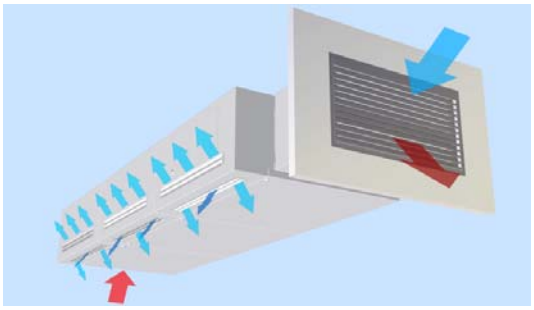
AIR TECH
SYSTEMS

Technical Brochure

LTG Air -Water Systems

LTG Decentral

Decentralized Ventilation Units
FVS Univent



Installation below/in the ceiling

www.LTG.net

LTG Comfort Air Technology

Air-Water-Systems

Air Diffusers

Air Distribution

Content

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.

LTG Decentral

Decentralized Ventilation Units

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.

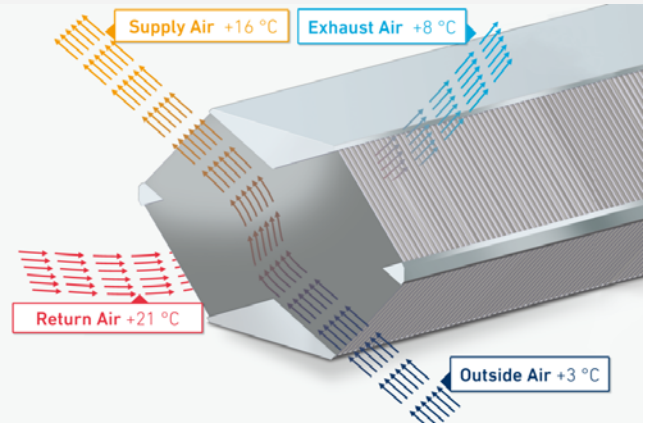
Without a central AHU, decentralized systems offer the only, highly efficient solution to renovate existing buildings in an energy-efficient manner. Local systems offer an innovative and energy-efficient means for individual, demand-controlled air conditioning for new construction projects as well.

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

Functions	**Supply/exhaust air, heat recovery, night -time ventilation**	■
Technical Data	**Fresh air supply**	up to 720 m^3/h
	Noise level L_{pA}	27 dB(A) 1)
	Electr. power intake	50 W 1)
	Reheating ratio	83 %
Dimensions [L x W x H in mm, unit to be covered on-site]		3050 (incl. sound absorber) x 830 x 430
SFP value		360 $W/(m^3/s)$
Design / Options		Installation in ceiling box or exposed installation, with integrated LDB linear diffusers
Accessories		Re-heater/-cooler, connection to various bus systems

■ Standard 1) At 6 dB room dampening and at 400 m^3/h

Application

Compact A/C units for schools, child day-cares, meeting and conference rooms.

Installation, positioning

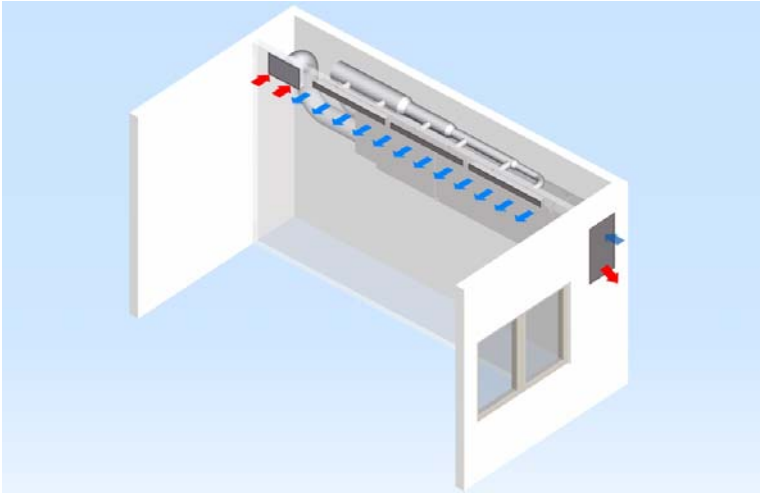
Visible installation below the ceiling or installation as part of the intermediate ceiling or ceiling panelling.

