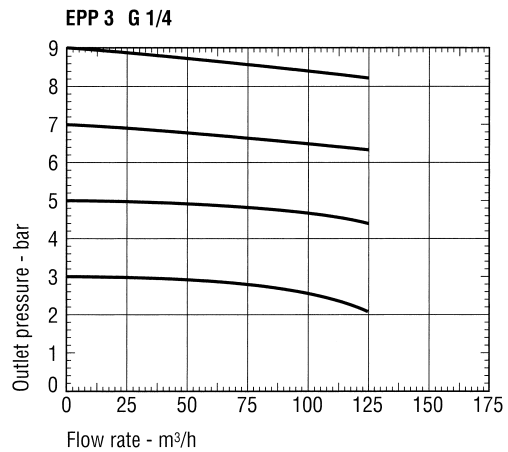
Please ask for the special technical specification sheet No. 8677 for more details.

SUMMARY OF TYPES

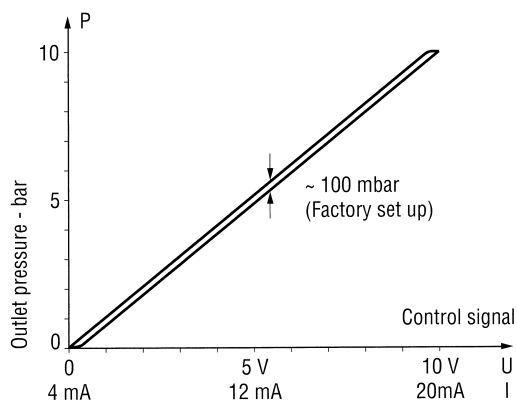
		Connection G	With integrated pressure sensor	Entry options for external sensor signal		Outlet signal options			Electrical connection	
				Feedback signal 0-10 V	Feedback signal 4-20 mA	without	0 - 10 V 4 - 20 mA	0 - 10 V 0/24 alarm	DIN 43651 connector	Cable gland Pg. 13.5
EPP3JC	21 U/I 100 10	1/4	•			•				•
	21 U/I 600 10	1/4	•				•		•	
	21 U/I 700 10	1/4	•					•	•	
EPP3JC	23 U/I 130 10	1/4		•		•			•	
	24 U/I 130 10	1/4			•	•			•	
EPP3JC	41 U/I 100 10	1/2	•			•				•
	41 U/I 600 10	1/2	•				•		•	
	41 U/I 700 10	1/2	•					•	•	
EPP3JC	43 U/I 130 10	1/2		•		•			•	
	44 U/I 130 10	1/2			•	•			•	

FLOW DATA

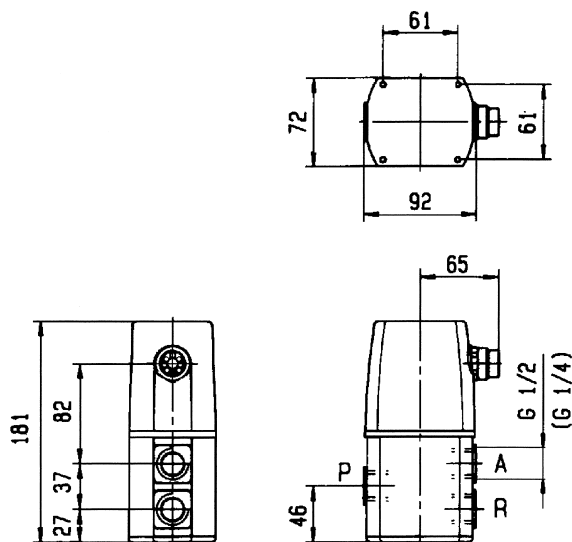
Outlet Pressure in Function of Flow at Constant Control Signal ($P_1 = 10$ bar)



HYSTERESIS DIAGRAM



**EPP3JC...130/600/700... with
DIN circular plug-in connection
6 P + E (connector included)**



TECHNICAL DATA

Fluid:

Lubricated or non lubricated air and neutral gases recommended filtration : 25-50 μ

Temperature range:

Ambient 0 to 50°C
Fluid 0 to 50°C

Inlet pressure range:

G 1/8 - 1 to 10 bar
G 1/4 - 1 to 7 bar

Outlet pressure range:

G 1/8 - 0.2 to 10 bar
G 1/4 - 0.2 to 7 bar

Hysteresis:

~ 50 mbar (Factory set up)

Linearity:

1% f.s.o.

Air consumption at constant control signal:

0

Supply voltage:

24 V DC $\pm$ 15% (Max. ripple 1 V)

Power consumption:

G 1/8 - max. 6 W } with 24 V DC and constant
G 1/4 - max. 7 W } changes of the control signal
< 1 W without change of control signal

Control signal:

Analog 0 - 10 V Impedance: 10 k Ω
Analog 4 - 20 mA Impedance: 0.5 k Ω

Outlet sensor signal:

For types with output signal module.
Proportional pressure output signal supplied by the pressure sensor.

A) 0-10 V, voltage signal (recommended load resistance 10 k Ω)

B) 4-20 mA, current signal (recommended load resistance 0.5 k Ω)

Voltage and current signal can be received simultaneously. Both are protected against short-circuits

C) "Alarm" output signal 0/24 V (I_{max.} = 40 mA) with adjustable triggering level.

(Difference between control signal and sensor pressure signal)

- factory set up: diff. signal = $\pm$ 0.8 V to $\pm$ 1 V

- possible set up: diff. signal = $\pm$ 0.1 V to $\pm$ 5 V

To neutralize the alarm output signal during the control signal changes, the use of a synchronized time lag relay is required.

Indicative response time:

With a volume of 30 cm³ at the outlet of the EP-transducer

Filling :	2 to 4 bar	-
Emptying :	-	4 to 2 bar
Step response: G 1/8	~ 100 ms	~120 ms
G 1/4	~ 70 ms	~100 ms

Conductance C (dm³/s.bar):

G 1/8 - 0.1

G 1/4 - 0.2

Outlet pressure/Flow rate:

G 1/8 - pressure drop 0.5 bar at 1.0 Nm³/h
(P₁ = 7 bar, P_{out} = 6 bar)

G 1/4 - pressure drop 0.5 bar at 2.1 Nm³/h
(P₁ = 7 bar, P_{out} = 6 bar)

Safety position:

In case of control failure or if it is less than 1% of its full scale value, the regulated pressure drops automatically to 0 bar (atmospheric pressure). In case of voltage supply failure, the regulated pressure will be kept constant

Electrical connection:

4 screw terminals under the protection cover with Pg 13.5 cable gland or through DIN 43651 connector (6 P + E)

Life expectancy:

> 50 Mio changes of control signal steps

Attention: It is compulsory to set the control signal at 0 V or 4 mA each time the air pressure supply is turned off (during the night or the weekend). When the air pressure supply cannot be fully exhausted, it is necessary to assure that the deviation between the control value and the inlet pressure remains smaller than 1 bar.

Mounting position:

Indifferent (recommended position: upright; electronic part on top).

Resistance to vibrations:

30 g in all directions

External sensors:

All pressure sensors with following characteristics are compatible with the EP-transducer

Sensitivity: 0.5 V/bar up to 10 V/bar

Zero offset: -3 V/bar to 10 V/bar

Degree of protection:

IP 65

Electromagnetic compatibility:

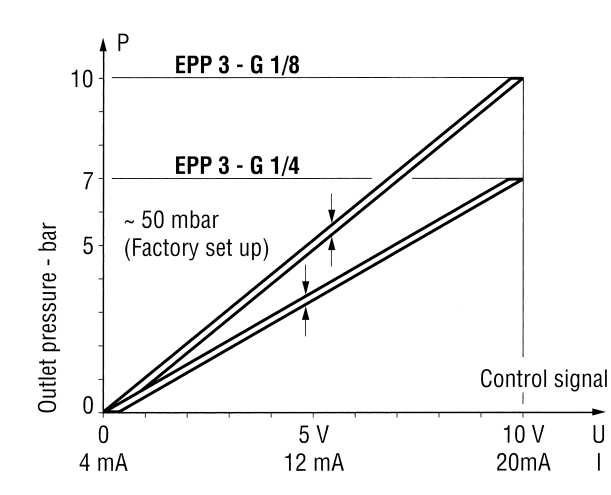
In accordance with IEC 801-4 part 4 standards

Installation and setting instructions:

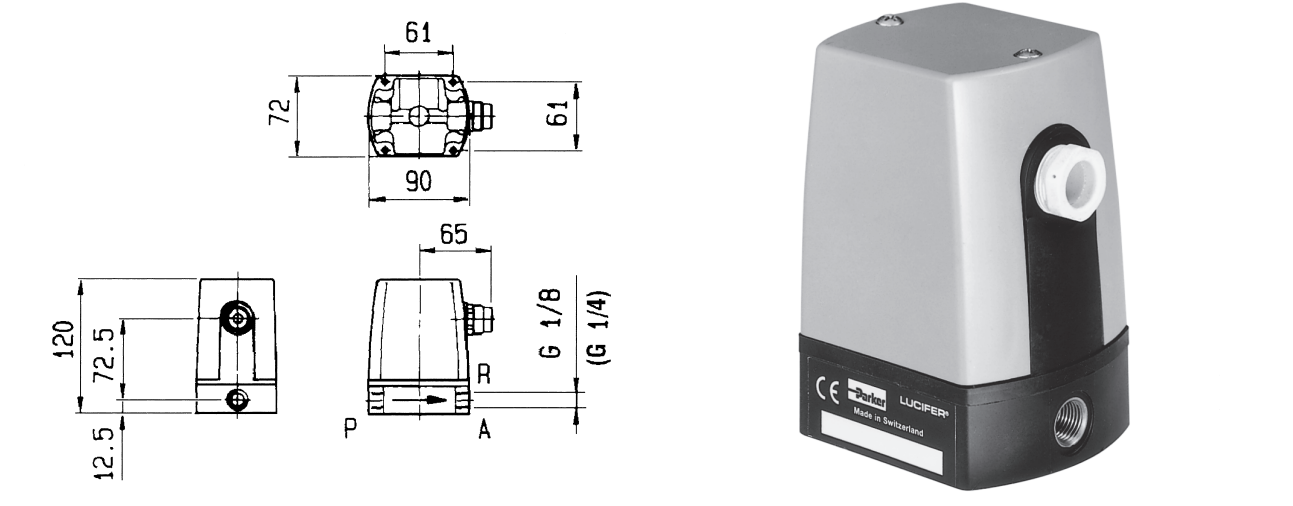
See publication MI-9202 and appendix supplied with the product.

Please ask for the special technical specification sheet No. 8678 for more details.

HYSTERESIS DIAGRAM



EPP3PC ... 130/600/700



SUMMARY OF TYPES

	Connection G	With integrated pressure sensor	Entry options for external sensor signal		Outlet signal options			Electrical connection	
			Feedback signal 0-10 V	Feedback signal 4-20 mA	Without	0 - 10 V 4 - 20 mA	0 - 10 V 0/24 alarm	DIN 43651 connector	Cable gland Pg. 13.5
EPP3PC 11 U/I 100 10	1/8	•			•				•
11 U/I 600 10	1/8	•				•		•	
11 U/I 700 10	1/8	•					•	•	
EPP3PC 13 U/I 130 10	1/8		•		•			•	
14 U/I 130 10	1/8			•	•			•	
EPP3PC 21 U/I 100 07	1/4	•			•				•
21 U/I 600 07	1/4	•				•		•	
21 U/I 700 07	1/4	•					•	•	
EPP3PC 23 U/I 130 07	1/4		•		•			•	
24 U/I 130 07	1/4			•	•			•	

Electropneumatic Pressure Regulator - High Flow

EPP3 Series

TECHNICAL DATA

Fluid:

Lubricated or non lubricated air and neutral gases recommended filtration : 25-50 μ

Temperature range:

Ambient 0 to 50°C
Fluid 0 to 50°C

Inlet pressure range:

1 to 12 bar (the inlet pressure must always be at least 1 bar above the regulated pressure)

Outlet pressure range:

0.2 to 10 bar

Hysteresis:

~ 100 mbar (Factory set up)

Linearity:

1% f.s.o.

Air consumption at constant control signal:

0

Supply voltage:

24 V DC $\pm$ 15% (Max. ripple 1 V)

Power consumption:

Max. 6 W with 24 V DC and constant changes of the control signal
<1 W without change of control signal

Control signal:

Analog 0 - 10 V Impedance: 10 k Ω
Analog 4 - 20 mA Impedance: 0.5 k Ω

Outlet sensor signal:

A) proportional pressure outlet signal 0-10 V from integrated sensor (recommended load resistance 10 k Ω)

B) proportional pressure outlet signal 4-20 mA from integrated sensor (recommended load resistance 0.5 k Ω)

C) "Alarm" output signal 0/24 V with adjustable triggering level. (Difference between control signal and sensor pressure signal) (Imax. = 40 mA)

- factory set up: diff. signal = $\pm$ 0.8 V to $\pm$ 1 V

- possible set up: diff. signal = $\pm$ 0.1 V to $\pm$ 5 V

To neutralize the alarm output signal during the control signal changes, the use of a synchronized time lag relay is required

Safety position:

In case of control failure or if it is less than 1% of its full scale value, the regulated pressure drops automatically to 0 bar (atmospheric pressure). In case of voltage supply failure, the regulated pressure will be kept constant

Electrical connection:

Through DIN 43651 circular plug-in connector (6 P + E)

Life expectancy:

> 20 Mio changes of control signal steps

Attention: It is compulsory to set the control signal at 0 V or 4 mA each time the air pressure supply is turned off (during the night or the weekend). When the air pressure supply cannot be fully exhausted, it is necessary to assure that the deviation between the control value and the inlet pressure remains smaller than 1 bar.

Mounting position:

Indifferent (recommended position: upright; electronic part on top)

Resistance to vibrations:

30 g in all directions

Degree of protection:

IP 65

Assembly:

Silicone free

Electromagnetic compatibility:

In accordance with IEC 801-4 part 4 standards.

Installation and setting instructions:

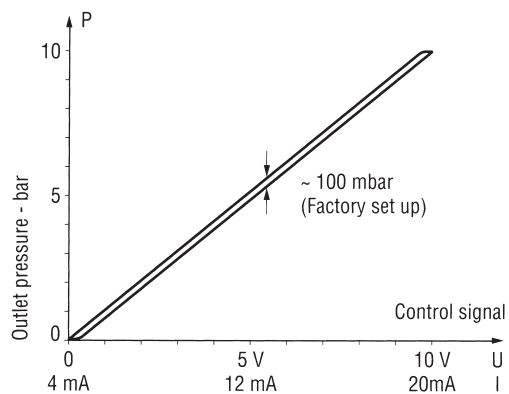
See publication MI-9202 and appendix supplied with the product.

Please ask for the special technical specification sheet No. 8679 for more details.

