ISQ-V

Wall mounted active supply air diffuser

Quick facts

- ISQ-V is four products in one
  - A supply air diffuser, a damper control, a silencer, and a sensor unit
- A complete climate control unit for offices, care facilities and schools where the ceiling height can be limiting
- Installation efficient
  - Built-in room climate controller
  - Built-in motor-controlled air flow valve
  - Built-in and configured sensors
  - Easy and quick installation
- Exceptional sound and flow performance
- Allows for a both low and cold supply airflow without creating draft
- Adjustable air distribution pattern
- Network connection for communication and visualization
- Bluetooth® for easy local access via the LINDINSIDE app
- An environmental declaration for construction products, EPD, is registered since June 2022 at www.epdhub.com
- Designed for efficient transportation using a minimum of packaging material

Demand-controlled ventilation can reduce energy use by creating an optimal indoor climate when and where it is needed. With INSQAIR®, a series of smart supply air diffusers, the focus has been taken on simplicity, maximum flexibility and digitization.

Performance, a careful choice of materials, pre-mounted sensors, Bluetooth® and network connection makes ISQ-V a quiet and smart supply air solution also for the future.

LINDINVENT®

Why INSQAIR® and ISQ-V?

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"*.

Maximum digitization
The starting point is an architecture for wired network communication (CAN) where control units are equipped with Bluetooth®. Measurement data is accessed via API, Modbus, HTTP, and a smartphone app. The platform makes real estate data meaningful, enabling digitization and cloud solutions.

Sustainable design
All products in the INSQAIR series have been designed with sustainability and good environmental choices in mind. The design has also 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 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.

Increased flexibility
With supply air diffusers you can, in many cases, design an attractive indoor climate without having to install water-borne cooling. This increases flexibility when reconstruction is needed.

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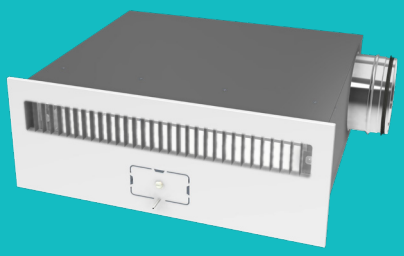


Quick data ISQ-V

- Recommended flow range: Between 4 and 60 l/s
- Sound performance:
  Below 30 dB(A) up to 70 l/s at 100 Pa
- Height: 190 mm (with front panel 222 mm)
- Width (front panel): 580 mm

System requirements

Presence and level of activity

Home office, sick leave, holidays, and 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 airflow 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.

Right pressure and right temperature

Duct pressures, airflows, and temperatures must be continuously optimized to achieve the lowest possible energy use.

Simplicity and collaboration

Smart climate control should be easy to design, install, commission, and maintain. Systems for lighting control and sunscreen control must be able to operate in collaboration with other installations for climate control.

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.

- Large flow range (Supply and extract air)
- Low noise level even with high airflow and high duct pressure
- Draft-free environment even with severely under-tempered supply air and a low airflow
- A compact design that simplifies installation work
- Easy integration and deployment of accessories
- Diffusers with an adjustable air distribution pattern
- Smart local control and optimization functions
- Parent functions for optimization and debugging
- Robust and reliable communication between devices
- Multiple and intuitive user interfaces
- Commissioning via app and Bluetooth®
- Good environmental choice in all aspects

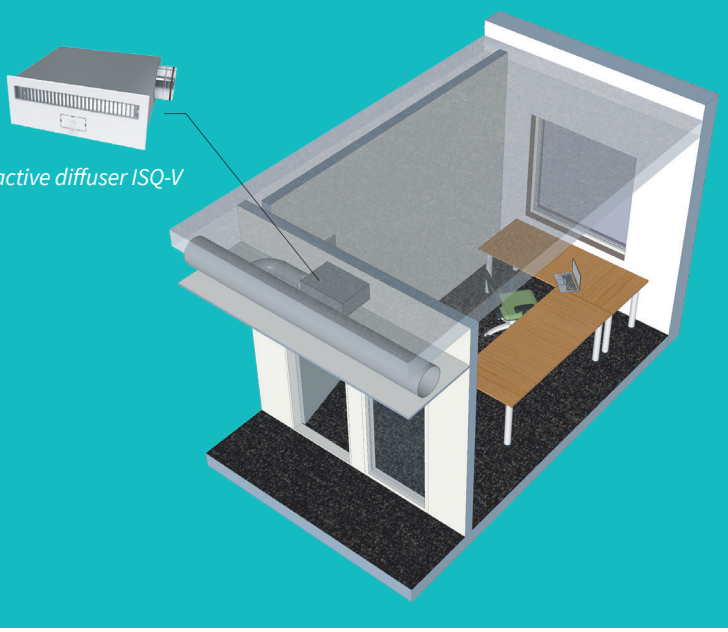
Solutions based on the INSQAIR product series might be the world's most versatile and thus useful systems for room climate control at workplaces. Consultants, installers, integrators, operating technicians, tenants, and property owners shall feel safe with their choice of system now and for future requirements.

An office with ISQ-V

Variable air flow based on presence detection and room temperature.

