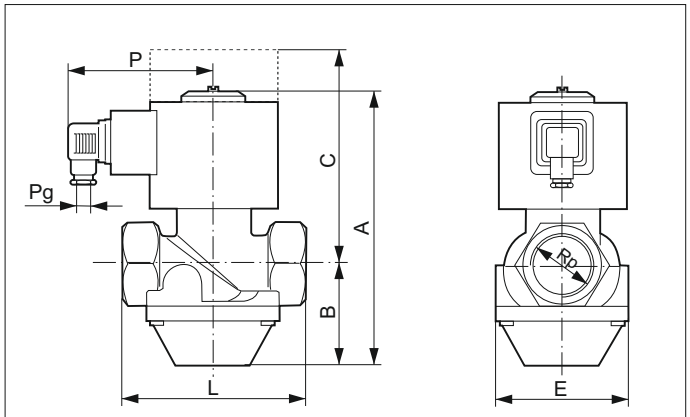
11. Storage guidelines

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

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



Type	ZEG-20	ZEG-25	ZEG-32	ZEG-40	ZEG-50
	valves with threaded connection				
DN	20	25	32	40	50
Rp	3/4	1	1 1/4	1 1/2	2
A	154	154	189	214	227
B	56	56	70	74	80
C(1)	158	158	197	229	236
E	75	75	100	125	150
L	100	100	145	156	190
P	95	95	102	110	110
Pg	11	11	11	11	11
Weight	2,20	2,10	4,40	6,00	6,60

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Solenoid Valve
type ZEG

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

CE 1015

- **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

release 06/2018

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1. Description

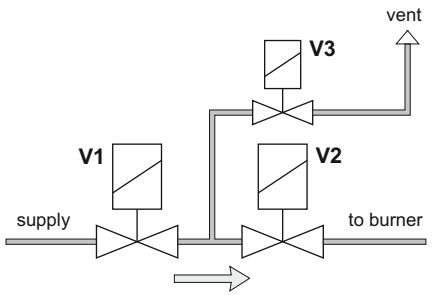
ZEF type solenoid valve is an automatic shut-off valve designed for reliable service in all types of gas and air installations with pressure not exceeding 2 bars.
The valve is designed as closed if the coil is powered with electricity and automatically opened when there is no power supply (its lack).

ZEG valve features:

- 2/2 -way, membrane, assisted lift
- single-stage, unidirectional
- opened in deenergized state -**NO**
- uniform flow
- suited to zero pressure differentional conditions (ΔP_{min} = 0 bar)
- suited to applications where pressure differential fluctuates or is very hard to define
- conforms to **PN-EN 161:2011+A3:2013**
- meets principal requirments of Regulations (UE):
  2016/426 (GAR) from 9'th March 2016
- meets applicabe requirments of Directives UE: \
  2014/35/UE (LVD) and **2014/30/UE** (EMC)

2. Application

- due to the inversion type of operation (NO), the ZEG valve can act as a automatic vent valve located between two automatic shut-off valves in so-called „gas train".



