	<b>FLAME ARRESTER</b>	<b>REV 1.0</b>
	<b>933-G-Rp1 1/2 /4x0,17/D and 933-A-40/4x0,17/D</b> <b>INSTRUCTIONS FOR OPERATING AND MAINTENANCE</b>	<b>Page 1/7</b>

For the flame arrester type 933-G-Rp1 1/2 /4x0,17/D and 933-A-40/4x0,17/D catalogue data sheets as "Dimension sheet", "Technical data" and "Pressure drop/volume flow charts" are available including the technical data, constructions and dimensions.

## 1. Use

The flame arrester type 933-G-Rp1 1/2 /4x0,17/D (series with joint thread Rp1 1/2 ") and type 933-A-40/4x0,17/D or 933-A-40ANSI/4x0,17/D (series with DIN standards joint flange DN40 PN16 or flanges according ANSI 150 RF) complies with of the standard EN 16852 : 2016 – "Flame Arrester – Performance requirements, test methods and limits for use".

The general suitability as a detonation flame arrester for stable detonation when used with inflammable gas/air mixture and vapour/air mixture of inflammable liquid of the explosion group IIC (normal gap width < 0,50 mm) has been verified by tests executed at the Institute for Safety Technology IBExU Freiberg. The results of it were confirmed by the issued EC prototype test certificate **IBExU15ATEX2001\_X**.

On principle, for all cases of use the placement conditions, especially the following limits for the operating pressure and temperature have to be considered:

- maximum permissible operating pressure : 1,4 bar (absolute)
- maximum permissible operating temperature : 60°C

The technical parameter of the flame arrester are documented in the works test certificate according to EN 10204 with the delivery of the device.

In the declaration of compliance it is referred to the accordance with the draft of the harmonised standard EN-ISO 16852. The maintenance of the basic safety requirements according to directive 2014/34/EU has been confirmed.

The following documents are considered as an integral part of the instruction for operation and maintenance:

- EC-Prototype test certificate
- Test certificate EN 10204
- Declaration of compliance

The flame arrester shall only be installed and used following the conditions for use according to the EC prototype test certificate. Any foreign use of the flame arrester has to be excluded.

## 2. Construction

The flame arrester consists of the flame arrester element (3) which is chucked between the cover (1), the O-rings (4) for the outer sealing and the connecting elements threaded bolt (5) and hexagon nut (6) with protection cover (7).


The flame arrester element (3) holds four metal foil elements (9) and (10) with different directions of winding in its grid cage (8). The foil elements are kept on distance by a clip (11) and a ring (12) and fastened in an axial position with the stars (13) by means of a screw (14) with hexagon nut (15).

By means of a locking washer (29) and over and above that adhesive in the thread the hexagon nut (15) is safeguarded against loosening.

The thread holes positioned on the cover (1) are closed by closure screws (19) and sealing rings (20). The closure screw on the lower side is used for condensate drain. In case of using a resistance thermometer (21) the closure screw on the upper side of the flange sheet is exchanged together with the sealing ring inside.

The inlet and outlet nozzles of the flame arrester have to be locked by means of sealing plug or flange coverings (24) for the protection against impurities and moisture during the transport.

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### 3. Marking

The information for marking the flame arrester are arranged on the nameplate (sheet 6/7+7/7).  
The following data are indicated :

- Name and address of the manufacturer
- Type
- Serial number and year of production
- Number of the certificate (EC prototype test certificate-No.)
- Stock number
- EN-number
- The specific mark for prevention of explosions in connection with the mark referring to the group of devices II, and the letter „G“ (for areas where explosive gas-, vapour, air mixtures are present)
- Explosion group
- The CE mark with the number of the indicated inspection authority, which acts during production observation

The flame arrester is visibly marked on the grid cage (8) with BS&B-4x0,17.