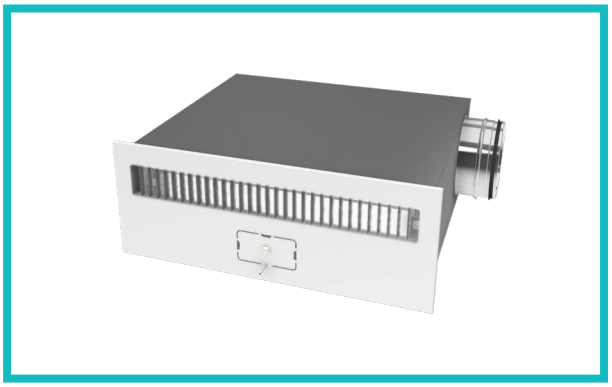
- 4 - 85 l/s
- Silent control
- No additional dampers
- No wall mounted sensors

Necessary sensors are included in ISQ-V.
A Corbon dioxide and humidity sensor can easily be retrofitted without additional cabling and costly integration.

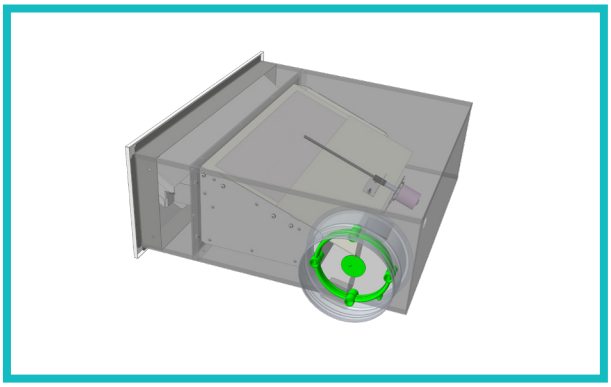


The active diffuser ISQ-V

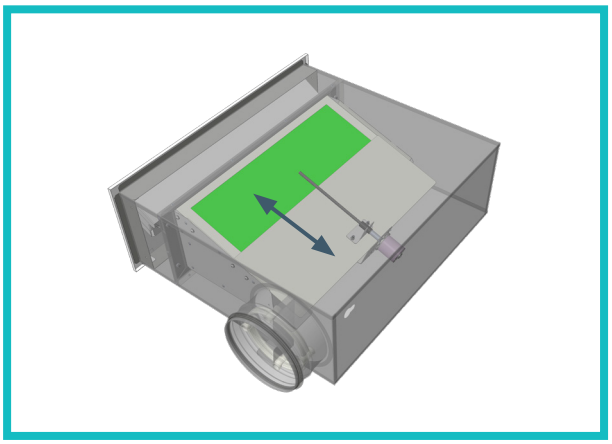
Construction parts



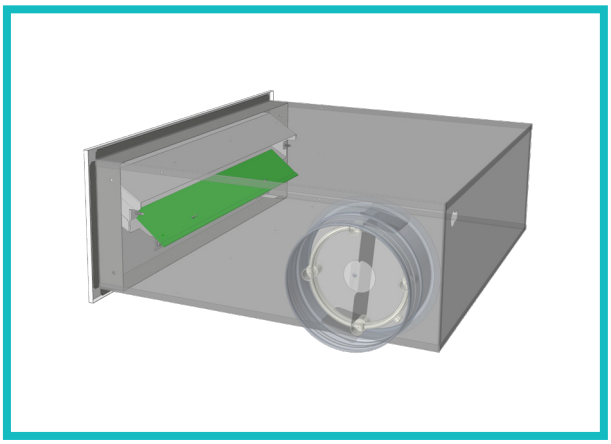
ISQ-V is a supply air device intended for horizontal placement in an upright, vertical wall.



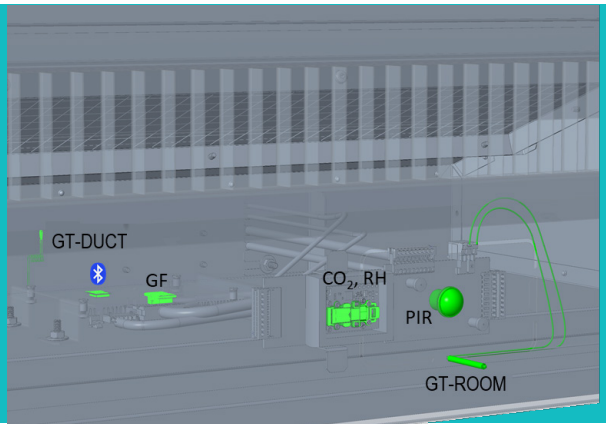
A patented flow measuring device that limits the need for a straight section before the measuring device. The diffuser can, for example, be mounted directly after a 90° bend.



A patented motor controlled airflow valve designed for quiet regulation also at high airflow. The valve consists of a disc which via motor control allows a varying degree of air flow through a permeable fiber material.



A loosely hanging lamella in the inlet to the diffuser section opens or closes with changes in air flow. The construction means that a high air velocity and thus high air mixing capacity, out of the device, can be maintained over the entire flow range.



Built-in controller with sensors

The room climate controller with compact sensors and Bluetooth® is located behind the removable front panel with adjustable lamellas. The panel has openings for sensors. The room temperature sensor (GT) is placed on the panel and points out into the room. The position of the sensor gives a correct value of the mixed room air.

