

Fire and explosion protection

EXPLOSION PROTECTION

WE PROTECT YOUR INDUSTRY TOO



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Fire and explosion protection



Proudly made in the Czech Republic

All our products and equipment are tested and comply with legislation. We design and comprehensively address the safety of operations and individual technologies in terms of fire and explosion prevention, risk analysis, engineering, and documentation according to applicable legislation 99/92/EC - ATEX 153. We perform engineering with regard to safety standards, regulations, decrees, and directives valid in the Czech Republic and abroad - we comply with the ATEX directive, VDI, NFPA.

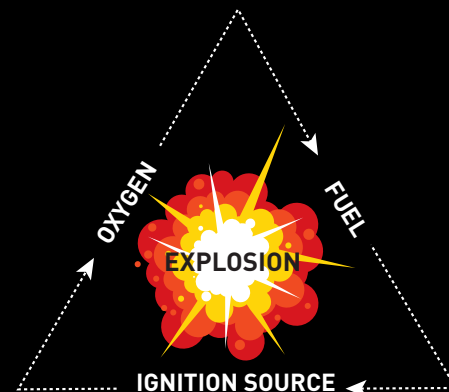


WE CAN FIND A SOLUTION FOR YOU!

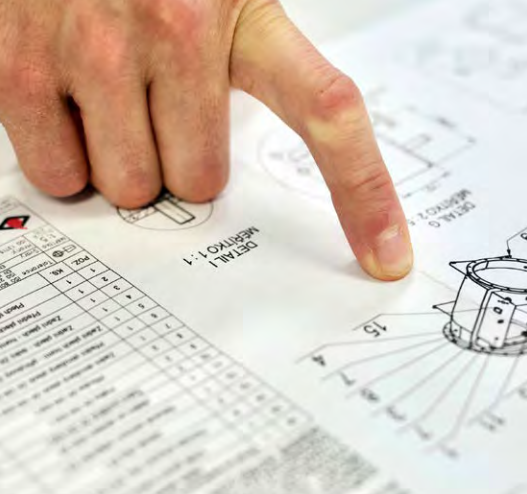
At RSBP, we are ready to offer a complete solution through our services in fire and explosion protection and thus eliminate the consequences of fire or explosion. By professional assessment of the technological process, we can determine the degree of risk of explosion, as well as by proposing suitable measures to ensure its minimization or complete elimination. We will reduce the risk of damage to your operation.

The risk of the explosion becomes a real threat if the following conditions are met at the given place and at the same time:

- substances that create explosive atmospheres
- sufficient amount oxygen or another oxidizing agent
- effective ignition source



By using suitable explosion protection, the negative effects of possible accidents in industrial plants can be significantly reduced and considerable financial resources, as well as the health and lives of operating personnel, can be protected. Proper application is based on the correct assumptions of designing protection systems and requires a comprehensive approach to this issue.



SERVICING AND MAINTENANCE

Our service department is available on the phone 24/7 and is ready to help with your current request at any time.

- we offer regular service according to legislation
- we provide repairs, supply of spare parts
- we provide a completely new installation of protection equipment in cases of expansion of the production line
- we provide maintenance for all equipment installed by our company



PROPOSED SOLUTIONS IN THE FIELD OF "ATEX"

- design proposals for the protection of technological equipment against explosion
- software simulations of pressure resistance of existing technology
- practical measurements of pressure resistance of machinery (filters, silos, ...)
- comprehensive proposals for organizational and technical measures to reduce or minimize the risk of explosion hazard
- implementation and service activities in the field of fire and explosion protection
- by professional assessment of the technological process, we are able to determine the degree of risk of explosion, as well as its minimalization or complete elimination by proposing suitable protection, and thus reduce the risk of damage in your operation

PROCESSING OF ENTRY REQUIREMENTS - SOLUTION OF "ATEX" ISSUES

- elaboration of fire technical and explosion characteristics of substances
- measurement of dust and concentration of gases and vapors
- consultation over a draft protocol on the determination of external influences
- identification of sources of risk and investigation of the causes of explosions in practice

ANALYSIS AND EVALUATION OF THE CURRENT SITUATION IN ACCORDANCE WITH "ATEX"

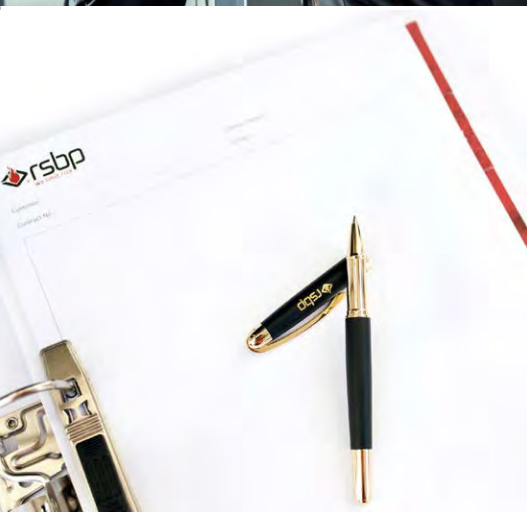
- elaboration of explosion protection documentation (EPD) including its regular updating
- discussion of explosion protection documentation with public authorities
- elaboration of expert opinions from the point of view of the explosion of combustible dust
- inspection and designation of zones in the project documentation for existing operations

PROFESSIONAL SEMINARS OF FIRE AND EXPLOSION PROTECTION

We organize professional seminars and training on various topics related to fire and explosion protection in industrial plants. More information including current dates can be found on our website.

Suitable for:

- for personnel from the ranks of employees and external experts of companies whose operations this issue concerns
- for manufacturers of technological equipment
- for experts in the field such as professionally qualified personnel, or civil engineers, firefighters, insurance companies, etc.



EXPLOSION VENTING DEVICES – EXPLOSION VENTING

Explosion venting devices are the economical solution for safety in the industries with a risk of explosion, which arises not only when handling dust, but also gas, steam, and hybrid mixtures.

Under normal operating conditions, the venting hole is covered by a panel. When the operating level of the pressure inside the device is exceeded, the panel on its casing opens and thus the pressure and the flame are released. The pressure in the protected technology is lower than its pressure resistance level and therefore it will not be destroyed.

ADVANTAGES:

- high efficiency and reliability
- long service life
- resistance against abrasion, mechanical particle impacts, and weather conditions
- **simple installation, exchange, and easy availability of spare parts**
- variability static activation pressure

VMP devices are primarily suitable for protection of filters, reservoirs, mills, crushers, cyclones and other equipment with dust explosion danger.



