# Pressure Differential Systems

The solution for smoke-free escape and emergency routes







The overpressure ventilation technology was invented during the eighties as an appropriate element within fire protection concepts for skyscrapers. The manufacturer Systemair was instrumental in pushing the development of an important improvement: the electronic control for pressurisation ventilation fans. This system provides higher security for selfrescue and especially for the fire brigade.

# Stairways Pressure Differential Systems

# Important for save live and for a fast fire fighting

In the case of fire, it is not just for the people fleeing that smoke gases present the greatest threat. It also puts the rescue service personnel at risk and hinders their work. Therefore, electronically-controlled overpressure systems bring a new dimension to fire protection. With a simple switch, the fire services can switch the supply air fans to maximum power, limiting the need for mobile fans to be used, or even making them unnecessary. This means that electronic overpressure systems do not just support self-rescue, but also provide additional protection against smoke gases for the firefighting personnel, even at high fire temperatures. They provide clear visibility and generally make it possible to reach the source of the fire more quickly.

Systemair is the leading company when it comes to combining EC motor technology and frequency converter control technology. An airtight building with low leakage places higher demands on the planning and implementation of smoke extraction concepts. When designing an overpressure system, the smoke extraction fans required for smoke extraction in internal shafts play a significant role. Uniting both systems – smoke extraction and the overpressure system – into a functioning overall concept is the latest development from Systemair.

Systemair will come up with individual solutions for your applications.

## The electronic control technology

The pressure differential system MUB-EC by Systemair and its AC version needs no pressure relief unit due to its control characteristics. It offers a complete solution with fewer components and actuators for the pressure differential ventilation in stairways and escape tunnels as conventional systems. The system is also available with smoke extraction function\* in EC and AC design. The complete system as well as its components meets the requirements according to EN 12101-6 (Smoke and heat control systems – part 6: specification for pressure differential systems). The adjusted EC motor/AC motor regulation unit guarantees a standardised regulation performance plus very low energy consumption during the ventilation process.

#### \*Smoke extraction

Optional smoke extract fan certified to EN 12101-3 (Smoke- and heat control systems – part 3: Specification for powered smoke and heat exhaust fans).

#### Design example

Our MUB-EC centrifugal fan unit is used for residential buildings up to eight floors. The capacity can be increased by parallel operation of two or more units. Higher buildings normally require several supply air units installed at different positions in the stairway. The self-regulating EC control panel is connected to the fan unit via a 0-10V-signal. There is just one standard 230 V cable necessary for the control unit. The optional on/off switch of the MUB-EC ventilation unit can be directly wired to the 400 V power supply. Systemair's complete solution includes periferic controls like, connections for smoke detectors, manual call points and a fire indicator panel.



# Ten benefits of electronic overpressure systems

#### 1. Faster self rescue

Fire escape stairways are recommended even if other arrangements are permitted for escape and rescue routes. People evacuation is faster through smoke-free stairways or stairways with less smoke – the panic risk can be reduced.

#### 2. Faster rescue by others

On electronic overpressure systems, the air supply of the fans can be switched to the maximum air volume by a firefighter's switch. This enables pushing back and leading smoke away, even at high fire temperatures. The pressure in the stairway exceeds the standards limitation, and a time-consuming installation of mobile fans, allowing a clear view, in many cases is unnecessary.

## 3. More flexibility during fire-fighting operations

Mobile fans placed in the building entry can become a "tripping hazard" for emergency task forces. With the Systemair Pressure Differential System those fans are not needed.

### 4. Higher security for emergency task forces

High air velocities combined with electronically controlled ventilation reduces the concentration of flammable gases and hot air in the zone on fire. This reduces the risk of backdrafts and delays flashover.

#### 5. Higher building protection

With the possibility of overriding the set pressure with the electronic overpressure system a faster access for the firefighters is enabled. This reduces fire damages which can be honoured by the assurance in certain cases.

#### 6. Reliability

Electronic overpressure systems are not affected by wind loads, snow coverings or pressure changes due to cold or warm supply air.

#### 7. Reduction of construction costs

Openings for air outlets are not required. Control dampers and additional weather protection equipment are usually not necessary.