The metal foil element is marked at the outermost wound element, as follows :

- name of the manufacturer
- gap width
- material number
- direction of winding

Example : BS&B-0,17-1.4571-R

The marking of the parts tested on leak proofness and strength is done by stamping.

The flame arrester is marking on the cover (1) by a sticker with the warning about short time burning if the flame arrester is equipped with a resistance thermometer.

### 4. Installation

The arrangement and the installation of the flame arrester shall be carried out under the observance of the applicable rules, especially applicable the safety regulations for the application field.

Before the installation into pipe line the sealing plug or flange coverings shall be removed.

The special criteria mentioned in the EC prototype test certificate under chapter (17) -Special Conditions-have to be followed. The usage of a resistance thermometer for signalling an afterburn in the flame arrester is to be checked in a special way.

The flame arrester of the type 933-G-Rp1 1/2 /4x0,17/D and 933-A-40/4x0,17/D is safe against short time burning. The flanging of the flame arrester into the pipe is carried out independently from the direction of the starting flame (Bidirectional flame arrester).

A vertical as well as a horizontal mounting position is permitted, whereas in case of a vertical positioning the mixture flow should be from down to up.

The flame arrester type 933-G is equipped with a pipe internal thread according to ISO 7-1. For the joint pipe line the suitable tapered outer pipe thread is recommended. If necessary a sealant in the thread may be used (see table1).

For relieving the mounting and dismantling of the flame arrester using a suitable tube fitting is practical.

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	<b>FLAME ARRESTER</b>	<b>REV 1.0</b>
	<b>933-G-Rp1 ½ /4x0,17/D and 933-A-40/4x0,17/D</b> <b>INSTRUCTIONS FOR OPERATING AND MAINTENANCE</b>	<b>Page 3/7</b>

Table 1: Connecting thread and width across flat 933-G

Cylindrical internal thread of the flame arrester (shortcut Rp)	Rp 1 ½
Tapered outer thread of the pipe line (shortcut R)	R 1 ½
Width across flat	SW 60

The flame arrester 933-A is set as a type with a flange according to DIN 2501 PN16 - shape C and ANSI 150 RF in the dimension DN40. For the flanged joints the flat gaskets with a sealing parameter  $k_0K_D \leq 25b_D$  are recommended. While flange-mounting the sealing faces must not be damaged. There must not be any foreign matter or dirt between the flanges, so that no gap to the atmosphere can arise. There should always be a leak test before putting the plant into operation.

The proving pressures of the flame arrester according to the test certificate EN 10204 must not be exceeded. The flame arrester must not be a bed for the pipe and should be installed with only little stress.

For the dismantling of the resistance thermometer assembly freedom is necessary, with the dimensions according to table 2 minimum (see spare parts drawing, page 6/7 and 7/7).

Table 2: Dismantling dimensions of the resistance thermometer

<b>Dimension</b>	<b>Rp 1 ½ or DN40</b>
<b>D mm</b>	340

The resistance thermometer delivered separately from the flame arrester has to be assembled on this side of the flame arrester which is situated towards the ignition source. Therefore, the temperature sensing element in exchange with the screw plug shall be tightened by the accompanying gasket ring in the appropriate tapped hole of the cover flange and safeguarded against loosening by applying Loctite 221 to the thread.

Is to be counted with application as bidirectional in-line deflagration flame arrester reciprocally the flame arrester element on a after burning, then each cover is to be equipped with a temperature sensor, whereby the assembly of the temperature sensors from space reasons must take place around 90° or around 180° transferred to each other.

When the temperature sensing element is fitted to the measuring device the installation guide lines of the resistance thermometer's manufacturer and the conditions for guaranteeing the compliance have to be considered. The circuit between the resistance thermometer and the device for stopping the mixture input or another equal event (release of an emergency function) has to be done in that way so that within 30 seconds after recording the flame by the resistance thermometer the hazardous situation is be stopped.

