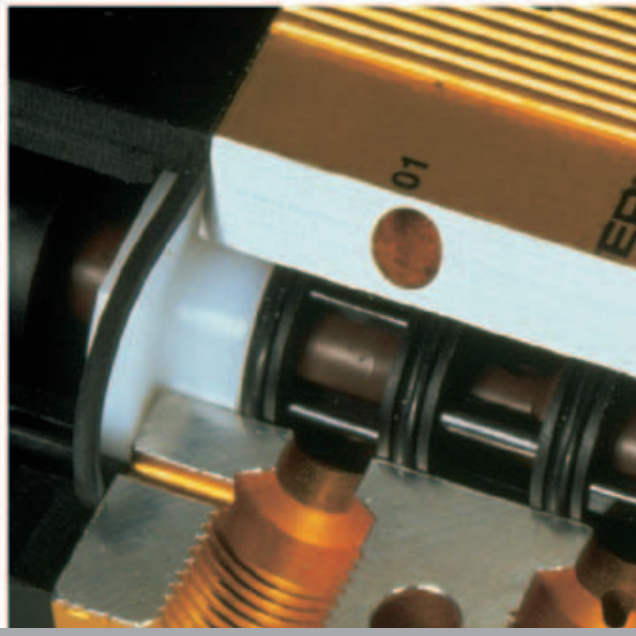
LUCIFER®

General Catalogue
Solenoid Valves
Pressure regulator
Electrical parts
Index by type

Catalogue 8930/GB

CONTENTS ►



Parker

Parker Lucifer SA

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

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

With the multinational structure of the Parker Group we now have support that enables us to face the international market. To date we are represented in over 50 Countries with an established network of distributors in each industrial market open to us. Parker Lucifer is located in Geneva, Switzerland, a European communications and traffic centre.

Mastering technologies in anticipation of your needs.

We aim always to stay a step ahead of our customers' demands. You are looking for someone who has expertise in the latest technology, who has a solid body of know-how and who will participate directly in the development of your products.

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

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

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

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

Your future depends on offering your customers ever more efficient, more reliable products. To do that, you have to be able to rely on first-rate suppliers who share your vision of the future and are capable of understanding your needs.

In order to better meet your demands and to ensure that we can offer you full guarantees of reliability, we have perfected a Total Quality program. At the same time, we pursue a strategy of innovation both in our processes and functions as well as in safety.

Environmental management bears witness to our desire to protect essential values.

Parker Lucifer is committed to respecting and protecting our environment by applying its own solutions. Although not mandatory, the ISO 14001 standards concern the environmental commitment of the company to supply products and service that will help our customers improve environmental quality. It relates to waste reduction, elimination of harmful materials, recycling and development of environment-friendly products. This Certified Management System to ISO 9001 / 14001 will also play a key role as a competitive differentiation in the marketplace.

Contents

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

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.

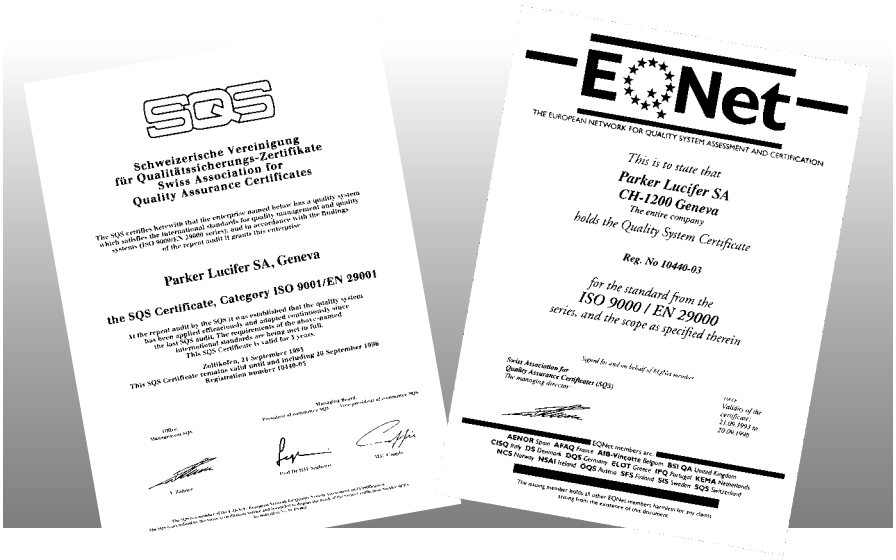
Making business as simple as possible

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.

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

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

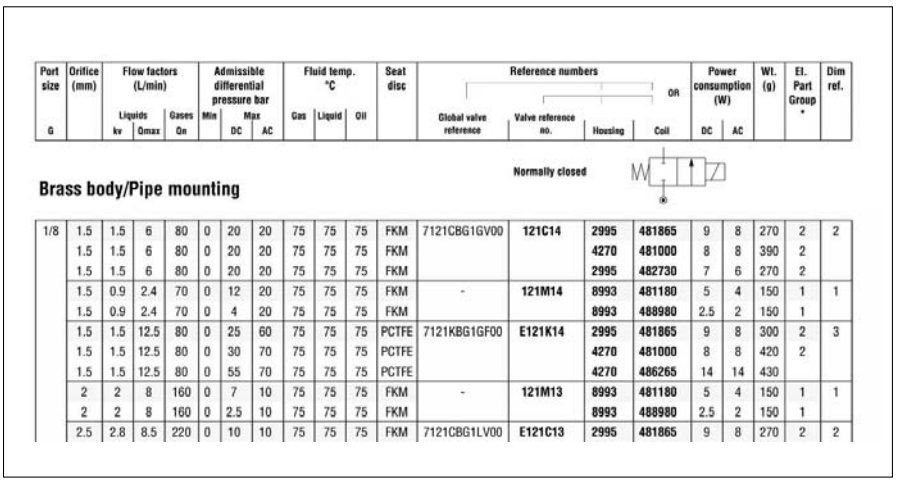
How to order a valve

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 G	Orifice (mm)	Flow factors (L/min) Liquids kv	Liquids Qmax	Gases Qn	Admissible differential pressure bar Min	Max DC	Max AC	Fluid temp. °C Gas	Liquid	Oil	Seat disc	Reference numbers Global valve reference	Valve reference no.	Housing	Coil	Power consumption (W) DC	AC	Wt. (g)	El. Part Group *	Dim ref.
Brass body/Pipe mounting													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
7121KBG2LVMO-2995-481865-220/50

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

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

Electropneumatic pressure regulator EPP3 Series

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.

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

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 ± 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 (recomended 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 = ± 0.8 V to ± 1 V
- possible set up: diff. signal = ± 0.1 V to ± 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 cm^3 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 suply 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			•	•			•	

Parker Lucifer SA
Fluid Control Division Europe
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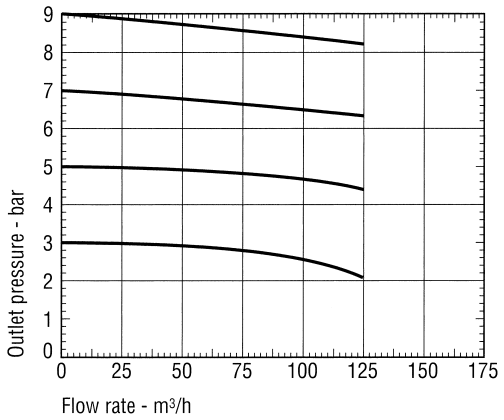
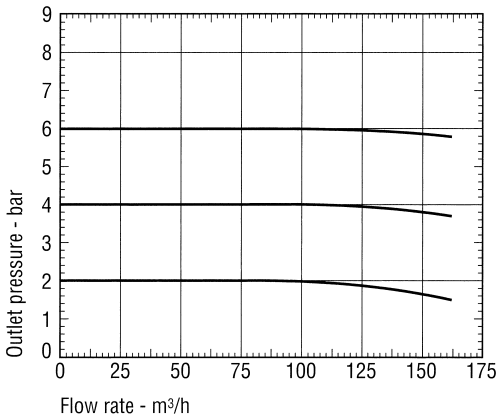
FLOW DATA
Outlet Pressure in Function of Flow at Constant Control Signal (P1 = 10 bar)

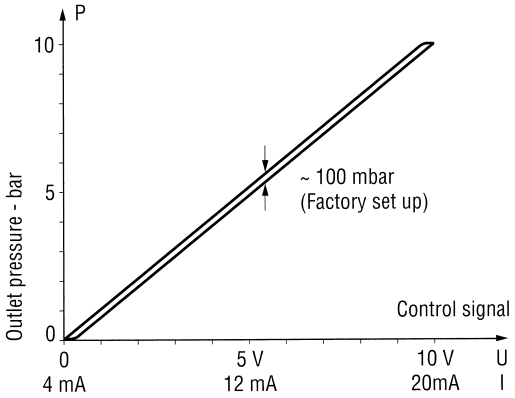
EPP 3 G 1/4



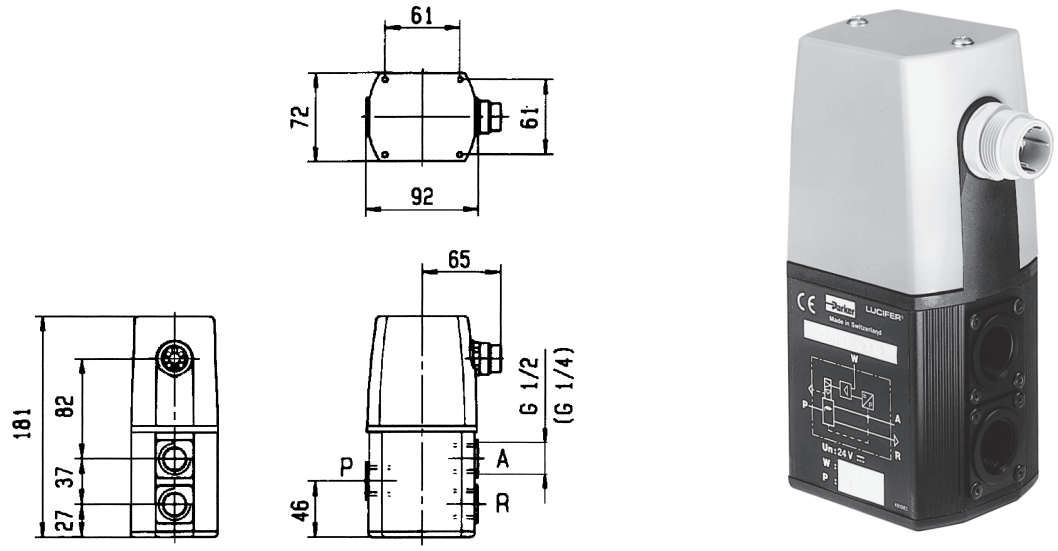
EPP 3 G 1/2



HYSTERESIS DIAGRAM



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



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

EP-Transducer

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 ± 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 (recomended 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 (Imax. = 40 mA) with adjustable triggering level. (Difference between control signal and sensor pressure signal)
- factory set up: diff. signal = ± 0.8 V to ± 1 V
- possible set up: diff. signal= ± 0.1 V to ± 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 cm^3 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 (dm^3/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 Nm^3/h (P_1 = 7 bar, P_{out} = 6 bar)
G 1/4 - pressure drop 0.5 bar at 2.1 Nm^3/h (P_1 = 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

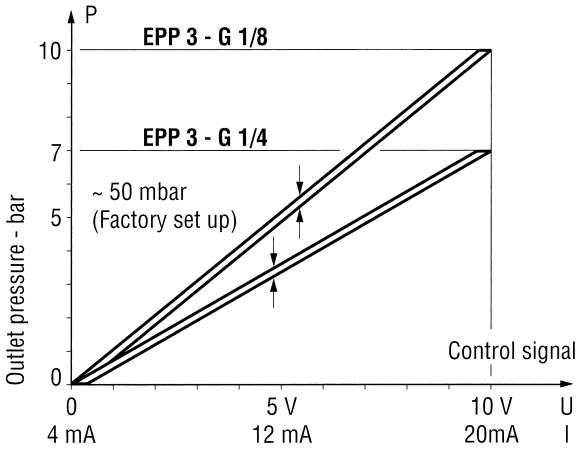
Electromagnetic compatibility:
In accordance with IEC 801-4 part 4 standards

Installation and setting instructions:
See publication MI-9202 and appendix supplied with the product.

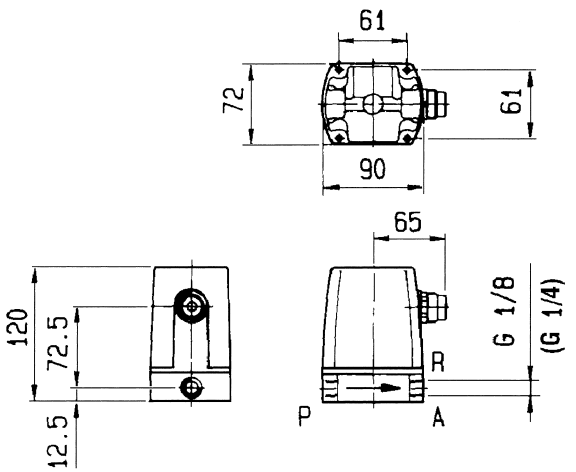
Please ask for the special technical specification sheet No. 8678 for more details.

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

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			•	•			•	

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

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 ± 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 (recomended 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 = ± 0.8 V to ± 1 V
- possible set up: diff. signal = ± 0.1 V to ± 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.

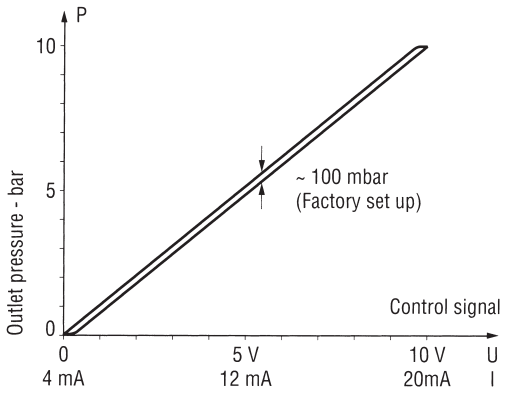
Please ask for the special technical specification sheet No. 8679 for more details.

