

# 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 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.

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.

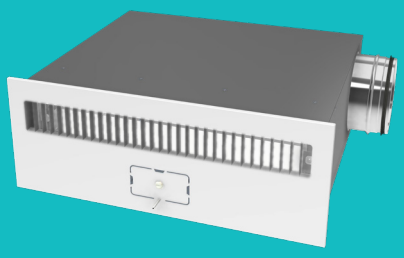
### Sustainable Design
All products in the INSQAIR series have been designed with sustainability and good environmental choices in mind. The design has also been optimized to be able to ship the products efficiently and with a minimum of packaging.

### 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.

## Content





## 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 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

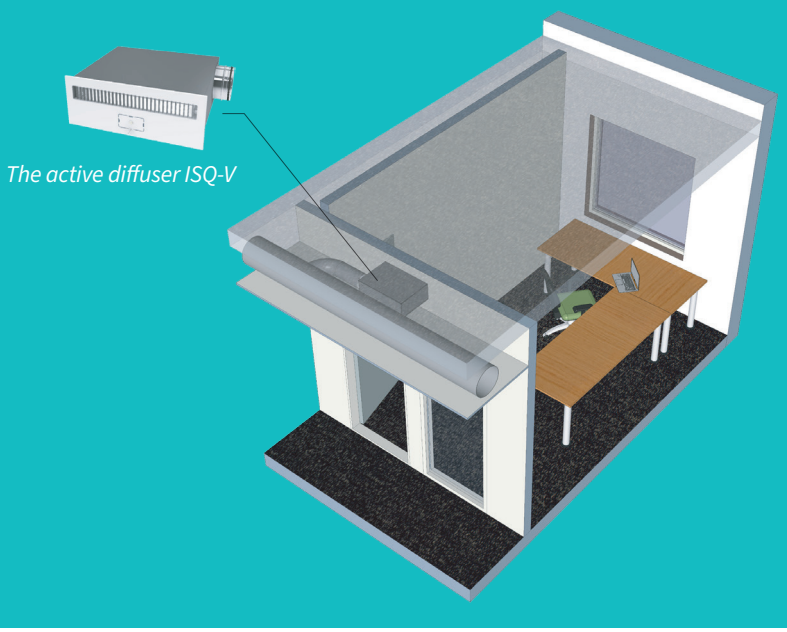
Solutions based on the INSQAIR product series might be the world's most versatile and thus useful systems for room climate control at workplaces. Consultants, installers, integrators, operating technicians, tenants, and property owners shall feel safe with their choice of system now and for future requirements.

# An Office with ISQ-V

Variable air flow based on presence detection and room temperature.

- 4 - 60 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*

# Functions

## 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 controls the room for optimal function in terms of air volume and supplemental heating or cooling. In the case of registered absence, the device can operate in an economy mode which allows greater temperature variation and utilization of stored energy in the building frame. The diffuser delivers the desired room climate on its own or in collaboration with several diffusers.