Unit views, installation examples

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

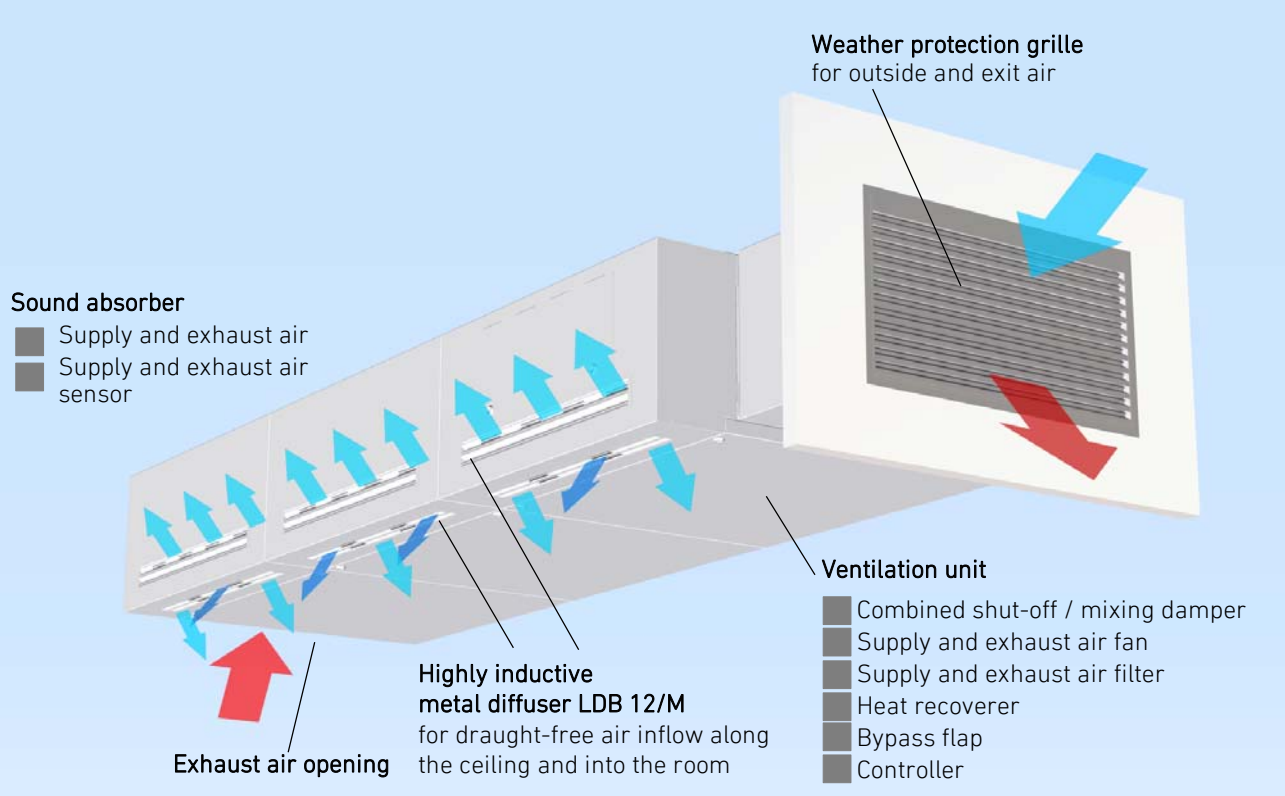
Above: Visible installation

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

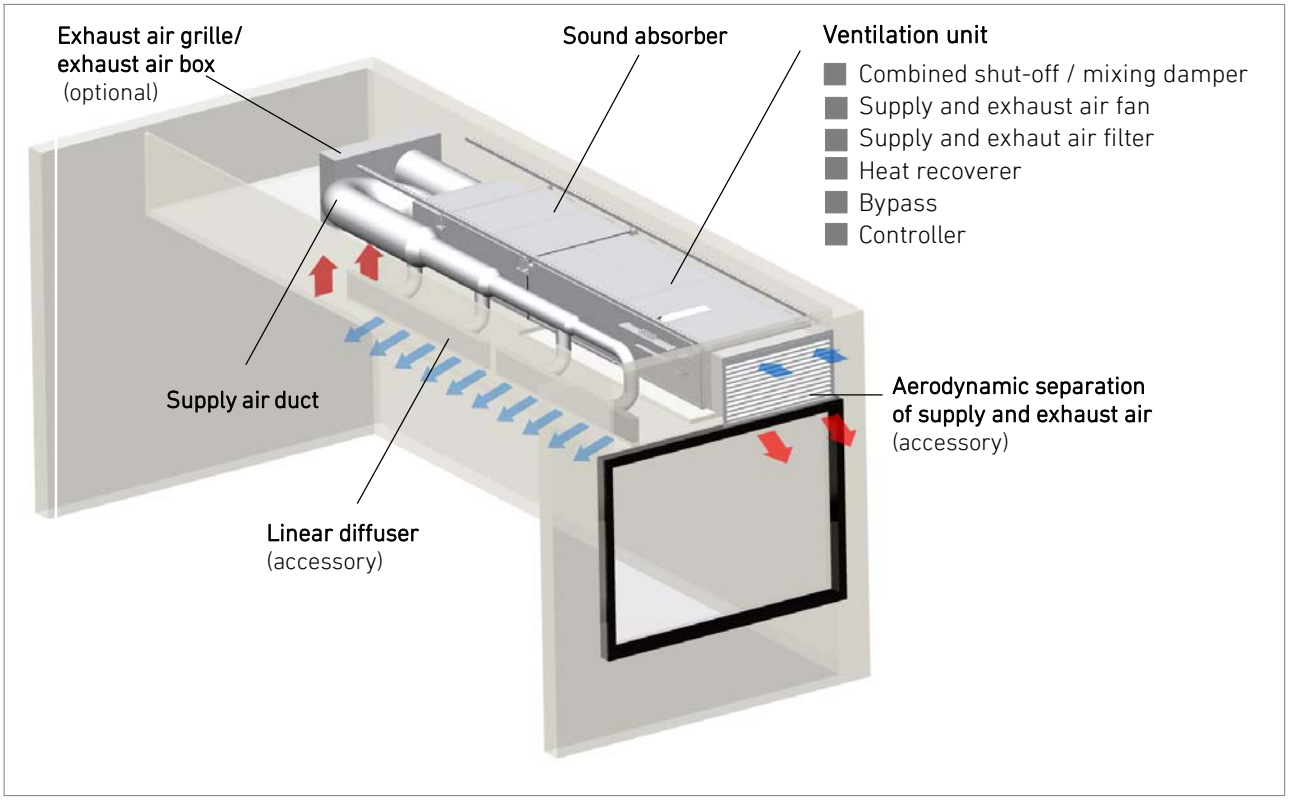


The new condensate supervision feature permits further installation option, such as slanted installation behind an intermediate wall.

Equipment configuration type FVS-S – visible installation



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



Functional principle

- **On-demand ventilation**
  Unit switched on and off by CO_2 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.

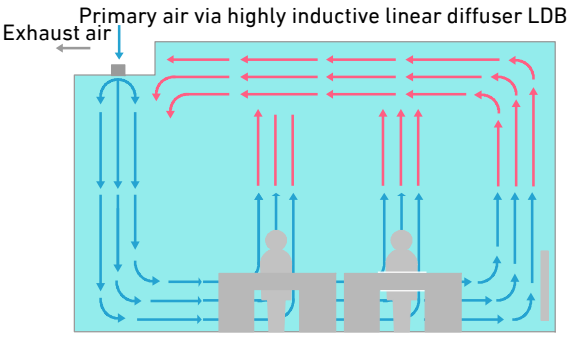
- **Forced ventilation**
  If in the Eco" or „Com" modes „forced ventilation" has been activated, the CO_2 level inside the room will be ignored. The unit will continue until "forced ventilation" is deactivated or the mode of operation changed.

- **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.

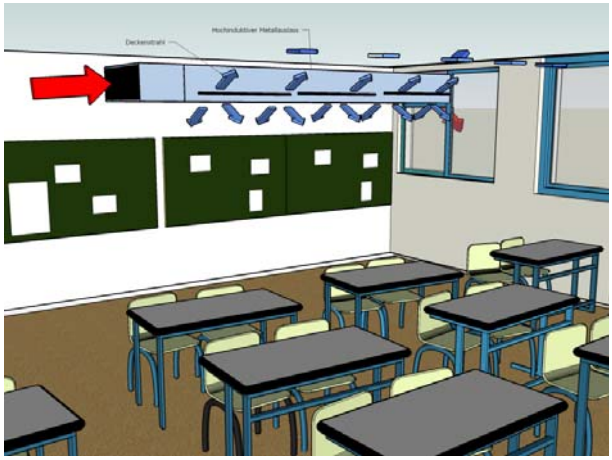
- **LTG system unit for operation without additional condensate drain** (optional),
  Intelligent control means a condensate drain can be dispensed with.

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.



Mixed-displacement flow (type FVS-DI)



Room air flow (type FVS-S)

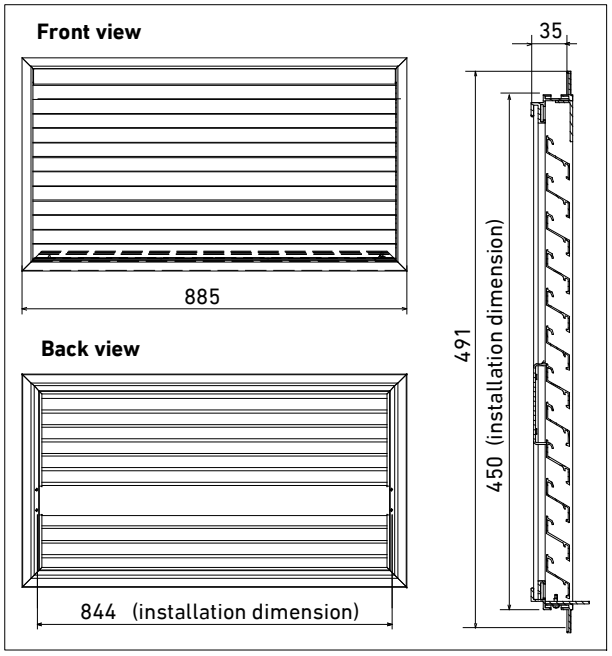
Technical brochure · Decentralized ventilation units FVS Univent

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 V_{nom} (600 m^3/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/(m^3/h), SFP1 conforms to DIN EN 13779.
- 4-pipe heat exchanger (optional)
- High-efficiency compact sound absorber for supply and exhaust air