### 8. Reduction of operating costs

No complex adjusting or cleaning of mechanical control dampers.

## 9. Steady precision during life cycle

Electronic overpressure systems automatically compensate potential leakages due to normal wear and tear of the building.

#### 10. Architectural freedom

Huge air terminal devices or high roof fans are not required.

#### Control

- Pressure differential regulation module in control cabinet for wall mounting
- Integrated module for EC driven motors or frequency converter
- Automatic regulation system for customisation of operational characteristics via numeric display
- Display of the operational characteristics in real time
- Integrated connection for suitable smoke detectors
- Integrated connection for manual call points
- Control of motorised damper
- Connection for daily ventilation

#### Components

The stairways pressure differential system is delivered as a project-related overall system.

Basic components include:

- Supply air fan unit MUB EC-P / MUB FU-P/B oder equivalent axail fans
- Pressure differential control panel module 230V AWS-ÜD-EC or suitable control panel 230V AES-ÜD-FU
- Pressure differential control panel module 24V AES-ÜD-EC or suitable control panel 24V AES-ÜD-FU
- incl. pressure differential sensor

You will find standard accessories on page 18 or in our online-catalogue at **www.systemair.com**.

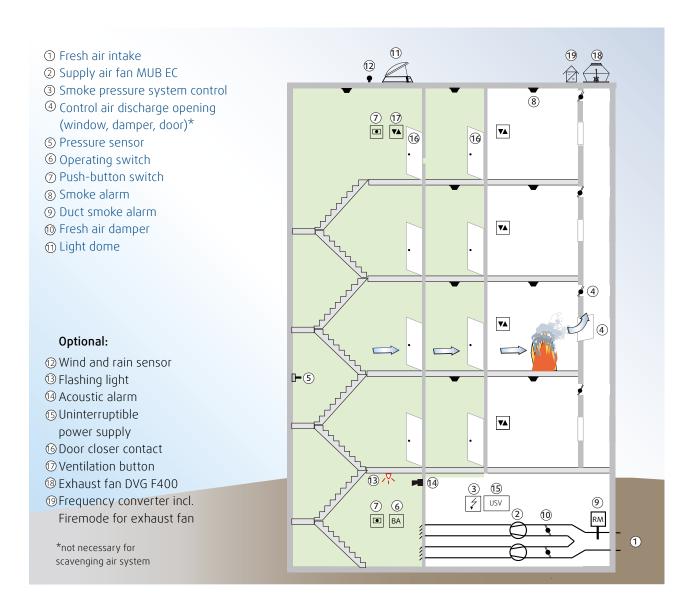


# **Function**

#### **Multibox EC**

Thanks to a special control system, we are able to realise a constant differential pressure in stairwells, using EC fans. The constantly-measured differential pressure is evaluated in the control system in real-time and compared with corresponding setpoint values. The speed of the EC fans is adjusted by the control system so that the setpoint values are adhered to in the stairwell. This prevents the forces required to open the doors from getting too high (max. 100 N). By selectively controlling the outflows

in the individual storeys, e.g. windows, the necessary airspeed (at least 0.75 m/s, or 2 m/s) – depending on the stairwell – is achieved by the open door between the stairwell and the rooms on the individual storeys. The light dome also serves to constantly exchange the air in the stairwell and can also be used for daily ventilation as required. Another option is to couple a smoke gas extraction fan to the system. The extract air fan is needed if the outflow openings on the individual storeys lead to an extract air shaft/duct which has too high a pressure loss.

