EICHELBERGER

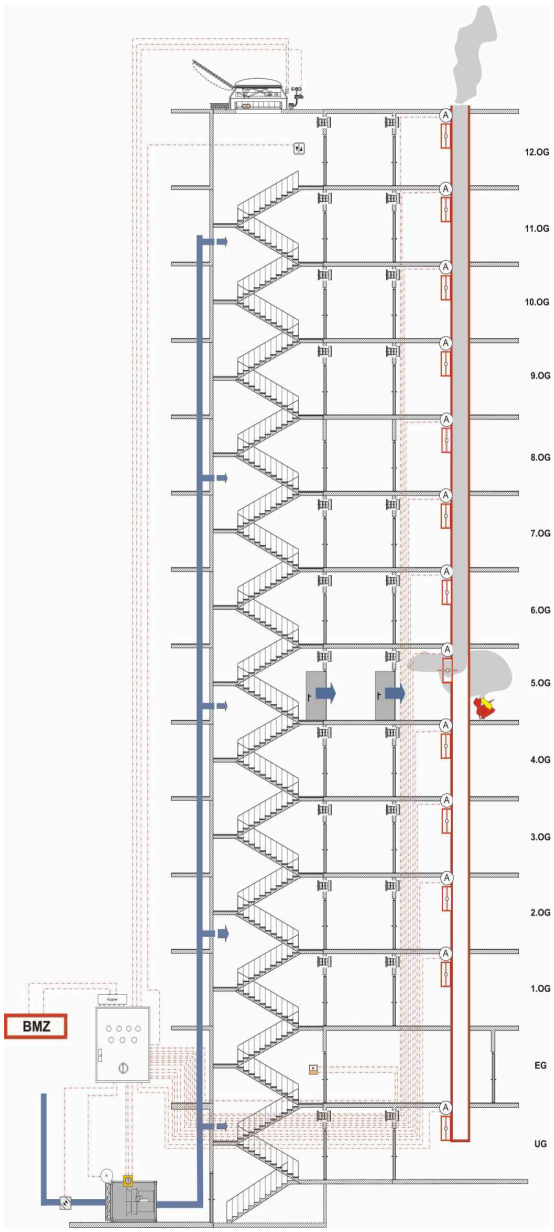
Smoke control for evacuation
and escape routes

PRESSURE DIFFERENTIAL SYSTEMS

Pressure differential systems

Pressure differential systems are active systems of preventive fire protection, which exert a decisive influence on the safety of the persons within the building. The effectiveness of the system can only be guaranteed if the components are geared to each other.
We offer you complete system solutions, incl. the important ventilation-related components and the control system (along with its field devices).
We provide assistance that covers everything from planning, assembly and activation to maintenance and servicing of the system.

RDA system - Functional diagram



Planning support

- Recommendation for the conception of an RDA system, with due regard to constructionrelated and normative requirements.
- Development of dimensioning-related recommendations for the airflow rate of the supply air, air distribution, pressure regulation airflow rate.
- Evaluation of relevant influence quantities such as the leakage air quantity, the pressure losses associated with the stairwell, thermal influences (uplift force), door forces, etc.
- Selection of important components.

Components lying within the scope of delivery

- Supply air devices associated with smoke protection - With accessories
- Pressure regulation units for installation on roofs or walls, or as bypass arrangement in the supply air device
- Overflow elements for sluice-purging
- Control cabinets and control systems - If necessary, with certified functional security up to SIL 2
- Field devices (optical smoke detectors; manual release button; optional: fire brigade control section, ventilation button, wind-rain sensor, channel smoke detector, position switch)

Activation

- Electrical activation and checking of all switching functions.
- Ventilation-related activation and adjustment of the system.
- Creation of all necessary measurement logs.
- Participation in the expert approval process and training the operating personnel

Servicing

- Annual maintenance of all the components, as well as extensive functional check and recording of all system functions..

Smoke protection for evacuation and escape routes

The task of pressure differential systems (RDA) is to ensure that evacuation and escape routes (stairwells, firefighting lifts, escape tunnels, etc.) are kept free of smoke.
A controlled overpressure (with respect to the adjacent areas, in which a fire could break out) is created within the area to be protected.

Closed doors →Controlled overpressure

The overpressure causes the perfusion of the leakage areas (e.g. around the doors) in the protected zone, within the area filled with smoke. This prevents smoke or air containing smoke from streaming into the overpressure zone.
It must always be possible to open doors without a large exertion of force. The maximum permissible door operating force is 100 N. The operating force that acts upon the door handle depends on the pressure difference, the door size and the closing force of the door closer. The door sizes and the closing torques of the door closer must be geared towards the expected overpressure. As a rule, an overpressure of 50 Pa is planned for.

Opened door on the fire storey →Airflow through the open door

When, on the floor that has caught fire, the doors between the fire room and the protected area are opened, an adequate perfusion of the door must take place along the direction of the floor that has caught fire, so that no smoke will penetrate into the protected area.
The value of the required speed depends upon the temperature difference at the door under consideration.
The higher the temperature difference, the higher the average perfusion speed has to be, in order to ensure smoke protection even if the door is open.

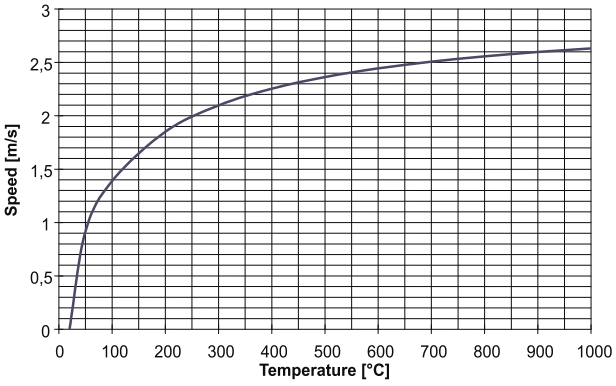


Diagram 1: Required speed through a 2 m high and 0,9 m wide door for preventing a transfer of smoke - According to John

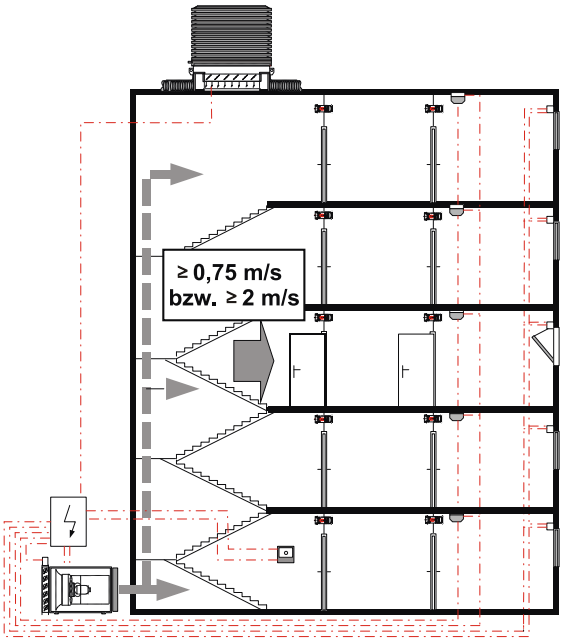
As per EN 12101-6; 09/2005 – the following minimum speeds are to be applied, depending on the protection target:

Protection target	Minimum speed
for means of escape	0.75 m/s
for means of fire-fighting	2.0 m/s

The German regulation on high-rise buildings and the Austrian TRVB (technical regulations for preventive fire protection) S112 contain requirements associated with the perfusion speed that deviate from this.
In order to guarantee the perfusion of the self-opening doors, flow-off facilities must exist for the downstream spaces. Such facilities can, for example, be realised through the use of an EI90 shaft with smoke control dumpers arranged in a floor-wise manner, or through the use of motorised windows. If windows are used for discharging, the wind-independent effectiveness of the flow-off path must be guaranteed (if possible, assembly on 2 façade sides). The flow-off areas must be dimensioned in a manner which ensures that the pressure drop does not exceed the magnitude of the planned overpressure in the stairwell.

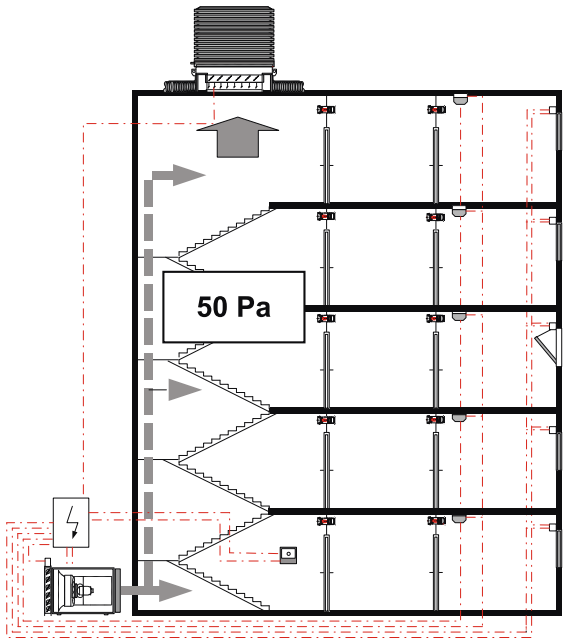
Pressure regulation →Permissible control time 3 seconds

Since the airflow rate that is required for the attainment of the necessary speed is significantly higher than that required for the generation of pressure when the doors are closed, the pressure or, as the case may be, the airflow rate for the supply air must be regulated. According to DIN EN 12101-6, after a door is opened or closed, at least 90% of the new volumetric requirements must be fulfilled within a maximum period of 3 seconds.
In case of self-opening doors, the airflow rate that is necessary for the door to be perfused must be made available within this 3 second period. In case of self-closing doors, the airflow rate for the supply air must be reduced within the 3 second period, or the extra quantity of air must be discharged through the use of pressure release damper that open at a sufficiently high speed.



Airflow criterion

If both the sluice doors on the storey where the fire has broken out are opened, the doors must be perfused at a minimum speed of 0.75 to 2 m/s. In this phase, the pressure regulating damper at the top of the stairwell closes, so that the entire airflow rate will be available for the perfusion of the open door. The flow-off flaps on the floor where the fire has broken out are opened, in order to secure the perfusion.



Pressure criterion

When all the doors in the stairwell are closed, a controlled overpressure of about 50 Pa should be built up in the stairwell. The door opening force may not exceed 100 N at any door.
In this phase, the pressure regulating damper is open, and it lets the excess air escape. It causes a drop in pressure, the magnitude of which equals that of the planned overpressure (50 Pa).

Calculation of the airflow rates

Stairwell leakage:

Along with the airflow rate for the perfusion of the open doors, the system must also cover leakage losses.
Leakage areas are present at all doors, windows, lift shaft doors, fissures and cracks in walls, etc.; openings that have been created on purpose in order to facilitate continuous purging are also to be taken into consideration. Information regarding the relevant calculation methods can be found in the annexe of EN 12101-6.

Calculation of the airflow rate for the supply air

The airflow rate for the supply air equates to the sum of the portion for the perfusion of the open doors and the leakage air. It is recommended that the leakage air instalment be taken into account in the invoice. During activation, the airflow rate for the supply air can be adjusted visàvis the actual leakage by adjusting the fan blade angle. The pressure regulating damper is dimensioned with respect to the variable portion of the airflow rate for the supply air.
In case of tall buildings, the pressure difference is also influenced by height-dependent parameters such as thermally-induced uplift pressures and pressure drops in the stairwell. We would be happy to provide assistance for the dimensioning of such buildings.

Planning information and structural requirements

Doors and windows
All the doors and lobby doors that are part of the stairwell must be of the self-closing variety.
It should not be possible to open the windows manually. If the opening operation makes use of an actuating drive, the drives should be integrated into the switching mechanism of the pressure system; when a triggering operation takes place, the windows should be closed automatically.

Door forces
The maximum permissible door operating force is 100 N. As a rule, an overpressure of 50 Pa is planned for. Along with the pressure difference, the door operating force depends upon the door geometry and the existing door closer.
—> In case of doors that open towards the stairwell, the door closer must be designed in a manner which ensures that the planned overpressure does not exceed the level of 100 N.
—> In case of doors that open away from the stairwell (e.g. exit door leading into the open), the door closer must be designed in a manner which ensures that the door closes securely even when it has to oppose the overpressure. If applicable, it may be necessary to use an additional free-swing door closer that is only activated when the pressure system is in operation.

Door perfusion speeds
In order to ensure that smoke cannot enter the stairwell even when the door is open, a perfusion that is directed towards the burning storey must be facilitated in the open door crosssection. (As a rule, the average perfusion speeds that are to be adhered to are part of the fire protection concept.)
In this regard, flow-off paths that have been dimensioned to a sufficient degree are necessary.
The required geometry is determined by the available overpressure in the stairwell. The drop in pressure via the flow-off path may not exceed the overpressure (with regard to the pressure pattern within the stairwell) that is provided in the stairwell. When it comes to dimensioning the components with regard to the flow from the storey that is on fire, we recommend that a pressure loss of 30 Pa not be exceeded.
If the concept is based on the requirement associated with the build-up of speed at the doors of the burning storey when a door leading into the open is open, the flow-off pressure drop should be reduced further, in order to minimise the amount of air lost through the exit door.
The flow-off areas (windows or dampers) on the storey that is on fire must be opened automatically, and the flow-off areas on all the other storeys should remain closed.

Triggering of the system
Pressure differential systems must be activated automatically (via smoke detectors). As a rule, this takes place via a comprehensive on-site fire detection system.
—> If the triggering of the flow-off paths (dampers or windows) is covered by our scope of services, the BMA must provide a potential-free contact for the RDA control cabinet for every scenario.
We recommend that the BMA couplers be positioned in the installation space of the control cabinet.

If no BMA is available, it is, at the very least, mandatory to position smoke detectors at each access door that leads to the protected area.

External air inlet:
The external air inlet must be positioned in a manner which ensures that under no circumstances can smoke be sucked in as a result of the fire event under consideration. It should be positioned in the lower section of the building, beneath building openings such as windows.
If a suction process in the vicinity of the roof cannot be avoided, two independent suction points should be provided on two façade sides; the single slings should be monitored via smoke detectors and blocked, if necessary. In this regard, it is strongly advised that a corresponding agreement be reached with the approval agencies/experts.

