



## Quick Facts

- A supply air diffuser with patented technology for an exceptionally quiet distribution of strongly under-tempered, draft-free supply air
- Completely mechanical
- Designed for reduced energy use 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

# ISQ-FM

## Exposed Reactive Supply Air Diffuser

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 devices for draft-free indoor environments at both high and low air flows. A room solution with the reactive air diffuser ISQ-FM is particularly suitable in larger premises where no future need to change the room structure is anticipated.

## Why INSQAIR® and ISQ-FM?

**INSQAIR® = INnovative Smart Quiet AIR**  
INSQAIR is a series of supply air diffusers from Lindinvent that share solutions to achieve an installation efficient 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 makes 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 cooling baffle. 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 optimized to be able to ship the products efficiently and with a minimum of packaging.

### Environmental Product Declaration - EPD

All supply air diffusers in the INSQAIR product series have EPDs. Ours can be downloaded via [www.epdhub.com](http://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

### Presence and Level of Activity

Home office, sick leave, holidays, or external assignments are all reasons that contribute to variations in the degree of presence. To limit energy use, a function must ensure that the total air flow is always adapted 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 Draft

To minimize the need for, and thus the cost of, added cooling, the highest possible cooling effect should be obtained from under-tempered supply air. This requires a diffuser that provides good mixing with room air even at low supply air flows. The risk of cold draft prevents many systems from being able to reduce air flows and at the same time work with strongly under-tempered supply air. With good heat exchange, a heating battery is rarely needed. From Stockholm and southwards, it is almost 8000 h/year when no added cooling is needed. In Lulea, there are only about 250 h/year when outdoor air for free cooling is not available.

### 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.

Solutions based on the INSQAIR product series might be the world's most versatile and thus useful systems for room climate control at workplaces. Consultants, installers, integrators, operating technicians, tenants, and property owners shall feel safe with their choice of system now and for future requirements.

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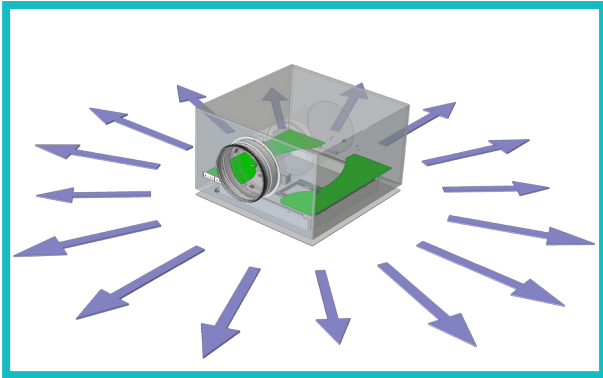


### Quick Data ISQ-FM

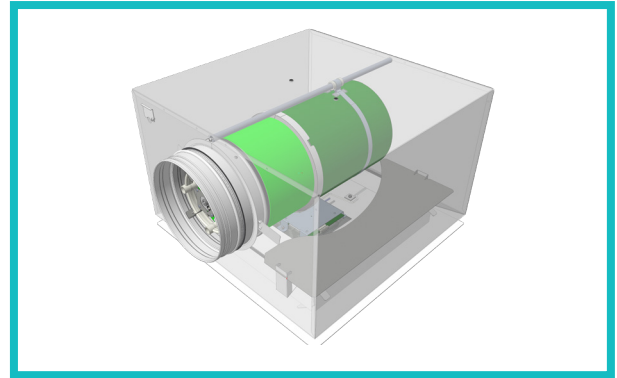
- Recommended flow range:  
Between 5 and 150 l/s
- Sound performance:  
Below 30 dB(A) up to 125 l/s at 100 Pa
- Height: 336 mm



