ISQ-V2

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
- Climate control for reduced energy usage in offices, atriums, healthcare facilities and schools where ceiling height can be limiting
  - Built-in room climate controller
  - Built-in motor-controlled airflow valve
  - Built-in and configured sensors
- Exceptional sound performance
- Draft-free and adjustable air distribution
- Network connection for visualisation and administration via LINDINSPECT®
- Bluetooth® for access via LINDINSIDE
- Environmentally certified with registered EPD
- Design for efficient transportation using a minimum of packaging material

Demand-controlled ventilation can reduce energy utilization 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.

ISQ-V2 is a complete diffuser for premises with limited ceiling height. It interacts with other control units, has unique solutions for throw length and airflow control, and has all the necessary sensors for energy-efficient room climate control.

LINDINVENT®

Why INSQAIR® and ISQ-V2?

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"*.

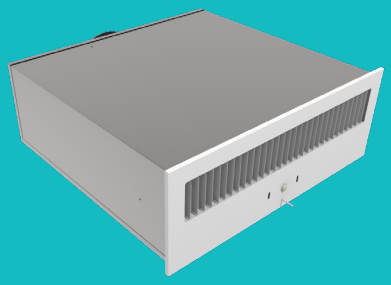
Maximum Digitization
The starting point is an architecture for wired network communication (CAN) where control units are equipped with Bluetooth®. Measurement data is accessed via API, Modbus, HTTP, and a smartphone app. The platform makes real estate data meaningful, enabling digitization and cloud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

Content



Quick Data ISQ-V2

- Airflow range:
  4 to 70 l/s
- Sound performance:
  Below 30 dB(A) up to 70 l/s at 100 Pa
- Height: 212 mm (front panel)
- Width: 574 mm (front panel)

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.

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 subcooled 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

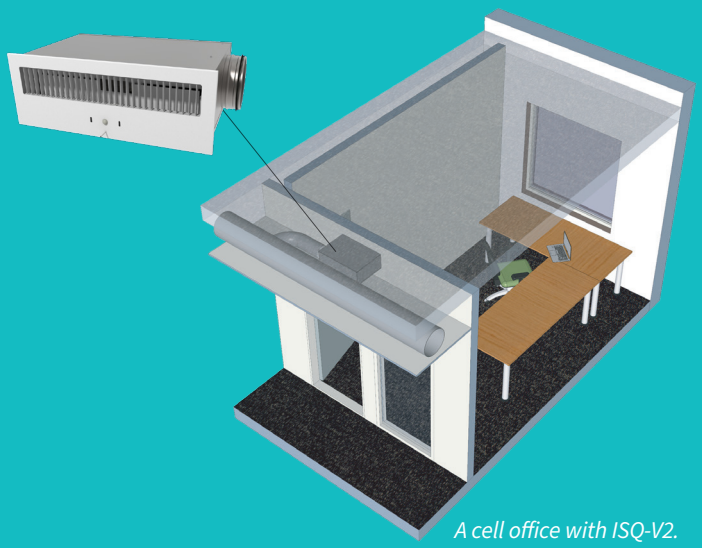
With the INSQAIR product series, we have developed unique, quiet, versatile and smart supply air devices that meet the requirements for room climate control in various environments.

An Office with ISQ-V2

Variable air flow based on presence detection, room temperature and/or air quality.

- 4 - 70 l/s
- Outstanding silent control
- No additional dampers
- No wall mounted sensors

ISQ-V2 includes the necessary sensors. Carbon dioxide and humidity sensors can be easily retrofitted without cables, wiring, or expensive integration.



A cell office with ISQ-V2.

Functionality

Airflow control
The air flow is continuously measured and regulated by the motor-controlled flow valve. The diffuser section has a construction that provides a high outlet velocity even at low air flows. The spread pattern can be adjusted via lamellas in the front panel.

Room climate control
The built-in room climate controller measures and regulates the room temperature and air flow according to set points. The built-in presence sensor can set the room to an economy mode when the occupant is absent. A duct temperature sensor in the diffuser controls the system.

The diffuser can optionally be fitted with a built-in sensor unit for regulating carbon dioxide and humidity levels. The diffuser can control additional heating and cooling.

Lighting control
Lighting rules can be created to control DALI luminaires through the built-in presence sensor and LUX sensor.

LINDINSIDE och Bluetooth®
The device is equipped with Bluetooth® for communication via Lindinvent's mobile application, LINDINSIDE. The app allows users to read operating values and change setpoints. Bluetooth® also enables connection to other devices.

Network connection
Active devices are connected to a local wired network (a CAN loop). Control units can be distributed over multiple CAN loops. A CAN loop is connected via the Gateway NCE to Lindinvent's central unit or other systems.

