

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

### 11. Standard kit content

Valves MAG-3 are sold together with counterflanges.

Standard kit includes:

- valve+ dedicated, two-sided wrench
- two counterflanges+two seals
- 8 x M16 screws with washers and nuts
- crimped-on ring terminal (6mm<sup>2</sup>) - for clamping cable connected to electrical potential equalization system of conducting parts (earthing) - required if valve application in zone 1 or 2 of explosion hazardous areas

Available counterflanges diameters DN:

- for valve ZBK-50k ⇒ DN32, DN40, DN50
- for valve ZBK-100 ⇒ DN65, DN80, DN100

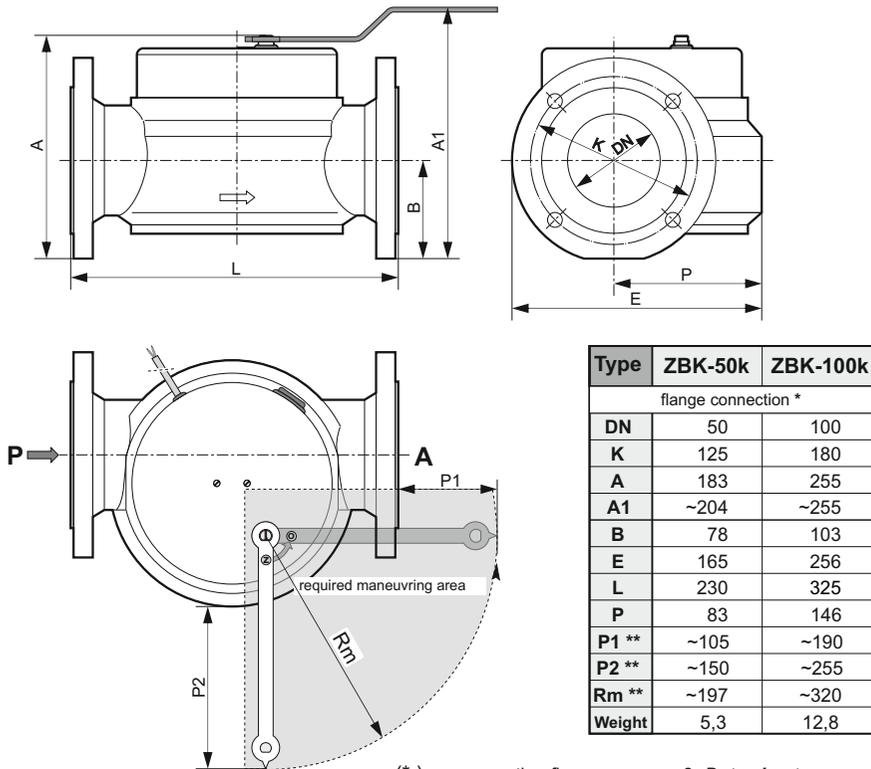
### 12. Accessories - option (available on order)

- valve closing element position indicator
- colour

### 13. Storage guidelines

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

### 14. Overall dimensions (mm); Weight (kg)



(\*) connecting flanges - see p. 3. **Data sheet**  
 (\*\*) see also fig. A and B (page 6)

**ATTENTION:** For ZBK-100k (DN100) valve only 4 flange connection screw holes applied

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# Shut-off flap valve MAG-3

type ZBK-50k and ZBK-100k

designed to operate with gas detectors



- 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

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### 1. Description

Shut-off valve MAG-3 is a full flow, quick-closing flap valve designed to operate with gas detectors (detection systems).

The valve can only be **opened** manually, however it may be **closed** either by an electrical impulse (or manually by a dedicated button).

The valve does not require power supply either in opened or closed position. In operating mode the valve is fully opened allowing an unrestricted medium passage. The valve is triggered resulting in cutting of the gas supply to the installation immediately by an electrical impulse from the detection system sensing the gas presence in protected areas. The impulse is only generated when the gas concentration exceeds a predefined level.

