ISQ-FM

Exposed Reactive Supply Air Diffuser

Quick Facts

- A supply air diffuser with patented technology for an exceptionally silent distribution of strongly under-tempered, draft-free supply air
- Completely mechanical
- Designed for reduced energy usage at on-demand control of room climate in conjunction with control unit DCV-RCb
- Intended for larger premises with lower requirements for flexibility in case of tenant adaptation
- An appearance that mimics the active supply air diffuser ISQ-F
- Adjustable air distribution pattern
- Environmentally certified with registered EPD
- Designed for efficient transport, a minimum of packaging material, and easy installation

Demand-controlled ventilation can reduce energy use by creating an optimal indoor climate when and where it is needed.

INSQAIR® is a series of uniquely quiet supply air diffusers for draft-free indoor environments at both high and low airflows. A room solution with the reactive diffuser ISQ-FM is particularly suitable in larger premises where no future need to change the room structure is anticipated.

LINDINVENT®

Why INSQAIR® and ISQ-FM?

INSQAIR® = INnovative Smart Quiet AIR
INSQAIR is a series of supply air diffusers from Lindinvent that offer installation efficiency and high-performance climate control. Several technical solutions have resulted in international patents.

Simplicity and Performance
A unique technical performance. Easy planning, easy installation, easy commissioning, and easy user interface make the INSQAIR product series optimal for cost-effective and sustainable indoor climate control.

Lowest Life Cycle Cost (LCC)
A system based on demand-controlled ventilation and under-tempered supply air has the lowest investment and life-cycle cost according to several surveys.

Increased Productivity and Efficiency
Cooling with air leads to increased air volumes compared to a solution based on chilled beams. With increased air volumes, staff efficiency increases by up to 8 % according to the Harvard study *"Economic, Environmental and Health Implications of Enhanced Ventilation in Office Buildings"*.

Sustainable Design
All products in the INSQAIR series have been designed with sustainability and good environmental choices in mind. The design has been optimised to ship the products efficiently and with minimal packaging.

Environmental Product Declaration - EPD
All supply air diffusers in the INSQAIR product series have EPDs. Ours can be downloaded via www.epdhub.com which is one of the international systems for third party verified EPDs. An EPD is based on the ISO 14025 method for Life Cycle Assessment of a product's environmental impact. Suppliers contribute to improved environmental declaration of buildings by providing EPDs.

System Requirements

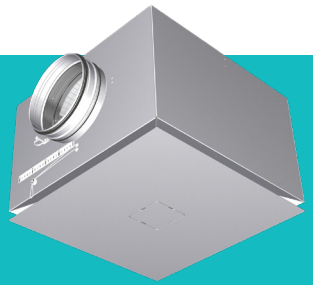
Occupancy Rate and Activity Level
Work from home, sick leave, vacations, and external assignments contribute to variations in the occupancy rate. To limit energy consumption, a function must ensure that the total air flow is always adjusted to the actual need. This minimizes the energy required to drive the air and reduces the amount of air that needs to be heated or cooled to maintain the correct room temperature.

Free Cooling Without Cold Drafts
To minimize the need for and cost of added cooling, the maximum cooling effect should be obtained from sub-cooled supply air. This requires units that provide good mixing with room air even at a low supply air flow. The risk of cold drafts prevents many systems from reducing air flows while using highly sub-cooled supply air. With good heat exchange, reheat coils are rarely needed.

Versatility and Performance
Room climate control should be part of a system solution that efficiently and sustainably delivers a good indoor climate when and where it is demanded.

With the INSQAIR product series, we have developed unique, quiet, versatile and smart supply air diffusers that meet the requirements for room climate control in various environments.