SUMMARY OF TYPES

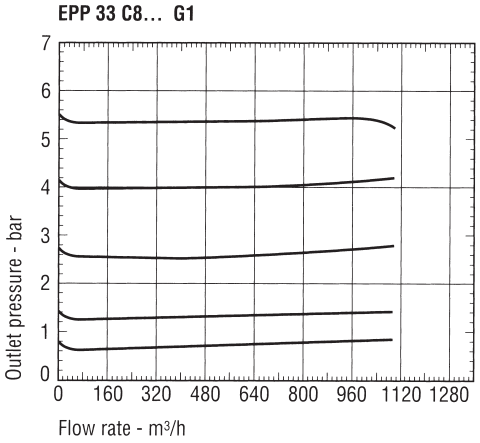
		Connection G	With integrated pressure sensor	Outlet signal options		Electrical connection
				0 - 10 V 4 - 20 mA	0 - 10 V 0/24 alarm	DIN 43651 connector
EPP3C8	1 U/I 600 10	1	•	•		•
	1 U/I 700 10	1	•		•	•
EPP34CC	1 U/I 600 10	2	•	•		•
	1 U/I 700 10	2	•		•	•

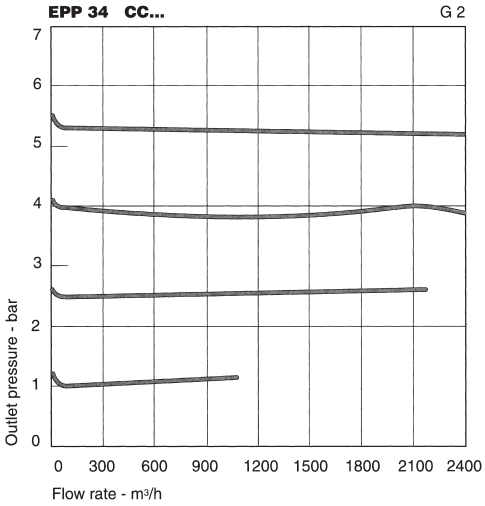
Parker Lucifer SA
Fluid Control Division Europe
CH-1227 Carouge-Genève

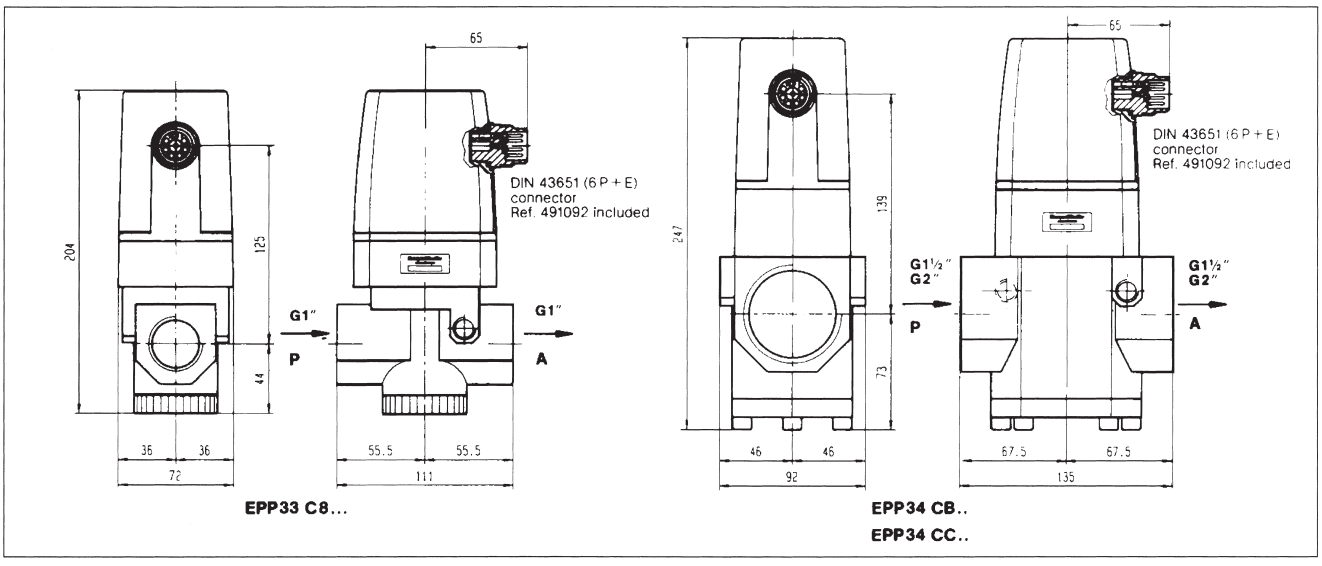
HYSTERESIS DIAGRAM



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







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Electrical Parts

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Part 1: Housings / Coil assembly kit

Part 2: Coils

Part 3: Explosion-proof electrical parts

Part 4: Explosive environments

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

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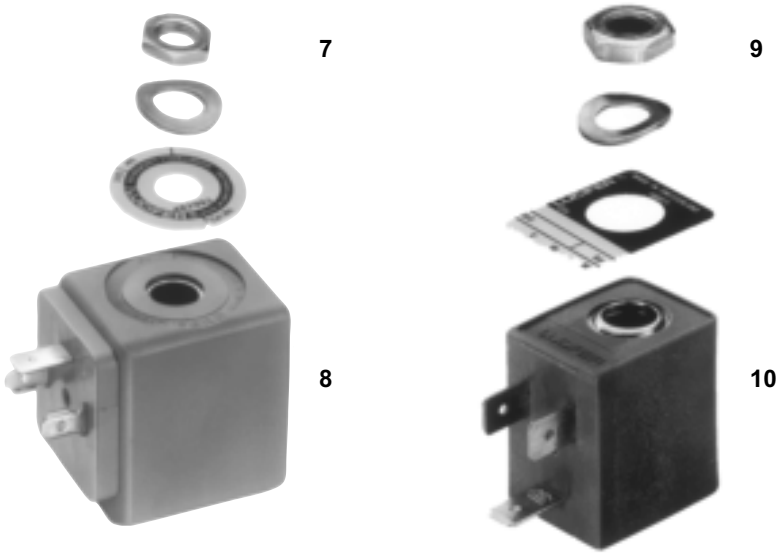
Housings or coil assembly kits, coils and electrical parts



Definitions:

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

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

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

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

Warning:

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

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

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Part 1: Housings or coil assembly kits

1.1 Coil housing with screw terminals

1.1.1 Standard housing

Reference: 4270 or **E0**

Material: epoxy-coated steel

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

Electrical connection:

Can be made with armoured conduit or cable gland 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:

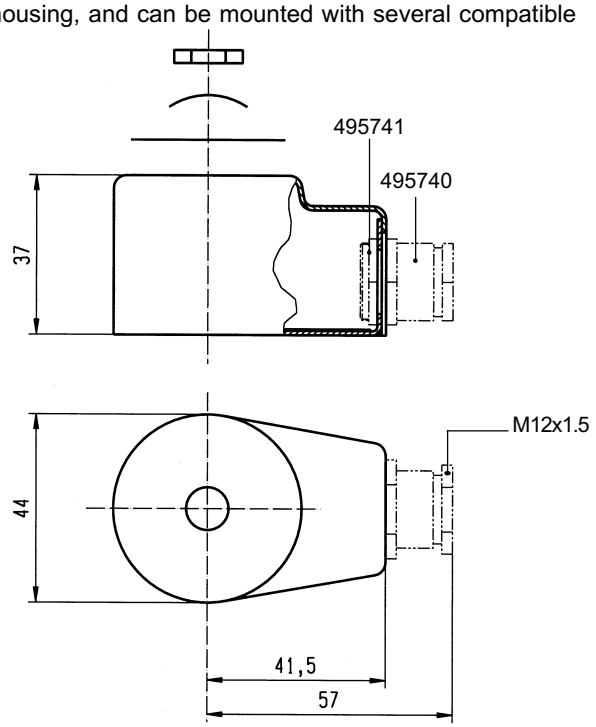
481000 or **EZ01**
Standard coil,
8 W, class F (155°C), page 12

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



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1.1.2 Housing for bistable (impulse) coils

Reference: 4269 or **E1**

Material: epoxy-coated steel

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

Electrical connection:

Can be made with armoured conduit or cable gland 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.

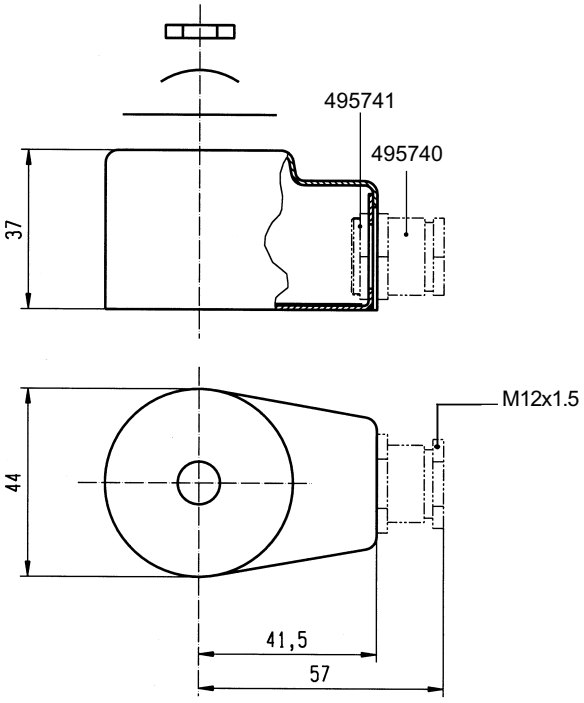
Application:

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



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1.2 Waterproof and dustproof housing

1.2.1 Waterproof housing

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

Material: Galvanized passivated steel

Degree of protection: **IP 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:

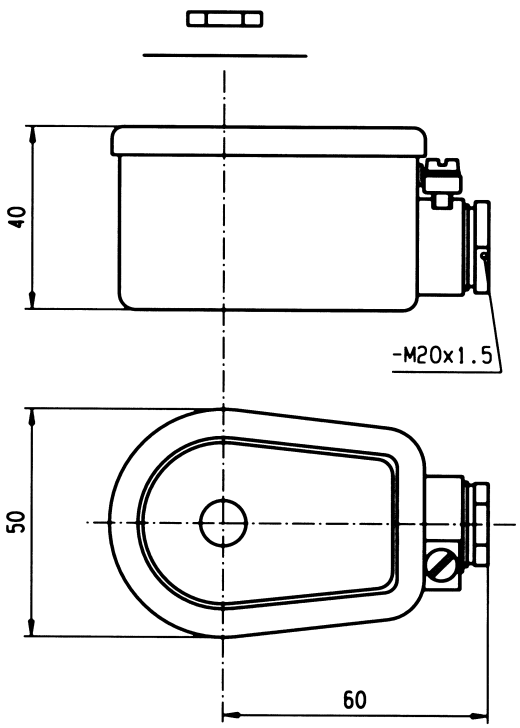
481000 or **EZ01**
Standard coil,
8 W, Class F (155°C), page 12

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



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1.2.2 Waterproof housing for high-temperature coils

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

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

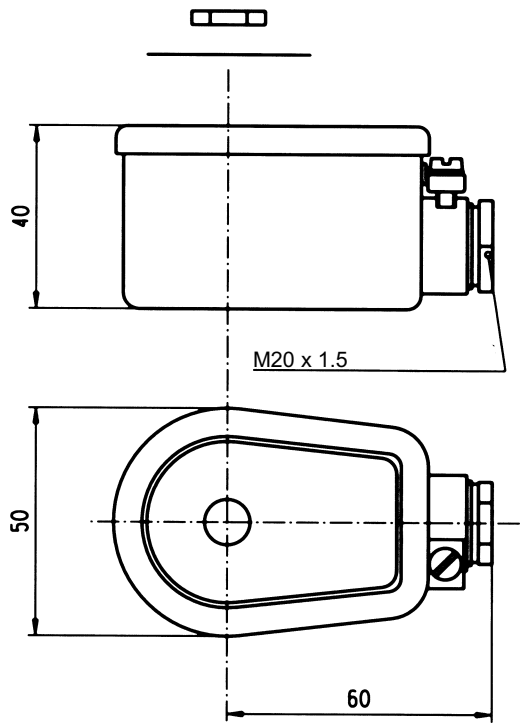
Application:

The majority of the Lucifer valves can be fitted with this housing and can be mounted with several compatible Lucifer coils for high temperature (14W, 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



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1.3 Coil assembly kits

1.3.1 Coil assembly kit for 22 mm coil

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

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

Reference	Code	Specification	Application
8993	**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

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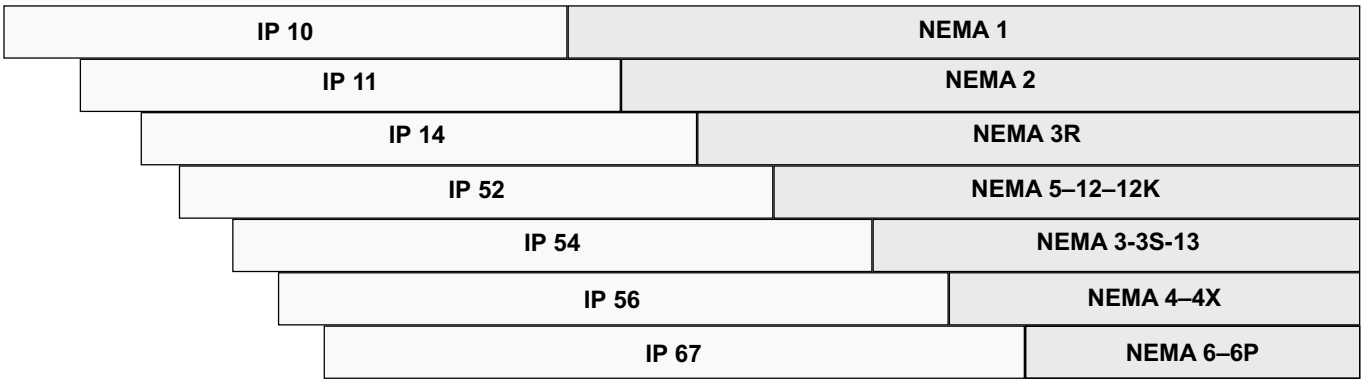
1.4 Degrees of protection "IP" – IEC/EN 60529

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**		**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
		5 4		
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



˙ NEMA: National Electrical Manufacturers Association (USA)

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

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Part 2: Coils

Groups:

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

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

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

1 Application on valves of 2000 series with 22 mm pilot

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

3 Specific application

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

5 Application on special valves for flameproof electrical parts

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

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

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

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

10 Application on valves for Offshore coils and electrical parts

11 Application flameproof "d" for Offshore coils and electrical parts

12 Application on Offshore valves with manual reset.

How to order:

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

Ordering example:

121K0756-2995-481865- 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.

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2.1 Coils with screw terminals:

2.1.1 Standard coils

2

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

CE

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

2 / 3

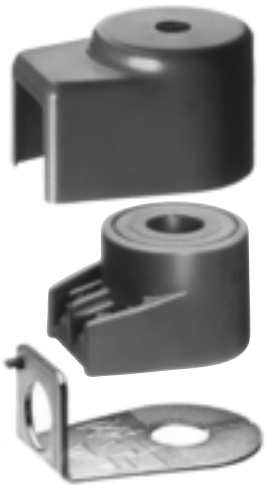
Coil / specification			Standard	Double frequency	High power	High temperature	High temp. + high power
Reference			481000 or **EZ01**	483520 or **EZ90**	481044 or **EZ91**	485100 or **EZ02**	486265 or **EZ92**
Class of insulation			F 155°C	F 155°C	F 155°C	H 180°C	H 180°C
Ambient temperature			-40°C to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



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2.1.2 Bistable (impulse) coils

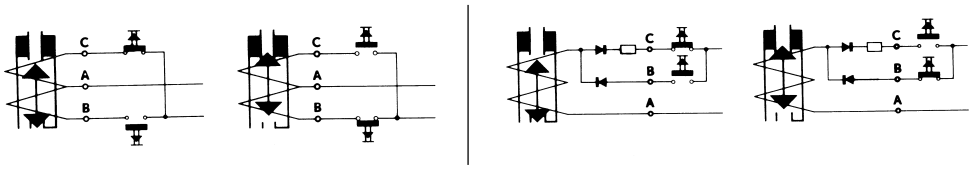
4

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

They can be mounted only with 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 mm˝.