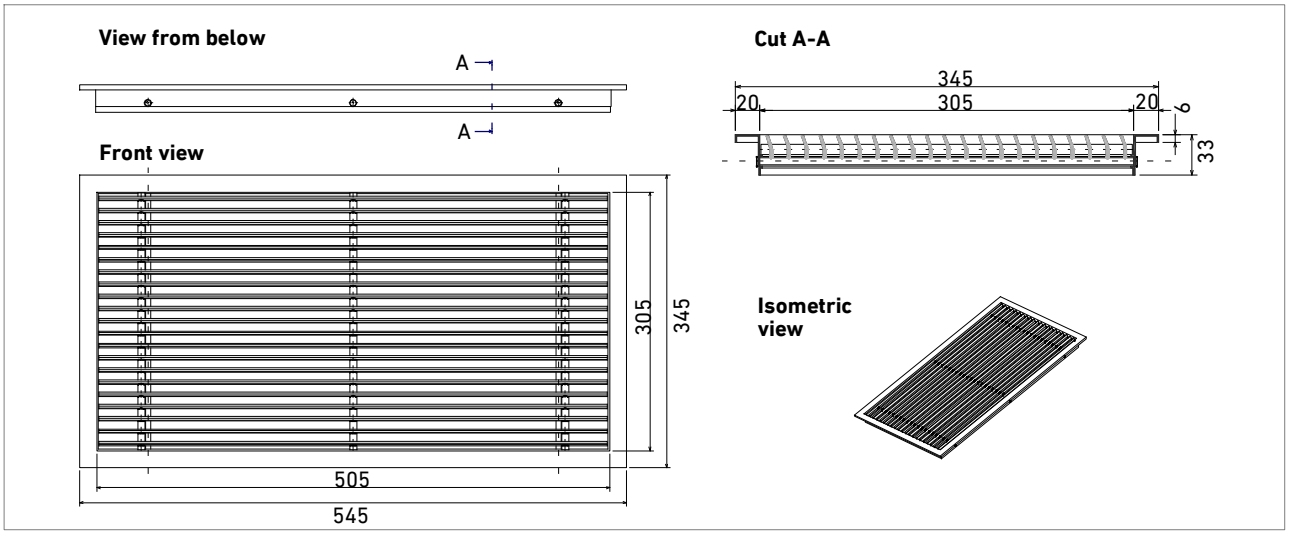
Weather protection grille

Weather protection grille



Customised dimensions are available on request.

Exhaust air grille (optional)



Accessories, special versions

		Type FVS-DI Integrated in ceiling panelling	Type FVS-DIH Upright installation	Type FVS-S Visible installation
Re-heater/Re-cooler	With water	■	—	—
	Electric	■	■	—
Surface casing	RAL 9010, special colours on request	—	■	■
Control	Presence sensor 	■	■	■
	CO_2-sensor 	■	■	■
LTG system unit for operation without additional condensate drain	Intelligent control means a condensate drain can be dispensed with	■	■ Standard	■
Communication	Via building management system: BACnet (additional module) LON (additional module) KNX (S-Mode) MODBus RTU (slave)	■	■	■
HMI-Module	Service tool to indicate / acknowledge malfunction, or to change parametrization	■	■	■
FSG	Remote switch with four switches to choose operating mode and LEDs for malfunction indication	■	■	■
Exhaust air grille / Exhaust air box	Exhaust air grille with aluminium blades, 500 x 300 mm. Special version with box and connection DN 280	■	■	■ integrated
Adapter duct to facade	Standard lengths 250 / 500 mm	■	■	■
Supply/exhaust air connection duct	Various designs	■	■	—

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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.

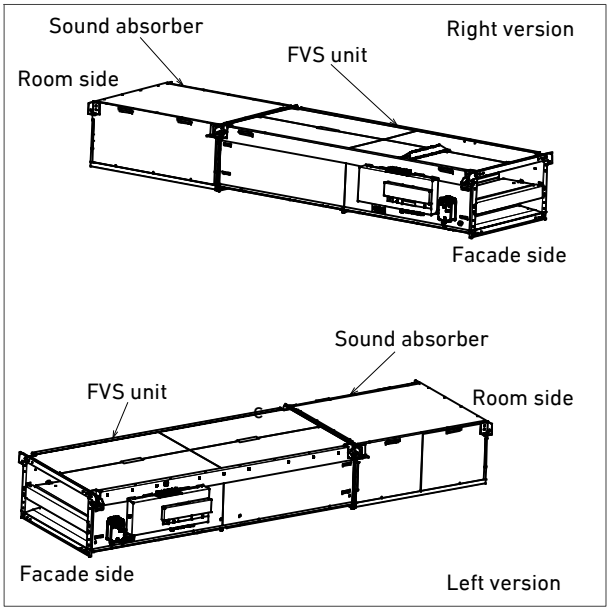
The inspection openings should be distributed as shown in the drawing. Avoid any bars underneath the medium cover in order not to impede the heat recoverer's removal.

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

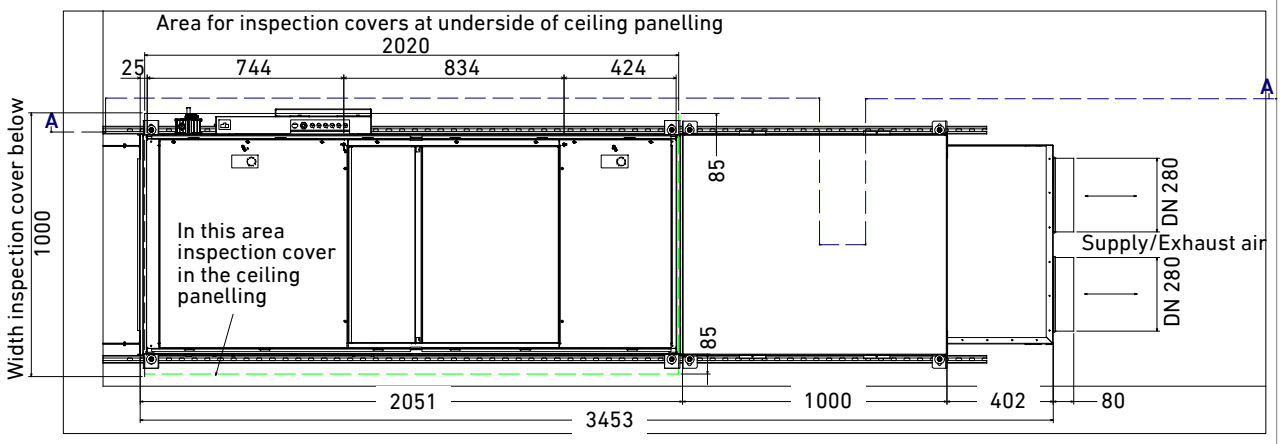


Right version: Electric socket and inspection opening on the right-hand side when seen from the room.

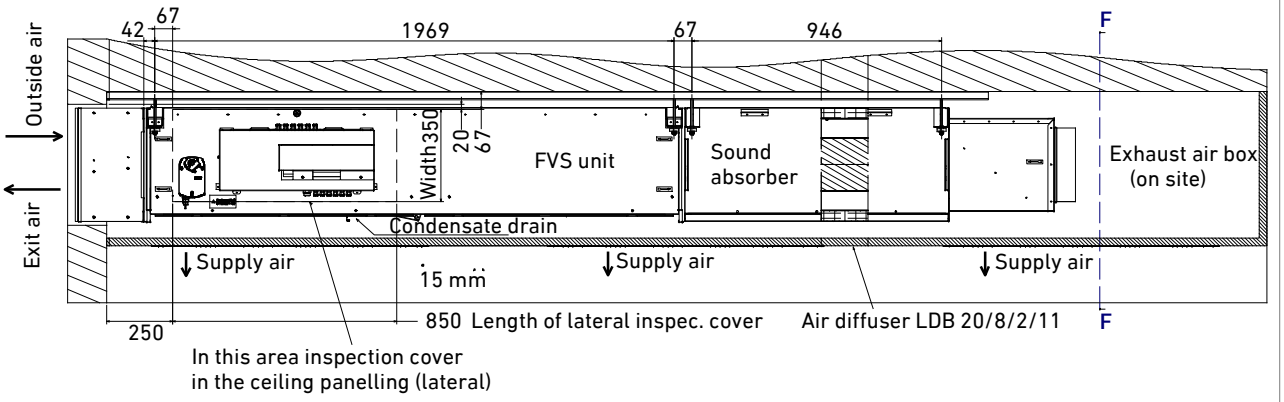
Left version: Electric socket and inspection opening on the left-hand side when seen from the room.