Examples of system functionality
Like Lindinvent's other room climate controllers, active diffusers support multiple zone affiliations, such as Flow zone, Actual value zone and Light zone. Zone affiliation allows multiple diffusers to interact to obtain higher-level functionality.

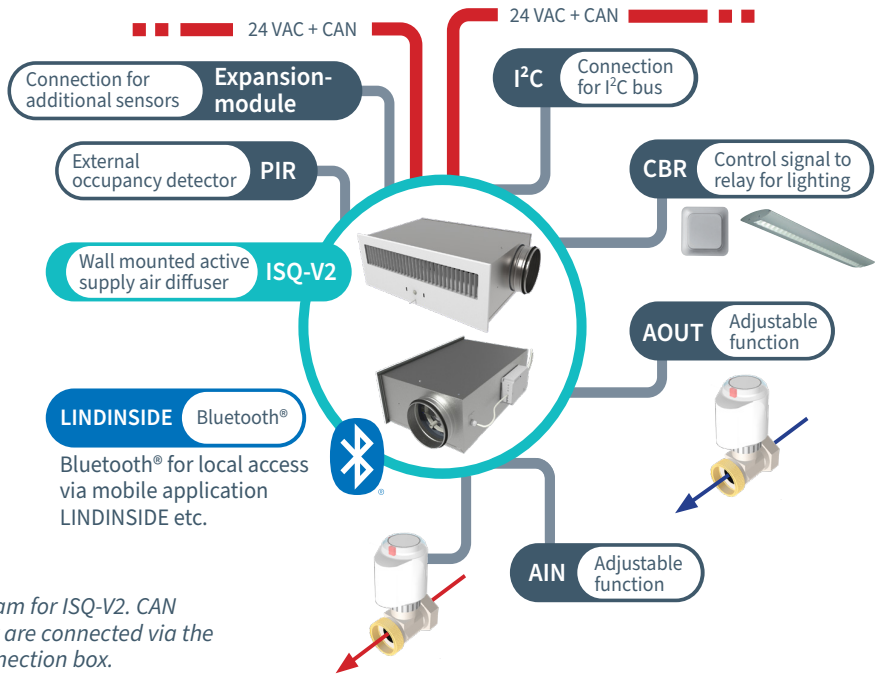
Operating modes with current or historical values are graphically visualised in the web-based interface LINDINSPECT.

Diffusers can be connected to different sun zones via LINDINSHADE, Lindinvent's sun shading system. Sun protection is adapted to achieve the best possible energy efficiency.

A diffuser is included in Lindinvent's DALI solution for lighting control via the lighting module INCONTROL.

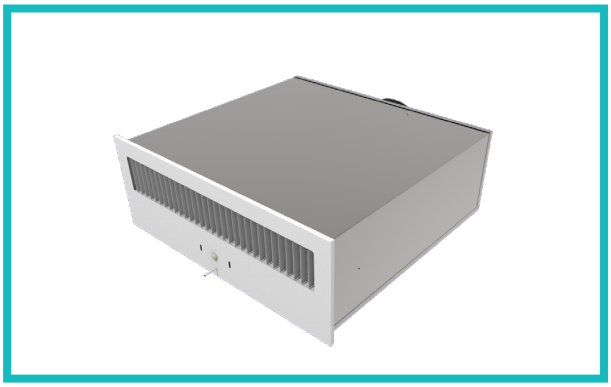
Diffusers can be assigned a system affiliation to optimise the air handling unit's pressure and temperature setpoint.

Connection Diagram

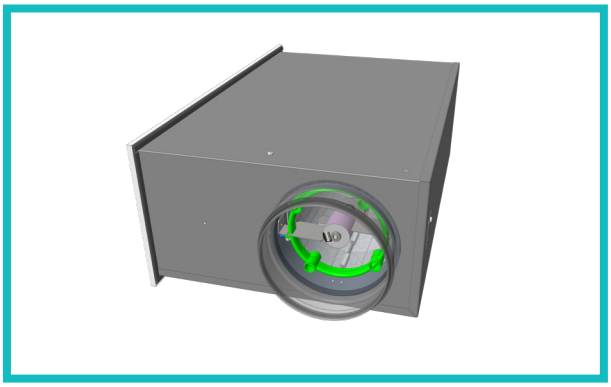


Connection diagram for ISQ-V2. CAN and power supply are connected via the supplied CBD connection box.