Function

Airflow control
The air flow is regulated by the motor controlled air flow valve. A high air velocity from the diffuser is maintained also at low air flow by a self-acting gap opening. Air distributor plates in the diffuser provide an air pattern that mimics circular diffusers. The air distribution pattern is adjustable. Air flow is measured via the built-in flow sensor.

Room climate control
The built-in room climate controller continuously controls the room for optimal function. This applies to air volumes but also additional heating or cooling. In the event of absence, the device works towards an operating mode that allows greater temperature fluctuations and the use of stored energy in the building's frame structure. ISQ delivers the desired room climate by itself or in collaboration with several diffusers.

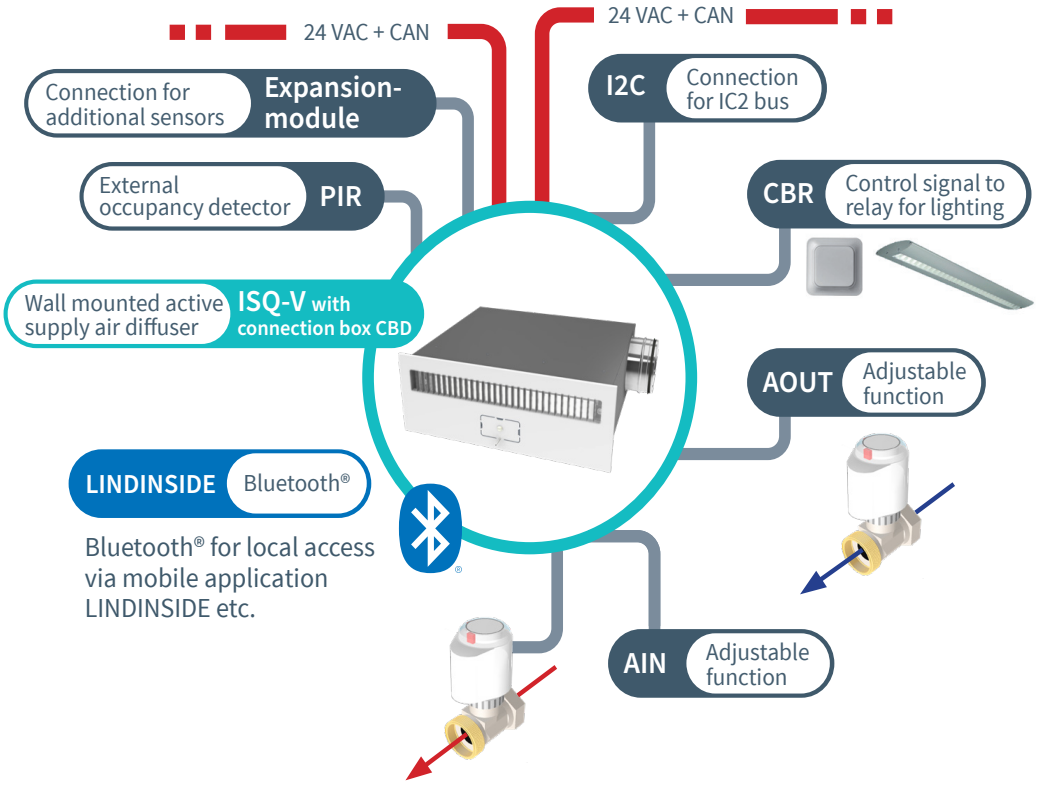
Temperature and air quality measurement
ISQ is equipped with both a room- and a duct temperature sensor. A carbon dioxide and humidity sensor is optional. The room temperature sensor is located on the panel and points out into the room. The placement provides a more accurate and faster value than that from a separate wall-mounted sensor.

Presence detection
Presence flow, economy and comfort mode as well as lighting control are functions supported by the integrated presence sensor with almost 200 detection zones. Exhaust and supply air fan units can be controlled by the detected degree of presence.

Bluetooth®
ISQ is equipped with Bluetooth® for communication via Lindinvent's mobile application LINDINSIDE. Via the app, operating values can be read and set points can be changed. Bluetooth® also enables connection to other external devices.

Network communication
Active diffusers are connected to other controllers to form a local area network (a CAN loop). All devices 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.

ISQ-V Connections



Accesories

Flow balancing
Airflow control unit DCV-BLb is used for extract air balancing.

Carbon dioxide & humidity sensors (CO_2 + RH)
ISQ offers a built-in carbon dioxide and humidity sensor for air quality control. Can be retrofitted.

Lighting control
Lighting can be controlled via the occupancy detector in ISQ and/or via push button by connecting relay box CBR. See SBDb for DALI lighting control.

Radiator control
Valve actuators for radiators can be connected for sequential regulation of heating and cooling.

Electric radiator control
Heating batteries and electric radiators can be controlled via control box CBT.

Air fan cooling
Additional cooling is control using I/O-box CBF-E or CBF-S.

External presence detector
For an alternative placement of the built-in occupancy detector see GO-C or PD-2400.