VMP SU – RECTANGULAR DOMED VENTING DEVICES

- triple-layer construction with PTFE insulation
- **with high vacuum resistance**
- for devices with operating temperatures up to 240 °C
- also suitable for devices with pressure shocks
- stainless steel



VMP D – RECTANGULAR DOMED VENTING DEVICES

- domed single-layer construction with operating temperature to 100 °C
- **also suitable for devices with pressure shocks**
- stainless steel

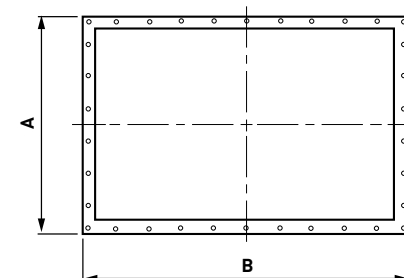


VMP F – RECTANGULAR FLAT VENTING DEVICES

- flat single-layer construction
- suitable for low operating pressure
- for devices with operating temperatures up to 100 °C
- installation without upper flange
- **curved: radius on request**
- stainless steel



VMP – DIMENSIONAL DIAGRAM



TECHNICAL DATA:

Dimension	Type			Vent area [m ²]			A – outer dimension (mm)			B – outer dimension (mm)		
	F	D	SU	SU	D	F	SU	D	F	SU	D	F
229 x 229	✓	✓	✓	0,04	0,05	0,05	309	309	309	309	309	309
229 x 305	✓					0,06			309			385
260 x 260	✓	✓	✓	0,05	0,06	0,07	340	340	337	340	340	337
150 x 600		✓			0,08			220			670	
170 x 470	✓					0,08			250			550
220 x 540	✓	✓	✓	0,10	0,11	0,12	300	300	308	620	620	628
270 x 458	✓					0,12			350			538
305 x 457	✓	✓	✓	0,11	0,12	0,14	375	375	390	527	527	542
300 x 500	✓					0,15			382			589
410 x 410	✓					0,17			490			490
610 x 290		✓	✓	0,14	0,16		685	685		365	365	
241 x 762	✓					0,18			331			852
630 x 310	✓	✓	✓	0,16	0,18	0,19	705	705	705	385	385	385
580 x 410	✓					0,24			500			670
490 x 590	✓	✓	✓	0,24	0,27	0,28	565	565	573	665	665	673
610 x 470	✓					0,29			550			690
2x 610 x 290		✓	✓	0,28	0,32		385	385		1385	1385	
600 x 600	✓					0,35			656			656
450 x 800	✓	✓	✓	0,32	0,34	0,36	530	530	550	880	880	900
2x 630 x 310		✓	✓	0,35	0,35		385	385		1405	1385	
610 x 610	✓					0,37			690			690
500 x 750	✓					0,38			580			830
457 x 890	✓					0,39			537			970
586 x 920	✓	✓	✓	0,48	0,51	0,53	661	661	671	995	995	1005
588 x 908	✓					0,53			680			1000
800 x 800	✓					0,62			853			853
685 x 1100	✓					0,75			765			1178
870 x 910	✓					0,79			960			1000
920 x 920	✓	✓	✓	0,78	0,81	0,83	995	995	1005	995	995	1005
915 x 1118	✓	✓	✓	0,95	0,98	1,02	990	990	1000	1193	1193	1203
1020 x 1020	✓	✓	✓	0,96	1,00	1,03	1095	1095	1106	1095	1095	1106
1118 x 1118	✓					1,25			1202			1202
1130 x 1130	✓					1,28			1220			1220
1000 x 2000	✓					2,00			1090			2090

* explosion venting devices are sorted by the vent area from the smallest to the largest

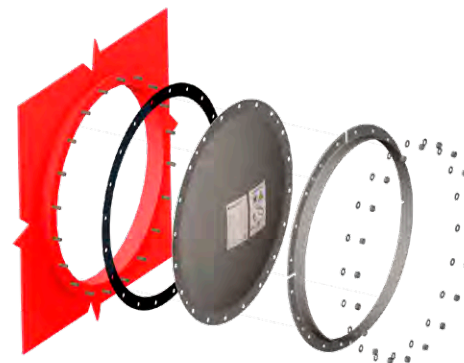
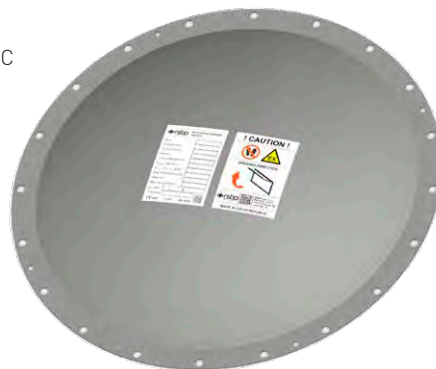
** other dimensions on request

VMP SU

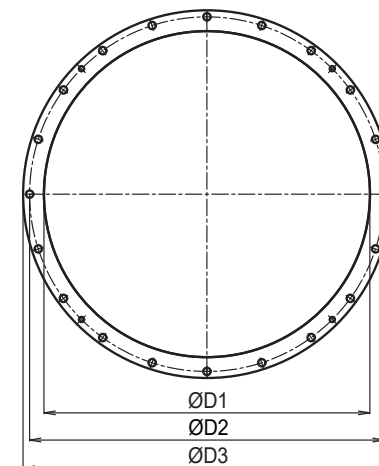
– ROUNDED DOMED VENTING DEVICES

- triple-layer construction with PTFE insulation
- **with high vacuum resistance**
- for devices with operating temperatures up to 240 °C
- also suitable for devices with pressure shocks
- stainless steel

VMP SU explosion venting devices are especially suitable for the protection of technological equipment where pressure shocks, high temperatures, or vacuum may occur.



venting device installation scheme



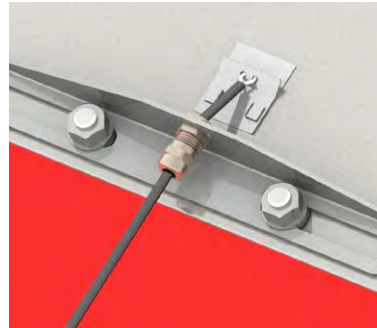
TECHNICAL DATA:

