

Oxygen use for this test is strictly forbidden (for exmple from gas bottle). **There is huge risk of explosion initiation (oxygen+lubricant in valve)**

- protecting the valve against heavy dust and flushing
- ensuring the correct operating temperature
- valve should not be exposed to dilatation nor any dynamic forces under operating conditions
- the protective conductor contact in the plug-in socket must be connected to the electrical system in accordance with the locally applied antielectrocution protection system

10. Accessories - option (available on order)

- design for other control voltage values
- counterflanges with stub pipe (for valves with flanged connection)
- stub pipe for inlet and/or outlet pressure measurement ($\varnothing 9$, G1/8 lub G1/4 together with gaskets)
- gas pressure sensor (at the inlet and/or outlet of a valve)
- plug with voltage presence indicator

11. Periodical inspection and service

During normal operation valve does not require any maintenance activities. It is only necessary to take care of periodic removal of accumulated dust

At a certain time (depending on the type of media, its contamination and local operating conditions), the valve should be partially dismantled for cleaning and maintenance of its internal parts. Performing these activities should be entrusted to the manufacturer's service department or a person with appropriate qualifications. The re-commissioning of the valve should be preceded by checking its tightness in accordance with generally applicable rules.

12. Storage guidelines

Valve should be stored in a dry place, in a vibration, dust or gas and noxious fumes free environment. The sotrage room's temperature should not be lower than +5° C

13. Overall dimensions (mm); Weight (kg)

Type	ZEA-25 BIO	ZEA-40 BIO	ZEA-50 BIO	ZEA-50k BIO	ZEA-65k BIO	ZEA-80k BIO	ZEA-100k BIO
	valves with threaded connection			valves with flanged connection			
DN	25	40	50	50	65	80	100
Rp	1	1 1/2	2				
A	156	224	231	268	314	360	373
A*	166	248	255	292	366	412	426
B	28	48	40	78	83	94	103
C ⁽¹⁾	170	239	254	253	323	344	349
C*	190	273	288	287	388	409	414
E	79	112	142	165	185	200	222
L	115	178	193	230	270	310	350
P	95/102 ⁽³⁾	110	110	110	132	132	144
Pg	11	11	11	11	11	11	11
Weight ⁽²⁾	2,13	6,00	6,75	7,75	17,80	24,65	28,55

* - dimension for ZEA-B BIO

(1) - dimension updated to allow coil maintenance

(2) - approximate value (dependant on the selected coil)

(3) - dependant on the selected coil

ELEKTROZAWORY R.Z. Wawrzyczek, A. Koziel s.c.

43-418 Pogwizdów k/Cieszyna, ul. Szkolna 3;
phone +48 33 856-85-70, 856-83-94; fax +48 33 856-85-62
www.flamagaz.com e-mail: firma@flamagaz.com



Solenoid Valve

type ZEA BIO, ZEA-B BIO

for
gas fuels (gas)
air and other non-aggressive gases



- The following document should be consulted first before installing the valve.
- Proceed with the installation only if following documentation fully understood
- Valves should be installed in accordance with prevailing regulations in force.

SERVICE MANUAL

Contents

1. Description	page.....	2
2. Application		2
3. Technical data		3
3.1. Electrical parameters		3
4. Construction and principle of operation.....		4
5. Coil replacement		4
6. Electrical connection		5
7. Flow regulation		5
8. Flow characteristic.....		6
9. Installation-assembly requirements		7
10. Accessories		8
11. Periodical inspection and service		8
12. Storage guidelines.....		8
13. Overall dimensions.....		8

1. Description

ZEA BIO type solenoid valve is an automatic class A shut-off valve dedicated mainly to gas installation application. It was also constructionally adjusted to **biogas** application. All of its details having direct contact with the medium have been made of materials that are highly resistant to the corrosive effect of biogas.

Valve ZEA BIO is used to protect, limit, cut off and unblock the medium supply to devices with which it cooperates.

The valve is designed as open if the coil is powered with electricity and automatically closed when there is no power supply (its lack).