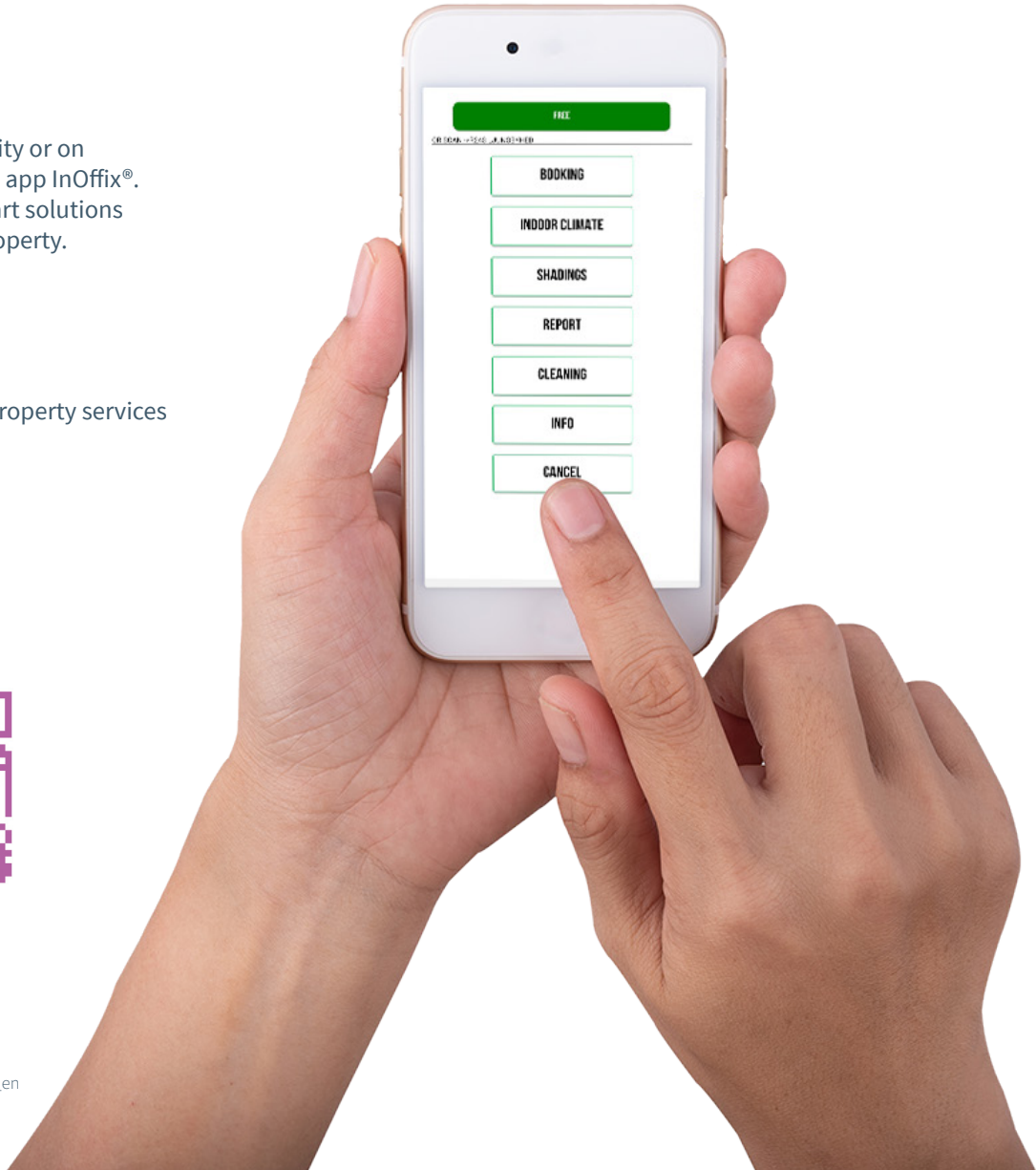
Setpoint switch panel
The wall-mounted panel DRP can be installed to adjust the room temperature setpoint or temporarily activate enforced ventilation. See also INOFFIX below.

Smart electrical outlets with power measurement
Via Bluetooth® and smartplug SPB, electricity use can be reduced through presence control of everything from workplace lighting, screens and adjustable desks. The product is under development.

INOFFIX®

Scan QR codes placed in the facility or on equipment with the smart phone app InOffix®. Lindinvent offer a number of smart solutions for a smart and more efficient property. Learn more at inoffix.com

Functions:
- Adjust temperature
- Adjust sunscreen
- Book rooms or order offered property services
- Put in a cleaning request
- Deviation rapport
- Surveys
- Check in/out
- Room info



Communication

The visualization tool LINDINSPECT®

LINDINSPECT® is a powerful web-based tool that enables a central and coordinated administration and visualization of control units. Everything from active devices to other control equipment for comfort and sustainable energy use is monitored and displayed on a plan view with its climate data. Deviating values are marked. Operating conditions for individual equipment can be graphically indicated.