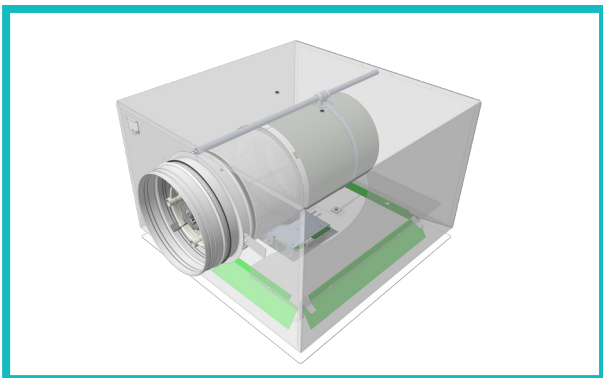
## Construction



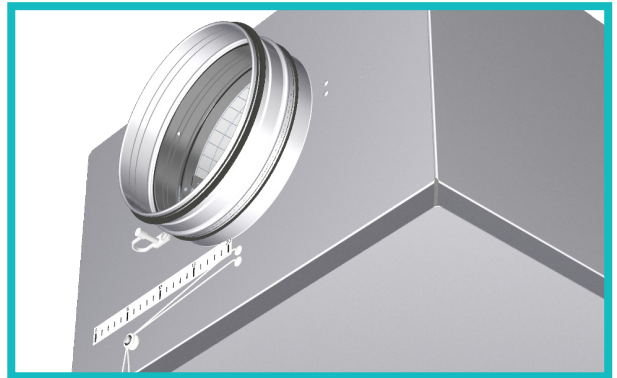
The ISQ-FM is a rectangular supply air diffuser designed for horizontal installation in suspended ceilings. Two air distributors provide a radial distribution pattern that mimics circular diffusers.



A patented airflow valve without motor control. The valve, built around a cylinder with permeable fibrous material, is manually adjusted to an opening that ensures an even distribution of airflow across connected ISQ-FM diffusers.



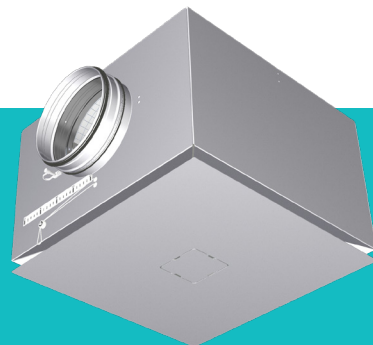
Movable louvers at the inlet of the diffuser section widen or narrow the airflow passage in response to changes in airflow. A high air velocity and thus a high air mixing capacity are maintained across the entire flow range. Each louver can be individually blocked to provide an adjustable air distribution pattern.



The diffuser is equipped with a cord for manual adjustment of the valve 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 airflow asymmetry, the flow should be evenly distributed across the connected diffusers. The total airflow is measured at the regulating damper.

