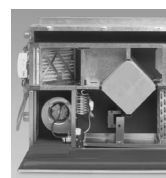


Cooling and heating systems

Facade ventilation unit FG-L



Preliminary remarks

Users place increasingly heavy demands on modern administrative buildings. On the one hand offices require sophisticated intelligent communications technology with a resultant large heat gain from office equipment and on the other personnel sometimes accounts for less than 20%.

Actual end use is often unknown during the construction phase. Indoor air conditioning thus requires a ventilation system that can respond in a flexible way to various user requirements and whose mode of operation can be adjusted individually, while always remaining economical.

With a suitable control strategy, these requirements can be met by a central HVAC plant.

If, however, a central HVAC system is not planned, requirements can also be met very effectively with the facade ventilation unit from KRANTZ KOMPONENTEN. Within the room, the unit is placed in front of the facade. Outdoor and exhaust air connection is made directly via the facade.

The unit has a modular construction. In addition to fresh air supply, the following functions are possible:

- Heating
- Cooling
- Operation with energy recovery
- Operation with recirculated air
- Operation with outdoor air
- 3-step fan circuit

Construction design

The main components of the unit are the housing **1** with rear (facade-side) connection spigot and outdoor air dampers **2** and **4** as well as the exhaust air damper **3**, outdoor air filter **5**, lateral return air vent with return air filter **6**, upper supply air spigot **12** for connection of the separately placed (in the client's parapet covering **7**) adjustable air outlet **8** (induction outlet).

The basic unit model also includes the following: highpower radial fan for supply air **9** and return air **10**, fixed-plate cross flow heat exchanger **11** for energy recovery from return air, recirculation air damper **13**, compact water heat exchanger **14** with separate water circuits for heating and cooling operation (four-pipe system).

The unit is fitted with an acoustic and thermal lining.

The outdoor air and exhaust air vents can be screened on the outside with visible protective hoods **2a** and **3a**. The client can also have concealed intake/discharge apertures (**2b** and **3b**) in combination with front-suspended facades.

For the backflow of indoor air to the unit the parapet covering can either be provided with a perforated area **7a** or an opening near the floor **7b** with a free in-flow cross-section of at least 400 cm².

If condensation can be expected at the cooling coil **14** due to high outside air humidity, the drain **15** should be connected to the waste water grid.

For fastening the unit a mounting plate **16** is available which also fixes the exact location of the outdoor and exhaust air vents and can also be moved in 2 planes to balance construction tolerances.

The chilled-water and hot-water pipes **17** are best fitted under the unit.

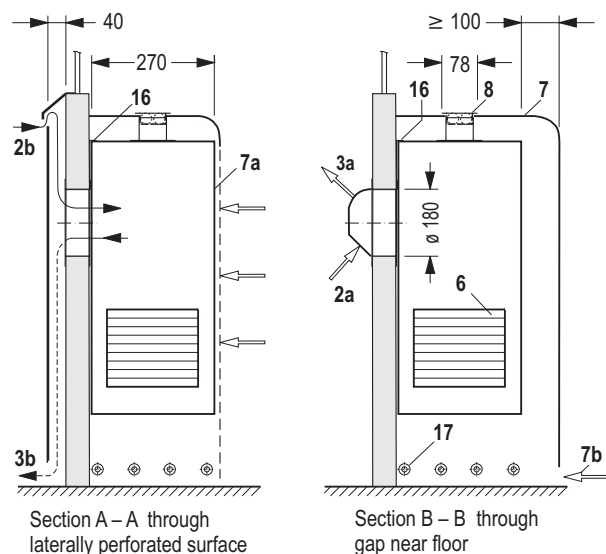
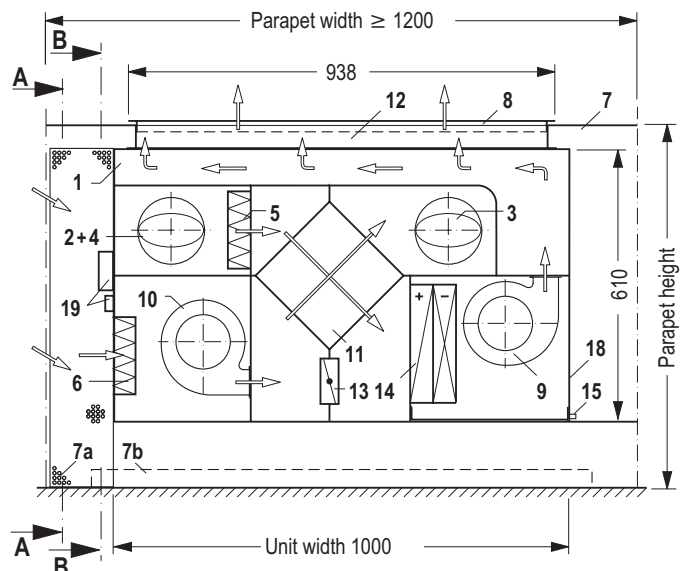