CE

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

Coil / Specification			Direct Current		Alternating Current
Diagram			 Only an electrical impulse given to terminals A-C reverses the magnetic field. This magnetic field demagnetises the reversible magnet enough to allow the return spring to bring the plunger back to its initial position and close the valve.		
Length of impulses			Switch on (terminals A-B): minimum 50 ms, (maximum 1s) Switch off (terminals A-C): minimum 35 ms, (maximum 1s)		
Reference			485400 or **MZ02**	* 482245 or **MZ90**	484990 or **MZ01**
Electr. Power consuption	**DC**	Attraction (hot)	13 W	13 W	-
		Attraction (cold)	19 W	19 W	-
		Release (hot)	8 W	8 W	-
		Release (cold)	10 W	10 W	-
	AC	Attraction (hot)	-	-	11 W
		Attraction (cold)	-	-	17 W
		Release (hot)	-	-	4 W
		Release (cold)	-	-	7 W

* Electrical part IP67; contact your distributor for details.

Class of insulation material: F 155°C

Ambient temperature: -40°C to +50°C

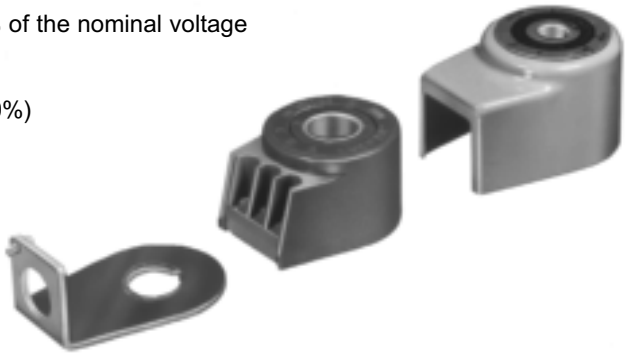
Voltage tolerances: -10% to +10% of the nominal voltage

Voltages: See voltage code table

Duty: Continuous duty coil (ED 100%)

Weight: 150 g

Mounting: example



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2.2 Coils for DIN plug connection:

2.2.1 32 mm Coils

2

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

CE

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

2 / 3

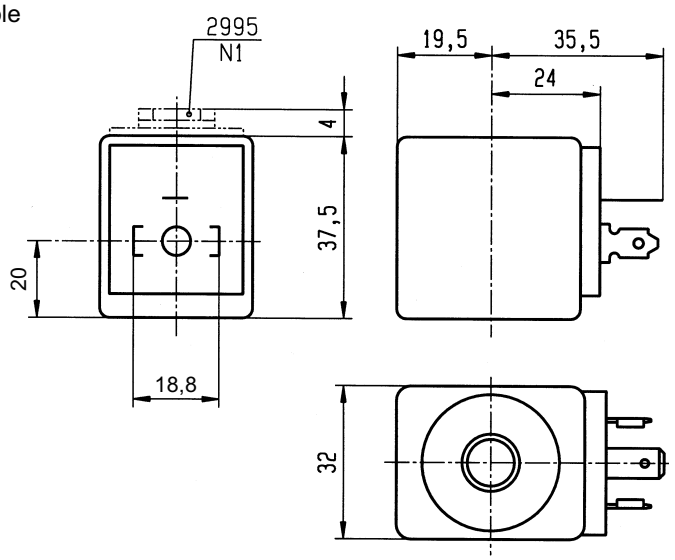
Specification			Standard	Double frequency	Reduced power	High temperature	High temp. + High power
Ref. (without plug) **Ref.** (with plug)			481865 or **DZ02** 482725 or **DZ03**	483510 or **DZ06** 482635 or **DZ07**	482730 or **DZ90** 482735 or **DZ91**	492453 or **DZ04** 492726 or **DZ05**	492425 or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

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

Duty: Continuous duty coil (ED 100%)

Voltages: see voltage code table

Weight: 130 g (without plug)



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2.2.1.1 32 mm UL-recognized Coil

2

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

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

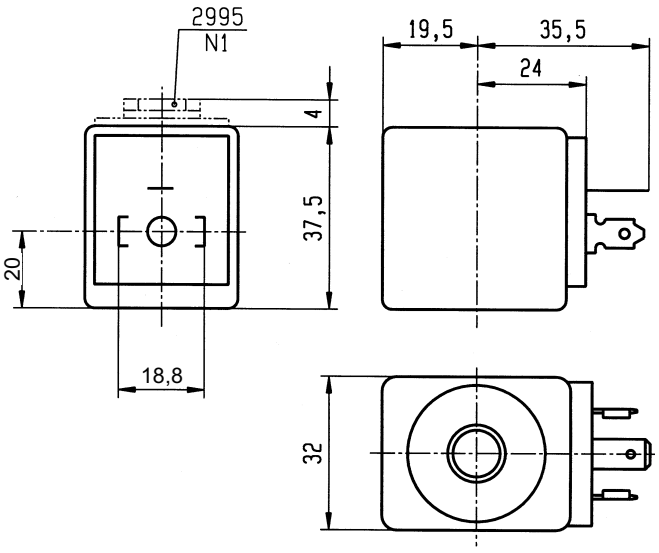
Specification			**UL-recognized coil - UL File E125678 - designation AMIF**	
Reference (without plug)			491514 or **D400**	491514 or **D500**
Degree of protection			**IP65** according to IEC / EN 60529 standards (with plug connection)	
Class of insulation			F 155°C	F 155°C
Electrical connection			Through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

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

Duty: Continuous duty coil (ED 100%)

Voltages: see voltage code table

Weight: 130 g (without plug)



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2.2.1.2 32 mm Miniwatt Coil

6

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

CE

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

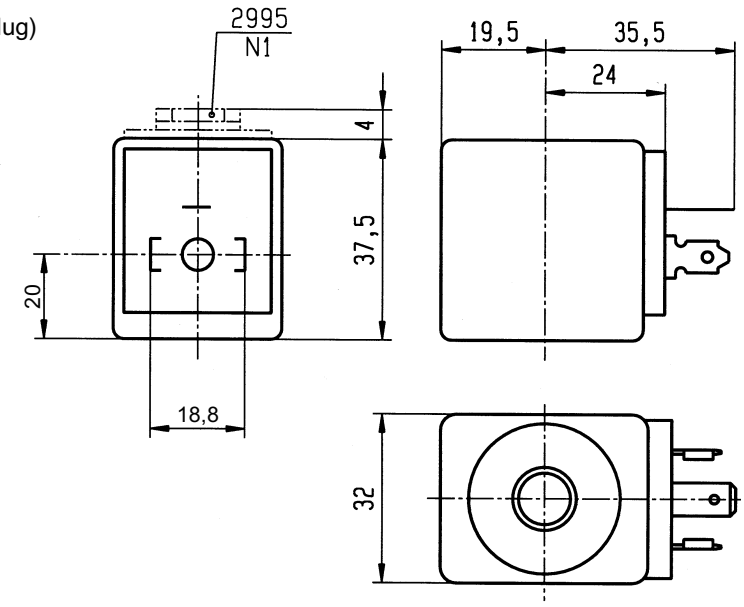
Specification			Miniwatt
Reference (without plug) **Reference** (with plug)			482740 or **DZ10** 482745 or **DZ11**
Degree of protection			**IP65** according to IEC / EN 60529 standards (with plug connection)
Class of insulation			F 155°C
Electrical connection			Through a 2 P + E plug according to DIN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



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2.2.1.2 32 mm CPR Coil

9

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

CE

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

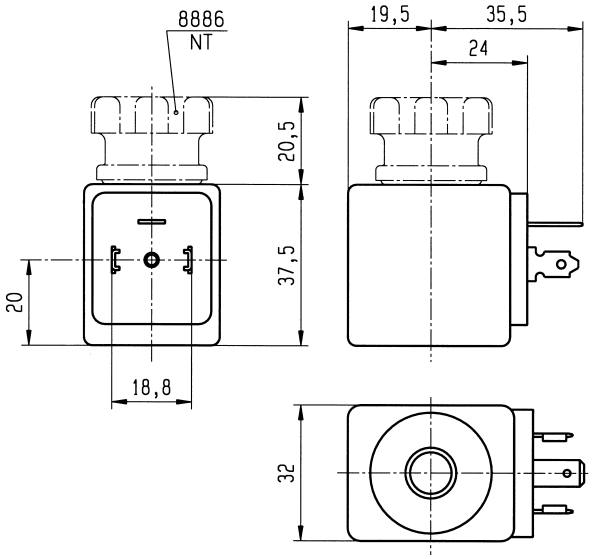
Specification			CPR
Reference (without plug) **Reference** (with plug)			492385 or **DZ92** 492387 or **DZ93**
Degree of protection			**IP65** according to IEC / EN 60529 standards (with plug connection)
Class of insulation			F 155°C
Electrical connection			Through a 2 P + E plug according to DIN 43650 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.

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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.

CE

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

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

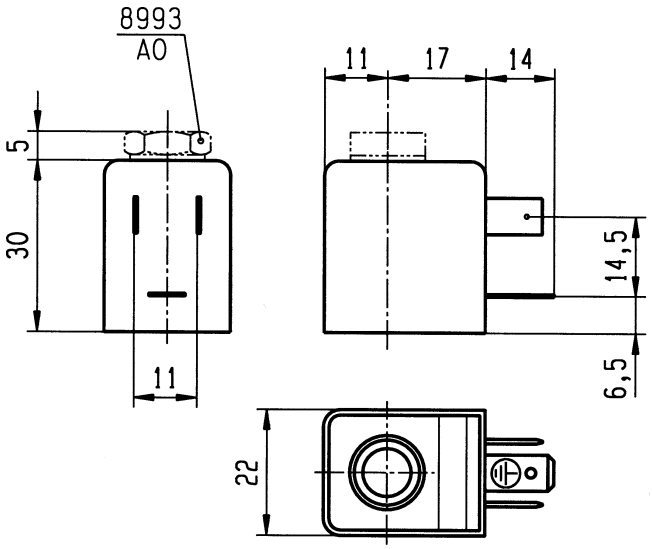
* This coil is UL/CSA accepted with corresponding approved valves only.

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

Duty: continuous duty coil (ED 100%)

Voltages: see voltage code table

Weight: 100 g with plug



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Part 3: Explosion proof electrical parts

3.1 Encapsulated electrical parts for zone 22:

3.1.1 22 mm electrical part with connector

1

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.

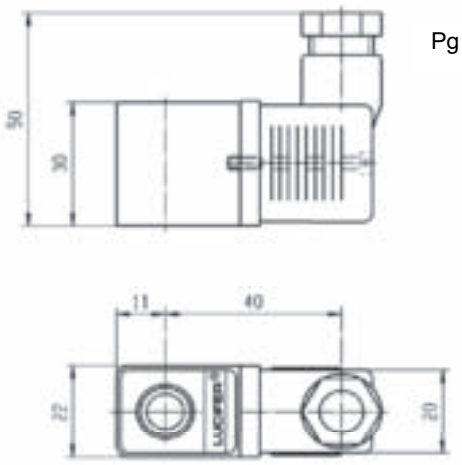
All Lucifer valves which are suitable for standard 22 mm coils can be fitted with those electrical parts.

CE Ex

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.

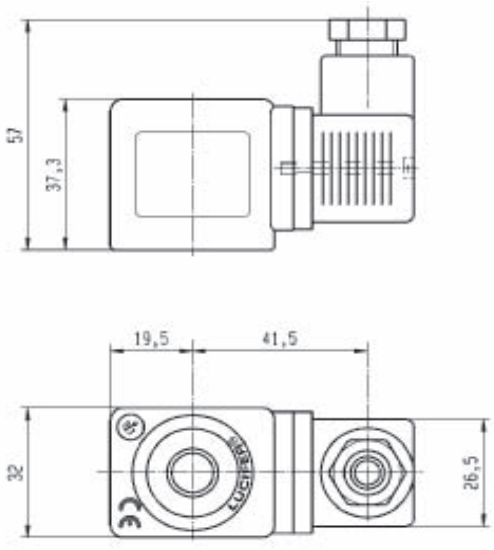
Small size for ease of mounting in confined spaces.

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.



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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.

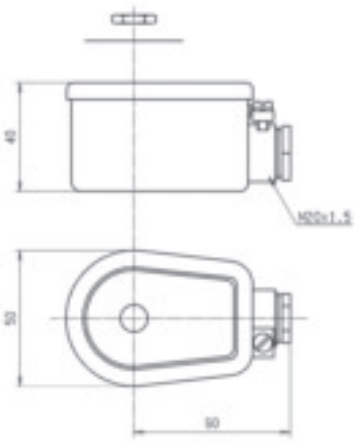
Small size for ease of mounting in confined space. Simplifies conversion of existing equipment to hazardous area requirements.

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 consption	**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



DC

AC

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

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3.3 Encapsulated electrical parts “m”:

3.3.1 22 mm electrical part

1

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

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

Small size for ease of mounting in confined spaces.

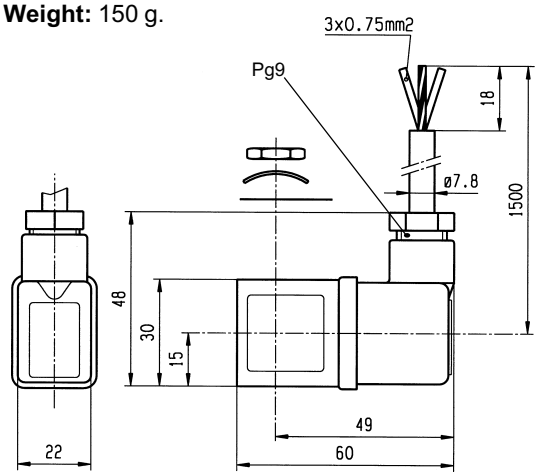
All Lucifer valves which are suitable for standard 22 mm coils can be fitted with those electric parts.

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˝) encapsulated with coil	
Elect. Power	**DC**	**Pn** (hot)	5 W	2.5 W
		P (cold) 20°C	6.5 W	3 W
	AC	**Pn** (holding)	4 W	2 W
		Attraction cold	8.9 VA (5 W)	5.7 VA (2.5 W)
Voltage / Voltage tolerance			see voltage code table / tolerance ± 10% of the nominal voltage	
Solenoid duty			Continuous duty solenoid (ED 100%)	

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

Weight: 150 g.



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

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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.