Technical brochure · Decentralized ventilation units FVS Univent
Type FVS-DI, integrated in ceiling panellings

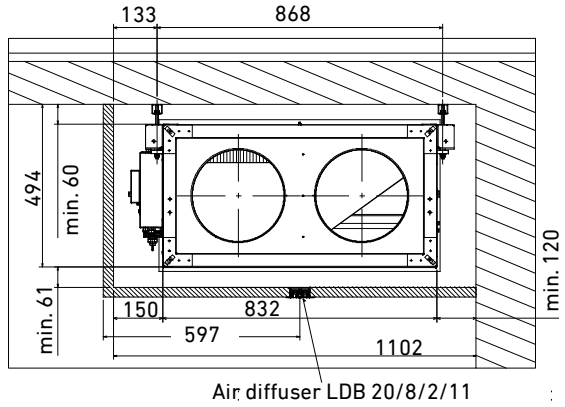
Dimensions (left version)



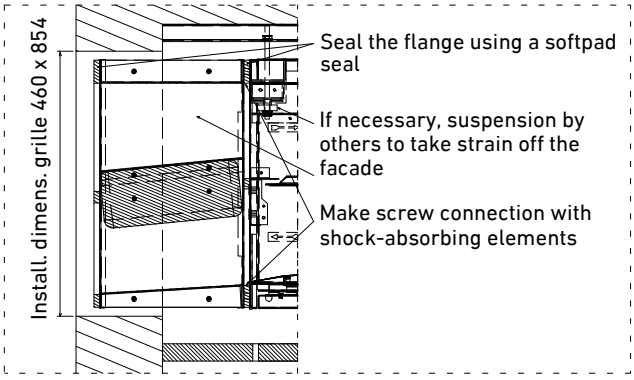
Cut A-A



Cut F-F

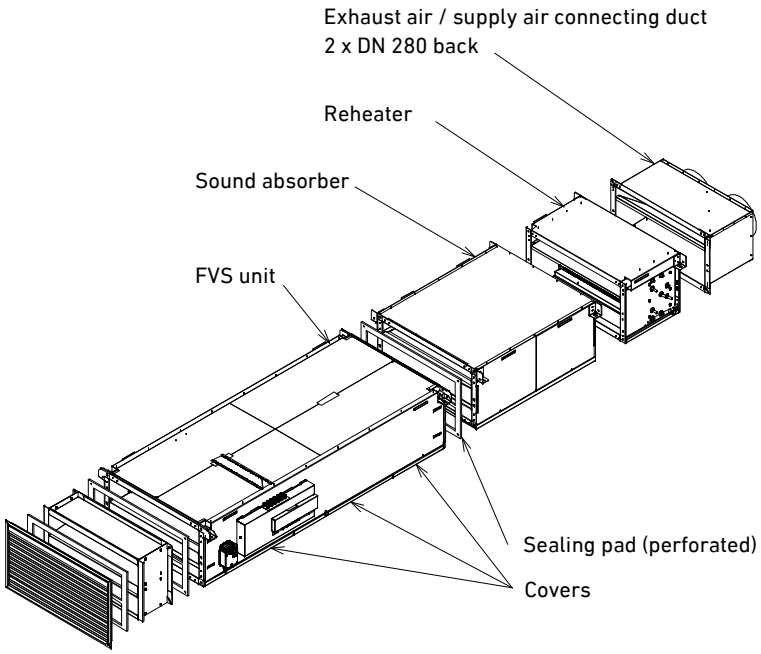


Cut D-D



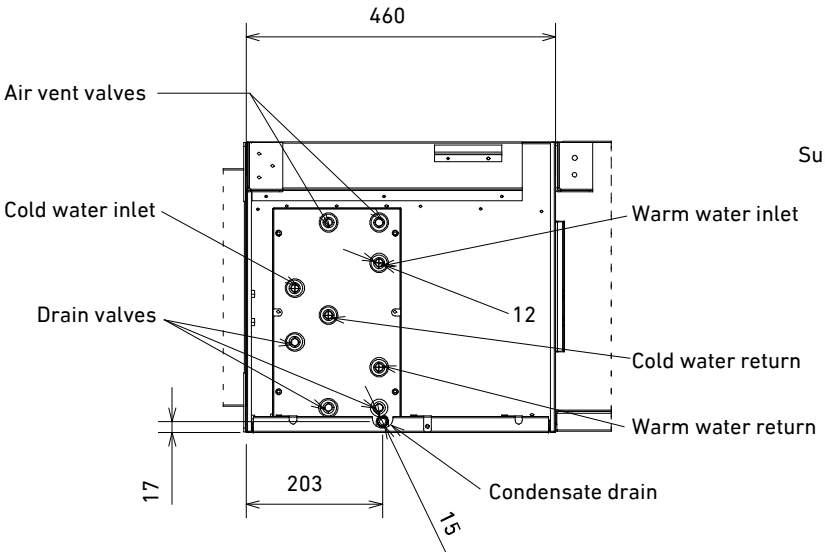
Connections (reheater optional)

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



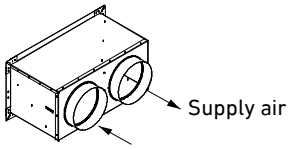
Shown with water connection on the left.

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

Connecting duct variants:



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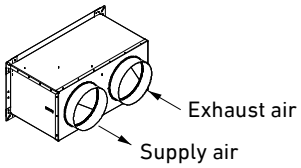

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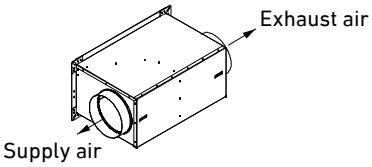

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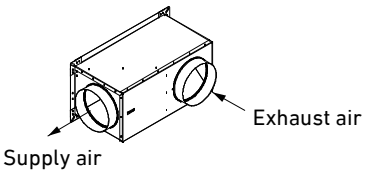

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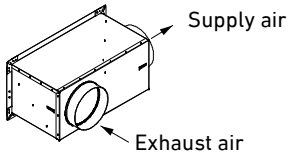

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Technical brochure · Decentralized ventilation units FVS Univent
Type FVS-DIH, upright assembly