Figure 1: Main dimensions and view of return air vents in the client's parapet covering. The figure also shows an example of the concealed intake/discharge apertures (**2b** and **3b**) and the visible type **2a** and **3a**; water connection right **18**, control unit and mains connection **19**

Mode of operation

The unit is suitable for heating and cooling operation. The user can select from 3 supply and return air flow rate settings between 30 and 53 l/s (110 and 190 m³/h). The mode of operation is as follows:

Cooling operation

The supply air fan 9 takes in outdoor air via the filter 5 and the outdoor air bypass damper 4 and discharges it via the adjustable induction outlet 8 into the room.

An equally large volume flow rate is collected by the return air fan 10 via the filter 6 and discharged into the atmosphere via the damper 3.

If the outside temperature in summer is higher than room temperature, the outdoor air flow rate is reduced to the requisite minimum percentage through the recirculation air damper 13 to save energy. This air flow is also fed through the fixed-plate cross flow heat exchanger for energy recovery.

Due to the lower temperature of the return air passing through the fixed-plate crossflow exchanger, the indoor air is cooled in the crossflow.

The supply air is cooled in the water heat exchanger 14 to the required temperature.

Heating operation

The supply air fan 9 takes in outdoor air via the filter 5, the energy recovery damper 2, the fixed-plate crossflow exchanger 11 and the water heat exchanger 14 and discharges it through the adjustable induction outlet 8 into the room.

At the same time the return air fan 10 takes in indoor air via the filter 6 and discharges it through the fixed-plate crossflow heat exchanger 11 and exhaust air damper 3 into the atmosphere. Heat is removed from the return air passing through the fixed-plate crossflow heat exchanger and is transmitted to the outdoor air in crossflow. As required, a part of the indoor air is admixed as recirculated air with outdoor air via the damper 13.

The supply air is reheated in the water heat exchanger 14 to the required temperature.

Heating and cooling operation with recirculated air

This mode of operation is for maintaining temperature when the room is not in use, e.g. at night and at the weekend (intermittent operation).

Dampers 2, 3 and 4 are shut.

The air fans 9 and 10 take in indoor air via the filter 6 and convey it through the open recirculation air damper 13. In the water heat exchanger 14, the supply air is cooled or heated at maximum capacity before it is discharged into the room through the adjustable induction outlet 8.

