ICI-F

Active Supply Air Diffuser, Visible Mounting

Quick Facts

- Smart active supply air diffuser for demand controlled indoor climate and significantly reduced energy consumption in offices, healthcare facilities, and schools.
- Efficient installation
  - Built-in room climate regulato
  - Built-in motorized airflow valve
  - Integrated indoor climate sensors
- Excellent sound and flow performance
- Draft-free with sub-cooled supply air
- Adjustable air distribution pattern
- Communication and web interface via LINDINSPECT
- Bluetooth® for app access

ICI-F provides workplaces with a smart, energy-efficient, and quiet system for optimal, demand-based indoor climate control.

Lindinvent's series of active supply air diffusers focus on superior technical performance, maximum flexibility, and digitalisation. With innovative solutions, carefully selected materials, built-in controller with sensors and, Bluetooth® ICI-F is a quiet, smart choice for future-proofing buildings.

LINDINVENT®

Why Active Air Devices?

Lindinvent's series of supply air devices incorporates several technical solutions aimed at installation efficiency and high-performance climate control. Some of these solutions have been granted international patents.

Simplicity and Performance

Unique technical performance makes active air devices easy to plan, install, commission, and use, making them optimal for climate control.

Lowest Life Cycle Cost (LCC)

A system based on demand-controlled ventilation and sub-cooled supply air has the lowest investment and life cycle cost according to several studies.

Increased Staff Efficiency

Cooling primarily through supply air increases airflow, which in turn enhances staff efficiency by up to 8%, according to the study "*Economic, Environmental, and Health Implications of Enhanced Ventilation in Office Buildings*" published in November 2015.

Maximum Digitalization

The system is built with an architecture for stable network communication between devices, equipped with Bluetooth®. Data can be accessed via API, Modbus, HTTP, and app, making property data meaningful and enabling maximum digitalization.

Sustainable Material Choices

All air devices are constructed using recyclable materials, and packaging requirements have been minimized to reduce waste.

Environmental Product Declaration (EPD)

Environmental impact data can be retrieved from www.epdhub.com. The values for the devices in the INSQAIR series are representative of all Lindinvent active air devices. Life cycle data only differ by material weights, which are lower for upcoming Lindinvent devices.

Maximum Flexibility

Lindinvent's supply air devices can create an optimal indoor climate without the need for waterborne cooling, offering greater flexibility during renovations. The integrated sensors in the active device reduce the need for additional wiring. In many cases, walls can be built or moved without requiring the rerouting of cables. Additionally, renovation projects are simplified as active devices within a flow area can be serviced by different supply air channels.

Table of Contents

Quick Data ICI-F

- Recommended Flow Range: 5 to 125 l/s
- Sound Performance: Below 30 dB(A) up to 125 l/s at 100 Pa
- Height: 361 mm

System Overview

Occupancy and Activity Level

Factors such as working from home, sick leave, vacations, and external tasks contribute to variations in occupancy. To reduce energy consumption, the system ensures that the total airflow always adapts to the actual needs. This minimizes energy for air circulation and reduces the amount of air that needs to be heated or cooled to maintain the correct room temperature.

Free Cooling without Cold Drafts

To minimize the need for, and cost of, additional cooling, maximum cooling effect should be obtained from sub-cooled supply air. This requires air devices that provide good mixing with room air, even at low supply airflows. The risk of cold drafts prevents many systems from reducing airflow while using strongly sub-cooled supply air. With effective heat exchange, reheat coils are rarely needed. In Stockholm and further south, nearly 8,000 hours per year require no additional cooling. In Luleå, free cooling is available for about 250 hours annually.

Correct Duct Pressure and Temperature

Duct pressures/flows and temperatures should be continuously optimized to achieve the lowest possible energy consumption for the given operating environment and set points.

Simplicity and Integration

A smart climate control system should be simple to design, install, commission, and maintain. Systems for lighting control and sun shading should easily integrate with other climate control equipment.

Versatility and Performance

Climate control should be part of a comprehensive system that efficiently and sustainably delivers excellent indoor environments when and where needed. Key performance factors include.