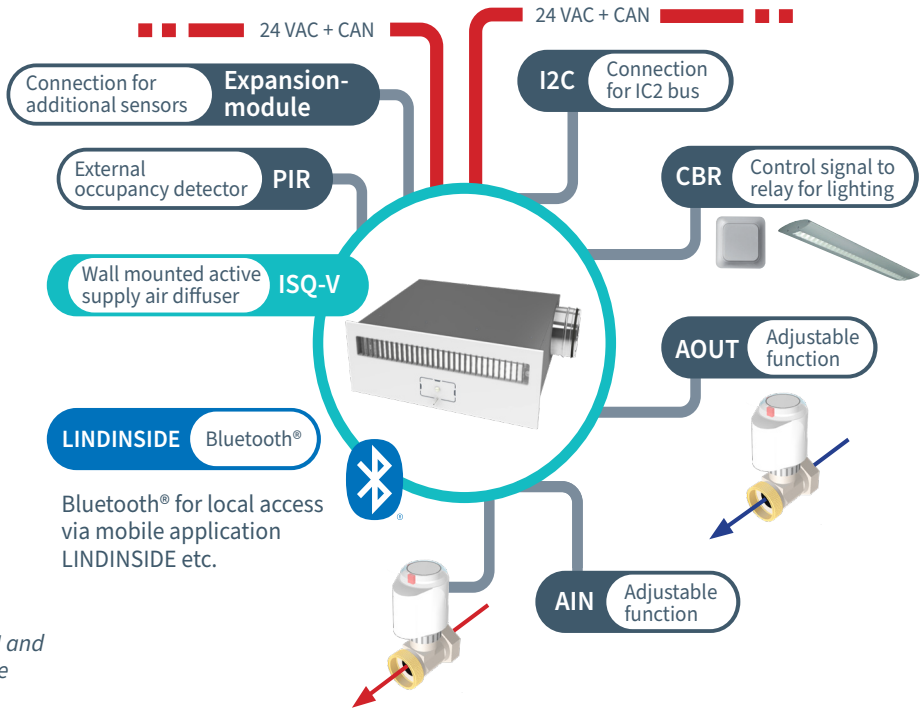
## Temperature and Air Quality Measurement
ISQ is equipped with both a room- and a duct temperature sensor.  A carbon dioxide and humidity sensor is optional. The room temperature sensor is located on the panel and points out into the room. The placement provides a more accurate and faster value than 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. Extract and supply air fan units can be controlled by the detected degree of presence.

## LINDINSIDE and 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.

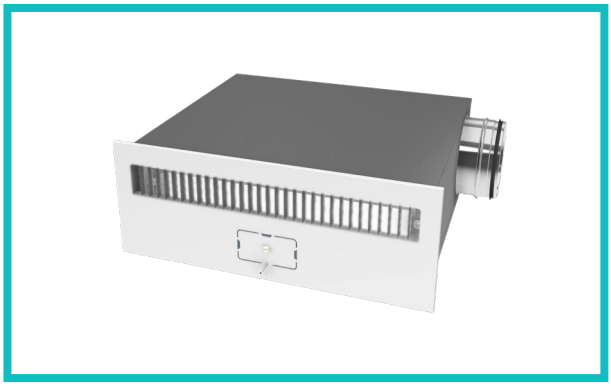
## Network Communication
Active diffusers are connected to other controllers to form a local area network (a CAN loop). All devices are addressed with a unique node ID. The CAN loop is in turn connected to Gateway NCE for communication with Lindinvent's central unit or another parent system.

# Connection Diagram

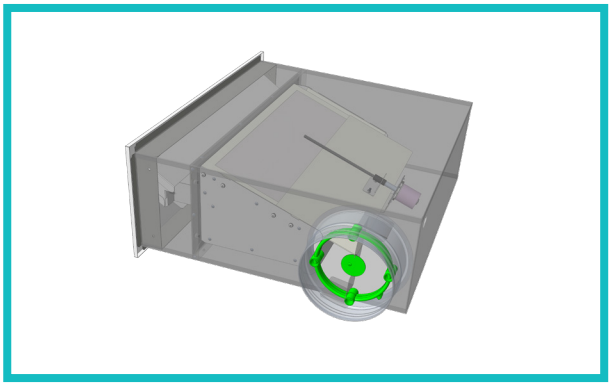



*Connection diagram for ISQ-V. CAN and power supply are connected via the supplied CBD connection box.*