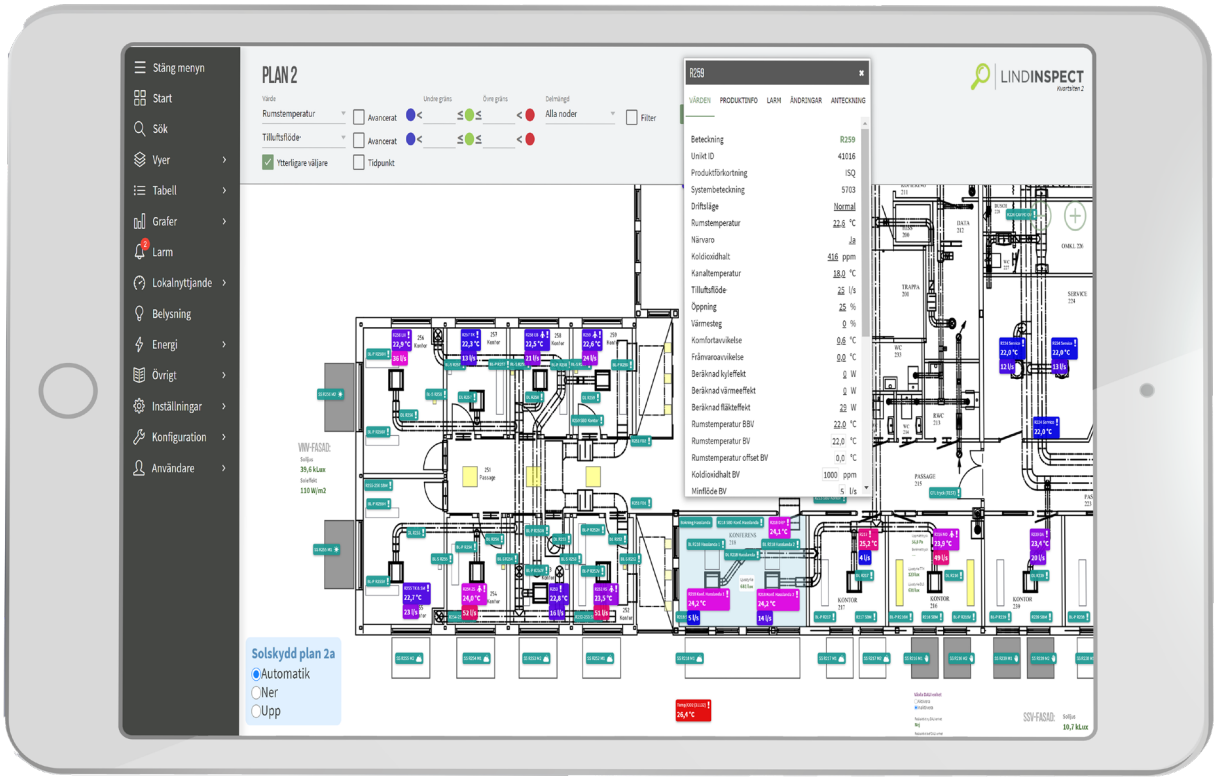
LINDINSPECT® requires a system build-up where Lindinvent's central unit is connected to all individual control units through Gateway NCE.

API

Lindinvent's REST-based API can be accessed for data that can be used by third-party applications. Lindinvent's app InOffix® uses this API.

Modbus TCP or Modbus RTU

Individual control units can also be accessed in a system setup without LINDINSPECT®. Connection to an external superior system is made via Gateway NCE and then always either via Modbus TCP or Modbus RTU.



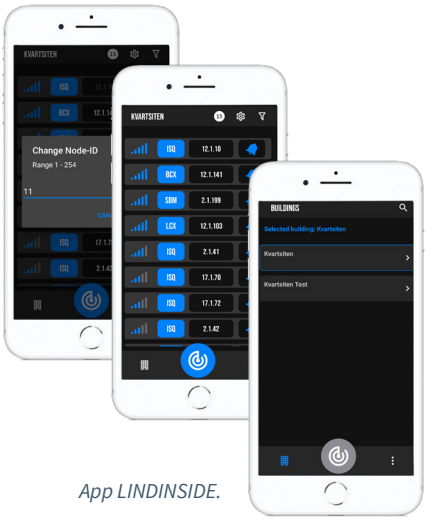
Plan view - LINDINSPECT®.

LINDINSIDE

The smart phone app LINDINSIDE allows connection via Bluetooth® directly to individual control units. Authorized personnel can identify other Bluetoth® units to easily make settings or read values using a smartphone. Data is stored in the cloud for easy access.

Bluetooth®

Additional communication possibilities are created via Bluetooth®.



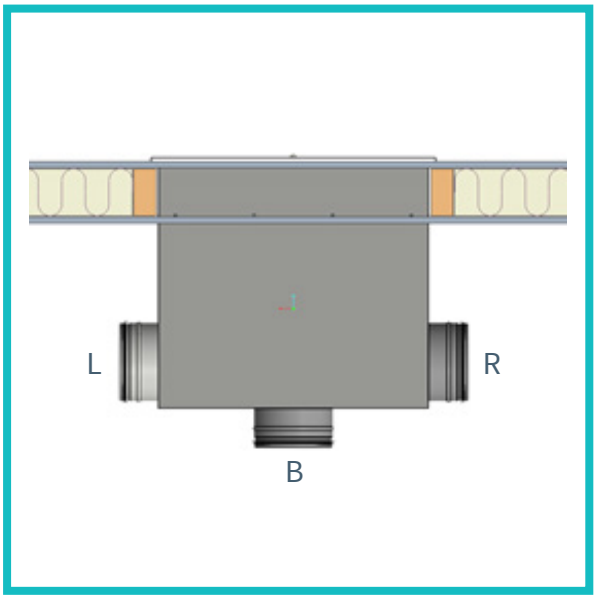
App LINDINSIDE.