- Wide airflow range (supply and extract)
- Low noise levels even at high airflow and duct pressure
- Draft-free environment even with strongly sub-cooled air and low airflow
- Compact design simplifying installation
- Easy integration and commissioning of accessories
- Supply air device with adjustable airflow distribution pattern
- Smart local control and optimization functions
- Overarching functions for optimization and troubleshooting
- Robust and reliable communication between devices
- Multiple intuitive user interfaces
- Commissioning and local access via app and Bluetooth®
- Environmentally friendly choices throughout

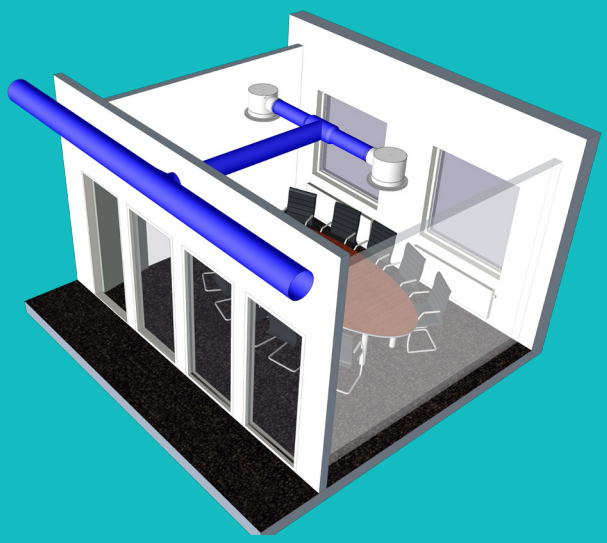
Lindinvent's INCIRQLAIR- and INSQAIR-based solutions may be among the world's most versatile and practical systems for workplace climate control. Consultants, installers, technicians, tenants, and property owners can trust these systems to meet current and future needs.

Conference Rooms with ICI-F

ICI-F enables climate control based on temperature, occupancy detection, and CO2 levels.

- 10 - 250 l/s
- Quiet Regulation
- No supply air dampers
- No wall-mounted sensors

A flexible solution with low installation costs, the occupancy detector increases ventilation to a typical flow level when people are present. The CO2 sensor can be retrofitted into one of the devices without the need for electrical installation. This sensor regulates airflow based on demand and can also estimate the number of people in the room. Integration with a room booking system allows tracking of room usage and reservations. The device's regulator can sequentially control valve actuators for heating. Using the INOFFIX app, users can book the room, adjust the temperature, and submit fault reports.



Conference Rooms with Active Air Devices

Features

Airflow Control
The airflow is regulated by a motorized valve, maintaining high air velocity even at low flow rates via a self regulating slot opening. The airflow distribution pattern from individual units can be customized, and the airflow is measured via the built-in flow sensor.

Room Climate Control
The built-in room climate regulator continuously ensures optimal room function, controlling both airflow and additional heating or cooling. In absence mode, the device operates in an economic setting, allowing for greater temperature fluctuations and utilizing stored energy from the building's structure. The unit can deliver the desired room climate independently or in coordination with multiple units.

Temperature and Air Quality Measurement
The unit is equipped with both room and duct temperature sensors. Optional CO2 and humidity sensors are available. The room temperature sensor is located at the edge of the diffuser plate, projecting into the room for more accurate and faster readings than those provided by separate wall-mounted sensors.