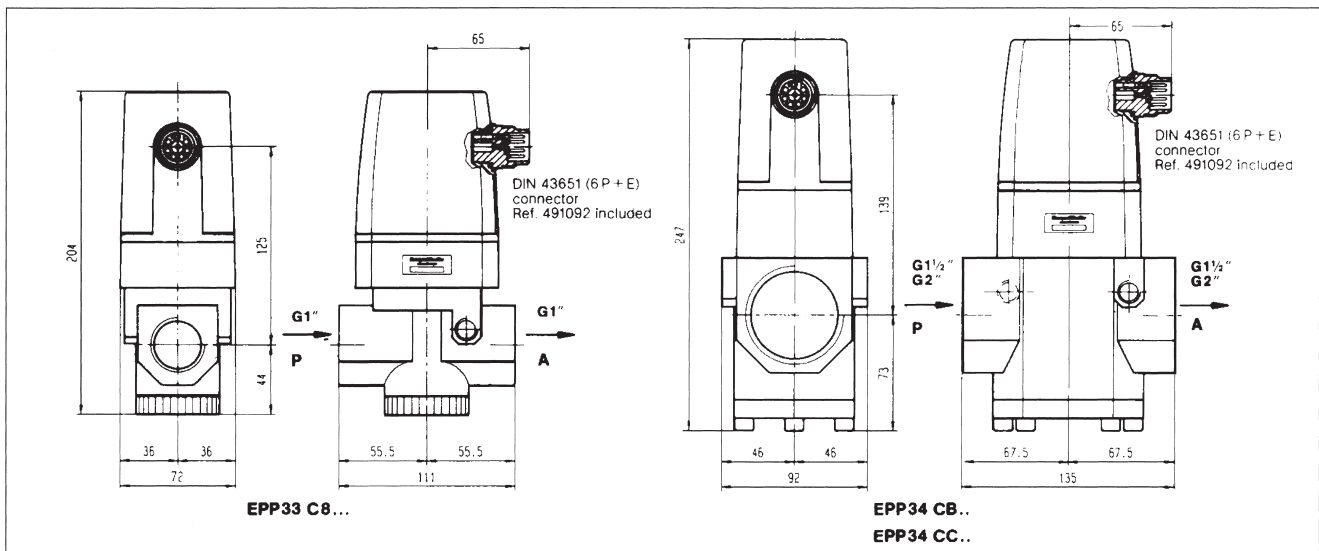
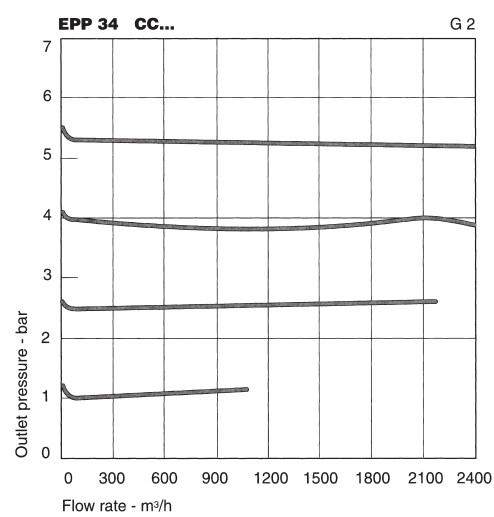
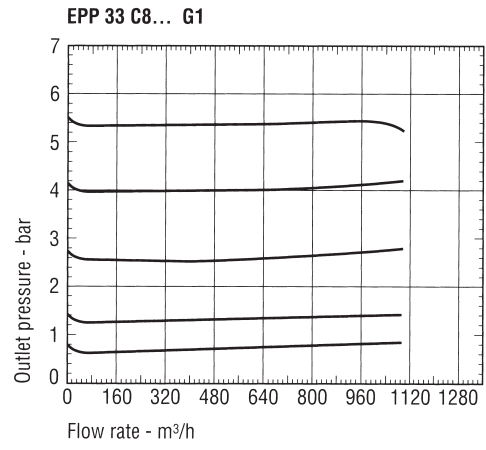
SUMMARY OF TYPES

	Connection G	With integrated pressure sensor	Outlet signal options		Electrical connection
			0 - 10 V 4 - 20 mA	0 - 10 V 0/24 alarm	DIN 43651 connector
EPP3C8 1 U/I 600 10	1	•	•		•
1 U/I 700 10	1	•		•	•
EPP34CC 1 U/I 600 10	2	•	•		•
1 U/I 700 10	2	•		•	•

HYSTERESIS DIAGRAM



FLOW DATA
Outlet Pressure in Function of Flow at Constant Control Signal
(P1 = 7 BAR)



Electrical Parts

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Part 3: Explosion-proof electrical parts

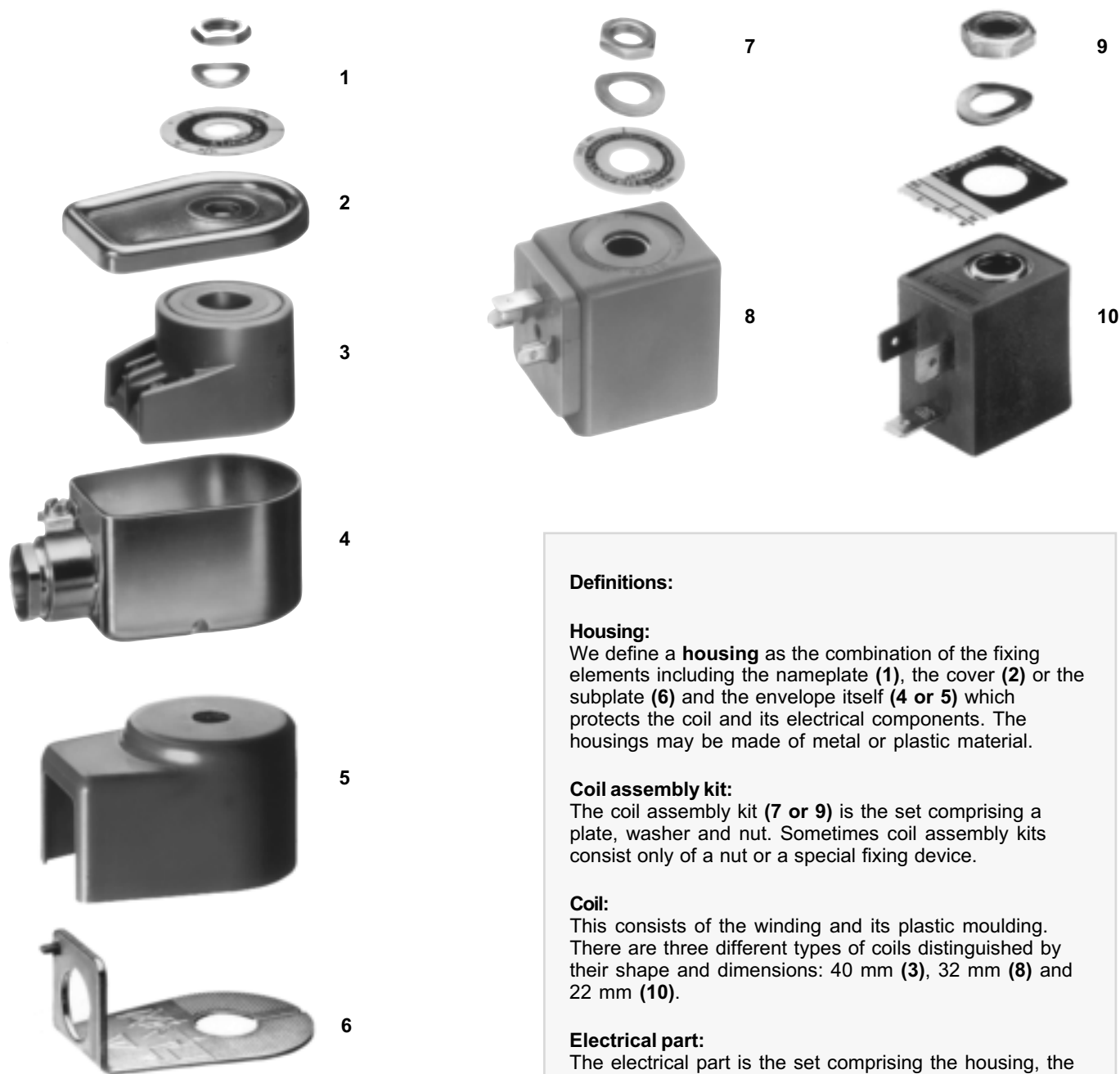
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For complete information please refer to publication No. 8700/GB

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.

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 M12x1.5, Parts No. 495740 and 495741 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**

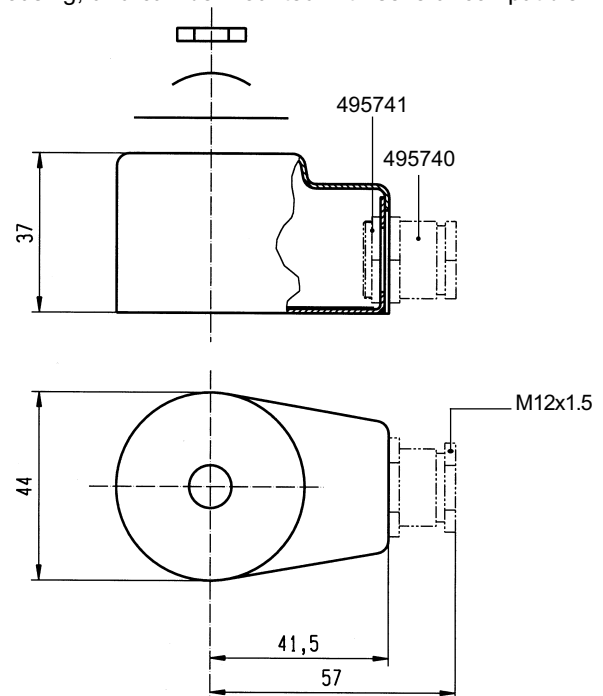
Standard high-power coil,
14 W, class F (155°C), page 12

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



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 M12x1.5, Parts No. 495740 and 495741 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.

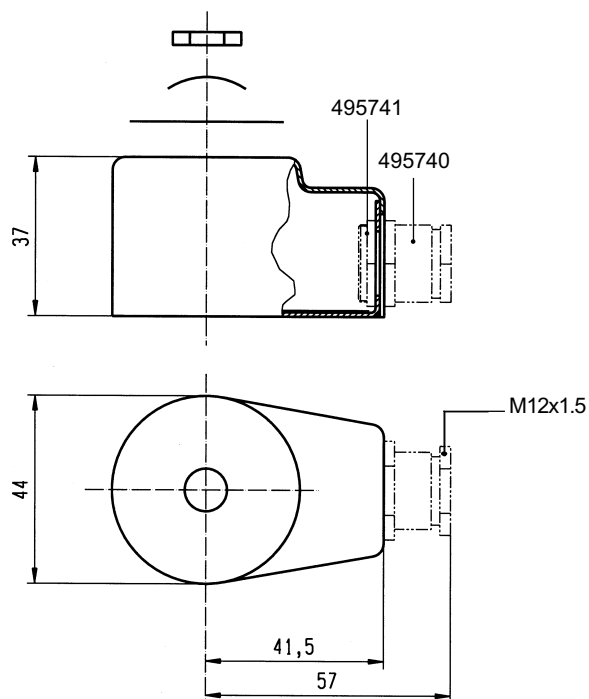
Application:

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



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 67** according to IEC/EN 60529

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

485100 or **EZ02**

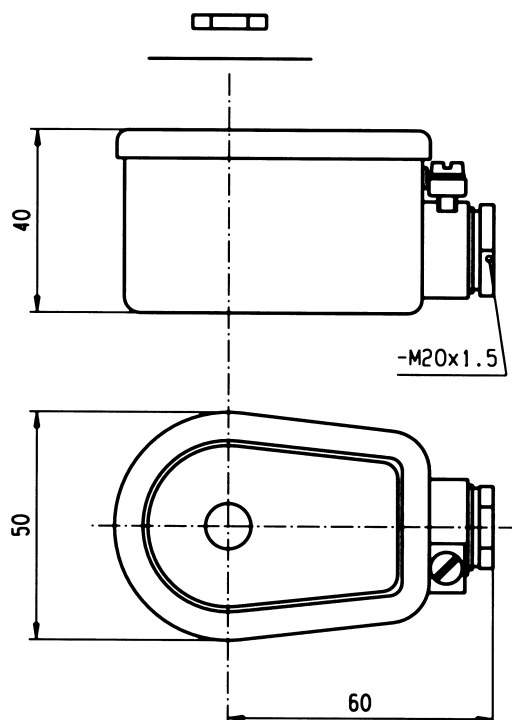
Coil for high temperature,
8 W, class H (180°C), page 12

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



1.2.2 Waterproof housing for high-temperature coils



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

Degree of protection: IP 67 according to IEC/EN 60529

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 "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.

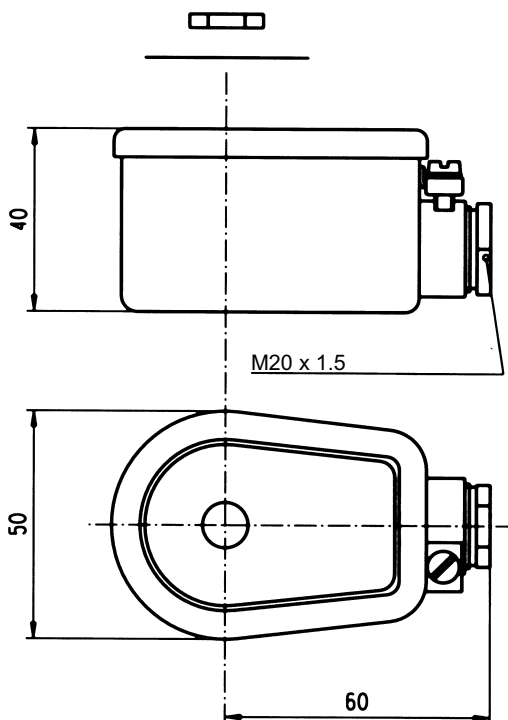
Application:

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, class F).

Compatible coils:

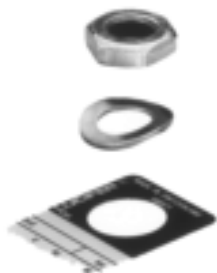
481044 or **EZ91**
High power coil,
14 W, Class F (155°C), page 12

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



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	A4	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

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 [psi]	UL / CSA valves
8132	NL	Special - aluminium nameplate - stainless steel washer and nut - pressure indication in [kPa]	316L St. Steel valves

1.3.3 Coil assembly kit for CPR coils



It is composed of a plastic nut with a metal insert to secure the CPR coils to the valves, e.g. 133x.../432300C2.

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

1.4 Degrees of protection “IP” – IEC/EN 60529

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	IP	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		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* 250 standards

IP 10	NEMA 1
IP 11	NEMA 2
IP 14	NEMA 3R
IP 52	NEMA 5–12–12K
IP 54	NEMA 3-3S-13
IP 56	NEMA 4–4X
IP 67	NEMA 6–6P

* NEMA: National Electrical Manufacturers Association (USA)

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

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- 3D 220-230/50 3D **or**
7121KBG2LVM0-N1-DZ02 3D

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

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 mm".



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

2 / 3

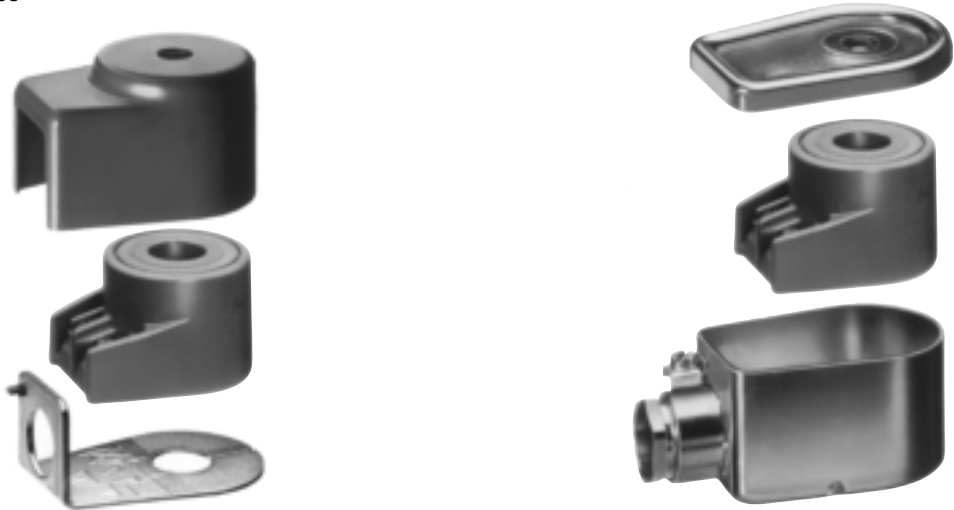
Coil / specification			Standard	Double frequency	High power	High temperature	High temp. + high power
Reference			481000 or EZ01	483520 or EZ90	481044 or EZ91	485100 or EZ02	486265 or EZ92
Class of insulation			F 155°C	F 155°C	F 155°C	H 180°C	H 180°C
Ambient temperature			-40°C to +50°C	-40°C to +50°C	-40°C to +50°C	-40°C to +50°C	-40°C to +50°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



2.1.2 Bistable (impulse) coils

4

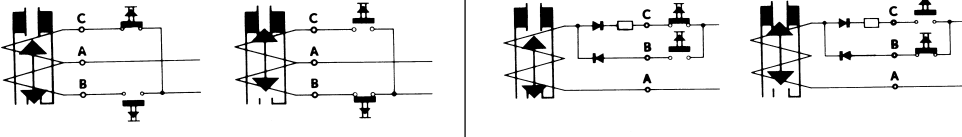


These coils are specially designed for Lucifer bistable (or impulse or magnetic latch) solenoid valves.

They can be mounted only with Lucifer metallic housings 4269 or 4538. 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.