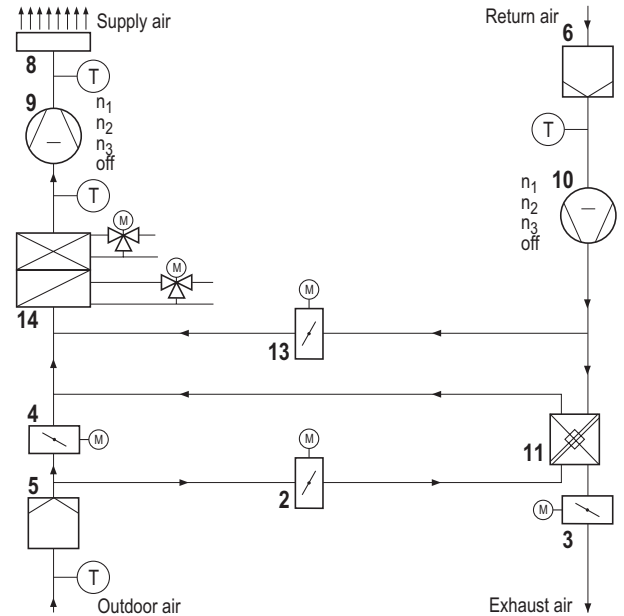


Figure 2: Diagram of mode operation

Key for all pages

- | | | |
|------------------------------------|---|---|
| 1 Housing | 5 Outdoor air filter | 10 Return air fan |
| 2 Energy recovery damper | 6 Return air filter | 11 Fixed-plate cross-flow exchanger |
| 2a Protective hood for outdoor air | 4 Outdoor air bypass damper | 12 Supply air spigot |
| 2b Concealed intake | 7 Parapet covering, at customer's expense | 13 Recirculation air damper |
| 3 Exhaust air damper | 7a Perforated return air intake | 14 Water heat exchanger |
| 3a Protective hood for exhaust air | 7b Return air vent gap near floor | 15 Drain |
| 3b Concealed discharge opening | 8 Adjustable induction outlet | 16 Mounting plate |
| 4 Outdoor air bypass damper | 9 Supply air fan | 17 Supply lines |
| | | 18 Water connection |
| | | 19 Control unit and electricity connections |

Technical data ¹⁾

Supply air / Return air volume flow rate (3-step switching)	max. 53 l/s resp. (max. 190 m ³ /h resp.)
Supply air temperature, summer (for outdoor air 32°C/40% relative humidity)	18°C
Total requisite cooling capacity included in this are:	720 W
for cooling 33% outdoor air	200 W
for room cooling at t _R = 26°C	520 W
Chilled water temperature	14 / 17°C
Chilled water volume flow rate	200 l/h
Supply air temperature, winter (for outdoor air - 15°C)	36°C
Total requisite heating capacity included in this are:	1200 W
for heating up 33% outdoor air	500 W
for room heating at t _R = 22°C	920 W
Warm water temperature	50 / 40°C
Warm water flow rate	90 l/h
Perm. operating pressure of heat exchanger ²⁾	16 bar
Degree of energy recovery of fixed-plate crossflow exchanger (related to 33 % minimum outdoor air ratio)	approx. 50%
Throughput setting 1	30 l/s (110 m ³ /h)
Throughput setting 2	42 l/s (150 m ³ /h)
Throughput setting 3	53 l/s (190 m ³ /h)
Sound pressure level at 1.5 m distance for equivalent sound absorption surface of 15 m ² Sabine, e.g. at throughput setting 2 = 42 l/s (150 m ³ /h)	38 dB(A) ref. 2·10 ⁻⁵ Pa
Insertion loss (outdoor and exhaust air dampers open)	52 dB
Power consumption	max. 65 W
Total connected load	100 VA
Operating voltage	230 V / 50 Hz
Weight	approx. 50 kg

1) Applies for chilled water flow temperature of 14°C in summer and warm water flow temperature of 50°C in winter. Higher capacities are possible for other flow temperatures, see Charts 1 – 6

