ISQ-M

Conceald reactive supply air diffuser

Quick facts

- Intended for distribution of a variable supply air flow over a number of ISQ-M diffusers in a larger room
- For suspended ceiling mounting
- An appearance that mimics the active supply air diffuser ISQ-200
- Completely mechanical. The air flow is regulated via a smart damper control on the supply air duct
- Equipped with patented mechanics that gives the device an exceptional sound and flow performance
- Can operate with sub-temperature supply air over the entire flow interval without causing drafts
- Adjustable air distribution pattern
- Easy and quick installation
- Designed to reduce the need for packaging materials

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-M is particularly suitable in larger premises where no future need to change the room structure is anticipated.

LINDINVENT®

Why INSQAIR® and ISQ-M?

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 material
All products in the INSQAIR series are designed with durable and recyclable material. Packaging materials has been kept to a minimum.

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

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.

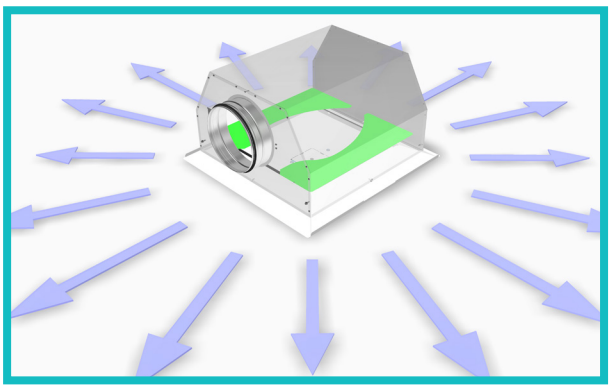
Solutions based on the INSQAIR product series might be the world's most versatile and thus useful systems for room climate control at workplaces. Consultants, installers, integrators, operating technicians, tenants, and property owners shall feel safe with their choice of system now and for future requirements.

Content

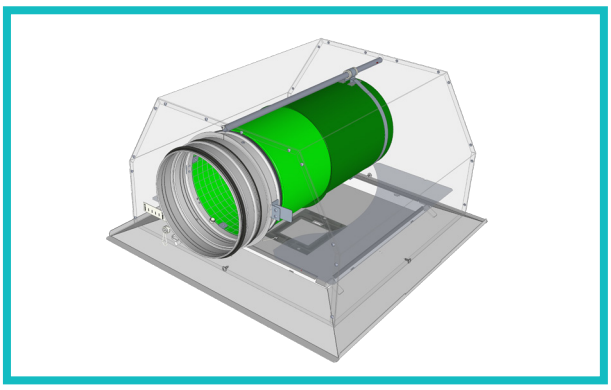
Quick data ISQ-M

- 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

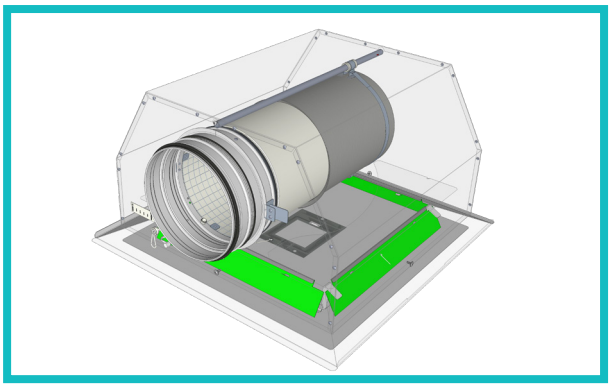
Construction parts



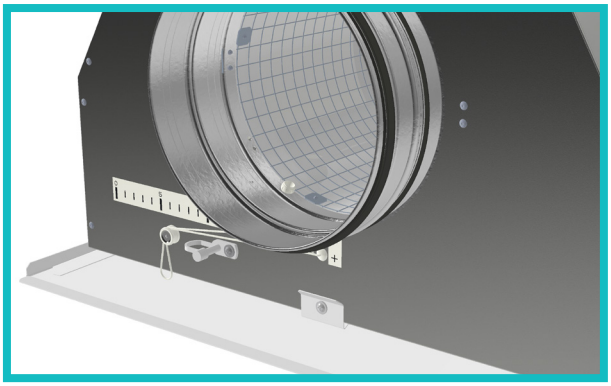
ISQ-M is a rectangular supply air diffuser designed for horizontal mounting in a suspended ceiling. Two air distributor plates provide a radial distribution pattern that mimics circular diffusers.