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, (maximum 1s) Switch off (terminals A-C): minimum 35 ms, (maximum 1s)			
Reference			485400 or MZ02	* 482245 or MZ90	484990 or MZ01	
Electr. Power consumption	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: -40°C to +50°C

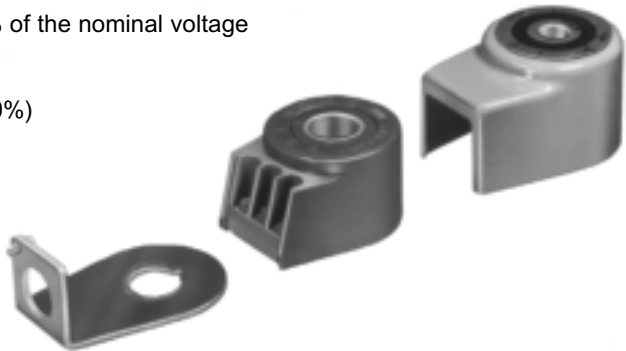
Voltage tolerances: -10% to +10% of the nominal voltage

Voltages: See voltage code table

Duty: Continuous duty coil (ED 100%)

Weight: 150 g

Mounting: example



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.



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

2 / 3

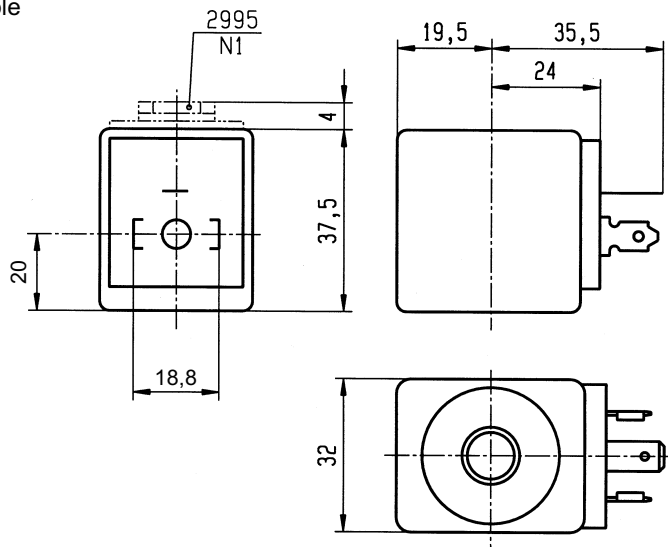
Specification			Standard	Double frequency	Reduced power	High temperature	High temp. + High power
Ref. (without plug)			481865 or DZ02	483510 or DZ06	482730 or DZ90	492453 or DZ04	492425 or DZ08
Ref. (with plug)			482725 or DZ03	482635 or DZ07	482735 or DZ91	492726 or DZ05	492727 or DZ09
Degree of protection			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			Through a 2 P + E plug according to DIN 43650 type A				
Ambient temperature			-40°C to +50°C	-40°C to +50°C	-40°C to +50°C	-40°C to +50°C	-40°C to +50°C
			The application is limited also by the temperature range of the valve				
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)



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.

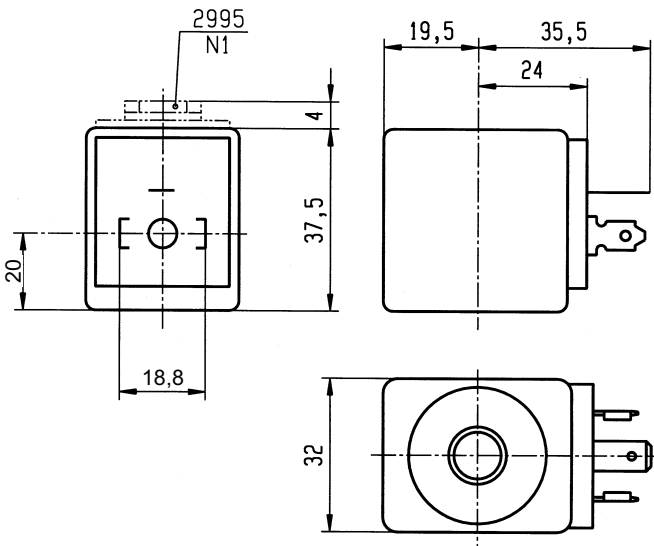
Specification			UL-recognized coil - UL File E125678 - designation AMIF	
Reference (without plug)			491514 or D400	491514 or D500
Degree of protection			IP65 according to IEC / EN 60529 standards (with plug connection)	
Class of insulation			F 155°C	F 155°C
Electrical connection			Through a 2 P + E plug according to DIN 43650 type A	
Ambient temperature			-40°C to 50°C	- 40°C to 50°C
			The application is limited also by the temperature range of the valve	
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)



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.



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

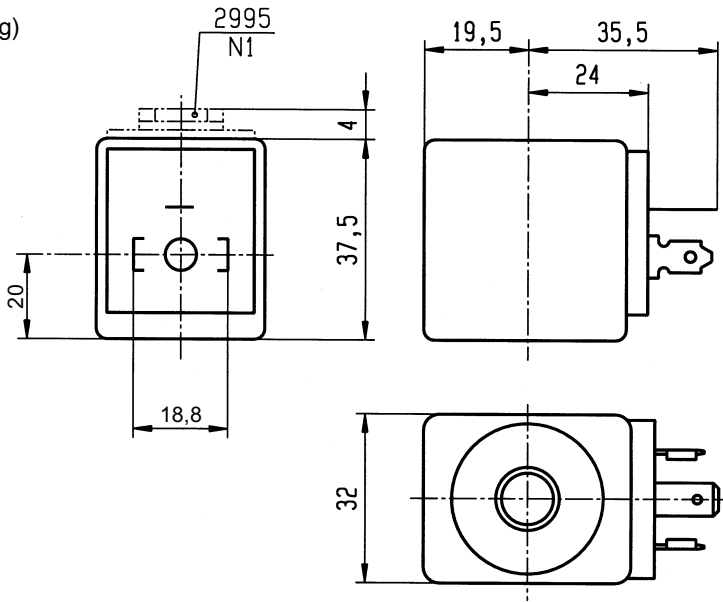
Specification			Miniwatt
Reference (without plug) Reference (with plug)			482740 or DZ10 482745 or DZ11
Degree of protection			IP65 according to IEC / EN 60529 standards (with plug connection)
Class of insulation			F 155°C
Electrical connection			Through a 2 P + E plug according to DIN 43650 type A
Ambient 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)



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)

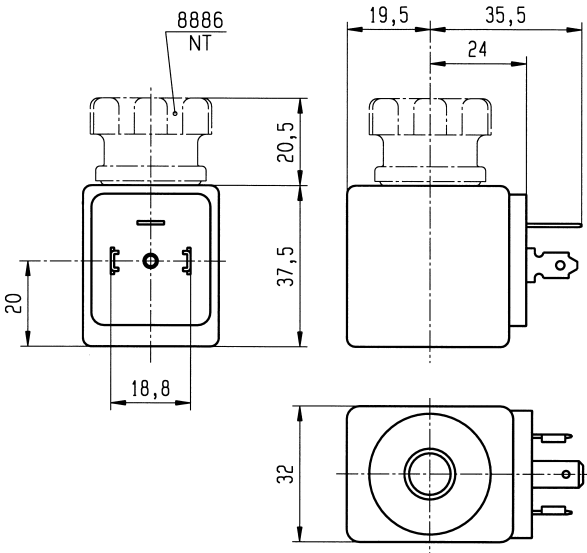


This coil conforms to the IEC/CENELEC safety standards and complies with European low-voltage directive 73/23/EC.

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			Through 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)	9 W
		Attraction cold	12 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.



2.2.2 22 mm Coil

1



This miniature coil is designed for valves equipped with a miniature tube assembly. 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 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)			488980 or DA01	481180 or DA03	492912 or DA05	483590 or DA07
Ref. (with plug)			481045 or DA02	481530 or DA04	492919 or DA06	
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			Through a 2 P + E plug according to DIN 43650 type B			
Ambient temperature			-40°C to +50°C	-40°C to +50°C	-40°C to +50°C	-40°C to +50°C
			The application is limited also by the temperature range of the valve			
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)

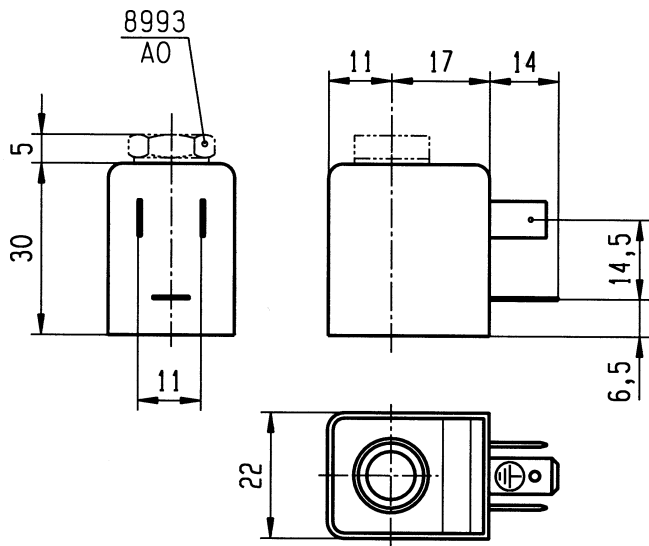
* This coil is UL/CSA accepted with corresponding approved valves only.

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



Part 3: Explosion proof electrical parts

3.1 Encapsulated electrical parts for zone 22:

3.1.1 22 mm electrical part with connector



Application: Control of solenoid valves in explosive atmospheres where dust dangerous area (zone 22) is required.

Benefits: 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.

Small size for ease of mounting in confined spaces.

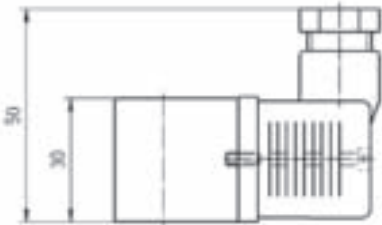
All Lucifer valves which are suitable for standard 22 mm coils can be fitted with those electrical parts.



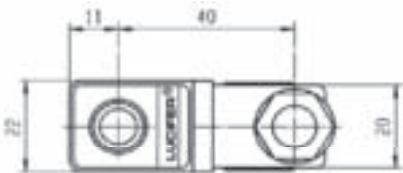
These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC « ATEX ».

Reference			495865
Specification			Standard 22 mm
Type of protection	Dust		II 3 D (zone 22)
Degree of protection			IP65 according to IEC / EN 60529 standards (with plug connection)
Ambient temperature			- 40 °C to + 50 °C The application is limited also by the temperature range of the valve
Dust temperature class (D)			95 °C
Class of insulation			F (155 °)
Electrical connection			Through a 2 P + E plug according to EN 175301-803 type B
Elect. Power	DC	Pn (hot)	2.5 W
		P (cold) 20°C	3 W
	AC	Pn (holding)	2 W
		Attraction cold	5.7 VA (2.5W)
Voltage			24 VDC, 220-230/50
Voltage tolerance			± 10% of the nominal voltage
Solenoid duty			Continuous duty solenoid (ED 100%)

Weight: 120 g.



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3.1.2 32 mm electrical parts with connector

2



Application: Control of solenoid valves in explosive atmospheres where dust dangerous area (zone 22) is required.

Benefits: 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.

Small size for ease of mounting in confined spaces.

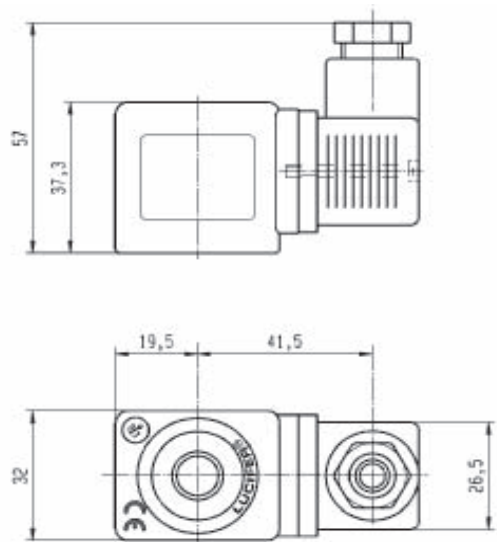
All Lucifer valves which are suitable for standard 32 mm coils can be fitted with those electrical parts.



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

Reference			495870	495875	495880
Specification			Standard 32 mm	Low power 32 mm	High power 32 mm
Type of protection	Dust		II 3 D (zone 22)		
Degree of protection			IP65 according to IEC / EN 60529 standards (with plug connection)		
Ambient temperature			- 40 °C to + 50 °C The application is limited also by the temperature range of the valve		
Dust temperature class (D)			130 °C	130 °C	170 °C
Class of insulation			F (155 °C)	F (155 °C)	H (180 °C °)
Electrical connection			Through a 2 P + E plug according to EN 175301-803 type A		
Elect. Power	DC	Pn (hot)	9 W	7 W	14 W
		P (cold) 20°C	12 W	9 W	21 W
	AC	Pn (holding)	8 W	6 W	14 W
		Attraction cold	26 VA (9W)	20 VA (7W)	55 VA (18W)
Voltage			24 VDC, 48/50, 110/50, 220-230/50	24 VDC, 220-230/50	24 VDC, 230/50
Voltage tolerance			± 10% of the nominal voltage		
Solenoid duty			Continuous duty solenoid (ED 100%)		

Weight: 150 g.



Pg9

3.2 Increased safety electrical parts for zone 22

3.2.1 Electrical parts 495915

4



Application: Control of solenoid valves in explosive atmospheres where dust dangerous area (zone 22) 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.

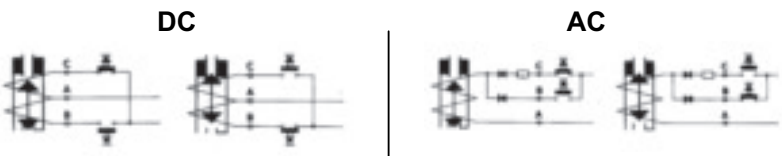
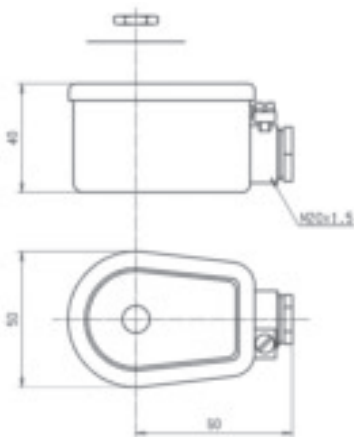
These electrical parts are specially designed for Lucifer bistable (or impulse or magnetic latch) solenoid valves.



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

Reference			495915 DC	495915 AC
Type of protection		Dust	II 3 D (zone 22)	
Dust temperature class (D)			130 °C	
Insulation Class			F (155 °C)	
Ambiant temperature			- 40 °C ÷ + 50 °C The application is limited also by the temperature range of the valve	
Electr. Power conspion	DC	Attraction (hot)	13 W	-
		Attraction (cold)	19 W	-
		Release (hot)	8 W	-
		Release (cold)	10 W	-
	AC	Attraction (hot)	-	11 W
		Attraction (cold)	-	17 W
		Release (hot)	-	4 W
		Release (cold)	-	7 W
Voltages, (voltage tolerance)			24 VDC (± 10%)	110-115 VAC; 220-230 VAC, (± 10%)
Duty cycle			100%	

Weight: 320 g



As soon as an electrical impulse is given to the terminals A-B, the electromagnetical force attracts the plunger and simultaneously magnetizes a reversible permanent magnet ring. This magnet retains the plunger in place. Repeated or extended impulses or continuous current do not alter the position of the movable core. It stays in position even without current.

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

Switch on (terminals A-B): minimum 50 ms, maximum 1 s
Switch off (terminals A-C): minimum 35 ms, maximum 1 s

3.3 Encapsulated electrical parts “m”:

3.3.1 22 mm electrical part



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

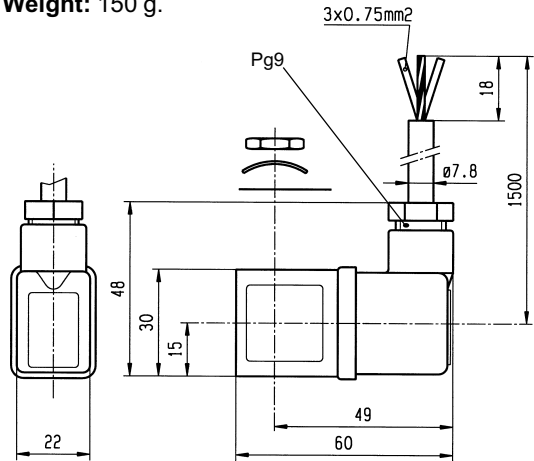


These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

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	
Ambient temperature			-40°C to +50°C	-40°C to +50°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 0.75 mm ²) encapsulated with coil	
Elect. Power	DC	P _n (hot)	5 W	2.5 W
		P (cold) 20°C	6.5 W	3 W
	AC	P _n (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, 63mA
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

3.3.2 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.