## 5. Maintenance

The maintenance includes a periodic visual control of the flame arrester, especially the metal foil elements with regard to contamination and appearance as well as a periodic functional check of the resistance thermometer. The intervals for the maintenance works depend on the operating conditions and the kind how the individual media tend to contamination and shall be set operator.


For cleansing works the flame arrester element has to be drawn.

By solve of the connection elements (5), (6) and dismantling of the covers (1) the accessibility of the flame arrester element (3) is enabled to, at the same time can take place the examination of the gasket rings (4).

In case of minor contamination the flame arrester element shall be blown out with compressed air or hot vapour in a direction contrary to the operational flow.

In case of major contamination or stickily adhering impurities on the metal foil element a rinsing in a cleaning agent may be carried out. After cleansing works with a special cleaning agent all part which had been wetted hall be blown dry.

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During the cleansing works no mechanical modification on the metal foil elements and on the housing of the flame arrester may be done. The tight position of the screws joint (14), (15) (29) fastened against loosening shall be checked. (Table 3).

Table 3 : Tightening torque of the screws joint (14), (15), (29)

<b>Dimension</b>	<b>Rp 1 1/2 or DN40</b>
<b>Torque Nm</b>	12

The occurrence of explosions with a succeeding stabilised burning at the metal foil element leads to major mechanical and thermal stresses. If due to a fire at the metal foil element changes in its structure will appear or winds were loosened the flame arrester element has to be replaced.

On principle, the flame arrester element has to be replaced by a new one, if:

- a fire occurred on the metal foil element
- loosening or distortions in the structure of the metal foil element have been recognised;
- corrosion damages at the metal foil element have been detected;
- in case of strongly contaminated metal foil elements, even after cleaning, a residual contamination of more than 30 % of the free flow cross-section remained.

All works in connection with the cleaning and replacement of the arrester element shall be executed only by trained and authorised skilled personnel.

After a fire at the flame arrester element the functionality of the resistance thermometer shall be checked.

In case of replacement of the gasket rings (4) it shall be paid attention to that before reinstallation they must be slightly greased with silikone grease (order-no. 702015500) and must not be dragged over sharp edges.


The threaded bolts (5) shall be slightly lubricated with a high pressure grease (order-no. 700556600) and fastened with a torque according of 15 Nm.

The external leak-proofness of all pressure loaded flanged and thread joints shall be checked.

It is recommended to have the appropriate flame arrester available for the operating flame arrester for a fast exchange.

In case of replacement of structural units only original spare parts listed in the spare parts list may be installed to ensure the required safety.

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## 6. Spare parts list

Table 4 : Spare parts 933-G-Rp1 1/2 /4x0,17/D and 933-A-40/4x0,17/D

Item No.	Designation	No.	Material	Order-No.
				<b>Rp1 1/2 or DN40</b>
3*	Flame arrester element 4x0,17	1	NSt	15 513 026
4*	O-ring	2	KV	792041100
	O-ring	2	KG	792066100
	O-ring	2	K	792065300
5	Threaded bolt	4	St	222100623
	Threaded bolt	4	NSt	222101423
6	Hexagon nut	8	St	200506439
	Hexagon nut	8	NSt	202026423
7	Protection cover	8	K	700547800
19	Screw plug	4	St	215031200
	Screw plug	4	NSt	212097500
20*	Gasket ring	4	LM	504650200
21*	Ex(i)-thermometer			
	3-conductor	1	NSt	662025820
	4-conductor	1	NSt	662059623
	3-conductor+transmitter	1	NSt	662064323

Attention: Parts marked with \* shall be available for maintenance works.