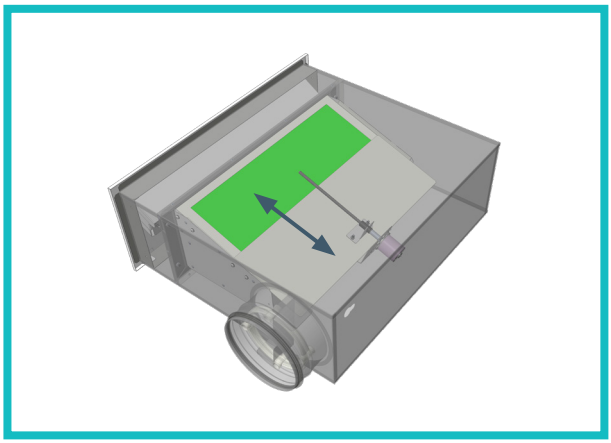
## Construction Parts



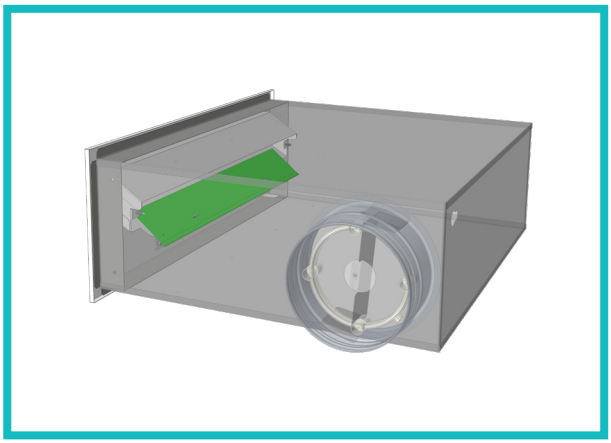
ISQ-V is a supply air device intended for horizontal placement in an upright, vertical wall.



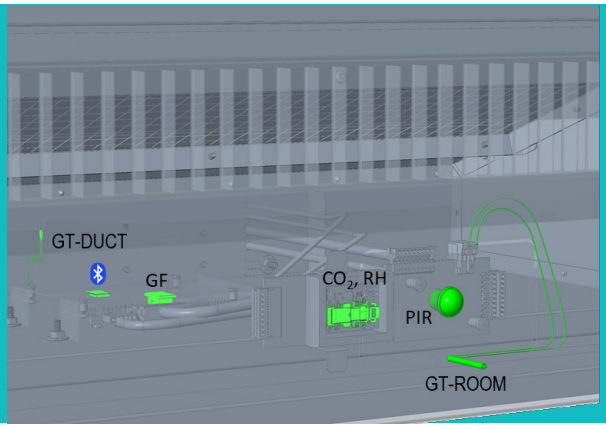
The flow meter is designed for flow measurement within a wide flow range. Its design reduces the need for a straight section in front of the device, so it can, for example, be mounted directly after a 90° bend.



A motorized airflow valve for quiet regulation even at high airflows. The valve consists of a motorized plate that allows a varying degree of airflow through a permeable fiber material.



A loosely hanging disc in the inlet to the diffuser section opens or closes in response to changes in air flow. The construction maintains a high air velocity, thereby ensuring a high air mixing capacity throughout the entire flow range.




## Behind the Front Panel

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.

## Installation in wall

### Front Panel and Plenum Box

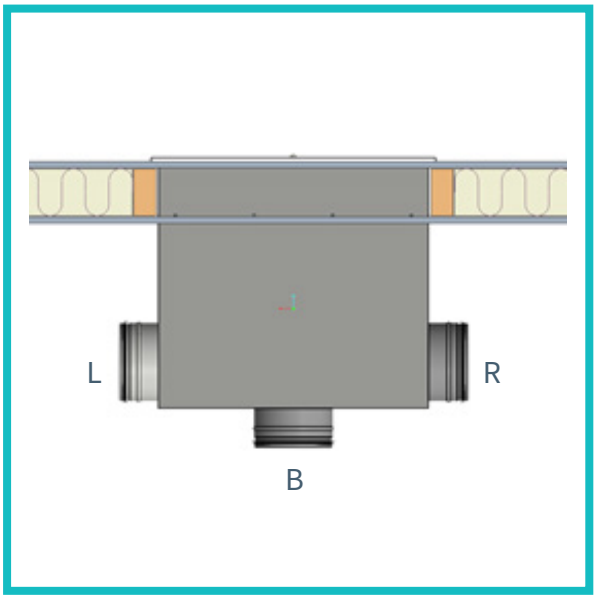
ISQ-V is delivered on a pallet where the front panel, the mounting frame, the plenum box and connection box CBD are packed separately.