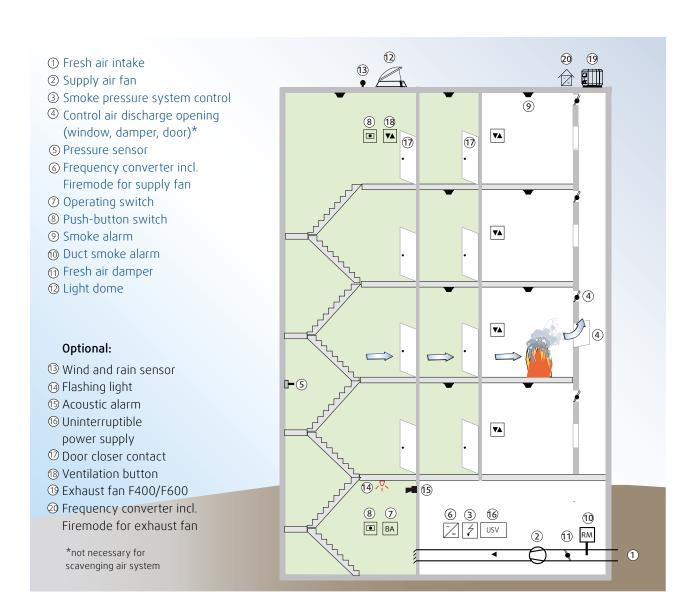




#### Axial fan with frequency control

Thanks to a special control system, a constant differential pressure is realised in the stairwell using AXC fans. The constantly-measured differential pressure is evaluated in the control system in real-time and compared with corresponding setpoint values. The speed of the fans is adjusted by the control system so that the setpoint values are adhered to in the stairwell. This prevents the forces required to open the doors from getting too high (max. 100 N). By selectively controlling the outflows in the individual storeys, e.g. windows, the necessary

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# **Multibox EC**





- High efficiency in all areas of the fan curve
- Removable panels
- Flexible air flow direction
- Installation in any mounting position
- Low noise level

#### Casing

The casing consists of an aluminium frame with fibreglass reinforced plastic corners of PA6. The double skin panels are manufactured from galvanized steel with 20 mm mineral wool insulation.

#### Motor

MUB-EC fans are driven by EC-external rotor motors. All motors are suitable for 50/60Hz.

### Impeller

All models are equipped with impellers with backward curved blades, manufactured from aluminium.

#### Speed control

100% speed control by a 0-10V signal.

## Motor protection

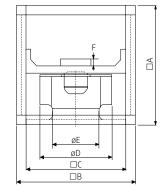
Integrated electronic motor protection.

Please find more information in our online-catalogue at www.systemair.com.

#### Technical data

MUB		062 560 EC-UDA	062 630 EC-UDA	100 710 EC-UDA
Art. no.		34563	34564	37891
Voltage/Frequency	V/50 Hz	400	400	400
Phase	~	3	3	3
Power	W	1976	2480	6434
Current	А	3.05	3.80	8.96
Max. airflow	m³/h	10790	12860	26806
Fan impeller speed	min <sup>-1</sup>	1360	1209	1205
Max. temp. of transported air	°C	60	60	40
Max. temp. of transported air when speed-controlled	°C	60	60	40
Sound pressure level at 3 m (20 m <sup>2</sup> Sabine)	dB(A)	64	68	74
Weight	kg	135	97	175
Insulation class. motor		F	F	F
Enclosure class, motor	IP	54	54	54

# Change the exhaust direction on site by simply changing the positions of the side panels! Straight through airflow 90° airflow Change the exhaust direction



MUB EC	□A	□В	□C	ØD	ØE	F	
560	800	800	720	560	360	70	
630	800	800	720	630	407	70	
710	1000	1000	920	806	470	73	





# Axial fan AXC



- AXC with aerofoil impeller, adjustable pitch angle for maximum efficiency
- Die cast aluminium hub and blades
- Terminal box in IP65 mounted at the outside of the casing for easy wiring
- Suitable for operating temperatures between -20 °C and +55 °C
- Inspection hole to verify correct direction of rotation

The adjustable pitch angle setting offers a wide performance and maximum flexibility to match precisely individual airflow requirements. The AXC axial fans have been performance tested in accordance with DIN ISO 5801, DIN 24163 and AMCA 210-99 on the Systemair fan test rig.

## Impeller

The AXC die cast aerofoil aluminium impellers can be offered with full or fractional solidities, maximum efficiencies can be obtained. Different impeller/hub configurations allow high operating pressures.

#### Casino

Axial fan casings are heavy gauge, galvanized, with spun flanges for high rigidity. Long cased execution as standard stock range. Also available with short casing and with an acoustically insulated box.