Właściwości zaworu ZEA BIO:

- **ZEA valve features:**
- 2/2 -way, poppet, direct acting
- single-stage, unidirectional
- closed in deenergized state -**NC**
- uniform flow -standard design
- manual regulation of flow (flow capacity) - version **ZEAb BIO**.
- suited to zero pressure differential conditions ($\Delta P_{min} = 0$ bar)
- maximum pressure difference ΔP_{max} that can appear on the valve depends on nominal diameter of valve (see -**TABLE 1**)
- equipped in permanent built-in filter
- conforms to **PN-EN 161:2011+A3:2013**
- meets principal requirements of Regulations (UE) - **2016/426** (GAR) from 9th March 2016
- meets applicable requirements of Directives UE: **2014/35/UE** (LVD) and **2014/30/UE** (EMC)

2. Application

- designed for reliable service in all types of installations and appliances, supplied from low pressure gas network (including **biogas**)
- as a part of the **gas train** supplying high power gas appliances, the valve will act as an automatic safety shut-off valve

ZEA BIO solenoid valves meet the requirements of point 5.2.2.3 of PN-EN746-2,

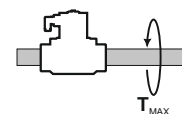
which says: "**The gas supply to the burner should be controlled by two class A shutoff valves in series.**"

9. Installation - assembly requirements

- valve can only be installed by a person holding appropriate qualifications and relevant authorization
- before moving on to installation, it is essential to:
 - carefully read the information from the nominal table of the valve and coil to verify that the required parameters dictated by the installation's location are met (pressure level, voltages, nominal diameters, etc.)
 - take into account the pressure that may occur at the valve inlet in case of failure to components in the system located upstream the valve
- assembly should be performed in professional way with use of proper tools
- assemble to installation according to the gas flow arrow on the valve
- mounting position is coil upwards. Acceptable deviation from vertical position cannot exceed 90°.
- direct contact of the valve with wall, ground, etc. is unacceptable; keep the minimum distance - about 1 cm
- attention should be paid so that after valve installation there is enough space left (**maneuvering area**), necessary for its ease opening (or manual closing) - see p.13
- in order to facilitate the installation of the valve, the coil can be removed - see point 5
- ensure proper rigidity of the installation in the place where the valve is installed (Group 1 valve). This can be achieved by using rigid supports to the bending and torsional stress exerted by the piping system in the installation (eg due to the lack of alignment of the of the pipeline at the inlet and outlet of the valve)
- ensure that valve is mounted rigidly so as to avoid any vibration
- no part of the valve should be used as a „lever” to facilitate the installation
- a strainer which protects from mechanical impurities should be fitted upstream the valve in the gas installation. Maximum dimension of strainer openings should not exceed 0,2 mm
- it is required to blow installation just before valve assembly
- **during valve installation, attention should be paid to the following:**
 - putting a lot of emphasis to keep interiors of the installation clean
 - thoroughly cleaning the pipes from carbon deposits, filings and corrosion products etc.
 - ensuring no stresses on the valve during the installation

valve with threaded connection

- use appropriate thread sealant to ensure tightness of the connections
- protect the valve against contamination and in particular against excess material used to seal threaded joints
- in valves with threaded connections pipe should be screw in that way so that 10 second torque not exceed below values:



DN	25	40	50
Rp	1	1 1/2	2
T _{MAX} [Nm] t ≤10s	125	200	250

valves with flanged connections

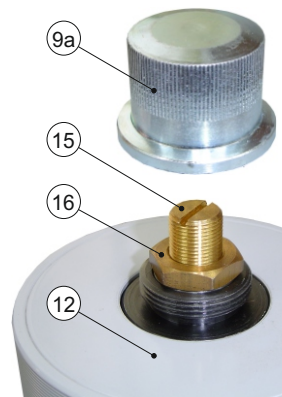
- protecting lateral surfaces of the flanges from mechanical damage
- flange reparation by welding is not admissible
- leave counterflanges tightened to the valve only during the initial part of the welding procedure (positioning the valve). **The actual welding of counterflanges must be carried out without the valve** (after it is disassembled)
- ensuring the inside of the valve is clean before its reassembly
- ensure correct positioning of the gasket
- flange bolts should be tightened across
- maximum torque for flange bolts:

DN	50	65	80	100
Torque [Nm]	50	50	50	80

- valve's assembly should be finalized with carrying out an leaktightness test of installation including **ZEA** valve using **compressed air** or inert gas. Test pressure cannot exceed **P_s = 5 bar**.