Requirements associated with fire resistance and function maintenance
If the external air pipe crosses areas that are, from the point of view of fire protection, to be separated from the stairwell, the cables must be laid out vis-à-vis fire-resistance rating L90.

Installation of the control cabinet and requirements associated with function maintenance
The control cabinet should be installed in a separate, insulated electrical service room corresponding to the F90 rating, in which there are no other fire loads. Deviations should be agreed upon with the fire protection expert/inspection expert. As a rule, a temperature range of 0° - 25°C should be maintained in the installation space. As a rule, a function maintenance period of 90 minutes should be guaranteed for the RDA system. Consequently, electrical lines should be laid out in accordance with the E90 function maintenance class, or in a manner which ensures that they are endowed with a corresponding degree of protection.
If the cable system is set up in a manner characterised by the presence of a fail-safe system (in case of a rupture in the cable system, the system switches over to the specified normal operations), the function maintenance quality can, under certain circumstances, be sacrificed.

Energy supply
Pressure differential systems must be equipped with a secure energy supply system. At the very least, a separate conduit that is directly behind the main meter (sprinkler-pump circuit) is necessary. According to the building law, safety power supplies corresponding to VDE 0108 are required for special constructions.
—> Information regarding the concrete form of the energy supply that is actually required can be found in the construction permit or the fire protection concept. An agreement must be reached with the inspection expert regarding the form in question.

Number of pressure relief and supply air points
Depending on the geometry of the stairwell and the number of storeys, the stairwell offers resistance to the flowing air. This resistance can lead to a top-to-bottom drop in pressure. Consequently, it would be advisable to introduce the supply air in multiple levels; EN 12101-6 envisions supply air points for all three storeys. In case of tall buildings, a second pressure regulating damper can become necessary. In case of an excessive build-up of pressure in the lower section of the stairwell, it can discharge the extra air into the atmosphere.

Redundancy
Within the framework of the fire protection concept, individual requirements can be put into effect with regard to the redundancy of individual system components (e.g. fans). Redundancy-related requirements are usually applicable in situations in which the stairwell represents the sole escape route.

Activation guideline
The pressure should be measured and the perfusion speeds in open door cross-sections should be monitored when the final condition, which is characteristic of the subsequent use of the building, has been realised in the area that is to be subjected to an overpressure (stairwell, corridor, lift shaft etc.), i.e. when all the doors, windows, etc. have been installed and equipped with the respective seals.

Self-regulating pressure differential systems

The Eichelberger RDA systems are based on an automatic regulation system. The component parts are one (or more) smoke protection supply air device(s) and one (or more) automatic spring-loaded pressure regulating damper(s). When it comes to self-opening/self-closing doors, this facilitates the quickest possible pressure regulation system that corresponds to the temporal requirements associated with EN 12101-6. The pressure regulating damper regulates the overpressure in the stairwell with the help of a spring system. This procedure is fully automatic, and does not require any auxiliary energy. The regulation pressure can be set between 25 Pa and 75 Pa. As a standard feature, a value of 50 Pa is set at delivery. If a regulation pressure that is less than 50 Pa is to be provided, it can be provided with the help of flaps whose dimensions are somewhat larger. (The statements regarding the airflow rates that are made in this catalogue are based on a regulation pressure of 50 Pa.)

The closing torque of the damper system is adjusted vis-à-vis the opening aerodynamic force torques. The damper remains closed until the adjusted regulation pressure (e.g. 50 Pa) is reached. In case of a further rise in pressure, the pressure regulating damper opens to an extent which ensures that, during the perfusion process, the adjusted value emerges in the form of a pressure drop, i.e. in the form of an overpressure in the stairwell. In case of self-opening doors and the resultant drop in pressure, the control butterfly valve closes immediately, and the entire airflow rate of the supply air (minus the leakage air quantity) becomes available for the perfusion of the open door. The closing of the door immediately results in the opening of the pressure regulating damper; the maximum permissible overpressure is never exceeded.

The system reacts automatically. Measuring elements, pressure regulators, actuating drives, clamping points and transfer points can be dispensed with. This translates to a minimisation of failure-capable components. In case of the RDA-type smoke protection pressure device, the pressure regulating dampers in the supply air device are integrated into the system using a bypass arrangement.

Overview of devices

	**Smoke protection supply air device - RDS 400 — 1000** Air-handling unit with integrated axial fan, with steplessly adjustable rotor blades and guide wheel as well as characteristic curve stabiliser. The stabiliser causes an expansion of the stable part of the characteristic curve of the axial fan. A weather-proof model can also be delivered for external installation. An insulated louver damper with a spring return motor can also be integrated into the system.	Pages 10/11
	**Smoke protection pressure device - RDA2-type 400 – 800** The RDA-type smoke protection pressure device regulates the pressure with the help of integrated pressure-relief dampers. This process is automatic, and does not make use of any additional components. The spring-loaded pressure relief dampers are placed in the bypass arrangement associated with the fan. If the overpressure exceeds the designated value of 50 Pa, the dampers open and part of the airflow rate associated with the fan circulates within the device. If the doors open themselves and the pressure drops, the pressure relief dampers close immediately due to the spring force, and the entire airflow rate becomes available for the perfusion of the open door.	Pages 24-31

Pressure regulating device for roof-mounting - DEK-V-DS

In case of this variant, the automatic pressure regulating damper is installed in a roof frame. A motorised, insulated louver damper (with spring return motor, opens without electricity) is in a downstream position. The air disperses in a four-sided manner via a lamellar hood. This results in a mode of operation that is independent of the wind direction.

Pages 12-14

Pressure regulating device for roof-mounting Type - DEK-V-LK With light-related, ventilation-related and smoke discharge options

The single-part or two-part roof frame made of galvanised sheet steel comprises the automatic pressure regulating damper.
The end plate is formed by a dome light with a flash-over drive mechanism, which causes an opening angle of ca. 165°, thereby ensuring that the functioning of the pressure relief system is, by and large, independent of the wind direction.
Equipping the pressure regulating damper with an additional actuating drive facilitates options related to light, ventilation and the discharge of smoke.

Pages 15-17

Pressure regulating device for wall-mounting - Type DEK-H

Several variants are offered for wall-mounted pressure regulating devices. Internal or external wall solutions are possible, as are wall-recessing variants and the architecturally appealing combination of a pressure regulating damper and a lamellar window.

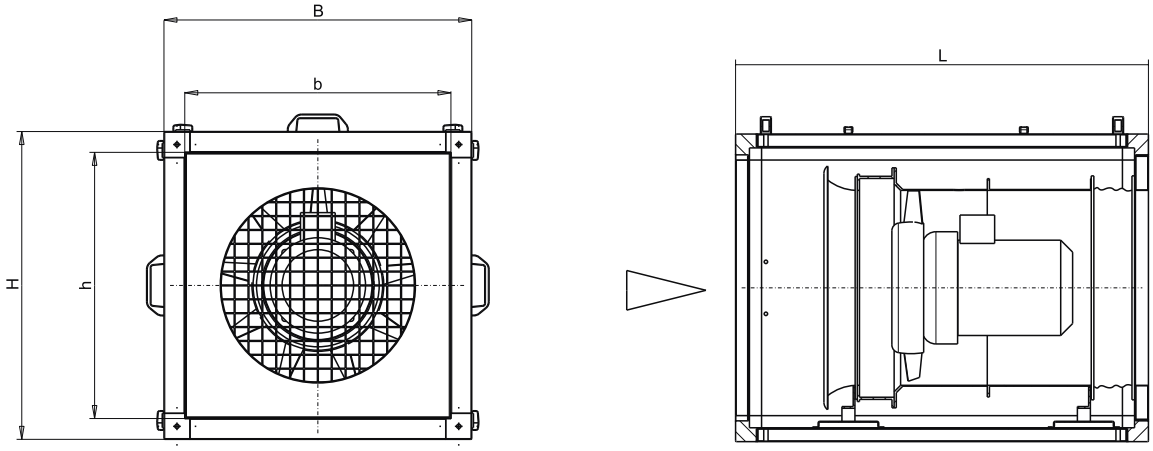
Pages 18-23

Selection table – RDS-type smoke protection supply air device

Airflow rate [m³/h]	Total pressure [Pa]	Static pressure [Pa] freely-blowing	Motor output [KW]	Speed [1/min]	Type	Weight incl. motor [kg]
5.000	240	> 140	0,75	1.500	RDS 450/4/0,75	132
5.000	600	> 440	1,50	3.000	RDS 400/2/1,5	125
7.500	300	> 160	1,50	1.500	RDS 500/4/1,5	161
7.500	850	> 500	3,00	3.000	RDS 400/2/3	137
10.000	300	> 50	1,50	1.500	RDS 500/4/1,5	161
10.000	900	> 500	4,00	3.000	RDS 450/2/4	157
12.500	370	> 210	2,20	1.500	RDS 630/4/2,2	256
12.500	900	> 500	5,50	3.000	RDS 500/2/5,5	193
15.000	420	> 195	3,00	1.500	RDS 630/4/3	262
15.000	1200	> 640	7,50	3.000	RDS 500/2/7,5	234
17.500	570	> 260	4,00	1.500	RDS 630/4/4	269
17.500	570	> 380	4,00	1.500	RDS 710/4/4	363
20.000	450	> 50	4,00	1.500	RDS 630/4/4	269
20.000	550	> 150	5,50	1.500	RDS 630/4/5,5	269
20.000	700	> 450	5,50	1.500	RDS 710/4/5,5	376
25.000	710	> 320	7,50	1.500	RDS 710/4/7,5	396
25.000	850	> 600	11,00	1.500	RDS 800/4/11	512
30.000	550	> 190	7,50	1.500	RDS 800/4/7,5	490
30.000	900	> 540	11,00	1.500	RDS 800/4/11	512
35.000	700	> 205	11,00	1.500	RDS 800/4/11	512
35.000	1000	> 505	15,00	1.500	RDS 800/4/15	540
40.000	650	> 390	11,00	1.000	RDS 1000/6/11	662
40.000	950	> 550	15,00	1.500	RDS 900/4/15	595

The operating points in the table represent a selection. Other operating points can be used upon request.

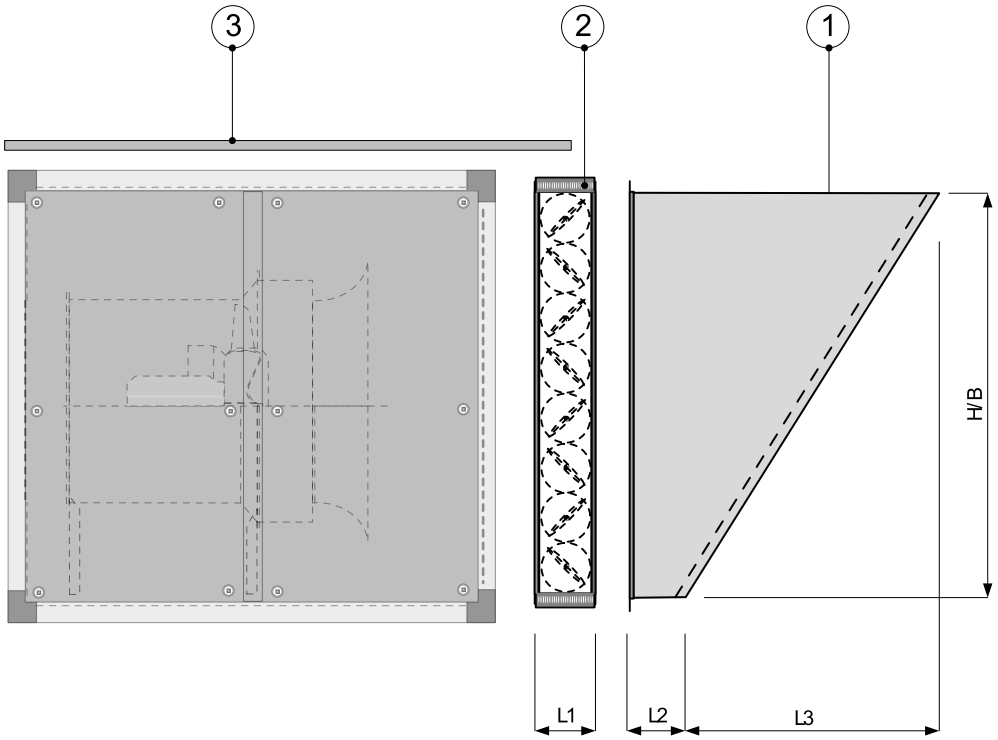
Main dimension – RDS-type smoke protection supply air device



	B [mm]	H [mm]	L [mm]	Channel interface dimensions - b x h [mm]
RDS 400/../..	650	650	925	590 x 590 EP 30
RDS 450/../..	710	710	953	650 x 650 EP 30
RDS 500/../..	780	780	1024	720 x 720 EP 30
RDS 560/../..	860	860	1082	800 x 800 EP 30
RDS 630/../..	970	970	1240	910 x 910 EP 30
RDS 710/../..	1090	1090	1308	1030 x 1030 EP 30
RDS 800/../..	1200	1200	1422	1140 x 1140 EP 30
RDS 900/../..	1340	1340	1505	1280 x 1280 EP 30
RDS 1000/../..	1470	1470	1620	1410 x 1410 EP 30

Subject to changes in dimension and weight

Accessories – RDS



1. Aspiration ports made of galvanised sheet steel with integrated bird screen
2. Insulated louver damper with spring return motor, 24 V, opens without electricity, mounted on the suction side of the device
3. Rain shield

	L1 [mm]	L2 [mm]	L3 [mm]	H x B [mm]
RDS 400	120	150	340	590 x 590
RDS 450	120	150	375	650 x 650
RDS 500	120	150	415	720 x 720
RDS 560	120	150	465	800 x 800
RDS 630	120	150	525	910 x 910
RDS 710	120	150	595	1030 x 1030
RDS 800	120	150	660	1140 x 1140
RDS 900	120	150	740	1280 x 1280
RDS 1000	120	150	815	1410 x 1410

RDS-type smoke protection supply air device

For controlled maintenance of overpressure in evacuation and escape routes.
Secure mode of operation through characteristic-stabilised axial fan with guide wheel and adjustable rotor blades for adjustment of airflow rate.
Casing featuring a stable frame structure made of hot-dip galvanised and sealed special pipe profile, bolted to a removable frame unit with corner connections.
Double-layered cladding panels, wall thickness 30 mm, screwed into the frame structure, air-tight and removable from all sides.
Inner and outer shells made of hot-dip galvanised sheet steel, in a sealed design featuring intermediate, non-inflammable mineral fibre insulation corresponding to DIN 4102.
Inner and outer sides of the device smooth, no cutting edges and no welded seams. Large inspection cover with handles and rotating fasteners, removable from all sides. From BG 800 onwards - Divided side walls.
Inspection cover with age-resistant, circumferential rubber profile - Sealed in an airtight manner.
Axial fan with guide wheel and characteristic curve stabiliser, made of welded steel. Axial running wheel with rotor blades that can be adjusted when the system is at a standstill, mounted directly on the drive motor, dynamically balanced as per DIN ISO 1940-1, quality class G = 6.3.
DS drive motor in B5 format as per DIN IEC 34, IP 54 and ISO class F, with extended cable for the repair switch (external, on the air-handling unit).
Impact sound-decoupled assembly of the axial fan vis-à-vis the box frame via rubber oscillation damper; on the pressure-side, via elastic connecting pieces that establish a connection with the device casing.
Suction-side and pressure-side contact protection grids.
Suction side and pressure side pre-drilled for rectangular channel interface frame EP30; optional: round spigot pre-mounted on the pressure side.