Dimension	Vent area [m ²]	Ø D1 internal camber dimension [mm]	Ø D2 pitch circle dimension [mm]	Ø D3 flange outer dimension [mm]
DN 250	0,05	270	320	350
DN 300	0,06	320	350	380
DN 350	0,07	345	387	425
DN 400	0,10	400	443	480
DN 450	0,13	450	486	530
DN 510	0,16	510	550	590
DN 600	0,24	600	646	680
DN 630	0,27	630	680	710
DN 750	0,41	770	817	850
DN 800	0,47	820	860	900
DN 880	0,53	880	920	960
DN 900	0,57	900	955	1000
DN 1000	0,72	1000	1060	1100
DN 1100	0,87	1100	1160	1200

* explosion venting devices are sorted by the vent area from the smallest to the largest

** other dimensions on request

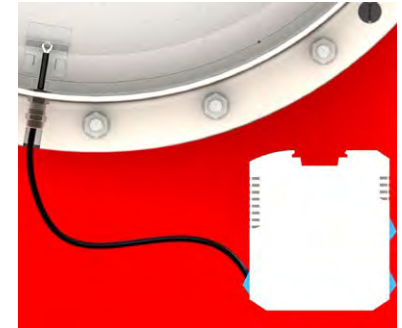
OPTIONAL ACCESSORIES FOR VMP F, D, SU



G1 – opening indicator



thermal insulation

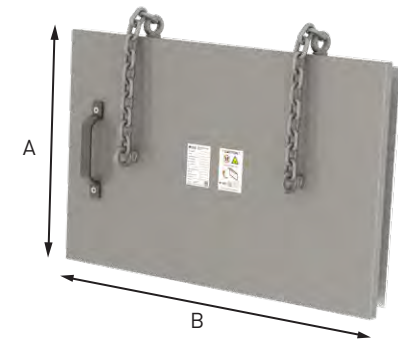


intrinsically safe relay with VMP opening indicator

- opening indicator
 - G1 - cable
 - G2 - magnetic
 - G3 - additional (installation possible on all types of VMP)
- thermal insulation
- intrinsically safe relay
- frame for VMP Type D and SU
- EPDM or silicone frame seal for VMP Type D and SU

EX DOOR – EXPLOSION DOORS

- magnetic construction
- suitable for technologies with low operating pressure and without pressure shocks
- possibility of repeated use
- suitable for technologies with very low-pressure resistance
- carbon steel with anti-corrosion surface treatment



TECHNICAL DATA:

Dimension	Vent area [m ²]	A – outer dimension (mm)	B – outer dimension (mm)
450 x 800	0,36	590	940



FLEX – FLAMELESS EXPLOSION VENTING

FLEX guarantees explosion venting in enclosed or internal spaces without propagation of flame, dangerous pressure and heat to near surroundings, therefore the equipment and technologies that are located in hard to access spaces can be protected by the flameless explosion venting without increased costs for building modifications that are usually related to installation of conventional explosion venting devices.

ADVANTAGES:

- effective arrest of flame and dangerous temperature
- securing a safe zone for technology and construction and the safe movement of personnel
- **effective dust retention - no environmental pollution**
- suitable for the food and pharmaceutical industries
- easy installation and maintenance-free operation
- elimination of building modification costs
- **also suitable for technologies working with melting, coarse and light metal dust**
- meets the strictest requirements legislation for flameless explosion venting

Protection of your technology by the FLEX flameless explosion venting device is suitable in cases, where the explosion venting is not possible to a safety zone or there is not enough space for installation of conventional explosion venting device.

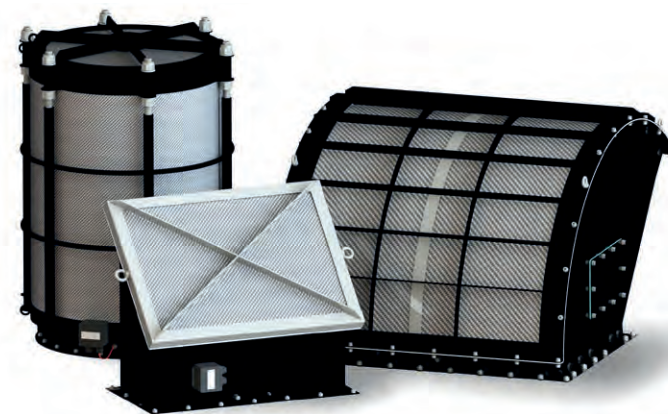
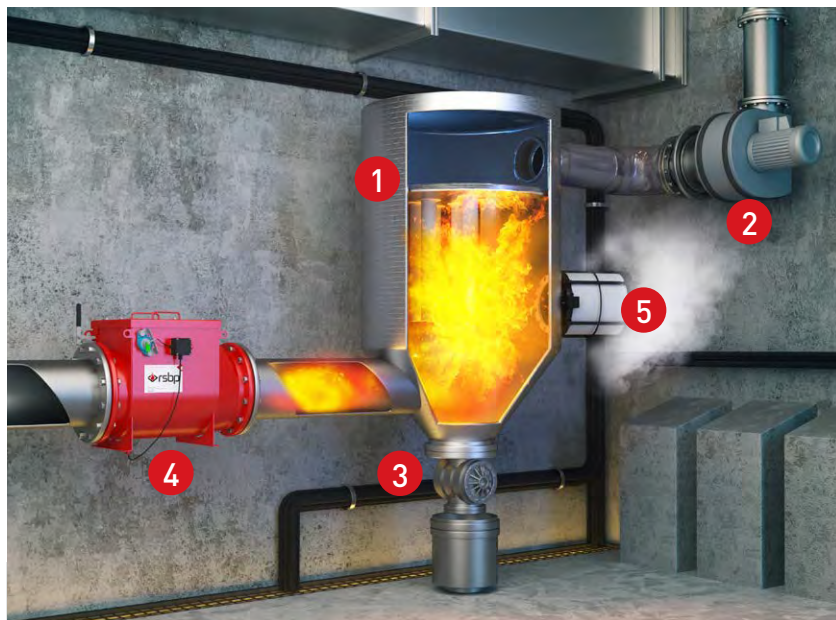


DIAGRAM OF FLEX DEVICE INSTALLATION ON THE FILTER

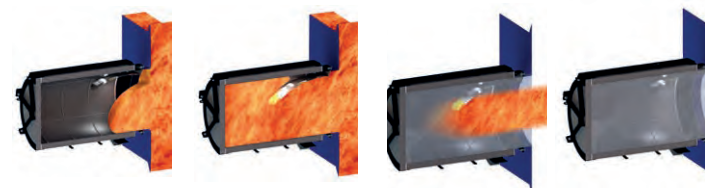


1. filter
2. fan
3. rotary valve
4. explosion isolation flap B-FLAP I
5. flameless explosion venting device FLEX C

The explosion venting device opens due to fast increasing pressure and the FLEX absorbs flame, burning dust, and gases. As opposed to an explosion venting, the FLEX device is capable to absorb these undesirable effects thanks to its construction.