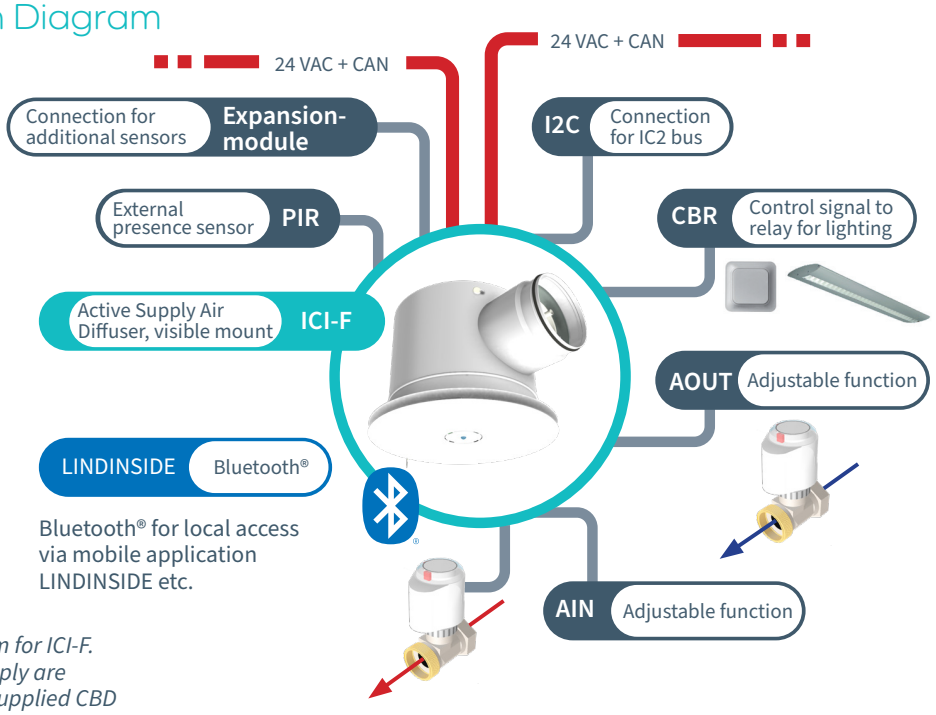
Occupancy Detection
The integrated occupancy sensor supports functions such as occupancy-based airflow, economic mode, comfort mode, and lighting control. The sensor has approximately 200 detection zones.

LINDINSIDE and Bluetooth®
The unit features Bluetooth® communication, allowing connection via the Lindinvent mobile app, LINDINSIDE. Through the app, operating values can be read and setpoints adjusted. Bluetooth® also enables communication with other external devices.

Network Communication
Active supply air diffusers are physically connected to other control units, forming a local network (CAN loop). Each device is assigned a unique node ID. The CAN loop is then connected to the NCE Gateway for communication with Lindinvent's central unit or other parent system.

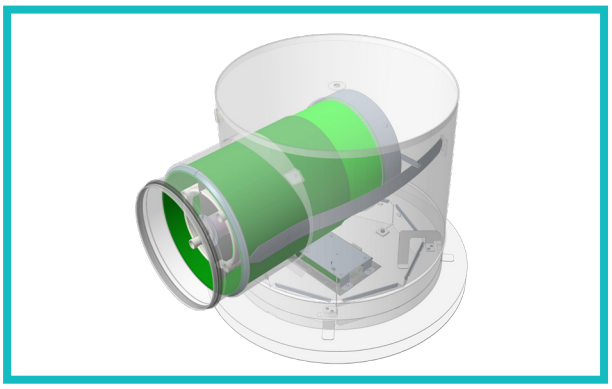
Visualization Tool LINDINSPECT®
LINDINSPECT® is a powerful web-based tool that enables a unified system environment for central administration and visualization. It displays everything from control equipment to sun protection and lighting control tools. Control units are monitored and displayed in a floor plan with climate data. Deviations are marked, and operating conditions are graphically indicated.

Connection Diagram

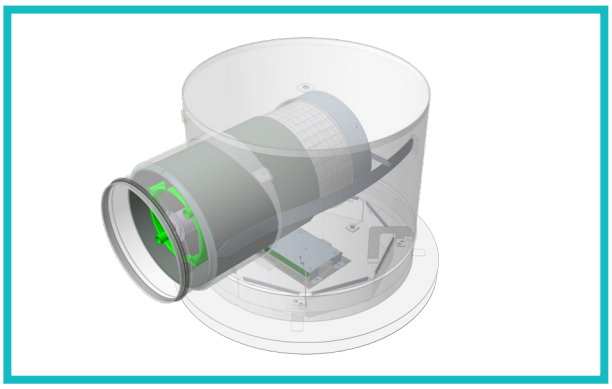


Connection diagram for ICI-F. CAN and power supply are connected via the supplied CBD connection box.