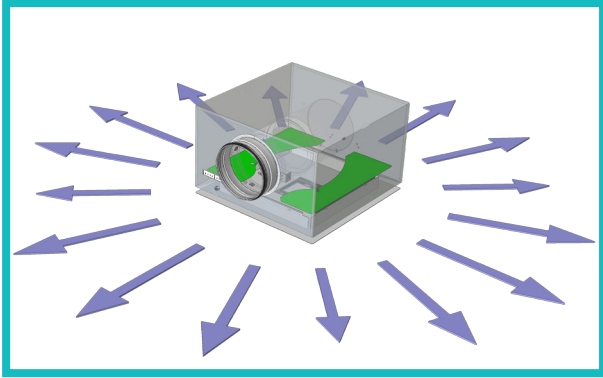
### Diffuser Plate

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

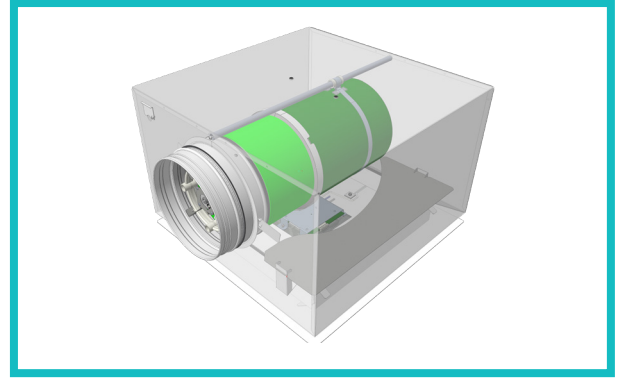


*The reactive supply air diffuser ISQ-FM for suspended installation.*

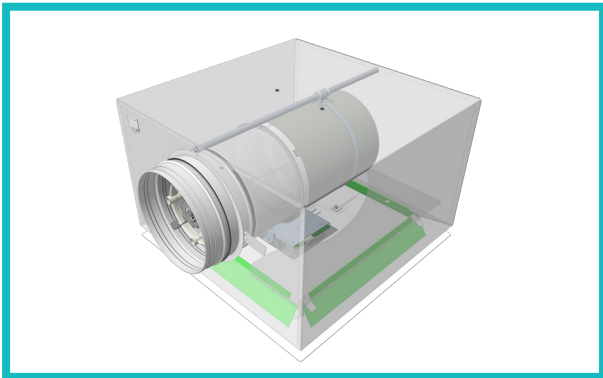
## Construction Parts



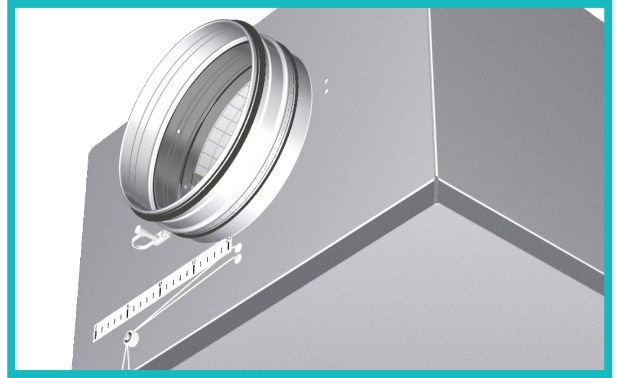
ISQ-FM is a rectangular supply air diffuser designed for horizontal mounting in a suspended ceiling. Two air distributor plates provide a radial distribution pattern that mimics circular diffusers.



A patented airflow valve without motor control. The valve, which is built around a cylinder with permeable fiber material, is manually adjusted to an opening that achieves an even distribution of the airflow over connected ISQ-FM diffusers.



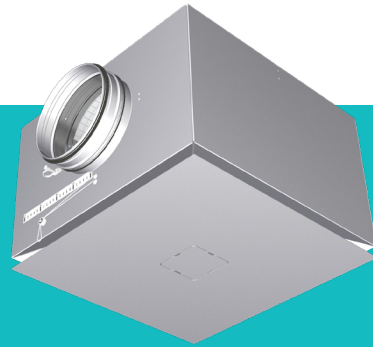
Movable lamellas in the inlet to the diffuser part widen or narrow the airflow passage following changes in the airflow. A high air speed and thus a high air mixing capacity is maintained over the entire flow range. Each lamella can be blocked individually for an adjustable air distribution pattern.



The diffuser is equipped with a string for manually adjusting the valve opening and a nipple for pressure measurement. A manual pressure measurement is required to calculate the airflow from an individual diffuser. In case of airflow asymmetry, the flow is to be distributed evenly over the connected diffusers. Total airflow is measured on the regulating damper.

## Diffuser Plate

- Removable plate with suspension device
- Distributes the supply air horizontally
- Central openings to imitate the active device



*The reactive supply air diffuser ISQ-FM for exposed installation.*

## Room Climate Control with Reactive Diffusers

### Airflow Control

- The total supply of air is distributed evenly over the number reactive diffusers via damper unit DCV-RCb.
- The airflow valve in the individual diffusers can be manually set to adjust airflows.
- Movable lamellas in the inlet to the diffuser part ensure a high air velocity and mixing capacity. The technical solution allows the system to work with strongly sub-temper supply air over the entire flow range without creating drafts.
- The lamellas can be blocked individually to provide the desired air distribution pattern.

### Room Climate Control Unit DCV-RCb

DCV-RCb, with external sensors, continuously adapts the total supply air flow and connected equipment for additional heating or cooling according to the level of activity in the room. The control can work in an economy mode that allows delayed heating and cooling steps.

### Network Communication

DCV-RCb is connected to other controllers to form a local area network (a CAN-loop). All controllers are addressed with a unique node ID. The CAN-loop is in turn connected to Gateway NCE for communication with Lindinvent's central unit or another parent system.

### Bluetooth®

DCV-RCb and other main control units are equipped with Bluetooth® for communication via Lindinvent's mobile application LINDINSIDE.

## Application

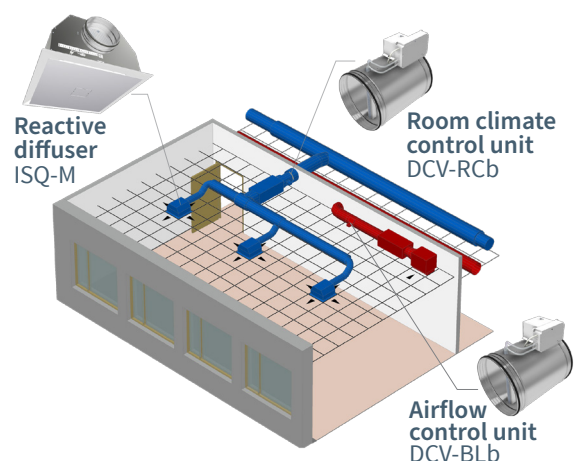
### A Classroom with ISQ-M or ISQ-FM

Room climate control based on temperature, presence detection and carbon dioxide content.