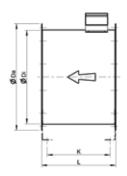
#### Motor

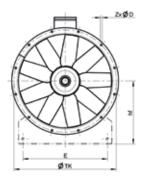
Three phase motor, IP55, insulation class F, in accordance with IEC norm. The built-in motors are equipped with PTC thermistors for optimum motor protection. Single or two speed motors. Speed controllable by frequency converter.

Please find more information in our online-catalogue at www.systemair.com.

# Technical data

AXC		1000-5/16°-4 EK	900-10/16°-4 EK	630-6/16°-2 EK	630-6/11°-2 EK	560-6/14°-2 EK
Art. no.		31531	31532	31533	31534	31535
Voltage/Frequency	V/50 Hz	400	400	400	400	400
Phase	~	3	3	3	3	3
Power	W	11	11	11	7,5	5,5
Current	Α	21	21	20	13,9	10,6
Max. airflow	m³/h	32000	26545	21480	16500	12800
Fan impeller speed	min <sup>-1</sup>	1460	1460	2930	2940	2937
Max. temp. of transported air	°C	55	55	55	55	55
Max. temp. of transported air when speed-controlled	°C	55	55	55	55	55
Sound pressure level at 3 m (20 m <sup>2</sup> Sabine)	dB(A)	75	72	79	78	76
Weight	kg	273	272	115	191	191
Insulation class. motor		F	F	F	F	F
Enclosure class. motor	ΙP	55	55	55	55	55





AXC	ØDa	ØDi	hf	ØTK	Е	zxØd	Motor	L	K
560	650	560	375	620	500	12x12	80-112	500	424
							132-160	750	674
630	720	630	425	690	570	12x12	80-112	500	424
							132-160	750	674
900	1005	900	560	970	830	16x15	100-132	640	552
							160-200	762	850
1000	1105	1000	670	1070	930	16x15	100-132	552	640
							160-200	762	850





# Roof fan DVV and DVG



- Max. temperature 400°C/120 min, 600°C/120 min.
- IE2 high efficiency motor inside
- Suitable for coastal applications
- Vertical exhaust
- Low sound level

# Casing

The casing is manufactured from seawater resistant aluminium. The base frame consist of galvanised steel.

#### Motor

Frequency converter controllable IEC flange motors which comply with Efficiency Class IE2.

#### Impeller

The impeller with backward-curved blades is manufactured from stainless steel.

# Speed control

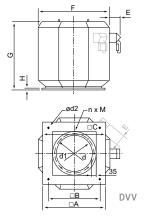
For speed control use frequency inverter.

Please find more information in our online-catalogue at www.systemair.com.

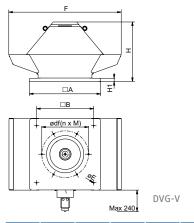
# Technical data

DVV		DVV 800D6/F600 IE2*	DVV 630D4/F600 IE2*	DVG-V 800D6/F400 IE2	DVG-V 630D4/F400 IE2
Art. no.		95191	95183	95128	95171
Voltage/Frequency	V/50 Hz	400	400	400	400
Motor circuit connection		D	Y/Y	D	D
Phase	~	3	3	3	3
Power	W	6390	6700	5857	5000
Current	А	12,6	11	12,6	9,7
Starting current	Α	76	95	76	63
Max. airflow	m³/h	25500	19300	25500	17670
Fan impeller speed	1/min	960	1455	960	1440
Max. temperature 120 min.	°C	600	600	400	400
Sound pressure level in 4 m	dB(A)	72	75	74	75
Sound pressure level in 10 m	dB(A)	64	69	66	69
Weight	kg	213	144	212	128
Insulation class. motor		F	F	F	F
Enclosure class. motor	IP	54	54	55	55

<sup>\*</sup>auch in F400 erhältlich.