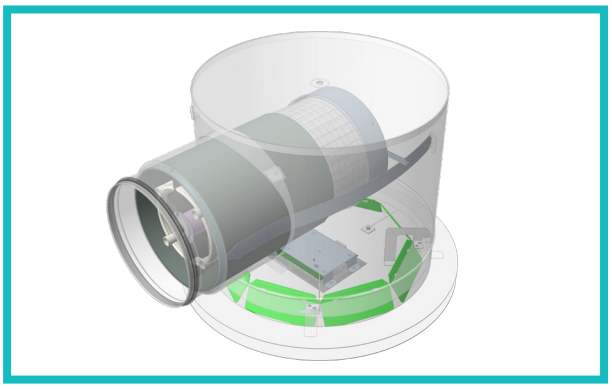
Construction



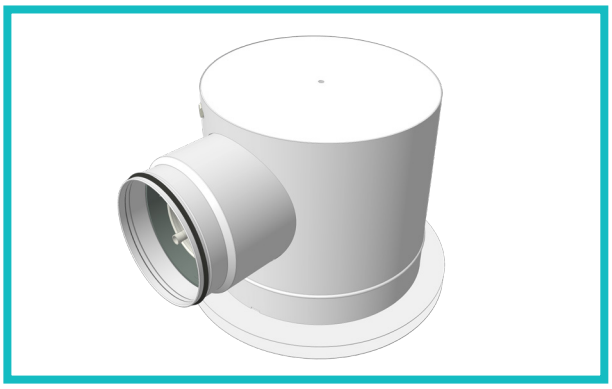
The ICI-F includes a patented motorized airflow valve made from permeable fiber material, designed for quiet regulation even at high duct pressures and airflow rates.



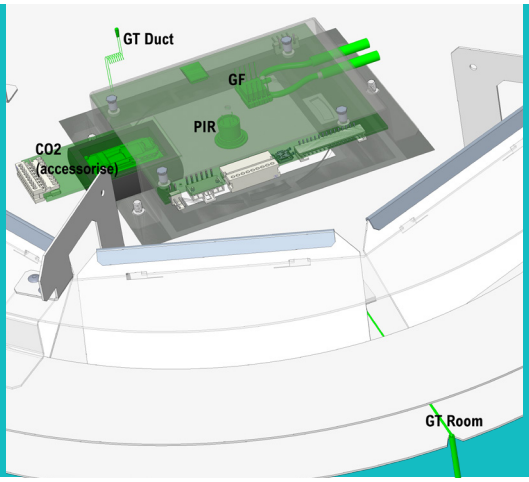
It also features a patented flow meter that handles a wide range of airflow. The flow meter's placement within the valve reduces the need for a straight section before the device, making it possible to install the unit directly after a 90° bend.



Self-regulating discs at the diffuser outlet control the airflow passage to maintain the throw length. This ensures high air velocity and mixing capacity across the entire flow range. The discs can also be adjusted to create a customizable airflow distribution pattern.



ICI-F is delivered with the diffuser part and plenum box separately. The plenum box has a motorized air flow valve, a room climate controller with connected sensors, and a connection box.



The diffuser section

- Includes a detachable diffuser plate with a holder for the room climate controller with sensors and Bluetooth®
- Includes a body part with the set of self-regulating discs and a bayonet fixture for detachable mounting in the plenum box part
- Plenum box suspension mechanism
- Openings for sensors

Technical Specifications

Materials
Diffuser: Powder-coated steel plate
Casing: Galvanized steel, C3
Airflow valve (housing), flow meter and, discs:
Thermoplastics (PS, PP)
For detailed material specifications:
Refer to Byggvarubedomningen.se
Net Weight: 8,5 kg

Dimensions
Width: Ø 500 mm
Height: 363 mm
Connection: Ø 200 mm

Diffuser Color
Standard: RAL 9003 (gloss level 30)
Custom colors available by specifying RAL number

Temperature Limits & IP Rating
Operating: 10°C to 40°C; <85% RH
Storage: -20°C to 50°C; <90% RH
IP Rating: IP 22

Cabling (16-wire)
ICI-F comes with a pre-installed cable connected to the CBD junction box. Standard length: 1 m (maximum length up to 10 m)

IP-class
IP 22

Electrical System
Power Supply: 24 VAC

Power Consumption
Standby: 2 VA
During regulation: 4 VA (approximately 200–300 h/year)

Communication
CAN Communication: Signal cable with integrated power supply wires (shielded cable FLAQQBR: 2x1 + 1x2x0.22)

Radio Communication
BLE module: Bluetooth® 2.4 GHz
Non-continuous function. Listens only to signals from apps or similar; beacon functionality requires transmission.