Accessories (covered by the scope of delivery):
- Repair switch, wired with motor, on the exterior of the RDS device

Technical data, based on air density 1.2 kg/m³

Airflow rate	m³/h	:	
Overall rise in pressure	Pa	:	
External rise in pressure	Pa	:	
Speed	1/min	:	
Motor output	KW	:	
Voltage	V	:	400
Frequency	Hz	:	50
Nominal current	A	:	
Activation type	d/s-d	:	
Dimensions		:	
Brand		:	Eichelberger
Type		:	RDS .../../..

Accessories (optional):
- Rain shield for outdoor installation
- Sealed, insulated louver damper with spring return motor, 24 V, opens without electricity, mounted on the suction-side
- Aspiration ports

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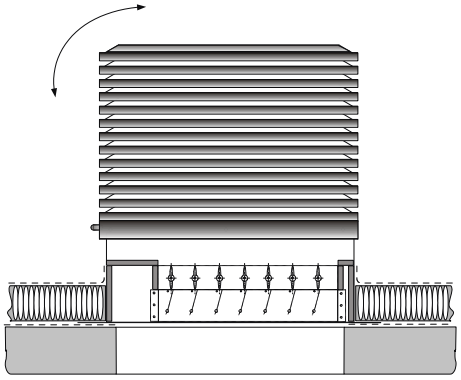
Description of pressure regulating device - Type DEK-V-DS



- **Complete unit for automatic pressure regulation**
- **largely independent of the influence of wind**
- **Ready for automatic pressure regulation within a few seconds (opening process of the spring return motor)**

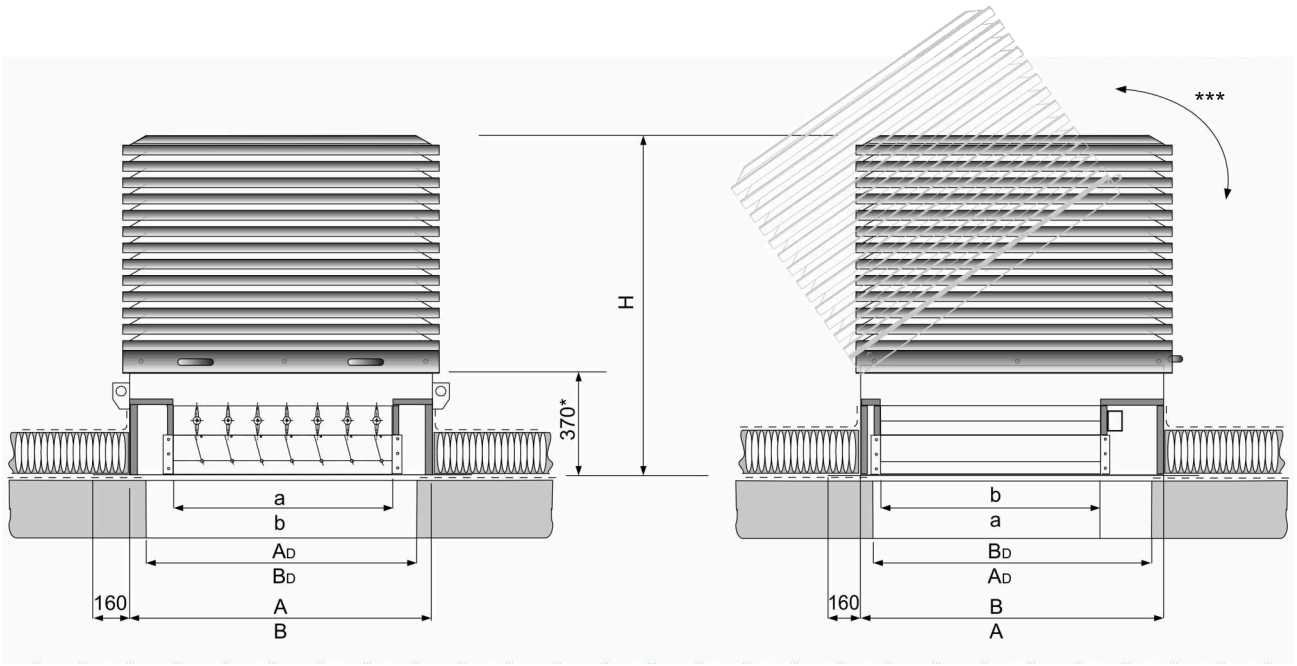
Structure:

The unit comprises an internal, insulated roof frame, the integrated pressure regulating damper with the downstream louver damper and a lamellar hood.
The pressure regulating damper regulates the overpressure in the stairwell with the help of a spring system. This procedure is fully automatic, and does not require any auxiliary energy.
In order to prevent condensation and the entry of cold air, and in order to ensure that the control butterfly valve is protected from contamination and atmospheric influences, an air-tight and insulated louver damper is positioned above the pressure regulating damper.
Styrodur is stuck across the exterior of the frame; one side of the lamellas is covered with an Armaflex coating, which is fixed using metal strips.
Gear wheels are used to couple the lamellas of the louver damper such that they work in opposite directions.
The roof frame is made up of galvanised sheet steel, and it is provided with a Styrodur coating along its interior.
The lamellar hood can be swung open (supported by an accelerator cable spring system in case of large design sizes) and locked in the 'open' position, so that the pressure regulating damper and the actuating drive of the louver damper can be inspected.
The louver damper drive should be connected via an externally positioned terminal box that is on the roof frame.
The flow takes place via an aluminium lamellar hood with opening areas, which facilitate an allside flow and thereby guarantee a large degree of wind-independence.

Mode of operation:

When the system is triggered, the control device de-energises the spring return motor of the louver damper that has been integrated into the unit, and the flap opens. After the opening position (limit switch) has been attained, the supply air fan can become operational.
The pressure regulation process now takes place automatically via the spring-loaded pressure regulating damper.
The placement of the pressure regulating device at the top of the stairwell results, when the doors are closed, in the stairwell being purged.

Main dimension - Pressure regulating device - Type DEK-V-DS



Subject to changes in dimension and weight

Design size	A [mm]	B [mm]	a [mm]	b [mm]	H * [mm]	Weight [kg]	Minimum size ** Roof penetration AD x BD [mm]	Airflow rate at 50 Pa pressure difference [m³/h]
DEK-V 600/500-DS 900/900	900	900	600	500	1150	150	600 x 600	5.500
DEK-V 600/900-DS 1200/1200	1200	1200	600	900	1250	210	900 x 900	10.000
DEK-V 900/900-DS 1400/1400	1400	1400	900	900	1400	350	900 x 900	15.000
DEK-V 1000/1000-DS 1500/1500	1500	1500	1000	1000	1450	450	1000 x 1000	19.000
DEK-V 1100/1100-DS 1500/1500	1500	1500	1100	1100	1450	460	1100 x 1100	21.000
DEK-V 1300/1300-DS 1800/1800	1800	1800	1300	1300	1700	600	1300 x 1300	30.000
DEK-V 1500/1500-DS 2000/2000	2000	2000	1500	1500	2000	800	1500 x 1500	40.000

* The height of the base can be adjusted vis-à-vis the thickness of the on-site thermal insulation (enlargement up to 200 mm is cost neutral).

** If additional fittings (grids etc.) are used, a larger opening may become necessary.

*** The lamellar hood can be swung open for inspection-related purposes. It must be ensured that a free space of ca. 1 m is maintained around the entire circumference, in order to guarantee accessibility. It must also be ensured that the roof fittings do not impede the swing-open movements.

Pressure regulating device - Type DEK-V-DS

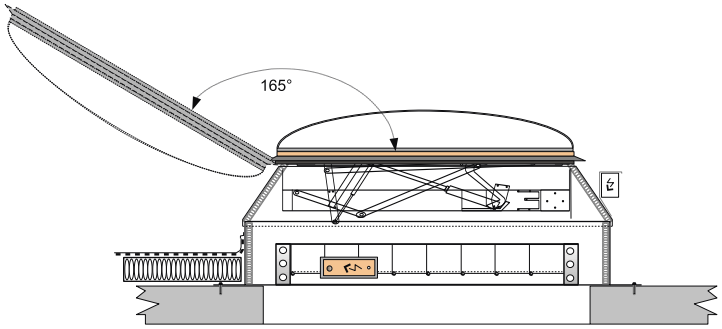
To be installed on the roof at the top of a stairwell, for the maintenance of a controlled overpressure in the pressure chamber.
Immediate response to self-opening or self-closing doors, through an automatic pressure regulating damper that does not require any auxiliary force. Compliance with the requirements associated with the control time (3 seconds), as per EN 12101-6
Consists of:
Roof frame made of galvanised, thermally insulated sheet steel, with a circumferential adhesive flange. The height of the roof frame can, with respect to the height of the thermal insulation, be increased by up to 200 mm in a cost neutral manner. Automatic pressure regulating damper that provides steady control and which features multiple lamellas, for vertical perfusion.
The operational reliability and the compliance with the control time (3 seconds) requirements associated with EN 12101-6 have been verified and tested through a functional test, a stability test and a resonance test (carried out after 10000 load reversals). This was done in collaboration with a notified testing centre (IFI Aachen). Axles and connecting rods made of high-grade steel; frames and damper blades made of aluminium. Damper system opens and closes along the same direction via a bar connection; low-friction mounting of the damper axles.
The closing torque is, with respect to the aerodynamic force torque that produces the opening action, generated via a tension spring system. Consequently, the set overpressure is controlled in a manner that is independent of the quantity of air, and this control is maintained up to the nominal airflow rate (steady type of control).
The pressure difference of the pressure regulating damper can be adjusted by manipulating the spring pre-load length and the closing lever such that compatibility with the range of 25 - 75 Pa is attained. It is usually pre-set to 50 Pa at delivery. The maximum pressure regulation airflow rate depends on the adjusted regulation pressure. Louver damper - Air-tight as per DIN 1946-4, for avoidance of condensation and the entry of cold air. Contrary coupling of the lamellas via gear wheels. Armaflex is used to provide the lamellas with a thermal insulation coating on one side. The lamellas are also provided with metal cladding. Aluminium lamellas. Actuating drive with spring return motor, opens without electricity, limit switch.
Lamellar hood made of aluminium with option for four-sided discharge, for securing a pressure discharge operation that is largely independent of the wind. Bird screen.
Terminal box that is mounted externally on the roof frame, for connecting the damper-related actuating drive. Standard colour of the roof frame - White aluminium RAL 9006; aluminium lamellar hood untreated.
Above the roof frame, a rain outlet is integrated into the lamellar hood for any moisture that may penetrate the system.

Please note:
The system must be operated in a manner which ensures that the supply air is only switched on when the louver damper above the pressure regulating damper has been opened (limit switch).Otherwise, the required pressure discharge operation cannot be guaranteed.

Technical data, based on air density 1.2 kg/m³

Pressure regulation airflow rate	m³/h	:
Total pressure loss	Pa	: 50
Preset regulation pressure	Pa	: 50
Type		: DEK-V-DS
Brand		: Eichelberger

Pressure regulating device - Type DEK(A)-V-LK



- **Complete unit for mounting on the roof, with automatic pressure regulation**
- **The DEKA-V-LK variant makes the following options possible:**
  - → **Light incidence when the system is at a standstill**
  - → **The dome light unit can be used to facilitate ventilation. It can also be used as an opening for the smoke discharge facility**

Structure:

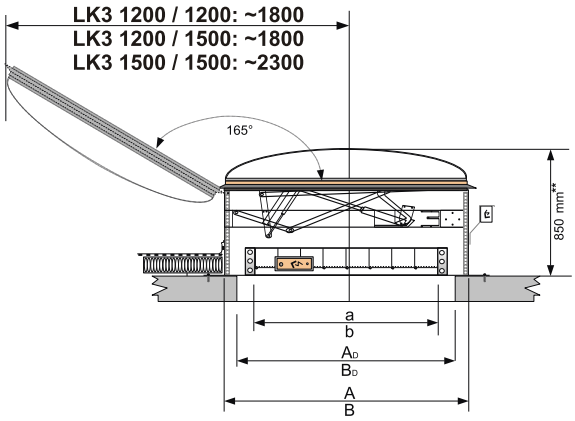
The pressure regulating device consists of a roof frame with an integrated automatic pressure regulating damper.
This damper regulates the overpressure in the stairwell in a purely mechanical manner, using a spring mechanism - the process takes a matter of seconds. This ensures that the control time requirements associated with DIN EN 12101-6 are fulfilled. The flow takes place via a dome light, which is equipped with a flash-over drive system, which in turn ensures that an opening angle of ca. 165° can be attained, in order to facilitate a large degree of independence from the wind. In case of the DEKA-VLK variant, an additional actuating drive is mounted at the pressure regulating damper. This actuating drive can actuate the damper in a motor-driven manner, in order to implement functions such as the ones associated with light incidence, ventilation or smoke discharge.