The explosion venting can achieve temperatures up to 1 500 °C, with light metals such as aluminum and magnesium the temperature being around 3 000 °C.

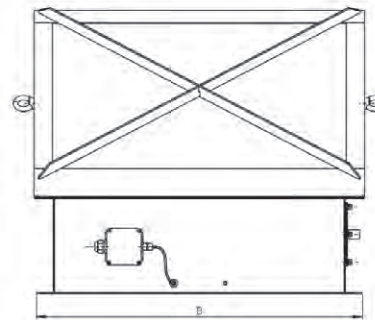
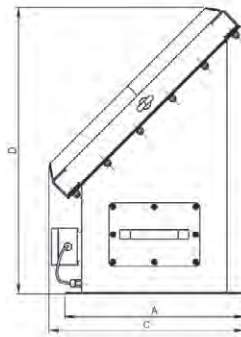
During explosion venting with the FLEX flameless equipment, the temperature is lowered to a safe level that is not dangerous for surrounding equipment and for work and movement of personnel.



TECHNICAL DATA:

Type	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)	VMP dimension*
FLEX F1 PRO	225	675	265	465	24	150 x 600
FLEX F2 PRO	305	625	335	530	28	220 x 540
FLEX F3 PRO	390	710	420	620	35	630 x 310

* FLEX is standardly equipped with a VMP of a given dimension.


APPLICATION:

Dust type	FLEX F application
Organic dust	✓
Melt and coarse dust	✓

OPTIONAL ACCESSORIES:

- sanitary bag
- intrinsically safe relay

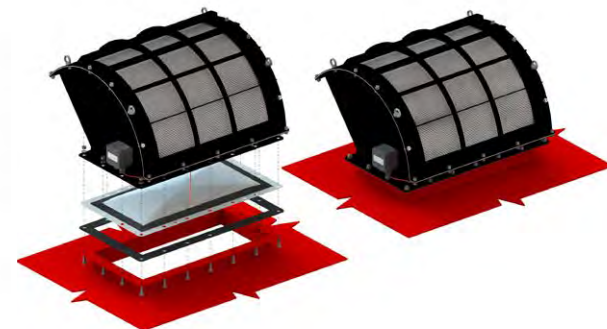
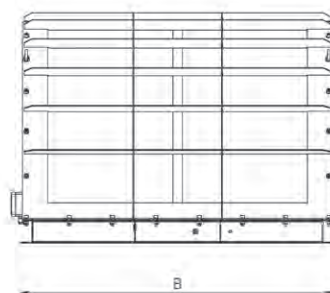
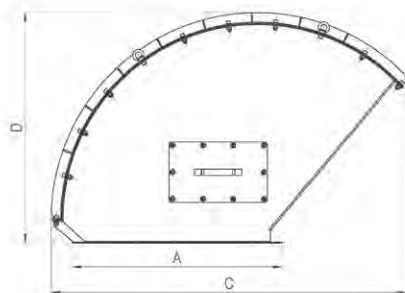




TECHNICAL DATA:

Type	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)	VMP dimension*
FLEX R1 PRO	390	710	635	410	40	630 x 310
FLEX R2 PRO	540	890	900	580	74	450 x 800
FLEX R3 PRO	666	1000	1130	735	109	586 x 920
FLEX R4 PRO	996	1198	1660	1070	215	915 x 1118

* FLEX is standardly equipped with a VMP of a given dimension.



APPLICATION:

Dust type	FLEX R application
Organic dust	✓
Melt and coarse dust	✓

OPTIONAL ACCESSORIES:

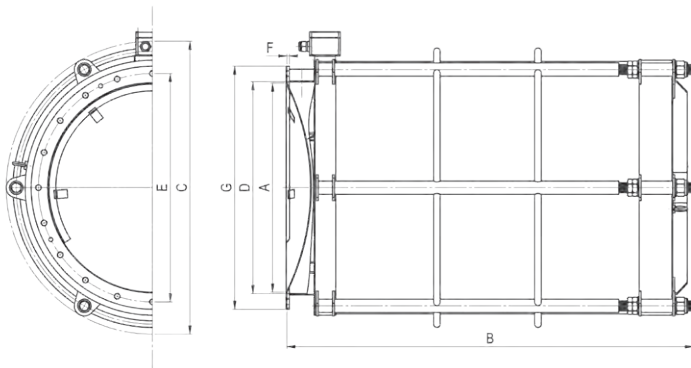
- sanitary bag
- intrinsically safe relay



TECHNICAL DATA:

Type	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	Weight (kg)	VMP dimension*
FLEX C1 PRO	315	580	485	320	350	5	375	30	DN 300
FLEX C1 PRO S	315	879	633	320	350	5	375	80	DN 300
FLEX C2 PRO S	445	1075	633	450	486	5	525	87	DN 450
FLEX C3 PRO S	505	1286	705	510	550	6	585	126	DN 510
FLEX C4 PRO S	625	1385	1020	630	680	6	705	243	DN 630
FLEX C5 PRO	815	2215	1020	820	860	6	895	291	DN 800

* FLEX is standardly equipped with a VMP of a given dimension.


APPLICATION:

Dust type	FLEX C application
Organic dust	✓
Melt and coarse dust	✓
Light metal dust	✓

OPTIONAL ACCESSORIES:

- sanitary bag
- intrinsically safe relay



EXPLOSION ISOLATION FLAP B-FLAP I – EXPLOSION ISOLATION

B-FLAP I is a mechanical device designed to prevent the transfer of flame and pressure between technologies during an explosion. The innovated explosion isolation flap B-FLAP I is certified according to EN 16447 and EN 15089.

During normal operation, the explosion isolation flap is kept open using the RPD (Reducer of Pressure Drop) mechanism. This solution significantly reduces pressure losses in the piping system, or due to airflow in the pipeline. During the explosion, the protected pipe will be closed and locked.