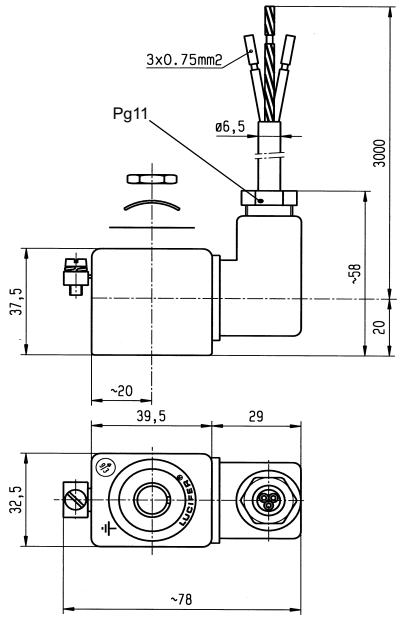
All Lucifer valves which are suitable for standards coils (9W DC or 8W AC) can be fitted with this electrical part.

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˝) encapsulated with coil
Elect. Power	**DC**	**Pn** (hot)	9 W
		P (cold) 20°C	12 W
	AC	**Pn** (holding)	8 W
		Attraction cold	26 VA (9 W)
Voltage / Voltage tolerance			see voltage code table / tolerance ±10% of the nominal voltage
Solenoid duty			Continuous duty solenoid (ED 100%)

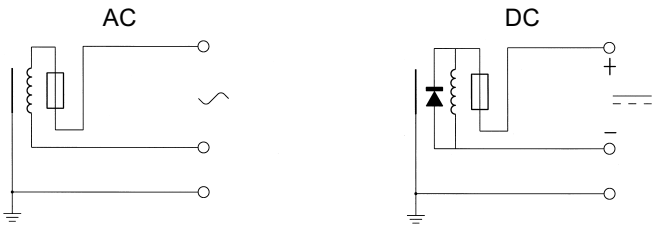
Weight: 320g.

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



Special conditions:

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



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

Recommended values:

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

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3.3.3 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.

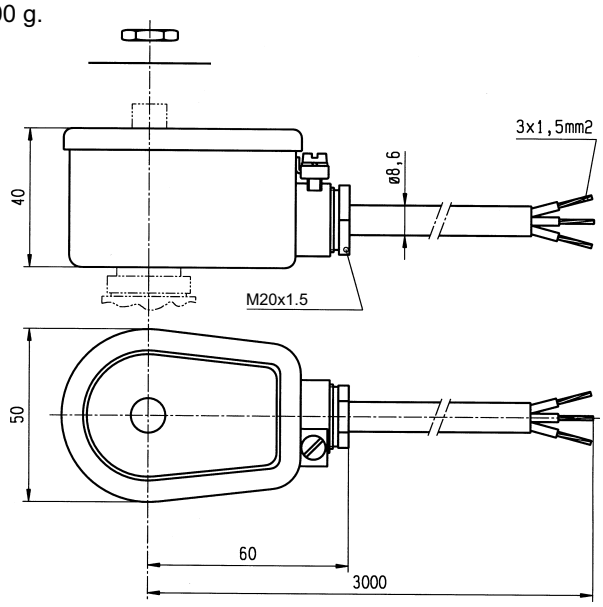
All Lucifer valves which are suitable for standards coils (8 W or 2.5 W DC) can be fitted with these electrical parts.

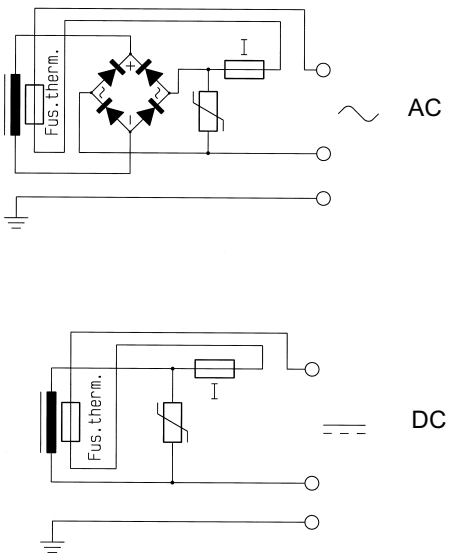
These electrical parts conform to the IEC/CENELEC safety standards and comply with European explosive atmosphere directive 94/9/EC «ATEX».

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

Weight: 500 g.

* 492070.60 - 6 m cable length





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3.3.4 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.

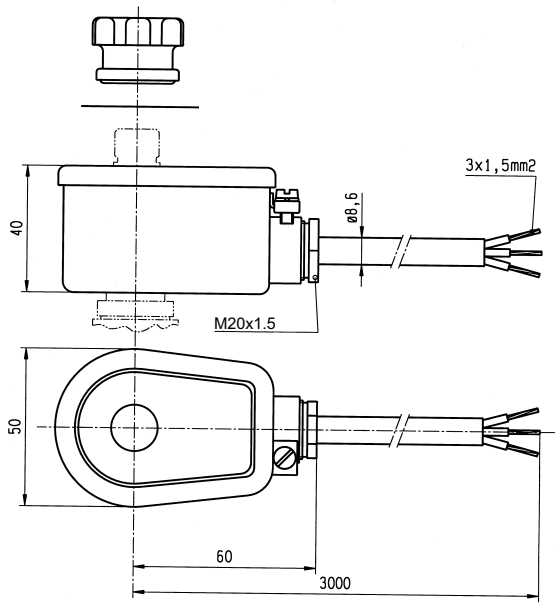
Small size for ease of mounting in confined space. Simplifies conversion of existing equipment to hazardous area requirements.

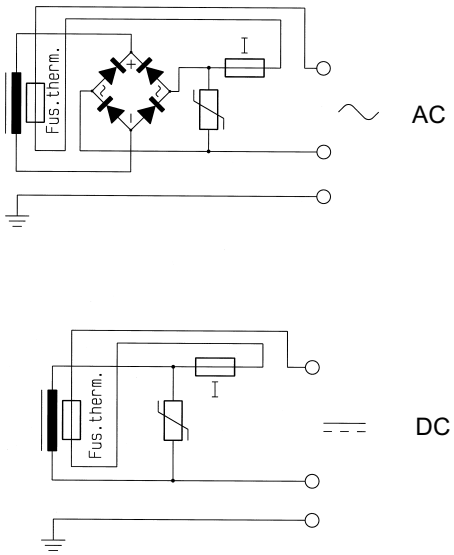
All Lucifer valves equipped with the specific CPR* upper parts, can be fitted with this electrical part.
(* **CPR** = Chemical, Petrochemical and Refinery application)

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.





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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.

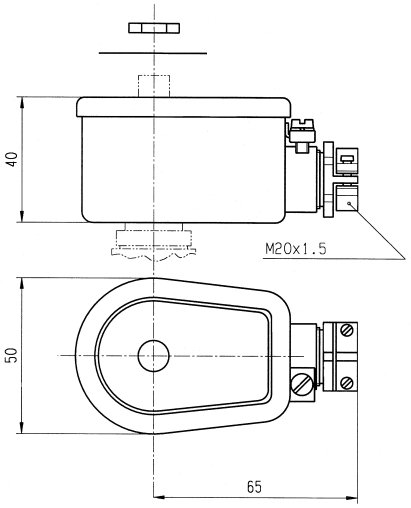
All Lucifer valves suitable for standard 8 W DC or AC coils can be fitted with these electrical parts.

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

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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.

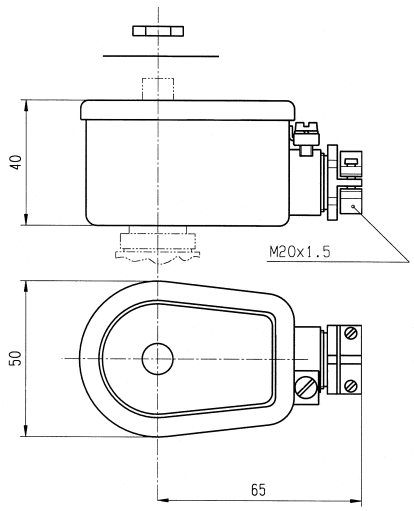
Small size for ease of mounting in confined space. Simplifies conversion of existing equipment to hazardous area requirements.

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

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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.

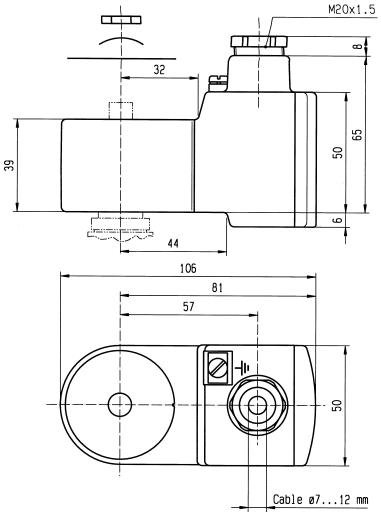
All Lucifer valves suitable for standard 8WDC coils can be fitted with the VZ03, and all Lucifer valves with the suffix ‘‘80’’ can be fitted with VZ06 electrical parts.

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

			2		6	
Reference			492190 or **VZ03** *492190.10 or **VZ90**		492390 or **VZ06**	492190.03 or **VZ34**
Approval			**LCIE 02 ATEX 6023 X**			**AUS Ex 321**
Type of protection		**Gas**	II 2 G - EEx me II T3	II 2 G - EEx me II T4	II 2 G - EEx me II T5/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%)			

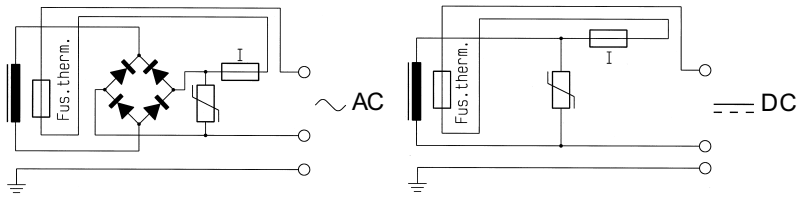
Weight: 500 g.

* 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.



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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.

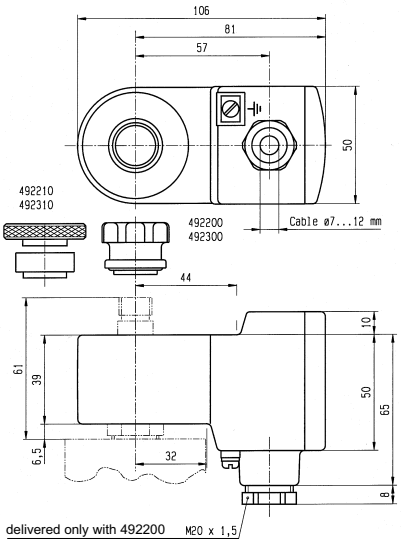
Small size for ease of mounting in confined space.

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».

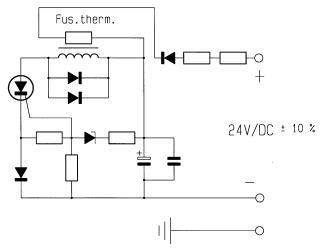
		9		10	
Reference		492200 or **VZ13**		492210 or **VZ26**	
Approval		**LCIE 02 ATEX 6023 X**			
Type of protection	**Gas**	II 2 G - EEx me II T5	II 2 G - EEx me II T6	II 2 G - EEx me II T5	II 2 G - EEx me II T6
	Dust	II 2 D -95°C	II 2 D -80°C	II 2 D -95°C	II 2 D -80°C
Degree of protection		IP66		IP66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

Weight: 500 g.



Indications:

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



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

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3.5.3 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.

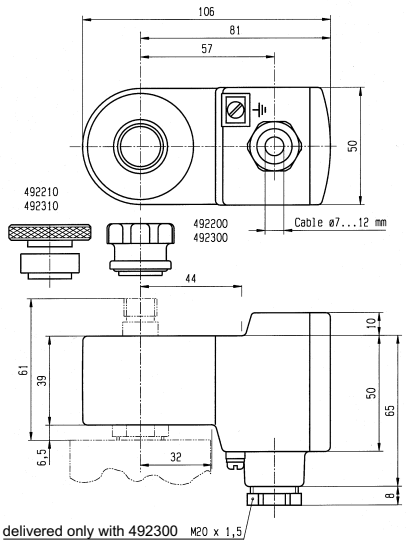
Small size for ease of mounting in confined space.

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

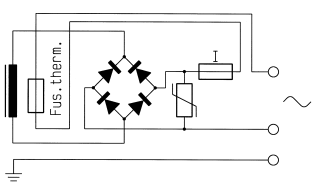
Weight: 500 g.



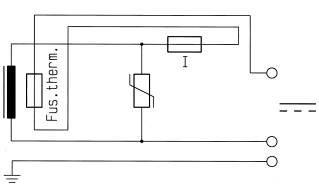
Indications:

VZ14 = for CPR valves
VZ27 = for Offshore valves

AC



DC



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3.6 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.

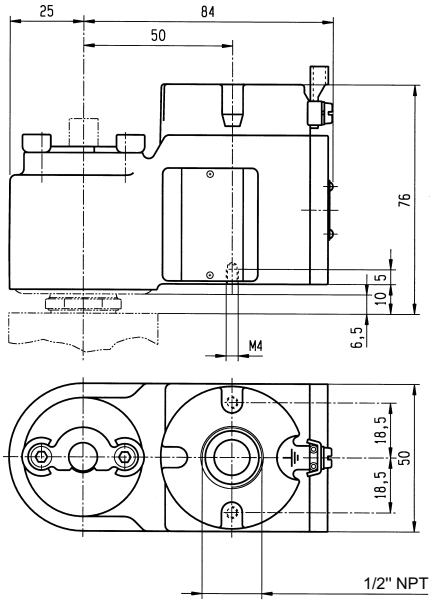
Small size for ease of mounting in confined space.

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 plate and is therefore integrated into the housing, which is screwed on the valve body.

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

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3.4.2 Electrical parts 483270 or HZ19 and 483270.02 or HZ21

9

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

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

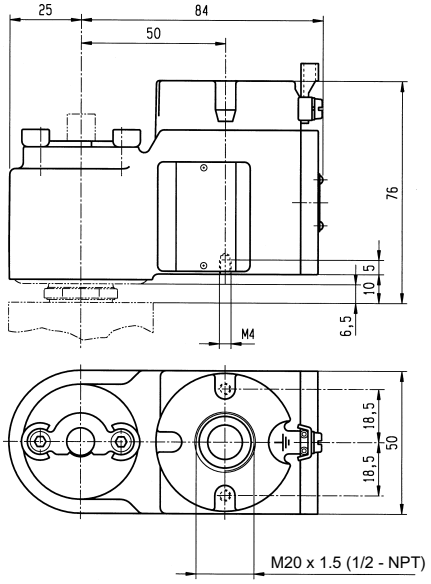
Small size for ease of mounting in confined space.