Mode of operation in case of DEKA-V-LK variant:

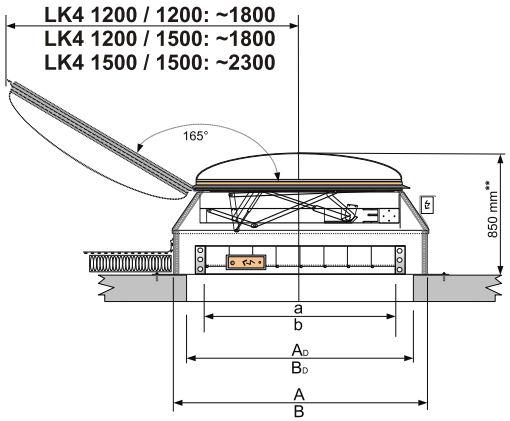
Operating state:
When the system is at a standstill, the lamellas of the pressure release damper are actuated via the actuating drive. Consequently, light incidence can take place via the dome light that is directly above it. Furthermore, the stairwell can be ventilated by opening the dome light in a motor-driven manner.
Fire conditions - Pressure regulation operation:
When the pressure regulation operation is triggered, the dome light is actuated. At the same time, the mechanical connection between the actuating drive and the pressure regulating damper is disengaged, so that the dampers can function independently.
After a specific opening angle has been attained (according to EN 12101-6, no later than 60 seconds after triggering), the pressure fan is activated. The system can then carry out an automatic pressure regulation operation.
Fire conditions - Smoke discharge or purging operation
If necessary, the actuating drive can be used to activate the pressure regulating damper. The construction-related need for smoke discharge areas can thus be fulfilled. For example, this particular mode of operation can be triggered when:
- Smoke was detected within the stairwell (100% purging operation),
- the pressure fan has malfunctioned,
- the fire brigade decides that the smoke discharge function should be implemented.

Main dimensions Pressure regulating devices Type DEK-V-LK and DEKA-V-LK

Type LK3 (one piece frame)



Type LK4 (two piece frame)



Subject to changes in dimension and weight

Type	Name	A x B [mm]	a x b [mm]	Weight [Kg]	Minimum size - Opening*** AD x BD [mm]	Max. airflow rate for 50 Pa [m³/h]
LK 3	DEK-V 600/700-LK3 1200/1200 DEKA-V 600/700-LK3 1200/1200	1000x1000	600x700	160	700 x 700	8.000
LK 3	DEK-V 700/700-LK3 1200/1200 DEKA-V 700/700-LK3 1200/1200	1000x1000	700x700	160	700 x 700	9.500
LK 3	DEK-V 800/700-LK3 1200/1200 DEKA-V 800/700-LK3 1200/1200	1000x1000	800x700	160	800 x 800	11.500
LK 3	DEK-V 800/800-LK3 1200/1200 *	1000x1000	800x800	160	800 x 800	12.500
LK 3	DEK-V 700/1000-LK3 1200/1500 DEKA-V 700/1000-LK3 1200/1500	1000x1300	700x1000	180	1000x1000	13.500
LK 3	DEK-V 800/1000-LK3 1200/1500 DEKA-V 800/1000-LK3 1200/1500	1000x1300	800x1000	180	1000x1000	15.500
LK 3	DEK-V 800/1100-LK3 1200/1500 *	1000x1300	800x1100	180	1100x1100	17.000
LK 4	DEK-V 900/1000-LK4 1200/1200 DEKA-V 900/1000-LK4 1200/1200	1300x1300	900x1000	200	1000x1000	17.500
LK 4	DEK-V 1000/1000-LK4 1200/1200 DEKA-V 1000/1000-LK4 1200/1200	1300x1300	1000x1000	200	1000x1000	19.500
LK 4	DEK-V 900/1200-LK4 1200/1500 DEKA-V 900/1200-LK4 1200/1500	1300x1600	900x1200	230	1200x1200	21.000
LK 4	DEK-V 1000/1200-LK4 1200/1500 DEKA-V 1000/1200-LK4 1200/1500	1300x1600	1000x1200	230	1200x1200	23.500
LK 4	DEK-V 1100/1200-LK4 1200/1500 DEKA-V 1100/1200-LK4 1200/1500	1300x1600	1100x1200	230	1200x1200	26.000
LK 4	DEK-V 1200/1200-LK4 1500/1500 DEKA-V 1200/1200-LK4 1500/1500	1600x1600	1200x1200	270	1200x1200	28.000
LK 4	DEK-V 1300/1300-LK4 1500/1500 DEKA-V 1300/1300-LK4 1500/1500	1600x1600	1300x1300	270	1300x1300	33.000

DEKA variant: The pressure regulating damper is equipped with an additional actuating drive. Consequently, the unit can implement light-related, ventilation-related and smoke discharge functions.

DEK variant: The unit should only be used to regulate the pressure.

* The design sizes marked with * can only be delivered in the DEK (without drive) variant.
** The height of the base can be adjusted vis-à-vis the thickness of the on-site thermal insulation (cost neutral up to 200 mm).
*** If additional fittings (grids etc.) are used, a larger opening may become necessary.

Pressure regulating device - Type DEK-V-LK

To be installed on the roof at the top of a stairwell, for the maintenance of a controlled overpressure in the pressure chamber. Immediate response to self-opening or self-closing doors, through an automatic pressure regulating damper that does not require any auxiliary force.
Compliance with the requirements associated with the control time (3 seconds), as per EN 12101-6
Consists of:
Roof frame that is made of galvanised sheet steel and which features a welded construction; divided into two parts for larger damper dimensions; can be dismounted from the outside using a screw connection, in order to facilitate inspections.
Screwed-in cross-piece for accommodation of the drive system; can be dismounted for inspections. The entire base unit is provided with a thermal insulation coating on the inside.
Circumferential adhesive flange for roof sealing. The height of the roof frame can, with respect to the height of the thermal insulation, be increased by up to 200 mm in a cost neutral manner.
Standard colour of the base unit - White aluminium RAL 9006.
Automatic pressure regulating damper that facilitates steady control and which features multiple lamellas, for horizontal or vertical perfusion.
The operational reliability and the compliance with the control time (3 seconds) requirements associated with EN 12101-6 have been verified and tested through a functional test, a stability test and a resonance test (carried out after 10000 load reversals). This was done in collaboration with a notified testing centre (IFI Aachen).
Axles and connecting rods made of high-grade steel; frames and damper blades made of aluminium. Damper system opens and closes along the same direction via a bar connection; low-friction mounting of the damper axles.
The closing torque is, with respect to the aerodynamic force torque that produces the opening action, generated via a tension spring system. Consequently, the set overpressure is controlled in a manner that is independent of the quantity of air, and this control is maintained up to the nominal airflow rate (steady type of control).
The pressure difference of the pressure regulating damper can be adjusted by manipulating the spring pre-load length and the closing lever such that compatibility with the range of 25 - 75 Pa is attained. It is usually pre-set to 50 Pa at delivery. The maximum pressure regulation airflow rate depends on the adjusted regulation pressure.
Dome light (double-layered) consisting of 2 acrylic glass shells, linked through a dust-proof connection, including snow-proof and rain-proof seal with circumferential border frame made of aluminium, which acts as an edge protector. Ready-for-use dome light mounted on the upper part of the roof frame.
Flash-over drive system for attainment of an opening angle of 165°, which guarantees that the pressure release process is largely independent of the wind.
Integrated position switch for signalling the 'open' position.
Pressure regulating device completely connected to the external terminal box, protection class I P65.

Please note:
The system must be operated in a manner which ensures that the supply air is only switched on when the dome light above the pressure regulating damper has been activated (position switch).Otherwise, the required pressure discharge operation cannot be guaranteed.

Technical data, based on air density 1.2 kg/m³

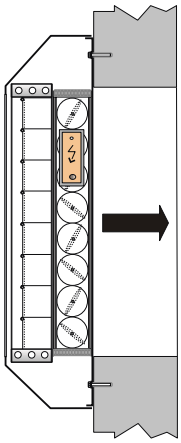
Max. pressure regulation airflow rate	(50Pa)	m³/h	:
Total pressure loss	Pa	: 50	
Preset regulation pressure	Pa	: 50	
Nominal size DEK	mm	:	
Nominal size - Dome light	mm	:	
Geometric opening area	m²	:	
Type		: DEK-V-LK oder DEKA-V-LK	
Brand		: Eichelberger	

Optional:
Model with additional options for light incidence, ventilation and smoke discharge
Type DEKA-V-LK

Motor-driven version of the pressure regulating damper for optional functions related to light incidence and ventilation and smoke discharge. The pressure regulating damper is equipped with an actuating drive (FR 24 V), which can keep the damper open when the system is at a standstill (operating state).When the pressure aeration process is triggered, the actuating drive should be switched over to a position that facilitates the automatic control function of the dampers (operating position for pressure regulation).In case of a defect associated with the triggered status, the drive mechanism can actuate the control butterfly valve (operating position for smoke discharge).

Pressure regulating devices for non-recessed wall mounting Type DEK-H

Structure:
Eichelberger offers pressure regulating devices with integrated, automatic pressure regulating dampers for non-recessed mounting on internal as well as external walls (recessed mounting available upon request). Each pressure regulating device comprises the DEK pressure regulating damper (which performs the regulation function automatically), a downstream damper that prevents condensation and protects the pressure regulating damper and a support structure. A casing, weather protection facilities and wind shields can also be included in the scope of the offer.
If pressure regulating dampers are used on façades, it must be ensured that the pressure regulation procedure cannot be impeded by the influence of wind.



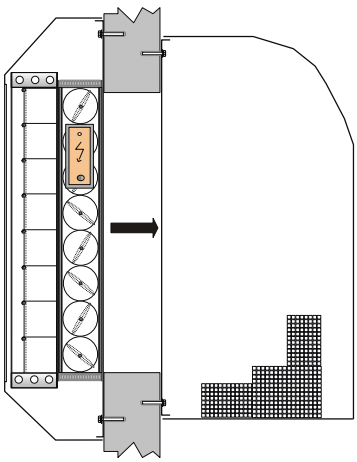
DEK-H-JK-RG

Application:
Interior wall – Non-recessed mounting

In the scope of delivery:
- Wall frame
- Tight-closing, insulated louver damper
- Spring return motor 24 V
- Pressure regulating damper
- Protective grid
- Removable casing made of aluminium

Positioning:
A weather protection grid, a discharge nozzle or the like can be accommodated behind the wall opening.
ATTENTION: During the dimensioning process, the flow-off pressure loss associated with the downstream components must be taken into consideration. The total pressure loss determines the overpressure in the stairwell.

DEK-H-JK-R
As before, but without casing



Variant DEK-H-JK-RG-WH

When it comes to façades that are expected to come into contact with strong winds, precautionary measures that are designed to counteract the direct effects of wind should be implemented. Wind protection covers that are designed to be aerodynamically efficient and which are made of galvanised sheet steel, aluminium sheets or high-grade steel are included in the scope of the offer. Their lower sections (and if necessary, the lateral sections) are equipped with a protective grid.

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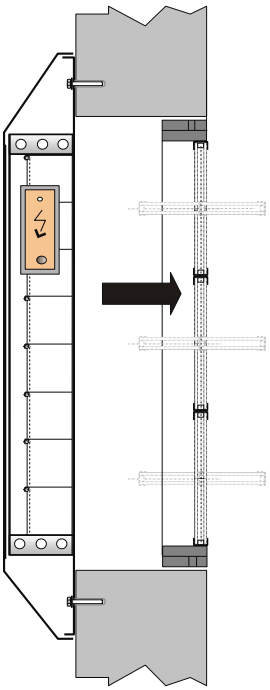
Pressure regulating devices for non-recessed wall mounting



DEK(A)-H-RG-LF

Application:
Interior wall - Non-recessed mounting - Type DEK-H-RG-LF

In the scope of delivery:
- Wall frame
- Lamellar window, loose incl. drive
- Pressure regulating damper
- Protective grid
- Removable casing made of aluminium.

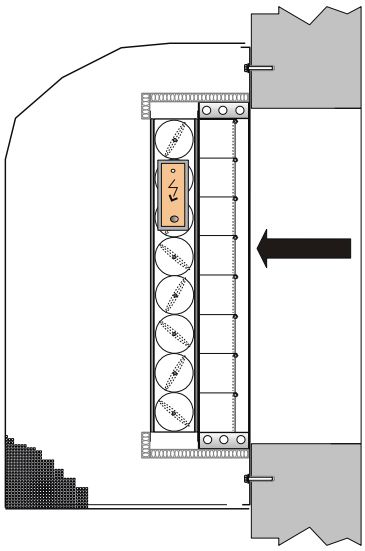
Optional:
Type DEKA-H-RG-LF
- With additional actuating drive at the DEK (pressure regulating damper)
- The lamellar window can now be used for light-related, ventilation-related and smoke discharge functions.

Positioning:

A glass lamellar window (k-value 1.1) with an actuating drive is positioned behind the pressure regulating damper. With regard to the flow, the lamellar window represents a relatively small pressure loss. It also takes over the functions associated with protection from the weather and thermal protection.

DEK(A)-H-R-LF

As before, but without casing



DEK-H-is-JK-R-WG

Application:
Non-recessed wall mounting - External wall

In the scope of delivery:
- Wall frame
- Tight-closing, insulated louver damper
- Insulated casing for louver damper and pressure regulating damper
- Spring return motor - 24 V
- Pressure regulating damper
- Protective grid
- Removable casing made of aluminium.