Installation

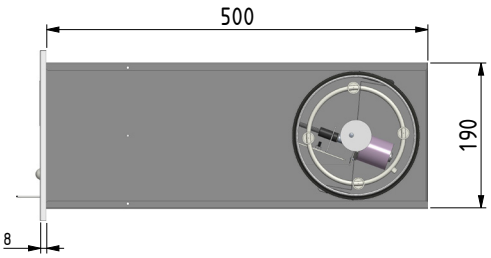
Front panel and plenum box
ISQ-V is delivered on a pallet where the front panel, the mounting frame, the plenum box and connection box CBD are packed separately.

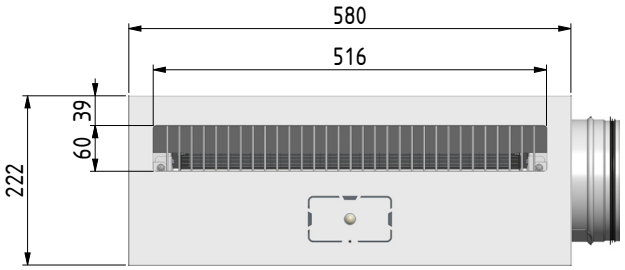
Mounting
The plenum box is mounted from outside the room by a hole in the wall (560x200 mm). The mounting frame and front panel are screwed from inside the room. Before mounting the front panel, a cable is connected to the sensor board positioned on the inside of the front panel. ISQ-V can be fitted with a duct connection on the right (R), left (L) or rear (B). The direction is to be stated at order.

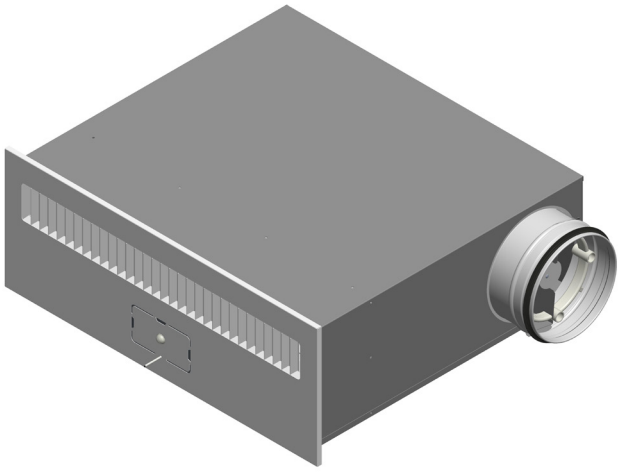
Connection box CBD
All wiring to ISQ-V is done via junction box CBD. Peripheral equipment is connected via the box but also the joint cable for power supply and communication.

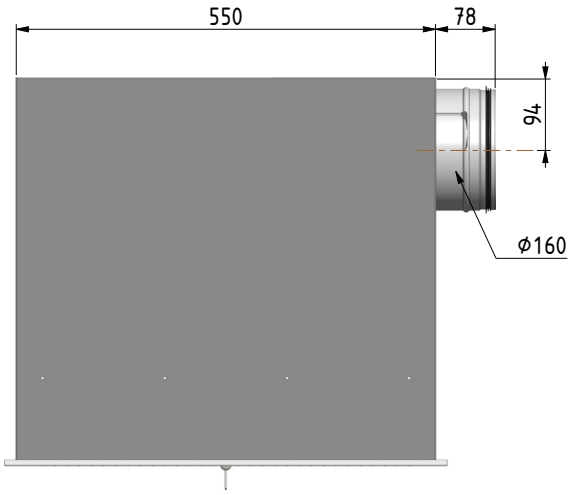


Dimensions (mm)









Technical specifications

Material
Diffuser part: Powder coated steel plate
Plenumbox: Galvanized steel plate, C3
Valve module: Galvanized steel, Aluminium, fiber
Flow meter and lamellas: Thermoplastic
Other: Electronics and electrical motor
EPD and Building material declaration available.
Net weight ISQ-V: 11 kg

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

Duct connection (L. R or B)
Duct: Ø 200 mm
State direction at order.

Temperature limits
Operation: 10°C till 30°C; <85% RF
Storage: -20°C till 50°C; <90% RF

Cable (16-conductor)
ISQ-V is delivered with a mounted 16-conductor cable in position for easy connection to connection box CBD.
Standard length (16-conductor): 1 m
A longer cable can be specially ordered (5 or 10 m)

Electrical system
Supply voltage: 24 VAC

Effect
Stand by mode 2 VA
Control mode: 4 VA (approx. 200–300 h/year)

Communication
Serial communication in the same cable as voltage supply (shielded FLAQQBR: 2x1+1x2x0.22)

Radio communication
Bluetooth® 2.4 GHz
Listen mode only for calls from the app or similar.
Beacon functionality etc requires transmission.

IP-class
Complies with IP 22

CE-marking
Complies with EMC and the low voltage directive.
A certificate of compliance is available at lindinvent.com

Presence detector
PIR: Passiv IR-detector with 200 zones
Detecting area: 107° x 107°

Room temperature measurement
Sensor with termistor of NTC type.
Accuracy: ± 0,5 K

Carbon dioxide measurement (option)
Automatic Background Calibrating sensor
Range: 400 - 10 000 ppm
Accuracy: ± (30 ppm + 3%)

Relative humidity measurements (Option)
Range: 0 - 100 % RH
Accuracy (at 25oC and 50% RH):
Relative humidity: ± 5% RH
Absolute humidity: ± 1g/kg
Condensing point: ± 1 K

Air flow control and measurement
ISQ-V is equipped with an air flow sensor
Airflow range: 4 - 85 l/s
Sound levels according to diagram.
Accuracy: ± 5% or minimum ± 2 l/s
Length of straighet section after 90 ° bend: No need
Length of straighet section after T-piece: 400 mm
Length of straighet section for dimensional change in front of ISQ-V: 200 mm
Performance: The flow is adjusted to a new setpoint within approximately 2 minutes.