7.b. valve with nominal diameter DN40 ÷ DN100

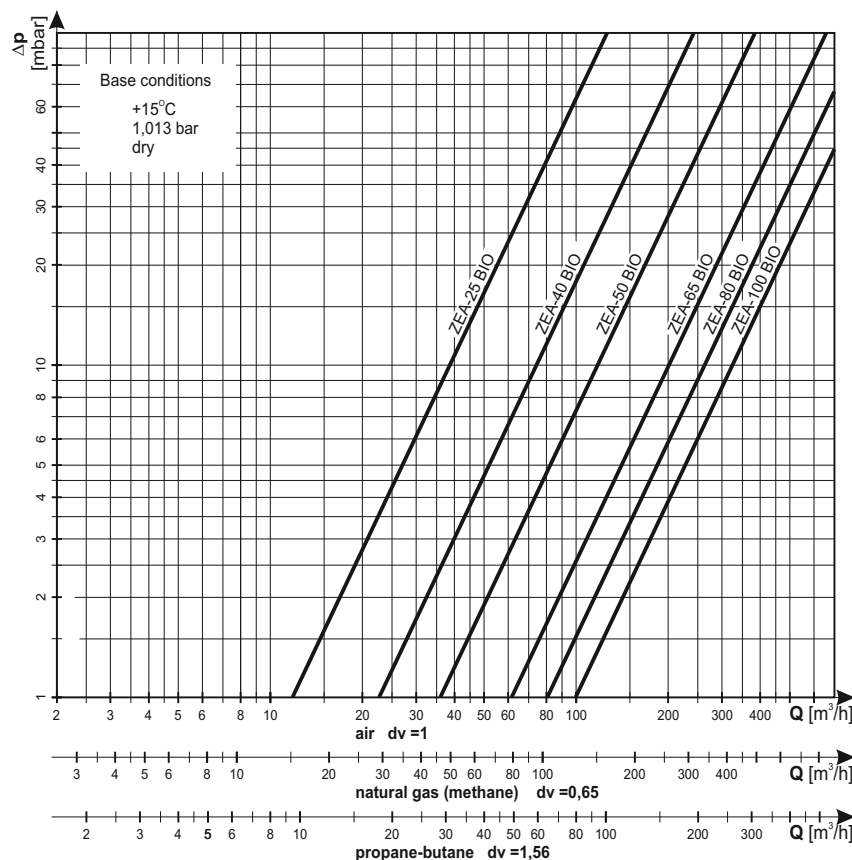
- unscrew the cover (9a) securing the coil and protecting the flow control unit
- loosen the nut (16) counter-positioning of the adjusting screw (15)
- set the adjusting screw (15) to obtain the desired flow
By screwing in, we reduce the flow by screwing out - we increase the flow. Regulation is possible in the range of 0 to 100% of full flow.



Attention: The extreme positions of the adjusting screw are characterized by a **perceptible refusal**, which will be present when screwing in (0%) or screwing out (100%)

- tighten the nut (16) counter-positioning of the adjusting screw (15)
- screw the cover (9a) securing the coil and protecting the flow control unit

8. Flow characteristic



3. Technical data

valve class.....	A
group.....	1
diameter range.....	Rp 1 ÷ Rp 2; DN25 ÷ DN100
media.....	gas fuels(natural gas, propane-butane) air, non-agressive gases
maximum operating pressure.....	P _{MAX} - see TABLE 1
differential pressure minimum.....	ΔP _{min} = 0 bar
maximum.....	ΔP _{max} - see TABLE 1
safe static pressure.....	P _s = 5 bar (It is used during leaktightness test of installation-valve by this pressure can not operate)
flow	see p.8 - Flow characteristics
opening/closing time.....	< 1s
flow regulation range ZEAb BIO.....	0 ÷ 100 %
ambient and media temperature	-10° C ÷ 60° C
pipe threaded connection.....	Rp - internal straight thread compliant with PN-EN 10226
flanged	flanges are an integral part of the valve and are suitable for connections with flanges [PN16, 01, B] in accordance with PN-EN 1092-1 - keeps compatibility of connection dimensions
material: valve body.....	aluminium alloy
internal elements	aluminium alloy, stainless steel or galvanized steel, ARMCO
sealing material.....	VITON
mounting direction.....	coil upwards -acceptable deviation from vertical position up to 90°