#### MAG-3 valve features:

- 2/2-way, flap, unidirectional, intended to use in explosion hazardous areas (Ex)
- available with two types of solenoid triggers: **WEx** or **COD-3/A**  
Information about applied trigger is located on the valve MAG-3 housing label.
- very low flow resistance - comparable with ball valve
- light weight
- adapted for external application (see p. 7.)
- equipped with valve position sensor (indicator)-option available on special order (see p. 3.1.)
- meets standard **PN-EN 161:2011+A3:2013** requirements and meets applicable requirements of Regulation (UE) 2016/426 from 9<sup>th</sup> March 2016 (GAR) and Directives **UE: 2014/35/UE** (LVD); **2014/30/UE** (EMC)
- meets applicable requirements of Directives **2014/34/UE (ATEX)** referring to apparatus intended to be used in explosion hazardous atmosphere.

MAG-3 valve has been designed so that it can operate in accordance with its operational parameters determined by the manufacturer ensuring a high level of explosion protection in spaces where the occasional occurrence of an explosive atmosphere is likely. The type of protection used against ignition (explosion) of construction type "c" allows it to be used in zones 1 or 2 of potentially explosive atmospheres of gases, vapors or flammable vapours classified as explosion class IIB, temperature classes T1, T2, T3 or T4, under condition that specific conditions of use will be provided, as described in section 1.1.

Valve meets the requirements of PN-EN 13463-1: 2010 and PN-EN 13463-5: 2012. Valve designation according to the ATEX Directive:  II 2G c IIB T4

#### 1.1. Special conditions of use (ATEX)

- Applicable only for : natural gas, propane-butane
- When valve installed in explosion hazardous area, its housing should be connected to electrical potential equalization system of conductive parts in zone (earthing) - see p. 7.1.

##### A) Valve with solenoid trigger **WEx** (information on valve MAG-3 housing label)

- 1) Ambient temperature range:  $-30^{\circ}\text{C} \leq T_a \leq 60^{\circ}\text{C}$

Duration of single triggering impulse or sum of impulses series:	$t_{pul} \leq 1\text{ s}$	Time interval between impulses or series of impulses	$t_p \geq 30\text{ s}$
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- 2) Ambient temperature range:  $-30^{\circ}\text{C} \leq T_a \leq 50^{\circ}\text{C}$

Duration of single triggering impulse or sum of impulses series:	$t_{pul} \leq 3\text{ s}$	Time interval between impulses or series of impulses	$t_p \geq 60\text{ s}$
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- 3) Trigger WEx has to be powered from control modules type MD...Z... manufactured by GAZEX

##### B) Valve with solenoid trigger **COD-3/A** (information on valve MAG-3 housing label)

Ambient temperature range:  $-30^{\circ}\text{C} \leq T_a \leq 50^{\circ}\text{C}$ .

Trigger COD-3/A can be powered exclusively by control module type MD...Z... manufactured by GAZEX

### 2. Application

- in **Gas Safety Systems** installed in: gas boiler rooms, industrial facilities, public utility buildings, domestic installations (i.e. one family houses and multi-family houses, farmsteads, private use recreational buildings), gas reduction -measuring stations, etc. itp. - **as an actuator** that surely and effectively cuts off the gas supply to faulty installations when a gas presence is detected in supervised by **System** compartments
- in gas installations supplied in conformance with appropriate regulations from low and medium pressure gas grid

- flange bolts should be tightened across
- maximum torque for flange bolts

	<b>DN</b>	50	65	80	100
	Torque [ <b>Nm</b> ]	50	50	50	80

- valve's assembly should be finalized with carrying out an leaktightness test of installation including **MAG-3** valve using compressed air or inert gas. Test pressure cannot exceed **P<sub>s</sub> = 6,5 bar**  
Oxygen use for this test is strictly forbidden (for example from gas bottle). **There is huge risk of explosion initiation (oxygen+lubricant in valve)**
- protecting the valve against heavy dust and flushing (both before, during and after assembly)
- ensuring the correct operating temperature
- valve should not be exposed to dilatation nor any dynamic forces under operating conditions
- **electrical connection - see p. 5.**

#### 7.1. Installation in explosive hazardous area - additional requirements

- valve body should be connected to electrical potential equalization system of conductive parts (earthing)  
Could be done in one of possible ways:
  - a) by use of conductor with cross section of 4 mm<sup>2</sup>, connected to dedicated earthing clamp (12) on valve body
  - b) by a permanent mechanical connection (also ensuring reliable and permanent electrical contact) of the valve body with an external structural element, electrically connected in a reliable and durable manner with such a potential equalization system