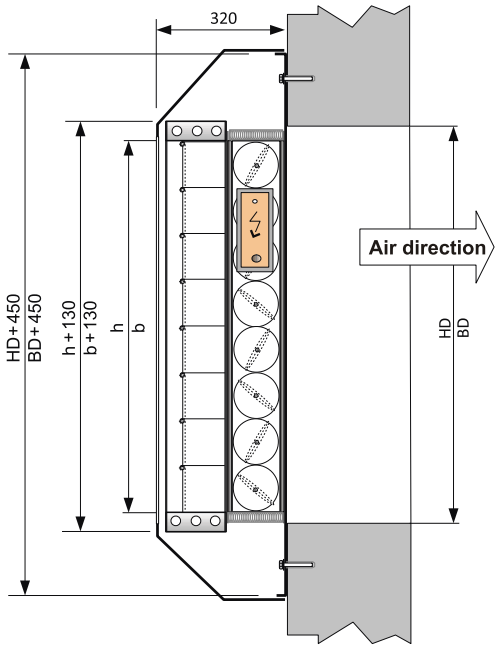
Positioning:

The pressure regulating damper and the tight-closing louver damper are mounted on an external wall frame. Both dampers are externally insulated. For protection against wind and weather conditions, a wind protection casing that has been designed to be aerodynamically efficient is screwed onto the wall frame. The lower (and, if necessary, lateral) section of the wind protection casing is equipped with a protective grid.
Adjustments and inspections are performed with the help of a removable inspection flap.

The depicted units represent a sample. Other pressure regulating devices (such as those that can be installed within a pipe, on a pipe, within a wall, below the ceiling, etc.) are also feasible.
Please contact the manufacturer directly, and you will receive a solution that is tailored to the building in question.

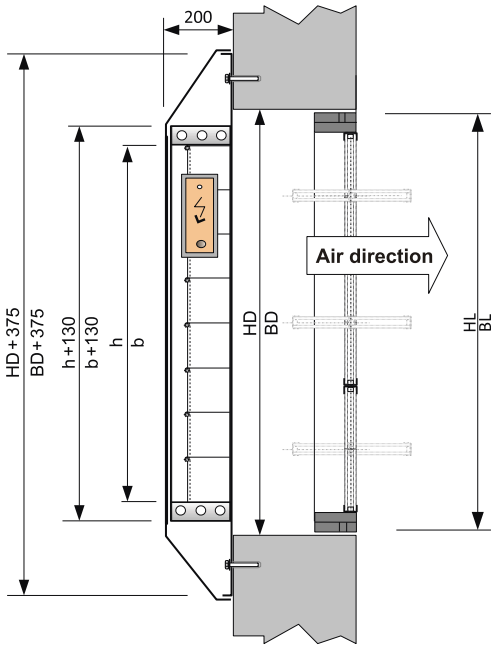
Pressure regulating devices for non-recessed wall mounting

Type DEK-H-JK-RG



$H_D \geq h$
$B_D \geq b$

Type DEK(A)-H-RG-LF



$H_L \geq h + 100$ mm
$B_L \geq b + 100$ mm

$H_D = H_L + 20$ mm
$B_D = B_L + 20$ mm

Airflow rate for a pressure difference of 50 Pa *

Subject to changes in dimension

h \ b	500	600	700	800	900	1000	1100	1200	1300	1400	1500
500	4.500	5.400	6.300	7.200	8.100	9.000	9.900	10.800	11.700	12.600	13.500
600	5.400	6.400	7.500	8.600	9.700	10.800	11.800	12.900	14.000	15.100	16.200
700	6.300	7.500	8.800	10.000	11.300	12.600	13.800	15.100	16.300	17.600	18.900
800	7.200	8.600	10.000	11.500	12.900	14.400	15.800	17.200	18.700	20.100	21.600
900	8.100	9.700	11.300	12.900	14.500	16.200	17.800	19.400	21.000	22.600	24.300
1000	9.000	10.800	12.600	14.400	16.200	18.000	19.800	21.600	23.400	25.200	27.000
1100	9.900	11.800	13.800	15.800	17.800	19.800	21.700	23.700	25.700	27.700	29.700
1200	10.800	12.900	15.100	17.200	19.400	21.600	23.700	25.900	28.000	30.200	32.400
1300	11.700	14.000	16.300	18.700	21.000	23.400	25.700	28.000	30.400	32.700	35.100
1400	12.600	15.100	17.600	20.100	22.600	25.200	27.700	30.200	32.700	35.200	37.800
1500	13.500	16.200	18.900	21.600	24.300	27.000	29.700	32.400	35.100	37.800	40.500

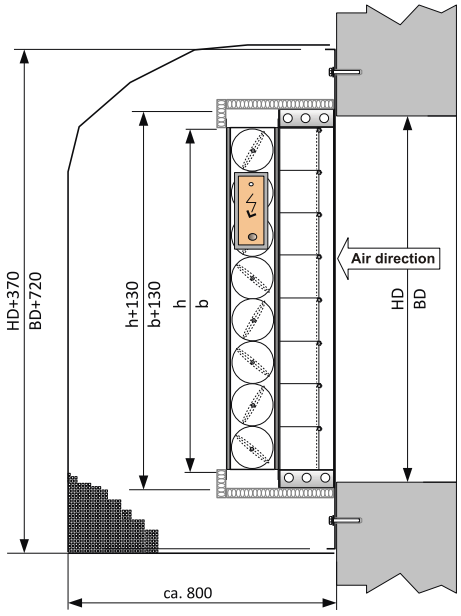
Example: DEK-H 900/1100

***ATTENTION:**

The airflow rates specified in the table consider the pressure drop associated with the pressure release damper and the louver damper or, as the case may be, the pressure drop associated with the lamellar window.
Downstream elements (such as sheets, weather protection grids, etc.) can significantly reduce the maximum airflow rate, and are to be taken into consideration during the dimensioning process. If weather protection grids are used, the opening should be larger than the nominal size of the DEK (pressure regulating damper).
If on-site façade elements are to be used, we would be happy to help you estimate the pressure losses.

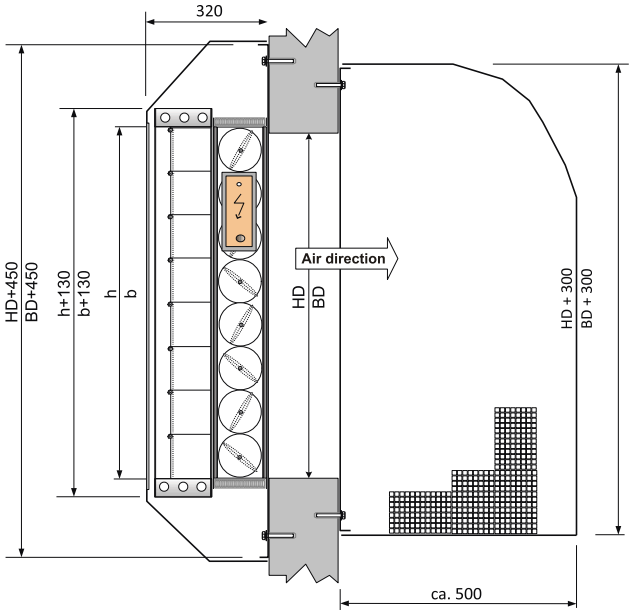
Main dimensions Pressure regulating devices for non-recessed wall mounting

Typ DEK-H-is-JK-R-WG



$H_D \geq h$
$B_D \geq b$

Typ DEK-H-JK-RG-WH



$H_D \geq h$
$B_D \geq b$

Airflow rate [m3/h] for a pressure difference of 50 Pa *

Subject to changes in dimension

h \ b	500	600	700	800	900	1000	1100	1200	1300	1400	1500
500	4.000	4.800	5.600	6.400	7.200	8.100	8.900	9.700	10.500	11.300	12.100
600	4.800	5.800	6.800	7.700	8.700	9.700	10.600	11.600	12.600	13.600	14.500
700	5.600	6.800	7.900	9.000	10.200	11.300	12.400	13.600	14.700	15.800	17.000
800	6.400	7.700	9.000	10.300	11.000	12.200	13.400	14.600	15.900	17.100	18.300
900	7.200	8.700	10.200	11.000	12.300	13.700	15.100	16.500	17.900	19.200	20.600
1000	8.100	9.100	10.700	12.200	13.700	15.300	16.800	18.300	19.800		
1100	8.400	10.000	11.700	13.400							
1200	9.100	11.000	12.800								
1300	9.900	11.900									
1400											
1500											

Upon request

Example: DEK-H 900/1100

Pressure regulating device for non-recessed wall mounting

For the maintenance of a controlled overpressure in the pressure chamber. Immediate response to self-opening or self-closing doors, through an automatic pressure regulating damper that does not require any auxiliary force. Compliance with the requirements associated with the control time (3 seconds), as per EN 12101-6
Consists of:

Automatic pressure regulating damper - Type DEK

Automatic pressure regulating damper that facilitates steady control and which features multiple lamellas, for horizontal or vertical perfusion.
The operational reliability and the compliance with the control time (3 seconds) requirements associated with EN 12101-6 have been verified and tested through a functional test, a stability test and a resonance test (carried out after 10000 load reversals). This was done in collaboration with a notified testing centre (IFI Aachen). Axles and connecting rods made of high-grade steel; frames and damper blades made of aluminium. Damper system opens and closes along the same direction via a bar connection; low-friction mounting of the damper axles.
The closing torque is, with respect to the aerodynamic force torque that produces the opening action, generated via a tension spring system. Consequently, the set overpressure is controlled in a manner that is independent of the quantity of air, and this control is maintained up to the nominal airflow rate (steady type of control).
The pressure difference of the pressure regulating damper can be adjusted by manipulating the spring pre-load length and the closing lever such that compatibility with the range of 25 - 75 Pa is attained. It is usually pre-set to 50 Pa at delivery. The maximum pressure regulation airflow rate depends on the adjusted regulation pressure.

The following components may be used, depending upon the selected version

Louver damper (JK)

Louver damper - Air-tight as per DIN 1946-4, for avoidance of condensation and the entry of cold air. Contrary coupling of the lamellas via gear wheels. Armaflex is used to provide the lamellas with a thermal insulation coating on one side. The lamellas are also provided with metal cladding. Aluminium lamellas. Actuating drive with spring return motor, opens without electricity, limit switch.

Wall or ceiling frames for openings of up to 2.5 m² (R)

Stable wall or ceiling frame made of galvanised sheet steel, for mounting on the internal or external wall - For accommodating the pressure regulating device. In case the size of the opening is up to 2.0 m2, the external dimensions of the frame are as per the dimensions of the on-site opening.
Pressure regulating damper (and, if necessary, louver damper) pre-mounted on the wall frame.

Covering hood up to 2.5 m² (G)

Removable covering hood made of aluminium. Edges welded. Standard colour - RAL 9006, white aluminium. The fastening screws of the wall frame are completely hidden by the casing.
For opening sizes of up to 2.5 m²

Glass lamellar window (LF)

For installation in façade - With several horizontal glass lamella segments. With regard to the exterior, the lamellas are flush with the frame. Thermal insulation glazing (U-value 1.1), thermally separated aluminium profiles. Surface anodised (optional: coating in RAL colour hue: additional charge)
Actuating drive - 24 V, DC
Position switch for signalling the 'open' position.
External dimensions B x H:

Wind protection hood - Up to 2,5 m² (WH)

Flow-optimised wind protection hood made of galvanised sheet steel for installation on external wall; equipped with protective grids in the lower (and, if necessary, lateral) sections, in order to minimise the influence of wind on the control mode of the pressure differential system.
Standard colour - RAL9006, white aluminium.
For opening sizes of up to 2.5 m².

Wind protection casing - Up to 2.5 m² (WG)

Wind-proof and rain-proof casing for pressure regulating devices on external walls. Shaped in an aerodynamically efficient manner, made of galvanised sheet steel, equipped with protective grids in the lower (and, if necessary, lateral) sections, in order to minimise the influence of wind on the control mode of the pressure differential system.
Standard colour - RAL9006, white aluminium.
For opening sizes of up to 2.5 m².

Insulated casing for damper cross-sections of up to 2.5 m²

Insulated casing made of galvanised sheet steel with thermal insulation, for insulation of the pressure regulating damper and the louver damper - For damper cross-sections of up to 2.5 m².

Motor-driven version of the pressure regulating damper for the implementation of functions related to light incidence, ventilation and smoke discharge (A)

The pressure regulating damper is equipped with an actuating drive (FR 24 V), which can keep the damper open when the system is at a standstill (operating state). When the pressure aeration process is triggered, the actuating drive should be switched over to a position that facilitates the automatic control function of the dampers (operating position for pressure regulation). In case the energy supply breaks down or is interrupted when the system has been triggered, the drive can actuate the dampers (operating position for smoke discharge).

Please note:

Components that are downstream of the pressure regulating damper (pipe components, weather protection grids, etc.) should be rated in a manner which ensures that the total pressure loss (incl. damper) does not exceed the level of 50 Pa (or, as the case may be, the planned overpressure).An agreement must be reached with the manufacturer regarding the installation circumstances.

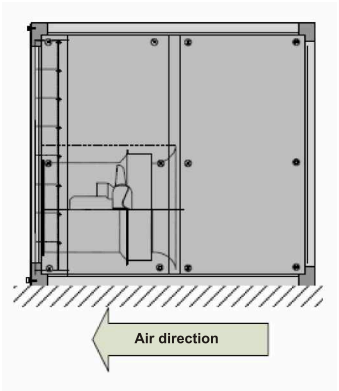
The system must be operated in a manner which ensures that the supply air is only switched on when the shut-off damper behind the pressure regulating damper has been opened completely (limit switch).Otherwise, the required pressure discharge operation cannot be guaranteed.