### Material marks

St ... steel	LM ... light metal	KG ... gummy plastic
NSt ... stainless steel	K ... plastic	KV ... Viton

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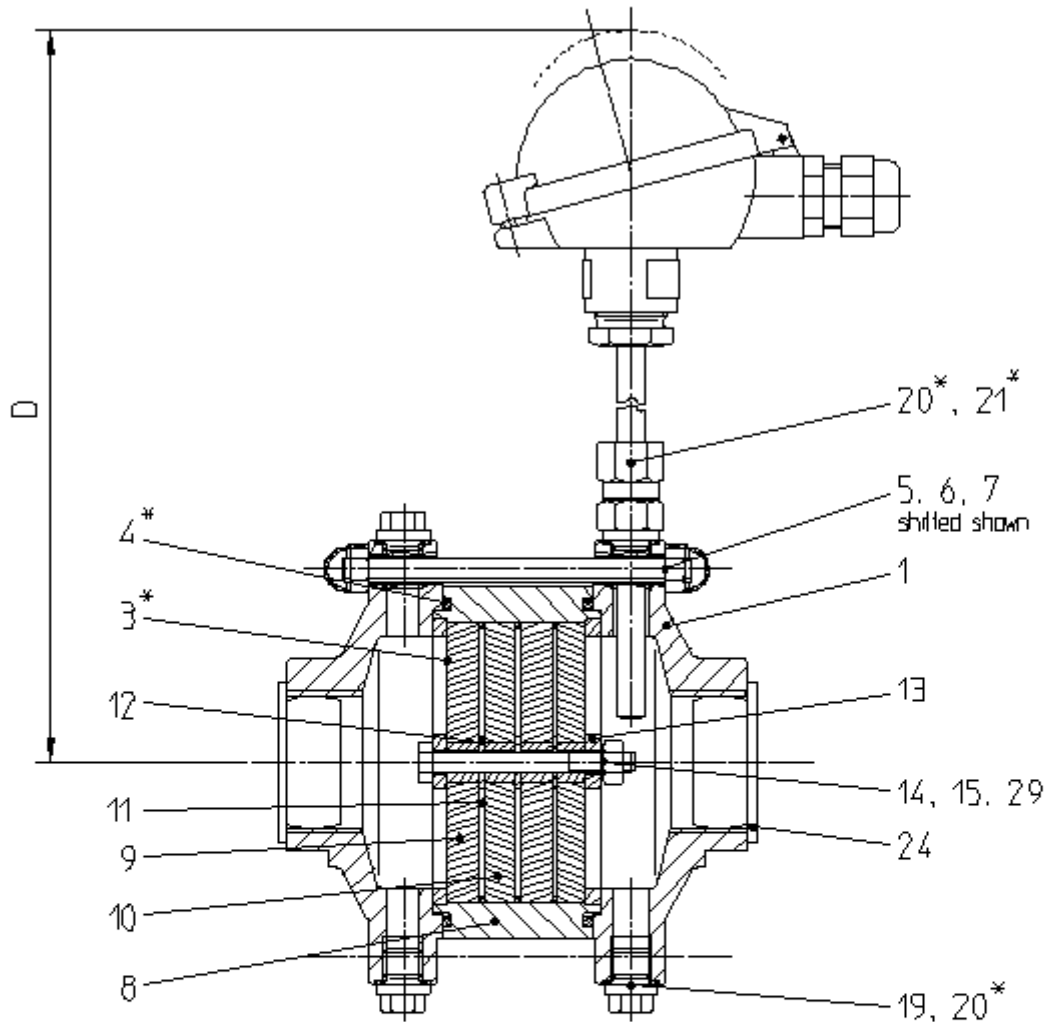


