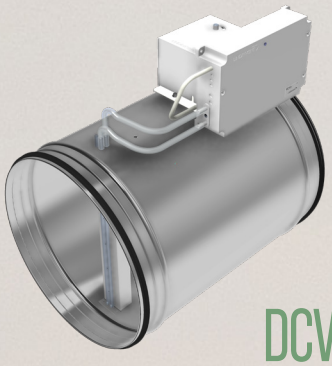


DCV-RCb
DUCT Mounted
Room Climate Control Unit

Quick Facts

- A smart duct-mounted controller for on-demand control of room climate in larger premises
- Adapts the supply air and activates additional heating or cooling according to setpoints, operating mode, and measured climate data
- Used together with reactive diffusers which, like Lindinvent's active diffusers, can work with both low and sub-temperature air flows without the risk of cold drafts
- Can activate lighting
- Is connected to a CAN loop for collaboration and communication
- Bluetooth® for easy local access via the app LINDINSIDE
- DCV-RCb Circular is pre-assembled for easy and quick mounting

Demand-controlled ventilation limits energy use and creates an optimal indoor climate where it is needed. DCV-RCb in conjunction with reactive supply air diffusers provides a uniquely quiet and draft-free climate control at both high and low airflows. Climate control with DCV-RCb is suitable for larger premises and spaces where the need for future changes to the room structure is assumed to be limited. For spaces where the need for change is assumed to be higher, a room solution with active diffusers may be more suitable.

LINDINVENT®

Why DCV-RCb?

Simplicity and Performance

DCV-RCb, in conjunction with reactive diffusers from Lindinvent's product series INSQAIR® (INnovative Smart Quiet AIR) delivers comfort and efficient operation as a result of a unique technical performance. Solutions are developed for simplicity at all levels. Easy planning, easy installation, and easy commissioning. A simple user interface provides accessibility and overview.

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 Staff Efficiency

Primarily cooling via the supply air results in increased air volumes. With increased air volumes, staff efficiency increases by up to 8% according to the study *"Economic, Environmental and Health Implications of Enhanced Ventilation in Office Buildings"* published in 2015.

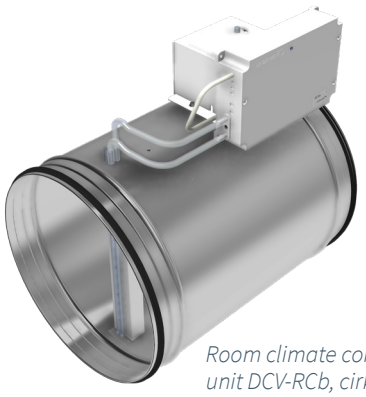
Maximum Digitization

The starting point is an architecture for stable network communication between control units that also are equipped with Bluetooth®. Measurement data is accessed via API, Modbus, HTTP, and app. The platform makes indoor climate data meaningful and creates room for maximum digitization.

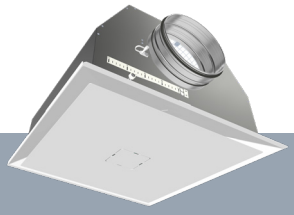
The Need for Flexibility

With Lindinvent's supply air device, you can often achieve an attractive indoor climate without having to install waterborne cooling. This leads to increased flexibility when remodeling is needed.

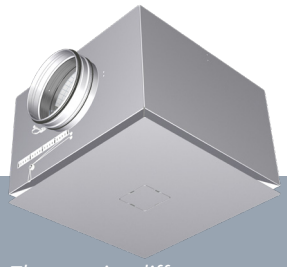
Lindinvent offers supply air solutions for cooling via either reactive or active diffusers. A system solution with reactive diffusers and DCV-RCb offers less flexibility as both channels and cabling to sensors may need to be rerouted. With active diffusers, walls can often be erected or moved without the need to move ducts and cabling.



Room climate control unit DCV-RCb, cirkular.



The reactive supply air diffuser ISQ-M for concealed mounting.



The reactive diffuser ISQ-FM for freehanging mounting.