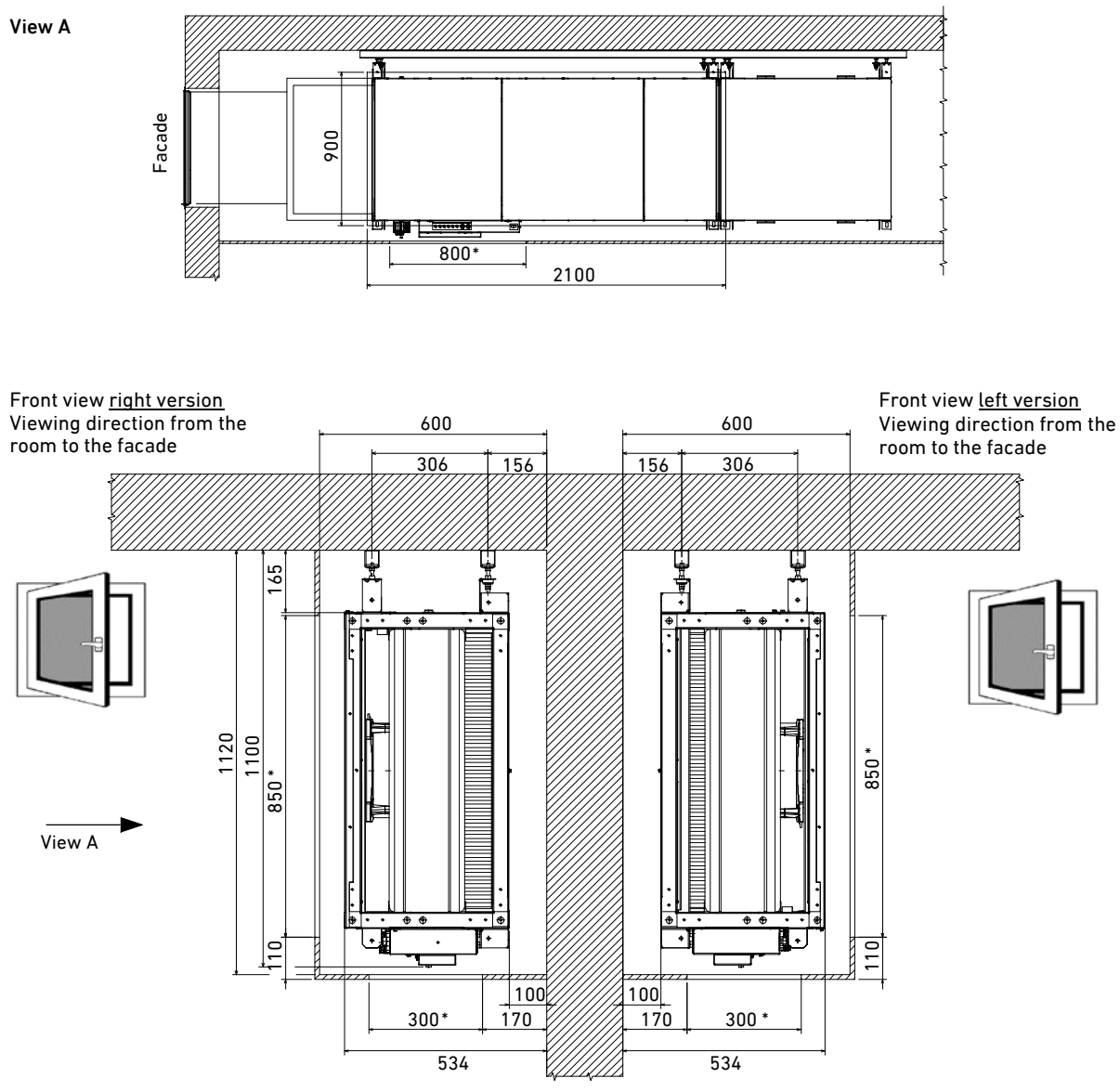
Upright assembly opens up further installation possibilities, for example behind an intermediate wall. This variant is only possible with condensate supervision.
The inspection openings should be distributed according to the drawings. On the side of the middle cover there must be no bars that might hinder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



* = Dimensions for inspection openings

Technical brochure · Decentralized ventilation units FVS Univent Type FVS-DI und FVS-DIH

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

Necessary reheating capacity (with -15 °C outside air temperature, V_{nom} = 600 m³/h)	= 1600 W
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_{nom} = 600 m³/h, $T_{supply\ air}$ = 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)

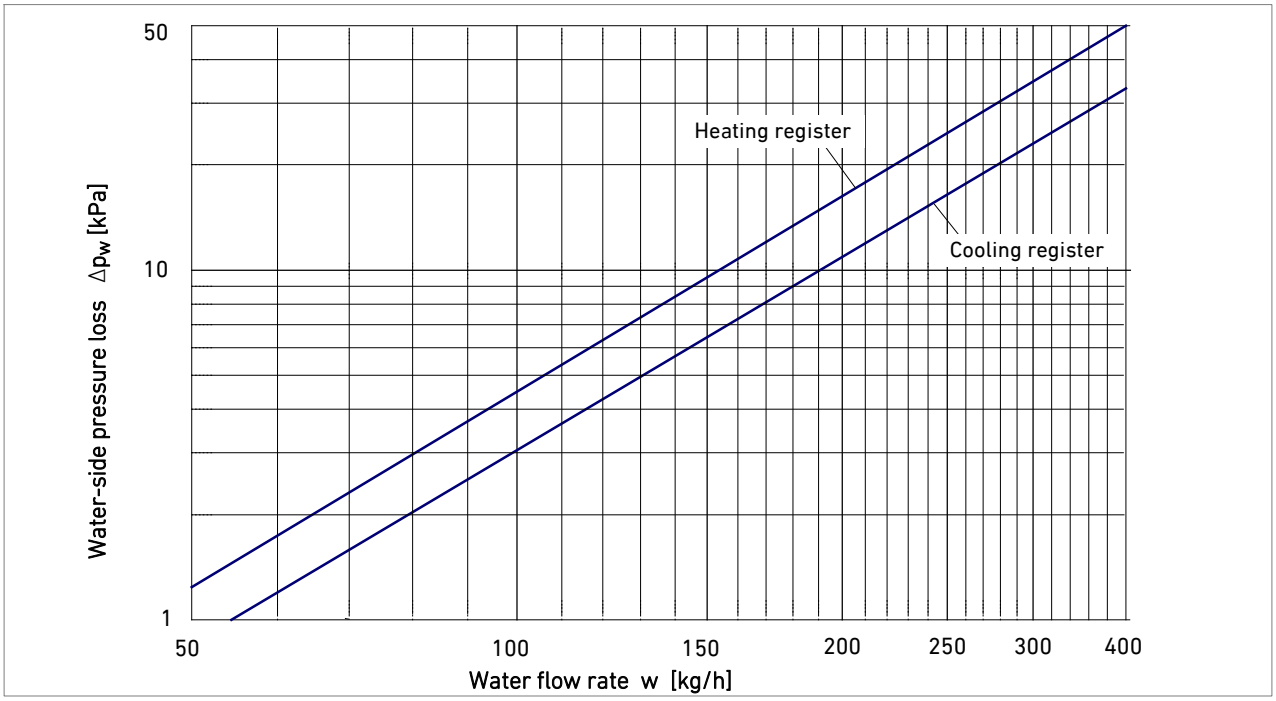
Necessary reheating capacity (with -15 °C outside air temperature, V_{nom} = 600 m³/h)	1600 W
Voltage	230 V AC
Capacity	up to 4 KW
Control input	0 (2)...10 V DC
Operating with continuous signal	
Temperature control TW	
with automatic RESET	75 °C
with manual RESET	95 °C