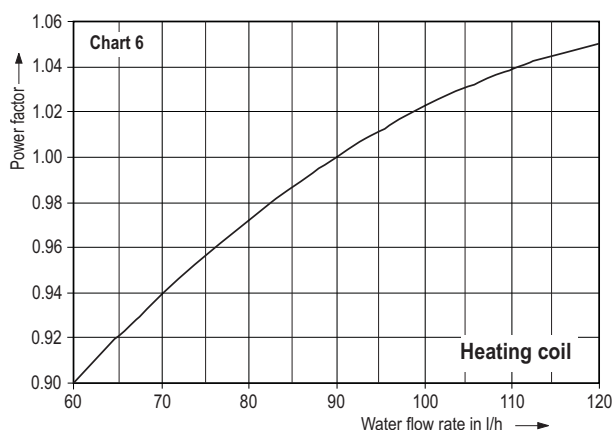
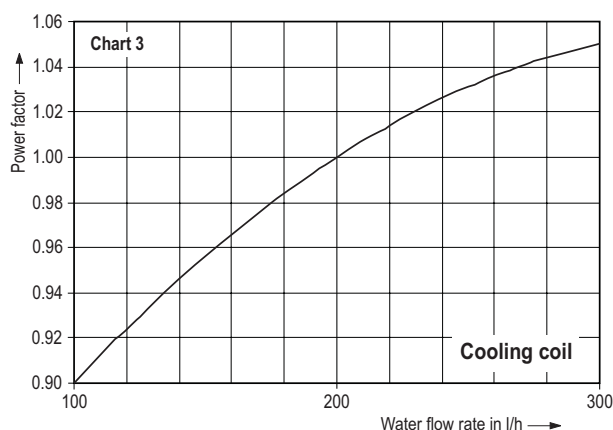
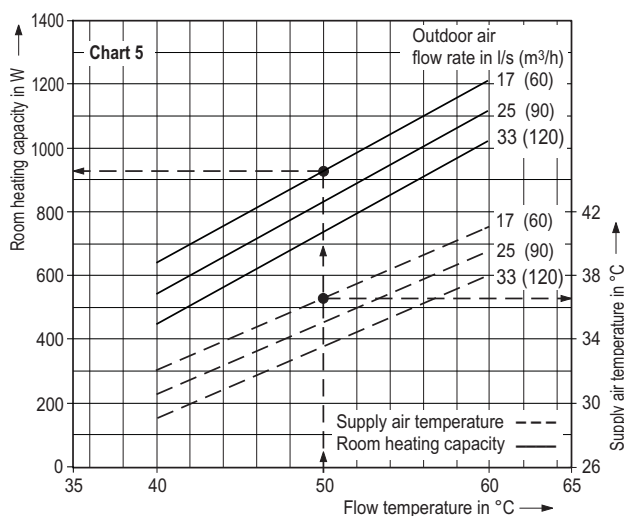
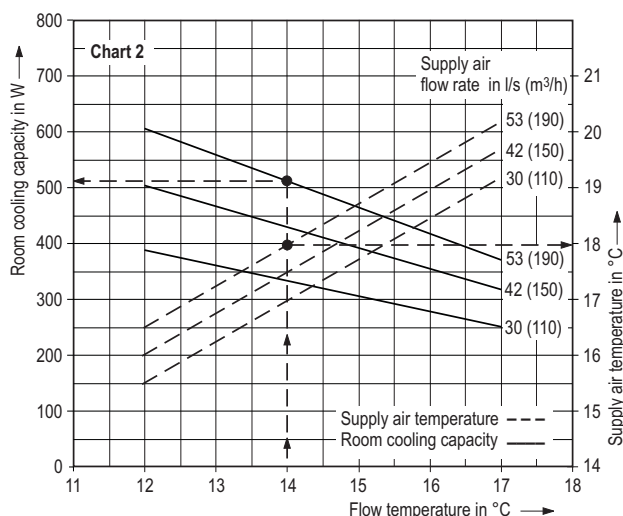
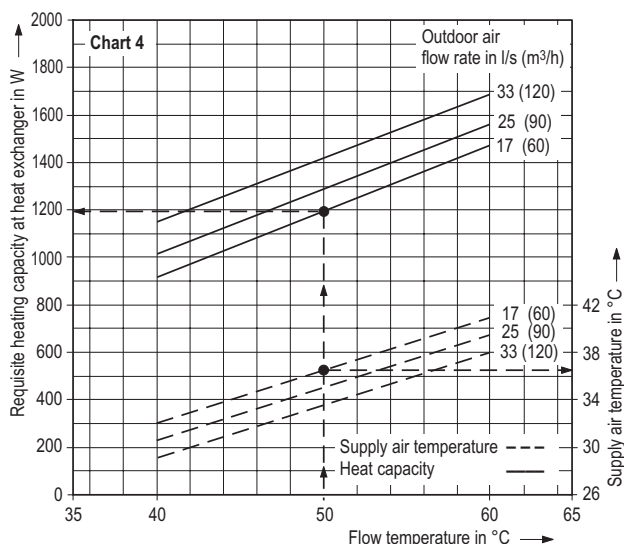
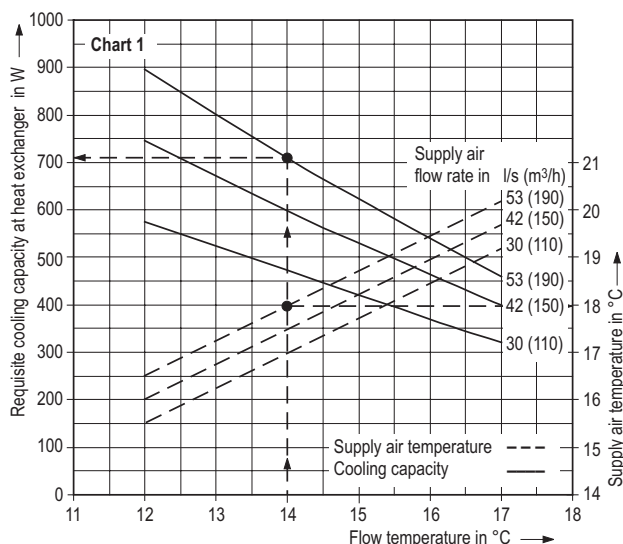
2) Higher pressures on request.