### 8. Setting up procedure - opening the valve

**Attention!** The valve is delivered in closed state.

- check if the valve is closed, the red marker on the stretching pin should be in perpendicular position to the arrow indicating direction of the flow
- put the proper end of the wrench on straining mandrel:
  - "arrow" on the wrench end indicates **"Z"** (see fig.A)
  - in "hole" on the end of the wrench **"Z"** is located (see fig.B)
- open the valve by rotating the wrench in accordance with the direction indicated by arrow „U“ and inscription „OPENING“ (counterclockwise), till the valve's internal mechanism is interlocked in „O“ position by a latch.
- **remove the wrench from a straining mandrel**  
The wrench should be kept in a dedicated place, available only for authorized personnel
- the valve is ready to operate when the red marker on stretching pin is in a parallel position with the arrow indicating the direction of the flow

#### Attention!

1. The wrench **must not** be left on a straining mandrel, it can be located there only during opening the valve procedure  
**Leaving the wrench on straining mandrel can cause serious damage to health of all who are near the installation while valve receives a „close“ signal**
2. Under no circumstances force attempting of manual movement with a wrench key (not related to opening the valve) - beyond the extreme "O" and "Z" positions are not allowed.  
This may damage the ratchet mechanism and result in the loss of warranty rights.

### 9. Valve manual closing

The valve construction enables its manual closing, without electrical impulse generated by gas leak detection system. For this purpose:

- press button (2) **"MANUAL CLOSE"** located on the housing

**Attention!** The valve cannot be closed using the wrench - see p. 8.2

### 10. Periodical inspection and service

The flap MAG shut-off valve is a device that does not require other maintenance activities other than operation ones. It also does not require interference in internal mechanisms - the housing has been sealed. It is only necessary to take care of periodic removal of accumulated dust, at least during periodical inspections of correctness of operation.

Checking the correct operation of the valve consists of two attempts to close the valve:

- the signal generated by the System (detector, control module). The method of performing this test is given in the Safety System Operation Manual by the manufacturer of this system
- and manually using the button on the valve

After re-opening the valve according to the procedure described in point 8, it can be considered that the MAG valve is working properly and is ready for operation.

Required frequency of periodical inspections:

- after the first month of operation
- then around every 3 months, but not longer than every 6 months

- valve can be installed:
  - outside the buildings - in the junction box protecting against direct influence of atmospheric factors  
**Attention! Valve is not waterproof!!!**  
**It should be installed in such a box and in such a way that it is completely protected against dripping water during rain and snowfall.**
  - inside the buildings
- assembly should be performed in professional way with use of proper tools
- install downstream the main tap, upstream or downstream the gas meter
- assemble to installation according to the gas flow arrow on the valvee
- mounting position - any
- direct contact of the valve with wall, ground, etc. is unacceptable; keep the minimum distance - about 1 cm
- location of the MAG-3 valve should be selected so as to ensure free access needed to its operation (for persons authorized to do so)
- attention should be paid so that after installing the valve there is enough space left (**maneuvering space**) for free operation with the attached tightening wrench, in the full rotation range necessary to open the valve
- Attention!**  
 Valve is delivered with a dedicated wrench that enables (according to the current needs) setting the flow direction of the valve through opening valve in one of two available positions. This feature makes the adaptation of the valve to the installation much easier especially for already existing installations (see fig. A and B)

- in zone 1 or 2 hazardous areas with gases and flammable vapours assigned to explosive class IIB, temperature class T1,T2,T3,T4, under condition that „**Special usage conditions (ATEX)**” will be assured - see p. 1.1.
- additionally valve can be used as manual stopcock, however it can not act as gas installation **main stopcock**
- together with gas detection system, valve can perform a function of lock-up for devices that burn gas fuels and are intended for use inside the buildings and utility compartments. Such a lock-up prevents from accumulation of burning gas in mentioned buildings and compartments