Content

Included Products (For Circular or Rectangular Design)

- Room climate controller RCXb
- Circular damper with measuring flange SPMF
- Rectangular damper JSPM
- Rectangular measuring flange SMRD
- Damper actuator DBA

Typical Accessories

- Occupancy detector PD-2400
- Room temperature and carbon dioxide sensor GTQ-D/-V
- Room temperature sensor GT-D/-V

System Requirements

Presence and Level of Activity

Home office, sick leave, holidays, or external assignments are all reasons that contribute to variations in the degree of presence. To limit energy use, a function must ensure that the total air flow is always adapted to the actual need. This minimizes the energy required to drive the air and reduces the amount of air that needs to be heated or cooled to maintain the correct room temperature.

Free Cooling Without Cold Draft

To minimize the need for, and thus the cost of, added cooling, the highest possible cooling effect should be obtained from under-tempered supply air. This requires a diffuser that provides good mixing with room air even at low supply air flows. The risk of cold draft prevents many systems from being able to reduce air flows and at the same time work with strongly under-tempered supply air. With good heat exchange, a heating battery is rarely needed. From Stockholm and southwards, it is almost 8000 h/year when no added cooling is needed. In Lulea, there are only about 250 h/year when outdoor air for free cooling is not available.

The Right Duct Pressures and Temperatures

Duct pressure, 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 solar shading 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 air 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
- Diffusers with an adjustable air distribution pattern
- Compact design that simplifies installation work
- Easy integration and deployment of accessories
- 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.

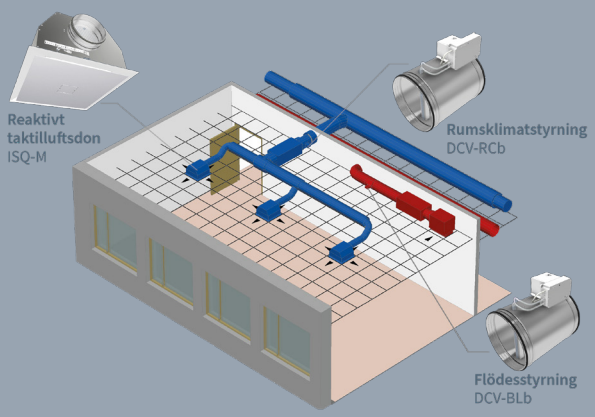
A Classroom with ISQ-M or ISQ-FM

Room climate control based on room temperature, presence detection and carbon dioxide content.

- DCV-RCb is equipped with an external occupancy detector and a combined sensor for room temperature and carbon dioxide
- 15 - 375 l/s (three ISQ-M or ISQ-FM diffusers)
- Quiet regulation
- DCV-BLb for extract air balancing

Head count via the carbon dioxide sensor

The carbon dioxide sensor is used for air quality control but also for monitoring the degree of presence. The number of people present is calculated based on the measured level of carbon dioxide.



A classroom equipped with ISQ-M diffusers and supply air regulation via DCV-RCb. The room is equipped with its own extract air balancing via DCV-BLb.

Function

Area of Use
DCV-RCb is part of Lindinvent's series of smart dampers and intended for on-demand control of room climate in conjunction with reactive diffusers.

Airflow Control
The supply of air is measured and demand-controlled via the damper and the flow meter in DCV-RCb. The airflow is distributed evenly over several reactive diffusers. A reactive diffuser lacks electronics but is, like an active diffuser from Lindinvent, equipped with lamellas for a self-acting variable gap-opening. The construction results in a maintained air velocity and thus good mixing of air even at low airflow. The air distribution pattern from individual diffusers can easily be adjusted.

Room Climate Control
The included room climate controller controls the room for optimal function. This applies to air volumes as well as supplemental heating or cooling. When the room is not in use, the control works towards an economy mode that allows greater temperature fluctuations and the use of stored energy in the main building structure.

Climate Data
All necessary sensors for on-demand control of indoor climate can be connected directly to DCV-RCb. A duct temperature sensor intended for continuous measurement of the supply air temperature is included in the control unit, while other sensors or detectors are optional.