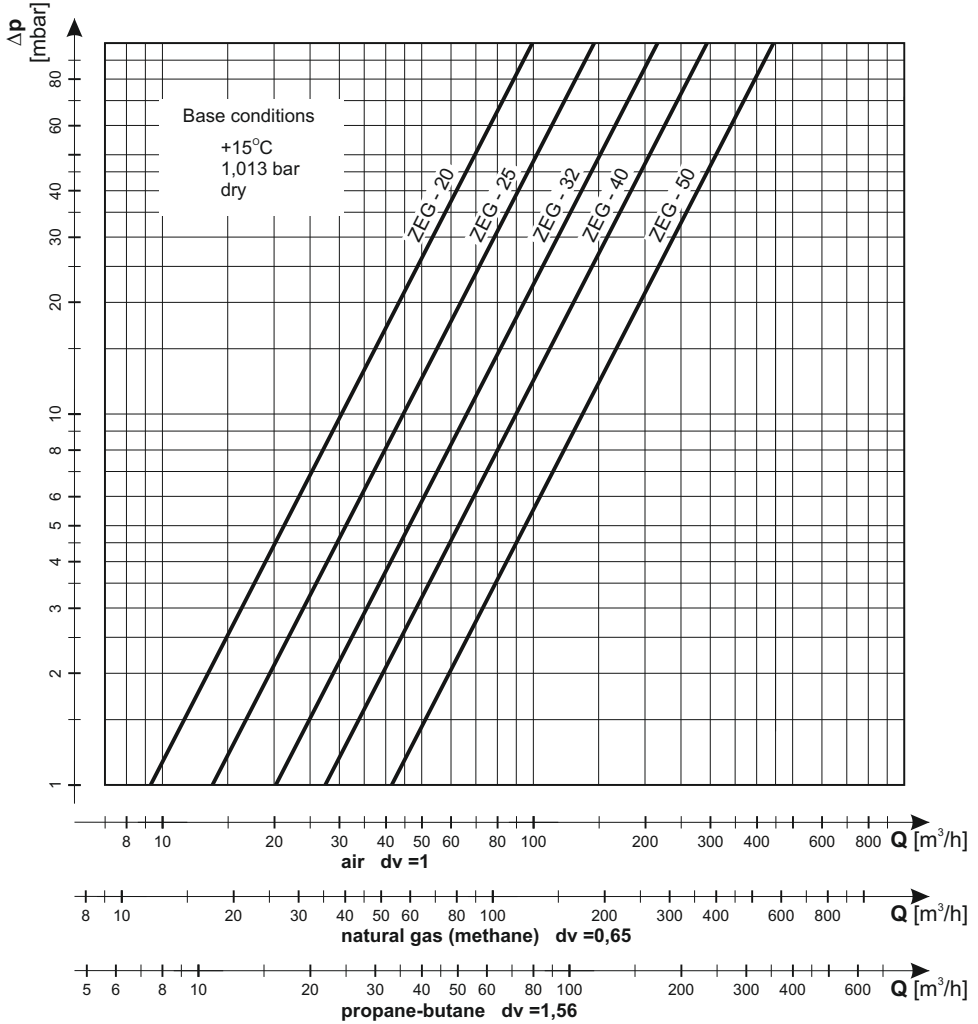
flo

Such gas train set is required to supply industrial burners and high-power gas appliances.

When the burner is not in operation (valve coils without voltage), the valves V1 and V2 are closed and shut off the gas supply to the burner, and the valve V3 (ZEG) is opened and connects with the atmosphere the chamber between the automatic shut-off valves V1 and V2. Applying voltage to the valves closes the vent valve V3, opens the valves V1 and V2, thus opening the gas w train to the burner.

- pneumatic control systems

9. Flow characteristic

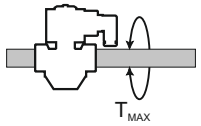


10. Periodical inspection and service

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

8. Installation - assembly requirments

- valve can only be installed by a person holding appropriate qualifications and relvant 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,nominalnal diameters, etc.)
  - take into account the pressure that may occure 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.
  Accebtable deviation from vertical position cannot exceed 90^{O}.
- 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.12
- in order to facilitate the installation of the valve, the coil can be removed - see point 6
- no part of the valve should be used as a „lever" to facilitate the installation
- 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
- 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 installtion, 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 corosion products etc.
  - ensuring no stresses on the valve during the installation
  - use appropriate thread sealant to ensure tightness of the connections
  - pipe should be screw in that way so that 10 second torque not exceed below values:



DN	20	25	32	40	50
Rp	3/4	1	1 1/4	1 1/2	2
T_{MAX} [Nm] t ≤ 10s	85	125	160	200	250

  - protect the valve against contamination and in particular against excess material used to seal threaded joints

- valve's assembly should be finalized with carrying out an leaktightness test of gas installation together with **ZEG** valve.
  Should be performed with **compressed air** or inert gas use**.** Pressure can not exceed P_s **=** 5 **bar** - see TABLE 1. 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
- it is forbidden to apply voltage to the solenoid trigger coil when it is dismounted from the valve

3. Technical data

valve class	B
group	1
diameter range	Rp 3/4 ÷ Rp2
media	gas fuels(natural gas, propane-butane) air, non-agressive gases
maximum operating pressure	P_{MAX} = 2 bar
differential pressure minimum	ΔP_{min} = 0 bar
maximum	ΔP_{max} =2 bar
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.9 - ***Flow characteristics***
opening time	< 1s
closing time	< 1s
ambient and media temperature	-10^{O} C ÷ 60^{O} C
pipe threaded connection	Rp - internal straight thread compliant with PN-EN 10226
material: valve body	aluminium alloy
internal elements	aluminium alloy, brass, stainless steel or galvanized steel, ARMCO
sealing material	nitrile-butadiene rubber NBR
mounting direction	coil upwards -acceptable deviation from vertical position up to 90^{O}