A patented airflow valve without motor control that is built around a cylinder with permeable fiber material. The valve can be adjusted manually to achieve an evenly distributed supply airflow from the connected ISQ-M devices.



Loosely hanging lamellas in the inlet to the diffuser part open or close at changes in airflow. This design ensures that a high air velocity and thus high air mixing capacity is maintained over the entire flow range. The lamellas can be blocked for an adjustable air distribution pattern.



The diffuser is equipped with a string for manual valve opening adjustment and a nipple for pressure measurement. A duct measurement is required to calculate the airflow from an individual diffuser. In the case of airflow asymmetry, the flow should be distributed evenly over the connected diffusers. Total airflow is measured by the regulating roomklimate control unit on the main duct.

The ISQ-M diffuser plate

- Distributes the supply air horizontally
- Equipped with an internal removable suspension device

The pattern in the middle of the plate has only an aesthetic function that imitates the pattern in the active device.

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

Room climate control with reactive diffusers

Airflow control

- The smart damper unit DCV-RCb controls the supply airflow, which is distributed evenly over a number of reactive diffusers.
- By manually changing the opening degree of the airflow valve, the pressure and thus the air flow from the individual diffuser can be adjusted. The diffuser is delivered with an identical valve opening and normally this does not need to be adjusted to achieve an even flow distribution.
- The diffuser has a nipple for manual pressure measurement.
- Fixed air distributors in the plenum box part provide an air pattern that mimics circular diffusers.
- Movable lamellas in the diffuser part open or close with changes in air flow. The construction means that a strong co-injection of room air can be maintained even at a low air flow. The technical solution allows the diffuser to work with strongly under-tempered supply air over the entire flow range without creating drafts.
- The lamellas can be blocked individually to achieve a suitable 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.

The introduction of Bluetooth®

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

Application

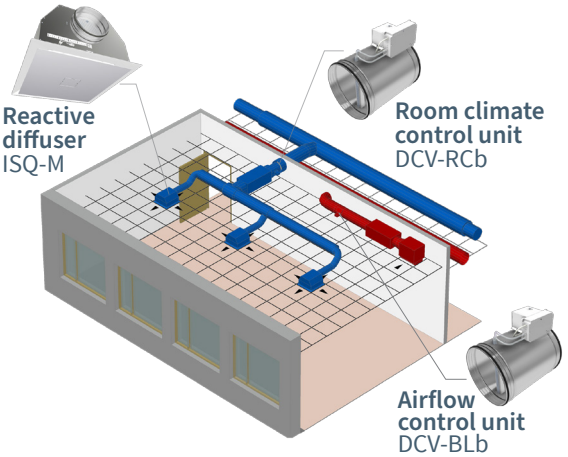
A classroom with ISQ-M or ISQ-FM

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

Leave space for easy installation

The suspended ceiling support structure needs to be in place with the required mounting space in height. Easy mounting requires maneuvering space for duct connection. Connection via a flexible aluminum hose or push nipple is recommended.