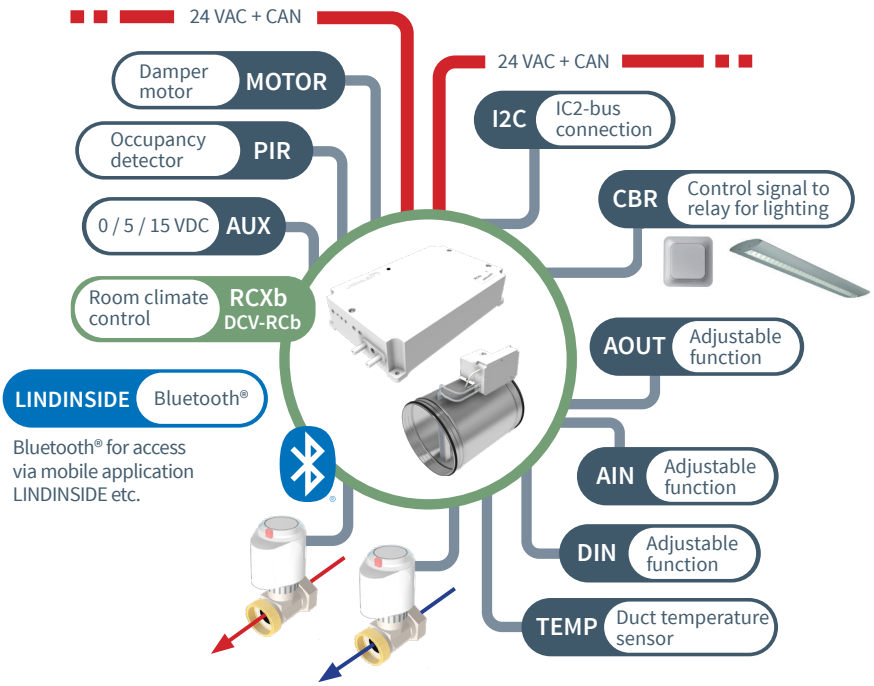
Presence Detection
Functions such as the activation of airflow level, economy- and comfort mode, and lighting control are made possible with the help of presence detectors. Presence detection can be used for the control of air handling units.

Bluetooth®
DCV-RCb is equipped with Bluetooth® for communication via the mobile application LINDINSIDE. Operating values can be read and setpoints changed via the app.

Network Communication
DCV-RCb is physically connected to a local network (CAN-loop) of cooperating controllers. All controllers are addressed with a unique node ID. The CAN-loop is in turn connected to Gateway NCE for communication with Lindinvent's central unit or another parent system.

Connection diagram

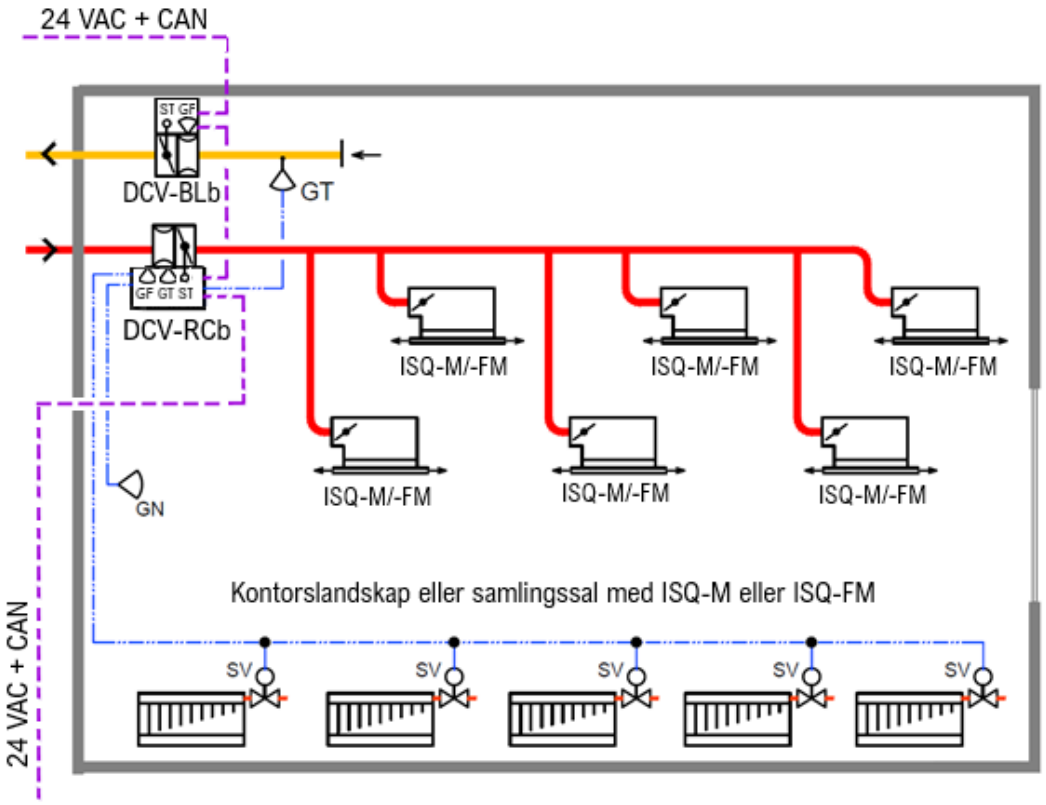
CAN and 24 VAC are connected to RCXb, included as part of control unit DCV-RCb, using a shielded 4-wire cable. Two conductors are used for CAN and two for voltage supply. The same type of cable is used for accessories.