For other layout specifications (e.g. other flow temperatures and water flow rates), the cooling and heating capacities can be read off the charts.

The requisite cooling and heating capacities at the heat exchanger are higher than those for the room as cool-

ing or heating capacity for the outdoor air has to be used up by the central supply station.

Room cooling capacities per unit of 520 W can easily be obtained. For a floor area of 1.35 m x 5.50 m a unit can remove specific cooling loads of up to 70 W/m².



The charts apply for
summer: outside temperature 32°C/40% r.F.
indoor temperature 26°C/50% r.F.

winter: outside temperature -15°C / 90% r.F.
indoor temperature 22°C

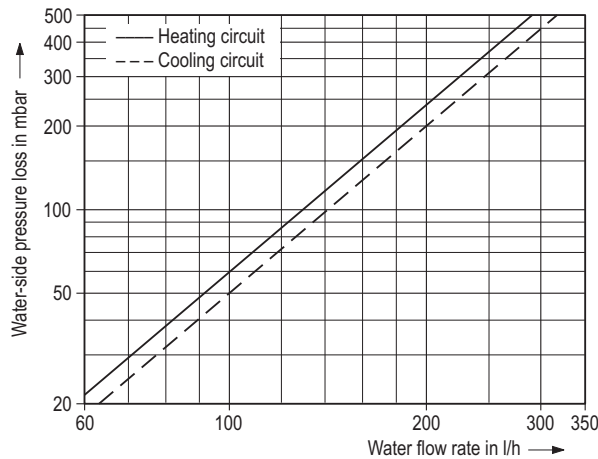


Figure 3: Pressure loss of the heat exchanger in the facade ventilation unit

Control

Each facade ventilation unit is fitted with a bussable control device for flexible adjustment to changes in unit use. Temperature sensors are located in the outdoor, return and supply air flow. A temperature detector is also inserted behind the water heat exchanger for the antifreeze circuit. The controller receives these measured values, processes them with its internal control algorithms and transmits actuating signals to the electric servodrives of the dampers and valves. Using the open LONWORKS bus system enables convenient targetted access to all relevant parameters of the facade ventilation units. The supply voltage for the controller and valves is available in the ventilation unit, so there is no need for a separate voltage network in the building.

