Decentralized Ventilation Units
FVS Univent

Installation below/in the ceiling
### Technical brochure · Decentralized ventilation units FVS Univent

**LTG Comfort Air Technology**

**Air-Water-Systems**

**Air Diffusers**

**Air Distribution**

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**Notes**

Dimensions stated in this brochure are in mm.

Dimensions stated in this brochure are subject to General Tolerances according to DIN ISO 2768-vL.

For the outlet grille special tolerances stated in the drawing apply.

Straightness and twist tolerances for extruded aluminum profiles according to DIN EN 12020-2.

The surface finish is designed to meet the requirements for applications in buildings - room climate according to DIN 1946 part 2. Other requirements on request.

The actual tender documentations are available in word format at your local dealership or at www.LTG.net.

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Flexible and energy-efficient!
Decentralized Ventilation Units with Highly Efficient Heat Recovery

Decentralized ventilation units offer unique flexibility in combination with high economic efficiency to architects and planners.

All ventilation is provided locally. Both supply air and exhaust are guided across the facade and treated. An integrated highly efficient heat recuperator minimizes the heat/cold loss and thus ensures low energy costs.

Without a central AHU, decentralized systems offer the only, highly efficient solution to renovate existing buildings in an energy-efficient manner. Local systems offer an innovative and energy-efficient means for individual, demand-controlled air conditioning for new construction projects as well.

LTG Aktiengesellschaft offers units for local air conditioning for all installation situations in the ceiling, the facade and the false floor.

The product portfolio ranges from efficient supply air and supply/return air units to innovative concepts with non-stationary flow.

Benefits
- No central air conditioning plant or duct system
- Lower floor height possible for reduced construction costs and efficiently space use
- High user acceptance by individual control
- High energy efficiency by demand-controlled ventilation with heat recovery

Heat exchanger
## Technical brochure · Decentralized ventilation units FVS Univent

### Product Overview

<table>
<thead>
<tr>
<th>Functions</th>
<th>Supply/exhaust air, heat recovery, night-time ventilation</th>
<th>Technical Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Fresh air supply</td>
</tr>
<tr>
<td></td>
<td></td>
<td>up to 720 m³/h</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Noise level Lₚₐ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27 dB(A) ¹)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electr. power intake</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 W ¹)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reheating ratio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>83 %</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td>3050 (incl. sound absorber) x 830 x 430</td>
</tr>
<tr>
<td>SFP value</td>
<td></td>
<td>360 W/(m³/s)</td>
</tr>
</tbody>
</table>

### Design / Options
- Installation in ceiling box or exposed installation, with integrated LDB linear diffusers

### Accessories
- Re-heater/-cooler, connection to various bus systems

¹) Standard 1) At 6 dB room dampening and at 400 m³/h
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Application
Compact A/C units for schools, child day-cares, meeting and conference rooms.

Installation, positioning
Visible installation below the ceiling or installation as part of the intermediate ceiling or ceiling panelling.

Unit views, installation examples

Installation in colour-matched ceiling panelling.
For high architectonic standards.

Above: Visible installation
Installation in ceiling panelling directly above the teacher’s desk. Using the highly inductive linear diffusers this installation is free of draughts.

The new condensate supervision feature permits further installation option, such as slanted installation behind an intermediate wall.
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Equipment configuration type FVS-S – visible installation

- Weather protection grille for outside and exit air
- Heat recoverer
- Supply and exhaust air fan
- Combined shut-off / mixing damper
- Supply and exhaust air filter
- Bypass flap
- Controller
- Sound absorber
- Supply and exhaust air sensor
- Supply and exhaust air
- Exhaust air opening
- Highly inductive metal diffuser LDB 12/M for draught-free air inflow along the ceiling and into the room

Equipment configuration type FVS-DI – installation in a ceiling panelling

- Exhaust air grille/exhaust air box (optional)
- Aerodynamic separation of supply and exhaust air (accessory)
- Linear diffuser (accessory)
- Supply air duct
- Sound absorber
- Supply and exhaust air
- Ventilation unit
- Combined shut-off / mixing damper
- Supply and exhaust air fan
- Supply and exhaust air filter
- Heat recoverer
- Bypass
- Controller
Technical brochure · Decentralized ventilation units FVS Univent

Functional principle

- **On-demand ventilation**
  Unit switched on and off by CO₂ sensors, movement sensors, manual switches or the building management system. On-demand regulation means energy-efficient operation can be achieved optimally and easily.

- **Weather protection grille**
  The weather protection grille performs the function of aerodynamically separating the exit air and the outside air.