DVV	ød2	F	G	Н	пхМ	□A	□В	□C	ød	ød1
630	18	1100	958	40	12xM8	995	880	990	500	541
800	18	1272	1165	40	16xM10	995	880	990	630	674



DVG-V	□A	□В	øΕ	F	ødf (n x M)	H1	H
630	1039	840	14	1573	674 (8xM8)	40	858
800	1255	1050	14	2024	872 (8xM8)	40	999





# Induction thrust fan IHS



- Easy installation and maintenance
- Reduces the required supply air volume
- Supply and extract air shafts can be minimized which saves space an money
- Compact design for low ceilings
- Suitable for mounting in false ceilings

The IHS is an induction thrust fan in a compact casing with an integrated, direct driven high performance centrifugal fan. It can be supplied with on-off switch (optional) and is suitable for horizontal installation.

#### Casing

Casing manufactured from galvanised steel, for maximum protection against corrosion.

#### Motor

3-phase motors according to IEC standards; protection class IP55.

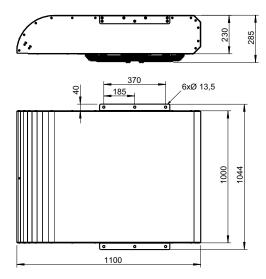
#### Impeller

Aerodynamic centrifugal impeller for maximum boost and minor sound emission.

Please find more information in our online-catalogue at www.systemair.com.

#### Technical data

IHS		50-4/6 (B)	50-4/8 (B)
Artikel-Nr.		37254	37255
Voltage/Frequency	V/50 Hz	400	400
Phase	~	3	3
Power	W	1500	1300
Current	Α	3,7	3,3
Starting current	А	25,9	15,6
Thrust	N	52	52
Max. airflow	m³/h	6196	6138
Fan impeller speed	1/min	1445	1430
Max. temperature	°C	55	55
Max. temp. of transported air for 120 min.	°C	300	300
Schalldruckpegel in 3 m (Freifeld)	dB(A)	73	73
Weight	kg	100	100
Insulation class. motor		Н	Н
Enclosure class. motor	IP	55	55



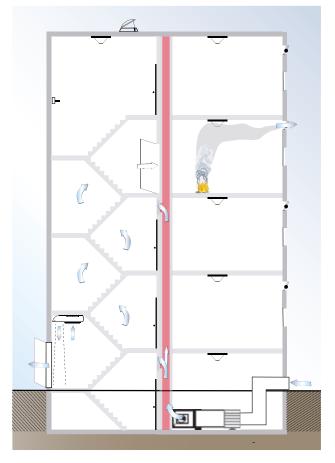


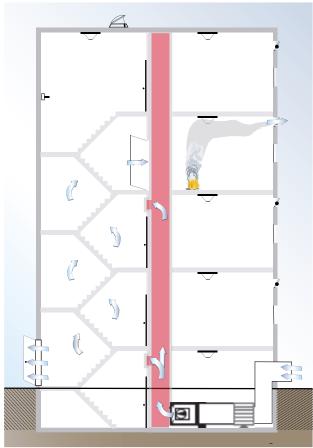
# Functional principle of IHS

# New ideas and approaches when the physics offers almost no way out.

Depending on the stairwell, an air speed of 0.75 or 2 m/s must be maintained at the open door to the room with the fire. When the entry door is opened for people to escape, the appropriate amount of air flows out of the stairwell. This volume must be added once more. If the flow is reduced, the fans, and above all the duct system, can be designed with significantly smaller dimensions. This reduces the cost and takes up less space.

This is where the induction thrust fan IHS is applied. It is installed above the entry door and reduces thanks to the generated air curtain the flow volume through the opened entrance.





With IHS Without IHS



# **Accessories**

# Operating switch



Operating switch for Overload Pressure Contol Unit from plastic. With protection glass. This switch has absolute priority! All other activators have lower ranking. In case of cutting the connection cable the "max. Overload pressure mode" is activated.

AES-UD-BA		
Art. no.		35719
h/b/d	mm	125/125/70
Enclosure class, motor	IP	44
Colour		red

## Duct smoke alarm



Duct smoke alarm with 600 mm air sampling tube for detecting smoke in the fresh air duct, with potential-free output contact and LED contamination display. Connection bolts:  $3 \times M16$ 

KRM		230 V AC	24 V AC
Art. no.		35937	35720
h/b/d	mm	257/166/77	257/166/77
Enclosure class, motor	IP	54	54
Colour		red	red

### Smoke detector



Smoke detector (optical and thermal) with socket for connection with Multi-sensor alarm with limit-value technology, in compliance with DIN-EN 54-7, with VdS approval. High operational safety thanks to intelligent evaluation of the signal from the optical and thermal measurement chamber.