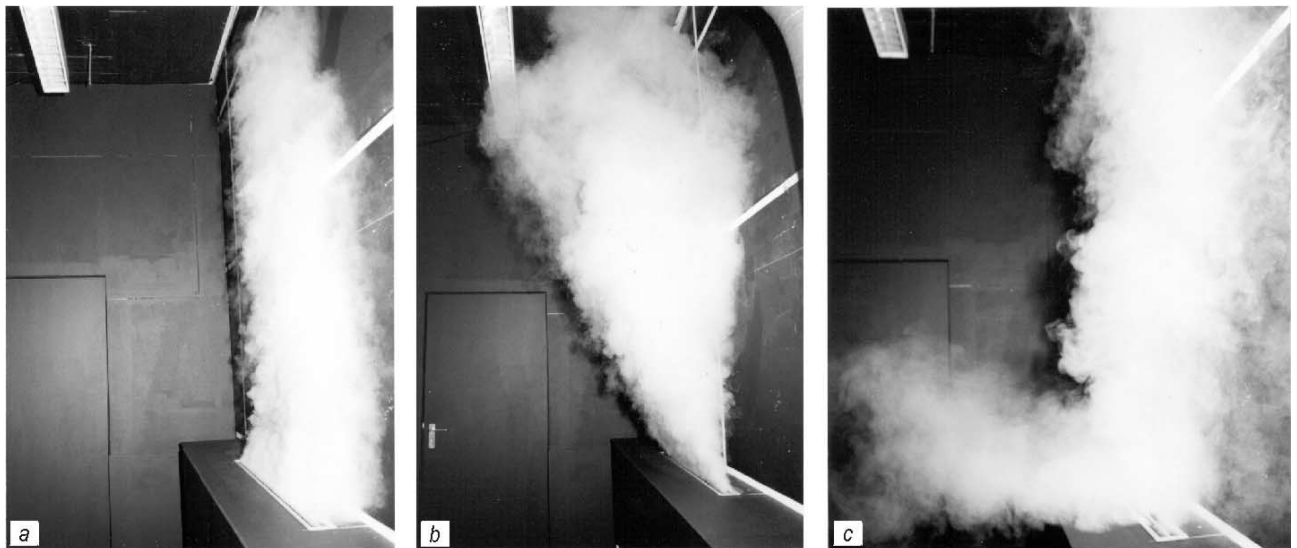


Figure 4: Supply air distribution via adjustable induction outlet, made visible with smoke tracer

a) Linear facade air jet;

b) Spread facade air jet;