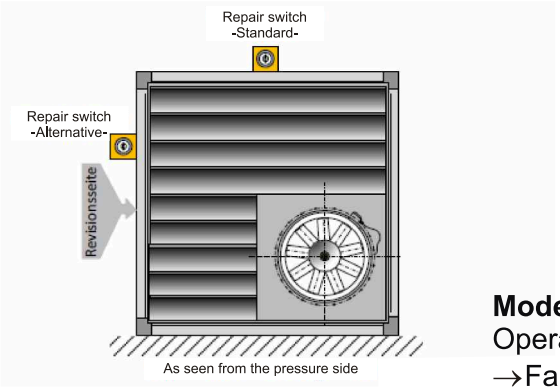
Technical data, based on air density 1.2 kg/m³		
Max. pressure regulation airflow rate	m³/h	:
Total pressure loss	Pa	: 50
Preset regulation pressure	Pa	: 50
Dimensions i.l. B x H	mm	:
External dimensions B x H x L	mm	:

Smoke protection pressure device - Type RDA 2

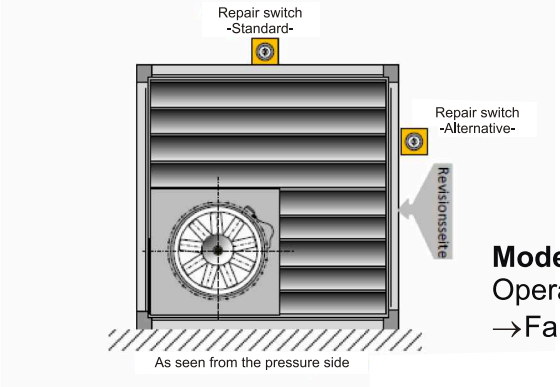
The supply air fan and the pressure release dampers that perform their function automatically via a spring mechanism are accommodated within the air-handling unit. These open automatically when the overpressure exceeds the desired value and facilitate a bypass arrangement vis-à-vis the suction side of the fan.
The opening force of the bypass dampers is raised by means of the overpressure in the stairwell/escape route. Thanks to a spring system, it is confronted with a closing force.
The pressure difference for which the dampers open (usually 50 Pa) can be set by varying the spring force, which in turn is done by changing the pre-load length.
When the dampers are open, part of the air volume circulates within the device.
When the overpressure declines due to self-opening doors, the spring system makes the dampers undergo a closing motion. This stimulates the dimensioning-related airflow rate.

Models



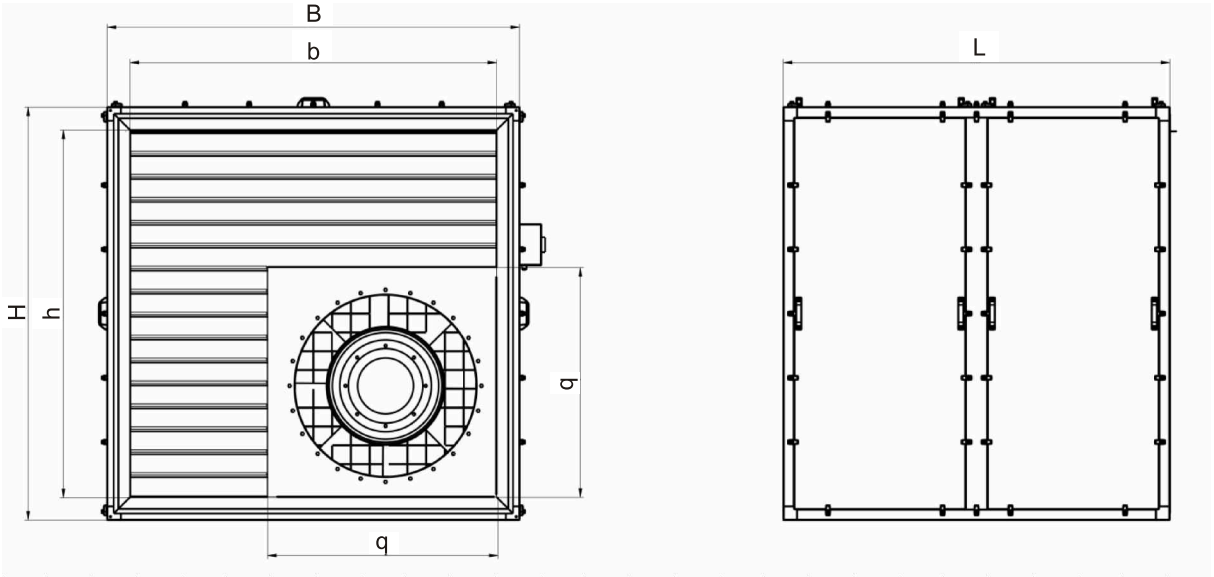


Model R -
Operating side in air direction: Right
→Fan in air direction (left)



Model L -
Operating side in air direction: left
→Fan in air direction (right)

Performance data and main dimensions

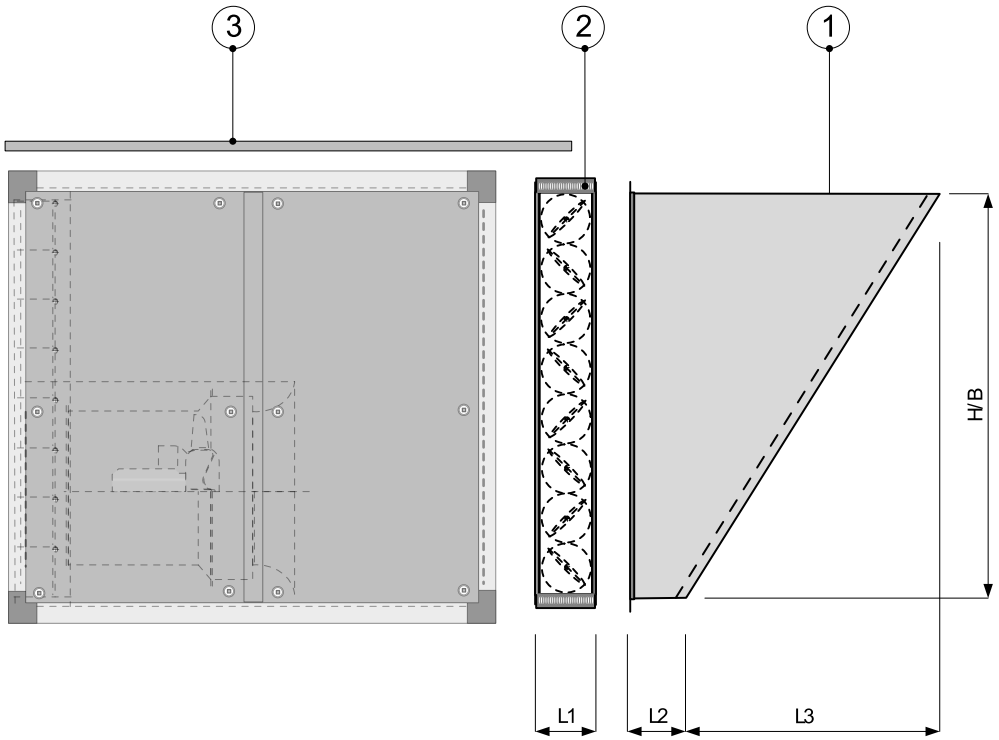


Design size	*H [mm]*	*B [mm]*	*L [mm]*	*h [mm]*	*b [mm]*	*q [mm]*	*Pipe connection dimensions Width x Height [mm]*	*Area of pressure release [m²]*
500	1200	1200	1160	1000	1000	600	1140 x 1140 EP 30	0,64
560	1400	1400	1240	1200	1200	700	1340 x 1340 EP 30	0,95
630	1500	1500	1420	1300	1300	800	1440 x 1440 EP 30	1,05
710	1700	1700	1510	1500	1500	900	1640 x 1640 EP 30	1,44
800	1800	1800	1640	1600	1600	1000	1740 x 1740 EP 30	1,56

Design size	*Max. supply air airflow rate [m³/h]*	*Max. pressure release airflow rate for 50 Pa overpressure and max. 50 Pa suction-side underpressure* [m³/h]*	*Available pressure [Pa]*	*Motor output [KW]*	*Nominal current [A]*
RDA2 500/4/0,75 RDA2 500/4/1,1 RDA2 500/4/1,5	7.000 8.000 10.000	10.000	50 + 50	0,75 1,1 1,5	2,0 2,6 3,5
RDA2 560/4/1,5 RDA2 560/4/2,2 RDA2 560/4/3,0	11.000 14.000 15.000	15.000	50 + 50	1,5 2,2 3,0	3,5 4,8 6,6
RDA2 630/4/3,0 RDA2 630/4/4,0 RDA2 630/4/5,5	16.000 20.000 21.000	20.000	50 + 50	3,0 4,0 5,5	6,6 8,8 11,5
RDA2 710/4/4,0 RDA2 710/4/5,5 RDA2 710/4/7,5	22.000 26.000 30.000	27.000	50 + 50	4,0 5,5 7,5	18,8 11,5 15,5
RDA2 800/4/4,0 RDA2 800/4/7,5 RDA2 800/4/11	27.000 32.000 35.000	30.000	50 + 50	4,0 7,5 11,0	8,8 15,5 22,0

* Please note: The maximum pressure release airflow rate applies to a direct connection with the pressure chamber, in a situation in which the maximum suction-side underpressure is at the level of 50 Pa. It can vary with respect to the individual installation conditions. If necessary, reach an agreement with the manufacturer regarding the installation circumstances.

Accessories RDA 2



1. Aspiration ports made of galvanised sheet steel with integrated bird screen
2. Insulated louver damper with spring return motor, 24 V, opens without electricity, mounted on the suction side of the device
3. Rain shield

	L1 [mm]	L2 [mm]	L3 [mm]	H x B [mm]
RDA2 500	120	150	660	1140 x 1140
RDA2 560	120	150	775	1340 x 1340
RDA2 630	120	150	830	1440 x 1440
RDA2 710	180	150	950	1640 x 1640
RDA2 800	180	150	1005	1740 x 1740

Smoke protection pressure device Type RDA 2

For controlled maintenance of overpressure in evacuation and escape routes.
The operational reliability and the compliance with the control time (3 seconds) requirements associated with EN 12101-6 have been verified and tested through a functional test, a stability test and a resonance test (carried out after 10000 load reversals). This was done in collaboration with a notified testing centre (IFI Aachen).
Overpressure air-handling unit featuring a stable frame structure made of hot-dip galvanised and sealed special pipe profile, bolted to a removable frame unit with corner connections. Double-layered cladding panels, wall thickness 30 mm, screwed into the frame structure, air-tight and removable from all sides.
Inner and outer shells made of hot-dip galvanised sheet steel, in a sealed design featuring intermediate, non-inflammable mineral fibre insulation corresponding to DIN 4102.
Inner and outer sides of the device smooth, no cutting edges and no welded seams.
Large inspection cover with handles and rotating fasteners, removable from three sides. Inspection cover with age-resistant, circumferential rubber profile - Sealed in an airtight manner. Pressure release damper system (featuring a bypass circuit) that is integrated into the device.
The closing torques are, with respect to the aerodynamic force torques that produce the opening action, generated via tension spring systems. The initial response pressure difference can be adjusted by varying the spring pre-load length. It is pre-set to 50 Pa at delivery.
Axial fan with guide wheel, made of welded steel.
Axial running wheel with rotor blades that can be adjusted when the system is at a standstill, mounted directly on the drive motor, dynamically balanced as per DIN ISO 1940-1, quality class G = 6.3.
DS drive motor in B5 format as per DIN IEC 34, IP 54 and ISO class F, with extended cable for the repair switch (external, on the air-handling unit).
Impact sound-decoupled assembly of the axial fan vis-à-vis the box frame via rubber oscillation damper; on the pressure-side, via elastic connecting pieces that establish a connection with the device casing.
Maximum permissible external air pressure loss - 50 Pa.
Protected by patents.

<u>Technical data, based on air density 1.2 kg/m³</u>

Supply air airflow rate	m³/h	:
Maximum pressure release at 50 Pa	m³/h	:
External pressure enhancement	Pa	: 50 + 50
Speed	1/min	:
Motor output	KW	:
Voltage	V	: 400
Frequency	Hz	: 50
Nominal current	A	:
Activation type	d/s-d	:
Dimensions		:
Brand		: Eichelberger
Type		: RDA 2 .../../..

Accessories (covered by the scope of delivery):
- Repair switch, wired with motor, on the exterior of the RDA device

Accessories (optional):
- Rain shield for outdoor installation
- Sealed, insulated louver damper with spring return motor, 24 V, opens without electricity, mounted on the suction-side of the device
- Aspiration ports with bird screen

Installation instructions for RDA2 device

In addition to the supply air fan, RDA2-type smoke protection pressure devices also encompass a pressure release damper (which features a bypass circuit) that performs the regulatory action automatically and which is actuated via a spring mechanism.

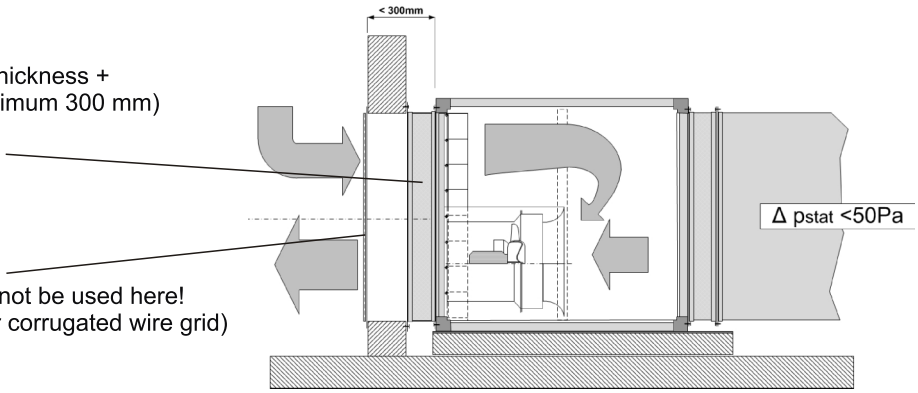
In order to ensure that this damper system works in a defect-free manner, the following instructions must be followed (also refer to the installation related suggestions on the following page):

- **Suction-side pressure losses (via channel lines, weather protection grids, etc.) may not exceed 50 Pa.**
- The device is mounted such that it is in direct contact with the pressure chamber. On the pressure-side, the flow may not be constricted in any way; surface transfers (transitions, levels etc.) must be avoided. The wall opening associated with the stairwell must, at the very least, correspond to the channel dimension specified in the measurement chart.
- On the pressure-side, if the connection with the stairwell is established through the use of channel lines (distance between the device and the purging area > 300 mm), the bypass airflow rate that acts along the opposite direction must be separated from the airflow rate of the supply air through the use of a ventilation arrangement.
  Towards this end, separating guide plates can be integrated into the pressure-side duct. Alternatively, a pipe that is to be connected to the fan can be mounted within the pressure-side channel line.
  Please contact the manufacturer to reach an agreement regarding the specific details of this particular variant.
- The fire protection related requirements associated with the fire resistance of the external air and the supply air line are to be fulfilled in accordance with the building permit and the fire protection concept.
  The following variants are feasible:
  - The entire (i.e. up to the stairwell) external air and supply air line is structured as a ventilation line featuring a fire resistance capability (L90). In such a case, the device should, with respect to the corresponding fire-resistance rating, be sealed off.
  - If the installation space does not contain any fire load apart from the control system that is required for the RDA, the fire resistance requirement can be waived. If an installation space that is designed to correspond to the F90 quality level (access doors corresponding to the RS quality level) contains no fire loads, a free suction arrangement would be feasible..