Operation Card

Duct-mounted Climate Control with Reactive Supply Air Diffusers

- The supply airflow and duct temperature are measured using the internal sensors in RCXb.
- An external detector for occupancy (GN) and a room temperature sensor (GT) are connected.
- When presence is detected, the supply air is increased from its minimum flow to the presence flow.
- When the room temperature rises, the airflow is increased to cool away heat loads.
- When the room temperature drops, the airflow is reduced to presence flow or minimum flow.
- Room temperature has a higher priority than presence.
- When the room temperature drops, the radiator valve actuators (SV) are opened.
- Airflow control unit DCV-BLb continuously balances the supply air considering any offset.
- The room climate can be controlled to an economy mode where the room is neither heated nor cooled within specified limits.
- Reading of actual values and changing setpoints is done via CAN and a superior system or via the LINDINSIDE® app and a mobile phone.
- The manually operated airflow valve in each diffuser (ISQ-M or ISQ-FM) is fixed to the position where the total variable airflow is distributed evenly over all of the diffusers.



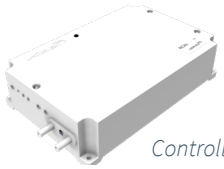
Material Specification:

ISQ-M/-FM	Reactive supply air diffuser ISQ-M or ISQ-FM
DCV-RCb	Damper + measuring flange with room climate controller RCXb and damper actuator DBA
DCV-BLb	Damper + measuring flange with airflow controller FBLb and damper actuator DBA
SV	Valve actuator 24VAC ON/OFF
GT	Duct-mounted room temperature sensor GT-D
GN	Occopancy detector GO-C or PD-2400

Construction Parts with Specifications

The products below are included in DCV-RCb. The damper and measuring flange are either for a circular or a rectangular design. See the product description for more complete technical specifications. DCV-RCb in circular design is available in the MagiCad database. DCV-RCb rectangular is drawn as damper JSPM and measuring flange SMRD.

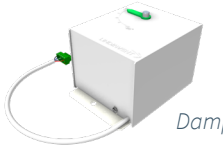
DCV-RCb Circular (Delivered with Parts Assembled and Connected)



Controller RCXb.

Room Climate Controller - RCXb

- Integrated digital airflow sensor
- Integrated duct temperature sensor
- CAN connection
- Inputs and outputs for equipment/ functions
- IP-class: IP53
- Operating temperature limits: 0°C to 40°C; <85% RH
- Temperature limit storage: -20°C to 50°C; <90% RH
- Weight: 0.4 kg



Damper actuator DBA.

Damper Actuator - DBA

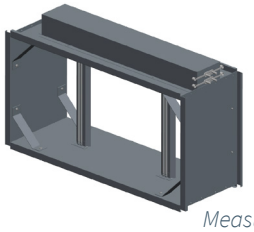
- Microprocessor controlled BLDC motor
- Indicator pin to show opening angle.
- IP-class: IP42 (mounted on the actuator holder)
- Operating temperature limits: 0°C to 40°C; <85% RH
- Temperature limit storage: -20°C to 50°C; <90% RH
- Weight: 0.9 kg

Damper SPMF.