c) Facade air jet and flat air jet for direct supply to workplace

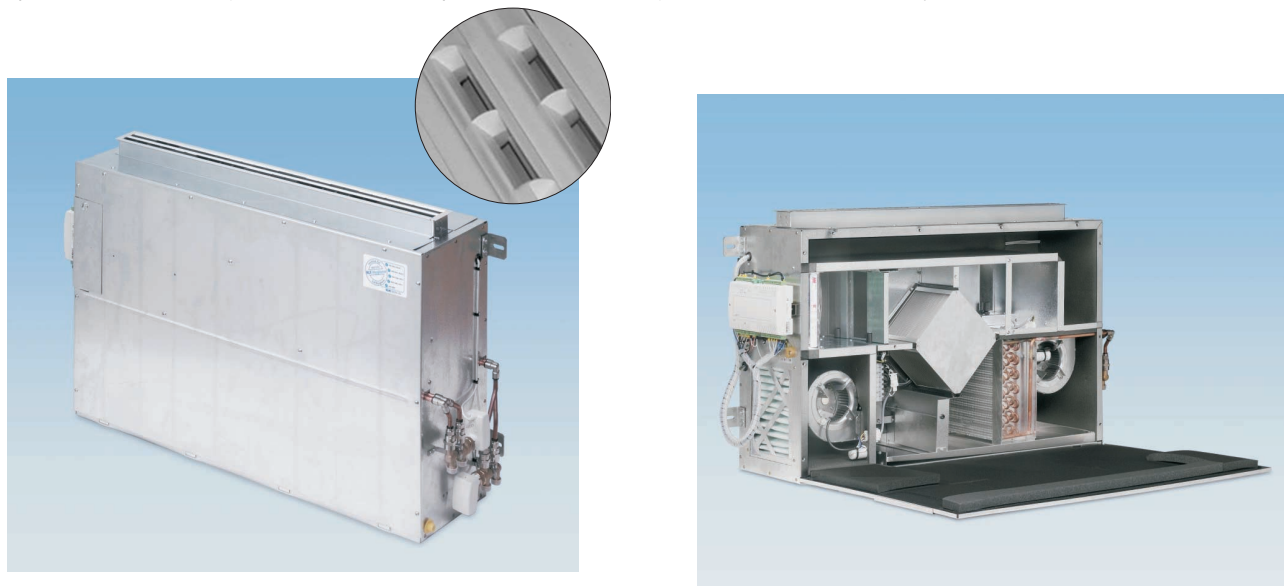


Figure 5: Facade ventilation unit

Left: Face and lateral water connections; adjustable induction outlet stuck on from above,

Right: Lateral return air orifice with filter, faceplate open.

Features

- Ventilation unit for decentralized air supply at the building facade
- Outdoor air intake and exhaust air discharge directly through the facade; ventilation operation without air ductwork
- Hygiene tested to VDI 6022, Part 1 and Part 3, VDI 3803, DIN 1946, Part 2 and Part 4
- F5 filtration with biostatic filter pads
- Compact design and housing made of galvanized sheet steel with fittings: air filter, energy recovery unit, water heat exchanger with separate water circuits for cooling and heating operation, air dampers, supply and return air fans (3-speed), including bussable controller
- Supply air distribution through a double-row adjustable induction outlet with resultant facade screening by means of a linear vertical air jet and – as required – additional flat air jet for direct supply to workplace
- Adaptable operation for various user requirements:
 - Heating
 - Cooling
 - Operation with energy recovery
 - Operation with recirculated air
 - Operation with outdoor air
 - 3-speed fan circuit
- Bussable controller with high flexibility for individual user requirements

Type code

FG – L –

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Facade unit	Function / Kind	Heat exchanger

Function/Kind

L = Ventilation

Heat exchanger

W = Water heat exchanger with separate water circuits for cooling and heating operation

E = Electrical heating coil

Example

Facade ventilation unit with water heat exchanger

Type FG – L - W

Tender text

..... units

Facade ventilation unit for integration in the parapet of a facade with direct outdoor and exhaust air connection, consisting of:

Item 1:

Housing made of galvanized sheet steel, with acoustic and thermal lining, connection apertures on the facade side for outdoor and exhaust air as well as intake for room return air on the room side,

Supply air spigot on the top side of the unit – centric or positioned to the operating side – for connection to the separately placed induction outlet in the parapet covering,

High-power radial fan for supply and return air resp., including drive motor and transformer for 3-speed operation,

Fixed-plate crossflow heat exchanger for energy recovery from return air,

Water heat exchanger made of copper piping with mounted aluminium blades and separate water circuits for heating and cooling operation (4-pipe system),

Condensate basin and drain for ½" hose,

Biostatic filter (F5) for outdoor and indoor air resp. for easy filter replacement from the room after opening the parapet covering,

Dampers with sealing for outdoor, exhaust, recirculated and bypass air, including the electric servomotors, continuous control,

Temperature sensor for outdoor, supply and indoor air, anti-freeze,

Complete internal electric wiring of sensors and actuators, including voltage supply (24 V~) for the control unit and water-side valves,

All fittings, including outdoor and exhaust air apertures on the facade side, easily accessible for maintenance purposes after removal of unit faceplate from room; fixed-plate crossflow heat exchanger removable for cleaning

Item 2:

Adjustable induction outlet in double-row arrangement, with high induction effect of the supply air jets and fast drop in jet velocity without producing thermal discomfort due to tangential air patterns,

Rear air outlet row with vertical discharge direction for thermal screening of the window facade in cooling and heating mode,

Front air outlet row for adjustment of discharge direction from vertical to almost horizontal as required, enabling individual adjustment of air flow intensity at workplace.