- **Intelligent supply air temperature control**
  The supply air temperature control has the following functions:
  - Prevention of draughts, plus a high degree of thermal comfort.
    "Intelligent" control of the "supply air temperature" of min. 17 °C (all year round) in combination with highly inductive linear diffusers of type LDB ensures a high degree of thermal comfort. At very low outside temperatures, a supply air temperature of min. 17 °C is assured by "recirculating air admixing".
  - Use of free cooling.
    Particularly in the changing seasons (autumn, spring), and when the sun is low in the sky, the solar gains and heat loads generated by people can be compensated for in an energy-efficient way by the use of free cooling. Free cooling is achieved by a "bypass flap" through which some of the supply air is routed past the heat recovery unit. Here too, the supply air temperature does not of course drop below 17 °C, so a high degree of thermal comfort in all temperatures is assured.

- **Anti freeze**
  At very low outside air temperatures freezing of the heat recoverer is avoided by adding recirculated air, without additional heating.

- **Cooling / heating registers (optional)**
  Heating register:
  If a heating register is used, the "supply air temperature" (e.g. 17 °C) is not attained by the admixing of recirculating air, but by the heating register (for the necessary heating capacity see page 19). That assures a full fresh air volume flow all year round.

  Cooling register:
  With the cooling register, the supply air temperature of 17 °C can be assured all year round even at very high outside air temperatures (for necessary cooling capacity see page 17).

- **Night-time ventilation**
  In summer, the cool night air can be used. To do so, the heat recovering unit is largely bypassed.

- **Forced ventilation**
  If in the Eco” or “Com” modes “forced ventilation” has been activated, the CO₂ level inside the room will be ignored. The unit will continue until “forced ventilation” is deactivated or the mode of operation changed.

- **Emergency closing functions (fire protection)**
  In the event of a power failure, the outside air flap automatically closes the outside air and exit air opening using a spring return unit (running time 20 s). In the event of a fire in the building, all units can be switched off from the central fire alarm system; the voltage supply at the ventilation unit is interrupted.

- **LTG system unit for operation without additional condensate drain (optional),**
  Intelligent control means a condensate drain can be dispensed with.

Room air flow

The decentralized ventilation unit FVS Univent uses the so-called mixed/displacement flow. This type of flow is characterized by very rapid mixing of the supply air with the room air, ensuring a high degree of thermal comfort without draughts. The highly inductive linear diffusers and the regulated minimum inlet temperature of 17 °C using the FVS Univent enable the potential from free cooling to be used without any problems in the daytime too.

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Specification
- Outside air/exit air damper with thermal insulation, with automatic shut-off in case of power failure.
- Corrosion resistant outside air box protected against wind-driven rain with aerodynamically optimized weather protection grille, water drainage to the outside and air conduction almost without airstream short-circuits
- Outside air filter F7
- Exhaust air filter M5
- Counterflow heat exchanger with heat recovery coefficient (dry) 0.83 at Vₚₑ₉ₑ (600 m³/h)
- Controlled heat recovery bypass for exhaust air stream
- Free running centrifugal fans with backwards curved blades and EC drive (continuous speed 0...10 V), with very low power requirement per fan of 0.12 W/(m³/h), SFP1 conforms to DIN EN 13779.
- 4-pipe heat exchanger (optional)
- High-efficiency compact sound absorber for supply and exhaust air

Weather protection grille

Exhaust air grille (optional)

Customised dimensions are available on request.
# Technical brochure · Decentralized ventilation units FVS Univent

## Accessories, special versions

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<th>Type FVS-S Visible installation</th>
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<td>Re-heater/Re-cooler</td>
<td>■</td>
<td>■</td>
<td>—</td>
</tr>
<tr>
<td>With water</td>
<td>■</td>
<td>■</td>
<td>—</td>
</tr>
<tr>
<td>Electric</td>
<td>■</td>
<td>■</td>
<td>—</td>
</tr>
<tr>
<td>Surface casing</td>
<td>—</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>RAL 9010, special colours on request</td>
<td>—</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Control</td>
<td>Presence sensor</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>CO₂-sensor</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>LTG system unit for operation without additional condensate drain</td>
<td>Intelligent control means a condensed drain can be dispensed with</td>
<td>■</td>
<td>Standard</td>
</tr>
<tr>
<td>Communication</td>
<td>Via building management system: BACnet (additional module)</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>LON (additional module)</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>KNX (S-Mode)</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>MODBus RTU (slave)</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>HMI-Module</td>
<td>Service tool to indicate / acknowledge malfunction, or to change parametrization</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>FSG</td>
<td>Remote switch with four switches to choose operating mode and LEDs for malfunction indication</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Exhaust air grille / Exhaust air box</td>
<td>Exhaust air grille with aluminium blades, 500 x 300 mm. Special version with box and connection DN 280</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Exhaust air box</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Adapter duct to facade</td>
<td>Standard lengths 250 / 500 mm</td>
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<td>■</td>
</tr>
<tr>
<td>Supply/exhaust air connection duct</td>
<td>Various designs</td>
<td>■</td>
<td>■</td>
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Technical brochure · Decentralized ventilation units FVS Univent
Type FVS-DI, integrated in ceiling panellings