Certification
CE-marked, compliant with EMC and low-voltage directives. *Certificates available at lindinvent.se*

Occupancy Detection
PIR Sensor: Passive IR detector with 200 detection zones
Detection range: 107° x 107°

Room and duct temperature Measurement
Temperature Sensor, NTC type.
Temperature accuracy: ±0.5 K.

CO2 Measurement (optional expansion module)
Slot on the control unit for easy retrofit.
Measurement Range: 400 - 10,000 ppm
Accuracy: ± (30 ppm + 3%) with background calibration

Humidity Measurement (optional expansion module)
Measurement Range (at 25°C):
Relative humidity: 0 - 100% RH
Accuracy (at 25°C and 50% RH):
Relative humidity: ± 5% RH
Absolute humidity: ± 1 g/kg
Dew point: ± 1 K

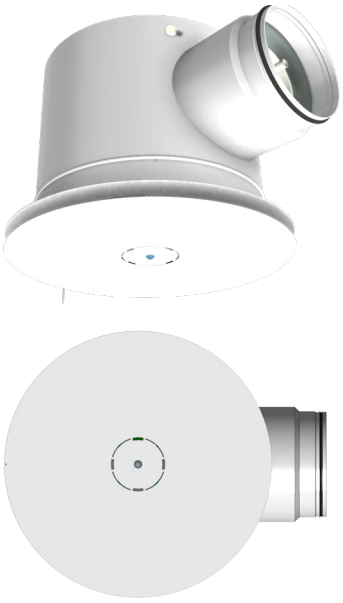
Airflow Measurement and Control
ICI-F is equipped with a flow sensor.
Flow Range: ISQ-200: 5 - 125 l/s
Noise Levels: As shown in diagram
Tolerance: ± 5% or at least ± 2 l/s
Minimum straight section before the diffuser:
- after 90° bend: 0 mm (no straight section required)
- after T-junction: 400 mm
- for dimension change in one step: minimum 200 mm
- for two or more dimension changes: minimum 400 mm

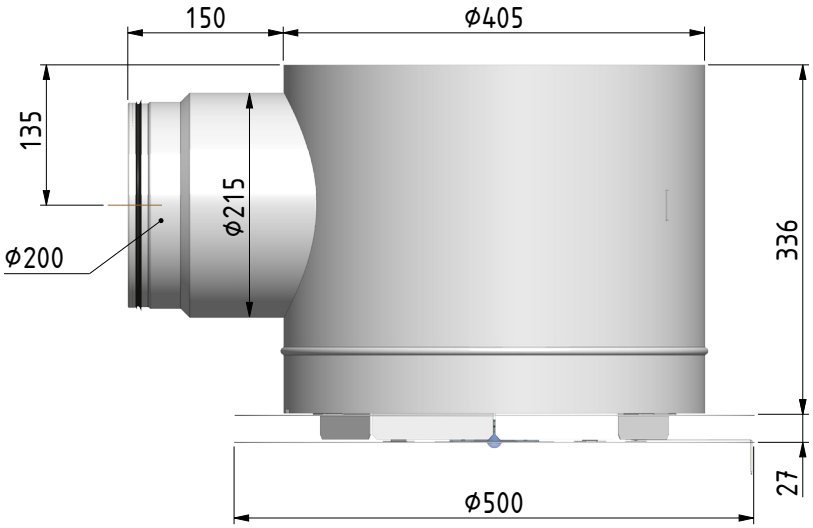
Duct Pressure Calculation
Calculated based on airflow and valve opening degree
Accuracy: ± 10 Pa (with valve opening > 20% and airflow > 10 l/s). Pressure Range: 10 - 200 Pa

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

Dimensions (mm)





Installation

Roof suspension

The top of the plenum box has a centrally located blind rivet nut for suspension via a threaded rod (M8). A U-bracket is recommended.