Technical data:

Volume flow rate

- Supply air fan: max. 53 l/s (190 m³/h)
- Return air fan: max. 53 l/s (190 m³/h)

Degree of energy recovery: approx. 50 %
(related to 33% minimum outdoor air ratio)

Heating capacity: W

Warm water temperature: °C

Cooling capacity: W

Chilled water temperature: °C

Max. sound pressure level ¹⁾: 38 dB(A) ref. 2·10⁻⁵ Pa
at 42 l/s (150 m³/h)

Operating voltage: 230 V / 50 Hz

Power consumption: max. 65 W

Material

- Housing: Galvanized steel
- Fan: Galvanized steel
- Fixed-plate crossflow heat exchanger: Aluminium
- Water heat exchanger: Copper/Aluminium
- Air dampers: Galvanized steel
- Induction outlet:
 - Air outlet profile: Aluminium
 - ☐ painted to RAL 9010 ²⁾, pure white
 - Discharge element: Polycarbonate PC GF 10
 - ☐ Coloured pitch black, similar to RAL 9005 ²⁾
 - ☐ Coloured pure white, similar to RAL 9010 ²⁾

Dimensions:

- Width: 1000 mm
- Height: 610 mm
- Height incl. air outlet: 650 mm
- Depth: 270 mm

Perm. operating pressure ³⁾: 16 bar

Weight: approx. 50 kg

Make: KRANTZ KOMPONENTEN

Type: FG – L – ____

Item 3

LONWORKS-compatible DDC controller

For joint use of data with other LONMARK-compatible units in the network,

With NEURON processor and FTT-10 transceiver for networks with free topology and twisted two-wire circuits,

Presetting facility for different controller modes with time programmes of a LONWORKS compatible primary system,

Cascade control of indoor air-supply air temperature for optimum energy-efficient operation,

Temperature comparison between outdoor and indoor air for the use of the recirculation air damper and fixed-plate crossflow exchanger as heating or cooling element as required,

Optional connection

- ☐ of a window contactor to switch off the unit when a window is open or to prevent energy losses,
- ☐ of a movement detector to record room occupation,

Item 4

Electric control valve with

microprocessor-controlled valve drive, reversible for three-step control, including mixing valve underpart,

1 unit each for warm or chilled water circulation per unit; permissible operating pressure 16 bar ³⁾.

Item 5 – optional

Room control unit with

room setpoint adjustment ± 3°C, function selector, LED fan switch for 3 speeds.

Item 6 – optional

LONWORKS-compatible room control unit with

LCD display and 4 control keys, internal indoor air temperature sensor, function selector;

when connected to the LONWORKS network with following indicator information: indoor air temperature, indoor air temperature setpoint, outdoor air temperature, fan setting, operation status (engaged, ready or disengaged), current air conditioning (heating or cooling).

Adjustable settings: indoor air temperature setpoint, fan setting (3-speed), operating mode.

Item 7 – optional

Electrical heating coil instead of water heat exchanger.

Item 8 – optional

Protective hood for outdoor and exhaust air apertures at building's outer facade.

Item 9 – optional

Mounting plate for fastening unit and fixing the outdoor and exhaust air apertures in the facade, movable in 2 planes to adjust to the parapet covering and the permissible constructional deviations.

Subject to technical alterations!

¹⁾ Built in behind parapet covering, at 1.5 m distance for equivalent room sound absorption surface of 15 m² Sabine

²⁾ Other colours on request

³⁾ Higher pressure on request

Krantz GmbH

Uersfeld 24, 52072 Aachen, Germany

Phone: +49 241 441-1

Fax: +49 241 441-555

info@krantz.de | www.krantz.de