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

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

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

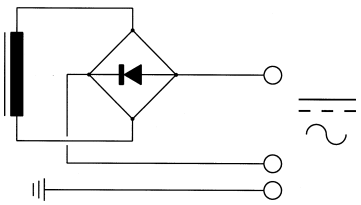
Weight: 1100 g (with coil)



Plunger tube

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

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



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3.6.3 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.

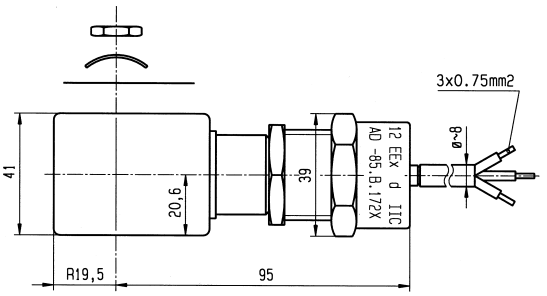
Small size for ease of mounting in confined space.

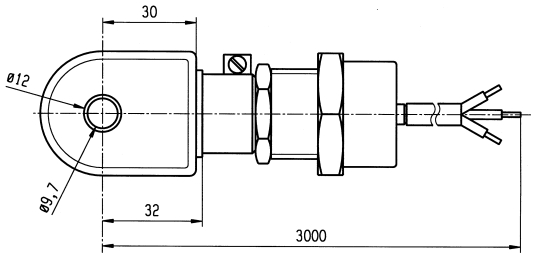
All Lucifer valves suitable for standard 8W coils can be fitted with this electrical part.

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

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3.7 Intrinsically safe electrical parts “i”:

Intrinsic safety

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

Application

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

Safety barriers

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

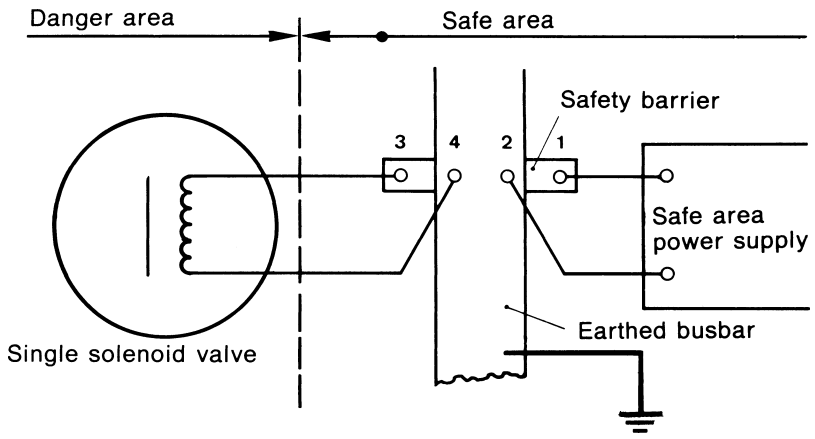
Minimum voltage calculations for proper valve functioning must be made with the total resistance value of barrier, coil (hot) and wiring (total length), and with the maximum ambient temperature.

Electrical suply

Parker Lucifer intrinsically electrical parts may only be fed from:

- **Certified I.S, power supplies or**
- **Through an adequate intrinsic safe safety barrier**
- **Through intrinsically safe Remote I/O**

Installation sketch



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3.7.1 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.

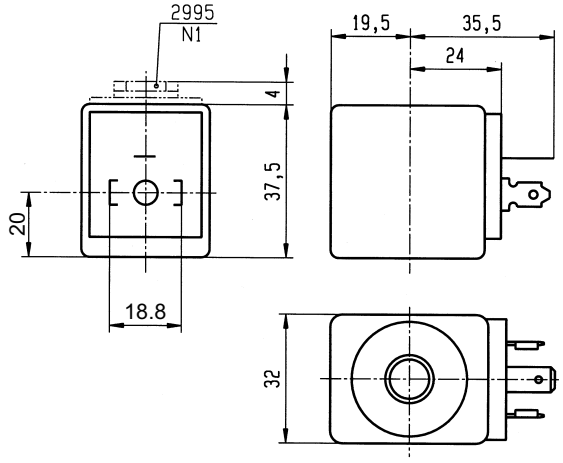
Small size for ease of mounting in confined space.

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 **Impedance** **Apparent inductance** **Apparent capacitance**			340 Ω 340 Ω 0 mH 0 µF		
Solenoid duty			Continuous duty solenoid (ED 100%)		

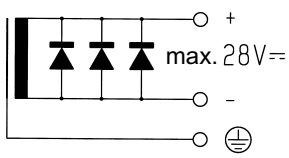
Weight: 160 g (with plug)



Important

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

The minimal holding current is 20 mA



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

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3.7.2 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.

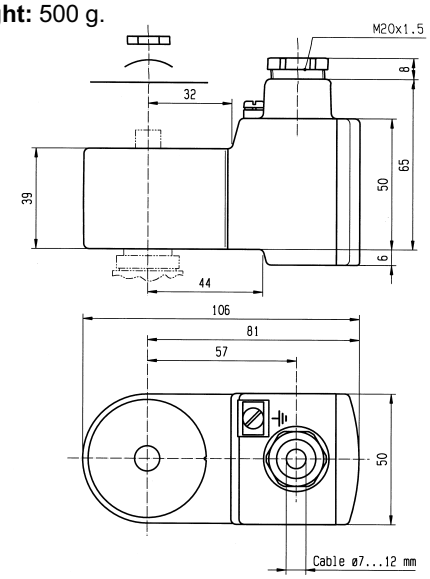
All Lucifer valves with the suffix ‘‘90’’ can be fitted with these electrical parts.

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 The application is limited also by the temperature range of the valve		-40°C to +65°C	+60°C
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 The minimum operating voltage at maximum +60°C is 11.5 VDC		28 VDC – 110 mA	30 VDC – 100 mA
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.

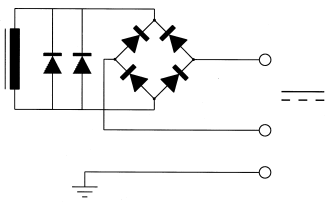
Weight: 500 g.



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.

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

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.

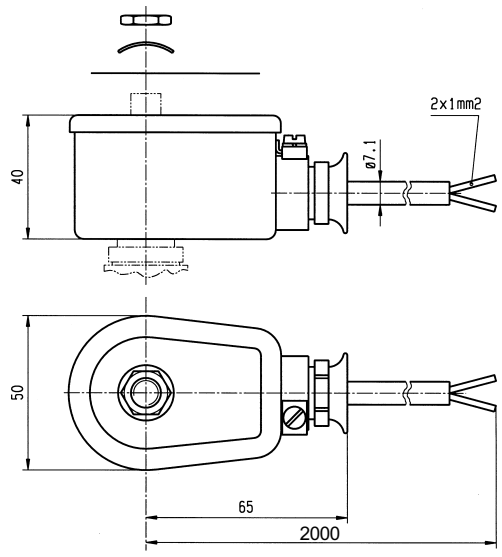
Small size for ease of mounting in confined space.

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˝), blue connection cable, entry cable gland M20 x 1.5. Additional earth connection possible with external screw terminal		
Maximum supply voltage			28 VDC – 110 mA The minimum operating voltage at maximum +60°C is 11.5 VDC		30 VDC – 100 mA
Power	**DC**	Minimum	300 mW		300 mW
		Maximum	3 W		3 W
	Depending on applied voltage, IS barrier type and length resistance of connected cable				
Coil resistance at 20°C **Impedance** **Apparent inductance** **Apparent capacitance**			295 Ω 345 Ω 0 mH 0 µF		
Solenoid duty			Continuous duty solenoid (ED 100%)		

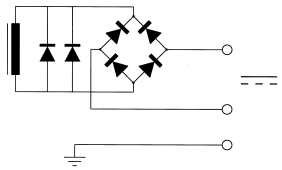
Weight: 500 g.



Important

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

The minimal holding current is 20 mA



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

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

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.

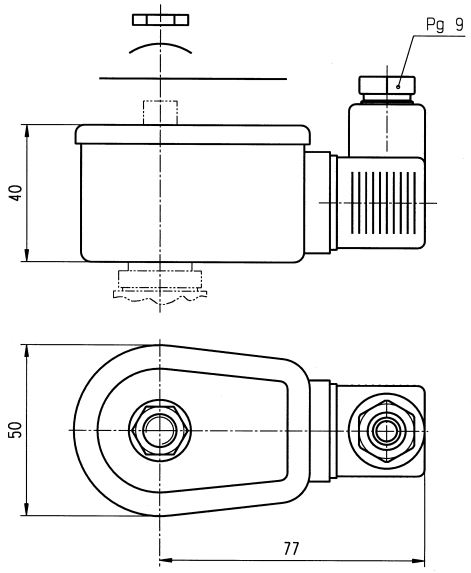
Small size for ease of mounting in confined space.

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
		Dust	II 1 D - 80°C	Cl. II, Div. I, Gr. E, F, G
Degree of protection			IP67	NEMA 4-4X
Ambiant temperature			-40°C to +65°C	+60°C
			The application is limited also by the temperature range of the valve	
Electrical connection			DIN standard plug interface 2P + T (DIN 43650 A) with Pg 9 cable gland.	
Maximum supply voltage			28 VDC – 110 mA	30 VDC – 100 mA
			The minimum operating voltage at maximum +60°C is 11.5 VDC	
Power	**DC**	Minimum	300 mW	300 mW
		Maximum	3 W	3 W
	Depending on applied voltage, IS barrier type and resistance of connected cable			
Coil resistance at 20°C **Impedance** **Apparent inductance** **Apparent capacitance**			295 Ω 345 Ω 0 mH 0 µF	
Solenoid duty			Continuous duty solenoid (ED 100%)	

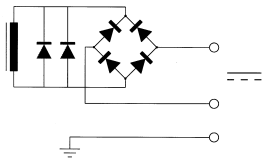
Weight: 500 g.



Important

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

The minimal holding current is 20 mA



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

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

3.7.5 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.

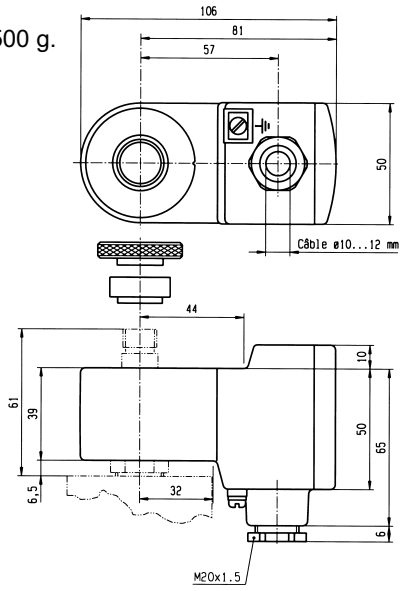
All Lucifer valves labelled ‘‘033X’’ with manual-reset can be fitted with these electrical parts.

CE Ex

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

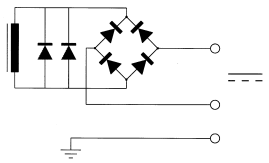
Reference			482160.01 or **VZ95**	482870.01 or **VZ23**	482870.03 or **VZ24**	492335 or **VZ30**
Approval			**LCIE 02 ATEX 6024 X**		**AUS Ex 137 X**	**LCIE / FM / CSA**
Type of protection	**Gas**		II 1 G - EEx ia IIB T6	II 1 G - EEx ia IIC T6	EEx ia IIC T6 Classe I - Zone 0	Cl. I, Div. I, Gr. A, B, C, D
	Dust		II 1 D - 80°C			Cl. II, Div. I, Gr. E, F, G
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 **Impedance** **Apparent inductance** **Apparent capacitance**			295 Ω 345 Ω 0 mH 0 µF			
Solenoid duty			Continuous duty solenoid (ED 100%)			

Weight: 500 g.



Important

The required minimal holding current is 25 mA



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

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

3.7.6 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.

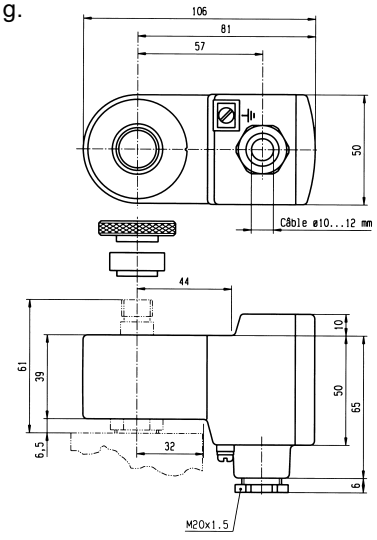
Small size for ease of mounting in confined space.

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».

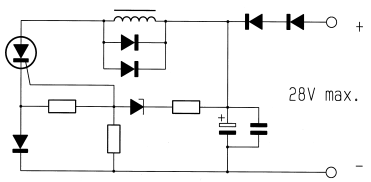
Reference			482660 or **VZ11**	483330.01 or **VZ12**	483330.03 or **VZ25**	490860 or **VZ28**
Approval			**LCIE 02 ATEX 6024 X**		**AUS Ex 137 X**	**LCIE / FM / CSA**
Type of protection		**Gas**	II 2 G - EEx ib IIB T6	II 2 G - EEx ib IIC T6	EEx ib IIC T6 Classe I - Zone 1	Cl. I, Div. I, Gr. A, B, C, D
		Dust	II 2 D - 80°C			Cl. II, Div. I, Gr. E, F, G
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 **Impedance** **Apparent inductance** **Apparent capacitance**			23 Ω 50 Ω 0 mH 0 µF			
Response time			2 – 4 s			
Solenoid duty			Continuous duty solenoid (ED 100%)			

Weight: 500 g.



Important

The intrinsically safe supply circuit should have enough capacity under all environmental conditions to assure a **minimum operating current of 45 mA** through the coil.



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

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

3.7.7 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.

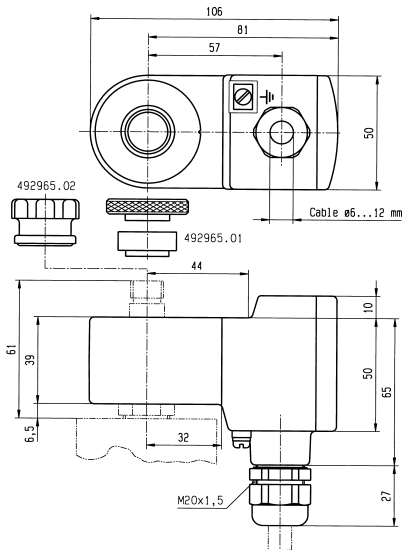
Small size for ease of mounting in confined space.

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».

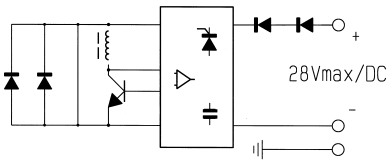
Reference			492965.01 or **VZ91** - stainless steel fixation 492965.02 or **VZ92** - plastic fixation
Approval			**LCIE 02 ATEX 6066 X**
Type of protection		**Gas**	II 1 G - EEx ia IIC T6
		Dust	II 1 D - 80°C
Degree of protection			IP66
Ambiant temperature			-40°C to +65°C The application is limited 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 **Impedance** **Apparent inductance** **Apparent capacitance**			85 Ω 275 Ω (with 13 VDC) – 260 Ω (with 24 VDC) 0 mH 0 µF
Response time			2 – 4 s
Solenoid durty			Continuous duty solenoid (ED 100%)

Weight: 500 g.