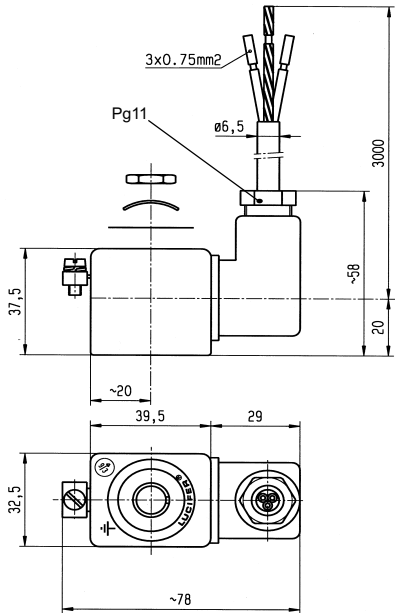


These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

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 mm ²) encapsulated with coil
Elect. Power	DC	P _n (hot)	9 W
		P (cold) 20°C	12 W
	AC	P _n (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%)

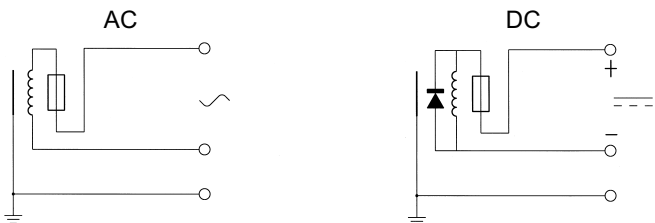
Weight: 320g.

* 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

3.3.3 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».

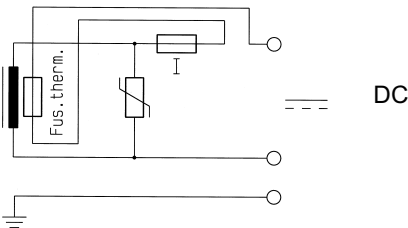
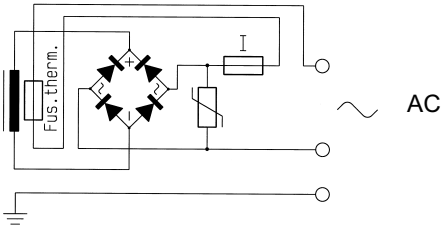
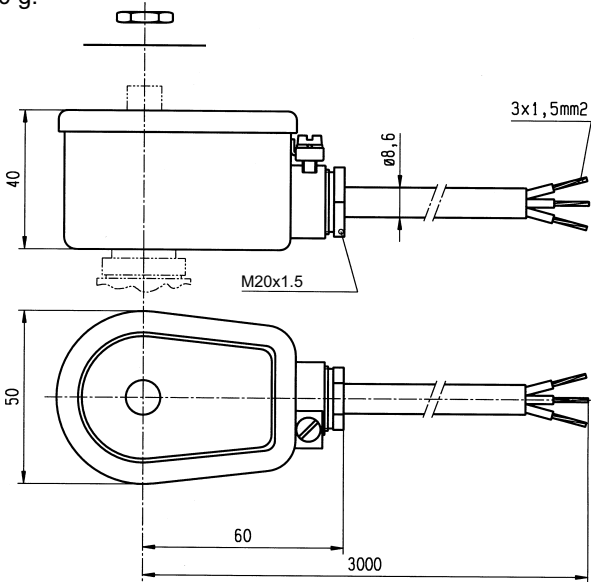
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6

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 The application is limited also by the temperature range of the valve	-40°C to +40°C	-40 to +65°C / +40 °C
Class of insulation			F (155°C)		F (155°C)
Electrical connection			Cable connection (3 x 1.5mm ²) with cable gland M20x1.5, external earth screw connection		
Elect. Power	DC	P _n (hot)	8 W	2.5 W	8 W
		P (cold) 20°C	10 W	3 W	10 W
	AC	P _n (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



3.3.4 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)

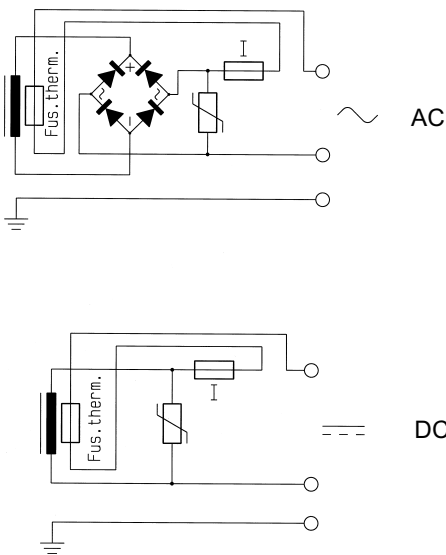
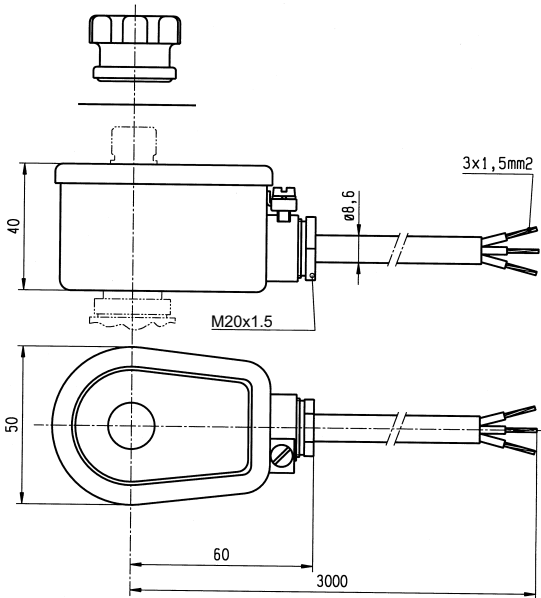
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These electrical parts conform to the IEC/CENELEC safety standards and complies with European explosive atmosphere directive 94/9/EC «ATEX».

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 1.5mm") 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.



3.4 Increased safety electrical parts “me”:

3.4.1 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.

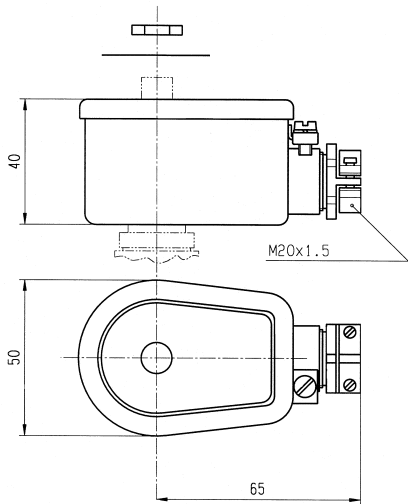


These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

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 +65°C	-40°C to +90°C	-40°C to +65°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 valves



Fuses:

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

HZ06:

DC: 12V, 1000mA, 24V, 400mA - 48V, 250mA - 110V, 100mA
AC 50 Hz: 24V, 630mA - 48V, 315mA - 110V, 160mA - 220/230V, 80mA
AC 60 H2: 24V, 750mA - 110V, 160mA - 240V, 80mA

HZ23:

DC: 24V, 400mA - 48V, 250mA - 110V, 100mA, 220V, 63mA
AC 50 Hz: 24V, 630mA - 48V, 315mA - 110/115V, 160mA - 220/230V, 80mA

3.4.2 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.

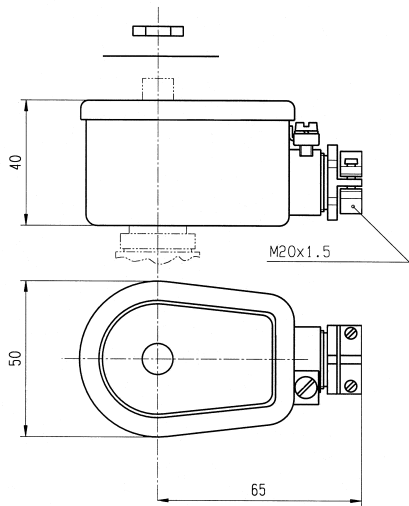
All Lucifer valves which are suitable for standard coils 2.5 WDC only can be fitted with this electrical part.



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 mm". 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

3.5 Encapsulated and increased safety electrical parts “me”:

3.5.1 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».

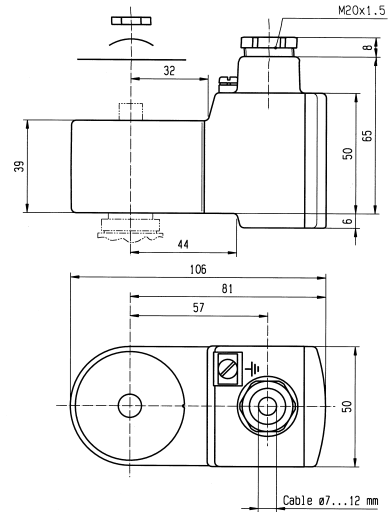
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6

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/T6	Ex me IIC T3 / T4 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	IP66	IP65
Ambient temperature			-40°C to +75°C	-40°C to +40°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%)			

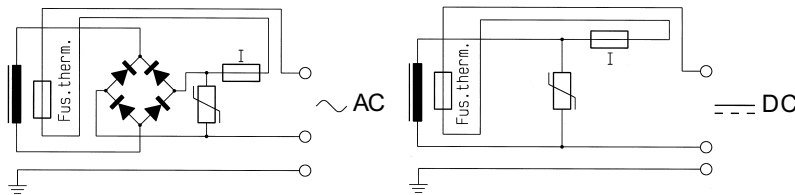
Weight: 500 g.

* 492190.10 for stainless steel valves applications.



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.



3.5.2 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 and booster electronic 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 (except type U033X).



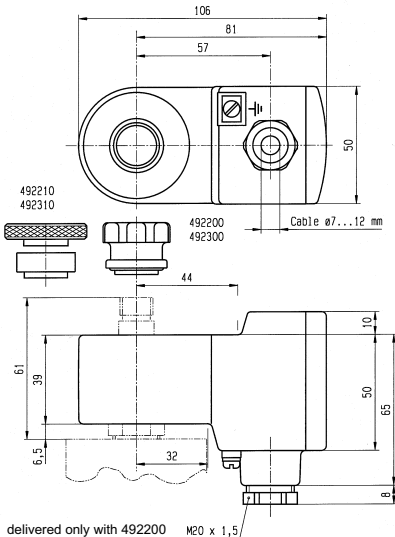
These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

9

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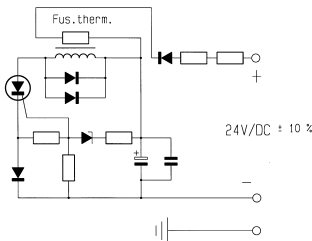
Reference		492200 or VZ13		492210 or VZ26	
Approval		LCIE 02 ATEX 6023 X			
Type of protection	Gas	II 2 G - EEx me II T5	II 2 G - EEx me II T6	II 2 G - EEx me II T5	II 2 G - EEx me II T6
	Dust	II 2 D -95°C	II 2 D -80°C	II 2 D -95°C	II 2 D -80°C
Degree of protection		IP66		IP66	
Ambient temperature		-40°C 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

3.5.3 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

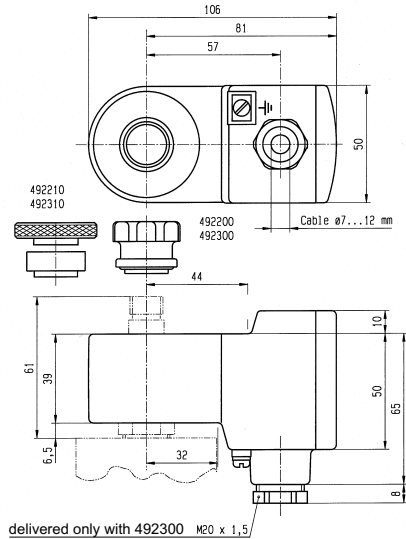
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Reference			492300 or VZ14	492310 or VZ27	492310.03 or VZ29
Approval			LCIE 02 ATEX 6023 X		AUS Ex 321
Type of protection	Gas		II 2 G - EEx me II T4	II 2 G - EEx me II T5	Ex me IIC T4 / T5 Classe I - Zone 1
	Dust		II 2 D - 130°C	II 2 D - 95°C	
Degree 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%)		

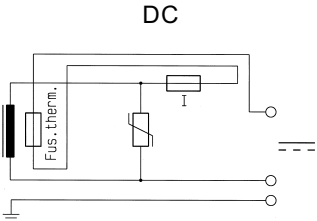
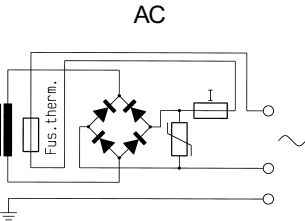
Weight: 500 g.

Indications:

VZ14 = for CPR valves
VZ27 = for Offshore valves



delivered only with 492300 M20 x 1,5



3.6 Flameproof electrical parts “d”:

3.6.1 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.

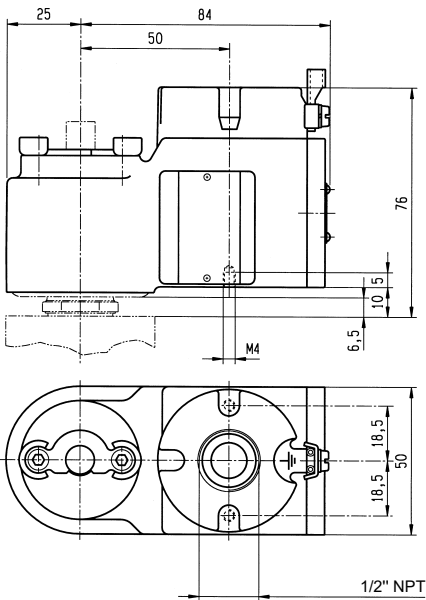
All Lucifer valves with the suffix “1D” (except CPR/Offshore valves 1D) can be fitted with these electrical parts.



These electrical parts conform to the IEC/CENELEC safety standards and

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 plunger 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.

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.

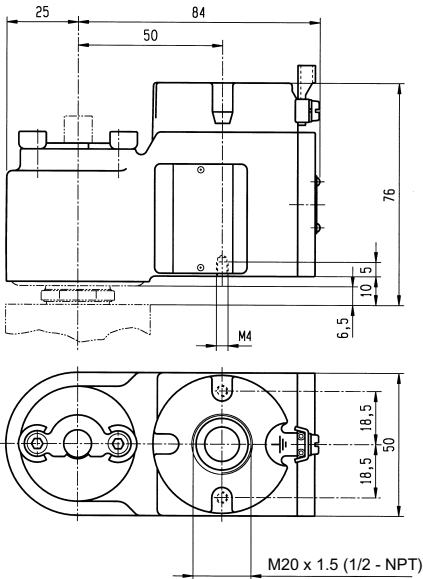
Benefits: Rotatable 360°, housing made of cast iron with internal connection chamber: Cover made of aluminium alloy fixed with 4 screws. The electromagnetic control pilot is composed of three main elements: housing, coil and plunger tube including housing plate.
Small size for ease of mounting in confined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

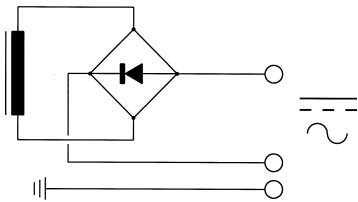
Reference			483270 or HZ19 (M20 x 1.5)		483270.02 or HZ21 (1/2 NPT)			
Approval			LCIE 02 ATEX 6008 X					
Type of protection		Gas	II 2 G - EEx d IIC T4		II 2 G - EEx d IIC T5		II 2 G - EEx d IIC T6	
		Dust	II 2 D - 130°C		II 2 D - 95°C		II 2 D - 80°C	
Degree of protection			IP65 with appropriate cable 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.



3.6.3 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.

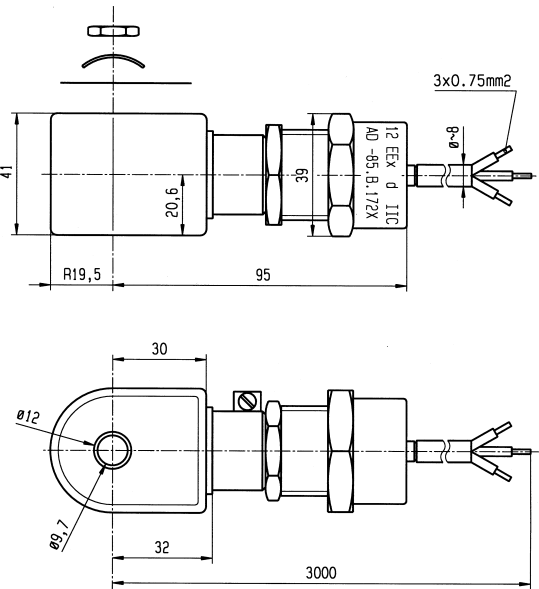
All Lucifer valves suitable for standard 8W coils can be fitted with this electrical part.