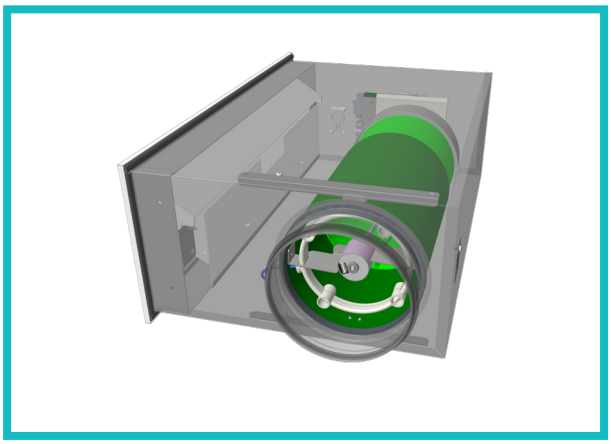
Construction Parts



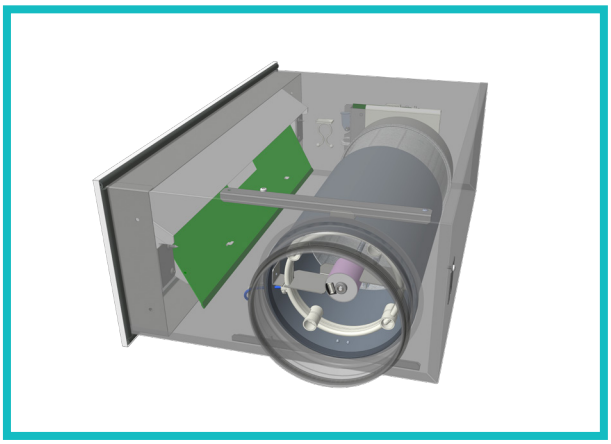
ISQ-V2 is a supply air device intended for horizontal placement in an upright, vertical wall.



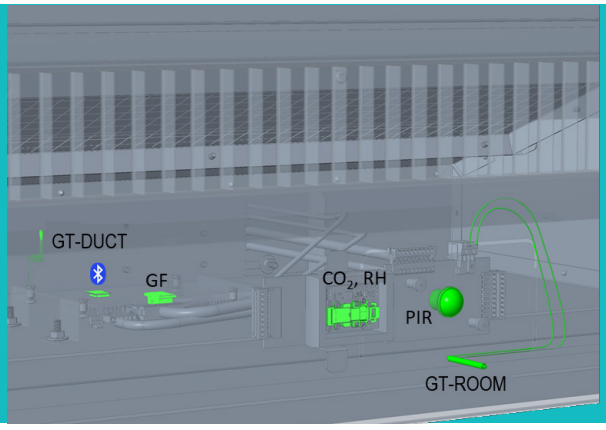
The flow meter is designed for flow measurement within a wide flow range. Its design reduces the need for a straight section in front of the device, so it can, for example, be mounted directly after a 90° bend.



The patented motorized airflow valve is built around a permeable fiber material for quiet regulation even at high duct pressures and high airflows.



A self-acting opening in the inlet to the diffuser section opens or closes when the air flow 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.

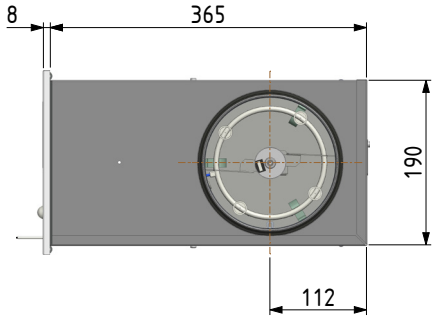


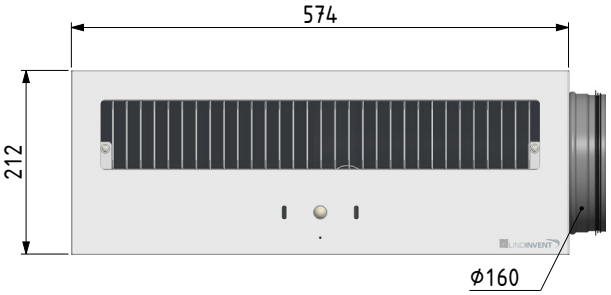
Built-in sensors

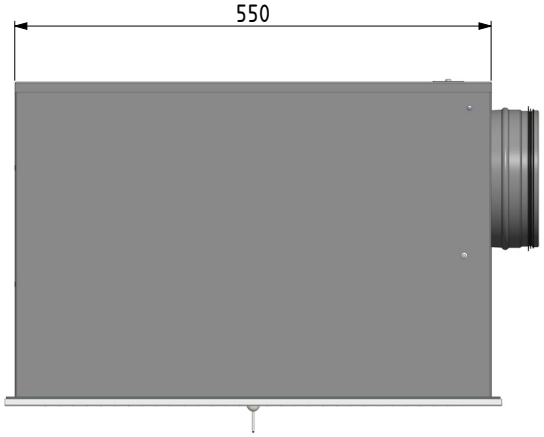
Sensors are centrally located and accessible behind the removable front cover:

- GF for flow measurement and duct pressure calculation
- PIR for presence detection
- LUX för for light level sensor
- CO_2 RH for carbon dioxide and humidity measurement
- GT DUCT for duct temperature measurement
- GT ROOM for room temperature measurement