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**933-G-Rp1 1/2 /4x0,17/D and 933-A-40/4x0,17/D**  
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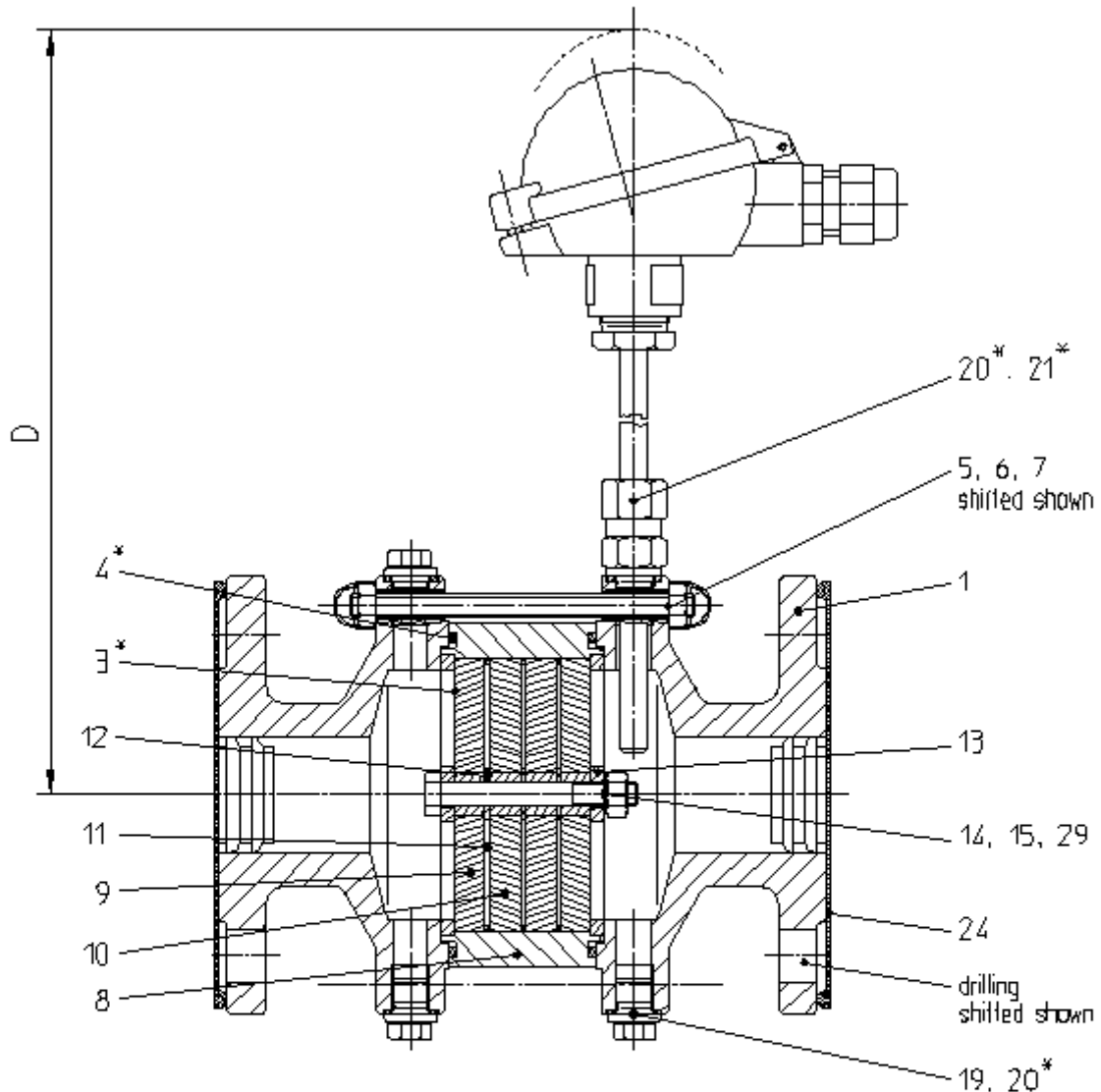
Drawing of the spare parts : 933-G-Rp1<sup>1/2</sup>/4x0,17/D



Attention . Parts marked with \* shall be available for maintenance works.  
Dimension D is a size dismantled condition.

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Drawing of the spare parts : 933-A-40/4x0,17/D



Attention : Parts marked with \* shall be available for maintenance works  
 Dimension D is a size dismantled condition.

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