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 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			Special “EEx d” cable gland 1/2” NPT, galvanized steel, with EPDM sealing. (EPR) cable, outside diameter 7.3 ± 0.5 mm	
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, 630 mA
- AC: 110/50-120/60, 250 mA - 220/50-240/60, 125mA
- 230/50, 125 mA

3.7 Intrinsically safe electrical parts “i”:

Intrinsic safety

A system or an element of a system in a 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.

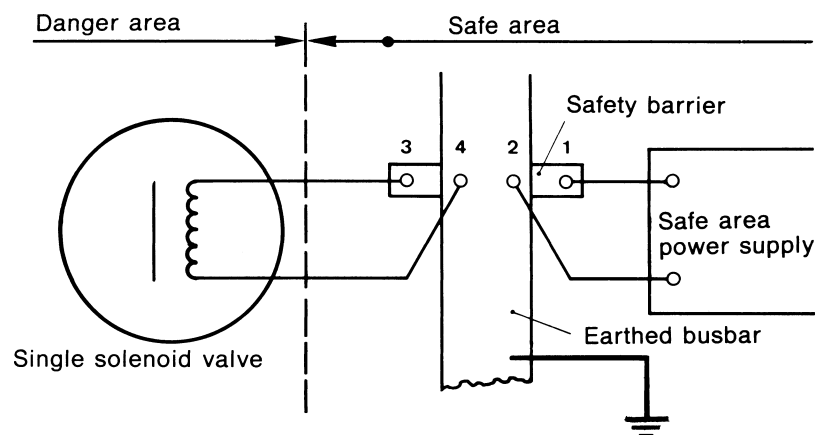
Minimum voltage calculations for proper valve functioning must be made with the total resistance value of barrier, coil (hot) and wiring (total length), and with the maximum ambient temperature.

Electrical supply

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



3.7.1 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.

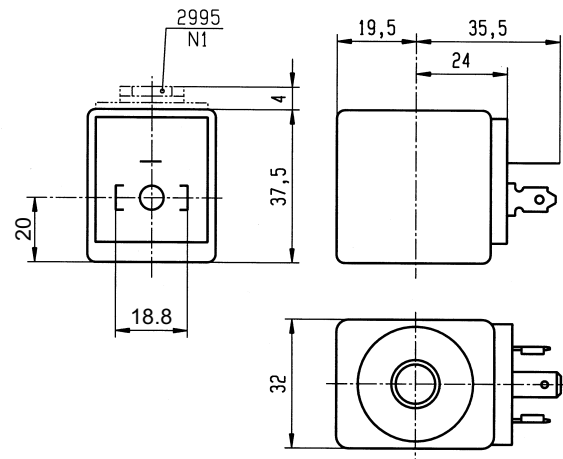
All Lucifer valves with the suffix “90” can be fitted with these electrical parts.



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	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			IP65 with plug connection		NEMA 4-4X
Ambient temperature			-40°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 +		
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		340 Ω		
Impedance		340 Ω			
Apparent inductance		0 mH			
Apparent capacitance		0 µF			
Solenoid duty			Continuous duty solenoid (ED 100%)		

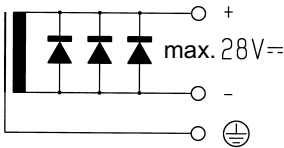
Weight: 160 g (with plug)



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.

3.7.2 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.

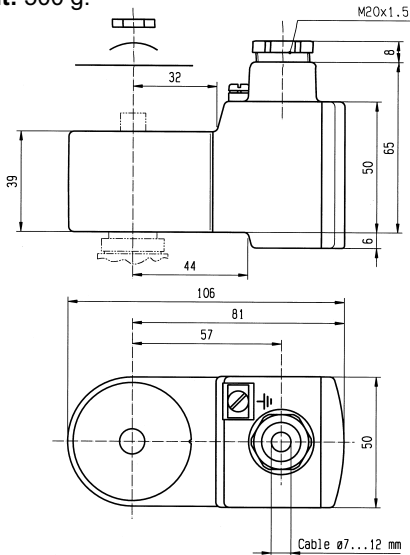


These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

Reference			488650.01 or VZ07	* 494035.10 or VZ93	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 mm" max. Additional earth connection possible with external screw terminal			
Maximum supply voltage			28 VDC – 110 mA		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	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%)			

* with stainless steel fixing kit.

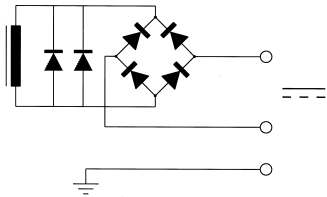
Weight: 500 g.



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.

3.7.3 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.

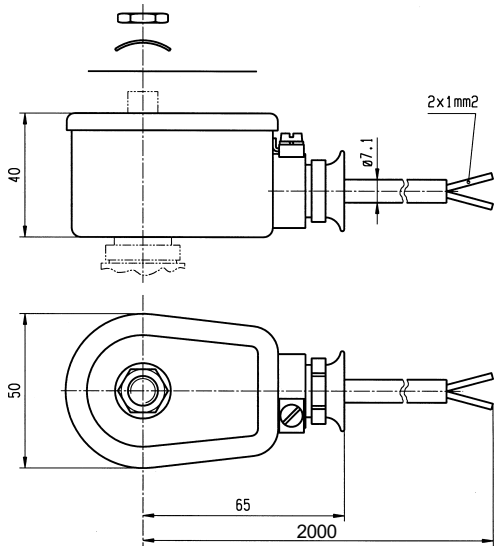
All Lucifer valves with the suffix “90” can be fitted with these electrical parts.



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			-40°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 1mm ²), 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			295 Ω		
Impedance			345 Ω		
Apparent inductance			0 mH		
Apparent capacitance			0 μF		
Solenoid duty			Continuous duty solenoid (ED 100%)		

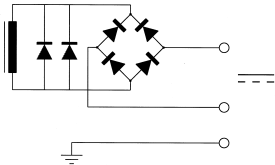
Weight: 500 g.



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

3.7.4 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.

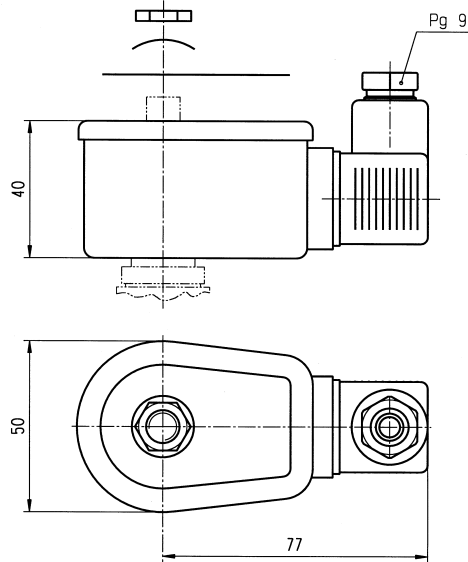
All Lucifer valves with the suffix “90” can be fitted with these electrical parts



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 Cl. II, Div. I, Gr. E, F, G
	Dust		II 1 D - 80°C	
Degree of protection			IP67	NEMA 4-4X
Ambiant temperature			-40°C to +65°C The application is limited also by the temperature range of the valve	+60°C
Electrical connection			DIN standard plug interface 2P + T (DIN 43650 A) with Pg 9 cable gland.	
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 resistance of connected cable			
Coil resistance at 20°C Impedance			295 Ω 345 Ω	
Apparent inductance			0 mH	
Apparent capacitance			0 μF	
Solenoid duty			Continuous duty solenoid (ED 100%)	

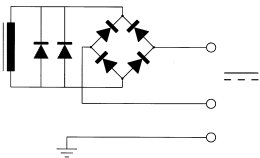
Weight: 500 g.



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

3.7.5 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.

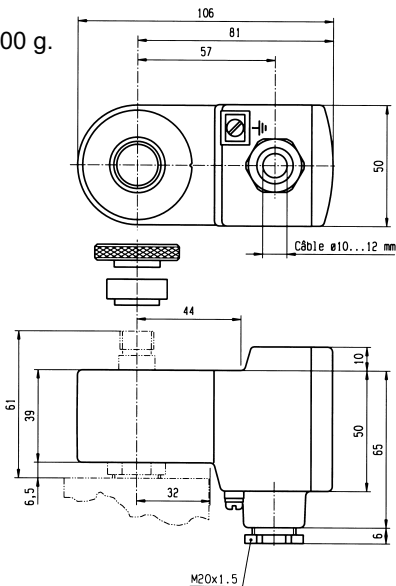
All Lucifer valves labelled “033X” with manual-reset can be fitted with these electrical parts.



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

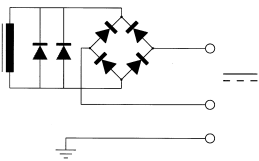
Reference			482160.01 or VZ95	482870.01 or VZ23	482870.03 or VZ24	492335 or VZ30
Approval			LCIE 02 ATEX 6024 X		AUS Ex 137 X	LCIE / FM / CSA
Type of protection	Gas		II 1 G - EEx ia IIB T6	II 1 G - EEx ia IIC T6	EEx ia IIC T6 Classe I - Zone 0	Cl. I, Div. I, Gr. A, B, C, D Cl. II, Div. I, Gr. E, F, G
	Dust		II 1 D - 80°C			
Degree of protection			IP66		IP65	NEMA 4-4X
Ambiant temperature			-40°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	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			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 required minimal holding current is 25 mA



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

3.7.6 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.

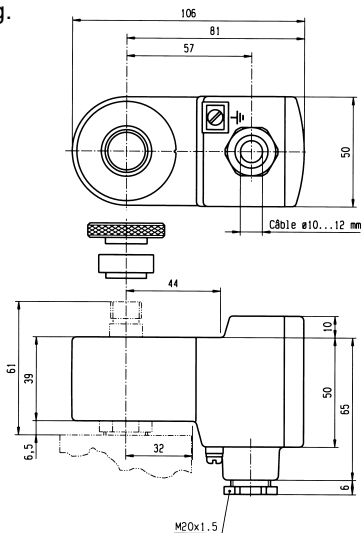
All Lucifer valves suitable for CPR/Offshore application can be fitted with these electrical parts (except type U033X).



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

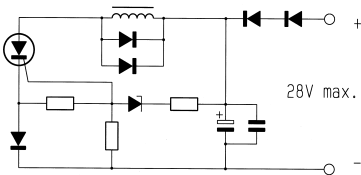
Reference			482660 or VZ11	483330.01 or VZ12	483330.03 or VZ25	490860 or VZ28
Approval			LCIE 02 ATEX 6024 X		AUS Ex 137 X	LCIE / FM / CSA
Type of protection		Gas	II 2 G - EEx ib IIB T6	II 2 G - EEx ib IIC T6	EEx ib IIC T6 Classe I - Zone 1	Cl. I, Div. I, Gr. A, B, C, D Cl. II, Div. I, Gr. E, F, G
		Dust	II 2 D - 80°C			
Degree of protection			IP66		IP65	NEMA 4-4X
Ambiant temperature			-40°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			23 Ω			
Impedance			50 Ω			
Apparent inductance			0 mH			
Apparent capacitance			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 45 mA** through the coil.



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

3.7.7 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.

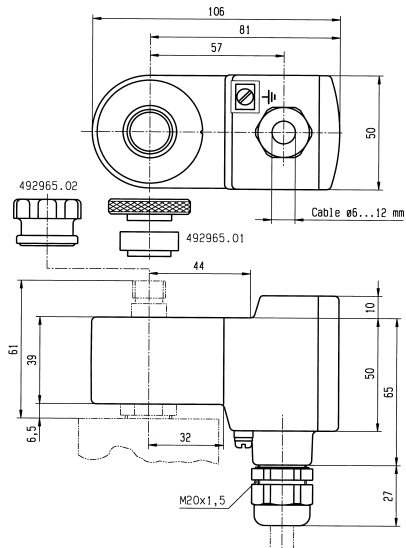
All Lucifer valves suitable for CPR/Offshore application can be fitted with these electrical parts (except type U033X).



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

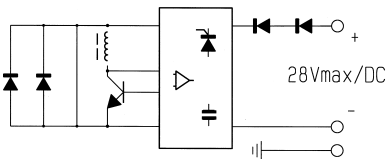
Reference		492965.01 or VZ91 - stainless steel fixation 492965.02 or VZ92 - plastic fixation	
Approval		LCIE 02 ATEX 6066 X	
Type of protection	Gas	II 1 G - EEx ia IIC T6	
	Dust	II 1 D - 80°C	
Degree of protection		IP66	
Ambiant temperature		-40°C to +65°C The application is limited also by the temperature range of the valve	
Electrical connection		Cable connection through a plastic cable gland M20 x 1.5 allowing use of cable diameter from 6 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		85 Ω	
Impedance		275 Ω (with 13 VDC) – 260 Ω (with 24 VDC)	
Apparent inductance		0 mH	
Apparent capacitance		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.

IS Standard coils parameters

IS- STANDARD ELECTRICAL PARTS									
Type of IS-protection	EEEx ia IIC T6	EEEx ia IIC T6	EEEx ia IIC T6	Ex ia	EEEx ia IIB T6	EEEx ia IIC T6	Ex ia	EEEx ia IIC T6	Ex ia
Order references	488650.01/03	490885	483580.01/03	490880	482160.01	482870.01	492335		
	488660.01/03	490890	483960.01/03	493997					
	488670.01/03	490895							
Certified by	LCIE/AUS	LCIE/FM/CSA	PTB/AUS	LCIE/FM	LCIE	LCIE	LCIE/FM/CSA		
	295 Ohm	295 Ohm	340 Ohm	340 Ohm	295 Ohm	295 Ohm	295 Ohm		
	345 Ohm	345 Ohm	340 Ohm	340 Ohm	345 Ohm	345 Ohm	345 Ohm		
Function parameters	Minimum voltage required for functioning at 60°C	11.5 V	14 V	14 V	manual reset	manual reset	manual reset		
	Minimum current required for functioning (attraction)	29 mA	35 mA	35 mA	manual reset	manual reset	manual reset		
	Minimum current required for holding	20 mA	20 mA	20 mA	25 mA	25 mA	25 mA		
	Inductance [L] of coil (mH apparent)	0	0	0	0	0	0		
	Capacitance [C] of coil (µF apparent)	0	0	0	0	0	0		
	Ambient temperatures	(-40 à +65°C)	(-40 à +65°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 - 0.77 W	30V/100mA	28V / 110mA - 0.77 W	30V / 100mA	28V / 280mA - 1.96 W	28V / 110mA - 0.77 W	30V / 100mA	
		27V / 120mA - 0.81 W	28V/330 Ohm	27V / 120mA - 0.81 W	-	27V / 320mA - 2.16 W	27V / 120mA - 0.81 W	28V/300Ohm	
		26V / 135 mA - 0.88 W	-	26V / 135 mA - 0.88 W	-	26V / 350 mA - 2.27 W	26V / 135 mA - 0.88 W	-	
		25V / 150 mA - 0.94 W		25V / 150 mA - 0.94 W		25V / 390 mA - 2.43 W	25V / 150 mA - 0.94 W		
		24V / 170 mA - 1.2 W		24V / 170 mA - 1.2 W		24V / 430 mA - 2.58 W	24V / 170 mA - 1.2 W		