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

### Carbon Dioxide Sensor & Personel Counter

The sensor is used for air quality control but also to analyze the presence level. The number of people in a room can be calculated via the amount of carbon dioxide and the airflow. Integration with room booking systems enables the release of "no-shows" for new bookings.



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

## Easy and Fast Installation

### A Complete Unit

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

### Suspension

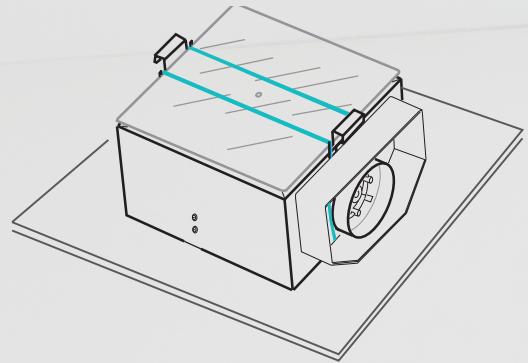
ISQ-FM is delivered with two suspension arms. The maximum length of the arms is customizable upon order. The top side of the diffuser is prepared with a blind rivet nut for suspension using a threaded rod.

### Mounting Handles

The diffuser is lifted and mounted with cardboard protection, cover profiles, and mounting handles robustly attached. Handles and protection are not removed until the unit is correctly fitted into the ceiling structure.

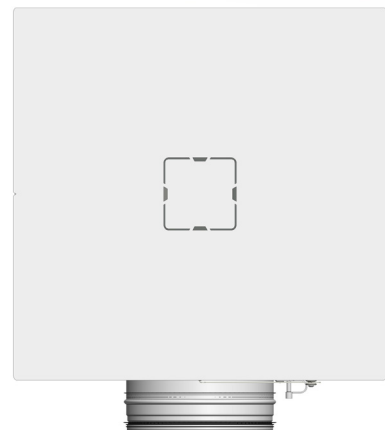
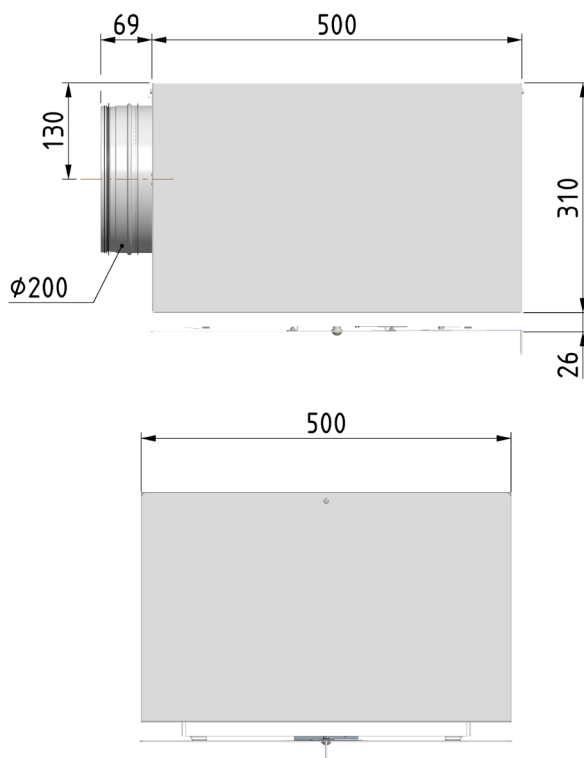
### No Connection Box To Be Installed

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



*The tension strap, which holds the mounting handles and protective cardboard with cover strips in place, is only removed when the unit is lifted and anchored to the ceiling. Protective carton is left 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, measuring device, and lamellas: 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 works with dynamically varying air volumes. The unit is equipped with movable lamellas in the diffuser part, which gives a unique ability to maintain a high outlet velocity and thus good throw length even at low air flows. For throw lengths, see the Design instructions for INSQAIR®.

### No Cabeling

ISQ-FM is not equipped with any electronics and therefore does not require electrical installation. Sensors and other electronic equipment is connected to the duct mounted room climate control unit DCV-RCb.