### Mounting

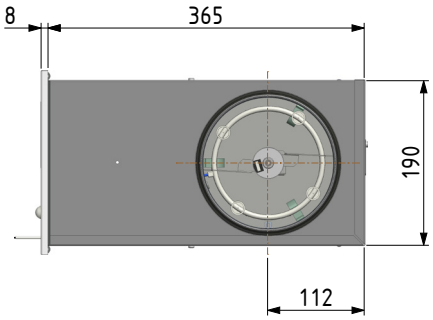
The plenum box is mounted from outside the room by a hole in the wall (560x200 mm). The mounting frame and front panel are screwed from inside the room. Before mounting the front panel, a cable is connected to the sensor board positioned on the inside of the front panel. ISQ-V can be fitted with a duct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

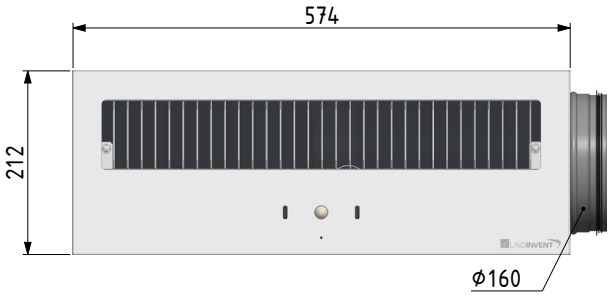
### Connection Box CBD

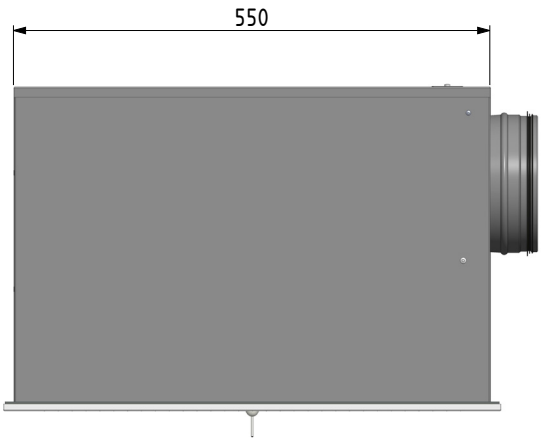
All wiring to ISQ-V is done via junction box CBD. Peripheral equipment is connected via the box but also the joint cable for power supply and communication.




## 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 disc: 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 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
Listen mode only for calls from app or similar.
Beacon functionality etc requires transmission.

## 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 - 85 l/s
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 I2C 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 |

### 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 |

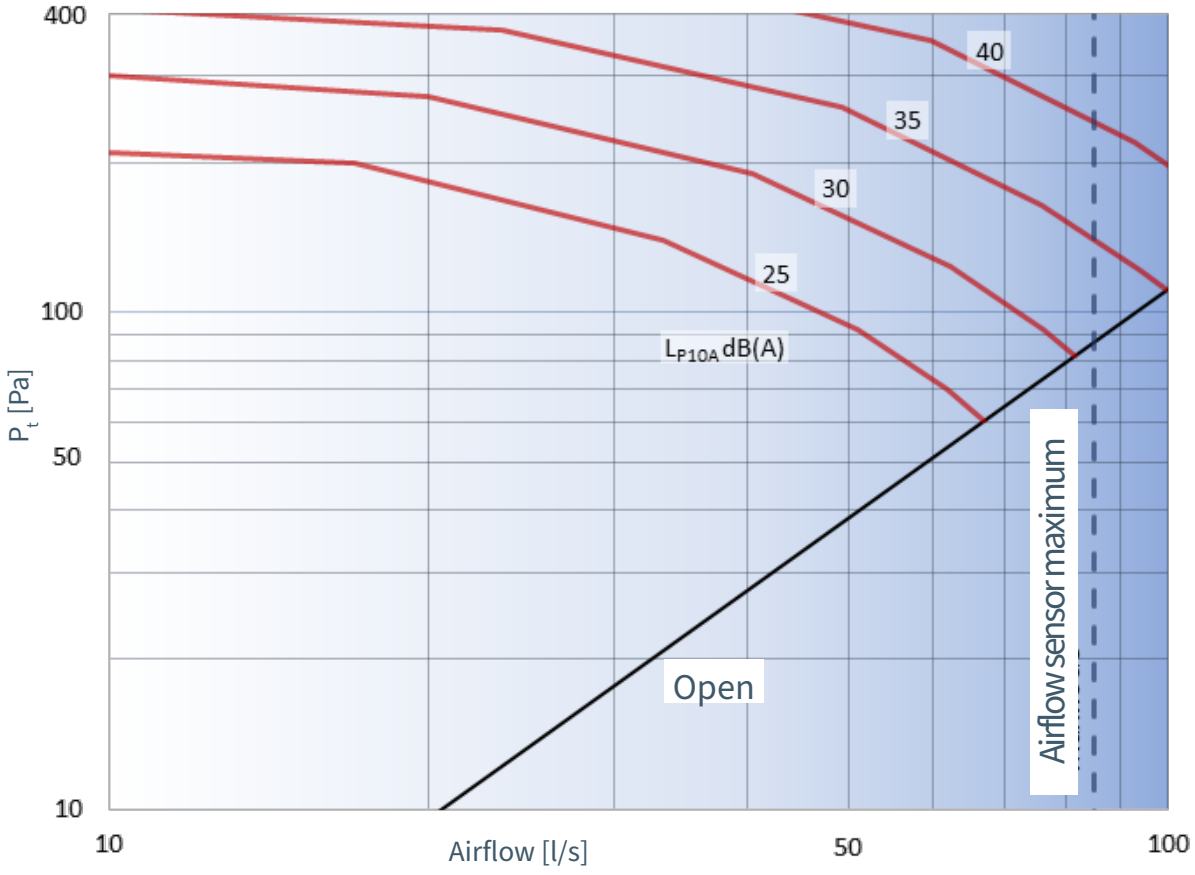
### Self Attenuation[dB]