Mounting the diffuser part

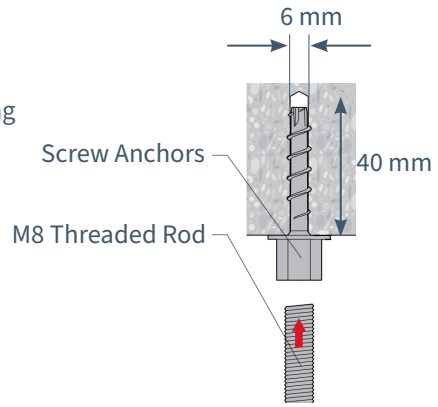
Before mounting the diffuser part, using the bayonet fitting in the plenum box part, the control unit, with pre-installed sensors, is placed in the bracket on the inside of the diffuser part detachable lid.

The dust cover remains around the diffuser and is removed during commissioning.

Connection Box CBD

The connection box, which is delivered with the plenum box, is used for connecting accessories and for connecting the diffuser to the CAN loop with voltage supply.

A complete ICI-F.



Example of fixing a threaded rod in concrete via a screw anchor (internal M8 thread).

Example with a U-bracket as a suspension device. The bracket is mounted on the top of the plenum box with a screw (M8x16).

Delivery

Two delivery units

The plenum box part and the diffuser part are packed separately on different EU pallets per project and floor, unless otherwise specified in the order.

Pressure, Flow, and Noise Levels

The sound pressure levels (LPA) in the diagram correspond to A-weighted sound levels in a reverberation field with an equivalent sound absorption area of 10 m^2. This corresponds to a 4 dB room attenuation in a normally damped room with a volume of 25 m^3.

- Sound Power Level/Octave Band, $L_w = L_{P10A} + K_0$ [dB]
- L_{P10A} = Sound pressure level [dB(A)] from the diagram
- K_0 = Correction factor/octave band [dB] from the table
- p_t = Total pressure drop
- Self-damping from table

Sound pressure and sound power measurements have been conducted according to ISO 3741 and ISO 5135. Measurements of sound attenuation have been performed in accordance with SS-EN ISO 7235:2009.

Room Damping Correction [dB]

Room Volume	Room Type	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 Factors, K_0 [dB]

ICI-F	Octave Band [Hz]							
	63	125	250	500	1K	2K	4K	8K
200	10	11	6	2	-2	-8	-13	-10