Mounting handles

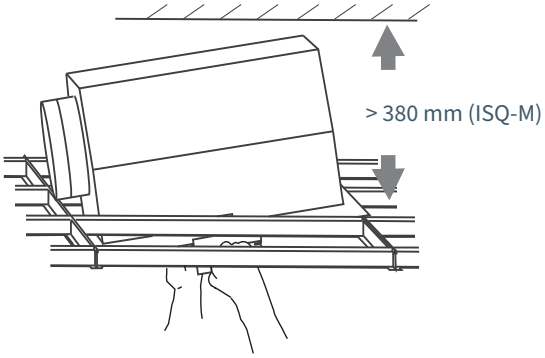
The diffuser is ready to be lifted up, connected to the duct and placed in the suspended ceiling in one assembly step, directly from the pallet, using the two pre-assembled mounting handles. The handles are removed and left for recycling when the diffuser is in place.

Cover profiles for concealed installation

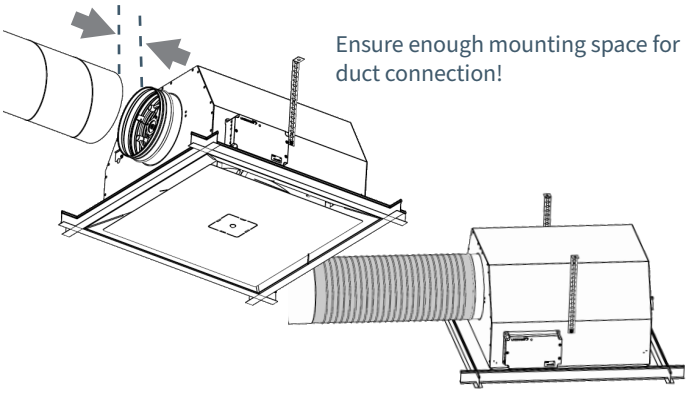
Gaps between the outer edge of the diffuser and the suspended ceiling profile occur on both sides where the handles have been removed. These gaps must be covered by the two supplied cover profiles.

No connection box

Unlike the active device, ISQ-M is mounted without a connection box. All cabling and other connections are made to the duct-mounted room climate control unit.

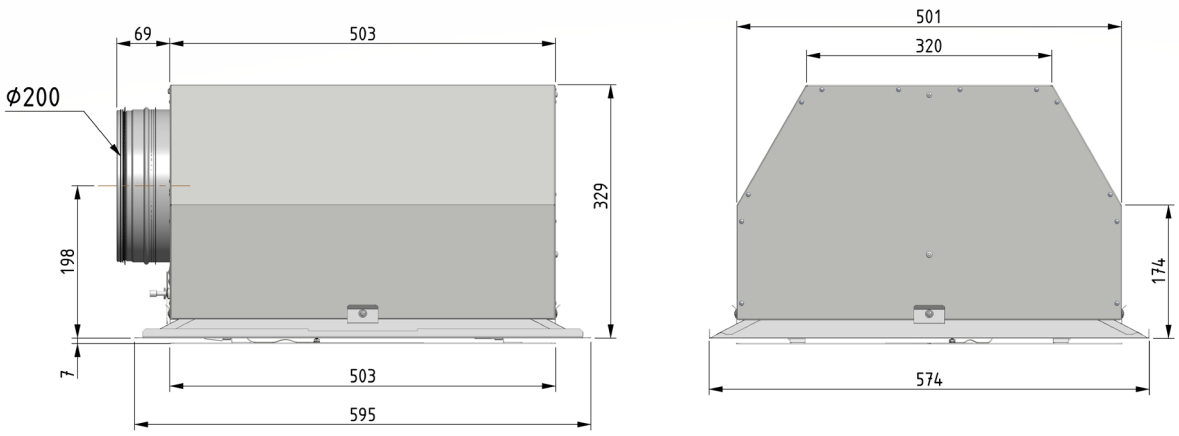


Minimum space above the suspended ceiling.



Duct connection via a flexible aluminum hose.

Dimensions (mm)



Technical specifications

Material
Diffuser part: Powder-coated sheet steel
Plenum box: Galvanized sheet steel, C3
Airflow valve (housing), distribution plates, measuring device, and lamellas: Industrial plastic (PS, PP)
For a detailed material description:
See Byggvarubedomningen.se
Net weight: 12 kg

Paint colour
RAL 9003. Other colours may be specially ordered; please state RAL number.