The type FVS-DI is suitable for integration in ceiling panellings (to be provided on site) usually between the facade and the corridor wall. The ceiling cavity in its function as supply air plenum is to be air tight and has to be applied a minor overpressure of 5…10 Pa.

The inspection openings should be distributed as shown in the drawing. Avoid any bars underneath the medium cover in order not to impede the heat recoverer’s removal.

For supply air diffusion use linear diffusers type LDB 20/8/2 or LDB 20/8/3. Install the air outlet rails along the width of the ceiling panelling in a horizontal direction in cutouts provided on site.

The following unit weights should be considered when suspended from the ceiling:

- 13.5 kg Weather protection grille with balancing line (250 mm long)
- 170 kg Ventilation unit
- 66 kg Sound absorber
- 35 kg Reheater
- 6 kg Exhaust air diffuser with plenum and coarse dust filter

Right / left version

Right version: Electric socket and inspection opening on the right-hand side when seen from the room.

Left version: Electric socket and inspection opening on the left-hand side when seen from the room.
Technical brochure · Decentralized ventilation units FVS Univent
Type FVS-DI, integrated in ceiling panellings

Dimensions (left version)

Cut A-A

Cut F-F

Cut D-D

In this area inspection cover in the ceiling panelling (lateral)

Seal the flange using a softpad seal

If necessary, suspension by others to take strain off the facade

Make screw connection with shock-absorbing elements
Connections (reheater optional)

Depending on the type of connection, the following options are available:

- Connecting duct variants:
  - Mat.Nr: 1047263
    - Supply air
    - Exhaust air
  - Mat.Nr: 1043380
    - Supply air
    - Exhaust air
  - Mat.Nr: 1044836
    - Supply air
    - Exhaust air
  - Mat.Nr: 1047690
    - Supply air
    - Exhaust air

Shown with water connection on the left.

Hoses and valves for the cooling water circuit must be insulated up to the heat exchanger connection in order to prevent condensation!

Water connections NW Ø 12 mm for quick coupling
Technical brochure · Decentralized ventilation units FVS Univent
Type FVS-DIH, upright assembly

Upright assembly opens up further installation possibilities, for example behind an intermediate wall. This variant is only possible with condensate supervision. The inspection openings should be distributed according to the drawings. On the side of the middle cover there must be no bars that might hinder the removal of the heat recovery unit.

As a supply air diffuser, the LTG air diffuser LW can for example be used for wall installation (types LW 20/8/2 or LW 20/8/3). The outlet rails must be installed over the full width of the ceiling panelling in the vertical wall surface, in cutouts to be made by others.

The adapter duct to the facade site can for example be provided using a DN280 adapter duct on the weather protection grille. The appropriate adapter sections on both the unit side and the facade side can on request be manufactured specifically for the project.

The following unit weights should be considered when suspended from the ceiling:

- 13.5 kg  Weather protection grille with balancing line (250 mm long)
- 170 kg  Ventilation unit
- 66 kg  Sound absorber
- 35 kg  Reheater
- 6 kg  Exhaust air diffuser with plenum and coarse dust filter

Dimensions, installation situation right and left

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Type FVS-DI und FVS-DIH

Re-heater with water
(for type FVS-DI, optional)

Necessary reheating capacity = 1600 W
(with -15 °C outside air temperature, 
\( V_{\text{nom}} = 600 \text{ m}^3/\text{h} \))
Nominal water flow rate = 80 kg/h
Pressure loss with nominal water flow rate = 4.7 kPa
Nominal water inlet temperature = 40 °C

The reheater is sufficiently dimensioned for the necessary heating capacity to be assured even at low inlet temperatures.