Circular Damper with Measuring Flange - SPMF

- Measuring flange with double measurment points
- Full damper blade
- Actuator shelf adapted for Lindinvent's damper actuator
- Tightness class 3 according to VVS AMA
- Pressure class A according to VVS AMA
- Weight: After damper size (1 to 10 kg)

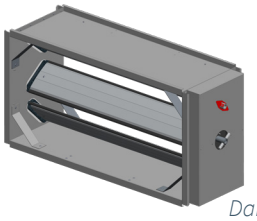
DCV-RCb Rectangular (Parts Delivered Separately for Assembly On-site)



Measuring Flange SMRD.

Rectangular Measuring Flange - SMRD

- Included in DCV-RCb Rectangular
- Measuring flange with double measurment points
- Case and measuring flanges of galvanized sheet steel (C3)
- Measuring tubes of aluminum (C4)
- Weight: After damper size (2 to 20 kg)



Damper JSPM.

Rectangular Damper - JSPM

- Included in DCV-RCb Rectangular
- Opposed blade shutter damper
- Actuator shelf adapted for Lindinvent's damper actuator
- Case and of galvanized sheet steel (C3)
- Damper blades of aluminium (C4)
- Tightness class 2 according to VVS AMA
- Pressure class A according to VVS AMA
- Available to order with circular connection
- Weight: After damper size (3 to 40 kg)

Airflow Ranges and Measurement

Circular & Rectangular

Measurement range: 0.5 – 6.0 m/s
Maximum rangel: 0.2 – 7.0 m/s
Accuracy: ± 5 % or at least ± x l/s (where x = The channel area in dm^2)
Airflow calculation (q): $q = k * \sqrt{\Delta p}$ [l/s]

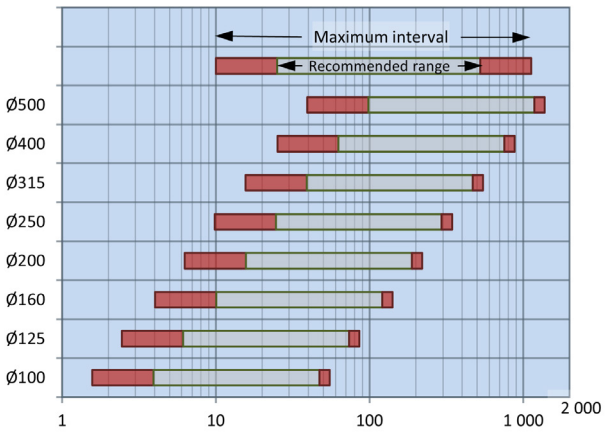
k-factor Rectangular

Calculate k as follows:
k = 749 * A where A = Width(W) * Height(H) where measures W and H in meters
An example: SMRD 500x200 = 749 * 0,5 * 0,2 = 74,9

k-factor Circular

The k-factor can be read from the damper or from the table in the product description for SPMF.

Quick Guide to Flow Ranges for DCV-RCb Circular



Additional Examples of Accessories

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

Sensor for Air Quality
See Lindinvent's series of duct, wall or ceiling mounted sensors for room temperature and carbon dioxide.

Lighting Control Box
Lighting can be controlled via occupancy detector or manually via push button by connecting lighting box CBR. See controller SBDb for lighting control via DALI.

Electric Radiator Control Box
Heating batteries or electric radiators can be controlled. See the I/O-product CBT.

Air Fan Cooling Control Box
Control additional cooling via control boxes CBF-E or CBF-S.

External Occupancy Detector
For an occupancy detector see PD-2400 or GO-C.

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.