### 3. Technical data

valve class.....	A	
group.....	1	
explosion protection type (ignition).....	constructional safety "c"	
designation acc. to ATEX Directive.....	II 2G c IIB T4	
nominal diameter of the valve.....	DN50	valve type ZBK-50k
	DN100	valve type ZBK-100k
nominal diameter of the counterflanges.....	DN32, DN40, DN50	valve type ZBK-50k
	DN65, DN80, DN100	valve type ZBK-100k
media.....	gas fuels (natural gas, propane-butane)	
maximum operating pressure.....	$P_{max} = 5 \text{ bar}$	
safe static pressure.....	$P_s = 6,5 \text{ bar}$ ( <b>It is used during leaktightness test of installation-valve by this pressure can not operate</b> )	
flow characteristics.....	see p.6 - <b>Flow characteristics</b>	
opening the valve.....	only manual	
closing the valve.....	electric impulse or manual	
ambient and media temperature.....	$-30^{\circ}\text{C} \div 60^{\circ}\text{C}$ (for Ex - see p. 1.1.)	
closing time.....	<1s	
pipe flange connection.....	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, brass, stainless steel or galvanized steel	
sealing material.....	nitrile-butadiene rubber NBR	
mounting position.....	any	
protection degree (acc. PN-EN 60529).....	IP4X (for valve)	

### 3.1. Electrical parameters

<b>Solenoid trigger (Ex)</b>	type <b>WEX</b>	type <b>COD-3/A</b>
explosion-proof construction type.....	rugged "e"	rugged "e"
designation acc. to ATEX Directive.....	II 2G Ex eb IIC T5 Gb	II 2G Ex eb IIC T4 Gb
rated current - <b>impulse</b> .....	6A	6A
rated voltage $U_{N \text{ pul}} - \text{impulse}$ .....	12V DC	12÷16V DC
max voltage $U_{m \text{ pul}} - \text{impulse}$ .....	24V	
minimal impulse time (necessary for closing the valve).....	0,2s	0,2s
ambient temperature range.....	$-30^{\circ}\text{C} \leq T_a \leq +50^{\circ}\text{C}/+60^{\circ}$ see p. 1.1.A1 i 1.1.A2	$-30^{\circ}\text{C} \leq T_a \leq +50^{\circ}\text{C}$ see p.1.1.B
impulse duration or sum of impuses series.....	$t_{pul} \leq 1s/3s$ -see p. 1.1.A1	see p. 1.1.B
time interval between impulses or series of impulses.....	$t_p \geq 30s/60s$ -see p. 1.1.A2	see p. 1.1.B
protection degree (acc. PN-EN 60529).....	IP66	IP66/67
operation type.....	S3 intermittent running(times given above)	
electrical connection.....	valve is equipped in white cable conducted outside (2x1,5mm <sup>2</sup> , lenght. ~2m)	
<b>Valve closing element indicator (Ex) - option</b>	limit switch BARTEK type: 07-2511-5330/01	
explosion-proof construction type.....	fire-proof housing "d"	
designation acc. to ATEX Directive.....	II 2G Ex d IIC T6 Gb	
connecting element.....	change-over contact (1NO+1NC)	
usage category.....	AC-15, DC-13	
rated connecting voltage /current.....	AC-15: 1A /250V DC-13: 0,15A / 250V, 0,03A/230V (for inductive load L/R=3μs i Ta=40°C)	
mechanical durability.....	> 2 x 10 <sup>6</sup> cycles	
electrical connection.....	limit switch has black cable conducted outside (3x0,75mm <sup>2</sup> , lenght ~3m) (other data - see p. <b>Electrical connection</b> )	
safety class.....	II	
protection degree (acc. PN-EN 60529).....	IP66	

(\*) For ZBK-100k (DN100) valve only 4 flange connection screws applied

Fig. A

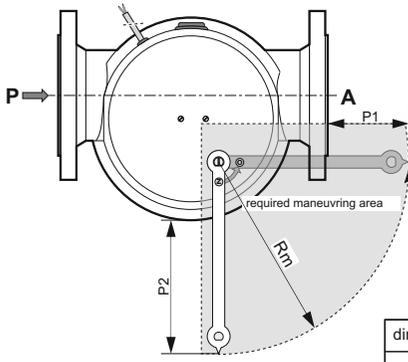
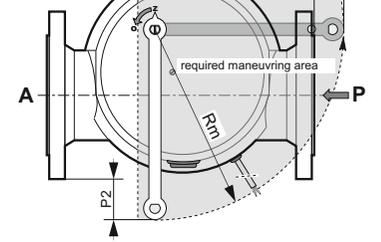


Fig. B



dimensions in [mm]	Fig. A			Fig. B		
	P1	P2	Rm	P1	P2	Rm
<b>ZBK-50k</b>	~105	~150	~197	~65	~72	~197
<b>ZBK-100k</b>	~190	~255	~317	~107	~122	~317