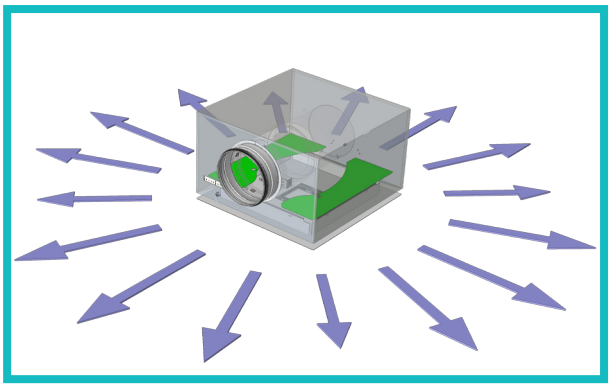
Content



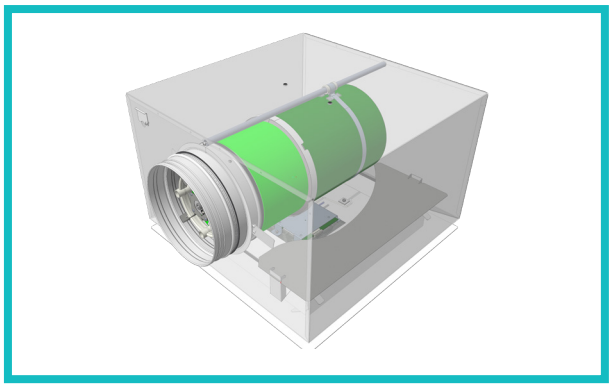
Quick Data ISQ-FM

- Working range: 5 to 150 l/s
- Sound performance: Below 30 dB(A) up to 125 l/s at 100 Pa
- Height: 336 mm

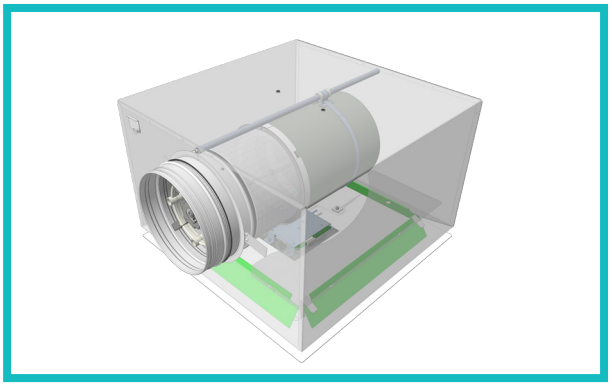
Construction



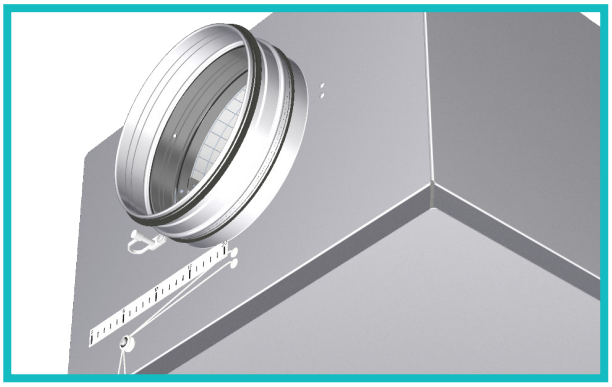
The ISQ-FM is a rectangular supply air diffuser designed for horizontal installation in suspended ceilings. Two air distributors provide a radial distribution pattern that mimics circular diffusers.



A patented airflow damper without motor control. The damper is designed for quiet regulation even at high duct pressures and air volumes. It´s built around a cylinder with permeable fibrous material. The damper is manually adjusted.



Self-acting openings in the inlet to the spreader part opens or closes when the air volume changes. The design ensures a high outlet velocity and a long throw. The solution allows the device to work with significantly under-temperature, draft-free supply air even at low air flows.



The diffuser is equipped with a cord for manual adjustment of the damper opening and a push nipple for pressure measurement. Manual pressure measurement is required to calculate the airflow from an individual diffuser. In the case of asymmetry, the airflow should be evenly distributed across the connected diffusers. The total airflow is measured at the duct-mounted room climate control damper unit.

Diffuser Plate

- Removable plate with suspension mechanism
- Distributes supply air horizontally
- Central openings to mimic the active diffuser ISQ-F

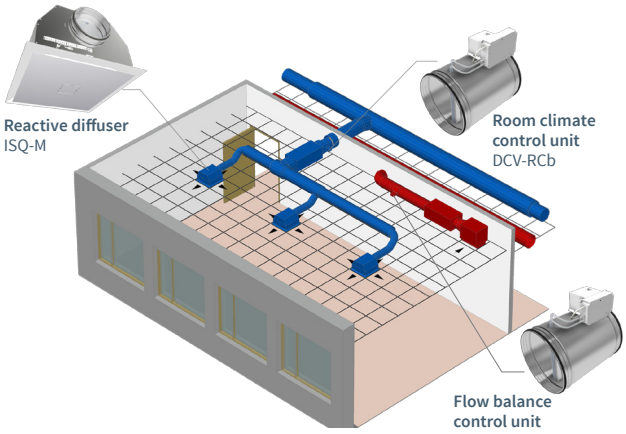
The diffuser plate on the reactive supply air diffuser ISQ-FM.

An application

A classroom with ISQ-M/ISQ-FM

Room climate control based on temperature, occupancy detection and carbon dioxide level.