Pressure measurement
Duct pressure is calculated based on the air flow and the degree of valve opening.
Accuracy: ± 10 Pa (minimum valve opening at 20% and a minimum rate of air flow at 10 l/s)
Pressure range: 10 - 200 Pa

Connection box CBD

- Supplied with the diffuser
- Magnets at the bottom for flexible and easy placement
- 2 terminals for connection of ISQ to 24 VAC + CAN
- 1 terminal 0–10 VDC analog input
- 1 terminal block for lighting control relay box CBR
- 1 terminal 0–10 VDC analog output
- 1 terminal 24 VAC, TRIAC - for valve actuator control
- Maximum load TRIAC: 10 thermal actuators of 1 W
- Terminal for I2C bus

Pressure, flow & sound levels

The sound pressure levels LPA in the diagram corresponds to A-weighted sound level in the reverberation zone with 10 m² equivalent sound absorption area. This corresponds to 4 dB acoustic attenuation in a normally damped room with 25 m³ room volume. See the table with correction factors depending on type of room.

- Sound power level/octave band (Lw) = L_{P10A} + K_0 [dB]
- L_{P10A} = Sound pressure level [dB (A)] from diagram
- K_0 = Correction factor/octave band [dB] from table
- p_t = Total pressure drop
- $L_{0,2}$ = Throw length for isovel 0.2 m/s [m] from diagram
- 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 room attenuation [dB]

Room volume	Room type	Correction
25 m³	hard	+2 dB
25 m³	normal	0 dB
25 m³	subdued	–2 dB
150 m³	hard	–3 dB
150 m³	normal	–5 dB
150 m³	subdued	–7 dB

Correction factor, K_0 [dB]

ISQ-V	Octave band [Hz]							
	63	125	250	500	1K	2K	4K	8K
K_0	6	7	5	-1	-3	-7	-7	-3

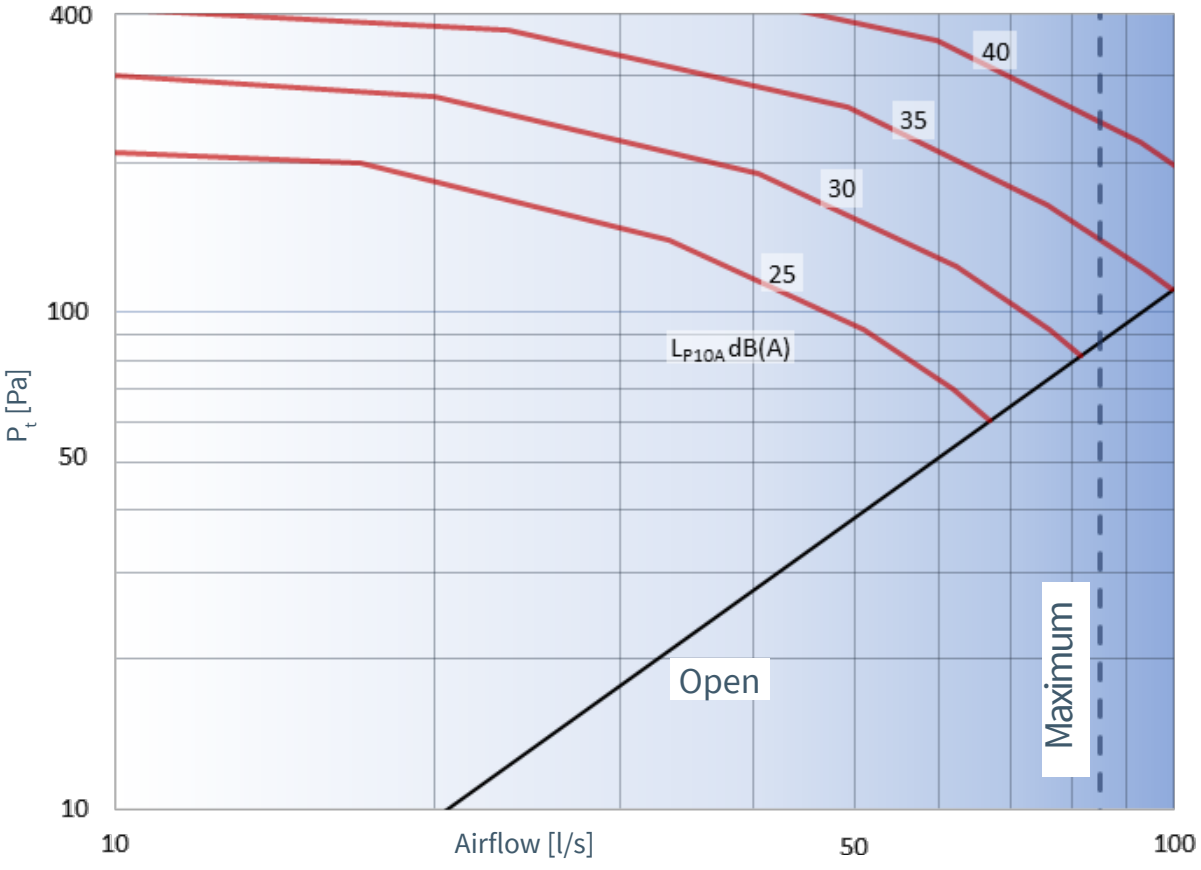
Self attenuation[dB]