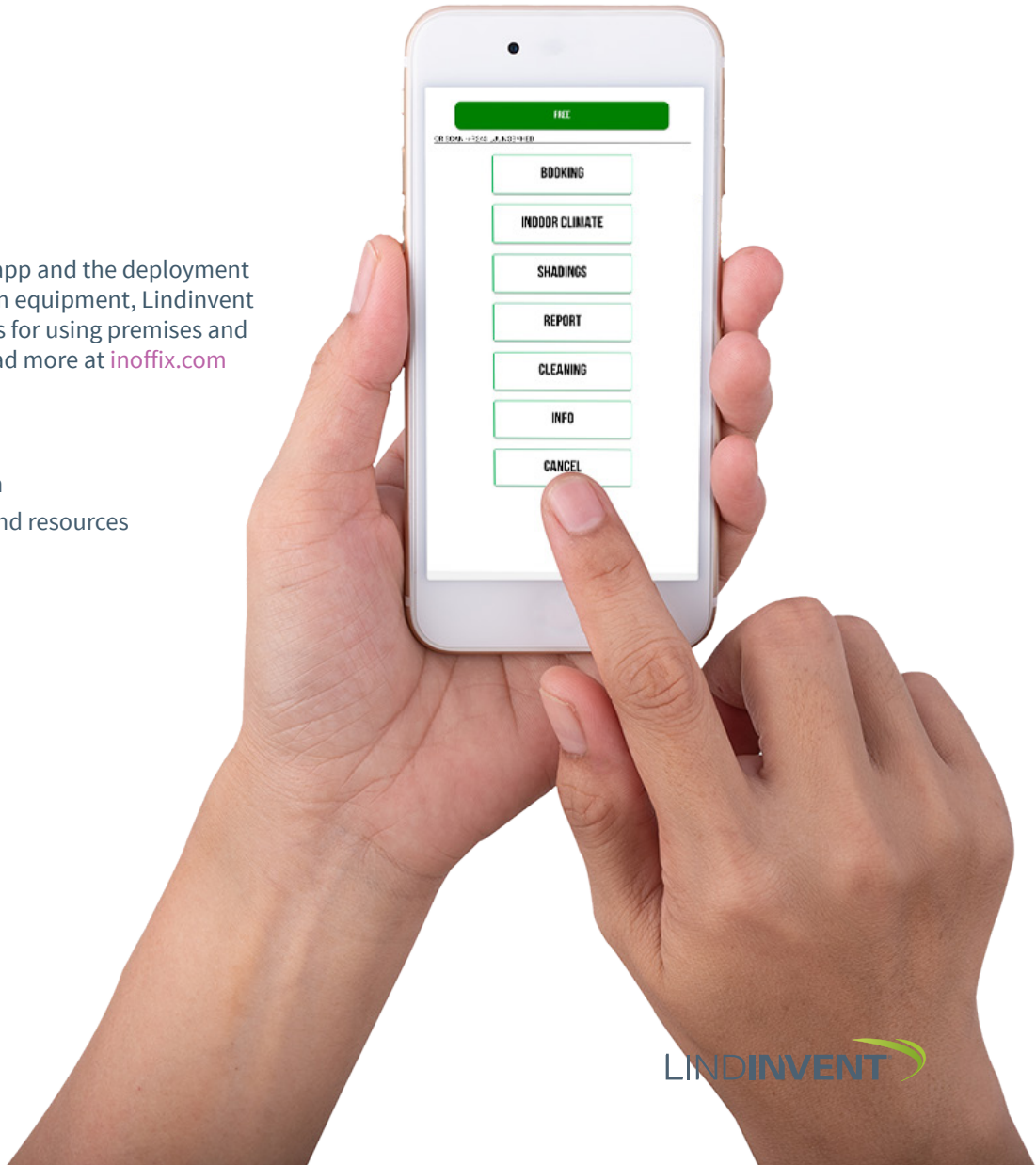
Smart Electrical Outlets with Power Measurement
Via the occupancy detector and Bluetooth®, the Smartplug SPB can reduce the tenant's electricity usage by on-demand control of workplace lighting, screens, and electric desk lifts, etc. The Product is not yet released.