Dimensions (mm), duct connection L or R*:

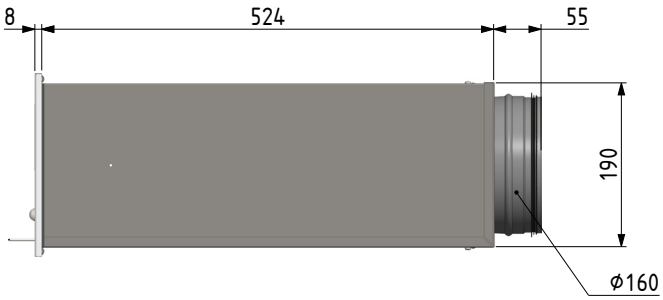


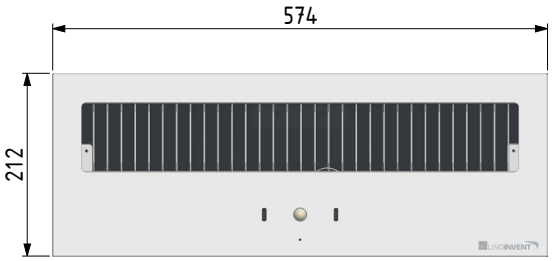


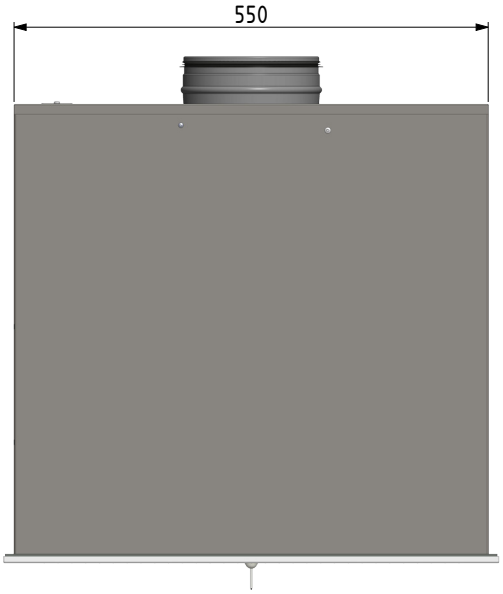


*Turned during assembly to obtain a left or right duct connection.

Dimensions (mm), duct connection B:







Technical Specifications

Material
Diffuser part: Powder coated steel plate
Plenumbox: Galvanized steel plate, C3
Valve module: Galvanized steel, Aluminium, fiber
Flow meter and airflow opening disc: Thermoplastic
Other: Electronics and electrical motor
EPD and Building material declaration available.
Net weight ISQ-V-160: 9 kg

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

Duct Connection
Duct: Ø 200 mm
State direction L, R or B at order.

Temperature Limits and IP-Class
Operation: 10°C till 30°C; <85% RF
Storage: -20°C till 50°C; <90% RF
Complies with IP 22

Cable (16-conductor)
ISQ is delivered with an attached cable to connection box CBD. The standard length is 1 m. Maximum length at 5 m.

Electrical System
Supply voltage: 24 VAC

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

Communication
CAN communication via signal cable with conductors also for voltage supply (shielded FLAQQBR: 2x1+1x2x0.22)

Radio Communication
Bluetooth® 2.4 GHz
Non-continuous function. Listens to calls from an app or similar. Beacon functionality can be activated.

Presence Detection
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

Supply Air Temperature Measurement
Sensor with termistor of NTC type.
Accuracy: ± 0,5 K

Carbon Dioxide Measurement (Option, Expansion Module)
Card slot at the control unit for easy retrofitting.
Automatic Background Calibrating sensor
Measuring range: 400 - 10 000 ppm
Accuracy: ± (30 ppm + 3%)

Relative Humidity Measurements (Option, Expansion Module)
Card slot at the control unit for easy retrofitting.
Measuring 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 - 70 l/s
Minimum flow: Applies to duct pressure up to 100 Pa
Sound levels according to diagram.
Accuracy: ± 5% or minimum ± 2 l/s
Minimum straight section in front of diffuser:
- after 90° bend: 0 mm / no straight section required
- after T-piece: 400 mm
- at single-step size change: at least 200 mm
- at two or more steps of size change: at least 400 mm

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 minimum airflow at 10 l/s); Pressure range: 10 - 200 Pa

Connection box CBD

- Magnets on casing for easy and flexible mounting
- Terminal for the 16-pin ISQ cable
- Terminals for 24 VAC + CAN (CAN loop connection)
- 1 x AIN1 (general, 0 to 10 VDC)
- 1 x AOUT1 (general, 0 to 10 VDC)
- 1 x DIN1 with PULL-UP function [+5] ON/OFF
- Terminal for lighting control with relay box CBR
- Terminal for 24 VAC & TRIAC (On/Off control of radiator valve actuators) Max load TRIAC: 6 valve actuators at 1 W
- AUX socket for generic power supply (+5V)
- Terminal for I^2C bus