3.1. Electrical parameters

control voltage alternating AC(50Hz).....	24V, 230V
direct DC.....	24V
voltage tolerance	-15%; +10%
power consumption	19 ÷ 85 VA (W) (dependant on coil type)
safety class.....	I (earthing)
operation type.....	S1 continuous
electrical connection.....	tri-contact terminal block *
degree of protection (acc. PN-EN 60529).....	IP54

TABLE 1	Valve type		DN	Rp	Diff. pressure ΔP [bar]		P_{MAX} [bar]	P_s [bar]
					ΔP_{min}	ΔP_{max}		
	valves with threaded connection							
	ZEA-25 BIO	ZEAb-25 BIO	25	1	0	0,17 0,30 with coils AC,DC.../25B	0,17 0,30	5
	ZEA-40 BIO	ZEAb-40 BIO	40	1 1/2	0	0,25	0,25	5
	ZEA-50 BIO	ZEAb-50 BIO	50	2	0	0,14 0,20 with coil AC.../65	0,14 0,20	5
	valves with flanged connection							
	ZEA-50k BIO	ZEAb-50k BIO	50		0	0,14 0,20 with coil AC.../65	0,14 0,20	5
	ZEA-65k BIO	ZEAb-65k BIO	65		0	0,25	0,25	5
	ZEA-80k BIO	ZEAb-80k BIO	80		0	0,11	0,11	5
ZEA-100k BIO	ZEAb-100k BIO	100		0	0,11	0,11	5	

4. Construction and the principle of operation

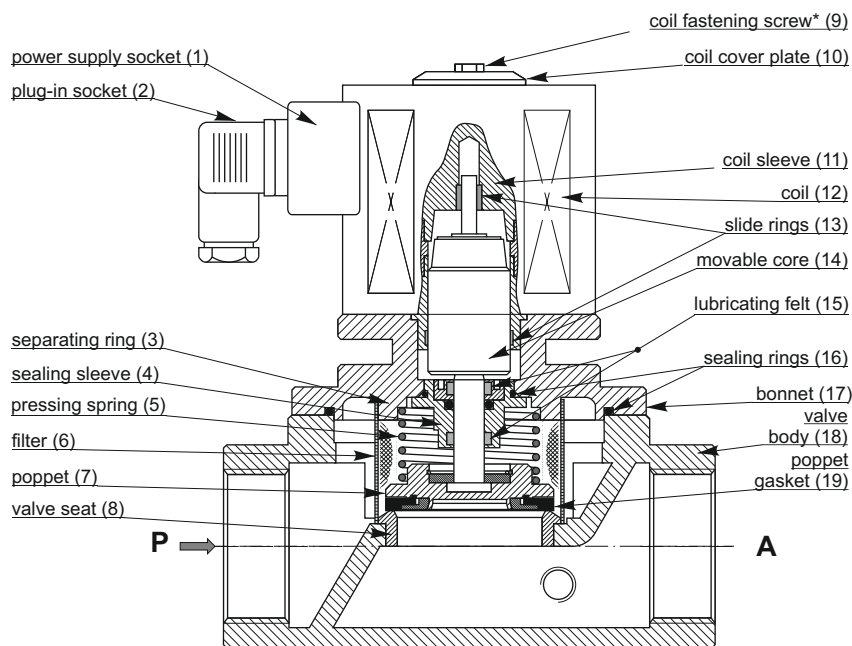
Zawór elektromagnetyczny ZEA BIO jest zaworem grzybkowym bezpośredniego działania.

In such valves, the movable core (14) of the electromagnet mechanically connected to the poppet (7) is a valve head*, which opens or closes the flow opening depending on the presence or absence of the voltage supplying the coil (12). This happens without the differential pressure ΔP acting on the valve. In a de-energized state, when the current through the coil does not flow, the pressing spring (5) presses the poppet (7) with the gasket (19) to the valve seat (8) and closes the media flow through the valve - the valve remains closed.

When the voltage is applied to the coil, the current flowing through it induces a magnetic field. This creates a force that draws in the core (14), overcoming the pressure of the pressing spring (5) and the force from the inlet pressure P pressing on the poppet (7), draws in the valve head to the open position and opens the valve. Closing of the valve takes place under the influence of the pressing spring (5) - after the current decay in the coil (12).