INOFFIX®

With support from the InOffix® app and the deployment of QR codes in the building or on equipment, Lindinvent offers a range of smart solutions for using premises and equipment more efficiently. Read more at inoffix.com

Functions:

- Temperature adjustments
- Adjustment of sun protection
- Booking conference rooms and resources
- Request cleaning
- Deviation reporting
- Forms
- Check in/out
- Room information



Communication

Visualization Tool LINDINSPECT®

LINDINSPECT® is a powerful web-based tool that enables central and coordinated administration and visualization of everything from control units to complementary systems for comfort and sustainable energy use in buildings. Complementary systems are Lindinvent's products for DALI lighting and Sunscreen control.

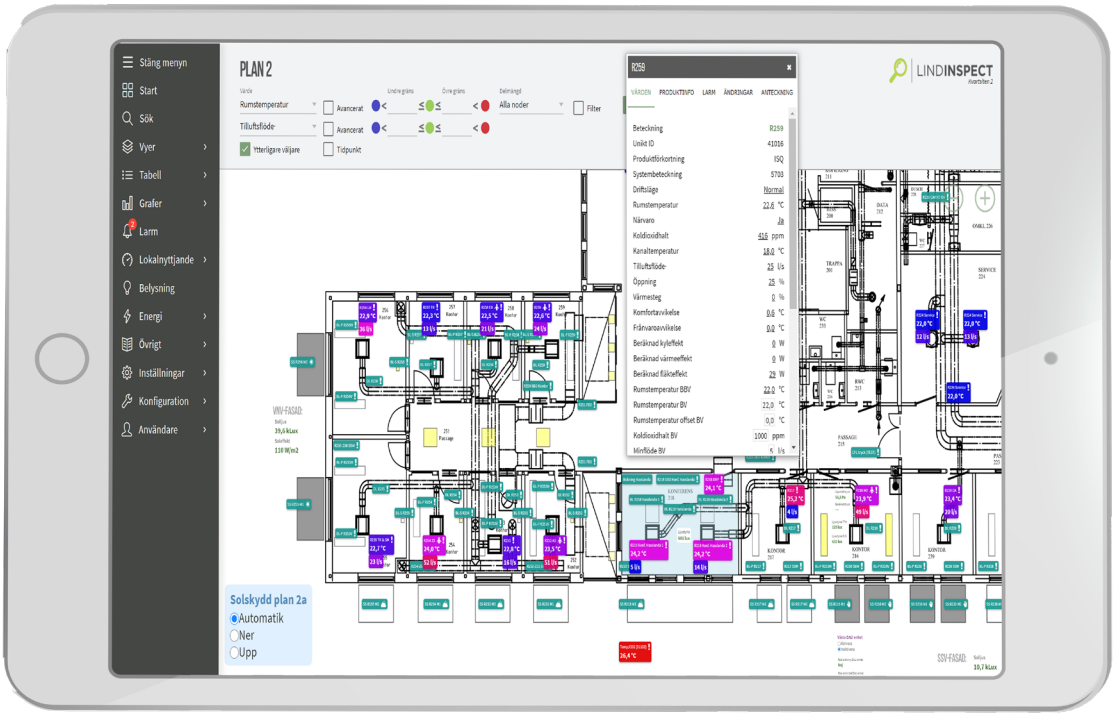
LINDINSPECT® requires a system structure where Lindinvent's central unit is connected to all individual control units through the Gateway NCE.

API

Lindinvent's REST-based API is called form LINDINSPECT®. This way data can be accessed by third-party applications. Lindinvent uses this API for their app INOFFIX®.

Modbus TCP or Modbus RTU

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



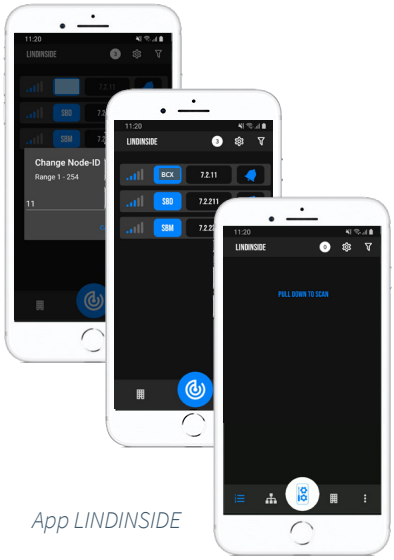
Plan view in LINDINSPECT®.