Pressure, Flow & Sound Levels

The sound pressure levels L_{PA} 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 $L_w = L_{P10A} + K_0$ [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

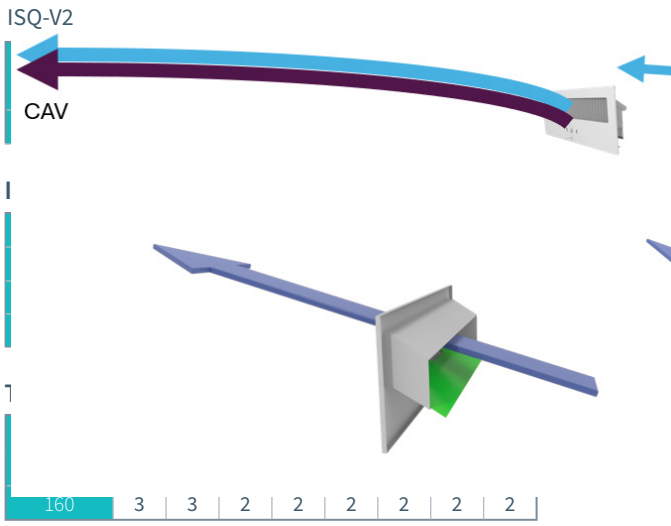
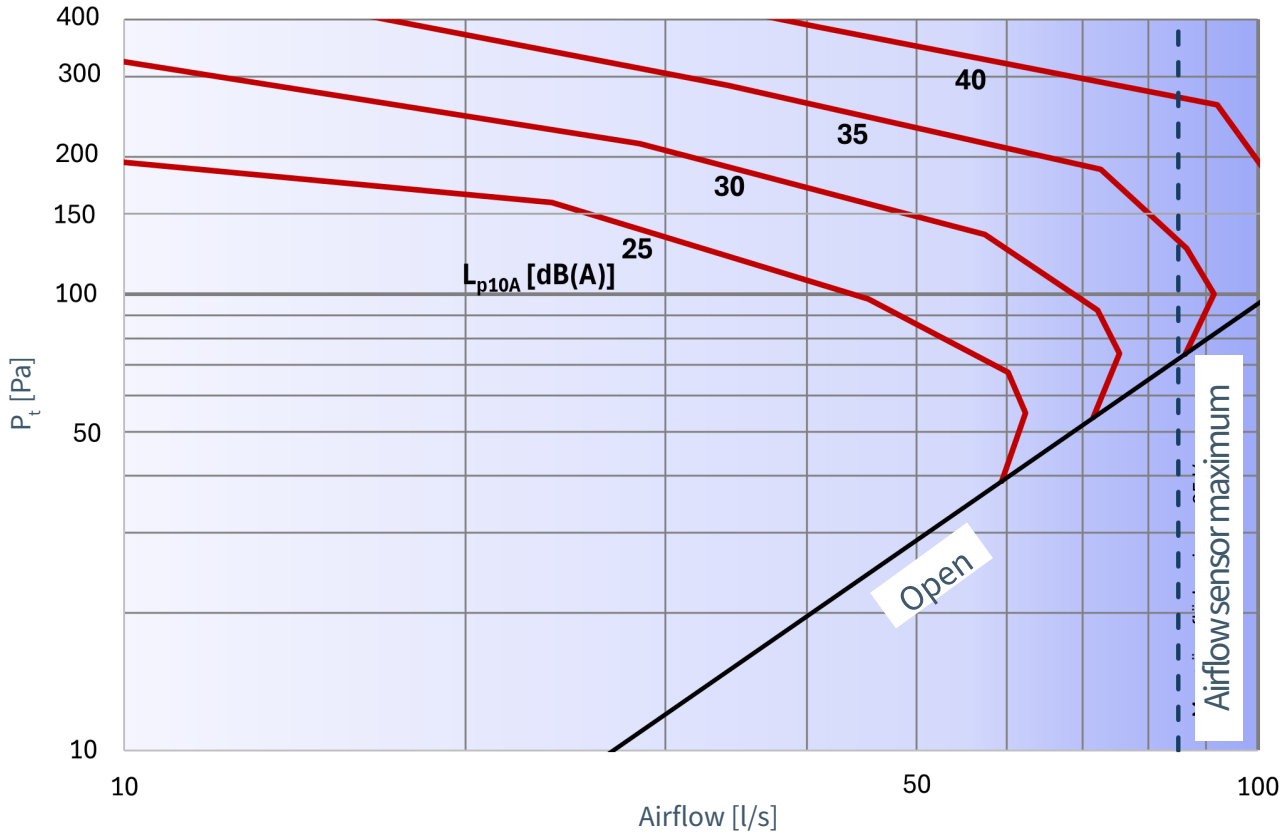
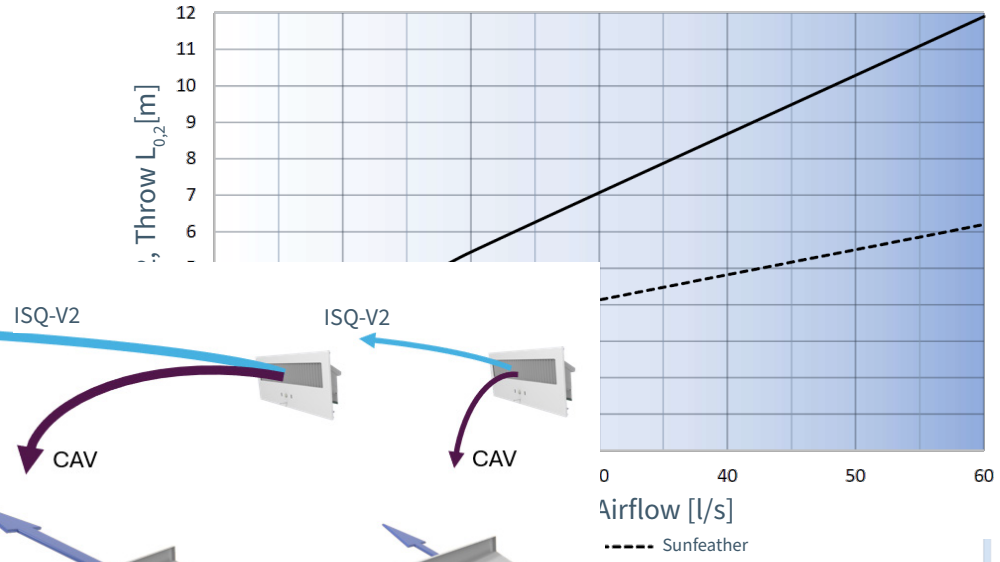