ISQ-V	Octave band [Hz]							
Opening	63	125	250	500	1K	2K	4K	8K
25%	16	9	12	14	13	15	20	23
100%	15	9	11	11	13	14	16	19

Tolerance [dB]

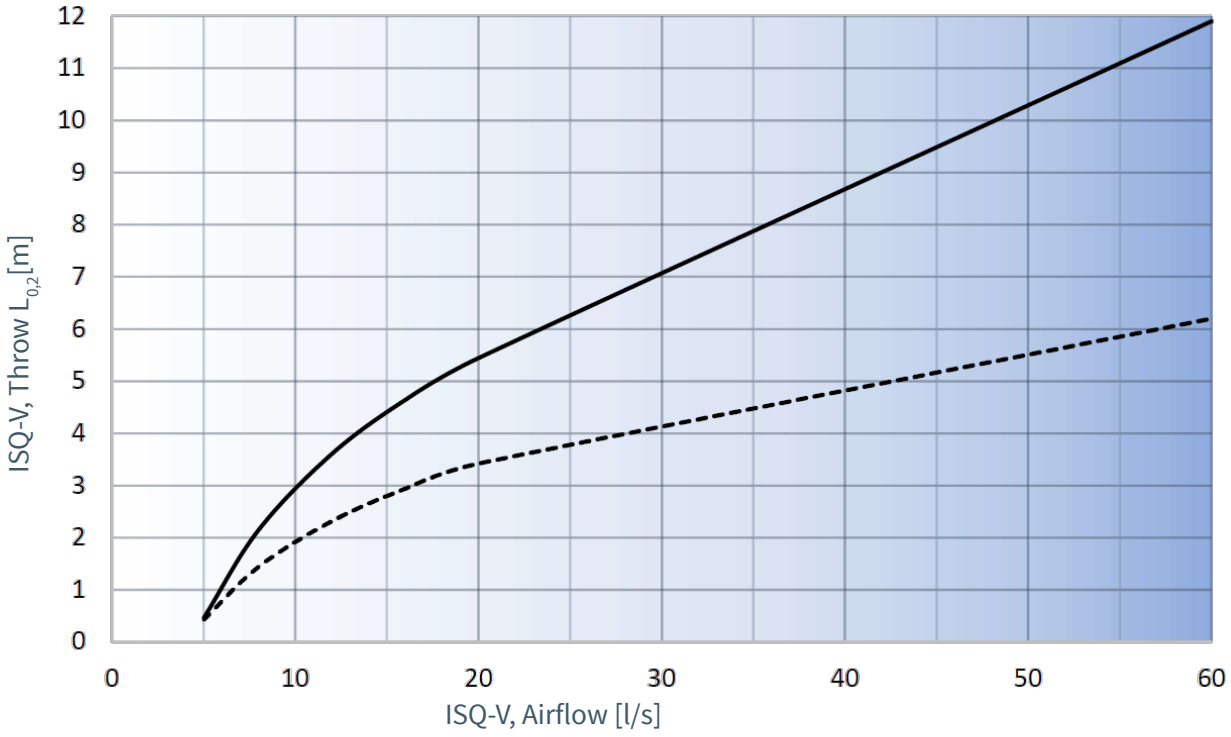
ISQ-V ± [dB]	Octave band [Hz]							
	63	125	250	500	1K	2K	4K	8K
160	3	3	2	2	2	2	2	2

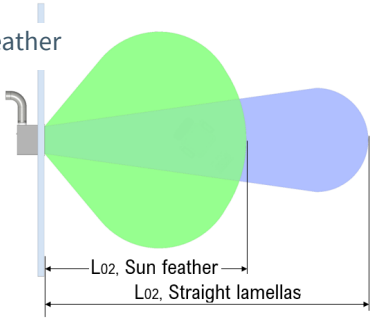
Diagram ISQ-V, Sound pressure LPA dB(A)



Throw length diagram

Diagram 1: ISQ-V, Throw L0,2[m]





Additional product documentation for ISQ-V

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

Documents	Comments
Installation instruction	Note: Only intended for horizontal installation. Instructions with assembly steps.
Start-up instruction	A guide on how to use the app LINDINSIDE to start-up commisioning of ISQ(-F/-160/-200/-V).
Maintenance instruction	Regarded as maintenance-free.
External connection diagram	ISQ(-F/-160/-200/-V) and connection box CBD.
Building material declaration	Environmental Product Declaration registered. Material declaration assessed by Byggvarubedömningen.
End-user info	A brief introduction to Lindinvent's system for smart ventilation.
Modbuslista	The latest modbus list for ISQ (-F/-160/-200/-V).
AMA-text	Descriptive text according to AMA standard.
Design instructions	The INSQAIR® product series on flows, air patterns, CFD and type room solutions (Not updated with ISQ-V)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