Important

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



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

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

IS Standard coils parameters

IS- STANDARD ELECTRICAL PARTS								
Type of IS-protectiom		**EEx ia IICT6**	**EEx ia IICT6**	**EEx ia IIC T6**	**Ex ia**	**EEx ia IIB T6**	**EEx ia IIC T6**	**Ex ia**
Order references		**488650.01/03** **488660.01/03** **488670.01/03**	**490885** **490890** **490895**	**483580.01/03** **483960.01/03**	**490880** **493997**	**482160,01**	**482870,01**	**492335**
Certified by		**LCIE/AUS**	**LCIE/FM/CSA**	**PTB/AUS**	**LCIE/FM**	**LCIE**	**LCIE**	**LCIE/FM/CSA**
Function parameters	**Resistance of coil winding at 20°C** (for information only)	295 Ohm	295 Ohm	340 Ohm	340 Ohm	295 Ohm	295 Ohm	295 Ohm
	Impedance of electrical part	345 Ohm	345 Ohm	340 Ohm	340 Ohm	345 Ohm	345 Ohm	345 Ohm
	Minimum voltage required for functionning at 60°C	11.5 V	11.5 V	14 V	14 V	manual reset	manual reset	manual reset
	Minimum current required for functionning (attraction)	**29 mA**	**29 mA**	**35 mA**	**35 mA**	**manual reset**	**manual reset**	**manual reset**
	Minimum current required for holding	20 mA	20 mA	20 mA	20 mA	25 mA	25 mA	25 mA
	Inductance [L] of coil (mH apparent)	0	0	0	0	0	0	0
	Capacitance [C] of coil (µF apparent)	0	0	0	0	0	0	0
	Ambient temperatures	(-40 à +65°C)	(-40 à +65°C)	(-40 à +55°C)	(-40 à +55°C)	(-40 à +65°C)	(-40 à +65°C)	(-40 à +65°C)
Security parameters	**Maximum admissible voltage/current**	28V / 110mA - 0.77 W 27V / 120mA - 0.81 W 26V / 135 mA - 0.88 W 25V / 150 mA - 0.94 W 24V / 170 mA - 1.2 W	30V/100mA 28V/330 Ohm -	28V / 110mA - 0.77 W 27V / 120mA - 0.81 W 26V / 135 mA - 0.88 W 25V / 150 mA - 0.94 W 24V / 170 mA - 1.2 W	30V / 100mA - -	28V / 280mA - 1.96 W 27V / 320mA - 2.16 W 26V / 350 mA - 2.27 W 25V / 390 mA - 2.43 W 24V / 430 mA - 2.58 W	28V / 110mA - 0.77 W 27V / 120mA - 0.81 W 26V / 135 mA - 0.88 W 25V / 150 mA - 0.94 W 24V / 170 mA - 1.2 W	30V / 100mA 28V/300Ohm -

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.

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

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

TYPE	MANUFACTURER	REFERENCE	EEx..	RESIST. of barrier in Ohm	IS ELECTRICAL PARTS						
					EEx ia IIC T6 LCIE/AUS 488650.01/03 488660.01/03 488670.01/03	EEx ia IIC T6 LCIE/FM/CSA 490885 490890 490895	EEx ia IIC T6 LCIE/AUS 483580.01/03 483960,01	Exia LCIE/FM/CSA 490880 493997	EEx ia IIB T6 LCIE 482160,01	EEx ia IIC T6 LCIE 482870,01	Ex ia LCIE/FM/CSA 492335
Shunt Diode	**MTL**	7128P	ia	275					x		
Safety barriers		728,7028	ia	332	x	x	x	x	x	x	x
(passive)											
	Pepperl & Fuchs	Z 728	ia	300	x	x	x	x	x	x	x
		Z779	ia	300	x	x	x	x	x	x	x
	STAHL	9001/01-252-100-14	ia	252	x	x	27Vmin./LRmax 3	27Vmin./LRmax 3	x	x	x
		9001/01-280-100-10	ia	280	x	x	24Vmin./LRmax 3	24Vmin./LRmax 3	x	x	x
		9001/01-280-110-10	ia	255	x		24Vmin./LRmax 3		x	x	
		9002/13-280-100-04	ia	340	24Vmin./LRmax3	24Vmin./LR3	27Vmin./LRmax 3	27Vmin./LRmax 3	24Vmin./LRmax 3	24Vmin./LRmax 3	24Vmin./LRmax 3
Galvanic Isolated	**A puissance 3**	NAEV 22-140	ia		x		x		x	x	
Interface Units		NAEV 26 -100	ia		x		x		x	x	
(actives)											
and Remote I/O	**ABB**	V17132-54	ib		x		LRmax 5		x	x	
		V17132-55	ib		x				x	x	
		V17132-61	ia		x				x	x	
		DO 890	ib		x		x		x	x	
		S900- DO4-Ex	ib		x		x		x	x	
	BARTEC	07-7331-2301/1000	ia		x				x	x	
		07-7331-2301/1100	ia		x		x		x	x	
	BRADLEY	FEX-EX 24V	ia		x	x	x	x	x	x	
	COOPER	LB 2101	ia		x	x	LRmax15	LRmax15	x	x	x
		LB 2105	ia		x	x	x	x	x	x	x
		LB 2112	ia		x	x	x	x	x	x	x
	ELCON	1881 / 1882	ia		x	x	x	x	x	x	x
		471 / 472	ia		x	x	x	x	x	x	x
		2871/2872	ia		x	x	x	x	x	x	x
		2875/2876	ia		x	x	x	x	x	x	x
	GEORGIN	AVB 122	ia		x		x		x	x	
		AVB 125	ia		x		x		x	x	
		AVB 128	ia		x		x		x	x	
	HIMA	F3328A	ib		x		LRmax 5		x	x	
		F3335	ib		x				x	x	
		H4007	ib		x		x		x	x	

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

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

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

TYPE	MANUFACTURER	REFERENCE	EEx..	RESIST. of barrier in Ohm	IS ELECTRICAL PARTS						
					EEx ia IIC T6 LCIE/AUS 488650.01/03 488660.01/03 488670.01/03	EEx ia IIC T6 LCIE/FM/CSA 490885 490890 490895	EEx ia IIC T6 LCIE/AUS 483580.01/03 483960,01	Ex ia LCIE/FM/CSA 490880	EEx ia IIB T6 LCIE 482160,01	EEx ia IIC T6 LCIE 482870,01	Ex ia LCIE/FM/CSA 492335
Galvanic Isolated	**MTL**	3021, 4021, 4021S	ia		x		x		x	x	
Interface Units		3022	ia						x		
(actives)		4023	ia						x		
and Remote I/O		4024	ia		x		x		x	x	
		4025	ia		x	x	x	x	x	x	x
		5021, 5023, 5024	ia		x		x		x	x	
		5025	ia		x		x		x	x	x
	Pepperl & Fuchs	EGA-041-3	ia		x	x	x	x	x	x	x
		KFD2-SD-Ex1.36	ia						x		
		KFD2-SD-Ex1.48	ia		x		x		x	x	x
		KFD2-SL-Ex1.36	ia						x		
		KFD2-SL2-Ex1.LK	ia		x		x		x	x	
		KFD2-SL2-Ex2	ia		x		x		x	x	
		KFD2-SL-Ex1.48	ia		x		x		x	x	x
		KSD2-BO-Ex	ia		x	x	x	x	x	x	x
		RSD-BO-Ex4	ib		x		x		x	x	x
	STAHL	9311/52-11-10	ia		x	x	25Vmin/LRmax 3	25Vmin./LRmax 3	x	x	x
		9111/63-11-00	ia		x	x	25Vmin./LRmax3	25Vmin./LRmax 3	x	x	x
		9351/10-15-10	ia		x	x			x	x	x
		9351/10-16-10	ia		x		x		x	x	
		9351/10-17-10	ia						x		
		9381/10-187-050-10	ib		x	x	x	x	x	x	x
		9381/10-246-055-10	ib		x	x	x	x	x	x	x
		9381/10-246-070-10	ib		x	x	x	x	x	x	x
		9475/12-04-11	ia		x	x			x	x	x
		9475/12-04-21	ia/ib		x		x		x	x	
	TURCK	MK72-S01-Ex	ib						x	x	
		MK72-S02-Ex	ib						x	x	
		MK72-S04-Ex	ib		x		x		x	x	
		MK72-S05-Ex	ib		x				x	x	
		MK72-S06-Ex	ib		x		x		x	x	
		MK72-S07-Ex	ib		x				x	x	
		MK72-S12-Ex	ia		x		x		x	x	
		MC72-41	ia		x		x		x	x	
		MC72-43	ia		x		x		x	x	

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

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

IS Booster coils parameters

IS - BOOSTER ELECTRICAL PARTS						
Type of IS-protection		**EEx ia 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	23 Ohm
	Impedance of electrical part	275 Ohm/13V		50 Ohm *	50 Ohm *	50 Ohm *
	Minimum voltage required for functionning at 60°C	13 V		21.6 V	21.6 V	21.6 V
	Minimum current required for functionning (attraction)	-		-	-	-
	Minimum current required for functionning (holding)	**20 mA**		**45 mA**	**45 mA**	**45 mA**
	Inductance [L] of coil (mH apparent)	-		0	0	0
	Capacitance [C] of coil (µF apparent)	-		0	0	0
	Ambient temperatures	-40 °C to +65 °C		-40 °C to +65 °C	-40 °C to +65 °C	+65°C
	Maximum current for continuous line check	4 mA		0	0	0
Security parameters	**Maximum admissible voltages /current**	28V / 280mA - 1.96 W 27V / 320mA - 2.16 W 26V / 350 mA - 2.27 W 25V / 390 mA - 2.43 W 24V / 430 mA - 2.58 W	28V / 110mA - 0.77 W 27V / 120mA - 0.81 W 26V / 135 mA - 0.88 W 25V / 150 mA - 0.94 W 24V / 170 mA - 1.2 W	28V / 280mA - 1.96 W 27V / 320mA - 2.16 W 26V / 350 mA - 2.27 W 25V / 390 mA - 2.43 W 24V / 430 mA - 2.58 W	28V / 110mA - 0.77 W 27V / 120mA - 0.81 W 26V / 135 mA - 0.88 W 25V / 150 mA - 0.94 W 24V / 170 mA - 1.2 W	see certif. FM/CSA.

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.

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

TYPE	MANUFACTURER	REFERENCE	EEx..	RESIST. of barrier in Ohm	IS Booster coil			
					EEx ia IIC T6 492965.01/02	EEx ib IIB T6 482660	EEx ib IIC T6 483330,01	Ex ia 490860
					LCIE	LCIE	LCIE	LCIE/FM/CSA
Shunt Diode	**MTL**	728	ia		x			
Safety Barriers		728,7028	ia		x			
(passive)	**Pepperl & Fuchs**	Z 728	ia		x	x	x	
		Z 779	ia		x			
	STAHL	9001/01-252-100-14	ia	252	x	x	x	
		9001/01-280-100-10	ia	280	x	x	x	x
		9001/01-280-110-10	ia	255	x	x	x	
		9002/13-280-100-04	ia	340	17Vmin/LRmax30	26Vmin/LRmax3	26Vmin/LRmax3	26Vmin/LRmax3
Galvanic Isolated	**A puissance 3**	NAEV 26 - 1002-140	ia		x	x	x	
Interface Units	**ABB**	V171132-54	ib		x			
(active)		V171132-55	ib		x			
and Remotes I/O		V171132-61	ia		x			
		DO 890	ib		x	x	x	
		S900-DO4-Ex	ib		x			
	BARTEC	07-7331-2301/1000	ia		x			
		07-7331-2301/1100	ia		x			
	BRADLEY	FEX-EX 24V	ia		x	x	x	x
	COOPER	LB 2101	ia		x			
		LB 2105	ia		x	x	x	x
		LB 2112	ia		x	x	x	x
	ELCON	1881 / 1882	ia		x	x	x	x
		471 / 472	ia		x	x	x	x
		2871/2872	ia		x	x	x	x
		2875/2876	ia		x	x	x	x
	GEORGIN	AVB 122	ia		x	x	x	
		AVB 125	ia		x	x	x	
		AVB 128	ia		x	x	x	
	Hima	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
		4023	ia			x		
		4024	ia		x	x	x	x
		4025	ia		x	x	x	x
		5021, 5025	ia		x			

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

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

TYPE	MANUFACTURER	REFERENCE	EEx..	RESIST. of barrier in Ohm	IS Booster coil			
					EEx ia IIC T6 492965.01/02	EEx ib IIB T6 482660	EEx ib IIC T6 483330,01	Exia 490860
					LCIE	LCIE	LCIE	LCIE/FM/CSA
Galvanic Isolated	**Pepperl & Fuchs**	EGA-041-3	ia		x			
Interface Units		KFD2-SD-Ex1.36	ia			x		
(active)		KFD2-SL-Ex1.36	ia			x		
and Remotes I/O		KFD2-SD-Ex1.48	ia		x			
		KFD2-SL-Ex1.48	ia		x			
		KFD2-SL-Ex1.48.90A	ia		x	x	x	x
		KFD2-SL-Ex1.48.90A	ia		x	x	x	x
		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			x	x	
		MK72-S12-Ex	ia		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 addiditional Line Resistance.
LRmax = max.additional Line Resistance in Ohm with min. voltage if required.