  We recommend that an agreement be reached with the inspection expert regarding the fire protection requirements.
- A side wall (inspection cover) must be disassembled (on the right or left side) in order to make it possible to adjust the rotor blade angle and the spring system. The corresponding accessibility must be guaranteed (L90 enclosure must contain the corresponding inspection cover).

On-site wall connection (wall thickness + length of the connection - maximum 300 mm)

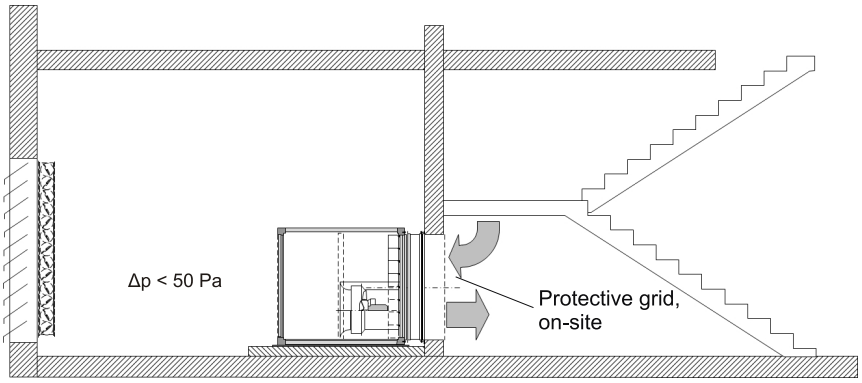
On-site protective grid.
Weather protection grids may not be used here!
Open grid (use a wire mesh or corrugated wire grid)



1. Installation of the device outside the stairwell, directly on the wall associated with the stairwell

The device is mounted directly at the wall associated with the pressure-aerated space. The distance between the device and the purging level in the overpressure area may not exceed 300 mm.

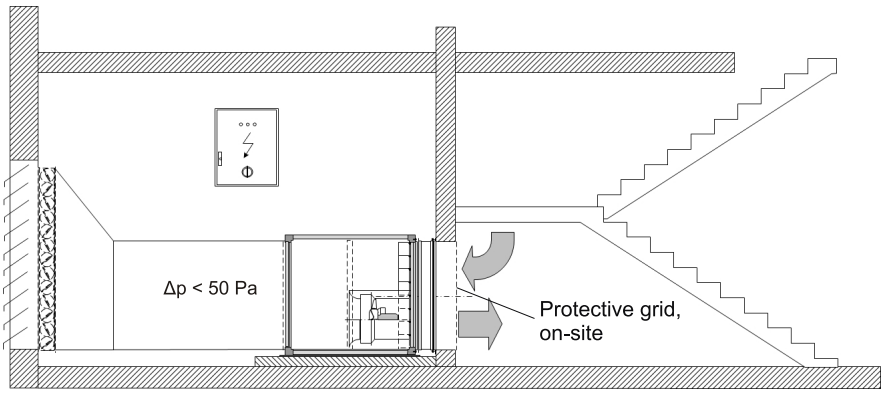
The following variants are feasible, depending on the fire protection requirements associated with the installation space. → **In each case, an agreement must be reached with the respective fire protection expert regarding the fire protection requirements!**



Free inlet:
The device absorbs freely from the installation space.

Fire protection:
The installation space must be free of fire loads.

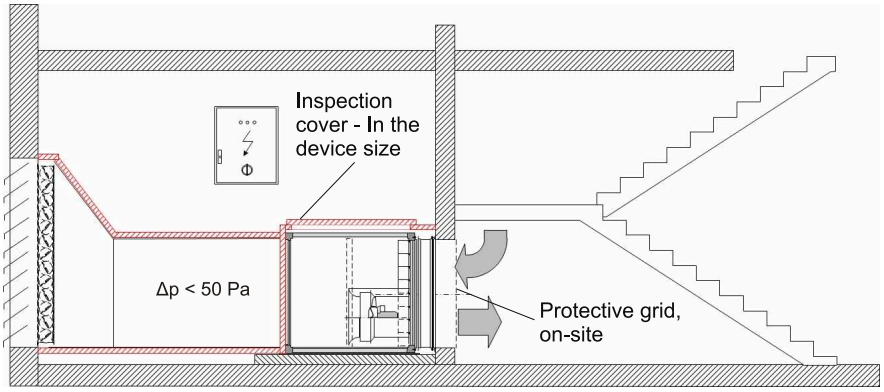
In the scope of delivery:
- Protective grid, suction-side
- Optional: Insulated louver damper



Suction-side channel interface (without fire resistance):

Fire protection:
The installation space must be free of fire loads; as a rule, the control cabinet for the RDA may be accommodated in the same space.

In the scope of delivery:
- Optional: Insulated louver damper



Suction-side channel interface (with fire resistance):

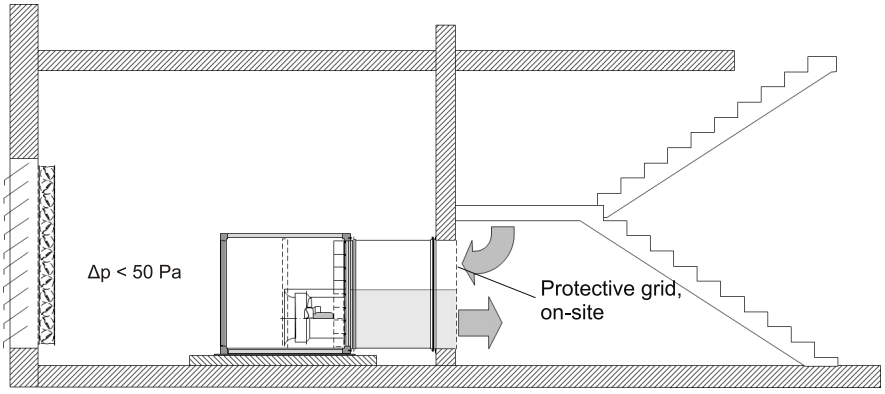
Fire protection:
If fire loads are present in the installation space, the line (incl. the device enclosure) should be compatible with the L90 class along its entire length, i.e. until it emerges into the open.

In the scope of delivery:
- Optional: Insulated louver damper

2. Installation of the device outside the stairwell, at a distance from the wall →On the pressure side, ventilation-related separation of supply air and bypass

If the distance between the device and the purging level in the overpressure area exceeds 300 mm, a ventilation-related partition (guide plates or a pipe for the supply air) should, on the pressure-side, be integrated into the channel line. Please contact the manufacturer to obtain information regarding the individual design.

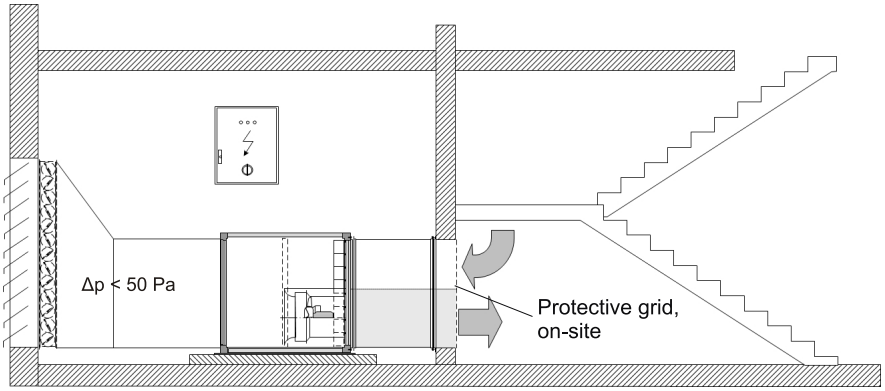
The following variants are feasible, depending on the fire protection requirements associated with the installation space. → **In each case, an agreement must be reached with the respective fire protection expert regarding the fire protection requirements!**



Free inlet:
The device absorbs freely from the installation space.

Fire protection:
The installation space must be free of fire loads.

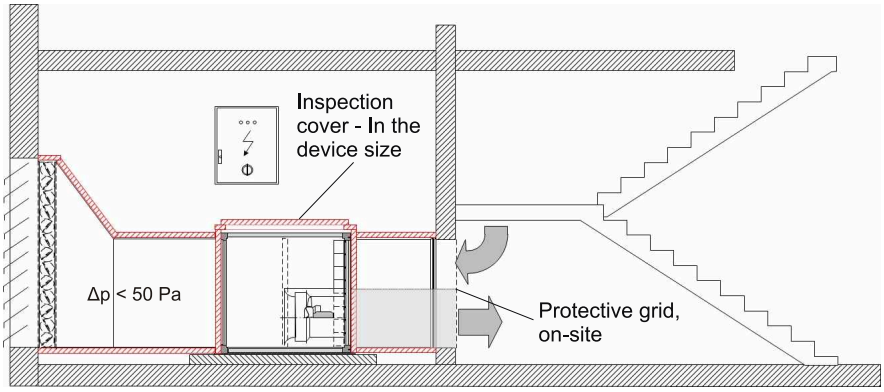
In the scope of delivery:
- Protective grid, suction-side
- Optional: Insulated louver damper



Suction-side channel interface (without fire resistance):

Fire protection:
The installation space must be free of fire loads; as a rule, the control cabinet for the RDA may be accommodated in the same space.

In the scope of delivery:
- Optional: Insulated louver damper

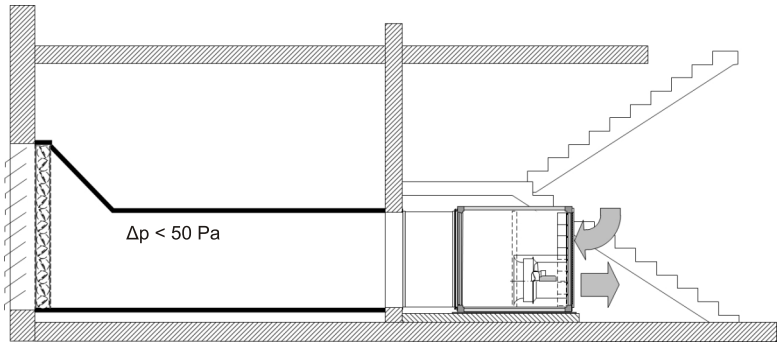


Suction-side channel interface (with fire resistance):

Fire protection:
If fire loads are present in the installation space, the line (incl. the device enclosure) should be compatible with the L90 class along its entire length, i.e. until it emerges into the open.

In the scope of delivery:
- Optional: Insulated louver damper

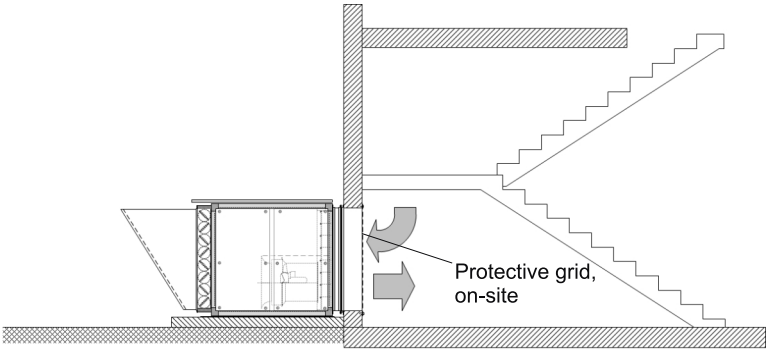
3. Installation of the device within the stairwell



Fire protection:
The line that is outside the stairwell must correspond to the L90 class and be guided into the open.

In the scope of delivery:
- Protective grid, suction-side
- Optional: Insulated louver damper

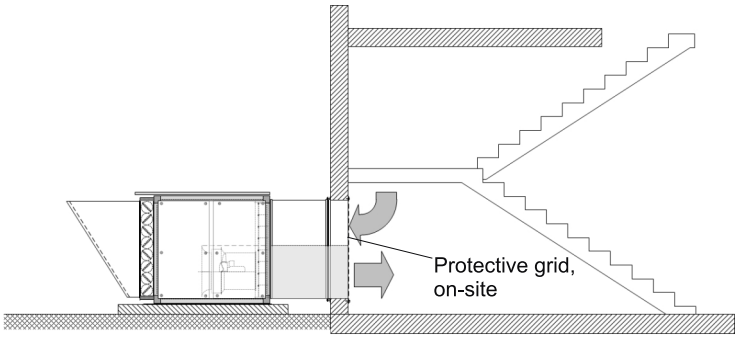
4. Installation of the device outside the building - Weather-proof model



Installation directly at the wall associated with the stairwell

The device is mounted directly at the wall associated with the pressure-aerated space. The distance between the device and the purging level in the overpressure area may not exceed 300 mm.