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



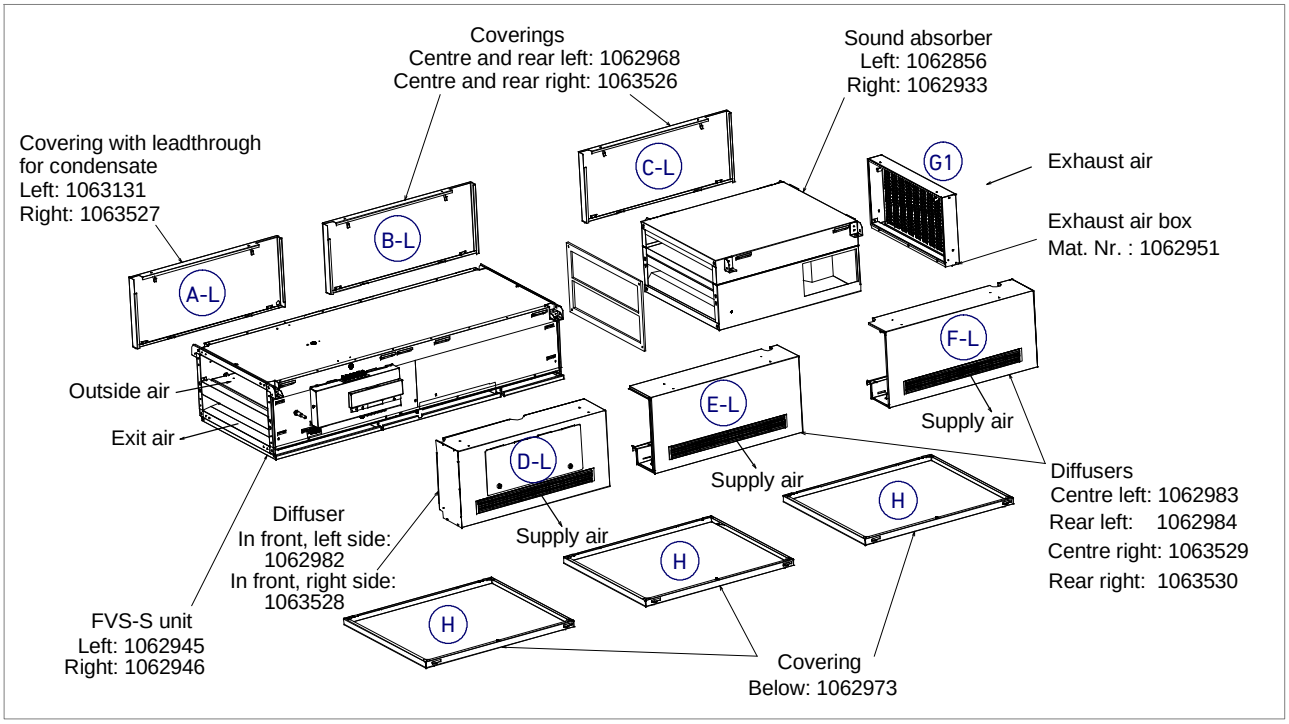
Technical brochure · Decentralized ventilation units FVS Univent
Type FVS-S, visible installation

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:

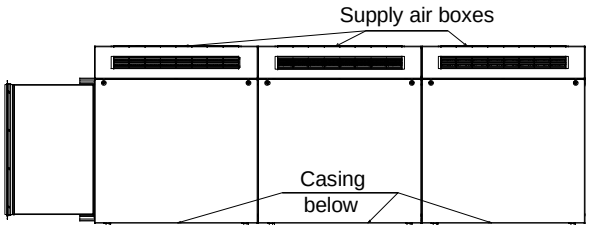
13.5 kg	Weather protection grille with balancing line (250 mm long)
321 kg	Ventilation unit incl. sound absorber and air diffusers

Parts and assembly

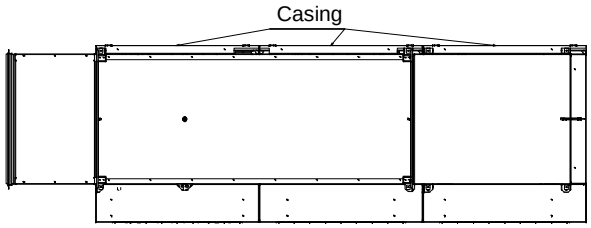


Dimensions

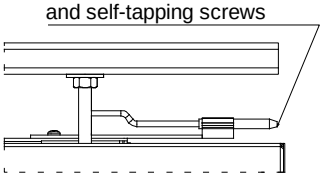
View from below



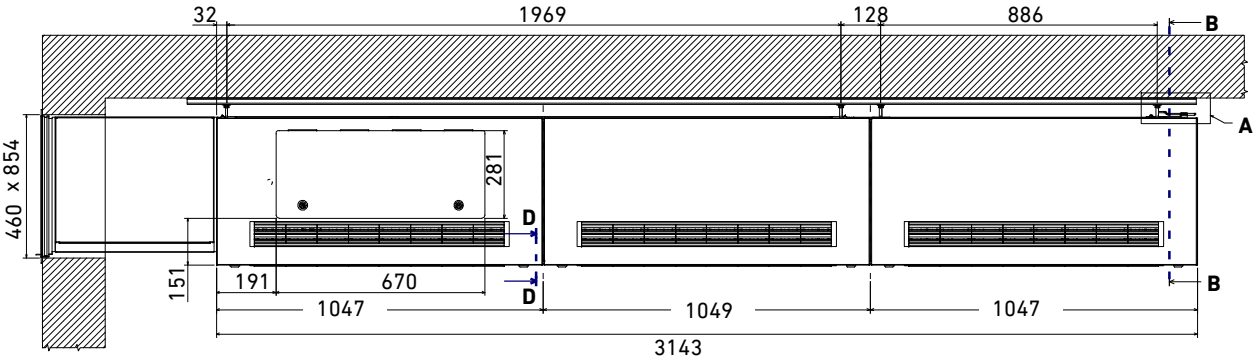
Top view



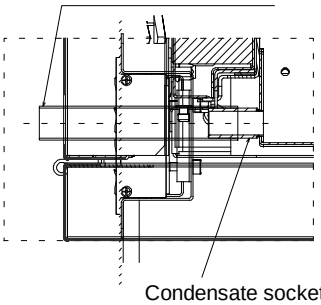
Detail A Attach exhaust air temperature sensor using the support clip and self-tapping screws