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

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

TYPE	MANUFACTURER	REFERENCE	EEEx..	RESIST. of barrier In Ohm	IS ELECTRICAL PARTS								
					EEEx ia IIC T6 LCIE/AUS 488650.01/03 488660.01/03 488670.01/03	EEEx ia IIC T6 LCIE/FM/CSA 490885 490890 490895	EEEx ia IIC T6 LCIE/AUS 483580.01/03 483960.01	Exia LCIE/FM/CSA 490880 493997	EEEx ia IIB T6 LCIE 482160,01	EEEx ia IIC T6 LCIE 482870,01	Ex ia LCIE/FM/CSA 492335		
Shunt Diode Safety barriers (passive)	MTL	7128P	ia	275									
		728.7028	ia	332									
	Pepperl & Fuchs	Z 728	ia	300									
		Z779	ia	300									
	STAHL	9001/01-252-100-14	ia	252									
		9001/01-280-100-10	ia	280									
		9001/01-280-110-10	ia	255									
		9002/13-280-100-04	ia	340									
Galvanic Isolated Interface Units (actives) and Remote I/O	A puissance 3	NAEV 22-140	ia										
		NAEV 26 -100	ia										
	ABB	V17132-54	ib										
		V17132-55	ib										
		V17132-61	ia										
		DO 890	ib										
		S900- DO4-Ex	ib										
	BARTEC	07-7331-2301/1000	ia										
		07-7331-2301/1100	ia										
	BRADLEY	FEX-EX 24V	ia										
		LB 2101	ia										
	COOPER	LB 2105	ia										
		LB 2112	ia										
	ELCON	1881 / 1882	ia										
		471 / 472	ia										
		2871/2872	ia										
		2875/2876	ia										
	GEORGIN	AVB 122	ia										
		AVB 125	ia										
		AVB 128	ia										
	HIMA	F3328A	ib										
		F3335	ib										
		H4007	ib										

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

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 488660.01/03 488670.01/03	EEx ia IIC T6 LCIE/FM/CSA 490890 490895	EEx ia IIC T6 LCIE/AUS 483580.01/03 483960,01	EEx ia LCIE/FM/CSA 490880	EEx ia IIB T6 LCIE 482160,01	EEx ia IIC T6 LCIE 482870,01	EEx ia LCIE/FM/CSA 482335		
Galvanic Isolated Interface Units (actives) and Remote I/O	MTL	3021, 4021, 4021S	ia										
		3022	ia										
		4023	ia										
		4024	ia										
		4025	ia										
			5021, 5023, 5024	ia									
			5025	ia									
	Pepperl & Fuchs	EGA-041-3	ia										
		KFD2-SD-Ex1.36	ia										
KFD2-SD-Ex1.48		ia											
KFD2-SL-Ex1.36		ia											
KFD2-SL-Ex1.LK		ia											
		KFD2-SL-Ex2	ia										
		KFD2-SL-Ex1.48	ia										
		KSD2-BO-Ex	ia										
		RSD-BO-Ex4	ib										
STAHL		9311/52-11-10	ia										
		9111/63-11-00	ia										
		9351/10-15-10	ia										
		9351/10-16-10	ia										
		9351/10-17-10	ia										
		9381/10-187-050-10	ib										
		9381/10-246-055-10	ib										
		9381/10-246-070-10	ib										
		9475/12-04-11	ia										
		9475/12-04-21	ia/ib										
TURCK													
		MK72-S01-Ex	ib										
		MK72-S02-Ex	ib										
		MK72-S04-Ex	ib										
		MK72-S05-Ex	ib										
		MK72-S06-Ex	ib										
		MK72-S07-Ex	ib										
		MK72-S12-Ex	ia										
		MC72-41	ia										
		MC72-43	ia										

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

IS Booster coils parameters

IS - BOOSTER ELECTRICAL PARTS						
Type of IS-protection	EEx ia IIB T6	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	
	Impedance of electrical part		275 Ohm/13V	50 Ohm *	50 Ohm *	
	Minimum voltage required for functioning at 60°C		13 V	21.6 V	21.6 V	
	Minimum current required for functioning (attraction)		-	-	-	
	Minimum current required for functioning (holding)		20 mA	45 mA	45 mA	
	Inductance [L] of coil (mH apparent)		-	0	0	
	Capacitance [C] of coil (µF apparent)		-	0	0	
	Ambient temperatures		-40 °C to +65 °C	-40 °C to +65 °C	+65°C	
	Maximum current for continuous line check		4 mA	0	0	
Security parameters	Maximum admissible voltages /current		28V / 280mA - 1.96 W	28V / 110mA - 0.77 W	28V / 110mA - 0.77 W	see certif. FM/CSA.
			27V / 320mA - 2.16 W	27V / 120mA - 0.81 W	27V / 120mA - 0.81 W	
			26V / 350 mA - 2.27 W	26V / 135 mA - 0.88 W	26V / 135 mA - 0.88 W	
			25V / 390 mA - 2.43 W	25V / 150 mA - 0.94 W	25V / 150 mA - 0.94 W	
			24V / 430 mA - 2.58 W	24V / 170 mA - 1.2 W	24V / 170 mA - 1.2 W	

Cable resistance (there and back): 0.6 mm_ - 59 Ohm/km; 1.0 mm_ - 35 Ohm/km; 1.5 mm_ - 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.

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

TYPE	MANUFACTURER	REFERENCE	EEEx..	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	EEx ia 490860
					LCIE	LCIE	LCIE	LCIE/FM/CSA
Shunt Diode Safety Barriers (passive)	MTL	728	ia		x			
		728,7028	ia		x			
	Pepperl & Fuchs	Z 728	ia		x	x	x	
		Z 779	ia		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	
Galvanic Isolated Interface Units (active) and Remotes I/O		9002/13-280-100-04	ia	340	17Vmin/LRmax30	26Vmin/LRmax3	26Vmin/LRmax3	26Vmin/LRmax3
	A puissance 3	NAEV 26 - 1002-140	ia		x	x		
	ABB	V171132-54	ib		x			
		V171132-55	ib		x			
		V171132-61	ia		x			
		DO 890	ib		x	x	x	
		S900-DO4-Ex	ib		x			
	BARTEC	07-7331-2301/1000	ia		x			
		07-7331-2301/1100	ia		x			
	BRADLEY COOPER	FEX-EX 24V	ia		x	x	x	x
		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
GEORGIN		2871/2872	ia		x	x	x	x
		2875/2876	ia		x	x	x	x
	AVB 122		ia		x	x	x	
	AVB 125		ia		x	x	x	
	AVB 128		ia		x	x	x	
	F3328A		ib		x	x	x	
	F3335		ib		x	x	x	
	H4007		ib		x	x	x	
	MTL	3021, 4021, 4021S	ia		x	x	x	x
		3022	ia			x		x
Hima		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 additional Line Resistance.
LRmax = max.additional Line Resistance in Ohm with min. voltage if required.

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

TYPE	MANUFACTURER	REFERENCE	EEEx..	RESIST. of barrier in Ohm	IS Booster coil			
					EEEx ia IIC T6 492965.01/02	EEEx ib IIB T6 482660	EEEx ib IIC T6 483330,01	Exia 490860
					LCIE	LCIE	LCIE	LCIE/FM/CSA
Galvanic Isolated Interface Units (active)	Pepperl & Fuchs	EGA-041-3	ia		x			
		KFD2-SD-Ex1.36	ia			x		
		KFD2-SL-Ex1.36	ia			x		
		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
		KFD2-SL2-Ex1.LK	ia		x			
		KFD2-SL2-Ex2	ia		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					
		MK72-S12-Ex	ia		x	x	x	
		MC72 - 41	ia		x			
		MC72 - 43	ia		x			
		MC72 - 44	ia		x			
Conditions: ED 100%, Max. ambient temp. 60°C. Coils marked with x: Suitable for > 30 Ohm additional Line Resistance. LRmax = max.additional Line Resistance in Ohm with min. voltage if required.								

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. 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)

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																																													
Ref.	Code	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				
Coils																																													
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	•	•		•		•				•		•					•									•									•	•	•			•	•			
491514	D400										•													•										•			•	•	•			•	•		
492425	DZ08	•			•				•																												•								
492453	DZ04	•	•	•				•			•																										•	•							
Electrical parts																																													
482160.01	VZ22		•			•		•																																					
482605	VA01		•			•		•																																					
482606	VA02		•	•		•		•			•		•					•																											
482606.10	VA12							•																													•	•			•	•			
482606.160	VA07							•																																					
482660	VZ11																																												
482870.01	VZ23																																												
483250	HZ08		•	•	•		•																																						
483270	HZ19																			•	•				•					•						•	•			•	•				
483330.01	VZ12																			•	•				•					•								•							
483371	HZ06	•	•	•	•		•		•											•																									
483371.01	HZ14																																												
483371.05	HZ15		•	•					•																																				
483580.01	DZ12																																												
488650.01	VZ07																																												
488660.01	VZ08																																												
488670.01	VZ09																																												
490880	DZ18																																												
490885	VZ33																																												
490890	VZ18																																												
490895	VZ20																																												
491117	VZ04																																												
492070	VZ01																			•		•					•	•						•		•	•			•	•				
492070.60	VZ96																																												

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.

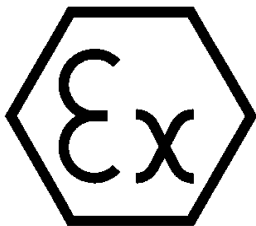
Electrical equipment for use in potentially explosive environments is certified by a government-approved body when it meets relevant European standards (EN 50014 and upwards) covering each type of protection (**d, i, e, m, p**, etc.). Such equipment is then issued with a **European certificate of conformity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

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 occurred, 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)

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) * USA (NEC) ~	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)

* (CEC): Code Canadien d'Electricité / ~ (NEC): National Electrical Code

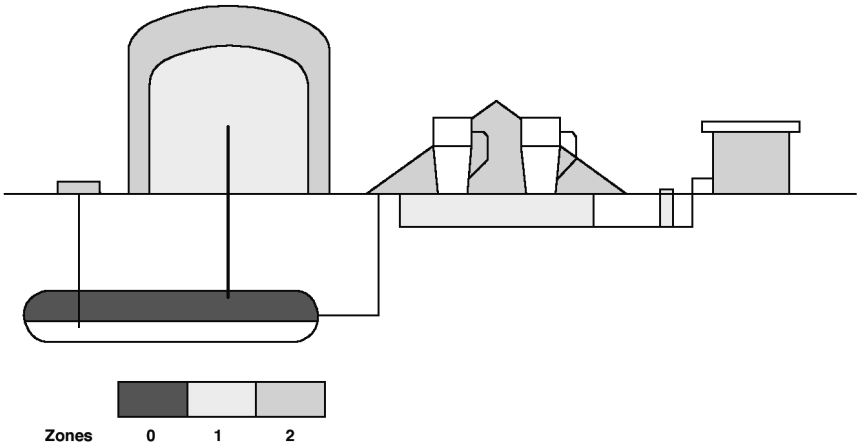
Zones and types of protection (gas applications)

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:

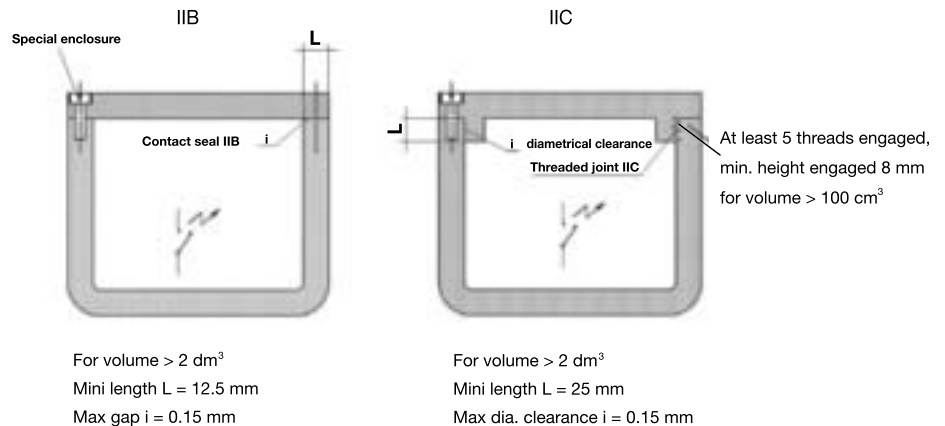


4.5. Types of protection used by Lucifer

4.5.1 Flameproof enclosure

“d”

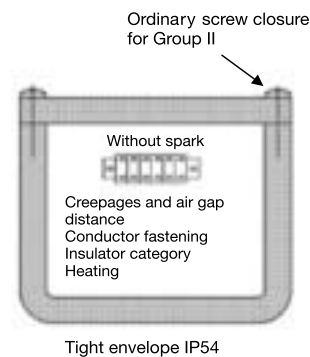
A type of protection where the parts that can ignite an explosive environment are placed in an enclosure which can withstand the pressure developed during an internal explosion of an explosive mixture and which prevents the transmission of the explosion to the explosive environment surrounding the enclosure.



4.5.2 Increased safety

“e”

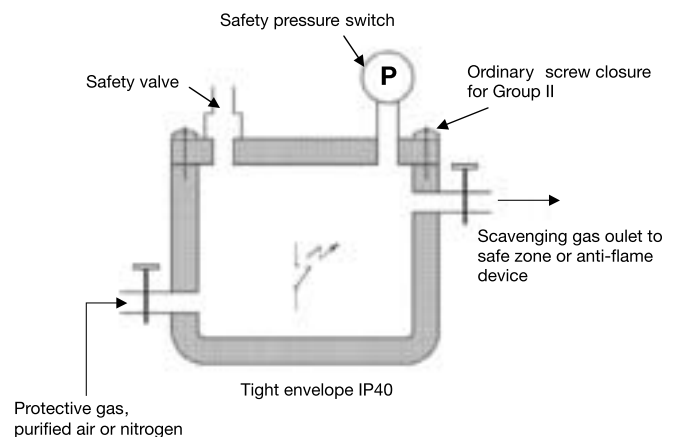
Type of protection applied to electrical apparatus that does not produce arcs or sparks in normal service, in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks.



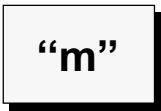
4.5.3 Pressurized apparatus

“p”

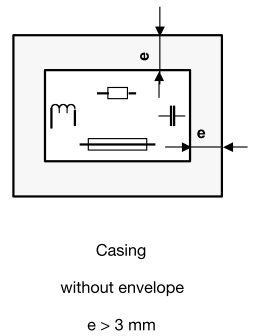
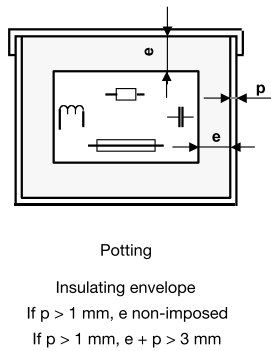
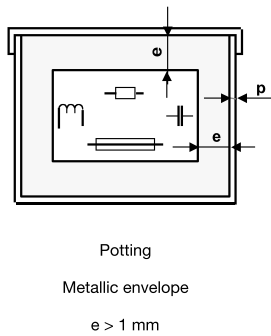
A type of protection by which the entry of a surrounding environment into the enclosure of the electrical apparatus, is prevented by maintaining, inside the said enclosure, a protective gas at a higher pressure than that of the surrounding environment. The overpressure is maintained either with or without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



4.5.4 Encapsulation



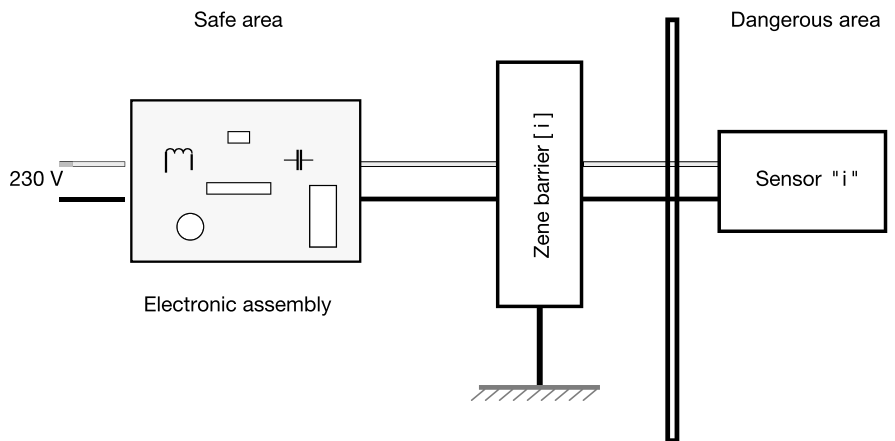
A type of protection in which the parts which could ignite an explosive environment by either sparking or heating are enclosed in a compound in such a way that this explosive environment cannot be ignited



4.5.5 Intrinsic safety



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.



Principles of operation

Solenoid valves are electro-mechanical devices that control fluid flow. This is achieved by opening or closing one or several orifices in the solenoid valve. The (solenoid) coil is the electrical element that converts an electrical signal into a mechanical force which, in turn, shifts the mobile plunger that opens or closes an orifice (nozzle) by means of its seat disc(s).

Solenoid valves are usually constructed from 3 distinct components:

- the body (including the sleeve assembly)
- the coil (or coil housing)
- the housing (or nut/nameplate fixing elements).

These 3 modular components are in many cases interchangeable i.e. a valve body can be used with a number of coil/housing combinations. This catalogue presents the main recommended versions. Your distributor will be pleased to speak to you about other specific versions.