- Room climate control unit DCV-RCb on the supply air duct. DCV-RCb is equipped with external sensors for room temperature, occupancy detection and carbon dioxide measurement
- 5 - 375 l/s
- Silent regulation
- DCV-BLb is installed for extract air balancing
- The sensors for room temperature and carbon dioxide are placed in the extract air duct
- DCV-RCb and DCV-BLb are connected to the same local network (CAN-loop)



Classroom with ISQ-M and supply air control via DCV-RCb. The room is equipped with extract air balancing via DCV-BLb.

Counter based on carbon dioxide level

The sensor is used for air quality control, as well as to analyse the occupancy level. The number of people in a room can be estimated based on the amount of carbon dioxide present. Integration with room booking systems enables the release of “No-shows” for new bookings.

Installation

A Complete Unit

ISQ-FM, which includes the plenum box, is delivered and installed in the ceiling as a complete unit.

Suspension

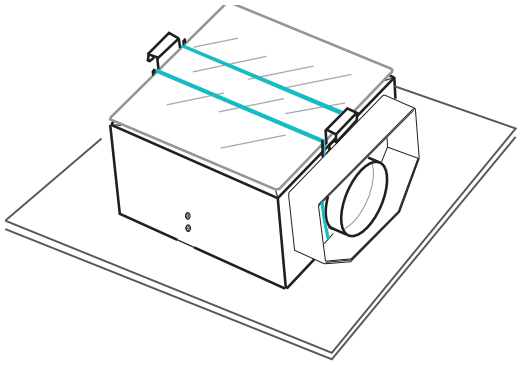
ISQ-FM is delivered with two suspension arms. The maximum length of the arms can be customised on request at the time of order. Alternatively, a threaded rod can be used. The top of the diffuser has a blind rivet for attaching the rod.

Mounting Handles

The diffuser is lifted and installed completely, as delivered, with its cardboard protection, cover profiles, and mounting handles, firmly in place. The handles and protections are not to be removed until the unit is correctly installed in the ceiling structure.