| 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]

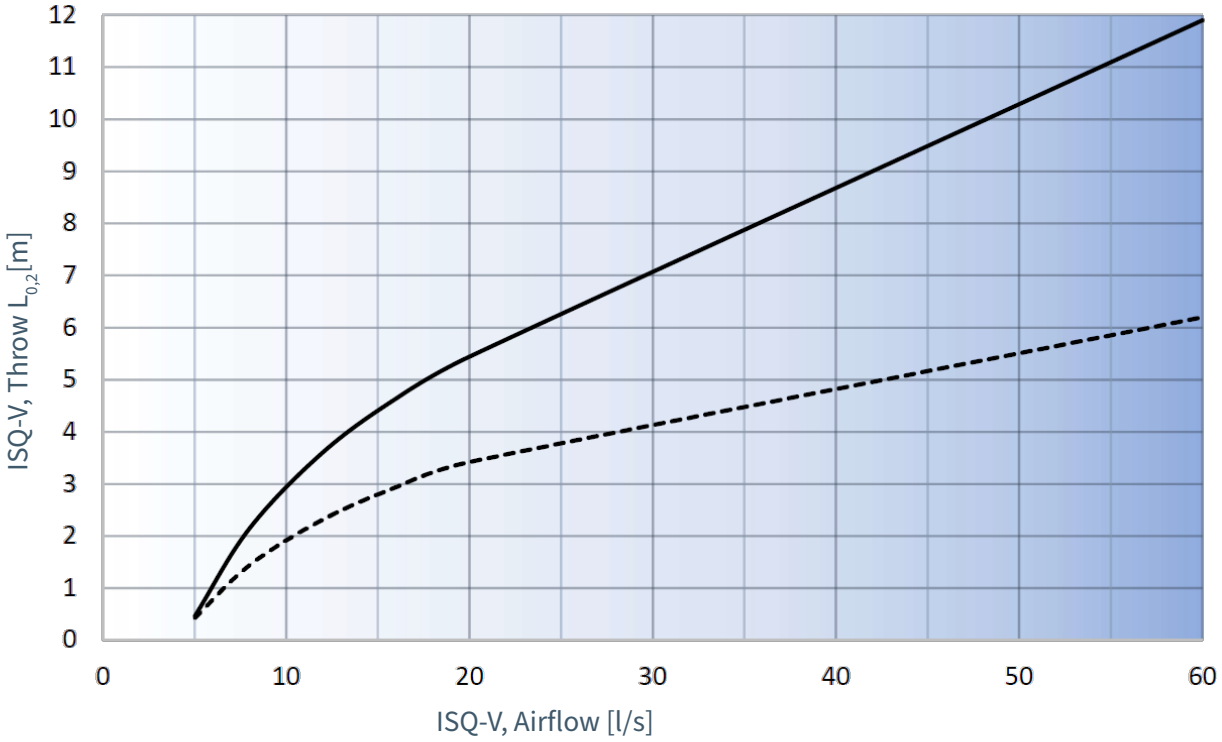
| ISQ-V ± [dB] | Octave band [Hz] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K |
| 160 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