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Accessories

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

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Voltage code		A1	A2	A4	A5	0A	A7	3D	F4	A9	B2	K8	6J	B7	J3	B8	7J	S2	4K	P0	S4	P2	P3	1P	S5	0P	R5	P9	3P	S6	S2	Q3	Q1	5P	C1	C2	N7	L8	C4	C5	C7
Coils / Electrical parts		12/50	24/50	48/50	110/50	110/50-115/50	220/50	220/50-230/50	230/50	380/50	24/60	115/60	110/60-115/60	220/60	230/60	240/60	220/60-230/60	200/60-230/60	220/60-240/60	24/50-24/60	48/50-48/60	110/50-60	110/50-120/60	110-115/50,	110-115/50,	100/50, 115/60	220/50-60	230/50-60	220-230/50-60	220-240/50-	220/50-230/60	220/50-240/60	240/50-60	380/50-440/60	12/DC	24/DC	28/DC	30/DC	48/DC	110/DC	220/DC
Ref.	Code																																								
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																										●								●					
492190	VZ03																			●	●						●	●					●		●			●	●	●
492190.05	VZ95																										●								●					
492190.10	VZ90																										●								●					
492200	VZ13																																		●					
492210	VZ26																																		●					
492270	VZ02																			●							●						●		●			●	●	
492300	VZ14																			●		●					●						●	●	●			●	●	
492310	VZ27																			●							●							●	●			●	●	
492335	VZ30																																				●				
492370	VZ05																										●								●					
492390	VZ06																										●								●					
492670	HZ05		●	●	●				●							●																		●	●			●	●	
492670.10	HZ90								●																											●					
492670.160	HZ91								●																											●					
492965.01	VZ91																																				●				
492965.02	VZ92																																				●				
493640	HZ09								●																						●				●		●			
494035.10	VZ93																																				●				
494040	HZ23		●			●		●																												●					

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Part 4: Explosive environments

4.1. Introduction

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

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

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

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

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

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

European Commission mark for "Ex" equipment

European Community member states

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

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

4.2.1 Explosive gas environments

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

4.2.2 Hazardous areas

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

4.2.3. Ingredients for an explosion

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

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

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

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

4.2.4 Zones

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

- **Zone 0**

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

- **Zone 1**

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

- **Zone 2**

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

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Classification of hazardous location

Explosive environment	Continuous presence	Intermittent presence (normal operation conditions)	Occasional presence (abnormal operation)
IEC	Zone 0 (gas) Zone 20 (dust)	Zone 1 (gas) Zone 21 (dust)	Zone 2 (gas) Zone 22 (dust)
Europe	Zone 0 (gas) Zone 20 (dust)	Zone 1 (gas) Zone 21 (dust)	Zone 2 (gas) Zone 22 (dust)
Canada (CEC)˙ **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

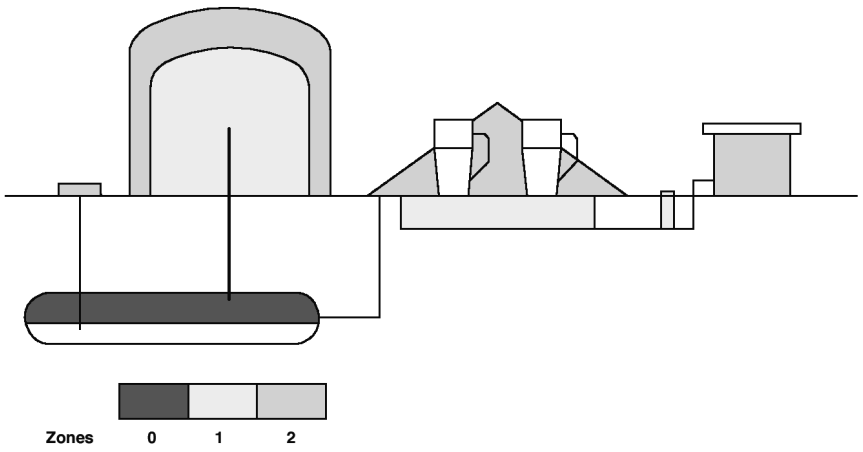
Zones and types of protection (gas applications)

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:



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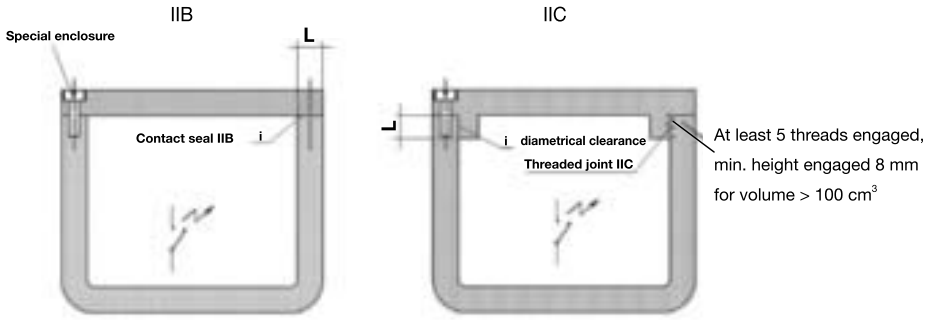
4.5. Types of protection used by Lucifer

4.5.1 Flameproof enclosure

"d"

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



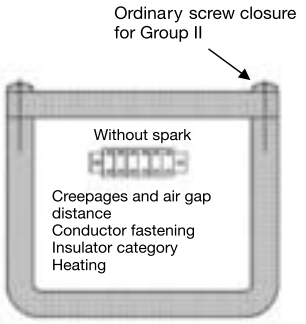
For volume > 2 dm^3
Mini length L = 12.5 mm
Max gap i = 0.15 mm

For volume > 2 dm^3
Mini length L = 25 mm
Max dia. clearance i = 0.15 mm

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.

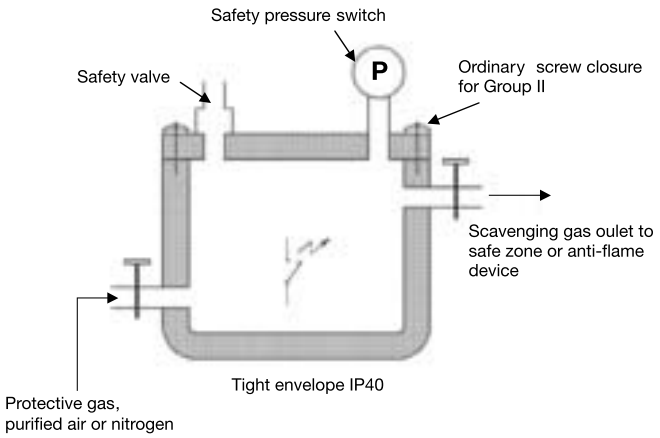


Tight envelope IP54

4.5.3 Pressurized apparatus

"p"

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



Tight envelope IP40

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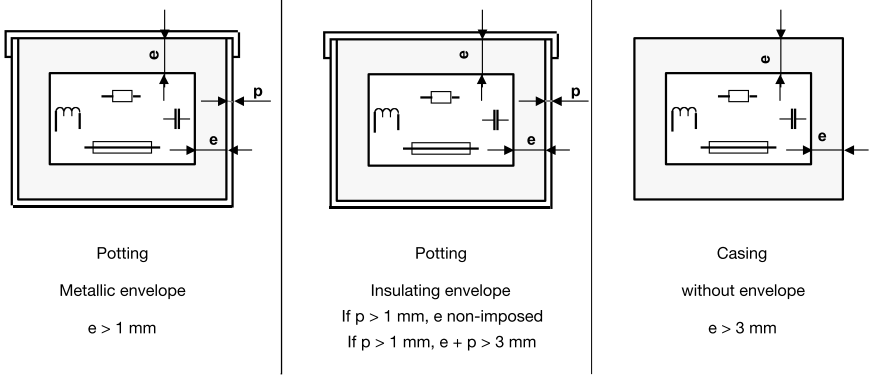
4.5.4 Encapsulation

“m”

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



Potting
Metallic envelope
e > 1 mm

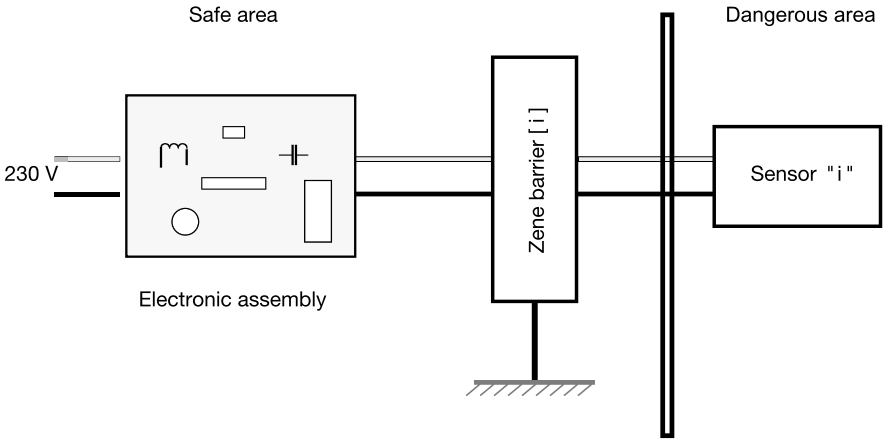
Potting
Insulating envelope
If p > 1 mm, e non-imposed
If p > 1 mm, e + p > 3 mm

Casing
without envelope
e > 3 mm

4.5.5 Intrinsic safety

“i”

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



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Additional information

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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.

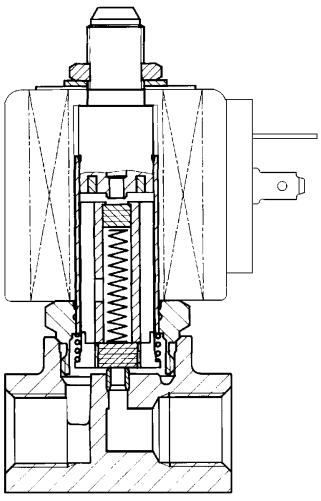

Fig. 1

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.

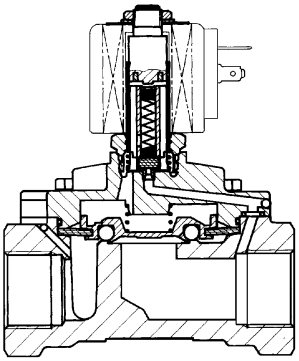

Fig. 2

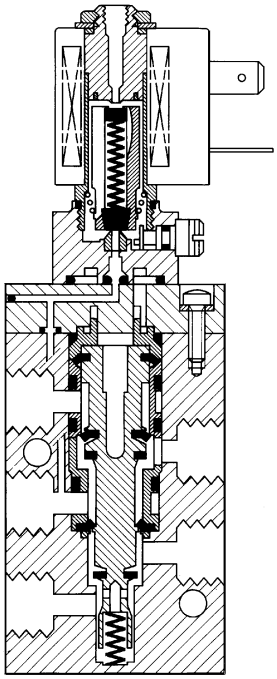

Fig. 3

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.

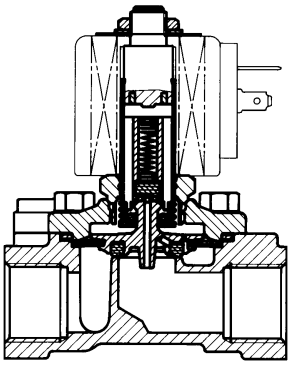

Fig. 4

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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 γ = 1 kg/dm³

Flow factor k_v
The kv 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 kv i.e. kv may be expressed in L/h or m³/h, etc. Care should therefore be taken when comparing values.

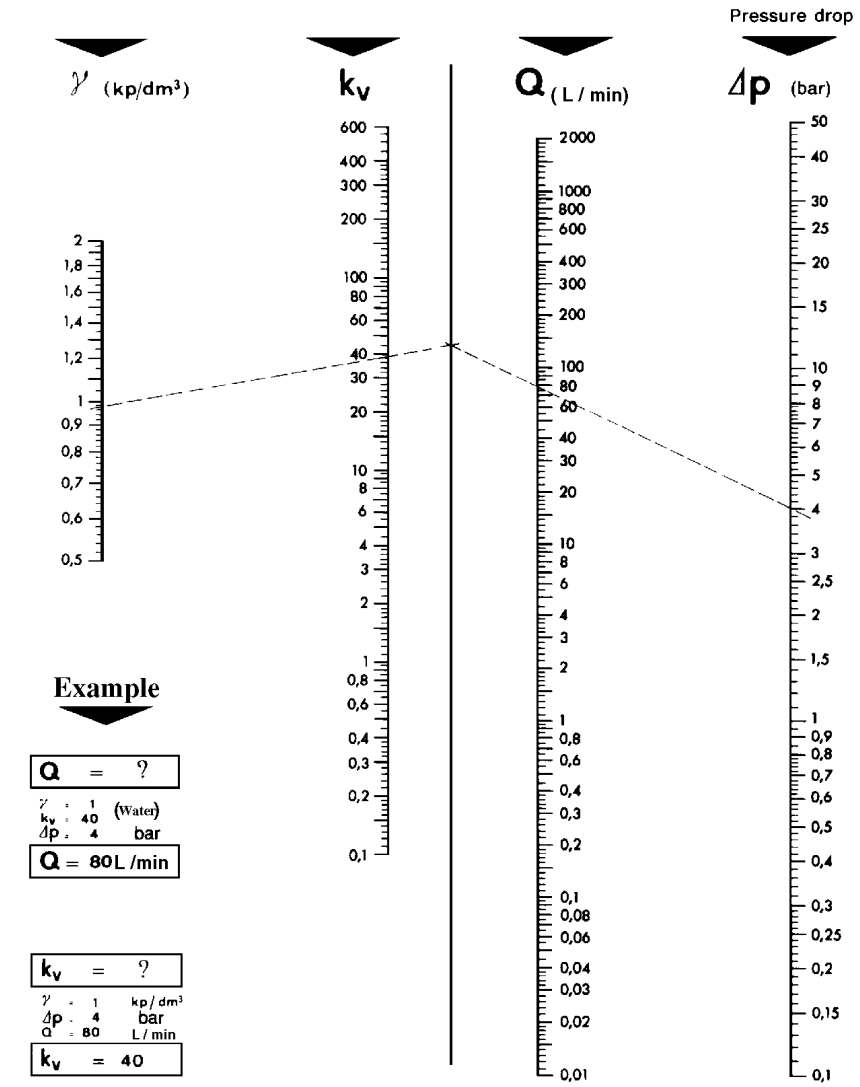
Maximum flow rate Qmax.
For particular 2-way valves the maximum flow must be limited for reasons of mechanical resistance and durability. A very high flow velocity may dislocate a poppet sealing or a diaphragm. Maximum flow rates are indicated in the catalogue.

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 bar and the pressure drop Δp = 1 bar.