ADVANTAGES:

- suitable for all types of dusts, including metal dust, up to St 3
- installation on horizontal and vertical pipes
- reverse flow application
- certified for dusts with extremely low values of MIE and MIT
- suitable for push and pull system
- low pressure losses, high pressure resistance
- easy installation, inspection, and maintenance
- explosion isolation flap is locked when closed
- possibility of application on pipes with elbows and / or obstacles
- standardly equipped with an RPD mechanism
- optional possibility to produce in a stainless steel version

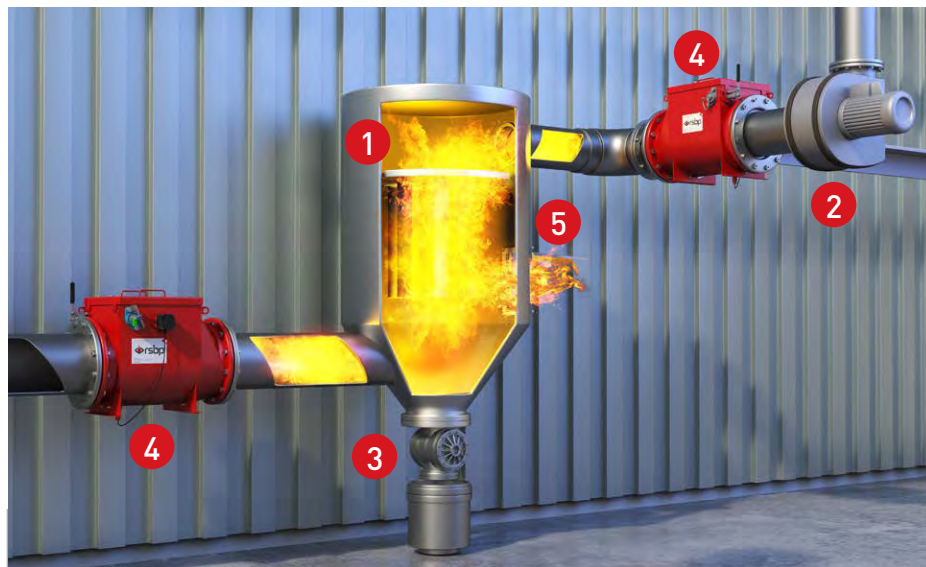
The innovated B-FLAP I is suitable for use to prevent the transfer of an explosion through pipelines between filters, cyclones and other equipment where there is a risk of dust explosion. It is suitable for pipes of sizes DN 100 - DN 800.



APPLICATION:

Organic dust	Melting dust	Light metal dust
✓	✓	✓

DIAGRAM OF B-FLAP I INSTALLATION ON PIPELINE



1. filter
2. fan
3. rotary valve
4. explosion isolation flap B-FLAP I
5. explosion venting device VMP

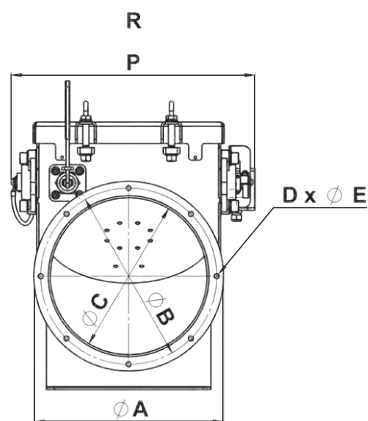
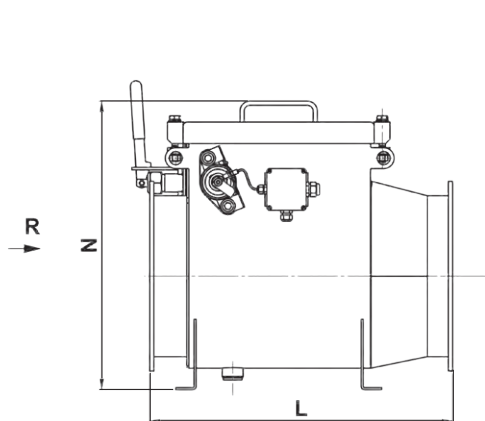
OPTIONAL ACCESSORIES:

- inductive sensor
- dust sensor
- J-Box (junction box)
- intrinsically safe relay
- counter-flanges



TECHNICAL DATA:

Dimension	ØA (mm)	ØB (mm)	ØC (mm)	D x ØE	L (mm)	N (mm)	P (mm)	Weight (kg)
DN 100	152	132	100	4 x 9,5	280	287	244	9
DN 125	177	157	125	4 x 9,5	305	308	269	11
DN 150	202	182	150	6 x 9,5	330	337	294	13
DN 200	253	233	200	6 x 9,5	390	387	344	18
DN 250	303	283	250	6 x 9,5	510	502	417	40
DN 280	343	317	280	8 x 9,5	560	537	447	47
DN 300	363	337	300	8 x 9,5	580	552	467	50
DN 315	378	352	315	8 x 9,5	600	567	482	53
DN 355	418	392	355	8 x 9,5	630	607	522	61
DN 400	464	438	400	8 x 9,5	695	652	568	77
DN 450	514	488	450	8 x 9,5	750	702	619	88
DN 500	564	538	500	8 x 9,5	800	752	669	101
DN 560	664	629	560	16 x 14	930	838	745	157
DN 630	734	698	630	16 x 14	1005	908	815	180
DN 710	814	775	710	16 x 14	1156	1102	967	305
DN 800	904	861	800	24 x 14	1246	1193	1057	351



QUICK-ACTING SLIDE VALVE GATEX – EXPLOSION ISOLATION

The GatEx quick-acting valve is used to completely close the pipe in the event of an explosion. The GatEx quick-acting slide valve is activated when an explosion is detected. The detector sends an explosion signal to the control panel, which activates the slide closing mechanism. GatEx is closed pneumatically.