Direct operated valves (see fig. 1)

The magnetic force is used directly to open or close the passage of fluid at the plunger sealing. The performance is limited by the available performance of the coil (limits of pressure/orifice size.) The pressure rating of the valve starts from zero bar to the maximum value.

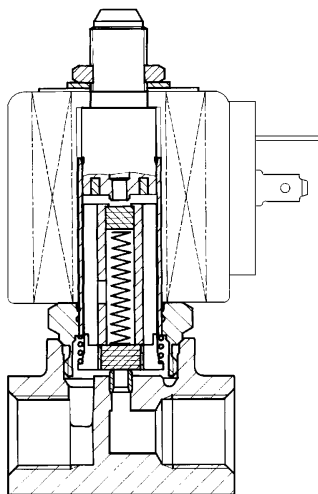


Fig. 1

Pilot operated valves (see fig. 2 and 3)

In cases where it is necessary to control higher flow/higher pressure it is necessary to use pilot operated valves. The supply pressure enters the direct operated "pilot stage" which directs the flow to a "pilot chamber" which, in turn, applies the pilot pressure over a large area (generally a diaphragm or a piston). Therefore, a large force is generated to move the main sealing elements against higher pressure or over a large orifice. One condition of operation is to have a minimum pressure (indicated in the catalogue table) available to shift the valve. In most applications this presents no particular problems (refer to "Magnalift valves" below). The pressure rating of the valve starts from a minimum value (0.3 or 0.5 bar) up to the maximum value.

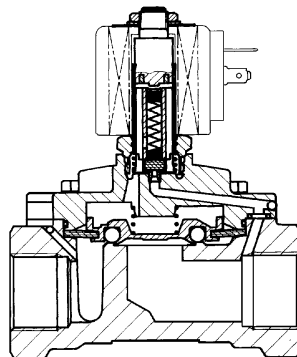


Fig. 2

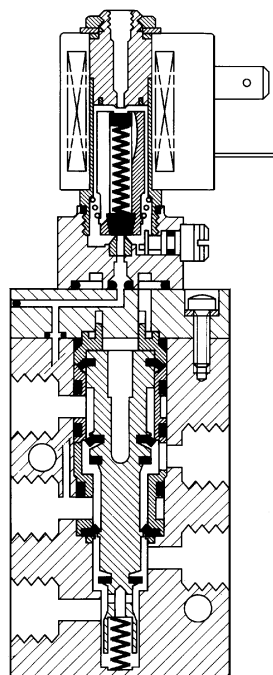


Fig. 3

Magnalift valves (see fig. 4)

The magnalift valves combine the features of a direct operated and a pilot operated valve. A mechanical link between the plunger and the diaphragm retainer allows the valve to operate as a direct operated valve at low pressures and as a pilot operated valve at higher pressures.

The advantage of this design is that the pressure rating of the valve starts from zero bar to the maximum value.

Magnalift valves are specified when the valve controls the emptying/filling of a tank under gravity.

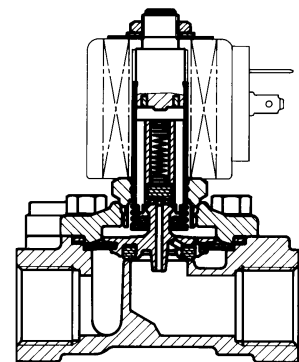


Fig. 4

Flow rate

Liquids

The flow through a pipe or a valve is given by:

$$Q = k_v \sqrt{\Delta p / \gamma}$$

where Q = flow (L/min)
 Δ = pressure drop (bar)
 γ = density of fluid (kg/dm³)
 k_v = flow factor of the pipe or valve (L/min)
 For water $\gamma = 1 \text{ kg/dm}^3$

Flow factor k_v

The k_v flow factor of a valve is defined as the flow rate of water in litres per minute with a pressure drop of 1 bar across the valve. Valve manufacturers use different definitions for k_v i.e. k_v may be expressed in L/h or m³/h, etc. Care should therefore be taken when comparing values.

Maximum flow rate Q_{max} .

For particular 2-way valves the maximum flow must be limited for reasons of mechanical resistance and durability. A very high flow velocity may dislocate a poppet sealing or a diaphragm. Maximum flow rates are indicated in the catalogue.

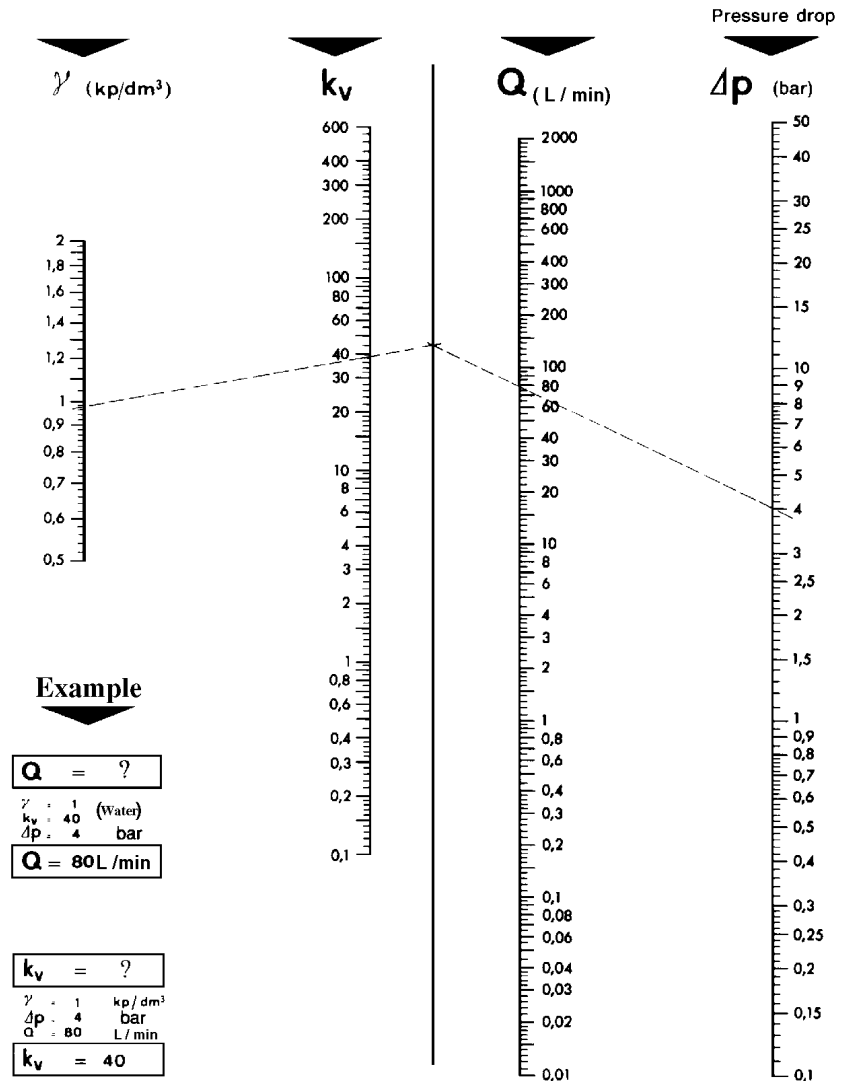
Gases

Nominal flow Q_n

Calculations can be made with specific flow factors based on the CETOP RP 50P standard. For practical purposes and ease of valve selection the catalogue shows the nominal flow Q_n . The nominal flow Q_n is defined as the flow rate (L/min) of air across the valve when the inlet pressure $p_1 = 6 \text{ bar}$ and the pressure drop $\Delta p = 1 \text{ bar}$.

N.B. THE VALUES OF FLOW FACTORS AND FLOW RATES MENTIONED IN CATALOGUES ARE SUBJECT TO $\pm 15\%$ TOLERANCES.

For detailed technical information please ask for publication 1230/GB



Nomogram for liquid flow calculation

Unit conversion tables/designation of sealing materials

Measures

1 inch = 25.4 mm
 1 mm = 0.039 inch
 1 U.S. gallon = 3.785 litres
 1 imperial gallon = 4.546 litres

Pressure

1 bar = 1.02 kg/cm² = 0.98 atm
 = 10⁵ Pa = 100 kPa
 1 bar = 14.51 psi
 1 psi = 0.0689 bar = 0.0703 kg/cm²

Flow rate

k_v in L/min/Δp = 1 bar
 c_v in gpm/Δp = 1 psi
 1 c_v = 0.07 k_v
 1 k_v = 14.28 c_v
 1 gpm (U.S. gallon) = 3.785 L/min
 1 L/min = 0.0353 cfm

Temperature

°F = °C × 9/5 + 32
 °C = (°F - 32) × 5/9

Torque

1 in. lb. = 0.113 Nm
 1 Nm = 8.25 in. lb.

Size

mm	inches	decimal inches
0.79	1/32	0.031
1.59	1/16	0.063
2.38	3/32	0.094
3.18	1/8	0.125
3.97	5/32	0.156
4.76	3/16	0.188
5.56	7/32	0.219
6.35	1/4	0.250
7.14	9/32	0.281
7.94	5/16	0.313
8.73	11/32	0.344
9.53	3/8	0.375
10.3	13/32	0.406
11.1	7/16	0.438
11.9	15/32	0.469
12.7	1/2	0.500
13.5	17/32	0.531
14.3	9/16	0.563
15.1	19/32	0.594
15.9	5/8	0.625
16.7	21/32	0.656
17.5	11/16	0.688
18.3	23/32	0.719
19.1	3/4	0.750
19.8	25/32	0.781
20.6	13/16	0.813
21.4	27/32	0.844
22.2	7/8	0.875
23.0	29/32	0.906
23.8	15/16	0.938
24.6	31/32	0.969
25.4	1	1.000

Designation of sealing materials

ASTM Designation	Commercial Designation
NBR	Nitrile rubber, Buna-N., Perbunan
FKM	Fluoroelastomer
EPDM	Ethylene propylene
PCTFE	Kel-F
PTFE	
CR	Neoprene
PUR	Polyurethane
PFPM	Kalrez

Fluid compatibility of LUCIFER valves

Key:
NBR = Buna N, Perbunan
FKM = Viton
EPDM = Ethylene - Propylene
PTFE = Teflon
PPFM = Kalrez
PCTFE = Kel F
CR = Neoprene
* Without phase shift ring only with DC coil

VALVE FUNCTIONS			2/2 DIRECT OPERATED				3/2 DIRECT OPERATED				3/2 SERVO OPERATED				5/2 SERVO OPERATED
VALVE TYPES			2/2 DIRECT OPERATED				3/2 DIRECT OPERATED				3/2 SERVO OPERATED				5/2 SERVO OPERATED
BODY MATERIALS			2/2 DIRECT OPERATED				3/2 DIRECT OPERATED				3/2 SERVO OPERATED				5/2 SERVO OPERATED
FLUIDS			2/2 DIRECT OPERATED				3/2 DIRECT OPERATED				3/2 SERVO OPERATED				5/2 SERVO OPERATED
SEALING DISCS OR MEMBRANES			2/2 DIRECT OPERATED				3/2 DIRECT OPERATED				3/2 SERVO OPERATED				5/2 SERVO OPERATED
Acetone			FKM	EPDM	FKM	Ruby	FKM	EPDM	FKM	EPDM	FKM	EPDM	FKM	NBR	
Acetylene, dry*	+20°C		•	•	•	•	•	•	•	•	•	•	•	•	
Acid - Boric*	+20°C														
Acid - Chrome	<40%, +20°C														
Acid - Citric	<10%, +20°C														
Acid - Hydrochloric	1%, +20°C														
Acid - Lactic	+20°C														
Acid - Nitric*	<10%, +20°C														
Acid - Phosphoric	<10%, +20°C														
Acid - Picric	<10%, +20°C														
Acid - Salicylic	<10%														
Acid - Sulphuric	<20%														
Acid - Sulphurous	<5%, +20°C														
Air, hot	+120°C		•	•	•	•	•	•	•	•	•	•	•	•	
Air, unlubricated			•	•	•	•	•	•	•	•	•	•	•	•	
Alcohol - Amyl alcohol				•		•	•		•		•		•		
Alcohol - Butyl alcohol (Butanol)			•	•	•	•	•	•	•	•	•	•	•	•	
Alcohol - Ethyl alcohol (Ethanol)			•	•	•	•	•	•	•	•	•	•	•	•	
Alcohol - Methyl alcohol (Methanol)			•	•	•	•	•	•	•	•	•	•	•	•	
Alcohol - Propyl alcohol (Propanol)			•	•	•	•	•	•	•	•	•	•	•	•	
Ammonia, gas (anhydrous)	+60°C		•	•	•	•	•	•	•	•	•	•	•	•	
Aniline*						•	•								
Argon			•	•	•	•	•	•	•	•	•	•	•	•	
Beer						•	•				•				
Benzene - leaded and unleaded (motor)			•	•	•	•	•	•	•	•	•	•	•	•	
Chloroform	+20°C		•	•	•	•	•	•	•	•	•	•	•	•	
Cider						•	•				•				
Coffee						•	•				•				
Cream						•	•				•				
Cyclohexane						•	•				•				
Ethyl chloride						•	•				•				
Ethylene glycol (antifreeze)			•	•	•	•	•				•				
Exhaust gas			•	•	•	•	•				•				

[illegible]