Electrical parameters

control voltage alternating AC(50Hz)	24V, 230V
direct DC	24V
voltage tolerance	-15%; +10%
power consumption	19 ÷ 45 VA(W) -dependant on coil type
safety class	I (earthing)
operation type	S1 continuous (100%)
electrical connection	tri-contact terminal block *
degree of protection (acc. PN-EN 60529)	IP54

TABLE 1

Valve type	DN	Rp	Diff. pressure ΔP [bar]		Max. op. pressure P_{MAX} [bar]	Safe. st.pressure P_S [bar]
			ΔP_{min}	ΔP_{max}		
ZEG-20	20	3/4	0	2	2	5
ZEG-25	25	1	0	2	2	5
ZEG-32	32	1 1/4	0	2	2	5
ZEG-40	40	1 1/2	0	2	2	5
ZEG-50	50	2	0	2	2	5

4. Construction and the principle of operation

Assisted lift solenoid valves utilize process pressure for operation (the existence of pressure difference ΔP on valve). They consist of two main components: the main valve (7) and the pilot valve (10).
In the valve we can distinguish three areas of different pressure occurrence: area I from the inflow side P, area II under the membrane (5), area III from the outflow side A.
The characteristic design features of the valve:

- the pilot valve is located in the main valve poppet (9). They are connected to the movable core (5) and together form the valve head *
- pilot valve works like a typical direct-acting valve
- the area on the inlet side I is connected to the area II under the membrane with the equalizing channel (8)

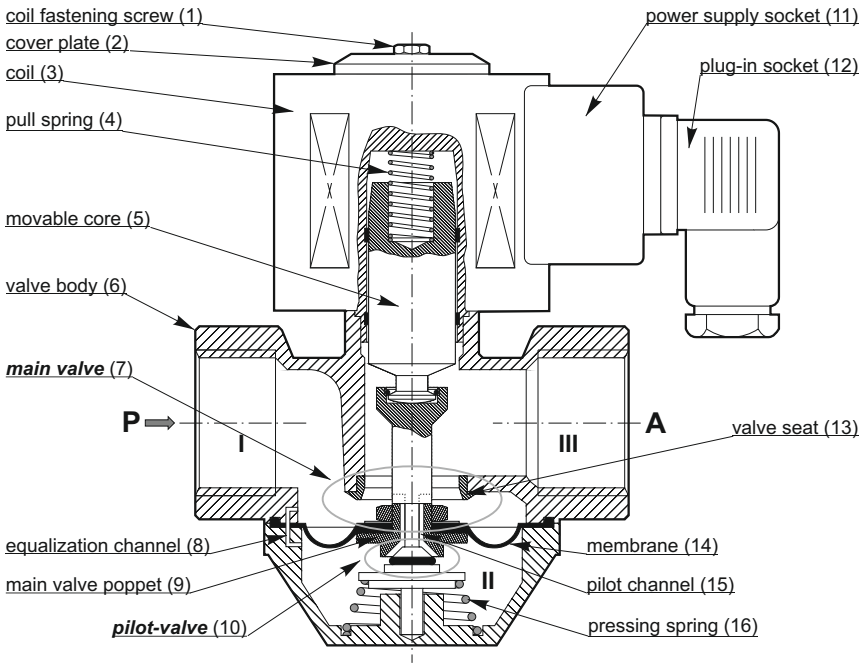
(*) - valve head: movable part of valve which shuts-off gas fow

- area II under the membrane connects to area III from the outflow side through the pilot valve
- the medium flow through the equalizing channel (8) is smaller than through the pilot valve