Suspended/Dropped ceiling
ISQ-M is adapted for suspended ceiling profile edge A and E.
Profile D is feasable: State profile at order. Mounting angles are fitted on the plenum box and a cover frame is attached to the diffuser frame.

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

Throw
ISQ-M 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-M 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^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 diffuser 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 beencarried out according to SS-EN ISO 7235:2009.

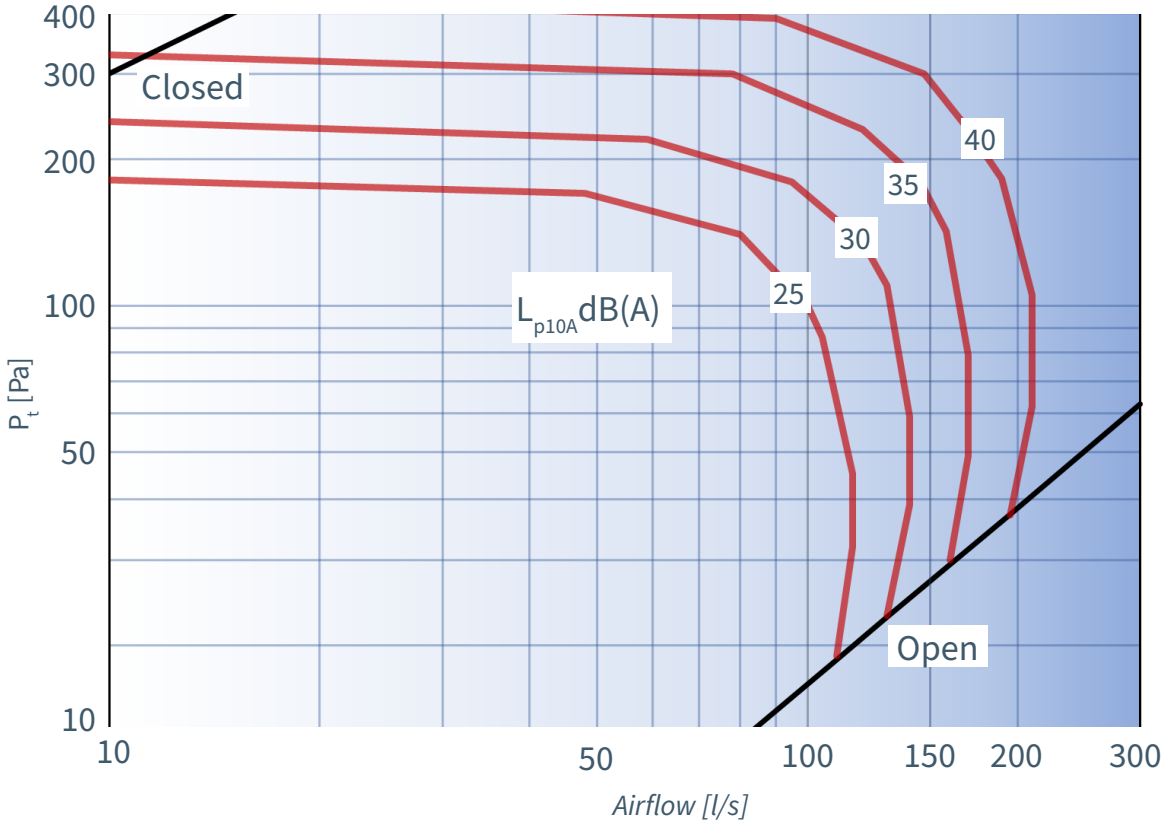
Correction for acoustic room attenuation [dB]

Room volyme	Type of rum	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

Diagram ISQ-M, Sound pressure L_{P10A} dB(A)



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

Additional product documentation for ISQ-M

Download available in ISQ-M 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.
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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