ADVANTAGES:

- use for pipes from DN 50
- **pressure resistance up to 21 bar**
- extremely fast reaction time
- **short installation distance**
- respects fail-safe design

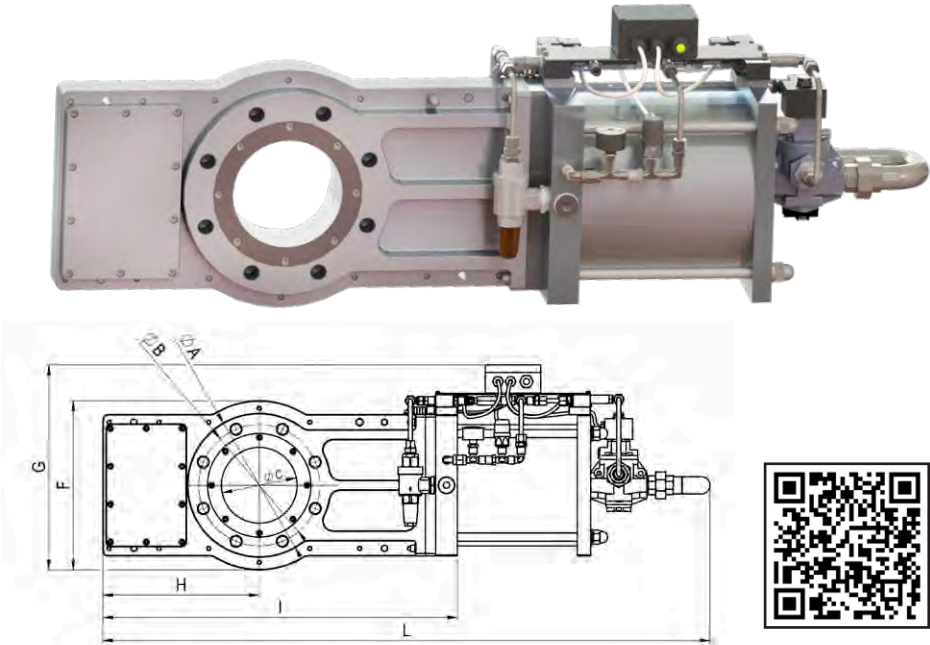
The quick-acting valve GatEx is especially suitable for pneumatic transport but also for preventing the transmission of the explosion between two production technologies. It is also suitable for technology designed for maximum explosion pressure.

OPTIONAL ACCESSORIES:

- heating bag

APPLICATION:

Organic dust	Melting dust	Light metal dust
✓	✓	✓



INSTALLATION OF GATEX ON FILLING DUCT



TECHNICAL DATA:

Dimension	A (mm)	B (mm)	C (mm)	F (mm)	G (mm)	H (mm)	I (mm)	L (mm)	Weight (kg)
DN 50	165	125	50	230	336	193	436	837	44
DN 65	185	145	65	245	344	202,5	468	884	48
DN 80	200	160	80	260	351	205	493	924	51
DN 100	220	180	100	280	379	235	553	1004	58
DN 125	250	210	125	305	391	273	628	1104	64
DN 150	285	240	150	335	406	310	703	1204	73
DN 200	340	295	200	390	458,5	385	853	1404	100

1. silo
2. explosion venting devices VMP
3. GatEx
4. control unit CONEX
5. filling duct



The HRD barrier is an active explosion protection system to prevent the transmission of an explosion and is characterized by the extremely fast introduction of extinguishing agent into the pipeline connecting the protected technological equipment and thus stopping the increase in pressure. In the event of an explosion, the explosion pressure first spreads through the pipe, followed by a flame. Both of these quantities can be detected by special detectors.

ADVANTAGES:

- **quick system response**
- independent storage of data from the detector
- variability of use of detectors, control units, and container units
- high-quality components
- possibility of adjustment according to quality requirements
- application indoor and outdoor

The HRD barrier prevents the transmission of explosions in pipes in filters, tanks, mills, crushers, dryer separators, cyclones, and other technological equipment.



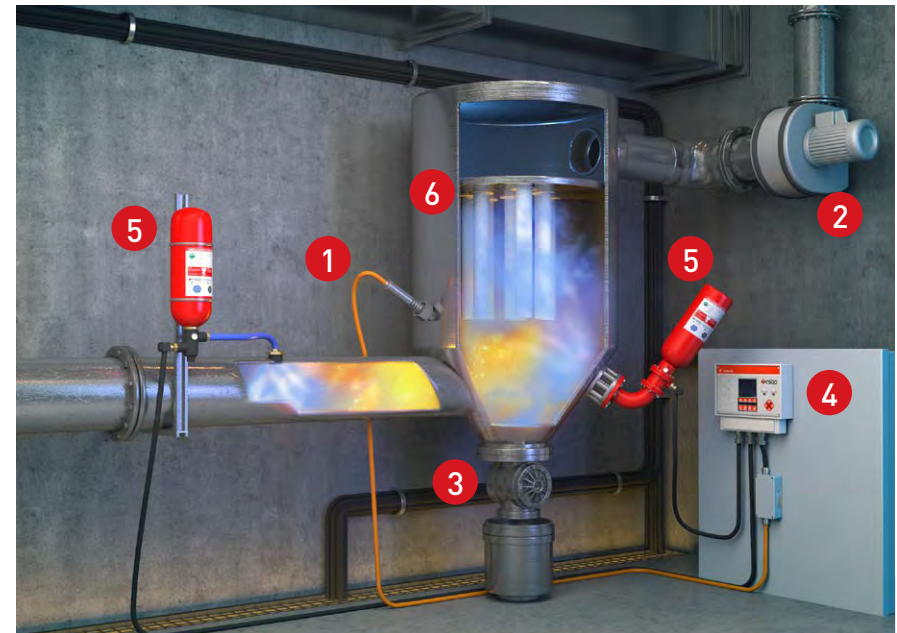
APPLICATION:

Organic dust	Melting dust	Light metal dust
✓	✓	✓

The HRD barrier is also suitable for use in such technological units with increased demands on hygienic requirements - for example in the pharmaceutical or food industry. The barrier can be used both alone or in combination with the HRD system for explosion suppression on technologies connected by piping.

The HRD barrier is also designed for use on equipment with different operating conditions, such as vibration processes or high temperatures. The HRD barrier works on the principle where the detectors transmit a signal to the control unit, which activates the HRD container units. These are equipped with quick-opening valves capable of immediately releasing the extinguishing agent into the protected space and thus creating an effective barrier of the extinguishing medium.

DIAGRAM OF HRD BARRIER INSTALLATION ON PIPELINE



1. detector
2. fan
3. rotary valve
4. control unit CONEX
5. HRD container units
6. filter



HRD SYSTEM – EXPLOSION SUPPRESSION

The HRD (high rate discharge) system is a verified explosion suppression system. It detects the initial phase of an explosion inside the device and subsequently suppresses the explosion of combustible dust in industrial technologies. The reaction time of the control unit CONEX is in milliseconds. Thanks to its overall function, the HRD system effectively suppresses the explosion and reduces the explosion pressure inside the device below the limit of its pressure resistance, thus preventing its destruction. The HRD system eliminates damage to technology, but above all, it protects human health and lives.