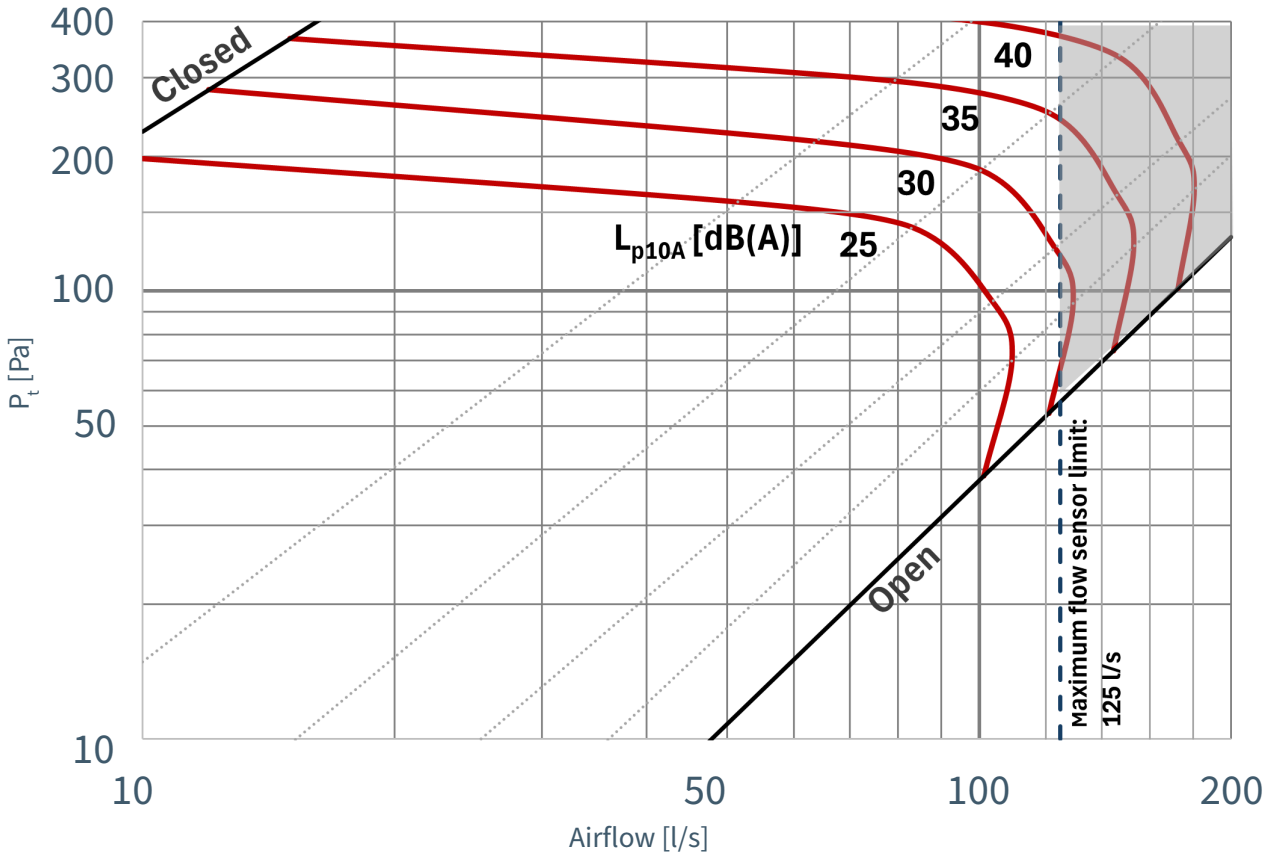
Self-Damping ICI-F [dB]

ICI-F	Octave Band [Hz]							
Opening	63	125	250	500	1K	2K	4K	8K
25%	20	13	15	17	18	19	18	12
100%	19	12	14	18	11	13	14	11

Tolerances [dB]

ICI-F ± [dB]	Octave Band [Hz]							
	63	125	250	500	1K	2K	4K	8K
200&160	3	3	2	2	2	2	2	2

Diagram ICI-F, Sound Pressure Leve L_{P10A} dB(A)



Accessories

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

CO2 and Humidity Sensors
The GQH-I expansion card or any of Lindinvent's other CO2 sensors can be easily retrofitted.

Lighting Control
The active diffuser supports lighting control via presence detection and selected lighting function. Relay box CBR enables relay control using a push button. See SBDb for DALI control.

Radiator Control
Valve actuators A40405(NC) or A41405(NO) for sequential heating and cooling regulation.

Radiator Control with Function Check
GT-S temperature sensor with a connection for valve actuators is used to control a radiator circuit.

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

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

External Occupancy Sensor
GO-C or PD-2400 occupancy sensors offer placement options for desired coverage.

Setpoint Adjuster
CAN-connected DRP wall-mounted user panel. The panel can be configured to allow users to temporarily adjust the room temperature setpoint and activate forced ventilation. See also INOFFIX® for corresponding functionality.

Supplementary Product Documentation for ICI-F

Documents are available on the product page for ICI-F at Lindinvent.com

Documents	Comment
Installation Instructions:	Note: Designed for horizontal mounting. See this description for guidance.
Commissioning Instructions	Login to ICI-F via LINDINSIDE and Quick Setup guide.
Maintenance Instructions	Considered maintenance-free.
External Connection Diagram	Shows how equipment is connected to the device. Cobined with the wiring diagram for the CBD.
Environmental Product Declaration	Assessed by Byggvarubedömningen in Sweden. EPD registered for similar active devices in June 2022.
User Information	Overview of Lindinvent's smart ventilation system.
Modbus List	Common for ICI-F, ISQ-V, ISQ-F, ISQ-160, and ISQ-200.
AMA Text	Descriptive text according to AMA standards.

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