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

For detailed technical information please ask for publication 1230/GB



Nomogram for liquid flow calculation

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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/cm^2 = 0.98 atm
= 10^5 Pa = 100 kPa
1 bar = 14.51 psi
1 psi = 0.0689 bar = 0.0703 kg/cm^2

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 x 9/5 +32
°C = (°F -32) x 5/9

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

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

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

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Fluid compatibility of LUCIFER valves

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

FLUIDS / SEALING DISCS OR MEMBRANES	FKM	PCTFE	Ruby	EPDM	FKM	Ruby	FKM	Ruby	PTFE	EPDM	PFPM	PCTFE	PTFE	NBR	FKM	EPDM	FKM	EPDM	FKM	PCTFE	Ruby	EPDM	NBR	FKM	PCTFE	Ruby	EPDM	FKM	Ruby	PFPM	CR	PCTFE	EPDM	NBR	NBR
VALVE FUNCTIONS	2/2 DIRECT OPERATED													2/2 SERVO OPERATED					3/2 DIRECT OPERATED															3/2 SERVO OPERATED	5/2 SERVO OPERATED
VALVE TYPES	121F-K-M V0 122K-V8-V9 125K				121C1. 121C2.		121V5 122V5			Special valve on request				221G 222G 321F-G-H-K 322F-G-H-K 325K			221G5		131C-F-K-M-V0-V1-X0 132F-K-M-V0-V1 133F-K-V0-V1-X0 135K				131E	131T2.-T5. 132T2.-T5. 133T2.				131V5. 132V5 133V5		Special valve on request				331B-F-L 332B-F-L 335B-F-L 531L	341B-F-L 345B-F-L 347B-F-L 541L
BODY MATERIALS	Brass				Brass		St. steel			St. steel				Brass/bronze			St. steel		Brass				Brass	Brass				St. steel		St. steel				Aluminium	Aluminium
Acetone		•	•	•		•		•	•	•	•	•	•			•				•	•	•			•	•	•		•	•		•	•		
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							•	•	•	•	•		•				•											•	•	•			•		
Benzine - leaded and unleaded (motor)	•	•	•		•	•	•	•	•		•	•	•		•		•		•	•	•			•	•	•		•	•	•		•			
Chloroform +20°C	•				•		•	•	•		•		•		•		•		•					•				•	•	•					
Cider							•	•	•		•		•				•											•	•	•		•			
Coffee							•	•	•	•	•		•				•	•										•	•	•			•		
Cream							•	•	•		•						•											•	•	•					
Cyclohexane							•	•	•		•		•															•	•	•					
Ethyl chloride																																			
Ethylene glycol (antifreeze)	•	•	•	•	•	•	•	•						•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
Exhaust gas																																			

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Fire-resistant, non-aqueous hydraulic fluid		•	•	•			•		•			•		•	•		•	•		•		•					•					•	•	•								•	•	•			•		•		•		•												
Fire-resistant, oil in water emulsions		•		•			•		•			•		•	•		•			•		•					•					•		•								•		•			•		•		•														
Fire-resistant, water in oil emulsions		•		•			•		•			•		•	•		•			•		•					•					•		•								•		•			•		•		•														
Fire-resistant, water/glycol solutions		•		•			•		•			•		•	•		•			•		•					•					•		•								•		•			•		•		•														
Food products												•		•			•										•																				•		•		•														
Freon 12, gas			•											•	•			•		•													•																•			•	•												
Freon 22														•	•		•			•																													•																
Helium		•	•				•					•		•	•		•	•		•		•					•					•	•			•						•	•				•		•		•	•	•												
Kerosene JP-1 to JP-3		•		•			•		•			•		•	•		•			•		•					•					•		•		•						•		•			•		•		•					•					•				
Lemon and orange juice												•		•			•										•																				•		•		•														
Mercury*												•		•	•		•			•																											•		•		•														
Milk												•		•			•										•																				•		•		•														
Naptha												•		•			•																														•		•		•														
Nitrogen		•	•	•	•		•		•			•		•	•	•	•	•		•		•	•				•			•		•	•	•	•	•						•	•	•	•		•		•		•	•	•		•	•					•				
Oil - animal oil												•		•			•										•																				•		•		•														
Oil - ASTM oil, 1, 2, 3		•	•	•			•		•			•		•			•					•					•					•	•	•		•						•	•	•			•		•		•					•					•				
Oil - diesel oil		•		•			•		•			•		•	•		•			•		•					•					•		•		•						•		•			•		•		•					•					•				
Oil - estable oil												•		•			•										•																				•		•		•														
Oil - extra light, medium		•		•			•		•			•		•	•		•			•		•					•					•		•								•		•			•		•		•														
Oil - fuel oil												•		•			•										•																				•		•		•														
Oil - greasing oil		•	•	•			•		•			•		•	•		•	•		•		•					•					•	•	•		•						•	•	•			•		•		•		•												
Oil - heavy		•		•			•		•			•		•	•		•			•		•					•					•		•								•		•			•		•		•														
Oil - silicone oil		•	•	•			•		•			•		•	•		•	•		•		•					•					•	•	•		•						•	•	•			•		•		•		•												
Oil - transformer oil* on request												•		•			•										•																				•		•		•														
Oil - vegetable oil												•		•			•										•																				•		•		•														
Ozone gas/liquid* on request												•		•	•	•	•	•		•							•																				•		•		•	•	•		•										
Perchloroethylene +20°C		•		•			•		•			•		•	•		•			•		•					•					•										•		•			•		•		•														
Phenol												•		•	•		•	•		•																											•		•		•		•												
Potassium sulfate												•		•	•	•	•			•																											•		•		•				•										
Soapy water												•		•	•	•	•			•																											•		•		•				•										
Sodium hydroxide														•	•	•		•		•																											•		•				•		•										
Toluene (Toluol)		•		•			•		•			•		•	•		•			•		•										•		•								•		•			•		•		•														
Trichloroethylene												•		•	•		•			•							•																				•		•		•														
Turpentina												•		•	•		•																														•		•		•														
Water		•	•	•	•		•		•			•		•	•	•	•	•		•		•	•				•			•		•	•	•	•	•						•	•	•	•		•		•		•		•		•										
Water - deionised/distilled												•		•	•			•		•																											•		•				•												
Water - demineralised												•		•	•	•	•	•		•																											•		•		•		•		•										
Water - drinkable												•		•		•	•	•									•			•																	•		•		•		•		•										
Water - hot and steam				•	•									•		•	•						•				•			•				•	•														•		•				•										
Water - oxygenated* on request												•		•	•	•	•	•		•																											•		•		•		•		•										
Water - sea salt												•		•	•	•	•	•		•																											•		•		•		•		•										
Xylene												•		•	•		•			•																											•		•		•														

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Index by reference numbers

Valve reference number - global reference number

Valve reference	Global valve ref.	Page
U 033X5156	7033XRN2SN00	274/294
U 033X51561D	7033XRN2SN1D	274/292
U 033X5256	7033XRN3SN00	276/294
U 033X52561D	7033XRN3SN1D	274/294
E 121F43	7121FBF4NF00	14/88
E 121F4302	7121FBF4NV00	14/50
E 121F44	7121FBF4GF00	14/88
E 121F4406	7121FBF4GV00	14/50
121F47	7121FBF4LF00	14
121F4706	7121FBF4LV00	14/50
121F63	7121FBF4LR00	14/88
121F64	7121FBF4NR00	14/88
121F67	7121FBF4GR00	14/88
121G2320	7121GBG34VT0	104
121G2520	7121GBG45VT0	104
121G2523	7121GBG45VT1	104
121K01	7121KBG2SV00	12/48
121K0103	7121KBG2SE00	72
121K0150	7121KBG2SVMO	10/48
121K02	7121KBG2QV00	10/48
121K0250	7121KBG2QVM0	10/48
E 121K03	7121KBG2NF00	10/86
E 121K0302	7121KBG2NV00	10/46
121K0323	7121KBG2NE00	72
E 121K0352	7121KBG2NVM0	10/46
E 121K04	7121KBG2GF00	10/86
E 121K0402	7121KBG2GV00	8/46
E 121K07	7121KBG2LF00	10
121K0706	7121KBG2LV00	10/46
121K0756	7121KBG2LVM0	10/46
121K1302	7121KBG1NV00	8
121K1352	7121KBG1NVM0	8/46
E 121K14	7121KBG1GF00	8/86
E 121K23	7121KBG1LR00	8/86/102
121K2423	7121KBG1NRT0	104
121K3106	7121KBG3SV00	12/48/104
121K3206	7121KBG3QV00	12/48/104
121K3303	7121KBG3UE00	72
121K3306	7121KBG3UV00	12/48/104
E 121K45	7121KBG44V00	12/48
E 121K4503	7121KBG44E00	72
E 121K46	7121KBG42V00	12/48
E 121K4603	7121KBG42E00	72
121K6220	7121KBG2QRT0	106
E 121K63	7121KBG2LR00	10/86/104
E 121K64	7121KBG2NR00	10/86/104
121K6423	-	104/104
E 121K65	7121KBG2ER00	8/86/104
E 121K67	7121KBG2GR00	10/86/104
121M13	-	8/46
121M14	-	8/46
121V5106	7121VVG2SV00	118
121V51061D	7121VVG2SV1D	118
121V5112	7121VVG2ST00	118
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121V5206	7121VVG2QV00	116
121V5212	7121VVG2QT00	116
121V5263	7121VVG2QR00	74/116
121V5306	7121VVG2NV00	116
121V53061D	7121VVG2NV1D	116
121V5363	7121VVG2NR00	74/116
121V5406	7121VVG2GV00	116
121V5463	7121VVG2GR00	74/116
121V5706	7121VVG2LV00	116
121V5763	7121VVG2LR00	74/116
122K83	7122KBG2LF00	12
122K8306	7122KBG2LV00	12/48
122K8321	7122KBG2LRT0	106
122K8363	7122KBG2LR00	12/88/106
122K84	7122KBG2GF00	12/88
122K8406	7122KBG2GV00	12/48
122K8408	7122KBG2GR00	12/88
122K9321	7122KBG1LRT0	106
122K9363	7122KBG1LR00	12/88/106
125K01	7125KBG2SV00	14/50
125K03	7125KBG2NF00	12
E 131E03	7131EBG2LN00	130/228
E 131F26	7131FDF2JV00	148
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131F4650	7131FBF4JVM0	144
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E 131K0358	7131KBG2LPM0	130/228
E 131K04	7131KBG2GV00	126/226
E 131K0450	7131KBG2GVM0	126/226
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E 131K06081D	7131KBG2JP1D	128/228
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E 131K6350	7131KBG2LRM0	130
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131K65	7131KBG2BR00	176
131M14	-	124/226
131M15	-	124/226
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131M7450	-	142
131M75	-	138
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321K4356	7321KBG3TVMW	66
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2347NAKBPNM0	347N12	268
2347PAG1HNM0	347P01	240
2347PAG2PNM0	347P02	246
3121BBN1AV00	-	38
3121BBN1EV00	-	38
3121BBN1GV00	-	38
3121BBN1JV00	-	38
3121BBN1LV00	-	38
3121BBN1NV00	-	38
3121BBN1QV00	-	38
3121BJA7EVC#	-	42
3121BJA7GVC#	-	42
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3131BBN1QV00	-	162
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3133BBN1LV00	-	164
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3933BJA7EVC#	-	170
3933BJA7GVC#	-	172
3933BSN1AV00	-	168
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7121KBG1NVM0	121K1352	8/46
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7121KBG2LR00	E 121K63	10/86/104
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7121KBG2LVM0	121K0756	10/46
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7121KBG2NF00	E 121K03	10/86
7121KBG2NR00	E 121K64	10/86/104
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7121KBG2NV00	E 121K0302	10/46
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7121KBG2QV00	121K02	10/48
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7121KBG2SE00	121K0103	72
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7121KBG3QV00	121K3206	12/48/104
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7121KBG3UE00	121K3303	72
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7121VVG2NR00	121V5363	74/116
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7121ZBG1LRT0	-	102
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7121ZCBG1LR00	-	102
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7122KBG1LRT0	122K9321	106
7122KBG2GF00	122K84	12/88
7122KBG2GR00	122K8408	12/88
7122KBG2GV00	122K8406	12/48
7122KBG2LF00	122K83	12
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7122KBG2LV00	122K8306	12/48
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7125KBG2SV00	125K01	14/50
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7131FBF4JVM0	131F4650	144
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7131KBG1JVM0	131K1650	124
7131KBG1LV00	E 131K13	124
7131KBG2BF00	131K05	176
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7131KBG2GV00	E 131K04	126/226
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7131KBG2JP1D	E 131K06081D	128/228
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7131KBG2JVM0	E 131K0650	126/226
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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
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7131TBG2LV00	131T29	128
7131TBG2LVM0	131T2901	128
7131TBG2NVA0	131T22	132
7131TBG2RV00	131T21	132
7131TBG2RVM0	131T2101	132
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7131VVG2GV00	131V5406	182
7131VVG2LR00	131V5363	182
7131VVG2LV00	131V5306	182
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7132FBF4JV00	132F46	144
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7132KBG2LV00	132K03	132
7132TBG2JV00	132T23	132
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7133FBF4GVM0	E 133F4450	144
7133FBF4JV00	133F46	144
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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
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7133TBG2JVM0	133T2301	134
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7133TBG2NVM0	133T2101	134
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7133VVG2GV00	133V5406	182
7133VVG2LR00	133V5363	182
7133VVG2LV00	133V5306	182
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7133XRN2VN9H	U 133X51961D	280
7133XRN3SN96	U 133X5296	282/290
7133XRN3SN9H	U 133X52961D	282/290
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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
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7221GBG51NCH	221G1631	64
7221GBG51NH0	221G1630	18/52
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7221GBG51VH0	221G2630	18
7221GBG61E00	221G1703	76
7221GBG61N00	221G17	18/52
7221GBG61NC0	221G1710	64
7221GBG61NCH	221G1731	64
7221GBG61NH0	221G1730	18/52
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7221GBG61VH0	221G2730	18
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7221GBG64NCH	221G2131	64
7221GBG64NH0	221G2130	18/52
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72228BG5VES0	222G3603	78
72228BG5VV00	222G3606	20/54
72228RG3TE00	222G5303	78
72228RG3TV00	222G5306	20/54
72228RG4UE00	222G5503	78
72228RG4UV00	222G5506	20/54
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73218BG3TTS0	321G8312	80
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73218BG5VTS0	321G8612	80
73218BG64TS0	321G8712	82
73218BG75TS0	321G8812	82
73218BG87TS0	321G8912	82
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7321BBG3TNM0	-	56
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7321BBG4TNM0	-	56
7321BBG53E00	-	80
7321BBG53N00	-	56
7321BBG53NM0	-	56
7321BBG64E00	-	80
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7321GBG88NMC	E 321G3910	68
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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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7322GBG53N00	322G36	32/58
7322GBG53NC0	322G3610	68
7322GBG53V00	322G3606	32
7322GBG64N00	322G37	32/60
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7322GBG88V00	322G3906	32
7322GBG99N00	322G40	32/60
7322GBG99NC0	322G4010	68
7322GBG99V00	322G4006	32
7322HBG2SN00	322H71	30/92
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7322HBG3TV00	322H7306	32/92/108
7322HBG4UN00	322H75	32/92
7322HBG4UV00	322H7506	32/92/110
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7322KBG3TVW0	322K4306	32
7322KBG4TVW0	322K4506	32
7322KBG51VW0	322K4606	32
7322KBG62VW0	322K4706	32
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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
7341NAKBHN90	341N3190	260
7341NAKBJN1D	341N31001D	260
7341NAKBJNL2	341N3180	260
7341NAKBJNM0	341N31	260
7341NAKBJNM1	341N21	258
7341NAKBJP1D	341N31081D	260
7341NAKBJPM0	341N3108	260
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7341NRKDJN1D	U 341N31501D	308
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7341NRKDJN95	U 341N3195	310
7341NRKNNN00	U 341N3250	312
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7341NRKNNN95	U 341N3295	312
7341PAG1JN1D	341P21001D	240
7341PAG1JN90	341P2190	238
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7341PAG1JPM0	341P2108	238
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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
7347NRKDHN92	U 347N3192	314
7347NRKDHNM0	U 347N3150	314
7347NRKNNN00	U 347N3250	314
7347PAG1HN90	347P2190	240
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7347PAG2PNM0	347P22	244
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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
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