ADVANTAGES:

- **quick system response**
- highly efficient technology
- application indoor and outdoor
- **suitable for toxic and otherwise hazardous materials**
- independent archiving of data from the detector
- possibility of adjustment according to customer requirements
- variability of component use

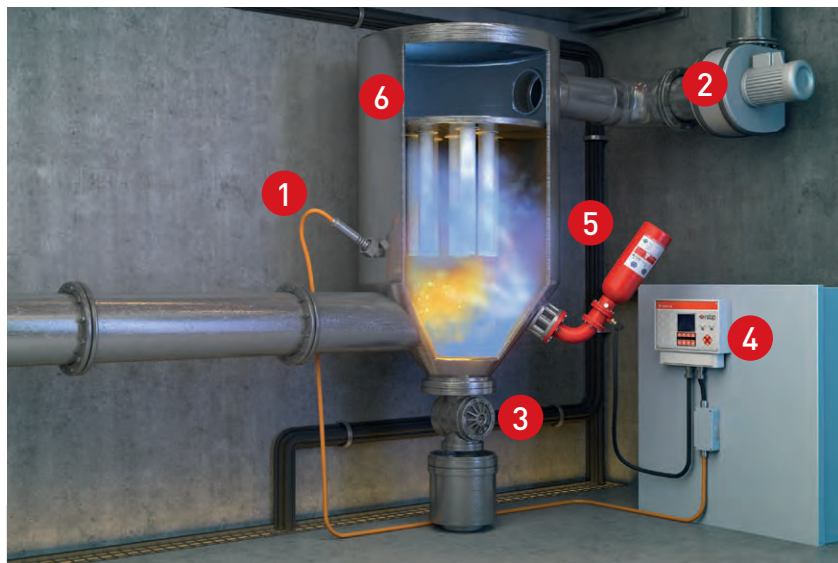
HRD system protects against the consequences of explosion in filters and filtration units, industrial vacuum cleaners, silos, mills, elevators, dryers, cyclones, conveyors, powder containers, mixers, crushers, and other industrial equipment.



HRD Dry Chemical Explosion Suppression System is FM Approved per Approval Standard 5700.



DIAGRAM OF HRD SYSTEM INSTALLATION ON THE FILTER



1. detector
2. fan
3. rotary valve
4. control unit CONEX
5. HRD container unit
6. filter



The HRD system is also suitable for use in technological units with increased demands on hygienic requirements - for example in pharmaceutical, chemical, or the food industry.

The HRD system can be used alone or in combination with the HRD barrier - a system for isolating explosions in pipelines.

The design of the HRD system is also adapted for use on devices with different operating conditions, such as vibration processes or high temperatures.

The HRD system works on the principle of very sensitive detectors, which can detect the emerging explosion in the order of milliseconds. The control unit sends a signal to open the valves. The pressure of the fire extinguisher will eject the special telescopic nozzles, which will ensure the effective dispersion of the fire extinguisher into the entire protected area. Thanks to the HRD system, the explosion pressure is under control and its side effects are minimized.

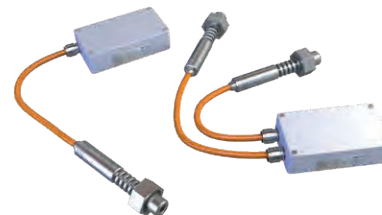
BASIC PARTS OF THE HRD SYSTEM

CONTROL UNIT CONEX



A dual or multi-zone control unit CONEX is a key part of the whole system. It evaluates, stores information from detectors, sends a signal to apply a fire extinguisher to a protected area and provides data to superior systems. It serves as a user interface for the operating personnel.

EXPLOSION DETECTOR



Pressure detectors constantly monitor operating conditions and are able to immediately detect an early explosion. They transmit this information within milliseconds to the control panel. The main advantage is the short reaction time and the variability in use.

HRD CONTAINER UNIT



Special HRD container units, equipped with a quick-opening valve and other accessories. They keep the fire extinguisher under constant pressure. If an explosion is detected, they ensure the immediate and effective induction of the extinguishing medium into the protected equipment. The advantage is the variability of the size of the HRD container unit (8, 20, or 50 liters), fast and effective explosion suppression in its initial phase, easy handling, and simple maintenance.

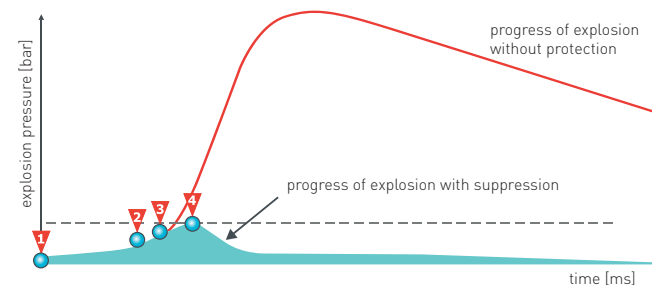
EXPLOSION SUPPRESSION PROCESS

Time:	0 ms	5 – 35 ms	40 ms	60 ms
Pressure:	0 bar	0,03 – 0,15 bar	0,1 – 0,25 bar	0,2 – 0,4 bar



1. initiation
2. detection of explosion origin
3. extinguishing agent injection
4. explosion pressure reduction
5. explosion suppression

PROGRESS OF EXPLOSION PRESSURE INCREASE RELATED TO TIME



1. initiation
2. detection of explosion origin
3. activation of HRD container unit (extinguishing agents injection, explosion pressure reduction)
4. explosion suppression