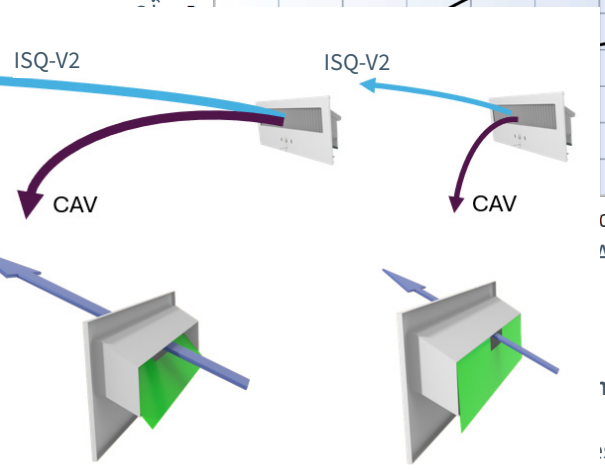
Diagram ISQ-V2, Sound pressure LPA dB(A)



Throw Length

Diagram 1: ISQ-V2, Throw L0,2[m], applies to distance ceiling - top edge of front panel ≤ 300 mm.



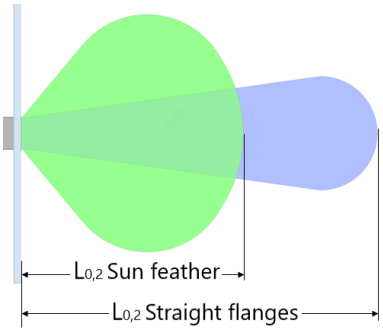


the Front Panel

be adjusted by manually
s in tne panel are angled.

non-angled, straight flanges, see ”L0.2 Straight flanges”.

- Flanges, adjusted evenly, from the center, in ±45° degrees, give the dispersion image L0.2 ”Sun feather”.