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



# Throw Length

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

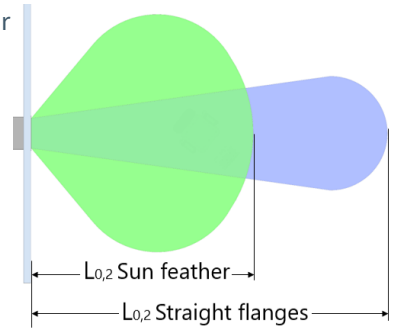



Isotermic

Straight flanges  Sunfeather

**Manually Adjustable Flanges in the Front Panel**
The air distribution pattern can be adjusted by manually adjusting how individual flanges in tne panel are angled.

- The diffuser is delivered with 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”.



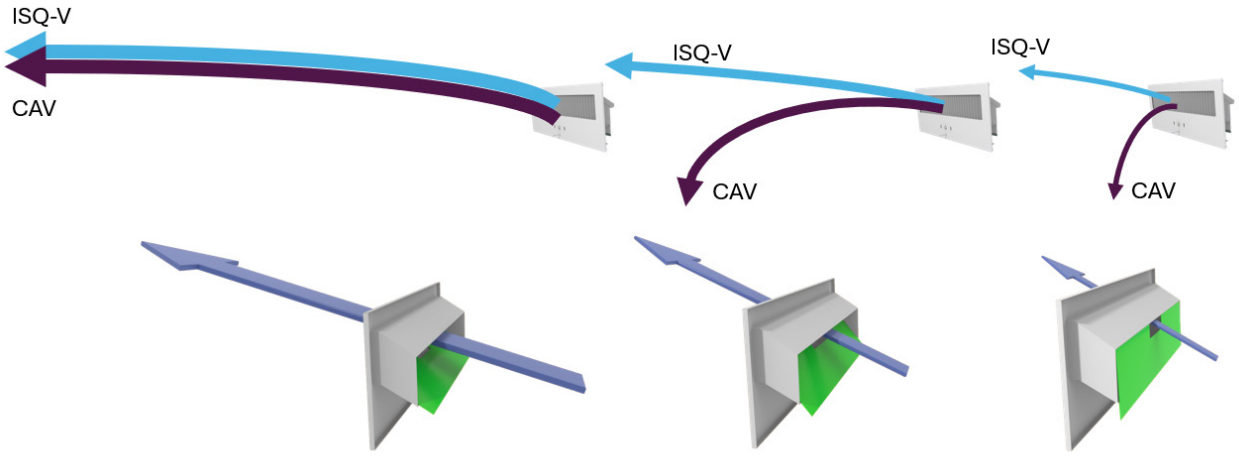




*Illustration showing how the moving disc, at the outlet of the ISQ-V, by gradually closing at lower airflow, results in a high air velocity out from the diffuser even at lower airflow. A CAV diffuser loses the Coanda effect at reduced airflows.*