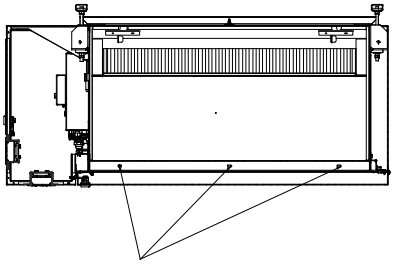
Front view



Cut D-D

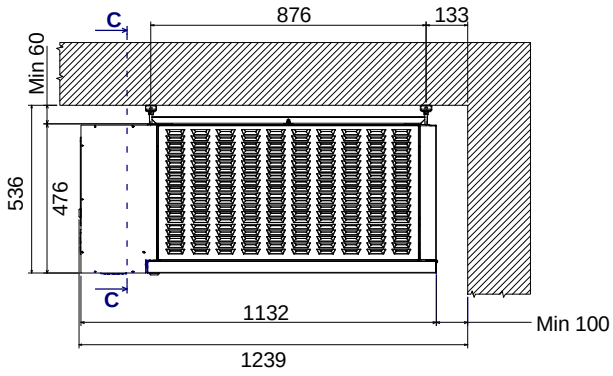


Cut B-B



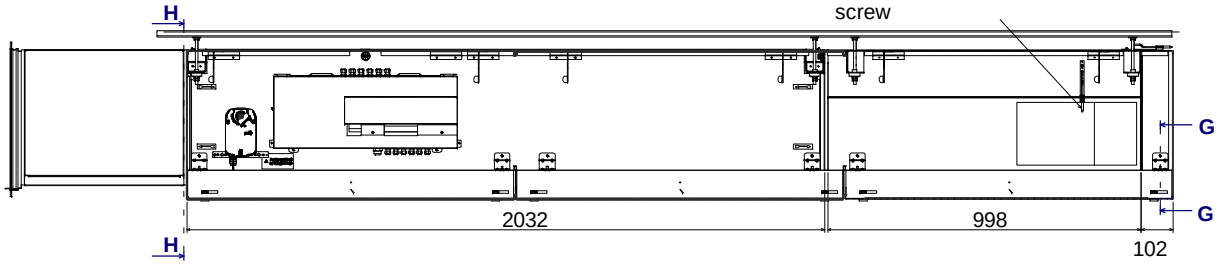
Dimensions

View exhaust air side

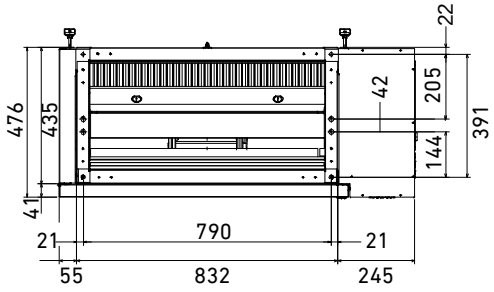


Cut C-C

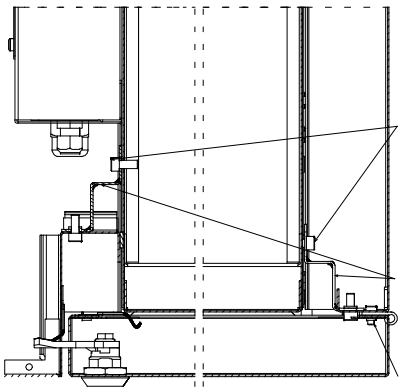
Attach supply air temperature sensor using the support clip and self-tapping screw



Cut H-H



Cut G-G



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

Operating mode	Eco	Com	Com	
Bypass	closed	closed	open	closed *
V [m³/h]	400	600	680	730
$L_{wA,1}$ [dB(A)]	33	39	39	42
$L_{wA,2}$ [dB(A)]	38	44	47	47
$L_{wA,3}$ [dB(A)]	51	61	61	66
$L_{wA,3}$ [dB(A)] with 500 mm splitter attenuator	45	55	55	60
P_{el} [W]	50	130	130	235

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

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

$L_{wA,2}$ Sound power level of emission via casing, 3 dB sound absorption via ceiling panelling
Note: not applicable for visible installed units

$L_{wA,3}$ Sound power level on the outside at the weather protection grille for outside air and exit air, without sound absorber

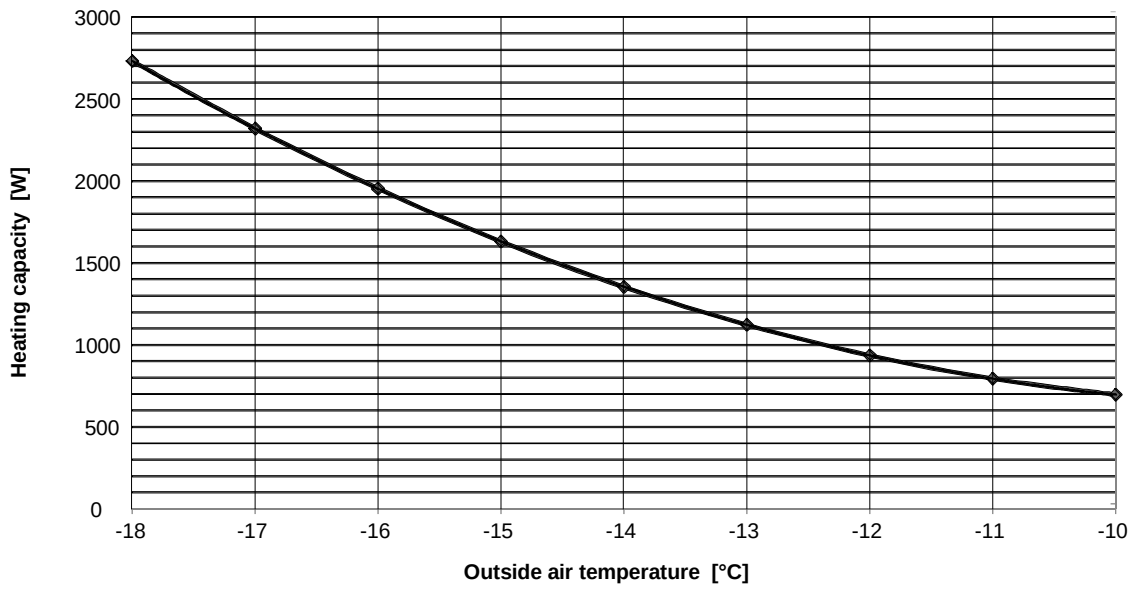
With average room absorption D_1 = 12 dB and damping and absorption D_2 = 3 dB in the ceiling panelling.

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 $L_{pA,3}$ 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

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

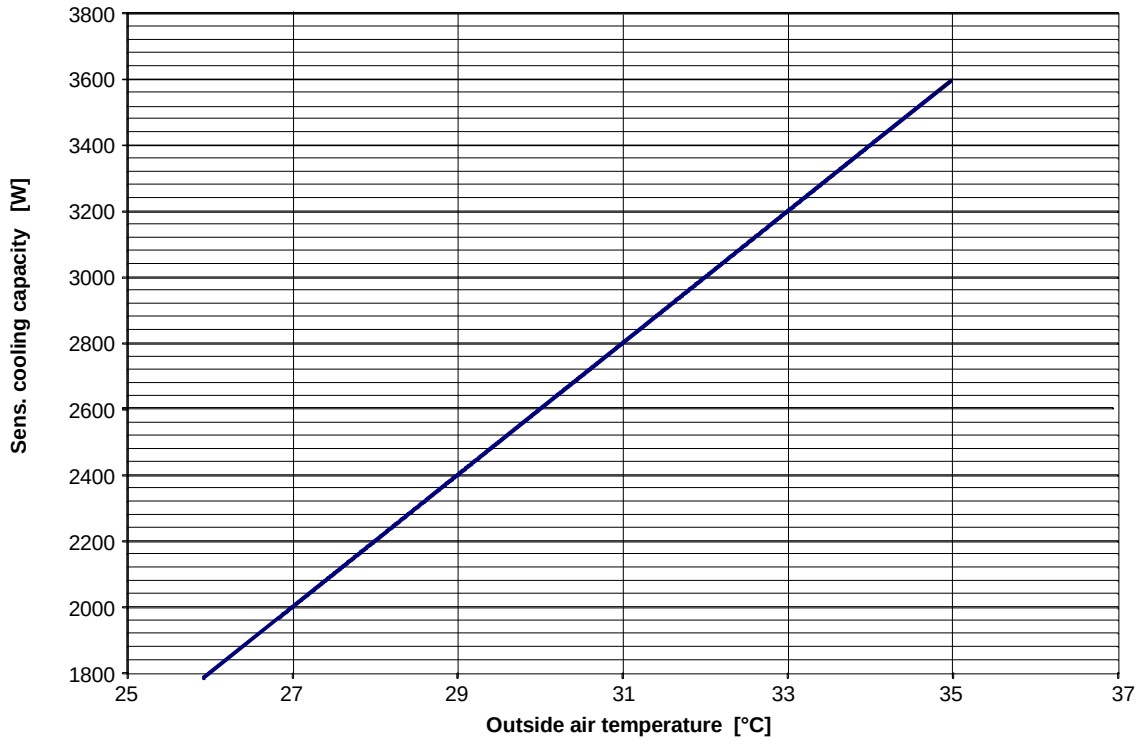


This graph relates to the following values:

Relative exhaust air humidity	= 25 %
Relative outside air humidity	= 90 %
Exhaust air temperature	= 22 °C
Nominal flow rate	= 600 m^3/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.