LINDINSIDE User Interface

Easily connect directly to individuals controllers via Bluetooth® and Lindinvent's mobile application LINDINSIDE. With the app, authorized personnel can identify the device to make settings or read values. Data is stored in the cloud for easy access.

Bluetooth®

Creates additional communication possibilities.



App LINDINSIDE

Order Format DCV-RCb

Circular Ø100-500 mm

Room climate control unit, Lindinvent AB,
DCV-RCb-[Damper size][Material]-[Colour]

Damper size: 100, 125, 160, 200, 250, 315, 400, 500
Material: galvanised sheet steel(C3), stainless acid-resistant sheet steel(C5), epoxy-coated sheet steel (E), powder-coated sheet steel(P)
Omitted material specification: Galvanised(C3)
Colour: RAL9003 (with gloss 30, corrosivity class C4 as standard). Other colours and gloss levels can be ordered. The colour entry is omitted for C3 and C5

Exampel:

- DCV-RCb-250C3:
  A circular DCV-RCb, galvanized, supplied with controller RCXb and damper actuator DBA mounted on damper SPMF-250 with sensor hoses connected and the duct temperature gauge fitted
- DCV-RCb-250P-RAL9003:
  A circular DCV-RCb supplied as above but where the damper is powder coated with color RAL9003

Circular duct connection Ø630 mm

Room climate control unit, Lindinvent AB,
DCV-RCb-630(700x700)[Material] or
DCV-RCb-630(800x800)[Material]

Size: 700x700 or 800x800 available
Material: Galvaniserad (C3)

Exampel: DCV-RCb-630(700x700)C3
DCV-RCb-630 is delivered as a construction kit. The rectangular damper JSPM 700x700 with circular connection 630, a circular measuring flange with diameter 630 mm, controller RCXb and damper actuator DBA are supplied separately to be installed on site.

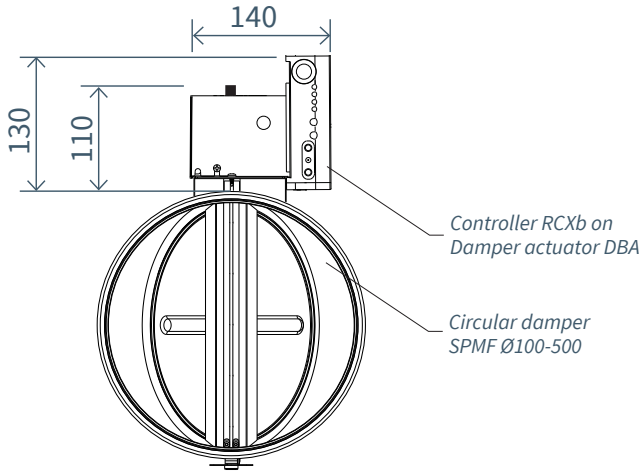
Rektangular

Room climate control unit, Lindinvent AB,
DCV-RCb-[WxH][Material]

Standard damper sizes WxH: from 200x200 to 1600x1000 mm
Width(W): from 200 to 1000 mm in intervals of 100, then in intervals of 200 mm
Hight(H): from 200 till 800 mm in intervals of 100, then in intervals of 200 mm
Contact Lindinvent if you need non-standard dimensions.
Material = Galvanised(C3)

Exampel: DCV-RCb-600x300C3
Rectangular DCV-RCb is delivered as a construction kit where damper JSPM, measuring flange SMRD, controller RCXb and damper actuator DBA are delivered separately to be installed on site.

Dimensions (mm)



Dimensions of a mounted circular DCV-RCb.

Complementary Documentation DCV-RCb

Document can be viewed on the product page at www.lindinvent.com

Document	Comments
Installation instructions	Combined installation instructions for DCV-RCb and room climate controller RCXb (mounting + connection).
Operation instructions	Short presentation of LINDINSIDE and control variables.
Maintenance instructions	Considered maintenance free. For cleaning and control measurement of the flange, see the maintenance instructions for SPMF.
External connection diagram	Shows how conductors from equipment are connected to RCXb.
Environmental product declaration	For assessment at Byggvarubedömningen in Sweden.
Modbus list	Last entry in the modbus list for RCXb.
AMA-text	Available.