# 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.

## 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.

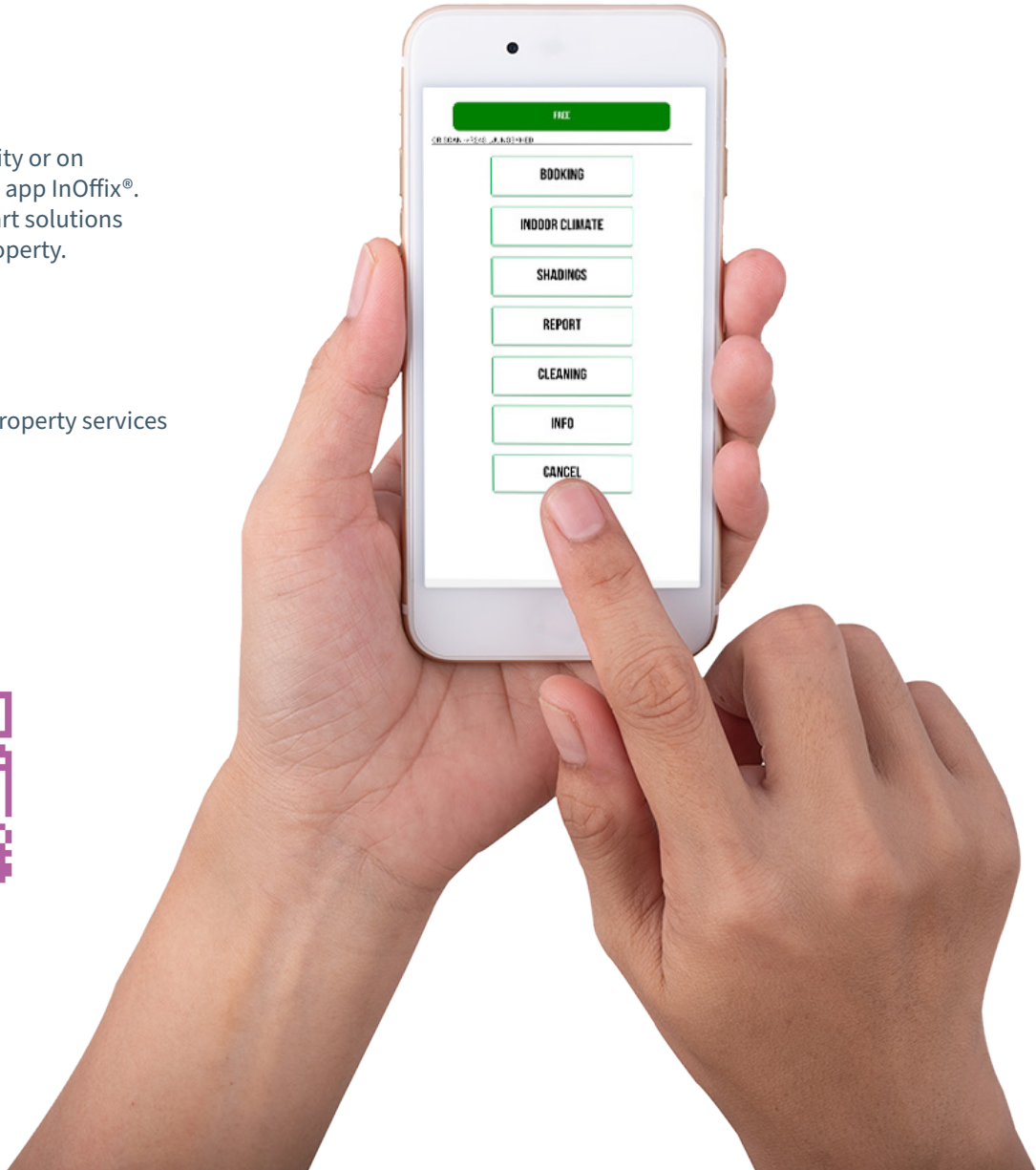
## Air Fan Cooling
Additional cooling is regulated via control box CBF-E or CBF-S.

## 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



## To Specify at Order

Active wall-mounted supply air diffuser ISQ-V, Lindinvent AB, ISQ-V-160-[Cabling]-[Connection]-[Color]
Cabling: The length in meters of the cabling to connection box CBD (1 or 5, where 1-meter is 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-V-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 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 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 | The INSQAIR® product series on flows, air patterns, CFD and type room solutions (Not updated with ISQ-V) |


LUND | GÖTEBORG | STOCKHOLM | LINKÖPING | UMEÅ