Re-cooler with water
(for type FVS-DI, optional)

Necessary after-cooling capacity
sens. cooling capacity = 3000 W
total cooling capacity = 4800 W
(with 32 °C outside air temperature, 
\( V_{\text{nom}} = 600 \text{ m}^3/\text{h}, T_{\text{supply air}} = 17 °C \)).
Nominal water flow rate = 250 kg/h
Pressure loss with nominal water flow rate = 16 kPA
Nominal water inlet temperature (condensing operation) = 6°C

Electric Re-heater
(for type FVS-DI and FVS-DIH, optional)

Necessary reheating capacity 1600 W
(with -15 °C outside air temperature, 
\( V_{\text{nom}} = 600 \text{ m}^3/\text{h} \))
Voltage 230 V AC
Capacity up to 4 kW
Control input 0 (2)...10 V DC
Operating with continuous signal
Temperature control TW
with automatic RESET 75 °C
with manual RESET 95 °C
Air flow control
Reach-in prevention grille at inlet and outlet
Installation by insertion into the supply air duct

Water-side pressure loss for different water flow rates

<table>
<thead>
<tr>
<th>Water flow rate w [kg/h]</th>
<th>Water-side pressure loss ( \Delta P_w ) [kPa]</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>150</td>
<td>30</td>
</tr>
<tr>
<td>200</td>
<td>40</td>
</tr>
<tr>
<td>250</td>
<td>50</td>
</tr>
<tr>
<td>300</td>
<td>60</td>
</tr>
<tr>
<td>350</td>
<td>70</td>
</tr>
<tr>
<td>400</td>
<td>80</td>
</tr>
</tbody>
</table>

Heating register
Cooling register

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Technical brochure · Decentralized ventilation units FVS Univent
Type FVS-S, visible installation

Ready-to-install decentralized ventilation unit for installation below the ceiling, suitable for visible assembly without additional ceiling panelling. With high-efficiency sound absorber for supply and exhaust air and with direct connection to the facade including outside/exit air openings and weather protection grille with aerodynamic separation of supply and exhaust air conduction. For decentralized ventilation (supply and return) directly via the facade.

The following unit weights should be considered when suspended from the ceiling:
- 13.5 kg Weather protection grille with balancing line (250 mm long)
- 321 kg Ventilation unit incl. sound absorber and air diffusers

Parts and assembly
Technical brochure · Decentralized ventilation units FVS Univent
Type FVS-S, visible installation

Dimensions

View from below

Top view

Front view

Detail A · Attach exhaust air temperature sensor using the support clip and self-tapping screws

Cut D-D

Condensate socket DN 15

Cut B-B

Exhaust air box, bolt with M5x12 DIN 933
Technical brochure · Decentralized ventilation units FVS Univent
Type FVS-S, visible installation

Dimensions

View exhaust air side

Cut C-C

Cut H-H

Cut G-G

Attach supply air temperature sensor using the support clip and self-tapping screw

Fix with screw M5x12 DIN 912

Angle brackets to fix the diffuser

Casing is fixed to a hinge with M4x8 DIN 912 screw
Technical data ventilation unit

<table>
<thead>
<tr>
<th>Operating mode</th>
<th>Eco</th>
<th>Com</th>
<th>Com</th>
<th>Bypass</th>
</tr>
</thead>
<tbody>
<tr>
<td>V [m³/h]</td>
<td>400</td>
<td>600</td>
<td>680</td>
<td>closed</td>
</tr>
<tr>
<td>(L_{WA,1}) [dB(A)]</td>
<td>33</td>
<td>39</td>
<td>39</td>
<td>closed</td>
</tr>
<tr>
<td>(L_{WA,2}) [dB(A)]</td>
<td>38</td>
<td>44</td>
<td>47</td>
<td>closed</td>
</tr>
<tr>
<td>(L_{WA,3}) [dB(A)]</td>
<td>51</td>
<td>61</td>
<td>61</td>
<td>closed</td>
</tr>
<tr>
<td>(L_{WA,3}) [dB(A)] with 500 mm splitter attenuator</td>
<td>45</td>
<td>55</td>
<td>55</td>
<td>60</td>
</tr>
<tr>
<td>(P_{el}) [W]</td>
<td>50</td>
<td>130</td>
<td>130</td>
<td>235</td>
</tr>
</tbody>
</table>

* Max. possible flow rate in the “Com” mode. This application is possible using an internal program adjustment.

LWA,1 Sound power level of radiated noise at the sound absorber outlet for supply air and exhaust air, with 3 dB absorption via diffusers

LWA,2 Sound power level of emission via casing, 3 dB sound absorption via ceiling panelling

Note: not applicable for visible installed units

LWA,3 Sound power level on the outside at the weather protection grille for outside air and exit air, without sound absorber

With average room absorption \(D_1 = 12\) dB and damping and absorption \(D_2 = 3\) dB in the ceiling panelling.