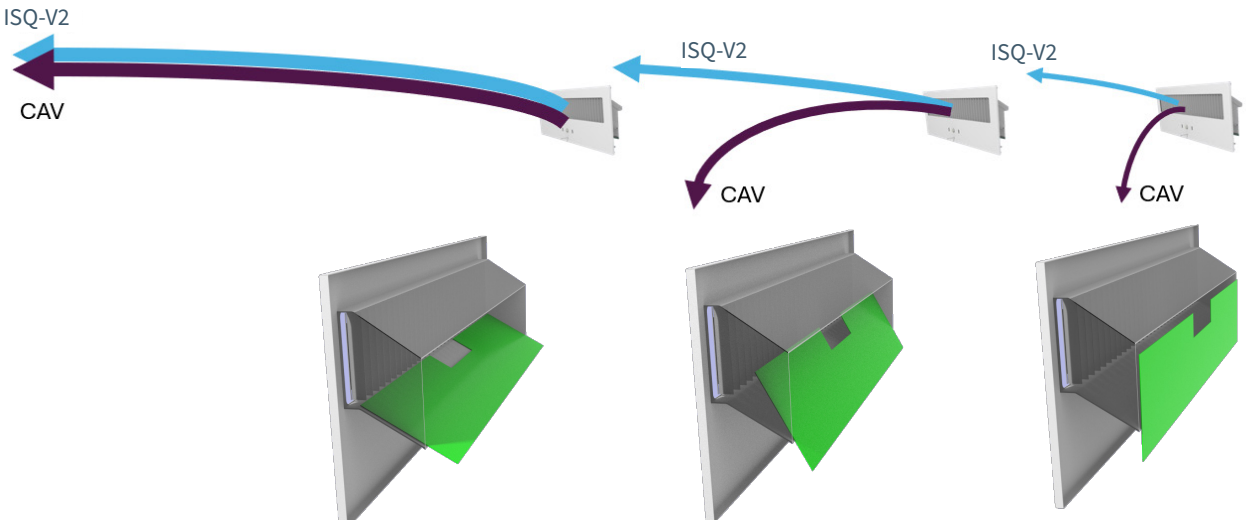


Illustration showing how the moving disc, at the outlet of the ISQ-V2, by gradually closing at lower airflow, results in a high air velocity out from the diffuser even at lower airflow. A CAV diffuser loses the Coanda effect at reduced airflows.

Accesories

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

Carbon Dioxide & Humidity Sensor
The expansion card GQH-I or one of Lindinvent's other carbon dioxide sensors is easily mounted afterward.

Other sensors
It is possible to equip the device with sensors for TVOC and formaldehyde via an expansion card.

Lighting Control
Relay box CBR enables double relay control via a push button, presence detection, and a selected lighting function. See SBDb for DALI control.

Valve Actuator Control
Valve actuator A40405(NC) or A41405(NO) for control of additional heat from radiators.

Surface Temperature Control
Sensor unit GT-S for valve actuator control with radiator temperature measurement.

Electric Radiator Control
Control box CBT for additional heating via heating batteries or electric radiators.

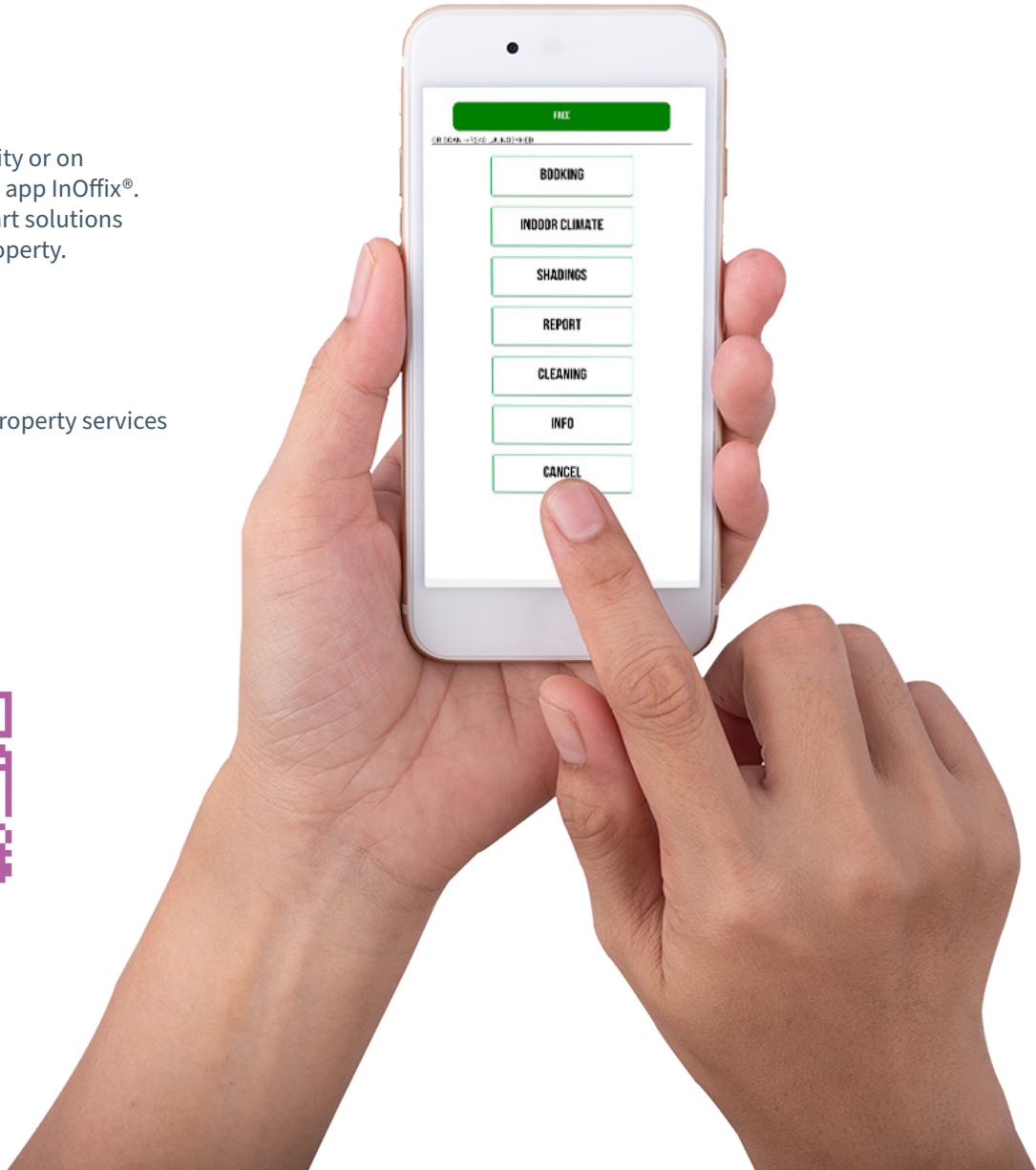
Air Fan Cooling
Additional cooling is regulated via control box CBF-E or CBF-S.