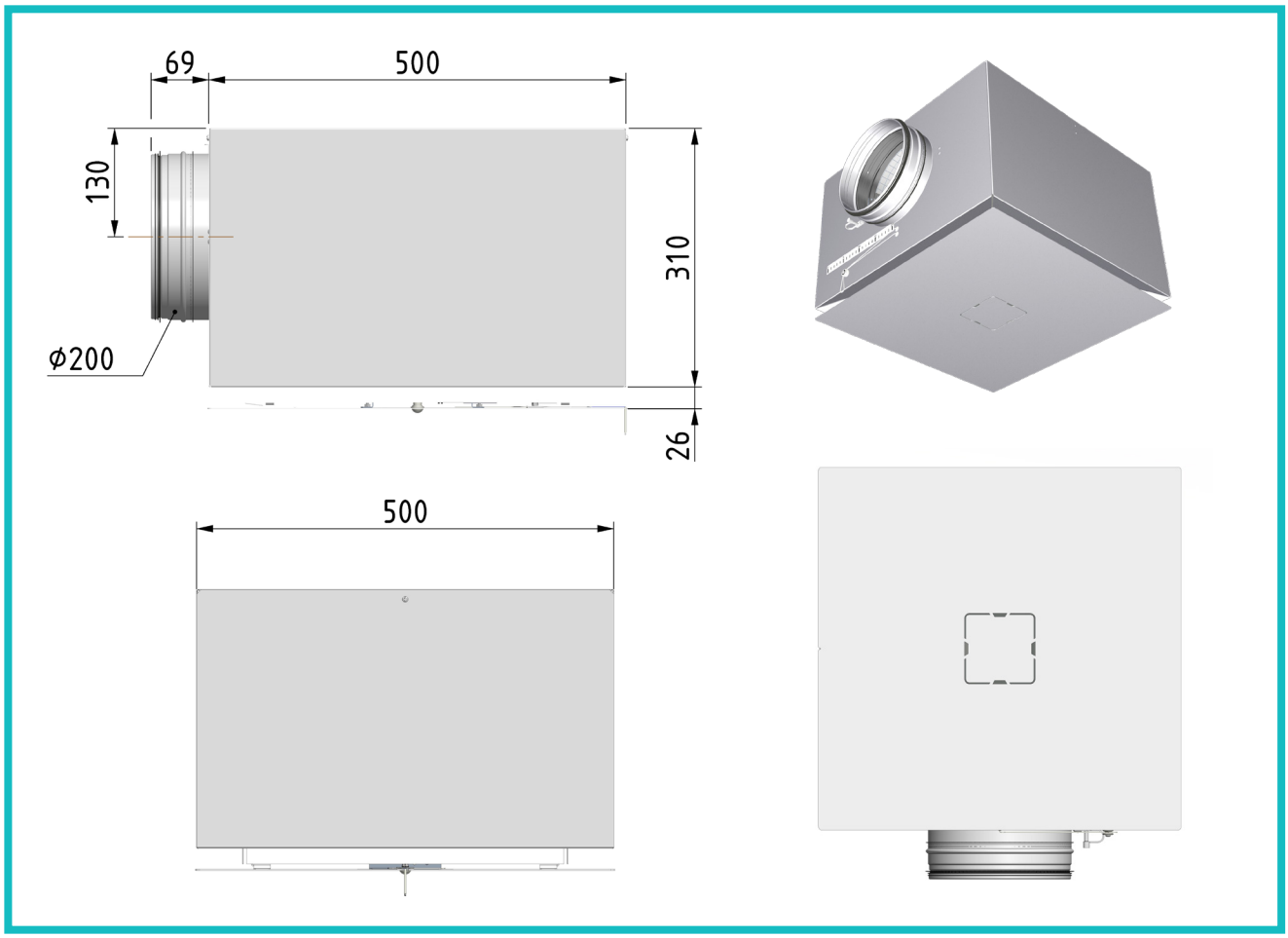
No Connection box

ISQ-FM operates without any electrical components and is therefore mounted without a connection box.



The strap, which holds the mounting handle and protective cardboard (with cover profiles) in place, is only removed when the unit is lifted and anchored to the ceiling. The protective cardboard is left in place until it is time for commissioning.

Dimensions (mm)



Technical Specifications

Material
Diffuser part and plenum box: Powder-coated steel sheet as standard. The unit can also be ordered in an electro-galvanized version. This surface treatment is not homogeneous, sanding marks may appear.
Airflow valve (housing), distribution plates, and self-acting discs: Thermoplastics (PS, PP)
See Byggvarubedomningen.se for a material description.
Net weight ISQ-FM-200: 10 kg

Color
RAL 9003 (Gloss 30) in standard version.
Special colors are available. State RAL number.

Connection
Duct socket: Ø 200 mm
Notice: Connection via a flexible aluminum hose or push nipple is recommended.

Suspension
ISQ-FM is supplied with two adjustable arms for suspension. The maximum length of the arms is customizable upon order. The top side of the diffuser is equipped with a blind rivet nut for suspension using a threaded rod.

Throw
ISQ-FM deals with dynamically varying air volumes. The unit is equipped with self-acting discs in the diffuser part, which provides a unique ability to maintain a high outlet velocity and thus a good throw length, even at low air flows. For throw lengths, refer to the Design Instructions for INSQAIR®.

No Cabling
ISQ-FM is not equipped with any electronics and therefore does not require electrical installation. Sensors and other electronic equipment are connected to the duct-mounted room climate control unit DCV-RCb.

Pressure, Airflow & Sound Levels

The sound pressure level LPA, read from the diagram at a specific airflow, corresponds to the A-weighted sound level in the reverberation field at 10 m^2 equivalent sound absorption area. It corresponds to 4 dB acoustic attenuation in a normally damped room with 25 m^3 room volume. See table for other room types. For an account of the throw lengths, see the design instructions for INSQAIR.

- Sound power level per octave band (Lw) = L_{P10A} + K_0 [dB]
- L_{P10A} = Sound pressure level [dB (A)] from diagram
- K_0 = Correction factor per octave band [dB] from table
- p_t = Total pressure drop
- Self-attenuation factor from table

Measurements of sound pressure and sound power have been carried out according to ISO 3741 and ISO 5135. Measurements of intrinsic sound attenuation have been carried out according to SS-EN ISO 7235:2009.