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
- CO_2 sensor without signal, if connected

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

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).

HMI service tool

Manual operation of ventilation mode

No CO_2 sensor connected. The unit is switched on/off via button at „Com" or „Eco". Longer, uncontrolled running times due to forgotten switch-off may be avoided using central switch-off. Manual operation is not a standard operating mode, therefore parametrization is required.

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 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.

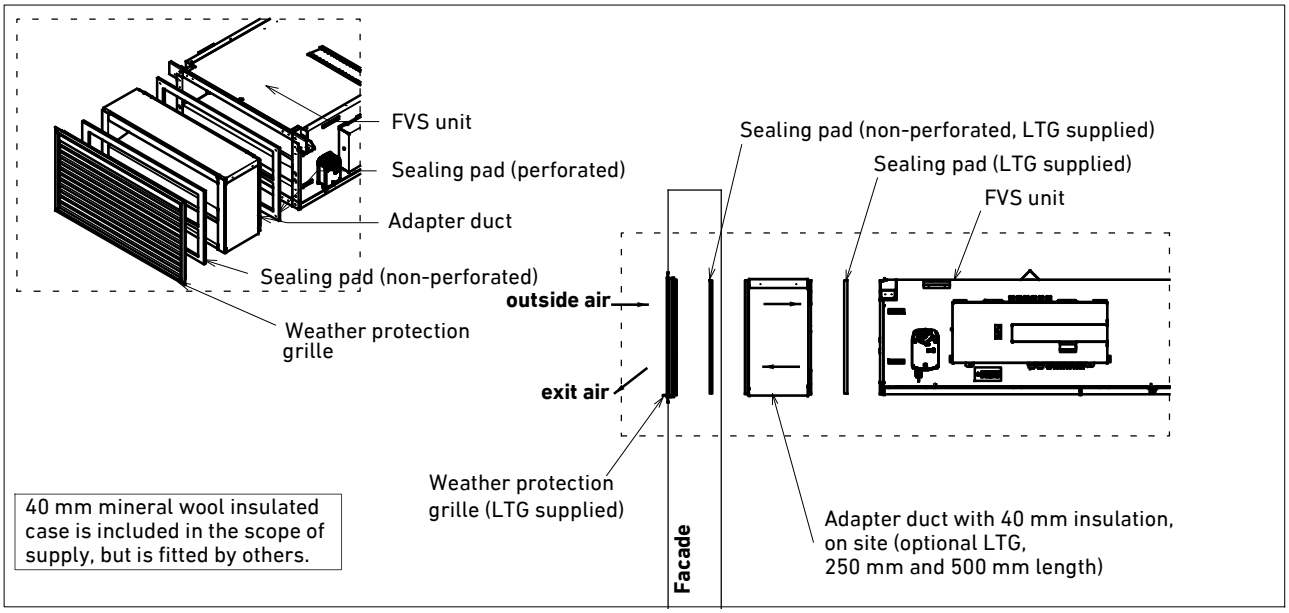
The balancing line (standard length 250 mm or 500 mm) bridges a variety of thicknesses of outer wall and window constructions and isolates FVS from the facade. Lead the center-divided air conveyance line through the facade opening to the weather protection grille flange, then seal it using an adhesive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

Suspension to the ceiling relieves the facade and ensures air and water tight connection to the weather protection grille.

Open gaps in the facade cutout must be insulated from the inside and grouted to be permanently elastic. Larger gaps should be sheet covered for reasons of sound insulation.

In case adapter ducts are required on site (height difference between unit and facade opening, bypassing a ceiling girder, 90° floor plan deflection, etc.) observe the following rules:

- Ensure air-tight separation of outside air from exit air duct (separate lines)
- Use 1 mm sheet steel for air duct inside
- 40 mm mineral wool insulated case. Do not use Armaflex for acoustic reasons (closed pored cellular caoutchouc)
- Use 1 mm sheet steel for shell
- Clear cross-section outside air duct > 0.12 m^2
- Clear cross-section exit air duct > 0.07 m^2
- Airtight connection of adapter line (LTG supplied) to the weather protection grille
- Weather protection grille (LTG supplied)
- Free exit air discharge by 45° downwards, i.e. no obstruction caused by protruding facade elements, sun protection devices, etc.
- Inspection opening in LTG adapter duct recommended
- Exit air sound absorber possible (optional)
- Ensure slight slope towards facade (2...5 %)
- Use water-resistant seal with the facade
- Only use odour-neutral sealant



Connection to the facade

Nomenclature, ordering code

FVS / DI / O / M / SK / R / RAL9010 / O / S844x450 / NE / O / O / CO2 / O

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)

(1)	Series	FVS	=	FVS
(2)	Type	DI	=	Ceiling panelling
		S	=	Visible Installation
		DIH	=	Ceiling panelling upright
(3)	Flap to cover the heat recovery unit	O	=	Without (Standard)
		M	=	With
(4)	Condensate supervision	M	=	With (Standard)
		O	=	Without
(5)	Sound absorber	SK	=	With short sound absorber (Standard)
		MS	=	With sound absorber 1.8 m (typ FVS-DI only)
(6)	Version (s. pages 11/14)	R	=	Right Version
		L	=	Left Version
(7)	Surface casing	RAL 9010	=	RAL colour
(8)	Air treatment	O	=	Without heat exchanger
		H	=	Heating
		K	=	Cooling
		HK	=	Heating and Cooling
		E	=	Electrical heating register DN 280
(9)	Weather protection grille	S844x450	=	Standard
		L x B	=	Width W x length L
(10)	Surface weather protection grille	NE	=	Natural anodized (standard)
		RAL 9010	=	Coated sim. to . . . . (indicate RAL-Nr.)
(11)	Exhaust air grille / exhaust air box	O	=	Without
		A	=	With exhaust air grille, without exhaust air box
		A-250	=	With exhaust air grille and exhaust air box, connection DN 250
(12)	Adapter duct	O	=	Without
		K50	=	500 mm
		K25	=	250 mm
(13)	Control	CO2	=	CO_2 controlled
		P	=	Presence controlled
(14)	Communication	O	=	Without
		LON	=	LON
		BAC	=	BACnet
		KNX	=	KNX
		MOD	=	Modbus

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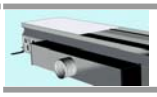
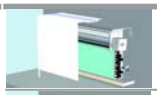
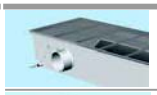
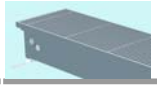
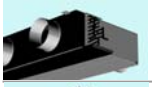
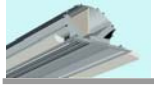
AIR TECH SYSTEMS

Product Overview
LTG Air-Water Systems

LTG Induction – Induction Units

Ceiling installation	Sill Installation	Floor Installation
 HFF *suite* SilentSuite	 HFV / *HFVsf* System SmartFlow	 HFB / HFB *sf* System SmartFlow
 LHG System Indivent	 HFG	
 HDF / HDF *sf* System SmartFlow	 QHG	
 HDC		

LTG FanPower – Fan Coil Units

Ceiling Installation	Sill Installation	Floor Installation
 LVC System Indivent	 VFC	 VKB
 VKH	 QVC	 SKB
 VKE		
 KFA CoolWave		

LTG Decentral – Decentralised Ventilation Units

Ceiling Installation	Sill Installation	Floor Installation
 FVS Univent	 FVP *pulse-V* System PulseVentilation	 FVP *pulse-B* System PulseVentilation
		 FVD/FVDplus

Engineering Services

 LTG Engineering Services Comfort Air Technology

AIR TECH
SYSTEMS

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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