External Presence Detector
Presence detector GO-C or PD-2400 provides options regarding placement for the desired coverage.

Setpoint Adjuster
CAN-connected user panel for wall mounting DRP. The panel can be configured to adjust the setpoint for room temperature or temporarily activate forced ventilation in the room. See also INOFFIX ® below.

INOFFIX®
Scan QR codes placed in the facility or on equipment with the smart phone app InOffix®. Lindinvent offers 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



Installation

Front panel, mounting frame and plenum box

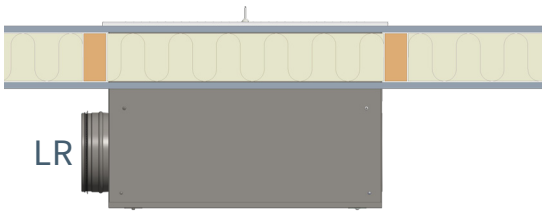
ISQ-V2 is delivered with front panel, mounting frame, plenum box and CBD connection box packed together on a pallet.

Mounting

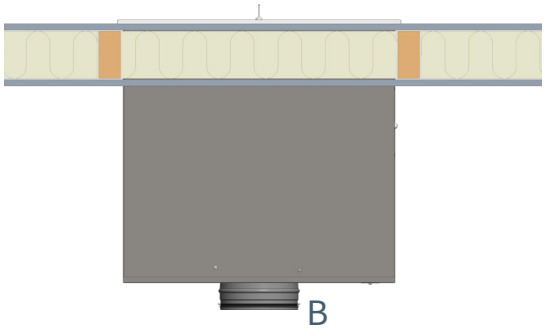
The plenum box is mounted from outside the room by a hole in the wall (560x200 mm). The mounting frame and front panel are screwed from inside the room. Before mounting the front panel, a cable is connected to the sensor board positioned on the inside of the front panel. ISQ-V2 has connections on the side (LR) or the back (B) when viewed in the air direction. The unit is turned during installation to obtain the desired side connection.

Connection Box CBD

All wiring to ISQ-V2 is done via junction box CBD. Peripheral equipment is connected via the box but also the joint cable for power supply and communication.



ISQ-V2 with side connection LR. The unit can be turned for the desired duct connection.



ISQ-V2 with duct connection B (rear).

ISQ-V2 with connection box CBD.

To specify at order

Active wall-mounted supply air diffuser ISQ-V, Lindinvent AB, ISQ-V2-160-[Cabling]-[Connection]-[Color]
Cabling: The cable to connection box CBD is 1 or 5 meters, with 1 meter as standard.
Connection: Orientation of the duct connection seen from the back of the diffuser (B for rear mounting, L for the left side or R for right side)
Color: RAL code. If no color code is specified, RAL9003 is assumed as standard.
Example: ISQ-V2-160-1m-R (ISQ-V-160 with a 1-meter cable and with the duct connection to the right. Front panel in RAL9003)

Additional product documentation

Download available in ISQ-V2 product page at lindinvent.com

Documents	Comments
Installation instruction	Note: Only intended for horizontal installation. Instructions with steps for assembly
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 in Sweden.
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	See separate instructions for information and comments on airflows, dispersion images, CFD and type rooms.

LINDINVENT®
INDOOR SPACES SMARTER