## Pressure, Flow & Sound Levels

The sound pressure levels  $L_{PA}$  in the diagram corresponds to A-weighted sound level in the reverberation field at 10 m<sup>2</sup> equivalent sound absorption area. It corresponds to 4 dB acoustic attenuation in a normally damped room with 25 m<sup>3</sup> room volume. See table for other room types. For an account of the diffuser throw lengths, see the design instructions for INSQAIR.

- Sound power level per octave band ( $L_w$ ) =  $L_{P10A} + K_0$  [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 <sup>3</sup>	hard	+2 dB
25 m <sup>3</sup>	normal	0 dB
25 m <sup>3</sup>	damped	-2 dB
150 m <sup>3</sup>	hard	-3 dB
150 m <sup>3</sup>	normal	-5 dB
150 m <sup>3</sup>	damped	-7 dB

### Correction factor, $K_0$ [dB]

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

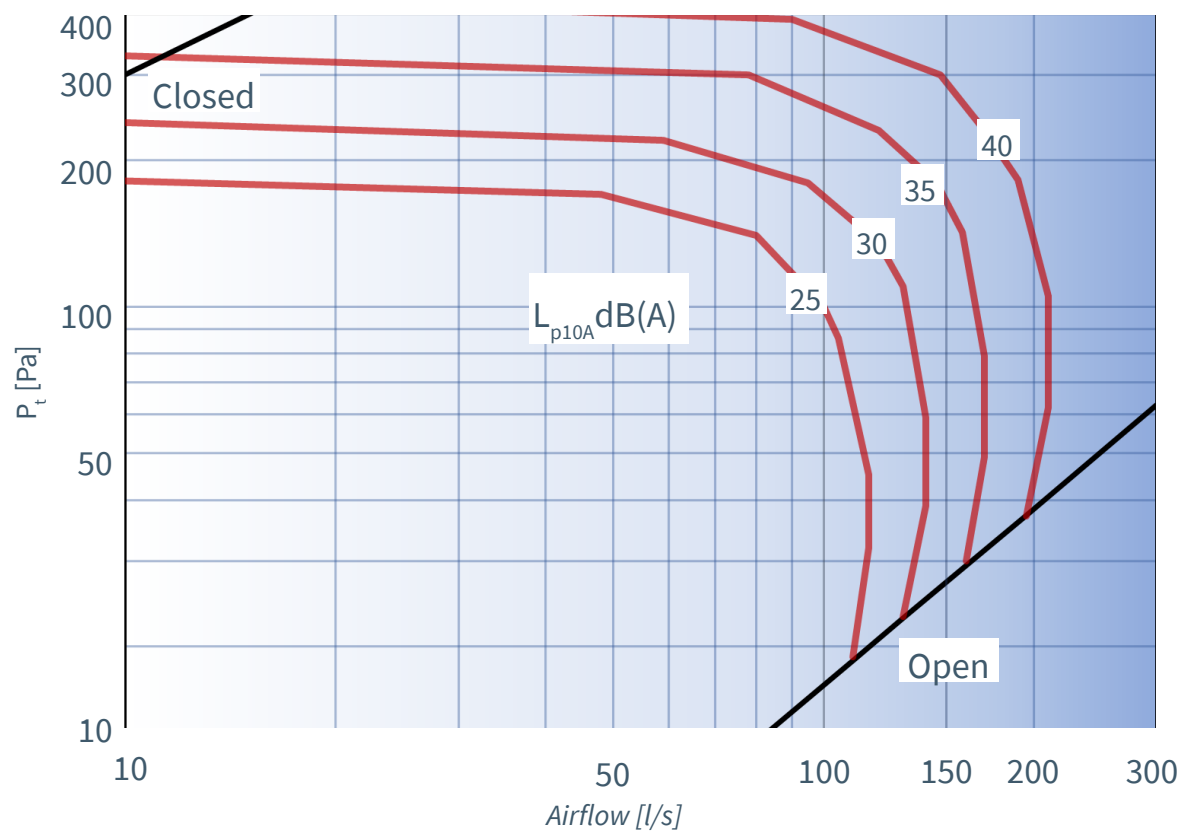
### Self-attenuation [dB]

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)



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Additional Product Documentation for ISQ-FM

Download available in ISQ-FM product page at [lindinvent.com](https://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 Bygghälsöversyn 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.