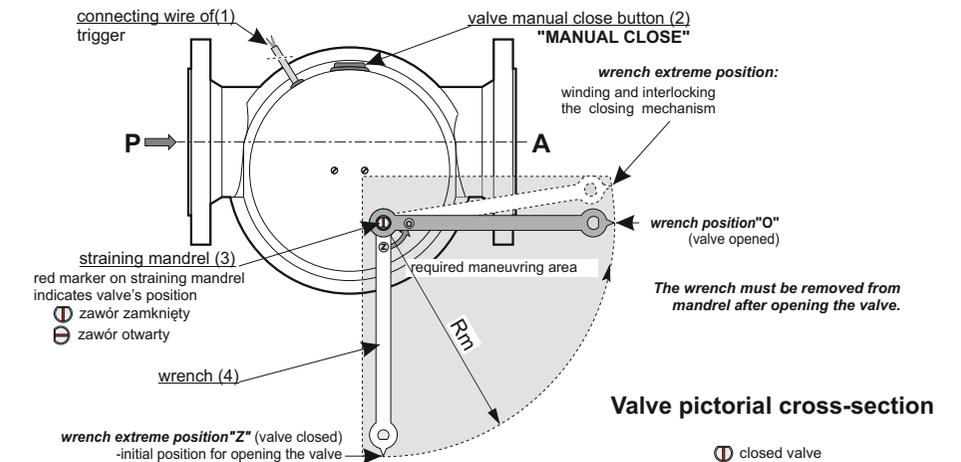
- ensure proper rigidity of the installation in the place where the valve is installed (Group 1 valve). This can be achieved by using rigid supports to the bending and torsional stress exerted by the piping system in the installation (eg due to the lack of alignment of the of the pipeline at the inlet and outlet of the valve)
- ensure that the 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
  - 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 he 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

## 4. Construction and the principle of operation

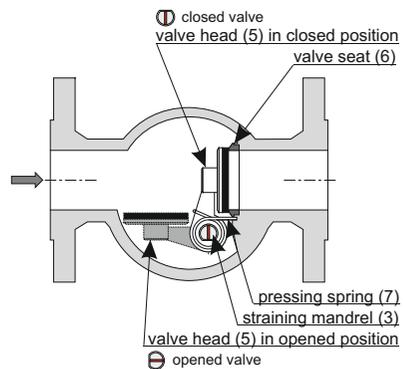
The pressing component of valve head (5) to the valve seat (6) is pressing spring (7) element placed on straining mandrel (3). Valve can only be opened manually using a dedicated wrench (4) which is applied on a straining mandrel. Opening the valve procedure is carried out by a quarter-turn of wrench in an indicated direction (counterclockwise) till the ratchet mechanism (9) locks the valve's closing component in an open position ("O"). Ratchet mechanism consist of among other things trigger lever (10) and detent (11). During valve opening trigger spring (7) is subjected to additional winding.

**The wrench must be removed from mandrel after opening the valve.** Closing the valve (by the trigger spring) occurs when trigger lever (10) release ratchet mechanism. This take place in case receiving an electrical impulse on solenoid trigger (8) or by pressing the "MANUAL CLOSE" button (2).

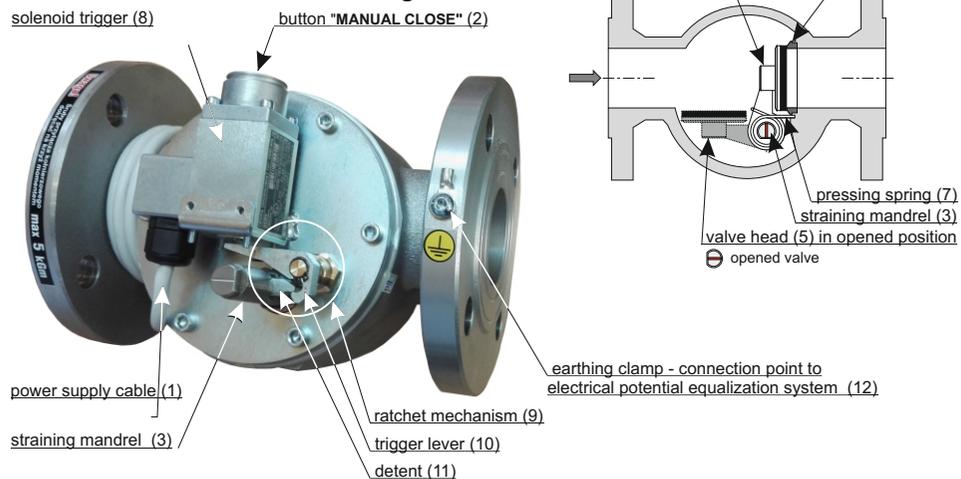
Valve body has possibility of connection to electrical potential equalization system of conductive parts - very important in explosive hazardous areas. Earthing clamp (12) is located on the flange.