AMM-2		
Art. no.		35711
Enclosure class, motor	IP	40
Material		ABS
Colour		white

### Smoke alarm



Automatic smoke alarm with limit-value technology, in compliance with DIN-EN 54-7, with VdS approval. High operational safety thanks to intelligent evaluation of the signal from the optical measurement chamber, with detector base.

ARM-1		
Art. no.		35710
Enclosure class, motor	IP	40
Material		ABS
Colour		white

# Flash light



The flashing light signals the optical alarm in the case of fire.

BL-1	
Art. no.	36358
Voltage	V 230

# Acoustic alarm



The acoustic alarm signals the alarm state locally.

H-230		
Art. no.		36359
Voltage	V	230
Enclosure class, motor	IP	43
Material		Plastic
Colour		grey



# Light dome



The light dome serves as a smoke extraction system and keeps the escape routes free of smoke in case of fire. Available in a range of sizes.

# Wind and rain sensor



The wind and rain sensor detects and evaluates the wind speed and precipitation. If wind, rain or snow is coming, it switches off the ventilation and closes the light dome.

AES-ÜD-DKWR	
Art. no.	36798



# Systemair worldwide



### Skinnskatteberg, Sweden:

Systemair AB, the Systemair group head office is in Skinnskatteberg, Sweden. The production is virtually fully automated with modern machinery featuring advanced computer support. Also located here is the company's most advanced test installation for measuring technical data.

### Klockgården, Sweden:

Systemair's small air handling units are manufactured at Klockgården in Skinnskatteberg. Frico's central warehouse is also located here.

# Windischbuch, Germany:

Production facility for fans and modular air handling units, specialized on engineered products (e.g. tunnel and jet fans). Distribution center.

### Langenfeld, Germany:

Production of air curtains.

#### Mülheim an der Ruhr, Germany:

Menerga is a leading European producer of air handling units for swimming pool halls and comfort ventilation with extra high efficiency.

## Hässleholm, Sweden:

VEAB is the leading European manufacturer of electric duct heaters. Production of heating and cooling coils, electric and water based.

# Ukmerge, Lithuania:

Production of smaller air handling units with energy recovery systems.

#### Maribor, Slovenia:

Specialized in centrifugal smoke extract fans, EN certified.

#### Hasselager, Denmark:

Production of modular air handling units.













#### Quality:

Systemair is certified in accordance with ISO 9001; ISO 14001 and ATEX. Our research and development laboratories are one of the most modern in Europe; measurements are made in accordance with international standards like AMCA and ISO.

# Save energy, lower running cost!

Our label "Green Ventilation" features products with a high energy saving potential. All products labelled with "Green Ventilation" combine energy economy with energy efficiency.



### Dal, Eidsvoll, Norway:

Production of air handling units for the Norwegian market.

# Bratislava, Slovakia:

The factory in Bratislava manufactures air distribution products and EN certified fire and smoke dampers.

#### Kuala Lumpur, Malaysia:

Production and marketing of products for Tunnel and garage ventilation.

#### Madrid, Spain:

Production of air handling units for the southern European market.

### Hyderabad, India:

Production if air distribution products.

#### New Delhi, India:

The factories in New Delhi and Noida manufacture grilles and diffusers.

## Milan, Italy:

Our factory in Italy, Systemair AC, develops and manufactures a wide range of air conditioner.

### Bouctouche, Canada:

Our main North American production facility of air handling units and inline fans for commercial and residential applications is located in Bouctouche.

# Kansas City, USA:

Production of fans for the US market.

### Istanbul, Turkey:

Systemair-HSK is Turkey's leading manufacturer of air handling units.

### Waalwijk, Netherlands:

Holland Heating is Netherlands leading manufacturer of air handling units.

#### Wujiang, China:

Production of air handling units for the Asian market.