In the scope of delivery:
- Protective grid, suction-side
- Insulated louver damper
- Aspiration ports
- Rain shield



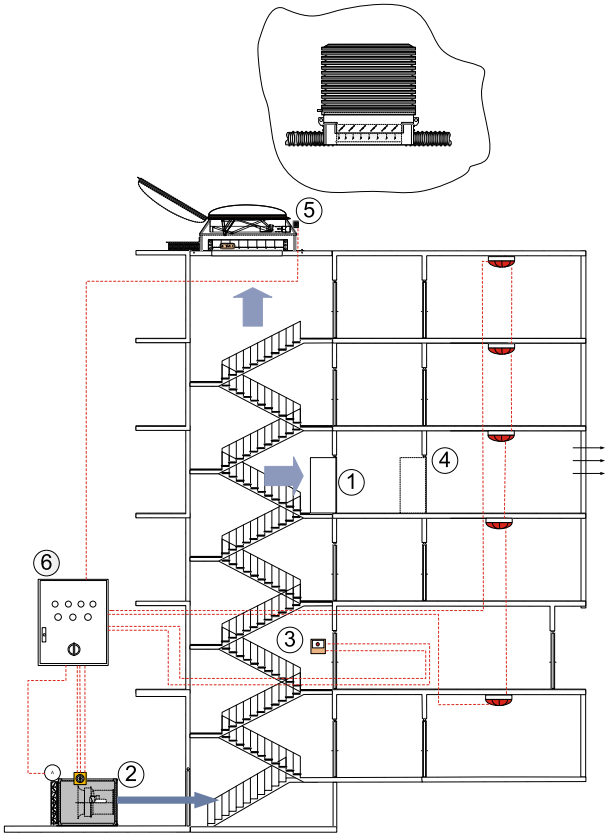
Installation of the device such that the device is away from the wall

If the distance between the device and the purging level in the overpressure area exceeds 300 mm, a ventilation-related partition (guide plates or a pipe for the supply air) should, on the pressure-side, be integrated into the channel line. Please contact the manufacturer to obtain information regarding the individual design.

In the scope of delivery:
- Protective grid, suction-side
- Insulated louver damper
- Aspiration ports
- Rain shield

Purging systems with pressure maintenance

Pressure differential systems, in which the flow emanating from the floor that is on fire is not facilitated through the use of dampers or windows that open automatically, are not capable of securely preventing the entry of smoke.
In case of stairwells that do not have to be totally free of smoke (e.g. important internal stairwells; other escape routes are available in the building), purging systems with pressure maintenance facilities can be used.
This type of system could also be used in stairwells in which the building utilisation results in a scenario in which only a few opening procedures need to be considered in relation to a door that leads to the fire area (e.g. residential building). (Corresponds to system category 3 of VDMA standard sheet 24188 - 'Smoke protection measures in stairwells')

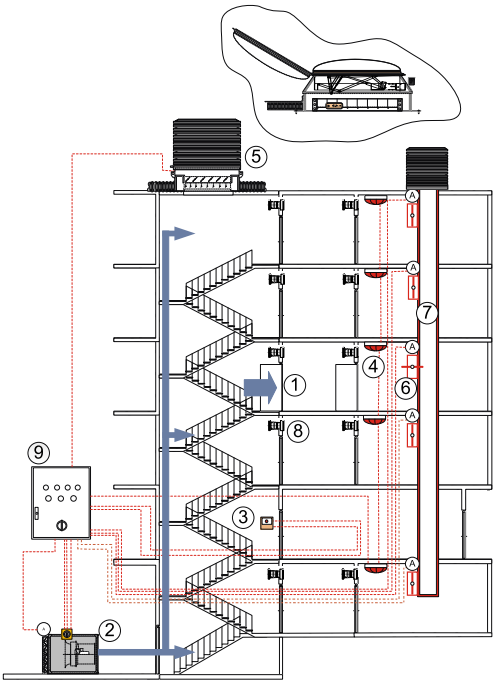


1. Doors with door closers
2. Smoke protection supply air device - Type RDS
3. Manual release button
4. Optical smoke detectors
5. Pressure regulating device
6. Control cabinet

In the lower section, the smoke protection supply air device boosts fresh air into the stairwell.
The pressure regulating device (e.g. type DEK-V-DS or DEK-V-LK) is accommodated at the top of the stairwell. This automatically regulates the pressure via the spring-loaded pressure regulating damper.
The system is actuated via smoke detectors (or via a comprehensive fire alarm system). These smoke detectors are accommodated outside the stairwell, in the vicinity of the access doors. If the doors are closed, the stairwell is perfused from bottom to top in a manner characterised by the preservation of the planned overpressure.
On the floor that is on fire, if the door leading to the stairwell opens, the door is only perfused to the extent that leakages or, as the case may be, manually-opened (e.g. by the fire brigade) windows or windows that have been shattered by the fire are present. On the other hand, if the area is 'sealed', smoke can enter the stairwell over the period of time during which the door on the burning floor is open. However, the airflow rate of the purge air causes the rapid dilution of the smoke that has entered.

Pressure differential system with secured flow

In case of systems that have to prevent smoke from entering a stairwell (e.g. within safety stairwells), the flow that takes place on the respective floor should be secured through the use of self-opening dampers or windows.
The perfusion speeds through the doors leading from the stairwell to the lobby and those leading from the lobby to the respective floor should be verified during the approval process that is carried out by an expert.
A speed of 2 m/s has been specified in the sample guideline for multi-storey buildings. This speed should not be undercut. The maximum permissible door operating force is 100 N.
In order to ensure that this speed can be built up, the pressure loss associated with the flow-off path must be smaller than the overpressure envisioned for the stairwell. We recommend that a pressure loss of 30 Pa be targeted when the dampers, windows and shaft surfaces are being dimensioned.



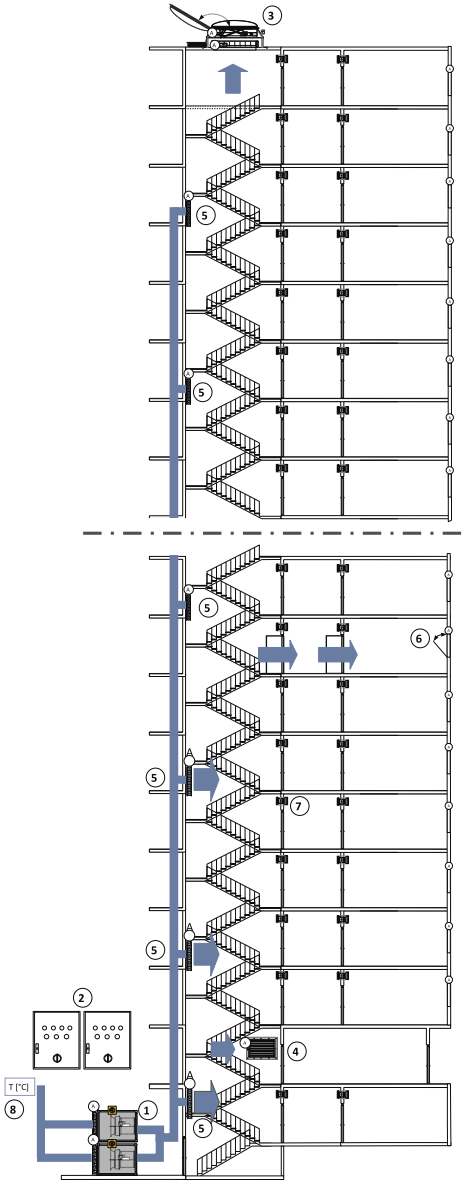
1. Doors with door closers
2. RDS-type smoke protection supply air device
3. Manual release button
4. Optical smoke detectors
5. Pressure regulating device
6. Smoke extraction damper
7. Smoke extraction channel, L90
8. Overflow element K90 with check valve
9. Control cabinet

The smoke protection supply air device boosts fresh air into the stairwell. In case of a tall building, a shaft is used to blow the supply air into several levels (e.g. into every third floor), in order to minimise pressure losses associated with the perfusion of the stairwell. The pressure regulating device (e.g. type DEK-V-DS or DEK-V-LK) is accommodated at the top of the stairwell. This automatically regulates the pressure via the spring-loaded pressure regulating damper.
The system is actuated via a comprehensive fire alarm system or smoke detectors. These smoke detectors are accommodated outside the lobbies, in the vicinity of the access doors. If smoke is detected on a certain floor, the flow-off flaps/windows are triggered in a selective manner. This means that a flow is only facilitated on the floor in question.
Overflow elements (cut-off devices with check valves) can be accommodated in the sluice walls. Smoke that has entered the sluice can thus be flushed out.

If, on the floor that is on fire, the access door leading to the stairwell is opened, the pressure regulating damper closes immediately, and the door can be perfused with the airflow rate that has been made available within the stairwell. In case of a closing door, the control butterfly valve directly secures the pressure release process, and the doors can be opened at any time.

Pressure differential systems in multi-storey buildings

Considering the ever-increasing heights of buildings, physical factors such as thermal updrafts and the pressure losses associated with the perfusion of stairwells are becoming ever more important.
The thermal updraft is caused by the difference between internal and external temperatures. Due to this difference, a buoyancy effect emerges within a high (stairwell) shaft during winter, if the internal temperatures are at a high level (similar to what happens within a chimney). A similar (but correspondingly negative) effect emerges during the summer, although its magnitude is lower.
The pressure loss associated with the stairwell can amount to several Pascals, depending on the geometry of the stairwell and the height of the vertical airflow rate. When it comes to multi-storey buildings, this pressure loss is not negligible.



① Smoke protection supply air device, redundant
② Control cabinet, redundant
③ Upper pressure regulating device DEK-V-LK or DEK-V-DS
④ Lower pressure regulating device e.g. DEK-H-JK-LF
⑤ Supply air dampers, selectable
⑥ Flow in the storey
⑦ Overflow elements
⑧ Temperature sensors for controlling the supply air

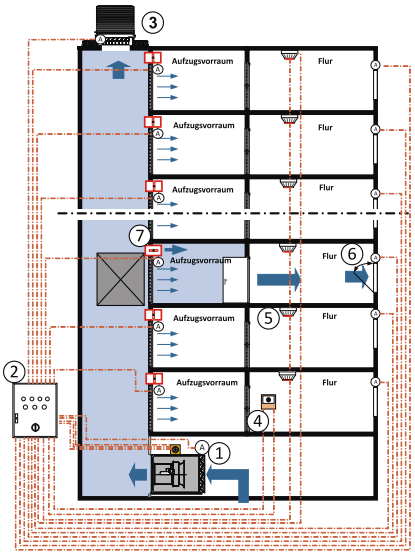
In case of isothermal circumstances, the pressure loss associated with the perfusion causes a scenario in which the pressure difference vis-à-vis the atmosphere goes on increasing towards the bottom (if there is only one pressure regulating damper at the top of the stairwell).
Bringing supply air into several levels (e.g. into every third storey) minimises this effect. If a building exceeds a certain height, we recommend using an additional pressure regulating damper, which should be accommodated in the lower section of the stairwell.
In case of very tall multi-storey buildings, the different pressure patterns that arise in summer and winter on account of thermal updrafts need to be taken into consideration.

Temperature-controlled distribution of supply air

During the winter, if the external temperatures are very low and the building under consideration is tall, an under-pressure (vis-à-vis the atmosphere) can emerge in the lower section, even if the supply air system in the stairwell is in operation.
Since the loss of pressure (towards the bottom) in the stairwell leads to a cumulative overpressure, the pressure loss can offset the uplift during the winter. Although the pressure losses in the stairwell exert a 'disruptive' influence under isothermal circumstances, they represent the solution for counterbalancing the uplift during winter.
0Under isothermal circumstances, in order to ensure that the distribution of pressure
is as uniform as possible across all storeys, an attempt should be made to ensure that the introduction of supply air is as uniform as possible. During the winter season, it would make sense to channel a larger quantity of supply air into the lower section.
We offer control modules for such use cases, which regulate the airflow rate of the supply air and the air distribution in a manner that is dependent upon the external temperature.
As before, the pressure regulation procedure that takes place in response to self-opening and self-closing doors is automatic, quick and reliable.

Fire-fighting elevator shaft with elevator lobby

When it comes to fire-fighting elevators, the task of the pressure differential system is to ensure that the shaft of the fire-fighting elevator and the associated lobbies are free of smoke.
According to the German regulations for multi-storey buildings, this requirement is considered to have been fulfilled when, in a situation involving an open lobby door, the lobby is perfused vis-àvis
the corridor at a minimum speed of 0.75 m/s.
[Fire-fighting concepts corresponding to the Austrian TRVB (technical regulations for fire prevention) S112 or EN 12101-6 necessitate higher speeds; however, in these approaches, the stairwell and the fire-fighting elevator have a common lobby.]
The maximum permissible operating force for the lobby doors is 100 N.



1. Smoke protection supply air device
2. Control cabinet
3. Pressure regulating device DEK-V-DS
4. Manual release button
5. Optical smoke detectors or comprehensive fire alarm system
6. Flow-off flaps (Smoke extraction damper or window)
7. Overflow dampers

The controlled overpressure is built up within the elevator shaft. The overpressure level associated with the lobby areas expands vis-à-vis the leakages associated with the travelling shaft doors. Motor-driven overflow dampers are accommodated in the walls between the shaft and the lobbies, whereby only the damper on the floor that is on fire is actuated. With regard to fire protection, the quality of the dampers must be in alignment with the fire protection concept.
With regard to the construction-related requirement which states that the shaft and the lobby are to be kept free of smoke, we are of the opinion that non-flammable dampers that feature ON/OFF motors and which do not possess a fire resistance capability can be used; but we do recommend that an individual agreement be reached with the approval agencies or, as the case may be, the entity that created the fire protection concept.
When smoke is detected on the floor that is on fire, the overflow damper and the flow-off damper/window are opened. The total pressure loss that emerges between the elevator shaft and the exterior may not exceed the planned overpressure of 50 Pa. In order to perfuse a 2 m2 door at the rate of 0.75 m/s, it is recommended that a geometric free space of ~0.4 m2 be used for the overtopping procedure.
The pressure regulation procedure takes place automatically via the pressure regulating device that is accommodated in the shaft head (e.g. type DEK-DS).As an alternative to the scenario depicted in the figure, a smoke protection pressure device featuring integrated control butterfly valves can also be used (device type RDA2).
When the lobby doors are closed, the surplus air is released via the pressure regulating damper.
If the lobby door on the floor that is on fire opens, the pressure in the shaft drops and the pressure regulating damper closes. This ensures that the required quantity of air is available for the perfusion of the open door.

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