Example for 600 m³/h:
Sum level \(L_{WA,1} + L_{WA,2} = 45 \) dB(A),

Sound pressure \(L_{PA1+2} = 45 \) dB -12 dB

= 33 dB(A) inside the room

Sound pressures \(L_{PA3}\) of 4 units in the facade at a distance of 10 m in front of the weather protection grille (free field) with absorption \(D_4\): \(L_{PA3} = L_{WA,3} - 28\) dB;

Example for 600 m³/h with sum level 6 dB and distance absorption 28 dB:
\(L_{PA,3} = 61 + 6 \) dB - 28 dB = 39 dB(A) outside
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Required heating capacity depending on outside air temperature (with 17 °C supply air temperature)

This graph relates to the following values:
Relative exhaust air humidity = 25 %
Relative outside air humidity = 90 %
Exhaust air temperature = 22 °C
Nominal flow rate = 600 m³/h

The relative humidity has a strong influence on the heating capacity. For that reason, this graph can only be regarded as an example. Other conditions must be set specifically for the project.

Required cooling capacity depending on outside air temperature (with 17 °C supply air temperature)
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Control

Condensate
Under certain operating conditions condensate formation may be impossible to avoid due to high heat return. The unit is provided with a condensate drainage system to be connected on site with the required slope or via pump. Use a flexible condensate connection.

LTG system unit for operation without additional condensate drain (optional)
Intelligent control means a condensate drain can be dispensed with.

Remote switch FSG (optional)
Dimensions 74 x 126 x 25 mm.
Minimum requirement: shielded 10-strand cable, cross-section at least 0.5 mm².

Parametrization via HMI module
(Human Machine Interface, optional)
Via service tool HMI the set operating modes, set-points and running times may be indicated and indicated malfunctions may be acknowledged.

Having entered your password you may also use the service tool HMI to change control parameters (after consultation with the manufacturer).

Remote switch FSG (optional)

Malfunction indicator
The controller comprises of a malfunction indicator input in terms of a group alarm which is switched if the following occurs:
- Exhaust air temperature below limit
- Supply air temperature sensor fracture
- Exit air temperature sensor fracture
- CO₂ sensor without signal, if connected

The malfunction message must be acknowledged to confirm elimination of the problem.

Electrical connections
Based on Machine Guidelines, the FVS unit is considered an „incomplete machinery“ which requires the use of a maintenance switch allowing for complete disconnection from the main power supply before opening the unit or its terminal box. For the FVS the power plug performs this function and has to be pulled whenever work on the unit is performed.

With a supply voltage of 230 V, the unit is provided with an integrated 6.3 A safety fuse. Power consumption is 2.5 A max.

The switchboard is not included in the delivery and will have to be provided on site. It offers the possibility to activate unit functions from a central location and will indicate malfunctions, if any.
Installation

Requirements on site
- The weather protection grille has already been integrated in the facade according to the manufacturer’s instructions. Exit air must be able to flow freely downwards at about 45 degree. When in the outside air intake mode do not exceed a free cross-section related air speed of 2.5 m/s to keep rain from being sucked in. And take special care not to install any sun protection devices in front of the weather protection grille which might deflect the exit air stream and cause a short-circuit.
- On-site adapter duct(s) are installed (e.g. due to beams, for facade isolation)
- If the unit is to be installed in the intermediate ceiling, inspection openings and cutouts, if any, for the diffusers are to be provided (page 11 et seqq.).
- Consider sufficient lateral distance to walls and ceiling panellings for electrical connections (page 11 et seqq.).

Connection to the Facade
Install the standard version of ceiling mounted FVS as ready-to-plug-in ventilation unit horizontally flush and up to the facade opening.

The weather protection grille supplied by the manufacturer is to be installed with its frame tight fitting in the facade cutout and should be fixed to the outer shell using an adhesive or screws.

The balancing line (standard length 250 mm or 500 mm) bridges a variety of thicknesses of outer wall and window constructions and isolates FVS from the facade. Lead the center-divided air conveyance line through the facade opening to the weather protection grille flange, then seal it using an adhesive sealant.

Connection to the facade
Technical brochure · Decentralized ventilation units FVS Univent

Nomenclature, ordering code

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# Product Overview

## LTG Air-Water Systems

### LTG Induction – Induction Units

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### LTG FanPower – Fan Coil Units

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### LTG Decentral – Decentralised Ventilation Units

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### Engineering Services

LTG Engineering Services Comfort Air Technology
Comfort Air Technology
Air-Water Systems
Air Diffusers
Air Distribution

Process Air Technology
Fans
Filtration technology
Humidification Technology

Engineering Services
Laboratory Test / Experiment
Field Measurement / Optimisation
Simulation / Analysis
R&D / Start-up

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