Pressure Differential Systems
The system solution in stairways
The overpressure ventilation technology is not new. It 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 self-rescue and especially for the fire brigade.

Stairways Pressure Differential Systems
Systemair is the leading company in combining differential pressure and smoke extracting in one system with EC technology.

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, particularly with regard to connections such as cables and hydraulic hoses.
In case of fire, smoke gases are a dangerous threat to escaping people and can also endanger and obstruct rescuers. Therefore, electronically controlled positive pressure units are the next step in fire protection. The firefighters can use an ordinary switch to increase the supply air fan volume to maximum air volume and therefore less mobile fans are necessary or even none at all. Electronic pressure differential systems are a great help for self rescue. They also give an additional protection from smoke gases for the fire fighters during high fire temperatures, provide a clear view and allow a faster approach to the source of fire.

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.

Nowadays, an air-tight building with few leakages demands higher requirements for the planning and installation of smoke extraction concepts. Not only are influences from outside, such as temperature and wind, relevant for the design of pressure differential systems but also smoke extraction fans which create a negative pressure inside the building in case of fire. This negative pressure inside modern buildings can no longer be neglected and has a significant influence on the pressure distribution in the building and consequently on the pressure differential systems. The latest development of Systemair combines both systems into an overall concept with energy optimised EC technology.
The stairways pressure differential system with EC/AC driven motors

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.

**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.

*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).
Control panel for centrifugal MUB-EC or axial AXC FU solutions

- Pressure differential regulation module in control cabinet for wall mounting
- Integrated module for EC driven motors or frequency converter for AC motors
- 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
- Pressure differential control panel module
- Pressure differential sensor

Accessories

Additional accessories:
- Damper control
- Window control
- Fireman's switch
- Smoke detector

You will find standard accessories in our online-catalogue at www.systemair.com
Pressure differential system combined with smoke extraction*

Centrifugal fan unit MUB-EC

Wiring (minimum dimensions!):
- a = NHXHX 3 x 1.5 mm² E90
- b = NYM 5 x 1.5 mm²
- c = JY(ST)Y 2 x 2 x 0.8 mm
- d = JY(ST)Y 4 x 2 x 0.8 mm
- e = NHXHX 5 x 1.5 mm² E90
- f = JY(ST)Y 6 x 2 x 0.8 mm²

*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).
Axial fan unit AXC and frequency inverter solutions

Wiring (minimum dimensions!):
- a = NHXHX 3 x 1.5 mm² E90
- b = NYM 5 x 1.5 mm²
- c = JY(Y) 2 x 2 x 0.8 mm
- d = JY(Y) 4 x 2 x 0.8 mm
- e = YSLCY/JZ 5 x 2.5 mm²
- f = NHXHX 5 x 4 m² E90
- g = JY(Y) 6 x 2 x 0.8 mm²

Emergency power supply 400V AC

Fireman's switch AES-ÜD-BA / 35719

Control unit AES-ÜD-FU
- 230V: * 34568
- 24V: * 34571
- 7.5 kW 34569
- 5,5 kW 34572

including:
- DSG 200, AES-ÜD-BA
- actuator

External fire detection system on site

Duct smoke sensor 24V AC/DC KRM-2 / 35720

Extraction duct
- with roof fan DVG

smoke exhaust damper or motorised window
- 24V DC / max. 1A

smoke exhaust damper or motorised window
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MUB-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 geometry
All models are equipped with impellers with backward curved blades, manufactured from aluminium.

Speed Control
Speed control by a 0-10V signal.

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

<table>
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<th>MUB 062...UDA</th>
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</table>

Change the exhaust direction on site by simply changing the positions of the side panels!

Straight through airflow

Change the exhaust direction

90° airflow
Reference: doubleU

City/Country: Düsseldorf, Germany
Products: Pressure differential system with 4 x MUB 062 630 EC
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.

**High efficiency impellers**
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.

**Sturdy casing**
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.

**Motors**
The built-in motors are equipped with PTC thermistors for optimum motor protection. Single or two speed motors. Speed controllable by frequency converter.

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Reference: Taunusanlage 11

City/Country: Frankfurt/Main, Germany

Products: Pressure differential systems with 4 x AXC 630-6-2 (7.5 kW) medium pressure axial fans and 1 x DVV 8000/D6/F600 IE2 roof fan.

Image source: MACINA/KSP Jürgen Engel Architekten/FRÉO Group
Induction fan IHS

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.

Further information can be found in our online-catalogue: www.systemair.de.

Technical Data

<table>
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<tr>
<th>IHS 50-4</th>
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<tr>
<td>Enclosure class, motor</td>
<td>IP 55</td>
</tr>
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</table>

- Easy installation and maintenance
- Reduces the required supply air volume
- Supply and extract air shafts can be minimized
- Compact design for low ceilings
- Suitable for mounting in false ceilings
- Easy to operate
Principle

New ideas and ways to overcome physical law. The air flow at the open door to the fire room must be kept at 0.75 or 2 m/s. If the entrance door is open for escape, a large amount of air is led out of the stairway. This air volume must be replenished additionally. Airflow reduction allows the selection of a smaller sized fan and especially smaller ducting. This enables cost reduction and space saving.

With induction fan IHS

Without induction fan IHS
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.

Mühlheim 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.
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.

Hasselager, Denmark:
Production of modular air handling units.

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 of 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.