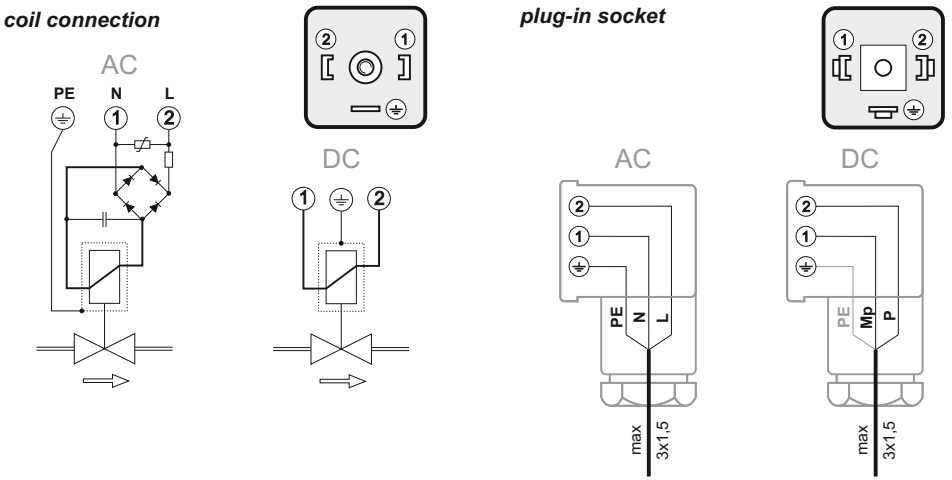
When describing the operation of the ZEG valve (with assisted lift), we distinguish two cases:

A. ***By a low or zero differential pressure P-A,*** the valve works like a direct-acting valve.
   1. In a de-energized state (coil (3) without voltage) pull spring (4) counterbalancing force from pressing spring (16) keep the valve head in the opened position. Pilot valve is open as well. The medium flows freely through the valve.
   2. After applying the voltage to the coil (3), force that draw in the core is created, it overcoms the force of pull spring (4) and closes the pilot valve and main valve. Spring (16) presses valve head to valve seat (13). The flow of medium through the valve is cut off.

B. ***When the pressure difference P-A is high*** the closing and opening of the valve is assisted by the process pressure.
   1. The mechanism maintaining the valve head in the opened position is described in point A.1.. Since the pilot valve is open at this time and the flow of medium through the equalization channel (8) is smaller than through pilot valve, the pressure in the area under the membrane is lower than over the membrane. The resulting pressure difference creates additional force to assist in maintaining the valve in the open position.
   2. Applying voltage to the coil causes the movement of the core (5), which pulled inside the solenoid, closes the pilot valve. The pressure under the membrane increases due to the flow of medium through the equalizing channel (8) from area I to area II. A pressure difference is created above and under the membrane which generates the force, which together with the solnoid movable core pulling force, close the main valve. This force, acting on the valve head, additionally tightens the valve. The pressure under the membrane is equal to the inlet pressure.
   3. The valve opens when the power is interrupted to the coil. The force holding the movable core disappears. The spring acting on the valve head causes the opening of the pilot valve only in the first phase. The medium begins to flow from area II to area III. At the same time, it flows through the equalization channel (8) from area I to area II. Because the flow through the equalizing channel is smaller than through the pilot valve, the pressure under the membrane will start to decrease. As a result of the changing pressure difference, the resultant force acting on the membrane (taking into account the pull spring (4) force) overcomes the force of the pressing spring (16) and causes the valve head movement to the open position.



5. Electrical connection



- solenoid coil is designed for direct voltage
- coils for alternating volatge in electrical connection (11) has built-in permanent rectifier together with overvoltage system (suppression)
- polarization of wire in conductor is indiffererent (apart from PE wire). However, the PN-EN 161 sandard unambiguously assigns to the contact pins connections of PE, L, N potentials of the power cable respectively. (as on the drawing above)
- the plug-in socket(12) can be fixed in **4 positions** (each 90°) towards the socket (11)
- the maximum conductor wire size that can be inserted into the plug-in socket of the connection is 3 x 1.5 mm^2
- 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

6. Coil replacement

- switch off the control voltage and secure the off state
- disconnect the plug-in socket (12) from the coil(3) power supply socket (11)
- remove the fastening screw (1) fixing the coil
- replace the coil (3) with a new one, checking its type and voltage on the nameplate
- screw the fastening screw (1) of the coil;
- connect the plug-in socket (12)

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

- loosen the fastening screw (1) fixing the coil
- change the position of the coil (3)
- tighten the coil fastening screw (1) again

7. Accessories - option (available on order)

- design for other control voltage values
- stub pipe for inlet and/or outlet pressure measurment (∅9, G1/8 lub G1/4 together with gaskets) - used alternatively with plugs G1/8 lub G1/4
- gas pressure sensor at the valve inlet
- plug with voltage presence indicator