These valves work correctly from zero differential pressure ($\Delta P_{min}=0$). The maximum differential pressure ΔP_{max} depends on the lifting force of the electromagnet and the nominal diameter of the valve (flow opening) - see Table 1.

Due to the corrosive properties of biogas, all details of ZEA BIO valves, which have direct contact with the medium, have been made of corrosion-resistant materials. In addition, a special separator was used in the valves, the role of which is to separate the space in which the movable core (14) moves in the coil sleeve (11) from the area through which the medium flows. The separator is made of a sealing sleeve (4) in which there are two lubricating felts (15) soaked with special oil and a separating ring (3).



(*) in valves ZEA b special cover (9a) fastening coil act as coil fastening screw (9) - see p.7.

5. Coil replacement

- switch off the control voltage and secure the off state
- disconnect the plug-in socket (2) from the coil (12) power supply socket (1)
- remove the fastening screw (9) fixing the coil (for the ZEA b version - unscrew the cover (9a))
- replace the coil with a new one, checking its type and voltage on the nameplate
- screw the fastening screw (9) of the coil (for ZEA b version - close the cover (9a))

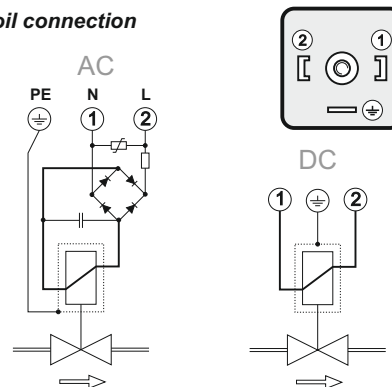
- connect the plug-in socket

Attention: It is possible to **change the position of the coil** around its axis. To do this:

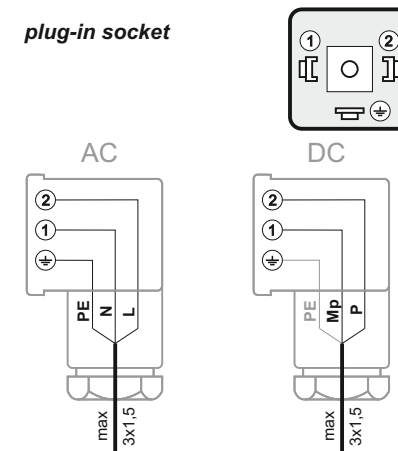
- loosen the fastening screw (9) fixing the coil (for the ZEA b version - loosen the cover (9a))
- change the position of the coil
- tighten the coil fastening screw (9) again (for ZEA b version - tighten the cover (9a))

6 Electrical connection

coil connection



plug-in socket



- solenoid coil is designed for direct voltage
- coils for alternating voltage in electrical connection (1) has built-in permanent rectifier together with overvoltage system (suppression)
- the plug-in socket (2) can be fixed in **4 positions** (each 90°) towards the power supply socket (1)
- polarization of wire in conductor is indifferent (apart from PE wire). However, the PN-EN 161 standard unambiguously assigns to the contact pins connections of PE, L, N potentials of the power cable respectively. (as on the drawing above)
- the maximum conductor wire size that can be inserted into the plug-in socket of the connection is 3 x 1.5 mm²
- if it is necessary to use a conductor with a larger wire size, use a tight, intermediate junction box with the degree of protection IP54 or higher

7. Flow regulation - only for ZEA b BIO type

Attention: The regulation can be carried out with both open and closed valves. The valves are factory set to full flow (100%).

7.a. valve with nominal diameter DN25

- loosen the cover (9a) securing the coil (12) and the counterlocking adjusting screw (15) and then make it a few revolutions counterclockwise (it should stay screwed on the adjusting screw)
- through the hole (18) in the cover (9a) insert the allen key (17) (size 5mm) into the hexagonal socket S5 located in the upper part of the adjusting screw (under the hole)
- turn the key (17) to set the desired flow
- By screwing in screw (15), we reduce the flow by screwing out - we increase the flow
- **Attention:** The extreme positions of the adjusting screw are characterized by a **perceptible refusal**, which will be present when screwing in (0%) or screwing out (100%)
- not changing the position of the allen key (17), tighten manually the cover (9a) by counteracting the position of the adjusting screw (15)