Correction for acoustic room attenuation [dB]

Room Volume	Type of Room	Correction
25 m^3	hard	+2 dB
25 m^3	normal	0 dB
25 m^3	damped	–2 dB
150 m^3	hard	–3 dB
150 m^3	normal	–5 dB
150 m^3	damped	–7 dB

Correction factor, K0 [dB]

ISQ-FM	Oktave Band [Hz]							
	63	125	250	500	1K	2K	4K	8K
200	6	9	8	1	-4	-9	-10	-7

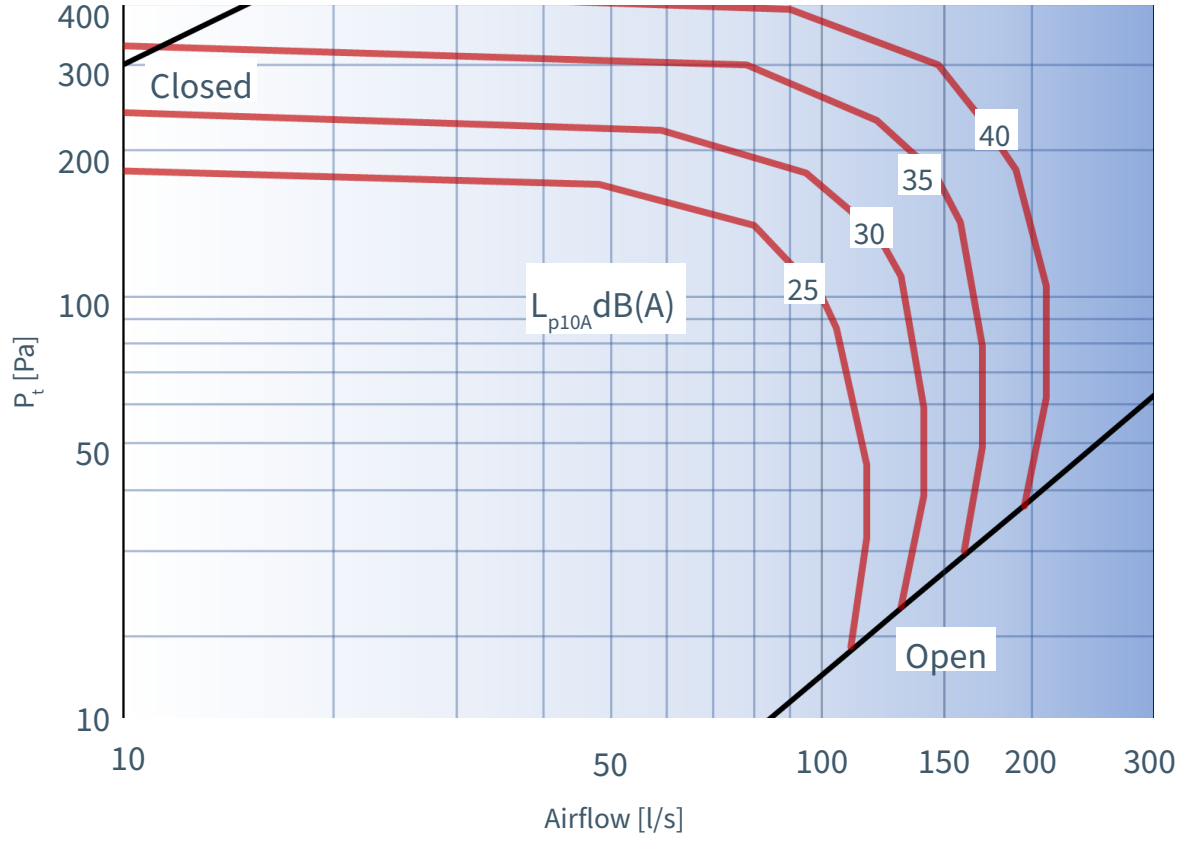
Self-attenuation [dB]

ISQ-FM Opening	Oktave Band [Hz]							
	63	125	250	500	1K	2K	4K	8K
20%	16	12	19	22	23	20	22	25
100%	11	7	14	17	18	15	17	20

Tolerance [dB]

ISQ-FM ± [dB]	Oktave Band [Hz]							
	63	125	250	500	1K	2K	4K	8K
200	3	3	2	2	2	2	2	2

Diagram ISQ-FM, Sound Pressure Level, L_{P10A} dB(A)



Additional Product Documentation for ISQ-FM

Download available in ISQ-FM product page at lindinvent.com

Documents	Comments
Installation Instruction	Installation and requirements for approved installation.
Start-Up Instruction	Not relevant. See the start-up instructions for DCV-RCb.
Maintenance Instruction	Regarded as maintenance-free.
External Connection Diagram	Not relevant. See the connection diagram for DCV-RCb.
Building Material Declaration	Assessed by Byggvarubedömningen in Sweden.
End-User Info	A brief presentation of Lindinvent's diffuser products for smart ventilation.
Modbus List	Not relevant. See the modbus list for DCV-RCb.
AMA-Text	Descriptive text according to AMA standard.
Design Instructions	For the INSQAIR® product series on flows, distribution patterns, CFD and type room solutions.

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