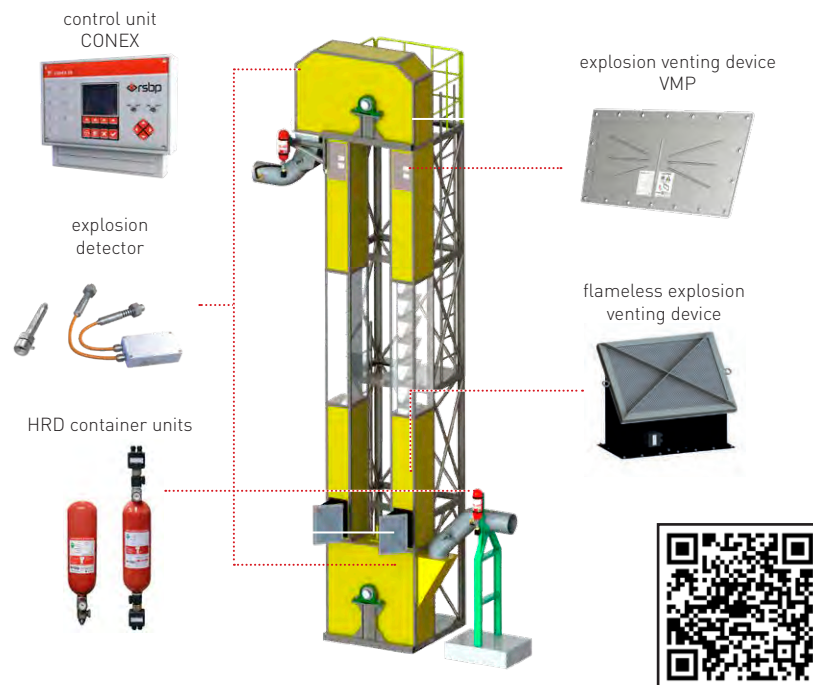
ELEVEX – EXPLOSION PROTECTION OF BUCKET ELEVATORS

ELEVEX is an effective solution for the protection of vertical conveyors of bulk materials against the devastating consequences of an explosion. Using a compact, sophisticated, highly efficient, tested and certified ELEVEX protection system is a safe and effective way to protect a bucket elevator or other vertical conveyor.

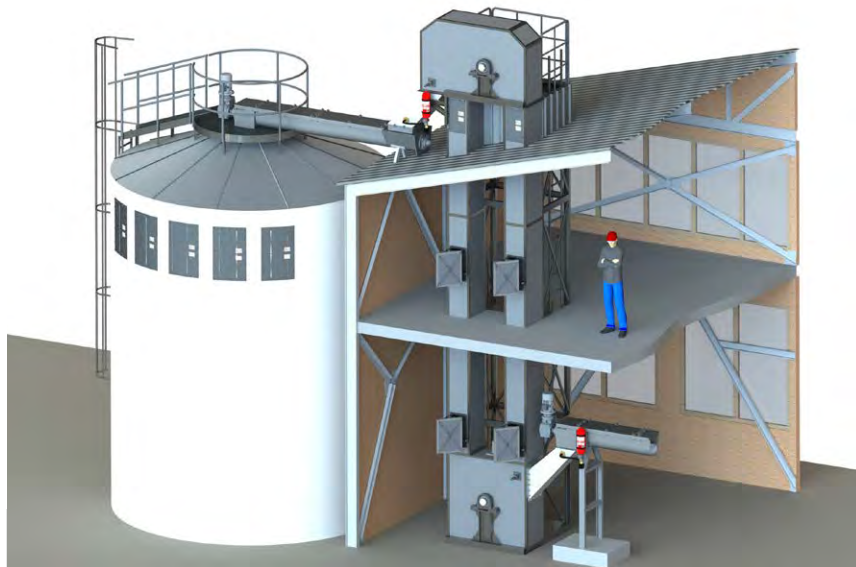
ADVANTAGES:

- **verified and certified protection system**
- high quality of used components
- easy installation even on existing technology
- maximum protection with minimum costs
- **suitable even for high elevators**
- variability of components

The ELEVEX system is suitable for interior and exterior applications. It is a variable system due to the diversity of components used, so it can provide maximum protection with minimum costs and without the need for any construction modifications.



INSTALLATION DIAGRAM OF ONE OF THE ELEVEX SYSTEM VARIANTS



THE ELEVEX SYSTEM INCLUDES VARIABLE PROTECTION FOR INTERIOR AND EXTERIOR AREAS

In the event of an explosion inside the elevator, there is a great risk not only of destroying the entire production technology but also the risk of endangering human health. In the case of destruction of unprotected equipment, there are incredibly high costs associated with the acquisition of a new bucket elevator and resumption of production.

THE MOST FREQUENT INITIATION SOURCES:

- sparks caused by deflection of the traction system from the axis
- sparks from the elevator drive or hot surface of the elevator caused by friction
- hot particles introduced together with the transported material
- bearing friction, etc.

The ELEVEX system reduces the explosion pressure to an extremely low value - this means that even existing and used technologies can be safely protected in the event of an explosion without any destructive consequences. The list of factors that can cause an explosion in a bucket elevator or similar vertical conveyor system is long, and the probability that an explosion will occur during operation is significant.

VARIANTS OF EXPLOSION PROTECTION OF BUCKET ELEVATORS

**EXPLOSION SUPPRESSION**

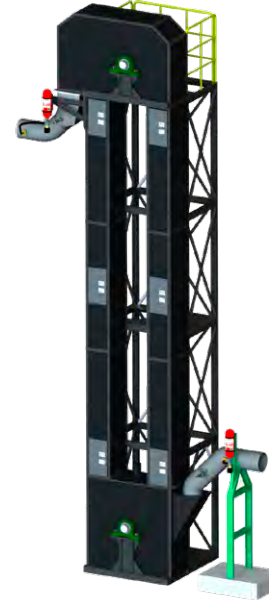
Explosion suppression is the most common method of explosion protection for bucket elevators.

COMPONENTS:

- explosion detector
- HRD barriers preventing the propagation of an explosion at the entrance and the exit to connected technologies
- suppression on the top and bottom of the elevator
- control unit CONEX

ADVANTAGES:

- reduces explosion pressure to an extremely low value - even existing and used technologies are safely protected in the event of an explosion without destructive consequences
- a safe and suitable way to protect elevators that are located both outside and inside the building

**EXPLOSION VENTING**

The main purpose of explosion venting is that the flame and pressure wave will be released through the venting panels into a safe zone.

COMPONENTS:

- explosion detector
- HRD barriers preventing the propagation of an explosion at the entrance and the exit to connected technologies
- explosion venting devices
- control unit CONEX

ADVANTAGES:

- extremely fast decrease of explosion pressure
- an efficient, cost-effective solution, and easy installation
- optional explosion venting panel opening sensors and thermal insulation
- suitable for elevators located outside
- in the event of an explosion, it will safely protect existing and already used technologies without destructive consequences

**FLAMELESS EXPLOSION VENTING**

The flameless explosion venting device FLEX which stops flame, thermal fronts and at the same time reduces pressure in the protected equipment.

COMPONENTS:

- explosion detector
- HRD barriers preventing the propagation of an explosion at the entrance and the exit to connected technologies
- flameless explosion venting device FLEX
- control unit CONEX

ADVANTAGES:

- effective arrest of flame and temperature and provision of a secure zone for the movement of people, technology, and buildings
- effective dust retention
- high efficiency and system reliability
- easy installation and maintenance-free operation
- elimination of expensive building modifications



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Fire and explosion protection