Index by reference numbers

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U 033X51561D	7033XRN2SN1D	274/292	121V5212	7121VVG2QT00	116	131M14	-	124/226
U 033X5256	7033XRN3SN00	276/294	121V5263	7121VVG2QR00	74/116	131M15	-	124/226
U 033X52561D	7033XRN3SN1D	274/294	121V5306	7121VVG2NV00	116	131M74	-	142
E 121F43	7121FBF4NF00	14/88	121V53061D	7121VVG2NV1D	116	131M7450	-	142
E 121F4302	7121FBF4NV00	14/50	121V5363	7121VVG2NR00	74/116	131M75	-	138
E 121F44	7121FBF4GF00	14/88	121V5406	7121VVG2GV00	116	131M7550	-	138
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121F63	7121FBF4LR00	14/88	122K83	7122KBG2LF00	12	131T23	7131TBG2JV00	126
121F64	7121FBF4NR00	14/88	122K8306	7122KBG2LV00	12/48	131T2301	7131TBG2JVM0	126
121F67	7121FBF4GR00	14/88	122K8321	7122KBG2LRT0	106	131T29	7131TBG2LV00	128
121G2320	7121GBG34VT0	104	122K8363	7122KBG2LR00	12/88/106	131T2901	7131TBG2LVM0	128
121G2520	7121GBG45VT0	104	122K84	7122KBG2GF00	12/88	131V5306	7131VVG2LV00	182
121G2523	7121GBG45VT1	104	122K8406	7122KBG2GV00	12/48	131V5363	7131VVG2LR00	182
121K01	7121KBG2SV00	12/48	122K8408	7122KBG2GR00	12/88	131V5406	7131VVG2GV00	182
121K0103	7121KBG2SE00	72	122K9321	7122KBG1LRT0	106	131V5463	7131VVG2GR00	182
121K0150	7121KBG2SVM0	10/48	122K9363	7122KBG1LR00	12/88/106	131V5490	-	182
121K02	7121KBG2QV00	10/48	125K01	7125KBG2SV00	14/50	131V65	7131WVG2BR00	176
121K0250	7121KBG2QVM0	10/48	125K03	7125KBG2NF00	12	131X1101	7131XAKLVN00	230
E 121K03	7121KBG2NF00	10/86	E 131E03	7131EBG2LN00	130/228	U 131X1201	7131XRKMVN00	276/292
E 121K0302	7121KBG2NV00	10/46	E 131F26	7131FDF2JV00	148	132F43	7132FBF4LV00	144
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E 121K0352	7121KBG2NVM0	10/46	E 131F4350	7131FBF4LVM0	144	132F46	7132FBF4JV00	144
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121K1352	7121KBG1NVM0	8/46	U 131F5695	7131FRF2LV95	276/292	132T29	7132TBG2LV00	132
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121K3303	7121KBG3UE00	72	E 131K0350	7131KBG2LVM0	128/228	133F4650	7133FBF4JVM0	144
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221G13	7221GBG3VN00	16/52/64
221G1303	7221GBG3VE00	76
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221G15	7221GBG4VN00	16/52/64
221G1503	7221GBG4VE00	76
221G1530	7221GBG4VNH0	16/52/64
221G16	7221GBG51N00	18/52
221G1603	7221GBG51E00	76
221G1610	7221GBG51NC0	64
221G1630	7221GBG51NH0	18/52
221G1631	7221GBG51NCH	64
221G17	7221GBG61N00	18/52
221G1703	7221GBG61E00	76
221G1710	7221GBG61NC0	64
221G1730	7221GBG61NH0	18/52
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221G21	7221GBG64N00	18/54
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221G2110	7221GBG64NC0	64
221G2130	7221GBG64NH0	18/52
221G2131	7221GBG64NCH	64
221G2136	7221GBG64VH0	18
221G23	7221GBG3VV00	16
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222G5306	72228RG3TV00	20/54
222G5503	72228RG4UE00	78
222G5506	72228RG4UV00	20/54
222G5603	72228RG5VE00	78
E 321F32	7321FBF3TN00	34/60/92
E 321F3202	7321FBF3TV00	34/92/110
E 321G36	7321GBG53N00	24/56
E 321G3606	7321GBG53V00	24
E 321G3610	7321GBG53NMC	66
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E 321G38	7321GBG76N00	26/58
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E 321G40	7321GBG99N00	30/58
E 321G4006	7321GBG99V00	28
E 321G4010	7321GBG99NMC	68
E 321G40101D	7321GBG99N3D	30
321G4090	-	28
321G8312	73218BG3TTS0	80
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321G8612	73218BG5VTS0	80
321G8712	73218BG64TS0	82
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321K4506	7321KBG4TVW0	66
321K4556	7321KBG4TVMW	66
321K4603	7321KBG51EW0	80
321K4606	7321KBG51VW0	66
321K4656	7321KBG51VMW	66
321K4703	7321KBG62EW0	80
321K4706	7321KBG62VW0	66
321K4756	7321KBG62VMW	66
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322G3710	7322GBG64NC0	68
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322G3910	7322GBG88NC0	68
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322G8512	73228BG4UTS0	82
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322H7106	7322HBG2SV00	30/90/108
322H73	7322HBG3TN00	32/92
322H7306	7322HBG3TV00	32/92/108
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3121BBN1GV00	-	38
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3121BBN1LV00	-	38
3121BBN1NV00	-	38
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7121KBG2NE00	121K0323	72
7121KBG2NF00	E 121K03	10/86
7121KBG2NR00	E 121K64	10/86/104
7121KBG2NRT0	121K6423	104
7121KBG2NV00	E 121K0302	10/46
7121KBG2NVM0	E 121K0352	10/46
7121KBG2QRT0	121K6220	106
7121KBG2QV00	121K02	10/48
7121KBG2QVM0	121K0250	10/48
7121KBG2SE00	121K0103	72
7121KBG2SV00	121K01	12/48
7121KBG2SVM0	121K0150	10/48
7121KBG3QV00	121K3206	12/48/104
7121KBG3SV00	121K3106	12/48/104
7121KBG3UE00	121K3303	72
7121KBG3UV00	121K3306	12/48/104
7121KBG42E00	E 121K4603	72
7121KBG42V00	E 121K46	12/48
7121KBG44E00	E 121K4503	72
7121KBG44V00	E 121K45	12/48
7121VVG2GR00	121V5463	74/116
7121VVG2GV00	121V5406	116
7121VVG2LR00	121V5763	74/116
7121VVG2LV00	121V5706	116
7121VVG2NR00	121V5363	74/116
7121VVG2NV00	121V5306	116
7121VVG2NV1D	121V53061D	116
7121VVG2QR00	121V5263	74/116
7121VVG2QT00	121V5212	116
7121VVG2QV00	121V5206	116
7121VVG2SR00	121V5163	74/118
7121VVG2ST00	121V5112	118
7121VVG2SV00	121V5106	118
7121VVG2SV1D	121V51061D	118
7121ZBG1GV00	-	8/46
7121ZBG1LR00	-	102
7121ZBG1LRT0	-	102
7121ZBG1LV00	-	8/46
7121ZCBG1LR00	-	102
7122KBG1LR00	122K9363	12/88/106
7122KBG1LRT0	122K9321	106
7122KBG2GF00	122K84	12/88
7122KBG2GR00	122K8408	12/88

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7122KBG2LF00	122K83	12
7122KBG2LR00	122K8363	12/88/106
7122KBG2LRT0	122K8321	106
7122KBG2LV00	122K8306	12/48
7125KBG2NF00	125K03	12
7125KBG2SV00	125K01	14/50
7131EBG2LN00	E 131E03	130/228
7131FBF4GLV5	131F4480	140
7131FBF4GV00	E 131F44	144
7131FBF4GVM0	E 131F4450	144
7131FBF4JV00	131F46	144
7131FBF4JVM0	131F4650	144
7131FBF4LV00	E 131F43	144
7131FBF4LVM0	E 131F4350	144
7131FDF2JV00	E 131F26	148
7131FRF2LV1D	U 131F56951D	278
7131FRF2LV95	U 131F5695	276/292
7131KBG1GV00	E 131K14	124
7131KBG1JV00	131K16	124
7131KBG1JVM0	131K1650	124
7131KBG1LV00	E 131K13	124
7131KBG2BF00	131K05	176
7131KBG2BR00	131K65	176
7131KBG2CV90	131K0490	126/226
7131KBG2ER00	E 131K64	126
7131KBG2ERM0	E 131K6450	126
7131KBG2GV00	E 131K04	126/226
7131KBG2GVL5	131K0480	126/226
7131KBG2GVM0	E 131K0450	126/226
7131KBG2JP1D	E 131K06081D	128/228
7131KBG2JV00	E 131K06	126/226
7131KBG2JVM0	E 131K0650	126/226
7131KBG2LP00	E 131K0308	130/228
7131KBG2LP1D	E 131K03081D	130/228
7131KBG2LPM0	E 131K0358	130/228
7131KBG2LR00	E 131K63	130
7131KBG2LRM0	E 131K6350	130
7131KBG2LV00	E 131K03	128
7131KBG2LV1D	E 131K03001D	228
7131KBG2LVM0	E 131K0350	128/228
7131TBG2JV00	131T23	126
7131TBG2JVM0	131T2301	126
7131TBG2LV00	131T29	128
7131TBG2LVM0	131T2901	128
7131TBG2NVA0	131T22	132
7131TBG2RV00	131T21	132
7131TBG2RVM0	131T2101	132
7131VVG2GR00	131V5463	182
7131VVG2GV00	131V5406	182
7131VVG2LR00	131V5363	182
7131VVG2LV00	131V5306	182
7131VVG2BR00	131V65	176
7131XAKLVN00	131X1101	230
7131XRKMVN00	U 131X1201	276/292
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7132FBF4JV00	132F46	144

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7132KBG2JV00	132K06	132
7132KBG2LV00	132K03	132
7132TBG2JV00	132T23	132
7132TBG2JVM0	132T2301	132
7132TBG2LV00	132T29	132
7132TBG2NVA0	132T22	134
7133FBF4GV00	E 133F44	144
7133FBF4GVM0	E 133F4450	144
7133FBF4JV00	133F46	144
7133FBF4JVM0	133F4650	144
7133FBF4LV00	E 133F43	146
7133FBF4LVM0	E 133F4350	144
7133KBG1GV00	E 133K14	134
7133KBG1JV00	E 133K16	134
7133KBG1LV00	E 133K13	134
7133KBG2BV00	E 133K05	176
7133KBG2GV00	E 133K04	134
7133KBG2GV1D	E 133K04001D	134
7133KBG2GVM0	E 133K0450	134
7133KBG2JV00	E 133K06	134
7133KBG2JVM0	E 133K0650	134
7133KBG2LV00	E 133K03	134
7133KBG2LVM0	E 133K0350	134
7133TBG2JV00	133T23	134
7133TBG2JVM0	133T2301	134
7133TBG2NV00	133T21	134
7133TBG2NVM0	133T2101	134
7133VRN2LV95	U 133V5695	278/288
7133VRN2LV9D	U 133V56951D	278/288
7133VVG2GR00	133V5463	182
7133VVG2GV00	133V5406	182
7133VVG2LR00	133V5363	182
7133VVG2LV00	133V5306	182
7133XRN2SV00	U 133X5156	280/290
7133XRN2SV1D	U 133X51561D	280/288
7133XRN2VN96	U 133X5196	280
7133XRN2VN9H	U 133X51961D	280
7133XRN3SN96	U 133X5296	282/290
7133XRN3SN9H	U 133X52961D	282/290
7135KBG2GV00	135K04	136/228
7135KBG2LV00	135K03	136/228
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72218RG3TV00	221G5306	20/54
72218RG4UE00	221G5503	78
72218RG4UV00	221G5506	20/54
72218RG5VE00	221G5603	78
72218RG5VV00	221G5606	20/54
7221GBG3VE00	221G1303	76
7221GBG3VN00	221G13	16/52/64
7221GBG3VNH0	221G1330	16/52/64
7221GBG3VV00	221G23	16
7221GBG3VVH0	221G2330	16
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7221GBG51NC0	221G1610	64
7221GBG51NCH	221G1631	64
7221GBG51NH0	221G1630	18/52
7221GBG51V00	221G26	18
7221GBG51V1D	221G26001D	16
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7221GBG61E00	221G1703	76
7221GBG61N00	221G17	18/52
7221GBG61NC0	221G1710	64
7221GBG61NCH	221G1731	64
7221GBG61NH0	221G1730	18/52
7221GBG61V00	221G27	18
7221GBG61V1D	221G27001D	18
7221GBG61VH0	221G2730	18
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7221GBG64NCH	221G2131	64
7221GBG64NH0	221G2130	18/52
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72228BG3TV00	222G3306	20/54
72228BG4UES0	222G3503	78
72228BG4UV00	222G3506	20/54
72228BG5VES0	222G3603	78
72228BG5VV00	222G3606	20/54
72228RG3TE00	222G5303	78
72228RG3TV00	222G5306	20/54
72228RG4UE00	222G5503	78
72228RG4UV00	222G5506	20/54
72228RG5VE00	222G5603	78
73218BG3TTS0	321G8312	80
73218BG4UTS0	321G8512	80
73218BG5VTS0	321G8612	80
73218BG64TS0	321G8712	82
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7321BBG4TN00	-	56
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7321BBG53E00	-	80
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7321BBG88E00	-	82

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7321BBG99NM0	-	58
7321BBG99NM1	-	58
7321BBGDCNM1	-	58
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7321GBG53V00	E 321G3606	24
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7321GBG64NMC	E 321G3710	66
7321GBG64V00	E 321G3706	24
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7321GBG88N00	E 321G39	28/58
7321GBG88N3D	E 321G39101D	28
7321GBG88NMC	E 321G3910	68
7321GBG88V00	E 321G3906	26
7321GBG99N00	E 321G40	30/58
7321GBG99N3D	E 321G40101D	30
7321GBG99NMC	E 321G4010	68
7321GBG99V00	E 321G4006	28
7321HBG2SN00	E 321H11	22/90
7321HBG2SV00	E 321H21	22/90/108
7321HBG3TN00	E 321H13	22/90
7321HBG3TV00	E 321H23	22/90/108
7321HBG3TVT0	321H2322	108
7321HBG4UN00	E 321H15	24/90
7321HBG4UV00	E 321H25	22/90/108
7321HBG4UVT0	321H2522	108
7321KBG2SEW0	321K4103	80
7321KBG2SVMW	321K4156	66
7321KBG2SVW0	321K4106	66
7321KBG3TEW0	321K4303	80
7321KBG3TVMW	321K4356	66
7321KBG3TVW0	321K4306	66
7321KBG4TEW0	321K4503	80
7321KBG4TVMW	321K4556	66
7321KBG4TVW0	321K4506	66
7321KBG51EW0	321K4603	80
7321KBG51VMW	321K4656	66
7321KBG51VW0	321K4606	66
7321KBG62EW0	321K4703	80
7321KBG62VMW	321K4756	66
7321KBG62VW0	321K4706	66
73228BG3TTS0	322G8312	82
73228BG4UTS0	322G8512	82
73228BG52TS0	322G8612	82
73228BG64TS0	322G8712	82
73228BG75TS0	322G8812	82
73228BG87TS0	322G8912	82
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7322BBG64N00	-	60
7322BBG78N00	-	60
7322BBG88N00	-	60
7322BBG99N00	-	60
7322FBF3TN00	322F72	34/60/92
7322FBF3TV00	322F7206	34/92/110
7322GBG4UV00	322G7506	110
7322GBG53N00	322G36	32/58
7322GBG53NC0	322G3610	68
7322GBG53V00	322G3606	32
7322GBG64N00	322G37	32/60
7322GBG64NC0	322G3710	68
7322GBG64V00	322G3706	32
7322GBG76N00	322G38	32/60
7322GBG76NC0	322G3810	68
7322GBG76V00	322G3806	32
7322GBG88N00	322G39	32/60
7322GBG88NC0	322G3910	68
7322GBG88V00	322G3906	32
7322GBG99N00	322G40	32/60
7322GBG99NC0	322G4010	68
7322GBG99V00	322G4006	32
7322HBG2SN00	322H71	30/92
7322HBG2SV00	322H7106	30/90/108
7322HBG3TN00	322H73	32/92
7322HBG3TV00	322H7306	32/92/108
7322HBG4UN00	322H75	32/92
7322HBG4UV00	322H7506	32/92/110
7322KBG2SVW0	322K4106	32
7322KBG3TVW0	322K4306	32
7322KBG4TVW0	322K4506	32
7322KBG51VW0	322K4606	32
7322KBG62VW0	322K4706	32
7325KBG2SVW0	325K4106	34
7325KBG3TVW0	325K4306	34
7325KBG4TVW0	325K4506	34
7325KBG51VW0	325K4606	34
7325KBG62VW0	325K4706	34
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7331BAG2KNL2	331B7480	150
7331BAG2KNM0	E 331B74	150
7331BAG2QN00	E 331B01	152
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7341BAG2JNM0	341B3403	188
7341BAG2JNMR	341B34	188
7341BAG2KN00	341B02	198
7341BAG2PN00	E 341B01	198
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7341BAG4TN00	E 341B21	212
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7341LAKBGNL2	341L9584	270
7341LAKBGNM0	341L9534	270
7341LAPBGPL2	341L9588	270
7341LAV4TN90	341L2190	216
7341LAV4TNM0	E 341L21	218
7341LDC1LNL8	341L0180	218
7341LDC1LNM8	E 341L01	218
7341LDC1LNMI	E 341L02	218
7341LMG2NNM0	E 341L1130	204/254
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7341NAKBJN1D	341N31001D	260
7341NAKBJNL2	341N3180	260
7341NAKBJNM0	341N31	260
7341NAKBJNM1	341N21	258
7341NAKBJP1D	341N31081D	260
7341NAKBJPM0	341N3108	260
7341NAKBPN1D	341N32001D	266
7341NAKBPN90	341N3290	266
7341NAKBPNL2	341N3280	266
7341NAKBPNM0	341N32	266
7341NAKBPNM1	341N22	264
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7341NRKDJN1D	U 341N31501D	308
7341NRKDJN92	U 341N3192	310
7341NRKDJN95	U 341N3195	310
7341NRKNNN00	U 341N3250	312
7341NRKNNN92	U 341N3292	312
7341NRKNNN95	U 341N3295	312
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7341PAG1JN90	341P2190	238
7341PAG1JNL2	341P2180	238
7341PAG1JNM0	341P21	238
7341PAG1JPM0	341P2108	238
7341PAG2PN1D	341P22001D	246
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7341PAG2PNM0	341P22	244
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7341PRN2JN9D	U 341P31951D	298
7341PRN3NN00	U 341P3250	300
7341PRN3NN92	U 341P3292	300
7341PRN3NN95	U 341P3295	300
7341PRN3NN9D	U 341P32951D	302
7345BAG2JNMR	345B34	192
7345BAG2PN00	345B04	200
7345BAG4TN00	345B24	212
7345FAS3JNMR	345F34	194
7345LAV4TNM0	345L21	218
7345LDC1LNM8	345L01	220
7345PAG1JNM0	345P21	242
7347LMG2NNM0	E 347L1130	208
7347NAKBHNM0	347N31	262
7347NAKBPNM0	347N32	268
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7347NRKNNN00	U 347N3250	314
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7347PAG1HNM0	347P21	240
7347PAG2PNM0	347P22	244
7347PRN2JN00	U 347P3150	304
7347PRN2JN95	U 347P3195	304
7347PRN3NN00	U 347P3250	304
7347PRN3NN95	U 347P3295	306
7441NAKBJPM0	441N3108	266
7441PAG1JPM0	441P2108	242
7441PRN3NN00	U 441P3250	302
7541LDC1LNR0	541L01	220
7541NAKBJN00	541N01	262
7541PAG1JP00	541P0108	244
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Parker Hannifin Corporation

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