Valve pictorial cross-section



Valve view without housing



## 5. Electrical connection, valve control (requirements):

### Solenoid trigger (Ex):

- type COD-3/A can be powered exclusively by control module type MD...Z... manufactured by GAZEX
- type WEX parameters of power supply (control impulses) given in p. 3.1 and 1.1. Trigger WEX has to be powered from control modules type MD...Z... manufactured by GAZEX

- solenoid trigger has two wire, non-detachable, white power supply conductor (2x1,5mm<sup>2</sup>) (1) with length of app. 1,5m, conducted out of the valve through a rubber-sleeve in valve's housing

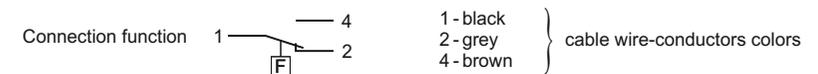
**Attention-important!** The trigger coil with power supply cable connection is fitted into internal chamber in cable gland and has been molded with polyurethane..

**This connection cannot be dismantled.**

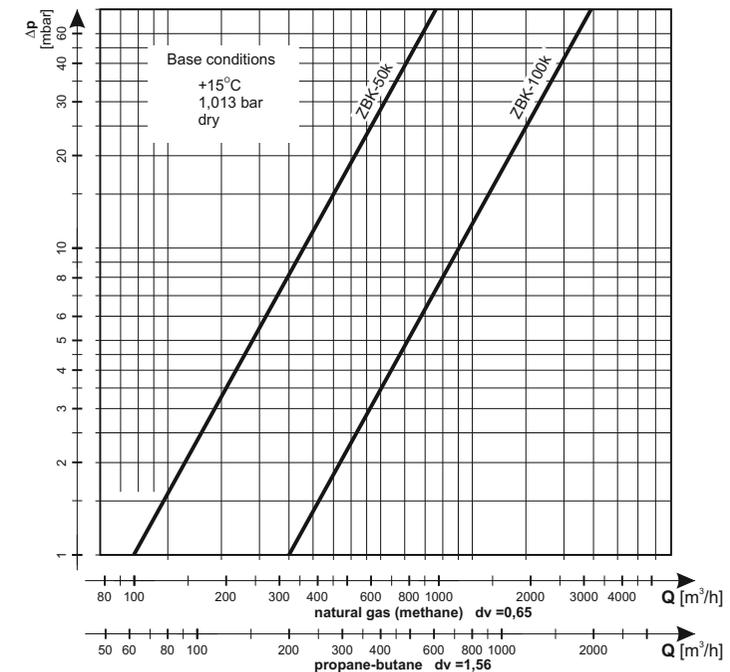
- wire ends of a conductor are separated and terminated with ferrules
- connecting cable of trigger should be:
  - cabling (especially during valve assembly) in ambient temperature not lower than -5°C
  - independently fastened on whole length outside the valve
  - protected against direct impact of sun, rain and other expected hazard
- electrical connection between the valve and the control module should be established with a solid-core two wire cable through an additional, leak-proof junction box with protection degree IP54 or higher. It should be ensured to use explosion protected (Ex) junction box if fitted in explosion hazardous area.
- connecting wire size depends on distance to control module (central)- see data in **Service manual** of applied control module. Size and allowable length could be also determined assuming as admissible 10% voltage drop on conductor (calculated from rated voltage 12 V)
- polarization of wire in conductor is **indifferent**
- it is not allowed to apply a voltage to solenoid trigger, when it is disassembled from the valve

### Valve closing element position indicator (Ex) - Option available on order

- limit switch has 3-wire (3x0,75mm<sup>2</sup>, ) non-detachable, **black** connecting conductor with length app. 3m, conducted out of the valve through a rubber-sleeve in valve's housing (connector data sheet - see p.3.1.)
- connecting elements is change-over contact (1NO+1NC)



## 6. Flow characteristic



## 7. 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